

A Brighter Solution

# AMP DISPLAY INC.

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## SPECIFICATIONS

### 8.0-in COLOR TFT MODULE

|                      |                      |
|----------------------|----------------------|
| CUSTOMER:            |                      |
| CUSTOMER PART NO.    |                      |
| AMP DISPLAY PART NO. | AM - 800600CTMQW-00H |
| APPROVED BY:         |                      |
| DATE:                |                      |

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APPROVED FOR SPECIFICATIONS

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APPROVED FOR SPECIFICATION AND PROTOTYPES

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## AMP DISPLAY INC

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## RECORD OF REVISION

| Revision Date | Page | Contents    | Editor |
|---------------|------|-------------|--------|
| 2007/10/17    | -    | New Release | Edward |

## 1. Features

8 inch Amorphous-TFT-LCD (Thin Film Transistor Liquid Crystal Display) module.  
This module is composed of a 8" TFT-LCD panel, LED backlight and T-CON board unit.

- (1) Construction: 8" a-Si TFT active matrix, White LED Backlight .
  - (2) Resolution (pixel): 800(R.G.B) X600
  - (3) Number of the Colors : 262K colors ( R , G , B 6 bit digital each)
  - (4) LCD type : Transmissive , normally White
  - (5) Interface: 40 pin
  - (6) Power Supply Voltage: 3.3V single power input.
- Viewing Direction: 6 O'clock ( The direction it's hard to be discolored )

## 2. PHYSICAL SPECIFICATIONS

| Item              | Specifications               | unit |
|-------------------|------------------------------|------|
| LCD size          | 8 inch (Diagonal)            |      |
| Resolution        | 800 x 3(RGB) x 600           | dot  |
| Dot pitch         | 0.0675(W) x 0.2025(H)        | mm   |
| Active area       | 162.0(W) x 121.5(H)          | mm   |
| Module size       | 183.0(W) x 141.0(H) x 9.3(D) | mm   |
| Surface treatment | Anti-Glare                   |      |
| Color arrangement | RGB-stripe                   |      |
| interface         | Digital                      |      |
| Weight            | TBD                          | g    |

### 3. ABSOLUTE MAX. RATINGS

(GND = AVSS = 0V, Note 2)

| Item                  | Symbol  | Values  |          | UNIT | Note               |
|-----------------------|---------|---------|----------|------|--------------------|
|                       |         | Min.    | Max.     |      |                    |
| Power voltage         | VCC     | -0.3    | 5.0      | V    |                    |
|                       | AVDD    | -0.5    | 13.5     |      |                    |
|                       | VGH     | 13.0    | 19.0     |      |                    |
|                       | VGL     | -12.0   | -2.0     |      |                    |
|                       | VGH-VGL | --      | 31.0     |      |                    |
| Input signal voltage  | V1~V7   | 0.4AVDD | AVDD+0.3 | V    | Note 1             |
|                       | V8~V14  | -0.3    | 0.6AVDD  | V    | Note 1             |
| Operation temperature | TOP     | -20     | 70       | °C   |                    |
| Storage temperature   | TST     | -30     | 80       | °C   |                    |
| LED Reverse Voltage   | VR      | --      | 1.2      | V    | each LED<br>Note 3 |
| LED Forward Voltage   | IF      | --      | 25       | mA   | each LED           |

Note 1:  $AVDD - 0.1 \geq V1 \geq V2 \geq V3 \geq V4 \geq V5 \geq V6 \geq V7 \geq V8 \geq V9 \geq V10 \geq V11 \geq V12 \geq V13 \geq V14 \geq AVSS + 0.1$

Note 2: The absolute maximum rating values of the module should not be exceeded. Once exceeded absolute maximum rating values, the characteristics of the module may not be recovered. Even in an extreme condition, may result in module permanently destroyed.

Note 3: VR Conditions : Zener Diode 20mA

## 4. ELECTRICAL CHARACTERISTICS

### 4-1 Typical Operation Conditions

(GND = AVSS = 0V, Note 1)

| Item                     | Symbol | Values   |      |          | UNIT | Note  |
|--------------------------|--------|----------|------|----------|------|-------|
|                          |        | Min.     | Typ. | Max.     |      |       |
| Power voltage            | VCC    | 3.0      | 3.3  | 3.6      | V    | Note2 |
|                          | AVDD   | --       | 10.2 | --       |      |       |
|                          | VGH    | --       | 16.0 | --       |      |       |
|                          | VGL    | --       | -7.0 | --       |      |       |
| Input signal voltage     | VCOM   | --       | 4.15 | --       | V    |       |
|                          | V1~V7  | 0.4 AVDD | --   | AVDD-0.1 |      |       |
|                          | V8~V14 | 0.1      | --   | 0.6 AVDD |      |       |
| Input logic high voltage | VIH    | 0.7VCC   | --   | VCC      | V    | Note3 |
| Input logic low voltage  | VIL    | 0        | --   | 0.3 VCC  | V    |       |

Note 1: Be sure to apply GND, VCC, and VGL, to the LCD first, and then apply VGH.

Note 2: VCC setting should match the signals output voltage (refer to Note 3) of customer's system board.

Note 3: STHL, STHR, OEH, L/R, CPH1~CPH3, STVD, STVU, OEV, CKV, U/D.

