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**1.0 General Descriptions****1.1 Introduction**

The M080AWAA R3 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 8.0 inch diagonally measured active display area with HD resolution (1280horizontal by 720vertical pixels array).

**1.2 Features**

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

**1.3 Product Summary**

| Items                                                  | Specifications                                  | Unit               |
|--------------------------------------------------------|-------------------------------------------------|--------------------|
| Screen Diagonal                                        | 8.0                                             | inch               |
| Active Area (H x V)                                    | 176.64x 99.36                                   | mm                 |
| Number of Pixels (H x V)                               | 1,280 x 720                                     | -                  |
| Pixel Pitch (H x V)                                    | 0.1380 x 0.1380                                 | mm                 |
| Pixel Arrangement                                      | R.G.B. Vertical Stripe                          | -                  |
| Display Mode                                           | Normally Black                                  | -                  |
| White Luminance                                        | (750) (Typ.)                                    | cd /m <sup>2</sup> |
| Contrast Ratio                                         | (1000) (Typ.)                                   | -                  |
| Response Time                                          | (20) (Typ) @ 25℃                                | ms                 |
| Input Voltage                                          | (3.3) (Typ.)                                    | V                  |
| Power Consumption                                      | (5.81) (max.)@ White pattern ,FV=60Hz           | W                  |
| Weight                                                 | (215) (Max.)                                    | g                  |
| Outline Dimension (H x V x D)<br>( With FPC&component) | (187.2) (Typ.) x (117.05) (Typ.) x (8.4) (Max.) | mm                 |
| Electrical Interface (Logic)                           | LVDS                                            | -                  |
| Support Color                                          | 16.7 M                                          | -                  |
| NTSC                                                   | 75 (Typ.)                                       | %                  |
| Surface Treatment                                      | AG                                              | -                  |

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#### 1.4 Functional Block Diagram

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

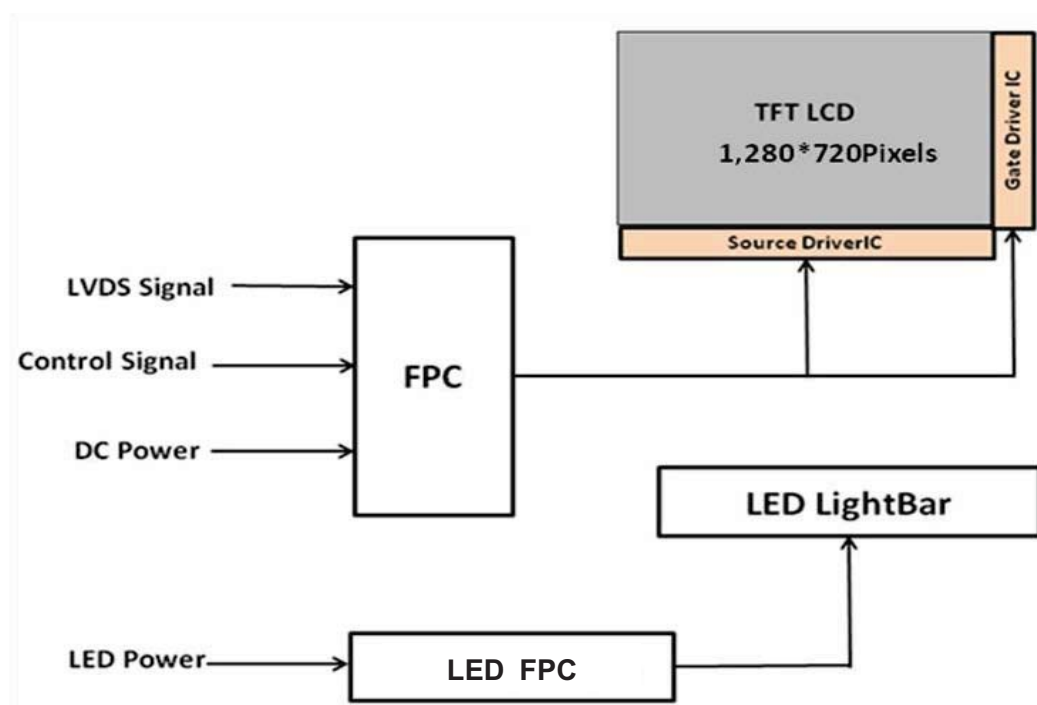


Figure 1 Block Diagram

#### 1.5

##### Pixel Mapping

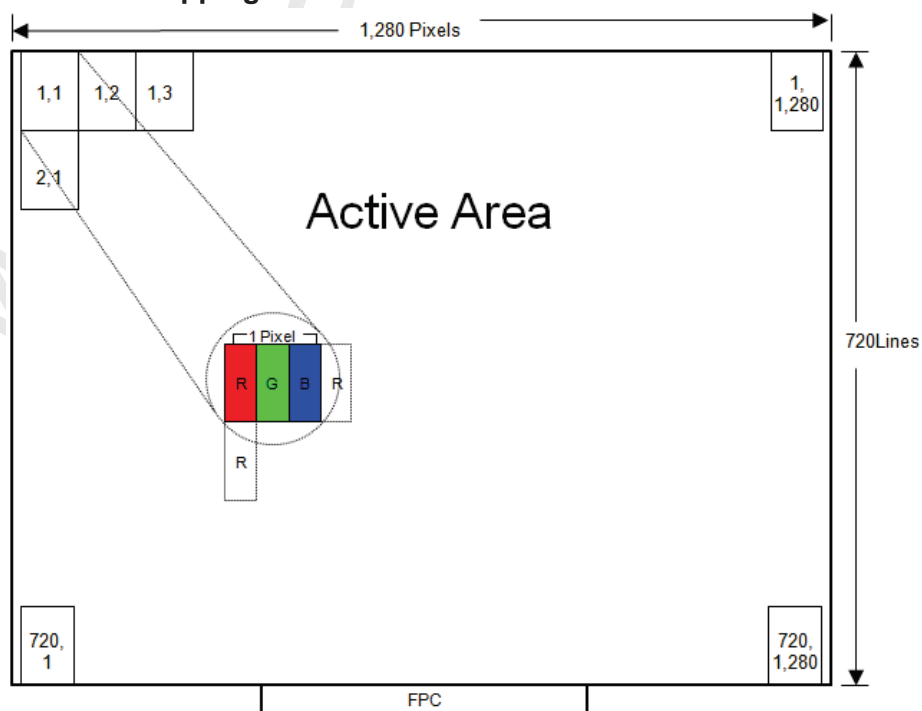


Figure 2 Pixel Mapping

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## 2.0 Absolute Maximum Ratings

