



|                                                |  |      |                                  |                   |
|------------------------------------------------|--|------|----------------------------------|-------------------|
| Product Description: T400XW01_V0 TFT-LCD PANEL |  |      |                                  |                   |
|                                                |  |      |                                  |                   |
| AUO Model Name: T400XW01 V0 (97.40T01.000)     |  |      |                                  |                   |
| Customer Part No/Project Name:                 |  |      |                                  |                   |
| Customer Signature                             |  | Date | AUO                              | Date              |
|                                                |  |      | Approved By: <i>Pichun Chen</i>  | <i>11/29/06</i>   |
|                                                |  |      | Reviewed By: <i>Hong-Hong-Ju</i> | <i>11/26/2006</i> |
|                                                |  |      | Prepared By: <i>Jackie Chen</i>  | <i>11/8</i>       |



2006/11/30

## **Product Specifications**

**40" WXGA Color TFT-LCD Module**

**Model Name: T400XW01. V0**

**()**

**() Preliminary Specifications**

**(\*) Final Specifications**



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## Record of Revision

[illegible]



## 1. General Description

This specification applies to the 40.0 inch Color TFT-LCD Module T400XW01 V0. This LCD module has a TFT active matrix type liquid crystal panel 1366x768 pixels, and diagonal size of 40.0 inch. This module supports 1366x768 HD-Ready mode.

Each pixel is divided into Red, Green and Blue sub-pixels or dots which are arranged in vertical stripes. Gray scale or the brightness of the sub-pixel color is determined with a 8-bit gray scale signal for each dot.

The T400XW01 V0 has been designed to apply the 8-bit 1 channel LVDS interface method. It is intended to support displays where high brightness, wide viewing angle, high color saturation, and high color depth are very important.

### \* General Information

| Items                  | Specification                  | Unit   | Note               |
|------------------------|--------------------------------|--------|--------------------|
| Active Screen Size     | 40.00                          | inch   |                    |
| Display Area           | 885.168(H) x 497.00(V)         | mm     |                    |
| Outline Dimension      | 952.0(H) x 551.0 (V) x 48.4(D) | mm     | With Balance board |
| Driver Element         | a-Si TFT active matrix         |        |                    |
| Display Colors         | 8 bit, 16.7M                   | Colors |                    |
| Number of Pixels       | 1366 x 768                     | Pixel  |                    |
| Pixel Pitch            | 0.648(H) x 0.648(W)            | mm     |                    |
| Pixel Arrangement      | RGB vertical stripe            |        |                    |
| Display Operation Mode | Transmissive, Normally Black   |        |                    |
| Surface Treatment      | Hard-Coating (3H), Anti-Glare  |        |                    |

## 2. Absolute Maximum Ratings

The following are maximum values that, if exceeded, may cause permanent damage to the device.

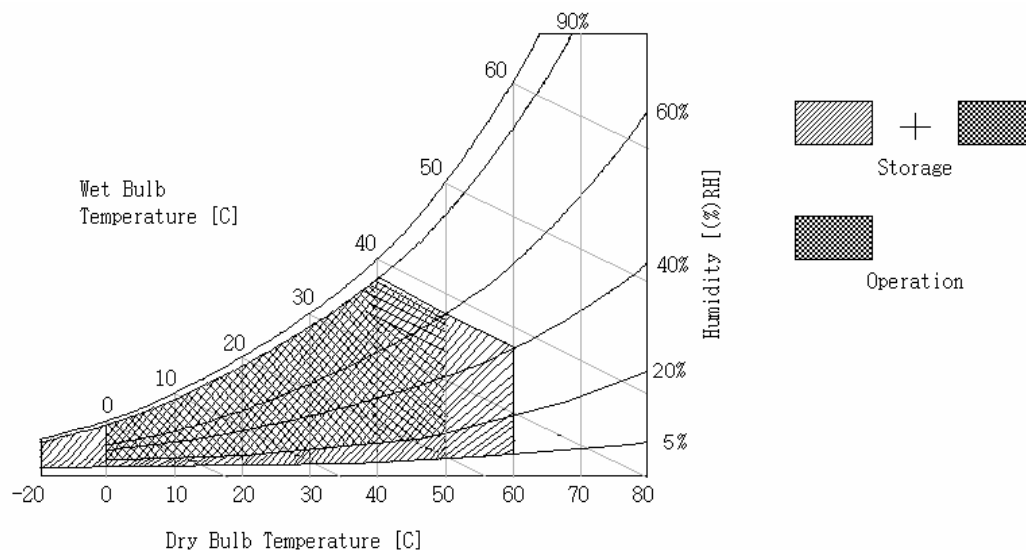
| Item                    | Symbol          | Min  | Max | Unit   | Note |
|-------------------------|-----------------|------|-----|--------|------|
| Logic/LCD Drive Voltage | V <sub>cc</sub> | -0.3 | 6   | [Volt] | [1]  |
| Input Voltage of Signal | V <sub>in</sub> | -0.3 | 4   | [Volt] | [1]  |
| Operating Temperature   | T <sub>OP</sub> | 0    | 50  | [°C]   | [2]  |
| Operating Humidity      | H <sub>OP</sub> | 10   | 90  | [%RH]  | [2]  |
| Storage Temperature     | T <sub>ST</sub> | -20  | 65  | [°C]   | [2]  |
| Storage Humidity        | H <sub>ST</sub> | 10   | 90  | [%RH]  | [2]  |

Note 1: Duration = 50msec

Note 2 : Maximum Wet-Bulb should be 39°C and No condensation.

Note 3: Temperature and relative humidity range is shown below

- Humidity 90%RH Max (T<sub>a</sub> ≤ 40°C)
- Wet-bulb temperature ≤ 39°C.(T<sub>a</sub> > 40°C)
- No condensation



### 3. Electrical Characteristics

The T400XW01 V1 requires two power inputs.

1. 1<sup>st</sup> input power: for TFT-LCD Module driving.
2. 2<sup>nd</sup> input power: for the BLU driving, (powered inverter)

#### 3-1 TFT-LCD Module

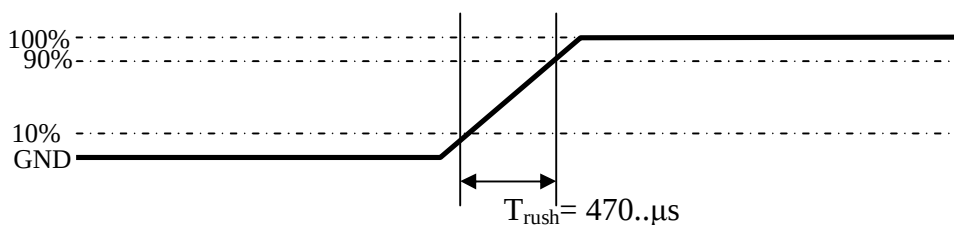
(Ta=25±2°C)

| Parameter                  |                                           | Symbol                 | Values |     |     | Unit              | Notes |
|----------------------------|-------------------------------------------|------------------------|--------|-----|-----|-------------------|-------|
|                            |                                           |                        | Min    | Typ | Max |                   |       |
| Power Supply Input Voltage |                                           | V <sub>CC</sub>        | 4.5    | 5   | 5.5 | V <sub>dc</sub>   |       |
| Power Supply Input Current |                                           | I <sub>CC</sub>        | -      | 1.4 |     | A                 | [1]   |
| Power Consumption          |                                           | P <sub>c</sub>         | -      | 7   |     | Watt              | [1]   |
| Inrush Current             |                                           | I <sub>RUSH</sub>      | -      |     | 4   | A <sub>peak</sub> | [2]   |
| LVDS Interface             | Differential Input High Threshold Voltage | V <sub>TH</sub>        |        |     | 100 | mV                | [3]   |
|                            | Differential Input Low Threshold Voltage  | V <sub>TL</sub>        | -100   |     |     | mV                | [3]   |
|                            | Common Input Voltage                      | V <sub>ICM</sub>       | 1.0    | 1.2 | 1.5 | V                 |       |
| CMOS Interface             | Input High Threshold Voltage              | V <sub>IH</sub> (High) | 2.7    |     | 3.3 | V <sub>dc</sub>   |       |
|                            | Input Low Threshold Voltage               | V <sub>IL</sub> (Low)  | 0      |     | 0.6 | V <sub>dc</sub>   |       |

