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Customer Approval Specification

To:

Product Name: M123AWF4 R2

Document Issue Date: 2022/03/02

| Customer | InfoVision Optoelectronics |
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| Revision | Date | Page | Revised Content/Summary | Remark |
|----------|------------|------|--|--------|
| 00 | 2021/06/03 | -- | First issued. | |
| 01 | 2021/07/19 | 22 | Update Timing and POWER ON &OFF Timing | |
| | 2022/03/02 | -- | Update Final Version | |
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1.0 General Descriptions

1.1 Introduction

The M123AWF4 R2 is a Color Active Matrix Liquid Crystal Display with a back light system. The matrix uses a-Si Thin Film Transistor as a switching device. This TFT LCD has a 12.3 inch diagonally measured active display area with FHD resolution (1,920 horizontal by 720 vertical pixels array).

1.2 Features

- Supported FHD Resolution
- LVDS Interface
- Wide View Angle
- Compatible with RoHS Standard

1.3 Product Summary

| Items | Specifications | Unit |
|--|--|--------------------|
| Screen Diagonal | 12.3 | inch |
| Active Area (H x V) | 292.032 x 109.512 | mm |
| Number of Pixels (H x V) | 1,920 x 720 | - |
| Pixel Pitch (H x V) | 0.1521 x 0.1521 | mm |
| Pixel Arrangement | R.G.B. Vertical Stripe | - |
| Display Mode | Normally Black | - |
| White Luminance | 1000 (Typ.) | cd /m ² |
| Contrast Ratio | 1000 (Typ.) | - |
| Response Time | 30 (Max.)@25°C | ms |
| Input Voltage | 3.3 (Typ.) | V |
| Power Consumption | 14.48 (Max.) @ Mosaic, FV=60Hz | W |
| Weight | 380 (Max.) | g |
| Outline Dimension (H x V x D) With PCBA | 299.032(Typ.) x 123.012(Typ.) x 8.023 (Max.) | mm |
| Electrical Interface (Logic) | LVDS | - |
| Support Color | 16.7 M | - |
| NTSC | 75%(Typ) | % |
| SCI | 6(Typ) | % |
| Optimum Viewing Direction | All O'clock | - |
| Surface Treatment | HC/3H | - |

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1.4 Functional Block Diagram

Figure 1 shows the functional block diagram of the LCD module.

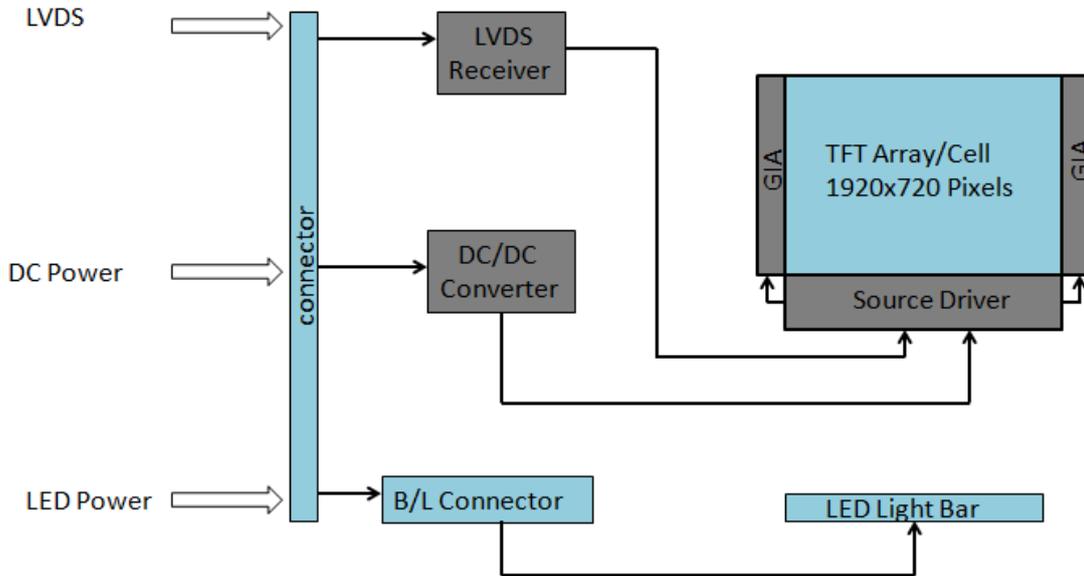


Figure 1 Block Diagram

1.5 Pixel Mapping

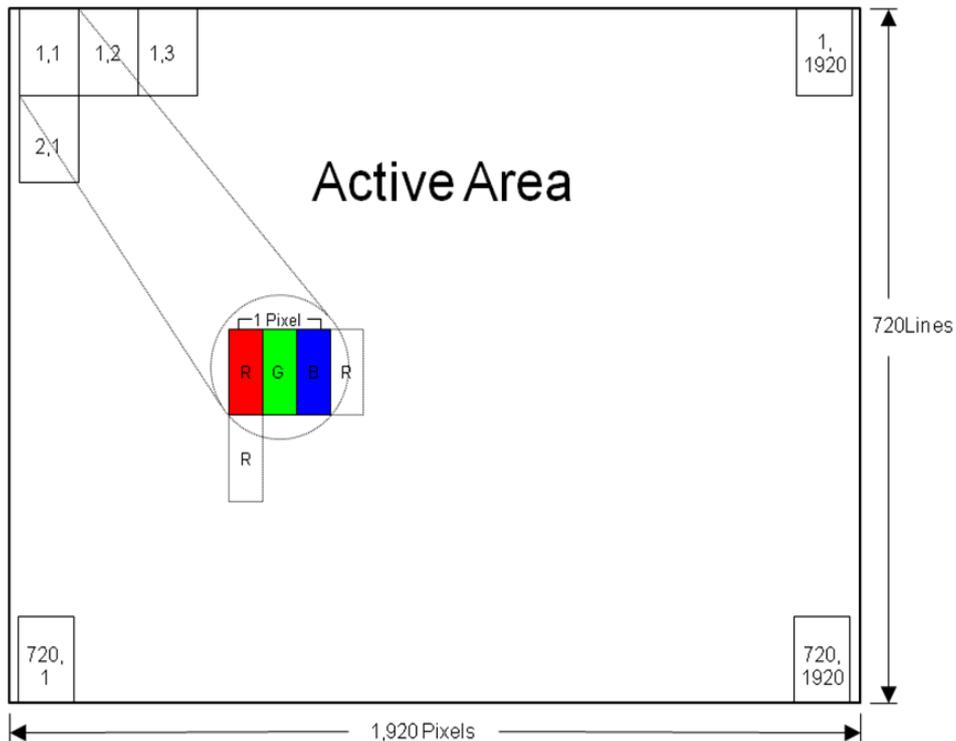


Figure 2 Pixel Mapping

| | | | | | |
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2.0 Absolute Maximum Ratings

Table 1 Electrical & Environment Absolute Rating

| Item | Symbol | Min. | Max. | Unit | Note |
|----------------------------|--------------|------|--------------|------|---------------------|
| Logic Supply Voltage | V_{CC} | -0.3 | 4.0 | V | (1),(2), (3),(4) |
| Logic Input Signal Voltage | V_{Signal} | -0.3 | $V_{CC}+0.3$ | V | |
| Operating Temperature | T_{gs} | -30 | 85 | °C | |
| Storage Temperature | T_a | -40 | 90 | °C | |

Note (1) All the parameters specified in the table are absolute maximum rating values that may cause faulty operation or unrecoverable damage, if exceeded. It is recommended to follow the typical value.

Note (2) All the contents of electro-optical specifications and display fineness are guaranteed under Normal Conditions. All the display fineness should be inspected under normal conditions. Normal conditions are defined as follow: Temperature: 25°C, Humidity: 55± 10%RH.

Note (3) Unpredictable results may occur when it was used in extreme conditions. T_a = Ambient Temperature, T_{gs} = Glass Surface Temperature. All the display fineness should be inspected under normal conditions.

Note (4) Temperature and relative humidity range are shown in the figure below. Wet bulb temperature should be lower than 57.8°C, and no condensation of water. Besides, protect the module from static electricity.

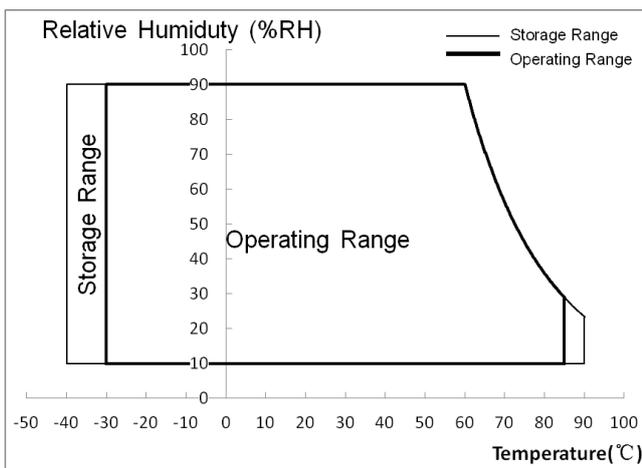


Figure 3 Absolute Ratings of Environment of the LCD Module

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3.0 Optical Characteristics

The optical characteristics are measured under stable conditions as following notes.