### 4-2 Current Consumption

(GND = AVSS = 0V)

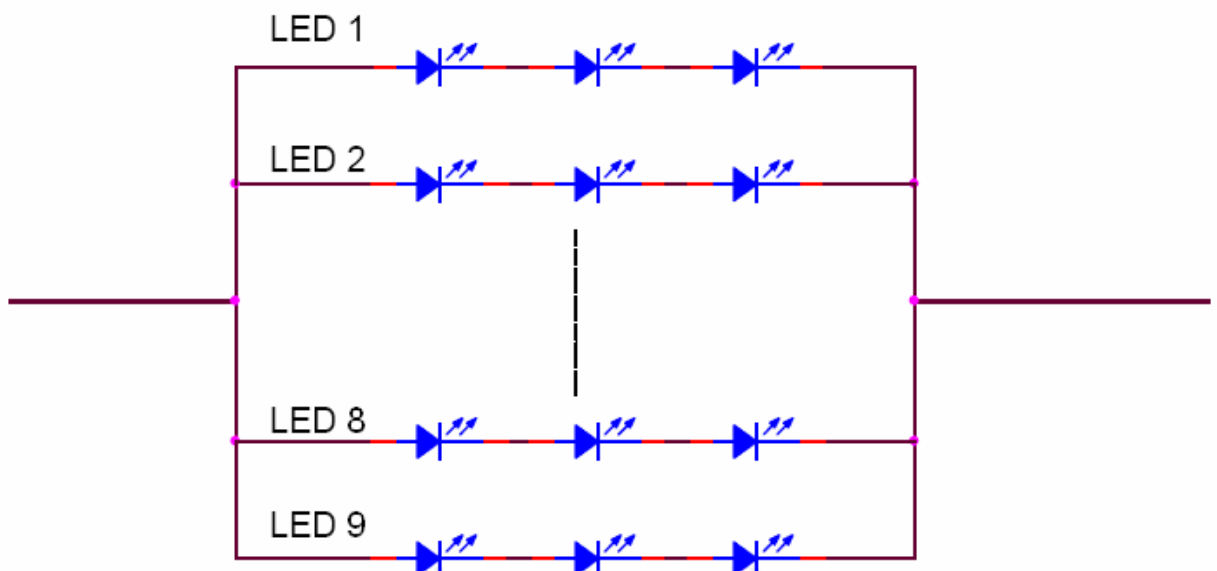
| Item               | Symbol | Values |      |      | Unit | Note         |
|--------------------|--------|--------|------|------|------|--------------|
|                    |        | Min.   | Typ. | Max. |      |              |
| Current for Driver | IGH    | --     | 0.2  | 0.5  | mA   | VGH = 16.0V  |
|                    | IGL    | --     | 0.2  | 1.0  | mA   | VGL = -7.0V  |
|                    | ICC    | --     | 5.5  | 10.0 | mA   | VCC = 3.3V   |
|                    | IAVDD  | --     | 32   | 50.0 | mA   | AVDD = 10.0V |

### 4-3 Backlight Driving Conditions

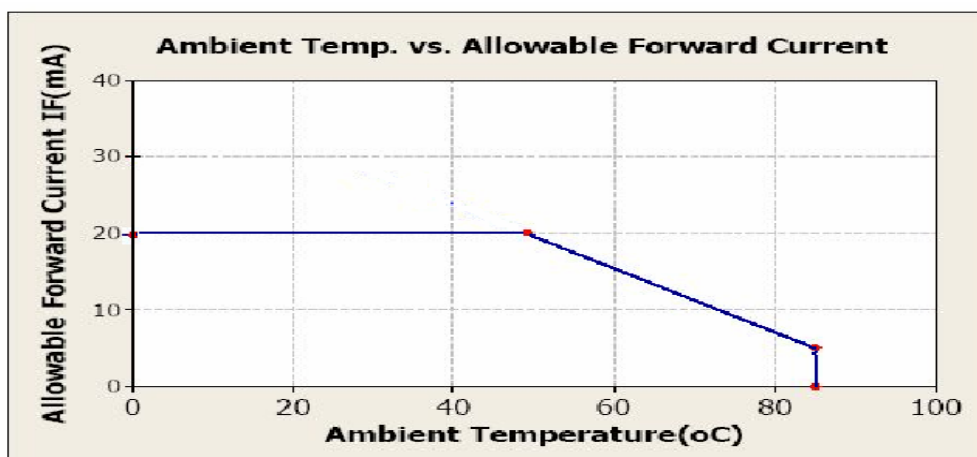
| Item          | Symbol | Values |      |      | Unit | Note   |
|---------------|--------|--------|------|------|------|--------|
|               |        | Min.   | Typ. | Max. |      |        |
| LED voltage   | VL     | 9.3    | 9.9  | 10.5 | V    | Note 1 |
| LED current   | IL     | 18     | 20   | 22   | mA   | Note 1 |
| LED life time | --     | 20,000 | --   | --   | Hr   | Note 2 |

Note 1 : The LED driving condition is defined for each LED module. (3 LED Serial)

Note 2 : The “LED life time” is defined as the module brightness decrease to 50% original brightness that ambient temperature is 25°C and IL = 20mA.

