CHI MEI OPTOELECTRONICS CORP.

Issued Date: Feb., 13, 2009
Model No.: V315B6-P01
**Approval**

# TFT LCD Preliminary Specification

# MODEL NO.: V315B6-P01

Customer: _____

Approved by: _____

Note:

| | |
|---|---|
| Approved By | TVHD |
| | LY Chen |

| | | |
|---|---|---|
| Reviewed By | QRA Dept. | Product Development Div. |
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## REVISION HISTORY

| Version | Date | Page (New) | Section | Description |
|---|---|---|---|---|
| Ver 2.0 | Feb.,13, 09' | All | All | Approval Specification was first issued. |

# 1. GENERAL DESCRIPTION

## 1.1 OVERVIEW

V315B6- P01 is a 31.5" TFT Liquid Crystal Display module. This module supports 1366 x 768 WXGA format and can display 16.7M colors (6-bit+Hi-FRC colors).

## 1.2 CHARACTERISTICS

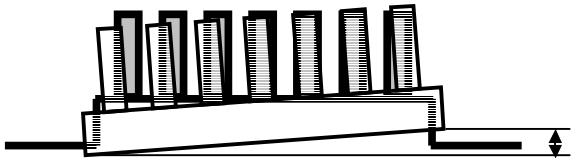
| CHARACTERISTICS ITEMS | SPECIFICATIONS |
|---|---|
| Screen Diagonal [in] | 31.5" |
| Pixels [lines] | 1366×768 |
| Active Area [mm] | 697.6845 (H) x 392.256 (V) (31.5" diagonal) |
| Sub -Pixel Pitch [mm] | 0.17025 (H) x 0.51075 (V) |
| Pixel Arrangement | RGB vertical stripe |
| Weight [g] | TYP. 1150 |
| Physical Size [mm] | 716.1(W) x 410(H) x 1.8(D) Typ. |
| Display Mode | Transmissive mode / Normally black |
| Contrast Ratio | 3000:1 Typ.<br>(Typical value measured at CMO's module: V315B6-L01) |
| Glass thickness (Array/CF) [mm] | 0.7 / 0.7 |
| Viewing Angle (CR>20) | +88/-88(H),+88/-88(V) Typ.<br>(Typical value measured at CMO's module: V315B6-L01) |
| Color Chromaticity | R=0.643, 0.332<br>G=0.278, 0.597<br>B=0.145, 0.068<br>W=0.285, 0.293<br>(Typical value measured at CMO's module: V315B6-L01) |
| Cell Transparency [%] | 5.8%Typ.<br>(Typical value measured at CMO's module: V315B6-L01) |
| Polarizer (CF side) | Super Wide View Anti-glare coating, 709.7(H) x 405(W)<br>Hardness:2H |
| Polarizer (TFT side) | Super Wide View, 709.7(H) x 405(W). |

## 1.3 MECHANICAL SPECIFICATIONS

| Item | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|
| Weight | | 1150 | | g | - |
| I/F connector mounting position | The mounting inclination of the connector makes the screen center within ±0.5mm as the horizontal. | | | | (2) |

Note (1) Please refer to the attached drawings for more information of front and back outline dimensions.

(2) Connector mounting position



## 2. ABSOLUTE MAXIMUM RATINGS

### 2.1 ABSOLUTE RATINGS OF ENVIRONMENT (BASED ON CMO MODULE V315B6-L02)

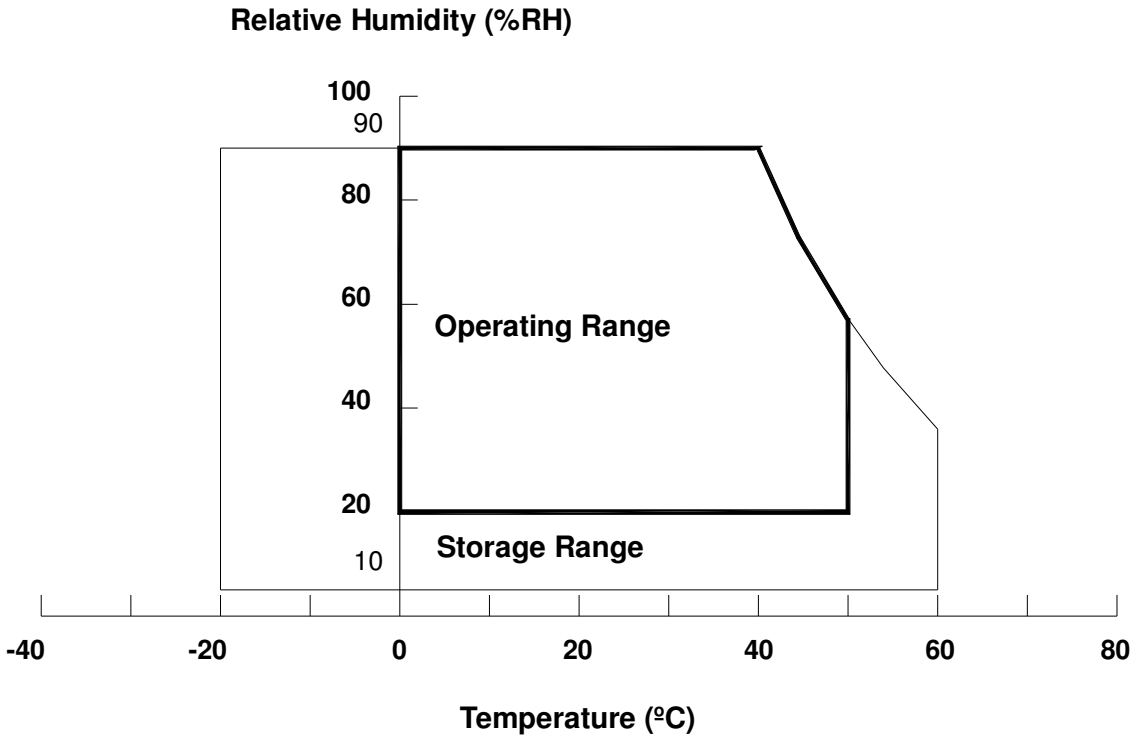
| Item | Symbol | Value | | Unit | Note |
|---|---|---|---|---|---|
| | | Min. | Max. | | |
| Storage Temperature | $T_{ST}$ | -20 | +60 | ºC | (1), (3) |
| Operating Ambient Temperature | $T_{OP}$ | 0 | 50 | ºC | (1), (2), (3) |
| Altitude Operating | $A_{OP}$ | 0 | 5000 | M | (3) |
| Altitude Storage | $A_{ST}$ | 0 | 12000 | M | (3) |

Note (1) Temperature and relative humidity range is shown in the figure below.

(a) 90 %RH Max. (Ta ≦ 40 ºC).

(b) Wet-bulb temperature should be 39 ºC Max. (Ta > 40 ºC).

(c) No condensation.




Note (2) The maximum operating temperature is based on the test condition that the surface temperature of display area is less than or equal to 65 ºC with LCD module alone in a temperature controlled chamber. Thermal management should be considered in your product design to prevent the surface temperature of display area from being over 65 ºC. The range of operating temperature may degrade in case of improper thermal management in your product design.