#### Note:

1. Testing condition is shown in table and figure below for electrical characteristic measurement:

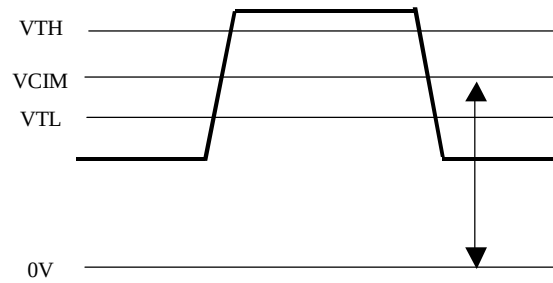
|                               | Symbol            | Value | Units | Note               |
|-------------------------------|-------------------|-------|-------|--------------------|
| Input Voltage                 | V <sub>CC</sub>   | 5     | Volt  |                    |
| Vertical Frequency            | f <sub>v</sub>    | 60    | Hz    |                    |
| Frequency of Clock            | f <sub>CLK</sub>  | 65    | MHz   |                    |
| Inrush Current                | I <sub>rush</sub> | 4     | A     |                    |
| Time period with rush current | Δ t               | 470   | us    | Shown in Fig.1     |
| Common input Voltage          | V <sub>ICM</sub>  |       | V     |                    |
| Test Pattern level            | Level             | L255  |       | L255 White Pattern |



**Figure 1: Measurement of I<sub>rush</sub>**

2. Environment condition for electrical characteristic measurement::  
 Temperature and relative humidity range is shown below:
  - A. Humidity 90%RH Max (Ta ≤ 40°C)
  - B. Wet-bulb temperature ≤ 39°C.(Ta > 40°C)
  - C. No condensation

3. Measurement of LVDS differential voltage is shown in Figure 2.



**Figure 2 : LVDS Differential Voltage**



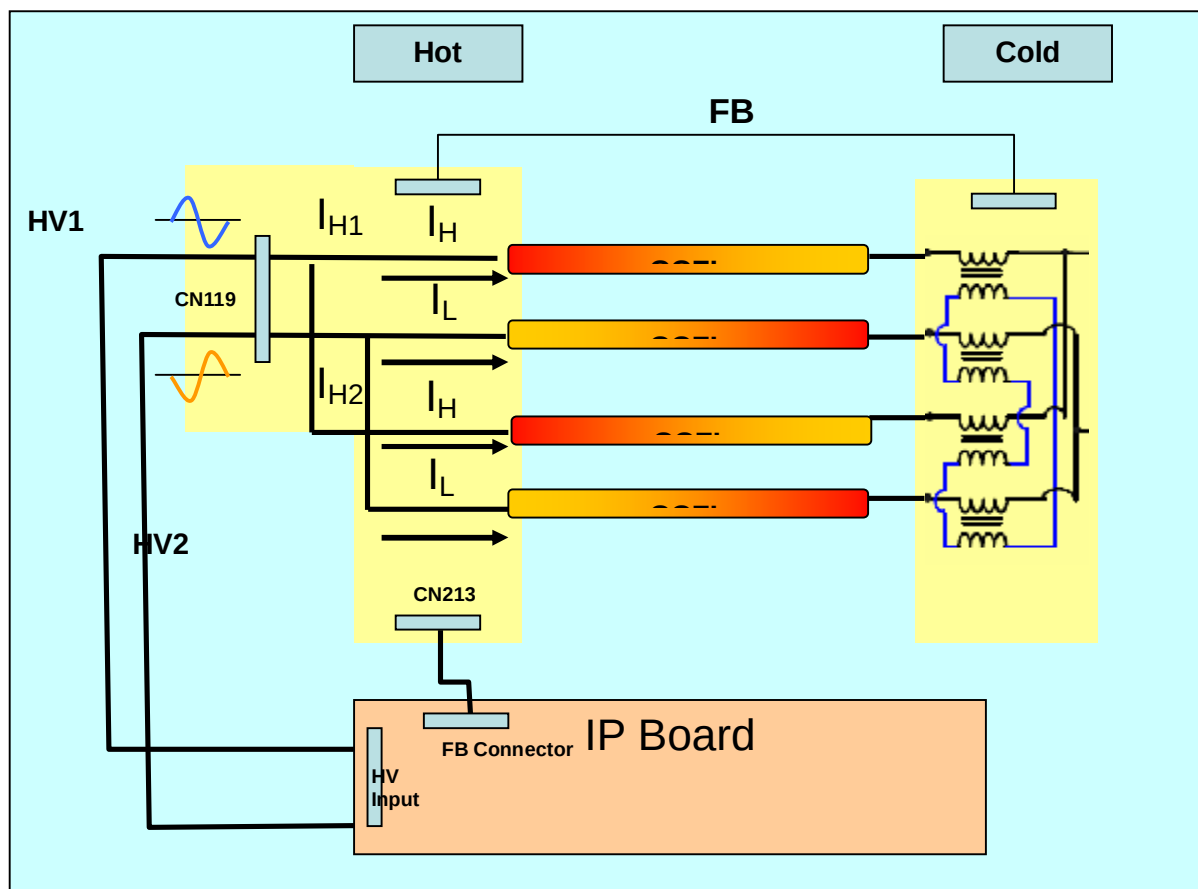
### 3-2 BACKLIGHT UNIT

(Ta=25±2°C)

| Parameter    | Symbol         | Value |      |     | Units | Note                                     |
|--------------|----------------|-------|------|-----|-------|------------------------------------------|
|              |                | Min   | Typ. | Max |       |                                          |
| Lamp Voltage | V <sub>L</sub> |       | 1475 |     |       |                                          |
| Lamp current | P <sub>L</sub> | 150   | 165  | 180 |       | Typical value is for defining brightness |
| Life time    | L <sub>L</sub> | 50000 |      |     |       |                                          |

**Note:**

1. Do not attach a conducting tape to lamp connecting wire. If the lamp wire attach to conducting tape, TFT-LCD Module have a low luminance and the inverter has abnormal action because leakage current occurs between lamp wire and conducting tape.
2. The performance of the Lamp in LCM, for example lifetime or brightness, is extremely influenced by the input signal of Integrated Power board(I/P board). So all the parameters of integrated power board must be carefully designed so as not to produce too much leakage current and loading. When you design or order one New power board, please inform AUO and double check if the performance will be influenced by different balance board. When you confirm it, the LCD Assembly should be operated in the same condition as installed in your instrument.





## 4. INPUT TERMINAL PIN ASSIGNMENT

### 4-1 TFT-LCD Module

- LCD connector (CN3): JAE FI-E30S-HF

Mating connector:

| No | Signal          |
|----|-----------------|
| 1  | NC              |
| 2  | NC              |
| 3  | NC              |
| 4  | GND             |
| 5  | Rx0-            |
| 6  | Rx0+            |
| 7  | GND             |
| 8  | Rx1-            |
| 9  | Rx1+            |
| 10 | GND             |
| 11 | Rx2-            |
| 12 | Rx2+            |
| 13 | GND             |
| 14 | RxCLK-          |
| 15 | RxCLK+          |
| 16 | GND             |
| 17 | Rx3-            |
| 18 | Rx3+            |
| 19 | GND             |
| 20 | NC              |
| 21 | LVDS Option (3) |
| 22 | N.C             |
| 23 | GND             |
| 24 | GND             |
| 25 | GND             |
| 26 | Vcc (+5V)       |
| 27 | Vcc (+5V)       |
| 28 | Vcc(+5V)        |
| 29 | Vcc (+5V)       |
| 30 | Vcc (+5V)       |

