August 1994
Edition 1.0

DATA SHEET

FTP–633MCL/DCL

BATTERY DRIVEN, MICRO LINE THERMAL PRINTER 3” TYPE, MECHANISM / INTERFACE BOARD

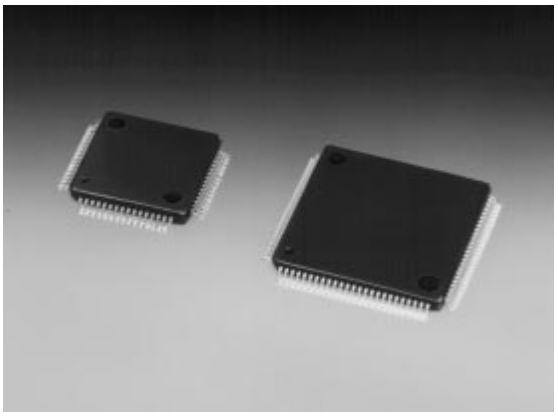
DESCRIPTION

This micro line thermal printer can be driven by batteries with high printing speed for 3 inches width paper (70mm). It is suitable to portable equipment which requires compact size and lightweight.
In addition to interface board, driving LSI (MCU + Gate Array) is also available.

FEATURES

- DRIVEN BY BATTERIES (DIRECT CONNECT BETWEEN THERMAL HEAD AND BATTERIES)
  It can be driven by a broad range of voltages (4.2 to 8.5V) of NiCd or Nickel–Hydrogen or Lithium Ion batteries by using Fujitsu’s unique head drive control system. The battery pack can be connected directly to the print head without a voltage regulator.
- HIGH SPEED PRINTING
  It can print at approx. 24 character lines/s (480 dot lines/s = 60mm/s).
- COMPACT AND LIGHTWEIGHT
  It is light weight as approx. 88g.
- LOW POWER CONSUMPTION
  The peak current for head driving is approx. 3.0A.
- THREE PAPER PATHS
  Front, rear, and top paper insertion paths can be used.
- AUTOMATED PAPER FEED FUNCTION
  Paper feed is possible by operating head up lever.
- VARIETY OF APPLIED PAPER
  1–ply roll paper, 2–ply paper (TCC AND roll), labels, and long–life paper are applicable.
- UL RECOGNIZED
  UL File No. E142123 Vol. 3 Sec.1

FTP–633MCL353/FTP–633MCL354



FTP–623CU001, FTP–633GA101

■ GENERAL SPECIFICATIONS

Item		Specifications
Printing Method		Thermally–Sensitive Line Dot
Dot Structure		512 dots / line
Dot Pitch (W)		0.125 mm (8dot/mm) — Dot Density
Dot Pitch (V)		0.125 mm (8 dot/mm) — Line Feed Pitch
Effective Printing Area		64 mm
Printing Mode		(1) Single Density — Standard Mode — HS Mode 1. ~ 3. / HQ Mode; Reduced Mode — HS Mode 1. ~ 3. / HQ Mode (2) Double Density Mode
Maximum Printing Speed [Bus interface]		Approx. 24 character lines/s (480 dot lines/s = 60mm/s) [1ply, 8 columns of “H”, Double Density, 7.2V, 1/10” line returns, Bus Interface.] Approx. 16 character lines/s (416 dot lines/s = 52mm/s) [1ply, 12 columns of “H”, Single Reduced, 7.2V, 1/8” line returns, Bus Interface.]
Character Types		JIS ANK : 128; ASCII : 31; Semi–graphic : 36; International characters : 130; Special : 30; Download : 8
Character Grade Mode		Standard Character (12 × 6 dot font) / High Grade Character (16 × 8 dot font)
Character Composition, Dimension, (H x W) No. of Cols. [Standard]		Single Density Standard : 24 × 12 dots (3.0 × 1.5mm), 42 columns; 32 × 16 dots (4.0 × 2.0mm), 32 columns Single Density Reduced*1 : 24 × 12 dots (3.0 × 1.5mm), 42 columns; 32 × 16 dots (4.0 × 2.0mm), 32 columns Double Density : 16 × 8 dots (2.0 × 1.0mm), 64 columns
Interface		(1)Centronics (2) Bus interface*2
Operating Voltage	For Print Head	4.2 to 8.5 V DC [4 or 5 Ni–Cd or Ni–MH batteries, equivalent to 2 Li–ion, Constant Voltage Power Supply] Approx. 3.0A [peak value, 7.2V. 100% printing ratio]
	For Motor	4.2 to 8.5V DC [4 or 5 Ni–Cd or Ni–MH batteries, equivalent to 2 Li–ion, Constant Voltage Power Supply] Ave. 0.7A or less
	For Logic	5VDC±5%, 0.3A

