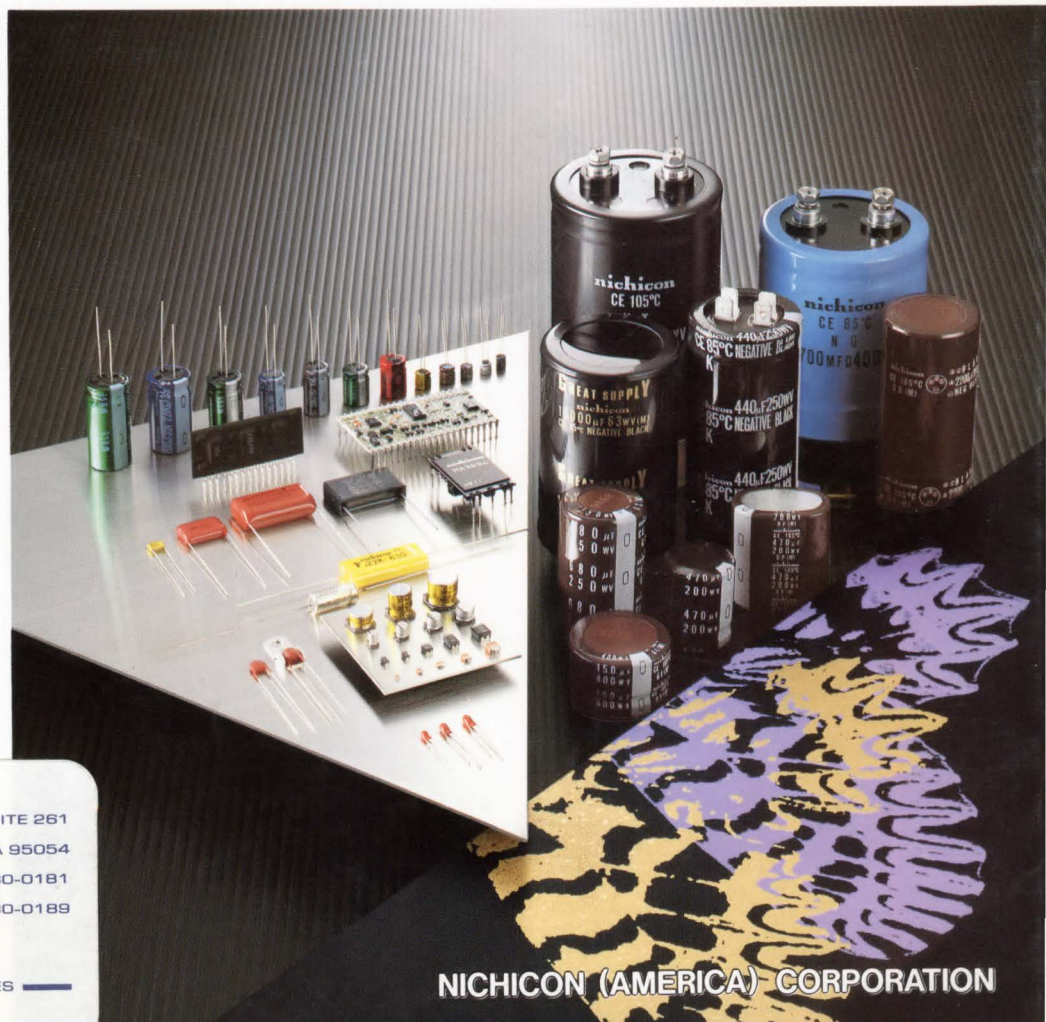
CAT. 8100D

nichicon

'91 ELECTRONIC COMPONENTS

ALUMINUM ELECTROLYTIC CAPACITORS
PLASTIC FILM CAPACITORS
POSITIVE THERMISTORS "Posi-R" HYBRID I.C.s "Hi-Net"



CALTRON COMPONENTS CORPORATION
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TEL: (408) 980-0181
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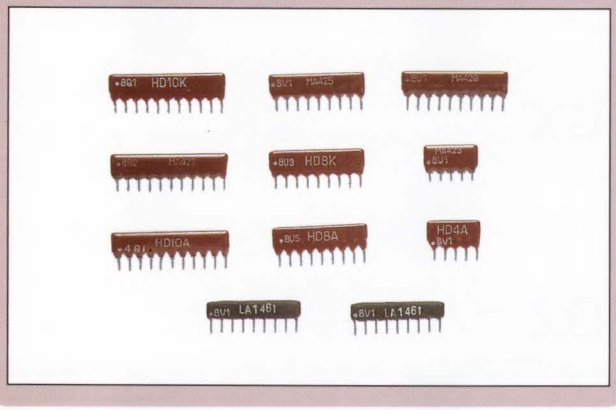
MANUFACTURERS REPRESENTATIVES

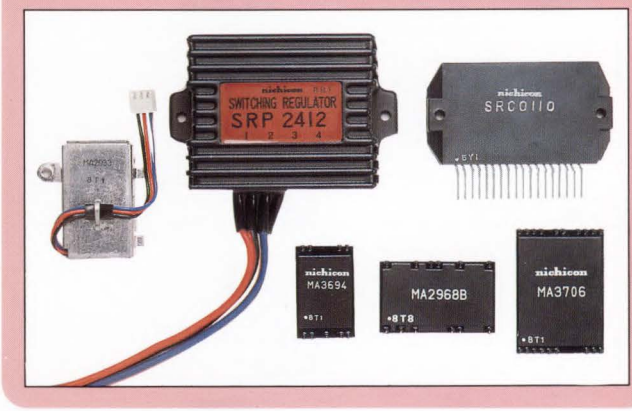
NICHICON (AMERICA) CORPORATION

Hybrid ICs "Hi-Net"

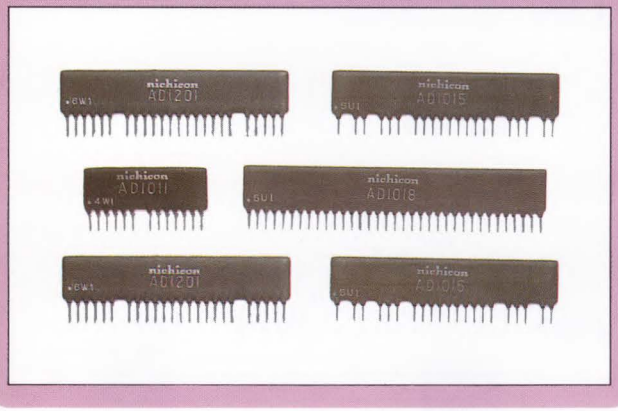
Diode Array Series



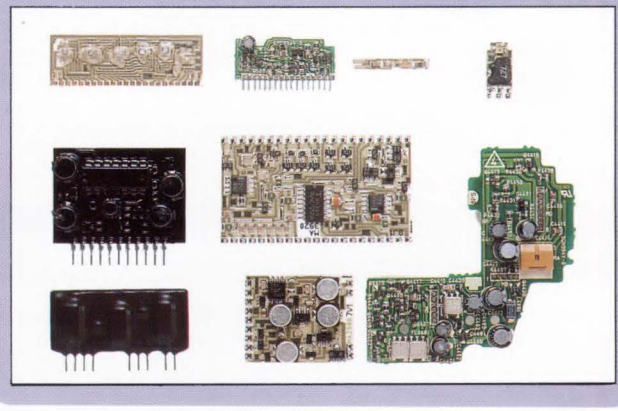
SWitching Regulator PoWer Hybrid IC



Graphic Equalizer Series

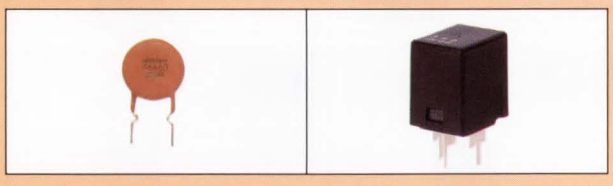


Custom-made Hybrid IC

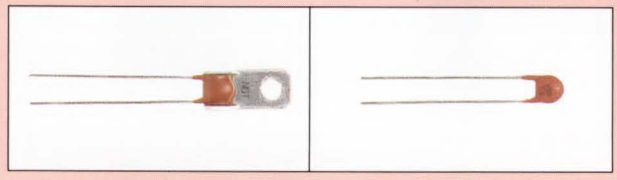


Positive Thermistors "P osi-R"

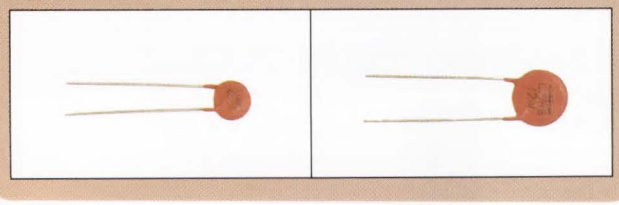
For Color TV Automatic Degaussing Circuit



For Thermal Protection



For Overcurrent Protection



★ New series ★ Extended series

For Audio Equipment

KZ High Grade Type, For Audio Equipment

FS Standard, For Audio Equipment

FX Miniature Sized, For Audio Equipment

FM Miniature Sized, For General Audio Products

SK 7mmL, For Audio Equipment

MC 5mmL, For Audio Equipment

UK 6mmL Chip Type, For Audio Epuipment

ES Non-Polarized, For Audio Equipment

DB·GB Bi-Polarized, For Speaker Network

High Reliability Type

GQ Snap-in Terminal Type, Long Life, Wide Temperature Range

GE ★ Snap-in Terminal Type, Low-Profile Sized, Wide Temperature Range

GX Snap-in Terminal Type, Long Life, Wide Temperature Range

GR ★ Snap-in Terminal Type, Long Life, Wide Temperature Range

GZ ★ Snap-in Terminal Type, Long Life, Wide Temperature Range

DP Oval-Shaped Type Wide Temperature Range

DK Horizontal Mounting Type. Wide Temperature Range

Large Can Aluminum Electrolytic Capacitors

Standard Type

LK Snap-in Terminal Type, Standard

LQ Snap-in Terminal Type, Low-Profile Sized

KD Lug Terminal Type, Standard

DL Horizontal Mounting Type

High Reliability Type

GK Snap-in Terminal Type, Wide Temperature Range

GK-HH PC Board Mounting Type

Special Type

AB Snap-in Terminal Type, Withstanding Overvoltage

NR Screw Terminal Type

NQ ★ Screw Terminal Type, Smaller Sized

NT Screw Terminal Type, Wide Temperature Range

NZ Screw Terminal Type, Low Impedance

MK Lug Terminal Type, For Motor Starting

For Audio Equipment

GS Lug/Snap-in Terminal Type, For Audio Equipment

Miniature Aluminum Electrolytic Capacitors

Chip Type

WX 5.5mmL Chip Type.	**WP** ★ 5.5mmL Chip Type. Non Polarized	**WT** 5.5mmL Chip Type. Wide Temperature Range	**WF** ★ Chip Type, Low Impedance	**UP** 6mmL Chip Type, Non-Polarized
UT 6mmL Chip Type, Wide Temperature Range	**UZ** 6mmL Chip Type. Long Life Assurance	**UR** ★ Chip Type, High C/V	**UX** Chip Type, Higher Capacitance Range	**UK** 6mmL Chip Type, For Audio Equipment

Ultra-Miniature Type

MA 5mmL, Standard, For General Purposes	**ML** 5mmL, Low Leakage Current
MP 5mmL, Non-Polarized	**MT** 5mmL, Wide Temperature Range
MQ 5mmL, Long Life Assurance	**MF** 5mmL, Low Impedance
MJ 5.2mmL, MAX. ★	**SA** 7mmL, For General Purposes
SR 7mmL, High C/V	**SL** 7mmL, Low Leakage Current
SP 7mmL, Non-Polarized	**ST** 7mmL, Wide Temperature Range
SQ 7mmL, Long Life Assurance	**SF** 7mmL, Low Impedance

Standard Type

VX Standard, For General Purposes (Radial Lead Type)	**VX** Standard, For General Purposes(Axial Lead Type)
VR Miniature Sized ★	**VZ** Wide Temperature Range ★

Standard Type

VS Low-Profile Sized	**RS** Compact & Low-Profile Sized
RZ Compact & Low-Profile Sized, Wide Temperature Range	**RT** Low-Profile Sized, Wide Temperature Range
VP Non-Polarized	**ET** Non-Polarized, Wide Temperature Range

High Reliability Type

PR Standard, For Switching Power Supplies	**PY** Low Impedance, High Reliability ★
PF Low Impedance, High Reliability	**PL** Extremely Low Impedance, High Reliability
PQ Miniature Sized, Low Impedance, High Reliability	**PG** Long Life, High Reliability
PH Extremely Long Life, High Reliability	**BE** High Temperature Range, For +125℃ Use

Special Type

KL Low Leakage Current	**ZA** Low Noise Purposes
TM Timer Circuit Use	**SH** Vertical Time Constant Circuit Use
HA Horizontal Deflection Current Correction Use	**JB** Memory Back-Up Use

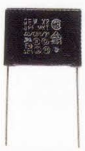
Plastic Film Capacitors

Safety Standards Recognition Type

XW
UL, CSA, VDE, SEV, DEMKO, SEMKO, NEMKO, EI, Approved (Compact Size)

XC
UL, CSA, VDE, SEV, DEMKO, SEMKO,NEMKO, EI, Approved

EW
UL, CSA, VDE, SEV, DEMKO, SEMKO, NEMKO, EI, Approved



XE
VDE, DEMKO, SEMKO, Approved

XB
UL, CSA, VDE, B S, Approved

Metallized Film Type

XJ
Standard Type

XN
Compact Size Standard Type

XF
Standard Type for High Frequency Applications

XR
Electrical Appliance and Material Control Law Approved

AS
Tape-Wrapped Axial lead Type

AF
Tape-Wrapped Axial lead Type for High Frequency Applications

Foil Type

YX
Miniaturized Standard Type

YS
Ultra-Miniatarized Low-Profile Type

YP
Ultra-Miniaturized 5mm Lead Pitch Type

Contents

Nichicon has developed many new series of capacitors and extended the existing ratings in order to meet various needs from our customers.
To select our line of products for right application, we have put the following pictgraphs to individual series for your easy reference.


For SMD


Smaller

High Ripple Current

Low Impedance

Low Leakage Current

Long Life

Non-polarized


RCJ Approved


For Audio Use


Anti-Solvent Feature

For High Frequency


Safety Standards Recognized

nichicon

ALUMINUM ELECTROLYTIC CAPACITORS

1 ALUMINUM ELECTROLYTIC CAPACITORS

Contents

Miniature Aluminum Electrolytic Capacitors

★New series ☆Extended series

Classification	Series	JIS Configuration	Applications	Operating Temperature Range (℃)	Features: Standard type	Features: Smaller-sized & low profile	Features: Low impedance	Features: Long life	Features: Anti-cleaning solvent	Voltage Range (V.D.C)	Capacitance Range (μF)	Capacitance Tolerance (%)	Page
Surface Mounting type	WX	Chip	5.5mmL Chip Type	−40～+85	●				●	4～50	0.1～220	±20	13
	★WP	Chip	5.5mmL Chip Type, Non-Polarized	−40～+85		●			●	6.3～50	0.1～47	±20	14
	WT	Chip	5.5mmL Chip Type, Wide Temperature Rang	−55～+105		●			●	4～50	0.1～100	±20	15
	★WF	Chip	5.5mmL Chip Type, Low Impedance	−55～+105			●		●	6.3～35	1～220	±20	16
	UP	Chip	6mmL Chip Type, Non-Polarized	−40～+105	●				●	6.3～50	0.1～47	±20	17
	UT	Chip	6mmL Chip Type, Wide Temperature Range	−55～+105	●				●	4～50	0.1～100	±20	18
	UZ	Chip	6mmL Chip Type, Long Life Assurance	−55～+105				●	●	4～50	0.1～100	±20	19
	★UR	Chip	6mmL Chip Type, High C/V	−40～+85		●			●	6.3～50	22～1000	±20	20
	UX	Chip	Chip Type, Higher Capacitance Range	−55～+105			●		●	6.3～50	22～470	±20	21
	UK	Chip	6mmL Chip Type, For Audio Equipment	−40～+85					●	4～50	0.1～220	±20	83
Ultra-Miniature type	MA	04	5mmL, Standard, For General Purposes	−40～+85	●				●	4～50	0.1～470	±20	22
	ML	04	5mmL, Low Leakage Current	−40～+85	●				●	4～50	0.1～100	±20	23
	MP	04	5mmL, Non-Polarized	−40～+85	●				●	6.3～50	0.1～47	±20	24
	MT	04	5mmL, Wide Temperature Range	−55～+105	●				●	4～50	0.1～100	±20	25
	MQ	04	5mmL, Long Life Assurance	−55～+105				●	●	4～50	0.1～100	±20	26
	MF	04	5mmL, Low Impedance	−55～+105			●		●	6.3～35	1～100	±20	27
	★MJ	04	5.2mmL MAX.	−40～+85		●			●	4～50	0.1～220	±20	28
	SA	04	7mmL, For General Purposes	−40～+85	●				●	6.3～50	0.1～220	±20	29
	SR	04	7mmL, High C/V	−40～+85		●			●	4～50	4.7～470	±20	29
	SL	04	7mmL, Low Leakage Current	−40～+85	●				●	6.3～50	0.1～220	±20	30
	SP	04	7mmL, Non-Polarized	−40～+85	●				●	6.3～50	0.1～47	±20	31
	ST	04	7mmL, Wide Temperature Range	−55～+105	●				●	6.3～50	0.1～220	±20	32
	SQ	04	7mmL, Long Life Assurance	−55～+105				●	●	6.3～50	0.1～220	±20	33
	SF	04	7mmL, Low Impedance	−55～+105			●		●	6.3～35	6.8～220	±20	34
Standard type	VX	04	Standard, For General Purposes	−40(−25)～+85	●				■	6.3～450	0.1～33000	±20	36
		02	Standard, For General Purposes	−40(−25)～+85	●				▲	6.3～450	0.47～22000	±20	38
	☆VR	04	Miniature Sized	−40(−25)～+85		●			■	6.3～450	0.1～22000	±20	40
	☆VZ	04	Wide Temperature Range	−55(−40, −25)～+105		●			■	6.3～450	0.1～22000	±20	42
	VS	04	Low-Profile Sized	−40～+85	●				■	6.3～400	0.1～10000	±20	35
	RS	04	Compact & Low-Profile Sized	−40～+85		●			●	6.3～50	0.1～10000	±20	44
	RZ	04	Compact & Low-Profile Sized, Wide Temperature Range	−55～+105	●				●	6.3～50	0.1～10000	±20	45
	RT	04	Low-Profile Sized, Wide Temperature Range	−55(−40)～+105		●			■	6.3～400	0.1～10000	±20	46
	VP	04	Non-Polarized	−40～+85	●				●	6.3～100	0.47～6800	±20	47
	ET	04	Non-Polarized, Wide Temperature Range	−55～+105	●				●	6.3～100	0.47～1000	±20	48
High Reliability type	PR	04	Standard, For Switching Power Supplies	−55(−40, −25)～+105		●	●		■	6.3～450	0.47～22000	±20	56
	★PY	04	Low Impedance, High Reliability	−55～+105		●	●	●	●	6.3～50	0.47～15000	±20	58
	PF	04	Low Impedance, High Reliability	−55～+105	●		●	●	●	6.3～100	0.47～15000	±20	49
	PL	04	Extremely Low Impedance, High Reliability	−55～+105			●	●	●	6.3～63	0.47～15000	±20	60
	PQ	04	Miniature Sized, Low Impedance, High Reliability	−55～+105			●	●	●	6.3～50	0.47～390	±20	66
	PG	04	Long Life, High Reliability	−55～+105			●	●	●	10～63	4.7～4700	±20	68
	PH	04	Extremely Long Life, High Reliability	−55～+105				●	●	10～63	47～3300	±20	69
	BE	04	High Temperature Range, For+125℃ Use	−40～+125				●	●	10～50	0.47～470	±20	70
		02	High Temperature Range, For+125℃ Use	−40～+125				●		10～50	0.47～470	±20	70

■ : Applicable up to 250 WV ratings.
[For VX 04 type(Radial lead type with case sizes larger than φ22mm), applicable only to 100WV ratings or lower.]
▲ : Applicable up to 100WV ratings or lower.

Miniature Aluminum Electrolytic Capacitors

★New series ☆Extended series

Classification	Series	JIS Configuration	Applications	Operating Temperature Range (℃)	Features: Standard type	Features: Smaller-sized & low profile	Features: Low impedance	Features: Long life	Features: Anti-cleaning solvent	Voltage Range (V.D.C)	Capacitance Range (μF)	Capacitance Tolerance (%)	Page
Special type	KL	04	Low Leakage Current	−40～+105	●				●	10～50	0.1～330	±20, ±10	71
	ZA	04	Low Noise Purposes	−40～+85	●				●	6.3～100	0.47～47	±20	72
	TM	04	Timer Circuit Use	−40～+85	●				●	10～50	1～470	±20, ±10	73
	SH	04	Vertical Time Constant Circuit Use	−40～+85	●				●	16～50	0.47～470	±20, ±10	74
	HA	04	Horizontal Deflection Current Correction Use	−25～+85	●				●	25, 50	2.2～10	±10	75
	JB	04	Memory Back-Up Use	−25～+85	●				●	5.5	2.2～47mF	−10～+50	76
For audio equipment	KZ	04	High Grade Type, For Audio Equipment	−40～+85					●	25～100	10～1000	±20	77
	FS	04	Standard, For Audio Equipment	−40～+85	●				●	6.3～100	0.1～10000	±20	78
	FX	04	Miniature Sized, For Audio Equipment	−40～+85		●			●	6.3～100	0.1～22000	±20	79
	FM	04	Miniature Sized, For General Audio Products	−40～+85		●			●	6.3～100	0.1～22000	±20	80
	SK	04	7mmL, For Audio Equipment	−40～+85	●				●	6.3～50	0.1～220	±20	81
	MC	04	5mmL, For Audio Equipment	−40～+85	●				●	4～50	0.1～220	±20	82
	UK	Chip	6mmL, Chip Type, For Audio Equipment	−40～+85					●	4～50	0.1～220	±20	83
	ES	04	Non-Polarized, For Audio Equipment	−40～+85	●				●	6.3～50	0.47～1000	±20	84
	DB,GB	04	Bi-Polarized, For Speaker Network	−40～+85	●				●	50	1～68	±20, ±10	85

Large Can Aluminum Electrolytic Capacitors

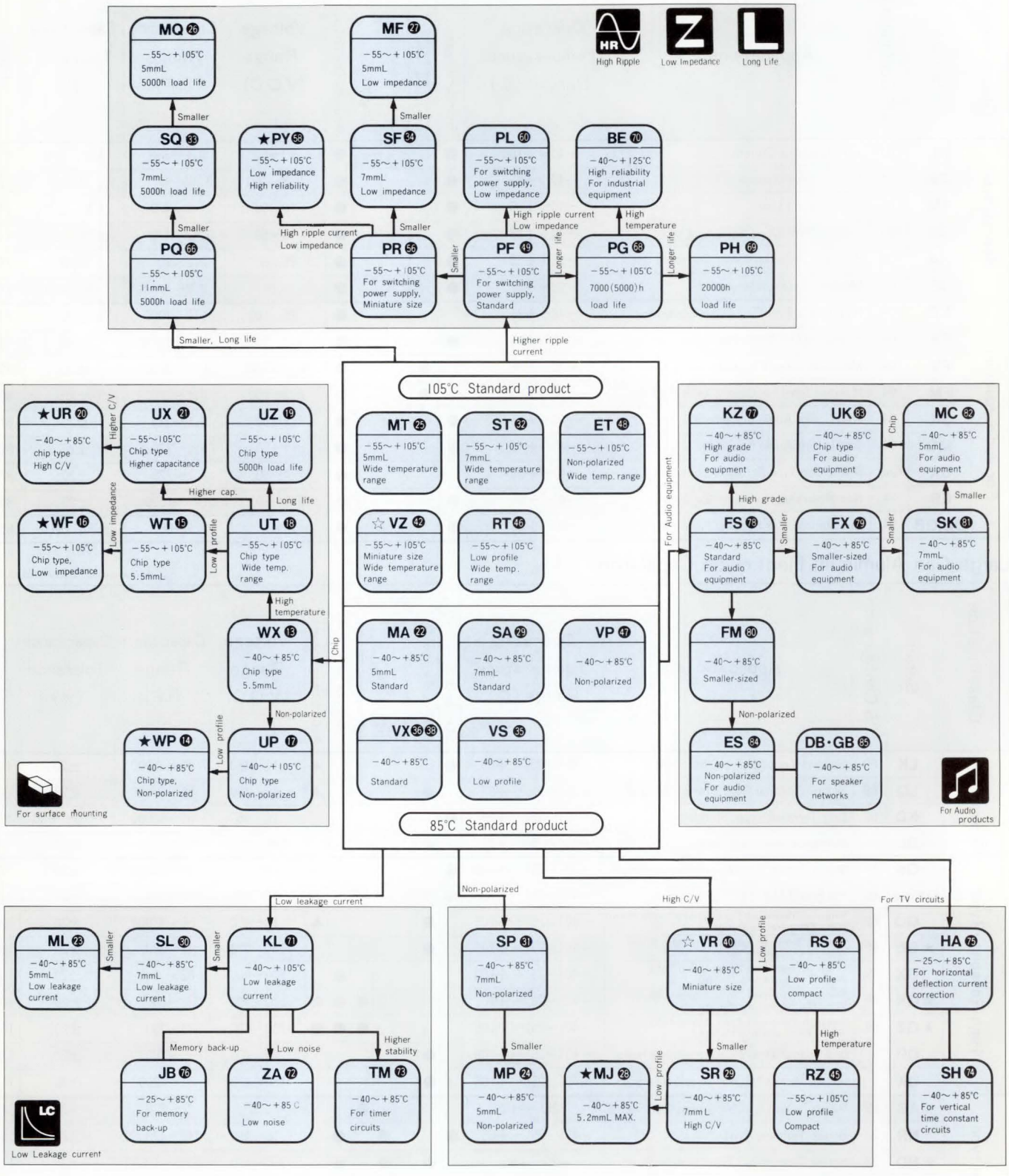
★New series ☆Extended series

Classification	Series	JIS Configuration	Applications	Operating Temperature Range (℃)	Features: Standard type	Features: Smaller-sized & low profile	Features: Low impedance	Features: High ripple	Features: High temperature range	Features: Long life	Features: Anti-cleaning solvent	Voltage Range (V.D.C)	Capacitance Range (μF)	Capacitance Tolerance (%)	Page
Standard type	LK	69	Snap-in Terminal Type, Standard	−40(−25)～+85	●						▲	16～450	47～33000	±20	86
	LQ	69	Snap-in Terminal Type, Low-Profile Sized	−40(−25)～+85		●					▲	16～450	56～56000	±20	89
	KD	62	Lug Terminal Type, Standard	−40(−25)～+85	●							16～450	33～68000	−10～+50	92
	DL	—	Horizontal Mounting Type	−40(−25)～+85		●						160～450	82～1500	±20	94
High Reliability type	GK	69	Snap-in Terminal Type, Wide Temperature Range	−40(−25)～+105	●						▲	16～400	56～33000	±20	95
	GK-HH	69	PC Board Mounting Type	−40(−25)～+105	●						▲	16～400	560～68000	±20	98
	GQ	69	Snap-in Terminal Type, Low-Profile Sized Wide Temperature Range	−40(−25)～+105		●					▲	16～450	56～47000	±20	100
	★GE	69	Snap-in Terminal Type, Low-Profile Sized, Wide Temperature Range	−40(−25)～+105		●						160～400	47～560	±20	103
	GX	69	Snap-in Terminal Type, Long Life, Wide Temperature Range	−40(−25)～+105						●		200～400	82～1500	±20	104
	★GR	69	Snap-in Terminal Type, Long Life, Wide Temperature Range	−40(−25)～+105					●	●	●	200～400	39～680	±20	106
	★GZ	69	Snap-in Terminal Type, Long Life, Wide Temperature Range	−40(−25)～+105					●	●	●	200～400	33～390	±20	108
	DP	—	Oval-Shaped Type, Wide Temperature Range	−40(−25)～+105		●						200, 400	33～1000	±20	110
	DK	—	Horizontal Mounting Type, Wide Temperature Range	−40(−25)～+105		●						160～400	82～1200	±20	111
Special type	AB	69	Snap-in Terminal Type, Withstanding Overvoltage	−25～+105					●			250	82～820	±20	112
	NR	33	Screw Terminal Type	−40(−25)～+85	●			●		●		16～450	470～470000	±20	114
	★NQ	33	Screw Termirminal Type, Smaller-Sized	−25～+85		●		●		●		350～450	1000～10000	±20	116
	NT	33	Screw Terminal Type, Wide Temperature Range	−40(−25)～+105				●	●			16～400	220～330000	±20	118
	NZ	33	Screw Terminal Type, Low Impedance	−40～+105			●	●				10～100	1000～100000	±20	113
	MK	62	Lug Terminal Type, For Motor Starting	−20～+65	●							125～250(VAC)	50～250	0～+20	122
For audio epuipment	GS	62	Lug/Snap-in Terminal Type, For Audio Equipment	−40～+85	●							16～100	680～33000	±20	120

▲ : Applicable up to 100WV ratings or lower.

Systematic Diagram by Series Based on Application

○ Page number
★ New series
☆ Extended series

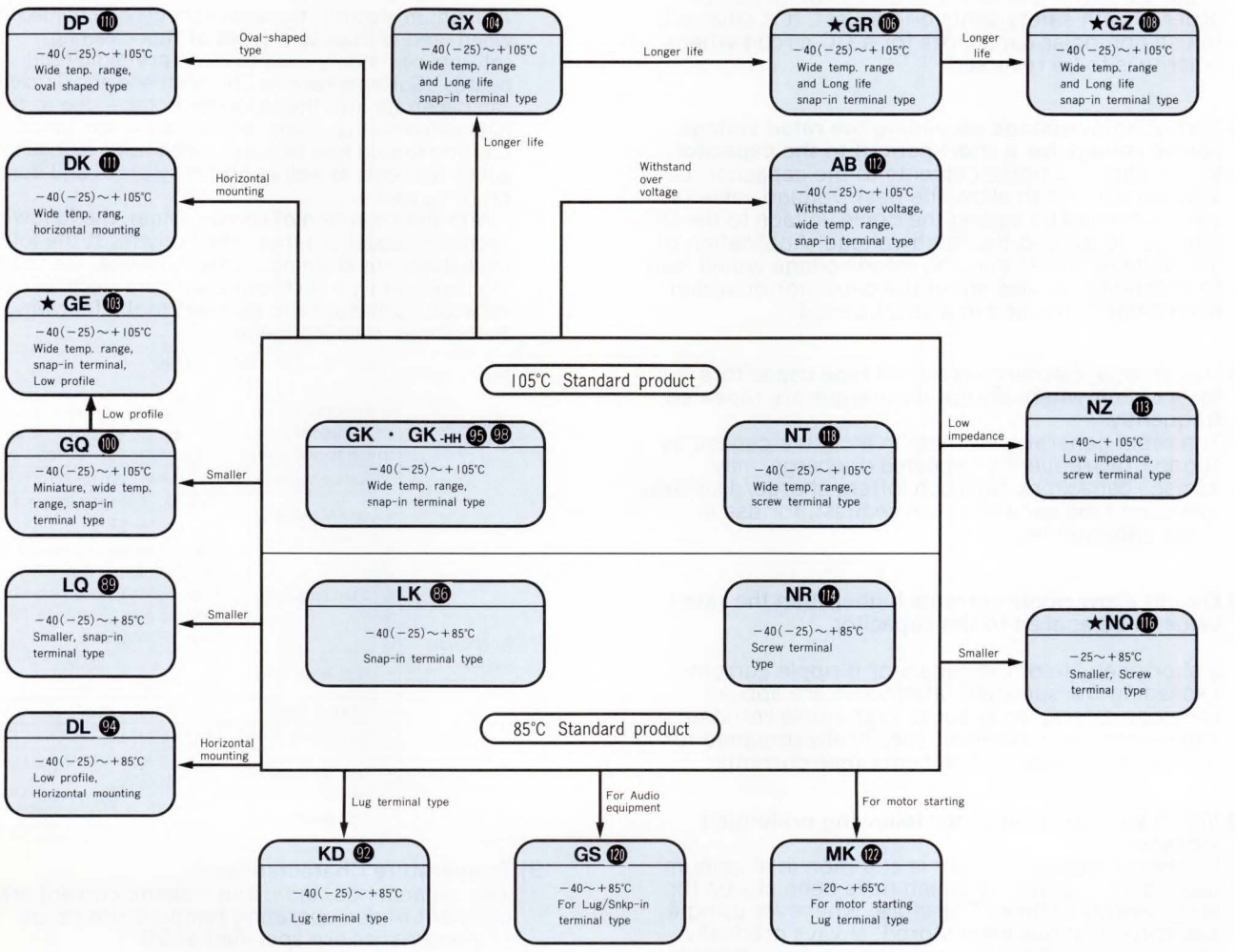


Miniature Aluminum Electrolytic Capacitors

● Matrix for major series

Configuration \ Feature	Standard	Non-polarized	High C/V	Low leakage current	Wide temperature range	For Audio equipment	Low impedance	Long life(5000h)
Standard type	VX	VP	VR	KL	VZ	FS	PL	PQ
Smaller type	VS	——	RS	——	RT(RZ)	——	——	——
7mmL type	SA	SP	SR	SL	ST	SK	SF	SQ
5mmL type	MA	MP	——	ML	MT	MC	MF	MQ
Chip type	WX	UP(WP)	——	——	UT(WT)	UK	WF	UZ

○ Page
★ New series
☆ Extended series



STANDARDIZATION

Some of the series listed right have been obsoleted from this catalog.
On designing, please select from the new series for your applications.

Obsoleted Series	New Series
KV	FX
GP	GE

MX	WX	KX	FX
PZ	PG, PL	HK	GK-HH
KS	FS	PK	GX

IMPORTANT INFORMATION ON THE APPLICATION OF ALUMINUM ELECTROLYTIC CAPACITORS

When you use aluminum electrolytic capacitors, remember the following:

1) DC electrolytic capacitors are polarized.

DC electrolytic capacitors have polarity. The polarity is marked on the body of the capacitor. If polarity is reversed, a short-circuit would occur and an explosion would occur if the capacitor were kept under current.

Nichicon capacitors with diameters ≥10mm are made with a safety-vent design to minimize the possibility of accidental explosion should a capacitor be connected with its polarity reversed. Smaller capacitors with diameters of 5mm~8mm can be ordered with safety-vents on request. It is advisable to use non-polar capacitors for a DC circuit where polarity is to be reversed.

2) Do not apply voltage exceeding the rated voltage (surge voltage for a short period) to the capacitor.

When applying ripple currents to the capacitor, be very careful not to allow the peak voltage value (a value obtained by adding the ripple voltage to the DC voltage) to exceed the rated voltage. Application of any voltage higher than the rated voltage would lead to shortened service life of the capacitor or would even destroy the unit in a short period.

3) Use charge/discharge-resistant type capacitors for a circuit where abrupt discharges are repeated frequently.

The rapid generation of heat in a circuit, caused by sudden or frequently repeated discharge, may damage capacitors. Nichicon offers charge/discharge -resistant type capacitors on request, for use in these applications.

4) Do not allow ripple currents higher than the rated value to be applied to the capacitor.

a shortened life of the capacitor if ripple currents exceeding the specified rated value are applied Nichicon offers, on request, high-ripple resistant capacitors that have been specifically designed for use in circuits exposed to high ripple currents.

5) When you use a capacitor following prolonged storage.

Increased leakage current is common in aluminum electrolytic capacitors which have been stored for long periods of time. Therefore, whenever using a capacitor that has been stored, always gradually increase the voltage to the rated working voltage before application. Since high temperature storage atmospheres tend to increase leakage current, capacitors should be stored at temperatures of −40°C~+40°C and kept out of direct sunlight.

6) Cautions in soldering capacitors.

The characteristics of capacitors will be adversely affected if they are dipped in solder too long or if the solder temperature is too high. Capacitors should be dipped in solder of 260°C or below for 10 sec. or less. Soldering irons must never come in contact with the vinyl insulating sleeve of the capacitor.

7) Be careful not to subject the terminals or lead wires of capacitors to excessive force.

The terminals or lead wires of capacitors may be broken or disconnected, or the capacitors may be damaged if allowed to be subjected to excessive force, so take care not to apply excessive force to them.

8) Cleaning agent for capacitors.

Aluminum electrolytic capacitors may be damaged when used with certain types of flux cleaning solvents commonly used to clean printed circuit boards. Solvents such as Chloroethene and Triclene can penetrate into the capacitor body – due to their high permeability – and destroy capacitor functions. Caution should also be taken when using halogenous adhesive agents as well as humidity-proof and dust-proofing agents.

With the exception of certain values, the following Nichicon capacitor series effectively resist the following halogenous cleaning agents. Likewise, the following large can type Nichicon aluminum electrolytic capacitor series are also resistant to the following halogenous cleaning agents:

Cleaning Agents	Freon TF, TES, TMS, T-P35, Daiflon S3-E, S3-P35		
Cleaning Conditions	5 minutes either by immersion, steaming, spraying or ultrasonic cleaning. Be careful not to apply mechanical stress to the terminals or lead wires.		
Applicable Series	Miniature type	Surface Mounting type	WX, WP, WT, WF, UP, UT, UZ, UR, UX, UK
		Ultra-Miniature type	MA, ML, MP, MT, MQ, MF, MJ, SA, SR, SL, SP, ST, SF, SQ
		Standard type	VX(04)(Less than φ20)(Less than 250 WV), VX(02)(Less than 100WV), VR(Less than 250WV), VZ(Less than 250WV), VS(Less than 250WV), RS, RZ, RT(Less than 250WV), VP, ET
		High Reliability type	PR(Less than 250WV), PY, PF, PL, PQ, PG, PH, BE(04)
		Special type	KL, ZA, TM, SH, HA, JB
		For audio equipment	KZ, FS, FX, FM, SK, MC, UK, ES, DB, GB
	Large Can type	Standard type	LK(Less than 100WV), LQ(Less than 100WV)
		High Reliability type	GK(Less than 100WV), GK-HH(Less than 100WV), GQ(Less than 100WV), GR, GZ

9) Temperature Characteristics.

The capacitance, tanδ, and leakage current are not constant under operating temperature range. These characteristics are specified at 20°C.

The capacitance and leakage current increase, and tanδ decreases at higher temperatures. The capacitance and leakage current decrease, and tanδ increases at lower temperatures.

10) Ripple Current Coefficients.

The maximum ripple current (r.m.s.) is normally specified at 85°C and 120 Hz. When the capacitors are used at a condition other than specified, the maximum ripple current varies with temperature and frequency. The maximum ripple current can be calculated using ripple coefficients which are listed in this catalog.

11) Estimated Life

Environmental conditions affecting the life of aluminum electrolytic capacitors are temperature, humidity, atmospheric pressure and vibration.
Temperature has the greatest effect on life. The relationship between ambient temperatures and capacitor life has been confirmed to follow ARRHENIUS' equation (a chemical reaction formula due to dielectric molecules activated by thermal energy) in the rated operating temperature range of the capacitor. Our test results show the life of the capacitor is reduced approximately by one-half for each temperature increase of 10°C.
The thermal deterioration due to ripple current stress can be seen in a capacitor in service. The relationship between these two factors and the life of the capacitor may be expressed by following formula:

$$L_N = L \cdot 2^{\frac{T-T_N}{10}} \cdot \frac{1}{B_N}$$

L_N : Lifetime under temperature "T_N" (°C), applied voltage "V_N" (V) and applied ripple current "i_N" (Arms).
L : Lifetime under maximum rated operating temperature "T" (°C) and applied voltage "V" (V) equal to rated voltage
B_N : Acceleration coefficient of ripple current at temperature "T_N" (°C) and applied ripple current "i_N"

12) Blank terminals must be mounted to an electrically isolated place.

Blank terminals are not perfectly isolated from the element. It is important when planning the printed circuit board to electrically isolate the blank terminals. The blank terminals are for added stability only, and should never be electrically connected to either the positive or negative terminal.

Type numbering system

1	2 3	4 5	6 7 8	9	10 11	12	13 14
Type	Series name	Rated voltage	Capacitance	Capacitance tolerance	Configuration	Size code	Taped, lead cut/formed

See pages 4 and 5.

See pages 13~122

Radial lead type (JIS CE04)	U
Axial lead type (JIS CE02)	T
Can type (JIS CE62, 69, 33)	L

Voltage (V)	Code
4	0G
5.5	0L
6.3	0J
10	1A
16	1C
25	1E
35	1V
50	1H
63	1J
80	1K
100	2A

Voltage (V)	Code
110	2Q
125	2B
160	2C
180	2Z
200	2D
220	2P
250	2E
315	2F
350	2V
400	2G
450	2W

Capacitance (μF)	Code
0.1	0R1
0.47	R47
1	010
2.2	2R2
22	220
220	221
2200	222
22000	223

Cap. Tol. (%)	Code
±10	K
±20	M
−10~+30	Q
−10~+50	T
Special	A

See pages 10 and 11.

※Trimmed (Cut) or Formed Leads (Radial lead type)

The following code shall be put at 12th~14th digit of the corresponding type number of capacitors.

Configurations	Cut/Formed lead code		Dimensions (mm)				Shape
	Code	Applicable series	φD	F	P	ℓ	
Forming and cutting	1BA	5mmL、7mmL series	4	5	1.5	—	(Code 1BA) 1.5MAX (Code 1FA) 2.5MAX
			5	5	2.0	—	
	1FA	Other series	6.3	5	2.5	—	
			8	5	3.5	—	
Cutting	1CA	All series	10	5	—	—	
			12.5	5	—	—	
			16	7.5	—	—	
			18	7.5	—	—	
			20	10	—	—	
Snap-in	1AE	5mmL、7mmL series	4	5	1.5	1.1	(φ4、5、6.3、8) (Code 1AE) 1.5MAX (Code 1AA) 2.5MAX
			5	5	2.0	1.1	
			6.3	5	2.5	1.1	
			8	5	3.5	1.3	
	1AA	Other series	10	5	—	1.3	(φ10、12.5、16、18、20)
			12.5	5	—	1.3	
			16	7.5	—	1.3	
			18	7.5	—	1.3	
			20	10	—	1.8	

*Lead diameter (φd) differs by capacitor specifications.

※Taped Leads for Automatic Insertion Systems

● Radial lead type

● Specifications and dimensions of taped capacitors

(mm)

Specifications				Capacitor diameter (φ)	Taping code
Packaging	Lead style	Lead space	Feed/hole pitch		
Ammo-pack	Formed lead	5.0	12.7	4~8	1TE (5mmL、7mmL) 1TA (φ8X7、φ5X9~φ8X9、φ5X11~φ8X20)
	Straight lead	See Table 2	12.7	3~10	1TP (5mmL、7mmL) 1TD (φ8X7、φ5X9~φ10X20)
		See Table 2	15.0	12.5	1TO (φ12.5X12.5~φ12.5X25)
		See Table 2	15.0	16、18	1TN (φ16、φ18X15~25)

(Formed lead type)

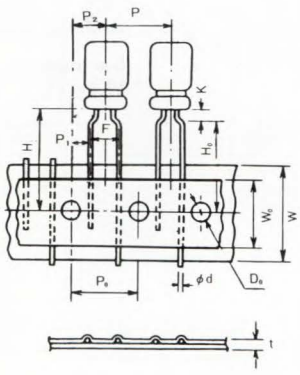


Table 1

(mm)

Item \ Case Size	Tolerance	Formed Lead Type						
		φ4X5 φ4X7	φ5X5 φ5X7	φ5X9 φ5X11	φ6.3X5 φ6.3X7	φ8X5 φ8X7	φ6.3X9 φ6.3X11 φ6.3X15	φ8X9 φ8X11.5 φ8X15 φ8X20
φd Lead-wire diameter	±0.05	0.45	0.45	0.5	0.45	0.45 0.5	0.5	0.6
P Pitch of component	±1.0	12.7	12.7	12.7	12.7	12.7	12.7	12.7
P_0 Feed hole pitch	±0.3	12.7	12.7	12.7	12.7	12.7	12.7	12.7
P_1 Hole center to lead	±0.7	3.85	3.85	3.85	3.85	3.85	3.85	3.85
P_2 Feed hole center to component center	±1.3	6.35	6.35	6.35	6.35	6.35	6.35	6.35
F Lead-to-lead distance	$\pm^{0.8}_{0.2}$	5.0	5.0	5.0	5.0	5.0	5.0	5.0
K Clinch height	MAX.	1.5	1.5	2.5	1.5	1.5 (4)※	2.5	4.0
H Height of component from tape center	±0.75	17.5	17.5	18.5	17.5	17.5 (20)※	18.5	20.0
H_0 Lead-wire clinch height	±0.5	16.0	16.0	16.0	16.0	16.0	16.0	16.0
W Tape width	$\pm^{1.0}_{0.5}$	18.0	18.0	18.0	18.0	18.0	18.0	18.0
W_0 Hold down tape width	MIN.	12.5	12.5	12.5	12.5	12.5	12.5	12.5
ϕD_0 Feed hole diameter	±0.2	4.0	4.0	4.0	4.0	4.0	4.0	4.0
t Total tape thickness	±0.2	0.7	0.7	0.7	0.7	0.7	0.7	0.7

※( ) Shows for φ8X7, applicable to taping code 1TA.

(Straight lead type)

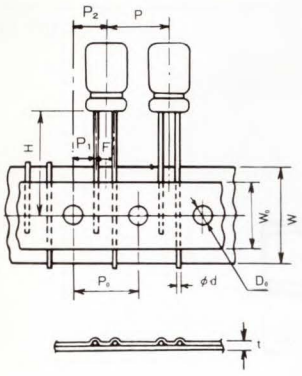


Table 2

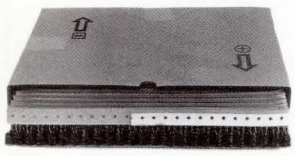
Item \ Type	Tolerance	φ3 φ3.5 φ4	φ5	φ6.3	φ8×5	φ8×7	φ8	φ10	φ12.5	φ16 φ18
		Straight Lead Type								
φd Lead-wire diameter	±0.05	0.4 0.45	0.45 0.5	0.45 0.5	0.45	0.5	0.6	0.6	0.6	0.8
P Pitch of component	±1.0	12.7	12.7	12.7	12.7	12.7	12.7	12.7	15.0	30.0
P_0 Feed hole pitch	±0.3	12.7	12.7	12.7	12.7	12.7	12.7	12.7	15.0	15.0
P_1 Hole center to leed	±0.7	5.1 ※5.35	5.1 ※5.35	5.1 ※5.35	5.1	4.6	4.6	3.85	5.0	3.75
P_2 Feed hole center to component center	±1.3	6.35	6.35	6.35	6.35	6.35	6.35	6.35	7.5	7.5
F Lead-to-lead distance	±0.8	2.5※	2.5※	2.5※	2.5	3.5	3.5	5.0	5.0	7.5
H Height of component from tape center	±0.75	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5
W Tape width	+1.0 −0.5	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
W_0 Hold down tape width	MIN.	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5
$φD_0$ Feed hole diameter	±0.2	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
t Total tape thickness	±0.2	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7

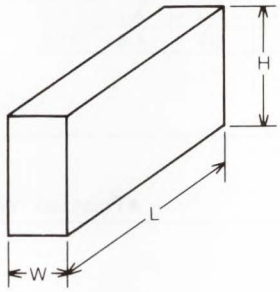
※F=2.0mm is also available.
(Except for 9mmL or longer)

Special taping specifications on H. F. K. dimensions other than the above figures are available upon request.

Packaging

● Ammo-pack (Flat box type)





mm

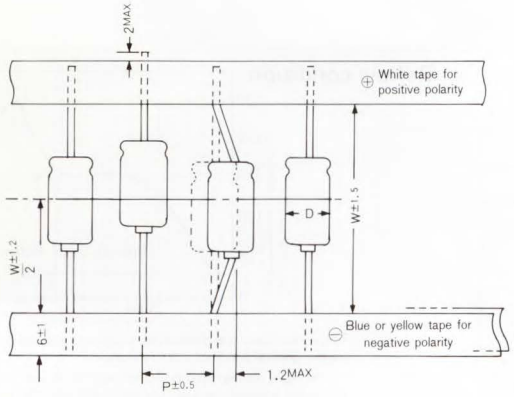
	L	H	W	Case Size	Q'ty/Box
A	340	250	50	4×5、4×7	2000pcs.
B	340	290	50	5×5、5×7	2000pcs.
C	340	260	54	4×11、5×9、5×11	2000pcs.
				8×5、8×7、8×9、8×11.5、8×15	1000pcs.
				10×9、10×12.5、10×15、10×16	500pcs.
D	340	260	62	8×20	1000pcs.
				10×20	500pcs.
E	340	300	54	6.3×9、6.3×11、6.3×15	2000pcs.
F	340	350	50	3×5、3.5×5	3000pcs.
				6.3×5、6.3×7	2000pcs.
G	340	320	62	12.5×12.5、12.5×15、12.5×20	500pcs.
				16×15、16×20、18×15、18×20	250pcs.
H	340	320	66	12.5×25	500pcs.
				16×25、18×25	250pcs.

● Axial lead type

mm

Specifications		Dia. of component (φ)	Taping code	Q'ty/Reel(pcs.)
Tape width	Pitch of component			
52.4	10	5、6、6.3、8	1LS	1500(φ5) 1400(φ6)
63.5	10	5、6、6.3、8	1LV	1300(φ6.3) 1000(φ8)
73.0	10	5、6、6.3、8	1LY	1500(φ5) 1400(φ6) 1300(φ6.3) 1000(φ8)
52.4	15	10、13(except φ13×31.5)	1LT	500(φ10) 350(φ13)
63.5	15	10、13	1LW	
73.0	15	10、13	1LZ	

Please contact us for complete information on the package dimensions for taped axial lead capacitors.

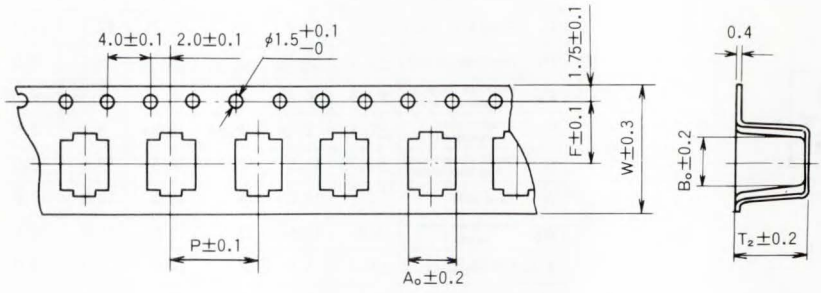


ALUMINUM ELECTROLYTIC CAPACITORS

Taping Specifications for Chip Type Capacitors (WX, WP, WT, WF, UP, UT, UZ, UR, UX, UK)

● Carrier tape

Unit:mm



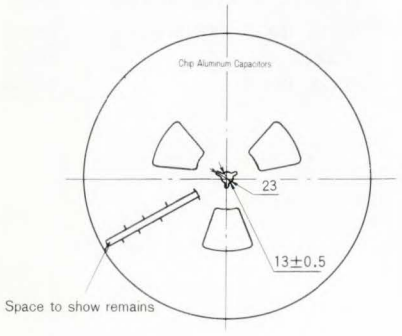
■Dimensions

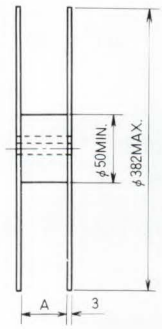
Item \ Series / Size	WX、WP、WT、WF				UP、UT、UZ、UR、UK			WF、UR、UX		
	φ3	φ4	φ5	φ6.3	φ4	φ5	φ6.3	φ8×6	φ8×10	φ10×10
W	12.0	12.0	12.0	16.0	12.0	12.0	16.0	16.0	24.0	24.0
P	8.0	8.0	12.0	12.0	8.0	12.0	12.0	12.0	16.0	16.0
F	5.5	5.5	5.5	7.5	5.5	5.5	7.5	7.5	11.5	11.5
A_o	3.8	5.0	6.0	7.0	5.0	6.0	7.0	8.7	8.7	10.7
B_o	3.8	5.0	6.0	7.0	5.0	6.0	7.0	8.7	8.7	10.7
T_2	5.8	5.8	5.8	5.8	6.3	6.3	6.3	6.8	11.0	11.0

● Reel

● Polarized (WX, WT, WF, UT, UZ, UR, UX, UK)

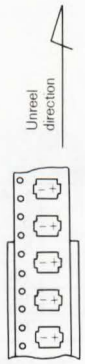
Unit:mm





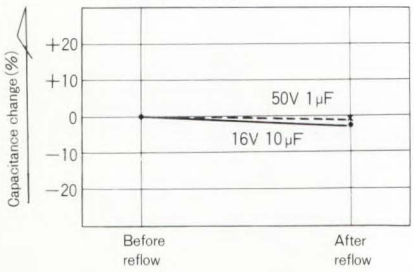
φD	Q'ty/Reel,
3、4	2000pcs.
5、6.3	1000pcs.
8×6	1000pcs.
8×10、10×10	500pcs.

φD	3、4	5	6.3	8×6	8×10、10×10
A	14	14	18	18	26

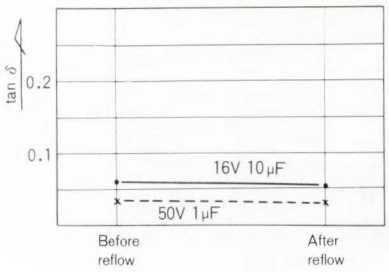


Reflow temperature characteristics

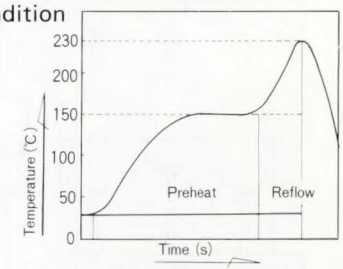
(1) Capacitance change vs. reflow



(2) Tan δ change vs. reflow



Reflow condition



Reflow conditions are different by equipment, but mentioned below are the general conditions, for reference:

- Duration of preheat shall be for 60 seconds at less than 150℃.
- Terminal temperature shall not be raised over 230℃.
- Duration of reflow shall be within 30 seconds.

WX series

5.5mmL Chip Type

For SMD | Smaller | Anti-Solvent Feature

- Chip type with 5.5mm height.
- Designed for surface mounting on high density PC board.
- Applicable to automatic insertion machine using carrier tape.
- Load life of 2000 hours at 85°C.

WT (High Temperature) / WP (Non-polarized) / WX

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+85°C
Voltage Range	4～50V
Capacitance Range	0.1～220μF
Capacitance Tolerance	±20% at 120Hz, 20°C
Leakage Current	After 2 minutes' application of rated voltage, leakage current is not more than 0.01CV or 3(μA), whichever is greater.
tan δ	Measurement frequency: 120Hz, Temperature: 20°C. Values in ( ) applicable to φ3 case size.

Rated voltage (V)	4	6.3	10	16	25	35	50
tan δ (MAX.)	0.35(0.40)	0.26(0.30)	0.20(0.24)	0.16(0.19)	0.14(0.16)	0.12(0.14)	0.12(0.14)

Stability at Low Temperature — Measurement frequency: 120Hz

Rated voltage (V)		4	6.3	10	16	25	35	50
Impedance ratio ZT/Z20 (MAX.)	Z−25°C/Z+20°C	7	4	3	2	2	2	2
	Z−40°C/Z+20°C	15	8	8	4	4	3	3

Load Life — After 2000 hours' application of rated voltage at 85°C, capacitors meet the characteristics requirements listed at right.

Leakage Current	Initial specifed value or less
Capacitance change	Within ±20% of initial value (Within ±25% for 4W.V. and φ3 units)
tan δ	200% or less of initial specified value

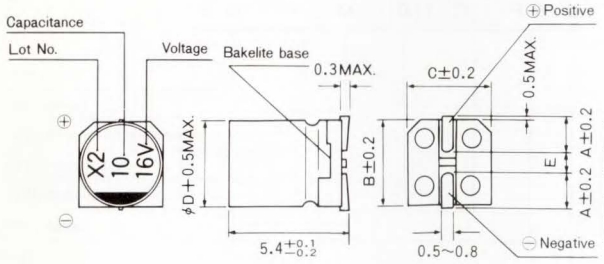
Shelf Life — After leaving capacitors under no load at 85°C for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.

Resistance to soldering heat — The capacitors shall be kept on the hot plate maintained at 250°C for 30 seconds. After removing from the hot plate and restored at room temperature, they meet the characteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±10% of initial value
tan δ	Initial specified value or less

Marking	Black print on the case top.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Chip Type



(mm)

φD	3	4	5	6.3
A	1.5	1.8	2.1	2.4
B	3.3	4.3	5.3	6.6
C	3.3	4.3	5.3	6.6
E	0.8	1.0	1.3	2.2

※In case of marking for 3φ units, "V" for rated voltage is omitted and Lot No. is expressed only by a digit (month code).

Type numbering system (Example: 16V 10μF)

1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	W	X	1	C	1	0	0	M	C	R	1	G	B

Taping code
Case dia. code
Configuration
Capacitance tolerance (±20%)
Capacitance (10μF)
Rated voltage (16V)
Series name
Type

φD	Code
3	2
4～6.3	1

■Dimensions

Cap. (μF) \ W.V.	Code	4		6.3		10		16		25		35		50	
		0G		0J		1A		1C		1E		1V		1H	
0.1	0R1													4	4(3) 1.0
0.22	R22													4	2.0
0.33	R33													4(3)	2.8
0.47	R47													4(3)	4.0
1	010													4(3)	8.4(8.0)
2.2	2R2											3	8.4	4(3)	13(10)
3.3	3R3											3	10	4	17
4.7	4R7									4(3)	16(12)	4	18	5	20
10	100							4(3)	23(18)	5	27	5	29	6.3	33
22	220	3	19	4(3)	28(21)	5	33	5	37	6.3	42	6.3	46		
33	330	4	28	5	37	5	41	6.3	49	6.3	52				
47	470	4	33	5	45	6.3	52	6.3	58						
100	101	5	56	6.3	70										
220	221	6.3	96											Case size	Allowable ripple

( ) is also available with φ3mm upon request.

Allowable Ripple (mA) at 85°C 120Hz

Taping Specifications are given in page 12.

ALUMINUM ELECTROLYTIC CAPACITORS

WP series — 5.5mL Chip Type, Non-Polarized

For SMD | Smaller | Anti-Solvent Feature | Non-polarized

- Designed for surface mounting on high density PC board.
- Applicable to automatic insertion machine using carrier tape.

WP ← Non-polarized → WX

■Specifications

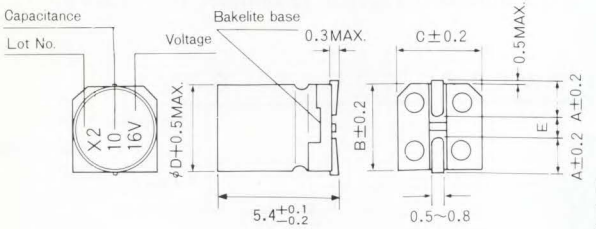
Item	Performance Characteristics
Operating Temperature Range	−40～+85℃
Voltage Range	6.3～50V
Capacitance Range	0.1～47μF
Capacitance Tolerance	±20% at 120 Hz, 20℃
Leakage Current	After 2 minutes' application of rated voltage, leakage current is not more than 0.05CV or 10(μA), whichever is greater.
tan δ	Measurement frequency : 120 Hz, Temperature: 20℃

Rated voltage (V)	6.3	10	16	25	35	50
tan δ (MAX.)	0.24	0.20	0.17	0.17	0.15	0.15

Stability at Low Temperature		Measurement frequency : 120Hz					
Rated voltage (V)		6.3	10	16	25	35	50
Impedance ratio ZT/Z20(MAX.)	Z−25℃/Z+20℃	4	3	2	2	2	2
	Z−40℃/Z+20℃	8	6	4	4	3	3

Load Life	After 1000 hours' application of rated voltage at 85℃ with the polarity inverted every 250 hours, capacitors meet the characteristics requirements listed at right.	Leakage Current: Initial specified value or less Capacitance change: Within ±20% of initial value tan δ: 200% or less of initial specified value
Shelf Life	After leaving capacitors under no load at 85℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.	
Resistance to soldering heat	The capacitors shall be kept on the hot plate maintained at 250℃ for 30 seconds. After removing from the hot plate and restored at room temperature, they meet the characteristics requirements listed at right.	Leakage current: Initial specified value or less Capacitance change: Within ±10% of initial value tan δ: Initial specified value or less
Marking	Black print on the case top.	
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.	

■Chip Type



φD	4	5	6.3
A	1.8	2.1	2.4
B	4.3	5.3	6.6
C	4.3	5.3	6.6
E	1.0	1.3	2.2

Type numbering system (Example: 16V 10μF)

1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	W	P	1	C	1	0	0	M	C	R	1	G	B

- 14: Taping code
- 13: Configuration
- 12: Capacitance tolerance (±20%)
- 11: Capacitance (10μF)
- 8～10: Rated voltage (16V)
- 4～7: Series name
- 1～3: Type

■Dimensions

Cap.(μF) \ W.V.	Code	6.3		10		16		25		35		50	
		0J		1A		1C		1E		1V		1H	
0.1	0R1											4	1.0
0.22	R22											4	2.0
0.33	R33											4	2.8
0.47	R47											4	4.0
1	010											4	8.4
2.2	2R2									4	8.4	5	13
3.3	3R3							5	12	5	16	5	17
4.7	4R7					4	12	5	16	5	18	6.3	20
10	100			4	17	5	23	6.3	27	6.3	29		
22	220	5	28	6.3	33	6.3	37						
33	330	6.3	37	6.3	41	6.3	49						Allowable
47	470	6.3	45									Case size	ripple

Allowable Ripple (mA) at 85℃ 120Hz

• Taping Specifications are given in page 12.

ALUMINUM ELECTROLYTIC CAPACITORS

nichicon

WT 5.5mmL Chip Type, Wide Temperature Range series

For SMD | Smaller | Anti-Solvent Feature

- Chip type with 5.5mm height, operating over wide temperature range of −55～+105℃.
- Designed for surface mounting on high density PC board.
- Applicable to automatic insertion machine using carrier tape.

WT
High Temperature
WX

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−55～+105℃
Voltage Range	4～50V
Capacitance Range	0.1～100μF
Capacitance Tolerance	±20% at 120Hz, 20℃
Leakage Current	After 2 minutes' application of rated voltage, leakage current is not more than 0.01CV or 3 (μA), whichever is greater.
tan δ	Measurement frequency : 120Hz, Temperature : 20℃

Rated voltage (V)	4	6.3	10	16	25	35	50
tan δ (MAX.)	0.40	0.30	0.24	0.20	0.16	0.14	0.14

Stability at Low Temperature		Measurement frequency : 120Hz						
Rated voltage (V)		4	6.3	10	16	25	35	50
Impedance ratio ZT/Z20 (MAX.)	Z−25℃/Z+20℃	7	4	3	2	2	2	2
	Z−40℃/Z+20℃	15	8	8	4	4	3	3

Load Life

After 1000 hours' application of rated votage at 105℃, capacitors meet the characteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±25% of initial value for capacitors of 16WV or less. Within ±20% of initial value for capacitors of 25WV or more.
tan δ	200% or less of initial specified value

Shelf Life

After leaving capacitors under no load at 105℃ for 1000hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.

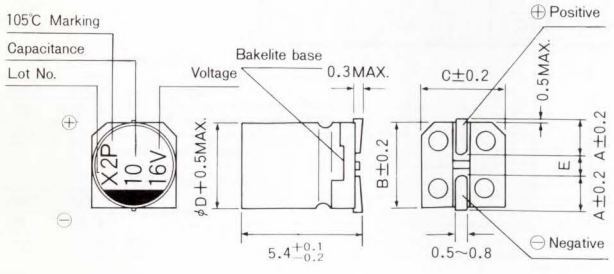
Resistance to soldering heat

The capacitors shall be kept on the hot plate maintained at 250℃ for 30 seconds. After removing from the hot plate and restored at room temperature, they meet the characteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±10% of initial value
tan δ	Initial specified value or less

Marking	Black print on the case top.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Chip Type



(mm)

φD	4	5	6.3
A	1.8	2.1	2.4
B	4.3	5.3	6.6
C	4.3	5.3	6.6
E	1.0	1.3	2.2

Type numbering system (Example: 16V 10μF)

1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	W	T	1	C	1	0	0	M	C	R	1	G	B

- Taping code
- Configuration
- Capacitance tolerance (±20%)
- Capacitance (10μF)
- Rated voltage (16V)
- Series name
- Type

■Dimensions

W.V.	4		6.3		10		16		25		35		50	
Cap. (μF)	Code	0G		0J		1A		1C		1E		1V		1H	
0.1	0R1													4	1.0
0.22	R22													4	2.6
0.33	R33													4	3.2
0.47	R47													4	3.8
1	010													4	6.2
2.2	2R2													4	11
3.3	3R3													4	14
4.7	4R7									4	13	4	15	5	19
10	100							4	18	5	23	5	25	6.3	30
22	220	4	22	4	22	5	27	5	30	6.3	38	6.3	42		
33	330	5	30	5	30	5	35	6.3	40	6.3	48				
47	470	5	36	5	36	6.3	46	6.3	50						Allowable ripple
100	101	6.3	60	6.3	60									Case size	

Allowable Ripple (mA) at105℃ 120Hz

• Taping Specifications are given in page 12.

ALUMINUM ELECTROLYTIC CAPACITORS

WF Chip Type. Low Impedance series

For SMD | Low Impedance | Anti-Solvent Feature

- Chip type, low impedance temperature range up to +105°C.
- Designed for surface mounting on high density PC board.
- Applicable to automatic insertion machine using carrier tape.

WF ← Low Impedance WT

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−55～+105℃
Voltage Range	6.3～35V
Capacitance Range	1～220μF
Capacitance Tolerance	±20% at 120Hz, 20℃
Leakage Current	After 2 minute's application of rated voltage, leakage current is not more than 0.01CV or 3(μA), whichever is greater.
tan δ	Measurement : frequency : 120Hz, Temperature : 20℃

Rated voltage (V)	6.3	10	16	25	35
tan δ (MAX.)	0.22	0.19	0.16	0.14	0.12

Stability at Low Temperature — Measurement frequency : 120Hz

Rated voltage (V)		6.3	10	16	25	35
Impedance ratio ZT/Z20 (MAX.)	Z−25℃/Z+20℃	2	2	2	2	2
	Z−55℃/Z+20℃	4	4	3	3	3

Load Life — After 1000 hours' application of rated voltage at 105℃, capacitors meet the characteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

Shelf Life — After leaving capacitors under no load at 105℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.

Resistance to soldering heat — The capacitors shall be kept on the hot plate maintained at 250℃ for 30 seconds. After removing from the hot plate and restored at room temperature, they meet the characteristics requirements listed at right.

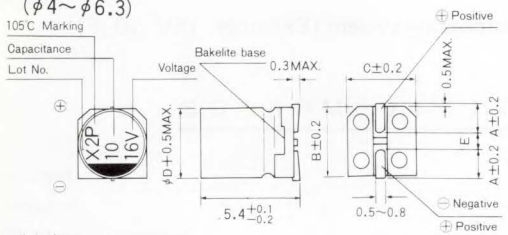
Leakage current	Initial specified value or less
Capacitance change	Within ±10% of initial value
tan δ	Initial specified value or less

Marking — φ4～φ6.3 : Blackprint on the case top, φ8 : Printed with black color letter on clear yellow sleeve according to JIS C-5141.

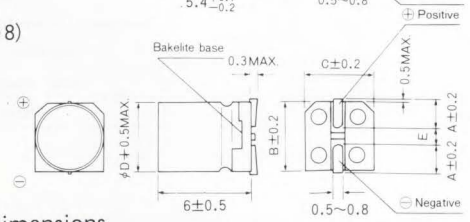
Applicable Standards — Characteristics W of JIS C-5141 and JIS C-5102.

■Chip Type

(φ4～φ6.3)



(φ8)



φD	4	5	6.3	8
A	1.8	2.1	2.4	3.3
B	4.3	5.3	6.6	8.3
C	4.3	5.3	6.6	8.3
E	1.0	1.3	2.2	2.3

Type numbering system (Example: 16V 10μF)

1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	W	F	1	C	1	0	0	M	C	R	1	G	B

Taping code
Configuration
Capacitance tolerance (±20%)
Capacitance (10μF)
Rated voltage (16V)
Series name
Type

φD	Code
4～6.3	GB
8	GS

φD	Code
4～6.3	CR
8	BT

■Dimensions

W.V. / Cap. (μF)	Code	6.3			10			16			25			35		
		0J			1A			1C			1E			1V		
1	010													4	5.0	50
1.5	1R5													4	5.0	50
2.2	2R2													4	5.0	50
3.3	3R3													4	5.0	50
4.7	4R7										4	5.0	50	4	5.0	50
6.8	6R8										4	5.0	50	5	2.6	80
10	100							4	5.0	50	5	2.6	80	5	2.6	80
15	150							5	2.6	80	6.3	1.3	115	6.3	1.3	115
22	220	4	5.0	50	5	2.6	80	5	2.6	80	6.3	1.3	115	6.3	1.3	115
33	330	5	2.6	80	5	2.6	80	6.3	1.3	115	6.3	1.3	115	8	0.8	150
47	470	5	2.6	80	6.3	1.3	115	6.3	1.3	115	8	0.8	150	8	0.8	150
68	680	6.3	1.3	115	6.3	1.3	115	8	0.8	150	8	0.8	150			
100	101	6.3	1.3	115	8	0.8	150	8	0.8	150						
150	151	8	0.8	150	8	0.8	150							Case size	Impedance	Allowable ripple
220	221	8	0.8	150												

• Taping Specifications are given in page 12.

Allowable Ripple (mA) at 105℃ 100Hz
Max. Impedance: (Ω) at 20℃ 100kHz

UP series

6mmL Chip Type, Non-Polarized

For SMD | Non-Polarized | Anti-Solvent Feature

- Chip type, non-polarized withstanding high temperature range up to +105℃.
- Designed for surface mounting on high density PC board.
- Applicable to automatic insertion machine using carrier tape.

UP ← Non-polarized → UT

Smaller ↓

WP

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+105℃
Voltage Range	6.3～50V
Capacitance Range	0.1～47μF
Capacitance Tolerance	±20% at 120 Hz, 20℃
Leakage Current	After 2 minutes' application of rated voltage, leakage current is not more than 0.05CV or 10 (μA) , whichever is greater.
tan δ	Measurement frequency : 120 Hz, Temperature : 20℃

Rated voltage (V)	6.3	10	16	25	35	50
tan δ (MAX.)	0.24	0.20	0.17	0.17	0.15	0.15

Stability at Low Temperature — Measurement frequency : 120Hz

Rated voltage (V)		6.3	10	16	25	35	50
Impedance ratio	Z−25℃/Z+20℃	4	3	2	2	2	2
ZT/Z20 (MAX.)	Z−40℃/Z+20℃	8	6	4	4	3	3

Load Life — After 1000 hours' application of rated voltage at 105℃ with the polarity inverted every 250 hours, capacitors meet the characteristics requirements listed at right.

Leakage Current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

Shelf Life — After leaving capacitors under no load at 105℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.

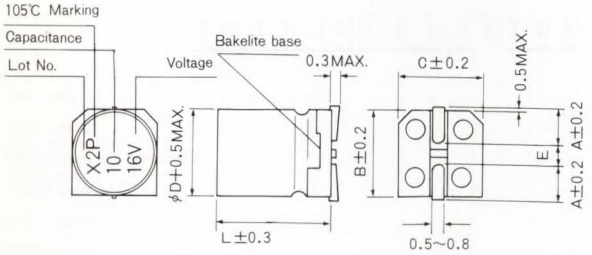
Resistance to soldering heat — The capacitors shall be kept on the hot plate maintained at 250℃ for 30 seconds. After removing from the hot plate and restored at room temperature, they meet the characteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±10% of initial value
tan δ	Initial specified value or less

Marking — Black print on the case top.

Applicable Standards — Characteristics W of JIS C-5141 and JIS C-5102.

■Chip Type



(mm)

φD	4	5	6.3
A	1.8	2.1	2.4
B	4.3	5.3	6.6
C	4.3	5.3	6.6
E	1.0	1.3	2.2
L	5.7	5.7	5.7

Type numbering system (Example: 16V 10μF)

1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	U	P	1	C	1	0	0	M	C	R	1	G	S

- 14: Taping code
- 13: Configuration
- 9: Capacitance tolerance (±20%)
- 8～6: Capacitance (10μF)
- 5～4: Rated voltage (16V)
- 3: Series name
- 2～1: Type

■Dimensions

W.V.	6.3		10		16		25		35		50	
Cap. (μF) / Code	0J		1A		1C		1E		1V		1H	
0.1 / 0R1											4	1.0
0.22 / R22											4	2.0
0.33 / R33											4	2.8
0.47 / R47											4	4.0
1 / 010											4	8.4
2.2 / 2R2									4	8.4	5	13
3.3 / 3R3							5	12	5	16	5	17
4.7 / 4R7					4	12	5	16	5	18	6.3	20
10 / 100			4	17	5	23	6.3	27	6.3	29		
22 / 220	5	28	6.3	33	6.3	37						
33 / 330	6.3	37	6.3	41	6.3	49						
47 / 470	6.3	45									Case size	Allowable ripple

Allowable Ripple (mA) at 105℃ 120Hz

• Taping Specifications are given in page 12.

ALUMINUM ELECTROLYTIC CAPACITORS

UT series

6mmL Chip Type, Wide Temperature Range

For SMD | Anti-Solvent Feature

- Chip type with load life 2000 hours at +105℃.
- Designed for surface mounting on high density PC board.
- Applicable to automatic insertion machine using carrier tape.

UT
High Temperature
MX

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−55～+105℃
Voltage Range	4～50V
Capacitance Range	0.1～100μF
Capacitance Tolerance	±20% at 120Hz, 20℃
Leakage Current	After 2 minutes' application of rated voltage, leakage current is not more than 0.01CV or 3 (μA), whichever is greater.
tan δ	Measurement frequency : 120Hz, Temperature : 20℃

Rated voltage (V)	4	6.3	10	16	25	35	50
tan δ (MAX.)	0.37	0.28	0.24	0.20	0.16	0.13	0.12

Stability at Low Temperature — Measurement frequency : 120Hz

Rated voltage (V)		4	6.3	10	16	25	35	50
Impedance ratio ZT/Z20 (MAX.)	Z−25℃/Z+20℃	6	3	3	2	2	2	2
	Z−40℃/Z+20℃	12	8	5	4	3	3	3

Load Life — After 2000 hours' application of rated votage at 105℃, capacitors meet the characteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±25% of initial value for capacitors of 16WV or less. Within ±20% of initial value for capacitors of 25WV or more.
tan δ	200% or less of initial specified value

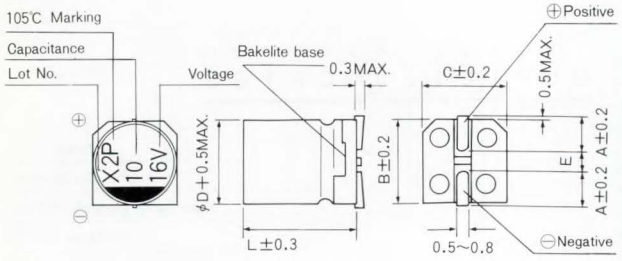
Shelf Life — After leaving capacitors under no load at 105℃ for 1000hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.

Resistance to soldering heat — The capacitors shall be kept on the hot plate maintained at 250℃ for 30 seconds. After removing from the hot plate and restored at room temperature, they meet the characteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±10% of initial value
tan δ	Initial specified value or less

Marking	Black print on the case top.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Chip Type



(mm)

φD	4	5	6.3
A	1.8	2.1	2.4
B	4.3	5.3	6.6
C	4.3	5.3	6.6
E	1.0	1.3	2.2
L	5.7	5.7	5.7

Type numbering system (Example: 16V 10μF)

1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	U	T	1	C	1	0	0	M	C	R	1	G	S

- 14: Taping code
- 13: Configuration
- 12: Capacitance tolerance (±20%)
- 11: Capacitance (10μF)
- 10: Rated voltage (16V)
- 9: Series name
- 8: Type

■Dimensions

W.V. / Cap. (μF)	Code	4		6.3		10		16		25		35		50	
		0G		0J		1A		1C		1E		1V		1H	
0.1	0R1													4	1.0
0.22	R22													4	2.6
0.33	R33													4	3.2
0.47	R47													4	3.8
1	010													4	6.2
2.2	2R2													4	11
3.3	3R3													4	14
4.7	4R7									4	13	4	15	5	19
10	100							4	18	5	23	5	25	6.3	30
22	220	4	22	4	22	5	27	5	30	6.3	38	6.3	42		
33	330	5	30	5	30	5	35	6.3	40	6.3	48				
47	470	5	36	5	36	6.3	46	6.3	50						Allowable ripple
100	101	6.3	60	6.3	60									Case size	

Allowable Ripple (mA) at 105℃ 120Hz

• Taping Specifications are given in page. 12

UZ series

6mmL Chip Type, Long Life Assurance

For SMD | Anti-Solvent Feature | Long Life

- Chip type with load life of 5000 hours at +105°C.
- Designed for surface mounting on high density PC board.
- Applicable to automatic insertion machine using carrier tape.

UT → Long Life → UZ

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−55～+105°C
Voltage Range	4～50V
Capacitance Range	0.1～100μF
Capacitance Tolerance	±20% at 120Hz, 20°C
Leakage Current	After 2 minutes' application of rated voltage, leakage current is not more than 0.01CV or 3 (μA), whichever is greater.
tan δ	Measurement frequency : 120Hz, Temperature : 20°C

Rated voltage (V)	4	6.3	10	16	25	35	50
tan δ (MAX.)	0.37	0.28	0.24	0.20	0.16	0.13	0.12

Stability at Low Temperature — Measurement frequency : 120Hz

Rated voltage (V)		4	6.3	10	16	25	35	50
Impedance ratio	Z−25°C/Z+20°C	6	3	3	2	2	2	2
ZT/Z20 (MAX.)	Z−55°C/Z+20°C	12	8	5	4	3	3	3

Load Life — After 5000 hours' application of rated votage at 105°C, capacitors meet the characteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±30% of initial value
tan δ	300% or less of initial specified value

Shelf Life — After leaving capacitors under no load at 105°C for 1000hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.

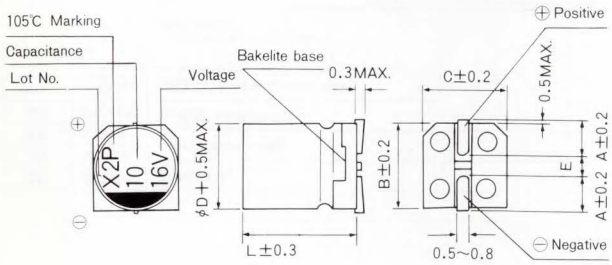
Resistance to soldering heat — The capacitors shall be kept on the hot plate maintained at 250°C for 30 seconds. After removing from the hot plate and restored at room temperature, they meet the characteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±10% of initial value
tan δ	Initial specified value or less

Marking — Black print on the case top.

Applicable Standards — Characteristics W of JIS C-5141 and JIS C-5102.

■Chip Type



(mm)

	4	5	6.3
A	1.8	2.1	2.4
B	4.3	5.3	6.6
C	4.3	5.3	6.6
E	1.0	1.3	2.2
L	5.7	5.7	5.7

Type numbering system (Example: 16V 10μF)

1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	U	Z	1	C	1	0	0	M	F	R	1	G	S

- 13 14 : Taping code
- 12 : Configuration
- 9 : Capacitance tolerance (±20%)
- 6 7 8 : Capacitance (10μF)
- 4 5 : Rated voltage (16V)
- 3 : Series name
- 1 2 : Type

■Dimensions

W.V.	4		6.3		10		16		25		35		50	
Cap. (μF) / Code	0G		0J		1A		1C		1E		1V		1H	
0.1 / 0R1													4	1.0
0.22 / R22													4	2.6
0.33 / R33													4	3.2
0.47 / R47													4	3.8
1 / 010													4	6.2
2.2 / 2R2													4	11
3.3 / 3R3													4	14
4.7 / 4R7									4	13	4	15	5	19
10 / 100							4	18	5	23	5	25	6.3	30
22 / 220	4	22	4	22	5	27	5	30	6.3	38	6.3	42		
33 / 330	5	30	5	30	5	35	6.3	40	6.3	48				
47 / 470	5	36	5	36	6.3	46	6.3	50						Allowable ripple
100 / 101	6.3	60	6.3	60									Case size	

Allowable Ripple (mA) at 105°C 120°C 120Hz

• Taping Specifications are given in page 12 .

ALUMINUM ELECTROLYTIC CAPACITORS

UR series — Chip Type, High C/V

For SMD | Anti-Solvent Feature

- Chip type, higher capacitance in larger case sizes
- Designed for surface mounting on high density PC board.
- Applicable to automatic insertion machine using carrier tape.

UX → Smaller → UR

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+85℃
Voltage Range	6.3～50V
Capacitance Range	22～1000μF
Capacitance Tolerance	±20% at 120Hz, 20℃
Leakage Current	After 1 minutes' application of rated voltage, leakage current is not more than 0.03CV (μA).

tan δ — Measurement frequency : 120 Hz, Temperature : 20℃

Rated voltage (V)	6.3	10	16	25	35	50
tan δ (MAX.)	0.28	0.24	0.20	0.16	0.14	0.12

Stability at Low Temperature — Measurement frequency : 120Hz

Rated voltage (V)		6.3	10	16	25	35	50
Impedance ratio ZT/Z20 (MAX.)	Z−25℃/Z+20℃	5	4	3	2	2	2
	Z−40℃/Z+20℃	10	8	6	4	3	3

Load Life — After 2000 hours' application of rated voltage at 85℃, capacitors meet the characteristics requirements listed at right.

Leakage Current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

Shelf Life — After leaving capacitors under no load at 85℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.

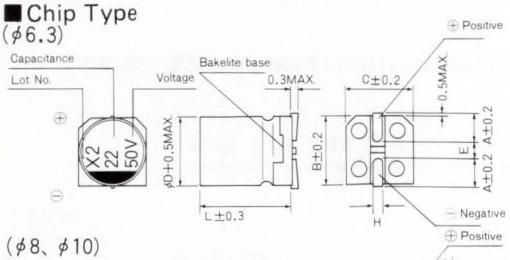
Resistance to soldering heat — The capacitors shall be kept on the hot plate maintained at 250℃ for 30 seconds. After removing from the hot plate and restored at room temperature, they meet the characteristics requirements listed at right.

Leakage Current	Initial specified value or less
Capacitance change	Within ±10% of initial value
tan δ	Initial specified value or less

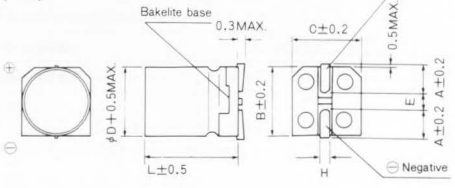
Marking	φ6.3 : Black print on the case top. φ8～φ10 : Printed with black color letter on clear yellow sleeve according to JIS C-5141.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Chip Type

(φ6.3)



(φ8、φ10)



DXL	6.3X5.7	8X6	8X10	10X10
A	2.4	3.3	2.9	3.2
B	6.6	8.3	8.3	10.3
C	6.6	8.3	8.3	10.3
E	2.2	2.3	3.1	4.5
H	0.5~0.8	0.5~0.8	0.8~1.1	0.8~1.1

Type numbering system (Example: 16V 220μF)

1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	U	R	1	C	2	2	1	M	N	T	1	G	S

- 12 13 14 : Taping code
- 10 11 : Configuration
- 9 : Capacitance tolerance (±20%)
- 6 7 8 : Capacitance (220μF)
- 4 5 : Rated voltage (16V)
- 3 : Series name
- 1 2 : Type

DXL	Code
6.3X5.7	CR
8X6	BT
8X10	NT
10X10	NT

■Dimensions

DXL (mm)

Cap. (μF) \ W.V.	Code	6.3		10		16		25		35		50	
		0J		1A		1C		1E		1V		1H	
22	220											6.3X5.7	45
33	330									6.3X5.7	55	8X6	95
47	470							6.3X5.7	65	8X6	105	8X10	140
100	101			6.3X5.7	70	8X6	125	8X6	145	8X10	175	10X10	195
220	221	8X6	160	8X6	175	8X10	215	10X10	250	10X10	265		
330	331	8X6	190	8X10	240	8X10	270	10X10	305				
470	471	8X10	265	8X10	290	10X10	330						
1000	102	10X10	400										

Allowable Ripple (ma) at 85℃ 120Hz

• Taping Specifications are given in page 12.

●Frequency coefficient of allowable ripple current

Cap. (μF) \ Frequency	50Hz	120Hz	300Hz	1kHz	10kHz～
～47	0.80	1	1.15	1.40	1.67
100～1000	0.85	1	1.08	1.20	1.30

●Allowable ripple current vs. Ambient temperature

Ambient temp. (℃)	～+70	+85
Coefficient	1.27	1.0

UX series

Chip Type, Higher Capacitance Range

For SMD | Anti-Solvent Feature

- Chip type, higher capacitance in larger case sizes(φ8, φ10mm).
- Designed for surface mounting on high density PC board.
- Applicable to automatic insertion machine using carrier tape.

UX ← Surface mounting RT

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−55～+105℃
Voltage Range	6.3～50V
Capacitance Range	22～470μF
Capacitance Tolerance	±20% at 120Hz, 20℃
Leakage Current	After 1 minute's application of rated voltage, leakage current is not more than 0.03CV(μA)
tan δ	Measurement frequency : 120Hz, Temperature : 20℃

Rated voltage (V)	6.3	10	16	25	35	50
tan δ (MAX.)	0.22	0.19	0.16	0.14	0.12	0.10

Stability at Low Temperature — Measurement frequency:120Hz

Rated voltage (V)		6.3	10	16	25	35	50
Impedance ratio ZT/Z20 (MAX.)	Z−55℃/Z+20℃	4	4	3	3	3	2

Load Life — After 2000 hours' application of rated votage at 105℃, capacitors meet the characteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

Shelf Life — After leaving capacitors under no load at 105℃ for 1000hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.

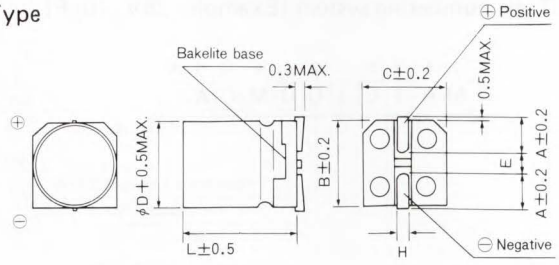
Resistance to soldering heat — The capacitors shall be kept on the hot plate maintained at 250℃ for 30 seconds. After removing from the hot plate and restored at room temperature, they meet the characteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±10% of initial value
tan δ	Initial specified value or less

Marking — Printed with black color letter on clear yellow sleeve according to JIS C-5141.