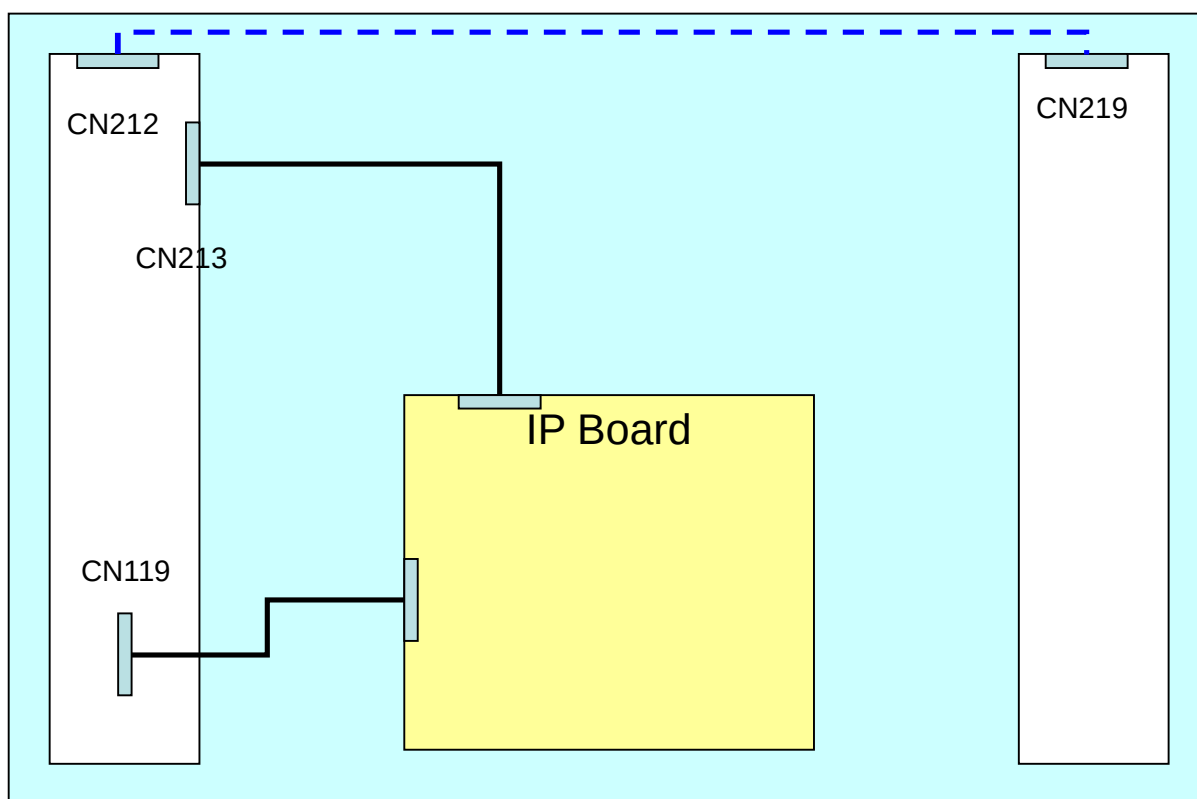
**Note:**

1. All GND (ground) pins should be connected together and should also be connected to the LCD's metal frame. All Vcc (power input) pins should be connected together.
2. NC Only – Pull High or Low is not allowed

## 4-2 Balance board UNITS

### 4-2-1 Hot Board unit

|                        | Connector | PIN | Symbol | Description              | I/O    |
|------------------------|-----------|-----|--------|--------------------------|--------|
| High Voltage connector | CN119     | 1   | HV1    | +High Voltage            | Input  |
|                        |           | 2   | HV2    | - High Voltage           | Input  |
| Feedback Connector     | CN213     | 1   | VDD    | Supply Voltage           | Input  |
|                        |           | 2   | FB     | Current feedback control | Output |
|                        |           | 3   | GND    | GND                      | -      |
|                        |           | 4   | OLP    | Open Lamp Protection     | Output |
|                        |           | 5   | LD     | Lamp detector            | Output |





#### 4-2-2 Recommend operation condition

(Ta=25±2°C)

|   | ITEM                | symbol | Min | Typ  | Max | UNIT | Note        |
|---|---------------------|--------|-----|------|-----|------|-------------|
| 1 | Lamp Voltage        | HV     |     | 1475 |     | V    |             |
| 2 | Total input current | IT     | 150 | 165  | 180 | mA   | Hot side    |
| 3 | Output current      | IL     | 7.5 | 8.25 | 9   | mA   | Hot current |
| 4 | Inverter Frequency  | FOP    | 50  | 60   | 70  | kHz  |             |



#### 4-2-3 Feedback Signal Specification

These operation condition is recommended for operating the balance board.

(Ta=25±2°C)

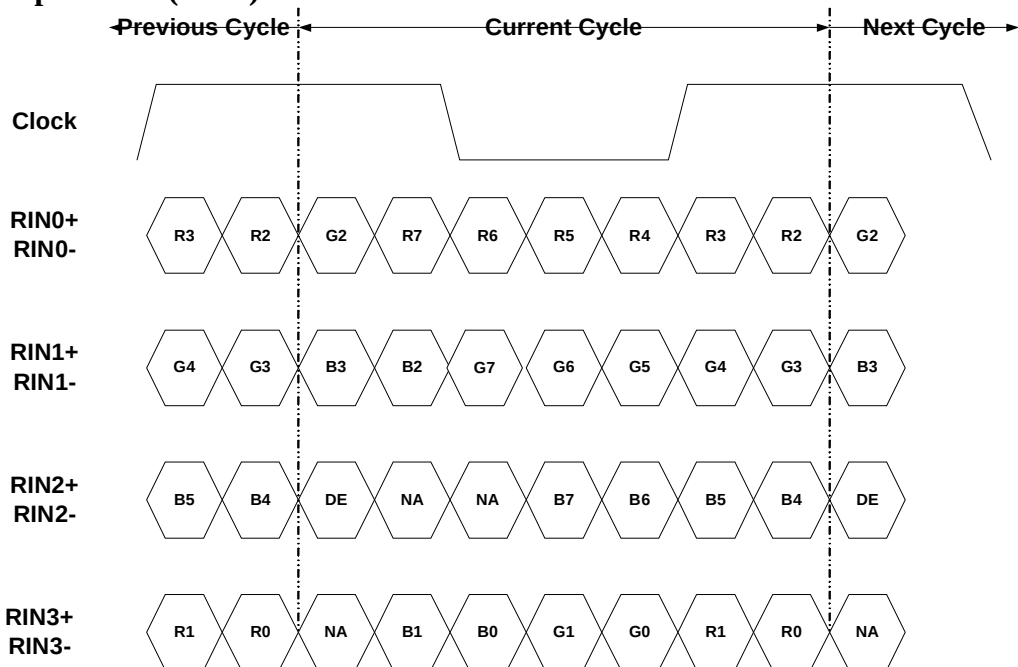
Feedback I/O specification

| No | Item                    | SYMBOL | MIN | TYP | MAX  | UNIT | Note                        |
|----|-------------------------|--------|-----|-----|------|------|-----------------------------|
| 1  | Lamp detected           | LD     | 0   | -   | 0.8  | V    | At abnormal conditi         |
|    |                         |        | 10  | -   | 12   | V    | At normal conditio          |
| 2  | Open lamp protected     | OLP    | 0   |     | 0.8  | V    | At normal conditio          |
|    |                         |        | 11  | 12  | 13   | V    | At OLP status               |
| 3  | Current feedback signal | FB     | 1.0 | 1.0 | 1.54 | V    | At IT=120mA                 |
| 4  | Supply voltage          | VDD    | 6   | 12  | 15   | V    | At recommended Lo condition |
| 5  | Input current           | Ic     | -   | 20  | -    | mA   | -                           |