*1 Character composition is the same as single density standard mode.
*2 The data to be printed is automatically read out by the printer driver equipment memory (host system frame memory). The communication is parameter transfer.

■ GENERAL SPECIFICATIONS

Item		Specifications
Dimension (W × D × H)	Mechanism	85 × 49 × 20mm (excluding knob, lever, and flexible PC board)
	Interface Board	108 × 91 × 18mm
Weight	Mechanism	Approx. 88g
	Interface Board	Approx. 60g
Thermal Head Life		Pulse life : 30×10^6 pulse/dot Wear resistance : 30km (12.5% printing ratio)
Environmental Characteristics	Operating Temperature	+5 to +40°C*3
	Operating Humidity	20 to 85 % RH (No condensation)
	Storage Temperature	–20 to +60°C (Paper excluded)
	Storage Humidity	5 to 95% RH (No condensation)
Detection	Head Temperature	By Thermistor
	Paper out / Mark	By Photointerruper (Command set)
	Voltage	By Micro Controller
	Head up	By Microswitch
Paper width		$70\ ^{+0}_{-1}$ mm
Specified paper		1ply (roll) : FTP–030PG021 Long life (roll) : FTP–030PR202 Label(roll) : FTP030PL021 2ply(TCC) : FTP–030P8821 2 ply (roll) : FTP–030P7122

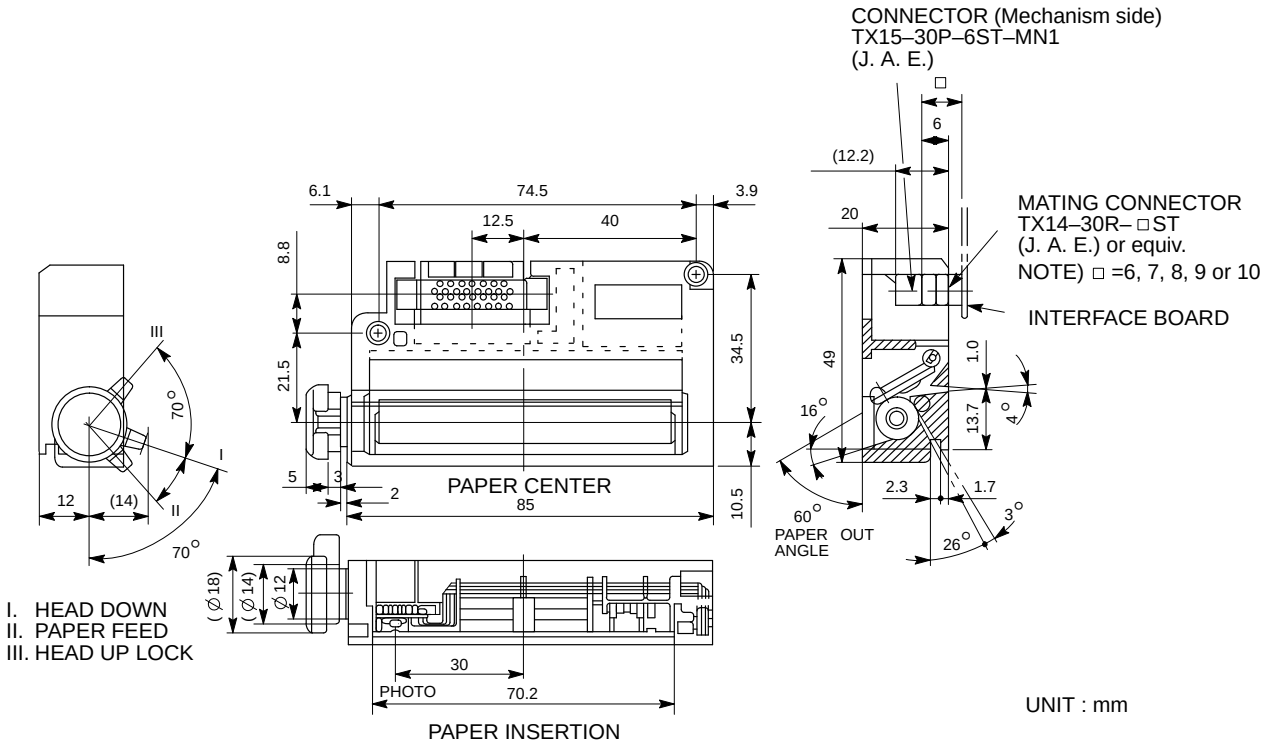
*3 Temperature range for guaranteed printing density. It can be operated in the range of 0 to +40°C.