Applicable Standards — Characteristics W of JIS C-5141 and JIS C-5102.

■Chip Type



(mm)

DXL	8X6	8X10	10X10
A	3.3	2.9	3.2
B	8.3	8.3	10.3
C	8.3	8.3	10.3
E	2.3	3.1	4.5
H	0.5～0.8	0.8～1.1	0.8～1.1

Type numbering system (Example: 16V 100μF)

1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	U	X	1	C	1	0	1	M	N	T	1	G	S

- Taping code
- Configuration
- Capacitance tolerance (±20%)
- Capacitance (100μF)
- Rated voltage (16V)
- Series name
- Type

DXL	Code
8X6	BT
8X10	NT
10X10	NT

■Dimensions

DXL (mm)

W.V.	6.3		10		16		25		35		50	
Cap(μF) \ Code	0J		1A		1C		1E		1V		1H	
22	220										8X6	67
33	330								8X6	76	8X10	133
47	470						8X6	79	8X10	124	10X10	180
100	101		8X6	90	8X10	148	8X10	181	10X10	304		
220	221	8X10	161	8X10	173	10X10	330					
330	331	8X10	288	10X10	318	10X10	441					
470	471	10X10	340	10X10	351						Case size	Allowable ripple

Allowable Ripple (mA) at 105℃ 120Hz

● Frequency coefficient of allowable ripple current

Frequency(Hz) / Cap.(μF)	50Hz	120Hz	300Hz	1kHz	10kHz～
～47	0.80	1.00	1.15	1.40	1.67
100～470	0.85	1.00	1.08	1.20	1.30

● Allowable ripple current vs. Ambient temperature

Ambient temp.(℃)	～+70	+85	+105
Coefficient	1.62	1.40	1.00

• Taping Specifications are given in page 12.

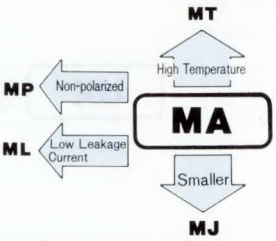
ALUMINUM ELECTROLYTIC CAPACITORS

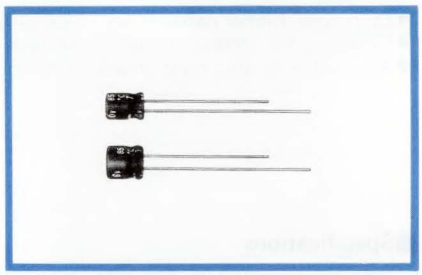
MA series

5mmL, Standard, For General Purposes

Anti-Solvent Feature

- Standard ultra-miniature series with 5mm height.





■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+85℃
Voltage Range	4 ～50V
Capacitance Range	0.1～470μF
Capacitance Tolerance	±20% at 120 Hz, 20℃
Leakage Current	After 2 minutes' application of rated voltage, leakage current is not more than 0.01CV or 3 (μA), whichever is greater.

tan δ

Measurement frequency : 120 Hz, Temperature : 20℃

Rated voltage (V)	4	6.3	10	16	25	35	50
tan δ (MAX.)	0.35	0.24	0.20	0.16	0.14	0.12	0.10

Stability at Low Temperature

Measurement frequency : 120 Hz

Rated voltage (V)		4	6.3	10	16	25	35	50
Impedance ratio	Z−25℃/Z+20℃	7	4	3	2	2	2	2
ZT/Z20 (MAX.)	Z−40℃/Z+20℃	15	8	6	4	4	3	3

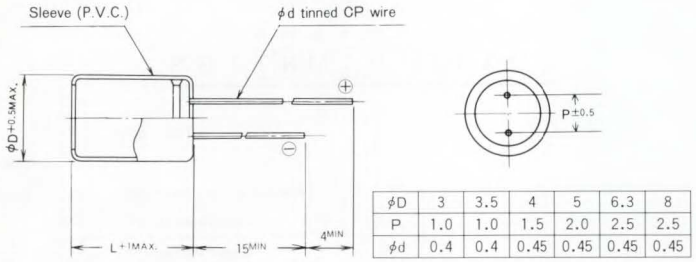
Load Life

After 1000 hours' application of rated voltage at 85℃, capacitors meet the characteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value (φ3 : Within ±25%)
tan δ	200% or less of initial specified value

Shelf Life	After leaving capacitors under no load at 85℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.
Marking	Printed with white color letter on black sleeve according to JIS C-5141.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Radial Lead Type



φD	3	3.5	4	5	6.3	8
P	1.0	1.0	1.5	2.0	2.5	2.5
φd	0.4	0.4	0.45	0.45	0.45	0.45

Type numbering system (Example: 25V 10μF)

1	2	3	4	5	6	7	8	9	10	11	12
U	M	A	1	E	1	0	0	M	C	A	

※ Case dia. code

φD	Code
3	2
3.5	3
4～8	——

Configuration

Capacitance tolerance (±20%)

Capacitance (10μF)

Rated voltage (25V)

Series name

Type

φD	Code
3～6.3	CA
8	BA

※ In case at φ3、φ3.5 units, put 2 (φ3) or 3 (φ3.5) as case dia. code.

■Dimensions

D X L (mm)

W.V.	4		6.3		10		16		25		35		50	
Cap.(μF) Code	0G		0J		1A		1C		1E		1V		1H	
0.1	0R1												4X5(3X5)	1.0(1.0)
0.22	R22												4X5(3X5)	2.0(2.0)
0.33	R33												4X5(3X5)	2.8(2.8)
0.47	R47												4X5(3X5)	4.0(4.0)
1	010												4X5(3X5)	8.4(8.0)
2.2	2R2										3X5	8.4	● 4X5	13
3.3	3R3								3X5	10	●3.5X5	14	4X5	17
4.7	4R7						3X5	10	● 4X5	16	4X5	18	5X5	20
10	100		3X5	15			● 4X5	23	5X5	27	5X5	29	6.3X5	33
22	220	3X5	● 4X5	28	5X5	33	5X5	37	6.3X5	42	6.3X5	46	□ 8X5	52
33	330	4X5	5X5	37	5X5	41	6.3X5	49	6.3X5	52	□ 8X5	62	8X5	71
47	470	4X5	5X5	45	○6.3X5	52	6.3X5	58	□ 8X5	70	8X5	80		
100	101	5X5	○6.3X5	70	□ 8X5	80	8X5	92	8X5	110				
220	221	6.3X5	8X5	110	8X5	135								
330	331	8X5	8X5	170									Case size	Allowable ripple
470	471	8X5	185											

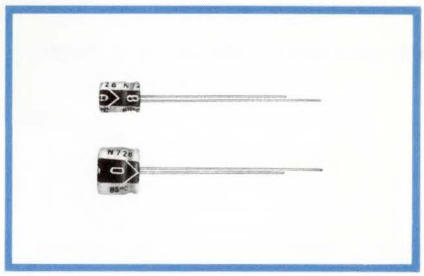
Size 3X5 is available for capacitors marked. "●"
Size 5X5 is available for capacitors marked."○"
Size 6.3X5 is available for capacitors marked."□"
In such a case, M R will be put at 2nd and 3rd digit of type numbering system.

Allowable Ripple (mA) at 85℃ 120Hz

ML 5mmL, Low Leakage Current series

Low Leakage Current | Anti-Solvent Feature

● Low leakage current series with 5mm height.



ML Low Leakage Current MA

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+85℃
Voltage Range	4～50V
Capacitance Range	0.1～100 μF
Capacitance Tolerance	±20% at 120 Hz, 20℃
Leakage Current	After 2 minutes' application of rated voltage, leakage current is not more than 0.002CV or 0.4 (μA), whichever is greater.
tan δ	Measurement frequency : 120 Hz, Temperature : 20℃

Rated voltage (V)	4	6.3	10	16	25	35	50
tan δ (MAX.)	0.35	0.24	0.20	0.16	0.14	0.12	0.10

Stability at Low Temperature — Measurement frequency : 120 Hz

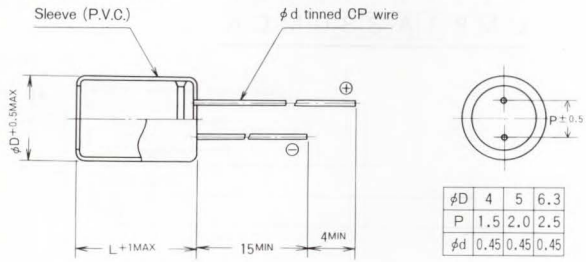
Rated voltage (V)		4	6.3	10	16	25	35	50
Impedance ratio	Z−25℃ /Z+20℃	7	4	3	2	2	2	2
ZT/Z20 (MAX.)	Z−40℃ /Z+20℃	15	10	8	6	4	3	3

Load Life — After 1000 hours' application of rated voltage at 85℃, capacitors meet the characteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

Shelf Life	After leaving capacitors under no load at 85℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.
Marking	Printed with black color letter on yellow sleeve according to JIS C-5141.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Radial Lead Type



φD	4	5	6.3
P	1.5	2.0	2.5
φd	0.45	0.45	0.45

Type numbering system (Example: 10V 33μF)

1	2	3	4	5	6	7	8	9	10	11
U	M	L	1	A	3	3	0	M	C	A

Configuration
Capacitance tolerance (±20%)
Capacitance (33μF)
Rated voltage (10V)
Series name
Type

φD	Code
4～6.3	CA

■Dimensions

DXL(mm)

W.V.	4		6.3		10		16		25		35		50	
Cap. (μF) / Code	0G		0J		1A		1C		1E		1V		1H	
0.1	0R1												4X5	1.0
0.22	R22												4X5	2.0
0.33	R33												4X5	2.8
0.47	R47												4X5	4.0
1	010												4X5	8.4
2.2	2R2												4X5	13
3.3	3R3												5X5	17
4.7	4R7								4X5	16	4X5	18	5X5	20
10	100						4X5	23	5X5	27	5X5	29	6.3X5	33
22	220		4X5	28	5X5	33	5X5	37	6.3X5	42	6.3X5	46		
33	330	5X5	5X5	37	5X5	41	6.3X5	49	6.3X5	52				
47	470	5X5	5X5	45	6.3X5	52	6.3X5	58						Allow-able ripple
100	101	6.3X5	6.3X5	70									Case size	

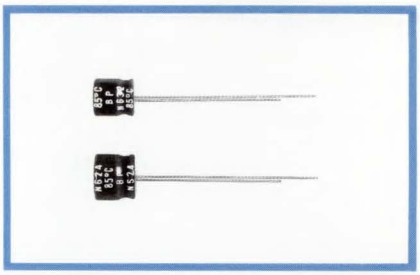
Allowable Ripple (mA) at 85℃ 120Hz

ALUMINUM ELECTROLYTIC CAPACITORS

MP 5mmL, Non-Polarized series

Non-Polarized　Anti-Solvent Feature

● Non-polarized series with 5mm height.



MP ← Non-polarized **MA**

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+85℃
Voltage Range	6.3～50V
Capacitance Range	0.1～47μF
Capacitance Tolerance	±20% at 120 Hz, 20℃
Leakage Current	After 2 minutes' application of rated voltage, leakage current is not more than 0.05CV or 10(μA), whichever is greater.

tan δ — Measurement frequency : 120 Hz, Temperature : 20℃

Rated voltage (V)	6.3	10	16	25	35	50
tan δ (MAX.)	0.24	0.20	0.17	0.17	0.15	0.15

Stability at Low Temperature — Measurement frequency : 120 Hz

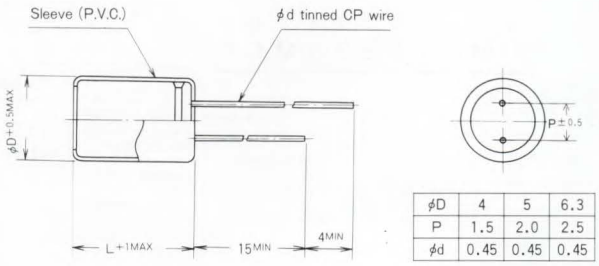
Rated voltage (V)		6.3	10	16	25	35	50
Impedance ratio ZT/Z20 (MAX.)	Z−25℃/Z+20℃	4	3	2	2	2	2
	Z−40℃/Z+20℃	8	6	4	4	3	3

Load Life — After 1000 hours' application of rated voltage at 85℃ with the polarity inverted every 250 hours, capacitors meet the characteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

Shelf Life	After leaving capacitors under no load at 85℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.
Marking	Printed with white color letter on black sleeve according to JIS C-5141.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Radial Lead Type



φD	4	5	6.3
P	1.5	2.0	2.5
φd	0.45	0.45	0.45

Type numbering system (Example: 10V 33μF)

1	2	3	4	5	6	7	8	9	10	11
U	M	P	1	A	3	3	0	M	C	A

Configuration

Capacitance tolerance (±20%)

Capacitance (33μF)

Rated voltage (10V)

Series name

Type

φD	Code
4～6.3	CA

■Dimensions

DXL(mm)

Cap. (μF) \ W.V.	Code	6.3		10		16		25		35		50	
		0J		1A		1C		1E		1V		1H	
0.1	0R1											4X5	1.0
0.22	R22											4X5	2.0
0.33	R33											4X5	2.8
0.47	R47											4X5	4.0
1	010											4X5	8.4
2.2	2R2									4X5	8.4	5X5	13
3.3	3R3							5X5	12	5X5	16	5X5	17
4.7	4R7					4X5	12	5X5	16	5X5	18	6.3X5	20
10	100			4X5	17	5X5	23	6.3X5	27	6.3X5	29		
22	220	5X5	28	6.3X5	33	6.3X5	37						
33	330	6.3X5	37	6.3X5	41	6.3X5	49						Allow-able ripple
47	470	6.3X5	45									Case size	

Allowable Ripple (mA) at 85℃ 120Hz

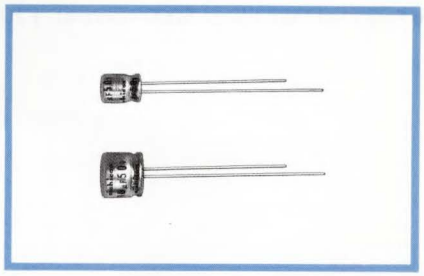
ALUMINUM ELECTROLYTIC CAPACITORS

nichicon

MT 5mmL, Wide Temperature Range series

Anti-Solvent Feature

- Wide temperature range of −55～+105℃, with 5mm height.



MT

High Temperature

MA

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−55～+105℃
Voltage Range	4～50V
Capacitance Range	0.1～100μF
Capacitance Tolerance	±20% at 120Hz, 20℃
Leakage Current	After 2 minutes' application of rated voltage, leakage current is not more than 0.01CV or 3(μA), whichever is greater.

tan δ — Measurement frequency : 120Hz, Temperature : 20℃

Rated voltage (V)	4	6.3	10	16	25	35	50
tan δ (MAX.)	0.37	0.28	0.24	0.20	0.16	0.13	0.12

Stability at Low Temperature — Measurement frequency : 120Hz

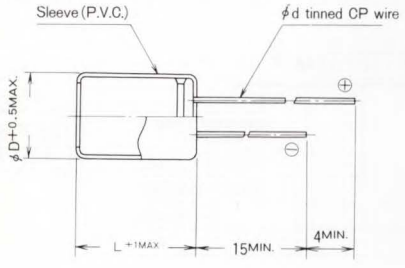
Rated voltage (V)		4	6.3	10	16	25	35	50
Impedance ratio ZT/Z20 (MAX.)	Z−25℃/Z+20℃	6	3	3	2	2	2	2
	Z−40℃/Z+20℃	12	8	5	4	3	3	3

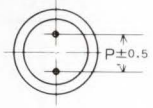
Load Life — After 1000 hours' application of rated voltage at 105℃, capacitors meet the characteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±25% of initial value (≤16V) Within ±20% of initial value (≥25V)
tan δ	200% or less of initial specified value

Shelf Life	After leaving capacitors under no load at 105℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.
Marking	Printed with black color letter on clear green sleeve according to JIS C-5141.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Radial Lead Type





φD	4	5	6.3
P	1.5	2.0	2.5
φd	0.45	0.45	0.45

Type numbering system (Example: 25V 10μF)

1	2	3	4	5	6	7	8	9	10	11
U	M	T	1	E	1	0	0	M	C	H

- 10 11: Configuration
- 9: Capacitance tolerance (±20%)
- 6 7 8: Capacitance (10μF)
- 4 5: Rated voltage (25V)
- 1 2 3: Series name
- 1: Type

φD	Code
4～6.3	CH

■Dimensions

D×L(mm)

Cap. (μF) \ W.V.		4		6.3		10		16		25		35		50	
	Code	0G		0J		1A		1C		1E		1V		1H	
0.1	0R1													4×5	1.0
0.22	R22													4×5	2.6
0.33	R33													4×5	3.2
0.47	R47													4×5	3.8
1	010													4×5	6.2
2.2	2R2													4×5	11
3.3	3R3													4×5	14
4.7	4R7									4×5	13	4×5	15	5×5	19
10	100							4×5	18	5×5	23	5×5	25	6.3×5	30
22	220	4×5	22	4×5	22	5×5	27	5×5	30	6.3×5	38	6.3×5	42		
33	330	5×5	30	5×5	30	5×5	35	6.3×5	40	6.3×5	48				
47	470	5×5	36	5×5	36	6.3×5	46	6.3×5	50						Allowable ripple
100	101	6.3×5	60	6.3×5	60									Case size	

Allowable Ripple (mA) at 105℃ 120Hz

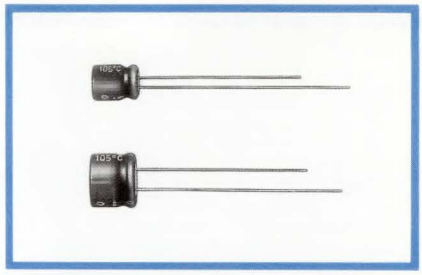
ALUMINUM ELECTROLYTIC CAPACITORS

MQ series

5mmL, Long Life Assurance

Long Life　Anti-Solvent Feature

- Extended load life of 5000 hours at +105℃, with 5mm height.



MT → Long Life → MQ

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−55～+105℃
Voltage Range	4～50V
Capacitance Range	0.1～100μF
Capacitance Tolerance	±20% at 120Hz, 20℃
Leakage Current	After 2 minutes' application of rated voltage, leakage current is not more than 0.01CV or 3(μA), whichever is greater.
tan δ	Measurement frequency : 120Hz, Temperature : 20℃

Rated voltage (V)	4	6.3	10	16	25	35	50
tan δ (MAX.)	0.37	0.28	0.24	0.20	0.16	0.13	0.12

Stability at Low Temperature — Measurement frequency : 120Hz

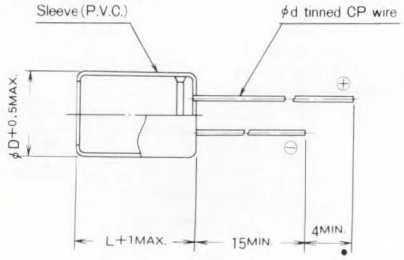
Rated voltage (V)		4	6.3	10	16	25	35	50
Impedance ratio	Z−25℃/Z+20℃	6	3	3	2	2	2	2
ZT/Z20 (MAX.)	Z−40℃/Z+20℃	12	8	5	4	3	3	3

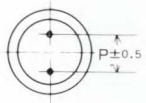
Load Life — After 5000 hours' application of rated voltage at 105℃, capacitors meet the characteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±30% of initial value
tan δ	300% or less of initial specified value

Shelf Life	After leaving capacitors under no load at 105℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.
Marking	Printed with silver color letter on dark brown sleeve according to JIS C-5141.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Radial Lead Type





φD	4	5	6.3
P	1.5	2.0	2.5
φd	0.45	0.45	0.45

Type numbering system (Example: 25V 10μF)

1	2	3	4	5	6	7	8	9	10	11
U	M	Q	1	E	1	0	0	M	F	H

Configuration

Capacitance tolerance (±20%)

Capacitance (10μF)

Rated voltage (25V)

Series name

Type

φD	Code
4～6.3	FH

■Dimensions

DXL(mm)

W.V.	4		6.3		10		16		25		35		50	
Cap. (μF) / Code	0G		0J		1A		1C		1E		1V		1H	
0.1	0R1												4X5	1.0
0.22	R22												4X5	2.6
0.33	R33												4X5	3.2
0.47	R47												4X5	3.8
1	010												4X5	6.2
2.2	2R2												4X5	11
3.3	3R3												4X5	14
4.7	4R7								4X5	13	4X5	15	5X5	19
10	100						4X5	18	5X5	23	5X5	25	6.3X5	30
22	220	4X5	22	4X5	22	5X5	27	5X5	30	6.3X5	38	6.3X5	42		
33	330	5X5	30	5X5	30	5X5	35	6.3X5	40	6.3X5	48				
47	470	5X5	36	5X5	36	6.3X5	46	6.3X5	50						Allow-able ripple
100	101	6.3X5	60	6.3X5	60									Case size	

Allowable Ripple (mA) at 105℃ 120Hz

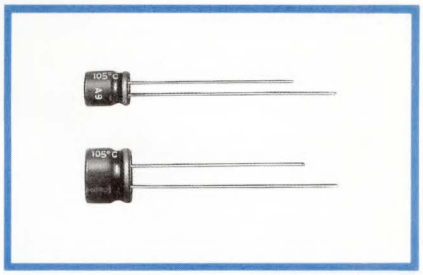
ALUMINUM ELECTROLYTIC CAPACITORS

nichicon

MF 5mmL, Low Impedance series

Low Impedance | Anti-Solvent Feature

- Low impedance over wide temperature range of −55～+105℃, with 5mm height.
- Suited for DC-DC converters where smaller case size and lower impedance are required.



MF ← Low Impedance **MT**

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−55～+105℃
Voltage Range	6.3～35V
Capacitance Range	1～100μF
Capacitance Tolerance	±20% at 120 Hz, 20℃
Leakage Current	After 2 minutes' application of rated voltage, leakage current is not more than 0.01CV or 3(μA), whichever is greater.
tan δ	Measurement frequency : 120 Hz, Temperature : 20℃

Rated voltage (V)	6.3	10	16	25	35
tan δ (MAX.)	0.22	0.20	0.18	0.14	0.12

Stability at Low Temperature — Measurement frequency : 120 Hz

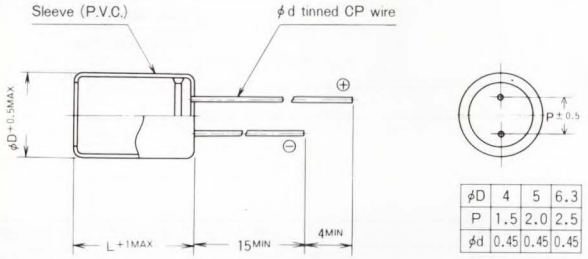
Rated voltage (V)		6.3	10	16	25	35
Impedance ratio ZT/Z20 (MAX.)	Z−25℃/Z+20℃	2	2	2	2	2
	Z−55℃/Z+20℃	4	4	3	3	3

Load Life — After 1000 hours' application of rated voltage at 105℃, capacitors meet the characteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

Shelf Life	After leaving capacitors under no load at 105℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.
Marking	Printed with white color letter on dark brown sleeve according to JIS C-5141.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Radial Lead Type



φD	4	5	6.3
P	1.5	2.0	2.5
φd	0.45	0.45	0.45

Type numbering system (Example:25V 10μF)

1	2	3	4	5	6	7	8	9	10	11
U	M	F	1	E	1	0	0	M	C	H

Configuration

φD	Code
4～6.3	CH

Capacitance tolerance (±20%)
Capacitance(10μF)
Rated voltage(25V)
Series name
Type

■Dimensions

DXL(mm)

W.V.		6.3			10			16			25			35		
Cap.(μF)	Code	0J			1A			1C			1E			1V		
1	010													4X5	3.6	60
1.5	1R5													4X5	3.6	60
2.2	2R2													4X5	3.6	60
3.3	3R3													4X5	3.6	60
4.7	4R7										4X5	3.6	60	4X5	3.6	60
6.8	6R8										4X5	3.6	60	5X5	1.8	95
10	100							4X5	3.6	60	5X5	1.8	95	5X5	1.8	95
15	150							5X5	1.8	95	6.3X5	0.9	140	6.3X5	0.9	140
22	220	4X5	3.6	60	5X5	1.8	95	5X5	1.8	95	6.3X5	0.9	140	6.3X5	0.9	140
33	330	5X5	1.8	95	5X5	1.8	95	6.3X5	0.9	140	6.3X5	0.9	140			
47	470	5X5	1.8	95	6.3X5	0.9	140	6.3X5	0.9	140						
68	680	6.3X5	0.9	140										Case size	Impedance	Allowable ripple
100	101	6.3X5	0.9	140												

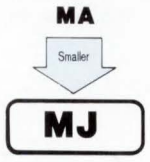
Max. Impedance(Ω) at 20℃ 100kHz
Allowable Ripple(mA) at 105℃ 100kHz

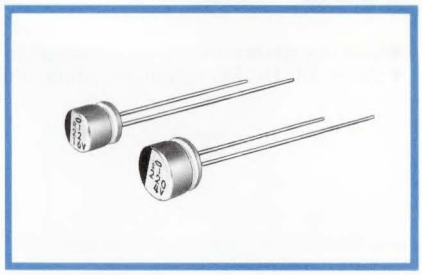
ALUMINUM ELECTROLYTIC CAPACITORS

MJ 5.2mmL MAX. series

Smaller | Anti-Solvent Feature

- 5.2mmL MAX. height.





■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+85℃
Voltage Range	4～50V
Capacitance Range	0.1～220μF
Capacitance Tolerance	±20% at 120Hz, 20℃
Leakage Current	After 2 minutes' application of rated voltage, leakage current is not more than 0.01CV or 3(μA), whichever is greater.
tan δ	Measurement frequency : 120Hz, Temperature : 20℃

Rated voltage (V)	4	6.3	10	16	25	35	50
tan δ (MAX.)	0.35	0.26	0.20	0.16	0.14	0.12	0.12

Stability at Low Temperature — Measurement frequency : 120Hz

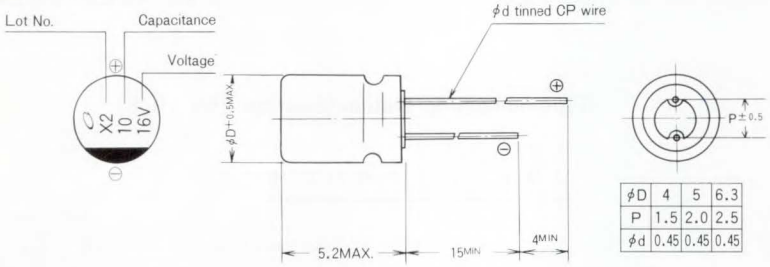
Rated voltage (V)		4	6.3	10	16	25	35	50
Impedance ratio ZT/Z20 (MAX.)	Z−25℃/Z+20℃	7	4	3	2	2	2	2
	Z−40℃/Z+20℃	15	8	8	4	4	3	3

Load Life — After 1000 hours' application of rated voltage at 85℃, capacitors meet the characteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

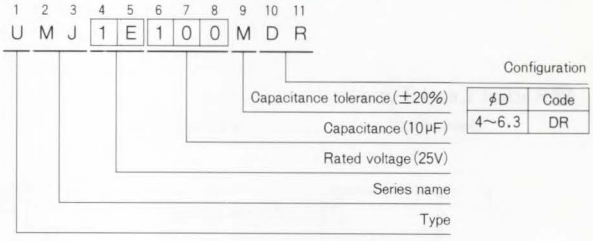
Shelf Life	After leaving capacitors under no load at 85℃ for 1000 hours and applying voltage according to JIS C-5102 4-3. they meet the specified value for load life characteristics listed above.
Marking	Black print on the case top.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Radial Lead Type



φD	4	5	6.3
P	1.5	2.0	2.5
φd	0.45	0.45	0.45

Type numbering system (Example: 25V 10μF)



φD	Code
4～6.3	DR

■Dimensions

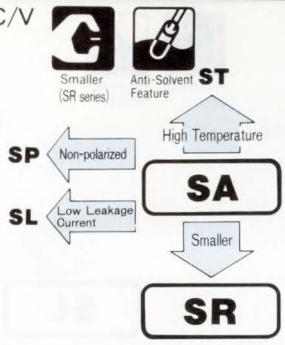
Cap. (μF) \ W.V.	Code	4		6.3		10		16		25		35		50	
		0G		0J		1A		1C		1E		1V		1H	
0.1	0R1													4	1.0
0.22	R22													4	2.0
0.33	R33													4	2.8
0.47	R47													4	4.0
1	010													4	8.4
2.2	2R2													4	13
3.3	3R3													4	17
4.7	4R7									4	16	4	18	5	20
10	100							4	23	5	27	5	29	6.3	33
22	220			4	28	5	33	5	37	6.3	42	6.3	46		
33	330	4	28	5	37	5	41	6.3	49	6.3	52				
47	470	4	33	5	45	6.3	52	6.3	58						
100	101	5	56	6.3	70									Case size	Allowable ripple
220	221	6.3	96												

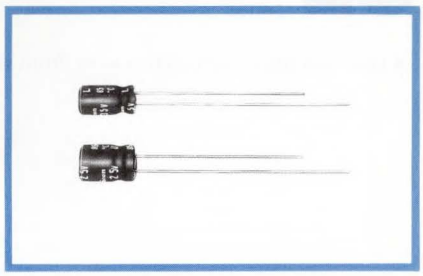
Allowable Ripple (mA) at 85℃ 120Hz

SA 7mmL, For General Purposes series

.SR 7mmL, High C/V series

- Standard miniature series with 7mm height.
- Higher C/V series with 7mm height.





●Specifications

Item	SA series	SR series
Operating Temperature Range	−40～+85℃	−40～+85℃
Voltage Range	6.3～50V	4～50V
Capacitance Range	0.1～220μF	4.7～470μF
Capacitance Tolerance	±20% at 120Hz, 20℃	
Leakage Current	After 2 minutes' application of rated voltage, leakage current is not more than 0.01CV or 3 (μA), whichever is greater.	

tan δ δ)

Measurement frequency : 120Hz, Temperature : 20℃

Rated voltage (V)	4	6.3	10	16	25	35	50
tan δ (MAX.)	0.35	0.24	0.20	0.16	0.14	0.12	0.10

Stability at Low Temperature

Measurement frequency : 120Hz

Rated Voltage (V)		4	6.3	10	16	25	35	50
Impedance ratio ZT/Z20 (MAX.)	Z−25℃/Z+20℃	6	4	3	2	2	2	2
	Z−40℃/Z+20℃	12	8	6	4	4	3	3

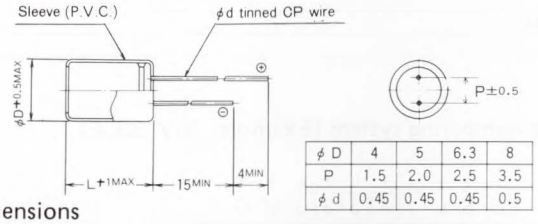
Load Life

After 1000 hours' application of rated voltage at 85℃, capacitors meet the characteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

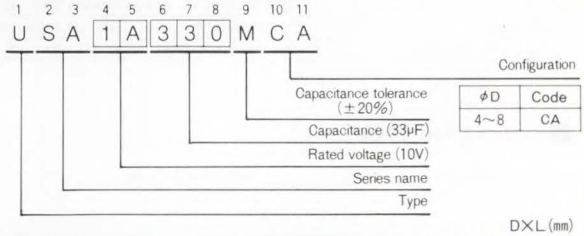
Shelf Life	After leaving capacitors under no load at 85℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.
Marking	Printed with white color letter on black sleeve according to JIS C-5141.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Radial Lead Type



φD	4	5	6.3	8
P	1.5	2.0	2.5	3.5
φd	0.45	0.45	0.45	0.5

Type numbering system (Example: SA series: 10V 33μF)



φD	Code
4～8	CA

■Dimensions

DXL (mm)

Cap. (μF) \ W.V. (Code) / Series / Code	4 (0G)	6.3 (0J)		10 (1A)		16 (1C)		25 (1E)		35 (1V)		50 (1H)	
	SR	SA	SR	SA	SR	SA	SR	SA	SR	SA	SR	SA	SR
0.1	0R1											4X7	
												1.0	
0.22	R22											4X7	
												2.3	
0.33	R33											4X7	
												3.5	
0.47	R47											4X7	
												5.0	
1	010											4X7	
												10	
2.2	2R2											4X7	
												19	
3.3	3R3											4X7	
												24	
4.7	4R7									4X7		5X7	4X7
										24		29	23
10	100						4X7		5X7	4X7	5X7	4X7	6.3X7	5X7
							28		33	28	36	31	44	38
22	220		4X7		5X7	4X7	5X7	4X7	6.3X7	5X7	6.3X7	5X7	8X7	6.3X7
			34		38	35	44	39	51	48	57	52	65	58
33	330	4X7	5X7	4X7	5X7	4X7	6.3X7	5X7	6.3X7	5X7	8X7	6.3X7		8X7
		33	42	40	47	43	57	55	63	58	72	65		75
47	470	4X7	5X7	4X7	6.3X7	5X7	6.3X7	5X7	8X7	6.3X7		8X7		
		39	50	48	59	59	68	65	78	71		85		
100	101	5X7	6.3X7	5X7	8X7	6.3X7	8X7	6.3X7		8X7				
		65	77	78	96	87	107	98		115				
220	221	6.3X7	8X7	6.3X7		8X7								
		110	130	120		145								
330	331	8X7		8X7										
		165		180										
470	471	8X7												Case size
		240												Allowable ripple

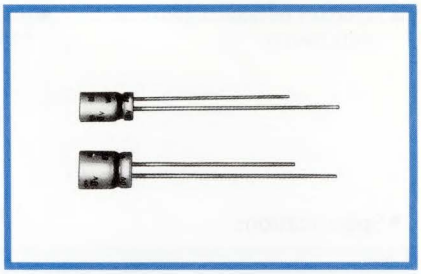
Allowable Ripple (mA) at 85℃ 120Hz

ALUMINUM ELECTROLYTIC CAPACITORS

SL 7mmL, Low Leakage Current series

Low Leakage Current | Anti-Solvent Feature

● Low leakage current series with 7mm height.



SL — Low Leakage Current — SA

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+85℃
Voltage Range	6.3～50V
Capacitance Range	0.1～220μF
Capacitance Tolerance	±20% at 120 Hz, 20℃
Leakage Current	After 2 minutes' application of rated voltage, leakage current is not more than 0.002CV or 0.4(μA), whichever is greater.
tan δ	Measurement frequency : 120 Hz, Temperature : 20℃

Rated voltage (V)	6.3	10	16	25	35	50
tan δ (MAX.)	0.24	0.20	0.16	0.14	0.12	0.10

Stability at Low Temperature — Measurement frequency : 120 Hz

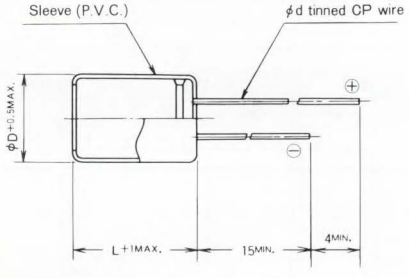
Rated voltage (V)		6.3	10	16	25	35	50
Impedance ratio ZT/Z20 (MAX.)	Z−25℃/Z+20℃	4	3	2	2	2	2
	Z−40℃/Z+20℃	8	6	4	4	3	3

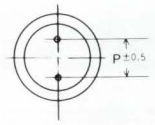
Load Life — After 1000 hours' application of rated voltage at 85℃, capacitors meet the characteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

Shelf Life	After leaving capacitors under no load at 85℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.
Marking	Printed with black color letter on yellow sleeve according to JIS C-5141.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

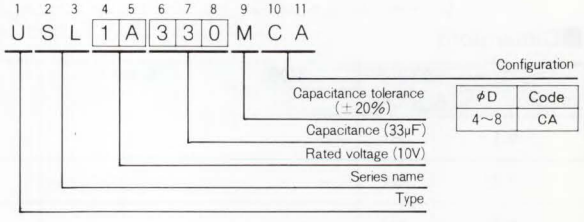
■Radial Lead Type





φD	4	5	6.3	8
P	1.5	2.0	2.5	3.5
φd	0.45	0.45	0.45	0.5

Type numbering system (Example: 10V 33μF)



φD	Code
4～8	CA

■Dimensions

DXL (mm)

Cap. (μF) \ W.V.	Code	6.3		10		16		25		35		50	
		0J		1A		1C		1E		1V		1H	
0.1	0R1											4X7	1.0
0.22	R22											4X7	2.3
0.33	R33											4X7	3.5
0.47	R47											4X7	5.0
1	010											4X7	10
2.2	2R2											4X7	19
3.3	3R3											4X7	24
4.7	4R7									4X7	24	5X7	29
10	100					4X7	29	5X7	33	5X7	36	6.3X7	44
22	220	4X7	34	5X7	38	5X7	44	6.3X7	51	6.3X7	57	8X7	65
33	330	5X7	42	5X7	47	6.3X7	57	6.3X7	63	8X7	72		
47	470	5X7	50	6.3X7	59	6.3X7	68	8X7	78				
100	101	6.3X7	77	8X7	96	8X7	107						
220	221	8X7	130									Case size	Allowable ripple

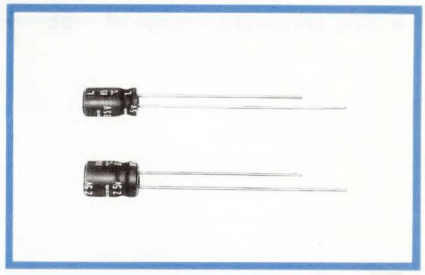
Allowable Ripple (mA) at 85℃ 120Hz

SP 7mmL, Non-Polarized series

NP Non-Polarized

Anti-Solvent Feature

- Non-polarized series with 7mm height.



SP Non-polarized SA

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+85℃
Voltage Range	6.3～50V
Capacitance Range	0.1～47μF
Capacitance Tolerance	±20% at 120 Hz, 20℃
Leakage Current	After 2 minutes' application of rated voltage, leakage current is not more than 0.05CV or 10(μA), whichever is greater.
tan δ	Measurement frequency : 120 Hz, Temperature : 20℃

Rated voltage (V)	6.3	10	16	25	35	50
tan δ (MAX.)	0.24	0.20	0.16	0.16	0.14	0.12

Stability at Low Temperature — Measurement frequency : 120 Hz

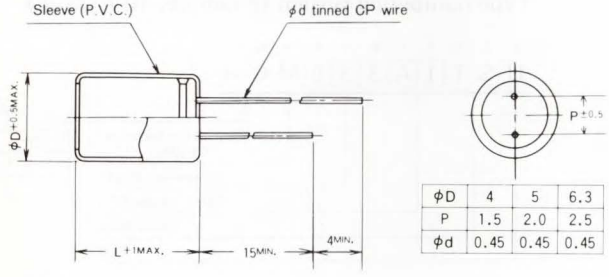
Rated voltage (V)		6.3	10	16	25	35	50
Impedance ratio ZT/Z20 (MAX.)	Z−25℃/Z+20℃	4	3	2	2	2	2
	Z−40℃/Z+20℃	8	6	4	4	3	3

Load Life — After 1000 hours' application of rated voltage at 85℃ with the polarity inverted every 250 hours, capacitors meet the characteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

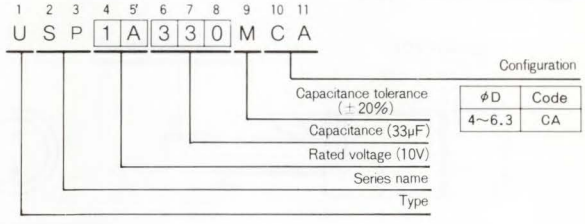
Shelf Life	After leaving capacitors under no load at 85℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.
Marking	Printed with white color letter on black sleeve according to JIS C-5141.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Radial Lead Type



φD	4	5	6.3
P	1.5	2.0	2.5
φd	0.45	0.45	0.45

Type numbering system (Example: 10V 33μF)



φD	Code
4～6.3	CA

■Dimensions

D×L (mm)

Cap. (μF) \ W.V.	Code	6.3		10		16		25		35		50	
		0 J		1 A		1 C		1 E		1 V		1 H	
0.1	0R1											4×7	1.0
0.22	R22											4×7	2.3
0.33	R33											4×7	3.5
0.47	R47											4×7	5.0
1	010											4×7	10
2.2	2R2											4×7	14
3.3	3R3									4×7	16	5×7	20
4.7	4R7					4×7	18	5×7	21	5×7	22	6.3×7	27
10	100			4×7	24	5×7	30	6.3×7	35	6.3×7	37		
22	220			5×7	40	6.3×7	51	6.3×7	53				
33	330	5×7	42	6.3×7	56	6.3×7	63						Allow-able ripple
47	470			6.3×7	67	6.3×7	75					Case size	

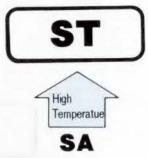
Allowable Ripple (mA) at 85℃ 120Hz

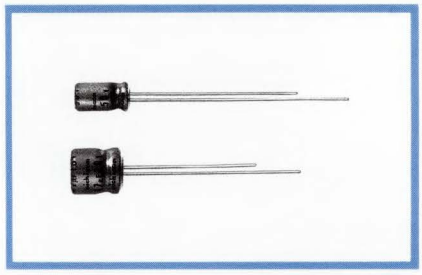
ALUMINUM ELECTROLYTIC CAPACITORS

ST 7mmL, Wide Temperature Range series

Anti Solvent Feature

● Wide temperature range of −55～+105℃, with 7mm height.





■Specifications

Item	Performance Characteristics
Operating Temperature Range	−55～+105℃
Voltage Range	6.3～50V
Capacitance Range	0.1～220μF
Capacitance Tolerance	±20% at 120Hz, 20℃
Leakage Current	After 2 minutes' application of rated voltage, leakage current is not more than 0.01CV or 3(μA), whichever is greater.
tan δ	Measurement frequency : 120Hz, Temperature : 20℃

Rated voltage (V)	6.3	10	16	25	35	50
tan δ (MAX.)	0.24	0.21	0.18	0.15	0.13	0.12

Stability at Low Temperature — Measurement frequency : 120Hz

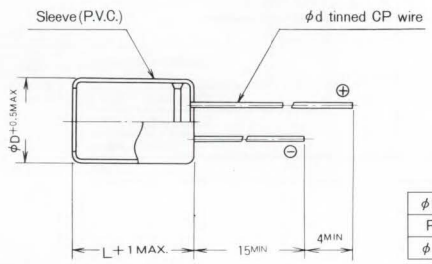
Rated voltage (V)		6.3	10	16	25	35	50
Impedance ratio ZT/Z20(MAX.)	Z−25℃/Z+20℃	3	2	2	2	2	2
	Z−40℃/Z+20℃	6	5	4	3	3	3

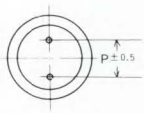
Load Life — After 1000 hours' application of rated voltage at 105℃, capacitors meet the characteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±25% of initial value (≦16V)
	Within ±20% of initial value (≧25V)
tan δ	200% or less of initial specified value

Shelf Life	After leaving capacitors under no load at 105℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.
Marking	Printed with black color letter on clear green sleeve according to JIS C-5141.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

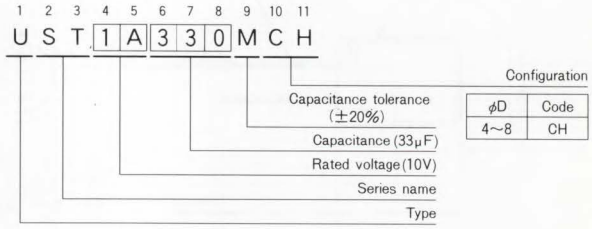
■Radial Lead Type





φD	4	5	6.3	8
P	1.5	2.0	2.5	3.5
φd	0.45	0.45	0.45	0.5

Type numbering system (Example: 10V 33μF)



φD	Code
4～8	CH

■Dimensions

DXL(mm)

Cap.(μF) \ W.V.	Code	6.3		10		16		25		35		50	
		0J		1A		1C		1E		1V		1H	
0.1	0R1											4X7	1.0
0.22	R22											4X7	2.3
0.33	R33											4X7	3.5
0.47	R47											4X7	5.0
1	010											4X7	10
2.2	2R2											4X7	19
3.3	3R3											4X7	24
4.7	4R7									4X7	24	5X7	29
10	100					4X7	29	5X7	33	5X7	36	6.3X7	44
22	220	4X7	34	5X7	38	5X7	44	6.3X7	51	6.3X7	57	8X7	65
33	330	5X7	42	5X7	47	6.3X7	57	6.3X7	63	8X7	72		
47	470	5X7	50	6.3X7	59	6.3X7	68	8X7	78				
100	101	6.3X7	77	8X7	96	8X7	107						Allow-able ripple
220	221	8X7	130									Case size	

Allowable Ripple(mA) at 105℃ 120Hz

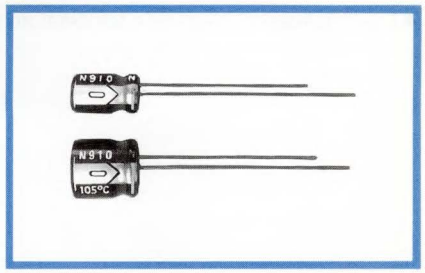
ALUMINUM ELECTROLYTIC CAPACITORS

nichicon

SQ 7mmL, Long Life Assurance series

Long Life | Anti-Solvent Feature

● Extended load life of 5000 hours at +105℃, with 7mm height.



ST Long Life **SQ**

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−55～+105℃
Voltage Range	6.3～50V
Capacitance Range	0.1～220μF
Capacitance Tolerance	±20% at 120 Hz, 20℃
Leakage Current	After 2 minutes' application of rated voltage, leakage current is not more than 0.01CV or 3(μA), whichever is greater.
tan δ	Measurement frequency : 120 Hz, Temperature : 20℃

Rated voltage (V)	6.3	10	16	25	35	50
tan δ (MAX.)	0.24	0.21	0.18	0.15	0.13	0.12

Stability at Low Temperature — Measurement frequency : 120 Hz

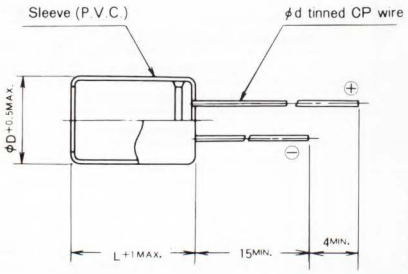
Rated voltage (V)		6.3	10	16	25	35	50
Impedance ratio ZT/Z20 (MAX.)	Z−25℃/Z+20℃	3	2	2	2	2	2
	Z−40℃/Z+20℃	6	5	4	3	3	3

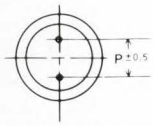
Load Life — After 5000 hours' application of rated voltage at 105℃, capacitors meet the characteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±30% of initial value
tan δ	300% or less of initial specified value

Shelf Life	After leaving capacitors under no load at 105℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.
Marking	Printed with silver color letter on dark brown sleeve according to JIS C-5141.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Radial Lead Type





φD	4	5	6.3	8
P	1.5	2.0	2.5	3.5
φd	0.45	0.45	0.45	0.5

Type numbering system (Example: 10V 33μF)

1	2	3	4	5	6	7	8	9	10	11
U	S	Q	1	A	3	3	0	M	F	H

Configuration

φD	Code
4～8	FH

Capacitance tolerance (±20%)
Capacitance (33μF)
Rated voltage (10V)
Series name
Type

■Dimensions

DXL (mm)

W.V. / Cap. (μF)	Code	6.3		10		16		25		35		50	
		0J		1A		1C		1E		1V		1H	
0.1	0R1											4X7	1.0
0.22	R22											4X7	2.3
0.33	R33											4X7	3.5
0.47	R47											4X7	5.0
1	010											4X7	10
2.2	2R2											4X7	19
3.3	3R3											4X7	24
4.7	4R7									4X7	24	5X7	29
10	100					4X7	29	5X7	33	5X7	36	6.3X7	44
22	220	4X7	34	5X7	38	5X7	44	6.3X7	51	6.3X7	57	8X7	65
33	330	5X7	42	5X7	47	6.3X7	57	6.3X7	63	8X7	72		
47	470	5X7	50	6.3X7	59	6.3X7	68	8X7	78				
100	101	6.3X7	77	8X7	96	8X7	107						Allowable ripple
220	221	8X7	130									Case size	

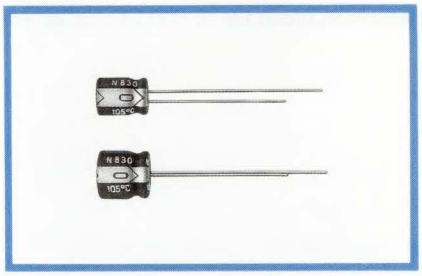
Allowable Ripple (mA) at 85℃ 120Hz

ALUMINUM ELECTROLYTIC CAPACITORS

SF 7mmL, Low Impedance series

Low Impedance　Anti-Solvent Feature

● Low impedance over wide temperature range of −55～+105℃, with 7mm height.



SF　Low Impedance　ST

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−55～+105℃
Voltage Range	6.3～35V
Capacitance Range	6.8～220 μF
Capacitance Tolerance	±20% (120Hz、20℃)
Leakage Current	After 2 minutes' application of rated voltage, leakage current is not more than 0.01CV or 3(μA), whichever is greater.
tan δ	Measurement frequency:120Hz, Temperature:20℃

Rated voltage (V)	6.3	10	16	25	35
tan δ (MAX.)	0.18	0.16	0.14	0.12	0.12

Stability at Low Temperature — Measurement frequency : 120Hz

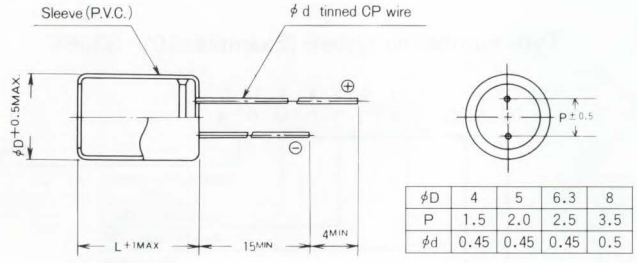
Rated voltage (V)		6.3	10	16	25	35
Impedance ratio	Z−25℃ Z+20℃	2	2	2	2	2
ZT/Z20(MAX.)	Z−55℃ Z+20℃	3	3	3	3	3

Load Life — After 1000 hours' application of rated voltage at 105℃, capacitors meet the characteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

Shelf Life	After leaving capacitors under no load at 105℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.
Marking	Printed with white color letter on dark brown sleeve according to JIS C-5141.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Radial Lead Type



φD	4	5	6.3	8
P	1.5	2.0	2.5	3.5
φd	0.45	0.45	0.45	0.5

Type numbering system (Example: 10V 33μF)

1	2	3	4	5	6	7	8	9	10	11
U	S	F	1	A	3	3	0	M	C	H

Configuration

φD	Code
4～8	C H

Capacitance tolerance (±20%)
Capacitance (33 μF)
Rated voltage (10V)
Series name
Type

■Dimensions

DXL (mm)

Cap.(μF) \ Code		6.3 0J			10 1A			16 1C			25 1E			35 1V		
6.8	6R8													4×7	2.8	75
10	100										4×7	2.8	75	5×7	1.4	120
15	150							4×7	2.8	75	5×7	1.4	120	6.3×7	0.7	180
22	220				4×7	2.8	75	5×7	1.4	120	5×7	1.4	120	6.3×7	0.7	180
33	330	5×7	1.4	120	5×7	1.4	120	6.3×7	0.7	180	6.3×7	0.7	180	8×7	0.4	225
47	470	5×7	1.4	120	6.3×7	0.7	180	6.3×7	0.7	180	8×7	0.4	225			
68	680	6.3×7	0.7	180	6.3×7	0.7	180	8×7	0.4	225	8×7	0.4	225			
100	101	6.3×7	0.7	180	8×7	0.4	225	8×7	0.4	225						
150	151	8×7	0.4	225	8×7	0.4	225							Case size	Impe-dance	Allow-able ripple
220	221	8×7	0.4	225												

Case size DXL(mm)
MAX. Impedance(Ω) at 20℃ 100kHz
Allowable Ripple(mA) at 105℃ 100kHz

ALUMINUM ELECTROLYTIC CAPACITORS

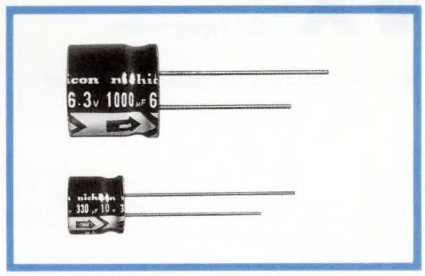
nichicon

VS Low-Profile Sized series

Anti-Solvent Feature (Through 250V)

● Low-profile series endurable against vibrations and shocks.

RT
High Temperature
VS
Smaller
RS



■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+85℃
Voltage Range	6.3～400V
Capacitance Range	0.1～10000μF
Capacitance Tolerance	±20% at 120Hz, 20℃
Leakage Current	After 2 minutes' application of rated voltage, not more than 0.01CV or 3 (μA), whichever is greater. (6.3～50V) / After 1 minutes' application of rated voltage, not more than 0.04CV+100 (μA). (160～400V)

tan δ

For capacitance of more than 1000μF, add 0.02 for every increase of 1000μF. Measurement frequency: 120Hz, Temperature: 20℃

Rated voltage (V)	6.3	10	16	25	35	50	160	200	250	400
tan δ (MAX.)	0.24	0.20	0.16	0.14	0.12	0.10	0.20	0.20	0.20	0.25

Stability at Low Temperature

Measurement frequency: 120Hz

Rated voltage (V)		6.3	10	16	25	35	50	160	200	250	400
Impedance ratio ZT/Z20 (MAX.)	Z−25℃/Z+20℃	4	3	2	2	2	2	3	3	3	6
	Z−40℃/Z+20℃	10	8	6	4	3	3	4	4	6	6

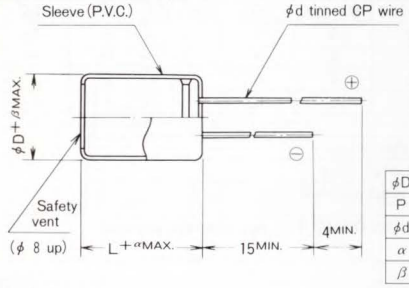
Load Life

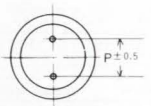
After 1000 hours' application of rated voltage at 85℃, capacitors meet the characteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value for capacitors of 16WV or less, and φ5 and φ6.3 Within ±15% of initial value for capacitors of 25WV or more, and above φ6.3
tan δ	150% or less of initial specified value

Shelf Life	After leaving capacitors under no load at 85℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.
Marking	Printed with white color letter on dark blue sleeve according to JIS C-5141.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Radial Lead Type





φD	5	6.3	8	10	12.5	16	18	20
P	2	2.5	3.5	5.0	5.0	7.5	7.5	10.0
φd	0.5	0.5	0.6	0.6	0.6	0.8	0.8	1.0
α	1	1	1	1	1	1(1.5)	1(1.5)	2
β	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1

Remarks: Dimensions in ( ) are applied to the capacitors rated at 160～400WV.

Type numbering system (Example: 10V 330μF)

1	2	3	4	5	6	7	8	9	10	11	12
U	V	S	1	A	3	3	1	M	N	A	

12: Case size code / Configuration
9: Capacitance tolerance (±20%)
6～8: Capacitance (330μF)
4～5: Rated voltage (10V)
3: Series name
1～2: Type

φD	Code
5X9, 6.3X9	CA
8X9, 10X9, 12.5X12.5	NA
10X12.5	PA
12.5X15, 16X15, 16X20 18X15, 18X20, 18X25 20X15, 20X20, 20X25	RA

■Dimensions

DXL (mm)

W.V.	6.3		10		16		25		35		50		160		200		250		400	
Cap. (μF) \ Code	0J		1A		1C		1E		1V		1H		2C		2D		2E		2G	
0.1	0R1										5X9	1.3								
0.22	R22										5X9	2.9								
0.33	R33										5X9	4.3								
0.47	R47										5X9	6.0								
1	010										5X9	9.0								
2.2	2R2										5X9	17								
3.3	3R3										5X9	24								
4.7	4R7						5X9	24	5X9	26	5X9	29								
10	100				5X9	33	5X9	36	5X9	38	5X9	42							16X15	115
22	220			5X9	45	5X9	50	5X9	55	6.3X9	60	6.3X9	65					16X15	250	△18X20	180
33	330	5X9	50	5X9	55	5X9	60	6.3X9	65	6.3X9	70	8X9	85			16X15	300	• 18X15	320	★18X25	220
47	470	5X9	60	5X9	65	6.3X9	85	6.3X9	90	8X9	95	8X9	105	16X15	360	• 18X15	370	△18X20	390		
68	680													• 18X15	440	△18X20	460	★18X25	470		
100	101	6.3X9	100	6.3X9	105	8X9	120	8X9	125	10X9	155	10X12.5	190	△18X20	560	★18X25	570				
150	151													20X25	710						
220	221	8X9	145	8X9	160	10X9	200	10X12.5	240	12.5X12.5	280	12.5X15	340								
330	331	8X9	190	10X9	220	10X12.5	270	12.5X12.5	320	12.5X15	390	16X15	480								
470	471	10X9	240	10X12.5	290	12.5X12.5	360	12.5X15	410	16X15	510	• 18X15	630								
1000	102	12.5X12.5	440	12.5X15	520	16X15	660	• 18X15	750	• 18X15	790	△18X20	950								
2200	222	16X15	750	16X15	810	• 18X15	980	△18X20	1150	★18X25	1250										
3300	332	• 18X15	910	• 18X15	1050	△18X20	1150	★18X25	1350												
4700	472	△18X20	1100	△18X20	1250	★18X25	1400														
6800	682	★18X25	1350	★18X25	1450	20X25	1700														
10000	103	20X25	1700	20X25	1800															Case size	Allowable ripple

Size 16X20 is available for capacitors marked "• " Size 20X15 is available for capacitors marked "△" Size 20X20 is available for capacitors marked "★".

In this case, 6 will be put at 12th digit of type numbering system.

Allowable Ripple (mA) at 85℃ 120Hz

●Frequency coefficient of allowable ripple current

W.V.	Cap. (μF) \ Frequency (Hz)	50	120	300	1k	10k～
6.3～50	～47	0.75	1.00	1.35	1.57	2.00
	100～470	0.80	1.00	1.23	1.34	1.50
	1000～10000	0.85	1.00	1.10	1.13	1.15
160～400	10～150	0.80	1.00	1.25	1.40	1.60

●Allowable ripple current vs. Ambient temperature

Ambient temp. (℃)	～+70	+85
Coefficient	1.27	1.00

ALUMINUM ELECTROLYTIC CAPACITORS

VX

Standard, For General Purposes

(04 type) series

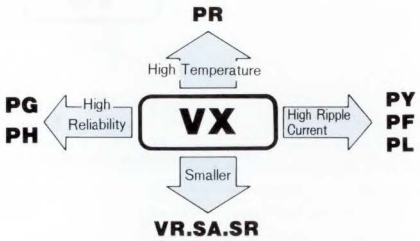
RCJ Approved

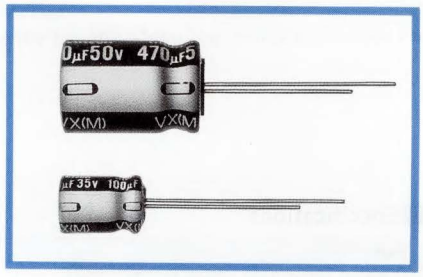
Anti-Solvent Feature

(• For capacitors up to 250WV. • For case sizes of φ22 or larger, only up to 100WV.)

Approved by Reliability Center for Electronic Component, Japan-Certification No. RCJ-03-22C

● Standard series for general purposes.





■Specifications

Item	Performance Characteristics
Operating Temperature Range	φD≦20 −40～+85℃ (6.3～400V), −25～+85℃ (450V) φD>20 −40～+85℃ (6.3～250V), −25～+85℃ (315～450V)
Voltage Range	6.3～450V
Capacitance Range	0.1～33000μF
Capacitance Tolerance	±20% at 120Hz, 20℃

Leakage Current

Rated voltage (V)	6.3～100	160～450
φD≦18	After 1 minute's application of rated voltage, not more than 0.03 CV or 4μA, whichever is greater. After 2 minutes' application of rated voltage, not more than 0.01CV or 3μA, whichever is greater.	In case of CV≦1000 After 1 minute's application of rated voltage, not more than 0.1CV+40 (μA). In case of CV>1000 After 1 minute's application of rated voltage, not more than 0.04CV+100 (μA).
φD>18	After 5 minutes' application of rated voltage, not more than $3\sqrt{CV}$.	After 5 minutes' application of rated voltage, not more than $3\sqrt{CV}$.

tan δ

For capacitance of more than 1000μF, add 0.02 for every increase of 1000μF. Measurement frequency: 120Hz, Temperature: 20℃

Rated voltage (V)	6.3	10	16	25	35	50	63～100	160～315	350～450
tan δ (MAX.)	0.24	0.20	0.16	0.14	0.12	0.10	0.08	0.20	0.25

Stability at Low Temperature

Measurement frequency: 120Hz

Rated voltage (V)			6.3	10	16	25	35～100	160～200	250	315～350	400	450
Impedance ratio ZT/Z20 (MAX.)	Z−25℃/Z+20℃	φD≦20	4	3	2	2	2	3	3	6	6	15
		φD>20	6	4	3	3	2	4	4	6	15	15
	Z−40℃/Z+20℃	φD≦20	10	8	6	4	3	4	6	6	6	—
		φD>20	20	18	15	10	8	12	12	—	—	—

Load Life

After 2000 hours' application of rated voltage at 85℃, capacitors meet the characteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

Shelf Life

After leaving capacitors under no load at 85℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.

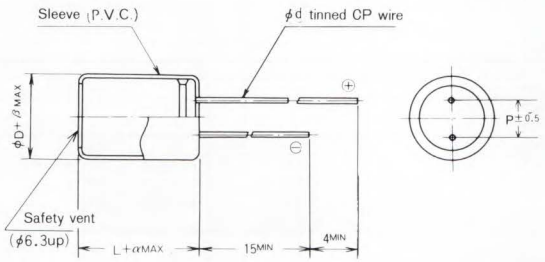
Marking

Printed with white color letter on purple blue sleeve according to JIS C-5141.

Applicable Standards

Characteristics W of JIS C-5141 and JIS C-5102.

■Radial Lead Type



φD	5	6.3	8	10	12.5	16	18	20	22	25
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5	10.0	10.0	12.5
φd	0.5	0.5	0.6	0.6	0.6	0.8	0.8	1.0	1.0	1.0
α ～100WV	1.0	1.0	1.0	1.5	1.5	1.5	1.5	2.0	2.0	2.0
α 160WV～	—	1.5	1.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0
β	0.5	0.5	0.5	0.5	0.8	0.5	0.5	1.0	1.0	1.0

Type numbering system (Example: 10V 330μF)

1	2	3	4	5	6	7	8	9	10	11	12
U	V	X	1	A	3	3	1	M	P	A	

Configuration

Capacitance tolerance (±20%)

Capacitance (330μF)

Rated voltage (10V)

Series name

Type

φD	Code
5	DA
6.3	EA
8～10	PA
12.5～16	HA
18	RA
20	RAY
22	RAZ
25	RAA

• Dimension table in next page.

VX (04 type) series

■Dimensions

D×L (mm)

Cap. (μF) \ W.V.	6.3		10		16		25		35		50		63		100	
Code	0J		1A		1C		1E		1V		1H		1J		2A	
0.1	0R1										5×11	1.1			5×11	2.1
0.22	R22										5×11	2.3			5×11	4.7
0.33	R33										5×11	3.5			5×11	7
0.47	R47										5×11	5			5×11	10
1	010										5×11	10			5×11	21
2.2	2R2										5×11	23			5×11	30
3.3	3R3										5×11	35			5×11	40
4.7	4R7						5×11	30	5×11	35	5×11	40	5×11	45	5×11	45
10	100				5×11	40	5×11	50	5×11	55	5×11	65	5×11	70	6.3×11	75
22	220	5×11	35	5×11	55	5×11	75	5×11	80	5×11	85	5×11	95	6.3×11	115	8×11.5	130
33	330	5×11	55	5×11	80	5×11	90	5×11	95	5×11	105	6.3×11	125	6.3×11	140	10×12.5	170
47	470	5×11	75	5×11	95	5×11	110	5×11	115	6.3×11	140	6.3×11	150	8×11.5	190	10×16	230
100	101	5×11	130	5×11	145	6.3×11	175	6.3×11	185	8×11.5	230	8×11.5	250	10×12.5	300	12.5×20	400
220	221	6.3×11	215	6.3×11	230	8×11.5	300	8×11.5	320	10×12.5	370	10×16	440	10×20	490	16×25	710
330	331	6.3×11	265	8×11.5	330	8×11.5	360	10×12.5	420	10×16	490	10×20	580	12.5×20	680	16×25	860
470	471	8×11.5	360	8×11.5	390	10×12.5	470	10×16	540	10×20	640	12.5×20	760	12.5×25	880	16×31.5	1100
1000	102	10×12.5	570	10×16	630	10×20	790	12.5×20	950	12.5×25	1100	16×25	1350	16×31.5	1550	18×40	1690
																20×35	1720
2200	222	12.5×20	1050	12.5×20	1100	12.5×25	1350	16×25	1550	16×31.5	1800	18×35.5	2090	18×40	2200	22×50	2070
												20×31	2060	20×35	2250	25×40	2010
3300	332	12.5×20	1250	12.5×25	1400	16×25	1700	16×31.5	1950	18×35.5	2220	20×40	2360	22×40	2290	—	—
										20×31	2190	22×35	2280	25×35	2300	25×60	2950
4700	472	16×25	1700	16×25	1800	16×31.5	2100	18×35.5	2360	18×40	2490	22×40	2740	22×50	2670		
								20×31	2330	20×35	2460	25×35	2730	25×40	2940		
6800	682	16×25	1900	16×31.5	2150	18×35.5	2500	20×40	2590	22×40	2860	—	—	—	—		
						20×31	2470	22×35	2540	25×35	2850	25×45	3730	25×50	3900		
10000	103	16×31.5	2250	18×35.5	2500	18×40	2640	22×40	3080	—	—	—	—				
				20×31	2470	20×35	2610	25×35	3070	25×45	3920	25×60	5220				
12000	123	16×35.5	2450	18×35.5	2600	20×40	2730	22×50	3770	—	—						
				20×31	2560	22×35	2700	25×40	3590	25×50	4530						
15000	153	18×35.5	2680	18×40	2720	22×40	3310	—	—	—	—						
		20×31	2650	20×35	2680	25×35	3300	25×45	4260	25×60	5550						
18000	183	18×40	2750	20×40	2850	22×50	4050	—	—	—	—						
		20×35	2720	22×35	2790	25×40	3860	25×50	4920								
22000	223	20×40	2850	22×40	3300	—	—	—	—	—	—						
		22×35	2790	25×35	3290	25×45	4270	25×60	5960								
27000	273	22×45	3330	22×50	4090	—	—	—	—	—	—						
		25×35	3130	25×40	3900	25×50	5290										
33000	333	22×50	3890	—	—	—	—	—	—	—	—						
		25×40	3710	25×50	4820	25×60	6410										

Cap. (μF) \ W.V.	160		200		250		315		350		400		450	
Code	2C		2D		2E		2F		2V		2G		2W	
0.47	R47	6.3×11	12	6.3×11	12	6.3×11	12							
1	010	6.3×11	17	6.3×11	17	6.3×11	17	6.3×11	17	8×11.5	18	8×11.5	18	10×12.5	19
2.2	2R2	6.3×11	26	6.3×11	26	8×11.5	30	8×11.5	30	10×12.5	28	10×12.5	28	10×16	29
3.3	3R3	8×11.5	35	8×11.5	35	10×12.5	35	10×12.5	35	10×16	35	10×16	35	10×20	35
4.7	4R7	8×11.5	40	10×12.5	45	10×12.5	45	10×16	45	10×16	40	10×20	45	12.5×20	50
10	100	10×12.5	65	10×16	70	10×20	70	10×20	70	12.5×20	70	12.5×20	70	12.5×25	75
22	220	10×20	110	10×20	110	12.5×25	130	12.5×25	120	12.5×25	110	16×25	110	16×31.5	110
33	330	12.5×20	150	12.5×25	160	12.5×25	160	16×25	150	16×31.5	140	16×31.5	140	18×35.5	150
														20×31	140
47	470	12.5×25	180	12.5×25	180	16×25	210	16×31.5	190	18×35.5	220	18×35.5	220	20×40	230
										20×31	210	20×31	210	22×35	220
100	101	16×25	300	16×31.5	330	18×35.5	340	18×40	340	20×40	360	22×40	370	—	—
						20×31	330	20×35	330	22×35	350	25×35	360	25×40	390
150	151	16×35.5	420	18×35.5	450	18×40	460	20×40	450	22×40	460	—	—	—	—
				20×31	440	20×35	460	22×35	450	25×35	450	25×45	520	25×60	600
220	221	18×35.5	510	18×40	520	20×40	530	22×45	590	—	—	—	—		
		20×31	500	20×35	510	22×35	520	25×35	550	25×45	630	25×60	720		
270	271	18×40	540	20×40	570	22×40	610	—	—	—	—				
		20×35	540	22×35	560	25×30	560	25×45	810	25×60	830				
330	331	20×40	600	22×40	670	22×45	720	—	—						
		22×35	590	25×30	620	25×35	680	25×60	890						
390	391	22×40	580	22×45	770	22×50	820								
		25×30	530	25×35	720	25×40	790								
470	471	22×45	800	22×50	890	—	—								
		25×35	750	25×40	850	25×45	920								
560	561	22×50	920	—	—	—	—								
		25×40	870	25×45	980	25×60	1160								
680	681	—	—	—	—										
		25×45	1020	25×60	1250										
820	821	—	—											Case size	Allow-able ripple
		25×60	1300												

Allowable Ripple(mA) at 85℃ 120Hz

●Frequency coefficient of allowable ripple current

W. V.	Cap. (μF) \ Frequency (Hz)	50	120	300	1 k	10k～
6.3～100	～ 47	0.75	1.00	1.35	1.57	2.00
	100～ 470	0.80	1.00	1.23	1.34	1.50
	1000～33000	0.85	1.00	1.10	1.13	1.15
160～450	0.47～ 220	0.80	1.00	1.25	1.40	1.60
	270～ 820	0.90	1.00	1.10	1.13	1.15

●Allowable ripple current vs. Ambient temperature

Ambient temp. (℃)	～+70	+85
Coefficient	1.27	1.00

ALUMINUM ELECTROLYTIC CAPACITORS

VX

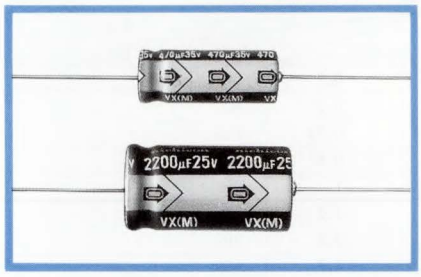
Standard, For General Purposes - Axial Lead Type

(02 type) series

Anti-Solvent Feature

(Through 100V only)

● Axial lead type of standard series for general purposes.



■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+85℃ (6.3～250V), −25～+85℃ (315～450V)
Voltage Range	6.3～450V
Capacitance Range	0.47～22000 μF
Capacitance Tolerance	±20% at 120 Hz, 20℃
Leakage Current	Rated voltage (V): 6.3～100 / 160～450 φD≦18: After 1 minute's application of rated voltage, not more than 0.03 CV or 4μA, whichever is greater. After 2 minutes' application of rated voltage, not more than 0.01CV or 3μA, whichever is greater. / In case of CV≦1000: After 1 minute's application of rated voltage, not more than 0.1CV+40 (μA). In case of CV>1000: After 1 minute's application of rated voltage, not more than 0.04CV+100 (μA). φD>18: After 5 minutes' application of rated voltage, not more than $3\sqrt{CV}$. / After 5 minutes' application of rated voltage, not more than $3\sqrt{CV}$.
tan δ	For capacitance of more than 1000μF, add 0.02 for every increace of 1000μF. Measurement frequency: 120 Hz, Temperature: 20℃

Rated voltage (V)	6.3	10	16	25	35	50	63～100	160～315	350～450
tan δ (MAX.)	0.24	0.20	0.16	0.14	0.12	0.10	0.08	0.20	0.25

Stability at Low Temperature — 120Hz

Rated voltage (V)			6.3	10	16	25	35～100	160～250	315・350	400・450
Impedance ratio ZT/Z20 (MAX.)	Z−25℃/Z+20℃	φD≦18	4	3	2	2	2	4	6	15
		φD>18	6	4	3	3	2	4	6	15
	Z−40℃/Z+20℃	φD≦18	10	8	6	4	3	12	—	—
		φD>18	20	18	15	10	8	12	—	—

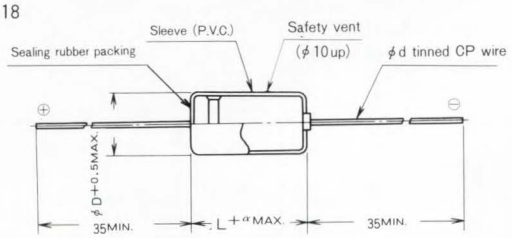
Load Life: After 2000 hours' application of rated voltage at 85℃, capacitors meet the characteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

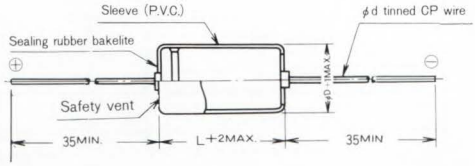
Shelf Life	After leaving capacitors under no load at 85℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.
Marking	Printed with white color letter on purple blue sleeve according to JIS C-5141.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Axial Lead Type

φD≦18



φD≧22



φD	5～13	16～25.4
φd	0.6	0.8

WV	6.3～100	160～450
α	1	2

Type numbering system (Example: 10V 330μF)

1	2	3	4	5	6	7	8	9	10	11
T	V	X	1	A	3	3	1	M	A	A

- 1 2 3: Type
- 4 5: Series name
- 6 7 8: Rated voltage (10V)
- 9: Capacitance (330μF)
- 10: Capacitance tolerance (±20%)
- 11: Configuration

φD	Code
5～8	AA
10～18	CA
22, 25.4	DA

• Dimension table in next page.

VX (02 type)

■Dimensions

DXL(mm)

W.V. / Cap.(μF)	Code	6.3		10		16		25		35		50		63		100	
		0J		1A		1C		1E		1V		1H		1J		2A	
0.47	R47											5X12	5			5X12	10
1	010											5X12	10			5X12	18
2.2	2R2											5X12	23			5X12	28
3.3	3R3											5X12	28	5X12	31	5X12	34
4.7	4R7											5X12	34	5X12	37	5X12	40
10	100							5X12	40	5X12	45	5X12	50	5X12	55	6.3X12	60
22	220					5X12	60	5X12	65	5X12	70	6.3X12	85	6.3X12	90	8X16	120
33	330			5X12	65	5X12	70	5X12	80	6.3X12	90	6.3X16	110	6.3X16	120	8X16	150
47	470			5X12	80	5X12	85	6.3X12	100	6.3X16	120	6.3X16	130	8X16	160	8X20	190
100	101	5X12	110	6.3X12	130	6.3X16	160	6.3X16	170	8X16	210	8X16	220	8X20	260	10X26	340
220	221	6.3X16	200	6.3X16	210	8X16	260	8X16	280	8X20	340	10X21	410	10X26	480	13X26	560
330	331	6.3X16	250	8X16	300	8X16	320	8X20	380	10X21	460	10X26	560	13X26	650	13X31.5	750
470	471	8X16	330	8X16	350	8X20	430	10X26	510	10X26	610	13X26	730	13X31.5	840	16X31.5	970
1000	102	10X21	600	10X21	640	10X26	770	13X26	900	13X31.5	1060	16X31.5	1260	16X31.5	1330	22X40	1540
2200	222	13X26	1020	13X26	1090	13X31.5	1180	16X31.5	1480	16X31.5	1580	18X41	1920	22X40	2160	25.4X52	2430
3300	332	13X26	1200	13X31.5	1390	16X31.5	1620	16X41.5	1710	16X41.5	2050	22X40	2340	22X52	2470		
4700	472	16X31.5	1500	16X31.5	1730	16X41.5	1840	18X41	2170	22X40	2470	22X52	2650	25.4X61	2710		
6800	682	16X31.5	1840	16X41.5	1930	18X41	2310	22X40	2580	22X52	2720	25.4X61	2910				
10000	103	16X41.5	2260	18X41	2350	22X40	2620	22X52	2940	25.4X61	3600						
15000	153	22X40	2450	22X40	2730	22X52	2860	25.4X61	3880								
22000	223	22X52	2550	22X52	2940	25.4X61	3630										

W.V. / Cap.(μF)	Code	160		200		250		315		350		400		450	
		2C		2D		2E		2F		2V		2G		2W	
1	010	6.3X12	13	6.3X12	13	6.3X16	14	6.3X16	14	6.3X16	12	8X16	14	8X16	14
2.2	2R2	6.3X16	23	6.3X16	23	8X16	27	8X16	27	8X16	24	8X20	28	10X21	31
3.3	3R3	8X16	33	8X16	33	8X16	33	8X20	36	8X20	32	10X21	38	10X21	38
4.7	4R7	8X16	39	8X16	39	8X20	45	8X20	45	10X21	46	10X21	46	10X26	50
10	100	8X20	60	10X21	70	10X21	70	10X26	80	13X26	85	13X26	85	13X26	85
22	220	10X26	120	13X26	140	13X26	140	13X31.5	150	13X31.5	140	16X31.5	150	16X31.5	150
33	330	13X26	170	13X26	170	13X31.5	190	16X31.5	210	16X31.5	190	16X41.5	210	18X41	230
47	470	13X31.5	230	13X31.5	230	16X31.5	260	16X31.5	260	16X41.5	260	18X41	290	22X40	310
100	101	16X41.5	430	16X41.5	430	16X41.5	430	22X40	460	22X40	420	22X52	460	25.4X52	540
220	221	22X40	680	22X40	680	22X40	680								
330	331	22X52	940	25.4X52	1010										
470	471	25.4X52	1200											Case size	Allowable ripple

Allowable Ripple (mA) at 85℃ 120Hz

●Frequency coefficient of allowable ripple current

W. V.	Cap.(μF) \ Frequency (Hz)	120	300	1 k	10k～
6.3～100	～ 47	1.00	1.35	1.57	2.00
	100～ 470	1.00	1.23	1.34	1.50
	1000～22000	1.00	1.10	1.13	1.15
160～450	1～ 220	1.00	1.25	1.40	1.60
	330～ 470	1.00	1.10	1.13	1.15

●Allowable ripple current vs. Ambient temperature

Ambient temp.(℃)	～+70	+85
Coefficient	1.27	1.00

ALUMINUM ELECTROLYTIC CAPACITORS

VR Miniature Sized series

Smaller

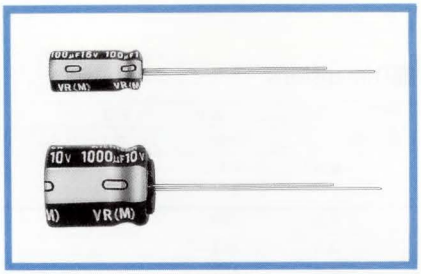
Anti-Solvent Feature (Through 250WV only)

● One rank smaller case sizes than VX series

VZ

High Temperature

VR



■Specifications

Item	Performance Characteristcs
Operating Temperature Range	−40～+85℃ (6.3～400V), −25～+85℃ (450V)
Voltage Range	6.3～450V
Capacitance Range	0.1～22000μF
Capacitance Tolerance	±20% at 120Hz, 20℃

Leakage Current

Rated voltage (V)	6.3～100	160～450
———	After 1 minute's application of rated voltage, leakage current is not more than 0.03CV or 4(μA), whichever is greater. After 2 minutes' application of rated voltage, leakage current is not more than 0.01CV or 3(μA), whichever is greater.	After 1 minute's application of rated voltage, CV≦1000: I =0.1CV+40μA or less After 1 minute's application of rated voltage, CV＞1000: I =0.04CV+100(μA) or less

tan δ

For capacitance of more than 1000μF, add 0.02 for every increase of 1000μF. Measurement frequency:120Hz, Temperature:20℃

Rated voltage (V)	6.3	10	16	25	35	50	63	100	160～315	350～450
tan δ (MAX.)	0.28	0.24	0.20	0.16	0.14	0.12	0.10	0.08	0.20	0.25

Stability at Low Temperature

Measurement frequency:120Hz

Rated voltage (V)		6.3	10	16	25	35	50	63	100	160～200	250～350	400	450
Impedance ratio	Z−25℃/Z+20℃	5	4	3	2	2	2	2	2	3	4	6	15
ZT/Z20 (MAX.)	Z−40℃/Z+20℃	12	10	8	5	4	3	3	3	4	8	10	—

Load Life

After 2000 hours' application of rated voltage at 85℃, capacitors meet the chracteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

Shelf Life

After leaving capacitors under no load at 85℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.

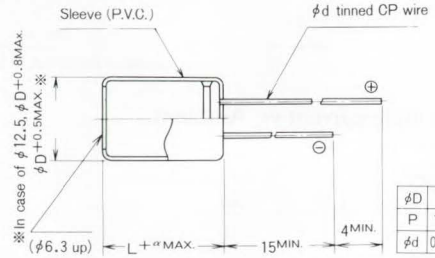
Marking

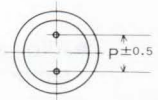
Printed with white color letter on black sleevs according to JIS C-5141.

Applicable Standards

Characteristics W of JIS C-5141 and JIS C-5102.

■Radial Lead Type





φD	4	5	6.3	8	10	12.5	16	18	20
P	1.5	2	2.5	3.5	5	5	7.5	7.5	10
φd	0.45	0.5	0.5	0.6	0.6	0.6	0.8	0.8	1.0

α	(L< 20)1.5 (L≧20)2.0

Type numbering system (Example: 10V 330μF)

1	2	3	4	5	6	7	8	9	10	11	12
U	V	R	1	A	3	3	1	M	E	A	

Configuration

Capacitance tolerance (±20%)

Capacitance (330μF)

Rated voltage (10V)

Series name

Type

φD	Code
4	DA6
5	DA
6.3	EA
8～10	PA
12.5～20	RA

• Dimension table in next page.

VR series

■Dimensions

DXL (mm)

Cap. (μF) \ W.V.	Code	6.3		10		16		25		35		50	
		0J		1A		1C		1E		1V		1H	
0.1	0R1											•5X11	1.1
0.22	R22											•5X11	2.3
0.33	R33											•5X11	3.5
0.47	R47											•5X11	5
1	010											•5X11	10
2.2	2R2											•5X11	23
3.3	3R3											•5X11	35
4.7	4R7							•5X11	30	•5X11	35	•5X11	40
10	100					•5X11	40	•5X11	50	•5X11	55	•5X11	60
22	220	•5X11	35	•5X11	55	•5X11	75	•5X11	80	•5X11	85	5X11	95
33	330	•5X11	55	•5X11	80	•5X11	90	•5X11	95	5X11	105	5X11	120
47	470	•5X11	75	•5X11	95	•5X11	110	•5×11	115	5X11	130	6.3X11	155
100	101	•5X11	130	•5X11	145	5X11	160	6.3X11	190	6.3X11	210	8X11.5	260
220	221	5X11	200	6.3X11	240	6.3X11	260	8X11.5	330	10X12.5	385	10X12.5	410
330	331	6.3X11	270	6.3X11	290	8X11.5	370	10X12.5	440	10X12.5	470	10X16	520
470	471	6.3X11	320	6.3X11	350	8X11.5	440	10X12.5	520	10X16	580	12.5X20	740
1000	102	8X11.5	540	10X12.5	620	10X16	710	10X20	830	12.5X20	1000	12.5X25	1100
2200	222	10X20	900	10X20	970	12.5X20	1150	12.5X25	1300	16X25	1550	16X35.5	1700
3300	332	10X20	1050	12.5X20	1250	12.5X25	1400	16X25	1650	16X35.5	1950	18X35.5	2200
4700	472	12.5X20	1350	12.5X25	1500	16X25	1700	16X31.5	2050	18X35.5	2400		
6800	682	12.5X25	1600	16X25	1850	16X35.5	2150	18X35.5	2550	20X40	3000		
10000	103	16X25	2000	16X35.5	2350	18X35.5	2700						
15000	153	16X35.5	2550	18X35.5	2950	20X40	3400						Allow-able ripple
22000	223	18X40	3200	20X40	3700							Case size	

Cap. (μF) \ W.V.	Code	63		100		160		200		250		315		350		400		450	
		1J		2A		2C		2D		2E		2F		2V		2G		2W	
0.1	0R1			5X11	2.1														
0.22	R22			5X11	4.7														
0.33	R33			5X11	7														
0.47	R47			5X11	10	6.3X11	12	6.3X11	12	6.3X11	12								
1	010			5X11	21	6.3X11	17	6.3X11	17	6.3X11	17	6.3X11	17	6.3X11	18	8X11.5	18	8X11.5	18
2.2	2R2			5X11	30	6.3X11	26	6.3X11	26	6.3X11	26	8X11.5	30	8X11.5	25	10X12.5	28	10X12.5	28
3.3	3R3			5X11	40	6.3X11	29	6.3X11	29	8X11.5	33	10X12.5	35	10X12.5	32	10X12.5	32	10X16	35
4.7	4R7			5X11	45	6.3X11	34	8X11.5	39	8X11.5	39	10X12.5	42	10X12.5	39	10X16	41	10X20	43
10	100	5X11	65	6.3X11	75	8X11.5	58	10X12.5	61	10X16	64	10X20	70	10X20	65	12.5X20	70	12.5X20	70
22	220	5X11	100	6.3X11	130	10X16	95	10X20	99	12.5X20	110	12.5X20	110	12.5X25	110	16X25	120	16X25	120
33	330	6.3X11	140	8X11.5	180	10X20	120	12.5X20	140	12.5X20	140	16X25	150	16X25	130	16X31.5	140	16X35.5	150
47	470	6.3X11	170	10X12.5	230	12.5X20	160	12.5X20	160	12.5X25	170	16X25	180	16X35.5	160	16X35.5	160	18X40	170
100	101	10X12.5	300	10X20	370	12.5X25	240	16X31.5	250	16X31.5	250	18X35.5	270	18X40	250				
220	221	10X16	470	12.5X25	620	16X35.5	380	18X35.5	390	20X40	430								
330	331	10X20	710	12.5X25	760	18X40	490												
470	471	12.5X20	900	16X25	1000														Allowable ripple
1000	102	16X25	1300	18X40	1380													Case size	

Allowable Ripple (mA) at 85℃ 120Hz
Size 4X11 is available for capacitors marked "●"

● Frequency coefficient of allowable ripple current

W.V.	Cap.(μF) \ Frequency	50Hz	120Hz	300Hz	1kHz	10kHz～
6.3～100	～47	0.75	1.00	1.35	1.57	2.00
	100～470	0.80	1.00	1.23	1.34	1.50
	1000～22000	0.85	1.00	1.10	1.13	1.15
160～450	0.47～220	0.80	1.00	1.25	1.40	1.60
	330	0.90	1.00	1.10	1.13	1.15

● Allowable ripple current vs. Ambient temperature

Ambient temp.(℃)	～+70	+85
Coefficient	1.27	1.00

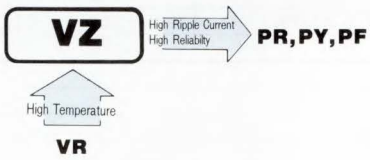
ALUMINUM ELECTROLYTIC CAPACITORS

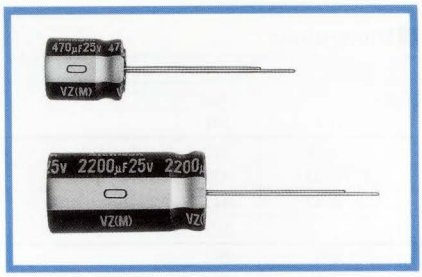
VZ Wide Temperature Range series

Smaller

Anti-Solvent Feature (Through 250V only)

- Small case sizes as same as VR series, but operating over wide temperature range of −55～+105℃.