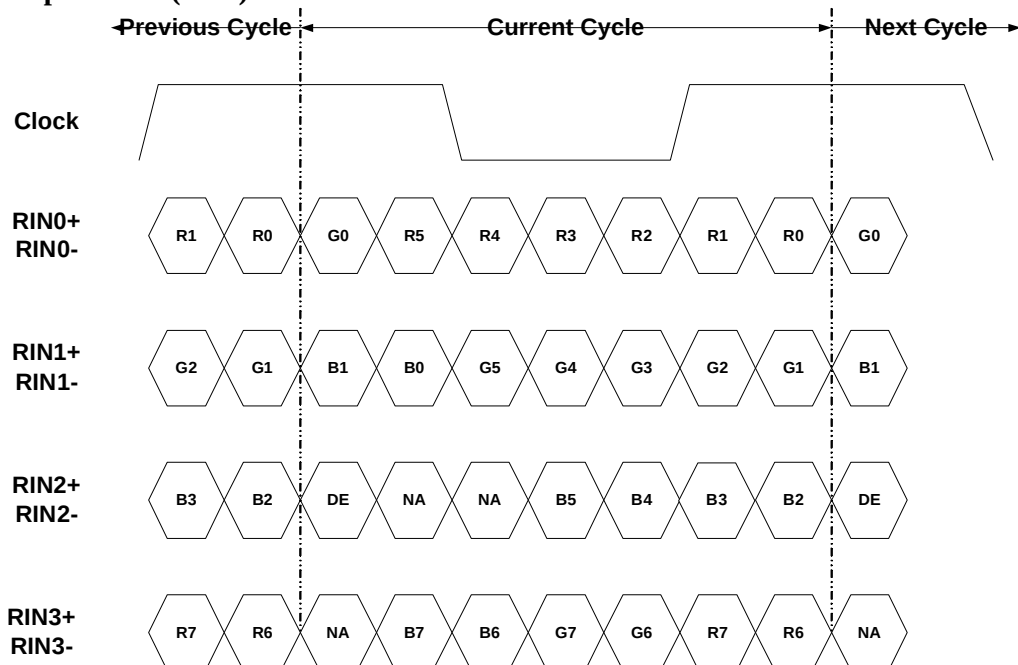


## 4-3 LVDS DATA FORMAT

### LVDS Option = L (GND)



### LVDS Option = H (3.3V) or N.C. è NS Format





#### 4-4 COLOR INPUT DATA ASSIGNMENT

The brightness of each primary color (red, green and blue) is based on the 8 bit gray scale data input for the color; the higher the binary input, the brighter the color. The table below provides a reference for color versus data input.

#### COLOR DATA REFERENCE

| Color       |            | Input Color Data |    |    |    |     |    |    |    |       |    |    |    |     |    |    |    |      |    |    |    |     |    |    |    |
|-------------|------------|------------------|----|----|----|-----|----|----|----|-------|----|----|----|-----|----|----|----|------|----|----|----|-----|----|----|----|
|             |            | RED              |    |    |    |     |    |    |    | GREEN |    |    |    |     |    |    |    | BLUE |    |    |    |     |    |    |    |
|             |            | MSB              |    |    |    | LSB |    |    |    | MSB   |    |    |    | LSB |    |    |    | MSB  |    |    |    | LSB |    |    |    |
|             |            | R7               | R6 | R5 | R4 | R3  | R2 | R1 | R0 | G7    | G6 | G5 | G4 | G3  | G2 | G1 | G0 | B7   | B6 | B5 | B4 | B3  | B2 | B1 | B0 |
| Basic Color | Black      | 0                | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0   | 0  | 0  | 0  |
|             | Red(255)   | 1                | 1  | 1  | 1  | 1   | 1  | 1  | 1  | 0     | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0   | 0  | 0  | 0  |
|             | Green(255) | 0                | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 1     | 1  | 1  | 1  | 1   | 1  | 1  | 1  | 0    | 0  | 0  | 0  | 0   | 0  | 0  | 0  |
|             | Blue(255)  | 0                | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 1    | 1  | 1  | 1  | 1   | 1  | 1  | 1  |
|             | Cyan       | 0                | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 1     | 1  | 1  | 1  | 1   | 1  | 1  | 1  | 1    | 1  | 1  | 1  | 1   | 1  | 1  | 1  |
|             | Magenta    | 1                | 1  | 1  | 1  | 1   | 1  | 1  | 1  | 0     | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 1    | 1  | 1  | 1  | 1   | 1  | 1  | 1  |
|             | Yellow     | 1                | 1  | 1  | 1  | 1   | 1  | 1  | 1  | 1     | 1  | 1  | 1  | 1   | 1  | 1  | 1  | 0    | 0  | 0  | 0  | 0   | 0  | 0  | 0  |
|             | White      | 1                | 1  | 1  | 1  | 1   | 1  | 1  | 1  | 1     | 1  | 1  | 1  | 1   | 1  | 1  | 1  | 1    | 1  | 1  | 1  | 1   | 1  | 1  | 1  |
| RED         | RED(000)   | 0                | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0   | 0  | 0  | 0  |
|             | RED(001)   | 0                | 0  | 0  | 0  | 0   | 0  | 0  | 1  | 0     | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0   | 0  | 0  | 0  |
|             | ----       |                  |    |    |    |     |    |    |    |       |    |    |    |     |    |    |    |      |    |    |    |     |    |    |    |
|             | RED(254)   | 1                | 1  | 1  | 1  | 1   | 1  | 1  | 0  | 0     | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0   | 0  | 0  | 0  |
|             | RED(255)   | 1                | 1  | 1  | 1  | 1   | 1  | 1  | 1  | 0     | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0   | 0  | 0  | 0  |
| GREEN       | GREEN(000) | 0                | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0   | 0  | 0  | 0  |
|             | GREEN(001) | 0                | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0   | 0  | 0  | 1  | 0    | 0  | 0  | 0  | 0   | 0  | 0  | 0  |
|             | ----       |                  |    |    |    |     |    |    |    |       |    |    |    |     |    |    |    |      |    |    |    |     |    |    |    |
|             | GREEN(254) | 0                | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 1     | 1  | 1  | 1  | 1   | 1  | 1  | 0  | 0    | 0  | 0  | 0  | 0   | 0  | 0  | 0  |
|             | GREEN(255) | 0                | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 1     | 1  | 1  | 1  | 1   | 1  | 1  | 1  | 0    | 0  | 0  | 0  | 0   | 0  | 0  | 0  |
| BLUE        | BLUE(000)  | 0                | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0   | 0  | 0  | 0  |
|             | BLUE(001)  | 0                | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0   | 0  | 0  | 1  |
|             | -----      |                  |    |    |    |     |    |    |    |       |    |    |    |     |    |    |    |      |    |    |    |     |    |    |    |
|             | BLUE(254)  | 0                | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 1    | 1  | 1  | 1  | 1   | 1  | 1  | 0  |
|             | BLUE(255)  | 0                | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0   | 0  | 0  | 0  | 1    | 1  | 1  | 1  | 1   | 1  | 1  | 1  |



## 5. Interface Timing

### 5-1 INPUT SIGNAL TIMING SPECIFICATIONS:

This is the signal timing required at the input of the User connector. All of the interface signal timing should be satisfied with the following specifications for its proper operation.

#### Timing Table (DE only Mode)

A. Frame Rate = 60 Hz

| Signal               | Item      | Symbol   | MIN  | TYP  | MAX  | Unit |
|----------------------|-----------|----------|------|------|------|------|
| Vertical Section     | Period    | Tv       | 789  | 806  | 1000 | Th   |
|                      | Active    | Tdisp(v) |      | 768  |      | Th   |
|                      | Blanking  | Tblk(v)  | 21   | 38   | 232  | Th   |
| Horizontal Section   | Period    | Th       | 1414 | 1560 | 1722 | Tclk |
|                      | Active    | Tdisp(h) |      | 1366 |      | Tclk |
|                      | Blanking  | Tblk(h)  | 48   | 194  | 356  | Tclk |
| Vertical Frequency   | Frequency | Freq     | 47   | 60   | 63   | Hz   |
| Horizontal Frequency | Frequency | Freq     | 43   | 48   | 50   | KHz  |
| Clock                | Frequency | FCLK     | 65   | 76   | 85   | MHz  |

1.) Display position is specific by the rise of DE signal only.

