**Preliminary**

# TFT LCD Specification

# Model Name: TD170WGCA1

| Customer Signature |
| --- |
| |
| Date |
| |

This technical specification is subjected to change without notice

## Table of Contents

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## Record of Reversion

| Rev | Issued Date | Description |
|---|---|---|
| 0.00 | Sep 19, 2003 | New Create |
| 0.01 | Sep 22, 2003 | Modify as below:<br>1. Vsync Frequency changes from 75(Typ.) to 60(Typ.) on page 7.<br>2. Hsync Frequency changes from 80(Typ.) to 64(Typ.) on page 7.<br>3. Main Frequency changes from 135(Typ.) to 108(Typ.) on page 7.<br>4. Shock (non-operation) condition: Shock level change from 50G to 70G on page 18.<br>5. Surface Discharge (non-operation) condition: Description is changed from "Discharge: Air: ± 8kV; Contact: ± 6kV" to "Discharge: Air: ± 15kV; Contact: ± 8kV" on page 18.<br>6. Add an explanatory note 8-2: Temperature and relative humidity range are show in the figure below. Wet bulb temperature should be 39 max. and no condensation of water.<br>7. Update the connected data of "Timing Parameters Table" on page 11.<br>8. Update the connected illustration of "Timing definition" on page 12.<br>9. Add the connected section of "6.5 Power ON/OFF Sequence" on page 13.<br>Add<br>1. Page 23 Module Label Drawing & Definition |
| 0.02 | Sep 26, 2003 | Modify as below:<br>1. Page 6: LVDS Interface<br>2. Page 8: Light Source<br>3. Page 14: Color Chromaticity |
| 0.03 | Oct 30, 2003 | Add<br>1. Page 4: Color Saturation<br>2. Page 5: Connector Diagram<br>3. Page 16: Cross Talk spec<br>Modify<br>1. Page 10: Driving Backlight<br>2. Page 16: Optical Specification<br>3. Page 23: Mechanical Drawing<br>4. Page 25: Module Label Drawing & Definition |

| 0.04 | Jan 13, 2004 | Modify<br>1. Page 2: Table of Contents<br>2. Page 10: 5.1TFT LCD Module<br>3. Page 14: a. Timing Parameters<br>4. Page 17: Gray level transmittance<br>5. Page 26:Package Drawing |
|------|--------------|---|
|  |  |  |
|  |  |  |
|  |  |  |

TD170WGCA1

## 1. FEATURES

TD170WGCA1 is a color active matrix TFT (Thin Film Transistor) liquid crystal display (LCD) that uses amorphous silicon TFTs as a switching device. This mode is composed of a TFT LCD panel, a driver circuit and a back-light system. The resolution of a 17.0" contains 1280 x 1024 pixels and can display up to 16.2 millions colors.

(1) 17.0" SXGA (1280 x RGB x 1024 pixels) display size for PC

(2) LVDS interface system

(3) Thin and light weight

(4) High contrast ratio

## 2. GENERAL SPECIFICATIONS

| Item | Description | Unit |
|---|---|---|
| Display Size (Diagonal) | 17.0 (43.2) | Inch (cm) |
| Driver Element | TFT-LCD Active Matrix | |
| Active Area (HxV) | 337.92 (H) x 270.336 (V) | mm |
| Number of Dots (HxV) | 1280 x RGB x 1024 | dot |
| Pixel Pitch (HxV) | 0.088 x 0.264 | mm |
| Color Arrangement | RGB Vertical Stripe | |
| Color Numbers | 16,194,227 (6 bits+FRC) | |
| Color Saturation | 72 (NTSC) | % |
| Outline Dimension (HxVxT) | 358.5 x 296.5 x 17.0 (Typ) | mm |
| Weight | 1900(Typ) +/- 50 | g |
| Display Mode | Normally White | |
| Surface Treatment | Anti Glare and Hard-Coating    3H | |

## 3. INPUT/OUTPUT TERMINALS

3.1 TFT LCD Panel

Connector Name/ Designation: Interface Connector/ Interface Card

Type Part Number: JAE FI-XB30S-H or Equivalent

Mating Housing Part Number: JAE FI-X30S-H or Equivalent

| Pin No | Symbol | Function | Remark |
|---|---|---|---|
| 1 | R1IN0- | Receiver signal of Odd side pixels (-) | LVDS |
| 2 | R1IN0+ | Receiver signal of Odd side pixels (+) | LVDS |
| 3 | R1IN1- | Receiver signal of Odd side pixels (-) | LVDS |
| 4 | R1IN1+ | Receiver signal of Odd side pixels (+) | LVDS |
| 5 | R1IN2- | Receiver signal of Odd side pixels (-) | LVDS |
| 6 | R1IN2+ | Receiver signal of Odd side pixels (+) | LVDS |

| 7 | GND | | |
|---|---|---|---|
| 8 | CK1IN- | Receiver signal of Odd side pixels (-) | LVDS |
| 9 | CK1IN+ | Receiver signal of Odd side pixels (+) | LVDS |
| 10 | R1IN3- | Receiver signal of Odd side pixels (-) | LVDS |
| 11 | R1IN3+ | Receiver signal of Odd side pixels (+) | LVDS |
| 12 | R2IN0- | Receiver signal of Even side pixels (-) | LVDS |
| 13 | R2IN0+ | Receiver signal of Even side pixels (+) | LVDS |
| 14 | GND | | |
| 15 | R2IN1- | Receiver signal of Even side pixels (-) | LVDS |
| 16 | R2IN1+ | Receiver signal of Even side pixels (+) | LVDS |
| 17 | GND | | |
| 18 | R2IN2- | Receiver signal of Even side pixels (-) | LVDS |
| 19 | R2IN2+ | Receiver signal of Even side pixels (+) | LVDS |
| 20 | CK2IN- | Clock signal of Even side pixels (-) | LVDS |
| 21 | CK2IN+ | Clock signal of Even side pixels (+) | LVDS |
| 22 | R2IN3- | Receiver signal of Even side pixels (-) | LVDS |
| 23 | R2IN3+ | Receiver signal of Even side pixels (+) | LVDS |
| 24 | GND | | |
| 25 | NC | | |
| 26 | NC | | |
| 27 | NC | | |
| 28 | $V_{DD}$ | +5 power supply | Power |
| 29 | $V_{DD}$ | +5 power supply | Power |
| 30 | $V_{DD}$ | +5 power supply | Power |

3.2 Connector Diagram

pin 1          pin 30
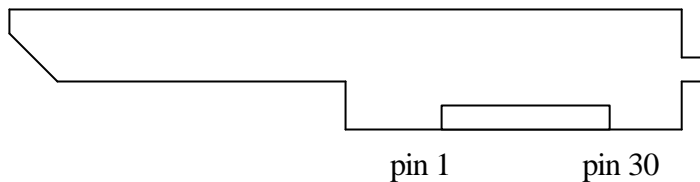
Rear view of LCM

### 3.3 LVDS Interface (Tx: DS90C383 or DS90C385 Equivalent)

| 1st LVDS Transmitter ( **DS90C383, DS90C385** ) Signal Interface | | | | | | |
|---|---|---|---|---|---|---|
| Device Input Pin | | Device Input Signal | | Output Signal | To TD170WGCA1 Interface(J101) | |
| No | Symbol | Symbol | Function | | Terminal | Symbol |
| 51 | TXIN0 | RO0 | Red Odd Pixel Data (LSB) | TXOUT0- TXOUT0+ | No. 1 No. 2 | RXO0- RXO0+ |
| 52 | TXIN1 | RO1 | Red Odd Pixel Data | | | |
| 54 | TXIN2 | RO2 | Red Odd Pixel Data | | | |
| 55 | TXIN3 | RO3 | Red Odd Pixel Data | | | |
| 56 | TXIN4 | RO4 | Red Odd Pixel Data | | | |
| 2 | TXIN5 | RO7 | Red Odd Pixel Data (MSB) | TXOUT3- TXOUT3+ | No. 10 No. 11 | RXO3- RXO3+ |
| 3 | TXIN6 | RO5 | Red Odd Pixel Data | TXOUT0- TXOUT0+ | No. 1 No. 2 | RXO0- RXO0+ |
| 4 | TXIN7 | GO0 | Green Odd Pixel Data (LSB) | | | |
| 6 | TXIN8 | GO1 | Green Odd Pixel Data | TXOUT1- TXOUT1+ | No. 3 No. 4 | RXO1- RXO1+ |
| 7 | TXIN9 | GO2 | Green Odd Pixel Data | | | |
| 8 | TXIN10 | GO6 | Green Odd Pixel Data | TXOUT3- TXOUT3+ | No. 10 No. 11 | RXO3- RXO3+ |
| 10 | TXIN11 | GO7 | Green Odd Pixel Data (MSB) | | | |
| 11 | TXIN12 | GO3 | Green Odd Pixel Data | TXOUT1- TXOUT1+ | No. 3 No. 4 | RXO1- RXO1+ |
| 12 | TXIN13 | GO4 | Green Odd Pixel Data | | | |
| 14 | TXIN14 | GO5 | Green Odd Pixel Data | | | |
| 15 | TXIN15 | BO0 | Blue Odd Pixel Data (LSB) | | | |
| 16 | TXIN16 | BO6 | Blue Odd Pixel Data | TXOUT3- TXOUT3+ | No. 10 No. 11 | RXO3- RXO3+ |
| 18 | TXIN17 | BO7 | Blue Odd Pixel Data  (MSB) | | | |
| 19 | TXIN18 | BO1 | Blue Odd Pixel Data | TXOUT1- TXOUT1+ | No. 3 No. 4 | RXO1- RXO1+ |
| 20 | TXIN19 | BO2 | Blue Odd Pixel Data | | | |
| 22 | TXIN20 | BO3 | Blue Odd Pixel Data | TXOUT2- TXOUT2+ | No. 5 No. 6 | RXO2- RXO2+ |
| 23 | TXIN21 | BO4 | Blue Odd Pixel Data | | | |
| 24 | TXIN22 | BO5 | Blue Odd Pixel Data | | | |
| 50 | TXIN27 | RO6 | Red Odd Pixel Data | TXOUT3- TXOUT3+ | No. 10 No. 11 | RXO3- RXO3+ |

