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# Datasheet

## Innolux

**G141C1-L01**

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## TFT LCD Approval Specification

# MODEL NO.: G141C1 - L01

|              |
|--------------|
| Customer:    |
| Approved by: |
| Note:        |

| Liquid Crystal Display Division |                   |
|---------------------------------|-------------------|
| QRA Division.                   | OA Head Division. |
| Approval                        | Approval          |
|                                 |                   |

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**REVISION HISTORY**

| Version | Date        | Page (New) | Section | Description                              |
|---------|-------------|------------|---------|--|
| 2.0     | Aug. 02,'10 | All        | All     | Approval specification was first issued. |

## 1 GENERAL DESCRIPTION

### 1.1 OVERVIEW

G141C1 - L01 is a 14.1" TFT Liquid Crystal Display module with LED Backlight unit and LVDS interface. This module supports 1440 x (3 RGB) x 900 WXGA+ MVA mode and can display 262,144 colors. The LED converter module for backlight is built in.

### 1.2 FEATURES

- Thin and Light Weight
- WXGA+ (1440 x 900 pixels) resolution
- DE only mode
- 3.3V LVDS (Low Voltage Differential Signaling) interface with 2 pixel/clock
- RoHS compliance

### 1.3 APPLICATION

- TFT LCD display

### 1.4 GENERAL SPECIFICATIONS

| Item               | Specification                               | Unit  | Note |
|--------------------|---|-------|------|
| Active Area        | 303.48(H) X 189.675(V) (14.1 inch Diagonal) | mm    | (1)  |
| Bezel Opening Area | 306.76 (H) x 193.0 (V)                      | mm    |      |
| Driver Element     | a-si TFT active matrix                      | -     | -    |
| Pixel Number       | 1440 x R.G.B. x 900                         | pixel | -    |
| Pixel Pitch        | 0.21075 (H) x 0.21075 (V)                   | mm    | -    |
| Pixel Arrangement  | RGB vertical stripe                         | -     | -    |
| Display Colors     | 262,144                                     | color | -    |
| Transmissive Mode  | Normally Black                              | -     | -    |
| Surface Treatment  | Glare                                       | -     | -    |

### 1.5 MECHANICAL SPECIFICATIONS

| Item        | Min.          | Typ.  | Max.  | Unit  | Note |     |
|-------------|---------------|-------|-------|-------|------|-----|
| Module Size | Horizontal(H) | 319.1 | 319.5 | 319.9 | mm   | (1) |
|             | Vertical(V)   | 205.1 | 205.5 | 205.9 | mm   |     |
|             | Depth(D)      | --    | 5.2   | 5.5   | mm   |     |
| Weight      | --            | 406   | 421   | g     |      |     |

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

(2) The Module Power Consumption is specified at 3.3V, white pattern and 100% duty for LED backlight.

## 2 ABSOLUTE MAXIMUM RATINGS

### 2.1 ABSOLUTE RATINGS OF ENVIRONMENT

| Item                          | Symbol           | Value |       | Unit | Note     |
|-------------------------------|------------------|-------|-------|------|----------|
|                               |                  | Min.  | Max.  |      |          |
| Storage Temperature           | T <sub>ST</sub>  | -20   | +60   | °C   | (1)      |
| Operating Ambient Temperature | T <sub>OP</sub>  | 0     | +50   | °C   | (1), (2) |
| Shock (Non-Operating)         | S <sub>NOP</sub> | -     | 220/2 | G/ms | (3), (5) |
| Vibration (Non-Operating)     | V <sub>NOP</sub> | -     | 1.5   | G    | (4), (5) |