■ DESIGNATION

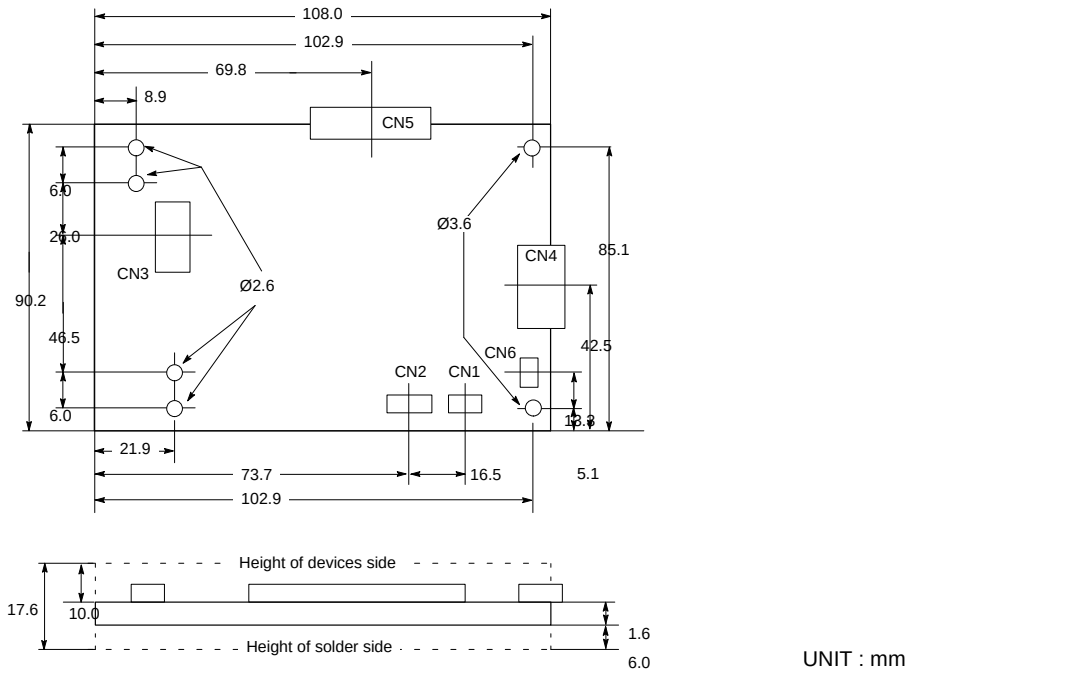
Item		Part number
Printer mechanism	Front paper insertion type	FTP–633MCL353
	Rear paper insertion type	FTP–633MCL354
Interface board		FTP–623DCL001
LSI	Micro Controller Unit	FTP–623CU001
	Gate Array	FTP–633GA101

■ DIMENSION

Printer Mechanism



Interface Board



■ INTERFACE

1. Centronics Standard

(1) Connector (CN5)

