

# LITEMAX

DLD2158-B

Sunlight Readable 21.5" LED B/L LCD

## User Manual

| Approved by | Checked by | Prepared by |
|-------------|------------|-------------|
|             |            |             |

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### Record of Revision

| Version and Date | Page | Old Description | New Description | Remark |
|------------------|------|-----------------|-----------------|--------|
| Oct/4/2022       | all  |                 | Initial release |        |
|                  |      |                 |                 |        |
|                  |      |                 |                 |        |
|                  |      |                 |                 |        |

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## 1 General Description

The **DLD2158-B** is a 21.5 inch industrial grade sunlight readable LCD, with high brightness 1600 nits, it produce sharp images, crisp text and lifelike colors. The Durapixel LED backlight technology ensures high reliability and low power consumption, suitable for outdoor application, kiosk, factory automation, military, transportation and gaming application.

### 1.1 Features

- High Brightness 1600 nits
- Sunlight Readable
- LED Backlight
- Low Power Consumption
- Wide Temperature (-20 °C ~ 70 °C)
- LCD Blackening Defect Free (Hi-Tni 110 °C)
- BL MTBF: 100,000 hours

### 1.2 General Specifications

| Model Name              | DLD2158-B                                                    |
|-------------------------|--------------------------------------------------------------|
| Description             | 21.5" TFT LCD, 1600 nits LED Backlight, 1920x1080            |
| Screen Size             | 21.5"                                                        |
| Display Area (mm)       | 476.64(H) x 268.11(V)                                        |
| Brightness              | 1600 cd/m <sup>2</sup>                                       |
| Resolution              | 1920x1080                                                    |
| Aspect Ratio            | 16 : 9                                                       |
| Contrast Ratio          | 900 : 1                                                      |
| Pixel Pitch (mm)        | 0.24825(H) x 0.24825(V)                                      |
| Pixel Per Inch (PPI)    | 102                                                          |
| Viewing Angle           | 178°(H),178°(V)                                              |
| Color Saturation (NTSC) | 81%                                                          |
| Display Colors          | 16.7M                                                        |
| Response Time (Typical) | 14ms                                                         |
| Panel Interface         | LVDS                                                         |
| Input Interface         | HDMI, DP                                                     |
| Input Power             | DC12V                                                        |
| Power Consumption       | 49W                                                          |
| OSD Key                 | 4 Keys (Power Switch, Menu, +, -)                            |
| OSD Control             | Brightness, Color, Contrast, Auto Turing, H/V Position...etc |
| Dimensions (mm)         | 500.2 x 294.6 x 36 mm                                        |
| Bezel Size(U/B/L/R)     | 13.3/13.2/11.8/11.8 mm                                       |
| Weight (Net)            | 3.3kg                                                        |
| Mounting                | 75x75, 100x100                                               |
| Operating Temperature   | -20 °C ~ 70 °C                                               |
| Storage Temperature     | -30 °C ~ 80 °C                                               |

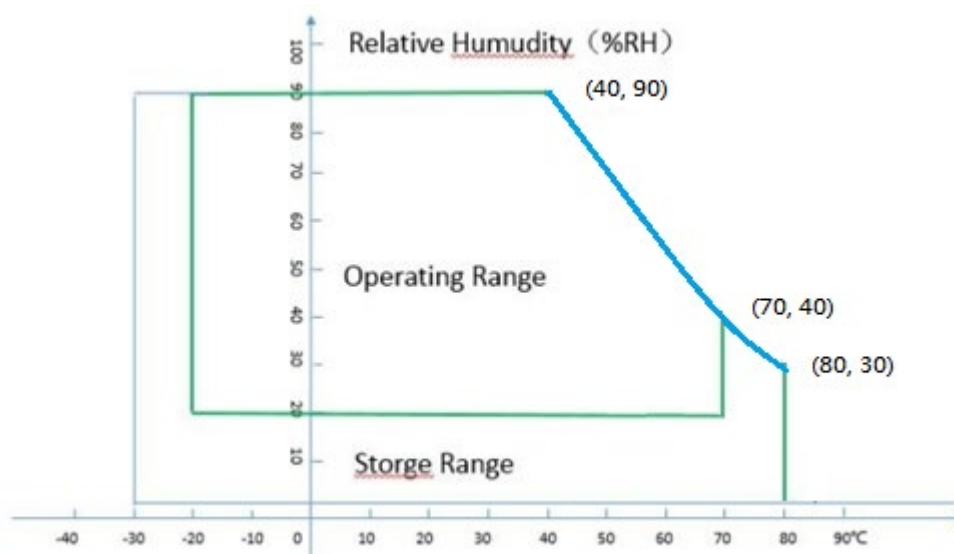
**DLD**= Panel + LED Driving Board + AD Control Board + Housing

### 1.3 Absolute Maximum Ratings

Permanent damage may occur if exceeding the following maximum rating.

[VSS=GND=0V]

| Parameter                  | Symbol   | Min.    | Max.         | Unit | Remarks    |
|----------------------------|----------|---------|--------------|------|------------|
| Power Supply Voltage       | $V_{DD}$ | -0.3    | 5.5          | V    | Ta = 25 °C |
| Logic Supply Voltage       | $V_{IN}$ | VSS-0.3 | $V_{DD}+0.3$ | V    |            |
| Operating Temperature      | $T_{OP}$ | -20     | +70          | °C   |            |
| Storage Temperature        | $T_{ST}$ | -30     | +80          | °C   |            |
| Liquid crystal clear point | $T_{Lc}$ | 104.9   |              | °C   | Typ.       |



## 2 Electrical Specifications

### 2.1 Electrical Characteristics

[Ta = 25±2 °C]

| Parameter                                       |            | Min. | Typ. | Max. | Unit | Remarks                             |
|-------------------------------------------------|------------|------|------|------|------|-------------------------------------|
| Power Supply Voltage                            | $V_{DD}$   | 4.5  | 5.0  | 5.5  | V    | Note 1                              |
| Power Supply Current                            | $I_{DD}$   | -    | 700  | 1200 | mA   |                                     |
| In-Rush Current                                 | $I_{RUSH}$ | -    | -    | 3    | A    | Note 2                              |
| Permissible Input Ripple Voltage                | $V_{RF}$   | -    | -    | 300  | mV   | $V_{DD} = 5.0V$                     |
| High Level Differential Input Threshold Voltage | $V_{IH}$   | -    | -    | +100 | mV   |                                     |
| Low Level Differential Input Threshold Voltage  | $V_{IL}$   | -100 | -    | -    | mV   |                                     |
| Differential input voltage                      | $ V_{ID} $ | 200  | -    | 600  | mV   |                                     |
| Differential input common mode voltage          | $V_{cm}$   | 1.0  | 1.2  | 1.5  |      | $V_{IH}=100mV$ ,<br>$V_{IL}=-100mV$ |

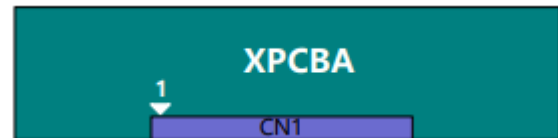
Notes : 1. The supply voltage is measured and specified at the interface connector of LCM. The current draw and power consumption specified is for VDD=5.0V, Frame rate=60Hz. Test Pattern of power supply current