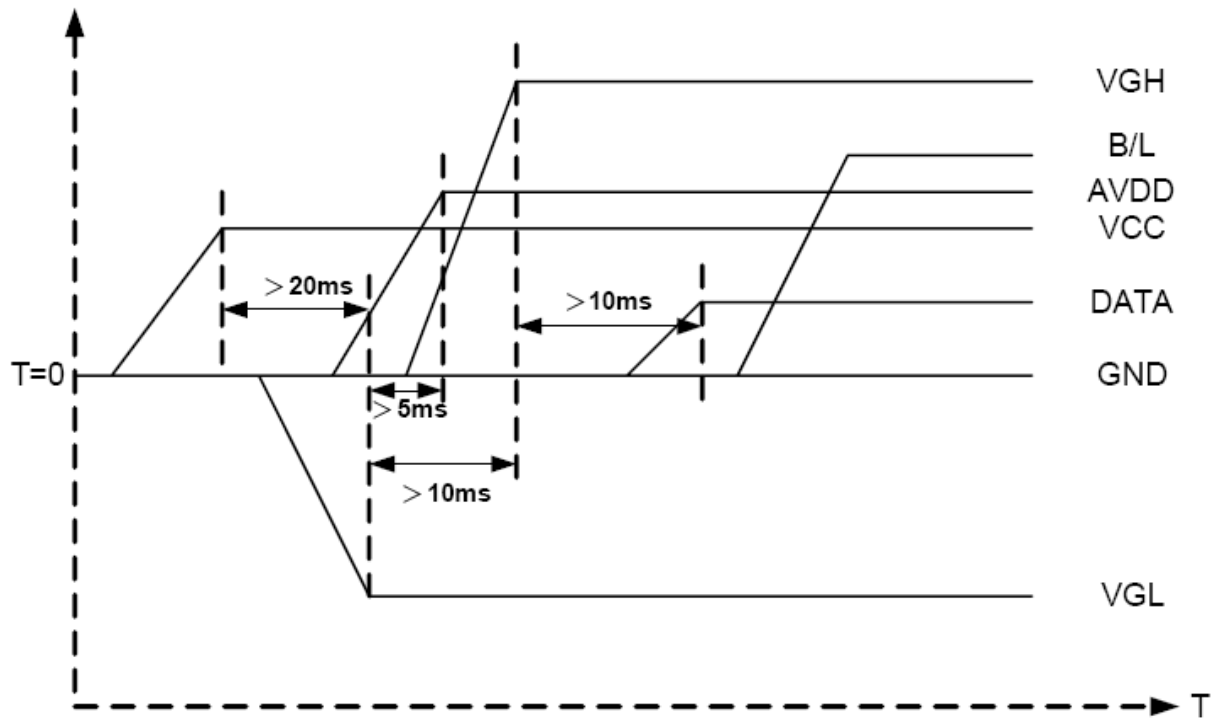


Note 3 : When LCM is operated over 40°C ambient temperature, the ILED of each LED module (3 LED Serial) should be follow :