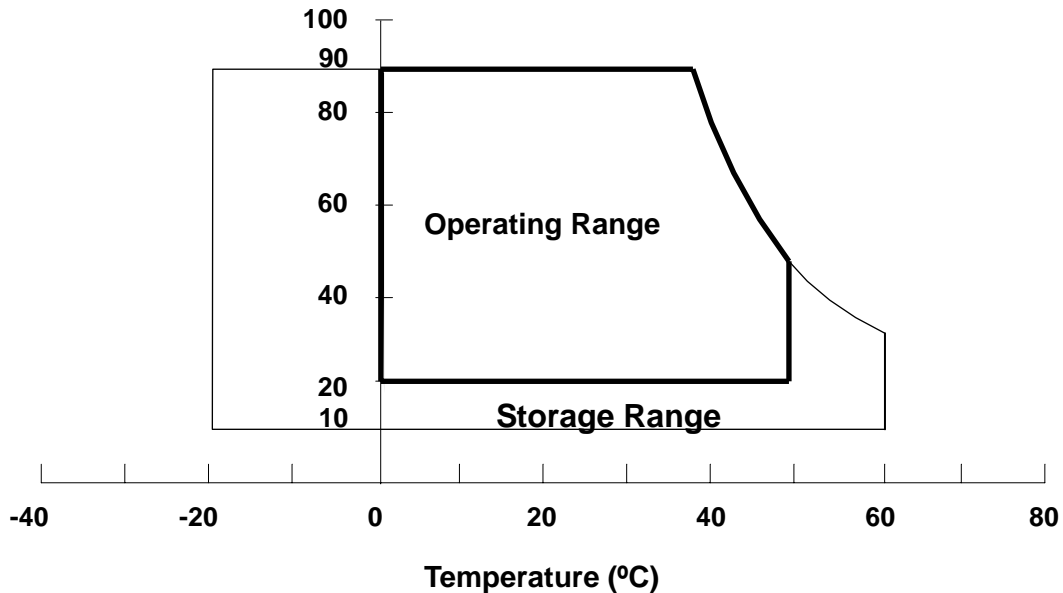
Note (1) (a) 90 %RH Max. (Ta = 40 °C).

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

(c) No condensation.

Note (2) The temperature of panel display surface area should be 0 °C Min. and 60 °C Max..

#### Relative Humidity (%RH)



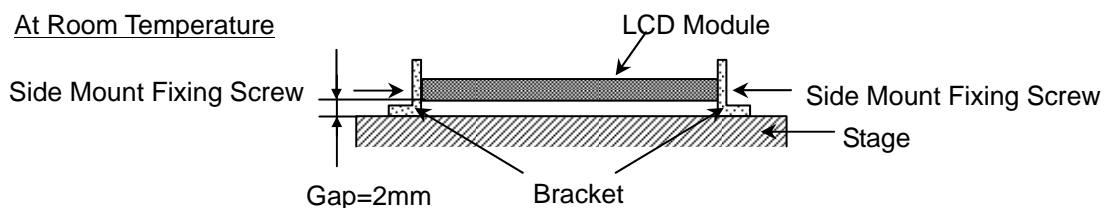
Note (3) 1 time for ± X, ± Y, ± Z. for Condition (220G / 2ms) is half Sine Wave,.

Note (4) 10 ~ 500 Hz, 30 min / Cycle, 1 cycles for each X, Y, Z axis.

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.

The fixing condition is shown as below:

At Room Temperature



## 2.2 ELECTRICAL ABSOLUTE RATINGS

### 2.2.1 TFT LCD MODULE

| Item                 | Symbol | Value |      | Unit | Note |
|----------------------|--------|-------|------|------|------|
|                      |        | Min.  | Max. |      |      |
| Power Supply Voltage | VCC    | - 0.3 | +5.5 | V    | (1)  |

### 2.2.2 BACKLIGHT UNIT

| Item              | Symbol  | Value |      | Unit | Note     |
|-------------------|---------|-------|------|------|----------|
|                   |         | Min.  | Max. |      |          |
| Converter Voltage | LED_VCC | -0.3  | 18   | V    | (1), (2) |
| Enable Voltage    | BLU_EN  | ---   | 5.5  | V    |          |
| Backlight Adjust  | BLU_ADJ | ---   | 5.5  | V    |          |

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) Specified values are for lamp (Refer to 3.2 for further information).



