奇美電子
CHIMEI INNOLUX

PRODUCT SPECIFICATION

☐Tentative Specification
☐ Preliminary Specification
■ Approval Specification

# MODEL NO.: V315B6
# SUFFIX: L03

**Customer:**

**APPROVED BY**          **SIGNATURE**

Name / Title
**Note**

Please return 1 copy for your confirmation with your signature and comments.

| Approved By | Checked By | Prepared By |
|---|---|---|
| Chao-Chun Chung | Vincent Chou | Kevin Tsai |

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**REVISION HISTORY**

| Version | Date | Page(New) | Section | Description |
|---|---|---|---|---|
| Ver. 0.0 | Aug. 16, 2010 | All | All | The tentative specification was first issued. |
| Ver. 1.0 | Sep. 06, 2010 | All | All | The preliminary specification was first issued. |
| Ver. 2.0 | Oct. 08, 2010 | All | All | The Approval specification was first issued. |

# PRODUCT SPECIFICATION

## 1. GENERAL DESCRIPTION

### 1.1 OVERVIEW

V315B6-L03 is a TFT Liquid Crystal Display module with 4U type CCFL Backlight unit and 1ch-LVDS interface. This module supports 1366 x 768 HDTV format and can display 16.7M colors (8-bit/color). The inverter module for backlight is built-in.

### 1.2 FEATURES

- High brightness (450 nits)
- High contrast ratio (3000:1)
- Fast response time (Gray to gray average 8.5 ms)
- Response time (8.5ms)
- High color saturation (NTSC 72%)
- HDTV (1366 x 768 pixels) resolution, true HDTV format
- DE (Data Enable) only mode
- LVDS (Low Voltage Differential Signaling) interface
- Optimized response time for 60 Hz frame rate
- Ultra wide viewing angle : Super MVA technology
- Viewing Angle : 176(H)/176(V) (CR>10) VA Technology

### 1.3 APPLICATION

- Standard Living Room TVs
- Public Display Application
- Home Theater Application
- MFM Application

### 1.4 GENERAL SPECIFICATIONS

| Item | Specification | Unit | Note |
|---|---|---|---|
| Active Area | 698.4*392.85 | mm | (1) |
| Bezel Opening Area | 703.8*399 | mm | (1) |
| Driver Element | a-si TFT active matrix | - | - |
| Pixel Number | 1366 x R.G.B. x768 | pixel | - |
| Pixel Pitch(Sub Pixel) | 0.17025(H) x 0.51075 (V) | mm | - |
| Pixel Arrangement | RGB vertical stripe | - | - |
| Power consumption | 70.76W (LVDS input Power 5.76W + Backlight Power 65 W) | Watt | (2) |
| Display Colors | 16.7M | color | - |
| Display Operation Mode | Transmissive mode / Normally Black | - | - |
| Surface Treatment | Anti-Glare coating (Haze 11%), Hard Coating (3H) | - | (3) |

Note (1) Please refer to the attached drawings in chapter 9 for more information about the front and back outlines.

Note (2) Please refer sec 3.1 and 3.2 for more information of Power consumption

Note (3) The spec. of the surface treatment is temporarily for this phase. CMI reserves the rights to change this feature.

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## 1.5 MECHANICAL SPECIFICATIONS

| Item | | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| Horizontal (H)<br>Vertical (V)<br>Depth (D)<br>Depth (D) | 759.0 | 760.0 | 761.0 | mm | (1) | (1) |
| | 449.0 | 450.0 | 451.0 | mm | (1) | (1) |
| | 39.5 | 40.5 | 41.5 | mm | (2) | (2) |
| | 46.9 | 47.9 | 48.9 | mm | (3) | (3) |
| Weight | | - | 5100 | - | g | - |

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

Note (2) Module Depth is between bezel to rear.

Note (3) Module Depth is between bezel to Inverter cover.

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory!  www.panelook.com

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## 2. ABSOLUTE MAXIMUM RATINGS

### 2.1 ABSOLUTE RATINGS OF ENVIRONMENT

| Item | Symbol | Value | | Unit | Note |
|------|--------|-------|-------|------|------|
| | | Min. | Max. | | |
| Storage Temperature | TST | -20 | +60 | ºC | (1) |
| Operating Ambient Temperature | TOP | 0 | 50 | ºC | (1), (2) |
| Shock (Non-Operating) | SNOP | - | 50 | G | (3), (5) |
| Vibration (Non-Operating) | VNOP | - | 1.0 | G | (4), (5) |

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

> (a) 90 ％RH Max. (Ta $\leq$ 40 ℃).

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

> (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 ℃ with LCD module alone in a temperature controlled chamber. Thermal management should be considered in final product design to prevent the surface temperature of display area from being over 65 ℃. The range of operating temperature may degrade in case of improper thermal management in final product design.

Note (3) 11 ms, half sine wave, 1 time for ± X, ± Y, ± Z.

Note (4) 10 ～ 200 Hz, 10 min, 1 time each X, Y, Z.

Note (5) At testing Vibration and Shock, the fixture in holding the module has to be hard and rigid enough so that the module would not be twisted or bent by the fixture.
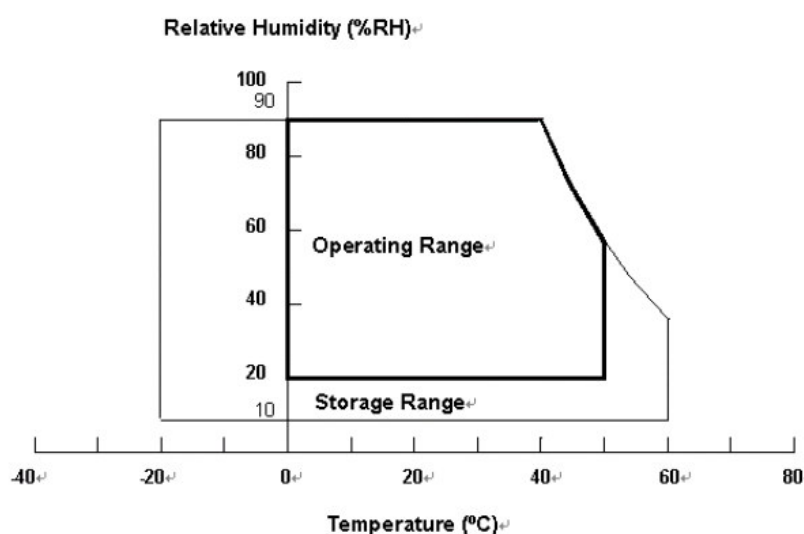
## 2.2 PACKAGE STORAGE

When storing modules as spares for a long time, the following precaution is necessary.

(a) Do not leave the module in high temperature, and high humidity for a long time, It is highly recommended to store the module with temperature from 0 to 35 ℃ at normal humidity without condensation.

(b) The module shall be stored in dark place. Do not store the TFT-LCD module in direct sunlight or fluorescent light.

## 2.3 ELECTRICAL ABSOLUTE RATINGS

### 2.3.1 TFT LCD MODULE

| Item | Symbol | Value | | Unit | Note |
|---|---|---|---|---|---|
| | | Min. | Max. | | |
| Power Supply Voltage | VCC | -0.3 | 13.5 | V | (1) |
| Logic Input Voltage | VIN | -0.3 | 3.6 | V | |

### 2.3.2 BACKLIGHT INVERTER UNIT

| Item | Symbol | Value | | Unit | Note |
|---|---|---|---|---|---|
| | | Min. | Max. | | |
| Lamp Voltage | VW | — | 3000 | VRMS | |
| Power Supply Voltage | VBL | 0 | 30 | V | (1) |
| Control Signal Level | — | -0.3 | 7 | V | (1), (3) |

Note (1) Permanent damage to the device may occur if maximum values are exceeded. Function operation should be restricted to the conditions described under Normal Operating Conditions.
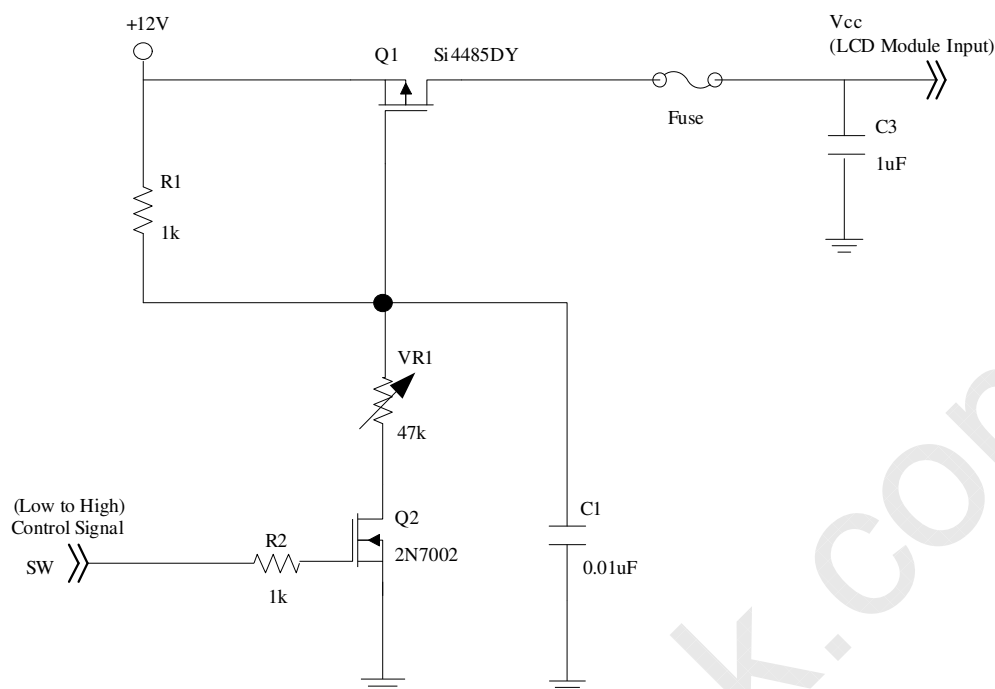
Note (2) No moisture condensation or freezing.

Note (3) The control signals include On/Off Control and Internal PWM Control.

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## 3. ELECTRICAL CHARACTERISTICS

### 3.1 TFT LCD MODULE

(Ta = 25 ± 2 ºC)

| Parameter | | Symbol | Value | | | Unit | Note |
|---|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | | |
| Power Supply Voltage | | $V_{CC}$ | 10.8 | 12 | 13.2 | V | (1) |
| Rush Current | | $I_{RUSH}$ | — | — | 3.9 | A | (2) |
| Power consumption | White Pattern | $P_T$ | — | 4.92 | 6 | W | (3) |
| | Horizontal Stripe | | — | 5.76 | 7.08 | W | |
| | Black Pattern | | — | 3.6 | 4.44 | W | |
| Power Supply Current | White Pattern | — | — | 0.41 | 0.5 | A | (4) |
| | Horizontal Stripe | — | — | 0.48 | 0.59 | A | |
| | Black Pattern | — | — | 0.3 | 0.37 | A | |
| LVDS interface | Differential Input High Threshold Voltage | $V_{LVTH}$ | +100 | — | — | mV | (5) |
| | Differential Input Low Threshold Voltage | $V_{LVTL}$ | — | — | -100 | mV | |
| | Common Input Voltage | $V_{CM}$ | 1.0 | 1.2 | 1.4 | V | |
| | Differential input voltage (single-end) | $|V_{ID}|$ | 200 | — | 600 | mV | |
| | Terminating Resistor | $R_T$ | — | 100 | — | ohm | |
| CMIS 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 the above ranges.