■Specifications

Item	Performance Characteristics
Opearating Temperature Range	−55～+105℃ (6.3～100V), −40～+105℃ (160～400V), −25～+105℃ (450V)
Voltage Range	6.3～450V
Capacitance Range	0.1～22000μF
Capacitance Tolerance	±20% at 120Hz, 20℃

Leakage Current

Rated voltage (V)	6.3～100	160～450
———	After 1 minute's application of rated voltage, leakage current is not more than 0.03CV or 4(μA), whichever is greater. After 2 minutes' application of rated voltage, leakage current is not more than 0.01CV or 3(μA), whichever is greater.	After 1minute's application of rated voltage, CV≦1000: I=0.1CV+40μA or less After 1 minute's application of rated voltage, CV>1000: I=0.04CV+100(μA) or less

tan δ

For capacitance of more than 1000μF, add 0.02 for every increase of 1000μF. Measurement frequency:120Hz, Temperature:20℃

Rated voltage (V)	6.3	10	16	25	35	50	63	100	160～315	350～450
tan δ (MAX.)	0.28	0.24	0.20	0.16	0.14	0.12	0.10	0.08	0.20	0.25

Stability at Low Temperature

Measurement frequeney:120Hz

Rated voltage (V)		6.3	10	16	25	35	50	63	100	160～200	250～350	400	450
Impedance ratio	Z−25℃/Z+20℃	5	4	3	2	2	2	2	2	3	4	6	15
ZT/Z20 (MAX.)	Z−40℃/Z+20℃	10	8	6	4	3	3	3	3	4	8	10	—

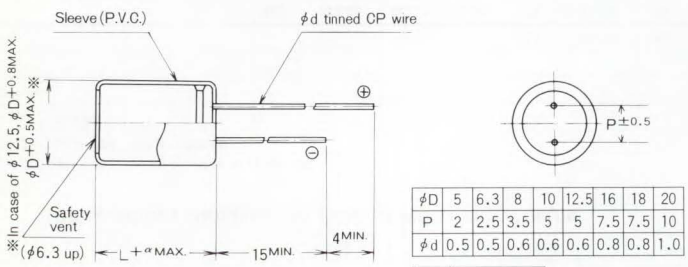
Load Life

After 1000 hours' application of rated voltage at 105℃, capacitors meet the characteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

Shelf Life	After leaving capacitors under no load at 105℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.
Markig	Printed with white color letter on black sleeve according to JIS C-5141.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Radial Lead Type



φD	5	6.3	8	10	12.5	16	18	20
P	2	2.5	3.5	5	5	7.5	7.5	10
φd	0.5	0.5	0.6	0.6	0.6	0.8	0.8	1.0

α	(L<20) 1.5 (L≧20) 2.0

Type numbering system (Example: 10V 330μF)

1	2	3	4	5	6	7	8	9	10	11
U	V	Z	1	A	3	3	1	M	E	H

Configuration

Capacitance tolerance (±20%)

Capacitance (330μF)

Rated voltage (10V)

Series name

Type

φD	Code
5	DH
6.3	EH
3～10	PH
12.5～20	RH

• Dimension table in next page.

VZ series

■Dimensions

DXL (mm)

W.V.	6.3		10		16		25		35		50	
Cap.(μF) / Code	0J		1A		1C		1E		1V		1H	
0.1	0R1										5X11	1.1
0.22	R22										5X11	2.3
0.33	R33										5X11	3.5
0.47	R47										5X11	7
1	010										5X11	12
2.2	2R2										5X11	18
3.3	3R3										5X11	25
4.7	4R7						5X11	22	5X11	25	5X11	29
10	100				5X11	30	5X11	36	5X11	39	5X11	46
22	220	5X11	28	5X11	41	5X11	54	5X11	58	5X11	61	5X11	68
33	330	5X11	43	5X11	58	5X11	65	5X11	68	5X11	75	5X11	86
47	470	5X11	56	5X11	68	5X11	79	5X11	83	5X11	93	6.3X11	115
100	101	5X11	93	5X11	105	5X11	115	6.3X11	140	6.3X11	150	8X11.5	190
220	221	5X11	145	6.3X11	175	6.3X11	190	8X11.5	240	10X12.5	275	10X12.5	295
330	331	6.3X11	195	6.3X11	210	8X11.5	265	10X12.5	315	10X12.5	340	10X16	375
470	471	6.3X11	230	6.3X11	250	8X11.5	315	10X12.5	375	10X16	415	12.5X20	530
1000	102	8X11.5	390	10X12.5	445	10X16	510	10X20	595	12.5X20	715	12.5X25	790
2200	222	10X20	645	10X20	695	12.5X20	825	12.5X25	930	16X25	1110	16X35.5	1220
3300	332	10X20	750	12.5X20	895	12.5X25	1000	16X25	1180	16X35.5	1400	18X35.5	1580
4700	472	12.5X20	965	12.5X25	1080	16X25	1220	16X31.5	1470	18X35.5	1720		
6800	682	12.5X25	1150	16X25	1330	16X35.5	1540	18X35.5	1830	20X40	2150		
10000	103	16X25	1430	16X35.5	1680	18X35.5	1930						
15000	153	16X35.5	1830	18X35.5	2110	20X40	2430						
22000	223	18X40	2290	20X40	2650								
											Case size	Allowable ripple	

W.V.	63		100		160		200		250		315		350		400		450	
Cap.(μF) / Code	1J		2A		2C		2D		2E		2F		2V		2G		2W	
0.1	0R1		5X11	1.5														
0.22	R22		5X11	3.4														
0.33	R33		5X11	5.0														
0.47	R47		5X11	7.1	6.3X11	8.6	6.3X11	8.6	6.3X11	8.6								
1	010		5X11	15	6.3X11	12	6.3X11	12	6.3X11	12	6.3X11	12	6.3X11	13	8X11.5	13	8X11.5	13
2.2	2R2		5X11	21	6.3X11	18	6.3X11	18	6.3X11	18	8X11.5	22	8X11.5	18	10X12.5	20	10X12.5	20
3.3	3R3		5X11	29	6.3X11	21	6.3X11	21	8X11.5	24	10X12.5	25	10X12.5	23	10X12.5	23	10X16	25
4.7	4R7		5X11	32	6.3X11	24	8X11.5	28	8X11.5	28	10X12.5	30	10X12.5	28	10X16	30	10X20	32
10	100	5X11	46	6.3X11	54	8X11.5	41	10X12.5	44	10X16	46	10X20	50	10X20	47	12.5X20	50	12.5X20	50
22	220	5X11	71	6.3X11	93	10X16	68	10X20	71	12.5X20	79	12.5X20	79	12.5X25	79	16X25	86	16X25	86
33	330	6.3X11	100	8X11.5	130	10X20	86	12.5X20	100	12.5X20	100	16X25	110	16X25	100	16X31.5	110	16X35.5	120
47	470	6.3X11	120	10X12.5	165	12.5X20	115	12.5X20	115	12.5X25	120	16X25	130	16X35.5	120	16X35.5	120	18X40	130
100	101	10X12.5	215	10X20	265	12.5X25	170	16X31.5	180	16X31.5	180	18X35.5	200	18X40	180				
220	221	10X16	335	12.5X25	440	16X35.5	270	18X35.5	280	20X40	310								
330	331	10X20	510	12.5X25	540	18X40	350												
470	471	12.5X20	640	16X25	715														
1000	102	16X25	930	18X40	985												Case size	Allowable ripple	

Allowable Ripple (mA) at 105℃ 120Hz

● Frequency coefficient of allowable ripple current

W.V.	Cap.(μF) \ Frequency	50Hz	120Hz	300Hz	1kHz	10kHz~
6.3~100	~47	0.75	1.00	1.35	1.57	2.00
	100~470	0.80	1.00	1.23	1.34	1.50
	1000~22000	0.85	1.00	1.10	1.13	1.15
160~450	0.47~220	0.80	1.00	1.25	1.40	1.60
	330	0.90	1.00	1.10	1.13	1.15

● Allowable ripple current vs. Ambient temperature

Ambient temp.(℃)	~+70	+85	+105
Coefficient	1.78	1.40	1.00

ALUMINUM ELECTROLYTIC CAPACITORS

RS Compact & Low-profile Sized series

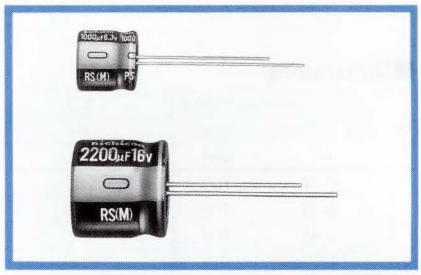
Smaller | Anti-Solvent Feature

- More compact & low profile case sizes than VS series.

vs

Smaller

RS



■Specification

Item	Performance Characteristics
Operating Temperature Range	−40～+85℃
Voltage Range	6.3～50V
Capacitance Range	0.1～10000μF
Capacitance Tolerance	±20% at 120Hz, 20℃
Leakage Current	After 1 minute's application of rated voltage, leakage current is not more than 0.03CV or 4 (μA), whichever is greater. After 2 minutes' application of rated voltage, leakage current is not more than 0.01CV or 3 (μA), whichever is greater.
tan δ	For capacitance of more than 1000μF, add 0.02 for every increase of 1000μF. Measurement frequency: 120Hz, Temperature: 20℃

Rated voltage (V)	6.3	10	16	25	35	50
tan δ (MAX.)	0.28	0.24	0.20	0.16	0.14	0.12

Stability at Low Temperature — Measurement frequency: 120Hz

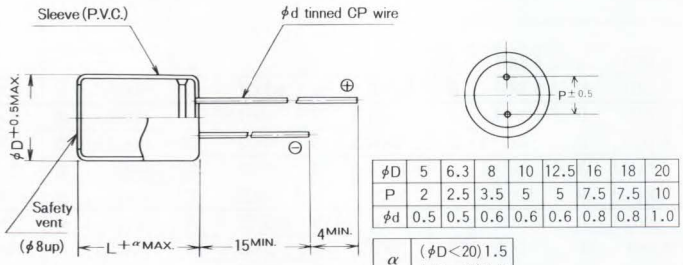
Rated voltage (V)		6.3	10	16	25	35	50
Impedance ratio	Z−25℃/Z+20℃	5	4	3	2	2	2
ZT/Z20 (MAX.)	Z−40℃/Z+20℃	12	10	8	5	4	3

Load Life — After 2000 hours' application of rated voltage at 85℃, capacitors meet the characteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

Shelf Life	After leaving capacitors under no load at 85℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.
Marking	Printed with white color letter on black sleeve according to JIS C-5141.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Radial Lead Type



φD	5	6.3	8	10	12.5	16	18	20
P	2	2.5	3.5	5	5	7.5	7.5	10
φd	0.5	0.5	0.6	0.6	0.6	0.8	0.8	1.0

α	
	(φD<20) 1.5
	(φD≥20) 2.0

Type numbering system (Example: 10V 330μF)

1	2	3	4	5	6	7	8	9	10	11
U	R	S	1	A	3	3	1	M	N	A

Configuration
Capacitance tolerance (±20%)
Capacitance (330μF)
Rated voltage (10V)
Series name
Type

φD	Code
5×9, 6.3×9	CA
8×9, 10×9 12.5×12.5	NA
10×12.5	PA
12.5×15 16×15 18×15 18×20 18×25 20×25	RA

■Dimensions

DXL (mm)

Cap. (μF) \ W.V.	6.3		10		16		25		35		50	
Code	0J		1A		1C		1E		1V		1H	
0.1	0R1										5×9	1.1
0.22	R22										5×9	2.3
0.33	R33										5×9	3.5
0.47	R47										5×9	5
1	010										5×9	10
2.2	2R2										5×9	23
3.3	3R3										5×9	35
4.7	4R7						5×9	30	5×9	35	5×9	40
10	100				5×9	40	5×9	50	5×9	55	5×9	60
22	220	5×9	35	5×9	55	5×9	70	5×9	75	5×9	80	5×9	90
33	330	5×9	55	5×9	75	5×9	85	5×9	95	5×9	100	6.3×9	120
47	470	5×9	75	5×9	90	5×9	100	5×9	110	6.3×9	130	6.3×9	140
100	101	5×9	125	5×9	135	6.3×9	160	6.3×9	180	8×9	220	10×9	240
220	221	6.3×9	200	6.3×9	220	8×9	270	10×9	310	10×9	330	10×12.5	410
330	331	6.3×9	240	8×9	300	10×9	340	10×9	380	10×12.5	470	12.5×12.5	520
470	471	8×9	330	8×9	360	10×9	410	10×12.5	520	12.5×12.5	580	16×15	740
1000	102	10×9	500	10×12.5	620	12.5×12.5	710	12.5×15	820	16×15	1000	18×20	1150
2200	222	12.5×15	890	12.5×15	960	16×15	1150	18×15	1350	18×20	1550	20×25	1750
3300	332	16×15	1200	16×15	1300	18×15	1450	18×20	1700	20×25	2000		
4700	472	16×15	1400	18×15	1550	18×20	1750	18×25	2050				
6800	682	18×15	1650	18×20	1850	18×25	2150						
10000	103	18×20	2000	18×25	2350								
											Case size		Allowable ripple

Allowable Ripple (mA) at 85℃ 120Hz

●Frequency coefficient of allowable ripple current

Cap. (μF) \ Frequency (Hz)	50	120	300	1k	10k～
～47	0.75	1.00	1.35	1.57	2.00
100～470	0.80	1.00	1.23	1.34	1.50
1000～	0.85	1.00	1.10	1.13	1.15

●Allowable ripple current vs. Ambient temperature

Ambient temp. (℃)	～+70	+85
Coefficient	1.27	1.00

ALUMINUM ELECTROLYTIC CAPACITORS

nichicon

RZ Compact & Low-Profile Sized, Wide Temperature Range series

Smaller

Anti-Solvent Feature

- Very small case sizes as same as RS series, but operating over wide temperature range of −55～+105℃.

RZ
High Temperature
RS

■Specification

Item	Performance Characteristics
Operating Temperature Range	−55～+105℃
Voltage Range	6.3～50V
Capacitance Range	0.1～10000μF
Capacitance Tolerance	±20% at 120Hz, 20℃
Leakage Current	After 1 minute's application of rated voltage, leakage current is not more than 0.03CV or 4 (μA), whichever is greater. After 2 minutes' application of rated voltage, leakage current is not more than 0.01CV or 3 (μA), whichever is greater.
tan δ	For capacitance of more than 1000μF, add 0.02 for every increase of 1000μF. Measurement frequency: 120Hz, Temperature: 20℃

Rated voltage (V)	6.3	10	16	25	35	50
tan δ (MAX.)	0.28	0.24	0.20	0.16	0.14	0.12

Stability at Low Temperature — Measurement frequency: 120Hz

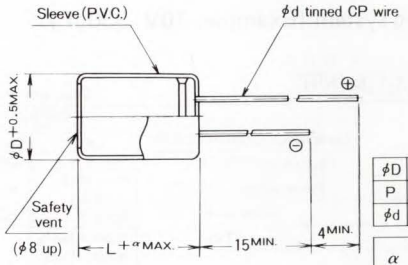
Rated voltage (V)		6.3	10	16	25	35	50
Impedance ratio ZT/Z20 (MAX.)	Z−25℃/Z+20℃	5	4	3	2	2	2
	Z−40℃/Z+20℃	10	8	6	4	3	3

Load Life — After 1000 hours' application of rated voltage at 105℃, capacitors meet the characteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

Shelf Life	After leaving capacitors under no load at 105℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.
Marking	Printed with white color letter on black sleeve according to JIS C-5141.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Radial Lead Type



φD	5	6.3	8	10	12.5	16	18	20
P	2	2.5	3.5	5	5	7.5	7.5	10
φd	0.5	0.5	0.6	0.6	0.6	0.8	0.8	1.0

α	(φD<20) 1.5 (φD≥20) 2.0

Type numbering system (Example: 10V 330μF)

1	2	3	4	5	6	7	8	9	10	11
U	R	Z	1	A	3	3	1	M	N	H

Configuration

Capacitance tolerance (±20%)

Capacitance (330μF)

Rated voltage (10V)

Series name

Type

φD	Code
5×9 6.3×9	CH
8×9, 10×9 12.5×12.5	NH
10×12.5	PH
12.5×15 16×15 18×15 18×20 18×25 20×25	RH

■Dimensions

D×L (mm)

Cap. (μF) \ W.V.	Code	6.3		10		16		25		35		50	
		0J		1A		1C		1E		1V		1H	
0.1	0R1											5×9	1.1
0.22	R22											5×9	2.3
0.33	R33											5×9	3.5
0.47	R47											5×9	5
1	010											5×9	10
2.2	2R2											5×9	18
3.3	3R3											5×9	25
4.7	4R7							5×9	20	5×9	25	5×9	30
10	100					5×9	30	5×9	35	5×9	40	5×9	45
22	220	5×9	25	5×9	40	5×9	50	5×9	55	5×9	60	5×9	65
33	330	5×9	40	5×9	55	5×9	60	5×9	70	5×9	75	6.3×9	85
47	470	5×9	55	5×9	65	5×9	70	5×9	80	6.3×9	95	6.3×9	100
100	101	5×9	90	5×9	95	6.3×9	115	6.3×9	130	8×9	155	10×9	170
220	221	6.3×9	145	6.3×9	155	8×9	190	10×9	220	10×9	235	10×12.5	290
330	331	6.3×9	170	8×9	210	10×9	240	10×9	270	10×12.5	335	12.5×12.5	370
470	471	8×9	235	8×9	255	10×9	290	10×12.5	370	12.5×12.5	410	16×15	530
1000	102	10×9	360	10×12.5	440	12.5×12.5	510	12.5×15	585	16×15	710	18×20	820
2200	222	12.5×15	635	12.5×15	685	16×15	820	18×15	960	18×20	1110	20×25	1250
3300	332	16×15	860	16×15	930	18×15	1040	18×20	1210	20×25	1430		
4700	472	16×15	1000	18×15	1110	18×20	1250	18×25	1460				
6800	682	18×15	1180	18×20	1320	18×25	1540						
10000	103	18×20	1430	18×25	1680							Case size	Allowable ripple

Allowable Ripple(mA) at 105℃ 120Hz

- Frequency coefficient of allowable ripple current

Cap.(μF) \ Frequency(Hz)	50	120	300	1k	10k～
～47	0.75	1.00	1.35	1.57	2.00
100～470	0.80	1.00	1.23	1.34	1.50
1000～	0.85	1.00	1.10	1.13	1.15

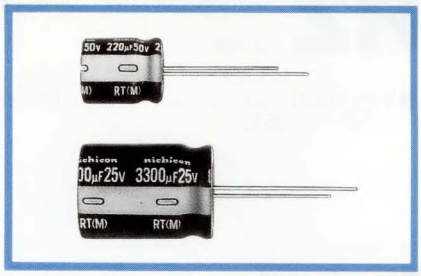
- Allowable ripple current vs. Ambient temperature

Ambient temp.(℃)	～+70	+85	+105
Coefficient	1.78	1.40	1.00

ALUMINUM ELECTROLYTIC CAPACITORS

RT Low-Profile Sized, Wide Temperature Range series

Anti-Solvent Feature (Through 250V only)



- Low-profile case sizes as same as VS series, but operating over wide temperature range.
- Higher voltage ratings available up to 400V.

RT
High Temperature
vs

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−55～+105℃ (6.3～50V), −40～+105℃ (160～400V)
Voltage Range	6.3～400V
Capacitance Range	0.1～10000μF
Capacitance Tolerance	±20% at 120Hz, 20℃
Leakage Current	Rated voltage (V): 6.3～50V — Leakage current: After 2 minutes' application of rated voltage, leakage current is not more than 0.01CV or 3(μA), whichever is greater. / 160～400V — 0.04CV+100(μA), after 1 minute's application of rated voltage.
tan δ	For capacitance of more than 1000μF, add 0.02 for every increase of 1000μF. Measurement frequency: 120Hz, Temperature: 20℃

Rated voltage (V)	6.3	10	16	25	35	50	160～250	400
tan δ (MAX.)	0.26	0.22	0.18	0.16	0.14	0.12	0.15	0.20

Stability at Low Temperature — Measurement frequency: 120Hz

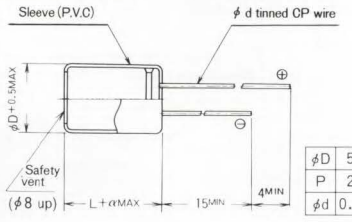
Rated voltage (V)		6.3	10	16	25	35	50	160～200	250	400
Impedance ratio	Z−25℃/Z+20℃	4	3	2	2	2	2	3	3	6
ZT/Z20 (MAX.)	Z−40℃/Z+20℃	8	6	4	3	3	3	4	6	6

Load Life — After 1000 hours' application of rated voltage at 105℃, capacitors meet the characteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

Shelf Life	After leaving capacitors under no load at 105℃ for 1000 hours' and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.
Marking	Printed with white color letter on black sleeve according to JIS C-5141.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Radial Lead Type



φD	5	6.3	8	10	12.5	16	18	20
P	2	2.5	3.5	5	5	7.5	7.5	10
φd	0.5	0.5	0.6	0.6	0.6	0.8	0.8	1.0

α	
	(φD≦20)1.5
	(φD≧20)2.0

Type numbering system (Example: 10V 330μF)

1	2	3	4	5	6	7	8	9	10	11	12
U	R	T	1	A	3	3	1	M	N	H	

Case size code
Configuration
Capacitance tolerance (±20%)
Capacitance (330μF)
Rated voltage (10V)
Series name
Type

φD	Code
5X9, 6.3X9	CH
8X9, 10X9, 12.5X12.5	NH
10X12.5	PH
12.5X15, 16X15, 16X20, 18X15, 18X20, 18X25, 20X15, 20X20, 20X25	RH

■Dimensions

DXL (mm)

W.V.	6.3		10		16		25		35		50		160		200		250		400	
Cap.(μF) / Code	0J		1A		1C		1E		1V		1H		2C		2D		2E		2G	
0.1	0R1										5X9	1.1								
0.22	R22										5X9	2.3								
0.33	R33										5X9	3.5								
0.47	R47										5X9	5								
1	010										5X9	10								
2.2	2R2										5X9	16								
3.3	3R3										5X9	25								
4.7	4R7						5X9	20	5X9	25	5X9	30								
10	100				5X9	30	5X9	35	5X9	40	5X9	45							16X15	85
22	220		5X9	40	5X9	50	5X9	55	6.3X9	65	6.3X9	70					16X15	180	△18X20	130
33	330	5X9	5X9	55	5X9	60	6.3X9	70	6.3X9	80	8X9	90			16X15	220	• 18X15	230	★18X25	160
47	470	5X9	5X9	70	6.3X9	80	6.3X9	90	8X9	100	8X9	110	16X15	260	• 18X15	270	△18X20	280		
68	680												• 18X15	320	△18X20	330	★18X25	340		
100	101	6.3X9	6.3X9	110	8X9	130	8X9	140	10X9	160	10X12.5	200	△18X20	400	★18X25	410				
150	151												20X25	510						
220	221	8X9	8X9	180	10X9	210	10X12.5	250	12.5X12.5	280	12.5X15	320								
330	331	8X9	10X9	230	10X12.5	290	12.5X12.5	320	12.5X15	360	16X15	440								
470	471	10X9	10X12.5	320	12.5X12.5	360	12.5X15	400	16X15	490	• 18X15	550								
1000	102	12.5X12.5	12.5X15	500	16X15	630	• 18X15	700	• 18X15	750	△18X20	820								
2200	222	16X15	16X15	810	• 18X15	930	△18X20	1050	★18X25	1150										
3300	332	• 18X15	• 18X15	1000	△18X20	1150	★18X25	1300												
4700	472	△18X20	△18X20	1200	★18X25	1400														
6800	682	★18X25	★18X25	1450	20X25	1700														Allowable ripple
10000	103	20X25	20X25	1800															Case size	

Size 16X20 is available for capacitors marked. "•" Size 20X15 is available for capacitors marked. "△" Size 20X20 is available for capacitors marked. "★". In this case, 6 will be put at 12th digit of type numbering system. Allowable Ripple (mA) at 105℃ 120Hz

●Frequency coefficient of allowable ripple current

W.V.	Cap.(μF) \ Frequency (Hz)	50	120	300	1k	10k～
6.3～50	～47	0.75	1.00	1.35	1.57	2.00
	100～470	0.80	1.00	1.23	1.34	1.50
	1000～10000	0.85	1.00	1.10	1.13	1.15
160～400	10～150	0.80	1.00	1.25	1.40	1.60

●Allowable ripple current vs. Ambient temperature

Ambient temp.(℃)	～+70	+85	+105
Coefficient	1.62	1.40	1.00

ALUMINUM ELECTROLYTIC CAPACITORS

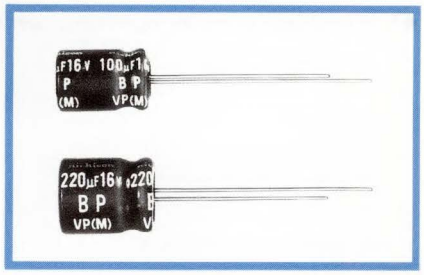
nichicon

VP Non-Polarized series

NP Non-Polarized | Anti-Solvent Feature

● Standard non-polarized series for entertainment electronics.

VP → Smaller → SP. MP



■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+85℃
Voltage Range	6.3～100V
Capacitance Range	0.47～6800μF
Capacitance Tolerance	±20% at 120Hz, 20℃
Leakage Current	After 5 minutes' application of rated voltage, leakage current is not more than 0.03CV or 3(μA), whichever is greater.
tan δ	For capacitance of more than 1000μF, add 0.02 for every increase of 1000μF. Measurement frequency : 120Hz, Temperature : 20℃

Rated voltage (V)	6.3	10	16	25	35	50	63	100
tan δ (MAX.)	0.26	0.24	0.22	0.20	0.16	0.14	0.12	0.10

Stability at Low Temperature — Measurement frequency : 120Hz

Rated voltage (V)		6.3	10	16	25	35	50	63	100
Impedance ratio ZT/Z20 (MAX.)	Z−25℃/Z+20℃	4	3	2	2	2	2	2	2
	Z−40℃/Z+20℃	10	8	6	5	4	4	3	3

Load Life — After 1000 hours' application of rated voltage at 85℃ with the polarity inverted every 250 hours, capacitors meet the characteristics requirements listed at right.

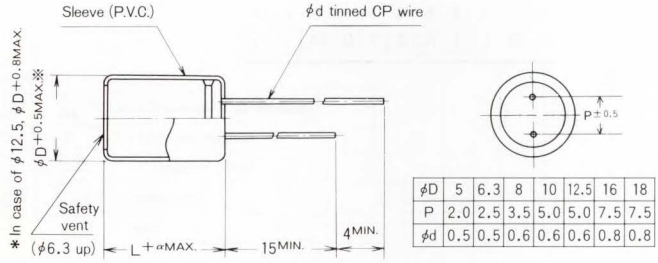
Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

Shelf Life — After leaving capacitors under no load at 85℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.

Marking — Printed with white color letter on black sleeve according to JIS C-5141.

Applicable Standards — Characteristics W of JIS C-5141 and JIS C-5102.

■Radial Lead Type



φD	5	6.3	8	10	12.5	16	18
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5
φd	0.5	0.5	0.6	0.6	0.6	0.8	0.8

α	(L<20)1.5 (L≧20)2.0

Type numbering system (Example: 10V 47μF)

1	2	3	4	5	6	7	8	9	10	11
U	V	P	1	A	4	7	0	M	D	A

Type
Series name
Rated voltage (10V)
Capacitance (47μF)
Capacitance tolerance (±20%)
Configuration

φD	Code
5	DA
6.3	EA
8～10	PA
12.5～18	RA

■Dimensions

DXL(mm)

Cap. (μF) \ W.V.	6.3		10		16		25		35		50		63		100	
Code	0J		1A		1C		1E		1V		1H		1J		2A	
0.47	R47										5×11	11			5×11	14
1	010										5×11	17			5×11	21
2.2	2R2										5×11	25			6.3×11	34
3.3	3R3										5×11	27	5×11	28	6.3×11	39
4.7	4R7								5×11	34	5×11	34	6.3×11	34	6.3×11	47
10	100				5×11	42	5×11	42	5×11	43	6.3×11	52	6.3×11	57	8×11.5	71
22	220		5×11	57	5×11	57	6.3×11	65	6.3×11	73	8×11.5	89	8×11.5	95	10×16	135
33	330	5×11	5×11	64	5×11	70	6.3×11	80	8×11.5	100	8×11.5	105	10×12.5	135	12.5×20	220
47	470	5×11	5×11	76	6.3×11	95	6.3×11	95	8×11.5	120	10×12.5	150	10×16	180	12.5×20	240
100	101	6.3×11	6.3×11	125	8×11.5	160	8×11.5	160	10×16	230	10×20	265	12.5×20	320	16×25	425
220	221	8×11.5	8×11.5	215	10×12.5	275	10×16	305	12.5×20	410	12.5×25	480	16×25	575	18×35.5	720
330	331	8×11.5	10×16	345	10×16	375	12.5×20	450	12.5×20	505	16×25	650	16×31.5	655		
470	471	10×12.5	10×16	410	10×20	485	12.5×20	540	12.5×25	655	16×31.5	835	18×35.5	965		
1000	102	10×20	12.5×20	720	12.5×25	855	16×25	950	16×31.5	1140						
2200	222	12.5×25	16×25	1280	16×31.5	1510	18×35.5	1620								
3300	332	16×25	16×31.5	1690	18×35.5	1980										
4700	472	16×31.5	18×35.5	2160												
6800	682	18×35.5													Case size	Allowable ripple

Allowable Ripple (mA) at 85℃ 120Hz

ALUMINUM ELECTROLYTIC CAPACITORS

ET series

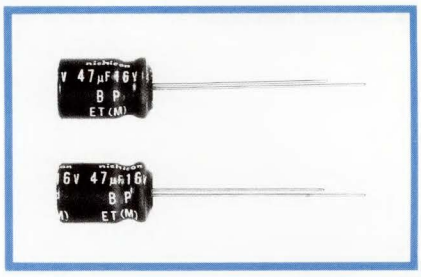
Non-Polarized, Wide Temperature Range

NP Non-Polarized

Anti-Solvent Feature

● Non-polarized series for operations over wide temperature range of −55～+105℃.

ET
High Temperature
VP



■Specifications

Item	Performance Characteristics
Operating Temperature Range	−55～+105℃
Voltage Range	6.3～100V
Capacitance Range	0.47～1000μF
Capacitance Tolerance	±20% at 120 Hz, 20℃
Leakage Current	After 5 minute's application of rated voltage, leakage current is not more than 0.03CV or 3(μA), whichever is greater.
tan δ	Measurement frequency : 120Hz, Temperature : 20℃

Rated voltage (V)	6.3	10	16	25	35	50	63	100
tan δ (MAX.)	0.24	0.20	0.16	0.16	0.14	0.12	0.10	0.09

Stability at Low Temperature — Measurement frequency : 120Hz

Rated voltage (V)		6.3	10	16	25	35	50	63	100
Impedance ratio ZT/Z20 (MAX.)	Z−25℃/Z+20℃	4	3	2	2	2	2	2	2
	Z−40℃/Z+20℃	8	6	4	4	3	3	3	3

Load Life — After 1000 hours' application of rated voltage at 105℃ with the polarity inverted every 250 hours, capacitors meet the characteristics requirements listed at right.

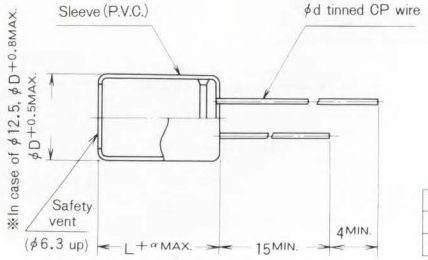
Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

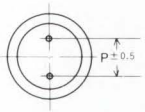
Shelf Life — After leaving capacitors under no load at 105℃ for 1000 hours' and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.

Marking — Printed with white color letter on black sleeve.

Applicable Standards — Characteristics W of JIS C-5141 and JIS C-5102.

■Radial Lead Type





φD	5	6.3	8	10	12.5	16
P	2.0	2.5	3.5	5.0	5.0	7.5
φd	0.5	0.5	0.6	0.6	0.6	0.8

α	(L<20)1.5 (L≧20)2.0

Type numbering system (Example: 10V 47μF)

1	2	3	4	5	6	7	8	9	10	11
U	E	T	1	A	4	7	0	M	E	H

Configuration

Capacitance tolerance (±20%)

Capacitance (47μF)

Rated voltage (10V)

Series name

Type

φD	Code
5	DH
6.3	EH
8～10	PH
12.5～16	RH

■Dimensions

DXL(mm)

W.V.	6.3		10		16		25		35		50		63		100	
Cap.(μF) Code	0J		1A		1C		1E		1V		1H		1J		2A	
0.47 R47											5X11	8			5X11	10
1 010											5X11	12			5X11	15
2.2 2R2											5X11	18			6.3X11	22
3.3 3R3											5X11	22	6.3X11	26	8X11.5	32
4.7 4R7							5X11	23	5X11	25	6.3X11	29	6.3X11	31	8X11.5	39
10 100					5X11	30	5X11	34	6.3X11	40	8X11.5	51	8X11.5	53	10X12.5	64
22 220			5X11	42	6.3X11	51	6.3X11	55	8X11.5	68	10X12.5	82	10X16	96	10X20	114
33 330	5X11	46	6.3X11	57	6.3X11	63	8X11.5	79	10X12.5	89	10X16	107	10X20	129	12.5X20	164
47 470	6.3X11	61	6.3X11	67	8X11.5	89	10X12.5	100	10X12.5	111	10X20	146	10X20	157	12.5X25	200
100 101	8X11.5	104	10X12.5	125	10X12.5	139	10X16	164	10X20	196	12.5X25	264	12.5X25	275	16X25	304
220 221	10X12.5	168	10X16	204	10X20	279	12.5X25	336	12.5X25	364	16X25	443	16X31.5	486		
330 331	10X16	229	10X20	275	12.5X20	346	12.5X25	414	16X25	493	16X31.5	593				
470 471	10X20	300	12.5X20	371	12.5X25	460	16X25	543	16X25	586						Allow-able ripple
1000 102	12.5X25	550	16X25	668	16X25	746	16X31.5	871							Case size	

Allowable Ripple (mA) at 105℃ 120Hz

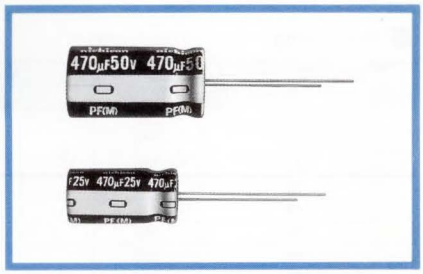
PF

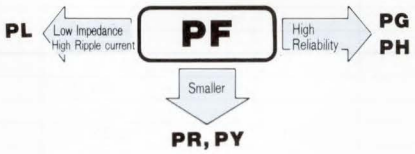
Low Impedance, High Reliability series

Low Impedance | Long Life | RCJ Approved | Anti-Solvent Feature

Approved by Reliability Center for Electronic Component,Japan-Certification No. RCJ-03-23C

- Low impedance and high reliability withstanding 5000 hour load life at +105℃(3000/2000 hours for smaller case sizes as specified below).
- Capacitance ranges available based on the numerical values in E12 series under JIS.
- Ideally suited for use of switching power supplies.





■Specifications

Item	Performance Characteristics
Operating Temperature Range	−55～+105℃
Voltage Range	6.3～100 V
Capacitance Range	0.47～15000μF
Capacitance Tolerance	±20% at 120Hz, 20℃
Leakage Current	After 1 minute's application of rated voltage, leakage current is not more than 0.03CV or 4μA, whichever is greater.
tan δ	For capacitance of more than 1000μF, add 0.02 for every increase of 1000μF. Measurement frequency : 120Hz, Temperature : 20℃
Stability at Low Temperature	Measurement frequency : 120Hz
Load Life	After 5000 hours' application of rated voltage at 105℃, capacitors meet the characteristics requirements listed at right. (In case of φD=5, 6.3 : 2000hours', φD=8 : 3000hours' application)
Shelf Life	After leaving capacitors under no load at 105℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.
Marking	Printed with white color letter on dark brown sleeve according to JIS C-5141.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

tan δ

Rated voltage(V)	6.3	10	16	25	35	50	63	80	100
tan δ (MAX.)	0.24	0.20	0.16	0.14	0.12	0.10	0.08	0.08	0.08

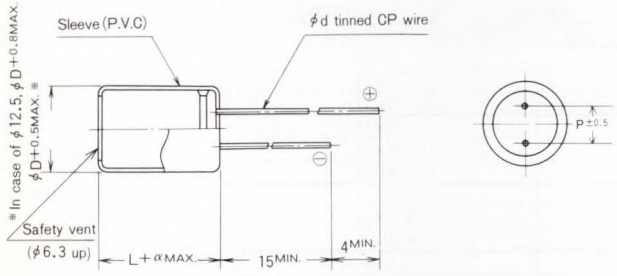
Stability at Low Temperature

Rated voltage(V)		6.3	10	16	25	35	50	63	80	100
Impedance ratio ZT/Z20(MAX.)	Z−55℃/Z+20℃	4	4	3	3	3	2	2	2	2

Load Life

Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

■Radial Lead Type



α	(φD<10)1.0 (φD≧10)1.5

φD	5	6.3	8	10	12.5	16	18
P	2	2.5	3.5	5	5	7.5	7.5
φd	0.5	0.5	0.6	0.6	0.6*	0.8	0.8

※ In case L>25 for the φ12.5dia. unit, lead dia. φd=0.8mm.

Type numbering system (Example: 25V 470μF φ12.5 x 15)

1	2	3	4	5	6	7	8	9	10	11	12
U	P	F	1	E	4	7	1	M	R	H	6

Case size code

Type	Code
Small Dia	—
Low Body	6

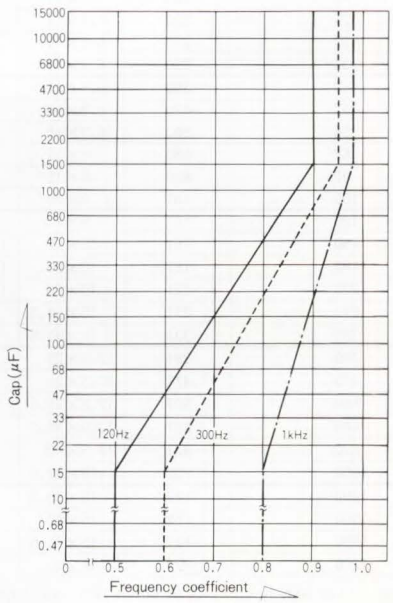
Configuration

φD	Code
5	DH
6.3	EH
8～10	PH
12.5～18	RH

Capacitance tolerance (±20%)
Capacitance (470μF)
Rated voltage (25V)
Series name
Type

●Frequency coefficient of allowable ripple current

(10kHz～200kHz=1)



●Allowable ripple current vs. Ambient temperature

Ambient temp.(℃)	～+45	+65	+85	+105
Coefficient	2.4	2.2	1.7	1.0

• Dimension table in next page.

ALUMINUM ELECTROLYTIC CAPACITORS

PF series

■Dimensions

DXL (mm)

Cap.(μF) \ W.V.(Code) / Size code	6.3(0J)		10(1A)		16(1C)		25(1E)		35(1V)	
	—	6	—	6	—	6	—	6	—	6
22	220								5×11	
27	270								5×11	
33	330							5×11	6.3×11	
39	390							5×11	6.3×11	
47	470					5×11		6.3×11	6.3×11	
56	560					5×11		6.3×11	6.3×11	
68	680			5×11		6.3×11		6.3×11	6.3×15	
82	820			5×11		6.3×11		6.3×11	6.3×15	
100	101	5×11		6.3×11		6.3×11		6.3×15	8×11.5	
120	121	5×11		6.3×11		6.3×11		6.3×15	8×15	10×12.5
150	151	6.3×11		6.3×11		6.3×15		8×11.5	8×15	10×12.5
180	181	6.3×11		6.3×11		6.3×15		8×15	10×12.5	8×20	10×15
220	221	6.3×11		6.3×15		8×11.5		8×15	10×12.5	8×20	10×15
270	271	6.3×15		6.3×15		8×15	10×12.5	8×20	10×15	10×20	12.5×15
330	331	6.3×15		8×11.5		8×15	10×12.5	8×20	10×15	10×20	12.5×15
390	391	8×11.5		8×15	10×12.5	8×20	10×15	10×20	12.5×15	10×25	12.5×15
470	471	8×15	10×12.5	8×15	10×12.5	8×20	10×15	10×20	12.5×15	10×31.5	16×15
560	561	8×15	10×12.5	8×20	10×15	10×20	12.5×15	10×25	12.5×15	12.5×20	16×15
680	681	8×20	10×15	8×20	10×15	10×20	12.5×15	10×31.5	16×15	12.5×25	18×15
820	821	8×20	10×15	10×20	12.5×15	10×25	12.5×15	12.5×20	16×15	12.5×25	18×15
1000	102	10×20	12.5×15	10×20	12.5×15	10×31.5	16×15	12.5×25	18×15	12.5×31.5	16×20
1200	122	10×20	12.5×15	10×25	12.5×15	12.5×20	16×15	12.5×25	18×15	12.5×35.5	16×25
1500	152	10×25	12.5×15	10×31.5	16×15	12.5×25	18×15	12.5×31.5	16×20	12.5×40	18×20
1800	182	10×31.5	16×15	12.5×20	16×15	12.5×31.5	16×20	12.5×35.5	16×25	16×31.5	18×25
2200	222	10×31.5	16×15	12.5×25	18×15	12.5×31.5	16×20	12.5×40	18×20	16×35.5	18×31.5
2700	272	12.5×25	18×15	12.5×31.5	16×20	12.5×35.5	16×25	16×31.5	18×25	16×40	18×35.5
3300	332	12.5×25	18×15	12.5×35.5	16×20	12.5×40	18×20	16×35.5	18×31.5	18×40	
3900	392	12.5×31.5	16×20	12.5×40	18×20	16×31.5	18×25	16×40	18×35.5		
4700	472	12.5×35.5	18×20	16×31.5	18×25	16×35.5	18×31.5	18×40			
5600	562	12.5×40	18×20	16×35.5	18×25	16×40	18×35.5				
6800	682	16×31.5	18×25	16×35.5	18×31.5	18×35.5					
8200	822	16×35.5	18×31.5	16×40	18×35.5	18×40					
10000	103	16×40	18×31.5	18×40							
12000	123	18×35.5									
15000	153	18×40									

Cap. (μF) \ W.V.(Code) / Code / Size code	50(1H)		63(1J)		80(1K)		100(2A)	
	—	6	—	6	—	6	—	6
0.47	R47	5×11						5×11	
0.68	R68	5×11						5×11	
1	010	5×11						5×11	
1.5	1R5	5×11						5×11	
2.2	2R2	5×11						5×11	
3.3	3R3	5×11						5×11	
4.7	4R7	5×11					5×11	6.3×11	
6.8	6R8	5×11					5×11	6.3×11	
10	100	5×11		5×11			6.3×11	6.3×11	
12	120	5×11		5×11			6.3×11	6.3×11	
15	150	5×11		6.3×11			6.3×11	6.3×15	
18	180	5×11		6.3×11			6.3×11	6.3×15	
22	220	6.3×11		6.3×11			6.3×15	8×11.5	
27	270	6.3×11		6.3×11			6.3×15	8×15	10×12.5
33	330	6.3×11		6.3×15			8×11.5	8×15	10×12.5
39	390	6.3×11		6.3×15			8×15	10×12.5	8×20	10×15
47	470	6.3×15		8×11.5			8×15	10×12.5	10×20	12.5×15
56	560	6.3×15		8×15	10×12.5		8×20	10×15	10×20	12.5×15
68	680	8×11.5		8×15	10×12.5		10×20	12.5×15	10×25	12.5×15
82	820	8×15	10×12.5	8×20	10×15		10×20	12.5×15	10×31.5	16×15
100	101	8×20	10×15	10×20	12.5×15		10×25	12.5×15	10×31.5	16×15
120	121	8×20	10×15	10×20	12.5×15		10×31.5	16×15	12.5×25	16×15
150	151	10×20	12.5×15	10×25	12.5×15		10×31.5	16×15	12.5×25	18×15
180	181	10×20	12.5×15	10×31.5	16×15		12.5×25	16×15	12.5×31.5	16×20
220	221	10×25	12.5×15	12.5×20	16×15		12.5×31.5	18×15	12.5×35.5	16×25
270	271	10×31.5	16×15	12.5×25	18×15		12.5×31.5	16×20	12.5×40	18×20
330	331	10×31.5	16×15	12.5×25	18×15		12.5×35.5	16×25	16×31.5	18×25
390	391	12.5×25	16×15	12.5×31.5	16×20		12.5×40	18×20	16×35.5	18×31.5
470	471	12.5×25	18×15	12.5×35.5	16×25		16×31.5	18×25	16×40	18×35.5
560	561	12.5×31.5	16×20	12.5×40	18×20		16×35.5	18×31.5	18×35.5	
680	681	12.5×35.5	16×20	16×31.5	18×25		16×40	18×31.5	18×40	
820	821	12.5×40	18×20	16×35.5	18×31.5		18×35.5			
1000	102	16×31.5	18×25	16×40	18×35.5		18×40			
1200	122	16×35.5	18×31.5	18×40						
1500	152	16×40	18×31.5							
1800	182	18×35.5								
2200	222	18×40								

※ In case of low body type, [6] will be put at 12th digit of type numbering system.

PF series

■Standard ratings

WV / Size code / Item / Code / Cap. (μF)		6.3(0J)					6				
		Case size φDXL (mm)	Impedance (Ω MAX.)		Allowable ripple (mA rms)		Case size φDXL (mm)	Impedance (Ω MAX.)		Allowable ripple (mA rms)	
			20℃/100kHz	−10℃/100kHz	105℃/10kHz~200kHz	105℃/120Hz		20℃/100kHz	−10℃/100kHz	105℃/10kHz~200kHz	105℃/120Hz
100	101	5×11	1.70	4.30	97	64					
120	121	5×11	1.30	3.30	110	74					
150	151	6.3×11	0.98	2.50	131	91					
180	181	6.3×11	0.78	2.00	147	105					
220	221	6.3×11	0.61	1.50	166	120					
270	271	6.3×15	0.49	1.20	191	140					
330	331	6.3×15	0.40	1.00	212	160					
390	391	8×11.5	0.34	0.85	292	225					
470	471	8×15	0.28	0.70	348	275	10×12.5	0.29	0.73	352	280
560	561	8×15	0.24	0.60	376	305	10×12.5	0.26	0.65	372	300
680	681	8×20	0.20	0.50	452	375	10×15	0.22	0.55	431	355
820	821	8×20	0.17	0.43	491	415	10×15	0.19	0.48	464	390
1000	102	10×20	0.15	0.38	577	495	12.5×15	0.17	0.43	542	465
1200	122	10×20	0.13	0.33	620	545	12.5×15	0.15	0.38	577	505
1500	152	10×25	0.11	0.28	726	650	12.5×15	0.13	0.33	620	555
1800	182	10×31.5	0.10	0.25	812	730	16×15	0.11	0.28	894	800
2200	222	10×31.5	0.087	0.22	871	780	16×15	0.099	0.25	942	845
2700	272	12.5×25	0.076	0.19	959	860	18×15	0.089	0.22	1060	950
3300	332	12.5×25	0.068	0.17	1020	915	18×15	0.079	0.20	1130	1010
3900	392	12.5×31.5	0.062	0.16	1130	1010	16×20	0.072	0.18	1230	1100
4700	472	12.5×35.5	0.056	0.14	1250	1120	18×20	0.065	0.16	1370	1230
5600	562	12.5×40	0.052	0.13	1330	1190	18×20	0.060	0.15	1420	1270
6800	682	16×31.5	0.048	0.12	1730	1550	18×25	0.055	0.14	1600	1440
8200	822	16×35.5	0.044	0.11	1900	1710	18×31.5	0.051	0.13	1760	1580
10000	103	16×40	0.041	0.10	2050	1840	18×31.5	0.047	0.12	1830	1640
12000	123	18×35.5	0.038	0.095	2140	1920					
15000	153	18×40	0.036	0.090	2290	2060					

WV / Size code / Item / Code / Cap. (μF)		10(1A)					6				
		Case size φDXL (mm)	Impedance (Ω MAX.)		Allowable ripple (mA rms)		Case size φDXL (mm)	Impedance (Ω MAX.)		Allowable ripple (mA rms)	
			20℃/100kHz	−10℃/100kHz	105℃/10kHz~200kHz	105℃/120Hz		20℃/100kHz	−10℃/100kHz	105℃/10kHz~200kHz	105℃/120Hz
68	680	5×11	1.60	4.00	100	63					
82	820	5×11	1.30	3.30	110	71					
100	101	6.3×11	1.10	2.80	124	82					
120	121	6.3×11	0.89	2.20	138	93					
150	151	6.3×11	0.70	1.80	155	105					
180	181	6.3×11	0.59	1.50	169	120					
220	221	6.3×15	0.48	1.20	193	140					
270	271	6.3×15	0.40	1.00	212	155					
330	331	8×11.5	0.33	0.83	296	225					
390	391	8×15	0.28	0.70	348	270	10×12.5	0.30	0.75	346	265
470	471	8×15	0.24	0.60	376	300	10×12.5	0.26	0.65	372	295
560	561	8×20	0.20	0.50	452	365	10×15	0.22	0.55	431	350
680	681	8×20	0.17	0.43	491	405	10×15	0.18	0.45	477	395
820	821	10×20	0.14	0.35	597	505	12.5×15	0.16	0.40	559	475
1000	102	10×20	0.12	0.30	645	555	12.5×15	0.13	0.33	620	535
1200	122	10×25	0.10	0.25	836	735	12.5×15	0.12	0.30	645	565
1500	152	10×31.5	0.090	0.23	856	770	16×15	0.10	0.25	938	840
1800	182	12.5×20	0.078	0.20	877	785	16×15	0.089	0.22	994	890
2200	222	12.5×25	0.068	0.17	1010	905	18×15	0.078	0.20	1130	1010
2700	272	12.5×31.5	0.060	0.15	1150	1030	16×20	0.070	0.18	1240	1110
3300	332	12.5×35.5	0.053	0.13	1280	1150	16×20	0.062	0.16	1320	1180
3900	392	12.5×40	0.049	0.12	1370	1230	18×20	0.057	0.14	1460	1310
4700	472	16×31.5	0.046	0.12	1760	1580	18×25	0.052	0.13	1650	1480
5600	562	16×35.5	0.042	0.11	1940	1740	18×25	0.049	0.12	1700	1530
6800	682	16×35.5	0.040	0.10	1990	1790	18×31.5	0.045	0.11	1870	1680
8200	822	16×40	0.038	0.095	2130	1910	18×35.5	0.042	0.11	2040	1830
10000	103	18×40	0.035	0.088	2320	2080					

ALUMINUM ELECTROLYTIC CAPACITORS

PF series

■Standard ratings

WV / Size code / Item / Code / Cap. (μF)		16 (1C)					6				
		Case size φDXL (mm)	Impedance (Ω MAX.)		Allowable ripple (mA rms)		Case size φDXL (mm)	Impedance (Ω MAX.)		Allowable ripple (mA rms)	
			20℃/100kHz	−10℃/100kHz	105℃/10kHz~200kHz	105℃/120Hz		20℃/100kHz	−10℃/100kHz	105℃/10kHz~200kHz	105℃/120Hz
47	470	5×11	1.60	4.00	100	60					
56	560	5×11	1.30	3.30	110	67					
68	680	6.3×11	1.00	2.50	130	81					
82	820	6.3×11	0.85	2.10	141	91					
100	101	6.3×11	0.70	1.80	155	100					
120	121	6.3×11	0.58	1.50	171	115					
150	151	6.3×15	0.47	1.20	195	135					
180	181	6.3×15	0.40	1.00	212	150					
220	221	8×11.5	0.33	0.83	296	215					
270	271	8×15	0.28	0.70	348	260	10×12.5	0.28	0.70	358	265
330	331	8×15	0.23	0.58	384	295	10×12.5	0.23	0.58	395	300
390	391	8×20	0.20	0.50	452	350	10×15	0.20	0.50	452	350
470	471	8×20	0.18	0.45	477	380	10×15	0.18	0.45	477	380
560	561	10×20	0.15	0.38	577	470	12.5×15	0.16	0.40	559	455
680	681	10×20	0.13	0.33	620	515	12.5×15	0.14	0.35	597	495
820	821	10×25	0.11	0.28	726	615	12.5×15	0.12	0.30	645	545
1000	102	10×31.5	0.095	0.24	833	720	16×15	0.11	0.28	894	770
1200	122	12.5×20	0.083	0.21	850	745	16×15	0.093	0.23	972	855
1500	152	12.5×25	0.072	0.18	986	885	18×15	0.083	0.21	1100	990
1800	182	12.5×31.5	0.064	0.16	1110	995	16×20	0.074	0.19	1210	1080
2200	222	12.5×31.5	0.057	0.14	1180	1060	16×20	0.067	0.17	1270	1140
2700	272	12.5×35.5	0.051	0.13	1310	1170	16×25	0.060	0.15	1460	1310
3300	332	12.5×40	0.047	0.12	1390	1250	18×20	0.055	0.14	1480	1330
3900	392	16×31.5	0.044	0.11	1800	1620	18×25	0.051	0.13	1660	1490
4700	472	16×35.5	0.041	0.10	1960	1760	18×31.5	0.047	0.12	1830	1640
5600	562	16×40	0.039	0.098	2100	1890	18×35.5	0.045	0.11	1970	1770
6800	682	18×35.5	0.037	0.093	2170	1950					
8200	822	18×40	0.036	0.090	2290	2060					

WV / Size code / Item / Code / Cap. (μF)		25 (1E)					6				
		Case size φDXL (mm)	Impedance (Ω MAX.)		Allowable ripple (mA rms)		Case size φDXL (mm)	Impedance (Ω MAX.)		Allowable ripple (mA rms)	
			20℃/100kHz	−10℃/100kHz	105℃/10kHz~200kHz	105℃/120Hz		20℃/100kHz	−10℃/100kHz	105℃/10kHz~200kHz	105℃/120Hz
33	330	5×11	1.60	4.00	86	49					
39	390	5×11	1.30	3.30	96	55					
47	470	6.3×11	1.10	2.80	108	64					
56	560	6.3×11	0.89	2.20	120	73					
68	680	6.3×11	0.72	1.80	134	84					
82	820	6.3×11	0.60	1.50	147	95					
100	101	6.3×15	0.49	1.20	169	110					
120	121	6.3×15	0.41	1.00	184	125					
150	151	8×11.5	0.33	0.83	296	205					
180	181	8×15	0.28	0.70	348	245	10×12.5	0.30	0.75	346	245
220	221	8×15	0.23	0.58	384	280	10×12.5	0.26	0.65	372	270
270	271	8×20	0.19	0.48	464	345	10×15	0.22	0.55	431	320
330	331	8×20	0.17	0.43	491	375	10×15	0.19	0.48	464	355
390	391	10×20	0.14	0.35	597	465	12.5×15	0.16	0.40	559	435
470	471	10×20	0.13	0.33	620	495	12.5×15	0.14	0.35	597	475
560	561	10×25	0.11	0.28	726	590	12.5×15	0.12	0.30	645	525
680	681	10×31.5	0.093	0.23	842	700	16×15	0.11	0.28	894	745
820	821	12.5×20	0.082	0.21	855	725	16×15	0.098	0.25	947	800
1000	102	12.5×25	0.072	0.18	986	850	18×15	0.086	0.22	1080	930
1200	122	12.5×25	0.065	0.16	1030	905	18×15	0.078	0.20	1130	990
1500	152	12.5×31.5	0.058	0.15	1170	1050	16×20	0.068	0.17	1260	1130
1800	182	12.5×35.5	0.053	0.13	1280	1150	16×25	0.062	0.16	1430	1280
2200	222	12.5×40	0.048	0.12	1380	1240	18×20	0.056	0.14	1470	1320
2700	272	16×31.5	0.044	0.11	1800	1620	18×25	0.051	0.13	1660	1490
3300	332	16×35.5	0.041	0.10	1960	1760	18×31.5	0.047	0.12	1830	1640
3900	392	16×40	0.038	0.095	2130	1910	18×35.5	0.043	0.11	2010	1800
4700	472	18×40	0.036	0.090	2290	2060					

PF series

■Standard ratings

WV		35 (1V)					6				
Size code											
Item		Case size φDXL (mm)	Impedance (Ω MAX.)		Allowable ripple (mA rms)		Case size φDXL (mm)	Impedance (Ω MAX.)		Allowable ripple (mA rms)	
Cap. (μF)	Code		20℃/100kHz	−10℃/100kHz	105℃/10kHz~200kHz	105℃/120Hz		20℃/100kHz	−10℃/100kHz	105℃/10kHz~200kHz	105℃/120Hz
22	220	5×11	1.50	3.80	89	47					
27	270	5×11	1.20	3.00	100	55					
33	330	6.3×11	0.99	2.50	114	64					
39	390	6.3×11	0.83	2.10	125	72					
47	470	6.3×11	0.69	1.70	137	82					
56	560	6.3×11	0.57	1.40	151	92					
68	680	6.3×15	0.48	1.20	170	105					
82	820	6.3×15	0.39	0.98	189	120					
100	101	8×11.5	0.32	0.80	301	200					
120	121	8×15	0.28	0.70	348	235	10×12.5	0.31	0.78	340	230
150	151	8×15	0.23	0.58	384	265	10×12.5	0.25	0.63	379	265
180	181	8×20	0.20	0.50	452	320	10×15	0.22	0.55	431	305
220	221	8×20	0.17	0.43	491	360	10×15	0.18	0.45	477	350
270	271	10×20	0.14	0.35	597	445	12.5×15	0.16	0.40	559	415
330	331	10×20	0.12	0.30	645	495	12.5×15	0.13	0.33	620	475
390	391	10×25	0.11	0.28	726	565	12.5×15	0.12	0.30	645	500
470	471	10×31.5	0.093	0.23	842	670	16×15	0.11	0.28	894	715
560	561	12.5×20	0.082	0.21	855	695	16×15	0.096	0.24	957	775
680	681	12.5×25	0.072	0.18	986	820	18×15	0.085	0.21	1090	910
820	821	12.5×25	0.064	0.16	1040	880	18×15	0.076	0.19	1150	975
1000	102	12.5×31.5	0.058	0.15	1170	1010	16×20	0.068	0.17	1260	1080
1200	122	12.5×35.5	0.052	0.13	1300	1140	16×25	0.062	0.16	1430	1250
1500	152	12.5×40	0.048	0.12	1380	1240	18×20	0.056	0.14	1470	1320
1800	182	16×31.5	0.044	0.11	1800	1620	18×25	0.051	0.13	1660	1490
2200	222	16×35.5	0.040	0.10	1990	1790	18×31.5	0.047	0.12	1840	1650
2700	272	16×40	0.037	0.093	2150	1930	18×35.5	0.043	0.11	2010	1800
3300	332	18×40	0.035	0.088	2320	2080					

WV		50 (1H)					6				
Size code											
Item		Case size φDXL (mm)	Impedance (Ω MAX.)		Allowable ripple (mA rms)		Case size φDXL (mm)	Impedance (Ω MAX.)		Allowable ripple (mA rms)	
Cap. (μF)	Code		20℃/100kHz	−10℃/100kHz	105℃/10kHz~200kHz	105℃/120Hz		20℃/100kHz	−10℃/100kHz	105℃/10kHz~200kHz	105℃/120Hz
0.47	R47	5×11	47.0	118.0	15	7					
0.68	R68	5×11	32.0	80.0	19	9					
1	010	5×11	22.0	55.0	24	12					
1.5	1R5	5×11	15.0	38.0	30	15					
2.2	2R2	5×11	10.0	25.0	36	18					
3.3	3R3	5×11	6.70	17.0	44	22					
4.7	4R7	5×11	4.70	12.0	54	27					
6.8	6R8	5×11	3.20	8.00	61	33					
10	100	5×11	2.20	5.50	78	39					
12	120	5×11	1.80	4.50	84	42					
15	150	5×11	1.40	3.50	92	46					
18	180	5×11	1.20	3.00	100	51					
22	220	6.3×11	0.98	2.50	122	65					
27	270	6.3×11	0.80	2.00	127	69					
33	330	6.3×11	0.65	1.60	141	80					
39	390	6.3×11	0.55	1.40	153	88					
47	470	6.3×15	0.45	1.10	176	105					
56	560	6.3×15	0.38	0.95	191	115					
68	680	8×11.5	0.31	0.78	306	190					
82	820	8×15	0.26	0.65	361	230	10×12.5	0.28	0.70	358	230
100	101	8×20	0.22	0.55	431	285	10×15	0.24	0.60	376	250
120	121	8×20	0.18	0.45	477	320	10×15	0.20	0.50	452	305
150	151	10×20	0.15	0.38	577	400	12.5×15	0.16	0.40	559	390
180	181	10×20	0.13	0.33	620	440	12.5×15	0.14	0.35	597	425
220	221	10×25	0.11	0.28	726	530	12.5×15	0.12	0.30	645	470
270	271	10×31.5	0.094	0.24	837	625	16×15	0.10	0.25	938	700
330	331	10×31.5	0.084	0.21	886	680	16×15	0.090	0.23	988	760
390	391	12.5×25	0.073	0.18	979	760	16×15	0.081	0.20	1040	810
470	471	12.5×25	0.066	0.17	1020	815	18×15	0.070	0.18	1200	960
560	561	12.5×31.5	0.060	0.15	1150	935	16×20	0.066	0.17	1280	1040
680	681	12.5×35.5	0.054	0.14	1270	1060	16×20	0.060	0.15	1340	1110
820	821	12.5×40	0.050	0.13	1350	1140	18×20	0.054	0.14	1500	1270
1000	102	16×31.5	0.046	0.12	1760	1520	18×25	0.050	0.13	1680	1450
1200	122	16×35.5	0.043	0.11	1920	1680	18×31.5	0.047	0.12	1830	1610
1500	152	16×40	0.040	0.10	2070	1860	18×31.5	0.044	0.11	1900	1710
1800	182	18×35.5	0.038	0.095	2140	1920					
2200	222	18×40	0.035	0.088	2320	2080					

ALUMINUM ELECTROLYTIC CAPACITORS

PF series

■Standard ratings

WV / Size code / Item / Code / Cap. (μF)		63 (1J)										
		—					6					
		Case size φDXL (mm)	Impedance (Ω MAX.)		Allowable ripple (mA rms)		Case size φDXL (mm)	Impedance (Ω MAX.)		Allowable ripple (mA rms)	
			20℃/100kHz	−10℃/100kHz	105℃/10kHz~200kHz	105℃/120Hz		20℃/100kHz	−10℃/100kHz	105℃/10kHz~200kHz	105℃/120Hz
10	100	5×11	1.60	4.00	86	43					
12	120	5×11	1.40	3.50	92	46					
15	150	6.3×11	1.10	2.80	108	54					
18	180	6.3×11	0.95	2.40	116	59					
22	220	6.3×11	0.78	2.00	129	69					
27	270	6.3×11	0.64	1.60	142	78					
33	330	6.3×15	0.52	1.30	164	93					
39	390	6.3×15	0.45	1.10	176	100					
47	470	8×11.5	0.37	0.93	279	165					
56	560	8×15	0.31	0.78	331	200	10×12.5	0.34	0.85	325	195
68	680	8×15	0.26	0.65	361	225	10×12.5	0.28	0.70	358	225
82	820	8×20	0.22	0.55	431	280	10×15	0.24	0.60	413	265
100	101	10×20	0.18	0.45	527	350	12.5×15	0.20	0.50	500	330
120	121	10×20	0.15	0.38	577	390	12.5×15	0.18	0.45	527	355
150	151	10×25	0.13	0.33	667	465	12.5×15	0.14	0.35	597	415
180	181	10×31.5	0.11	0.28	774	550	16×15	0.12	0.30	856	610
220	221	12.5×20	0.094	0.24	798	585	16×15	0.10	0.25	938	685
270	271	12.5×25	0.082	0.21	923	690	18×15	0.088	0.22	1070	800
330	331	12.5×25	0.073	0.18	979	750	18×15	0.078	0.20	1130	870
390	391	12.5×31.5	0.065	0.16	1100	855	16×20	0.070	0.18	1240	965
470	471	12.5×35.5	0.058	0.15	1230	980	16×25	0.063	0.16	1420	1130
560	561	12.5×40	0.052	0.13	1330	1080	18×20	0.058	0.15	1450	1180
680	681	16×31.5	0.048	0.12	1730	1440	18×25	0.052	0.13	1650	1370
820	821	16×35.5	0.044	0.11	1900	1610	18×31.5	0.048	0.12	1820	1540
1000	102	16×40	0.041	0.10	2050	1770	18×35.5	0.044	0.10	1990	1720
1200	122	18×40	0.038	0.095	2230	1960					

WV / Size code / Item / Code / Cap. (μF)		80 (1K)									
		—					6				
		Case size φDXL (mm)	Impedance (Ω MAX.)		Allowable ripple (mA rms)		Case size φDXL (mm)	Impedance (Ω MAX.)		Allowable ripple (mA rms)	
			20℃/100kHz	−10℃/100kHz	105℃/10kHz~200kHz	105℃/120Hz		20℃/100kHz	−10℃/100kHz	105℃/10kHz~200kHz	105℃/120Hz
4.7	4R7	5×11	4.20	11.0	53	26					
6.8	6R8	5×11	2.60	7.00	68	34					
10	100	6.3×11	1.70	4.60	87	43					
12	120	6.3×11	1.40	3.80	96	48					
15	150	6.3×11	1.20	3.20	104	52					
18	180	6.3×11	1.00	2.70	114	58					
22	220	6.3×15	0.77	2.10	135	71					
27	270	6.3×15	0.63	1.70	149	80					
33	330	8×11.5	0.53	1.40	234	132					
39	390	8×15	0.46	1.20	272	156	10×12.5	0.49	1.30	271	155
47	470	8×15	0.39	1.10	295	175	10×12.5	0.42	1.10	293	174
56	560	8×20	0.34	0.92	347	208	10×15	0.36	0.97	337	202
68	680	10×20	0.28	0.76	426	264	12.5×15	0.31	0.84	402	249
82	820	10×20	0.25	0.68	447	284	12.5×15	0.27	0.73	430	273
100	101	10×25	0.21	0.57	526	347	12.5×15	0.23	0.62	466	308
120	121	10×31.5	0.18	0.49	606	406	16×15	0.20	0.54	663	444
150	151	10×31.5	0.15	0.41	663	459	16×15	0.18	0.47	699	484
180	181	12.5×25	0.13	0.35	734	520	16×15	0.15	0.41	766	543
220	221	12.5×31.5	0.12	0.32	816	595	18×15	0.13	0.35	881	643
270	271	12.5×31.5	0.10	0.27	894	667	16×20	0.11	0.30	995	742
330	331	12.5×35.5	0.088	0.24	1000	767	16×25	0.099	0.27	1140	874
390	391	12.5×40	0.078	0.21	1060	822	18×20	0.089	0.24	1170	908
470	471	16×31.5	0.069	0.19	1450	1150	18×25	0.080	0.22	1330	1060
560	561	16×35.5	0.062	0.17	1600	1300	18×31.5	0.072	0.19	1490	1210
680	681	16×40	0.055	0.15	1770	1470	18×31.5	0.065	0.18	1560	1300
820	821	18×35.5	0.049	0.13	1890	1590					
1000	102	18×40	0.044	0.12	2080	1790					

PF series

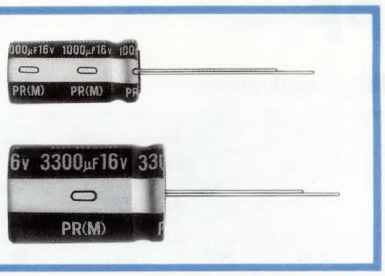
■Standard ratings

WV / Size code / Item / Code / Cap. (μF)		100 (2A)					6				
		Case size φDXL (mm)	Impedance (Ω MAX.)		Allowable ripple (mA rms)		Case size φDXL (mm)	Impedance (Ω MAX.)		Allowable ripple (mA rms)	
			20℃/100kHz	−10℃/100kHz	105℃/10kHz~200kHz	105℃/120Hz		20℃/100kHz	−10℃/100kHz	105℃/10kHz~200kHz	105℃/120Hz
0.47	R47	5×11	43.0	116.0	17	8					
0.68	R68	5×11	23.0	62.0	23	11					
1	010	5×11	17.0	46.0	27	13					
1.5	1R5	5×11	10.0	27.0	35	17					
2.2	2R2	5×11	6.60	18.0	43	21					
3.3	3R3	5×11	4.10	11.0	54	27					
4.7	4R7	6.3×11	2.80	7.60	68	34					
6.8	6R8	6.3×11	1.90	5.10	83	41					
10	100	6.3×11	1.20	3.20	104	52					
12	120	6.3×11	1.00	2.70	114	57					
15	150	6.3×15	0.81	2.20	131	65					
18	180	6.3×15	0.67	1.80	145	73					
22	220	8×11.5	0.55	1.50	230	122					
27	270	8×15	0.47	1.30	269	146	10×12.5	0.50	1.40	268	145
33	330	8×15	0.38	1.00	299	169	10×12.5	0.42	1.10	293	166
39	390	8×20	0.33	0.89	352	202	10×15	0.36	0.97	337	193
47	470	10×20	0.28	0.76	423	252	12.5×15	0.31	0.84	402	239
56	560	10×20	0.24	0.65	456	274	12.5×15	0.27	0.73	430	258
68	680	10×25	0.21	0.57	526	326	12.5×15	0.23	0.62	466	289
82	820	10×31.5	0.18	0.49	606	386	16×15	0.19	0.51	681	433
100	101	10×31.5	0.15	0.41	663	438	16×15	0.17	0.46	719	475
120	121	12.5×25	0.13	0.35	774	519	16×15	0.14	0.38	793	531
150	151	12.5×25	0.11	0.30	798	553	18×15	0.12	0.32	917	635
180	181	12.5×31.5	0.098	0.26	904	641	16×20	0.11	0.30	995	706
220	221	12.5×35.5	0.087	0.23	1000	730	16×25	0.093	0.25	1170	854
270	271	12.5×40	0.072	0.19	1130	843	18×20	0.080	0.22	1230	918
330	331	16×31.5	0.062	0.17	1520	1160	18×25	0.070	0.19	1420	1080
390	391	16×35.5	0.053	0.14	1730	1340	18×31.5	0.062	0.17	1600	1240
470	471	16×40	0.047	0.13	1920	1530	18×35.5	0.056	0.15	1770	1410
560	561	18×35.5	0.041	0.11	2070	1680					
680	681	18×40	0.036	0.097	2300	1910					

ALUMINUM ELECTROLYTIC CAPACITORS

PR Standard, For Switching Power Supplies series

Smaller , Low Impedance , Anti-Solvent Feat (Through 250V only)



- Same case sizes as VX series, but operating at higher temperature range up to +105°C.
- Designed specifically for use in switching power supplies.

PR → (High Ripple / High Reliabilty) PY,PF,PL

PR → (Smaller) VZ

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−55～+105℃ (6.3～100V) , −40～+105℃ (160～400V) , −25～+105℃ (450V)
Voltage Range	6.3～450V
Capacitance Range	0.47～22000μF
Capacitance Tolerance	±20% at 120Hz, 20℃
Leakage Current	Rated voltage(V): 6.3～100 / 160～450 Leakage current: After 1 minute's application of rated voltage, leakage current is not more than 0.03CV or 4(μA), whichever is greater. After 2 minutes' application of rated voltage, leakage current is not more than 0.01CV or 3(μA), whichever is greater. CV≦1000: I =0.1CV+40(μA)max. (1 minute's) CV＞1000: I =0.04CV+100(μA)max. (1 minute's)
tan δ	For capacitance of more than 1000 μF, add 0.02 for every increase of 1000 μF. Measurement frequency : 120 Hz, Temperature : 20℃

Rated voltage (V)	6.3	10	16	25	35	50	63	100	160～250	315～350	400～450
tan δ (MAX.)	0.26	0.22	0.18	0.16	0.13	0.10	0.09	0.08	0.15	0.20	0.25

Stability at Low Temperature — Measurement frequency:120 Hz

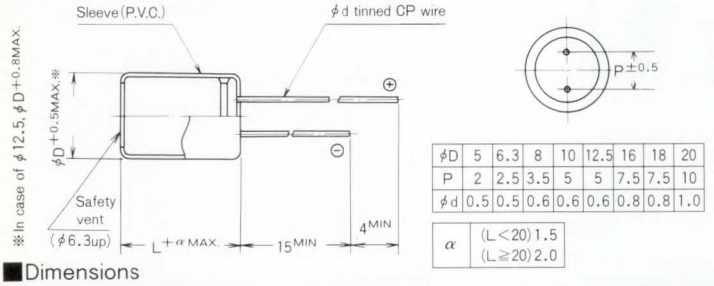
Rated voltage (V)		6.3	10	16	25～100	160～200	250	315～400	450
Impedance ratio	Z−25℃/Z+20℃	4	3	2	2	3	3	6	15
ZT/Z20 (MAX.)	Z−40℃/Z+20℃	8	6	4	3	4	6	6	—

Load Life — After 2000 hours' application of rated voltage at 105℃, capacitors meet the characteristics requirements listed at right. (In case of φD≦8, after 1000 hours' application)

Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

Shelf Life	After leaving capacitors under no load at 105℃ for 1000 hours' and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.
Marking	Printed with white color letter on dark brown sleeve according to JIS C-5141.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Radial Lead Type



φD	5	6.3	8	10	12.5	16	18	20
P	2	2.5	3.5	5	5	7.5	7.5	10
φd	0.5	0.5	0.6	0.6	0.6	0.8	0.8	1.0

α	
	(L＜20) 1.5
	(L≧20) 2.0

Type numbering system (Example: 10V 330μF)

1	2	3	4	5	6	7	8	9	10	11	12
U	P	R	1	A	3	3	1	M	P	H	

- 12: Case size code
- 10,11: Configuration
- 9: Capacitance tolerance (±20%)
- 6,7,8: Capacitance (330μF)
- 4,5: Rated voltage (10V)
- 2,3: Series name
- 1: Type

φD	Code
5	DH
6.3	EH
8～10	PH
12.5～20	RH

■Dimensions

Cap.(μF) \ W.V.(Code) / Code / Item		6.3 (0J) Case size	6.3 (0J) Impedance	6.3 (0J) Allowable ripple	10 (1A) Case size	10 (1A) Impedance	10 (1A) Allowable ripple	16 (1C) Case size	16 (1C) Impedance	16 (1C) Allowable ripple	25 (1E) Case size	25 (1E) Impedance	25 (1E) Allowable ripple
4.7	4R7										5×11	5.00	24
10	100							5×11	2.80	35	5×11	2.80	39
22	220	5×11	2.40	34	5×11	2.40	45	5×11	2.40	55	5×11	2.40	60
33	330	5×11	2.30	50	5×11	2.30	60	5×11	2.30	70	5×11	2.20	75
47	470	5×11	2.10	65	5×11	2.10	75	5×11	1.80	85	5×11	1.60	90
100	101	5×11	1.90	100	5×11	1.80	110	6.3×11	0.80	135	6.3×11	0.62	145
220	221	6.3×11	0.67	165	6.3×11	0.58	180	8×11.5	0.36	235	8×11.5	0.35	250
330	331	6.3×11	0.48	200	8×11.5	0.36	255	8×11.5	0.32	285	10×12.5	0.22	355
470	471	8×11.5	0.31	280	8×11.5	0.26	305	10×12.5	0.20	395	10×16	0.16	470
1000	102	10×12.5	0.22	470	10×16	0.14	570	10×20	0.12	700	12.5×20	0.10	855
2200	222	12.5×20	0.096	930	12.5×20	0.090	1010	12.5×25	0.067	1150	16×25	0.053	1230
3300	332	12.5×20	0.090	1100	12.5×25	0.074	1220	16×25	0.052	1350	16×31.5	0.045	1450
4700	472	16×25	0.061	1320	16×25	0.054	1410	16×31.5	0.045	1560	●18×35.5	0.040	1660
6800	682	16×25	0.056	1490	16×31.5	0.046	1610	●18×35.5	0.040	1750	20×40	0.030	2070
10000	103	16×31.5	0.051	1830	●18×35.5	0.038	1980	△18×40	0.035	2170			
15000	153	●18×35.5	0.039	2280	△18×40	0.033	2470						
22000	223	20×40	0.030	2860									

Case size : DXL(mm) MAX. Impedance : (Ω) at 20℃ 100kHz Allowable ripple : (mA) at 105℃ 120Hz
Size 20×31 is available fof capacitors marked."・" Size 20×35 is available for capacitors marked."△" In this case, 6 will be put at 12 th digit of type numbering system.

PR series

■ Dimensions

W.V. / Cap.(μF) / Code / Item	35 (1V)			50 (1H)			63 (1J)			100 (2A)		
	Case size	Impedance	Allowable ripple	Case size	Impedance	Allowable ripple	Case size	Impedance	Allowable ripple	Case size	Impedance	Allowable ripple
0.47 R47				5×11	47.0	7				5×11	43.0	10
1 010				5×11	22.0	12				5×11	20.0	15
2.2 2R2				5×11	10.0	18				5×11	9.80	22
3.3 3R3				5×11	6.70	25				5×11	6.60	29
4.7 4R7	5×11	5.00	27	5×11	4.70	30	5×11	4.70	34	5×11	4.60	37
10 100	5×11	2.80	44	5×11	2.20	50	5×11	2.10	55	6.3×11	1.80	65
22 220	5×11	2.30	65	5×11	1.90	75	6.3×11	0.98	90	8×11.5	0.68	115
33 330	5×11	1.90	85	6.3×11	0.84	105	6.3×11	0.71	110	10×12.5	0.46	160
47 470	6.3×11	1.00	115	6.3×11	0.80	125	8×11.5	0.65	155	10×16	0.37	210
100 101	8×11.5	0.50	190	8×11.5	0.45	210	10×12.5	0.31	260	12.5×20	0.180	385
220 221	10×12.5	0.24	325	10×16	0.21	400	10×20	0.20	465	16×25	0.100	590
330 331	10×16	0.20	440	10×20	0.19	535	12.5×20	0.12	650	16×25	0.090	720
470 471	10×20	0.12	580	12.5×20	0.10	730	12.5×25	0.081	800	16×31.5	0.076	875
1000 102	12.5×25	0.067	995	16×25	0.053	1110	16×31.5	0.049	1200	△18×40	0.047	1320
2200 222	16×31.5	0.044	1450	●18×35.5	0.037	1530	△18×40	0.032	1840			
3300 332	●18×35.5	0.038	1660	20×40	0.028	1950						
4700 472	△18×40	0.033	2030									

Case size : D×L(mm)
MAX. Impedance : (Ω) at 20℃ 100kHz
Allowable ripple : (mA) at 105℃ 120Hz

W.V. / Cap. (μF) / Code	160		200		250		315		350		400		450	
	2C		2D		2E		2F		2V		2G		2W	
0.47 R47	6.3×11	12	6.3×11	12	6.3×11	12	8×11.5	11	8×11.5	11				
1 010	6.3×11	17	6.3×11	17	6.3×11	17	8×11.5	16	10×12.5	17	10×12.5	16	10×12.5	18
2.2 2R2	6.3×11	25	6.3×11	25	8×11.5	29	10×12.5	28	10×16	31	10×16	27	10×20	29
3.3 3R3	8×11.5	36	8×11.5	36	10×12.5	42	10×12.5	34	10×16	38	10×20	36	12.5×20	41
4.7 4R7	8×11.5	43	10×12.5	50	10×12.5	50	10×16	45	10×20	49	10×20	43	12.5×20	49
10 100	10×12.5	70	10×16	80	10×20	88	10×20	72	12.5×20	82	12.5×25	72	16×25	75
22 220	10×20	130	10×20	140	12.5×25	155	12.5×25	120	16×25	130	16×25	110	16×31.5	115
33 330	12.5×20	180	12.5×25	190	12.5×25	190	16×25	155	16×31.5	160	16×31.5	140	●18×35.5	145
47 470	12.5×25	220	12.5×25	220	16×25	230	16×35.5	190	●18×35.5	200	●18×35.5	170	20×40	175
100 101	16×25	330	16×31.5	335	●18×35.5	340	△18×40	285	20×40	290				Allowable ripple
220 221	●18×35.5	500	△18×40	515	20×40	525							Case size	

Allowable Ripple (mA) at 105℃ 120Hz

Size 20×31 is available for capacitors marked." • "
Size 20×35 is available for capacitors marked."△"
In this case, 6 will be put at 12th digit of type numbering system.

●Frequency coefficient of allowable ripple current

W.V.	CAP(μF) \ Frequency	50Hz	120Hz	300Hz	1kHz	10kHz~
6.3~100	~47	0.75	1.00	1.35	1.57	2.00
	100~470	0.80	1.00	1.23	1.34	1.50
	1000~22000	0.85	1.00	1.10	1.13	1.15
160~450	0.47~220	0.80	1.00	1.25	1.40	1.60

●Allowable ripple current vs. Ambient temperature

Ambient temp.(℃)	~+70	+85	+105
Coefficient	1.78	1.40	1.00

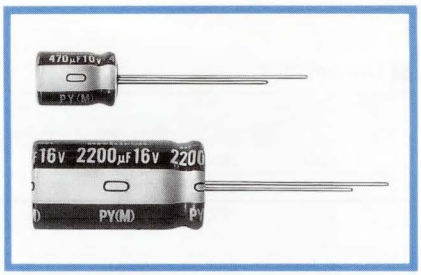
ALUMINUM ELECTROLYTIC CAPACITORS

PY Low Impedance, High Reliability series

Smaller | Low Impedance | Anti-Solvent Feature

- Smaller case size than PF series
- Lower impedance at high frequency range.

PY ← Low Impedance PF



■Specifications

Item	Performance Characteristics
Operating Temperature Range	−55～+105℃
Voltage Range	6.3～50V
Capacitance Range	0.47～15000μF
Capacitance Tolerance	±20% at 120Hz, 20℃
Leakage Current	After 1 minute's application of rated voltage, leakage current is not more than 0.03CV or 4μA., whichever is greater.
tan δ	For capacitance of more than 1000μF, add 0.02 for every increase of 1000μF. Measurement frequency:120Hz, Temperature:20℃
Stability at Low Temperature	Measurement frequency:120Hz
Load Life	After 2000 hours' application of rated voltage at 105℃, capacitors meet the characteristics requirements listed at right. (In case of φD=8:1000hours' application)
Shelf Life	After leaving capacitors under no load at 105℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.
Marking	Printed with white color letter on dark brown sleeve according to JIS C-5141.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

tan δ

Rated voltage (V)	6.3	10	16	25	35	50
tan δ (MAX.)	0.24	0.20	0.16	0.14	0.12	0.10

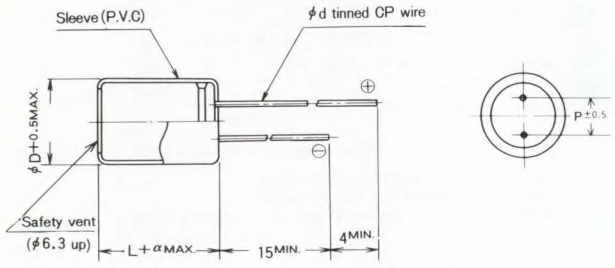
Stability at Low Temperature

Rated voltage (V)		6.3	10	16	25	35	50
Impedance ratio ZT/Z20(MAX.)	Z−55℃/Z+20℃	5	5	4	4	3	3

Load Life

Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

■Radial Lead Type



α	(L<20) 1.5 (L≧20) 2.0

φD	5	6.3	8	10	12.5	16	18
P	2	2.5	3.5	5	5	7.5	7.5
φd	0.5	0.5	0.6	0.6	0.6	0.8	0.8

Type numbering system (Example: 25V 470μF)

1	2	3	4	5	6	7	8	9	10	11
U	P	Y	1	E	4	7	1	M	P	H

Configuration
Capacitance tolerance (±20%)
Capacitance (470μF)
Rated voltage (25V)
Series name
Type

φD	Code
5	DH
6.3	EH
8～10	PH
12.5～18	RH

●Frequency coefficient of allowable ripple current

Cap(μF) \ Frequency	50Hz	120Hz	300Hz	1kHz	10kHz～
～47	——	0.17	0.40	0.65	1
100～220	0.30	0.50	0.65	0.80	1
330～680	0.57	0.71	0.82	0.90	1
1000～15000	0.75	0.87	0.96	0.98	1

●Allowable ripple current vs. Ambient temperature

Ambient temp. (℃)	～+70	+85	+105
Coefficient	1.78	1.4	1.0

• Dimension table in next page.

