



PHOENIX DISPLAY INTERNATIONAL, INC.

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SPECIFICATION FOR LCD MODULE

| | |
|--------------------|------------------------|
| CUSTOMER | |
| PART NUMBER | PDI070WWVBE-31 |
| DESCRIPTION | 7.0" 800 * (RGB) * 480 |
| VERSION | V1.0 |
| ISSUE DATE | 29-Jun-18 |

COMPANY ADDRESS:

Phoenix Display International, Inc.
6150 W. Gila Springs Place Unit 2
Chandler, AZ 85226
USA
www.phoenixdisplay.com
(630) 359-5700 office
(630) 359-5701 fax

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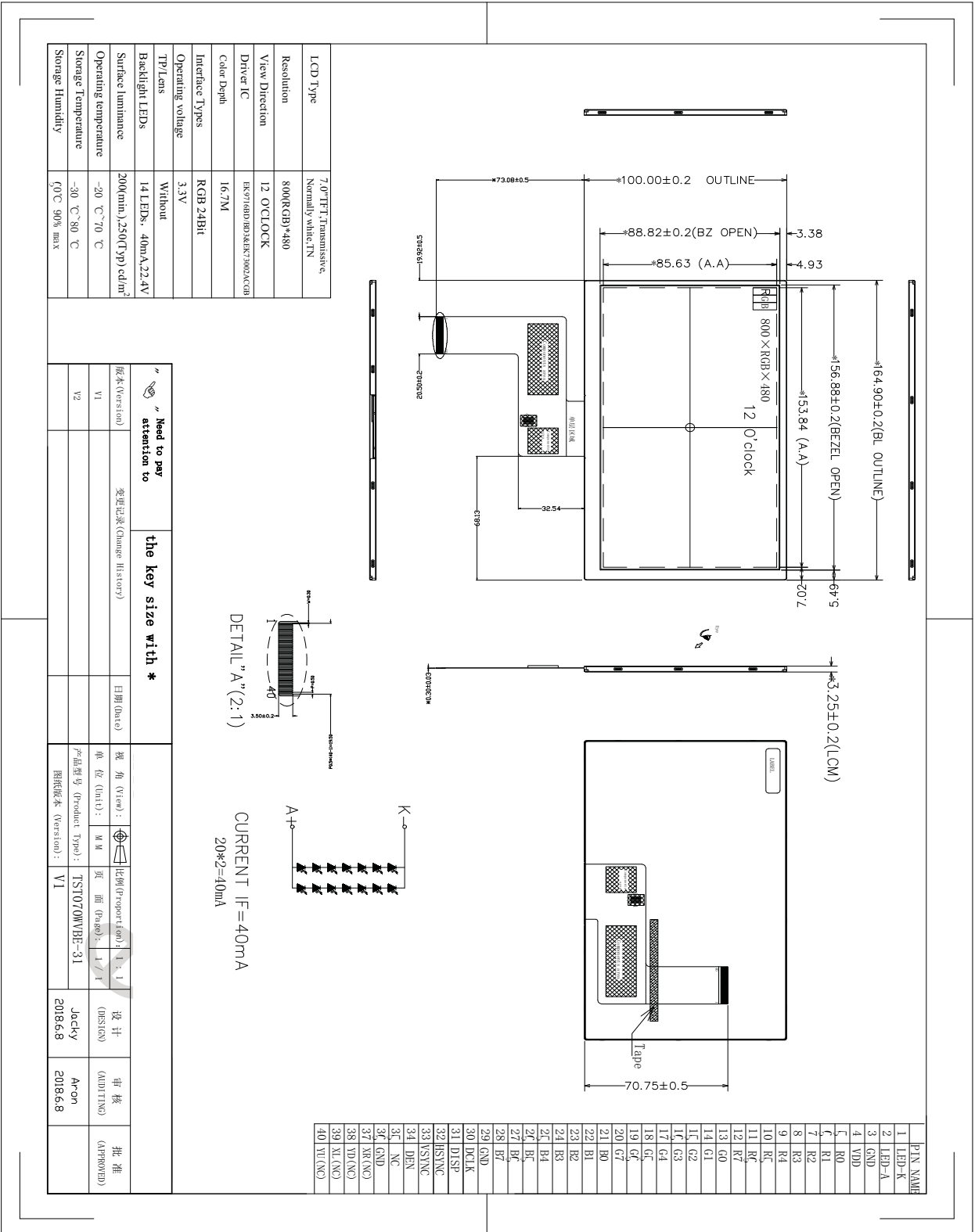
1 General Characteristics