Table 2 Optical Characteristics

| Item | Conditions | Min. | Typ. | Max. | Unit | Note |
|------------------------------------|------------------|---------------|-------|---------------|-------------------|--|
| Viewing Angle (CR>10) | Horizontal | θ_{x+} | 80 | 85 | - | degree (1),(2),(3),(4)(8) |
| | | θ_{x-} | 80 | 85 | - | |
| | Vertical | θ_{y+} | 80 | 85 | - | |
| | | θ_{y-} | 80 | 85 | - | |
| Contrast Ratio | Center | 800 | 1000 | - | - | (1),(2),(4),(8) $\theta_x=\theta_y=0^\circ$ |
| Response Time T=25°C | Rising + Falling | - | 25 | 30 | ms | (1),(2),(5),(8) $\theta_x=\theta_y=0^\circ$ |
| Response Time T=-20°C | | - | 170 | 250 | ms | |
| Response Time T=-30°C | | - | 360 | 450 | ms | |
| Color Chromaticity (CIE1931) | Red x | Typ. -0.04 | 0.621 | Typ. +0.04 | - | (1),(2),(3),(8) $\theta_x=\theta_y=0^\circ$ |
| | Red y | | 0.313 | | - | |
| | Green x | | 0.304 | | - | |
| | Green y | | 0.650 | | - | |
| | Blue x | | 0.157 | | - | |
| | Blue y | | 0.054 | | - | |
| | White x | | 0.300 | | - | |
| | White y | | 0.320 | | - | |
| NTSC | - | 70 | 75 | - | % | (1),(2),(3),(8) $\theta_x=\theta_y=0^\circ$ |
| White Luminance | Center Point | 850 | 1000 | - | cd/m ² | (1),(2),(6),(8) $\theta_x=\theta_y=0^\circ$ |
| Luminance | 9 Points@ white | 70 | 80 | - | % | (1),(2),(7),(8) $\theta_x=\theta_y=0^\circ$ |
| Uniformity | 9 Points@ black | 50 | 60 | - | | |

Note (1) Measurement Setup:

The LCD module should be stabilized at given ambient temperature (25°C) for 30 minutes to avoid abrupt temperature changing during measuring. In order to stabilize the luminance, the

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measurement should be executed after lighting backlight for 30 minutes in the windless room.

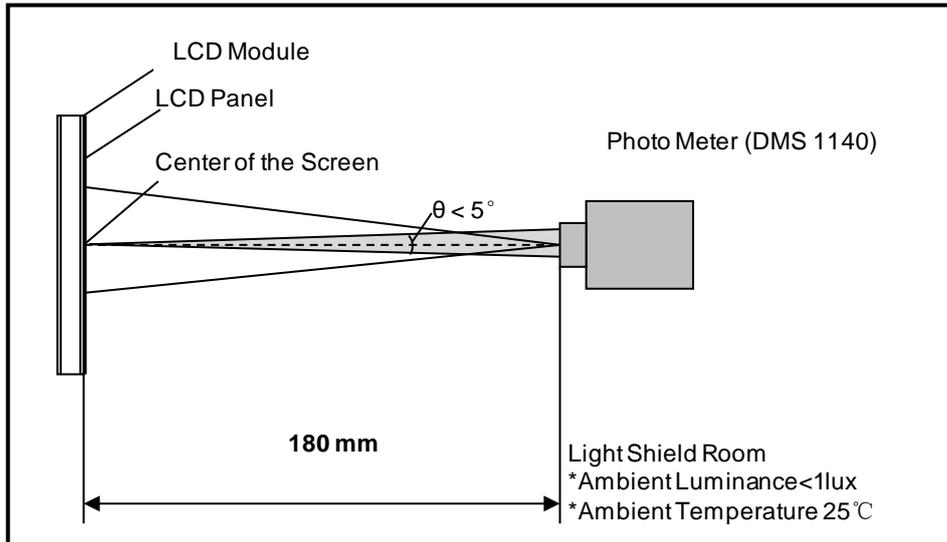


Figure 4 Measurement Setup

Note (2) The LED input parameter setting as:

$$I_{LED}: 360mA$$

Note (3) Definition of Viewing Angle

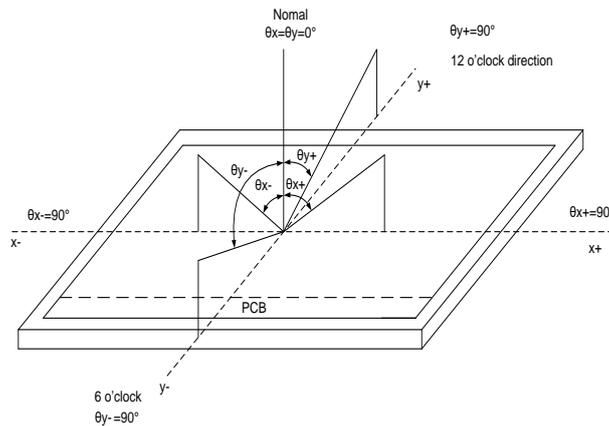


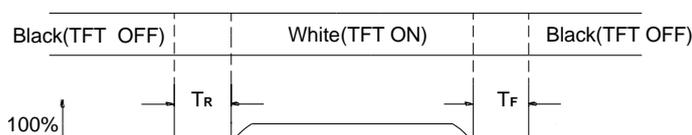
Figure 5 Definition of Viewing Angle

Note (4) Definition of Contrast Ratio (CR)

The contrast ratio can be calculated by the following expression:

$$\text{Contrast Ratio (CR)} = \frac{\text{The luminance of White pattern}}{\text{The luminance of Black pattern}}$$

Note (5) Definition of Response Time (T_R , T_F)



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Figure 6 Definition of Response Time

Note (6) Definition of Luminance of White

Measure the luminance of White pattern (Ref.: Active Area)

Display Luminance=L1 (center point)

H—Active Area Width, V—Active Area Height, L—Luminance

Note (7) Definition of Luminance Uniformity (Ref.: Active Area)

Measure the luminance of White pattern at X points.

Luminance Uniformity= $\text{Min.}(L1, L2, \dots L9) / \text{Max.}(L1, L2, \dots L9)$

H—Active Area Width, V—Active Area Height, L—Luminance

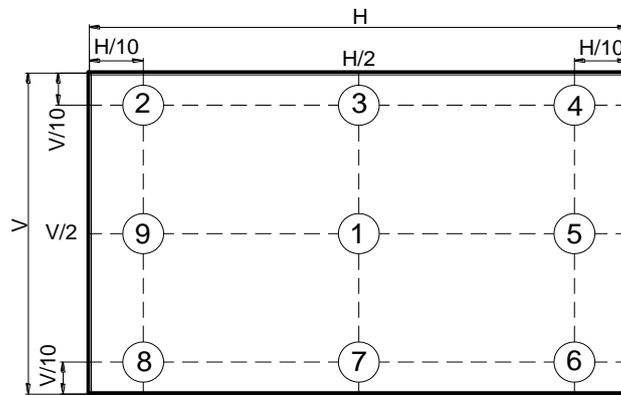


Figure 7 Measurement Locations of 9 Points

Note (8) All optical data are based on IVO given system & nominal parameter & testing machine in this document.

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4.0 Electrical Characteristics

4.1 Interface Connector

Table 3 Signal Connector Type

| Item | Description |
|---------------------|-------------------|
| Manufacturer / Type | BJD-101049-205050 |

Table 4 Signal Connector Pin Assignment

| Pin No. | Symbol | Description | Remarks |
|---------|-----------|---|---------------|
| 1 | GND | Digital ground | - |
| 2 | BIST | LCD Panel Self Test Enable, When it is not used, connecting to GND is recommended, don't floating | Active as3.3V |
| 3 | VCC | Digital Power/Vin =3.3V | - |
| 4 | VCC | Digital Power/Vin =3.3V | - |
| 5 | GND | Power ground | - |
| 6 | GND | Power ground | - |
| 7 | OTP | Serial interface OTP power | (1) 8.6V |
| 8 | NC | No connection | - |
| 9 | GND | Power ground | - |
| 10 | ORXIN0- | Negative LVDS differential data input(Odd data) | - |
| 11 | ORXIN0+ | Positive LVDS differential data input(Odd data) | - |
| 12 | ORXIN1- | Negative LVDS differential data input(Odd data) | - |
| 13 | ORXIN1+ | Positive LVDS differential data input(Odd data) | - |
| 14 | ORXIN2- | Negative LVDS differential data input(Odd data) | - |
| 15 | ORXIN2+ | Positive LVDS differential data input(Odd data) | - |
| 16 | ORXCLKIN- | Negative LVDS differential data input(Odd clock) | - |
| 17 | ORXCLKIN+ | Positive LVDS differential data input(Odd clock) | - |
| 18 | ORXIN3- | Negative LVDS differential data input(Odd data) | - |