PY series

■Standard ratings

W.V. / Item / Cap.(μF) / Code	6.3 (0J)			10 (1A)			16 (1C)		
	Case size φD×L (mm)	Impedance (Ω) MAX. 20℃ 100kHz	Allowable ripple (mA rms) 105℃ 100kHz	Case size φD×L (mm)	Impedance (Ω) MAX. 20℃ 100kHz	Allowable ripple (mA rms) 105℃ 100kHz	Case size φD×L (mm)	Impedance (Ω) MAX. 20℃ 100kHz	Allowable ripple (mA rms) 105℃ 100kHz
10 / 100							5×11	0.60	180
22 / 220	5×11	0.60	180	5×11	0.60	180	5×11	0.60	180
33 / 330	5×11	0.60	180	5×11	0.60	180	5×11	0.60	180
47 / 470	5×11	0.60	180	5×11	0.60	180	5×11	0.60	180
100 / 101	5×11	0.60	180	5×11	0.60	180	6.3×11	0.25	280
150 / 151	6.3×11	0.25	280	6.3×11	0.25	280	6.3×11	0.25	280
220 / 221	6.3×11	0.25	280	6.3×11	0.25	280	8×11.5	0.14	450
330 / 331	6.3×11	0.25	280	8×11.5	0.14	450	8×11.5	0.14	450
470 / 471	8×11.5	0.14	450	8×11.5	0.14	450	10×12.5	0.095	660
680 / 681	10×12.5	0.095	660	10×12.5	0.095	660	10×16	0.070	850
1000 / 102	10×12.5	0.095	660	10×16	0.070	850	10×20	0.053	1100
1500 / 152	10×20	0.053	1100	10×20	0.053	1100	12.5×20	0.050	1400
2200 / 222	12.5×20	0.050	1400	12.5×20	0.050	1400	12.5×25	0.038	1700
3300 / 332	12.5×20	0.050	1400	12.5×25	0.038	1700	16×25	0.025	2100
4700 / 472	16×25	0.025	2100	16×25	0.025	2100	16×31.5	0.022	2600
6800 / 682	16×25	0.025	2100	16×31.5	0.022	2600	18×35.5	0.020	3000
10000 / 103	16×31.5	0.022	2600	18×35.5	0.020	3000	18×40	0.018	3600
15000 / 153	18×35.5	0.020	3000	18×40	0.018	3600			

W.V. / Item / Cap.(μF) / Code	25 (1E)			35 (1V)			50 (1H)		
	Case size φD×L (mm)	Impedance (Ω) MAX. 20℃ 100kHz	Allowable ripple (mA rms) 105℃ 100kHz	Case size φD×L (mm)	Impedance (Ω) MAX. 20℃ 100kHz	Allowable ripple (mA rms) 105℃ 100kHz	Case size φD×L (mm)	Impedance (Ω) MAX. 20℃ 100kHz	Allowable ripple (mA rms) 105℃ 100kHz
0.47 / R47							5×11	5.0	25
1 / 010							5×11	3.5	40
2.2 / 2R2							5×11	3.0	55
3.3 / 3R3							5×11	2.6	65
4.7 / 4R7	5×11	0.60	180	5×11	0.60	180	5×11	2.3	90
10 / 100	5×11	0.60	180	5×11	0.60	180	5×11	1.4	120
22 / 220	5×11	0.60	180	5×11	0.60	180	5×11	1.2	150
33 / 330	5×11	0.60	180	5×11	0.60	180	6.3×11	0.43	250
47 / 470	5×11	0.60	180	6.3×11	0.25	280	6.3×11	0.43	250
100 / 101	6.3×11	0.25	280	8×11.5	0.14	450	8×11.5	0.24	340
150 / 151	8×11.5	0.14	450	8×11.5	0.14	450	10×12.5	0.17	490
220 / 221	8×11.5	0.14	450	10×12.5	0.095	660	10×16	0.12	650
330 / 331	10×12.5	0.095	660	10×16	0.070	850	10×20	0.10	810
470 / 471	10×16	0.070	850	10×20	0.053	1100	12.5×20	0.085	1100
680 / 681	10×20	0.053	1100	12.5×20	0.050	1400	12.5×25	0.065	1200
1000 / 102	12.5×20	0.050	1400	12.5×25	0.038	1700	16×25	0.043	1600
1500 / 152	16×25	0.025	2100	16×25	0.025	2100	16×31.5	0.038	2000
2200 / 222	16×25	0.025	2100	16×31.5	0.022	2600	18×35.5	0.034	2300
3300 / 332	16×31.5	0.022	2600	18×35.5	0.020	3000			
4700 / 472	18×35.5	0.020	3000	18×40	0.018	3600			
6800 / 682	18×40	0.018	3600						

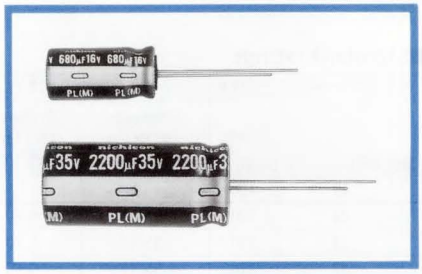
ALUMINUM ELECTROLYTIC CAPACITORS

PL series

Extremely Low Impedance, High Reliability

Low Impedance | Long Life | Anti-Solvent Feature

- Same case sizes as PF series, but extremely low impedance as little as 1/2 of PF series.
- High reliability withstanding 5000hour load life at +105℃(3000/2000hours for smaller case sizes as specified below).
- Capacitance ranges available based on the numerical values in E12 series under JIS.
- Ideally suited for use in switching power supplies.



PL ← Low Impedance → PF

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−55～+105℃
Voltage Range	6.3～63V
Capacitance Range	0.47～15000μF
Capacitance Tolerance	±20% at 120Hz, 20℃
Leakage Current	After 1 minute's application of rated voltage, leakage current is not more than 0.03CV or 4 μA, whichever is greater.
tan δ	For capacitance of more than 1000μF, add 0.02 for every increas of 1000μF. Measurement frequency : 120 Hz, Temperature : 20℃

Rated voltage (V)	6.3	10	16	25	35	50	63
tan δ (MAX.)	0.22	0.19	0.16	0.14	0.12	0.10	0.08

Stability at Low Temperature — Measurement frequency : 120 Hz

Rated voltage (V)		6.3	10	16	25	35	50	63
Impedance ratio ZT/Z20 (MAX.)	Z−55℃/Z+20℃	4	4	3	3	3	2	2

Load Life — After 5000 hours' application of rated voltage at 105℃, capacitors meet the characteristics requirements listed at right. (In case of φD=5, 6.3: 2000hours, φD=8: 3000hours application)

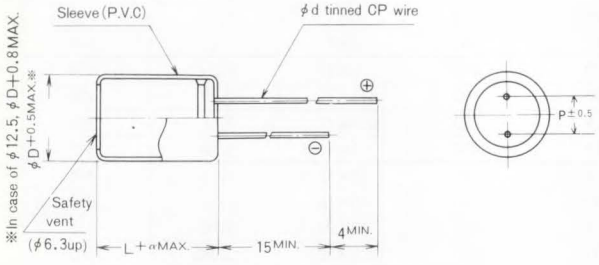
Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

Shelf Life — After leaving capacitors under no load at 105℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above. The value of tan δ is, however, 150% or less of initial specified value.

Marking — Printed with white color letter on dark brown sleeve according to JIS C-5141.

Applicable Standards — Characteristics W of JIS C-5141 and JIS C-5102.

■Radial Lead Type



α	(L<20) 1.5 (L≧20) 2.0

φD	5	6.3	8	10	12.5	16	18
P	2	2.5	3.5	5	5	7.5	7.5
φd	0.5	0.5	0.6	0.6	0.6*	0.8	0.8

※In case L>25 for φ12.5(D) case sizes, lead diameter φ0.8(d) will be applied.

Type numbering system (Example: 25V 470μF φ12.5 x 15)

1	2	3	4	5	6	7	8	9	10	11	12
U	P	L	1	E	4	7	1	M	R	H	6

Case size code

Type	code
Small Dia.	—
Low Profile	6

Configuration

φD	Code
5	DH
6.3	EH
8～10	PH
12.5～18	RH

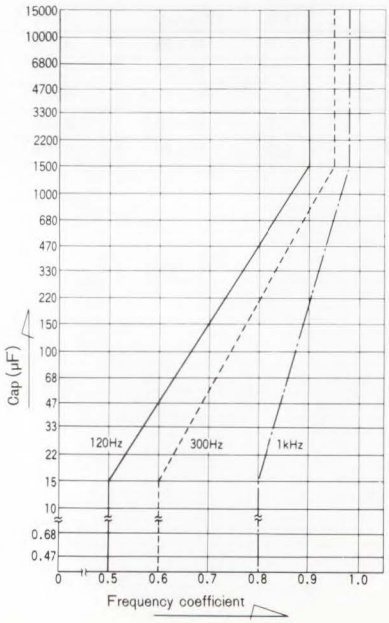
Capacitance tolerance (±20%)
Capacitance (470μF)
Rated voltage (25V)
Series name
Type

●Allowable ripple current vs. Ambient temperature

Ambient temp. (℃)	～+45	+65	+85	+105
Coefficient	2.4	2.2	1.7	1.0

●Frequency coefficient of allowable ripple current

(10kHz～200kHz=1)



• Dimension table in next page.

PL series

■Dimensions

DXL(mm)

Cap. (μF)	W.V. (Code) / Size code	6.3(0J)		10(1A)		16(1C)		25(1E)		35(1V)		50(1H)		63(1J)	
		—	6	—	6	—	6	—	6	—	6	—	6	—	6
0.47	R47											5X11			
0.68	R68											5X11			
1	010											5X11			
1.5	1R5											5X11			
2.2	2R2											5X11			
3.3	3R3											5X11			
4.7	4R7											5X11			
6.8	6R8											5X11			
10	100											5X11		5X11	
12	120											5X11		5X11	
15	150											5X11		6.3X11	
18	180											5X11		6.3X11	
22	220									5X11		6.3X11		6.3X11	
27	270									5X11		6.3X11		6.3X11	
33	330							5X11		6.3X11		6.3X11		6.3X15	
39	390							5X11		6.3X11		6.3X11		6.3X15	
47	470					5X11		6.3X11		6.3X11		6.3X15		8X11.5	
56	560					5X11		6.3X11		6.3X11		6.3X15		8X15	10X12.5
68	680			5X11		6.3X11		6.3X11		6.3X15		8X11.5		8X15	10X12.5
82	820			5X11		6.3X11		6.3X11		6.3X15		8X15	10X12.5	8X20	10X15
100	101	5X11		6.3X11		6.3X11		6.3X15		8X11.5		8X20	10X15	10X20	12.5X15
120	121	5X11		6.3X11		6.3X11		6.3X15		8X15	10X12.5	8X20	10X15	10X20	12.5X15
150	151	6.3X11		6.3X11		6.3X15		8X11.5		8X15	10X12.5	10X20	12.5X15	10X25	12.5X15
180	181	6.3X11		6.3X11		6.3X15		8X15	10X12.5	8X20	10X15	10X20	12.5X15	10X31.5	16X15
220	221	6.3X11		6.3X15		8X11.5		8X15	10X12.5	8X20	10X15	10X25	12.5X15	12.5X20	16X15
270	271	6.3X15		6.3X15		8X15	10X12.5	8X20	10X15	10X20	12.5X15	10X31.5	16X15	12.5X25	18X15
330	331	6.3X15		8X11.5		8X15	10X12.5	8X20	10X15	10X20	12.5X15	10X31.5	16X15	12.5X25	18X15
390	391	8X11.5		8X15	10X12.5	8X20	10X15	10X20	12.5X15	10X25	12.5X15	12.5X25	16X15	12.5X31.5	16X20
470	471	8X15	10X12.5	8X15	10X12.5	8X20	10X15	10X20	12.5X15	10X31.5	16X15	12.5X25	18X15	12.5X35.5	16X25
560	561	8X15	10X12.5	8X20	10X15	10X20	12.5X15	10X25	12.5X15	12.5X20	16X15	12.5X31.5	16X20	12.5X40	18X20
680	681	8X20	10X15	8X20	10X15	10X20	12.5X15	10X31.5	16X15	12.5X25	18X15	12.5X35.5	16X20	16X31.5	18X25
820	821	8X20	10X15	10X20	12.5X15	10X25	12.5X15	12.5X20	16X15	12.5X25	18X15	12.5X40	18X20	16X35.5	18X31.5
1000	102	10X20	12.5X15	10X20	12.5X15	10X31.5	16X15	12.5X25	18X15	12.5X31.5	16X20	16X31.5	18X25	16X40	18X35.5
1200	122	10X20	12.5X15	10X25	12.5X15	12.5X20	16X15	12.5X25	18X15	12.5X35.5	16X25	16X35.5	18X31.5	18X40	
1500	152	10X25	12.5X15	10X31.5	16X15	12.5X25	18X15	12.5X31.5	16X20	12.5X40	18X20	16X40	18X31.5		
1800	182	10X31.5	16X15	12.5X20	16X15	12.5X31.5	16X20	12.5X35.5	16X25	16X31.5	18X25	18X35.5			
2200	222	10X31.5	16X15	12.5X25	18X15	12.5X31.5	16X20	12.5X40	18X20	16X35.5	18X31.5	18X40			
2700	272	12.5X25	18X15	12.5X31.5	16X20	12.5X35.5	16X25	16X31.5	18X25	16X40	18X35.5				
3300	332	12.5X25	18X15	12.5X35.5	16X20	12.5X40	18X20	16X35.5	18X31.5	18X40					
3900	392	12.5X31.5	16X20	12.5X40	18X20	16X31.5	18X25	16X40	18X35.5						
4700	472	12.5X35.5	18X20	16X31.5	18X25	16X35.5	18X31.5	18X40							
5600	562	12.5X40	18X20	16X35.5	18X25	16X40	18X35.5								
6800	682	16X31.5	18X25	16X35.5	18X31.5	18X35.5									
8200	822	16X35.5	18X31.5	16X40	18X35.5	18X40									
10000	103	16X40	18X31.5	18X40											
12000	123	18X35.5													
15000	153	18X40													

※ In case of low profile type, 6 will be put at 12th digit of type numbering system.

ALUMINUM ELECTROLYTIC CAPACITORS

PL series

■Standard ratings

WV / Size code / Item / Code / Cap. (μF)		6.3 (0J)									
							6				
		Case size φD×L (mm)	Impedance (Ω MAX.)		Allowable ripple (mA rms)		Case size φD×L (mm)	Impedance (Ω MAX.)		Allowable ripple (mA rms)	
			20℃/100kHz	−10℃/100kHz	105℃/10kHz~200kHz	105℃/120Hz		20℃/100kHz	−10℃/100kHz	105℃/10kHz~200kHz	105℃/120Hz
100	101	5×11	0.85	1.70	150	99					
120	121	5×11	0.65	1.30	175	115					
150	151	6.3×11	0.49	0.98	225	155					
180	181	6.3×11	0.39	0.78	250	175					
220	221	6.3×11	0.30	0.60	285	205					
270	271	6.3×15	0.24	0.48	370	275					
330	331	6.3×15	0.20	0.40	405	310					
390	391	8×11.5	0.17	0.34	445	345					
470	471	8×15	0.14	0.28	550	435	10×12.5	0.14	0.28	575	455
560	561	8×15	0.12	0.24	595	480	10×12.5	0.13	0.26	600	485
680	681	8×20	0.10	0.20	730	605	10×15	0.11	0.22	700	580
820	821	8×20	0.085	0.17	795	670	10×15	0.095	0.19	750	635
1000	102	10×20	0.075	0.15	950	820	12.5×15	0.085	0.17	890	765
1200	122	10×20	0.065	0.13	1020	895	12.5×15	0.075	0.15	950	835
1500	152	10×25	0.055	0.11	1220	1090	12.5×15	0.065	0.13	1020	915
1800	182	10×31.5	0.050	0.10	1370	1230	16×15	0.055	0.11	1270	1140
2200	222	10×31.5	0.043	0.086	1470	1320	16×15	0.049	0.098	1340	1200
2700	272	12.5×25	0.038	0.076	1590	1430	18×15	0.044	0.088	1500	1350
3300	332	12.5×25	0.034	0.068	1710	1530	18×15	0.039	0.078	1600	1440
3900	392	12.5×31.5	0.031	0.062	1910	1710	16×20	0.036	0.072	1720	1540
4700	472	12.5×35.5	0.028	0.056	2100	1890	18×20	0.032	0.064	1920	1720
5600	562	12.5×40	0.026	0.052	2270	2040	18×20	0.030	0.060	1980	1780
6800	682	16×31.5	0.024	0.048	2370	2130	18×25	0.027	0.054	2210	1980
8200	822	16×35.5	0.022	0.044	2550	2290	18×31.5	0.025	0.050	2390	2150
10000	103	16×40	0.020	0.040	2750	2470	18×31.5	0.023	0.046	2490	2240
12000	123	18×35.5	0.019	0.038	2820	2530					
15000	153	18×40	0.018	0.036	2960	2660					

WV / Size code / Item / Code / Cap. (μF)		10 (1A)									
							6				
		Case size φD×L (mm)	Impedance (Ω MAX.)		Allowable ripple (mA rms)		Case size φD×L (mm)	Impedance (Ω MAX.)		Allowable ripple (mA rms)	
			20℃/100kHz	−10℃/100kHz	105℃/10kHz~200kHz	105℃/120Hz		20℃/100kHz	−10℃/100kHz	105℃/10kHz~200kHz	105℃/120Hz
68	680	5×11	0.80	1.60	155	97					
82	820	5×11	0.65	1.30	175	110					
100	101	6.3×11	0.55	1.10	210	135					
120	121	6.3×11	0.44	0.88	235	160					
150	151	6.3×11	0.35	0.70	265	185					
180	181	6.3×11	0.29	0.58	290	205					
220	221	6.3×15	0.24	0.48	370	270					
270	271	6.3×15	0.20	0.40	405	300					
330	331	8×11.5	0.16	0.32	460	350					
390	391	8×15	0.14	0.28	550	430	10×12.5	0.15	0.30	555	430
470	471	8×15	0.12	0.24	595	475	10×12.5	0.13	0.26	600	475
560	561	8×20	0.10	0.20	730	590	10×15	0.11	0.22	700	565
680	681	8×20	0.085	0.17	795	660	10×15	0.090	0.18	770	635
820	821	10×20	0.070	0.14	985	835	12.5×15	0.080	0.16	920	780
1000	102	10×20	0.060	0.12	1060	915	12.5×15	0.065	0.13	1040	895
1200	122	10×25	0.050	0.10	1280	1120	12.5×15	0.060	0.12	1060	930
1500	152	10×31.5	0.045	0.090	1440	1290	16×15	0.050	0.10	1330	1190
1800	182	12.5×20	0.039	0.078	1470	1320	16×15	0.044	0.088	1420	1270
2200	222	12.5×25	0.034	0.068	1710	1530	18×15	0.039	0.078	1600	1440
2700	272	12.5×31.5	0.030	0.060	1940	1740	16×20	0.035	0.070	1740	1560
3300	332	12.5×35.5	0.026	0.052	2180	1960	16×20	0.031	0.062	1850	1660
3900	392	12.5×40	0.024	0.048	2360	2120	18×20	0.028	0.056	2050	1840
4700	472	16×31.5	0.023	0.046	2420	2170	18×25	0.026	0.052	2250	2020
5600	562	16×35.5	0.021	0.042	2610	2340	18×25	0.024	0.048	2340	2100
6800	682	16×35.5	0.020	0.040	2680	2410	18×31.5	0.022	0.044	2540	2280
8200	822	16×40	0.019	0.038	2820	2530	18×35.5	0.021	0.042	2690	2420
10000	103	18×40	0.017	0.034	3040	2730					

PL series

■Standard ratings

WV / Size code / Item / Code / Cap. (μF)		16 (1C)					6				
		Case size φD×L (mm)	Impedance (Ω MAX.)		Allowable ripple (mA rms)		Case size φD×L (mm)	Impedance (Ω MAX.)		Allowable ripple (mA rms)	
			20℃/100kHz	−10℃/100kHz	105℃/10kHz~200kHz	105℃/120Hz		20℃/100kHz	−10℃/100kHz	105℃/10kHz~200kHz	105℃/120Hz
47	470	5×11	0.80	1.60	155	92					
56	560	5×11	0.65	1.30	175	105					
68	680	6.3×11	0.50	1.00	220	135					
82	820	6.3×11	0.42	0.84	240	155					
100	101	6.3×11	0.35	0.70	265	175					
120	121	6.3×11	0.29	0.58	290	195					
150	151	6.3×15	0.23	0.46	375	260					
180	181	6.3×15	0.20	0.40	405	285					
220	221	8×11.5	0.16	0.32	460	335					
270	271	8×15	0.14	0.28	550	410	10×12.5	0.14	0.28	575	430
330	331	8×15	0.12	0.24	595	455	10×12.5	0.12	0.24	625	480
390	391	8×20	0.10	0.20	730	570	10×15	0.10	0.20	730	570
470	471	8×20	0.090	0.18	770	615	10×15	0.090	0.18	770	615
560	561	10×20	0.075	0.15	950	770	12.5×15	0.080	0.16	920	745
680	681	10×20	0.065	0.13	1020	845	12.5×15	0.070	0.14	985	815
820	821	10×25	0.055	0.11	1220	1030	12.5×15	0.060	0.12	1060	895
1000	102	10×31.5	0.047	0.094	1410	1210	16×15	0.055	0.11	1270	1090
1200	122	12.5×20	0.041	0.082	1430	1250	16×15	0.046	0.092	1390	1220
1500	152	12.5×25	0.036	0.072	1660	1490	18×15	0.041	0.082	1560	1400
1800	182	12.5×31.5	0.032	0.064	1880	1690	16×20	0.037	0.074	1700	1530
2200	222	12.5×31.5	0.028	0.056	2010	1800	16×20	0.033	0.066	1800	1620
2700	272	12.5×35.5	0.025	0.050	2220	1990	16×25	0.030	0.060	2010	1800
3300	332	12.5×40	0.023	0.046	2410	2160	18×20	0.027	0.054	2090	1880
3900	392	16×31.5	0.022	0.044	2470	2220	18×25	0.025	0.050	2290	2060
4700	472	16×35.5	0.020	0.040	2680	2410	18×31.5	0.023	0.046	2490	2240
5600	562	16×40	0.019	0.038	2820	2530	18×35.5	0.022	0.044	2620	2350
6800	682	18×35.5	0.018	0.036	2900	2610					
8200	822	18×40	0.017	0.034	3040	2730					

WV / Size code / Item / Code / Cap. (μF)		25 (1E)					6				
		Case size φD×L (mm)	Impedance (Ω MAX.)		Allowable ripple (mA rms)		Case size φD×L (mm)	Impedance (Ω MAX.)		Allowable ripple (mA rms)	
			20℃/100kHz	−10℃/100kHz	105℃/10kHz~200kHz	105℃/120Hz		20℃/100kHz	−10℃/100kHz	105℃/10kHz~200kHz	105℃/120Hz
33	330	5×11	0.80	1.60	155	88					
39	390	5×11	0.65	1.30	175	100					
47	470	6.3×11	0.55	1.10	210	125					
56	560	6.3×11	0.44	0.88	235	140					
68	680	6.3×11	0.36	0.72	260	160					
82	820	6.3×11	0.30	0.60	285	180					
100	101	6.3×15	0.24	0.48	370	245					
120	121	6.3×15	0.20	0.40	405	275					
150	151	8×11.5	0.16	0.32	460	320					
180	181	8×15	0.14	0.28	550	390	10×12.5	0.15	0.30	555	395
220	221	8×15	0.11	0.22	625	455	10×12.5	0.13	0.26	600	435
270	271	8×20	0.095	0.19	750	560	10×15	0.11	0.22	700	525
330	331	8×20	0.085	0.17	795	610	10×15	0.095	0.19	750	575
390	391	10×20	0.070	0.14	985	770	12.5×15	0.080	0.16	920	720
470	471	10×20	0.065	0.13	1020	810	12.5×15	0.070	0.14	985	785
560	561	10×25	0.055	0.11	1220	990	12.5×15	0.060	0.12	1060	860
680	681	10×31.5	0.046	0.092	1420	1180	16×15	0.055	0.11	1270	1050
820	821	12.5×20	0.041	0.082	1430	1210	16×15	0.049	0.098	1340	1130
1000	102	12.5×25	0.036	0.072	1660	1430	18×15	0.043	0.086	1520	1310
1200	122	12.5×25	0.032	0.064	1760	1550	18×15	0.039	0.078	1600	1400
1500	152	12.5×31.5	0.029	0.058	1980	1780	16×20	0.034	0.068	1770	1590
1800	182	12.5×35.5	0.026	0.052	2180	1960	16×25	0.031	0.062	1980	1780
2200	222	12.5×40	0.024	0.048	2360	2120	18×20	0.028	0.056	2050	1840
2700	272	16×31.5	0.022	0.044	2470	2220	18×25	0.025	0.050	2290	2060
3300	332	16×35.5	0.020	0.040	2680	2410	18×31.5	0.023	0.046	2490	2240
3900	392	16×40	0.019	0.038	2820	2530	18×35.5	0.021	0.042	2690	2420
4700	472	18×40	0.018	0.036	2960	2660					

ALUMINUM ELECTROLYTIC CAPACITORS

PL series

■Standard ratings

WV / Size code / Item / Code / Cap. (μF)		35 (1 V)									
							6				
		Case size φD×L (mm)	Impedance (Ω MAX.)		Allowable ripple (mA rms)		Case size φD×L (mm)	Impedance (Ω MAX.)		Allowable ripple (mA rms)	
			20℃/100kHz	−10℃/100kHz	105℃/10kHz~200kHz	105℃/120Hz		20℃/100kHz	−10℃/100kHz	105℃/10kHz~200kHz	105℃/120Hz
22	220	5×11	0.75	1.50	160	85					
27	270	5×11	0.60	1.20	180	99					
33	330	6.3×11	0.49	0.98	225	125					
39	390	6.3×11	0.41	0.82	245	140					
47	470	6.3×11	0.34	0.68	270	160					
56	560	6.3×11	0.28	0.56	295	180					
68	680	6.3×15	0.24	0.48	370	230					
82	820	6.3×15	0.19	0.38	415	265					
100	101	8×11.5	0.16	0.32	460	305					
120	121	8×15	0.14	0.28	550	370	10×12.5	0.15	0.30	555	375
150	151	8×15	0.12	0.24	595	415	10×12.5	0.12	0.24	625	435
180	181	8×20	0.10	0.20	730	520	10×15	0.11	0.22	700	500
220	221	8×20	0.085	0.17	795	580	10×15	0.090	0.18	770	560
270	271	10×20	0.070	0.14	985	735	12.5×15	0.080	0.16	920	690
330	331	10×20	0.060	0.12	1060	810	12.5×15	0.065	0.13	1020	780
390	391	10×25	0.055	0.11	1220	955	12.5×15	0.060	0.12	1060	825
470	471	10×31.5	0.046	0.092	1420	1130	16×15	0.055	0.11	1270	1010
560	561	12.5×20	0.041	0.082	1430	1160	16×15	0.048	0.096	1360	1100
680	681	12.5×25	0.036	0.072	1660	1370	18×15	0.042	0.084	1540	1270
820	821	12.5×25	0.032	0.064	1760	1490	18×15	0.038	0.076	1620	1370
1000	102	12.5×31.5	0.029	0.058	1980	1710	16×20	0.034	0.068	1770	1530
1200	122	12.5×35.5	0.026	0.052	2180	1920	16×25	0.031	0.062	1980	1740
1500	152	12.5×40	0.024	0.048	2360	2120	18×20	0.028	0.056	2050	1840
1800	182	16×31.5	0.022	0.044	2470	2220	18×25	0.025	0.050	2290	2060
2200	222	16×35.5	0.020	0.040	2680	2410	18×31.5	0.023	0.046	2490	2240
2700	272	16×40	0.018	0.036	2900	2610	18×35.5	0.021	0.042	2690	2420
3300	332	18×40	0.017	0.034	3040	2730					

WV / Size code / Item / Code / Cap. (μF)		50 (1 H)									
							6				
		Case size φD×L (mm)	Impedance (Ω MAX.)		Allowable ripple (mA rms)		Case size φD×L (mm)	Impedance (Ω MAX.)		Allowable ripple (mA rms)	
			20℃/100kHz	−10℃/100kHz	105℃/10kHz~200kHz	105℃/120Hz		20℃/100kHz	−10℃/100kHz	105℃/10kHz~200kHz	105℃/120Hz
0.47	R47	5×11	3.90	7.80	22	11					
0.68	R68	5×11	3.70	7.40	28	14					
1	010	5×11	3.50	7.00	36	18					
1.5	1R5	5×11	3.30	6.60	45	22					
2.2	2R2	5×11	3.00	6.00	54	27					
3.3	3R3	5×11	2.60	5.20	66	33					
4.7	4R7	5×11	2.20	4.40	81	40					
6.8	6R8	5×11	1.80	3.60	91	45					
10	100	5×11	1.40	2.80	115	57					
12	120	5×11	1.20	2.40	125	62					
15	150	5×11	0.93	1.86	145	72					
18	180	5×11	0.80	1.60	155	79					
22	220	6.3×11	0.65	1.30	195	100					
27	270	6.3×11	0.53	1.06	215	115					
33	330	6.3×11	0.43	0.86	240	135					
39	390	6.3×11	0.36	0.72	260	150					
47	470	6.3×15	0.30	0.60	330	195					
56	560	6.3×15	0.25	0.50	360	220					
68	680	8×11.5	0.20	0.40	410	255					
82	820	8×15	0.17	0.34	500	320	10×12.5	0.18	0.36	510	330
100	101	8×20	0.14	0.28	620	410	10×15	0.16	0.32	580	385
120	121	8×20	0.12	0.24	670	455	10×15	0.13	0.26	640	435
150	151	10×20	0.10	0.20	820	570	12.5×15	0.11	0.22	785	545
180	181	10×20	0.085	0.17	890	635	12.5×15	0.095	0.19	845	605
220	221	10×25	0.075	0.15	1040	760	12.5×15	0.080	0.16	920	670
270	271	10×31.5	0.065	0.13	1200	900	16×15	0.070	0.14	1120	840
330	331	10×31.5	0.055	0.11	1300	995	16×15	0.060	0.12	1210	925
390	391	12.5×25	0.048	0.096	1440	1120	16×15	0.055	0.11	1270	990
470	471	12.5×25	0.044	0.088	1500	1190	18×15	0.046	0.092	1470	1170
560	561	12.5×31.5	0.040	0.080	1680	1360	16×20	0.044	0.088	1550	1260
680	681	12.5×35.5	0.036	0.072	1850	1530	16×20	0.040	0.080	1630	1350
820	821	12.5×40	0.033	0.066	2010	1700	18×20	0.036	0.072	1810	1530
1000	102	16×31.5	0.030	0.060	2120	1830	18×25	0.033	0.066	2000	1730
1200	122	16×35.5	0.028	0.056	2260	1990	18×31.5	0.031	0.062	2140	1880
1500	152	16×40	0.026	0.052	2410	2170	18×31.5	0.029	0.058	2220	1990
1800	182	18×35.5	0.025	0.050	2460	2210					
2200	222	18×40	0.024	0.048	2560	2300					

PL series

■Standard ratings

WV / Size code / Item / Code / Cap. (μF)		63 (1J)					6				
		Case size φD×L (mm)	Impedance (Ω MAX.)		Allowable ripple (mA rms)		Case size φD×L (mm)	Impedance (Ω MAX.)		Allowable ripple (mA rms)	
			20℃/100kHz	−10℃/100kHz	105℃/10kHz~200kHz	105℃/120Hz		20℃/100kHz	−10℃/100kHz	105℃/10kHz~200kHz	105℃/120Hz
10	100	5×11	1.06	2.12	135	67					
12	120	5×11	0.93	1.86	145	72					
15	150	6.3×11	0.73	1.46	185	92					
18	180	6.3×11	0.63	1.26	195	100					
22	220	6.3×11	0.52	1.04	215	110					
27	270	6.3×11	0.43	0.86	240	130					
33	330	6.3×15	0.35	0.70	305	170					
39	390	6.3×15	0.30	0.60	330	190					
47	470	8×11.5	0.25	0.50	365	215					
56	560	8×15	0.21	0.42	450	275	10×12.5	0.23	0.46	450	275
68	680	8×15	0.17	0.34	500	315	10×12.5	0.19	0.38	495	310
82	820	8×20	0.15	0.30	600	385	10×15	0.16	0.32	580	375
100	101	10×20	0.12	0.24	750	495	12.5×15	0.14	0.28	695	460
120	121	10×20	0.10	0.20	820	555	12.5×15	0.12	0.24	750	510
150	151	10×25	0.090	0.18	950	665	12.5×15	0.095	0.19	845	590
180	181	10×31.5	0.075	0.15	1110	790	16×15	0.080	0.16	1050	750
220	221	12.5×20	0.065	0.13	1140	835	16×15	0.070	0.14	1120	820
270	271	12.5×25	0.055	0.11	1340	1000	18×15	0.060	0.12	1290	965
330	331	12.5×25	0.049	0.098	1420	1090	18×15	0.050	0.10	1410	1080
390	391	12.5×31.5	0.043	0.086	1620	1260	16×20	0.047	0.094	1500	1170
470	471	12.5×35.5	0.039	0.078	1780	1420	16×25	0.042	0.084	1700	1350
560	561	12.5×40	0.035	0.070	1950	1580	18×20	0.039	0.078	1730	1400
680	681	16×31.5	0.032	0.064	2050	1700	18×25	0.035	0.070	1940	1610
820	821	16×35.5	0.029	0.058	2220	1880	18×31.5	0.032	0.064	2110	1780
1000	102	16×40	0.027	0.054	2370	2050	18×35.5	0.029	0.058	2280	1970
1200	122	18×40	0.025	0.050	2510	2210					

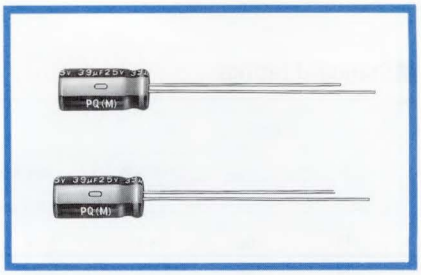
ALUMINUM ELECTROLYTIC CAPACITORS

PQ Miniature Sized, Low Impedance, High Reliability series

Z Low Impedance　L Long Life　Anti-Solvent Feature

- Miniature sized low impedance series withstanding 5000hour load life at +105℃.
- Developed for space-saving installation on switching power supplies.

PL Long Life → PQ



■Specifications

Item	Performance Characteristics
Operating Temperature Range	−55～+105℃
Voltage Range	6.3～50V
Capacitance Range	0.47～390μF
Capacitance Tolerance	±20% at 120Hz, 20℃
Leakage Current	After 1 minute's application of rated voltage, leakage current is not more than 0.03CV or 4(μA), whichever is greater.
tan δ	Fregency:120Hz, Temperature:20℃

Rated voltage(V)	6.3	10	16	25	35	50
tan δ (MAX.)	0.22	0.19	0.16	0.14	0.12	0.10

Stability at Low Temperature — Measurement frepuency:120Hz

Rated voltage (V)		6.3	10	16	25	35	50
Impedance ratio ZT/Z20(MAX.)	Z−55℃/Z+20℃	4	4	3	3	3	2

Load Life — After 5000 hours' application of rated voltage at 105℃, capacitors meet the characteristics requirements listed at right.

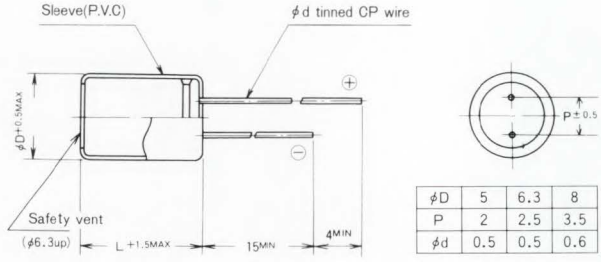
Leakage current	Initial specified value or less
Capacitance change	Within ±30% of initial value
tan δ	300% or less of initial specified value

Shelf Life — After leaving capacitors under no load at 105℃ for 1000 hours and applying voltage according to JIS C-5102 4-3. they meet the specified value for load life characteritics listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	150% or less of initial specified value

Markig	Printed with white color letter on dark brown sleeve according to JIS C-5141.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Radial Lead Type



φD	5	6.3	8
P	2	2.5	3.5
φd	0.5	0.5	0.6

Type numbering system (Example:25V 47μF φ6.3×11)

1	2	3	4	5	6	7	8	9	10	11
U	P	Q	1	E	4	7	0	M	G	H

Configuration

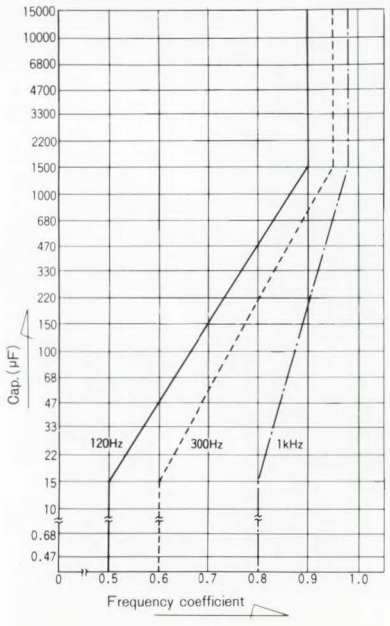
φD	Code
5	FH
6.3～8	GH

Capacitance tolerance (±20%)
Capacitance(47μF)
Rated voltage (25V)
Series name
Type

- Allowable ripple current vs. Ambient temperature

Ambient temp.(℃)	～+45	+65	+85	+105
Coefficient	2.4	2.2	1.7	1.0

- Frequency coefficient of allowable ripple current (10kHz～200kHz=1)



• Dimension table in next page.

PQ series

■Dimensions

WV / Item / Code / Cap.(μF)		6.3 (0J)			10 (1A)			16 (1C)			25 (1E)		
		Case size φD×L (mm)	Impedance (Ω)MAX. 20℃ 100kHz	Allowable ripple (mA rms) 105℃ 100kHz	Case size φD×L (mm)	Impedance (Ω)MAX. 20℃ 100kHz	Allowable ripple (mA rms) 105℃ 100kHz	Case size φD×L (mm)	Impedance (Ω)MAX. 20℃ 100kHz	Allowable ripple (mA rms) 105℃ 100kHz	Case size φD×L (mm)	Impedance (Ω)MAX. 20℃ 100kHz	Allowable ripple (mA rms) 105℃ 100kHz
33	330										5×11	0.80	155
39	390										5×11	0.65	175
47	470							5×11	0.80	155	6.3×11	0.55	210
56	560							5×11	0.65	175	6.3×11	0.44	235
68	680				5×11	0.80	155	6.3×11	0.50	220	6.3×11	0.36	260
82	820				5×11	0.65	175	6.3×11	0.42	240	6.3×11	0.30	285
100	101	5×11	0.85	150	6.3×11	0.55	210	6.3×11	0.35	265	8×11.5	0.24	370
120	121	5×11	0.65	175	6.3×11	0.44	235	6.3×11	0.29	290	8×11.5	0.20	405
150	151	6.3×11	0.49	225	6.3×11	0.35	265	8×11.5	0.23	375	8×11.5	0.16	460
180	181	6.3×11	0.39	250	6.3×11	0.29	290	8×11.5	0.20	405			
220	221	6.3×11	0.30	285	8×11.5	0.24	370	8×11.5	0.16	460			
270	271	8×11.5	0.24	370	8×11.5	0.20	405						
330	331	8×11.5	0.20	405	8×11.5	0.16	460						
390	391	8×11.5	0.17	445									

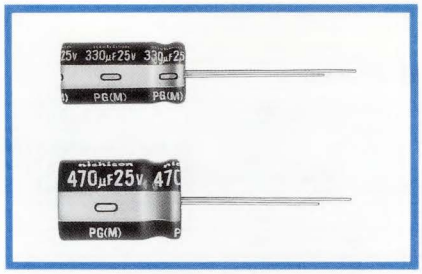
WV / Item / Code / Cap.(μF)		35 (1V)			50 (1H)		
		Case size φD×L (mm)	Impedance (Ω)MAX. 20℃ 100kHz	Allowable ripple (mA rms) 105℃ 100kHz	Case size φD×L (mm)	Impedance (Ω)MAX. 20℃ 100kHz	Allowable ripple (mA rms) 105℃ 100kHz
0.47	R47				5×11	3.90	22
0.68	R68				5×11	3.70	28
1	010				5×11	3.50	36
1.5	1R5				5×11	3.30	45
2.2	2R2				5×11	3.00	54
3.3	3R3				5×11	2.60	66
4.7	4R7				5×11	2.20	81
6.8	6R8				5×11	1.80	91
10	100				5×11	1.40	115
12	120				5×11	1.20	125
15	150				5×11	0.93	145
18	180				5×11	0.80	155
22	220	5×11	0.75	160	6.3×11	0.65	195
27	270	5×11	0.60	180	6.3×11	0.53	215
33	330	6.3×11	0.49	225	6.3×11	0.43	240
39	390	6.3×11	0.41	245	6.3×11	0.36	260
47	470	6.3×11	0.34	270	8×11.5	0.30	330
56	560	6.3×11	0.28	295	8×11.5	0.25	360
68	680	8×11.5	0.24	370	8×11.5	0.20	410
82	820	8×11.5	0.19	415			
100	101	8×11.5	0.16	460			

ALUMINUM ELECTROLYTIC CAPACITORS

PG Long Life, High Reliability series

Low Impedance | Long Life | Anti-Solvent Feature

- Extended load life up to 7000hours at +105℃.
- Suited for switching power supplies in which dependable performance is essential.



PR → Long Life → **PG**

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−55～+105℃
Voltage Range	10～63V
Capacitance Range	4.7～4700μF
Capacitance Tolerance	±20% at 120 Hz, 20℃
Leakage Current	After 2 minute's application of rated voltage, leakage current is not more than 0.01CV or 3 (μA), whichever is greater.
tan δ	For capacitance of more than 1000 μF, add 0.02 for every increase of 1000 μF. Measurement frequency : 120 Hz, Temperature : 20℃

Rated voltage (V)	10	16	25	35	50	63
tan δ (MAX.)	0.30	0.25	0.22	0.18	0.15	0.12

Stability at Low Temperature — Measurement frequency : 120 Hz

Rated Voltage (V)		10	16	25	35	50	63
Impedance ratio	Z−25℃/Z+20℃	2	2	2	2	2	2
ZT/Z20 (MAX.)	Z−55℃/Z+20℃	5	4	3	3	3	3

Load Life

After 7000 hours' application of rated voltage at 105℃, capacitors meet the characteristics requirements listed at right. (In case of φD≦10, after 5000 hours' application)

Leakage current	Initial specified value or less
Capacitance change	Within ±30% of initial value
tan δ	300% or less of initial specified value

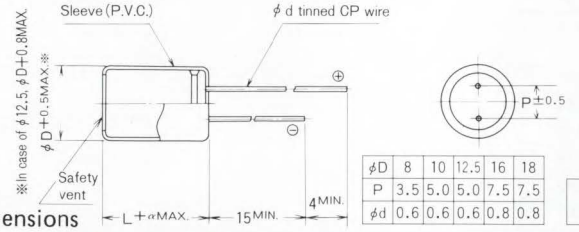
Shelf Life

After leaving capacitors under no load at 105℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±15% of initial value
tan δ	150% or less of initial specified value

Marking	Printed with white color letter on dark brown sleeve according to JIS C-5141.
Applicable Standards	Characteristics W of JIS C-5141, JIS C-5102.

■Radial Lead Type



φD	8	10	12.5	16	18
P	3.5	5.0	5.0	7.5	7.5
φd	0.6	0.6	0.6	0.8	0.8

α	
	(L<20) 1.5
	(L≧20) 2.0

Type numbering system (Example: 10V 470μF)

1	2	3	4	5	6	7	8	9	10	11
U	P	G	1	A	4	7	1	M	P	H

Type
Series name
Rated voltage (10V)
Capacitance (470μF)
Capacitance tolerance (±20%)
Configuration

φD	Code
8,10	PH
12.5～18	RH

■Dimensions

Cap. (μF) \ W.V. (Code) / Code / Item		10 (1A) Case size	10 (1A) Impedance	10 (1A) Allowable ripple	16 (1C) Case size	16 (1C) Impedance	16 (1C) Allowable ripple	25 (1E) Case size	25 (1E) Impedance	25 (1E) Allowable ripple
47	470							8×11.5	1.00	170
100	101	8×11.5	1.00	170	8×11.5	1.00	170	10×12.5	0.60	250
220	221	10×12.5	0.60	250	10×12.5	0.60	250	10×16	0.40	370
330	331	10×16	0.40	370	10×16	0.40	370	10×20	0.28	500
470	471	10×16	0.40	370	10×20	0.28	500	12.5×20	0.16	750
1000	102	12.5×20	0.16	750	12.5×25	0.14	800	16×25	0.08	1250
2200	222	16×25	0.08	1250	16×25	0.08	1250	16×35.5	0.06	1550
3300	332	16×31.5	0.07	1400	16×35.5	0.06	1550	18×40	0.04	1800
4700	472	16×35.5	0.06	1550	18×35.5	0.05	1700			

Cap. (μF) \ W.V. (Code) / Code / Item		35 (1V) Case size	35 (1V) Impedance	35 (1V) Allowable ripple	50 (1H) Case size	50 (1H) Impedance	50 (1H) Allowable ripple	63 (1J) Case size	63 (1J) Impedance	63 (1J) Allowable ripple
4.7	4R7				8×11.5	1.00	170	8×11.5	1.00	170
10	100				8×11.5	1.00	170	8×11.5	1.00	170
22	220				8×11.5	1.00	170	8×11.5	1.00	170
33	330	8×11.5	1.00	170	10×12.5	0.60	250	10×12.5	0.60	250
47	470	8×11.5	1.00	170	10×12.5	0.60	250	10×12.5	0.60	250
100	101	10×12.5	0.60	250	10×16	0.40	370	10×20	0.28	500
220	221	10×20	0.28	500	12.5×20	0.16	750	12.5×20	0.16	750
330	331	12.5×20	0.16	750	12.5×20	0.16	750	12.5×20	0.16	750
470	471	12.5×20	0.16	750	16×25	0.08	1250	16×25	0.08	1250
1000	102	16×25	0.08	1250	16×31.5	0.07	1400	18×35.5	0.05	1700
2200	222	18×35.5	0.05	1700						

●Frequency coefficient of allowable ripple current

Cap. (μF) \ Frequency (Hz)	50	120	300	1 k	10k～
～4.7	——	0.15	0.33	0.55	1.00
10～22	0.17	0.30	0.45	0.64	1.00
33～47	0.28	0.42	0.55	0.70	1.00
100～330	0.43	0.55	0.66	0.80	1.00
470～4700	0.59	0.70	0.80	0.90	1.00

●Allowable ripple current vs. Ambient temperature

Ambient temp. (℃)	～+65	+85	+105
Coefficient	2.2	1.7	1.0

Ratings of 0.47～3.3μF at 50v/63v are available upon request.

Case size : DXL (mm)
Impedance : (Ω) MAX. at 20℃ 100kHz
Allowable ripple : (mA) at 105℃ 100kHz

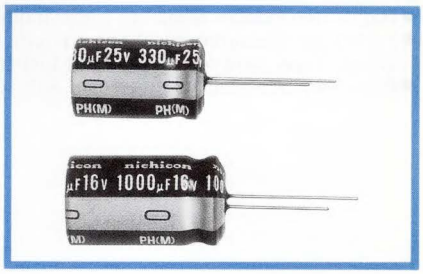
ALUMINUM ELECTROLYTIC CAPACITORS

nichicon

PH Extremely Long Life, High Reliability series

Long Life | Anti-Solvent Feature

- Extremely long load life of 20,000hours at +105℃.
- Ideally suited for industrial applications where reliability and quality are the most important.



PG → Long Life → **PH**

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−55～+105℃
Voltage Range	10～63V
Capacitance Range	47～3300μF
Capacitance Tolerance	±20% at 120Hz, 20℃
Leakage Current	After 2 minutes' application of rated voltage, leakage current is not more than 0.01CV(μA).
tan δ	For capacitance of more than 1000μF, add 0.02 for every increase of 1000μF. Measurement frequency : 120 Hz, Temperature : 20℃
Stability at Low Temperature	Measurement frequency : 120 Hz
Load Life	Capacitors meet the requirements shown at right after 20000 hours' application of rated ripple current overlapped with DC voltage, the max. sum of these being equal to the rated voltage, at 105℃.
Shelf Life	After leaving capacitors under no load at 105℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the characteristics requirements listed at right.
Marking	Printed with white color letter on dark brown sleeve according to JIS C-5141.
Applicable Standards	Characteristics W of JIS C-5102.

tan δ

Rated voltage (V)	10	16	25	35	50	63
tan δ (MAX.)	0.19	0.16	0.14	0.12	0.10	0.10

Stability at Low Temperature

Rated voltage (V)	10	16	25	35	50	63
Impedance ratio Z−55℃/Z+20℃ (MAX.)	2	2	2	2	2	2

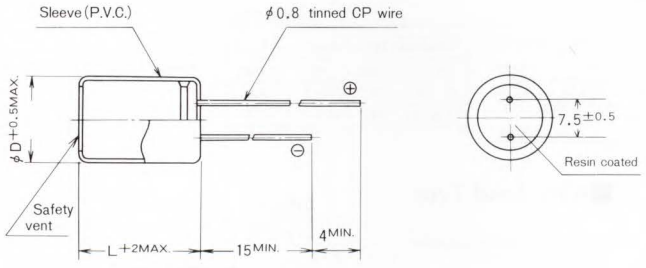
Load Life

Leakage current	Initial specified value or less
Capacitance change	Within ±30% of initial value
tan δ	300% or less of initial specified value

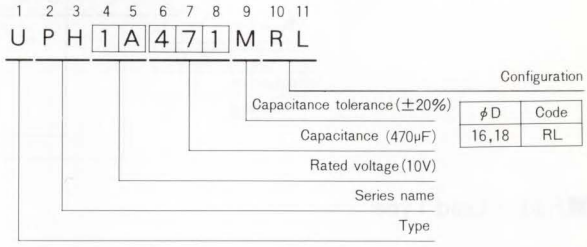
Shelf Life

Leakage current	Initial specified value or less
Capacitance change	Within ±15% of initial value
tan δ	150% or less of initial specified value

■Radial Lead Type



Type numbering system (Example: 10V 470μF)



■Dimensions

Cap. (μF) \ Code \ Item	W.V. (Code)	10(1A) Case size	10(1A) Impedance	10(1A) Allowable ripple	16(1C) Case size	16(1C) Impedance	16(1C) Allowable ripple	25(1E) Case size	25(1E) Impedance	25(1E) Allowable ripple
330	331				16×26	0.13	0.6	16×26	0.13	0.6
470	471	16×26	0.13	0.6	18×26	0.10	0.9	18×26	0.10	0.9
1000	102	18×26	0.10	0.9	18×31	0.08	1.2	18×41	0.05	1.6
2200	222	18×41	0.05	1.6	18×41	0.05	1.6			
3300	332	18×41	0.05	1.6						

Cap. (μF) \ Code \ Item	W.V. (Code)	35(1V) Case size	35(1V) Impedance	35(1V) Allowable ripple	50(1H) Case size	50(1H) Impedance	50(1H) Allowable ripple	63(1J) Case size	63(1J) Impedance	63(1J) Allowable ripple
47	470							16×26	0.13	0.6
100	101				16×26	0.13	0.6	18×26	0.10	0.9
220	221	16×26	0.13	0.6	18×26	0.10	0.9	18×31	0.08	1.2
330	331	18×26	0.10	0.9	18×31	0.08	1.2	18×41	0.05	1.6
470	471	18×31	0.08	1.2	18×41	0.05	1.6			

Case size : DXL (mm)
Impedance : (Ω) MAX. at 20℃ 100kHz
Allowable ripple : (A) at 105℃ 100kHz

●Frequency coefficient of allowable ripple current

Cap. (μF) \ Frequency (Hz)	50	120	300	1k	10k～
～1000	0.57	0.71	0.82	0.92	1.00
2200～3300	0.84	0.92	0.95	0.97	1.00

●Allowable ripple current vs. Ambient temperature

Ambient temp. (℃)	～+65	+85	+105
Coefficient	2.2	1.7	1.0

ALUMINUM ELECTROLYTIC CAPACITORS

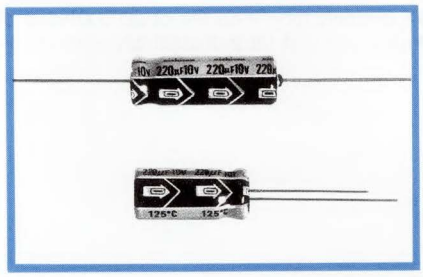
BE series

High Temperature Range, For +125℃ Use

Long Life

Anti-Solvent Feature (Radial Lead Type only)

- Highly dependable reliability withstanding load life of 2,000hours at +125℃.
- Suited for telecommunications equipment, space equipment and automobile electronics where heavy duty services are indispensable.
- Axial lead type available, too.(Not anti-solvent yet)



■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+125℃
Voltage Range	10～50V
Capacitance Range	0.47～470μF
Capacitance Tolerance	±20% at 120 Hz, 20℃
Leakage Current	After 5 minutes' application of rated voltage, leakage current is not more than 0.002CV or 2 (μA) whichever is greater.
tan δ	Measurement frequency : 120 Hz, Temperature : 20℃

Rated voltage (V)	10	16	25	35	50
tan δ (MAX.)	0.15	0.12	0.10	0.10	0.08

Stability at Low Temperature — Measurement frequency : 120 Hz

Rated voltage (V)		10	16	25	35	50
Impedance ratio	Z−25℃/Z+20℃	3	2	2	2	2
ZT/Z20 (MAX.)	Z−40℃/Z+20℃	6	4	4	4	4

Load Life — After 2000 hours' application of rated voltage at 125℃, capacitors meet the characteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
Dissipation Factor	200% or less of initial specified value

Shelf Life	After leaving capacitors under no load at 125℃ for 1000 hours and applying voltage according to JIS C-5141 4-3, they meet the requirements for load life characteristics listed above.
Marking	Printed with black color letter on clear blue sleeve according to JIS C-5141.
Applicable Standards	Characteristics C of JIS C-5141 and JIS C-5102.

Type numbering system (Example: Radial Lead Type 16V 47μF)

1	2	3	4	5	6	7	8	9	10	11
U	B	E	1	C	4	7	0	M	P	T

Type

Type	Code
Radial lead	U
Axial lead	T

Capacitance tolerance (±20%)

Capacitance (47μF)

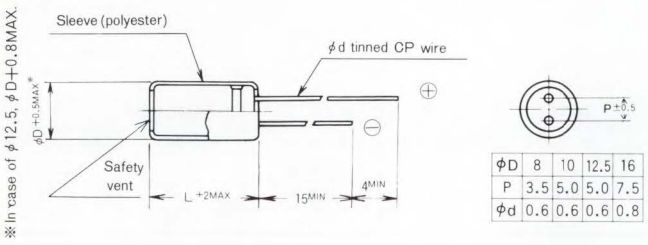
Rated voltage (16V)

Series name

Configuration

Radial lead Type		Axial lead Type	
φD	Code	φD	Code
8, 10	PT	6・8	AT
12.5, 16	RT	10～16	CT

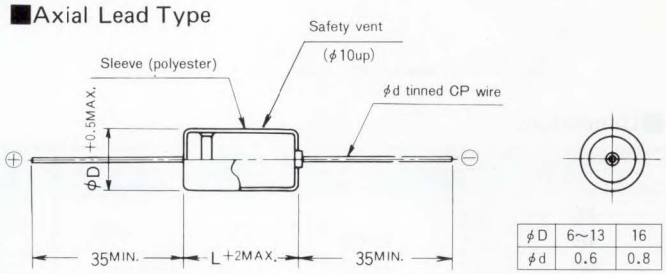
■Radial Lead Type



※In case of φ12.5, φD+0.8MAX.

φD	8	10	12.5	16
P	3.5	5.0	5.0	7.5
φd	0.6	0.6	0.6	0.8

■Axial Lead Type



φD	6～13	16
φd	0.6	0.8

■Dimensions

D×L (mm)

Cap. (μF) \ W.V.	Code	10	16	25	35	50
		1 A	1 C	1 E	1 V	1 H
0.47	R47					8×11.5
1	010					8×11.5
2.2	2R2					8×11.5
3.3	3R3					8×11.5
4.7	4R7					8×11.5
10	100					8×11.5
22	220				8×11.5	10×12.5
33	330			8×11.5	10×12.5	10×16
47	470		8×11.5	10×12.5	10×16	10×20
100	101	10×12.5	10×16	10×20	12.5×20	12.5×25
220	221	10×20	12.5×20	12.5×25	16×25	
330	331	12.5×20	12.5×25	16×25		
470	471	12.5×25	16×25			

■Dimensions

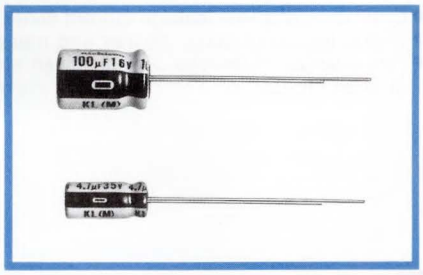
D×L (mm)

Cap. (μF) \ W.V.	Code	10	16	25	35	50
		1 A	1 C	1 E	1 V	1 H
0.47	R47					6×16
1	010					6×16
2.2	2R2					6×16
3.3	3R3					6×16
4.7	4R7					6×16
10	100				6×16	6×16
22	220			6×16	8×16	8×20
33	330	6×16	8×16	8×20	8×20	10×21
47	470	6×16	8×16	8×20	10×21	10×26
100	101	8×20	10×21	10×21	10×26	13×26
220	221	10×21	10×26	13×26	13×31.5	16×31.5
330	331	13×26	13×26	13×31.5	16×31.5	
470	471	13×31.5	13×31.5	16×31.5		

KL Low Leakage Current series

Low Leakage Current | Anti-Solvent Feature

● Standard low leakage current series.

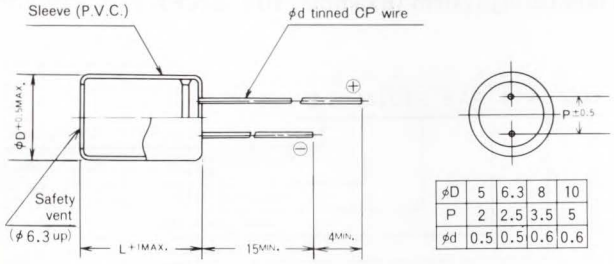


KL Low Leakage Current vx

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+105℃
Voltage Range	10～50V
Capacitance Range	0.1～330 μF
Capacitance Tolerance	±20%(M), ±10%(K) at 120Hz 20℃
Leakage Current	After 1 minute's application of rated voltage, leakage current is not more than 0.002CV or 0.2(μA) whichever is greater.
tan δ	Rated voltage (V): 10 / 16 / 25、35、50; tan δ (MAX.): 0.15 / 0.12 / 0.08. Measurement frequency : 120Hz, Temperature : 20℃
Stability at Low Temperature	Rated voltage (V): 10 / 16 / 25、35、50; Impedance ratio Z−25℃/Z+20℃: 2 / 2 / 1.5; ZT/Z20 (MAX.) Z−40℃/Z+20℃: 4 / 3 / 2. Mesurement frequency : 120Hz
Load Life	After 2000 hours' application of rated voltage at 85℃, or 1000 hours' at 105℃, capacitors meet the characteristics requirements listed at right. Leakage current: Initial specifed value or less; Capacitance change: Within ±15% of initial value; tan δ: 150% or less of initial specified value
Shelf Life	After leaving capacitors under no load at 105℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.
Marking	Printed with black color letter on orange sleeve according to JIS C-5141.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Radial Lead Type



φD	5	6.3	8	10
P	2	2.5	3.5	5
φd	0.5	0.5	0.6	0.6

Type numbering system (Example: 10V 47μF)

1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	K	L	1	A	4	7	0	M	D	A	A	N	A

※ Configuration
Capacitance tolerance (M : ±20%, K : ±10%)
Capacitance (47μF)
Rated voltage (10V)
Series name
Type

φD	Code
5	DA
6.3	EA
8～10	PA

※ In case 105℃ unit is reqeired.

■Dimensions

D×L(mm)

Cap. (μF) \ W.V.	Code	10		16		25		35		50	
		1A		1C		1E		1V		1H	
0.1	0R1									5×11	1.1
0.15	R15									5×11	1.6
0.22	R22									5×11	2.3
0.33	R33									5×11	3.5
0.47	R47									5×11	5.0
0.68	R68									5×11	7.3
1	010									5×11	10.7
1.5	1R5									5×11	16
2.2	2R2									5×11	23
3.3	3R3									5×11	40
4.7	4R7					5×11	45			5×11	45
6.8	6R8					5×11	55			5×11	55
10	100			5×11	55	5×11	70			5×11	70
15	150			5×11	70	5×11	85	5×11	85	6.3×11	95
22	220			5×11	85	5×11	100	6.3×11	110	6.3×11	110
33	330			5×11	100	6.3×11	140	6.3×11	140	8×11.5	165
47	470	5×11	110	6.3×11	140	6.3×11	170	8×11.5	190	8×11.5	190
68	680	6.3×11	150	6.3×11	160	8×11.5	230	8×11.5	230	10×12.5	250
100	101	6.3×11	180	8×11.5	230	8×11.5	280	10×12.5	300		
150	151	8×11.5	250	8×11.5	280	10×12.5	370				
220	221	8×11.5	310	10×12.5	370						
330	331	10×12.5	400							Case size	Allowable ripple

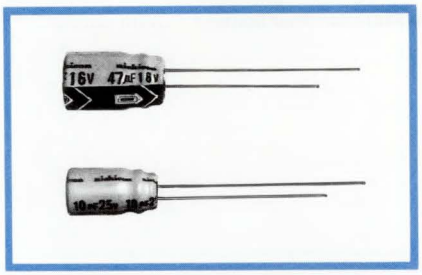
Allowable Ripple (mA) at 85℃ 120Hz

ALUMINUM ELECTROLYTIC CAPACITORS

ZA Low Noise Purposes series

Low Leakage Current | Anti-Solvent Feature

- Low noise and low leakage current series.
- Suited for use in audio devices and measuring instruments.
- Few change on leakage currents, even after severe high temperature shelf testing or shelf life test for a long period at normal temperature.



ZA ← Low Noise KL

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+85℃
Voltage Range	6.3～100V
Capacitance Range	0.47～47μF
Capacitance Tolerance	±20% at 120Hz, 20℃
Leakage Current	After 30 seconds' application of rated voltage, leakage current is not more than 0.004CV or 0.2(μA) whichever is greater.
tan δ	Measurement frequency : 120Hz, Temperature : 20℃

Rated voltage (V)	6.3	10	16	25	35	50	63	100
tan δ (MAX.)	0.22	0.20	0.17	0.15	0.12	0.10	0.10	0.10

Stability at Low Temperature — Measurement frequency : 120 Hz

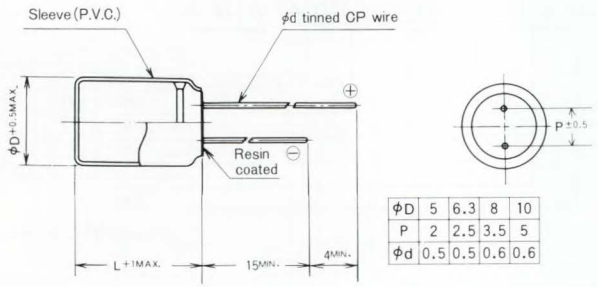
Rated voltage (V)		6.3	10	16	25	35	50	63	100
Impedance ratio	Z−25℃/Z+20℃	4	3	2	2	2	2	2	2
ZT/Z20 (MAX.)	Z−40℃/Z+20℃	8	6	4	4	4	4	4	4

Load Life — After 1000 hours' application of rated voltage at 85℃, capacitors meet the characteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±15% of initial value
tan δ	150% or less of initial specified value

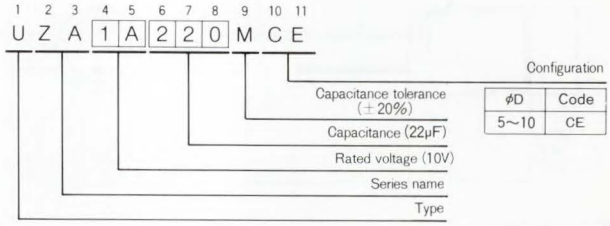
Shelf Life	After leaving capacitors under no load at 85℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.
Marking	Printed with black color letter on orange sleeve according to JIS C-5141.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Radial Lead Type



φD	5	6.3	8	10
P	2	2.5	3.5	5
φd	0.5	0.5	0.6	0.6

Type numbering system (Example: 10V 22μF)



φD	Code
5～10	CE

■Dimensions

D×L (mm)

W.V.	6.3	10	16	25	35	50	63	100
Cap. (μF) Code	0J	1A	1C	1E	1V	1H	1J	2A
0.47 R47						5×11.5		5×11.5
1 010						5×11.5	5×11.5	6.3×11.5
2.2 2R2						5×11.5	5×11.5	6.3×11.5
3.3 3R3				5×11.5		6.3×11.5	6.3×11.5	8×13.5
4.7 4R7				5×11.5		6.3×11.5	8×13.5	10×13.5
10 100			5×11.5	6.3×11.5		8×13.5	8×13.5	
22 220	6.3×11.5	6.3×11.5	6.3×11.5	8×13.5	10×13.5	10×13.5		
33 330	6.3×11.5	6.3×11.5	8×13.5	8×13.5	10×13.5			
47 470	6.3×11.5	8×13.5	8×13.5	10×13.5				

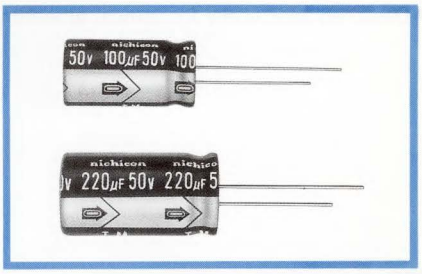
TM

Timer Circuit Use

series

Low Leakage | Anti-Solvent Feature

- Ideally suited for timer circuits.
- Excellent leakage current stability, even subjected to load or no load at high temperature for a long time.



TM ← High Stability KL

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+85℃
Voltage Range	10～50V
Capacitance Range	1～470μF
Capacitance Tolerance	±20% (M) (±10% (K) semi-standard) at 120 Hz, 20℃
Leakage Current	After 2 minutes' application of rated voltage, leakage current is 0.001CV+1 (μA) or less.
tan δ	Measurement frequency : 120 Hz, Temperature : 20℃

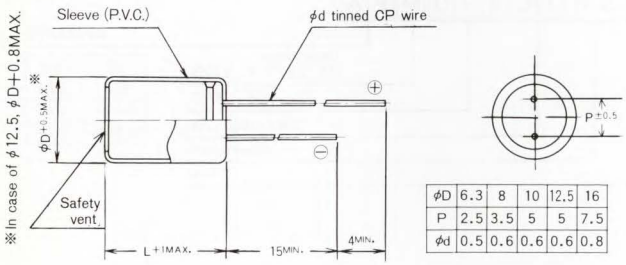
Rated voltage (V)	10	16	25	50
tan δ (MAX.)	0.17	0.13	0.10	0.08

Stability at Low Temperature	Measurement frequency : 120 Hz				
Rated voltage (V)		10	16	25	50
Impedance ratio ZT/Z20 (MAX.)	Z−25℃/Z+20℃	2	2	1.5	1.5
	Z−40℃/Z+20℃	4	3	2	2

Load Life	After 2000 hours' application of rated voltage at 85℃, capacitors meet the characteristics requirements listed at right.	Leakage current	Initial specified value or less
		Capacitance change	Within ±10% of initial value
		tan δ	150% or less of initial specified value

Shelf Life	After leaving capacitors under no load at 85℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the requirements for load life characteristics listed above.
Marking	Printed with white color letter on dark blue sleeve according to JIS C-5141.
Applicable Standards	Characteristics C of JIS C-5141 and JIS C-5102.

■Radial Lead Type



φD	6.3	8	10	12.5	16
P	2.5	3.5	5	5	7.5
φd	0.5	0.6	0.6	0.6	0.8

Type numbering system (Example: 10V 33μF)

1	2	3	4	5	6	7	8	9	10	11
U	T	M	1	A	3	3	0	M	P	A

Configuration

Capacitance tolerance (M : ±20%, K : ±10%)

Capacitance (33μF)

Rated voltage (10V)

Series name

Type

φD	Code
6.3	EA
8～10	PA
12.5～16	RA

■Dimensions

D×L (mm)

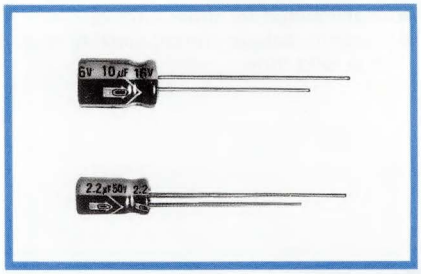
Cap. (μF) \ W.V.	10	16	25	50
Code	1A	1C	1E	1H
1	010				6.3×11
2.2	2R2				6.3×11
3.3	3R3			6.3×11	6.3×11
4.7	4R7			6.3×11	8×11.5
10	100		6.3×11	8×11.5	10×12.5
22	220	6.3×11	8×11.5	10×12.5	10×16
33	330	8×11.5	10×12.5	10×16	10×20
47	470	8×11.5	10×12.5	10×16	12.5×20
100	101	10×16	10×20	12.5×20	12.5×25
220	221	10×20	12.5×25	16×25	16×31.5
330	331	12.5×25	16×25	16×25	
470	471	12.5×25	16×25	16×31.5	

ALUMINUM ELECTROLYTIC CAPACITORS

SH Vertical Time Constant Circuit Use series

Anti-Solvent Feature

● Designed specifically for vertical time constant circuits of TVs.



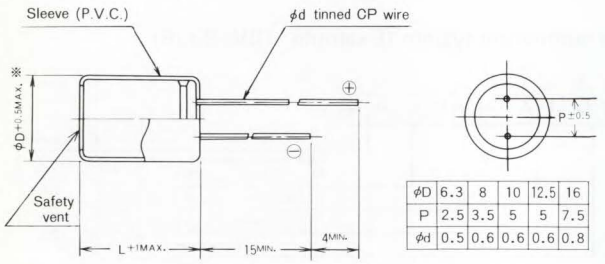
■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+85℃
Voltage Range	16～50V
Capacitance Range	0.47～470μF
Capacitance Tolerance	±20% (M) (±10% (K) semi-standard) at 120Hz, 20℃
Leakage Current	After 2 minutes' application of rated voltage, leakage current is 0.01CV+3(μA) or less.
tan δ	0.07 or less at 120 Hz, 20℃
Stability at Low and High Temperature	Measurement frequency : 120Hz
Load Life	After 1000 hours' application of rated voltage at 85℃, capacitors meet the characteristics requirements listed at right.
Shelf Life	After leaving capacitors under no load at 85℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.
Marking	Printed with black color letter on red sleeve according to JIS C-5141.
Applicable Standards	Characteristics C of JIS C-5141 and JIS C-5102.

Temperature	Capacitance change/20℃	tan δ (MAX.)	Impedance ratio/20℃ (MAX.)
−40℃	within −20%	0.21	2
+85℃	within +20%	0.07	———

Leakage current	Initial specified value or less
Capacitance change	Within ±10% of initial value
tan δ	150% or less of initial specified value

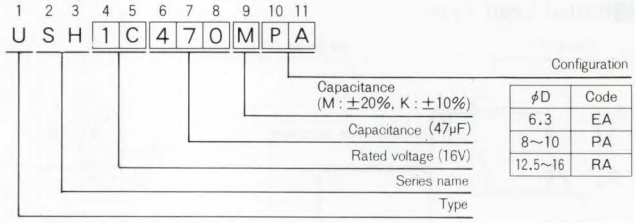
■Radial Lead Type



※In case of φ12.5, φD+0.8MAX.

φD	6.3	8	10	12.5	16
P	2.5	3.5	5	5	7.5
φd	0.5	0.6	0.6	0.6	0.8

Type numbering system (Example: 16V 47μF)



φD	Code
6.3	EA
8～10	PA
12.5～16	RA

■Dimensions

DXL(mm)

Cap. (μF) \ W.V.	Code	16	25	50
		1 C	1 E	1 H
0.47	R47			6.3X11
1	010			6.3X11
2.2	2R2			6.3X11
3.3	3R3		6.3X11	6.3X11
4.7	4R7		6.3X11	8X11.5
10	100	8X11.5	10X12.5	10X16
22	220	10X16	10X16	10X20
33	330	10X16	10X20	12.5X20
47	470	10X20	12.5X20	12.5X25
100	101	12.5X20	12.5X25	16X25
220	221	12.5X25	16X25	16X35.5
330	331	16X25	16X31.5	
470	471	16X35.5		

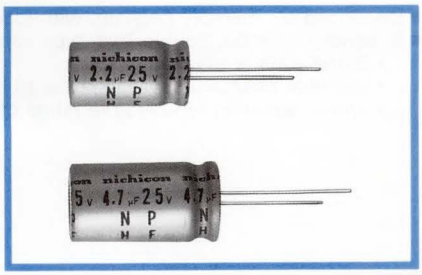
HA

Horizontal Deflection Current Correction Use

series

Anti-Solvent Feature

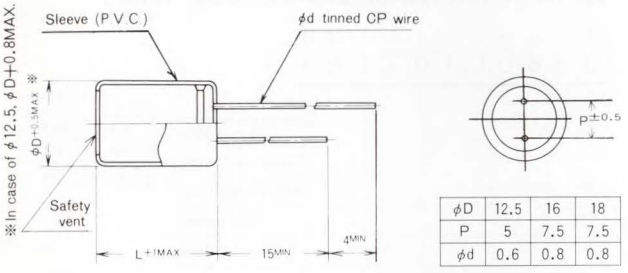
- Designed specifically for horizontal deflection current correction of TVs where high frequencies and high ripple currents are applied.



■Specifications

Item	Performance Characteristics
Operating Temperature Range	−25～+85℃
Voltage Range	25V, 50V
Capacitance Range	2.2～10μF
Capacitance Tolerance	±10% at 120 Hz, 20℃
Leakage Current	After 5 minutes' application of rated voltage, leakage current is 100 (μA) or less.
tan δ	Measurement frequency : 120 Hz, Temperature : 20℃ Rated voltage (V): 25, 50 tan δ (MAX.): 0.05
Load Life	After 1000 hours' application of DC 12V on which the specified allowable ripple current is superimposed at 70℃, capacitors meet the characteristics requirements listed at right. Leakage current: Initial specified value or less Capacitance change: Within ±15% of initial value tan δ: 200% or less of initial specified value
Shelf Life	After leaving capacitors under no load at 85℃ for 500 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.
Marking	Printed with blue color letter on light blue sleeve according to JIS C-5141.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Radial Lead Type



φD	12.5	16	18
P	5	7.5	7.5
φd	0.6	0.8	0.8

Type numbering system (Example: 25V 3.3μF)

1	2	3	4	5	6	7	8	9	10	11
U	H	A	1	E	3	R	3	K	R	A

Configuration

φD	Code
12.5~18	RA

Capacitance tolerance (±10%)
Capacitance (3.3μF)
Rated voltage (25V)
Series name
Type

■Dimensions

Cap. (μF) \ W.V.	Code	25, 50	
		1 E, 1 H	
2.2	2R2	12.5×25	5
3.3	3R3	16×25	6
4.7	4R7	16×31.5	7
5.6	5R6	16×31.5	7.5
6.8	6R8	16×35.5	8
10	100	18×35.5	10

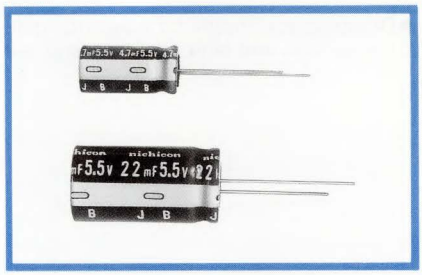
Case size(mm) Allowable ripple(A)
Ripple (Ap-p) at 70℃ 15.75 kHz.

ALUMINUM ELECTROLYTIC CAPACITORS

JB Memory Back-Up Use series

Anti-Solvent Feature

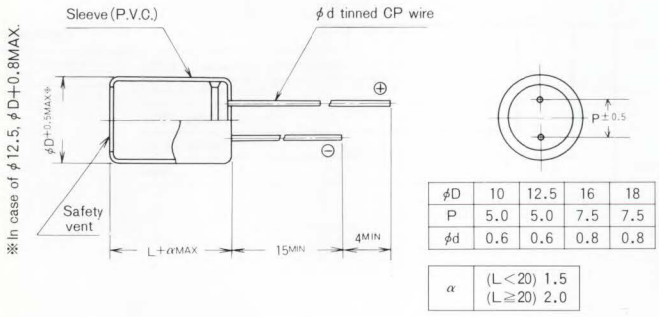
- Developed for memory back-up, with load life of 1000 hours at +85℃.
- Superior to electric double layer type capacitors in the following characteristics:
  - Better voltage maintenance.
  - Speedier charge-up available due to low impedance feature.
  - Wider operating temperature range of −25～+85℃.



■Specifications

Item	Performance Characteristics
Operating Temperature Range	−25～+85℃
Voltage Range	5.5V
Capacitance Range	2.2～47mF　　See Note 1
Capacitance Tolerance	−10～+50%
Leakage Current	C(μA)　(C=Rated capacitance value in mF)　　See Note 2
Voltage Maintenance	More than 3.5V　　See Note 3
Stabiijty at Low Temperature	Capacitance(−25℃)/Capacitance(20℃)×100≧70%
Impedance See Note 4	Capacitance (mF) 2.2 / 3.3 / 4.7 / 8.2 / 10 / 18 / 22 / 27 / 33 / 39 / 47 Impedance (Ω) 1.5 / 1.0 / 0.6 / 0.3 / 0.4 / 0.2 / 0.2 / 0.2 / 0.2 / 0.1 / 0.1
Load Life	After 1000 hours' application of rated voltage at 85℃, capacitors meet the characteristics requirements listed at right. Leakage current: Initial specified value or less Capacitance change: Within ±30% of initial value Impedance: Within 4 times of initial specified value Voltage maintenance: Satisfies initial specified value
Shelf Life	After leaving capacitors under no load at 85℃ for 500 hours and applying voltage according JIS C-5102 4-3, they meet the requirements for load life characteristics listed above.
Marking	Printed with white color letter on black sleeve according to JIS C-5141.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

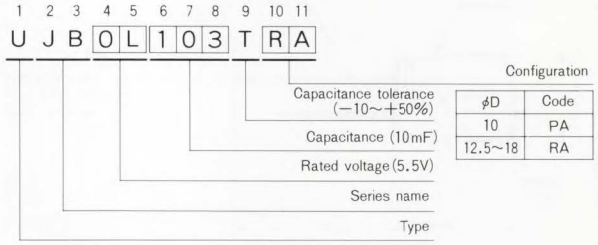
■Radial Lead Type



φD	10	12.5	16	18
P	5.0	5.0	7.5	7.5
φd	0.6	0.6	0.8	0.8

α	(L<20) 1.5 (L≧20) 2.0

Type numbering system (Example: 5.5V 10mF)



φD	Code
10	PA
12.5～18	RA

Note :

1. After charging a capacitor at the rated voltage of 5.5V for an hour, the capacitance is calculated by the following formula, measuring the time of duration, △T(Sec.) from 4V down to 3V when constant current dischage at i(mA)=0.02× nominal capacitance is carried out.
   Capacitance (mF)= i × ΔT
2. Current value (20℃) after applying the rated voltage of 5.5V for an hour.
3. Voltage value maintained after the capacitor is subjected to 1 hour voltage application at 5V and then left at room temperature (lower than 25℃) for 24 hours.
4. Measuring Frequency : 1kHz (20℃)

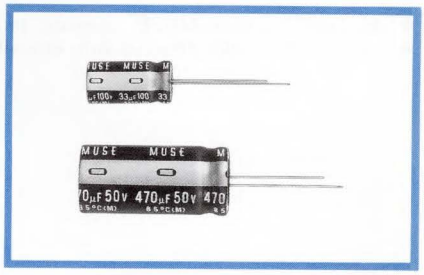
Ratings (V−mF)	Case Size φD×L (mm)
5.5—2.2	10×12.5
5.5—3.3	10×16
5.5—4.7	10×20
5.5—8.2	12.5×20
5.5—10	12.5×25
5.5—18	16×25
5.5—22	16×31.5
5.5—27	16×35.5
5.5—33	18×31.5
5.5—39	18×35.5
5.5—47	18×40

nichicon MUSE KZ series

High Grade Type, For Audio Equipment

For Audio Use　Anti-Solvent Feature

- High grade "nichicon MUSE" acoustic series.
- Ideally suited for first class audio equipment where qualitative and quantitative comfortableness is required.



KZ ← High Grade FS

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+85℃
Voltage Range	25～100V
Capacitance Range	10～1000 μF
Capacitance Tolerance	±20% at 120 Hz, 20℃
Leakage Current	After 1 minute's application of rated voltage, leakage current is 0.01CV or less.
tan δ	Measurement frequency : 120 Hz, Temperature : 20℃

Rated voltage (V)	25	50	100
tan δ (MAX.)	0.12	0.08	0.07

Stability at Low Temperature	Measurement frequency : 120 Hz			
Rated voltage (V)		25	50	100
Impedance ratio ZT/Z20 (MAX.)	Z−25℃/Z+20℃	2	2	2
	Z−40℃/Z+20℃	4	3	3

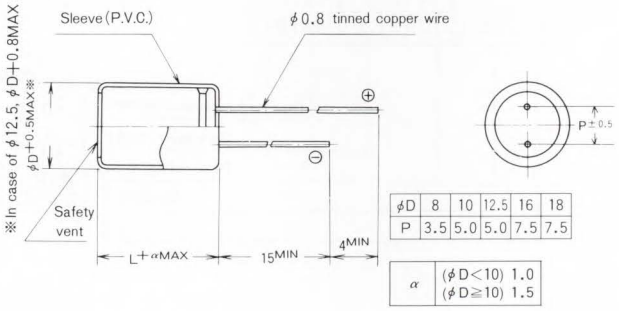
Load Life

After 1000 hours' application of rated voltage at 85℃, capacitors meet the characteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	150% or less of initial specified value

Shelf Life	After leaving capacitors under no load at 85℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above
Marking	Printed with gold color letter on black sleeve according to JIS C-5141.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Radial Lead Type



φD	8	10	12.5	16	18
P	3.5	5.0	5.0	7.5	7.5

α	(φD<10) 1.0 (φD≧10) 1.5

Type numbering system (Example: 25V 100μF)

1	2	3	4	5	6	7	8	9	10	11
U	K	Z	1	E	1	0	1	M	P	B

Configuration

φD	Code
8～10	PB
12.5～18	HB

Capacitance tolerance (±20%)
Capacitance (100 μF)
Rated voltage (25V)
Series name
Type

■Dimensions

DXL(mm)

W.V. / Cap. (μF)	Code	25 1 E	50 1 H	100 2 A
10	100			8X11.5
22	220		8X11.5	10X16
33	330	8X11.5	10X12.5	10X20
47	470	10X12.5	10X16	12.5X20
100	101	10X16	12.5X20	16X25
220	221	12.5X20	16X25	16X35.5
330	331	12.5X25	16X31.5	18X35.5
470	471	16X25	16X35.5	
1000	102	16X35.5	18X40	

ALUMINUM ELECTROLYTIC CAPACITORS

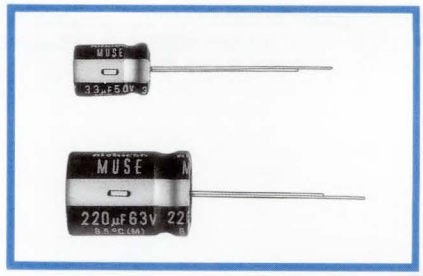
nichicon MUSE **FS** series

Standard, For Audio Equipment

For Audio Use　Anti-Solvent Feature

- Standard "nichicon MUSE" acoustic series.
- Low distortion ratio ensured with anti-vibration structures.

KZ High Grade → **FS** → Smaller → **FX, FM, SK, MC**



■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+85℃
Voltage Range	6.3～100V
Capacitance Range	0.1～10000μF
Capacitance Tolerance	±20% at 120Hz, 20℃
Leakage Current	After 1 minute's application of rated voltage, leakage current is not more than 0.01CV or 3(μA), whichever is greater.
tan δ	For capacitance of more than 1000μF, add 0.02 for every increase of 1000μF. Measurement frequency : 120Hz, Temperature : 20℃

Rated voltage (V)	6.3	10	16	25	35	50	63	100
tan δ (MAX.)	0.22	0.19	0.16	0.14	0.12	0.10	0.09	0.08

Stability at Low Temperature — Measurement frequency : 120Hz

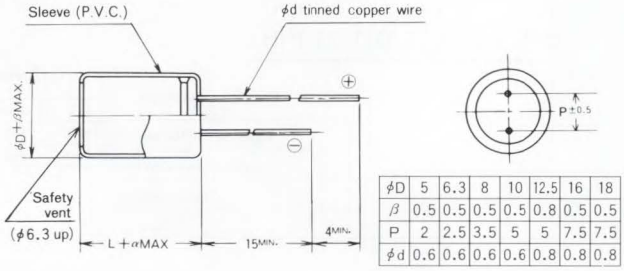
Rated voltage (V)		6.3	10	16	25	35	50	63	100
Impedance ratio ZT/Z20 (MAX.)	Z−25℃/Z+20℃	4	3	2	2	2	2	2	2
	Z−40℃/Z+20℃	8	6	4	4	3	3	3	3

Load Life — After 1000 hours' application of rated voltage at 85℃, capacitors meet the characteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±20% of the initial measurement for units of not more than 16WV or φ6.3 Within ±15% of the initial measurement for units of not less than 25WV or above φ6.3
tan δ	150% or less of initial specified value

Shelf Life	After leaving capacitors under no load at 85℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.
Marking	Printed with white color letter on emerald green sleeve according to JIS C-5141.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Radial Lead Type



φD	5	6.3	8	10	12.5	16	18
β	0.5	0.5	0.5	0.5	0.8	0.5	0.5
P	2	2.5	3.5	5	5	7.5	7.5
φd	0.6	0.6	0.6	0.6	0.8	0.8	0.8

α	(φD<10) 1.0 (φD≥10) 1.5

Type numbering system (Example: 6.3V 22μF)

1	2	3	4	5	6	7	8	9	10	11
U	F	S	0	J	2	2	0	M	D	J

Configuration
Capacitance tolerance (±20%)
Capacitance (22μF)
Rated voltage (6.3V)
Series name
Type

φD	Code
5	DJ
6.3	EJ
8～10	PJ
12.5～18	HJ

■Dimensions

DXL (mm)

Cap. (μF) \ W.V.	Code	6.3		10		16		25		35		50		63		100	
		0J		1A		1C		1E		1V		1H		1J		2A	
0.1	0R1											5×11	1.1			5×11	2.3
0.22	R22											5×11	2.4			5×11	5.5
0.33	R33											5×11	3.6			5×11	8.0
0.47	R47											5×11	5.0			5×11	10
1	010											5×11	9.0			5×11	15
2.2	2R2											5×11	18			5×11	22
3.3	3R3											5×11	22			5×11	27
4.7	4R7							5×11	22	5×11	24	5×11	27			5×11	36
10	100					5×11	31	5×11	32	5×11	36	5×11	39	6.3×11	50	8×11.5	65
22	220	5×11	36	5×11	41	5×11	46	5×11	50	6.3×11	60	6.3×11	65	8×11.5	85	10×12.5	110
33	330	5×11	46	5×11	51	5×11	57	6.3×11	70	6.3×11	75	8×11.5	93	8×11.5	105	10×16	150
47	470	5×11	55	5×11	60	6.3×11	74	6.3×11	85	8×11.5	101	8×11.5	111	10×12.5	140	10×20	190
100	101	6.3×11	88	6.3×11	99	8×11.5	128	8×11.5	140	10×12.5	176	10×16	215	10×20	255	12.5×20	300
220	221	8×11.5	155	8×11.5	170	10×12.5	226	10×16	260	10×20	320	12.5×20	390	12.5×20	420	16×25	549
330	331	10×12.5	226	10×12.5	247	10×16	309	10×20	351	12.5×20	446	12.5×20	488	12.5×25	541	16×31.5	734
470	471	10×12.5	270	10×16	330	10×20	406	12.5×20	476	12.5×25	590	16×25	650	16×25	840	18×35.5	980
1000	102	10×20	485	12.5×20	601	12.5×25	723	16×25	854	16×25	1060	16×31.5	1143	18×35.5	1400		
2200	222	12.5×25	867	16×25	1047	16×25	1290	16×35.5	1570	18×35.5	1840						
3300	332	16×25	1135	16×31.5	1520	16×35.5	1720	18×40	1794								
4700	472	16×31.5	1431	16×35.5	1840	18×35.5	2140										
6800	682	18×35.5	1810	18×40	2049												Allowable ripple
10000	103	18×40	2100													Case size	

Allowable Ripple (mA) at 85℃ 120Hz

ALUMINUM ELECTROLYTIC CAPACITORS

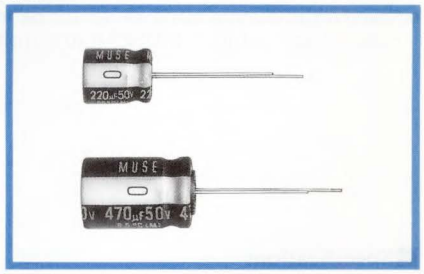
nichicon

nichicon MUSE **FX** series

Miniature Sized, For Audio Equipment

Smaller | For Audio Use | Anti-Solvent Feature

- Miniature sized "nichicon MUSE" acoustic series.
- Suited for use in audio devices where lighter, thinner, shorter and smaller capacitors are required.