| ITEM | Specification | Unit |
|--------------------------------|--|-------------------|
| LCD Type | a-Si TFT, Transmissive, Normally white, TN | - |
| LCD Size | 7.0 | inch |
| Resolution (W x H) | 800x (RGB) × 480 | pixel |
| LCM size | 164.9(H) x 100(V) x 3.25(T) | mm |
| Active Area | 154.08 (H) x 85.92 (V) | mm |
| Dot Pitch | 0.0642(H) × 0.1790(V) | mm |
| Viewing Direction | 12 o'clock | - |
| Gray Scale Inversion Direction | 6 o'clock | - |
| Color Depth | 16.7M | - |
| Pixel Arrangement | RGB-stripe | - |
| Backlight Type | 14 LEDs, 40mA | - |
| Surface Luminance | 200Min, 250TYP | cd/m ² |
| Surface Treatment | Anti-glare | - |
| LCD Driver IC | EK9716BD/BD3&EK73002ACGB | - |
| Interface Type | TTL(RGB-24bit) | - |
| Input Voltage | 3.3 | V |
| With/Without TP | Without | - |
| Weight | TBD | g |

Note 1: RoHS compliant

Note 2: LCM weight tolerance: ± 5%.

2 Product drawings



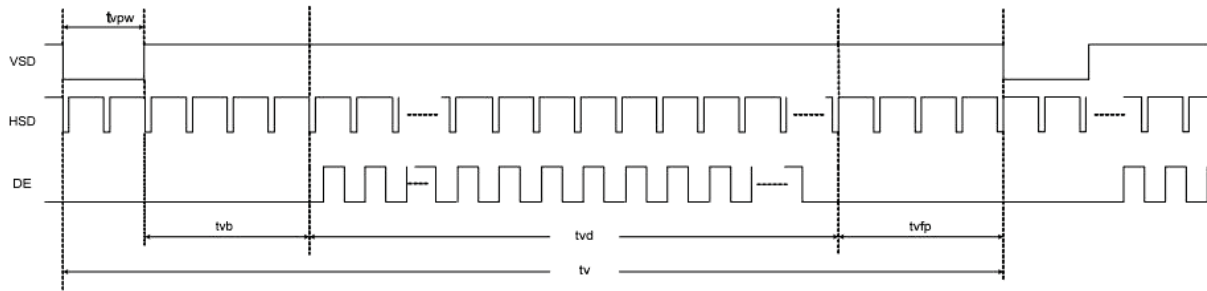
3 Interface description

3.1 LCM interface description

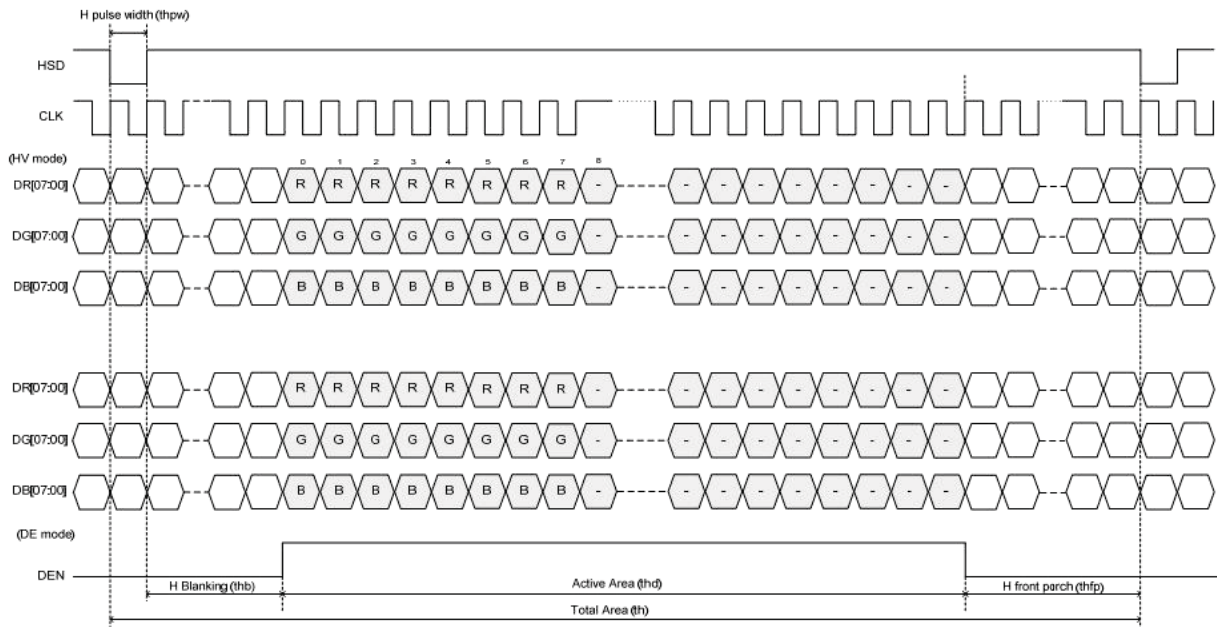
| PIN NO. | Symbol | description |
|---------|--------|--|
| 1 | LED-K | Backlight K Cathode input pin. |
| 2 | LED-A | Backlight A Anode input pin. |
| 3 | GND | System Ground. (0V) |
| 4 | VDD | Power supply +3.3V |
| 5~12 | R0~R7 | Red Data BUS |
| 13~20 | G0~G7 | Green Data BUS |
| 21~28 | B0~B7 | Blue Data BUS |
| 29 | GND | System Ground. (0V) |
| 30 | DCLK | Clock for input data. Data latched at rising/falling edge of this signal. Default is falling edge. |
