# FTP-642MCL001/002
# PRODUCT SPECIFICATIONS

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TITLE FTP-642MCL001/002
PRODUCT SPECIFICATIONS

DRAW No. A1NA02243-0001/6 CUST

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## 1. Guideline for product recycling

- Fujitsu Takamizawa Component Co., Ltd. is making an effort to promote the environmental management per ISO 14001 with a policy "Better corporate activities while valuing the environment"
- The below lists the components and their materials used in this printer. Refer this list when the printer is to be recycled.

FTP-642MCL001/002 List of materials

| No. | Name of components | Material |
|---|---|---|
| 1 | Printer frame | PPO resin (with GF) |
| 2 | Gear cover | POM resin |
| 3 | Rubber roller | Silicone rubber + SUS |
| 4 | Platen gear, middle gears 1, 2 | POM resin |
| 5 | Pulse motor | SPCC + iron + copper wire |
| 6 | Motor FG plate | SUS |
| 7 | Sensor fixture | ABS resin |
| 8 | Knob | ABS resin |
| 9 | FG plate | SUS |
| 10 | Head-up arm | Zinc alloy |
| 11 | Head-up lever | POM resin |
| 12 | Thermal head | Aluminum + ceramic substrate |
| 13 | Head pressurizing shaft | SUS |
| 14 | Head support board | SPCC |
| 15 | Head pressurizing spring | SUS |
| 16 | Arm spring | SUS |
| 17 | Spring (Only MCL001) | SUS |
| 18 | Pinch roller (Only MCL001) | POM resin |
| 19 | Bearing | Sintered alloy |
| 20 | FG coil spring | SUS |
| 21 | Guide film (Only MCL001) | PET resin |

"Abbreviations for the materials used"

SUS: Stainless steel
POM: Polyacetal resin
PET: Poly(ethylene terephthalate)
PPO: Poly (phenylene oxid) resin
SPCC: Rolled steel plate
PI: Polyimide
GF: Fiberglass resin

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## 2. Scope

This specification applies to FTP-642MCL001/002.

The following standard interface board or drive LSI and reference circuits satisfy the specifications in this manual:

(1) Standard interface board: FTP-622DCL001
(2) Drive LSI: FTP-622CU101

## 3. Description

This printer is a compact and light high-speed printer equipped with a line dot thermal head with 8-dot/mm resolution.

## 4. Configuration

The configuration of this printer (mechanical unit) is shown below.

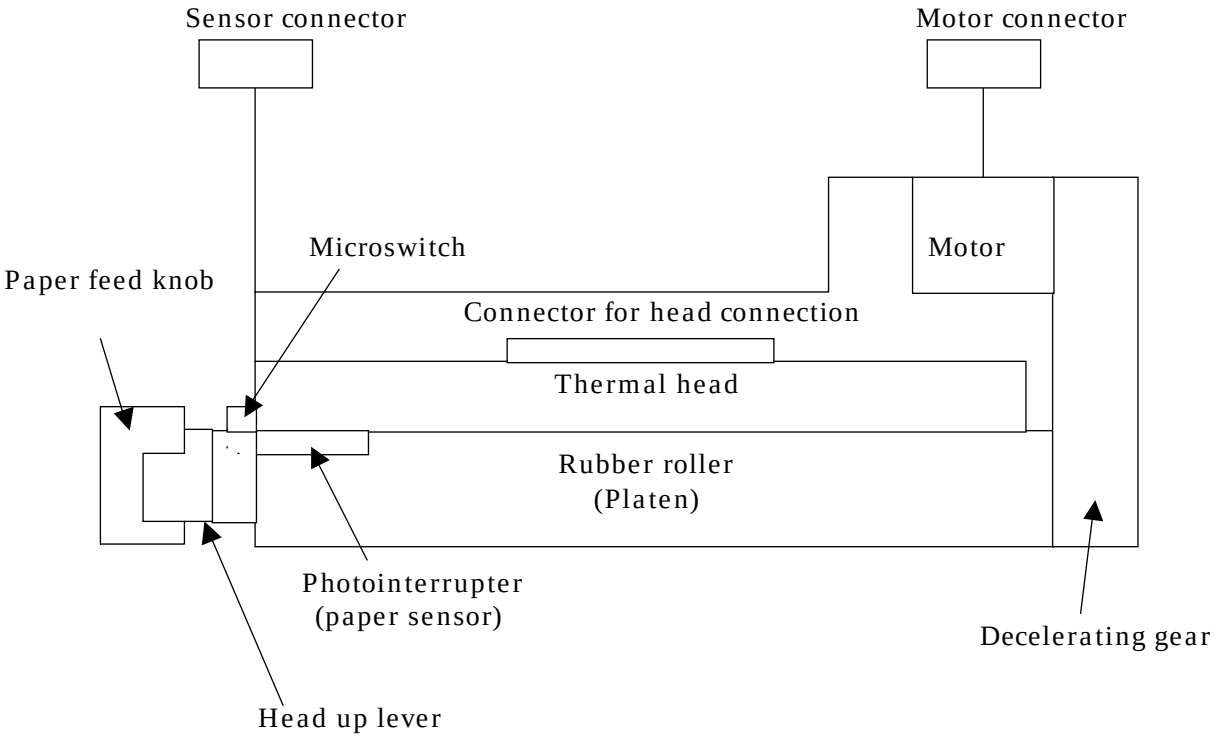


Figure 1 Printer configuration

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## 5. General Specifications

| ITEM | | SPESIFICATION |
|---|---|---|
| Printing specifications | Printing method | Thermal sensitive line dot method |
| | Effective printing width | 104mm |
| | Head configuration | 832 dots / line |
| | Dot pitch | 0.125(vertical direction) x 0.125(horizontal direction) |
| | Print density | OD 0.8 or higher at the F&T standard printing condition when the specified paper is used.<br>*Measuring instrument : SAKURA densitometer PDA-65 from Konica Co.,Ltd. |
| | Printing speed | At 24V drive<br>Maximum 80mm / second (640 dot lines / second)<br>At standard paper and F&T high-speed printing mode. |
| Specified paper(*1) | High-sensitivity paper | TF50KS-E4 NIPPON PAPER |
| | Standard paper | TF50KS-E NIPPON PAPER |
| | | PD150R OJI PAPER |
| | Medium-term preservable paper | TF60KS-F1 NIPPON PAPER |
| | | P220VBB-1 MITSUBISHI PAPER |
| | | PD170R OJI PAPER |
| | Long-term preservable paper | TP50KJ-R NIPPON PAPER |
| | | AFP-235 MITSUBISHI PAPER |
| | | PD160R OJI PAPER |
| Paper width | | MCL001 : $112^{+0}_{-1}$mm (front insertion) |
| | | MCL002 : $114^{+0}_{-1}$mm (rear insertion) |
| Paper feed method | | Friction feed (1 dot line / 4 pulse, bipolar 1-2 phase excitation) |
| Paper feed accuracy | | ±5% at fixed-speed feed with the back tension of approx.100g(0.98N) (±2% at 25℃ and 60%RH) |
| Line gap in one print line by enable drive | | Gap between right and left print line in the same line dot line : 0.125mm |
| Detection function | Head temperature detection | Thermistor |
| | Paper detection | Photointerrupter |
| | Mark detection | |
| | Head up detection | Microswitch |
| External dimensions(W x D x H) | | 138mm x 48mm x 20mm (excluding the lever and knob) |
| Mass | | Approx. 125g |

*1 For using unspecified paper, both sides shall consult and evaluate and check it to determine whether to use it.

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| ITEM | | | SPESIFICATION |
|---|---|---|---|
| Operating power | Head | For printing | Voltage : 24 VDC ±5%<br>Current : peak current of approx.4.1A<br>(2-part divided drive, Printing rate : 50%<br>printing speed : 80mm/sec,<br>head resistance value : 1275 Ω) |
| | | For logic | Voltage : 5 VDC ±5%<br>Current : Maximum 0.3A |
| | Motor drive | | Voltage : 24 VDC ±5%<br>Current : Maximum 1.0A (by the F&T standard constant-current drive circuit) |
| Environmental characteristics | | Operating temperature and humidity(*2) | 5℃ to 40℃, 20 to 85%RH No condensation |
| | | Storage temperature and humidity | -20℃ to 60℃, 5 to 95%RH No condensation<br>paper is excluded |
| | | Noise | 60 dB or less at 1m from the surface of the printing mechanism |
| Reliability (*3) | | Vibration (non-operation) | 10 to 55 to 10 Hz, one-side amplitude 0.15mm,1 octave/minute, maximum 1G<br>20 cycles for each of X, Y, and Z directions |
| | | Impact (non-operation) | 50G, 11ms, half-sine wave, 5 times for each of the X, Y, and Z directions |
| | | Pack drop | 75cm drop for 6 surface, corner and ridges in pack |
| | | Temperature and humidity cycle (non-operation) | Two successive cycles of -25℃ (2 hours) to room temperature (2 hours) to 65℃ and 85% RH (2hours) to room temperature (2hours) |
| Life | | Electrical life | 1 hundred million pulses (at the F&T standard printing condition) |
| | | Mechanical life | Paper length : 50 km (printing rate : 25% or less) |
| | Life of the head up lever | | 5000 or more times when one up and down are counted as one time |
| | Photointerrupter life | | 1.2 x $10^4$ hours (time while the current is conducted) with the specified circuit |
| Printing start position at the left end | | | MCL001 : 4±1 mm ,<br>MCL002 : 5±1 mm from the paper edge to the print start position. This value is :<br>1. When the paper of 112mm (MCL001) and 114mm (MCL002) width is used<br>2. When 1-ply long-term perceivable paper is used<br>3. When no paper jam or collapse occurs |
| Paper positioning by mark detection | | | Approx. 7.5mm (MCL001) and 10.2mm (MCL002) from the mark end position to heating element.<br>This value is when paper is inserted from front, fixed-speed feed is used, and paper feeding by marking detection is the default (2mm). |

*2 The print density is guaranteed in this range. The printer can operate from 0℃ to 50℃.

*3 After the test, the printing specifications shall be satisfied.

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## 6. External Dimensions and Mounting Positions

(1) External dimensions

Figure 2 shows the external dimensions.