Horizontal display position is specified by the falling edge of 1<sup>st</sup> DCLK right after the rise of ENAB, is displayed on the left edge of the screen.

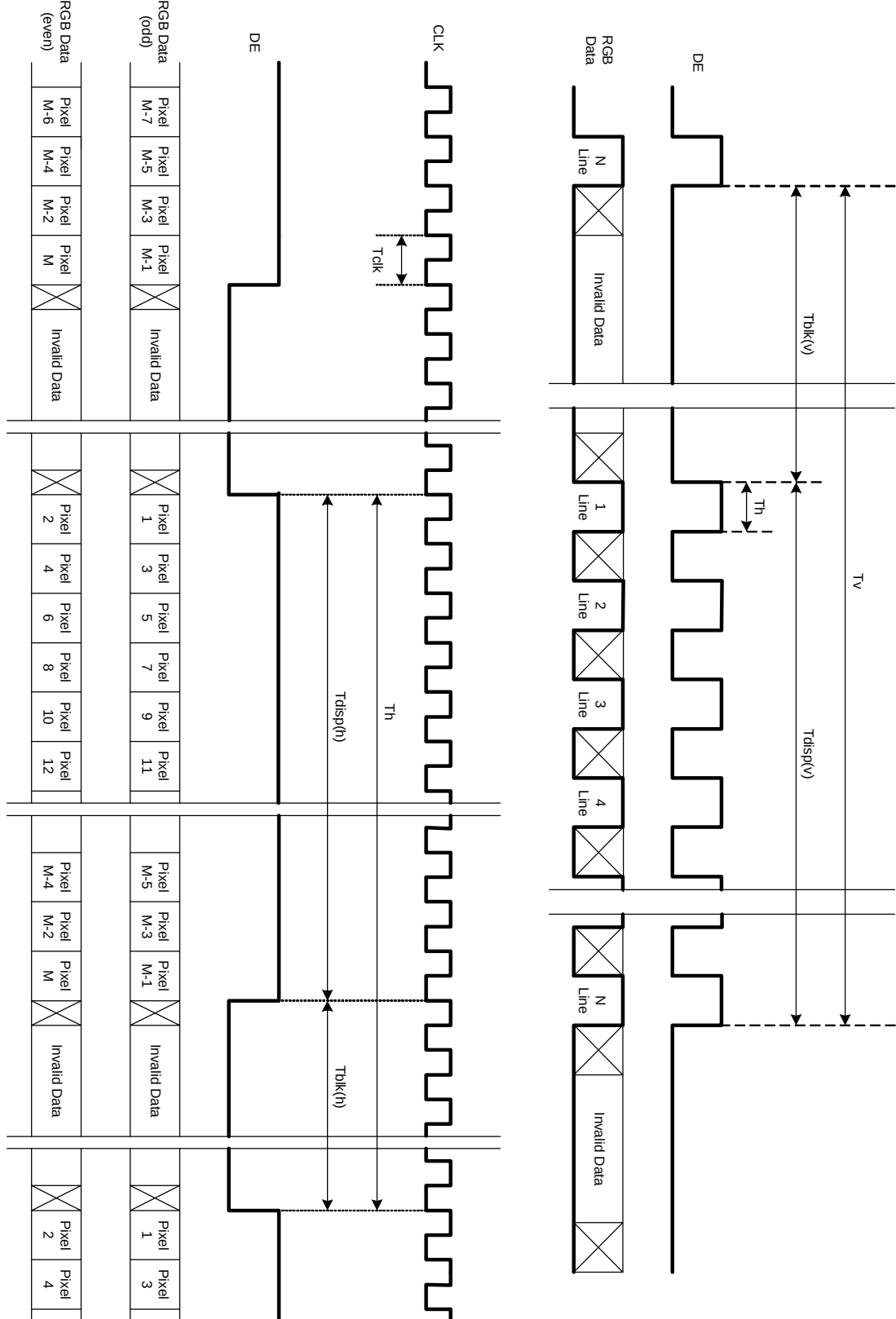
Vertical display position is specified by the rise of DE after a “Low” level period equivalent to eight times of horizontal period. The 1<sup>st</sup> data corresponding to one horizontal line after the rise of ENAB is displayed at the top line of screen.

3.) If a period of DEB “High” is less than 1366 DCLK or less than 768 lines, the rest of the screen displays black.

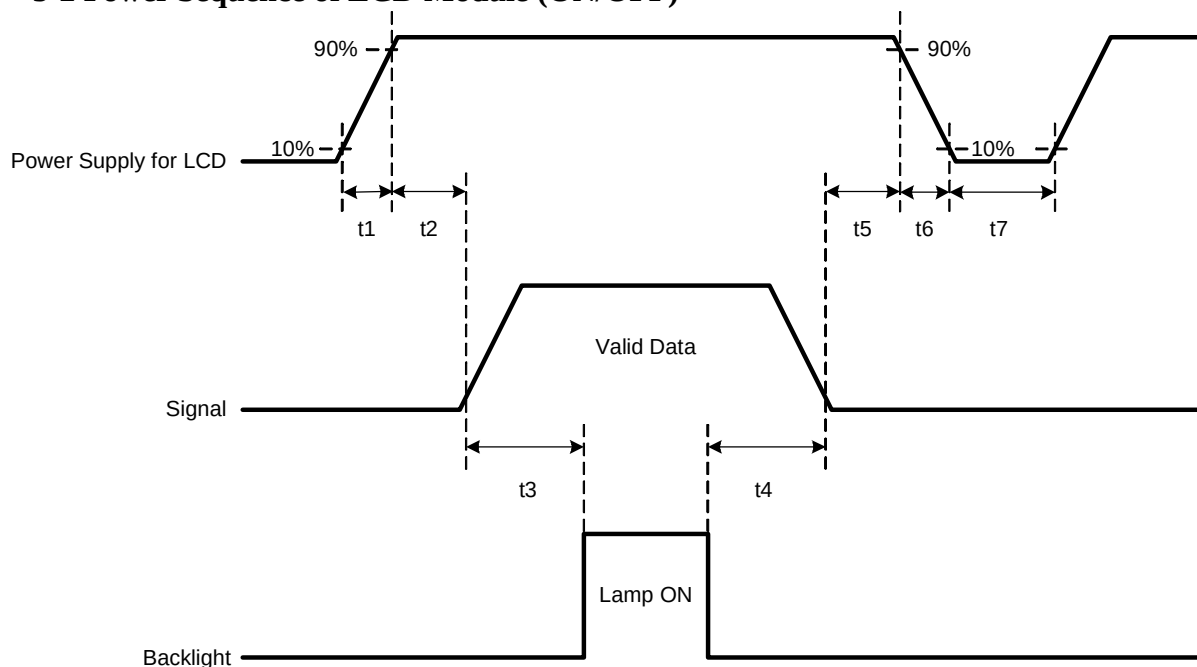
4.) The display position does not fit to the screen if a period of DE “High” and the effective data period do not synchronize with each other.