| 2nd LVDS Transmitter ( **DS90C383, DS90C385** ) Signal Interface | | | | | | |
|---|---|---|---|---|---|---|
| Device Input Pin | | Device Input Signal | | Output Signal | To TD170WGCA1 Interface(J101) | |
| No | Symbol | Symbol | Function | | Terminal | Symbol |
| 51 | TXIN0 | RE0 | Red Even Pixel Data (LSB) | TXOUT0- TXOUT0+ | No. 12 | RXE0- |
| 52 | TXIN1 | RE1 | Red Even Pixel Data | | | |
| 54 | TXIN2 | RE2 | Red Even Pixel Data | | No. 13 | RXE0+ |
| 55 | TXIN3 | RE3 | Red Even Pixel Data | | | |
| 56 | TXIN4 | RE4 | Red Even Pixel Data | | | |
| 2 | TXIN5 | RE7 | Red Even Pixel Data (MSB) | TXOUT3- TXOUT3+ | No. 22 | RXE3- |
| | | | | | No. 23 | RXE3+ |
| 3 | TXIN6 | RE5 | Red Even Pixel Data | TXOUT0- TXOUT0+ | No. 12 | RXE0- |
| 4 | TXIN7 | GE0 | Green Even Pixel Data (LSB) | | No. 13 | RXE0+ |
| 6 | TXIN8 | GE1 | Green Even Pixel Data | TXOUT1- TXOUT1+ | No. 15 | RXE1- |
| 7 | TXIN9 | GE2 | Green Even Pixel Data | | No. 16 | RXE1+ |
| 8 | TXIN10 | GE6 | Green Even Pixel Data | TXOUT3- TXOUT3+ | No. 22 | RXE3- |
| 10 | TXIN11 | GE7 | Green Even Pixel Data (MSB) | | No. 23 | RXE3+ |
| 11 | TXIN12 | GE3 | Green Even Pixel Data | TXOUT1- TXOUT1+ | No. 15 | RXE1- |
| 12 | TXIN13 | GE4 | Green Even Pixel Data | | No. 16 | RXE1+ |
| 14 | TXIN14 | GE5 | Green Even Pixel Data | | | |
| 15 | TXIN15 | BE0 | Blue Even Pixel Data (LSB) | | | |
| 16 | TXIN16 | BE6 | Blue Even Pixel Data | TXOUT3- TXOUT3+ | No. 22 | RXE3- |
| 18 | TXIN17 | BE7 | Blue Even Pixel Data (MSB) | | No. 23 | RXE3+ |
| 19 | TXIN18 | BE1 | Blue Even Pixel Data | TXOUT1- TXOUT1+ | No. 15 | RXE1- |
| | | | | | No. 16 | RXE1+ |
| 20 | TXIN19 | BE2 | Blue Even Pixel Data | TXOUT2- TXOUT2+ | No. 18 | RXE2- |
| 22 | TXIN20 | BE3 | Blue Even Pixel Data | | No. 19 | RXE2+ |
| 23 | TXIN21 | BE4 | Blue Even Pixel Data | | | |
| 24 | TXIN22 | BE5 | Blue Even Pixel Data | | | |
| 50 | TXIN27 | RE6 | Red Even Pixel Data | TXOUT3- TXOUT3+ | No. 22 | RXE3- |
| | | | | | No. 23 | RXE3+ |

3.4 Light Source

Connector Name/ Designation: Lamp Connector/ Backlight Lamp

Type Part Number: BHSR-02VS-1 or Equivalent

Mating Type Part Number: SM02B-BHSS-1 or Equivalent

| Pin NO. | Symbol | Input | Color | Function |
|---------|--------|-------|-------|----------|
| 1 | Pin 1 | HOT | Pink & Blue | High Voltage |
| 2 | Pin 2 | COLD | White | Low Voltage |

## 4. ABSOLUTE MAXIMUM RATINGS

GND =0V

| Item | Symbol | MIN | MAX | Unit | Remark |
|------|--------|-----|-----|------|--------|
| Power Supply Voltage | $V_{cc}$ | +4.7 | +5.5 | V | |
| Lamp Current | $I_L$ | -- | 10 | mA rms | |
| Lamp Frequency | $F_L$ | -- | 100 | KHz | |
| Operating Temperature | Topr | 0 | +50 | | |
| Storage Temperature | Tstg | -20 | +60 | | |
| Storage Humidity | Hstg | 10 | 90 | %RH | Note 4-1 |

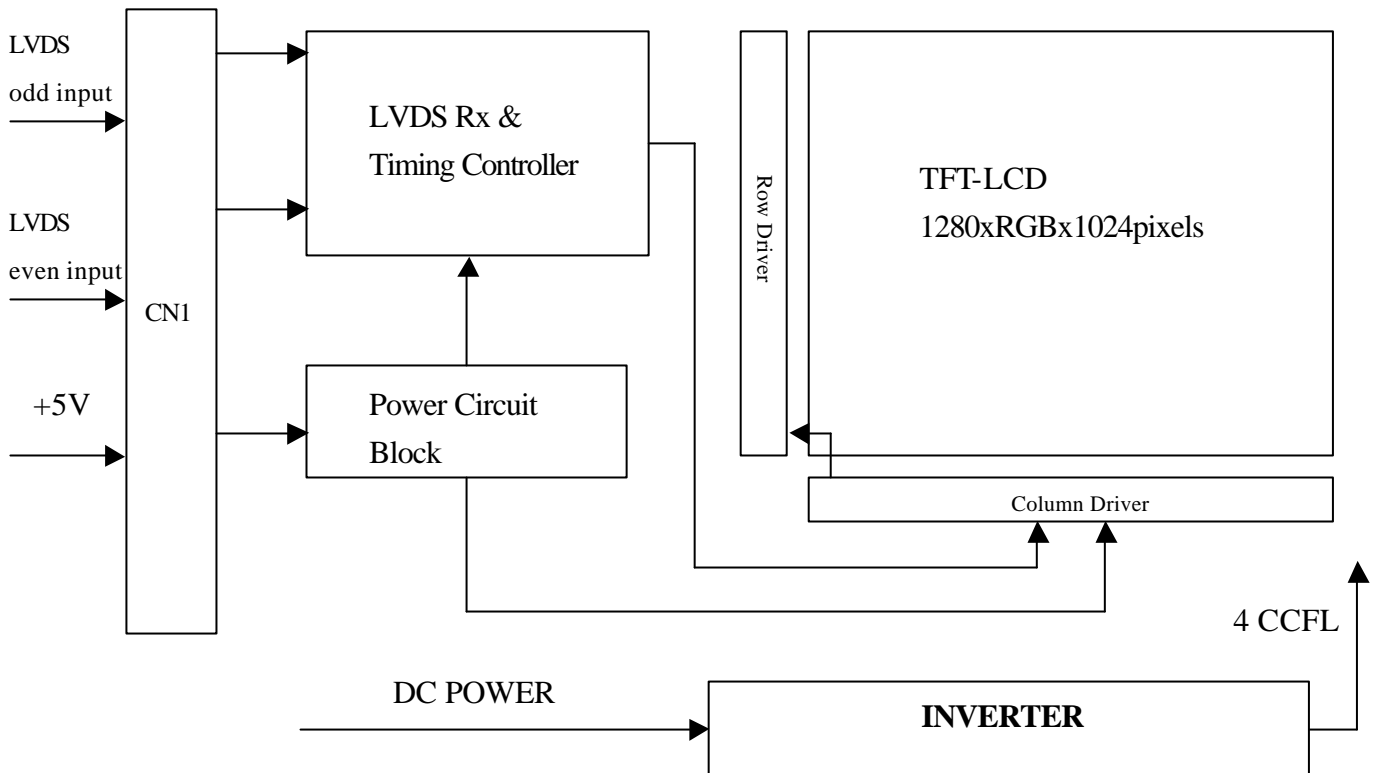Note 4-1: Maximum wet – bulb temperature at 39    or less.  Ta    40     No condensation

## 5. ELECTRICAL CHARACTERISTICS

### 5.1 TFT LCD Module

Ta=25

| Item | | Symbol | MIN | TYP | MAX | Unit | Remark |
|---|---|---|---|---|---|---|---|
| Voltage of power supply | | $V_{DD}$ | 4.7 | 5.0 | 5.5 | V | |
| Differential Input Threshold Voltage | High | $V_{HIH}$ | -- | -- | 100 | mV | $V_{CM}$ = +1.2V |
| | Low | $V_{HIL}$ | -100 | -- | -- | mV | |
| Rush Current | $I_{RUSH}$ | -- | -- | -- | 3.75 | A | |
| Vsync Frequency | | $f_V$ | -- | 60 | 75 | Hz | |
| Hsync Frequency | | $f_H$ | 62 | 64 | 80 | KHz | |
| Main Frequency | | $f_{DCLK}$ | 42 | 54 | 67.5 | MHz | |
| Current of Power Supply | White | -- | 940 | -- | mA | | |
| | Mosaic | -- | 940 | -- | mA | | |
| | Max Pattern (One dot inversion) | -- | 940 | 1200 | mA | | |

### 5.2 Driving TFT LCD Module Block Diagram

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5.3 Driving Backlight

The backlight system is an edge – lighting type with a single CCFL (Cold Cathode Fluorescent Lamp). The characteristics of a single lamp are shown in the following tables.