KZ / FS ← High Grade — **FX** — Smaller → SK,MC

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+85℃
Voltage Range	6.3～100V
Capacitance Range	0.1～22000 μF
Capacitance Tolerance	±20% at 120 Hz, 20℃
Leakage Current	After 2 minutes' application of rated voltage, leakage current is not more than 0.01CV or 3 (μA), whichever is greater. After 1 minute's application of rated voltage, leakage current is not more than 0.03CV or 4(μA), whichever is greater.
tan δ	For capacitance of more than 1000 μF, add 0.02 for every increase of 1000 μF. Measurement frequency : 120 Hz, Temperature : 20℃

Rated voltage (V)	6.3	10	16	25	35	50	63	100
tan δ (MAX.)	0.26	0.22	0.18	0.16	0.14	0.12	0.10	0.10

Stability at Low Temperature — Measurement frequency : 120 Hz

Rated voltage (V)		6.3	10	16	25	35	50	63	100
Impedance ratio ZT/Z20 (MAX.)	Z−25℃/Z+20℃	4	3	2	2	2	2	2	2
	Z−40℃/Z+20℃	10	8	6	4	3	3	3	3

Load Life — After 1000 hours' application of rated voltage at 85℃, capacitors meet the characteristics requirements listed at right.

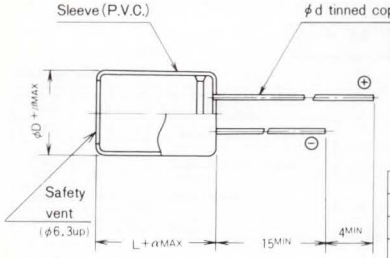
Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

Shelf Life — After leaving capacitors under no load at 85℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.

Marking — Printed with silver color letter on emerald green sleeve according to JIS C-5141.

Applicable Standards — Characteristics W of JIS C-5141 and JIS C-5102.

■Radial Lead Type



φD	5	6.3	8	10	12.5	16	18	20
β	0.5	0.5	0.5	0.5	0.8	0.5	0.5	1.0
P	2	2.5	3.5	5	5	7.5	7.5	10
φd	0.6	0.6	0.6	0.6	0.8	0.8	0.8	1.0

α	
(L<20)	1.5
(L≥20)	2.0

Type numbering system (Example: 10V 330μF)

1	2	3	4	5	6	7	8	9	10	11
U	F	X	1	A	3	3	1	M	P	J

- Capacitance tolerance (±20%)
- Capacitance (330μF)
- Rated voltage (10V)
- Series name
- Type

Configuration

φD	Code
5	DJ
6.3	EJ
8～10	PJ
12.5～18	HJ
20	NJ

■Dimensions

DXL(mm)

Cap. (μF) \ W.V.	Code	6.3		10		16		25		35		50		63		100	
		0 J		1 A		1 C		1 E		1 V		1 H		1 J		2 A	
0.1	0R1											5×11	1.1			5×11	2.1
0.22	R22											5×11	2.3			5×11	4.7
0.33	R33											5×11	3.5			5×11	7
0.47	R47											5×11	5			5×11	10
1	010											5×11	10			5×11	21
2.2	2R2											5×11	23			5×11	30
3.3	3R3											5×11	35			5×11	35
4.7	4R7							5×11	30	5×11	35	5×11	40	5×11	40	5×11	40
10	100					5×11	40	5×11	50	5×11	50	5×11	55	5×11	60	6.3×11	70
22	220	5×11	35	5×11	55	5×11	70	5×11	75	5×11	80	5×11	85	6.3×11	100	8×11.5	120
33	330	5×11	55	5×11	75	5×11	85	5×11	90	5×11	95	6.3×11	110	6.3×11	120	10×12.5	150
47	470	5×11	75	5×11	90	5×11	100	5×11	110	6.3×11	120	6.3×11	140	8×11.5	170	10×16	190
100	101	5×11	120	5×11	130	6.3×11	160	6.3×11	170	8×11.5	210	8×11.5	230	10×12.5	270	12.5×20	330
220	221	6.3×11	200	6.3×11	220	8×11.5	280	8×11.5	300	10×12.5	340	10×16	380	10×20	440	16×25	520
330	331	6.3×11	250	8×11.5	310	8×11.5	340	10×12.5	390	10×16	430	10×20	490	12.5×20	600	16×25	630
470	471	8×11.5	340	8×11.5	370	10×12.5	440	10×16	480	10×20	540	12.5×20	660	12.5×25	740	16×31.5	780
1000	102	10×12.5	530	10×16	600	10×20	700	12.5×20	830	12.5×25	910	16×25	1000	16×31.5	1100	18×40	1200
2200	222	12.5×20	930	12.5×20	1000	12.5×25	1100	16×25	1200	16×31.5	1300	18×35.5	1450	18×40	1600		
3300	332	12.5×20	1050	12.5×25	1200	16×25	1350	16×31.5	1450	18×35.5	1600	20×40	1750				
4700	472	16×25	1300	16×25	1400	16×31.5	1550	18×35.5	1700	18×40	1850						
6800	682	16×25	1500	16×31.5	1650	18×35.5	1850	20×40	2000								
10000	103	16×31.5	1700	18×35.5	1850	18×40	2000										
15000	153	18×35.5	1950	18×40	2050												Allow-able ripple
22000	223	20×40	2200													Case size	

Allowable Ripple(mA) at 85℃ 120Hz

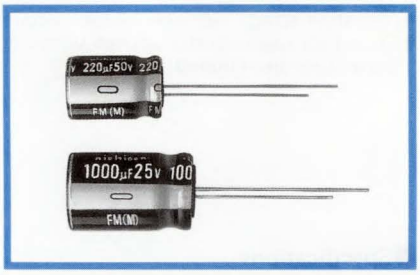
ALUMINUM ELECTROLYTIC CAPACITORS

FM series

Miniature Sized, For General Audio Products

Smaller | For Audio Use | Anti-Solvent Feature

- Standard miniature sized series for general audio products, taking the same designing concept as "nichicon MUSE" into consideration.



KZ / FS FX ← High Grade — **FM** — Smaller → **SK,MC**

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+85℃
Voltage Range	6.3～100V
Capacitance Range	0.1～22000μF
Capacitance Tolerance	±20% at 120 Hz, 20℃
Leakage Current	After 2 minutes' application of rated voltage, leakage current is not more than 0.01CV or 3 (μA), whichever is greater. After 1 minute's application of rated voltage, leakage current is not more than 0.03CV or 4(μA), whichever is greater.
tan δ	For capacitance of more than 1000 μF, add 0.02 for every increase of 1000 μF. Measurement frequency : 120 Hz, Temperature : 20℃

Rated voltage (V)	6.3	10	16	25	35	50	63	100
tan δ (MAX.)	0.24	0.20	0.16	0.14	0.12	0.10	0.08	0.08

Stability at Low Temperature — Measurement frequency : 120 Hz

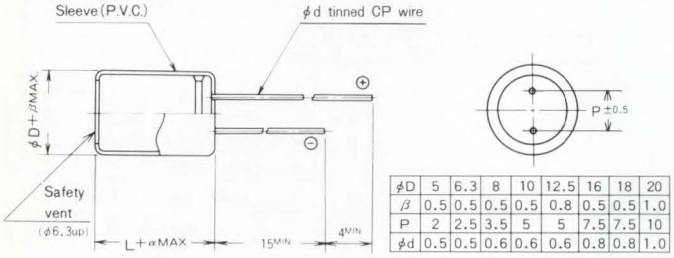
Rated voltage (V)		6.3	10	16	25	35	50	63	100
Impedance ratio ZT/Z20 (MAX.)	Z−25℃/Z+20℃	4	3	2	2	2	2	2	2
	Z−40℃/Z+20℃	10	8	6	4	3	3	3	3

Load Life — After 2000 hours' application of rated voltage at 85℃, capacitors meet the characteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

Shelf Life	After leaving capacitors under no load at 85℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.
Marking	Printed with white color letter on dark brown sleeve according to JIS C-5141.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Radial Lead Type



φD	5	6.3	8	10	12.5	16	18	20
β	0.5	0.5	0.5	0.5	0.8	0.5	0.5	1.0
P	2	2.5	3.5	5	5	7.5	7.5	10
φd	0.5	0.5	0.6	0.6	0.6	0.8	0.8	1.0

α	
	(L<20) 1.5
	(L≧20) 2.0

Type numbering system (Example: 10V 330μF)

1	2	3	4	5	6	7	8	9	10	11
U	F	M	1	A	3	3	1	M	P	A

- Capacitance tolerance (±20%)
- Capacitance (330μF)
- Rated voltage (10V)
- Series name
- Type

Configuration

φD	Code
5	DA
6.3	EA
8～10	PA
12.5～16	HA
18～20	RA

■Dimensions

DXL (mm)

W.V.	6.3		10		16		25		35		50		63		100	
Cap. (μF) / Code	0 J		1 A		1 C		1 E		1 V		1 H		1 J		2 A	
0.1	0R1										5X11	1.1			5X11	2.1
0.22	R22										5X11	2.3			5X11	4.7
0.33	R33										5X11	3.5			5X11	7
0.47	R47										5X11	5			5X11	10
1	010										5X11	10			5X11	21
2.2	2R2										5X11	23			5X11	30
3.3	3R3										5X11	35			5X11	40
4.7	4R7						5X11	30	5X11	35	5X11	40	5X11	45	5X11	45
10	100				5X11	40	5X11	50	5X11	55	5X11	65	5X11	70	6.3X11	75
22	220	5X11	35	5X11	55	5X11	75	5X11	80	5X11	85	5X11	95	6.3X11	115	8X11.5	130
33	330	5X11	55	5X11	80	5X11	90	5X11	95	5X11	105	6.3X11	125	6.3X11	140	10X12.5	170
47	470	5X11	75	5X11	95	5X11	110	5X11	115	6.3X11	140	6.3X11	150	8X11.5	190	10X16	230
100	101	5X11	130	5X11	145	6.3X11	175	6.3X11	185	8X11.5	230	8X11.5	250	10X12.5	300	12.5X20	400
220	221	6.3X11	215	6.3X11	230	8X11.5	300	8X11.5	320	10X12.5	370	10X16	440	10X20	490	16X25	710
330	331	6.3X11	265	8X11.5	330	8X11.5	360	10X12.5	420	10X16	490	10X20	580	12.5X20	680	16X25	860
470	471	8X11.5	360	8X11.5	390	10X12.5	470	10X16	540	10X20	640	12.5X20	760	12.5X25	880	16X31.5	1100
1000	102	10X12.5	570	10X16	630	10X20	790	12.5X20	950	12.5X25	1100	16X25	1350	16X31.5	1550	18X40	1690
2200	222	12.5X20	1050	12.5X20	1100	12.5X25	1350	16X25	1550	16X31.5	1800	18X35.5	2090	18X40	2200		
3300	332	12.5X20	1250	12.5X25	1400	16X25	1700	16X31.5	1950	18X35.5	2220	20X40	2360				
4700	472	16X25	1700	16X25	1800	16X31.5	2100	18X35.5	2360	18X40	2490						
6800	682	16X25	1900	16X31.5	2150	18X35.5	2500	20X40	2590								
10000	103	16X31.5	2250	18X35.5	2500	18X40	2640										
15000	153	18X35.5	2680	18X40	2720												Allowable ripple
22000	223	20X40	2850													Case size	

Allowable Ripple (mA) at 85℃ 120Hz

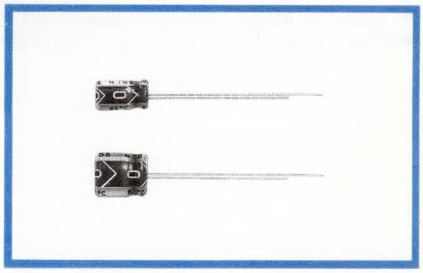
nichicon MUSE SK series

7mmL, For Audio Equipment

For Audio Use | Anti-Solvent Feature

- "nichicon MUSE" acoustic series, with 7mm height.
- Ideally suited for Hi-Fi VTR, car stereos, car CD players, etc.

FX
Smaller
SK



■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+85℃
Voltage Range	6.3～50V
Capacitance Range	0.1～220μF
Capacitance Tolerance	±20% at 120 Hz, 20℃
Leakage Current	After 2 minutes' application of rated voltage, leakage current is not more than 0.01 CV or 3 (μA), whichever is greater.
tan δ	Measurement frequency : 120 Hz, Temperature : 20 ℃

Rated voltage (V)	6.3	10	16	25	35	50
tan δ (MAX.)	0.24	0.20	0.16	0.14	0.12	0.10

Stability at Low Temperature — Measurement frequency : 120 Hz

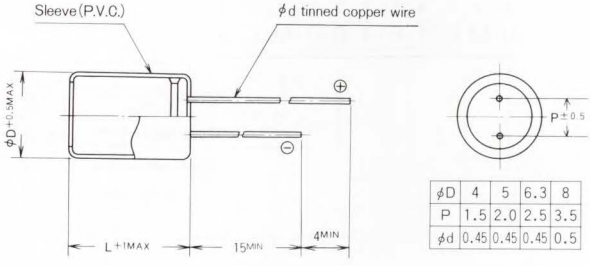
Rated voltage (V)		6.3	10	16	25	35	50
Impedance ratio ZT/Z20 (MAX.)	Z−25℃/Z+20℃	4	3	2	2	2	2
	Z−40℃/Z+20℃	8	6	4	4	3	3

Load Life — After 1000 hours' application of rated voltage at 85℃, capacitors meet the characteristics requirement listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

Shelf Life	After leaving capacitors under no load at 85℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.
Marking	Printed with black color letter on clear green sleeve according to JIS C-5141.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Radial Lead Type



φD	4	5	6.3	8
P	1.5	2.0	2.5	3.5
φd	0.45	0.45	0.45	0.5

Type numbering system (Example: 10V 33μF)

1	2	3	4	5	6	7	8	9	10	11
U	S	K	1	A	3	3	0	M	C	J

Configuration
Capacitance tolerance (±20%)
Capacitance (33 μF)
Rated voltage (10V)
Series name
Type

φD	Code
4 ～ 8	CJ

■Dimensions

DXL(mm)

Cap. (μF) \ W.V.		6.3		10		16		25		35		50	
		0J		1A		1C		1E		1V		1H	
0.1	0R1											4X7	1.0
0.22	R22											4X7	2.3
0.33	R33											4X7	3.5
0.47	R47											4X7	5.0
1	010											4X7	10
2.2	2R2											4X7	19
3.3	3R3											4X7	24
4.7	4R7									4X7	24	5X7	29
10	100					4X7	29	5X7	33	5X7	36	6.3X7	44
22	220	4X7	34	5X7	38	5X7	44	6.3X7	51	6.3X7	57	8X7	65
33	330	5X7	42	5X7	47	6.3X7	57	6.3X7	63	8X7	72		
47	470	5X7	50	6.3X7	59	6.3X7	68	8X7	78				
100	101	6.3X7	77	8X7	96	8X7	107						
220	221	8X7	130									Case size	

Allowable Ripple(mA) at 85℃ 120Hz

ALUMINUM ELECTROLYTIC CAPACITORS

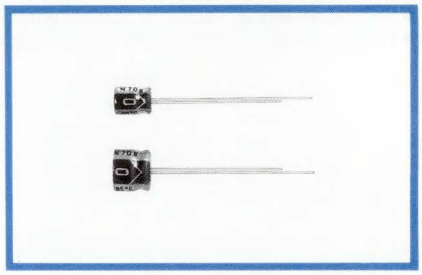
nichicon MUSE **MC** series

5mmL, For Audio Equipment

For Audio Use　Anti-Solvent Feature

- "nichicon MUSE" acoustic series, with 5mm height.
- Ideally suited for very compact audio products in very thin and small dimensions.

SK
Smaller
MC



■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+85℃
Voltage Range	4～50V
Capacitance Range	0.1～220μF
Capacitance Tolerance	±20% at 120Hz, 20℃
Leakage Current	After 2 minutes' application of rated voltage, leakage current is not more than 0.01CV or 3(μA), whichever is greater.
tan δ	Measurement frequency : 120Hz, Temperature : 20℃

Rated voltage (V)	4	6.3	10	16	25	35	50
tan δ (MAX.)	0.35	0.24	0.20	0.16	0.14	0.12	0.10

Stability at Low Temperature — Measurement frequency : 120Hz

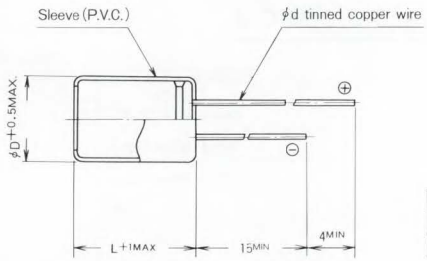
Rated voltage (V)		4	6.3	10	16	25	35	50
Impedance ratio ZT/Z20(MAX.)	Z−25℃/Z+20℃	7	4	3	2	2	2	2
	Z−40℃/Z+20℃	15	8	6	4	4	3	3

Load Life — After 1000 hours' application of rated voltage at 85℃, capacitors meet the characteristics requirement listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

Shelf Life	After leaving capacitors under no load at 85℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.
Marking	Printed with black color letter on clear green sleeve according to JIS C-5141.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Radial Lead Type



φD	4	5	6.3
P	1.5	2.0	2.5
φd	0.45	0.45	0.45

Type numbering system (Example: 25V 10μF)

1	2	3	4	5	6	7	8	9	10	11
U	M	C	1	E	1	0	0	M	C	J

Configuration

φD	Code
4～6.3	CJ

Capacitance tolerance (±20%)
Capacitance (10μF)
Rated voltage (25V)
Series name
Type

■Dimensions

DXL(mm)

W.V.	4		6.3		10		16		25		35		50	
Cap.(μF) / Code	0G		0J		1A		1C		1E		1V		1H	
0.1	0R1												4X5	1.0
0.22	R22												4X5	2.0
0.33	R33												4X5	2.8
0.47	R47												4X5	4.0
1	010												4X5	8.4
2.2	2R2												4X5	13
3.3	3R3												4X5	17
4.7	4R7								4X5	16	4X5	18	5X5	20
10	100						4X5	23	5X5	27	5X5	29	6.3X5	33
22	220			4X5	28	5X5	33	5X5	37	6.3X5	42	6.3X5	46		
33	330	4X5	28	5X5	37	5X5	41	6.3X5	49	6.3X5	52				
47	470	4X5	33	5X5	45	6.3X5	52	6.3X5	58						
100	101	5X5	56	6.3X5	70									Allowable ripple	
220	221	6.3X5	96										Case size		

Allowable Ripple(mA) at 85℃ 120Hz

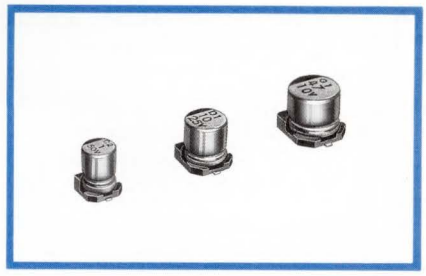
nichicon MUSE UK series

6mmL Chip Type, For Audio Equipment

For SMD | For Audio Use | Anti-Solvent Feature

- Chip type "nichicon MUSE" acoustic series.
- Applicable to automatic insertion machine using carrier tape.

MC
Chip
UK



■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+85℃
Voltage Range	4～50V
Capacitance Range	0.1～220μF
Capacitance Tolerance	±20% at 120Hz, 20℃
Leakage Current	After 2 minutes' application of rated voltage, leakage current is not more than 0.01 CV or 3 (μA), whichever is greater.
tan δ	Measurement frequency : 120Hz, Temperature : 20℃

Rated voltage (V)	4	6.3	10	16	25	35	50
tan δ (MAX.)	0.35	0.26	0.20	0.16	0.14	0.12	0.12

Stability at Low Temperature — Measurement frequency : 120Hz

Rated voltage (V)		4	6.3	10	16	25	35	50
Impedance ratio ZT/Z20 (MAX.)	Z−25℃/Z+20℃	7	4	3	2	2	2	2
	Z−40℃/Z+20℃	15	8	8	4	4	3	3

Load Life — After 2000 hours' application of rated voltage at 85℃, capacitors meet the characteristics requirements listed at right.

Leakage Current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

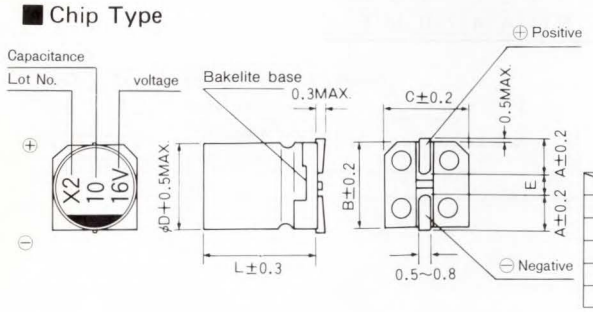
Shelf Life — After leaving capacitors under no load at 85℃ for 1000 hours and applying voltage according to JIS C-5102, 4-3, they meet the specified value for load life characteristics listed above.

Resistance to soldering heat — The capacitors shall be kept on the hot plate maintained at 250℃ for 30 seconds. After removing from the hot plate and restored at room temperature, they meet the characteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±10% of initial value
tan δ	Initial specified value or less

Marking	Black print on the case top.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Chip Type



(mm)

φD	4	5	6.3
A	1.8	2.1	2.4
B	4.3	5.3	6.6
C	4.3	5.3	6.6
E	1.0	1.3	2.2
L	5.7	5.7	5.7

Type numbering system (Example: 16V 10μF)

1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	U	K	1	C	1	0	0	M	C	U	1	G	S

14 Taping code
13 Configuration
12 Capacitance tolerance (±20%)
11 Capacitance (10μF)
10 Rated voltage (16V)
9 Series name
8 Type

■Dimensions

Cap. (μF) \ W.V.	Code	4		6.3		10		16		25		35		50	
		0G		0J		1A		1C		1E		1V		1H	
0.1	0R1													4	1.0
0.22	R22													4	2.0
0.33	R33													4	2.8
0.47	R47													4	4.0
1	010													4	8.4
2.2	2R2													4	13
3.3	3R3													4	17
4.7	4R7									4	16	4	18	5	20
10	100							4	23	5	27	5	29	6.3	33
22	220			4	28	5	33	5	37	6.3	42	6.3	46		
33	330	4	28	5	37	5	41	6.3	49	6.3	52				
47	470	4	33	5	45	6.3	52	6.3	58						
100	101	5	56	6.3	70										
220	221	6.3	96											Case size	Allowable ripple

Allowable Ripple (mA) at 85℃ 120Hz

• Taping Specifications are given in page. 12

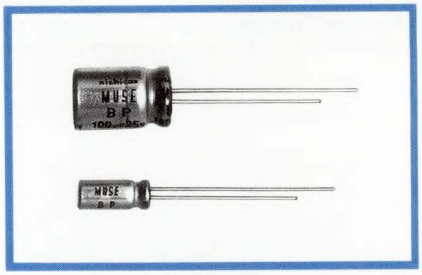
ALUMINUM ELECTROLYTIC CAPACITORS

nichicon MUSE **ES** series

Non-Polarized, For Audio Equipment

For Audio Use | Non-polarized | Anti-Solvent Feature

- Non-polarized "nichicon MUSE" acoustic series.
- Suited for audio signal circuits.



ES ← Non-polarized **FS**

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+85℃
Voltage Range	6.3～50V
Capacitance Range	0.47～1000μF
Capacitance Tolerance	±20% at 120Hz, 20℃
Leakage Current	After 1 minute's application of rated voltage, leakage current is not more than 0.03CV or 3(μA), whichever is greater.
tan δ	Measurement frequency : 120Hz, Temperature : 20℃

Rated voltage (V)	6.3	10	16	25	35	50
tan δ (MAX.)	0.24	0.20	0.16	0.16	0.14	0.12

Stability at Low Temperature — Measurement frequency : 120Hz

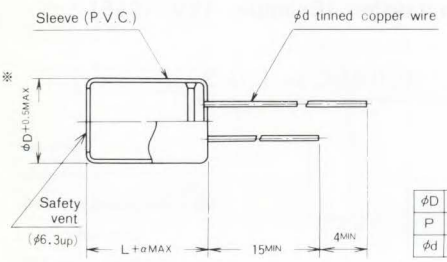
Rated voltage (V)		6.3	10	16	25	35	50
Impedance ratio ZT/Z20 (MAX.)	Z−25℃/Z+20℃	4	3	2	2	2	2
	Z−40℃/Z+20℃	8	6	4	4	4	4

Load Life — After 1000 hours' application of rated voltage at 85℃ with the polarity inverted every 250 hours, capacitors meet the characteristics requirement listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	150% or less of initial specified value

Shelf Life	After leaving capacitors under no load at 85℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.
Marking	Printed with black color letter on clear green sleeve according to JIS C-5141.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Radial Lead Type



※In case of φ12.5, φD+0.8MAX.

φD	5	6.3	8	10	12.5	16
P	2	2.5	3.5	5	5	7.5
φd	0.6	0.6	0.6	0.6	0.8	0.8

α	(φD≦10) 1.0 (φD≧10) 1.5

Type numbering system (Example: 10V 47μF)

1	2	3	4	5	6	7	8	9	10	11
U	E	S	1	A	4	7	0	M	E	J

- 10 → Capacitance tolerance (±20%)
- 9 → Configuration
- 6 7 8 → Capacitance (47μF)
- 4 5 → Rated voltage (10V)
- 3 → Series name
- 1 2 → Type

φD	Code
5	DJ
6.3	EJ
8～10	PJ
12.5～16	HJ

■Dimensions

D×L(mm)

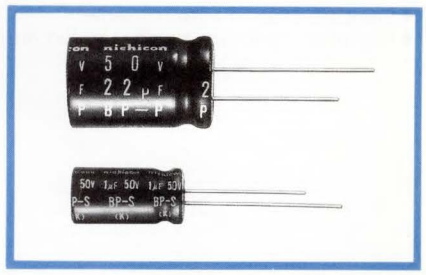
W.V. / Code		6.3 0J	10 1A	16 1C	25 1E	35 1V	50 1H
0.47	R47						5×11
1	010						5×11
2.2	2R2						5×11
3.3	3R3						5×11
4.7	4R7				5×11	5×11	6.3×11
10	100			5×11	5×11	6.3×11	8×11.5
22	220		5×11	6.3×11	6.3×11	8×11.5	10×12.5
33	330	5×11	6.3×11	6.3×11	8×11.5	10×12.5	10×16
47	470	6.3×11	6.3×11	8×11.5	10×12.5	10×12.5	10×20
100	101	8×11.5	10×12.5	10×12.5	10×16	10×20	12.5×25
220	221	10×12.5	10×16	10×20	12.5×25	12.5×25	16×25
330	331	10×16	10×20	12.5×20	12.5×25	16×25	16×31.5
470	471	10×20	12.5×20	12.5×25	16×25	16×25	
1000	102	12.5×25	16×25	16×25	16×31.5		

DB.GB

Bi-Polarized, For Speaker Network series

For Audio Use Anti-Solvent Feature

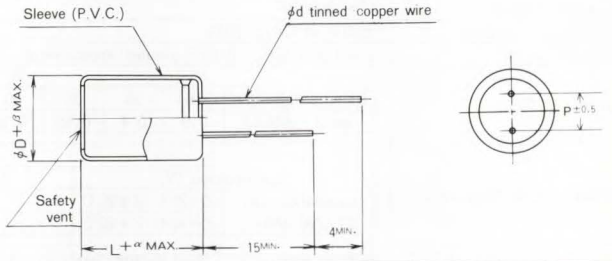
- Bi-polarized series.
- Designed specifically for crossover networks in Hi-Fi sound systems.



■Specifications

Performance Characteristics	DB series	GB series
Operating Temperature Range	−40～+85℃	−40～+85℃
Voltage Range	50V	50V
Capacitance Tolerance	±20% at 1kHz	±10% at 1kHz
Leakage Current (After 5 minutes' application of rated voltage)	0.03CV or 3(μA)	0.03CV or 3(μA)
tan δ (MAX.) (1 kHz)	0.10 or less	0.05 or less
tan δ (MAX.) (5 kHz)	0.15 or less	0.05 or less
Allowable Continuous Current (8Ω-fc)	Value in table or less	Value in table or less
Marking	Printed with white color letter on dark green sleeve.	
Applicable Standards	EIAJ RC 3803	EIAJ RC 3803

■Radial Lead Type



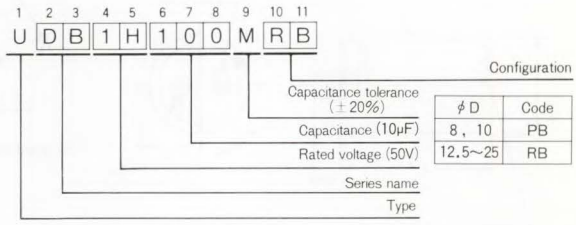
φD	8	10	12.5	16	18	22	25
P	3.5	5	5	7.5	7.5	10	12.5
φd	0.8	0.8	0.8	0.8	0.8	1.0	1.0
α	1	1	1	1	1	2	2
β	0.5	0.5	0.8	0.5	0.5	1	1

■Dimensions

D×L (mm)

Cap. (μF)	Series / Code	DB	GB	Allowable ripple (mA rms)		
		1H (50V)		Frequency (Hz)	DB	GB
1	010	8×11.5	10×20	20k	205	760
1.5	1R5	8×11.5	12.5×20	13k	245	800
2.2	2R2	10×12.5	12.5×20	9k	320	820
3.3	3R3	10×16	16×25	6k	400	850
4.7	4R7	10×20	16×25	4.2k	480	890
6.8	6R8	12.5×20	16×31.5	2.9k	540	920
10	100	12.5×25	18×35.5	2k	600	970
15	150	12.5×25	22×40	1.3k	660	1040
22	220	16×25	22×40	900	740	1060
33	330	16×31.5	25×40	600	800	1120
47	470	18×35.5	——	420	1020	——
68	680	22×40	——	290	1200	——

Type numbering system (Example: DB series 50V 10μF)



φD	Code
8, 10	PB
12.5～25	RB

ALUMINUM ELECTROLYTIC CAPACITORS

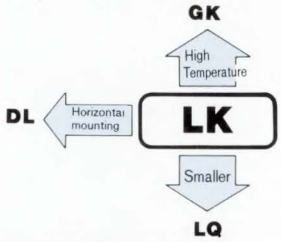
LK Snap-in Terminal Type, Standard series

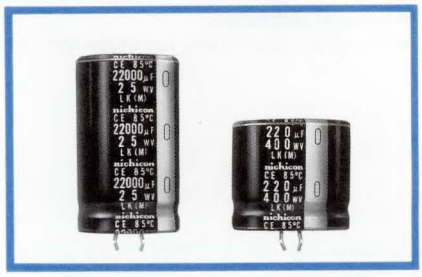
RCJ Approved

Anti-Solvent Feature (Through 100V only)

Approved by Reliability Center for Electronic Component, Japan-Certification No. RCJ-03-25C

- Standard snap-in terminal series.
- Extended capacitance ranges based on the numerical values in E12 series under JIS.





■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+85℃ (16～250V) , −25～+85℃ (400・450V)
Voltage Range	16～450V
Capacitance Range	47～33000μF
Capacitance Tolerance	±20% at 120Hz, 20℃
Leakage Current	I ≦3 $\sqrt{CV}$ (μA) (After 5 minutes' application of rated voltage) [C:Capacitance (μF), V:Voltage (V)]
tan δ	Measurement frequency:120Hz, Temperature:20℃

Rated voltage (V)	16	25	35	50	63	80	100	160	200	250	400	450
tan δ (MAX.)	0.5	0.4	0.35	0.3	0.25	0.2	0.2	0.15	0.10	0.10	0.20	0.20

Stability at Low Temperature — Measurement frequency:120Hz

Rated voltage (V)		16～100	160～250	400・450
Impedance ratio	Z−25℃/Z+20℃	4	3	8
ZT/Z20 (MAX.)	Z−40℃/Z+20℃	15	12	—

Load Life — After an application of rated voltage (maximum value of DC voltage overlapped by an allowable ripple current) for 2000 hours at 85℃, capacitors meet the characteristics requirements listed at right.

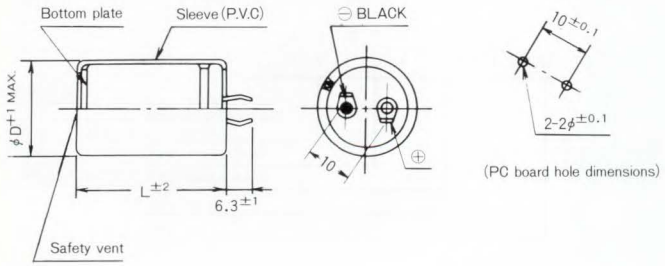
Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

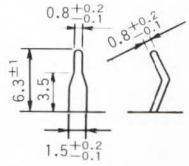
Shelf Life — After leaving capacitors under no load at 85℃ for 1000 hours, they meet the requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±15% of initial value
tan δ	150% or less of initial specified value

Marking	Printed with white color letter on black sleeve.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Drawing





(Terminal dimensions)

Type numbering system (Example: 400V 180μF)

1	2	3	4	5	6	7	8	9	10	11	12
L	L	K	2	G	1	8	1	M	H	S	A

Case dia. code

φD	Code
22	Z
25	A
30	B
35	C

- Configuration
- Capacitance tolerance (±20%)
- Capacitance (180μF)
- Rated voltage (400V)
- Series name
- Type

• Dimension table in next page.

LK series

■Dimensions

DXL (mm)

Cap. (μF)	Code	W.V. (Code) / φD	16 (1C)				25 (1E)				35 (1V)				50 (1H)			
			22	25	30	35	22	25	30	35	22	25	30	35	22	25	30	35
2200	222														22×25			
															1.85			
2700	272														22×30			
															2.10			
3300	332										22×25				22×35	25×25		
											2.20				2.35	2.35		
3900	392										22×30				22×35	25×30		
											2.25				2.50	2.50		
4700	472						22×25				22×30	25×25			22×40	25×35	30×25	
							1.90				2.40	2.40			2.80	2.80	2.80	
5600	562						22×30				22×35	25×30			22×45	25×40	30×30	
							2.25				2.75	2.75			3.30	3.30	3.30	
6800	682		22×25				22×35	25×25			22×40	25×35	30×25		22×50	25×40	30×35	
			2.50				2.55	2.55			2.95	2.95	2.95		3.80	3.80	3.80	
8200	822		22×30				22×40	25×30	30×25		22×45	25×40	30×30			25×50	30×40	35×30
			2.65				3.10	3.10	3.20		3.45	3.50	3.45			4.30	4.35	4.25
10000	103		22×30	25×25			22×45	25×35	30×30			25×45	30×35				30×45	35×35
			2.85	2.85			3.40	3.40	3.40			4.00	4.00				4.75	4.70
12000	123		22×35	25×30			22×50	25×40	30×30			25×50	30×40	35×30			30×50	35×40
			3.25	3.25			4.00	3.90	3.85			4.45	4.50	4.40			5.30	5.25
15000	153		22×40	25×35	30×25			25×45	30×35	35×30			30×45	35×35				35×45
			3.70	3.75	3.65			3.75	4.45	4.45			5.00	5.00				5.90
18000	183		22×50	25×40	30×30				30×40	35×35			30×50	35×40				35×50
			4.35	4.25	4.20				5.00	5.10			5.55	5.50				6.50
22000	223			25×45	30×35	35×30			30×50	35×40				35×50				
				4.80	4.80	4.80			5.80	5.75				6.25				
27000	273				30×40	35×30				35×50								
					5.20	5.15				6.60								
33000	333				30×45	35×40												
					5.80	5.90												

Cap. (μF)	Code	W.V. (Code) / φD	63 (1J)				80 (1K)				100 (2A)			
			22	25	30	35	22	25	30	35	22	25	30	35
820	821										22×25			
											1.20			
1000	102										22×30	25×25		
											1.50	1.50		
1200	122						22×25				22×35	25×30		
							1.30				1.75	1.75		
1500	152						22×30	25×25			22×40	25×30	30×25	
							1.80	1.80			1.95	1.90	1.95	
1800	182		22×25				22×35	25×30			22×45	25×35	30×30	
			1.70				2.05	2.05			2.30	2.20	2.30	
2200	222		22×30	25×25			22×40	25×30	30×25		22×50	25×40	30×30	
			2.30	2.30			2.30	2.30	2.30		2.65	2.60	2.55	
2700	272		22×35	25×30			22×45	25×35	30×30			25×45	30×35	35×30
			2.40	2.45			2.50	2.45	2.50			2.85	2.85	2.95
3300	332		22×40	25×35	30×25		22×50	25×40	30×30				30×40	35×35
			2.75	2.80	2.75		2.95	2.85	2.80				3.45	3.45
3900	392		22×45	25×35	30×30			25×45	30×35				30×45	35×35
			3.00	2.90	3.00			3.20	3.20				3.85	3.75
4700	472		22×50	25×40	30×30			25×50	30×40	35×30				35×40
			3.30	3.25	3.20			3.75	3.80	3.70				4.30
5600	562			25×45	30×35				30×45	35×35				35×50
				3.75	3.75				4.40	4.35				5.10
6800	682				30×40	35×30			30×50	35×40				
					4.20	4.15			4.80	4.80				
8200	822				30×45	35×35				35×45				
					4.70	4.65				5.35				
10000	103					35×40								
						5.20								
12000	123					35×50								Case size
						6.10								Allowable ripple

Allowable Ripple (A) at 85℃ 120Hz

ALUMINUM ELECTROLYTIC CAPACITORS

LK series

■ Dimensions

DXL(mm)

W.V. (Code) / Cap. (μF) / Code / φD	160(2C)				200(2D)				250(2E)			
	22	25	30	35	22	25	30	35	22	25	30	35
180 (181)									22×25 0.95			
220 (221)					22×25 1.10				22×30 1.15	25×25 1.15		
270 (271)					22×30 1.25				22×35 1.25	25×30 1.25		
330 (331)	22×25 1.30				22×30 1.40	25×25 1.40			22×40 1.45	25×30 1.45	30×25 1.45	
390 (391)	22×30 1.50	25×25 1.55			22×35 1.60	25×30 1.60			22×45 1.70	25×35 1.70	30×30 1.70	
470 (471)	22×35 1.75	25×30 1.75			22×40 1.80	25×35 1.80	30×25 1.75		22×50 1.90	25×40 1.90	30×35 1.90	35×25 1.90
560 (561)	22×35 1.90	25×30 1.90	30×25 1.95		22×45 2.00	25×35 2.00	30×30 2.05			25×45 2.15	30×35 2.15	35×30 2.15
680 (681)	22×40 2.15	25×35 2.20	30×30 2.20			25×40 2.25	30×35 2.25	35×25 2.30			30×40 2.40	35×30 2.35
820 (821)	22×50 2.45	25×40 2.45	30×30 2.45	35×25 2.50		25×50 2.55	30×40 2.60	35×30 2.50			30×45 2.75	35×35 2.75
1000 (102)		25×45 2.80	30×35 2.80	35×30 2.85			30×45 2.95	35×35 2.90				35×40 3.00
1200 (122)		25×50 3.10	30×40 3.20	35×35 3.25			30×50 3.40	35×40 3.40				35×50 3.50
1500 (152)			30×45 3.70	35×40 3.75				35×45 3.80				
1800 (182)				35×40 4.00				35×50 4.15				
2200 (222)				35×50 4.50								

W.V. (Code) / Cap. (μF) / Code / φD	400(2G)				450(2W)			
	22	25	30	35	22	25	30	35
47 (470)					22×25 0.49			
56 (560)					22×30 0.57			
68 (680)	22×25 0.58				22×30 0.63	25×25 0.63		
82 (820)	22×30 0.60				22×35 0.74	25×30 0.75		
100 (101)	22×30 0.77	25×25 0.77			22×40 0.88	25×35 0.89	30×25 0.86	
120 (121)	22×35 0.86	25×30 0.86			22×45 0.96	25×40 0.98	30×30 0.96	35×25 0.99
150 (151)	22×40 0.97	25×30 0.92	30×25 0.96			25×45 1.10	30×35 1.10	35×30 1.13
180 (181)	22×45 1.10	25×35 1.06	30×30 1.11	35×25 1.13		25×50 1.24	30×40 1.18	35×30 1.22
220 (221)	22×50 1.25	25×40 1.22	30×35 1.28	35×30 1.32			30×45 1.42	35×35 1.40
270 (271)		25×45 1.39	30×40 1.47	35×30 1.46			30×50 1.62	35×40 1.61
330 (331)			30×45 1.68	35×35 1.70				35×45 1.83
390 (391)			30×50 1.95	35×40 1.93				35×50 2.10
470 (471)				35×45 2.23				
560 (561)				35×50 2.54				Case size Allowable ripple

Allowable Ripple(A) at 85℃ 120Hz

●Frequency coefficient of allowable ripple current

Frequency (Hz)		50	60	120	1 k	10k～
Coeff.	16～100V	0.88	0.90	1.00	1.15	1.15
	160～250V	0.85	0.88	1.00	1.15	1.20
	400・450V	0.88	0.90	1.00	1.10	1.15

●Allowable ripple current vs. Ambient temperature

Ambient temp.(℃)	～+45	+60	+70	+85
Coefficient	1.48	1.42	1.30	1.00

ALUMINUM ELECTROLYTIC CAPACITORS

nichicon

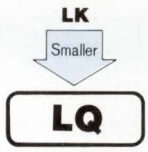
LQ series

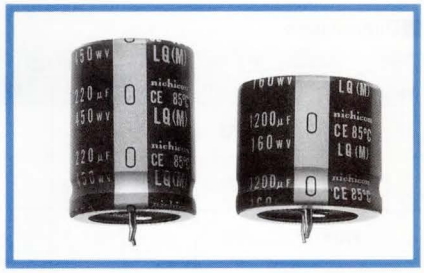
Snap-in Terminal Type, Small-Sized

Smaller

Anti-Solvent Feature (Through 100V only)

- Much smaller case sizes than standard LK series.
- Working voltage ranges extended from 16V to 450V.





■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+85℃ (16～250V), −25～+85℃ (400・450V)
Voltage Range	16～450V
Capacitance Range	56～56000μF
Capacitance Tolerance	±20% at 120Hz, 20℃
Leakage Current	$I \leq 3\sqrt{CV}$ (μA) (After 5 minutes' application of rated voltage) [C: Capacitance (μF), V: Voltage (V)]
tan δ	Measurement frequency: 120Hz, Temperature: 20℃

Rated voltage (V)	16	25	35	50	63	80	100	160	200	250	400	450
tan δ (MAX.)	0.50	0.40	0.35	0.30	0.25	0.20	0.20	0.15	0.15	0.15	0.20	0.20

Stability at Low Temperature — Measurement frequency: 120Hz

Rated voltage (V)		16～100	160～250	400・450
Impedance ratio	Z−25℃/Z+20℃	4	3	8
ZT/Z20(MAX.)	Z−40℃/Z+20℃	15	12	—

Load Life — After an application of rated voltage (maximum value of DC voltage overlapped by an allowable ripple current) for 2000 hours at 85℃, capacitors meet the characteristics requirements listed at right.

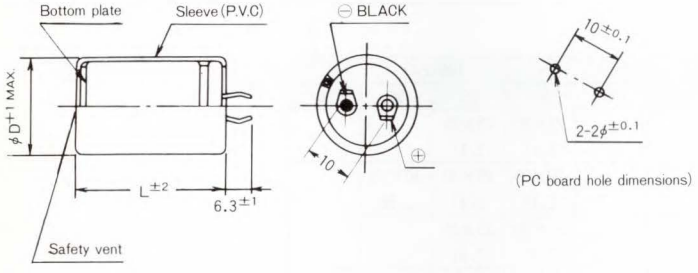
Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

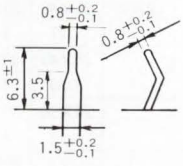
Shelf Life — After leaving capacitors under no load at 85℃ for 1000 hours, they meet the requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±15% of initial value
tan δ	150% or less of initial specified value

Marking	Printed with white color letter on black sleeve.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Drawing





(Terminal dimensions)

Type numbering system (Example: 200V 470μF)

1	2	3	4	5	6	7	8	9	10	11	12
L	L	Q	2	D	4	7	1	M	H	S	A

Case dia. code

Configuration

Capacitance tolerance (±20%)

Capacitance (470μF)

Rated voltage (200V)

Series name

Type

φD	Code
22	Z
25	A
30	B
35	C

●Frequency coefficient of allowable current

Frequency (Hz)		50	60	120	1 k	10k～
Coeff.	16～100V	0.88	0.90	1.00	1.15	1.15
	160～250V	0.85	0.88	1.00	1.15	1.20
	400・450V	0.88	0.90	1.00	1.10	1.15

●Allowable ripple current vs. Ambient temperature

Ambient temp.(℃)	～+45	+60	+70	+85
Coefficient	1.48	1.42	1.30	1.00

• Dimension table in next page.

ALUMINUM ELECTROLYTIC CAPACITORS

LQ series

■Dimensions

DXL (mm)

W.V.(Code) / Cap.(μF) / Code / φD	16 (1C)				25 (1E)				35 (1V)				50 (1H)			
	22	25	30	35	22	25	30	35	22	25	30	35	22	25	30	35
3300 332													22×30	25×25		
													2.35	2.35		
3900 392									22×25				22×35	25×30		
									2.16				2.66	2.68		
4700 472									22×30	25×25			22×40	25×35	30×25	
									2.42	2.42			3.02	3.07	2.98	
5600 562					22×25				22×35				22×45	25×40	30×30	
					2.11				2.66				3.40	3.47	3.42	
6800 682					22×30	25×25			22×40	25×30	30×25		22×50	25×40	30×35	
					2.47	2.47			2.97	2.82	2.93		3.84	3.74	3.93	
8200 822	22×25				22×35				22×45	25×35				25×50	30×40	35×30
	2.55				2.86				3.29	3.17				4.44	4.47	4.36
10000 103	22×30				22×40	25×30	30×25		22×50	25×40	30×30				30×45	35×35
	2.89				3.31	3.15	3.27		3.75	3.65	3.60				5.08	5.01
12000 123	22×30	25×25			22×45	25×35	30×30			25×45	30×35	35×30			30×50	35×40
	3.01	3.01			3.77	3.63	3.80			4.15	4.14	4.27			5.72	5.69
15000 153	22×35	25×30	30×25		22×50	25×40					30×40	35×35				35×45
	3.45	3.48	3.61		4.21	4.10					4.77	4.95				6.56
18000 183	22×40	25×35				25×45	30×35	35×30			30×45	35×40				35×50
	3.84	3.91				4.53	4.52	4.66			5.30	5.52				7.14
22000 223	22×50	25×40	30×30				30×45	35×35				35×45				
	4.52	4.40	4.34				5.33	5.26				6.20				
27000 273		25×45	30×35				30×50	35×40				35×50				
		4.96	4.95				5.96	5.93				6.89				
33000 333			30×40	35×30				35×45								
			5.60	5.46				6.65								
39000 393			30×45	35×35				35×50								
			6.21	6.12				7.31								
47000 473			30×50	35×40												
			6.93	6.89												
56000 563				35×45												
				7.69												

W.V.(Code) / Cap.(μF) / Code / φD	63 (1J)				80 (1K)				100 (2A)			
	22	25	30	35	22	25	30	35	22	25	30	35
1200 122					22×25				22×30	25×25		
					1.66				2.11	2.11		
1500 152					22×30				22×35	25×30	30×25	
					1.96				2.45	2.47	2.56	
1800 182	22×25				22×30	25×25			22×40	25×35		
	1.82				2.11	2.11			2.77	2.81		
2200 222	22×30	25×25			22×35	25×30	30×25		22×45	25×40	30×30	
	2.14	2.14			2.44	2.46	2.56		3.15	3.21	3.17	
2700 272	22×35	25×30			22×40	25×35				25×45	30×35	35×30
	2.49	2.52			2.82	2.86				3.66	3.65	3.77
3300 332	22×35	25×30	30×25		22×45	25×40	30×30			25×50	30×40	
	2.72	2.74	2.84		3.23	3.29	3.25			4.15	4.18	
3900 392	22×40	25×35			22×50	25×45	30×35				30×45	35×35
	3.09	3.13			3.62	3.71	3.70				4.67	4.61
4700 472	22×50	25×40	30×30	35×25		25×50	30×40	35×30			30×50	35×40
	3.69	3.59	3.54	3.25		4.20	4.23	4.12			5.26	5.23
5600 562		25×45	30×35				30×45	35×35				35×45
		4.01	4.00				4.70	4.64				5.88
6800 682		25×50	30×40	35×30			30×50	35×40				
		4.52	4.55	4.44			5.27	5.24				
8200 822			30×45	35×35				35×45				
			5.12	5.05				5.89				
10000 103			30×50	35×40				35×50				
			5.78	5.75				6.63				
12000 123				35×45								Case size
				6.47								Allowable ripple

Allowable Ripple(A) at 85℃ 120Hz

LQ series

■Dimensions

DXL (mm)

Cap.(μF)	Code	W.V.(Code) / φD	160 (2C)				180 (2Z)				200 (2D)				250 (2E)			
			22	25	30	35	22	25	30	35	22	25	30	35	22	25	30	35
220	221														22×25			
															1.15			
270	271										22×25				22×30	25×25		
											1.25				1.25	1.25		
330	331						22×25				*22×30				22×35	*25×30		
							1.35				1.40				1.45	1.45		
390	391		22×25				22×30				22×30	25×25			22×40	25×30	30×25	
			1.55				1.55				1.60	1.60			1.70	1.70	1.70	
470	471		22×30	25×25			22×35	25×25			22×35	25×30			22×45	25×35	30×30	
			1.75	1.75			1.75	1.75			1.80	1.80			1.90	1.90	1.90	
560	561		*22×35	*25×30			22×40	25×30			22×40	*25×35	30×25		22×50	25×40	30×30	35×25
			1.90	1.90			2.00	2.00			2.00	2.00	2.00		2.15	2.15	2.15	2.15
680	681		*22×40	25×30	30×25		22×45	25×35	30×25		22×45	*25×40	30×30			25×45	30×35	*35×30
			2.15	2.15	2.15		2.25	2.25	2.25		2.30	2.25	2.30			2.35	2.35	2.35
820	821		22×45	25×35	*30×30		22×50	25×40	30×30	35×25	22×50	25×45	30×35	*35×30			30×40	*35×35
			2.45	2.45	2.45		2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50			2.75	2.75
1000	102		22×50	25×40	30×30	35×25		25×45	30×35	35×30			30×40	35×30			30×45	*35×40
			2.80	2.80	2.80	2.80		2.85	2.85	2.85			2.95	2.95			3.00	3.00
1200	122			25×45	30×35	35×30		25×50	30×40	35×30			30×45	35×35				35×45
				3.25	3.25	3.25		3.30	3.30	3.30			3.40	3.40				3.50
1500	152				30×40	35×35			30×45	35×35			30×50	35×40				35×50
					3.75	3.75			3.75	3.75			3.80	3.80				4.00
1800	182				30×50	35×40				35×45				35×45				
					4.00	4.00				4.05				4.15				
2200	222					35×45				35×50				35×50				
						4.50				4.60				4.70				
2700	272					35×50												
						5.15												

Cap.(μF)	Code	W.V.(Code) / φD	400 (2G)				450 (2W)			
			22	25	30	35	22	25	30	35
56	560						22×25			
							0.59			
68	680						*22×30			
							0.63			
82	820		22×25				22×30	25×25		
			0.72				0.78	0.78		
100	101		*22×30				22×35	25×30		
			0.77				0.92	0.92		
120	121		22×30	25×25			22×40	25×35	30×25	
			0.94	0.94			1.06	1.08	1.05	
150	151		22×35	*25×30			22×50	25×40	30×30	
			1.13	0.92			1.28	1.25	1.23	
180	181		22×40	*25×35	30×25			25×45	30×40	
			1.27	1.06	1.26			1.41	1.48	
220	221		22×45	*25×40	30×30	35×25		25×50	30×40	35×30
			1.45	1.22	1.46	1.50		1.59	1.60	1.57
270	271			25×45	30×35	*35×30			30×45	35×35
				1.69	1.68	1.46			1.83	1.80
330	331			25×50	30×40	35×30			30×50	35×40
				1.92	1.93	1.88			2.08	2.06
390	391				30×45	35×35				35×45
					2.16	2.13				2.31
470	471				30×50	35×40				35×50
					2.43	2.42				2.47
560	561					35×45				
						2.72				
680	681					35×50				
						3.08			Allowable ripple	

See LK series for the rating with * mark.

Allowable Ripple (A) at 85°C 120Hz

KD

Lug Terminal Type, Standard

series

- Standard lug terminal series.
- Suited for either commercial or industrial use, requring quality and stability.

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+85℃ (16～100V), −25+85℃ (160～450V)
Voltage Range	16～450V
Capacitance Range	33～68000μF
Capacitance Tolerance	−10～+50% at 120Hz, 20℃
Leakage Current	$I \leq 3\sqrt{CV}$ (μA) (After 5 minutes' application of rated voltage) [C: Capacitance (μF), V: Voltage (V)]

tan δ — Measurement frequency: 120Hz, Temperature: 20℃

Rated voltage (V)	16・25			35～63		80～350	400・450
Capacitance (μF)	3300～10000	15000～33000	47000～68000	1000～10000	15000～33000	47～10000	33～470
tan δ (MAX.)	0.35	0.50	0.75	0.25	0.35	0.20	0.25

Stability at Low Temperature — Measurement frequency: 120Hz

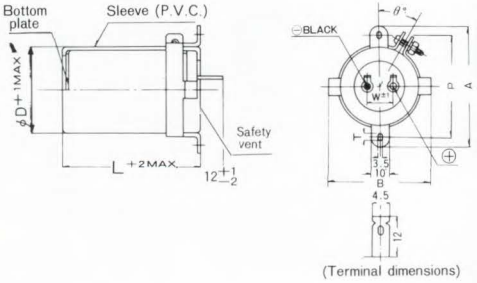
Rated voltage (V)		16～100	160～250	315～450
Impedance ratio ZT/Z20 (MAX.)	Z−25℃/Z+20℃	3	3	8
	Z−40℃/Z+20℃	12	———	———

Load Life — After 1000 hours' application of rated voltage at 85℃, capacitors meet the characteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

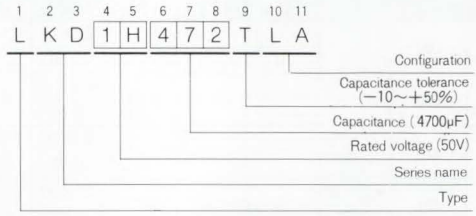
Shelf Life	After leaving capacitors under no load at 85℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.
Marking	Printed with white color letter on black sleeve.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Drawing



(Terminal dimensions)

Type numbering system (Example: 50V 4700μF)



■Dimensions

(mm)

D	A	B	T	P	θ°	W
22	43	*	5.5	35	45	8
25	48	33	6	38	45	10
30	52	38	6	42	30	10
35	58	44.6	7	48	30	14
40	64	48	7	54	45	14

* No auxiliary legs are provided for φ22 mounting brackets.

• Dimension table in next page.

KD series

■Dimensions

D×L (mm)

Cap. (μF) \ W.V.	16		25		35		50		63		80		100	
Code	1C		1E		1V		1H		1J		1K		2A	
470	471												22×30	0.8
680	681										22×30	1.0	22×40	1.1
1000	102								22×30	1.1	22×40	1.3	25×40	1.4
1500	152						22×30	1.1	22×40	1.5	22×40	1.7	25×50	1.8
2200	222				22×30	1.3	22×40	1.6	25×40	1.7	25×50	1.9	30×50	2.4
3300	332		22×30	1.4	22×40	1.8	25×40	2.1	25×50	2.3	30×50	2.6	35×50	2.8
4700	472	22×30	22×40	1.9	25×40	2.0	25×50	2.6	30×50	2.8	35×50	3.1	35×63	3.7
6800	682	22×40	25×40	2.4	25×50	2.7	30×50	3.0	35×50	3.2	35×63	3.9	35×100	5.1
10000	103	25×40	25×50	2.9	30×50	3.2	35×63	4.4	35×80	4.9	35×100	5.8		
15000	153	30×50	30×63	3.7	35×63	4.0	35×80	4.9	35×100	5.9				
22000	223	30×63	35×63	4.9	35×80	5.4	35×100	6.5						
33000	333	35×63	35×80	6.2	40×100	8.0								
47000	473	35×80	40×100	8.4										
68000	683	40×100	8.4											

Cap. (μF) \ W.V.	160		200		250		315		350		400		450	
Code	2C		2D		2E		2F		2V		2G		2W	
33	330										22×30	0.2	22×30	0.2
47	470						22×30	0.2	22×30	0.2	22×40	0.2	22×40	0.2
68	680				22×30	0.3	22×40	0.3	22×40	0.3	25×40	0.3	25×40	0.3
100	101		22×30	0.3	22×40	0.4	25×40	0.4	25×40	0.4	25×50	0.4	30×50	0.5
150	151	22×30	22×40	0.5	25×40	0.5	25×50	0.6	25×50	0.6	30×50	0.6	35×50	0.6
220	221	22×40	25×40	0.7	25×50	0.7	30×50	0.8	30×50	0.8	35×50	0.8	35×63	0.9
330	331	25×50	25×50	0.9	30×50	1.0	35×50	1.0	35×50	1.1	35×63	1.1	35×80	1.2
470	471	30×50	30×50	1.2	35×50	1.3	35×63	1.4	35×80	1.5	35×100	1.5	40×100	1.6
680	681	35×50	35×50	1.7	35×63	1.8	35×80	1.9	35×100	2.1	40×100	2.0		
1000	102	35×63	35×63	2.2	35×80	2.4	40×100	2.6	40×100	2.6				
1500	152	35×80	35×100	3.3	40×100	3.5								Allowable ripple
2200	222	40×100	40×100	3.9									Case size	

Allowable Ripple (A) at 85℃ 120Hz

●Frequency coefficient of allowable ripple current

Frequency (Hz)		50	60	120	1k	10k	50k～
Coefficient	16～100V	0.88	0.9	1.0	1.15	1.15	1.15
	160～250V	0.77	0.8	1.0	1.50	1.60	1.63
	315～450V	0.88	0.9	1.0	1.15	1.15	1.15

●Allowable ripple current vs. Ambient temperature

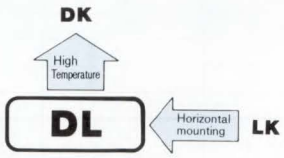
Ambient temp. (℃)	～+20	+45	+70	+85
Ripple coefficient	1.50	1.48	1.30	1.00

ALUMINUM ELECTROLYTIC CAPACITORS

DL Horizontal Mounting Type series

Smaller

- Same case sizes as LK series, but suited for horizontal mounting to assure flat and low-profile design.



■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+85℃ (160～250V), −25～+85℃ (400·450V)
Voltage Range	160～450V
Capacitance Range	82～1500μF
Capacitance Tolerance	±20% at 120Hz, 20℃
Leakage Current	$I \leqq 3\sqrt{CV}$ (μA) (After 5 minutes' application of rated voltage) 〔C : Capacitance (μF), V : Voltage (V)〕
tan δ	Measurement frequency : 120Hz, Temperature : 20℃

Rated voltage (V)	160	200	250	400	450
tan δ (MAX.)	0.15	0.10	0.10	0.20	0.25

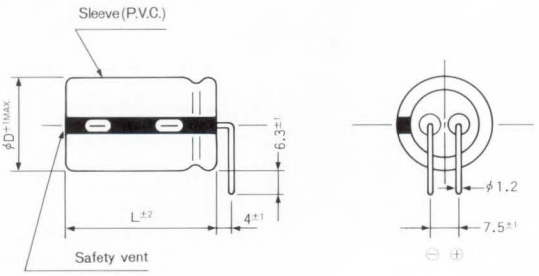
Stability at Low Temperature	Measurement frequency : 120Hz		
Rated voltage (V)		160～250	400・450
Impedance ratio ZT/Z20 (MAX.)	Z−25℃/Z+20℃	3	8
	Z−40℃/Z+20℃	12	—

Load Life	After an application of rated voltage (maximum value of DC voltage overlapped by an allowable ripple current) for 2000 hours at 85℃, capacitors meet the characteristics requirements listed at right.	
	Leakage current	Initial specified value or less
	Capacitance change	Within ±20% of initial value
	tan δ	200% or less of initial specified value

Shelf Life	After leaving capacitors under no load at 85℃ for 1000 hours, they meet the requirements listed at right.	
	Leakage current	Initial specified value or less
	Capacitance change	Within ±15% of initial value
	tan δ	150% or less of initial specified value

Marking	Printed with white color letter on black sleeve.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Drawing



Type numbering system (Example: 400V 220μF)

1	2	3	4	5	6	7	8	9	10	11	12	13	14
L	D	L	2	G	2	2	1	M	J	B	1	G	A

Lead wire configuration (GA: ⊖ Left side from the front; HA: ⊖ Right side from the front)

Case dia. code

φD	Code
22	1
25	2

Configuration

Capacitance tolerance (±20%)

Capacitance (220μF)

Rated voltage (400V)

Series name

Type

■Dimensions

DXL (mm)

Cap. (μF)	W.V. (Code) / Code / φD	160(2C) 22	160(2C) 25	200(2D) 22	200(2D) 25	250(2E) 22	250(2E) 25	400(2G) 22	400(2G) 25	450(2W) 22	450(2W) 25
82	820									22×35 0.38	
100	101									22×40 0.44	25×35 0.44
120	121							22×35 0.75		22×45 0.51	25×40 0.51
150	151							22×40 0.90		22×60 0.59	25×45 0.59
180	181							22×45 1.00	25×35 1.00		25×50 0.68
220	221							22×50 1.15	25×40 1.10		25×60 0.76
270	271					22×35 1.25			25×50 1.35		
330	331					22×40 1.45			25×60 1.50		
390	391			22×35 1.60		22×45 1.70	25×35 1.70				
470	471			22×40 1.80		22×50 1.90	25×40 1.90				
560	561	22×35 1.90		22×45 2.00	25×35 2.00	22×60 2.10	25×45 2.15				
680	681	22×40 2.15	25×35 2.20	22×60 2.25	25×40 2.25		25×60 2.35				
820	821	22×50 2.45	25×40 2.45		25×50 2.55						
1000	102	22×60 2.80	25×45 2.80		25×60 2.90						
1200	122		25×50 3.10								Allowable ripple
1500	152		25×60 3.70								Case size

Allowable Ripple (A) at 85℃ 120Hz

●Frequency coefficient of allowable ripple current

Frequency (Hz)		50	60	120	1k	10k～
Coeff.	160～250V	0.85	0.88	1.00	1.15	1.20
	400・450V	0.88	0.90	1.00	1.10	1.15

●Allowable ripple current vs. Ambient temperature

Ambient temp. (℃)	～+45	+60	+70	+85
Coefficient	1.48	1.42	1.30	1.00

GK

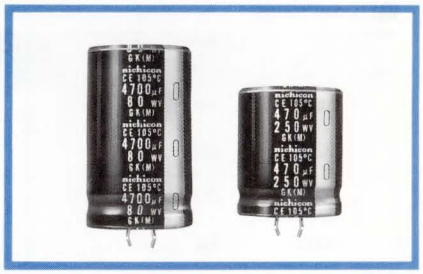
Snap-in Terminal Type, Wide Temperature Range series

RCJ Approved

Anti-Solvent Feature (Through 100V only)

Approved by Reliability Center for Electronic Component, Japan-Certification No. RCJ-03-24C

- Higher operating temperature range up to +105°C.
- Extended capacitance ranges based on the numerical values in E12 series under JIS.



■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+105°C (16～250V), −25～+105°C (400V)
Voltage Range	16～400V
Capacitance Range	56～33000μF
Capacitance Tolerance	±20% at 120Hz, 20°C
Leakage Current	$I \leq 3\sqrt{CV}$ (μA) (After 5 minutes' application of rated voltage) (C: Capacitance (μF), V: Voltage (V))
tan δ	Measurement frequency: 120Hz, Temperature: 20°C

Rated voltage (V)	16	25	35	50	63	80	100	160	200	250	400
tan δ (MAX.)	0.5	0.4	0.35	0.3	0.25	0.2	0.2	0.15	0.10	0.10	0.20

Stability at Low Temperature — Measurement frequency: 120Hz

Rated voltage (V)		16～100	160～250	400
Impedance ratio ZT/Z20 (MAX.)	Z−25°C/Z+20°C	4	3	8
	Z−40°C/Z+20°C	15	12	—

Load Life — After an application of rated voltage (maximum value of DC voltage overlapped by an allowable ripple current) for 2000 hours at 105°C, capacitors meet the characteristics requirements listed at right.

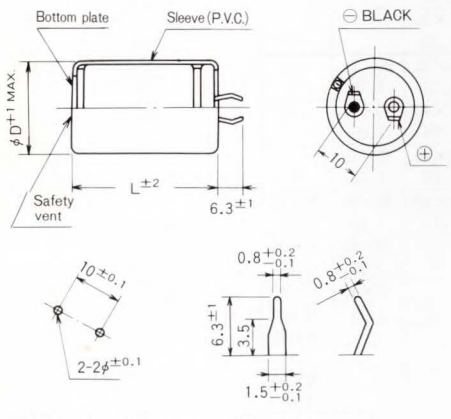
Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

Shelf Life — After leaving capacitors under no load at 105°C for 1000 hours, they meet the requirements lited at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±15% of initial value
tan δ	150% or less of initial specified value

Marking	Printed with white color letter on dark brown sleeve.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Drawing



(PC board hole dimensions) (Terminal dimensions)

Type numbering system (Example: 250V 330μF)

1	2	3	4	5	6	7	8	9	10	11	12
L	G	K	2	E	3	3	1	M	H	S	A

Case dia. code

φD	Code
22	Z
25	A
30	B
35	C

Configuration
Capacitance tolerance (±20%)
Capacitance (330μF)
Rated voltage (250V)
Series name
Type

• Dimension table in next page.

ALUMINUM ELECTROLYTIC CAPACITORS

GK series

■Dimensions

DXL(mm)

Cap.(μF) \ W.V.(Code) / Code / φD		16 (1C)				25 (1E)				35 (1V)				50 (1H)			
		22	25	30	35	22	25	30	35	22	25	30	35	22	25	30	35
1800	182													22×25 1.15			
2200	222													22×30 1.35			
2700	272									22×25 1.25				22×30 1.45	25×25 1.45		
3300	332									22×30 1.45				22×35 1.85	25×30 1.85		
3900	392					22×25 1.25				22×30 1.60	25×25 1.60			22×40 1.95	25×35 1.95	30×25 1.95	
4700	472					22×30 1.55				22×35 1.80	25×30 1.80			22×45 2.30	25×40 2.25	30×30 2.25	
5600	562	22×25 1.45				22×30 1.80	25×25 1.80			22×40 2.15	25×35 2.15	30×25 2.10		22×50 2.75	25×40 2.70	30×35 2.70	
6800	682	22×30 1.65				22×35 2.05	25×30 2.05			22×45 2.45	25×40 2.45	30×30 2.40			25×50 3.30	30×40 3.30	35×30 3.25
8200	822	22×30 1.85	25×25 1.85			22×45 2.40	25×35 2.35	30×25 2.35			25×45 2.75	30×35 2.75	35×30 2.75			30×45 3.60	35×35 3.55
10000	103	22×35 2.15	25×30 2.15	30×25 2.15		22×50 2.60	25×40 2.60	30×30 2.60			25×50 3.20	30×40 3.20	35×35 3.20			30×50 3.95	35×40 3.90
12000	123	22×40 2.45	25×35 2.50	30×25 2.45			25×45 2.90	30×35 2.90	35×30 2.85			30×45 3.45	35×35 3.40				35×45 4.40
15000	153	22×50 2.85	25×40 2.85	30×30 2.85				30×40 3.25	35×35 3.25			30×50 3.90	35×45 3.85				35×50 4.85
18000	183		25×45 3.20	30×35 3.20				30×45 3.75	35×40 3.75				35×50 4.05				
22000	223		25×50 3.75	30×40 3.70	35×30 3.70				35×45 4.20								
27000	273			30×45 3.95	35×40 4.00												
33000	333				35×45 4.50												

Cap.(μF) \ W.V.(Code) / Code / φD		63 (1J)				80 (1K)				100 (2A)			
		22	25	30	35	22	25	30	35	22	25	30	35
560	561									22×25 0.75			
680	681									22×30 0.95			
820	821					22×25 1.00				22×30 1.10	25×25 1.05		
1000	102					22×30 1.15				22×35 1.20	25×30 1.20		
1200	122	22×25 0.95				22×30 1.25	25×25 1.20			22×40 1.35	25×35 1.35	30×25 1.30	
1500	152	22×30 1.20				22×35 1.30	25×30 1.30			22×50 1.70	25×40 1.65	30×30 1.65	
1800	182	22×30 1.30	25×25 1.25			22×40 1.70	25×35 1.65	30×25 1.65			25×45 1.85	30×35 1.80	
2200	222	22×35 1.60	25×30 1.55			22×45 1.80	25×40 1.80	30×30 1.75			25×50 2.10	30×40 2.10	35×30 2.05
2700	272	22×40 1.80	25×35 1.80	30×25 1.75			25×45 2.10	30×35 2.10				30×45 2.50	35×35 2.45
3300	332	22×50 2.15	25×40 2.15	30×30 2.10			25×50 2.50	30×40 2.45	35×30 2.45			30×50 2.85	35×40 2.80
3900	392		25×45 2.55	30×35 2.55				30×45 2.85	35×35 2.85				35×45 3.15
4700	472		25×50 2.75	30×40 2.70	35×30 2.70			30×50 3.20	35×40 3.20				35×50 3.50
5600	562			30×45 3.15	35×35 3.10				35×45 3.50				
6800	682			30×50 3.60	35×40 3.55				35×50 3.90				
8200	822				35×45 3.90								
10000	103				35×50 4.40								Case size Allowable ripple

Allowable Ripple (A) at 105℃ 120Hz

GK series

■Dimensions

DXL(mm)

Cap.(μF) \ W.V.(Code) / Code / φD	160 (2C)				200 (2D)				250 (2E)				400 (2G)			
	22	25	30	35	22	25	30	35	22	25	30	35	22	25	30	35
56 (560)													22×25			
													0.29			
68 (680)													22×30	25×25		
													0.36	0.36		
82 (820)													22×35	25×30		
													0.44	0.46		
100 (101)													22×40	25×35	30×25	
													0.55	0.55	0.53	
120 (121)									22×25				22×45	25×35	30×30	
									0.55				0.59	0.57	0.60	
150 (151)									22×30				22×50	25×40	30×30	35×25
									0.65				0.67	0.64	0.63	0.60
180 (181)					22×25				22×30	25×25				25×50	30×35	35×30
					0.70				0.75	0.75				0.82	0.78	0.80
220 (221)	22×25				22×25				22×35	25×30	30×25			25×50	30×40	35×35
	0.75				0.80				0.85	0.85	0.85			0.85	0.88	0.90
270 (271)	22×30				22×30	25×25			22×40	25×35	30×30				30×45	35×35
	0.90				0.90	0.90			0.95	1.00	1.00				0.98	0.96
330 (331)	22×30				22×35	25×30			22×45	25×35	30×30				30×50	35×40
	1.00				1.05	1.05			1.10	1.10	1.10				1.21	1.21
390 (391)	22×35	25×25			22×40	25×35	30×25		22×50	25×40	30×35	35×25				35×45
	1.15	1.10			1.20	1.25	1.20		1.25	1.25	1.25	1.25				1.32
470 (471)	22×40	25×30			22×45	25×35	30×30			25×45	30×35	35×30				35×50
	1.30	1.25			1.30	1.30	1.35			1.30	1.30	1.30				1.45
560 (561)	22×45	25×35	30×25		22×50	25×40	30×30	35×25			30×40	35×35				
	1.45	1.40	1.40		1.50	1.45	1.50	1.50			1.55	1.55				
680 (681)	22×50	25×40	30×30	35×25		25×50	30×35	35×30			30×50	35×40				
	1.65	1.60	1.60	1.60		1.70	1.70	1.70			1.80	1.80				
820 (821)		25×45	30×35	35×30			30×40	35×35			30×50	35×40				
		1.80	1.75	1.75			1.90	1.90			1.95	1.95				
1000 (102)			30×40	35×35			30×50	35×40				35×50				
			2.00	2.00			2.15	2.10				2.30				
1200 (122)			30×45	35×35				35×40								
			2.30	2.30				2.30								
1500 (152)				35×40				35×50								
				2.65				2.75								
1800 (182)				35×50												Case size
				3.05												Allowable ripple

Allowable Ripple (A) at 105℃ 120Hz

●Frequency coefficient of allowable ripple current

Frequency (Hz)		50	60	120	1 k	10k～
Coeff.	16～100V	0.88	0.90	1.00	1.15	1.15
	160～250V	0.85	0.88	1.00	1.15	1.20
	400V	0.88	0.90	1.00	1.10	1.15

● Allowable ripple current vs. Ambient temperature

Ambient temp.(℃)	～+45	+60	+70	+85	+105
Coefficient	2.47	2.37	2.17	1.67	1.00

ALUMINUM ELECTROLYTIC CAPACITORS

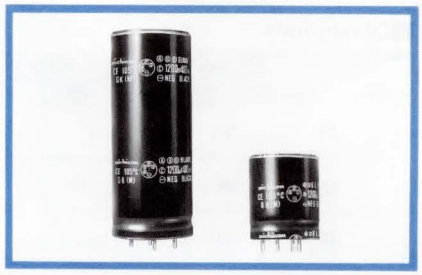
GK HH series

PC Board Mounting Type

Anti-Solvent Feature (Through 100V only)

- Higher C/V products of GK series.
- Plentiful line up from φ35×63 to φ40×100mm.
- Auxiliary terminals provided to assure anti-vibration performamance.

GK HH ← High C/V — GK



■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+105℃ (16～250V), −25～+105℃ (400V)
Voltage Range	16～400V
Capacitance Range	560～68000μF
Capacitance Tolerance	±20%(120Hz, 20℃)
Leakage Current	$I \leqq 3\sqrt{CV}$ (μA) (After 5 minutes' application of rated voltage) [C:Capacitance(μF), V:Voltage(V)]

tan δ — Measurement frequency:120Hz, Temperature:20℃

Rated voltage(V)	16	25	35	50	63	80	100	160	200	250	400
tan δ (MAX.)	0.60	0.50	0.40	0.35	0.30	0.30	0.25	0.20	0.15	0.15	0.30

Stability at Low Temperature — Measurement frequuency:120Hz

Rated voltage(V)		16～250	400
Impedance ratio	Z−25℃/Z+20℃	4	8
ZT/Z20(MAX.)	Z−40℃/Z+20℃	15	—

Load Life — After an application of rated voltage (maximum value of DC voltage overlapped by an allowable ripple current) for 2000 hours at 105℃, capacitors meet the characteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

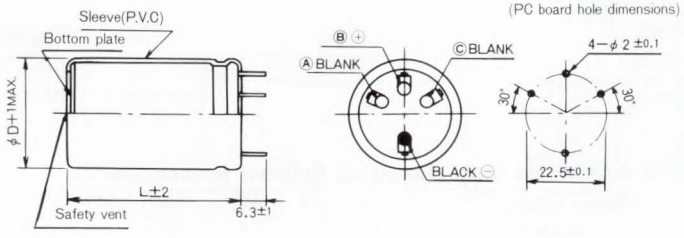
Shelf Life — After leaving capacitors under no load at 105℃ for 1000 hours, they meet the requirements lited at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±15% of initial value
tan δ	150% or less of initial specified value

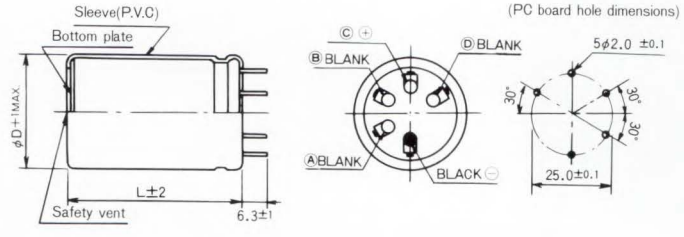
Marking	Printed with white color letter on dark brown sleeve.
Applicable Standards	Charactetristics W of JIS C-5141 and JIS C-5102.

■Drawing

- For 63mmL or shorter with φ35 and φ40mm.



- For 63mmL or longer with φ40mm.



Type numbering system (Example: 200WV 2700μF)

1	2	3	4	5	6	7	8	9	10	11	12
L	G	K	2	D	2	7	2	M	H	H	D

- 12: Case dia. code

φD	Code
35	C
40	D

- 11: Configuration
- 10: Capacitance tolerance(±20%)
- 9: Capacitance(2700μF)
- 8: Rated voltage(200WV)
- 7: Series name
- 1: Type

- Frequency coefficient of allowable ripple current

Frequency (Hz)		50	60	120	1 k	10k～
Coeff.	16～100V	0.88	0.90	1.00	1.15	1.15
	160～250V	0.85	0.88	1.00	1.15	1.20
	400V	0.88	0.90	1.00	1.10	1.15

- Allowable ripple current vs. Ambient temperature

Ambient temp.(℃)	～+45	+60	+70	+85	+105
Coefficient	2.47	2.37	2.17	1.67	1.00

• Dimension table in next page.

GK$_{HH}$ series

■Dimensions

DXL (mm)

Cap.(μF) \ W.V.(Code) / Code / φD	16 (1C)		25 (1E)		35 (1V)		50 (1H)	
	φ35	φ40	φ35	φ40	φ35	φ40	φ35	φ40
18000 183							35×68	40×63
							5.55	5.80
22000 223					35×63	40×50	35×80	40×63
					5.1	5.0	6.35	6.15
27000 273					35×68	40×63		
					5.5	5.8		
33000 333			35×63	40×50	35×80	40×63		
			5.6	5.5	6.25	6.05		
39000 393			35×68	40×63				
			6.0	6.3				
47000 473	35×63	40×50	35×80	40×63				
	5.9	5.75	6.8	6.6				
56000 563	35×68	40×63						
	6.20	6.45						
68000 683	35×80	40×63						
	6.90	6.70						

Cap.(μF) \ W.V.(Code) / Code / φD	63 (1J)		80 (1K)		100 (2A)	
	φ35	φ40	φ35	φ40	φ35	φ40
5600 562					35×68	40×63
					4.40	4.55
6800 682					35×80	40×63
					4.80	4.65
8200 822			35×63	40×50		
			4.75	4.65		
10000 103			35×80	40×63		
			5.45	5.00		
12000 123	35×63	40×50				
	5.35	5.25				
15000 153	35×80	40×63				
	5.85	6.10				

Cap.(μF) \ W.V.(Code) / Code / φD	160 (2C)		200 (2D)		250 (2E)		400 (2G)	
	φ35	φ40	φ35	φ40	φ35	φ40	φ35	φ40
560 561							35×63	40×50
							1.75	1.70
680 681							35×80	40×63
							2.05	2.00
820 821							35×80	
							2.20	
1000 102							35×100	40×80
							2.65	2.60
1200 122					35×63	40×50		40×100
					2.75	2.70		3.00
1500 152					35×68	40×63		
					3.20	3.35		
1800 182			35×63	40×50	35×100	40×80		
			3.30	3.20	4.05	3.95		
2200 222	35×63	40×50	35×80	40×63	35×100	40×80		
	3.50	3.45	3.90	3.80	4.35	4.20		
2700 272	35×68	40×63	35×100	40×80		40×100		
	3.90	4.10	4.65	4.50		5.00		
3300 332	35×80	40×63		40×80				
	4.55	4.40		4.90				
3900 392	35×100	40×80		40×100				
	5.30	5.20		5.70				
4700 472		40×100					Case size	
		6.15					Allowable ripple	

Allowable Ripple(A) at 105℃ 120Hz

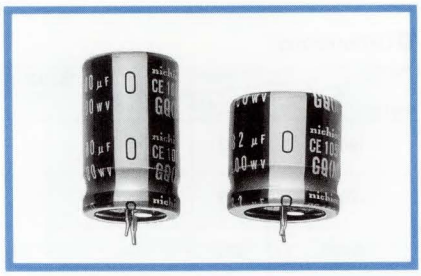
ALUMINUM ELECTROLYTIC CAPACITORS

GQ Snap-in Terminal Type, Smaller-Sized, Wide Temperature Range series

Smaller

Anti-Solvent Feature
(Through 100V only)

- One rank smaller case sizes than GK series.
- Extended working voltge ranges from 16V to 450V.



GK
Smaller
GQ

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+105℃ (16～250V), −25～+105℃ (400・450V)
Voltage Range	16～450V
Capacitance Range	56～47000μF
Capacitance Tolerance	±20% (120Hz, 20℃)
Leakage Current	$I \leq 3\sqrt{CV}$ (μA) (After 5 minutes' application of rated voltage) [C: Capacitance (μF), V: Voltage (V)]
tan δ	Measurement frequency: 120Hz, Temperature: 20℃

Rated voltage (V)	16	25	35	50	63	80	100	160	200	250	400	450
tan δ (MAX.)	0.50	0.40	0.35	0.30	0.25	0.20	0.20	0.15	0.15	0.15	0.25	0.25

Stability at Low Temperature — Measurement frequency: 120Hz

Rated voltage (V)		16～100	160～250	400・450
Impedance ratio ZT/Z20 (MAX.)	Z−25℃/Z+20℃	4	3	8
	Z−40℃/Z+20℃	15	12	—

Load Life — After an application of rated voltage (maximum value of DC voltage overlapped by an allowable ripple current) for 2000 hours at 105℃, capacitors meet the characteristics requirements listed at right.

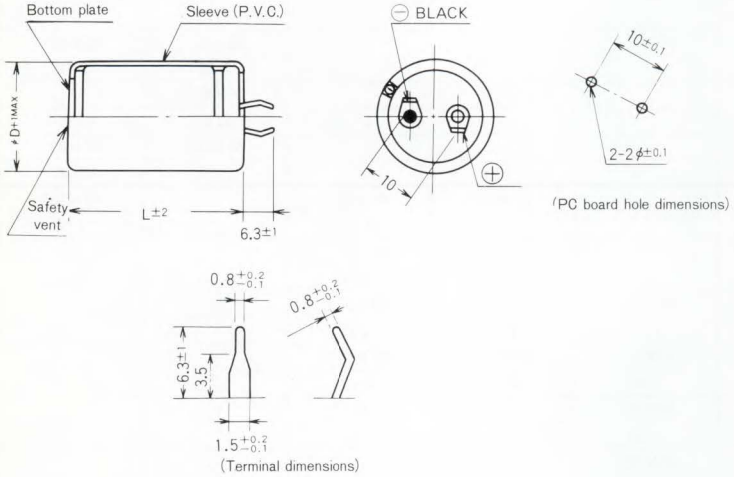
Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

Shelf Life — After leaving capacitors under no load at 105℃ for 1000 hours they meet the requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±15% of initial value
tan δ	150% or less of initial specified value

Marking	Printed with white color letter on dark brown sleeve
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Drawing



Type numbering system (Example: 450V 150μF)

1	2	3	4	5	6	7	8	9	10	11	12
L	G	Q	2	W	1	5	1	M	H	S	A

Case dia. code

φD	Code
22	Z
25	A
30	B
35	C

Configuration
Capacitance tolerance (±20%)
Capacitance (150μF)
Rated voltage (450V)
Series name
Type

●Frequency coefficient of allowable ripple current

Frequency (Hz)		50	60	120	1 k	10k～
Coeff.	16～100V	0.88	0.90	1.00	1.15	1.15
	160～250V	0.85	0.88	1.00	1.15	1.20
	400・450V	0.88	0.90	1.00	1.10	1.15

●Allowable ripple current vs. Ambient temperature

Ambient temp. (℃)	～+45	+60	+70	+85	+105
Coefficient	2.47	2.37	2.17	1.67	1.00

• Dimension table in next page.