| 31 | DISP | Standby mode control. (Normally pull high) DISP="L", enter standby mode for power saving. Timing controller and source driver will turn off, all outputs are Hi-Z. DISP="H", normal operation. |
| 32 | HSYNC | Horizontal sync input in digital parallel RGB. Negative polarity. |
| 33 | VSYNC | Vertical sync input in digital parallel RGB. Negative polarity. |
| 34 | DEN | Input data enable control. When DE mode, active High to enable data input. (Normally pull low) |
| 35 | NC | No connect |
| 36 | GND | System Ground. (0V) |
| 37 | XR/X+ | No connect |
| 38 | YD/Y- | No connect |
| 39 | XL/X- | No connect |
| 40 | YU/Y+ | No connect |

4 RGB Timing Characteristics

Vertical input timing



Horizontal input timing



Horizontal input timing

| Parameter | Symbol | Value | | | Unit | Note |
|---------------------------|--------|-------|------|------|------|-------------------------------|
| Horizontal display area | thd | 800 | | | DCLK | |
| DCLK frequency | fclk | Min. | Typ. | Max | MHz | |
| | | 20 | 33.3 | 50 | | |
| 1 Horizontal Line | th | 908 | 928 | 1088 | DCLK | thb+thpw=88 DCLK is fixed. |
| HSD pulse width | thpw | 1 | 48 | 87 | | |
| HSD Back Porch (Blanking) | thb | 87 | 40 | 1 | | |
| HSD Front Porch | thfp | 20 | 40 | 200 | | |

Vertical input timing

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Note |
|---------------------------|--------|------|------|------|------|-------------------------|
| Vertical display area | tvd | 480 | | | H | |
| VSD period time | tv | 517 | 525 | 712 | H | tpw+tvb=32H Is fixed |
| VSD pulse width | tpw | 1 | 1 | 3 | H | |
| VSD Back Porch (Blanking) | tvb | 31 | 31 | 29 | H | |
| VSD Front Porch | tvfp | 5 | 13 | 200 | H | |