a) Typ : Color Bar pattern

b) Max : Gray Level

2. Duration of rush current is about 2 ms and rising time of VDD is  $520 \mu s \pm 20 \%$

## 2.2 Electrical Interface Connection

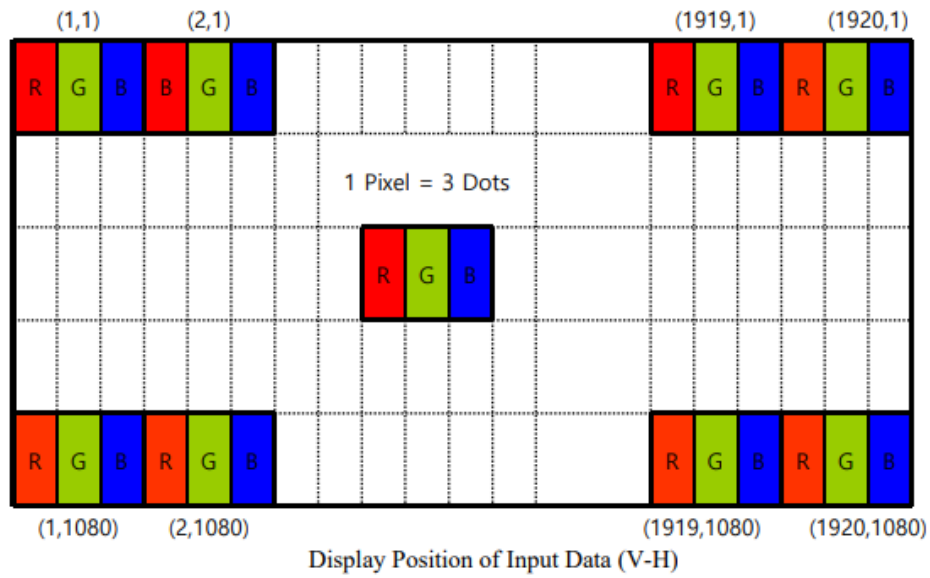


CN1 Module Side Connector : UJU IS100-L300-C23 or MSBKT2407P30

User Side Connector : JAE FI-X30

| Pin No | Symbol | Function                                     | Remark |
|--------|--------|----------------------------------------------|--------|
| 1      | RXO0-  | Negative Transmission data of Pixel 0 (ODD)  |        |
| 2      | RXO0+  | Positive Transmission data of Pixel 0 (ODD)  |        |
| 3      | RXO1-  | Negative Transmission data of Pixel 1 (ODD)  |        |
| 4      | RXO1+  | Positive Transmission data of Pixel 1 (ODD)  |        |
| 5      | RXO2-  | Negative Transmission data of Pixel 2 (ODD)  |        |
| 6      | RXO2+  | Positive Transmission data of Pixel 2 (ODD)  |        |
| 7      | GND    | Power Ground                                 |        |
| 8      | RXOC-  | Negative Transmission Clock (ODD)            |        |
| 9      | RXOC+  | Positive Transmission Clock (ODD)            |        |
| 10     | RXO3-  | Negative Transmission data of Pixel 3 (ODD)  |        |
| 11     | RXO3+  | Positive Transmission data of Pixel 3 (ODD)  |        |
| 12     | RXE0-  | Negative Transmission data of Pixel 0 (EVEN) |        |
| 13     | RXE0+  | Positive Transmission data of Pixel 0 (EVEN) |        |
| 14     | GND    | Power Ground                                 |        |
| 15     | RXE1-  | Negative Transmission data of Pixel 1 (EVEN) |        |
| 16     | RXE1+  | Positive Transmission data of Pixel 1 (EVEN) |        |
| 17     | GND    | Power Ground                                 |        |
| 18     | RXE2-  | Negative Transmission data of Pixel 2 (EVEN) |        |
| 19     | RXE2+  | Positive Transmission data of Pixel 2 (EVEN) |        |
| 20     | RXEC-  | Negative Transmission Clock (EVEN)           |        |
| 21     | RXEC+  | Positive Transmission Clock (EVEN)           |        |
| 22     | RXE3-  | Negative Transmission data of Pixel 3 (EVEN) |        |
| 23     | RXE3+  | Positive Transmission data of Pixel 3 (EVEN) |        |
| 24     | GND    | Power Ground                                 | Note 1 |
| 25     | NC     | Not connection, this pin should be open      |        |
| 26     | NC     | Not connection, this pin should be open      |        |
| 27     | NC     | Not connection                               |        |
| 28     | VDD    | Power Supply: +5V                            |        |
| 29     | VDD    |                                              |        |
| 30     | VDD    |                                              |        |

## 2.3 Data Input Format



## 2.4 Signal Timing Specifications

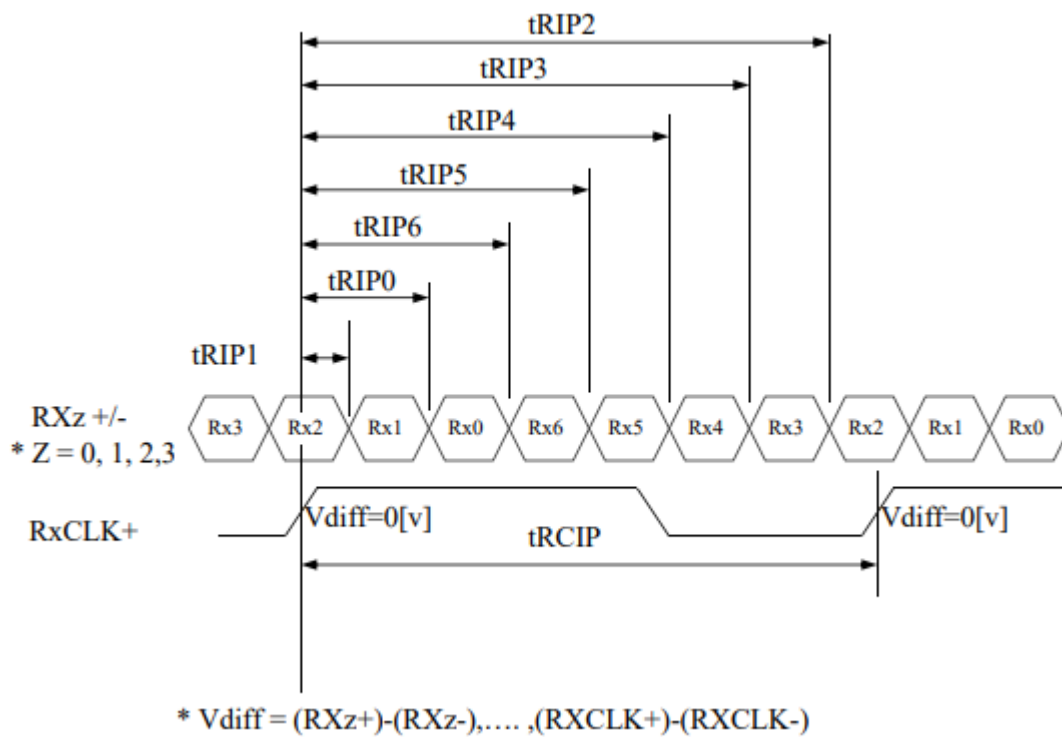
The panel is operated by the DE only.

| Item                      |           | Symbols | Min   | Typ   | Max   | Unit   |
|---------------------------|-----------|---------|-------|-------|-------|--------|
| Clock                     | Frequency | 1/Tc    | 63    | 74.25 | 88    | MHz    |
|                           | High Time | -       | -     | 4/7Tc | -     |        |
|                           | Low Time  | -       | -     | 3/7Tc | -     |        |
| Frame Period              |           | Tv      | 1100  | 1125  | 1200  | line   |
|                           |           |         | 55    | 60    | 65    | Hz     |
|                           |           |         | 15.38 | 16.67 | 18.18 | ms     |
| Vertical Display Period   |           | Tvd     | -     | 1080  | -     | line   |
| One line Scanning Period  |           | Th      | 1050  | 1100  | 1120  | clocks |
| Horizontal Display Period |           | Thd     | -     | 960   | -     | clocks |

## 2.5 LVDS Rx Interface Timing Paramete

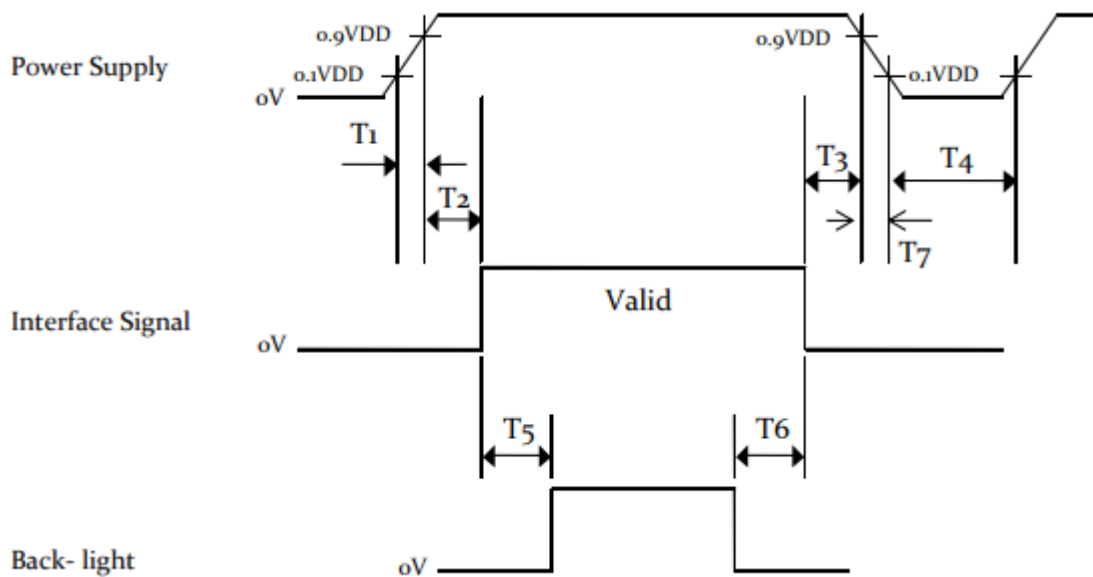
The specification of the LVDS Rx interface timing parameter is shown in Table.

| Item         | Symbol | Min             | Typ         | Max             | Unit | Remark |
|--------------|--------|-----------------|-------------|-----------------|------|--------|
| CLKIN Period | tRCIP  | 10.76           | 13.46       | 16.15           | nsec |        |
| Input Data 0 | tRIP1  | -0.4            | 0.0         | +0.4            | nsec |        |
| Input Data 1 | tRIP0  | tRCIP/7-0.4     | tRCIP/7     | tRCIP/7+0.4     | nsec |        |
| Input Data 2 | tRIP6  | 2 × tRCIP/7-0.4 | 2 × tRCIP/7 | 2 × tRCIP/7+0.4 | nsec |        |
| Input Data 3 | tRIP5  | 3 × tRCIP/7-0.4 | 3 × tRCIP/7 | 3 × tRCIP/7+0.4 | nsec |        |
| Input Data 4 | tRIP4  | 4 × tRCIP/7-0.4 | 4 × tRCIP/7 | 4 × tRCIP/7+0.4 | nsec |        |
| Input Data 5 | tRIP3  | 5 × tRCIP/7-0.4 | 5 × tRCIP/7 | 5 × tRCIP/7+0.4 | nsec |        |
| Input Data 6 | tRIP2  | 6 × tRCIP/7-0.4 | 6 × tRCIP/7 | 6 × tRCIP/7+0.4 | nsec |        |



## 2.6 Power Sequence

To prevent a latch-up or DC operation of the LCD module, the power on/off sequence shall be as shown in below.