Connector Part Number : FCN–215Q030–G/0 (Fujitsu) or equivalent
Mating Connector Part Number : FCN–217J030–G/0 (Fujitsu) or equivalent
FCN–214J030–G/0 (Fujitsu) or equivalent
FCN–215J030–G/0 (Fujitsu) or equivalent

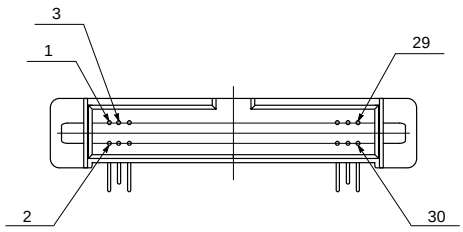
(2) Connector Pin Assignment

No	Code	I/O	Signal	No	Code	I/O	Signal
1	$\overline{\text{PRSTB}}$	I	Data strobe	2	$\overline{\text{PRSTB}}$ –RET	–	Connected to logic GND
3	PRDT0	I	Data 0	4	PRDT0 –RET	–	Connected to logic GND
5	PRDT1	I	Data 1	6	PRDT1 –RET	–	Connected to logic GND
7	PRDT2	I	Data 2	8	PRDT2 –RET	–	Connected to logic GND
9	PRDT3	I	Data 3	10	PRDT3 –RET	–	Connected to logic GND
11	PRDT4	I	Data 4	12	PRDT4 –RET	–	Connected to logic GND
13	PRDT5	I	Data 5	14	PRDT5 –RET	–	Connected to logic GND
15	PRDT6	I	Data 6	16	PRDT6 –RET	–	Connected to logic GND
17	PRDT7	I	Data 7	18	PRDT7 –RET	–	Connected to logic GND
19	$\overline{\text{ACKNLG}}$	O	Data input acknowledge	20	$\overline{\text{ACKNLG}}$ –RET	–	Connected to logic GND
21	BUSY	O	Busy	22	BUSY –RET	–	Connected to logic GND
23	RINF2	O	Printer status	24	$\overline{\text{INPRM}}$ –RET	–	Connected to logic GND
25	$\overline{\text{SLCTIN}}$	I	Printer select	26	$\overline{\text{INPRM}}$	I	Reset
27	RINF1	O	Printer status	28	RINF3	O	Printer status
29	$\overline{\text{ATF}}$	I	Paper feed request	30	GND	–	Logic GND

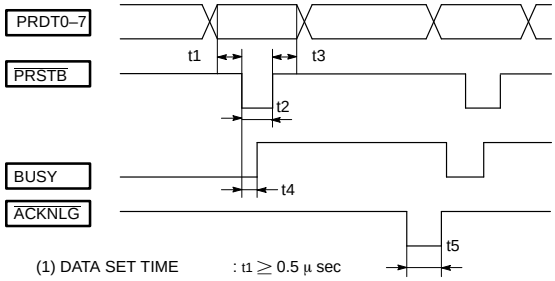
Notes) • Symbol " ¯ "means a negative logic signal.
• " –RET" signal is a return signal of the twisted pair cable.
• "I" or "O" means a signal direction from the printer side.

(3) Connector Pin Number

FCN–215Q030–G/0 (Fujitsu) or equivalent



(4) Data Input Signal Timing



(1) DATA SET TIME : $t_1 \geq 0.5\ \mu$ sec
(2) $\overline{\text{PRSTB}}$ PULSE WIDTH : $t_2 \geq 0.5\ \mu$ sec
(3) DATA HOLD TIME : $t_3 \geq 0.5\ \mu$ sec
(4) $\overline{\text{PRSTB}}$ to BUSY = "H" : $t_4 \leq 0.5\ \mu$ sec
(5) $\overline{\text{ACKNLG}}$ PULSE TIME : $t_5 = 1.0 \sim 1.5\ \mu$ sec

2. Extended Bus Interface

(1) Connector (CN4)

Connector Part Number : FCN–215Q040–G/0 (Fujitsu) or equivalent
Mating Connector Part Number : FCN–217J040–G/0 (Fujitsu) or equivalent
FCN–214J040–G/0 (Fujitsu) or equivalent
FCN–215J040–G/0 (Fujitsu) or equivalent