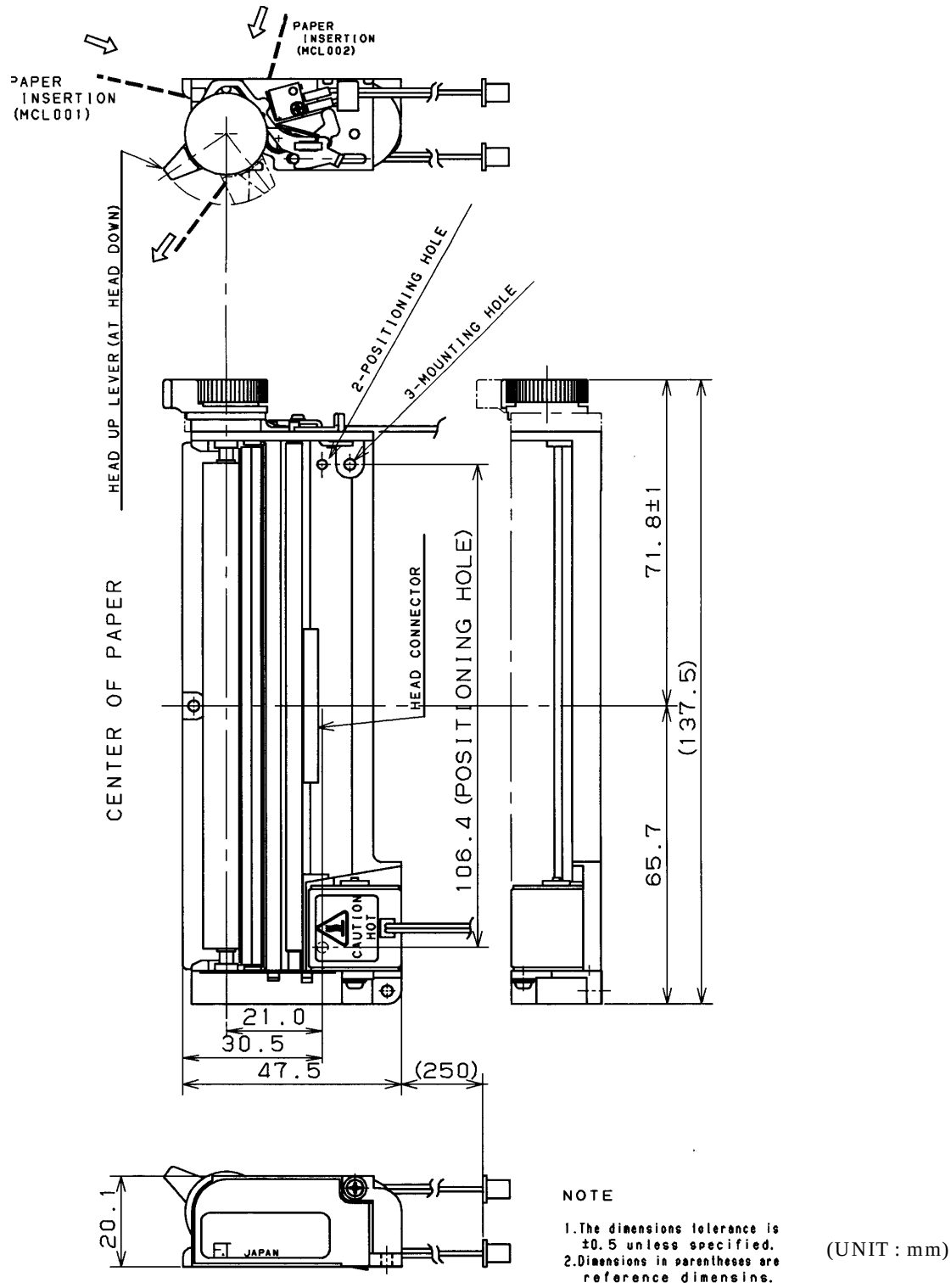


Figure 2 FTP-642MCL001/002 outerview dimensions

| | | | | | | | | |
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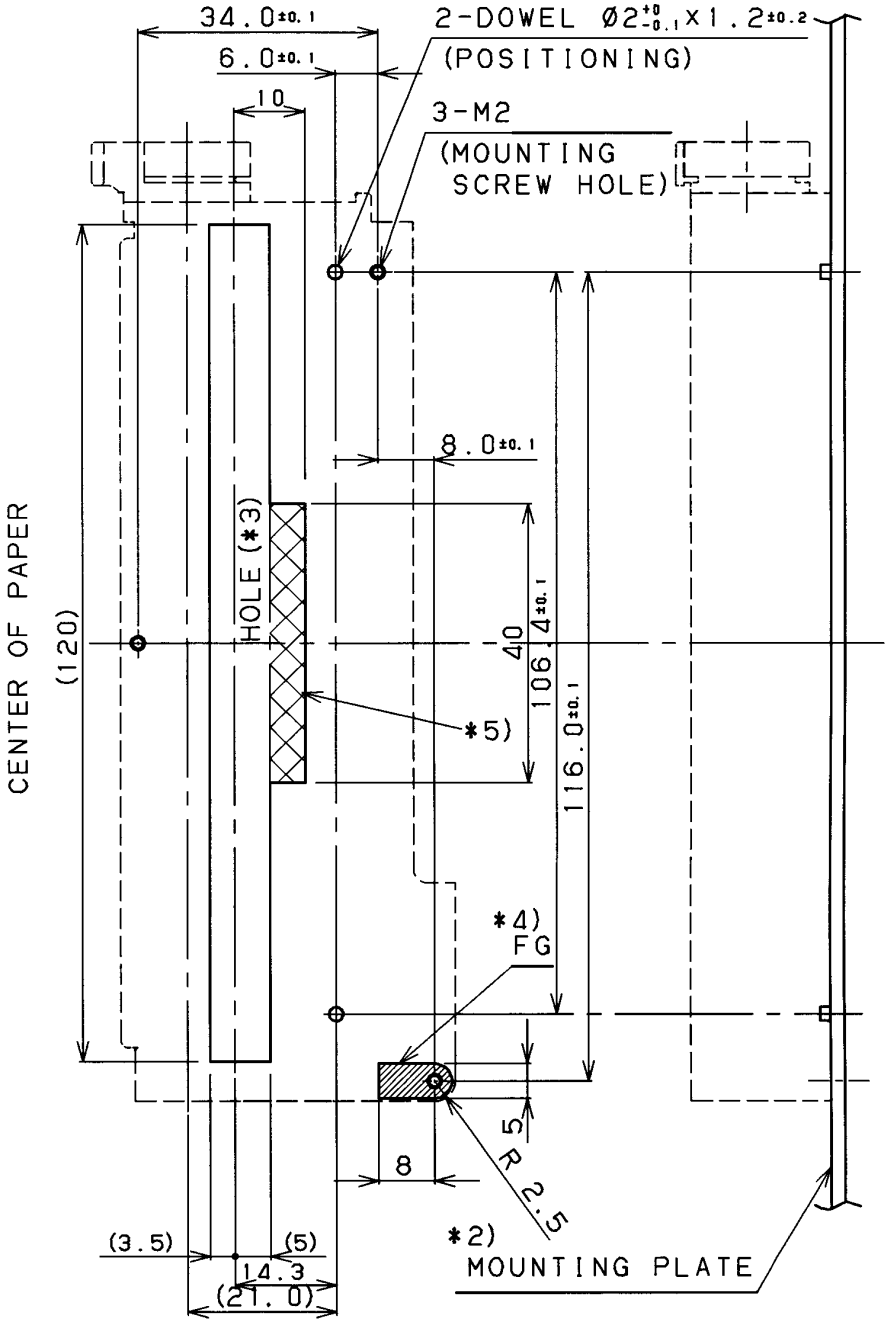
(2) Mounting positions

Figure 3 shows the mounting dimensions of this printer.




NOTES)
1. We recommends dowel to be installed for positioning the printer.
2. The plane degree of the installation board of the printer is within 0.1.
3. *sign size is a center at the entrance of the form of the printer for MCLxx2. The size is assumed to be a reference value. (Please set the size that the form don't come in contact.
4. Please connect FG more than the range in the slash part.
5. Please installrunning away like part ▨ so that there is a possibility to come in contact with the installation board by the winding of FFC.

(UNIT : mm)

Figure 3 FTP-642MCL001/002 mounting dimensions

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# 7. Connector Specifications

## 7.1 Thermal Head

(1) Connectors used

Mechanical unit side : B16B-PH-K-S-2.2 (made by J.S.T) or equivalent

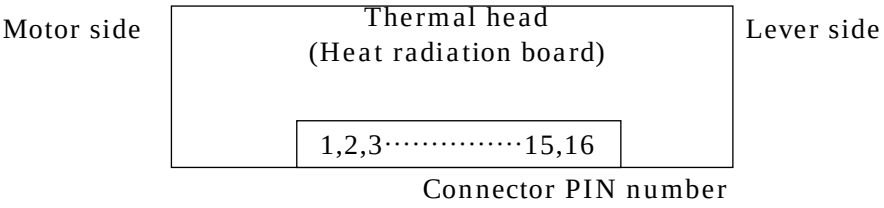
Remote (housing) side : PHR-16 (made by J.S.T) or equivalent

(2) Pin assignment on the mechanical unit side

Connector A:

| Number | Symbol | Signal name |
|---|---|---|
| 1 | VH | Head drive power |
| 2 | VH | Head drive power |
| 3 | GND | Ground |
| 4 | GND | Ground |
| 5 | *STB 1 | Strobe 1 |
| 6 | *STB 2 | Strobe 2 |
| 7 | *STB 3 | Strobe 3 |
| 8 | TH*1 | Thermistor |
| 9 | *STB 4 | Strobe 4 |
| 10 | *LAT | Data latch |
| 11 | *STB 5 | Strobe 5 |
| 12 | VDD | Logic power |
| 13 | CLK | Clock |
| 14 | DIN | Data in |
| 15 | GND | Ground |
| 16 | VH | Head drive power |

*1) One end of the thermistor is connected to the ground.




(3) Notes

1) Pull up the five strobe signals with about 22kΩ.
2) Pull down the latch, data input, and clock signals with 22kΩ.
3) Don't connect or disconnect a connector with the power turned on.
4) Don't connect or disconnect a connector 11 or more times.
5) Don't strain connector.