**Table 1 Electrical & Environment Absolute Rating**

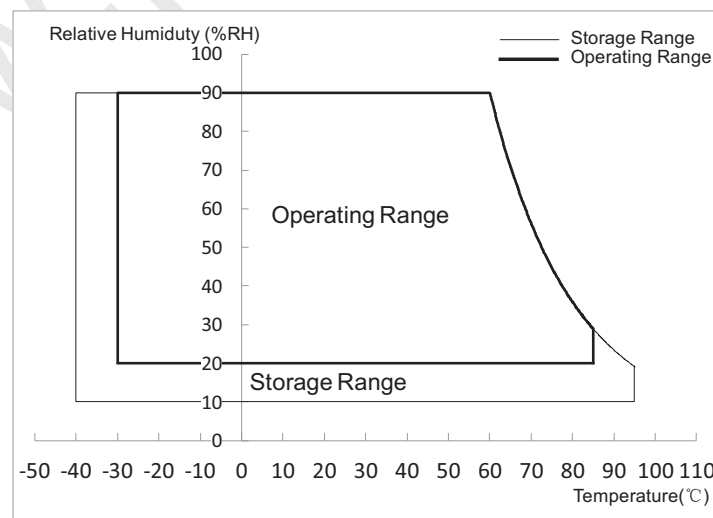
| Item                  | Symbol   | Min.   | Max.      | Unit | Note                |
|-----------------------|----------|--------|-----------|------|---------------------|
| Logic Supply Voltage  | $V_{DD}$ | (-0.3) | (4.0)     | V    | (1),(2),<br>(3),(4) |
| Input signals         | $V_{IO}$ | (-0.3) | (VDD+0.3) | V    |                     |
| Operating Temperature | $T_{gs}$ | -30    | 85        | °C   |                     |
| Storage Temperature   | $T_a$    | -40    | 95        | °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**

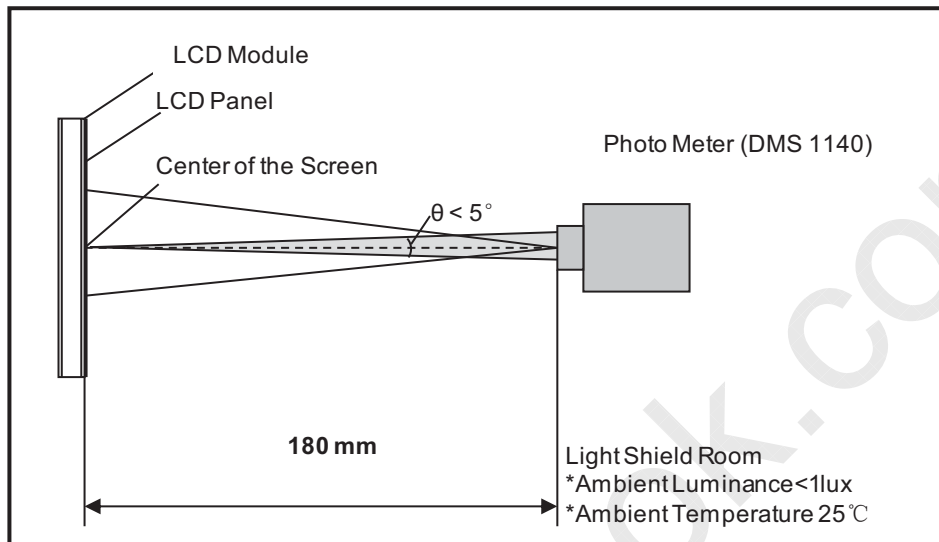
| Item                            | Conditions          |               | Min.          | Typ.    | Max.          | Unit              | Note                                           |
|---------------------------------|---------------------|---------------|---------------|---------|---------------|-------------------|------------------------------------------------|
| Viewing Angle<br>(CR≥10)        | Horizontal          | $\theta_{x+}$ | (80)          | (85)    | -             | degree            | (1),(2),(3),(4)(8)                             |
|                                 |                     | $\theta_{x-}$ | (80)          | (85)    | -             |                   |                                                |
|                                 | Vertical            | $\theta_{y+}$ | (80)          | (85)    | -             |                   |                                                |
|                                 |                     | $\theta_{y-}$ | (80)          | (85)    | -             |                   |                                                |
| Contrast Ratio                  | Center              |               | (800)         | (1,000) | -             | -                 | (1),(2),(4),(8)<br>$\theta_x=\theta_y=0^\circ$ |
|                                 | U/D@20°, L/R@45°    |               | (350)         | -       | -             | -                 | (1),(2),(4),(8)                                |
| Response Time                   | Rising +<br>Falling | 25°C          | -             | (20)    | (30)          | ms                | (1),(2),(5),(8)<br>$\theta_x=\theta_y=0^\circ$ |
|                                 |                     | -10°C         | -             | (80)    | (100)         | ms                |                                                |
|                                 |                     | -20°C         | -             | (180)   | (250)         | ms                |                                                |
|                                 |                     | -30°C         | -             | (300)   | (450)         | ms                |                                                |
| Color Chromaticity<br>(CIE1931) | Red                 | x             | Typ.<br>-0.04 | (0.653) | Typ.<br>+0.04 | -                 | (1),(2),(3),(8)<br>$\theta_x=\theta_y=0^\circ$ |
|                                 | Red                 | y             |               | (0.341) |               | -                 |                                                |
|                                 | Green               | x             |               | (0.288) |               | -                 |                                                |
|                                 | Green               | y             |               | (0.625) |               | -                 |                                                |
|                                 | Blue                | x             |               | (0.149) |               | -                 |                                                |
|                                 | Blue                | y             |               | (0.054) |               | -                 |                                                |
|                                 | White               | x             |               | (0.289) |               | -                 |                                                |
|                                 | White               | y             |               | (0.295) |               | -                 |                                                |
| NTSC                            | -                   |               | (70)          | (75)    | -             | %                 | (1),(2),(3),(8)<br>$\theta_x=\theta_y=0^\circ$ |
| White Luminance                 | Center              |               | (650)         | (750)   | -             | cd/m <sup>2</sup> | (1),(2),(6),(8)<br>$\theta_x=\theta_y=0^\circ$ |
| Luminance Uniformity            | 9 Points            |               | (70)          | (80)    | -             | %                 | (1),(2),(7),(8)<br>$\theta_x=\theta_y=0^\circ$ |