Note (3) The rating of environment is base on LCD module. Leave LCD cell alone, this environment condition can't be guaranteed. Except LCD cell, the customer has to consider the ability of other parts of LCD module and LCD module process.

## 2.2 ABSOLUTE RATINGS OF ENVIRONMENT (OPEN CELL)

Storage Condition: With shipping package.

Storage temperature range: 25±5 ℃

Storage humidity range: 50±10%RH

Shelf life: a month

## 2.3 ELECTRICAL ABSOLUTE RATINGS

### 2.3.1 TFT LCD OPEN CELL

| Item | Symbol | Value | | Unit | Note |
|---|---|---|---|---|---|
| | | Min. | Max. | | |
| Power Supply Voltage | Vcc | -0.3 | 13.0 | V | (1) |
| Input Signal Voltage | $V_{IN}$ | -0.3 | 3.6 | V | |

Note (1) Permanent damage to the device may occur if maximum values are exceeded. Functional operation should be restricted to the conditions described under normal operating conditions.

## 3. ELECTRICAL CHARACTERISTICS

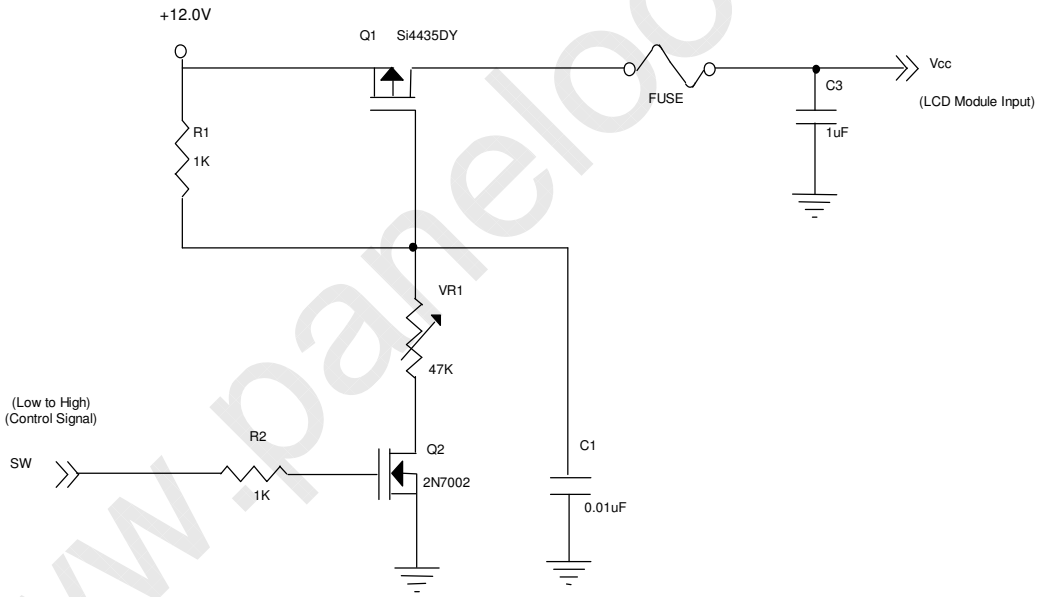
### 3.1 TFT LCD OPEN CELL

Ta = 25 ± 2ºC

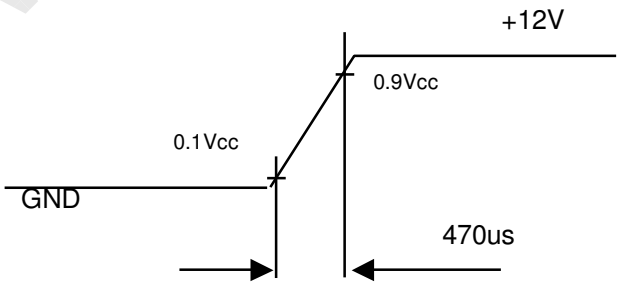
| Parameter | | Symbol | Value | | | Unit | Note |
|---|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | | |
| Power Supply Voltage | | $V_{CC}$ | 11.4 | 12.0 | 12.6 | V | (1) |
| Power Supply Ripple Voltage | | $V_{RP}$ | - | - | 100 | mV | |
| Rush Current | | $I_{RUSH}$ | - | - | 3.9 | A | (2) |
| Power Supply Current | White | $I_{CC}$ | - | 0.45 | 0.52 | A | (3) |
| | Black | | - | 0.33 | - | A | |
| | Vertical Stripe | | - | 0.45 | - | A | |
| LVDS Interface | Differential Input High Threshold Voltage | $V_{LVTH}$ | - | - | +100 | mV | |
| | Differential Input Low Threshold Voltage | $V_{LVTL}$ | -100 | - | - | mV | |
| | Common Input Voltage | $V_{LVC}$ | 1.125 | 1.25 | 1.375 | V | |
| | Terminating Resistor | $R_T$ | - | 100 | - | ohm | |
| CMOS interface | Input High Threshold Voltage | $V_{IH}$ | 2.7 | - | 3.3 | V | |
| | Input Low Threshold Voltage | $V_{IL}$ | 0 | - | 0.7 | V | |

Note (1) The module should be always operated within above ranges.

Note (2) Measurement Conditions:




**Vcc rising time is 470us**



Note (3) The specified power supply current is under the conditions at Vcc =12V, Ta = 25 ± 2 ºC, $f_v$ = 60 Hz, whereas a power dissipation check pattern below is displayed.