### 3 ELECTRICAL CHARACTERISTICS

#### 3.1 TFT LCD MODULE

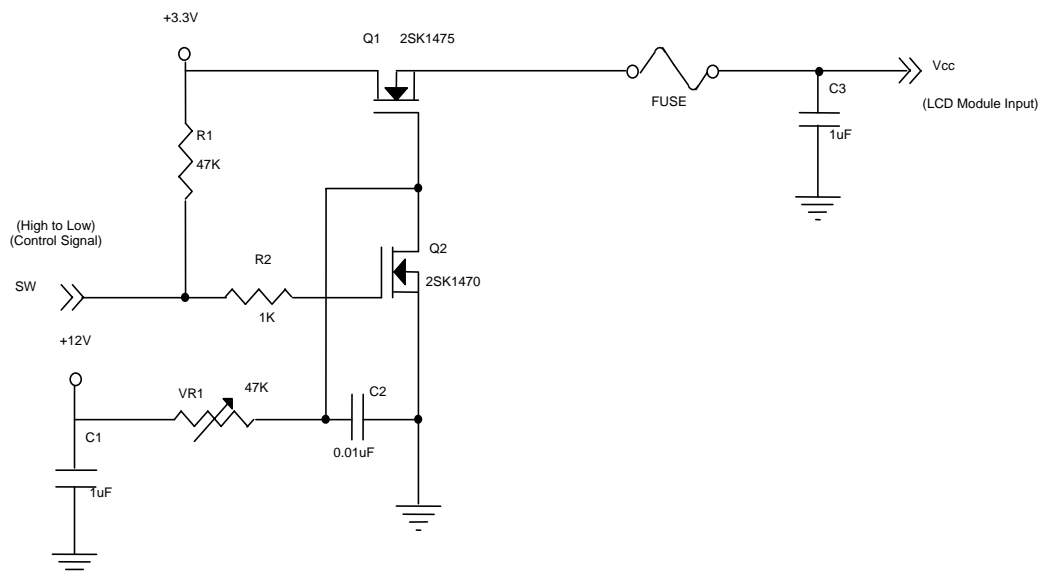
Ta = 25 ± 2 °C

| Parameter                         | Symbol            | Value            |       |      | Unit | Note                          |                         |
|-----------------------------------|-------------------|------------------|-------|------|------|-------------------------------|-------------------------|
|                                   |                   | Min.             | Typ.  | Max. |      |                               |                         |
| Power Supply Voltage              | VCC               | 3.0              | 3.3   | 3.6  | V    | at VCC=3.3V                   |                         |
| Rush Current                      | I <sub>RUSH</sub> | ---              | ---   | 1.5  | A    | (2), at VCC=3.3V              |                         |
| Power Supply Current              | White             | I <sub>vcc</sub> | ---   | 550  | ---  | mA                            | (3)a, at VCC=3.3V, 60Hz |
|                                   | Black             |                  | ---   | 450  | ---  |                               |                         |
| Power Consumption                 | P <sub>L</sub>    | ---              | 1.815 | ---  | W    | VCC=3.3V, 60Hz, White Pattern |                         |
| Differential Input High Threshold | V <sub>TH</sub>   | ---              | 50    | 100  | mV   | V <sub>ICM</sub> =1.2V        |                         |
| Differential Input Low Threshold  | V <sub>TL</sub>   | -100             | -50   | ---  | mV   | V <sub>ICM</sub> =1.2V        |                         |
| LVDS differential input voltage   | V <sub>ID</sub>   | 100              | ---   | 600  | mV   | -                             |                         |
| LVDS common input voltage         | V <sub>ICM</sub>  | 0.7              | 1.2   | 1.6  | V    | -                             |                         |

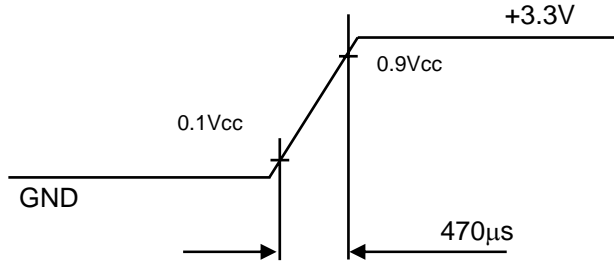
Note (1) The module is recommended to operate within specification ranges listed above for normal function..

Note (2) I<sub>RUSH</sub>: the maximum current when VCC is rising

Measurement Conditions: Shown as the following figure.

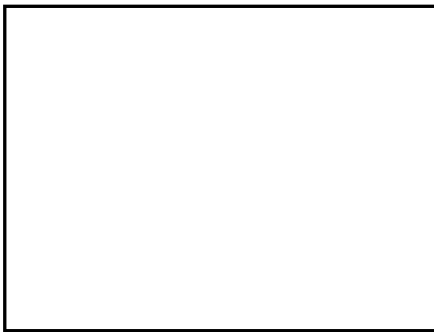


**Vcc rising time is 470μs**



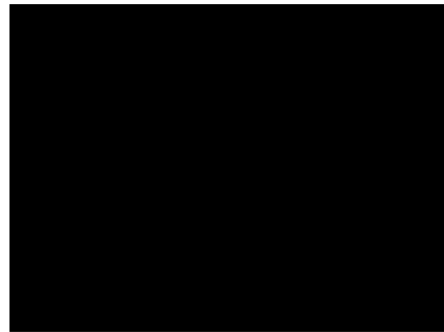
Note (3) The specified power supply current is under the conditions at  $V_{cc} = 3.3\text{ V}$ ,  $T_a = 25 \pm 2\text{ }^\circ\text{C}$ ,  $f_v = 60\text{ Hz}$ , whereas a power dissipation check pattern below is displayed.