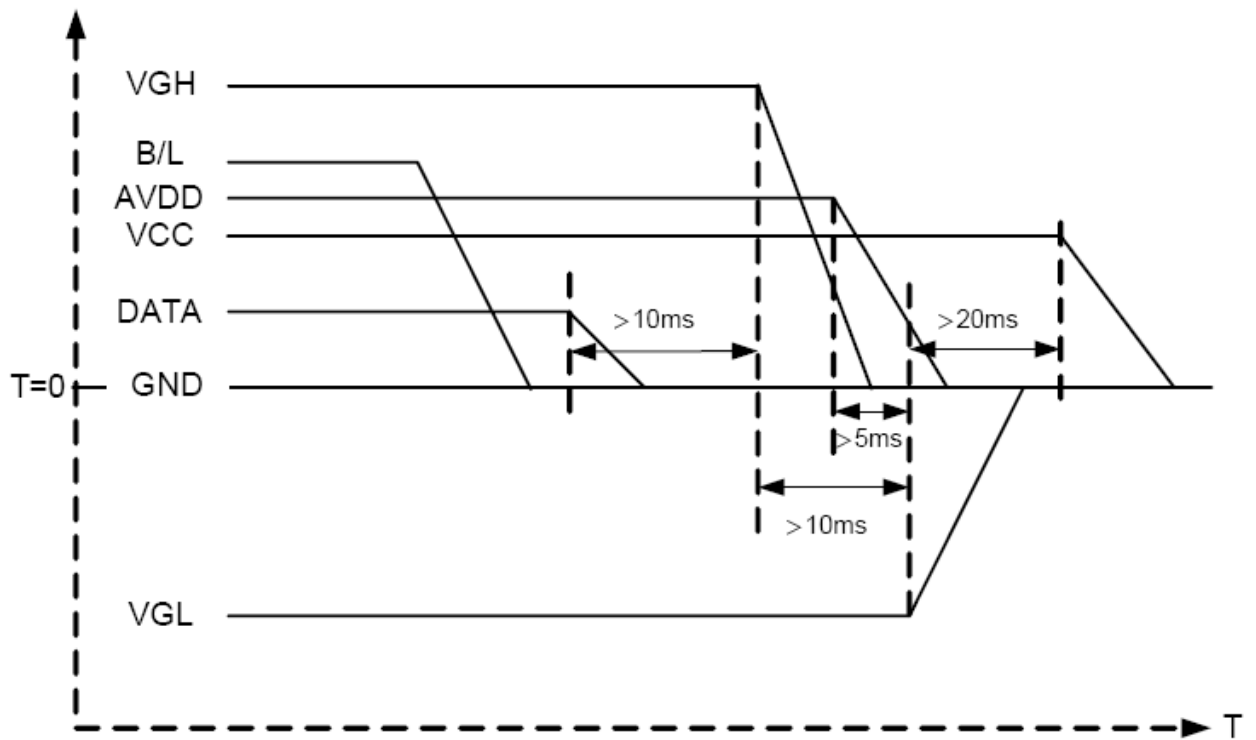
## 4-4 Power Sequence

### 4-4-1 Power on :



VCC→VGL→VGH→Data→B/L

### 4-4-2 Power off :



B/L→Data→VGH→VGL→VCC

## 5. Optical Specifications

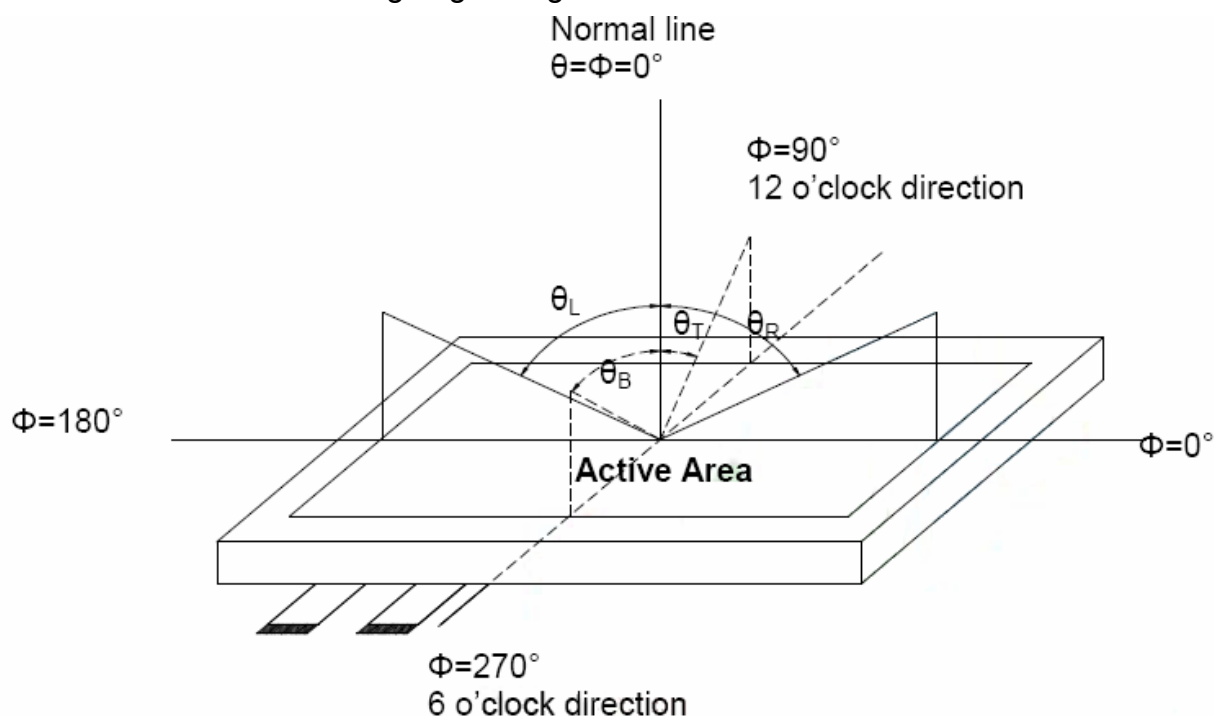
| Item                              | Symbol     | Condition                           | Values |      |      | Unit              | Note  |
|-----------------------------------|------------|-------------------------------------|--------|------|------|-------------------|-------|
|                                   |            |                                     | Min.   | Typ. | Max. |                   |       |
| Viewing angle<br>( $CR \geq 10$ ) | $\theta L$ | $\Phi = 180^\circ$<br>(9 o'clock)   | 60     | 70   | --   | degree            | Note1 |
|                                   | $\theta R$ | $\Phi = 0^\circ$<br>(3 o'clock)     | 60     | 70   | --   |                   |       |
|                                   | $\theta T$ | $\Phi = 90^\circ$<br>(12 o'clock)   | 40     | 50   | --   |                   |       |
|                                   | $\theta B$ | $\Phi = 270^\circ$<br>(6 o'clock)   | 60     | 70   | --   |                   |       |
| Response time                     | TON        | Normal<br>$\theta = \Phi = 0^\circ$ | --     | 10   |      | msec              | Note3 |
|                                   | TOFF       |                                     | --     | 15   |      | msec              |       |
| Contrast ratio                    | CR         |                                     | 400    | 500  | --   | --                | Note4 |
| Color chromaticity                | WX         |                                     | 0.26   | 0.31 | 0.36 | --                | Note5 |
|                                   | WY         |                                     | 0.28   | 0.33 | 0.38 | --                | Note6 |
| Luminance                         | L          |                                     | 200    | 250  | --   | cd/m <sup>2</sup> | Note6 |
| Luminance uniformity              | YU         |                                     | 70     | 75   | --   | %                 | Note7 |

Test Conditions :

1. VCC = 3.3V,  $I_L = 20\text{mA}$  (Backlight current), the ambient temperature is 25°C.
2. The test systems refer to Note 2.

