# Customer Approved Specification

**To:** 苏州与来视讯科技有限公司

**Product Name: M080AWT8 R1**

**Document Issue Date: 2022/08/29**

| Customer | InfoVision Optoelectronics |
|---|---|
| **SIGNATURE**<br><br>_____<br><br>_____<br><br>_____<br><br>Please return 1 copy for your confirmation with your signature and comments. | **SIGNATURE**<br><br>**REVIEWED BY CQM**<br><br>_____<br><br>**PREPARED BY FAE**<br><br>_____ |

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| Revision | Date | Page | Revised Content/Summary | Remark |
|---|---|---|---|---|
| 00 | 2022/08/29 | -- | First issued. | |
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## 1.0 General Descriptions

### 1.1 Introduction

The M080AWT8 R1 is a color active matrix liquid crystal display with a backlight system. The matrix uses a-Si Thin Film Transistor as a switching device. This TFT LCD has a 8.0 inch diagonally measured active display area with WSVGA resolution (1,024 horizontal by 600 vertical pixels array).

### 1.2 Features

- ■ Supported WSVGA Resolution
- ■ LVDS Interface
- ■ Compatible with RoHS Standard

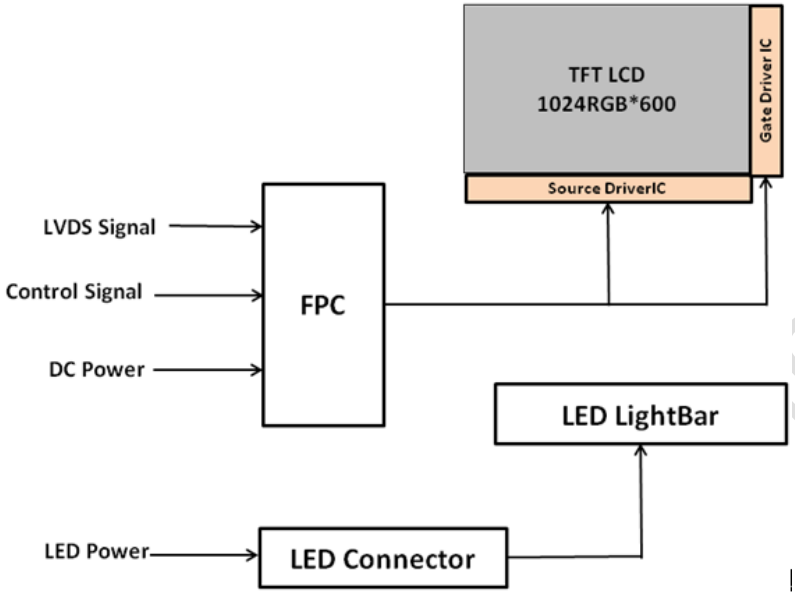
### 1.3 Product Summary

| Items | Specifications | Unit |
|---|---|---|
| Screen Diagonal | 8.0 | inch |
| Active Area (H x V) | 176.64 x 99.36 | mm |
| Number of Pixels (H x V) | 1,024 x 600 | - |
| Pixel Pitch (H x V) | 0.1725 x 0.1656 | mm |
| Pixel Arrangement | R.G.B. Vertical Stripe | - |
| Display Mode | Normally White | - |
| White Luminance☆ | 670(Typ.) | cd /$m^2$ |
| Contrast Ratio ☆ | 800 (Typ.) | - |
| Response Time | 16 (Typ.) 25(Max) | ms |
| Input Voltage | 3.3 (Typ.) | V |
| Power Consumption | 4.6 (Max.) @Black Pattern, FV=60Hz | W |
| Weight | 240 (Max.) | g |
| Outline Dimension (H x V x D) | 192.8(Typ.) x 116.9(Typ.) x 6.6(Max.) | mm |
| Electrical Interface (Logic) | LVDS | - |
| Support Color | 16.7M | - |
| NTSC | 72 (Typ.) | % |
| Viewing Direction | 6 O'clock | - |
| Surface Treatment | Anti-glare | - |

### 1.4 Functional Block Diagram

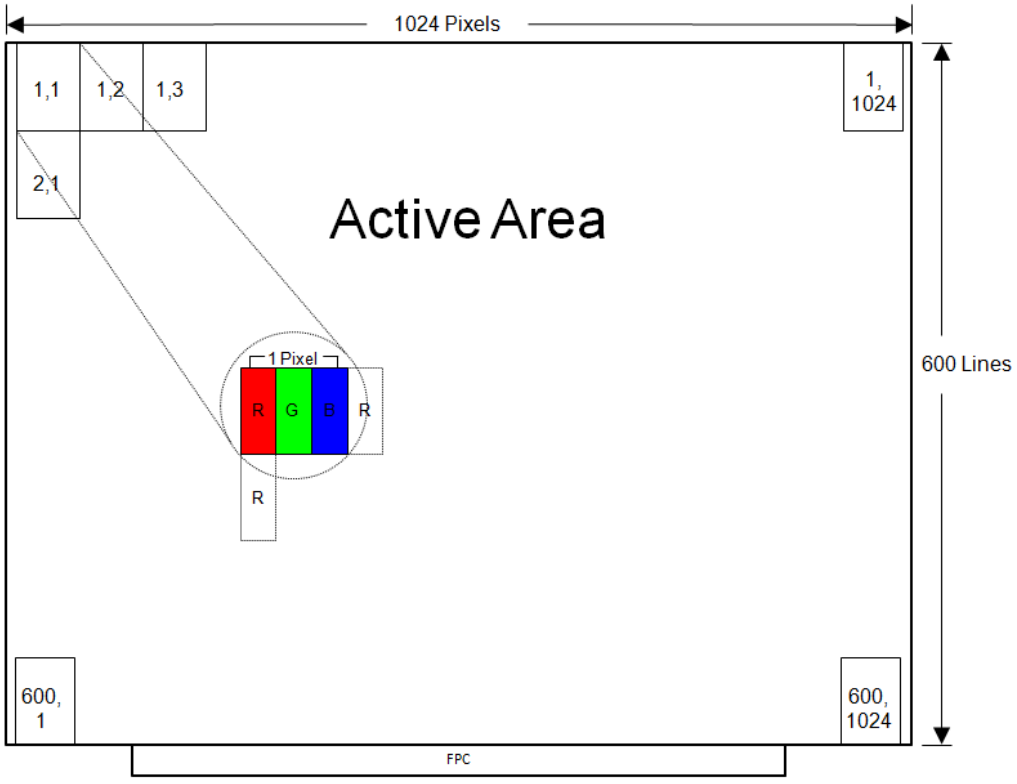
Figure 1 shows the functional block diagram of the LCD module.