a. White Pattern



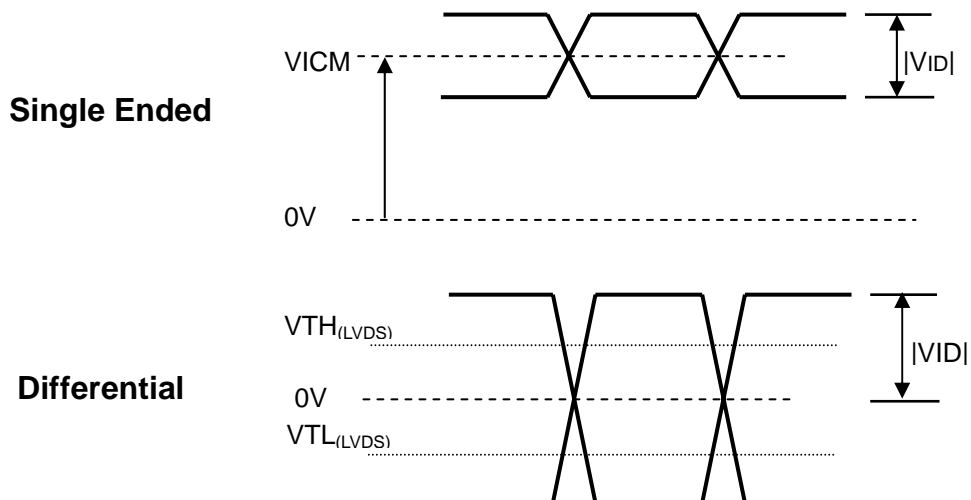
Active Area

b. Black Pattern



Active Area

Note (4) The parameters of LVDS signals are defined as the following figures.



## 3.2 LED CONVERTER

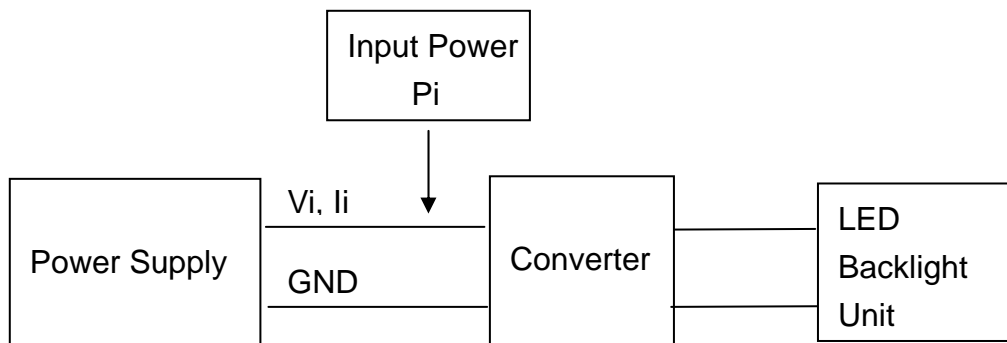
 $T_a = 25 \pm 2 \text{ } ^\circ\text{C}$ 

| Parameter                      | Symbol         | Value   |        |      | Unit | Note                                |     |
|--------------------------------|----------------|---------|--------|------|------|-------------------------------------|-----|
|                                |                | Min.    | Typ.   | Max. |      |                                     |     |
| Converter Power Supply Voltage | $V_i$          | 7       | 12.0   | 20   | V    | (Duty 100%)                         |     |
| Converter Power Supply Current | $I_i$          | 0.49    | 0.44   | 0.4  | A    | @ $V_i = 12\text{V}$<br>(Duty 100%) |     |
| LED Power Consumption          | $P_{LED}$      | ---     | 4.48   | ---  | W    | @ $V_i = 12\text{V}$<br>(Duty 100%) |     |
| EN Control Level               | Backlight on   | BLU_EN  | 2.0    | ---  | 3.3  | V                                   |     |
|                                | Backlight off  |         | 0      | ---  | 0.8  | V                                   |     |
| PWM Control Level              | PWM High Level | BLU_ADJ | 2.0    | ---  | 3.3  | V                                   |     |
|                                | PWM Low Level  |         | 0      | ---  | 0.15 | V                                   |     |
| PWM Control Duty Ratio         |                |         | 20     |      | 100  | %                                   |     |
| PWM Control Frequency          | $f_{PWM}$      |         | 190    | 200  | 210  | Hz                                  |     |
| LED Life Time                  | $L_L$          |         | 30,000 |      |      | Hrs                                 | (2) |