## Signal Timing Waveforms



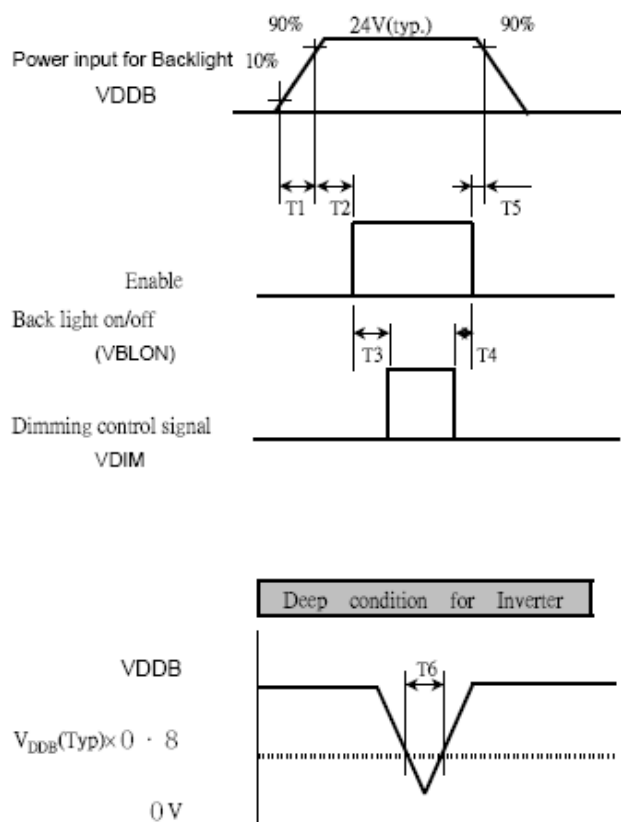
## 5-2 Power Sequence of LCD Module (ON/OFF)



| Parameter | Values |      |      | Units<br>Min. |
|-----------|--------|------|------|---------------|
|           | Min.   | Typ. | Max. |               |
| T1        | 470    | -    | 1000 | <b>us</b>     |
| T2        | 20     | -    | 35   | <b>ms</b>     |
| T3        | 500    | -    | -    | <b>ms</b>     |
| T4        | 200    | -    | -    | <b>ms</b>     |
| T5        | 5      | -    | -    | <b>ms</b>     |
| T6        | -      | -    | 30   | <b>ms</b>     |
| T7        | 1      | -    | -    | <b>s</b>      |

**Note:** User should follow the power on/off sequence and the rising/falling time to avoid miss operation of the panel.

### 5-3 Power Sequence of Inverter



| Parameter | Values |      |      | Units |
|-----------|--------|------|------|-------|
|           | Min.   | Typ. | Max. |       |
| T1        | 20     | -    | -    | us    |
| T2        | 500    | -    | -    | ms    |
| T3        | 250    | -    | -    | ms    |
| T4        | 0      | -    | -    | ms    |
| T5        | 1      | -    | -    | ms    |
| T6        | -      | -    | 10   | ms    |

## 6. Optical Specification

### 6-1 Warm-up procedure & testing methods & testing condition

**Warm-up procedure:** Stable for 45 minutes in dark environment at 25°C.

**Measurement tools:** BM7 or equivalent

**Testing method:** Specified distance is 50cm from LCD surface at a viewing angle of  $\varphi$  and  $\theta$  is 0°. (Measurement Equipment is shown in Fig.1)

**Testing Condition:**

| Parameter | Value | Parameter                   | Value     |
|-----------|-------|-----------------------------|-----------|
| VDDDB     | 24V   | Frequency (f <sub>v</sub> ) | 60Hz      |
| IDDB      | 5A    | Temperature                 | Ta=25±2°C |

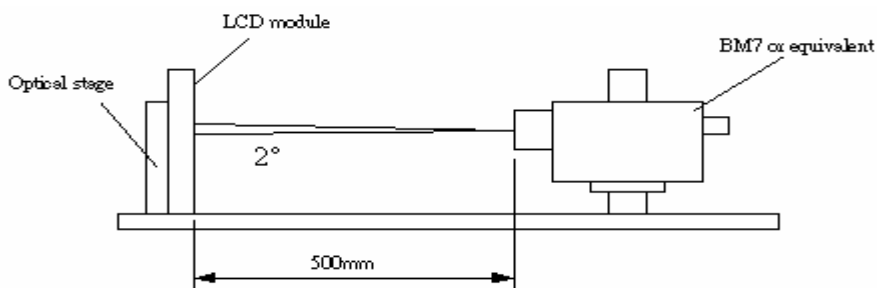


FIG.1 Measurement equipment

### 6-2 Optical Specification

(Ta=25±2°C)

| Parameter                       |               | Symbol                  |                           | Condition                                                        | Value        |       |              | Units             | Notes |
|---------------------------------|---------------|-------------------------|---------------------------|------------------------------------------------------------------|--------------|-------|--------------|-------------------|-------|
|                                 |               |                         |                           |                                                                  | Min.         | Typ.  | Max.         |                   |       |
| Contrast Ratio                  |               | CR                      |                           | $\varphi = 0^\circ, \theta = 0^\circ$<br>Viewing<br>Normal angle | 1200         | 1500  |              |                   | 1     |
| Surface Luminance, white        |               | LWH                     |                           |                                                                  | 500          | 550   |              | cd/m <sup>2</sup> | 2     |
| Luminance Variation             |               | $\delta_{\text{WHITE}}$ | 9 pts                     |                                                                  |              |       | 1.3          | cd/m <sup>2</sup> | 3     |
| Response Time                   | Rise Time     | Tr <sub>R</sub>         |                           |                                                                  |              | 15    |              | ms                | 4     |
|                                 | Decay Time    | Tr <sub>D</sub>         |                           |                                                                  |              | 8     |              | ms                |       |
|                                 | Gray to Gray  | T <sub>γ</sub>          |                           |                                                                  |              | (8)   |              | ms                |       |
| Color Coordinates<br>(CIE 1931) | RED           | R <sub>X</sub>          |                           |                                                                  | Typ<br>-0.03 | 0.640 | Typ<br>+0.03 |                   |       |
|                                 |               | R <sub>Y</sub>          |                           |                                                                  |              | 0.330 |              |                   |       |
|                                 | GREEN         | G <sub>X</sub>          |                           |                                                                  |              | 0.29  |              |                   |       |
|                                 |               | G <sub>Y</sub>          |                           |                                                                  |              | 0.600 |              |                   |       |
|                                 | BLUE          | B <sub>X</sub>          |                           |                                                                  |              | 0.150 |              |                   |       |
|                                 |               | B <sub>Y</sub>          |                           |                                                                  |              | 0.060 |              |                   |       |
|                                 | WHITE         | W <sub>X</sub>          |                           |                                                                  |              | 0.280 |              |                   |       |
|                                 |               | W <sub>Y</sub>          |                           |                                                                  |              | 0.290 |              |                   |       |
| Viewing Angle                   | x axis, right | $\theta_r$              | ( $\varphi = 0^\circ$ )   | CR≥20                                                            | 88           |       | Degree       |                   | 5     |
|                                 | x axis, left  | $\theta_l$              | ( $\varphi = 180^\circ$ ) |                                                                  | 88           |       |              |                   |       |
|                                 | y axis, up    | $\theta_u$              | ( $\varphi = 90^\circ$ )  |                                                                  | 88           |       |              |                   |       |
|                                 | y axis, down  | $\theta_d$              | ( $\varphi = 0^\circ$ )   |                                                                  | 88           |       |              |                   |       |

**Note:**

1. Contrast ratio will be measured in the center of panel (point 5 in Figure 2), Contrast Ratio (CR) is defined mathematically as:

$$C/R(\text{Contrast ratio}) = \frac{\text{Lum}(L255)}{\text{Lum}(L0)}$$

Lum(L255): Luminance measured at the center point of panel when all pixels is white.

Lum(L0) : Luminance measured at the center point of panel when all pixels is black.

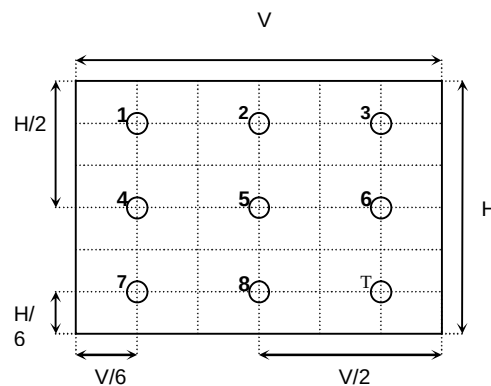
2. Surface luminance is defined as luminance value measured at point 5 with pre-described measurement methods and measurement condition.