Ta=25

| Item | Symbol | MIN | TYP | MAX | Unit | Remark |
|---|---|---|---|---|---|---|
| Lamp Current | $I_L$ | 3.0 | 7.0 | 7.5 | mArms | Note 5-1 |
| Lamp Voltage | $V_L$ | 580 | 650 | 780 | Vrms | $I_L$  7mA |
| Power Consumption | $P_L$ | -- | 18.2 | -- | W | Note 5-2 |
| Frequency | $F_L$ | 40 | 50 | 80 | kHz | Note 5-3 |
| Operating Life time | Hr | 30000 | 50000 | -- | Hour | Note 5-4 |
| Lamp starting voltage | Vs | -- | -- | 1120  25 | Vrms | Note 5-5 |
|  |  |  |  | 1460  0 |  |  |

Note 5-1: Lamp current is measured with a high frequency current meter as show below.



High Voltage    (Pink)

Low Voltage    (White)

**LCD Module**  **1 2**  **A**  **Inverter**
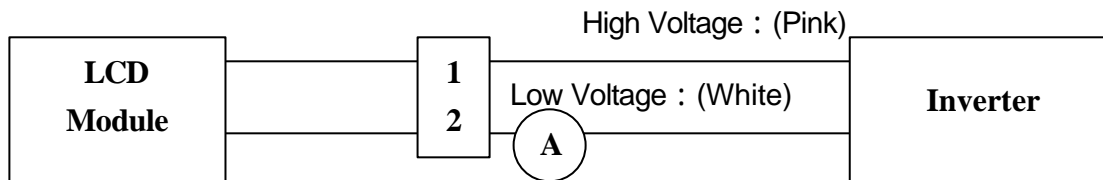
Switching Frequency    (40~80)KHz

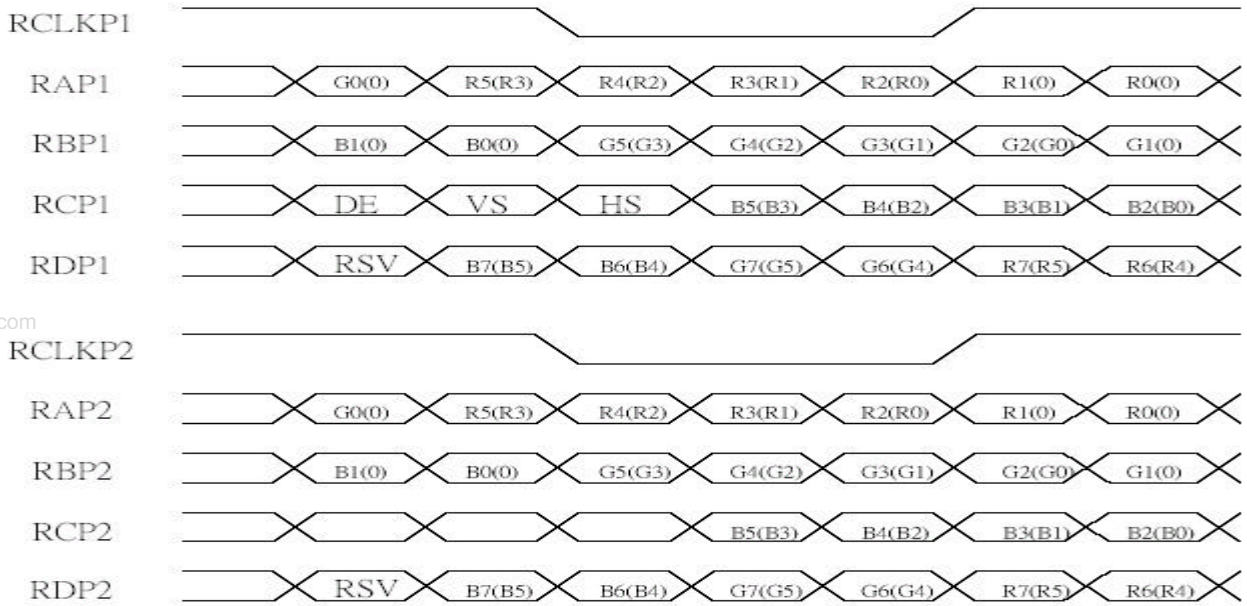Note 5-2: W    $I_L \times V_L \times 4$

Note 5-3: Lamp frequency may produce interference with horizontal synchronous frequency and this may cause line flow on the display. Therefore lamp frequency shall be detached from the horizontal synchronous frequency and its harmonics as far as possible in order to avoid interference.

Note 5-4: Brightness is decreased to the 50% of the initial value.
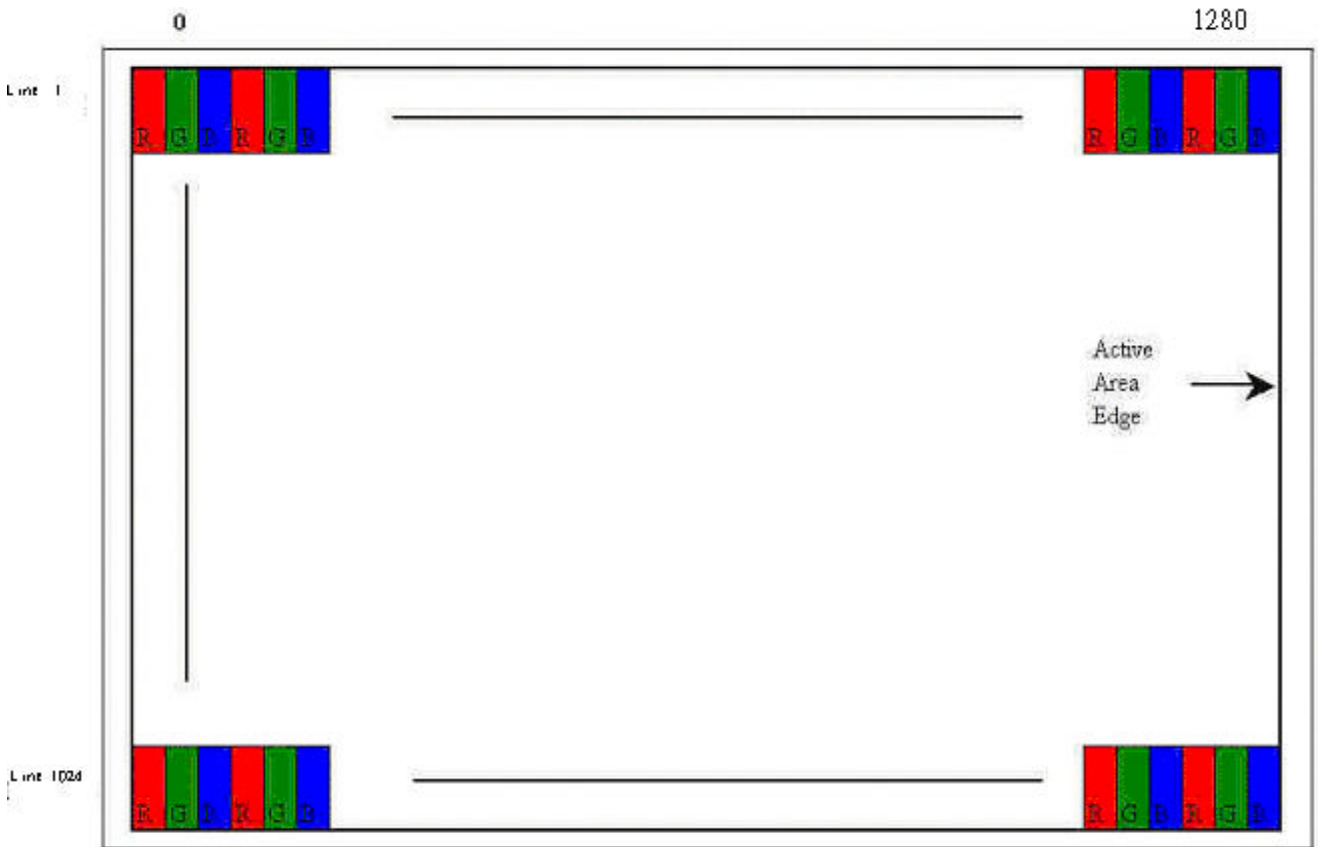
Note 5-5: Above this value should be applied to the lamp for more than 1 second to startup, otherwise the lamp may be not to turn on.

