RESISTIVE COMPONENTS RC2

BOURNS

TRIMMING POTENTIOMETERS / RESISTOR NETWORKS / SENSORS / CONTROLS

BOURNS

Resistive Components

Bourns, Inc. leads the industry in quality resistive components. The breadth and scope of the Bourns resistive component product line is the direct result of the emphasis placed on innovative product design. A staff of skilled engineers develops and designs products to satisfy the technical requirements of our diversified customers in a wide variety of markets and applications.

Bourns' dedication to quality is world renowned. Our quality assurance organization is involved in the entire manufacturing operation.

Bourns also has the capability to develop and undertake special inspection programs to meet specific testing requirements.

In every aspect, from innovation to component delivery, Bourns is the first choice for resistive components. Remember—There's Still No Equivalent.

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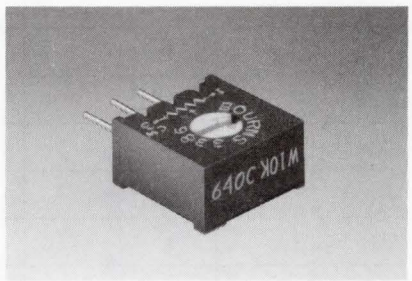


TRIMMING POTENTIOMETERS

BOURNS

PRODUCT SELECTION GUIDE
Commercial Sealed Trimmers

Model Number	Element Technology		Number of Turns		Size						Packaging Options	Adjust	Page
	Cermet	WW	Single	Multi	1/4"	5/16"	3/8"	1/2"	3/4"	1-1/4"	See Note1	See Note 2	No.
3323	•		•		•						T,B	T,S	30
3362	•		•		•						T,R	T,S	36
3329	•		•		•						T,B,R	T,S	31
3386	•		•				•				T,B,R	T,S	38
3262	•			•	•						T	T,S	17
3266	•			•	•						T	T,S	18
3339	•			•		•					T,R	T,S	32
3292	•			•			•				T,B	T,S	20
3296	•			•			•				T,R	T,S	21
3296-OT1	•			•			•				T	T,S	22
3299	•			•			•				T,B	T,S	23
3252	•			•				•			T,B	T,S	15
3082	•			•				•			T	S	12
3006	•			•					•		T,B	S	8
3009	•			•					•		T,B	S	9
3099	•			•					•		T	S	13
20	•			•					20MM		T	S	6
3059	•			•						•	T,B	S	11
3345		•	•					•			B	S,T	33
3260		•		•	•						T	S,T	16
3290		•		•			•				T,B	S,T	19
3250		•		•				•			T,B	S,T	14
3005		•		•					•		T	S	7
3057		•		•						•	T,B	S	10

NOTE 1: Standard packaging; some options may require alternate packaging. Consult factory.
T = Tube, B = Bulk, R = Tape and Reel, E = Embossed Tape
NOTE 2: T = Top Adjustment, S = Side Adjustment

BOURNS

PRODUCT SELECTION GUIDE
Commercial Open-Frame Trimmers

Model Number	Element Technology		Number of Turns		Mounting Type		Size				Packaging Options	Adjust	Page No.
	Cermet	Carbon	Single	Multi	SMT	Leaded	4mm	6mm	9mm	3/8"	See Note1	See Note 2	
3304	•		•		•		•				E,G	T	178
3306	•		•			•		•			B	T,S	24
3309	•		•			•			•		B	T,S	26
3352	•		•			•				•	B	T,S	34
3359/VA05*	•		•			•				•	T,B	T,S	35
3316		•	•			•		•			B	T,S	27
3319		•	•			•			•		B	T,S	29

*Europe

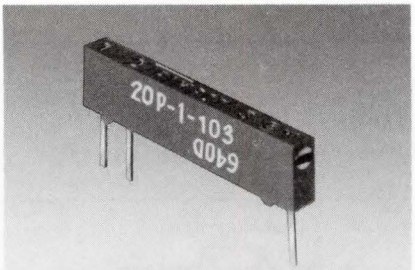
Surface Mounted Trimmers

Model Number	Element Technology		Number of Turns		Sealed Open		Size				Packaging Options	Adjust	Page No.
	Cermet	W/W	Single	Multi	Sealed	Open	4mm	5mm	1/4"	.35"	See Note 1	See Note 2	
3304	•		•			•	•				E,G	T	178
3314	•		•		•		•				E,G	T,S	180
3335	•		•		•			•			E,G	T	184
3325	•		•		•				•		B,T	T,S	183
3269	•			•	•				•		G,T	T,S	176
3272	•			•	•					•	G,T	S	177

Military Sealed Trimmers

Model Number	Element Technology		Turns		Size				Packaging Options	Adjust	Page No.
	Cermet	W/W	Single	Multi	1/4"	3/8"	1/2"	1-1/4"	See Note 1	See Note 2	
RJ/RJR 50	•		•		•				T	S	207
RJ/RJR 26	•			•	•				T	S,T	205
RJ/RJR 24	•			•		•			B,T	S,T	204
RJ 22	•			•			•		B,T	S,T	203
RJR 28	•			•			•		T	S	206
RJ/RJR 12	•			•				•	B,T	S	202
RT 26		•		•	•				T	S,T	211
RT/RTR 24		•		•		•			T	S,T	210
RT/RTR 22		•		•			•		B,T	S,T	209
RT/RTR 12		•		•				•	B,T	S	208

NOTE 1: Standard packaging; some options may require alternate packaging. Consult factory.
T = Tube, B = Bulk, E = Embossed Tape - 7" Reel, G = Embossed Tape - 13" Reel
NOTE 2: T = Top Adjustment, S = Side Adjustment



BOURNS

20MM RECTANGULAR / SIP MULTITURN CERMET / SEALED

- Machine insertable SIP design provides extra cost savings
- .080" width allows side-by-side spacing on standard 0.100" grid
- PC board profile - only 0.185" high

Model 20

Trimpot® Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range
.....10 to 5 megohms
(see standard resistance table)
Resistance Tolerance .....±10% std.
(tighter tolerance available)
Absolute Minimum Resistance
.....3.0% or 3 ohms max.
(whichever is greater)
Contact Resistance Variation
.....1.0% or 1 ohm
(whichever is greater)
Adjustability
Voltage .....±0.01%
Resistance .....±0.05%
Resolution .....Infinite
Insulation Resistance .....500 vdc.
100 megohms min.
Dielectric Strength
Sea Level .....1000 vac
70,000 Feet .....350 vac
Effective Travel .....15 turns nom.

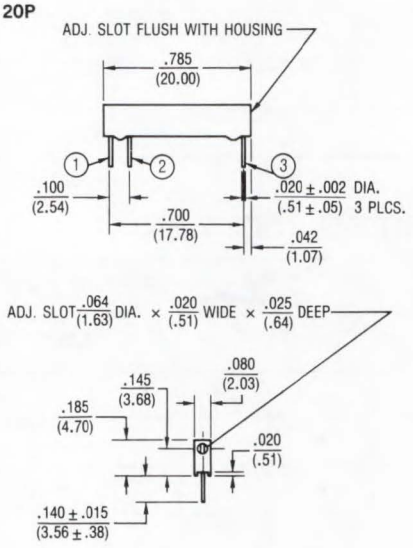
Environmental Characteristics

Power Rating (250 volts max.)
70°C .....0.25 watt
150°C .....0 watt
Temperature Range
.....-55°C to +125°C
Temperature Coefficient
.....±100ppm/°C
(50 ohms and above)
.....±150ppm/°C
(below 50 ohms)
Seal Test .....85°C Fluorinert*
Humidity .....MIL-STD-202 Method 103
96 hours
(3% ΔTR, 20 Megohms IR)
Vibration .....20G (1% ΔTR; 1% ΔVR)
Shock .....50G (1% ΔTR; 1% ΔVR)
Load Life
.....1,000 hours 0.25 watt @ 70°C
(3% ΔTR; 3% or 3 ohms,
whichever is greater, CRV)
Rotational Life .....200 cycles
(3% ΔTR; 3% or 3 ohms,
whichever is greater, CRV)

Physical Characteristics

Torque .....5.0 oz-in. max.
Mechanical Stops .....Wiper idles
Terminals .....Solderable pins
Weight .....0.015 oz.
Marking .....Manufacturer's
trademark, resistance code,
terminal numbers, date code,
manufacturer's model number
and style
Standard Packaging ..25 pcs. per tube

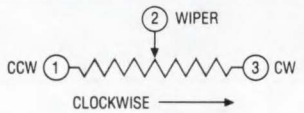
20P



*BOURNS ADJUSTMENT TOOL H91 AVAILABLE FOR THIS MODEL

TOLERANCES: ± .010 (.25) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)



STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code
10	100
20	200
50	500
100	101
200	201
500	501
1,000	102
2,000	202
5,000	502
10,000	103
20,000	203
50,000	503
100,000	104
200,000	204
500,000	504
1,000,000	105
2,000,000	205
5,000,000	505

Special resistances available from 10 to 5 megohms.

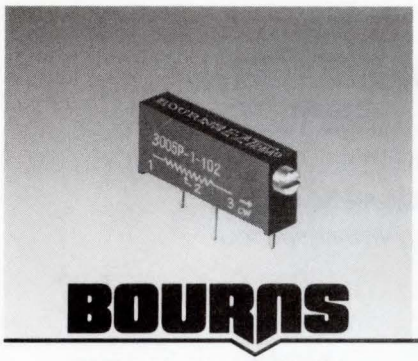
HOW TO ORDER

20 P - 1 - 103

Model
Style
Standard or Modified Product Indicator
-1 = Standard Product
-12 = 5% Resistance Tolerance
Resistance Code

Consult factory for other available options.

Specifications are subject to change without notice.
*"Fluorinert" is a registered trademark of 3M Co.



3/4" RECTANGULAR / MULTITURN WIREWOUND / INDUSTRIAL / SEALED

- Sealed to prevent contamination from fluxing, soldering and cleaning
- Low cost model
- Panel mount option available (see page 44 for details)

BOURNS

Model 3005

Bourns® Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range
.....10 to 50K ohms
(see standard resistance table)
Resistance Tolerance .....±10% std.
(tighter tolerances available)
Absolute Minimum Resistance
.....0.5% or 1 ohm max.
(whichever is greater)
Noise .....100 ohms ENR max.
Resolution
.....See standard resistance table
Insulation Resistance .....500 vdc.
100 megohms min.
Dielectric Strength
Sea Level .....1,000 vac
80,000 Feet .....250 vac
Adjustment Travel .....20 turns nom.

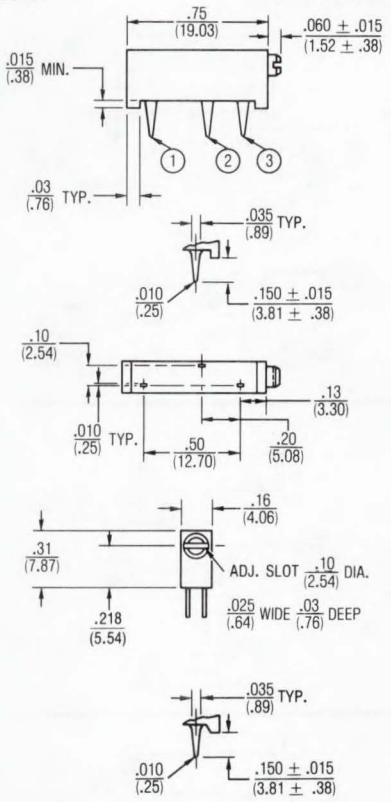
Environmental Characteristics

Power Rating
70°C .....1 watt
125°C .....0 watt
Temperature Range
.....-65°C to +125°C
Temperature Coefficient
.....±50ppm/°C
Seal Test .....85°C Fluorinert*
Humidity .....MIL-STD-202 Method 106
96 hours
(5% ΔTR, 20 Megohms IR)
Vibration .....20G (2% ΔTR; 2% ΔVR)
Shock .....50G (2% ΔTR; 2% ΔVR)
Load Life
.....1,000 hours 1 watt @ 70°C
(3% ΔTR)
Rotational Life .....200 cycles
(4% ΔTR)

Physical Characteristics

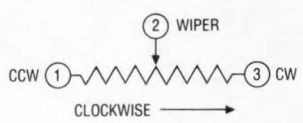
Torque .....5.0 oz-in. max.
Mechanical Stops .....Wiper Idles
Terminals .....Solderable pins
Weight .....0.045 oz.
Marking .....Manufacturer's
trademark, resistance code,
wiring diagram, date code,
manufacturer's model number
and style
Standard Packaging ..25 pcs. per tube

3005P



TOLERANCES: ± .010 (.25) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)



STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code	Nominal Resolution (Percent)
10	100	1.7
20	200	1.5
50	500	1.0
100	101	0.8
200	201	0.7
500	501	0.5
1,000	102	0.5
2,000	202	0.4
5,000	502	0.3
10,000	103	0.3
20,000	203	0.2
50,000	503	0.2

Special resistances available from 10 to 50K ohms.

HOW TO ORDER

3005 P - 1 - 103 Z

Model
Style
Standard or Modified Product Indicator
-1 = Standard Product
-11 = 5% Resistance Tolerance
Resistance Code
Optional Suffix Letter
Z = Panel Mount (Factory Installed)

Consult factory for other available options.

Specifications are subject to change without notice.
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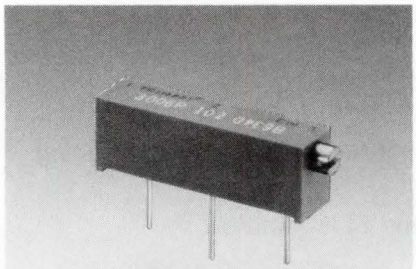


3/4" RECTANGULAR / MULTITURN CERMET / INDUSTRIAL / SEALED

- Low PC board profile - only 1/4" high
- Panel mount option available (see page 44 for details)
- Transparent housing available, setting visually without hook-up and instrumentation

BOURNS

Model 3006

Trimpot® Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range
.....10 to 5 megohms
(see standard resistance table)
Resistance Tolerance .....±10% std.
(tighter tolerance available)
Absolute Minimum Resistance
.....1.0% or 2 ohms max.
(whichever is greater)
Contact Resistance Variation
.....1.0% or 1 ohm
(whichever is greater)
Adjustability
Voltage .....±0.01%
Resistance .....±0.05%
Resolution .....Infinite
Insulation Resistance .....500 vdc.
1,000 megohms min.
Dielectric Strength
Sea Level .....1,000 vac
80,000 Feet .....250 vac
Adjustment Angle .....15 turns nom.

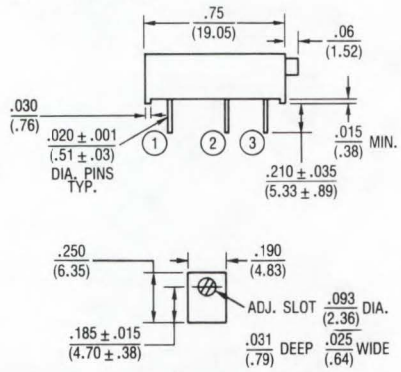
Environmental Characteristics

Power Rating (400 volts max.)
70°C .....0.75 watt
150°C .....0 watt
Temperature Range
.....-55°C to +125°C
Temperature Coefficient
.....±100ppm/°C
Seal Test .....85°C Fluorinert*
Humidity.....MIL-STD-202 Method 103
96 hours
(3% ΔTR, 20 Megohms IR)
Vibration .....20G (2% ΔTR; 2% ΔVR)
Shock .....50G (2% ΔTR; 2% ΔVR)
Load Life
.....1,000 hours 0.75 watt 70°C
(4% ΔTR)
Rotational Life .....200 cycles
(3% ΔTR; 1% or 1 ohm,
whichever is greater, CRV)

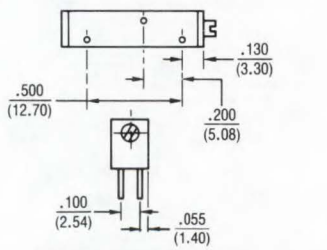
Physical Characteristics

Torque .....5.0 oz-in. max.
Mechanical Stops .....Wiper idles
Terminals .....Solderable pins
Weight .....0.04 oz.
Marking .....Manufacturer's trademark, resistance code, terminal numbers, date code, manufacturer's model number and style
Standard Packaging
P&Y Style .....25 pcs. per tube
W Style .....50 pcs. per tray

COMMON DIMENSIONS



3006P



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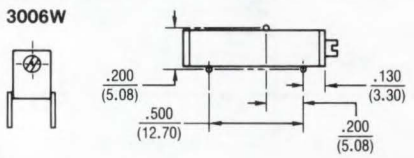
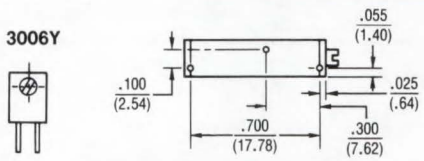
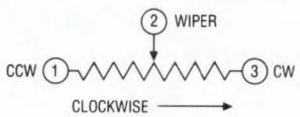


3006Y



TOLERANCES: ± .010 (.25) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)



STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code
10	100
20	200
50	500
100	101
200	201
500	501
1,000	102
2,000	202
5,000	502
10,000	103
20,000	203
25,000	253
50,000	503
100,000	104
200,000	204
250,000	254
500,000	504
1,000,000	105
2,000,000	205
5,000,000	505

Special resistances available from 10 to 5 megohms.

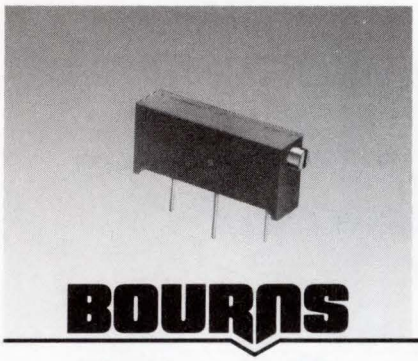
HOW TO ORDER

3006 P - 1 - 103 Z

Model
Style
Standard or Modified Product Indicator
-1 = Standard Product
-7 = Transparent Housing
-12 = 5% Resistance Tolerance
Resistance Code
Optional Suffix Letter
Z = Panel Mount (Factory Installed)

Consult factory for other available options.

Specifications are subject to change without notice.
*"Fluorinert" is a registered trademark of 3M Co.



3/4" RECTANGULAR / MULTITURN CERMET / INDUSTRIAL / SEALED

- Low temperature coefficient: ±100ppm/°C
- Stable, infinite resolution cermet element
- CRV 1.0% or 1 ohm
- Panel mount option available (see page 44 for details)

BOURNS

Model 3009

Trimpot® Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range ..... 10 to 5 megohms (see standard resistance table)
Resistance Tolerance ..... ±10% std. (tighter tolerance available)
Absolute Minimum Resistance ..... 1.0% or 2 ohms max. (whichever is greater)
Contact Resistance Variation ..... 1.0% or 1 ohm (whichever is greater)
Adjustability
Voltage ..... ±0.01%
Resistance ..... ±0.05%
Resolution ..... Infinite
Insulation Resistance ..... 500 vdc. 100 megohms min.
Dielectric Strength
Sea Level ..... 1,000 vac
80,000 Feet ..... 250 vac
Adjustment Travel ..... 15 turns nom.

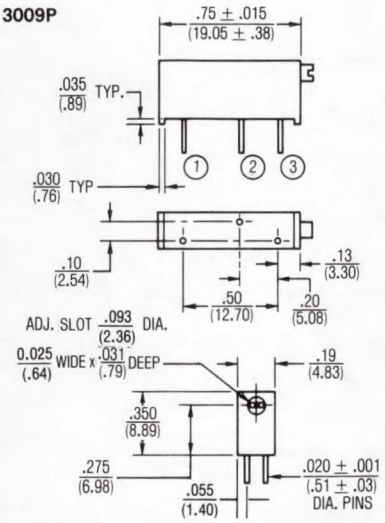
Environmental Characteristics

Power Rating (400 volts max.)
70°C ..... 0.75 watt
150°C ..... 0 watt
Temperature Range ..... -55°C to +125°C
Temperature Coefficient ..... ±100ppm/°C
Seal Test ..... 85°C Fluorinert*
Humidity ..... MIL-STD-202 Method 103 96 hours (3% ΔTR, 20 Megohms IR)
Vibration ..... 20G (2% ΔTR; 2% ΔVR)
Shock ..... 50G (2% ΔTR; 2% ΔVR)
Load Life ..... 1,000 hours 0.75 watt @ 70°C (4% ΔTR)
Rotational Life ..... 200 cycles (3% ΔTR; 1% or 1 ohm, whichever is greater, CRV)

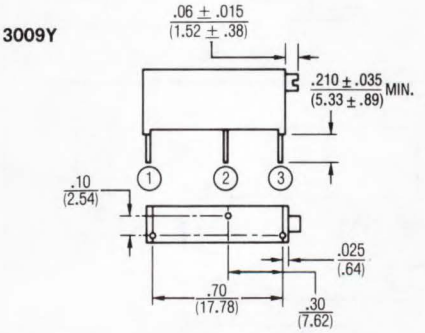
Physical Characteristics

Torque ..... 5.0 oz-in. max.
Mechanical Stops ..... Wiper idles
Terminals ..... Solderable pins
Weight ..... 0.05 oz.
Marking ..... Manufacturer's trademark, resistance code, terminal numbers, date code, manufacturer's model number and style
Standard Packaging .. 25 pcs. per tube

3009P

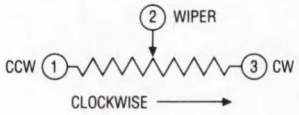


3009Y



TOLERANCES: ± .010 (.25) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)



STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code
10	100
20	200
50	500
100	101
200	201
500	501
1,000	102
2,000	202
5,000	502
10,000	103
20,000	203
25,000	253
50,000	503
100,000	104
200,000	204
250,000	254
500,000	504
1,000,000	105
2,000,000	205
5,000,000	505

Special resistances available from 10 to 5 megohms.

HOW TO ORDER

3009 P - 1 - 103 Z

Model
Style
Standard or Modified Product Indicator
-1 = Standard Product
-11 = 5% Resistance Tolerance
Resistance Code
Optional Suffix Letter
Z = Panel Mount (Factory Installed)

Consult factory for other available options.

Specifications are subject to change without notice.
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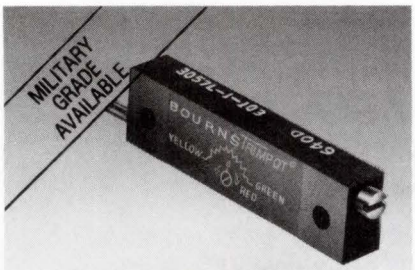


1-1/4" RECTANGULAR / MULTITURN WIREWOUND / INDUSTRIAL / SEALED

- Listed on the QPL for style RT12 per MIL-R-27208 and RTR12 per High-Rel MIL-R-39015 (See page 208)
- Panel mount option available (see page 44 for details)

BOURNS

Model 3057

Trimpot® Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range ..... 10 to 50K ohms (see standard resistance table)
Resistance Tolerance ..... ±5% std. (tighter tolerance available)
Absolute Minimum Resistance ..... 0.1% or 1 ohm max. (whichever is greater)
Noise ..... 100 ohms ENR max.
Resolution ..... See standard resistance table
Insulation Resistance ..... 500 vdc. 1,000 megohms min.
Dielectric Strength
Sea Level ..... 1,500 vac
70,000 Feet ..... 400 vac
Adjustment Travel ..... 22 turns nom.

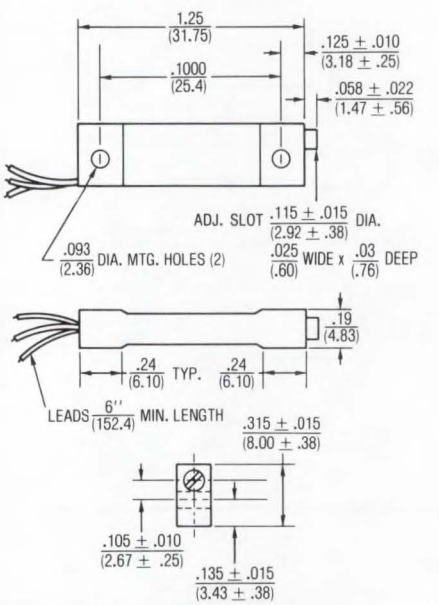
Environmental Characteristics

Power Rating
70°C ..... 1 watt
150°C ..... 0 watt
Temperature Range ..... -55°C to +150°C
Temperature Coefficient ..... ±50ppm/°C
Seal Test ..... 85°C Fluorinert* (pin styles only)
Humidity ..... MIL-STD-202 Method 106 96 hours (2% ΔTR, 100 Megohms IR)
Vibration ..... 30G (1% ΔTR; 0.5% + resolution ΔVR)
Shock ..... 100G (1% ΔTR; 0.5% + resolution ΔVR)
Load Life ..... 1,000 hours 1 watt @ 70°C (2% ΔTR)
Rotational Life ..... 200 cycles (2% ΔTR)

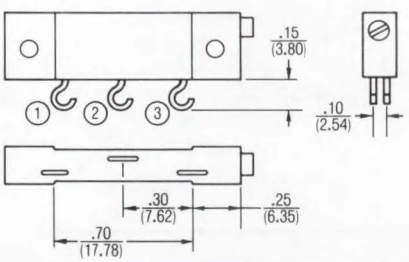
Physical Characteristics

Torque ..... 5.0 oz-in. max.
Mechanical Stops ..... Wiper idles
Terminals ..... Solderable pins and lugs
Flexible leads .... (7 strands of 30 AWG)
Weight ..... 0.10 oz.
Marking ..... Manufacturer's trademark, resistance code, terminal numbers, date code, manufacturer's model number and style
Standard Packaging
P&Y Style ..... 10 pcs. per tube
L&J Style ..... 100 pcs. per bag

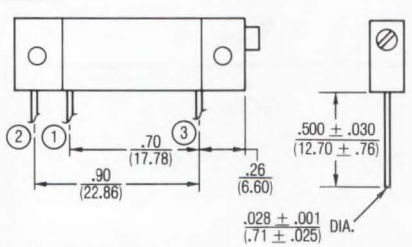
3057L



3057J



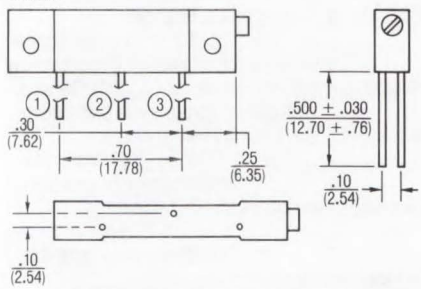
3057P

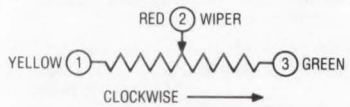


TOLERANCES: ± .010 (.25) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)

3057Y





STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code	Nominal Resolution (Percent)
10	100	2.40
20	200	1.90
50	500	1.40
100	101	1.00
200	201	0.86
500	501	0.89
1,000	102	0.72
2,000	202	0.58
5,000	502	0.43
10,000	103	0.34
20,000	203	0.31
50,000	503	0.24

Special resistances available from 10 to 50K ohms.

See page 208 for Mil-Spec qualified resistance values, terminal styles and failure rates.

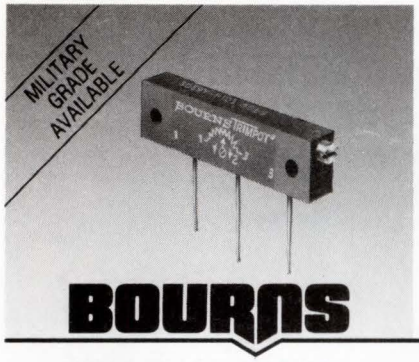
HOW TO ORDER

3057 L - 1 - 103 M

Model
Style
Standard or Modified Product Indicator
-1 = Standard Product
-73 = 12" Flexible Leads
Resistance Code
Optional Suffix Letter
M = Panel Mount (Factory Installed)

Consult factory for other available options.

Specifications are subject to change without notice.
Fluorinert is a registered trademark of 3M Co.



1-1/4" RECTANGULAR / MULTITURN CERMET / INDUSTRIAL / SEALED

- Listed on the QPL for style RJ12 per MIL-R-22097 and RJR12 High-Rel MIL-R-39035 (see page 202)
- Panel mount option available (see page 44 for details)

Model 3059

Trimpot® Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range
.....10 to 5 megohms
(see standard resistance table)
Resistance Tolerance .....±10% std.
(tighter tolerance available)
Absolute Minimum Resistance
.....1% or 2 ohms max.
(whichever is greater)
Contact Resistance Variation
.....1.0% or 1 ohm
(whichever is greater)
Adjustability
Voltage .....±0.01%
Resistance .....±0.05%
Resolution .....Infinite
Insulation Resistance .....500 vdc.
1,000 megohms min.
Dielectric Strength
Sea Level .....900 vac
70,000 Feet .....350 vac
Effective Travel .....22 turns nom.

Environmental Characteristics

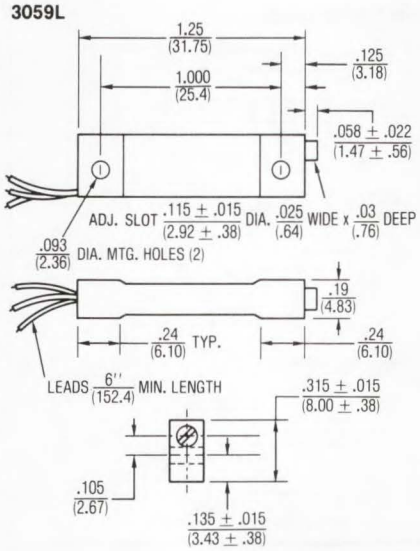
Power Rating (400 volts max.)
70°C .....1.0 watt
150°C .....0 watt
Temperature Range ..-55°C to +150°C
Temperature Coefficient
.....±100ppm/°C
Seal Test .....85°C Fluorinert*
(pin styles only)
Humidity .....MIL-STD-202 Method 106
(2% ΔTR, 10 Megohms IR)
Vibration .....20G (1% ΔTR; 1% ΔVR)
Shock .....50G (1% ΔTR; 1% ΔVR)
Load Life
.....1,000 hours 1.0 watt @ 70°C
(3% ΔTR; 1% or 1 ohms,
whichever is greater, CRV)
Rotational Life .....200 cycles
(2% ΔTR; 1% or 1 ohm,
whichever is greater, CRV)

Physical Characteristics

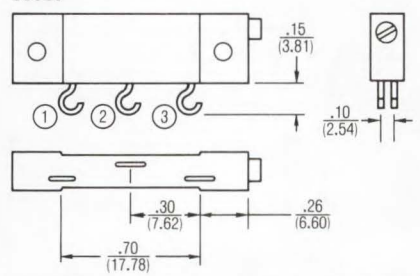
Torque .....5.0 oz-in. max.
Mechanical Stops .....Wiper idles
Terminals
.....Solderable printed circuit pins
Flexible leads ....(7 strands of 30 AWG)
Weight .....0.1 oz.
Marking .....Manufacturer's trademark,
resistance code, terminal
numbers, date code, manufacturer's
model number and style
Standard Packaging
P&Y Styles .....10 pcs. per tube
L&J Styles .....100 pcs. per bag

Specifications are subject to change without notice.
*"Fluorinert" is a registered trademark of 3M Co.

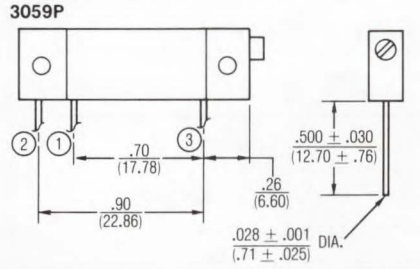
3059L



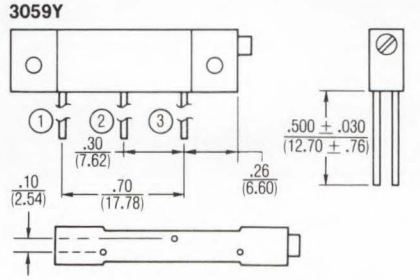
3059J



3059P

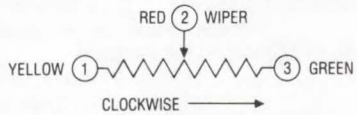


3059Y



TOLERANCES: ± .010 (.25) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)



STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code
10	100
20	200
50	500
100	101
200	201
500	501
1,000	102
2,000	202
5,000	502
10,000	103
20,000	203
25,000	253
50,000	503
100,000	104
200,000	204
250,000	254
500,000	504
1,000,000	105
2,000,000	205
5,000,000	505

Special resistances available from 10 to 5 megohms.

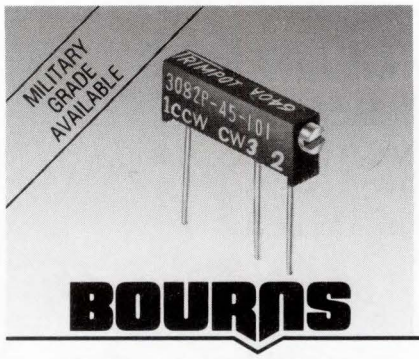
See page 202 for Mil-Spec qualified resistance values, terminal styles, characteristics and failure rates.

HOW TO ORDER

3059 L - 1 - 103 M

Model
Style
Standard or Modified
Product Indicator
-1 = Standard Product
-8 = 44 Turns Nominal
-11 = 5% Resistance Tolerance
-73 = 12" Flexible Leads
Resistance Code
Optional Suffix Letter
M = Panel Mount
(Factory Installed)

Consult factory for other available options.



1/2" RECTANGULAR / MULTITURN / CERMET INDUSTRIAL / SEALED

- Listed on the QPL for style RJR28 per MIL-R-39035 (see page 206)
- Available with or without stand-offs

BOURNS

Model 3082

Trimpot® Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range ..... 10 to 2 megohms (see standard resistance table)
Resistance Tolerance ..... ±10% std. (tighter tolerance available)
Absolute Minimum Resistance ..... 1% or 2 ohms max. (whichever is greater)
Contact Resistance Variation ..... 3% or 3 ohms (whichever is greater)
Adjustability
Voltage ..... ±0.03%
Resistance ..... ±.1%
Resolution ..... Infinite
Insulation Resistance ..... 500 vdc. 1,000 megohms min.
Dielectric Strength
Sea Level ..... 900 vac
80,000 Feet ..... 400 vac
Effective Travel ..... 10 turns nom.

Environmental Characteristics

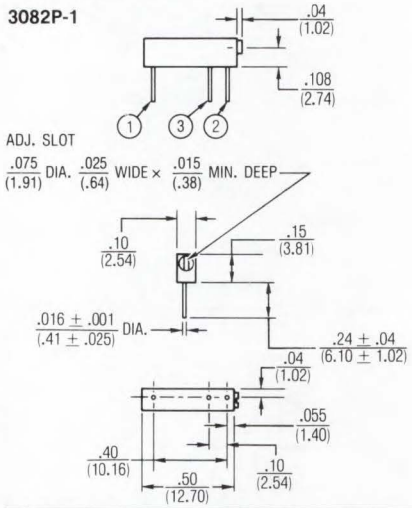
Power Rating (300 volts max.)
85°C ..... 0.3 watt
150°C ..... 0 watt
Temperature Range ..... -65°C to +150°C
Temperature Coefficient ..... ±100ppm/°C
Seal Test ..... 85°C Fluorinert*
Humidity ..... MIL-STD-202 Method 103 96 hours (2% ΔTR, 10 Megohms IR)
Vibration ..... 30G (1% ΔTR; 1% ΔVR)
Shock ..... 100G (1% ΔTR;1% ΔVR)
Load Life ..... 1,000 hours 0.3 watt @ 85°C (2% ΔTR; 3% or 3 ohms, whichever is greater, CRV)
Rotational Life ..... 200 cycles (2% ΔTR; 3% or 3 ohms, whichever is greater, CRV)

Physical Characteristics

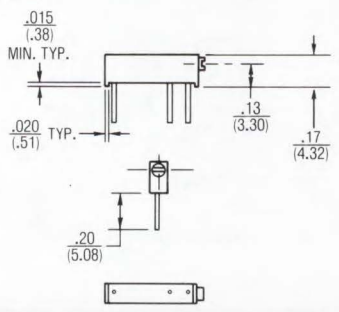
Torque ..... 2.0 oz-in. max.
Mechanical Stops ..... Wiper idles
Terminals ..... Solderable pins
Weight ..... Approximately .01 oz.
Marking ..... Manufacturer's trademark, resistance code, terminal numbers, date code, manufacturer's model number and style
Standard Packaging .. 25 pcs. per tube

COMMON DIMENSIONS

3082P-1

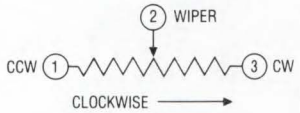


3082P-45



TOLERANCES: ± .010 (.25) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)



STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code
10	100
20	200
50	500
100	101
200	201
500	501
1,000	102
2,000	202
5,000	502
10,000	103
20,000	203
50,000	503
100,000	104
200,000	204
500,000	504
1,000,000	105
2,000,000	205

Special resistances available from 10 to 2 megohms.

See page 206 for Mil-Spec qualified resistance values, terminal styles, characteristics and failure rates.

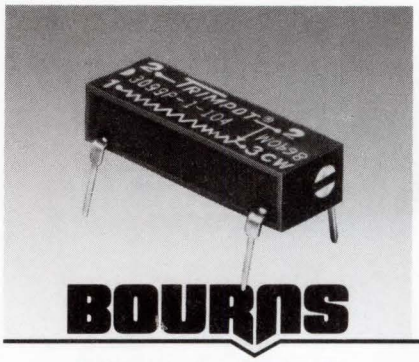
HOW TO ORDER

3082 P - 1 - 103

Model
Style
Standard or Modified Product Indicator
-1 = Standard Product
-45 = Standoffs
Resistance Code

Consult factory for other available options.

Specifications are subject to change without notice.
*"Fluorinert" is a registered trademark of 3M Co.



3/4" RECTANGULAR / MULTITURN DIP CERMET / INDUSTRIAL / SEALED

- Standard DIP size (T0-116)
- Compatible with DIP automatic insertion equipment

Model 3099

Trimpot® Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range ..... 10 to 5 megohms (see standard resistance table)
Resistance Tolerance ..... ±10% std. (tighter tolerance available)
Absolute Minimum Resistance ..... 1% or 2 ohms max. (whichever is greater)
Contact Resistance Variation ..... 1% or 1 ohm (whichever is greater)
Adjustability
Voltage ..... ±0.01%
Resistance ..... ±0.05%
Resistance ..... Infinite
Insulation Resistance ..... 500 vdc. 100 megohms min.
Dielectric Strength
Sea Level ..... 1,000 vac
80,000 Feet ..... 250 vac
Effective Travel ..... 20 turns nom.

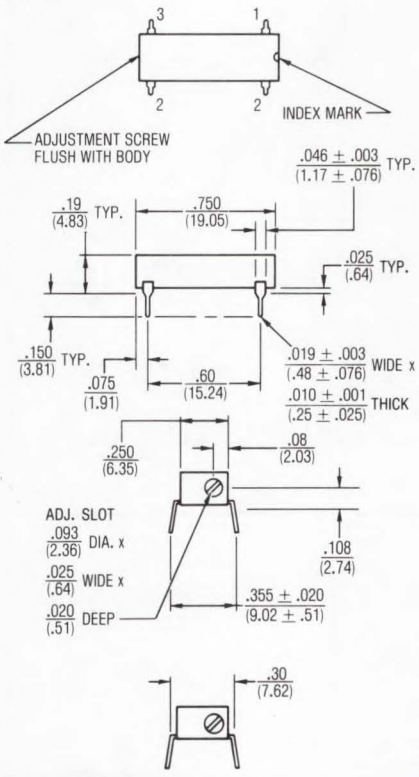
Environmental Characteristics

Power Rating (400 volts max.)
70°C ..... 1 watt
150°C ..... 0 watt
Temperature Range ..... -55°C to +150°C
Temperature Coefficient ..... ±100ppm/°C
Seal Test ..... 85°C Fluorinert*
Humidity ..... MIL-STD-202 Method 103 96 hours (2% ΔTR, 100 Megohms IR)
Vibration ..... 20G (2% ΔTR; 1% ΔVR)
Shock ..... 50G (2% ΔTR; 1% ΔVR)
Load Life ..... 1,000 hours 1 watt @ 70°C (3% ΔTR; 1% or 1 ohm, whichever is greater, CRV)
Rotational Life ..... 200 cycles (2% ΔTR; 1% or 1 ohm, whichever is greater, CRV)

Physical Characteristics

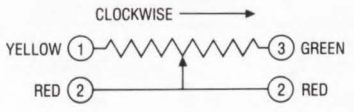
Torque ..... 5.0 oz-in. max.
Mechanical Stops ..... Wiper idles
Terminals ..... Solderable pins
Weight ..... 0.04 oz.
Marking ..... Manufacturer's trademark, resistance code, terminal numbers, date code, manufacturer's model number and style
Standard Packaging .. 25 pcs. per tube

3099 P



TOLERANCES: ± .010 (.25) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)



STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code
10	100
20	200
50	500
100	101
200	201
500	501
1,000	102
2,000	202
5,000	502
10,000	103
20,000	203
50,000	503
100,000	104
200,000	204
500,000	504
1,000,000	105
2,000,000	205
5,000,000	505

Special resistances available from 10 to 5 megohms.

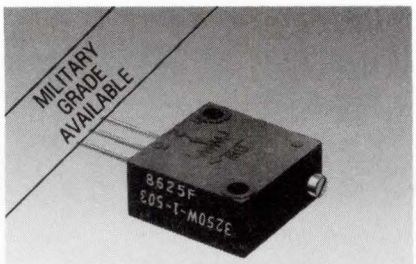
HOW TO ORDER

3099 P - 1 - 103

Model
Style
Standard or Modified Product Indicator
-1 = Standard Product
-11 = 5% Resistance Tolerance
Resistance Code

Consult factory for other available options.

Specifications are subject to change without notice.
*"Fluorinert" is a registered trademark of 3M Co.



1/2" SQUARE / MULTITURN / WIREWOUND SEALED

- Listed on the QPL for style RT22 per MIL-R-27208 and RTR22 per High-Rel MIL-R-39015 (see page 209)

BOURNS

Model 3250

Bourns® Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range
.....10 to 50K ohms
(see standard resistance table)
Resistance Tolerance .....±5% std.
(tighter tolerance available)
Absolute Minimum Resistance
.....0.1% or 1 ohm max.
(whichever is greater)
Noise .....100 ohms ENR max.
Resolution
.....See standard resistance table
Insulation Resistance .....500 vdc.
1,000 megohms min.
Dielectric Strength
Sea Level .....1,000 vac
80,000 Feet .....400 vac
Adjustment Travel .....25 turns nom.

Environmental Characteristics

Power Rating
85°C .....1.0 watt
150°C .....0 watt
Temperature Range
.....-65°C to +150°C
Temperature Coefficient
.....±70ppm/°C
Seal Test .....85°C Fluorinert*
(pin styles only)
Humidity.....MIL-STD-202 Method 106
(2% ΔTR; 100 Megohms IR)
Vibration 30G
(1% ΔTR; 0.5% + resolution ΔVR)
Shock 100G
(1% ΔTR; 0.5% + resolution ΔVR)
Load Life
.....1,000 hours 1.0 watt @ 85°C
(2% ΔTR; 500 ohms ENR)
Rotational Life .....200 cycles
(2% ΔTR; 500 ohms ENR)

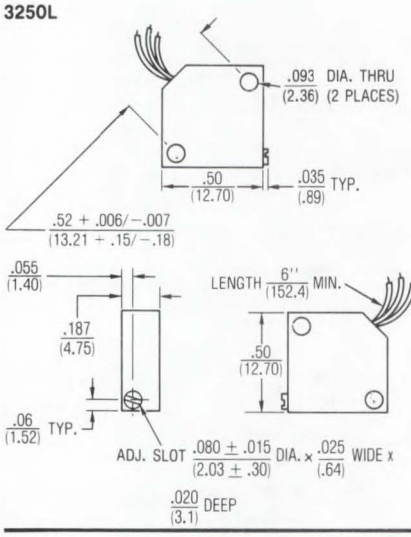
Physical Characteristics

Torque .....5.0 oz-in. max.
Mechanical Stops .....Wiper idles
Terminals
.....Solderable printed circuit pins
Flexible leads (7 strands of 30 AWG)
Weight .....0.06 oz.

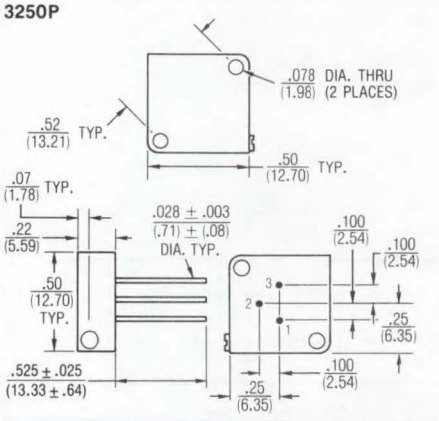
Machine Screw Mounting

Torque .....12 oz-in. max.
Marking .....Manufacturer's trademark, resistance code, terminal numbers, date code, manufacturer's model number and style
Standard Packaging
P&W Styles .....25 pcs. per tube
L Style .....100 pcs. per bag

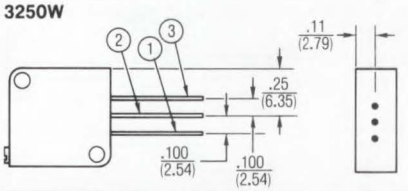
3250L



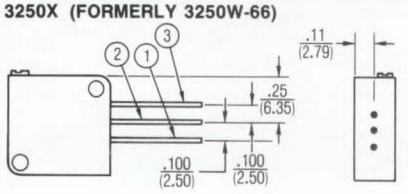
3250P



3250W

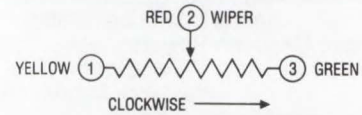


3250X (FORMERLY 3250W-66)



TOLERANCES: ± .010 (.25) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)



STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code	Nominal Resolution (Percent)
10	100	1.30
20	200	1.00
50	500	0.80
100	101	0.90
200	201	0.70
500	501	0.60
1,000	102	0.40
2,000	202	0.30
5,000	502	0.25
10,000	103	0.19
20,000	203	0.16
25,000	253	0.14
50,000	503	0.13

Special resistances available from 10 to 50K ohms.

See page 209 for Mil-spec qualified resistance values, terminal styles and failure rates.

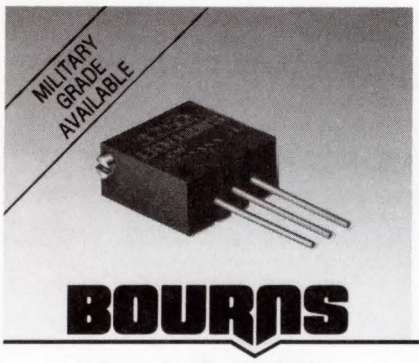
HOW TO ORDER

3250 L - 1 - 103 M

Model
Style
Standard or Modified Product Indicator
-1 = Standard Product
-12 = 3% Resistance Tolerance
-73 = 12" Flexible Leads
Resistance Code
Optional Suffix Letter
M = Panel Mount (Factory Installed)

Consult factory for other available options.

Specifications are subject to change without notice.
*"Fluorinert" is a registered trademark of 3M Co.



1/2" SQUARE / MULTITURN / CERMET INDUSTRIAL / SEALED

- Listed on the QPL for style RJ22 per MIL-R-22097 (see page 203)
- Panel mount option available (see page 45 for details)

BOURNS

Model 3252

Bourns® Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range ..... 10 to 2 megohms (see standard resistance table)
Resistance Tolerance ..... ±10% std. (tighter tolerance available)
Absolute Minimum Resistance ..... 1% or 2 ohms max. (whichever is greater)
Contact Resistance Variation ..... 1% or 2 ohms (whichever is greater)
Adjustability
  Voltage ..... ±0.01%
  Resistance ..... ±0.05%
Resolution ..... Infinite
Insulation Resistance ..... 500 vdc. 1,000 megohms min.
Dielectric Strength
  Sea Level ..... 1,000 vac
  80,000 Feet ..... 400 vac
Effective Travel ..... 25 turns nom.

Environmental Characteristics

Power Rating (400 volts max.)
  85°C ..... 0.75 watt
  150°C ..... 0 watt
Temperature Range ..... -65°C to +150°C
Temperature Coefficient ..... ±100ppm/°C
Seal Test ..... 85°C Fluorinert* (pin styles only)
Humidity ..... MIL-STD-202 Method 103 96 hours (1% ΔTR; 100 Megohms IR)
Vibration ..... 30G (1% ΔTR; 1% ΔVR)
Shock ..... 100G (1% ΔTR; 1% ΔVR)
Load Life ..... 1,000 hours 0.75 watt @ 85°C (3% ΔTR; 3% or 3 ohms, whichever is greater, CRV)
Rotational Life ..... 200 cycles (2% ΔTR; 3% or 3 ohms, whichever is greater, CRV)

Physical Characteristics

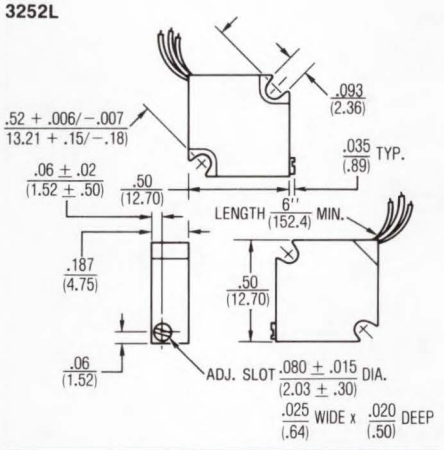
Torque ..... 5.0 oz-in. max.
Mechanical Stops ..... Wiper idles
Terminals ..... Solderable printed circuit pins
Flexible leads ..... (7 strands of 30 AWG)
Weight ..... 0.065 oz.

Machine Screw Mounting

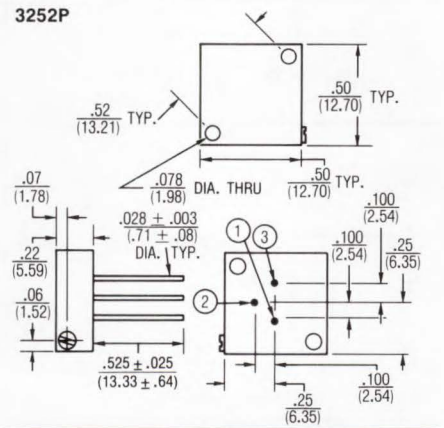
Torque ..... 5 oz-in. max.
Marking ..... Manufacturer's trademark, resistance code, wiring diagram, date code, manufacturer's model number and style
Standard Packaging
  P&W Styles ..... 25 pcs. per tube
  L Style ..... 100 pcs. per bag

Specifications are subject to change without notice.
*"Fluorinert" is a registered trademark of 3M Co.

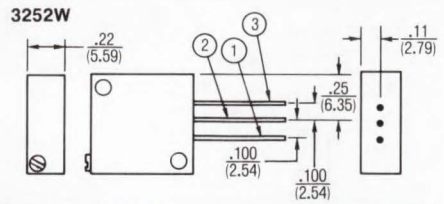
3252L



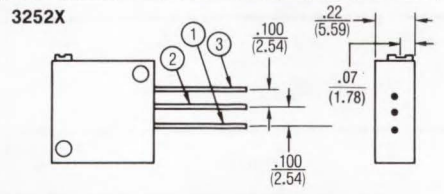
3252P



3252W

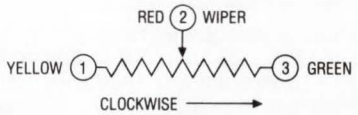


3252X



TOLERANCES: ± .010 (.25) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)



STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code
10	100
20	200
50	500
100	101
200	201
500	501
1,000	102
2,000	202
5,000	502
10,000	103
20,000	203
25,000	253
50,000	503
100,000	104
200,000	204
500,000	504
1,000,000	105
2,000,000	205

Special resistances available from 10 to 2 megohms.

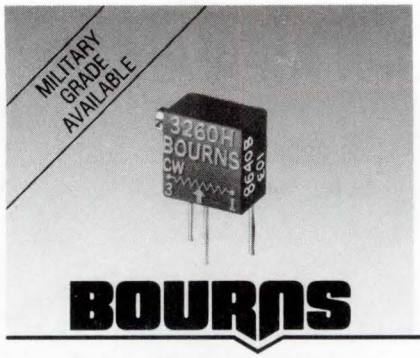
See page 203 for Mil-Spec qualified resistance values, terminal styles, characteristics and failure rates.

HOW TO ORDER

3252 L - 1 - 103 M

Model
Style
Standard or Modified Product Indicator
  -1 = Standard Product
  -11 = 5% Resistance Tolerance
  -73 = 12" Leads
Resistance Code
Optional Suffix Letter
  M = Panel Mount (Factory Installed)

Consult factory for other available options.



1/4" SQUARE / MULTITURN / WIREWOUND INDUSTRIAL / SEALED

■ Listed on the QPL for style RT26 per MIL-R-27208 (see page 211)

BOURNS

Model 3260

Bourns® Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range
.....10 to 25K ohms
(see standard resistance table)
Resistance Tolerance .....±5% std.
(tighter tolerance available)
Absolute Minimum Resistance
.....0.1% or 1 ohm max.
(whichever is greater)
Noise .....100 ohms ENR max.
Resolution
.....See standard resistance table
Insulation Resistance .....500 vdc.
1,000 megohms min.
Dielectric Strength
Sea Level .....600 vac
80,000 Feet .....250 vac
Adjustment Angle .....11 turns nom.

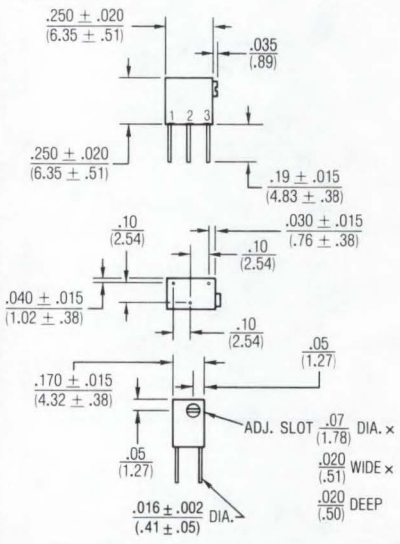
Environmental Characteristics

Power Rating
85°C .....0.25 watt
150°C .....0 watt
Temperature Range
.....-65°C to +150°C
Temperature Coefficient
.....±70ppm/°C
Seal Test .....85°C Fluorinert*
Humidity.....MIL-STD-202 Method 106
(2% ΔTR, 100 Megohms IR)
Vibration 30G
(1% ΔTR; 1% + resolution ΔVR)
Shock 100G
(1% ΔTR; 1% + resolution ΔVR)
Load Life
.....1,000 hours 0.25 watt @ 85°C
(2% ΔTR; 500 ohms ENR)
Rotational Life .....200 cycles
(2% ΔTR; 500 ohms ENR)

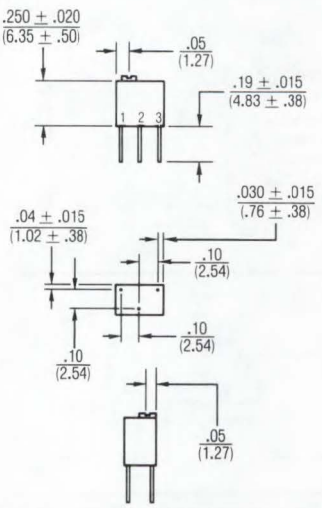
Physical Characteristics

Torque .....3.0 oz-in. max.
Mechanical Stops .....Wiper idles
Terminals
.....Solderable printed circuit pins
Weight .....0.015 oz.
Marking .....Manufacturer's trademark, resistance code, wiring diagram, date code, manufacturer's model number and style
Standard Packaging ..50 pcs. per tube

3260H

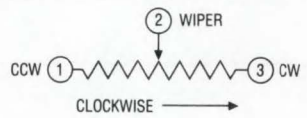


3260W



TOLERANCES: ± .010 (.25) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)



STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code	Nominal Resolution (Percent)
10	100	1.90
20	200	1.50
50	500	1.23
100	101	1.00
200	201	0.94
500	501	0.58
1,000	102	0.50
2,000	202	0.45
5,000	502	0.34
10,000	103	0.29
20,000	203	0.28
25,000	253	0.23

Special resistances available from 10 to 25K ohms.

See Page 211 for Mil-Spec qualified resistance and terminal styles.

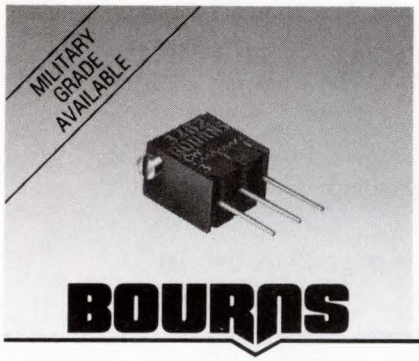
HOW TO ORDER

3260 H - 1 - 502

Model
Style
Standard or Modified Product Indicator
-1 = Standard Product
-12 = 3% Resistance Tolerance
Resistance Code

Consult factory for other available options.

Specifications are subject to change without notice.
**"Fluorinert" is a registered trademark of 3M Co.



1/4" SQUARE / MULTITURN / CERMET INDUSTRIAL / SEALED

- Listed on the QPL for style RJ26 per MIL-R-22097 and RJR26 per High-Rel MIL-R-39035 (see page 205).

BOURNS

Model 3262

Bourns® Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range ..... 10 to 1 megohm (see standard resistance table)
Resistance Tolerance ..... ±10% std. (tighter tolerance available)
Absolute Minimum Resistance ..... 1% or 2 ohms max. (whichever is greater)
Contact Resistance Variation ..... 3.0% or 3 ohms (whichever is greater)
Adjustability
Voltage ..... ±0.02%
Resistance ..... ±0.05%
Resolution ..... Infinite
Insulation Resistance ..... 500 vdc. 1,000 megohms min.
Dielectric Strength
Sea Level ..... 600 vac
80,000 Feet ..... 250 vac
Effective Travel ..... 12 turns nom.

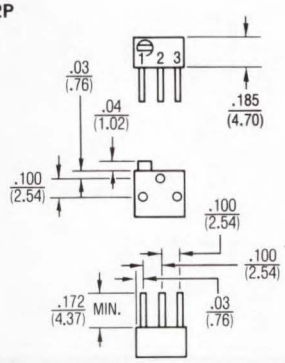
Environmental Characteristics

Power Rating (300 volts max.)
85°C ..... 0.25 watt
150°C ..... 0 watt
Temperature Range ..... -65°C to +150°C
Temperature Coefficient ..... ±100ppm/°C
Seal Test ..... 85°C Fluorinert*
Humidity ..... MIL-STD-202 Method 103 96 hours (2% ΔTR, 100 Megohms IR)
Vibration ..... 30G (1% ΔTR; 1% ΔVR)
Shock ..... 100G (1% ΔTR; 1% ΔVR)
Load Life ..... 1,000 hours 0.25 watt @ 85°C (3% ΔTR; 3% or 3 ohms, whichever is greater, CRV)
Rotational Life ..... 200 cycles (2% ΔTR; 3% or 3 ohms, whichever is greater, CRV)

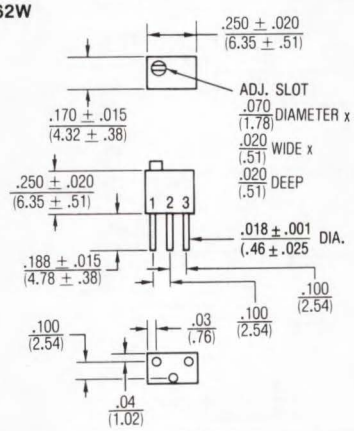
Physical Characteristics

Torque ..... 3.0 oz-in. max.
Mechanical Stops ..... Wiper idles
Terminals ..... Solderable pins
Weight ..... 0.015 oz.
Marking ..... Manufacturer's trademark, resistance code, wiring diagram, date code, manufacturer's model number and style
Standard Packaging .. 50 pcs. per tube

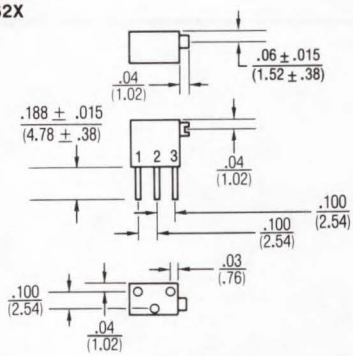
3262P



3262W

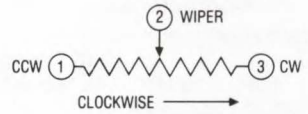


3262X



TOLERANCES: ± .010 (.25) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)



STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code
10	100
20	200
50	500
100	101
200	201
500	501
1,000	102
2,000	202
5,000	502
10,000	103
20,000	203
25,000	253
50,000	503
100,000	104
200,000	204
250,000	254
500,000	504
1,000,000	105

Special resistances available from 10 ohms to 1 megohm.

See page 205 for Mil-Spec qualified resistance values, terminal styles, characteristics and failure rates.

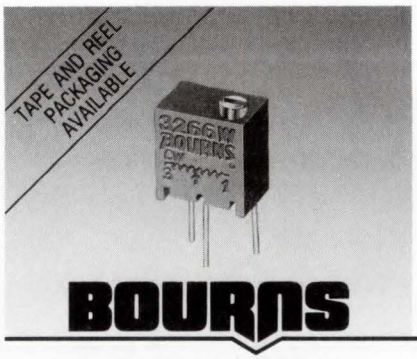
HOW TO ORDER

3262 P - 1 - 103

Model
Style
Standard or Modified Product Indicator
-1 = Standard Product
-11 = 5% Resistance Tolerance
-99 = 5/8" Long Pins
Resistance Code

Consult factory for other available options.

Specifications are subject to change without notice.
*"Fluorinert" is a registered trademark of 3M Co.



1/4" SQUARE / MULTITURN / CERMET INDUSTRIAL / SEALED

- Plasma etched body seal
- Standoffs allow thorough PC board washing
- Double chevron shaft seal
- Tape and reel packaging available (see page 42 for details)

BOURNS

Model 3266

Bourns® Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range
.....10 to 1 megohm
(see standard resistance table)
Resistance Tolerance .....±10% std.
Absolute Minimum Resistance
.....1% or 2 ohms max.
(whichever is greater)
Contact Resistance Variation
.....3.0% or 3 ohms
(whichever is greater)
Adjustability
Voltage .....±0.02%
Resistance .....±0.05%
Resolution .....Infinite
Insulation Resistance .....500 vdc.
1,000 megohms min.
Dielectric Strength
Sea Level .....600 vac
80,000 Feet .....250 vac
Effective Travel .....12 turns nom.

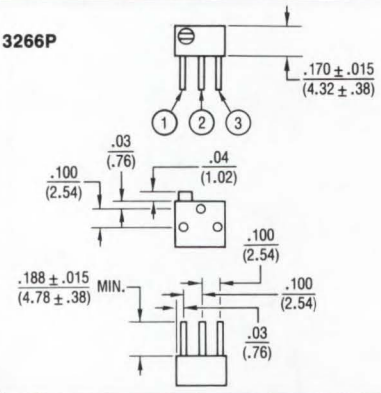
Environmental Characteristics

Power Rating (300 volts max.)
70°C .....0.25 watt
150°C .....0 watt
Temperature Range
.....-55°C to +125°C
Temperature Coefficient
.....±100ppm/°C
Seal Test .....85°C Fluorinert*
Humidity.....MIL-STD-202 Method 103
96 hours
(2% ΔTR, 10 Megohms IR)
Vibration .....30G (1% ΔTR; 1% ΔVR)
Shock .....100G (1% ΔTR; 1% ΔVR)
Load Life
.....1,000 hours 0.25 watt 70°C
(3% ΔTR; 3% CRV)
Rotational Life.....200 cycles
(4% ΔTR; 3% or 3 ohms,
whichever is greater, CRV)

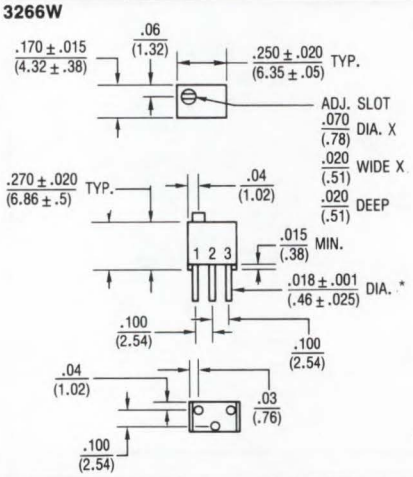
Physical Characteristics

Torque .....3.0 oz-in. max.
Mechanical Stops .....Wiper idles
Terminals .....Solderable pins
Weight .....0.015 oz.
Marking .....Manufacturer's
trademark, resistance code,
wiring diagram, date code,
manufacturer's model
number and style
Standard Packaging ..50 pcs. per tube

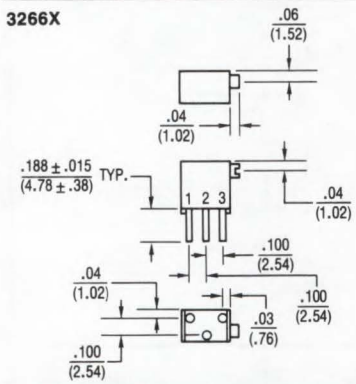
3266P



3266W

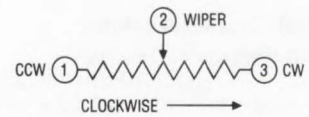


3266X



TOLERANCES: ± .010 (.25) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)



STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code
10	100
20	200
50	500
100	101
200	201
500	501
1,000	102
2,000	202
5,000	502
10,000	103
20,000	203
25,000	253
50,000	503
100,000	104
200,000	204
250,000	254
500,000	504
1,000,000	105

Special resistances available from 10 ohms to 1 megohm.

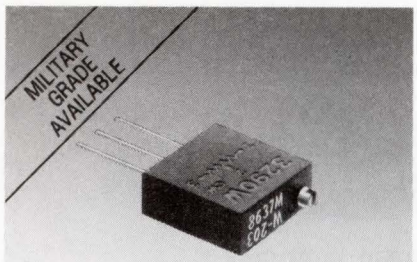
HOW TO ORDER

3266 W - 1 - 103

Model
Style
Standard or Modified Product Indicator
-1 = Standard Product
Resistance Code

Consult factory for other available options.

Specifications are subject to change without notice.
*"Fluorinert" is a registered trademark of 3M Co.



3/8" SQUARE / MULTITURN / WIREWOUND INDUSTRIAL / SEALED

- Listed on the QPL for style RT24 per MIL-R-27208 and RTR24 per High-Rel MIL-R-39015 (see page 210)
- Panel mount option available (see page 45 for details)

BOURNS

Model 3290

Trimpot® Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range ..... 10 to 50K ohms (see standard resistance table)
Resistance Tolerance ..... ±5% std. (tighter tolerance available)
Absolute Minimum Resistance ..... 0.1% or 1 ohm max. (whichever is greater)
Noise ..... 100 ohms ENR max.
Resolution (see standard resistance table)
Insulation Resistance ..... 500 vdc. 1,000 megohms min.
Dielectric Strength
Sea Level ..... 1,000 vac
80,000 Feet ..... 350 vac
Adjustment Travel ..... 25 turns nom.

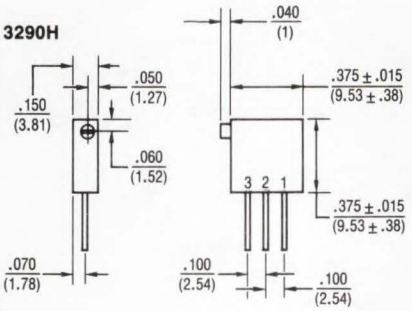
Environmental Characteristics

Power Rating
85°C ..... 1.0 watt
150°C ..... 0 watt
Temperature Range ..... -65°C to +150°C
Temperature Coefficient ..... ±50ppm/°C
Seal Test ..... 85°C Fluorinert*
Humidity ..... MIL-STD-202 Method 106 96 hours (2% ΔTR; 100 Megohms IR)
Vibration ..... 30G (1% ΔTR; 0.5% + resolution ΔVR)
Shock ..... 100G (1% ΔTR; 0.5% + resolution ΔVR)
Load Life ..... 1,000 hours 1.0 watt @ 85°C (2% ΔTR; 500 ohms ENR)
Rotational Life ..... 200 cycles (2% ΔTR; 500 ohms ENR)

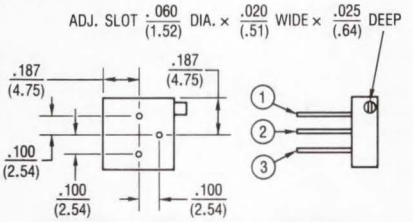
Physical Characteristics

Torque ..... 5.0 oz-in. max.
Mechanical Stops ..... Wiper idles
Terminals ..... Solderable printed circuit pins
Weight ..... 0.025 oz.
Marking ..... Manufacturer's trademark, resistance code, wiring diagram, date code, manufacturer's model number and style
Standard Packaging .. 50 pcs. per tube

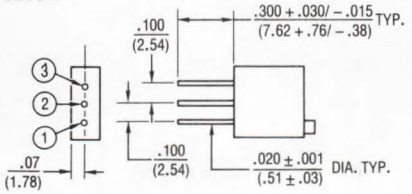
3290H



3290P

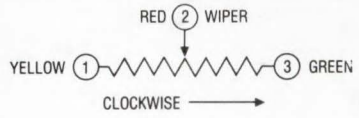


3290W



TOLERANCES: ± .010 (.25) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)



STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code	Nominal Resolution (Percent)
10	100	1.11
20	200	0.93
50	500	0.62
100	101	0.60
200	201	0.54
500	501	0.42
1,000	102	0.33
2,000	202	0.26
5,000	502	0.20
10,000	103	0.17
20,000	203	0.14
25,000	253	0.13
50,000	503	0.11

Special resistances available from 10 to 50K ohms.

See page 210 for Mil-Spec qualified resistance values, terminal styles and failure rates.

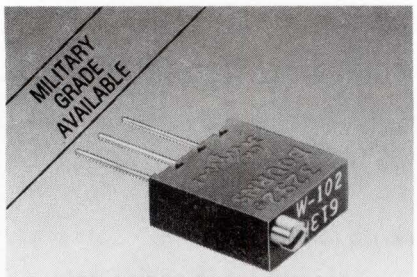
HOW TO ORDER

3290 H - 1 - 103 M

Model
Style
Standard or Modified Product Indicator
-1 = Standard Product
-12 = 3% Resistance Tolerance
Resistance Code
Optional Suffix Letter
M = Panel Mount (Factory Installed)

Consult factory for other available options.

Specifications are subject to change without notice.
*"Fluorinert" is a registered trademark of 3M Co.



3/8" SQUARE / MULTITURN / CERMET INDUSTRIAL / SEALED

- Listed on the QPL for style RJ24 per MIL-R-22097 and RJR24 per High-Rel MIL-R-39035 (see page 204)
- Double chevron shaft seal
- Optional panel mount available (see page 45 for details)

Model 3292

Bourns® Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range
..... 10 to 1 megohm
(see standard resistance table)
Resistance Tolerance ..... ±10% std.
(tighter tolerance available)
Absolute Minimum Resistance
..... 1% or 2 ohms max.
(whichever is greater)
Contact Resistance Variation
..... 1.0% or 3 ohms
(whichever is greater)
Adjustability
Voltage ..... ±0.01%
Resistance ..... ±0.05%
Resolution ..... Infinite
Insulation Resistance ..... 500 vdc.
1,000 megohms min.
Dielectric Strength
Sea Level ..... 1,000 vac
80,000 Feet ..... 400 vac
Effective Travel ..... 25 turns nom.

Environmental Characteristics

Power Rating (400 volts max.)
85°C ..... 0.5 watt
150°C ..... 0 watt
Temperature Range
..... -65°C to +150°C
Temperature Coefficient
..... ±100ppm/°C
Seal Test ..... 85°C Fluorinert*
(pin styles only)
Humidity ..... MIL-STD-202 Method 103
96 hours
(1% ΔTR, 100 Megohms IR)
Vibration ..... 30G (1% ΔTR; 1% ΔVR)
Shock ..... 100G (1% ΔTR; 1% ΔVR)
Load Life
..... 1,000 hours 0.5 watt @ 85°C
(2% ΔTR; 3% or 3 ohms,
whichever is greater, CRV)
Rotational Life ..... 200 cycles
(2% ΔTR; 3% or 3 ohms,
whichever is greater, CRV)

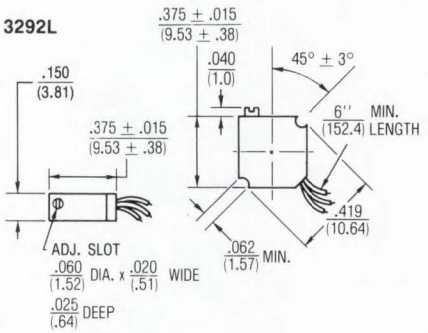
Physical Characteristics

Torque ..... 5.0 oz-in. max.
Mechanical Stops ..... Wiper idles
Terminals
..... Solderable printed circuit pins
Weight ..... 0.025 oz.

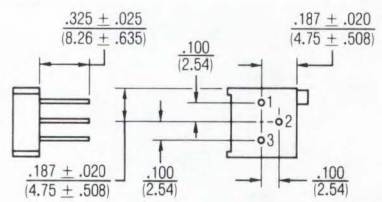
Machine Screw Mounting

Torque ..... 12 oz-in. max.
Marking ..... Manufacturer's
trademark, resistance code,
wiring diagram, date code,
manufacturer's model
number and style
Standard Packaging
P,W &X Styles ..... 50 pcs. per tube
L Style ..... 100 pcs. per bag

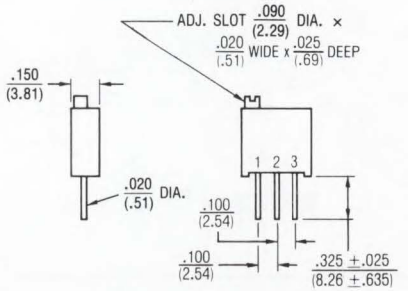
3292L



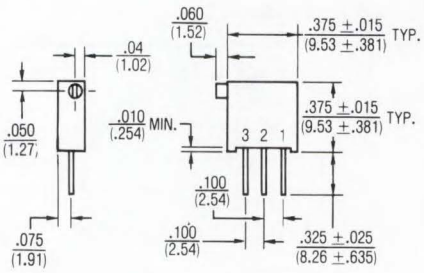
3292P



3292W

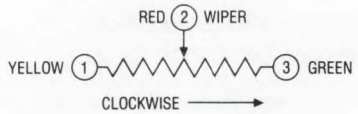


3292X



TOLERANCES: ± .010 (.25) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)



STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code
10	100
20	200
50	500
100	101
200	201
500	501
1,000	102
2,000	202
5,000	502
10,000	103
20,000	203
25,000	253
50,000	503
100,000	104
200,000	204
250,000	254
500,000	504
1,000,000	105

Special resistances available from 10 ohms to 1 megohm.

See Page 204 for Mil-Spec qualified resistance values, terminal styles and failure rates.

HOW TO ORDER

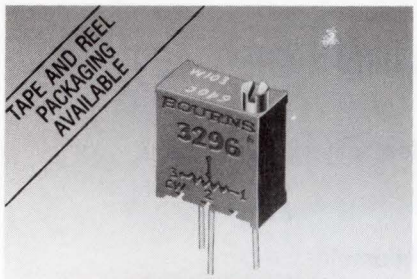
3292 L - 1 - 103 M

Model
Style
Standard or Modified Product Indicator
-1 = Standard Product
-11 = 5% Resistance Tolerance
-73= 12" Flexible Leads
Resistance Code
Optional Suffix Letter
M = Panel Mount (Factory Installed)

Consult factory for other available options.

Specifications are subject to change without notice.

*"Fluorinert" is a registered trademark of 3M Co.



3/8" SQUARE / MULTITURN / CERMET INDUSTRIAL / SEALED

- 5 terminal styles
- Thin body profile
- Tape and reel packaging available (see page 42 for details)

BOURNS

Model 3296

Bourns® Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range
..... 10 to 5 megohms
(see standard resistance table)
Resistance Tolerance ..... ±10% std.
(tighter tolerance available)
Absolute Minimum Resistance
..... 1% or 2 ohms max.
(whichever is greater)
Contact Resistance Variation
..... 1.0% or 3 ohms
(whichever is greater)
Adjustability
Voltage ..... ±0.01%
Resistance ..... ±0.05%
Resolution ..... Infinite
Insulation Resistance ..... 500 vdc.
1,000 megohms min.
Dielectric Strength
Sea Level ..... 900 vac
70,000 Feet ..... 350 vac
Effective Travel ..... 25 turns nom.

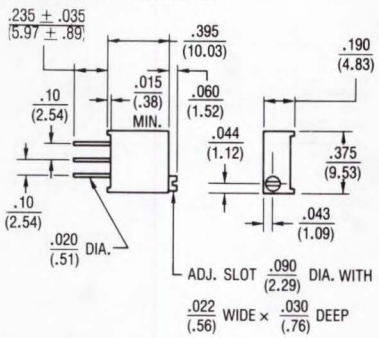
Environmental Characteristics

Power Rating (300 volts max.)
70°C ..... 0.5 watt
125°C ..... 0 watt
Temperature Range
..... -55°C to +125°C
Temperature Coefficient
..... ±100ppm/°C
Seal Test ..... 85°C Fluorinert*
Humidity ..... MIL-STD-202 Method 103
96 hours
(2% ΔTR, 10 Megohms IR)
Vibration ..... 20G (1% ΔTR; 1% ΔVR)
Shock ..... 100G (1% ΔTR; 1% ΔVR)
Load Life
..... 1,000 hours 0.5 watt @ 70°C
(3% ΔTR; 3% or 3 ohms,
whichever is greater, CRV)
Rotational Life ..... 200 cycles
(4% ΔTR; 3% or 3 ohms,
whichever is greater, CRV)

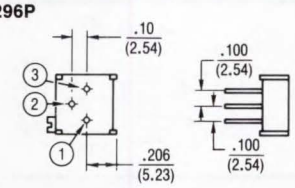
Physical Characteristics

Torque ..... 3.0 oz-in. max.
Mechanical Stops ..... Wiper idles
Terminals ..... Solderable pins
Weight ..... 0.03 oz.
Marking ..... Manufacturer's
trademark, resistance code,
wiring diagram, date code,
manufacturer's model
number and style
Standard Packaging .. 50 pcs. per tube

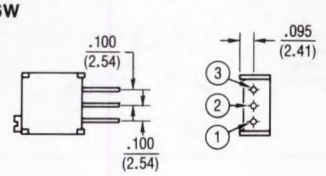
COMMON DIMENSIONS



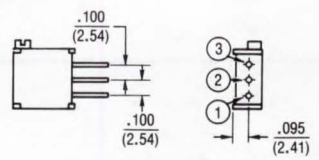
3296P



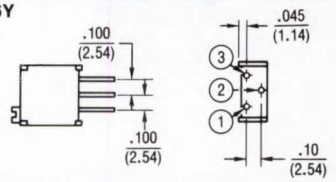
3296W



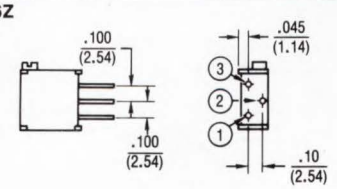
3296X



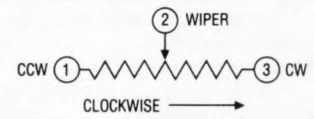
3296Y



3296Z



TOLERANCES: ± .010 (.25) EXCEPT WHERE NOTED
DIMENSIONS: IN. (MM)



STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code
10	100
20	200
50	500
100	101
200	201
500	501
1,000	102
2,000	202
5,000	502
10,000	103
20,000	203
25,000	253
50,000	503
100,000	104
200,000	204
250,000	254
500,000	504
1,000,000	105
2,000,000	205
5,000,000	505

Special resistances available from 10 ohms to 5 megohms.

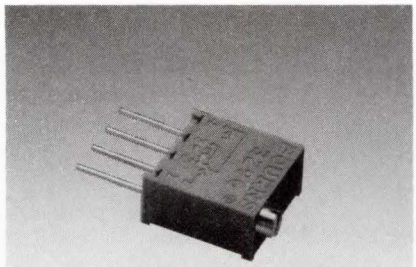
HOW TO ORDER

3296 W - 1 - 103

Model
Style
Standard or Modified Product Indicator
-1 = Standard Product
-11 = 5% Resistance Tolerance
Resistance Code

Consult factory for other available options.

Specifications are subject to change without notice.
*"Fluorinert" is a registered trademark of 3M Co.



3/8" SQUARE / MULTITURN / CERMET INDUSTRIAL / SEALED

- Designed for operational amplifier offset voltage adjustment applications
- Reduces power supply drift errors
- Unique center tapped trimming potentiometer
- Vertical and horizontal adjust types available

Model 3296-OT1

Bourns® Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range (Pin 1 to Pin 3) ..... 100 ohms to 1 megohm (see standard resistance table)
Resistance Tolerance ..... ±20% std.
Absolute Minimum Resistance ..... 2 ohms max.
Voltage Output Variation ..... +0.25%
Adjustability (VR) ..... ±0.025%
Insulation Resistance @ 500 VDC ..... 1,000 megohms min.
Dielectric Strength
Sea Level ..... 900 vac
70,000 Feet ..... 350 vac
Effective Electrical Travel, Nom. ..... 25 turns
Center Tap Resistance .... 2 ohms max.
Center Tap Electrical Center ..... ±5%
Center Tap Dead Band ..... 0.5 turn

Environmental Characteristics

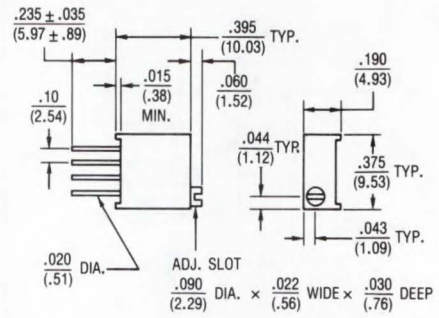
Power Rating
70°C ..... 0.5 watt
125°C ..... 0 watt
Temperature Range ..... -55°C to +125°C
Temperature Stability (ΔVR) ..... ±0.5% max.
Seal Test ..... 85°C Fluorinert*
Humidity ..... MIL-STD-202 Method 103
96 hours ..... 10 megohms min.
Vibration, 20G ..... ±1% ΔTR
Shock, 100G ..... ±1% ΔTR
Load Life, 1,000 Hours ..... ±3% ΔTR
Rotational Life, 200 cycles ..... ±4% ΔTR

Physical Characteristics

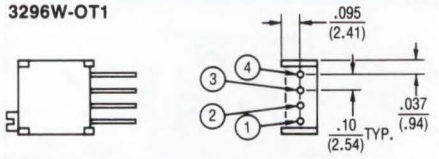
Torque ..... 3.0 oz-in. max.
Mechanical Stops ..... Wiper idles
Terminals ..... Solderable pins
Weight ..... 0.03 oz.
Marking ..... Manufacturer's trademark, resistance code, wiring diagram, date code, manufacturer's model number and style
Standard Packaging .. 50 pcs. per tube

Also see Model 3386-OT1, page 41.

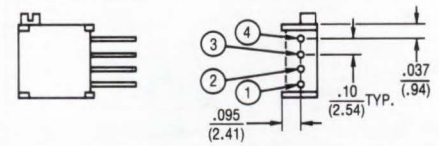
COMMON DIMENSIONS



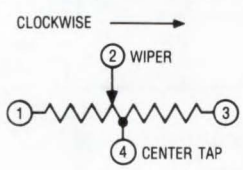
3296W-OT1



3296X-OT1



TOLERANCES: ± .010 (.25) OR LESS EXCEPT WHERE NOTED
DIMENSIONS: IN. (MM)



STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code
100	101
200	201
500	501
1,000	102
2,000	202
5,000	502
10,000	103•
20,000	203
50,000	503•
100,000	104•
200,000	204
500,000	504
1,000,000	105

•Preferred Values

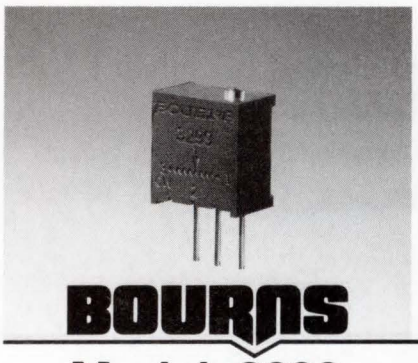
Special resistances available from 100 to 1 megohm.

HOW TO ORDER

3296 X - OT1 - 103

Model
Style
Catalog Product
Resistance Code

Specifications are subject to change without notice.
**"Fluorinert" is a registered trademark of 3M Co.



3/8" SQUARE / MULTITURN / CERMET INDUSTRIAL / SEALED

- Low noise, high performance
- High power rating
- Five popular terminal styles

BOURNS

Model 3299

Bourns® Trimming Potentiometer

Electrical Characteristics

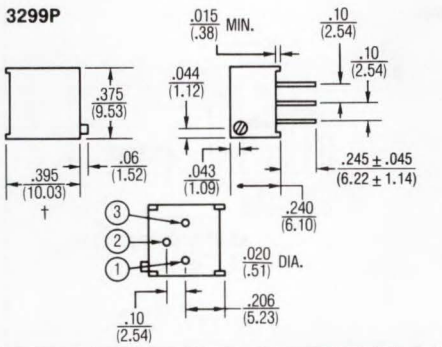
Standard Resistance Range
.....10 to 5 megohms
(see standard resistance table)
Resistance Tolerance .....±10% std.
(tighter tolerance available)
Absolute Minimum Resistance
.....1% or 2 ohms max.
(whichever is greater)
Contact Resistance Variation
.....1.0% or 3 ohms
(whichever is greater)
Adjustability
Voltage .....±0.01%
Resistance .....±0.05%
Resolution .....Infinite
Insulation Resistance .....500 vdc.
1,000 megohms min.
Dielectric Strength
Sea Level .....900 vac
70,000 Feet .....350 vac
Effective Travel .....25 turns nom.

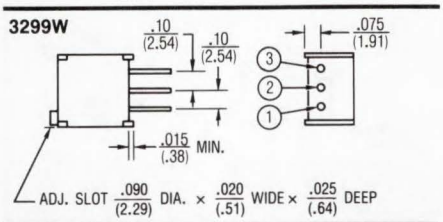
Environmental Characteristics

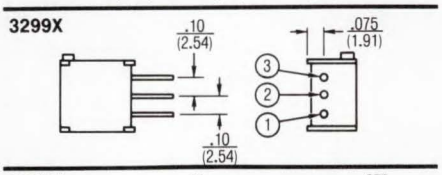
Power Rating (300 volts max.)
70°C .....0.5 watt
125°C .....0 watt
Temperature Range
.....-55°C to +125°C
Temperature Coefficient
.....±100ppm/°C
Seal Test .....85°C Fluorinert*
Humidity.....MIL-STD-202 Method 103
96 hours
(2% ΔTR, 10 Megohms IR)
Vibration .....20G (1% ΔTR; 1% ΔVR)
Shock .....100G (1% ΔTR; 1% ΔVR)
Load Life
.....1,000 hours 0.5 watt @ 70°C
(3% ΔTR; 3% or 3 ohms,
whichever is greater, CRV)
Rotational Life .....200 cycles
(4% ΔTR; 3% or 3 ohms,
whichever is greater, CRV)

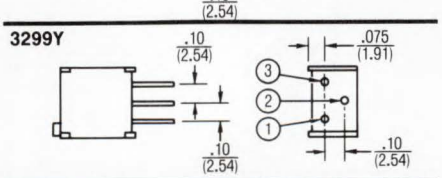
Physical Characteristics

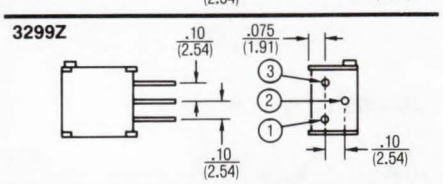
Torque .....3.0 oz-in. max.
Mechanical Stops .....Wiper idles
Terminals .....Solderable pins
Weight .....0.035 oz.
Marking .....Manufacturer's
trademark, resistance code,
wiring diagram, date code,
manufacturer's model
number and style
Standard Packaging ..50 pcs. per tube





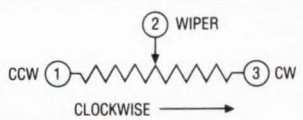






TOLERANCES: ± .010 (.25) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)



STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code
10	100
20	200
50	500
100	101
200	201
500	501
1,000	102
2,000	202
5,000	502
10,000	103
20,000	203
25,000	253
50,000	503
100,000	104
200,000	204
250,000	254
500,000	504
1,000,000	105
2,000,000	205
5,000,000	505

Special resistances available from 10 ohms to 5 megohms.

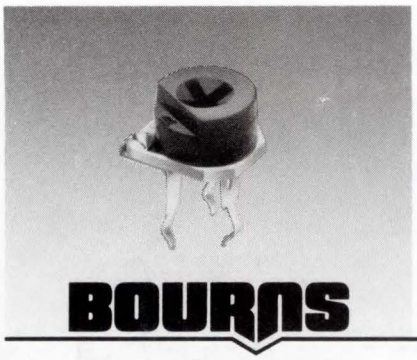
HOW TO ORDER

3299 W - 1 - 103

Model
Style
Standard or Modified Product Indicator
-1 = Standard Product
-11 = 5% Resistance Tolerance
Resistance Code

Consult factory for other available options.

Specifications are subject to change without notice.
*"Fluorinert" is a registered trademark of 3M Co.



BOURNS

6MM ROUND / SINGLE-TURN / CERMET INDUSTRIAL / OPEN FRAME

- Cross slot rotor design suitable for automatic adjustment equipment
- Board retention feature
- Dust resistant/splash resistant cover
- PC board stand-offs
- Front and top adjust styles

Model 3306

Bourns® Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range
.....100 to 1 megohm
(see standard resistance table)
Resistance Tolerance .....±25% std.
Closer tolerances available
Absolute Minimum Resistance
.....2% max. (≤2K = 30 ohms)
Contact Resistance Variation
.....3% max.
Resolution .....Infinite
Adjustment Angle .....215° nom.

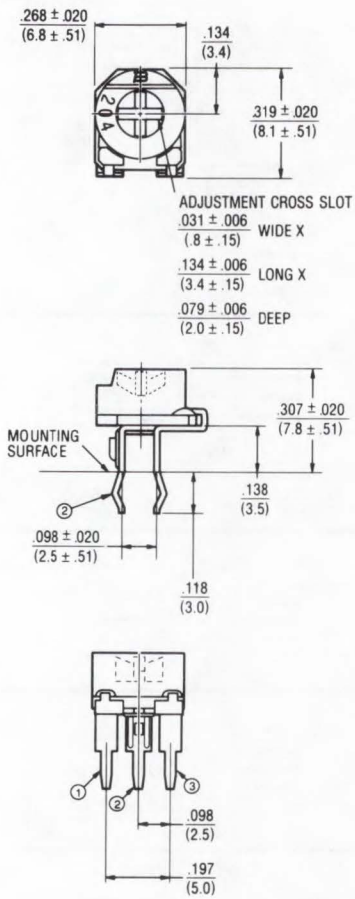
Environmental Characteristics

Power Rating (100 volts max.)
70°C .....0.2 watt
Temperature Range
.....-25°C to +100°C
Temperature Coefficient
.....±250ppm/°C
Load Life
.....1,000 hours 0.2 watt @ 70°C
(5% ΔTR)

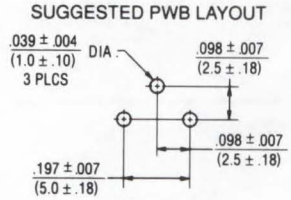
Physical Characteristics

Torque (Operating) .....4.5 oz-in. max.
Stop Strength .....6.5 oz -in. min.
Terminals .....Solderable pins
Marking .....Manufacturer's
trademark, resistance code
Rotor Color .....Blue
Standard Packaging
.....300 pcs. per bag

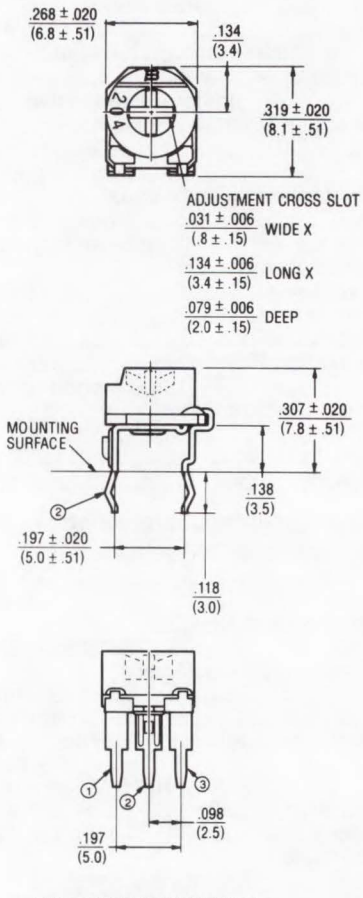
3306P



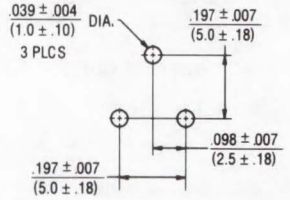
SUGGESTED PWB LAYOUT



3306F



SUGGESTED PWB LAYOUT

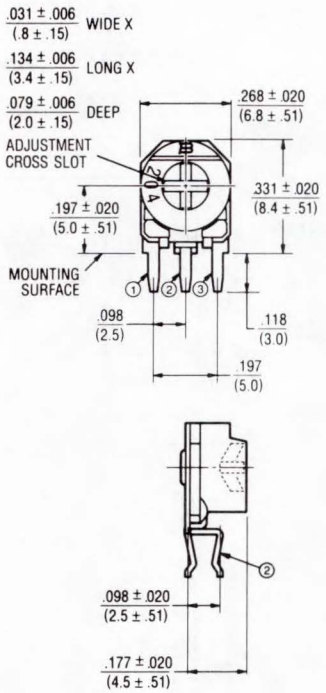


Specifications are subject to change without notice.

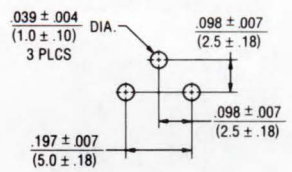
Model 3306

Bourns® Trimming Potentiometer

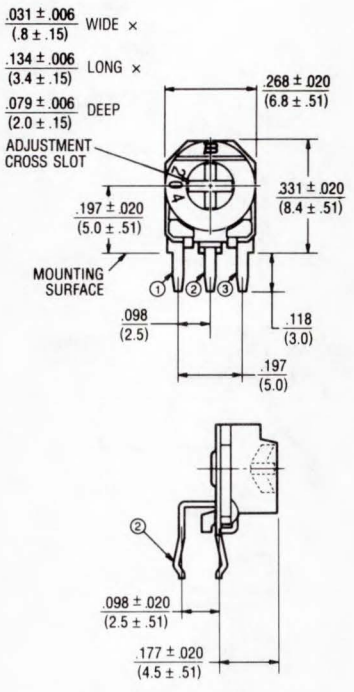
3306 W



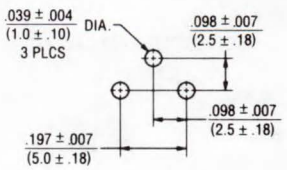
SUGGESTED PWB LAYOUT



3306K

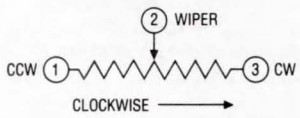


SUGGESTED PWB LAYOUT



TOLERANCES: ± .012 (0.30) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)



STANDARD RESISTANCE TABLE

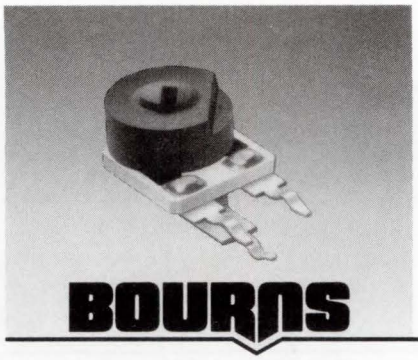
Resistance (Ohms)	Resistance Code
100	101
200	201
500	501
1,000	102
2,000	202
5,000	502
10,000	103
20,000	203
25,000	253
50,000	503
100,000	104
200,000	204
250,000	254
500,000	504
1,000,000	105

HOW TO ORDER

3306 W - 1 - 103

Model
Style
Standard Product
Resistance Code

Other rotor colors available, consult factory.



9MM ROUND / SINGLE-TURN / CERMET INDUSTRIAL / OPEN FRAME

- Cross slot rotor design suitable for automatic adjustment equipment
- Board retention feature
- Dust resistant/splash resistant cover
- PC board stand-offs
- Front and top adjust styles

Model 3309

Bourns® Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range
.....100 to 1 megohm
(see standard resistance table)
Resistance Tolerance .....±25% std.
Absolute Minimum Resistance
.....2% max. (≤2K = 30 ohms)
Contact Resistance Variation
.....3% max.
Resolution .....Infinite
Adjustment Angle .....235° nom.

Environmental Characteristics

Power Rating (250 volts max.)
70°C .....0.5 watt
Temperature Range
.....-25°C to +100°C
Temperature Coefficient
.....±250ppm/°C
Load Life
.....1,000 hours 0.5 watt @ 70°C
(5% ΔTR)

Physical Characteristics

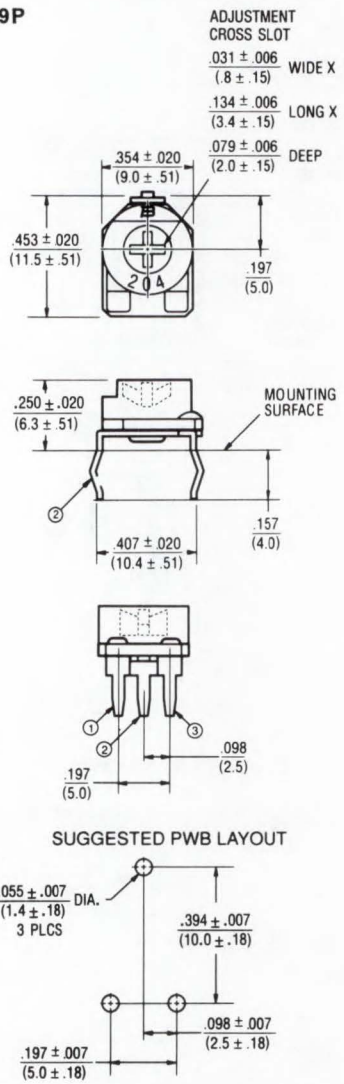
Torque (Operating)
.....5 oz-in. max.
Stop Strength
.....11.0 oz -in. min.
Terminals .....Solderable pins
Marking .....Manufacturer's trademark, resistance code
Rotor Color .....Blue

Standard Packaging
.....200 pcs. per bag

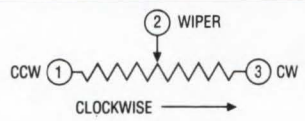
STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code
100	101
200	201
500	501
1,000	102
2,000	202
5,000	502
10,000	103
20,000	203
25,000	253
50,000	503
100,000	104
200,000	204
250,000	254
500,000	504
1,000,000	105

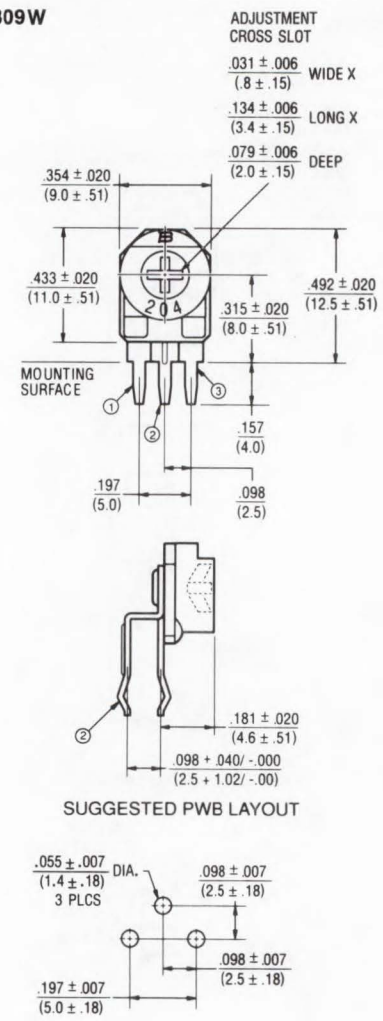
3309P



TOLERANCES: ± .012 (0.30) EXCEPT WHERE NOTED
DIMENSIONS: IN. (MM)



3309W



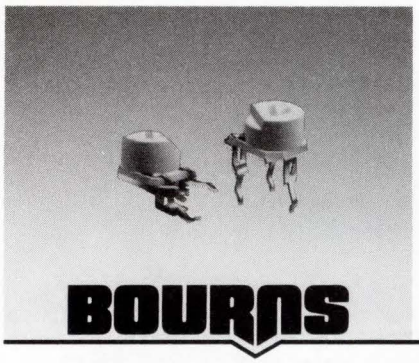
HOW TO ORDER

3309 W - 1 - 103

Model
Style
Standard Product
Resistance Code

Other rotor colors available, consult factory.

Specifications are subject to change without notice.



6MM ROUND / SINGLE-TURN / CARBON COMMERCIAL / OPEN FRAME

- Cross slot rotor design suitable for automatic adjustment equipment
- Board retention feature
- Dust resistant/splash resistant cover
- PC board stand-offs
- Front and top adjust styles

Model 3316

Bourns® Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range
.....100 to 1 megohm
(see standard resistance table)
Resistance Tolerance .....±25% std.
End Resistance
.....2% max. (≤2K = 30 ohms)
Contact Resistance Variation
.....3% max.
Resolution .....Infinite
Adjustment Angle .....215° nom.

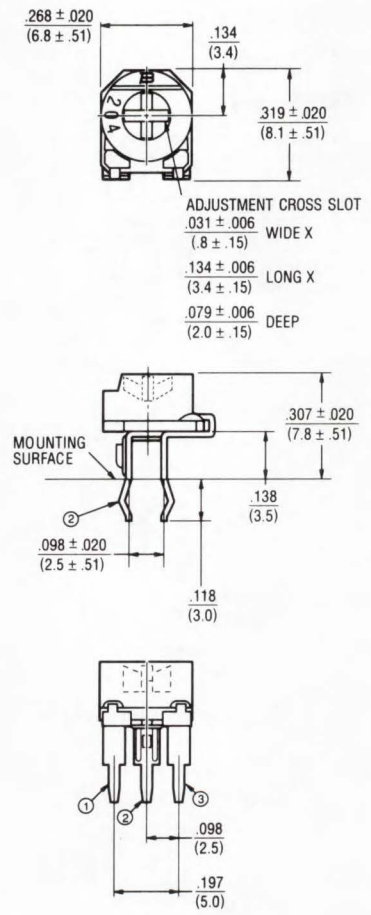
Environmental Characteristics

Power Rating (100 volts max.)
70°C .....0.1 watt
Temperature Range
.....-25°C to +100°C
Temperature Coefficient
.....±1000ppm/°C
Load Life
.....1,000 hours 0.1 watt @ 70°C
(10% ΔTR)

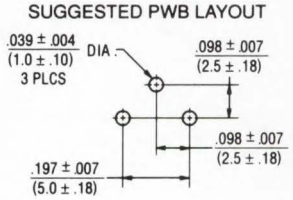
Physical Characteristics

Torque (Operating)
.....4.5 oz-in. max.
Stop Strength
.....6.5 oz -in. min.
Terminals .....Solderable pins
Marking .....Manufacturer's
trademark, resistance code
Standard Packaging
.....300 pcs. per bag

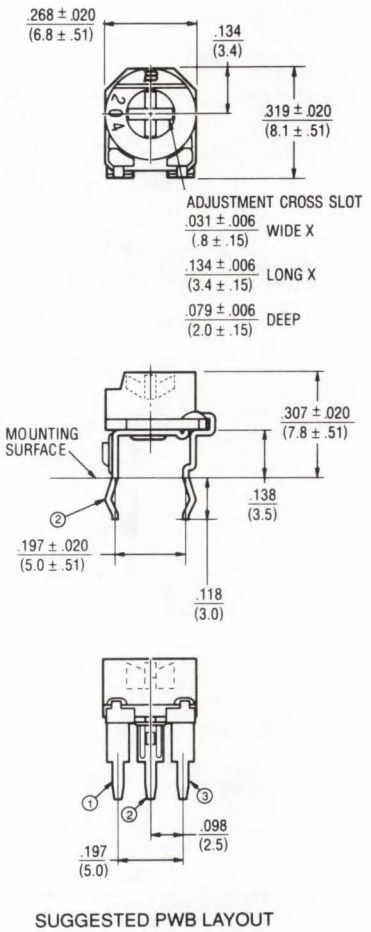
3316P



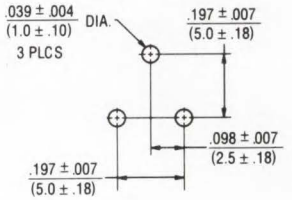
SUGGESTED PWB LAYOUT



3316F



SUGGESTED PWB LAYOUT

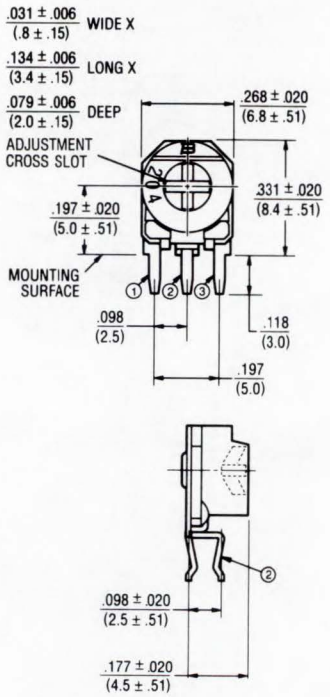


Continued on next page.

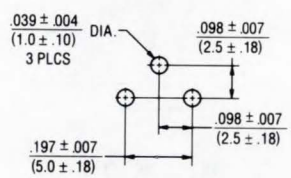
Model 3316

Bourns® Trimming Potentiometer

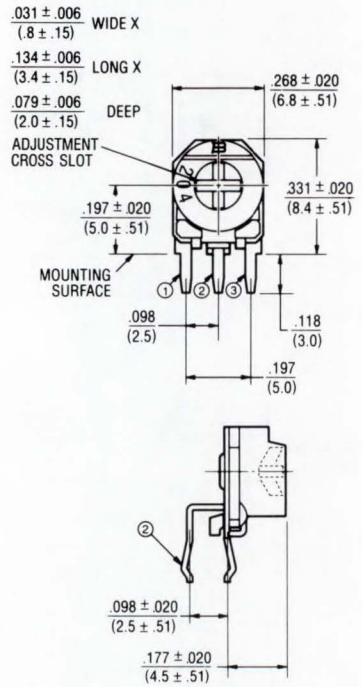
3316W



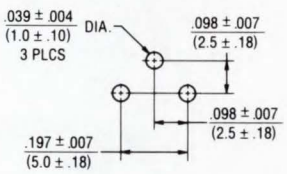
SUGGESTED PWB LAYOUT



3316K

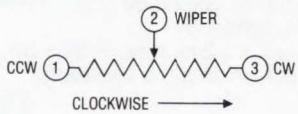


SUGGESTED PWB LAYOUT



TOLERANCES: ± .012 (0.30) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)



STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code
100	101
200	201
500	501
1,000	102
2,000	202
5,000	502
10,000	103
20,000	203
25,000	253
50,000	503
100,000	104
200,000	204
250,000	254
500,000	504
1,000,000	105

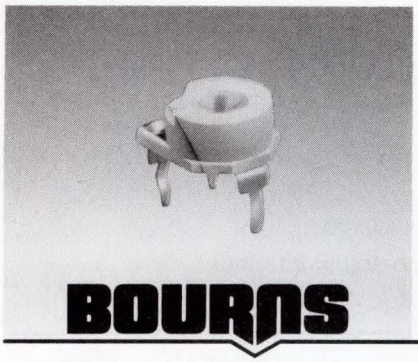
HOW TO ORDER

3316 W - 1 - 103

Model
Style
Standard Product
Resistance Code

Other rotor colors available, consult factory.

Specifications on page 27.



9MM ROUND / SINGLE-TURN / CARBON COMMERCIAL / OPEN FRAME

- Cross slot rotor design suitable for automatic adjustment equipment
- Board retention feature
- Dust resistant/splash resistant cover
- PC board stand-offs
- Front and top adjust styles

Model 3319

Bourns® Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range
.....100 to 1 megohm
(see standard resistance table)
Resistance Tolerance .....±25% std.
End Resistance
.....2% max. (≤2K = 30 ohms)
Contact Resistance Variation
.....3% max.
Resolution .....Infinite
Adjustment Angle .....235° nom.

Environmental Characteristics

Power Rating (200 volts max.)
70°C .....0.2 watt
Temperature Range
.....-25°C to +100°C
Temperature Coefficient
.....±1000ppm/°C
Load Life
.....1,000 hours 0.2 watt @ 70°C
(<100K = +3/-7% ΔTR)
(≥100K = +3/-10% ΔTR)

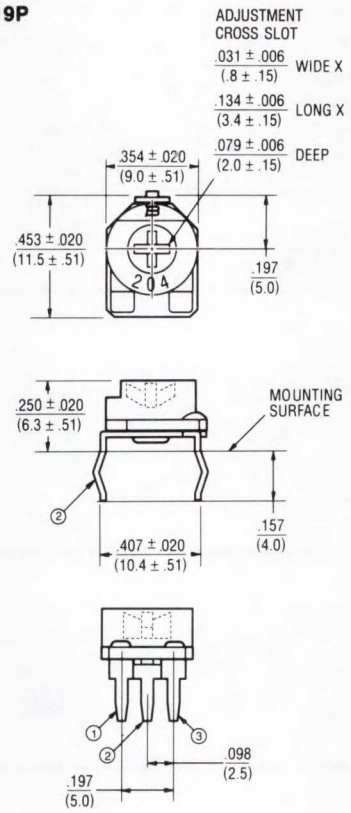
Physical Characteristics

Torque (Operating)
.....5 oz-in. max.
Stop Strength
.....11.0 oz -in. min.
Terminals .....Solderable pins
Marking .....Manufacturer's trademark, resistance code
Rotor Color .....White
Standard Packaging
.....200 pcs. per bag

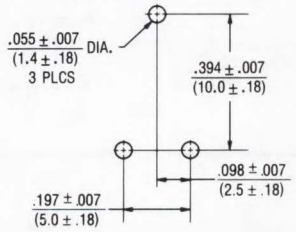
STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code
100	101
200	201
500	501
1,000	102
2,000	202
5,000	502
10,000	103
20,000	203
25,000	253
50,000	503
100,000	104
200,000	204
250,000	254
500,000	504
1,000,000	105

3319P

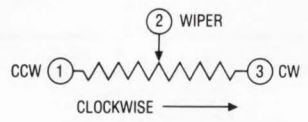


SUGGESTED PWB LAYOUT

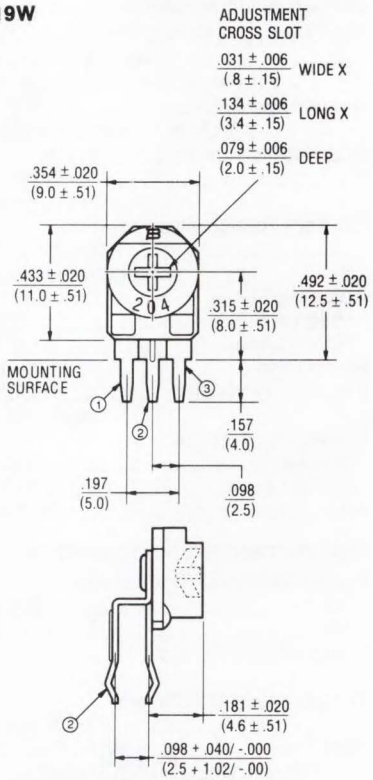


TOLERANCES: ± .012 (0.30) EXCEPT WHERE NOTED

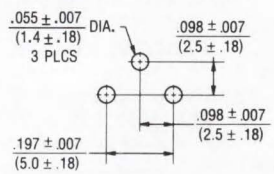
DIMENSIONS: IN. (MM)



3319W



SUGGESTED PWB LAYOUT

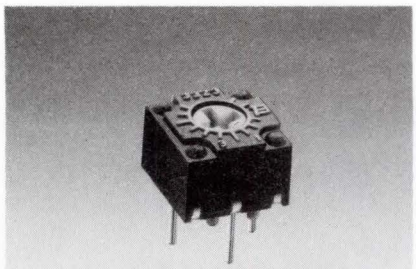


HOW TO ORDER

3319 W - 1 - 103

Model
Style
Standard Product
Resistance Code

Other rotor colors available, consult factory.



1/4" SQUARE / SINGLE-TURN / CERMET INDUSTRIAL / SEALED

- Miniature industrial single-turn
- 5 standard terminal styles
- Vertical and horizontal adjust types available
- Rotor designed for automatic machine adjust interface
- For tape and reel, see Model 3362 (page 43)

Model 3323

3® Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range
.....20 to 2 megohms
(see standard resistance table)
Resistance Tolerance .....±20% std.
(tighter tolerance available)
Absolute Minimum Resistance
.....1% or 2 ohms max.
(whichever is greater)
Contact Resistance Variation
.....1.0% or 3 ohms
(whichever is greater)
Adjustability
Voltage .....±0.05%
Resistance .....±0.15%
Resolution .....Infinite
Insulation Resistance .....500 vdc.
1,000 megohms min.
Dielectric Strength
Sea Level .....900 vac
80,000 Feet .....350 vac
Adjustment Angle .....240° nom.

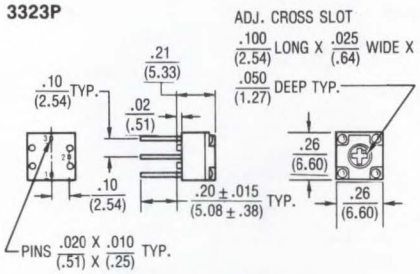
Environmental Characteristics

Power Rating (300 volts max.)
70°C .....0.5 watt
150°C .....0 watt
Temperature Range
.....-55°C to +125°C
Temperature Coefficient
.....±100ppm/°C
Seal Test .....85°C Fluorinert*
Humidity.....MIL-STD-202 Method 103
96 hours
(2% ΔTR, 10 Megohms IR)
Vibration .....30G (1% ΔTR; 1% ΔVR)
Shock .....100G (1% ΔTR; 1% ΔVR)
Load Life
.....1,000 hours 0.5 watt @ 70°C
(3% ΔTR; 3% or 3 ohms,
whichever is greater, CRV)
Rotational Life .....200 cycles
(4% ΔTR; 3% or 3 ohms,
whichever is greater, CRV)

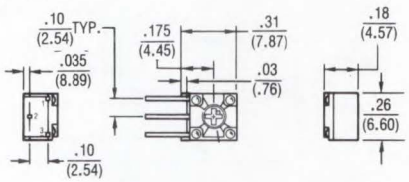
Physical Characteristics

Mechanical Angle .....270° nom.
Torque .....3.0 oz-in. max.
Stop Strength .....8.0 oz -in. min.
Terminals .....Solderable pins
Weight .....0.02 oz.
Marking .....Manufacturer's
trademark, resistance code,
terminal numbers, date code
on packaging, manufacturer's
model number and style
Standard Packaging ..50 pcs. per tube

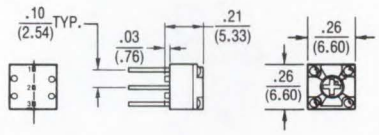
3323P



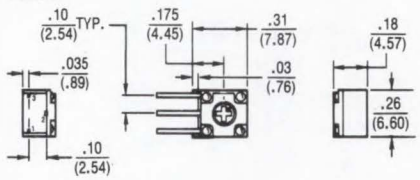
3323S



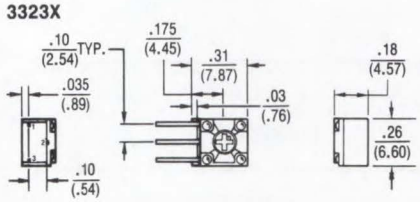
3323U



3323W

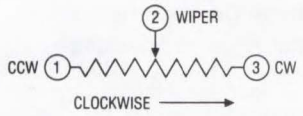


3323X



TOLERANCES: ± .010 (.25) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)



STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code
20	200
50	500
100	101
200	201
500	501
1,000	102
2,000	202
5,000	502
10,000	103
20,000	203
25,000	253
50,000	503
100,000	104
200,000	204
250,000	254
500,000	504
1,000,000	105
2,000,000	205

Special resistances available from 20 ohms to 2 megohms.

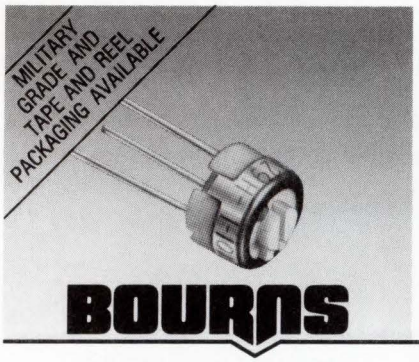
HOW TO ORDER

3323 W - 1 - 103

Model
Style
Standard or Modified Product Indicator
-1 = Standard Product
-10 = 10% Resistance Tolerance
Resistance Code

Consult factory for other available options.

Specifications are subject to change without notice.
*"Fluorinert" is a registered trademark of 3M Co.



1/4" ROUND / SINGLE-TURN / CERMET INDUSTRIAL / SEALED

- See Model RJ50 for QPL per MIL-R-22097 and RJR50 per High-Rel MIL-R-39035 (page 207)
- 5 standard terminal styles
- Vertical and horizontal adjust types available
- Tape and reel packaging available (see page 43 for details)

BOURNS

Model 3329

Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range ..... 10 to 1 megohm (see standard resistance table)
Resistance Tolerance ..... ±10% std. (closer tolerance available)
Absolute Minimum Resistance ..... 1% or 2 ohms (whichever is greater)
Contact Resistance Variation ..... 3.0% or 3 ohms (whichever is greater)
Adjustability
Voltage ..... ±0.05%
Resistance ..... ±0.15%
Resolution ..... Infinite
Insulation Resistance ..... 500 vdc. 1,000 megohms min.
Dielectric Strength
Sea Level ..... 600 vac
80,000 Feet ..... 250 vac
Adjustment Angle ..... 240° nom.