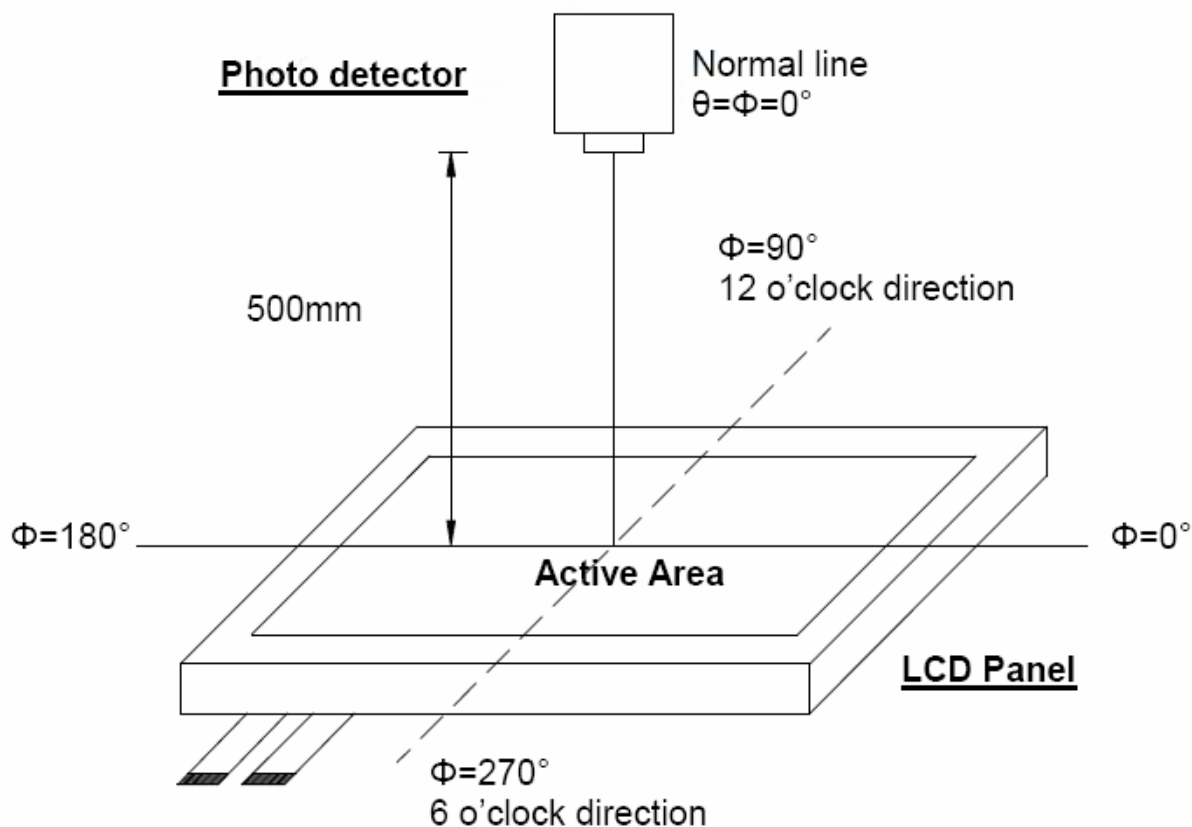


Note 1 : Definition of viewing angle range



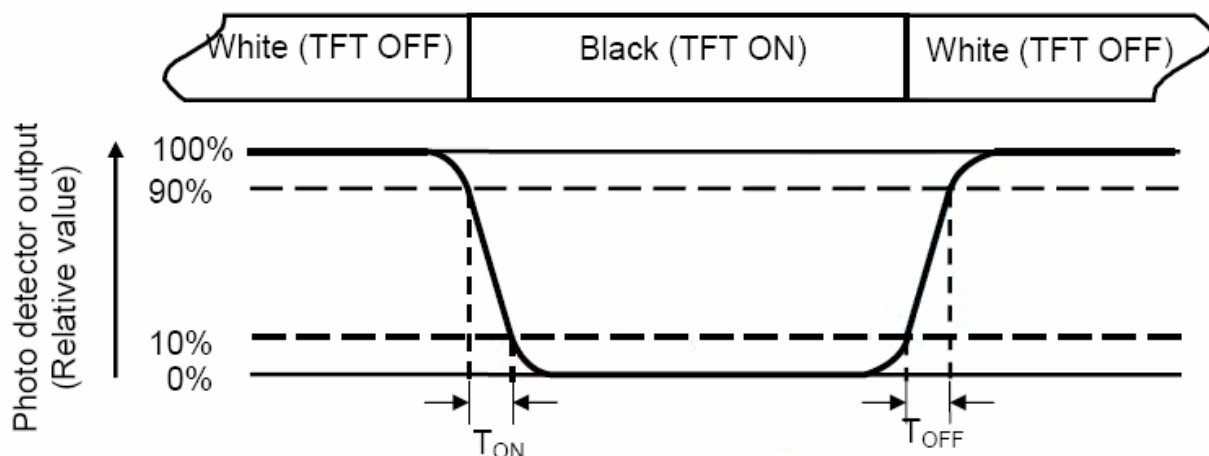
Note 2 : Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 30 minutes operation, the optical properties are measured at the center point of the LCD screen. (Response time is measured by Photo detector TOPCON BM-7, other items are measured by BM-5A/Field of view :  $1^\circ$  / Height : 500mm.)