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

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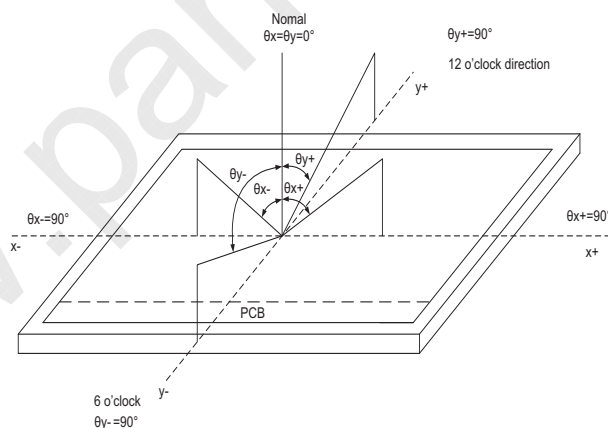
|     |               |                                             |                   |            |              |    |
|-----|---------------|---------------------------------------------|-------------------|------------|--------------|----|
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**Figure 4 Measurement Setup**

Note (2) The LED input parameter setting as:

$I_{LED}$ : (248)mA

Note (3) Definition of Viewing Angle

**Figure 5 Definition of Viewing Angle**

Note (4) Definition of Contrast Ratio (CR)

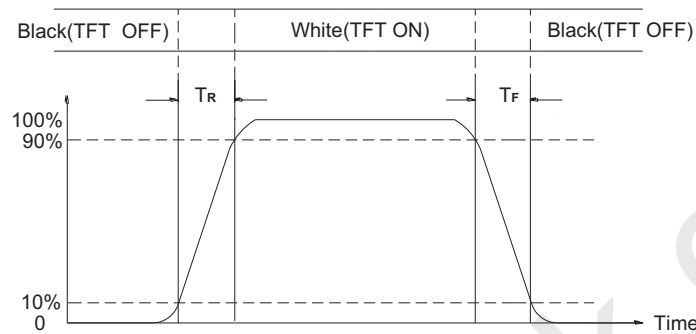
The contrast ratio can be calculated by the following expression:

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

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



**Figure 6 Definition of Response Time**

Note (6) Definition of Luminance of White

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

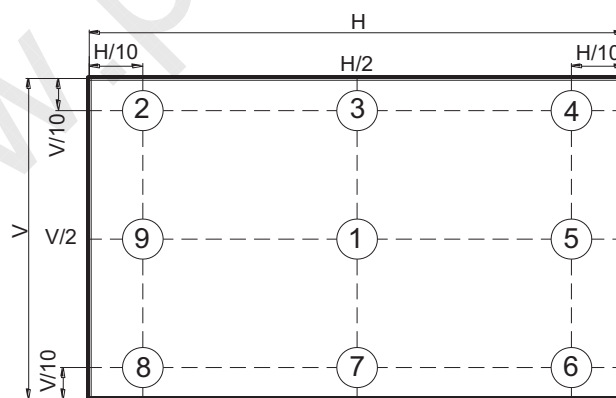
Display Luminance= $L_1$ (center point)

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

Measure the luminance of White/Black pattern at 9 points.

Luminance Uniformity= $\text{Min.}(L_1, L_2, \dots L_9) / \text{Max.}(L_1, L_2, \dots L_9)$

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           |
|--------------------------------------|-----------------------|
| Mating Receptacle / Type (Reference) | HIROSE FH52-40S-0.5SH |

Table 4 Signal Connector Pin Assignment

| Pin No. | Symbol | Description                                          | Remarks |
|---------|--------|------------------------------------------------------|---------|
| 1       | GND    | Ground.                                              | -       |
| 2       | CSB    | Panel internal test pin, must floating for customer. | -       |
| 3       | SCL    | Panel internal test pin, must floating for customer. | -       |
| 4       | SDA    | Panel internal test pin, must floating for customer. | -       |
| 5       | NC     | dummy.                                               | -       |
| 6       | RESET  | Reset pin for panel,active low.                      | -       |
| 7       | STBYB  | Stbyb pin for panel,active low.                      | -       |
| 8       | GND    | Ground                                               | -       |
| 9       | PIND3  | Positive LVDS differential input                     | -       |
| 10      | NIND3  | Negative LVDS differential input                     | -       |
| 11      | GND    | Ground.                                              | -       |
| 12      | CLKP   | Positive LVDS differential clock input               | -       |
| 13      | CLKN   | Negative LVDS differential clock input               | -       |
| 14      | GND    | Ground.                                              | -       |
| 15      | PIND2  | Positive LVDS differential input                     | -       |
| 16      | NIND2  | Negative LVDS differential input                     | -       |
| 17      | GND    | Ground.                                              | -       |
| 18      | PIND1  | Positive LVDS differential input                     | -       |
| 19      | NIND1  | Negative LVDS differential input                     | -       |
| 20      | GND    | Ground.                                              | -       |
| 21      | PIND0  | Positive LVDS differential input                     | -       |
| 22      | NIND0  | Negative LVDS differential input                     | -       |
| 23      | GND    | Ground.                                              | -       |



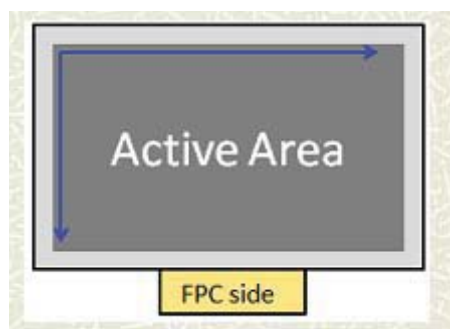
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|    |       |                                                                      |     |
|----|-------|----------------------------------------------------------------------|-----|
| 24 | ATREN | Panel internal test pin,must floating for customer.                  |     |
| 25 | NC    | dummy.                                                               | -   |
| 26 | SHLR  | horizontal scan direction control. don't floating                    | (1) |
| 27 | UPDN  | vertical scan direction control. don't floating                      | (1) |
| 28 | GND   | Ground.                                                              | -   |
| 29 | NC    | dummy.                                                               | -   |
| 30 | VDD   | system supply voltage(3.3V typ)                                      | -   |
| 31 | VDD   | system supply voltage(3.3V typ)                                      | -   |
| 32 | VDD   | system supply voltage(3.3V typ)                                      | -   |
| 33 | VDD   | system supply voltage(3.3V typ)                                      | -   |
| 34 | NC    | dummy.                                                               | -   |
| 35 | GND   | Ground.                                                              | -   |
| 36 | BIST  | BIST test pin,if not used,floating or connect to GND. don't floating | -   |
| 37 | NC    | dummy.                                                               | -   |
| 38 | VPP   | Panel internal test pin, must floating for customer.                 | -   |
| 39 | VPP   | Panel internal test pin, must floating for customer.                 | -   |
| 40 | NC    | dummy.                                                               | -   |