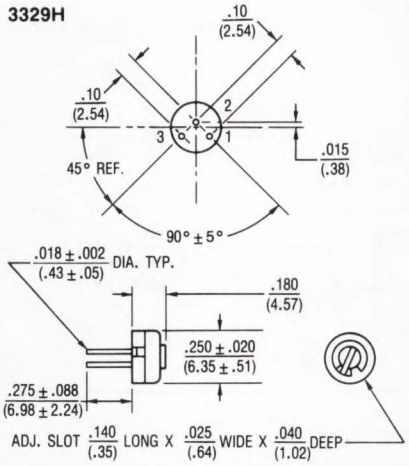
Environmental Characteristics

Power Rating (300 volts max.)
85°C ..... 0.5 watt
150°C ..... 0 watt
Temperature Range ..... -55°C to +150°C
Temperature Coefficient ..... ±100ppm/°C
Seal Test ..... 85°C Fluorinert*
Humidity (Commercial Model) ..... MIL-STD-202 Method 103 96 hours (3% ΔTR, 10 Megohms IR)
Vibration ..... 30G (1% ΔTR; 1% ΔVR)
Shock ..... 100G (1% ΔTR; 1% ΔVR)
Load Life ..... 1,000 hours 0.5 watt @ 85°C (3% ΔTR; 3% CRV)
Rotational Life ..... 200 cycles (4% ΔTR; 4% CRV)

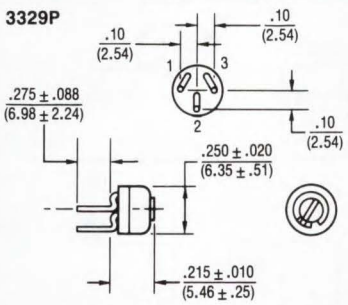
Physical Characteristics

Mechanical Angle ..... 260° nom.
Torque ..... 5.0 oz-in. max.
Stop Strength ..... 5.0 oz -in. min.
Terminals ..... Solderable pins
Weight ..... 0.02 oz.
Marking ..... Manufacturer's trademark, resistance code, date code, manufacturer's model number and style
Standard Packaging .. 50 pcs. per tube

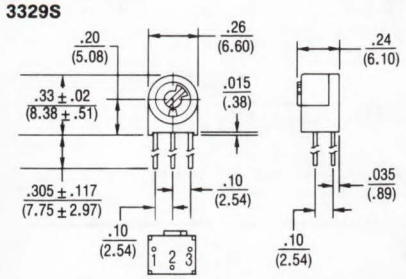
3329H



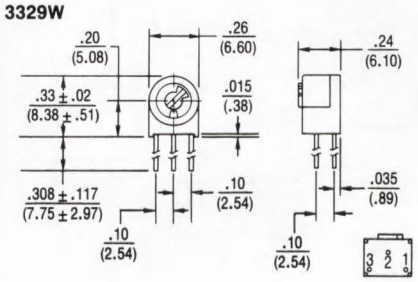
3329P



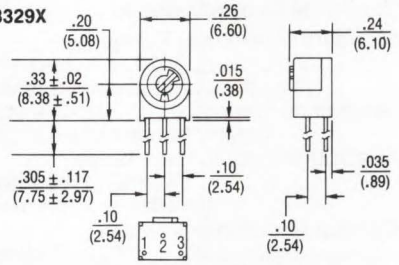
3329S



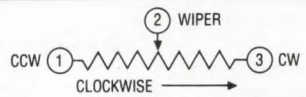
3329W



3329X



TOLERANCES: ± .010 (.25) EXCEPT WHERE NOTED
DIMENSIONS: IN. (MM)



STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code
10	100
20	200
50	500
100	101
200	201
500	501
1,000	102
2,000	202
5,000	502
10,000	103
20,000	203
25,000	253
50,000	503
100,000	104
200,000	204
250,000	254
500,000	504
1,000,000	105

Special resistances available from 10 ohms to 1 megohm.

See page 207 for Mil-Spec qualified resistance values, terminal styles, characteristics and failure rates.

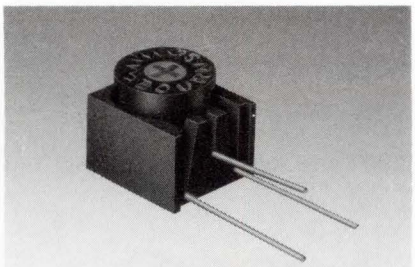
HOW TO ORDER

3329 P - 1 - 103

Model
Style
Standard or Modified Product Indicator
-1 = Standard Product
-11 = 5% Resistance Tolerance
-99 = 5/8" Length Pins
Resistance Code

Consult factory for other available options.

Specifications are subject to change without notice.
*"Fluorinert" is a registered trademark of 3M Co.



5/16" ROUND / FOUR-TURN / CERMET INDUSTRIAL / SEALED

- Unique planetary drive offers precise wiper setting of a multiturn in a single-turn package size
- Top and side adjust styles

BOURNS

Model 3339

Bourns® Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range
.....10 to 1 megohm
(see standard resistance table)
Resistance Tolerance .....±10% std.
(tighter tolerance available)
Absolute Minimum Resistance
.....1% or 2 ohms max.
(whichever is greater)
Contact Resistance Variation
.....3% or 3 ohms
(whichever is greater)
Adjustability
Voltage .....±0.05%
Resistance .....±0.1%
Resolution .....Infinite
Insulation Resistance .....500 vdc.
1,000 megohms min.
Dielectric Strength
Sea Level .....600 vac
80,000 Feet .....250 vac
Effective Travel .....4 turns nom.

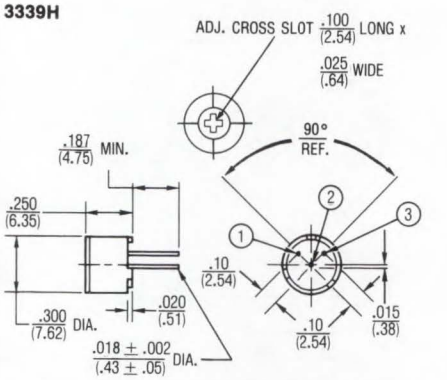
Environmental Characteristics

Power Rating (300 volts max.)
85°C .....0.5 watt
150°C .....0 watt
Temperature Range
.....-55°C to +150°C
Temperature Coefficient
.....±100ppm/°C
Seal Test .....85°C Fluorinert*
Humidity.....MIL-STD-202 Method 103
96 hours
(3% ΔTR, 10 Megohms IR)
Vibration .....30G (1% ΔTR; 1% ΔVR)
Shock .....100G (1% ΔTR; 1% ΔVR)
Load Life
.....1,000 hours 0.5 watt @ 85°C
(3% ΔTR; 3% or 3 ohms,
whichever is greater, CRV)
Rotational Life .....200 cycles
(3% ΔTR; 3% or 3 ohms,
whichever is greater, CRV)

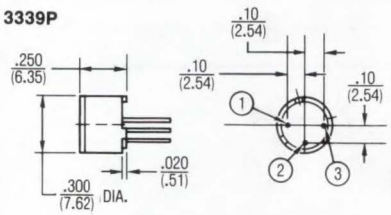
Physical Characteristics

Torque .....3 oz-in. max.
Mechanical Stops .....Wiper idles
Terminals .....Solderable pins
Weight .....0.02 oz.
Marking .....Manufacturer's
trademark, resistance code,
wiring diagram, date
code, manufacturer's
model number and style
Standard Packaging ..50 pcs. per tube

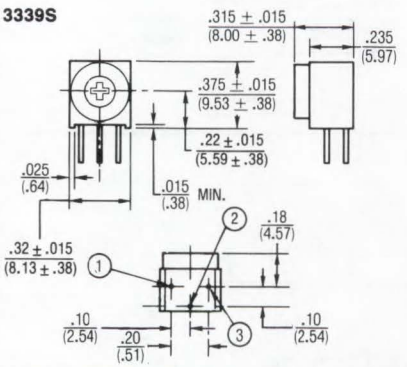
3339H



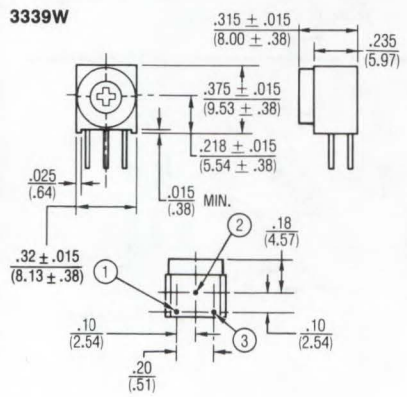
3339P



3339S

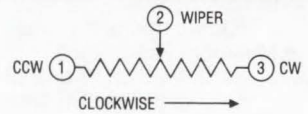


3339W



TOLERANCES: ± .010 (.25) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)



STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code
10	100
20	200
50	500
100	101
200	201
500	501
1,000	102
2,000	202
5,000	502
10,000	103
20,000	203
25,000	253
50,000	503
100,000	104
200,000	204
250,000	254
500,000	504
1,000,000	105

Special resistances available from 10 ohms to 1 megohm.

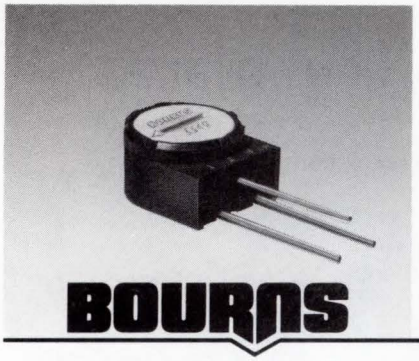
HOW TO ORDER

3339 H - 1 - 103

Model
Style
Standard or Modified Product Indicator
-1 = Standard Product
-11 = 5% Resistance Tolerance
-99 = 5/8 Length Pins
Resistance Code

Consult factory for other available options.

Specifications are subject to change without notice.
*"Fluorinert" is a registered trademark of 3M Co.



1/2" ROUND / SINGLE-TURN / WIREWOUND INDUSTRIAL / SEALED

- Industrial wirewound
- 1.0 watt power rating at 70°C
- Available with a thumbwheel and screwdriver slot adjustment

Model 3345

Bourns® Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range
.....10 to 50K ohms
(see standard resistance table)
Resistance Tolerance .....±5% std.
(tighter tolerance available)
Absolute Minimum Resistance
.....1.0% or 0.5 ohms max.
(whichever is greater)
Noise .....100 ohms ENR max.
Resolution
.....(see standard resistance table)
1,000 megohms min.
Dielectric Strength
Sea Level .....1500 vac
70,000 Feet .....350 vac
Insulation Resistance .....500 vdc.
1,000 megohms min.
Adjustment Angle .....280° nom.

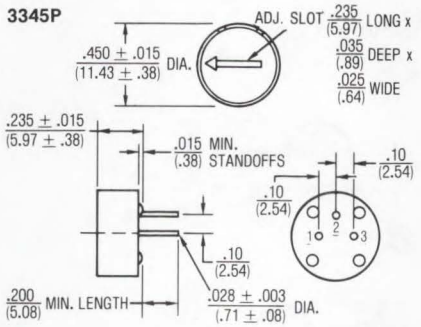
Environmental Characteristics

Power Rating
70°C .....1.0 watt
150°C .....0 watt
Temperature Range
.....-55°C to +150°C
Temperature Coefficient
.....±50ppm/°C
Seal Test .....85°C Fluorinert*
Humidity .....MIL-STD-202 Method 106
(1% ΔTR; 10 Megohms IR)
Vibration .....30G (1% ΔTR; 1% ΔVR)
Shock .....100G (1% ΔTR; 1% ΔVR)
Load Life
.....1,000 hours 1.0 watt @ 70°C
Rotational Life .....200 cycles
(2% ΔTR; 500 ohms ENR)

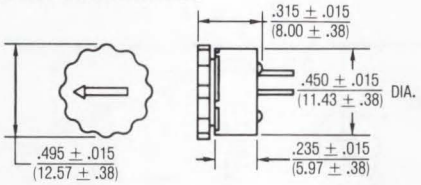
Physical Characteristics

Mechanical Angle .....310° nom.
Torque .....5.0 oz-in. max.
Stop Strength .....15 oz -in. min.
Terminals .....Solderable pins
Weight .....0.04 oz.
Marking .....Manufacturer's
trademark, resistance code,
wiring diagram, date
code, manufacturer's
model number and style
Standard Packaging
.....100 pcs. per bag

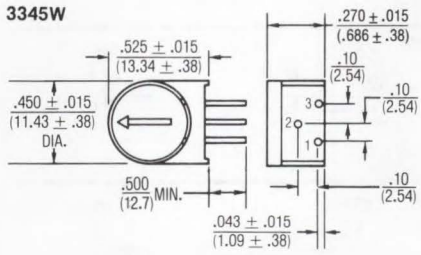
3345P



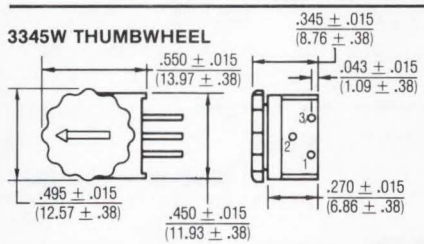
3345P THUMBWHEEL



3345W

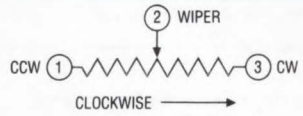


3345W THUMBWHEEL



TOLERANCES: ± .010 (.25) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)



STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code	Nominal Resolution (Percent)
10	100	0.94
20	200	0.76
50	500	0.58
100	101	0.49
200	201	0.49
500	501	0.38
1,000	102	0.30
2,000	202	0.24
5,000	502	0.18
10,000	103	0.14
20,000	203	0.13
50,000	503	0.12
50,000	503	0.10

Special resistances available from 10 to 50K ohms..

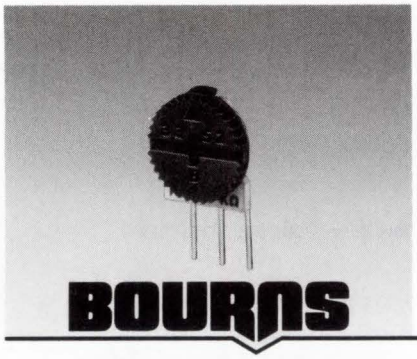
HOW TO ORDER

3345 P - 1 - 502 T

Model
Style
Standard Product
Resistance Code
Optional Suffix Letter
T = Thumb Wheel

Consult factory for other available options.

Specifications are subject to change without notice.
*"Fluorinert" is a registered trademark of 3M Co.



3/8" ROUND / SINGLE-TURN / CERMET INDUSTRIAL / SEALED

- Stable cermet element offers infinite resolution
- Very low profile
- Seven standard pin styles
- Thumb and screwdriver rotor adjustment

Model 3352

Bourns® Trimming Potentiometer

Electrical Characteristics

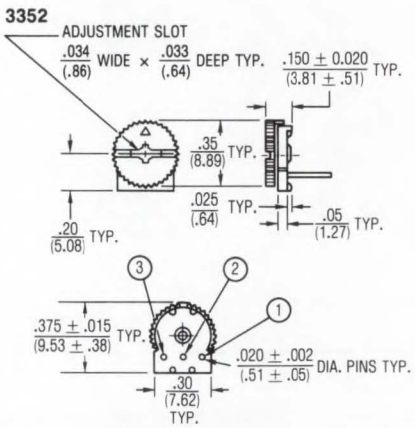
Standard Resistance Range
.....10 to 5 megohms
(see standard resistance table)
Resistance Tolerance.....±20% std.
(tighter tolerance available)
Absolute Minimum Resistance
.....2 ohms max.
Contact Resistance Variation
.....1.0% or 1 ohm
(whichever is greater)
Adjustability
Voltage .....±0.05%
Resistance .....±0.25%
Resolution .....Infinite
Dielectric Strength
Sea Level .....500 vac
80,000 Feet .....350 vac
Adjustment Angle .....205° nom.

Environmental Characteristics

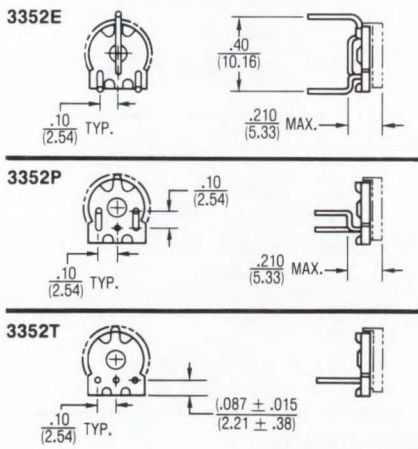
Power Rating (250 volts max.)
85°C .....0.50 watt
125°C .....0 watt
Temperature Range
.....-55°C to +125°C
Temperature Coefficient
±100ppm/°C .....2K & up
±150ppm/°C .....Below 2K
Humidity.....MIL-STD-202 Method 103
96 hours
(2% ΔTR, 10 Megohms IR)
Vibration .....30G (2% ΔTR; 2% ΔVR)
Shock .....100G (2% ΔTR; 2% ΔVR)
Load Life
.....1,000 hours 0.5 watt @ 85°C
(3% ΔTR)
Rotational Life .....200 cycles
(10% ΔTR)

Physical Characteristics

Mechanical Angle .....250° nom.
Torque .....3.0 oz-in. max.
Stop Strength .....8 oz -in. min.
Terminals .....Solderable pins
Weight .....0.01 oz.
Marking .....Manufacturer's
trademark, resistance value
and model number.
Date code on packaging.
Standard Packaging
.....100 pcs. per bag



TOP ADJUST



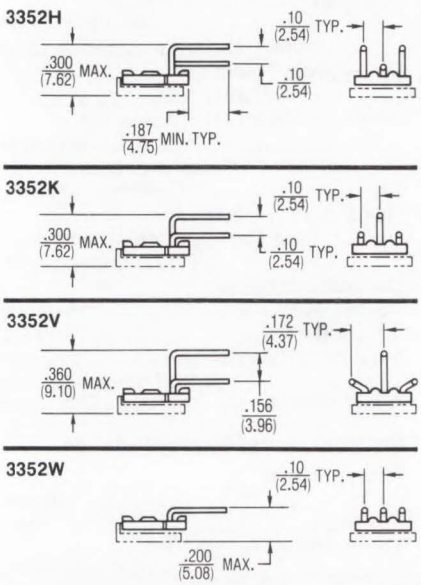
HOW TO ORDER

3352 W - 1 - 103

Model
Style
Standard or Modified Product Indicator
-1 = Standard Product
-10 = 10% Resistance Tolerance
-11 = 5% Resistance Tolerance
Resistance Code

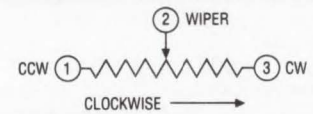
Consult factory for other available options.

SIDE ADJUST



TOLERANCES: ± .010 (.25) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)

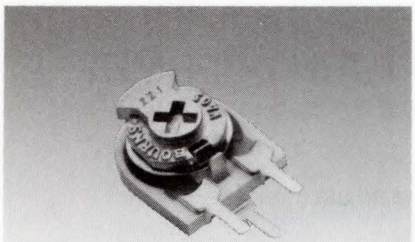


STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code
10	100
20	200
50	500
100	101
200	201
500	501
1,000	102
2,000	202
5,000	502
10,000	103
20,000	203
25,000	253
50,000	503
100,000	104
200,000	204
250,000	254
500,000	504
1,000,000	105
2,000,000	205
5,000,000	505

Special resistances available from 10 ohms to 5 megohms.

Specifications are subject to change without notice.



3/8" ROUND / SINGLE-TURN / CERMET INDUSTRIAL / OPEN FRAME

- Adjustable from front and rear, or top and bottom
- Carbon tip wiper for long life
- Durable metal construction

Model 3359/VA05*

Bourns® Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range ..... 100 to 2 megohms (see standard resistance table)
Resistance Tolerance ..... ±20% std.
Absolute Minimum Resistance ..... 1.0% or 2 ohms max. (whichever is greater)
Contact Resistance Variation ..... 2% or 3 ohms (whichever is greater)
Resolution ..... Infinite
Adjustment Angle ..... 250° nom.

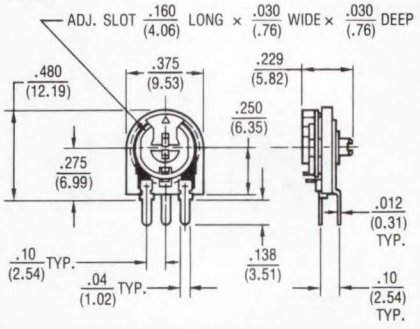
Environmental Characteristics

Power Rating (250 volts max.)
70°C ..... 0.5 watt
125°C ..... 0 watt
Temperature Range ..... -65°C to +125°C
Temperature Coefficient
100 ohms to 1K ohms ..... ±300ppm/°C
2K ohms to 2 megohms ..... +150/-50ppm°C
Humidity ..... MIL-STD-202 Method 103 504 hours (2% ΔTR)
Vibration ..... 30G (2% ΔTR; 2% ΔVR)
Shock ..... 100G (2% ΔTR; 2% ΔVR)
Load Life ..... 1,000 hours 0.5 watt @ 70°C (2% ΔTR)
Rotational Life ..... 500 cycles (10% ΔTR)

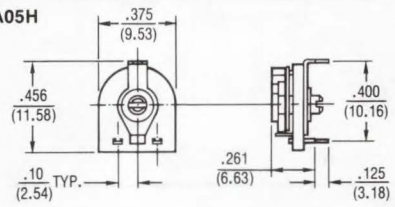
Physical Characteristics

Mechanical Angle ..... 270° nom.
Torque ..... 6.0 oz-in. max. 1.5 oz-in. min.
Stop Strength ..... 12 oz -in. min.
Terminals ..... Solderable pins
Weight ..... 0.04 oz.
Marking ..... Manufacturer's trademark, resistance code, and model number.
Standard Packaging .. 40 pcs. per tube

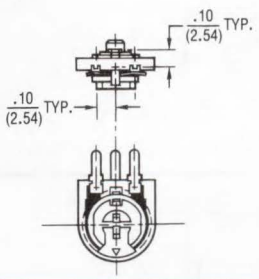
3359



VA05H

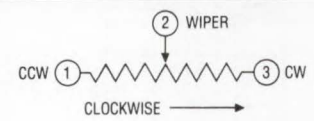


VA05V



TOLERANCES: ± .010 (.25) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)



STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code
100	101
200	201
500	501
1,000	102
2,000	202
5,000	502
10,000	103
20,000	203
50,000	503
100,000	104
200,000	204
500,000	504
1,000,000	105
2,000,000	205

HOW TO ORDER

3359 P - 1 - 103

Model
3359 Standard
VA05 Europe

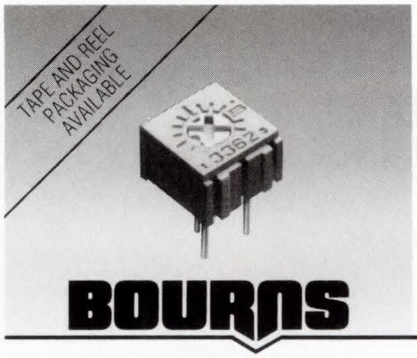
Style

Standard or Modified Product Indicator
-1 = Standard Product
-10 = 10% Resistance Tolerance

Resistance Code

Consult factory for other available options.

Specifications are subject to change without notice.
*Model 3359 is known as VA05 in Europe.



BOURNS

1/4" SQUARE / SINGLE-TURN / CERMET INDUSTRIAL / SEALED

- Miniature package
- Rotor designed for automatic machine adjust interface
- Multi-wire wiper to minimize CRV
- Withstands harsh environments and immersion cleaning processes
- Available on tape and reel packaging (see page 43)

Model 3362

Bourns® Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range
.....20 to 2 megohms
(see standard resistance table)
Resistance Tolerance .....±20% std.
(tighter tolerance available)
Absolute Minimum Resistance
.....1% or 2 ohms
(whichever is greater)
Contact Resistance Variation
.....1% or 3 ohms
(whichever is greater)
Adjustability
Voltage .....±0.05%
Resistance .....±0.15%
Resolution .....Infinite
Insulation Resistance .....500 vdc.
1,000 megohms min.
Dielectric Strength
Sea Level .....900 vac
80,000 Feet .....350 vac
Adjustment Angle .....240° nom.

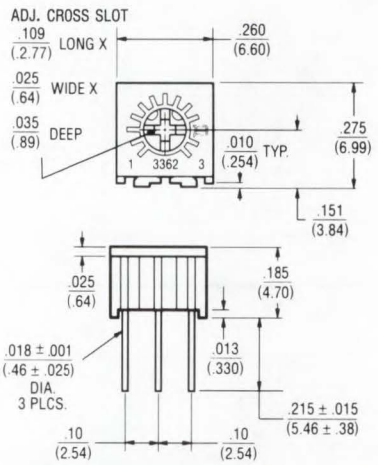
Environmental Characteristics

Power Rating (300 volts max.)
70°C .....0.50 watt
125°C .....0 watt
Temperature Range
.....-55°C to +125°C
Temperature Coefficient
.....±100ppm/°C
Seal Test .....85°C Fluorinert*
Humidity .....MIL-STD-202 Method 103
96 hours
(2% ΔTR; 10 Megohms IR)
Vibration .....30G (1% ΔTR; 1% ΔVR)
Shock .....100G (1% ΔTR; 1% ΔVR)
Load Life
.....1,000 hours 0.5 watt @ 70°C
(3% ΔTR; 3% or 3 ohms,
whichever is greater, CRV)
Rotational Life .....200 cycles
(4% ΔTR; 3% or 3 ohms,
whichever is greater, CRV)

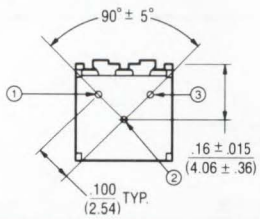
Physical Characteristics

Mechanical Angle .....270° nom.
Torque .....3.0 oz-in. max.
Stop Strength .....7.0 oz -in. min.
Terminals .....Solderable pins
Weight .....0.02 oz.
Marking .....Manufacturer's
trademark, resistance code,
terminal numbers, manufacturer's
model number, style
and date code
Standard Packaging ..50 pcs. per tube

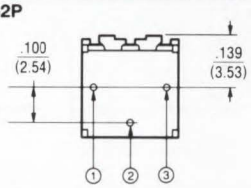
COMMON DIMENSIONS
TOP ADJUST



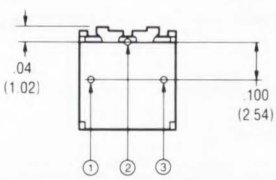
3362H



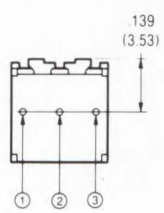
3362P



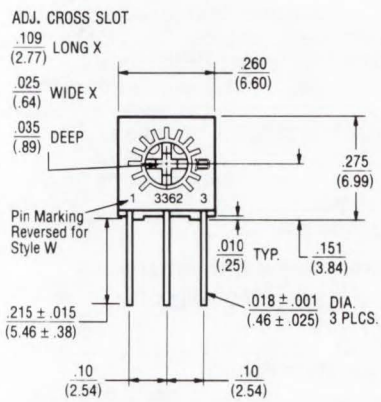
3362R



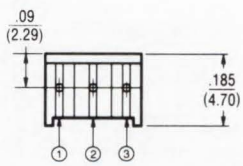
3362U



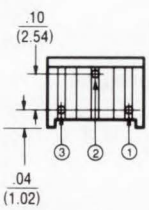
COMMON DIMENSIONS
SIDE ADJUST



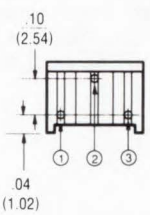
3362M



3362W



3362X



Common dimensions unless otherwise specified.

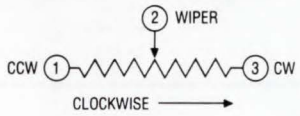
Specifications are subject to change without notice.
*"Fluorinert" is a registered trademark of 3M Co.

Model 3362

Bourns® Trimming Potentiometer

TOLERANCES: ± .010 (.25) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)



STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code
20	200
50	500
100	101
200	201
500	501
1,000	102
2,000	202
5,000	502
10,000	103
20,000	203
25,000	253
50,000	503
100,000	104
200,000	204
250,000	254
500,000	504
1,000,000	105
2,000,000	205

Special resistances available from 20 to 2 megohms.

HOW TO ORDER

3362 U - 1 - 502

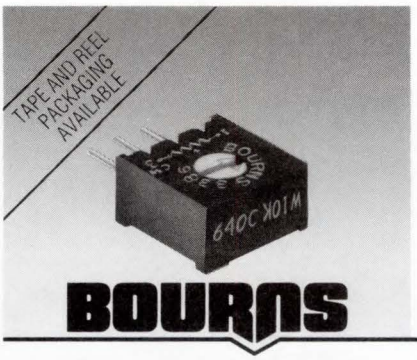
Model

Style

Standard or Modified Product Indicator
-1 = Standard Product
-10 = 10% Resistance Tolerance

Resistance Code

Consult factory for other available options.



3/8" SQUARE / SINGLE-TURN / CERMET INDUSTRIAL / SEALED

- Available on tape and reel (see page 43 for details)
- Available with a knob for finger adjust
- 12 standard terminal styles
- Top and side adjust types
- High voltage type HV2 available (see page 40 for details)

Model 3386

Bourns® Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range
.....10 to 2 megohms
(see standard resistance table)
Resistance Tolerance .....±10% std.
(tighter tolerance available)
Absolute Minimum Resistance
.....2 ohms max.
Contact Resistance Variation
.....1% or 1 ohm
(whichever is greater)
Adjustability
Voltage .....±0.05%
Resistance .....±0.15%
Resolution .....Infinite
Insulation Resistance .....500 vdc.
1,000 megohms min.
Dielectric Strength
Sea Level .....900 vac
70,000 Feet .....350 vac
Adjustment Angle .....280° nom.

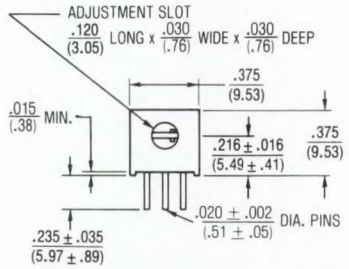
Environmental Characteristics

Power Rating (300 volts max.)
85°C .....0.5 watt
125°C .....0 watt
Temperature Range
.....-55°C to +125°C
Temperature Coefficient
.....±100ppm/°C
Seal Test .....85°C Fluorinert*
Humidity .....MIL-STD-202 Method 103
96 hours
(2% ΔTR, 10 Megohms min.)
Vibration .....30G (1% ΔTR; 1% ΔVR)
Shock .....100G (1% ΔTR; 1% ΔVR)
Load Life
.....1,000 hours 0.5 watt @ 70°C
(3% ΔTR; 1% or 1 ohm,
whichever is greater, CRV)
Rotational Life .....200 cycles
(4% ΔTR; 1% or 1 ohm,
whichever is greater, CRV)

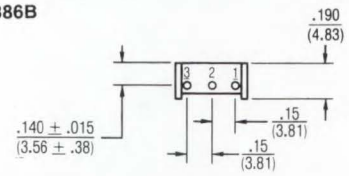
Physical Characteristics

Mechanical Angle .....310° nom.
Torque .....5.0 oz-in. max.
Stop Strength .....15.0 oz -in. min.
Terminals .....Solderable pins
Weight .....0.03 oz.
Marking .....Manufacturer's
trademark, resistance code,
wiring diagram, date code,
manufacturer's model
number and style
Standard Packaging
Styles B,C,H,S,W,X,P,Y,F
.....50 pcs. per tube
Styles M,R,T .....100 pcs per tray

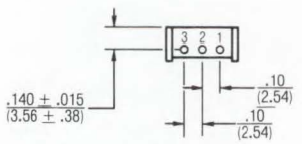
COMMON DIMENSIONS
SIDE ADJUST



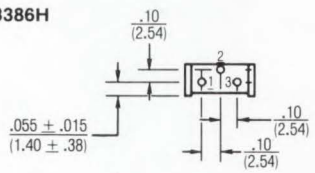
3386B



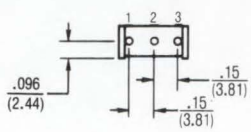
3386C



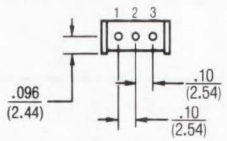
3386H



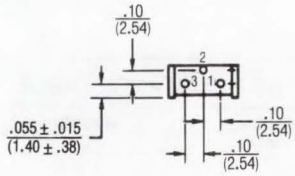
3386S



3386W



3386X



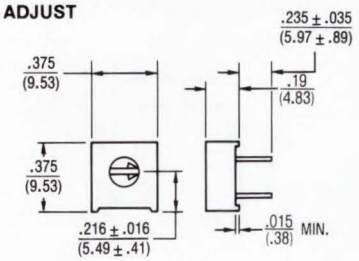
Specifications are subject to change without notice.
*"Fluorinert" is a registered trademark of 3M Co.

Model 3386

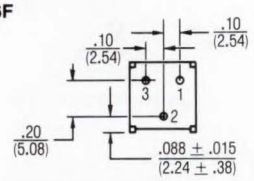
Bourns® Trimming Potentiometer

COMMON DIMENSIONS

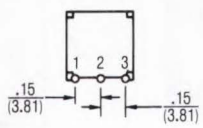
TOP ADJUST



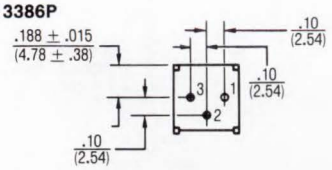
3386F



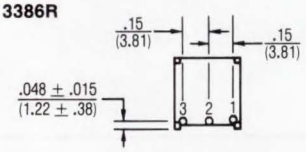
3386M



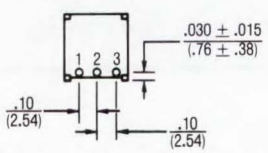
3386P



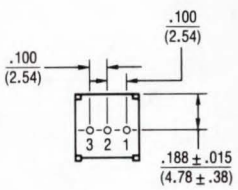
3386R



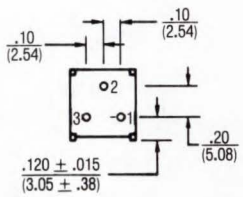
3386T



3386U

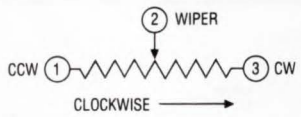


3386Y

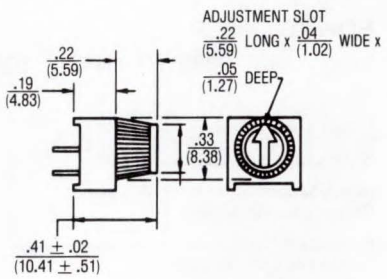


TOLERANCES: ± .010 (.25) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)



The Model 3386 is available with a knob for finger adjustment. Add suffix letter "T" to order code.



STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code
10	100
20	200
50	500
100	101
200	201
500	501
1,000	102
2,000	202
5,000	502
10,000	103
20,000	203
25,000	253
50,000	503
100,000	104
200,000	204
250,000	254
500,000	504
1,000,000	105
2,000,000	205

Special resistances available from 10 to 2 megohms.

HOW TO ORDER

3386 P - 1 - 103 T

Model

Style

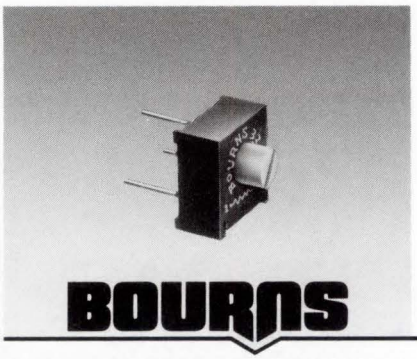
Standard or Modified Product Indicator
- -1 = Standard Product
- -11 = 5% Resistance Tolerance
- -99 = 5/8" Length Pins

Resistance Code

Optional Suffix Letter
- T = Knob

Consult factory for other available options.

Specifications are subject to change without notice.



3/8" SQUARE / SINGLE-TURN / CERMET INDUSTRIAL / SEALED HIGH VOLTAGE FOCUS CONTROL

- Designed for electrostatic focus control application on monochrome or color CRTs
- Rated at 1KV D.C input voltage
- High stability cermet element
- Available with optional red knob

Model 3386HV-2

Bourns® Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range ..... 2.5 and 5 megohms
Resistance Tolerance ..... ±20%
Contact Resistance Variation ..... 1% max.
Adjustability
  Voltage Divider ..... ±0.05%
  Rheostat ..... ±0.15%
Resolution ..... Infinite
Insulation Resistance @ 1KV D.C. ..... 1,000 megohms min.
Dielectric Strength (5,000 foot altitude) ..... 1.5 KV A.C. min.
Adjustment Angle ..... 280° nom.

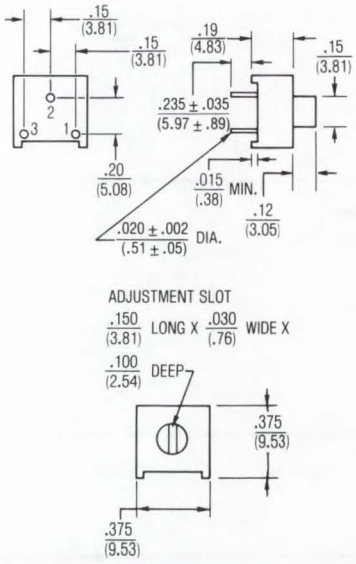
Environmental Characteristics

Power Rating (1 KV D.C. max. input)
  85°C ..... 0.5 watt
  125°C ..... 0 watt
Temperature Range ..... -55°C to +125°C
Temperature Coefficient ..... ±400ppm/°C
Humidity ..... MIL-STD-202 Method 103 240 Hours (100 megohms min. IR)
Load Life ..... 1,000 hours 1 KV D.C. 60°C, 90% R.H. (3% max. ΔTR)
Voltage Breakdown (5,000 foot altitude) ..... 1.5 KV min.
Seal Test ..... 85°C Fluorinert*
Vibration ..... No discontinuity 30G
Shock ..... No discontinuity 100G
Rotational Life ..... 200 cycles min.

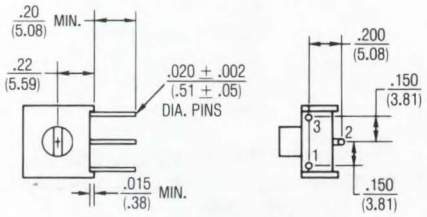
Physical Characteristics

Mechanical Angle ..... 310° nom.
Torque ..... 5.0 oz-in. max.
Stop Strength ..... 15.0 oz -in. min.
Terminals ..... Solderable pins
Weight ..... 0.04 oz.
Marking ..... Manufacturer's trademark, resistance code, wiring diagram, date code, manufacturer's model number and style
Standard Packaging .. 50 pcs. per tube

3386N



3386U

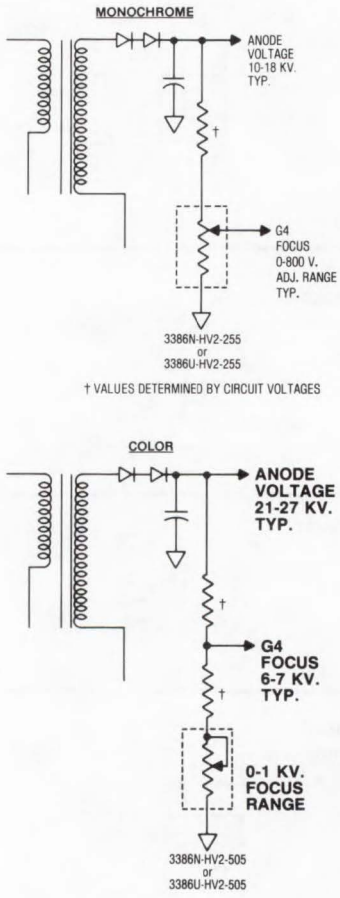


HOW TO ORDER

3386 N - HV2 - 505 T

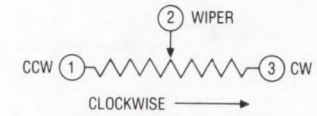
Model
Style
High Voltage Construction Indicator
Resistance Code
  -255 and -505 Available
  -255 = 2.5 megohms
  -505 = 5 megohms
Optional Suffix Letter
  T = Red Knob

TYPICAL FOCUS CONTROL CIRCUITS

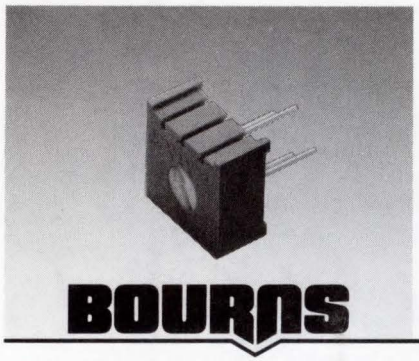


TOLERANCES: ± .010 (.25) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)



Specifications are subject to change without notice.
*"Fluorinert" is a registered trademark of 3M Co.



3/8" SQUARE / SINGLE-TURN / CERMET INDUSTRIAL / SEALED

- Designed for operational amplifier offset voltage adjustment applications
- Reduces power supply drift errors
- Unique center tapped trimming potentiometer
- Vertical adjust type available

Model 3386-OT1

Bourns® Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range
.....100 ohms to 1 megohm
(see standard resistance table)
Resistance Tolerance .....±20% std.
Absolute Minimum Resistance
.....2 ohms max.
Voltage Output Variation .....±0.25%
Adjustability (VR) .....±0.025%
Insulation Resistance @ 500 vdc
.....1,000 megohms min.
Dielectric Strength
Sea Level .....900 vac
70,000 Feet .....350 vac
Effective Electrical Travel ....280° nom.
Center Tap Resistance....2 ohms max.
Center Tap Electrical Center .....±5%
Center Tap Dead Band .....6°±4°

Environmental Characteristics

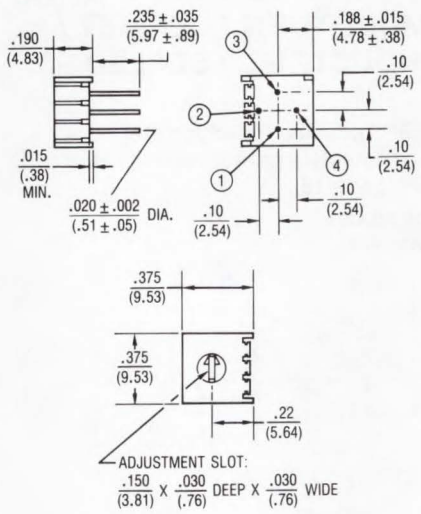
Power Rating
85°C .....0.5 watt
150°C .....0 watt
Temperature Range
.....-55°C to +150°C
Temperature Stability (ΔVR)
.....±0.5% max.
Seal Test .....85°C Fluorinert*
Humidity.....MIL-STD-202 Method 103
96 hours ±2%
..... ΔTR 10 Megohms min.
Vibration, 30G .....±1% ΔTR
Shock, 100G .....±1% ΔTR
Load Life, 1,000 Hours .....±3% ΔTR
Rotational Life, 200 cycles ...±4% ΔTR

Physical Characteristics

Mechanical Angle .....310° nom.
Torque .....5.0 oz-in. max.
Stop Strength .....15.0 oz-in. min.
Terminals .....Solderable pins
Weight .....0.03 oz.
Marking .....Manufacturer's trademark, resistance code, wiring diagram, date code, manufacturer's model number and style
Standard Packaging ..50 pcs. per tube

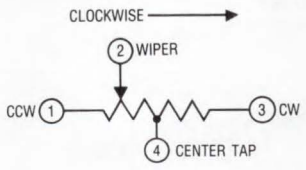
Also see Model 3296-OT1, page 22.

3386P-OT1



TOLERANCES: ± .010 (.25) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)



STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code
100	101
200	201
500	501
1,000	102
2,000	202
5,000	502
10,000	103•
20,000	203
50,000	503•
100,000	104•
200,000	204
500,000	504
1,000,000	105

•Preferred Values
Special resistances available from 100 to 1 megohms.

HOW TO ORDER

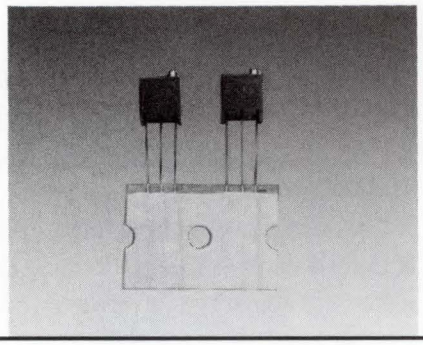
3386 P - OT1 - 103

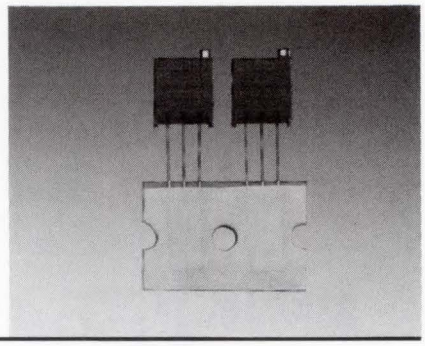
Model
Style
Catalog Product
Resistance Code

Specifications are subject to change without notice.
*"Fluorinert" is a registered trademark of 3M Co.

BOURNS® POTENTIOMETER TAPE AND REEL PACKAGING OPTIONS

BOURNS





Model 3266

Model 3296*

Now there is a full assortment of Trimpot® Potentiometer models on tape and reel.

- Assembly speed is up to 10X faster because radial insertion equipment can place over 100 components a minute!
- Assembly cost reduction is up to 75% because automatic insertion eliminates errors.
- All models are taped and packaged per EIA Standard 468 on 18mm tape packaged on 14" reels.
- All models have been tested for compatibility with all popular radial insertion machine models on the market today.

HOW TO ORDER

3362 M - 1 - 103 R

Model
Style
Standard Product
Resistance Code
Tape & Reel

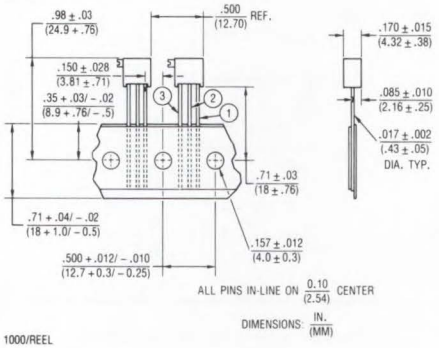
Designator: Use "A" for Ammo Pack.
Use "R" for Tape & Reel.

1/4 INCH SQUARE MULTITURN / CERMET / INDUSTRIAL / SEALED

B® Trimming Potentiometer
For complete product specifications, see page 18.

SIDE ADJUST

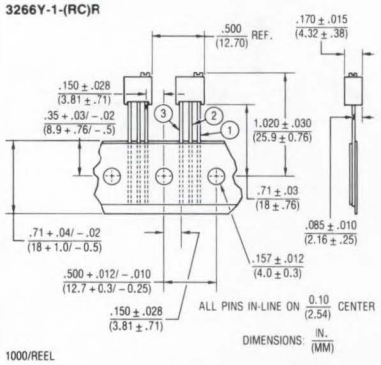
3266Z-1-(RC)R



1000/REEL

TOP ADJUST

3266Y-1-(RC)R



1000/REEL

STANDARD RESISTANCE TABLE

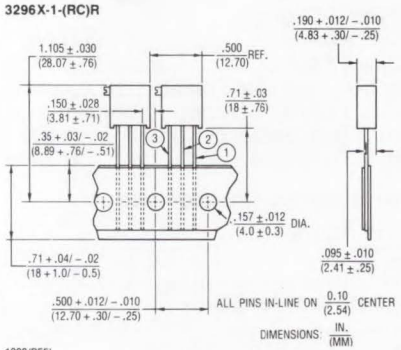
Resistance (Ohms)	Resistance Code	Resistance (Ohms)	Resistance Code
100	101	20,000	203
200	201	25,000	253
500	501	50,000	503
1,000	102	100,000	104
2,000	202	200,000	204
5,000	502	250,000	254
10,000	103	500,000	504
		1,000,000	105

3/8 INCH SQUARE MULTITURN / CERMET / INDUSTRIAL / SEALED

B® Trimming Potentiometer
For complete product specifications, see page 21.

SIDE ADJUST

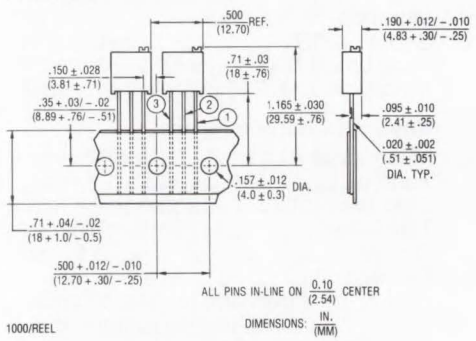
3296X-1-(RC)R



1000/REEL

TOP ADJUST

3296W-1-(RC)R

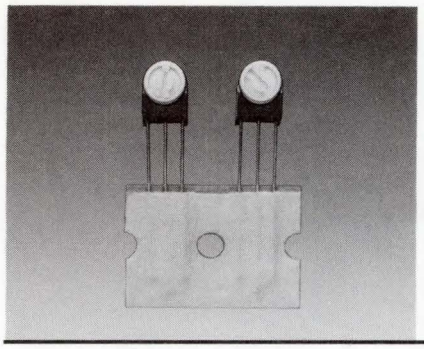


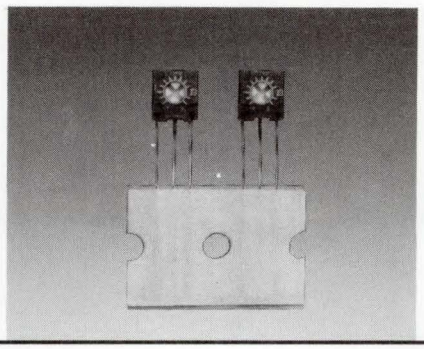
1000/REEL

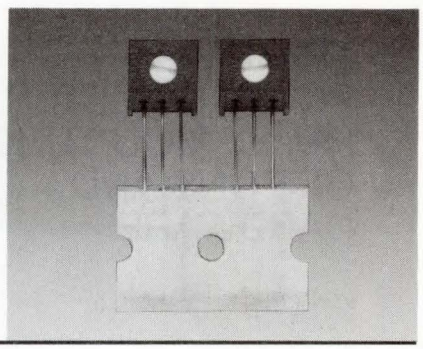
STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code	Resistance (Ohms)	Resistance Code
10	100	20,000	203
20	200	25,000	253
50	500	50,000	503
100	101	100,000	104
200	201	200,000	204
500	501	250,000	254
1,000	102	500,000	504
2,000	202	1,000,000	105
5,000	502	2,000,000	205
10,000	103	5,000,000	505

Specifications are subject to change without notice.
*Ammo Pak available.







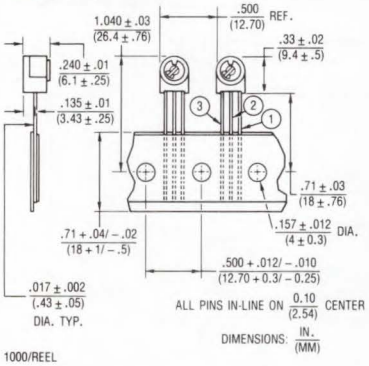
Model 3329

1/4 INCH DIAMETER SINGLE-TURN / CERMET / INDUSTRIAL / SEALED

Bourns® Trimming Potentiometer
For complete product specifications, see page 31.

SIDE ADJUST

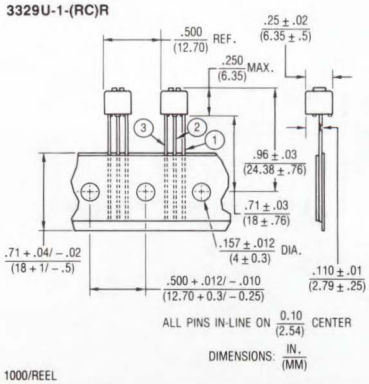
3329M-1-(RC)R



1000/REEL

TOP ADJUST

3329U-1-(RC)R



1000/REEL

STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code	Resistance (Ohms)	Resistance Code
10	100	10,000	103
20	200	20,000	203
50	500	25,000	253
100	101	50,000	503
200	201	100,000	104
500	501	200,000	204
1,000	102	250,000	254
2,000	202	500,000	504
5,000	502	1,000,000	105

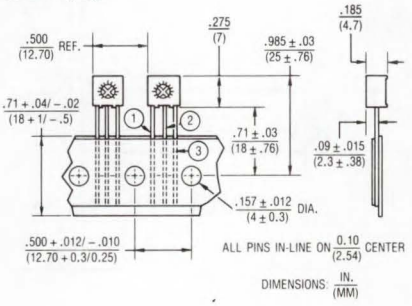
Model 3362

1/4 INCH SQUARE SINGLE-TURN / CERMET / INDUSTRIAL / SEALED

Bourns® Trimming Potentiometer
For complete product specifications, see page 36.

SIDE ADJUST

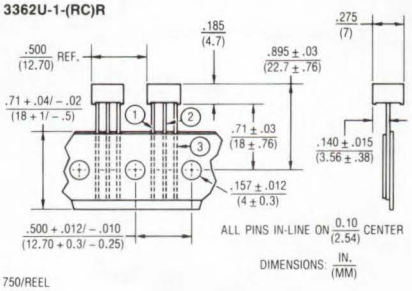
3362M-1-(RC)R



1000/REEL

TOP ADJUST

3362U-1-(RC)R



750/REEL

STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code	Resistance (Ohms)	Resistance Code
20	200	20,000	203
50	500	25,000	253
100	101	50,000	503
200	201	100,000	104
500	501	200,000	204
1,000	102	250,000	254
2,000	202	500,000	504
5,000	502	1,000,000	105
10,000	103	2,000,000	205

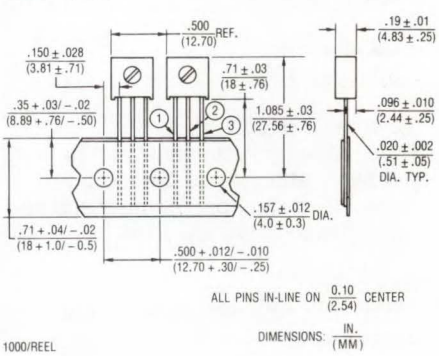
Model 3386*

3/8 INCH SQUARE SINGLE-TURN / CERMET / INDUSTRIAL / SEALED

Bourns® Trimming Potentiometer
For complete product specifications, see pages 38 and 40.

SIDE ADJUST

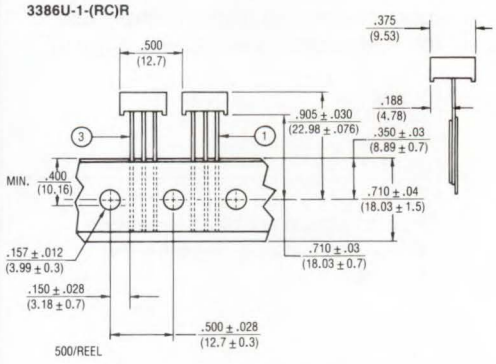
3386W-1-(RC)R



1000/REEL

TOP ADJUST

3386U-1-(RC)R



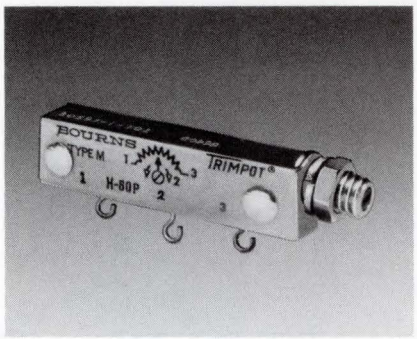
500/REEL

STANDARD RESISTANCE TABLE

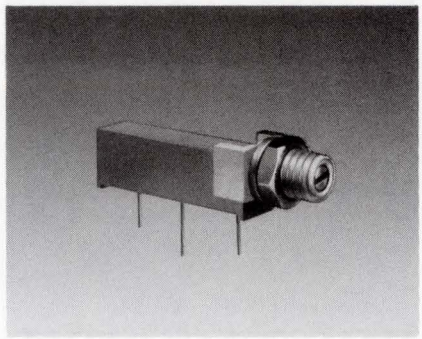
Resistance (Ohms)	Resistance Code	Resistance (Ohms)	Resistance Code
10	100	20,000	203
20	200	25,000	253
50	500	50,000	503
100	101	100,000	104
200	201	200,000	204
500	501	250,000	254
1,000	102	500,000	504
2,000	202	1,000,000	105
5,000	502	2,000,000	205
10,000	103		

Specifications are subject to change without notice.
*Ammo Pak available.

TRIMPOT® POTENTIOMETER PANEL MOUNTING OPTIONS AND HARDWARE



FACTORY INSTALLED PANEL MOUNT



FACTORY INSTALLED PANEL MOUNT

Many Trimpot® Potentiometers are available for panel mount application.

This product option provides for maximum design flexibility.

To order Trimpot® Potentiometers with panel mount hardware attached by the factory, simply add an "M" or "Z" suffix to the Bourns part number per Table I, page 47 .

Example:
3005P-1-100Z

To order military Trimpot® Potentiometers with panel mount hardware attached by the factory, order the military part number and add "with panel mount attached."

Example:
RTR12CL100, with panel mount attached.

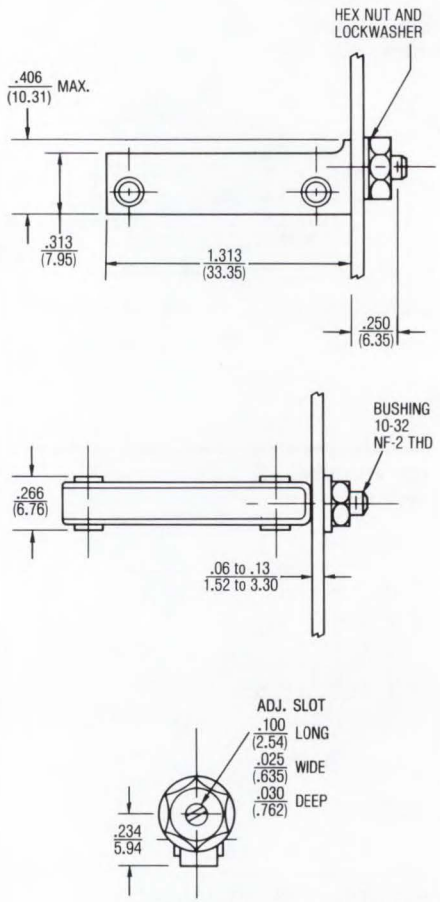
To order panel mounting accessories for customer installation, simply use the part number per Table II, page 47 .

Example:
H83P

NOTE:
For complete product specifications, see catalog page for the trimmer model.

Models RT12/RTR12 RJ12/RJR12 3057/3059

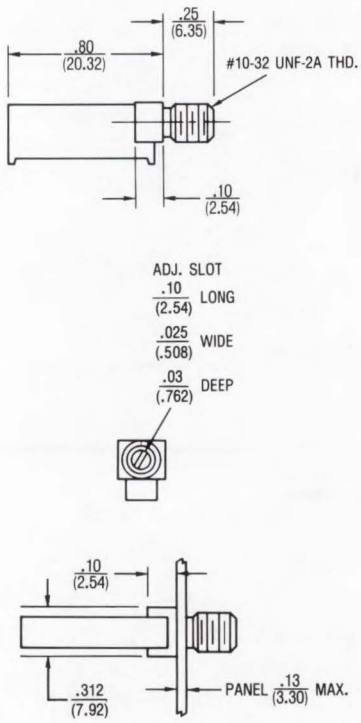
FACTORY ASSEMBLED PANEL MOUNT



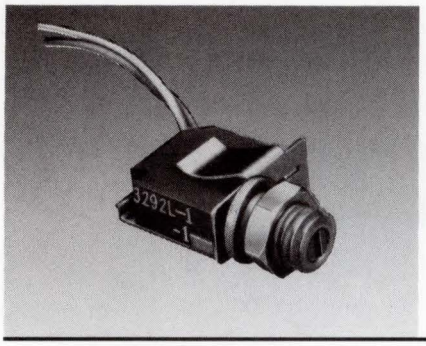
NOTES:
1. Provided with lockwasher and mounting nut.
2. Recommend panel holes. #10 drill (.194).

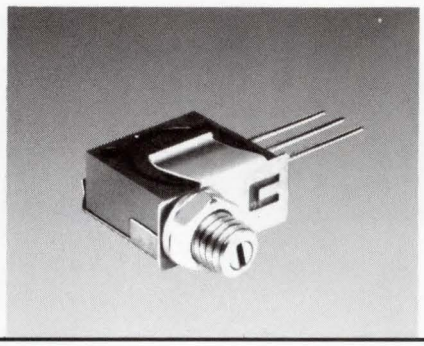
Models 3005/3006/3009

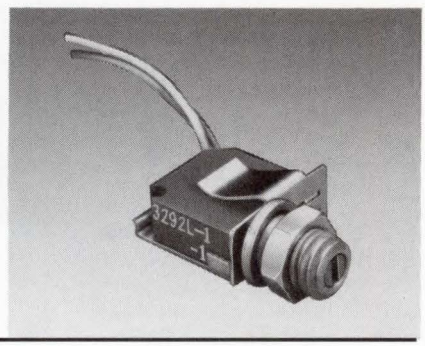
FACTORY ASSEMBLED PANEL MOUNT



NOTES:
1. Provided with lockwasher and mounting nut.
2. Recommend panel hole size .200 dia (#7 drill).



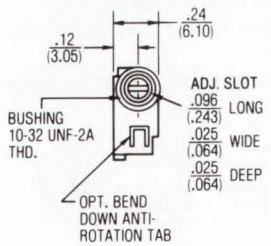


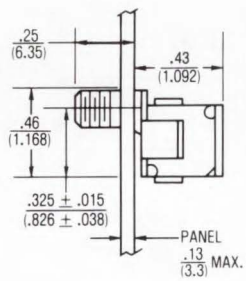


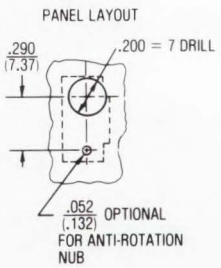
FACTORY INSTALLED PANEL MOUNT

Models 3292L,W RJ24L,W/RJR24L,W

FACTORY ASSEMBLED PANEL MOUNT



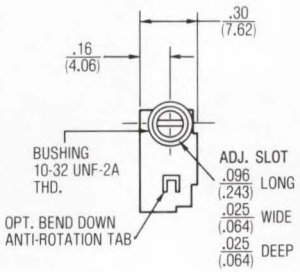


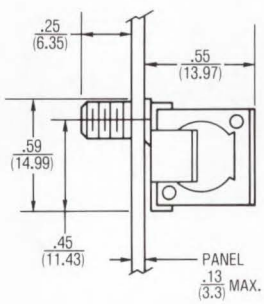


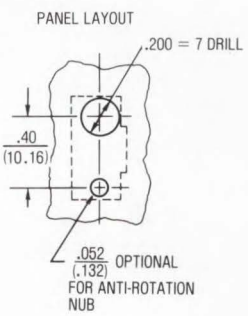
NOTES:
1. Provided with lockwasher and mounting nut.

Models RT22/RTR22 RJ22 3250/3252

FACTORY ASSEMBLED PANEL MOUNT



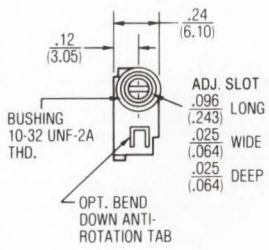


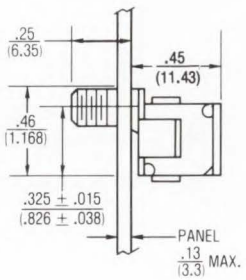


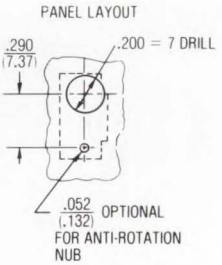
NOTES:
1. Provided with lockwasher and mounting nut.

Models RT24H,W/ RTR24H,W 3290H,W

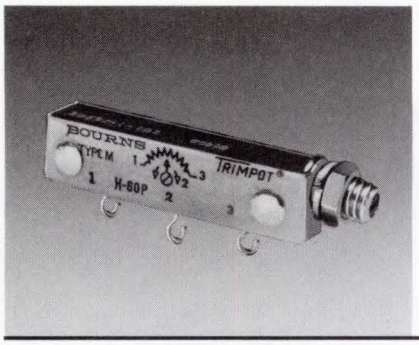
FACTORY ASSEMBLED PANEL MOUNT

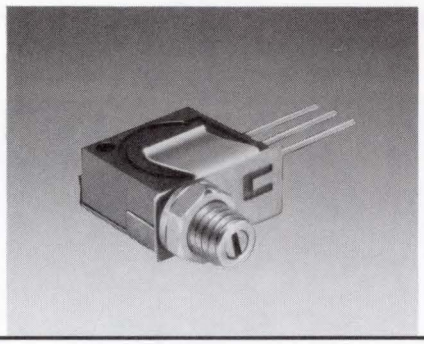


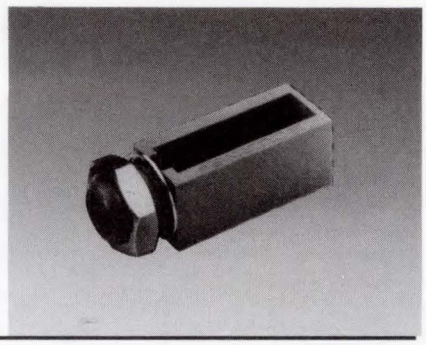




NOTES:
1. Provided with lockwasher and mounting nut.







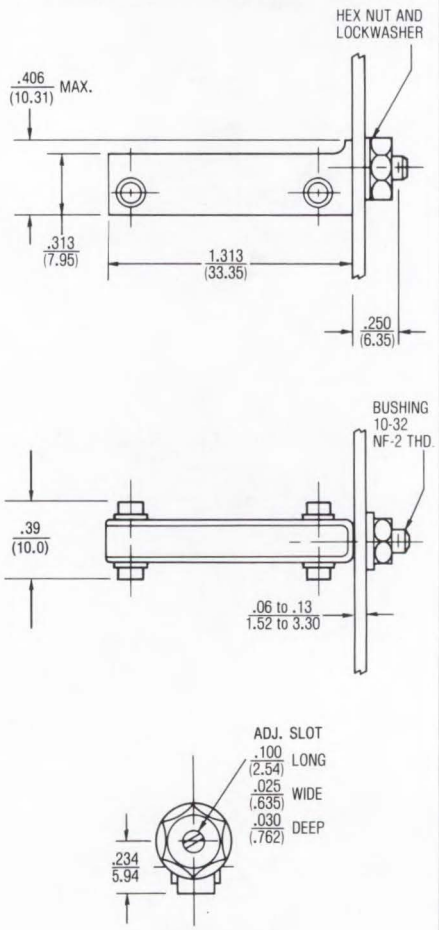
H-58P PANEL MOUNT

H-65P PANEL MOUNT

H-83P PANEL MOUNT

1-1/4 INCH RECTANGULAR MULTITURN MODELS

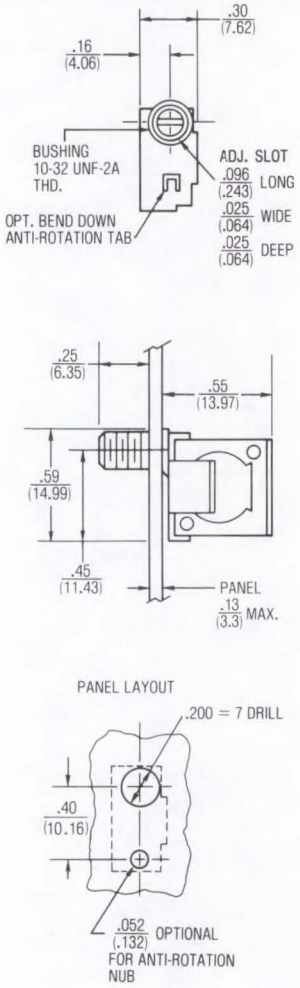
CUSTOMER INSTALLED PANEL MOUNT



NOTES:
1. Provided with lockwasher and mounting nut.
2. Recommend panel holes #10 drill (.194).
3. Drawings shown with trimmer. Order part separately.

1/2 INCH SQUARE MULTITURN MODELS

CUSTOMER INSTALLED PANEL MOUNT

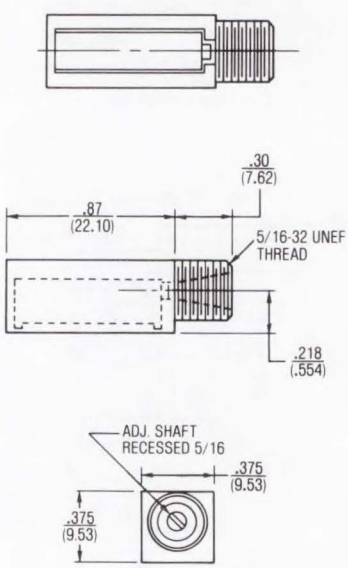


NOTES:
1. Provided with lockwasher and mounting nut.
2. Drawings shown with trimmer. Order part separately.

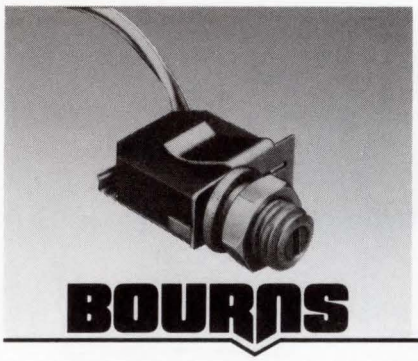
ADAPTER FOR MODELS 3005 AND 3006

The H-83P Adapter is used with Models 3005 (page 7) and 3006 (page 8). Order separately and simply snap fit the trimmer in the plastic case. The H-83P with lockwasher and mounting nut is available in 50-piece lots.

CUSTOMER INSTALLED PANEL MOUNT



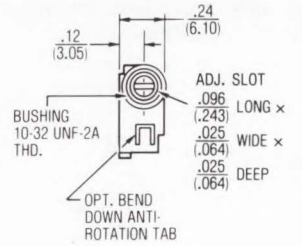
NOTES:
1. Drawings shown with trimmer. Order part separately.

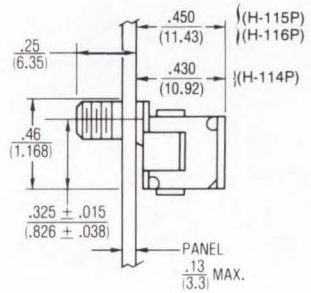


H-114P/H-115P/H-116P
PANEL MOUNT

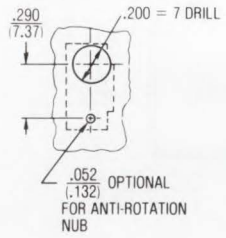
3/8 INCH SQUARE MULTITURN MODELS

CUSTOMER INSTALLED PANEL MOUNT





PANEL LAYOUT



NOTES:
1. Provided with lockwasher and mounting nut.
2. Drawings shown with trimmer. Order part separately.

TABLE I

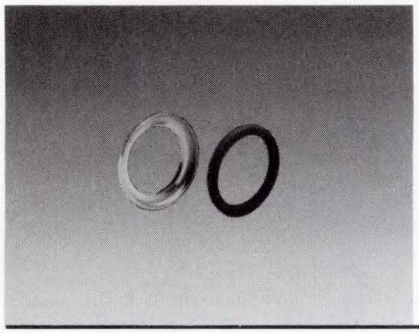
FACTORY INSTALLED PANEL MOUNTS

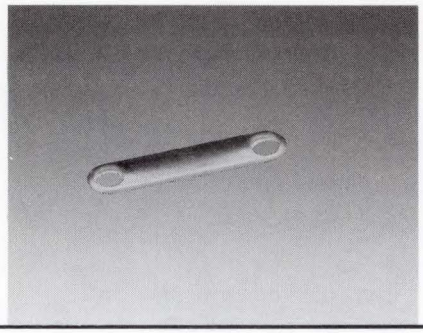
STANDARD PART NO.	PART NO. WITH PANEL MOUNT
3005P-1-(RC)	3005P-1-(RC) Z
3006P,Y, or W-1-(RC)	3006P,Y, or W-1-(RC) Z
3009P or Y-1-(RC)	3009P or Y-1-(RC) Z
3057L,J,P, or Y-1-(RC)	3057L,J,P, or Y-1-(RC) M
3059L,J,P, or Y-1-(RC)	3059L,J,P, or Y-1-(RC) M
3250L or W-1-(RC)	3250L or W-1-(RC) M
3252L or W-1-(RC)	3252L or W-1-(RC) M
3290 H or W-1-(RC)	3290H or W-1-(RC) M
3292L,W, or X-1-(RC)	3292L,W, or X-1-(RC) M

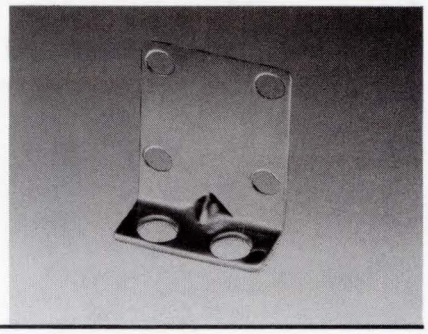
TABLE II

RETRO-FIT PANEL MOUNTS FOR INSTALLATION BY CUSTOMER

STANDARD PART NO.	ORDER PANEL MOUNT PART NO.
3005P-1-(RC)	H-83P
3006P,Y, or W-1-(RC)	H-83P
3057L,J,P, or Y-1-(RC)	H-58P
3059L,J,P, or Y-1-(RC)	H-58P
3250L or W-1-(RC)	H-65P
3252L or W-1-(RC)	H-65P
3290 H or W-1-(RC)	H-114P
3292L-1-(RC)	H-115P
3292W OR X-1-(RC)	H-116P
RT12P,Y,L / RTR12P,Y,L	H-58P
RJ12L,P,Y / RJR12L,P,Y	H-58P
RT22L,W / RTR22L,W	H-65P
RJ22L,W	H-65P
RT24W / RTR24W	H-114P
RJ24L / RJR24L	H-115P
RJ24W / RJR24W	H-116P







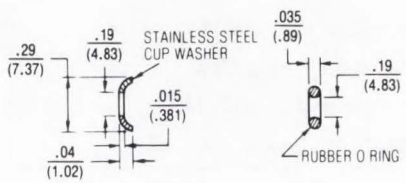
H-82

H-25/H-28

H-26

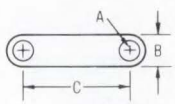
PANEL SEAL FOR ALL PANEL MOUNTS WITH SIZE 10-32 BUSHINGS

This hardware is available for special mounting applications.



STACKING STRAPS FOR MODELS 3250, 3252 (H-25) AND 3292 (H-28)

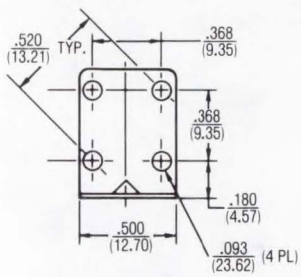
This hardware is available for special mounting applications.

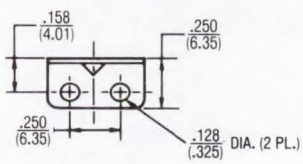


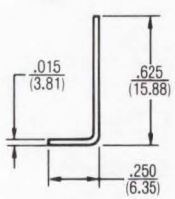
DIM.	H-25	H-28
A	.093 (.236)	.070 (.178)
B	.143 (.363)	.125 (.318)
C	.520 (1.321)	.419 (1.064)

SIDE BRACKET FOR MODELS 3250 AND 3252

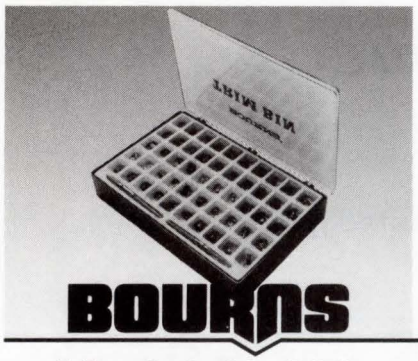
This hardware is available for special mounting applications.







Specifications are subject to change without notice.



TRIMMER LAB DESIGN KIT

- Wide assortment of popular trimmers
- Convenient, easy-to-use packaging
- Single-turn and multiturn styles
- Many configurations in both cermet and wirewound element types

Model H-800

TrimBin™ Trimmer Kit

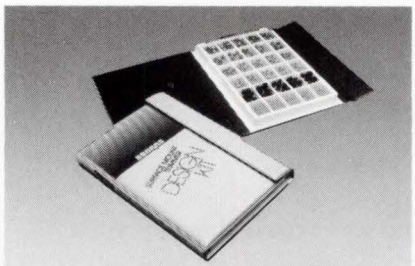
A complete assortment of the most popular styles from Bourns Trimpot is contained in one convenient package. The kit contains 126 parts representing 50 varieties of resistances and pin styles.

Select the size, shape, type of element, and method of adjustment to suit your application.

H-800 PART NUMBER MATRIX

MODEL	PIN STYLE	RESISTANCE VALUE & QUANTITY						
		-102 1KΩ	-202 2KΩ	-502 5KΩ	-103 10KΩ	-203 20KΩ	-503 50KΩ	-104 100KΩ
20	P	2						
3005	P			2	2			
3006	P			2	2			
3266	W			2	2			
	X	2						
3269	W			2				
3290	W	2		2				
	P		2		2			
3296	P				2			
	W					4		
	X	Y				2		
3304	X				6			
3306	P				2			
	W			2				
3309	P							2
	W		2					
3323	P	2		4		2		
	W				2		2	
	W					2		2
3329	H	2		4		2		
	W		2		4			
3335	W				4			
3339	P	2			4		2	
3345	P		2					
3352	P	2			4			
	W			4			2	
	T				4			2
	T				4			
3386	P	2		4		2		
	W		2		2	4		
H-90		Adjustment Tool						
H-91		Adjustment Tool						
Product Literature								

Specifications are subject to change without notice.



SURFACE MOUNT TRIMMER LAB DESIGN KIT

- Full line of surface mount trimmers
- Convenient, easy-to-use packaging
- Single-turn, multiturn, sealed, open-frame styles
- Popular pin styles and ohmic values

BOURNS

Model H-814

Surface Mount Trimmer Kit

A complete assortment of the most popular surface mount trimmers from Bourns Trimpot is contained in this convenient lab design kit. It contains 220 parts in popular pin styles and resistance values to help in your design selection.

Also included are complete performance parameters and specifications for each model in the kit. Plus, a convenient Trimmer Adjustment Tool.

H-814 PART NUMBER MATRIX

MODEL	PIN STYLE	FEATURES*	RESISTANCE VALUE & QUANTITY					
			-101 100Ω	-501 500Ω	-102 1KΩ	-103 10KΩ	-104 100KΩ	-105 1 MEGΩ
3314	G	T, V	5		5	5	5	5
	J	T, V	5		5	5	5	5
	S	S, V	5		5	5	5	5
3304	X, W	T, V		5	5	5	5	5
	A, B	T, V		5	5	5	5	5
	C, D	T, R		5	5	5	5	5
3269	P	S, V	3		3	3	3	3
	W	T, V	3		3	3	3	3
	X	S, V	3		3	3	3	3
3363	X	T, V	5		5	5	5	5
Adjustment Tool		Part No. H-91						

** T =Top Adjust, S =Side Adjust, V =Voltage Divider, R =Rheostat*

DESIGNER'S GUIDE

HOW TO USE THIS SECTION

This Designer's Guide is intended to provide you with points to consider for designing circuits, selecting trimmers and arranging board layouts, to achieve maximum performance and long life for your circuits and systems. We have also included information on steps your manufacturing engineers can take to preserve reliability of your circuits.

For example, are you aware that the trimmers and other mechanical components on your boards may face a more extreme environment during boardwashing on your own production line, than they ever will in use? For those trimmers that may need to be reset, are you remembering to select and mount the trimmers to provide easy accessibility?

In this section, you'll find dozens of pointers, reminders and useful facts that will help you be more knowledgeable and successful in using trimmers.

TRIMMER BASICS

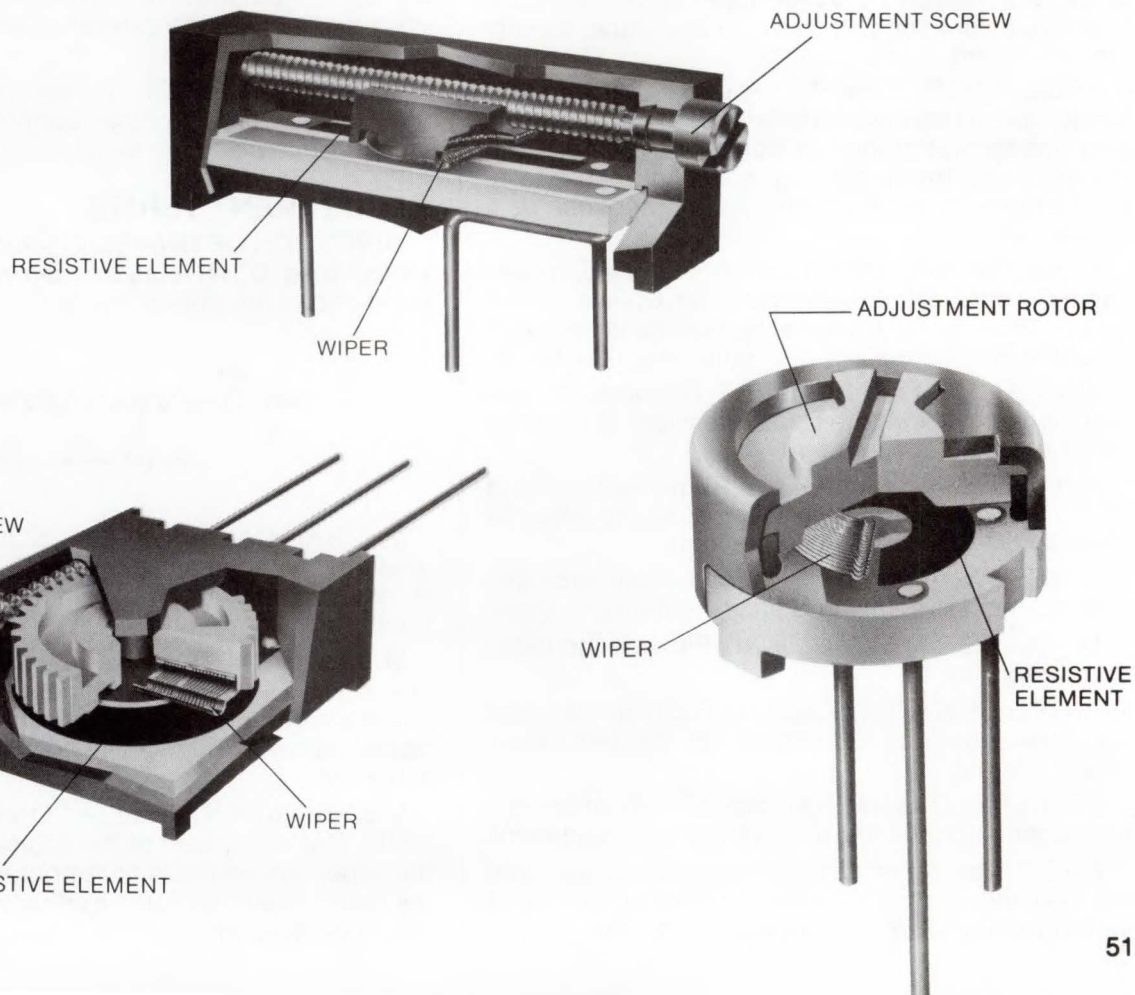
In its most common form, a trimmer is simply a device containing a resistive element, and a wiper, or adjustable tap, contacting the element. The wiper can be mechanically moved to vary the amount of voltage or resistance in te circuit. The resistive element is usually laid out in linear or a circular configuration:

The Resistive Element

Trimmers for commercial applications typically have a resistive element made of carbon or cermet (a combination of CERamic and METal), or of resistance wire wound on an insulated copper mandrel.

The main advantages of wirewound trimmers are their low temperature coefficient, higher power dissipation, lower noise, tighter resistance tolerance, and, when used as a variable resistor, the excellent current-carrying capacity through the wiper due to the lower contact resistance. Also, their long term resistance stability with time and temperature is slightly better than cermet.

Cermet trimmers provide a wider resistance range (10 ohms to 5 megohms, versus a maximum of 50K ohms for wirewound). Also, the wiper output can be set closer to the desired value since the resistive element presents a continuous contact surface for the wiper, as opposed to the discrete turns (resolution) of the wirewound. Other advantages with cermet are the lower reactance in high frequency applications, the smaller sizes available, and the generally lower price than wirewound types.



TRIMMING POTENTIOMETERS AND DEFINITIONS

The following terms and definitions have been edited from the Industrial Standard published by the Variable Resistive Components Institute. It is intended to encourage standardization in communication and understanding between the manufacturer and user. The complete standard, including detailed test procedures, is available upon request.

GENERAL TERMS

TRIMMING POTENTIOMETER: An electrical mechanical device with three terminals. Two terminals are connected to the ends of a resistive element and one terminal is connected to a movable conductive contact which slides over the element, thus allowing the input voltage to be divided as a function of the mechanical input. It can function as either a voltage divider or rheostat.

WIREWOUND TRIMMING POTENTIOMETER: A trimming potentiometer characterized by a resistance element made up of turns of wire on which the wiper contacts only a small portion of each turn.

NON-WIREWOUND TRIMMING POTENTIOMETER: A trimming potentiometer characterized by the continuous nature of the surface area of the resistance element to be contacted. Contact is maintained over a continuous, unbroken path. The resistance is achieved by using material compositions other than wire such as carbon, conductive plastic, metal film and cermet.

RESISTANCE ELEMENT: A continuous, unbroken length of resistive material without joints, bonds or welds except at the junction of the element and the electrical terminals connected to each end of the element, or at an intermediate point such as a center tap.

ADJUSTMENT SHAFT: The mechanical input member of a trimming potentiometer which when actuated causes the wiper to traverse the resistance element resulting in a change in output voltage or resistance.

SINGLE TURN ADJUSTMENT: Requires 360° or less mechanical input to cause the wiper to traverse the total resistance element.

MULTITURN ADJUSTMENT: Requires more than 360° mechanical adjustment to cause the wiper to traverse the total resistance element.

TERMINAL: An external member that provides electrical access to the resistance element and wiper.

LEADWIRE TYPE TERMINAL: Flexible insulated conductor.

PRINTED CIRCUIT TERMINAL: Rigid uninsulated electrical conductor, suitable for printed circuit board plug-in.

SOLDER LUG TERMINAL: Rigid uninsulated electrical conductor, suitable for external lead attachment.

WIPER: The wiper is the member in contact with the resistive element that allows the output to be varied when the adjustment shaft is rotated.

STOP-CLUTCH: A device which allows the wiper to idle at the ends of the resistive element without damage as the adjustment shaft continues to be actuated in the same direction.

STOP — SOLID: A positive limit to mechanical and/or electrical adjustment.

STACKING: The mounting of one trimming potentiometer adjacent to or on top of another utilizing the same mounting hardware.

THEORETICAL RESOLUTION: (Wirewound only) The theoretical measurement of sensitivity to which the output ratio may be adjusted; the reciprocal of the number of turns of wire in resistance winding expressed as a percentage.

N = Total number of resistance wire turns.

$\frac{1}{N} \times 100$ = Theoretical resolution percent.

INPUT AND OUTPUT TERMS

TOTAL APPLIED VOLTAGE: The total voltage applied between the designated input terminals.

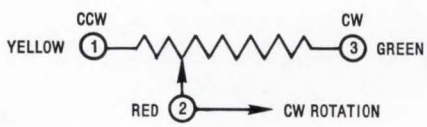
OUTPUT VOLTAGE: The voltage between the wiper terminal and the designated reference point. Unless otherwise specified, the designated reference point is the CCW terminal.

OUTPUT RATIO: The ratio of the output voltage to the designated input reference voltage. Unless otherwise specified, the reference voltage is the total applied voltage.

LOAD RESISTANCE: An external resistance as seen by the Output Voltage (connected between the wiper terminal and the designated reference point).

ADJUSTMENT TERMS

DIRECTION OF TRAVEL: Clockwise (CW) or counterclockwise (CCW) rotation when viewing the adjustment end of the potentiometer.



MECHANICAL TRAVEL — SOLID STOPS: The total travel of the adjustment shaft between integral stops. Continuity must be maintained throughout the travel.

MECHANICAL TRAVEL — CLUTCHING ACTION: The total travel of the adjustment shaft between the points where clutch actuation begins. Continuity must be maintained throughout the travel and during clutch actuation.

MECHANICAL TRAVEL — CONTINUOUS ROTATION: The total travel of the adjustment shaft when the wiper movement is unrestricted at either end of the resistive element as the adjustment shaft continues to be actuated.

ADJUSTMENT TRAVEL (ELECTRICAL): The total travel of the adjustment shaft between minimum and maximum output voltages.

CONTINUITY TRAVEL: The total travel of the shaft over which electrical continuity is maintained between the wiper and the resistance element.

ELECTRICAL AND OPERATIONAL CHARACTERISTICS

TOTAL RESISTANCE: The DC resistance between the input terminals with the wiper positioned to either end stop, or in dead band for continuous rotation potentiometers.

TEST VOLTAGE

Total Resistance, Nominal	Maximum Test Voltage	
	Non-Wirewound	Wirewound
Ohms	Volts DC	Volts DC
.1 to 1.0	0.1	0.1
1.0 to 50	0.3	0.3
50 to 100	2.0	2.0
100 to 1000	3.0	3.0
1k to 100k	10	10
Over 0.1 megohm	50	—

NOTE: The test voltages should never exceed the equivalent of 10% rated power. The minimum voltage to be used is 10 MV.

ABSOLUTE MINIMUM RESISTANCE: The resistance measured between the wiper terminal and each end terminal with the wiper positioned to give a minimum value.

END RESISTANCE: The resistance measured between the wiper terminal and an end terminal when the wiper is positioned at the corresponding end of mechanical travel. Absolute minimum resistance and end resistance are synonymous for continuous rotation trimmers.

TEMPERATURE COEFFICIENT OF RESISTANCE: The unit change in resistance per degree celsius change from a reference temperature, expressed in parts per million per degree celsius as follows:

$$TC = \frac{R_2 - R_1}{R_1 (T_2 - T_1)} \times 10^6$$

Where:
R_1 = Resistance at reference temperature in ohms.
R_2 = Resistance at test temperature in ohms.
T_1 = Reference temperature in degrees celsius.
T_2 = Test temperature in degrees celsius.

RESISTANCE-TEMPERATURE CHARACTERISTIC: The difference between the total resistance values measured at a reference temperature of 25°C and the specified test temperature expressed as a percent of the Total Resistance.

$$RTC = \frac{R_2 - R_1}{R_1} \times 100$$

Where:

R_1 = Resistance at reference temperature (25°C) in ohms.

R_2 = Resistance at the test temperature in ohms.

CONTACT RESISTANCE VARIATION: The apparent resistance seen between the wiper and the resistance element when the wiper is energized with a specified current and moved over the adjustment travel in either direction at a constant speed. The output variations are measured over a specified frequency bandwidth, exclusive of the effects due to roll-on or roll-off of the terminations and is expressed in ohms or % of total resistance.

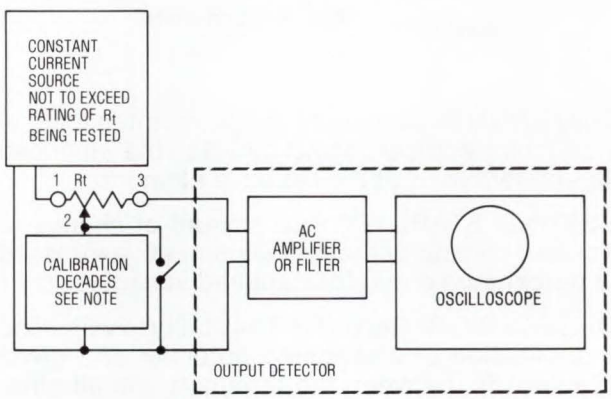


Figure 1. Contact-resistance-variation measuring circuit

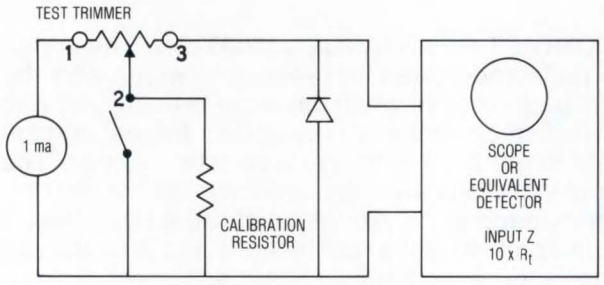
R_t = Test specimen
Output detector bandwidth: 100 cycles to 50 kilocycles
Minimum input impedance to output detector:
At least 10 times the nominal resistance being tested

NOTE: At the calibration of the decade, terminals 1 and 2 must be coincident. Calibration decade is to be set for the contact-resistance variation (CRV) level of the specified nominal resistance being tested.

TABLE II

Test Current (±20%)	Total Resistance Range
30 ma	$2 = R_t = 200$
5 ma	$200 < R_t = 3K$
1 ma	$3K < R_t = 200K$
200 ua	$200K < R_t = 1$ megohm
50 ua	1 megohm $< R_t = 5$ megohm

EQUIVALENT NOISE RESISTANCE: Wirewound only. Any spurious variation in the electrical output not present in the input, defined quantitatively in terms of an equivalent parasitic, transient resistance in ohms, appearing between the contact and the resistant element when the shaft is rotated. The equivalent Noise Resistance is defined independently of the resolution, functional characteristics and the total travel. The magnitude of the Equivalent Noise Resistance is the maximum departure from a specific reference line. The wiper of the potentiometer is required to be excited by a specific current and moved at a specific speed.



$$\text{ENR (ohms)} = \frac{\text{Max. deviation (volts)}}{.001 \text{ amps}}$$

CONTINUITY: Continuity is the maintenance of continuous electrical contact between the wiper and both end terminals of the resistive element.

SETTING STABILITY: The amount of change in the output voltage, without readjustment, expressed as a percentage of the total applied voltage.

DIELECTRIC STRENGTH: The ability to withstand the application of a specified potential of a given characteristic, between the terminals and all other external conducting members such as shaft, housing and mounting hardware without exceeding a specified leakage current value.

INSULATION RESISTANCE: The resistance to a specified DC voltage impressed between the terminals and all other external conducting members such as shaft, housing and mounting hardware.

POWER RATING: The maximum power that a trimming potentiometer can dissipate across the total resistive element under specified conditions while meeting specified performance requirements.

ROTATIONAL LIFE: The number of cycles obtainable under specified operating conditions while remaining within specified allowable degradation. A cycle is defined as one complete traversal of the wiper over the resistive element in both directions.

LOAD LIFE: The number of hours at which a device may dissipate rated power under specified operating conditions while remaining within specified allowable degradations.

ADJUSTABILITY (OUTPUT RESISTANCE): The precision with which the output resistance of a device can be set to the desired value.

ADJUSTABILITY (OUTPUT VOLTAGE RATIO): The precision with which the output voltage ratio of a device can be set to the desired value.

MECHANICAL TERMS

STARTING TORQUE: The maximum moment in the clockwise and counterclockwise directions required to initiate shaft adjustment anywhere in the mechanical travel.

STOP TORQUE: The maximum static moment that can be applied to adjustment shaft at each mechanical stop for a specified period of time without loss of continuity or mechanical damage affecting operational characteristics.

SOLDERABILITY: The ability of the terminals to accept a uniform coating of solder under specified conditions.

WELDABILITY: The ability of materials to be welded together under specified conditions.

TERMINAL STRENGTH: The ability of the terminals to withstand specified mechanical stresses without sustaining damage that would affect utility of the terminals or operation of the trimming potentiometer.

IMMERSION SEALED: The ability of the unit to withstand submersion in acceptable cleaning solutions used in normal soldering processes without performance degradation under specified environmental conditions.

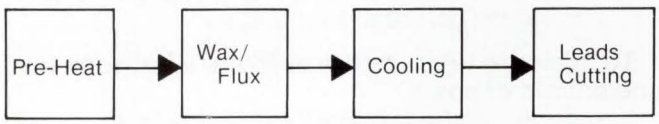
TRIMMER "-ABILITIES"

When you are selecting components for a new design, you typically take into account the environmental conditions that the components will need to endure during the lifetime of the instrument or device. Designers in the past have often overlooked the environmental extremes of their own production lines, where the conditions may be much more severe than anything encountered in actual end use.

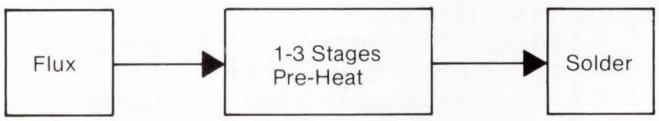
PROCESSABILITY

"Processability" refers to the ability of the unit to withstand the production-line processes associated with the finishing steps on the PC boards. Typically these steps are as follows:

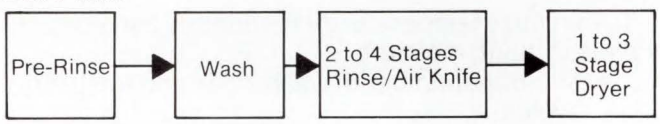
Leads Cutting (Optional)



Soldering



Board Wash



Soldering

Two main types of equipment are used for production soldering:

Drag System — In this method the PC boards are dragged across the surface of the solder pot. The components are usually exposed to relatively high temperatures due to the longer time the board spends in contact with the solder.

Inclined Wave System — The PC board passes an inclined portion of the solder wave at a slight angle (typically 6 to 9 degrees). Because only a portion of the board is exposed to the solder at any given moment, individual components receive less severe heating.

PC Board Washing

This process, designed to remove the excess flux and contaminants left behind by earlier manufacturing steps, subjects the board to a very sudden temperature drop from the elevated levels of wave soldering. This rapid drop can be even harder on the board and components than the temperature rise at the beginning of soldering. A typical temperature profile is shown in Fig. 1. Water is now the predominent fluid used for cleaning since "OSHA" cautioned manufacturers on the carcinogenic effects of hydrocarbon solvents.

Two types of water-washing systems are in common use:

Pressure System — Cleaning is accomplished by directing the spray of water under high pressure from multiple nozzles. With this type of system, care must be used to avoid direct exposure of rotor seal areas relying on O-rings for sealing.

Flooding Systems — A combination of flooding (at normal water pressure) and detergent action is used to accomplish the required cleaning. Since less stress is exerted on O-ring seals, component orientation is less of a concern.

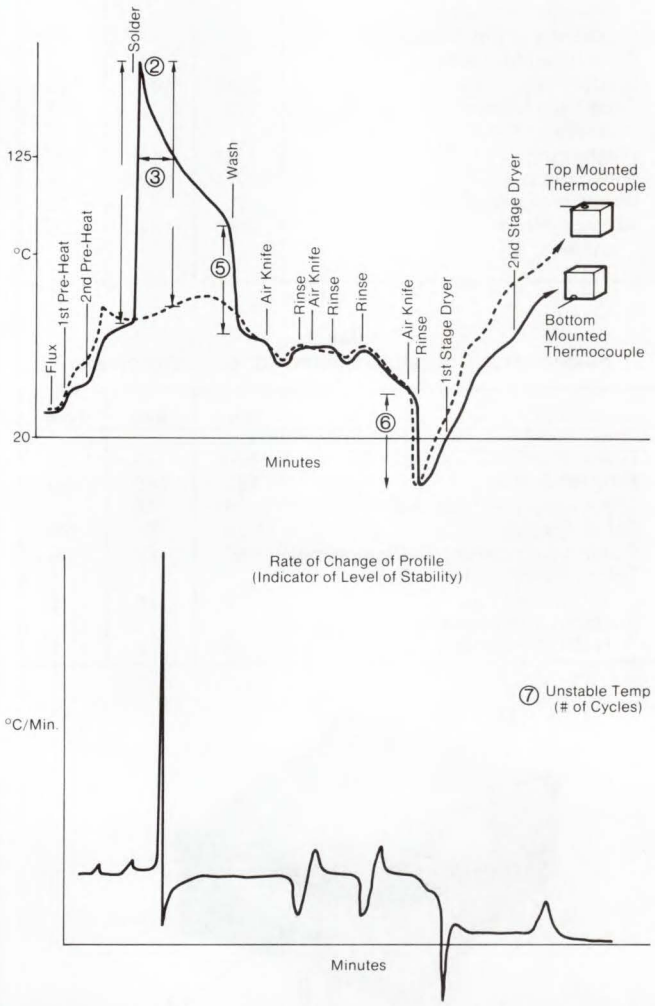


Figure 1.
Typical temperature profile for board washing and soldering.

Critical profile parameters

① Temperature Shock (°C)
② Maximum Temperature (°C)
③ Temperature Exposure (Minimum)
④ Temperature Gradient (°C)
⑤ Temperature Shock Decrease in Water (°C)
⑥ Temperature Shock Decrease in Water & Air Pressure (°C)
⑦ Unstable Temperature (see next page)

Soldering and Washing Parameters

A survey of 13 major Bourns customers has established some system parameters that may be useful for comparison (see Table 1). This data has been analyzed to show the magnitude of critical parameters that the boards encounter (Table 2).

Table 1.
Solder/Wash Processing System
Parameters of 13 major Bourns customers

	High	Avg.	Low
Conveyor speed (ft/min)	7	4.6	3
Pre-heat temp. (°F) (trimmer pin/body junction at top of board)	226	163	118
Time in solder (secs.)	16	4	1
Solder temp. (°F)	500	491	446
Time from solder to wash (min.)	15	3	1
Wash temp. (°F)	170	148	130
Rinse temp. (°F)	170	142	114
Water press. (psi)	32	22	15
Air temp. from knives (°F)	250	124	75

Table 2.
Solder/Wash Critical Parameters for same customers.

	High	Avg.	Low
Temp. shock °C (increasing)	130	71	25
Max. temp. (°C)	182	145	100
Temp. exposure (secs. over 125°C)	74	18	0
Temp. gradient (°C)	78	61	25
Temp. shock, water °C (decreasing)	50	22	0
Temp. shock, water and air °C (decreasing)	72	26	5
Unstable Temperature (Hot/Cold Cycles)	13	6	1

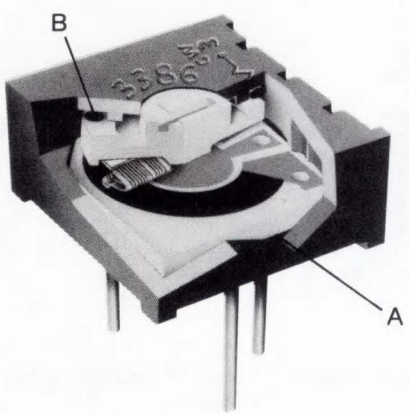


Figure 2.
Trimmer areas most exposed to damage in board soldering/washing.

A. Subjected to damage from temperature shock (increase in air); maximum temperature; temperature exposure; and temperature gradient.

B. Subjected to temperature shock (decrease of temperature in rinse water and in combination of water and air).

Guarding Against Damage

A number of steps may be taken to protect the trimmers and other board components against damage during the soldering/washing process. Among the key ones are —

To minimize temperature shock
- Pre-heat boards to maximum acceptable level
- Reduce time in solder

To avoid heating components above their maximum rated temperature
- Use lowest acceptable solder temperature
- Use maximum allowable conveyor speed
- Limit pre-heat temperature to maximum necessary

To limit time of exposure above rated temperature
- Limit time in solder
- After solder operation, cool board to wash temperature before it enters wash

To minimize temperature difference between top and bottom of board
- Apply pre-heat to both top and bottom

To reduce temperature shock on entering the moist environment of the wash
- Use wash/rinse temperature as near component temperature as possible
- Extend time between solder process and wash
- Cool board after solder operation, prior to entering wash

To minimize temperature variations as component travels through moisture
- Minimize number of wash/rinse and rinse/dry cycles
- Use heated air for air knives (to counter evaporative cooling effect)
- Minimize difference between wash and rinse temperature

To minimize exposure to high-pressure water during board wash
- Select trimmer models with pin styles that orient the rotor seal area away from exposure to the high-pressure water stream

SETTABILITY

Settability refers to the ease with which a trimmer can be set accurately to the position that produces the desired circuit condition.

Where the requirement is for obtaining a highly accurate setting the preference is for cermet — because a small incremental adjustment in a wirewound unit does not always produce the expected change in output as the wiper moves off one turn of wire and onto another.

Setting accuracy is better with a multiturn unit than with a single-turn. This is especially true when the speed of setting is also a requirement as on a production line (Fig. 2).

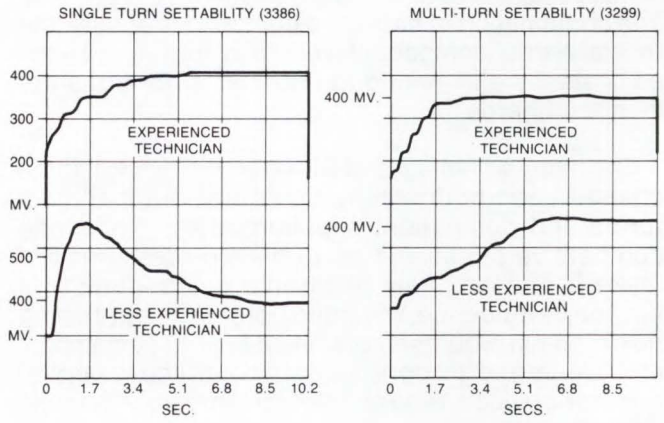


Figure 2.
When accurate setting is required, a multi-turn trimmer can generally be set faster than a single-turn.

STABILITY

Stability refers to the ability of the trimmer to remain at the desired setting. Environmental factors play an important role here: stability may be affected by temperature exposure, thermal shock/cycling, humidity, and mechanical shock or vibration.

This is not a matter of concern in most applications, since Bourns trimmers exhibit excellent stability under all specified conditions. Stability is most often a concern when cermet trimmers are used in low current "dry" circuits (25μ amps and below). Under these conditions the contact resistance may vary, making the wiper appear unstable. This is most noticeable in some rheostat applications. This can be avoided by using a wirewound unit, or choosing a cermet trimmer that has been designed for dry-circuit applications. Bourns applications engineers can assist you on this and other questions.

ACCESSIBILITY

When selecting a trimmer and determining its placement on the board, keep in mind the people who will have to use it. Bourns trimmers are available in a wide variety of sizes, shapes, configurations, and placement of adjustment screws. You will usually find a unit on which the access for adjustment will be convenient for the user.

Keep in mind the different requirements for accessibility depending on whether adjustment will be done on the assembly line or in the field; with the board uncovered, in a housing or cabinet, or on an extender. Also consider whether production-line adjustment will be done manually or by robotics. A Bourns applications engineer can advise on special high-speed automatic adjustment features.

USABILITY

In selecting a trimmer for a specific application, it's important to be aware that the catalog contains a myriad of facts about each model that can assist you in finding the most suitable choice. For example:

Contact Resistance Variation (CRV) — Under MIL-R-22097 and MIL-R-39035, the maximum CRV is 3%. All Bourns trimmers meet this standard (3% or 3 ohms, whichever is greater). For applications that demand a more rigorous standard, some Bourns trimmers are rated at 2% or 2 ohms, and many others at 1% or 1 ohm.

Power Rating — The ambient temperature at which the trimmer will operate has an important bearing on power rating. Power ratings are usually specified at 70° or 85°C; at a temperature of 150°C, the power rating of many trimmers is reduced to zero.

Temperature Coefficient of Resistance (T.C.) — This specification is a measure of how much the resistance changes with a change in temperature. In many applications a T.C. of ±250 PPM/°C is acceptable. Typical T.C. specifications for cermet models are ±100 PPM/°C and ±50 PPM/°C for wirewound models.

RELIABILITY

One of the greatest challenges facing American manufacturers in the early '90s lies in the area of reliability — a challenge for component manufacturers and equipment manufacturers alike. Bourns has been on the leading edge of this effort, both in the area of instituting new methods and technologies for achieving higher reliability, and bringing an awareness of the need to other manufacturers.

SURFACE MOUNTED DEVICES (SMD) — AN EMERGING TECHNOLOGY

Surface mounting of electronic components represents another significant advance in PC board processing. Many U.S. companies have expressed an interest in SMD assembly methods to replace the often troublesome and costly techniques now used with leaded components. Unfortunately, for a number of reasons, this interest has not resulted to date in a major commitment to SMD handling equipment.

There are direct and indirect benefits associated with surface mounting. Since the direct benefits are outgrowths of the indirect ones, some explanation of these interrelated factors is required in order to understand this complex, highly technical and investment intensive subject. Further, a listing of the primary advantages will make additional comments on Japan's SMD usage and growth unnecessary.

In capsule format, the primary advantages (with comments on secondary benefits) are:

- **Lower End-Equipment Cost** (positions OEM's for aggressive pricing to achieve market penetration).
- **Superior Product Performance** (satisfies user requirements for improved operational performance).
- **Improved Product Quality and Reliability** (creates confidence factor which easily translates to increased demand or sales).
- **Smaller Finished Product Size** (addresses demand for miniaturization).

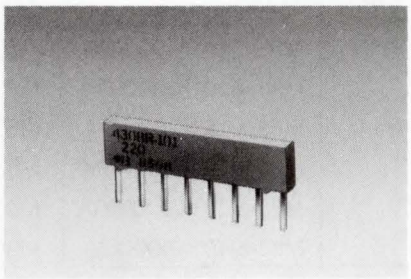
Cost, performance, quality/reliability and size — how are these factors interrelated and how are they achieved through surface mounting?

A by-product of SMD technology is the downsizing of components. Size reductions range from 25% to 60%, depending upon the device in question. High PC board densities can be achieved (more components per square inch of real estate; surface mounted units can also be assembled on both sides). PC board material savings alone are substantial. When circuits diminish, external hardware and other materials follow — further savings. Even freight charges are decreased by lighter equipment weight and less packaging.

Surface mounted component prices are forecasted to decline, the result of automated volume production. Volume is directly related to component **standardization.** By having a few sizes to cover a large range of electrical values and/or parameters, large quantities of a given device can be produced at a much lower **per unit** cost. Selling prices fall as volume increases. Component quality is also enhanced by eliminating many of the variables associated with short production runs.

Automatic SMD handling equipment, although capital intensive, is the single-most effective way to reduce labor costs and increase yields. Typical "pick and place" machines can assemble components 8 to 10 times faster than human assemblers, with virtually no mistakes. Major direct labor reductions are obvious. The combination of improved component quality and "mistake-free" component placement further decreases costs by eliminating the normal rework of auto-inserted boards.

The many advantages of SMD technology will force change upon both electronic equipment manufacturers and component suppliers alike. Worldwide competitive prices and performance pressures will make it happen. Few electronic components will escape its influence, trimming potentiometers being no exception. Bourns is committed to SMD conversion, and we intend to be a leader in surface mounted trimmer devices. Bourns surface mount trimmers begin on page 176.



RESISTOR NETWORKS

PRODUCT SELECTION GUIDE
Molded Resistor Networks

Product Board Space	Series Number	Pin Ct.	Isolated Resistors	Bussed Resistors	Dual Terminators	Page No.
Molded DIP Low Profile .185" (4.70 mm) Seated Height	4100R	8	4108R-001-RC	4108R-002-RC	4108R-003-RC/RC	64
		14	4114R-001-RC	4114R-002-RC	4114R-003-RC/RC	
		16	4116R-001-RC	4116R-002-RC	4116R-003-RC/RC	
		18	4118R-001-RC	4118R-002-RC	4118R-003-RC/RC	
		20	4120R-001-RC	4120R-002-RC	4120R-003-RC/RC	
	M83401-01	14	M8340101KXXXXFA M8340101KXXXXGA M8340101KXXXXJA M8340101MXXXXFA M8340101MXXXXGA M8340101MXXXXJA	M8340101KXXXXFB M8340101KXXXXGB M8340101KXXXXJB M8340101MXXXXFB M8340101MXXXXGB M8340101MXXXXJB		214
	M83401-02	16	M8340102KXXXXFA M8340102KXXXXGA M8340102KXXXXJA M8340102MXXXXFA M8340102MXXXXGA M8340102MXXXXJA	M8340102KXXXXFB M8340102KXXXXGB M8340102KXXXXJB M8340102MXXXXFB M8340102MXXXXGB M8340102MXXXXJB		214
Molded SIP Low Profile .195" (4.96 mm) Seated Height	4300R	6	4306R-102-RC	4306R-101-RC	4306R-104-RC/RC	66
		8	4308R-102-RC	4308R-101-RC	4308R-104-RC/RC	
		9		4309R-101-RC	4309R-104-RC/RC	
		10	4310R-102-RC	4310R-101-RC	4310R-104-RC/RC	
		11		4311R-101-RC	4311R-104-RC/RC	
	M83401-07	6	M8340107KXXXXFG M8340107KXXXXGG M8340107KXXXXJG M8340107MXXXXFG M8340107MXXXXGG M8340107MXXXXJG	M8340107KXXXXFC M8340107KXXXXGC M8340107KXXXXJC M8340107MXXXXFC M8340107MXXXXGC M8340107MXXXXJC		216
	M83401-08	8	M8340108KXXXXFG M8340108KXXXXGG M8340108KXXXXJG M8340108MXXXXFG M8340108MXXXXGG M8340108MXXXXJG	M8340108KXXXXFC M8340108KXXXXGC M8340108KXXXXJC M8340108MXXXXFC M8340108MXXXXGC M8340108MXXXXJC		216
	M83401-09	10	M8340109KXXXXFG M8340109KXXXXGG M8340109KXXXXJG M8340109MXXXXFG M8340109MXXXXGG M8340109MXXXXJG	M8340109KXXXXFC M8340109KXXXXGC M8340109KXXXXJC M8340109MXXXXFC M8340109MXXXXGC M8340109MXXXXJC		216

BOURNS

PRODUCT SELECTION GUIDE
Molded Resistor Networks

Product Board Space	Series Number	Pin Ct.	Isolated Resistors	Bussed Resistors	Dual Terminators	Page No.
Molded SIP Medium Profile	4300M	4	4304M-102-RC	4304M-101-RC	4304M-104-RC/RC	68
		6	4306M-102-RC	4306M-101-RC	4306M-104-RC/RC	
		8	4308M-102-RC	4308M-101-RC	4308M-104-RC/RC	
.250" (6.35 mm) Seated Height		10	4310M-102-RC	4310M-101-RC	4310M-104-RC/RC	
Molded SIP High Profile	4300H	4	4304H-102-RC	4304H-101-RC	4304H-104-RC/RC	70
		6	4306H-102-RC	4306H-101-RC	4306H-104-RC/RC	
		8	4308H-102-RC	4308H-101-RC	4308H-104-RC/RC	
		10	4310H-102-RC	4310H-101-RC	4310H-104-RC/RC	
.350" (8.89 mm) Seated Height	M83401-04	6	M8340104KXXXXFG M8340104KXXXXGG M8340104KXXXXJG M8340104MXXXXFG M8340104MXXXXGG M8340104MXXXXJG	M8340104KXXXXFC M8340104KXXXXGC M8340104KXXXXJC M8340104MXXXXFC M8340104MXXXXGC M8340104MXXXXJC		218
	M83401-05	8	M8340105KXXXXFG M8340105KXXXXGG M8340105KXXXXJG M8340105MXXXXFG M8340105MXXXXGG M8340105MXXXXJG	M8340105KXXXXFC M8340105KXXXXGC M8340105KXXXXJC M8340105MXXXXFC M8340105MXXXXGC M8340105MXXXXJC		218
	M83401-06	10	M8340106KXXXXFG M8340106KXXXXGG M8340106KXXXXJG M8340106MXXXXFG M8340106MXXXXGG M8340106MXXXXJG	M8340106KXXXXFC M8340106KXXXXGC M8340106KXXXXJC M8340106MXXXXFC M8340106MXXXXGC M8340106MXXXXJC		218

PRODUCT SELECTION GUIDE
Conformal Resistor Networks

Product Board Space	Series Number	Pin Ct.	Isolated Resistors	Bussed Resistors	Dual Terminators	Page No.
Conformal SIP Low Profile .200" (5.08 mm) Seated Height Pin Count / A Maximum Inches (mm): 4 .398 (10.11); 5 .498 (12.65); 6 .598 (15.19); 7 .698 (17.73); 8 .798 (20.27); 9 .898 (22.81); 10 .998 (25.35); 11 1.098 (27.89); 12 1.198 (30.43); 13 1.298 (32.97); 14 1.398 (35.51) Industrial Grade	**4600X**	4	4604X-102-RC	4604X-101-RC	4604X-104-RC/RC	72
		5		4605X-101-RC	4605X-104-RC/RC	
		6	4606X-102-RC	4606X-101-RC	4606X-104-RC/RC	
		7		4607X-101-RC	4607X-104-RC/RC	
		8	4608X-102-RC	4608X-101-RC	4608X-104-RC/RC	
		9		4609X-101-RC	4609X-104-RC/RC	
		10	4610X-102-RC	4610X-101-RC	4610X-104-RC/RC	
		11		4611X-101-RC	4611X-104-RC/RC	
		12	4612X-102-RC	4612X-101-RC	4612X-104-RC/RC	
		13		4613X-101-RC	4613X-104-RC/RC	
		14	4614X-102-RC	4614X-101-RC	4614X-104-RC/RC	
Conformal SIP Medium Profile .250" (6.35 mm) Seated Height Pin Count / A Maximum Inches (mm): 4 .398 (10.11); 5 .498 (12.65); 6 .598 (15.19); 7 .698 (17.73); 8 .798 (20.27); 9 .898 (22.81); 10 .998 (25.35); 11 1.098 (27.89); 12 1.198 (30.43); 13 1.298 (32.97); 14 1.398 (35.51) Industrial Grade	**4600M**	4	4604M-102-RC	4604M-101-RC	4604M-104-RC/RC	74
		5		4605M-101-RC	4605M-104-RC/RC	
		6	4606M-102-RC	4606M-101-RC	4606M-104-RC/RC	
		7		4607M-101-RC	4607M-104-RC/RC	
		8	4608M-102-RC	4608M-101-RC	4608M-104-RC/RC	
		9		4609M-101-RC	4609M-104-RC/RC	
		10	4610M-102-RC	4610M-101-RC	4610M-104-RC/RC	
		11		4611M-101-RC	4611M-104-RC/RC	
		12	4612M-102-RC	4612M-101-RC	4612M-104-RC/RC	
		13		4613M-101-RC	4613M-104-RC/RC	
		14	4614M-102-RC	4614M-101-RC	4614M-104-RC/RC	
Conformal SIP HIgh Profile .350" (8.89 mm) Seated Height Pin Count / A Maximum Inches (mm): 4 .398 (10.11); 5 .498 (12.65); 6 .598 (15.19); 7 .698 (17.73); 8 .798 (20.27); 9 .898 (22.81); 10 .998 (25.35); 11 1.098 (27.89); 12 1.198 (30.43); 13 1.298 (32.97); 14 1.398 (35.51) Industrial Grade	**4600H**	4	4604H-102-RC	4604H-101-RC	4604H-104-RC/RC	76
		5		4605H-101-RC	4605H-104-RC/RC	
		6	4606H-102-RC	4606H-101-RC	4606H-104-RC/RC	
		7		4607H-101-RC	4607H-104-RC/RC	
		8	4608H-102-RC	4608H-101-RC	4608H-104-RC/RC	
		9		4609H-101-RC	4609H-104-RC/RC	
		10	4610H-102-RC	4610H-101-RC	4610H-104-RC/RC	
		11		4611H-101-RC	4611H-104-RC/RC	
		12	4612H-102-RC	4612H-101-RC	4612H-104-RC/RC	
		13		4613H-101-RC	4613H-104-RC/RC	
		14	4614H-102-RC	4614H-101-RC	4614H-104-RC/RC	

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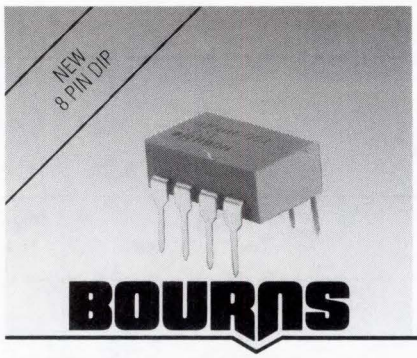
PRODUCT SELECTION GUIDE
Surface Mounted Resistor Networks

Product Package Outline	Series Number	Pin Ct.	Isolated Resistors	Bussed Resistors	Dual Terminators	Page No.
	4400P	16	4416P-001-RC 4416P-004-RC	4416P-002-RC	4416P-003-RC/RC	186
		20	4420P-001-RC 4420P-004-RC	4420P-002-RC	4420P-003-RC/RC	
	4400J	16	4416J-001-RC 4416J-004-RC	4416J-002-RC	4416J-003-RC/RC	188
		20	4420J-001-RC 4420J-004-RC	4420J-002-RC	4420J-003-RC/RC	
	4800P	14	4814P-001-RC	4814P-002-RC	4814P-003-RC/RC	190
		16	4816P-001-RC 4816P-004-RC	4816P-002-RC	4816P-003-RC/RC	
		18	4818P-001-RC	4818P-002-RC	4818P-003-RC/RC	
		20	4820P-001-RC 4820P-004-RC	4820P-002-RC	4820P-003-RC/RC	



MOLDED DIPs
8, 14, 16, 18 AND 20 PIN

- Compatible with automatic insertion equipment
- Copper leads for excellent heat dissipation
- High temperature design ensures compatibility with all popular board soldering techniques
- Trifurcated Krimp-Joint™ lead attachment for product reliability and strength

Model 4100R Series

Bourns® Resistor Networks

Electrical Characteristics

Resistance Range ..... 10 ohms to 3.3 megohms
Maximum Operating Voltage 100V
Temperature Coefficient of Resistance
50Ω to 2.2 MΩ ..... ±100ppm/°C
below 50Ω ..... ±250ppm/°C
above 2.2 MΩ ..... ±250ppm/°C
Voltage Coefficient ..... ±100ppm/V typical by decade values
TCR Tracking ..... 50ppm/°C maximum; equal values
Resistor Tolerance ..... See circuits
Operating Temperature ..... –55°C to +125°C

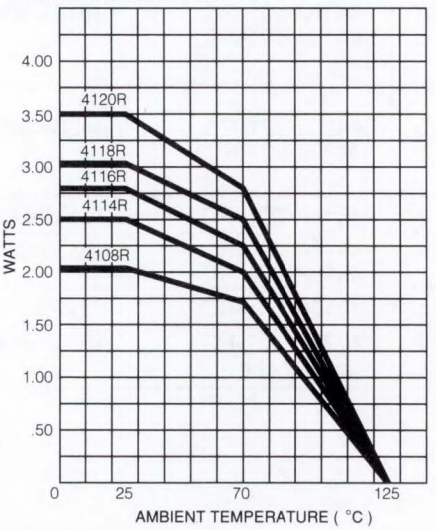
Environmental Characteristics

TESTS PER MIL-R-83401 ..... ΔR MAX.
Short Time Overload ..... ±0.25%
Load Life ..... ±1.00%
Mechanical Shock ..... ±0.25%
Moisture Resistance ..... ±0.50%
Resistance to Soldering Heat ..... ±0.25%
Terminal Strength ..... ±0.25%
Thermal Shock ..... ±0.25%
Vibration ..... ±0.25%
Insulation Resistance ..... 10,000 megohms minimum
Dielectric Withstanding Voltage ..... 200 VRMS
Lead Solderability/Solvent Resistance ..Meet requirements of MIL-R-83401

Physical Characteristics

Flammability ..... Conforms to UL94V-0
Lead Frame Material ..... Copper (OLIN 194) 90/10 electroplate
Body Material ..... Novolac epoxy

PACKAGE POWER TEMPERATURE DERATING CURVE



Package Power Rating at 70°C

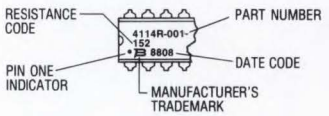
4108R	1.69 watts
4114R	2.00 watts
4116R	2.25 watts
4118R	2.50 watts
4120R	2.80 watts

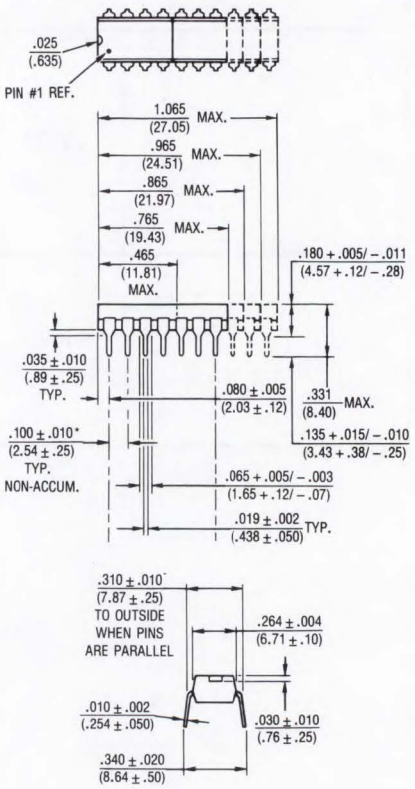
Package Power Rating at 25°C

4108R	2.11 watts
4114R	2.50 watts
4116R	2.81 watts
4118R	3.13 watts
4120R	3.50 watts

TYPICAL PART MARKING

Represents total content. Layout may vary.