5 Absolute Maximum Ratings

| PARAMETER | SYMBOL | MIN | MAX | UNIT |
|---------------------------|--------|------|----------------|------|
| Supply Voltage for Analog | VDD | -0.5 | 5.0 | V |
| Operating Temperature | TOP | -20 | 70 | ° C |
| Storage Temperature | TST | -30 | 80 | ° C |
| Humidity | RH | - | 90%(Max 60° C) | RH |

6 Electrical Characteristics

| PARAMETER | SYMBOL | MIN | TYP | MAX | UNIT |
|---------------------------|--------|----------|-----|----------|------|
| Analog operating voltage | VDD | 3 | 3.3 | 3.6 | V |
| Logic operating voltage | IOVDD | 3 | 3.3 | 3.6 | V |
| Input Current | IDD | - | TBD | - | mA |
| Input Voltage ' H ' level | VIH | 0.7IOVCC | - | IOVCC | V |
| Input Voltage ' L ' level | VIL | GND | - | 0.3IOVCC | |

7 Backlight Characteristics

| ITEM | SYMBOL | MIN | TYP | MAX | UNIT |
|---------------------------|-----------------|-------|-------|-----|------|
| Voltage for LED backlight | V _f | - | 22.4 | - | V |
| Current for LED backlight | I _f | - | 40 | - | mA |
| Power consumption | W _{bl} | - | 896 | - | mW |
| Uniformity | Avg | 80 | - | - | % |
| LED Life Time | - | 30000 | 40000 | - | Hrs |

Note:

- 1.The LED life time is defined as the module brightness decrease to 50% original brightness at Ta=25°C, 60%RH ±5 %.
2. The life time of LED will be reduced if LED is driven by high current, high ambient temperature and humidity conditions.
3. Typical operating life time is an estimated data.
4. Permanent damage to the device may occur if maximum values are exceeded or reverse voltage is loaded .Functional operation should be restricted to the conditions described under normal operating conditions.

8 LCD Optical specifications

| Item | Symbol | Condition | Specification | | | Unit | Remark |
|------------------------------|--------|--------------------|---------------|-------|-------|------|------------|
| | | | Min | Typ | Max | | |
| Response time (By Quick) | Tr+Tf | $\theta = 0^\circ$ | - | 25 | - | ms | Note 5 |
| Contrast ratio | CR | $\theta = 0^\circ$ | 400 | 500 | - | | Note 2,6 |
| Viewing angle | Top | $CR \geq 10$ | 70 | 75 | - | Deg. | Note 2,6,7 |
| | Bottom | $CR \geq 10$ | 65 | 70 | - | | |
| | Left | $CR \geq 10$ | 70 | 75 | - | | |
| | Right | $CR \geq 10$ | 70 | 75 | - | | |
| Color chromaticity (CIE1931) | Wx | $\theta = 0^\circ$ | 0.294 | 0.304 | 0.314 | | Note 3 |
| | Wy | | 0.329 | 0.339 | 0.349 | | |
| | Rx | | 0.585 | 0.601 | 0.615 | | |
| | Ry | | 0.309 | 0.324 | 0.339 | | |
| | Gx | | 0.291 | 0.301 | 0.311 | | |
| | Gy | | 0.552 | 0.557 | 0.582 | | |
| | Bx | | 0.133 | 0.143 | 0.153 | | |
| | By | | 0.159 | 0.174 | 0.189 | | |
| NTSC | | | - | 50% | - | | Note 3 |
| Transmittance | Trans | | - | 6.03% | - | | Note 4 |

Note 1: Ambient temperature = 25°C.

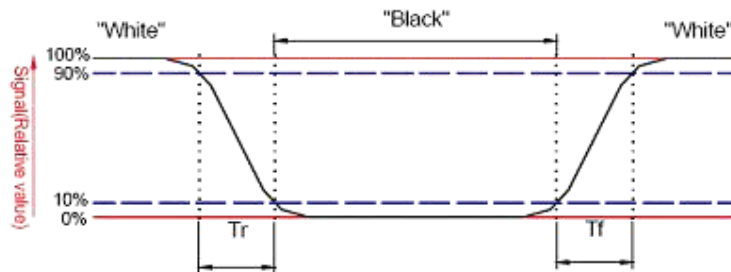
Note 2: To be measured with a viewing cone of 2° by Topcon luminance meter BM-5A.