Note (1) :

| SHRL | UPDN | Scan direction                                                   |
|------|------|------------------------------------------------------------------|
| H    | H    | Data scan from left to right; Gate scan from up to down(Default) |



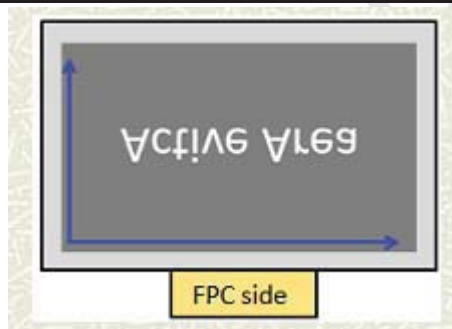
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| SHRL | UPDN | Scan direction                                          |
|------|------|---------------------------------------------------------|
| L    | H    | Data scan from right to left; Gate scan from up to down |



| SHRL | UPDN | Scan direction                                          |
|------|------|---------------------------------------------------------|
| H    | L    | Data scan from left to right; Gate scan from down to up |



| SHRL | UPDN | Scan direction                                          |
|------|------|---------------------------------------------------------|
| L    | L    | Data scan from right to left; Gate scan from down to up |

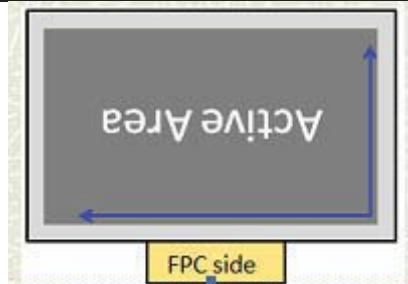


Table 5 Backlight Connector Type

| Item                                 | Description             |
|--------------------------------------|-------------------------|
| Mating Receptacle / Type (Reference) | IRISO IMSA-9637S-12Y800 |

Table 6 Backlight Connector Pin Assignment



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|                                                                                   |               |                                             |                   |            |               |    |
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| Pin No. | Symbol       | Description                |
|---------|--------------|----------------------------|
| 1       | LED1-        | Negative backlight voltage |
| 2       | LED2-        | Negative backlight voltage |
| 3       | LED3-        | Negative backlight voltage |
| 4       | NC           | /                          |
| 5       | NC           | /                          |
| 6       | Thermistors1 | Thermal sensor for LED     |
| 7       | Thermistors2 | Thermal sensor for LED     |
| 8       | NC           | /                          |
| 9       | NC           | /                          |
| 10      | LED+         | Positive backlight voltage |
| 11      | LED+         | Positive backlight voltage |
| 12      | LED+         | Positive backlight voltage |

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## 4.2 Signal Electrical Characteristics

### 4.2.1 Signal Electrical Characteristics For LVDS Receiver

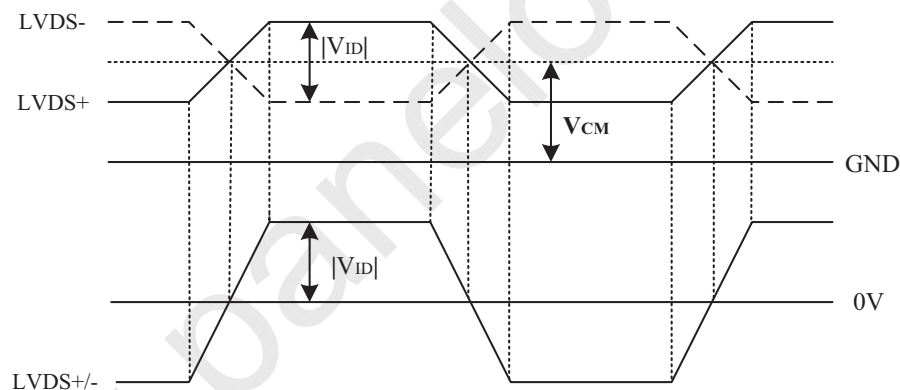
The built-in LVDS receiver is compatible with (ANSI/TIA/TIA-644 ) standard.

**Table 7 LVDS Receiver Electrical Characteristics**

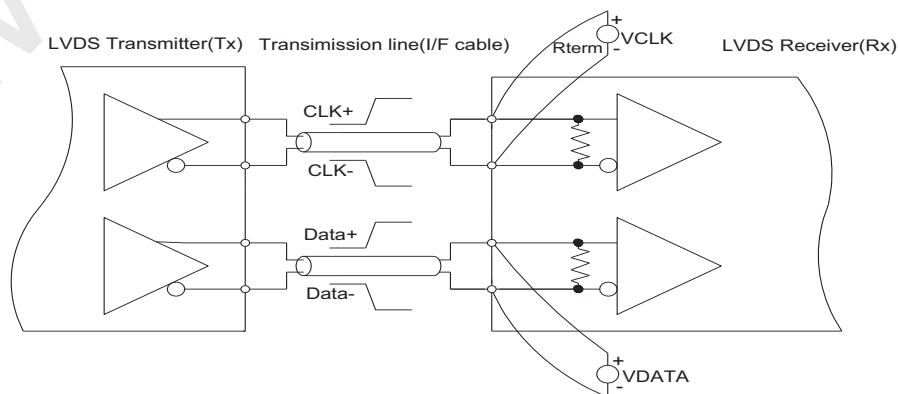
| Parameter                            | Symbol          | Min.   | Typ.  | Max.                     | Unit | Conditions             |
|--------------------------------------|-----------------|--------|-------|--------------------------|------|------------------------|
| Differential Input High Threshold    | V <sub>th</sub> | -      | -     | (+100)                   | mV   | V <sub>CM</sub> =+1.2V |
| Differential Input Low Threshold     | V <sub>tl</sub> | (-100) | -     | -                        | mV   | V <sub>CM</sub> =+1.2V |
| Magnitude Differential Input Voltage | V <sub>ID</sub> | (100)  | -     | (600)                    | mV   | -                      |
| Common Mode Voltage                  | V <sub>CM</sub> | (1)    | (1.2) | 1.7- V <sub>ID</sub>  /2 | V    | -                      |