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|----|-----------|---|-------|
| 19 | ORXIN3+ | Positive LVDS differential data input(Odd data) | - |
| 20 | ERXIN0- | Negative LVDS differential data input(Even data) | - |
| 21 | ERXIN0+ | Positive LVDS differential data input(Even data) | - |
| 22 | ERXIN1- | Negative LVDS differential data input(Even data) | - |
| 23 | ERXIN1+ | Positive LVDS differential data input(Even data) | - |
| 24 | ERXIN2- | Negative LVDS differential data input(Even data) | - |
| 25 | ERXIN2+ | Positive LVDS differential data input(Even data) | - |
| 26 | ERXCLKIN- | Negative LVDS differential data input(Even clock) | - |
| 27 | ERXCLKIN+ | Positive LVDS differential data input(Even clock) | - |
| 28 | ERXIN3- | Negative LVDS differential data input(Even data) | - |
| 29 | ERXIN3+ | Positive LVDS differential data input(Even data) | - |
| 30 | GND | Power ground | - |
| 31 | FAULT | FAULT signal output(normal=H,abnormal=L) | - |
| 32 | RESET | Global reset pin,active High. | - |
| 33 | STBYB | Standby mode,active High. | - |
| 34 | CSB | Serial interface chip enable | (1) |
| 35 | SCL | Serial interface clock input | |
| 36 | SDAI | Serial interface data input | |
| 37 | SDAO | Serial interface data output. | |
| 38 | GND | Power ground | - |
| 39 | GND | Power ground | - |
| 40 | NC | No connection | - |
| 41 | LEDA | LED power(Anode) | 36.3V |
| 42 | LEDA | LED power(Anode) | |
| 43 | LEDA | LED power(Anode) | |
| 44 | NC | No connection | - |

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| | | | |
|----|-------|-------------|------|
| 45 | LEDK | Cathode1 | 90mA |
| 46 | LEDK | Cathode2 | 90mA |
| 47 | LEDK | Cathode3 | 90mA |
| 48 | LEDK | Cathode4 | 90mA |
| 49 | NTC_A | NTC_Anode | - |
| 50 | NTC_K | NTC_Cathode | - |

Note(1): Pin 7,34-37 only for IVO use, NC is recommended.

4.2 Signal Electrical Characteristics

4.2.1 Signal Electrical Characteristics For LVDS Receiver

The built-in LVDS receiver is compatible with (ANSI/TIA/TIA-644) standard.

Table 5 LVDS Receiver Electrical Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|--------------------------------------|-------------------|------|------|--------------------------|------|------------------------|
| Differential Input High Threshold | Vth | +150 | - | - | mV | V _{CM} =+1.2V |
| Differential Input Low Threshold | Vtl | - | - | -150 | mV | - |
| Magnitude Differential Input Voltage | V _{ID} | 150 | - | 600 | mV | - |
| LVDS Input Voltage | V _{INLV} | 0.7 | - | 1.7 | V | - |
| Common Mode Voltage | V _{CM} | 1.0 | 1.2 | 1.7- V _{ID} /2 | V | - |

Note (1) Input signals shall be low or Hi- resistance state when VCC is off.

Note (2) All electrical characteristics for LVDS signal are defined and shall be measured at the interface connector of LCD.

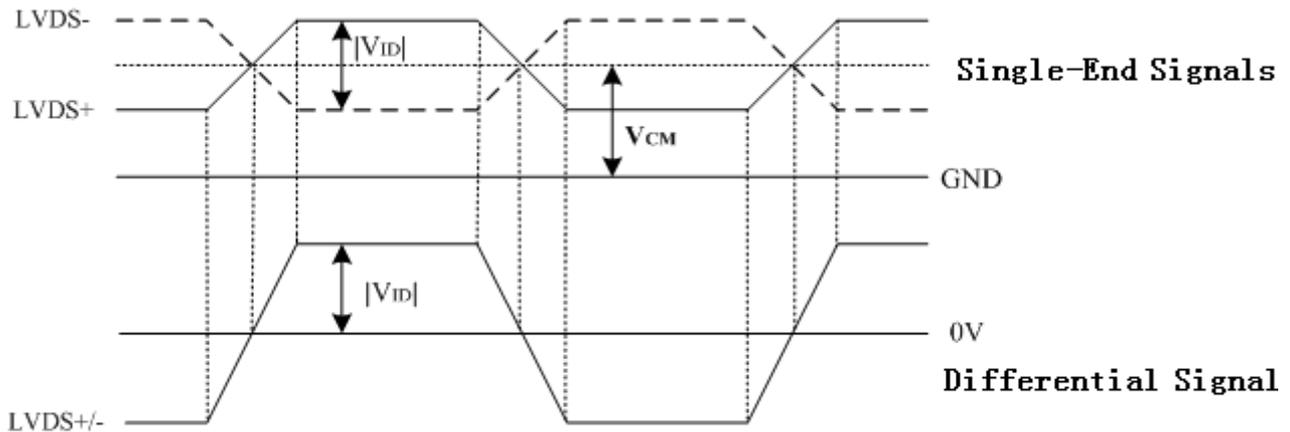


Figure 8 Voltage Definitions

Table 6 LVDS mode AC electrical characteristics

| | | | | | |
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| Parameter | Symbol | Spec | | | Unit |
|--------------------------|----------|------|-----|------|--------|
| | | Min | Typ | Max | |
| Clock frequency(1-port) | Flvcyc | 40.8 | - | 48.2 | MHz |
| Clock period(1-port) | Tlvcyc | 20.7 | - | - | ns |
| 1 data bit time | UI | - | 1/7 | - | Tlvcyc |
| Clock high time | TLVHW | - | 4 | - | UI |
| Clock low time | TLVLW | - | 3 | - | UI |
| Position1 | Tpos1 | -0.2 | 0 | 0.2 | UI |
| Position0 | Tpos0 | 0.8 | 1 | 1.2 | UI |
| Position6 | Tpos6 | 1.8 | 2 | 2.2 | UI |
| Position5 | Tpos5 | 2.8 | 3 | 3.2 | UI |
| Position4 | Tpos4 | 3.8 | 4 | 4.2 | UI |
| Position3 | Tpos3 | 4.8 | 5 | 5.2 | UI |
| Position2 | Tpos2 | 5.8 | 6 | 6.2 | UI |
| Input eye width | TEYEW | 0.6 | - | - | UI |
| Input eye border | TEX | - | - | 0.2 | UI |
| LVDS clock to clock skew | TSKEW_EO | -1 | - | 1 | UI |

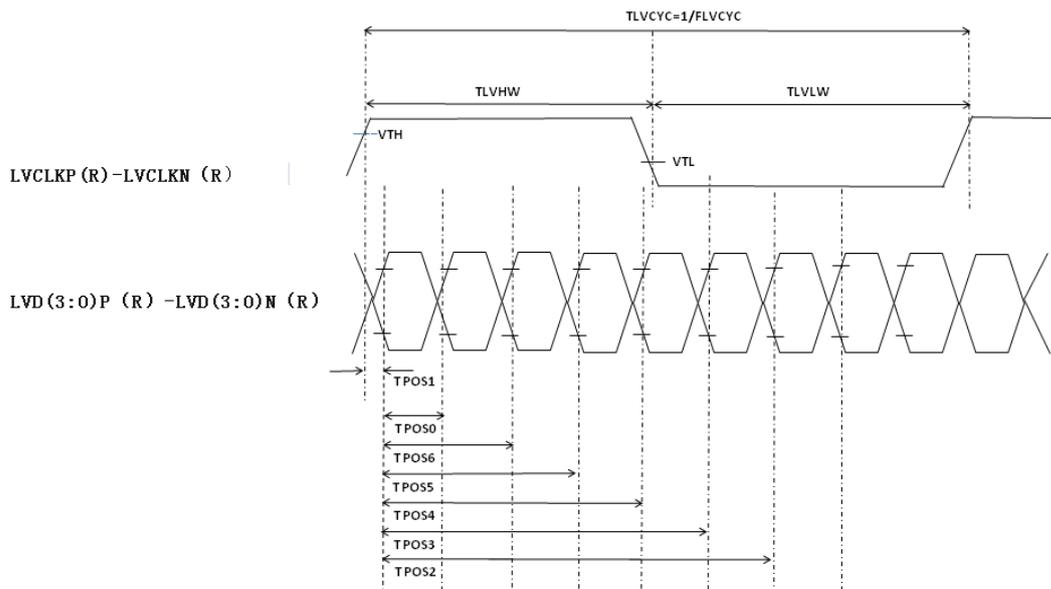


Figure 9 LVDS input timing

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Single-ended:
LVDS[3:0]P,
LVDS[3:0]N

