

THERMAL PRINT HEAD SPECIFICATION

Model No

E48



HEC SHANDONG HUALING ELECTRONICS CO., LTD.

REVISION					<u>Approved</u>
Rev	Description	Date	Approved	Drawn	
A	-----	00-6-15	T.Endo	HX.Cong	
B					<u>Checked</u>
					<u>Drawn</u>

CJP International Inc.
 “Your Global Technology Partner”

CJP International Inc.
 Higashi-Ikebukuro Q BLD. 8F
 2-23-2 , Higashi-Ikebukuro
 Toshima-ku , Tokyo 170-0013
 Japan
 TEL : 81-3-5391-7688
 FAX : 81-3-5391-7692
 e-mail : kokusai@cjp-net.co.jp
<http://www.cjptech.com>

Anaheim Office :
 CJP International Inc.
 610 N. Dwyer Drive
 Anaheim CA 92801
 USA
 TEL/FAX : 714-535-0185

Preliminary

1. Description

This specification is applied to E48 thermal print head.

2. Scope

The E48 is a thermal print head which has heat elements which produce 384 dots with 8 dots/mm by means of a high density thick film process. It also includes C-MOS ICs; Which operate as 384 bits shift-registers, latches and switching transistors to drive heat elements.

3. Outline

Item	Specification	Note
Dimension	Fig.4	
Schematic diagram	Fig.3	
Pin assignment	Fig.4	
Print width	48mm	
Number of heaters	384 dots	
Heater resolution	8 dots/mm	
Heater pitch	0.125 mm	
Printed dot dimension	0.11mm×0.13 mm	Nominal
Heater resistance	$\bar{R}=140\Omega \pm 5\%$	
Specifications for driver ICs	Table.2	
Number of driver ICs	64 – bit× 6	
Number of data inputs	1 serial input	
Number of strobes	6	
Logic power supply	5 V × 30 mA	at 2MHz
Specification for thermistor	$R_{25}=30K\Omega \pm 5\%, B=3,950K \pm 2\%$	Table.1

4. Maximum ratings

Parameter	Symbol	Specification	Note
Heater energy consumption	$E_o \text{ max}$	0.46 mJ/dot	5 ms/line
Head voltage	VH	10V	Between Connectors
Logic voltage	Vdd	7V	
Environment temperature	Ta	+5 °C ~ +50 °C	Operating
		- 40 °C ~ +80 °C	Non-operating
Environment humidity		10 ~ 90%RH	Non-condensing
Maximum operating temperature	Ts	65°C 30min. MAX	
		Detected temperature of thermistor shall not exceed 65°C.	Head temperature shall not exceed 70°C.

5. Standard printing conditions

Parameter	Symbol	Recommended operating conditions	Note
Speed		5 ms/line	1 inch/sec
Heater power consumption	P_o	0.12 W/dot	$\bar{R} = 140 \Omega$
Heat voltage	VH	5 V	Connectors
Heater energy consumption	E_o (t_s)	0.27 mJ/dot (2.10 ms)	$\bar{R} = 140 \Omega$ (Note 1)
		0.21 mJ/dot (1.63 ms)	
		0.18 mJ/dot (1.40 ms)	
Supply current	I_o	30 mA/dot	$\bar{R} = 140 \Omega$
Timing chart		Fig.1	
Platen pressure		6.7~8.6 N (0.7~0.9 kgf)/TPH	
Platen hardness		30~40deg	
Platen diameter		ϕ 10 max.	
Scanning resolution		8 line/mm	
Thermal paper		F24OAC MITSUBISHI PAPER MILL CO.,LTD.	
Optical density		1.1 OD min.	(Note 2)

(Note 1) Supply energy is defined by the following formula.

$$E_o = I_o^2 \times \bar{R} \times t_s = \frac{(VH - V_{com})^2 \times \bar{R} \times t_s}{(\bar{R} + R_{ON})^2}$$

$R_{ON} = 15 \Omega$: Driver IC "ON" resistance

t_s : Strobe prints pulse width

VH : Heat voltage

$\bar{R}$: Heater average resistance

$V_{com} = 0.3V$: Common electrode voltage dorp

(Note 2) Printed optical density is measured at 10mm intervals after the starting point. Printed optical density is measured by a RD-914 reflector optical density meter or equivalent.

6. Life expectancy

6.1 The life expectancy under 12.5% printing duty of less at 25° C is defined by the following whichever earlier comes.

Item	Specification	Note
Number of pulses	1×10^8 pulses	
Run length	50 Km	

6.2 At 5° C 10% humidity, the platen roller which is protected by a rubber insulator , will operate under test conditions with no paper for a maximum of 3Km, before the heat element fails.