+12V

Q1    Si4485DY

Vcc
(LCD Module Input)

Fuse

C3
1uF

R1
1k

VR1
47k

(Low to High)
Control Signal

SW

R2
1k

Q2
2N7002

C1
0.01uF

**Vcc rising time is 470us**

Vcc

0.9Vcc

0.1Vcc

GND

470us
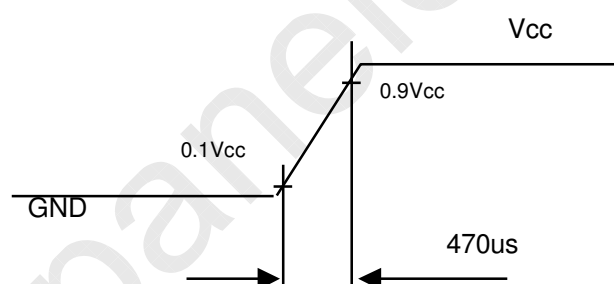
Note (3) The Specified Power consumption is under a,b,c pattern.

Note (4) The specified power supply current is under the conditions at Vcc = 12 V, Ta = 25 ± 2 ºC, $f_v$ = 60 Hz, whereas a power dissipation check pattern below is displayed.
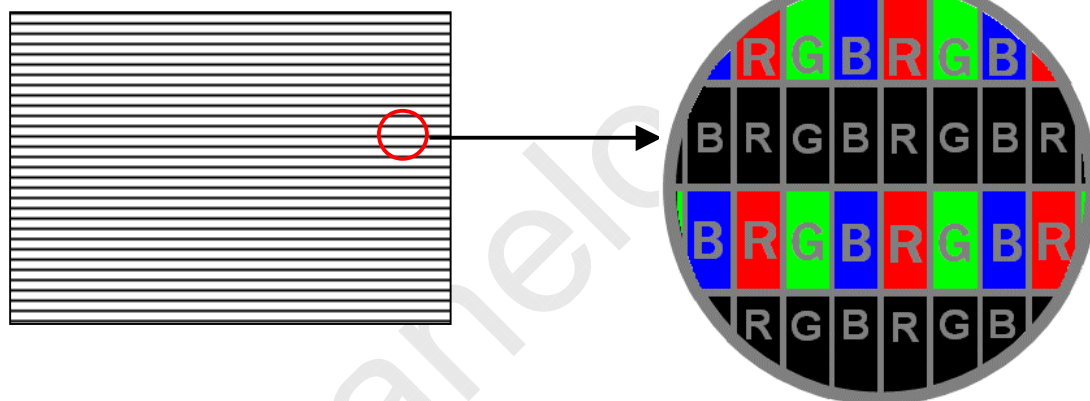
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a. White Pattern

Active Area

b. Black Pattern

Active Area

c. Horizontal Pattern

Note (4) The LVDS input characteristics are as follows :

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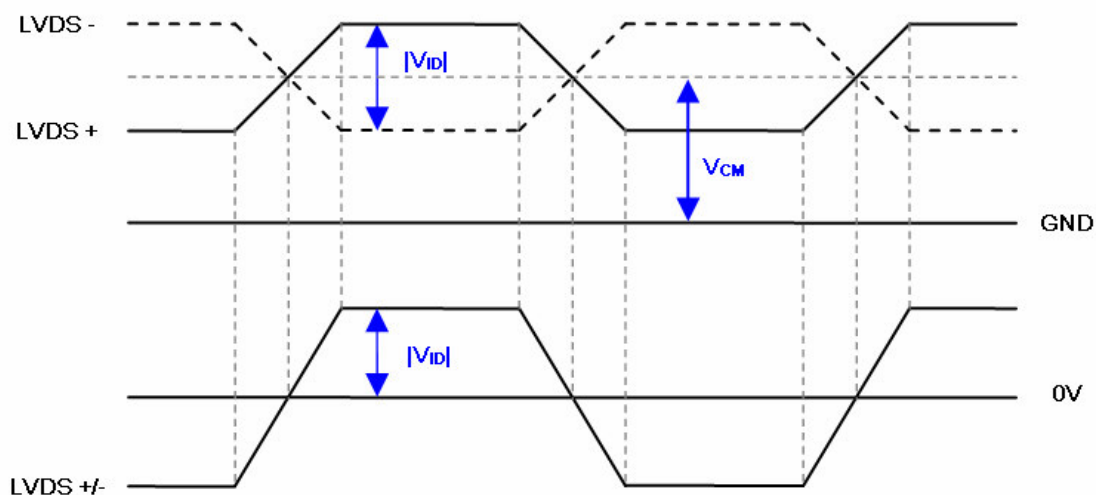
## 3.2 BACKLIGHT CONNECTOR PIN CONFIGURATION

### 3.2.1 LAMP SPECIFICATION　　(Ta = 25 ± 2 ºC)

| Parameter | Symbol | Value | | | Unit | Note |
|-----------|--------|-------|-------|-------|------|------|
| | | Min. | Typ. | Max. | | |
| Lamp Input Voltage | VL | - | 1560 | - | $V_{RMS}$ | $I_L$=10.5mA |
| Lamp Current | $I_L$ | 10.0 | 10.5 | 11.0 | $mA_{RMS}$ | |
| Lamp Turn On Voltage | VS | - | - | 2760 | $V_{RMS}$ | (1) , Ta = 0 ºC |
| | | - | - | 2300 | $V_{RMS}$ | (1) , Ta = 25 ºC |
| Operating Frequency | FL | 30 | - | 80 | KHz | (2) |
| Lamp Life Time | LBL | 50,000 | - | - | Hrs | (3) |

### 3.2.2 ELECTRICAL SPECIFICATION

(Ta = 25 ± 2 ºC)

| Parameter | Symbol | Value | | | Unit | Note |
|-----------|--------|-------|-------|-------|------|------|
| | | Min. | Typ. | Max. | | |
| Total Power Consumption | $P_{255}$ | - | 65 | 69 | W | (5), (6), $I_L$ =10.5mA |
| Power Supply Voltage | $V_{BL}$ | 22.8 | 24.0 | 25.2 | VDC | |
| Power Supply Current | $I_{BL}$ | - | 2.71 | 2.88 | A | Non Dimming |
| Inrush current | $I_R$ | - | - | 4.22 | $A_{peak}$ | $V_{BL}$=24V,(IL=typ) (7) |
| Input Ripple Noise | - | - | - | 912 | mVP-P | VBL=22.8V |
| Oscillating Frequency | $F_W$ | 60 | 63 | 66 | kHz | (3) |
| Dimming Frequency | $F_B$ | 150 | 160 | 170 | Hz | |
| Minimum Duty Ratio | $D_{MIN}$ | 10 | 20 | - | % | (8) |

Note (1) Lamp current is measured by utilizing AC current probe.

Note (2) The lamp starting voltage $V_S$ should be applied to the lamp for more than 1 second after startup. Otherwise the lamp may not be turned on.

Note (3) The lamp frequency may produce interference with horizontal synchronous frequency of the display input signals, and it may result in line flow on the display. In order to avoid interference, the lamp frequency should be detached from the horizontal synchronous frequency and its harmonics as far as possible.

Note (4) The life time of a lamp is defined as when the brightness is larger than 50% of its original value and the effective discharge length is longer than 80% of its original length (Effective discharge length is

defined as an area that has equal to or more than 70% brightness compared to the brightness at the center point of lamp.) as the time in which it continues to operate under the condition at Ta = 25 ±2℃ and $I_L$ = (10.0~ 11.0) mArms.

Note (5) The power supply capacity should be higher than the total inverter power consumption $P_{BL}$. Since the pulse width modulation (PWM) mode was applied for backlight dimming, the driving current changed as PWM duty on and off. The transient response of power supply should be considered for the changing loading when inverter dimming.

Note (6) The measurement condition of Max. value is based on 31.5" backlight unit under input voltage 24V, average lamp current 10.8 mA and lighting 30 minutes later.

Note (7) The duration of Input Inrush Current is about VBL Rising Time 30ms.

Note (8) 10% minimum duty ratio is only valid for electrical operation.

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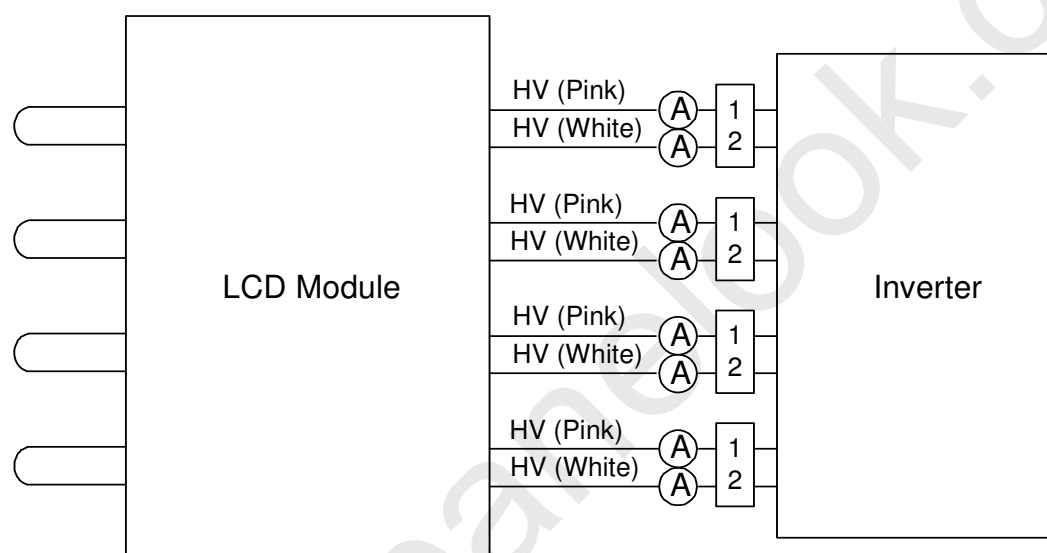
### 3.2.3 INVERTER INTERFACE CHARACTERISTICS

| Parameter | | Symbol | Test Condition | Value | | | Unit | Note |
|---|---|---|---|---|---|---|---|---|
| | | | | Min. | Typ. | Max. | | |
| On/Off Control Voltage | ON | $V_{BLON}$ | — | 2.4 | — | 5.0 | V | |
| | OFF | | — | 0 | — | 0.8 | V | |
| Internal PWM Control Voltage | MAX | $V_{IPWM}$ | — | 2.85 | 3.0 | 3.15 | V | Maximum duty ratio |
| | MIN | | | — | 0 | — | V | Minimum duty ratio |
| External PWM Control Voltage | HI | $V_{EPWM}$ | — | 2.4 | — | 5.0 | V | Duty on |
| | LO | | — | 0 | — | 0.8 | V | Duty off |
| Error Signal | | ERR | — | Open Collector | | | | Abnormal |
| | | | | 0 | — | 0.8 | V | Normal |
| Error Turn on Delay Time | | $T_{ER-R}$ | — | — | — | 200 | ms | |
| Error Turn off Delay Time | | $T_{ER-F}$ | — | — | — | 200 | ms | |
| VBL Rising Time | | Tr1 | — | 30 | — | — | ms | 10%-90%$V_{BL}$ |
| VBL Falling Time | | Tf1 | — | 30 | — | — | ms | |
| Control Signal Rising Time | | Tr | — | — | — | 100 | ms | |
| Control Signal Falling Time | | Tf | — | — | — | 100 | ms | |
| PWM Signal Rising Time | | $T_{PWMR}$ | — | — | — | 50 | us | |
| PWM Signal Falling Time | | $T_{PWMF}$ | — | — | — | 50 | us | |
| Input impedance | | $R_{IN}$ | — | 1 | — | — | MΩ | |
| PWM Turn on Delay Time | | $T_{PWMON}$ | — | 500 | | — | ms | |
| PWM Turn off Delay Time | | $T_{PWMOFF}$ | — | 1 | | — | ms | |
| BLON Turn on Delay Time | | $T_{on}$ | — | 200 | — | — | ms | |
| BLON Turn off Time | | $T_{off}$ | — | 200 | — | — | ms | |
| BLON Delay Time | | $T_{on1}$ | — | 300 | — | — | ms | |