GQ series

Dimensions

DXL (mm)

Cap.(μF)	Code	W.V.(Code) / φD	16 (1C)				25 (1E)				35 (1V)				50 (1H)			
			22	25	30	35	22	25	30	35	22	25	30	35	22	25	30	35
1800	182														22×25			
															1.31			
2700	272														22×30	25×25		
															1.70	1.70		
3300	332										22×25				22×35	25×30		
											1.43				1.98	2.00		
3900	392										22×30				22×40	25×35	30×25	
											1.65				2.25	2.28	2.22	
4700	472						22×25				22×35	25×25			22×45	25×40	30×30	
							1.55				1.89	1.78			2.56	2.61	2.58	
5600	562						22×30				22×35	25×30	30×25		22×50	25×40	30×35	
							1.76				2.02	2.04	2.12		2.89	2.81	2.95	
6800	682		22×25				22×30	25×25			22×40	25×35				25×50	30×40	35×30
			1.60				1.91	1.91			2.28	2.31				3.37	3.39	3.31
8200	822		22×30				22×35	25×30	30×25		22×50	25×40	30×30				30×45	35×35
			1.85				2.14	2.16	2.24		2.67	2.60	2.56				3.71	3.66
10000	103		22×30	25×25			22×40	25×35				25×45	30×35				30×50	35×40
			1.99	1.99			2.40	2.44				2.92	2.92				4.09	4.07
12000	123		22×35	25×30	30×25		22×45	25×40	30×30			25×50	30×40	35×30				35×45
			2.28	2.30	2.38		2.69	2.74	2.70			3.26	3.28	3.20				4.50
15000	153		22×40	25×35				25×45	30×35	35×30			30×45	35×35				
			2.64	2.68				3.15	3.13	3.22			3.74	3.69				
18000	183		22×45	25×40	30×30			25×50	30×40					35×40				
			2.98	3.04	3.00			3.54	3.54					4.16				
22000	223			25×45	30×35				30×45	35×35				35×50				
				3.40	3.39				4.24	3.96				4.92				
27000	273			25×50	30×40	35×30				35×45								
				3.81	3.83	3.74				4.75								
33000	333				30×45	35×35				35×50								
					4.30	4.24				5.39								
39000	393				30×50	35×40												
					4.74	4.72												
47000	473					35×45												
						5.27												

Cap.(μF)	Code	W.V.(Code) / φD	63 (1J)				80 (1K)				100 (2A)			
			22	25	30	35	22	25	30	35	22	25	30	35
560	561										22×25			
											1.07			
820	821						22×25				22×30	25×25		
							1.11				1.35	1.35		
1000	102						22×30	25×25			22×35	25×30		
							1.29	1.29			1.54	1.56		
1200	122		22×25				22×30	25×25			22×40	25×35	30×25	
			1.25				1.39	1.39			1.74	1.76	1.71	
1500	152		22×30	25×25			22×35	25×30			22×45	25×40	30×30	
			1.44	1.44			1.61	1.62			1.99	2.03	2.00	
1800	182		22×30	25×25			22×40	25×35	30×25			25×45	30×35	
			1.52	1.52			1.83	1.86	1.81			2.28	2.27	
2200	222		22×35	25×30			22×45	25×35	30×30			25×50	30×40	35×30
			1.73	1.75			2.09	2.01	2.10			2.57	2.59	2.52
2700	272		22×40	25×35	30×25			25×45	30×35				30×45	35×35
			1.97	1.99	1.93			2.43	2.43				2.94	2.90
3300	332		22×50	25×40	30×30			25×50	30×40	35×30			30×50	35×40
			2.32	2.27	2.24			2.76	2.78	2.71			3.32	3.31
3900	392			25×45	30×35				30×45	35×35				35×45
				2.54	2.55				3.12	3.07				3.69
4700	472			25×50	30×40	35×30			30×50	35×40				35×50
				2.88	2.90	2.83			3.52	3.50				4.14
5600	562				30×45	35×35				35×45				
					3.28	3.24				3.87				
6800	682				30×50	35×40				35×50				
					3.73	3.71				4.19				
8200	822					35×45								
						4.16								
10000	103					35×50							Case size	
						4.69							Allowable ripple	

Allowable Ripple (A) at 105℃ 120Hz

ALUMINUM ELECTROLYTIC CAPACITORS

GQ series

■Dimensions

DXL (mm)

W.V.(Code) / Cap.(μF) / Code / φD	160 (2C)				180 (2Z)				200 (2D)				250 (2E)			
	22	25	30	35	22	25	30	35	22	25	30	35	22	25	30	35
150 / 151													22×25			
													0.65			
180 / 181													22×25			
													0.75			
220 / 221													22×30	25×25		
													0.85	0.85		
270 / 271	22×25				22×25				22×25				22×35	25×30	30×25	
	0.90				0.90				0.90				1.00	1.00	1.00	
330 / 331	＊22×25				22×30				22×30	25×25			22×40	25×30	30×25	
	1.00				1.05				1.05	1.05			1.10	1.10	1.10	
390 / 391	22×30				22×30	25×25			22×35	25×30			22×45	＊25×40	30×30	
	1.15				1.20	1.20			1.25	1.25			1.25	1.25	1.25	
470 / 471	22×35	25×25			22×35	25×30			22×40	25×30	30×25		22×50	25×40	＊30×35	35×25
	1.30	1.30			1.30	1.30			1.35	1.35	1.35		1.30	1.30	1.30	1.30
560 / 561	22×40	25×30			22×40	25×35	30×25		22×45	25×35	＊30×30			25×50	30×35	35×30
	1.45	1.45			1.40	1.40	1.40		1.50	1.50	1.50			1.55	1.55	1.55
680 / 681	22×45	25×35	30×25		22×45	25×40	30×30		22×50	25×45	30×30	35×25			30×45	35×35
	1.65	1.65	1.65		1.65	1.65	1.65		1.70	1.70	1.70	1.70			1.80	1.80
820 / 821	22×50	25×40	30×30	35×25	22×50	25×45	30×35	35×25		25×50	30×35	35×30				＊35×40
	1.80	1.80	1.80	1.80	1.85	1.85	1.85	1.85		1.90	1.90	1.90				1.95
1000 / 102		25×45	30×35	35×30		25×50	30×40	35×30			30×45	35×35				35×45
		2.00	2.00	2.00		2.05	2.05	2.05			2.15	2.15				2.30
1200 / 122		25×50	30×40	35×30			30×45	35×35			30×50	35×35				35×50
		2.30	2.30	2.30			2.30	2.30			2.30	2.30				2.65
1500 / 152			30×45	35×35			30×50	35×40				35×45				
			2.65	2.65			2.70	2.70				2.75				
1800 / 182			30×50	35×45				35×45				35×50				
			3.05	3.05				3.15				3.25				
2200 / 222				35×50				35×50								
				3.50				3.60								

W.V.(Code) / Cap.(μF) / Code / φD	400 (2G)				450 (2W)			
	22	25	30	35	22	25	30	35
56 / 560					22×25			
					0.41			
68 / 680	22×25				22×30	25×25		
	0.40				0.48	0.48		
82 / 820	22×30	25×25			22×35			
	0.50	0.50			0.56			
100 / 101	22×35	25×30			22×40	25×30	30×25	
	0.55	0.55			0.64	0.61	0.63	
120 / 121	22×40	25×30	30×25		22×45	25×35		
	0.60	0.60	0.60		0.72	0.71		
150 / 151	22×45	25×35	＊30×30		22×50	25×40	30×30	35×25
	0.70	0.70	0.70		0.83	0.81	0.80	0.82
180 / 181	22×50	25×40	30×30	35×25		25×45	30×35	
	0.85	0.85	0.85	0.85		0.92	0.91	
220 / 221		25×45	30×35	35×30		25×50	30×40	35×30
		0.90	0.90	0.90		1.05	1.05	1.03
270 / 271		25×50	30×40	35×30			30×45	35×35
		1.00	1.00	1.00			1.21	1.19
330 / 331			30×45	35×35			30×50	35×40
			1.25	1.25			1.38	1.38
390 / 391			30×50	35×40				35×45
			1.35	1.35				1.55
470 / 471				35×45				35×50
				1.45				1.74
560 / 561				35×50			Case size	
				1.65			Allowadle ripple	

See GK series for the rating with ＊ mark.

Allowable Ripple(A) at 105℃ 120Hz

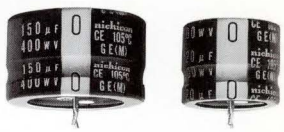
GE

Snap-in Terminal Type, Low-Profile Sized, Wide Temperature Range
series

Smaller

- Low-profile version of GQ series.
- Ideally suited for flat and low-profile design.

GQ
Low Profile
GE



■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+105℃ (160～250V), −25～+105℃ (400V)
Voltage Range	160～400V
Capacitance Range	47～560μF
Capacitance Tolerance	±20% at 120Hz, 20℃
Leakage Current	$I \leq 3\sqrt{CV}$ (μA) (After 5 minutes' application of rated voltage) 〔C: Capacitance (μF), V: Voltage (V)〕
tan δ	Measurement frequency: 120Hz, Temperature: 20℃
Stability at Low Temperature	Measurement frequency: 120Hz
Load Life	After an application of rated voltage (maximum value of DC voltage overlapped by an allowable ripple current) for 2000 hours at 105℃, capacitors meet the characteristics requirements listed at right.
Shelf Life	After leaving capacitors under no load at 105℃ for 1000 hours they meet the requirements listed at right.
Marking	Printed with white color letter on dark brown sleeve
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

tan δ

Rated voltage (V)	160	180	200	250	400
tan δ (MAX.)	0.20	0.15	0.15	0.15	0.25

Stability at Low Temperature

Rated voltage (V)		160～250	400
Impedance ratio ZT/Z20 (MAX.)	Z−25℃/Z+20℃	3	8
	Z−40℃/Z+20℃	12	—

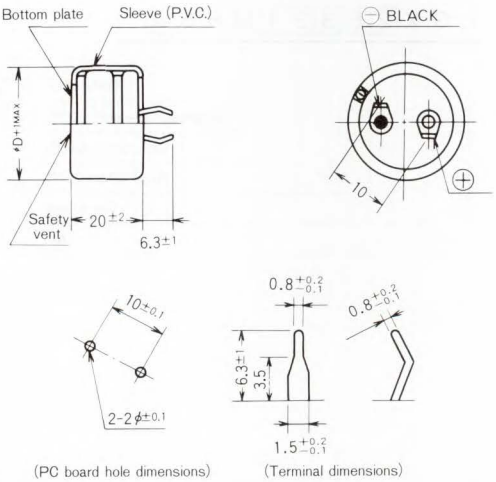
Load Life

Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

Shelf Life

Leakage current	Initial specified value or less
Capacitance change	Within ±15% of initial value
tan δ	150% or less of initial specified value

■Drawing



(PC board hole dimensions) (Terminal dimensions)

Type numbering system (Example: 200V 330μF)

1	2	3	4	5	6	7	8	9	10	11	12
L	G	E	2	D	3	3	1	M	H	S	B

Case dia. code

φD	Code
22	Z
25	A
30	B
35	C

Configuration
Capacitance tolerance (±20%)
Capacitance (330μF)
Rated voltage (200V)
Series name
Type

■Dimensions

DXL (mm)

Cap.(μF) \ W.V. / Code		160 (2C)		180 (2Z)		200 (2D)		250 (2E)		400 (2G)	
47	470									22×20	0.23
68	680									25×20	0.31
100	101							22×20	0.46	30×20	0.41
120	121							22×20	0.51	35×20	0.49
150	151			22×20	0.55	22×20	0.55	25×20	0.62	35×20	0.55
180	181	22×20	0.65	22×20	0.65	25×20	0.67	30×20	0.75		
220	221	22×20	0.69	25×20	0.76	25×20	0.76	30×20	0.86		
270	271	25×20	0.85	30×20	0.95	30×20	1.05	35×20	1.04		
330	331	30×20	1.05	30×20	1.04	30×20	1.10	35×20	1.15		
390	391	30×20	1.13	35×20	1.25	35×20	1.25				
470	471	35×20	1.35	35×20	1.37	35×20	1.37				
560	561	35×20	1.48							Case size	Allowable ripple

Allowable Ripple (A) at 105℃ 120Hz

●Frequency coefficient of allowable ripple current

Frequency (Hz)		50	60	120	1 k	10k～
Coeff.	160～250V	0.85	0.88	1.00	1.15	1.20
	400V	0.88	0.90	1.00	1.10	1.15

●Allowable ripple current vs. Ambient temperature

Ambient temp. (℃)	～+45	+60	+70	+85	+105
Coefficient	2.47	2.37	2.17	1.67	1.00

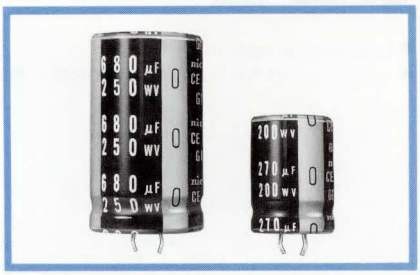
ALUMINUM ELECTROLYTIC CAPACITORS

GX series

Snap-in Terminal Type, Long Life, Wide Temperature Range

Long Life

- Long life assurance series withstanding 5000 hour application of ripple current.
- Suited for use in high reliability equipment.



GK Long Life → GX

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+105℃ (200・250V), −25～+105℃ (400V)
Voltage Range	200～400V
Capacitance Range	82～1500μF
Capacitance Tolerance	±20% (120Hz, 20℃)
Leakage Current	$I \leq 3\sqrt{CV}$ (μA) (After 5 minutes' applicatication of rated voltage) [C:Capacitance(μF), V:Voltage V)]
tan δ	Measurement frequency:120Hz, Temperature:20℃
Stability at Low Temperature	Measurement frequency:120Hz,
Load Life	After an application of rated voltage(maximum value of DC voltage overlapped by an allowable ripple current) for 5000 hours at 105℃, capacitors meet the characteristics requirements listed at right.
Shelf Life	After leaving capacitors under no load at 105℃ for 1000 hours, they meet the requirements listed at right.
Marking	Printed with white color letter on dark brown sleeve.
Applicable Standards	Characteristics W ofJIS C-5141 and JIS C-5102.

tan δ

Rated voltage(V)	200・250	400
tan δ (MAX.)	0.15	0.25

Stability at Low Temperature

Rated voltage (V)		200・250	400
Impedance ratio ZT/Z20(MAX.)	Z−25℃/Z+20℃	4	8
	Z−40℃/Z+20℃	12	—

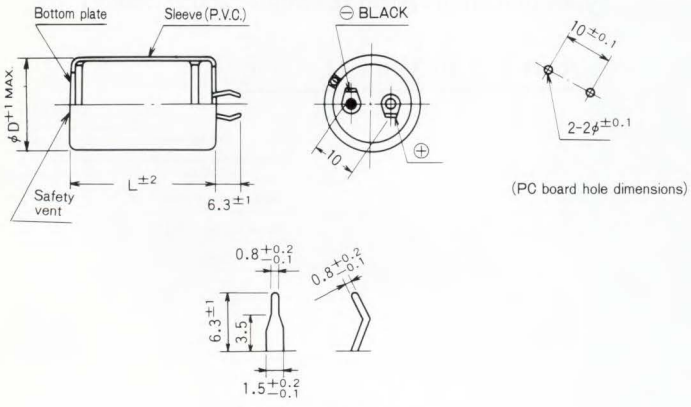
Load Life

Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

Shelf Life

Leakage current	Initial specified value or less
Capacitance change	Within ±15% of initial value
tan δ	150% or less of initial specified value

■Drawing



(PC board hole dimensions)

(Terminal dimensions)

Type numbering system (Example: 250V 330μF)

1	2	3	4	5	6	7	8	9	10	11	12
L	G	X	2	E	3	3	1	M	H	S	A

- 12: Case dia. code
- 11: Configuration
- 10: Capacitance tolerance (±20%)
- 9: Capacitance (330μF)
- 8: Rated voltage (250V)
- 5: Series name
- 1: Type

φD	Code
22	Z
25	A
30	B
35	C

• Dimension table in next page.

GX series

■Dimensions

DXL(mm)

Cap.(μF) \ W.V.(Code) / Code / φD		200 (2D)				250 (2E)				400 (2G)			
		22	25	30	35	22	25	30	35	22	25	30	35
82	820									22×30 0.45			
100	101									22×35 0.52	25×30 0.52	30×25 0.54	
120	121									22×40 0.59	25×35 0.60	30×30 0.62	
150	151									22×50 0.70	25×40 0.68	30×30 0.67	
180	181					22×30 0.66	25×25 0.66				25×45 0.76	30×35 0.76	
220	221					22×35 0.78	25×30 0.79				25×50 0.85	30×40 0.86	35×30 0.84
270	271	22×30 0.82	25×25 0.82			22×40 0.92	25×30 0.88	30×25 0.91				30×45 0.95	35×35 0.94
330	331	22×35 0.94	25×30 0.95			22×45 1.05	25×35 1.01	30×30 1.06				30×50 1.10	35×40 1.09
390	391	22×40 1.07	25×35 1.08	30×25 1.05		22×50 1.19	25×40 1.15	30×35 1.20					35×45 1.22
470	471	22×45 1.21	25×35 1.17	30×30 1.22			25×45 1.30	30×35 1.30	35×30 1.34				35×50 1.35
560	561	22×50 1.36	25×40 1.32	30×30 1.31				30×40 1.47	35×35 1.52				
680	681		25×50 1.58	30×35 1.51	35×30 1.55			30×50 1.72	35×40 1.71				
820	821			30×40 1.72	35×35 1.78				35×45 1.91				
1000	102			30×50 2.02	35×40 2.01				35×50 2.14				
1200	122				35×45 2.25								
1500	152				35×50 2.55								Case size Allowable ripple

Allowable Ripple A) at 105℃ 120Hz

● Frequency coefficient of allowable ripple current

Frequency (Hz)		50	60	120	1 k	10k～
Coeff.	200・250V	0.85	0.88	1.00	1.15	1.20
	400V	0.88	0.90	1.00	1.10	1.15

● Allowable ripple current vs. Ambient temperature

Ambient temp.(℃)	～+45	+60	+70	+85	+105
Coefficient	2.47	2.37	2.17	1.67	1.00

ALUMINUM ELECTROLYTIC CAPACITORS

GR series — Snap-in Terminal Type, Long Life, Wide Temperature Range

Long Life | Anti-Solvent Feature

- Long life assurance series withstanding 10000 hour application of ripple current.
- Resistant to cleaning solvents as sealing parts are coated with epoxy resin.
- Suited for use in high reliability equipment.

GX → Long Life → **GR**

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+105℃ (200・250V), −25～+105℃ (400V)
Voltage Range	200～400V
Capacitance Range	39～680μF
Capacitance Tolerance	±20% (120Hz, 20℃)
Leakage Current	$I \leqq 3\sqrt{CV}$ (μA) (After 5 minutes' application of rated voltage) [C:Capacitance (μF), V:Voltage V)]
tan δ	Measurement frequency: 120Hz, Temperature: 20℃

Rated voltage (V)	200・250	400
tan δ (MAX.)	0.15	0.25

Stability at Low Temperature — Measurement frequency: 120Hz

Rated voltage (V)		200・250	400
Impedance ratio	Z−25℃/Z+20℃	4	8
ZT/Z20 (MAX.)	Z−40℃/Z+20℃	12	—

Load Life — After an application of rated voltage (maximum value of DC voltage overlapped by an allowable ripple current) for 10000 hours at 105℃, capacitors meet the characteristics requirements listed at right.

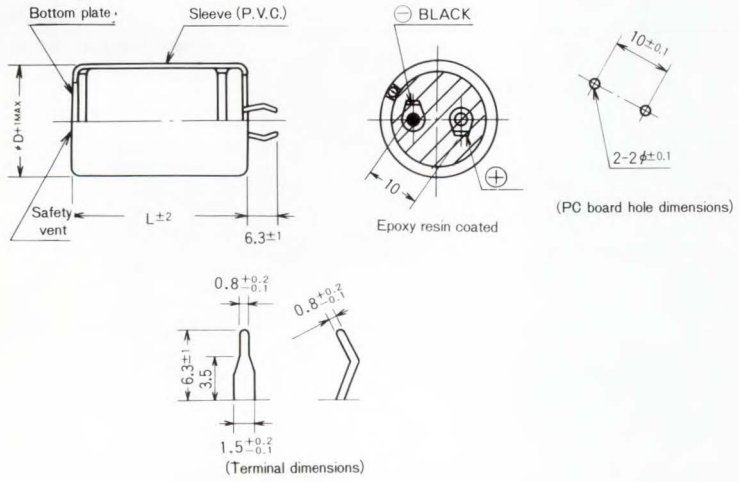
Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

Shelf Life — After leaving capacitors under no load at 105℃ for 1000 hours, they meet the requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±15% of initial value
tan δ	150% or less of initial specified value

Marking	Printed with white color letter on dark brown sleeve.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Drawing



Type numbering system (Example: 250V 330μF)

1	2	3	4	5	6	7	8	9	10	11	12
L	G	R	2	E	3	3	1	M	H	S	A

- 12: Case dia. code
- 11: Configuration
- 10: Capacitance tolerance (±20%)
- 8–9: Capacitance (330μF)
- 4–7: Rated voltage (250V)
- 3: Series name
- 1–2: Type

φD	Code
22	Z
25	A
30	B
35	C

• Dimension table in next page.

GR series

■Dimensions

D×L(mm)

Cap.(μF)	Code	W.V.(Code) / φD	200 (2D)				250 (2E)				400 (2G)			
			22	25	30	35	22	25	30	35	22	25	30	35
39	390										22×30	25×25		
											0.26	0.26		
47	470										22×35	25×30		
											0.33	0.33		
56	560										22×40	25×30	30×25	
											0.37	0.35	0.37	
68	680										22×45	25×35	30×25	
											0.43	0.42	0.40	
82	820										22×50	25×40	30×30	
											0.49	0.47	0.47	
100	101											25×45	30×35	35×30
												0.55	0.55	0.57
120	121						22×30	25×25				25×50	30×40	35×30
							0.51	0.51				0.62	0.63	0.61
150	151		22×30	25×25			22×35	25×30					30×45	35×35
			0.56	0.56			0.61	0.62					0.74	0.73
180	181		22×35	25×30			22×40	25×35	30×25					35×40
			0.65	0.66			0.71	0.72	0.70					0.82
220	221		22×40	25×30	30×25		22×50	25×40	30×30					
			0.77	0.73	0.76		0.87	0.84	0.83					
270	271		22×45	25×35	30×30			25×45	30×35	35×30				
			0.89	0.86	0.90			0.96	0.96	0.99				
330	331		22×50	25×40	30×30			25×50	30×40	35×35				
			1.02	0.99	0.98			1.09	1.10	1.14				
390	391			25×45	30×35	35×30			30×45	35×35				
				1.11	1.11	1.14			1.23	1.21				
470	471			25×50	30×40	35×30				35×40				
				1.25	1.26	1.23				1.38				
560	561				30×45	35×35								
					1.42	1.40								
680	681					35×40								Case size
						1.60								Allowable ripple

Allowable Ripple(A) at 105℃ 120Hz

● Frequency coefficient of allowable ripple current

Frequency(Hz)		50	60	120	1 k	10k～
Coeff.	200・250V	0.85	0.88	1.00	1.15	1.20
	400V	0.88	0.90	1.00	1.10	1.15

● Allowable ripple current vs. Ambient temperature

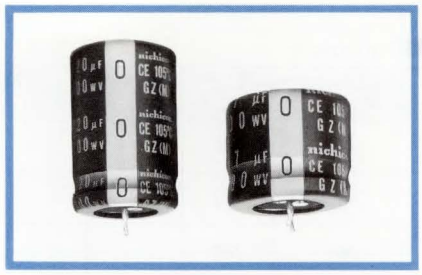
Ambient temp.(℃)	～+45	+60	+70	+85	+105
Coefficient	2.47	2.37	2.17	1.67	1.00

ALUMINUM ELECTROLYTIC CAPACITORS

GZ series — Snap-in Terminal Type, Long Life, Wide Temperature Range

Long Life　Anti-Solvent Feature

- Long life assurance series withstanding 20000 hour application of ripple current.
- Resistant to cleaning solvents as sealing parts are coated with epoxy resin.
- Suited for use in high reliability equipment.



GR → Long Life → **GZ**

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+105℃ (200・250V) , −25～+105℃ (400V)
Voltage Range	200～400V
Capacitance Range	33～390μF
Capacitance Tolerance	±20% (120Hz, 20℃)
Leakage Current	$I \leq 3\sqrt{CV}$ (μA) (After 5 minutes' applicatication of rated voltage) [C:Capacitance (μF), V:Voltage V)]
tan δ	Measurement frequency:120Hz, Temperature:20℃

Rated voltage(V)	200・250	400
tan δ (MAX.)	0.15	0.25

Stability at Low Temperature — Measurement frequency:120Hz

Rated voltage(V)		200・250	400
Impedance ratio	Z−25℃/Z+20℃	4	8
ZT/Z20 (MAX.)	Z−40℃/Z+20℃	12	—

Load Life — After an application of rated voltage (maximum value of DC voltage overlapped by an allowable ripple current) for 20000 hours at 105℃, capacitors meet the characteristics requirements listed at right.

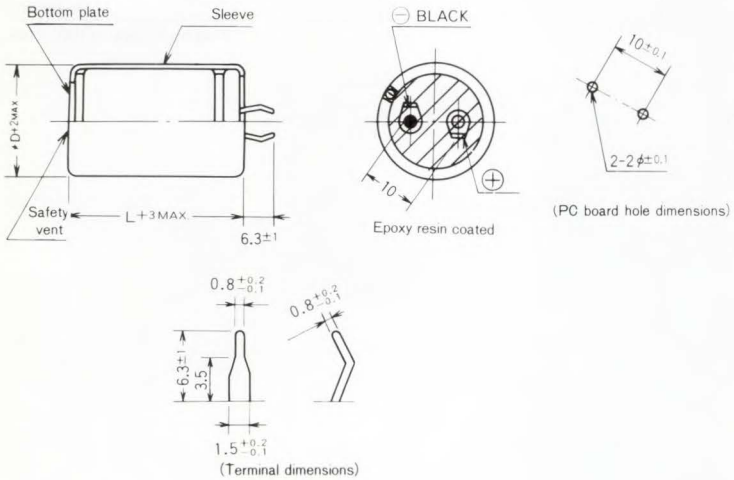
Leakage current	Initial specified value or less
Capacitance change	Within ±25% of initial value
tan δ	250% or less of initial specified value

Shelf Life — After leaving capacitors under no load at 105℃ for 1000 hours, they meet the requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±15% of initial value
tan δ	150% or less of initial specified value

Marking	Printed with white color letter on black sleeve.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Drawing



Type numbering system (Example: 250V 330μF)

1	2	3	4	5	6	7	8	9	10	11	12
L	G	Z	2	E	3	3	1	M	H	S	B

- 12: Case dia. code
- 11: Configuration
- 10: Capacitance tolerance (±20%)
- 9–8: Caoacitance (330μF)
- 7–6–5: Rared voltage (250V)
- 4–3: Series name
- 2–1: Type

φD	Code
22	Z
25	A
30	B
35	C

• Dimension table in next page.

GZ series

■Dimensions

DXL(mm)

Cap.(μF) \ W.V.(Code) / φD	Code	200 (2D) 22	200 (2D) 25	200 (2D) 30	200 (2D) 35	200 (2E) 22	200 (2E) 25	200 (2E) 30	200 (2E) 35	400 (2G) 22	400 (2G) 25	400 (2G) 30	400 (2G) 35
33	330									22×30	25×25		
										0.29	0.29		
39	390									22×35	25×30		
										0.33	0.34		
47	470									22×40	25×35	30×25	
										0.38	0.38	0.37	
56	560									22×45	25×40	30×30	
										0.44	0.44	0.44	
68	680										25×45	30×35	35×30
											0.50	0.50	0.52
82	820					22×30	25×25				25×50	30×40	35×30
						0.46	0.46				0.58	0.58	0.57
100	101					22×35	25×30					30×45	35×35
						0.55	0.55					0.66	0.65
120	121	22×30	25×25			22×40	25×35	30×25				30×50	35×40
		0.55	0.55			0.64	0.65	0.63				0.76	0.76
150	151	22×40	25×30			22×50	25×40	30×30					
		0.69	0.66			0.79	0.76	0.75					
180	181	22×45	25×35	30×30			25×45	30×35	35×30				
		0.80	0.77	0.81			0.88	0.88	0.91				
220	221	22×50	25×40	30×30			25×50	30×40	35×30				
		0.93	0.90	0.89			1.00	1.00	0.98				
270	271		25×45	30×35	35×30			30×45	35×35				
			1.03	1.03	1.06			1.14	1.12				
330	331			30×40	35×35			30×50	35×40				
				1.17	1.21			1.29	1.28				
390	391			30×50	35×40								Case size
				1.37	1.36								Allowable ripple

Allowable Ripple(A) at 105℃ 120Hz

● Frequency coefficient of allowable ripple current

Frequency(Hz)		50	60	120	1 k	10k ～
Coeff.	200・250V	0.85	0.88	1.00	1.15	1.20
	400V	0.88	0.90	1.00	1.10	1.15

● Allowable ripple current vs. Ambient temperature

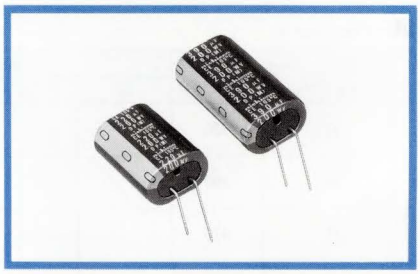
Ambient temp.(℃)	～+45	+60	+70	+85	+105
Coefficient	2.47	2.37	2.17	1.67	1.00

ALUMINUM ELECTROLYTIC CAPACITORS

DP Oval-Shaped Type, Wide Temperature Range series

Smaller

- Oval-shaped series for horizontal mounting.
- High operating temperature ranges up to +105℃.
- Designed for use in very thin and flat equipment like switching power supplies, automobile electronics and etc.

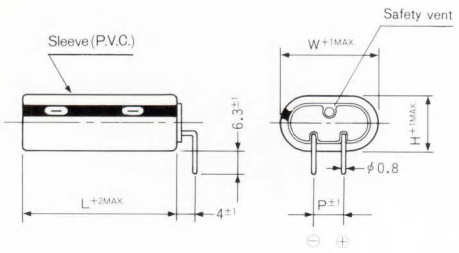


DP ← Oval-shaped GK

■Specifications

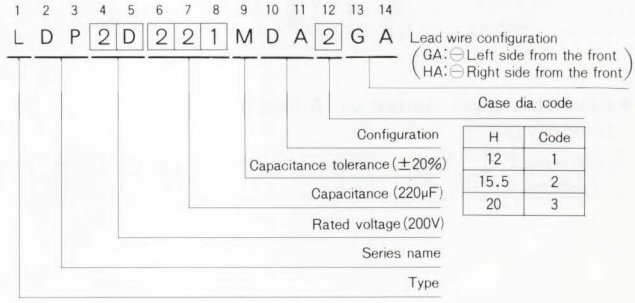
Item	Performance Characteristics
Operating Temperature Range	−40～+105℃ (200V), −25～+105℃ (400V)
Voltage Range	200・400V
Capacitance Range	33～1000μF
Capacitance Tolerance	±20% at 120 Hz, 20℃
Leakage Current	$I \leqq 3\sqrt{CV}$ (μA) (After 5 minutes' application of rated voltage) [C:Capacitance (μF), V:Voltage (V)]
tan δ	Measurement frequency : 120Hz, Temperature : 20℃ Rated voltage (V): 200 / 400 tan δ (MAX.): 0.12 / 0.20
Stability at Low Temperature	Measurement frequency : 120Hz Rated voltage (V): 200 / 400 Impedance ratio Z−25℃/Z+20℃: 3 / 8 ZT/Z20 (MAX.) Z−40℃/Z+20℃: 12 / —
Load Life	After an application of rated voltage (maximum value of DC voltage overlapped by an allowable ripple current) for 2000 hours at 105℃, capacitors meet the characteristics requirements listed at right. Leakage current: Initial specified value or less Capacitance change: Within ±20% of initial value tan δ: 200% or less of initial specified value
Shelf Life	After leaving capacitors under no load of 105℃ for 1000 hours they meet the requirements listed at right. Leakage current: Initial specified value or less Capacitance change: Within ±15% of initial value tan δ: 150% or less of initial specified value
Marking	Printed with white color letter on dark brown sleeve.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Drawing



H	P
12	7.5
15.5	7.5
20	10

Type numbering system (Example: 200V 220μF)



H	Code
12	1
15.5	2
20	3

■Dimensions

W.V. (Code) / Size HXWXL (mm) / Characteristics	200 (2D) Capacitance (μF)	200 (2D) Allowable ripple (A)	400 (2G) Capacitance (μF)	400 (2G) Allowable ripple (A)
12×25×25	100	0.37	33	0.21
12×25×30	120	0.44	47	0.27
12×25×35	150	0.52	68	0.35
12×25×40	180	0.60	82	0.40
15.5×25×25	120	0.44	47	0.27
15.5×25×30	180	0.58	68	0.35
15.5×25×35	220	0.68	82	0.41
15.5×25×40	270	0.80	100	0.48
15.5×25×50	390	1.06	120	0.59
20×35×30	270	0.84	82	0.36
20×35×35	330	0.99	120	0.46
20×35×40	470	1.24	150	0.54
20×35×50	560	1.49	180	0.66
20×35×60	1000	2.16	270	0.87

Allowable Ripple at 105℃ 120Hz

●Frequency coefficient of allowable ripple current

Frequency (Hz)		50	60	120	1 k	10k～
Coeff.	200V	0.85	0.88	1.00	1.15	1.20
	400V	0.88	0.90	1.00	1.10	1.15

●Allowable ripple current vs. Ambient temperature

Ambient temp. (℃)	～+45	+60	+70	+85	+105
Coefficient	2.47	2.37	2.17	1.67	1.00

ALUMINUM ELECTROLYTIC CAPACITORS

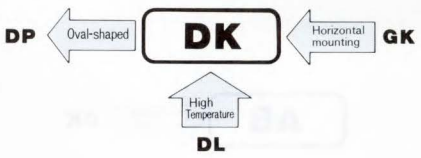
nichicon

DK series

Horizontal Mounting Type, Wide Temperature Range

Smaller

- Horizontal mounting version of GK series.
- Suited for use in flat electronic devices where height space is limited.



■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+105℃ (160～250V), −25～+105℃ (400V)
Voltage Range	160～400V
Capacitance Range	82～1200μF
Capacitance Tolerance	±20% at 120Hz, 20℃
Leakage Current	$I \leqq 3\sqrt{CV}$ (μA) (After 5 minutes' application of rated voltage) [C : Capacitance (μF), V : Voltage (V)]
tan δ	Measurement frequency : 120Hz, Temperature : 20℃

Rated voltage (V)	160	200	250	400
tan δ (MAX.)	0.15	0.10	0.10	0.20

Stability at Low Temperature — Measurement frequency : 120Hz

Rated voltage (V)		160～250	400
Impedance ratio ZT/Z20 (MAX.)	Z−25℃/Z+20℃	3	8
	Z−40℃/Z+20℃	12	—

Load Life — After an application of rated voltage (maximum value of DC voltage overlapped by an allowable ripple current) for 2000 hours at 105℃, capacitors meet the characteristics requirements listed at right.

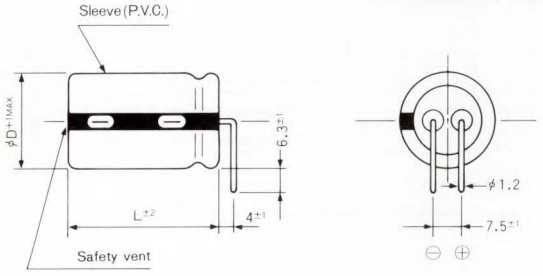
Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

Shelf Life — After leaving capacitors under no load at 105℃ for 1000 hours they meet the re requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Within ±15% of initial value
tan δ	150% or less of initial specified value

Marking	Printed with white color letter on dark brown sleeve.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Drawing



Type numbering system (Example: 200V 470μF)

1	2	3	4	5	6	7	8	9	10	11	12	13	14
L	D	K	2	D	4	7	1	M	J	B	1	G	A

Lead wire configuration (GA: ⊖ Left side from the front; HA: ⊖ Right side from the front)

Case dia. code

φD	Code
22	1
25	2

Configuration

Capacitance tolerance (±20%)

Capacitance (470μF)

Rated voltage (200V)

Series name

Type

■Dimensions

DXL (mm)

Cap. (μF)	W.V. (Code) / φD / Code	160 (2C)				200 (2D)				250 (2E)				400 (2G)			
		22		25		22		25		22		25		22		25	
82	820													22×35	0.44		
100	101													22×40	0.55		
120	121													22×45	0.59	25×35	0.57
150	151													22×50	0.67	25×40	0.64
180	181													22×60	0.82	25×50	0.82
220	221									22×35	0.85					25×50	0.85
270	271									22×40	0.95					25×60	0.96
330	331					22×35	1.05			22×45	1.10	25×35	1.10				
390	391	22×35	1.15			22×40	1.20			22×50	1.12	25×40	1.25				
470	471	22×40	1.30			22×45	1.30	25×35	1.30	22×60	1.30	25×45	1.30				
560	561	22×45	1.45	25×35	1.40	22×50	1.50	25×40	1.45			25×60	1.55				
680	681	22×50	1.65	25×40	1.60	22×60	1.70	25×50	1.70								
820	821	22×60	1.80	25×45	1.75			25×60	1.90								
1000	102			25×50	2.00												
1200	122			25×60	2.20												

Allowable Ripple (A) at 105℃ 120Hz

●Frequency coefficient of allowable ripple current

Frequency (Hz)		50	60	120	1 k	10k～
Coeff.	160～250V	0.85	0.88	1.00	1.15	1.20
	400V	0.88	0.90	1.00	1.10	1.15

●Allowable ripple current vs. Ambient temperature

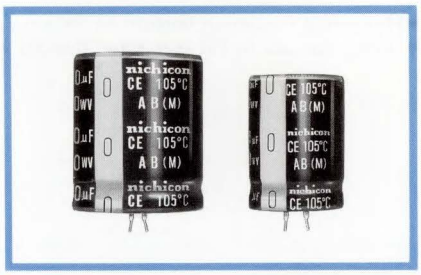
Ambient temp. (℃)	～+45	+60	+70	+85	+105
Coefficient	2.47	2.37	2.17	1.67	1.00

ALUMINUM ELECTROLYTIC CAPACITORS

AB series

Snap-in Terminal Type, Withstanding Overvoltage

- Suited for 100V/200V switch-over use in switching power supplies.
- Applicable to "Abnormal Test" under the safety standard, VDE 0806.
- Withstand overvoltage and high surge voltages.

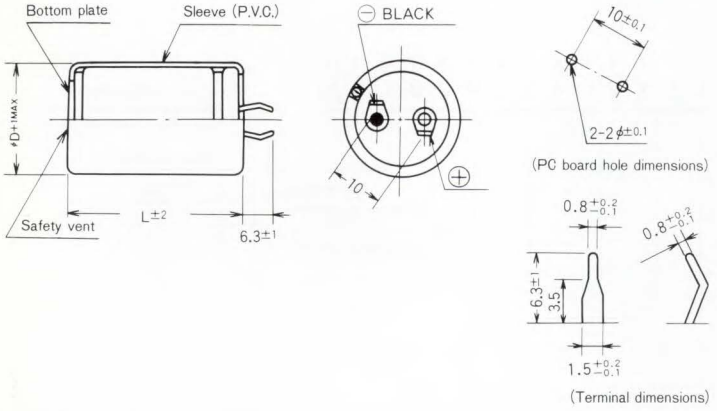


AB ← Withstand overvoltage **GK**

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−25～+105℃
Voltage Range	250V
Capacitance Range	82～820μF
Capacitance Tolerance	±20% at 120Hz, 20℃
Leakage Current	$I \leqq 3\sqrt{CV}$ (μA) (After 5 minutes' application of rated voltage) 〔C : Capacitance (μF), V : Voltage (V)〕
tan δ	Rated voltage (V): 250; tan δ (MAX.): 0.20. Measurement frequency: 120Hz, Temperature: 20℃
Stability at Low Temperature	Rated voltage (V): 250; Impedance ratio ZT/Z20 (MAX.) Z−25℃/Z+20℃: 8. Measurement frequency: 120Hz
Load Life	After an application of rated voltage (maximum value of DC voltage overlapped by an allowable ripple current) for 2000 hours at 105℃, capacitors meet the characteristics requirements listed at right. — Leakage current: Initial specified value or less; Capacitance change: Within ±20% of initial value; tan δ: 200% or less of initial specified value
Shelf Life	After leaving capacitors under no load at 105℃ for 1000 hours they meet the requirements listed at right. — Leakage current: Initial specified value or less; Capacitance change: Within ±15% of initial value; tan δ: 150% or less of initial specified value
Withstand excess voltage	Not defective after 7 hours continuous charges of 360VDC at 70℃ atmosphere.
Marking	Printed with white color letter on dark blue sleeve
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Drawing



Type numbering system (Example: 250V 470μF)

1	2	3	4	5	6	7	8	9	10	11	12
L	A	B	2	E	4	7	1	M	H	S	B

- 12: Case dia. code
- 10–11: Configuration
- 9: Capacitance tolerance (±20%)
- 5–8: Capacitance (470μF)
- 4–5: Rated voltage (250V)
- 3: Series name
- 1–2: Type

φD	Code
22	Z
25	A
30	B
35	C

■Dimensions

DXL(mm)

Cap. (μF) \ W.V. (Code)	Code \ φD	250 (2E) 22		25		30		35	
82	820	22×20	0.40						
100	101	22×25	0.50	25×20	0.50				
150	151	22×30	0.65	25×25	0.65	30×20	0.65		
180	181	22×35	0.75	25×30	0.75	30×25	0.85		
220	221	22×40	0.85	25×30	0.85	30×25	0.85		
270	271	22×45	0.95	25×35	1.00	30×30	1.00	35×25	1.00
330	331	22×50	1.10	25×40	1.10	30×30	1.10	35×25	1.10
390	391			25×45	1.25	30×35	1.25	35×30	1.25
470	471					30×40	1.30	35×30	1.30
560	561					30×45	1.55	35×35	1.55
680	681							35×40	1.80
820	821							35×45	1.95
								Case size	Allowable ripple

Allowable Ripple (A) at 105℃ 120Hz

●Frequency coefficient of allowable ripple current

Frequency (Hz)	50	60	120	1 k	10k～
Coefficient	0.88	0.90	1.00	1.10	1.15

●Allowable ripple current vs. Ambient temperature

Ambient temp. (℃)	～+45	+60	+70	+85	+105
Coefficient	2.47	2.37	2.17	1.67	1.00

NZ Screw Terminal Type, Low Impedance series

HR High Ripple Current Z Low Impedance

- Screw terminal series, withstanding 2000 hour application of ripple current at +105℃.
- Extremely low impedance at high frequency ranges.
- Suited for use in filtering circuits of power sources for computers, telecommunications equipment and etc.

NZ ← Low Impedance — NT

• Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+105℃
Voltage Range	10～100V
Capacitance Range	1000～100000μF
Capacitance Tolerance	±20% (120Hz, 20℃)
Leakage Current	After 5 minutes' application of rated voltage, leakage current is not more than $3\sqrt{CV}$ (μA) or 5 mA, whichever is smaller (at 20℃) [C: Capacitance (μF), V: Voltage (V)]
Impedance at High Frequency	Impedance at 20℃ 20kHz, as per Table below
Load Life	After an application of rated voltage (maximum value of DC voltage overlapped by an allowable ripple current) for 2000 hours at 105℃, capacitors meet the characteristics requirements listed at right.
Shelf Life	After leaving capacitors under no load at 105℃ for 1000 hours they meet the requirements listed at right.
Marking	Printed with white color letter on black sleeve.
Applicable Standard	Characteristics B of JIS C-5141 Grade Y and JIS C5102

Load Life	
Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

Shelf Life	
Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

■Drawing

Please refer to Drawing for NR series in page 114.

■Dimensions

W.V.(Code) / Cap.(μF) / Code / Item	10 (1A)			16 (1C)			25 (1E)			35 (1V)		
	Case size	Impedance	Allowable ripple	Case size	Impedance	Allowable ripple	Case size	Impedance	Allowable ripple	Case size	Impedance	Allowable ripple
4700 / 472										35×50	0.016	8.9
10000 / 103	35×50	0.012	10.4	35×50	0.012	10.4	35×80	0.010	14.0	35×80	0.010	14.0
22000 / 223	35×80	0.008	15.6	35×80	0.008	15.6	35×100	0.008	17.2	51×80	0.007	20.4
33000 / 333	35×80	0.007	17.6	35×100	0.008	18.6	51×80	0.006	22.0			
47000 / 473	35×100	0.006	20.0	51×80	0.006	23.6						
100000 / 104	51×120	0.005	29.0									

W.V.(Code) / Cap.(μF) / Code / Item	50 (1H)			63 (1J)			80 (1K)			100 (2A)		
	Case size	Impedance	Allowable ripple	Case size	Impedance	Allowable ripple	Case size	Impedance	Allowable ripple	Case size	Impedance	Allowable ripple
1000 / 102										35×50	0.022	7.6
2200 / 222				35×50	0.018	8.4	35×80	0.014	11.0	35×80	0.014	11.3
3300 / 332	35×50	0.015	9.2	35×80	0.012	12.4	35×80	0.012	12.7	35×100	0.011	14.2
4700 / 472	35×80	0.010	13.9	35×80	0.010	13.9	35×100	0.008	16.1			
10000 / 103	35×100	0.008	17.2	51×80	0.007	20.3						

Case size D×L (mm)
Impedance (Ω) at 20℃, 20kHz
Allowable ripple (A) at 85℃, 20kHz

• Frequency coefficient of allowable ripple current

Frequency (Hz)	120	360	1 k	20k～
Coefficient	0.86	0.89	0.94	1.00

• Allowable ripple current vs. Ambient temperature

Ambient temp.(℃)	～+40	+60	+70	+85	+105
Coefficient	1.50	1.42	1.30	1.00	0.50

Type numbering system (Example: 25V 33000μF)

1	2	3	4	5	6	7	8	9	10	11
L	N	Z	1	E	3	3	3	M	S	M

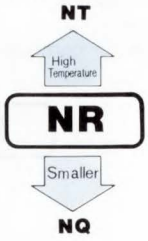
- 10: Configurati
- 9: Capacitance tolerance(±20%)
- 6 7 8: Capacitance(33000μF)
- 4 5: Rated voltage(25V)
- 3: Series name
- 1 2: Type

ALUMINUM ELECTROLYTIC CAPACITORS

NR Screw Terminal Type series

HR High Ripple　L Long Life

- Screw terminal series in more compact case sizes.
- Designed for high reliability and high ripple current capability.
- I deally suited for use in industrial robbots, tooling machines, inverters, telecommunications equipment, measuring instruments and etc.



●Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+85℃ (16～100V)， −25～+85℃ (160～450V)
Voltage Range	16～450V
Capacitance Range	470～470000μF
Capacitance Tolerance	±20% (120Hz, 20℃)
Leakage Current	After 5 minutes' application of rated voltage, leakage current is not more than $3\sqrt{CV}$ (μA) or 5 mA, whichever is smaller (at 20℃). [C : Capacitance (μF), V : Voltage (V)]

tan δ

Case dia. \ W.V.	16	25	35	50	63	80	100	160～250	350～450
φ 35	0.7	0.45	0.45	0.3	0.25	0.25	0.2	0.15	0.25
φ 51	1.0	0.6	0.6	0.45	0.35	0.3	0.2	0.15	0.25
φ 63.5	1.3	0.8	0.7	0.5	0.4	0.35	0.25	0.2	0.25
φ 76.2	2.0	1.2	0.9	0.7	0.5	0.4	0.35	0.25	0.25
φ 90	—	—	—	—	—	—	—	0.25	0.25

Measurement frequency : 120Hz, 20℃

Stability at Low Temperature

Measurement frequency : 120 Hz

Rated voltage (V)	16～100	160～450
Impedance ratio ZT/Z20 (MAX.)	Z−40℃/Z+20℃	Z−25℃/Z+20℃
	12	8

Load Life

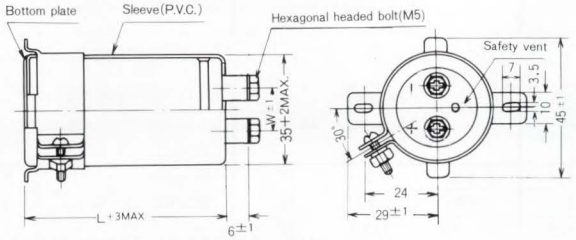
Capacitors meet the requirements shown at right after subjected to 5000 hours' application of allowable ripple current overlapped with DC voltage, the max. sum of these being equal to rated voltage at 85℃.

Leakage current	Initial specified value or less
Capacitance change	Within ±15% of initial value
tan δ	175% or less of initial specified value

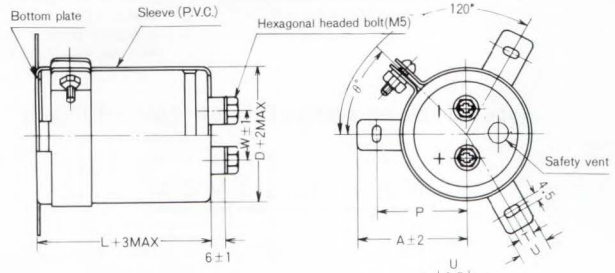
Shelf Life	After leaving capacitors under no load at 85℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.
Marking	Printed with black color letter on light blue sleeve.
Applicable Standard	Characteristics B of JIS C-5141 Grade X and JIS C-5102.

■ Drawing

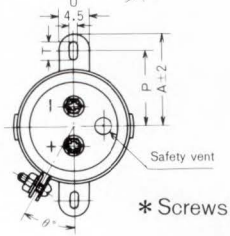
φ35 Screw terminal type



φ51 or larger Screw terminal type



Note :
Capacitors with body dia. φ51 or larger are furnished with 3-leg brackets shown above as standard.
If these capacitors are preferred to have 2-leg brackets as shown right, add "B" in the 12th digit of type numbering system.



∗ Screws conform to ISO.

• Dimension table in next page.

●Dimension of terminal pitch (W)

Case dia. (mm)	W (mm)
35	12.7
51	22.0
63.5	28.6
76.2	31.8
90	31.8

●Dimensions of mounting bracket

mm

Symbol \ Leg Shape / φD	3-Leg φ51	3-Leg φ63.5	3-Leg φ76.2	3-Leg φ90	2-Leg φ51	2-Leg φ63.5	2-Leg φ76.2	2-Leg φ90
P	32.5	38.1	44.5	50.8	33.2	40.5	46.5	53
A	38.5	43	49.2	55.5	39.5	46.5	53	59
T	7	8	7	7	6	6	6	6
U	12	14	16	16	14	14	14	14
θ°	60	60	60	60	30	30	30	30

Type numbering system (Example 450V 2200μF)

1	2	3	4	5	6	7	8	9	10	11
L	N	R	2	W	2	2	2	M	S	M

- 11 : Configuration
- 9 10 : Capacitance tolerance (±20%)
- 6 7 8 : Capacitance (2200μF)
- 4 5 : Rated voltage (450V)
- 3 : Series name
- 1 2 : Type

NR series

■Dimensions

DXL(mm)

Cap. (μF)	Code	W.V. (Code) / S.V.	16 (1C)		25 (1E)		35 (1V)		50 (1H)		63 (1J)	
			20		32		44		63		79	
10000	103										35×80	4.1
15000	153								35×80	5.4	35×100	5.5
22000	223								35×100	6.1	35×120	7.1
33000	333				35×80	6.0	35×80	6.2	51×70	7.0	51×80	8.8
47000	473		35×80	6.4	35×100	8.2	35×120	8.2	51×90	8.6	51×120	11.7
68000	683		35×100	7.9	35×120	9.4	51×80	9.3	51×100	11.0	63.5×100	15.0
100000	104		35×120	10.6	51×100	12.0	51×120	13.6	63.5×100	14.2	63.5×140	20.8
150000	154		51×100	11.5	51×120	15.3	63.5×100	14.5	76.2×120	18.6	76.2×140	26.0
220000	224		51×120	15.6	63.5×120	18.9	76.2×100	16.8				
330000	334		63.5×120	25.1	76.2×120	23.2	76.2×140	24.8				
470000	474		76.2×120	30.5								

Cap. (μF)	Code	W.V. (Code) / S.V.	80 (1K)		100 (2A)		160 (2C)		200 (2D)		250 (2E)	
			100		125		200		250		300	
1000	102										35×80	2.4
1500	152								35×80	2.9	35×100	3.0
2200	222						35×80	3.2	35×100	3.5	51×80	4.0
3300	332						35×120	4.7	51×80	4.8	51×100	5.4
4700	472				35×80	3.8	51×80	5.0	51×100	6.3	63.5×100	7.3
6800	682				35×100	4.5	51×100	6.4	51×140	7.3	63.5×120	8.9
10000	103		35×80	4.2	35×120	5.3	63.5×100	9.1	63.5×120	9.8	76.2×120	11.8
15000	153		35×120	6.0	51×80	6.0	76.2×100	12.0	76.2×120	13.0	90×140	16.4
22000	223		51×80	6.5	51×100	6.8	76.2×140	16.9	90×140	15.9		
33000	333		51×120	9.2	51×140	10.0	90×140	19.2				
47000	473		63.5×100	12.7	63.5×140	14.4						
68000	683		63.5×140	15.5	76.2×140	18.2						
100000	104		76.2×140	21.3								

Cap.(μF)	Code	W.V.(Code) / S.V.	350 (2V)		400 (2G)		450 (2W)	
			400		450		500	
470	471				35×80	2.0	35×80	2.1
680	681		35×80	2.5	35×100	2.6	35×120	2.9
1000	102		51×60	3.3	51×70	3.3	51×80	3.6
1200	122		51×70	3.6	51×80	4.2	51×100	4.2
1500	152		51×80	4.5	51×100	4.8	51×110	5.1
1800	182		51×90	5.1	51×110	5.4	63.5×90	5.4
2200	222		51×110	6.0	51×130	6.3	63.5×110	6.6
2700	272		51×130	6.9	63.5×110	7.2	63.5×130	7.5
3300	332		63.5×100	8.1	63.5×130	8.4	76.2×110	8.4
3900	392		63.5×110	9.0	76.2×100	8.7	76.2×130	9.6
4700	472		76.2×100	9.6	76.2×130	10.5	76.2×150	11.4
5600	562		76.2×110	11.4	76.2×150	12.3	76.2×150	13.2
6800	682		76.2×130	13.5	76.2×150	13.5	90×150	14.4
8200	822		76.2×150	15.0	90×150	15.9	90×150	15.9
10000	103		90×150	16.8	90×150	17.7	90×190	17.5
12000	123		90×150	18.4	90×190	20.7		
15000	153		90×190	22.8				

Case size φD×L

Allowable ripple(A) at 85℃ 120Hz

●Frequency coefficient of allowable ripple current

Frequency (Hz)		60	120	360	1 k	10k～
Coeff.	16～100V	0.90	1.00	1.08	1.15	1.15
	160～250V	0.88	1.00	1.08	1.15	1.20
	350～450V	0.82	1.00	1.20	1.35	1.40

●Allowable ripple current vs. Ambient temperature

Ambient temp. (℃)		～+40	+60	+70	+85
Coeff.	16～250V	1.50	1.42	1.30	1.00
	350～450V	2.70	2.00	1.70	1.00

ALUMINUM ELECTROLYTIC CAPACITORS

NQ series — Screw Terminal Type, Smaller-Sized

Smaller | High Ripple | Long Life

- Smaller case sizes than NR series.
- High reliability, long life guaranteed for 10,000 hour application of ripple current at +85°C.
- Suited for use in industrial power supplies like inverter circuits, etc.

NR → Smaller → NQ

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−25～+85℃
Voltage Range	350～450V
Capacitance Range	1000～10000μF
Capacitance Tolerance	±20% (120Hz, 20℃)
Leakage Current	After 5 minutes' application of rated voltage, leakage current is not more than $3\sqrt{CV}$ (μA) or 5 mA, whichever is smaller(at 20℃). [C:Capacitance (μF), V:Voltage(V)]
tan δ	Measurement frequency:120Hz, Temperature:20℃

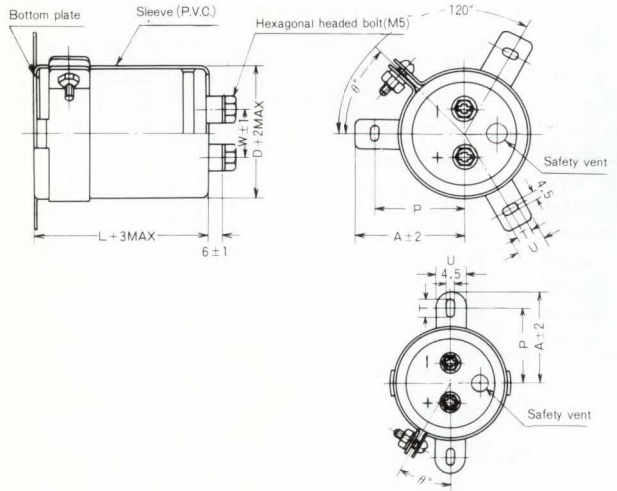
Case dia. \ W.V.	350～450
φ 51	0.25
φ 63.5	0.25
φ 76.2	0.25
φ 90	0.25

Stability at Low Temperature	Measurement frequency:120Hz	
	Rated voltage (V)	350～450
	Impedance ratio ZT/Z20 (MAX.)	Z−25℃/Z+20℃
		8

Load Life	Capacitors meet the requirements shown at right after subjected to 10000 hours' application of allowable ripple current overlapped with DC voltage, the max. sum of these being equal to rated voltage at 85℃.	
		Leakage current: Initial specified value or less
		Capacitance change: Within ±20% of initial value
		tan δ: 200% or less of initial specified value

Shelf Life	After leaving capacitors under no load at 85℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.
Marking	Printed with black color letter on light blue sleeve.
Applicable Standard	Characteristics B of JIS C-5141 Grade X and JIS C-5102.

■Drawing



＊Screws conform to ISO.

● Dimension of terminal pitch (W)

Case dia. (mm)	W (mm)
51	22.0
63.5	28.6
76.2	31.8
90	31.8

● Dimensions of mounting bracket

mm

Symbol \ Leg Shape / φD	3-Leg φ51	3-Leg φ63.5	3-Leg φ76.2	3-Leg φ90	2-Leg φ51	2-Leg φ63.5	2-Leg φ76.2	2-Leg φ90
P	32.5	38.1	44.5	50.8	33.2	40.5	46.5	53
A	38.5	43	49.2	55.5	39.5	46.5	53	59
T	7	8	7	7	6	6	6	6
U	12	14	16	16	14	14	14	14
θ°	60	60	60	60	30	30	30	30

Type numbering system (Example 450V 2200μF)

1	2	3	4	5	6	7	8	9	10	11
L	N	Q	2	W	2	2	2	M	S	M

- 1–2: Type
- 3: Series name
- 4–5: Rated voltage (450V)
- 6–8: Capacitance (2200μF)
- 9: Capacitance tolerance (±20%)
- 10–11: Configuration

Note :

Capacitors with body dia. φ51 or larger are furnished with 3-leg brackets shown above as standard.

If these capacitors are preferred to have 2-leg brackets as shown right, add "B" in the 12th digit of type numbering system.

• Dimension table in next page.

NQ series

■Dimensions

D×L(mm)

Cap.(μF) \ W.V.(Code) / Code / S.V.		350 (2V)		400 (2G)		450 (2W)	
		400		450		500	
1000	102					51× 75	4.3
1200	122			51× 75	4.6	51× 95	5.4
1500	152	51× 75	5.3	51× 95	5.9	51×105	6.4
1800	182	51× 85	6.2	51×105	6.8	63.5× 85	7.0
2200	222	51×105	7.7	51×125	8.3	63.5×105	8.6
2700	272	51×115	9.0	63.5×105	9.3	63.5×115	10.1
3300	332	63.5× 95	9.4	63.5×125	11.1	76.2×105	11.6
3900	392	63.5×105	12.1	76.2×105	12.3	76.2×115	13.2
4700	472	76.2× 95	14.0	76.2×125	14.8	76.2×135	15.1
5600	562	76.2×105	16.1	76.2×135	16.7	76.2×145	18.0
6800	682	76.2×125	18.6	90×125	19.3	90×145	21.5
8200	822	76.2×145	22.2	90×145	22.8		
10000	103	90×145	26.0			Case size	Allowable ripple

Allowable ripple(A) at 85℃ 120Hz

● Frequency coefficient of allowable ripple current

Frequency(Hz)	60	120	360	1 k	10k～
Coefficient	0.80	1.00	1.10	1.30	1.40

● Allowable ripple Current vs, Ambient temperature

Ambient temp(℃)	～+40	+60	+70	+85
Coefficient	2.50	2.00	1.70	1.00

ALUMINUM ELECTROLYTIC CAPACITORS

NT Screw Terminal Type, Wide Temperature Range series

HR High Ripple

- Screw terminal series for high temperature up to +105℃.
- High reliability, long life guaranteed for 2000 hour application of ripple current at +105℃.
- Suited for use in industrial applications where high reliability and dependable performance are the most important.

NT
High Temperature
NR

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+105℃ (16～100V), −25～+105℃ (160～400V)
Voltage Range	16～400V
Capacitance Range	220～330000μF
Capacitance Tolerance	±20% at 120Hz, 20℃
Leakage Current	After 5 minutes' application of rated voltage, leakage current is not more than $I \leqq 3\sqrt{CV}$ (μA) or 5mA, whichever is smaller. (C: Capacitance (μF), V: Voltage (V))

tan δ — Measurement frequency: 120Hz, Temperature: 20℃

φD \ W.V.	16	25	35	50	63	80	100	160	200	250	350	400
35	0.45	0.45	0.40	0.30	0.25	0.25	0.20	0.15	0.15	0.15	0.25	0.25
51	0.60	0.60	0.45	0.45	0.35	0.30	0.20	0.15	0.15	0.15	0.25	0.25
63.5	0.80	0.70	0.50	0.50	0.40	0.35	0.25	0.20	0.20	0.20	0.25	0.25
76.2	1.20	0.90	0.70	0.70	0.70	0.50	0.40	0.35	0.25	0.25	0.25	0.25
90	—	—	—	—	—	—	—	0.35	0.25	0.25	0.25	0.25

Stability at Low Temperature — Measurement frequency: 120Hz

Rated voltage (V)		16～100	160～400
Impedance ratio	Z−25℃/Z+20℃	—	8
ZT/Z20 (MAX.)	Z−40℃/Z+20℃	12	—

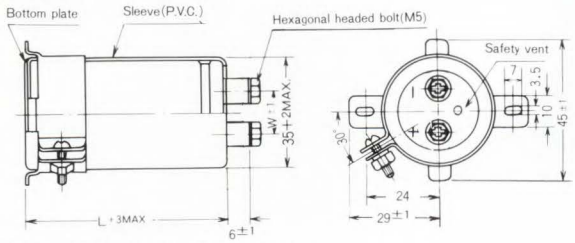
Load Life — After an application of rated voltage (maximum value of DC voltage overlapped by an allowable ripple current) for 2000 hours at 105℃, capacitors meet the characteristics requirements listed at right.

Leakage current	Initial specified value or less
Capacitance change	Not less than 20% of initial value
tan δ	200% or less of initial specified value

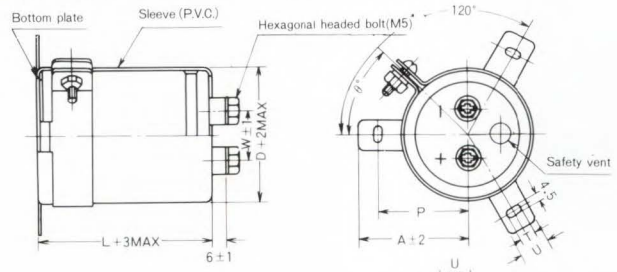
Shelf Life	After leaving capacitors under no load at 105℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.
Marking	Printed with white color letter on black sleeve.
Applicable Standard	Characteristics B of JIS C-5141 Grade X and JIS C 5102

■ Drawing

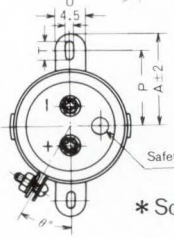
φ35 Screw terminal type



φ51 or larger Screw terminal type



Note:
Capacitors with body dia. φ51 or larger are furnished with 3-leg brackets shown above as standard.
If these capacitors are preferred to have 2-leg brackets as shown right, add "B" in the 12th digit of type numbering system.



• Dimension table in next page.

●Dimension of terminal pitch (W)

Case dia. (mm)	W (mm)
35	12.7
51	22.0
63.5	28.6
76.2	31.8
90	31.8

●Dimensions of mounting bracket

Leg shape	3-Legs				2-Legs			
Symbol \ φD	φ51	φ63.5	φ76.2	φ90	φ51	φ63.5	φ76.2	φ90
P	32.5	38.1	44.5	50.8	33.2	40.5	46.5	53
A	38.5	43	49.2	55.5	39.5	46.5	53	59
T	7	8	7	7	6	6	6	6
U	12	14	16	16	14	14	14	14
θ°	60	60	60	60	30	30	30	30

Type numbering system (Example: 250V 3300μF)

1	2	3	4	5	6	7	8	9	10	11
L	N	T	2	E	3	3	2	M	S	M

- 11: Configuration
- 10: Capacitance tolerance (±20%)
- 9: Capacitance (3300μF)
- 8: Rated voltage (250V)
- 5: Series name
- 1: Type

*Screws conform to ISO.

NT series

■Dimensions

DXL (mm)

Cap. (μF) \ W.V. (Code) / Surge Volt. / Code		16 (1C)		25 (1E)		35 (1V)		50 (1H)	
		20		32		44		63	
10000	103					35×80	9.4	35×80	9.7
15000	153					35×80	10.2	35×100	11.0
22000	223			35×80	7.5	35×100	11.1	51×80	12.6
33000	333	35×80	8.9	35×100	10.8	51×80	14.8	51×120	15.5
47000	473	35×100	11.5	51×80	14.8	51×100	16.7	63.5×100	19.8
68000	683	51×80	14.2	51×120	16.9	51×120	24.5	63.5×120	25.6
100000	104	51×100	19.1	63.5×100	21.6	63.5×120	26.1	76.2×120	33.5
150000	154	51×120	20.7	63.5×120	27.5	76.2×120	30.2		
220000	224	63.5×120	28.1	76.2×120	34.0				
330000	334	76.2×120	41.2						

Cap. (μF) \ W.V. (Code) / Surge Volt. / Code		63 (1J)		80 (1K)		100 (2A)		160 (2C)	
		79		100		125		200	
1000	102							35×80	3.0
1500	152							35×80	4.2
2200	222					35×80	4.5	35×100	5.1
3300	332					35×80	6.5	51×80	7.5
4700	472			35×80	5.8	35×100	7.6	51×100	8.0
6800	682			35×100	6.9	51×80	9.0	63.5×100	10.2
10000	103	35×100	7.4	51×80	8.8	51×100	10.6	63.5×120	14.6
15000	153	51×80	9.9	51×100	12.6	63.5×100	13.8	76.2×120	19.2
22000	223	51×100	12.8	63.5×100	13.6	76.2×100	15.6	76.2×140	23.5
33000	333	63.5×100	15.8	76.2×100	19.3	76.2×140	20.0	90×140	26.7
47000	473	63.5×120	21.1	76.2×120	26.7				
68000	683	76.2×120	27.0						

Cap. (μF) \ W.V. (Code) / Surge Volt. / Code		200 (2D)		250 (2E)		350 (2V)		400 (2G)	
		250		300		400		450	
220	221							35×80	1.3
330	331					35×80	1.5	35×80	1.7
470	471					35×80	2.1	35×100	2.4
680	681			35×80	2.7	51×80	3.5	51×100	3.8
1000	102	35×80	3.3	35×100	3.8	51×100	4.6	51×120	5.0
1500	152	35×100	4.6	51×80	4.8	51×120	6.3	63.5×100	6.8
2200	222	51×80	5.6	51×100	6.4	63.5×120	8.4	76.2×100	8.6
3300	332	51×100	7.7	63.5×100	8.6	76.2×120	11.3	76.2×140	12.2
4700	472	63.5×100	10.1	63.5×120	11.7	76.2×140	13.4	90×140	14.9
6800	682	63.5×120	11.7	76.2×120	14.2	90×140	18.9		
10000	103	76.2×120	15.7	90×140	18.9				
15000	153	76.2×140	20.8						Allowable
22000	223	90×140	30.2					Case size	ripple

Allowable Ripple (A) at 85℃ 120Hz

●Frequency coefficient of allowable ripple current

Frequency (Hz)		60	120	360	1 k	10k～
Coeff.	16～100V	0.90	1.00	1.08	1.15	1.15
	160～250V	0.88	1.00	1.08	1.15	1.20
	400・450V	0.90	1.00	1.08	1.10	1.15

● Allowable ripple current vs. Ambient temperature

Ambient temp.	～+40	+60	+70	+85	+105
Coefficient	1.50	1.42	1.30	1.00	0.50

ALUMINUM ELECTROLYTIC CAPACITORS

GS series

Lug/Snap-in Termial Type, For Audio Epuipment

For Audio Use

Gold Supply
Highest
TYPE-Ⅳ
Higher Grade
TYPE-Ⅲ
High Grade
TYPE-Ⅱ
Smaller
TYPE-Ⅰ

- Designed for high grade audio equipment, giving priority to high fidelity sound quality.
- Snap-in terminal type developed to suit for use in mini-compos, CD, DAT players, cassette decks and etc.
- Selectable from the following 5 grades :
  Great Supply Type Ⅰ Compact size
  Great Supply Type Ⅱ Standard
  Great Supply Type Ⅲ High grade
  Great Supply Type Ⅳ Higher grade
  Gold Supply Highest grade with gold-plated terminals

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+85℃
Voltage Range	16～100V
Capacitance Range	680～33000μF
Capacitance Tolerance	±20% at 120Hz, 20℃
Leakage Current	After 5 minutes' application of rated voltage, leakage current is not more than $3\sqrt{CV}$ (μA). [C : Capacitance (μF), V : Voltage (V)]

tan δ — Measurement frequency : 120Hz, Temperature : 20℃

Rated voltage (WV)	16			25～63			71～100		
Grade	TYPE-Ⅰ	TYPE-Ⅱ	TYPE-Ⅲ, Ⅳ Gold Supply	TYPE-Ⅰ	TYPE-Ⅱ	TYPE-Ⅲ, Ⅳ Gold Supply	TYPE-Ⅰ	TYPE-Ⅱ	TYPE-Ⅲ, Ⅳ Gold Supply
tan δ	0.35	0.30	0.25	0.30	0.25	0.22	0.25	0.22	0.20

Stability at Low Temperature — Measurement frequency : 120Hz

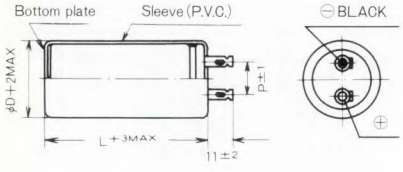
Rated voltage (V)		16～100
Impedance ratio	Z−25℃/Z+20℃	4
ZT/Z20 (MAX.)	Z−40℃/Z+20℃	12

Load Life — Capacitors meet the requirements shown at right after 1000 hours' application of rated ripple current overlapped with DC voltage, the max. sum of these being equal to rated voltage, at 85℃.

Leakage current	Initial specified value or less
Capacitance change	Within ±20% of initial value
tan δ	200% or less of initial specified value

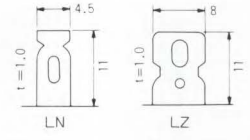
Shelf Life	After leaving capacitors under no load at 85℃ for 1000 hours and applying voltage according to JIS C-5102 4-3, they meet the specified value for load life characteristics listed above.
Marking	Printed with gold color letter on black sleeve.
Applicable Standards	Characteristics W of JIS C-5141 and JIS C-5102.

■Drawing (Lug terminal type)



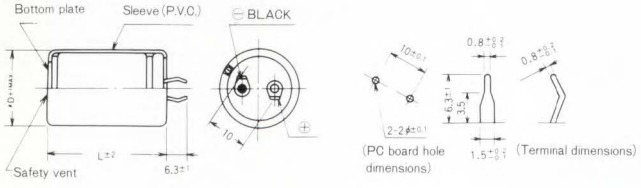
■Configuration

φ35 ～ φ40　φ50 ～ φ76



φD	35	40	50	63	76
P	14	14	18	25	25
Configuration	L N		L Z		

(Snap-in terminal type)



Type numbering system (Example: Great Supply Type Ⅰ 50V 15000μF)

Grade	Code
Gold Supply	—
Great Supply TYPE Ⅰ	V
Great Supply TYPE Ⅱ	W
Great Supply TYPE Ⅲ	X
Great Supply TYPE Ⅳ	Y

1	2	3	4	5	6	7	8	9	10	11	12
L	G	S	1	H	1	5	3	M	L	N	V

Grade
Configuration
Capacitance tolerance (±20%)
Capacitance (15000μF)
Rated voltage (50V)
Series name
Type

Type numbering system (Example: Great Supply Type Ⅰ 25V 6800μF)

Grade	Code
Great Supply TYPE-Ⅰ	G1
Great Supply TYPE-Ⅱ	G2
Great Supply TYPE-Ⅲ	G3

1	2	3	4	5	6	7	8	9	10	11	12	13	14
L	G	S	1	E	6	8	2	M	H	S	A	G	1

Grade
Case dia. code
Configuration
Capacitance tolerance (±20%)
Capacitance (6800μF)
Rated voltage (25V)
Series name
Type

φD	Code
22	Z
25	A
30	B
35	C

■Dimensions (Lug terminal type)

D×L (mm)

Cap. (μF)	Code	Grade \ W.V. (Code)	50 (1H)		63 (1J)		71 (H2)		80 (1K)		100 (2A)	
6800	682	TYPE-Ⅰ							35×68	4.4	40×80	5.1
		TYPE-Ⅱ			35×68	4.3	40×80	5.5	40×100	6.1	50×80	6.2
		TYPE-Ⅲ	35×80	5.2	40×80	5.5	40×100	6.5	50×80	6.7	50×100	7.3
		TYPE-Ⅳ	40×80	5.5	40×100	6.1	50×80	6.7	50×80	6.7	50×100	7.3
10000	103	TYPE-Ⅰ			35×68	3.9	35×80	4.7	40×80	5.0	50×80	5.7
		TYPE-Ⅱ	35×80	4.6	40×80	4.9	40×100	6.1	50×80	6.2	50×100	6.9
		TYPE-Ⅲ	40×100	6.1	40×100	6.1	50×100	7.3	50×100	7.3	63×80	7.6
		TYPE-Ⅳ	40×100	6.1	50×80	6.2	50×100	7.3	63×80	7.6	63×100	8.3
15000	153	TYPE-Ⅰ	35×68	4.8	40×80	5.5	40×100	6.7	50×80	7.0	50×100	7.7
		TYPE-Ⅱ	40×80	6.1	40×100	6.7	50×80	7.6	50×100	8.4	63×80	8.7
		TYPE-Ⅲ	50×80	7.6	50×100	8.4	63×80	9.3	63×100	10.1	76×100	11.3
		TYPE-Ⅳ	50×100	8.4	63×80	8.7	63×100	10.1	63×100	10.1	76×100	11.3
22000	223	TYPE-Ⅰ	40×80	6.7	40×100	7.4	50×80	8.4	63×80	9.3	63×80	9.7
		TYPE-Ⅱ	50×80	8.3	50×100	9.1	63×80	10.5	63×100	11.6	76×100	12.9
		TYPE-Ⅲ	63×80	10.5	63×100	11.6	63×100	12.3	76×100	13.7		Allowable ripple
		TYPE-Ⅳ	63×80	10.5	63×100	11.6	63×100	12.3	76×100	13.7		
33000	333	TYPE-Ⅰ					63×80	9.5	63×100	10.4	Case size	

Allowable Ripple (A) at 85℃ 120Hz

GS series

■Dimensions (Snap-in terminal type)

DXL(mm)

Cap.(μF)	Code	Grade	W.V.(Code) / φD	16 (1C) 22	16 (1C) 25	16 (1C) 30	16 (1C) 35	25 (1E) 22	25 (1E) 25	25 (1E) 30	25 (1E) 35	35 (1V) 22	35 (1V) 25	35 (1V) 30	35 (1V) 35	50 (1H) 22	50 (1H) 25	50 (1H) 30	50 (1H) 35
1000	102	TYPE-Ⅰ																	
		TYPE-Ⅱ														22×25 0.95			
		TYPE-Ⅲ						22×25 1.05				22×30 1.10	25×25 1.10			22×35 1.20	25×25 1.10		
1500	152	TYPE-Ⅰ														22×25 1.05			
		TYPE-Ⅱ										22×25 1.15				22×30 1.20	25×25 1.20		
		TYNE Ⅲ	22×25 1.10				22×30 1.35	25×25 1.35			22×35 1.45	25×30 1.45	30×25 1.50		22×45 1.60	25×35 1.55	30×30 1.65	35×25 1.65
2200	222	TYPE-Ⅰ									22×25 1.25				22×30 1.35	25×25 1.35		
		TYPE-Ⅱ					22×25 1.35				22×30 1.50	25×25 1.50			22×40 1.65	25×30 1.60	30×25 1.65	
		TYPE-Ⅲ	22×30 1.45	25×25 1.45			22×40 1.90	25×30 1.75	30×25 1.80		22×45 1.95	25×40 2.00	30×30 1.95	35×25 2.00		25×45 2.10	30×35 2.10	35×35 2.15
3300	332	TYPE-Ⅰ					22×25 1.50				22×30 1.65	25×25 1.65			22×40 1.90	25×30 1.80	30×25 1.85	
		TYPE-Ⅱ	22×20 1.35				22×30 1.80	25×25 1.80			22×35 1.95	25×30 1.95	30×25 2.00		22×50 2.25	25×40 2.20	30×30 2.15	35×25 2.20
		TYPE-Ⅲ	22×40 2.00	25×35 2.00	30×25 2.10		22×50 2.50	25×40 2.45	30×30 2.40	35×25 2.45		25×50 2.70	30×40 2.70	35×30 2.65			30×45 2.85	35×35 2.80
4700	472	TYPE-Ⅰ	22×20 1.50				22×30 2.00	25×25 2.00			22×35 2.10	25×30 2.15	30×25 2.20		22×50 2.45	25×40 2.40	30×30 2.35	35×25 2.45
		TYPE-Ⅱ	22×25 1.80				22×35 2.30	25×30 2.30	30×25 2.40		22×45 2.55	25×40 2.65	30×30 2.60	35×25 2.65		25×50 2.90	30×40 2.90	35×30 2.85
		TYPE-Ⅲ		25×45 2.70	30×35 2.70	35×25 2.60			30×40 3.25	35×30 3.15			30×50 3.55	35×40 3.55				35×45 3.70
6800	682	TYPE-Ⅰ	22×25 1.95				22×35 2.25	25×30 2.25	30×25 2.35		22×45 2.50	25×35 2.40	30×30 2.55	35×25 2.60		25×50 2.85	30×40 2.85	35×30 2.80
		TYPE-Ⅱ	22×35 2.25	25×30 2.25	30×25 2.35		22×45 2.75	25×40 2.80	30×30 2.75	35×25 2.85		25×50 3.10	30×40 3.10	35×30 3.00			30×50 3.45	35×40 3.40
		TYPE-Ⅲ			30×45 3.20	35×35 3.15			30×50 3.80	35×40 3.80				35×50 4.15				
10000	103	TYPE-Ⅰ	22×35 2.05	25×30 2.05	30×25 2.15		22×45 2.50	25×40 2.55	30×30 2.50	35×25 2.60		25×50 2.80	30×35 2.70	35×30 2.75			30×50 3.15	35×40 3.10
		TYPE-Ⅱ	22×45 2.50	25×35 2.50	30×30 2.50	35×25 2.60		25×50 3.10	30×40 3.10	35×30 3.00			30×50 3.40	35×40 3.40				
		TYPE-Ⅲ				35×45 3.50												

Cap.(μF)	Code	Grade	W.V.(Code) / φD	63 (1J) 22	63 (1J) 25	63 (1J) 30	63 (1J) 35	80 (1K) 22	80 (1K) 25	80 (1K) 30	80 (1K) 35	100 (2A) 22	100 (2A) 25	100 (2A) 30	100 (2A) 35
680	681	TYPE-Ⅰ						22×25 0.80				22×30 0.85	25×25 0.85		
		TYPE-Ⅱ	22×25 0.75				22×30 0.90	25×25 0.90			22×35 0.95	25×30 1.00	30×25 1.00	
		TYPE-Ⅲ	22×30 0.90	25×25 0.90			22×40 1.10	25×35 1.10	30×30 1.10		22×50 1.20	25×40 1.20	30×30 1.15	35×25 1.20
1000	102	TYPE-Ⅰ	22×25 0.85				22×30 1.00	25×25 1.00			22×35 1.10	25×30 1.10	30×25 1.15	
		TYPE-Ⅱ	22×30 1.00	25×25 1.00			22×35 1.20	25×30 1.20	30×25 1.25		22×50 1.35	25×40 1.35	30×30 1.35	35×25 1.35
		TYPE-Ⅲ	22×40 1.25	25×30 1.20	30×25 1.25		22×50 1.40	25×40 1.45	30×35 1.50				30×40 1.60	35×30 1.55
1500	152	TYPE-Ⅰ	22×30 1.10	25×25 1.10			22×35 1.35	25×30 1.35	30×25 1.40		22×50 1.55	25×40 1.50	30×30 1.50	35×25 1.55
		TYPE-Ⅱ	22×35 1.30	25×30 1.30	30×25 1.35		22×50 1.70	25×40 1.65	30×30 1.65	35×25 1.65		25×50 1.80	30×40 1.85	35×30 1.80
		TYPE-Ⅲ	22×50 1.70	25×40 1.65	30×30 1.65	35×25 1.65			30×45 2.05	35×35 2.00				35×40 2.15
2200	222	TYPE-Ⅰ	22×35 1.45	25×30 1.45	30×25 1.50		22×50 1.90	25×40 1.85	30×30 1.80	35×25 1.85		25×50 2.05	30×40 2.05	35×30 2.00
		TYPE-Ⅱ	22×45 1.75	25×40 1.80	30×30 1.75	35×25 1.80		25×50 2.20	30×40 2.20	35×30 2.15			30×50 2.45	35×40 2.45
		TYPE-Ⅲ			30×40 2.20	35×35 2.30				35×45 2.70				
3300	332	TYPE-Ⅰ	22×50 2.05	25×40 2.00	30×30 2.00	35×25 2.05		25×50 2.50	30×40 2.50	35×30 2.45			30×50 2.75	35×40 2.75
		TYPE Ⅱ		25×50 2.45	30×40 2.45	35×30 2.40			30×50 3.00	35×40 2.95				
		TYPE-Ⅲ				35×45 3.10								
4700	472	TYPE-Ⅰ		25×50 2.65	30×40 2.65	35×30 2.60			30×50 3.30	35×40 3.25				
		TYPE-Ⅱ			30×50 3.20	35×40 3.20				35×50 3.90				
		TYPE-Ⅲ												
6800	682	TYPE-Ⅰ			30×50 3.15	35×40 3.15				35×50 3.85				
		TYPE-Ⅱ				35×50 3.75								
		TYPE-Ⅲ												Case size Allowable ripple

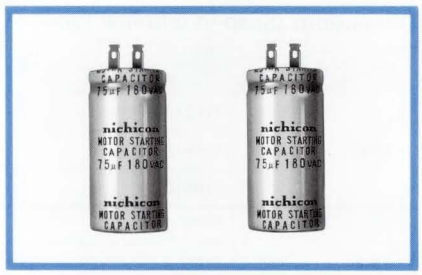
Allowable Ripple(A) at 85°C 120Hz

ALUMINUM ELECTROLYTIC CAPACITORS

MK series

Lug Terminal Type, For Motor Starting

- Two or three ranks smaller case sizes than the previous MS series.
- Three different terminal dimensions selectable for particular usages as shown below.



■Specifications

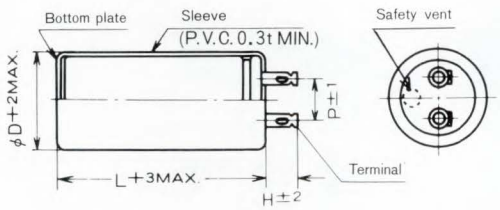
Item	Performance Characteristics
Operating Temperature Range	−20～+65℃
Voltage Range	125～250V.AC
Capacitance Range	50～250μF
Capacitance Tolerance	0～+20% at 60 Hz, 20℃
tan δ	0.08 or less at 60 Hz, 20℃
Overvoltage	①Withstanding 1.4 times of AC rated voltage for 30 seconds. ②Withstanding 1.2 times of AC rated voltage for 2 minutes. Note: The tests ① and ② are conducted by using different specimens.
Safety Vent Performance	Internal element shall not burst out of capacitor body or break the case when abnormal heat is generated by continuous application of AC voltage equivalent to 1.4 times or less of rated voltage.
Insulation Resistance	Between all terminals and mounting fixture: 100 MΩ or more
Withstand Voltage	Between all terminals and mounting fixture: 1500 VAC for 1 min.
Life Test	Apply rated voltage to a capacitor at 65℃ in accordance with the table at right. Capacitors meet the requirements shown at right when it is restored at normal temperature after completion of the test.

Rated voltage	Voltage application cycle	Number of applications
125・140V	2 times/min. 1 sec. on and 29 sec. off	75000 times
160～250V	Once/min. 1 sec. on and 59 sec. off	30000 times

Capacitance change	Within ±25% of measurement before test
Dissipation factor (tan δ)	0.2 or less

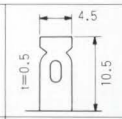
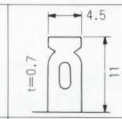
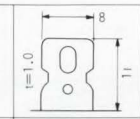
Item	Performance Characteristics
Applicable Standard	JIS C-4905, provided capacitance and dissipation factor (tan δ) are measured in accordance with 60 Hz bridge method or the equivalent.