7. Warning during use

7.1 Strobe signal

During head power supply ON/OFF sequence strobes should be kept "disable".

7.2 Stability of IC operation

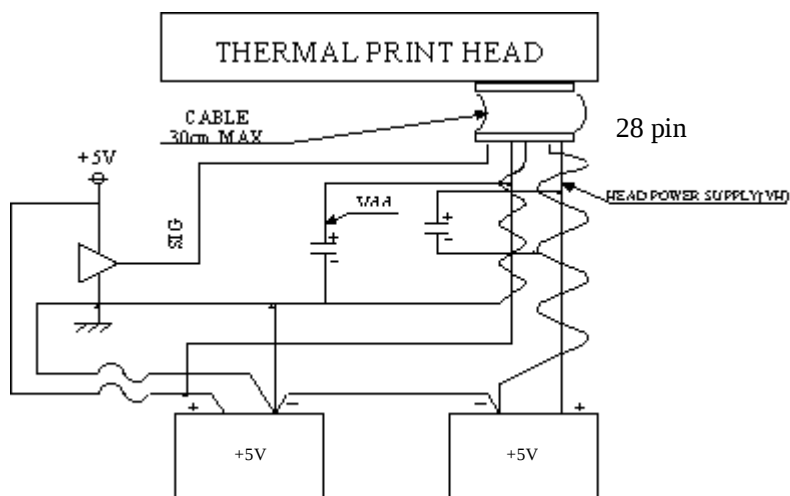
Care should be taken for stable operation of driver ICs as indicated bellow.(Fig.1)

- (1) Insert a capacitor ($100\ \mu F$) for low frequency noise reduction between Vdd (+5V) and GND.
- (2) If the voltage including surge exceeds maximum rating of driver IC, the TPH may burn out by latch-up. Care should be taken especially when head current changes by strobes or at the ON/OFF sequence. The voltage shall be kept within the following voltage.

VH	: $0V \sim +10V$
Vdd	: $0V \sim +7V$
Other signals	: $GND -0V \sim Vdd +0.3V$

For surge suppression it is recommended to insert a capacitor of $220\ \mu F$ between VH and GND.

- 7.3 The heater and driver ICs are electrostatically sensitive. Care should be taken not to touch connectors with hands or an electrostatically charged object. It is recommended that brushes near the head be provided to discharge electrostatic build up.
- 7.4 On the surface near the heater, do not apply any hard material. The abrasion resistant layer is fragile to mechanical impact.
- 7.5 Ink dregs adhered to the heater should be wiped off softly with a soft cloth dipped alcohol or detergent. Do not use sandpaper or equivalent.
- 7.6 Keep hard particles out of the heater surface. Hard particles may scratch the abrasion resistant layer.
- 7.7 Maximum number of heaters for simultaneous is 64bits .
- 7.8 When the printer is on standby, the thermal head (VH) must be switched off.

Fig.1 Recommend Connection**Table.1 Thermistor**

$$R_{25} = 30K\Omega \pm 5\% \quad B \text{ CONST} = 3950\text{kelvin} \pm 2\% \quad R = R_{25} e^{B(1/T - 1/T_{25})}$$

Temperature (°C)	Thermistor Resistance (R)		
	Min. (KΩ)	Typ. (KΩ)	Max. (KΩ)
-40.0	924.3	1048.0	1184.0
-35.0	667.4	751.1	843.1
-30.0	487.6	545.0	607.6
-25.0	360.0	399.9	442.9
-20.0	268.8	296.6	326.5
-15.0	202.7	222.3	243.2
-10.0	154.2	168.2	182.9
-5.0	118.4	128.4	138.9
0.0	91.7	98.9	106.4
5.0	71.7	76.7	82.1
10.0	56.2	60.0	63.9
15.0	44.5	47.3	50.1
20.0	35.5	37.5	39.6
25.0	28.5	30.0	31.5
30.0	22.8	24.1	25.5
35.0	18.4	19.6	20.7
40.0	15.0	15.9	16.9
45.0	12.2	13.1	13.9
50.0	10.0	10.8	11.5
55.0	8.3	8.9	9.6
60.0	6.9	7.4	8.0
65.0	5.7	6.2	6.7
70.0	4.8	5.2	5.7
75.0	4.0	4.4	4.8
80.0	3.4	3.8	4.1

Table.2 C-MOS 64bits driver**Table 2.1** Electrical characteristics for driver IC.

Absolute maximum ratings for driver ICs.