## 6. TIMING CHART

### 6.1 LVDS Channel Interface Data Mapping Diagram

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| RCLKP1 | | | | | | | |
| RAP1 | G0(0) | R5(R3) | R4(R2) | R3(R1) | R2(R0) | R1(0) | R0(0) |
| RBP1 | B1(0) | B0(0) | G5(G3) | G4(G2) | G3(G1) | G2(G0) | G1(0) |
| RCP1 | DE | VS | HS | B5(B3) | B4(B2) | B3(B1) | B2(B0) |
| RDP1 | RSV | B7(B5) | B6(B4) | G7(G5) | G6(G4) | R7(R5) | R6(R4) |
| RCLKP2 | | | | | | | |
| RAP2 | G0(0) | R5(R3) | R4(R2) | R3(R1) | R2(R0) | R1(0) | R0(0) |
| RBP2 | B1(0) | B0(0) | G5(G3) | G4(G2) | G3(G1) | G2(G0) | G1(0) |
| RCP2 | | | | B5(B3) | B4(B2) | B3(B1) | B2(B0) |
| RDP2 | RSV | B7(B5) | B6(B4) | G7(G5) | G6(G4) | R7(R5) | R6(R4) |

### 6.2 Pixel Format in Display

6.3 Input Signals, Basic Display Color and Gray Scale of Each Color

| Color & Gray Scale | | 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 Colors | 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 |
| | Blue | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Green | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 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 |
| | Red | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 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 |
| Gray Scale Of Red | 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 |
| | Darker | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Darker | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Brighter | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Brighter | 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 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gray Scale Of Green | 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 |
| | Darker | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Darker | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Brighter | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Brighter | 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 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gray Scale Of Blue | 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 |
| | Darker | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | Darker | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| | Brighter | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 |
| | Brighter | 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 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

| Gray Scale Of White & Black | 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 |
| | Darker | 0 0 0 0 0 0 1 0 0 0 0 0 0 1 0 0 0 0 0 0 1 |
| | | 0 0 0 0 0 1 0 0 0 0 0 0 1 0 0 0 0 0 0 1 0 |
| | Brighter | 1 1 1 1 1 1 0 1 1 1 1 1 1 0 1 1 1 1 1 1 0 1 |
| | | 1 1 1 1 1 1 1 0 1 1 1 1 1 1 0 1 1 1 1 1 1 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 |

## 6.4 Interface Timing

### a. Timing Parameters

| Signal | Item | Symbol | MIN | TYP | MAX | Unit | Note |
|---|---|---|---|---|---|---|---|
| Clock | Frequency | $T_V$ | 42 | 54 | 67.5 | Mhz | |
| | High Time | TCH | 4 | -- | -- | nsec | |
| | Low Time | TCL | 4 | -- | -- | nsec | |
| Data | Setup Time | TDS | 4 | -- | -- | nsec | |
| | Hold Time | TDH | 4 | -- | -- | nsec | |
| Data Enable | Setup Time | TES | 4 | -- | -- | nsec | |
| Frame Frequency | Cycle | TV | -- | 16.7 | -- | msec | |
| | | | 1030 | 1066 | 1530 | Lines | |
| Vertical Active Display Term | Display Period | $T_{VD}$ | -- | 1024 | -- | Lines | |
| | Vertical Blank Period | TVB | 6 | -- | -- | Lines | |
| One Line Scanning Time | Cycle | $T_H$ | 688 | 844 | 1022 | Clocks | |
| Horizontal Active Display Term | Display Period | $T_{HD}$ | 640 | 640 | 640 | Clocks | |

b. Timing definition

● Vertical timing
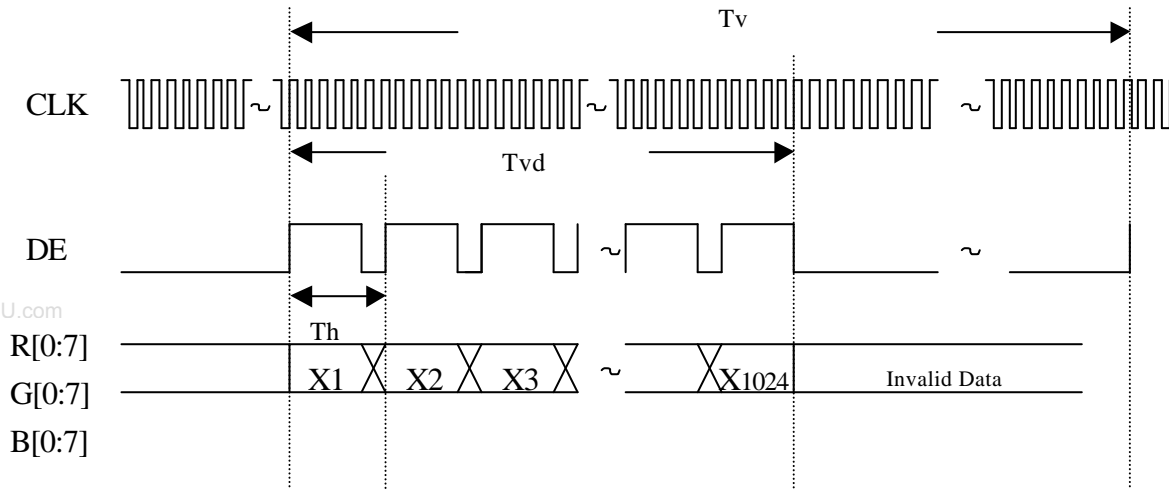


● Horizontal timing
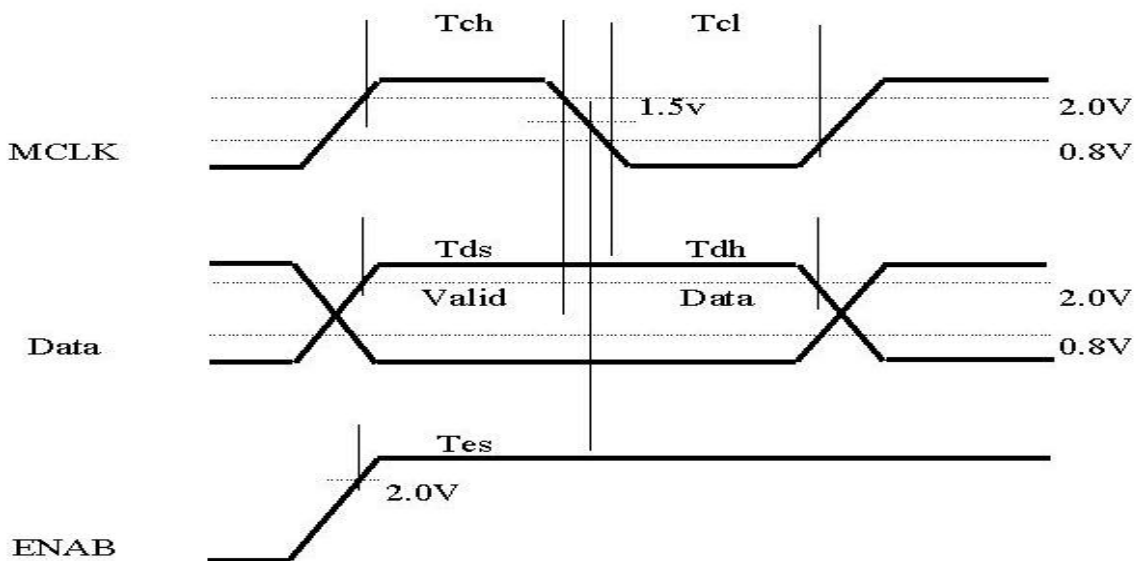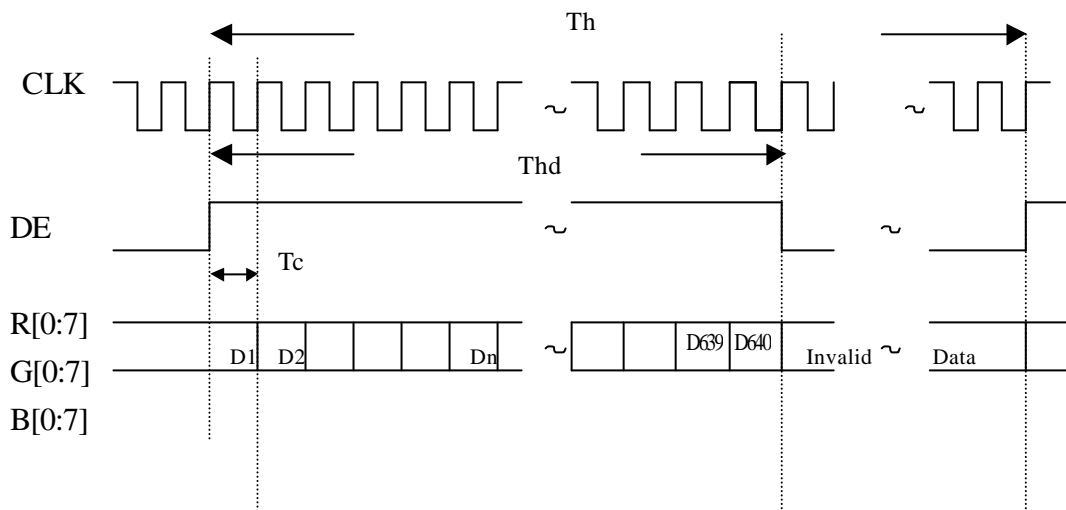
## 6.5 Power ON/OFF Sequence
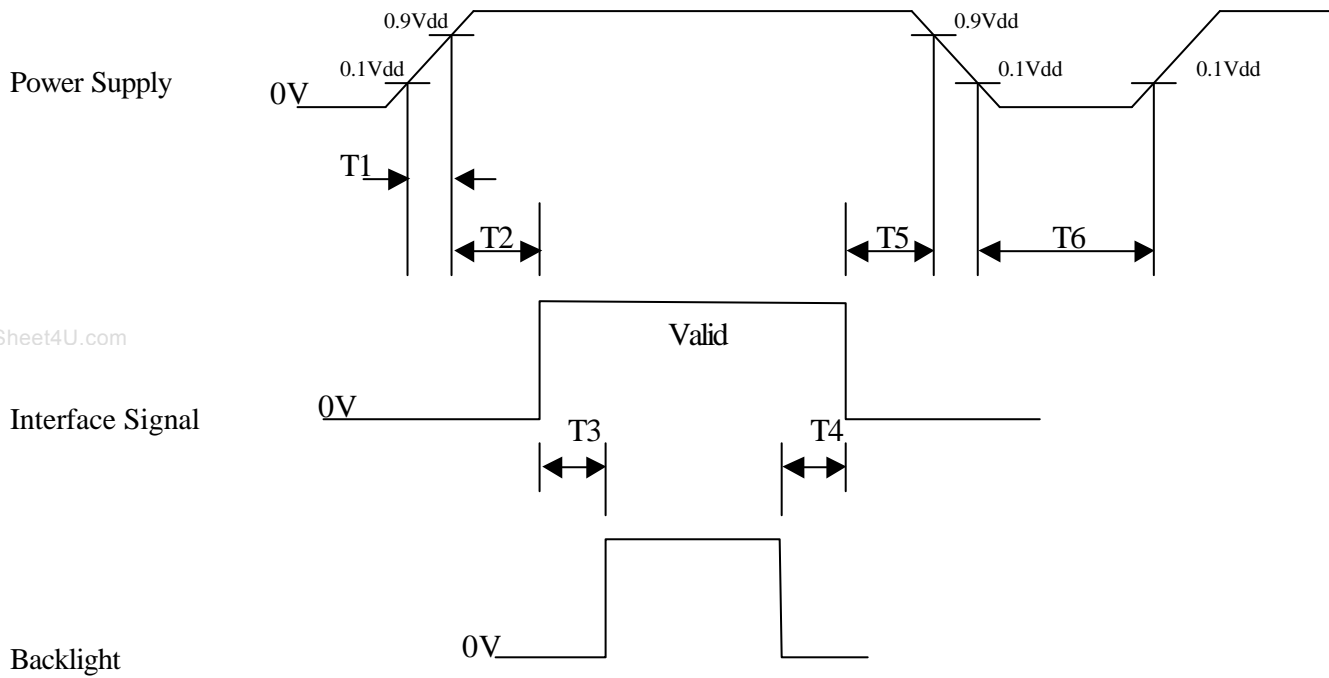