Note (1) The Dimming signal should be valid before backlight turns on by BLON signal. It is inhibited to change the internal/external PWM signal during backlight turn on period.
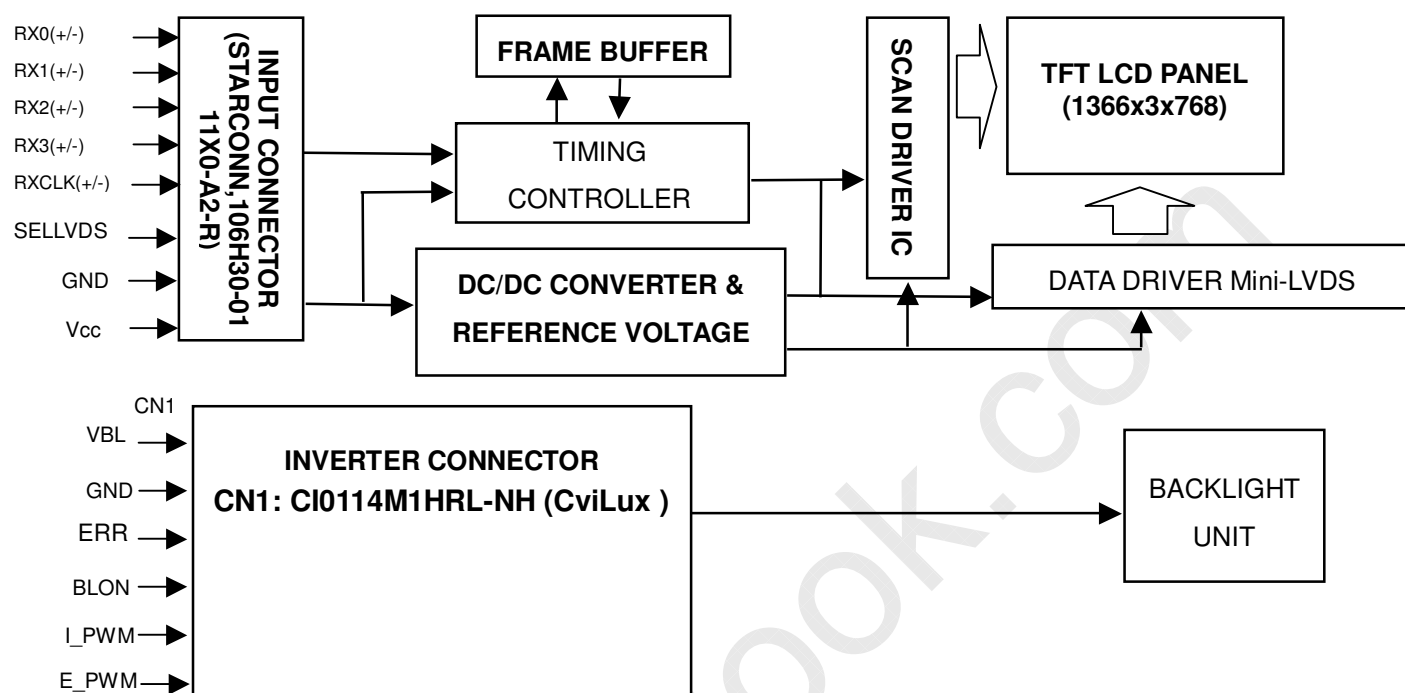
Note (2) The power sequence and control signal timing are shown in the following figure. For a certain reason, the inverter has a possibility to be damaged with wrong power sequence and control signal timing.

Note (3) While system is turned ON or OFF, the power sequences must follow as below descriptions:

Turn ON sequence: VBL → PWM signal → BLON

Turn OFF sequence: BLOFF → PWM signal → VBL

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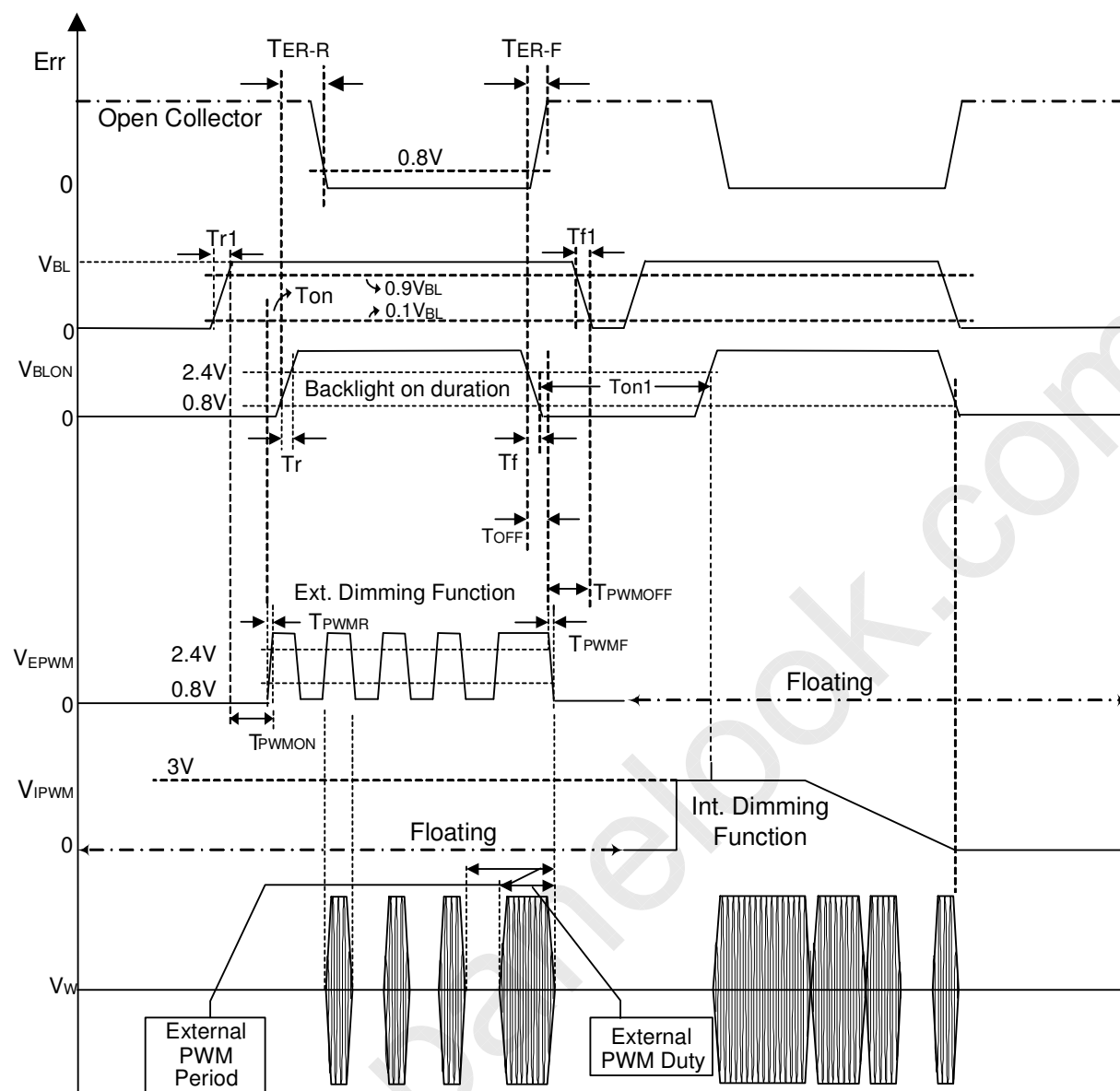
## 4. BLOCK DIAGRAM OF INTERFACE

## 4.1 TFT LCD MODULE

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## 5. INPUT TERMINAL PIN ASSIGNMENT

### 5.1 TFT LCD Module Input

#### CNF1 Connector Pin Assignment

| Pin | Name | Description | Note |
|-----|------|-------------|------|
| 1 | N.C. | No Connection | (3) |
| 2 | SCL | EEPROM Serial Clock | |
| 3 | SDA | EEPROM Serial Data | |
| 4 | GND | Ground | |
| 5 | RX0- | Negative transmission data of pixel 0 | |
| 6 | RX0+ | Positive transmission data of pixel 0 | |
| 7 | GND | Ground | |
| 8 | RX1- | Negative transmission data of pixel 1 | |
| 9 | RX1+ | Positive transmission data of pixel 1 | |
| 10 | GND | Ground | |
| 11 | RX2- | Negative transmission data of pixel 2 | |
| 12 | RX2+ | Positive transmission data of pixel 2 | |
| 13 | GND | Ground | |
| 14 | RXCLK- | Negative of clock | |
| 15 | RXCLK+ | Positive of clock | |
| 16 | GND | Ground | |
| 17 | RX3- | Negative transmission data of pixel 3 | |
| 18 | RX3+ | Positive transmission data of pixel 3 | |
| 19 | GND | Ground | |
| 20 | PANEL_SEL | No Connection | (3) |
| 21 | SELLVDS | Select LVDS data format | (2)(4) |
| 22 | WP | EEPROM Write Protect | |
| 23 | GND | Ground | |
| 24 | GND | Ground | |
| 25 | N.C. | No Connection | (3) |
| 26 | VCC | Power supply: +12V | |
| 27 | VCC | Power supply: +12V | |
| 28 | VCC | Power supply: +12V | |
| 29 | VCC | Power supply: +12V | |
| 30 | VCC | Power supply: +12V | |

Note (1) Connector type: STARCONN 106H30-011100-A2-R or compatible

LVDS connector pin order defined as follows
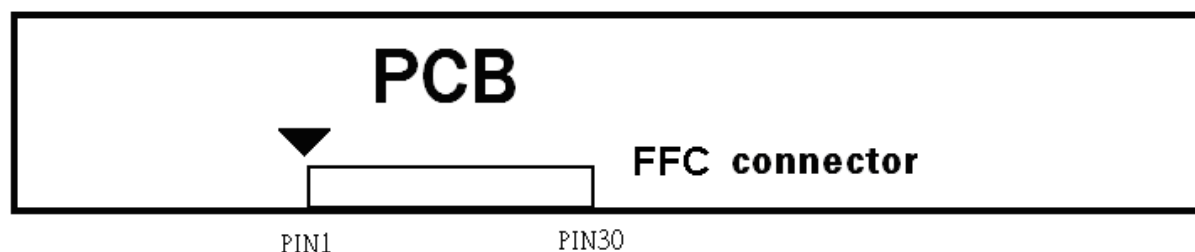


Note (2) High = Connect to +3.3V or Open: VESA Format, Low = connect to GND: JEIDA Format.