**Figure 1 Block Diagram**




### 1.5 Pixel Mapping

**Figure2 Pixel Mapping**



## 2.0 Absolute Maximum Ratings

**Table 1 Electrical & Environment Absolute Rating**

| Item | Symbol | Min. | Max. | Unit | Note |
|---|---|---|---|---|---|
| Digital Supply Voltage | $V_{DD}$ | -0.5 | 3.9 | V | (1),(2) (3),(4) |
| Logic Input Signal Voltage | $V_{Signal}$ | -0.5 | 3.9 | V | |
| Operating Temperature | $T_{gs}$ | -30 | 85 | ℃ | |
| Storage Temperature | $T_a$ | -40 | 90 | ℃ | |

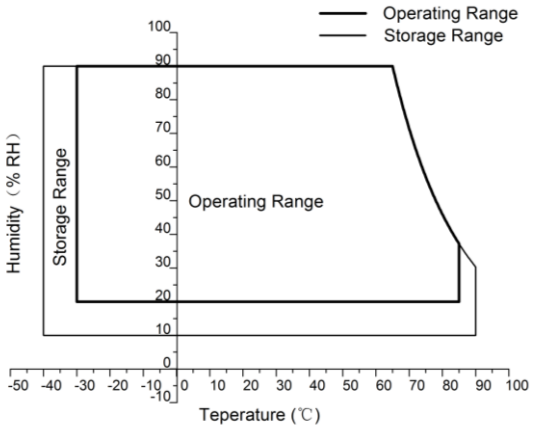
Note (1) All the parameters specified in the table are absolute maximum rating values that may cause faulty operation or unrecoverable damage, if exceeded. It is recommended to follow the typical value.

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℃, 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 62.7℃, and no condensation of water. Besides, protect the module from static electricity.

**Absolute Ratings of Environment of the LCD Module**



### 3.0 Optical Characteristics

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

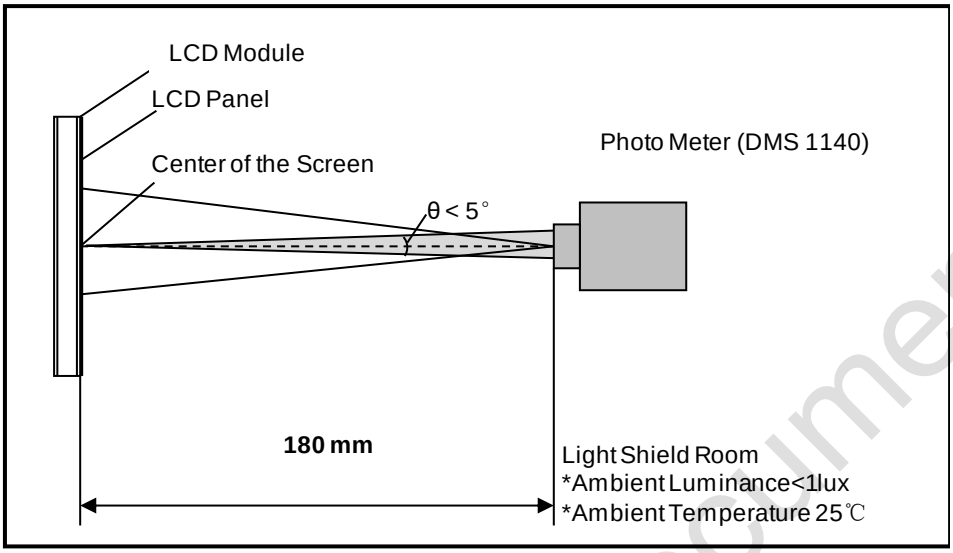
**Table 2 Optical Characteristics**

| Item | Conditions | | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|---|
| Viewing Angle ( CR≥10 ) ☆ | Horizontal | $\theta_{x+}$ | 65 | 75 | - | degree | (1),(2),(3),(4),(7) |
| | | $\theta_{x-}$ | 65 | 75 | - | | |
| | Vertical | $\theta_{y+}$ | 60 | 70 | - | | |
| | | $\theta_{y-}$ | 65 | 75 | - | | |
| Contrast Ratio ☆ | Center | | 600 | 800 | - | - | (1),(2),(4),(7) θx=θy=0° |
| Response Time | Rising + Falling | | - | 16 | 25 | ms | (1),(2),(5),(7) θx=θy=0° |
| Color Chromaticity (CIE1931) ☆ | Red x | | Typ. -0.04 | 0.630 | Typ. +0.04 | - | (1),(2),(3),(7) θx=θy=0° |
| | Red y | | | 0.358 | | - | |
| | Green x | | | 0.302 | | - | |
| | Green y | | | 0.641 | | - | |
| | Blue x | | | 0.150 | | - | |
| | Blue y | | | 0.059 | | - | |
| | White x | | | 0.315 | | - | |
| | White y | | | 0.335 | | - | |
| NTSC | - | | 67 | 72 | - | % | (1),(2),(3),(7) θx=θy=0° |
| White Luminance☆ | Center Point | | 550 | 670 | - | $cd/m^2$ | (1),(2),(7) θx=θy=0° |
| Luminance Uniformity | 9 Points | | 75 | 80 | - | % | (1),(2),(6),(7) θx=θy=0° |

Note (1) Measurement Setup:

The LCD module should be stabilized at given temperature (25℃) for 30 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 30 minutes in a windless room.

**Figure 3 Measurement Setup**

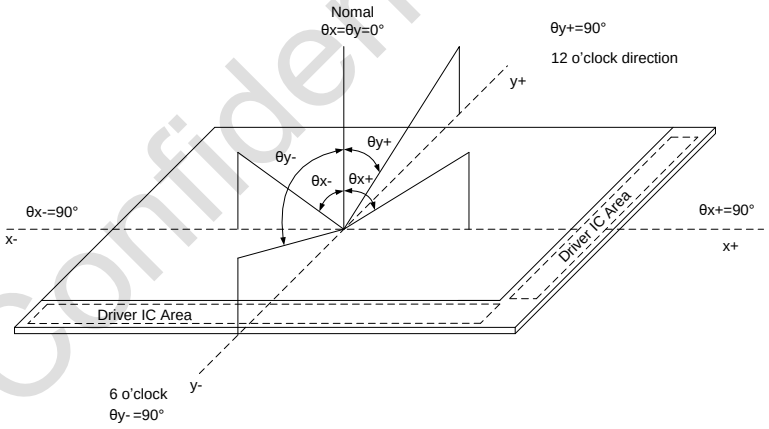



Note (2) The LED input parameter setting as:

I_LED: 420mA

Note (3) Definition of Viewing Angle

**Figure 4 Definition of Viewing Angle**



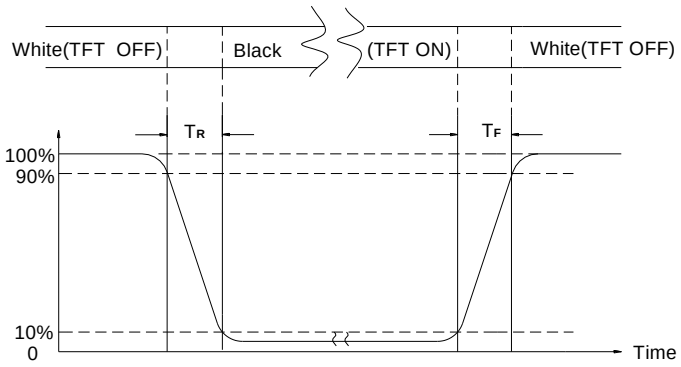

Note (4) Definition of Contrast Ratio (CR)

The contrast ratio can be calculated by the following expression:

Contrast Ratio (CR) = The luminance of White pattern/ The luminance of Black pattern

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

**Figure 5 Definition of Response Time**



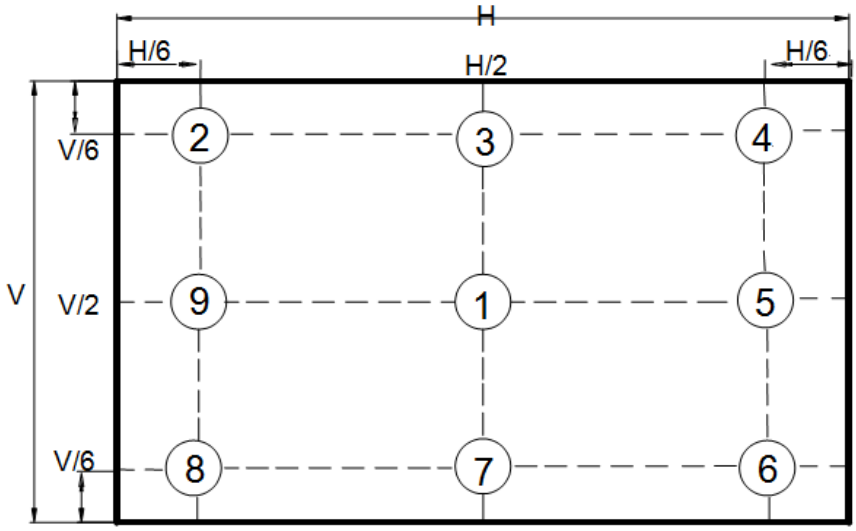

Note (6) Definition of Luminance Uniformity (Ref.: Active Area)

Measure the luminance of White pattern at 9 points.

Luminance Uniformity= Min.(L1, L2, ... L9) / Max.(L1, L2, ... L9)

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

**Figure 6 Measurement Locations of 9 Points**




Note (7) All optical data based on IVO given system & nominal parameter & testing machine in this document.

## 4.0 Electrical Characteristics

### 4.1 Interface Connector

**Table 3 Signal Connector Type**

| Item | Description |
|---|---|
| Manufacturer/Type | AORORA:F32D-1A7Y-21040 |

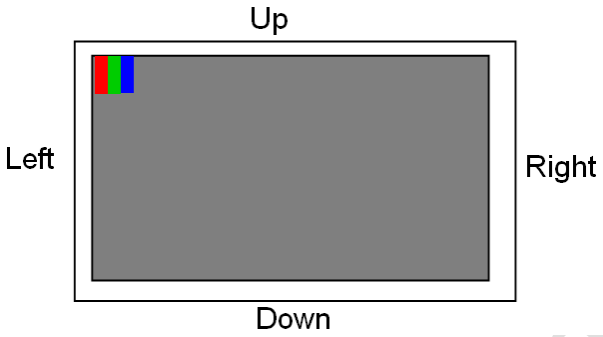
**Table 4 Signal Connector Pin Assignment**

| Pin No. | Symbol | Description | Remarks |
|---|---|---|---|
| 1 | VCOM | Common voltage | - |
| 2 | DVDD | Digital power | - |
| 3 | DVDD | Digital power | - |
| 4 | NC | Not connect | |
| 5 | RESRT | Global reset pin. Active low to enter reset state.<br>Suggest to connecting with an RC reset circuit for stability.<br>Normally pull high.(R=10kΩ,C=1uF) | - |
| 6 | STBYB | Standby mode ,normally pull high<br>STBYB ="1",normal operation<br>STBYB ="0",timing control ,source driver will turn off, all output are high-Z | - |
| 7 | GND | Ground | - |
| 8 | NIND0 | Negative LVDS differential data input | - |
| 9 | PIND0 | Positive LVDS differential data input | - |
| 10 | GND | Ground | - |
| 11 | NIND1 | Negative LVDS differential data input | - |
| 12 | PIND1 | Positive LVDS differential data input | - |
| 13 | GND | Ground | - |
| 14 | NIND2 | Negative LVDS differential data input | - |
| 15 | PIND2 | Positive LVDS differential data input | - |
| 16 | GND | Ground | - |
| 17 | NINC | Negative LVDS differential clock input | - |
| 18 | PINC | Positive LVDS differential clock input | - |

| | | | |
|---|---|---|---|
| 19 | GND | Ground | - |
| 20 | NIND3 | Negative LVDS differential data input | - |
| 21 | PIND3 | Positive LVDS differential data input | - |
| 22 | GND | Ground | - |
| 23 | NC | Not connect | - |
| 24 | NC | Not connect | - |
| 25 | GND | Ground | - |
| 26 | NC | Not connect | - |
| 27 | NC | Not connect | - |
| 28 | SELB | LVDS input data is 8 bits, SELB set to low | - |
| 29 | AVDD | Power for Analog Circuit | - |
| 30 | GND | Ground | - |
| 31 | NC | Not connect | - |
| 32 | NC | Not connect | - |
| 33 | SHLR | Horizontal inversion | Note1 |
| 34 | UPDN | Vertical inversion | Note1 |
| 35 | VGL | Negative power for TFT | - |
| 36 | NC | Not connect | - |
| 37 | NC | Not connect | - |
| 38 | VGH | Positive power for TFT | - |
| 39 | NC | Not connect | - |
| 40 | Bist | Normal operation/BIST pattern select. Normally pull low.<br>When BIST=H: BIST. (CLK input is not needed.)<br>When BIST=L: Normal operation. (Default) | System without the need to signal |

Note1：UPDN and SHLR control function

| SHLR | UPDN | Data shifting |
|---|---|---|
| DVDD | GND | Left→Right，Up→Down(default) |
| GND | GND | Right→Left，Up→Down |
| DVDD | DVDD | Left→Right，Down→Up |
| GND | DVDD | Right→Left，Down→Up |