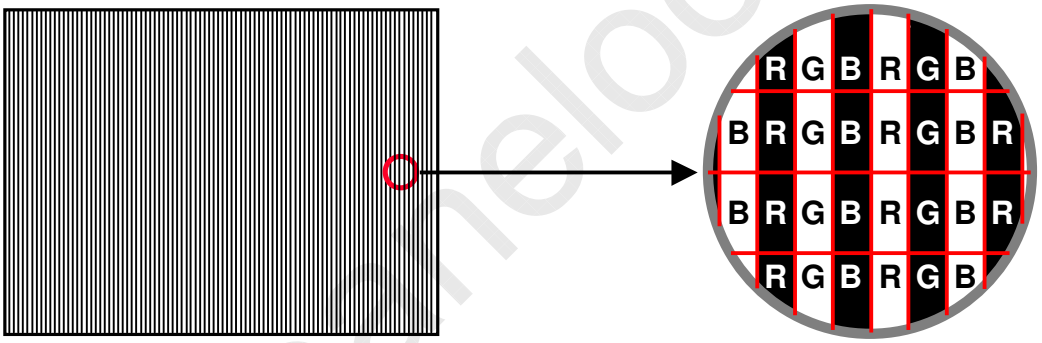
a. White Pattern

Active Area

b. Black Pattern

Active Area

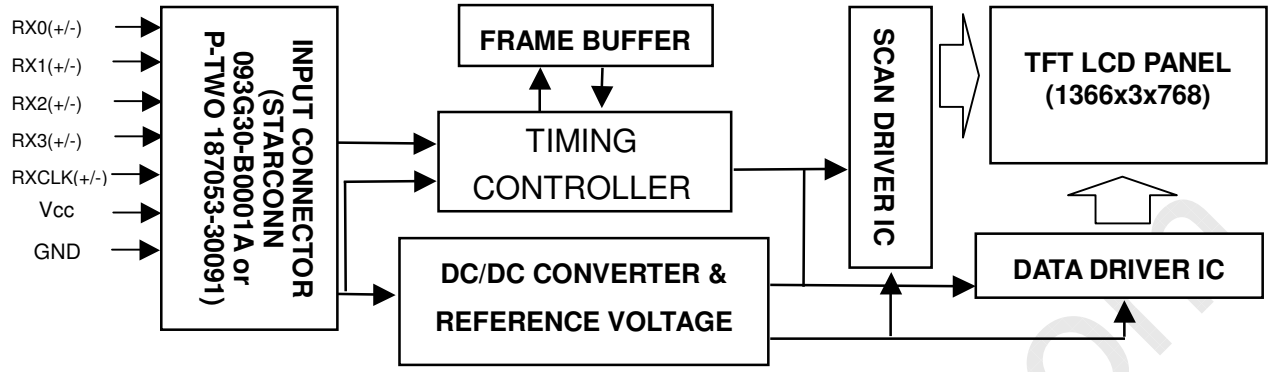
c. Vertical Stripe Pattern




Active Area

## 4. BLOCK DIAGRAM

### 4.1 TFT LCD OPEN CELL



# 5. INTERFACE PIN CONNECTION

## 5.1 TFT LCD OPEN CELL

**CNF1 Connector Pin Assignment**

| Pin No. | Symbol | Description | Note |
|---|---|---|---|
| 1 | VCC | Power supply: +12V | |
| 2 | VCC | Power supply: +12V | |
| 3 | VCC | Power supply: +12V | |
| 4 | VCC | Power supply: +12V | |
| 5 | GND | Ground | |
| 6 | GND | Ground | |
| 7 | GND | Ground | |
| 8 | GND | Ground | |
| 9 | SELLVDS | Select LVDS data format | (2) |
| 10 | ODSEL | Overdrive Lookup Table Selection | (3) |
| 11 | GND | Ground | |
| 12 | RX0- | Negative transmission data of pixel 0 | |
| 13 | RX0+ | Positive transmission data of pixel 0 | |
| 14 | GND | Ground | |
| 15 | RX1- | Negative transmission data of pixel 1 | |
| 16 | RX1+ | Positive transmission data of pixel 1 | |
| 17 | GND | Ground | |
| 18 | RX2- | Negative transmission data of pixel 2 | |
| 19 | RX2+ | Positive transmission data of pixel 2 | |
| 20 | GND | Ground | |
| 21 | RXCLK- | Negative of clock | |
| 22 | RXCLK+ | Positive of clock | |
| 23 | GND | Ground | |
| 24 | RX3- | Negative transmission data of pixel 3 | |
| 25 | RX3+ | Positive transmission data of pixel 3 | |
| 26 | GND | Ground | |
| 27 | NC | No connection | (4) |
| 28 | NC | No connection | (4) |
| 29 | GND | Ground | |
| 30 | GND | Ground | |

Note (1) Connector type: STARCONN 093G30-B0001A or P-TWO 187053-30091 or compatible

Note (2) Ground or OPEN: VESA, High: JEIDA LVDS format

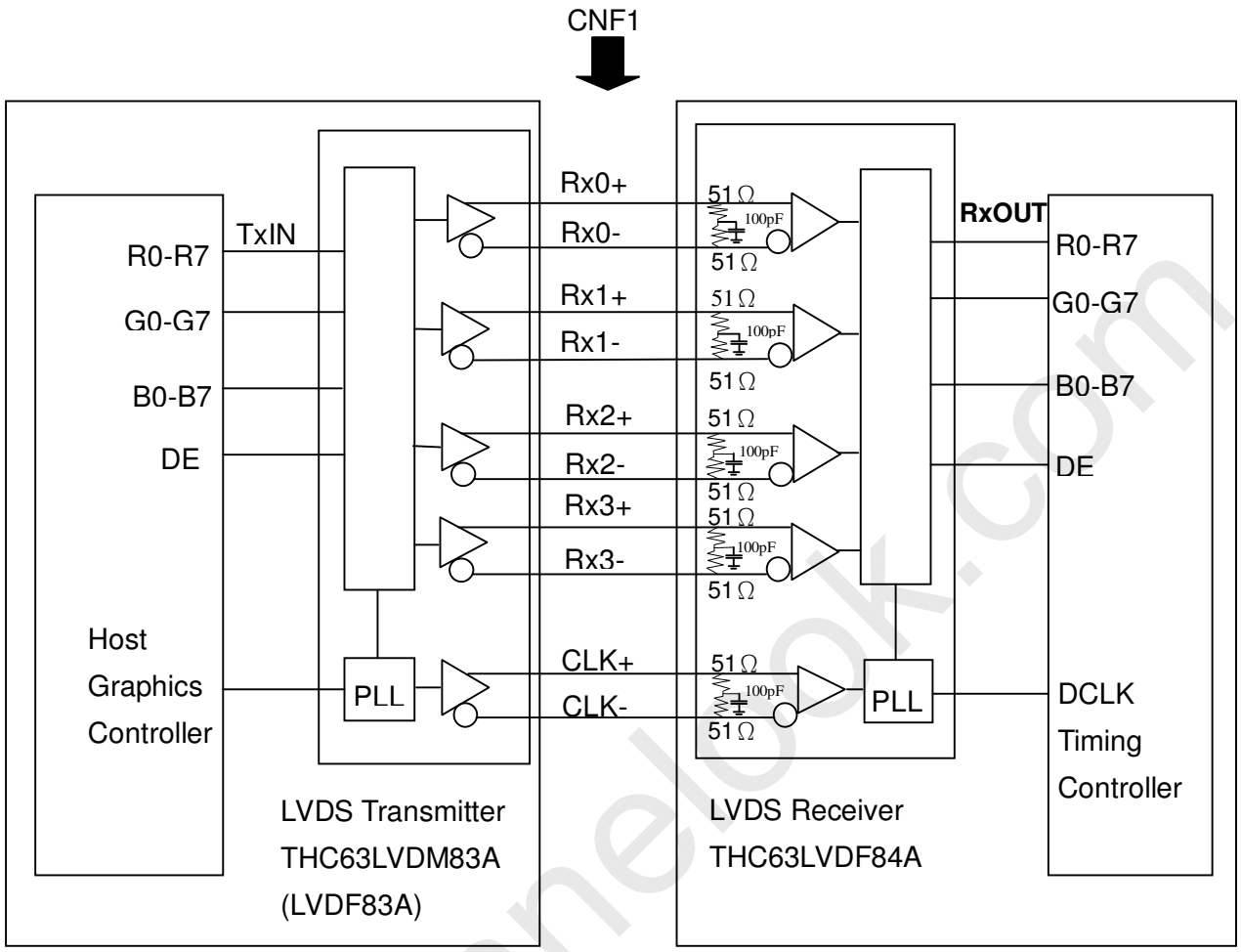
Please refer to 5.3 LVDS INTERFACE

Note (3) Overdrive lookup table selection. The Overdrive lookup table should be selected in accordance to the frame rate to optimize image quality.

| ODSEL | Note |
|---|---|
| L or Open | Lookup table was optimized for 60 Hz frame rate. |
| H | Lookup table was optimized for 50 Hz frame rate. |

Note (4) Reserved for internal use. Left it open.