Please refer to 5.5 LVDS INTERFACE

Note (3) Reserved for internal use. Left it open.

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Note (4) LVDS signal pin connected to the LCM side has the following diagram. R1 in the system side should be less than 1K Ohm. (R1 < 1K Ohm)

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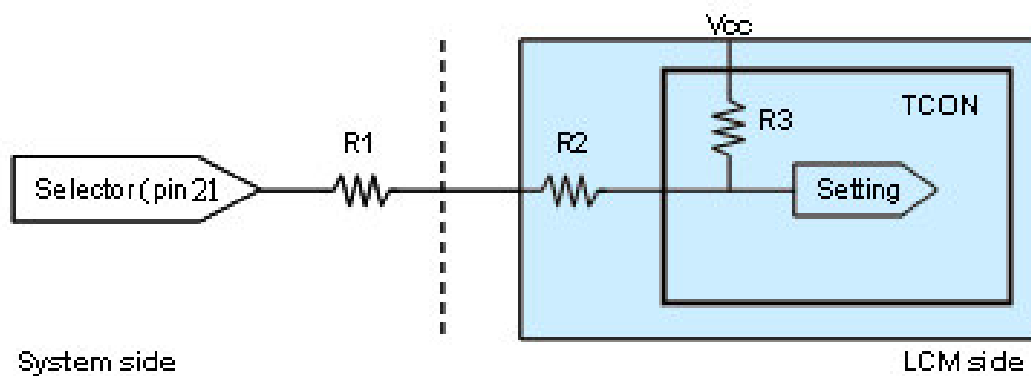
## 5.2 BACKLIGHT UNIT

The pin configuration for the housing and the leader wire is shown in the table below.

CN: E01B-KCF, manufactured by JST or Equivalent
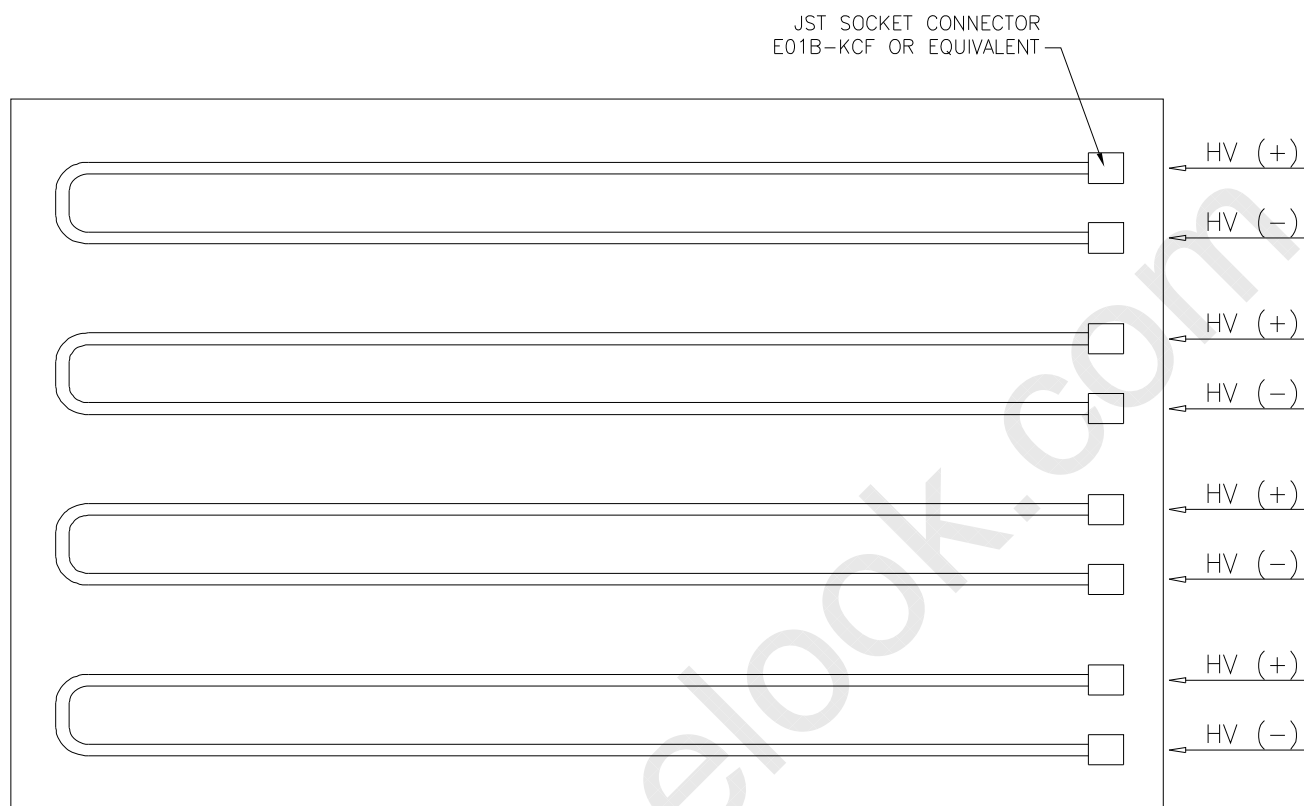


## 5.3 INVERTER UNIT

CN1: CI0114M1HRL-NH　(CviLux)

| Pin № | Symbol | Feature |
|---|---|---|
| 1 | VBL | +24V |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | GND | GND |
| 7 | | |
| 8 | | |
| 9 | | |
| 10 | | |
| 11 | ERR | Normal (GND) Abnormal(Open collector) |
| 12 | BLON | BL ON/OFF |
| 13 | I_PWM | Internal PWM Control |
| 14 | E_PWM | External PWM Control |

Note (1) PIN 13:Intermal PWM Control (Use Pin 13): Pin 14 must open.

Note (2) PIN 14:External PWM Control (Use Pin 14): Pin 13 must open.
Note (3) Pin 13(I_PWM) and Pin 14(E_PWM) can't open in same period.

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## 5.4 BLOCK DIAGRAM OF INTERFACE
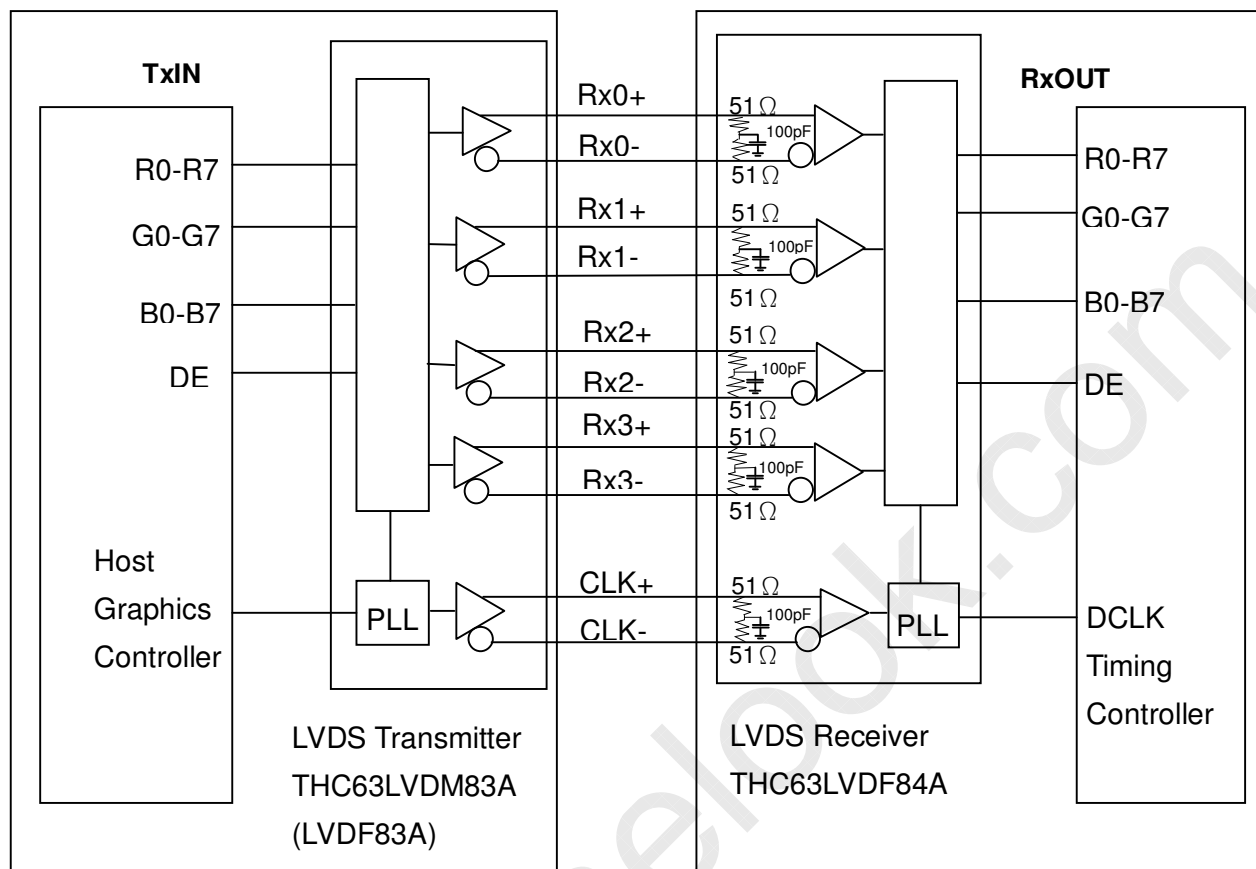


R0~R7　　: Pixel R Data　,

G0~G7　　: Pixel G Data　,

B0~B7　　: Pixel B Data　,

DE　　　　: Data enable signal

DCLK　　: Data clock signal

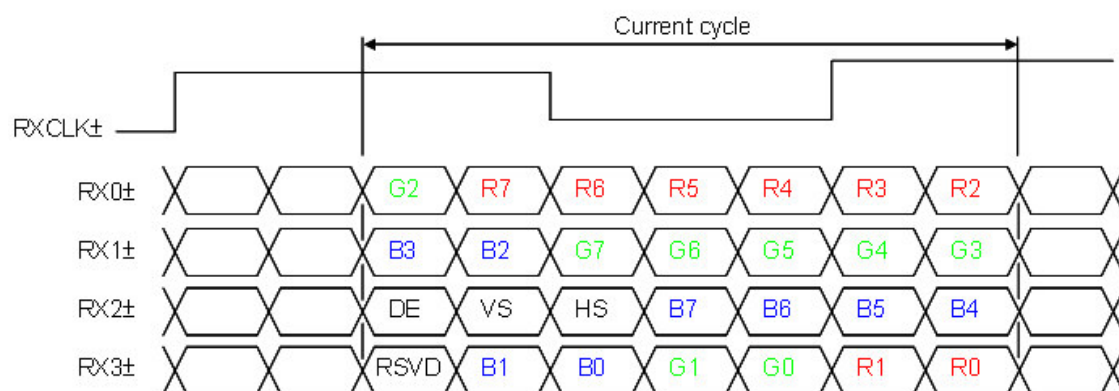Note (1) The system must have the transmitter to drive the module.