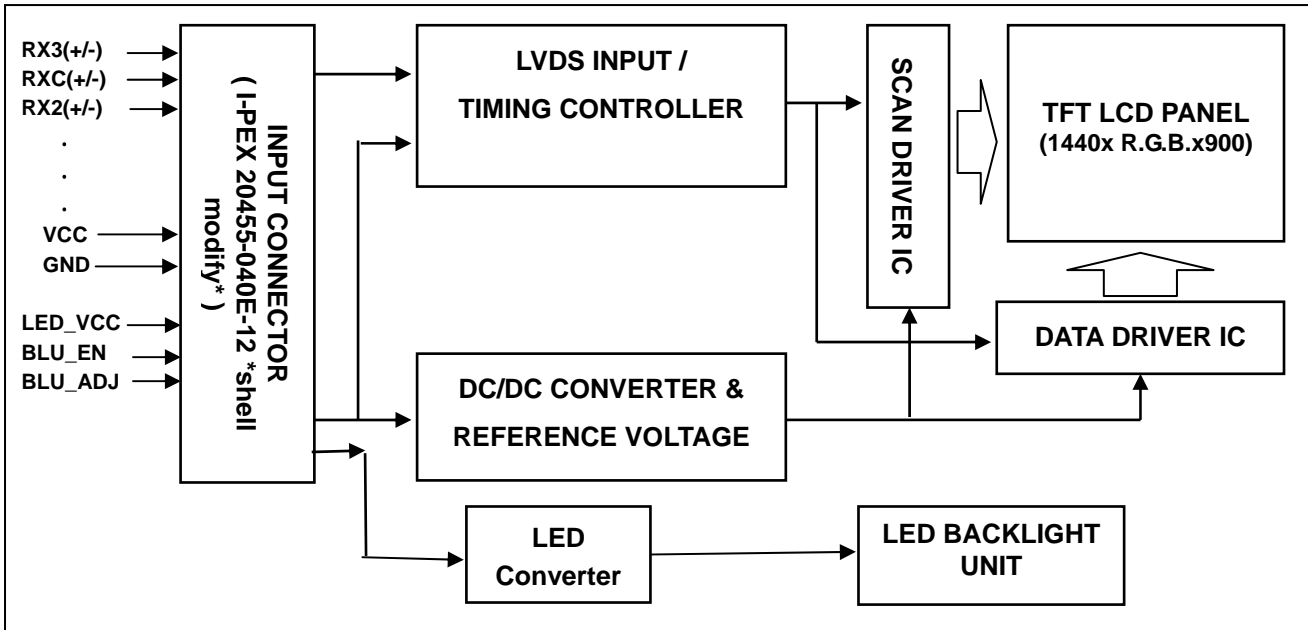
Note (1) The module is recommended to operate within specification ranges listed above for normal function..

Note (2)  $I_{RUSH}$ : the maximum current when VCC is rising

Measurement Conditions: Shown as the following figure.