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### 7.2 Paper Feed Motor

(1) Connectors used

Motor side(housing) : PHR-4 (made by J.S.T) or equivalent

Remote side: B4B-PH-PH-K-S (made by J.S.T) or equivalent

(2) Pin assignment on the motor side

| Number | Symbol | Signal name |
|---|---|---|
| 1 | *B | Excitation signal *B |
| 2 | B | Excitation signal B |
| 3 | *A | Excitation signal *A |
| 4 | A | Excitation signal A |

### 7.3 Sensor Connector

(1) Connectors used

Sensor side(housing) : PHR-5 (made by J.S.T) or equivalent

Remote side: B5B-PH-K-S (made by J.S.T) or equivalent

(2) Pin assignment on the sensor side

| Number | Symbol | Signal name |
|---|---|---|
| 1 | VSEN | Power for the paper sensor |
| 2 | PHE | Photointerrupter emitter |
| 3 | PHK | Photointerrupter cathode |
| 4 | SW1 | Head up detection switch 1 |
| 5 | SW2 | Head up detection switch 2 |

## 8. Thermal Head Specifications

(1) General Characteristics

| | | |
|---|---|---|
| 1. | Method | : Thermal line dot method |
| 2. | Total number of dots | : 832 dots/line |
| 3. | Dot pitch | : 0.125 mm (Vertical) x 0.125 mm (Horizontal) |
| 4. | Dot dimensions | : 0.110 x 0.132 mm |
| 5. | Average resistance | : 1500 Ω±15 % |

(2) Maximum rating

| | | |
|---|---|---|
| 1. | Maximum voltage applied | : 27V |
| 2. | Maximum energy applied | : 0.352 mJ/dot (Vset=24.0 V, Ton=0.95 ms, Tcy=2.5ms) |
| 3. | Maximum board temperature | : 70°C (thermistor temperature) |
| 4. | Maximum number of concurrently energized dots | : 384 dots |

3) Electrical characteristics

| | | |
|---|---|---|
| 1. | Circuit block diagram | : Fiqure 4 |
| 2. | Electrical characterisitics | : Table 1 |
| 3. | Timing chart | : Figure 5 |
| 4. | Equivalent circuit | : Figure 6 |
| 5. | Driver formation | : 64 bits x 13 drivers |
| 6. | data transfer method | : Single-input serial transfer |
| 7. | Data input frequency | : 5.0 MHz or lower |
| 8. | Power supplu for driver | : 5 V ± 5% at 0.2 A |
| 9. | Printing method | : Independent 5-enable method |

(4) Electrical operating conditions (nominal ratings)

| | | |
|---|---|---|
| 1. | Power applied (Po) | : 0.370 W/dot |
| 2. | Width of pulse applied (Ton) | : 0.73 msec |
| 3. | Energy applied (Eo) | : 0.27 mJ / dot (25°C) |
| 4. | Printing cycle period | : 2.5 msec (at 25°C, 2-part divided drive) |
| 5. | This can be shorten by using self-hysteresis methodVoltage applied (VH) | : 24.0V |
| 6. | Current consumption | : 5.9 A (peak value at 24.0 V) |

**Notes :**
**Energy calculation formula**

| Head average Resistance value (Rav) | Power applied (P) | Power loss ($P_L$) | Voltage drop ($V_L$) |
|---|---|---|---|
| 1500±15% | 0.370 W / dot | 0.013 W / dot | 0.85 V |

$$P = \frac{(VH - V_L)^2}{Rav} + P_L$$

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(5) Thermistor characteristics

1) Thermistor constant (B) :3950 k ± 2%
2) Resistance value R25 : 30 kΩ ± 5%
3) Operating temperature range : -20 to 80°C
4) Heat time constant : within 30 seconds (in air)
5) Temperature characteristics : RX=R25 x EXP{ B x ( 1/TX-1/T25 )}
( T = Absolute temperature)

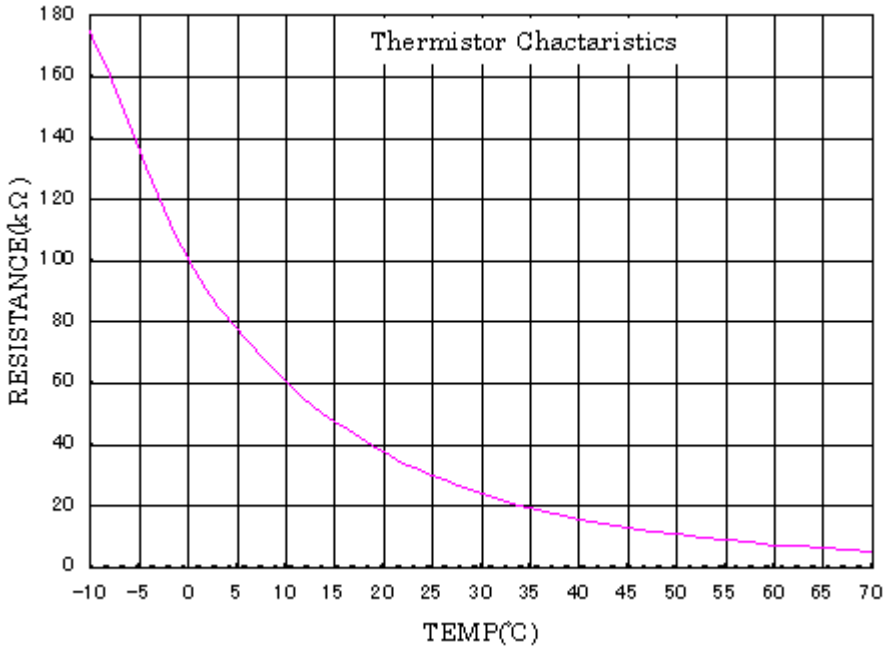


Figure 3 Temperature characteristics of thermistor

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(6) Notes on use

1) Control the head board (thermistor) temperature within the specified temperature if printing characters at a high printing rate.
2) It is recommended to turn VH off if the printer is in standby mode so that ions and noise does not damage the thermal head.
3) Control surge noise between VH and GND so that it does not exceed 32V.
4) Control the printer so that the thermal head does not overheat if a line to the thermistor is cut.
5) Do not apply pulse noise that is 2 V or greater and/or 20 ns or more to the signal pins.
6) It is recommended to route the lines from VH to the thermal head and GND to the thermal head using wires 300mm or less and 15mΩ or less that are separated from the other signal lines.
7) Control the CLK, LAT, DIN, and STB signals using the C-MOS (74HC240 or similar).
8) Install an aluminum electrolytic capacitor with approximately 15 V withstand voltage and 33 μF between VDD and GND to prevent noise.
9) Turn on the VDD first, then the VH. Turn off the VH first, then the VDD.

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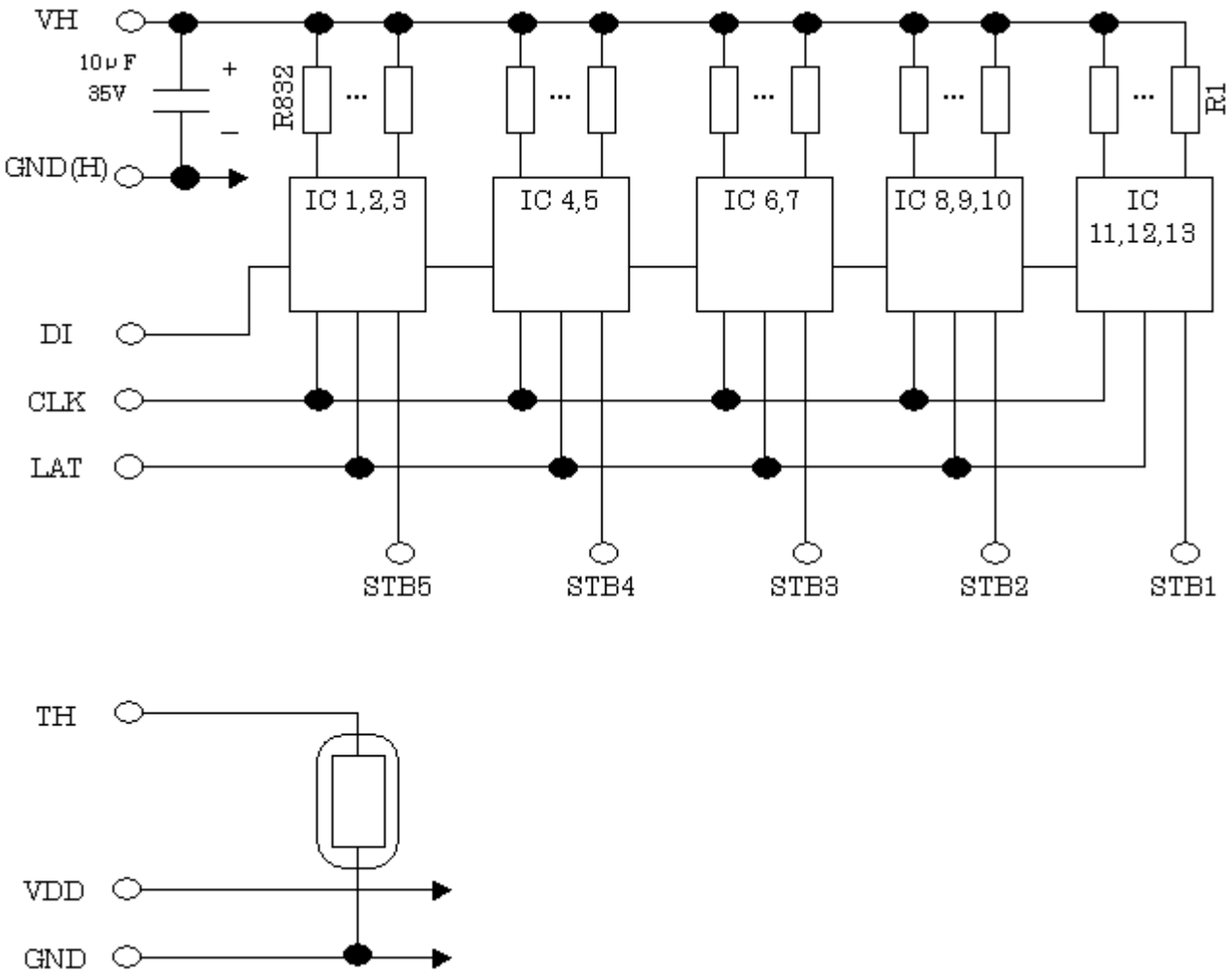


Figure 4 Circuit block diagram

Notes:

1. VH is the power for the head.
2. VDD is the power for the logic.
3. GND is the power ground.
4. R1 to R832 are heating resistance elements.