a. 0<T1   10ms
b. 0<T2   50ms
c. 500   T3
d. 100ms   T4
e. 0<T5   50ms
f. 1sec   T6

## 7. OPTICAL CHARACTERISTICS

### 7.1 Optical Specification

Ta=25

| Item | | Symbol | Condition | MIN | TYP | MAX | Unit | Remarks |
|---|---|---|---|---|---|---|---|---|
| Viewing Angle | Hor. | 11 | CR=10 At center point | 65 | 75 | -- | degree | Note 7-1 |
| | | 12 | | 65 | 75 | -- | | |
| | Ver. | 21 | | 65 | 75 | -- | | |
| | | 22 | | 50 | 60 | -- | | |
| Contrast ratio (Center point) | | CR | | 300 | 450 | -- | | Note 7-2 |
| Response time | Rising | Tr | | -- | 4 | 5 | ms | Note 7-4 |
| | Falling | Tf | | -- | 12 | 15 | | |
| Luminance of White (Center Point) | | $Y_L$ | | 200 | 260 | -- | cd/m$^2$ | Note 7-5 |
| Color Chromaticity (CIE1931) | Red | $R_X$ | =0° =0° Normal Viewing Angle | 0.622 | 0.652 | 0.682 | | Note 7-6 |
| | | $R_Y$ | | 0.303 | 0.333 | 0.363 | | |
| | Green | $G_X$ | | 0.247 | 0.277 | 0.307 | | |
| | | $G_Y$ | | 0.599 | 0.629 | 0.659 | | |
| | Blue | $B_X$ | | 0.111 | 0.141 | 0.171 | | |
| | | $B_Y$ | | 0.024 | 0.054 | 0.084 | | |
| | White | $W_X$ | | 0.28 | 0.31 | 0.34 | | |
| | | $W_Y$ | | 0.30 | 0.33 | 0.36 | | |
| 9 Points White Variation | | $\delta$L | | 0.7 | 0.8 | -- | | Note 7-3 |
| Cross Talk | | CT | | -- | -- | 2.0 | % | Note 7-7 |

Gray level transmittance:

| Gray level | Transmittance (%) |
|---|---|
| 0 | 0.19 |
| 31 | 0.57 |
| 63 | 3.89 |
| 95 | 10.97 |
| 127 | 23.2 |
| 159 | 38.19 |
| 191 | 55.81 |
| 223 | 79.07 |
| 255 | 100 |

7.2 Basic measure condition

(1) Ambient temperature: Ta=25+/-2

(2) Vcc = 5.0V

(3) Fv = 75Hz

(4) $f_{DCLK}$ = 135MHz

(5) $I_L$ = 7mA

(6) Inverter model: PLCD1717418A/E-MAX

Environmental illumination 1 Lux

(7) Testing facility

TFT LCD Module
with Backlight

Photometer
(TOPCON BM-5A)

Signal Input

500mm
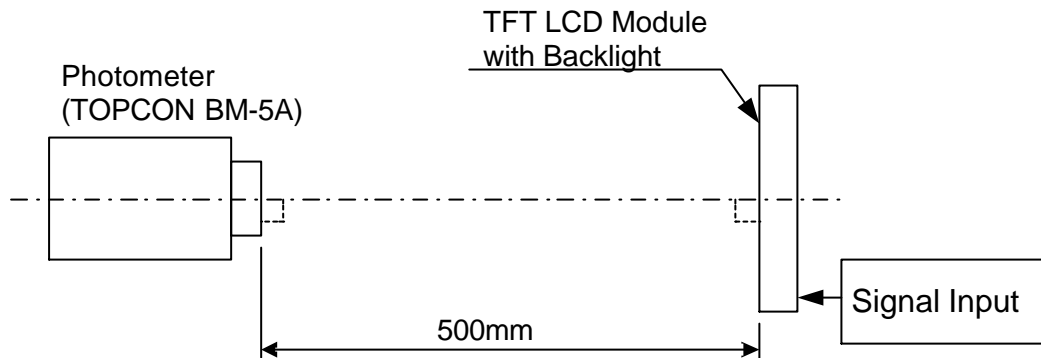
Note 7-1: Viewing angle diagrams:

Normal
= 0°

: Viewing Angle
: Viewing Direction

3 O'clock
=0°

21      22

12    11

12 O'clock
=90°

6 O'clock
=270°

9 O'clock
=180°

TFT LCD Panel
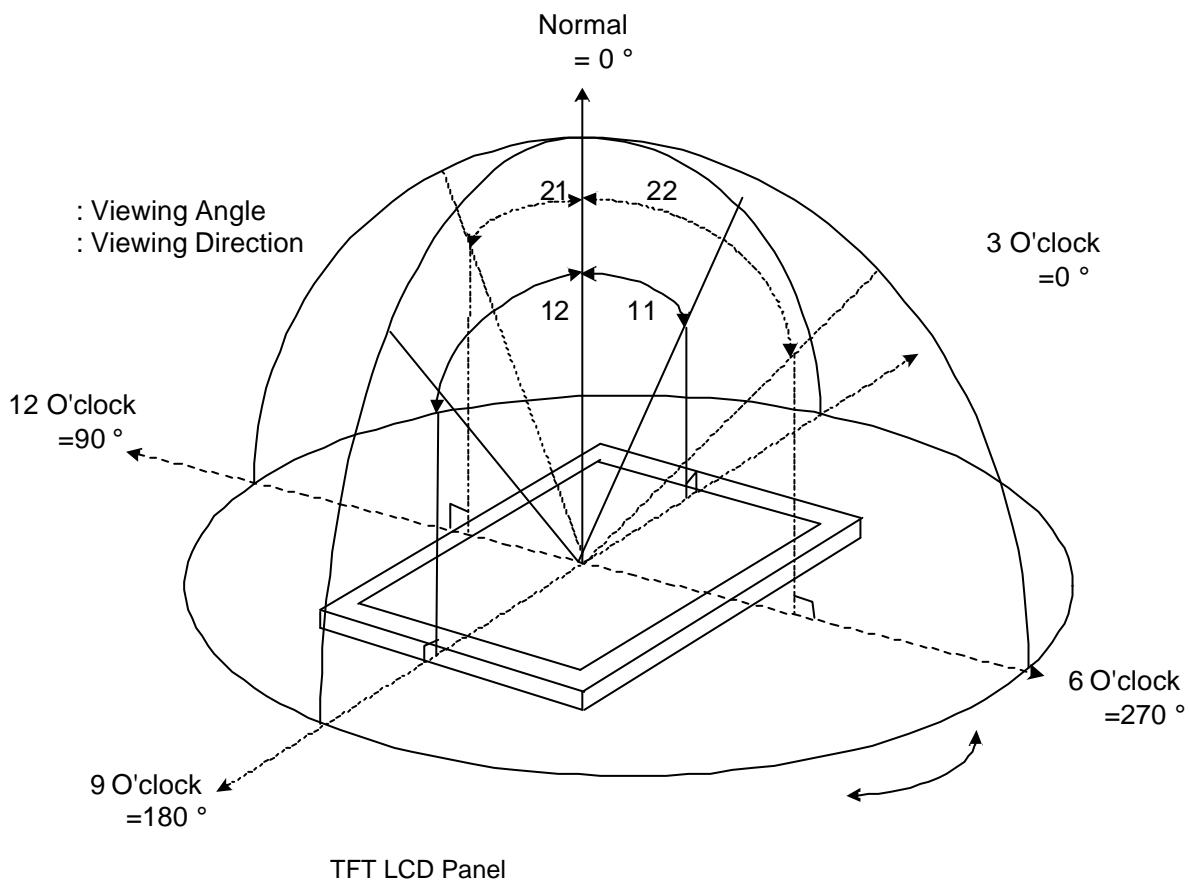
Note 7-2: Definition of Contrast ratio  Ratio of gray max (Gmax), gray min (Gmin) at the center point of