### 5.2 BLOCK DIAGRAM OF INTERFACE



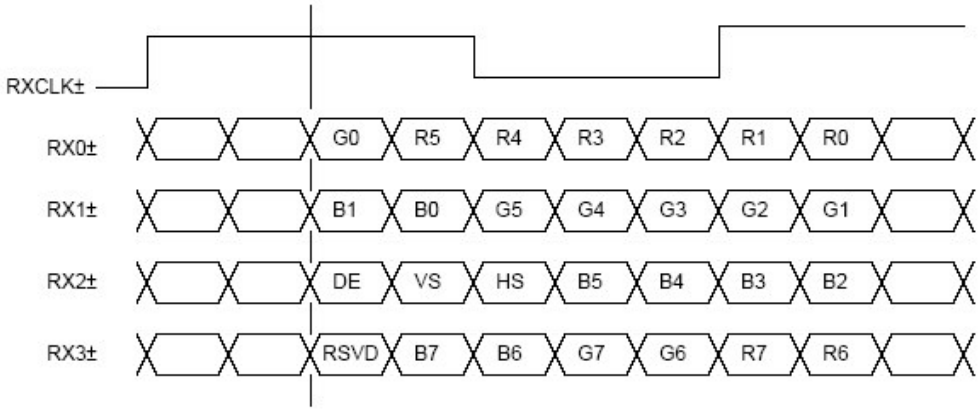

R0~R7 : Pixel R Data
G0~G7 : Pixel G Data
B0~B7 : Pixel B Data
DE : Data enable signal

Note (1) The system must have the transmitter to drive the module.

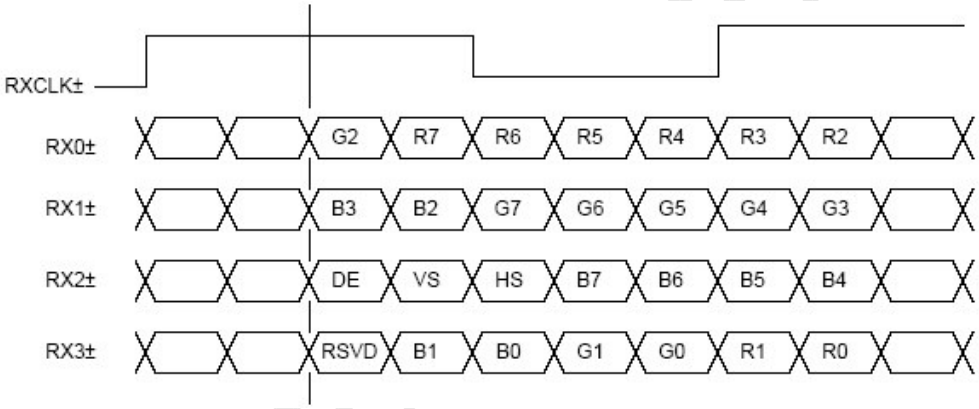
Note (2) LVDS cable impedance shall be 50 ohms per signal line or about 100 ohms per twist-pair line when it is used differentially.

## 5.3 LVDS INTERFACE

**SELLVDS = L or Open (VESA)**




**SELLVDS = H (JEIDA)**




R0~R7: Pixel R Data (7; MSB, 0; LSB)

G0~G7: Pixel G Data (7; MSB, 0; LSB)

B0~B7: Pixel B Data (7; MSB, 0; LSB)

DE: Data enable signal

Note (1) RSVD(reserved)pins on the transmitter shall be “H” or( “L” or OPEN)

### 5.4 COLOR DATA INPUT 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 the assignment of color versus data input.

| Color | | Data Signal | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Red | | | | | | | | Green | | | | | | | | Blue | | | | | | | |
| | | 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 |
| | 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 |
| | 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 |
| | 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 |
| | 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 |
| Gray Scale Of Red | Red(0) / Dark | 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(1) | 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(2) | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : |
| | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : |
| | Red(253) | 1 | 1 | 1 | 1 | 1 | 1 | 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 |
| Gray Scale Of Green | Green(0) / Dark | 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(1) | 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(2) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : |
| | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : |
| | Green(253) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 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 |
| Gray Scale Of Blue | Blue(0) / Dark | 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(1) | 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(2) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : |
| | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : |
| | Blue(253) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 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 |

Note (1) 0: Low Level Voltage, 1: High Level Voltage

# 6. INTERFACE TIMING

## 6.1 INPUT SIGNAL TIMING SPECIFICATIONS

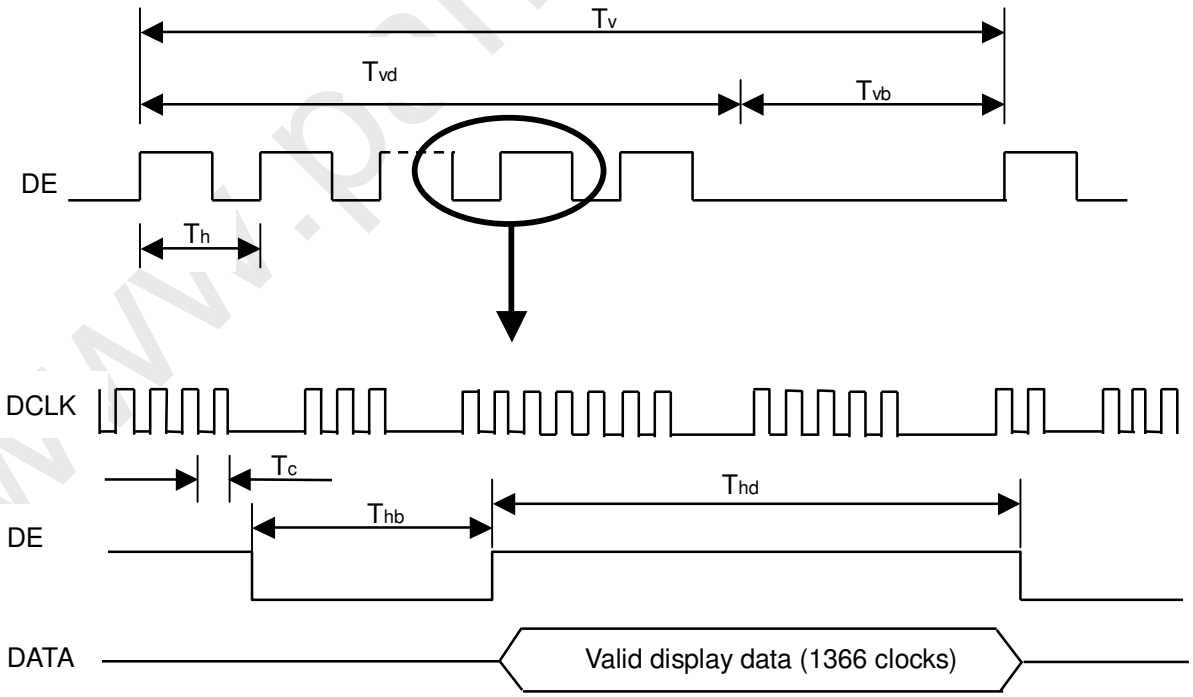
The input signal timing specifications are shown as the following table and timing diagram.