- $0.5 \text{ ms} \leq T1 \leq 10 \text{ ms}$
- $0 \leq T2 \leq 50 \text{ ms}$
- $0 \leq T3 \leq 50 \text{ ms}$
- $1 \text{ sec} \leq T4$
- $200 \text{ ms} \leq T5$
- $200 \text{ ms} \leq T6$

Notes:

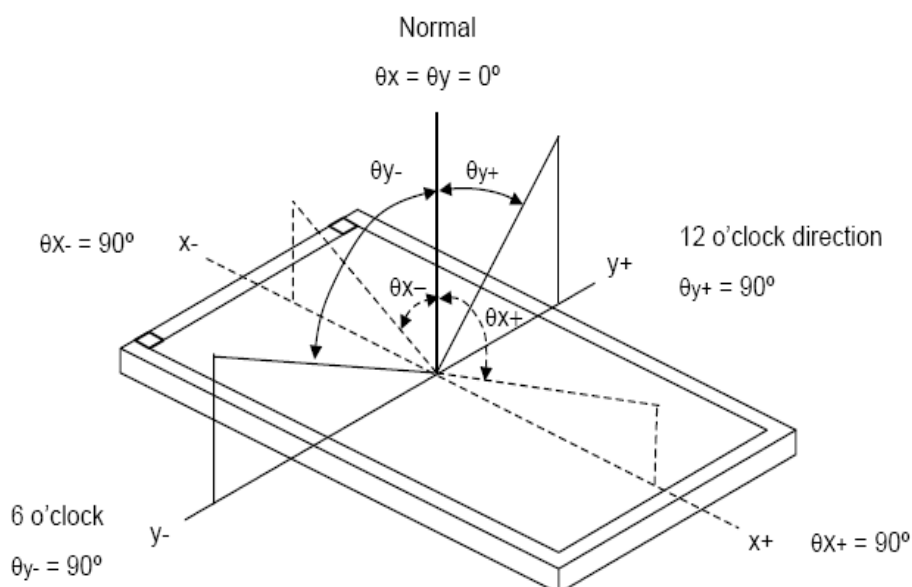
1. When the power supply VDD is 0V, keep the level of input signals on the low or keep high impedance.
2. Do not keep the interface signal high impedance when power is on.
3. Back Light must be turn on after power for logic and interface signal are valid.
4. T7 decreases smoothly, there is none re-bouncing voltage.
5. During changing the resolution or mode changing, the logic power/ back-light/interface signal should be turned off as shown above; after the changing, power on as shown above.

### 3 Optical Specification

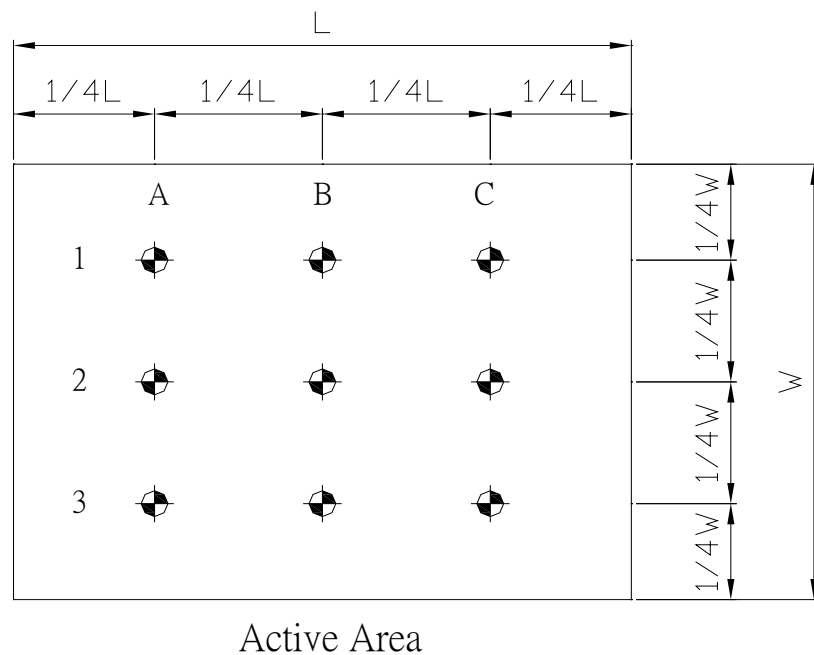
| Item                      |            | Symbol         | Condition                                  | Min.  | Typ.  | Max.  | Unit              | Note                      |
|---------------------------|------------|----------------|--------------------------------------------|-------|-------|-------|-------------------|---------------------------|
| Color chromaticity        | Red        | R <sub>x</sub> | $\theta_x=0$<br>$\theta_y=0$<br>Klein K-10 | 0.607 | 0.637 | 0.667 | -                 | Test Mode:<br>(1) (2) (3) |
|                           |            | R <sub>y</sub> |                                            | 0.320 | 0.350 | 0.380 | -                 |                           |
|                           | Green      | G <sub>x</sub> |                                            | 0.254 | 0.284 | 0.314 | -                 |                           |
|                           |            | G <sub>y</sub> |                                            | 0.615 | 0.645 | 0.675 | -                 |                           |
|                           | Blue       | B <sub>x</sub> |                                            | 0.116 | 0.146 | 0.176 | -                 |                           |
|                           |            | B <sub>y</sub> |                                            | 0.020 | 0.050 | 0.080 | -                 |                           |
|                           | White      | W <sub>x</sub> |                                            | 0.274 | 0.304 | 0.334 | -                 |                           |
|                           |            | W <sub>y</sub> |                                            | 0.315 | 0.345 | 0.375 | -                 |                           |
| Center Luminance of White |            | L <sub>c</sub> | $\theta_x=0$                               |       | 1600  |       | cd/m <sup>2</sup> |                           |
| Uniform                   |            | L <sub>u</sub> | $\theta_y=0$<br>BM-7                       |       | 89    |       | %                 |                           |
| Contrast Ratio            |            | CR             | $\theta_x=0$                               |       | 900:1 |       | -                 | Test Mode:<br>(1) (4)     |
| Color Saturation          |            | NTSC           | $\theta_y=0$<br>Klein K-10                 |       | 81    |       | %                 |                           |
| Viewing Angle             | Horizontal | $\theta_{x+}$  | $CR \geq 10$                               |       | 89    |       | Deg               | Test Mode:<br>(1) (3)     |
|                           |            | $\theta_{x-}$  |                                            |       | 89    |       |                   |                           |
|                           | Vertical   | $\theta_{y+}$  |                                            |       | 89    |       |                   |                           |
|                           |            | $\theta_{y-}$  |                                            |       | 89    |       |                   |                           |

#### Test Mode :

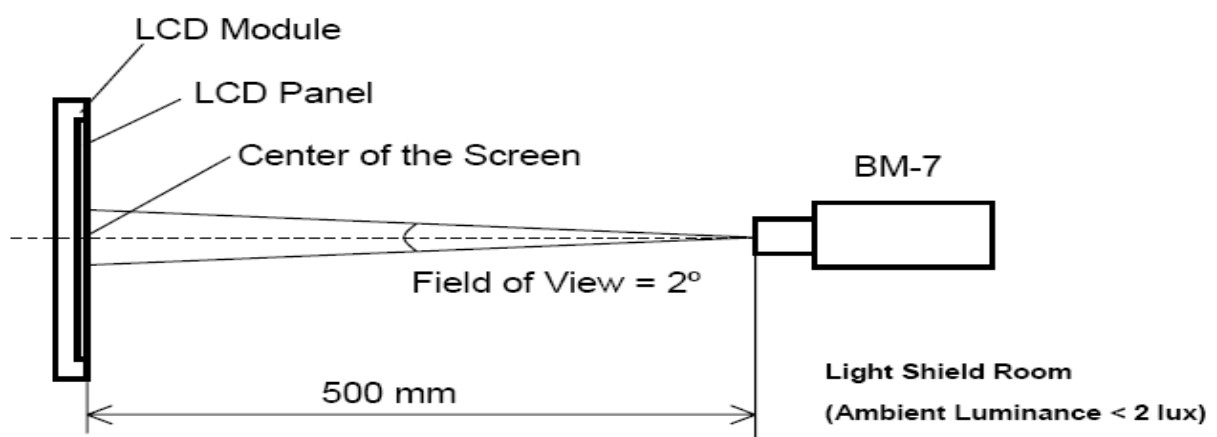
(1) Definition of Viewing Angle ( $\theta_x$  ,  $\theta_y$ ):



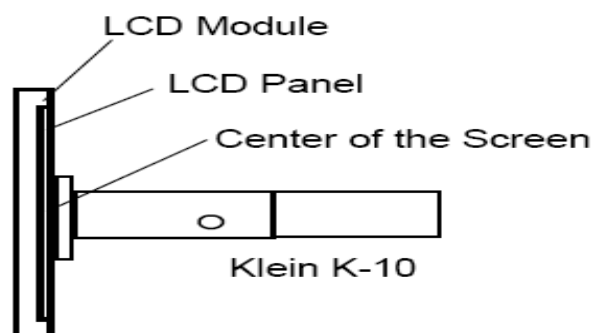
(2) Definition of Test Point:



(3) BM-7 Measurement Setup:



(4) Klein K-10 Measurement Setup:



## 4 LED Driving Board Specifications

This specification is applied to LED converter unit for LED backlight.