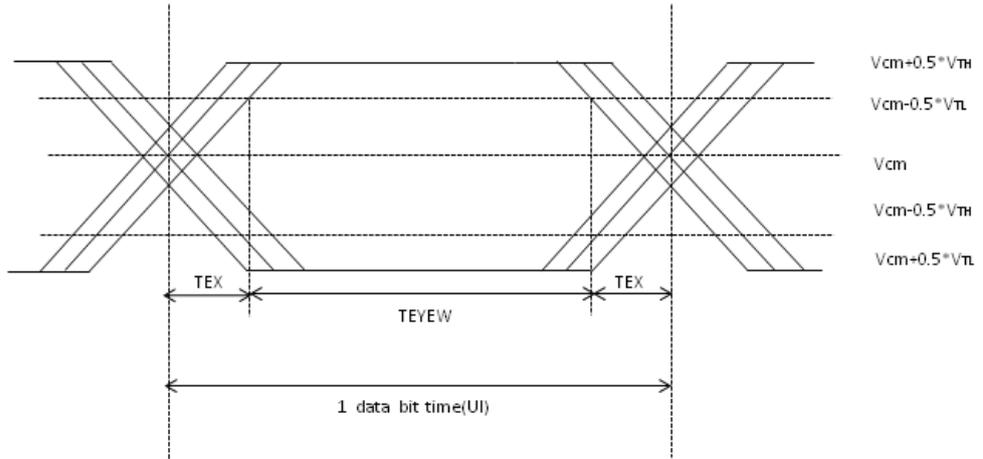


Figure 10 LVDS input eye diagram

Differential:
LVD[3:0]P-LVD[3:0]N

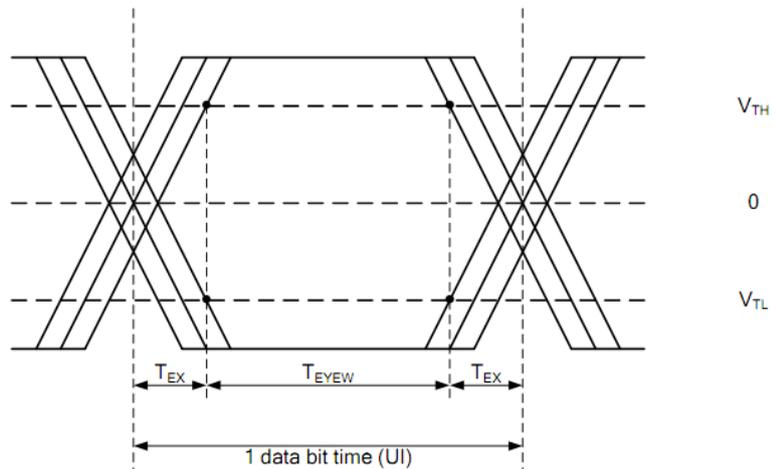


Figure 11 LVDS input eye diagram

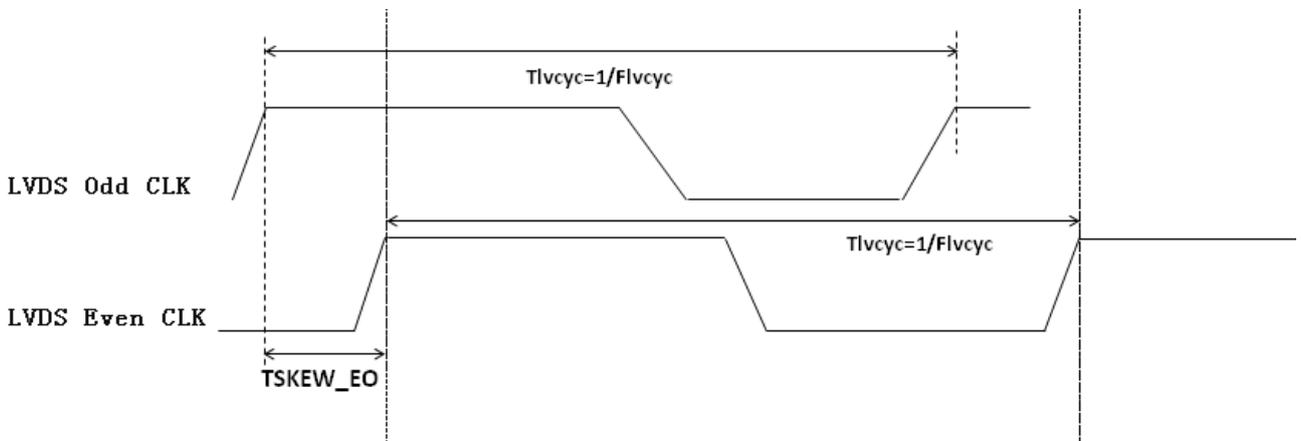


Figure 12 LVDS clock to clock skew

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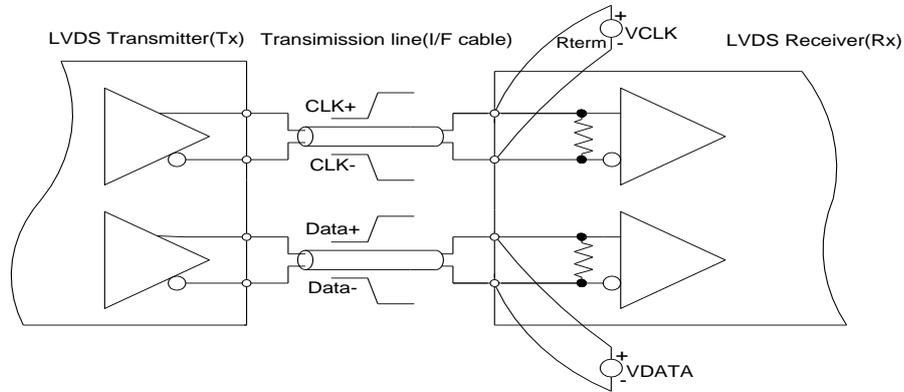


Figure 13 Measurement System

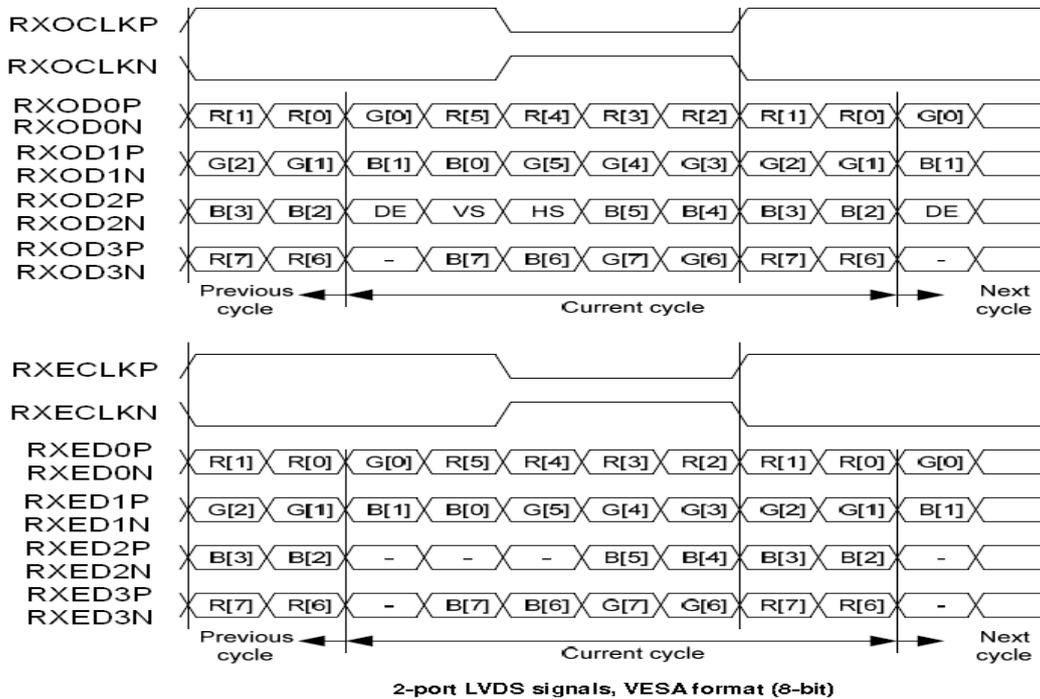


Figure 14 Data Mapping

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4.2.2 LVDS Receiver Internal Circuit

Figure 11 shows the internal block diagram of the LVDS receiver. This LCD module equips termination resistors for LVDS link.