| Signal | Item | Symbol | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|---|
| LVDS Receiver Clock | Frequency | 1/Tc | 60 | 76 | 82 | MHz | |
| | Input cycle to cycle jitter | Trcl | - | - | 200 | ps | |
| LVDS Receiver Data | Setup Time | Tlvsu | 600 | - | - | ps | |
| | Hold Time | Tlvhd | 600 | - | - | ps | |
| Vertical Active Display Term | Frame Rate | Fr5 | 47 | 50 | 53 | Hz | (2) |
| | | Fr6 | 57 | 60 | 63 | Hz | |
| | Total | Tv | 778 | 806 | 888 | Th | Tv=Tvd+Tvb |
| | Display | Tvd | 768 | 768 | 768 | Th | - |
| | Blank | Tvb | 10 | 38 | 120 | Th | - |
| Horizontal Active Display Term | Total | Th | 1442 | 1560 | 1936 | Tc | Th=Thd+Thb |
| | Display | Thd | 1366 | 1366 | 1366 | Tc | - |
| | Blank | Thb | 76 | 194 | 570 | Tc | - |

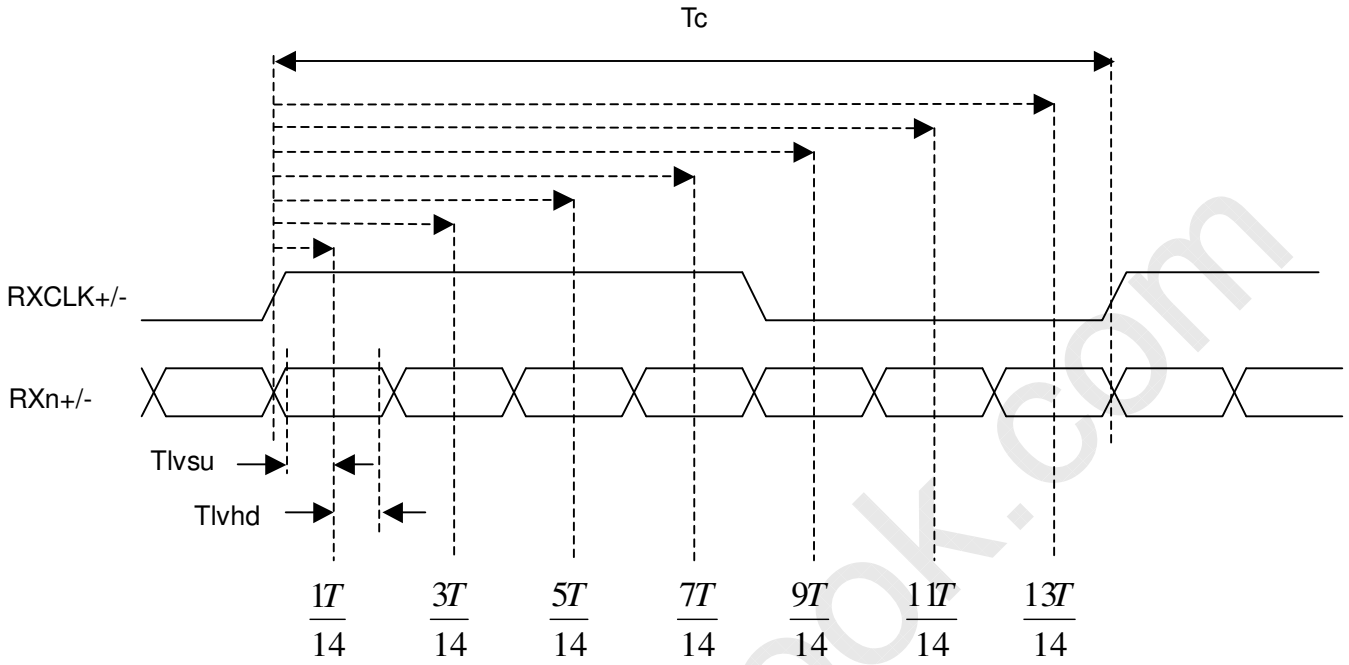
Note (1) Since this module is operated in DE only mode, Hsync and Vsync input signals should be set to low logic level. Otherwise, this module would operate abnormally.

(2) Please refer to 5.1 for detail information.