### 4.1 Operating Characteristics

| Item                               | Symbol            | Condition             | MIN.  | TYP.  | MAX.  | Unit | Remark |
|------------------------------------|-------------------|-----------------------|-------|-------|-------|------|--------|
| Input Voltage                      | V <sub>in</sub>   |                       | 10.0  | 12.0  | 14.0  | V    |        |
| Input Current<br>(Low Brightness)  | I <sub>inL</sub>  | Brightness = 0%       | 0.0   | ----- | ----- | mA   |        |
| Input Current<br>(High Brightness) | I <sub>inH</sub>  | Brightness = 100%     | 4.40  | 3.73  | 3.24  | A    | (1)    |
| LED Current<br>(Low Brightness)    | I <sub>outL</sub> | Brightness = 0%       | 0.0   | ----- | ----- | Arms |        |
| LED Current<br>(High Brightness)   | I <sub>outH</sub> | Brightness = 100%     | 1.00  | 1.02  | 1.04  | A    |        |
| Working Frequency                  | W_Freq            | Brightness = 100%     | 350   | 400   | 450   | KHZ  |        |
| Brightness Control                 | DC mode           |                       |       |       |       |      |        |
|                                    | V <sub>adj</sub>  | Connection of Voltage | 0.2   | ----- | 4.8   | V    | (2)    |
|                                    | PWM mode          |                       |       |       |       |      |        |
|                                    | PWM               | Connect to PWM        | 0     | ----- | 100   | %    | (3)    |
|                                    | Freq              |                       | ----- | 200   | ----- | Hz   | (4)    |
| ON/OFF Control                     | V <sub>on</sub>   | Normal Operation      | 2     | ----- | 5     | V    |        |
|                                    | V <sub>off</sub>  |                       | 0     | ----- | 0.8   | V    |        |
| Output Voltage                     | V <sub>out</sub>  | Brightness = 100%     | 40.01 | 40.12 | 40.23 | V    |        |
| Efficiency                         | η                 | Brightness = 100%     | 90.8  | 91.4  | 92.3  | %    | (5)    |

#### Remark:

- (1) this data is based on the testing result of practical input voltage, I<sub>in</sub> is measured by related V<sub>in</sub>.  
(min, typ, max)
- (2) Max brightness at V<sub>adj</sub>=0.2V. Min brightness at V<sub>adj</sub>=4.8V.
- (3) Max dimming ratio = 1:100.
- (4) Frequency can be adjusted in accordance with demand(120Hz minimum, or lights will be flickering)
- (5)  $\eta_{\max} = V_{\text{out}(\max)} * I_{\text{outH}(\max)} / V_{\text{in}(\max)} * I_{\text{inH}(\min)}$   
 $\eta_{\min} = V_{\text{out}(\min)} * I_{\text{outH}(\min)} / V_{\text{in}(\min)} * I_{\text{inH}(\max)}$

## 4.2 Connector Socket

### Input Connector:

J3(JST S9B-PH-SM3-TB or Compatible)

| PIN No | Symbol     | Description         |
|--------|------------|---------------------|
| 1      | Vin        | DC+                 |
| 2      | Vin        | DC+                 |
| 3      | Vin        | DC+                 |
| 4      | GND        | Ground              |
| 5      | GND        | Ground              |
| 6      | GND        | Ground              |
| 7      | Brightness | Brightness Control  |
| 8      | Control    | ON/OFF Control      |
| 9      | CL         | PWM or DC selection |

**Note: Pin9 is dimming method control pin, Low → DC dimming, High → PWM dimming.  
If pin9 is be used, please NC JP1.**

### Output Connector:

J1,J2(JST S2B-EH or Compatible)

| PIN No | Symbol | Description           |
|--------|--------|-----------------------|
| 1      | Output | LED High Voltage( + ) |
| 2      | Output | LED Low Voltage ( - ) |

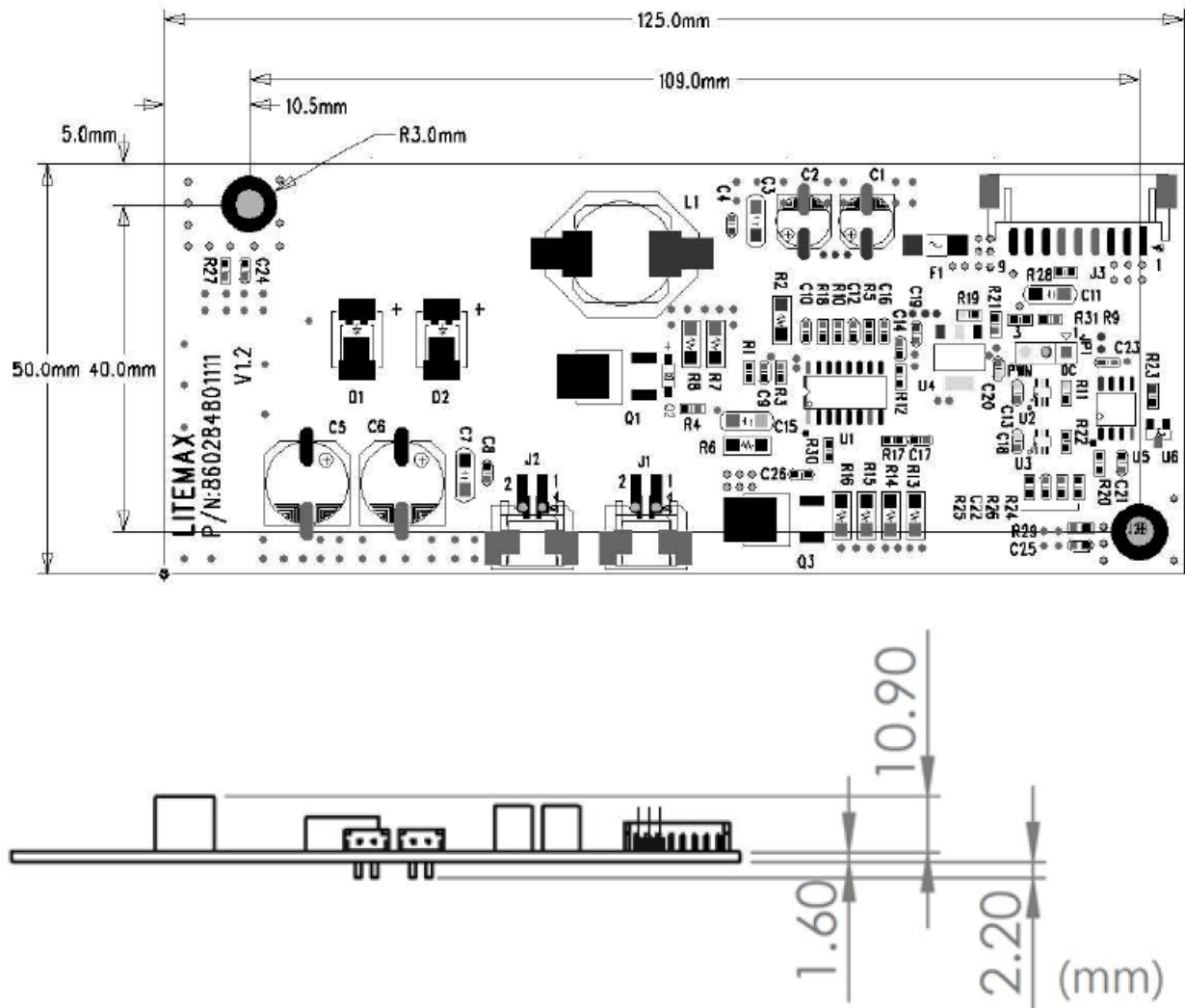
### DC or PWM Connector :JP1

| PIN No | Symbol | Description                                |
|--------|--------|--------------------------------------------|
| 1      | DC     | Close pin 1,2<br>LED driver is DC dimming  |
| 2      | GND    |                                            |
| 3      | PWM    | Close pin 2,3<br>LED driver is PWM dimming |