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**

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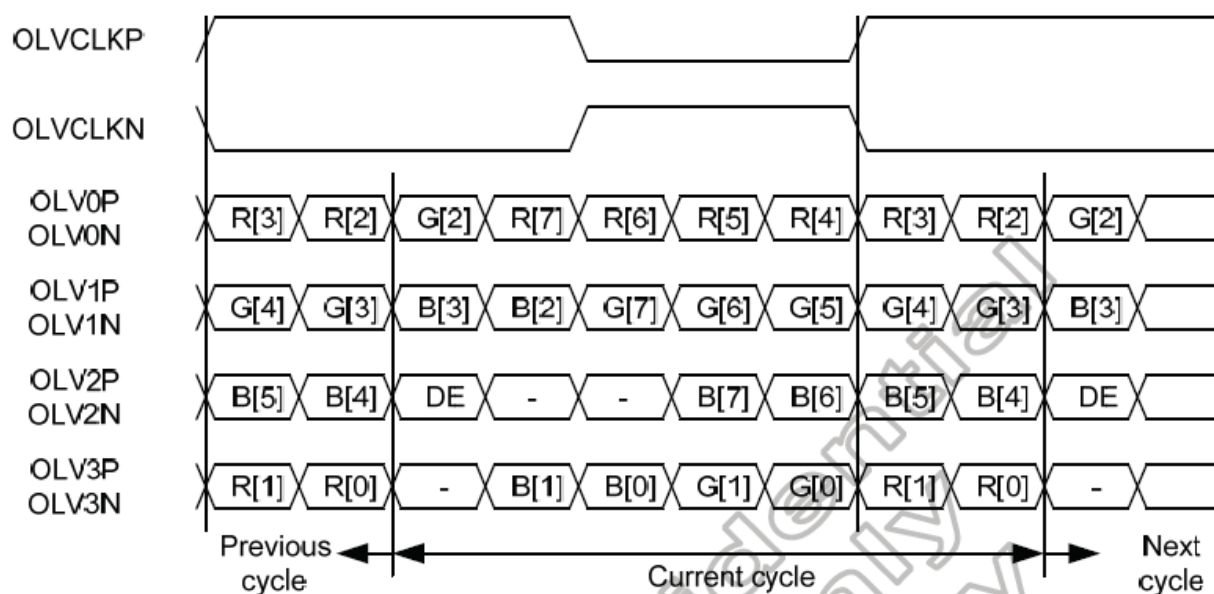


Figure 10 Data Mapping(JEIDA Format)

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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.

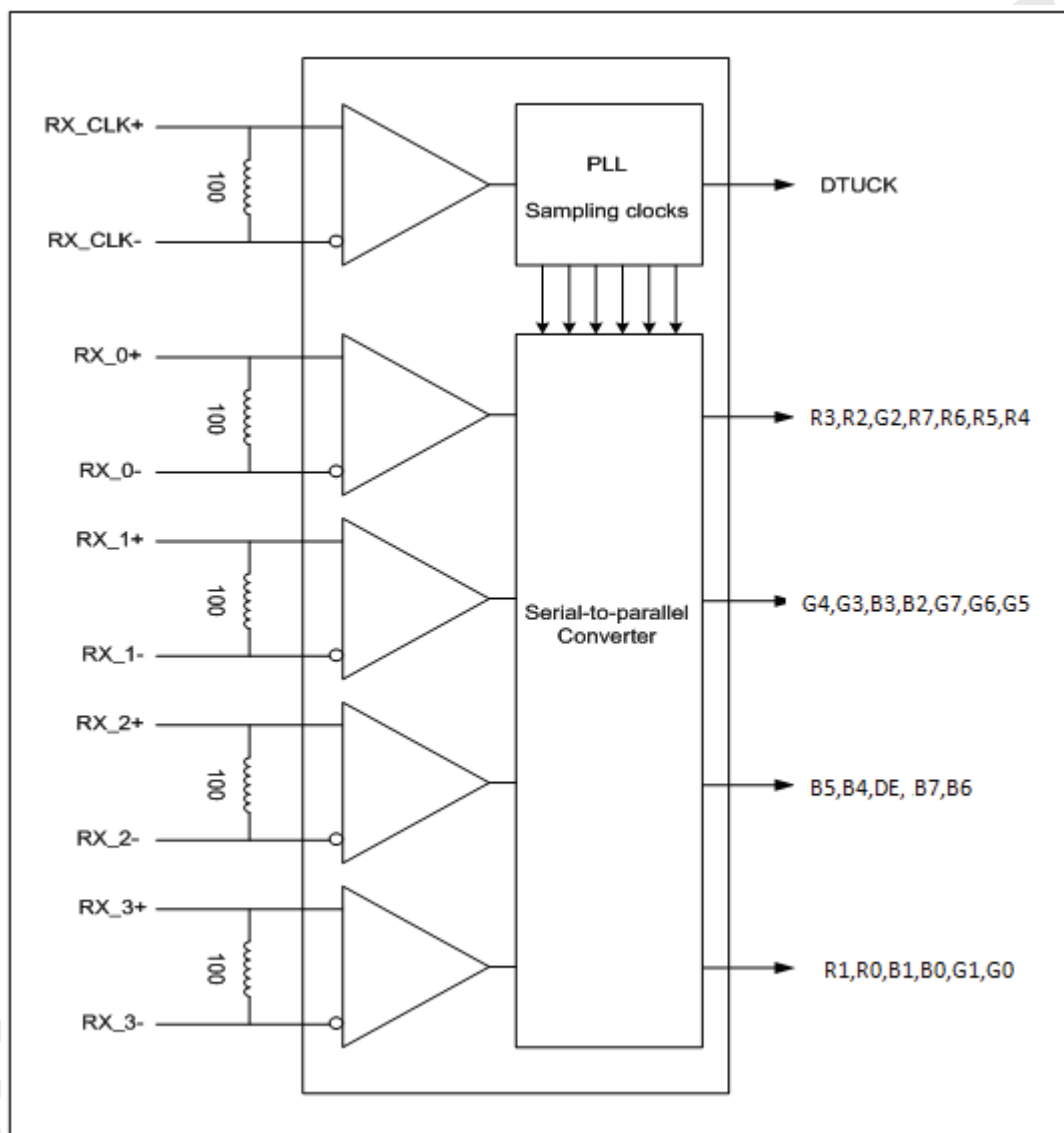


Figure 11 LVDS Receiver Internal Circuit



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## 4.3 Interface Timings

Table 8 Interface Timings

| Parameter            | Symbol | Min.    | Typ.    | Max.    | Unit   |
|----------------------|--------|---------|---------|---------|--------|
| LVDS Clock Frequency | Fclk   | (69.49) | (71.15) | (75.54) | MHz    |
| H Total Time         | HT     | (1,524) | (1,540) | (1,566) | Clocks |
| H Active Time        | HA     | 1,280   |         |         | Clocks |
| V Total Time         | VT     | (760)   | (770)   | (804)   | Lines  |
| V Active Time        | VA     | 720     |         |         | Lines  |
| Frame Rate           | FV     | (55)    | (60)    | (65)    | Hz     |

Note1:  $HT * VT * \text{Frame Frequency} \leq (75.54) \text{ MHz}$

Note2: All reliabilities are specified for timing specification based on refresh rate of 60Hz.