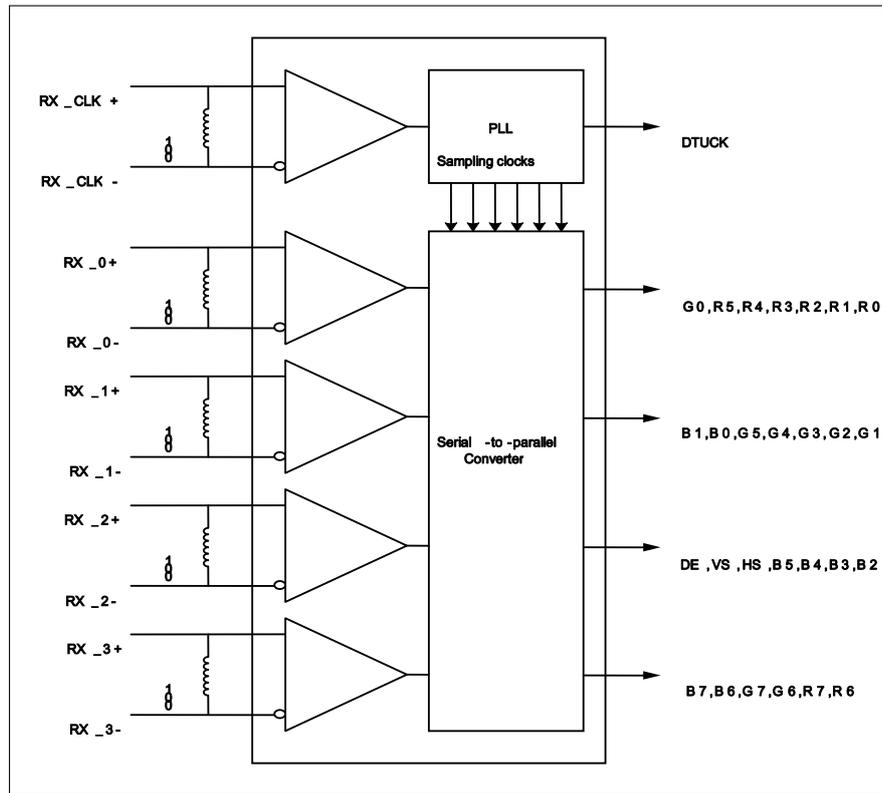


Figure 15 LVDS Receiver Internal Circuit

| | | | | | |
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4.3 Interface Timings

Table 6 Interface Timings

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Note |
|----------------------|--------|-------|------|------|--------|------|
| LVDS Clock Frequency | Fclk | 81.6 | 89.0 | 96.5 | MHz | (1) |
| H Total Time | HT | 1,975 | 2030 | 2880 | Clocks | - |
| H Active Time | HA | 1920 | | | Clocks | - |
| V Total Time | VT | 728 | 731 | 1080 | Lines | - |
| V Active Time | VA | 720 | | | Lines | - |
| Frame Rate | FV | 55 | 60 | 65 | Hz | - |

Note1: This module actually uses 2-port.

Note2: $HT * VT * \text{Frame Frequency} \leq 48.25\text{MHz}$ (1-port) .

Note3: All reliabilities are specified for timing specification based on refresh rate of 60Hz.

DE Only Mode

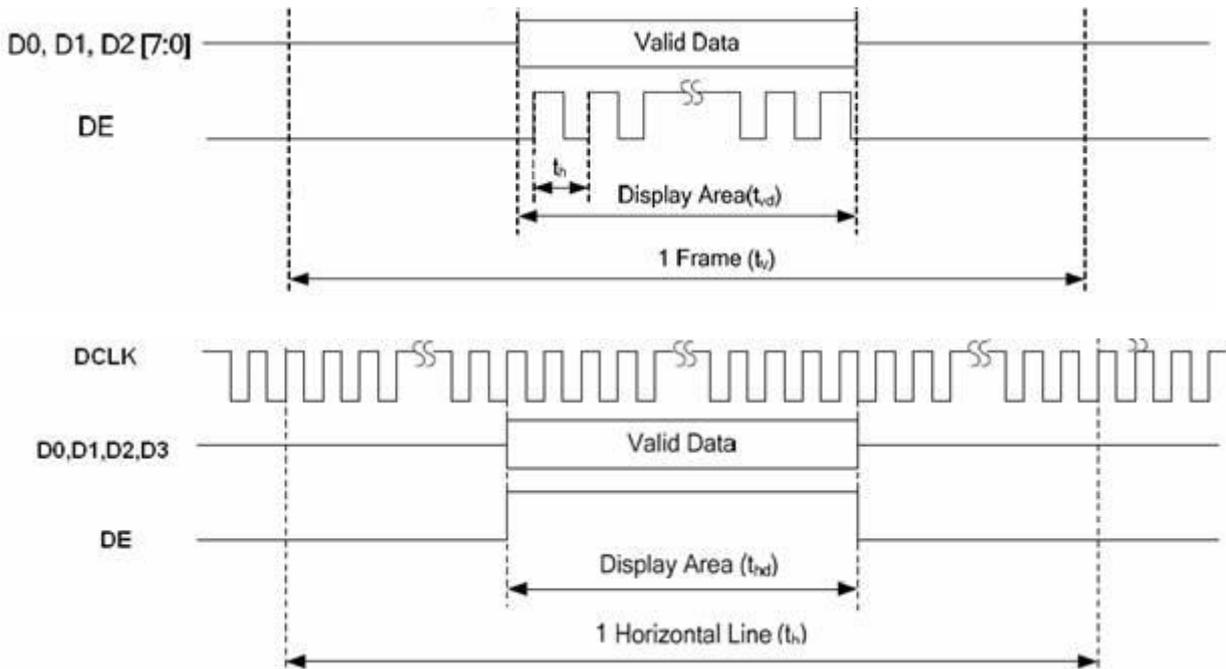


Figure 16 Timing Diagram

| | | | | | |
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4.4 Input Power Specifications

Input power specifications are as follows.

Table 7 Input Power Specifications

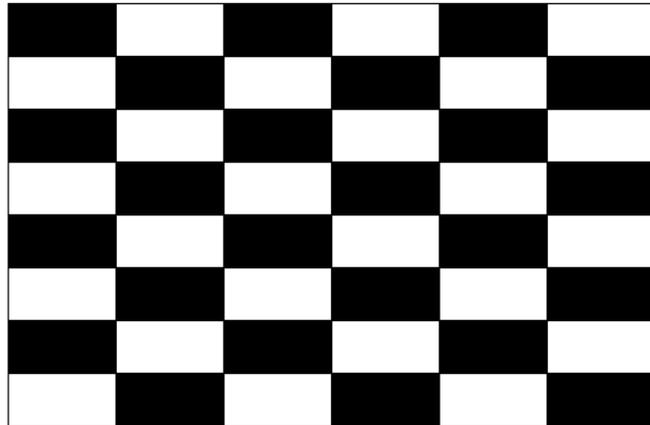
| Parameter | Symbol | Min. | Typ. | Max. | Unit | Note |
|--|--------------------------------|--------|------|------|-------|-------------|
| <i>System Power Supply</i> | | | | | | |
| Power Supply Input Voltage | V_{CC} | 3.0 | 3.3 | 3.6 | V | (1),(2) |
| Power Supply Input Current | Mosaic I_{CC} | - | - | 460 | mA | (1),(3) |
| PCC Power Consumption | Mosaic P_{CC} | - | - | 1.38 | W | |
| Logic Input Signal | High level voltage V_{IH} | 3.0 | - | 3.6 | V | (1) |
| | Low level voltage V_{IL} | 0 | - | 0.4 | V | |
| Logic Output Signal | High level voltage V_{OH} | 3.0 | - | 3.6 | V | (1) |
| | Low level voltage V_{OL} | 0 | - | 0.5 | V | |
| Rush Current | I_{Rush} | - | - | 1500 | mA | (1),(4) |
| Allowable Logic/LCD Drive Ripple Voltage | V_{VCC-RP} | - | - | 200 | mV | (1) |
| <i>LED Power Supply</i> | | | | | | |
| LED Input Voltage | V_{LED} | - | - | 36.3 | V | (1),(2),(7) |
| LED Power Consumption | P_{LED} | - | - | 13.1 | W | (1),(7) |
| LED Forward Voltage | V_F | - | - | 3.3 | V | (1),(2),(8) |
| LED Forward Current | I_F | - | 90 | - | mA | |
| LED Life Time | LT | 30,000 | - | - | Hours | (1),(6) |

Note (1) All of the specifications are guaranteed under normal conditions. Normal conditions are defined as follow: Temperature: 25℃, Humidity: 55± 10%RH.

Note (2) All of the absolute maximum ratings specified in the table, if exceeded, may cause faulty operation or unrecoverable damage.It is recommended to follow the typical value.

Note (3) The specified I_{CC} current and power consumption are measured under the $V_{CC} = 3.3$ V, $FV = 60$ Hz condition and Mosaic pattern.

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Note (4) The figures below is the measuring condition of V_{CC} Rush current can be measured when T_{RUSH} is 0.5 ms.