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.

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**5.5 LVDS INTERFACE**

VESA LVDS format：(SELLVDS pin=H or open)
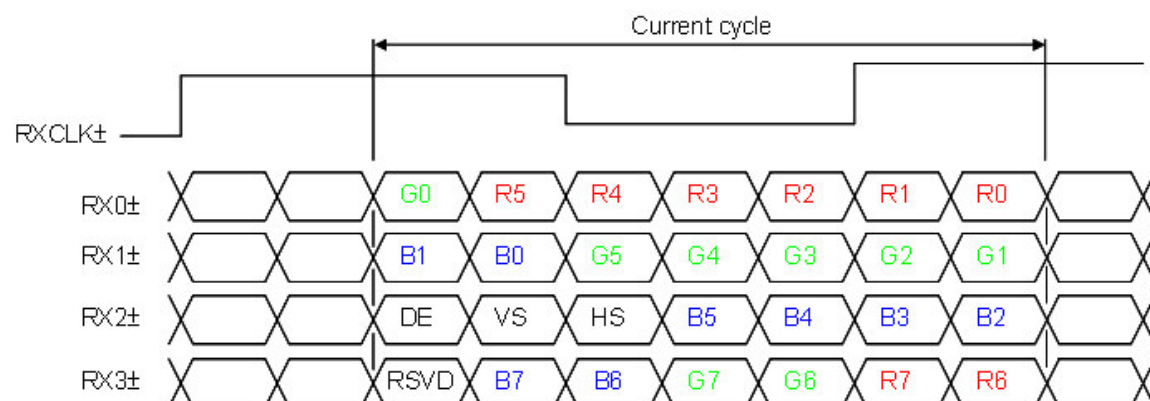


JEDIA LVDS format：(SELLVDS pin=L)



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

DCLK : Data clock signal

Notes: (1) RSVD (reserved) pins on the transmitter shall be "H" or "L".

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## 5.6 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 the 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

PRODUCT SPECIFICATION

## 6. INTERFACE TIMING

### 6.1 INPUT SIGNAL TIMING SPECIFICATIONS

(Ta = 25 ± 2 ºC)

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 | $F_{clkin}$ (=1/TC) | 60 | 76 | 82 | MHz | |
| | Input cycle to cycle jitter | $T_{rcl}$ | — | — | 200 | ps | (2) |
| | Spread spectrum modulation range | $F_{clkin\_mod}$ | $F_{clkin}$-2% | — | $F_{clkin}$+2% | MHz | (3) |
| | Spread spectrum modulation frequency | $F_{SSM}$ | — | — | 200 | KHz | |
| LVDS Receiver Data | Setup Time | Tlvsu | 600 | — | — | ps | |
| | Hold Time | Tlvhd | 600 | — | — | ps | |
| Vertical Active Display Term | Frame Rate | $F_{r5}$ | 47 | 50 | 53 | Hz | |
| | | $F_{r6}$ | 57 | 60 | 63 | Hz | |
| | Total | Tv | 776 | 806 | 1018 | Th | Tv=Tvd+Tvb |
| | Display | Tvd | 768 | 768 | 768 | Th | |
| | Blank | Tvb | 8 | 38 | 250 | Th | |
| Horizontal Active Display Term | Total | Th | 1442 | 1560 | 2006 | Tc | Th=Thd+Thb |
| | Display | Thd | 1366 | 1366 | 1366 | Tc | |
| | Blank | Thb | 76 | 194 | 640 | Tc | |

Note (1) Please make sure the range of frame rate has follow the below equation：

Fclkin(max) ≧ Fr6 ╳ Tv ╳ Th

Fr5 ╳ Tv ╳ Th ≧ Fclkin(min)

PRODUCT SPECIFICATION

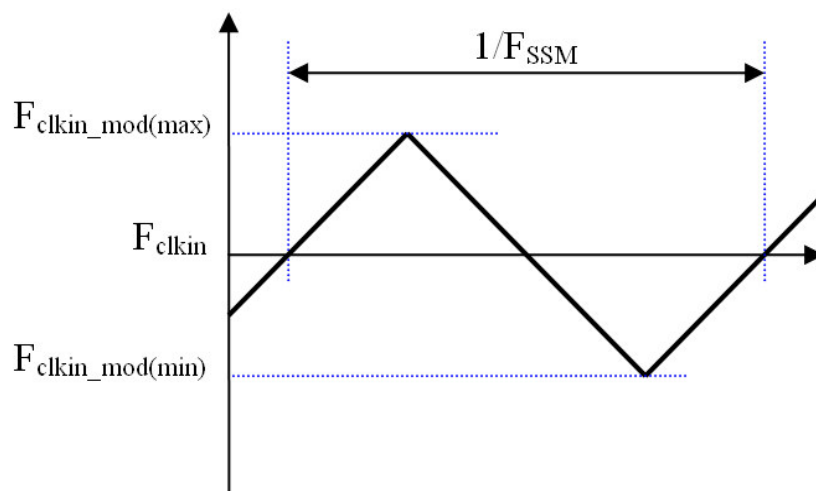Note (2)   This module is operated in DE only mode and please follow the input signal timing diagram below：

**INPUT SIGNAL TIMING DIAGRAM**
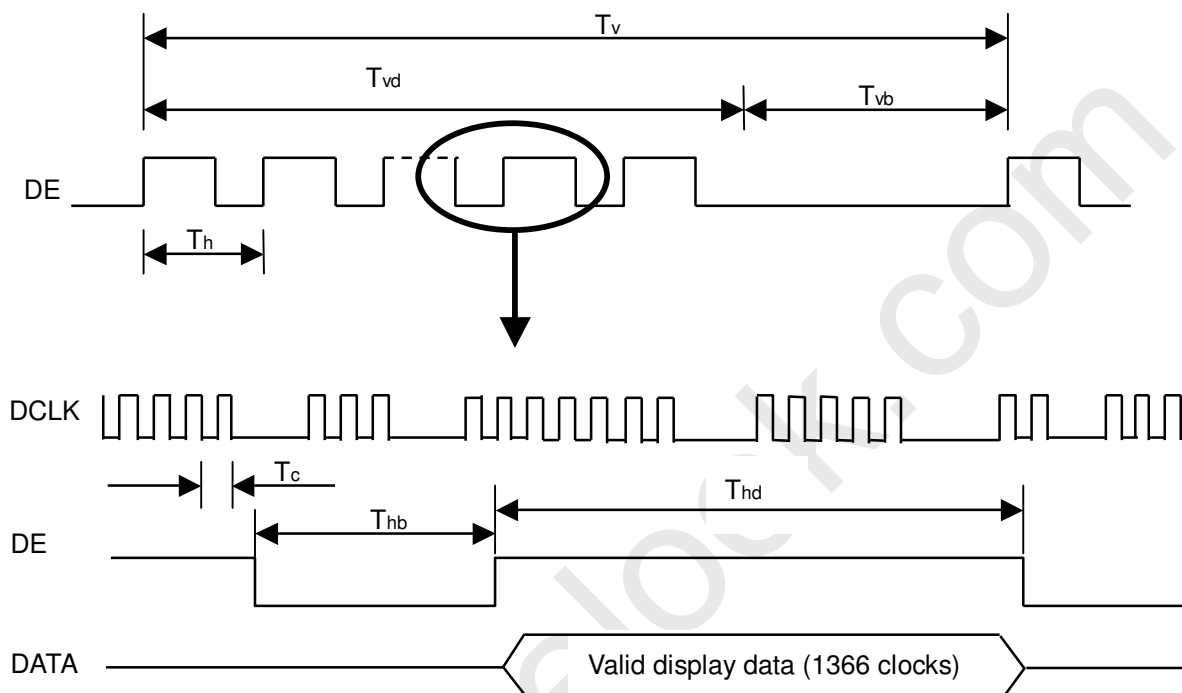


Note (3) The input clock cycle-to-cycle jitter is defined as below figures. Trcl = I $T_1$ – TI
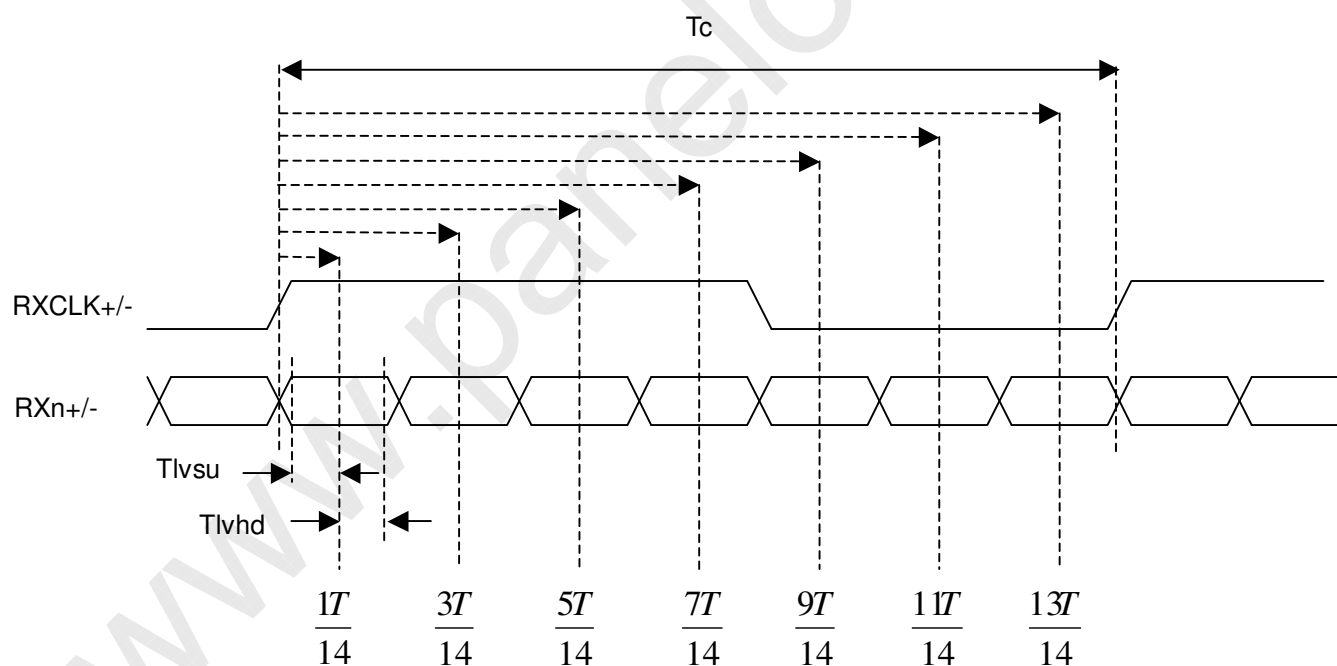
奇美電子
CHIMEI **INNOLUX**
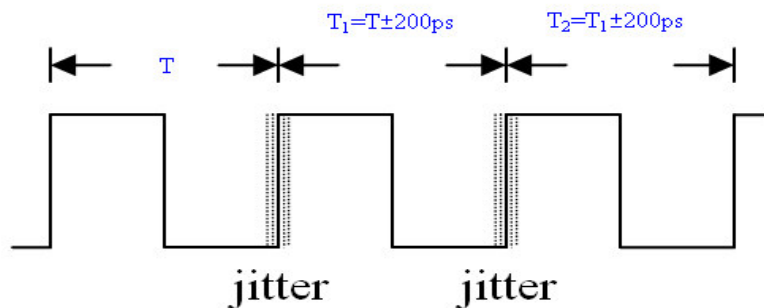
Note (4) The SSCG (Spread spectrum clock generator) is defined as below figures.