M080AWAA R3 is secured only for function under lower refresh rate; 60Hz at Normal mode

Note3: DE mode only



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**4.4 Input Power Specifications**

Input power specifications are as follows.

**Table 9 Input Power Specifications**

| Parameter                                               |                    | Symbol       | Min.     | Typ.   | Max.   | Unit  | Note        |
|---------------------------------------------------------|--------------------|--------------|----------|--------|--------|-------|-------------|
| <i>System Power Supply</i>                              |                    |              |          |        |        |       |             |
| LCD Drive Voltage (Logic)                               |                    | $V_{DD}$     | (3.0)    | (3.3)  | (3.6)  | V     | (1),(2)     |
| VDD Current                                             | White Pattern      | $I_{DD}$     | -        | -      | (0.23) | A     | (1),(4)     |
| VDD Power Consumption                                   | White Pattern      | $P_{DD}$     | -        | -      | (0.75) | W     |             |
| Control signals<br>(BIST、RESET、<br>STBYB、SHLR、<br>UPDN) | High level voltage | $V_{signal}$ | (3.0)    | -      | (VDD)  | V     | (1)         |
|                                                         | Low level voltage  |              | (0)      | -      | (0.4)  | V     |             |
| Rush Current                                            |                    | $I_{Rush}$   | -        | -      | (1.0)  | A     | (1),(5)     |
| Allowable Logic/LCD<br>Drive Ripple Voltage             |                    | $V_{VDD-RP}$ | -        | -      | (200)  | mV    | (1),(3)     |
| <i>LED Power Supply</i>                                 |                    |              |          |        |        |       |             |
| LED Input Voltage                                       |                    | $V_{LED}$    | (21.6)   | (24.0) | (27.2) | V     | (1),(2),(7) |
| LED Power Consumption                                   |                    | $P_{LED}$    | -        | -      | (5.06) | W     | (1), (7)    |
| LED Forward Voltage                                     |                    | $V_F$        | (2.7)    | (3.0)  | (3.4)  | V     | (1),(2)     |
| LED Forward Current                                     |                    | $I_F$        | -        | (62)   | -      | mA    |             |
| LED Life Time                                           |                    | LT           | (10,000) | -      | -      | 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.

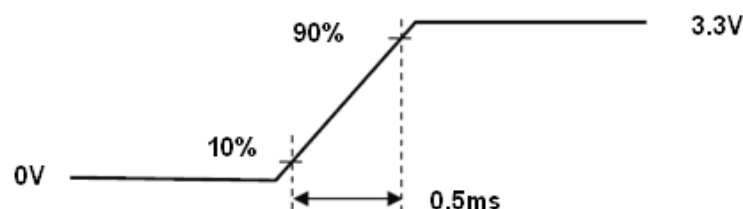
Note (4) The specified  $V_{DD}$  current and power consumption are measured under the  $V_{DD} = (3.3) V$ ,  $FV = (60) Hz$  condition and White pattern.

Note (5) The figures below is the measuring condition of  $V_{DD}$ . Rush current can be measured when  $T_{RUSH}$  is 0.5 ms.



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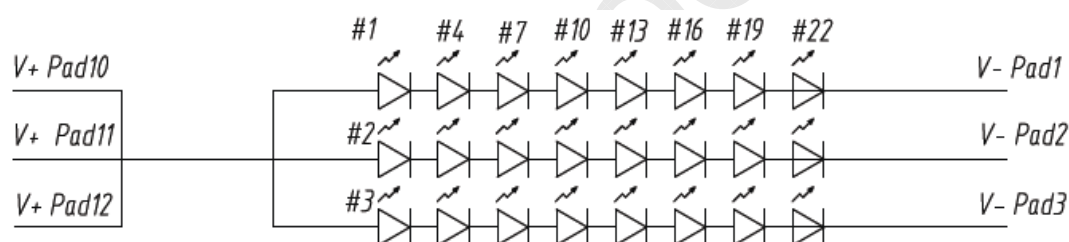
|                                                                                   |               |                                             |                   |            |               |    |
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**Figure 12 V<sub>DD</sub> Rising Time**

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 70% of the minimum value under normal operating condition.

Note (7) Definition of V<sub>LED</sub> and P<sub>LED</sub>

$$V_{LED} = V_F \times 8, I_{LED} = I_F \times 3, P_{LED} = V_{LED} \times I_{LED}$$



Note (8) Backlight operation must be follow diagram of Ambient temperature and Allowed forward current.

TBD

**Figure 13 Backlight Current De-rating Curve**

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#### 4.4 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 VDD voltage is off.
2. When system first start up, should keep the VDD high time longer than 200ms, otherwise may cause image sticking when VDD drop off.

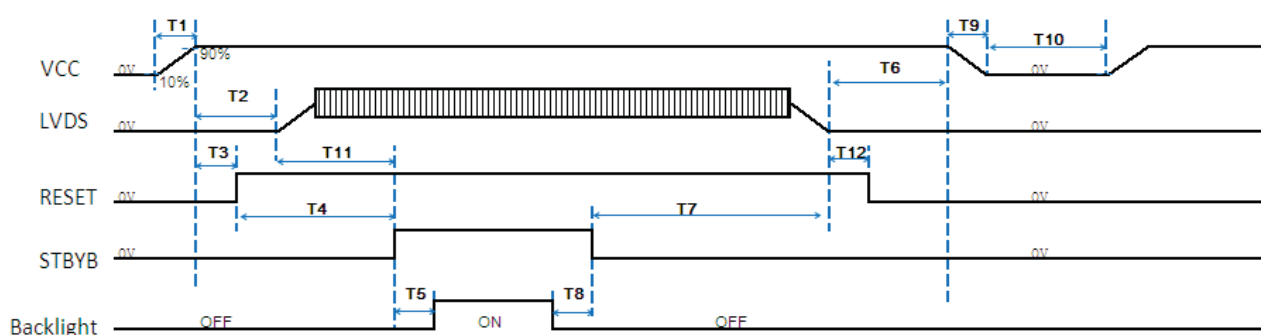


Figure 14 Power Sequence

Table 10 Power Sequencing Requirements

| Parameter                      | Symbol | Min. | Typ. | Max. | Unit |
|--------------------------------|--------|------|------|------|------|
| VCC Rise Time                  | T1     | 0.5  | -    | 10   | ms   |
| VCC to LVDS                    | T2     | 0    | -    | -    | ms   |
| VCC to RESET                   | T3     | 10   | -    | -    | ms   |
| RESET to STBYB pull H          | T4     | 36   | -    | -    | ms   |
| STBYB to BL power on           | T5     | 200  | -    | -    | ms   |
| BL Power off to STBYB pull L   | T8     | 200  | -    | -    | ms   |
| STBYB pull L to LVDS Disable   | T7     | 100  | 117  | -    | ms   |
| LVDS Disable to VCC Power off  | T6     | 0    | 26   | -    | ms   |
| VCC Fall Time                  | T9     | -    | -    | -    | ms   |
| VCC Power off                  | T10    | 1    | -    | -    | s    |
| LVDS Enable to STBYB pull high | T11    | 1    | -    | -    | ms   |
| LVDS Disable to RESET pull L   | T12    | 0    | -    | -    | ms   |