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Table 1 Electrical characteristics

| Item | Symbol | Minimum | Typical | Maximum | Unit | Conditions |
|---|---|---|---|---|---|---|
| Average resistance Value | Rave | 1275 | 1500 | 1725 | Ω | |
| Output supply Voltage | Vset | - | 24.0 | 27.0 | V | Standard printing conditions The maximum rating is 27.0 V. |
| Supply voltage | VDD | 4.5 | 5.00 | 5.5 | V | |
| High input voltage | Vih | 0.8xVDD | - | VDD | V | ENB, DI, LAT, CLK |
| Low input voltage | Vil | 0.0 | - | 0.2xVDD | V | 〃 |
| High input current | Iih | - | - | 1.0 | μA | DI |
| | | - | - | 13.0 | μA | CLK, LAT |
| | | - | - | 52.0 | μA | ENB |
| Low input current | Iil | - | - | -1.0 | μA | DI |
| | | - | - | -13.0 | μA | CLK, LAT |
| | | - | - | -949.0 | μA | ENB |
| Driver leakage current | IL | - | - | 10.0 | μA /dot | VDD=5.0V, VH=27V |
| Driver saturation voltage | Voon | - | - | 2.0 | V | VDD=5.0V, VIo=45mA |
| Maximum transfer Frequency | fd | - | - | 5.0 | MHz | |
| Data setup time | T1 | 70.0 | - | - | ns | See Figure 4, "Timing chart." |
| Data holding time | T2 | 30.0 | - | - | ns | Same as above |
| Latch setup time | T3 | 300.0 | - | - | ns | Same as above |
| Latch pulse width | T4 | 200.0 | - | - | ns | Same as above |
| Strobe setup time | T5 | 1.5 | - | - | μs | Same as above |
| Propagation delay Time | T6 | - | - | 3.0 | μs | Same as above |
| Propagation delay Time | T7 | - | - | 3.0 | μs | Same as above |

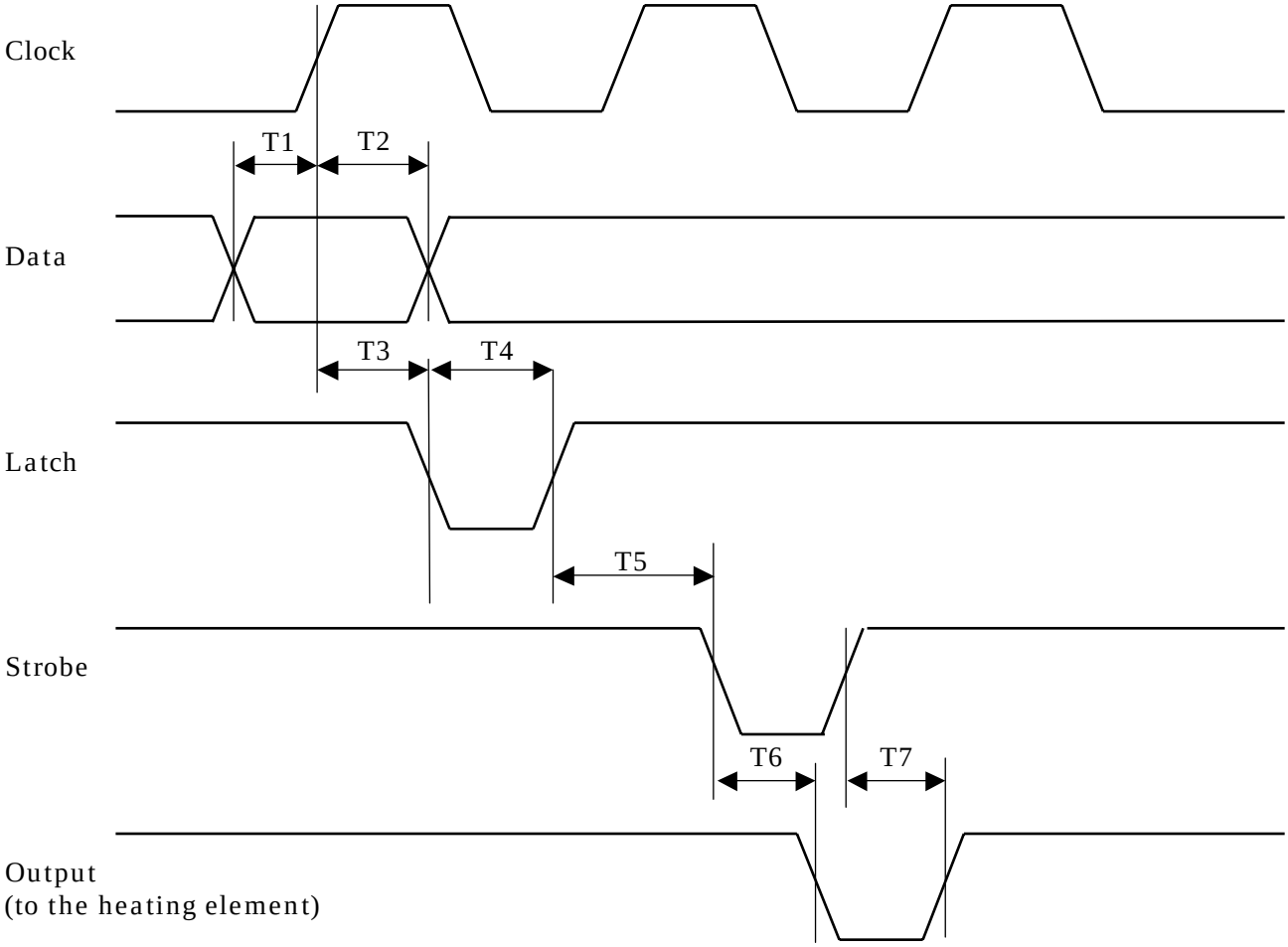


Figure 5 Timing chart

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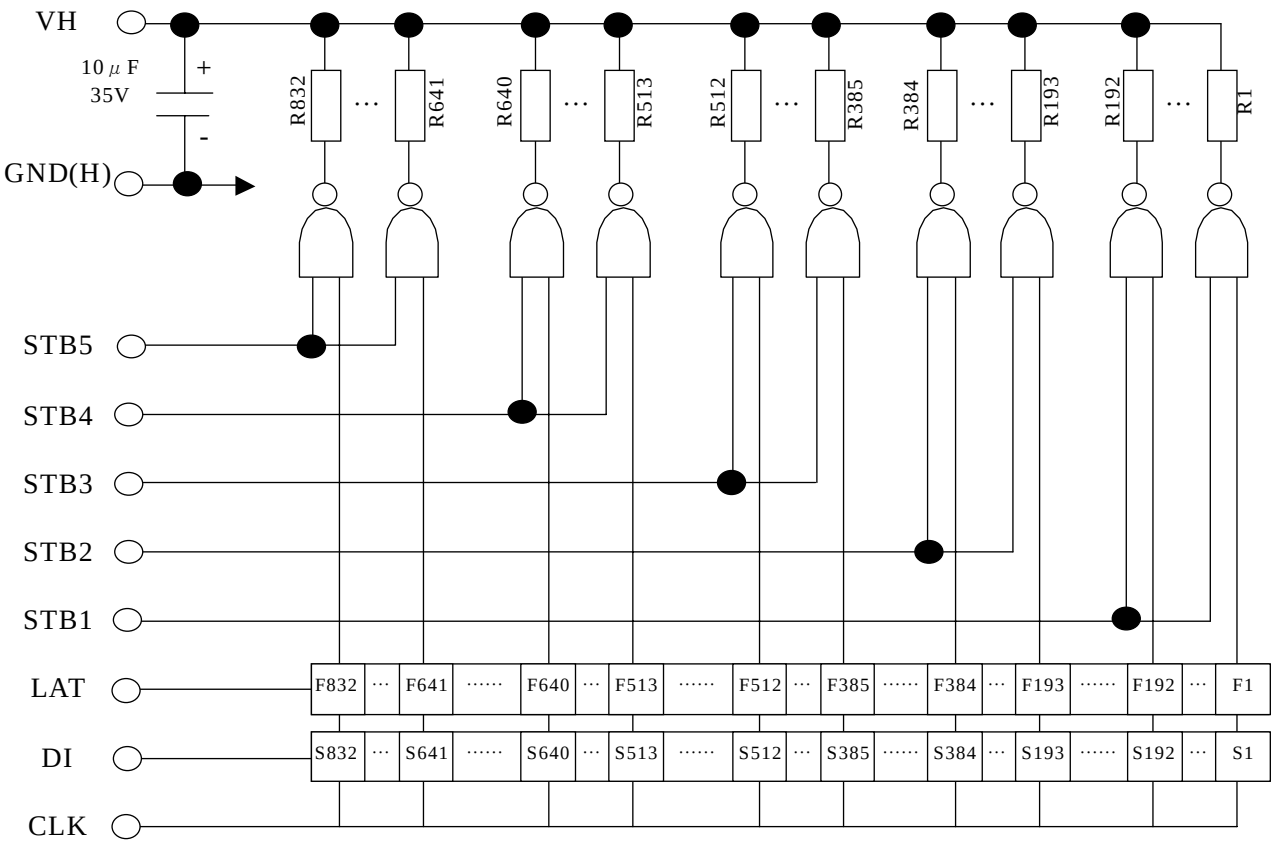
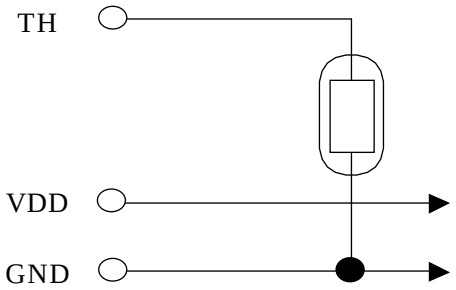
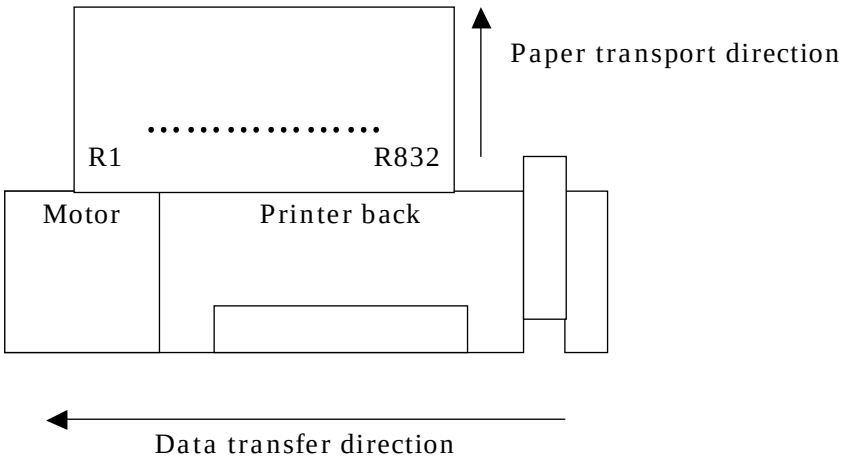



F : Flip flop
S : Shift register




Notes:
1. VH is the power for the head.
2. VDD is the power for the logic.
3. GND is the power ground.
4. R1 to R832 are heating resistance elements.