Governing dimensions are in inches. Dimensions in parentheses are metric (mm) and are approximate.

*Terminal centerline to centerline measurements made at point of emergence of the lead from the body.

HOW TO ORDER

41 14 R - 001 - 152

Model
(41 = Molded DIP)

Number of Pins

Physical Configuration
(R = Low Profile)

Electrical Configuration
- 001 = Isolated
- 002 = Bussed
- 003 = Dual Terminator

Resistance Code
- First 2 digits are significant
- Third digit represents the number of zeros to follow.

Consult factory for other available options.

Specifications are subject to change without notice.

- Superior package integrity to withstand moisture and contamination
- Laser marking on contrasting background for permanent identification
- Gold epoxy provides excellent marking contrast
- Laser marking for permanent identification

Model 4100R Series

Bourns® Resistor Networks

ISOLATED RESISTORS
(001 CIRCUIT)

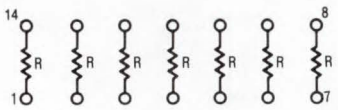
Model 4108-001-RC
(4 Isolated Resistors)

Model 4114R-001-RC
(7 Isolated Resistors)

Model 4116R-001-RC
(8 Isolated Resistors)

Model 4118R-001-RC
(9 Isolated Resistors)

Model 4120R-001-RC
(10 Isolated Resistors)



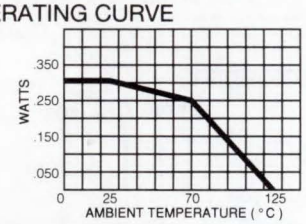
Resistance Tolerance

10 ohms to 49 ohms .....±1 ohm
50 ohms to 5 megohms .....±2%*
Above 5 megohms .....±5%

Power Rating per Resistor

At 70°C .....0.250 watt
At 25°C .....0.312 watt

POWER TEMPERATURE
DERATING CURVE



BUSSED RESISTORS
(002 CIRCUIT)

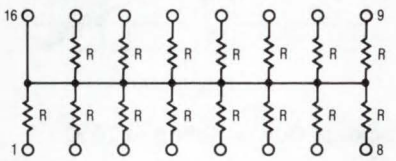
Model 4108R-002-RC
(7 Resistors, Pin 8 Common)

Model 4114R-002-RC
(13 Resistors, Pin 14 Common)

Model 4116R-002-RC
(15 Resistors, Pin 16 Common)

Model 4118R-002-RC
(17 Resistors, Pin 18 Common)

Model 4120R-002-RC
(19 Resistors, Pin 20 Common)



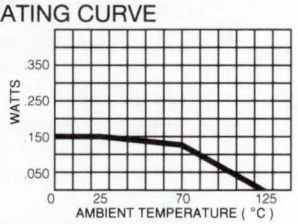
Resistance Tolerance

10 ohms to 49 ohms .....±1 ohm
50 ohms to 5 megohms .....±2%*
Above 5 megohms .....±5%

Power Rating per Resistor

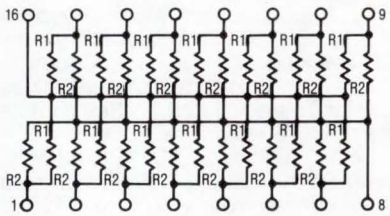
At 70°C .....0.125 watt
At 25°C .....0.156 watt

POWER TEMPERATURE
DERATING CURVE



DUAL TERMINATOR
(003 CIRCUIT)

Model 4108R-003-R1/R2
Model 4114R-003-R1/R2
Model 4116R-003-R1/R2 (shown)
Model 4118R-003-R1/R2
Model 4120R-003-R1/R2



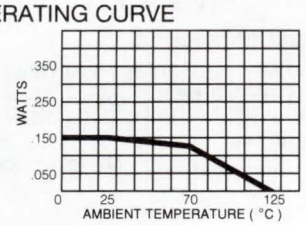
Resistance Tolerance

Below 100 ohms .....±2 ohms
100 ohms to 5 megohms .....±2%*
Above 5 megohms .....±5%

Power Rating per Resistor

At 70°C .....0.125 watt
At 25°C .....0.156 watt

POWER TEMPERATURE
DERATING CURVE



STANDARD RESISTANCE VALUES (001, 002 CIRCUITS)

Resistance (Ohms)	Resistance Code
10	100
22	220
27	270
33	330
39	390
47	470
56	560
68	680
82	820
100	101
120	121
150	151
180	181
220	221
270	271

Resistance (Ohms)	Resistance Code
330	331
390	391
470	471
560	561
680	681
820	821
1,000	102
1,200	122
1,500	152
1,800	182
2,000	202
2,200	222
2,700	272
3,300	332
3,900	392

Resistance (Ohms)	Resistance Code
4,700	472
5,600	562
6,800	682
8,200	822
10,000	103
12,000	123
15,000	153
18,000	183
20,000	203
22,000	223
27,000	273
33,000	333
39,000	393
47,000	473
56,000	563

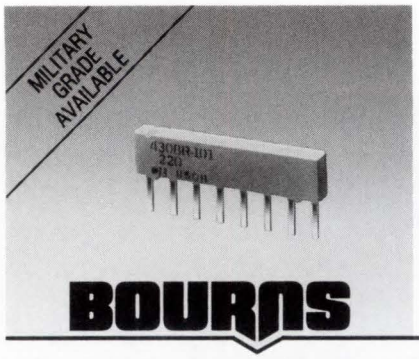
Resistance (Ohms)	Resistance Code
68,000	683
82,000	823
100,000	104
120,000	124
150,000	154
180,000	184
220,000	224
270,000	274
330,000	334
390,000	394
470,000	474
560,000	564
680,000	684
820,000	824
1,000,000	105

STANDARD RESISTANCE VALUES
(003 CIRCUIT)

Resistance			
(Ohms)		Code	
R_1	R_2	R_1	R_2
160	240	161	241
180	390	181	391
220	270	221	271
220	330	221	331
330	390	331	391
330	470	331	471
3,000	6,200	302	622

Specifications are subject to change without notice.

* ±1% Tolerance is available by adding suffix code "F" after the resistance code.



MOLDED SIPs, LOW PROFILE 6, 8, 9, 10, AND 11 PIN

- Low profile provides compatibility with DIPs
- Compatible with automatic insertion equipment
- High temperature design ensures compatibility with all popular board soldering techniques
- Copper leads for excellent heat dissipation

Model 4300R Series

Bourns® Resistor Networks

Electrical Characteristics

Resistance Range ..... 10 ohms to 10 megohms
Maximum Operating Voltage 100V
Temperature Coefficient of Resistance
50Ω to 2.2 MΩ ..... ±100ppm/°C
below 50Ω ..... ±250ppm/°C
above 2.2 MΩ ..... ±250ppm/°C
Voltage Coefficient ..... ±100ppm/V typical by decade values
TCR Tracking ..... 50ppm/°C maximum; equal values
Resistor Tolerance ..... See circuits
Operating Temperature ..... –55°C to +125°C
Power Rating ..... Derate to zero power from + 70°C to + 125°C

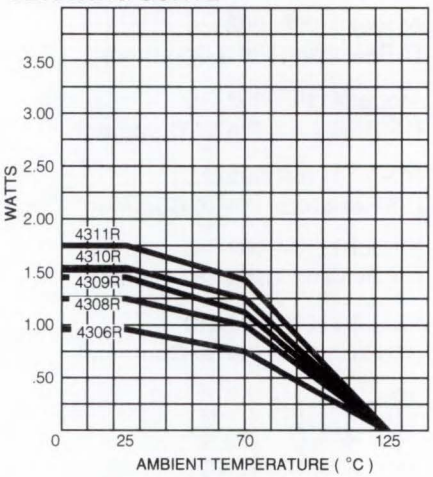
Environmental Characteristics

TESTS PER MIL-R-83401 ..... ΔR MAX.
Short Time Overload ..... ±0.25%
Load Life ..... ±1.00%
Mechanical Shock ..... ±0.25%
Moisture Resistance ..... ±0.50%
Resistance to Soldering Heat ..... ±0.25%
Terminal Strength ..... ±0.25%
Thermal Shock ..... ±0.25%
Vibration ..... ±0.25%
Insulation Resistance ..... 10,000 megohms minimum
Dielectric Withstanding Voltage ..... 200 VRMS
Lead Solderability/Solvent Resistance .. Meet requirements of MIL-R-83401

Physical Characteristics

Flammability ..... Conforms to UL94V-0
Lead Frame Material ..... Copper (OLIN 194) 60/40 solder dip
Body Material ..... Novolac epoxy

PACKAGE POWER TEMPERATURE DERATING CURVE



Package Power Rating at 70°C

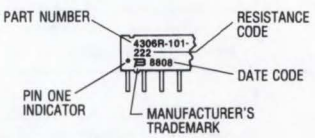
4306R ..... 0.75 watts
4308R ..... 1.00 watts
4309R ..... 1.13 watts
4310R ..... 1.25 watts
4311R ..... 1.38 watts

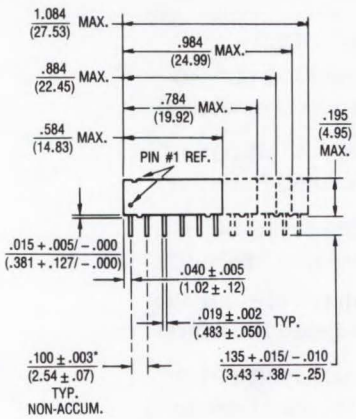
Package Power Rating at 25°C

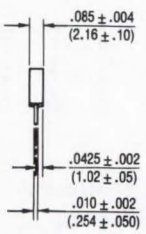
4306R ..... 0.94 watts
4308R ..... 1.25 watts
4309R ..... 1.41 watts
4310R ..... 1.56 watts
4311R ..... 1.73 watts

TYPICAL PART MARKING

Represents total content. Layout may vary.







Governing dimensions are in inches. Dimensions in parentheses are metric (mm) and are approximate.

*Terminal centerline to centerline measurements made at point of emergence of the lead from the body.

HOW TO ORDER

43 06 R - 101 - 222

Model (43 = Molded SIP)
Number of Pins
Physical Configuration (R = Low Profile)
Electrical Configuration
- 101 = Bussed
- 102 = Isolated
- 104 = Dual Terminator

Resistance Code
- First 2 digits are significant
- Third digit represents the number of zeros to follow.

Consult factory for other available options.

Specifications are subject to change without notice.

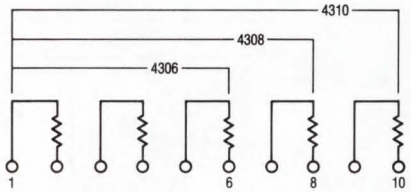
- Superior package integrity to withstand moisture and contamination
- Trifurcated Krimp-Joint™ lead attachment for product reliability and strength
- Laser marking on contrasting background for permanent identification

Model 4300R Series

B® Resistor Networks

ISOLATED RESISTORS
(102 CIRCUIT)

Model 4306R-102-RC (6 Pin)
Model 4308R-102-RC (8 Pin)
Model 4310R-102-RC (10 Pin)



These models incorporate 3, 4 or 5 isolated thick-film resistors of equal value, each connected between two pins.

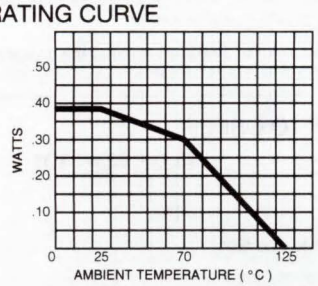
Resistance Tolerance

10 ohms to 49 ohms .....±1 ohm
50 ohms to 5 megohms .....±2%*
Above 5 megohms .....±5%

Power Rating per Resistor

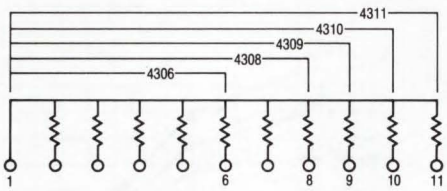
At 70°C .....0.30 watt
At 25°C .....0.375 watt

POWER TEMPERATURE
DERATING CURVE



BUSSED RESISTORS
(101 CIRCUIT)

Model 4306R-101-RC (6 Pin)
Model 4308R-101-RC (8 Pin)
Model 4309R-101-RC (9 Pin)
Model 4310R-101-RC (10 Pin)
Model 4311R-101-RC (11 Pin)



These models incorporate 5, 7, 8, 9 or 10 thick-film resistors of equal value, each connected between a separate pin.

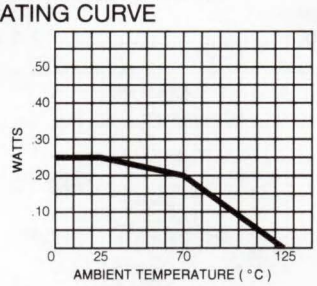
Resistance Tolerance

10 ohms to 49 ohms .....±1 ohm
50 ohms to 5 megohms .....±2%*
Above 5 megohms .....±5%

Power Rating per Resistor

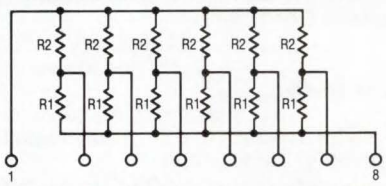
At 70°C .....0.20 watt
At 25°C .....0.25 watt

POWER TEMPERATURE
DERATING CURVE



DUAL TERMINATOR
(104 CIRCUIT)

Model 4306R-104-R1/R2
Model 4308R-104-R1/R2 (shown)
Model 4309R-104-R1/R2
Model 4310R-104-R1/R2
Model 4311R-104-R1/R2



4308R-104 (shown above) is an 8-pin configuration and terminates 6 lines. Pins 1 and 8 are common for ground and power, respectively. Twelve thick-film resistors are paired in series between the common lines (pins 1 and 8).

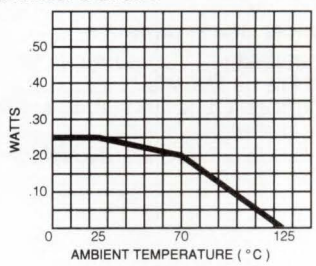
Resistance Tolerance

Below 100 ohms .....±2 ohms
100 ohms to 5 megohms .....±2%*
Above 5 megohms .....±5%

Power Rating per Resistor

At 70°C .....0.20 watt
At 25°C .....0.25 watt

POWER TEMPERATURE
DERATING CURVE



STANDARD RESISTANCE VALUES (101, 102 CIRCUITS)

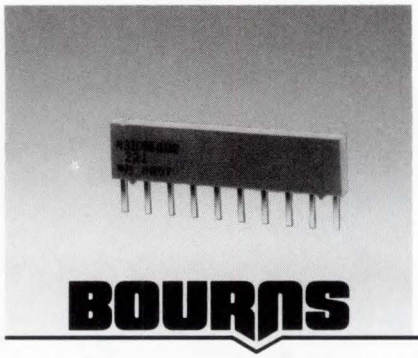
Resistance (Ohms)	Resistance Code	Resistance (Ohms)	Resistance Code	Resistance (Ohms)	Resistance Code	Resistance (Ohms)	Resistance Code
10	100	330	331	4,700	472	68,000	683
22	220	390	391	5,600	562	82,000	823
27	270	470	471	6,800	682	100,000	104
33	330	560	561	8,200	822	120,000	124
39	390	680	681	10,000	103	150,000	154
47	470	820	821	12,000	123	180,000	184
56	560	1,000	102	15,000	153	220,000	224
68	680	1,200	122	18,000	183	270,000	274
82	820	1,500	152	20,000	203	330,000	334
100	101	1,800	182	22,000	223	390,000	394
120	121	2,000	202	27,000	273	470,000	474
150	151	2,200	222	33,000	333	560,000	564
180	181	2,700	272	39,000	393	680,000	684
220	221	3,300	332	47,000	473	820,000	824
270	271	3,900	392	56,000	563	1,000,000	105

STANDARD RESISTANCE VALUES
(104 CIRCUIT)

Resistance			
(Ohms)		Code	
R_1	R_2	R_1	R_2
160	240	161	241
180	390	181	391
220	270	221	271
220	330	221	331
330	390	331	391
330	470	331	471
3,000	6,200	302	622

Specifications are subject to change without notice.

* ±1% Tolerance is available by adding suffix code "F" after the resistance code.



BOURNS

MOLDED SIPs, MEDIUM PROFILE
4, 6, 8 AND 10 PIN

- Medium profile offers increased power handling
- Compatible with automatic insertion equipment
- High temperature design ensures compatibility with all popular board soldering techniques
- Copper leads for excellent heat dissipation

Model 4300M Series

BI® Resistor Networks

Electrical Characteristics

Resistance Range
.....10 ohms to 10 megohms
Maximum Operating Voltage 100V
Temperature Coefficient of Resistance
50Ω to 2.2 MΩ .....±100ppm/°C
below 50Ω .....±250ppm/°C
above 2.2 MΩ .....±250ppm/°C
Voltage Coefficient
.....±100ppm/V typical by decade values
TCR Tracking .....50ppm/°C maximum; equal values
Resistor Tolerance .....See circuits
Operating Temperature
.....–55°C to +125°C

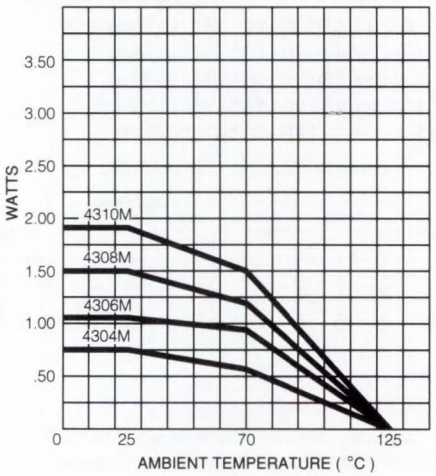
Environmental Characteristics

TESTS PER MIL-R-83401 .....ΔR MAX.
Short Time Overload .....±0.25%
Load Life.....±1.00%
Mechanical Shock .....±0.25%
Moisture Resistance.....±0.50%
Resistance to Soldering Heat
.....±0.25%
Terminal Strength .....±0.25%
Thermal Shock .....±0.25%
Vibration .....±0.25%
Insulation Resistance
.....10,000 megohms minimum
Dielectric Withstanding Voltage
.....200 VRMS
Lead Solderability/Solvent Resistance
..Meet requirements of MIL-R-83401

Physical Characteristics

Flammability .....Conforms to UL94V-0
Lead Frame Material .....
Copper (OLIN 194) 60/40 solder dip
Body Material
.....Novolac epoxy

PACKAGE POWER TEMPERATURE DERATING CURVE



Package Power Rating at 70°C

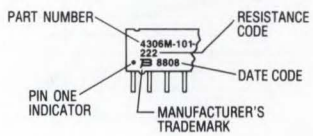
4304M .....0.60 watts
4306M .....0.90 watts
4308M .....1.20 watts
4310M .....1.50 watts

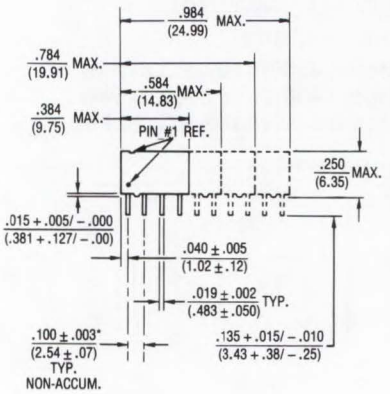
Package Power Rating at 25°C

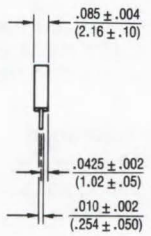
4304M .....0.75 watts
4306M .....1.13 watts
4308M .....1.50 watts
4310M .....1.88 watts

TYPICAL PART MARKING

Represents total content. Layout may vary.







Governing dimensions are in inches. Dimensions in parentheses are metric (mm) and are approximate.

*Terminal centerline to centerline measurements made at point of emergence of the lead from the body.

HOW TO ORDER

43 06 M - 101 - 222

Model
(43 = Molded SIP)
Number of Pins
Physical Configuration
(M = Medium Profile)
Electrical Configuration
•101 = Bussed
•102 = Isolated
•104 = Dual Terminator
Resistance Code
• First 2 digits are significant
•Third digit represents the number of zeros to follow.

Consult factory for other available options.

Specifications are subject to change without notice.

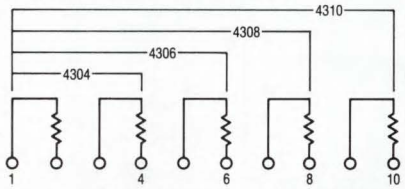
- Superior package integrity to withstand moisture and contamination
- Trifurcated Krimp-Joint™ lead attachment for product reliability and strength
- Gold epoxy provides excellent marking background
- Laser marking on contrasting background for permanent identification

Model 4300M Series

B® Resistor Networks

ISOLATED RESISTORS
(102 CIRCUIT)

Model 4304M-102-RC (4 Pin)
Model 4306M-102-RC (6 Pin)
Model 4308M-102-RC (8 Pin)
Model 4310M-102-RC (10 Pin)



These models incorporate 2, 3, 4, or 5 isolated thick-film resistors of equal value, each connected between two pins.

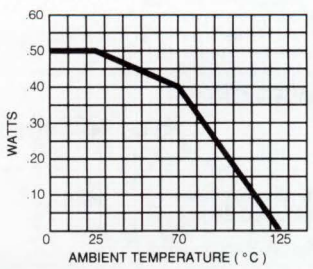
Resistance Tolerance

10 ohms to 49 ohms ..... ±1 ohm
50 ohms to 5 megohms ..... ±2%*
Above 5 megohms ..... ±5%

Power Rating per Resistor

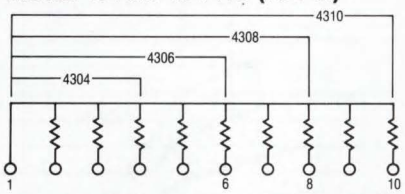
At 70°C ..... 0.40 watt
At 25°C ..... 0.50 watt

POWER TEMPERATURE
DERATING CURVE



BUSSED RESISTORS
(101 CIRCUIT)

Model 4304M-101-RC (4 Pin)
Model 4306M-101-RC (6 Pin)
Model 4308M-101-RC (8 Pin)
Model 4310M-101-RC (10 Pin)



These models incorporate 3, 5, 7, or 9 thick-film resistors of equal value, each connected between a common bus (pin 1) and a separate pin.

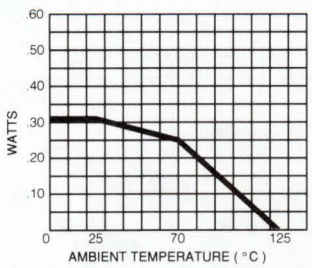
Resistance Tolerance

10 ohms to 49 ohms ..... ±1 ohm
50 ohms to 5 megohms ..... ±2%*
Above 5 megohms ..... ±5%

Power Rating per Resistor

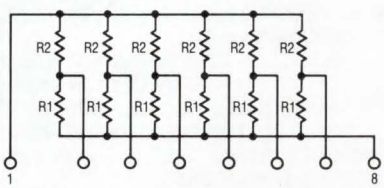
At 70°C ..... 0.25 watt
At 25°C ..... 0.31 watt

POWER TEMPERATURE
DERATING CURVE



DUAL TERMINATOR
(104 CIRCUIT)

Model 4304M-104-R1/R2
Model 4306M-104-R1/R2
Model 4308M-104-R1/R2 (shown)
Model 4310M-104-R1/R2



4308M-104 (shown above) is an 8-pin configuration and terminates 6 lines. Pins 1 and 8 are common for ground and power, respectively. Twelve thick-film resistors are paired in series between the common lines (pins 1 and 8).

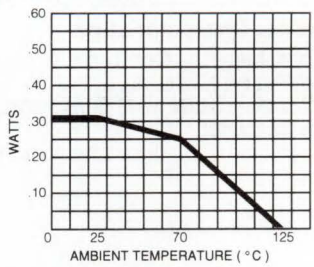
Resistance Tolerance

Below 100 ohms ..... ±2 ohms
100 ohms to 5 megohms ..... ±2%*
Above 5 megohms ..... ±5%

Power Rating per Resistor

At 70°C ..... 0.25 watt
At 25°C ..... 0.31 watt

POWER TEMPERATURE
DERATING CURVE



STANDARD RESISTANCE VALUES (101, 102 CIRCUITS)

Resistance (Ohms)	Resistance Code
10	100
22	220
27	270
33	330
39	390
47	470
56	560
68	680
82	820
100	101
120	121
150	151
180	181
220	221
270	271

Resistance (Ohms)	Resistance Code
330	331
390	391
470	471
560	561
680	681
820	821
1,000	102
1,200	122
1,500	152
1,800	182
2,000	202
2,200	222
2,700	272
3,300	332
3,900	392

Resistance (Ohms)	Resistance Code
4,700	472
5,600	562
6,800	682
8,200	822
10,000	103
12,000	123
15,000	153
18,000	183
20,000	203
22,000	223
27,000	273
33,000	333
39,000	393
47,000	473
56,000	563

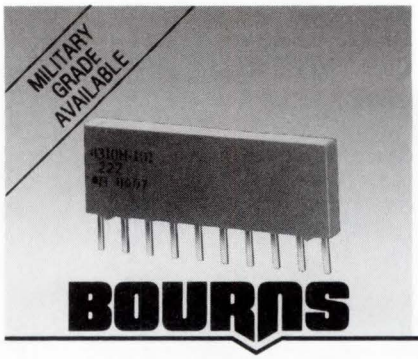
Resistance (Ohms)	Resistance Code
68,000	683
82,000	823
100,000	104
120,000	124
150,000	154
180,000	184
220,000	224
270,000	274
330,000	334
390,000	394
470,000	474
560,000	564
680,000	684
820,000	824
1,000,000	105

STANDARD RESISTANCE VALUES
(104 CIRCUIT)

Resistance			
(Ohms)		Code	
R_1	R_2	R_1	R_2
160	240	161	241
180	390	181	391
220	270	221	271
220	330	221	331
330	390	331	391
330	470	331	471
3,000	6,200	302	622

Specifications are subject to change without notice.

* ±1% Tolerance is available by adding suffix code "F" after the resistance code.



MOLDED SIPs, HIGH PROFILE 4, 6, 8, AND 10 PIN

- High profile offers increased power handling
- Compatible with automatic insertion equipment
- High temperature design ensures compatibility with all popular board soldering techniques
- Copper leads for excellent heat dissipation

Model 4300H Series

Bourns® Resistor Networks

Electrical Characteristics

Resistance Range ..... 10 ohms to 10 megohms
Maximum Operating Voltage 100V
Temperature Coefficient of Resistance
50Ω to 2.2 MΩ ..... ±100ppm/°C
below 50Ω ..... ±250ppm/°C
above 2.2 MΩ ..... ±250ppm/°C
Voltage Coefficient ..... ±100ppm/V typical by decade values
TCR Tracking ..... 50ppm/°C maximum; equal values
Resistor Tolerance ..... See circuits
Operating Temperature ..... –55°C to +125°C

Environmental Characteristics

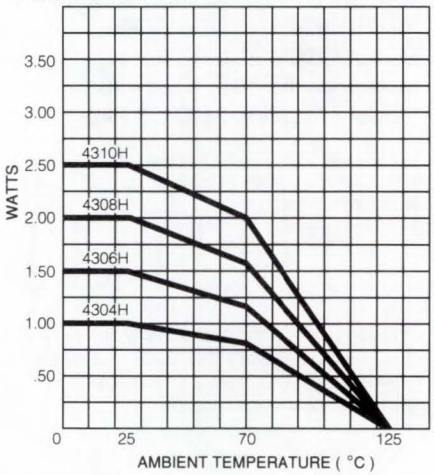
TESTS PER MIL-R-83401	ΔR MAX.
Short Time Overload	±0.25%
Load Life	±1.00%
Mechanical Shock	±0.25%
Moisture Resistance	±0.50%
Resistance to Soldering Heat	±0.25%
Terminal Strength	±0.25%
Thermal Shock	±0.25%
Vibration	±0.25%

Insulation Resistance ..... 10,000 megohms minimum
Dielectric Withstanding Voltage ..... 200 VRMS
Lead Solderability/Solvent Resistance .. Meet requirements of MIL-R-83401

Physical Characteristics

Flammability ..... Conforms to UL94V-0
Lead Frame Material
Copper (OLIN 194) 60/40 solder dip
Body Material ..... Novolac epoxy

PACKAGE POWER TEMPERATURE DERATING CURVE



Package Power Rating at 70°C

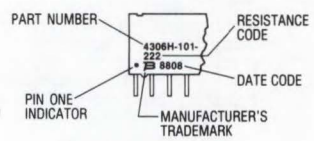
4304H	0.80 watts
4306H	1.20 watts
4308H	1.60 watts
4310H	2.00 watts

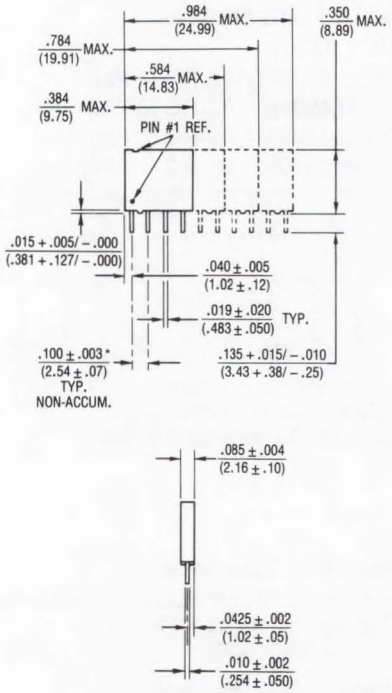
Package Power Rating at 25°C

4304H	1.00 watts
4306H	1.50 watts
4308H	2.00 watts
4310H	2.50 watts

TYPICAL PART MARKING

Represents total content. Layout may vary.





Governing dimensions are in inches. Dimensions in parentheses are metric (mm) and are approximate.

*Terminal centerline to centerline measurements made at point of emergence of the lead from the body.

HOW TO ORDER

43 06 H - 101 - 222

Model (43 = Molded SIP)
Number of Pins
Physical Configuration (H = High Profile)
Electrical Configuration
- 101 = Bussed
- 102 = Isolated
- 104 = Dual Terminator

Resistance Code
- First 2 digits are significant
- Third digit represents the number of zeros to follow.

Consult factory for other available options.

Specifications are subject to change without notice.

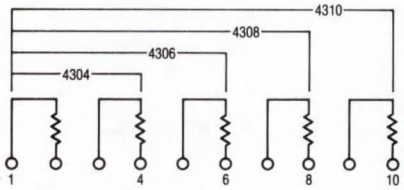
- Superior package integrity to withstand moisture and contamination
- Trifurcated Krimp-Joint™ lead attachment for product reliability and strength
- Laser marking on contrasting background for permanent identification

Model 4300H Series

BI® Resistor Networks

ISOLATED RESISTORS
(102 CIRCUIT)

Model 4304H-102-RC (4 Pin)
Model 4306H-102-RC (6 Pin)
Model 4308H-102-RC (8 Pin)
Model 4310H-102-RC (10 Pin)



These models incorporate 2, 3, 4, or 5 isolated thick-film resistors of equal value, each connected between two pins.

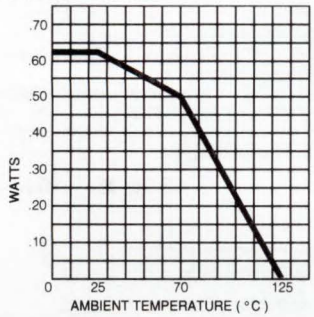
Resistance Tolerance

10 ohms to 49 ohms .....±1 ohm
50 ohms to 5 megohms .....±2%*
Above 5 megohms .....±5%

Power Rating per Resistor

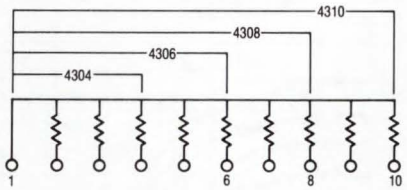
At 70°C .....0.50 watt
At 25°C .....0.625 watt

POWER TEMPERATURE
DERATING CURVE



BUSSED RESISTORS
(101 CIRCUIT)

Model 4304H-101-RC (4 Pin)
Model 4306H-101-RC (6 Pin)
Model 4308H-101-RC (8 Pin)
Model 4310H-101-RC (10 Pin)



These models incorporate 3, 5, 7, or 9 thick-film resistors of equal value, each connected between a common bus (pin 1) and a separate pin.

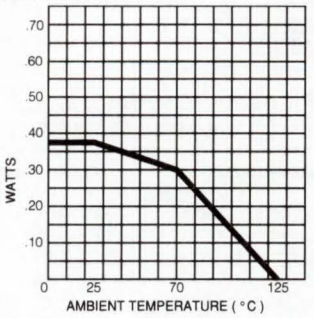
Resistance Tolerance

10 ohms to 49 ohms .....±1 ohm
50 ohms to 5 megohms .....±2%*
Above 5 megohms .....±5%

Power Rating per Resistor

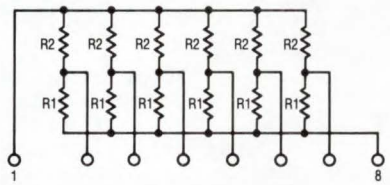
At 70°C .....0.30 watt
At 25°C .....0.375 watt

POWER TEMPERATURE
DERATING CURVE



DUAL TERMINATOR
(104 CIRCUIT)

Model 4304H-104-R1/R2
Model 4306H-104-R1/R2
Model 4308H-104-R1/R2 (shown)
Model 4310H-104-R1/R2



4308H-104 (shown above) is an 8-pin configuration and terminates 6 lines. Pins 1 and 8 are common for ground and power, respectively. Twelve thick-film resistors are paired in series between the common lines (pins 1 and 8).

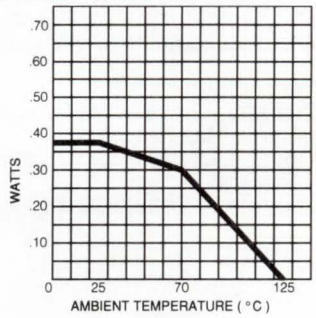
Resistance Tolerance

Below 100 ohms .....±2 ohms
100 ohms to 5 megohms .....±2%*
Above 5 megohms .....±5%

Power Rating per Resistor

At 70°C .....0.30 watt
At 25°C .....0.375 watt

POWER TEMPERATURE
DERATING CURVE



STANDARD RESISTANCE VALUES (101, 102 CIRCUITS)

Resistance (Ohms)	Resistance Code
10	100
22	220
27	270
33	330
39	390
47	470
56	560
68	680
82	820
100	101
120	121
150	151
180	181
220	221
270	271

Resistance (Ohms)	Resistance Code
330	331
390	391
470	471
560	561
680	681
820	821
1,000	102
1,200	122
1,500	152
1,800	182
2,000	202
2,200	222
2,700	272
3,300	332
3,900	392

Resistance (Ohms)	Resistance Code
4,700	472
5,600	562
6,800	682
8,200	822
10,000	103
12,000	123
15,000	153
18,000	183
20,000	203
22,000	223
27,000	273
33,000	333
39,000	393
47,000	473
56,000	563

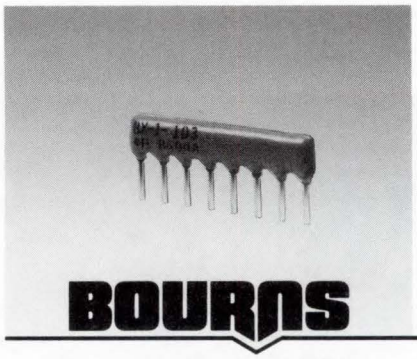
Resistance (Ohms)	Resistance Code
68,000	683
82,000	823
100,000	104
120,000	124
150,000	154
180,000	184
220,000	224
270,000	274
330,000	334
390,000	394
470,000	474
560,000	564
680,000	684
820,000	824
1,000,000	105

STANDARD RESISTANCE VALUES
(104 CIRCUIT)

Resistance			
(Ohms)		Code	
R_1	R_2	R_1	R_2
160	240	161	241
180	390	181	391
220	270	221	271
220	330	221	331
330	390	331	391
330	470	331	471
3,000	6,200	302	622

Specifications are subject to change without notice.

* ±1% Tolerance is available by adding suffix code "F" after the resistance code.



BOURNS

CONFORMAL SIPs, LOW PROFILE 4 THROUGH 14 PIN

- Low profile is compatible with DIPs
- Wide assortment of pin packages enhances design flexibility
- High temperature design ensures compatibility with all popular board soldering techniques
- Copper leads for excellent heat dissipation

Model 4600X

Bourns® Resistor Networks

Electrical Characteristics

Resistance Range
.....10 ohms to 10 megohms
Maximum Operating Voltage 100V
Temperature Coefficient of Resistance
50Ω to 2.2 MΩ .....±100ppm/°C
below 50Ω .....±250ppm/°C
above 2.2 MΩ .....±250ppm/°C
Voltage Coefficient
.....±100ppm/V typical by decade values
TCR Tracking .....50ppm/°C maximum; equal values
Resistor Tolerance .....See circuits
Operating Temperature
.....–55°C to +125°C

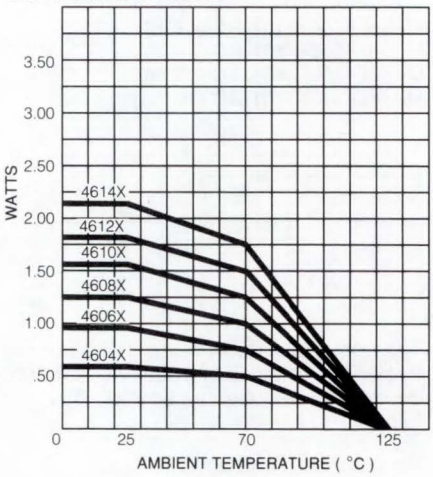
Environmental Characteristics

TESTS PER MIL-R-83401 .....ΔR MAX.
Short Time Overload .....±0.25%
Load Life.....±1.00%
Mechanical Shock .....±0.25%
Moisture Resistance .....±0.50%
Resistance to Soldering Heat
.....±0.25%
Terminal Strength .....±0.25%
Thermal Shock .....±0.25%
Vibration .....±0.25%
Insulation Resistance
.....10,000 megohms minimum
Dielectric Withstanding Voltage
.....200 VRMS
Lead Solderability/Solvent Resistance
..Meet requirements of MIL-R-83401

Physical Characteristics

Flammability .....Conforms to UL94V-0
Lead Frame Material
Copper (OLIN 194) 60/40 solder dip
Body Material
...Epoxy resin/anhydride disphenol A

PACKAGE POWER TEMPERATURE DERATING CURVE



Package Power Ratings (Watts)

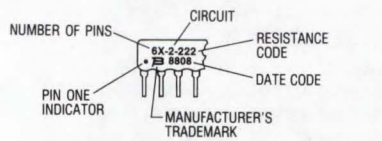
Pkg.	Ambient Temperature 70°C	25°C	Pkg.	Ambient Temperature 70°C	25°C
4604X	0.50	0.63	4610X	1.25	1.56
4605X	0.63	0.79	4611X	1.38	1.73
4606X	0.75	0.94	4612X	1.50	1.88
4607X	0.88	1.10	4613X	1.63	2.04
4608X	1.00	1.25	4614X	1.75	2.19
4609X	1.13	1.41			

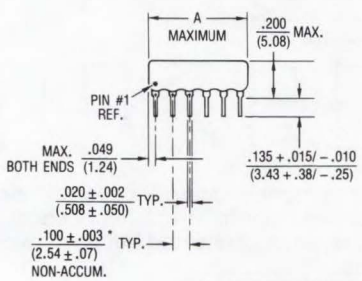
TYPICAL PART MARKING

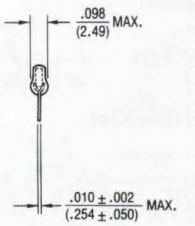
Represents total content. Layout may vary.

Part Number	Part Marking
4606X-101-RC	6X-1-RC
4608X-102-RC	8X-2-RC
4610X-104-RC/RC	10X-4-RC/RC

RC = ohmic value, 3-digit resistance code.







Pin Count	A Maximum Inches (mm)
4	.398 (10.11)
5	.498 (12.65)
6	.598 (15.19)
7	.698 (17.73)
8	.798 (20.27)
9	.898 (22.81)
10	.998 (25.35)
11	1.098 (27.89)
12	1.198 (30.43)
13	1.298 (32.97)
14	1.398 (35.51)

Maximum package length is equal to .100" (2.54mm) times the number of pins, less .002" (.005mm).

Governing dimensions are in inches. Dimensions in parentheses are metric (mm) and are approximate.

*Terminal centerline to centerline measurements made at point of emergence of the lead from the body.

HOW TO ORDER

46 06 X - 101 - 222

Model
(46 = Conformal SIP)

Number of Pins

Physical Configuration
(X = Low Profile)

Electrical Configuration
- 101 = Bussed
- 102 = Isolated
- 104 = Dual Terminator

Resistance Code
- First 2 digits are significant
- Third digit represents the number of zeros to follow.

Consult factory for other available options.

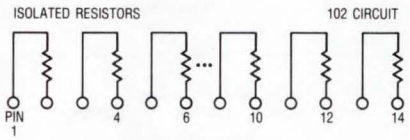
Specifications are subject to change without notice.

- Trifurcated Krimp-Joint™ lead attachment for product reliability and strength
- Gold epoxy provides excellent marking contrast
- Laser marking for permanent identification

Model 4600X

Bourns® Resistor Networks

ISOLATED RESISTORS
(102 CIRCUIT)
Model 4600X-102-RC
4, 6, 8, 10, 12 or 14 Pin



These models incorporate 2 to 7 isolated thick-film resistors of equal value, each connected between two pins.

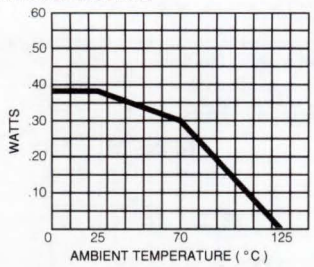
Resistance Tolerance

10 ohms to 49 ohms .....±1 ohm
50 ohms to 5 megohms .....±2%*
Above 5 megohms .....±5%

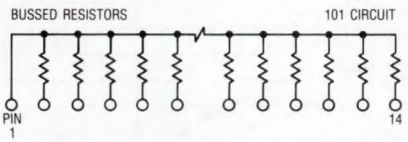
Power Rating per Resistor

At 70°C .....0.30 watt
At 25°C .....0.38 watt

POWER TEMPERATURE
DERATING CURVE



BUSSED RESISTORS
(101 CIRCUIT)
Model 4600X-101-RC
4 through 14 Pin



These models incorporate 3 to 13 thick-film resistors of equal value, each connected between a common bus (pin 1) and a separate pin.

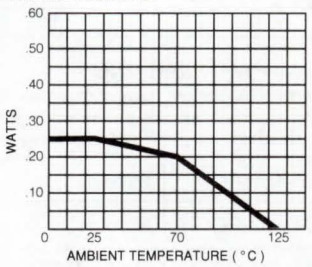
Resistance Tolerance

10 ohms to 49 ohms .....±1 ohm
50 ohms to 5 megohms .....±2%*
Above 5 megohms .....±5%

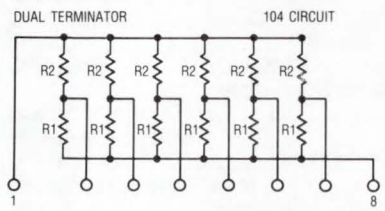
Power Rating per Resistor

At 70°C .....0.20 watt
At 25°C .....0.25 watt

POWER TEMPERATURE
DERATING CURVE



DUAL TERMINATORS
(104 CIRCUIT)
Model 4600X-104-R1/R2
4 through 14 Pin



The 4608X-104 (shown above) is an 8-pin configuration and terminates 6 lines. Pins 1 and 8 are common for ground and power, respectively. Twelve thick-film resistors are paired in series between the common lines (pins 1 and 8).

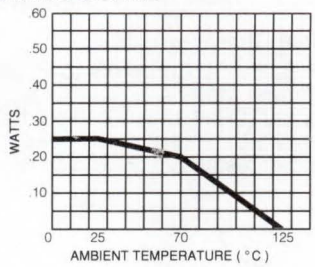
Resistance Tolerance

Below 100 ohms .....±2 ohms
100 ohms to 5 megohms .....±2%*
Above 5 megohms .....±5%

Power Rating per Resistor

At 70°C .....0.20 watt
At 25°C .....0.25 watt

POWER TEMPERATURE
DERATING CURVE



STANDARD RESISTANCE VALUES (101, 102 CIRCUITS)

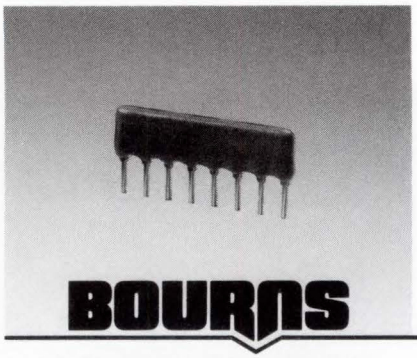
Resistance (Ohms)	Resistance Code	Resistance (Ohms)	Resistance Code	Resistance (Ohms)	Resistance Code	Resistance (Ohms)	Resistance Code
10	100	330	331	4,700	472	68,000	683
22	220	390	391	5,600	562	82,000	823
27	270	470	471	6,800	682	100,000	104
33	330	560	561	8,200	822	120,000	124
39	390	680	681	10,000	103	150,000	154
47	470	820	821	12,000	123	180,000	184
56	560	1,000	102	15,000	153	220,000	224
68	680	1,200	122	18,000	183	270,000	274
82	820	1,500	152	20,000	203	330,000	334
100	101	1,800	182	22,000	223	390,000	394
120	121	2,000	202	27,000	273	470,000	474
150	151	2,200	222	33,000	333	560,000	564
180	181	2,700	272	39,000	393	680,000	684
220	221	3,300	332	47,000	473	820,000	824
270	271	3,900	392	56,000	563	1,000,000	105

STANDARD RESISTANCE VALUES
(104 CIRCUIT)

Resistance			
(Ohms)		Code	
R_1	R_2	R_1	R_2
160	240	161	241
180	390	181	391
220	270	221	271
220	330	221	331
330	390	331	391
330	470	331	471
3,000	6,200	302	622

Specifications are subject to change without notice.

* ±1% Tolerance is available by adding suffix code "F" after the resistance code.



CONFORMAL SIPs, MEDIUM PROFILE 4 THROUGH 14 PIN

- Medium profile offers increased power handling
- Wide assortment of pin packages enhances design flexibility
- High temperature design ensures compatibility with all popular board soldering techniques
- Copper leads for excellent heat dissipation

BOURNS

Model 4600M

Bussed® Resistor Networks

Electrical Characteristics

Standard Resistance Values ..... 10 ohms to 10 megohms
Maximum Operating Voltage 100V
Temperature Coefficient of Resistance
50Ω to 2.2 MΩ ..... ±100ppm/°C
below 50Ω ..... ±250ppm/°C
above 2.2 MΩ ..... ±250ppm/°C
Voltage Coefficient ..... ±100ppm/V typical by decade values
TCR Tracking ..... 50ppm/°C maximum; equal values
Resistor Tolerance ..... See circuits
Operating Temperature ..... –55°C to +125°C

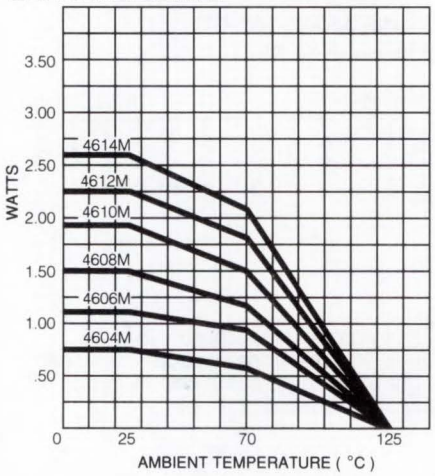
Environmental Characteristics

TESTS PER MIL-R-83401 ..... ΔR MAX.
Short Time Overload ..... ±0.25%
Load Life ..... ±1.00%
Mechanical Shock ..... ±0.25%
Moisture Resistance ..... ±0.50%
Resistance to Soldering Heat ..... ±0.25%
Terminal Strength ..... ±0.25%
Thermal Shock ..... ±0.25%
Vibration ..... ±0.25%
Insulation Resistance ..... 10,000 megohms minimum
Dielectric Withstanding Voltage ..... 200 VRMS
Lead Solderability/Solvent Resistance
.. Meet requirements of MIL-R-83401

Physical Characteristics

Flammability ..... Conforms to UL94V-0
Lead Frame Material
Copper (OLIN 194) 60/40 solder dip
Body Material
... Epoxy resin/anhydride disphenol A

PACKAGE POWER TEMPERATURE DERATING CURVE



Package Power Ratings (Watts)

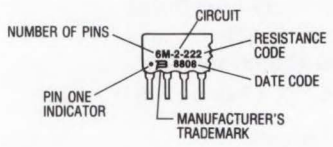
Pkg.	Ambient Temperature 70°C	25°C	Pkg.	Ambient Temperature 70°C	25°C
4604M	0.60	0.75	4610M	1.50	1.88
4605M	0.75	0.94	4611M	1.65	2.06
4606M	0.90	1.14	4612M	1.80	2.25
4607M	1.05	1.31	4613M	1.95	2.44
4608M	1.20	1.50	4614M	2.10	2.63
4609M	1.35	1.69			

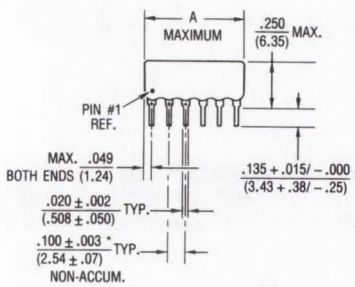
TYPICAL PART MARKING

Represents total content. Layout may vary.

Part Number	Part Marking
4606M-101-RC	6M-1-RC
4608M-102-RC	8M-2-RC
4610M-104-RC/RC	10M-4-RC/RC

RC = ohmic value, 3-digit resistance code.





Pin Count	A Maximum Inches (mm)
4	.398 (10.11)
5	.498 (12.65)
6	.598 (15.19)
7	.698 (17.73)
8	.798 (20.27)
9	.898 (22.81)
10	.998 (25.35)
11	1.098 (27.89)
12	1.198 (30.43)
13	1.298 (32.97)
14	1.398 (35.51)

Maximum package length is equal to .100" (2.54mm) times the number of pins, less .002" (.05mm).

Governing dimensions are in inches. Dimensions in parentheses are metric (mm) and are approximate.

*Terminal centerline to centerline measurements made at point of emergence of the lead from the body.

HOW TO ORDER

46 06 M - 101 - 222

Model
(46 = Conformal SIP)
Number of Pins
Physical Configuration
(M = Medium Profile)
Electrical Configuration
•101 = Bussed
•102 = Isolated
•104 = Dual Terminator
Resistance Code
• First 2 digits are significant
•Third digit represents the number of zeros to follow.

Consult factory for other available options.

Specifications are subject to change without notice.

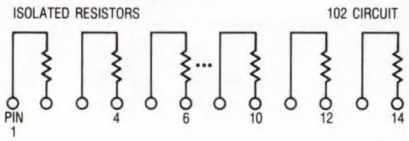
- Trifurcated Krimp-Joint™ lead attachment for product reliability and strength
- Gold epoxy provides excellent marking contrast
- Laser marking for permanent identification

Model 4600M

B® Resistor Networks

ISOLATED RESISTORS
(102 CIRCUIT)

Model 4600M-102-RC
4, 6, 8, 10, 12 or 14 Pin



These models incorporate 2 to 7 isolated thick-film resistors of equal value, each connected between two pins.

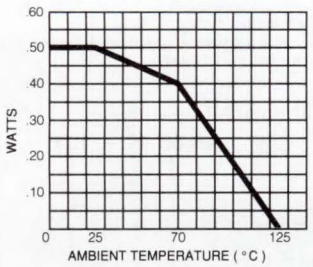
Resistance Tolerance

10 ohms to 49 ohms .....±1 ohm
50 ohms to 5 megohms .....±2%*
Above 5 megohms .....±5%

Power Rating per Resistor

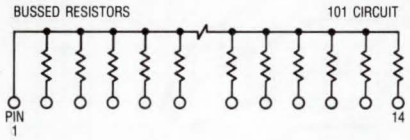
At 70°C .....0.40 watt
At 25°C .....0.50 watt

POWER TEMPERATURE
DERATING CURVE



BUSSED RESISTORS
(101 CIRCUIT)

Model 4600M-101-RC
4 through 14 Pin



These models incorporate 3 to 13 thick-film resistors of equal value, each connected between a common bus (pin 1) and a separate pin.

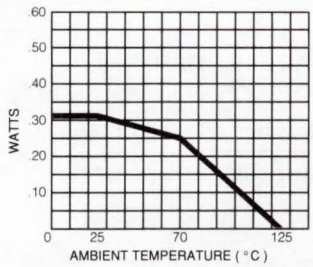
Resistance Tolerance

10 ohms to 49 ohms .....±1 ohm
50 ohms to 5 megohms .....±2%*
Above 5 megohms .....±5%

Power Rating per Resistor

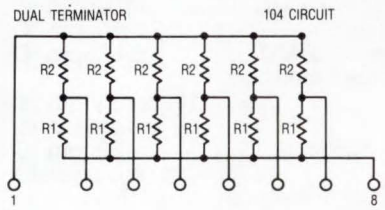
At 70°C .....0.25 watt
At 25°C .....0.31 watt

POWER TEMPERATURE
DERATING CURVE



DUAL TERMINATORS
(104 CIRCUIT)

Model 4600M-104-R1/R2
4 through 14 Pin



The 4608M-104 (shown above) is an 8-pin configuration and terminates 6 lines. Pins 1 and 8 are common for ground and power, respectively. Twelve thick-film resistors are paired in series between the common lines (pins 1 and 8).

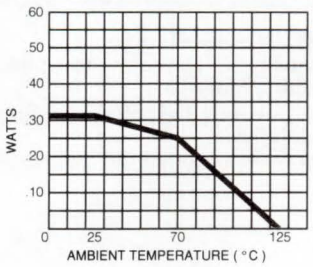
Resistance Tolerance

Below 100 ohms .....±2 ohms
100 ohms to 5 megohms .....±2%*
Above 5 megohms .....±5%

Power Rating per Resistor

At 70°C .....0.25 watt
At 25°C .....0.31 watt

POWER TEMPERATURE
DERATING CURVE



STANDARD RESISTANCE VALUES (101, 102 CIRCUITS)

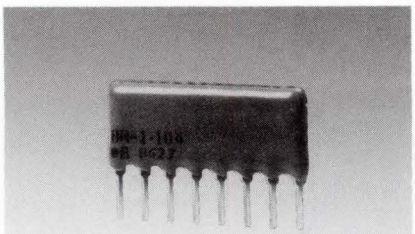
Resistance (Ohms)	Resistance Code	Resistance (Ohms)	Resistance Code	Resistance (Ohms)	Resistance Code	Resistance (Ohms)	Resistance Code
10	100	330	331	4,700	472	68,000	683
22	220	390	391	5,600	562	82,000	823
27	270	470	471	6,800	682	100,000	104
33	330	560	561	8,200	822	120,000	124
39	390	680	681	10,000	103	150,000	154
47	470	820	821	12,000	123	180,000	184
56	560	1,000	102	15,000	153	220,000	224
68	680	1,200	122	18,000	183	270,000	274
82	820	1,500	152	20,000	203	330,000	334
100	101	1,800	182	22,000	223	390,000	394
120	121	2,000	202	27,000	273	470,000	474
150	151	2,200	222	33,000	333	560,000	564
180	181	2,700	272	39,000	393	680,000	684
220	221	3,300	332	47,000	473	820,000	824
270	271	3,900	392	56,000	563	1,000,000	105

STANDARD RESISTANCE VALUES
(104 CIRCUIT)

Resistance			
(Ohms)		Code	
R_1	R_2	R_1	R_2
160	240	161	241
180	390	181	391
220	270	221	271
220	330	221	331
330	390	331	391
330	470	331	471
3,000	6,200	302	622

Specifications are subject to change without notice.

* ±1% Tolerance is available by adding suffix code "F" after the resistance code.



BOURNS

CONFORMAL SIPs, HIGH PROFILE 4 THROUGH 14 PIN

- High profile offers increased power handling
- Wide assortment of pin packages enhances design flexibility
- High temperature design ensures compatibility with all popular board soldering techniques
- Copper leads for excellent heat dissipation

Model 4600H

Bourns® Resistor Networks

Electrical Characteristics

Resistance Range
.....10 ohms to 10 megohms
Maximum Operating Voltage 100V
Temperature Coefficient of Resistance
50Ω to 2.2 MΩ .....±100ppm/°C
below 50Ω .....±250ppm/°C
above 2.2 MΩ .....±250ppm/°C
Voltage Coefficient
.....±100ppm/V typical by decade values
TCR Tracking.....50ppm/°C maximum; equal values
Resistor Tolerance .....See circuits
Operating Temperature
.....–55°C to +125°C

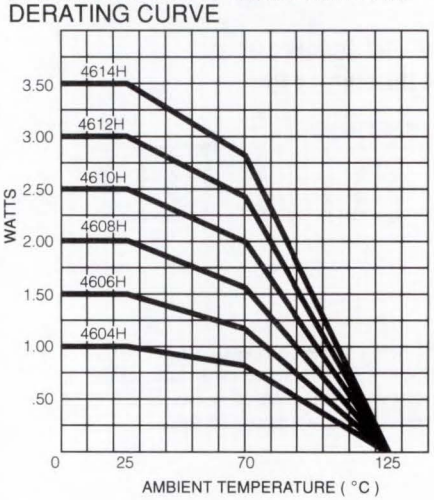
Environmental Characteristics

TESTS PER MIL-R-8340 ..... ΔR MAX.
Short Time Overload .....±0.25%
Load Life.....±1.00%
Mechanical Shock .....±0.25%
Moisture Resistance .....±0.50%
Resistance to Soldering Heat
.....±0.25%
Terminal Strength .....±0.25%
Thermal Shock .....±0.25%
Vibration .....±0.25%
Insulation Resistance
.....10,000 megohms minimum
Dielectric Withstanding Voltage
.....200 VRMS
Lead Solderability/Solvent Resistance
..Meet requirements of MIL-R-83401

Physical Characteristics

Flammability .....Conforms to UL94V-0
Lead Frame Material
Copper (OLIN 194) 60/40 solder dip
Body Material
...Epoxy resin/anhydride disphenol A

PACKAGE POWER TEMPERATURE DERATING CURVE



Package Power Ratings (Watts)

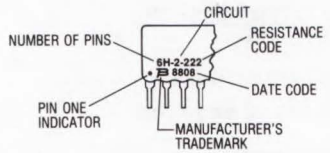
Pkg.	Ambient Temperature 70°C	25°C	Pkg.	Ambient Temperature 70°C	25°C
4604H	0.80	1.00	4610H	2.00	2.50
4605H	1.00	1.25	4611H	2.20	2.75
4606H	1.20	1.50	4612H	2.40	3.00
4607H	1.40	1.75	4613H	2.60	3.25
4608H	1.60	2.00	4614H	2.80	3.50
4609H	1.80	2.25			

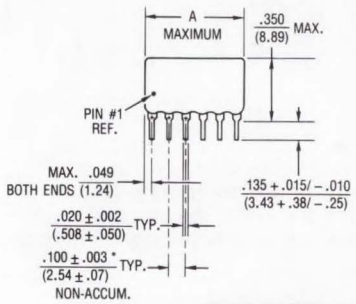
TYPICAL PART MARKING

Represents total content. Layout may vary.

Part Number	Part Marking
4606H-101-RC	6H-1-RC
4608H-102-RC	8H-2-RC
4610H-104-RC/RC	10H-4-RC/RC

RC = ohmic value, 3-digit resistance code.





Pin Count	A Maximum Inches (mm)
4	.398 (10.11)
5	.498 (12.65)
6	.598 (15.19)
7	.698 (17.73)
8	.798 (20.27)
9	.898 (22.81)
10	.998 (25.35)
11	1.098 (27.89)
12	1.198 (30.43)
13	1.298 (32.97)
14	1.398 (35.51)

Maximum package length is equal to .100" (2.54mm) times the number of pins, less .002" (.05mm).

Governing dimensions are in inches. Dimensions in parentheses are metric (mm) and are approximate.

*Terminal centerline to centerline measurements made at point of emergence of the lead from the body.

HOW TO ORDER

46 06 H - 101 - 222

Model
(46 = Conformal SIP)

Number of Pins

Physical Configuration
(H = High Profile)

Electrical Configuration
- 101 = Bussed
- 102 = Isolated
- 104 = Dual Terminator

Resistance Code
- First 2 digits are significant
- Third digit represents the number of zeros to follow.

Consult factory for other available options.

Specifications are subject to change without notice.

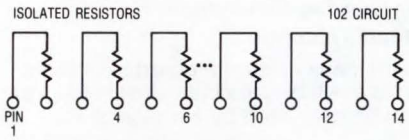
- Trifurcated Krimp-Joint™ lead attachment for product reliability and strength
- Gold epoxy provides excellent marking contrast
- Laser marking for permanent identification

Model 4600H

Bourns® Resistor Networks

ISOLATED RESISTORS (102 CIRCUIT)

Model 4600H-102
4, 6, 8, 10, 12 or 14 Pin



These models incorporate 2 to 7 isolated thick-film resistors of equal value, each connected between two pins.

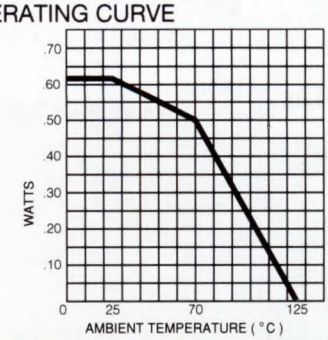
Resistance Tolerance

10 ohms to 49 ohms ..... ±1 ohm
50 ohms to 5 megohms ..... ±2%*
Above 5 megohms ..... ±5%

Power Rating per Resistor

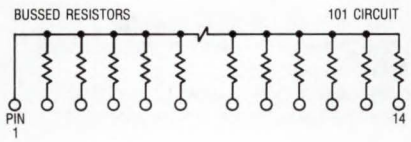
At 70°C ..... 0.50 watt
At 25°C ..... 0.625 watt

POWER TEMPERATURE DERATING CURVE



BUSSED RESISTORS (101 CIRCUIT)

Model 4600H-101
4 through 14 Pin



These models incorporate 3 to 13 thick-film resistors of equal value, each connected between a common bus (pin 1) and a separate pin.

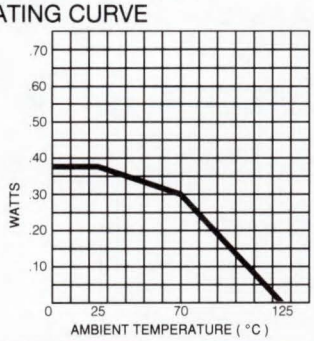
Resistance Tolerance

10 ohms to 49 ohms ..... ±1 ohm
50 ohms to 5 megohms ..... ±2%*
Above 5 megohms ..... ±5%

Power Rating per Resistor

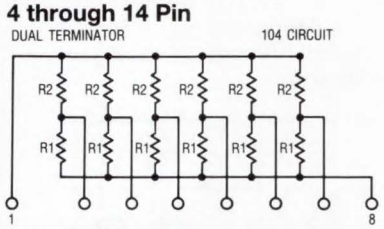
At 70°C ..... 0.30 watt
At 25°C ..... 0.375 watt

POWER TEMPERATURE DERATING CURVE



DUAL TERMINATORS (104 CIRCUIT)

Model 4600H-104-R1/R2
4 through 14 Pin



The 4608H-104 (shown above) is an 8-pin configuration and terminates 6 lines. Pins 1 and 8 are common for ground and power, respectively. Twelve thick-film resistors are paired in series between the common lines (pins 1 and 8).

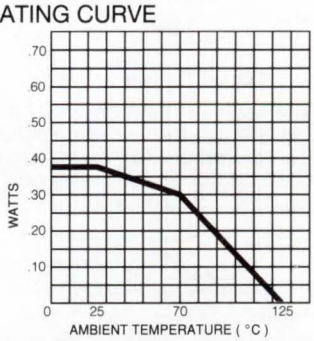
Resistance Tolerance

Below 100 ohms ..... ±2 ohms
100 ohms to 5 megohms ..... ±2%*
Above 5 megohms ..... ±5%

Power Rating per Resistor

At 70°C ..... 0.30 watt
At 25°C ..... 0.375 watt

POWER TEMPERATURE DERATING CURVE



STANDARD RESISTANCE VALUES (101, 102 CIRCUITS)

Resistance (Ohms)	Resistance Code
10	100
22	220
27	270
33	330
39	390
47	470
56	560
68	680
82	820
100	101
120	121
150	151
180	181
220	221
270	271

Resistance (Ohms)	Resistance Code
330	331
390	391
470	471
560	561
680	681
820	821
1,000	102
1,200	122
1,500	152
1,800	182
2,000	202
2,200	222
2,700	272
3,300	332
3,900	392

Resistance (Ohms)	Resistance Code
4,700	472
5,600	562
6,800	682
8,200	822
10,000	103
12,000	123
15,000	153
18,000	183
20,000	203
22,000	223
27,000	273
33,000	333
39,000	393
47,000	473
56,000	563

Resistance (Ohms)	Resistance Code
68,000	683
82,000	823
100,000	104
120,000	124
150,000	154
180,000	184
220,000	224
270,000	274
330,000	334
390,000	394
470,000	474
560,000	564
680,000	684
820,000	824
1,000,000	105

STANDARD RESISTANCE VALUES (104 CIRCUIT)

Resistance			
(Ohms)		Code	
R_1	R_2	R_1	R_2
160	240	161	241
180	390	181	391
220	270	221	271
220	330	221	331
330	390	331	391
330	470	331	471
3,000	6,200	302	622

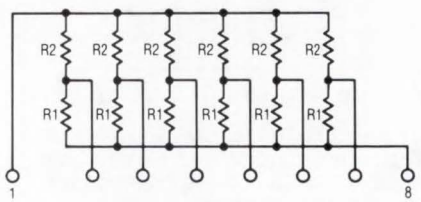
Specifications are subject to change without notice.

* ±1% Tolerance is available by adding suffix code "F" after the resistance code.

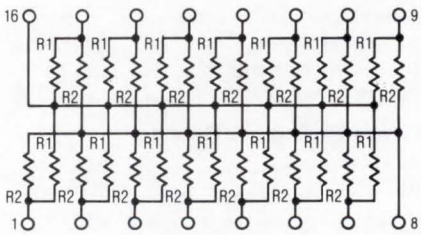
DUAL TERMINATOR RESISTOR NETWORKS

The Dual Terminator (or Thevenin equivalent) Network is commonly used for TTL dual-line termination and pulse squaring or ECL line terminations. In ECL line terminator, R2 functions as an emitter pull-down resistor and is normally tied to the most negative supply voltage to provide proper line currents. R1 is normally tied to ground and functions as the termination resistor and in parallel with R2 provides the characteristic impedance of the transmission line. This results in a zero reflection coefficient of this line to eliminate reflections.

The Dual Terminator circuit is available in both SIP and DIP configurations, as shown below.



SIP



DIP

Testing of Dual Terminators

Since the Dual Terminator circuit has many resistors in parallel, a direct pin-to-pin measurement for the values of R1 and R2 can be made using an ohmmeter with guard capabilities.

The function of the guard pin is to apply and equal voltage across the adjacent (parallel) resistance path. When applied, current flow is eliminated allowing an accurate measurement of the resistor under test.

Using the 8-pin SIP network shown, the testing method would be as follows:

Test R1 Values

To test the first resistor, connect the ohmmeter measurement leads between pin 8 and 2. Connect the guard lead to pin 1. R1 is now guarded and an accurate measurement can be made.

To test the second R1 resistor, connect the measurement leads between pin 8 and pin 3. Connect the guard to pin 1 and make the resistance measurement.

Continue this testing scheme for the remainder of the R1 resistors, always guarding pin 1.

Test R2 Values

To test the first R2 resistor, connect the ohmmeter measurement leads between pin 1 and pin 2. Connect the guard lead to pin 8. The first R2 resistor is now guarded and an accurate measurement can be made.

To test the second R2 resistor, connect the ohmmeter measurement leads between pin 1 and pin 3. Connect the guard lead to pin 8 and make the resistance measurement.

Continue this testing scheme for the remainder of the R2 resistors, always guarding pin 8.

An example of the type of ohmmeter to be utilized that incorporates a guarded measurement capability is the RACAL-DANA Model 6000 where the guard pin is the "analog low" lead. An additional ohmmeter is ESI Model 1700 where the guard pin is labeled "Guard." It must be noted that guarded measurements using ohmmeters of these types are satisfactory for measurements up to a ratio of about 10:1 between R1 and R2. Above a 10:1 ratio, accuracy is degraded and measurements can be incorrect because of inadequate guarding capability of the equipment.

Unguarded Resistance Measurements

In the case where no guarded ohmmeter is available, the individual resistors can be evaluated by comparing the unguarded resistance measurement to the theoretical value of the equivalent series-parallel circuit and determining the percent of error of each resistor.

Example:

Network 4608X-104-221/331 where R1 values are 220Ω and R2 values are 330Ω.

Rp = Parallel Resistance of Remaining Circuit (See diagram below.)

RE = Equivalent Series - Parallel Resistance Seen by Unguarded Meter

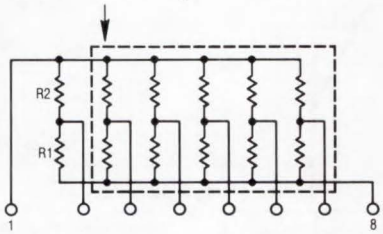
$$RE_{R1} = (P8\text{-}P2) = \frac{R1\,(R2 + Rp)}{R1 + (R2 + Rp)} = \frac{220\,(330 + 110)}{220 + (330 + 110)} = 146.67\Omega$$

2% Tolerance ≈ ±1.96Ω*

$$RE_{R2} = (P1\text{-}P2) = \frac{R1\,(R2 + Rp)}{R1 + (R2 + Rp)} = \frac{330\,(220 + 110)}{330 + (220 + 110)} = 165\Omega$$

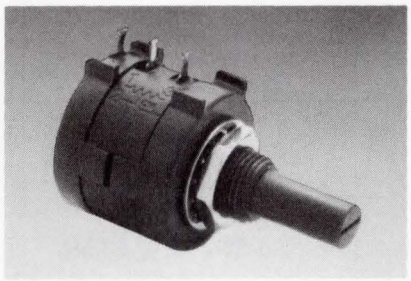
2% Tolerance ≈ ±1.65Ω

$$Rp = \frac{550}{5} = 110\Omega$$



Utilization of these formulas will enable you to determine the equivalent unguarded resistance to be expected from any values of R1 and R2 for a Dual Terminator Network.

$$*2\%\ \text{tolerance} \approx \frac{(RE_{R1})^2}{R1} \times .02 = 1.96\Omega$$



PRECISION POTENTIOMETERS

PRODUCT SELECTION GUIDE

Multiturn Precision Potentiometers

Model No.	Turns	Element Type	Resistance Tolerance	Resistance Range (Ohms)	Standard Linearity	Pkg. Dia.	Pkg. Depth	Shaft Dia./Length	Mount	Page No.
3070	10	Wirewound	±5%	100-50K	NA	5/16" (Sq.)	1-1/16"	N/A	Bushing/ PC	84
3400	10	Wirewound	±3%	100-500K	±0.15%	1-13/16"	1-3/4"	1/4"x13/16"	Bushing	86
3500	10	Wirewound	±3%	50-100K	±0.20%	7/8"	1"	1/4"x13/16"	Bushing	87
3501	10	Hybritron®	±10%	1K-100K	±0.25%	7/8"	1"	1/4"x13/16"	Bushing	87
3510	3	Wirewound	±3%	25-50K	±0.5%	7/8"	9/16"	1/8"x11/16"	Bushing	88
3511	3	Hybritron®	±10%	500-20K	±0.3%	7/8"	9/16"	1/8"x11/16"	Bushing	88
3520	5	Wirewound	±3%	20-75K	±0.3%	7/8"	11/16"	1/4"x13/16"	Bushing	89
3521	5	Hybritron®	±10%	500-50K	±0.3%	7/8"	11/16"	1/4"x13/16"	Bushing	89
3540	10	Wirewound	±5%	100-100K	±0.25%	7/8"	3/4"	1/4"x13/16"	Bushing	90
3541	10	Hybritron®	±10%	1K-100K	±0.25%	7/8"	3/4"	1/4"x13/16"	Bushing	90
3543	3	Wirewound	±5%	20-50K	±0.25%	7/8"	3/4"	1/4"x13/16"	Bushing	91
3545	5	Wirewound	±5%	50-50K	±0.25%	7/8"	3/4"	1/4"x13/16"	Bushing	91

PRODUCT SELECTION GUIDE

Multiturn Precision Potentiometers

Model No.	Turns	Element Type	Resistance Tolerance	Resistance Range (Ohms)	Standard Linearity	Pkg. Dia.	Pkg. Depth	Shaft Dia./Length	Mount	Page No.
3550	10	Wirewound	±3%	100-200K	±0.2%	7/8"	1-9/16"	1/8"x3/8"	Servo	92
3551	10	Hybritron®	±10%	1K-100K	±0.25%	7/8"	1-9/16"	1/8"x3/8"	Servo	92
3560	3	Wirewound	±3%	50-50K	±0.25%	7/8"	1-1/16"	1/8"x3/8"	Servo	93
3561	3	Hybritron®	±10%	500-20K	±0.25%	7/8"	1-1/16"	1/8"x3/8"	Servo	93
3570	5	Wirewound	±3%	50-50K	±0.25%	7/8"	1-3/16"	1/8"x3/8"	Servo	94
3571	5	Hybritron®	±10%	500-50K	±0.25%	7/8"	1-3/16"	1/8"x3/8"	Servo	94
3590	10	Wirewound	±5%	200-100K	±0.25%	7/8"	3/4"	Various	Bushing	95
3700	10	Wirewound	±5%	100-100K	±0.25%	1/2"	1"	3/32"x11/16"	Bushing	96
3701	10	Hybritron®	±10%	1K-100K	±0.25%	1/2"	1"	3/32"x11/16"	Bushing	96
3750	10	Wirewound	±5%	100-100K	±0.25%	1/2"	1-3/16"	3/32"x3/8"	Servo	97
3751	10	Hybritron®	±10%	1K-100K	±0.25%	1/2"	1-3/16"	3/32"x3/8"	Servo	97

PRODUCT SELECTION GUIDE

Single-turn Precision Potentiometers

Model No.	Element Type	Resistance Tolerance	Resistance Range (Ohms)	Standard Linearity	Pkg. Dia.	Pkg. Depth	Shaft Dia./Length	Mount	Page No.
3415	Wirewound	±3%	50-100K	±0.3%	2"	27/32"	1/4"x7/8"	Bushing	99
3435	Wirewound	±3%	50-50K	±0.5%	1-1/16"	11/16"	1/8"x7/8"	Bushing	99
3437	Wirewound	±5%	50-50K	±0.5%	1-1/16"	23/32"	1/4"x7/8"	Bushing	98
3437S-HYB	Hybritron®	±10%	200-20K	±0.5%	1-1/16"	23/32"	1/4"x7/8"	Bushing	98
3465	Wirewound	±3%	50K-100K	±0.3%	2"	13/16"	1/4"x5/8"	Servo	100
3485	Wirewound	±3%	50-50K	±0.5%	1-1/16"	11/16"	1/8"x7/8"	Servo	100
3435	Wirewound	±3%	50-20K	±0.5%	7/8"	11/16"	1/8"x1/2"	Bushing	99
3585	Wirewound	±3%	50-20K	±0.5%	7/8"	11/16"	1/8"x1/2"	Servo	100
6534	Conductive Plastic	±10%	1K-100K	±0.5%	7/8"	15/32"	1/8"x1/2"	Servo	101
6537	Conductive Plastic	±10%	1K-100K	±1.0%	7/8"	1/2"	1/8"x1/2"	Servo	102
6538	Conductive Plastic	±10%	1K-100K	±1%	7/8"	19/32"	1/8"x1/2"	Servo	102
6539	Conductive Plastic	±15%	1K-100K	±2%	7/8"	19/32"	1/8"x1/2"	Servo	103
6544	Conductive Plastic	±10%	1K-100K	±0.5%	1-1/16"	1/2"	1/8"x1/2"	Servo	104
6574	Conductive Plastic	±10%	1K-100K	±0.25%	2"	3/5"	1/4"x5/8"	Servo	105
6634	Conductive Plastic	±10%	1K-100K	±0.5%	7/8"	15/32"	1/8"x1/2"	Bushing	106
6637	Conductive Plastic	±10%	1K-100K	±1%	7/8"	9/16"	1/8"x7/8"	Bushing	107
6638	Conductive Plastic	±10%	1K-100K	±1%	7/8"	21/32"	1/8"x7/8"	Bushing	107
6639	Conductive Plastic	±15%	1K-100K	±2%	7/8"	21/32"	1/8"x7/8"	Bushing	103
6657	Conductive Plastic	±10%	1K-100K	±1%	1-5/16"	25/32"	1/4"x7/8"	Bushing	108
6674	Conductive Plastic	±10%	1K-100K	±0.25%	2"	3/5"	1/4"x7/8"	Bushing	109

PRODUCT SELECTION GUIDE

Knobpot® Precision Potentiometers

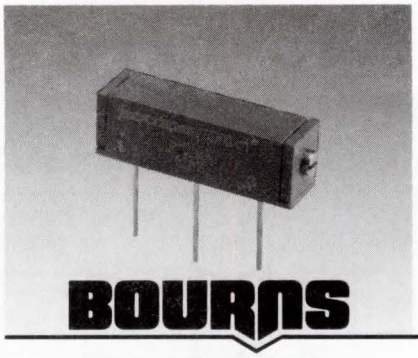
Model No.	Turns	Element Type	Resistance Tolerance	Resistance Range (Ohms)	Accuracy	Pkg. Dia.	Pkg. Depth	Shaft Dia./Length	Mount	Page No.
3600	10	Wirewound	±5%	100-100K	See Data Sheet	3/4"	See Data Sheet	N/A	Bushing	110
3610	10	Wirewound	±5%	100-100K	See Data Sheet	7/8"	See Data Sheet	N/A	Snap-in	111
3640	10	Wirewound	±3%	100-250K	See Data Sheet	1-1/4"	See Data Sheet	N/A	Bushing	112
3650	10	Wirewound	±3%	100-100K	See Data Sheet	1-1/4"	See Data Sheet	N/A	Single Hole	113

Digital Pushbutton Potentiometers

Model No.	Turns	Element Type	Resistance Tolerance	Resistance Range (Ohms)	Accuracy	Pkg. Dia.	Pkg. Depth	Shaft Dia./Length	Mount	Page No.
3680	N/A	Cermet	±3%	10-1 MEG	See Data Sheet	See Data Sheet	See Data Sheet	N/A	Snap-in	114

Turns-Counting Dials

Model Number	Turns	Approximate Package Diameter	Approximate Package Depth	Page No.
CT23	0-10	1-1/16"	1-1/4"	159
CT26	0-10	1-1/4"	1-1/4"	159
CT46	0-20	1-13/16"	1"	160
CT50	0-10	1"	1-1/3"	161
H490	0-30	1"	1-1/3"	162
H506	0-15	7/8"	1"	163
H507-6	0-15	7/8"	1"	164



5/16'' RECTANGULAR/10-TURN WIREWOUND

- Exceptional resolution (8X better than standard adjustment potentiometers)
- 6.5'' element in a 1'' body length
- 1.5 watt power rating at 70°C

FOR ORDERING INFORMATION SEE PAGE 116.

Model 3070

Bourns® Precision Potentiometer

Electrical Characteristics[1]

Standard Resistance Range	100 to 50KΩ
Resistance Tolerance*	±5%
Absolute Minimum Resistance*	0.1% or 1Ω, whichever is greater
Noise During Adjustment*	100Ω maximum
Insulation Resistance*	1,000 megohms minimum
Resolution (See Table Page 104)	.117 to .022%

Environmental Characteristics[1]

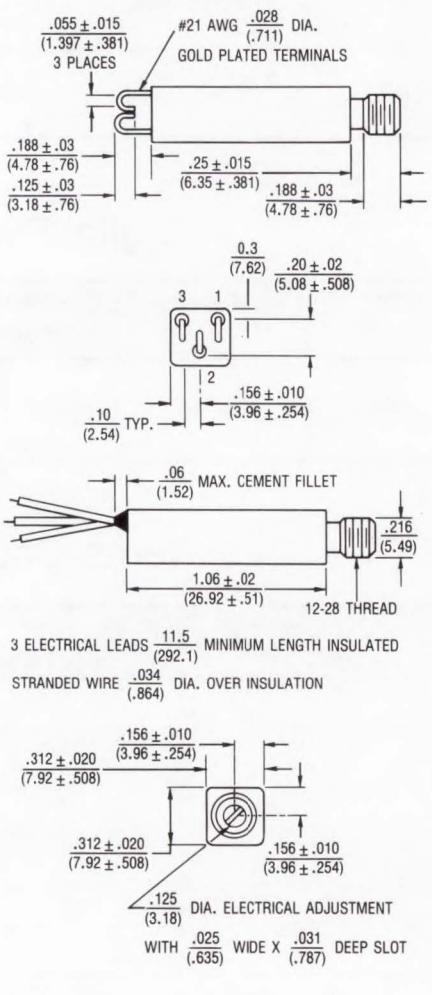
Power Rating	
70°C Ambient	1.5 watts
175°C Ambient	0 watt
Operating Temperature Range	−65°C to +175°C
Temperature Coefficient (MIL-R-27208)	±50ppm/°C maximum
Moisture Resistance (MIL-R-27208)	100 megohms minimum after removal from chamber
Vibration (MIL-R-27208)	30G
Contact Bounce	0.1 millisecond maximum
Wiper Shift	±0.2% maximum
Shock (MIL-R—27208	100G
Contact Bounce & Wiper Shift	Same as Vibration
Load Life (MIL-R-27208)	1,000 hours
Resistance Shift	2% maximum
Mechanical Life	200 cycles without discontinuity
Dielectric Strength	MIL-R-27208
Room Conditions	1,000 VAC
80,000 Feet (0.8'' Hg)	400 VAC

Physical Characteristics[1]

Immersion Leak Test*	No leaks
Shaft Torque*	5.0 oz-in. maximum
Mechanical Adjustment	10 turns nominal
Mechanical Stops	Wiper assembly idles
Weight	Approximately 0.2 oz.
Terminals	
L	Teflon insulated leads
S	Gold plated solder lugs
P, H	Gold plated, grade A nickel, printed circuit pins
Mounting Styles	Panel Mount, Eyelet Mount & Printed Circuit Pins

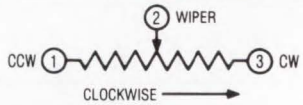
[1]At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.

3070 PANEL MOUNT L-S



NOTE:
PANEL MOUNT SUPPLIED WITH .030 (.762) THICK SPRING LOCKWASHER AND #12-28 HEX NUT .073 (1.85) THICK .28 ± .015 (7.11 ± .381) ACROSS FLATS

TOLERANCES: EXCEPT WHERE NOTED
DECIMALS: .XX ± .010 (.25), .XXX ± .005 (.13)
FRACTIONS: ± 1/64 DIMENSIONS: IN. (MM)



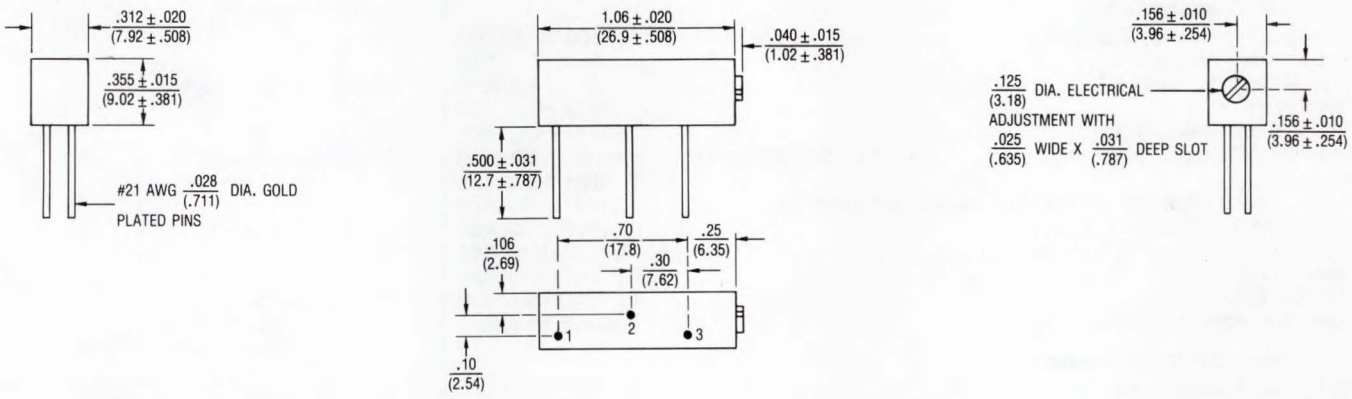
Specifications are subject to change without notice.

- Slip clutch action
- Versatile configurations - 3 mounting styles
- Moisture resistant
- Non-standard features and specifications available

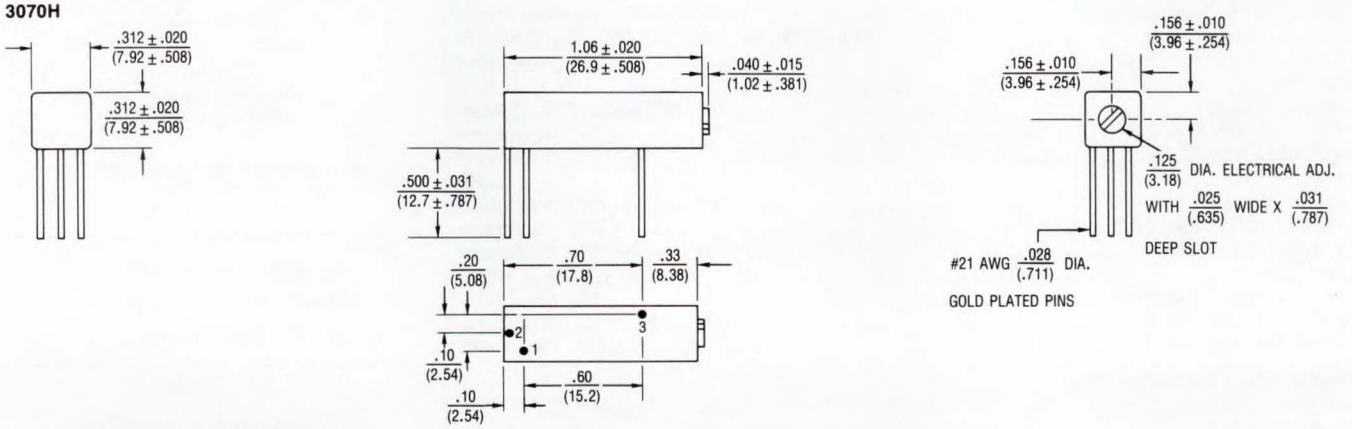
Model 3070

Bourns® Precision Potentiometer

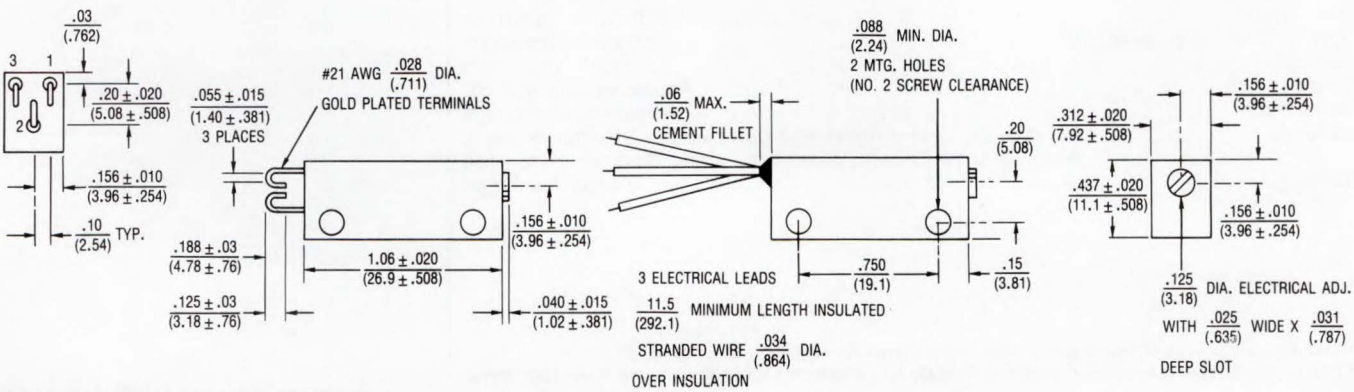
3070P



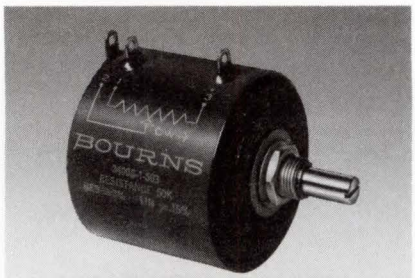
3070H



3070L-S



Specifications are subject to change without notice.



1-13/16" DIAMETER / 10-TURN / WIREWOUND

- Bushing mount
- Optional ±0.05 linearity option
- Excellent wiper stability
- High stop strength
- Sealable

FOR ORDERING INFORMATION SEE PAGE 116.

Model 3400

Bourns® Precision Potentiometers

3400
1-13/16" Bushing Mount

Electrical Characteristics[1]

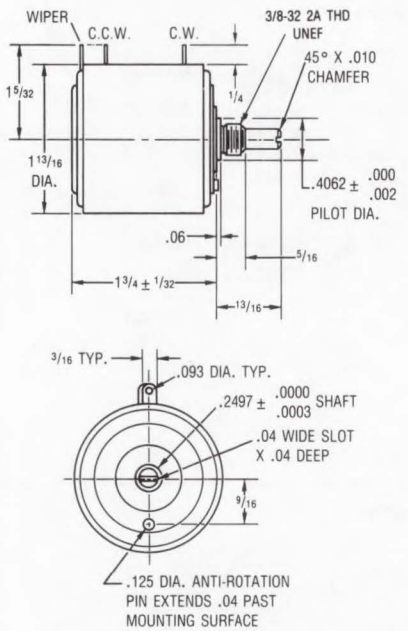
Standard Resistance Range	100 to 500KΩ
Resistance Tolerance	±3%
Independent Linearity	±0.15%
Resolution	See table page 104
Effective Electrical Angle	3600° +4°, −0°
Absolute Minimum Resistance	1Ω or 0.15% maximum (whichever is greater)
Noise	100Ω ENR maximum
Power Rating (Voltage Limited By Power Dissipation, or	(40°C) 5 watts
1,000 VAC, Whichever Is Less)	(105°C) 0 watt
Dielectric Withstanding Voltage	MIL-STD-202, Method 301
Sea Level	1,000 VAC minimum
80,000 Feet	300 VAC minimum
Insulation Resistance (500 VDC)	1,000 megohms minimum

Environmental Characteristics[1]

Operating Temperature	
Static Operation Temperature Range	−65°C to +125°C
Dynamic Temperature Range	+1°C to +125°C
Temperature Coefficient[2]	±20ppm/°C maximum/unit
Moisture Resistance	MIL-STD-202, Method 103, Condition B
Total Resistance Shift	±2% maximum
Vibration	10G
Wiper Bounce	0.1 millisecond maximum
Total Resistance Shift	±2% maximum
Voltage Ratio Shift	±0.1% maximum
Shock	50G
Wiper Bounce	0.1 millisecond maximum
Total Resistance Shift	±2% maximum
Voltage Ratio Shift	±0.1% maximum
Load Life	1,000 hours, 5 watts
Total Resistance Shift	±2% maximum
Rotational Life (No Load)	2,000,000 shaft revolutions
Total Resistance Shift	±5% maximum

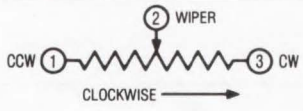
Mechanical Characteristics[1]

Mechanical Angle	3600° +4°, −0°
Shaft Runout	0.002 in. T.I.R.
Shaft End Play	0.005 in. T.I.R.
Shaft Radial Play	0.0025 in. T.I.R.
Pilot Diameter Runout	0.002 in. T.I.R.
Lateral Runout	0.005 in. T.I.R.
Stop Strength	550 oz-in. minimum
Torque (Starting & Running)	2.0 oz-in. minimum
Backlash	1.0° maximum
Weight	Approximately 4.2 oz.
Terminals	Gold-plated solder lugs
Markings	Manufacturer's name and part number, resistance value and tolerance, linearity tolerance, wiring diagram, date code
Ganging	2 cups maximum

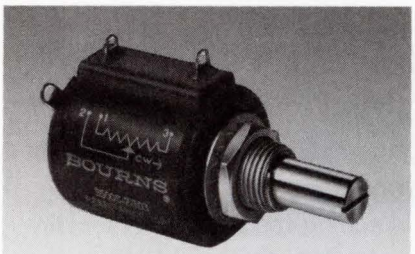


NOTE: LOCKWASHER AND HEX NUT TO BE SUPPLIED WITH EACH UNIT.

TOLERANCES: EXCEPT WHERE NOTED
DECIMALS: .XX ± .010 , .XXX ± .005
FRACTIONS: ± 1/64 DIMENSIONS: IN.



[1]At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.
[2]Consult manufacturer for complete specification details for resistances below 500 ohms and above 100K ohms.



7/8'' DIAMETER/10-TURN/WIREWOUND AND HYBRITRON® ELEMENT

- Bushing mount
- Sealable
- Non-standard features and specifications available
- Optional high torque feature
- Optional center tap feature
- Gangable

FOR ORDERING INFORMATION SEE PAGES 116.

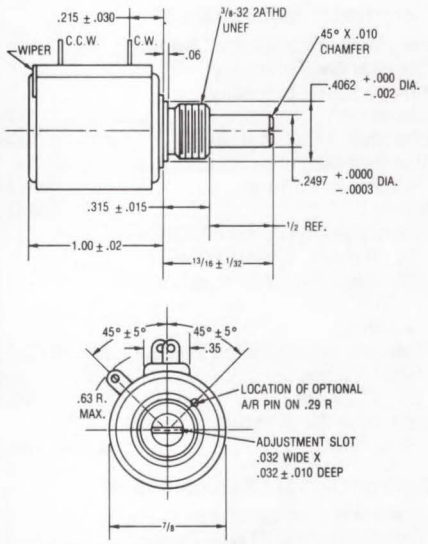
Models 3500/3501

Bourns® Precision Potentiometers

	3500 Wirewound Element	3501 Hybritron® Element
Electrical Characteristics[1]		
Standard Resistance Range	50 to 100KΩ	1K to 100KΩ
Resistance Tolerance	±3%	±10%
Independent Linearity	±0.20%	±0.25%
Resolution	See table page 105	Essentially infinite
Effective Electrical Angle	3600° +10°, −0°	3600° +10°, −2°
Absolute Minimum Resistance/ Minimum Voltage	1Ω or 0.1% maximum (whichever is greater)	Minimum voltage 0.2% maximum
Noise	100Ω ENR maximum	Output smoothness 0.1% maximum
Power Rating (Voltage Limited By Power Dissipation or 325 VAC, Whichever is Less)		
+70°C	2 watts	2 watts
+125°C	0 watt	0 watt
Dielectric Withstanding Voltage	MIL-STD-202, Method 301	MIL-STD-202, Method 301
Sea Level	1,500 VAC minimum	1,500 VAC minimum
70,000 Feet	400 VAC minimum	400 VAC minimum
Insulation Resistance (500 VDC)	1,000 megohms minimum	1,000 megohms minimum
Environmental Characteristics[1]		
Operating Temperature		
Static Operation Temp Range	−65°C to +125°C	−65°C to +125°C
Dynamic Temp Range	+1°C to +125°C	+1°C to +125°C
Temperature Coefficient[2]	±50ppm/°C maximum/unit	±100ppm°C maximum/unit
Vibration	20G	20G
Wiper Bounce	0.1 millisecond maximum	0.1 millisecond maximum
Total Resistance Shift	±2% maximum	±2% maximum
Voltage Ratio Shift	±0.1% maximum	0.1% maximum
Shock	100G	100G
Wiper Bounce	0.1 millisecond maximum	0.1 millisecond maximum
Total Resistance Shift	±2% maximum	±2% maximum
Voltage Ratio Shift	±0.1% maximum	±0.1% maximum
Load Life	1,000 hours, 2 watts	1,000 hours, 2 watts
Total Resistance Shift	±2% maximum	±5% maximum
Rotational Life (No Load)	2,000,000 shaft revolutions[2]	4,000,000 shaft revolutions
Total Resistance Shift	±5% maximum	±5% maximum
Moisture Resistance	MIL-STD-202, Method 103, Condition B	MIL-STD-202, Method 103, Condition B
Total Resistance Shift	±2% maximum	±5% maximum
Mechanical Characteristics[1]		
Mechanical Angle	3600° +10°, −0°	3600° +10°, −2°
Shaft Runout	0.002 in. T.I.R.	0.002 in. T.I.R.
Lateral Runout	0.005 in T.I.R.	0.005 in. T.I.R.
Pilot Diameter Runout	0.002 in. T.I.R.	0.002 in. T.I.R.
Shaft End Play	0.005 in. T.I.R.	0.005 in. T.I.R.
Shaft Radial Play	0.003 in. T.I.R.	0.003 in. T.I.R.
Stop Strength	96 oz-in. minimum	96 oz-in. minimum
Torque (Starting & Running)	0.6 oz-in. maximum	0.6 oz-in. maximum
Backlash	1.0° maximum	1.0° maximum
Weight	Approximately 1.0 oz.	Approximately 1.0 oz.
Terminals	Gold-plated solder lugs	Gold-plated turret lugs
Ganging	2 cups maximum	2 cups maximum

[1]At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.
[2]Consult manufacturer for complete specification details for resistances below 500 ohms.
Specifications are subject to change without notice.

3500S-2/3501H-1



NOTE: LOCKWASHER AND HEX NUT TO BE SUPPLIED WITH EACH UNIT.

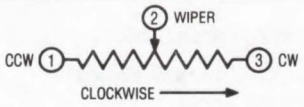
NOTE: SHAFT LENGTH VARIATIONS

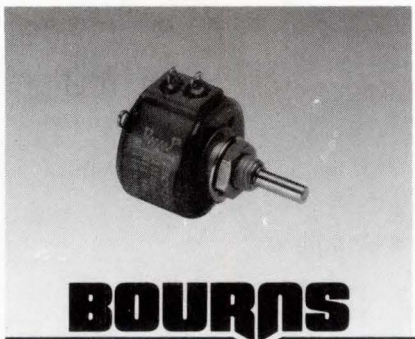
3500S-1-RC	11/16''
3500S-2-RC	13/16''
3501H-1-RC	13/16''

TOLERANCES: EXCEPT WHERE NOTED

DECIMALS: .XX ± .010 , .XXX ± .005

FRACTIONS: ± 1/64 DIMENSIONS: IN.





7/8'' DIAMETER/3-TURN/WIREWOUND AND HYBRITRON® ELEMENT

- Sealable
- Bushing mount
- Extended resistance range
- Long rotational life elements
- Gangable
- High temperature, moisture resistant, thermosetting plastic housing
- Outstanding resistance to humidity
- Non-standard features and specifications available

FOR ORDERING INFORMATION SEE PAGE 117.

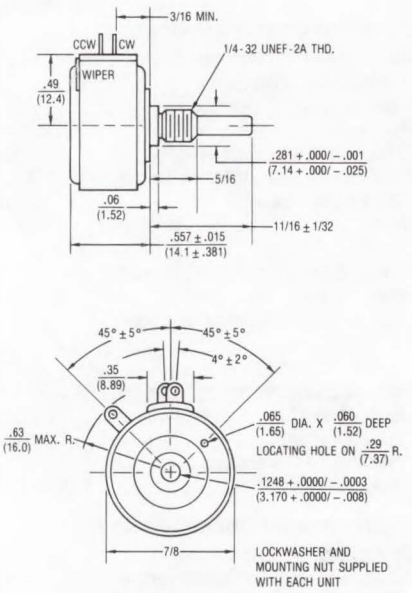
Models 3510/3511

Bourns® Precision Potentiometers

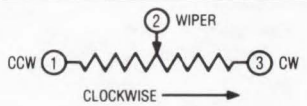
	3510 Wirewound Element	3511 Hybritron® Element
Electrical Characteristics[1]		
Standard Resistance Range	50 to 50KΩ	500 to 20KΩ
Resistance Tolerance	±3%	±10%
Independent Linearity	±0.3%	±0.3%
Resolution	See table page105	Essentially infinite
Effective Electrical Angle	1080° +10°, −0°	1080° +10°, −0°
Absolute Minimum Resistance/ Minimum Voltage	1Ω or 0.1% maximum (whichever is greater)	1Ω or 0.1% maximum (whichever is greater)
Noise	100Ω ENR maximum	Output smoothness 0.1%
Power Rating (Voltage Limited By Power Dissipation or 325 VAC, Whichever is Less)		
+70°C	1 watt	1 watt
+125°C	0 watt	0 watt
Dielectric Withstanding Voltage	MIL-STD-202, Method 301	MIL-STD-202, Method 301
Sea Level	1,500 VAC minimum	1,000 VAC minimum
80,000 Feet	400 VAC minimum	300 VAC minimum
Insulation Resistance (500 VDC)	1,000 megohms minimum	1,000 megohms minimum
Environmental Characteristics[1]		
Operating Temperature		
Static Operation Temp Range	−65°C to +125°C	−65°C to +125°C
Dynamic Temp Range	+1°C to +125°C	+1°C to +125°C
Temperature Coefficient[2]	±50ppm/°C maximum/unit	±100ppm°C maximum/unit
Vibration	20G	20G
Wiper Bounce	0.1 millisecond maximum	0.1 millisecond maximum
Total Resistance Shift	±2% maximum	±2% maximum
Voltage Ratio Shift	±0.1% maximum	0.1% maximum
Shock	100G	100G
Wiper Bounce	0.1 millisecond maximum	0.1 millisecond maximum
Total Resistance Shift	±2% maximum	±2% maximum
Voltage Ratio Shift	±0.1% maximum	±0.1% maximum
Load Life	1,000 hours, 1 watt	1,000 hours, 1 watt
Total Resistance Shift	±2%	±5%
Rotational Life (No Load)	200,000 shaft revolutions[2]	4,000,000 shaft revolutions[2]
Total Resistance Shift	±5% maximum	±5% maximum
Moisture Resistance	MIL-STD-202, Method 103, Condition B	MIL-STD-202, Method 103, Condition B
Total Resistance Shift	±2% maximum	±5% maximum
Mechanical Characteristics[1]		
Mechanical Angle	1080° +10°, −0°	1080° +10°, −2°
Shaft Runout	0.002 in. T.I.R.	0.002 in. T.I.R.
Lateral Runout	0.005 in T.I.R.	0.005 in. T.I.R.
Pilot Diameter Runout	0.002 in. T.I.R.	0.002 in. T.I.R.
Shaft End Play	0.005 in. T.I.R.	0.005 in. T.I.R.
Shaft Radial Play	0.003 in. T.I.R.	0.003 in. T.I.R.
Stop Strength	48 oz-in. minimum	96 oz-in. minimum
Torque (Starting & Running)	0.6 oz-in. maximum	0.6 oz-in. maximum
Backlash	1.0° maximum	1.0° maximum
Weight	Approximately 0.7 oz.	Approximately 0.7 oz.
Terminals	Gold-plated solder lugs	Gold-plated solder lugs
Ganging	2 cups maximum	2 cups maximum

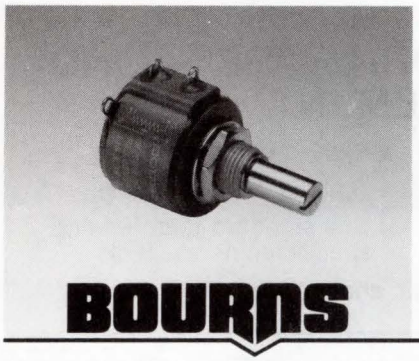
[1]At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.
[2]Consult factory for complete specification details.

3510



TOLERANCES: EXCEPT WHERE NOTED
DECIMALS: .XX ± .010 (.25), .XXX ± .005 (.13)
FRACTIONS: ± 1/64 DIMENSIONS: IN. (MM)





7/8'' DIAMETER/5-TURN/WIREWOUND AND HYBRITRON® ELEMENT

- Bushing mount
- Extended resistance range
- Long rotational life elements
- Non-standard features and specifications available
- Outstanding resistance to humidity
- Sealable
- High temperature, moisture resistant, thermosetting plastic housing
- Gangable

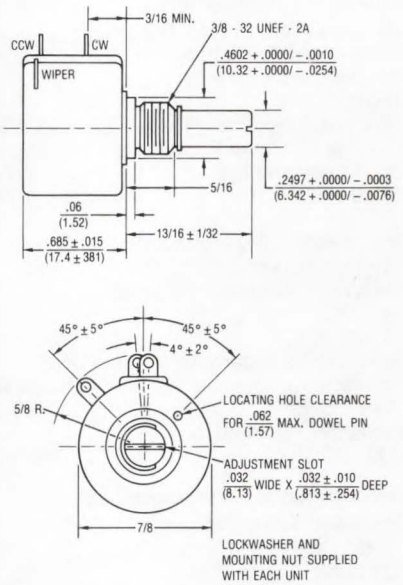
FOR ORDERING INFORMATION SEE PAGE 117.

Models 3520/3521

Bourns® Precision Potentiometers

	3520 Wirewound Element	3521 Hybritron® Element
Electrical Characteristics[1]		
Standard Resistance Range	20 to 75KΩ	500 to 50KΩ
Resistance Tolerance	±3%	±10%
Independent Linearity	±0.3%	±0.3%
Resolution	See table page 105	Essentially infinite
Effective Electrical Angle	1800° +10°, −0°	1800° +10°, −0°
Absolute Minimum Resistance/ Minimum Voltage	1Ω or 0.1% maximum (whichever is greater)	Minimum voltage 0.2% maximum
Noise	100Ω ENR maximum	Output smoothness 0.1%
Power Rating (Voltage Limited By Power Dissipation or 325 VAC, Whichever is Less)		
+70°C	1.5 watt	1.5 watt
+125°C	0 watt	0 watt
Dielectric Withstanding Voltage	MIL-STD-202, Method 301	MIL-STD-202, Method 301
Sea Level	1,500 VAC minimum	1,000 VAC minimum
70,000 Feet	400 VAC minimum	300 VAC minimum
Insulation Resistance (500 VDC)	1,000 megohms minimum	1,000 megohms minimum
Environmental Characteristics[1]		
Operating Temperature		
Static Operation Temp Range	−65°C to +125°C	−65°C to +125°C
Dynamic Temp Range	+1°C to +125°C	+1°C to +125°C
Temperature Coefficient[2]	±50ppm/°C maximum/unit	±100ppm°C maximum/unit
Vibration	20G	20G
Wiper Bounce	0.1 millisecond maximum	0.1 millisecond maximum
Total Resistance Shift	±2% maximum	±2% maximum
Voltage Ratio Shift	±0.1% maximum	0.1% maximum
Shock	100G	100G
Wiper Bounce	0.1 millisecond maximum	0.1 millisecond maximum
Total Resistance Shift	±2% maximum	±2% maximum
Voltage Ratio Shift	±0.1% maximum	±0.1% maximum
Load Life	1,000 hours, 1.5 watt	1,000 hours, 1.5 watt
Total Resistance Shift	±2%	±5%
Rotational Life (No Load)	200,000 shaft revolutions[2]	4,000,000 shaft revolutions[2]
Total Resistance Shift	±5% maximum	±5% maximum
Moisture Resistance	MIL-STD-202, Method 106,	MIL-STD-202, Method 106,
Total Resistance Shift	±2% maximum	±5% maximum
Mechanical Characteristics[1]		
Mechanical Angle	1800° +10°, −0°	1800° +10°, −2°
Shaft Runout	0.002 in. T.I.R.	0.002 in. T.I.R.
Pilot Diameter Runout	0.002 in. T.I.R.	0.002 in. T.I.R.
Shaft End Play	0.005 in. T.I.R.	0.005 in. T.I.R.
Shaft Radial Play	0.003 in. T.I.R.	0.003 in. T.I.R.
Stop Strength	48 oz-in. minimum	48 oz-in. minimum
Torque (Starting & Running)	0.6 oz-in. maximum	0.6 oz-in. maximum
Backlash	1.0° maximum	1.0° maximum
Weight	Approximately 0.7 oz.	Approximately 0.7 oz.
Terminals	Gold-plated solder lugs	Gold-plated solder lugs
Ganging	2 cups maximum	2 cups maximum

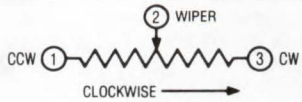
3520/3521



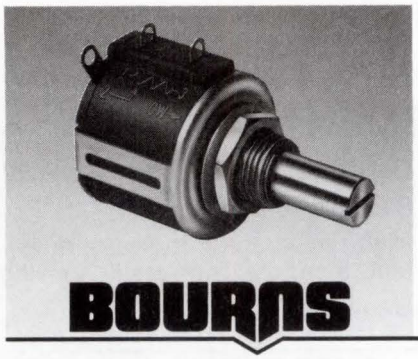
TOLERANCES: EXCEPT WHERE NOTED

DECIMALS: .XX ± .010 (.25), .XXX ± .005 (.13)

FRACTIONS: ±1/64 DIMENSIONS: IN. (MM)



[1]At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.
[2]Consult factory for complete specification details.
Specifications are subject to change without notice.



7/8" DIAMETER / 10-TURN / WIREWOUND AND HYBRITRON® ELEMENT

- Bushing mount
- Optional center tap and rear shaft extension
- Optional AR lug feature
- Gangable with common or concentric shafts
- High torque available
- Optional 0.1% linearity
- Non-standard features and specifications available

FOR ORDERING INFORMATION SEE PAGE 118.

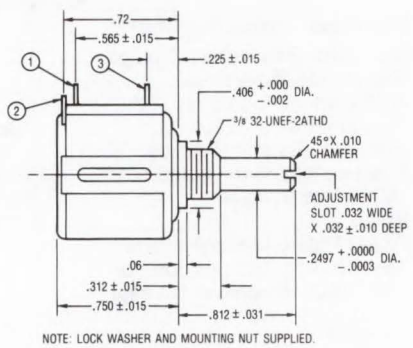
Models 3540/3541

Bourns® Precision Potentiometers

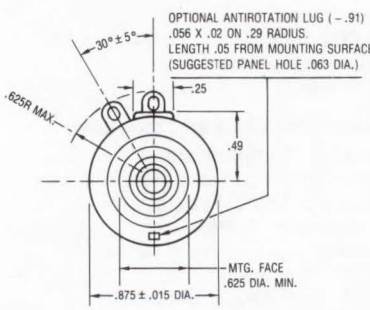
	3540 Wirewound Element	3541 Hybritron® Element
Electrical Characteristics[1]		
Standard Resistance Range	100 to 100KΩ	1KΩ to 100KΩ
Resistance Tolerance	±5%	±10%
Independent Linearity	±0.25%	±0.25%
Resolution	See table page 106	Essentially infinite
Effective Electrical Angle	3600° +10°, −0°	3600° +10°, −0°
Absolute Minimum Resistance/ Minimum Voltage	1Ω or 0.1% maximum (whichever is greater)	Minimum voltage 0.2% maximum
Noise	100Ω ENR maximum	Output smoothness 0.1% maximum
Power Rating (Voltage Limited By Power Dissipation, or 447 VAC, Whichever is Less)		
+70°C	2 watts	2 watts
+125°C	0 watt	0 watt
Dielectric Withstanding Voltage	MIL-STD-202, Method 301	MIL-STD-202, Method 301
Sea Level	1,000 VAC minimum	1,000 VAC minimum
Insulation Resistance (500 VDC)	1,000 megohms minimum	1,000 megohms minimum
Environmental Characteristics[1]		
Operating Temperature		
Static Operation Temp Range	−55°C to +125°C	−55°C to +125°C
Dynamic Temp Range	+1°C to +125°C	+1°C to +125°C
Temperature Coefficient[2]	±50ppm/°C maximum/unit	±100ppm°C maximum/unit
Vibration	15G	15G
Wiper Bounce	0.1 millisecond maximum	0.1 millisecond maximum
Shock	50G	50G
Wiper Bounce	0.1 millisecond maximum	0.1 millisecond maximum
Load Life	1,000 hours, 2 watts	1,000 hours, 2 watts
Total Resistance Shift	±2% maximum	±5% maximum
Rotational Life (No Load)	1,000,000 shaft revolutions	5,000,000 shaft revolutions
Total Resistance Shift	±5% maximum	±5% maximum
Moisture Resistance	MIL-STD-202, Method 103, Condition B	MIL-STD-202, Method 103, Condition B
Total Resistance Shift	±2% maximum	±5% maximum
Mechanical Characteristics[1]		
Mechanical Angle	3600° +10°, −0°	3600° +10°, −0°
Shaft Runout	0.003 in. T.I.R.	0.003 in. T.I.R.
Lateral Runout	0.005 in. T.I.R.	0.005 in. T.I.R.
Pilot Diameter Runout	0.003 in. T.I.R.	0.003 in. T.I.R.
Shaft End Play	0.012 in. T.I.R.	0.010 in. T.I.R.
Shaft Radial Play	0.003 in. T.I.R.	0.003 in. T.I.R.
Stop Strength	75 oz-in. minimum	75 oz-in. minimum
Torque (Starting & Running)	0.6 oz-in. maximum	0.5 oz-in. maximum
Backlash	1.0° maximum	1.0° maximum
Weight	Approximately 0.75 oz.	Approximately 0.80 oz.
Terminals	Gold-plated solder lugs	Gold-plated solder lugs
Ganging	2 cups maximum	2 cups maximum

[1]At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.
[2]Consult factory for complete specification details.

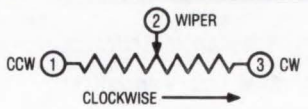
3540S-1/3541H-1

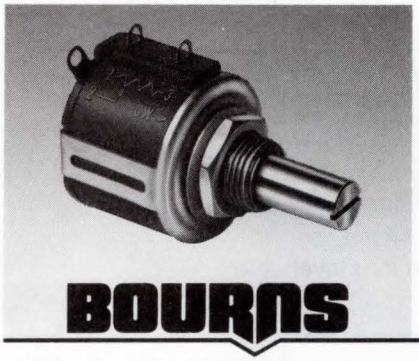


NOTE: LOCK WASHER AND MOUNTING NUT SUPPLIED.