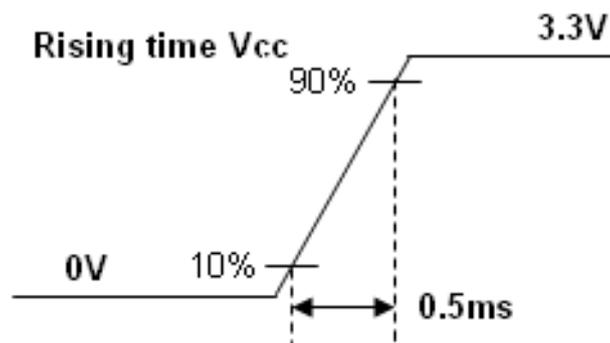


Figure 17 V_{CC} Rising Time

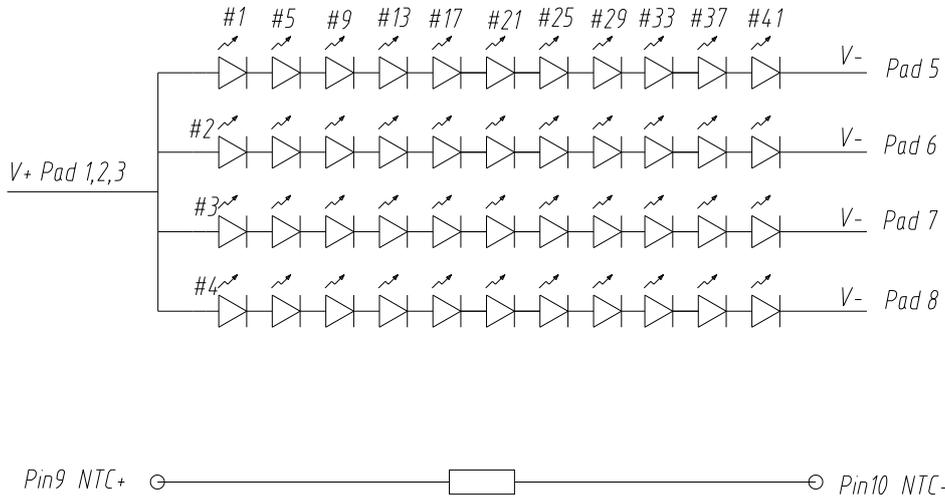
Note (5) Although acceptable range as defined, the dimming ratio is not effective at all conditions. The PWM frequency should be fixed and stable for more consistent luminance control at any specific level desired.

Note (6) The life time is determined as the sum of the lighting time till the luminance of LCD at the typical LED current reducing to 50% of the minimum value under normal operating condition.

Note (7) Definition of V_{LED} and P_{LED}

$$V_{LED} = V_F \times 11, I_{LED} = I_F \times 4, P_{LED} = V_{LED} \times I_{LED}$$

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Note (8) The allowable forward current of LED vary with environmental temperature (Type: Murata NCU15XH103F6SRC): :

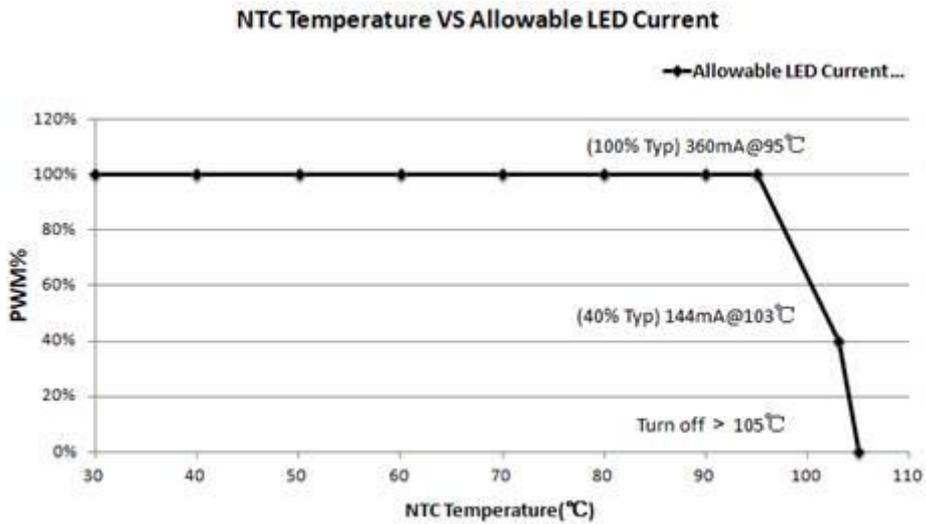


Figure 18 Backlight Current De-rating Curve

Table 9 The relationship of temperature and resistance for NTC

| Temperature/°C | Resistance/Kohm | Temperature/°C | Resistance/Kohm |
|----------------|-----------------|----------------|-----------------|
| -40 | 195.652 | 60 | 3.014 |
| -35 | 148.171 | 65 | 2.586 |
| -30 | 113.347 | 70 | 2.228 |
| -25 | 87.559 | 75 | 1.925 |

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|-----|--------|-----|-------|
| -20 | 68.237 | 80 | 1.669 |
| -15 | 53.650 | 85 | 1.452 |
| -10 | 42.506 | 90 | 1.268 |
| -5 | 33.892 | 95 | 1.110 |
| 0 | 27.219 | 100 | 0.974 |
| 5 | 22.021 | 105 | 0.858 |
| 10 | 17.926 | 110 | 0.758 |
| 15 | 14.674 | 115 | 0.672 |
| 20 | 12.081 | 120 | 0.596 |
| 25 | 10.000 | 125 | 0.531 |
| 30 | 8.315 | 130 | 0.474 |
| 35 | 6.948 | 135 | 0.424 |
| 40 | 5.834 | 140 | 0.381 |
| 45 | 4.917 | 145 | 0.342 |
| 50 | 4.161 | 150 | 0.309 |
| 55 | 3.535 | | |

| | | | | | |
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4.5 Power ON/OFF Sequence

1. Interface signals are also shown in the chart. Signals from any system shall be Hi-resistance state or low level when VCC voltage is off.
2. When system first start up, should keep the VCC high time longer than 200ms, otherwise may cause image sticking when VCC drop off.

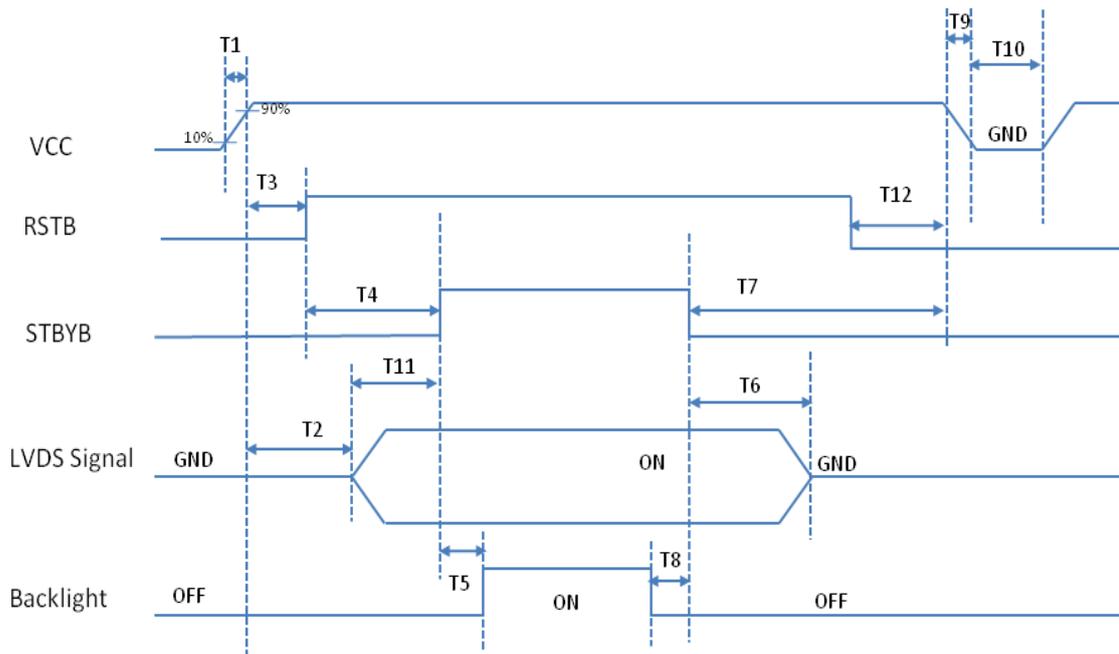


Figure 19 Power Sequence

Table 10 Power Sequencing Requirements

| Parameter | Symbol | Unit | Min. | Typ. | Max. |
|-------------------------------|--------|------|------|------|------|
| VCC Rising Time | T1 | ms | 0.5 | - | 10 |
| VCC to LVDS | T2 | ms | 0 | - | 50 |
| VCC to RSTB | T3 | us | 10 | - | - |
| RSTB to STBYB pull H | T4 | ms | 36 | - | - |
| STBYB pull H to BL power On | T5 | ms | 200 | - | - |
| BL power off to STBYB pull L | T8 | ms | 200 | - | - |
| STBYB pull L to LVDS Disable | T6 | ms | 50 | 67 | 83 |
| STBYB pull L to VCC Power off | T7 | ms | 50 | 67 | 83 |
| VCC Fall Time | T9 | ms | 0.5 | - | 30 |
| VCC Power off | T10 | s | 0.5 | 14.2 | - |

| | | | | | |
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| | | | | | |
|--------------------------------|-----|----|----|----|---|
| LVDS Enable to STBYB pull high | T11 | ms | 0 | 10 | - |
| RSTB pull L to VCC Power off | T12 | ms | 10 | - | - |

Note: IVO recommend T6, T7, T10, T11 to setting Typical value. There will be unknown risks if not.