Figure 6 Electric circuit block diagram

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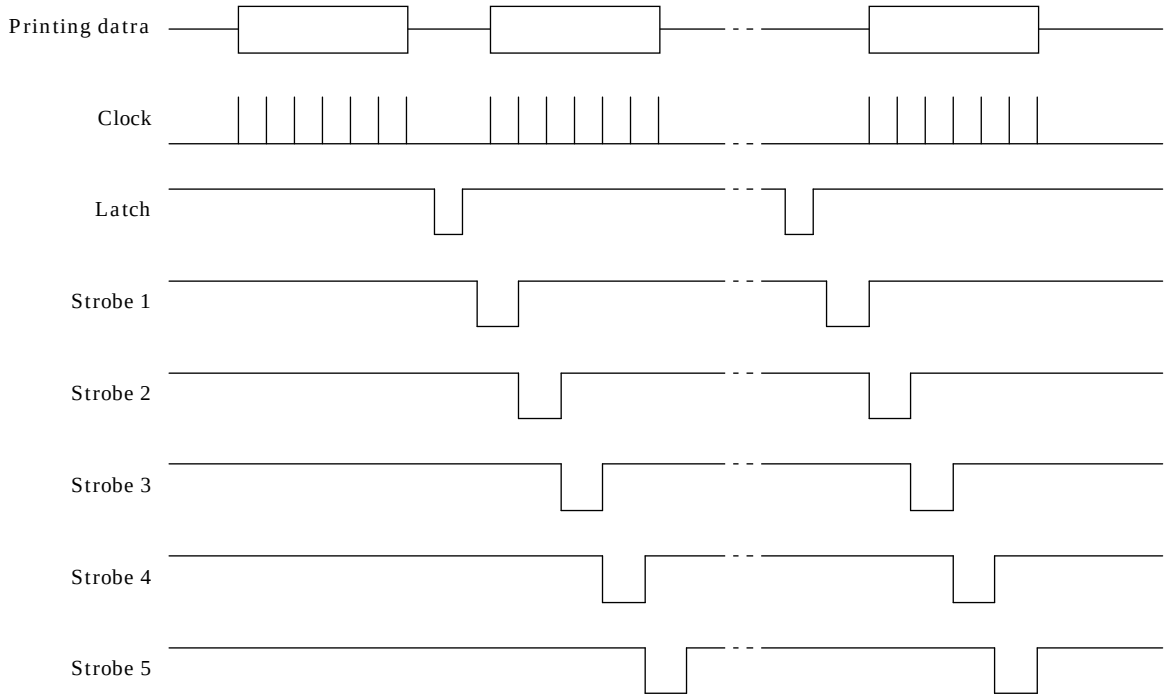
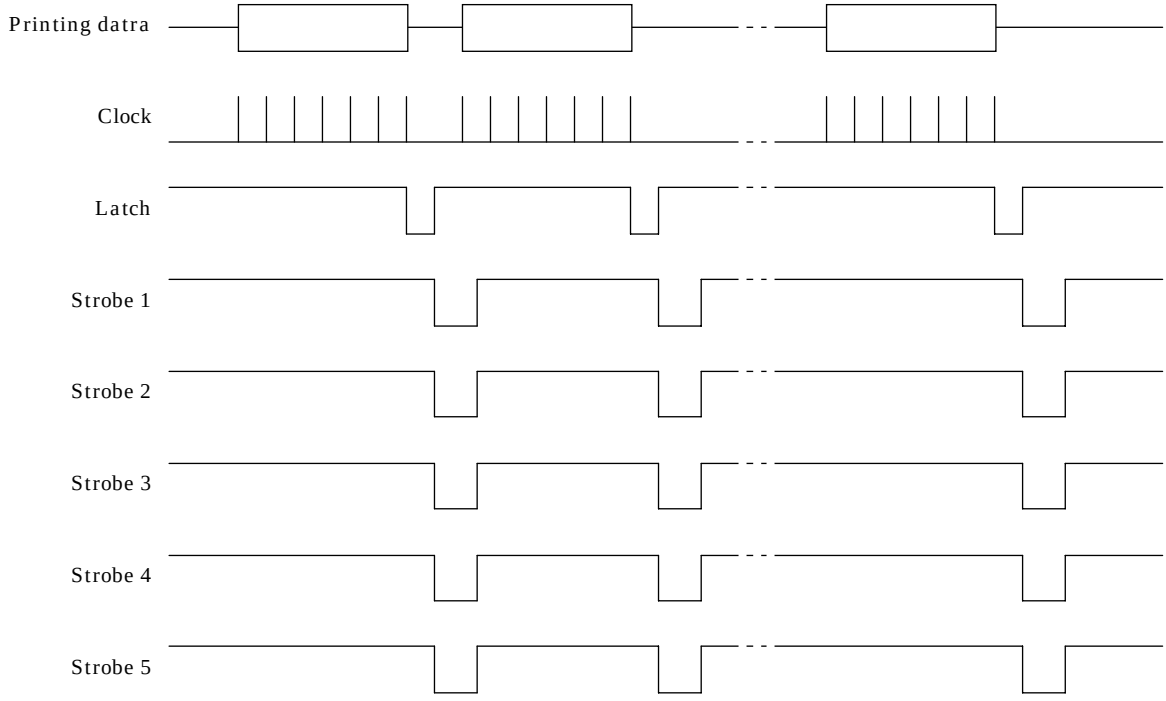
a. At standard drive




b. At high-speed drive




Note:
The head current consumption increases at high-speed drive.

Figure 7 Control timing

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Temperature characteristics of FTP-6x2MCL series thermistor and application width

| Temperature | Thermistor resistance value (kΩ) | Printing speed 80 mm/sec | | Printing speed 50 mm/sec | | Printing speed 30 mm/sec | |
|---|---|---|---|---|---|---|---|
| | | Application width (ms) | Energy (mj) | Application width (ms) | Energy (mj) | Application width (ms) | Energy (mj) |
| 0 | 100.99 | 0.867 | 0.310 | 1.009 | 0.360 | 1.245 | 0.445 |
| 5 | 77.85 | 0.822 | 0.294 | 0.956 | 0.342 | 1.180 | 0.422 |
| 10 | 60.57 | 0.777 | 0.278 | 0.904 | 0.323 | 1.116 | 0.399 |
| 15 | 47.53 | 0.732 | 0.262 | 0.852 | 0.304 | 1.052 | 0.376 |
| 20 | 37.61 | 0.682 | 0.244 | 0.794 | 0.284 | 0.980 | 0.350 |
| 25 | 30.00 | 0.638 | 0.228 | 0.742 | 0.265 | 0.916 | 0.327 |
| 30 | 24.11 | 0.598 | 0.214 | 0.696 | 0.249 | 0.859 | 0.307 |
| 35 | 19.51 | 0.563 | 0.201 | 0.655 | 0.234 | 0.808 | 0.289 |
| 40 | 15.89 | 0.538 | 0.192 | 0.626 | 0.224 | 0.773 | 0.276 |
| 45 | 13.03 | 0.513 | 0.183 | 0.597 | 0.213 | 0.737 | 0.263 |
| 50 | 10.75 | 0.493 | 0.176 | 0.574 | 0.205 | 0.708 | 0.253 |
| 55 | 8.92 | 0.478 | 0.171 | 0.556 | 0.199 | 0.687 | 0.245 |
| 60 | 7.45 | 0.463 | 0.165 | 0.539 | 0.193 | 0.665 | 0.238 |
| 65 | 6.25 | 0.453 | 0.162 | 0.527 | 0.188 | 0.651 | 0.233 |
| 70 | 5.27 | 0.438 | 0.156 | 0.510 | 0.182 | 0.630 | 0.225 |
| 75 | 4.47 | 0.433 | 0.155 | 0.504 | 0.180 | 0.622 | 0.222 |
| 80 | 3.80 | 0.423 | 0.151 | 0.493 | 0.176 | 0.608 | 0.217 |

"Condition"

Supply voltage : 24 V

Paper : Standard paper (PD150R)