TOLERANCES: EXCEPT WHERE NOTED
DECIMALS: .XX ± .010 , .XXX ± .005
DIMENSIONS: IN.





7/8'' DIAMETER/3- AND 5-TURN WIREWOUND

- Bushing mount
- Optional AR pin feature
- Non-standard features and specifications available
- Gangable

FOR ORDERING INFORMATION SEE PAGE 118.

Models 3543/3545

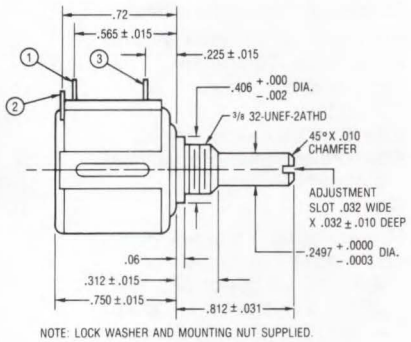
Bourns® Precision Potentiometers

	3543 3-Turn	3545 5-Turn
Electrical Characteristics[1]		
Standard Resistance Range	20 to 50KΩ	50 to 50KΩ
Resistance Tolerance	±5%	±5%
Independent Linearity	±0.25%	±0.25%
Resolution	See table page 106	See table page 106
Effective Electrical Angle	1080° +10°, −0°	1800° +10°, −0°
Absolute Minimum Resistance/	1Ω or 0.1% maximum (whichever is greater)	1Ω or 0.1% maximum (whichever is greater)
Noise	100Ω ENR maximum	100Ω ENR maximum
Power Rating (Voltage Limited By Power Dissipation, or 224 VAC [3543] or 273 VAC [3545], Whichever is Less)		
+70°C	1 watt	1.5 watts
+125°C	0 watt	0 watt
Dielectric Withstanding Voltage	MIL-STD-202, Method 301	MIL-STD-202, Method 301
Sea Level	1,000 VAC minimum	1,000 VAC minimum
Insulation Resistance (500 VDC)	1,000 megohms minimum	1,000 megohms minimum
Environmental Characteristics[1]		
Operating Temperature		
Static Operation Temp Range	−55°C to +125°C	−55°C to +125°C
Dynamic Temp Range	+1°C to +125°C	+1°C to +125°C
Temperature Coefficient[2]	±50ppm/°C maximum/unit	±50ppm°C maximum/unit
Vibration	15G	15G
Wiper Bounce	0.1 millisecond maximum	0.1 millisecond maximum
Shock	50G	50G
Wiper Bounce	0.1 millisecond maximum	0.1 millisecond maximum
Load Life	1,000 hours, 1 watt	1,000 hours, 1.5 watts
Total Resistance Shift	±2% maximum	±2% maximum
Rotational Life (No Load)	300,000 shaft revolutions	500,000 shaft revolutions
Total Resistance Shift	±5% maximum	±5% maximum
Moisture Resistance	MIL-STD-202, Method 103, Condition B	MIL-STD-202, Method 103, Condition B
Total Resistance Shift	±2% maximum	±2% maximum
Mechanical Characteristics[1]		
Mechanical Angle	1080° +10°, −0°	1800° +10°, −0°
Shaft Runout	0.003 in. T.I.R.	0.003 in. T.I.R.
Lateral Runout	0.005 in. T.I.R.	0.005 in. T.I.R.
Pilot Diameter Runout	0.003 in. T.I.R.	0.003 in. T.I.R.
Shaft End Play	0.010 in. T.I.R.	0.010 in. T.I.R.
Shaft Radial Play	0.003 in. T.I.R.	0.003 in. T.I.R.
Stop Strength	75 oz-in. minimum	75 oz-in. minimum
Torque (Starting & Running)	0.5 oz-in. maximum	0.5 oz-in. maximum
Weight	Approximately 0.75 oz.	Approximately 0.75 oz.
Terminals	Gold-plated solder lugs	Gold-plated solder lugs
Backlash	1.0° maximum	1.0° maximum
Ganging	2 cups maximum	2 cups maximum

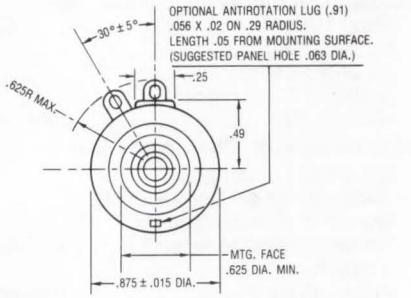
[1]At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.
[2]Consult factory for complete specification details.

Specifications are subject to change without notice.

3543S-1/3545S-1



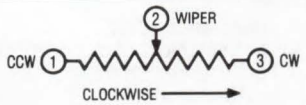
NOTE: LOCK WASHER AND MOUNTING NUT SUPPLIED.

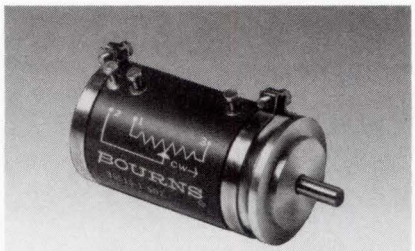


TOLERANCES: EXCEPT WHERE NOTED

DECIMALS: .XX ± .010 , .XXX ± .005

FRACTIONS: ± 1/64 DIMENSIONS: IN.





BOURNS

7/8'' DIAMETER/10-TURN/WIREWOUND AND HYBRITRON® ELEMENT

- Servo mount
- Excellent rotational life
- Excellent resolution
- Non-standard features and specifications available
- Gangable

FOR ORDERING INFORMATION SEE PAGE 118.

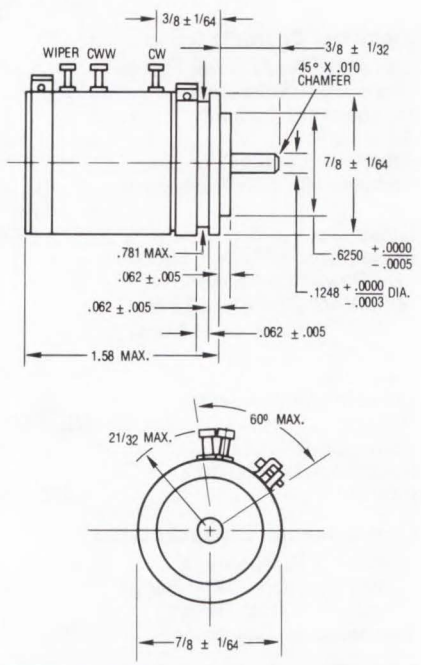
Models 3550/3551

Bourns® Precision Potentiometers

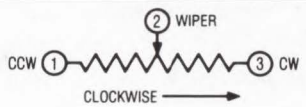
	3550 Wirewound Element	3551 Hybritron® Element
Electrical Characteristics[1]		
Standard Resistance Range	100 to 200KΩ	1K to 100KΩ
Resistance Tolerance	±3%	±10%
Independent Linearity	±0.2%	±0.25%
Resolution	See table page 106	Essentially infinite
Effective Electrical Angle	3600° +10°, −0°	3600° +10°, −2°
Absolute Minimum Resistance/ Minimum Voltage	1Ω or 0.1% maximum (whichever is greater)	Minimum voltage 0.2% maximum
Noise	100Ω ENR maximum	Output smoothness 0.1% maximum
Power Rating (Voltage Limited By Power Dissipation or 500 VAC [3550] or 325 VAC [3551], Whichever is Less)		
+70°C	2.5 watts	2 watts
+125°C	0 watt	0 watt
Dielectric Withstanding Voltage	MIL-STD-202, Method 301	MIL-STD-202, Method 301
Sea Level	1,000 VAC minimum	1,000 VAC minimum
80,000 Feet	300 VAC minimum	
70,000 Feet		300 VAC minimum
Insulation Resistance (500 VDC)	1,000 megohms minimum	1,000 megohms minimum
Environmental Characteristics[1]		
Operating Temperature		
Static Operation Temp Range	−65°C to +125°C	−55°C to +105°C
Dynamic Temp Range	+1°C to +125°C	+1°C to +105°C
Temperature Coefficient[2]	±50ppm/°C maximum/unit	±100ppm°C maximum/unit
Vibration	20G	20G
Wiper Bounce	0.1 millisecond maximum	0.1 millisecond maximum
Total Resistance Shift	±2% maximum	±2% maximum
Voltage Ratio Shift	±0.2% maximum	0.2% maximum
Shock	100G	100G
Wiper Bounce	0.1 millisecond maximum	0.1 millisecond maximum
Total Resistance Shift	±2% maximum	±2% maximum
Voltage Ratio Shift	±0.2% maximum	±0.2% maximum
Load Life	1,000 hours, 2.5 watts	1,000 hours, 2 watts
Total Resistance Shift	±2% maximum	±5% maximum
Rotational Life (No Load)	1,000,000 shaft revolutions	10,000,000 shaft revolutions
Total Resistance Shift	±5% maximum	±5% maximum
Moisture Resistance	MIL-STD-202, Method 103, Condition B	MIL-STD-202, Method 103, Condition B
Total Resistance Shift	±2% maximum	±5% maximum
Mechanical Characteristics[1]		
Mechanical Angle	3600° +10°, −0°	3600° +10°, −0°
Shaft Runout	0.001 in. T.I.R.	0.001 in. T.I.R.
Lateral Runout	0.003 in. T.I.R.	0.003 in. T.I.R.
Pilot Diameter Runout	0.0015 in. T.I.R.	0.0015 in. T.I.R.
Shaft End Play	0.003 in. T.I.R.	0.003 in. T.I.R.
Shaft Radial Play	0.002 in. T.I.R.	0.002 in. T.I.R.
Stop Strength	96 oz-in. minimum	96 oz-in. maximum
Torque (Starting)	0.4 oz-in. maximum	0.5 oz-in. maximum
Torque (Running)	0.3 oz-in. maximum	0.5 oz-in. maximum
Backlash	1.0° maximum	1.0° maximum
Weight	Approximately 1.1 oz.	Approximately 1.1 oz.
Terminals	Gold-plated turrets	Gold-plated turrets
Ganging	3 cups maximum	3 cups maximum

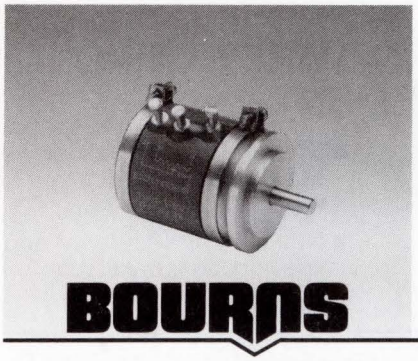
[1]At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.
[2]Consult factory for complete specification details.

3550/3551



TOLERANCES: EXCEPT WHERE NOTED
DECIMALS: .XX ± .010 , .XXX ± .005
FRACTIONS: ± 1/64 DIMENSIONS: IN.





7/8'' DIAMETER/3-TURN/WIREWOUND AND HYBRITRON® ELEMENT

- Servo mount
- Shaft supported front and rear by precision ball bearings
- High temperature, moisture resistant, thermosetting plastic housing
- Special rotor and slider design assures excellent wiper stability
- Non-standard features and specifications available
- Gangable

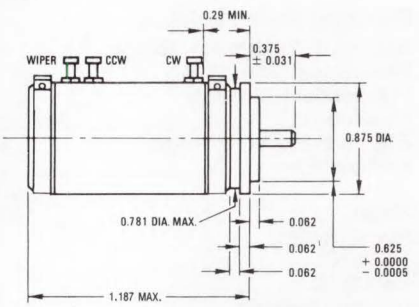
FOR ORDERING INFORMATION SEE PAGES 118.

Models 3560/3561

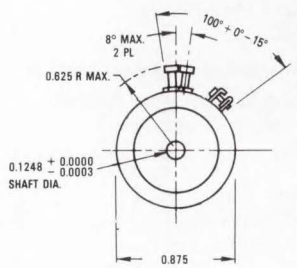
Bourns® Precision Potentiometers

	3560 Wirewound Element	3561 Hybritron® Element
Electrical Characteristics[1]		
Standard Resistance Range	50 to 50KΩ	500 to 20KΩ
Resistance Tolerance	±3%	±10%
Independent Linearity	±0.25%	±0.25%
Resolution	See ordering information	Essentially infinite
Effective Electrical Angle	1080° +10°, −0°	1080° +10°, −0°
Absolute Minimum Resistance/ Minimum Voltage	1Ω or 0.1% (whichever is greater)	0.1% maximum
Noise	100Ω ENR maximum	Output smoothness 0.1%
Power Rating (Voltage Limited By Power Dissipation or 325 VAC, Whichever is Less)		
+70°C	1.5 watt	1.5 watt
+125°C	0 watt	0 watt
Dielectric Strength	MIL-R-12934	MIL-R-12934
Sea Level	1,000 VAC minimum	1,000 VAC minimum
80,000 Feet	300 VAC minimum	300 VAC minimum
Insulation Resistance (500 VDC)	1,000 megohms minimum	1,000 megohms minimum
Environmental Characteristics[1]		
Operating Temperature Range	−65°C to +125°C	−65°C to +125°C
Temp. Coefficient of Wire	20ppm/°C maximum	100ppm/°C maximum
Humidity	MIL-R-12934 Humidity Cycling	MIL-R-39023 Humidity Cycling
Vibration	MIL-R-12934, 20G	MIL-R-39023, 20G
Wiper Bounce	0.1 millisecond maximum	0.1 millisecond maximum
Wiper Shift	0.2% maximum	0.1% maximum
Shock	MIL-R-12934, 100G	MIL-R-39023, 100G
Wiper Bounce and Wiper Shift	Same as vibration	Same as vibration
Load Life	1,000 hours	1,000 hours
Resistance Shift	2% maximum	5% maximum
Mechanical Characteristics[1]		
Mechanical Angle	1080° +10°, −0°	1080° +10°, −0°
Shaft Runout	0.001 in. T.I.R.	0.001 in. T.I.R.
Lateral Runout	0.003 in. T.I.R.	0.003 in. T.I.R.
Pilot Diameter Runout	0.0015 in. T.I.R.	0.0015 in. T.I.R.
Shaft End Play	0.003 in. T.I.R.	0.003 in. T.I.R.
Shaft Radial Play	0.002 in. T.I.R.	0.002 in. T.I.R.
Rotational Life, Shaft Revolutions	600,000	4,000,000
Stop Strength	96 oz-in. minimum	96 oz-in. minimum
Torque	0.4 oz-in. maximum starting/ 0.3 oz-in. maximum running	0.4 oz-in. maximum
Moment of inertia	0.25 g cm²	0.25 g cm²
Ganging	3 cups maximum	3 cups maximum
Weight	Approximately 23 g	Approximately 23 g
Terminals	Gold plated turret type	Gold plated turret type
Markings	Manufacturer's name and part number, resistance value and tolerance, linearity tolerance, wiring diagram and date code.	

3560/3561



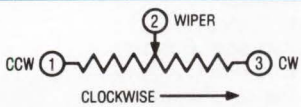
ADD 0.725'' MAX. FOR EACH ADDITIONAL CUP



TOLERANCES: EXCEPT WHERE NOTED

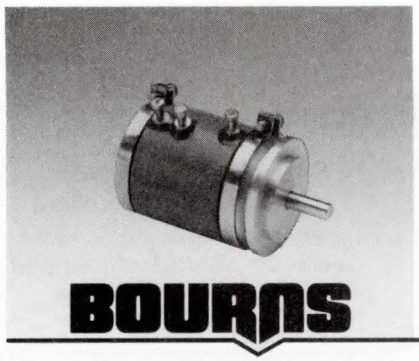
DECIMALS: .XX ± .010 , .XXX ± .005

DIMENSIONS: IN.



[1]At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.

Specifications are subject to change without notice.



BOURNS

7/8'' DIAMETER/5-TURN/WIREWOUND AND HYBRITRON® ELEMENT

- Servo mount
- Shaft supported front and rear by precision ball bearings
- High temperature, moisture resistant, thermosetting plastic housing
- Special rotor and slider design assures excellent wiper stability
- Non-standard features and specifications available
- Gangable

FOR ORDERING INFORMATION SEE PAGE 119.

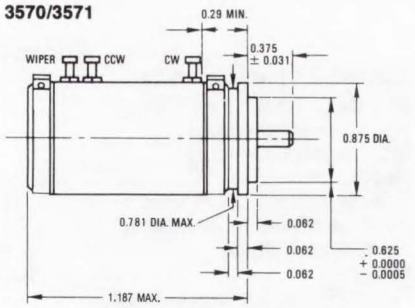
Models 3570/3571

Bourns® Precision Potentiometers

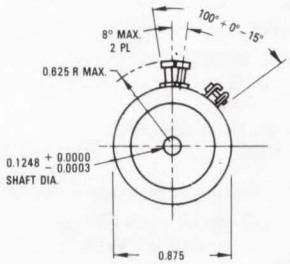
	3570 Wirewound	3571 Hybritron®
Electrical Characteristics[1]		
Standard Resistance Range	50 to 100KΩ	500 to 50KΩ
Resistance Tolerance	±3%	±10%
Independent Linearity	±0.25%	±0.25%
Resolution	See ordering information	Essentially infinite
Effective Electrical Angle	1800° +10°, −0°	1800° +10°, −0°
End Voltage	1Ω or 0.1% (whichever is greater)	0.1% maximum
Noise	100Ω ENR maximum	Output smoothness 0.1%
Power Rating		
+70°C	2.0 watts	2.0 watts
+125°C	0 watt	0 watt
Dielectric Strength		
Sea Level	1,000 VAC minimum	1,000 VAC minimum
80,000 Feet	300 VAC minimum	300 VAC minimum
Insulation Resistance (500 VDC)	1,000 megohms minimum	1,000 megohms minimum
Environmental Characteristics[1]		
Operating Temperature Range	−65°C to +125°C	−65°C to +125°C
Temperature Coefficient[2]	±20ppm/°C maximum	±100ppm°C maximum
Humidity	MIL-R-12934 Humidity cycling	MIL-R-39023 Humidity cycling
Vibration	MIL-R-12934, 20G	MIL-R-39023, 20G
Wiper Bounce	0.1 millisecond maximum	0.1 millisecond maximum
Wiper Shift	0.2% maximum	0.1% maximum
Shock	MIL-R-12934, 100G	MIL-R-39023, 100G
Wiper Bounce & Wiper Shift	Same as Vibration	Same as Vibration
Load Life	1,000 hours	1,000 hours
Total Resistance Shift	±2% maximum	±5% maximum
Mechanical Characteristics[1]		
Mechanical Angle	1800° +10°, −0°	1800° +10°, −0°
Shaft Runout	0.001 in. T.I.R.	0.001 in. T.I.R.
Lateral Runout	0.003 in. T.I.R.	0.003 in. T.I.R.
Pilot Diameter Runout	0.0015 in. T.I.R.	0.0015 in. T.I.R.
Shaft End Play	0.003 in. T.I.R.	0.003 in. T.I.R.
Shaft Radial Play	0.002 in. T.I.R.	0.002 in. T.I.R.
Rotational Life	1,000,000 shaft revolutions	4,000,000 shaft revolutions
Stop Strength	96 oz-in. minimum	96 oz-in. minimum
Torque		
Starting	0.4 oz-in. maximum	0.4 oz-in. maximum
Running	0.3 oz-in maximum	0.4 oz-in. maximum
Moment of Inertia	0.28g cm²	0.28g cm²
Ganging	3 cups maximum	3 cups maximum
Weight	Approximately 25g	Approximately 25g
Terminals	Gold-plated turret type	Gold-plated turret type
Markings	Manufacturer's name and part number, resistance value and tolerance, linearity tolerance, wiring diagram, date code	

[1]At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.

3570/3571



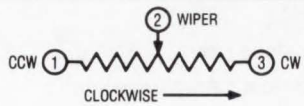
ADD 0.860'' MAX. FOR EACH ADDITIONAL CUP

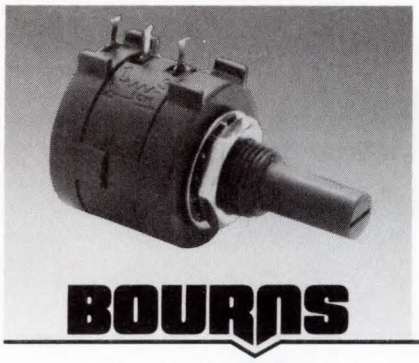


TOLERANCES: EXCEPT WHERE NOTED

DECIMALS: .XX ± .010 , .XXX ± .005

DIMENSIONS: IN.





7/8'' DIAMETER / 10-TURN / WIREWOUND

- Bushing mount
- Optional AR pin feature
- Plastic or metal shaft and bushings
- Wirewound
- Solder lugs or PC pins
- Sealable
- Non-standard features and specifications available

FOR ORDERING INFORMATION SEE PAGE 119.

Model 3590

Bourns® Precision Potentiometer

Electrical Characteristics[1]

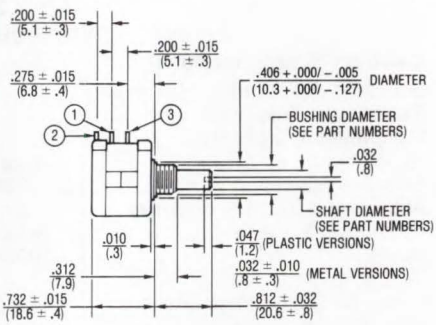
Standard Resistance Range	200 to 100KΩ
Resistance Tolerance	±5%
Independent Linearity	±0.25%
Resolution	See table page 108
Effective Electrical Angle	3600° +10°, −0°
Absolute Minimum Resistance	1Ω or 0.1% maximum (whichever is greater)
Noise	100Ω ENR maximum
Power Rating (Voltage Limited By Power Dissipation or 450 VAC, Whichever is Less)	
+40°C	2 watts
+125°C	0 watt
Dielectric Withstanding Voltage	MIL-STD-202, Method 301
Sea Level	2,000 VAC minimum
Insulation Resistance (500 VDC)	1,000 megohms minimum

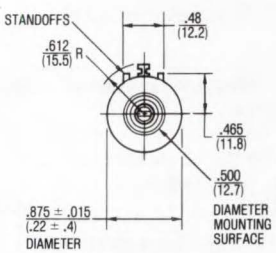
Environmental Characteristics[1]

Operating Temperature	
Static Operation Temperature Range	−55°C to +125°C
Dynamic Operation Temperature Range	−55°C to +125°C
Temperature Coefficient[2]	±50ppm/°C maximum/unit
Vibration	15G
Wiper Bounce	0.1 millisecond maximum
Shock	50G
Wiper Bounce	0.1 millisecond maximum
Load Life	1,000 hours, 2 watts
Total Resistance Shift	±2% maximum
Rotational Life (No Load)	1,000,000 shaft revolutions
Total Resistance Shift	±5% maximum
Moisture Resistance	MIL-STD-202, Method 103, Condition B
Total Resistance Shift	±2% maximum

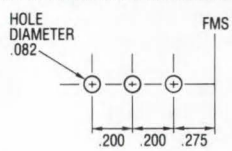
Mechanical Characteristics[1]

Mechanical Angle	3600° +10°, − 0°
Shaft Runout	0.005 in. T.I.R.
Lateral Runout	0.008 in. T.I.R.
Pilot Diameter Runout	0.003 in. T.I.R.
Shaft End Play	0.010 in. T.I.R.
Shaft Radial Play	0.005 in. T.I.R.
Stop Strength	64 oz-in. minimum
Torque (Starting & Running)	0.5 oz-in. maximum (unsealed)
	1.5 oz-in. maximum (sealed)
Mounting Torque	5-7 in-lbs. (plastic)
	15-18 in-lbs. (metal)
Backlash	1.0° maximum
Terminals	Solder lugs or PC pins



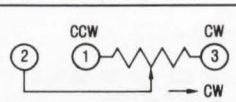


RECOMMENDED PC BOARD MOUNTING HOLE LOCATIONS



DIMENSIONS IN INCHES
PARENTHESES INDICATE MILLIMETERS

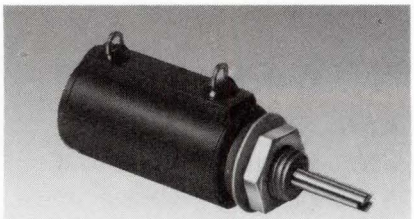
TOLERANCES
EXCEPT WHERE NOTED
.xx ± .02 (± .51)
.xxx ± .005 (± .127)
DIMENSIONS: IN. / (MM)



SHAFT & BUSHING CONFIGURATIONS

(Bushing - DxL, Shaft - D)
(-1) Plastic Bushing (3/8'' x 5/16'') and Shaft (.2480 +.001, −.002)
(-2) Metal Bushing (3/8'' x 5/16'') and Shaft (.2497 +.0000, −.0009)
(-3) Sealed, Plastic Bushing (3/8'' x 5/16'') and Shaft (.2480 +.001, −.002)
(-4) Sealed, Metal Bushing (3/8'' x 5/16'') and Shaft (.2497 +.0000, −.0009)
(-5) Metric, Plastic Bushing (9mm x 7.94mm) and Shaft (6mm +0, −.076mm)
(-6) Metric, Metal Bushing (9mm x 7.94mm) and Shaft (6mm +0, −.023mm)
(-7) Metric, Sealed, Plastic Bushing (9mm x 7.94mm) and Shaft (6mm +0, −.076mm)
(-8) Metric, Sealed, Metal Bushing (9mm x 7.94mm) and Shaft (6mm +0, −.023mm)

NOTE: For Anti-Rotation pin add 91 after configuration dash number. Example: -2 becomes -291 to add AR pin.
[1]At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.
[2]Consult manufacturer for complete specification details for resistance below 1K ohms.
Specifications are subject to change without notice.



1/2'' DIAMETER/10-TURN/WIREWOUND AND HYBRITRON® ELEMENT

- Bushing mount
- Excellent resolution
- Non-standard features and specifications available
- Small diameter
- High rotational life

FOR ORDERING INFORMATION SEE PAGES 119.

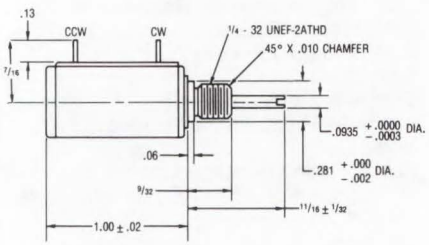
Models 3700/3701

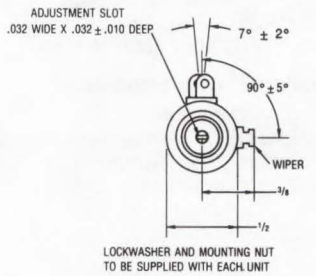
Bourns® Precision Potentiometers

	3700 Wirewound Element	3701 Hybritron® Element
Electrical Characteristics[1]		
Standard Resistance Range	100 to 100KΩ	1K to 100KΩ
Resistance Tolerance	±5%	±10%
Independent Linearity	±0.25%	±0.25%
Resolution	See table page 108	Essentially infinite
Effective Electrical Angle	3600° +10°, −0°	3600° +10°, −2°
Absolute Minimum Resistance/ Minimum Voltage	1Ω or 0.1% maximum (whichever is greater)	Minimum voltage 0.2% maximum
Noise	100Ω ENR maximum	Output smoothness 0.1% max.
Power Rating (Voltage Limited By Power Dissipation or 315 VAC, Whichever is Less)		
+70°C	1 watt	1 watt
+125°C	0 watt	0 watt
Dielectric Withstanding Voltage	MIL-STD-202, Method 301	MIL-STD-202, Method 301
Sea Level	1,000 VAC minimum	1,000 VAC minimum
80,000 Feet	400 VAC minimum	
70,000 Feet		300 VAC minimum
Insulation Resistance (500 VDC)	1,000 megohms minimum	1,000 megohms minimum
Environmental Characteristics[1]		
Operating Temperature		
Static Operation Temp Range	−65°C to +125°C	−55°C to +105°C
Dynamic Temp Range	+1°C to +125°C	+1°C to +105°C
Temperature Coefficient[2]	±50ppm/°C maximum/unit	±100ppm°C maximum/unit
Vibration	20G	20G
Wiper Bounce	0.1 millisecond maximum	0.1 millisecond maximum
Total Resistance Shift	±2% maximum	±2% maximum
Voltage Ratio Shift	±0.5% maximum	0.5% maximum
Shock	100G	100G
Wiper Bounce	0.1 millisecond maximum	0.1 millisecond maximum
Total Resistance Shift	±2% maximum	±2% maximum
Voltage Ratio Shift	±0.5% maximum	±0.5% maximum
Load Life	1,000 hours, 1 watt	1,000 hours, 1 watt
Total Resistance Shift	±2% maximum	±5% maximum
Rotational Life (No Load)	1,000,000 shaft revolutions	4,000,000 shaft revolutions
Total Resistance Shift	±5% maximum	±5% maximum
Moisture Resistance	MIL-STD-202, Method 103, Condition B	MIL-STD-202, Method 103, Condition B
Total Resistance Shift	±2% maximum	±5% maximum
Mechanical Characteristics[1]		
Mechanical Angle	3600° +50°, −0°	3600° minimum
Shaft Runout	0.002 in. T.I.R.	0.002 in. T.I.R.
Shaft End Play	0.005 in. T.I.R.	0.005 in. T.I.R.
Shaft Radial Play	0.003 in. T.I.R.	0.003 in. T.I.R.
Stop Strength	20 oz-in. minimum	20 oz-in. minimum
Torque (Starting & Running)	0.6 oz-in. maximum	0.6 oz-in. maximum
Backlash	1.0° maximum	1.0° maximum
Weight	Approximately 1 oz.	Approximately 1 oz.
Terminals	Gold-plated solder lugs	Gold-plated turret lugs

[1]At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.
[2]Consult factory for complete specification details.

3700S-1/3701H-1

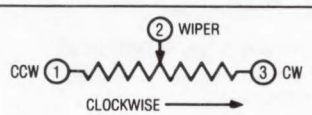


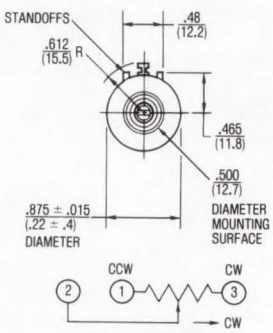


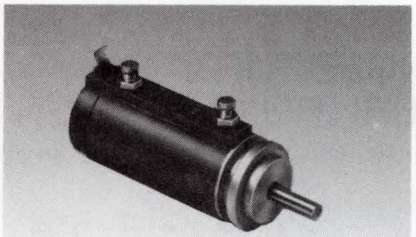
TOLERANCES: EXCEPT WHERE NOTED

DECIMALS: .XX ± .010 , .XXX ± .005

FRACTIONS: ± 1/64 DIMENSIONS: IN.







1/2'' DIAMETER/10-TURN/WIREWOUND AND HYBRITRON® ELEMENT

- Servo mount
- Excellent resolution
- Non-standard features and specifications available
- Small diameter
- High rotational life

FOR ORDERING INFORMATION SEE PAGE 120.

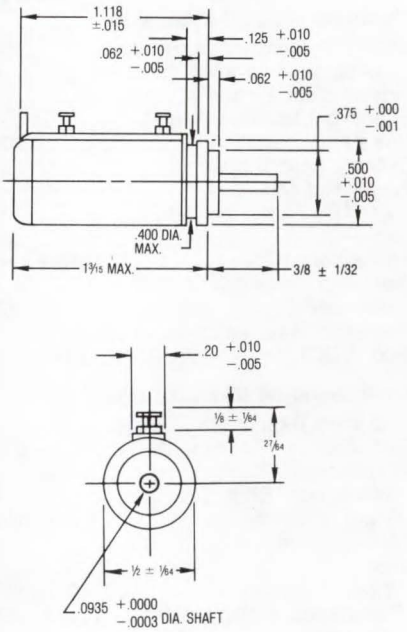
Models 3750/3751

Bourns® Precision Potentiometers

	3750 Wirewound Element	3751 Hybritron® Element
Electrical Characteristics[1]		
Standard Resistance Range	100 to 100KΩ	1K to 100KΩ
Resistance Tolerance	±5%	±10%
Independent Linearity	±0.25%	±0.25%
Resolution	See table page 108	Essentially infinite
Effective Electrical Angle	3600° +10°, −0°	3600° +10°, −4°
Absolute Minimum Resistance/ Minimum Voltage	1Ω or 0.1% maximum (whichever is greater)	Minimum voltage 0.2% maximum
Noise	100Ω ENR maximum	Output smoothness 0.1% maximum
Power Rating (Voltage Limited By Power Dissipation or 315 VAC, Whichever is Less)		
+70°C	1 watt	1 watt
+125°C	0 watt	0 watt
Dielectric Withstanding Voltage	MIL-STD-202, Method 301	MIL-STD-202, Method 301
Sea Level	1,000 VAC minimum	1,000 VAC minimum
80,000 Feet	300 VAC minimum	
70,000 Feet		300 VAC minimum
Insulation Resistance (500 VDC)	1,000 megohms minimum	1,000 megohms minimum
Environmental Characteristics[1]		
Operating Temperature		
Static Operation Temp Range	−65°C to +125°C	−55°C to +105°C
Dynamic Temp Range	+1°C to +125°C	+1°C to +105°C
Temperature Coefficient[2]	±50ppm/°C maximum/unit	±100ppm/°C maximum/unit
Vibration	20G	20G
Wiper Bounce	0.1 millisecond maximum	0.1 millisecond maximum
Total Resistance Shift	±2% maximum	±2% maximum
Voltage Ratio Shift	±0.2% maximum	0.2% maximum
Shock	100G	100G
Wiper Bounce	0.1 millisecond maximum	0.1 millisecond maximum
Total Resistance Shift	±2% maximum	±2% maximum
Voltage Ratio Shift	±0.2% maximum	±0.2% maximum
Load Life	1,000 hours, 1 watt	1,000 hours, 1 watt
Total Resistance Shift	±2% maximum	±5% maximum
Rotational Life (No Load)	1,000,000 shaft revolutions	10,000,000 shaft revolutions
Total Resistance Shift	±5% maximum	±5% maximum
Moisture Resistance	MIL-STD-202, Method 103, Condition B	MIL-STD-202, Method 103, Condition B
Total Resistance Shift	±2% maximum	±5% maximum
Mechanical Characteristics[1]		
Mechanical Angle	3600° +20°, −0°	3600° +20°, −0°
Shaft Runout	0.003 in. T.I.R.	0.003 in. T.I.R.
Lateral Runout	0.003 in. T.I.R.	0.003 in T.I.R.
Pilot Diameter Runout	0.002 in. T.I.R.	0.002 in. T.I.R.
Shaft End Play	0.005 in. T.I.R.	0.005 in. T.I.R.
Shaft Radial Play	0.002 in. T.I.R.	0.002 in. T.I.R.
Stop Strength	20 oz-in. minimum	20 oz-in. minimum
Torque, Starting	0.5 oz-in. maximum	0.5 oz-in. maximum
Torque, Running	0.3 oz-in. maximum	0.5 oz-in. maximum
Backlash	1.0° maximum	1.0° maximum
Weight	Approximately 0.3 oz.	Approximately 0.3 oz.
Terminals	Gold-plated turrets	Gold-plated turrets

[1]At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.
[2]Consult factory for complete specification details.
Specifications are subject to change without notice.

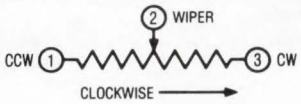
3750/3751

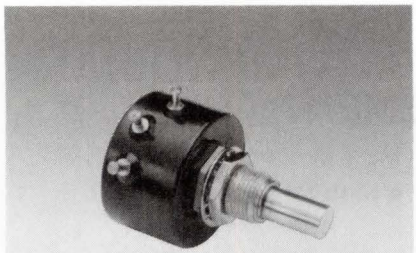


TOLERANCES: EXCEPT WHERE NOTED

DECIMALS: .XX ± .010 , .XXX ± .005

FRACTIONS: ± 1/64 DIMENSIONS: IN.





BOURNS

1-1/16" DIAMETER/SINGLE-TURN WIREWOUND AND HYBRITRON® ELEMENT

- Moisture resistant, thermosetting plastic housing; stainless steel shaft
- 1 watt power rating at 40°C
- Rotational life up to 4,000,000 shaft revolutions (Model 3437S-HYB)
- Non-standard features and specifications available

FOR ORDERING INFORMATION SEE PAGE 116.

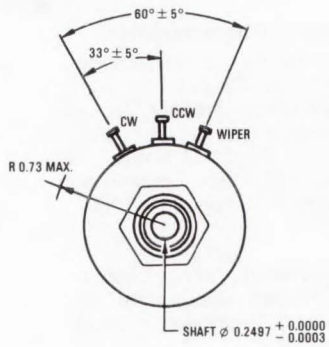
Models 3437/3437S-HYB

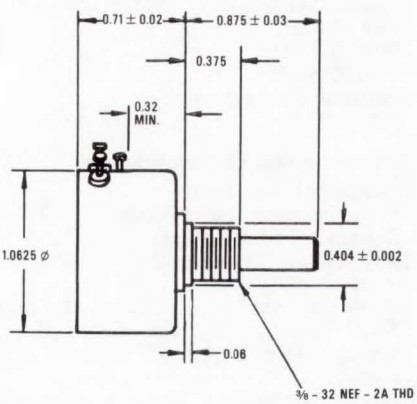
Bourns® Precision Potentiometers

	Model 3437 Wirewound Element	Model 3437S-HYB Hybritron® Element
Electrical Characteristics[1]		
Standard Resistance Range	50 to 50KΩ	200 to 20KΩ
Resistance Tolerance	±5%	±10%
Independent Linearity	±0.5%	±0.5%
Effective Electrical Angle	320° ±5°	320° ±5°
Noise	100Ω ENR maximum	
Output Smoothness	0.5% maximum	
Power Rating		
+40°C	1 watt	1 watt
+80°C	0 watt	0 watt
Resolution	See ordering information	Essentially infinite
Dielectric Strength	MIL-R-12934	MIL-R-12934
Sea Level	500 VAC minimum	500 VAC minimum
Insulation Resistance (500 VDC)	1,000 megohms minimum	1,000 megohms minimum
Environmental Characteristics[1]		
Operating Temperature Range	−15°C to +80°C	−15°C to +80°C
Temperature Coefficient[2]	±20ppm/°C maximum	±100ppm°C maximum
Vibration		
Resistance Shift	10G, 10-500 CPS	10G, 10-500 CPS
Wiper Bounce	0.1 millisecond maximum	0.1 millisecond maximum
Wiper Shift	1% maximum	1% maximum
Shock	15¾G	15G
Wiper Bounce	0.1 millisecond maximum	0.1 millisecond maximum
Resistance & Wiper Shift	Same as Vibration	Same as Vibration
Load Life	1,000 hours	1,000 hours
Total Resistance Shift	±5% maximum	±5% maximum
Mechanical Characteristics[1]		
Mechanical Angle	Continuous	Continuous
Rotational Life	200,000 shaft revolutions	4,000,000 shaft revolutions
Torque (Starting & Running)	2.0 oz-in. maximum	2.0 oz-in. maximum
Weight	Approximately 30g	Approximately 30g
Terminals	Gold-plated turrets	Gold-plated turrets
Markings	Manufacturer's name and part number, resistance value and tolerance, linearity tolerance, wiring diagram, date code	

[1]At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.
[2]Consult factory for complete specification details.

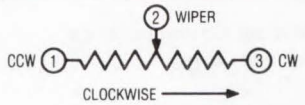
3437/3437S-HYB



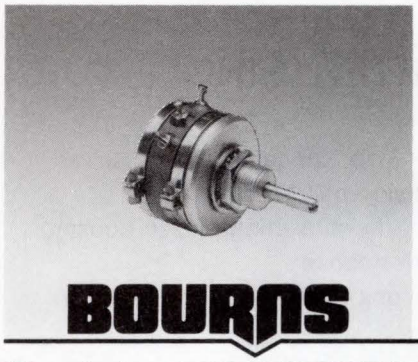


NOTE:
LOCKWASHER & HEX NUT TO BE SUPPLIED WITH UNIT.

TOLERANCES: EXCEPT WHERE NOTED
DECIMALS: .XX ± .010 , .XXX ± .005
FRACTIONS: ± 1/64 DIMENSIONS: IN.



Specifications are subject to change without notice.



7/8'', 1-1/16'', 2'' DIAMETER / SINGLE-TURN WIREWOUND

- Bushing mount
- Gangable
- Outstanding vibration and shock performance
- Shaft supported front and rear by precision sleeve bearings
- High temperature, moisture resistant, thermosetting plastic housing
- Non-standard features and specifications available

FOR ORDERING INFORMATION SEE PAGE 117.

Models 3535/3435/3415

Bourns® Precision Potentiometers

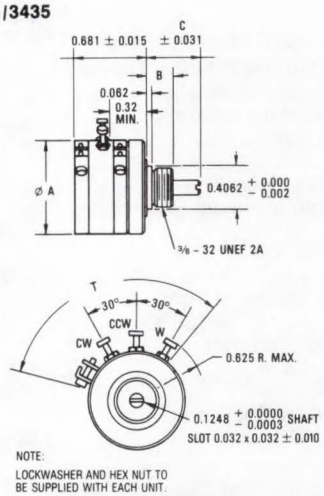
	Model 3535 7/8'' Diameter	Model 3435 1-1/16'' Diameter	Model 3415 2'' Diameter
Electrical Characteristics[1]			
Standard Resistance Range	50 to 20KΩ	50 to 50KΩ	50 to 100KΩ
Resistance Tolerance	±3%	±3%	±3%
Independent Linearity	±0.5%	±0.5%	±0.3%
Resolution	See ordering information	See ordering information	See ordering information
Effective Electrical Angle	350° ±2°	350° ±2°	350° ±2°
Absolute Minimum Resistance	1Ω or 0.1% (whichever is greater)	1Ω or 0.1% (whichever is greater)	1Ω or 0.1% (whichever is greater)
Noise	100Ω ENR max.	100Ω ENR max.	100Ω ENR max.
Power Rating +70°C	1 watt	1.5 watts	4 watts
+125°C	0 watt	0 watt	0 watt
Dielectric Strength			
Sea Level	1,000 VAC min.	1,000 VAC min.	1,000 VAC min.
70,000 Feet	300 VAC min.	300 VAC min.	250 VAC min.
Insulation Resistance (500 VDC)	1,000 megohms minimum	1,000 megohms minimum	1,000 megohms minimum
Environmental Characteristics[1]			
Operating Temperature Range	−65°C to +125°C	−65°C to +125°C	−65°C to +125°C
Temperature Coefficient[2]	±20ppm/°C max.	±20ppm°C max.	±20ppm°C max.
Humidity	MIL-R-12934 Humidity cycling	MIL-R-12934 Humidity cycling	MIL-R-12934 Humidity cycling
Vibration	MIL-R-12934, 15G	MIL-R-12934, 15G	MIL-R-12934, 15G
Wiper Bounce	0.1 millisecond maximum	0.1 millisecond maximum	0.1 millisecond maximum
Wiper Shift	1.0% maximum	1.0% maximum	1.0% maximum
Shock	MIL-R-12934, 50G	MIL-R-12934, 50G	MIL-R-12934, 50G
Wiper Bounce	Same as Vibration	Same as Vibration	Same as Vibration
Load Life	1,000 hours	1,000 hours	1,000 hours
Resistance Shift	2.0% maximum	2.0% maximum	2.0% maximum
Mechanical Characteristics[1]			
Mechanical Angle	Continuous	Continuous	Continuous
Shaft Runout	0.001 in. T.I.R.	0.001 in. T.I.R.	0.001 in. T.I.R.
Shaft End Play	0.003 in. T.I.R.	0.003 in. T.I.R.	0.003 in. T.I.R.
Shaft Radial Play	0.003 in. T.I.R.	0.003 in. T.I.R.	0.004 in. T.I.R.
Rotational Life	2,000,000 shaft revolutions	2,000,000 shaft revolutions	1,000,000 shaft revolutions
Torque (Starting)	0.15 oz-in. max.	0.2 oz-in. max.	1.5 oz-in. max.
Torque (Running)	0.15 oz-in. max.	0.2 oz-in. max.	1.0 oz-in. max.
Torque (Additional Cups)	Add 75% each	Add 75% each	Add 75% each
Ganging	8 cups maximum	8 cups maximum	8 cups maximum
Weight	Approx. 20g	Approx. 23g	Approx. 85g
Terminals	Gold-plated turrets	Gold-plated turrets	Gold-plated turrets
Markings	Manufacturer's name and part number, resistance value and tolerance, linearity tolerance, wiring diagram, date code		

[1]At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.
[2]Consult factory for complete specification details.

DIMENSIONS (INCH)

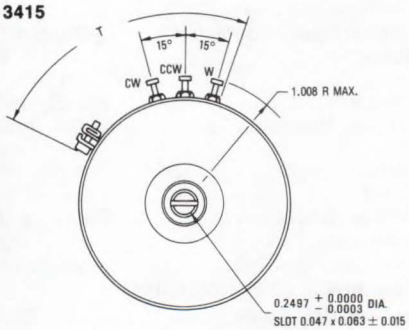
Model	ø A	B	C	T	Add for each additional cup
3535	0.875	0.250	0.500	145° + 0 − 20°	0.405
3435	1.060	0.375	0.875	130° + 0 − 15°	0.405
3415	2.000	0.375	0.875	90° + 0 − 20°	0.500

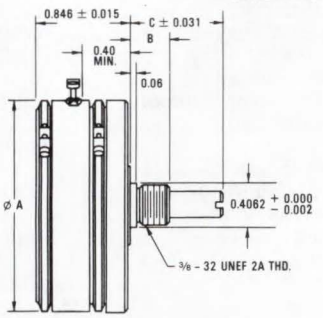
3535/3435



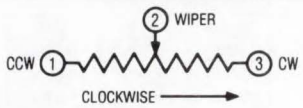
NOTE:
LOCKWASHER AND HEX NUT TO BE SUPPLIED WITH EACH UNIT.

3415

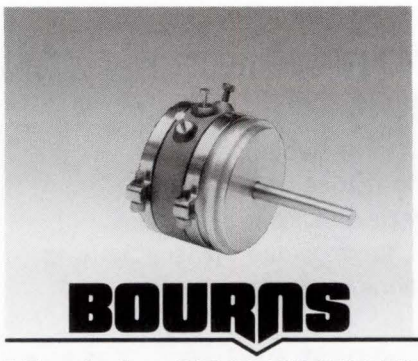




TOLERANCES: EXCEPT WHERE NOTED
DECIMALS: .XX ± .010 , .XXX ± .005
FRACTIONS: ± 1/64 DIMENSIONS: IN.



Specifications are subject to change without notice.



7/8'', 1-1/16'', 2'' DIAMETER / SINGLE-TURN WIREWOUND

- Servo mount
- Gangable
- Shaft support front and rear by precision ball bearings
- High temperature, moisture resistant, thermosetting plastic housing
- Outstanding vibration and shock performance
- Non-standard features and specifications available

FOR ORDERING INFORMATION SEE PAGE 119.

Models 3585/3485/3465

Bourns® Precision Potentiometers

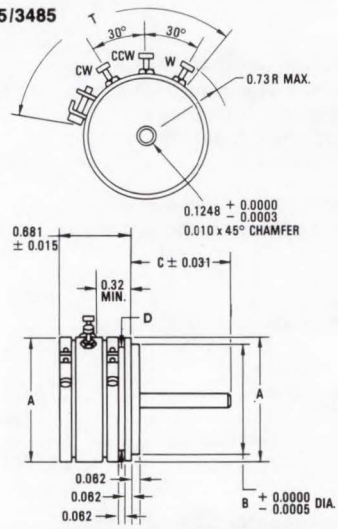
Electrical Characteristics[1]	Model 3585 7/8'' Diameter	Model 3485 1-1/16'' Diameter	Model 3465 2'' Diameter
Standard Resistance Range	25 to 20KΩ	50 to 50KΩ	50 to 100KΩ
Resistance Tolerance	±3%	±3%	±3%
Independent Linearity	±0.5%	±0.5%	±0.3%
Resolution	See ordering information	See ordering information	See ordering information
Effective Electrical Angle	350° ±2°	350° ±2°	350° ±2°
Absolute Minimum Resistance	1Ω or 0.1% (whichever is greater)	1Ω or 0.1% (whichever is greater)	1Ω or 0.1% (whichever is greater)
Noise	100Ω ENR max.	100Ω ENR max.	100Ω ENR max.
Power Rating +70°C	1 watt	1.5 watts	4 watts
+125°C	0 watt	0 watt	0 watt
Dielectric Strength			
Sea Level	1,000 VAC min.	1,000 VAC min.	1,000 VAC min.
70,000 Feet	300 VAC min.	300 VAC min.	250 VAC min.
Insulation Resistance (500 VDC)	1,000 megohms minimum	1,000 megohms minimum	1,000 megohms minimum
Environmental Characteristics[1]			
Operating Temperature Range	−65°C to +125°C	−65°C to +125°C	−65°C to +125°C
Temperature Coefficient[2]	±20ppm/°C max.	±20ppm°C max.	±20ppm°C max.
Humidity	MIL-R-12934 Humidity cycling	MIL-R-12934 Humidity cycling	MIL-R-12934 Humidity cycling
Vibration	MIL-R-12934, 15G	MIL-R-12934, 15G	MIL-R-12934, 15G
Wiper Bounce	0.1 millisecond maximum	0.1 millisecond maximum	0.1 millisecond maximum
Wiper Shift	1.0% maximum	1.0% maximum	1.0% maximum
Shock	MIL-R-12934, 50G	MIL-R-12934, 50G	MIL-R-12934, 50G
Wiper Bounce	Same as Vibration	Same as Vibration	Same as Vibration
Load Life	1,000 hours	1,000 hours	1,000 hours
Resistance Shift	2.0% maximum	2.0% maximum	2.0% maximum
Mechanical Characteristics[1]			
Mechanical Angle	Continuous	Continuous	Continuous
Shaft Runout	0.001 in. T.I.R.	0.001 in. T.I.R.	0.001 in. T.I.R.
Shaft End Play	0.003 in. T.I.R.	0.003 in. T.I.R.	0.003 in. T.I.R.
Shaft Radial Play	0.002 in. T.I.R.	0.002 in. T.I.R.	0.0015 in. T.I.R.
Lateral Runout	0.002 in. T.I.R.	0.002 in. T.I.R.	0.003 in. T.I.R.
Pilot Diameter Runout	0.0015 in. T.I.R.	0.0015 in. T.I.R.	0.002 in. T.I.R.
Rotational Life	2,000,000 shaft revolutions	2,000,000 shaft revolutions	1,000,000 shaft revolutions
Torque (Starting)	0.1 oz-in. max.	0.1 oz-in. max.	1.0 oz-in. max.
Torque (Running)	0.1 oz-in. max.	0.1 oz-in. max.	0.6 oz-in. max.
Moment of Inertia	0.1g cm²	0.12g cm²	1.67g cm²
Ganging	8 cups maximum	8 cups maximum	8 cups maximum
Weight	Approx. 17g	Approx. 20g	Approx. 85g
Terminals	Gold-plated turrets	Gold-plated turrets	Gold-plated turrets
Markings	Manufacturer's name and part number, resistance value and tolerance, linearity tolerance, wiring diagram, date code		

[1]At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.
[2]Consult factory for complete specification details.

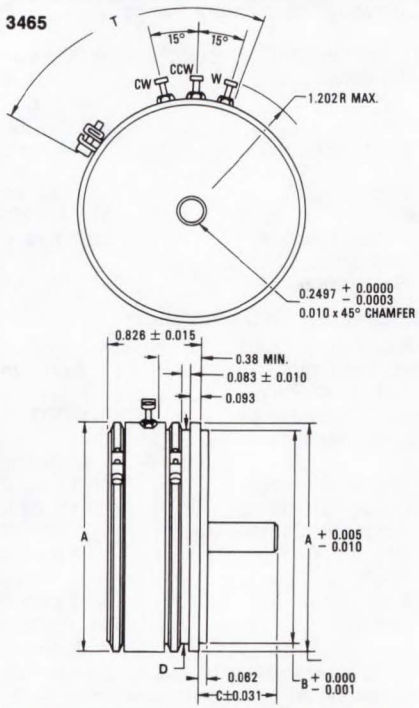
DIMENSIONS (INCH)

Model	ϕA	ϕB	C	ϕD	T	Add for each additional cup
3585	0.875	0.7500	0.500	.700	145° +0 −20°	0.405
3485	1.062	0.9688	0.875	.937	130° +0 −15°	0.405
3465	2.000	1.8750	0.625	1.875	90° +0 −20°	0.500

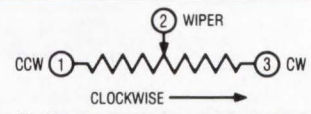
3585/3485



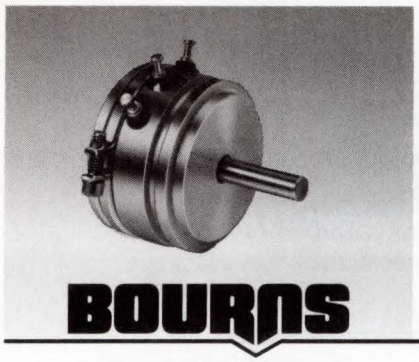
3465



TOLERANCES: EXCEPT WHERE NOTED
DECIMALS: .XX ± .010 , .XXX ± .005



Specifications are subject to change without notice.



BOURNS

7/8'' DIAMETER / SINGLE-TURN CONDUCTIVE PLASTIC

- Servo mount
- Shaft supported by front and rear precision ball bearings
- Non-standard features and specifications available
- Gangable up to 10 cups

FOR ORDERING INFORMATION SEE PAGE 120.

Model 6534

Bourns® Precision Potentiometer

Electrical Characteristics[1]

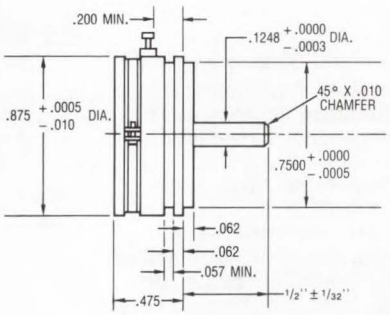
Standard Resistance Range	1K to 100KΩ
Resistance Tolerance	±10%
Independent Linearity	±0.5%
Effective Electrical Angle	320° ±3°
Minimum Voltage	0.1% maximum (0.2% at 2KΩ, 0.4% at 1KΩ)
Resolution	Essentially infinite
Power Rating (Voltage Limited By Power Dissipation or 350 VAC, Whichever is Less)	
+70°C	1 watt
+125°C	0 watt
Output Smoothness	0.1%
Dielectric Withstanding Voltage	MIL-STD-202, Method 301
Sea Level	750 VAC minimum
70,000 Feet	250 VAC minimum
Insulation Resistance (500 VDC)	1,000 megohms minimum

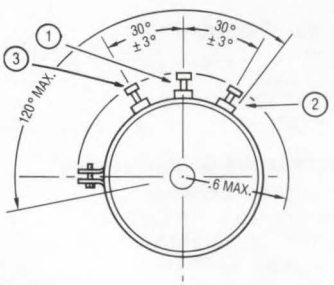
Environmental Characteristics[1]

Operating Temperature	
Static Operation Temperature Range	−65°C to +125°C
Dynamic Operation Temperature Range	+1°C to +125°C
Temperature Coefficient	±500ppm/°C maximum
Moisture Resistance	MIL-STD-202, Method 103, Condition B
Total Resistance Shift	±10% maximum
Vibration	15G
Wiper Bounce	0.1 millisecond maximum
Total Resistance Shift	±2% maximum
Shock	50G
Wiper Bounce	0.1 millisecond maximum
Rotational Life (No Load)	25,000,000 shaft revolutions
Total Resistance Shift	±10% maximum

Mechanical Characteristics[1]

Shaft Runout	0.001 in. T.I.R.
Shaft End Play	0.003 in. T.I.R.
Shaft Radial Play	0.003 in. T.I.R.
Pilot Diameter Runout	0.001 in. T.I.R.
Lateral Runout	0.002 in. T.I.R.
Backlash	0.1° maximum
Mechanical Angle	Continuous
Torque (Starting & Running)	0.25 oz-in. maximum

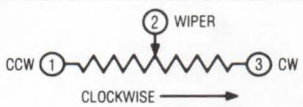




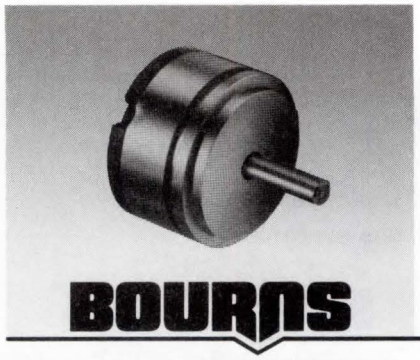
TOLERANCES: EXCEPT WHERE NOTED

DECIMALS: .XX ± .015 , .XXX ± .005

FRACTIONS: ± 1/64 DIMENSIONS: IN.



[1]At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.
Specifications are subject to change without notice.



7/8'' DIAMETER / SINGLE-TURN / CONDUCTIVE PLASTIC

- Infinite resolution element
- Standard linearity: 1.0%
- Extended temperature range: −65°C to +125°C
- Extended life version (6538)
- Output smoothness: 0.1% standard
- Molded-in rear terminals
- Non-standard features and specifications available

FOR ORDERING INFORMATION SEE PAGE 120.

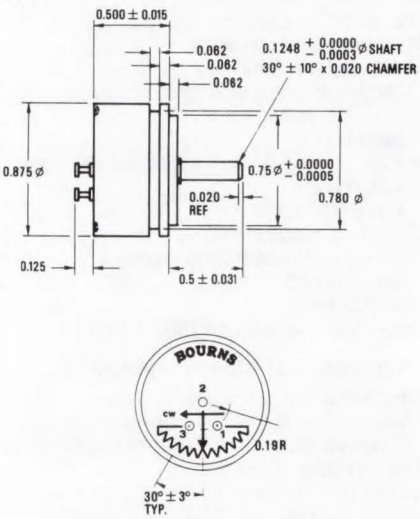
Models 6537/6538

Bourns® Precision Potentiometers

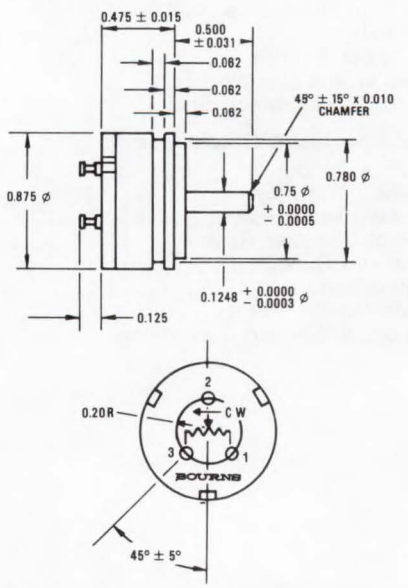
	6537 7/8'' Diameter	6538 7/8'' Diameter (Ball Bearing)
Electrical Characteristics[1]		
Standard Resistance Range	1KΩ to 100KΩ	1KΩ to 100KΩ
Resistance Tolerance	±10%	±10%
Independent Linearity	±1%	±1%
Resolution	Essentially infinite	Essentially infinite
Effective Electrical Angle	340° ±3°	340° ±3°
End Voltage	0.5% maximum	0.5% maximum
Output Smoothness	0.1%	0.1%
Power Rating (Voltage Limited By Power Dissipation, or 300 VAC, Whichever is Less)		
+70°C	1 watt	1 watt
+125°C	0 watt	0 watt
Dielectric Withstanding Voltage	MIL-STD-202, Method 301	MIL-STD-202, Method 301
Sea Level	750 VAC minimum	750 VAC minimum
Insulation Resistance (500 VDC)	500 megohms minimum	1,000 megohms minimum
Environmental Characteristics[1]		
Operating Temperature		
Static Operation Temp Range	−65°C to +125°C	−65°C to +125°C
Dynamic Temp Range	+1°C to +125°C	+1°C to +125°C
Temperature Coefficient	±500ppm/°C maximum	±500ppm°C maximum
Moisture Resistance	MIL-STD-202, Method 106	MIL-STD-202, Method 106
Total Resistance Shift	±10% maximum	±10% maximum
Vibration	15G	15G
Wiper Bounce	0.1 millisecond maximum	0.1 millisecond maximum
Total Resistance Shift	±5% maximum	±5% maximum
Voltage Ratio Shift	±0.5% maximum	±0.5% maximum
Shock	50G	50G
Wiper Bounce	0.1 millisecond maximum	0.1 millisecond maximum
Total Resistance Shift	±5% maximum	±5% maximum
Voltage Ratio Shift	±0.5% maximum	±0.5% maximum
Load Life	1,000 hours, 1 watt	1,000 hours, 1 watt
Total Resistance Shift	±10% maximum	±10% maximum
Rotational Life (No Load)	10,000,000 shaft revolutions	20,000,000 shaft revolutions
Total Resistance Shift	±10% maximum	±10% maximum
Mechanical Characteristics[1]		
Mechanical Angle	Continuous	Continuous
Backlash	0.1° maximum	0.1° maximum
Shaft Runout	0.005 in. T.I.R.	0.001 in. T.I.R.
Shaft End Play	0.005 in. T.I.R.	0.005 in. T.I.R.
Shaft Radial Play	0.005 in. T.I.R.	0.003 in. T.I.R.
Pilot Diameter		
Runout	0.0025 in. T.I.R.	0.0025 in. T.I.R.
Lateral Runout	0.003 in. T.I.R.	0.003 in. T.I.R.
Torque (Starting & Running)	0.5 oz-in. maximum	0.25 oz-in. maximum
Terminals	Molded-in rear	Molded-in rear

[1]At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.

6537



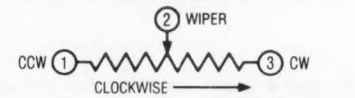
6538 7/8'' DIAMETER



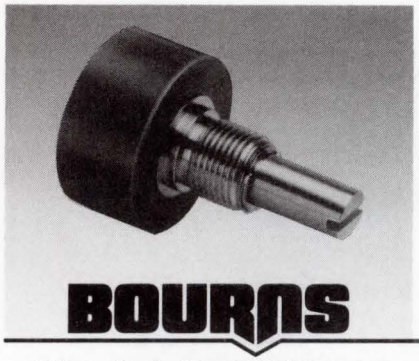
TOLERANCES: EXCEPT WHERE NOTED

DECIMALS: .XX ± .010 , .XXX ± .005

DIMENSIONS: IN.



Specifications are subject to change without notice.



7/8 INCH DIAMETER/SINGLE-TURN CONDUCTIVE PLASTIC

- Essentially Infinite Resolution
- Excellent Rotational Life
- High Quality, Rugged Construction
- General Purpose Applications
- Non-Standard Features Available
- Cost and Space Saving

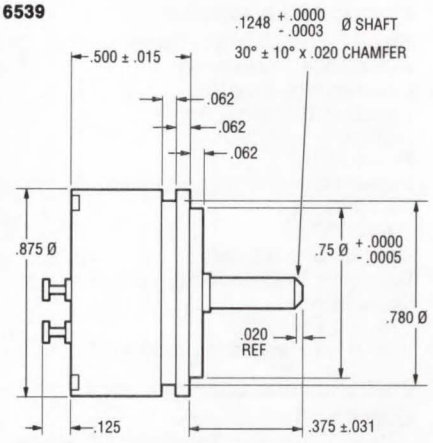
FOR ORDERING INFORMATION SEE PAGE 120 AND 121.

Model 6539/6639

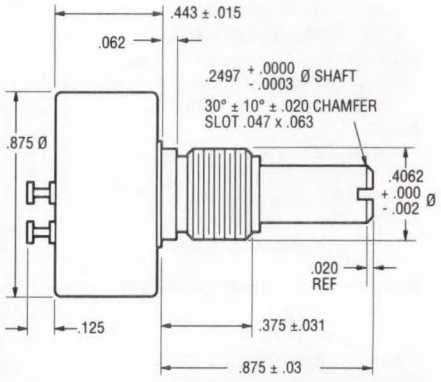
Bourns® Precision Potentiometer

	6539 Servo Mount	6639 Bushing Mount
Electrical Characteristics[1]		
Standard Resistance Range	1KΩ to 100KΩ	1KΩ to 100KΩ
Resistance Tolerance		
Standard	±15%	±15%
Independent Linearity		
Standard	±2.0%	±2.0%
Resolution	Essentially infinite	Essentially infinite
Effective Electrical Angle	340° ±3°	340° ±3°
End Voltage	0.5% maximum	0.5% maximum
Output Smoothness	0.1%	0.1%
Power Rating (Voltage Limited By Power Dissipation, or 300 VAC, Whichever is Less)		
+70°C	1.0 watt	1.0 watt
+125°C	0 watt	0 watt
Dielectric Withstanding Voltage	MIL-STD-202, Method 301	MIL-STD-202, Method 301
Sea Level	750 VAC minimum	750 VAC minimum
Insulation Resistance (500 VDC)	500 megohms minimum	500 megohms minimum
Environmental Characteristics[1]		
Operating Temperature		
Static Operation Temp Range	−65°C to +125°C	−65°C to +125°C
Dynamic Temp Range	+1°C to +125°C	+1°C to +125°C
Vibration	15G	15G
Wiper Bounce	0.1 millisecond maximum	0.1 millisecond maximum
Shock	50G	50G
Wiper Bounce	0.1 millisecond maximum	0.1 millisecond maximum
Rotational Life (No Load)	10,000,000 shaft revolutions	10,000,000 shaft revolutions
Mechanical Characteristics[1]		
Mechanical Angle	Continuous, Stops (340°+8°−0°) available	Continuous, Stops (340°+8°−0°) available
Backlash	0.1° maximum	0.1° maximum
Shaft Runout	0.005 in. T.I.R.	0.005 in. T.I.R.
Shaft End Play	0.005 in. T.I.R.	0.005 in. T.I.R.
Shaft Radial Play	0.005 in. T.I.R.	0.005 in. T.I.R.
Pilot Diameter		
Runout	0.0025 in. T.I.R.	0.0025 in. T.I.R.
Lateral Runout	0.003 in. T.I.R.	0.003 in. T.I.R.
Torque (Starting & Running)	0.5 oz-in. maximum/ 0.353 nom. maximum	0.5 oz-in. maximum/ 0.353 nom. maximum
Terminals	Rear Turret Type	Rear Turret Type
Bearing Type	Brass Sleeve	Nickel Plated Brass
Markings	Manufacturer's name, part number, resistance value and tolerance, linearity tolerance, wiring diagram and date code.	Manufacturer's name, part number, resistance value and tolerance, linearity tolerance, wiring diagram and date code.

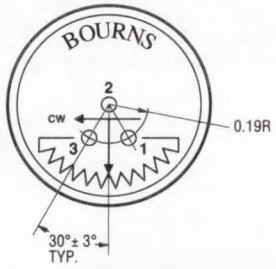
6539



6639



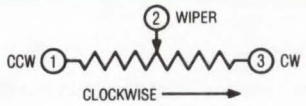
65/6639



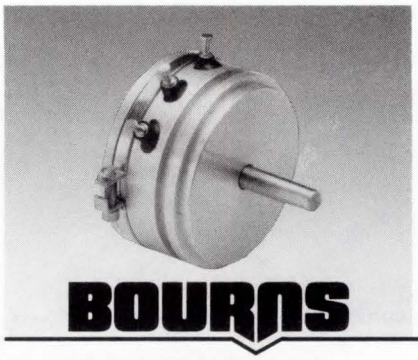
TOLERANCES: EXCEPT WHERE NOTED

DECIMALS: .XX ± .015 , .XXX ± .005

FRACTIONS: ± 1/64 DIMENSIONS: IN.



Specifications are subject to change without notice.



1-1/16'' DIAMETER/SINGLE-TURN CONDUCTIVE PLASTIC

- Extended rotational life
- Ball bearings front and rear
- Servo Mount
- Ganging up to 10 cups
- Non-standard features and specifications available

FOR ORDERING INFORMATION SEE PAGE 120.

Model 6544

Bourns® Precision Potentiometer

Electrical Characteristics[1]

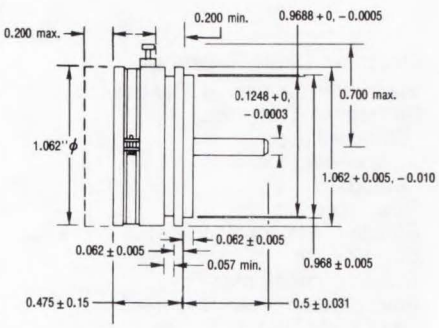
Standard Resistance Range	1K to 100KΩ
Resistance Tolerance	±10%
Independent Linearity	±0.25%
Effective Electrical Angle	350° ±2°
Minimum Voltage	0.1% maximum (0.2% at 2KΩ, 0.4% at 1KΩ)
Resolution	Essentially infinite
Power Rating (Voltage Limited By Power Dissipation or 350 VAC, Whichever is Less)	
+70°C	2 watts
+125°C	0 watt
Output Smoothness	0.1%
Dielectric Withstanding Voltage	MIL-STD-202, Method 301
Sea Level	1,000 VAC minimum
70,000 Feet	350 VAC minimum
Insulation Resistance (500 VDC)	1,000 megohms minimum

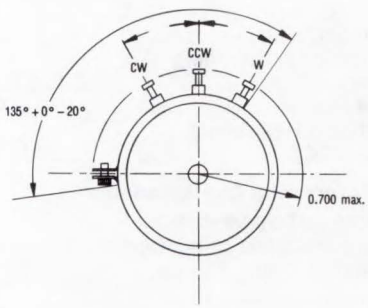
Environmental Characteristics[1]

Operating Temperature	
Static Operation Temperature Range	−65°C to +125°C
Dynamic Operation Temperature Range	+1°C to +125°C
Temperature Coefficient[2]	±500ppm/°C maximum
Moisture Resistance	MIL-STD-202, Method 103, Condition B
Total Resistance Shift	±10% maximum
Vibration	15G
Wiper Bounce	0.1 millisecond maximum
Total Resistance Shift	±2% maximum
Shock	60G
Wiper Bounce	0.1 millisecond maximum
Rotational Life (No Load)	25,000,000 shaft revolutions
Total Resistance Shift	±10% maximum
Load Life	1,000 hours, 1.5 watts
Total Resistance Shift	±10% maximum

Mechanical Characteristics[1]

Shaft Runout	0.001 in. T.I.R.
Shaft End Play	0.003 in. T.I.R.
Shaft Radial Play	0.003 in. T.I.R.
Pilot Diameter Runout	0.001 in. T.I.R.
Lateral Runout	0.003 in. T.I.R.
Backlash	0.1° maximum
Mechanical Angle	Continuous
Torque (Starting & Running)	0.25 oz-in. maximum

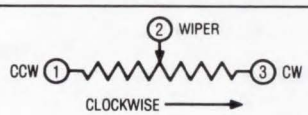




TOLERANCES: EXCEPT WHERE NOTED

DECIMALS: .XX ± .010 , .XXX ± .005

DIMENSIONS: IN.



[1]At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.

BOURNS

2" DIAMETER/SINGLE-TURN CONDUCTIVE PLASTIC

- Servo mount style
- Shaft supported by front and rear precision ball bearings
- Non-standard features and specifications available
- Gangable up to 10 cups

FOR ORDERING INFORMATION SEE PAGE 120.

Model 6574

Bourns® Precision Potentiometer

Electrical Characteristics[1]

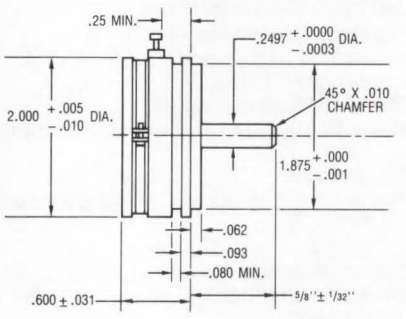
Standard Resistance Range	1K to 100KΩ
Resistance Tolerance	±10%
Independent Linearity	±0.25%
Effective Electrical Angle	350° ±2°
Minimum Voltage	0.1% maximum (0.2% at 2KΩ, 0.4% at 1KΩ)
Resolution	Essentially infinite
Power Rating (Voltage Limited By Power Dissipation or 350 VAC, Whichever is Less)	
+70°C	2 watts
+125°C	0 watt
Output Smoothness	0.1%
Dielectric Withstanding Voltage	MIL-STD-202, Method 301
Sea Level	1,000 VAC minimum
70,000 Feet	350 VAC minimum
Insulation Resistance (500 VDC)	1,000 megohms minimum

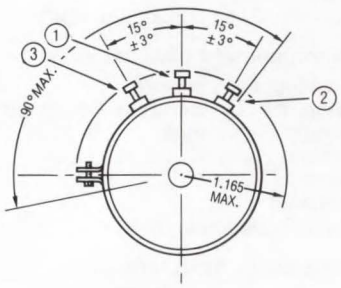
Environmental Characteristics[1]

Operating Temperature	
Static Operation Temperature Range	−65°C to +125°C
Dynamic Operation Temperature Range	+1°C to +125°C
Temperature Coefficient[2]	±500ppm/°C maximum
Moisture Resistance	MIL-STD-202, Method 103, Condition B
Total Resistance Shift	±10% maximum
Vibration	15G
Wiper Bounce	0.1 millisecond maximum
Total Resistance Shift	±2% maximum
Shock	60G
Wiper Bounce	0.1 millisecond maximum
Rotational Life (No Load)	25,000,000 shaft revolutions
Total Resistance Shift	±10% maximum
Load Life	1,000 hours, 1.5 watts
Total Resistance Shift	±10% maximum

Mechanical Characteristics[1]

Shaft Runout	0.001 in. T.I.R.
Shaft End Play	0.003 in. T.I.R.
Shaft Radial Play	0.003 in. T.I.R.
Pilot Diameter Runout	0.001 in. T.I.R.
Lateral Runout	0.003 in. T.I.R.
Backlash	0.1° maximum
Mechanical Angle	Continuous
Torque (Starting & Running)	0.25 oz-in. maximum

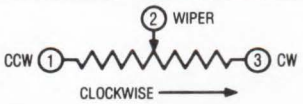




TOLERANCES: EXCEPT WHERE NOTED

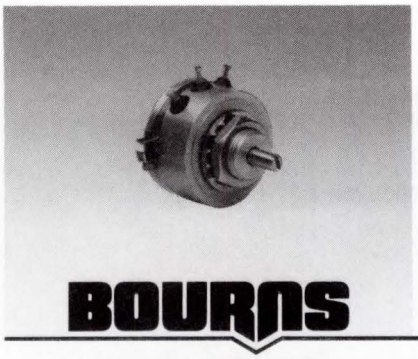
DECIMALS: .XX ± .015 , .XXX ± .005

FRACTIONS: ± 1/64 DIMENSIONS: IN.



[1]At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.

Specifications are subject to change without notice.



BOURNS

7/8'' DIAMETER/SINGLE-TURN CONDUCTIVE PLASTIC

- Excellent resolution
- High rotational life
- Bushing mount
- Non-standard features and specifications available
- Gangable up to 10 cups

FOR ORDERING INFORMATION SEE PAGE 120.

Model 6634

Bourns® Precision Potentiometer

Electrical Characteristics[1]

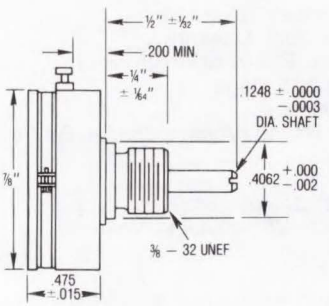
Standard Resistance Range	1K to 100KΩ
Resistance Tolerance	±10%
Independent Linearity	±0.5%
Effective Electrical Angle	320° ±3°
Absolute Minimum Resistance/Minimum Voltage	0.1% maximum (0.2% at 2KΩ, 0.4% at 1KΩ
Resolution	Essentially infinite
Power Rating (Voltage Limited By Power Dissipation or 350 VAC, Whichever is Less)	
+70°C	1 watt
+125°C	0 watt
Output Smoothness	0.1%
Dielectric Strength V.R.M.S.	
Sea Level	750
70,000 Feet	250
Insulation Resistance (500 VDC)	1,000 megohms minimum

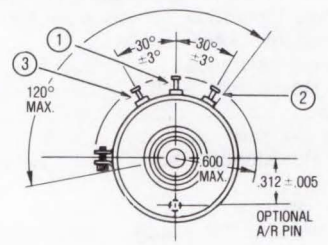
Environmental Characteristics[1]

Operating Temperature	−65°C to +125°C
Resistance Temperature Coefficient	±5% TRS
Moisture Resistance	Res. change ±10% maximum
Vibration	15G
Shock	50G
Rotational Life	25,000,000 revolutions
Total Resistance Shift	±10% maximum

Mechanical Characteristics[1]

Shaft Runout (MIL-R-39023)	0.001 in. T.I.R.
Shaft End Play (MIL-R-39023)	0.003 in. T.I.R.
Shaft Radial Play	0.004 in. T.I.R.
Backlash	0.1° maximum
Mechanical Angle	Continuous
Torque (Starting & Running, oz-in. Maximum)	0.25

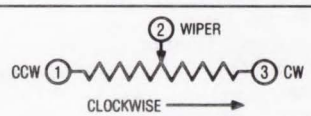




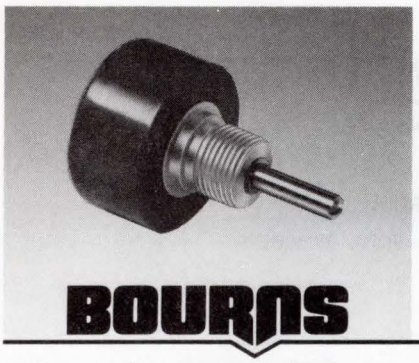
TOLERANCES: EXCEPT WHERE NOTED

DECIMALS: .XX ± .010 , .XXX ± .005

FRACTIONS: ± 1/64 DIMENSIONS: IN.



[1]At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.



7/8'' DIAMETER / SINGLE-TURN / CONDUCTIVE PLASTIC

- Bushing mount
- Excellent resolution
- High rotational life (ball bearing shaft support available - 6638)
- Non-standard features and specifications available

FOR ORDERING INFORMATION SEE PAGE 120.

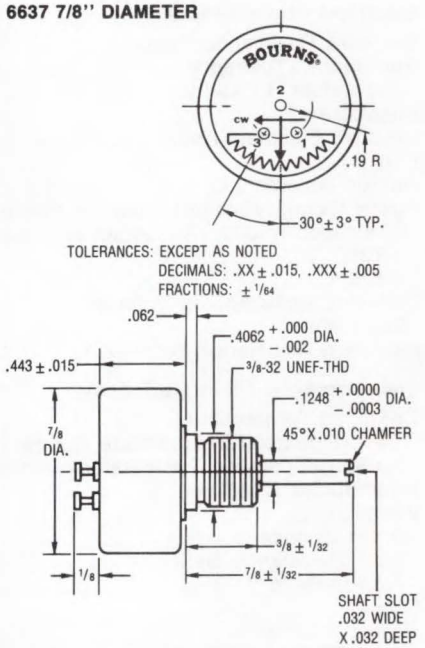
Models 6637/6638

Bourns® Precision Potentiometers

	6637 7/8'' Diameter	6638 7/8'' Diameter (Ball Bearing)
Electrical Characteristics[1]		
Standard Resistance Range	1KΩ to 100KΩ	1KΩ to 100KΩ
Resistance Tolerance	±10%	±10%
Independent Linearity	±1%	±1%
Effective Electrical Angle	340° ±3°	340° ±3°
End Voltage	0.5% maximum	0.5% maximum
Output Smoothness	0.1% maximum	0.1% maximum
Resolution	Essentially infinite	Essentially infinite
Power Rating (Voltage Limited By Power Dissipation, or 300 VAC, Whichever is Less)		
+70°C	1 watt	1 watt
+125°C	0 watt	0 watt
Dielectric Withstanding Voltage	MIL-STD-202, Method 301	MIL-STD-202, Method 301
Sea Level	750 VAC minimum	750 VAC minimum
Insulation Resistance (500 VDC)	1,000 megohms minimum	1,000 megohms minimum
Environmental Characteristics[1]		
Operating Temperature		
Static Operation Temp Range	−65°C to +125°C	−65°C to +125°C
Dynamic Temp Range	+1°C to +125°C	+1°C to +125°C
Temperature Coefficient	±500ppm/°C maximum	±500ppm°C maximum
Moisture Resistance	MIL-STD-202, Method 106	MIL-STD-202, Method 106
Total Resistance Shift	±10% maximum	±10% maximum
Vibration	15G	15G
Wiper Bounce	0.1 millisecond maximum	0.1 millisecond maximum
Total Resistance Shift	±5% maximum	±5% maximum
Voltage Ratio Shift	±0.5% maximum	±0.5% maximum
Shock	50G	50G
Wiper Bounce	0.1 millisecond maximum	0.1 millisecond maximum
Total Resistance Shift	±5% maximum	±5% maximum
Voltage Ratio Shift	±0.5% maximum	±0.5% maximum
Rotational Life (No Load)	10,000,000 shaft revolutions	20,000,000 shaft revolutions
Total Resistance Shift	±10% maximum	±10% maximum
Load Life	1,000 hours, 1 watt	1,000 hours, 1 watt
Total Resistance Shift	±10% maximum	±10% maximum
Mechanical Characteristics[1]		
Mechanical Angle	Continuous	Continuous
Backlash	0.1° maximum	0.1° maximum
Shaft Runout	0.001 in. T.I.R.	0.001 in. T.I.R.
Shaft End Play	0.005 in. T.I.R.	0.005 in. T.I.R.
Shaft Radial Play	0.005 in. T.I.R.	0.003 in. T.I.R.
Torque (Starting & Running)	0.5 oz-in. maximum	0.25 oz-in. maximum

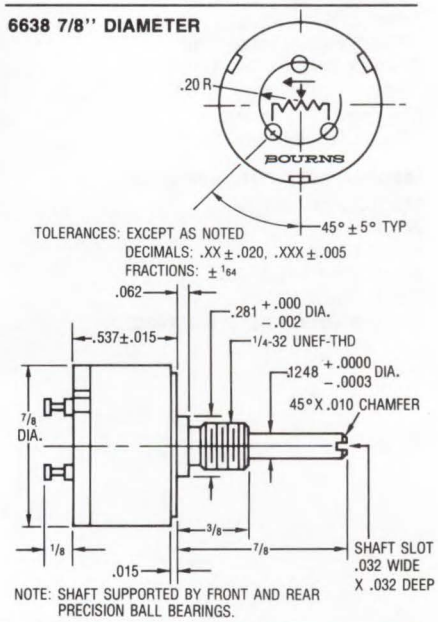
[1]At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.
Specifications are subject to change without notice.

6637 7/8'' DIAMETER

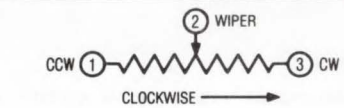


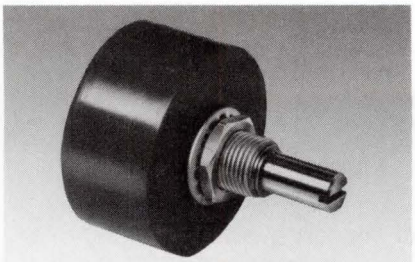
NOTE: SHAFT SUPPORTED BY FRONT SLEEVE BEARING.

6638 7/8'' DIAMETER



NOTE: SHAFT SUPPORTED BY FRONT AND REAR PRECISION BALL BEARINGS.





1-5/16'' DIAMETER/SINGLE-TURN CONDUCTIVE PLASTIC

- Bushing mount
- Shaft supported by front sleeve bearing
- Non-standard features and specifications available

FOR ORDERING INFORMATION SEE PAGE 121.

Model 6657

Bourns® Precision Potentiometer

Electrical Characteristics[1]

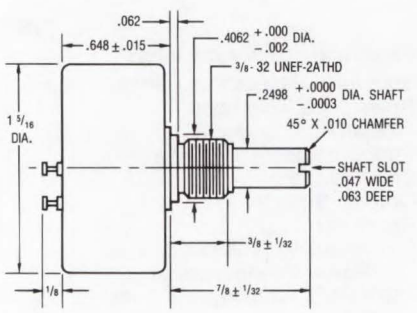
Standard Resistance Range	1K to 100KΩ
Resistance Tolerance	±10%
Independent Linearity	±1%
Resolution	Essentially infinite
Effective Electrical Angle	340° ±3°
End Voltage	0.5% maximum
Output Smoothness	0.1%
Power Rating (Voltage Limited By Power Dissipation or 300 VAC, Whichever is Less)	
+70°C	1.5 watts
+125°C	0 watt
Dielectric Withstanding Voltage	MIL-STD-202, Method 301
Sea Level	750 VAC minimum
Insulation Resistance (500 VDC)	1,000 megohms minimum

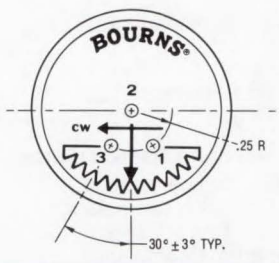
Environmental Characteristics[1]

Operating Temperature	
Static Operation Temperature Range	−65°C to +125°C
Dynamic Operation Temperature Range	+1°C to +125°C
Temperature Coefficient	±500ppm/°C maximum
Vibration	15G
Wiper Bounce	0.1 millisecond maximum
Total Resistance Shift	±5% maximum
Voltage Ratio Shift	±0.5% maximum
Shock	50G
Wiper Bounce	0.1 millisecond maximum
Total Resistance Shift	±5% maximum
Voltage Ratio Shift	±0.5% maximum
Load Life	1,000 hours, 1.5 watts
Total Resistance Shift	±10% maximum
Rotational Life (No Load)	10,000,000 shaft revolutions
Total Resistance Shift	±10% maximum
Moisture Resistance	MIL-STD-202, Method 106
Total Resistance Shift	±15% maximum

Mechanical Characteristics[1]

Mechanical Angle	Continuous
Backlash	0.1° maximum
Shaft Runout	0.001 in. T.I.R.
Shaft End Play	0.005 in. T.I.R.
Shaft Radial Play	0.005 in. T.I.R.
Torque (Starting & Running)	0.5 oz-in. maximum

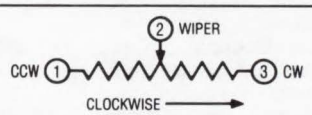




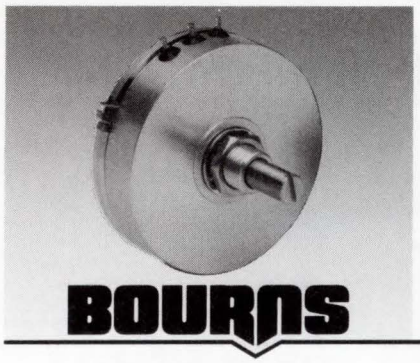
TOLERANCES: EXCEPT WHERE NOTED

DECIMALS: .XX ± .010 , .XXX ± .005

FRACTIONS: ± 1/64 DIMENSIONS: IN.



[1]At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.



2" DIAMETER/SINGLE-TURN CONDUCTIVE PLASTIC

- Excellent resolution
- High rotational life
- Bushing mount
- Non-standard features and specifications available
- Gangable up to 10 cups

FOR ORDERING INFORMATION SEE PAGE 121.

Model 6674

Bourns® Precision Potentiometer

Electrical Characteristics[1]

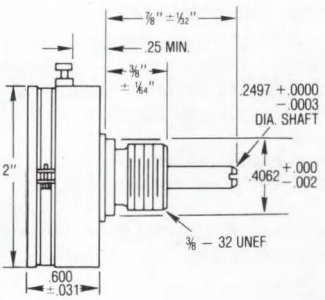
Standard Resistance Range	1K to 100KΩ
Resistance Tolerance	±10%
Independent Linearity	±0.25%
Effective Electrical Angle	350° ±2°
Resolution	Infinite
Power Rating (Voltage Limited By Power Dissipation or 350 VAC, Whichever is Less)	
+70°C	2 watts
+125°C	0 watt
Output Smoothness	0.1%
Dielectric Strength (VRMS)	
Sea Level	1,000
70,000 Feet	350
Insulation Resistance (300 VDC)	1,000 megohms minimum

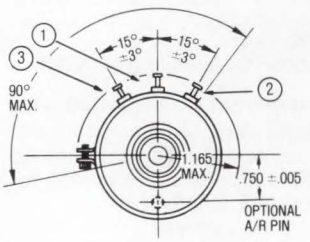
Environmental Characteristics[1]

Test Procedures Per	Method 106
Operating Temperature	−65°C to +125°C
Resistance Temperature Coefficient	±5% TRS
Moisture Resistance Characteristics	Resistance change ±10% maximum
Vibration	15G
Shock	60G
Rotational Life	25,000,000 revolutions
Total Resistance Shift	±10% maximum

Mechanical Characteristics[1]

Shaft Runout	0.001 in. T.I.R.
Shaft End Play	0.003 in. T.I.R.
Shaft Radial Play	0.004 in. T.I.R.
Backlash	0.1% maximum
Mechanical Angle - Standard	Continuous
Torque (Starting & Running)	0.75 oz-in. maximum

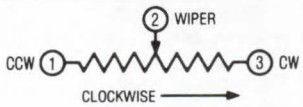




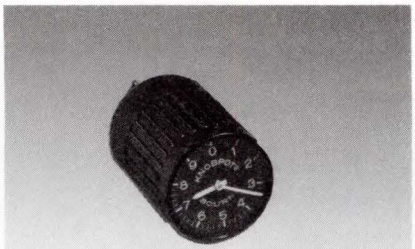
TOLERANCES: EXCEPT WHERE NOTED

DECIMALS: .XX ± .010 , .XXX ± .005

FRACTIONS: ± 1/64 DIMENSIONS: IN.



[1]At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.
Specifications are subject to change without notice.



BOURNS

3/4'' DIAMETER / 10-TURN / WIREWOUND

- Bushing mount
- Cost saving; pre-phased
- Highly readable clockface readout
- Easy mounting

FOR ORDERING INFORMATION SEE PAGE 121.

Model 3600

Knobpot® Precision Potentiometer

Electrical Characteristics[1]

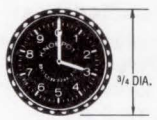
Standard Resistance Range	100 to 100KΩ
Resistance Tolerance	±5%
Accuracy (Correleation of Dial Readout to Voltage Ratio Output)	±0.5% voltage ratio
Repeatability of Dial Readout	±0.1% voltage ratio
Resolution	See table page 109
Effective Electrical Angle	3600° nominal
Absolute Minimum Resistance	1Ω or 0.1% maximum (whichever is greater)
Noise	100Ω ENR maximum
Power Rating (Voltage Limited By Power Dissipation or 385 VAC, Whichever is Less)	
+25°C	1.5 watts
+85°C	0 watt
Dielectric Withstanding Voltage	MIL-STD-202, Method 301
Sea Level	1,000 VAC minimum
70,000 Feet	400 VAC minimum
Insulation Resistance (500 VDC)	1,000 megohms minimum

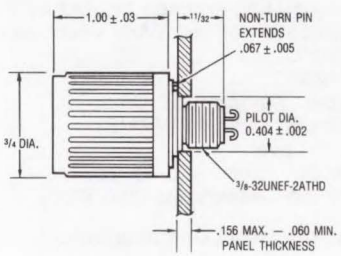
Environmental Characteristics[1]

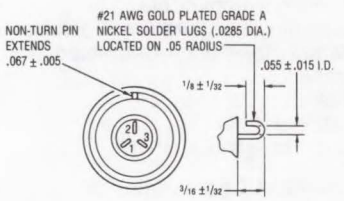
Operating Temperature	
Static Operation Temperature Range	−65°C to +85°C
Dynamic Operation Temperature Range	+1°C to +85°C
Temperature Coefficient[2]	±50ppm/°C maximum/unit
Moisture Resistance	MIL-STD-202, Method 103, Condition B
Total Resistance Shift	±2% maximum
Vibration	10G
Wiper Bounce	0.1 millisecond maximum
Total Resistance Shift	±2% maximum
Voltage Ratio Shift	±0.2% maximum
Shock	50G
Wiper Bounce	0.1 millisecond maximum
Total Resistance Shift	±2% maximum
Voltage Ratio Shift	±0.2% maximum
Load Life	1,000 hours, 1.5 watts
Total Resistance Shift	±2% maximum
Rotational Life (No Load)[2]	200,000 revolutions
Total Resistance Shift	±2% maximum

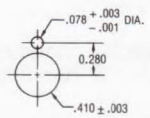
Mechanical Characteristics[1]

Mechanical Angle	3600° +20°, − 0°
Stop Strength	20 oz-in. minimum
Torque (Starting & Running)	4.0 oz-in. maximum
Variation	1.0 oz-in. maximum
Backlash	1.0° maximum
Weight	Approximately 0.6 oz.
Terminals	Gold-plated J-Hooks
Markings	Manufacturer's name and part number, resistance value and date code









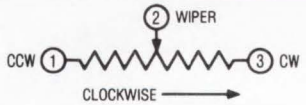
PANEL HOLE PATTERN

LOCKWASHER AND MOUNTING NUT TO BE SUPPLIED WITH EACH UNIT

TOLERANCES: EXCEPT WHERE NOTED

DECIMALS: .XX ± .010 , .XXX ± .005

FRACTIONS: ± 1/64 DIMENSIONS: IN.



[1]At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.
[2]Consult manufacturer for complete specification details for resistances below 1000 ohms.

BOURNS

7/8'' DIAMETER / 10-TURN / DIGITAL / WIREWOUND

- Snap-in mounting
- Space saving - extends only 5/8'' behind most panels
- Easy one-hole, snap-in mounting
- Digital dial provides excellent readability

FOR ORDERING INFORMATION SEE PAGE 121.

Model 3610

Knobpot® Precision Potentiometer

Electrical Characteristics[1]

Standard Resistance Range	100 to 100KΩ
Resistance Tolerance	±5%
Accuracy (Correleation of Dial Readout to Voltage Ratio Output)	±0.5% voltage ratio
Repeatability of Dial Readout	±0.1% voltage ratio
Resolution	See table page 109
Effective Electrical Angle	3600° nominal
Absolute Minimum Resistance	1Ω or 0.1% maximum (whichever is greater)
Noise	100Ω ENR maximum
Power Rating (Voltage Limited By Power Dissipation or 385 VAC, Whichever is Less)	
+25°C	1.5 watts
+85°C	0 watt
Dielectric Withstanding Voltage	MIL-STD-202, Method 301
Sea Level	1,000 VAC minimum
70,000 Feet	400 VAC minimum
Insulation Resistance (500 VDC)	1,000 megohms minimum

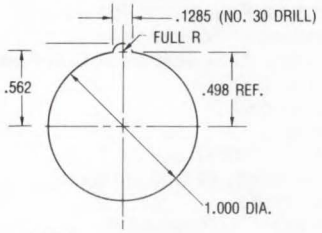
Environmental Characteristics[1]

Operating Temperature	
Static Operation Temperature Range	−25°C to +85°C
Dynamic Operation Temperature Range	+1°C to +85°C
Temperature Coefficient[2]	±50ppm/°C maximum/wire
Moisture Resistance	MIL-STD-202, Method 103, Condition B
Total Resistance Shift	±2% maximum
Vibration	10G
Wiper Bounce	0.1 millisecond maximum
Total Resistance Shift	±2% maximum
Voltage Ratio Shift	±0.2% maximum
Shock	50G
Wiper Bounce	0.1 millisecond maximum
Total Resistance Shift	±2% maximum
Voltage Ratio Shift	±0.2% maximum
Load Life	1,000 hours, 1.5 watts
Total Resistance Shift	±2% maximum
Rotational Life (No Load)	50,000 revolutions
Total Resistance Shift	±2% maximum

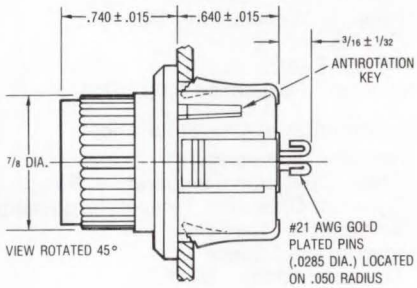
Mechanical Characteristics[1]

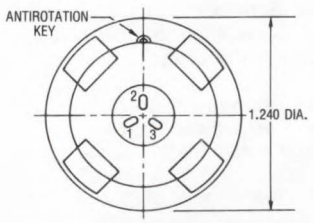
Mechanical Angle	3600° +20°, − 0°
Stop Strength	20 oz-in. minimum
Torque (Starting & Running)	4.0 oz-in. maximum
Variation	1.0 oz-in. maximum
Backlash	1.0° maximum
Weight	Approximately 0.7 oz.
Terminals	Gold-plated J-Hooks
Markings	Manufacturer's name and part number, resistance value and date code

PANEL HOLE PATTERN

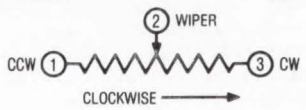


NOTES:
1. SNAP-IN MOUNTING CUP ACCOMMODATES PANEL THICKNESS .025 THRU .078 (NO. 22GA THRU NO. 14GA) AND .125



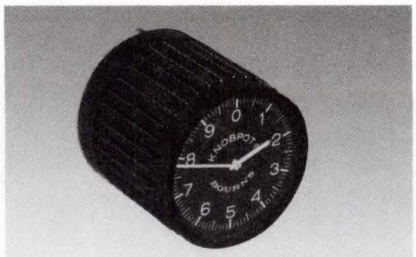


TOLERANCES: EXCEPT WHERE NOTED
DECIMALS: .XX ± .010 , .XXX ± .005
FRACTIONS: ± 1/64 DIMENSIONS: IN.



[1]At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.
[2]Consult manufacturer for complete specification details for resistances below 500 ohms and above 100K ohms.

Specifications are subject to change without notice.



BOURNS

1-1/4'' DIAMETER / 10-TURN / WIREWOUND

- Bushing mount
- Integral clockface readout
- Cost saving; pre-phased
- Highly readable clockface readout

FOR ORDERING INFORMATION SEE PAGE 121.

Model 3640

Knobpot® Precision Potentiometer

Electrical Characteristics[1]

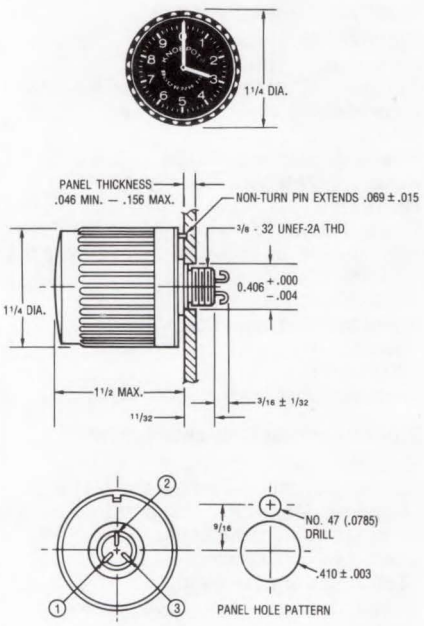
Standard Resistance Range	100 to 100KΩ
Resistance Tolerance	±3%
Accuracy (Correleation of Dial Readout to Voltage Ratio Output)	
100 to 200Ω	±0.20% voltage ratio
500 to 5KΩ	±0.15% voltage ratio
10KΩ	±0.12% voltage ratio
15K to 250KΩ	±0.10% voltage ratio
Repeatability of Dial Readout	±0.05% voltage ratio
Resolution	See table page 94
Effective Electrical Angle	3600° nominal
Absolute Minimum Resistance	1Ω or 0.1% maximum (whichever is greater)
Noise	100Ω ENR maximum
Power Rating (Voltage Limited By Power Dissipation or 500 VAC, Whichever is Less)	
+25°C	2.5 watts
+85°C	0 watt
Dielectric Withstanding Voltage	MIL-STD-202, Method 301
Sea Level	1,000 VAC minimum
70,000 Feet	250 VAC minimum
Insulation Resistance (500 VDC)	1,000 megohms minimum

Environmental Characteristics[1]

Operating Temperature	
Static Operation Temperature Range	−65°C to +85°C
Dynamic Operation Temperature Range	+1°C to +85°C
Temperature Coefficient[2]	±50ppm/°C maximum/wire
Moisture Resistance	MIL-STD-202, Method 103, Condition B
Total Resistance Shift	±2% maximum
Vibration	10G
Wiper Bounce	0.1 millisecond maximum
Total Resistance Shift	±2% maximum
Voltage Ratio Shift	±0.2% maximum
Shock	50G
Wiper Bounce	0.1 millisecond maximum
Total Resistance Shift	±2% maximum
Voltage Ratio Shift	±0.2% maximum
Load Life	1,000 hours, 1.5 watts
Total Resistance Shift	±2% maximum
Rotational Life (No Load)	100,000 shaft revolutions
Total Resistance Shift	±4% maximum

Mechanical Characteristics[1]

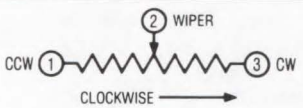
Mechanical Angle	3600° +10°, − 0°
Stop Strength	48 oz-in. minimum
Torque	
Starting	1.0 to 10.0 oz-in. maximum
Running	10.0 oz-in. maximum
Variation	3.0 oz-in. maximum
Weight	Approximately 1.75 oz.
Terminals	Gold-plated J-Hooks
Markings	Manufacturer's name and part number, resistance value and date code



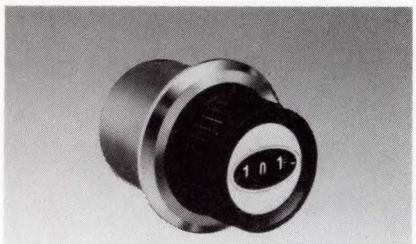
TOLERANCES: EXCEPT WHERE NOTED

DECIMALS: .XX ± .010 , .XXX ± .005

FRACTIONS: ± 1/64 DIMENSIONS: IN.



[1]At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.
[2]Consult factory for complete specification details.



BOURNS

1-1/4" DIAMETER / 10-TURN / DIGITAL WIREWOUND

- Easy single-hole mounting with recessed cup provided
- Digital dial provides excellent readability
- Cost saving; pre-phased

FOR ORDERING INFORMATION SEE PAGE 121.

Model 3650

Knobpot® Precision Potentiometer

Electrical Characteristics[1]

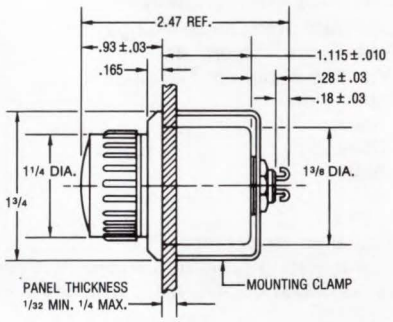
Standard Resistance Range	100 to 100KΩ
Resistance Tolerance	±3%
Accuracy (Correleation of Dial Readout to Voltage Ratio Output)	
100 to 200Ω	±0.20% voltage ratio
500 to 5KΩ	±0.15% voltage ratio
10K to 20KΩ	±0.12% voltage ratio
50K to 100KΩ	±0.10% voltage ratio
Repeatability of Dial Readout	±0.05% voltage ratio
Resolution	See table page 110
Effective Electrical Angle	3600° nominal
Absolute Minimum Resistance	1Ω or 0.1% maximum (whichever is greater)
Noise	100Ω ENR maximum
Power Rating (Voltage Limited By Power Dissipation or 500 VAC, Whichever is Less)	
+25°C	2.5 watts
+85°C	0 watt
Dielectric Withstanding Voltage	MIL-STD-202, Method 301
Sea Level	1,000 VAC minimum
70,000 Feet	250 VAC minimum
Insulation Resistance (500 VDC)	1,000 megohms minimum

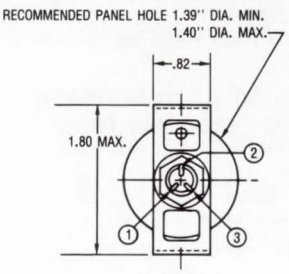
Environmental Characteristics[1]

Operating Temperature	
Static Operation Temperature Range	−25°C to +85°C
Dynamic Operation Temperature Range	+1°C to +85°C
Temperature Coefficient[2]	±50ppm/°C maximum/wire
Moisture Resistance	MIL-STD-202, Method 103, Condition B
Total Resistance Shift	±2% maximum
Vibration	10G
Wiper Bounce	0.1 millisecond maximum
Total Resistance Shift	±2% maximum
Voltage Ratio Shift	±0.2% maximum
Shock	50G
Wiper Bounce	0.1 millisecond maximum
Total Resistance Shift	±2% maximum
Voltage Ratio Shift	±0.2% maximum
Load Life	1,000 hours, 2.5 watts
Total Resistance Shift	±2% maximum
Rotational Life (No Load)	100,000 revolutions
Total Resistance Shift	±4% maximum

Mechanical Characteristics[1]

Mechanical Angle	3600° +10°, − 0°
Stop Strength	48 oz-in. minimum
Torque	
Starting	1.0 to 15.0 oz-in. maximum
Running	15.0 oz-in. maximum
Variation	3.0 oz-in. maximum
Backlash	1.0° maximum
Weight	Approximately 4 oz.
Terminals	Gold-plated J-Hooks
Markings	Manufacturer's name and part number, resistance value and date code



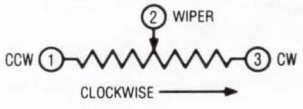


NOTE: LOCKWASHER HEX NUT AND 2 MOUNTING CLAMPS SUPPLIED WITH EACH UNIT.

TOLERANCES: EXCEPT WHERE NOTED

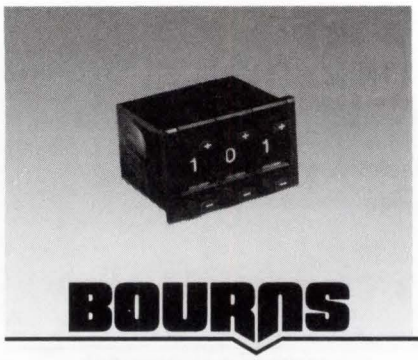
DECIMALS: .XX ± .010 , .XXX ± .005

FRACTIONS: ± 1/64 DIMENSIONS: IN.



[1]At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.
[2]Consult factory for complete specification details.

Specifications are subject to change without notice.



DIGITAL PUSHBUTTON POTENTIOMETER/ CERMET

- Repeatable settings
- Resolution to 0.001%
- Digital display provides excellent readability
- Snap-in panel mount

FOR ORDERING INFORMATION SEE PAGE 121.

Model 3680

Knobpot® Precision Potentiometer

Electrical Characteristics[1]

Standard Resistance Range . . . . . 50 ohms to 1 megohm
Resistance Tolerance . . . . . ±3%
Absolute Minimum Resistance . . . . . 3Ω or 0.2% maximum (whichever is greater)
Resolution
3681 . . . . . 10%
3682 . . . . . 1%
3683 . . . . . 0.1%
3684 . . . . . 0.01%
3685 . . . . . 0.001%
Insulation Resistance (500 VDC) . . . . . 1,000 megohms minimum
Power Rating (Voltage Limited By Power Dissipation or 500 VAC, Whichever is Less)
+25°C . . . . . 2 watts
+85°C . . . . . 0 watt
Dielectric Withstanding Voltage . . . . . MIL-STD-202, Method 301
Sea Level . . . . . 1,000 VAC minimum
Accuracy (Dial Reading to Output Ratio) . . . . . ±0.5% full scale
±2.0% (3681 only)

Environmental Characteristics[1]

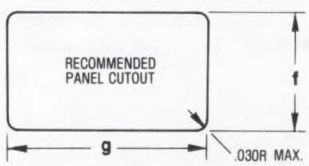
Operating Temperature Range . . . . . −25°C to +85°C
Temperature Coefficient . . . . . ±100ppm/°C maximum
Vibration 10G
Wiper Bounce . . . . . 0.1 millisecond maximum
Total Resistance Shift . . . . . ±1% maximum
Voltage Ratio Shift . . . . . ±0.2% maximum
Shock 50G
Wiper Bounce . . . . . 0.1 millisecond maximum
Total Resistance Shift . . . . . ±1% maximum
Voltage Ratio Shift . . . . . ±0.2% maximum
Load Life . . . . . 1,000 hours, 2 watts
Total Resistance Shift . . . . . ±2% maximum

Mechanical Characteristics[1]

Expected Life . . . . . 75,000 button operations each decade
Total Resistance Shift . . . . . ±2% maximum
Terminals . . . . . 0.11" wide × .016" thick, tinned solder lugs for 3 #20 AWG wires
Readout Marking . . . . . 10 positions, 0-9
Markings . . . . . Manufacturer's name and part number, resistance value and date code

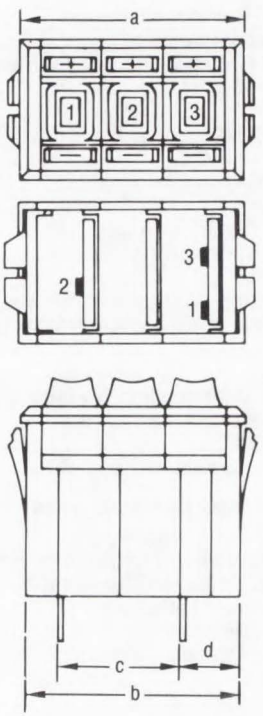
Model	Dimensions					Weight (Approx)	
	a	b	c	d	e ±.015	oz.	gms.
3681	.650	.590	—	.39	.165	.336	9.53
3682	1.050	.990	.420	.47	.330	.576	16.33
3683	1.460	1.390	.730	.47	.165	.824	23.36
3684	1.870	1.790	1.210	.47	.330	1.072	30.39
3685	2.270	2.190	1.540	.47	.165	1.320	37.42

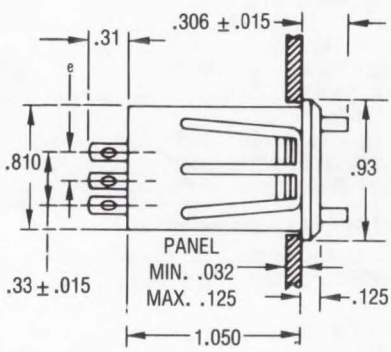
Model	f ±.010	g ±.010
3681	.830	.620
3682	.830	1.020
3683	.830	1.420
3684	.830	1.820
3685	.830	2.220

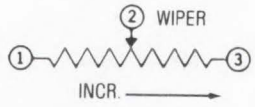


[1]At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.
NOTE: Terminals 1 & 3 are reversed from illustration for models 3682 and 3684.

3680

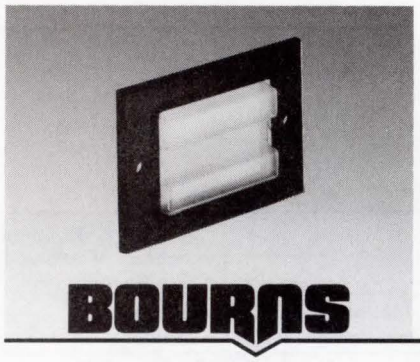






NOTE: TOLERANCES EXCEPT AS SHOWN:
.XX ± .015
.XXX ± .005

Specifications are subject to change without notice.



PROTECTOR FOR PUSHBUTTON POTENTIOMETER

■ For use with Model 3680 digital pushbutton precision potentiometer

BOURNS

Model H-385

Panel Seal Assembly

Physical Characteristics

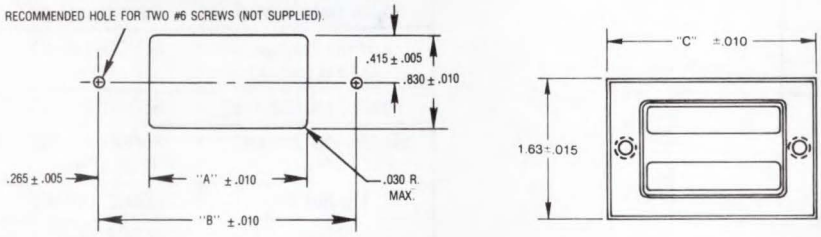
Material (Boot) . . . . . Clear silicone rubber
Material (Frame) . . . . . Rigid black plastic
Expected Life . . . . . 100,000 actuations minimum
Weight
H-385-1 . . . . . Approximately 0.25 oz.
H-385-2 . . . . . Approximately 0.30 oz.
H-385-3 . . . . . Approximately 0.35 oz.
H-385-4 . . . . . Approximately 0.40 oz.
H-385-5 . . . . . Approximately 0.45 oz.

APPLICATION DATA

- Protects front of the pot from unwanted entry of rain, dust, grease or oils
- Transparent for easy viewing of numerals
- Tear resistant for long life
- Matte finish black plastic frame to complement most front panels

Bourns® Model H-385 Panel Seal Assembly minimizes accidental entry of liquids or foreign matter through the front of the Model 3680 Family Potentiometer.

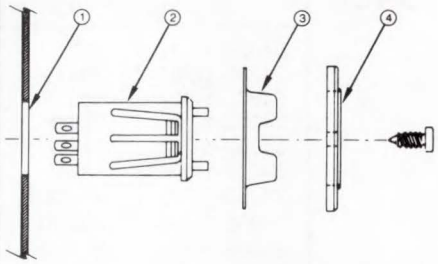
PANEL CUT-OUT/HOLE DIMENSIONS



For Use With	Part Number	Frame Dimensions "C"	Panel Cutout/ Hole Dimensions "A"	"B"
3681	H-385-1	1.592	.620	1.150
3682	H-385-2	1.992	1.020	1.550
3683	H-385-3	2.392	1.420	1.950
3684	H-385-4	2.792	1.820	2.350
3685	H-385-5	3.192	2.220	2.750

H-385 MOUNTING INSTRUCTIONS

1. Cut out and drill panel [1] per chart.
2. Install snap-in potentiometer [2].
3. Locate silicone boot [3] and frame [4] over potentiometer and holes.
4. Attach panel seal assembly to panel with two #6 screws (not supplied).



Specifications are subject to change without notice.

ORDERING INFORMATION
Precision Potentiometers

3070

For product specifications, see page 84

Resistance (Ω)	Part Number*						Nominal Resolution (%)
			Printed Circuit Pins				
	Panel Mount (Solder Lugs)	Panel Mount (Flexible Leads)	Printed Circuit Pins		Eyelet Mounting (Flexible Leads)	Eyelet Mounting (Solder Lugs)	
100	3070S-1-101M	3070L-1-101M	3070H-1-101	3070P-1-101	3070L-1-101	3070S-1-101	.117
200	3070S-1-201M	3070L-1-201M	3070H-1-201	3070P-1-201	3070L-1-201	3070S-1-201	.095
500	3070S-1-501M	3070L-1-501M	3070H-1-501	3070P-1-501	3070L-1-501	3070S-1-501	.072
1,000	3070S-1-102M	3070L-1-102M	3070H-1-102	3070P-1-102	3070L-1-102	3070S-1-102	.064
2,000	3070S-1-202M	3070L-1-202M	3070H-1-202	3070P-1-202	3070L-1-202	3070S-1-202	.043
5,000	3070S-1-502M	3070L-1-502M	3070H-1-502	3070P-1-502	3070L-1-502	3070S-1-502	.046
10,000	3070S-1-103M	3070L-1-103M	3070H-1-103	3070P-1-103	3070L-1-103	3070S-1-103	.037
20,000	3070S-1-203M	3070L-1-203M	3070H-1-203	3070P-1-203	3070L-1-203	3070S-1-203	.030
50,000	3070S-1-503M	3070L-1-503M	3070H-1-503	3070P-1-503	3070L-1-503	3070S-1-503	.022

3400

Part Number*	Resistance (Ω)	Resolution (%)
3400S-1-101	100	.045
3400S-1-201	200	.034
3400S-1-501	500	.023
3400S-1-102	1,000	.020
3400S-1-202	2,000	.016
3400S-1-502	5,000	.013
3400S-1-103	10,000	.010
3400S-1-203	20,000	.011
3400S-1-503	50,000	.008
3400S-1-104	100,000	.006
3400S-1-204	200,000	.005
3400S-1-254	250,000	.005
3400S-1-504	500,000	.004

Optional Feature	Part Number
±0.05% Ind. Linearity	3400S-41-RC (1KΩ min.)

For product specifications, see page 86

3437

Part Number*	Resistance (Ω)	Resolution (%)
3437S-1-500	50	0.371
3437S-1-101	100	0.285
3437S-1-201	200	0.233
3437S-1-501	500	0.174
3437S-1-102	I,000	0.143
3437S-1-202	2,000	0.111
3437S-1-502	5,000	0.103
3437S-1-103	10,000	0.095
3437S-1-203	20,000	0.071
3437S-1-503	50,000	0.054

For product specifications, see page 98

3437S -HYB

Part Number*	Resistance (Ω)
3437S-HYB-1-201	200
3437S-HYB-1-501	500
3437S-HYB-1-102	1,000
3437S-HYB-1-202	2,000
3437S-HYB-1-502	5,000
3437S-HYB-1-103	10,000
3437S-HYB-1-203	20,000

For product specifications, see page 98

3500

Part Number*	Resistance (Ω)	Resolution (%)
3500S-2-500	50	.058
3500S-2-101	100	.053
3500S-2-210	200	.044
3500S-2-501	500	.033
3500S-2-102	1,000	.030
3500S-2-202	2,000	.024
3500S-2-502	5,000	.018
3500S-2-103	10,000	.019
3500S-2-203	20,000	.015
3500S-2-503	50,000	.011
3500S-2-104	100,000	.008

Optional Feature	Part Number
High Torque (2 to 8 oz.-in.)	3500S-16-RC
Sealed for Dip Test	3500S-21-RC
±0.1% Ind. Linearity	3500S-42-RC (200 Ω min.)
Center Tap	3500S-52-RC
AR Pin	3500S-90-RC

For product specifications, see page 87

3501

Part Number*	Resistance (Ω)
3501H-1-102	1,000
3501H-1-202	2,000
3501H-1-502	5,000
3501H-1-103	10,000
3501H-1-203	20,000
3501H-1-503	50,000
3501H-1-104	100,000

Optional Feature	Part Number
High Torque (2 to 8 oz.-in.)	3501H-16-RC
Sealed for Dip Test	3501H-20-RC
Center Tap	3501H-50-RC
AR Pin	3501H-91-RC

For product specifications, see page 87

* The last three digits of the part number represent the resistance value in standard code.