4 BLOCK DIAGRAM  
 4.1 TFT LCD MODULE



## 5 INPUT TERMINAL PIN ASSIGNMENT

### 5.1 TFT LCD MODULE

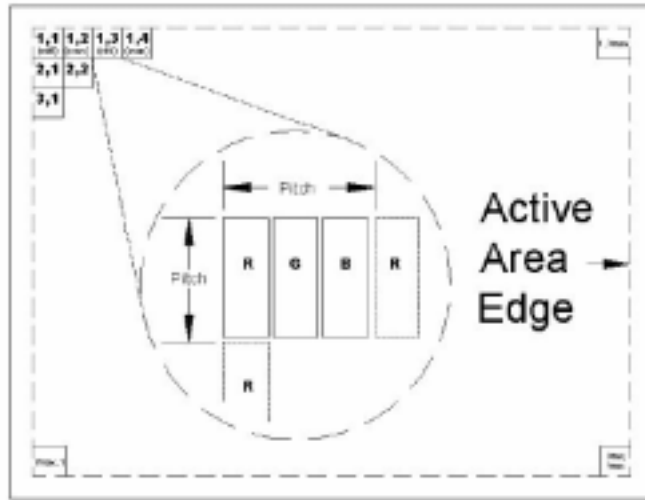
| Pin | Symbol  | Description                         | Polarity | Remark   |
|-----|---------|-------------------------------------|----------|----------|
| 1   | GND     | Ground                              |          |          |
| 2   | VCC     | Power Supply +3.3 V (typical)       |          |          |
| 3   | VCC     | Power Supply +3.3 V (typical)       |          |          |
| 4   | EE_VDD  | EDID Power supply                   |          |          |
| 5   | NC      | Non-Connection                      |          |          |
| 6   | EE_SC   | I2C Clock for EDID                  |          |          |
| 7   | EE_SD   | I2C Data for EDID                   |          | -        |
| 8   | RX00-   | LVDS Differential Data Input (Odd)  | Negative |          |
| 9   | RX00+   | LVDS Differential Data Input (Odd)  | Positive |          |
| 10  | GND     | Ground                              |          |          |
| 11  | RX01-   | LVDS Differential Data Input (Odd)  | Negative |          |
| 12  | RX01+   | LVDS Differential Data Input (Odd)  | Positive |          |
| 13  | GND     | Ground                              |          |          |
| 14  | RX02-   | LVDS Differential Data Input (Odd)  | Negative |          |
| 15  | RX02+   | LVDS Differential Data Input (Odd)  | Positive |          |
| 16  | GND     | Ground                              |          |          |
| 17  | RXOC-   | LVDS Clock Data Input (Odd)         | Negative |          |
| 18  | RXOC+   | LVDS Clock Data Input (Odd)         | Positive |          |
| 19  | GND     | Ground                              |          |          |
| 20  | RxE0-   | LVDS Differential Data Input (Even) | Negative |          |
| 21  | RxE0+   | LVDS Differential Data Input (Even) | Positive |          |
| 22  | GND     | Ground                              |          |          |
| 23  | RxE1-   | LVDS Differential Data Input (Even) | Negative |          |
| 24  | RxE1+   | LVDS Differential Data Input (Even) | Positive |          |
| 25  | GND     | Ground                              |          |          |
| 26  | RxE2-   | LVDS Differential Data Input (Even) | Negative |          |
| 27  | RxE2+   | LVDS Differential Data Input (Even) | Positive |          |
| 28  | GND     | Ground                              |          |          |
| 29  | RXEC-   | LVDS Clock Data Input (Even)        | Negative |          |
| 30  | RXEC+   | LVDS Clock Data Input (Even)        | Positive |          |
| 31  | GND     | Ground                              |          |          |
| 32  | GND     | Ground                              |          |          |
| 33  | GND     | Ground                              |          |          |
| 34  | NC      | Non-Connection                      |          |          |
| 35  | BLU_ADJ | Backlight Adjust                    |          | Note (3) |
| 36  | BLU_EN  | Enable BLU                          |          | Note (3) |
| 37  | NC      | Non-Connection                      |          |          |
| 38  | LED_VCC | Power Supply +12V (typical)         |          |          |
| 39  | LED_VCC | Power Supply +12V (typical)         |          |          |
| 40  | LED_VCC | Power Supply +12V (typical)         |          |          |

Note (1) Connector Part No.: 20455-040E-12 \*shell modify\* ( I-PEX )