Average resistance value : 1500 Ω

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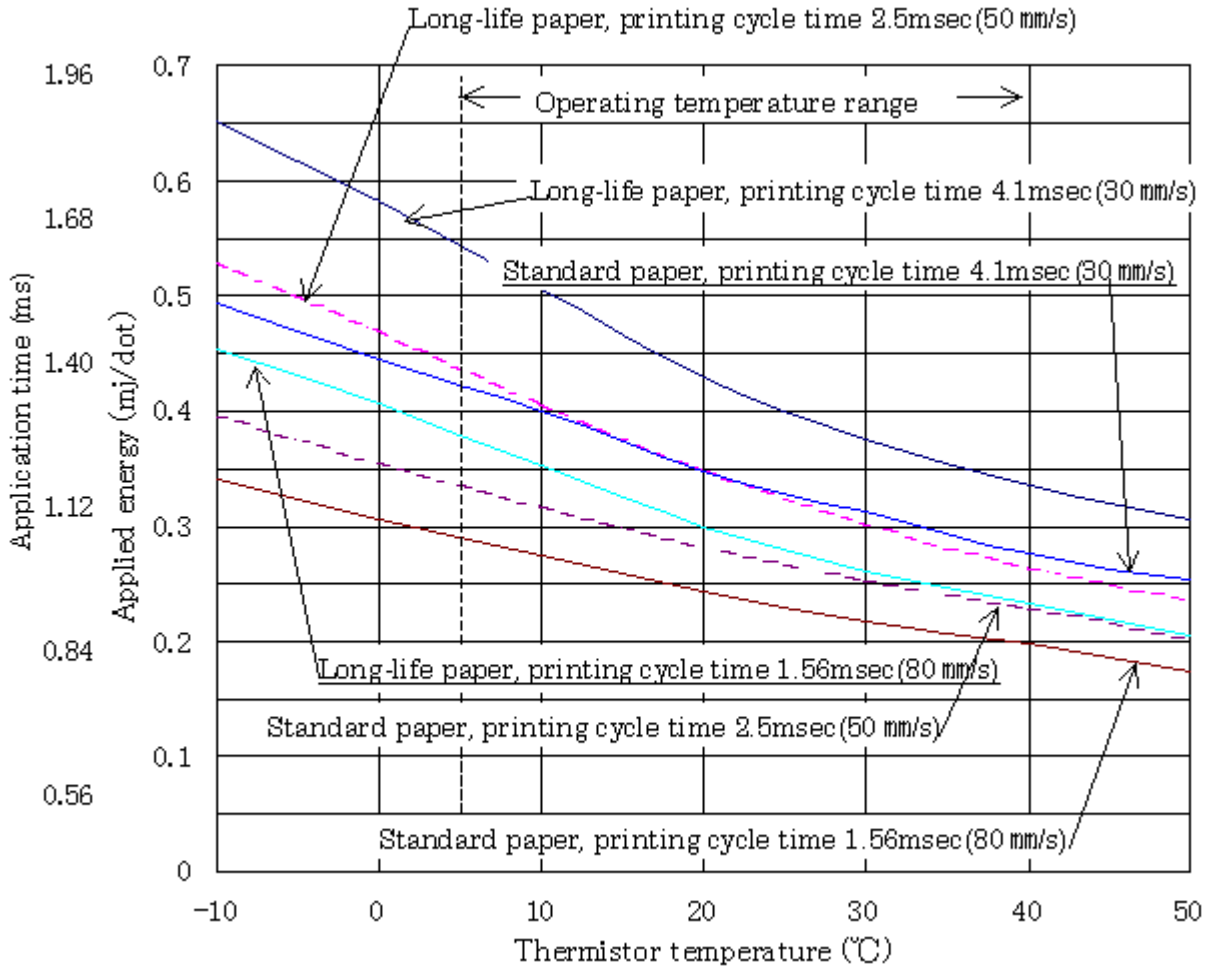


Temperature-applied energy characteristics of FTP-6x2MCL series

Condition
Head supply voltage : 24V
Standard paper : PD150R
Long-life paper : AFP-235

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## 9. Stepping Motor Specifications

(1) General specifications (motor as a single unit)

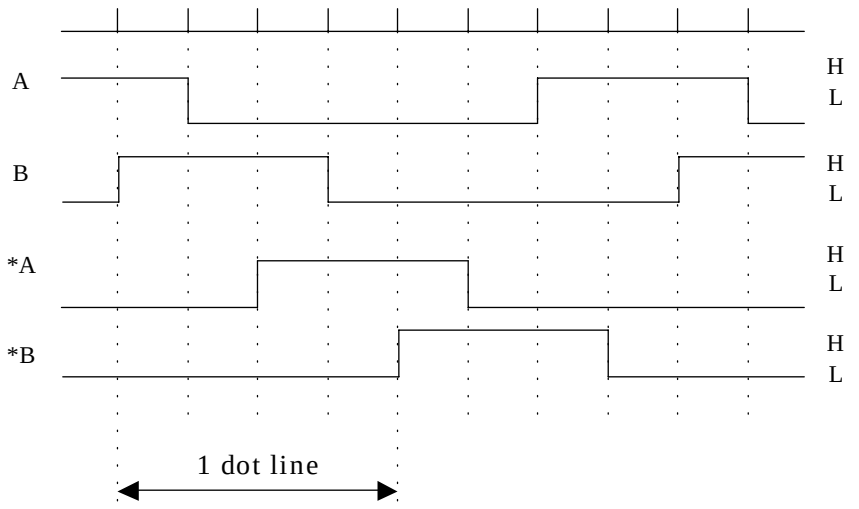
| Item | Specification |
|---|---|
| Type | Permanent magnetic type |
| Number of phases | 2 phases (bipolar specification) |
| Step angle | 9 ° at 1-2 phase excitation |
| Coil resistance/phase | 6.0Ω±10% |
| Rated voltage | DC24 V |
| Maximum input | 1.5 W |

(2) Stepping motor drive method

1) Drive the stepping motor by bipolar 1-2 phase excitation.
2) Number of steps per dot line printed

| Excitation method | Number of steps | Rotation angle |
|---|---|---|
| 1-2 phase excitation | 4 | 9 degrees/step |

3) The excitation method for reference is shown below.

| Method | Excitation sequence (HIGH: +, LOW: -) |
|---|---|
| 1-2 phase excitation |  |



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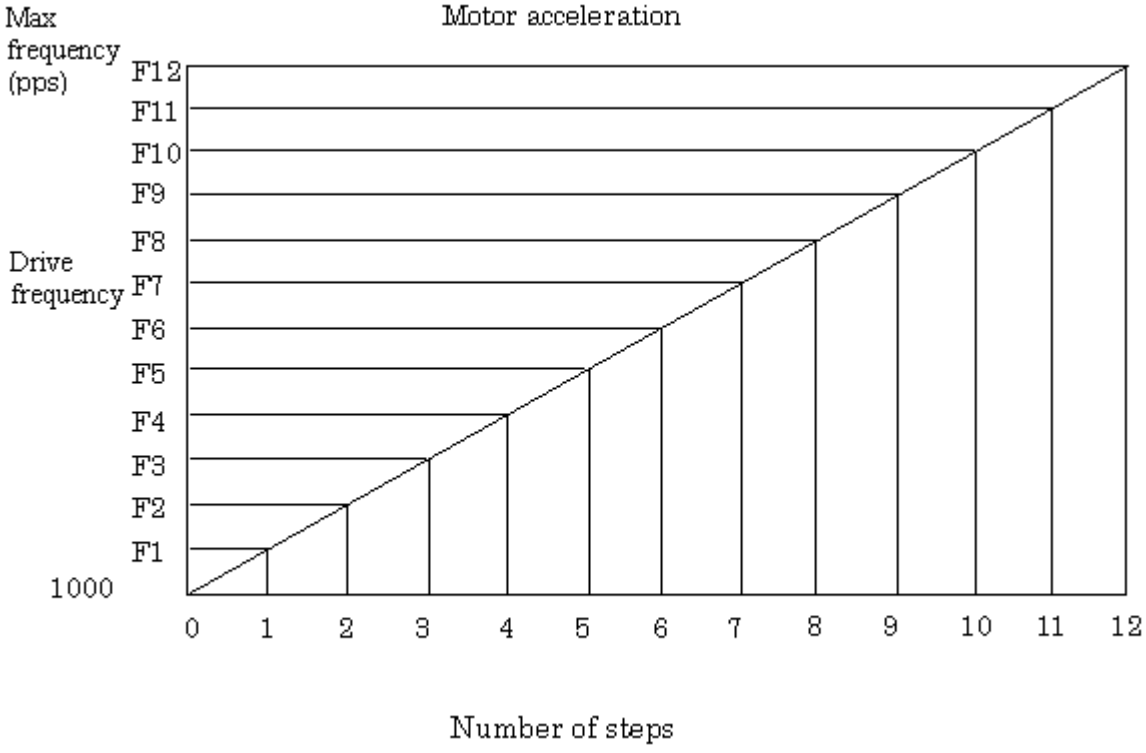
(3) Motor control of FTP-6x2MCL series

1) Motor drive conditions

| ITEM | CONTENTION |
|---|---|
| Drive method | Bipolar 1-2 phase drive |
| Drive current | 480 mA |
| Drive voltage | 24 V |

2) Acceleration control method

(a) Control motor acceleration and deceleration as follows.




(b) If motor excitation is off when acceleration is started, feed current though the motor for about eight ms beforehand.

(c) After printing, wait in the 1-phase excitation state for about 10 seconds and hold the paper position until the start of the next printing.

(d) After 10 or more seconds have passed from a printing end, turn off motor excitation to suppress heating.

(e) If a trouble occurs, turn off the motor current.

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(4) Motor drive condition

1) In this motor, coil resistance is suppressed low to prevent the current rise waveform from being dulled by the L component of the motor coil at high-speed drive. Drive this motor by a constant-current circuit (up to 500 mA) according to the drive circuit example to obtain stable torque over resistance value variation, voltage, etc.

   Excessive current generates abnormal heat and excessive torque to damage the mechanical unit. Don't allow current that exceeds the required to flow.

2) Check the effect of temperature, humidity, paper type, etc. on load variation before determining the motor drive conditions. Motor drive with excessive torque ;may damage the gear at paper lock or other.

3) At low-speed drive (low drive frequency), abnormal noise or torque drop may occur because of motor resonance. Perform full evaluation and check to use a 500 pps or lower drive frequency.

4) Control acceleration and deceleration when rapidly changing the motor drive speed at

5) printing start and when starting printing after motor excitation is turned off.

6) Perform dummy feed of several dot lines to match the motor excitation phase and remove the effect of the drive transmission system when starting printing after motor excitation is turned off.

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(5) Notes

1) If the motor is stopped and motor excitation is discontinued during printing, the print may be separated because of the elasticity of the rubber roller when the motor is restarted. Print crush or white line insertion may occur. When print continuity is required, print all data at one time instead of stopping printing halfway. The above rubber roller deformation and other effect can also be reduced by feeding minute current in the standby state. In this case, the current as a guide is 150 mA

2) Turn off excitation to leave the printer unused for long time. The motor, drive element, or other may be heated.

3) Hold the motor side wall temperature 90°C or lower in use. Excess of 90°C may damage the coil in the motor.

4) When an abnormal condition occurs, stop printer drive as early as possible.

5) This printer feeds one dot line by four steps. Therefore, in motor drive by 1-2 phase excitation, control the motor so that stop occur in the 1-phase excitation state and start occurs in the 2-phase excitation state to save power and stabilize operation.

6) Printing operation with no paper and the head down may wear the rubber roller or damage the head. Don't perform printing in this condition.

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(6) Example of stepping motor drive circuit

Figure 10 shows an example of the bipolar constant-current drive circuit.