**Note: If you use JP1 to set DC/PWM, please NC the pin9 of J3.**

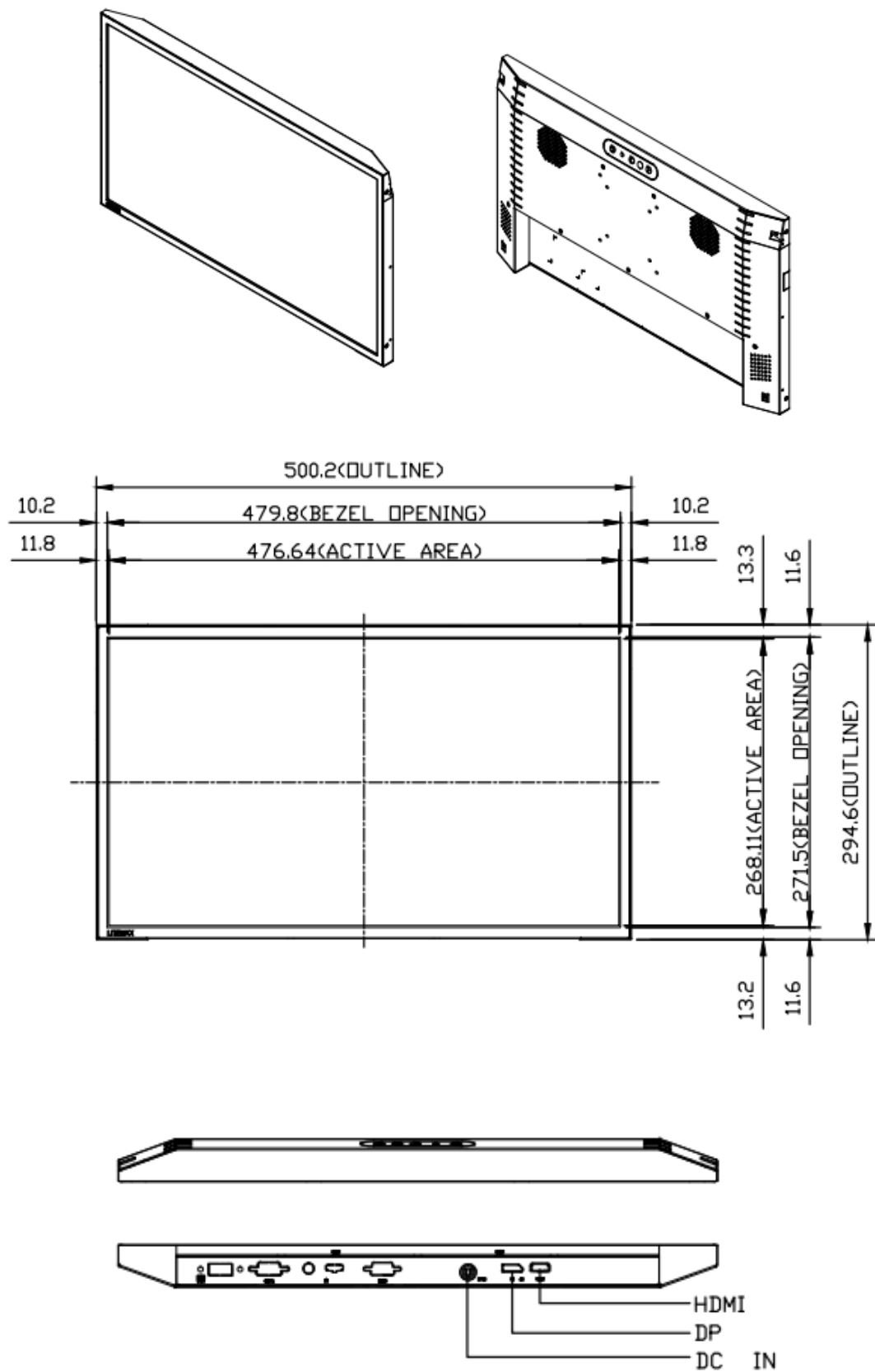
### 4.3 Mechanical Characteristics

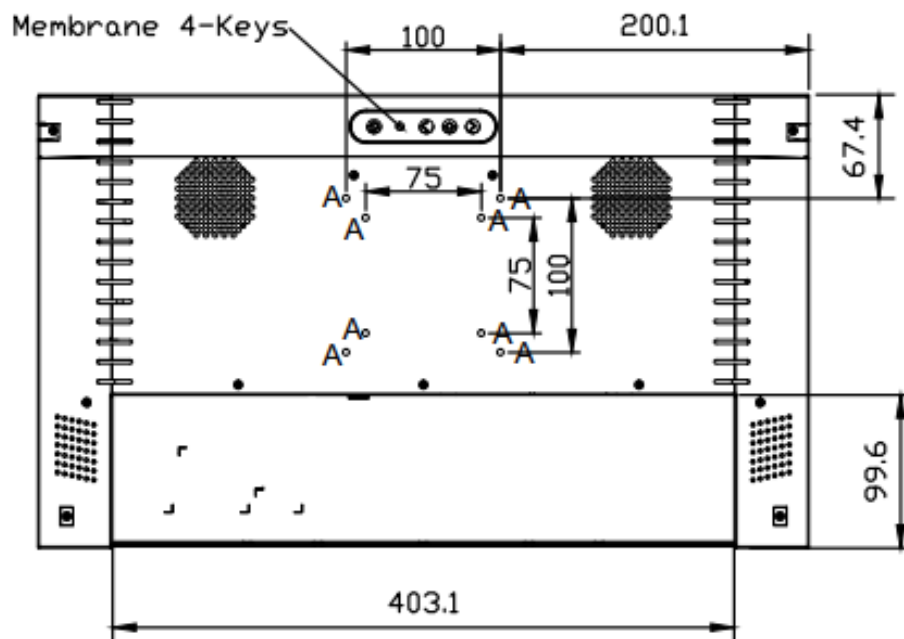
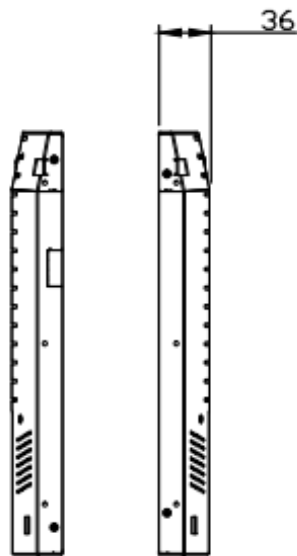
Dimension: 125mm\*50mm\*12.5mm



## 5 Mechanical Drawing

Unit: mm





NOTE :

O.D : OUTLINE DIMENSION

B.O : BEZEL OPENING

A.A : LCD ACTIVE AREA

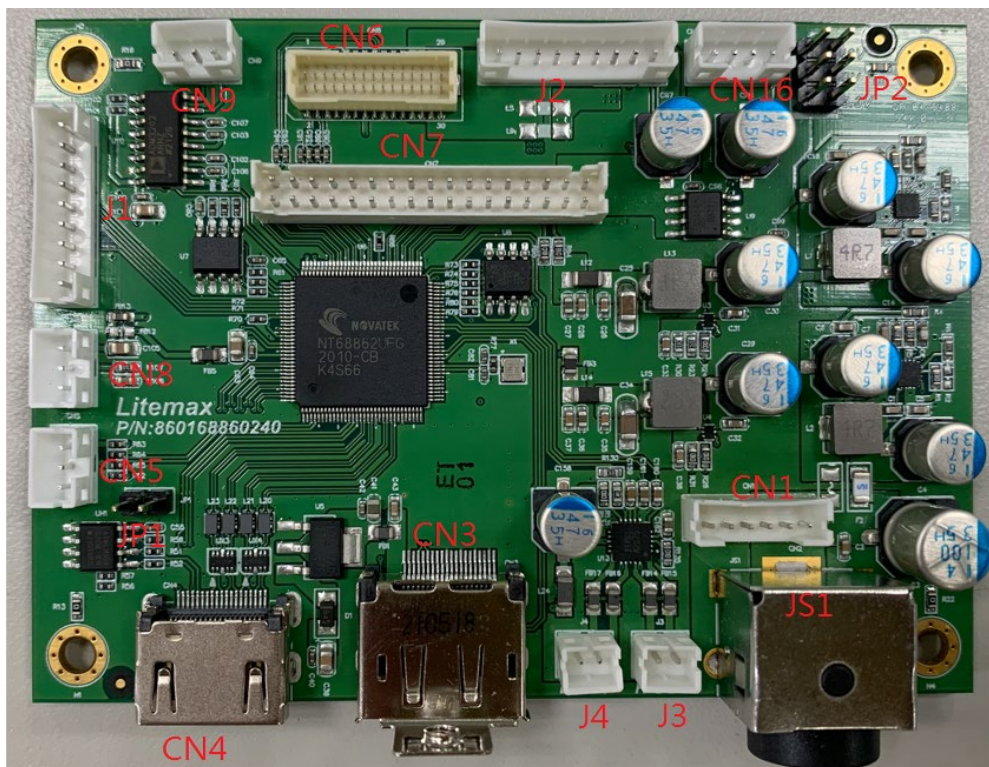
A : 8-M4\_USER\_HOLE\_MAX. DEPTH=4mm

## 6 AD68862HP Board & OSD Functions

We developed this A/D board to support industrial high brightness and commercial applications. This A/D board has many functions. It has a HDMI and Display Port input. Rev.1 is European RoHS compliant.