**Power Supply Voltage**

| Item | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|
| Avdd | 10.8 | 11.0 | 11.2 | V |
| Vcom | 4.0 | 4.2 | 4.4 | V |
| VGH | 19 | 20 | 21 | V |
| VGL | -7.8 | -6.8 | -5.8 | V |

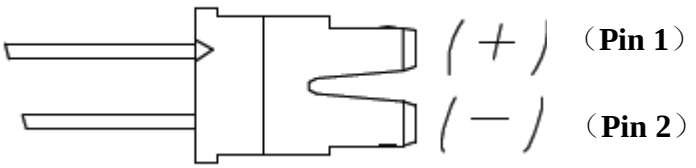
**Table 5 LED Connector Name / Designation**

| Item | Description |
|---|---|
| Manufacturer / Type | JST/BHSR-02VS-1 |
| Mating Receptacle / Type (Reference) | JST/SMO2B-BHSS-1 or Compatible |

**Table 6 LED Connector Pin Assignment**

| Pin No. | Symbol | Description | Remarks |
|---|---|---|---|
| 1 | A | Anode | - |
| 2 | K | Cathode | - |

**Figure 7 LED Connector**



### 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 7 LVDS Receiver Electrical Characteristics**

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|---|---|---|---|---|---|---|
| Differential Input High Threshold | Vth | - | - | +100 | mV | $V_{CM}$=+1.2V |
| Differential Input Low Threshold | Vtl | -100 | - | - | mV | $V_{CM}$=+1.2V |
| Magnitude Differential Input Voltage | $\|V_{ID}\|$ | 200 | - | 600 | mV | - |
| Common Mode Voltage | $V_{CM}$ | 1.0 | 1.2 | 1.4 | V | $V_{th}$- $V_{tl}$ |
| Common Mode Voltage Offset | $\Delta V_{CM}$ | -50 | - | +50 | mV | $V_{th}$- $V_{tl}$ |

Note (1) Input signals shall be low or Hi- resistance state when VDD 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**

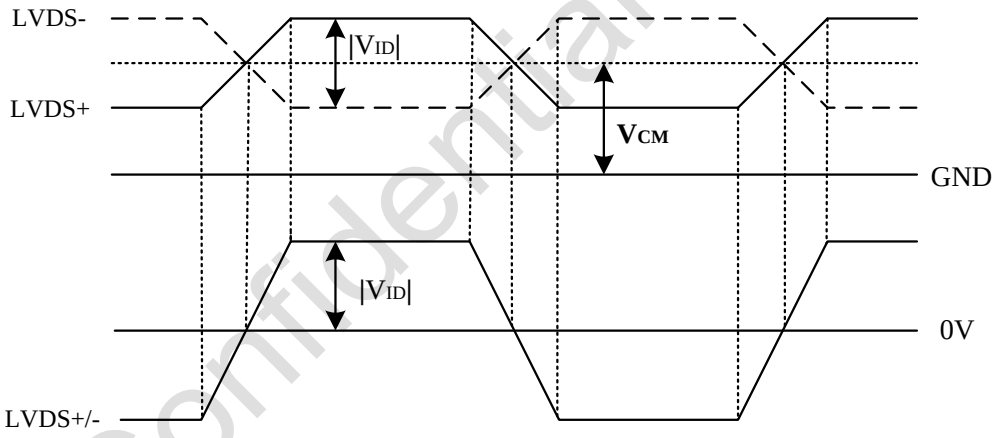


**Figure 9 Measurement System**

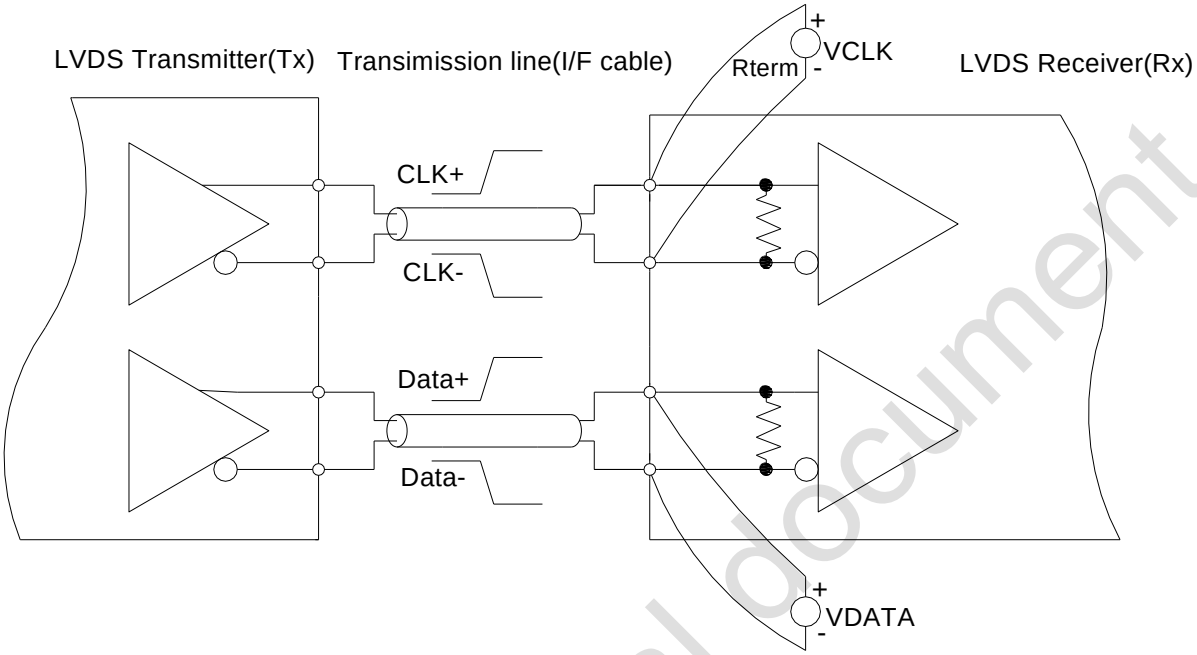
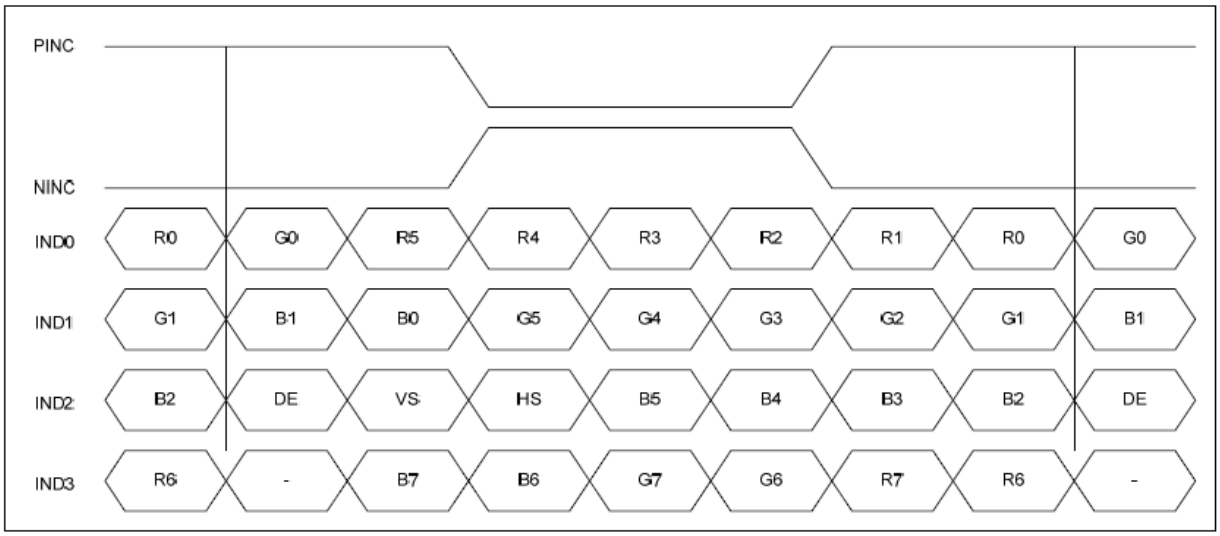