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## 5.0 Mechanical Characteristics

### 5.1 Outline Drawing

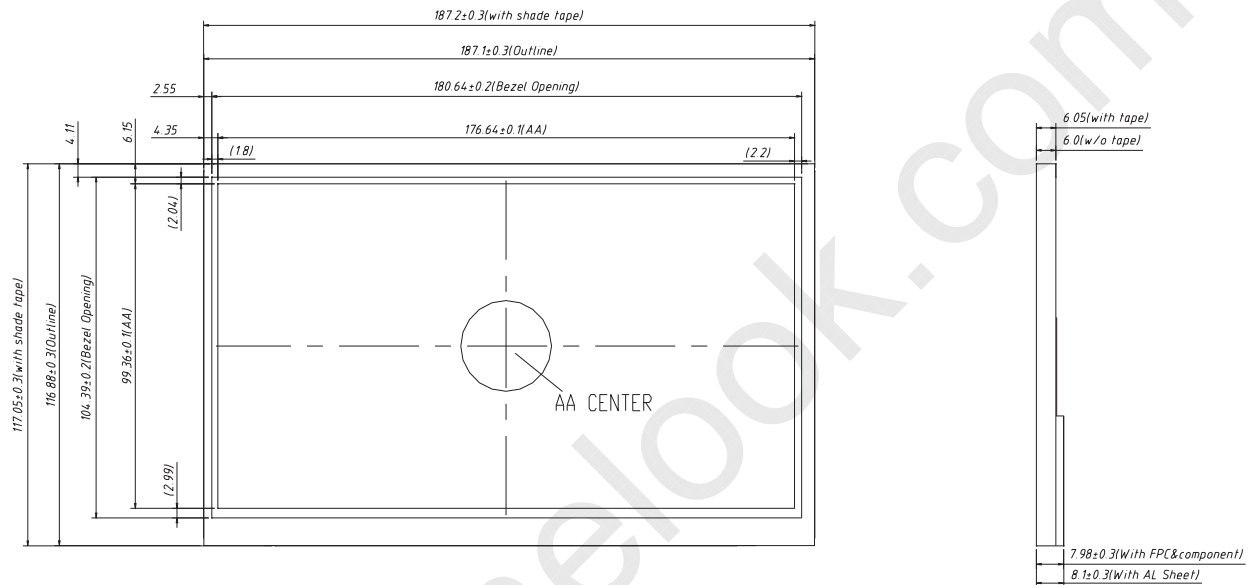


Figure 15 Reference Outline Drawing (Front Side)



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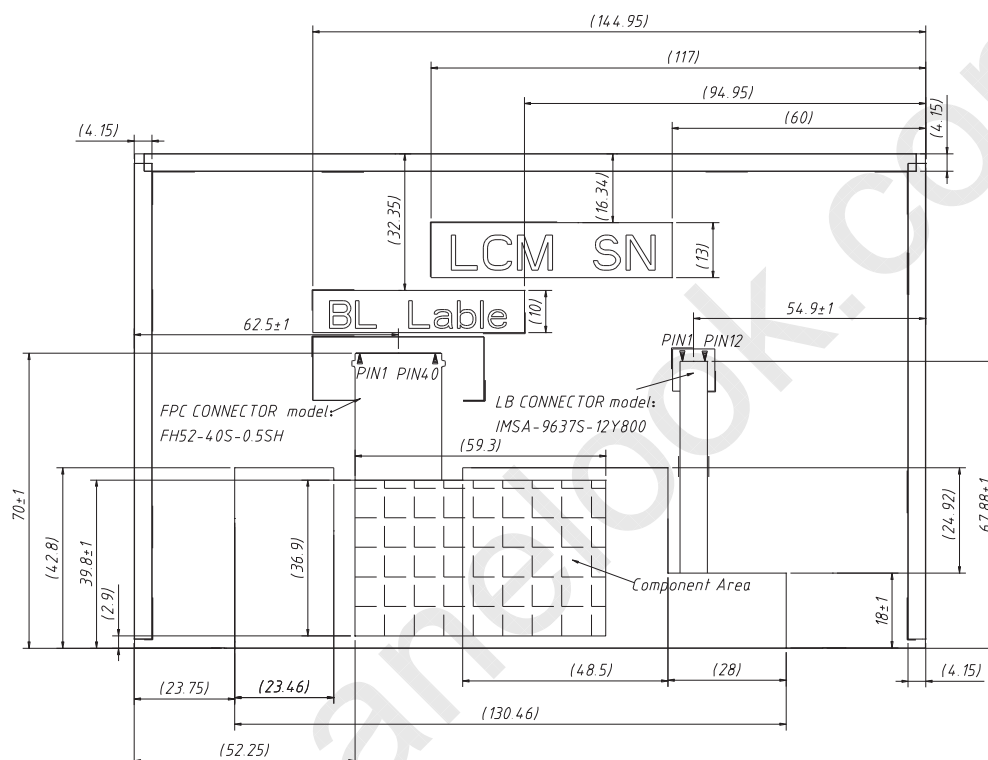


Figure 16 Reference Outline Drawing (Back Side)

Note (1) Not marked tolerance is  $\pm 0.3\text{mm}$ 

## 5.2 Dimension Specifications

Table 11 Module Dimension Specifications

| Item      |                         | Min.     | Typ.     | Max.     | Unit |
|-----------|-------------------------|----------|----------|----------|------|
| Width     |                         | (186.9)  | (187.2)  | (187.5)  | mm   |
| Height    |                         | (116.75) | (117.05) | (117.35) | mm   |
| Thickness | Without FPC & Component | (5.8)    | (6.1)    | (6.4)    | mm   |
|           | With PCBA & Component   | -        | -        | (8.4)    | mm   |
| Weight    |                         | -        | -        | (215)    | g    |



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## 6.0 Reliability Conditions