5.0 Mechanical Characteristics

5.1 Outline Drawing

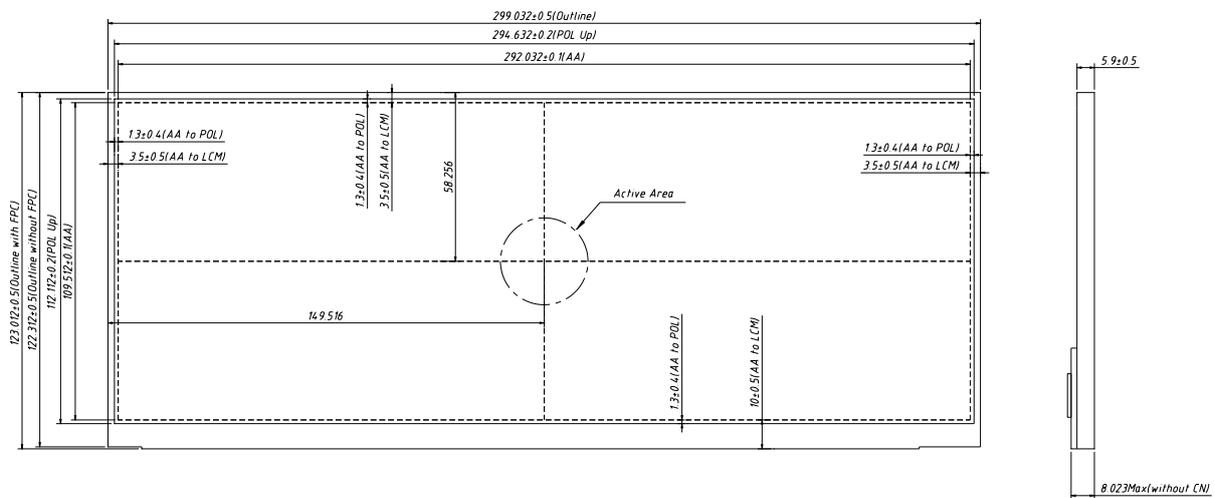
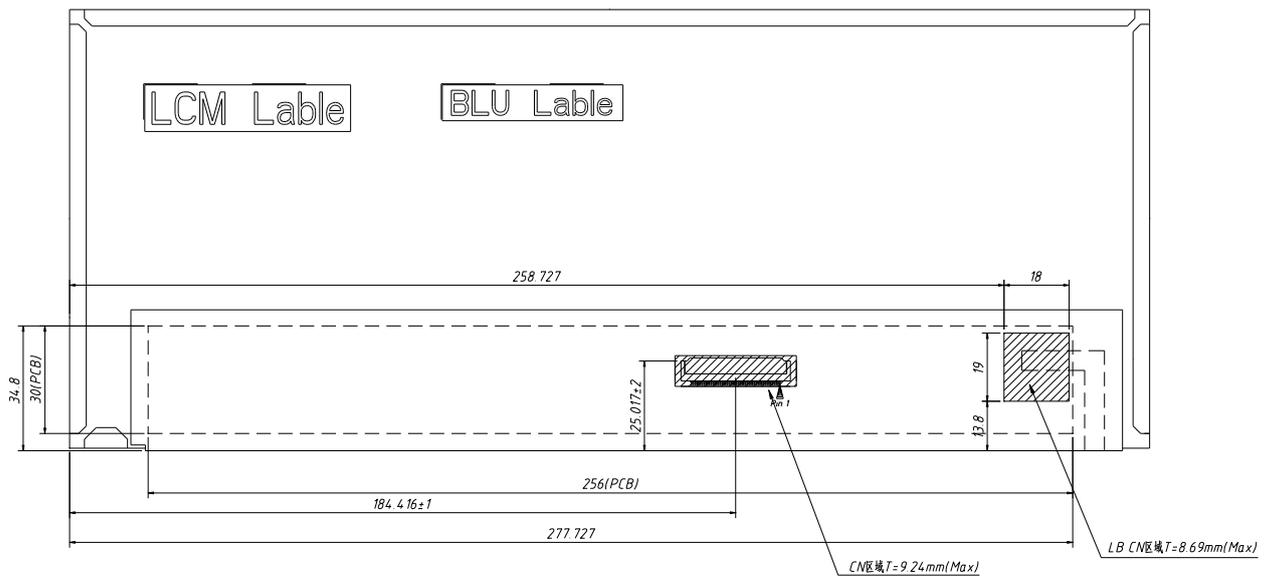


Figure 20 Reference Outline Drawing (Front Side)



Notes: Unmarked tolerance ± 0.5

Figure 21 Reference Outline Drawing (Back Side)

| | | | | | |
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5.2 Dimension Specifications

Table 11 Module Dimension Specifications

| Item | | Min. | Typ. | Max. | Unit |
|-----------|-----------|---------|---------|---------|------|
| Width | | 298.532 | 299.032 | 299.532 | mm |
| Height | | 122.512 | 123.012 | 123.512 | mm |
| Thickness | With PCBA | - | - | 8.023 | mm |
| Weight | | - | 348.5 | 380 | g |

Note: Outline dimension measure instrument: Vernier Caliper.

6.0 Reliability Conditions

Table 12 Reliability Condition

| Item | | Package | Test Conditions | | Note |
|---|-----------|---------|--|----------------------|-------------------------|
| High Temperature/High Humidity Operating Test | | Module | T _{gs} =60°C, 90%RH, 500 hours | | (1),(2),(3),(4), (7) |
| High Temperature Operating Test | | Module | T _{gs} =85°C, 500 hours | | |
| Low Temperature Operating Test | | Module | T _a =-30°C, 500 hours | | |
| High Temperature Storage Test | | Module | T _a =90°C, 500 hours | | (1),(3),(4) |
| Low Temperature Storage Test | | Module | T _a =-40°C, 500 hours | | |
| Shock Non-operating Test | | Module | 100G,6ms,sin wave,±XYZ×3times,Total 18times | | (1),(3),(5) |
| Vibration Non-operating Test | | Module | half-sine Frequency: 8Hz ~ 33Hz Stroke: 1.3mm Sweep: 2.9G 33.3Hz ~ 400Hz X,Z Cycle : 15 minutes 2 hrs for each direction of X,Z ; 4 hours for Y direction | | |
| ESD Test | Operating | Module | Contact | ±8KV, 150 pF,R=330Ω | (1),(2),(6) |
| | | | Air | ±15KV, 150pF, R=330Ω | |

Note (1) A sample can only have one test. Outward appearance, image quality and optical data can only be checked at normal conditions according to the IVO document before reliable test. Only check the function of the module after reliability test.

Note (2) The setting of electrical parameters should follow the typical value before reliability test.

Note (3) During the test, it is unaccepted to have condensate water remains. Besides, protect the module from static electricity.

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Note (4) The sample must be released for 24 hours under normal conditions before judging. Furthermore, all the judgment must be made under normal conditions. Normal conditions are defined as follow: Temperature: 25°C, Humidity: 55± 10%RH. T_a= Ambient Temperature, T_{gs}= Glass Surface Temperature.

Note (5) The module should be fixed firmly in order to avoid twisting and bending.

Note (6) It could be regarded as pass, when the module recovers from function fault caused by ESD after resetting.