ORDERING INFORMATION
Precision Potentiometers

3510

Part Number*	Resistance (Ω)	Resolution (%)
3510S-1-500	50	.162
3510S-1-101	100	.123
3510S-1-201	200	.104
3510S-1-501	500	.085
3510S-1-102	1,000	.090
3510S-1-202	2,000	.070
3510S-1-502	5,000	.055
3510S-1-103	10,000	.041
3510S-1-203	20,000	.032
3510S-1-253	25,000	.037
3510S-1-503	50,000	.028

For product specifications, see page 88

3511

Part Number*	Resistance (Ω)
3511H-1-501	500
3511H-1-102	1,000
3511H-1-202	2,000
3511H-1-502	5,000
3511H-1-103	10,000
3511H-1-203	20,000

For product specifications, see page 88

3520

Part Number*	Resistance (Ω)	Resolution (%)
3520S-1-200	20	.120
3520S-1-500	50	.097
3520S-1-101	100	.089
3520S-1-201	200	.077
3520S-1-501	500	.054
3520S-1-102	1,000	.047
3520S-1-202	2,000	.050
3520S-1-502	5,000	.037
3520S-1-103	10,000	.030
3520S-1-203	20,000	.025
3520S-1-503	50,000	.020
3520S-1-753	75,000	.015

For product specifications, see page 89

3521

Part Number*	Resistance (Ω)
3521H-1-501	500
3521H-1-102	1,000
3521H-1-202	2,000
3521H-1-502	5,000
3521H-1-103	10,000
3521H-1-203	20,000
3521H-1-503	50,000

For product specifications, see page 89

3535

Part Number*	Resistance (Ω)	Resolution (%)
3535S-1-500	50	.308
3535S-1-101	100	.292
3535S-1-201	200	.234
3535S-1-501	500	.194
3535S-1-102	1,000	.189
3535S-1-202	2,000	.146
3535S-1-502	5,000	.118
3535S-1-103	10,000	.095
3535S-1-203	20,000	.090

For product specifications, see page 99

3435

Part Number*	Resistance (Ω)	Resolution (%)
3435S-1-500	50	0.323
3435S-1-101	100	0.246
3435S-1-201	200	0.200
3435S-1-501	500	0.154
3435S-1-102	1,000	0.120
3435S-1-202	2,000	0.106
3435S-1-502	5,000	0.115
3435S-1-103	10,000	0.085
3435S-1-203	20,000	0.072
3435S-1-503	50,000	0.058

For product specifications, see page 99

3415

Part Number*	Resistance (Ω)	Resolution (%)
3415S-1-500	50	0.233
3415S-1-101	100	0.186
3415S-1-201	200	0.154
3415S-1-501	500	0.128
3415S-1-102	1,000	0.095
3415S-1-202	2,000	0.076
3415S-1-502	5,000	0.076
3415S-1-103	10,000	0.062
3415S-1-203	20,000	0.047
3415S-1-503	50,000	0.039
3415S-1-104	100,000	0.030

For product specifications, see page 99

3540

Part Number*	Resistance (Ω)	Resolution (%)
3540S-1-101	100	.061
3540S-1-201	200	.038
3540S-1-501	500	.031
3540S-1-102	1,000	.025
3540S-1-202	2,000	.022
3540S-1-502	5,000	.017
3540S-1-103	10,000	.018
3540S-1-203	20,000	.016
3540S-1-503	50,000	.010
3540S-1-104	100,000	.009

Optional Feature	Part Number
High Torque (2 to 8 oz.-in.)	3540S-16-RC
±0.1% Ind. Linearity	3540S-40-RC (250 Ω min.)
Center Tap	3540S-52-RC
Rear Shaft Extension	3540S-79-RC
Flatted Shaft	3540S-80-RC
AR Lug	3540S-91-RC

For product specifications, see page 90

ORDERING INFORMATION
Precision Potentiometers

3541

Part Number*	Resistance (Ω)
3541H-1-102	1,000
3541H-1-202	2,000
3541H-1-502	5,000
3541H-1-103	10,000
3541H-1-203	20,000
3541H-1-503	50,000
3541H-1-104	100,000

Optional Feature	Part Number
High Torque (2 to 8 oz.-in.)	3541H-16-RC
±0.1% Ind. Linearity	3541H-40-RC (1K Ω min.)
Center Tap	3541H-52-RC
Rear Shaft Extension	3541H-79-RC
Flatted Shaft	3541H-80-RC
AR Lug	3541H-91-RC

For product specifications, see page 90

3543

Part Number*	Resistance (Ω)	Resolution (%)
3543S-1-200	20	.169
3543S-1-500	50	.148
3543S-1-101	100	.127
3543S-1-201	200	.110
3543S-1-501	500	.077
3543S-1-102	1,000	.077
3543S-1-202	2,000	.062
3543S-1-502	5,000	.047
3543S-1-103	10,000	.040
3543S-1-203	20,000	.031
3543S-1-503	50,000	.024

Optional Feature	Part Number
AR Pin	3543S-91-RC

For product specifications, see page 91

3545

Part Number*	Resistance (Ω)	Resolution (%)
3545S-1-500	50	.110
3545S-1-101	100	.084
3545S-1-201	200	.069
3545S-1-501	500	.054
3545S-1-102	1,000	.043
3545S-1-202	2,000	.044
3545S-1-502	5,000	.038
3545S-1-103	10,000	.029
3545S-1-203	20,000	.023
3545S-1-503	50,000	.017

Optional Feature	Part Number
AR Pin	3545S-91-RC

For product specifications, see page 91

3550

Part Number*	Resistance (Ω)	Resolution (%)
3550S-1-101	100	.058
3550S-1-201	200	.044
3550S-1-501	500	.038
3550S-1-102	1,000	.030
3550S-1-202	2,000	.024
3550S-1-502	5,000	.023
3550S-1-103	10,000	.019
3550S-1-203	20,000	.017
3550S-1-503	50,000	.011
3550S-1-104	100,000	.009
3550S-1-204	200,000	.008

For product specifications, see page 92

3551

Part Number*	Resistance (Ω)
3551H-1-102	1,000
3551H-1-202	2,000
3551H-1-502	5,000
3551H-1-103	10,000
3551H-1-203	20,000
3551H-1-503	50,000
3551H-1-104	100,000

For product specifications, see page 92

3560

Part Number*	Resistance (Ω)	Resolution (%)
3560S-1-500	50	0.149
3560S-1-101	100	0.121
3560S-1-201	200	0.102
3560S-1-501	500	0.076
3560S-1-102	1,000	0.065
3560S-1-202	2,000	0.063
3560S-1-502	5,000	0.047
3560S-1-103	10,000	0.041
3560S-1-203	20,000	0.031
3560S-1-503	50,000	0.024

For product specifications, see page 93

3561

Part Number*	Resistance (Ω)
3561H-1-501	500
3561H-1-102	1,000
3561H-1-202	2,000
3561H-1-502	5,000
3561H-1-103	10,000
3561H-1-203	20,000

For product specifications, see page 93

* The last three digits of the part number represent the resistance value in standard code.

ORDERING INFORMATION
Precision Potentiometers

3570

Part Number*	Resistance (Ω)	Resolution (%)
3570S-1-500	50	0.105
3570S-1-101	100	0.086
3570S-1-201	200	0.068
3570S-1-501	500	0.053
3570S-1-102	1,000	0.043
3570S-1-202	2,000	0.042
3570S-1-502	5,000	0.032
3570S-1-103	10,000	0.029
3570S-1-203	20,000	0.021
3570S-1-503	50,000	0.016
3570S-1-104	100,000	0.013

For product specifications, see page 94

3571

Part Number*	Resistance (Ω)
3571H-1-501	500
3571H-1-102	1,000
3571H-1-202	2,000
3571H-1-502	5,000
3571H-1-103	10,000
3571H-1-203	20,000
3571H-1-503	50,000

For product specifications, see page 94

3585

Part Number*	Resistance (Ω)	Resolution (%)
3585S-1-500	50	0.370
3585S-1-101	100	0.307
3585S-1-201	200	0.260
3585S-1-501	500	0.233
3585S-1-102	1,000	0.189
3585S-1-202	2,000	0.162
3585S-1-502	5,000	0.119
3585S-1-103	10,000	0.097
3585S-1-203	20,000	0.080

For product specifications, see page 100

3485

Part Number*	Resistance (Ω)	Resolution (%)
3485S-1-500	50	0.304
3485S-1-101	100	0.253
3485S-1-201	200	0.215
3485S-1-501	500	0.163
3485S-1-102	1,000	0.162
3485S-1-202	2,000	0.132
3485S-1-502	5,000	0.101
3485S-1-103	10,000	0.081
3485S-1-203	20,000	0.066
3485S-1-503	50,000	0.052

For product specifications, see page 100

3465

Part Number*	Resistance (Ω)	Resolution (%)
3465S-1-500	50	0.233
3465S-1-101	100	0.186
3465S-1-201	200	0.159
3465S-1-501	500	0.116
3465S-1-102	1,000	0.095
3465S-1-202	2,000	0.084
3465S-1-502	5,000	0.076
3465S-1-103	10,000	0.062
3465S-1-203	20,000	0.047
3465S-1-503	50,000	0.036
3465S-1-104	100,000	0.030

For product specifications, see page 100

3590

Part Number (Printed Circuit)	Part Number (Solder Lug)	Resistance (Ω)	Resolution (%)
3590P-X*-201	3590S-X*-201	200	.039
3590P-X*-501	3590S-X*-501	500	.033
3590P-X*-102	3590S-X*-102	1,000	.029
3590P-X*-202	3590S-X*-202	2,000	.023
3590P-X*-502	3590S-X*-502	5,000	.025
3590P-X*-103	3590S-X*-103	10,000	.020
3590P-X*-203	3590S-X*-203	20,000	.019
3590P-X*-503	3590S-X*-503	50,000	.013
3590P-X*-104	3590S-X*-104	100,000	.009

**X=refer to Shaft/Bushing Table for appropriate configuration number*

For product specifications, see page 95

3700

Part Number*	Resistance (Ω)	Resolution (%)
3700S-1-101	100	.090
3700S-1-201	200	.075
3700S-1-251	250	.070
3700S-1-501	500	.060
3700S-1-102	1,000	.050
3700S-1-202	2,000	.040
3700S-1-502	5,000	.040
3700S-1-103	10,000	.035
3700S-1-203	20,000	.025
3700S-1-503	50,000	.020
3700S-1-753	75,000	.020
3700S-1-104	100,000	.020

For product specifications, see page 96

3701

Part Number*	Resistance (Ω)
3701H-1-102	1,000
3701H-1-202	2,000
3701H-1-502	5,000
3701H-1-103	10,000
3701H-1-203	20,000
3701H-1-503	50,000
3701H-1-104	100,000

For product specifications, see page 96

ORDERING INFORMATION
Precision Potentiometers

3750

Part Number*	Resistance (Ω)	Resolution (%)
3750S-1-101	100	.090
3750S-1-201	200	.075
3750S-1-251	250	.070
3750S-1-501	500	.060
3750S-1-102	1,000	.050
3750S-1-202	2,000	.040
3750S-1-502	5,000	.040
3750S-1-103	10,000	.035
3750S-1-203	20,000	.025
3750S-1-503	50,000	.020
3750S-1-104	100,000	.020

For product specifications, see page 97

3751

Part Number*	Resistance (Ω)
3751H-1-102	1,000
3751H-1-202	2,000
3751H-1-502	5,000
3751H-1-103	10,000
3751H-1-203	20,000
3751H-1-503	50,000
3751H-1-104	100,000

For product specifications, see page 97

6534

Part Number*	Resistance (Ω)
6534S-1-102	1,000
6534S-1-202	2,000
6534S-1-502	5,000
6534S-1-103	10,000
6534S-1-203	20,000
6534S-1-503	50,000
6534S-1-104	100,000

For product specifications, see page 101

6537

Part Number*	Resistance (Ω)
6537S-1-102	1,000
6537S-1-202	2,000
6537S-1-502	5,000
6537S-1-103	10,000
6537S-1-203	20,000
6537S-1-503	50,000
6537S-1-104	100,000

For product specifications, see page 102

6538

Part Number*	Resistance (Ω)
6538S-1-102	1,000
6538S-1-202	2,000
6538S-1-502	5,000
6538S-1-103	10,000
6538S-1-203	20,000
6538S-1-503	50,000
6538S-1-104	100,000

For product specifications, see page 102

6539

Part Number*	Resistance (Ω)
6539S-001-102	1,000
6539S-001-202	2,000
6539S-001-502	5,000
6539S-001-103	10,000
6539S-001-203	20,000
6539S-001-503	50,000
6539S-001-104	100,000

For product specifications, see page 103

6544

Part Number*	Resistance (Ω)
6544S-1-102	1,000
6544S-1-202	2,000
6544S-1-502	5,000
6544S-1-103	10,000
6544S-1-203	20,000
6544S-1-503	50,000
6544S-1-104	100,000

For product specifications, see page 104

6574

Part Number*	Resistance (Ω)
6574S-1-102	1,000
6574S-1-202	2,000
6574S-1-502	5,000
6574S-1-103	10,000
6574S-1-203	20,000
6574S-1-503	50,000
6574S-1-104	100,000

For product specifications, see page 105

6634

Part Number*	Resistance (Ω)
6634S-1-102	1,000
6634S-1-202	2,000
6634S-1-502	5,000
6634S-1-103	10,000
6634S-1-203	20,000
6634S-1-503	50,000
6634S-1-104	100,000

For product specifications, see page 106

6637
6638

Part Numbers*		Resistance (Ω)
6637S-1-102	6638S-1-102	1,000
6637S-1-202	6638S-1-202	2,000
6637S-1-502	6638S-1-502	5,000
6637S-1-103	6638S-1-103	10,000
6637S-1-203	6638S-1-203	20,000
6637S-1-503	6638S-1-503	50,000
6637S-1-104	6638S-1-104	100,000

For product specifications, see page 107

* The last three digits of the part number represent the resistance value in standard code.

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Precision Potentiometers

6657

Part Number*	Resistance (Ω)
6657S-1-102	1,000
6657S-1-202	2,000
6657S-1-502	5,000
6657S-1-103	10,000
6657S-1-203	20,000
6657S-1-503	50,000
6657S-1-104	100,000

For product specifications, see page 108

6674

Part Number*	Resistance (Ω)
6674S-1-102	1,000
6674S-1-202	2,000
6674S-1-502	5,000
6674S-1-103	10,000
6674S-1-203	20,000
6674S-1-503	50,000
6674S-1-104	100,000

For product specifications, see page 109

6639

Part Numbers*		Resistance
Bushing Mount	Mechanical Stops	(Ω)
6639S-001-102	6639S-301-102	1,000
6639S-001-202	6639S-301-202	2,000
6639S-001-502	6639S-301-502	5,000
6639S-001-103	6639S-301-103	10,000
6639S-001-203	6639S-301-203	20,000
6639S-001-503	6639S-301-503	50,000
6639S-001-104	6639S-301-104	100,000

For product specifications, see page 103

3600

Part Number*	Resistance (Ω)	Resolution (%)
3600S-1-101	100	.057
3600S-1-201	200	.047
3600S-1-501	500	.045
3600S-1-102	1,000	.035
3600S-1-202	2,000	.030
3600S-1-502	5,000	.027
3600S-1-103	10,000	.022
3600S-1-203	20,000	.017
3600S-1-503	50,000	.013
3600S-1-104	100,000	.012

For product specifications, see page 110

3610

Part Number*	Resistance (Ω)	Resolution (%)
3610S-1-101	100	.057
3610S-1-201	200	.047
3610S-1-501	500	.045
3610S-1-102	1,000	.035
3610S-1-202	2,000	.030
3610S-1-502	5,000	.027
3610S-1-103	10,000	.022
3610S-1-203	20,000	.017
3610S-1-503	50,000	.013
3610S-1-104	100,000	.012

For product specifications, see page 111

3640

Part Number*	Resistance (Ω)	Resolution (%)
3640S-1-101	100	.060
3640S-1-201	200	.045
3640S-1-501	500	.031
3640S-1-102	1,000	.030
3640S-1-202	2,000	.021
3640S-1-502	5,000	.016
3640S-1-103	10,000	.019
3640S-1-153	15,000	.016
3640S-1-203	20,000	.013
3640S-1-503	50,000	.011
3640S-1-753	75,000	.010
3640S-1-104	100,000	.010
3640S-1-254	250,000	.006

For product specifications, see page 112

3650

Part Number*	Resistance (Ω)	Resolution (%)
3650S-1-101	100	.060
3650S-1-201	200	.045
3650S-1-501	500	.031
3650S-1-102	1,000	.030
3650S-1-202	2,000	.021
3650S-1-502	5,000	.016
3650S-1-103	10,000	.019
3650S-1-153	15,000	.016
3650S-1-203	20,000	.013
3650S-1-503	50,000	.011
3650S-1-753	75,000	.010
3650S-1-104	100,000	.010

For product specifications, see page 113

3680

Resistance (Ω)	3681S-1-1 Decade	3682S-1-2 Decade	3683S-1-3 Decade	3684S-1-4 Decade	3685S-1-5 Decade
50	-500				
100	-101				
200	-201				
500	-501	-501			
1,000	-102	-102	-102		
2,000	-202	-202	-202		
5,000	-502	-502	-502		
10K	-103	-103	-103	-103	
20K		-203	-203	-203	
50K		-503	-503	-503	
100K	-104	-104	-104	-104	-104
500K			-504	-504	-504
1 Meg		-105	-105	-105	-105

For product specifications, see page 114

DEFINITIONS AND TEST PROCEDURES

Cermet Elements

Cermet elements are available in a wide range of resistance values and tapers. They offer essentially infinite resolution and excellent stability in the most severe environmental conditions. Static and dynamic noise (CRV) performance is good but not as good as that of conductive plastic.

The temperature coefficient of cermet elements, though not as good as wirewound elements, is better than conductive plastic or carbon type elements. Linearity is quite good for a film type element and can be improved considerably for greater dial setting accuracy by laser tailoring.

Frequency response of cermet materials is very good and the practical application range extends well beyond 100 MHZ.

Conductive Plastic Elements

Conductive plastic is a thick film ink, similar to cermet, but has a smoother surface. This characteristic offers several operational advantages over cermet. Dynamic noise characteristics (CRV or output smoothness) and rotational life are measurably improved as a result of the surface smoothness. Resolution is essentially infinite.

Conductive plastic elements are generally available in a wide range of resistance values and tapers.

Moisture resistance, temperature coefficient, power dissipation and wiper current capacity for conductive plastic elements are not as good as cermet elements.

Wirewound Elements

Wirewound elements offer good stability, excellent linearity, low noise, high power capabilities and good operational life.

Wirewound elements offer a wide selection of resistance values up to 500k ohms.

One primary limitation of wirewound elements is the finite resolution steps, which result from the wiper moving from turn to turn. (These steps are distinct, sudden, repeatable changes in output.) Resolution improves as resistance values increase due to the manufacturing processes whereby smaller wire and a higher number of turns are utilized.

In systems that might be sensitive to such discrete steps, care should be taken to select an element with resolution fine enough to avoid difficulty.

The many turns of resistance wire exhibit an inductive reactance that increases directly with frequency. This effect is most noticeable in low total resistance elements because the inductive reactance can be larger than the resistance, even at frequencies as low as 20KHZ.

The performance of wirewound elements is also affected by inherent capacitance. Capacitance exists from turn to turn and also between the winding and the mandrel. Capacitance effects are most significant in high total resistance elements.

Hybritron® Elements

This element is a combination of a wirewound element with a conductive plastic coating. It exhibits the temperature coefficient and resistance stability approaching a pure wirewound element. It displays the long operational life, essentially infinite resolution and low noise characteristics of the pure conductive plastic elements. The combination of the two provides the major benefits of both types of elements. Not recommended in applications requiring high wiper currents.

Absolute Minimum Resistance

DEFINITION

The resistance measured between the wiper terminal and either end terminal when the wiper is positioned to give a minimum value on the measuring device.

TEST PROCEDURE

The wiper shall be positioned at one end of the resistance element so that a minimum value of resistance shall be measured as specified between the wiper and the corresponding end terminal. The same procedure shall be followed for the opposite end of the resistance element.

Contact Resistance Variation (CRV)

DEFINITION

The apparent resistance seen between the wiper and the resistance element when the wiper is energized with a specified current and moved over the adjustment travel in either direction at a constant speed. The output variations are measured over a specified frequency bandwidth, exclusive of the effects due to roll-on or roll-off of the terminations and expressed in ohms or percent of total resistance.

TEST PROCEDURE

CRV shall be tested using the circuit as shown in Fig. 1 on page 253 of Potentiometer Handbook (or its equivalent). The operating shaft shall be rotated in both directions through 90% of the adjustment travel for a total of 6 cycles. Only the last 3 cycles shall count in determining whether or not a contact resistance variation is observed at least twice in the same area (within 5%), exclusive of the roll-on or roll-off points where the wiper moves from the termination, on or off, the resistance element. The rate of rotation of the operating shaft shall be such that the wiper completes 1 cycle in 5 seconds, minimum, to 2 minutes, maximum. The test current used shall be in accordance with the table below, unless otherwise specified.

Test Current (±20%)	**Total Resistance Range**
30 ma	50 Ohms
10 ma	= or > 50 Ohms to < 500 Ohms
1 ma	= or > 500 Ohms to < 100K
100 ua	= or > 100K to < 2 Meg
50 ua	= or > 2 Meg

DEFINITIONS AND TEST PROCEDURES

Dielectric Withstanding Voltage

DEFINITION
The ability to withstand under prescribed conditions, a specified potential of a given characteristic between the terminals of each cup and exposed conducting surface of the potentiometer, or between the terminals of each cup and the terminals of every other cup in the assembly without exceeding a specified leakage current value.

TEST PROCEDURE
The magnitude of the test voltage shall be specified. Connect the equipment by applying the high voltage source between the potentiometer terminals (interconnected) and the shaft or case. Raise the test voltage from zero to the proper maximum value at a rate of 500 volts per second maximum. Maintain the test voltage at this level while operating the shaft through one full sweep of its mechanical travel in a time interval of not less than 5 seconds nor more than 60 seconds. Monitor the leakage current indicating device throughout this test for evidence of damage, arcing, breakdown, or leakage current in excess of 1 milliampere. Upon completion of the test, prior to disconnecting the leads, gradually reduce the test voltage to zero.

For ganged potentiometers, repeat the foregoing applying the high voltage between the terminals of each cup and the terminals of every other cup on the potentiometer under test.

Equivalent Noise Resistance (ENR)

DEFINITION
Any spurious variation in the electrical output not present in the input, defined quantitatively in terms of an equivalent parasitic transient resistance in ohms, appearing between the contact and the resistance element when the shaft is rotated or translated. The equivalent noise resistance is defined independently of the resolution, the functional characteristics, and the total travel. The magnitude of the equivalent noise resistance is the maximum departure from a specified reference line. The wiper of the potentiometer is required to be excited by a specified current and moved at a specified speed.

TEST PROCEDURE
The potentiometer shaft is cycled not less than ten times over a minimum of 95% of the electrical continuity travel within the rated travel speed of the potentiometer just prior to making noise measurements. The potentiometer shaft is then connected mechanically to the constant speed drive and electrically connected to the test circuit. With the constant speed drive engaged, the potentiometer noise characteristic may then be noted on the oscilloscope as the wiper traverses one complete cycle over the full electrical continuity travel and the maximum values are compared to the specified limit.

If only random spikes of noise are noted, the potentiometer should be cycled again. If the random spikes are repetitive, the maximum values should be noted. Otherwise do not consider the initial measurements as noise.

Independent Linearity

DEFINITION
The maximum deviation expressed as a percent of the total applied voltage, of the actual function characteristic from a straight line whose slope and position minimize the maximum deviations over the actual electrical travel, or any specified portion thereof.

TEST PROCEDURE
Consult factory.

Insulation Resistance

DEFINITION
The resistance to a specified impressed DC voltage between the terminals of each cup and the exposed conducting surfaces of the potentiometer, or between the terminals of each cup and the terminals of every other cup in the gang, under prescribed conditions.

TEST PROCEDURE
Interconnect all electrically insulated terminals of each cup of the potentiometer. Connect the insulation resistance test set to the terminal of the first cup and to some exposed conducting surface (shaft, housing, etc.) and apply the specified test voltage. Unless otherwise specified the test voltage shall be 500 VDC. Maintain the test voltage at this level for 5 to 10 seconds before initiating movement of the shaft through one full sweep of the total mechanical travel in a time interval of not less than 5 seconds nor more than 60 seconds. Monitor the indicated insulation resistance during this voltage application, the insulation resistance is the minimum value observed during the movement of the shaft.

For ganged potentiometers, repeat the procedure for each cup applying the high voltage between the terminals of each cup and the exposed conducting surface of the potentiometer.

DEFINITIONS AND TEST PROCEDURES

Output Smoothness

DEFINITION
The spurious variations in the electrical output not present in the input. They are measured for specified travel increments over the theoretical electrical travel and expressed as a percentage of the total applied voltage.

TEST PROCEDURE
Mount the potentiometer in the constant-speed drive (4 RPM) and excite it with the power supply. Connect the wiper and the power common lead to the input of the filter and the output of the filter to the oscilloscope. When a load is specified for a conformity test, use that load for the output smoothness test. When no load is specified for the conformity test, apply a load equal to 100 times the nominal resistance value of the potentiometer under test between the wiper and the CCW end (unless otherwise specified).

The output smoothness is the largest excursion voltage occuring over one specified travel increment, divided by the total applied voltage. Unless otherwise specified, the travel increment is 1% of the theoretical electrical travel.

Excursions occuring at the point of abrput changes in input slope (start, end, and reversal) are not considered output smoothness faults.

Power Rating

DEFINITION
The maximum power, in watts, that a potentiometer can dissipate across the entire resistive element under specified conditions while meeting specified operating performance requirements.

Resolution

DEFINITION
A measure of the sensitivity to which the output of a potentiometer may be set. (Applicable to wirewound potentiometers only.)

Theoretical resolution; the reciprocal of the number of turns of wire in the resistance winding in the actual electrical travel, expressed as a percentage.

Travel resolution; the maximum value of shaft travel (in degress for rotary devices) in one direction per incremental voltage step in any specified portion of the resistance element.

Voltage resolution; the maximum incremental change in output ratio with shaft travel in one direction in any specified portion of the resistance element.

TEST PROCEDURE
Consult factory.

Temperature Coefficient of Resistance

DEFINITION
The unit change in resistance per degree Celsius change from a reference temperature, expressed in parts per million per degree Celsius using the following formula:

$TC = R1\text{-}R2/R1(T2\text{-}T1)x\ 10^6$

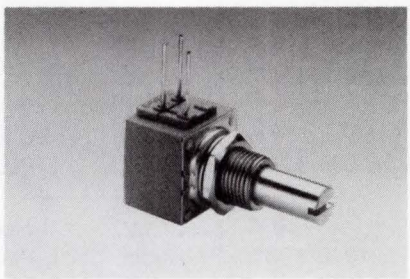
WHERE: R1 = Resistance at reference temperature in ohms
R2 = Resistance at test temperature in ohms
T1 = Reference temperature in degrees Celsius
T2 = Test temperature in degrees Celsius

TEST PROCEDURE
Position the wiper of the potentiometer to be tested off of the actual electrical travel or at a point to minimize the total resistance if no over travel exists. Subject the potentiometer to the specified test temperature(s). The total resistance is measured after temperature chamber has been stabilized for the test temperature for a minimum of 30 minutes (avoid over aging). The reference temperature of 25 degree Celsius shall be used for all elevated and reduced temperatures. Calculate the (TC) by inserting the appropriate data into the above formula and comparing the result to the specification.

Total Resistance

DEFINITION
The DC resistance between the end terminals of a potentiometer with the shaft positioned so as to give a maximum resistance value.

TEST PROCEDURE
With the VOM or DVM device (10ma maximum current) connected between the wiper and one end terminal, position the wiper onto the electrical overtravel. Reconnect the test leads of the measuring device to the end terminals of the potentiometer under test, the reading observed is the total resistance of the potentiometer.



PANEL CONTROLS

PRODUCT SELECTION GUIDE
Panel Controls

Model No.	Turns	Element Type	Tolerance	Tapers	Terminal Style	Package Dimension	Multi. Sec. Avail.	Switch Avail.	Page No.
51	Single	Cermet / Conductive	±5%, ±10% / ±10%, ±20%	Linear, Audio	In-line PC Pin .100" Centers	1/2" Square	Yes	No	130
52	Single	Cermet / Conductive	±5%, ±10% / ±10%, ±20%	Linear, Audio	In-line PC Pin .200" Centers	1/2" Square	Yes	No	130
53	Single	Cermet / Conductive	±5%, ±10% / ±10%, ±20%	Linear, Audio		1/2" Square	Yes	No	130
81	Single	Cermet Conductive / Plastic	±5%, ±10% / ±10%, ±20%	Linear, Audio	PC Pins L-Pattern	5/8"Square	Yes	No	133
82	Single	Cermet Conductive / Plastic	±5%, ±10% / ±10%, ±20%	Linear, Audio	J-Hooks L-Pattern	5/8"Square	Yes	No	133
81/82	Single	Cermet	±10%, ±20%	Straight T-Pad Attenuator	PC Pins/ J-Hook L-Pattern	5/8"Square	3 Only	No	145
83	10	Wirewound / Hybritron®	±5% / ±10%	Linear	PC Pins	5/8"Square	Yes	No	134
84	10	Wirewound / Hybritron®	±5% / ±10%	Linear	Solder Lugs	5/8"Square	Yes	No	134
85	Single	Conductive Plastic / Cermet	±10%, ±20% / ±5%, ±10%	Linear, Audio	PC Pins L-Pattern	5/8"Square	Yes	Yes	136
86	Single	Conductive Plastic / Cermet	±10%, ±20% / ±5%, ±10%	Linear, Audio	J-Hooks L-Pattern	5/8"Square	Yes	Yes	136
87	Single	Conductive Plastic / Cermet	±5% / ±3%	Semi-Precision Linear	J-Hooks L-Pattern	5/8"Square	Yes	No	137
88	Single	Conductive Plastic / Cermet	±5% / ±3%	Semi-Precision Linear	J-Hooks L-Pattern	5/8"Square	Yes	No	137
91	Single	Conductive Plastic / Cermet	±10%, ±20% / ±5%, ±10%	Linear, Audio	In-Line PC Pins	5/8"Square	Yes	No	141
92	Single	Conductive Plastic / Cermet	±10%, ±20% / ±5%, ±10%	Linear, Audio	In-Line J-Hooks	5/8"Square	Yes	No	141
91/92	Single	Cermet	±10%, ±20%	Straight T-Pad Attenuator	PC Pins/ J-Hook	5/8"Square	3 Only	No	141
93	Single	Conductive Plastic / Cermet	±10%, ±20% / ±5%, ±10%	Linear, Audio	L-Pattern PC Pins	5/8"Square	Yes	No	141
94	Single	Conductive Plastic / Cermet	±10%, ±20% / ±5%, ±10%	Linear, Audio	L-Pattern J-Hooks	5/8"Square	Yes	No	141
95	Single	Conductive Plastic / Cermet	±10%, ±20% / ±5%, ±10%	Linear, Audio	Triangle Pattern Solder Lugs	5/8"Square	Yes	No	141

PRODUCT SELECTION GUIDE
Panel Controls

Model No.	Turns	Element Type	Tolerance	Tapers	Terminal Style	Package Dimension	Multi. Sec. Avail.	Switch Avail.	Page No.
96	Single	Conductive Plastic / Cermet	±10%, ±20% / ±5%, ±10%	Linear, Audio	In-Line PC Pins (Sealed)	5/8"Square	Yes	No	141
97	Single	Conductive Plastic / Cermet	±10%, ±20% / ±5%, ±10%	Linear, Audio	L-Pattern PC Pins	5/8"Square	Yes	Yes	142
98	Single	Conductive Plastic / Cermet	±10%, ±20% / ±5%, ±10%	Linear, Audio	L-Pattern J-Hooks	5/8"Square	Yes	Yes	142
99	Single	Conductive Plastic / Cermet	±10%, ±20% / ±5%, ±10%	Linear, Audio	Triangle Pattern Solder Lugs	5/8"Square	Yes	Yes	142
3851	Single	Conductive Plastic	±10%, ±20%	Linear, Audio	PC Pins, Solder Lugs	3/4"Diameter	No	No	146
3852	Single	Cermet	±5%, ±10%	Linear, Audio	PC Pins, Solder Lugs	3/4"Diameter	No	No	146
3856	3-3/4	Cermet	±5%, ±10%	Linear, Audio	PC Pins, Solder Lugs	3/4"Diameter	No	No	146
3862	Single	Cermet	±5%, ±10%	Linear, Audio	PC Pins, J-Hooks	1/2" Diameter	No	No	148

Stepped Attenuators

Model Series	Taper	Tolerance	Resistance Value	Step Error	Detents	Page No.
PA . . .	db Linear	±5% of Nominal	10K Ω to 100K Ω	0.5 db at Each Step	22, 11	150

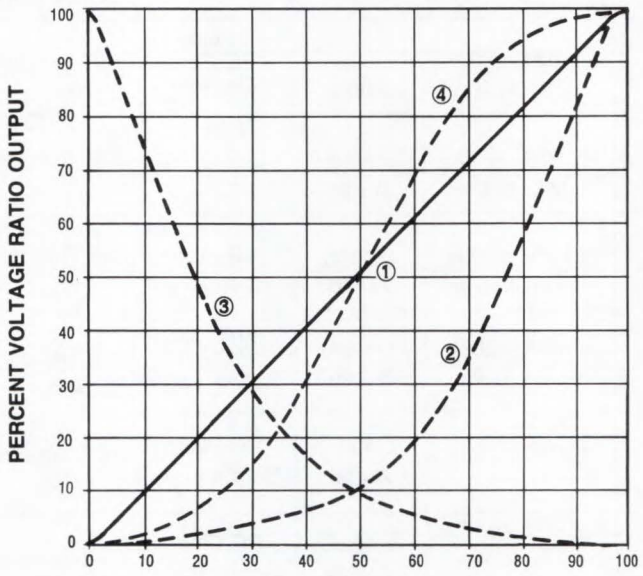
Slimline Potentiometers

Model Series	Tapers	Tolerance	Standard Resistance Range	Terminal Styles	Sections	Page No.
PC . . .	Linear CP CW Audio CP CCW Audio CP	±20%	500 Ω to 2.5 MΩ	PC Pin, Solder Lug	Single	156

Open Frame Slide Potentiometers

Model Series	Sections	Stroke Length	Terminal Styles	Element Types/Tapers	Page No.
SS	Single	10 mm 15 mm 20 mm 30 mm	PC Pins Horizontal and Vertical	Linear, LH Audio, RH Audio, "S" Curve	153
SD	Dual				

GENERAL INFORMATION
Panel Controls
Bourns® Panel Controls



TAPER DESCRIPTIONS

Graph	Models	Taper Code	Description	Linearity	T.R. Tol.
1	81,82,85,86,91-99,3852,3856,3862,50	A	Linear — Cermet	±5% Ind.	±10%
1	81,82,85,86,91-99,3851,50	B	Linear — C.P.	±5% Ind.	±20%
2	81,82,85,86,91-99,3852,3856,50	C	CW Audio — Cermet	N/A	±10%
2	81,82,85,86,91-99,3851,50	D	CW Audio — C.P.	N/A	±20%
1	81,82,85,86,91-99,3851,50	E	Linear — C.P.	±5% Ind.	±10%
3	81,82,85,86,91-99,3852,3856,50	F	CCW Audio — Cermet	N/A	±10%
3	81,82,85,86,91-99,3851,50	G	CCW Audio — C.P.	N/A	±20%
1	81,82,85,86,91-99,3852,3856,3862	H	Linear — Cermet	±5% Ind.	±5%
1	83,84	J	Linear — Wirewound	±.25% Ind.	±10%
1	83,84	K	Linear — Hybritron® El.	±.25% Ind.	±10%
1	85,86,87,88	L	Linear — C.P.	±2% Z.B.	±5%
1	85,86,87,88	M	Linear — Cermet	±2.5% Z.B.	±3%
1	85,86,87,88	N	Linear — C.P.	±1% Z.B.	±5%
1	85,86,87,88	P	Linear — Cermet	±1.5% Z.B.	±3%
2	81,82,85,86,91-99,50	S	CW Audio — C.P.	N/A	±10%
3	81,82,85,86,91-99,50	T	CCW Audio — C.P.	N/A	±10%
4	5000	Y	Dual Audio — C.P.	N/A	±20%

GENERAL INFORMATION
Panel Controls
Bourns® Panel Controls

MOUNTING HARDWARE

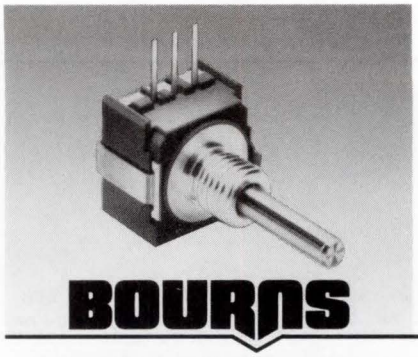
Panel control mounting hardware is determined by bushing style. The "X" in the bushing style column indicates what hardware is used with that bushing. Hardware indicated by shaded area is normally supplied with unit. Other hardware may be ordered separately. Hardware is bulk packaged with units.

Part Number and Description	Bushing Style										
	A	B	C	E	J	N	R	T	U	L	W
H-36-1 Flat Washer			X	X		X		X			
H-36-2 Flat Washer	X	X			X						
H-37-1 Lockwasher			X	X		X		X			
H-37-2 Lockwasher	X	X			X					X	X
H-38-1 Mounting Nut			X	X		X		X			
H-38-2 Mounting Nut	X	X			X						
H-38-3 Lock Nut				X				X			
H-38-4 Lock Nut		X									
H-37-3 Lockwasher									X		
H-37-4 Lockwasher							X				
H-38-8 M-7 Mounting Nut									X		
H-38-9 M-10 Mounting Nut							X				
H-38-11 M-9 Mounting Nut										X	X

PANEL CONTROLS OPTIONS MATRIX

	3851	3852	3856	3862	81/82	83/84	85/86	87/88	91-95	97-99	96	PC	50	EC	EN
Single Section	X	X	X	X	X	X	*	X	X	*	X	X	X	X	X
Dual Section					X	X	X*	X	X	X*	Δ		X		
Triple Section					X	Δ	Δ	X	Δ	Δ			X		
Quad Section					X	Δ	Δ	X	Δ	Δ					
1/8" Shafts	X	X	X	X	X	X	X	X	X	X	X		X		X
3/16" Shafts												X		X	
1/4" Shafts	X	X	X		X	X	X	X	X	X	X	X	X	X	X
4mm Shaft					X	X	X	X	X	X	X		X		
6mm Shaft					X	X	X	X	X	X	X	X	X	X	
Dual Concentric Shafts					X	X	Δ	X							
Switches							X*			X*					
Locking Bushing	X	X		X	X	X		X					X		

ΔConsult factory.
*Standard Construction - 1 pot section and 1 switch module.



SEALED 12.5MM SQUARE CONTROL

- Conductive plastic or cermet
- Linear and audio tapers
- PC board and bushing mount
- Gangable
- Metal bushing and shaft

BOURNS

Model 50 Series

Bourns® Panel Controls

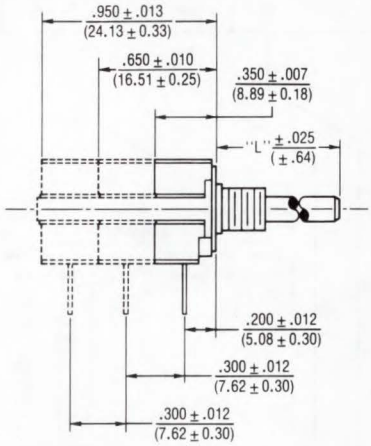
	Conductive Plastic	Cermet
Electrical Characteristics[1]		
Standard Resistance Range		
Linear	1K ohms to 1 megohm	150 ohms to 1 megohm
Audio	1K ohms to 1 megohm	1K ohms to 1 megohm
Total Resistance Tolerance		
Linear Tapers	±10% OR ±20%	±10% OR ±5%
Audio Tapers	±10% OR ±20%	±10%
Independent Linearity	±5%	±5%
Absolute Minimum Resistance	2 ohms maximum	2 ohms maximum
Effective Electrical Angle	270° ±5°	270° ±5°
Contact Resistance Variation	2.0%	2.0%
Dielectric Withstanding Voltage		
Sea Level	1,000 VAC minimum	1,000 VAC minimum
70,000 Feet	500 VAC minimum	500 VAC minimum
Insulation Resistance	1,000 megohms minimum	1,000 megohms minimum
Power Rating At 70°C (Derate To 0 At 125°C) (Voltage Limited By Power Dissipation or 350 VAC, Whichever Is Less)		
Linear Tapers	.5 watt	1.0 watt
Audio Tapers	.25 watt	.5 watt
Tracking (Multiple Sections)	3 db	3 db
Environmental Characteristics[1]		
Storage Temperature	−55°C to +125°C	−55°C to +125°C
TCR (Over Storage Temperature Range	±1,000ppm/°C	±150ppm/°C
Vibration (Single Section	15G	15G
Total Resistance Shift	±2% maximum	±2% maximum
Voltage Ratio Shift	±5% maximum	±5% maximum
Shock (Single Section)	30G	30G
Total Resistance Shift	±2% maximum	±2% maximum
Voltage Ratio Shift	±5% maximum	±5% maximum
Load Life (1,000 Hours)	±10% TRS maximum	±5% TRS maximum
Rotational Life--No Load (50,000 Cycles)[2]	±10% TRS maximum	±10% TRS maximum
CRV @ 25,000 Cycles	±2%	±4%
Moisture Resistance	±10% TRS	±5% TRS
Mechanical Characteristics		
Stop Strength	5 in-lb.	5 in-lb.
Mechanical Angle	295° ±5°	295° ±5°
Torque		
Running (Single Section)	0.2 to 2.0 oz-in.	0.2 to 2.0 oz-in.
Running (Dual or Triple Section)	0.5 to 2.5 oz-in.	0.5 to 2.5 oz-in.
Starting (All Sections)	Running +0.5 oz-in. maximum	Running +0.5 oz-in. maximum
Terminals	PC pin or solder lug	PC pin or solder lug
Weight		
Single Section	5.5 grams	5.5 grams
Additional Section	3.0 grams	3.0 grams
Marking	Manufacturer's symbol and part number, date code and resistance value	

[1]At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.
[2]Conductive plastic, 25,000 cycles for cermet elements.
Specifications are subject to change without notice.

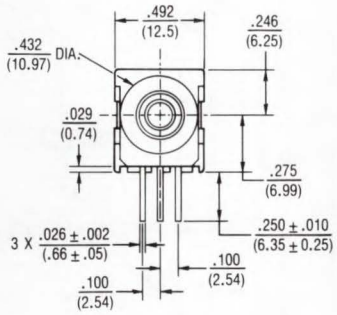
BOURNS

DIMENSIONAL DRAWINGS AND TOLERANCES
Model 50 Series

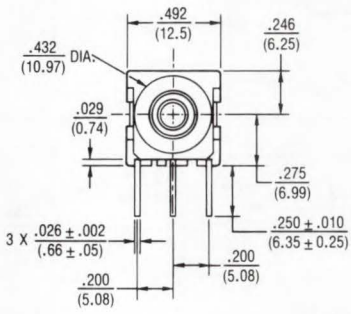
PACKAGE DIMENSIONS



[SINGLE, DUAL AND TRIPLE MODULE SHOWN]

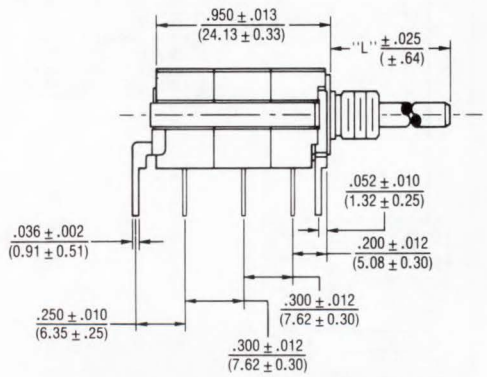


[.100" (2.54) TERMINAL SPACING]

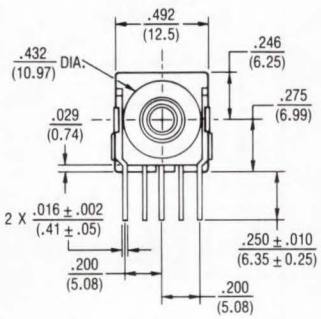


[.200" (5.08) TERMINAL SPACING]

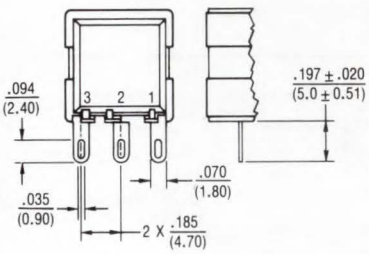
PACKAGE DIMENSIONS PCB MOUNTING BRACKET



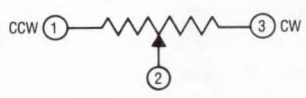
[AVAILABLE IN SINGLE, DUAL OR TRIPLE MODULE VERSIONS]



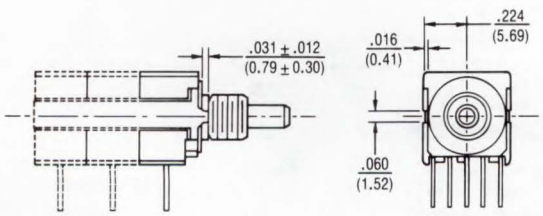
SOLDER LUG TERMINALS



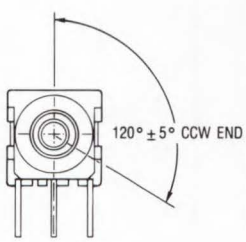
ELECTRICAL SCHEMATIC



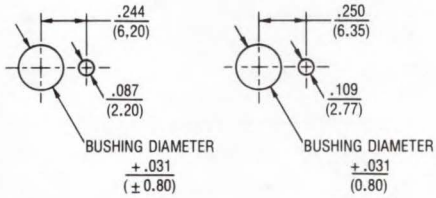
ANTI-ROTATION LUG



SHAFT FLAT ORIENTATION



SUGGESTED PANEL LAYOUTS



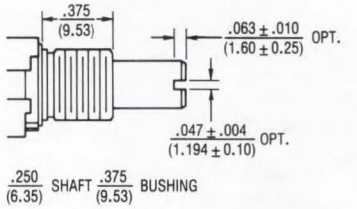
FOR TOLERANCES SHOWN: .XX = ±.010
.XXX = ±.005
SHAFT DIMENSIONS ± *1/32"*

Specifications are subject to change without notice.

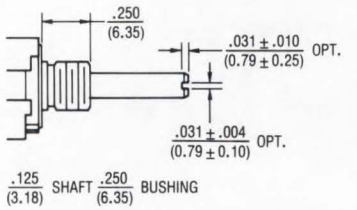
BOURNS

DIMENSIONAL DRAWINGS AND TOLERANCES
Model 50 Series

SHAFT/BUSHING STYLES



STD. LENGTH 'L'	
.500	(12.7)
.625	(15.88)
.750	(19.05)
.875	(22.23)
1.000	(25.4)



STD. LENGTH 'L'	
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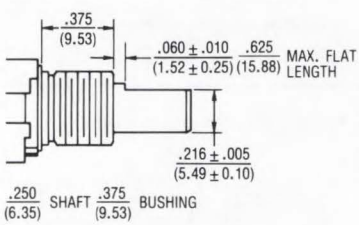
.500	(12.78)
.625	(15.88)
.750	(19.05)
.875	(22.23)
1.000	(25.4)



STD. LENGTH 'L'	
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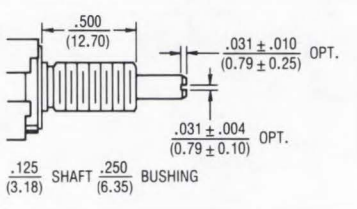
.750	(19.05)
.875	(22.23)
1.000	(25.4)



STD. LENGTH 'L'	
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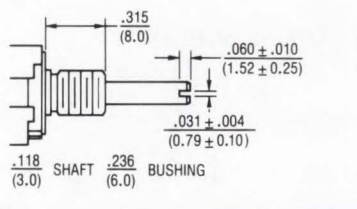
.750	(19.05)
.875	(22.23)
1.000	(25.4)



STD. LENGTH 'L'	
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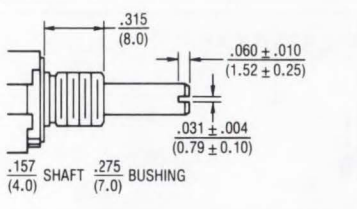
.630	(16.0)
.866	(22.0)
.984	(25.0)



STD. LENGTH 'L'	
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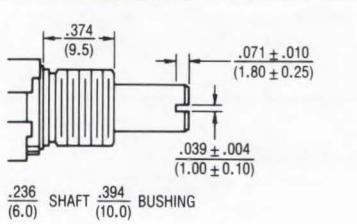
.512	(13.0)
.630	(16.0)
.866	(22.0)
.984	(25.0)



STD. LENGTH 'L'	
.512	(13.0)
.630	(16.0)
.866	(22.0)
.984	(25.0)

HOW TO ORDER

51	A	A	D	-	B	28	-	A	15

MODEL	
Code	Description
51	PC Pins (.100" centers)
52	PC Pins (.200" centers)
53	Solder Lugs

BUSHING CONFIGURATION	
Code	Description
A	3/8"D x 3/8"L
C	1/4"D x 1/4"L
F	1/4"D x 1/2"L
R	10mmD x 9.5mmL
S	6mmD x 8mmL
U	7mmD x 8mmL

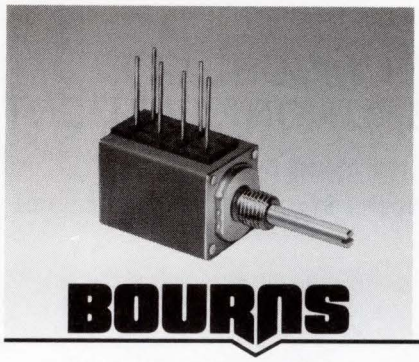
# SECTIONS/DETENTS	
Code	Description
A	Single No Detent
B	Double No Detent
C	Triple No Detent
E	Single w/Center Detent
F	Double w/Center Detent
G	Triple w/Center Detent

MOUNTING BRACKET/ ANTI-ROTATION LUG	
Code	Description
A	AR Lug 90°CW
C	AR Lug 270°CW
D	No AR Lug or Bracket
L	Front Bracket
M	Rear Bracket
N	Front and Rear Bracket

ELEMENT TAPER TYPE/TOLERANCE		RESISTANCE (CODE)
Code	Description	VALUE IN OHMS
(A) (H)	Linear Cermet ±10% Linear Cermet ±5%	(28) — 150 (30) — 15K (06) — 200 (16) — 20K (07) — 250 (17) — 25K (08) — 500 (18) — 50K (09) — 750 (19) — 75K (10) — 1K (20) — 100K (29) — 1.5K (31) — 150K (11) — 2K (21) — 200K (12) — 2.5K (22) — 250K (13) — 5K (23) — 500K (14) — 7.5K (24) — 750K (15) — 10K (25) — 1M
(B) (E)	Linear C-P ±20% Linear C-P ±10%	(10) — 1K (18) — 50K (12) — 2.5K (20) — 100K (13) — 5K (22) — 250K (15) — 10K (23) — 500K (16) — 20K (25) — 1M (17) — 25K
(C) (F)	CW Audio Cermet ±10% CCW Audio Cermet ±10%	(10) — 1K (18) — 50K (12) — 2.5K (20) — 100K (13) — 5K (22) — 250K (15) — 10K (23) — 500K (17) — 25K (25) — 1M
(D) (S)	CW Audio C-P ±20% CW Audio C-P ±10%	(10) — 1K (18) — 50K (12) — 2.5K (20) — 100K (13) — 5K (22) — 250K (15) — 10K (23) — 500K (17) — 25K (25) — 1M
(G) (T)	CCW Audio C-P ±20% CCW Audio C-P ±10%	(10) — 1K (18) — 50K (12) — 2.5K (20) — 100K (13) — 5K (22) — 250K (15) — 10K (23) — 500K (17) — 25K (25) — 1M

SHAFT LENGTH (FMS)		AVAILABLE ONLY IN BUSHING
Code	Description	Code
12	3/8"	C
16	1/2"	A, C
20	5/8"	A, C, F
24	3/4"	A, C, F
28	7/8"	A, C, F
32	1"	A, C, F
Metric		
10	10mm	R, S, U
13	13mm	R, S, U
16	16mm	R, S, U
22	22mm	R, S, U
25	25mm	R, S, U

SHAFT TYPE		AVAILABLE ONLY IN BUSHINGS	LENGTHS
Code	Description	Code	Description
A	Single Plain 1/4"D	A	20,24,28,32
B	Single Slotted 1/4"D	A	12,16,20,24,28,32
C	Single Flatted 1/4"D	A	24,28,32
D	Single Plain 1/8"D	C, F	16,20,24,28,32
E	Single Slotted 1/8"D	C, F	12,16,20,24,28,32
R	Single Slotted 6mmD	R	10,13,16,22,25
T	Single Slotted 4mmD	U	10,13,16,22,25
U	Single Slotted 3mmD	S	10,13,16,22,25



5/8 INCH SQUARE / SINGLE-TURN MODULAR / CERMET / CONDUCTIVE PLASTIC

- Unique shaft torque control
- Consistent, smooth quality feel
- Up to 4 sections available

FOR DIMENSIONAL DRAWINGS SEE PAGE 138.
FOR ORDERING INFORMATION SEE PAGE 140.

Models 81/82

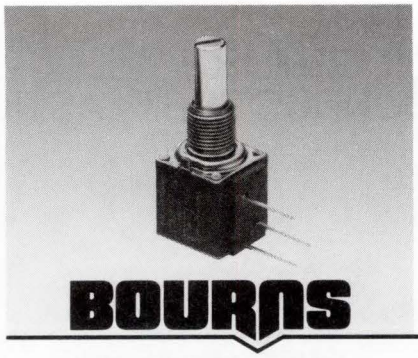
Bourns® Panel Controls

	Conductive Plastic Element	Cermet Element
Initial Electrical Characteristics[1]		
Standard Resistance Range		
Linear Tapers (A, B, E, & H)	(B & E) 250 ohms to 5 megohms	(A & H) 50 ohms to 5 megohms
Audio Tapers (C, D, F, G, S, & T)	(D, G, S, & T) 1K ohms to 5.0 megohms	(C & F) 1K ohms to 5.0 megohms
Resistance Tolerance	(B, D, & G tapers) ±20%	(A, C, & F tapers) ±10%
	(E, S, & T tapers) ±10%	(H taper) ±5%
Independent Linearity	(B & E tapers) ±5%	(A & H tapers) ±5%
Absolute Minimum Resistance	2 ohms maximum	2 ohms maximum
Continuity	Maintained for full mechanical angle.	Maintained for full mechanical angle.
Effective Electrical Angle	240° ±5°	240° ±6°
Contact Resistance Variation	±1%	±1% or 3 ohms (whichever is greater)
Theoretical Resolution	Essentially infinite	Essentially infinite
Dielectric Withstanding Voltage	MIL-STD-202, Method 301	MIL-STD-202, Method 301
Sea Level	1,000 VAC minimum	1,000 VAC minimum
70,000 Feet	500 VAC minimum	500 VAC minimum
Insulation Resistance (500 VDC)	1,000 megohms minimum	1,000 megohms minimum
Power Rating (Voltage Limited by Power Dissipation or 350 VAC, Whichever is Less)		
+70°C Single Section Assembly	(B & E tapers) 1 watt	(A & H tapers) 2 watts
	(D, G, S, & T tapers) 0.5 watt	(C & F tapers) 1 watt
+70°C Multiple Section Assembly	(B & E tapers) 0.5 watt/section	(A & H tapers) 1 watt/section
	(D, G, S & T tapers) 0.25 watt/section	(C & F tapers) 0.5 watt/section
+125°C	0 watt	0 watt
Roll-on/Roll-off	(B & E tapers) 0.25% maximum	(A & H tapers) 0.5% maximum
	(D & S tapers) 0.1% maximum CCW end	(C taper) 0.1% maximum CCW end
	(G & T tapers) 0.1% maximum CW end	(F taper) 0.1% maximum CW end
	(D & S tapers) 0.5% maximum CW end	(C taper) 1.0% maximum CW end
	(G & T tapers) 0.5% maximum CCW end	(F taper) 1.0% maximum CCW end
Environmental Characteristics[1]		
Storage Temperature Range	−55°C to +125°C	−55°C to +125°C
Temperature Coefficient		
Over Storage Temperature Range	±1,000PPM/°C	±150PPM/°C
Vibration (Single Section)	15G	15G
Voltage Ratio Shift	±5% maximum	±5% maximum
Total Resistance Shift	±2% maximum	±2% maximum
Shock (Single Section)	30G	30G
Voltage Ratio Shift	±5% maximum	±5% maximum
Total Resistance Shift	±2% maximum	±2% maximum
Load Life	1,000 hours	1,000 hours
Total Resistance Shift	±10% maximum	±5% maximum
Rotational Life (No Load)	100,000 cycles	100,000 cycles
Total Resistance Shift	(B & E tapers) 10 ohms or ±12% maximum (whichever is greater)	10 ohms or ±10% maximum (whichever is greater)
	(D, G, S & T tapers) ±20% maximum	
Moisture Resistance	MIL-STD-202, Method 103, Condition B	MIL-STD-202, Method 103, Condition B
Total Resistance Shift	(B & E tapers) ±10% maximum	±5% maximum (all tapers)
	(D, G, S & T tapers) ±20% maximum	
Insulation Resistance (500 VDC)	100 megohms minimum	100 megohms minimum
Mechanical Characteristics[1]		
Running Torque (Non-Locking Bushings)		
Single Section	0.2 to 1.5 oz-in.	0.2 to 1.5 oz-in.
Dual Section	0.2 to 1.5 oz-in.	0.2 to 1.5 oz-in.
Triple Section	0.5 to 2.0 oz-in.	0.5 to 2.0 oz-in.
Quadruple Section	0.5 to 2.0 oz-in.	0.5 to 2.0 oz-in.
Running Torque (Locking Bushings)	0.2 to 4.0 oz-in.	0.2 to 4.0 oz-in.
Shaft Locking Torque with Locknut @ 10 in-lb. (B & E Bushings)	20 in-oz.	20 in-oz.
Stop Strength	1/4" and 1/8" shafts — 4 in-lb. minimum	1/4" and 1/8" shafts — 4 in-lb. minimum
	.078" shaft — 2 in-lb. minimum	.078" shaft — 2 in-lb. minimum
Mechanical Angle	300° ±5°	300° ±5°
Weight (Single Section)	21 grams maximum	21 grams maximum
Each Additional Section	6 grams maximum	6 grams maximum
Terminals	Printed circuit terminals or J-Hooks	Printed circuit terminals or J-Hooks
Markings	Manufacturer's trademark, wiring diagram, date code, resistance, manufacturer's part number	Manufacturer's symbol, wiring diagram, date code, resistance, manufacturer's part number.

NOTE: Model 81/82 performance specifications do not apply to units subjected to printed circuit board cleaning procedures.

[1]At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.

Specifications are subject to change without notice.



BOURNS

5/8'' SQUARE / 10-TURN / MODULAR WIREWOUND OR HYBRITRON® ELEMENT

- Compatible with other members of the Model 80 Series
- The only 10-turn precision potentiometer in a modular panel control package
- Up to 3 sections available

FOR ORDERING INFORMATION SEE PAGE 140.

Models 83/84

Bourns® Precision Potentiometers

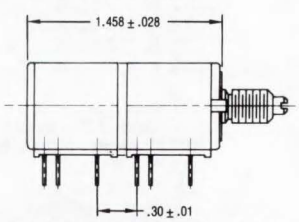
	Wirewound Element (J Taper)	Hybritron® Element (K Taper)
Initial Electrical Characteristics[1]		
Standard Resistance Range	200 to 100K ohms	1K to 100K ohms
Resistance Tolerance	±5%	±10%
Independent Linearity	±0.25%	±0.25%
Effective Electrical Angle	3600° +10°, −0°	3600° +10°, −0°
Minimum Resistance (J Taper)	1.0 ohm or 0.1% (whichever is greater)	—
End Voltage (K Taper)	—	0.2% of applied voltage
Noise (J Taper)	100 ohms ENR maximum	—
Output Smoothness (K Taper)	—	0.15% maximum
Power Rating (Voltage Limited by Power Dissipation or 316 VAC, Whichever is Less)		
+70°C	1 watt	1 watt
+125°C	0 watt	0 watt
Dielectric Withstanding Voltage	MIL-STD-202, Method 301	MIL-STD-202, Method 301
Sea Level	1,000 VAC minimum	1,000 VAC minimum
Insulation Resistance (500 VDC)	1,000 megohms minimum	1,000 megohms minimum
Theoretical Resolution	See table	Essentially infinite
Environmental Characteristics[1]		
Storage Temperature Range	−55°C to +125°C	−55°C to +125°C
Temperature Coefficient Over Storage Temperature Range	±50PPM/°C	±100PPM/°C
Vibration	15G	15G
Wiper Bounce	0.1 millisecond maximum	0.1 millisecond maximum
Shock	50G	50G
Wiper Bounce	0.1 millisecond maximum	0.1 millisecond maximum
Load Life	1,000 hours	1,000 hours
Total Resistance Shift	±2% maximum	±5% maximum
Rotational Life (No Load)	1,000,000 shaft revolutions	4,000,000 shaft revolutions
Total Resistance Shift	±5% maximum	±5% maximum
Moisture Resistance	MIL-STD-202, Method 103, Condition B	MIL-STD-202, Method 103, Condition B
Total Resistance Shift	±2% maximum	±5% maximum
Insulation Resistance (500 VDC)	100 megohms minimum	100 megohms minimum
Mechanical Characteristics[1]		
Mechanical Angle	3600° +15°, −0°	3600° +15°, −0°
Shaft Runout	0.006 in. T.I.R.	0.006 in. T.I.R.
Shaft End Play	0.014 in. T.I.R.	0.014 in. T.I.R.
Shaft Radial Play	0.005 in. T.I.R.	0.005 in. T.I.R.
Stop Strength	48.0 oz-in. minimum	48 oz-in. minimum
Running Torque (1 or 2 Section)	0.25 to 2.0 oz-in.	0.25 to 2.0 oz-in.
Weight	Approximately 0.75 oz.	Approximately 0.75 oz.
Terminals	Printed circuit terminals or solder lugs	Printed circuit terminals or solder lugs
Markings	Manufacturer's trademark, wiring diagram, date code, resistance, manufacturer's part number	Manufacturer's symbol, wiring diagram, date code, resistance, manufacturer's part number.

Wirewound Resolution Table

Resistance (ohms)	Resolution (nom.) (%)
200	.048
500	.037
1K	.032
2K	.031
5K	.023
10K	.020
20K	.015
50K	.012
100K	.010

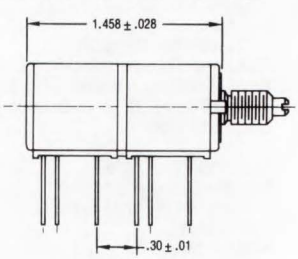
Dimensional Drawings

Dual Section Model 84 Solder Lugs



Note: The Models 83/84 dimensions for dual section assembly are for either single or dual concentric shaft styles.

Dual Section Model 83 PC Pins



NOTE: Model 83/84 performance specifications do not apply to units subjected to printed circuit board cleaning procedures.

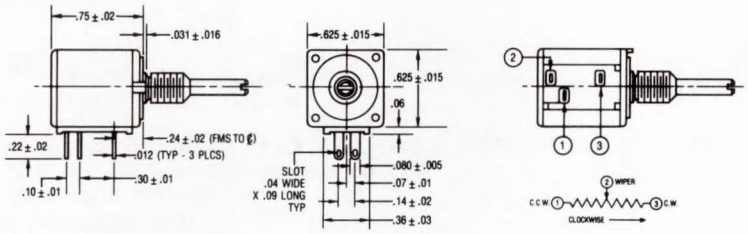
[1]At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.

Specifications are subject to change without notice.

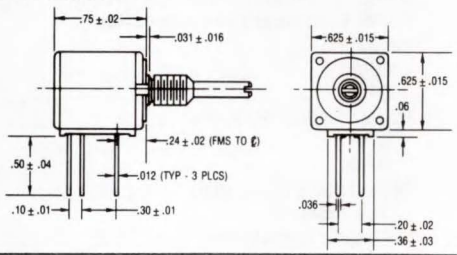
Models 83/84

Bourns® Precision Potentiometers

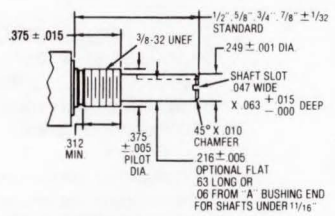
Solder Lug Model 84



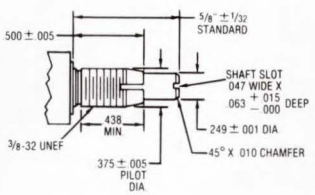
PC Pin Model 83



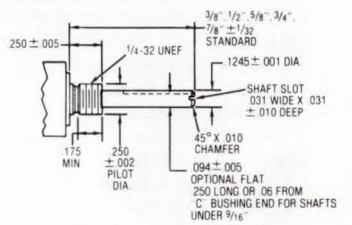
"A" Bushing
3/8" Dia. Plain - Single Shaft



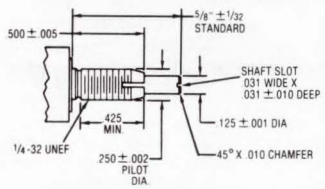
"B" Bushing
3/8" Dia. Locking - Single Shaft



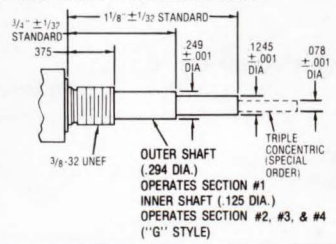
"C" Bushing
1/4" Dia. Plain - Single Shaft



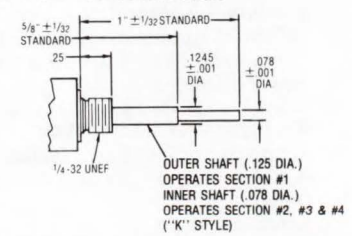
"E" Bushing
1/4" Dia. Locking - Single Shaft



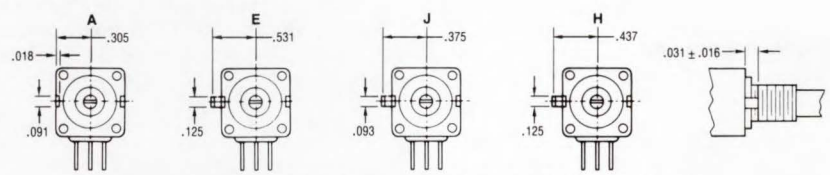
"A" Bushing
3/8" Dia. Plain - Concentric Shaft



"C" Bushing
1/4" Dia. Plain - Concentric Shaft

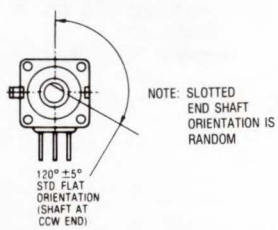


Locating Lug Options - All Model 80 Series



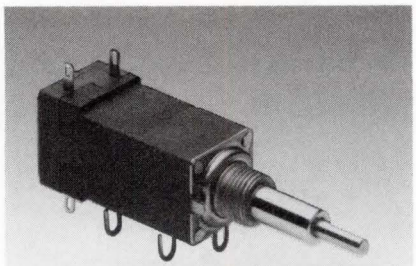
NOTE: "D" OPTION - NO A/R LUG. OTHER LOCATING LUG OPTIONS AVAILABLE. FOR DETAILS CONSULT FACTORY.

Shaft Flat Orientation



TOLERANCES EXCEPT AS SHOWN: DECIMAL .XXX ± .005
.XX ± .015
FRACTION ± 1/64
ANGLE ± 5°

Specifications are subject to change without notice.



BOURNS

5/8 INCH SQUARE/SINGLE-TURN/ROTARY SWITCH MODULE/CERMET OR CONDUCTIVE PLASTIC

- Designed for "on-off" function control
- Positive action, "non-tease" detent
- Low actuation torque

FOR DIMENSIONAL DRAWINGS SEE PAGE 139.
FOR ORDERING INFORMATION SEE PAGE 140.

Models 85/86

Bourns® Panel Controls

Switch specifications listed below.

Initial Electrical Characteristics[1]

Contacts:	
DPST	N.O./N.O., N.C./N.C. or N.O./N.C.
DPDT	2 N.O./N.C. (break before make)
Power Rating (Resistive Load):	
DPST	2A @ 125 volts RMS-60Hz or 2A @ 28 VDC, 1A @ 250 volts RMS-60 Hz
DPDT	1A @ 125 volts RMS-60 Hz or 1A @ 28 VDC
Dielectric Withstanding Voltage	MIL-STD-202, Method 301
Sea Level	1000 VAC minimum
Insulation Resistance	1000 megohms minimum
Contact Resistance (.1VDC-10ma.)	10 milliohms nominal
Contact Bounce	5 milliseconds maximum

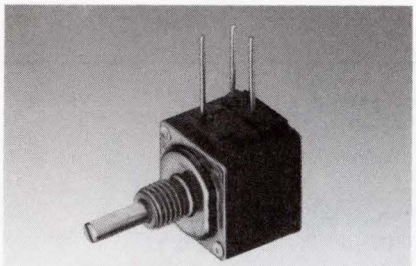
Environmental Characteristics[1]

Operating Temperature Range	0° to +70°C
Exposure Temperature Range	−65° to +125°C
Vibration (Dual Section)	8G
Contact Resistance	10 milliohms maximum
Contact Bounce	0.1 millisecond maximum
Shock (Dual Section)	20G
Contact Resistance	10 milliohms maximum
Contact Bounce	0.1 millisecond maximum
Rotational Life	25,000 cycles
Switch Actuating Torque (50% Duty Cycle @ Rated Power Load)	2-7 oz-in.
Contact Resistance	100 milliohms maximum
Moisture Resistance	MIL-STD-202, Method 106, Condition B
Contact Resistance (0.1VDC-10ma)	10 milliohms maximum
Insulation Resistance (After 24 Hours @ Room Temperature) (500 VDC)	100 megohms minimum
Housing Material	High temperature, flame retardant, thermosetting plastic

Mechanical Characteristics[1]

Actuating Torque (Each Section, Switch Module Only)	5-15 oz-in.
Running Torque (Out of Detent, 2-4 Module Assembly)	0.3-2 oz-in.
Detent	CW or CCW standard
Actuation Angle	25°
Contact Materials	Fine silver with gold overlay
Terminal Styles	Solder lug only
Standard Orientation	In-line with control terminals
Optional	Rotated 90° CCW from standard
Terminal Strength (Before and After Soldering Heat Exposure)	2 lbs. minimum

NOTE: Model 85/86 performance specifications do not apply to units subjected to printed circuit board cleaning procedures.
[1]At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.
Specifications are subject to change without notice.



BOURNS

5/8 INCH SQUARE/SINGLE-TURN MODULAR/SEMI-PRECISION/CERMET OR CONDUCTIVE PLASTIC

- Zero base linearity, as low as 1% available
- Exclusive shaft torque control feature
- Up to 4 sections available

FOR DIMENSIONAL DRAWINGS SEE PAGE 138.
FOR ORDERING INFORMATION SEE PAGE 140.

Models 87/88

Bourns® Panel Controls

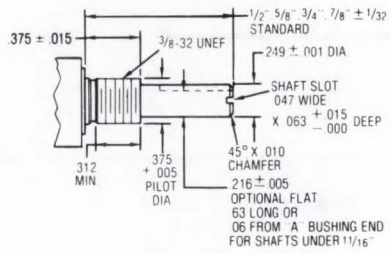
	Conductive Plastic Element	Cermet Element
Initial Electrical Characteristics[1]		
Standard Resistance Range	(L & N) 250 ohms to 2.5 megohms	(M & P) 250 ohms to 2.5 megohms
Resistance Tolerance	±5%	±3%
Zero Base Linearity	(L) Standard ±2%, (N) Optional ±1%	(M) Standard ±2.5%, (P) Optional ±1.5%
Absolute Minimum Resistance	2 ohms	2 ohms
Continuity	Maintained for full mechanical angle	Maintained for full mechanical angle
Effective Electrical Angle	240° ±4°	240° ±6°
Contact Resistance Variation	±1%	±1.5% or 3 ohms (whichever is greater)
Theoretical Resolution	Essentially infinite	Essentially infinite
Dielectric Withstanding Voltage	MIL-STD-202, Method 301	MIL-STD-202, Method 301
Sea Level	1,000 VAC minimum	1,000 VAC minimum
70,000 Feet	500 VAC minimum	500 VAC minimum
Insulation Resistance (500 VDC)	1,000 megohms minimum	1,000 megohms minimum
Power Rating (Voltage Limited by Power Dissipation or 350 VAC, Whichever is Less)		
+70°C Single Section Assembly	1 watt	2 watts
+70°C Multiple Section Assembly	0.5 watt/section	1 watt/section
+125°C	0 watt	0 watt
Roll-on/Roll-off	0.5% maximum	0.5% maximum
Environmental Characteristics[1]		
Storage Temperature Range	−55°C to +125°C	−65°C to +150°C
Temperature Coefficient Over Storage Temperature Range	±1,000PPM/°C	±150PPM/°C
Vibration (Single Section)	15G	15G
Voltage Ratio Shift	±5% maximum	±5% maximum
Total Resistance Shift	±2% maximum	±2% maximum
Shock (Single Section)	30G	30G
Voltage Ratio Shift	±5% maximum	±5% maximum
Total Resistance Shift	±2% maximum	±2% maximum
Load Life	1,000 hours	1,000 hours
Total Resistance Shift	±10% maximum	±5% maximum
Rotational Life (No Load)	100,000 cycles	100,000 cycles
Total Resistance Shift	10 ohms or ±12% maximum (whichever is greater)	10 ohms or ±10% maximum (whichever is greater)
Moisture Resistance	MIL-STD-202, Method 103, Condition B	MIL-STD-202, Method 103, Condition B
Total Resistance Shift	±10% maximum	±10% maximum
Insulation Resistance (500 VDC)	100 megohms minimum	100 megohms minimum
Mechanical Characteristics[1]		
Running Torque (Non-Locking Bushings)		
Single or Dual Section (A & B Bushings)	0.3 to 1.5 oz-in.	0.3 to 1.5 oz-in.
Single or Dual Section (C & E Bushings)	0.3 to 1.5 oz-in.	0.3 to 1.5 oz-in.
Triple Section (All Bushings)	0.5 to 2.0 oz-in.	0.5 to 2.0 oz-in.
Quadruple Section (All Bushings)	0.5 to 2.0 oz-in.	0.5 to 2.0 oz-in.
Shaft Locking Torque with Locknut @ 10 in-lb. (B & E Bushings)	20 in-oz.	20 in-oz.
Stop Strength	1/4" and 1/8" shafts — 4 in-lb. minimum .078" shaft — 2 in-lb. minimum	1/4" and 1/8" shafts — 4 in-lb. minimum .078" shaft — 2 in-lb. minimum
Mechanical Angle	300° ±5°	300° ±5°
Weight (Single Section)	21 grams maximum	21 grams maximum
Each Additional Section	6 grams maximum	6 grams maximum
Terminals	Printed circuit terminals or J-Hooks	Printed circuit terminals or J-Hooks
Markings	Manufacturer's trademark, wiring diagram, date code, resistance, manufacturer's part number	Manufacturer's symbol, wiring diagram, date code, resistance, manufacturer's part number.

NOTE: Model 87/88 performance specifications do not apply to units subjected to printed circuit board cleaning procedures.
[1]At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.
Specifications are subject to change without notice.

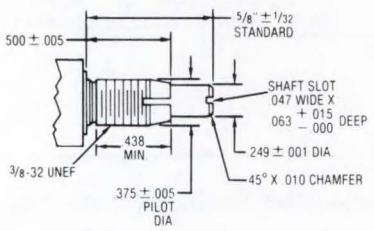
BOURNS

DIMENSIONAL DRAWINGS AND TOLERANCES
Model 81, 82, 87, 88

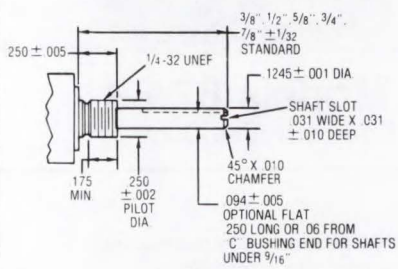
"A" Bushing
3/8" Dia. Plain - Single Shaft



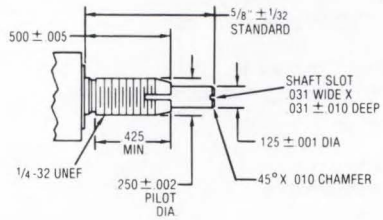
"B" Bushing
3/8" Dia. Locking - Single Shaft



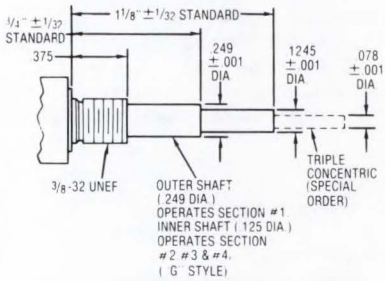
"C" Bushing
1/4" Dia. Plain - Single Shaft



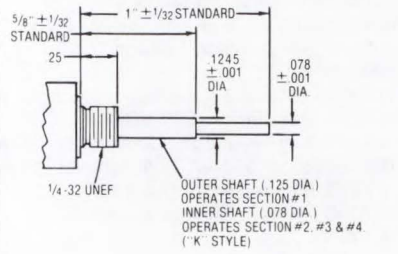
"E" Bushing
1/4" Dia. Locking - Single Shaft



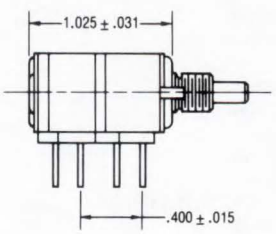
"A" Bushing
3/8" Dia. Plain - Concentric Shaft



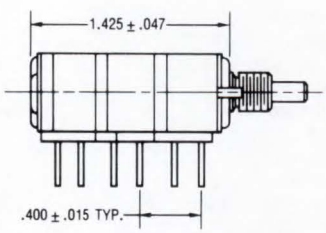
"C" Bushing
1/4" Dia. Plain - Concentric Shaft



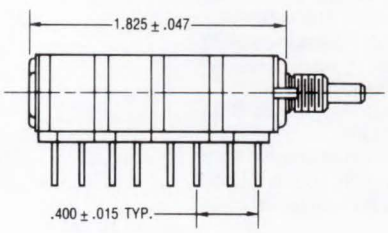
Dual Unit - PC Pins & J-Hook



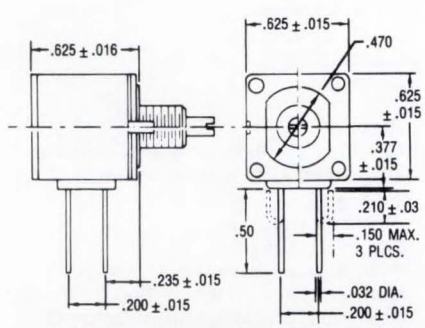
Triple Unit - PC Pins & J-Hook



Quad Unit - PC Pins & J-Hook

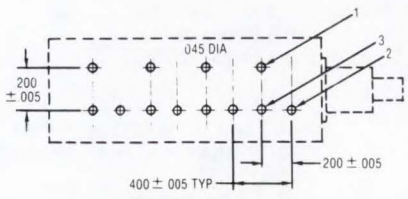


Model 81/82, 87/88
Single Unit - PC Pins & J-Hook



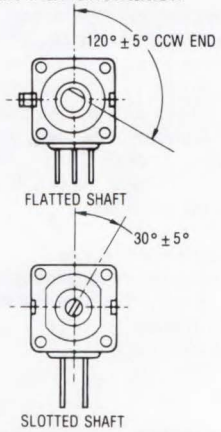
Terminal outlines shown as solid lines represent PC Pins, available on Model 81/87. Dashed line terminal outline represents "J" Hook, available on Model 82/88.

Model 81, 87
Suggested PC Board Layout - PC Pins
(Single-Shaft Style Bottom View)



Note: For units with dual concentric shaft styles, a .100 spacer is added between the module(s) driven by the outer shaft and those driven by the inner shaft. For G, K, or V shafts, add the spacer between modules 1 and 2. For L or M shafts, add the spacer between modules 2 and 3. For N or P shafts, add the spacer between modules 3 and 4.

Shaft Flat Orientation*

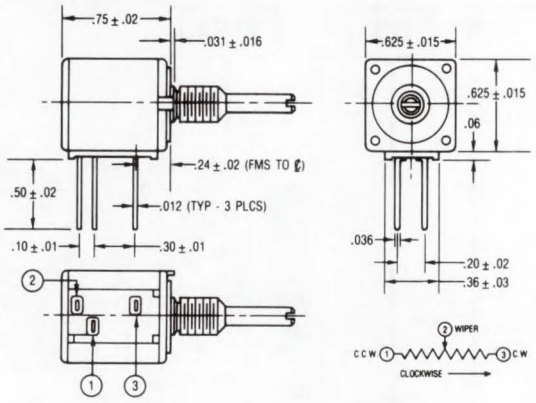


*EXCLUDES MODELS 83 AND 84

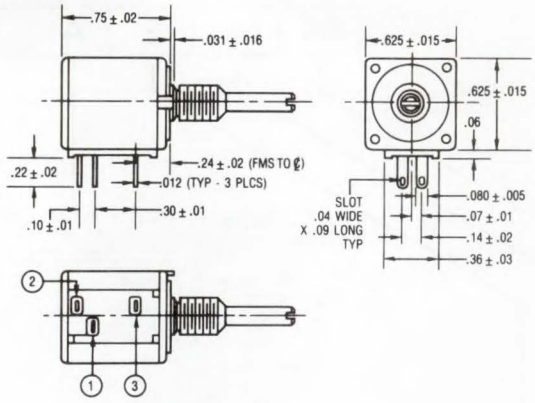
BOURNS

DIMENSIONAL DRAWINGS AND TOLERANCES
Model 83, 84, 85, 86

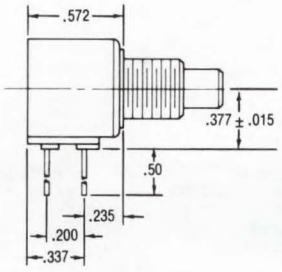
PC Pin Model 83



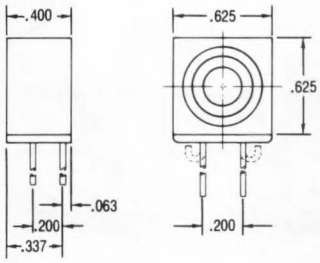
Solder Lug Model 84



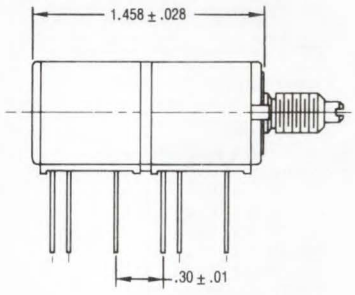
Primary Potentiometer Module Model 85/86



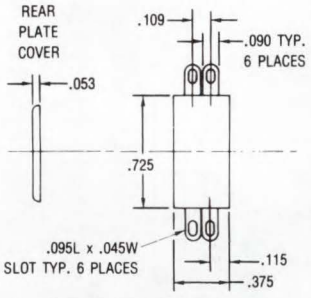
Secondary Potentiometer Module Model 85/86



Dual Section Model 83 PC Pins

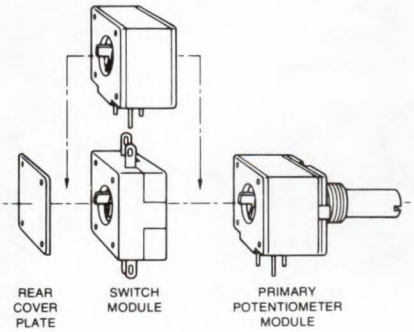


Switch Module Model 85/86

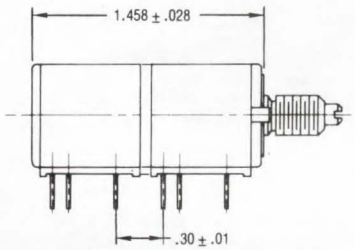


Note: For switch contact configurations and terminal identification, see "Switch Model Variations" on page 128.

Assembly Sequence Model 85/86 Secondary Potentiometer Module



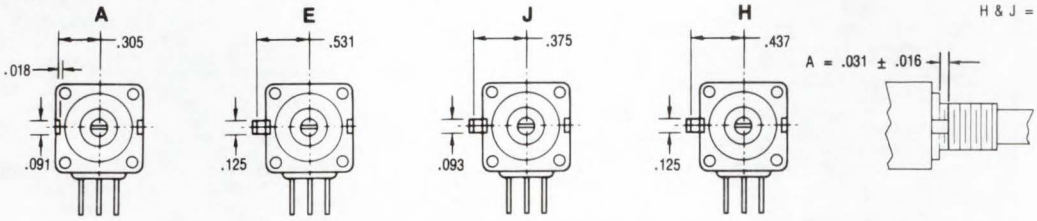
Dual Section Model 84 Solder Lugs



Note: The Models 83/84 dimensions for dual section assembly are for either single or dual concentric shaft styles.

TOLERANCES EXCEPT AS SHOWN: DECIMAL .XXX ± .005
.XX ± .015
FRACTION ± 1/64
ANGLE ± 5°

Locating Lug Options - All Model 80 Series



NOTE: "D" OPTION - NO A/R LUG. OTHER LOCATING LUG OPTIONS AVAILABLE. FOR DETAILS CONSULT FACTORY.

BOURNS

HOW TO ORDER
80 Series Panel Controls

85	A	2	A	B	28	A	03	R51

SWITCH TYPE (MODELS 85 & 86 ONLY)	
(R50)	DPST N.O./N.C. CW Detent In-Line Term
(R51)	DPST N.O./N.C. CCW Detent In-Line Term
(R52)	DPST N.O./N.O. CW Detent In-Line Term
(R53)	DPST N.O./N.O. CCW Detent In-Line Term
(R54)	DPST N.C./N.C. CW Detent In-Line Term
(R55)	DPST N.C./N.C. CCW Detent In-Line Term
(R56)	DPST N.O./N.C. CW Detent Horz Term
(R57)	DPST N.O./N.C. CCW Detent Horz Term
(R58)	DPST N.O./N.O. CW Detent Horz Term
(R59)	DPST N.O./N.O. CCW Detent Horz Term
(R60)	DPST N.C./N.C. CW Detent Horz Term
(R61)	DPST N.C./N.C. CCW Detent Horz Term
(R70)	DPDT CW Detent In-Line Term
(R71)	DPDT CCW Detent In-Line Term
(R72)	DPDT CW Detent Horz Term
(R73)	DPDT CCW Detent Horz Term

NOTE: All switch model terminals are solder lugs.

ANTI-ROTATION LUG	
A	Single .305R, 90°CW
B	Double .305R, 90° & 270°CW
C	Single .305R, 270°CW
D	No Lug
E	Single .531R, 90°CW
F	Single .305R, 180°CW
G	Single .305R, 0°CW
H	Single .437R, 90°CW
J	Single .375R, 90°CW
K	Double, .375R, 90° & 270°W

# SECTIONS		APPLICABLE MODELS
1	Single	81,82,83,84,87,88
2	Double	81,82,83,84,85,86,87,88
3	Triple	81,82,83*,84*,85*,86*,87,88
4	Quad	81,82,85*,86*,87,88

*Consult Factory

BUSHING	
A	Plain 3/8"D x 3/8"L
B	Locking 3/8"D x 1/2"L
C	Plain 1/4"D x 1/4"L
E	Locking 1/4"D x 1/2"L
J	Plain 3/8"D x 1/4"L
N	Plain 1/4"D x 3/8"L
R	Plain 10mmD x 9mmL
U	Plain 7mmD x 6mmL

MODEL	
81	Single-Turn, PC Pins
82	Single-Turn, J-Hooks
83	10-Turn, PC Pins
84	10-Turn, Solder Lugs
85	Single-Turn, Pot/Rotary Switch, PC Pins
86	Single-Turn, Pot/Rotary Switch, J-Hooks
87	Single-Turn, PC Pins, Semi-Precision
88	Single-Turn, J-Hooks, Semi-Precision

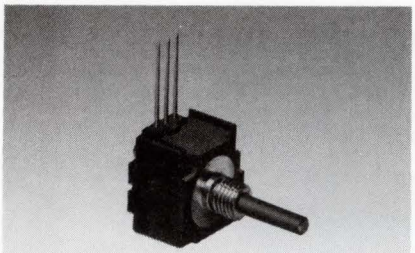
SHAFT LENGTH (From Mounting Surface)		Available Only In BUSHINGS (CODE)
12	3/8"L	C, N*, J
16	1/2"L	A, C, J, N
20	5/8"L	A, B, C, E, J, N
24	3/4"L	A, B, C, E, J, N
28	3/8"L	A, B, C, E, J, N
32	1"L	C, N
36	1-1/8"L	A, C, J, N
40	1-1/4"L	A, J
	METRIC	
10	10mmL	U
13	13mmL	U
16	16mmL	R
19	19mmL	R
22	22mmL	R, U
30	30mmL	R
42	42mmL	R
50	50mmL	R

*Consult Factory

SHAFT TYPE		Available Only In LENGTHS (CODE)	Available Only In BUSHINGS (CODE)
A	Single Plain 1/4"D	16,20,24,28	A, B, J
B	Single Slotted 1/4"D	16,20,24,28	A, B, J
C	Single Flatted 1/4"D	24,28	A, B, J
D	Single Plain 1/8"D	Consult Factory	C, N
E	Single Slotted 1/8"D	12,16,20,24,28	C, E, N
F	Single Flatted 1/8"D	Consult Factory	C, N
G	Dual Concentric Plain 1/4"D - 1/8"D Outer Operates Section 1	36,40	A, J
K	Dual Concentric Plain 1/8"D - 5/64"D Outer Operates Section 1	32,36	C, N
L	Dual Concentric Plain 1/4"D - 1/8"D Outer Operates Sections 1/2	36,40	A, J
M	Dual Concentric Plain 1/8"D - 5/64"D Outer Operates Sections 1/2	32,36	C, N
N	Dual Concentric Plain 1/4"D - 1/8"D Outer Operates Sections 1/2/3	36,40	A, J
P	Dual Concentric Plain 1/8"D - 5/64"D Outer Operates Sections 1/2/3	32,36	C, N
R	Single Slotted 6mmD	16,19,22,50	R
T	Single Slotted 4mmD	10,13,22	U
V	Dual Concentric Plain 6mmD - 2mmD Outer Operates Section 1	30,42	R

ELEMENT TYPE/TAPER/TOLERANCE		RESISTANCE CODE VALUE IN OHMS	
MODELS 81, 82, 85 AND 86 ONLY			
(A)	Linear Cermet ±10%	(03) — 50	(30) — 15K
(H)	Linear Cermet ±5%	(04) — 75	(16) — 20K
		(05) — 100	(17) — 25K
		(28) — 150	(18) — 50K
		(06) — 200	(19) — 75K
		(07) — 250	(20) — 100K
		(08) — 500	(31) — 150K
		(09) — 750	(21) — 200K
		(10) — 1K	(22) — 250K
		(29) — 1.5K	(23) — 500K
		(11) — 2K	(24) — 750K
		(12) — 2.5K	(25) — 1M
		(13) — 5K	(36) — 2M
		(14) — 7.5K	(26) — 2.5M
		(15) — 10K	(27) — 5M
(B)	Linear C-P ±20%	(07) — 250	(18) — 50K
(E)	Linear C-P ±10%	(08) — 500	(20) — 100K
		(10) — 1K	(22) — 250K
		(12) — 2.5K	(23) — 500K
		(13) — 5K	(25) — 1M
		(15) — 10K	(26) — 2.5M
		(16) — 20K	(27) — 5M
		(17) — 25K	
(C)	CW Audio Cermet ±10%	(10) — 1K	(20) — 100K
(D)	CW Audio C-P ±20%	(12) — 2.5K	(22) — 250K
(F)	CCW Audio Cermet ±10%	(13) — 5K	(23) — 500K
(G)	CCW Audio C-P ±20%	(15) — 10K	(25) — 1M
(S)	CW Audio C-P ±10%	(17) — 25K	(26) — 2.5M*
(T)	CCW Audio C-P ±10%	(18) — 50K	
MODELS 83 AND 84 ONLY			
		J	K
(J)	Linear Wirewound 10-Turn ±5%	(06) — 200	(10) — 1K
(K)	Linear Hybritron® Elements 10-Turn ±10%	(08) — 500	(11) — 2K
		(10) — 1K	(13) — 5K
		(11) — 2K	(15) — 10K
		(13) — 5K	(16) — 20K
		(15) — 10K	(18) — 50K
		(16) — 20K	(20) — 100K
		(18) — 50K	
		(20) — 100K	
MODELS 87 AND 88 ONLY			
(L)	Linear C-P ±5% Tol ±2% Z.B. Linearity	(07) — 250	(18) — 50K
(M)	Linear Cermet ±3% Tol ±2.5% Z.B. Linearity	(08) — 500	(20) — 100K
(N)	Linear C-P ±5% Tol. ±1% Z.B. Linearity	(10) — 1K	(22) — 250K
(P)	Linear Cermet ±3% Tol. ±1.5% Z.B. Linearity	(12) — 2.5K	(23) — 500K
		(13) — 5K	(25) — 1M
		(15) — 10K	(26) — 2.5M*
		(17) — 25K	
ELEMENT TYPE ATTENUATOR/IMPEDENCE/TOLERANCE MODELS 81 & 82 THREE SECTION ONLY			
ST3510	Straight T, 600 ohm impedence, ±10% tolerance		
ST3520	Straight T, 600 ohm impedence, ±20% tolerance		

*Cermet only.



BOURNS

5/8 INCH SQUARE/SINGLE-TURN MODULAR/CERMET OR CONDUCTIVE PLASTIC

- Features one-piece molded plastic shaft and rotor
- Virtually infinite electrical circuit isolation
- Available in a variety of pin-out configurations

FOR DIMENSIONAL DRAWINGS SEE PAGE 143.
FOR ORDERING INFORMATION SEE PAGE 144.

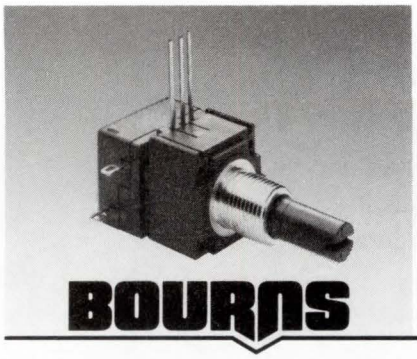
Models 91, 92, 93, 94, 95, 96

Bourns® Panel Controls

	Conductive Plastic Element	Cermet Element
Initial Electrical Characteristics[1]		
Standard Resistance Range		
Linear Tapers (A, B, E, & H)	(B & E) 150 ohms to 5 megohms	(A & H) 50 ohms to 5 megohms
Audio Tapers (C, D, F, G, S, & T)	(D, G, S, & T) 1K ohms to 5.0 megohms	(C & F) 1K ohms to 5.0 megohms
Resistance Tolerance	(B, D, & G tapers) ±20%	(A, C, & F tapers) ±10%
	(E, S, & T tapers) ±10%	(H taper) ±5%
Independent Linearity	(B & E tapers) ±5%	(A & H tapers) ±5%
Absolute Minimum Resistance	2 ohms maximum	2 ohms maximum
Continuity	Maintained for full mechanical angle.	Maintained for full mechanical angle.
Effective Electrical Angle	240° ±5°	240° ±6°
Contact Resistance Variation	±1%	±1% or 3 ohms (whichever is greater)
Theoretical Resolution	Essentially infinite	Essentially infinite
Dielectric Withstanding Voltage	MIL-STD-202, Method 301	MIL-STD-202, Method 301
Sea Level	1,000 VAC minimum	1,000 VAC minimum
70,000 Feet	500 VAC minimum	500 VAC minimum
Insulation Resistance (500 VDC)	1,000 megohms minimum	1,000 megohms minimum
Power Rating (Voltage Limited by Power Dissipation or 350 VAC, Whichever is Less)		
+70°C Single Section Assembly	(B & E tapers) 1 watt	(A & H tapers) 2 watts
	(D, G, S, & T tapers) 0.5 watt	(C & F tapers) 1 watt
+70°C Multiple Section Assembly	(B & E tapers) 0.5 watt/section	(A & H tapers) 1 watt/section
	(D, G, S & T tapers) 0.25 watt/section	(C & F tapers) 0.5 watt/section
+125°C	0 watt	0 watt
Roll-on/Roll-off	(B & E tapers) 0.25% maximum	(A & H tapers) 0.5% maximum
	(D & S tapers) 0.1% maximum CCW end	(C taper) 0.1% maximum CCW end
	(G & T tapers) 0.1% maximum CW end	(F taper) 0.1% maximum CW end
	(D & S tapers) 0.5% maximum CW end	(C taper) 1.0% maximum CW end
	(G & T tapers) 0.5% maximum CCW end	(F taper) 1.0% maximum CCW end
Environmental Characteristics[1]		
Storage Temperature Range	−55°C to +125°C	−55°C to +125°C
Temperature Coefficient		
Over Storage Temperature Range	±1,000PPM/°C	±150PPM/°C
Vibration (Single Section)	15G	15G
Voltage Ratio Shift	±5% maximum	±5% maximum
Total Resistance Shift	±2% maximum	±2% maximum
Shock (Single Section)	30G	30G
Voltage Ratio Shift	±5% maximum	±5% maximum
Total Resistance Shift	±2% maximum	±2% maximum
Load Life	1,000 hours	1,000 hours
Total Resistance Shift	±10% maximum	±5% maximum
Rotational Life (No Load)	100,000 cycles	100,000 cycles
Total Resistance Shift	(B & E tapers) 10 ohms or ±15% max. (whichever is greater)	10 ohms or ±10% maximum (whichever is greater)
	(D, G, S & T tapers) ±20% maximum	
Contact Resistance Variation @ 50,000 cycles	(B & E tapers) ±2%	
	(D, G, S & T tapers) ±3%	
Moisture Resistance	MIL-STD-202, Method 103, Condition B	MIL-STD-202, Method 103, Condition B
Total Resistance Shift	(B & E tapers) ±10% maximum	±5% maximum (all tapers)
	(D, G, S & T tapers) ±20% maximum	
Insulation Resistance (500 VDC)	100 megohms minimum	100 megohms minimum

Mechanical Characteristics[1]	
Running Torque	
Single or Dual Section (A, D & R Bushings)	0.3 to 1.5 oz-in.
Single or Dual Section (C & U Bushings)	0.2 to 1.5 oz-in.
Starting Torque	0.3 oz-in. maximum above average running torque
Torque Variation	0.5 oz-in. maximum in 45° shaft travel
Stop Strength (1/4" D Shaft)	4 in-lb.
(1/8" D Shaft)	3 in-lb.
Mechanical Angle	300° ±5°
Weight (Single Section)	7 grams maximum
Each Additional Section	4 grams maximum
Terminals	Printed circuit terminals, J-Hooks or solder lugs
Markings	Manufacturer's trademark, date code, resistance, manufacturer's part number

NOTE: All Model 90 performance specifications do not apply to units subjected to printed circuit board cleaning procedures, except for the sealed version (Model 96).
[1]At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.
Specifications are subject to change without notice.



5/8 INCH SQUARE/SINGLE-TURN/ROTARY SWITCH MODULE/CERMET OR CONDUCTIVE PLASTIC

- Designed for "on-off" function control
- Positive action "non-tease" detent
- Low actuation torque

FOR ORDERING INFORMATION SEE PAGE 144.

Models 97, 98, 99

Bourns® Panel Controls

Switch specifications are listed below. For potentiometer specifications see Models 93/94/95, page 126.

Initial Electrical Characteristics[1]

Contacts:	
DPST	N.O./N.O., N.C./N.C. or N.O./N.C.
DPDT	2 N.O./N.C. (break before make)
Power Rating (Resistive Load):	
DPST	2A @ 125 volts RMS-60 Hz or 2A @ 28 VDC, 1A @ 250 volts RMS-60 Hz
DPDT	1A @ 125 volts RMS-60 Hz or 1A @ 28 VDC
Dielectric Withstanding Voltage	MIL-STD-202, Method 301
Sea Level	1000 VAC minimum
Insulation Resistance	1000 megohms minimum
Contact Resistance (0.1 VDC-10ma.)	10 milliohms maximum
Contact Bounce	5 milliseconds maximum

Environmental Characteristics[1]

Operating Temperature Range	0° to +70°C
Exposure Temperature Range	−65° to +125°C
Vibration (Dual Section)	8G
Contact Resistance	10 milliohms maximum
Contact Bounce	0.1 millisecond maximum
Shock (Dual Section)	20G
Contact Resistance	10 milliohms maximum
Contact Bounce	0.1 millisecond maximum
Rotational Life	25,000 cycles
Switch Actuating Torque (50% Duty Cycle @ Rated Power Load)	2-7 oz-in.
Contact Resistance	100 milliohms maximum
Moisture Resistance	MIL-STD-202, Method 106, Condition B
Contact Resistance (0.1VDC-10ma.)	10 milliohms maximum
Insulation Resistance (After 24 Hours @ Room Temperature) (500 VDC)	100 megohms minimum
Housing Material	High temperature, flame retardant, thermosetting plastic

Mechanical Characteristics[1]

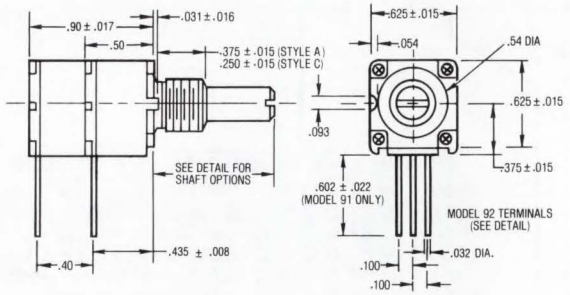
Actuating Torque (Each Section, Switch Module Only)	5-15 oz-in.
Running Torque (Out of Detent, 2-4 Module Assembly)	0.3-2 oz-in.
Detent	CW or CCW standard
Actuation Angle	20° ± 5°
Contact Materials	Fine silver with gold overlay
Terminal Styles	Solder lug only
Standard Orientation	In-line with control terminals
Optional	Rotated 90° CCW from standard
Terminal Strength (Before and After Soldering Heat Exposure)	2 lbs. minimum

NOTE: Model 97/98/99 performance specifications do not apply to units subjected to printed circuit board cleaning procedures.
[1]At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.
Specifications are subject to change without notice.

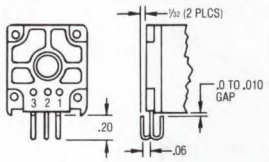
BOURNS

DIMENSION AND TOLERANCE DATA
Models 91, 92, 93, 94, 95, 96, 97, 98, 99

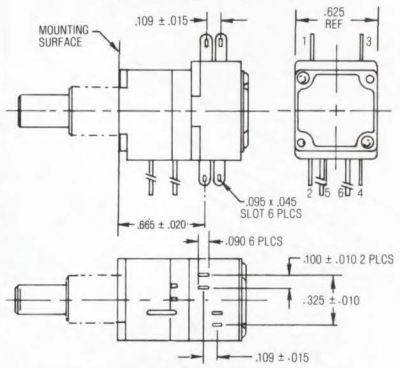
Model 91 PC Pin Terminals, In-Line



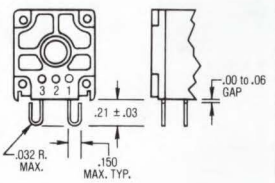
Model 92 J-Hooked Terminals, In-Line



Model 97 1st Cup Same As Model 93 (2nd Cup - Switch)

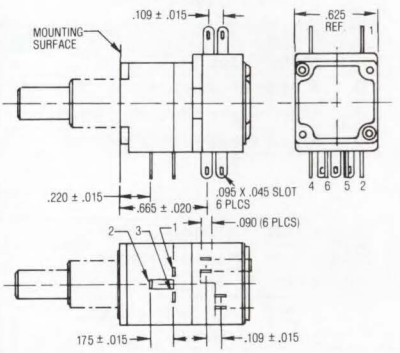


Model 94 J-Hooked Terminals, "L" Pattern

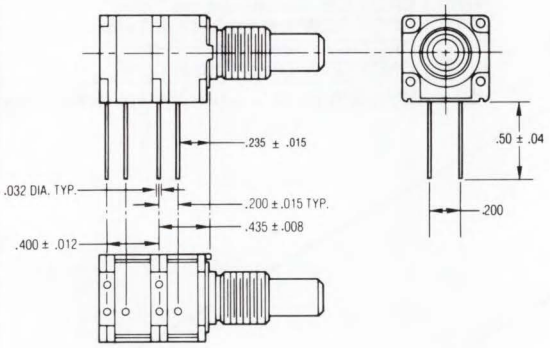


Model 98 1st Cup Same As Model 94 (2nd Cup - Switch)

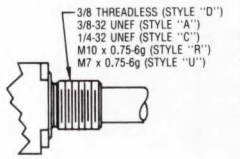
Model 99 1st Cup Same As Model 95 (2nd Cup - Switch)



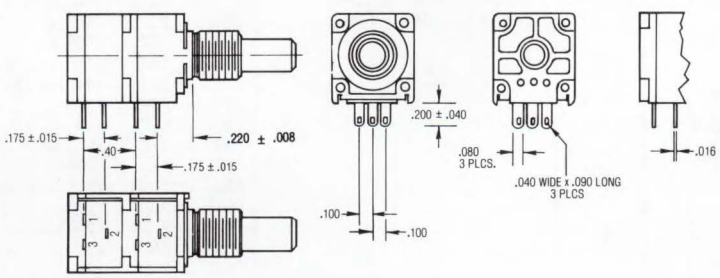
Model 93 PC Pin Terminals, "L" Pattern



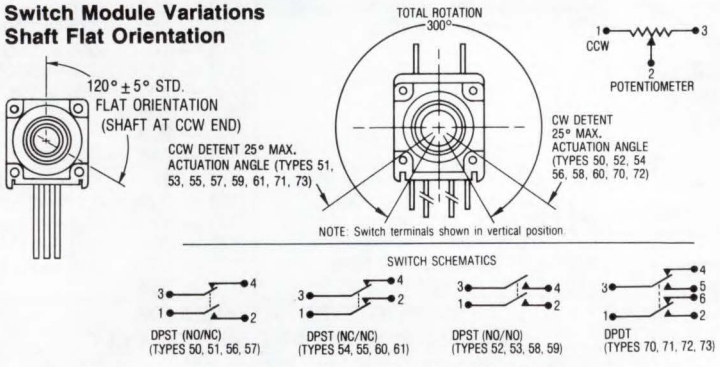
Bushing Styles



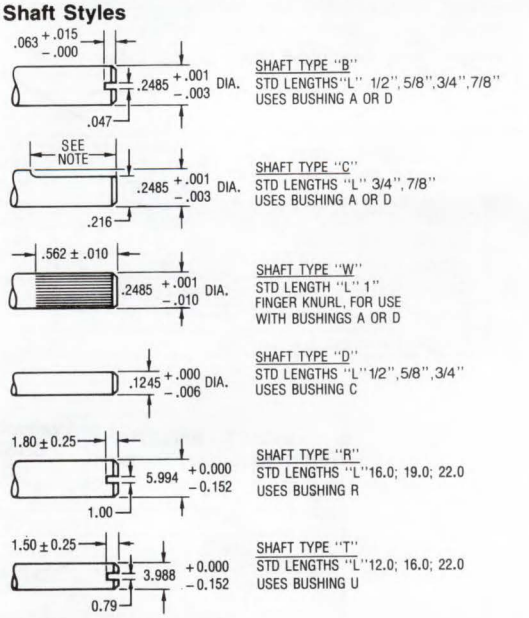
Model 95 Solder Lug Terminals, "Triangular" Pattern



Switch Module Variations Shaft Flat Orientation



Shaft Styles



* DIMENSIONS ARE IN MM

NOTE: FOR .750 SHAFT - FLAT LENGTH IS .313 - .875 SHAFT - FLAT LENGTH IS .440

TOLERANCES EXCEPT AS SHOWN: DECIMAL .XXX ± .005 FRACTION ± 1/64
.XX ± .015 ANGLE ± 5°

BOURNS

HOW TO ORDER
90 Series Panel Controls

PART NUMBERING SYSTEM

97	A	2	A - B	28 - B	15	R51

ANTI-ROTATION LUG	
A	Single .305R, 90°CW
C	Single .305R, 270°CW
D	No Lug

NO. SECTIONS	
1	Single, Models 91 Thru 96 Only
2	Dual, All Models, 2nd Section is a Switch in Models 97 Thru 99
3	Triple, Model 91/92 Attenuators Only

BUSHING	
A	Metal Plain 3/8"D x 3/8"L
C	Metal Plain 1/4"D x 1/4"L
D	Plastic Unthreaded 3/8"D x 3/8"L
R	Metal Plain 10mmD x 9mmL
U	Metal Plain 7mmD x 6mmL

SWITCH TYPE (MODELS 97, 98 & 99 ONLY)	
(R50)	DPST N.O./N.C. CW Detent In-Line Term
(R51)	DPST N.O./N.C. CCW Detent In-Line Term
(R52)	DPST N.O./N.O. CW Detent In-Line Term
(R53)	DPST N.O./N.O. CCW Detent In-Line Term
(R54)	DPST N.C./N.C. CW Detent In-Line Term
(R55)	DPST N.C./N.C. CCW Detent In-Line Term
(R56)	DPST N.O./N.C. CW Detent Horz Term
(R57)	DPST N.O./N.C. CCW Detent Horz Term
(R58)	DPST N.O./N.O. CW Detent Horz Term
(R59)	DPST N.O./N.O. CCW Detent Horz Term
(R60)	DPST N.C./N.C. CW Detent Horz Term
(R61)	DPST N.C./N.C. CCW Detent Horz Term
(R70)	DPDT CW Detent In-Line Term
(R71)	DPDT CCW Detent In-Line Term
(R72)	DPDT CW Detent Horz Term
(R73)	DPDT CCW Detent Horz Term

NOTE: All switch module terminals are solder lugs.

MODEL	
91	Single-Turn, In-Line PC Pins
92	Single-Turn, In-Line J-Hooks
93	Single-Turn, L-Pattern PC Pins
94	Single-Turn, L-Pattern J-Hooks
95	Single-Turn, Triangle-Pattern Solder Lugs
96	Single-Turn, In-Line PC Pins, Sealed
97	Single-Turn, L-Pattern PC Pins w/Switch
98	Single-Turn, L-Pattern J-Hooks w/Switch
99	Single-Turn, Triangle-Pattern Solder Lugs w/Switch

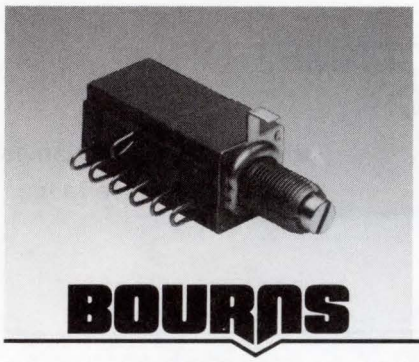
SHAFT TYPE (ALL PLASTIC)		Available Only In LENGTHS (CODE)	Available Only In BUSHINGS (CODE)
B	Single Slotted 1/4"D	16,20,24,28	A, D
C	Single Flatted 1/4"D	24,28	A, D
D	Single Plain 1/8"D	16,20,24	C
R	Single Slotted 6mmD	Metric 16,19,22	R
T	Single Slotted 4mmD	Metric 12,16,22	U
W	Single Knurled 1/4"D	32	A, D

SHAFT LENGTH (From Mounting Surface)		Available Only In BUSHINGS (CODE)
16	1/2"L	A, C, D
20	5/8"L	A, C, D
24	3/4"L	A, C, D
28	7/8"L	A, D
32	1"L	A, D
	METRIC	
12	12mmL	U
16	16mmL	R, U
19	19mmL	R
22	22mmL	R, U

ELEMENT TAPER TYPE/TOLERANCE		RESISTANCE CODE VALUE IN OHMS	
(A) (H)	Linear Cermet ±10% Linear Cermet ±5%	(03) — 50	(30) — 15K
		(04) — 75	(16) — 20K
		(05) — 100	(17) — 25K
		(28) — 150	(18) — 50K
		(06) — 200	(19) — 75K
		(07) — 250	(20) — 100K
		(08) — 500	(31) — 150K
		(09) — 750	(21) — 200K
		(10) — 1K	(22) — 250K
		(29) — 1.5K	(23) — 500K
		(11) — 2K	(24) — 750K
		(12) — 2.5K	(25) — 1M
		(13) — 5K	(36) — 2M
		(14) — 7.5K	(26) — 2.5M
		(15) — 10K	(27) — 5M
(B) (E)	Linear C-P ±20% Linear C-P ±10%	(07) — 250	(18) — 50K
		(08) — 500	(20) — 100K
		(10) — 1K	(22) — 250K
		(12) — 2.5K	(23) — 500K
		(13) — 5K	(25) — 1M
		(15) — 10K	
		(16) — 20K	
		(17) — 25K	
(C)	CW Audio Cermet ±10%	(10) — 1K	(20) — 100K
(D)	CW Audio C-P ±20%	(12) — 2.5K	(22) — 250K
(F)	CCW Audio Cermet ±10%	(13) — 5K	(23) — 500K
(G)	CCW Audio C-P ± 20%	(15) — 10K	(25) — 1M
(S)	CW Audio C-P ±10%	(17) — 25K	(26) — 2.5M*
(T)	CCW Audio C-P ±10%	(18) — 50K	

ELEMENT TYPE - ATTENUATOR MODELS 91 & 92 THREE SECTION ONLY	
ST3510	Straight T, 600 ohm impedence, ±10% tolerance
ST3520	Straight T, 600 ohm impedence, ±20% tolerance

*CERMET ONLY



VARIABLE ATTENUATORS/ STRAIGHT T-PAD

BOURNS

Models 81/82 & 91/92

Bourns® Variable Attenuators

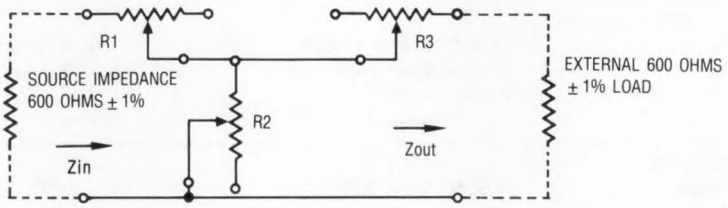
ATTENUATOR SPECIFICATIONS

- The impedance of the attenuator is 600 ohms ± 10% or ± 20% from DC through 15KHz and throughout the attenuation range when connected in the straight T-Pad configuration as shown in the schematic to a 600 ohm ± 1% source and a 600 ohm ± 1% load.
- Attenuation range is 30 dB minimum.
- Insertion loss, or minimum attenuation at output, 0.2 dB with shaft in full CW position.
- Adjustability ± 0.1 dB from 0.5 to 20 dB attenuation and ± 0.2 dB from 20 dB to maximum attenuation.
- In T-Pad configuration this model will withstand 10 DC voltage surges (5 each polarity) of 550 volts peak within a 10 minute period. Voltage surge characteristics to have a rise time of 100 v/sec. minimum and a decay time of 1/2 peak voltage in ≥ 1 millisecond.
- Customer part number and identification labelling is available on these attenuators.

The attenuator is most widely used in line balancing and voltage monitoring applications. The unique characteristic of this component is that it will maintain input and output impedance at an equal and constant level as the amount of attenuation is varied.

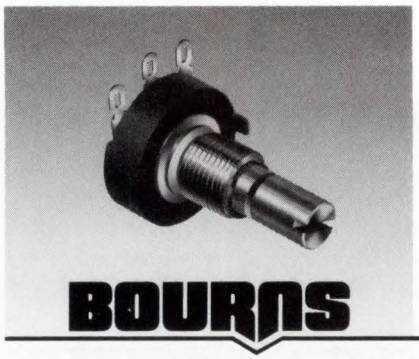
We offer a straight T, 600 ohm attenuator, that is extremely reliable, will withstand repeated high voltage surges without excessive change in impedance, has been customer qualified to REA specification PE-61, and offers a truly competitive price and delivery time.

STRAIGHT T ATTENUATOR SCHEMATIC



For stepped attenuators see page 150.

[1]At room ambient: + 25 °C nominal and 50% relative humidity nominal, except as noted.
Specifications are subject to change without notice.



BOURNS

3/4 INCH DIAMETER/CERMET OR CONDUCTIVE PLASTIC

- Single-turn (3851 and 3852)
- 3-3/4-turn (3856)
- Minimal depth package
- Good resolution
- Linear and audio tapers
- Wide resistance range

FOR ORDERING INFORMATION SEE PAGE 149.

Models 3851/3852/3856

Bourns® Panel Controls

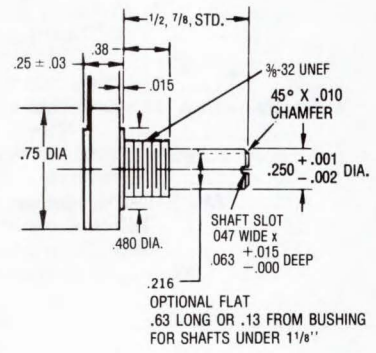
	3851 Conductive Plastic Element	3852/3856 Cermet Element
Initial Electrical Characteristics[1]		
Standard Resistance Range		
Linear Tapers (A, B, E, and H)	1K to 2.5 megohms	50 ohms to 5 megohms
Audio Tapers (C, D, F, and G)	750 ohms to 2.5 megohms	1K ohms to 2.5 megohms
Resistance Tolerance	(B, D, & G tapers) ±20% (E taper) ±10%	(A, C, & F tapers) ±10% (H taper) ±5%
Independent Linearity	±10%	(A & H tapers) ±5%
Absolute Minimum Resistance	2 ohms maximum	2 ohms maximum
Continuity	Maintained for full mechanical angle	Maintained for full mechanical angle
Effective Electrical Angle	250° ±5°	250° ±5°
Contact Resistance Variation	±1%	±3% of total resistance or 3 ohms (whichever is greater)
Theoretical Resolution	Essentially infinite	Essentially infinite
Dielectric Withstanding Voltage	MIL-STD-202, Method 301	MIL-STD-202, Method 301
Sea Level	900 VAC minimum	900 VAC minimum
70,000 Feet	350 VAC minimum	350 VAC minimum
Insulation Resistance (500 VDC)	1,000 megohms minimum	1,000 megohms minimum
Power Rating (Voltage Limited by Power Dissipation or 350 VAC, Whichever is Less)		
+70°C	(B & E tapers) 1 watt (D & G tapers) 0.5 watt	(A & H tapers) 2 watts (C & F tapers) 1 watt
+125°C	0 watt	
+150°C		0 watt
Environmental Characteristics[1]		
Storage Temperature Range	−65°C to +125°C	−65°C to +150°C
Temperature Coefficient Over Temperature Range	±1,000PPM/°C	±150PPM/°C
Vibration	20G	20G
Voltage Ratio Shift	±5% maximum	±6% maximum
Total Resistance Shift	±2% maximum	±2% maximum
Shock	100G	100G
Voltage Ratio Shift	±5% maximum	±6% maximum
Total Resistance Shift	±2% maximum	±2% maximum
Load Life	1,000 hours	1,000 hours
Total Resistance Shift	±10% maximum	±3% maximum
Rotational Life (No Load)	100,000 cycles	50,000 cycles
Total Resistance Shift	±15% maximum	±5% or 5 ohms (whichever is greater)
Moisture Resistance	MIL-STD-202, Method 103, Condition B	MIL-STD-202, Method 103, Condition B
Total Resistance Shift	±10% maximum	±2% maximum
Insulation Resistance (500 VDC)	100 megohms minimum	100 megohms minimum
Mechanical Characteristics[1]		
Shaft Torque	(A & B bushings) 0.5 to 6.0 oz-in. (C & E bushings) 0.3 to 6.0 oz-in.	3852 (A & B bushings) 0.5 to 6.0 oz-in. (C & E bushings) 0.3 to 6.0 oz-in. 3856 — 0.15 to 3.0 oz-in.
Stop Strength	5 in-lb.	5 in-lb.
Mechanical Angle	280° ±5°	3852 — 280° ±5° 3856 — 1350° ±50°
Weight	30 grams maximum	30 grams maximum
Terminals	Printed circuit terminals or solder lugs.	Printed circuit terminals or solder lugs.
Markings	Manufacturer's trademark, wiring diagram, date code, resistance, manufacturer's part number	Manufacturer's symbol, wiring diagram, date code, resistance, manufacturer's part number.

[1]At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.
Specifications are subject to change without notice.