Table 12 Reliability Condition

| Item                                          |           | Package | Test Conditions                                                                                                                                                 |                      | Note                |
|-----------------------------------------------|-----------|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|---------------------|
| High Temperature/High Humidity Operating Test |           | Module  | T <sub>gs</sub> =60℃, 90%RH, 500 hours                                                                                                                          |                      | (1),(2),(3),(4),(8) |
| High Temperature Operating Test               |           | Module  | T <sub>gs</sub> =85℃, 500 hours                                                                                                                                 |                      |                     |
| Low Temperature Operating Test                |           | Module  | T <sub>a</sub> =-30℃, 500 hours                                                                                                                                 |                      |                     |
| High Temperature Storage Test                 |           | Module  | T <sub>a</sub> =95℃, 500 hours                                                                                                                                  |                      | (1),(3),(4),(8)     |
| Low Temperature Storage Test                  |           | Module  | T <sub>a</sub> =-40℃, 500 hours                                                                                                                                 |                      |                     |
| Shock Non-operating Test                      |           | Module  | 100G, 6ms, ±X, ±Y, ±Z, 3times for each direction                                                                                                                |                      | (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  | Air                                                                                                                                                             | ±15KV, 150pF(150Ohm) | (1),(2),(6)         |
| Image Sticking                                |           | Module  | 25℃ : chessboard 7*5 pattern, change to 50% gray pattern; CheckPoint: 1hrs,release 5min;2hrs,release 5min,ND8%;                                                 |                      | (1),(2),(7)         |
|                                               |           |         | 65℃ : chessboard 7*5 pattern, change to 50% gray pattern; CheckPoint: 1hrs,release 5min;2hrs,release 5min, ND8%;                                                |                      |                     |

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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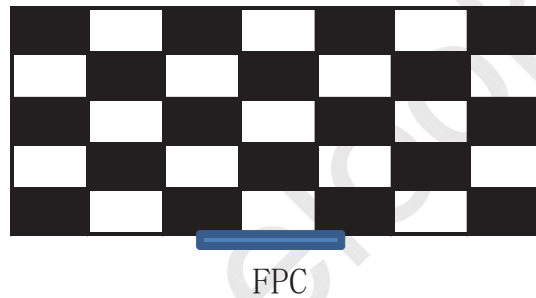
|                                                                                   |               |                                             |                   |            |               |    |
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Note (4) The sample must be released for 24 hours under normal conditions before judging. Furthermore, all the judgment must be made under normal conditions. Normal conditions are defined as follow: Temperature: 25℃, 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 a few minutes later.

Note (7) It is recommended to follow the nominal parameter specified by IVO before the Image Sticking test. Besides,  $V_{com}$  must be adjusted to optimize display quality.



**Figure 17 Image Sticking Pattern**

Note (8) LED Forward current should be follow the De-rating curve (Figure 13 Backlight De-rating Curve at Page 18)



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## 7.0 Package Specification

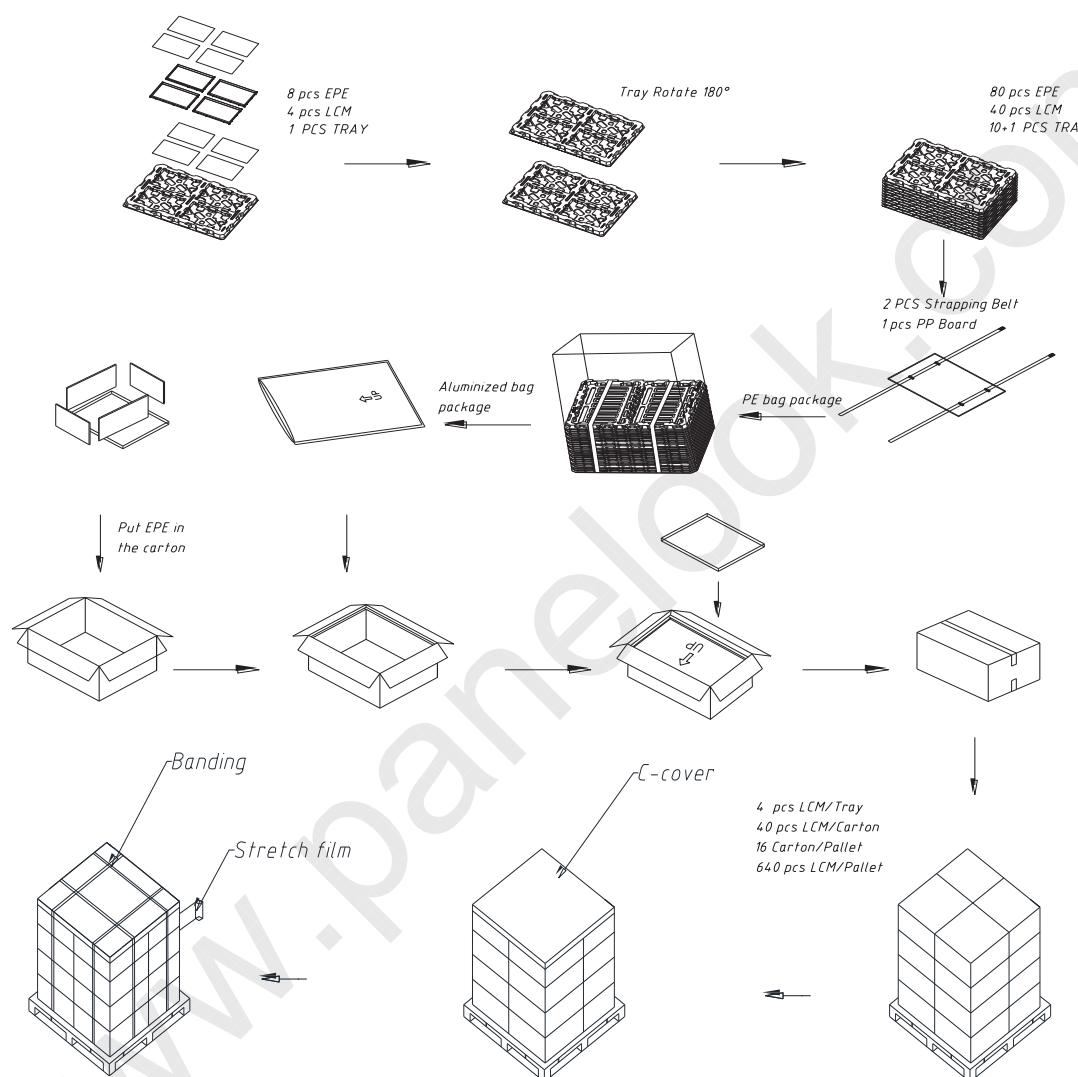


Figure 18 Packing Method



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**8.0 Lot Mark**

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## 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.



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(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  $5^{\circ}C$  and  $35^{\circ}C$  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



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When disposing LCD module, obey the local environmental regulations.

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