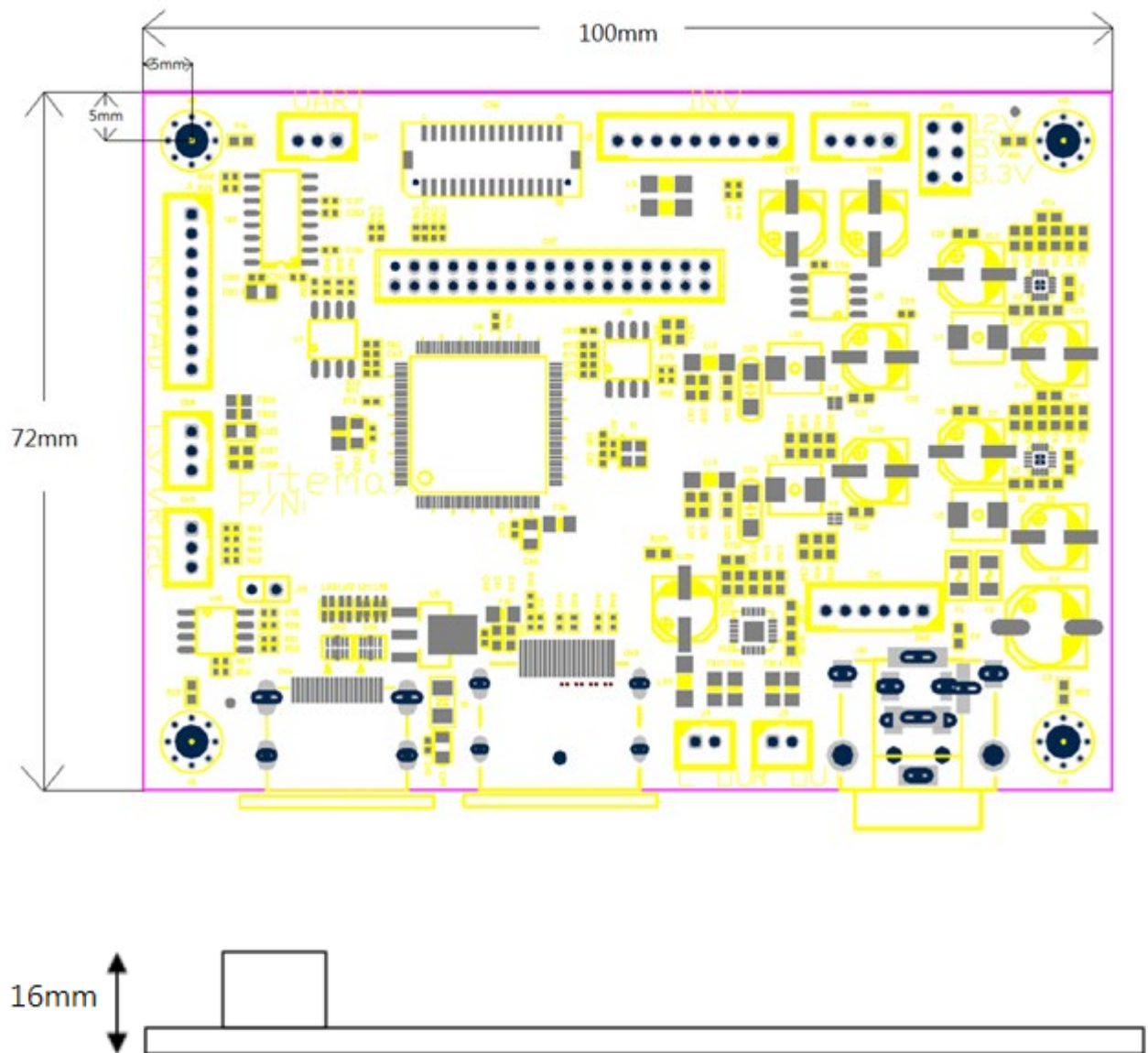
### General Description

- Max resolution 1920 x 1080 60Hz
- One DP 1.2 , supports 1920 x 1080 60Hz
- One HDMI 1.4 , supports 1920 x 1080 60Hz
- Embedded MCU with ADC port for VR, Light Sensor application. (Optional)
- Embedded OSD.
- Support panel voltage 3.3/ 5/ 12 V
- Support eDP panel.
- Support Dual/Single LVDS
- Support 2.8W speaker x 2 (Optional)
- Size 100mm\*72mm
- Support output voltage 12V(1A) or 5V(1A)



## Outline Dimensions

AD68862 100mm X 72mm



## AD68862 Board Pin Define

### **CN6:** eDP output(Wafer 1.0mm, 15\*2P)

| Pin | Function | Pin | Function   |
|-----|----------|-----|------------|
| 1   | TX0P     | 16  | TXAUX-     |
| 2   | TX0N     | 17  | TX_HPDP    |
| 3   | TX1P     | 18  | GND        |
| 4   | TX1N     | 19  | VCC        |
| 5   | GND      | 20  | VCC        |
| 6   | GND      | 21  | DIM_EDP    |
| 7   | NC       | 22  | ON/OFF_EDP |
| 8   | NC       | 23  | INVGND     |
| 9   | GND      | 24  | INVGND     |
| 10  | GND      | 25  | INVGND     |
| 11  | NC       | 26  | GND        |
| 12  | NC       | 27  | 12INV      |
| 13  | GND      | 28  | 12INV      |
| 14  | GND      | 29  | 12INV      |
| 15  | TXAUX+   | 30  | 12INV      |

### **CN7:** LVDS output(Wafer 2.0mm,17x2P)

| Pin | Function | Pin | Function |
|-----|----------|-----|----------|
| 1   | RXO0-    | 18  | RXE1+    |
| 2   | RXO0+    | 19  | RXE2-    |
| 3   | RXO1-    | 20  | RXE2+    |
| 4   | RXO1+    | 21  | RXEC-    |
| 5   | RXO2-    | 22  | RXEC+    |
| 6   | RXO2+    | 23  | RXE3-    |
| 7   | RXOC-    | 24  | RXE3+    |
| 8   | RXOC+    | 25  | NC       |
| 9   | RXO3-    | 26  | NC       |
| 10  | RXO3+    | 27  | GND      |
| 11  | NC       | 28  | GND      |
| 12  | NC       | 29  | +3.3V    |
| 13  | GND      | 30  | GND      |
| 14  | GND      | 31  | VCC      |
| 15  | RXE0-    | 32  | VCC      |
| 16  | RXE0+    | 33  | VCC      |
| 17  | RXE1-    | 34  | VCC      |

**CN3: DP input**

| Pin | Function    | Pin | Function    |
|-----|-------------|-----|-------------|
| 1   | ML_Lane3(n) | 11  | GND         |
| 2   | GND         | 12  | ML_Lane0(p) |
| 3   | ML_Lane3(p) | 13  | CONFIG1     |
| 4   | ML_Lane2(n) | 14  | CONFIG2     |
| 5   | GND         | 15  | AUX_CH(p)   |
| 6   | ML_Lane2(p) | 16  | GND         |
| 7   | ML_Lane1(n) | 17  | AUX_CH(n)   |
| 8   | GND         | 18  | Hot_Plug    |
| 9   | ML_Lane1(p) | 19  | Return      |
| 10  | ML_Lane0(n) | 20  | DP_PWR      |

**CN4: HDMI input**

| Pin | Function | Pin | Function    | Pin | Function |
|-----|----------|-----|-------------|-----|----------|
| 1   | RX2+     | 9   | RX0-        | 17  | GND      |
| 2   | GND      | 10  | TMDS Clock+ | 18  | HDMI +5V |
| 3   | RX2-     | 11  | HDMI DET    | 19  | HPD      |
| 4   | RX1+     | 12  | TMDS Clock- |     |          |
| 5   | GND      | 13  | NC          |     |          |
| 6   | RX1-     | 14  | NC          |     |          |
| 7   | RX0+     | 15  | HDMI_SCL    |     |          |
| 8   | GND      | 16  | HDMI_SDA    |     |          |

**CN1: Power input (Wafer 2.0mm pitch 6 pin)**

| Pin | Function    | Pin | Function |
|-----|-------------|-----|----------|
| 1   | Power Input | 4   | GND      |
| 2   | Power Input | 5   | GND      |
| 3   | Power Input | 6   | GND      |

**JS1: Power input (Power Din 4 pin)**

| Pin | Function    | Pin | Function |
|-----|-------------|-----|----------|
| 1   | Power Input | 3   | GND      |
| 2   | Power Input | 4   | GND      |

**CN2: Power input (Power Jack 3 pin)**

| Pin | Function    | Pin | Function |
|-----|-------------|-----|----------|
| 1   | Power Input | 3   | GND      |
| 2   | GND         |     |          |

**CN16: Power output (Wafer 2.0mm pitch 4 pin)**

| Pin | Function | Pin | Function |
|-----|----------|-----|----------|
| 1   | +5V(1A)  | 3   | +12V(1A) |
| 2   | GND      | 4   | GND      |

**J2: Backlight Power and Control (Wafer 2.0mm pitch 9 pin)**

| Pin | Function   | Pin | Function    |
|-----|------------|-----|-------------|
| 1   | DC/PWM SEL | 6   | GND         |
| 2   | Enable     | 7   | 12V (Note3) |
| 3   | Dimming    | 8   | 12V (Note3) |
| 4   | GND        | 9   | 12V (Note3) |
| 5   | GND        |     |             |

Note3: Pin 7,8,9 are for 12V version only. If you choose 24V version, these 3 pin are NC.