the panel.

$$CR = \frac{Gmax}{Gmin}$$

Gmax   Luminance with all pixels white

Gmin   Luminance with all pixels black

(128)                    (640)                    (1152)



(102)

(512)

(922)
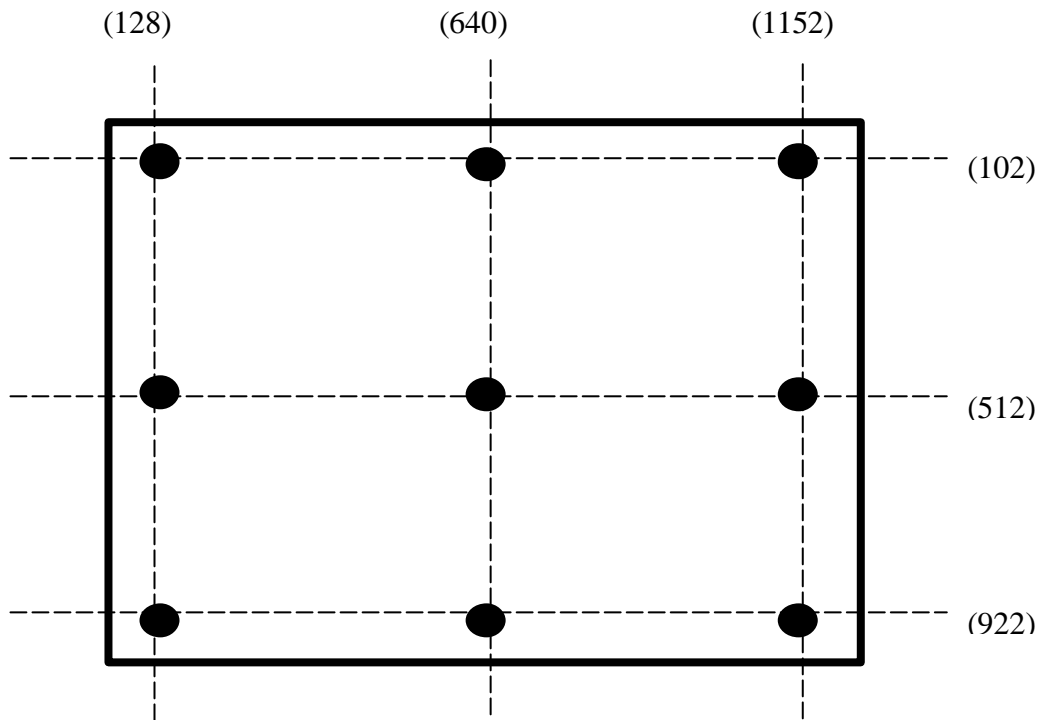
Note 7-3: Definition of uniformity; 9 point, Test point as Note 8-2

$$_L = \frac{\text{Minimum Luminance of 9 point}}{\text{Maximum Luminance of 9 point}}$$

Note 7-4: Definition of response time:



White        Black        White

Luminance

100%

90%

10%

0%

T r         T f

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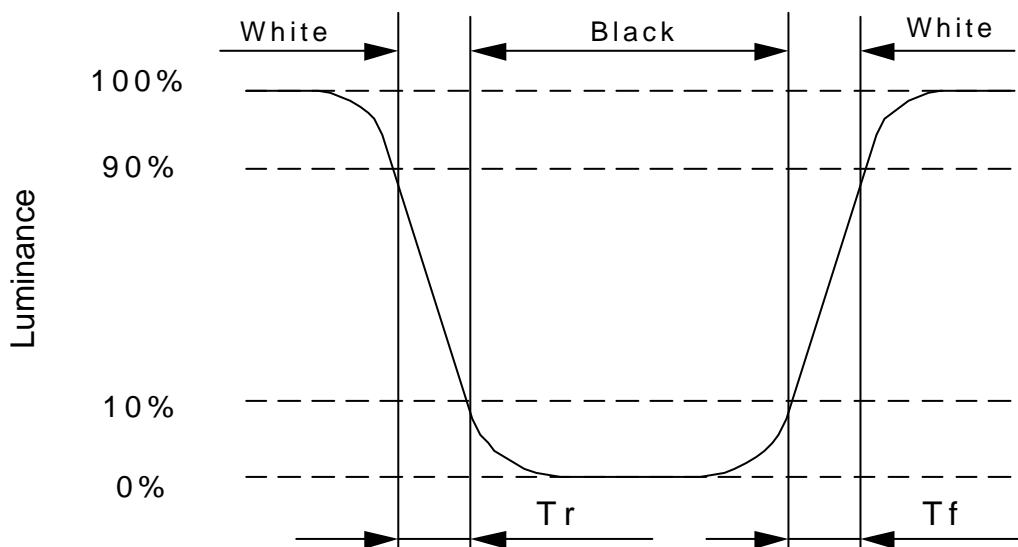
Note 7-5: Definition of Luminance of White　measure the luminance of white at the center point of the panel.

Note 7-6: To be measured in dark room environment and after lighting the backlight for 30 minutes.

Note 7-7: Wn: Grey level L31 luminance of measurement area

Wn': Subsequent dark-window luminance of measurement area

The location measured will be exactly the same in both patterns.

$$\text{Cross Talk} = \left| \frac{Wn' - Wn}{Wn} \right| * 100 \%$$

|  | W1　W1'　×　 |  | 1/3 W |
|---|---|---|---|
| W2　W2'　× |  (black) | W4　W4'　× | 1/3 W |
|  | ×　W3　　W3' |  | 1/3 W |
| 1/3 L | 1/3 L | 1/3 L |  |

## 8. RELIABILITY

| No | Test Item | Condition |
|---|---|---|
| 1 | High Temperature Operation | Ta=+50  , 240hrs |
| 2 | High Temperature & High Humidity Operation No Condensation | Ta=+40  , 90% RH, 240hrs |
| 3 | Low Temperature Operation | Ta=0  , 240hrs |
| 4 | High Temperature Storage | Ta=+60  , 240hrs |
| 5 | Low Temperature Storage | Ta=-20  , 240hrs |
| 6 | Surface Discharge (non-operation) | C=150pF, R=330  ; Discharge: Air: ± 15kV; Contact: ± 8kV 5 Times / Point; 9 Points / Panel |
| 7 | Vibration (non-operation) | Frequency: 10~300~10Hz 1.5 x 9.8m/s$^2$ constant Amplitude: 1.5mm; Sweep Time: 15min Test Time: 0.5 hr for each direction of X, Y, Z |
| 8 | Shock (non-operation) | Shock level: 70G Waveform: Half sine wave, 11ms Direction: ±X, ±Y, ±Z; One time for each axis |

Ta: Ambient Temperature

Note 8-1: Evaluation should be tested after one hour of room temperature storage.

Note 8-2: Temperature and relative humidity range are show in the figure below.