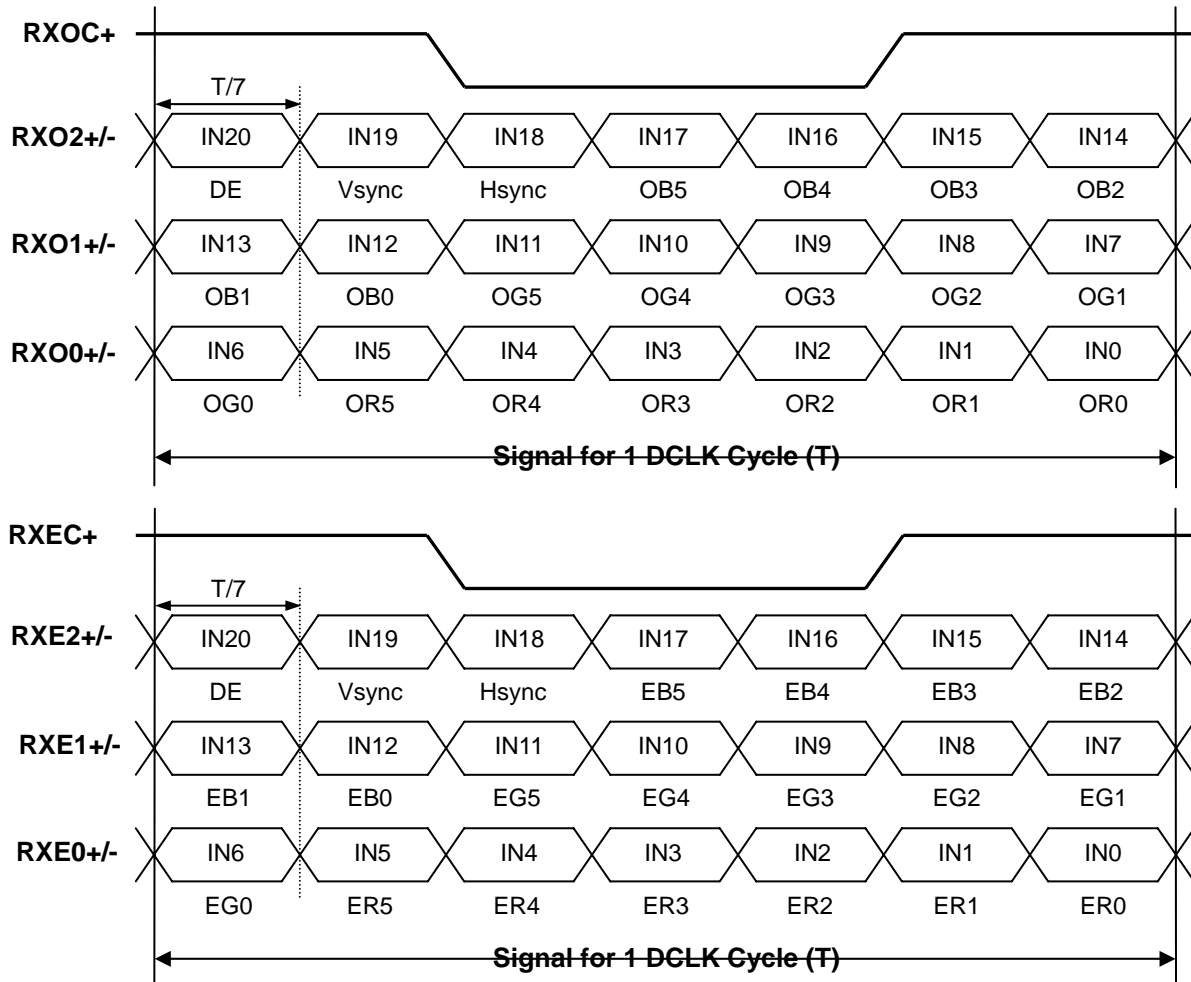
Note (2) User's connector Part No: 20453-040T-12

Note (3) "Low" stands for 0V. "High" stands for 3.3V. "NC" stands for "No Connected".

Note (4) The first pixel is odd as shown in the following figure.