Note 3: To be measured with Otsuta chromaticity meter LCF-2100M, CF only measure under C light simulation.

Note 4: BOE shipping status is cell without polarizer. Transmittance of Specification is cell with polarizer. The tolerance of Transmittance is $\pm 10\%$.

Note 5: Definition of response time:

The output signals of TRD-100 are measured when the input signals are changed to "White" (falling time) and from "White" to "Black" (rising time), respectively. The interval is between the 10% and 90% of amplitudes. Refer to figure as below.

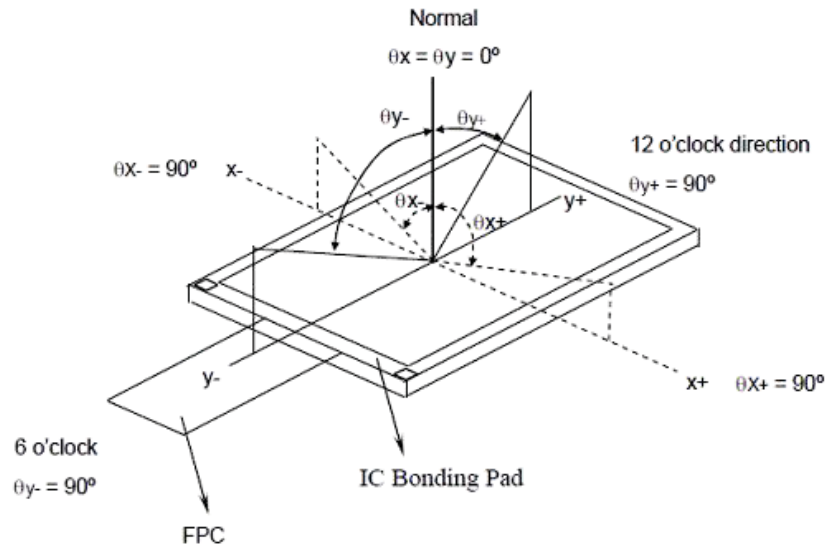


Note 6: Definition of contrast ratio:

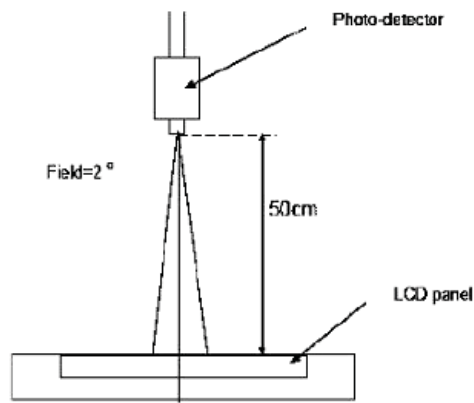
Contrast ratio is calculated by the following formula.

$$\text{Contrast ratio (CR)} = \frac{\text{Brightness on the "white" state}}{\text{Brightness on the "black" state}}$$

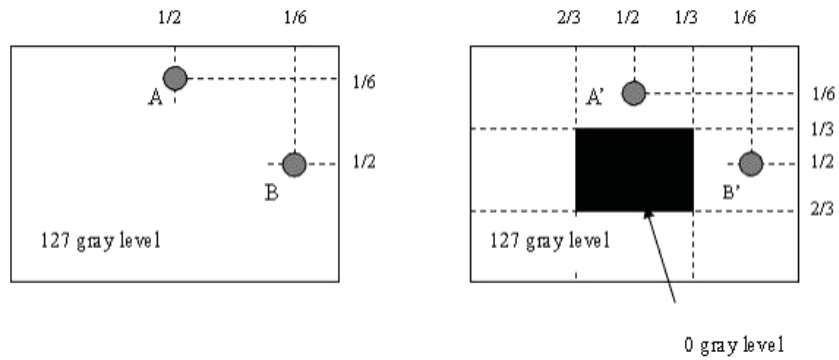
Note 7: Definition of viewing angle



Note 8: Optical characteristic measurement setup.