**INPUT SIGNAL TIMING DIAGRAM**

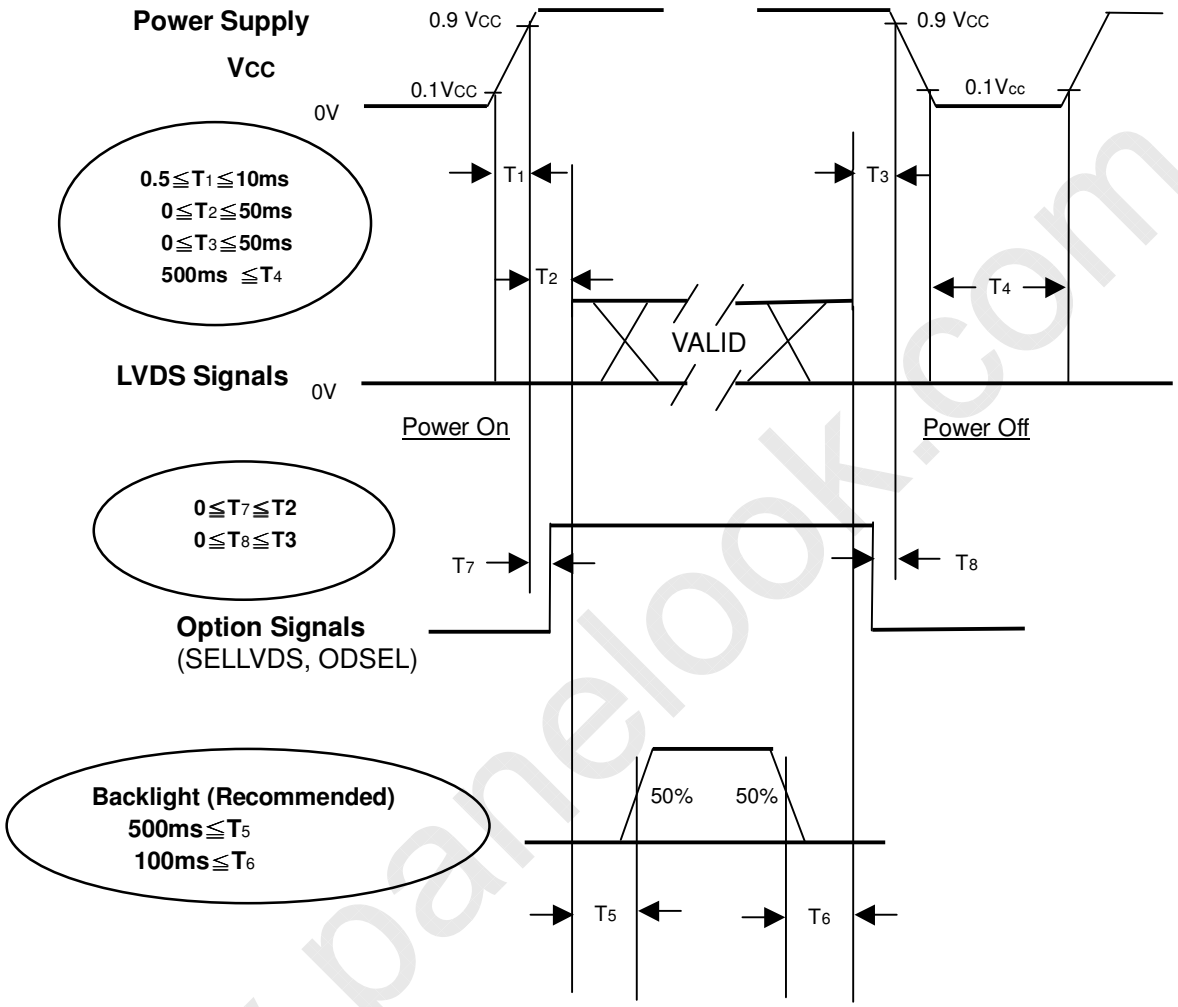


## LVDS RECEIVER INTERFACE TIMING DIAGRAM



### 6.2 POWER ON/OFF SEQUENCE

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




**Power ON/OFF Sequence**

Note (1) The supply voltage of the external system for the module input should follow the definition of Vcc.

Note (2) Apply the lamp voltage within the LCD operation range. When the backlight turns on before the LCD operation or the LCD turns off before the backlight turns off, the display may momentarily become abnormal screen.

Note (3) In case of Vcc is in off level, please keep the level of input signals on the low or high impedance. If T2<0, that maybe cause electrical overstress failures.

Note (4) T4 should be measured after the module has been fully discharged between power off and on period.

Note (5) Interface signal shall not be kept at high impedance when the power is on.

## 7. OPTICAL CHARACTERISTICS

### 7.1 TEST CONDITIONS

| Item | Symbol | Value | Unit |
|---|---|---|---|
| Ambient Temperature | Ta | 25±2 | °C |
| Ambient Humidity | Ha | 50±10 | %RH |
| Supply Voltage | $V_{CC}$ | 5.0 | V |
| Input Signal | According to typical value in "3. ELECTRICAL CHARACTERISTICS" | | |
| Inverter Current | $I_L$ | 10.5±0.5 | mA |
| Inverter Driving Frequency | $F_L$ | 63±3 | KHz |

### 7.2 OPTICAL SPECIFICATIONS

The relative measurement methods of optical characteristics are shown as below. The following items should be measured under the test conditions described in 7.1 and stable environment shown in Note (5).

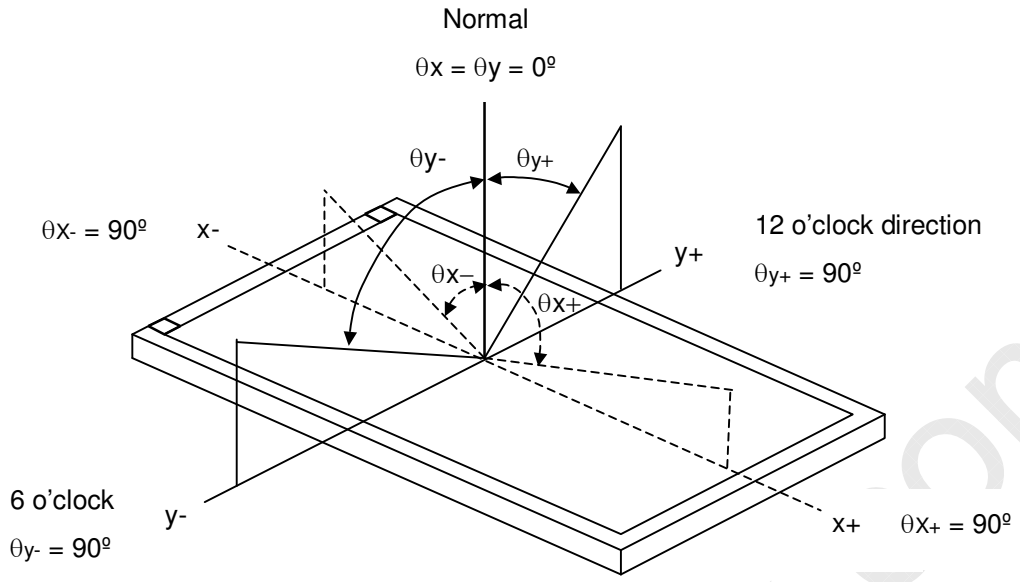
| Item | | Symbol | Condition | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|---|---|
| Color Chromaticity | Red | Rx | $\theta_x$=0°, $\theta_Y$ =0° Viewing angle at normal direction With CMO module | Typ.-0.03 | 0.643 | Typ+0.03 | - | (1),(5) |
| | | Ry | | | 0.332 | | - | |
| | Green | Gx | | | 0.278 | | - | |
| | | Gy | | | 0.597 | | - | |
| | Blue | Bx | | | 0.145 | | - | |
| | | By | | | 0.068 | | - | |
| | White | Wx | | | 0.285 | | - | |
| | | Wy | | | 0.293 | | - | |
| Center Transmittance | | T% | $\theta_x$=0°, $\theta_Y$ =0° With CMO Module | - | 5.8 | | % | (1), (7) |
| Contrast Ratio | | CR | | 2000 | 3000 | | - | (1), (3) |
| Response Time | | Gray to gray average | $\theta_x$=0°, $\theta_Y$ =0° With CMO Module@60Hz | - | 6.5 | 12 | ms | (4) |
| White Variation | | δW | $\theta_x$=0°, $\theta_Y$ =0° With CMO Module | | | 1.5 | - | (1), (6) |
| Viewing Angle | Horizontal | $\theta_x$+ | CR≥20 With CMO Module | 80 | 88 | - | Deg. | (1), (2) |
| | | $\theta_x$- | | 80 | 88 | - | | |
| | Vertical | $\theta_Y$+ | | 80 | 88 | - | | |
| | | $\theta_Y$- | | 80 | 88 | - | | |

Note (1) Light source is CMO's BLU and driving voltages are based on suitable gamma voltages. The calculated method is as following:

1. Measure module's and backlight's spectrum. White and R, G, B are with signal input.
2. Calculate cell's spectrum.

Note (2) Definition of Viewing Angle (θx, θy):

Viewing angles are measured by EZ-Contrast 160R (Eldim)




Note (3) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

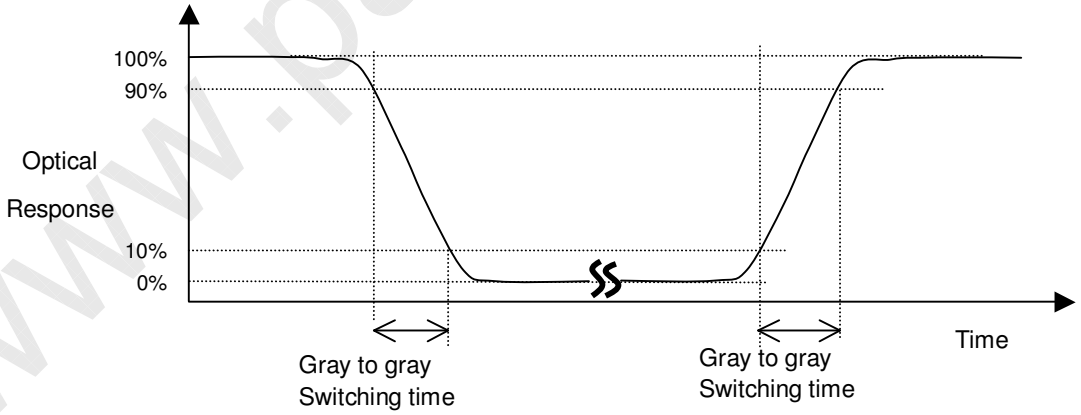
Contrast Ratio (CR) = L255 / L0

L255: Luminance of gray level 255

L 0: Luminance of gray level 0

CR = CR (5), where CR (X) is corresponding to the Contrast Ratio of the point X at the figure in Note (6).

Note (4) Definition of Gray-to-Gray Switching Time:



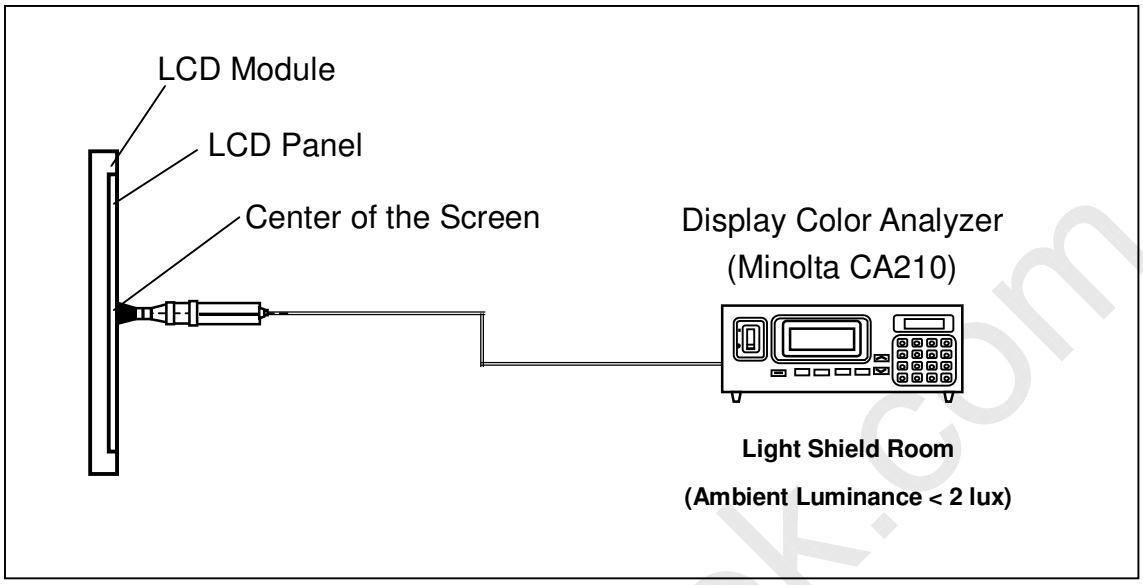

The driving signal means the signal of luminance 0%, 20%, 40%, 60%, 80%, 100%.

Gray to gray average time means the average switching time of luminance 0%, 20%, 40%, 60%, 80%, 100% to each other.

Note (5) Measurement Setup:

The LCD module should be stabilized at given temperature for 60 minutes to avoid abrupt

temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 60 minutes in a windless room.

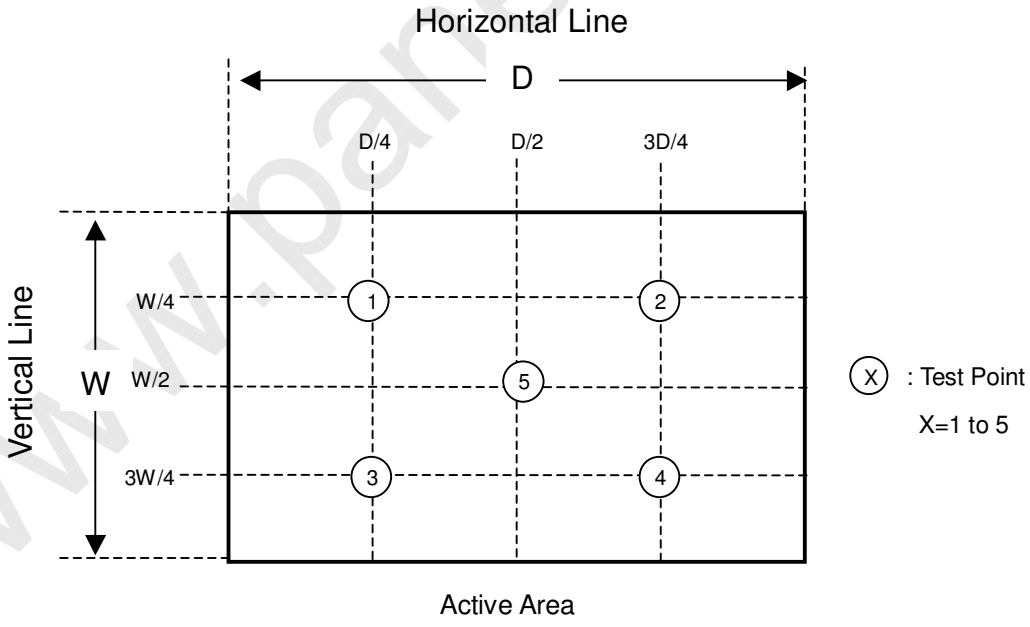



Note (6) Definition of White Variation (δW):

Measure the luminance of gray level 255 at 5 points

δW = Maximum [L (1), L (2), L (3), L (4), L (5)] / Minimum [L (1), L (2), L (3), L (4), L (5)]

where L (X) is corresponding to the luminance of the point X at the figure below.




Note (7) Definition of Transmittance (T%):

Module is without signal input.