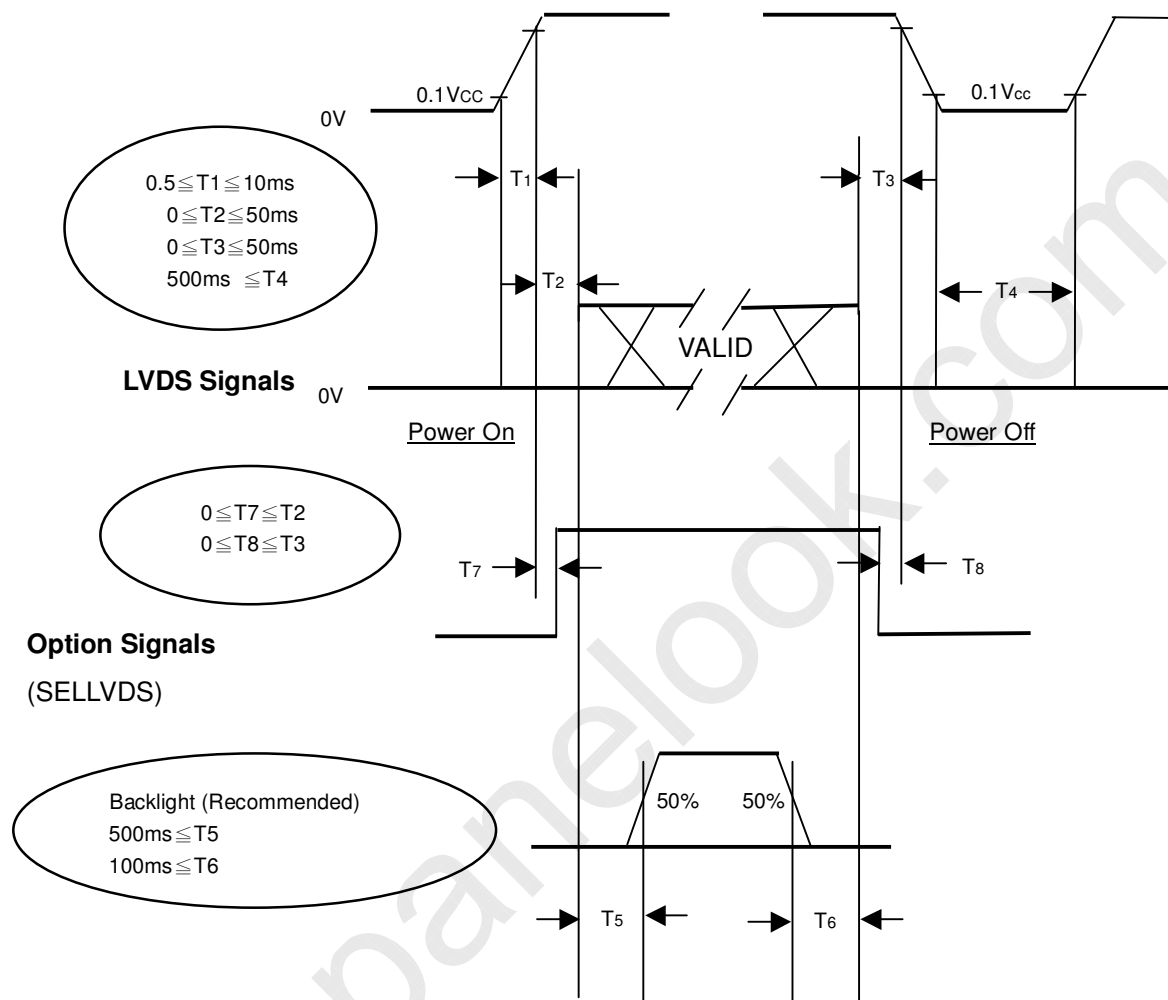Note (5) The LVDS timing diagram and setup/hold time is defined and showing as the following figures.

## LVDS RECEIVER INTERFACE TIMING DIAGRAM

PRODUCT SPECIFICATION

## 6.2 POWER ON/OFF SEQUENCE

(Ta = 25 ± 2 °C)

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



$0.1V_{CC}$　　　$0.1V_{CC}$

$0.5 \leqq T1 \leqq 10ms$
$0 \leqq T2 \leqq 50ms$
$0 \leqq T3 \leqq 50ms$
$500ms \leqq T4$

**LVDS Signals**

Power On　　Power Off

$0 \leqq T7 \leqq T2$
$0 \leqq T8 \leqq T3$

**Option Signals**
(SELLVDS)

Backlight (Recommended)
$500ms \leqq T5$
$100ms \leqq T6$

50%　　50%

**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.

PRODUCT SPECIFICATION

## 7. OPTICAL CHARACTERISTICS

### 7.1 TEST CONDITIONS

| Item | Symbol | Value | Unit |
|---|---|---|---|
| Ambient Temperature | Ta | 25±2 | $^o$C |
| Ambient Humidity | Ha | 50±10 | %RH |
| Supply Voltage | VCC | 12 | V |
| Input Signal | According to typical value in "3. ELECTRICAL CHARACTERISTICS" | | |
| Lamp Current | IL | 10.5 | mA |
| Oscillating Frequency (Inverter) | FW | 42 | KHz |
| Vertical Frame Rate | Fr | 60 | Hz |

The LCD module should be stabilized at given temperature for 1 hour to avoid abrupt temperature change during measuring in a windless room.

PRODUCT SPECIFICATION
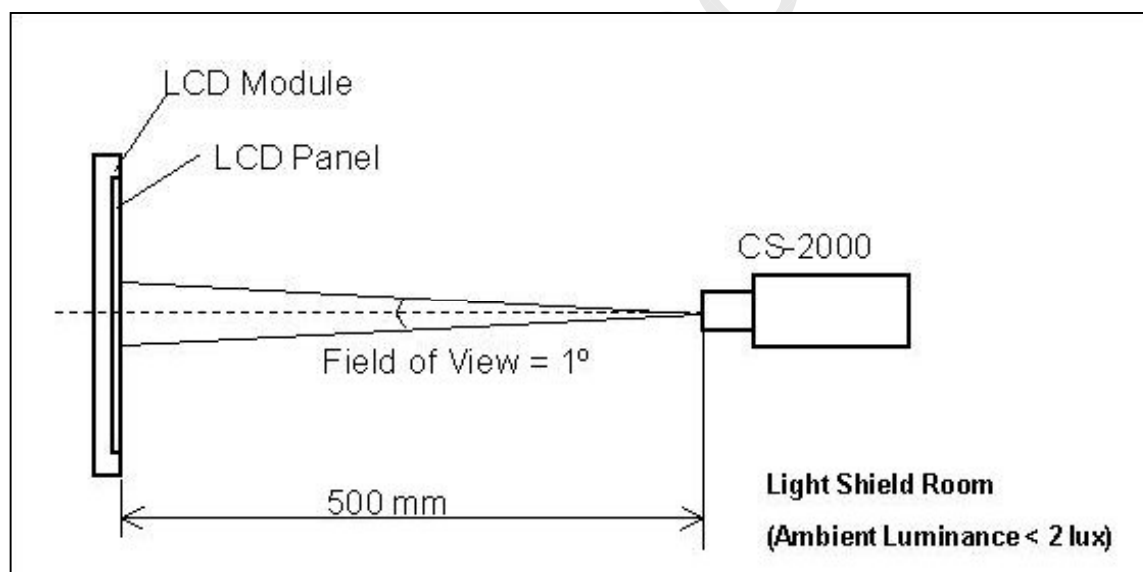
## 7.2 OPTICAL SPECIFICATIONS

The relative measurement methods of optical characteristics are shown in 7.2. The following items should be measured under the test conditions described in 7.1 and stable environment shown in 7.1.

| Item | | Symbol | Condition | Min. | Typ. | Max. | Unit | Note |
|------|--|--------|-----------|------|------|------|------|------|
| Contrast Ratio | | CR | | 2250 | 3000 | - | - | (2) |
| Response Time (VA) | | Gray to gray | | - | 8.5 | - | ms | (3) |
| Center Luminance of White | | $L_C$ | | 360 | 450 | - | cd/m$^2$ | (4) |
| White Variation | | $\delta W$ | | - | - | 1.3 | - | (6) |
| Cross Talk | | CT | | - | - | 4 | % | (5) |
| Color Chromaticity | Red | Rx | $\theta x=0°, \theta y=0°$ Viewing angle at normal direction | Typ. -0.03 | 0.645 | Typ. +0.03 | - | - |
| | | Ry | | | 0.330 | | - | |
| | Green | Gx | | | 0.278 | | - | |
| | | Gy | | | 0.598 | | - | |
| | Blue | Bx | | | 0.143 | | - | |
| | | By | | | 0.067 | | - | |
| | White | Wx | | | 0.280 | | - | |
| | | Wy | | | 0.290 | | - | |
| | Color Gamut | C.G | | - | 72 | - | % | NTSC |
| Viewing Angle | Horizontal | $\theta x+$ | CR≥10 | 80 | 88 | - | Deg. | (1) |
| | | $\theta x-$ | | 80 | 88 | - | | |
| | Vertical | $\theta Y+$ | | 80 | 88 | - | | |
| | | $\theta Y-$ | | 80 | 88 | - | | |

# PRODUCT  SPECIFICATION

Note (1) Definition of Viewing Angle ($\theta x$, $\theta y$) :

Viewing angles are measured by Conoscope Cono-80

Normal
$\theta x = \theta y = 0º$

$\theta x- = 90º$
x-

$\theta y-$  $\theta y+$

12 o'clock direction
$\theta y + = 90º$

$\theta x-$  $\theta x+$

6 o'clock
$\theta y- = 90º$  y-

$x_+$  $\theta x+ = 90º$
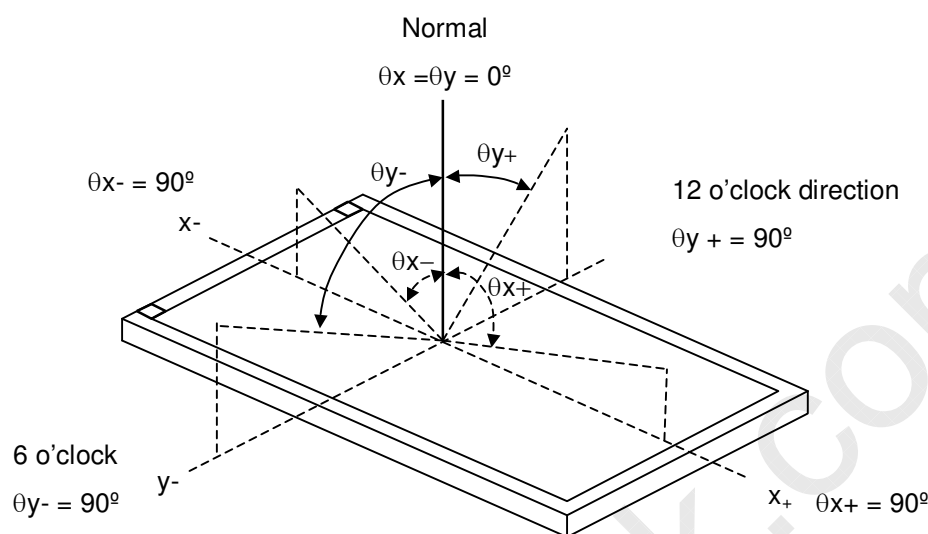
Note (2) Definition of Contrast Ratio (CR) :