Note 9:



1 $LA-LA' / LA \times 100\% = 2\% \text{ max.}$, LA and LA' are brightness at location A and A'.

1 $LB-LB' / LB \times 100\% = 2\% \text{ max.}$, LB and LB' are brightness at location B and B'.

9 RELIABILITY TEST

| NO. | TEST ITEM | TEST CONDITION | INSPECTION AFTER TEST |
|-----|------------------------------|--|---|
| 1 | High Temperature Storage | 80±2°C/96 hours | Inspection after 2~4 hours storage at room temperature and humidity. The condensation is not accepted. The sample shall be free from defects: <ol style="list-style-type: none"> 1. Air bubble in the LCD 2. Seal leak 3. Non-display 4. Missing segments 5. Glass crack |
| 2 | Low Temperature Storage | -30±2°C/96 hours | |
| 3 | High Temperature Operating | 70±2°C/96 hours | |
| 4 | Low Temperature Operating | -20±2°C/96 hours | |
| 5 | Temperature Cycle | -30±2°C ~ 25~ 80± 2°C × 10 cycles (30 min.) (5min.) (30min.) | |
| 6 | Damp Proof Test | 60°C ±5°C × 90%RH/96 hours | |
| 7 | Vibration Test | Frequency 10Hz~55Hz Stroke: 1.5mm Sweep: 10Hz~150 Hz~10Hz 2 hours For each direction of X, Y, Z | |
| 8 | Shock Test | Half-sine, wave, 300m/s | |
| 9 | Packing Drop Test | Height: 80 cm 1 corner, concrete floor | |
| 10 | Electrostatic Discharge Test | C=150pF, R=330 Ω Air: ±8KV 150pF/330Ω 30 times Contact: ±4KV,20 times | |

10 Suggestions for using LCD modules

10.1 Handling of LCM

1. The LCD screen is made of glass. Don't give excessive external shock, or drop from a high place.
2. If the LCD screen is damaged and the liquid crystal leaks out, do not lick and swallow. When the liquid is attach to your hand, skin, cloth etc, wash it off by using soap and water thoroughly and immediately.
3. Don't apply excessive force on the surface of the LCM.
4. If the surface is contaminated, clean it with soft cloth. If the LCM is severely contaminated, use Isopropyl alcohol/Ethyl alcohol to clean. Other solvents may damage the polarizer. The following solvents is especially prohibited: water , ketone Aromatic solvents etc.
5. Exercise care to minimize corrosion of the electrode. Corrosion of the electrodes is accelerated by water droplets, moisture condensation or a current flow in a high-humidity environment.
6. Install the LCD Module by using the mounting holes. When mounting the LCD module make sure it is free of

twisting, warping and distortion. In particular, do not forcibly pull or bend the I/O cable or the backlight cable.

7. Don't disassemble the LCM.

8. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

- Be sure to ground the body when handling the LCD modules.
- Tools required for assembling, such as soldering irons, must be properly grounded.
- To reduce the amount of static electricity generated, do not conduct assembling and other work under dry conditions.
- The LCD module is coated with a film to protect the display surface. Exercise care when peeling off this protective film since static electricity may be generated.

9. Do not alter, modify or change the the shape of the tab on the metal frame.

10. Do not make extra holes on the printed circuit board, modify its shape or change the positions of components to be attached.

11. Do not damage or modify the pattern writing on the printed circuit board.

12. Absolutely do not modify the zebra rubber strip (conductive rubber) or heat seal connector

13. Except for soldering the interface, do not make any alterations or modifications with a soldering iron.

14. Do not drop, bend or twist LCM.

10.2 Storage

1. Store in an ambient temperature of 5 to 45 °C, and in a relative humidity of 40% to 60%. Don't expose to sunlight or fluorescent light.

2. Storage in a clean environment, free from dust, active gas, and solvent.

3. Store in antistatic container.