**Figure 10 Data Mapping**

Single 8 bit LVDS input

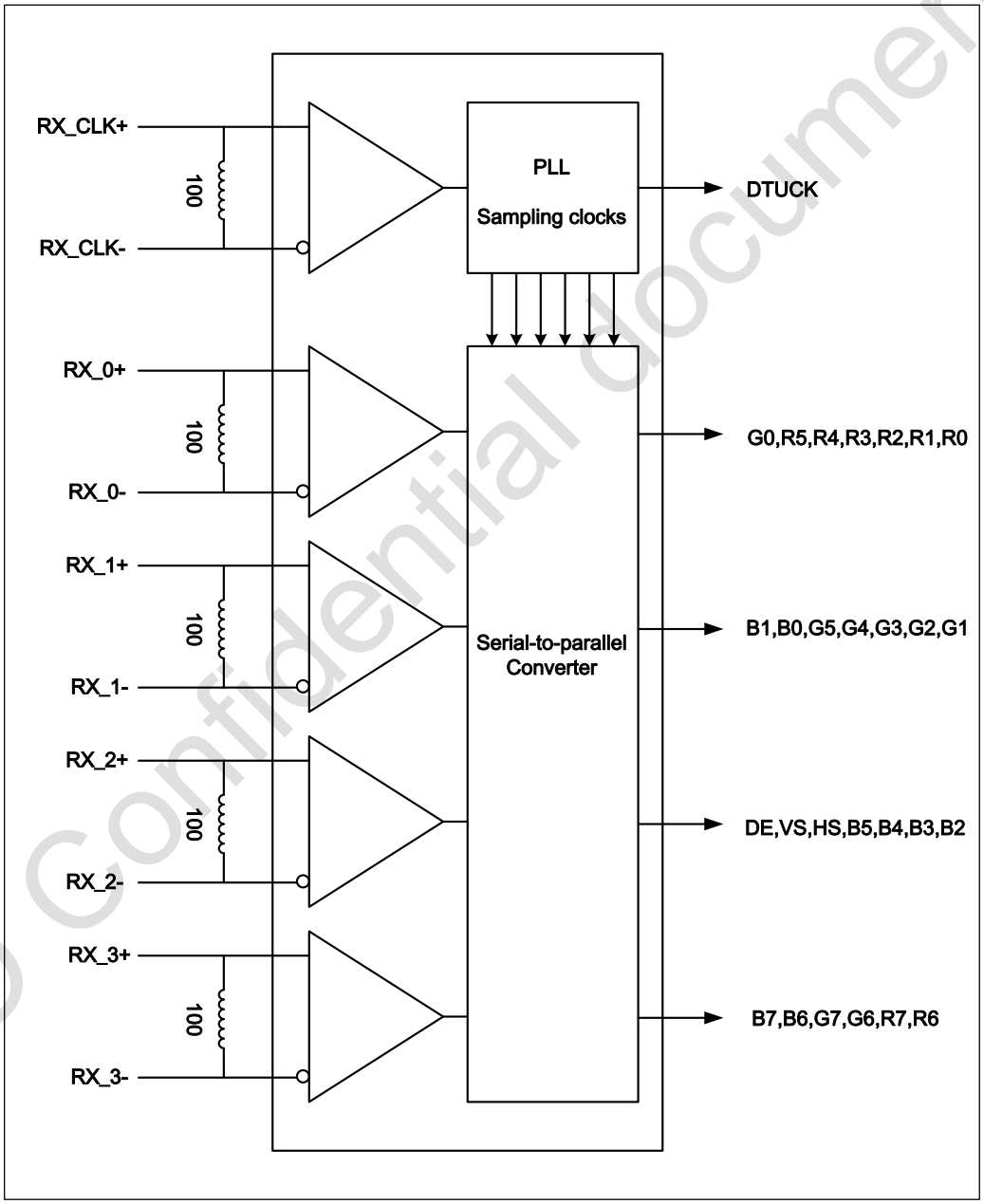


4.2.2 LVDS Receiver Internal Circuit

Figure 12 shows the internal block diagram of the LVDS receiver. This LCD module equips termination resistors for LVDS link.

**Figure 11 LVDS Receiver Internal Circuit**

8bit



### 4.3 Interface Timings

**Table 8 Interface Timings**

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| LVDS Clock Frequency | fdck | 41.4 | 51.2 | 57 | MHz |
| H Total Time | Thp | 1,324 | 1,344 | 1,364 | Clocks |
| H Active Time | HA | | 1,024 | | Clocks |
| H Blanking Time | $TH_{Blank}$ | 300 | 320 | 340 | Clocks |
| V Total Time | Tvp | 625 | 635 | 645 | Lines |
| V Active Time | VA | | 600 | | Lines |
| V Blanking Time | $TV_{Blank}$ | 25 | 35 | 45 | Clocks |
| Frame Rate | Fv | 50 | 60 | 65 | Hz |

Note1：HT * VT *Frame Frequency≤57 MHz

Note2: All reliabilities are specified for timing specification based on refresh rate of 60Hz. However, M080AWT8 R1 has a good actual performance even at lower refresh rate (e.g. 50Hz) for power saving mode, whereas M080AWT8 R1 is secured only for function under lower refresh rate; 60Hz at Normal mode, 50Hz at Power save mode. Don't care flicker level（power save mode）

### 4.4 Input Power Specifications

Input power specifications are as follows.