(2) Connector Pin Assignment

No	Code	I/O	Signal	No	Code	I/O	Signal
1	ALE	O	Address latch	2	$\overline{\text{BRD}}$	–	Data read
3	$\overline{\text{BWR}}$	–	Data write	4	READY	–	Data access ready
5	HACK	–	Hold acknowledge	6	HRQ	–	User hold request input
7	MCRC	–	Power-down	8	CLK	O	System clock
9	PCPAK1	O	Common RAM reading completion	10	$\overline{\text{ATF}}$	I	Automatic paper loading
11	PCPSD1	I	Common RAM reading request	12	PRON	O	Printer operation
13	$\overline{\text{RST}}$	I	Hard reset	14	GND	–	Ground
15	DB00	I/O	External address/Data bus 0	16	DB01	I/O	External address/Data bus 1
17	DB02	I/O	External address/Data bus 2	18	DB03	I/O	External address/Data bus 3
19	DB04	I/O	External address/Data bus 4	20	DB05	I/O	External address/Data bus 5
21	DB06	I/O	External address/Data bus 6	22	DB07	I/O	External address/Data bus 7
23	AB08	O	External address bus 08	24	AB09	O	External address bus 09
25	AB10	O	External address bus 10	26	AB11	O	External address bus 11
27	AB12	O	External address bus 12	28	AB13	O	External address bus 13
29	AB14	O	External address bus 14	30	AB15	O	External address bus 15
31	AB16	O	External address bus 16	32	AB17	O	External address bus 17
33	AB18	O	External address bus 18	34	AB19	O	External address bus 19
35	AB20	O	External address bus 20	36	AB21	O	External address bus 21
37	AB22	O	External address bus 22	38	AB23	O	External address bus 23
39	$\overline{\text{RAM2}}$	O	Common Ram access	40	$\overline{\text{INPRM}}$	I	Reset

Notes) • Symbol “ ¯ ”means a negative logic signal.
• “I” or “O” means a signal direction from the printer side.

■ CONNECTORS (INTERFACE BOARD)

1. Connector for Logic Power (CN1)

Part Number : B2B–XH–A–WHITE (J.S.T.) or equivalent (P.C.B.side)
Mating Connector Part Number : XHP–2 (J.S.T.) or equivalent (Cable side)

No	Code	I/O	Signal
1	Vcc	–	Power for logic
2	GND	–	Logic ground

2. Connector for Thermal Head and Motor Power (CN2)

Part Number : B6B–XH–A–WHITE (J.S.T.) or equivalent (P.C.B.side)
Mating Connector Part Number : XHP–6 (J.S.T.) or equivalent (Cable side)

No	Code	I/O	Signal
1	BAT	–	Power for head/motor
2	BAT	–	Power for head/motor
3	BAT	–	Power for head/motor
4	GND	–	Head/motor ground
5	GND	–	Head/motor ground
6	GND	–	Head/motor ground

3. Connector to Printer Mechanism (CN3)

Part Number : TX14–30R–6ST–N1 (J.A.E.) or equivalent (P.C.B.side)

No	Code	I/O	Signal	No	Code	I/O	Signal
1	GND	–	Head/Motor ground	2	ENB7*	–	Printing enable (not used)
3	ENB6*	–	Printing enable (not used)	4	ENB5	O	Printing enable
5	ENB4	O	Printing enable	6	HD	O	Printing data output
7	HDV	O	Power for logic	8	$\overline{LAT}$	O	Printing data latch
9	HCLK	O	Data transmission clock	10	ENB3	O	Printing enable
11	ENB2	O	Printing enable	12	ENB1	O	Printing enable
13	ENB0	O	Printing enable	14	V_{REF}	O	Power for thermistor
15	BAT	–	Power for head/motor	16	GND	–	Head/Motor ground
17	GND	–	Head/Motor ground	18	TMP	O	Temperature detection
19	HUP	I	Head–up detection	20	Vcc	–	Power for switch
21	PINCH	I	Automatic paper loading	22	SDV	–	Power for photointerrupter
23	——	–	Pull–down by resistor	24	$\overline{PES}$	I	Paper–out detection
25	MT/$\overline{B0}$	O	Motor excitation ($\overline{B}$)	26	MT/B0	O	Motor excitation (B)
27	MT/$\overline{A0}$	O	Motor excitation ($\overline{A}$)	28	MT/A0	O	Motor excitation (A)
29	BAT	–	Power for head/motor	30	BAT	–	Power for head/motor