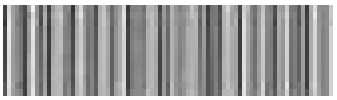
$$\text{Transmittance} = \frac{\text{Luminance of LCD module}}{\text{Luminance of backlight}} * 100\%$$

# 8. DEFINITION OF LABELS

## 8.1 OPEN CELL LABEL

The barcode nameplate is pasted on each open cell as illustration for CMO internal control.

V315B6-P01 XX



XXXXXXXXXXXX

## 8.2 CARTON LABEL

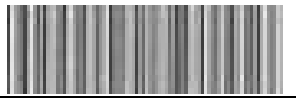
The barcode nameplate is pasted on each box as illustration, and its definitions are as following explanation.

P.O. NO._____

Parts ID._____

Model Name V315B6-P01

Carton ID._____ Quantities 21



XXXXXXXXXXXXXX

Made In China

(a) Model Name: V315B6– P01

(b) Carton ID: CMO internal control

(c) Quantities: 21

# 9. PACKAGING

## 9.1 PACKING SPECIFICATIONS

(1) 21 LCD TV panels / 1 Box

(2) Box dimensions : 970(L)x640(W)x319(H)mm

(3) Weight : approximately 38Kg ( 21 panels per box)

## 9.2 PACKING METHOD

Figures 9-1 and 9-2 are the packing method

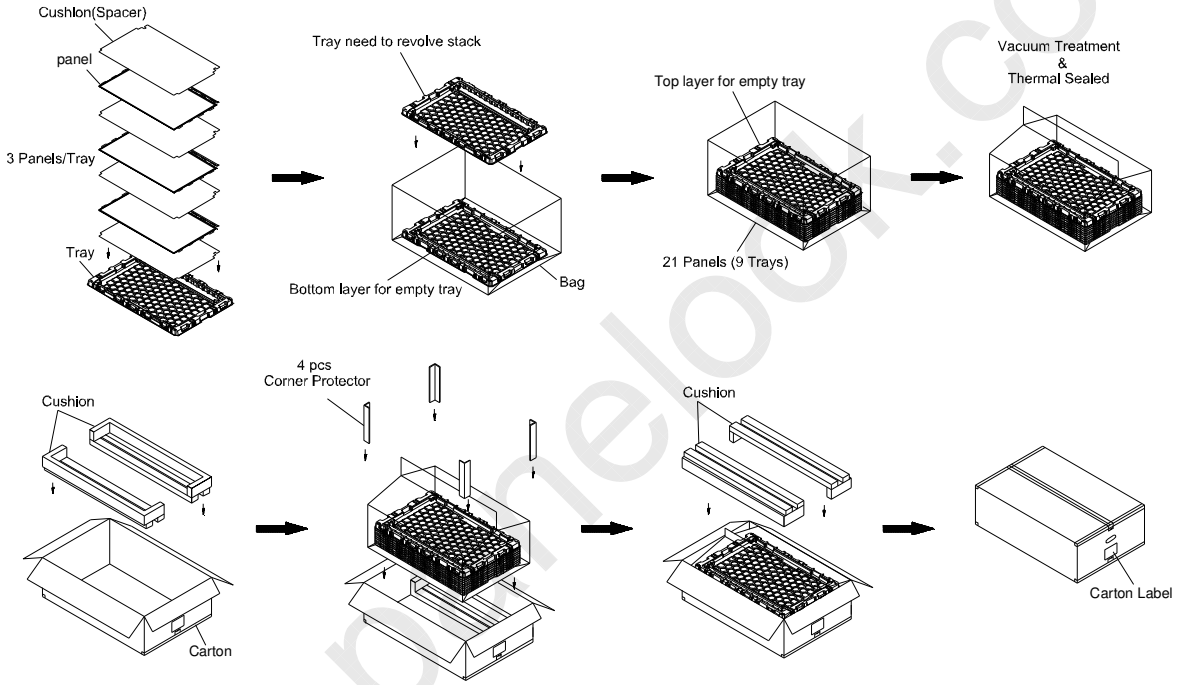
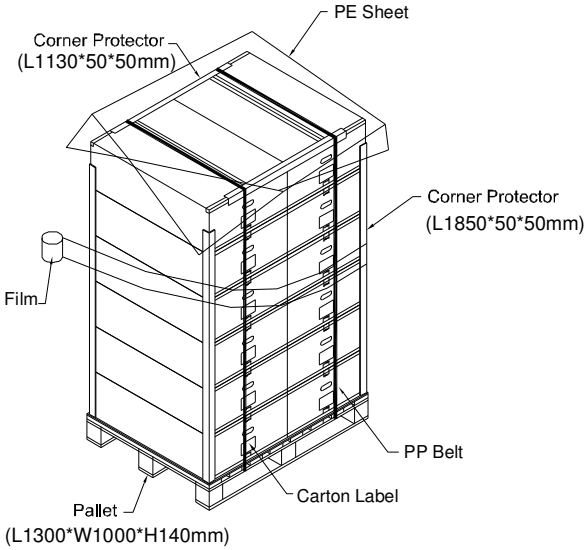



Figure.9-1 packing method

Sea & Land Transportation
Gross : 471kg




Air Transportation
Gross : 319kg

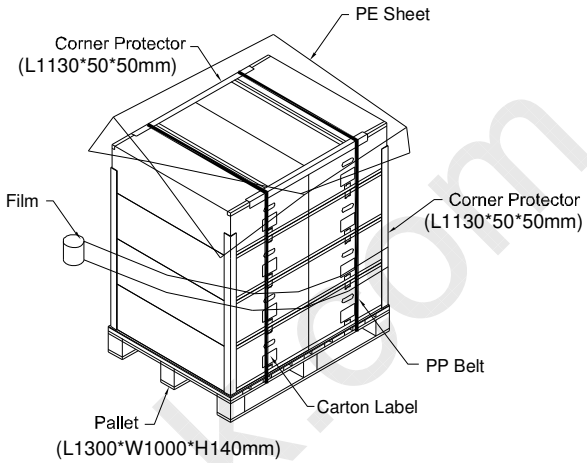



Figure.9-2 packing method

# 10. PRECAUTIONS

## 10.1 ASSEMBLY AND HANDLING PRECAUTIONS

(1) Do not apply rough force such as bending or twisting to the product during assembly.

(2) To assemble backlight or install module into user's system can be only in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.

(3) It's not permitted to have pressure or impulse on the module because the LCD panel will be damaged.

(4) Always follow the correct power sequence when the product is connecting and operating. This can prevent damage to the CMOS LSI chips during latch-up.

(5) Do not pull the I/F connector in or out while the module is operating.

(6) Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.

(7) It is dangerous that moisture come into or contacted the product, because moisture may damage the product when it is operating.

(8) High temperature or humidity may reduce the performance of module. Please store this product within the specified storage conditions.

(9) When ambient temperature is lower than 10ºC may reduce the display quality. For example, the response time will become slowly.

## 10.2 SAFETY PRECAUTIONS

(1) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.

(2) After the product's end of life, it is not harmful in case of normal operation and storage.

## 11. Mechanical Drawing