3. Luminance variation,  $\delta$  WHITE, is defined as:

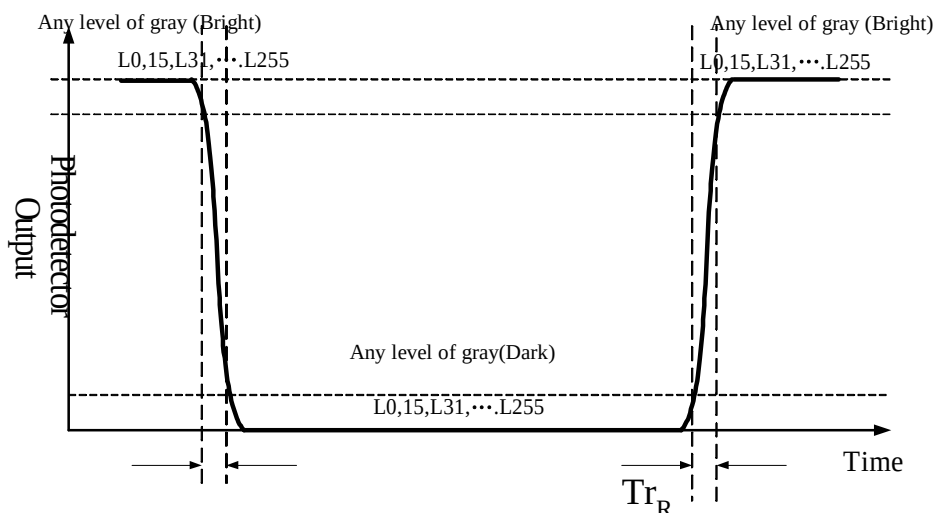
$$\delta_{\text{WHITE}}(9P) = \frac{\text{Maximum}(L_{on1}, L_{on2}, \dots, L_{on9})}{\text{Minimum}(L_{on1}, L_{on2}, \dots, L_{on9})} \quad \text{Position of each 9 pts for measuring is shown in FIG 2.}$$

4. Response time is the time required for the display to transition from black to white (Rise Time,  $Tr_R$ ) and from white to black (Decay Time,  $Tr_D$ ), that is shown in FIG3.

5. Detailed measurement method of viewing angle is shown in Fig4.

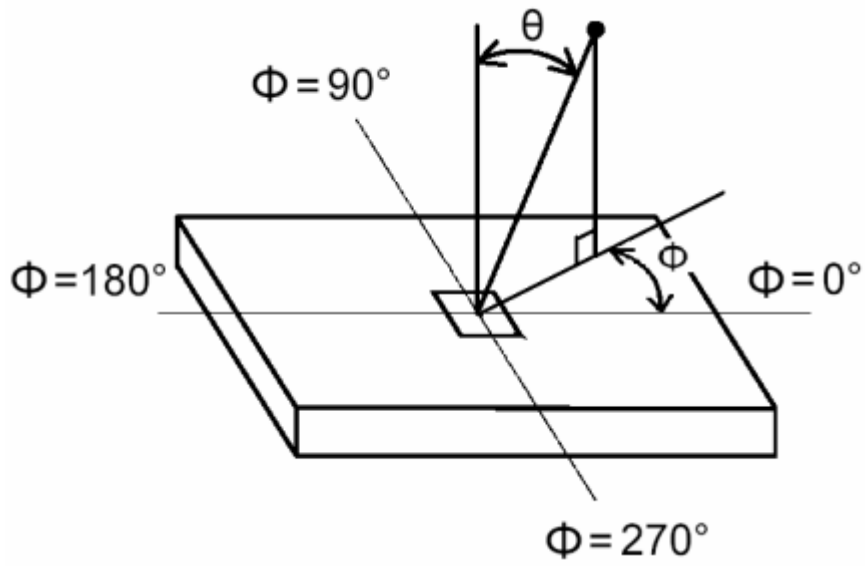


**FIG. 2 Luminance measurement positions**



**Note:** The response time is defined as the following figure and shall be measured by switching the input signal for “any level of gray(bright)” and “any level of gray(dark)”

**FIG.3 Measurement of Response Time**



**FIG.4 Measurement of viewing angle**

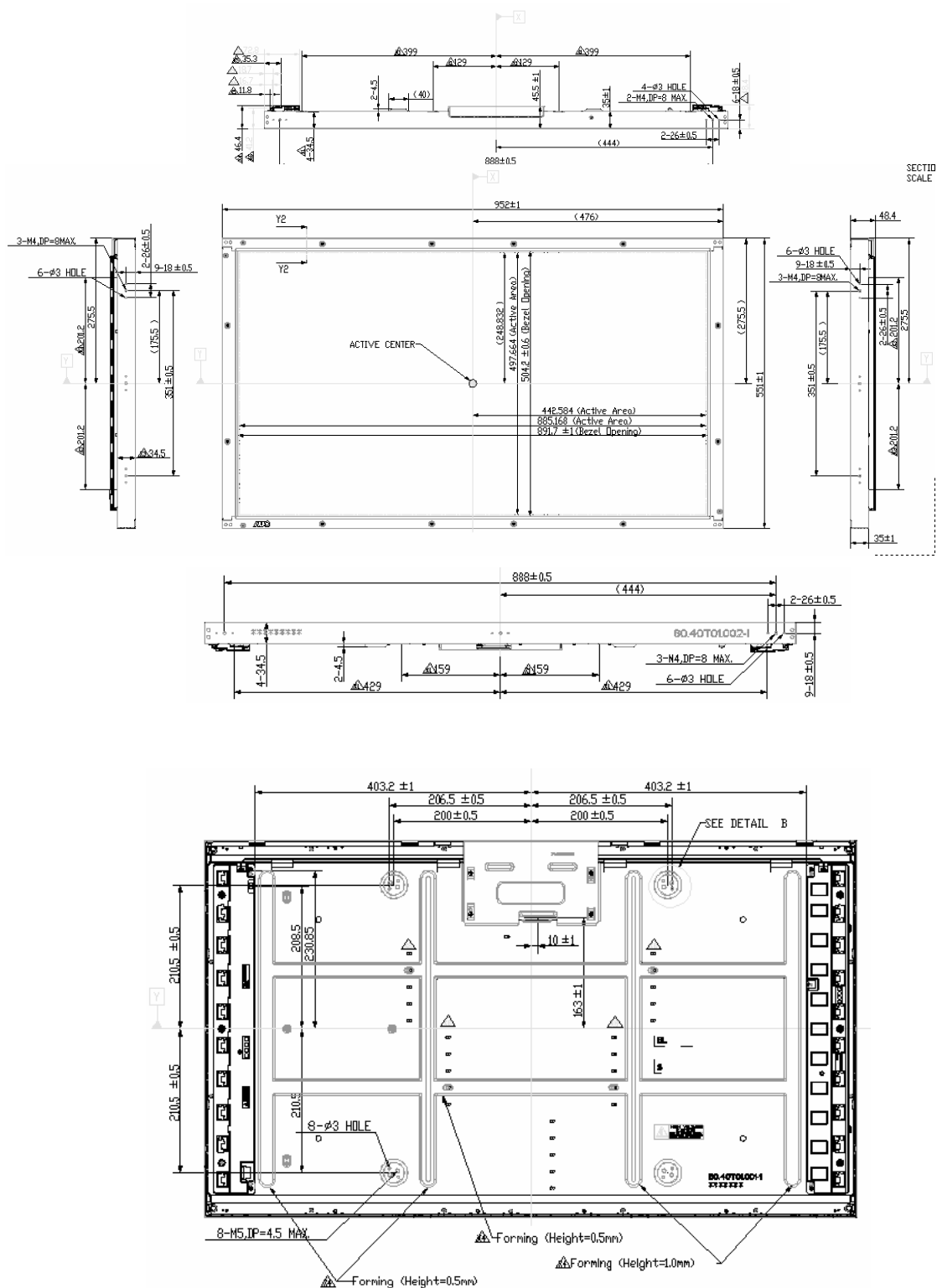


## 7. Mechanical Characteristics

The contents provide general mechanical characteristics for the model T400XW01 V0. Detailed mechanical drawings are shown in the following pages.

|                     |               |                                                                         |
|---------------------|---------------|-------------------------------------------------------------------------|
| Outline Dimension   | Horizontal    | 952.0 mm                                                                |
|                     | Vertical      | 551.0 mm                                                                |
|                     | Depth         | 46.4 mm(to balance board cover)<br>48.4 mm (To Balance board connector) |
| Bezel Opening       | Horizontal    | 891.7 mm                                                                |
|                     | Vertical      | 504.2 mm                                                                |
| Active Display Area | Horizontal    | 885.158mm                                                               |
|                     | Vertical      | 497.664 mm                                                              |
| Weight              | 11000g (Typ.) |                                                                         |