Wet bulb temperature should be 39  max. and no condensation of water.
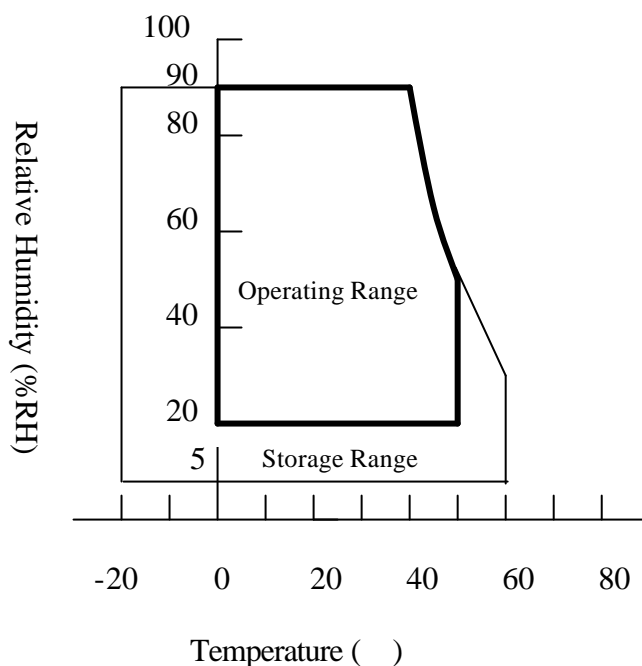
## 9. HANDLING CAUTIONS

9.1  Module assembly working environment should in the clean room.

9.2  The polarizer is easy damaged, handle it carefully and do not press or scratch the surface by sharp material.

9.3  Panel has polarizer protective film in the surface please remove the protection film of polarizer slowly to prevent the electrostatic discharge.

9.4  It is not permitted the pressure or impulse on the module, it may cause LCD panel or Backlight damaged.

9.5  Turn off the power supply before connecting and disconnecting signal input cable.

9.6  The lamp wire is very weak, do not handle panel only by lamp wire.

9.7  As the packing bag open, watch out the environment of the panel storage. High temperature and high humidity environment is prohibited.

9.8  Please to storage the LCD module within the specification condition. High temperature or high humidity environment may reduce the module performance.

9.9  Do not disassemble the module.

9.10 Do not touch the backlight connecter. The backlight start voltage about 1000Volts.it may cause electrical shock.

9.11 Do not adjust the variable resistor that is located on the module back side.

9.12 I/F connector pins shall not to be touched directly with bare hands.

9.13 When the TFT LCD module is broken or liquid crystal leaks from the panel, it should be keep always from the eyes or month. If your hand touches liquid crystal, wash your hand cleanly by water and soap as soon as possible.
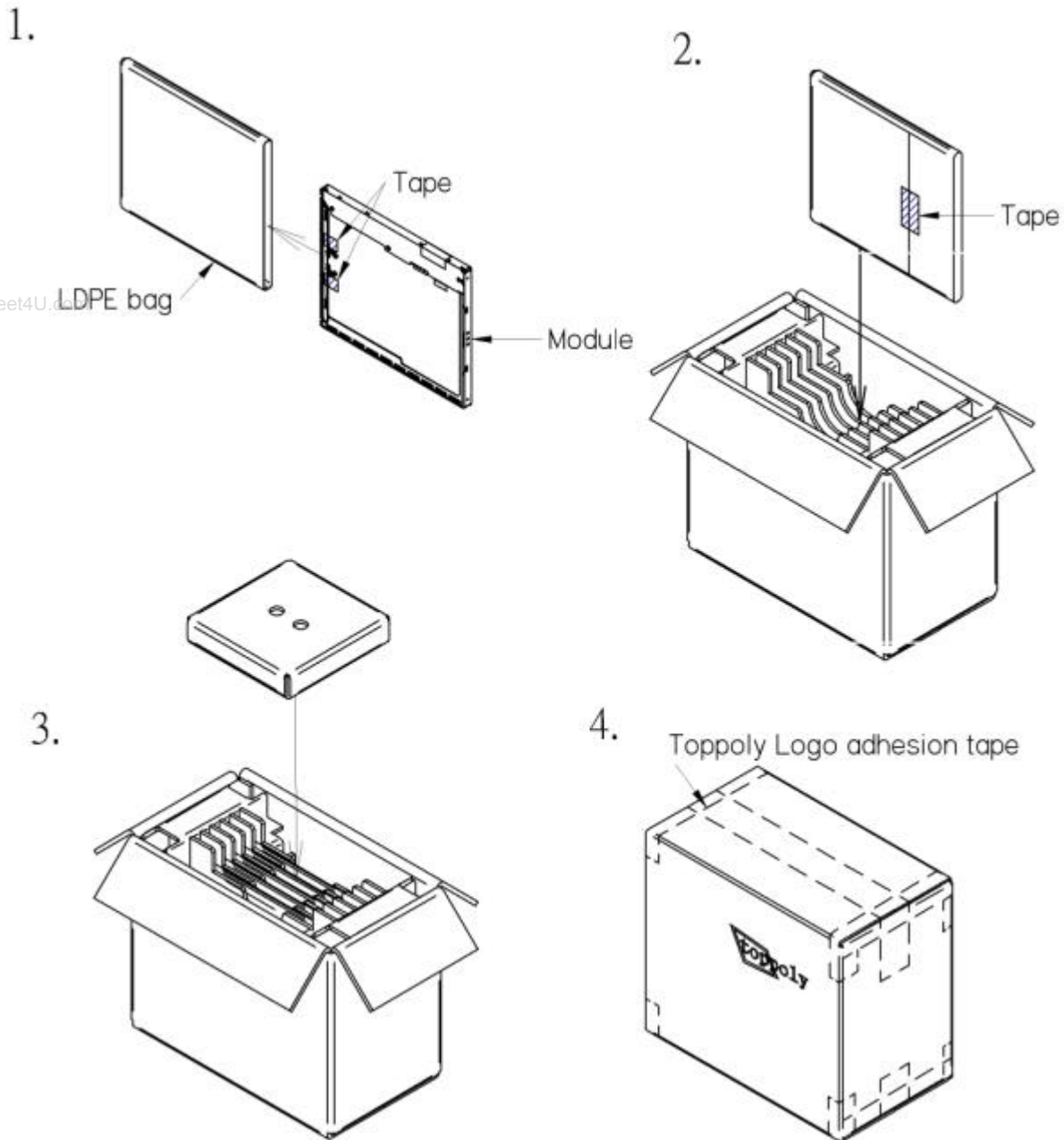
## 10. MECHANICAL DRAWING
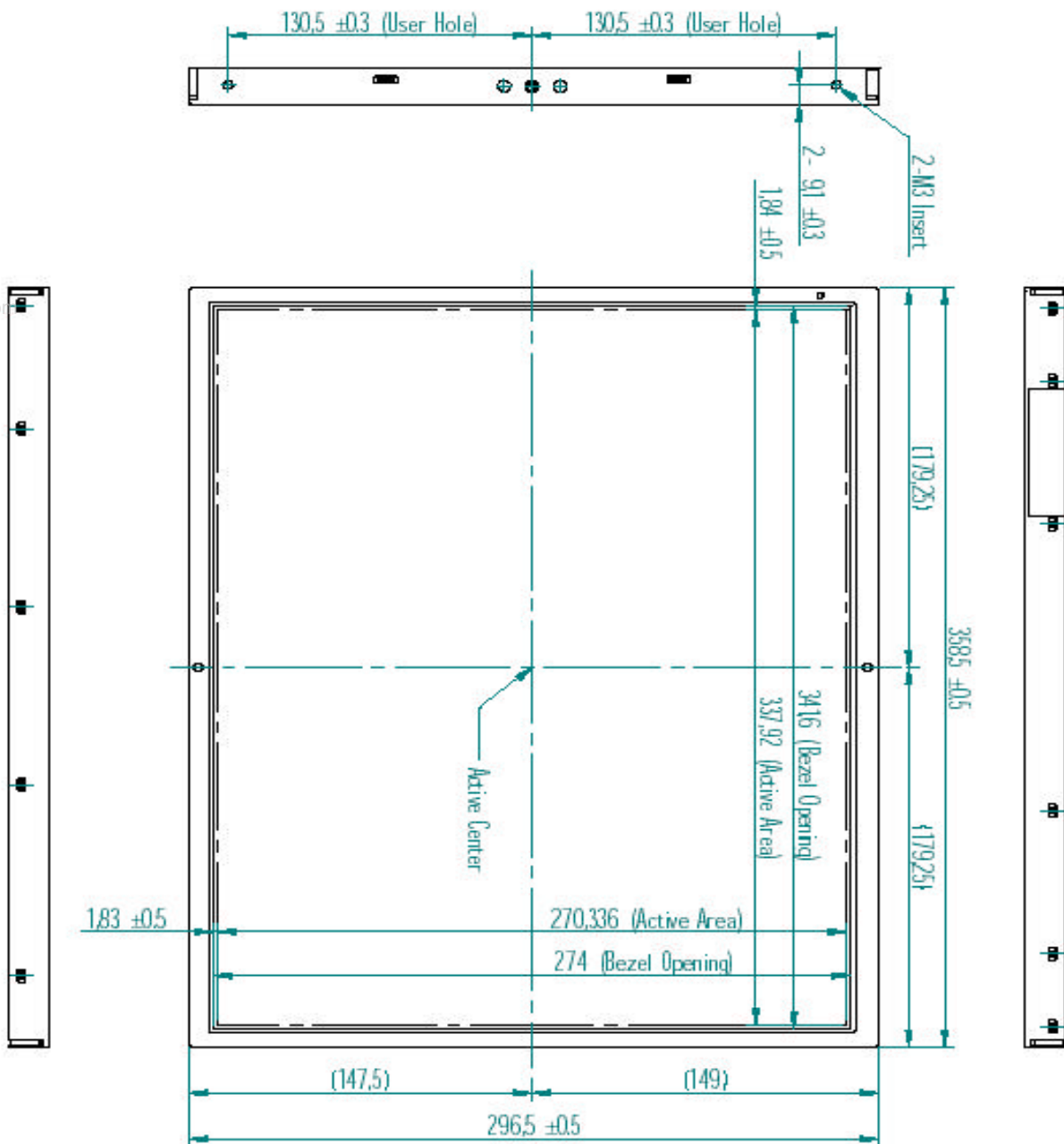
www.DataSheet4U.com