Notes)
- * : Not used at mechanism side.
- Symbol " — "means a negative logic signal.
- "I" or "O" means a signal direction from the printer side.
- Connector on Printer Mechanism Part Number : TX15–30P–6ST–MN1 (J.A.E.) or equivalent.

4. Connector for Bus Interface (CN4)

Part Number : FCN–215Q040–G/0 (Fujitsu) or equivalent
Mating Connector Part Number : FCN–217J040–G/0 (Fujitsu) or equivalent
FCN–214J040–G/0 (Fujitsu) or equivalent
FCN–215J040–G/0 (Fujitsu) or equivalent

5. Connector for Centronics Interface (CN5)

Part Number : FCN–215Q030–G/0 (Fujitsu) or equivalent
Mating Connector Part Number : FCN–217J030–G/0 (Fujitsu) or equivalent
FCN–214J030–G/0 (Fujitsu) or equivalent
FCN–215J030–G/0 (Fujitsu) or equivalent

6. Connector for Wrong Temp of Head signal (CN6)

Part Number : B3B–XH–A–WHITE (J.S.T.) or equivalent (P.C.B.side)
Mating Connector Part Number : XHP–3 (J.S.T.) or equivalent (Cable side)

No	Code	I/O	Signal	No	Code	I/O	Signal
1	TM PER	O	Wrong temp. of head	2	N.C.	–	Not connected
3	GND	–	Logic ground				

■ PRINTING COMMANDS (CENTRONICS STANDARD INTERFACE)

Command	Code	Action
Carriage return	LF, CR	Prints buffer data and return the line.
Double width print set	SO	Sets the double width character.
Power–down mode set	DC2, DC3	Reduces the power consumption during standing by.
Double width print reset	DC4	Resets the double width character.
Escape sequence entry	ESC	To form extend command with following commands.
Line space set	ESC + A + n	Sets the line space length in 2 × (0 to 255 dot lines)
Paper feed set in forward direction	ESC + B + n	Sets the paper feed in forward direction. [Feeding range : 2 × (1 to 255 dot lines)]
Bit image print set	ESC K + n_1 + n_2 + n_3	Sets the bit image printing in single or double density mode.
International character set	ESC R + n	Selects the international characters.
Download character register	ESC & + n_1 + n_2 + ~	Resisters the download characters of 12 × 6 or 16 × 8 dots.
Printing quality set	ESC Q + n + SP* + ~	Sets the printing quality conforming to type of paper.
Printing density set	ESC + Q + n + ! + A	Sets the printing density mode. (Single density standard, reduced, or double density)
Paper feed set in reserve direction	ESC j + n	Sets the paper feed in reverse direction. [Feeding range : 2 × (1 to 255 dot lines)]
Character grade set	ESC x + n	Sets the character grade in standard, or high grade.
Special character print set	ESC ¥ + n	Sets the special character.
Start position set for bit–image printing	ESC 1+ n	Sets the print start position of bit–image printing in left end.
Detecting function set	ESC 9 + n	Sets the detecting function.
Mark detection	ESC FF	Feeds the paper to the marking position.
Line feed length set after mark detection	ESC w + n	Sets the line feed length after mark detection.
Automatic paper loading length set	ESC EM + n	Sets paper feed length for automatic paper loading.
Automatic printing speed set	ESC s + n	Sets the function mode in the automatic printing speed set.
Initialization	ESC @	Initializes CPU.

Notes) • * : “SP” means space code (20H).
• Bus interface uses different commands.

■ PRINT SAMPLE