### Mechanical Figure:







## 8. Reliability

Environment test condition:

Panel condition in RA test

Brightness : 550nits

Lamp Current (Cold end) : 5.5mA

| No | Test Item                         | Condition                                                                                                                    |
|----|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| 1  | High temperature storage test     | Ta=60℃ 240h                                                                                                                  |
| 2  | Low temperature storage test      | Ta= -20℃ 240h                                                                                                                |
| 3  | High temperature operation test   | Ta=50℃ 80%RH 240h                                                                                                            |
| 4  | Low temperature operation test    | Ta=0℃ 240h                                                                                                                   |
| 5  | Vibration test<br>(non-operating) | Wave form: random<br>Vibration level: 1.5G RMS<br>Bandwidth: 10-500Hz,<br>Duration: X, Y, Z 20min<br>One time each direction |
| 6  | Shock test<br>(non-operating)     | Shock level: 50G<br>Waveform: half sine wave, 11ms<br>Direction: ±X, ±Y, ±Z<br>One time each direction                       |
| 7  | Vibration test<br>(with carton)   | Wave form: random<br>Vibration level: 1.5G RMS<br>Bandwidth: 10-500Hz,<br>Duration: X, Y, Z 30min<br>One time each direction |
| 8  | Drop test<br>(with carton)        | Height: 53.3cm<br>1 corner, 3 edges, 6 surfaces<br>(ASTMD4169-I)                                                             |



## **9. International Standard**

### **9-1 Safety**

- (1) UL1950 Third Edition, Underwriters Laboratories, Inc. Jan. 28, 1995  
Standard for Safety of Information Technology Equipment Including electrical Business Equipment.
- (2) CAN/CSA C22.2 No. 950-95/60950 Third Edition, Canadian Standards Association,  
Standard for Safety of Information Technology Equipment Including Electrical Business Equipment.
- (3) EN60950: 1992+A2: 1993+A2: 1993+C3: 1995+A4: 1997+A11: 1997  
IEC 950: 1991+A1: 1992+A2: 1993+C3: 1995+A4:1996  
European Committee for Electrotechnical Standardization (CENELEC)  
EUROPEAN STANDARD for Safety of Information Technology Equipment Including Electrical Business Equipment.

### **9-2 EMC**

- a) ANSI C63.4 “Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electrical Equipment in the Range of 9kHz to 40GHz. “American National standards Institute(ANSI), 1992
- b) C.I.S.P.R “Limits and Methods of Measurement of Radio Interface Characteristics of Information Technology Equipment.” International Special committee on Radio Interference.
- c) EN 55022 “Limits and Methods of Measurement of Radio Interface Characteristics of Information Technology Equipment.” European Committee for Electrotechnical Standardization. (CENELEC), 1998



## 10. Packing

### 10-1 DEFINITION OF LABEL:

#### A. Panel Label:



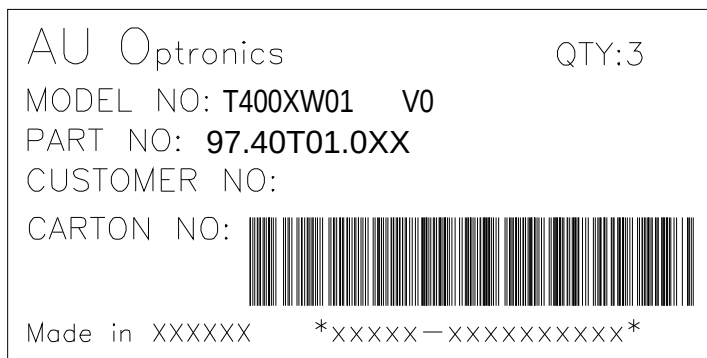
#### Green mark description

For Pb Free Product, AUO will add  for identification.

For RoHS compatible products, AUO will add  for identification.

**Note:** The green Mark will be present only when the green documents have been ready by AUO internal green team. (The definition of green design follows the AUO green design checklist.)

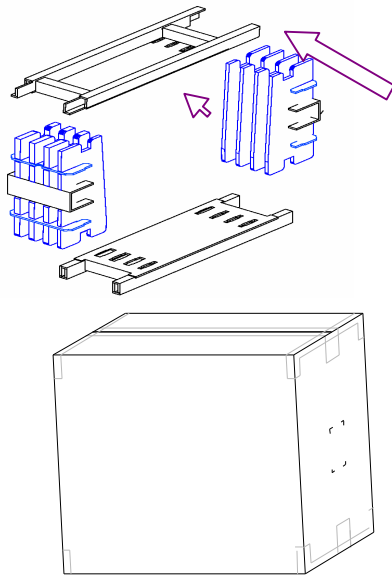
#### B. Carton Label:





## 10-2 PACKING METHODS:

3pcs Modules





## 11. PRECAUTIONS

Please pay attention to the followings when you use this TFT LCD module.

### 11-1 MOUNTING PRECAUTIONS

- (1) You must mount a module using holes arranged in four corners or four sides.
- (2) You should consider the mounting structure so that uneven force (ex. Twisted stress) is not applied to module. And the case on which a module is mounted should have sufficient strength so that external force is not transmitted directly to the module.
- (3) Please attach the surface transparent protective plate to the surface in order to protect the polarizer. Transparent protective plate should have sufficient strength in order to resist external force.
- (4) You should adopt radiation structure to satisfy the temperature specification.
- (5) Acetic acid type and chlorine type materials for the cover case are not desirable because the former generates corrosive gas of attacking the polarizer at high temperature and the latter causes circuit break by electro-chemical reaction.
- (6) Do not touch, push or rub the exposed polarizer with glass, tweezers or anything harder than HB pencil lead. And please do not rub with dust clothes with chemical treatment. Do not touch the surface of polarizer for bare hand or greasy cloth. (Some cosmetics are detrimental to the polarizer.)
- (7) When the surface becomes dusty, please wipe gently with absorbent cotton or other soft materials like chamois soaks with petroleum benzene. Normal-hexane is recommended for cleaning the adhesives used to attach front/ rear polarizer. Do not use acetone, toluene and alcohol because they cause chemical damage to the polarizer.
- (8) Wipe off saliva or water drops as soon as possible. Their long time contact with polarizer causes deformations and color fading.
- (9) Do not open the case because inside circuits do not have sufficient strength.

### 11-2 OPERATING PRECAUTIONS

- (1) The spike noise causes the mis-operation of circuits. It should be lower than following voltage:  $V=\pm 200\text{mV}$  (Over and under shoot voltage)
- (2) Response time depends on the temperature. (In lower temperature, it becomes longer..)
- (3) Brightness of CCFL depends on the temperature. (In lower temperature, it becomes lower.) And in lower temperature, response time (required time that brightness is stable after turned on) becomes longer.
- (4) 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.
- (5) When fixed patterns are displayed for a long time, remnant image is likely to occur.
- (6) Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods may be important to minimize the interface.



### **11-3 ELECTROSTATIC DISCHARGE CONTROL**

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 wristband etc. And don't touch interface pin directly.

### **11-4 PRECAUTIONS FOR STRONG LIGHT EXPOSURE**

Strong light exposure causes degradation of polarizer and color filter.

### **11-5 STORAGE**

When storing modules as spares for a long time, the following precautions are necessary.

- (1) 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.
- (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.

### **11-6 HANDLING PRECAUTIONS FOR PROTECTION FILM**

- (1) The protection film is attached to the bezel with a small masking tape. When the 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.
- (2) When the module with protection film attached is stored for a long time, sometimes there remains a very small amount of glue still on the Bezel after the protection film is peeled off.
- (3) You can remove the glue easily. When the glue remains on the Bezel or its vestige is recognized, please wipe them off with absorbent cotton waste or other soft material like chamois soaked with normal-hexane.