150 ±5

101.35 ±1

66.3 ±1

Pin1

Module Label
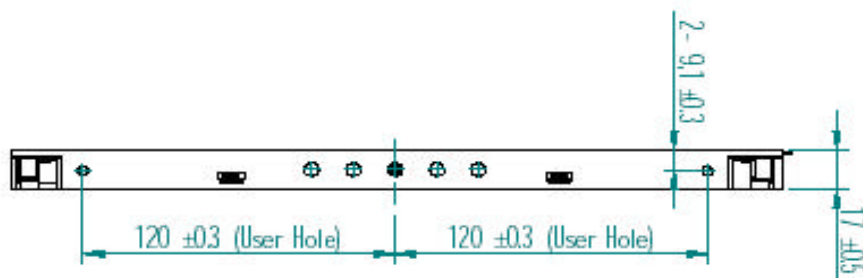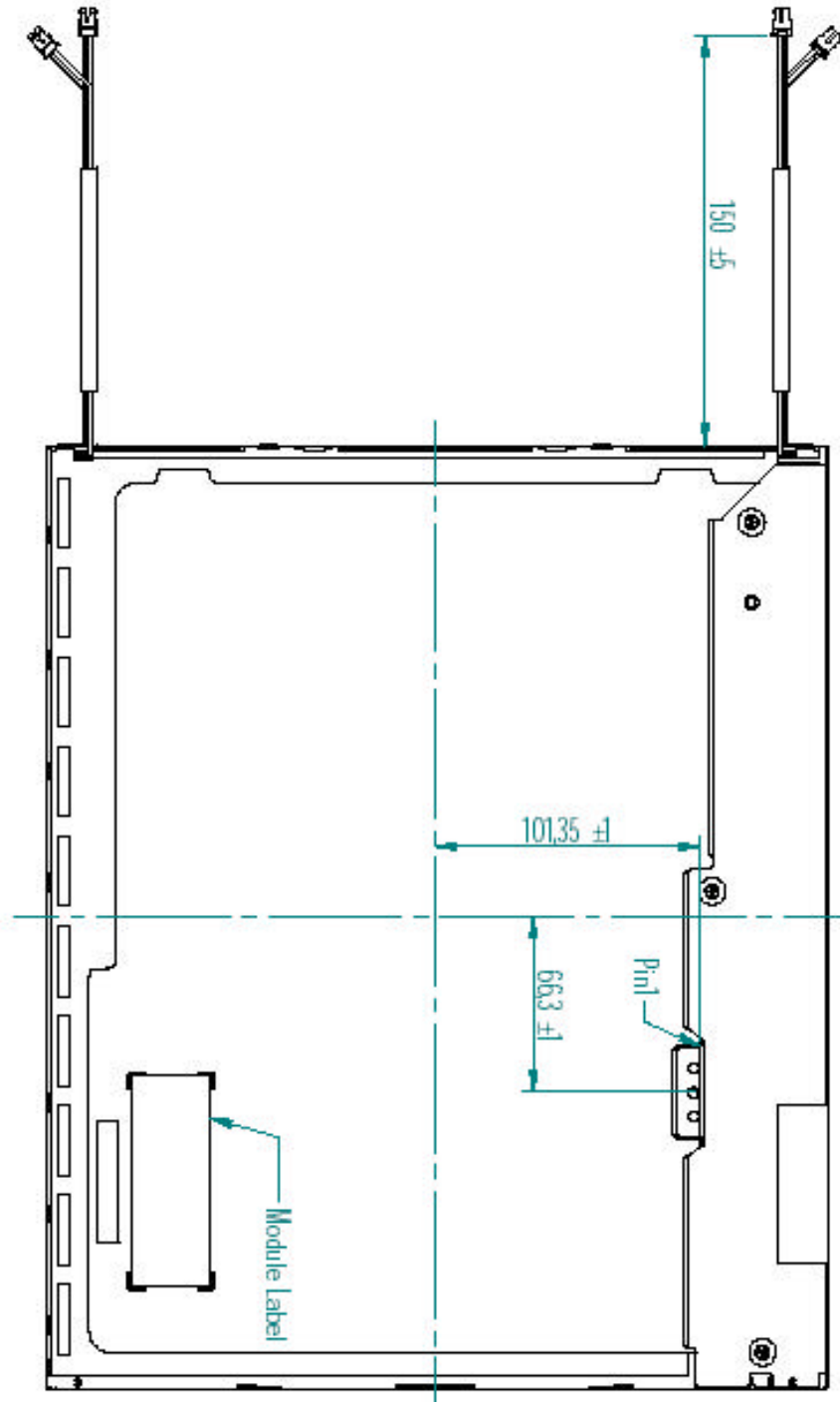
## 11. PACKING DRAWING



**17" Module delivery packing method    Packing Qty=5pcs**

1.   Module insert into LDPE bag
2.   Module with LDPE bag pack into the corrugated folding cushion unit
3.   Top cover by fold corrugated strip into the corrugated folding cushion unit
4.   Carton seating with adhesion tape

Carton Label

Film

Cardboard

PP Belt

Corner Protector
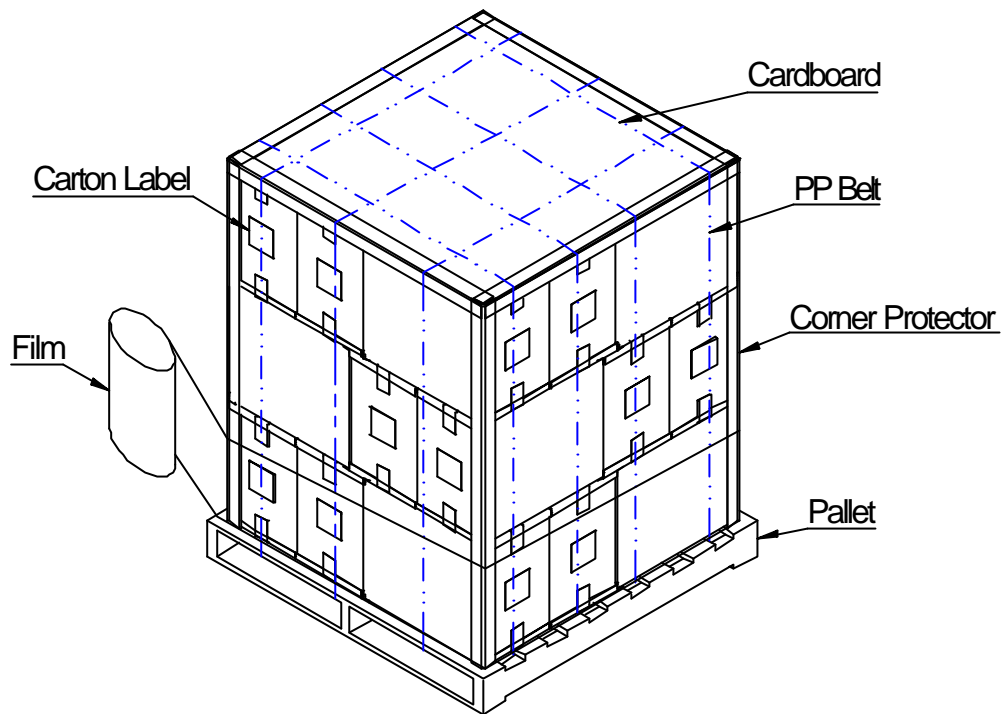
Pallet

Corner Protector    L1350mm    50mm×50mm
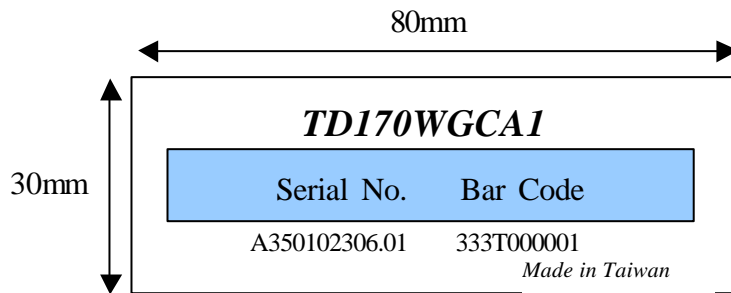Pallet    1140mm×1140mm×130mm
Pallet Stock Total Dimensions    1140mm×1140mm×1350mm
Weight    approx. 300kg

## 12. Module Label Drawing & Definition

The module Label Drawing & Definition illustration as below:

80mm

30mm

### TD170WGCA1

| Serial No. | Bar Code |

A350102306.01    333T000001

*Made in Taiwan*

(a) Module Name: TD170WGCA1

(b) Serial No.: There are 10 symbols as below, | Year | Week | Factory | Sequential Number |

    (1) Year is the last number of A.D.

    (2) The expression of Week is 01 ~ 53 in order.

    (3) The expression of Factory is one English letter, T for TP01 and N for NJ.

    (4) The order of sequential number is 000001~999999➔A00001~A99999➔

       B00001~B99999➔ and so on.