Note 3 : Definition of Response time

The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time ( $T_{ON}$ ) is the time between photo detector output intensity changed from 90% to 10%. And fall time ( $T_{OFF}$ ) is the time between photo detector output intensity changed from 10% to 90%.



Note 4 : Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

Note 5 : Definition of color chromaticity (CIE1931)

Color coordinated measured at center point of LCD.

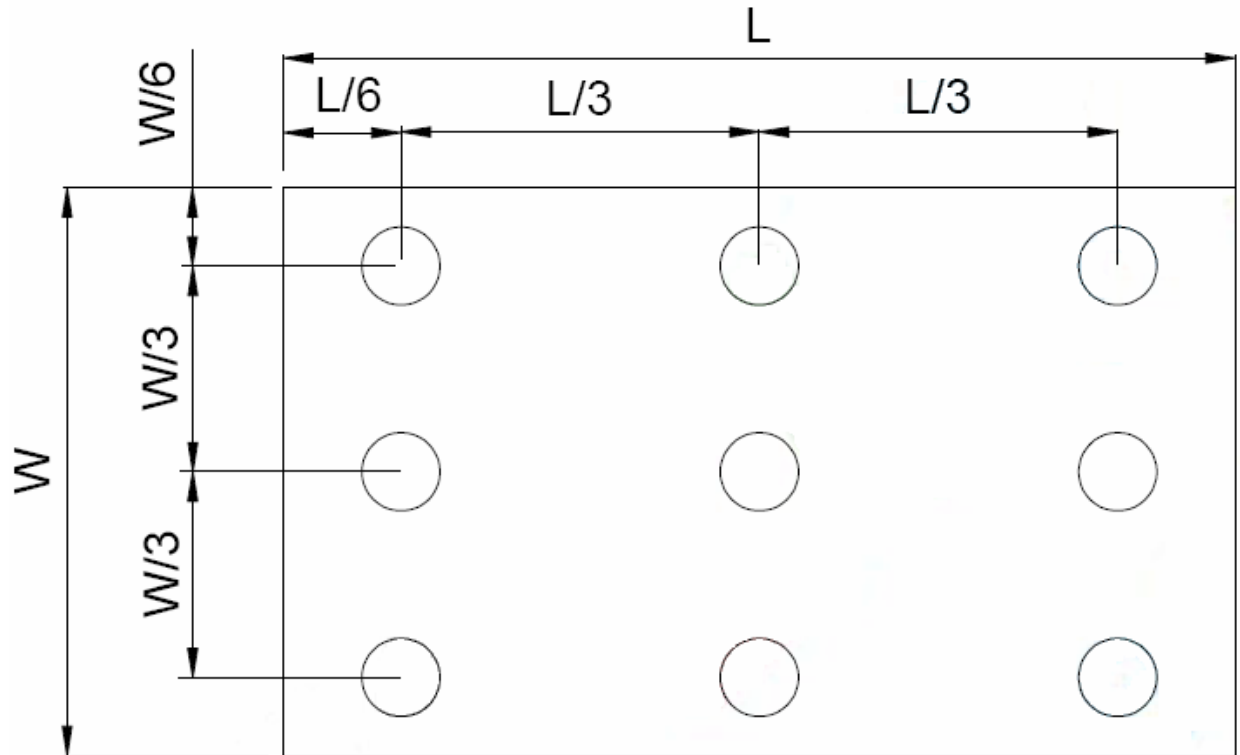
Note 6 : All input terminals LCD panel must be ground when measuring the center area of the panel.

Note 7 : Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer to bellow figure). Every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity (Yu)} = \frac{B_{\min}}{B_{\max}}$$

L ----- Active area length      W ----- Active area width



$B_{\max}$  : The measured maximum luminance of all measurement position.

$B_{\min}$  : The measured minimum luminance of all measurement position.

## 6. INTERFACE

### TFT LCD Panel Driving Section

| Pin No. | Symbol | I/O | Description                            | Note   |
|---------|--------|-----|----------------------------------------|--------|
| 1       | GND    | P   | Power ground                           |        |
| 2       | GND    | P   | Power ground                           |        |
| 3       | NC     |     | NC                                     |        |
| 4       | VCC    | I   | Power supply for digital circuit(3.3V) | Note 1 |
| 5       | VCC    | I   | Power supply for digital circuit(3.3V) | Note 1 |
| 6       | VCC    | I   | Power supply for digital circuit(3.3V) | Note 1 |
| 7       | VCC    | I   | Power supply for digital circuit(3.3V) | Note 1 |
| 8       | NC     |     | NC                                     |        |
| 9       | DE     | I   | Data enable                            |        |
| 10      | GND    | P   | Power ground                           |        |
| 11      | GND    | P   | Power ground                           |        |
| 12      | GND    | P   | Power ground                           |        |
| 13      | BI5    | I   | Blue data input (MSB)                  |        |
| 14      | BI4    | I   | Blue data input                        |        |
| 15      | BI3    | I   | Blue data input                        |        |
| 16      | GND    | P   | Power ground                           |        |
| 17      | BI2    | I   | Blue data input                        |        |
| 18      | BI1    | I   | Blue data input                        |        |
| 19      | BI0    | I   | Blue data input (LSB)                  |        |
| 20      | GND    | P   | Power ground                           |        |
| 21      | GI5    | I   | Green data input (MSB)                 |        |
| 22      | GI4    | I   | Green data input                       |        |
| 23      | GI3    | I   | Green data input                       |        |
| 24      | GND    | P   | Power ground                           |        |
| 25      | GI2    | I   | Green data input                       |        |