The contrast ratio can be calculated by the following expression.

$$\text{Contrast Ratio (CR)} = \frac{\text{Surface Luminance of L255}}{\text{Surface Luminance of L0}}$$

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 (3) Definition of Gray-to-Gray Switching Time:

100%
90%

Optical

Response

10%
0%

Time

Gray to gray switching time    Gray to gray switching time
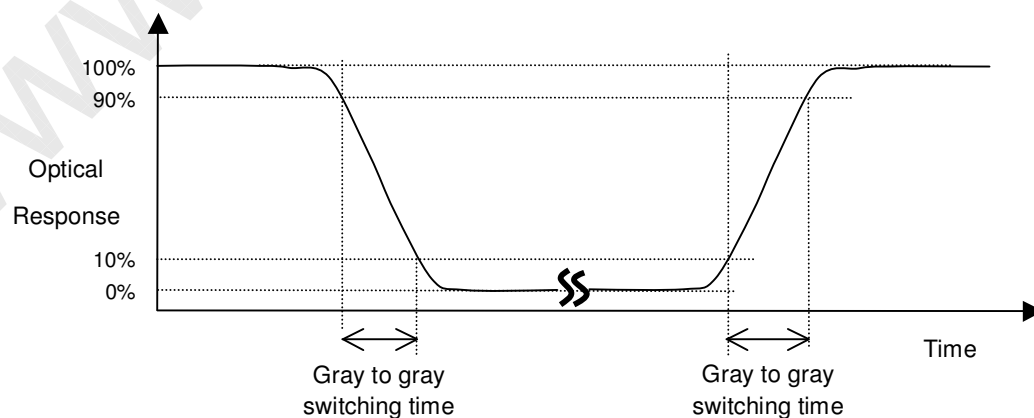
The driving signal means the signal of gray level 0, 31, 63, 95, 127, 159, 191, 223 and 255.

Gray to gray average time means the average switching time of gray level 0, 31, 63, 95, 127, 159, 191,

223 and 255 to each other.

Note (3) Definition of Response Time ($T_R$, $T_F$):

Gray Level 255                  Gray Level 255

100%
90%

Optical

Response

Gray Level 0

10%
0%

$T_R$                              $T_F$          Time
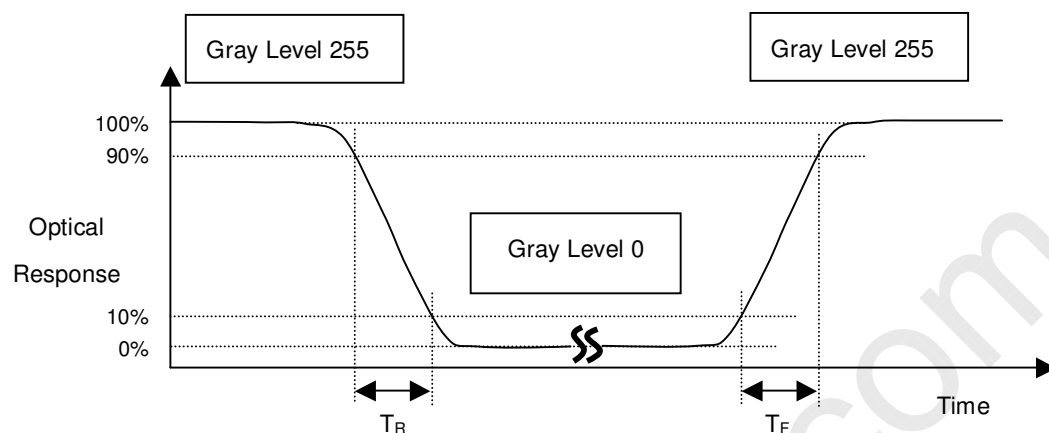
Note (4) Definition of Luminance of White ($L_C$):

Measure the luminance of gray level 255 at center point and 5 points

$L_C = L (5)$, where $L (X)$ is corresponding to the luminance of the point X at the figure in Note (6).

PRODUCT SPECIFICATION

Note (5) Definition of Cross Talk (CT):

$$CT = |Y_B - Y_A| / Y_A \times 100 \ (\%)$$

Where:

$Y_A$ = Luminance of measured location without gray level 0 pattern (cd/m2)

$Y_B$ = Luminance of measured location with gray level 0 pattern (cd/m2)

Active Area
(0, 0)

$Y_{A, U}$ (D/2,W/8)

Gray 128

$Y_{A, L}$ (D/8,W/2)          $Y_{A, R}$ (7D/8,W/2)

$Y_{A, D}$ (D/2,7W/8)

(D, W)

Active Area
(0, 0)

$Y_{B, U}$ (D/2,W/8)

(D/4,W/4)

$Y_{B, L}$ (D/8,W/2)          $Y_{B, R}$ (7D/8,W/2)

(3D/4,3W/4)
$Y_{B, D}$ (D/2,7W/8)
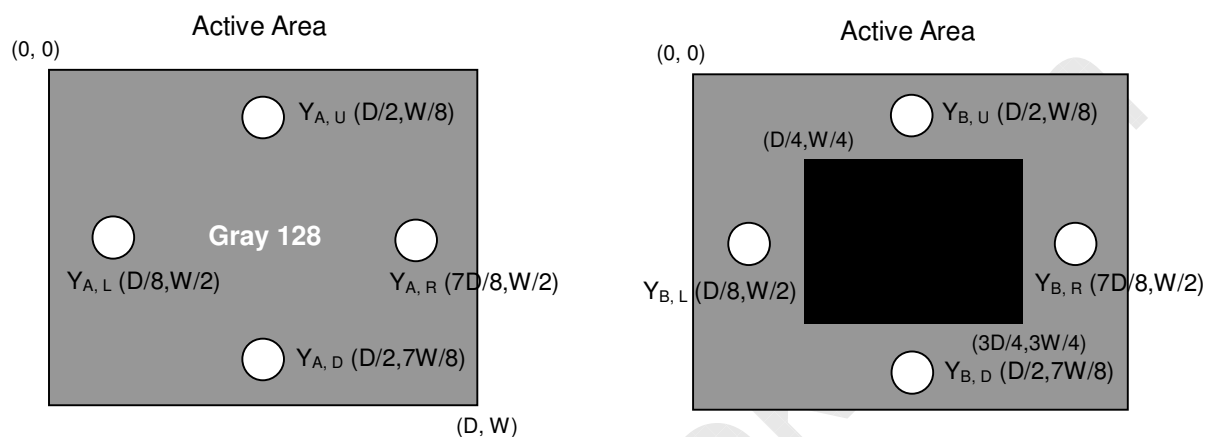
$Y_A$ = Luminance of measured location without gray level 255 pattern (cd/m2)

$Y_B$ = Luminance of measured location with gray level 255 pattern (cd/m2)

Active Area
(0, 0)

$Y_{A, U}$ (D/2,W/8)

Gray 128

$Y_{A, L}$ (D/8,W/2)          $Y_{A, R}$ (7D/8,W/2)

$Y_{A, D}$ (D/2,7W/8)

(D, W)

Active Area
(0, 0)

$Y_{B, U}$ (D/2,W/8)

(D/4,W/4)

$Y_{B, L}$ (D/8,W/2)          $Y_{B, R}$ (7D/8,W/2)

(3D/4,3W/4)
$Y_{B, D}$ (D/2,7W/8)

(D, W)

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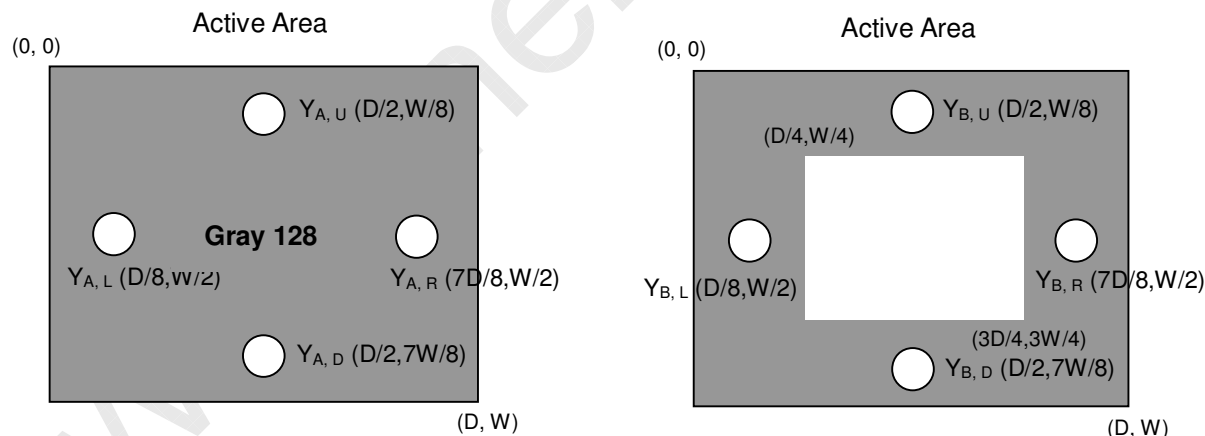
Note (6) Definition of White Variation (δW):

　　　　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)]

Horizontal Line



Active Area

PRODUCT SPECIFICATION
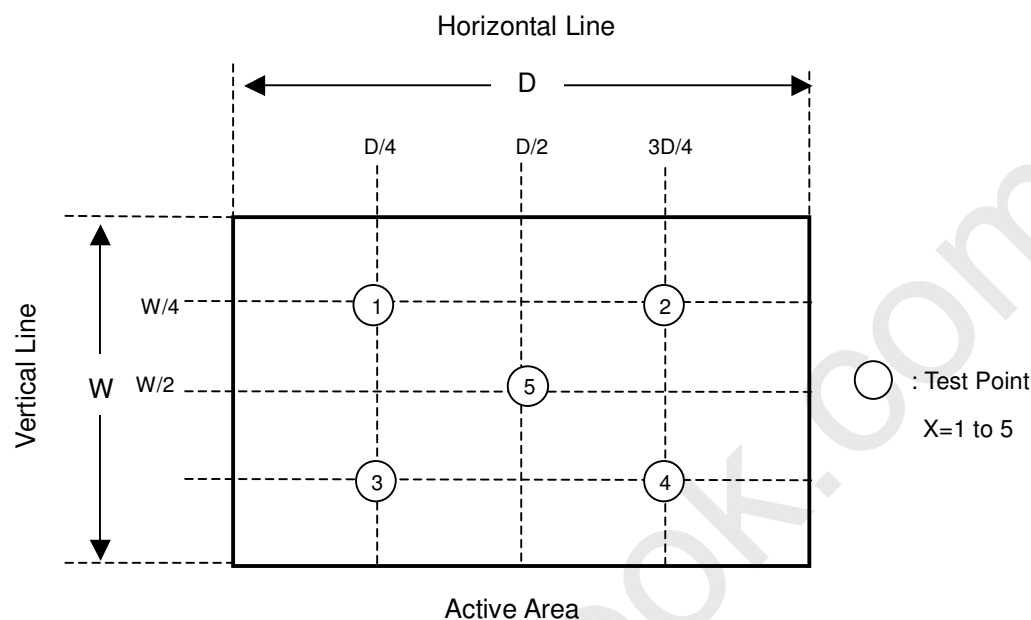
## PRECAUTIONS

### 8.1 ASSEMBLY AND HANDLING PRECAUTIONS

[ 1 ]  Do not apply rough force such as bending or twisting to the module during assembly.