**Table 9 Input Power Specifications**

| Parameter | | Symbol | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|---|
| **System Power Supply** | | | | | | | |
| LCD Drive Voltage (Logic) | | $D_{VDD}$ | 3.0 | 3.3 | 3.6 | V | (1),(2) |
| VDD Current | Black Pattern | $I_{DD}$ | - | - | 0.09 | A | (1),(3) |
| VDD Power Consumption | Black Pattern | $P_{DD}$ | - | - | 0.30 | W | |
| Rush Current | | $I_{Rush}$ | - | - | 1.5 | A | (1) ,(4) |
| Allowable Logic/LCD Drive Ripple Voltage | | $V_{VDD-RP}$ | - | - | 200 | mV | (1),(3) |
| **LED Power Supply** | | | | | | | |
| LED Input Voltage | | $V_{LED}$ | 8.4 | 9.6 | 10.2 | V | (1),(2),(7) |
| LED Power Consumption | | $P_{LED}$ | - | - | 4.3 | W | (1),(5),(7) |
| LED Forward Voltage | | $V_F$ | 2.8 | 3.2 | 3.4 | V | (1),(2) |
| LED Forward Current | | $I_F$ | - | 60 | - | mA | |
| LED Life Time | | LT | 30,000 | - | - | Hours | (1),(6) |

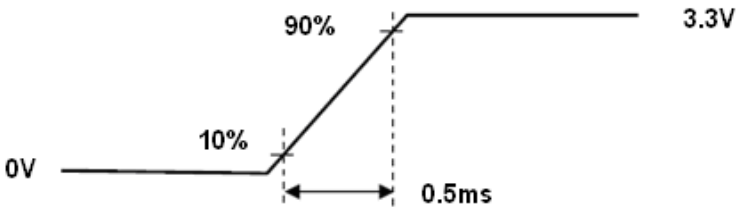
Note (1) All of the specifications are guaranteed under normal conditions. Normal conditions are defined as follow: Temperature: 25℃, Humidity: 55± 10%RH.

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 $V_{DD}$ current and power consumption are measured under the $V_{DD}$ = 3.3 V, $F_V$ = 60 Hz condition and Black pattern.

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

**Figure 12 VDD Rising Time**

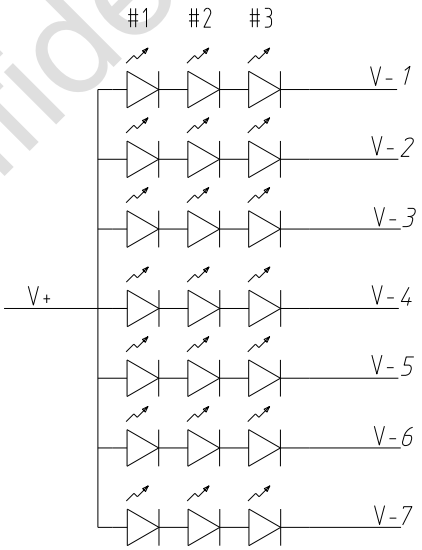



Note (5) The power consumption of LED Driver are under the $V_{LED}$ = 10.2V, Dimming of Max luminance.

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 VLED and PLED

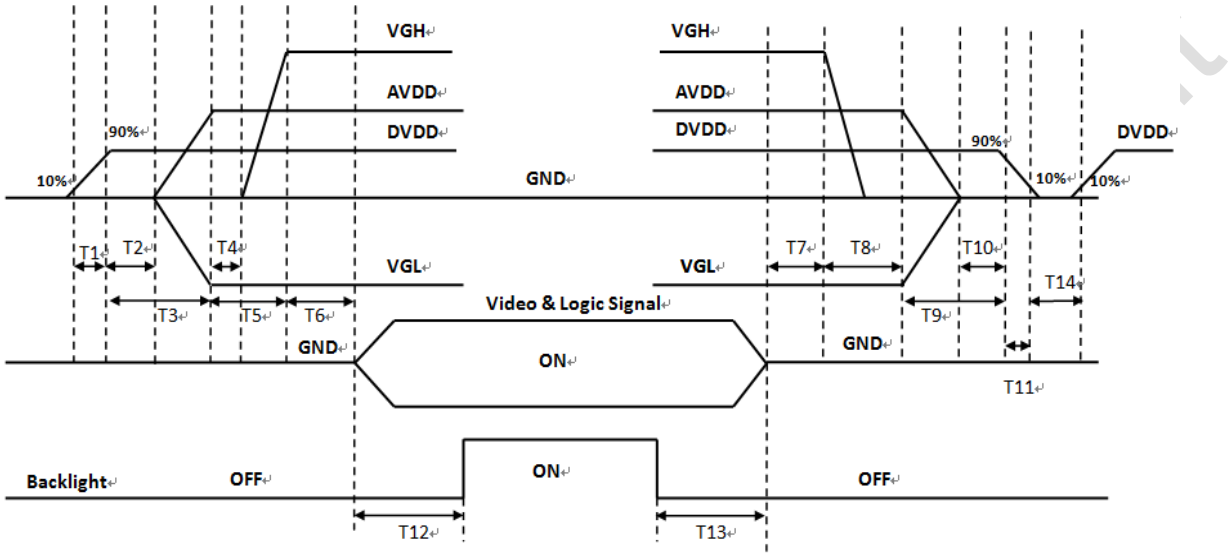
VLED =VF×3, ILED =IF×7, PLED = VLED×ILED



### 4.5 Power ON/OFF Sequence

Interface signals are also shown in the chart. Signals from any system shall be Hi- resistance state or low level when VDD voltage is off.