**J1: Keypad (Wafer 2.0mm pitch 9 pin)**

| Pin | Function  | Pin | Function |
|-----|-----------|-----|----------|
| 1   | POWER KEY | 6   | MENU KEY |
| 2   | GREEN LED | 7   | NC       |
| 3   | RED LED   | 8   | GND      |
| 4   | DOWN KEY  | 9   | NC       |
| 5   | UP KEY    |     |          |

**CN8: Light sensor (Wafer 2.0mm pitch 3 pin)**

| Pin | Function   | Pin | Function |
|-----|------------|-----|----------|
| 1   | 3.3V       | 3.  | GND      |
| 2   | Sensor Out |     |          |

**JP2: Panel power selection (2.54mm pitch 2x3 jump)**

| Pin       | Function | Pin       | Function |
|-----------|----------|-----------|----------|
| 1-2 close | 3.3V     | 5-6 close | 12V      |
| 3-4 close | 5V       |           |          |

**CN9: UART (Wafer 2.0mm pitch 3 pin)**

| Pin | Function | Pin | Function |
|-----|----------|-----|----------|
| 1   | TX       | 3   | GND      |
| 2   | RX       |     |          |

**CN5: I2C (Wafer 2.0mm pitch 3 pin)**

| Pin | Function | Pin | Function |
|-----|----------|-----|----------|
| 1   | SDA      | 3   | GND      |
| 2   | SCL      |     |          |

**J3: Audio out R (Wafer 2.0mm pitch 2 pin)(2.8W 4ΩLoad)**

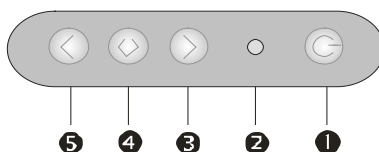
| Pin | Function | Pin | Function |
|-----|----------|-----|----------|
| 1   | ROUTP    | 2   | ROUTN    |

**J4: Audio out L (Wafer 2.0mm pitch 2 pin) (2.8W 4ΩLoad)**

| Pin | Function | Pin | Function |
|-----|----------|-----|----------|
| 1   | LOUTP    | 2   | LOUTN    |

## 6.1 OSD Function

### MEMBRANE CONTROL BUTTOM



- **POWER SWITCH:** Pushing the power switch will turn the monitor on. Pushing it again to turn the monitor off.
- **Power LED:** Power ON-Green / Power off-No.
- **Up Key >:** Increase item number or value of the selected item.
- **Menu Key:** Enter to the OSD adjustment menu. It also used for go back to previous menu for sub-menu, and the change data don't save to memory.
- **Down Key <:** Decrease item number or item value when OSD is on.

### Screen Adjustment Operation Procedure

#### 1. Entering the screen adjustment

The setting switches are normally at stand-by. Push the **Menu Key** once to display the main menu of the screen adjustment. The adjustable items will be displayed in the main menu.

#### 2. Entering the settings

Use the **Down Key <** and **Up Key >** buttons to select the desired setting icon and push the **SELECT** button to enter sub-menu.

#### 3. Change the settings

After the sub-menu appears, use the **Down Key <** and **Up Key >** buttons to change the setting values.

#### 4. Save

After finishing the adjustment, push the **SELECT** button to memorize the setting.

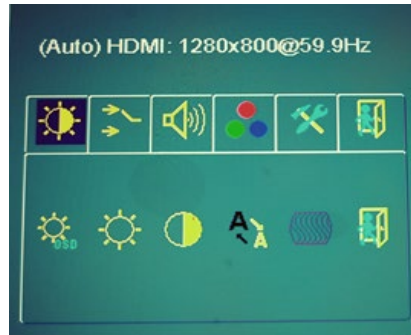
#### 5. Return & Exit the main menu

Exit the screen adjustment; push the "MENU" button. When no operation is done around 10 sec (default OSD timeout), it goes back to the stand-by mode and no more switching is accepted except MENU to restart the setting.

## 6.2 OSD Menu

Here are some instructions for you to use the OSD (On Screen Display). By pressing the “menu”, you will see the below picture.

Timing shows resolution and V-frequency of the panel. This 2 information is not changeable by user.



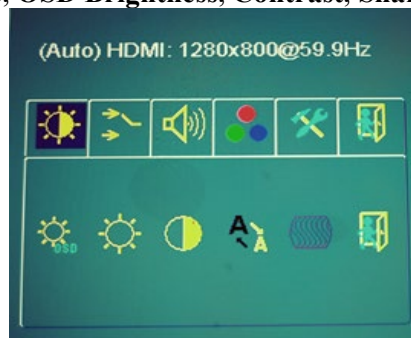
There are 6 sub menus within the OSD user interface:

**Brightness, Signal Select, Sound, Color, Tools, and Exit.**



### Brightness

When you press the “menu” button, you enter the “Brightness” sub directory. In this directory, you will see 6 selections: **Brightness Mode, OSD Brightness, Contrast, Sharpness, Auto Tune, Exit.**



### Brightness Mode :

press “menu” once, you can go into the Brightness Mode.



### VR: (OPTION)

press this Icon to activate the VR control of brightness.



### Ambient light sensor: (OPTION)

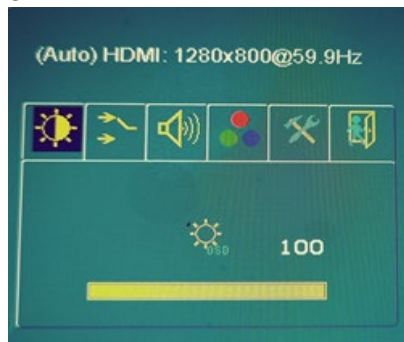
press this Icon, must to accompany with Litemax ambient light sensor to auto dimming.





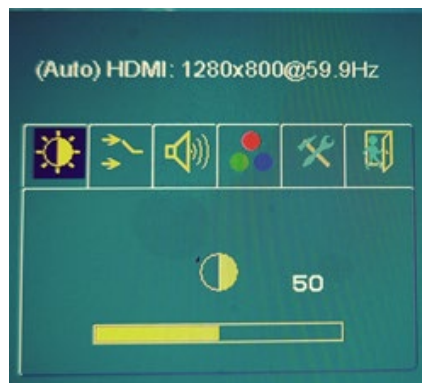
### OSD Brightness :

Press the “menu” once, to adjust the brightness. Press “left” to dim down the brightness to “0”, press “right” to increase the brightness to “100”



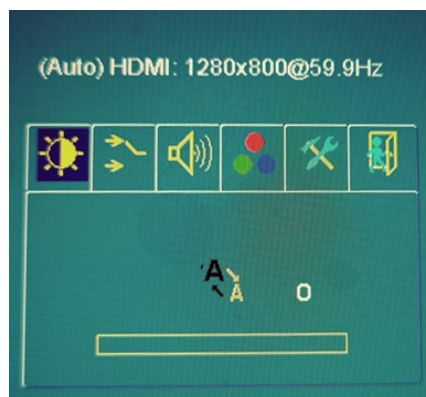
### Contrast :

Press “Menu” once, you can adjust the contrast from “0” to “100” by pressing the “Left” and “Right”.



### Sharpness :

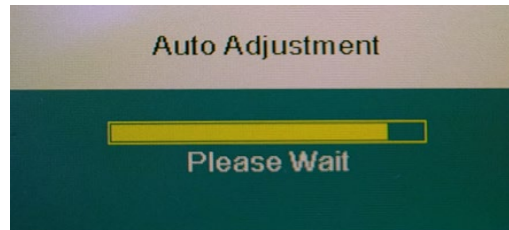
Press “Menu” once, you can adjust the Sharpness from “0” to “4” by pressing the “Left” and “Right”.