Parameter	Symbol	Test conditions	Ratings	Unit
Supply voltage	V_{dd}	Surge	0 ~ 7	V
	V_H	Surge	0 ~ 32	V
Input voltage for logics	V_{IN}		0 ~ $V_{dd} + 0.3$	V

Recommended operating conditions

Parameter	Symbol	Test conditions	Recommendations			Unit
			Min.	Typ.	Max.	
Supply voltage	V_{dd}		2.7	5.0	5.25	V
	V_H	Supply voltage for V_H	4.2	5.0	8.5	V
Input voltage for logic	V_{IH}	(Note 1)	$0.8 \times V_{dd}$		V_{dd}	V
	V_{IL}		0		$0.2 \times V_{dd}$	V
Clock frequency	f_{CLK}	duty 50%	0.1	1	10	MHz

(Note 1) : Recommended driver IC is 74HC244 or equivalent.

Table 2.2 Electrical characteristics for driver IC.(Values with parentheses is for each IC.)

Parameter	Symbol	Test conditions	Ratings			Unit
			Min.	Typ.	Max.	
Input current	$\overline{LATCH}$	$V_{dd} = 5\text{ V}$ $V_{IH} = 5\text{ V}$			(0.5) 3.0	μA
	$\overline{STROBE}$				(55) 55	μA
	CLOCK				(0.5) 3.0	μA
	DATA IN				(0.5) 0.5	μA
	$\overline{LATCH}$	$V_{dd} = 5\text{ V}$ $V_{IL} = 0\text{ V}$			(-0.5) -3.0	μA
	$\overline{STROBE}$				(-55) -55	μA
	CLOCK				(-0.5) -3.0	μA
	DATA IN				(-0.5) -0.5	μA
Output voltage of drivers (Heater supply voltage)	V_{OL}	$V_{dd} = 5\text{ V}$ $I_{OL} = 30\text{ mA}$		0.7	1.5	V
Leak current of drivers	I_{OH}	$V_{dd} = 5\text{ V}$ $V_H = 5\text{ V}$			1.0	$\mu\text{A}/\text{dot}$
Logic supply current	I_{dd}	$V_{dd} = 5\text{ V}$ ALL WHITE $f_{CLK} = 1.0\text{ MHz}$		(0.2) 0.8	(0.5) 3.0	mA

(Note) Each $\overline{STROBE}$ includes pull-up resistance of $300\text{K } \Omega \pm 50\%$ per IC.

Table 2.3 Switching characteristics for driver ICs.

Parameter	Symbol	Test conditions	Ratings			Unit
			Min.	Typ.	Max.	
Clock frequency	f_{MAX}				10.0	MHz
Clock pulse width	$tw(T)$		70			ns
Data setup time	$tsu(D)$		40			ns
Data hold time	$th(D)$		40			ns
Latch setup time	$tsu(LA)$		100			ns
Latch pulse width	$tw(LA)$		100			ns
Strobe setup time	$tsu(\overline{STB})$		100			ns
Strobe to driver Output delay time	$TpLH$				10.5	μs
	$TpHL$				10.5	μs

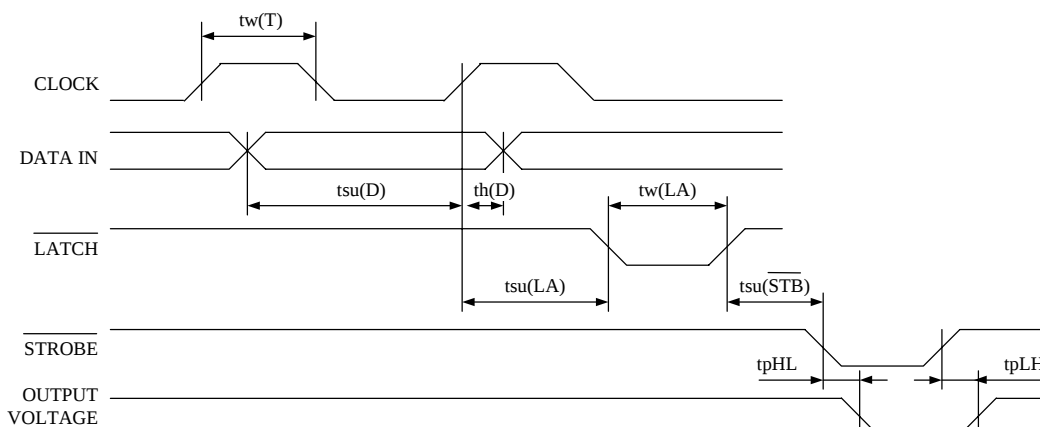
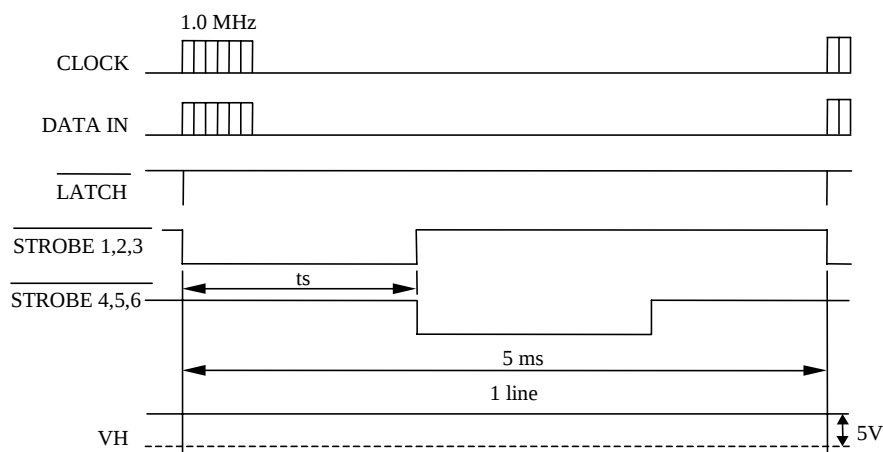
**Fig.2 Thermal Print Head (E48) Timing Chart**