**Figure 13 Power Sequence**




Power On: DVDD→AVDD/VGL→VGH→Video & Logic Signal→Backlight

Power Off: Backlight→ Video & Logic Signal→ VGH→ AVDD/VGL→ DVDD

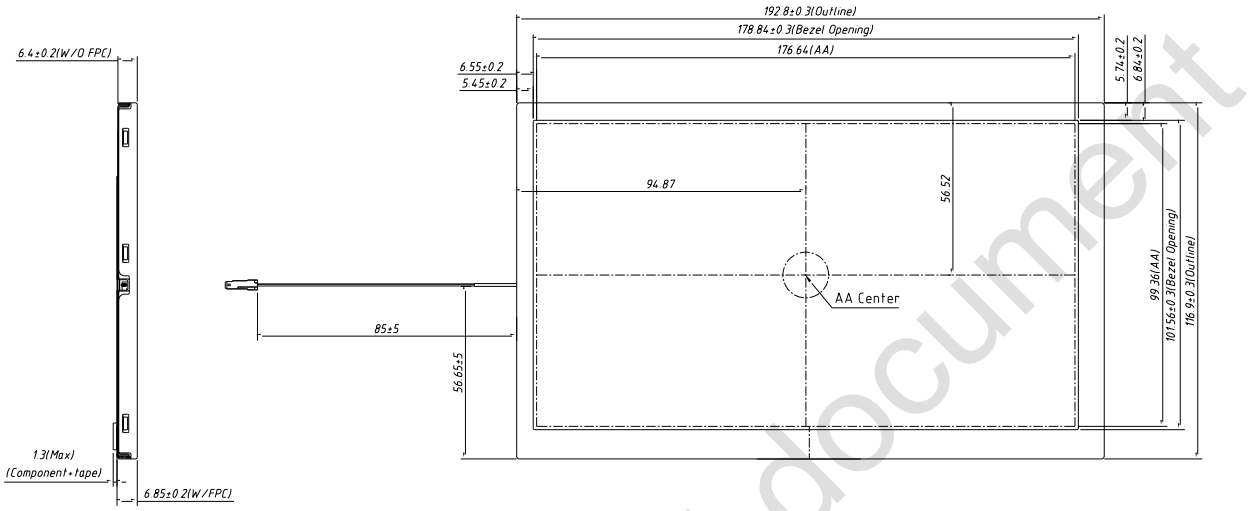
**Table 10 Power Sequencing Requirements**

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| DVDD Rising Time from 10% to 90% | T1 | 0.5 | - | 10 | ms |
| DVDD Good to AVDD/VGL On | T2 | 0 | - | - | ms |
| DVDD Good to AVDD/VGL Good | T3 | 20 | - | - | ms |
| AVDD/VGL Good to VGH On | T4 | 0 | - | - | ms |
| AVDD/VGL Good to VGH Good | T5 | 10 | - | - | ms |
| VGH Good to Signal Valid | T6 | 0 | - | 10 | ms |
| Signal Disable to VGH Down | T7 | 0 | - | 50 | ms |
| VGH Down to AVDD/VGL Down | T8 | 0 | - | 50 | ms |
| AVDD/VGL Down to DVDD Down | T9 | 0 | - | - | ms |
| AVDD/VGL Off to DVDD Down | T10 | 0 | - | - | ms |
| DVDD Falling Time | T11 | 0 | - | 10 | ms |
| Signal Valid to Backlight Power On | T12 | 200 | - | - | ms |
| Backlight Power Off to Signal disable | T13 | 200 | - | - | ms |
| Power Off Time | T14 | 500 | - | - | ms |

## 5.0 Mechanical Characteristics

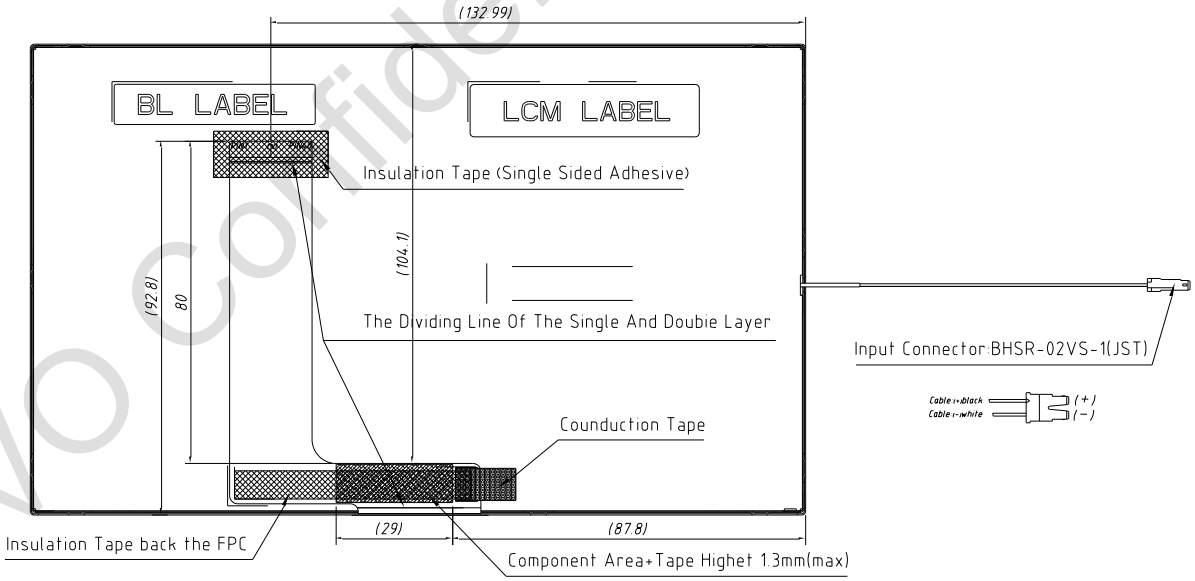
### 5.1 Outline Drawing

**Figure 14 Reference Outline Drawing (Front Side)**

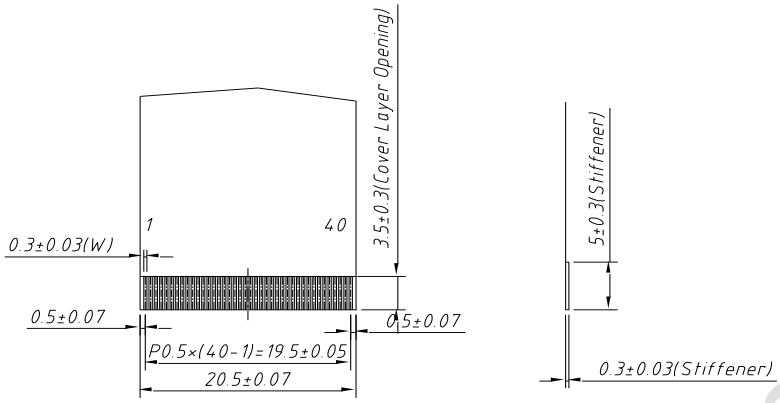



**Note 1: Unnoted tolerance ±0.3**

**Figure 15 Reference Outline Drawing (Back Side)**




Unit:mm



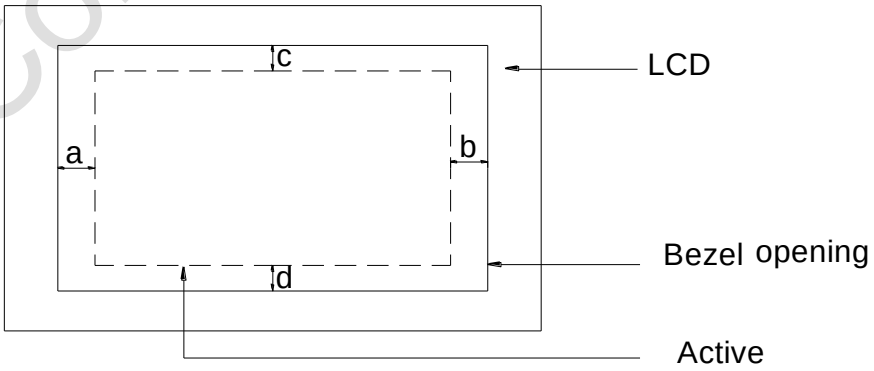

CN1 Detail

### 5.2 Dimension Specifications

**Table 11 Module Dimension Specifications**

| Item | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|
| Width | 192.5 | 192.8 | 193.1 | mm |
| Height | 116.6 | 116.9 | 117.2 | mm |
| Thickness | 6.2 | 6.4 | 6.6 | mm |
| Weight | - | - | 240 | g |
| BM: \| a-b \| & \| c-d \| | - | - | 1.0 | mm |