■Drawing



φD	25	30	35	40	45	50
P	10	10	14	14	18	18

■Dimensions of terminal

Terminal dimensions (H)			
Configuration	L A	L C	L D
Applicable size	φ25～φ35	φ 40～φ 45	φ 50

Type numbering system (Example: 125V 50μF)

1	2	3	4	5	6	7	8	9	10	11
L	M	K	2	B	5	0	0	A	L	A

- 10 11: Configuration (Lug terminal)
- 9: Capacitance tolerance (0～+20%)
- 6 7 8: Capacitance (50μF)
- 4 5: Rated voltage (125V)
- 1 2 3: Series name
- Type

■Dimensions

D×L(mm)

Cap. (μF) \ W. V. (VAC)	Code	125	140	160	180	200	220	250
		2 B	C 5	2 C	2 Z	2 D	2 P	2 E
50	500	25×40	25×40	25×50	25×60	35×60	35×63	35×80
75	750	25×50	25×60	25×68	30×60	35×80	35×100	35×100
80	800	25×50	25×60	30×60	30×60	35×80	35×100	40×80
100	101	25×63	25×63	30×60	30×68	35×80	35×100	40×100
120	121	25×68	30×60	35×60	35×63	40×100	40×100	40×120
150	151	30×63	30×63	35×63	35×68	40×120	40×120	45×125
170	171	30×68	35×50	35×80	35×80	40×120	45×105	50×105
200	201	35×60	35×63	35×100	35×100	45×125	45×125	50×125
250	251	35×68	35×80	35×100	40×100			

nichicon

PLASTIC FILM CAPACITORS

2 PLASTIC FILM CAPACITORS

Contents

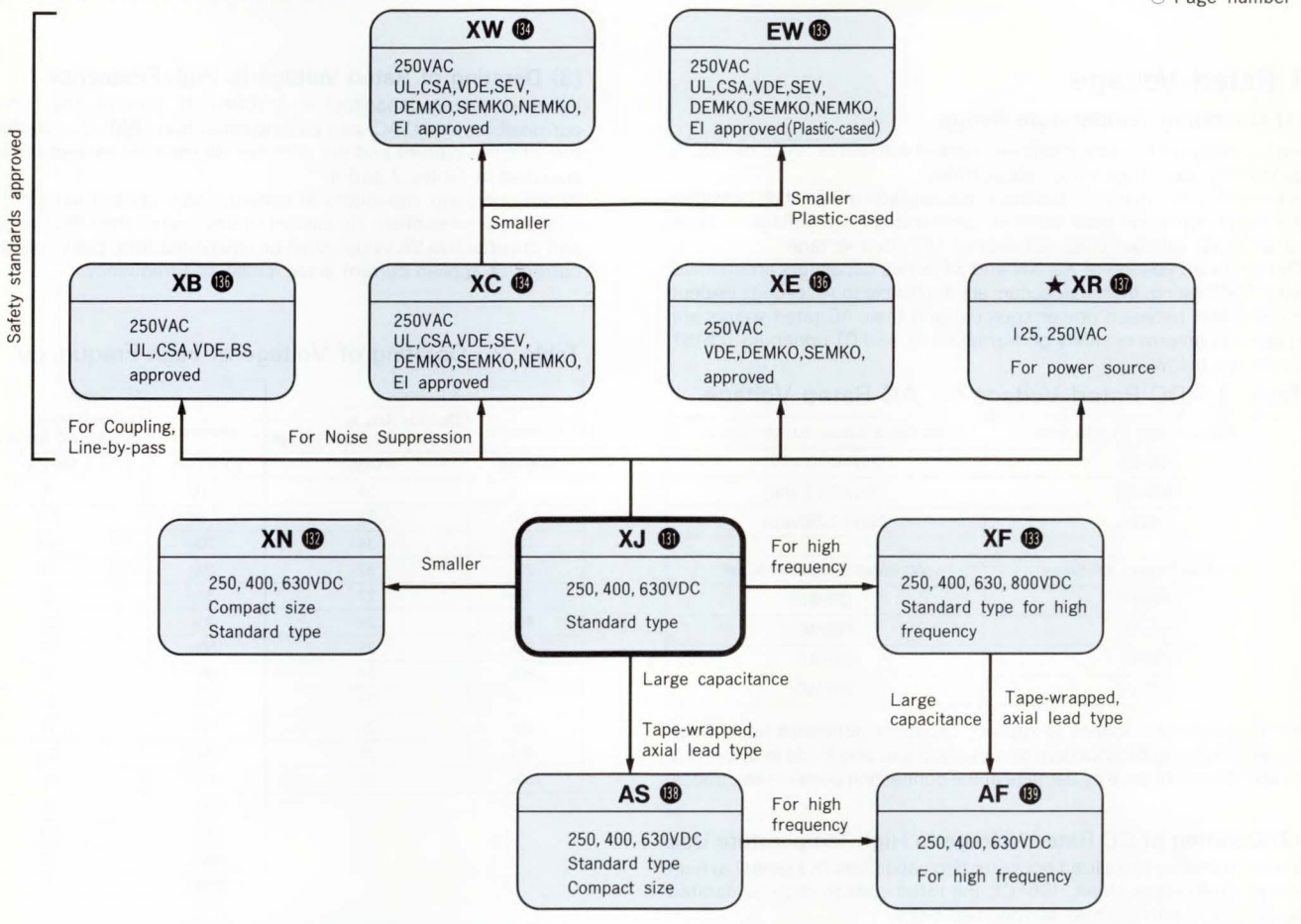
Type of Plastic Film Capacitors

Series	Electrode Construction	Dielectric	Outline	Operating Temperature Range	Rated Voltage and Capacitance Range	Features and Constructions	Applications	Page
XJ	Metallized Film Type	Metallized Polyester Film	Standard Type	−40~+85℃	0.01~3.9μF 250~630VDC	• Compact and lightweight • Flame-retardant epoxy coating	General purposes	131
XN		Metallized Polyester Film	Compact Size Standard Type	−40~+85℃	0.01~10μF 250~630VDC	• Compact and lightweight • Flame-retardant epoxy coating	General purposes	132
XF		Metallized Polypropylene Film	Standard Type For High Frequency Applications	−40~+85℃	0.01~3.9μF 250~800VDC	• Compact and lightweight • Excellent in temperature characteristics and high frequency operation • Flame-retardant epoxy coating.	For high frequency circuits	133
XW		Metallized Polyester, and Polypropylene Film	Safety Standard Approved	−40~+85℃	0.0033~1.0μF 250VAC	• UL, CSA, VDE, SEV, DEMKO, SEMKO, NEMKO, EI approved • Flame-retardant epoxy coating • High reliability	A.C. line noise suppression	134
XC		Metallized Polyester Film	Safety Standard Approved	−40~+85℃	0.01~0.47μF 250VAC	• UL, CSA, VDE, SEV, DEMKO, SEMKO, NEMKO, EI approved • Flame-retardant epoxy coating • High reliability	A.C. line noise suppression	134
EW		Metallized Polyester Film	Safety Standard Approved	−40~+85℃	0.068~1.0μF 250VAC	• Flame-retardant epoxy cased • UL, CSA, VDE, SEV, DEMKO, SEMKO, NEMKO, EI approved	A.C. line noise suppression	135
XE		Metallized Polyester Film	Safety Standard Approved	−40~+85℃	0.01~1.0μF 250VAC	• VDE, DEMKO, SEMKO, approved • Flame-retardant epoxy coating • High reliability	A.C. line noise suppression	136
XB		Metallized Polyester Film	Safety Standard Approved	−40~+85℃	0.001~0.047μF 250 VAC	• UL, CSA, VDE, BS approved • Flame-retardant epoxy coating • High reliability	Coupling, line-by-pass circuits	136
XR		Metallized Polyester Film	Electrical Appliance and Material Control Law Approved	−40~+85℃	0.01~1.0μF 125VAC 250VAC	• Flame-retardant epoxy coating • High reliability	A.C. line noise suppression	137
AS		Metallized Polyester Film	Tape-Wrapped Axial lead Type	−40~+85℃	0.1~10μF 250~630VDC	• Superior characteristics in protection from mechanical damage and high humidity • Large capacitance	Filtering, D.C. blocking and coupling circuits	138
AF		Metallized Polypropylene Film	Tape-Wrapped Axial lead Type For High Frequency Applications	−40~+85℃	0.15~10μF 250~630VDC	• Excellent in temperature coefficient and at high frequency operation • Humidity resistance • Large capacitance	Filtering of high frequency circuits and charging/discharging circuits	139
YX	Foil Type	Polyester Film	Miniaturized Standard Type	−40~+85℃	0.001~0.47μF 50, 100VDC	• Uniform epoxy coating (clear-yellow) • Optimum for auto-insertion	General purposes	140
YS		Polyester Film	Ultra-Miniaturized Low-Profile Type	−40~+85℃	0.001~0.47μF 50VDC	• Extremely low height (5mm)	Miniaturized equipment. Auto assemblies to P.C. board with high density	141
YP		Polyester Film	Ultra-Miniaturized 5mm Lead Pitch Type	−40~+85℃	0.001~0.1μF 50VDC	• Lower height and lead pitch of 5mm provide space advantage on P.C. board. • Optimum for auto insertion	Miniaturized equipment. Auto assemblies to P.C. board with high density	141

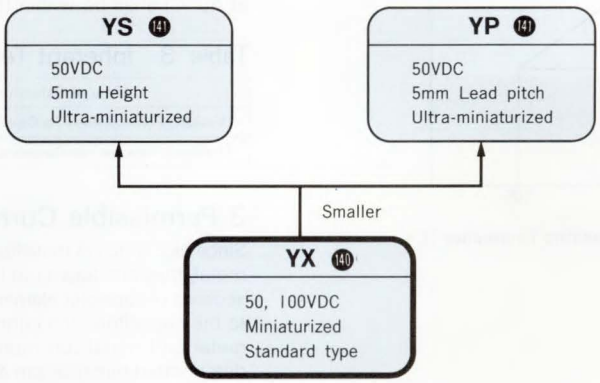
Please contact us in advance when DC rated capacitors are to be used in AC circuit.

Systematic Diagram by Series Based on Applications

Metallized Plastic Film Capacitors Chart



Foil Type Plastic Film Capacitors Chart



PRECAUTIONS IN USING PLASTIC FILM CAPACITORS

When you use plastic film capacitors, pay attention to the following.

1 Rated Voltage

(1) Operating Temperature Range

Rated voltage of film capacitors are marked with either "AC" or "DC", depending upon their major applications.
In case of "DC" marked capacitors, the applied voltage shall be within the range which the peak value of ripple voltage (DC voltage + peak value of AC voltage) does not exceed DC rated voltage.
Though rated voltage of XJ, XN and XF series capacitors are marked with "DC" rating, these capacitors are applicable to AC circuits (except for insertion between power sources) and their AC rated values are specified conform to safety performance A1 and C1 under JIS C 5151 as shown below.

Table 1 DC Rated Voltage vs. AC Rated Voltage

DC Rated Voltage XJ (XN) Series	AC Rated Voltage XJ (XN) Series
250VDC	125VAC(100VAC)
400VDC	200VAC(160VAC)
630VDC	250VAC(250VAC)

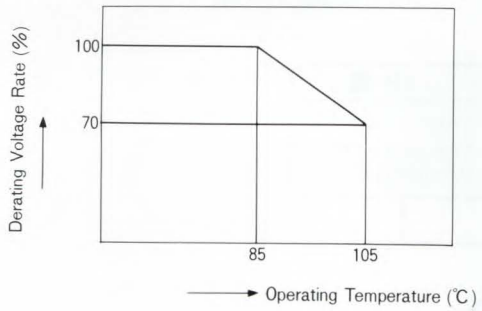
DC Rated Voltage XF Series	AC Rated Voltage XF Series
250VDC	125VAC
400VDC	160VAC
630VDC	200VAC
800VDC	250VAC

When excess AC voltage is applied, capacitor generates heat which causes oxidizing deterioration of metallized film and leads to failure due to an increase of tan δ by damage at the connecting points of electrodes.

(2) Derating of DC Rated Voltage to High Temperature Use

When operating metallized polyester film capacitors (XJ series) at high temperature range (Max. 105°C), the rated voltage shall be derated to operating temperature as specified below.
However, in case of metallized polypropylene film capacitors (XF series), they shall be operated within the specified temperature range since their heat shrinkage is much greater than metallized polyester film.

Derating of Voltage and Operating Temperature XJ Series



(3) Derating of Rated Voltage to High Frequency

When operating capacitors at 50/60Hz AC current, the maximum permissible value (VAC) can be calculated from Table 2, provided that the effective current and the effective VA shall not exceed the values specified in Tables 3 and 4.
When operating capacitors at sinuous wave other than sine wave, consult our sales office. (In case of sinuous wave, the effective current and the effective VA values shall be calculated from peak voltage and current of applied current wave, pulse and frequency.)

Table 2 Derating of Voltage at High Frequency

XJ Series		XF Series	
Frequency	Derating Rate to 50/60Hz AC Rated voltage	Frequency	Derating Rate to 50/60Hz AC Rated voltage
50/60(Hz)	100(%)	50/60(Hz)	100(%)
1k	54	1k	76
5k	39	5k	55
10k	34	10k	49
20k	30	20k	41
30k	27	30k	38
40k	26	40k	36
50k	25	50k	35
60k	24	60k	33
70k	23	70k	32
80k	22	80k	31
90k	21	90k	30
100k	21	100k	30
		200k	26
		300k	24
		400k	22
		500k	21

2 Operating Temperature Range

Operating temperature range (T) is specified as a sum of ambient temperature (Ta), inherent temperature (ΔT) and temperature rise by radiant heat from other heat sources (Tr). When capacitors are operated in AC circuit or high frequency/high ripple current circuit, temperature of capacitors rises inherently as explained above and causes damage and deterioration on dielectric film. Therefore, operating temperature shall be within the range specified for each series of capacitors.
The inherent temperature rise at no air circulation (ambient temperature at 40°C) shall be within the value listed in Table 3.

Table 3 Inherent Temperature Rise

Type of Capacitor	Inherent Temperature Rise
Metallized Polypropylene Film Capacitors (XF Series)	Within 5°C
Metallized Polyester Film Capacitors (XJ, XN Series)	Within 15°C

3 Permissible Current

Since electrodes of metallized film capacitors are of vacuum-evaporated metal, they are drawn out through a metalicon metal sprayed over the sections of capacitor element. By this reason, if excess current is applied to the capacitors, the connecting point between vacuum-evaporated metal and metalicon metal melts down and capacitor life may be deteriorated because tan δ increases and inherent temperature rises. Therefore, capacitors shall be operated within the permissible current values specified individually.

4 Use for Across-the-Line as Noise Suppressor

For across-the-line capacitors as noise suppressor, very strict safety performance is required in the U.S.A., Canada and European countries as well as in Japan. For this application, the most suitable type shall be selected from XW, XC, EW series (UL, CSA, VDE, NEMKO, SEMKO, DEMKO, SEV and EI standards recognized) and XE series (VDE, DEMKO and SEMKO standards recognized).
Besides, for antena coupling and line-by-pass capacitors, highly reliable XB series (UL, CSA, VDE and BS standards recognized) is recommended.

5 Safety Standards

For capacitors used as noise suppressor in OA appliances and VA equipment like TVs and VTRs, voltage is, in general, applied continuously for 24 hours, and moreover abnormal surge voltage (thunder serge) may be also applied unexpectedly. Such factors give very cruel influences to the capacitor life.
If capacitors get abnormal once, there will be possibility of smoking and flaming. To avoid such a dangerous trouble, many countries prohibit capacitors to be used in power source line unless otherwise recognized under the strict safety standards authorized in the world as listed below.

Table 4 Overseas Safety Standards

Name of Institution		Applicable Standards
UL	(U. S. A.)	UL1414
CSA	(Canada)	CSA C 22.2 No. 0、No. 1
VDE	(Germany)	VDE 0565-1
EI	(Finland)	E384/14(IEC384-14)
SEMKO	(Sweden)	SS 443 04 14
NEMKO	(Norway)	NEMKO 132
DEMKO	(Denmark)	Afsnit 21
SEV	(Switzerland)	SEV 1055
BSI	(U. K.)	BS 415

Though UL 1283 is the standard to specify a filter, a capacitor shall meet UL 1414 when used solely.

6 Class of Capacitors

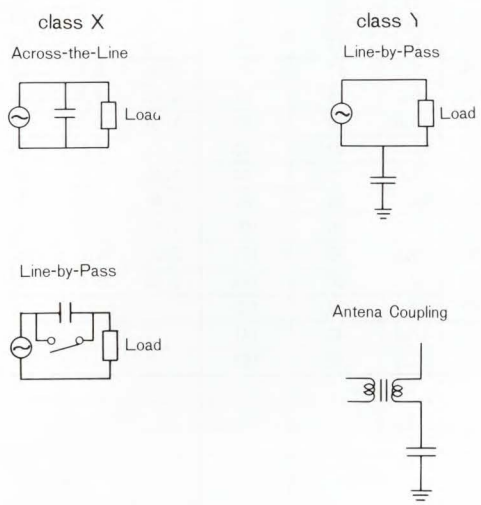
Safety regulations on capacitors are classified by IEC, depending upon the usage of circuitry. (European countries are also conforming to IEC standard.)

Class X : A capacitor of a type suitable for use in situations where failure of the capacitor would not lead to danger of electrical shock.

Class Y : A capacitor of a type suitable for use in situations where failure of the capacitor could lead to danger of electrical shock.

According to UL (U.S.A.) and CSA (Canada), the class of safety regulations is expressed and classified in the following ways.

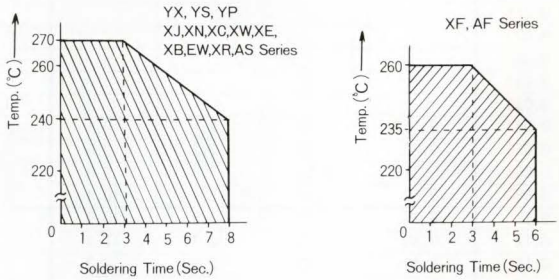
Across-the-line..... X
Line-by-pass.....X, Y
Antena coupling..... Y



7 General Precautions

(1) Soldering Conditions

When soldering capacitors, a soldering process for a long time and at high temperature may result in deterioration of characteristics or short-circuit defects. Please ensure that soldering is carried out within the range shown in the diagram below.



(2) Load to Lead Wires

Attention must be paid to avoid mechanical shock or damage to capacitors so that lead wires may not be loaded more than necessary, because excess load may result in disconnection of lead wires or short-circuit defects.

(3) Shock to Capacitors

Attention must be paid so that any sharp objects like air-driver, soldering iron, pincette, chassis edge and etc. may not stick strongly to the surface of capacitors.

(4) Cleaning Solvent

For cleaning PC boards, a solvent which has little effect to capacitors such as isopropyl alcohol, Daiflon S3-MC, Daiflon S3-E and etc. should be used.
Solvents containing chlorine types such as dichloroethane, trichloroethylene and etc. should be avoided.

(5) Charging / Discharging

When capacitors are used in a rapid and frequent charge / discharge circuit, the deterioration of capacitor performance is accelerated. So, film capacitors are not suited for such an application. If used so, charge / discharge should be done through a resistor of 2 kΩ or higher.

8 Hum (Buzz)

Hum produced by capacitors is due to mechanical vibration of dielectric (film) caused by the coulomb force which exsists between electrodes which opposite polarity. A more louder hum is produced especially when applied voltage has distortion, and/or higher frequency component, although hum does not spoil characteristics of capacitors.

9 Others

(1) With regard to product specifications, materials and other points mentioned in this catalog may be changed without notification.
Data shown in this catalog are of typical figures and do not guarantee performance of the capacitors.

(2) When placing an order or making an inquiry, please specify the followings;

- Working voltage (DC or AC)
- Capacitance value and capacitance tolerance
- Operating temperature range
- Operating conditions (Waveform, frequency, pulse, current, etc)
- Safety level

*Influence to other components when a capacitor gets short-circuited or open.
*Influence to the capacitor when other components or the circuit work irregularly.

■Table 5 XJ series Permissible Current and VA Value

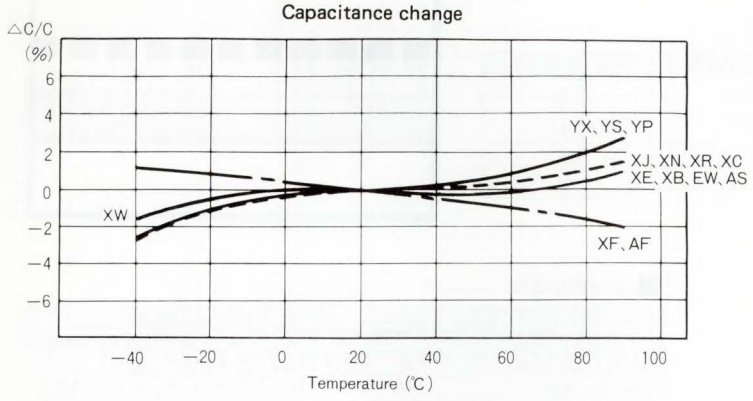
Capacitance (μF)	250VDC (2E)				400VDC (2G)				630VDC (2J)			
	Permissible Effective Current Ie (A)	Permissible Peak Current at Single Pulse Ip2 (A)	Permissible VA Value (Ie×Ve)		Permissible Effective Current Ie (A)	Permissible peak Current at Single Pulse Ip2 (A)	Permissible VA Value (Ie×Ve)		Permissible Effective Current Ie (A)	Permissible Peak Current at Single Pulse Ip2 (A)	Permissible VA Value (Ie×Ve)	
			Operating Temp. Max. 85℃ (VA)	Operating Temp. Max. 65℃ (VA)			Operating Temp. Max. 85℃ (VA)	Operating Temp. Max. 65℃ (VA)			Operating Temp. Max. 85℃ (VA)	Operating Temp. Max. 65℃ (VA)
0.01									0.10	1.00	2.6	11.3
0.012									0.15	1.50	2.7	11.9
0.015									0.15	1.50	2.9	12.6
0.018									0.20	2.00	3.0	13.3
0.022					0.15	1.50	2.3	10.2	0.25	2.50	3.3	14.3
0.027					0.20	2.00	2.5	10.8	0.25	2.50	3.5	15.4
0.033					0.20	2.00	2.6	11.5	0.25	2.50	3.8	16.7
0.039					0.20	2.00	2.8	12.1	0.25	2.50	4.1	17.8
0.047	0.15	1.50	2.1	9.1	0.25	2.50	2.9	12.7	0.25	2.50	4.3	18.7
0.056	0.20	2.00	2.2	9.5	0.30	3.00	3.1	13.4	0.30	3.00	4.6	19.9
0.068	0.25	2.50	2.3	9.8	0.35	3.50	3.3	14.3	0.35	3.50	5.0	21.8
0.082	0.30	3.00	2.4	10.4	0.35	3.50	3.5	15.3	0.45	4.50	5.4	23.5
0.1	0.35	3.50	2.5	10.9	0.35	3.50	3.8	16.5	0.55	5.50	5.7	24.9
0.12	0.35	3.50	2.7	11.9	0.35	3.50	4.1	18.1	0.55	5.50	6.2	26.9
0.15	0.40	4.00	2.9	12.7	0.45	4.50	4.5	19.6	0.55	5.50	7.3	31.8
0.18	0.50	5.00	3.0	13.3	0.55	5.50	4.8	21.0	0.65	6.50	7.9	34.5
0.22	0.60	6.00	3.3	14.3	0.65	6.50	5.2	22.6	0.80	8.00	8.5	37.0
0.27	0.65	6.50	3.5	15.4	0.80	8.00	5.7	24.9	1.00	10.00	9.3	40.7
0.33	0.65	6.50	3.8	16.7	1.00	10.00	6.2	27.0	1.20	12.00	10.2	44.5
0.39	0.65	6.50	4.3	18.6	1.20	12.00	6.6	28.9	1.25	12.50	11.1	48.2
0.47	0.75	7.50	4.6	19.9	1.20	12.00	7.2	31.6	1.25	12.50	12.1	53.0
0.56	0.90	9.00	4.8	21.1	1.20	12.00	8.3	36.3	1.50	15.00	13.1	57.3
0.68	1.10	11.00	5.3	23.2	1.40	14.00	9.0	39.4				
0.82	1.35	13.50	5.7	24.9	1.70	17.00	9.8	42.7				
1.0	1.65	16.50	6.2	27.0	1.95	19.50	10.7	46.7				
1.2	1.80	18.00	6.7	29.2	1.95	19.50	11.9	51.8				
1.5	1.80	18.00	8.0	35.1	2.40	24.00	13.1	57.1				
1.8	2.10	21.00	8.6	37.7								
2.2	2.60	26.00	9.4	41.1								
2.7	3.00	30.00	10.3	44.9								
3.3	3.00	30.00	11.6	50.5								
3.9	3.60	36.00	12.5	54.5								

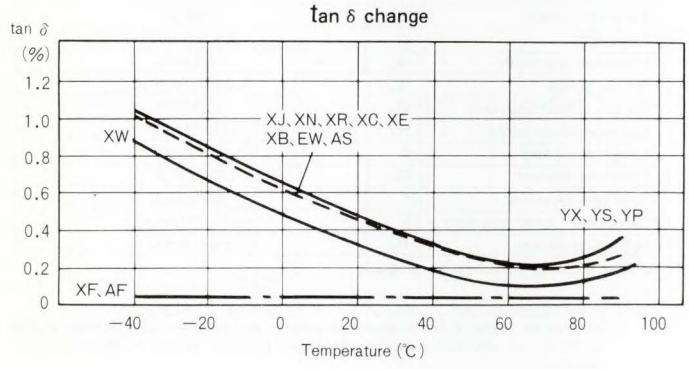
■Table 6 XF series Permissible Current and VA Value

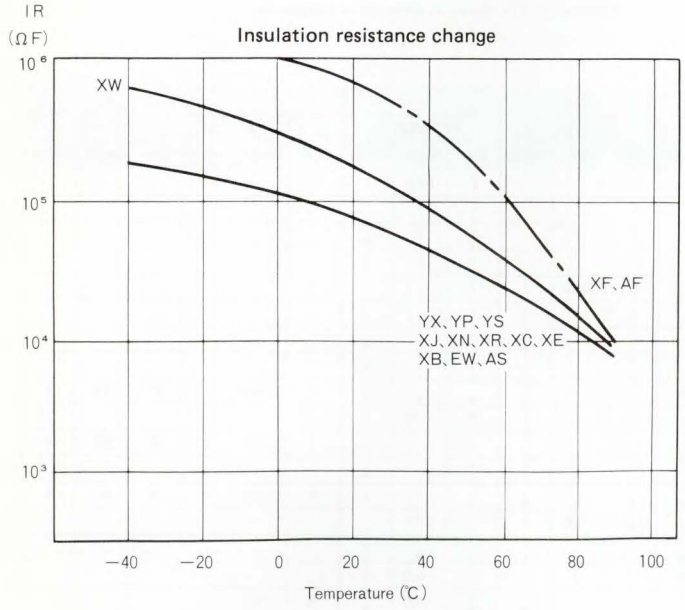
Capacitance (μF)	250VDC (2E)				400VDC (2G)				630VDC (2J)				800VDC (2K)			
	Permissible Effective Current Ie (A)	Permissible Peak Current at Single Pulse Ip2 (A)	Permissible VA Value (Ie×Ve)		Permissible Effective Current Ie (A)	Permissible Peak Current at Single Pulse Ip2 (A)	Permissible VA Value (Ie×Ve)		Permissible Effective Current Ie (A)	Permissible Peak Current at Single Pulse Ip2 (A)	Permissible VA Value (Ie×Ve)		Permissible Effective Current Ie (A)	Permissible Peak Current at Sinle Pulse Ip2 (A)	Permissible VA Value (Ie×Ve)	
			Operating Temp. Max. 85℃ (VA)	Operating Temp. Max. 65℃ (VA)			Operating Temp. Max. 85℃ (VA)	Operating Temp. Max. 65℃ (VA)			Operating Temp. Max. 85℃ (VA)	Operating Temp. Max. 65℃ (VA)			Operating Temp. Max. 85℃ (VA)	Operating Temp. Max. 65℃ (VA)
0.01									0.15	1.5	8	26	0.20	2.0	9	29
0.012									0.15	1.5	8	27	0.20	2.0	9	31
0.015									0.20	2.0	8	29	0.25	2.5	10	33
0.018									0.25	2.5	9	30	0.25	2.5	11	36
0.022					0.20	2.0	8	26	0.30	3.0	9	32	0.25	2.5	11	39
0.027					0.25	2.5	8	29	0.35	3.5	10	34	0.25	2.5	12	42
0.033					0.35	3.5	9	31	0.35	3.5	10	35	0.30	3.0	13	45
0.039					0.35	3.5	9	32	0.35	3.5	12	40	0.40	4.0	15	49
0.047	0.30	3.0	8	26	0.50	5.0	10	34	0.35	3.5	13	43	0.50	5.0	16	52
0.056	0.35	3.5	8	27	0.50	5.0	11	37	0.40	4.0	13	45	0.60	6.0	17	56
0.068	0.40	4.0	8	29	0.50	5.0	12	40	0.50	5.0	15	50	0.70	7.0	18	60
0.082	0.50	5.0	9	30	0.50	5.0	13	43	0.60	6.0	16	53	0.85	8.5	19	65
0.1	0.60	6.0	9	32	0.60	6.0	14	47	0.75	7.5	17	57	0.85	8.5	22	72
0.12	0.70	7.0	10	34	0.70	7.0	15	50	0.90	9.0	18	61	0.85	8.5	25	82
0.15	0.80	8.0	11	37	0.90	9.0	16	55	1.00	10.0	20	67	1.00	10.0	27	90
0.18	0.80	8.0	12	40	1.00	10.0	18	59	1.10	11.0	22	73	1.25	12.5	29	98
0.22	0.80	8.0	13	45	1.30	13.0	19	64	1.10	11.0	25	84	1.40	14.0	31	103
0.27	1.00	10.0	14	48	1.50	15.0	21	71	1.40	14.0	28	92	1.40	14.0	31	103
0.33	1.20	12.0	16	52	1.60	16.0	23	78	1.75	17.5	30	100	1.75	17.5	39	130
0.39	1.40	14.0	17	57	1.60	16.0	26	88	1.90	19.0	32	107	2.00	20.0	42	141
0.47	1.70	17.0	18	60	1.90	19.0	29	97	1.90	19.0	36	119	2.50	25.0	47	155
0.56	2.00	20.0	19	65	2.30	23.0	31	104	2.20	22.0	39	129				
0.68	2.50	25.0	21	72	2.60	26.0	34	114	2.70	27.0	42	141				
0.82	2.60	26.0	23	78	2.60	26.0	38	127	3.25	32.5	46	153				
1.0	2.60	26.0	28	92	3.10	31.0	42	139								
1.2	3.00	30.0	30	99	3.75	37.5	47	156								
1.5	3.85	38.5	33	110	4.75	47.5	51	169								
1.8	4.40	44.0	36	120												
2.2	4.40	44.0	41	135												
2.7	5.00	50.0	45	148												
3.3	5.00	50.0	49	163												
3.9	5.00	50.0	53	177												

Typical Characteristic Curves

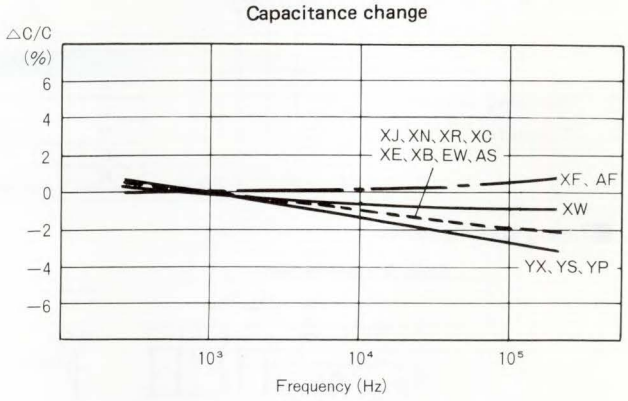
Temperature Characteristics

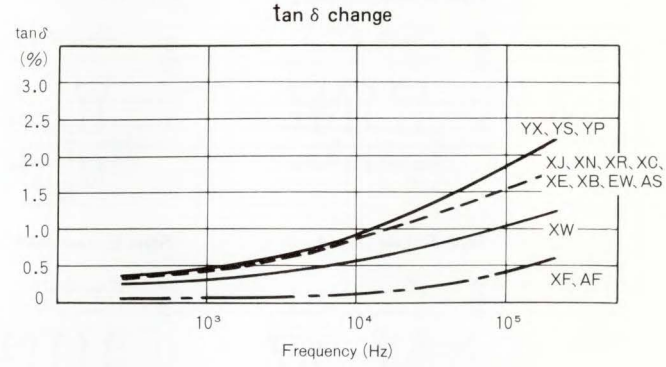


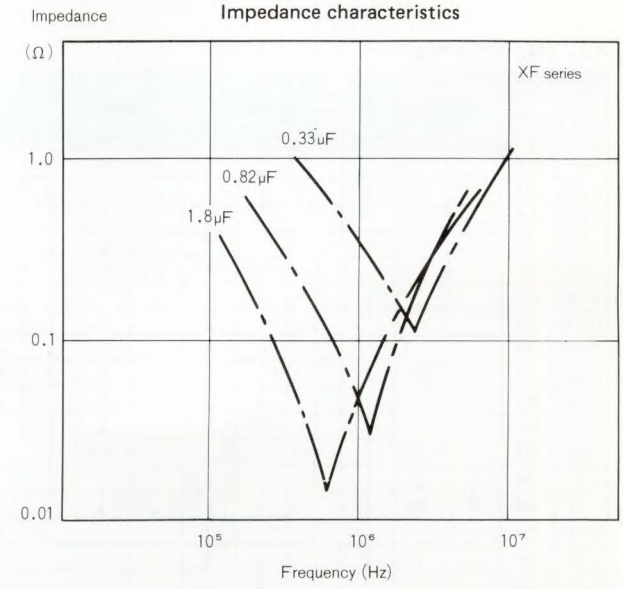




Frequency Characteristics







PLASTIC FILM CAPACITORS

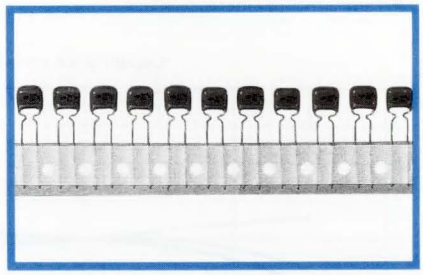
Taped Capacitors for Automatic Insertion Systems

■ Type numbering system

Q X J 2 J 1 0 3 K T P 3 T A (12 13 14)

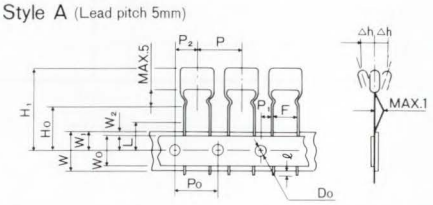
- Representing taped unit
- T : Ammo-pack
- Code

Code	Lead-to-lead distance(F)	Pitch of compont(P)
A	5.0	12.7
L	5.0	15.0
M	5.0	25.4
E	7.5	15.0
R	7.5	30.0

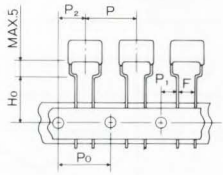


■ Taping specifications

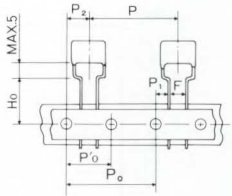
Style A (Lead pitch 5mm)



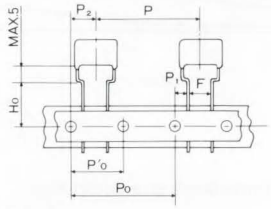
Style L (Lead pitch 5mm)



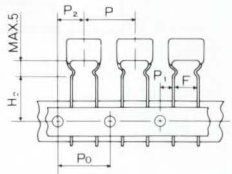
Style M (Lead pitch 5mm)



Style R (Lead pitch 7.5mm)



Style E (Lead pitch 7.5mm)



■ Dimensions

Item	Symbol	Dimensions(mm)					
		A	L	M	E	R	Tolerance
Pitch of component	P	12.7	15.0	25.4	15.0	30.0	±1.0
Feed hole pitch	P_o*	12.7	15.0	25.4	15.0	30.0	±0.3
Feed hole pitch	P'_o*	——	——	12.7	——	15.0	±0.3
Distance between hole and lead wire	P_1	3.85	5.0	3.85	3.75	3.75	±0.7
Distance between hole and component	P_2	6.35	7.5	6.35	7.5	7.5	±1.3
Lead-to-lead distance	F	5.0	5.0	5.0	7.5	7.5	±0.8
Tilt of component	△h	0±2.0					
Tape width	W	18+1.0−0.5					
Hold-down tape width	W_o	12.5MIN.					
Slip out of hole	W_1	9.0+0.75−0.5					
Slip out of hold-down tape	W_2	3.0MAX.					
Lead-wire clinch height	H_o	16.0±0.5					
Length of cut lead	ℓ	2.0MAX.					
Feed hole diameter	D_o	4.0±0.2					
Total tape thickness	t	0.7±0.2					
Cut length of rejected component	L	11.0MAX.					
Upper side position	H_1	Ho+ 5 +C					

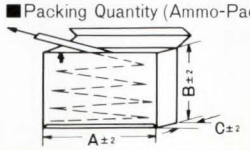
Remarks ＊ : No feed hole omission is allowed.

Note 1) Measuring positions for P_1, F, and H_o shall be at the lower part of lead wire clinch.
2) Conseecutive omissions due to rejected components shall be allowed up to 3 pieces, provided that the first one after turn-up shall be with no taping and not be counted among the omission numbers.
3) When connecting tapes, both of front and back sides shall be sticked with hold-down tape.
4) At the start and end of taping, empty feeding shall be corresponding to more than 8, and less than 11 pieces.
5) Marking shall be allowed at either side of components.

XJ、XN、XRseries

Series		XJ									XN									XR					
W.V.		250VDC			400VDC			630VDC			250VDC			400VDC			630VDC			125VAC			250VAC		
(μF) Cap.	Code	Style	Quantity	Case Code	Style	Quantity	Case Code	Style	Quantity	Case Code	Style	Quantity	Case Code	Style	Quantity	Case Code	Style	Quantity	Case Code	Style	Quantity	Case Code	Style	Quantity	Case Code
0.01	103							R	1000	3							E	1000	1						
0.012	123																								
0.015	153																								
0.018	183																		2						
0.022	223				E	1000	2		500	1				E	1000	2									
0.027	273																								
0.033	333																								
0.039	393				R		3												4						
0.047	473	L	1000	2						4	A	1000	1							E	1000	2	R	500	4
0.056	563																R	500	3						
0.068	683					500	1													E	1000	2	R	500	4
0.082	823								400																
0.1	104																		4	E	1000	2	R	400	4
0.12	124	M	500				4						2	R	500	3									
0.15	154																	400							
0.18	184										L		3												
0.22	224			3														300		R	500	3			
0.27	274					400										4									
0.33	334														400					R	400	4			
0.39	394			4							M	500	2												
0.47	474					300														R	400	4			
0.56	564												4												
0.68	684																								
0.82	824																								
1.0	105																								
1.2	125											400													
1.5	155																								

■ Packing Quantity (Ammo-Pack)



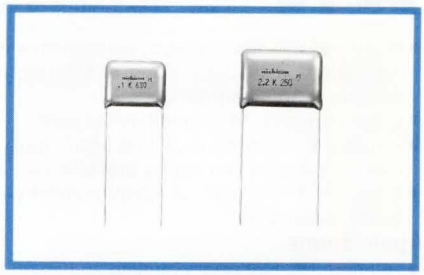
(mm)

Case Code	A	B	C
1	330	235	55
2	330	300	55
3	330	330	55
4	350	360	62

XJ

Metallized Polyester Film Capacitor

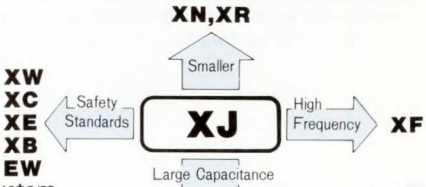
series (Extended Standard Type)



- Highly reliable and superior performance in high frequency applications, self-healing and non-inductive construction, using a dielectric made of polyethylene terepthalate film covered with vacuum-evaporated metal.
- Finished by inner dipping with liquid epoxy resin and outer coating with flame-retardant epoxy resin, those double coating provides excellentt humidity resistance.
- Designed to be compact and to cover larger capacitance range having advantage of tolerating to A.C. voltage and large current flow.
- Designed 1 mm max. of epoxy on lead wire for best performance at soldering process on P.C. board assemblies.
- Available both lead cut/forming type and taping type (capacitor width (W) must be 25.5 mm or less.) for automatic insertion systems.

Application

- Filtering. DC-blocking, coupling and so on of general communications equipment and use in AC circuits for motor starting, charging/discharging, lighting, noise suppression and etc. Contact us for details for use in AC circuits.



■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+85℃
Rated Voltage	250、400、630V.D.C.
Capacitance Range	0.01～3.9μF
Capacitance Tolerance	±5%(J)、±10%(K)
Dielectric Loss Tangent	0.8% or less (at 1kHz 20℃)
Insulation Resistance	C≦0.33μF 9000MΩ or more C>0.33μF 3000ΩF or more
Withstand Voltage	Between Terminals :Rated Voltage×175%, 1～5 secs. Between Terminals and Coverage:Rated Voltage×200%, 1～5 secs.
Encapsulation	Flame-retardant epoxy resin
Applicable Standard	JIS C 5115

Type numbering system
(Example: 630V 0.01μF)

1	2	3	4	5	6	7	8	9	10	11	12
Q	X	J	2	J	1	0	3	K	T	P	T

- 12: AC usage applicable
- 10,11: Configuration (TP : Polyester film, Soldered CP wire)
- 9: Capacitance tolerance (J : ±5% K : ±10%)
- 6,7,8: Capacitance (0.01 μF)
- 4,5: Rated voltage (630V)
- 1,2,3: Series name
- Q: Type

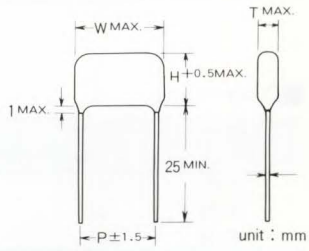
AC Rated Voltage

- AC rated voltage (Operating at 50/60Hz AC circuit) shall be as follows excluding across-the-line applications.

DC Rated Voltage	250VDC	400VDC	630VDC
AC Rated Voltage	125VAC	200VAC	250VAC

- Wher used in high frequency circuit, refer to Table 2 and 5 in pages 126, 128 for the values of effective voltage, current and effective VA.

■Drawing



■Dimensions

Cap. (μF)	Code	W.V.(Code) / Size	250VDC (2E)					400VDC (2G)					630VDC (2J)				
			T	W	H	d	P	T	W	H	d	P	T	W	H	d	P
0.01	103												4.8	15.0	8.9	0.6	12.5
0.012	123												5.1	15.0	9.2	0.6	12.5
0.015	153												5.5	15.0	9.5	0.6	12.5
0.018	183												5.8	15.0	9.9	0.6	12.5
0.022	223							4.9	13.0	9.0	0.6	10.5	6.3	15.0	10.3	0.6	12.5
0.027	273							5.2	13.0	9.3	0.6	10.5	6.8	15.0	10.9	0.6	12.5
0.033	333							5.6	13.0	9.7	0.6	10.5	7.1	15.0	11.8	0.6	12.5
0.039	393							5.2	15.0	9.3	0.6	12.5	7.6	15.0	12.3	0.6	12.5
0.047	473	4.7	13.0	8.8	0.6	10.5	5.5	15.0	9.6	0.6	12.5	6.2	20.0	11.0	0.6	17.5	
0.056	563	4.7	13.0	8.8	0.6	10.5	5.9	15.0	9.9	0.6	12.5	6.7	20.0	11.4	0.6	17.5	
0.068	683	4.7	13.0	8.8	0.6	10.5	6.3	15.0	10.4	0.6	12.5	6.7	20.0	13.0	0.6	17.5	
0.082	823	5.0	13.0	9.1	0.6	10.5	6.8	15.0	10.8	0.6	12.5	7.3	20.0	13.6	0.6	17.5	
0.1	104	5.3	13.0	9.4	0.6	10.5	7.3	15.0	11.4	0.6	12.5	7.8	20.0	14.1	0.6	17.5	
0.12	124	5.1	15.0	9.2	0.6	12.5	6.0	20.0	10.7	0.6	17.5	8.5	20.0	14.8	0.6	17.5	
0.15	154	5.5	15.0	9.6	0.6	12.5	6.6	20.0	11.3	0.6	17.5	8.0	25.5	14.8	0.8	22.5	
0.18	184	5.8	15.0	9.9	0.6	12.5	7.1	20.0	11.8	0.6	17.5	8.1	25.5	16.5	0.8	22.5	
0.22	224	6.3	15.0	10.4	0.6	12.5	7.7	20.0	12.4	0.6	17.5	8.9	25.5	17.1	0.8	22.5	
0.27	274	6.8	15.0	10.9	0.6	12.5	7.8	20.0	14.1	0.6	17.5	9.9	25.5	18.2	0.8	22.5	
0.33	334	7.4	15.0	11.5	0.6	12.5	8.6	20.0	14.8	0.6	17.5	10.9	25.5	19.3	0.8	22.5	
0.39	394	6.2	20.0	10.9	0.6	17.5	9.2	20.0	15.5	0.6	17.5	11.9	25.5	20.3	0.8	22.5	
0.47	474	6.7	20.0	11.4	0.6	17.5	10.1	20.0	16.4	0.6	17.5	11.3	30.5	19.7	0.8	27.5	
0.56	564	7.1	20.0	11.9	0.6	17.5	8.6	25.5	17.0	0.8	22.5	12.3	30.5	20.7	0.8	27.5	
0.68	684	7.2	20.0	13.5	0.6	17.5	9.5	25.5	17.9	0.8	22.5						
0.82	824	7.8	20.0	14.1	0.6	17.5	10.4	25.5	18.8	0.8	22.5						
1.0	105	8.6	20.0	14.8	0.6	17.5	11.5	25.5	19.9	0.8	22.5						
1.2	125	9.3	20.0	15.6	0.6	17.5	11.0	30.5	19.4	0.8	27.5						
1.5	155	8.3	25.5	16.6	0.8	22.5	12.3	30.5	20.6	0.8	27.5						
1.8	185	9.0	25.5	17.4	0.8	22.5											
2.2	225	10.0	25.5	18.3	0.8	22.5											
2.7	275	11.0	25.5	19.4	0.8	22.5											
3.3	335	10.7	30.5	19.1	0.8	27.5											
3.9	395	11.7	30.5	20.0	0.8	27.5											

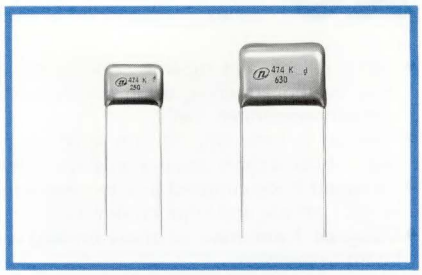
PLASTIC FILM CAPACITORS

XN

Metallized Polyester Film Capacitor

series (Extended Standard Type)

Smaller



- Highly reliable and superior performance in high frequency applications, self-healing and non-inductive construction, using a dielectric made of polyethylene terepthalate film covered with vacuum-evaporated metal.
- Large capacitance in small dimensions.
- Finished by inner dipping with liquid epoxy resin and outer coating with flame-retardant epoxy resin, those double coating provides excellent humidity resistance.
- Designed 1 mm max. of epoxy on lead wire for best performance at soldering process on P.C. board assemblies.

Applications

- Filtering, DC-blocking, coupling and so on of general communications equipment and use in AC circuits for motor starting, charging/discharging, lighting, noise suppression and etc. Contact us for details for use in AC circuits.

XN

Smaller

XJ

Type numbering system (Example: 630V 0.01μF)

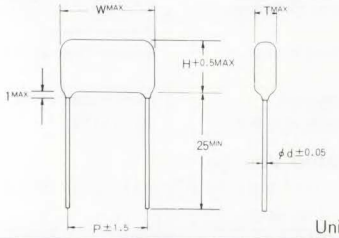
1	2	3	4	5	6	7	8	9	10	11
Q	X	N	2	J	1	0	3	K	T	P

- Configuration (TP: Polyester film, welded CP wire)
- Capacitance tolerance (J: ±5% K: ±10%)
- Capacitance (0.01 μF)
- Rated voltage (630V)
- Series name
- Type

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+85℃
Rated Voltage	250、400、630V.D.C.
Capacitance Range	0.01～10μF
Capacitance Tolerance	±5%(J)、±10%(K)
Dielectric Loss Tangent	0.8% or less (at 1 kHz 20℃)
Insulation Resistance	C≦0.33μF 9000MΩ or more C>0.33μFΩF 3000ΩF or more
Withstand Voltage	Between Terminals : Rated Voltage×175%, 1～5 secs. Between Terminals and Coverage : Rated Voltage×200%, 1～5 secs.
Encapsulation	Flame retardant epoxy resin
Applicable Standard	JIS C 5115

■Drawing



■Dimensions

Unit : mm

Cap. (μF) \ W.V.(Code) / Code / Size	250VDC (2E)					400VDC (2G)					630VDC (2J)				
	T	W	H	d	P	T	W	H	d	P	T	W	H	d	P
0.01 / 103											4.4	13.0	9.0	0.6	10.0
0.012 / 123											4.4	13.0	9.0	0.6	10.0
0.015 / 153											4.7	13.0	9.3	0.6	10.0
0.018 / 183											4.8	13.0	10.0	0.6	10.0
0.022 / 223						4.3	10.5	7.9	0.6	7.5	5.1	13.0	10.3	0.6	10.0
0.027 / 273						4.6	10.5	8.2	0.6	7.5	5.5	13.0	10.7	0.6	10.0
0.033 / 333						4.9	10.5	8.6	0.6	7.5	5.9	13.0	11.1	0.6	10.0
0.039 / 393						4.5	13.0	9.1	0.6	10.0	6.5	13.0	11.1	0.6	10.0
0.047 / 473	4.0	10.5	7.6	0.6	7.5	4.7	13.0	9.3	0.6	10.0	6.4	13.0	13.2	0.6	10.0
0.056 / 563	4.2	10.5	7.9	0.6	7.5	4.7	13.0	9.6	0.6	10.0	5.4	18.0	10.6	0.6	15.0
0.068 / 683	4.7	10.5	8.2	0.6	7.5	5.4	13.0	10.0	0.6	10.0	5.8	18.0	11.0	0.6	15.0
0.082 / 823	4.8	10.5	8.5	0.6	7.5	5.8	13.0	10.4	0.6	10.0	5.9	18.0	12.7	0.6	15.0
0.1 / 104	5.2	10.5	8.9	0.6	7.5	6.1	13.0	11.2	0.6	10.0	6.4	18.0	13.2	0.6	15.0
0.12 / 124	5.6	10.5	9.2	0.6	7.5	5.0	18.0	10.3	0.6	15.0	6.4	18.0	14.8	0.6	15.0
0.15 / 154	6.1	10.5	9.8	0.6	7.5	5.1	18.0	11.9	0.6	15.0	7.1	18.0	15.4	0.6	15.0
0.18 / 184	5.2	13.0	10.4	0.6	10.0	5.5	18.0	12.3	0.6	15.0	8.3	18.0	15.0	0.6	15.0
0.22 / 224	5.9	13.0	10.5	0.6	10.0	5.9	18.0	12.7	0.6	15.0	9.6	18.0	14.8	0.6	15.0
0.27 / 274	6.2	13.0	11.4	0.6	10.0	6.5	18.0	13.3	0.6	15.0	7.2	25.0	15.5	0.8	22.5
0.33 / 334	6.7	13.0	11.9	0.6	10.0	7.6	18.0	12.8	0.6	15.0	7.9	25.0	16.2	0.8	22.5
0.39 / 394	5.1	18.0	11.9	0.6	15.0	8.2	18.0	13.4	0.6	15.0	8.5	25.0	16.9	0.8	22.5
0.47 / 474	5.5	18.0	12.3	0.6	15.0	8.3	18.0	15.1	0.6	15.0	9.4	25.0	17.7	0.8	22.5
0.56 / 564	5.5	18.0	13.8	0.6	15.0	6.6	25.0	15.0	0.8	22.5	10.2	25.0	18.6	0.8	22.5
0.68 / 684	6.0	18.0	14.3	0.6	15.0	7.2	25.0	15.6	0.8	22.5	11.3	25.0	19.6	0.8	22.5
0.82 / 824	6.5	18.0	14.8	0.6	15.0	7.9	25.0	16.3	0.8	22.5	10.8	30.0	19.4	0.8	27.5
1.0 / 105	7.1	18.0	15.5	0.6	15.0	8.7	25.0	17.1	0.8	22.5	12.0	30.0	20.5	0.8	27.5
1.2 / 125	8.3	18.0	15.1	0.6	15.0	9.6	25.0	17.9	0.8	22.5	13.2	30.0	21.7	0.8	27.5
1.5 / 155	9.9	18.0	15.1	0.6	15.0	9.4	30.0	18.0	0.8	27.5	14.8	30.0	23.3	0.8	27.5
1.8 / 185	7.4	25.0	15.7	0.8	22.5	10.3	30.0	18.9	0.8	27.5	16.3	30.0	24.8	0.8	27.5
2.2 / 225	8.1	25.0	16.5	0.8	22.5	11.5	30.0	20.0	0.8	27.5					
2.7 / 275	9.0	25.0	17.4	0.8	22.5										
3.3 / 335	10.0	25.0	18.3	0.8	22.5										
3.9 / 395	10.9	25.0	19.2	0.8	22.5										
4.7 / 475	12.0	25.0	20.3	0.8	22.5										
5.6 / 565	11.5	30.0	20.1	0.8	27.5										
6.8 / 685	12.7	30.0	21.3	0.8	27.5										
8.2 / 825	14.1	30.0	22.6	0.8	27.5										
10.0 / 106	15.6	30.0	24.2	0.8	27.5										

nichicon

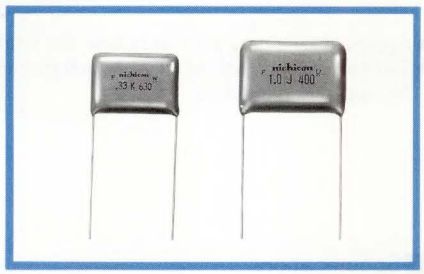
XF

Metallized Polypropylene Film Capacitor

series (For High Frequency Applications)

For High Frequency

- Ideal for high frequency applications due to a metallized polypropylene film dielectric which exhibits superior operative characteristics with minimal loss at high frequency.
- Self-healing electrode and non-inductive construction provide excellent characteristics in minimal inductance having better withstanding voltage capability.
- Finished by inner dipping with liquid epoxy resin and outer coating with flame-retardant epoxy resin, those double coating gives superior characteristics against moisture.



Applications

- High frequency circuit, large current flowing circuit and etc.

XJ High Frequency → XF

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+85℃
Rated Voltage	250、400、630、800V.D.C.
Capacitance Range	0.01～3.9μF
Capacitance Tolerance	±5%(J)、±10%(K)
Dielectric Loss Tangent	0.1% or less (at 1kHz 20℃)
Insulation Resistance	C≦0.33μF 30000MΩ or more C>0.33μF 10000ΩF or more
Withstand Voltage	Between Terminals : Rated Voltage×175%, 1～5 secs. Between Terminals and Coverage { 250V.D.C. 1000V.A.C., 1 minute 400～800V.D.C. 1500V.A.C., 1 minute
Encapsulation	Flame retardant epoxy resin

Type numbering system (Example: 630V 0.01μF)

1	2	3	4	5	6	7	8	9	10	11	12
Q	X	F	2	J	1	0	3	K	R	P	T

- 12: AC usage applicable
- 10 11: Configuration (RP:Polypropylene film, welded CP wire)
- 9: Capacitance tolerance (J:±5% K:±10%)
- 6 7 8: Capacitance (0.01 μF)
- 4 5: Rated voltage (630V)
- 2 3: Series name
- 1: Type

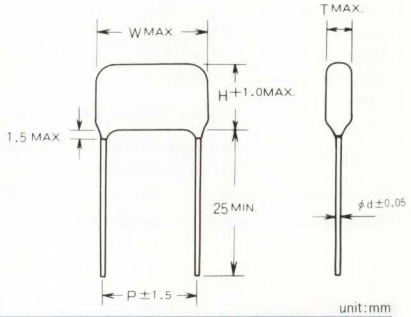
AC Rated Voltage

- AC rated voltage (Operating at 50/60 Hz AC circuit) shall be as follows excluding across-the-line applications.

DC Rated Voltage	250VDC	400VDC	630VDC	800VDC
AC Rated Voltage	125VAC	160VAC	200VAC	250VAC

- When used in high frequency circuit, refer to Table 2 and 6 for the values of effective voltage, current and effective VA, shown in pages 116～117

■Drawing



■Dimensions

unit:mm

Cap. (μF)	W.V.(Code) / Code / Size	250VDC (2E)					400VDC (2G)					630VDC (2J)					800VDC (2K)				
		T	W	H	d	P	T	W	H	d	P	T	W	H	d	P	T	W	H	d	P
0.01	103											5.5	15.5	9.6	0.6	12.5	6.2	15.5	10.3	0.6	12.5
0.012	123											5.7	15.5	9.8	0.6	12.5	6.5	15.5	10.6	0.6	12.5
0.015	153											6.1	15.5	10.1	0.6	12.5	7.0	15.5	11.1	0.6	12.5
0.018	183											6.4	15.5	10.5	0.6	12.5	7.5	15.5	11.6	0.6	12.5
0.022	223						5.8	15.5	9.4	0.6	12.5	6.8	15.5	10.8	0.6	12.5	8.0	15.5	12.1	0.6	12.5
0.027	273						6.1	15.5	10.2	0.6	12.5	7.2	15.5	11.3	0.6	12.5	6.6	20.5	11.3	0.6	17.5
0.033	333						6.5	15.5	10.6	0.6	12.5	7.5	15.5	11.2	0.6	12.5	7.1	20.5	11.8	0.6	17.5
0.039	393						6.8	15.5	10.9	0.6	12.5	7.9	15.5	12.6	0.6	12.5	7.0	20.5	13.3	0.6	17.5
0.047	473	5.6	15.5	9.6	0.6	12.5	7.2	15.5	11.3	0.6	12.5	6.7	20.5	11.4	0.6	17.5	7.5	20.5	13.8	0.6	17.5
0.056	563	5.8	15.5	9.9	0.6	12.5	7.7	15.5	11.7	0.6	12.5	7.1	20.5	11.8	0.6	17.5	8.0	20.5	14.3	0.6	17.5
0.068	683	6.1	15.5	10.2	0.6	12.5	8.2	15.5	12.3	0.6	12.5	7.1	20.5	13.4	0.6	17.5	8.7	20.5	14.9	0.6	17.5
0.082	823	6.4	15.5	10.5	0.6	12.5	7.1	20.5	11.2	0.6	17.5	7.6	20.5	13.9	0.6	17.5	9.4	20.5	15.6	0.6	17.5
0.1	104	6.8	15.5	10.9	0.6	12.5	7.6	20.5	11.7	0.6	17.5	8.2	20.5	14.4	0.6	17.5	9.6	20.5	17.5	0.6	17.5
0.12	124	7.2	15.5	11.3	0.6	12.5	8.1	20.5	12.2	0.6	17.5	8.8	20.5	15.0	0.6	17.5	8.7	26.0	17.1	0.8	22.5
0.15	154	7.7	15.5	11.8	0.6	12.5	8.6	20.5	13.3	0.6	17.5	9.6	20.5	15.9	0.6	17.5	9.6	26.0	18.0	0.8	22.5
0.18	184	8.2	15.5	12.3	0.6	12.5	9.2	20.5	13.9	0.6	17.5	9.8	20.5	17.6	0.6	17.5	10.5	26.0	18.8	0.8	22.5
0.22	224	7.4	20.5	11.4	0.6	17.5	9.2	20.5	15.5	0.6	17.5	9.0	26.0	17.3	0.8	22.5	11.5	26.0	19.8	0.8	22.5
0.27	274	7.9	20.5	12.0	0.6	17.5	10.1	20.5	16.4	0.6	17.5	9.8	26.0	18.2	0.8	22.5	11.1	31.0	19.4	0.8	27.5
0.33	334	8.5	20.5	12.6	0.6	17.5	11.1	20.5	17.3	0.6	17.5	10.7	26.0	19.1	0.8	22.5	12.1	31.0	20.5	0.8	27.5
0.39	394	8.8	20.5	13.5	0.6	17.5	10.1	26.0	16.9	0.8	22.5	11.6	26.0	19.9	0.8	22.5	13.1	31.0	21.5	0.8	27.5
0.47	474	9.4	20.5	14.1	0.6	17.5	10.4	26.0	18.7	0.8	22.5	11.1	31.0	19.4	0.8	27.5	13.7	31.0	23.7	0.8	27.5
0.56	564	9.3	20.5	15.6	0.6	17.5	11.2	26.0	19.6	0.8	22.5	12.0	31.0	20.4	0.8	27.5					
0.68	684	10.3	20.5	16.5	0.6	17.5	12.3	26.0	20.6	0.8	22.5	13.2	31.0	21.5	0.8	27.5					
0.82	824	11.1	20.5	17.4	0.6	17.5	11.8	31.0	20.2	0.8	27.5	13.6	31.0	23.5	0.8	27.5					
1.0	105	9.9	26.0	18.2	0.8	22.5	13.0	31.0	21.3	0.8	27.5										
1.2	125	10.7	26.0	19.0	0.8	22.5	13.4	31.0	24.3	0.8	27.5										
1.5	155	11.8	26.0	20.2	0.8	22.5	14.9	31.0	24.9	0.8	27.5										
1.8	185	12.9	26.0	21.3	0.8	22.5															
2.2	225	12.6	31.0	20.9	0.8	27.5															
2.7	275	13.1	31.0	23.0	0.8	27.5															
3.3	335	14.5	31.0	24.4	0.8	27.5															
3.9	395	15.7	31.0	25.7	0.8	27.5															

PLASTIC FILM CAPACITORS

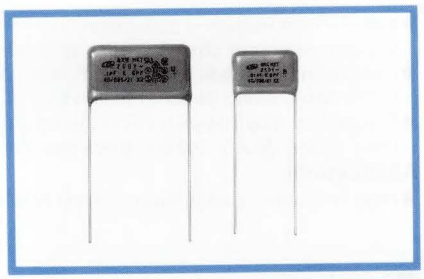
XW.XC

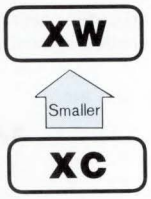
Metallized Polyester and Polypropylene Film Capacitor (XW)
Metallized Polyester Film Capacitor (XC)
series (Safety Standards recognized)

Smaller (XWseries)

Safety Standards recognized

- Approved by safety standards over the world as shown below for across-the-line applications.
- Self-healing and non-inductive wound by metallized film, with flame-retardant epoxy resin coating for humidity resistance.





■Specifications

XW series : UL, CSA, VDE, SEV, DEMKO, SEMKO, NEMKO, EI recognized.

Operating Temp. Range	−40～+85℃	Withstand Voltage	Between Terminals	1250VAC* 1 min.
Rated Voltage	250VAC		Between Terminals and Coverage	2000VAC 1 min.
Capacitance Range	0.0033～1.0μF			
Capacitance Tolelance	±10%(K)			
Dielectric Tangent of Loss Angle	1.0%(at 1kHz) or less	Insulating Resistance	15000MΩ(0.33μF or less)	
			5000ΩF(0.39μF or more)	
Humidity Resistance	Withstanding atmosphere at 40℃, Humidity 95%, 21days	Encapsulation	Flame-retardant epoxy resin	

XC series : UL, CSA, VDE, SEV, DEMKO, SEMKO, NEMKO, EI recognized.

Operating Temp. Range	−40～+85℃	Withstand Voltage	Between Terminals	1500VAC* 1 min.
Rated Voltage	250VAC		Between Terminals and Coverage	2000VAC 1 min.
Capacitance Range	0.01～0.47μF			
Capacitance Tolelance	±10%(K)			
Dielectric Tangent of Loss Angle	1.0%(at 1kHz) or less	Insulating Resistance	15000MΩ(0.33μF or less)	
			5000ΩF(0.39μF or more)	
Humidity Resistance	Withstanding atmosphere at 40℃, Humidity 95%, 21days	Encapsulation	Flame-retardant epoxy resin	

XC series can withstand up to 1000VDC, in use of DC voltage applications.

※Complying with revised UL requirement for withstand voltage, effective from December 1. 1989.

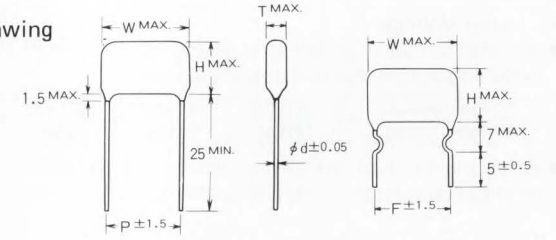
Type numbering system (Example: 250V 0.47μF)

1	2	3	4	5	6	7	8	9	10	11	12
Q	X	C	2	E	4	7	4	K	T	P	T

T : AC usage applicable Straight lead type.
□ □ □ : Lead cut forming type see table-1.

Configuraton(TP:Polyester film, welded CP wire)
Capacitance tolerance(±10% : K)
Capacitance (0.47μF)
Rated voltage(250V)
Series name
Type

■Drawing



Straight lead type(A)　　Cut/formed lead type (B)

■Dimensions

unit:mm

Series		XW series 250VAC (2E)						XC series 250VAC (2E)					
Cap.(μF) \ W.V.(Code) / Code / Size		T	W	H	d	P	F	T	W	H	d	P	F
0.0033	332	5.5	17.0	10.5	0.6	13.5	12.5						
0.0039	392	6.0	17.0	11.0	0.6	13.5	12.5						
0.0047	472	6.0	17.0	11.5	0.6	13.5	12.5						
0.0056	562	6.5	17.0	11.5	0.6	13.5	12.5						
0.0068	682	7.0	17.0	12.0	0.6	13.5	12.5						
0.0082	822	7.0	17.0	14.0	0.6	13.5	12.5						
0.01	103	7.5	17.0	14.5	0.6	13.5	12.5	6.2	20.0	13.0	0.6	16.5	15.0
0.012	123	8.0	17.0	15.0	0.6	13.5	12.5	6.6	20.0	13.4	0.6	16.5	15.0
0.015	153	9.0	17.0	15.5	0.6	13.5	12.5	7.2	20.0	14.0	0.6	16.5	15.0
0.018	183	7.5	19.0	14.0	0.6	15.5	15.0	7.8	20.0	14.6	0.6	16.5	15.0
0.022	223	8.0	19.0	14.5	0.6	15.5	15.0	8.5	20.0	15.2	0.6	16.5	15.0
0.027	273	8.5	19.0	15.5	0.6	15.5	15.0	9.3	20.0	16.0	0.6	16.5	15.0
0.033	333	9.0	19.0	16.0	0.6	15.5	15.0	7.5	25.0	14.8	0.8	21.5	20.0
0.039	393	7.0	25.0	14.0	0.8	21.5	20.0	8.0	25.0	15.3	0.8	21.5	20.0
0.047	473	7.5	25.0	14.5	0.8	21.5	20.0	8.7	25.0	16.0	0.8	21.5	20.0
0.056	563	8.0	25.0	15.5	0.8	21.5	20.0	8.8	25.0	17.7	0.8	21.5	20.0
0.068	683	8.5	25.0	16.0	0.8	21.5	20.0	9.7	25.0	18.5	0.8	21.5	20.0
0.082	823	9.0	25.0	16.5	0.8	21.5	20.0	10.6	25.0	19.9	0.8	21.5	20.0
0.1	104	8.0	30.0	17.0	0.8	26.5	25.0	9.6	30.0	18.9	0.8	26.5	25.0
0.12	124	8.5	30.0	17.5	0.8	26.5	25.0	10.4	30.0	19.8	0.8	26.5	25.0
0.15	154	9.5	30.0	18.5	0.8	26.5	25.0	9.6	35.0	21.5	0.8	31.5	30.0
0.18	184	10.5	30.0	19.0	0.8	26.5	25.0	10.5	35.0	22.4	0.8	31.5	30.0
0.22	224	11.5	30.0	20.0	0.8	26.5	25.0	11.6	35.0	23.5	0.8	31.5	30.0
0.27	274	12.0	30.0	22.0	0.8	26.5	25.0	13.0	35.0	24.8	0.8	31.5	30.0
0.33	334	13.0	30.0	23.5	0.8	26.5	25.0	14.4	35.0	26.2	0.8	31.5	30.0
0.39	394	12.5	34.0	23.5	0.8	30.5	30.0	14.0	40.0	25.8	0.8	36.5	35.0
0.47	474	14.0	34.0	25.0	0.8	30.5	30.0	14.7	40.0	28.1	0.8	36.5	35.0
0.56	564	14.5	34.0	27.0	0.8	30.5	30.0						
0.68	684	14.0	40.0	26.5	0.8	36.5	35.0						
0.82	824	15.5	40.0	28.0	0.8	36.5	35.0						
1.0	105	17.0	40.0	30.0	0.8	36.5	35.0						

F=lead pitch for formed / cut lead wires.

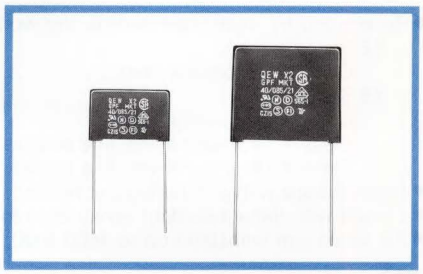
EW

Metallized Polyester Film Capacitor

series (Safety Standards recognized)

Safety Standards

- Recognized by the most authorized safety standards in the world, such as UL, CSA, VDE, SEV, DEMKO, SEMKO, NEMKO and EI, designing for applications where safety and reliability are required.
- Highly reliable series in a compact and light flame-retardant epoxy case for superior installation capability and non-inflammability.
- Self-healing and non-inductive construction, using a dielectric of metallized polyester film, suited for use as a noise suppressor (across-the-line).



EW

Smaller, Case type

XC,XW

■Specifications

Applicable Standard	CSA(C22.2)、UL(1414)、VDE(0565-1)、Other 5 European countries
Operating Temperature Range	−40～+85℃
Rated Voltage	250VAC
Capacitance Range	0.068～1.0μF
Capacitance Tolerance	±10%(K)
Dielectric Loss Tangent	1.0%(at 1kHz) or less
Withstand Voltage	1250VAC(Between Terminals) for 1 minute ※
	2000VAC(Between Terminals and Coverage) for 1 minute
Insulation Resistance	15000MΩ(0.33μF or less)
	5000ΩF(0.39μF or more)
Humidity Resistance	40℃ 95% for 21 days
Encapsulation	Flame-retardant resin case filled with epoxy resin

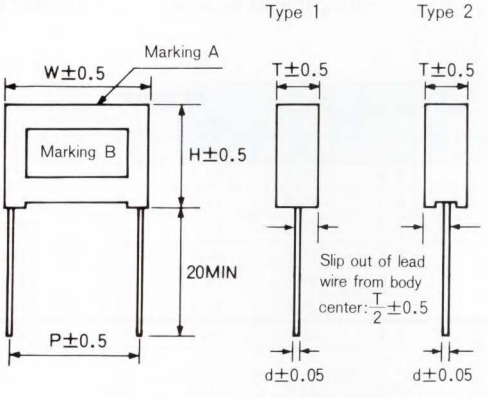
※Complying with revised UL requirement for withstand voltage, effective from December 1. 1989.

Type numbering system (Example : 250V 0.47μF)

1	2	3	4	5	6	7	8	9	10	11	12
Q	E	W	2	E	4	7	4	K	T	P	T

- 12: AC usage applicable
- 10 11: Configuration (TP: Polyester film,
- 9: Capacitance tolerance (±10%: K)
- 6 7 8: Capacitance (0.47μF)
- 4 5: Rated voltage (250V)
- 1 2 3: Series name
- 1: Type

■Drawing



■Dimensions

Cap.(μF) \ W.V.(Code) / Code / Size		250VAC(2E)					Type
		T	W	H	d	P	
0.068	683	8.5	18.0	15.5	0.6	15.0	1
0.1	104	7.0	26.0	17.0	0.8	22.5	1
0.22	224	11.0	26.0	19.0	0.8	22.5	2
0.33	334	12.5	31.0	20.5	0.8	27.5	2
0.47	474	14.0	31.0	23.5	0.8	27.5	2
1.0	105	20.0	34.0	30.5	0.8	30.0	2

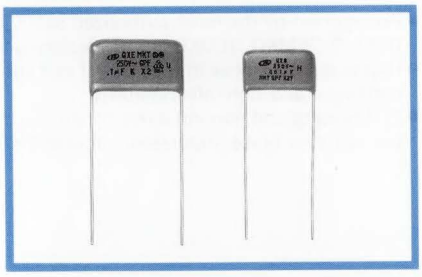
PLASTIC FILM CAPACITORS

XE.XB

Metallized Polyester Film Capacitor

series (Safety Standards recognized)

Safety Standards



- Recognized by safety standards in the world.
  - XE Series
    - Class X (Across-the-line) ..... VDE, SEMKO, DEMKO
  - XB Series
    - Class X (Across-the-line) } ..... UL, CSA, VDE
    - Class Y (Across-the-line, line by-pass and coupling) }
    - Class Y (Across-the-line, line by-pass and coupling) ..... BS
- Highly reliable with self-healing and non-inductive construction wound by metallized polyester film.
- Coated with flame-retardant epoxy resin for humidity resistance.
- XB series can withstand up to 1600 VDC, in use of DC voltage applications.

■Specifications

XE series : VDE, SEMKO, DEMKO recognized.

Operating Temp. Range	−40～+85℃	Withstand Voltage	Between Terminals	1075VDC 1 min.
Rated Voltage	250VAC		Between Terminals and Coverage	2000VAC 1 min.
Capacitance Range	0.01～1.0μF	Insulating Resistance	15000MΩ (0.33μF or less)	
Capacitance Tolelance	±10%(K)		5000ΩF (0.39μF or more)	
Dielectric Tangent of Loss Angle	1.0%(at 1kHz) or less	Encapsulation	Flame-retardant epoxy resin	
Humidity Resistance	Withstanding atmosphere at 40℃, Humidity 95%, 21days			

XB series : UL, CSA, VDE, BS recognized.

Operating Temp. Range	−40～+85℃	Withstand Voltage	Between Terminals	2000VAC 1 min.
Rated Voltage	250VAC		Between Terminals and Coverage	2000VAC 1 min.
Capacitance Range	0.001～0.047μF	Insulating Resistance	15000MΩ or more (Between Terminals)	
Capacitance Tolelance	±20%(M)		5000MΩ or more (Between Terminals and Coverage)	
Dielectric Tangent of Loss Angle	1.0%(at 1kHz) or less	Encapsulation	Flame-retardant epoxy resin	
Humidity Resistance	Withstanding atmosphere at 40℃, Humidity 95%, 21day			

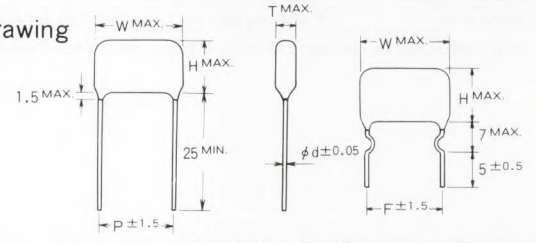
Cut/formed leads are available upon request. Please refer to Table 1 in details.

Type numbering system (Example: 250V 0.47μF)

1	2	3	4	5	6	7	8	9	10	11	12
Q	X	E	2	E	4	7	4	K	T	P	T

- 12: T : AC usage applicable Straight lead type. / □□ : Lead cut forming type see table-1.
- 10 11: Configuration (TP : Polyester film, Soldered CP wire)
- 9: Capacitance tolerance (±10% : K)
- 6 7 8: Capacitance (0.47 μF)
- 4 5: Rated voltage (250V)
- 1 2 3: Series name
- Type: Q

■Drawing



Straight lead type (A) Cut/formed lead type (B)

■Dimensions

Unit : mm

Series		XE Series						XB Series					
W.V.(Code)		250VAC (2E)						250VAC (2E)					
Cap.(μF) \ Size	Code	T	W	H	d	P	F	T	W	H	d	P	F
0.001	102							5.4	21.5	12.7	0.6	17.5	17.5
0.0015	152							6.3	21.5	13.5	0.6	17.5	17.5
0.0022	222							5.8	21.5	13.1	0.6	17.5	17.5
0.0033	332							6.8	21.5	14.1	0.6	17.5	17.5
0.0047	472							7.8	21.5	15.1	0.6	17.5	17.5
0.0068	682							7.1	25.0	14.9	0.8	21.5	20.0
0.01	103	5.7	16.0	12.4	0.6	12.5	12.5	8.4	25.0	16.2	0.8	21.5	20.0
0.012	123	6.0	16.0	12.8	0.6	12.5	12.5	—	—	—	—	—	—
0.015	153	6.5	16.0	13.3	0.6	12.5	12.5	9.5	25.0	18.8	0.8	21.5	20.0
0.018	183	5.7	16.0	12.5	0.6	12.5	12.5	—	—	—	—	—	—
0.022	223	6.1	16.0	12.9	0.6	12.5	12.5	11.4	25.0	20.8	0.8	21.5	20.0
0.027	273	6.5	16.0	13.3	0.6	12.5	12.5	—	—	—	—	—	—
0.033	333	6.2	18.0	13.0	0.6	14.5	12.5	10.3	31.0	22.2	0.8	27.5	27.5
0.039	393	6.6	18.0	13.4	0.6	14.5	12.5	—	—	—	—	—	—
0.047	473	7.1	18.0	13.9	0.6	14.5	12.5	12.3	31.0	24.2	0.8	27.5	27.5
0.056	563	7.7	18.0	14.4	0.6	14.5	12.5						
0.068	683	8.3	18.0	15.1	0.6	14.5	12.5						
0.082	823	9.0	18.0	15.8	0.6	14.5	12.5						
0.1	104	6.7	26.0	15.6	0.8	22.5	20.0						
0.15	154	7.9	26.0	16.8	0.8	22.5	20.0						
0.22	224	9.4	26.0	18.3	0.8	22.5	20.0						
0.33	334	10.3	30.0	21.2	0.8	26.5	25.0						
0.47	474	12.2	30.0	23.2	0.8	26.5	25.0						
0.68	684	11.1	40.0	23.6	0.8	36.5	35.0						
1.0	105	13.6	40.0	26.1	0.8	36.5	35.0						

F : Lead pitch for cut/formed lead wires

Table 1

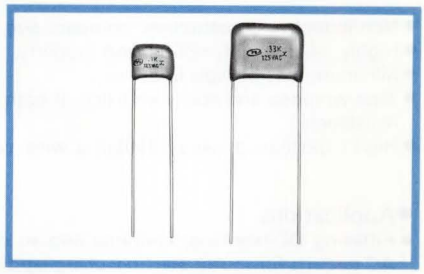
Straight lead pitch size in mm(P)	Cut/formed lead pitch size in mm(F)	Configurations code number 12th	13th	14th
12.5～14.5	12.5	I	F	L
15.5, 16.5	15.0	I	F	M
17.5	17.5	I	F	P
21.5, 22.5	20.0	I	F	R
26.5	25.0	I	F	V
27.5	27.5	I	F	X
30.5, 31.5	30.0	I	F	Y
36.5	35.0	I	F	Z

nichicon

XR

Metallized Polyester Film Capacitor
Electrical Appliance and Material Control Law (Japan) approved
For AC powey source
series

- Highly reliable and superior in high frequency applications, self-healing and non-inductive construction, using a dielectric of metallized polyester film.
- Finished by inner dipping, with liguid epoxy resin and outer coating with flame-retardant epoxy resin, those double coatings provide excellent humidity resistance.
- Designed in a small and compact size, but yet with higher capacitance, for high density mounting.
- Ideally suited for noise suppression in power source circuitry.



■Specifications

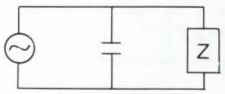
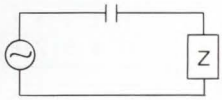
Item	Performance Characteristics
Operating Temperature Range	−40～+85℃
Rated Voltage	125、250VAC
Capacitance Range	Safety performance A1 0.01～0.47μF Safety performance C1 0.1 ～1.0 μF
Capacitance Tolerance	±10%(K)
Dielectric Loss Tangent	1.0% or less (at 1kHz 20℃)
Insulation Resistance	C≦0.47μF 2000MΩ or more C＞0.47μF 1000Ω F or more
Withstand Voltage	Between Terminals : Rated Voltage Between Terminals and Coverage : Rated Voltage
Encapsulation	Flame-retardant epoxy resin
Applicable Standard	JIS C 5151 A1、C1

Type numbering system (Example : 250V 0.1μF)

1	2	3	4	5	6	7	8	9	10	11	12
Q	X	R	2	E	1	0	4	K	T	P	T

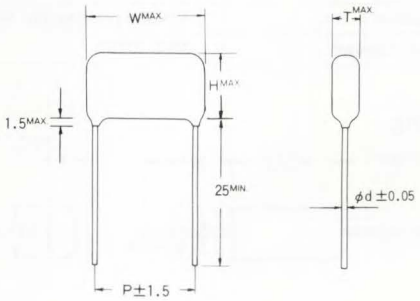
- 12: AC usage applicable
- 10, 11: Configuration (TP: Polyester film, welded CP wire)
- 9: Capacitance tolerance (±10%: K)
- 6, 7, 8: Capacitance (0.1μF)
- 4, 5: Rated voltage (250V)
- 3: Series name
- 1, 2: Type

■Safety Performance

Symbol	A1	C1
	Connected with load in parallel	Connected with load in series
Connecting Condition		
Capacitance	0.01～0.47μF	0.1～1.0μF

Remarks : In applications, at least either one of the conditions shown below has to be fulfilled :
① A resistor of 100Ω or more shall be connected with a capacitor in series.
② Pulse of higher than rated voltage×1.4×√2 Vo-p shall not be applied to both terminals of capacitor.

■Drawing



■Dimensions

Unit : mm

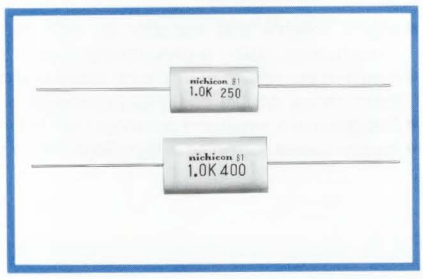
Cap.(μF)	W.V. / Code / Size	125 VAC (2B) T	W	H	d	p	250VAC (2E) T	W	H	d	p
0.01	103						4.8	15.0	9.4	0.6	12.5
0.015	153						5.5	15.0	10.0	0.6	12.5
0.022	223	4.3	10.5	8.4	0.6	7.5	6.3	15.0	10.8	0.6	12.5
0.033	333	4.9	10.5	9.1	0.6	7.5	7.1	15.0	12.3	0.6	12.5
0.047	473	4.7	13.0	9.8	0.6	10.0	6.2	20.0	11.5	0.6	17.5
0.068	683	5.4	13.0	10.5	0.6	10.0	6.7	20.0	13.5	0.6	17.5
0.1	104	6.1	13.0	11.7	0.6	10.0	7.8	20.0	14.6	0.6	17.5
0.15	154	5.1	18.0	12.4	0.6	15.0	8.0	25.5	15.3	0.8	22.5
0.22	224	5.9	18.0	13.2	0.6	15.0	8.9	25.5	17.6	0.8	22.5
0.33	334	7.6	18.0	13.3	0.6	15.0	10.9	25.5	19.8	0.8	22.5
0.47	474	8.3	18.0	15.6	0.6	15.0	11.3	30.5	20.2	0.8	27.5
0.68	684	7.2	25.0	16.1	0.8	22.5					
1.0	105	8.7	25.0	17.6	0.8	22.5					

PLASTIC FILM CAPACITORS

AS series

Metallized Polyester Film Capacitor

(Tape-wrapped Axial Compact Type)



- Non-inductive construction, compact size, metallized film capacitor with axial lead wires.
- Highly reliable with self-healing property.
- Minimum loss at high frequency.
- Tape-wrapped and epoxy endfilled at both leads for superior mechanical strength and humidity resistance.
- High capacitance value, offering a wide variety of applications.

●Applications

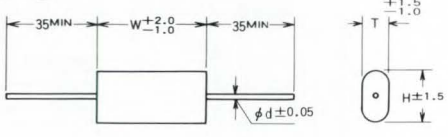
- Filtering DC-blocking, coupling and so on of general communications equipment and use in AC circuits for motor starting, charging/discharging, lighting, noise suppression, etc. Contact us for details for use in AC circuits.

AS → High Frequencies → **AF**

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+85℃
Rated Voltage	250、400、630V.D.C.
Capacitance Range	0.1～10 μF
Capacitance Tolerance	±5% (J)、±10% (K)
Dielectric Loss Tangent	1.0% or less (at 1kHz 20℃)
Insulation Resistance	C≦0.33μF : 9000MΩ or more　C＞0.33μF : 3000ΩF or more
Withstand Voltage	Between Terminals　Rated Voltage×175%, 1～5 secs. Between Terminals and Coverage　Rated Voltage×200%, 1～5 secs.
Encapsulation	Adhesive polyester film, epoxy resin
Applicable Standard	JIS C 5115

■Drawing



Type numbering system (Example: 250V 1.5μF)

1	2	3	4	5	6	7	8	9	10	11
Q	A	S	2	E	1	5	5	K	T	P

- Configuration (TP : Polyester film, Soldered CP wire)
- Capacitance tolerance (J : ±5%　K : ±10%)
- Capacitance (1.5 μF)
- Rated voltage (250V)
- Series name
- Type

■Dimensions

Unit : mm

W.V.(Code) / Cap. (μF)	Code / Size	250VDC (2E) T	W	H	d	400VDC (2G) T	W	H	d	630VDC (2J) T	W	H	d
0.1	104									4.5	28.0	11.0	0.8
0.12	124									5.0	28.0	11.5	0.8
0.15	154									6.0	28.0	12.5	0.8
0.18	184									6.0	28.0	14.0	0.8
0.22	224									7.0	28.0	15.0	0.8
0.27	274									8.0	28.0	16.0	0.8
0.33	334					6.0	23.0	14.0	0.8	9.0	28.0	17.0	0.8
0.39	394					6.5	23.0	14.5	0.8	10.0	28.0	18.0	0.8
0.47	474	4.0	23.0	10.5	0.8	7.5	23.0	15.5	0.8	9.5	33.0	17.5	0.8
0.56	564	4.5	23.0	11.0	0.8	8.0	23.0	16.0	0.8	10.5	33.0	18.5	0.8
0.68	684	5.5	23.0	11.5	0.8	7.5	28.0	15.5	0.8	10.0	38.0	19.5	1.0
0.82	824	6.0	23.0	12.5	0.8	8.5	28.0	16.0	0.8	11.0	38.0	20.5	1.0
1.0	105	6.0	23.0	14.0	0.8	9.5	28.0	17.5	0.8	11.0	44.0	20.5	1.0
1.2	125	7.0	23.0	15.0	0.8	10.5	28.0	18.5	0.8	12.5	44.0	22.5	1.0
1.5	155	6.5	28.0	14.5	0.8	11.5	28.0	21.0	0.8	14.5	44.0	23.5	1.0
1.8	185	7.0	28.0	15.0	0.8	13.0	28.0	22.0	0.8	16.0	44.0	25.5	1.0
2.2	225	8.0	28.0	16.0	0.8	12.0	33.0	21.5	0.8	16.5	50.0	26.0	1.0
2.7	275	9.0	28.0	17.0	0.8	14.0	33.0	23.5	0.8	18.5	50.0	28.0	1.0
3.3	335	8.0	33.0	18.0	0.8	15.5	33.0	25.0	0.8	21.0	50.0	30.0	1.0
3.9	395	9.0	33.0	19.0	0.8	17.0	33.0	26.5	0.8				
4.7	475	10.5	33.0	20.0	0.8	17.0	39.0	26.5	1.0				
5.6	565	12.0	33.0	21.0	0.8	19.0	39.0	28.0	1.0				
6.8	685	12.0	38.0	21.0	1.0								
8.2	825	13.0	38.0	22.5	1.0								
10.0	106	15.0	38.0	24.0	1.0								

nichicon

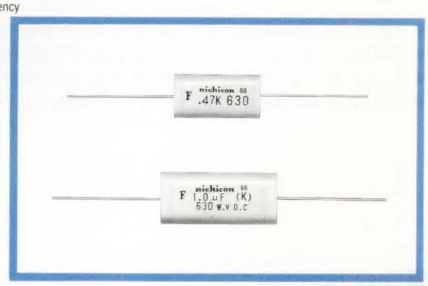
AF

Metallized Polypropylene Film Capacitor

series (Tape-wrapped Axial Type for High Frequency Applications)

For High Frequency

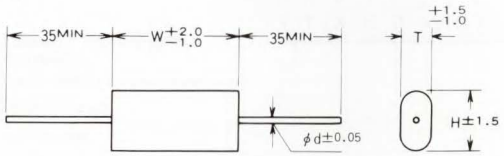
- Non-inductive construction, with axial lead wires.
- Superior performance in high frequency circuit and charging/discharging circuit due to excellent characteristics of metallized polypropylene film dielectric.
- Highly reliable with self-healing property.
- Tape-wrapped and epoxy endfilled at both leads for superior mechanical strength and humidity resistance.