Note(7) LED forward current should follow the current of LED vary with environmental temperature (Figure 18 Backlight De-rating Curve)

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7.0 Package Specification

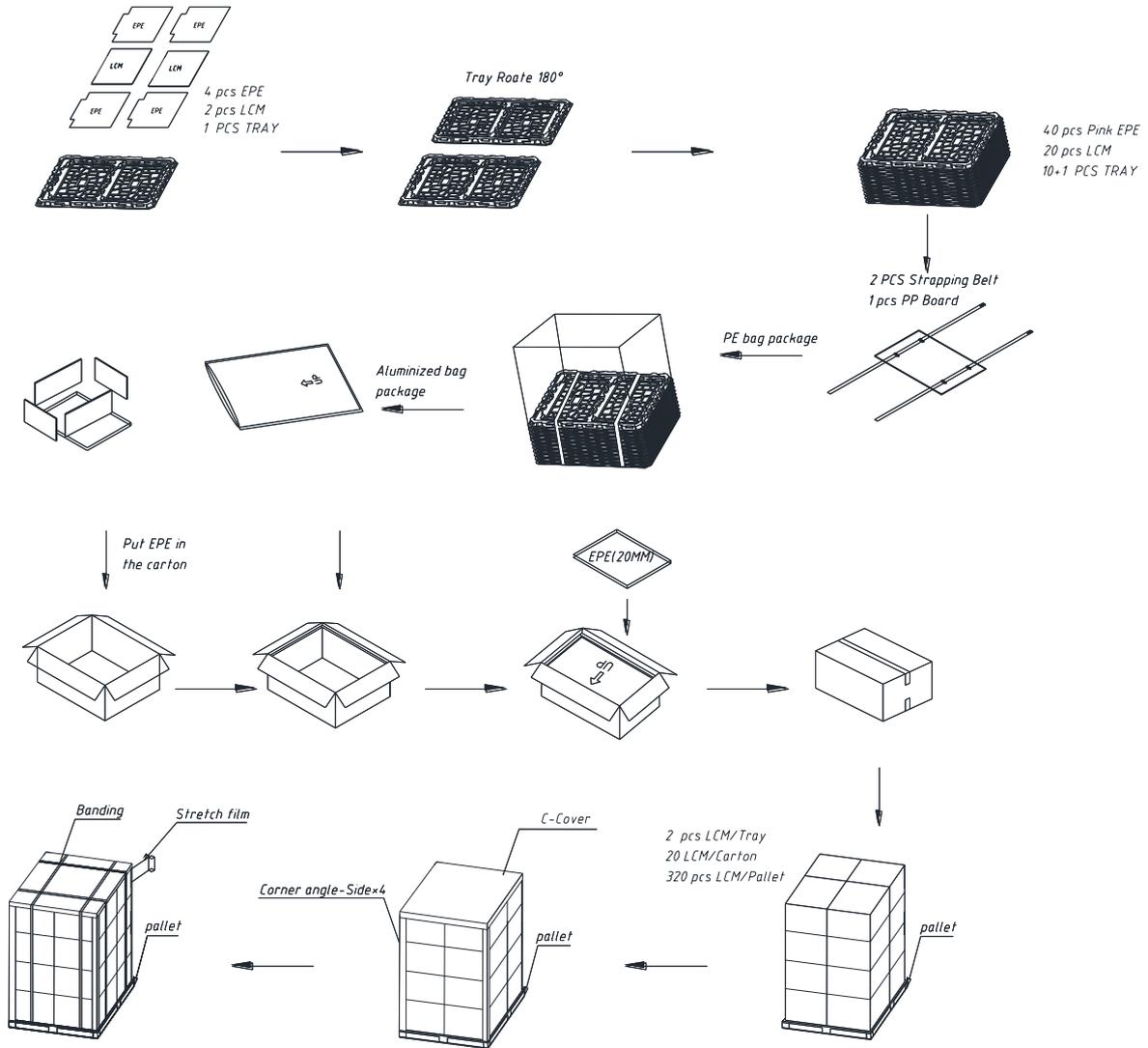


Figure 23 Packing Method

| | | | | | |
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8.0 Lot Mark

8.1 Module label



Note: This picture is only an example.

8.1.1 Lot Mark

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|

Code 1,2,4,5,6,7,8,9,10,11,16: IVO internal flow control code.

Code 3: Production Location.

Code 12: Production Year.

Code 13: Production Month.

Code 14,15: Production Day.

Code 17,18,19,20: Serial Number.

8.1.2 23 Customer Code

| | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|

Code 1,2: Manufacture District.

Code 3,4,5,6,7: IVO internal module name.

Code 8,9,10,13,16: IVO internal flow control code.

Code 11,12: Cell location Suzhou, China defined as "KS".

Code 14,15: Module location Kunshan, China defined as "KS"; Yangzhou, China defined as "YZ"; Shenzhen, China defined as "SE"; Zhuhai, China defined as "ZH"; Suzhou, China defined as "SZ".

Code 17,18,19 : Year, Month, Day refer to Note(1), Note(2) and Note(3).

Note (1) Production Year

| | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|-------|------|
| Year | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | | 2035 |
| Mark | 6 | 7 | 8 | 9 | A | B | C | D | | Z |

Note (2) Production Month

| | | | | | |
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| | | | | | | | | | | | | |
|-------|------|------|------|------|------|------|------|------|------|-----|------|------|
| Month | Jan. | Feb. | Mar. | Apr. | May. | Jun. | Jul. | Aug. | Sep. | Oct | Nov. | Dec. |
| Mark | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C |

Note (3) Production Day: 1~V.

Code 20~23 : Serial Number.

8.2 Carton label

| | | |
|----|-------------|--|
| 型號 | (Module) | M123AWF4 R2 |
| 版本 | (Rev.) | HW 1.1 FW 0.0 |
| 數量 | (QTY) | 20PCS / Carton |
| 重量 | (Weight) | 10.990kg |
| 箱號 | (Carton ID) | S211E10K2ZJ60500007 |
| | |  |
| 備註 | (Remark) | E10Z000124 ZB |

Note: This picture is only an example.

9.0 General Precaution

9.1 Using Restriction

This product is not authorized for using in life supporting systems, aircraft navigation control systems, military systems and any other appliance where performance failure could be life-threatening or lead to be catastrophic.

9.2 Operation Precaution

(1)The LCD product should be operated under normal conditions.

Normal conditions are defined as below:

Temperature: 25°C

Humidity: 55±10%

Display pattern: continually changing pattern (Not stationary)

(2) Brightness and response time depend on the temperature. (It needs more time to reach normal brightness in low temperature.)

(3) It is necessary for you to pay attention to condensation when the ambient temperature drops suddenly. Condensate water would damage the polarizer and electrical contacted parts of the module. Besides, smear or spot will remain after condensate water evaporating.

(4) If the absolute maximum rating value was exceeded, it may damage the module.

(5) Do not adjust the variable resistor located on the module.

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- (6) Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding may be important to minimize the interference.
- (7) Image sticking may occur when the module displayed the same pattern for long time.
- (8) Do not connect or disconnect the module in the “power on” condition. Power supply should always be turned on/off by the “power on/off sequence”
- (9) Ultra-violet ray filter is necessary for outdoor operation.

9.3 Mounting Precaution

- (1) All the operators should be electrically grounded and with Ion-blown equipment turning on when mounting or handling. Dressing finger-stalls out of the gloves is important for keeping the panel clean during the incoming inspection and the process of assembly.
- (2) It is unacceptable that the material of cover case contains acetic or chloric. Besides, any other material that could generate corrosive gas or cause circuit break by electro-chemical reaction is not desirable.
- (3) The case on which a module is mounted should have sufficient strength so that external force is not transmitted to the module directly.
- (4) It is obvious that you should adopt radiation structure to satisfy the temperature specification.
- (5) So as to acquire higher luminance, the cable of the power supply should be connected directly with a minimize length.
- (6) It should be attached to the system tightly by using all holes for mounting, when the module is assembled. Be careful not to apply uneven force to the module, especially to the PCB on the back.
- (7) A transparent protective film needs to be attached to the surface of the module.
- (8) Do not press or scratch the polarizer exposed with anything harder than HB pencil lead. In addition, don't touch the pin exposed with bare hands directly.
- (9) Clean the polarizer gently with absorbent cotton or soft cloth when it is dirty.
- (10) Wipe off saliva or water droplet as soon as possible. Otherwise, it may cause deformation and fading of color.
- (11) Clean the panel gently with absorbent cotton or soft cloth when it is dirty. Ethanol(C_2H_5OH) is allowed to be used. Ketone (ex. Acetone), Toluene, Ethyl acid, Methyl chloride, etc are not allowed to be used for cleaning the panel, which might react with the polarizer to cause permanent damage.
- (12) Do not disassemble or modify the module. It may damage sensitive parts in the LCD module, and cause scratches or dust remains. IVO does not warrant the module, if you disassemble or modify the module.

9.4 Handling Precaution

- (1) Static electricity will generate between the film and polarizer, when the protection film is peeled off. It should be peeled off slowly and carefully by operators who are electrically grounded and with Ion-blown equipment turning on. Besides, it is recommended to peel off the film from the bonding

| | | | | | |
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area.

(2) The protection film is attached to the polarizer with a small amount of glue. When the module with protection film attached is stored for a long time, a little glue may remain after peeling.

(3) If the liquid crystal material leaks from the panel, keep it away from the eyes and mouth. In case of contact with hands, legs or clothes, it must be clean with soap thoroughly.

9.5 Storage Precaution

When storing modules as spares for long time, the following precautions must be executed.

(1) Store them in a dark place. Do not expose to sunlight or fluorescent light. Keep the temperature between 5°C and 35°C at normal humidity.

(2) The polarizer surface should not come in contact with any other object. It is recommended that they be stored in the container in which they were shipped.

(3) It is recommended to use it in a short-time period, after it's unpacked. Otherwise, we would not guarantee the quality.

9.6 Others

When disposing LCD module, obey the local environmental regulations.