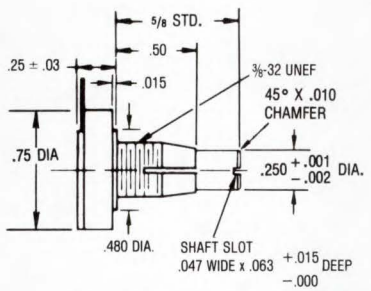
Models 3851/3852/3856

Bourns® Panel Controls

3851A/3852A

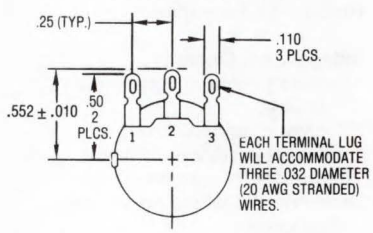


3851B/3852B

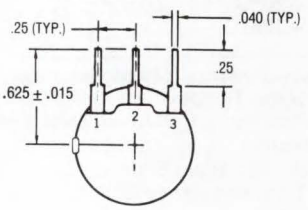


Terminal Configuration

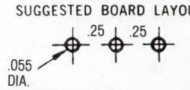
SOLDER LUG TERMINAL



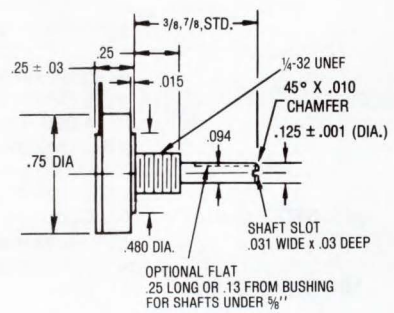
STANDARD PRINTED CIRCUIT TERMINAL



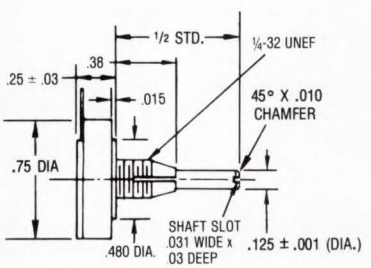
SUGGESTED BOARD LAYOUT



3851C/3852C

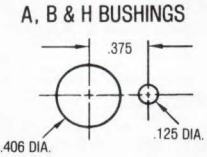


3851E/3852E

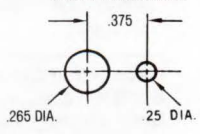


3851/3852/3856

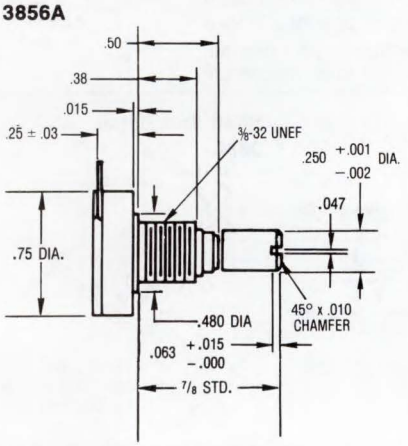
A, B & H BUSHINGS



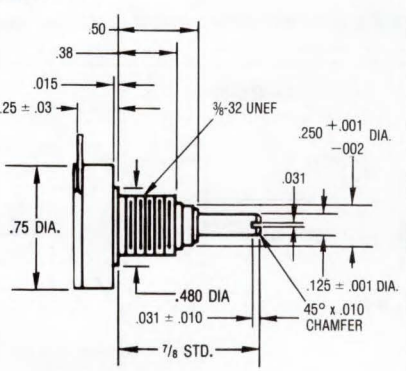
C & E BUSHINGS



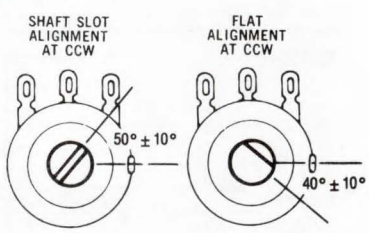
3856A



3856H

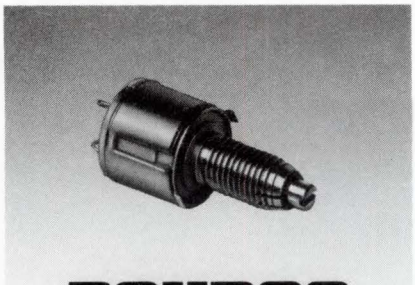


Shaft End Detail 3850 Family



TOLERANCES EXCEPT AS NOTED:
DECIMALS: .XXX ± .005, .XX ± .015
FRACTIONS: ± 1/64
ANGLE: ± 3°

Specifications are subject to change without notice.



1/2 INCH DIAMETER / SINGLE-TURN CERMET

- Small diameter
- Wide resistance range
- Good resolution
- Linear and audio tapers

FOR ORDERING INFORMATION SEE PAGE 149.

Model 3862

Bourns® Panel Controls

Initial Electrical Characteristics[1]

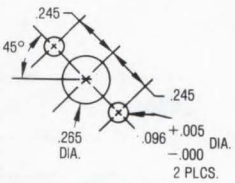
Standard Resistance Range (A and H Tapers)	100 ohms to 5 megohms
Resistance Tolerance	(A Taper) ±10%
	(H Taper) ±5%
Independent Linearity	±5%
Absolute Minimum Resistance	2 ohms maximum
Continuity	Maintained for full mechanical angle
Effective Electrical Angle	260° ±10°
Contact Resistance Variation	±3% of total resistance
Theoretical Resolution	Essentially infinite
Dielectric Withstanding Voltage	MIL-STD-202, Method 301
Sea Level	750 VAC minimum
70,000 Feet	350 VAC minimum
Insulation Resistance (500 VDC)	1,000 megohms minimum
Power Rating (Voltage Limited by Power Dissipation or 350 VAC, Whichever is Less)	
+70°C	1 watt
+125°C	0 watt

Environmental Characteristics[1]

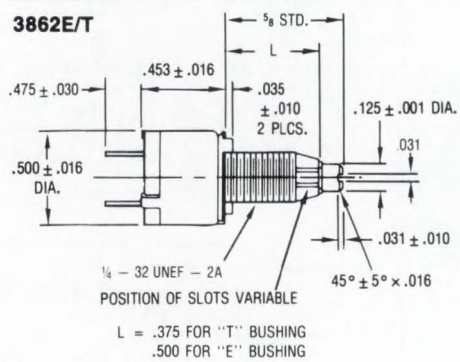
Storage Temperature Range	−65°C to +125°C
Temperature Coefficient Over Temperature Range	±150 ppm/°C
Vibration	20G
Voltage Ratio Shift	±6% maximum
Total Resistance Shift	±2% maximum
Shock	50G
Voltage Ratio Shift	±6% maximum
Total Resistance Shift	±2% maximum
Load Life	1,000 hours
Total Resistance Shift	±3% maximum
Rotational Life (C & N Bushing) (No Load)	50,000 cycles
Total Resistance Shift	±5% maximum
Moisture Resistance	MIL-STD-202, Method 103, Condition B
Total Resistance Shift	±2% maximum
Insulation Resistance (500 VDC)	100 megohms minimum
Salt Spray	MIL-STD-202, Method 101, Condition A

Mechanical Characteristics[1]

Shaft Torque	5 oz-in maximum
Shaft Locking Torque with Locking Bushings	20 oz-in
Mechanical Angle	295° ±3°
Weight	25 grams maximum
Terminals	Printed circuit pins or J-Hooks
Markings	Manufacturer's trademark, wiring diagram, date code, resistance, manufacturer's part number
Stop Strength	3 in-lb. maximum

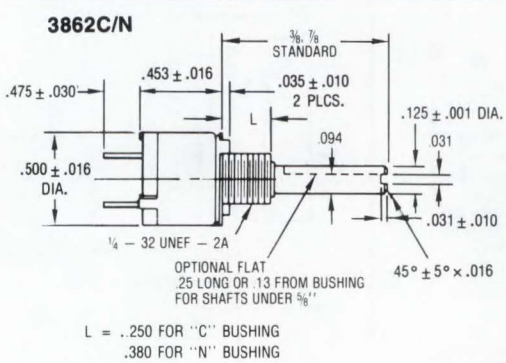


3862E/T



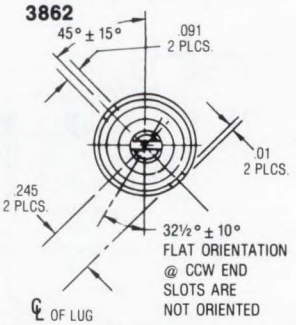
L = .375 FOR "T" BUSHING
.500 FOR "E" BUSHING

3862C/N



L = .250 FOR "C" BUSHING
.380 FOR "N" BUSHING

Shaft End Detail
3862

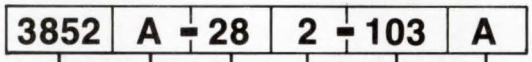


Specifications are subject to change without notice.

BOURNS

HOW TO ORDER
3800 Series Panel Controls

PART NUMBERING SYSTEM



MODEL	
3851	3/4"D Single-Turn C.P.
3852	3/4"D Single-Turn Cermet
3856	3/4"D 3 3/4-Turn Cermet
3862	1/2"D Single-Turn Cermet

	SHAFT LENGTH (FMS) & DIAMETER	AVAILABLE ONLY IN MODELS	BUSHINGS
12	3/8"L x 1/8"D	3851, 3852, 3862	C
16	1/2"L x 1/4"D	3851, 3852	A
16	1/2"L x 1/8"D	3851, 3852	C, E
		3862	C
20	5/8"L x 1/4"D	3851, 3852	A, B
20	5/8"L x 1/8"D	3851, 3852	C, E
		3862	C, E, N, T
28	7/8"L x 1/4"D	3851, 3852	A, B
		3856	A
28	7/8"L x 1/8"D	3851, 3852	C, E
		3856	H
		3862	C, E, N, T

Consult factory for lengths not shown.

	BUSHING	APPLICABLE MODELS
A	Plain 3/8"D x 3/8"L	3851, 3852, 3856
B	Locking 3/8"D x 1/2"L	3851, 3852
C	Plain 1/4"D x 1/4"L	3851, 3852, 3862
E	Locking 1/4"D x 3/8"L	3851, 3852
E	Locking 1/4"D x 1/2"L	3862
H	Plain 3/8"D x 3/8"L	3856 (1/8" Dia. Shaft)
N	Plain 1/4"D x 3/8"L	3862 (Consult Factory)
T	Locking 1/4"D x 3/8"L	3862 (Consult Factory)

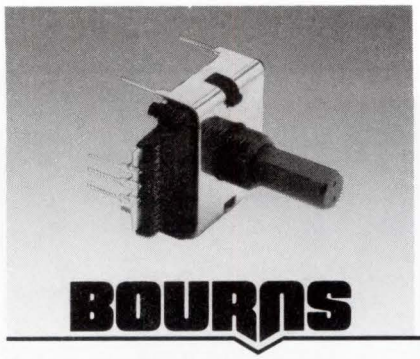
TERMINAL STYLE AND SHAFT TYPE		NOT RECOMMENDED FOR BUSHING/SHAFT COMBINATIONS SHOWN
1	Solder Lugs*, Plain End	A16, C12, E16 (Consult Factory)
2	Solder Lugs*, Slotted End	
3	Solder Lugs*, Flatted Shaft	A16, C12, E16 (Consult Factory)
5	PC Pins, Plain End	A16, C12, E16 (Consult Factory)
6	PC Pins, Slotted End	
7	PC Pins, Flatted Shaft	A16, C12, E16 (Consult Factory)

*Model 3862 comes with J-hook solder lugs.

RESISTANCE CODE/VALUE (IN OHMS)	
Model 3851	
(102)	1K
(252)	2.5K
(502)	5K
(103)	10K
(253)	25K
(503)	50K
(104)	100K
(254)	250K
(504)	500K
(105)	1M
Models 3852/3856	
(500)	50
(101)	100
(251)	250
(501)	500
(102)	1K
(252)	2.5K
(502)	5K
(103)	10K
(253)	25K
(503)	50K
(104)	100K
(254)	250K
(504)	500K
(105)	1M
(255)	2.5M
(505)	5M
Model 3862	
(101)	100
(251)	250
(501)	500
(102)	1K
(252)	2.5K
(502)	5K
(103)	10K
(253)	25K
(503)	50K
(104)	100K
(254)	250K
(504)	500K
(105)	1M
(255)	2.5M
(505)	5M

	ELEMENT TAPER/TOLERANCE	APPLICABLE MODELS
A	Linear ±10%	3852, 3856, 3862
B	Linear ±20%	3851
C	Audio CW ±10%*	3852, 3856
D	Audio CW ±20%*	3851
E	Linear ±10%	3851
F	Audio CCW ±10%*	3852, 3856
G	Audio CCW ±20%*	3851
H	Linear ±5%	3852, 3856, 3862

*The maximum resistance range for audio tapers is 1000 ohms to 2.5 megohms.



STEPPED ATTENUATOR SERIES

- Precision step adjustment
- High quality
- Long life
- Space saving

FOR ORDERING INFORMATION SEE PAGE 152.

Stepped Attenuator

Bourns® Stepped Attenuator

Electrical Characteristics[1]

Voltage	32 vac maximum
Minimum Resistance	5 ohms maximum
Insulation Resistance (500 vdc)	1,000 megohms minimum
Dielectric Withstanding Voltage	MIL-STD-202, Method 301
Sea Level	1,000 vac minimum
Temperature Coefficient	±150ppm/°C
Volume Controls	
Taper	db
Standard db/TR Range	
50db	10K - 100K ohms
60db	20K - 100K ohms
70db	50K - 100K ohms
Resistance Tolerance	±5% nominal
Detent Step Angle	15° per step
Detent Positions	22
Total Rotational Angle	315°

db Taper	Increments										
Value	1	2	3	4	5	6	7	8	20	21	22
-50db	Inf.	-50	-42	-37	-34	-32	-30	-28	-4	-2	0
-60db	Inf.	-60	-50	-42	-37	-33	-30	-28	-4	-2	0
-70db	Inf.	-70	-60	-50	-40	-34	-30	-28	-4	-2	0

db Step Error	Within 0.5db at each step with respect to the first step
Tone Controls	
Taper	Linear
Total Resistance Range	10K ohms - 100K ohms (±5% nominal)
Step Resistance Values	±5% nominal (except center detent position to be ±3%)
Total Resistance Tolerance	±5% nominal
Detent Step Angle	30° per step
Detent Positions	11 or 21
Total Rotational Angle	300°

Environmental Characteristics[1]

Storage Temperature Range	-40°C to +125°C
Temperature Coefficient Over Storage Temperature Range	±150ppm
Vibration	15G
Wiper Bounce	0.1MS maximum
Shock	50G
Wiper Bounce	0.1MS maximum
Rotational Life	100,000 cycles
Moisture Resistance	MIL-STD-202, Method 103, Condition B

Mechanical Characteristics[1]

Stop Strength	7 in-lbs. maximum
Terminals	Printed circuit pins or solder lugs
Mechanical Angle	
315°	22 detent positions
300°	11 detent positions
Mounting Torque	7 in-lbs. maximum

For variable attenuators, see page 145.

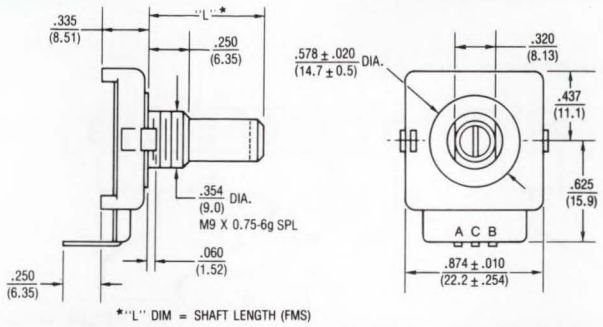
[1]At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.
Specifications are subject to change without notice.

BOURNS

Stepped Attenuator

Bourns® Stepped Attenuator

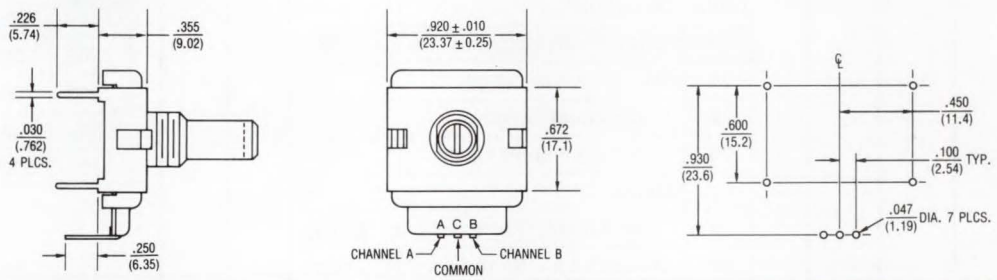
BUSHING MOUNTED



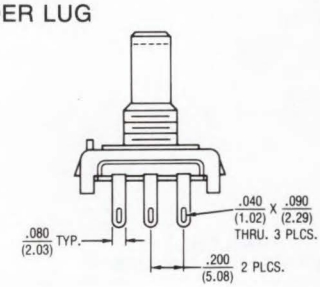
*"L" DIM = SHAFT LENGTH (FMS)

PCB BRACKET MOUNTED

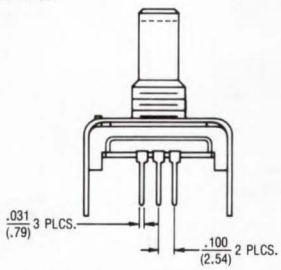
Dimensions not given are the same as bushing mounted.



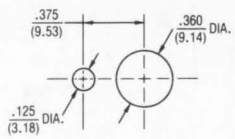
SOLDER LUG



TERMINAL

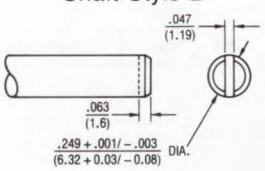


PANEL HOLE DIMENSIONS

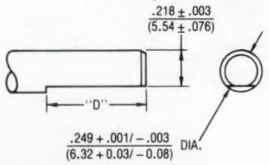


SHAFT STYLES (Full CCW Rotation)

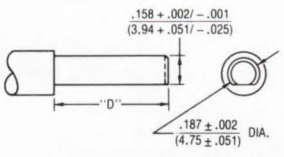
Shaft Style **B**



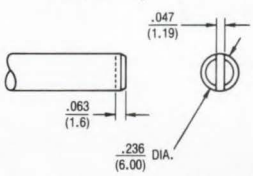
Shaft Style **C**



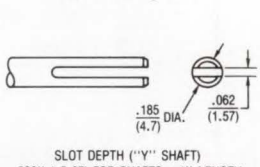
Shaft Style **J**



Shaft Style **R**



Shaft Style **Y**

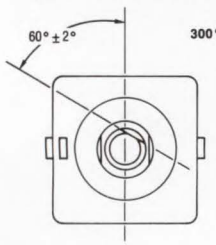


SLOT DEPTH ("Y" SHAFT)
.380" (9.65) FOR SHAFTS < 1" LENGTH
.580" (14.73) FOR SHAFTS ≥ 1" LENGTH

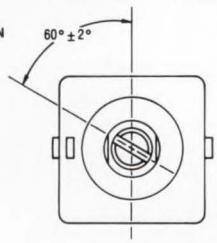
"D" DIMENSION EXTENDS FROM SHAFT END TO BUSHING FACE
"D" = (SHAFT LENGTH, FMS) – (BUSHING LENGTH)

SHAFT ORIENTATIONS

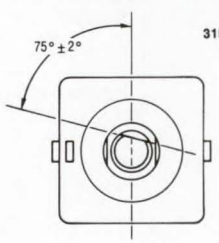
Shaft Styles **C, J**



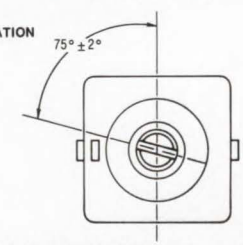
Shaft Styles **B, R, Y**



Shaft Styles **C, J**



Shaft Styles **B, R, Y**



FOR TOLERANCES NOT SHOWN .XX = ± .010
.XXX = ± .005

Specifications are subject to change without notice.

BOURNS

HOW TO ORDER
Stepped Attenuator
Bourns® Stepped Attenuator

PART NUMBERING SYSTEM

P	A	W	0	J	-	B	2	4	-	B	A	0	1	0	3

SHAFT LENGTH (FMS)	
Code	**Descriptiion**
24	3/4" (19mm) Length
28	7/8" (22.2mm) Length
32	1" (25.4mm) Length
36	1-1/8" (28.6mm) Length
	Metric
19	19mm Length (Shaft Style "R" Only)
24	24mm Length (Shaft Style "R" Only)

RESISTANCE VALUES	
Code	**Value**
103	10K Ohms
203	20K Ohms
253	25K Ohms
503	50K Ohms
104	100K Ohms

SHAFT STYLES (See Outline Drawing)	
Code	**Description**
B	1/4" Dia. Slotted
C	1/4" Dia. Flatted
J	3/16" Dia. Flatted
R	6mm Dia. Slotted (use metric lengths)
Y	3/16" Dia. Split Shaft

CENTER TAP OPTION	
Code	**Description**
0	No Center Tap
1	Center Tap

ANTI-ROTATION LUG	
Code	**Description**
0J	9:00 Position
0D	None

ELEMENT TAPER		AVAILABLE RESISTANCE VALUES					
Code	**Description**	**(Codes Shown)**					**Detents**
A	50db	103	203	253	503	104	22
B	60db	—	203	253	503	104	22
C	70db	—	—	—	503	104	22
D	Linear	103	203	253	503	104	11*

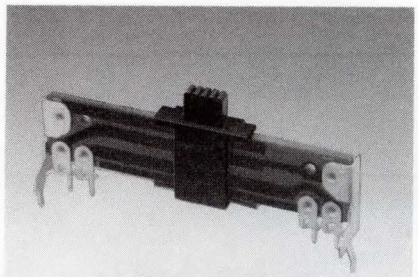
*21 available on request

BUSHING CONFIGURATION	
Code	**Descriptiion**
W	9mm x .250 Length Threaded M9 x 0.75 6g 5 Pl

TERMINAL CONFIGURATION (X Indicates "Equipped With")				
	Code			
Features	**A**	**B**	**C**	**D**
PC Pins	X	X		X
Solder Lugs			X	
PCB Bracket		X		X
Hardware Incl.	X		X	X

The sample part number demonstrates the identification code for Bourns stepped attenuators.

The part number shown is a commonly used model, typically available from stock.



BOURNS

10, 15, 20, AND 30MM LOW PROFILE

- Minimal installation space for maximum design flexibility
- Linear or audio taper versions
- Wide assortment of options

(FOR SALE IN UNITED STATES AND CANADA ONLY.)

Open-Frame Slide Potentiometers

Bourns® Slide Potentiometers

SPECIFICATIONS / MODEL		OPEN FRAME SLIDE POTENTIOMETERS			
		10MM	15MM	20MM	30MM
ELECTRICAL					
Standard Resistance Range (ohms)	Linear	1K 2K 5K 10K 20K 50K 100K 200K		2K 5K 10K 20K 50K 100K 200K 500K	
	Audio	2K 5K 10K 20K 50K 100K 200K		5K 10K 20K 50K 100K 200K 500K	
Resistance Tolerance		±20%, All Resistances/Tapers			
Resistance Taper	Linear	B and Y Tapers (see taper curves)			
	Audio	D and G Tapers (see taper curves)			
Independent Linearity		±5% for B Tapers (see curves for Y, D and G tapers)			
Absolute Minimum Resistance		1% or 100 ohms, whichever is less, for B taper			
Continuity		Maintained for full stroke			
Effective Electrical Travel		80% of Mechanical Travel	85% of Mechanical Travel	90% of Mechanical Travel	90% of Mechanical Travel
Peak Noise (CRV) Linear/Audio		3% / 6%	2% / 5%	2% / 5%	2% / 5%
Theoretical Resolution		Essentially Infinite			
Dielectric Strength (Sea Level)		500 VAC, 1 Minute, between Lever and Terminals			
Insulation Resistance (500 VDC)		1,000 Megohms Minimum between Lever and Terminals			
Power Rating at 70°C (0 Watt at 90°C)	Linear	0.05 Watt	0.05 Watt	0.1 Watt	0.1 Watt
	Audio	0.025 Watt	0.025 Watt	0.05 Watt	0.05 Watt
Maximum Working Voltage		Power Dissipation or 350 VAC, Whichever is Less			
Tracking Error (Dual Only)		4 dB Maximum; 0 to −40 dB			
MECHANICAL					
Operating Force		15 to 150 Gr			
Stop Strength		1.5 Kg Minimum			
Stroke		10mm	15mm	20mm	30mm
Terminals		PC Pins (Vertical or Horizontal)			
Marking		Trademark, Date Code, Taper and Resistance (ex. B10K) and Japan			
ENVIRONMENTAL					
Storage Temperature		−20°C to +90°C			
Temperature Coefficient of Resistance		±1,000ppm/°C			
Vibration (10 to 55Hz, 1.5mm)		Voltage Ratio Change: ±5% Maximum. Total Resistance Shift: ±2% Maximum			
Load Life (Rated Power at 25°C for 1,000 Hours)		(Pre-conditioning: 55°C, 20% RH, 24±4 Hours) Total Resistance Shift: ±10%			
Sliding Life (No Load - 15,000 Cycles)		Total Resistance Shift: ±5% = Linear; 2K, 5K, 10K, 20K, 50K ±10% = Linear; 100K, 200K, 500K & Audio; 2K to 500K			
Moisture Resistance (96 Hours @ 40°C 90-95% RH, Rated Power)		Total Resistance Shift: Linear ±12% Maximum, Audio ±20% Maximum Insulation Resistance: 100 Megohms Minimum			
Soldering Heat (3 Seconds @ 350°C)		Total Resistance Shift: ±5% Maximum			

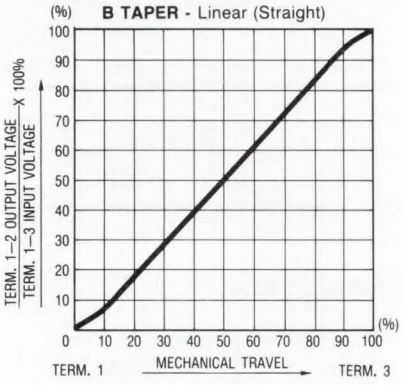
Specifications are subject to change without notice.

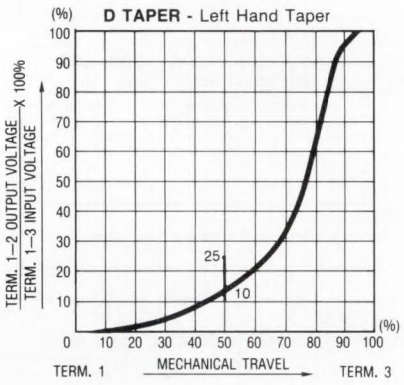
BOURNS

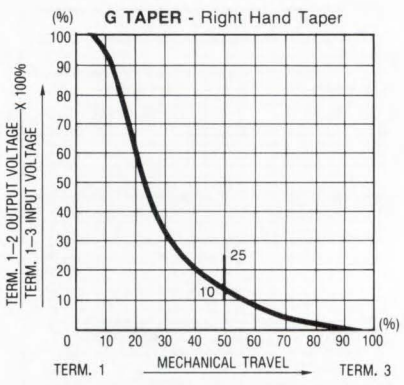
Open-Frame Slide Potentiometers

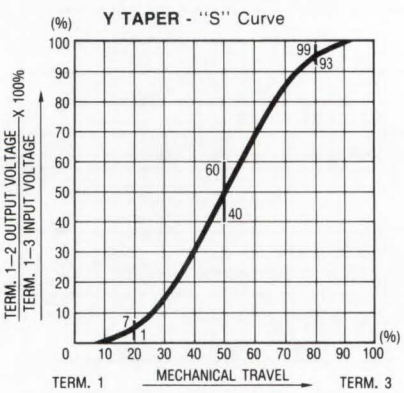
Bourns® Slide Potentiometers

TAPER CURVES





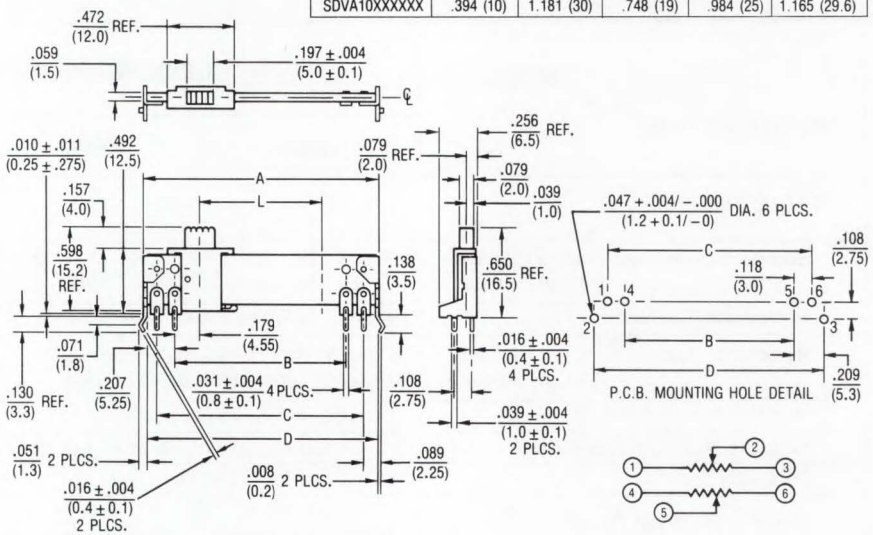




OUTLINE AND DIMENSIONAL DRAWINGS
(Dimensions Shown In Brackets Are In Millimeters)

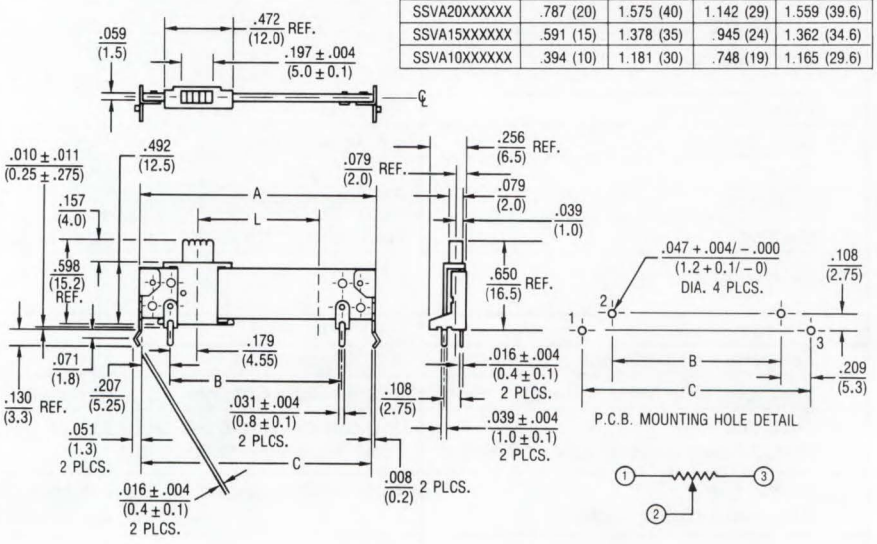
Dual Element
Vertical Mount

MODEL	DIMENSIONS ±0.20 (±0.5)				
	L (STROKE)	A	B	C	D
SDVA30XXXXXX	1.181 (30)	1.969 (50)	1.535 (39)	1.772 (45)	1.953 (49.6)
SDVA20XXXXXX	.787 (20)	1.575 (40)	1.142 (29)	1.378 (35)	1.559 (39.6)
SDVA15XXXXXX	.591 (15)	1.378 (35)	.945 (24)	1.181 (30)	1.362 (34.6)
SDVA10XXXXXX	.394 (10)	1.181 (30)	.748 (19)	.984 (25)	1.165 (29.6)



Single Element
Vertical Mount

MODEL	DIMENSIONS ±0.20 (±0.5)			
	L (STROKE)	A	B	C
SSVA30XXXXXX	1.81 (30)	1.969 (50)	1.535 (39)	1.953 (49.6)
SSVA20XXXXXX	.787 (20)	1.575 (40)	1.142 (29)	1.559 (39.6)
SSVA15XXXXXX	.591 (15)	1.378 (35)	.945 (24)	1.362 (34.6)
SSVA10XXXXXX	.394 (10)	1.181 (30)	.748 (19)	1.165 (29.6)

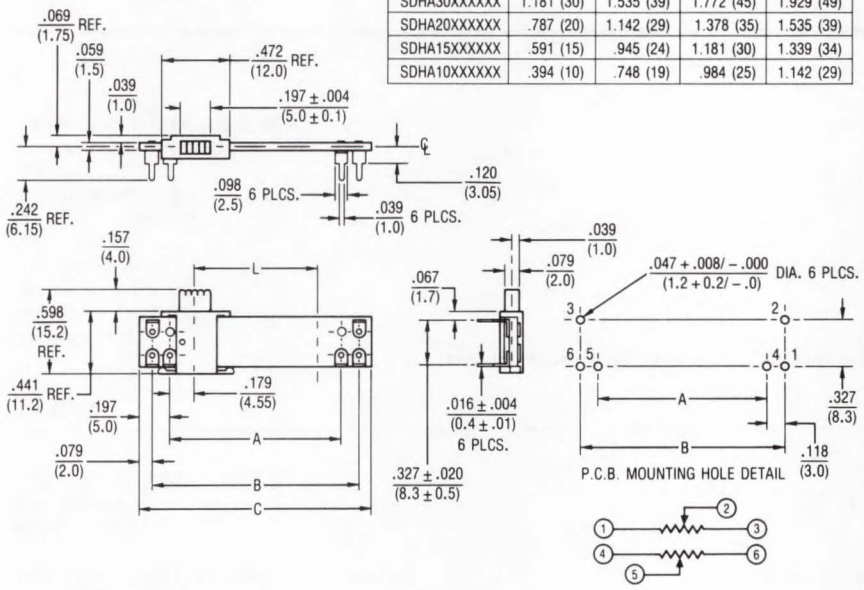


Open-Frame Slide Potentiometers

Bourns® Slide Potentiometers

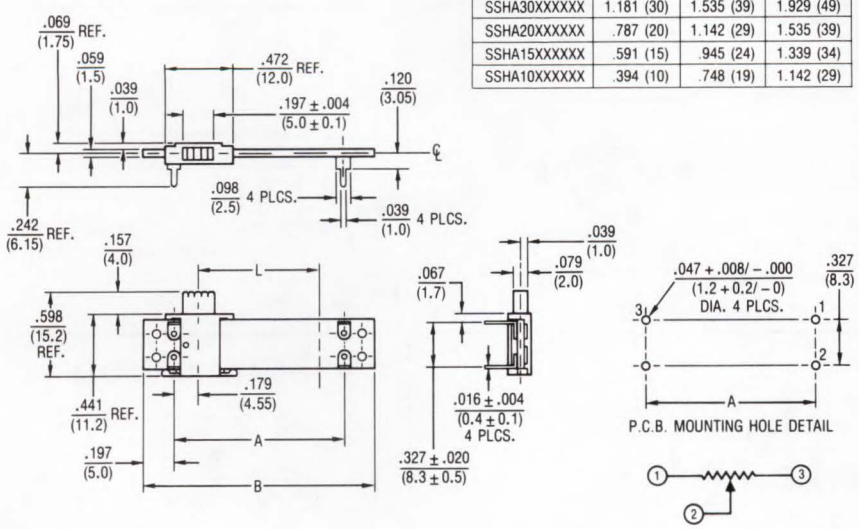
Dual Element
Horizontal Mount

MODEL	DIMENSIONS ±0.20 (±0.5)			
	L (STROKE)	A	B	C
SDHA30XXXXXX	1.181 (30)	1.535 (39)	1.772 (45)	1.929 (49)
SDHA20XXXXXX	.787 (20)	1.142 (29)	1.378 (35)	1.535 (39)
SDHA15XXXXXX	.591 (15)	.945 (24)	1.181 (30)	1.339 (34)
SDHA10XXXXXX	.394 (10)	.748 (19)	.984 (25)	1.142 (29)



Single Element
Horizontal Mount

MODEL	DIMENSIONS ±0.20 (±0.5)		
	L (STROKE)	A	B
SSHA30XXXXXX	1.181 (30)	1.535 (39)	1.929 (49)
SSHA20XXXXXX	.787 (20)	1.142 (29)	1.535 (39)
SSHA15XXXXXX	.591 (15)	.945 (24)	1.339 (34)
SSHA10XXXXXX	.394 (10)	.748 (19)	1.142 (29)



PART NUMBERING SYSTEM

S	S	V	A	2	0	B	1	0	3	0	0

STROKE LENGTH

Code	Description
10	10mm Slide Stroke
15	15mm Slide Stroke
20	20mm Slide Stroke
30	30mm Slide Stroke

LEVER AND COLOR

A	Black 4mm H x 5mm W

TERMINAL STYLE

H	PC Pin, Horizontal
V	PC Pin, Vertical

SECTIONS

S	Single Element
D	Dual Element

PRODUCT CLASS

S	Slide Potentiometer

ELEMENT TYPE/TAPER

Code	Description
B	Linear ±20%
D	LH Audio ±20%
G	RH Audio ±20%
Y	"S" Curve ±20%

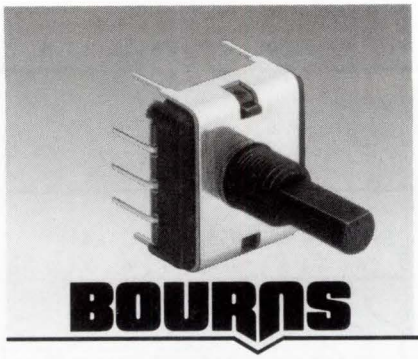
RESISTANCE CODE

Code	Resistance
102	1,000*
202	2,000
502	5,000
103	10,000
203	20,000
503	50,000
104	100,000
204	200,000
504	500,000**

*Available only on linear taper 10mm and 15mm stroke versions.
**Available only on 20mm and 30mm stroke versions.

COMBINATIONS

Code	Description
00	No Detent
01	Center Detent
02	Center Tap (B & Y Taper Only)
03	Center Tap With Detent (B & Y Taper Only)



NEW/LOW COST POTENTIOMETER CONDUCTIVE PLASTIC

- Space saving design
- PC pin or solder lug terminals
- Mounting brackets available
- Linear or audio taper versions
- Wide range of resistance values
- Metric shaft and bushing options

FOR ORDERING INFORMATION SEE PAGE 158.

Slimline Potentiometers

Bourns® Slimline Potentiometers

Electrical Characteristics

Standard Resistance Range	
Linear Tapers	500 ohms to 2.5 megohms
Audio Tapers	1K ohms to 500K ohms
Resistance Tolerance (All Tapers)	±20%
Independent Linearity	±5% (linear taper)
Absolute Minimum Resistance	5 ohms maximum
Effective Electrical Angle	270° ± 5°
Dielectric Withstanding Voltage	MIL-STD-202, Method 301
Sea Level	1,000 VAC minimum
70,000 Feet	500 VAC minimum
Insulation Resistance (500 VDC)	1,000 megohms
Power Rating @ 70°C (Voltage Limited by Power Dissipation or 350 VAC, Whichever is Less)	
Linear	.75 watt
Audio	.50 watt

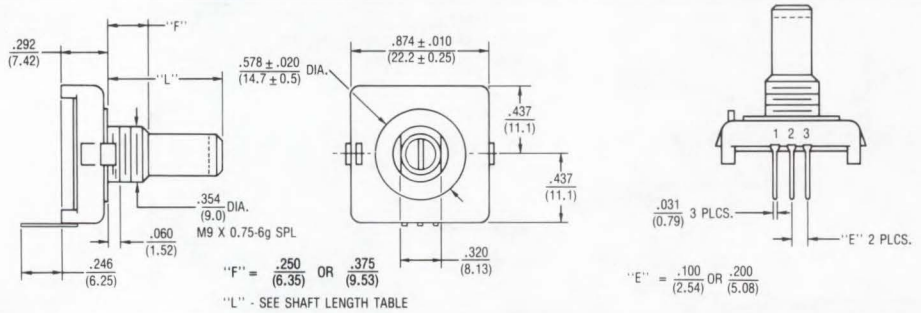
Environmental Characteristics

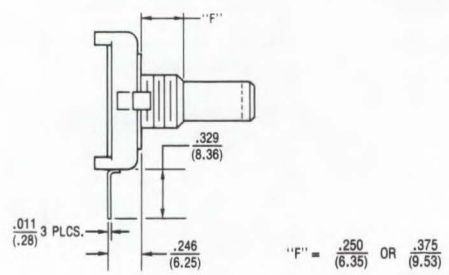
Storage Temperature	−55°C to +125°C
Load Life (1,000 Hours @ Rated Power, 20% RH, 70°C)	±10% maximum resistance shift
Rotational Life	50,000 cycles
Total Resistance Shift	
Linear	±10 ohms or 12%, whichever is greater
Audio	±20% maximum

Mechanical Characteristics

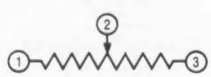
Stop Strength (1/4" and 6mm Shaft Diameters)	8 in-lb.
Mechanical Angle	300° ± 5°
Terminals	PC pin or solder lug
Running Torque	.3 to .75 in-oz. (undetented)
Mounting Torque	7 in-lbs. maximum
Detents	Center, 10, 20, 30, none
Shaft Variations	See diagram

PC PINS (Rear Facing)





SCHEMATIC DIAGRAM



TOLERANCES WHERE NOT SHOWN
.XX = ± .010
.XXX = ± .005

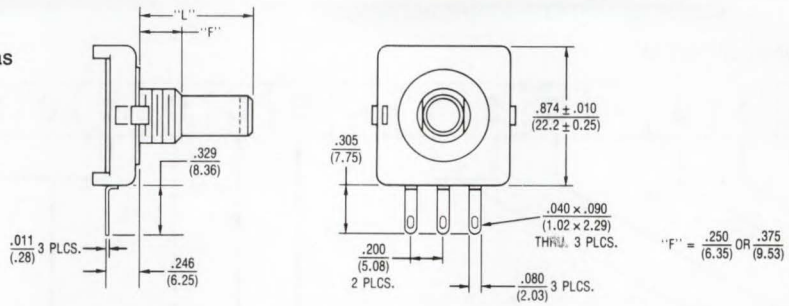
For additional features or specifications not shown, consult factory.
Specifications are subject to change without notice.

Slimline Potentiometers

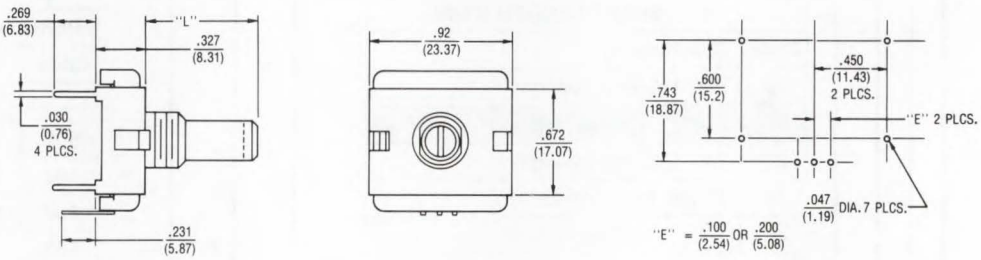
Bourns® Slimline Potentiometers

SOLDER LUGS

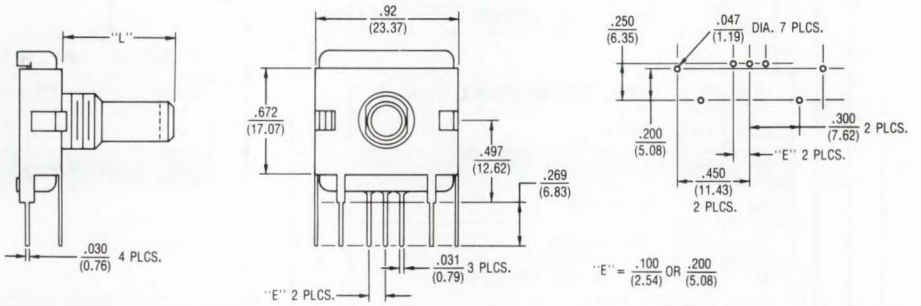
Dimensions not given are the same as PC pins (rear facing).



PC PINS (Rear Facing) With Rear Mounting Bracket

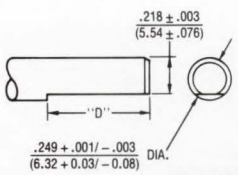


PC PINS (Side Exit) With Side Mounting Bracket

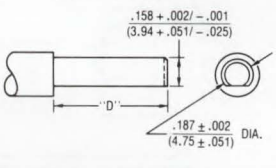


SHAFT STYLES AND ORIENTATION (Full CCW Rotation)

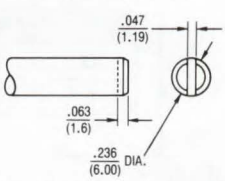
Shaft Style **C**



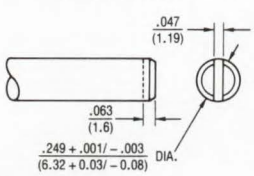
Shaft Style **J**



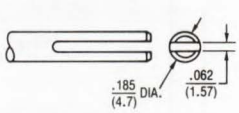
Shaft Style **R**



Shaft Style **B**



Shaft Style **Y**

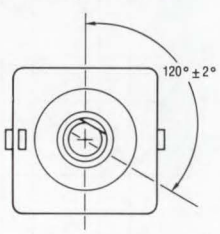


Slot Depth (Y Shaft)
.380 (9.65) for shafts <1" (2.54) length
.580 (14.73) for shafts ≥1" (2.54) length

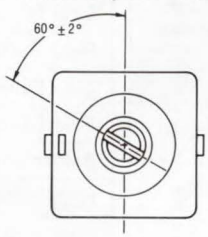
"D" dimensions extend from shaft end to bushing face "D" = (shaft length, FMS) − (bushing length)

Shaft Orientations

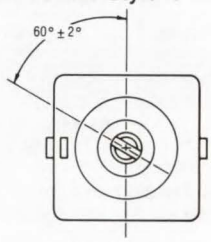
Shaft Styles **C, J**



Shaft Styles **B, R**



Shaft Style **Y**



TOLERANCES WHERE NOT SHOWN .XX = ± .010
.XXX = ± .005

BOURNS

HOW TO ORDER
Slimline Potentiometers
Bourns® Slimline Potentiometers

PART NUMBERING SYSTEM

P	C	W	1	J	-	B	2	4	-	B	C	D	1	0	3

SHAFT LENGTH (FMS)	
Code	**Description**
20	5/8" (15.9mm) Length
24	3/4" (19mm) Length
28	7/8" (22.2mm) Length
32	1" (25.4mm Length
36	1-1/8" (28.6mm) Length
	Metric
19	19mm Length (Shaft Style "R" Only)
24	24mm Length (Shaft Style "R" Only)

RESISTANCE VALUES					
Code	**TR**	**Code**	**TR**	**Code**	**TR**
		103	10KΩ	254	250KΩ
501	500Ω	203	20KΩ	504	500KΩ
102	1KΩ	253	25KΩ	105	1MΩ
252	2.5KΩ	503	50KΩ	255	2.5MΩ
502	5KΩ	104	100KΩ		

SHAFT STYLES (See Outline Drawing)	
Code	**Description**
B	1/4" Dia. Slotted
C	1/4" Dia. Flatted
J	3/16" Dia. Flatted
R	6mm Dia. Slotted (Use Metric Lengths Only)
Y	3/16" Dia. Split Shaft

ELEMENT TAPER VERSIONS			
Code	**Taper Description**	**Code**	**Taper Description**
B	Lin. CP ± 20%	G	CCW Audio CP ± 20%
D	CW Audio CP ± 20%		

ANTI-ROTATION LUG	
Code	**Description**
J	9:00 Position
D	None

DETENT CONFIGURATIONS	
Code	**Description**
A	No Detents
B	10 Detents
C	Center Detent Only
D	20 Detents
E	30 Detents

NO. SECTIONS	
1	Single

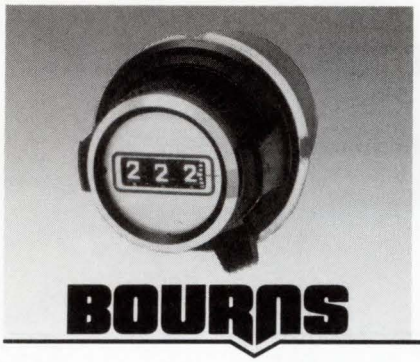
BUSHING CONFIGURATION		Available Shaft Styles
Code	**Description**	
W	9MM x .250 Length Threaded M9 x 0.75 6g 5 Pl	All
L	9MM x .375 Length Threaded M9 x 0.75 6g 5 Pl	B,C,R,

The sample part number demonstrates the identification code for Bourns Slimline Potentiometers.

The part number shown is a commonly used model, typically available from stock.

HOUSING TERMINAL CONFIGURATION												
	Code											
Features	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**J**	**K**	**L**	**M**	**N**
Rear Mounting Bracket		X							X	X			X
Side Mounting Bracket					X		X				X	X	
Rear Facing Terminals .100" Centers	X	X								X			
Side Exiting Terminals .100" Centers				X	X						X		
Side Exiting Terminals .200" Centers						X	X					X	
Solder Lugs .200" Centers			X										
Rear Facing Terminals .200" Centers								X	X				X
Hardware Included	X		X	X		X		X		X	X	X	X

Panel mount hardware not included as standard on bracketed versions.



1-1/16'' AND 1-1/4'' DIAMETER/0-10 TURNS

- No backlash - mounted directly to potentiometer shaft
- For use with precision potentiometers or other rotating devices up to 10 turns
- High force, positive brake

Models CT23/CT26

Bourns® Turns-Counting Dials

Mechanical and Physical Characteristics

Number of Turns	0 to 10
Readability	Within 1/500 of a turn
Weight	Approximately 1 1/8 oz.
Markings	White on black background
Accepts Shaft Diameter	1/4''
Locking Brake	Positive, friction

Shaft and Bushing Requirements

Shaft Extension Beyond Face of Locator Plate	0.435 in. minimum 0.640 in. maximum
Bushing Extension Beyond Face of Locator Plate	0.158 in. maximum

FEATURES

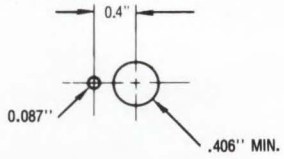
- For use with precision potentiometers or other rotating devices up to 10 turns
- Simplified mounting
- High quality, rugged construction throughout
- No backlash - mounted directly to potentiometer shaft
- White digits on black counter wheels for maximum readability
- High force, positive brake

Bourns® Model CT-23, front of panel mounting, digital turns-counting dial saves valuable internal space. Highly accurate, it will enhance the man/machine interface of any control panel. Easy to read white on black numerals provide excellent legibility and accurate readings within 1/500 of a turn.

Bourns® Model CT-26 recessed mounting digital turns-counting dial, counterpart to the Bourns Model CT-23, provides a lower panel profile. The design simplifies installation requiring only one panel hole. The CT-26 maintains the same high level of symmetry, legibility and accuracy of its counterpart.

CT-23 MOUNTING INSTRUCTIONS

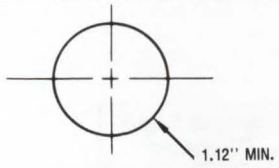
1. Drill or punch panel. See suggested hole pattern below.
2. Insert potentiometer in panel.
3. Position locator plate against panel and secure with hex nut making sure that anti-rotation tang is in the small hole.
4. Turn the potentiometer shaft counterclockwise to obtain minimum resistance or voltage ratio (not necessarily at the end of travel).
5. Loosen setscrew in knob with allen wrench. Set the dial readout to "000."
6. Slip the dial carefully over the potentiometer shaft. Tighten the setscrew without causing movement of the dial readout or potentiometer shaft.



PANEL HOLE PATTERN

CT-26 MOUNTING INSTRUCTIONS

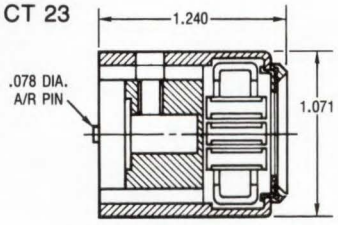
1. Drill or punch panel. See suggested hole pattern below.
2. Insert turns-counting dial in panel cutout and secure with mounting nut.
3. Secure locator plate to potentiometer bushing using two hex nuts.
4. Turn the potentiometer shaft counterclockwise to obtain minimum resistance or voltage ratio (not necessarily at the end of travel).
5. Loosen setscrew in turns-counting dial with allen wrench. Set the dial readout to "000."
6. Slip the potentiometer shaft into the turns-counting dial, insuring that the notch in the locator plate is over the pin at the rear of the dial. Tighten the setscrew without causing movement of the dial readout or potentiometer shaft.



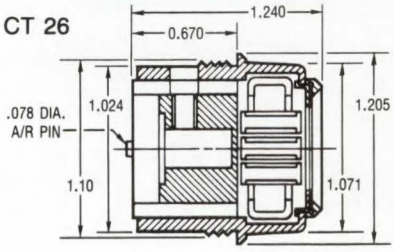
PANEL HOLE PATTERN

Dimensional Drawings

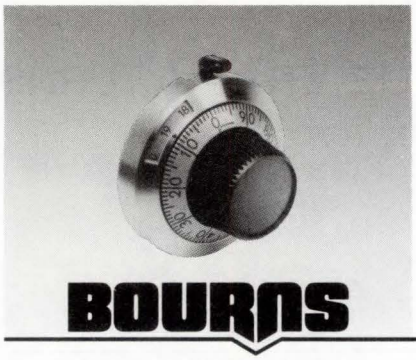
CT 23



CT 26



Specifications are subject to change without notice.



1 13/16" (46mm) DIAMETER/0-20 TURNS

- Large package size
- For use with precision potentiometers up to 20 turns

BOURNS

Model CT-46

Bourns® Turns Counting Dial

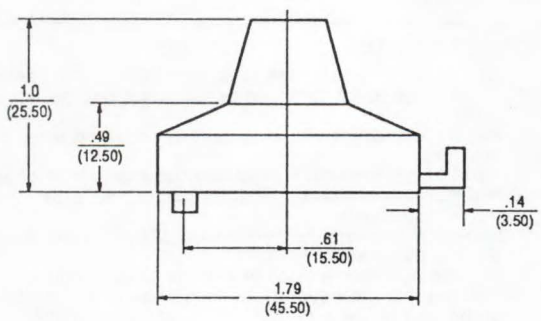
Mechanical and Physical Characteristics

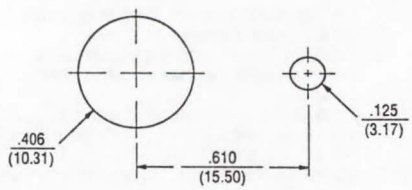
Number of Turns	0 to 20
Readability	Within 1/1000 of a turn
Weight	55 grams
Markings	White on black background
Accepts Shaft Diameter	See below
Locking Brake	Yes

Shaft and Bushing Requirements

Shaft Extension Beyond Panel	0.689 in. (17.5mm) minimum 0.925 in. (23.5mm) maximum
Bushing Extension Beyond Panel	0.394 in. (10mm) maximum

Dimensional Drawing
(Governing dimensions in inches)

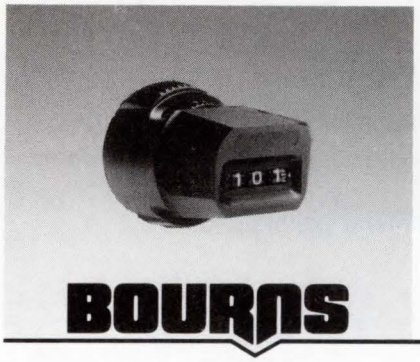




Panel Layout

Shaft Diameter

Part Number	Accepts Shaft Diameter
CT-46-6A	1/4"
CT-46-6M	6mm



7/8 DIAMETER/0-10 TURNS

- Simplified mounting
- Compact size

BOURNS

Model CT-50

Bourns® Turns Counting Dial

Mechanical and Physical Characteristics

Number of Turns	0 to 10
Readability	Within 1/5000 of a turn
Weight	11 grams
Markings	White on black background
Accepts Shaft Diameter	See below

Shaft and Bushing Requirements

Shaft Extension Beyond Panel	0.57 in. (14.5mm) minimum 0.73 in. (18.5mm) maximum
Bushing Extension Beyond Panel	0.264 in. (6.7mm) maximum

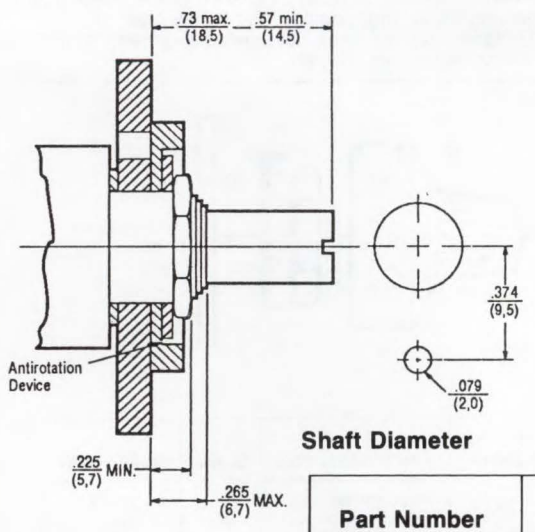
FEATURES

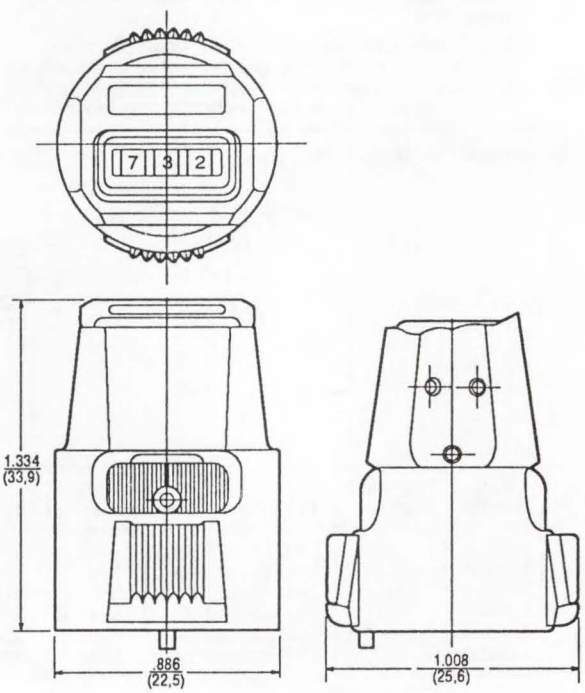
- For use with precision potentiometers or other rotating devices up to 10 turns.
- Excellent legibility - white marking on black background.
- High quality, rugged construction.
- Two set screws.
- Dial will not rotate when brake is applied.
- Compact - Requires only 1" diameter panel space.
- Standard models available for 6mm and 1/4" diameter shafts.

MOUNTING INSTRUCTIONS

1. Drill anti-rotation hole of 0.079" 0.374" vertical below centerline of potentiometer.
2. Insert potentiometer in panel.
3. Install anti-rotation device supplied with dial. Use standard lockwasher and mounting nut supplied with potentiometer.
4. Turn potentiometer shaft counter-clockwise to minimum resistance or voltage ratio. This is not necessarily identical with the mechanical stop.
6. Slip the dial carefully over the potentiometer shaft. Tighten the set screws without causing movement of the dial readout or potentiometer shaft.

Dimensional Drawings

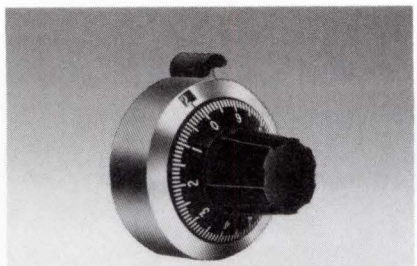




Shaft Diameter

Part Number	Accepts Shaft Diameter
CT-50-6MH	6mm
CT-50-6AH	1/4"

Specifications are subject to change without notice.



BOURNS

1" DIAMETER/0-30 TURNS

- No backlash - mounted directly to potentiometer shaft
- For use with precision potentiometers or other rating devices up to 30 turns
- Compact size - requires only 1" diameter panel space
- Available with or without brake

Model H-490

Bourns® Turns-Counting Dials

Mechanical and Physical Characteristics

Number of Turns	0 to 30
Dial Divisions	100 per turn
Readability - Over 10 Turns	1 part in 1000
Torque With Brake Engaged	5 oz-in. minimum
Weight	Approximately 1/4 oz.
Markings	White on black background
Set Screws	2 screws 120° apart

Environmental Characteristics

Operating Temperature Range	−15°C to +85°C
Mechanical Life	10,000 cycles
Set Screw Tightening Torque	2 in-lbs. minimum

Shaft and Bushing Requirements

Shaft Extension Beyond Panel	0.620 in. minimum 0.835 in. maximum
Bushing Extension Beyond Panel	0.355 in. maximum

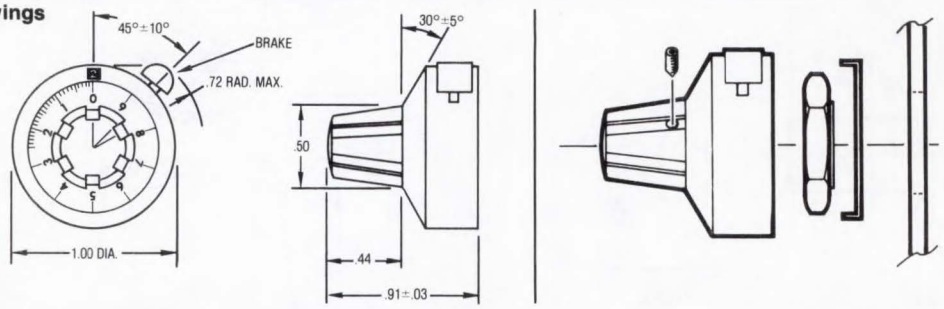
FEATURES

- For use with precision potentiometers or other rotating devices up to 30 turns
- Readability - 1 part in 1000 for ten turns
- Simplified mounting - no special panel holes required
- Compact - requires only 1" diameter panel space
- No backlash - mounted directly to potentiometer shaft
- Standard models available for 3/32", 1/8" and 1/4" diameter shafts
- Excellent legibility - white marking on black background
- Two set screws - standard on all models
- Available with or without brake

H-490 MOUNTING INSTRUCTIONS

1. Discard standard mounting nut and lockwasher supplied with the potentiometer; they will not be used.
2. Insert potentiometer in panel.
3. Using parts supplied with dial, position anti-rotation washer against panel. Tangs of washer should stick out from panel.
4. Install mounting nut supplied with dial. Be sure:
   a. Shoulder on nut engages hold of anti-rotation washer.
   b. Tangs of anti-rotation washer are aligned vertically. This positions the turns-counting window properly.
5. Turn potentiometer shaft counterclockwise to minimum resistance or voltage ratio. This is not necessarily at the end of travel.
6. Loosen set screw in knob of dial assembly. Set dial to "0.00" reading. Slip dial assembly over end of potentiometer shaft.
7. Holding outer ring of dial assembly, engage locating tangs on anti-rotation washer in notches on dial assembly.
8. While holding outer ring, position unit lightly against panel. Uniformly tighten knob set screws to potentiometer shaft with furnished hex wrench.

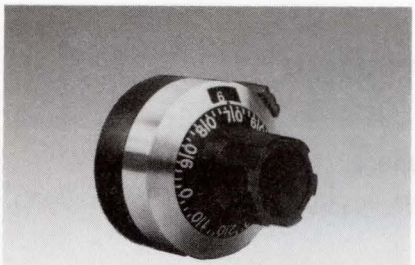
Dimensional Drawings



Part Number	Fits Shaft Diameter	Fits Bushing Size	Brake	Body Finish
H-491-1	3/32	1/4"-32UNEF-2A	No	Clear
H-492-1	3/32	1/4"-32UNEF-2A	Yes	Clear
H-493-1	3/32	1/4"-32UNEF-2A	No	Black
H-494-1	3/32	1/4"-32UNEF-2A	Yes	Black
H-491-2	1/8	1/4"-32UNEF-2A	No	Clear
H-492-2	1/8	1/4"-32UNEF-2A	Yes	Clear

Part Number	Fits Shaft Diameter	Fits Bushing Size	Brake	Body Finish
H-493-2	1/8	1/4"-32UNEF-2A	No	Black
H-494-2	1/8	1/4"-32UNEF-2A	Yes	Black
H-491-3	1/4	3/8"-32UNEF-2A	No	Clear
H-492-3	1/4	3/8"-32UNEF-2A	Yes	Clear
H-493-3	1/4	3/8"-32UNEF-2A	No	Black
H-494-3	1/4	3/8"-32UNEF-2A	Yes	Black

Specifications are subject to change without notice.



BOURNS

7/8'' DIAMETER/0-15 TURNS

- Compact, requires only 0.9'' diameter panel space
- No backlash
- For use with precision potentiometers or other rotating devices up to 15 turns

Model H-506

Bourns® Turns-Counting Dials

Mechanical and Physical Characteristics

Number of Turns	0 to 15
Dial Divisions	50 per turn
Readability - Over 10 Turns	2 parts in 1000
Torque - With Brake Engaged	7.0 oz-in. (5.0 Ncm) minimum
Weight	Approximately 10 grams
Markings	White on black background
Set Screws	2 screws 120° apart

Shaft and Bushing Requirements

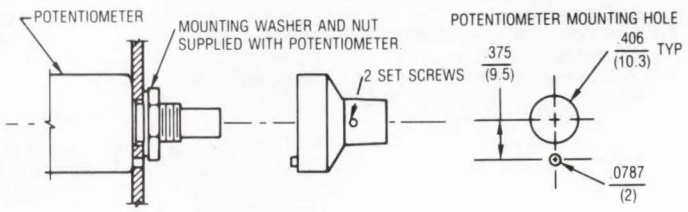
Shaft Extension Beyond Panel	0.6890 in. minimum (17.5 mm) 0.8858 in. maximum (22.5 mm)
Bushing Extension Beyond Panel	0.3937 in. maximum (10 mm)

FEATURES

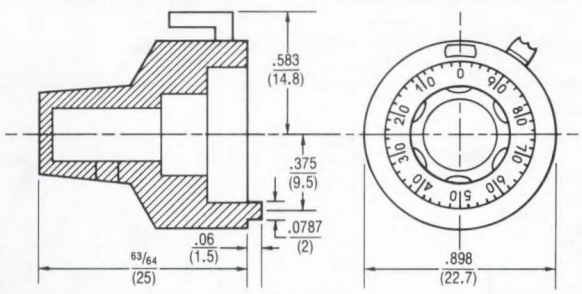
- For use with precision potentiometers or other rotating devices up to 15 turns
- Excellent legibility - white marking on black background
- High quality, rugged construction
- Two set screws
- No backlash
- High force, positive brake
- Compact - requires only .9'' diameter panel space
- Standard models to fit 1/4'' and 6mm diameter shafts

H-506 MOUNTING INSTRUCTIONS

1. Drill .0787 (2) diameter anti-rotation pin hole on vertical centerline, .375 (9.5mm) below center of potentiometer mounting hole.
2. Mount potentiometer in panel with nut and lockwasher supplied with the potentiometer.
3. Turn potentiometer shaft counterclockwise to obtain minimum resistance or voltage ratio. This is not necessarily identical with mechanical stop.
4. Loosen set screws in knob of dial. Set dial to ''0.0'' reading.
5. While holding outer ring of dial, position unit lightly against panel. Tighten knob set screws to potentiometer shaft.



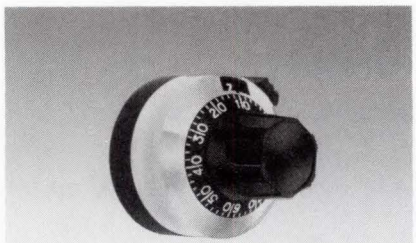
Dimensional Drawings



MEASUREMENTS IN INCHES (MM)

STANDARD PART NUMBERS

Shaft Diameter	Model
1/4'' 6mm	H-506-1/4 H-506-6



7/8'' DIAMETER/0-15 TURNS

- No backlash
- Compact - requires minimal panel space
- For use with precision potentiometers or other rotating devices, up to 15 turns

BOURNS

Model H-507-6

Bourns® Turns-Counting Dials

Mechanical and Physical Characteristics

Number of Turns	0 to 15
Dial Divisions	50 per turn
Readability - Over 10 Turns	2 parts in 1000
Torque - With Brake Engaged	5 oz-in. (350 cm. gr.) minimum
Weight	Approximately .2469 oz. (7 gr.)
Markings	White on black background
Mechanical Life	10,000 cycles
Set Screws	1 included

Shaft and Bushing Requirements

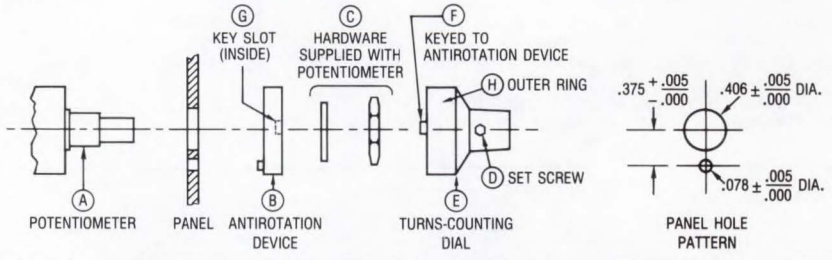
Shaft Extension Beyond Panel	0.7126 in. minimum (18.1 mm) 0.8504 in. maximum (21.6 mm)
Bushing Extension Beyond Panel	0.3976 in. maximum (10.1 mm)
Shaft Diameter	1/4'' (6.35 mm)

FEATURES

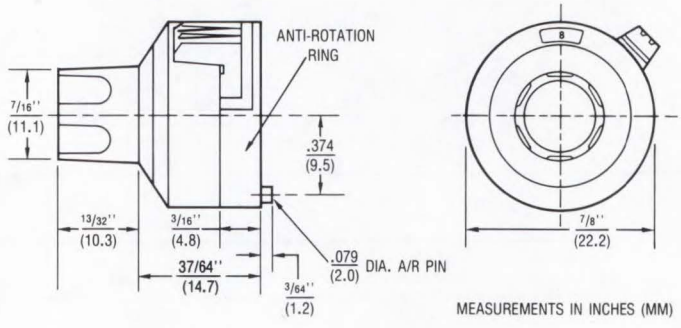
- For use with precision potentiometers or other rotating devices up to 15 turns
- Excellent legibility - white marking on black background
- High quality, rugged construction, aluminum housing, metal-to-metal setscrew threads
- No backlash - mounted directly to potentiometer shaft
- Compact - requires only 7/8'' diameter panel space
- High force, positive brake

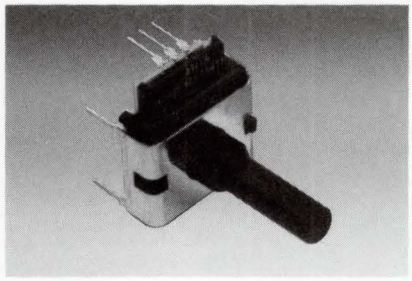
H-507-6 MOUNTING INSTRUCTIONS

1. Insert potentiometer [A] in panel.
2. Install anti-rotation device [B] using hardware [C] supplied with potentiometer.
3. Turn potentiometer shaft counterclockwise to minimum resistance or voltage ratio.
4. Loosen set screw [D] in knob of turns-counting dial [E] using allen wrench. Set dial to "0.0."
5. Mount dial on potentiometer shaft and position against anti-rotation device. Care must be exercised to insure dial key [F] is inserted in anti-rotation device slot [G].
6. While holding outer ring [H] of turns-counting dial, tighten set screw [D] to potentiometer shaft.



Dimensional Drawings





ENCODERS

BOURNS

PRODUCT SELECTION GUIDE
Encoders

ROTARY OPTICAL

The Bourns® EN model is a self-contained rotary optical encoder. It produces a 2-bit quadrature signal which is suitable for digital systems where both magnitude and direction of adjustment must be provided. The EN encoder is ideal for use as a digital panel control or as a position sensing device in applications where long life, reliability, high resolution and precise linearity are critical.

The EN series encoder converts rotary input into electrical signals which can be used by microprocessors without A/D conversion. Bourns encoder output signals are square wave digital pulses which do not require debounce circuitry. Both features make it possible to significantly reduce the memory overhead, wiring and wiring interconnects required by other types of control devices.

EN optical encoders offer a useful rotational life of from 10 million to 200 million shaft revolutions, making them ideal for extended service applications. The Bourns encoder is also compact and well suited for situations where the available space is limited. For easy mounting, the EN series comes standard with a front bushing and shaft.

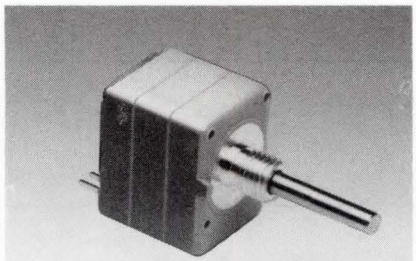
Model Series	Supply Voltage	Output	Output Voltage	Mount	Page No.
EN...	5.0 VDC ±0.25	Quadrature	Low: 0.8V max. High: 4V min.	Bushing or Servo	168

DIGITAL CONTACTING

The Digital Contacting Encoder is commonly referred to by such names as Digital Panel Control, Bit Switch, Gray Switch and Digital Switch. All such names are synonymous with a device whose output is a digital gray code signal, rather than a conventional potentiometric voltage ratio output.

The advantage of the Digital Contacting Encoder is that it permits the direct entry of digitized analog data into a digital circuit without A/D conversion. The two (2) channel gray coded signal of this incremental encoder allows the user's decoder circuit to sense analog direction of rotation, as well as up-down counter capabilities . . . all without the time and cost required for A/D conversion. This approach can reduce memory overhead, wiring and wiring interconnects, and can provide greater MPU program speed.

Model Series	Circuit Resistance	Output	Terminal Styles	Mount	Page No.
EC/EL	5Ω max. - Closed 100KΩ min. - Open	Quadrature	PC Pin Solder Holes	PC Board or Bushing	170



BOURNS

OPTICAL INCREMENTAL ENCODERS

- Two channel quadrature output
- Square wave signal
- Small size
- CMOS and TTL compatible
- Long life
- High operating speed
- Bushing or servo mount
- Index channel available

Rotary Optical Encoders

Bourns® Optical Encoders

Electrical Characteristics

Output	2-bit gray code, Channel A leads Channel B by 90° (electrical) with clockwise rotation
Supply Voltage	5.0 VDC ±0.25 VDC*
Supply Current	26 mA maximum
Output Voltage	
Low Output	0.8V maximum
High Output	4V minimum
Output Current	
Low Output	25 mA minimum
Insulation Resistance (500 VDC)	1,000 megohms
Rise/Fall Time	200ns (typical)
Shaft RPM (Ball Bearing)	5,000 rpm maximum
Power Consumption	136 mW maximum
Pulse Width (Electrical Degrees, Each Channel)	180° ± 45° TYP.
Pulse Width (Index Channel)	360° ± 90°
Phase (Electrical Degrees, Channel A to Channel B)	90° ± 45°TYP.
Index Channel Centered on 1-1 State Combination of A and B Channels	0° ± 45°

**Consult factory for other voltages up to 15 VDC.*

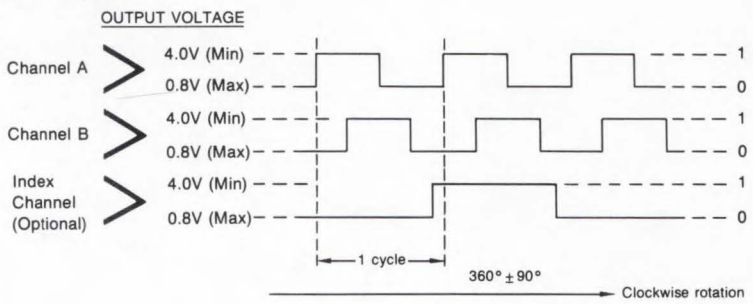
Environmental Characteristics

Operating Temperature Range (Standard)	−20°C to +85°C
Vibration	5G
Shock	50G
Humidity	MIL-STD-202, Method 103B, Condition B

Mechanical Characteristics

Torque (Starting and Running)	
A & C Bushings (Spring Loaded for Optimum Feel)	1.5 oz-in. maximum
W, S & T Bushings (Ball Bearing Shaft Support)	0.1 oz-in. maximum
Mechanical Rotation	Continuous
Shaft End Play	0.012" T.I.R. maximum
Shaft Radial Play	0.005" T.I.R. maximum
Rotational Life	
A & C Bushings (300 rpm maximum)	10,000,000 revolutions
W,S & T Bushings (5,000 rpm maximum)	200,000,000 revolutions
Weight	0.4 oz.

OUTPUT TABLE



STANDARD RESOLUTIONS AVAILABLE

(Full quadrature output cycles per shaft revolution.)

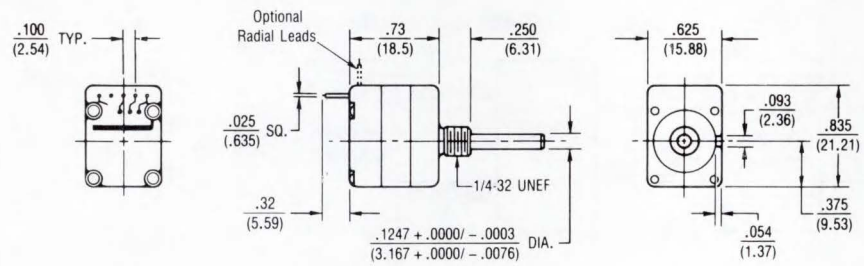
64
100
128
256

For Non-Standard Resolutions--Consult Factory

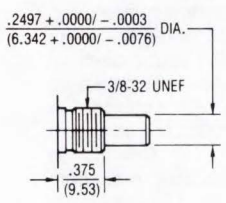
- CMOS and TTL compatible
- Long life
- Bushing mount configuration

Rotary Optical Encoders

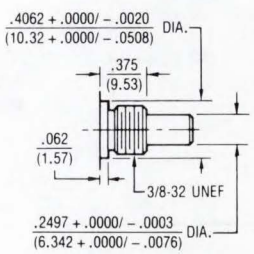
Bourns® Optical Encoders



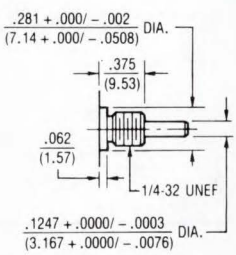
Bushing Style **C**



Bushing Style **A**

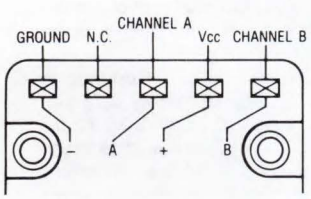


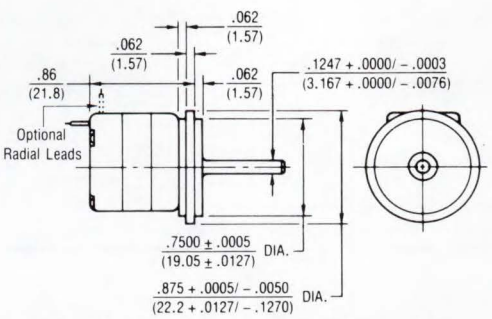
Bushing Style **S** (Ball Bearing)



Bushing Style **T** (Ball Bearing)

TERMINATION DIAGRAM





Servo Mount Style **W** (Ball Bearing)

Consult factory for options not shown, including:

- Wire lead or cable options
- Connectors
- Non-standard resolutions
- Special shaft/bushing sizes and features
- Special performance characteristics

HOW TO ORDER

BOURNS EN SERIES OPTICAL ENCODER

E	N	C	1	J	—	D	2	8	-	L	0	0	1	2	8

ANTI-ROTATION LUG POSITION

Code	Description
D	None
J	9:00 Position

SHAFT LENGTH*

Code	Description
16	1/2" Long
20	5/8" Long
28	7/8" Long

TERMINAL CONFIGURATION

Code	Description
L	Axial, Multi-Purpose Pin
R	Radial, Multi-Purpose Pin

SWITCHING CONFIGURATION

Code	Description
1	Channel A Leads Channel B By 90° (Clockwise Rotation)
2	Code 1 Switching With Index Channel

RESOLUTION

Code	Cycles Per Revolution
00064	64
00100	100
00128	128
00256	256

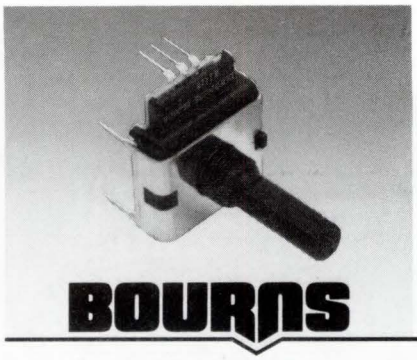
SHAFT STYLE

Code	Description	Use With Bushings (Code)
B	1/4" Dia., Plain End	A, S
D	1/8" Dia., Plain End	C, T, W

BUSHING CONFIGURATION

Code	Description
A	3/8"D x 3/8"L Threaded
C	1/4"D x 1/4"L Threaded
S	3/8"D x 3/8"L Threaded (Ball Bearing)
T	1/4"D x 3/8"L Threaded (Ball Bearing)
W	Servo Mount 7/8"D (Ball Bearing)

*Shaft length measured from mounting surface.



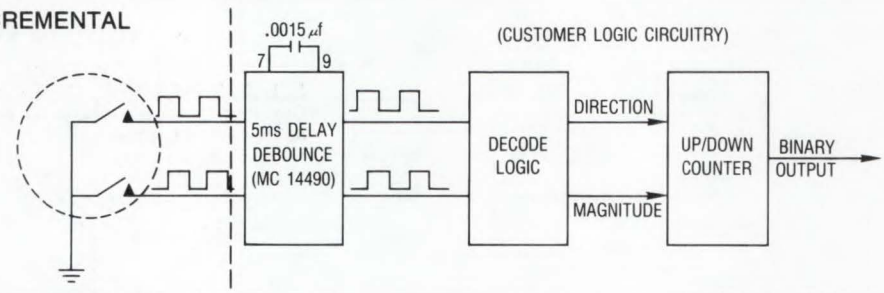
INCREMENTAL ENCODER/QUADRATURE OUTPUT

- Exceptionally long operating life
- High operating temperature capabilities
- Sturdy construction
- Bushing mount
- Available with PC board mounting bracket (optional)

Digital Contacting Encoders

Bourns® Contacting Encoders

RECOMMENDED INCREMENTAL CONTROL DIAGRAM



Electrical Characteristics

Output	2-bit gray code, Channel A leads Channel B by 90° electrically turning clockwise (CW)
Closed Circuit Resistance	5 ohms maximum
Open Circuit Resistance	100K ohms minimum
Contact Rating	10 milliamp @ 10 VDC or 0.1 watt maximum
Insulation Resistance (500 VDC)	1,000 megohms minimum
Dielectric Withstanding Voltage	MIL-STD-202 Method 301
Sea Level	1,000 VAC minimum
Electrical Travel	Continuous
Contact Bounce (15 RPM)	5 milliseconds maximum
RPM (Operating)	120 maximum

Environmental Characteristics

Storage Temperature Range	−40°C to +140°C
Operating Temperature Range	+1°C to +125°C
Humidity	MIL-STD-202, Method 103B, Condition B
Vibration	15 G
Contact Bounce	0.1 millisecond maximum
Shock	50 G
Contact Bounce	0.1 millisecond maximum
Rotational Life	200,000 shaft revolutions*

Mechanical Characteristics

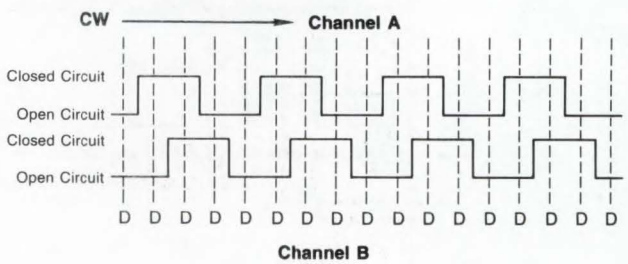
Mechanical Angle	Continuous
Weight	Approximately 0.75 oz.
Torque (Detented)	0.75 to 2.25 oz-in.
Mounting Torque	7 in-lbs. maximum
Shaft Side Load (Static)	10 lbs. minimum

*Applies to EC Option.

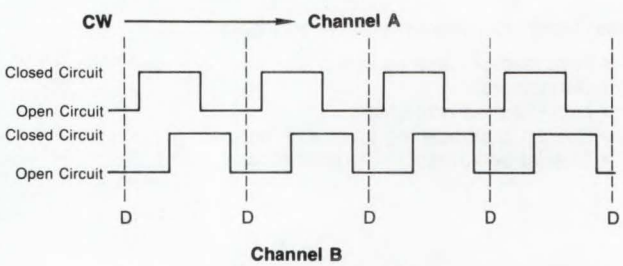
QUADRATURE OUTPUT TABLE

This table is intended to show available outputs as currently defined.

1/4 CYCLE PER DETENT



FULL CYCLE PER DETENT (Normally Open in Detent Shown)



Specifications are subject to change without notice.

BOURNS

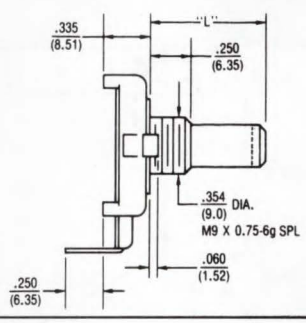
Digital Contacting Encoders

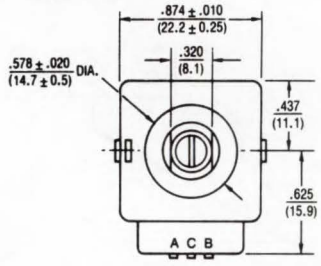
Bourns® Contacting Encoders

BUSHING MOUNTED - HOUSING **A**

W style bushing shown.

Shaft lengths "L" for B, C, R and Y styles
24 = .750" (19mm)
36 = 1.125" (28.5mm)

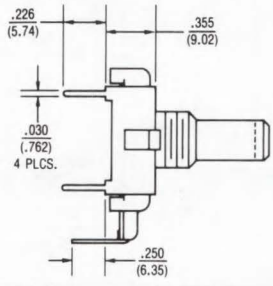


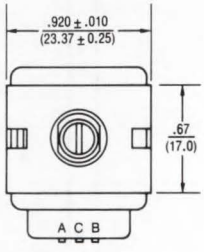


"L" Dim. = 1.125 or .750

PCB BRACKED MOUNTED - HOUSING **B**

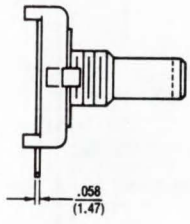
Dimensions not given are the same as Bushing Mounted.

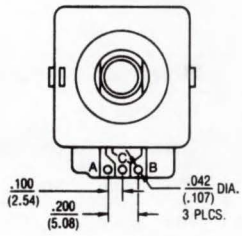




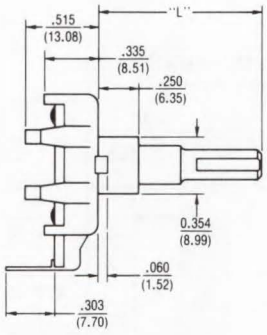
SOLDER HOLES - HOUSING **C**

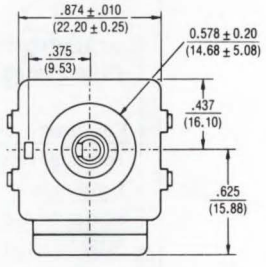
Dimensions not given are the same as Bushing Mounted.



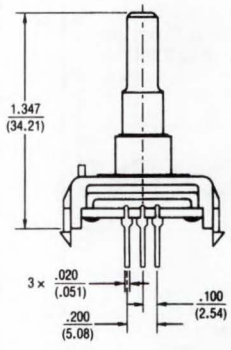


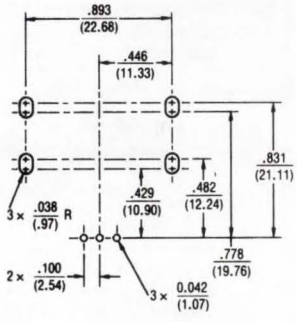
SNAP-IN MOUNT - HOUSING **G**



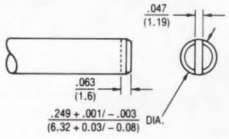


PCB MOUNTING DIMENSIONS

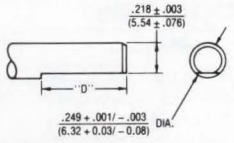




SHAFT STYLE **B**

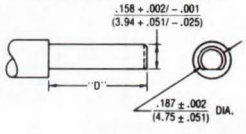


SHAFT STYLE **C**

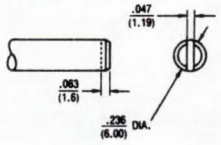


"D" dimension extends from shaft end to bushing face.
"D" = (shaft length, FMS) − (bushing length)

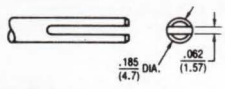
SHAFT STYLE **J**



SHAFT STYLE **R**



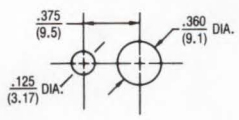
SHAFT STYLE **Y**



Slot depth (Y shaft) .380 (9.65) for shafts < 1" (2.54) length .580 (14.7) for shafts ≥ 1" (2.54) length

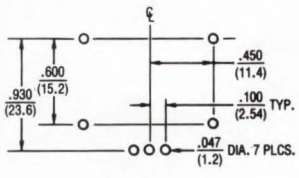
PANEL HOLE DIMENSIONS

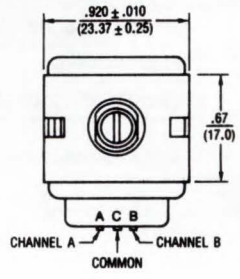
Bushing Mounted



PCB MOUNTING DIMENSIONS

(Housing Styles B and E)





FOR TOLERANCES NOT SHOWN
.XX = ± .010
.XXX = ± .005
SHAFT DIMENSIONS ± 1/32"

Specifications are subject to change without notice.

BOURNS

HOW TO ORDER
Digital Contacting Encoders
Bourns® Contacting Encoders

E	C	W	1	J	-	B	2	4	-	B	C	0	0	2	4

Code	Rotational Life
C	200,000 Revolutions
L	100,000 Revolutions

BUSHING CONFIGURATION	
Code	**Description**
W	9mm x 1/4" Length. Threaded M9x0.75
L	9mm x 3/8" Length. Threaded M9x0.75.
T	9mm x 1/4". No Thread.

SWITCHING CONFIGURATION (In Detent Position) Applies to performance codes B0012 and C0024 only, use code "0" for all other performance codes.	
Code	**Description**
0	Not Applicable
1	Normally Open
2	Normally Closed

ANTI-ROTATION LUG POSITION	
Code	**Description**
J	9:00 Position
D	None

SHAFT STYLE (See Outline Drawing for Details)	
Code	**Description**
B	Plain with Inserted Slot (1/4" Dia.)
C	Single Flatted
R	Plain with Inserted Slot (6mm Dia.)
Y	Split Shaft Version
J	Flatted Shaft (3/16" Dia.)

PERFORMANCE CODE		
Code	**Detents**	**Cycles/Rev.**
E0006	0	6
E0009		9
E0012		12
E0024		24
B0012	12	12
C0006	24	6
C0024		24
D0009	36	9

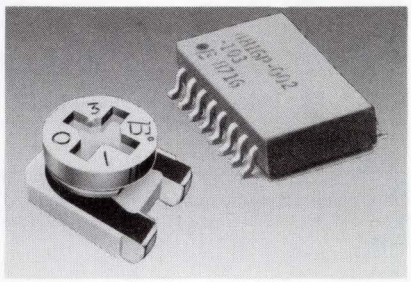
HOUSING/TERMINAL CONFIGURATION (X indicates "Equipped With")							
	Code						
Features	**A**	**B**	**C**	**D**	**E**	**F**	**G***
Terminal Cover	X	X			X		X
Terminals	X	X			X		X
Solder Holes			X	X		X	
PCB Bracket		X		X	X	X	
Hardware Included	X		X		X	X	
Snap-In Mount							X

*Bushing code T only.

SHAFT LENGTH (FMS)	
Code	**Description**
24	3/4" Length (19mm)
28	7/8" Length (22.2mm)
32	1" Length (25.4mm)
36	1-1/8" Length (28.6mm)
Metric	
19	19mm Length (Shaft Style "R" Only)
24	24mm Length (Shaft Style "R" Only)

The sample part number demonstrates the identification code for Bourns Contacting Encoders.

The part number shown is a commonly used model, typically available from stock.



SURFACE MOUNTED COMPONENTS

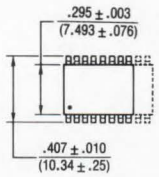
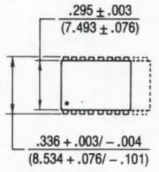
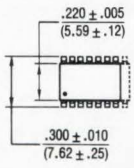
BOURNS

PRODUCT SELECTION GUIDE
Surface Mounted Trimmers

Model Number	Element Technology		Number of Turns		Sealed Open		Size				Packaging Options	Adjust	Page
	Cermet	W/W	Single	Multi	Sealed	Open	4mm	5mm	1/4"	.35"	See Note 1	See Note 2	No.
3304	•		•			•	•				E,G	T	178
3314	•		•		•		•				E,G	T,S	180
3335	•		•		•			•			E,G	T	184
3325	•		•		•				•		B,T	T,S	183
3269	•			•	•				•		G,T	T,S	176
3272	•			•	•					•	G,T	S	177

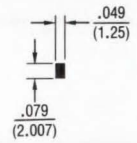
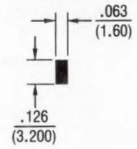
NOTE 1: Standard packaging; some options may require alternate packaging. Consult factory.
T = Tube, B = Bulk, E = Embossed Tape - 7" Reel, G = Embossed Tape - 13" Reel
NOTE 2: T = Top Adjustment, S = Side Adjustment

Surface Mounted Resistor Networks

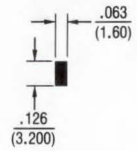
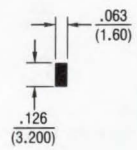
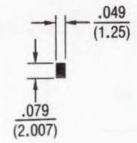
Product Package Outline	Series Number	Pin Ct.	Isolated Resistors	Bussed Resistors	Dual Terminators	Page No.
	4400P	16	4416P-001-RC 4416P-004-RC	4416P-002-RC	4416P-003-RC/RC	186
		20	4420P-001-RC 4420P-004-RC	4420P-002-RC	4420P-003-RC/RC	
	4400J	16	4416J-001-RC 4416J-004-RC	4416J-002-RC	4416J-003-RC/RC	188
		20	4420J-001-RC 4420J-004-RC	4420J-002-RC	4420J-003-RC/RC	
	4800P	14	4814P-001-RC	4814P-002-RC	4814P-003-RC/RC	190
		16	4816P-001-RC 4816P-004-RC	4816P-002-RC	4816P-003-RC/RC	
		18	4818P-001-RC	4818P-002-RC	4818P-003-RC/RC	
		20	4820P-001-RC 4820P-004-RC	4820P-002-RC	4820P-003-RC/RC	

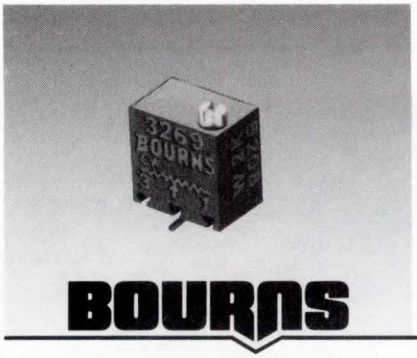
BOURNS

PRODUCT SELECTION GUIDE
Thick Film Chip Resistors

Product Package Outline	Series Number	Tolerance	Resistance Range and Temperature Coefficient	Power Rating and Maximum Operating Voltage	Page Number
	CR0805	5%	47Ω -1MΩ, 200ppm/°C 10Ω -43Ω, 300ppm/°C	0.100W, 100V	193
			0Ω Jumper (.05Ω Max), 200ppm/°C		
	CR1206	5%	47Ω -1MΩ, 200ppm/°C 10Ω -43Ω, 300ppm/°C	0.125W, 200V	195
		1%	100Ω -1MΩ, 100ppm/°C		
			0Ω Jumper (.05Ω Max), 200ppm/°C		

Thick Film Chip Resistors Lab Design Kits

Product Board Space	Part Number	Watt	Tolerance	Contents	Page Number
	H-810	1/8	1%	CR1206 Series - 25 Pieces on standard paper tape of 50 popular ohmic values	197
	H-811	1/8	5%	CR1206 Series - 25 pieces on standard paper tape of 50 popular ohmic values	197
	H-812	1/10	5%	CR0805 Series - 25 pieces on standard paper tape of 50 popular ohmic values	197



SMD 1/4" SQUARE / MULTITURN CERMET / INDUSTRIAL / SEALED

- High temperature construction, recommended for reflow solder processing
- Stable, infinite resolution cermet element
- Vertical and horizontal adjust styles
- Packaged in plastic tubes standard.
- "P" style optional packaging on embossed tape.

BOURNS

Model 3269

Bourns® Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range
.....10 ohms to 1 megohm
(see standard resistance table)
Resistance Tolerance .....±10% std.
(closer tolerance available)
Absolute Minimum Resistance
.....1% or 2 ohms max.
(whichever is greater)
Contact Resistance Variation
.....3.0% or 3 ohms
(whichever is greater)
Adjustability
Voltage .....±0.02%
Resistance .....±0.05%
Resolution .....Infinite
Insulation Resistance .....500 vdc.
1,000 megohms min.
Dielectric Strength
Sea Level .....600 vac
80,000 Feet .....250 vac
Effective Travel .....12 turns nom.

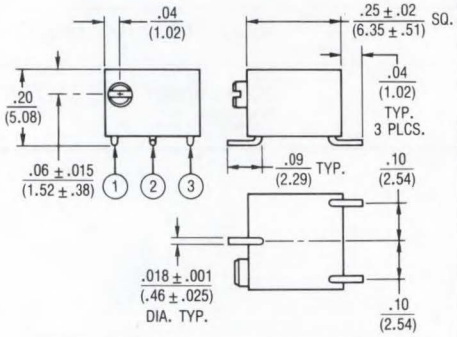
Environmental Characteristics

Maximum Exposure (Temp/Time)
.....+215°C/3 min.
Power Rating (300 volts max.)
85°C .....0.25 watt
150°C .....0 watt
Temperature Range
.....-65°C to +150°C
Temperature Coefficient
.....±100ppm/°C
Seal Test .....85°C Fluorinert*
Humidity .....MIL-STD-202 Method 106
(2% ΔTR; IR 100 megohms)
Vibration .....30G (1% ΔTR; 1% ΔVR)
Shock .....100G (1% ΔTR; 1% ΔVR)
Load Life
.....1,000 hours 0.25 watt @ 85°C
(3% ΔTR; 3% or 3 ohms,
whichever is greater, CRV)
Rotational Life .....200 cycles
(2% ΔTR; 3% or 3 ohms,
whichever is greater, CRV)

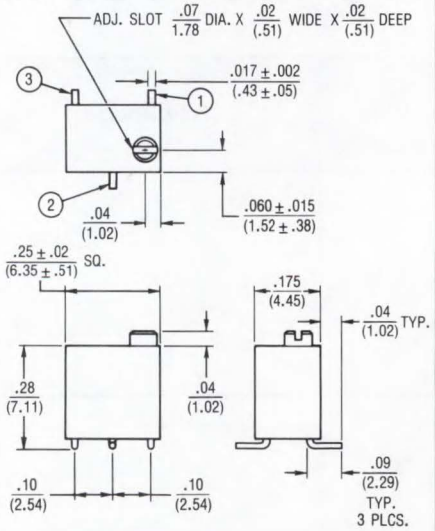
Physical Characteristics

Torque .....3.0 oz-in. max.
Mechanical Stops .....Wiper idles
Terminals .....Solderable pins
Weight .....0.015 oz.
Marking .....Manufacturer's trademark, resistance code, wiring diagram, date code, manufacturer's model number and style
Standard Packaging ..50 pcs. per tube

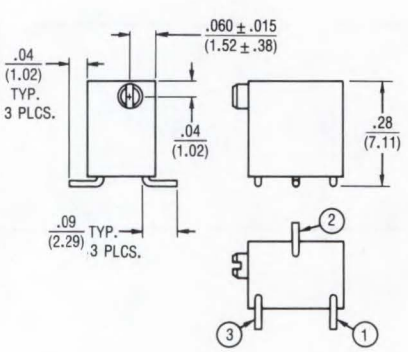
3269P



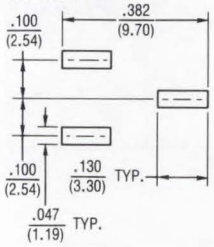
3269W



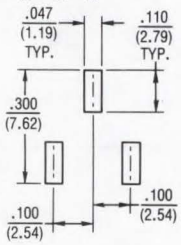
3269X



RECOMMENDED PCB LAYOUT — "P"

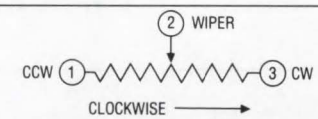


RECOMMENDED PCB LAYOUT — "W" & "X"



TOLERANCES: ± .010 (.25) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)



STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code
10	100
20	200
50	500
100	101
200	201
500	501
1,000	102
2,000	202
5,000	502
10,000	103
20,000	203
25,000	253
50,000	503
100,000	104
200,000	204
250,000	254
500,000	504
1,000,000	105

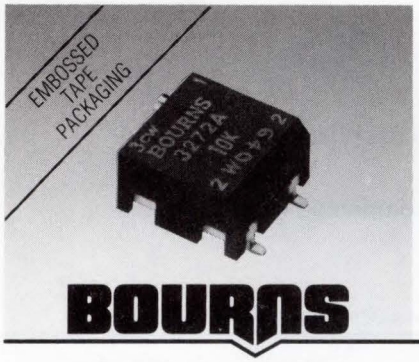
Special resistances available from 10 ohms to 1 megohm.

HOW TO ORDER

3269 X - 1 - 103 G

Model
Style
Standard Product
Resistance Code
1st 2 Significant Digits of Value
3rd Digit Number of Zeroes
Optional Suffix Letter
G = Embossed Tape
("P" Style Only) 750 pcs./13" reel

Specifications are subject to change without notice.
*"Fluorinert" is a registered trademark of 3M Co.



SMD .350" SQUARE / MULTITURN CERMET / INDUSTRIAL / SEALED

- JEDEC package compatible with automatic placement equipment
- Recommended for reflow solder processing
- Exceptional setting stability after high temperature exposure
- Packaged in tubes or optional 24mm embossed tape

BOURNS

Model 3272

Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range ..... 100 ohms to 1 megohm (see standard resistance table)
Resistance Tolerance ..... ±10% std. (closer tolerances available)
Absolute Minimum Resistance ..... 1% or 1 ohm (whichever is greater)
Contact Resistance Variation ..... 1.0% or 3 ohms (whichever is greater)
Adjustability
  Voltage ..... ±0.02%
  Resistance ..... ±0.05%
Resolution ..... Infinite
Insulation Resistance ..... 500 vdc. 1,000 megohms min.
Dielectric Strength
  Sea Level ..... 600 vac
  80,000 Feet ..... 250 vac
Effective Travel ..... 12 turns nom.

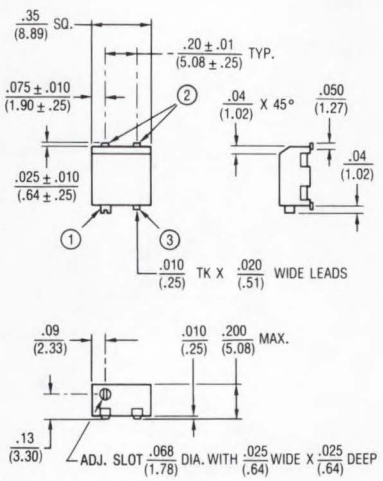
Environmental Characteristics

Maximum Exposure (Temp/Time) ..... +215°C/3min.
Setting Stability (After High Temperature Exposure)
  Total Resistance Shift ..... 1% max.
  Voltage Ratio Shift ..... 0.75% max.
Power Rating (300 volts max.)
  85°C ..... 0.25 watt
  150°C ..... 0 watt
Temperature Range ..... -65°C to +150°C
Temperature Coefficient ..... ±100ppm/°C
Seal Test ..... 85°C Fluorinert*
Humidity ..... MIL-STD-202 Method 106 96 hours (2% ΔTR, IR 100 megohms min.)
Vibration ..... 30G (1% ΔTR; 1% ΔVR)
Shock ..... 100G (1% ΔTR; 1% ΔVR)
Load Life ..... 1,000 hours 0.25 watt @ 85°C (3% ΔTR; 3% CRV)
Rotational Life ..... 200 cycles (2% ΔTR; 3% CRV)

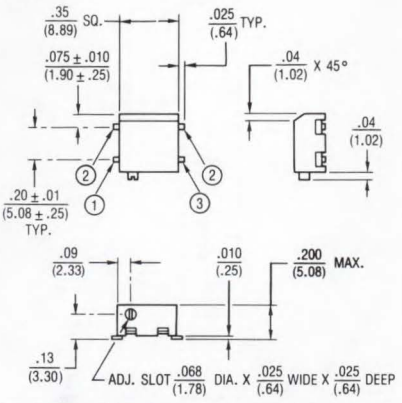
Physical Characteristics

Mechanical Angle ..... 16 turns nom.
Torque ..... 3.0 oz-in. max.
Mechanical Stops ..... Wiper idles
Terminals ..... Solderable pins
Weight ..... 0.02 oz.
Marking ..... Manufacturer's trademark, resistance code, terminal numbers, date code, manufacturer's model number and style
Standard Packaging ..... 50 pcs. per tube

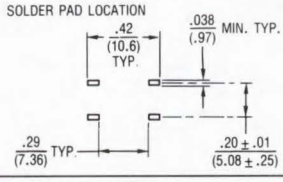
3272A



3272C

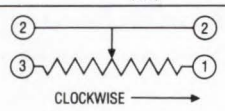


RECOMMENDED PCB LAYOUT — "A" & "C"

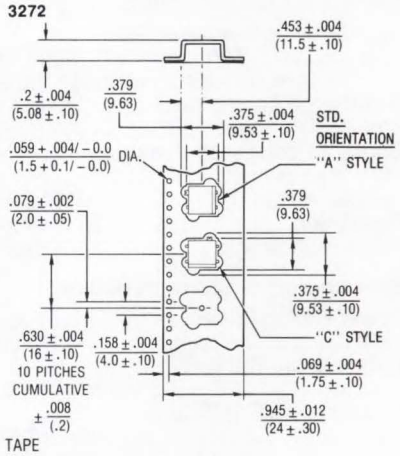


TOLERANCES: ± .010 (.25) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)

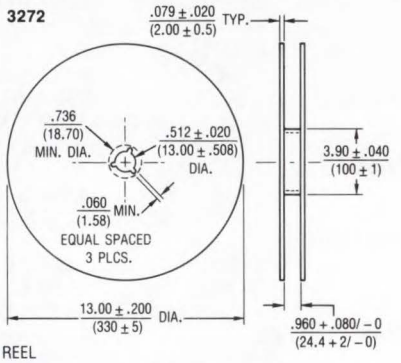


3272



TAPE

3272



REEL

Conforms with EIA Specification 481.

STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code	Resistance (Ohms)	Resistance Code
100	101	25,000	253
200	201	50,000	503
500	501	100,000	104
1,000	102	200,000	204
2,000	202	250,000	254
5,000	502	500,000	504
10,000	103	1,000,000	105
20,000	203		

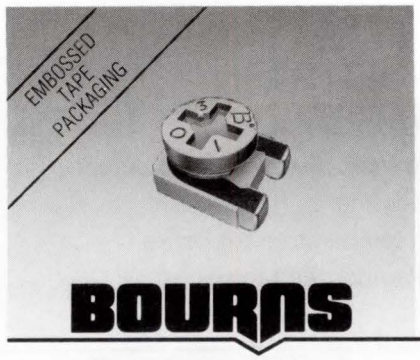
Special resistances available from 100 ohms to 1 megohm.

HOW TO ORDER

3272 C - 1 - 103 G

Model
Style
Standard Product
Resistance Code
Optional Suffix Letter
G = Embossed Tape, 750 pcs./13" reel

Specifications are subject to change without notice.
*"Fluorinert" is a registered trademark of 3M Co.



BOURNS

SMD 4MM SQUARE / SINGLE-TURN CERMET / INDUSTRIAL / OPEN FRAME

- Unique cross-slot rotor design suitable for pick and place and automatic adjustment equipment
- Supplied in 12mm embossed tape, compatible with automatic assembly equipment
- Two packaging orientations
- Recomended for reflow solder processing only

Model 3304

3® Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range
.....500 ohms to 1 megohm
(see standard resistance table)
Resistance Tolerance .....±25% std.
End Resistance .....5% max,
Contact Resistance Variation
(Voltage Divider)
Styles A,B,W & X .....5% max.
Resolution .....Infinite
Adjustment Angle .....230° nom.

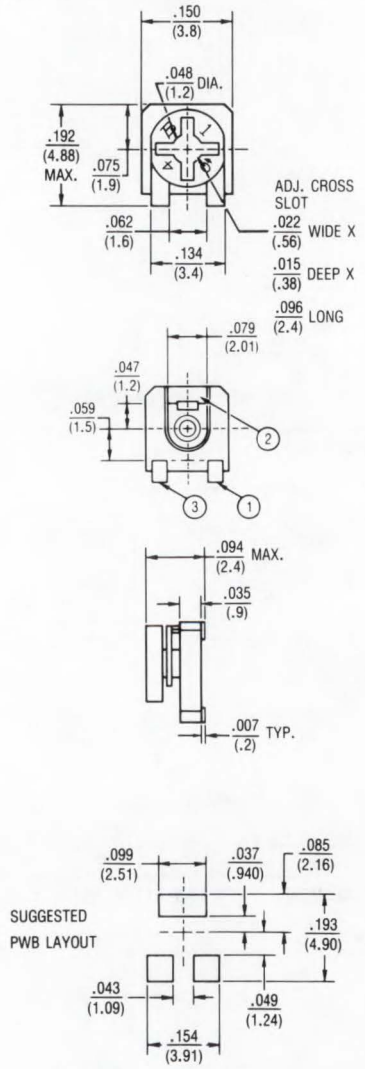
Environmental Characteristics

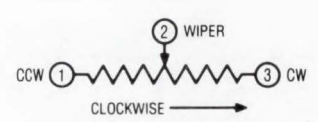
Power Rating (50 volts max.)
70°C .....0.2 watt
Temperature Range
.....-55°C to +125°C
Temperature Coefficient
.....±200ppm/°C
Humidity.....MIL-STD-202 Method 103
500 hours
(5% ΔTR) Styles A,B,W, & X
SRS ±5% Styles C & D
Vibration .....30G (2% ΔTR; 2% ΔVR)
Styles A,B,W & X
SRS ±5% Styles C & D
Shock .....100G (2% ΔTR; 2% ΔVR)
Styles A,B,W & X
SRS ±5% Styles C & D
Load Life
.....1,000 hours 0.2 watt @ 70°C
(5% ΔTR) Styles A,B,W & X
SRS ±5% Styles C & D
Rotational Life .....20 cycles
(15% ΔTR)

Physical Characteristics

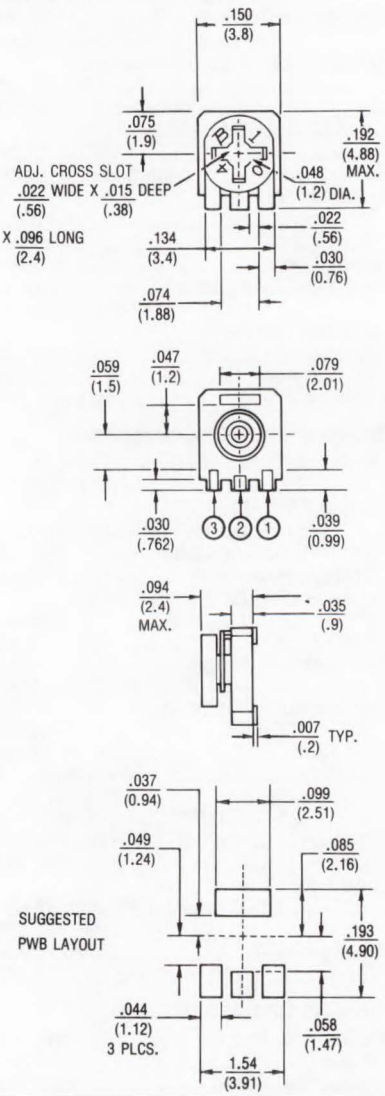
Torque (Operating) .....3.0 oz-in. max.
Mechanical Angle .....Continuous
Marking .....Manufacturer's trademark, resistance code, Manufacturer's full part number and date code on packaging
Terminals .....Solder coated
Packaging .....750 pieces/7" reel
Reflow solder processing recommended

3304 Voltage Divider
3-Terminal
3-Pad
Styles W, X

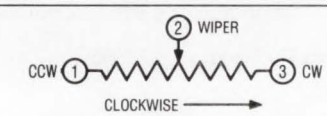




3304 Voltage Divider
3-Terminal
4-Pad
Styles A, B



TOLERANCES: ± .012 (0.30) EXCEPT WHERE NOTED
DIMENSIONS: IN. (MM)

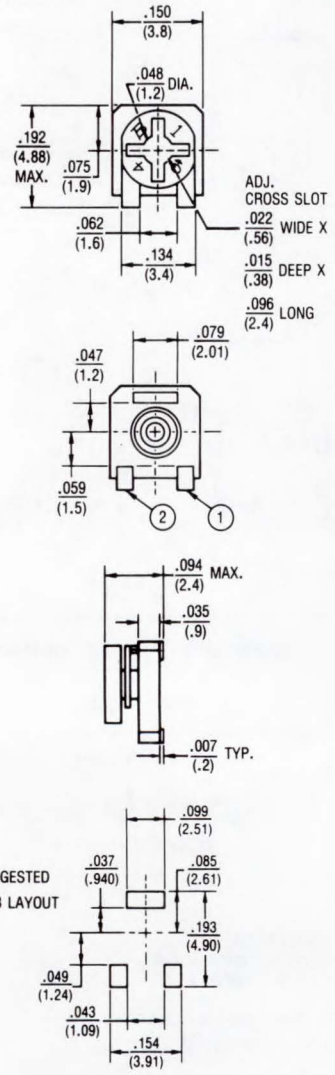


*SRS± = % Styles C&D
Specifications are subject to change without notice.

Model 3304

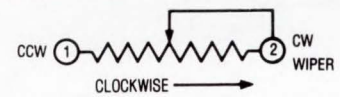
Trimming Potentiometer

3304 Rheostat
2-Terminal
3-Pad
Styles C, D



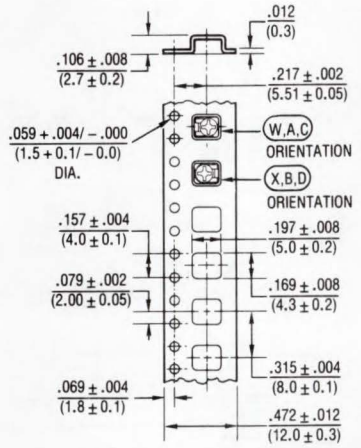
TOLERANCES: ± .012 (.3) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)

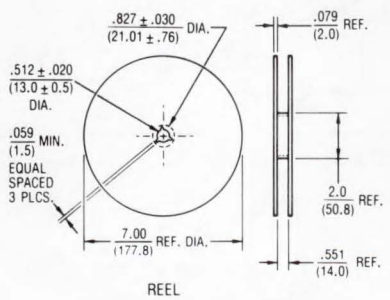


Specifications are subject to change without notice.

TAPE AND REEL



TAPE



REEL

750 pieces per reel.
Conforms with EIA specification RS-481.

Orientation of parts in tape:
Styles W, A, C: Terminals toward sprocket holes
Styles X, B, D: Terminals away from sprocket holes

STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code
500	501
1,000	102
2,000	202
5,000	502
10,000	103
20,000	203
50,000	503
100,000	104
500,000	504
1,000,000	105

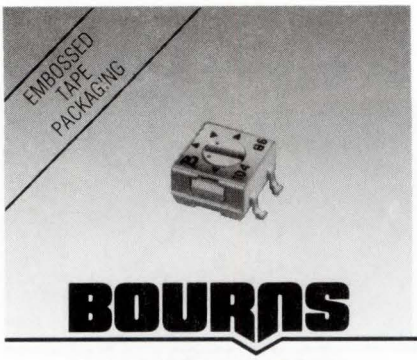
Special resistances available from 500 ohms to 1 megohm.

HOW TO ORDER

3304 X - 1 - 103 E

Model
Style
Standard Product
Resistance Code
Embossed Tape Designator
E = 750 pcs./7" reel (standard)
G = 3000 pcs./13" reel (optional)

Consult factory for other available options.



SMD 4MM SQUARE / SINGLE-TURN CERMET / INDUSTRIAL / SEALED

- Compatible with all surface mount soldering processes
- Very low CRV - 1%
- Standoffs facilitate boardwashing and mechanical stability

BOURNS

Model 3314

B® Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range
.....10 ohms to 2 megohms
(see standard resistance table)
Resistance Tolerance .....±20% std.
(tighter tolerance available)
End Resistance
.....1% or 2 ohms max.
(whichever is greater)
Contact Resistance Variation
.....1% or 3 ohms max.
(whichever is greater)
Resolution .....Essentially Infinite
Insulation Resistance .....500 vdc.
100 megohms min.
Dielectric Strength
Sea Level.....500 vac (1 minute)
Adjustment Angle .....210° nom.