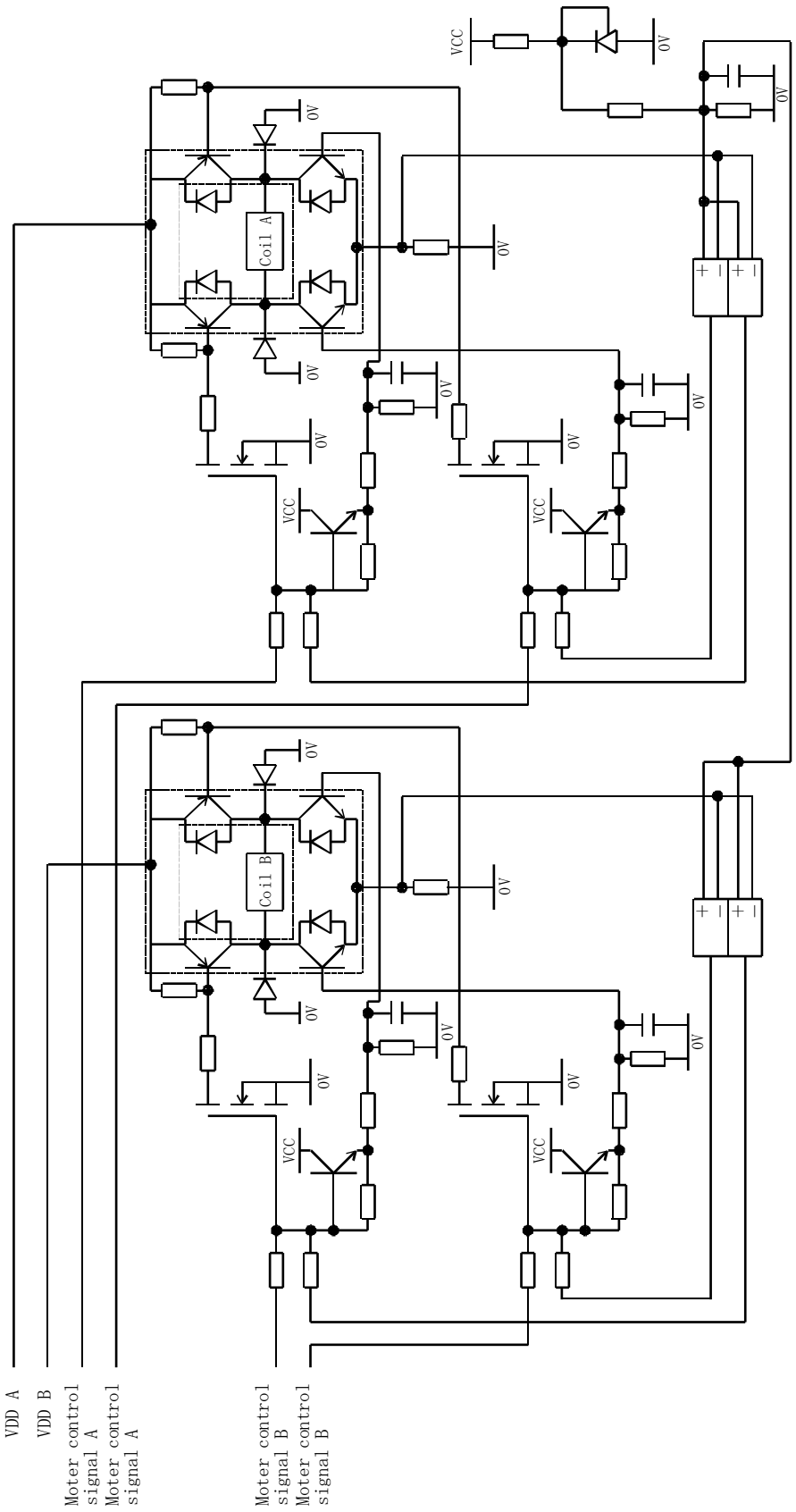


Figure 10 Motor drive circuit

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## 10. Photointerrupter Specifications

The main purpose of this photointerrupter is to position the paper by mark detection. This photointerrupter can also be used to detect no paper condition.

(1) Absolute maximum ratings

| Item | | Symbol | Rated value | Unit |
|---|---|---|---|---|
| Input | Forward current | $I_F$ | 50 | mA |
| | Reverse voltage | $V_R$ | 5 | V |
| | Allowable loss | P | 70 | mW |
| Output | Voltage between collector and emitter | $V_{CEO}$ | 20 | V |
| | Voltage between emitter and collector | $V_{ECO}$ | 5 | V |
| | Collector current | $I_C$ | 20 | mA |
| | Collector loss | $P_C$ | 70 | mW |

(2) Electrooptical characteristics

(25°C)

| Item | | Symbol | Minimum value | Typical value | Maximum value | Unit | Conditions |
|---|---|---|---|---|---|---|---|
| Input | Forward voltage | $V_F$ | 1.0 | 1.2 | 1.4 | V | $I_F$=20 mA |
| | Reverse current | $I_R$ | - | - | 10 | μA | $V_R$=3 V |
| Output | Dark current | $I_{CEO}$ | - | - | 200 | nA | $V_{CE}$=10 V |
| Transmission Characteri-Stics | Photoelectric current | $I_C$ | 260 | - | 1100 | μA | $V_{CE}$=5 V, $I_F$=10 mA |
| | Leakage current | $I_{LEAK}$ | - | - | 1 | μA | $V_{CE}$=5 V, $I_F$=20 mA |
| | Response time (rise) | tr | - | 5 | - | μs | $V_{CE}$=5 V, $I_C$=1 mA |
| | Response time (fall) (fall) | tf | - | 5 | - | μs | $R_L$=100Ω |

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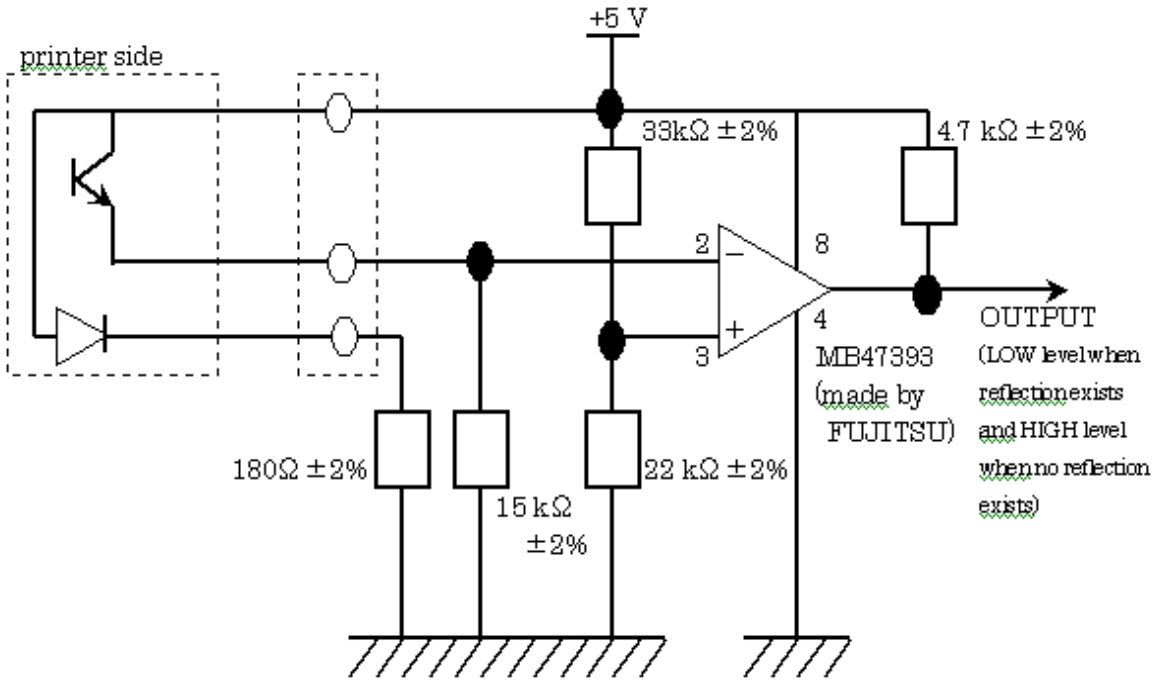
(3) Example of external connection circuit




## 11. Microswitch Specifications

Microswitches are built in to detect head up.

| Item | Specification |
|---|---|
| Rated voltage | DC 30V |
| Rated current | 0.1 A |
| Minute load capacity | DC5 V, 1 mA |
| Contact resistance | 200 mΩ or less |
| Contact material | Gold |

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## 12. Marking

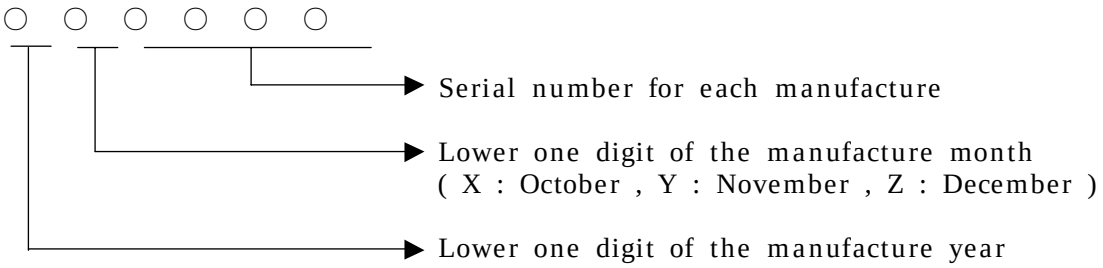
11.1 Type and Serial Number Marking label

(1) Contents: The type, manufacture serial number, and revision number are marked.

(2) Application place: This label shall be applied on the side of the main body of the mechanical unit.