**Auto Tune :** (VGA only)

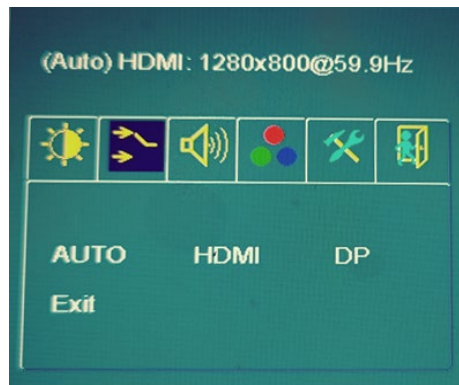
Press “Menu” once, you can activate the Auto Tune.



**Exit:** back to the beginning menu.



**Input Signal:** (default auto detect)



**AUTO**

**AUTO:** auto detect

**HDMI**

**HDMI:** HDMI input

**DP**

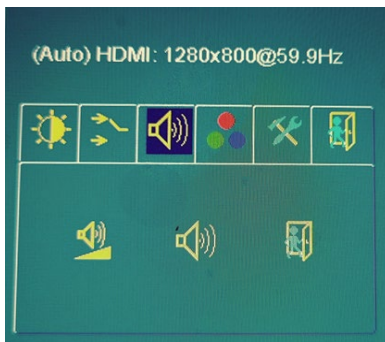
**DP:** DisplayPort input

**Exit**

**Exit:** back to the beginning menu.



## Audio:



**Audio Volume:** Audio volume adjustment, from “0” to “100”.



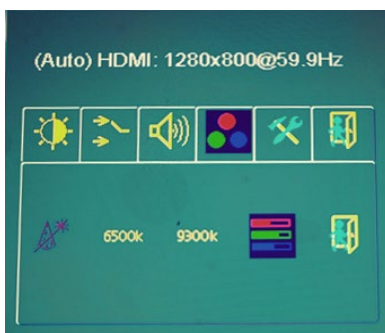
**UnMute/Mute:** You can mute the speaker by pressing this option.



**Exit:** back to the beginning menu.



## Color:



**Auto Color (VGA only) :**

By navigating over to the “Auto Color” option, optimal color performance is invoked.



**Color Tempture\_6500K:** Warm color scheme.



**Color Tempture\_9300K:** Cold color scheme.



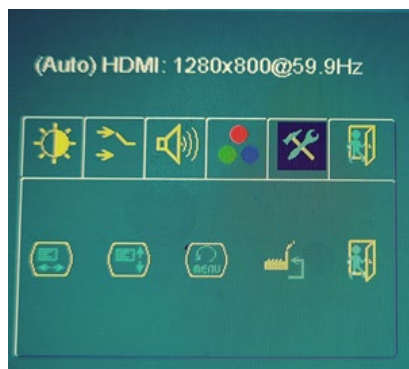
**Color Temperature User Define:** Default is 100 for “R”, “G”, and “B”. Range is “0” to “255”.



**Exit:** back to the beginning menu.



## Other Setting:



**HPos:** You can shift the screen horizontally using this function.



**VPos:** You can shift the screen vertically using this function.



**Rotation:** You can rotate the screen to 0° (No) 、 270° (Yes).



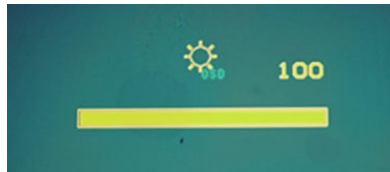
**Load Default:** You can load the default data using this function.



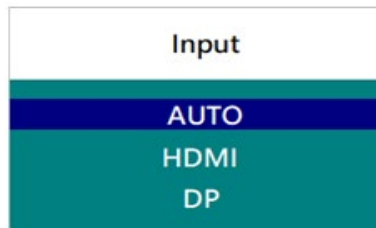
**Exit:** back to the beginning menu.

### < Hot Key >

Left click to display brightness adjustment.

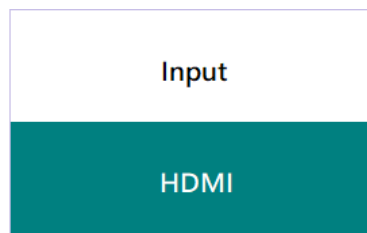


Right click to display Input Source Menu.



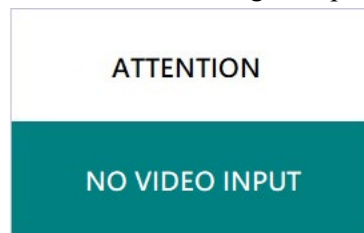
### <Others>

Signal Information will be displayed after powering on or switching the signal.



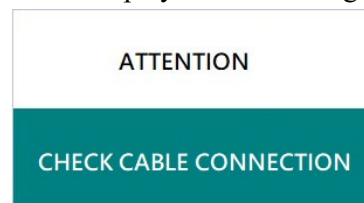
(Signal Information)

**NO VIDEO INPUT** will be displayed when there is no signal input.



(No Video Input)

**CHECK CABLE CONNECTION** will be displayed when the signal cable is not connected.



(Check Cable Connection)

## **7 Precautions**

### **7.1 Handling and Mounting Precautions**

- (1) The module should be assembled into the system firmly by using every mounting hole. Do not apply rough force such as bending or twisting to the LCD during assembly.
- (2) You should consider the mounting structure so that uneven force (ex. Twisted stress, Concentrated stress) is not applied to the module. And the case on which a module is mounted should have sufficient strength so that external force is not transmitted directly to the LCD module.
- (3) While assembling or installing LCD modules, it can only be in the clean area. The dust and oil may cause electrical short or damage the polarizer.
- (4) Use fingerstalls or soft gloves in order to keep display clean during the incoming inspection and assembly process.
- (5) Do not press or scratch the surface harder than a HB pencil lead on the panel because the polarizer is very soft and easily be scratched.
- (6) Please attach the surface transparent protection film to the surface in order to protect the polarizer. Transparent protection film should have sufficient strength in order to resist external force.
- (7) When the transparent protection film is peeled off, static electricity is generated between the film and polarizer. This should be peeled off slowly and carefully by people who are electrically grounded and with well ion-blown equipment or in such a condition, etc.
- (8) If the surface of the polarizer is dirty, please clean it by some absorbent cotton or soft cloth. Do not use Ketone type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanently damage the polarizer due to chemical reaction.
- (9) Wipe off water droplets or oil immediately. Staining and discoloration may occur if they left on panel for a long time.
- (10) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contacting with hands, legs or clothes, it must be washed away thoroughly with soap.
- (11) Protect the LCD module from static electricity, it may cause damage to the C-MOS Gate Array IC.
- (12) Do not disassemble the module.
- (13) Do not pull or fold the lamp wire.
- (14) Pins of I/F connector should not be touched directly with bare hands.

### **7.2 Storage Precautions**

- (1) High temperature or humidity may reduce the performance of LCD module. Please store LCD module within the specified storage conditions.
- (2) If possible store them in a dark place. Do not expose the module to sunlight or fluorescent light. Keep the temperature between 5°C and 35°C at normal humidity.
- (3) It is dangerous that moisture come into or contacted the LCD module, because the moisture may damage LCD module when it is operating.
- (4) 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.

### 7.3 Operation Precautions

- (1) Do not pull the I/F connector in or out while the LCD module is operating.
- (2) Always follow the correct power on/off sequence when LCD module is connecting and operating. This can prevent the CMOS LSI chips from damage during latch-up.
- (3) Response time depends on the temperature. (In lower temperature, it becomes longer.)
- (4) Brightness depends on the temperature. (In lower temperature, it becomes lower.)
- (5) Be careful for condensation at sudden temperature change. Condensation makes damage to polarizer or electrical contacted parts. And after fading condensation, smear or spot will occur.
- (6) Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods are very important to minimize the interference.
- (7) Please do not give any mechanical and/or acoustical impact to module. Otherwise, module can't be operated its full characteristics perfectly.
- (8) Since a module is composed of electronic circuits, it is not strong to electrostatic discharge. Make certain that treatment persons are connected to ground through wrist band etc. And don't touch interface pin directly.
- (9) Do not display the fixed pattern for a long time because it may cause image sticking.
- (10) In order to prevent image sticking, periodical power-off or screen save is needed after fixed pattern long time display.
- (11) Black image or moving image is strongly recommended as a screen save.
- (12) Static information display recommended to use with moving image. Cycling display between 10 minutes' information (static) display and 10 seconds' moving image.
- (13) Background and character (image) color change is recommended. Use different colors for background and character, respectively. And change colors themselves periodically.
- (14) LCD system is required to place in well-ventilated environment. Adapting active cooling system is highly recommended.
- (15) Product reliability and functions are only guaranteed when the product is used under right operation usages.
- (16) If product will be used in extreme conditions, such as high temperature/ humidity, shock and vibration it is strongly recommended to contact Litemax for filed application engineering advice. Otherwise, its reliability and function may not be guaranteed. Extreme conditions are commonly found at airports, transit stations, taxi-top, in vehicle and controlling systems.

## 8 Disclaimer

All information in this document are subject to change, please constant LiteMax for any new design.