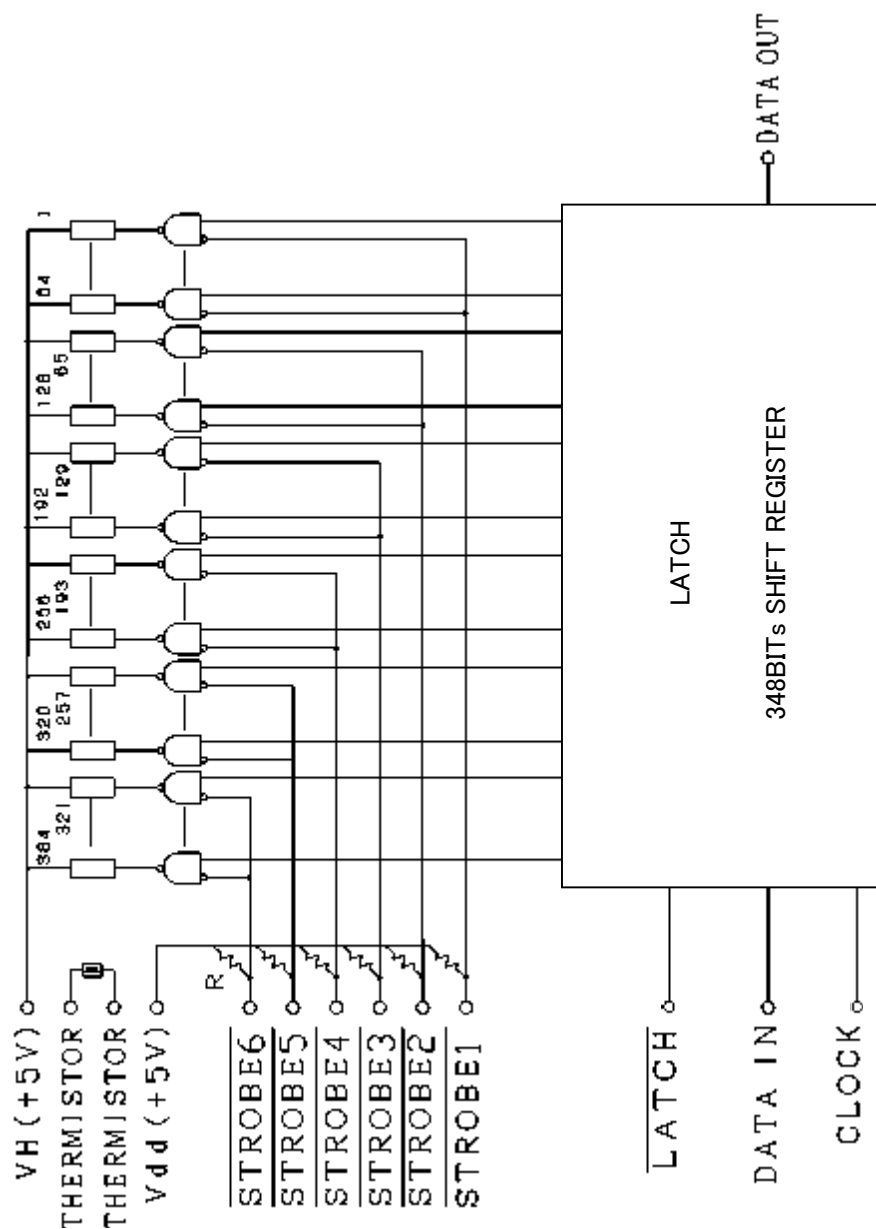
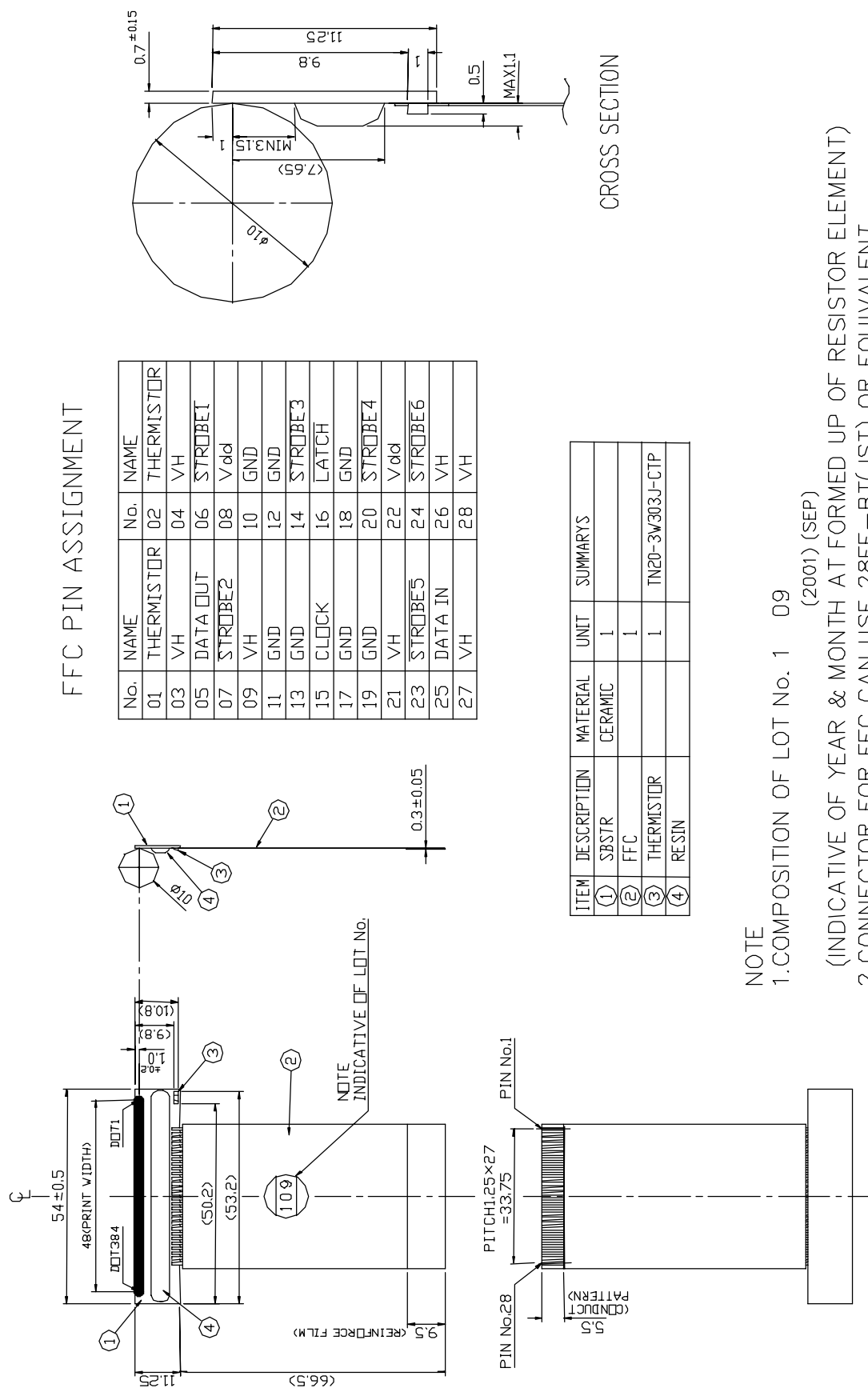
Fig.3 Schematic Diagram

Fig.4 Dimension



NOTE

1. COMPOSITION OF LOT No. 1 09

(2001) (SEP)

(INDICATIVE OF YEAR & MONTH AT FORMED UP OF RESISTOR ELEMENT)

2. CONNECTOR FOR FFC CAN USE 28FE-BT(JST) OR EQUIVALENT.