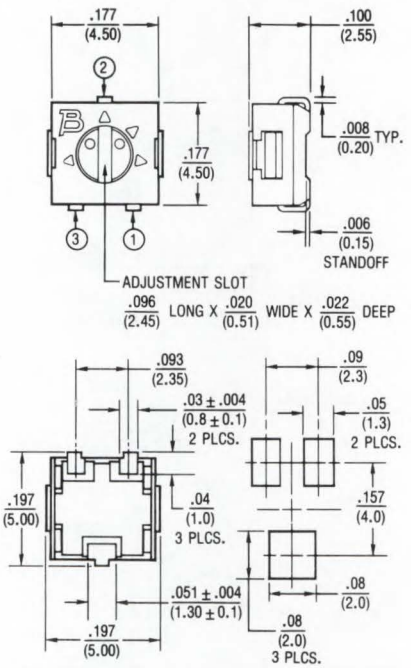
Environmental Characteristics

Soldering Heat
.....260°C, 10 seconds, TRS ±1%
Power Rating (300 volts max.)
70°C .....0.25 watt
125°C .....0 watt
Temperature Range
.....-55°C to +125°C
Temperature Coefficient
.....±100ppm/°C
Humidity .....90-98% RH,
10 cycles, 240 hours
TRS ±2%; IR 10 megohms
Vibration .....20G TRS ±1%; VRS ±1%
Shock .....100G TRS ±1%; VRS ±1%
Load Life
...(@ 70°C Rated Power 1000 Hours)
TRS ±3%
Rotational Life .....100 cycles
TRS ±3%
Thermal Shock .....5 cycles
TRS ±2%; VRS ±1%

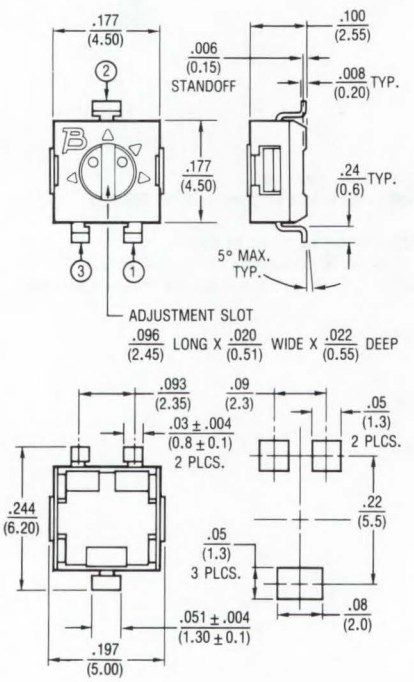
Physical Characteristics

Mechanical Angle .....240° nom.
Torque .....180g-cm typical
Stop Strength .....300g-cm typical
Pushover Strength (S Style)
.....2 kilograms (4.4 lbs.) minimum
Weight .....Approximately 0.01 oz.
Marking .....Manufacturer's
code, resistance code
and date code

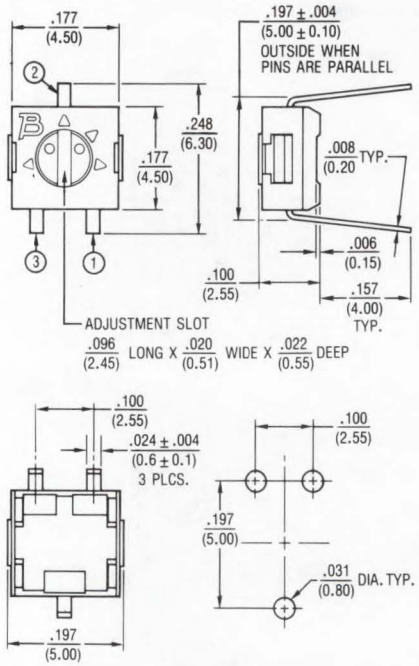
3314J



3314G

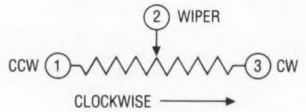


3314H



TOLERANCES: ± .012 (0.30) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)



FOR ALL MODELS
ROTOR POSITIONED WITHIN
±11° OF TERMINAL 2

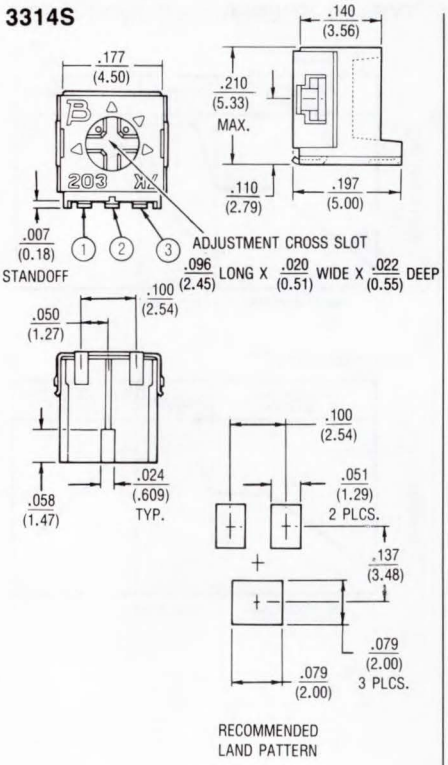
TERMINALS AND STANDOFFS TO BE
COPLANAR WITHIN .004 (.109) INCHES.

- Compatible with popular vacuum pick-and-place equipment
- J-hook, gull-wing and pinned configurations
- Meets EIA/EIAJ/IPC/VRCI SMD standard trimmer designs

Model 3314

® Trimming Potentiometer

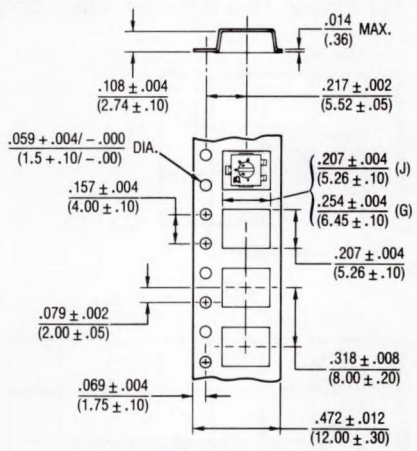
3314S



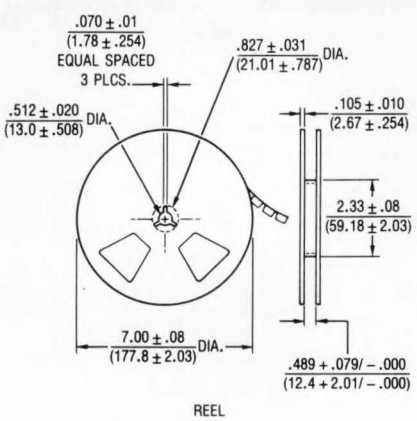
RECOMMENDED LAND PATTERN

PACKAGING SPECIFICATIONS

(J, G Styles)



TAPE



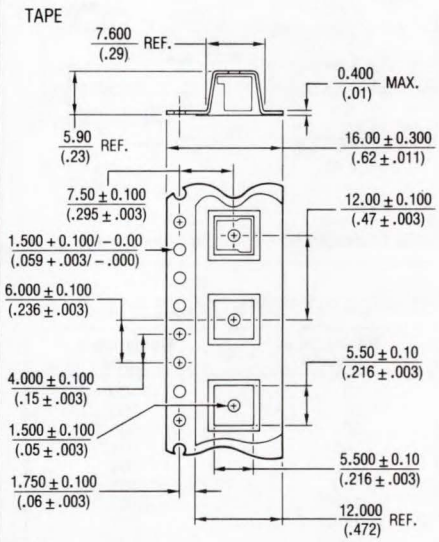
REEL

Meets EIA specification 481.

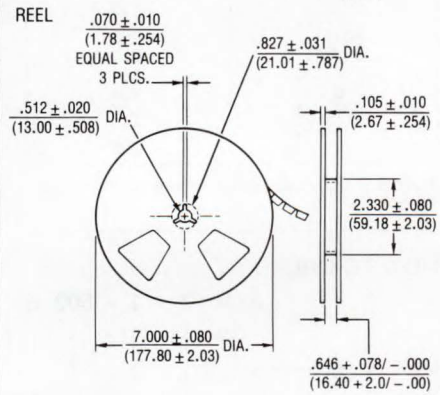
PACKAGING SPECIFICATIONS

(S Style)

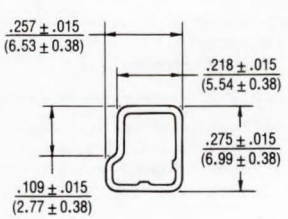
TAPE



REEL



TUBE



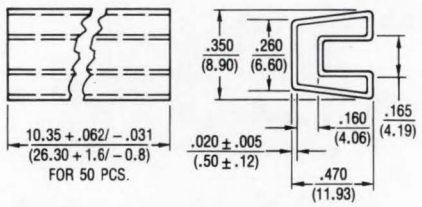
Tube length - 20.6 inches.
Units packaged 100 pieces per tube.

Continued, page 182.

Model 3314

B® Trimming Potentiometer

PACKAGING SPECIFICATIONS
(H Style)



Units packaged 50 pieces per tube.

STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code
10	100
20	200
50	500
100	101
200	201
500	501
1,000	102
2,000	202
5,000	502
10,000	103
20,000	203
50,000	503
100,000	104
200,000	204
500,000	504
1,000,000	105
2,000,000	205

Special resistances available from 10 ohms to 2 megohms.

HOW TO ORDER

3314 G - 1 - 502 E

Model

Style

Standard or Modified Product Indicator
-1 = Standard Product

Resistance Code

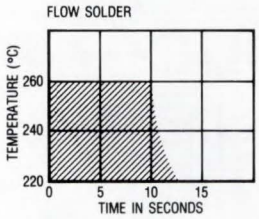
Embossed Tape Designator
(Applicable to Styles J and G only)
E = 500 pcs. /7" reel
G = 3000 pcs. /13" reel

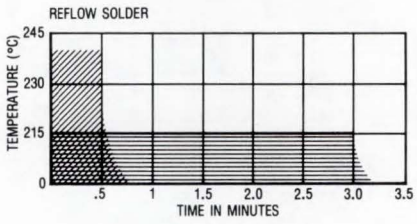
Consult factory for other available options.

Specifications, page 180.

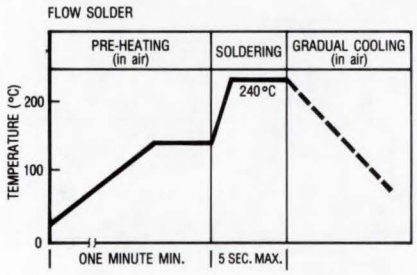
SOLDERING IRON HEAT ≤350°C, 3 SEC. MAX. (Wattage of iron 40W)

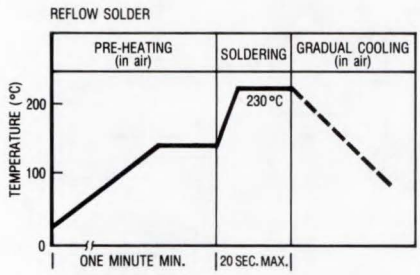
REFLOW SOLDERING TEMPERATURES (Must be within zone)



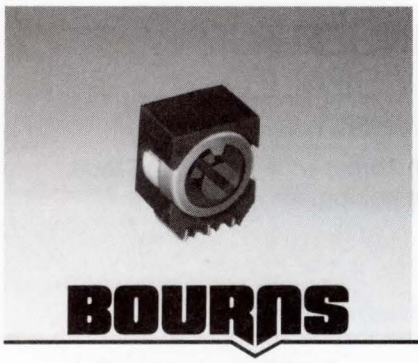


TYPICAL SOLDERING CONDITIONS





Specifications are subject to change without notice.



SMD 1/4" ROUND / SINGLE-TURN CERMET / INDUSTRIAL / SEALED

- Stable, infinite resolution cermet element
- High temperature construction
- Recommended for reflow solder processing
- Vertical and horizontal adjust styles
- "W" and "X" styles packaged in plastic tubes; "P" style in plastic trays

Model 3325

Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range
..... 10 ohms to 1 megohm
(see standard resistance table)
Resistance Tolerance ..... ±10% std.
(closer tolerance available)
Absolute Minimum Resistance
..... 1% or 2 ohms
(whichever is greater)
Contact Resistance Variation
..... 1.0% or 3 ohms
(whichever is greater)
Adjustability
Voltage ..... ±0.05%
Resistance ..... ±0.15%
Resolution ..... Infinite
Insulation Resistance ..... 500 vdc.
1,000 megohms min.
Dielectric Strength
Sea Level ..... 600 vac
80,000 Feet ..... 250 vac
Adjustment Travel ..... 240° nom.

Environmental Characteristics

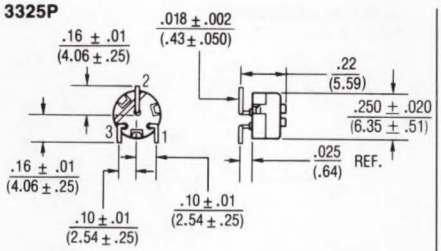
Maximum Exposure (Time/Temp)
..... +215°C/3 min.
Power Rating (300 volts max.)
85°C ..... 0.5 watt
150°C ..... 0 watt
Temperature Range
..... -55°C to +150°C
Temperature Coefficient
..... ±100ppm/°C
Seal Test ..... 85°C Fluorinert*
Humidity ..... MIL-STD-202 Method 103
96 hours
(3% ΔTR, IR 10 megohms min.)
Vibration ..... 30G (1% ΔTR; 1% ΔVR)
Shock ..... 100G (1% ΔTR; 1% ΔVR)
Load Life
..... 1,000 hours 0.5 watt @ 85°C
(3% ΔTR; 3% CRV)
Rotational Life ..... 200 cycles
(4% ΔTR; 4% CRV)

Physical Characteristics

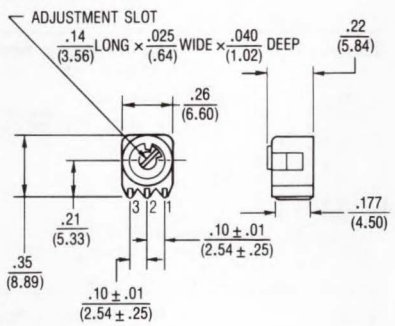
Mechanical Angle ..... 260° nom.
Torque ..... 3.0 oz-in. max.
Stop Strength ..... 5.0 oz -in. min.
Terminals ..... Solderable pins
Weight ..... 0.02 oz.
Marking ..... Manufacturer's
trademark, resistance code,
date code, manufacturer's
model number and style
Standard Packaging
W & X Styles ..... 50 pcs. per tube
P Style ..... 100 pcs. per tray

Specifications are subject to change without notice.
*"Fluorinert" is a registered trademark of 3M Co.

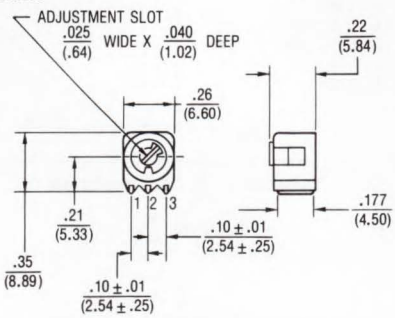
3325P



3325W

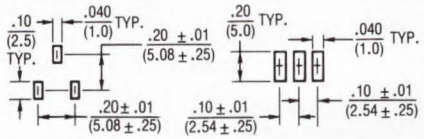


3325X



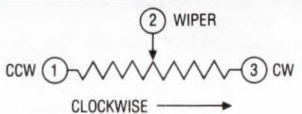
RECOMMENDED PCB LAYOUT

"P" STYLE **"W" & "X" STYLES**



TOLERANCES: ± .015 (.38) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)



STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code
10	100
20	200
50	500
100	101
200	201
500	501
1,000	102
2,000	202
5,000	502
10,000	103
20,000	203
25,000	253
50,000	503
100,000	104
200,000	204
250,000	254
500,000	504
1,000,000	105

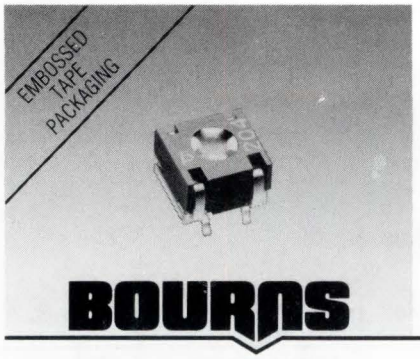
Special resistances available from 10 ohms to 1 megohm.

HOW TO ORDER

3325 P - 1 - 103

Model
Style
Standard Product
Resistance Code

Consult factory for other available options.



BOURNS

SMD 5MM SQUARE / SINGLE-TURN / CERMET / INDUSTRIAL / SEALED

- Available in 3 and 4 pad SMD design or thru hole
- Auto adjust rotor design, packaged in 16mm wide embossed tape, compatible with automatic placement equipment
- Rugged lead frame construction
- Multi-wire hoetip wiper
- Recommended for reflow solder processing only

Model 3335

Bourns® Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range
.....10 ohms to 500K ohms
(see standard resistance table)
Resistance Tolerance .....±20% std.
(closer tolerance available)
Absolute Minimum Resistance
.....1% or 2 ohms max.
(whichever is greater)
Contact Resistance Variation
.....3% or 3 ohms
(whichever is greater)
Adjustability
Voltage .....±0.05%
Resistance .....±0.15%
Resolution .....Infinite
Insulation Resistance .....500 vdc.
1,000 megohms min.
Dielectric Strength
Sea Level .....600 vac
80,000 Feet .....250 vac
Adjustment Travel .....240° nom.

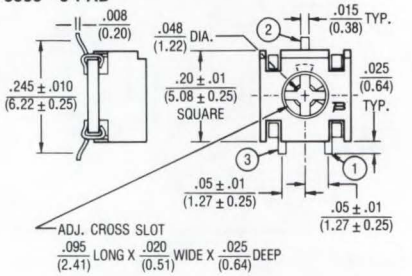
Environmental Characteristics

Maximum Exposure (Temp/Time)
.....+215°C/3 min.
Power Rating (100 volts max.)
85°C .....0.2 watt
150°C .....0 watt
Temperature Range
.....-55°C to +150°C
Temperature Coefficient
.....±100ppm/°C
Seal Test .....85°C Fluorinert*
Humidity.....MIL-STD-202 Method 103
96 hours
(3% ΔTR, 10 Megohms IR)
Vibration .....30G (1% ΔTR; 1% ΔVR)
Shock .....100G (1% ΔTR; 1% ΔVR)
Load Life
.....1,000 hours 0.2 watt @ 85°C
(3% ΔTR; 3% or 3 ohms,
whichever is greater, CRV)
Rotational Life .....200 cycles
(4% ΔTR; 3% or 3 ohms,
whichever is greater, CRV)

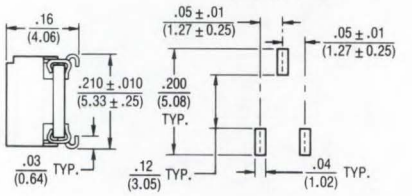
Physical Characteristics

Mechanical Angle .....270° nom.
Torque .....3.0 oz-in. max.
Stop Strength .....4.0 oz -in. min.
Terminals .....Solderable pins
Weight .....0.02 oz.
Marking .....Manufacturer's
trademark, resistance code,
and date code
(Manufacturer's model number,
style and date code on packaging)

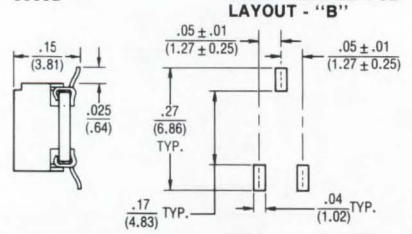
COMMON DIMENSIONS
3335 - 3 PAD



3335A — **RECOMMENDED PCB LAYOUT - "A"**

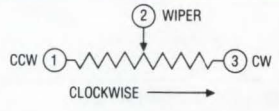


3335B — **RECOMMENDED PCB LAYOUT - "B"**



TOLERANCES: ± .015 (.38) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)

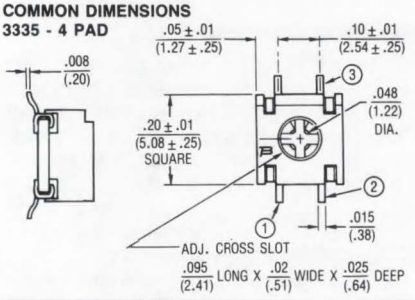


HOW TO ORDER

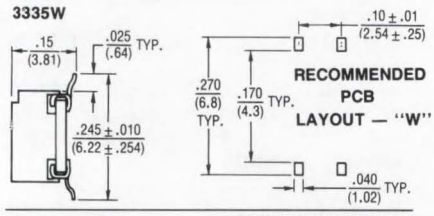
3335 W - 1 - 103 E

Model
Style
Standard Product
Resistance Code
Embossed Tape Designator
E = 500 pcs./7" reel
G = 1500 pcs./13" reel

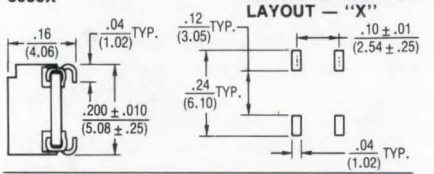
COMMON DIMENSIONS
3335 - 4 PAD



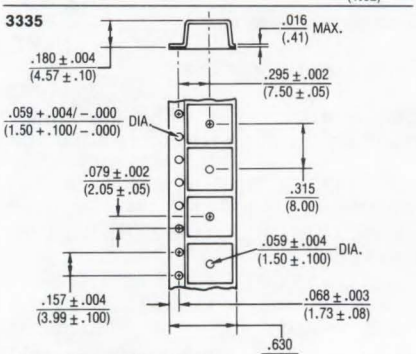
3335W



3335X — **RECOMMENDED PCB LAYOUT — "X"**



3335



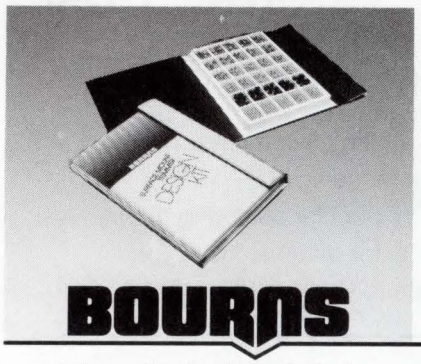
Meets EIA specification 481. TAPE

STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code	Resistance (Ohms)	Resistance Code
10	100	10,000	103
20	200	20,000	203
50	500	25,000	253
100	101	50,000	503
200	201	100,000	104
500	501	200,000	204
1,000	102	250,000	254
2,000	202	500,000	504
5,000	502		

Special resistances available from 10 to 500K ohms.

Specifications are subject to change without notice.
*"Fluorinert" is a registered trademark of 3M Co.



BOURNS

SURFACE MOUNT TRIMMER LAB DESIGN KIT

- Full line of surface mount trimmers
- Convenient, easy-to-use packaging
- Single-turn, multiturn, sealed, open-frame styles
- Popular pin styles and ohmic values

Model H-814

Surface Mount Trimmer Kit

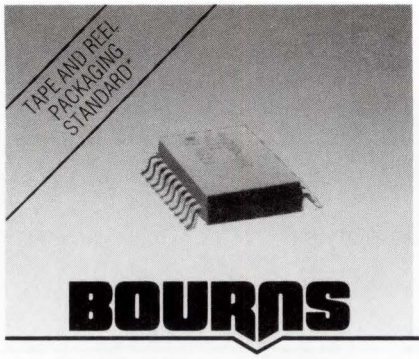
A complete assortment of the most popular surface mount trimmers from Bourns Trimpot is contained in this convenient lab design kit. It contains 220 parts in popular pin styles and resistance values to help in your design selection.

Also included are complete performance parameters and specifications for each model in the kit. Plus, a convenient Trimmer Adjustment Tool.

H-814 PART NUMBER MATRIX

MODEL	PIN STYLE	FEATURES*	RESISTANCE VALUE & QUANTITY					
			-101 100Ω	-501 500Ω	-102 1KΩ	-103 10KΩ	-104 100KΩ	-105 1 MEGΩ
3314	G	T, V	5		5	5	5	5
	J	T, V	5		5	5	5	5
	S	S, V	5		5	5	5	5
3304	X, W	T, V		5	5	5	5	5
	A, B	T, V		5	5	5	5	5
	C, D	T, R		5	5	5	5	5
3269	P	S, V	3		3	3	3	3
	W	T, V	3		3	3	3	3
	X	S, V	3		3	3	3	3
3363	X	T, V	5		5	5	5	5
Adjustment Tool		Part No. H-91						

** T =Top Adjust, S =Side Adjust, V =Voltage Divider, R =Rheostat*



BOURNS

SURFACE MOUNTED RESISTOR NETWORK WIDE BODY (.300 INCH WIDE) MOLDED SOL STYLE / 16 AND 20 PINS

- JEDEC package compatible with automatic placement equipment
- Compliant leads to reduce solder joint fatiguing
- High temperature design suitable for all popular soldering techniques
- Tape and reel packaging (see page 192 for dimensions)
- Copper leads for excellent heat dissipation

Model 4400P

Bourns® Resistor Networks

Electrical Characteristics

Resistance Range
.....10 ohms to 1.0 megohm
Maximum Operating Voltage 50V
Temperature Coefficient of Resistance
50W and above .....±100ppm/∞C
below 50W .....±250ppm/∞C
Voltage Coefficient
.....±100ppm/V typical
TCR Tracking
.....50ppm/∞C max.; equal values
Operating Temperature
.....-55°C to +125°C

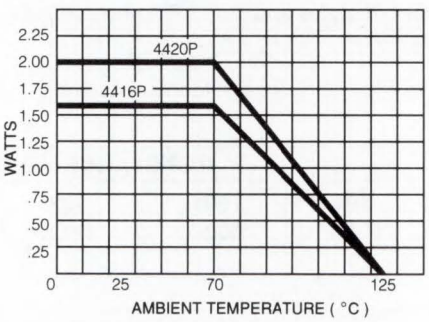
Environmental Characteristics

TESTS PER MIL-STD-202 .....ΔR MAX.
Short Time Overload .....±0.25%
Load Life .....±1.00%
Mechanical Shock .....±0.25%
Moisture Resistance .....±0.50%
Resistance to Soldering Heat
.....±0.25%
Thermal Shock .....±0.25%
Insulation Resistance
.....10,000 megohms min.
Dielectric Withstanding Voltage
.....200 VRMS
Lead Solderability /Solvent Resistance
..Meet requirements of MIL-R-83401

Physical Characteristics

Flammability .....Conforms to UL94V-0
Lead Frame Material .....Copper
(OLIN 194) 60/40 solder dip
Body Material .....Novolac epoxy

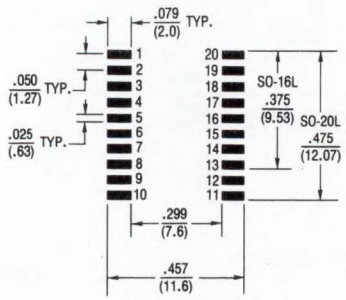
PACKAGE POWER TEMPERATURE DERATING CURVE



Package Power Rating at 70°C

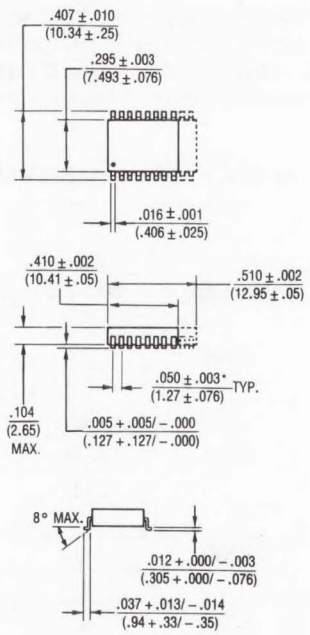
4420P .....2.00 watts
4416P .....1.60 watts

RECOMMENDED LAND PATTERN



NOTE: Land pattern dimensions are based on design rules established by the Institute for Interconnecting and Packaging Electronic Circuits in IPC-SM-782.

4420P

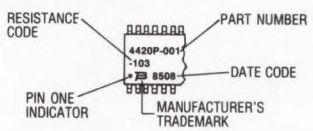


Governing dimensions are in inches. Dimensions in parentheses are metric (mm) and are approximate.

*Terminal centerline to centerline measurements made at point of emergence of the lead from the body.

TYPICAL PART MARKING

Represents total content. Layout may vary.



HOW TO ORDER

44 20 P - 001 - 103

Model
(44 = SMD SOIC Pkg)

Number of Pins

Electrical Configuration
•001/004 = Isolated*
•002 = Bussed*
•003 = Dual Terminator*

Resistance Code
•First 2 digits are significant
•Third digit represents the number of zeros to follow.

*For tube packaging, use T01, T02, T03 or T04. Consult factory for other available options.
Specifications are subject to change without notice.

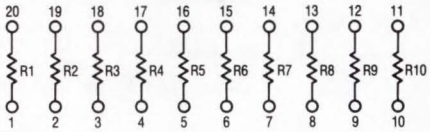
- Superior package integrity to withstand moisture and contamination
- Laser marking on contrasting background for permanent identification
- Standard electrical schematics: isolated, bussed, dual terminator
- Custom circuits are available

Model 4400P

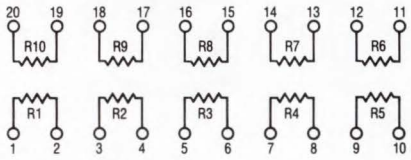
BI® Resistor Networks

ISOLATED RESISTORS
(001 and 004 CIRCUITS)

Model 4416P-001
Model 4420P-001 (Shown)



Model 4416P-004
Model 4420P-004 (Shown)



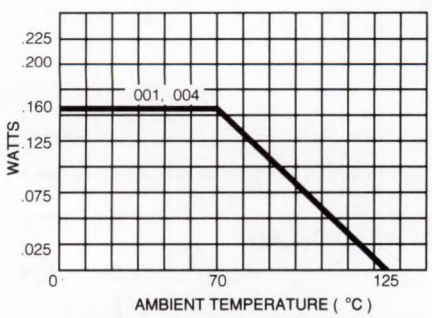
Resistance Tolerance

10 ohms to 49 ohms .....±1 ohm
50 ohms to 1.0 megohm .....±2%*

Power Rating per Resistor

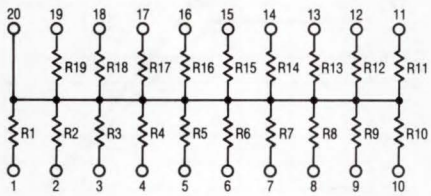
001 Circuit at 70°C .....0.160 watt
004 Circuit at 70°C .....0.160 watt

RESISTOR POWER TEMPERATURE DERATING CURVE



BUSSED RESISTORS
(002 CIRCUIT)

Model 4416P-002
Model 4420P-002 (Shown)



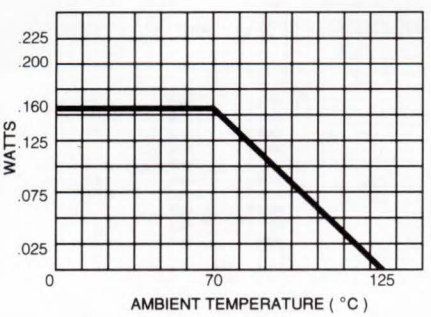
Resistance Tolerance

10 ohms to 49 ohms .....±1 ohm
50 ohms to 1.0 megohm .....±2%*

Power Rating per Resistor

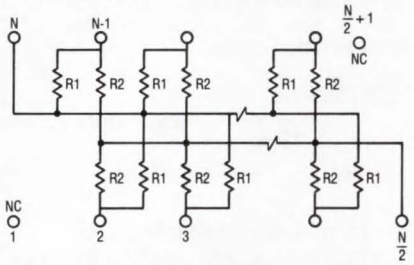
002 Circuit at 70°C .....0.160 watt

RESISTOR POWER TEMPERATURE DERATING CURVE



DUAL TERMINATOR
(003 CIRCUIT)

Model 4416P-003
Model 4420P-003 (Shown)



4420P-003 terminates 16 lines, convenient for a 16-bit computer bus.

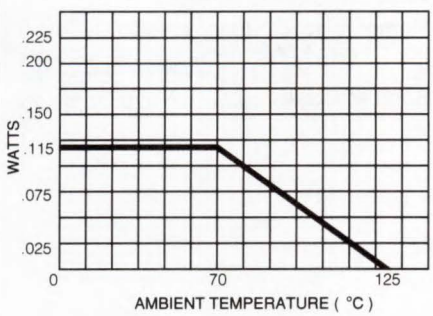
Resistance Tolerance

Below 100 ohms .....±2 ohms
100 ohms to 1.0 megohm .....±2%*

Power Rating per Resistor

003 Circuit at 70°C .....0.115 watt

RESISTOR POWER TEMPERATURE DERATING CURVE



STANDARD RESISTANCE VALUES (001, 004, and 002 CIRCUITS)

Resistance (Ohms)	Resistance Code
10	100
22	220
27	270
33	330
39	390
47	470
56	560
68	680
82	820
100	101
120	121
150	151
180	181
220	221
270	271

Resistance (Ohms)	Resistance Code
330	331
390	391
470	471
560	561
680	681
820	821
1,000	102
1,200	122
1,500	152
1,800	182
2,000	202
2,200	222
2,700	272
3,300	332
3,900	392

Resistance (Ohms)	Resistance Code
4,700	472
5,600	562
6,800	682
8,200	822
10,000	103
12,000	123
15,000	153
18,000	183
20,000	203
22,000	223
27,000	273
33,000	333
39,000	393
47,000	473
56,000	563

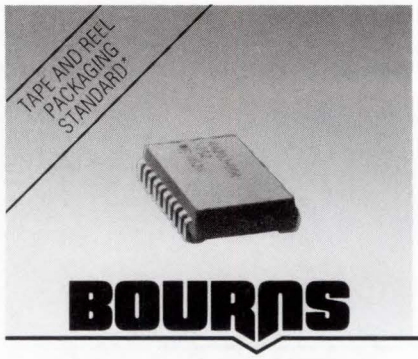
Resistance (Ohms)	Resistance Code
68,000	683
82,000	823
100,000	104
120,000	124
150,000	154
180,000	184
220,000	224
270,000	274
330,000	334
390,000	394
470,000	474
560,000	564
680,000	684
820,000	824
1,000,000	105

STANDARD RESISTANCE VALUES (003 CIRCUIT)

Resistance			
(Ohms)		Code	
R_1	R_2	R_1	R_2
160	240	161	241
180	390	181	391
220	270	221	271
220	330	221	331
330	390	331	391
330	470	331	471
3,000	6,200	302	622

Specifications are subject to change without notice.

* ±1% Tolerance is available by adding suffix code "F" after the resistance code.



BOURNS

SURFACE MOUNTED RESISTOR NETWORK WIDE BODY (.300 INCH WIDE) MOLDED SOL-J STYLE / 16 AND 20 PINS

- Board footprint identical to medium body (.220 wide) SOM gull wing
- Compliant leads to reduce solder joint fatiguing
- High temperature design suitable for all popular soldering techniques
- Tape and reel packaging (see page 192 for dimensions)
- Copper leads for excellent heat dissipation

Model 4400J

Bourns® Resistor Networks

Electrical Characteristics

Resistance Range
.....10 ohms to 1.0 megohm
Maximum Operating Voltage 50V
Temperature Coefficient of Resistance
50Ω and above .....±100ppm/°C
below 50Ω .....±250ppm/°C
Voltage Coefficient
.....±100ppm/V typical
TCR Tracking
.....50ppm/°C max.; equal values
Operating Temperature
.....–55°C to +125°C

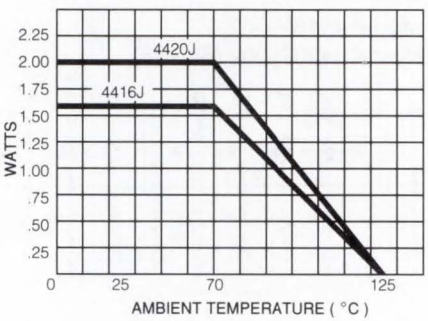
Environmental Characteristics

TESTS PER MIL-STD-202 .... ΔR MAX.
Short Time Overload .....±0.25%
Load Life .....±1.00%
Mechanical Shock .....±0.25%
Moisture Resistance .....±0.50%
Resistance to Soldering Heat
.....±0.25%
Thermal Shock .....±0.25%
Insulation Resistance
.....10,000 megohms min.
Dielectric Withstanding Voltage
.....200 VRMS
Lead Solderability /Solvent Resistance
..Meet requirements of MIL-R-83401

Physical Characteristics

Flammability .....Conforms to UL94V-0
Lead Frame Material .....Copper (OLIN 194) 60/40 solder dip
Body Material .....Novolac epoxy

PACKAGE POWER TEMPERATURE DERATING CURVE

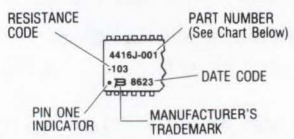


Package Power Rating at 70°C

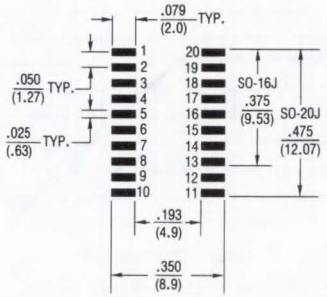
4420J .....2.00 watts
4416J .....1.60 watts

TYPICAL PART MARKING

Represents total content. Layout may vary.

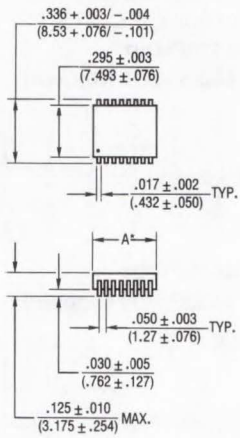


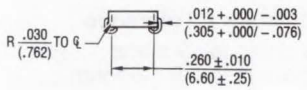
RECOMMENDED LAND PATTERN



NOTE: Land pattern dimensions are based on design rules established by the Institute for Interconnecting and Packaging Electronic Circuits in IPC-SM-782.

4416J





*DIM. A

4416J = .410 ± .003 (10.41 ± .07)

4420J = .510 +.001/ – .002 (12.95 +.025/ – .05)

Governing dimensions are in inches. Dimensions in parentheses are metric (mm) and are approximate.

*Terminal centerline to centerline measurements made at point of emergence of the lead from the body.

HOW TO ORDER

44 20 J - 001 - 103

Model
(44 = SMD SOIC Pkg)

Number of Pins

Electrical Configuration
•001/004 = Isolated*
•002 = Bussed*
•003 = Dual Terminator*

Resistance Code
• First 2 digits are significant
•Third digit represents the number of zeros to follow.

*For tube packaging use T01, T02, T03 or T04. Consult factory for other available options. Specifications are subject to change without notice.

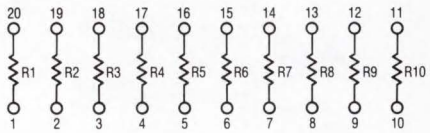
- Superior package integrity to withstand moisture and contamination
- Laser marking on contrasting background for permanent identification
- Standard electrical schematics: isolated, bussed, dual terminator
- Custom circuits are available

Model 4400J

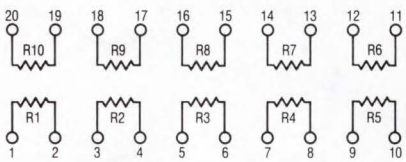
B® Resistor Networks

ISOLATED RESISTORS (001 and 004 CIRCUITS)

Model 4416J-001
Model 4420J-001 (Shown)



Model 4416J-004
Model 4420J-004 (Shown)



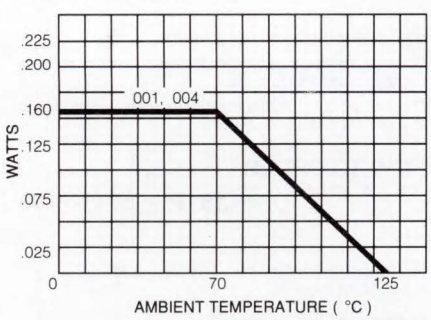
Resistance Tolerance

10 ohms to 49 ohms .....±1 ohm
50 ohms to 1.0 megohm .....±2%*

Power Rating per Resistor

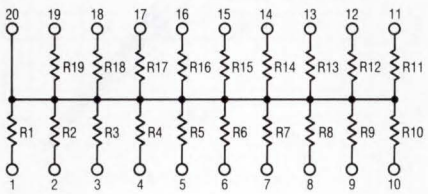
001 Circuit at 70°C .....0.160 watt
004 Circuit at 70°C .....0.160 watt

RESISTOR POWER TEMPERATURE DERATING CURVE



BUSSED RESISTORS (002 CIRCUIT)

Model 4416J-002
Model 4420J-002 (Shown)



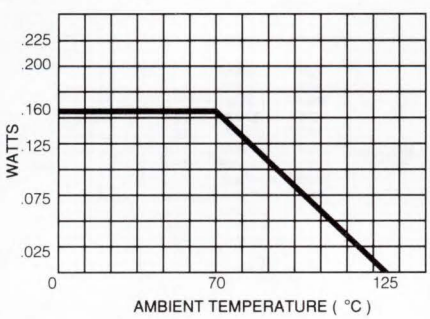
Resistance Tolerance

10 ohms to 49 ohms .....±1 ohm
50 ohms to 1.0 megohm .....±2%*

Power Rating per Resistor

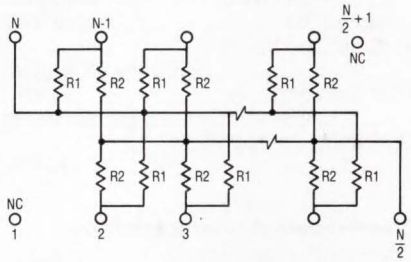
002 Circuit at 70°C .....0.160 watt

RESISTOR POWER TEMPERATURE DERATING CURVE



DUAL TERMINATOR (003 CIRCUIT)

Model 4416J-003
Model 4420J-003 (Shown)



4420J-003 terminates 16 lines, convenient for a 16-bit computer bus.

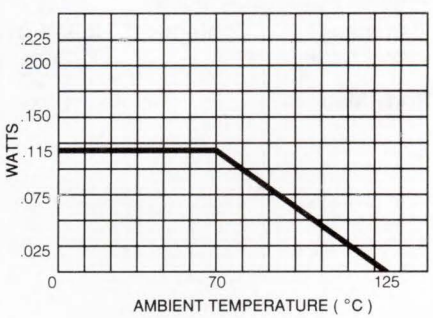
Resistance Tolerance

Below 100 ohms .....±2 ohms
100 ohms to 1.0 megohm .....±2%*

Power Rating per Resistor

003 Circuit at 70°C .....0.115 watt

RESISTOR POWER TEMPERATURE DERATING CURVE



STANDARD RESISTANCE VALUES (001, 004, and 002 CIRCUITS)

Resistance (Ohms)	Resistance Code
10	100
22	220
27	270
33	330
39	390
47	470
56	560
68	680
82	820
100	101
120	121
150	151
180	181
220	221
270	271

Resistance (Ohms)	Resistance Code
330	331
390	391
470	471
560	561
680	681
820	821
1,000	102
1,200	122
1,500	152
1,800	182
2,000	202
2,200	222
2,700	272
3,300	332
3,900	392

Resistance (Ohms)	Resistance Code
4,700	472
5,600	562
6,800	682
8,200	822
10,000	103
12,000	123
15,000	153
18,000	183
20,000	203
22,000	223
27,000	273
33,000	333
39,000	393
47,000	473
56,000	563

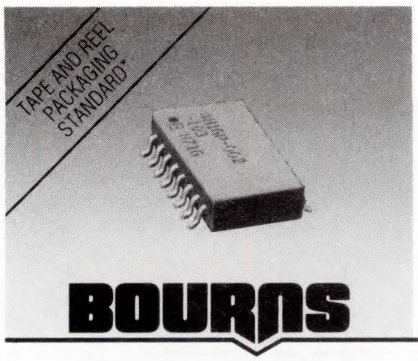
Resistance (Ohms)	Resistance Code
68,000	683
82,000	823
100,000	104
120,000	124
150,000	154
180,000	184
220,000	224
270,000	274
330,000	334
390,000	394
470,000	474
560,000	564
680,000	684
820,000	824
1,000,000	105

STANDARD RESISTANCE VALUES (003 CIRCUIT)

Resistance			
(Ohms)		Code	
R_1	R_2	R_1	R_2
160	240	161	241
180	390	181	391
220	270	221	271
220	330	221	331
330	390	331	391
330	470	331	471
3,000	6,200	302	622

Specifications are subject to change without notice.

* ±1% Tolerance is available by adding suffix code "F" after the resistance code.



BOURNS

SURFACE MOUNTED RESISTOR NETWORK MEDIUM BODY (.220 INCH WIDE) SOM PACKAGE / 14, 16, 18 AND 20 PINS

- Standard E.I.A. (SOGN-0002) package compatible with automatic placement equipment
- High temperature solder suitable for all popular soldering techniques
- Tape and reel packaging (see page 192 for dimensions)

Model 4800P

Bourns® Resistor Networks

Electrical Characteristics

Resistance Range
.....10 ohms to 1.0 megohm
Maximum Operating Voltage 50V
Temperature Coefficient of Resistance
50Ω and above .....±100ppm/°C
below 50Ω .....±250ppm/°C
Voltage Coefficient
.....±100ppm/V typical
TCR Tracking
.....50ppm/°C max.; equal values
Operating Temperature
.....–55°C to +125°C

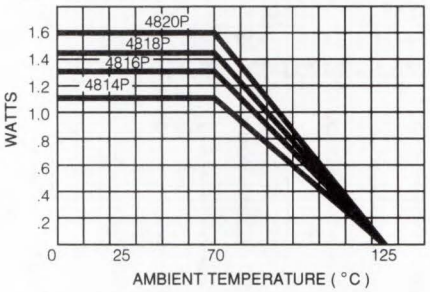
Environmental Characteristics

TESTS PER MIL-STD-202 .....ΔR MAX.
Short Time Overload .....±0.25%
Load Life.....±1.00%
Mechanical Shock .....±0.25%
Moisture Resistance .....±0.50%
Resistance to Soldering Heat
.....±0.25%
Thermal Shock .....±0.25%
Insulation Resistance
.....10,000 megohms min.
Dielectric Withstanding Voltage
.....200 VRMS
Lead Solderability /Solvent Resistance
..Meet requirements of MIL-R-83401

Physical Characteristics

Flammability .....Conforms to UL94V-0
Lead Frame Material .....Copper
(OLIN 194) 60/40 solder dip
Body Material .....Novolac epoxy

PACKAGE POWER TEMPERATURE DERATING CURVE

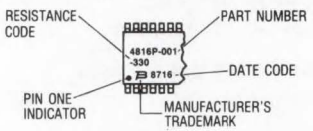


Package Power Rating at 70°C

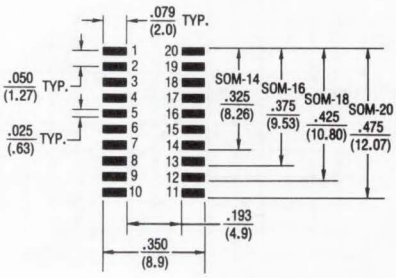
4814P .....1.12 watts
4816P .....1.28 watts
4818P .....1.44 watts
4820P .....1.60 watts

TYPICAL PART MARKING

Represents total content. Layout may vary.

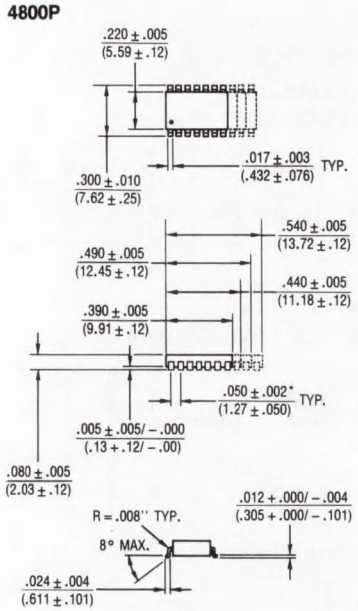


RECOMMENDED LAND PATTERN



NOTE: Land pattern dimensions are based on design rules established by the Institute for Interconnecting and Packaging Electronic Circuits in IPC-SM-782.

4800P



Lead coplanarity .004 inch max. at mounting surface.

Governing dimensions are in inches. Dimensions in parentheses are metric (mm) and are approximate.

*Terminal centerline to centerline measurements made at point of emergence of the lead from the body.

HOW TO ORDER

48 16 P - 001 - 103

Model
(48 = SOM Pkg)

Number of Pins

Electrical Configuration
•001/004 = Isolated*
•002 = Bussed*
•003 = Dual Terminator*

Resistance Code
• First 2 digits are significant
•Third digit represents the number of zeros to follow.

*For tube packaging, use T01, T02, T03 or T04. Consult factory for other available options.

Specifications are subject to change without notice.

- Superior package integrity to withstand moisture and contamination
- Laser marking on contrasting background for permanent identification
- Compliant leads to reduce solder joint fatiguing
- Copper leads for superior heat dissipation
- Standard electrical schematics: isolated, bussed, dual terminator
- Custom circuits are available

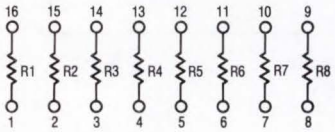
Model 4800P

Bourns® Resistor Networks

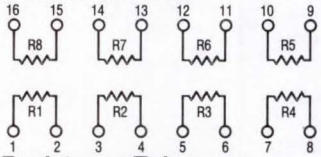
ISOLATED RESISTORS

(001 and 004 CIRCUITS)

Model 4814P-001
Model 4816P-001 (Shown)
Model 4818P-001
Model 4820P-001



Model 4814P-004
Model 4816P-004 (Shown)
Model 4818P-004
Model 4820P-004



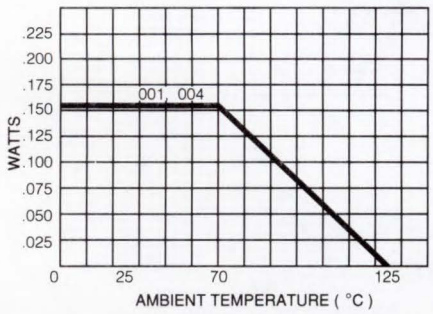
Resistance Tolerance

10 ohms to 49 ohms ..... ±1 ohm
50 ohms to 1.0 megohm ..... ±2%*

Power Rating per Resistor

001 Circuit at 70°C ..... 0.160 watt
004 Circuit at 70°C ..... 0.160 watt

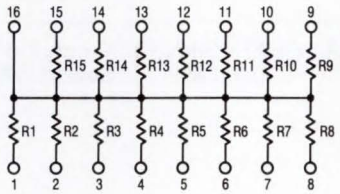
PACKAGE POWER TEMPERATURE DERATING CURVE



BUSSED RESISTORS

(002 CIRCUIT)

Model 4814P-002
Model 4816P-002 (Shown)
Model 4818P-002
Model 4820P-002



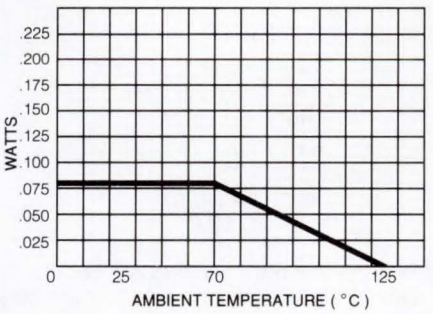
Resistance Tolerance

10 ohms to 49 ohms ..... ±1 ohm
50 ohms to 1.0 megohm ..... ±2%*

Power Rating per Resistor

002 Circuit at 70°C ..... 0.080 watt

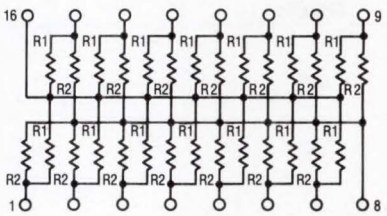
PACKAGE POWER TEMPERATURE DERATING CURVE



DUAL TERMINATOR

(003 CIRCUIT)

Model 4814P-003
Model 4816P-003 (Shown)
Model 4818P-003
Model 4820P-003



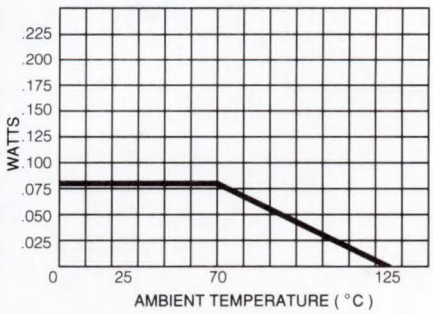
Resistance Tolerance

Below 100 ohms ..... ±2 ohm
100 ohms to 1.0 megohm ..... ±2%*

Power Rating per Resistor

003 Circuit at 70°C ..... 0.080 watt

PACKAGE POWER TEMPERATURE DERATING CURVE



STANDARD RESISTANCE VALUES (001, 004, and 002 CIRCUITS)

Resistance (Ohms)	Resistance Code	Resistance (Ohms)	Resistance Code	Resistance (Ohms)	Resistance Code	Resistance (Ohms)	Resistance Code
10	100	330	331	4,700	472	68,000	683
22	220	390	391	5,600	562	82,000	823
27	270	470	471	6,800	682	100,000	104
33	330	560	561	8,200	822	120,000	124
39	390	680	681	10,000	103	150,000	154
47	470	820	821	12,000	123	180,000	184
56	560	1,000	102	15,000	153	220,000	224
68	680	1,200	122	18,000	183	270,000	274
82	820	1,500	152	20,000	203	330,000	334
100	101	1,800	182	22,000	223	390,000	394
120	121	2,000	202	27,000	273	470,000	474
150	151	2,200	222	33,000	333	560,000	564
180	181	2,700	272	39,000	393	680,000	684
220	221	3,300	332	47,000	473	820,000	824
270	271	3,900	392	56,000	563	1,000,000	105

STANDARD RESISTANCE VALUES (003 CIRCUIT)

Resistance			
(Ohms)		Code	
R_1	R_2	R_1	R_2
160	240	161	241
180	390	181	391
220	270	221	271
220	330	221	331
330	390	331	391
330	470	331	471
3,000	6,200	302	622

Specifications are subject to change without notice.

* ±1% Tolerance is available by adding suffix code "F" after the resistance code.

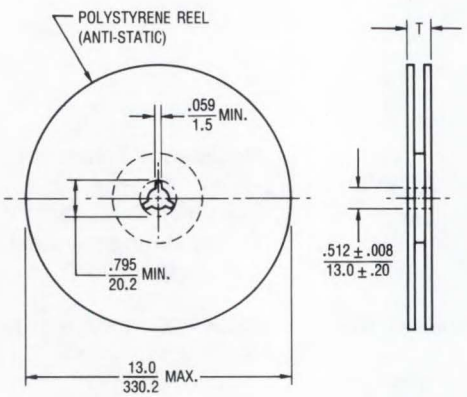
BOURNS

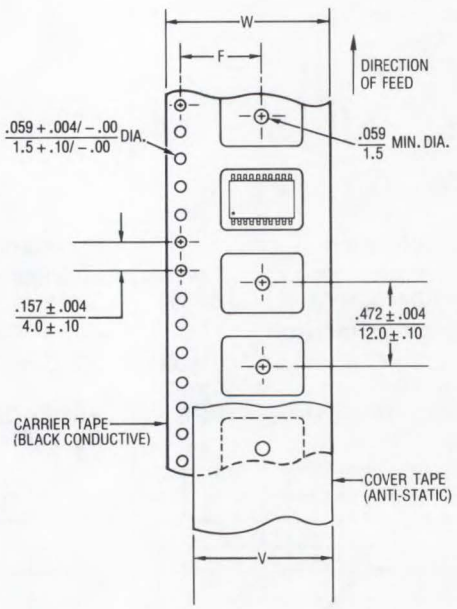
RESISTOR NETWORKS
SURFACE MOUNT
TAPE AND REEL SPECIFICATIONS

Model	Standard Quantity Per Reel	Carrier Tape Width (W)	Cover Tape Width (V)	Reel Width (T)	Pocket Center (F)
4416P 4416J	1,500	.630 ± .012 16.0 ±.30	.524 NOM. 13.3	.882 MAX. 22.4	.295 ± .004 7.5 ±.10
4420P 4420J	1,500	.945 ± .012 24.0 ±.30	.827 NOM. 21.0	1.197 MAX. 30.4	.453 ± .004 11.5 ±.10
4814P 4816P 4818P 4820P	2,000				

Leader Length = 530 ± 30mm
Trailer Length = 500mm Min
} Empty Component Pockets Sealed With Cover Tape

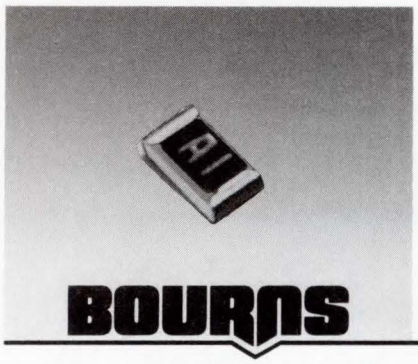
INCHES
MM





INCHES
MM

NOTE: Dimensions not specified are per EIA RS-481.
Governing dimensions are in millimeters.



BOURNS

1/10 WATT, THICK FILM, COMMERCIAL

- Tightest tolerances on electrode dimensions in the industry
- Superior flat surface rectangular design
- Glass and epoxy coating for superior protection

(FOR EUROPEAN EQUIVALENTS, CONSULT LOCAL EUROPEAN OFFICE)

Model CR0805

Bourns® Chip Resistor

Electrical Characteristics

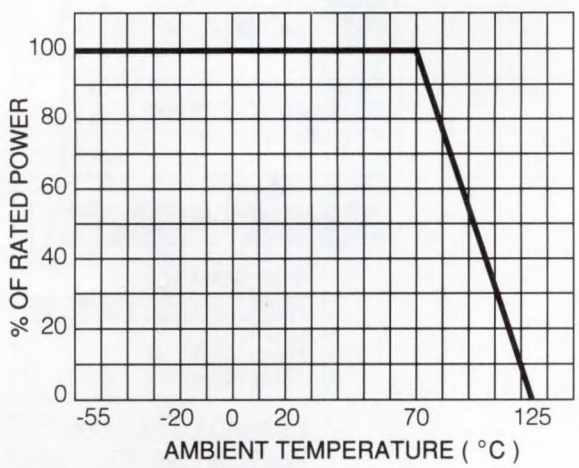
RESISTANCE RANGE	TOLERANCE	TEMP. COEFFICIENT
47 ohms to 1 megohm 10 ohms to 43 ohms	±5%	±200ppm/°C ±300ppm/°C
Zero ohm jumper	.05 ohm max.	

Power rating and Maximum Operating Voltage at 70°C 0.100W, 100V
Maximum Ambient Temperature .....125°C (See derating curve)
Temperature Range .....-55°C to +125°C

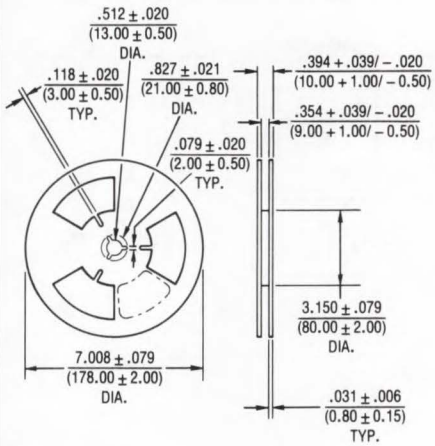
Performance Specifications

TEST	REQUIREMENT	METHOD
Thermal Shock –55°C	±0.5% ΔR Max.	MIL-R-55342 Par. 4.7.3
Low Temperature Operation –55°C	±0.5% ΔR Max.	MIL-R-55342 Par. 4.7.4
Short-Time Overload	±0.5% ΔR Max.	MIL-R-55342 Par. 4.7.5
High Temp Exposure 125°C	±0.5% ΔR Max.	MIL-R-55342 Par. 4.7.6
Resistance to Bonding Exposure	±0.25% ΔR Max.	MIL-R-55342 Par. 4.7.7
Moisture Resistance	±0.5% ΔR Max.	MIL-R-55342 Par. 4.7.8
Life 70°C/2,000 Hours	±2.0% ΔR Max.	MIL-R-55342 Par. 4.7.10
Solderability	95% Minimum Coverage	MIL-R-55342 Par. 4.7.11

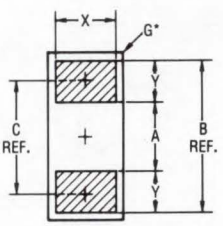
PACKAGE POWER TEMPERATURE DERATING CURVE



TAPE AND REEL SPECIFICATIONS



RECOMMENDED LAND PATTERN



Symbol	0805
A	.039 (1.00)
B	.118 (3.00)
C	.079 (2.00)
X	.050 (1.27)
Y	.039 (1.00)
G	.059 X .138 (1.5 X 3.5)

*Grid part outline is the perimeter that encompasses the part and its land pattern measured to the next .5mm increment.

Dimensions are in inches. Dimensions in parentheses are millimeters.

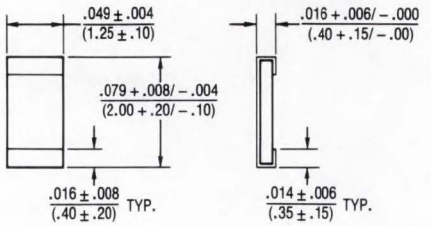
Continued, next page.

- Consistent manufacturing processes and product performance
- Broad range of resistance values
- High temperature materials and construction

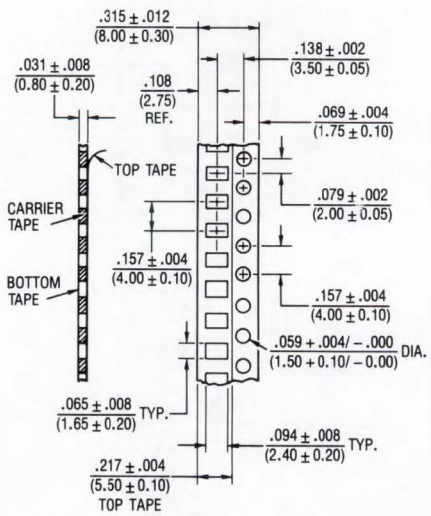
Model CR0805

Bourns® Chip Resistor

1/10 Watt (CR0805) PACKAGE DIMENSIONS



TAPE DIMENSIONS



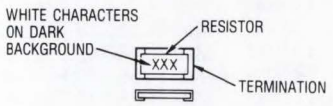
Governing dimensions are in inches. Dimensions in parentheses are metric (mm) and are approximate.

TYPICAL PART MARKING

Units will be marked with the resistance code only, in the following manner:
CR0805 (±5% tolerance): 3 digits will be used. The first 2 digits are significant, with the third digit denoting the number of zeros following. "R" will be used to denote a decimal point.

Example:

4.7Ω = 4R7 1MΩ = 105
10Ω = 100 0Ω JUMPER = 000
100Ω = 101



Specifications, page 193.

HOW TO ORDER

C R | 0 8 0 5 - | X X X X - | J | V | C | A

NOMINAL RESISTANCE VALUE
XXXX =
The first 3 digits are significant; last digit is the multiplier. For values less than 100Ω, use "R" as decimal point designator.

Examples:
68Ω = 68 R0
10KΩ = 1002
For 0Ω jumper, use "0000" as resistance code.

MODEL
(Size/Power)
0805 - 1/10W

COMMON CODE
CR = Chip Resistor

RESISTANCE TOLERANCE
J = ±5%
Z = 0Ω Jumper

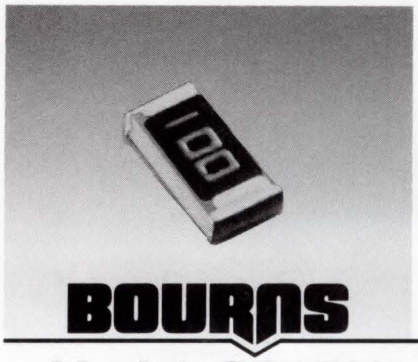
PACKAGING
V = Paper Tape & Reel

TCR (PPM/°C)
C = 200
D = 300
For 0Ω jumper, use "C" as TCR code.

SPECIAL FEATURES
A = 90/10 Solder (Std)

Part Number Example:
CR08051002JVCA = Chip Resistor, 1/10 Watt, 10KΩ±5%, Paper Tape, 200 PPM/°C, 90/10 Solder Coating.

Specifications are subject to change without notice.



BOURNS

1/8 WATT, THICK FILM, COMMERCIAL

- Tightest tolerances on electrode dimensions in the industry
- Superior flat surface rectangular design
- Glass and epoxy coating for superior protection

(FOR EUROPEAN EQUIVALENTS, CONSULT LOCAL EUROPEAN OFFICE

Model CR1206

Bourns® Chip Resistor

Electrical Characteristics

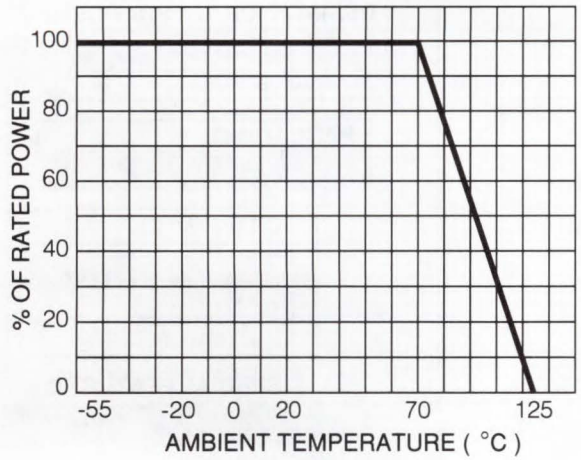
RESISTANCE RANGE	TOLERANCE	TEMP. COEFFICIENT
100 ohms to 1 megohm	±1%	±100ppm/°C
47 ohms to 1 megohm 10 ohms to 47 ohms	±5%	±200ppm/°C ±300ppm/°C
Zero ohm jumper	.05 ohm max.	

Power rating and Maximum Operating Voltage at 70°C 0.125W, 200V
Maximum Ambient Temperature .....125°C (See derating curve)
Temperature Range .....–55°C to +125°C

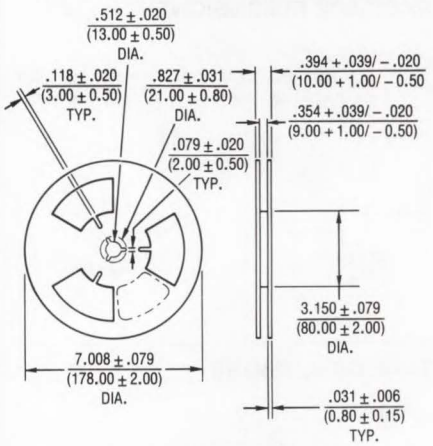
Performance Specifications

TEST	REQUIREMENT	METHOD
Thermal Shock –55°C	±0.5% ΔR Max.	MIL-R-55342 Par. 4.7.3
Low Temperature Operation –55°C	±0.5% ΔR Max.	MIL-R-55342 Par. 4.7.4
Short-Time Overload	±0.5% ΔR Max.	MIL-R-55342 Par. 4.7.5
High Temp Exposure 125°C	±0.5% ΔR Max.	MIL-R-55342 Par. 4.7.6
Resistance to Bonding Exposure	±0.25% ΔR Max.	MIL-R-55342 Par. 4.7.7
Moisture Resistance	±0.5% ΔR Max.	MIL-R-55342 Par. 4.7.8
Life 70°C/2,000 Hours	±2.0% ΔR Max.	MIL-R-55342 Par. 4.7.10
Solderability	95% Minimum Coverage	MIL-R-55342 Par. 4.7.11

PACKAGE POWER TEMPERATURE DERATING CURVE

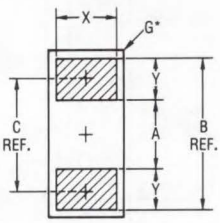


TAPE AND REEL SPECIFICATIONS



Tape and reel dimensions conform to EIA RS-481A.

RECOMMENDED LAND PATTERN



Symbol	1206
A	.072 (1.82)
B	.160 (4.06)
C	.116 (2.94)
X	.064 (1.62)
Y	.044 (1.12)
G	.079 X .177 (2.0 X 4.5)

*Grid part outline is the perimeter that encompasses the part and its land pattern measured to the next .5mm increment.

Dimensions are in inches. Dimensions in parentheses are millimeters.

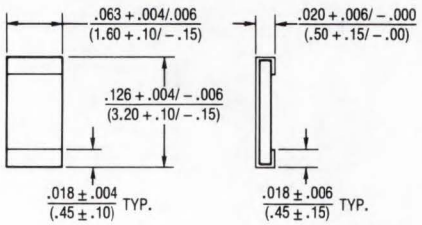
Continued, next page.

- Consistent manufacturing processes and product performance
- Broad range of resistance values
- High temperature materials and construction

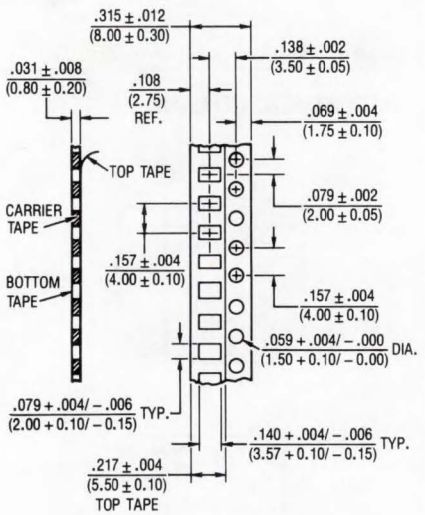
Model CR1206

Bourns® Chip Resistor

1/8 WATT (CR1206) PACKAGE DIMENSIONS



TAPE DIMENSIONS



TYPICAL PART MARKING

Units will be marked with the resistance code only, in the following manner:

CR1206 (±5% tolerance): 3 digits will be used. The first 2 digits are significant, with the third digit denoting the number of zeros following. "R" will be used to denote a decimal point.

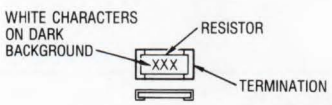
Example:

4.7Ω = 4R7 1MΩ = 105
10Ω = 100 0Ω JUMPER = 000
100Ω = 101

CR1206 (±1% tolerance): 4 digits will be used. The first 3 digits are significant, with the fourth digit denoting the number of zeros following. "R" will be used to denote a decimal point.

Example:

4.7Ω = 4R70 1MΩ = 1004
100Ω = 1000 20MΩ = 2005



Specifications, page 195.

HOW TO ORDER

C R 1 2 0 6 - X X X X - J V C A

NOMINAL RESISTANCE VALUE

XXXX =
The first 3 digits are significant; last digit is the multiplier. For values less than 100Ω, use "R" as decimal point designator.

Examples:
68Ω = 68R0
10KΩ = 1002
For 0Ω jumper, use "0000" as resistance code.

MODEL

(Size/Power)
1206 - 1/8 W

COMMON CODE

CR = Chip Resistor

RESISTANCE TOLERANCE

F = ±1%
J = ±5%
Z = 0Ω Jumper

PACKAGING

V = Paper Tape & Reel

TCR (PPM/°C)

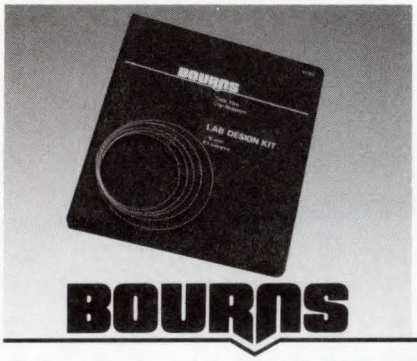
B = 100
C = 200
D = 300
For 0Ω jumper, use "C" as TCR code.

SPECIAL FEATURES

A = 90/10 Solder (Std)

Part Number Example:
CR12061002JVCA = Chip Resistor, 1/8 Watt, 10KΩ±5%, Paper Tape, 200 PPM/°C, 90/10 Solder Coating.

Specifications are subject to change without notice.



BOURNS

LAB DESIGN KITS

- Models feature "anti-tombstoning" design
- Convenient, easy-to-use binder format
- All parts individually packaged, marked, and protected
- Most popular ohmic values included
- Standard paper tape provided - 25 pieces each in 50 values

Models H-810/H-811/H-812

Bourns® Chip Resistors

A wide assortment of the most popular thick film chip resistors is available in these convenient kits. Three different versions are available: the H-810 Series (1/8 watt, 1% tolerance), the H-811 (1/8 watt, 5% tolerance), and the H-812 (1/10 watt, 5% tolerance).

Each kit contains 50 different ohmic values, with a strip of 25 parts for each. Product literature is included with each kit, which contains specifications, dimensional drawings and an application note on "tombstoning" chip resistors.

Select the size, tolerance and range to suit your application.

H-810
(CR1206 Series)
1/8 Watt
1% Tolerance

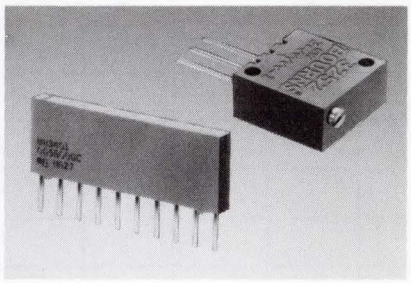
Ohmic Values Included			
100	ohms	6.19K	ohms
121	ohms	6.81K	ohms
150	ohms	7.5K	ohms
200	ohms	8.25K	ohms
301	ohms	10K	ohms
332	ohms	13K	ohms
475	ohms	15K	ohms
511	ohms	17.8K	ohms
681	ohms	20K	ohms
750	ohms	22.1K	ohms
825	ohms	24.9K	ohms
1K	ohms	27.4K	ohms
1.21K	ohms	28K	ohms
1.5K	ohms	30.1K	ohms
2K	ohms	36.5K	ohms
2.21K	ohms	47.5K	ohms
2.49K	ohms	68.1K	ohms
2.61K	ohms	75K	ohms
3.01K	ohms	82.5K	ohms
3.32K	ohms	90.9K	ohms
3.83K	ohms	100K	ohms
4.02K	ohms	150K	ohms
4.75K	ohms	200K	ohms
5.11K	ohms	511K	ohms
5.62K	ohms	1M	ohms

H-811
(CR1206 Series)
1/8 Watt
5% Tolerance

Ohmic Values Included			
10	ohms	2.7K	ohms
18	ohms	3.3K	ohms
22	ohms	3.9K	ohms
33	ohms	4.7K	ohms
39	ohms	5.6K	ohms
47	ohms	6.8K	ohms
56	ohms	8.2K	ohms
68	ohms	10K	ohms
100	ohms	12K	ohms
120	ohms	15K	ohms
150	ohms	20K	ohms
180	ohms	22K	ohms
220	ohms	27K	ohms
270	ohms	33K	ohms
330	ohms	39K	ohms
390	ohms	47K	ohms
470	ohms	56K	ohms
560	ohms	82K	ohms
680	ohms	100K	ohms
820	ohms	120K	ohms
1K	ohms	150K	ohms
1.2K	ohms	220K	ohms
1.5K	ohms	270K	ohms
2K	ohms	470K	ohms
2.2K	ohms	1M	ohms

H-812
(CR0805 Series)
1/10 Watt
5% Tolerance

Ohmic Values Included			
10	ohms	2.7K	ohms
18	ohms	3.3K	ohms
22	ohms	3.9K	ohms
33	ohms	4.7K	ohms
39	ohms	5.6K	ohms
47	ohms	6.8K	ohms
56	ohms	8.2K	ohms
68	ohms	10K	ohms
100	ohms	12K	ohms
120	ohms	15K	ohms
150	ohms	20K	ohms
180	ohms	22K	ohms
220	ohms	27K	ohms
270	ohms	33K	ohms
330	ohms	39K	ohms
390	ohms	47K	ohms
470	ohms	56K	ohms
560	ohms	82K	ohms
680	ohms	100K	ohms
820	ohms	120K	ohms
1K	ohms	150K	ohms
1.2K	ohms	220K	ohms
1.5K	ohms	270K	ohms
2K	ohms	470K	ohms
2.2K	ohms	1M	ohms



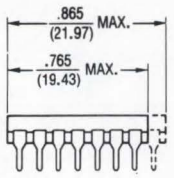
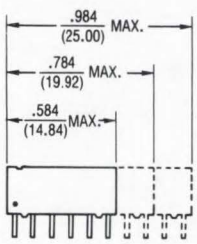
MILITARY COMPONENTS

PRODUCT SELECTION GUIDE
Military Sealed Trimmers

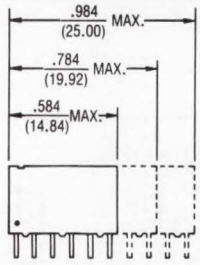
Model Number	Element Technology		Turns		Size				Packaging Options	Adjust	Page No.
	Cermet	W/W	Single	Multi	1/4"	3/8"	1/2"	1-1/4"	See Note 1	See Note 2	
RJ/RJR 50	•		•		•				T	S	207
RJ/RJR 26	•			•	•				T	S,T	205
RJ/RJR 24	•			•		•			B,T	S,T	204
RJ 22	•			•			•		B,T	S,T	203
RJR 28	•			•			•		T	S	206
RJ/RJR 12	•			•				•	B,T	S	202
RT 26		•		•	•				T	S,T	211
RT/RTR 24		•		•		•			T	S,T	210
RT/RTR 22		•		•			•		B,T	S,T	209
RT/RTR 12		•		•				•	B,T	S	208

NOTE 1: Standard packaging; some options may require alternate packaging. Consult factory.
T = Tube, B = Bulk, R = Tape and Reel, E = Embossed Tape
NOTE 2: T = Top Adjustment, S = Side Adjustment

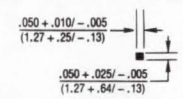
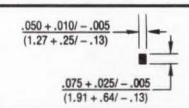
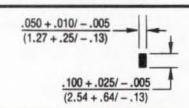
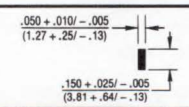
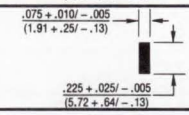
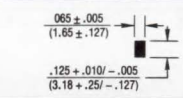
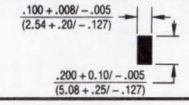
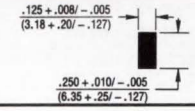
Mil-Spec Resistor Networks

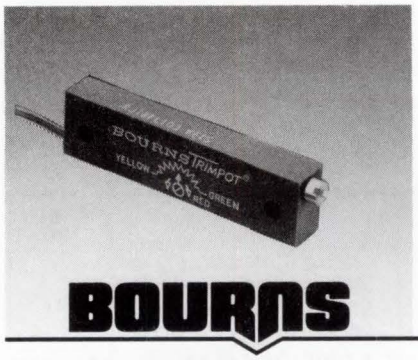
Package Outline	Product	Series Number	Pin Ct.	Isolated Resistors	Bussed Resistors	Page No.
	Molded DIP Low Profile	M83401-01	14	M8340101KXXXXFA M8340101KXXXXGA M8340101KXXXXJA M8340101MXXXXFA M8340101MXXXXGA M8340101MXXXXJA	M8340101KXXXXFB M8340101KXXXXGB M8340101KXXXXJB M8340101MXXXXFB M8340101MXXXXGB M8340101MXXXXJB	214
		M83401-02	16	M8340102KXXXXFA M8340102KXXXXGA M8340102KXXXXJA M8340102MXXXXFA M8340102MXXXXGA M8340102MXXXXJA	M8340102KXXXXFB M8340102KXXXXGB M8340102KXXXXJB M8340102MXXXXFB M8340102MXXXXGB M8340102MXXXXJB	214
	Molded SIP Low Profile .195" (4.96mm) Seated Height	M83401-07	6	M8340107KXXXXFG M8340107KXXXXGG M8340107KXXXXJG M8340107MXXXXFG M8340107MXXXXGG M8340107MXXXXJG	M8340107KXXXXFC M8340107KXXXXGC M8340107KXXXXJC M8340107MXXXXFC M8340107MXXXXGC M8340107MXXXXJC	216
		M83401-08	8	M8340108KXXXXFG M8340108KXXXXGG M8340108KXXXXJG M8340108MXXXXFG M8340108MXXXXGG M8340108MXXXXJG	M8340108KXXXXFC M8340108KXXXXGC M8340108KXXXXJC M8340108MXXXXFC M8340108MXXXXGC M8340108MXXXXJC	216
		M83401-09	10	M8340109KXXXXFG M8340109KXXXXGG M8340109KXXXXJG M8340109MXXXXFG M8340109MXXXXGG M8340109MXXXXJG	M8340109KXXXXFC M8340109KXXXXGC M8340109KXXXXJC M8340109MXXXXFC M8340109MXXXXGC M8340109MXXXXJC	216

PRODUCT SELECTION GUIDE
Mil-Spec Resistor Networks

Package Outline	Product	Series Number	Pin Ct.	Isolated Resistors	Bussed Resistors	Page No.
	Molded SIP High Profile .350" (8.89mm) Seated Height	M83401-04	6	M8340104KXXXXFG M8340104KXXXXGG M8340104KXXXXJG M8340104MXXXXFG M8340104MXXXXGG M8340104MXXXXJG	M8340104KXXXXFC M8340104KXXXXGC M8340104KXXXXJC M8340104MXXXXFC M8340104MXXXXGC M8340104MXXXXJC	218
		M83401-05	8	M8340105KXXXXFG M8340105KXXXXGG M8340105KXXXXJG M8340105MXXXXFG M8340105MXXXXGG M8340105MXXXXJG	M8340105KXXXXFC M8340105KXXXXGC M8340105KXXXXJC M8340105MXXXXFC M8340105MXXXXGC M8340105MXXXXJC	218
		M83401-06	10	M8340106KXXXXFG M8340106KXXXXGG M8340106KXXXXJG M8340106MXXXXFG M8340106MXXXXGG M8340106MXXXXJG	M8340106KXXXXFC M8340106KXXXXGC M8340106KXXXXJC M8340106MXXXXFC M8340106MXXXXGC M8340106MXXXXJC	218

Thick Film Chip Resistors

Board Space	Mil Standard	Series No.	Tolerance	Resistance Range	Power Rating	Page Number
	M55342, 02	RM 0505	1%	10 ohms to 294K ohms	50 milliwatts	220
			5%	10 ohms to 470K ohms		
	M55342, 06	RM 0705	1%	10 ohms to 500K ohms	100 milliwatts	221
			5%	10 ohms to 1 megohm		
	M55342, 03	RM 1005	1%	10 ohms to 500K ohms	100 milliwatts	222
			5%	10 ohms to 1 megohm		
	M55342, 04	RM 1505	1%	10 ohms to 1 megohm	150 milliwatts	223
			5%	10 ohms to 4.7 megohms		
	M55342, 05	RM 2208	1%	10 ohms to 2 megohms	225 milliwatts	224
			5%	10 ohms to 15 megohms		
	M55342, 07	RM 1206	1%	10 ohms to 500K ohms	250 milliwatts	225
			5%	10 ohms to 1 megohm		
	M55342, 08	RM 2010	1%	10 ohms to 7.5 megohms	500 milliwatts	226
			5%	10 ohms to 15 megohms		
	M55342, 09	RM 2512	1%	10 ohms to 7.5 megohms	1000 milliwatts	227
			5%	10 ohms to 15 megohms		



1-1/4" RECTANGULAR / MULTITURN / CERMET / SEALED

- DESC QPL for Model RJ12 per MIL-R-22097
- DESC QPL for Model RJR12 per High-Rel MIL-R-39035
- Infinite resolution cermet element
- High operating temperature +150°C

BOURNS

Model RJ/RJR12

Trimpot® Potentiometer

Electrical Characteristics

Standard Resistance Range
.....10 to 1 megohm
(see qualified part number table)
Resistance Tolerance .....±10%
Absolute Minimum Resistance
.....1% or 2 ohms max.
(whichever is greater)
Contact Resistance Variation
.....1.0% or 1 ohm
(whichever is greater)
Adjustability
Voltage .....±0.01%
Resistance .....±0.05%
Resolution .....Infinite
Insulation Resistance .....500 vdc.
1,000 megohms min.
Dielectric Strength
Sea Level .....900 vac
80,000 Feet .....350 vac
Effective Travel .....22 turns nom.

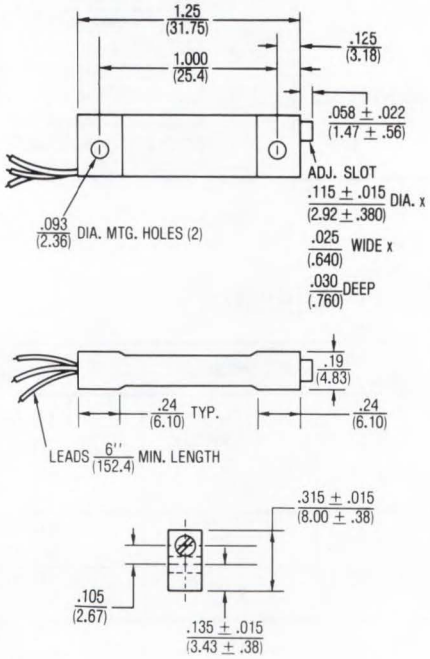
Environmental Characteristics

Power Rating (300 volts max.)
85°C .....0.75 watt
150°C .....0 watt
Temperature Range
.....-55°C to +150°C
Temperature Coefficient
Characteristic "F" .....±100ppm/°C
Characteristic "C" .....±250ppm/°C
Seal Test .....85°C Fluorinert*
(pin styles only)
Humidity.....MIL-STD-202 Method 106
RJ12 (1% ΔTR; 10 Megohms IR)
RJR12 (1% ΔTR; 100 Megohms IR)
Vibration .....20G (1% ΔTR; 1% ΔVR)
Shock .....100G (1% ΔTR; 1% ΔVR)
Load Life
RJ12 1,000 hours 0.75 watt @ 85°C
(2% ΔTR; 1% ΔVR)
RJR12 10,000 hrs. 0.75 watt @ 85°C
(3% ΔTR)
Rotational Life .....200 cycles
(2% ΔTR)

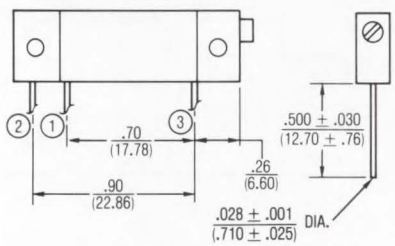
Physical Characteristics

Torque .....5.0 oz-in. max.
Mechanical Stops .....Wiper idles
Solderability MIL-STD-202
Method 208
Flexible leads.....7 strands of 30 AWG
Weight .....0.1 oz.
Marking .....Manufacturer's
trademark, wiring diagram
date code, Mil-Spec part number
Standard Packaging
P & Y Styles.....10 pcs. per tube
L Style .....100 pcs. per bag

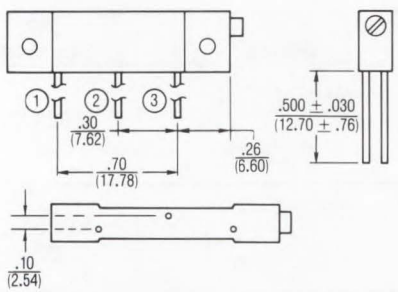
"L" FLEX LEAD TYPE



"P" PRINTED CIRCUIT PIN TYPE

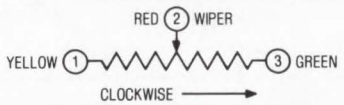


"Y" PRINTED CIRCUIT PIN TYPE



TOLERANCES: ±.010 (.25) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)



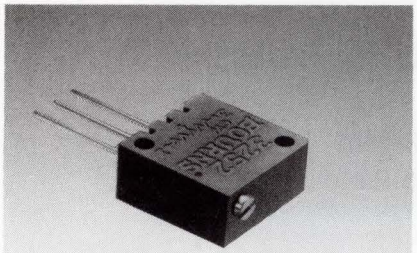
BOURNS QUALIFIED PART NUMBERS

STD. VALUES OHMS	RJ12C_____			RJ12F_____			RJR12C_____		RJR12F_____	
	L	P	Y	L	P	Y	L	Y	L	Y
10	RJ12CL100	RJ12CP100	RJ12CY100	RJ12FL100	RJ12FP100	RJ12FY100	-	-	-	-
20	RJ12CL200	RJ12CP200	RJ12CY200	RJ12FL200	RJ12FP200	RJ12FY200	-	-	-	-
50	RJ12CL500	RJ12CP500	RJ12CY500	RJ12FL500	RJ12FP500	RJ12FY500	-	-	-	-
100	RJ12CL101	RJ12CP101	RJ12CY101	RJ12FL101	RJ12FP101	RJ12FY101	RJR12CL101*	RJR12CY101*	RJR12FL101*	RJR12FY101*
200	RJ12CL201	RJ12CP201	RJ12CY201	RJ12FL201	RJ12FP201	RJ12FY201	RJR12CL201*	RJR12CY201*	RJR12FL201*	RJR12FY201*
500	RJ12CL501	RJ12CP501	RJ12CY501	RJ12FL501	RJ12FP501	RJ12FY501	RJR12CL501*	RJR12CY501*	RJR12FL501*	RJR12FY501*
1K	RJ12CL102	RJ12CP102	RJ12CY102	RJ12FL102	RJ12FP102	RJ12FY102	RJR12CL102*	RJR12CY102*	RJR12FL102*	RJR12FY102*
2K	RJ12CL202	RJ12CP202	RJ12CY202	RJ12FL202	RJ12FP202	RJ12FY202	RJR12CL202*	RJR12CY202*	RJR12FL102*	RJR12FY102*
5K	RJ12CL502	RJ12CP502	RJ12CY502	RJ12FL502	RJ12FP502	RJ12FY502	RJR12CL502*	RJR12CY502*	RJR12FL502*	RJR12FY502*
10K	RJ12CL103	RJ12CP103	RJ12CY103	RJ12FL103	RJ12FP103	RJ12FY103	RJR12CL103*	RJR12CY103*	RJR12FL103*	RJR12FY103*
20K	RJ12CL203	RJ12CP203	RJ12CY203	RJ12FL203	RJ12FP203	RJ12FY203	RJR12CL203*	RJR12CY203*	RJR12FL203*	RJR12FY203*
25K	RJ12CL253	RJ12CP253	RJ12CY253	RJ12FL253	RJ12FP253	RJ12FY253	RJR12CL253*	RJR12CY253*	RJR12FL253*	RJR12FY253*
50K	RJ12CL503	RJ12CP503	RJ12CY503	RJ12FL503	RJ12FP503	RJ12FY503	RJR12CL503*	RJR12CY503*	RJR12FL503*	RJR12FY503*
100K	RJ12CL104	RJ12CP104	RJ12CY104	RJ12FL104	RJ12FP104	RJ12FY104	RJR12CL104*	RJR12CY104*	RJR12FL104*	RJR12FY104*
†200K	RJ12CL204	RJ12CP204	RJ12CY204	RJ12FL204	RJ12FP204	RJ12FY204	-	-	-	-
250K	RJ12CL254	RJ12CP254	RJ12CY254	RJ12FL254	RJ12FP254	RJ12FY254	RJR12CL254*	RJR12CY254*	RJR12FL254*	RJR12FY254*
500K	RJ12CL504	RJ12CP504	RJ12CY504	RJ12FL504	RJ12FP504	RJ12FY504	RJR12CL504*	RJR12CY504*	RJR12FL504*	RJR12FY504*
1 MEG	RJ12CL105	RJ12CP105	RJ12CY105	RJ12FL105	RJ12FP105	RJ12FY105	RJR12CL105*	RJR12CY105*	RJR12FL105*	RJR12FY105*

*Last letter in number is failure rate level. M = 1.0% P = 0.1%
†For replacement purpose only. Not for new design.

Bourns reserves the right per MIL-R-39035 to substitute a higher grade temperature characteristic or failure rate (QPL) than requested.

Refer to page 213 for part numbering/ordering information.



1/2" SQUARE / MULTITURN / CERMET SEALED

- DESC QPL for Model RJ22 per MIL-R-22097
- Infinite resolution cermet element
- High power dissipation: 0.5 watt @ 85°C

BOURNS

Model RJ 22

Bourns® Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range ..... 10 to 1 megohm (see qualified part number table)
Resistance Tolerance ..... ±10%
Absolute Minimum Resistance ..... 1ohm max.
Contact Resistance Variation ..... 2.0% or 2 ohms (whichever is greater)
Adjustability
  Voltage ..... ±0.01%
  Resistance ..... ±0.05%
Resolution ..... Infinite
Insulation Resistance ..... 500 vdc. 1,000 megohms min.
Dielectric Strength
  Sea Level ..... 900 vac
  80,000 Feet ..... 350 vac
Effective Travel ..... 25 turns nom.

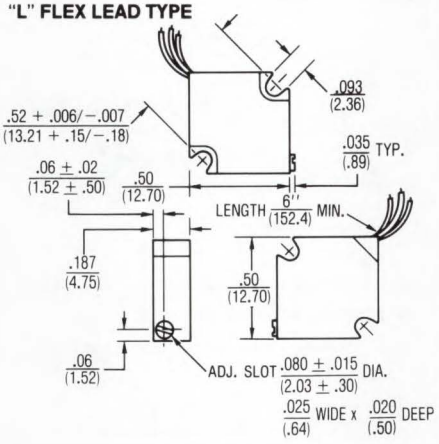
Environmental Characteristics

Power Rating (300 volts max.)
  85°C ..... 0.50 watt
  150°C ..... 0 watt
Temperature Range ..... -55°C to +150°C
Temperature Coefficient
  Characteristic "F" ..... ±100ppm/°C
  Characteristic "C" ..... ±250ppm/°C
Seal Test ..... 85°C Fluorinert* (pin styles only)
Humidity ..... MIL-STD-202 Method 106 (1% ΔTR; 10 Megohms IR)
Vibration ..... 20G (1% ΔTR; 1% ΔVR)
Shock ..... 100G (1% ΔTR; 1% ΔVR)
Load Life ..... 1,000 hours 0.5 watt @ 85°C (2% ΔTR; 1% ΔVR)
Rotational Life ..... 200 cycles (2% ΔTR)

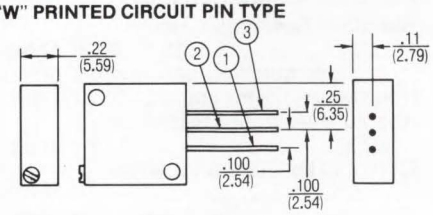
Physical Characteristics

Torque ..... 5.0 oz-in. max.
Mechanical Stops ..... Wiper idles
Solderability ..... MIL-STD-202 Method 208
Flexible leads ..... 7 strands of 30 AWG
Weight ..... 0.065 oz.
Machine Screw Mounting Torque ..... 5 oz-in. max.
Marking ..... Manufacturer's trademark, wiring diagram, date code, Mil-Spec part number
Standard Packaging
  P,W & X Styles ..... 25 pcs. per tube
  L Style ..... 100 pcs. per bag

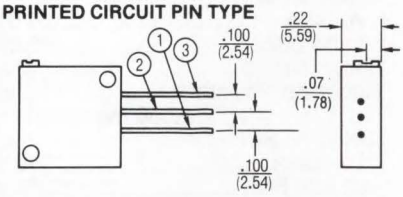
"L" FLEX LEAD TYPE



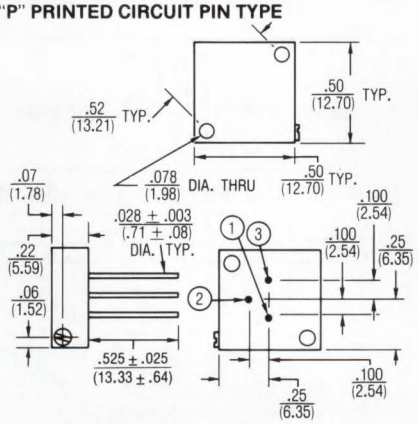
"W" PRINTED CIRCUIT PIN TYPE



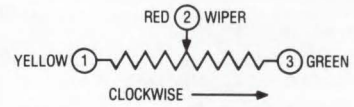
"X" PRINTED CIRCUIT PIN TYPE



"P" PRINTED CIRCUIT PIN TYPE



TOLERANCES: ± .010 (.25) EXCEPT WHERE NOTED
DIMENSIONS: IN. (MM)



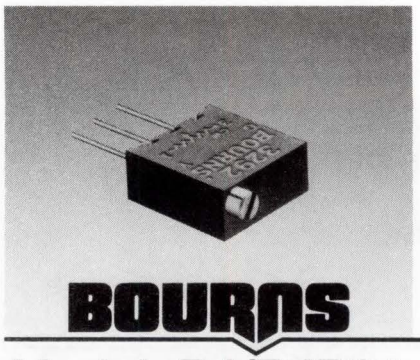
BOURNS QUALIFIED PART NUMBERS

STD. VALUES OHMS	RJ22C_____				RJ22F_____			
	L	P	W	X	L	P	W	X
10	RJ22CL100	RJ22CP100	RJ22CW100	RJ22CX100	RJ22FL100	RJ22FP100	RJ22FW100	RJ22FX100
20	RJ22CL200	RJ22CP200	RJ22CW200	RJ22CX200	RJ22FL200	RJ22FP200	FJ22FW200	RJ22FX200
50	RJ22CL500	RJ22CP500	RJ22CW500	RJ22CX500	RJ22FL500	RJ22FP500	RJ22FW500	RJ22FX500
100	RJ22CL101	RJ22CP101	RJ22CW101	RJ22CX101	RJ22FL101	RJ22FP101	RJ22FW101	RJ22FX101
200	RJ22CL201	RJ22CP201	RJ22CW201	RJ22CX201	RJ22FL201	RJ22FP201	RJ22FW201	RJ22FX201
500	RJ22CL501	RJ22CP501	RJ22CW501	RJ22CX501	RJ22FL501	RJ22FP501	RJ22FW501	RJ22FX501
1K	RJ22CL102	RJ22CP102	RJ22CW102	RJ22CX102	RJ22FL102	RJ22FP102	RJ22FW102	RJ22FX102
2K	RJ22CL202	RJ22CP202	RJ22CW202	RJ22CX202	RJ22FL202	RJ22FP202	RJ22FW202	RJ22FX202
5K	RJ22CL502	RJ22CP502	RJ22CW502	RJ22CX502	RJ22FL502	RJ22FP502	RJ22FW502	RJ22FX502
10K	RJ22CL103	RJ22CP103	RJ22CW103	RJ22CX103	RJ22FL103	RJ22FP103	RJ22FW103	RJ22FX103
20K	RJ22CL203	RJ22CP203	RJ22CW203	RJ22CX203	RJ22FL203	RJ22FP203	RJ22FW203	RJ22FX203
25K	RJ22CL253	RJ22CP253	RJ22CW253	RJ22CX253	RJ22FL253	RJ22FP253	RJ22FW253	RJ22FX253
50K	RJ22CL503	RJ22CP503	RJ22CW503	RJ22CX503	RJ22FL503	RJ22FP503	RJ22FW503	RJ22FX503
100K	RJ22CL104	RJ22CP104	RJ22CW104	RJ22CX104	RJ22FL104	RJ22FP104	RJ22FW104	RJ22FX104
250K	RJ22CL254	RJ22CP254	RJ22CW254	RJ22CX254	RJ22FL254	RJ22FP254	RJ22FW254	RJ22FX254
500K	RJ22CL504	RJ22CP504	RJ22CW504	RJ22CX504	RJ22FL504	RJ22FP504	RJ22FW504	RJ22FX504
1 MEG	RJ22CL105	RJ22CP105	RJ22CW105	RJ22CX105	RJ22FL105	RJ22FP105	RJ22FW105	RJ22FX105

Bourns reserves the right to substitute a higher grade temperature characteristic than requested.

Refer to page 213 for part numbering/ordering information.

Specifications are subject to change without notice.
*"Fluorinert" is a registered trademark of 3M Co.



3/8" SQUARE / MULTITURN / CERMET SEALED

- DESC QPL for Model RJ24 per MIL-R-22097
- DESC QPL for Model RJR24 per High-Rel MIL-R-39035
- Double chevron shaft seal
- Reliable wiper idling mechanism
- Space saving design: 0.150" body width

Model RJ/RJR24

Bourns® Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range
.....10 to 500K ohms
(see qualified part number table)
Resistance Tolerance .....±10% std.
Absolute Minimum Resistance
.....1 ohm max.
Contact Resistance Variation
.....3.0% or 3 ohms
(whichever is greater)
Adjustability
Voltage .....±0.01%
Resistance .....±0.05%
Resolution .....Infinite
Insulation Resistance .....500 vdc.
1,000 megohms min.
Dielectric Strength
Sea Level .....900 vac
80,000 Feet .....350 vac
Effective Travel .....25 turns nom.

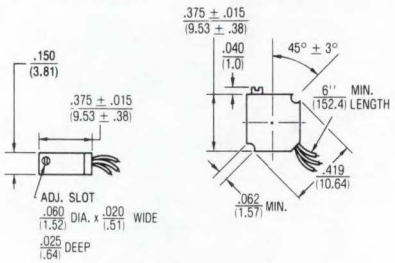
Environmental Characteristics

Power Rating (300 volts max.)
85°C .....0.50 watt
150°C .....0 watt
Temperature Range
.....-55°C to +150°C
Temperature Coefficient
Characteristic "F" .....±100ppm/°C
Characteristic "C" .....±250ppm/°C
Seal Test .....85°C Fluorinert*
(pin styles only)
Humidity.....MIL-STD-202 Method 106
RJ24 (1% ΔTR; 10 Megohms IR)
RJR24 (1% ΔTR; 100 Megohms IR)
Vibration .....20G (1% ΔTR; 1% ΔVR)
Shock .....100G (1% ΔTR; 1% ΔVR)
Load Life
RJ24 1,000 hours 0.5 watt @ 85°C
(2% ΔTR; 1% ΔVR)
RJR24 10,000 hrs. 0.5 watt @ 85°C
(3% ΔTR)
Rotational Life.....200 cycles (2% ΔTR)

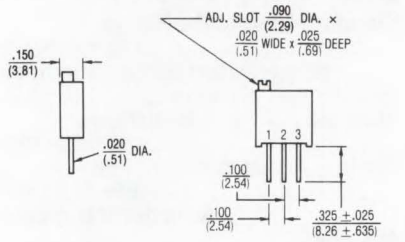
Physical Characteristics

Torque .....5.0 oz-in. max.
Mechanical Stops .....Wiper idles
Solderability MIL-STD-202
Method 208
Flexible leads..... 7 strands of 30 AWG
Weight .....0.025 oz.
Machine Screw Mounting Torque
.....12 oz-in. max.
Marking .....Manufacturer's
trademark, wiring diagram,
date code, Mil-Spec part number
Standard Packaging
P,W & X Styles .....50 pcs. per tube
L Style .....100 pcs. per bag

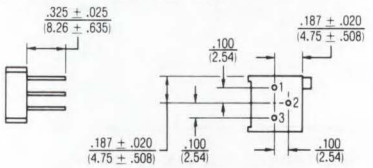
"L" FLEX LEAD TYPE

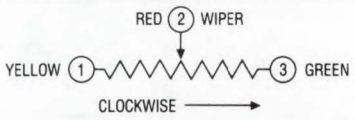


"W" PRINTED CIRCUIT PIN TYPE

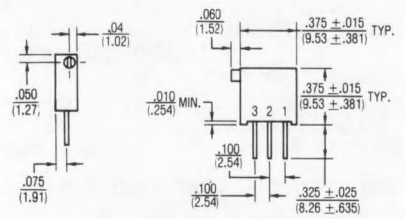


"P" PRINTED CIRCUIT PIN TYPE





"X" PRINTED CIRCUIT PIN TYPE



TOLERANCES: ± .010 (.25) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)

BOURNS QUALIFIED PART NUMBERS

STD. VALUES OHMS	RJ24C_____				RJ24F_____			
	L	P	W	X	L	P	W	X
10	RJ24CL100	RJ24CP100	RJ24CW100	RJ24CX100	RJ24FL100	RJ24FP100	RJ24FW100	RJ24FX100
20	RJ24CL200	RJ24CP200	RJ24CW200	RJ24CX200	RJ24FL200	RJ24FP200	FJ24FW200	RJ24FX200
50	RJ24CL500	RJ24CP500	RJ24CW500	RJ24CX500	RJ24FL500	RJ24FP500	RJ24FW500	RJ24FX500
100	RJ24CL101	RJ24CP101	RJ24CW101	RJ24CX101	RJ24FL101	RJ24FP101	RJ24FW101	RJ24FX101
200	RJ24CL201	RJ24CP201	RJ24CW201	RJ24CX201	RJ24FL201	RJ24FP201	RJ24FW201	RJ24FX201
500	RJ24CL501	RJ24CP501	RJ24CW501	RJ24CX501	RJ24FL501	RJ24FP501	RJ24FW501	RJ24FX501
1K	RJ24CL102	RJ24CP102	RJ24CW102	RJ24CX102	RJ24FL102	RJ24FP102	RJ24FW102	RJ24FX102
2K	RJ24CL202	RJ24CP202	RJ24CW202	RJ24CX202	RJ24FL202	RJ24FP202	RJ24FW202	RJ24FX202
5K	RJ24CL502	RJ24CP502	RJ24CW502	RJ24CX502	RJ24FL502	RJ24FP502	RJ24FW502	RJ24FX502
10K	RJ24CL103	RJ24CP103	RJ24CW103	RJ24CX103	RJ24FL103	RJ24FP103	RJ24FW103	RJ24FX103
20K	RJ24CL203	RJ24CP203	RJ24CW203	RJ24CX203	RJ24FL203	RJ24FP203	RJ24FW203	RJ24FX203
25K	RJ24CL253	RJ24CP253	RJ24CW253	RJ24CX253	RJ24FL253	RJ24FP253	RJ24FW253	RJ24FX253
50K	RJ24CL503	RJ24CP503	RJ24CW503	RJ24CX503	RJ24FL503	RJ24FP503	RJ24FW503	RJ24FX503
100K	RJ24CL104	RJ24CP104	RJ24CW104	RJ24CX104	RJ24FL104	RJ24FP104	RJ24FW104	RJ24FX104
250K	RJ24CL254	RJ24CP254	RJ24CW254	RJ24CX254	RJ24FL254	RJ24FP254	RJ24FW254	RJ24FX254
500K	RJ24CL504	RJ24CP504	RJ24CW504	RJ24CX504	RJ24FL504	RJ24FP504	RJ24FW504	RJ24FX504
1 MEG	-	RJ24CP105	RJ24CW105	RJ24CX105	-	RJ24FP105	RJ24FW105	RJ24FX105

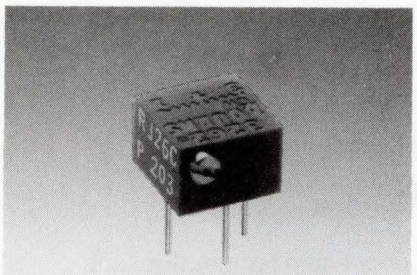
STD. VALUES OHMS	RJR24C_____			RJR24F_____		
	P	W	X	P	W	X
10	RJR24CP100*	RJR24CW100*	RJR24CX100*	RJR24FP100*	RJR24FW100*	RJR24FX100*
20	RJR24CP200*	RJR24CW200*	RJR24CX200*	RJR24FP200*	RJR24FW200*	RJR24FX200*
50	RJR24CP500*	RJR24CW500*	RJR24CX500*	RJR24FP500*	RJR24FW500*	RJR24FX500*
100	RJR24CP101*	RJR24CW101*	RJR24CX101*	RJR24FP101*	RJR24FW101*	RJR24FX101*
200	RJR24CP201*	RJR24CW201*	RJR24CX201*	RJR24FL201*	RJR24FW201*	RJR24FX201*
500	RJR24CP501*	RJR24CW501*	RJR24CX501*	RJR24FP501*	RJR24FW501*	RJR24FX501*
1K	RJR24CP102*	RJR24CW102*	RJR24CX102*	RJR24FP102*	RJR24FW102*	RJR24FX102*
2K	RJR24CP202*	RJR24CW202*	RJR24CX202*	RJR24FP202*	RJR24FW202*	RJR24FX202*
5K	RJR24CP502*	RJR24CW502*	RJR24CX502*	RJR24FP502*	RJR24FW502*	RJR24FX502*
10K	RJR24CP103*	RJR24CW103*	RJR24CX103*	RJR24FP103*	RJR24FW103*	RJR24FX103*
20K	RJR24CP203*	RJR24CW203*	RJR24CX203*	RJR24FP203*	RJR24FW203*	RJR24FX203*
25K	RJR24CP253*	RJR24CW253*	RJR24CX253*	RJR24FP253*	RJR24FW253*	RJR24FX253*
50K	RJR24CP503*	RJR24CW503*	RJR24CX503*	RJR24FP503*	RJR24FW503*	RJR24FX503*
100K	RJR24CP104*	RJR24CW104*	RJR24CX104*	RJR24FP104*	RJR24FW104*	RJR24FX104*
250K	RJR24CP254*	RJR24CW254*	RJR24CX254*	RJR24FP254*	RJR24FW254*	RJR24FX254*
500K	RJR24CP504*	RJR24CW504*	RJR24CX504*	RJR24FP504*	RJR24FW504*	RJR24FX504*
1 MEG	RJR24CP105*	RJR24CW105*	RJR24CX105*	RJR24FP105*	RJR24FW105*	RJR24FX105*

*Last letter in number is failure rate level. M = 1.0% P = 0.1% R = 0.01%

Bourns reserves the right per MIL-R-39035 to substitute a higher grade temperature characteristic or failure rate (QPL) than requested.

Refer to page 213 for part numbering/ordering information.

Specifications are subject to change without notice.
*"Fluorinert" is a registered trademark of 3M Co.



1/4" SQUARE / MULTITURN / CERMET SEALED

- DESC QPL for Model RJ26 per MIL-R-22097
- DESC QPL for Model RJR26 per High-Rel MIL-R-39035
- Stable, inifinite resolution cermet element

Model RJ/RJR26

Bourns® Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range ..... 10 to 1 megohm (see qualified part number table)
Resistance Tolerance ..... ±10% std.
Absolute Minimum Resistance ..... 1 ohm max.
Contact Resistance Variation ..... 3.0% or 3 ohms (whichever is greater)
Adjustability
Voltage ..... ±0.02%
Resistance ..... ±0.05%
Resolution ..... Infinite
Insulation Resistance ..... 500 vdc. 1,000 megohms min.
Dielectric Strength
Sea Level ..... 600 vac
80,000 Feet ..... 250 vac
Effective Travel ..... 12 turns nom.

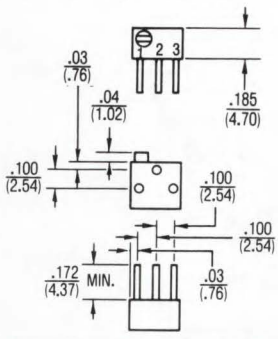
Environmental Characteristics

Power Rating (200 volts max.)
85°C ..... 0.25 watt
150°C ..... 0 watt
Temperature Range ..... -65°C to +150°C
Temperature Coefficient
Characteristic "F" ..... ±100ppm/°C
Characteristic "C" ..... ±250ppm/°C
Seal Test ..... 85°C Fluorinert*
Humidity ..... MIL-STD-202 Method 106
RJ26 (1% ΔTR; 10 Megohms IR)
RJR26 (1% ΔTR; 100 Megohms IR)
Vibration ..... 20G (1% ΔTR; 1% ΔVR)
Shock ..... 100G (1% ΔTR; 1% ΔVR)
Load Life
RJ26 1,000 hours 0.25 watt @ 85°C (2% ΔTR; 1%ΔVR)
RJR26 10,000 hrs. 0.25 watt @ 85°C (3% ΔTR)
Rotational Life ..... 200 cycles (2% ΔTR)

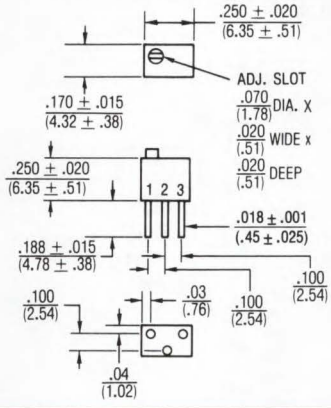
Physical Characteristics

Torque ..... 3.0 oz-in. max.
Mechanical Stops ..... Wiper idles
Solderability ..... MIL-STD-202 Method 208
Weight ..... 0.015 oz.
Marking ..... Manufacturer's trademark, wiring diagram, date code, Mil-Spec part number
Standard Packaging .. 50 pcs. per tube

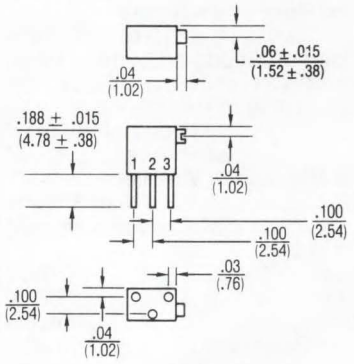
"P" PRINTED CIRCUIT PIN TYPE



"W" PRINTED CIRCUIT PIN TYPE

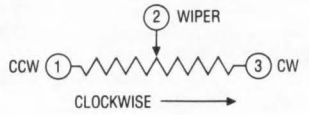


"X" PRINTED CIRCUIT PIN TYPE



TOLERANCES: ± .010 (.25) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)



BOURNS QUALIFIED PART NUMBERS

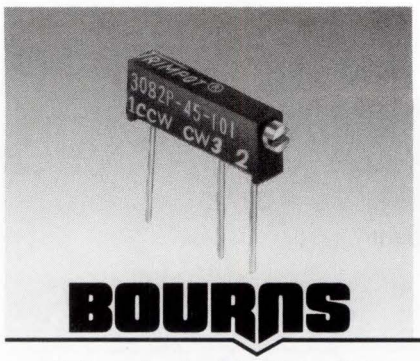
STD. VALUES OHMS	RJ26C_____			RJ26F_____			RJR26F_____		
	P	W	X	P	W	X	P	W	X
10	RJ26CP100	RJ26CW100	RJ26CX100	RJ26FP100	RJ26FW100	RJ26FX100	RJR26FP100*	RJR26FW100*	RJR26FX100*
20	RJ26CP200	RJ26CW200	RJ26CX200	RJ26FP200	FJ26FW200	RJ26FX200	RJR26FP200*	RJR26FW200*	RJR26FX200*
50	RJ26CP500	RJ26CW500	RJ26CX500	RJ26FP500	RJ26FW500	RJ26FX500	RJR26FP500*	RJR26FW500*	RJR26FX500*
100	RJ26CP101	RJ26CW101	RJ26CX101	RJ26FP101	RJ26FW101	RJ26FX101	RJR26FP101*	RJR26FW101*	RJR26FX101*
200	RJ26CP201	RJ26CW201	RJ26CX201	RJ26FP201	RJ26FW201	RJ26FX201	RJR26FP201*	RJR26FW201*	RJR26FX201*
500	RJ26CP501	RJ26CW501	RJ26CX501	RJ26FP501	RJ26FW501	RJ26FX501	RJR26FP501*	RJR26FW501*	RJR26FX501*
1K	RJ26CP102	RJ26CW102	RJ26CX102	RJ26FP102	RJ26FW102	RJ26FX102	RJR26FP102*	RJR26FW102*	RJR26FX102*
2K	RJ26CP202	RJ26CW202	RJ26CX202	RJ26FP202	RJ26FW202	RJ26FX202	RJR26FP202*	RJR26FW202*	RJR26FX202*
5K	RJ26CP502	RJ26CW502	RJ26CX502	RJ26FP502	RJ26FW502	RJ26FX502	RJR26FP502*	RJR26FW502*	RJR26FX502*
10K	RJ26CP103	RJ26CW103	RJ26CX103	RJ26FP103	RJ26FW103	RJ26FX103	RJR26FP103*	RJR26FW103*	RJR26FX103*
20K	RJ26CP203	RJ26CW203	RJ26CX203	RJ26FP203	RJ26FW203	RJ26FX203	RJR26FP203*	RJR26FW203*	RJR26FX203*
25K	RJ26CP253	RJ26CW253	RJ26CX253	RJ26FP253	RJ26FW253	RJ26FX253	RJR26FP253*	RJR26FW253*	RJR26FX253*
50K	RJ26CP503	RJ26CW503	RJ26CX503	RJ26FP503	RJ26FW503	RJ26FX503	RJR26FP503*	RJR26FW503*	RJR26FX503*
100K	RJ26CP104	RJ26CW104	RJ26CX104	RJ26FP104	RJ26FW104	RJ26FX104	RJR26FP104*	RJR26FW104*	RJR26FX104*
250K	RJ26CP254	RJ26CW254	RJ26CX254	RJ26FP254	RJ26FW254	RJ26FX254	RJR26FP254*	RJR26FW254*	RJR26FX254*
500K	RJ26CP504	RJ26CW504	RJ26CX504	RJ26FP504	RJ26FW504	RJ26FX504	RJR26FP504*	RJR26FW504*	RJR26FX504*
1 MEG	RJ26CP105	RJ26CW105	RJ26CX105	RJ26FP105	RJ26FW105	RJ26FX105	RJR26FP105*	RJR26FW105*	RJR26FX105*

*Last letter in number is failure rate level. M = 1.0% P = 0.1% R = 0.01%

Bourns reserves the right per MIL-R-39035 to substitute a higher grade temperature characteristic or failure rate (QPL) than requested.

Refer to page 213 for part numbering/ordering information.

Specifications are subject to change without notice.
*"Fluorinert" is a registered trademark of 3M Co.



BOURNS

1/2" RECTANGULAR / MULTITURN / CERMET / SEALED

- DESC QPL for Model RJR28 per MIL-R-39035
- Stable, infinite resolution cermet element
- Space saving size: 0.100" X 0.150" X 0.500"
- ±100ppm/°C temperature coefficient over entire temperature and resistances ranges

Model RJR 28

Trimpot® Potentiometer

Electrical Characteristics

Standard Resistance Range
.....10 to 50K ohms
(see qualified part number table)
Resistance Tolerance .....±10%
Absolute Minimum Resistance
.....1% or 2 ohms max.
(whichever is greater)
Contact Resistance Variation
.....3% or 3 ohms
(whichever is greater)
Adjustability
Voltage .....±0.03%
Resistance .....±0.1%
Resolution .....Infinite
Insulation Resistance .....500 vdc.
1,000 megohms min.
Dielectric Strength
Sea Level .....900 vac
80,000 Feet .....350 vac
Effective Travel .....10 turns nom.

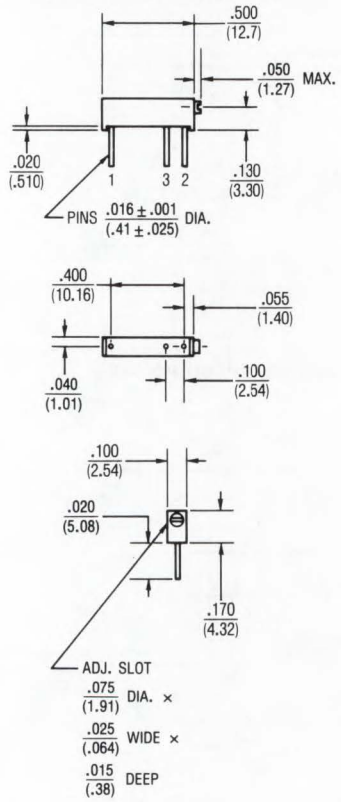
Environmental Characteristics

Power Rating (300 volts max.)
85°C .....0.3 watt
150°C .....0 watt
Temperature Range
.....-55°C to +150°C
Temperature Coefficient
Characteristic "F" .....±100ppm/°C
Characteristic "C" .....±250ppm/°C
Seal Test .....85°C Fluorinert*
Humidity.....MIL-STD-202 Method 106
(1% ΔTR; 100 Megohms IR)
Vibration .....20G (1% ΔTR; 1% ΔVR)
Shock .....100G (1% ΔTR, 1% ΔVR)
Load Life
.....10,000 hours 0.3 watt @ 85°C
(3% ΔTR)
Rotational Life .....200 cycles
(2% ΔTR)

Physical Characteristics

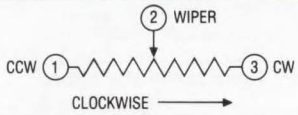
Torque .....2.0 oz-in. max.
Mechanical Stops .....Wiper idles
Solderability MIL-STD-202
Method 208
Weight .....Approximately 0.1 oz.
Marking .....Manufacturer's
trademark, terminal
numbers, date code,
Mil-Spec part number
Standard Packaging ..25 pcs. per tube

"P" PRINTED CIRCUIT PIN TYPE



TOLERANCES: ± .010 (.25) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)



BOURNS QUALIFIED PART NUMBERS

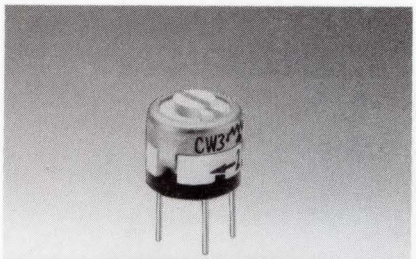
STD. VALUES OHMS	RJR28C_____	RJR28F_____
	P	P
10	RJR28CP100*	RJR28FP100*
20	RJR28CP200*	RJR28FP200*
50	RJR28CP500*	RJR28FP500*
100	RJR28CP101*	RJR28FP101*
200	RJR28CP201*	RJR28FP201*
500	RJR28CP501*	RJR28FP501*
1K	RJR28CP102*	RJR28FP102*
2K	RJR28CP202*	RJR28FP202*
5K	RJR28CP502*	RJR28FP502*
10K	RJR28CP103*	RJR28FP103*
20K	RJR28CP203*	RJR28FP203*
25K	RJR28CP253*	RJR28FP253*
50K	RJR28CP503*	RJR28FP503*

*Last letter in number is failure rate level.
M = 1.0% P = 0.1%

Bourns reserves the right per MIL-R-39035 to substitute a higher grade temperature characteristic or failure rate (QPL) than requested.