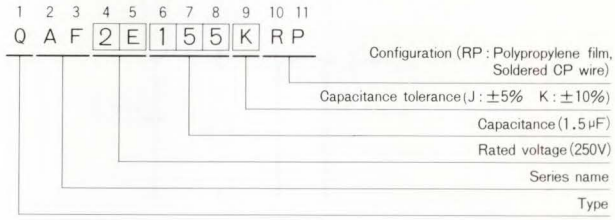
■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+85℃
Rated Voltage	250、400、630V.D.C.
Capacitance Range	0.15～10μF
Capacitance Tolerance	±5%(J)、±10%(K)
Dielectric Loss Tangent	0.1% or less (at 1kHz 20℃)
Insulation Resistance	C≦0.33μF 30000MΩ or more C>0.33μF 10000ΩF or more
Withstand Voltage	Between Terminals : Rated Voltage×175%, 1～5 secs. Between Terminals and Coverage : Rated Voltage×200%, 1～5 secs.
Encapsulation	Adhesive polyester film, resin

■Drawing



Type numbering system (Example: 250V 1.5μF)



■Dimensions

Unit:mm

Cap. (μF)	W.V.(Code) / Code / Size	250VDC (2E) T	W	H	d	400VDC (2G) T	W	H	d	630VDC (2J) T	W	H	d
0.15	154									4.8	28.0	11.4	0.8
0.18	184									5.4	28.0	12.0	0.8
0.22	224									5.6	28.0	13.8	0.8
0.27	274									6.5	28.0	14.6	0.8
0.33	334					6.1	28.0	12.7	0.8	7.4	28.0	15.6	0.8
0.39	394					6.8	28.0	13.4	0.8	8.3	28.0	16.4	0.8
0.47	474	4.3	28.0	10.9	0.8	7.7	28.0	14.2	0.8	7.8	33.0	15.9	0.8
0.56	564	4.8	28.0	11.4	0.8	7.9	28.0	16.2	0.8	8.7	33.0	16.9	0.8
0.68	684	5.0	28.0	13.2	0.8	9.0	28.0	17.2	0.8	9.9	33.0	18.1	0.8
0.82	824	5.7	28.0	13.9	0.8	8.5	33.0	16.7	0.8	10.5	33.0	20.2	0.8
1.0	105	6.5	28.0	14.7	0.8	9.7	33.0	17.9	0.8	10.4	38.0	20.1	1.0
1.2	125	7.4	28.0	15.5	0.8	10.3	33.0	20.0	0.8	11.7	38.0	21.4	1.0
1.5	155	8.6	28.0	16.7	0.8	11.9	33.0	21.6	0.8	12.0	44.0	21.7	1.0
1.8	185	9.6	28.0	17.8	0.8	11.7	38.0	21.4	1.0	13.5	44.0	23.2	1.0
2.2	225	9.3	33.0	17.5	0.8	13.3	38.0	22.7	1.0	15.3	44.0	25.0	1.0
2.7	275	10.0	33.0	19.7	0.8	13.6	44.0	23.3	1.0	15.8	50.0	25.6	1.0
3.3	335	11.4	33.0	21.1	0.8	15.4	44.0	25.1	1.0	17.9	50.0	27.6	1.0
3.9	395	12.7	33.0	22.4	0.8	17.1	44.0	26.8	1.0				
4.7	475	12.6	38.0	22.3	1.0	17.5	50.0	27.2	1.0				
5.6	565	12.6	44.0	22.3	1.0	19.5	50.0	29.2	1.0				
6.8	685	14.3	44.0	24.0	1.0								
8.2	825	16.1	44.0	25.8	1.0								
10.0	106	16.6	50.0	26.3	1.0								

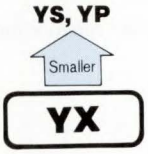
PLASTIC FILM CAPACITORS

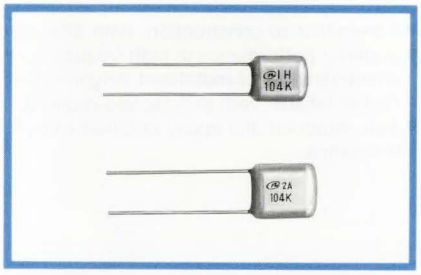
YX

Foil Type Polyester Film Capacitor

series (Standard type, Coating with Clear-yellow Resin)

- Inductive construction, using a dielectric of polyester film together with aluminum foil.
- Coated with epoxy resin for superior heat resistance, humidity resistance and solvent resistance.
- Suited for use in commercial and industrial applications.
- Available for automatic insertion systems.

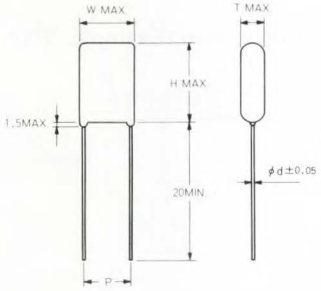




■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+85℃
Rated Voltage	50、100V.D.C.
Capacitance Range	0.001～0.47μF
Capacitance Tolerance	±5%(J)、±10%(K)
Dielectric Loss Tangent	0.8% or less (at 1kHz 20℃)
Insulation Resistance	30,000MΩ or more
Withstand Voltage	Between Terminals : Rated Voltage×250%. 1～5 secs. Between Terminals and Coverage : Rated Voltage×200%. 1～5 secs.
Encapsulation	Epoxy resin
Applicable Standard	JIS C5113

■Drawing



Type numbering system (Example: 50V 0.047μF)

1	2	3	4	5	6	7	8	9	10	11
Q	Y	X	1	H	4	7	3	K	T	P

- Configuration (TP : Polyester film, Soldered CP wire)
- Capacitance tolerance (±5% : J ±10% : K)
- Capacitance (0.047μF)
- Rated voltage (50V)
- Series name
- Type

■Dimensions

Unit:mm

W.V.(Code) / Cap. (μF) / Code / Size		50 VDC (1H)					100 VDC (2A)				
		T	W	H	d	P	T	W	H	d	P
0.001	102	2.5	5.0	7.0	0.5	3.5±0.75	2.8	5.5	10.0	0.5	$3.5^{+1.0}_{-0.8}$
0.0012	122	2.5	5.0	7.0	0.5	3.5	2.8	5.5	10.5	0.5	3.5
0.0015	152	2.5	5.0	7.0	0.5	3.5	2.8	5.5	10.5	0.5	3.5
0.0018	182	2.5	5.5	7.0	0.5	3.5	2.8	5.5	10.5	0.5	3.5
0.0022	222	3.0	5.5	7.0	0.5	3.5	2.8	5.5	10.5	0.5	3.5
0.0027	272	3.0	5.5	7.0	0.5	3.5	2.8	5.5	10.5	0.5	3.5
0.0033	332	3.0	5.5	7.0	0.5	3.5	2.8	5.5	10.5	0.5	3.5
0.0039	392	3.0	5.5	7.0	0.5	3.5	2.8	5.5	10.5	0.5	3.5
0.0047	472	3.0	6.0	7.0	0.5	3.5	2.8	5.5	10.5	0.5	3.5
0.0056	562	3.0	6.0	7.0	0.5	3.5	2.8	6.0	10.5	0.5	5.0±1.0
0.0068	682	3.0	6.0	7.0	0.5	3.5	2.8	6.0	10.5	0.5	5.0
0.0082	822	3.0	6.0	7.0	0.5	3.5	3.0	6.5	10.5	0.5	5.0
0.01	103	3.0	6.0	7.0	0.5	3.5	3.0	6.5	10.5	0.5	5.0
0.012	123	3.5	6.0	7.0	0.5	3.5	3.0	6.5	11.5	0.5	5.0
0.015	153	3.5	6.0	8.5	0.5	3.5	3.0	6.5	11.5	0.5	5.0
0.018	183	3.5	6.5	8.5	0.5	3.5	3.5	6.5	11.5	0.5	5.0
0.022	223	3.5	6.5	9.0	0.5	3.5	3.5	6.5	11.5	0.5	5.0
0.027	273	3.5	6.5	9.0	0.5	3.5	3.5	7.5	11.5	0.5	5.0
0.033	333	4.0	7.0	9.0	0.5	3.5	3.5	7.5	11.5	0.5	5.0
0.039	393	4.0	7.0	9.0	0.5	3.5	4.5	8.5	12.5	0.5	5.0
0.047	473	4.5	7.5	9.5	0.5	5.0±1.0	4.5	8.5	12.5	0.5	5.0
0.056	563	4.5	7.5	9.5	0.5	5.0	4.5	9.5	12.5	0.5	$7.5^{+1.0}_{-1.2}$
0.068	683	4.5	8.0	9.5	0.5	5.0	4.5	9.5	12.5	0.5	7.5
0.082	823	4.5	8.0	9.5	0.5	5.0	5.5	11.0	12.5	0.5	7.5
0.1	104	5.5	9.0	10.5	0.5	5.0	5.5	11.0	12.5	0.5	7.5
0.12	124	5.5	9.0	10.5	0.5	5.0	6.0	12.5	14.0	0.5	$10.0^{+1.0}_{-1.2}$
0.15	154	6.0	10.0	12.0	0.5	5.0	6.0	12.5	14.0	0.5	10.0
0.18	184	6.0	10.5	12.0	0.5	5.0	7.0	14.0	14.0	0.5	10.0
0.22	224	6.0	11.0	12.0	0.5	$7.5^{+1.0}_{-1.2}$	7.0	14.0	14.0	0.5	10.0
0.27	274	7.5	12.5	14.5	0.6	7.5	8.0	14.5	17.0	0.6	10.0
0.33	334	7.5	12.5	14.5	0.6	7.5	8.0	14.5	17.0	0.6	10.0
0.39	394	9.5	14.0	15.0	0.6	7.5	9.5	16.5	17.0	0.6	10.0
0.47	474	9.5	14.0	15.0	0.6	7.5	9.5	16.5	17.0	0.6	10.0

nichicon

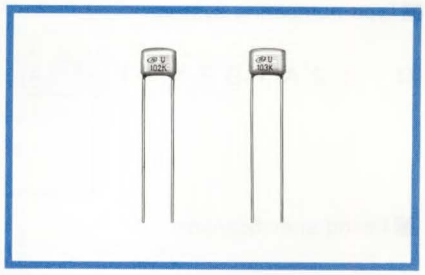
YS.YP

Foil Type Polyester Film Capacitor

series (Low Profile Super Miniature Type, Coating with Clear-yellow Resin)

Smaller

- YS – Extremely small in dimensions both of height and body width, and light in weight compared with YX series.
  - Superior performance in high density assemblies, reducing total thickness of electronic devices.
  - Applicable to automatic insertion machine.
- YP – Unified 5mm lead spacing for all ratings, low-profile size.
  - Optimum for high density assemblies on PC board, due to 5mm straight lead spacing.
  - Applicable to automatic insertion machine.



YS,YP

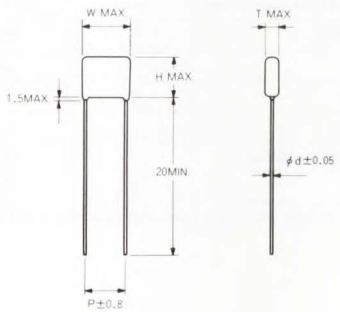
Smaller

YX

■Specifications

Item	Performance Characteristics
Operating Temperature Range	−40～+85℃
Rated Voltage	50 V. D.C.
Capacitance Range	0.001～0.47 μF
Capacitance Tolerance	±5% (J)、±10% (K)
Dielectric Loss Tangent	0.8% or less (at 1 kHz 20℃)
Insulation Resistance	30,000 MΩ or more
Withstand Voltage	Between Terminals : Rated Voltage × 250%. 1～5 secs. Between Terminals and Coverage : Rated Voltage × 200%. 1～5 secs.
Encapsulation	Epoxy resin
Applicable Standard	JIS C5113

■Drawing



Type numbering system (Example: 50V 0.047μF)

1	2	3	4	5	6	7	8	9	10	11
Q	Y	S	1	H	4	7	3	K	T	P

- Configuration (TP : Polyester film, Soldered CP wire)
- Capacitance tolerance (±5%: J ±10%: K)
- Capacitance (0.047 μF)
- Rated voltage. (50V)
- Series name
- Type

■Dimensions

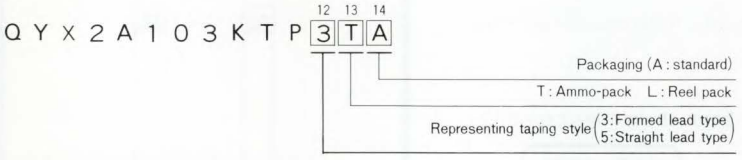
Unit: mm

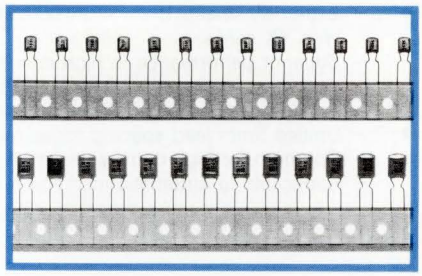
Series		YS Series					YP Series				
W.V.(Code)		50 VDC (1H)					50 VDC (1H)				
Cap. (μF) / Code	Size	T	W	H	d	P	T	W	H	d	P
0.001	102	3.0	5.0	5.0	0.5	3.5	3.0	6.5	5.0	0.5	5.0
0.0015	152	3.0	5.0	5.0	0.5	3.5	3.0	6.5	5.0	0.5	5.0
0.0022	222	3.0	5.5	5.0	0.5	3.5	3.0	6.5	5.0	0.5	5.0
0.0033	332	3.0	5.5	5.0	0.5	3.5	3.0	6.5	5.0	0.5	5.0
0.0047	472	3.0	6.0	5.0	0.5	3.5	3.0	6.5	5.0	0.5	5.0
0.0068	682	3.0	6.0	5.0	0.5	3.5	3.5	6.5	5.0	0.5	5.0
0.01	103	3.5	6.5	5.0	0.5	3.5	3.5	6.5	5.0	0.5	5.0
0.015	153	3.5	6.5	5.0	0.5	3.5	3.5	7.0	5.0	0.5	5.0
0.022	223	4.0	7.0	5.5	0.5	3.5	4.0	7.5	5.5	0.5	5.0
0.033	333	5.0	7.5	6.0	0.5	3.5	5.0	8.0	6.0	0.5	5.0
0.047	473	5.5	8.5	6.0	0.5	5.0	5.5	8.5	6.5	0.5	5.0
0.068	683	5.5	8.5	7.0	0.5	5.0	5.5	8.5	7.5	0.5	5.0
0.1	104	6.5	9.5	7.5	0.5	5.0	6.5	9.5	7.5	0.5	5.0
0.15	154	6.0	9.5	10.0	0.5	5.0					
0.22	224	6.5	10.5	11.0	0.5	7.5					
0.33	334	7.0	11.0	13.0	0.6	7.5					
0.47	474	8.5	12.5	13.0	0.6	7.5					

PLASTIC FILM CAPACITORS

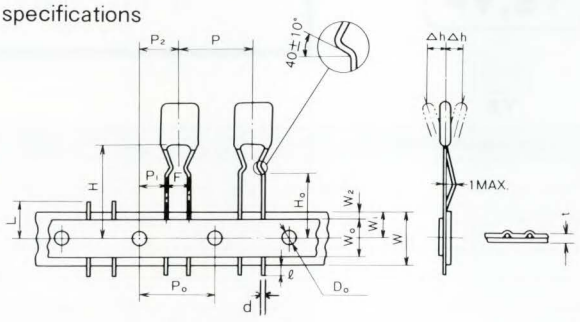
Taped Capacitors for Automatic Insertion Systems (YX, YS, YP series)

■Type numbering system

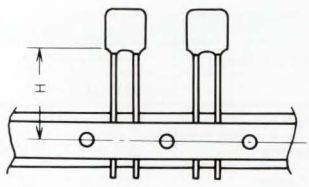




■Taping specifications



Formed lead type



Straight lead type

■Dimensions

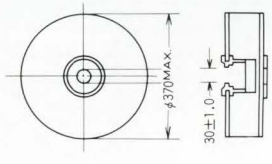
Item	Symbol	Dimensions (mm)	
		Dimensions	Tolerance
Pitch of component	P	12.7	±1.0
Feed hole pitch	P_o	12.7	±0.3
Distance between hole and lead wire	P_1	3.85	±0.7
Distance between hole and component	P_2	6.35	±1.3
Lead-to-lead distance	F	5.0	$^{+0.8}_{-0.2}$
Tilt of component	Δh	0	±2.0
Tape width	W	18.0	$^{+1.0}_{-0.5}$
Hold down tape width	W_o	15.0	$^{+0.5}_{-2.5}$
Slip out of hole	W_1	9.0	$^{+0.75}_{-0.5}$

Item	Symbol	Dimensions (mm)	
		Dimensions	Tolerance
Slip out of hold down tape	W_2	2.5	MAX.
Height of component from tape center	H※	20.0(16.0)	±0.75
Lead-wire clinch height	H_o	16.0	±0.5
Length of cut lead	ℓ	2.0	MAX.
Feed hole diameter	D_o	4.0	±0.2
Total tape thickness	t	0.7	±0.2
Cut length of rejected component	L	11.0	MAX.
Lead wire diameter	φd	0.5	±0.05

※Straight lead type is available only for 5mm lead pitch capacitors, and H will be 16mm.

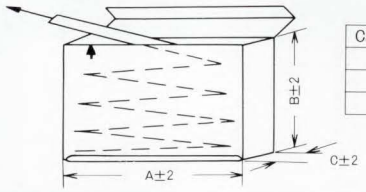
■Packaging

Reel pack



Series	Cap. range(μF)	Q'ty/Reel(pcs.)
YX (50V)	0.001 ~0.01	2,000
	0.012 ~0.039	1,500
	0.047 ~0.1	1,000
	0.12 ~0.22	800
YX(100V)	0.001 ~0.01	2,000
	0.012 ~0.039	1,500
	0.047 ~0.1	1,000

Ammo-pack



(mm)

Case Code	A	B	C
1	330	235	55
2	330	300	55
3	330	330	55

Series	Cap. range(μF)	Q'ty/Case(pcs.)	Case code
YX(50V)	0.001 ~0.0018	2,000	1
	0.0022~0.0039	2,000	2
	0.0047~0.027	2,000	3
	0.033 ~0.22	1,000	2
YX(100V)	0.001 ~0.0018	2,000	1
	0.0022~0.0039	2,000	2
	0.0047~0.027	2,000	3
	0.033 ~0.1	1,000	2
YS	0.001 ~0.0015	2,000	1
	0.0022~0.0033	2,000	2
	0.0047~0.022	2,000	3
	0.033 ~0.22	1,000	2
YP	0.001 ~0.0015	2,000	1
	0.0022~0.0033	2,000	2
	0.0047~0.022	2,000	3
	0.033 ~0.1	1,000	2

nichicon

3 POSITIVE THERMISTORS "Posi-R"

Contents

Characteristics of Positive Thermistors "Posi-R"

• Switching Temperature (Resistance Anomaly Point)

At the resistance/temperature characteristics of positive thermistors "Posi-R", the temperature which the resistance value becomes twice as high as that of at 25°C, is called as "switching temperature" (Curie point).
Thermistors "Posi-R" show anomalous temperature characteristic of resistivity, and typical characteristics are represented in Fig. 1.
Optimum characteristics can be selected for each application.

• Temperature Coefficient

The temperature coefficient is calculated from the linear range at the steepest portion of resistance ($T_1 \sim T_2$) as illustrated in Fig. 2.

$$\text{Temperature coefficient} = \frac{2.303\ (\log_{10} R_2/R_1)}{t_2 - t_1} \times 100\ (\%/°C)$$

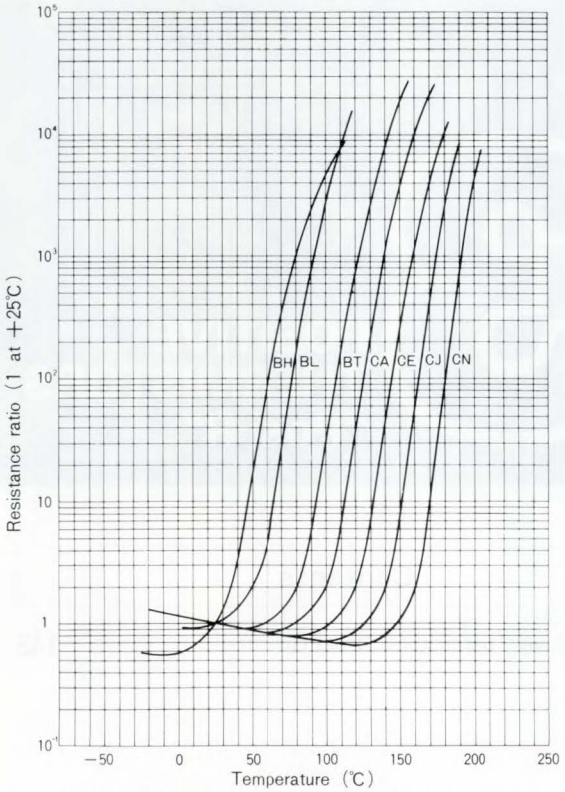


Fig. 1 Resistance vs. Temperature Characteristics

• Maximum Inrush Current

The maximum inrush current is the maximum allowable current (effective value) flowed into a Posi-R. No current higher than this shall be flowed as it causes breakdown of a Posi-R.

• Returning Time

The returning time is the time constant necessary for a Posi-R to quickly return to the switching temperature (resistance of twice as high as the initial value) after the power source is cut off.

• Dissipation Factor

When a power source is applied to Posi-R and thermal equilibrium will have been reached, the following equation is established.

$$V \cdot I = C\ (T_1 - T_0)$$

Where, V : Applied voltage (V)
I : Equilibrium current (A)
C : Dissipation factor (W/°C)
T_1 : Equilibrium temperature of Posi-R (°C)
T_0 : Ambient temperature (°C)

In case that the dissipation factor is known by putting arbitrary values of voltage and current into the above equation, the equilibrium temperature at the then voltage can be attained.
The temperature rise ($T_1 - T_0$) of Posi-R due to voltage application can be also computed easily.

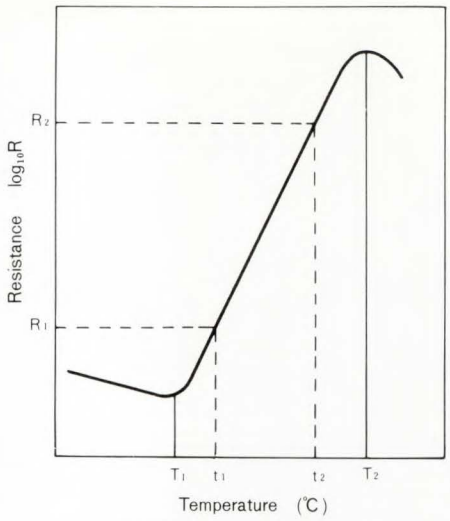


Fig. 2 Temperature Characteristics of P osi-R

• Voltage/Current Characteristics

In the Fig. 3 circuit, the relationship between voltage and current is called as the voltage/current characteristics when the voltage is applied to Posi-R and it gets the thermal equilibrium.
As seen in Fig. 4, the characteristic follows Ohm's law up to E_1 point. The current increases when the voltage is raised, provided that the temperature characteristic is within the range of switching temperature or lower. The range between E_1 and E_2 is over the switching temperature but within the constant range of power dissipation. However, beyond E_2 point, an excess power will run and Posi-R will result in breakdown, accordingly.
Therefore, the operating voltage of Posi-R shall be lower than E_2, and its rated voltage shall be defined to half of E_2 value or lower, taking the safety into account.

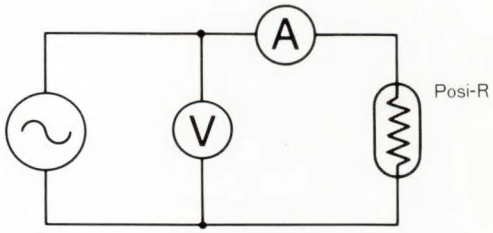


Fig. 3 Measuring Circuit

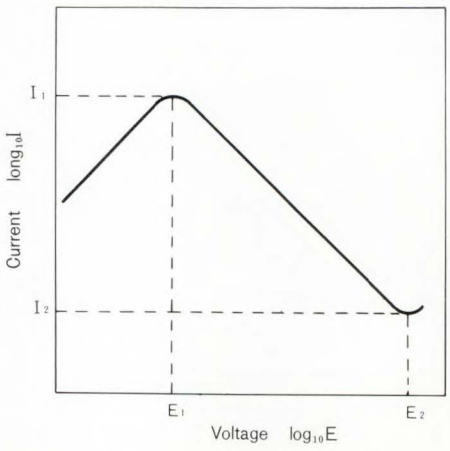


Fig. 4 Voltage/Current Characteristics

●Equilibrium Current, Equilibrium Resistance

The current, which Posi-R gets thermal equilibrium with an arbitrary voltage application (for 30 seconds or longer), is called as the equilibrium current.
Besides, the quotient which the applied voltage is divided by the equilibrium current is specified as the equilibrium resistance.

●Current vs. Time Characteristics

In the Fig. 5 circuit, when a load resistance (R) and a Posi-R are connected in series and an arbitrary voltage higher than E_1 in Fig. 4 is applied, the Posi-R will have inherent temperature due to a current flowing through it. Its temperature rises as time passes by, and it exceeds the switching temperature in a certain time, resulting in a rapid damp of the current. The trip time can be adjusted by the current volume as shown in Fig. 6.
By making use of these characteristics, a Posi-R can be used for the following applications;

1. Timing circuit
2. Switching use for motor running
3. Overcurrent protection

When the parameters of I_1, t_1, I_2 and t_2 in Fig. 6 are expressed in a logarithmic graph in the manner of Fig. 7, an almost linear graph is formed and the relationship between the circuit current and the trip time can be obtained.
But, when a Posi-R is used for a timing application such as a timer, the voltage shall be appropriately applied for 30 seconds or less as the changes of conditions may affect much more as time passes by.

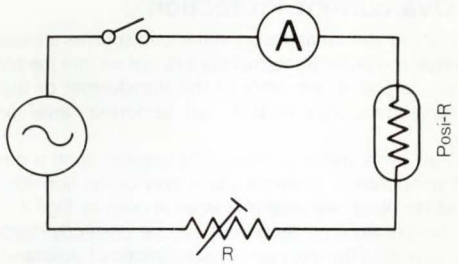


Fig. 5 Measuring Circuit

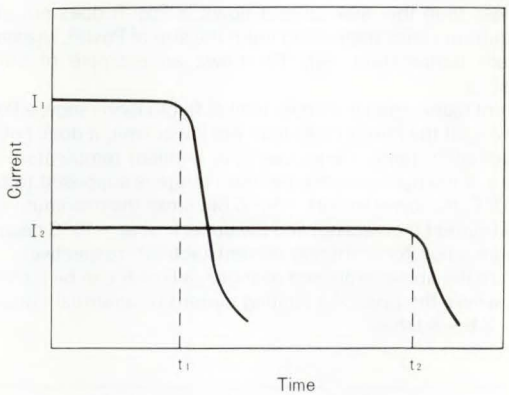


Fig. 6 Current vs. Time Characteristics

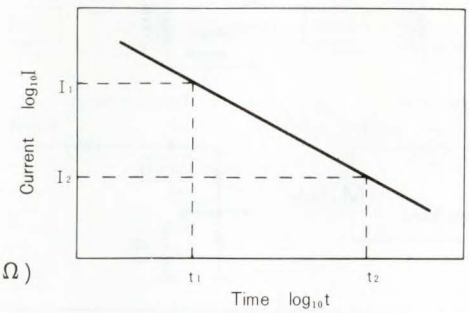


Fig. 7 Current vs. Time Characteristics

■Type numbering system

(Example for overcurrent protection 12V. 2.2Ω)

1	2	3	4	5	6	7	8	9	10	11
Z	P	C	1	9	C	E	2	R	2	A

Revision Code

Nominal resistance

Nominal resistance	Code
0.5Ω	0R5
1.0Ω	1R0
10Ω	100
100Ω	101
1kΩ	102

Switching Temperature(Example)

Configuration

Temperature	Code
50℃	BL
120℃	CE
135℃	CH

Usage

Type(Posi-R)

Application	Code
For degaussing, Solder-mounting type	B
For degaussing, Encased type	K
For overcurrent protection	C
Disc type	D
For constant temperature heater	H
For temperature detection	P
For motor starting	M
For general purpose, Solder-mounting type	A
Others	Z

For Overcurrent Protection

When something abnormal occurs at the load such as a transistor circuit or a small-type motor, an abnormal current rushes into the power source circuit. Then, a power transistor at the transformer or the switching power supply generates heat in an abnormal level and causes breakdown.

If a Posi-R for overcurrent protection is used in such a circuit, it can make the temperature compensation and protection for the power source and the load. An example is as shown in Fig. 8.

As to the temperature protection, it can be perfectly made in use of this Posi-R owing to the excellent characteristic of resistance anomaly, that is, a current is reduced by the increased resistance due to the self-heating of Posi-R.

At the voltage/current characteristics in Fig. 9, there is a peak current. If a current larger than this peak current flows, a Posi-R acts. But if a current less than the peak current flows, a Posi-R does not act.

The peak current varies depending upon the size of Posi-R, resistance and ambient temperature. Fig. 10 shows an example of current characteristics.

At the current higher than the upper limit of fluctuation range, a Posi-R acts. Contrary, at the current less than the lower limit, it does not act. But the fluctuation range varies owing to ambient temperature.

For instance, if the operating temperature range is supposed to be at $-10 \sim +60°C$, the lower limit at $+60°C$ becomes the maximum value for a normal current (non-acting) and the upper limit at $-10°C$ becomes the minimum value for a limiting current (acting), respectively.

Judging from the above explained relations, a Posi-R can be suited for the circuit where the ratio of a limiting current to a normal current is more than $2.5 \sim 3$ times.

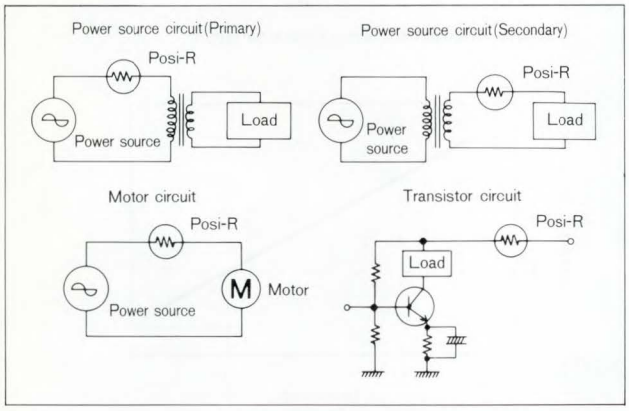


Fig. 8 Examples of applications

Characteristic of ZPC4MCE100A

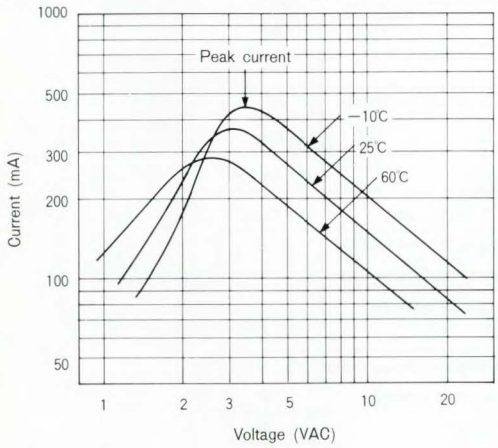


Fig. 9 Voltage/Current Characteristics

Characteristic of ZPC4MCE100A

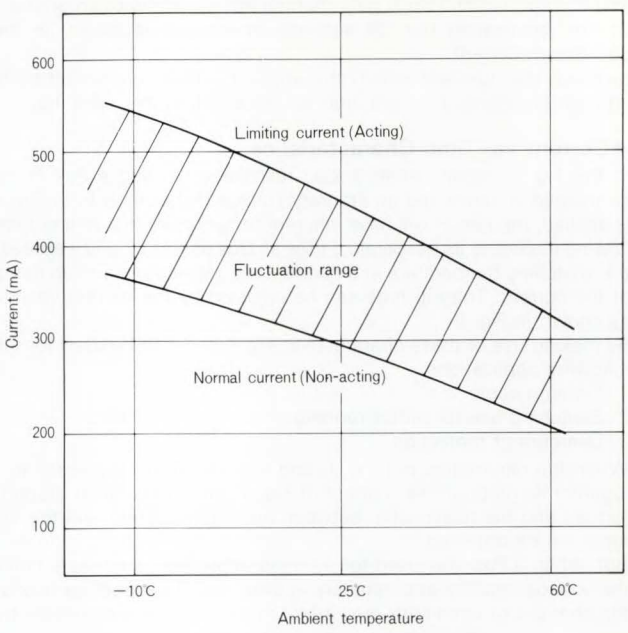


Fig. 10 Current Characteristic

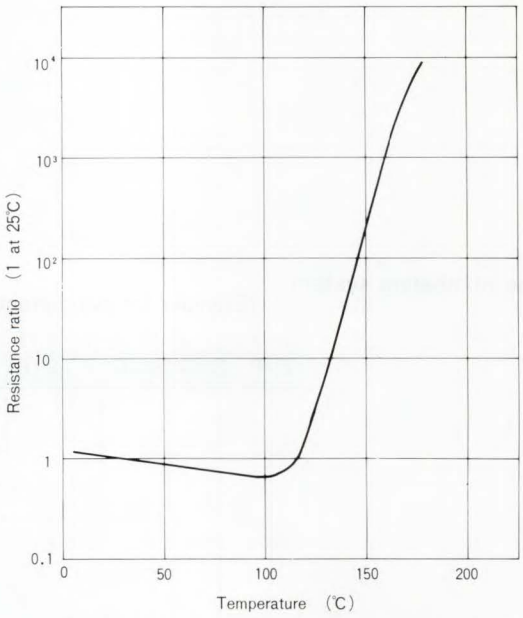
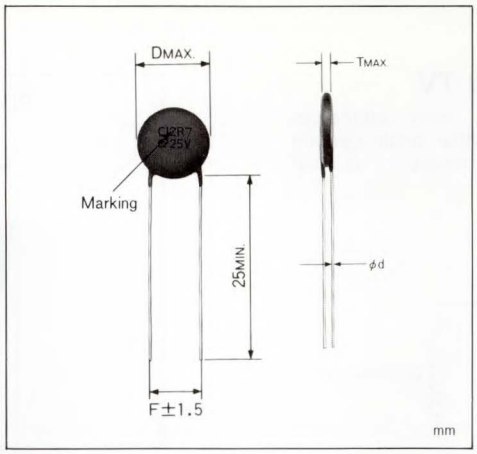


Fig. 11 Resistance vs. Temperature Characteristics

For Overcurrent Protection



• 12V Class

Type No.	Resistance	Max. Operating Voltage	Max. Inrush Current	Current Characteristic			Dimensions (mm)			
				25℃	Normal Current (60℃)	Limiting Current (−10℃)	D	T	F	d
ZPC19CE2R2A	2.2Ω ±20%	16V	2.4A	610mA±20%	350mA or less	890mA or more	9.7	3.0	6.3	0.6
ZPC1BCE1R8A	1.8Ω ±20%		2.7A	680mA±20%	400mA or less	1000mA or more	10.5			
ZPC1DCE1R5A	1.5Ω ±20%		3.0A	750mA±20%	440mA or less	1100mA or more	11.4			
ZPC1HCE1R2A	1.2Ω ±20%		3.6A	900mA±20%	520mA or less	1320mA or more	13.0		9.5	
ZPC1KCE1R0A	1.0Ω ±20%		3.9A	980mA±20%	570mA or less	1450mA or more	13.8			
ZPC1NCE0R8A	0.8Ω ±20%		4.5A	1130mA±20%	660mA or less	1700mA or more	15.1			
ZPC1TCE0R5A	0.5Ω ±20%		5.0A	1600mA±20%	940mA or less	2340mA or more	17.5			

• 25V Class

Type No.	Resistance	Max. Operating Voltage	Max. Inrush Current	Current Characteristic			Dimensions (mm)			
				25℃	Normal Current (60℃)	Limiting Current (−10℃)	D	T	F	d
ZPC25CE8R2A	8.2Ω ±20%	35V	1.3A	210mA±20%	120mA or less	310mA or more	8.0	3.5	5.0	0.6
ZPC29CE6R8A	6.8Ω ±20%		1.4A	350mA±20%	200mA or less	510mA or more	9.7		6.3	
ZPC29CE4R7A	4.7Ω ±20%		1.6A	390mA±20%	230mA or less	570mA or more	9.7			
ZPC2DCE4R7A	4.7Ω ±20%		1.8A	460mA±20%	270mA or less	680mA or more	11.4			
ZPC2DCE3R9A	3.9Ω ±20%		1.9A	480mA±20%	280mA or less	700mA or more	11.4			
ZPC2ECE3R9A	3.9Ω ±20%		2.1A	520mA±20%	300mA or less	760mA or more	11.9			
ZPC2ECE3R3A	3.3Ω ±20%		2.2A	540mA±20%	310mA or less	790mA or more	11.9			
ZPC2LCE2R7A	2.7Ω ±20%		2.5A	630mA±20%	370mA or less	930mA or more	14.3		9.5	
ZPC2LCE2R2A	2.2Ω ±20%		2.8A	690mA±20%	400mA or less	1020mA or more	14.3			
ZPC2RCE2R2A	2.2Ω ±20%		3.1A	780mA±20%	450mA or less	1150mA or more	15.9			
ZPC2RCE1R8A	1.8Ω ±20%		3.4A	850mA±20%	500mA or less	1250mA or more	15.9			

• 50V Class

Type No.	Resistance	Max. Operating Voltage	Max. Inrush Current	Current Characteristic			Dimensions (mm)			
				25℃	Normal Current (60℃)	Limiting Current (−10℃)	D	T	F	d
ZPC32CE240A	24Ω ±20%	60V	0.7A	170m A ±20%	100mA or less	250mA or more	6.5	4.5	5.0	0.5
ZPC35CE150A	15Ω ±20%		0.9A	220m A ±20%	130mA or less	320mA or more	8.0			
ZPC3ACE8R2A	8.2Ω ±20%		1.3A	330m A ±20%	190mA or less	480mA or more	10.1		6.3	0.6
ZPC3DCE6R2A	6.2Ω ±20%		1.5A	380m A ±20%	220mA or less	560mA or more	11.4			
ZPC3HCE4R7A	4.7Ω ±20%		1.9A	470m A ±20%	270mA or less	690mA or more	13.0		9.5	
ZPC3MCE3R6A	3.6Ω ±20%		2.2A	540m A ±20%	310mA or less	790mA or more	14.7			
ZPC3RCE3R0A	3.0Ω ±20%		2.5A	630m A ±20%	370mA or less	920mA or more	15.9			

• 100V、120V Class

Type No.	Resistance	Max. Operating Voltage	Max. Inrush Current	Current Characteristic			Dimensions (mm)			
				25℃	Normal Current (60℃)	Limiting Current (−10℃)	D	T	F	d
ZPC42CE560A	56Ω ±20%	140V	0.5A	110m A ±20%	65mA or less	160mA or more	7.0	6.0	5.0	0.5
ZPC45CE300A	30Ω ±20%		0.7A	170m A ±20%	100mA or less	250mA or more	8.7			
ZPC49CE220A	22Ω ±20%		1.0A	230m A ±20%	130mA or less	340mA or more	10.4		6.3	0.6
ZPC4CCE150A	15Ω ±20%		1.1A	280m A ±20%	160mA or less	410mA or more	11.7			
ZPC4MCE100A	10Ω ±20%		1.5A	370m A ±20%	210mA or less	540mA or more	15.3		9.5	
ZPC4PCE6R8A	6.8Ω ±20%		1.8A	450m A ±20%	260mA or less	660mA or more	16.2			

• Other current values are also available upon request.

For Degaussing Circuit in Color TV

A Posi-R for a degaussing circuit in color TV, using commercial frequency as a power source, is applicable to either single-element circuit or Double-element circuit with high attenuation, as illust-rated in Figs. 12 and 13, respectively.

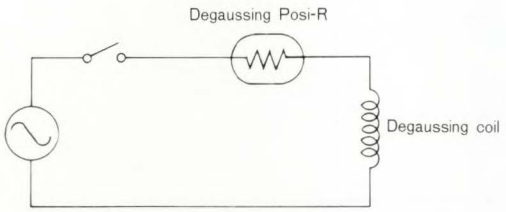


Fig. 12 Automatic Degaussing Circuit (Single-element)

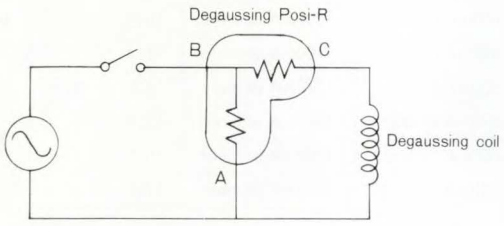
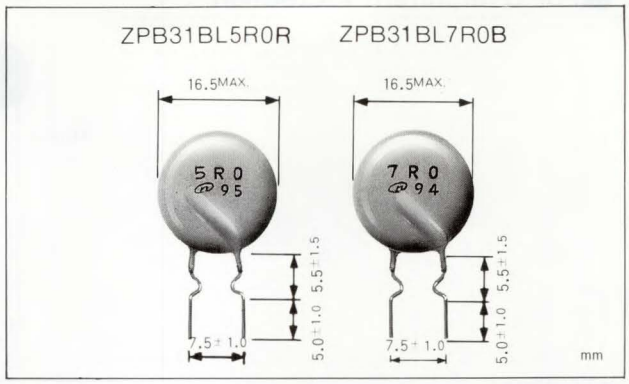
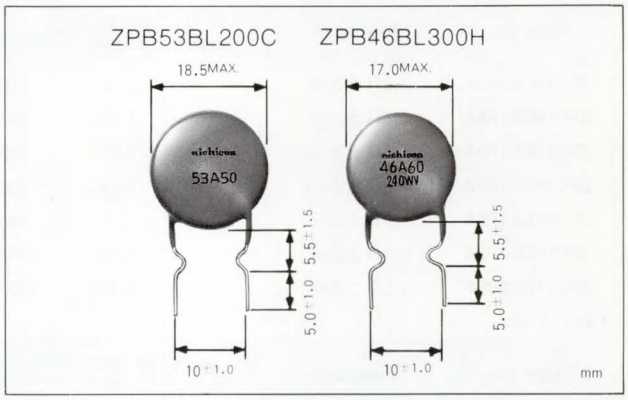
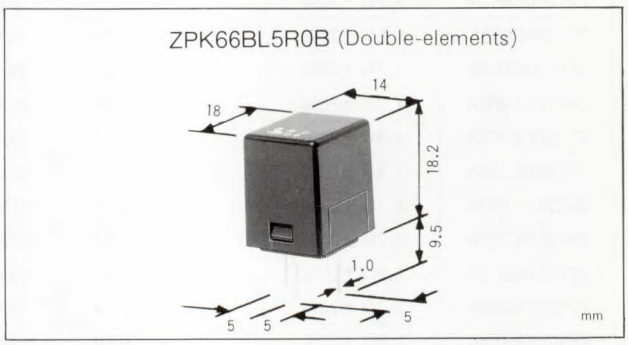


Fig. 13 Automatic Degaussing Circuit (Double-elements)







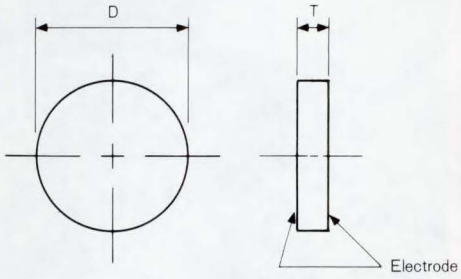
Type No.	Rated Voltage	Initial Resistance	Switching Temperature	Current Characteristic			Remarks
				Inrush	3 seconds	60 seconds	
ZPB31BL5R0R	100V	5Ω±20%	50℃	35Ap-p or more	300mAp-p or less	60mAp-p or less	Solder-mounting type
ZPB31BL7R0B	120V	7Ω±20%		25Ap-p or more	300mAp-p or less	60mAp-p or less	〃
ZPB45BL100J	120V	10Ω±30%		20Ap-p or more	240mAp-p or less	40mAp-p or less	〃
ZPB53BL200C	220V	20Ω±30%		7.5Ao-p or more	150mAo-p or less	20mAo-p or less	〃
ZPB46BL300H	220V	30Ω±30%		8Ao-p or more	110mAo-p or less	20mAo-p or less	〃
ZPK66BL5R0B	100V	5Ω±20%		35Ao-p or more	300mAo-p or lass	20Ao-p or less	Encased type
ZPK66BL7R0B	120V	7Ω±20%		25Ao-p or more	300mAo-p or less	10Ao-p or less	〃
ZPK66BL200D	220V	20Ω±30%		15Ao-p or more	300mAo-p or less	10mAo-p or less	〃

For Heater, Disc Type

A disc type Posi-R is ideal for a small-power heater, making use of its self-heating and self-equilibrium characteristics. As a Posi-R self-heats when voltage is applied, the size of a heater element and the switching temperature can be optionally selected in accordance with the shape of appliances.
Since this is of a non-contact control type, it is highly reliable for such applications.

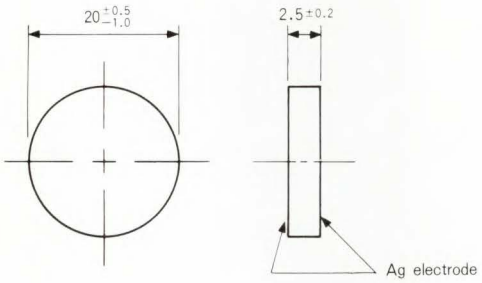
Outline

Size	Diameter : ϕ20mm or less
	Thickness : 2 ~ 3mm
Switching temperature	170°C or lower
Resistance	For 100V : 100Ω or more
	For 200V : 500Ω or more
	(Resistance value varies by size.)



For Motor Starting, Disc Type

This disc type Posi-R is ideally suited for motor starting in various home appliances like refrigerators, home-type air conditioners and etc.

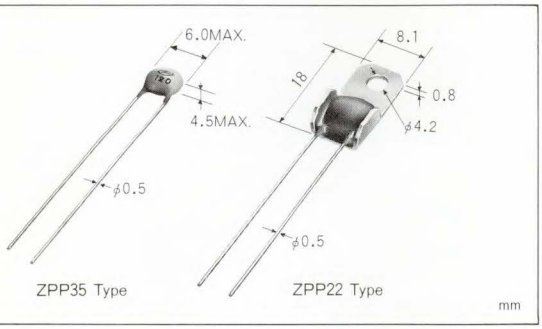


mm

Type No.	Initial Resistance	Switching Temperatrre	Max. Operating Voltage(Vrms)	Max. Inrush Current(Arms)
ZPD5YCE3R3A	3.3Ω ± 30%	120°C	160	12
ZPD5YCE4R7A	4.7Ω ± 30%		180	12
ZPD5YCE6R8A	6.8Ω ± 30%		200	10
ZPD5YCE100A	10 Ω ± 30%		225	9
ZPD5YCE150A	15 Ω ± 30%		250	8
ZPD5YCE220A	22 Ω ± 30%		270	7
ZPD5YCH3R3A	3.3Ω ± 30%	135°C	140	12
ZPD5YCH4R7A	4.7Ω ± 30%		160	12
ZPD5YCH6R8A	6.8Ω ± 30%		180	10
ZPD5YCH100A	10 Ω ± 30%		200	9

For Thermal Protection

This series of Posi-R as a temperature indicator is small in size and little in calorific capacity. It is so useful for indicating any overheating of power transistors and thyristors in the power sources.



mm

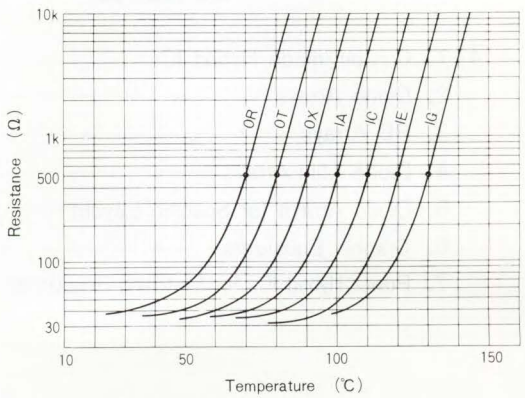


Fig. 14 Resistance vs. Temperature Characteristic

Type No.		Temperature Indication				Max. Operating Voltage	Max. Inrush Current
ZPP35 Type	ZPP22 Type	25°C	Tr (°C)	Tr-5°C	Tr+5°C		
ZPP350R500A	ZPP220R501A	100Ω or less	70	500Ω or less	500Ω or more	16VDC	100mA
ZPP350T500A	ZPP220T501A		80				
ZPP350X500A	ZPP220X501A		90				
ZPP351A500A	ZPP221A501A		100				
ZPP351C500A	ZPP221C501A		110				
ZPP351E500A	ZPP221E501A		120				
ZPP351G500A	ZPP221G501A		130				

※The current flowed in a Posi-R shall be within the range lest it should generate heat.
※Resistance at trip temperature (Tr) is available up to 3kΩ, upon request.

nichicon

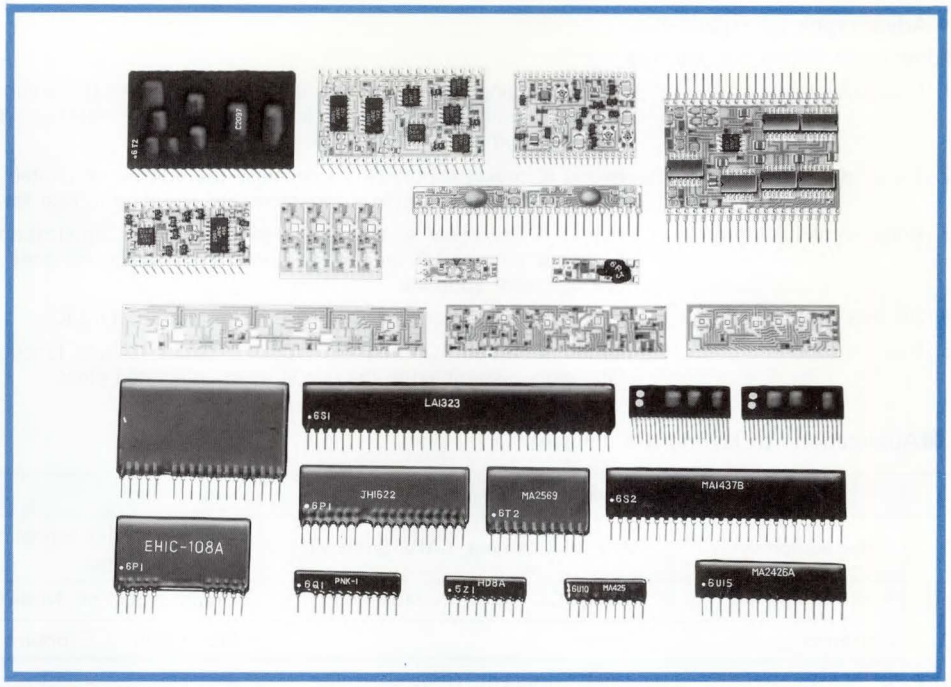
4 HYBRID I.C.s "Hi-Net"

Contents

NICHICON Hybrid ICs employ precious metal thick films featuring stable characteristics. Because of their high reliability, they are extensively used in various fields ranging from OA and FA associated equipment to VTR, audio appliances, automobile devices and electronic toys.

NICHICON offers you a complete line from Hybrid IC's including "Hybrid LSI" where a C.P.U. chip is directly bonded to simple C arrays and R arrays.

The low-cost and yet high-quality NICHICON Hybrid ICs are sure to help greatly in achieving smaller circuits, higher package density, higher reliability, labor saving, and improved productivity.



Custom-made Hybrid ICs

NICHICON offers to design and manufacture custom-made Hybrid ICs/"Hi-Net" with a required function and shape, based on the specific circuitry from the customer.
"Hi-Net" is available of either type with miniature molded semiconductor or chip-bonded semiconductor for high density mounting, and is rich in variety on coatings.

Custom-made "Hi -Net" is to be designed and manufactured in the following stages:

Customer	Nichicon	
Planning of new model	Inquiry	Inquiring with circuit drawing, specific parts required, quantity basis, delivery schedule.
Study	Quotation	Pricing, structure, shape, dimension, etc.
Designing	Sample order	Start of designing, Information on test method/regulations function of circuit requested.
Trial production	Sample submission	Generally 10 pcs. of samples are to be submitted.
Preparation for mass production	Approval of specifications	In case samples found good, final specifications for approval are to be submitted.
Pre-production	Sample delivery for pre-production	Final approval on samples and specifications
Mass production	Mass production	

Notice:
Confidential information given by the customer will be strictly kept secret without permission in writing.

• Advantages by Hybrid ICs

Adoption of Hybrid ICs will give:

1. Miniaturization . . . . . .High mounting density of Hybrid IC helps to make the equipment smaller in size and lighter in weight, that leads to total cost reduction, yet increases value of the equipment.
2. Cost reduction . . . . . .Hybrid IC makes it possible to decrease the number of printed circuit boards, or eliminate the use of them, connectors, etc, resulting in cost savings.
3. Retrenchment of trimming. . .Hybrid IC is highly reliable for a long period of application, by retrenching trimming process for pre-set resistors, that has to be done before Hybrid IC' has not been adopted.
4. Secrecy of circuit . . . . . .Secrecy of circuit can be kept by custom-made Hybrid IC
5. Best function. . . . . .Hybrid IC tested 100% by NICHICON provides reliable function and high yield ratio when assembled in the circuit as an integrated block.

■Applications of Hybrid ICs "Hi-Net"

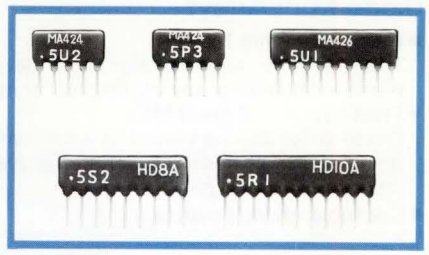
	Applications		Circuits
Consumer Equipment	Video equipment	VTR, VTR camera, CATV, 8mm VTR	Video amplifier, Signal control, Chroma, Synchronous signal, power supply circuits.
	Audio equipment	Stereo, Car stereo, Portable compo.	Graphic equalizer, Noise Canceller, Multi-plexer circuits
	Optronics	Camera	Motor control, Exposure circuits
	Automobile	Panel instrument, Turbo controller, Power steering, Wiper	Signal control, Signal amplifier, Interface circuits
	Home appliance	Air conditioner, Electronic musical instrument, Cooking system	Controller, Computer control, AD/DA converter, Detector circuits
	Medical instrument	Low frequency curing instrument, Hearing aid, Various medical appli-ance	Oscillator, Amplifier, Filter, Interface circuits
	Micro-computer	Computer, Peripheral	Power supply, Interface, Signal control circuits
	Electronic toy	Radio-control car, TV game	Control, Motor driver, RF/IF, Power supply circuits
	Others	Watch, Telephone, Interphone	Oscillator, Frequency divider, Driver, Amplifier circuits
Industrial Equipment	Office automation	Copying machine, Word processor, Facsimile, Printer	Driver, Filter, Memory, Signal control circuits
	Computer system	Computer, Disc memory	Calculator, Memory, Power supply, Matrix, Signal control, Interface circuits
	Traffic system	Signal, Display system, Controller	Signal control, Driver, Display, Logic, Interface circuits
	Control system	N-C machine, Sequencer, Control panel	Interface, Power supply, Control, Servo, Logic circuits
	Cable telecom system	Telephone, Crossbar exchanger, Security system	Signal amplifier, Logic circuits
	Radio system	Wireless telephone, Pocket bell, Cellularphone	High frequency, Mixer, IF, Detector, Audio circuits
	Detector	Sensor, Proximity switch	Oscillator, Switching, Amplifier, Sensing amplifier circuits
	Power supply	Power supply	Power, Sensor, Amplifier, Signal control circuits
	Others	Broadcasting	Various electronic circuits

■Standard Hybrid ICs "Hi-Net"

NICHICON has various standard units as shown below. Semi-custom made units are also available on request.

Series	Features	Applications
Diode array	High speed series, High voltage series	Diode matrix, Interface, Gate circuits, Surge killer circuits, Controller for OA peripheral
RD array	Compact product of resistors and diodes	Interface, Gate circuits, Controller for OA peripheral
Graphic equalizer	Stereo and monaural (4~9 channels)	Car-stereo, Tape recorder, Indicator
Audio circuit	Equalizer amplifier, Noise canceller	Car stereo, Tape recorder
Switching power supply	Single/multiple power supply	Power supply for automotive appliance, controller, radio apparatus
Automotive CD power supply	Ultra-miniature power supply	Automotive CD, On-boad power supply for OA equipment

Diode Arrays



High-speed switching diode arrays and high voltage-withstand diode arrays are of NICHICON's standand series. They are combined to be conveniently used for both binary and decimal systems. High-speed series is ideal for computer peripherals, control boards and general electronic appliances. Besides, high voltage-withstand series is ideal for plasma displays. relay surge-preventive circuits.
Both of these series are in stock for prompt delivery. Any special requirements with customer's particular circuits will be also welcome. Please consult us for the details.

■High-speed switching diode array series

● Absolute maximum ratings ※

Items	Symbol	Ratings
Peak reverse voltage	V_{RM}	40V
DC reverse voltage	V_R	40V
Surge current(1 μ s)	I_{FSM}	4.0A
Peak forward current	I_{FM}	300mA
Average rectified current	Io	150mA※
Storage temperature	Tstg	−25~+85℃

※ 100mA for simultaneous energizing.

※ Maximum Current value applicable to each diode.

● Electrical characteristics Ta : +25℃

Items	Symbol	Conditions	Ratings Min.	Ratings Typ.	Ratings Max.	Unit
Reverse current	I_R	VR=40V	—	—	0.5	μA
Forward voltage	V_{F1}	IF=10mA	—	0.7	1.0	V
Forward voltage	V_{F2}	IF=50mA	—	0.79	1.0	V
Forward voltage	V_{F3}	IF=100mA	—	0.85	1.2	V
Reverse recovery time	trr	IF=10mA, VR=6V	—	—	4.0	nS

■High voltage-withstand series

● Absolute maximum ratings ※

Items	Symbol	Ratings
Peak reverse voltage	V_{RM}	220V
Reverse DC voltage	V_R	200V
Surge current (1sec.)	Is	1A
Peak forward current	I_{FM}	600mA
Average rectified current	Io	200mA
Storage temperature	Tstg	−25~+85℃

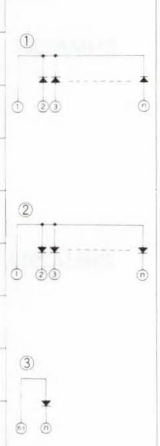
※ Maximum Current value applicable to each diode.

● Electrical characteristics Ta : +25℃

Items	Symbol	Conditions	Ratings Min.	Ratings Typ.	Ratings Max.	Unit
Reverse current	I_R	V_R=110V	—	—	1.0	μA
Forward voltage	V_F	I_F=50mA	—	—	1.3	V
Reverse voltage	V_R	I_R=100μA	220	—	—	V
Time required for recovery from reverse voltage or current	trr	I_F=I_R=30mA, R_L=100Ω	—	—	100	ns

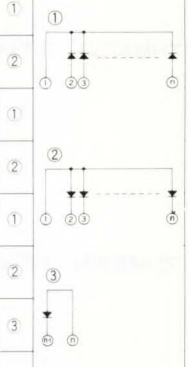
● Series List

Code	Type	Number of diodes	Common electrode	Dimensions (㎜Max.) W	H	T	No. of Pins n	Circuit diagram
ZHMA0423	MA423	4	Cathode	14	9	3.5	5	①
ZHMA0424	MA424		Anode					②
ZHMA0425	MA425	8	Cathode	24	9	3.5	9	①
ZHMA0426	MA426		Anode					②
ZHMA0427	MA427	10	Cathode	29	9	3.5	11	①
ZHMA0428	MA428		Anode					②
ZHMA0429	MA429	5	Isolated	27	9	3.5	10	③
ZHMA0430	MA430	4	Isolated	21.5	9	3.5	8	③
ZHMA0431	MA431	6	Cathode	19	9	3.5	7	①
ZHMA0432	MA432		Anode					②

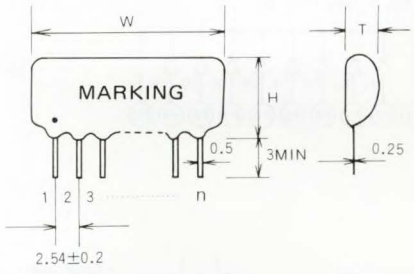


● Series List

Code	Type	Number of diodes	Common electrode	Dimensions (㎜Max.) W	H	T	No. of Pins n	Circuit diagram
ZHLA0650	HD-4K	4	Cathode	14	9	3	5	①
ZHLA0651	HD-4A		Anode					②
ZHLA0652	HD-8K	8	Cathode	24	9	3	9	①
ZHLA0653	HD-8A		Anode					②
ZHLA0654	HD-10K	10	Cathode	29	9	3	11	①
ZHLA0655	HD-10A		Anode					②
ZHLA0656	HD-4S	4	Isolated	21.5	9	3	8	③
ZHLA0657	HD-5S	5	Isolated	27	9	3	10	③



● Drawing

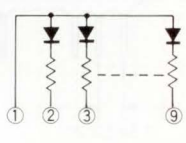


- Epoxy-resin coating
- Iron lead frame. tin-plated over copper

RD Arrays

● Series List

Code	Type	Common electrode	No. of elements Resistor	No. of elements Diode	Specifications Resistance	Specifications Tol.	Specifications Loss (R)	Dimensions (㎜Max.) W	H	T	No. of pins n	Circuit diagram
ZHMA2401	MA2401	Anode	8	8	330Ω	±5%	60mW	24.5	7	4	9	
ZHMA2402	MA2402	Anode	8	8	1kΩ	±5%	60mW	24.5	7	4	9	

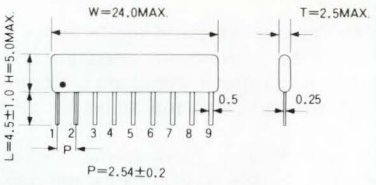


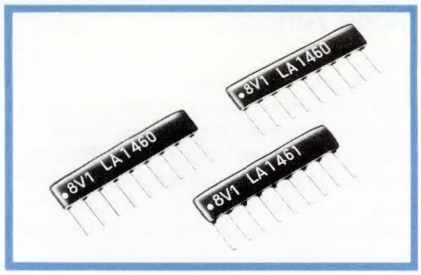
Diode Mini-Arrays

- Height·····5mm Max.
  The mounting height of electronic device can be made substantially low-profile and compact.
- Thickness····· 2.5mm Max.
  Diode arrays can be placed in a row with 2.54mm pitch, and high density mounting is available at a rate of one diode per 0.1 sq. inch.
- Electrical characteristics

Items	Symbol	Conditions	Ratings			Unit
			Min.	Typ.	Max.	
Reverse current	I_R	V_R=35V	—	—	0.5	μA
Forward voltage	V_{F1}	I_F=10mA	—	0.75	1.0	V
Forward voltage	V_{F2}	I_F=50mA	—	0.90	1.1	V
Forward voltage	V_{F3}	I_F=100mA	—	0.95	1.2	V
Reverse recovery time	trr	I_F=10mA V_R=6V	—	—	4.0	ns

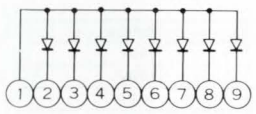
- Drawing



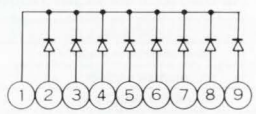


- Circuit diagram

ZHLA1460



ZHLA1461



Any particular specifications are also available upon request.

Diode Arrays for Specific Layout

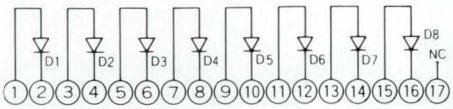
- Absolute maximum ratings

Items	Symbol	Ratings
Peak reverse voltage	V_{RM}	40V
DC reverse voltage	V_R	40V
Surge current (1μs)	I_{FSM}	4.0A
Peak forward current	I_{FM}	300mA
Average rectified current	Io	100mA
Storage temperature	Tstg	−25~+85℃

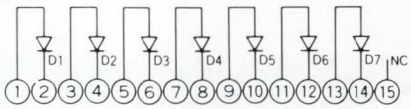
- Electrical characteristics

Items	Symbol	Conditions	Ratings			Unit
			Min.	Typ.	Max.	
Reverse current	I_R	VR=40V	—	—	0.5	μA
Forward voltage	V_{F1}	IF=10mA	—	0.7	1.0	V
Forward voltage	V_{F2}	IF=50mA	—	0.79	1.0	V
Forward voltage	V_{F3}	IF=100mA	—	0.85	1.2	V
Reverse recovery time	trr	IF=10mA, VR=6V	—	—	4.0	nS

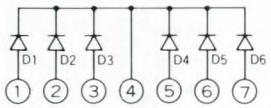
ZHMA2906 $23.5^W \times 16^H \times 6^T$ (mm) (Fig. B)



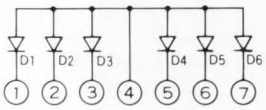
ZHMA2907 $21^W \times 16^H \times 6^T$ (mm) (Fig. B)



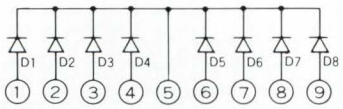
ZHMA2901 $19^W \times 9^H \times 3.5^T$ (mm) (Fig. A)



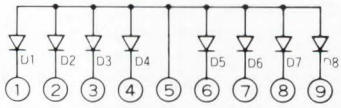
ZHMA2902 $19^W \times 9^H \times 3.5^T$ (mm) (Fig. A)



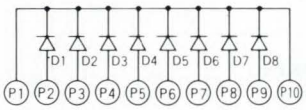
ZHMA2911 $24^W \times 9^H \times 3.5^T$ (mm) (Fig. A)



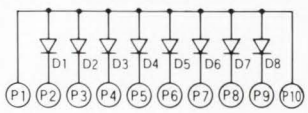
ZHMA2912 $24^W \times 9^H \times 3.5^T$ (mm) (Fig. A)



ZHMA2913 $26.5^W \times 9^H \times 3.5^T$ (mm) (Fig. A)



ZHMA2914 $26.5^W \times 9^H \times 3.5^T$ (mm) (Fig. A)



- Drawing

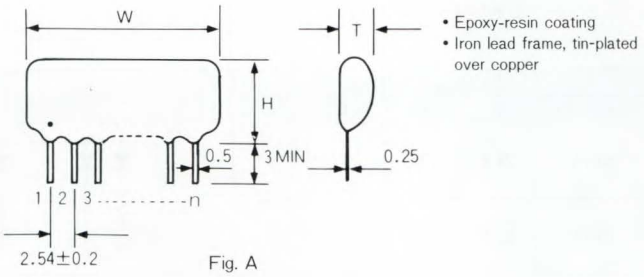


Fig. A

- Epoxy-resin coating
- Iron lead frame, tin-plated over copper

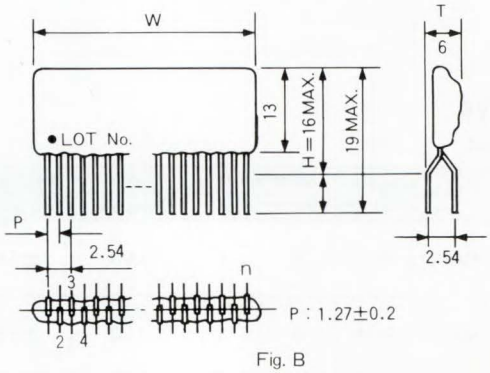


Fig. B

Cautions : Full care to be taken when solder flow applied to those miniature products.

Graphic Equalizers

Typical standard items of graphic equalizers are as shown below.

They are designed in blocks so as to be applicable to common circuits.

No. of elements	Type	Type numbering system	Dimensions (mm)	Appearance
4	AD1203	ZHLA0243	68^{W}×16^{H}×4^{T}	
5	AD1020	ZHMA1728	68^{W}×16^{H}×5^{T}	
	AD1011	ZHLA0224	37^{W}×16^{H}×4^{T}	
	AD1201	ZHLA0241	68^{W}×16^{H}×4^{T}	
	AD1015	ZHMA1663	68^{W}×16^{H}×5^{T}	
	LA1351	ZHLA1351	68^{W}×9.5^{H}×6^{T}	
	LA1360	ZHLA1360	68^{W}×9.5^{H}×6^{T}	
7	AD1018	ZHLA0244	90^{W}×16^{H}×4^{T}	
	AD1010	ZHMA1551	90^{W}×17.5^{H}×9^{T}	
9	AD1009	ZHLA0212B	57^{W}×16^{H}×4^{T}	

● Features

No. of elements	Type		Center frequency (Hz)	Gain (dB)	Applied Voltage(V)	Circuit current (mA)
4	AD1203	Stereo	100、500、2k、10k	±7	+12	30
5	AD1020	Stereo	60、250、1k、3.5k、10k	±10	+12	35
	AD1011	Monaural	100、330、1k、3.3k、10k	±9	+12	20
	AD1201	Stereo	100、330、1k、3.3k、10k	±9	+12	35
	AD1015	Stereo	63、250、1k、4k、16k	±8	+12	35
	LA1351	Stereo	100、300、1k、3k、12k	±12	+12	15
	LA1360	Stereo	60、250、1k、3.5k、10k	±12	+12	15
7	AD1018	Stereo	60、150、400、1k、2.4k、6k、15k	±12	+12	50
	AD1010	Stereo	60、140、250、500、1k、3.5k、9.1k	±12	+12	50
9	AD1009	Monaural	60、125、250、500、1k、2k、4k、8k、16k	±12	+12	30

Power Hybrid ICs for Switching Regulators

NICHICON's total engineering technology of thick film and assembling has successfully achieved in development of power hybrid ICs, which have a few watt power loss level. Hereunder are shown for standard switching regulators of DC-DC down converter type.

■SRP Series

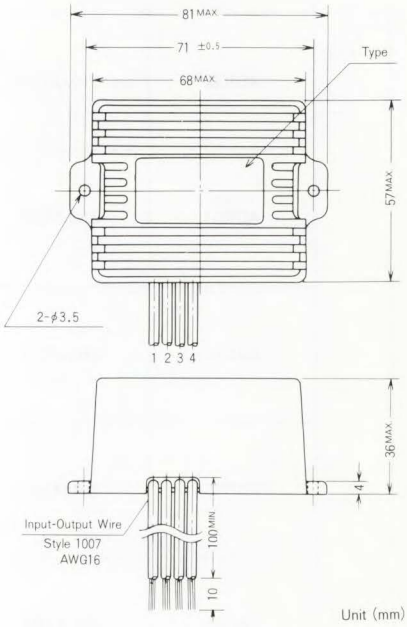
This compact module, packed in an aluminum die-casting case and sealed tightly with resin, is assembled with miniature thick film Hybrid IC and other components like electrolytic capacitors, choke coils and etc.
This is ideally suited for control circuits of switching regulators in battery apparatus, automobile appliances, and navigation devices, as it has vibration and salt resistance property.

● Electrical characteristics

Ta : +25℃

Items \ Type / Code	SRP2405 / ZHSP2405	SRP2409 / ZHSP2409	SRP2412 / ZHSP2412	SRP2412B / ZHSP2412B	SRP2415 / ZHSP2415
Input voltage (V)	19.2~31.2(24Typ.)				
Output current (A)	0.25~2.0 (3A for intermittent use)				
Oscillation frequency (kHz)	50				
Output voltage (V)	5	9	12	13.8	15
Regulation to line (mV)	30	100	150	150	180
Regulation to load (mV)	20	30	30	30	40
Output ripple (mVp-p)	50	60	60	60	80
Limited output current (A)	3.6	3.6	3.6	3.6	3.6
Efficiency (%)	70	75	81	83	84

● Dimensions



Unit (mm)

■SRC Series

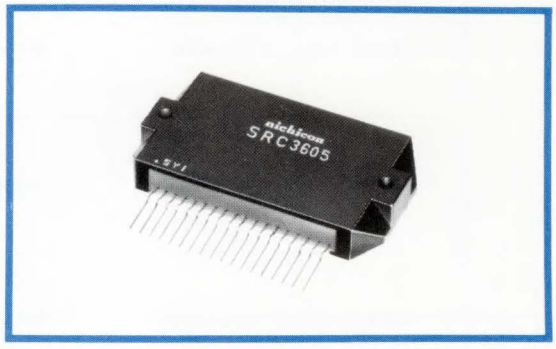
This compact module consists of thick film Hybrid IC and power electric parts mounted on an aluminum base, and has less heat resistance so as to be suitable for control circuits of switching regulators.
This is ideal for on-board power supplies of control panels and various kind of power supplies.

● Composite Power Supply (1 output)

Ta : +25℃

Items \ Type / Code	SRC3605 / ZHSC3605	SRC3609 / ZHSC3609	SRC3612 / ZHSC3612	SRC3612B / ZHSC3612B	SRC3615 / ZHSC3615
Input voltage (V)	50Max (36Typ.)				
Output current (A)	3.0Max.				
Oscillation frequency (kHz)	50				
Output voltage (V)	5	9	12	13.8	15
Regulation to line (mV)	100	200	250	300	300
Regulation to load (mV)	30	30	30	40	40
Output ripple (mVp-p)	20	30	40	50	50
Limited output current (A)	3.6	3.6	3.5	3.6	3.6
Efficiency (%)	65	75	80	82	83

SRC3605, 3609, 3612, 3612B, 3615

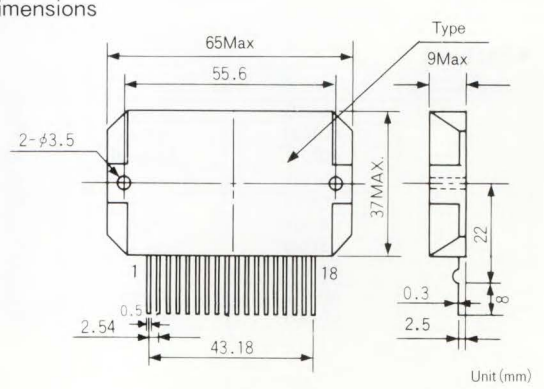


● Composite Power Supply (2 outputs)

Ta : +25℃

Item \ Type / Ratings	SRC 0110 (Code ZHSC0110)	
	Output 1	Output 2
Input voltage (V)	5 50Max.(35Typ.)	
Output voltage (V)	5.0±0.1	24.0±0.3
Output current AV (A)	3	3
Output current PK (A)	3.6	6
Regulation to line (mV)	150Max.	300Max
Regulation to load (mV)	180Max.	250Max
Oscillation frequency (kHz)	35Typ.	
Efficiency (%)	80Typ.	

● Dimensions

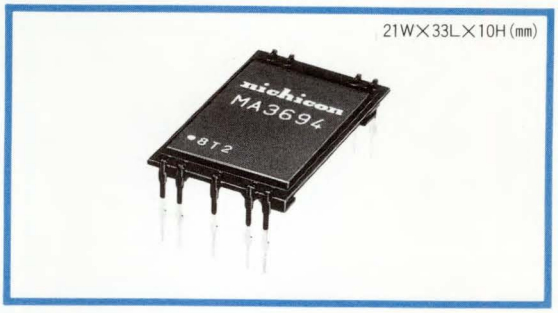


Unit (mm)

■On-board Power Supply Series

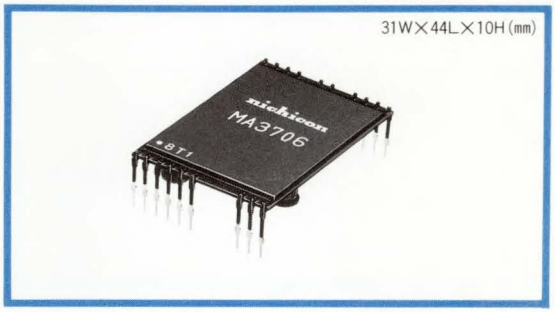
MA3694 (Code ZHMA 3694)

Items	Specifications
	Output
Input voltage (V)	20~30 (24Typ.)
Output voltage (V)	5.0±0.25
Output current (mA)	10~200
Regulation to line (mV)	25Max.
Regulation to load (mV)	50Max.
Output ripple (mVpp)	100Max.
Oscillation frequency (kHz)	50Typ.
Efficiency (%)	65Typ.



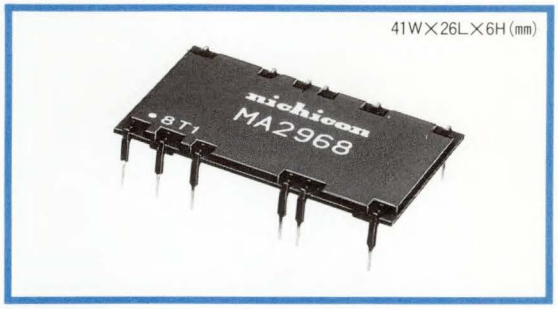
MA3706 (Code ZHMA 3706)

Items	Specifications	
	Output 1	Output 2
Input voltage (V)	8~16 (13.5Typ.)	
Output voltage (V)	15.0±0.2	−15.0±0.2
Output current (mA)	80~150	−50~−100
Regulation to line (mV)	50Max.	50Max.
Regulation to load (mV)	30Max.	30Max.
Output ripple (mVpp)	50Max.	50Max.
Oscillation frequency (kHz)	150Typ.	
Efficiency (%)	72Typ.	



MA2968 (Code ZHMA 2968)

Items	Specifications	
	Output 1	Output 2
Input voltage (V)	10.2~13.8 (12Typ.)	
Output voltage (V)	−5.0±0.1	12.0±0.24
Output current (mA)	−35~−65	90~200
Regulation to line (mV)	50Max.	50Max.
Regulation to load (mV)	10Max.	10Max.
Output ripple (mVpp)	50Max.	50Max.
Oscillation frequency (kHz)	150Typ.	
Efficiency (%)	78Typ.	



■Automobile CD Power Supply Series

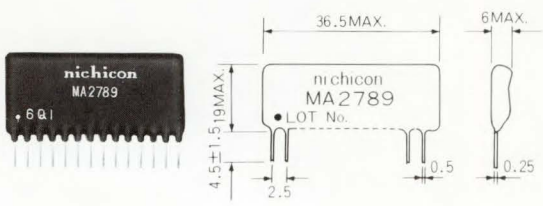
MA2033 (Code ZHMA 2033)

Items	Specifications
	Output
Input voltage (V)	8~16 (12Typ.)
Output voltage (V)	−8.0±0.2
Output current AV (A)	−100~−200
Regulation to line (mV)	300Max.
Regulation to load (mV)	100Max.
Output ripple (mVpp)	20Typ.
Oscillation frequency (kHz)	200Typ.
Efficiency (%)	58Typ.

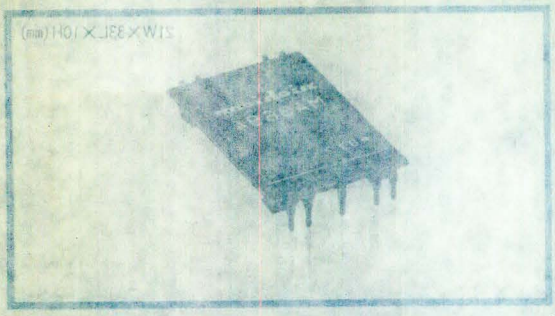
■Power Supply Control Circuit Series

MA2789 (Code ZHMA 2789)

Items	Specifications
Source voltage (V)	7~40
Output current (mA)	200Max.
Output voltage (V)	5.0±0.1
Frequency (kHz)	50Typ.
Base voltage (V)	5.0Typ.
Bias current (mA)	10Typ.

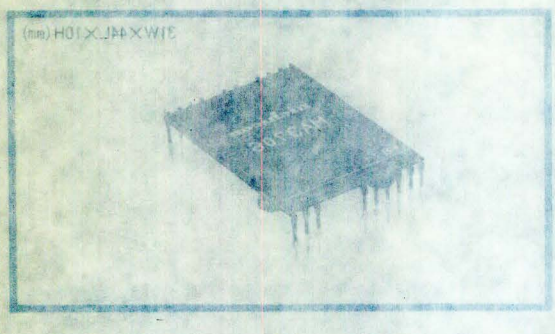


On-board Power Supply Series
MA3694 (Code 2HMA 3694)



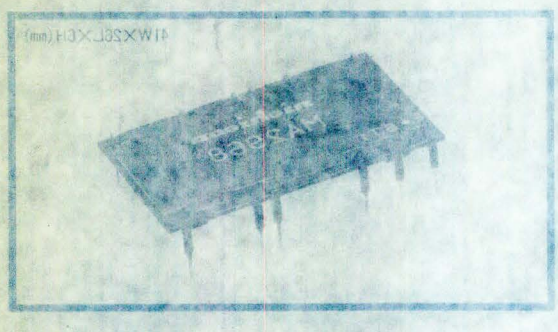
Items	Specifications
Input voltage (V)	20 – 30 (24Typ)
Output voltage (V)	5.0±0.25
Output current (mA)	10 – 200
Regulation to line (mV)	25Max.
Regulation to load (mV)	50Max.
Output ripple (mVpp)	100Max.
Oscillation frequency (kHz)	50Typ.
Efficiency (%)	65Typ.

MA3706 (Code 2HMA 3706)



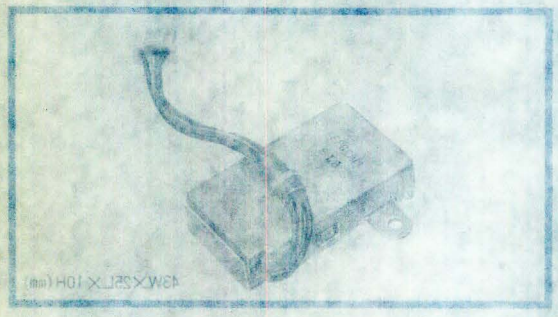
Items	Specifications	
	Output 1	Output 2
Input voltage (V)	8 – 16 (13.5Typ.)	
Output voltage (V)	15.0±0.2	−15.0±0.2
Output current (mA)	80 – 130	−50 – −100
Regulation to line (mV)	30Max.	50Max.
Regulation to load (mV)	30Max.	30Max.
Output ripple (mVpp)	50Max.	50Max.
Oscillation frequency (kHz)	150Typ.	
Efficiency (%)	72Typ.	

MA2968 (Code 2HMA 2968)



Items	Specifications	
	Output 1	Output 2
Input voltage (V)	10.2 – 13.8 (12Typ.)	
Output voltage (V)	−5.0±0.1	12.0±0.24
Output current (mA)	−35 – 65	90 – 200
Regulation to line (mV)	50Max.	50Max.
Regulation to load (mV)	10Max.	10Max.
Output ripple (mVpp)	50Max.	50Max.
Oscillation frequency (kHz)	150Typ.	
Efficiency (%)	78Typ.	

Automobile CD Power Supply Series
MA2033 (Code 2HMA 2033)



Items	Specifications
	Output
Input voltage (V)	8 – 16 (12Typ.)
Output voltage (V)	−8.0±0.2
Output current ΔV (A)	−100 – −200
Regulation to line (mV)	300Max.
Regulation to load (mV)	100Max.
Output ripple (mVpp)	2UTyp.
Oscillation frequency (kHz)	200Typ.
Efficiency (%)	98Typ.

Power Supply Control Circuit Series
MA2789 (Code 2HMA 2789)

Items	Specifications
Source voltage (V)	7 – 40
Output current (mA)	200Max.
Output voltage (V)	5.0±0.1
Frequency (kHz)	30Typ.
Base voltage (V)	3.0Typ.
Bias current (mA)	10Typ.

MILLIMETER TO INCH CONVERSION TABLE

mm	inch
1	.039
1.5	.059
2	.079
2.5	.098
3	.118
3.5	.138
4	.157
5	.197
5.3	.209
6	.236
6.3	.248
7	.275
8	.314
9	.354
10	.394
11	.433
11.5	.453
12	.472
12.5	.492
12.7	.500
13	.512
14	.551
15	.591
16	.629
17	.669

mm	inch
18	.709
19	.748
20	.787
21	.827
22	.866
23	.906
24	.945
25	.984
25.4	1.000
26	1.024
27	1.063
28	1.102
28.6	1.126
29	1.142
30	1.181
30.5	1.201
31	1.220
31.5	1.240
31.8	1.252
32	1.260
33	1.299
34	1.339
34.5	1.358
36	1.417
36.5	1.437

mm	inch
37	1.457
38	1.496
39	1.535
40	1.575
41	1.614
41.5	1.634
42	1.654
43	1.693
44	1.732
45	1.772
46	1.811
47	1.850
48	1.890
49	1.929
50	1.969
51	2.008
52	2.047
53	2.087
54	2.126
55	2.165
56	2.205
57	2.244
58	2.283
59	2.323
60	2.362

mm	inch
61	2.402
62	2.441
63	2.480
64	2.520
65	2.559
66	2.598
67	2.638
68	2.677
69	2.717
70	2.756
71	2.795
72	2.835
73	2.874
74	2.913
75	2.953
76	2.992
76.2	3.000
80	3.150
90	3.543
100	3.937
120	4.724
140	5.512
160	6.299

NOTE : To convert other millimeter values to inches multiply by 03937

CENTIGRADE TO FAHRENHEIT CONVERSION TABLE

$C^\circ = (F^\circ - 32) \times {}^5/_9$

$F^\circ = (C^\circ \times 1.8) + 32$

°C	−55	−40	−30	−25	−20	−17.8	0	20	25	40	45	60	70	85	105	125	260
°F	−67	−40	−22	−13	−4	0	32	68	77	104	113	140	158	185	221	257	500

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