|    |      |   |                        |  |
|----|------|---|------------------------|--|
| 26 | GI1  | I | Green data input       |  |
| 27 | GI0  | I | Green data input (LSB) |  |
| 28 | GND  | P | Power ground           |  |
| 29 | RI5  | I | Red data input (MSB)   |  |
| 30 | RI4  | I | Red data input         |  |
| 31 | RI3  | I | Red data input         |  |
| 32 | GND  | P | Power ground           |  |
| 33 | RI2  | I | Red data input         |  |
| 34 | RI1  | I | Red data input         |  |
| 35 | RI0  | I | Red data input (LSB)   |  |
| 36 | GND  | P | Power ground           |  |
| 37 | GND  | P | Power ground           |  |
| 38 | DCLK | I | Sample clock           |  |
| 39 | GND  | P | Power ground           |  |
| 40 | GND  | P | Power ground           |  |

Note : input, O : output, P : power

Note 1: Typ. Vcc = 3.3V, Min. Vcc = 3.0V, Max. Vcc = 3.6V

### Backlight Unit Section

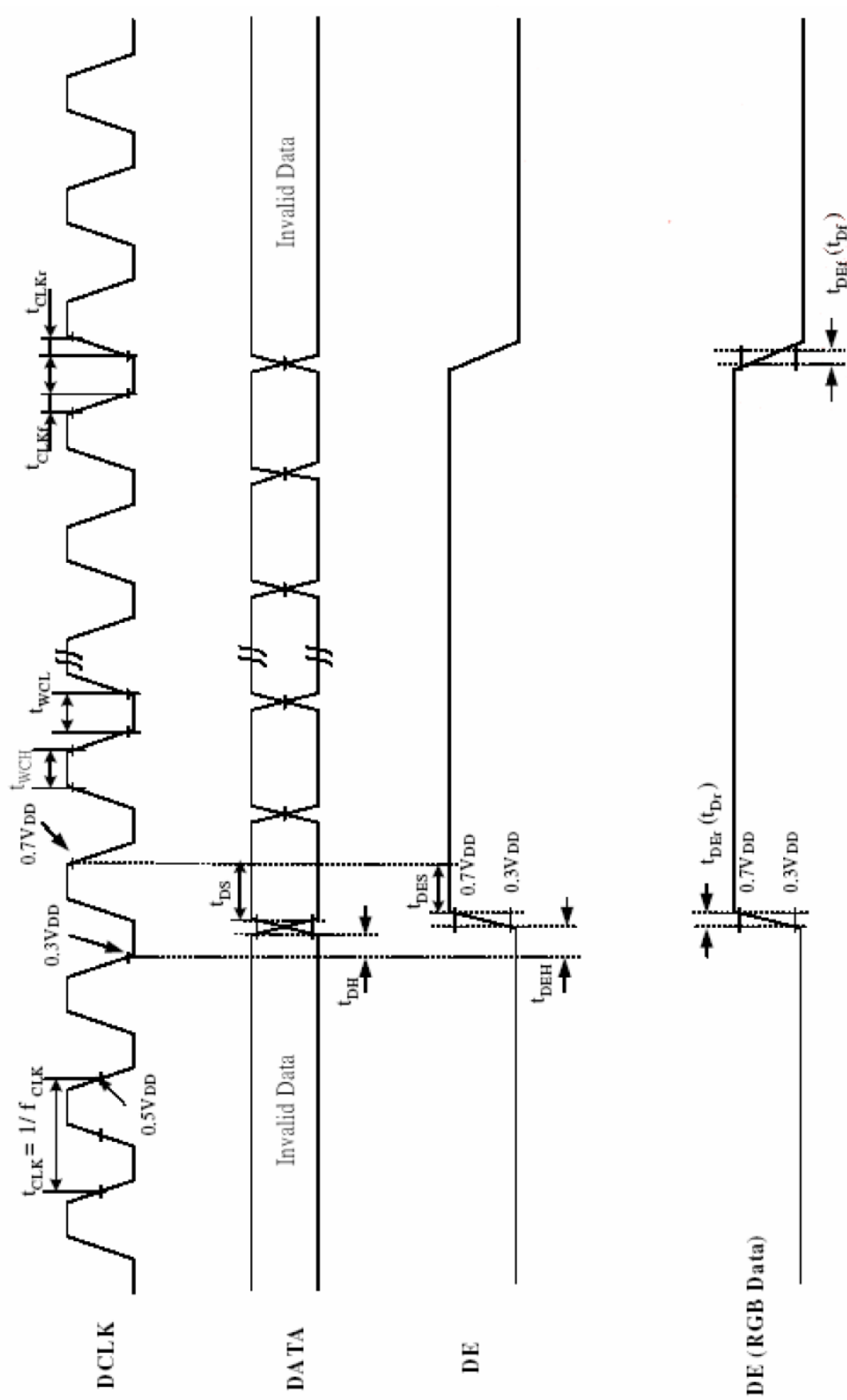
| Pin No. | Symbol | I/O | Description                     | Note  |
|---------|--------|-----|---------------------------------|-------|
| 1       | HI     | P   | Power supply for backlight unit | Pink  |
| 2       | GND    | P   | Ground for backlight unit       | White |