**Figure 16 BM Area**



## 6.0 Reliability Conditions

| Item | | Package | Test Conditions | | Note |
|---|---|---|---|---|---|
| High Temperature Operating Test | | Module | $T_{gs}$=85℃, 500 hours | | (1),(2),(3),(4) |
| Low Temperature Operating Test | | Module | $T_a$=-30℃, 500 hours | | (1),(2),(3),(4) |
| High Temperature Storage Test | | Module | $T_a$=90℃,500 hours | | (1),(3),(4) |
| Low Temperature Storage Test | | Module | $T_a$=-40℃, 500 hours | | (1),(3),(4) |
| High Temperature/High Humidity Operating Test | | Module | $T_{gs}$=65℃, 90%RH, 500 hours | | (1),(2),(3),(4) |
| High Temperature/High Humidity Storage Test | | Module | $T_a$=65℃, 90%RH, 500 hours | | (1),(3),(4) |
| Thermal Shock Storage | | Module | $T_a$=-40°(0.5hr)~85°(0.5hr)C/200cycles; | | (1),(3),(4), Meet the system reaches 615cycles |
| ESD Test | Operating | Module | Contact | ±8KV,150pF(330Ohm)(Class B) | (1),(2),(6) |
| | | | Air | ±15KV,150pF(330Ohm)(ClassB) | |

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.

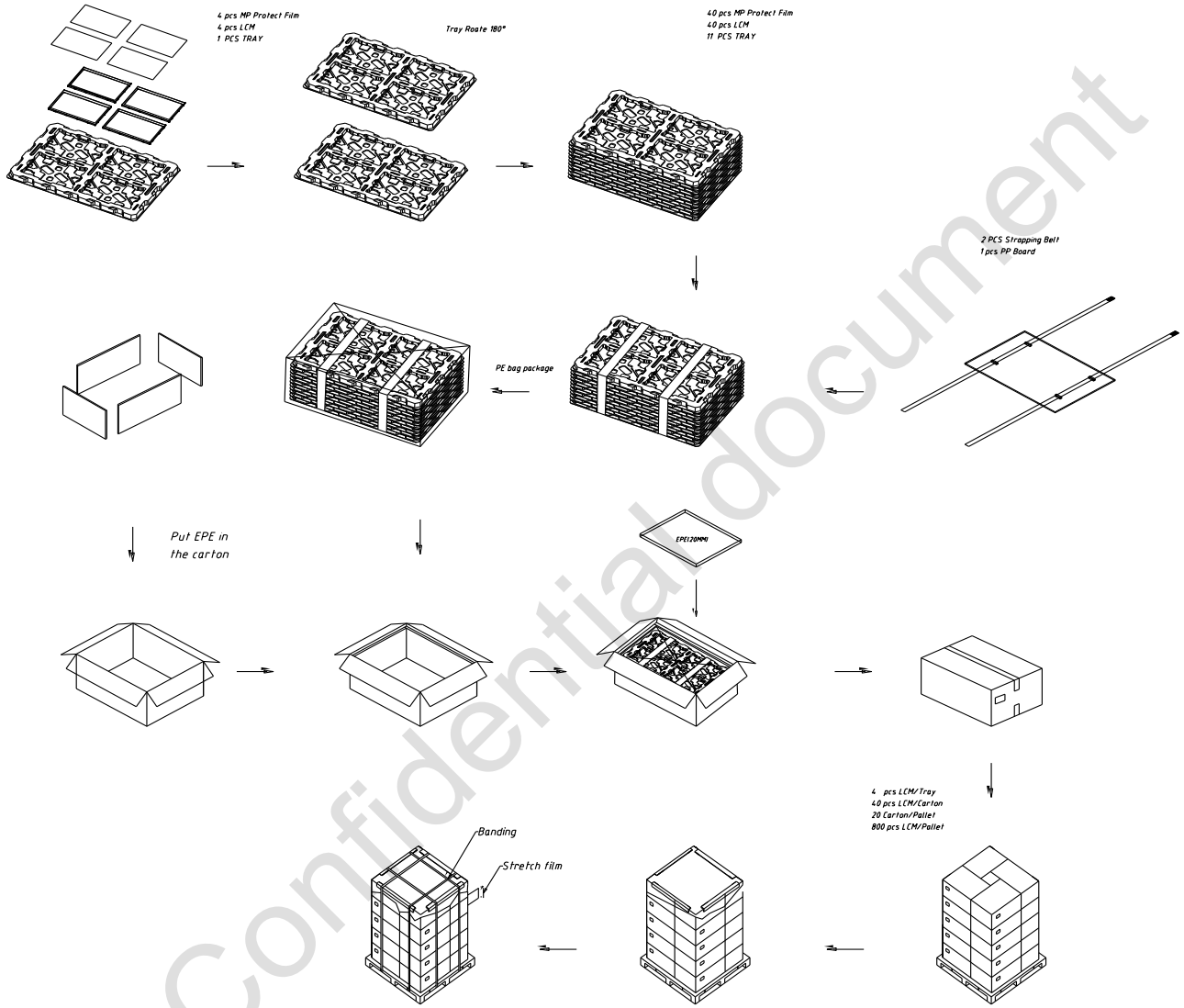
Note (4) The sample must be released for 24 hours under normal conditions before judging. Furthermore, all the judgment must be made under normal conditions. Normal conditions are defined as follow: Temperature: 25℃, Humidity: 55± 10%RH. $T_a$= Ambient Temperature, $T_{gs}$= Glass Surface Temperature.

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.

## 7.0 Package Specification

**Figure 18 Packing Method**



## 8.0 Lot Mark


Note: This picture is only an example.

### 8.1 20 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.

### 8.2 23 Product Barcode

| 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

| 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.

## 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℃

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.

(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 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℃ and 35℃ 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.