[ 2 ]  It is recommended to assemble or to install a module into the user's system in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.

[ 3 ]  Do not apply pressure or impulse to the module to prevent the damage of LCD panel and Backlight.

[ 4 ]  Always follow the correct power-on sequence when the LCD module is turned on. This can prevent the damage and latch-up of the CMIS LSI chips.

[ 5 ]  Do not plug in or pull out the I/F connector while the module is in operation.

[ 6 ]  Do not disassemble the module.

[ 7 ]  Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.

[ 8 ]  Moisture can easily penetrate into LCD module and may cause the damage during operation.

[ 9 ]  When storing modules as spares for a long time, the following precaution is necessary.

[ 9.1 ]  Do not leave the module in high temperature, and high humidity for a long time. It is highly recommended to store the module with temperature from 0 to 35℃ at normal humidity without condensation.

[ 9.2 ]  The module shall be stored in dark place. Do not store the TFT-LCD module in direct sunlight or fluorescent light.

[ 10 ]  When ambient temperature is lower than 10ºC, the display quality might be reduced. For example, the response time will become slow, and the starting voltage of CCFL will be higher than that of room temperature.

### 8.2 SAFETY PRECAUTIONS

[ 1 ]  The startup voltage of a Backlight is approximately 1000 Volts. It may cause an electrical shock while assembling with the inverter. Do not disassemble the module or insert anything into the Backlight unit.

[ 2 ]  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.

[ 3 ]  After the module's end of life, it is not harmful in case of normal operation and storage.

PRODUCT SPECIFICATION

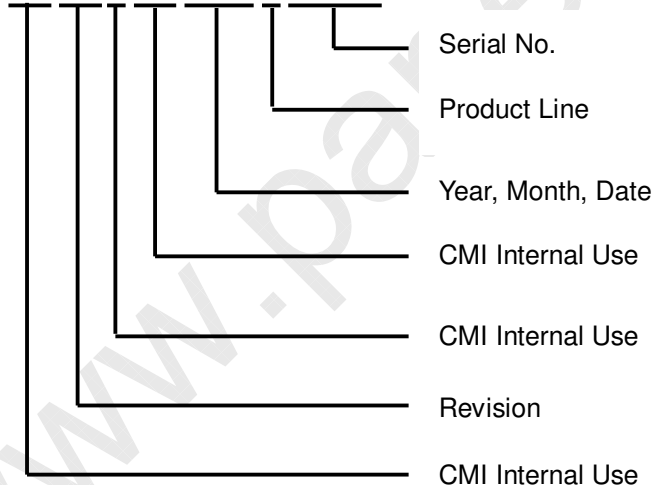## 9. DEFINITION OF LABELS

### 9.1 CMI MODULE LABEL

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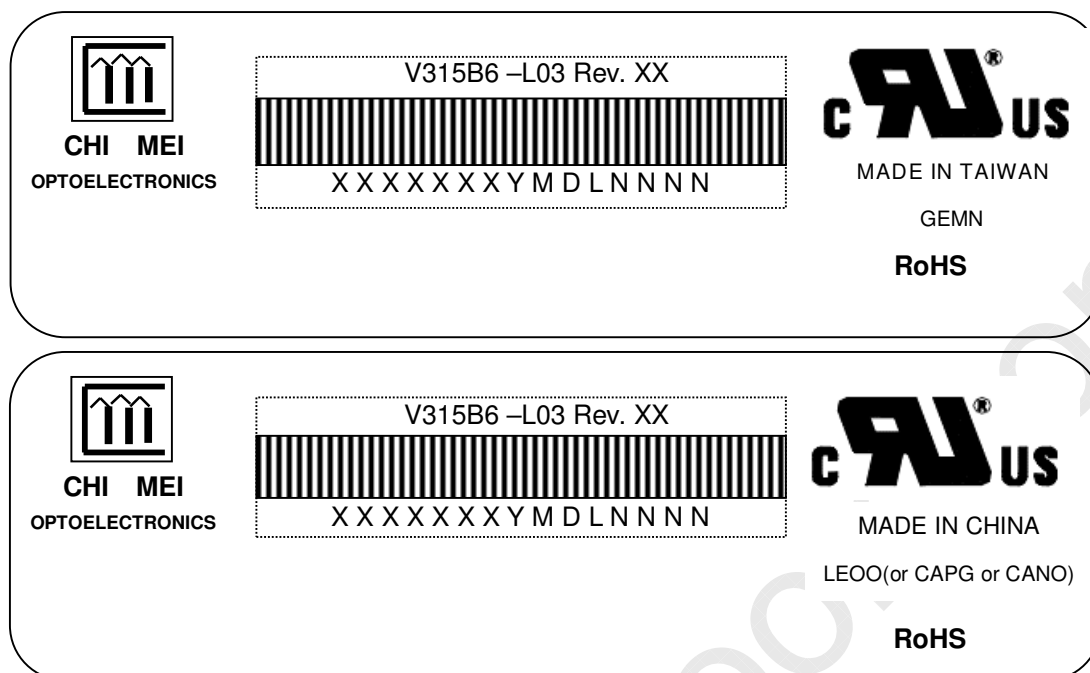


Model Name: V315B6-L03

Revision: Rev. XX, for example: A0, A1… B1, B2… or C1, C2…etc.

Serial ID: X X X X X X X Y M D L N N N N



Serial ID includes the information as below:

Manufactured Date:

Year : 2001=1, 2002=2, 2003=3, 2004=4…2010=0, 2011=1, 2012=2…

Month: 1~9, A~C, for Jan. ~ Dec.

Day: 1~9, A~Y, for 1st to 31st, exclude I ,O, and U.

Revision Code : Cover all the change

Serial No. : Manufacturing sequence of product

Product Line : 1 → Line1, 2 → Line 2, …etc.

PRODUCT  SPECIFICATION

## 10. PACKAGING

### 10.1 PACKAGING SPECIFICATIONS

　　　　(1)  5 LCD TV MODULES / 1 BOX

　　　　(2)  BOX DIMENSIONS : 826(L)X376(W)X540(H)MM

　　　　(3)  WEIGHT : APPROXIMATELY 28 KG (5 MODULES PER BOX)


### 10.2 PACKAGING METHOD

　　　　Figures 10-1 and 10-2 are the packing method
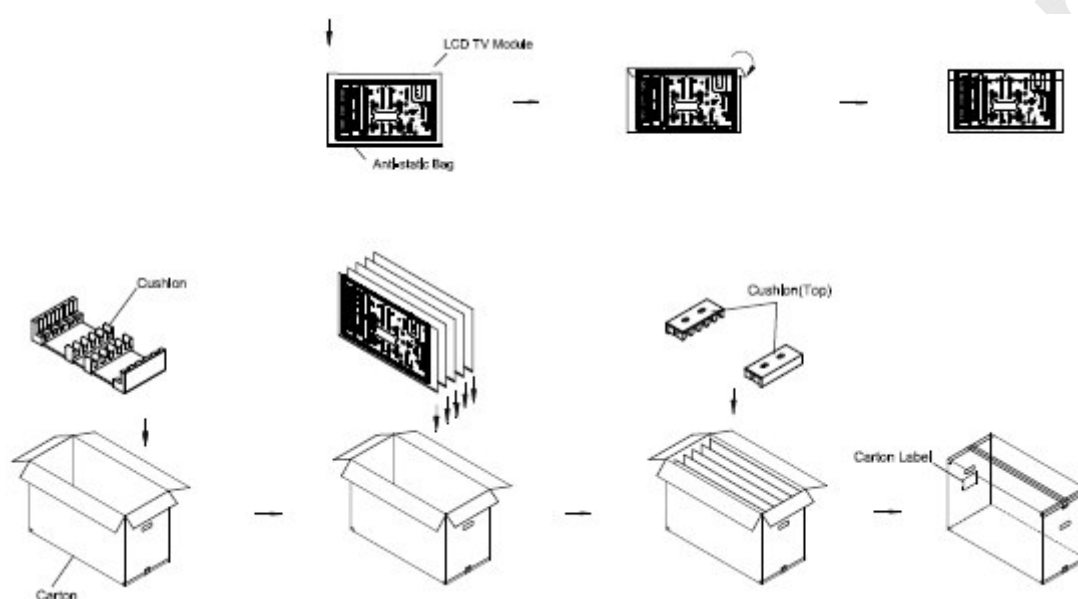


Figure. 10-1 Packing method
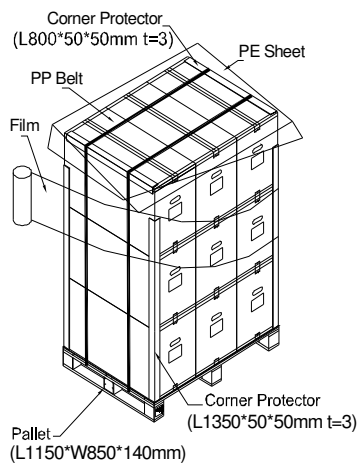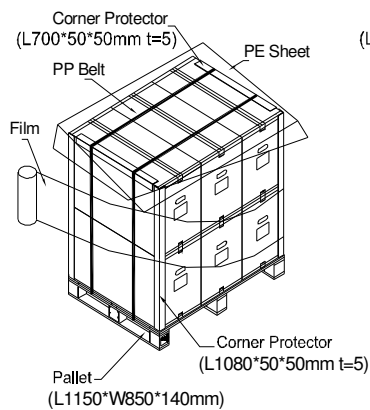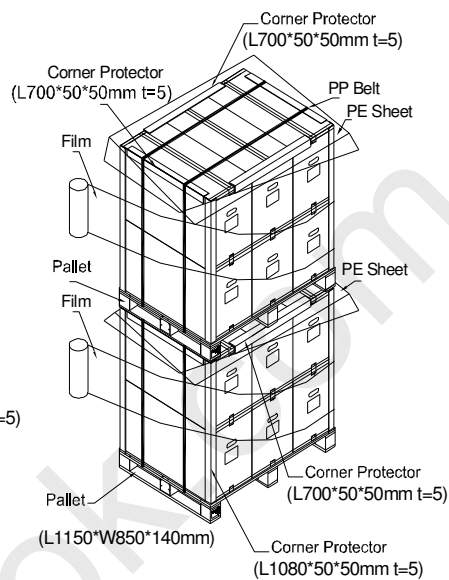
Figure. 10-2 Packing method

奇美電子
CHIMEI INNOLUX

PRODUCT SPECIFICATION

## 11. MECHANICAL CHARACTERISTIC

PRODUCT SPECIFICATION

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory!　*www.panelook.com*

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