Refer to page 213 for part numbering/ ordering information.

Specifications are subject to change without notice.
*"Fluorinert" is a registered trademark of 3M Co.



1/4" ROUND / SINGLE-TURN / CERMET SEALED

- DESC QPL for Model RJ50 per MIL-R-22097
- DESC QPL for Model RJR50 per High-Rel MIL-R-39035
- Stable, infinite resolution cermet element
- Space saving size: 0.25" diameter

BOURNS

Model RJ/RJR 50

Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range ..... 10 ohms to 1 megohm (see qualified part number table)
Resistance Tolerance ..... ±10% std. Closer tolerances available
Absolute Minimum Resistance ..... 1% or 2 ohms max. (whichever is greater)
Contact Resistance Variation ..... 3% or 3 ohms (whichever is greater)
Adjustability
Voltage ..... ±0.05%
Resistance ..... ±0.15%
Resolution ..... Infinite
Insulation Resistance ..... 500 vdc. 1,000 megohms min.
Dielectric Strength
Sea Level ..... 600 vac
80,000 Feet ..... 250 vac
Adjustment Angle ..... 240° nom.

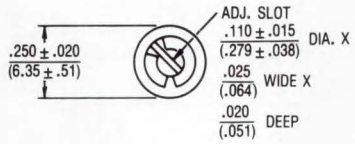
Environmental Characteristics

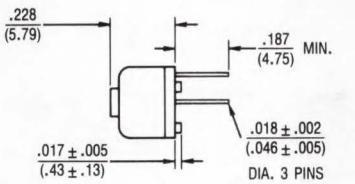
Power Rating (200 volts max.)
85°C ..... 0.25 watt
150°C ..... 0 watt
Temperature Range ..... -55°C to +150°C
Temperature Coefficient
Characteristic "F" ..... ±100ppm/°C
Characteristic "C" ..... ±250ppm/°C
Seal Test ..... 85°C Fluorinert*
Humidity ..... MIL-STD-202 Method 103
RJ50 (1% ΔTR; 10 Megohms IR)
RJR50 (1% ΔTR; 100 Megohms IR)
Vibration ..... 20G (1% ΔTR; 1% ΔVR)
Shock ..... 100G (1% ΔTR; 1% ΔVR)
Load Life
RJ50 1,000 hours 0.25 watt @ 85°C (2% ΔTR; `1% ΔVR)
RJR50 10,000 hrs. 0.25 watt @ 85°C (2% ΔTR; `1% ΔVR)
Rotational Life ..... 200 cycles (2% ΔTR)

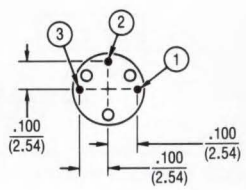
Physical Characteristics

Mechanical Angle ..... 260° nom.
Torque ..... 2.0 oz-in. max.
Stop Strength ..... 5.0 oz -in. min.
Solderability ..... MIL-STD-202 Method 208
Weight ..... 0.02 oz.
Marking ..... Manufacturer's trademark, wiring diagram, date code, Mil-Spec part number
Standard Packaging .. 50 pcs. per tube

"P" PRINTED CIRCUIT PIN TYPE

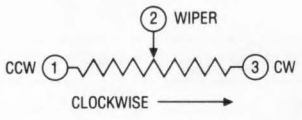






TOLERANCES: ± .010 (.25) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)



BOURNS QUALIFIED PART NUMBERS

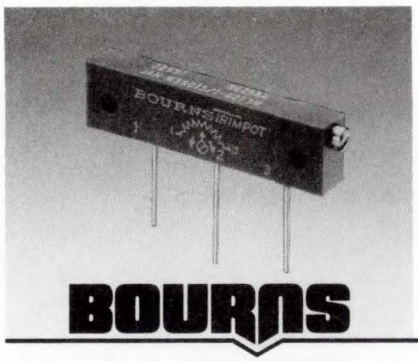
STD. VALUES OHMS	RJ50C_____	RJ50F_____	RJR50F_____
	P	P	P
10	RJ50CP100	RJ50FP100	RJR50FP100
20	RJ50CP200	RJ50FP200	RJR50FP200
50	RJ50CP500	RJ50FP500	RJR50FP500
100	RJ50CP101	RJ50FP101	RJR50FP101
200	RJ50CP201	RJ50FP201	RJR50FP201
500	RJ50CP501	RJ50FP501	RJR50FP501
1K	RJ50CP102	RJ50FP102	RJR50FP102
2K	RJ50CP202	RJ50FP202	RJR50FP202
5K	RJ50CP502	RJ50FP502	RJR50FP502
10K	RJ50CP103	RJ50FP103	RJR50FP103
20K	RJ50CP203	RJ50FP203	RJR50FP203
25K	RJ50CP253	RJ50FP253	RJR50FP253
50K	RJ50CP503	RJ50FP503	RJR50FP503
100K	RJ50CP104	RJ50FP104	RJR50FP104
250K	RJ50CP254	RJ50FP254	RJR50FP254
500K	RJ50CP504	RJ50FP504	RJR50FP504
1 MEG	RJ50CP105	RJ50FP105	RJR50FP105

*Last letter in number is failure rate level.
M = 1.0% P = 0.1%

Bourns reserves the right per MIL-R-39035 to substitute a higher grade temperature characteristic or failure rate (QPL) than requested.

Refer to page 213 for part numbering/ ordering information.

Specifications are subject to change without notice.
**"Fluorinert" is a registered trademark of 3M Co.



1 1/4" RECTANGULAR / MULTITURN / WIREWOUND / SEALED

- DESC QPL for Model RT12 per MIL-R-27208
- DESC QPL for Model RTR12 per High-Rel MIL-R-39015
- High power dissipation 0.75 watt @ 85°C
- High operating temperature 150°C

BOURNS

Model RT/RTR12

Trimpot® Potentiometer

Electrical Characteristics

Standard Resistance Range
RT12 ..... 10 to 20K ohms
RTR12 ..... 500 to 20K ohms
(see qualified part number table)
Resistance Tolerance ..... ±5%
Absolute Minimum Resistance
..... 0.1% or 1.0 ohm max.
(whichever is greater)
Noise ..... 100 ohms ENR max.
Resolution ..... (see qualified part number table)
Insulation Resistance ..... 500 vdc.
1,000 megohms min.
Dielectric Strength
Sea Level ..... 900 vac
80,000 Feet ..... 350 vac
Adjustment Travel ..... 22 turns nom.

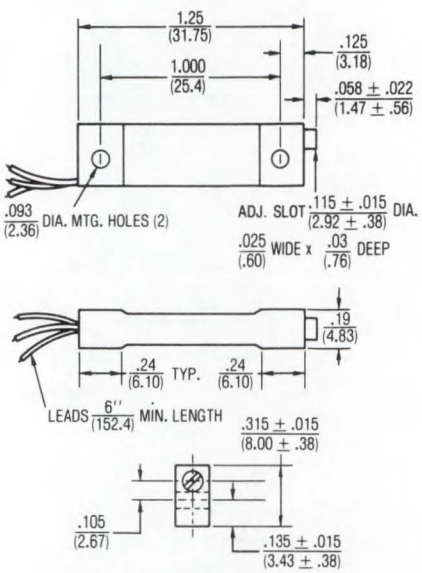
Environmental Characteristics

Power Rating
85°C ..... 0.75 watt
150°C ..... 0 watt
Temperature Range
..... -65°C to +150°C
Temperature Coefficient
..... ±50ppm/°C
Seal Test ..... 85°C Fluorinert*
(pin styles only)
Humidity ..... MIL-STD-202 Method 106
RT12 (1% ΔTR; 10 Megohms IR)
RTR12 (1% ΔTR; 100 Megohms IR)
Vibration 20G
(1% ΔTR; 0.5% + Resolution ΔVR)
Shock 100G
(1% ΔTR; 0.5% + Resolution ΔVR)
Load Life
RT12 1,000 hours 0.75 watt @ 85°C
(2% ΔTR; 2% + Resolution ΔVR)
RTR12 10,000 hrs. 0.75 watt @ 85°C
(3% + Resolution ΔTR)
Rotational Life ..... 200 cycles
(2% ΔTR)

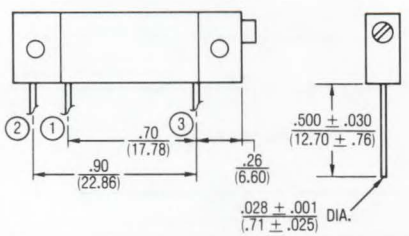
Physical Characteristics

Torque ..... 5.0 oz-in. max.
Mechanical Stops ..... Wiper idles
Solderability MIL-STD-202
Method 208
Flexible leads ..... 7 strands of 30 AWG
Weight ..... 0.10 oz.
Marking ..... Manufacturer's trademark, wiring diagram, date code, Mil-Spec part number
Standard Packaging
P&Y Styles ..... 10 pcs. per tube
L Style ..... 100 pcs. per bag

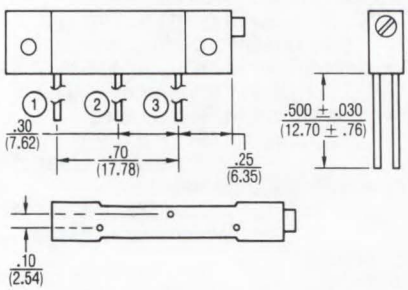
"L" FLEX LEAD TYPE



"P" PRINTED CIRCUIT PIN TYPE

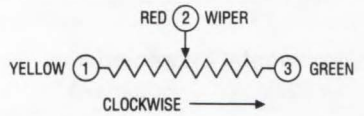


"Y" PRINTED CIRCUIT PIN TYPE



TOLERANCES: ± .010 (.25) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)



BOURNS QUALIFIED PART NUMBERS

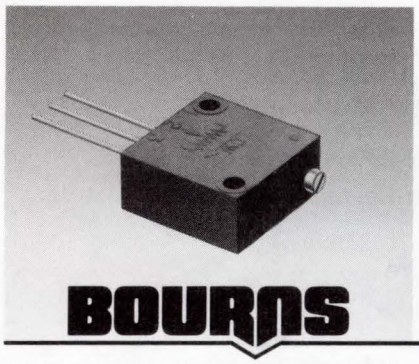
STD. VALUES OHMS	RT12C2_____			RTR12D_____			NOMINAL RESOLUTION (PERCENT)
	L	P	Y	L	P	Y	
10	RT12C2L100	RT12C2P100	RT12C2Y100	-	-	-	2.40
20	RT12C2L200	RT12C2P200	RT12C2Y200	-	-	-	1.90
50	RT12C2L500	RT12C2P500	RT12C2Y500	-	-	-	1.40
100	RT12C2L101	RT12C2P101	RT12C2Y101	-	-	-	1.00
200	RT12C2L201	RT12C2P201	RT12C2Y201	-	-	-	0.86
500	RT12C2L501	RT12C2P501	RT12C2Y501	RTR12DL501*	RTR12DP501*	RTR12DY501*	0.89
1K	RT12C2L102	RT12C2P102	RT12C2Y102	RTR12DL102*	RTR12DP102*	RTR12DY102*	0.72
2K	RT12C2L202	RT12C2P202	RT12C2Y202	RTR12DL202*	RTR12DP202*	RTR12DY202*	0.58
5K	RT12C2L502	RT12C2P502	RT12C2Y502	RTR12DL502*	RTR12DP502*	RTR12DY502*	0.43
10K	RT12C2L103	RT12C2P103	RT12C2Y103	RTR12DL103*	RTR12DP103*	RTR12DY103*	0.39
20K	RT12C2L203	RT12C2P203	RT12C2Y203	RTR12DL203*	RTR12DP203*	RTR12DY203*	0.31

* Last letter in number is failure rate level. M = 1.0% P = 0.1%

Bourns reserves the right per MIL-R-39015 to substitute a higher grade failure rate (QPL) than requested.

Refer to page 213 and for part numbering/ordering information.

Specifications are subject to change without notice.
*"Fluorinert" is a registered trademark of 3M Co.



1/2" SQUARE / MULTITURN / WIREWOUND / SEALED

- DESC QPL for Model RT22 per MIL-R-27208
- DESC QPL for Model RTR22 per High-Rel MIL-R-39015
- High power dissipation 0.75 watt @ 85°C
- Superior humidity-proof performance

Model RT/RTR22

Bourns® Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range
RT22 ..... 50 to 20K ohms
RTR22 ..... 500 to 20K ohms
(see qualified part number table)
Resistance Tolerance ..... ±5% std.
Absolute Minimum Resistance
..... 0.1% or 1.0 ohm
(whichever is greater)
Noise ..... 100 ohms ENR max.
Resolution ..... (see qualified part number table)
Insulation Resistance ..... 500 vdc.
1,000 megohms min.
Dielectric Strength
Sea Level ..... 900 vac
80,000 Feet ..... 350 vac
Effective Travel ..... 25 turns nom.

Environmental Characteristics

Power Rating
85°C ..... 0.75 watt
150°C ..... 0 watt
Temperature Range
..... -65°C to +150°C
Temperature Coefficient
..... ±50ppm/°C
Seal Test ..... 85°C Fluorinert*
(pin styles only)
Humidity ..... MIL-STD-202 Method 106
RT22 (1% ΔTR; 10 Megohms IR)
RTR22 (1% ΔTR; 100 Megohms IR)
Vibration 20G
(1% ΔTR; 0.5% + Resolution ΔVR)
Shock 100G
(1% ΔTR; 0.5% + Resolution ΔVR)
Load Life
RT22 1,000 hours 0.75 watt @ 85°C
(2% ΔTR; 2% + Resolution ΔVR)
RTR22 10,000 hrs. 0.75 watt @ 85°C
(3% + Resolution ΔTR)
Rotational Life ..... 200 cycles (2% ΔTR)

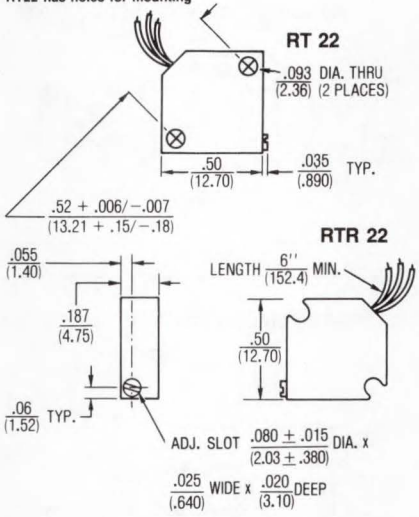
Physical Characteristics

Torque ..... 5.0 oz-in. max.
Mechanical Stops ..... Wiper idles
Solderability MIL-STD-202
Method 208
Flexible leads ..... 7 strands of 30 AWG
Weight ..... 0.06 oz.
Machine Screw Mounting
Torque ..... 12 oz-in. max.
Marking ..... Manufacturer's trademark, wiring diagram, date code, Mil-Spec part number
Standard Packaging
P,W & X Styles ..... 25 pcs. per tube
L Style ..... 100 pcs. per bag

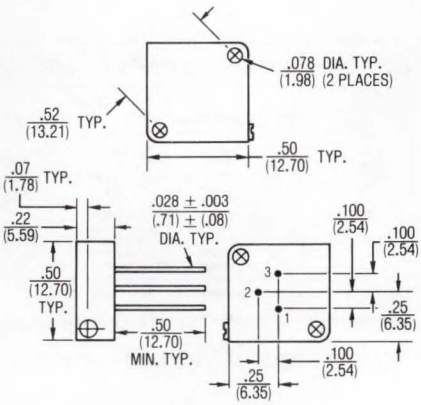
Specifications are subject to change without notice.
*"Fluorinert" is a registered trademark of 3M Co.

"L" FLEX LEAD TYPE

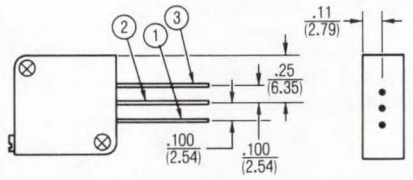
RTR22 has slots for mounting
RT22 has holes for mounting



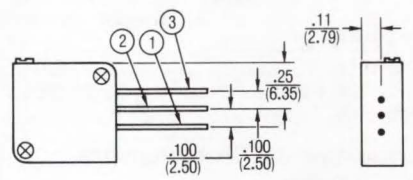
"P" PRINTED CIRCUIT PIN TYPE



"W" PRINTED CIRCUIT PIN TYPE

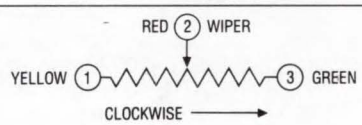


"X" PRINTED CIRCUIT PIN TYPE



TOLERANCES: ± .010 (.25) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)



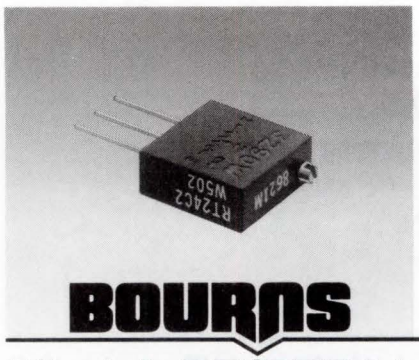
BOURNS QUALIFIED PART NUMBERS

STD. VALUES OHMS	RT22C2_____				RTR22D_____				NOMINAL RESOLUTION (PERCENT)
	L	P	W	X	L	P	W	X	
10	-	-	-	-	-	-	-	-	-
20	-	-	-	-	-	-	-	-	-
50	RT22C2L500	RT22C2P500	RT22C2W500	RT22C2X500	-	-	-	-	0.80
100	RT22C2L101	RT22C2P101	RT22C2W101	RT22C2X101	-	-	-	-	0.90
200	RT22C2L201	RT22C2P201	RT22C2W201	RT22C2X201	-	-	-	-	0.70
500	RT22C2L501	RT22C2P501	RT22C2W501	RT22C2X501	RTR22DL501*	RTR22DP501*	RTR22DW501*	RTR22DX501*	0.60
1K	RT22C2L102	RT22C2P102	RT22C2W102	RT22C2X102	RTR22DL102*	RTR22DP100*	RTR22DW102*	RTR22DX102*	0.40
2K	RT22C2L202	RT22C2P202	RT22C2W202	RT22C2X202	RTR22DL202*	RTR22DP202*	RTR22DW202*	RTR22DX202*	0.30
5K	RT22C2L502	RT22C2P502	RT22C2W502	RT22C2X502	RTR22DL502*	RTR22DP502*	RTR22DW502*	RTR22DX502*	0.25
10K	RT22C2L103	RT22C2P103	RT22C2W103	RT22C2X103	RTR22DL103*	RTR22DP103*	RTR22DW103*	RTR22DX103*	0.19
20K	RT22C2L203	RT22C2P203	RT22C2W203	RT22C2X203	RTR22DL203*	RTR22DP203*	RTR22DW203*	RTR22DX203*	0.16

*Last letter in number is failure rate level. M = 1.0% P = 0.1%

Bourns reserves the right per MIL-R-39015 to substitute a higher grade failure rate (QPL) than requested.

Refer to page 213 for part numbering/ordering information.



3/8" SQUARE / MULTITURN / WIREWOUND / SEALED

- DESC QPL for Model RT24 per MIL-R-27208
- DESC QPL for Model RTR24 per High-Rel MIL-R-39015
- High performance: 0.75 watt @ 85°C
- 150°C maximum operating temperature
- Space saving design: 0.150" body width

Model RT/RTR24

Trimpot® Potentiometer

Electrical Characteristics

Standard Resistance Range ..... 10 to 10K ohms (see qualified part number table)
Resistance Tolerance ..... ±5%
Absolute Minimum Resistance ..... 0.1% or 1.0 ohm max. (whichever is greater)
Noise ..... 100 ohms ENR max.
Resolution ..... (see qualified part number table)
Insulation Resistance ..... 500 vdc. 1,000 megohms min.
Dielectric Strength
Sea Level ..... 900 vac
80,000 Feet ..... 350 vac
Effective Travel ..... 25 turns nom.

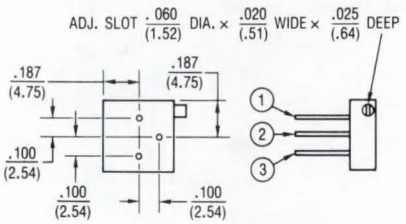
Environmental Characteristics

Power Rating
85°C ..... 0.75 watt
150°C ..... 0 watt
Temperature Range ..... -65°C to +150°C
Temperature Coefficient ..... ±50ppm/°C
Seal Test ..... 85°C Fluorinert*
Humidity ..... MIL-STD-202 Method 106
RT24 (1% ΔTR; 10 Megohms IR)
RTR24 (1% ΔTR; 100 Megohms IR)
Vibration 20G
(1% ΔTR; 0.5% + Resolution ΔVR)
Shock 100G
(1% ΔTR; 0.5% + Resolution ΔVR)
Load Life
RT24 1,000 hours 0.75 watt @ 85°C
(2% ΔTR; 2% + Resolution ΔVR)
RTR24 10,000 hrs. 0.75 watt @ 85°C
(3% + Resolution ΔVR)
Rotational Life ..... 200 cycles (2% ΔTR)

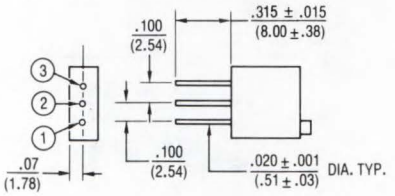
Physical Characteristics

Torque ..... 5.0 oz-in. max.
Mechanical Stops ..... Wiper idles
Solderability ..... MIL-STD-202 Method 208
Weight ..... 0.025 oz.
Marking ..... Manufacturer's trademark, wiring diagram, date code, Mil-Spec part number
Standard Packaging .. 50 pcs. per tube

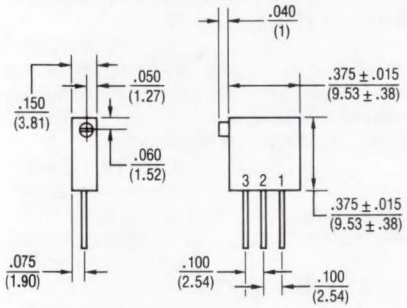
"P" PRINTED CIRCUIT PIN TYPE



"W" PRINTED CIRCUIT PIN TYPE

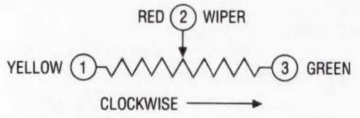


"X" PRINTED CIRCUIT PIN TYPE



TOLERANCES: ± .010 (.25) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)



BOURNS QUALIFIED PART NUMBERS

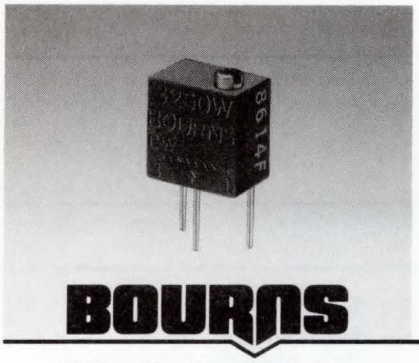
STD. VALUES OHMS	RT24C2_____			RTR24D_____			NOMINAL RESOLUTION (PERCENT)
	P	W	X	P	W	X	
10	RT24C2P100	RT24C2W100	RT24C2X100	-	-	-	1.11
20	RT24C2P200	RT24C2W200	RT24C2X200	-	-	-	0.93
50	RT24C2P500	RT24C2W500	RT24C2X500	-	-	-	0.62
100	RT24C2P101	RT24C2W101	RT24C2X101	-	-	-	0.60
200	RT24C2P201	RT24C2W201	RT24C2X201	-	-	-	0.54
500	RT24C2P501	RT24C2W501	RT24C2X501	RTR24DP501*	RTR24DW501*	RTR24DX501*	0.42
1K	RT24C2P102	RT24C2W102	RT24C2X102	RTR24DP102*	RTR24DW102*	RTR24DX102*	0.33
2K	RT24C2P202	RT24C2W202	RT24C2X202	RTR24DP202*	RTR24DW202*	RTR24DX202*	0.26
5K	RT24C2P502	RT24C2W502	RT24C2X502	RTR24DP502*	RTR24DW502*	RTR24DX502*	0.20
10K	RT24C2P103	RT24C2W103	RT24C2X103	RTR24DP103*	RTR24DW103*	RTR24DX103*	0.17

* Last letter in number is failure rate level. M = 1.0% P = 0.1%

Bourns reserves the right per MIL-R-39015 to substitute a higher grade failure rate (QPL) than requested.

Refer to pages 213 for part numbering/ordering information.

Specifications are subject to change without notice.
**"Fluorinert" is a registered trademark of 3M Co.



1/4" SQUARE / MULTITURN / WIREWOUND / SEALED

- DESC QPL for Model RT26 per MIL-R-27208
- Power rating of .25 watt @ 85°C

BOURNS

Model RT 26

Bourns® Trimming Potentiometer

Electrical Characteristics

Standard Resistance Range
.....10 to 50K ohms
(see qualified part number table)
Resistance Tolerance .....±5% std.
Absolute Minimum Resistance
.....0.25% or 1 ohm max.
(whichever is greater)
Noise .....100 ohms ENR max.
Resolution
(see qualified part number table)
Insulation Resistance .....500 vdc.
1,000 megohms min.
Dielectric Strength
Sea Level .....600 vac
80,000 Feet .....250 vac
Effective Travel .....11 turns nom.

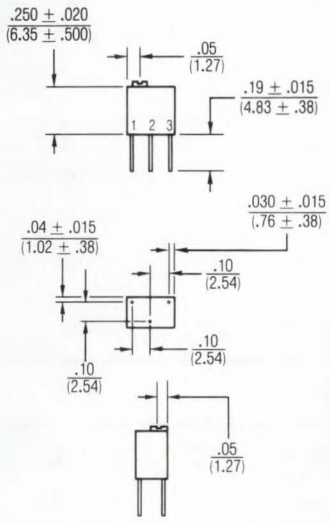
Environmental Characteristics

Power Rating
85°C .....0.25 watt
150°C .....0 watt
Temperature Range
.....-55°C to +150°C
Temperature Coefficient
.....±50ppm/°C
Seal Test .....85°C Fluorinert*
Humidity .....MIL-STD-202 Method 106
(1% ΔTR; 10 Megohms IR)
Vibration 20G
(1% ΔTR; 1% + resolution ΔVR)
Shock 100G
(1% ΔTR; 1% + resolution ΔVR)
Load Life
.....1,000 hours 0.25 watt @ 85°C
(2% ΔTR; 2% + resolution ΔVR)
Rotational Life .....200 cycles
(2% ΔTR)

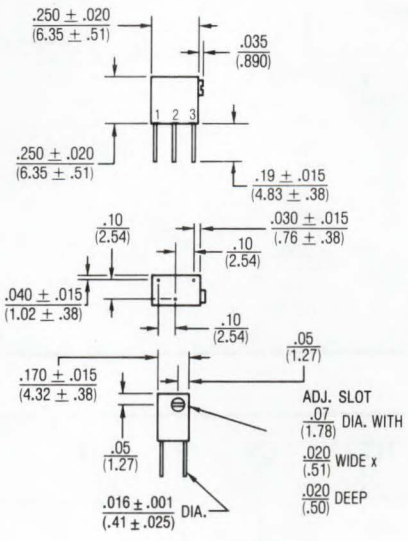
Physical Characteristics

Torque .....3.0 oz-in. max.
Mechanical Stops .....Wiper idles
Solderability MIL-STD-202
Method 208
Weight .....0.015 oz.
Marking .....Manufacturer's
trademark, wiring diagram,
date code, Mil-Spec
part number
Standard Packaging ..50 pcs. per tube

"W" PRINTED CIRCUIT PIN TYPE

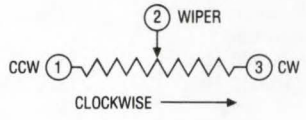


"X" PRINTED CIRCUIT PIN TYPE



TOLERANCES: ± .010 (.25) EXCEPT WHERE NOTED

DIMENSIONS: IN. (MM)



BOURNS QUALIFIED PART NUMBERS

STD. VALUES OHMS	RT26C2____		NOMINAL RESOLUTION (PERCENT)
	W	X	
10	RT26C2W100	RT26C2X100	1.90
20	RT26C2W200	RT26C2X200	1.50
50	RT26C2W500	RT26C2X500	1.25
100	RT26C2W101	RT26C2X101	1.00
200	RT26C2W201	RT26C2X201	0.94
500	RT26C2W501	RT26C2X501	0.58
1K	RT26C2W102	RT26C2X102	0.50
2K	RT26C2W202	RT26C2X202	0.45
5K	RT26C2W502	RT26C2X502	0.34

Refer to page 213 for part numbering/ ordering information.

Specifications are subject to change without notice.
*"Fluorinert" is a registered trademark of 3M Co.

BOURNS

MIL-SPEC NUMBERING SYSTEM

Explanation of System

NON-WIREWOUND RJR STYLES - HIGH RELIABILITY

MIL-R-39035 **RJR24** **(C or F)** **W** **102** **P**

- RJR24 — Style No.
- (C or F) — Characteristic
- W — Terminal Type
- 102 — Resistance In Code
  First Two Digits Significant
  Last Digit No. Of Zeros
  102 = 1,000 Ohms
- P — Failure Rate (% Failures/1,000 Hrs. — 60% Confidence)
  M = 1.0%
  P = 0.1%
  R = .01%

	C	F
T.C. Max.	±250 PPM°C	±100 PPM°C
C.R.V. Max.	3% or 3 Ohms	
Thermal Shock *	2%	1%
Humidity	2%	1%
Shock	1%	1%
Vibration	1%	1%
Load Life		
2,000 Hrs.	3%	3%
10,000 Hrs.	3%	3%
Low Temp.	2%	1%
High Temp.	3%	3%
Rotational Life	2%	2%
Conditioning	2%	1½%

*Max. Change In Resistance

NON-WIREWOUND RJ STYLES

MIL-R-22097 **RJ12** **(C or F)** **L** **103**

- RJ12 — Style No.
- (C or F) — Characteristic
- L — Terminal Type
- 103 — Resistance In Code
  First Two Digits Significant
  Last Digit No. Of Zeros
  103 = 10,000 Ohms

	C	F
T.C. Max.	±250 PPM°C	±100 PPM°C
C.R.V. Max.	3% or 3 Ohms	
Thermal Shock *	2%	1%
Humidity	2%	1%
Shock	1%	1%
Vibration	1%	1%
Load Life	3%	2%
Low Temp.	2%	1%
High Temp.	3%	2%
Rotational Life	2%	2%

*Max. Change In Resistance

WIREWOUND RT STYLES

MIL-R-27208 **RT24** **C2** **P** **101**

- RT24 — Style No.
- C2 — Characteristic
- P — Terminal Type
- 101 — Resistance In Code
  First Two Digits Significant
  Last Digit No. Of Zeros
  101 = 100 Ohms

Note: C & 2 Are The Only Characteristics In MIL-R-27208

C = Temp. Coeff. ±50 PPM/°C

2 = 85°C Rating Temp. 150°C Max. Oper. Temp.

BOURNS

HOW TO ORDER GUIDE

Mil-Spec Part Numbers

HIGH-REL WIREWOUND SPECIFICATION MIL-R-39015 RTR STYLES

This specification has a procedure for ordering, processing, and marking parts entirely different than the other three specifications. IT DOES NOT USE THE TYPE DESIGNATION NUMBER AS THE PART NUMBER.

THE NUMBER TO ORDER BY CONSISTS OF:

1. The individual specification sheet number
   M39015/1 (FOR STYLE RTR12)
   M39015/2 (FOR STYLE RTR22)
   M39015/3 (FOR STYLE RTR24)
2. A dash number from the specification sheet table for the resistance value

M39015/1	M39015/2	M39015/3
—009[1] 10Ω	—009[1] 10Ω	—001 10Ω
—010[1] 20	—010[1] 20	—002 20
—011[1] 50	—011[2] 50	—003 50
—001 100	—001 100	—004 100
—002 200	—002 200	—005 200
—003 500	—003 500	—006 500
—004 1K	—004 1K	—007 1K
—005 2K	—005 2K	—008 2K
—006 5K	—006 5K	—009 5K
—007 10K	—007 10K	—010 10K
—008 20K	—008 20K	

3. Terminal Type
4. Failure rate level M, P or R
   M = 1%
   P = 0.1%
   R = 0.01%
   % FAILURE/1,000 Hrs. — 60% Confidence

EXAMPLES OF PART NUMBERS

M39015/1 — **001PM**
100Ω Term. Type P — Failure Rate M

M39015/2 — **006LP**
5K Term. Type L — Failure Rate P

M39015/3 — **010XR**
10K Term. Type X — Failure Rate R

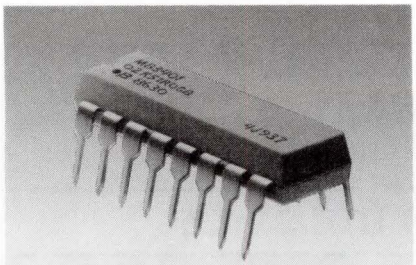
The following table shows all part numbers covered by this specification, the conversion to the RTR type designation number required by the supplier to manufacture the part, and the number that will be marked on the units you receive (same as part number ordered but with the letter "J" in front of it). The letter "J" is a government mark and it is certification that the parts comply with the specification.

INFORMATION NOTES
1. 10Ω, 20Ω and 50Ω values were added to M39015/1 and 39015/2 after original release.
2. M39015/3 was added to the Mil-Spec after its original release.

BOURNS HIGH RELIABILITY MIL-SPEC PART NUMBERS

Order By	Process By*	Marked With	Terminal Types	Failure Rates
M39015/1-003(TS)(FR)	RTR12D(TS)501(FR)	JM39015/1-003(TS)(FR)	L, P, Y	M, P
M39015/1-004(TS)(FR) M39015/1-005(TS)(FR) M39015/1-006(TS)(FR)	RTR12D(TS)102(FR) RTR12D(TS)202(FR) RTR12D(TS)502(FR)	JM39015/1-004(TS)(FR) JM39015/1-005(TS)(FR) JM39015/1-006(TS)(FR)		
M39015/1-007(TS)(FR) M39015/1-008(TS)(FR)	RTR12D(TS)103(FR) RTR12D(TS)203(FR)	JM39015/1-007(TS)(FR) JM39015/1-008(TS)(FR)		
M39015/2-003(TS)(FR) M39015/2-004(TS)(FR) M39015/2-005(TS)(FR)	RTR22D(TS)501(FR) RTR22D(TS)102(FR) RTR22D(TS)202(FR)	JM39015/2-003(TS)(FR) JM39015/2-004(TS)(FR) JM39015/2-005(TS)(FR)	L, P, W, X	
M39015/2-006(TS)(FR) M39015/2-007(TS)(FR) M39015/2-008(TS)(FR)	RTR22D(TS)502(FR) RTR22D(TS)103(FR) RTR22D(TS)203(FR)	JM39015/2-006(TS)(FR) JM39015/2-007(TS)(FR) JM39015/2-008(TS)(FR)		
M39015/3-006(TS)(FR) M39015/3-007(TS)(FR) M39015/3-008(TS)(FR)	RTR24D(TS)501(FR) RTR24D(TS)102(FR) RTR24D(TS)202(FR)	JM39015/3-006(TS)(FR) JM39015/3-007(TS)(FR) JM39015/3-008(TS)(FR)	P, W, X	M, P
M39015/3-009(TS)(FR) M39015/3-010(TS)(FR)	RTR24D(TS)502(FR) RTR24D(TS)103(FR)	JM39015/3-009(TS)(FR) JM39015/3-010(TS)(FR)		

NOTE: See individual model pages for Bourns qualified resistance values.
*May also order using this part number.



BOURNS

MILITARY QUALIFIED MOLDED DIPS

- Molded package is compatible with automatic insertion equipment
- High temperature solder ensures compatibility with all popular board soldering techniques

Models M83401-01/M83401-02

Bourns® Resistor Networks

Electrical Specifications	CHARACTERISTICS K	M
Temperature Coefficient of Resistance (TCR)	±100ppm/°C	±300ppm/°C
Maximum Ambient Temperature @ Rated Power	70°C	70°C
Maximum Ambient Temperature @ Zero Power	125°C	125°C
Resistance Tolerance	F = ± 1% G = ± 2% J = ± 5%	F = ± 1% G = ± 2% J = ± 5%

Environmental Specifications	K	M
Thermal Shock ΔR Plus Power Conditioning	± 0.7%	± 0.7%
Low Temperature Operation ΔR	± 0.25%	± 0.5%
Short Time Overload ΔR	± 0.25%	± 0.5%
Terminal Strength ΔR	± 0.25%	± 0.25%
Resistance to Soldering Heat - ΔR	± 0.25%	± 0.25%
Moisture Resistance ΔR	± 0.5%	± 0.5%
Shock ΔR	± 0.25%	± 0.25%
Vibration - High Frequency ΔR	± 0.25%	± 0.25%
Life ΔR	± 0.5%	± 2.0%
High Temperature Exposure ΔR	± 0.5%	± 1.0%
Low Temperature Storage ΔR	± 0.25%	± 0.5%
Insulation Resistance	10,000MegΩ	10,000MegΩ

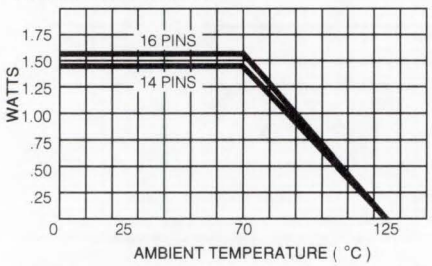
Mechanical Specifications

Flammability ..... Conforms to UL94V-0
Lead Frame Material ..... Copper (OLIN 194) 60/40 solder dip
Body Material ..... Novolac epoxy

Schematic A (Isolated)

PACKAGE POWER RATING AT 70°C
14-Pin ..... 1.4 watts
16-Pin ..... 1.6 watts

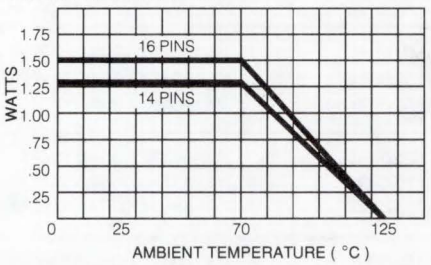
DERATING CURVE



Schematic B (Bussed)

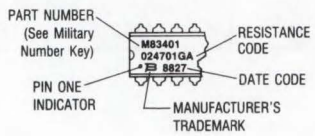
PACKAGE POWER RATING AT 70°C
14-Pin ..... 1.3 watts
16-Pin ..... 1.5 watts

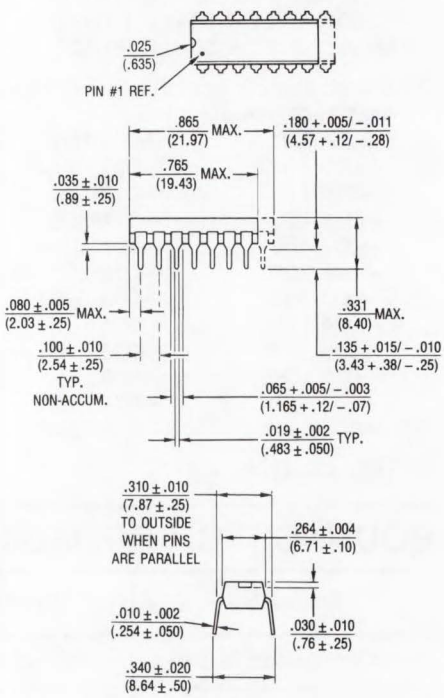
DERATING CURVE



TYPICAL PART MARKING

Represents total content. Layout may vary.





Governing dimensions are in inches. Dimensions in parentheses are metric (mm) and are approximate.

*Terminal centerline to centerline measurements made at point of emergence of the lead from the body.

MILITARY NUMBER KEY

M83401 01 K - XXXX G B

Military Resistor Network Identifier

Number of Pins
- 01 = 14-pin
- 02 = 16-pin

Characteristic
(See specifications above)

Resistance Code
- First 3 digits are significant (R indicates decimal point)
- Fourth digit represents number of zeros to follow

Tolerance
- F = ±1%
- G = ±2%
- J = ±5%

Schematic
- B = Bussed
- A = Isolated

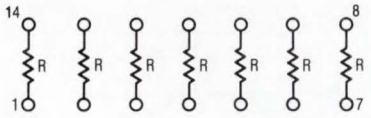
Specifications are subject to change without notice.

- Copper leads for superior heat dissipation
- Gold epoxy provides excellent marking contrast
- Laser marking for permanent identification

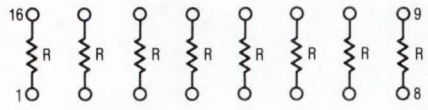
Models M83401-01/M83401-02

BI® Resistor Networks

ISOLATED RESISTORS
Mil-Style 01 (14-Pin)

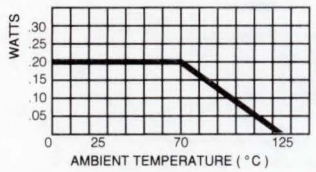


Mil-Style 02 (16-Pin)

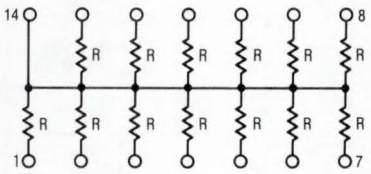


SCHEMATIC A
Resistance Tolerance
F .....±1%
G .....±2%
J .....±5%
Power Rating each Resistor
At 70°C .....0.20 watt

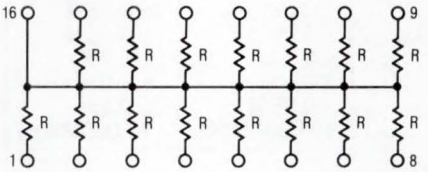
POWER TEMPERATURE
DERATING CURVE



BUSSED RESISTORS
Mil-Style 01 (14-Pin)

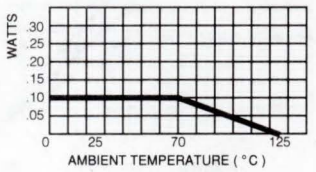


Mil-Style 02 (16-Pin)



SCHEMATIC B
Resistance Tolerance
F .....±1%
G .....±2%
J .....±5%
Power Rating each Resistor
At 70°C .....0.10 watt

POWER TEMPERATURE
DERATING CURVE

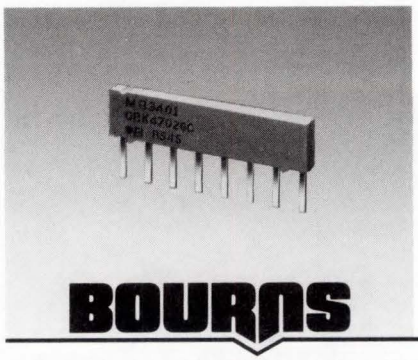


STANDARD RESISTANCE TABLES

For 5% tolerance resistance values and codes, see page 228.

For 1% tolerance resistance values and codes, see page 229.

Military P/N	Commercial Equivalent (Ref. Only)
M8340102KXXXXGB M8340102KXXXXJB M8340102MXXXXGB M8340102MXXXXJB	4116R-002-RC
M8340102KXXXXGA M8340102KXXXXJA M8340102MXXXXGA M8340102MXXXXJA	4116R-001-RC
M8340101KXXXXGB M8340101KXXXXJB M8340101MXXXXGB M8340101MXXXXJB	4114R-002-RC
M8340101KXXXXGA M8340101KXXXXJA M8340101MXXXXGA M8340101MXXXXJA	4114R-001-RC



MILITARY QUALIFIED MOLDED SIPS/LOW PROFILE

- Molded package is compatible with automatic insertion equipment
- Low profile is compatible with DIPs

BOURNS

Models M83401-07/M83401-08/M83401-09

Bourns® Resistor Network

Electrical Specifications

	CHARACTERISTICS K	CHARACTERISTICS M
Temperature Coefficient of Resistance (TCR)	±100ppm/°C	±300ppm/°C
Maximum Ambient Temperature @ Rated Power	70°C	70°C
Maximum Ambient Temperature @ Zero Power	125°C	125°C
Resistance Tolerance	F = ± 1% G = ± 2% J = ± 5%	F = ± 1% G = ± 2% J = ± 5%

Environmental Specifications

	K	M
Thermal Shock ΔR Plus Power Conditioning	± 0.7%	± 0.7%
Low Temperature Operation ΔR	± 0.25%	± 0.5%
Short Time Overload ΔR	± 0.25%	± 0.5%
Terminal Strength ΔR	± 0.25%	± 0.25%
Resistance to Soldering Heat - ΔR	± 0.25%	± 0.25%
Moisture Resistance ΔR	± 0.5%	± 0.5%
Shock ΔR	± 0.25%	± 0.25%
Vibration - High Frequency ΔR	± 0.25%	± 0.25%
Life ΔR	± 0.5%	± 2.0%
High Temperature Exposure ΔR	± 0.5%	± 1.0%
Low Temperature Storage ΔR	± 0.25%	± 0.5%
Insulation Resistance	10,000MegΩ	10,000MegΩ

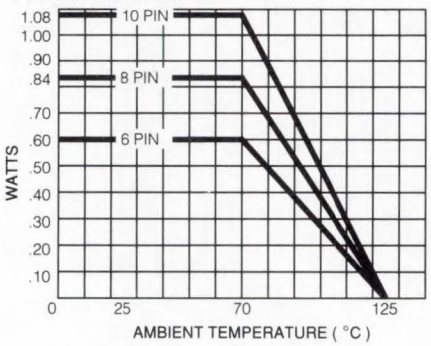
Mechanical Specifications

Flammability ..... Conforms to UL94V-0
Lead Frame Material ..... Copper (OLIN 194) 60/40 solder dip
Body Material ..... Novolac epoxy

Schematic C (Bussed)

PACKAGE POWER RATING AT 70°C
10-Pin ..... 1.08 watts
8-Pin ..... .84 watts
6-Pin ..... .60 watts

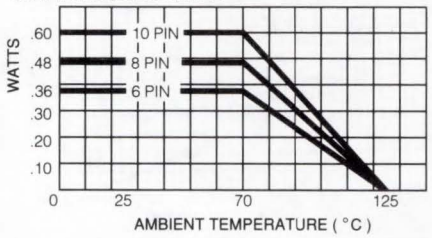
DERATING CURVE



Schematic G (Isolated)

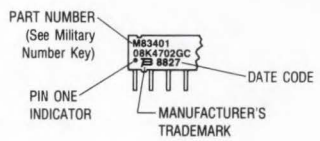
PACKAGE POWER RATING AT 70°C
10-Pin ..... .60 watts
8-Pin ..... .48 watts
6-Pin ..... .36 watts

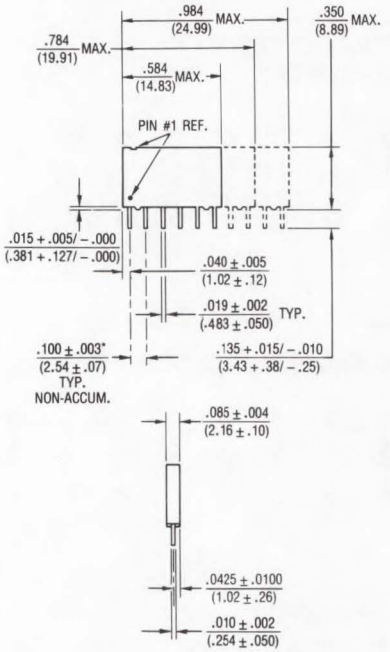
DERATING CURVE



TYPICAL PART MARKING

Represents total content. Layout may vary.





Governing dimensions are in inches. Dimensions in parentheses are metric (mm) and are approximate.
*Terminal centerline to centerline measurements made at point of emergence of the lead from the body.

MILITARY NUMBER KEY

M83401 08 K - XXXX G C

Military Resistor Network Identifier

Number of Pins
- 07 = 6-pin
- 08 = 8-pin
- 09 = 10-pin

Characteristic
(See specifications above)

Resistance Code
- First 3 digits are significant (R indicates decimal point)
- Fourth digit represents number of zeros to follow

Tolerance
- F = ±1%
- G = ±2%
- J = ±5%

Schematic
- C = Bussed
- G = Isolated

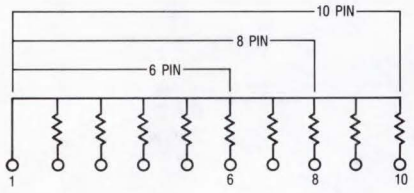
Specifications are subject to change without notice.

- High temperature solder ensures compatibility with all popular board soldering techniques
- Copper leads for superior heat dissipation

Models M83401-07/M83401-08/M83401-09

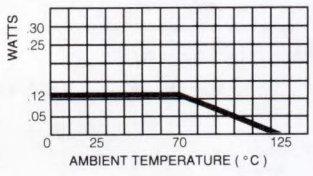
B® Resistor Network

ISOLATED RESISTORS
Mil-Style 07 (6-Pin)
Mil-Style 08 (8-Pin)
Mil-Style 09 (10-Pin)



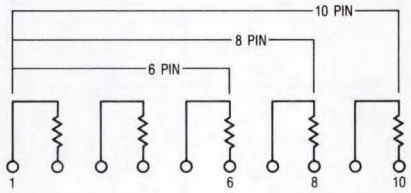
SCHEMATIC C
Resistance Tolerance
F .....±1%
G .....±2%
J .....±5%
Power Rating each Resistor
At 70°C .....0.12 watt

POWER TEMPERATURE DERATING CURVE



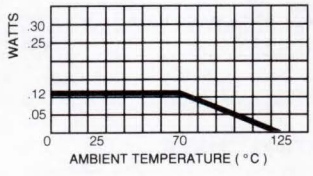
These models incorporate 5, 7 or 9 thick-film resistors of equal value, each connected between a common bus (pin1) and a separate pin.

ISOLATED RESISTORS
Mil-Style 07 (6-Pin)
Mil-Style 08 (8-Pin)
Mil-Style 09 (10-Pin)



SCHEMATIC G
Resistance Tolerance
F .....±1%
G .....±2%
J .....±5%
Power Rating each Resistor
At 70°C .....0.12 watt

POWER TEMPERATURE DERATING CURVE



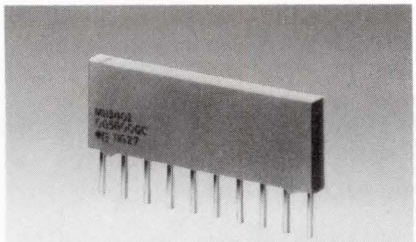
These models incorporate 3, 4 or 5 isolated thick-film resistors of equal value, each connected between two pins.

STANDARD RESISTANCE TABLES

For 5% tolerance resistance values and codes, see page 228.

For 1% tolerance resistance values and codes, see page 229.

Military Part Number	Commercial Equivalent (Ref. Only)
M8340107KXXXXGG M8340107KXXXXJG M8340107MXXXXGG M8340107MXXXXJG	4306R-102-RC
M8340107KXXXXGC M8340107KXXXXJC M8340107MXXXXGC M8340107MXXXXJC	4306R-101-RC
M8340108KXXXXGG M8340108KXXXXJG M8340108MXXXXGG M8340108MXXXXJG	4308R-102-RC
M8340108KXXXXGC M8340108KXXXXJC M8340108MXXXXGC M8340108MXXXXJC	4308R-101-RC
M8340109KXXXXGG M8340109KXXXXJG M8340109MXXXXGG M8340109MXXXXJG	4310R-102-RC
M8340109KXXXXGC M8340109KXXXXJC M8340109MXXXXGC M8340109MXXXXJC	4310R-101-RC



BOURNS

MILITARY QUALIFIED MOLDED SIPS/HIGH PROFILE

- Molded package is compatible with automatic insertion equipment
- High temperature solder ensures compatibility with all popular board soldering techniques
- Copper leads for superior heat dissipation

Models M83401-04/M83401-05/M83401-06

Bourns® Resistor Networks

CHARACTERISTICS

Electrical Specifications	K	M
Temperature Coefficient of Resistance (TCR)	±100ppm/°C	±300ppm/°C
Maximum Ambient Temperature @ Rated Power	70°C	70°C
Maximum Ambient Temperature @ Zero Power	125°C	125°C
Resistance Tolerance	F = ± 1% G = ± 2% J = ± 5%	F = ± 1% G = ± 2% J = ± 5%

Environmental Specifications	K	M
Thermal Shock ΔR Plus Power Conditioning ΔR	± 0.7%	± 0.7%
Low Temperature Operation ΔR	± 0.25%	± 0.5%
Short Time Overload ΔR	± 0.25%	± 0.5%
Terminal Strength ΔR	± 0.25%	± 0.25%
Resistance to Soldering Heat - ΔR	± 0.25%	± 0.25%
Moisture Resistance ΔR	± 0.5%	± 0.5%
Shock ΔR	± 0.25%	± 0.25%
Vibration - High Frequency ΔR	± 0.25%	± 0.25%
Life ΔR	± 0.5%	± 2.0%
High Temperature Exposure ΔR	± 0.5%	± 1.0%
Low Temperature Storage ΔR	± 0.25%	± 0.5%
Insulation Resistance	10,000MegΩ	10,000MegΩ

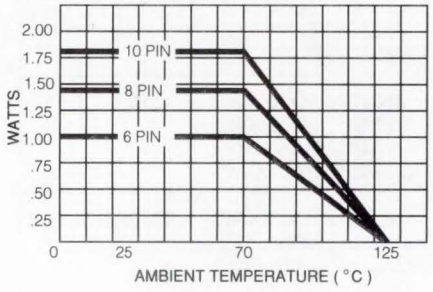
Mechanical Specifications

Flammability ..... Conforms to UL94V-0
Lead Frame Material ..... Copper (OLIN 194) 60/40 solder dip
Body Material ..... Novolac epoxy

Schematic C (Bussed)

PACKAGE POWER RATING AT 70°C
10-Pin ..... 1.8 watts
8-Pin ..... 1.4 watts
6-Pin ..... 1.0 watts

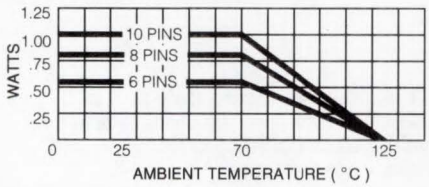
DERATING CURVE



Schematic G (Isolated)

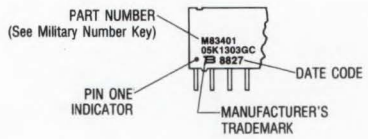
PACKAGE POWER RATING AT 70°C
10-Pin ..... 1.0 watts
8-Pin ..... 0.8 watts
6-Pin ..... 0.6 watts

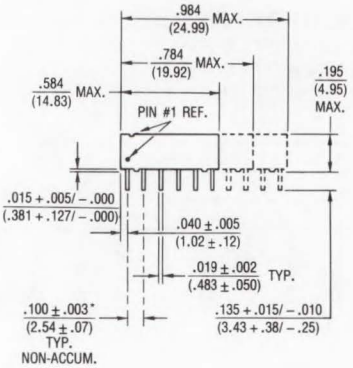
DERATING CURVE

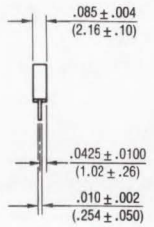


TYPICAL PART MARKING

Represents total content. Layout may vary.







Governing dimensions are in inches. Dimensions in parentheses are metric (mm) and are approximate.
*Terminal centerline to centerline measurements made at point of emergence of the lead from the body.

MILITARY NUMBER KEY

M83401 05 K - XXXX G C

Military Resistor Network Identifier

Number of Pins
- •04 = 6-pin
- •05 = 8-pin
- •06 = 10-pin

Characteristic
(See specifications above)

Resistance Code
- First 3 digits are significant (R indicates decimal point)
- Fourth digit represents number of zeros to follow

Tolerance
- F = ±1%
- G = ±2%
- J = ±5%

Schematic
- C = Bussed
- G = Isolated

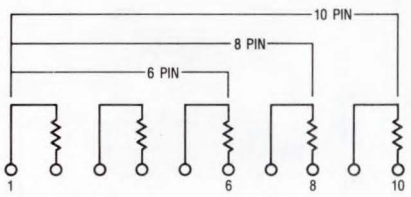
Specifications are subject to change without notice.

- Gold epoxy provides excellent marking contrast
- Laser marking for permanent identification

Models M83401-04/M83401-05/M83401-06

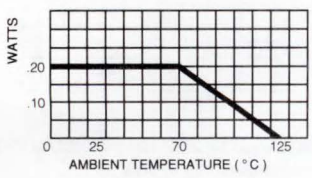
BI® Resistor Networks

BUSSED RESISTORS
Mil-Style 04 (6-Pin)
Mil-Style 05 (8-Pin)
Mil-Style 06 (10-Pin)



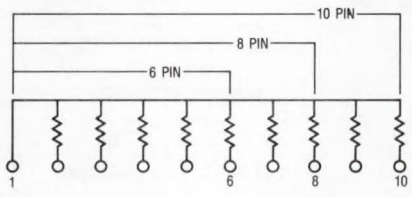
SCHEMATIC C
Resistance Tolerance
F .....±1%
G .....±2%
J .....±5%
Power Rating each Resistor
At 70°C .....0.20 watt

POWER TEMPERATURE
DERATING CURVE



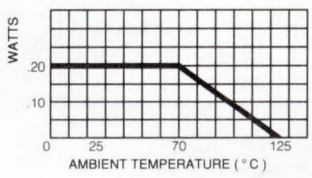
These models incorporate 5, 7 or 9 thick-film resistors of equal value, each connected between a common bus (pin1) and a separate pin.

ISOLATED RESISTORS
Mil-Style 04 (6-Pin)
Mil-Style 05 (8-Pin)
Mil-Style 06 (10-Pin)



SCHEMATIC G
Resistance Tolerance
F .....±1%
G .....±2%
J .....±5%
Power Rating each Resistor
At 70°C .....0.20 watt

POWER TEMPERATURE
DERATING CURVE



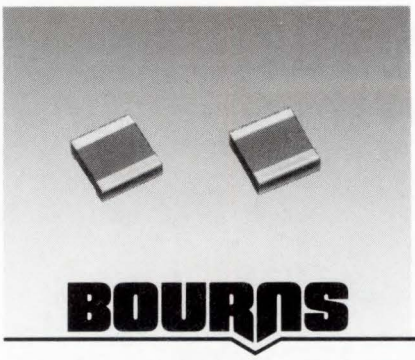
These models incorporate 3, 4 or 5 isolated thick-film resistors of equal value, each connected between two pins.

STANDARD RESISTANCE TABLES

For 5% tolerance resistance values and codes, see page 228.

For 1% tolerance resistance values and codes, see page 229.

Military Part Number	Commercial Equivalent (Ref. Only)
M8340104KXXXXGG M8340104KXXXXJG M8340104MXXXXGG M8340104MXXXXJG	4306H-102-RC
M8340104KXXXXGC M8340104KXXXXJC M8340104MXXXXGC M8340104MXXXXJC	4306H-101-RC
M8340105KXXXXGG M8340105KXXXXJG M8340105MXXXXGG	4308H-102-RC
M8340105KXXXXGC M8340105KXXXXJC M8340105MXXXXGC M8340105MXXXXJC	4308H-101-RC
M8340106KXXXXGG M8340106KXXXXJG M8340106MXXXXGG M8340106MXXXXJG	4310H-102-RC
M8340106KXXXXGC M8340106KXXXXJC M8340106MXXXXGC M8340106MXXXXJC	4310H-101-RC



BOURNS

50 MILLIWATT, THICK FILM, ESTABLISHED RELIABILITY, MILITARY GRADE

- 1% and 5% tolerances
- "M" and "K" characteristics
- "S" and "R" life failure rates
- Wide variety enhances design flexibility
- Waffle pack and tape & reel packaging
- Wrap-around terminations
- Meets Mil-R-55342D requirements

Model M55342, 02 (STYLE RM0505)

Bourns® Chip Resistor

Electrical Characteristics

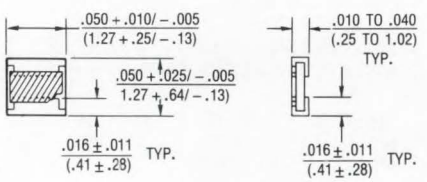
Resistance Range and Tolerance*
1% ..... 10 ohms to 249K ohms
5% ..... 10 ohms to 470K ohms
Power Rating "K" and "M" Characteristics ..... 50 milliwatts
Maximum Operating Voltage ..... 40 VDC
Temperature Range ..... – 65°C to + 150°C

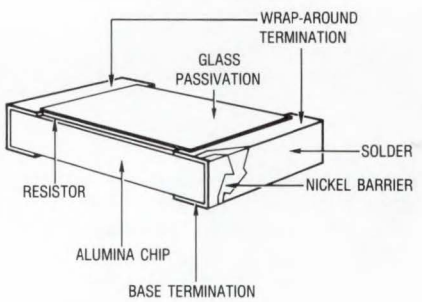
Characteristics

	K	M
Resistance Temperature Coefficient	± 100ppm/°C	± 300ppm/°C
Maximum Ambient Temperature Full Power	70°C	70°C
Maximum Temperature Zero Wattage	150°C	150°C
Thermal Shock (Max. % Change)	± 0.50	± 0.50
Low Temperature Operation (Max. % Change)	± 0.25	± 0.50
Short Time Overload (Max. % Change)	± 0.25	± 0.50
High Temperature Exposure (Max. % Change)	± 0.50	± 1.00
Resistance to Bonding Exp. (Max. % Change)	± 0.25	± 0.25
Moisture Resistance (Max. % Change)	± 0.50	± 0.50
Life, 2000 Hours (Max. % Change)	± 0.50	± 2.00

Packaging

Waffle Packs ..... In accordance with MIL-B-81705
Embossed Plastic Tape ..... Per EIA 481A
Tape and Reel ..... 8mm wide tape
Marking and Labeling ..... Per MIL-R-55342D (Para. 3.14)





HOW TO ORDER

M55342	K	02	B	91J0	R

MIL SPEC SHEET NO.
02-Style RM 0505

TERMINATION MATERIAL
B: Solderable
Base Metalization Barrier Metal
Solder Coated, Wrap-Around

RESISTANCE & TOLERANCE
4 CHARACTERS: 3 DIGITS/1 LETTER
The letter is used simultaneously as a decimal point, multiplier and a resistance tolerance designator. Use Table 1 to determine multiplier and TR tolerance.

LIFE FAILURE RATE DESIGNATION
R: 0.01% Per 1,000 Hours
S: 0.001% Per 1,000 Hours

CHARACTERISTIC
K = ± 100ppm/°C
M = ± 300ppm/°C

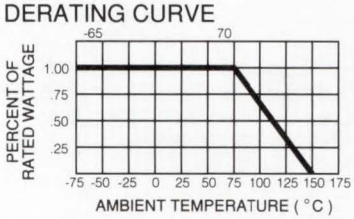
MILITARY SPECIFICATION
MIL-R-55342

TABLE 1

Symbol	Multiplier	Tolerance ± %
D	X1	1
E	X1,000	1
F	X1,000,000	1
J	X1	5
K	X1,000	5
L	X1,000,000	5

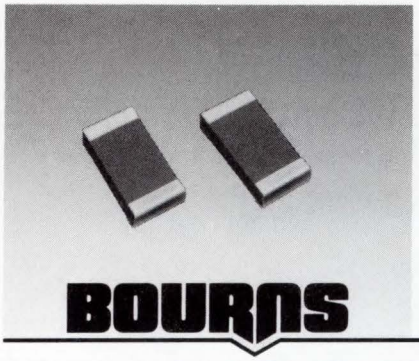
See pages 228 - 232 for available resistance values and codes.

DERATING CURVE



NOTE: This curve indicates the percentage of nominal wattage to be applied at temperatures higher than 70°C. This curve applies only to units mounted on a substrate; however, at no time shall the applied voltage exceed the maximum for each style.

*2% and 10% available on special request; consult factory.



BOURNS

100 MILLIWATT, THICK FILM ESTABLISHED RELIABILITY, MILITARY GRADE

- 1% and 5% tolerances
- "M" and "K" characteristics
- "S" and "R" life failure rates
- Wide variety enhances design flexibility
- Waffle pack and tape & reel packaging
- Wrap-around terminations
- Meets Mil-R-55342D requirements

Model M55342, 06 (STYLE RM0705)

Bourns® Chip Resistor

Electrical Characteristics

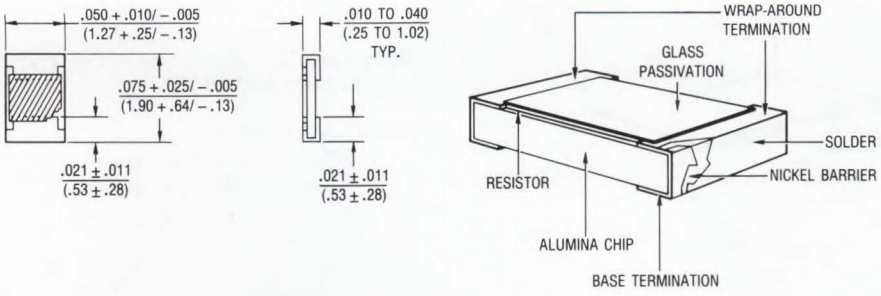
Resistance Range and Tolerance*
1% ..... 10 ohms to 500K ohms
5% ..... 10 ohms to 1 megohm
Power Rating "K" and "M" Characteristics ..... 100 milliwatts
Maximum Operating Voltage ..... 50 VDC
Temperature Range ..... – 65°C to + 150°C

Characteristics

	K	M
Resistance Temperature Coefficient	± 100ppm/°C	± 300ppm/°C
Maximum Ambient Temperature Full Power	70°C	70°C
Maximum Temperature Zero Wattage	150°C	150°C
Thermal Shock (Max. % Change)	± 0.50	± 0.50
Low Temperature Operation (Max. % Change)	± 0.25	± 0.50
Short Time Overload (Max. % Change)	± 0.25	± 0.50
High Temperature Exposure (Max. % Change)	± 0.50	± 1.00
Resistance to Bonding Exp. (Max. % Change)	± 0.25	± 0.25
Moisture Resistance (Max. % Change)	± 0.50	± 0.50
Life, 2000 Hours (Max. % Change)	± 0.50	± 2.00

Packaging

Waffle Packs ..... In accordance with MIL-B-81705
Embossed Plastic Tape ..... Per EIA 481A
Tape and Reel ..... 8mm wide tape
Marking and Labeling ..... Per MIL-R-55342D (Para. 3.14)



HOW TO ORDER

M55342	K	06	B	91J0	R

MIL SPEC SHEET NO.
06-Style RM 0705

TERMINATION MATERIAL
B: Solderable
Base Metalization Barrier Metal
Solder Coated, Wrap-Around

RESISTANCE & TOLERANCE
4 CHARACTERS: 3 DIGITS/1 LETTER
The letter is used simultaneously as a decimal point, multiplier and a resistance tolerance designator. Use Table 1 to determine multiplier and TR tolerance.

LIFE FAILURE RATE DESIGNATION
R: 0.01% Per 1,000 Hours
S: 0.001% Per 1,000 Hours

CHARACTERISTIC
K = ± 100ppm/°C
M = ± 300ppm/°C

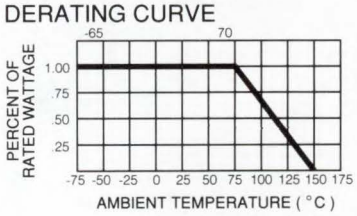
MILITARY SPECIFICATION
MIL-R-55342

TABLE 1

Symbol	Multiplier	Tolerance ± %
D	X1	1
E	X1,000	1
F	X1,000,000	1
J	X1	5
K	X1,000	5
L	X1,000,000	5

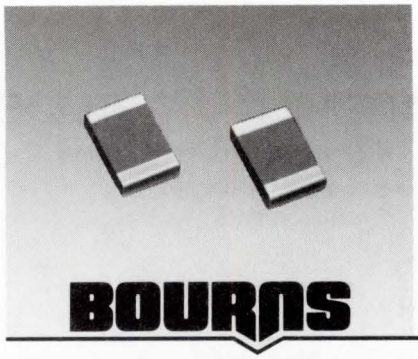
See pages 228 - 232 for available resistance values and codes.

DERATING CURVE



NOTE: This curve indicates the percentage of nominal wattage to be applied at temperatures higher than 70°C. This curve applies only to units mounted on a substrate; however, at no time shall the applied voltage exceed the maximum for each style.

*2% and 10% available on special request; consult factory.
Specifications are subject to change without notice.



100 MILLIWATT, THICK FILM, ESTABLISHED RELIABILITY, MILITARY GRADE

- 1% and 5% tolerances
- "M" and "K" characteristics
- "S" and "R" life failure rates
- Wide variety enhances design flexibility
- Waffle pack and tape & reel packaging
- Wrap-around terminations
- Meets Mil-R-55342D requirements

Model M55342, 03 (STYLE RM1005)

Bourns® Chip Resistor

Electrical Characteristics

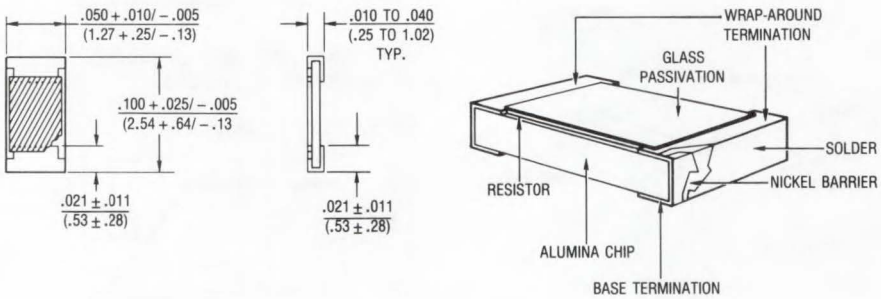
Resistance Range and Tolerance*
1% ..... 10 ohms to 500K ohms
5% ..... 10 ohms to 1 megohm
Power Rating "K" and "M" Characteristics ..... 100 milliwatts
Maximum Operating Voltage ..... 40 VDC
Temperature Range ..... – 65°C to + 150°C

Characteristics

	K	M
Resistance Temperature Coefficient	± 100ppm/°C	± 300ppm/°C
Maximum Ambient Temperature Full Power	70°C	70°C
Maximum Temperature Zero Wattage	150°C	150°C
Thermal Shock (Max. % Change)	± 0.50	± 0.50
Low Temperature Operation (Max. % Change)	± 0.25	± 0.50
Short Time Overload (Max. % Change)	± 0.25	± 0.50
High Temperature Exposure (Max. % Change)	± 0.50	± 1.00
Resistance to Bonding Exp. (Max. % Change)	± 0.25	± 0.25
Moisture Resistance (Max. % Change)	± 0.50	± 0.50
Life, 2000 Hours (Max. % Change)	± 0.50	± 2.00

Packaging

Waffle Packs ..... In accordance with MIL-B-81705
Embossed Plastic Tape ..... Per EIA 481A
Tape and Reel ..... 8mm wide tape
Marking and Labeling ..... Per MIL-R-55342D (Para. 3.14)



*2% and 10% available on special request; consult factory.

HOW TO ORDER

M55342	K	03	B	91J0	R

MIL SPEC SHEET NO.
03-Style RM 1005

TERMINATION MATERIAL
B: Solderable
Base Metalization Barrier Metal
Solder Coated, Wrap-Around

RESISTANCE & TOLERANCE
4 CHARACTERS: 3 DIGITS/1 LETTER
The letter is used simultaneously as a decimal point, multiplier and a resistance tolerance designator. Use Table 1 to determine multiplier and TR tolerance.

LIFE FAILURE RATE DESIGNATION
R: 0.01% Per 1,000 Hours
S: 0.001% Per 1,000 Hours

CHARACTERISTIC
K = ± 100ppm/°C
M = ± 300ppm/°C

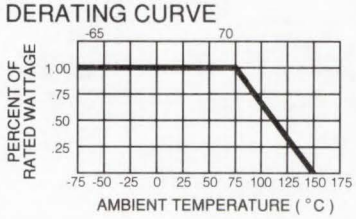
MILITARY SPECIFICATION
MIL-R-55342

TABLE 1

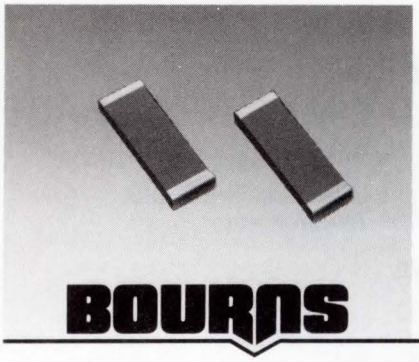
Symbol	Multiplier	Tolerance ± %
D	X1	1
E	X1,000	1
F	X1,000,000	1
J	X1	5
K	X1,000	5
L	X1,000,000	5

See pages 228 - 232 for available resistance values and codes.

DERATING CURVE



NOTE: This curve indicates the percentage of nominal wattage to be applied at temperatures higher than 70°C. This curve applies only to units mounted on a substrate; however, at no time shall the applied voltage exceed the maximum for each style.



150 MILLIWATT, THICK FILM ESTABLISHED RELIABILITY, MILITARY GRADE

- 1% and 5% tolerances
- "M" and "K" characteristics
- "S" and "R" life failure rates
- Wide variety enhances design flexibility
- Waffle pack and tape & reel packaging
- Wrap-around terminations
- Meets Mil-R-55342D requirements

Model M55342, 04 (STYLE RM1505)

Bourns® Chip Resistor

Electrical Characteristics

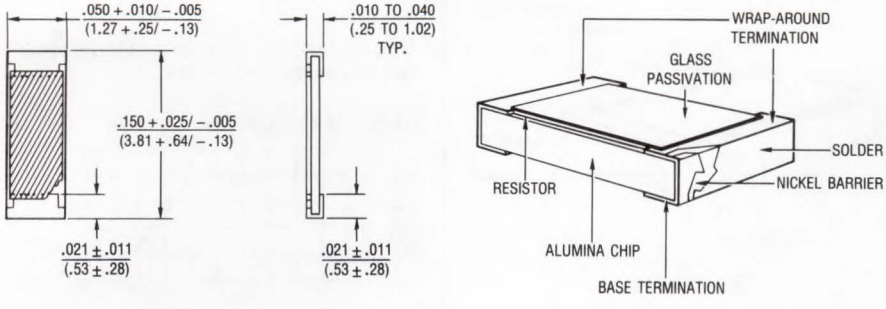
Resistance Range and Tolerance*
1% ..... 10 ohms to 1 megohm
5% ..... 10 ohms to 4.7 megohms
Power Rating "K" and "M" Characteristics ..... 150 milliwatts
Maximum Operating Voltage ..... 40 VDC
Temperature Range ..... – 65°C to + 150°C

Characteristics

	K	M
Resistance Temperature Coefficient	± 100ppm/°C	± 300ppm/°C
Maximum Ambient Temperature Full Power	70°C	70°C
Maximum Temperature Zero Wattage	150°C	150°C
Thermal Shock (Max. % Change)	± 0.50	± 0.50
Low Temperature Operation (Max. % Change)	± 0.25	± 0.50
Short Time Overload (Max. % Change)	± 0.25	± 0.50
High Temperature Exposure (Max. % Change)	± 0.50	± 1.00
Resistance to Bonding Exp. (Max. % Change)	± 0.25	± 0.25
Moisture Resistance (Max. % Change)	± 0.50	± 0.50
Life, 2000 Hours (Max. % Change)	± 0.50	± 2.00

Packaging

Waffle Packs ..... In accordance with MIL-B-81705
Embossed Plastic Tape ..... Per EIA 481A
Tape and Reel ..... 8mm wide tape
Marking and Labeling ..... Per MIL-R-55342D (Para. 3.14)



HOW TO ORDER

M55342	K	04	B	91J0	R

MIL SPEC SHEET NO.
04-Style RM 1505

TERMINATION MATERIAL
B: Solderable
Base Metalization Barrier Metal
Solder Coated, Wrap-Around

RESISTANCE & TOLERANCE
4 CHARACTERS: 3 DIGITS/1 LETTER
The letter is used simultaneously as a decimal point, multiplier and a resistance tolerance designator. Use Table 1 to determine multiplier and TR tolerance.

LIFE FAILURE RATE DESIGNATION
R: 0.01% Per 1,000 Hours
S: 0.001% Per 1,000 Hours

CHARACTERISTIC
K = ± 100ppm/°C
M = ± 300ppm/°C

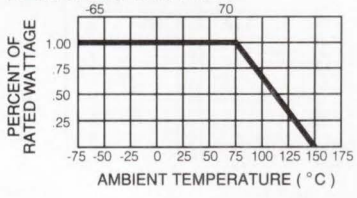
MILITARY SPECIFICATION
MIL-R-55342

TABLE 1

Symbol	Multiplier	Tolerance ± %
D	X1	1
E	X1,000	1
F	X1,000,000	1
J	X1	5
K	X1,000	5
L	X1,000,000	5

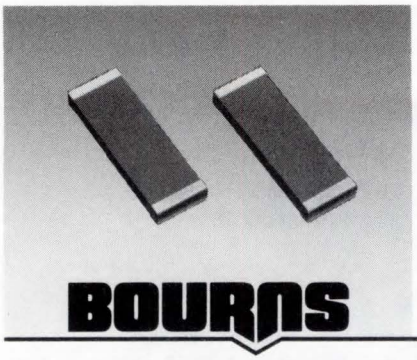
See pages 228 - 232 for available resistance values and codes.

DERATING CURVE



NOTE: This curve indicates the percentage of nominal wattage to be applied at temperatures higher than 70°C. This curve applies only to units mounted on a substrate; however, at no time shall the applied voltage exceed the maximum for each style.

*2% and 10% available on special request; consult factory.
Specifications are subject to change without notice.



BOURNS

225 MILLIWATT, THICK FILM ESTABLISHED RELIABILITY, MILITARY GRADE

- 1% and 5% tolerances
- "M" and "K" characteristics
- "S" and "R" life failure rates
- Wide variety enhances design flexibility
- Waffle pack and tape & reel packaging
- Wrap-around terminations
- Meets Mil-R-55342D requirements

Model M55342, 05 (STYLE RM2208)

Bourns® Chip Resistor

Electrical Characteristics

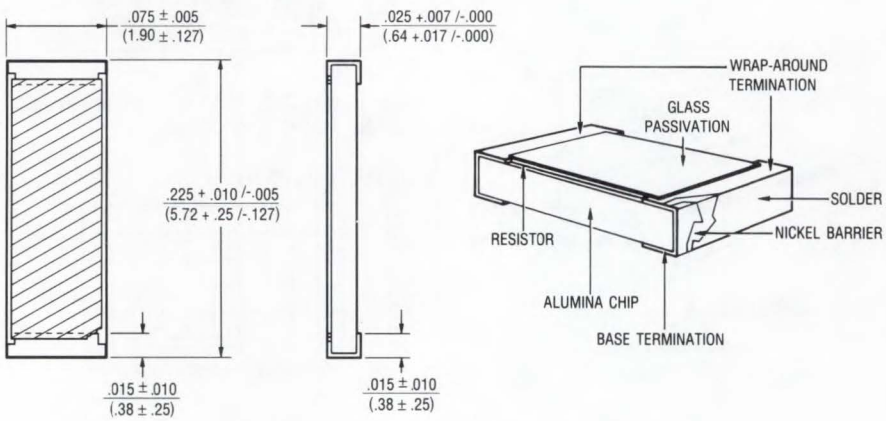
Resistance Range and Tolerance*
1% ..... 10 ohms to 2 megohms
5% ..... 10 ohms to 15 megohms
Power Rating "K" and "M" Characteristics ..... 225 milliwatts
Maximum Operating Voltage ..... 40 VDC
Temperature Range ..... – 55°C to + 125°C

Characteristics

	K	M
Resistance Temperature Coefficient	± 100ppm/°C	± 300ppm/°C
Maximum Ambient Temperature Full Power	70°C	70°C
Maximum Temperature Zero Wattage	150°C	150°C
Thermal Shock (Max. % Change)	± 0.50	± 0.50
Low Temperature Operation (Max. % Change)	± 0.25	± 0.50
Short Time Overload (Max. % Change)	± 0.25	± 0.50
High Temperature Exposure (Max. % Change)	± 0.50	± 1.00
Resistance to Bonding Exp. (Max. % Change)	± 0.25	± 0.25
Moisture Resistance (Max. % Change)	± 0.50	± 0.50
Life, 2000 Hours (Max. % Change)	± 0.50	± 2.00

Packaging

Waffle Packs ..... In accordance with MIL-B-81705
Embossed Plastic Tape ..... Per EIA 481A
Tape and Reel ..... 8mm wide tape
Marking and Labeling ..... Per MIL-R-55342D (Para. 3.14)



*2% and 10% available on special request; consult factory.

HOW TO ORDER

M55342	K	05	B	91J0	R

MIL SPEC SHEET NO.
05-Style RM 2208

TERMINATION MATERIAL
B: Solderable
Base Metalization Barrier Metal
Solder Coated, Wrap-Around

RESISTANCE & TOLERANCE
4 CHARACTERS: 3 DIGITS/1 LETTER
The letter is used simultaneously as a decimal point, multiplier and a resistance tolerance designator. Use Table 1 to determine multiplier and TR tolerance.

LIFE FAILURE RATE DESIGNATION
R: 0.01% Per 1,000 Hours
S: 0.001% Per 1,000 Hours

CHARACTERISTIC
K = ± 100ppm/°C
M = ± 300ppm/°C

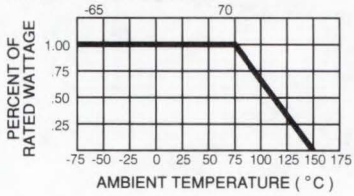
MILITARY SPECIFICATION
MIL-R-55342

TABLE 1

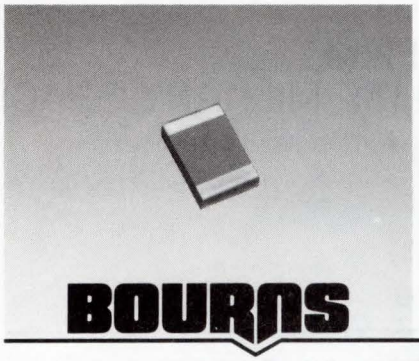
Symbol	Multiplier	Tolerance ± %
D	X1	1
E	X1,000	1
F	X1,000,000	1
J	X1	5
K	X1,000	5
L	X1,000,000	5

See pages 228 - 232 for available resistance values and codes.

DERATING CURVE



NOTE: This curve indicates the percentage of nominal wattage to be applied at temperatures higher than 70°C. This curve applies only to units mounted on a substrate; however, at no time shall the applied voltage exceed the maximum for each style.



BOURNS

250 MILLIWATT, THICK FILM, ESTABLISHED RELIABILITY, MILITARY GRADE

- 1% and 5% tolerances
- "M" and "K" characteristics
- "S" and "R" life failure rates
- Wide variety enhances design flexibility
- Waffle pack and tape & reel packaging
- Wrap-around terminations
- Meets Mil-R-55342D requirements

Model M55342, 07 (STYLE RM 1206)

Bourns® Chip Resistor

Electrical Characteristics

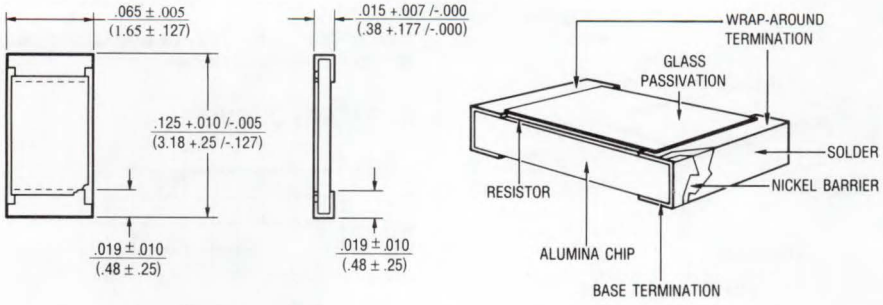
Resistance Range and Tolerance*
1% ..... 10 ohms to 500K ohms
5% ..... 10 ohms to 1 megohm
Power Rating "K" and "M" Characteristics ..... 250 milliwatts
Maximum Operating Voltage ..... 40 VDC
Temperature Range ..... – 65°C to + 150°C

Characteristics

	K	M
Resistance Temperature Coefficient	± 100ppm/°C	± 300ppm/°C
Maximum Ambient Temperature Full Power	70°C	70°C
Maximum Temperature Zero Wattage	150°C	150°C
Thermal Shock (Max. % Change)	± 0.50	± 0.50
Low Temperature Operation (Max. % Change)	± 0.25	± 0.50
Short Time Overload (Max. % Change)	± 0.25	± 0.50
High Temperature Exposure (Max. % Change)	± 0.50	± 1.00
Resistance to Bonding Exp. (Max. % Change)	± 0.25	± 0.25
Moisture Resistance (Max. % Change)	± 0.50	± 0.50
Life, 2000 Hours (Max. % Change)	± 0.50	± 2.00

Packaging

Waffle Packs ..... In accordance with MIL-B-81705
Embossed Plastic Tape ..... Per EIA 481A
Tape and Reel ..... 8mm wide tape
Marking and Labeling ..... Per MIL-R-55342D (Para. 3.14)



*2% and 10% available on special request; consult factory.

HOW TO ORDER

M55342	K	07	B	91J0	R

MIL SPEC SHEET NO.
07-Style RM 1206

TERMINATION MATERIAL
B: Solderable
Base Metalization Barrier Metal
Solder Coated, Wrap-Around

RESISTANCE & TOLERANCE
4 CHARACTERS: 3 DIGITS/1 LETTER
The letter is used simultaneously as a decimal point, multiplier and a resistance tolerance designator. Use Table 1 to determine multiplier and TR tolerance.

LIFE FAILURE RATE DESIGNATION
R: 0.01% Per 1,000 Hours
S: 0.001% Per 1,000 Hours

CHARACTERISTIC
K = ± 100ppm/°C
M = ± 300ppm/°C

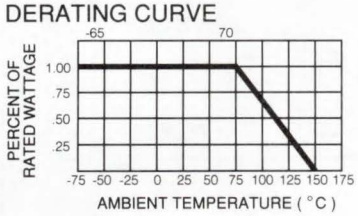
MILITARY SPECIFICATION
MIL-R-55342

TABLE 1

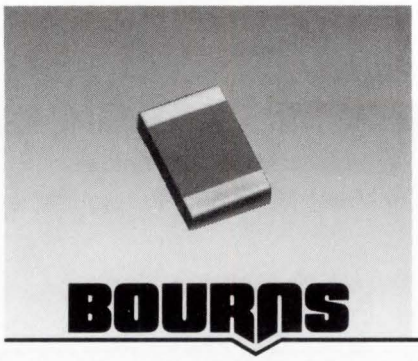
Symbol	Multiplier	Tolerance ± %
D	X1	1
E	X1,000	1
F	X1,000,000	1
J	X1	5
K	X1,000	5
L	X1,000,000	5

See pages 228 - 232 for available resistance values and codes.

DERATING CURVE



NOTE: This curve indicates the percentage of nominal wattage to be applied at temperatures higher than 70°C. This curve applies only to units mounted on a substrate; however, at no time shall the applied voltage exceed the maximum for each style.



500 MILLIWATT, THICK FILM, ESTABLISHED RELIABILITY, MILITARY GRADE

- 1% and 5% tolerances
- "M" and "K" characteristics
- "S" and "R" life failure rates
- Wide variety enhances design flexibility
- Waffle pack and tape & reel packaging
- Wrap-around terminations
- Meets Mil-R-55342D requirements

Model M55342, 08 (STYLE RM 2010)

Bourns® Chip Resistor

Electrical Characteristics

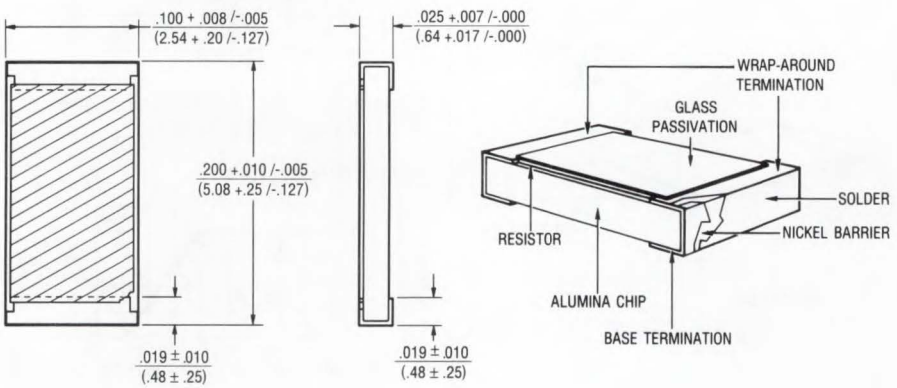
Resistance Range and Tolerance*
1% ..... 10 ohms to 7.5 megohms
5% ..... 10 ohms to 15 megohms
Power Rating "K" and "M" Characteristics ..... 500 milliwatts
Maximum Operating Voltage ..... 40 VDC
Temperature Range ..... – 55°C to + 125°C

Characteristics

	K	M
Resistance Temperature Coefficient	± 100ppm/°C	± 300ppm/°C
Maximum Ambient Temperature @ Full Rated Power	70°C	70°C
Maximum Temperature Zero Wattage	150°C	150°C
Thermal Shock (Max. % Change) ΔR	± 0.50	± 0.50
Low Temperature Operation (Max. % Change)	± 0.25	± 0.50
Short Time Overload (Max. % Change)	± 0.25	± 0.50
High Temperature Exposure (Max. % Change)	± 0.50	± 1.00
Resistance to Bonding Exp. (Max. % Change)	± 0.25	± 0.25
Moisture Resistance (Max. % Change)	± 0.50	± 0.50
Life, 2000 Hours (Max. % Change)	± 0.50	± 2.00

Packaging (All packaging complies with MIL-R-55342D)

Waffle Packs ..... In accordance with MIL-B-81705
Tape and Reel ..... 12mm wide tape
Embossed Plastic Tape ..... Per EIA 481A
Marking and Labeling ..... Per MIL-R-55342D (Para. 3.14)



*2% and 10% available on special request; consult factory.

HOW TO ORDER

M55342	K	08	B	91J0	R

MIL SPEC SHEET NO.
08-Style RM 2010

TERMINATION MATERIAL
B: Solderable
Base Metalization Barrier Metal
Solder Coated, Wrap-Around

RESISTANCE & TOLERANCE
4 CHARACTERS: 3 DIGITS/1 LETTER
The letter is used simultaneously as a decimal point, multiplier and a resistance tolerance designator. Use Table 1 to determine multiplier and TR tolerance.

LIFE FAILURE RATE DESIGNATION
R: 0.01% Per 1,000 Hours
S: 0.001% Per 1,000 Hours

CHARACTERISTIC
K = ± 100ppm/°C
M = ± 300ppm/°C

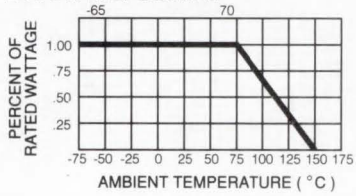
MILITARY SPECIFICATION
MIL-R-55342

TABLE 1

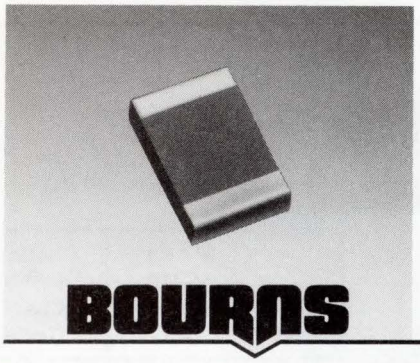
Symbol	Multiplier	Tolerance ± %
D	X1	1
E	X1,000	1
F	X1,000,000	1
J	X1	5
K	X1,000	5
L	X1,000,000	5

See pages 228 - 232 for available resistance values and codes.

DERATING CURVE



NOTE: This curve indicates the percentage of nominal wattage to be applied at temperatures higher than 70°C. This curve applies only to units mounted on a substrate; however, at no time shall the applied voltage exceed the maximum for each style.



1000 MILLIWATT, THICK FILM, ESTABLISHED RELIABILITY, MILITARY GRADE

- 1% and 5% tolerances
- "M" and "K" characteristics
- "S" and "R" life failure rates
- Wide variety enhances design flexibility
- Waffle pack and tape & reel packaging
- Wrap-around terminations
- Meets Mil-R-55342D requirements

Model M55342, 09 (STYLE RM 2512)

Bourns® Chip Resistor

Electrical Characteristics

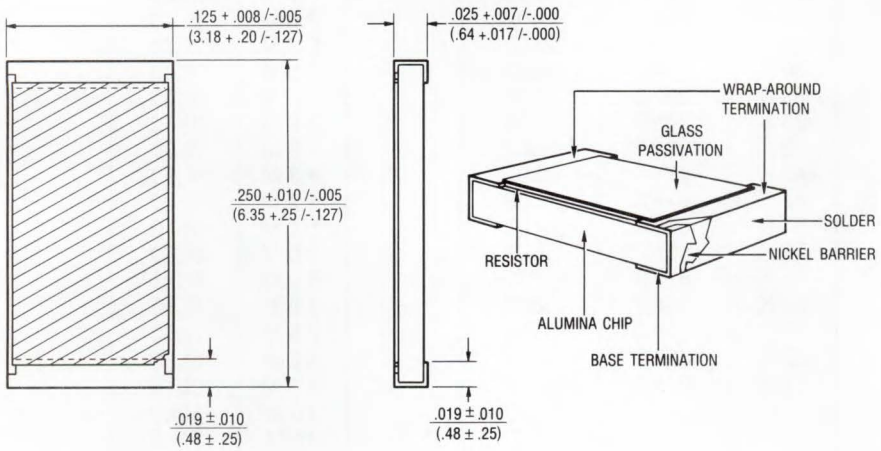
Resistance Range and Tolerance*
1% ..... 10 ohms to 7.5 megohms
5% ..... 10 ohms to 15 megohms
Power Rating "K" and "M" Characteristics ..... 1000 milliwatts
Maximum Operating Voltage ..... 40 VDC
Temperature Range ..... – 55°C to + 125°C

Characteristics

	K	M
Resistance Temperature Coefficient	± 100ppm/°C	± 300ppm/°C
Maximum Ambient Temperature @ Full Rated Power	70°C	70°C
Maximum Temperature Zero Wattage	150°C	150°C
Thermal Shock (Max. % Change) ΔR	± 0.50	± 0.50
Low Temperature Operation (Max. % Change)	± 0.25	± 0.50
Short Time Overload (Max. % Change)	± 0.25	± 0.50
High Temperature Exposure (Max. % Change)	± 0.50	± 1.00
Resistance to Bonding Exp. (Max. % Change)	± 0.25	± 0.25
Moisture Resistance (Max. % Change)	± 0.50	± 0.50
Life, 2000 Hours (Max. % Change)	± 0.50	± 2.00

Packaging (All packaging complies with MIL-R-55342D)

Waffle Packs ..... In accordance with MIL-B-81705
Tape and Reel ..... 12mm wide tape
Embossed Plastic Tape ..... Per EIA 481A
Marking and Labeling ..... Per MIL-R-55342D (Para. 3.14)



*2% and 10% available on special request; consult factory.

HOW TO ORDER

M55342	K	09	B	91J0	R

MIL SPEC SHEET NO.
09-Style RM 2512

TERMINATION MATERIAL
B: Solderable
Base Metalization Barrier Metal
Solder Coated, Wrap-Around

RESISTANCE & TOLERANCE
4 CHARACTERS: 3 DIGITS/1 LETTER
The letter is used simultaneously as a decimal point, multiplier and a resistance tolerance designator. Use Table 1 to determine multiplier and TR tolerance.

LIFE FAILURE RATE DESIGNATION
R: 0.01% Per 1,000 Hours
S: 0.001% Per 1,000 Hours

CHARACTERISTIC
K = ± 100ppm/°C
M = ± 300ppm/°C

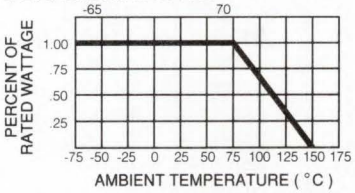
MILITARY SPECIFICATION
MIL-R-55342

TABLE 1

Symbol	Multiplier	Tolerance ± %
D	X1	1
E	X1,000	1
F	X1,000,000	1
J	X1	5
K	X1,000	5
L	X1,000,000	5

See pages 228 - 232 for available resistance values and codes.

DERATING CURVE



NOTE: This curve indicates the percentage of nominal wattage to be applied at temperatures higher than 70°C. This curve applies only to units mounted on a substrate; however, at no time shall the applied voltage exceed the maximum for each style.

PRODUCT SELECTION GUIDE

Military Resistance Values & Codes, 5% Tolerance

Value (Ω)	Military Chip Resistor Code	Military Resistor Network Code
10	10J0	
11	11J0	
12	12J0	
13	13J0	
15	15J0	
16	16J0	
18	18J0	
20	20J0	
22	22J0	
24	24J0	
27	27J0	
30	30J0	
33	33J0	
36	36J0	
39	39J0	
43	43J0	
47	47J0	
51	51J0	51R0
56	56J0	56R0
62	62J0	62R0
68	68J0	68R0
75	75J0	75R0
82	82J0	82R0
91	91J0	91R0
100	100J	1000
110	110J	1100
120	120J	1200
130	130J	1300
150	150J	1500
160	160J	1600
180	180J	1800
200	200J	2000
220	220J	2200
240	240J	2400
270	270J	2700
300	300J	3000
330	330J	3300
360	360J	3600
390	390J	3900
430	430J	4300
470	470J	4700
510	510J	5100
560	560J	5600
620	620J	6200
680	680J	6800
750	750J	7500
820	820J	8200
910	910J	9100

Value (Ω)	Military Chip Resistor Code	Military Resistor Network Code
1.0 K	1K00	1001
1.1 K	1K10	1101
1.2 K	1K20	1201
1.3 K	1K30	1301
1.5 K	1K50	1501
1.6 K	1K60	1601
1.8 K	1K80	1801
2.0 K	2K00	2001
2.2 K	2K20	2201
2.4 K	2K40	2401
2.7 K	2K70	2701
3.0 K	3K00	3001
3.3 K	3K30	3301
3.6 K	3K60	3601
3.9 K	3K90	3901
4.3 K	4K30	4301
4.7 K	4K70	4701
5.1 K	5K10	5101
5.6 K	5K60	5601
6.2 K	6K20	6201
6.8 K	6K80	6801
7.5 K	7K50	7501
8.2 K	8K20	8201
9.1 K	9K10	9101
10 K	10K0	1002
11 K	11K0	1102
12 K	12K0	1202
13 K	13K0	1302
15 K	15K0	1502
16 K	16K0	1602
18 K	18KO	1802
20 K	20K0	2002
22 K	22K0	2202
24 K	24K0	2402
27 K	27K0	2702
30 K	30K0	3002
33 K	33K0	3302
36 K	36K0	3602
39 K	39K0	3902
43 K	43K0	4302
47 K	47K0	4702
51 K	51K0	5102
56 K	56K0	5602
62 K	62K0	6202
68 K	68K0	6802
75 K	75K0	7502
82 K	82K0	8202
91 K	91K0	9102

Value (Ω)	Military Chip Resistor Code	Military Resistor Network Code
100K	100K	1003
110K	110K	1103
120 K	120K	1203
130 K	130K	1303
150 K	150K	1503
160 K	160K	1603
180 K	180K	1803
200 K	200K	2003
220 K	220K	2203
240 K	240K	2403
270 K	270K	2703
300 K	300K	3003
330 K	330K	3303
360 K	360K	3603
390 K	390K	3903
430 K	430K	4303
470 K	470K	4703
510 K	510K	5103
560 K	560 K	5603
620 K	620K	6203
680 K	680K	6803
750 K	750K	7503
820 K	820K	8203
910 K	910K	9103
1.0 M	1L00	1004
1.1 M	1L10	
1.2 M	1L20	
1.3 M	1L30	
1.5 M	1L50	
1.6 M	1L60	
1.8 M	1L80	
2.0 M	2L00	
2.2 M	2L20	
2.4 M	2L40	
2.7 M	2L70	
3.0 M	3L00	
3.3 M	3L30	
3.6 M	3L60	
3.9 M	3L90	
4.3 M	4L30	
4.7 M	4L70	
5.1 M	5L10	
5.6 M	5L60	
6.2 M	6L20	
6.8 M	6L80	
7.5 M	7L50	
8.2 M	8L20	
9.1 M	9L10	
10 M	10L0	
11 M	11L0	
12 M	12L0	
13 M	13L0	
15 M	15L0	

PRODUCT SELECTION GUIDE
Military Resistance Values & Codes, 1% Tolerance

Value (Ω)	Military Chip Resistor Code	Military Resistor Network Code
10.0	10D0	
10.2	10D2	
10.5	10D5	
10.7	10D7	
11.0	11D0	
11.3	11D3	
11.5	11D5	
11.8	11D8	
12.1	12D1	
12.4	12D4	
12.7	12D7	
13.0	13D0	
13.3	13D3	
13.7	13D7	
14.0	14D0	
14.3	14D3	
14.7	14D7	
15.0	15D0	
15.4	15D4	
15.8	15D8	
16.2	16D2	
16.5	16D5	
16.9	16D9	
17.4	17D4	
17.8	17D8	
18.2	18D2	
18.7	18D7	
19.1	19D1	
19.6	19D6	
20.0	20D0	
20.5	20D5	
21.0	21D0	
21.5	21D5	
22.1	22D1	
22.6	22D6	
23.2	23D2	
23.7	23D7	
24.3	24D3	
24.9	24D9	
25.5	25D5	
26.1	26D1	
26.7	26D7	
27.4	27D4	
28.0	28D0	
28.7	28D7	
29.4	29D4	
30.1	30D1	
30.9	30D9	

Value (Ω)	Military Chip Resistor Code	Military Resistor Network Code
31.6	31D6	
32.4	32D4	
33.2	33D2	
34.0	34D0	
34.8	34D8	
35.7	35D7	
36.5	36D5	
37.4	37D4	
38.3	38D3	
39.2	39D2	
40.2	40D2	
41.2	41D2	
42.2	42D2	
43.2	43D2	
44.2	44D2	
45.3	45D3	
46.4	46D4	
47.5	47D5	
48.7	48D7	
49.9	49D9	
51.1	51D1	51R1
52.3	52D3	52R3
53.6	53D6	53R6
54.9	54D9	54R9
56.2	56D2	56R2
57.6	57D6	57R6
59.0	59D0	59R0
60.4	60D4	60R4
61.9	61D9	61R9
63.4	63D4	63R4
64.9	64D9	64R9
66.5	66D5	66R5
68.1	68D1	68R1
69.8	69D8	69R8
71.5	71D5	71R5
73.2	73D2	73R2
75.0	75D0	75R0
76.8	76D8	76R8
78.7	78D7	78R7
80.6	80D6	80R6
82.5	82D5	82R5
84.5	84D5	84R5
86.6	86D6	86R6
88.7	88D7	88R7
90.9	90D9	90R9
93.1	93D1	93R1
95.3	95D3	95R3
97.6	97D6	97R6

Value (Ω)	Military Chip Resistor Code	Military Resistor Network Code
100	100D	1000
102	102D	1020
105	105D	1050
107	107D	1070
110	110D	1100
113	113D	1130
115	115D	1150
118	118D	1180
121	121D	1210
124	124D	1240
127	127D	1270
130	130D	1300
133	133D	1330
137	137D	1370
140	140D	1400
143	143D	1430
147	147D	1470
150	150D	1500
154	154D	1540
158	158D	1580
162	162D	1620
165	165D	1650
169	169D	1690
174	174D	1740
178	178D	1780
182	182D	1820
187	187D	1870
191	191D	1910
196	196D	1960
200	200D	2000
205	205D	2050
210	210D	2100
215	215D	2150
221	221D	2210
226	226D	2260
232	232D	2320
237	237D	2370
243	243D	2430
249	249D	2490
255	255D	2550
261	261D	2610
267	267D	2670
274	274D	2740
280	280D	2800
287	287D	2870
294	294D	2940
301	301D	3010
309	309D	3090

PRODUCT SELECTION GUIDE
Military Resistance Values & Codes, 1% Tolerance

Value (Ω)	Military Chip Resistor Code	Military Resistor Network Code
316	316D	3160
324	324D	3240
332	332D	3320
340	340D	3400
348	348D	3480
357	357D	3570
365	365D	3650
374	374D	3740
383	383D	3830
392	392D	3920
402	402D	4020
412	412D	4120
422	422D	4220
432	432D	4320
442	442D	4420
453	453D	4530
464	464D	4640
475	475D	4750
487	487D	4870
499	499D	4990
511	511D	5110
523	523D	5230
536	536D	5360
549	549D	5490
562	562D	5620
576	576D	5760
590	590D	5900
604	604D	6040
619	619D	6190
634	634D	6340
649	649D	6490
665	665D	6650
681	681D	6810
698	698D	6980
715	715D	7150
732	732D	7320
750	750D	7500
768	768D	7680
787	787D	7870
806	806D	8060
825	825D	8250
845	845D	8450
866	866D	8660
887	887D	8870
909	909D	9090
931	931D	9310
953	953D	9530
976	976D	9760

Value (Ω)	Military Chip Resistor Code	Military Resistor Network Code
1.00 K	1E00	1001
1.02 K	1E02	1021
1.05 K	1E05	1051
1.07 K	1E07	1071
1.10 K	1E10	1101
1.13 K	1E13	1131
1.15 K	1E15	1151
1.18 K	1E18	1181
1.21 K	1E21	1211
1.24 K	1E24	1241
1.27 K	1E27	1271
1.30 K	1E30	1301
1.33 K	1E33	1331
1.37 K	1E37	1371
1.40 K	1E40	1401
1.43 K	1E43	1431
1.47 K	1E47	1471
1.50 K	1E50	1501
1.54 K	1E54	1541
1.58 K	1E58	1581
1.62 K	1E62	1621
1.65 K	1E65	1651
1.69 K	1E69	1691
1.74 K	1E74	1741
1.78 K	1E78	1781
1.82 K	1E82	1821
1.87 K	1E87	1871
1.91 K	1E91	1911
1.96 K	1E96	1961
2.00 K	2E00	2001
2.05 K	2E05	2051
2.10 K	2E10	2101
2.15 K	2E15	2151
2.21 K	2E21	2211
2.26 K	2E26	2261
2.32 K	2E32	2321
2.37 K	2E37	2371
2.43 K	2E43	2431
2.49 K	2E49	2491
2.55 K	2E55	2551
2.61 K	2E61	2611
2.67 K	2E67	2671
2.74 K	2E74	2741
2.80 K	2E80	2801
2.87 K	2E87	2871
2.94 K	2E94	2941
3.01 K	3E01	3011
3.09 K	3E09	3091

Value (Ω)	Military Chip Resistor Code	Military Resistor Network Code
3.16 K	3E16	3161
3.24 K	3E24	3241
3.32 K	3E32	3321
3.40 K	3E40	3401
3.48 K	3E48	3481
3.57 K	3E57	3571
3.65 K	3E65	3651
3.74 K	3E74	3741
3.83 K	3E83	3831
3.92 K	3E92	3921
4.02 K	4E02	4021
4.12 K	4E12	4121
4.22 K	4E22	4221
4.32 K	4E32	4321
4.42 K	4E42	4421
4.53 K	4E53	4531
4.64 K	4E64	4641
4.75 K	4E75	4751
4.87 K	4E87	4871
4.99 K	4E99	4991
5.11 K	5E11	5111
5.23 K	5E23	5231
5.36 K	5E36	5361
5.49 K	5E49	5491
5.62 K	5E62	5621
5.76 K	5E76	5761
5.90 K	5E90	5901
6.04 K	6E04	6041
6.19 K	6E19	6191
6.34 K	6E34	6341
6.49 K	6E49	6491
6.65 K	6E65	6651
6.81 K	6E81	6811
6.98 K	6E98	6981
7.15 K	7E15	7151
7.32 K	7E32	7321
7.50 K	7E50	7501
7.68 K	7E68	7681
7.87 K	7E87	7871
8.06 K	8E06	8061
8.25 K	8E25	8251
8.45 K	8E45	8451
8.66 K	8E66	8661
8.87 K	8E87	8871
9.09 K	9E09	9091
9.31 K	9E31	9311
9.53 K	9E53	9531
9.76 K	9E76	9761

PRODUCT SELECTION GUIDE
Military Resistance Values & Codes, 1% Tolerance

Value (Ω)	Military Chip Resistor Code	Military Resistor Network Code
10.0 K	10E0	1002
10.2 K	10E2	1022
10.5 K	10E5	1052
10.7 K	10E7	1072
11.0 K	11E0	1102
11.3 K	11E3	1132
11.5 K	11E5	1152
11.8 K	11E8	1182
12.1 K	12E1	1212
12.4 K	12E4	1242
12.7 K	12E7	1272
13.0 K	13E0	1302
13.3 K	13E3	1332
13.7 K	13E7	1372
14.0 K	14E0	1402
14.3 K	14E3	1432
14.7 K	14E7	1472
15.0 K	15E0	1502
15.4 K	15E4	1542
15.8 K	15E8	1582
16.2 K	16E2	1622
16.5 K	16E5	1652
16.9 K	16E9	1692
17.4 K	17E4	1742
17.8 K	17E8	1782
18.2 K	18E2	1822
18.7 K	18E7	1872
19.1 K	19E1	1912
19.6 K	19E6	1962
20.0 K	20E0	2002
20.5 K	20E5	2052
21.0 K	21E0	2102
21.5 K	21E5	2152
22.1 K	22E1	2212
22.6 K	22E6	2262
23.2 K	23E2	2322
23.7 K	23E7	2372
24.3 K	24E3	2432
24.9 K	24E9	2492
25.5 K	25E5	2552
26.1 K	26E1	2612
26.7 K	26E7	2672
27.4 K	27E4	2742
28.0 K	28E0	2802
28.7 K	28E7	2872
29.4 K	29E4	2942
30.1 K	30E1	3012
30.9 K	30E9	3092

Value (Ω)	Military Chip Resistor Code	Military Resistor Network Code
31.6 K	31E6	3162
32.4 K	32E4	3242
33.2 K	33E2	3322
34.0 K	34E0	3402
34.8 K	34E8	3482
35.7 K	35E7	3572
36.5 K	36E5	3652
37.4 K	37E4	3742
38.3 K	38E3	3832
39.2 K	39E2	3922
40.2 K	40E2	4022
41.2 K	41E2	4122
42.2 K	42E2	4222
43.2 K	43E2	4322
44.2 K	44E2	4422
45.3 K	45E3	4532
46.4 K	46E4	4642
47.5 K	47E5	4752
48.7 K	48E7	4872
49.9 K	49E9	4992
51.1 K	51E1	5112
52.3 K	52E3	5232
53.6 K	53E6	5362
54.9 K	54E9	5492
56.2 K	56E2	5622
57.6 K	57E6	5762
59.0 K	59E0	5902
60.4 K	60E4	6042
61.9 K	61E9	6192
63.4 K	63E4	6342
64.9 K	64E9	6492
66.5 K	66E5	6652
68.1 K	68E1	6812
69.8 K	69E8	6982
71.5 K	71E5	7152
73.2 K	73E2	7322
75.0 K	75E0	7502
76.8 K	76E8	7682
78.7 K	78E7	7872
80.6 K	80E6	8062
82.5 K	82E5	8252
84.5 K	84E5	8452
86.6 K	86E6	8662
88.7 K	88E7	8872
90.9 K	90E9	9092
93.1 K	93E1	9312
95.3 K	95E3	9532
97.6 K	97E6	9762

Value (Ω)	Military Chip Resistor Code	Military Resistor Network Code
100K	100E	1003
102 K	102E	1023
105 K	105E	1053
107 K	107E	1073
110 K	110E	1103
113 K	113E	1133
115 K	115E	1153
118 K	118E	1183
121 K	121E	1213
124 K	124E	1243
127 K	127E	1273
130 K	130E	1303
133 K	133E	1333
137 K	137E	1373
140 K	140E	1403
143 K	143E	1433
147 K	147E	1473
150 K	150E	1503
154 K	154E	1543
158 K	158E	1583
162 K	162E	1623
165 K	165E	1653
169 K	169E	1693
174 K	174E	1743
178 K	178E	1783
182 K	182E	1823
187 K	187E	1873
191 K	191E	1913
196 K	196E	1963
200 K	200E	2003
205 K	205E	2053
210 K	210E	2103
215 K	215E	2153
221 K	221E	2213
226 K	226E	2263
232 K	232E	2323
237 K	237E	2373
243 K	243E	2433
249 K	249E	2493
255 K	255E	2553
261 K	261E	2613
267 K	267E	2673
274 K	274E	2743
280 K	280E	2803
287 K	287E	2873
294 K	294E	2943
301 K	301E	3013
309 K	309E	3093

PRODUCT SELECTION GUIDE
Military Resistance Values & Codes, 1% Tolerance

Value (Ω)	Military Chip Resistor Code	Military Resistor Network Code
316 k	316E	3163
324 K	324E	3243
332 K	332E	3323
340 K	340E	3403
348 K	348E	3483
357 K	357E	3573
365 K	365E	3653
374 K	374E	3743
383 K	383E	3833
392 K	392E	3923
402 K	402E	4023
412 K	412E	4123
422 K	422E	4223
432 K	432E	4323
442 K	442E	4423
453 K	453E	4533
464 K	464E	4643
475 K	475E	4753
487 K	487E	4873
499 K	499E	4993
511 K	511E	5113
523 K	523E	5233
536 K	536E	5363
549 K	549E	5493
562 K	562E	5623
576 K	576E	5763
590 K	590E	5903
604 K	604E	6043
619 K	619E	6193
634 K	634E	6343
649 K	649E	6493
665 K	665E	6653
681 K	681E	6813
698 K	698E	6983
715 K	715E	7153
732 K	732E	7323
750 K	750E	7503
768 K	768E	7683
787 K	787E	7873
806 K	806E	8063
825 K	825E	8253
845K	845E	8453
866 K	866E	8663
887 K	887E	8873
909 K	909E	9093
931 K	931E	9313
953 K	953E	9533
976 K	976E	9763

Value (Ω)	Military Chip Resistor Code	Military Resistor Network Code
1.00 M	1F00	1004
1.02 M	1F02	
1.05 M	1F05	
1.07 M	1F07	
1.10 M	1F10	
1.13 M	1F13	
1.15 M	1F15	
1.18 M	1F18	
1.21 M	1F21	
1.24 M	1F24	
1.27 M	1F27	
1.30 M	1F30	
1.33 M	1F33	
1.37 M	1F37	
1.40 M	1F40	
1.43 M	1F43	
1.47 M	1F47	
1.50 M	1F50	
1.54 M	1F54	
1.58 M	1F58	
1.62 M	1F62	
1.65 M	1F65	
1.69 M	1F69	
1.74 M	1F74	
1.78 M	1F78	
1.82 M	1F82	
1.87 M	1F87	
1.91 M	1F91	
1.96 M	1F96	
2.00 M	2F00	
2.05 M	2F05	
2.10 M	2F10	
2.15 M	2F15	
2.21 M	2F21	
2.26 M	2F26	
2.32 M	2F32	
2.37 M	2F37	
2.43 M	2F43	
2.49 M	2F49	
2.55 M	2F55	
2.61 M	2F61	
2.67 M	2F67	
2.74 M	2F74	
2.80 M	2F80	
2.87 M	2F87	
2.94 M	2F94	
3.01 M	3F01	
3.09 M	3F09	

Value (Ω)	Military Chip Resistor Code	Military Resistor Network Code
3.16 M	3F16	
3.24 M	3F24	
3.32 M	3F32	
3.40 M	3F40	
3.48 M	3F48	
3.57 M	3F57	
3.65 M	3F65	
3.74 M	3F74	
3.83 M	3F83	
3.92 M	3F92	
4.02 M	4F02	
4.12 M	4F12	
4.22 M	4F22	
4.32 M	4F32	
4.42 M	4F42	
4.53 M	4F53	
4.64 M	4F64	
4.75 M	4F75	
4.87 M	4F87	
4.99 M	4F99	
5.11 M	5F11	
5.23 M	5F23	
5.36 M	5F36	
5.49 M	5F49	
5.62 M	5F62	
5.76 M	5F76	
5.90 M	5F90	
6.04 M	6F04	
6.19 M	6F19	
6.34 M	6F34	
6.49 M	6F49	
6.65 M	6F65	
6.81 M	6F81	
6.98 M	6F98	
7.15 M	7F15	
7.32 M	7F32	
7.50 M	7F50	

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*In Europe

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FAX: 412-531-2008

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FAX: 508-256-8939

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Atlanta, GA 30338
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FAX: 404-394-8387

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7611 Washington Ave. South
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Edina, MN 55439-0216
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FAX: 612-944-0634

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CSR ELECTRONICS
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Knoxville, TN 37918
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Richardson, TX 75080-6753
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TWX: 910-867-4745
FAX: 214-669-8654

3300 Chimney Rock Road, Suite 202
Houston, TX 77056
TEL: 713-781-6240
FAX: 713-952-2094

7801 N. Lamar, Suite D73
Austin, TX 78752
TEL: 512-454-5131
FAX: 512-454-6483

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PARKER WEBSTER COMPANY
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Murray, UT 84117
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MICRO-COMP, INC.
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Baltimore, MD 21227
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EASYLINK: 629-18083
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Seattle, WA 98109-0327
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FAX: 206-282-2967

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Richfield, OH 44286-0427
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FAX: 216-659-4823

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OASIS SALES CORPORATION
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Brookfield, WI 53005
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DAVETEK MARKETING, INC.
206-2723 37th Ave., N.E.
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FAX: 403-250-3445

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FAX: 604-435-5490

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2044 St. Regis Blvd.
Dorval, Quebec H9P 1H6
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FAX: 514-685-6950

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Nepean, Ontario K2H 7T9
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FAX: 613-692-4081

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7270 Torbram Road
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Mississauga, Ontario L4T 3Y7
TEL: 416-673-0011
FAX: 416-673-1270

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WEISS CO. LTD.
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FAX: 604-873-1120

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Winnipeg, Manitoba R3H 0Z5
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FAX: 809-753-8345

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ING. OTTO FOLGER
Elektronische Geräte GmbH
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TLX: 131 882
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BOURNS BENELUX B.V.
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TLX: 75 904
FAX: 021-3574 43

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BOURNS, INC. LIFE SUPPORT AND NUCLEAR FACILITY APPLICATIONS POLICY

As a general policy Bourns, Inc. does not recommend the use of any of its products in (a) life support applications where failure or malfunction of the Bourns product can be reasonably expected to cause failure of the life support device or to significantly affect its safety or effectiveness or (b) any nuclear facility applications. Bourns, Inc. will not knowingly sell its products for use in such applications unless it receives in writing assurances satisfactory to Bourns that (a) the risks of injury or damage have been minimized, (b) the customer assumes all such risks, and (c) the liability of Bourns is adequately protected under the circumstances.

Examples of devices considered to be life support are neonatal oxygen analyzers, nerve stimulators (whether used for anesthesia, pain relief, or other purposes), autotransfusion devices, blood pumps, defibrillators, arrhythmia detectors and alarms, pacemakers, hemodialysis systems, peritoneal dialysis systems, neonatal ventilator incubators, ventilators for both adults and infants, anesthesia ventilators, and infusion pumps, as well as other devices designated as "critical" by the FDA.

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