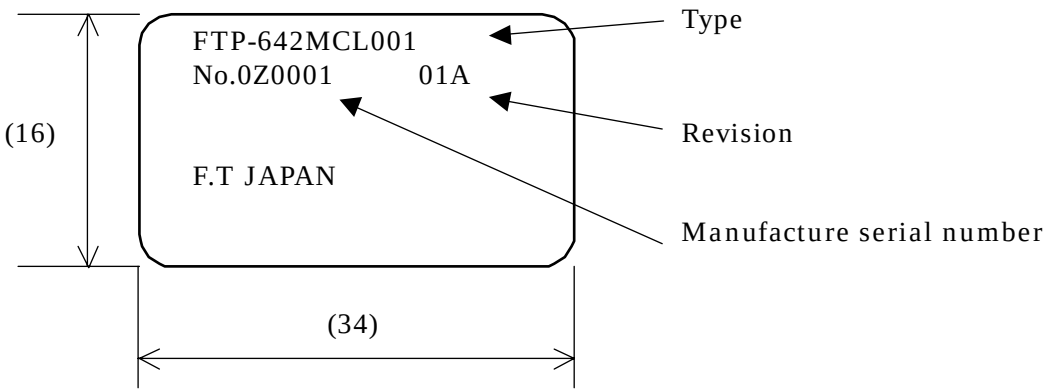
(3) Marking method: The type number, serial number, and revision number shall be marked by stamping.

(4) Serial number marking: 6-digits serial number shall be marked in the following format:




(5) Revision number marking: Mark the revision of the printer.

(6) Marking example: A marking example is shown below.




## 13. Packing

(1) Packing form: Put each unit in an antistatic bag and pack it in the dedicated packing box.

(2) Dimensions: Conform to the F&T standard.

(3) Number of units piled: Up to three units can be piled up in horizontal position.

(4) Marking: Mark the type and quantity on the surface of the packing box.

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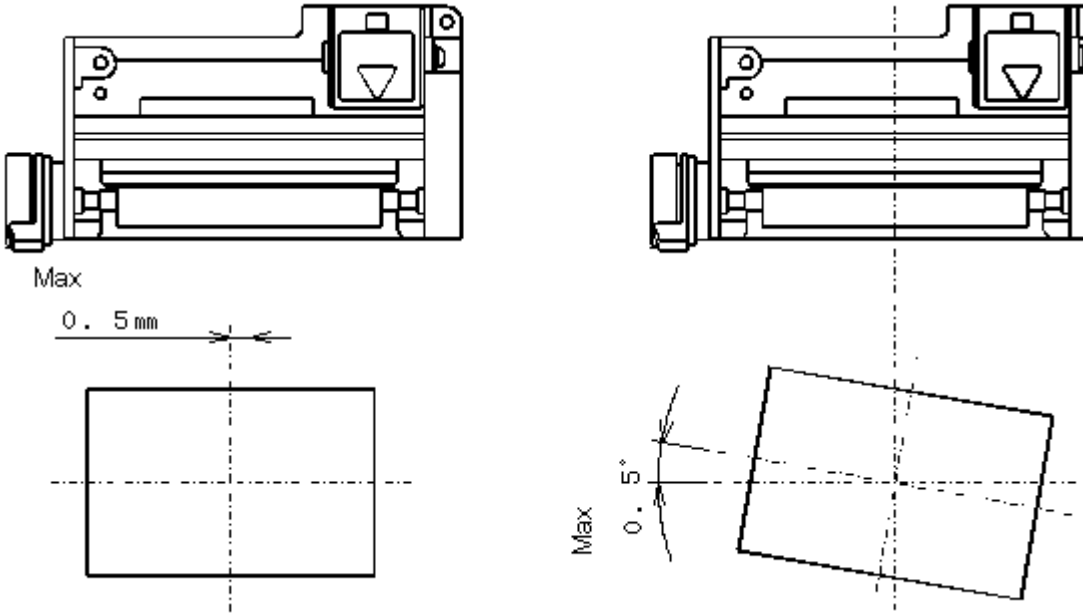
## 14. Notes for Handling

(1) Notes for paper loading and unloading

Load the paper so that its shaft is as parallel with the printer as possible.
(See the figure below)

Adjust paper ejection so that it is ejected smoothly without hitting the cover or other.

Without these treatments, trouble such as paper snaking, printing position misalignment, and paper jam may occur in printing.




(2) Notes for storage

For long-time storage (half year or longer in room temperature), load paper and establish head up condition.

If the rubber roller remain in direct contact with the head and pinch roller for long time, the rubber roller may be partially deformed to cause uneven print darkness.

Do not place the printer in an environment in which condensation may occur with the power on for long time to prevent galvanic corrosion.

(3) Notes for mounting and setting

Secure the printer by 3 mounting holes using three M2.5 screws.
At this time, support the printer by the same plate (flatness : 0.1 or less).

Connect the mounting section on the motor side to the frame ground of the main body.

In securing, take care not to strain or deform the printer body.

A violation of these notes may cause trouble such as blurred printing, wavy paper, paper jam, and noise.

(4) Back tension of recording paper

When using this printer with the F&T standard circuit, adjust the back tension of the paper at the printer paper entrance to approx.100g

Application of back tension that exceeds 100g may cause a paper jam or overload and damage the gear.

(5) Galvanic corrosion

If head voltage is applied with the paper wet, the head may be damaged because of gaivanic corrosion. Do not place the printer in an environment in which condensation may occur with the power on for long time.

(6) Dust and drip

The structure of this printer is neither dust-proof nor drip-proof. Give a treatment against dust and drips to the mainframe side beforehand.

(7) Other

Lift the head up lever when paper is not loaded on the printer.

If the paper runs out during printing, stop printer operation to prevent printing with no paper. This causes printer failures.

## 15. Other

(1) Both sides shall consult to solve occurred problems based on this specification.

(2) Both sides shall consult to make changes and additions incompatible with this specification.

In the range of compatibility, this printer may be changed without prior notice
because this type is a standard type.

(3) Preprinting

Consult on preprinting (printing on the paper) according to Appendix 1 bef orehand.
The ink used, printing method, and drying method of preprinting may affect the print quality of the thermal printer largely.

(4) Label feed

Do not feed labels backward by turning the knob in reverse direction or other because it may cause the label to adhere to the inside of printer.

(5) Paper rolling direction

Roll the paper with the heat-sensitive side on the outside to make paper insertion easy and reduce the transport load at drive.

(6) Paper perforation

Perforate paper from the heat-sensitive side to prevent printing failure or head life shortening because of a perforation burr or paper residues.

(7) Head cleaning

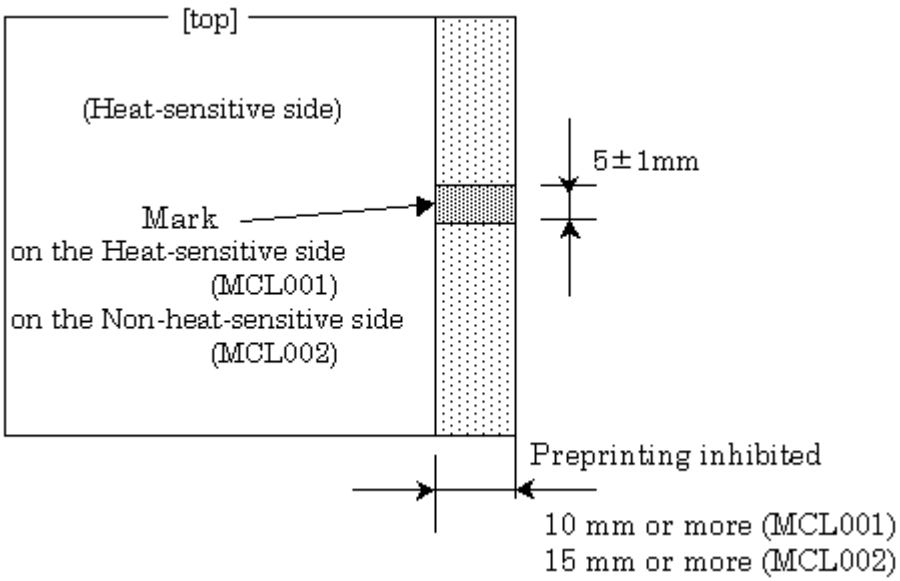
Paper residues or foreign matter may shorten the life of the head or platen. Clean the printer periodically.

Appendix 1

## Preprinting

### 1.Detecion mark position

Print the detection mark in a 5±1 mm x 10 mm (MCL001) and 15 mm (MCL002) or wider band as shown in the figure below.




### 2. Positioning mark preprinting

The mark color shall be black and the density shall be 7% or lower reflection factor and PCS0.9 or higher. Use oil ink and remove unevenness. Multiple coating is recommended to raise the PCS value.

The density measuring instrument and value are as follows:

PCS measuring instrument : Macbeth reflection-type densitometer PCM-II
(used filter : D range 900 nm)

### 3. Preprinting inhibition

Preprinting on the mark detection area (10 mm from the right edge) is inhibited. If this preprinting is required, select ink in the range of the wavelength (700 to 1000 nm) used by the photointerrupter and so that the reflection factor is 80% or higher.

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4. Notes for preprinting

The characteristics of heat-sensitive paper differ those of general printing paper and no-carbon paper. Note the following in print processing :

A. Printing method

Use the UV printing method because heat-sensitive paper has poor ink dryability.

B. Ink

(1) Use ink that doesn't have bad effect such as residue adhesion, head wearing, and sticking on the thermal printer.

(2) Use ink that contains 100 ppm or less of CI ions.

| Recommended ink : RNC type by F&K TOKA |
|---|

(3) Take care of the ink tack because the surface strength of the heat-sensitive layer is lower than general printing paper. Use 6.0 as the ink tack for general heat-sensitive paper or the same level as no-carbon paper for high-storage heat-sensitive paper.

(4) Don't apply an excessive amount of ink. An excessive amount of ink causes printing or coloring failure or sticking.

(5) Use heat-resistant ink material that doesn't perform cooling. Also use such ink for the non-heat-sensitive side.

(6) After printing, check that the ink adheres to the paper. Manage wetting water carefully because in general, UV ink tends to yield to water.

(7) Avoid ink transfer and blocking.

(8) Ensure that the preprint isn't peeled by water or alcohol.

C. Wetting water

(1) Manage wetting water carefully because heat-sensitive paper tends to repel water.

(2) An excessive amount of IPA in the wetting water may cause color smudging to background. adjust the IPA amount to 5% or less for general heat-sensitive paper or 10% or less for high-strong heat-sensitive paper.

D. Other

(1) When using many UV 1amps, take care of paper contraction (flow or width direction) or color smearing because of heat.

(2) Set the holding roller pressure of the drive roll high because the paper surface is slippery.

(3) Perform multiple printing to raise the PCS value of the positioning marker.

(4) Some preprinting causes sticking or the like. Be sure to perform evaluation and check on the actual machine.