## 7. INPUT SIGNAL :

### 7-1 Timing Condition

|                     | Parameter         | Symbol          | Values |         |      | Unit | Note       |
|---------------------|-------------------|-----------------|--------|---------|------|------|------------|
|                     |                   |                 | Min.   | Typ.    | Max. |      |            |
| DCLK                | Period            | TCLK            | --     | 25      | 25   | ns   |            |
|                     | Frequency         | FCLK            | --     | 40      | 40   | MHZ  |            |
|                     | Low Level Width   | TWCL            | 6      | --      | --   | ns   |            |
|                     | High Level Width  | TWCH            | 6      | --      | --   | ns   |            |
|                     | Rise, Fall Time   | TCLKR,<br>TCLKF | --     | --      | 3    | ns   |            |
|                     | Duty              | -               | 0.45   | 0.50    | 0.55 | --   | TCLKL/TCLK |
| DE<br>(Data Enable) | Setup Time        | TDES            | 5      | --      | --   | ns   |            |
|                     | Hold Time         | TDEH            | 10     | --      | --   | ns   |            |
|                     | Rise, Fall Time   | TDER,<br>TDEF   | --     | --      | 16   | ns   |            |
|                     | Horizontal Period | THP             | --     | 1000    | --   | TCLK |            |
|                     | Horizontal Valid  | THV             |        | 800     |      |      |            |
|                     | Horizontal Blank  | THBK            |        | THP-THV |      |      |            |
|                     | Vertical Period   | TVP             | --     | 660     | --   | THP  |            |
|                     | Vertical Valid    | TW              |        | 600     |      |      |            |
|                     | Vertical Blank    | TVBK            |        | TVP,TW  |      |      |            |
| Data                | Setup Time        | TDS             | 5      | --      | --   | ns   |            |
|                     | Hold Time         | TDH             | 10     | --      | --   | ns   |            |
|                     | Rise, Fall Time   | TDR, TDF        | --     | --      | 3    | ns   |            |

## 7-2 Timing Characteristic



## 8. RELIABILITY TEST CONDITIONS

(Note 3)

| Item                                     | Test Conditions                                                                                                                              | Note   |
|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|--------|
| High Temperature Storage                 | Ta = 80°C 240 hrs                                                                                                                            | Note 1 |
| Low Temperature Storage                  | Ta = -30°C 240 hrs                                                                                                                           | Note 1 |
| High Temperature Operation               | Ts = 70°C 240 hrs                                                                                                                            | Note 2 |
| Low Temperature Operation                | Ta = -20°C 240 hrs                                                                                                                           | Note1  |
| Operate at High Temperature and Humidity | +60°C, 90%RH 240 hrs                                                                                                                         |        |
| Thermal Shock                            | -40°C /30 min ~ +95°C /30 min for a total 100 cycles, Start with cold temperature and end with high temperature                              |        |
| Vibration Test                           | Frequency range : 10 ~ 55Hz<br>Stroke : 1.5mm<br>Sweep : 10Hz ~ 55Hz ~ 10Hz<br>2 hours for each direction of X. Y. Z.<br>(6 hours for total) |        |
| Mechanical Shock                         | 100G 6ms, ±X, ±Y, ±Z 3 times for each direction                                                                                              |        |
| Package Vibration Test                   | Random Vibration :<br>0.015G*G/Hz from 5-200HZ, -6dB/Octave from 200-500Hz<br>2 hours for each direction of X. Y. Z.<br>(6 hours for total)  |        |
| Package Drop Test                        | Height : 60 cm<br>1 comer, 3 edges, 6 surfaces                                                                                               |        |
| Electro Static Discharge                 | ±2KV, Human Body Mode, 100pF/1500Ω                                                                                                           |        |

Note 1 : Ta is the ambient temperature of samples.

Note 2 : Ts is the temperature of panel's surface.

Note 3 : In the standard condition, there shall be no practical problem that man affect the display function.



## **9. General Precautions**

### **9-1 Safety**

Liquid crystal is poisonous. Do not put it your mouth. If liquid crystal touches your skin or clothes, wash it off immediately by using soap and water.

### **9-2 Handling**

1. The LCD panel is plate glass. Do not subject the panel to mechanical shock or to excessive force on its surface.
2. The polarizer attached to the display is easily damaged. Please handle it carefully to avoid scratch or other damages.
3. To avoid contamination on the display surface, do not touch the module surface with bare hands.
4. Keep a space so that the LCD panels do not touch other components.
5. Put cover board such as acrylic board on the surface of LCD panel to protect panel from damages.
6. Transparent electrodes may be disconnected if you use the LCD panel under environmental conditions where the condensation of dew occurs.
7. Do not leave module in direct sunlight to avoid malfunction of the ICs.

### **9-3 Static Electricity**

1. Be sure to ground module before turning on power or operation module.
2. Do not apply voltage which exceeds the absolute maximum rating value.

### **9-4 Storage**

1. Store the module in a dark room where must keep at  $+25\pm 10^{\circ}\text{C}$  and 65%RH or less.
2. Do not store the module in surroundings containing organic solvent or corrosive gas.
3. Store the module in an anti-electrostatic container or bag.

### **9-5 Cleaning**

1. Do not wipe the polarizer with dry cloth. It might cause scratch.
2. Only use a soft cloth with IPA to wipe the polarizer, other chemicals might permanent damage to the polarizer.

10. OUTLINE DIMENSION