### 5.2 TIMING DIAGRAM OF LVDS INPUT SIGNAL



### 5.3 COLOR DATA INPUT ASSIGNMENT

The brightness of each primary color (red, green and blue) is based on the 6-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 |    |    |    |    |    |
|                     |               | R5          | R4 | R3 | R2 | R1 | R0 | G5    | G4 | G3 | G2 | G1 | G0 | 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  |
|                     | Red           | 1           | 1  | 1  | 1  | 1  | 1  | 0     | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  |
|                     | Green         | 0           | 0  | 0  | 0  | 0  | 0  | 1     | 1  | 1  | 1  | 1  | 1  | 0    | 0  | 0  | 0  | 0  | 0  |
|                     | Blue          | 0           | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 1    | 1  | 1  | 1  | 1  | 1  |
|                     | Cyan          | 0           | 0  | 0  | 0  | 0  | 0  | 1     | 1  | 1  | 1  | 1  | 1  | 1    | 1  | 1  | 1  | 1  | 1  |
|                     | Magenta       | 1           | 1  | 1  | 1  | 1  | 1  | 0     | 0  | 0  | 0  | 0  | 0  | 0    | 1  | 1  | 1  | 1  | 1  |
|                     | Yellow        | 1           | 1  | 1  | 1  | 1  | 1  | 1     | 1  | 1  | 1  | 1  | 1  | 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  |
| 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  |
|                     | Red(1)        | 0           | 0  | 0  | 0  | 0  | 1  | 0     | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  |
|                     | Red(2)        | 0           | 0  | 0  | 0  | 1  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  |
|                     | :             | :           | :  | :  | :  | :  | :  | :     | :  | :  | :  | :  | :  | :    | :  | :  | :  | :  | :  |
|                     | :             | :           | :  | :  | :  | :  | :  | :     | :  | :  | :  | :  | :  | :    | :  | :  | :  | :  | :  |
|                     | :             | :           | :  | :  | :  | :  | :  | :     | :  | :  | :  | :  | :  | :    | :  | :  | :  | :  | :  |
|                     | Red(61)       | 1           | 1  | 1  | 1  | 0  | 1  | 0     | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  |
|                     | Red(62)       | 1           | 1  | 1  | 1  | 1  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  |
| Red(63)             | 1             | 1           | 1  | 1  | 1  | 1  | 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  |
|                     | Green(1)      | 0           | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 1  | 0  | 0    | 0  | 0  | 0  | 0  | 0  |
|                     | Green(2)      | 0           | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 1  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  |
|                     | :             | :           | :  | :  | :  | :  | :  | :     | :  | :  | :  | :  | :  | :    | :  | :  | :  | :  | :  |
|                     | :             | :           | :  | :  | :  | :  | :  | :     | :  | :  | :  | :  | :  | :    | :  | :  | :  | :  | :  |
|                     | :             | :           | :  | :  | :  | :  | :  | :     | :  | :  | :  | :  | :  | :    | :  | :  | :  | :  | :  |
|                     | Green(61)     | 0           | 0  | 0  | 0  | 0  | 0  | 1     | 1  | 1  | 1  | 0  | 1  | 0    | 0  | 0  | 0  | 0  | 0  |
|                     | Green(62)     | 0           | 0  | 0  | 0  | 0  | 0  | 1     | 1  | 1  | 1  | 1  | 0  | 0    | 0  | 0  | 0  | 0  | 0  |
| Green(63)           | 0             | 0           | 0  | 0  | 0  | 0  | 1  | 1     | 1  | 1  | 1  | 1  | 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  |
|                     | Blue(1)       | 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  | 1  | 0  |
|                     | :             | :           | :  | :  | :  | :  | :  | :     | :  | :  | :  | :  | :  | :    | :  | :  | :  | :  | :  |
|                     | :             | :           | :  | :  | :  | :  | :  | :     | :  | :  | :  | :  | :  | :    | :  | :  | :  | :  | :  |
|                     | :             | :           | :  | :  | :  | :  | :  | :     | :  | :  | :  | :  | :  | :    | :  | :  | :  | :  | :  |
|                     | Blue(61)      | 0           | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 1  | 1    | 1  | 1  | 0  | 1  | 0  |
|                     | Blue(62)      | 0           | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 1  | 1    | 1  | 1  | 1  | 0  | 0  |
| Blue(63)            | 0             | 0           | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 1  | 1  | 1    | 1  | 1  | 1  | 1  |    |

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

### 5.4 EDID DATA STRUCTURE

The EDID (Extended Display Identification Data) data formats are to support displays as defined in the VESA Plug & Display and FPGDI standards

|   | Byte (hex) | Field Name and Comments | Value (hex) | Value (binary) |
|---|------------|-------------------------|-------------|----------------|
| 0 | 0          | Header                  | 00          | 00000000       |
| 1 | 1          | Header                  | FF          | 11111111       |
| 2 | 2          | Header                  | FF          | 11111111       |
| 3 | 3          | Header                  | FF          | 11111111       |
| 4 | 4          | Header                  | FF          | 11111111       |

|    |    |  |    |          |
|----|----|--|----|----------|
| 5  | 5  | Header                                       | FF | 11111111 |
| 6  | 6  | Header                                       | FF | 11111111 |
| 7  | 7  | Header                                       | 00 | 00000000 |
| 8  | 8  | EISA ID manufacturer name ("CMO")            | 0D | 00001101 |
| 9  | 9  | EISA ID manufacturer name (Compressed ASCII) | AF | 10101111 |
| 10 | 0A | ID product code (G141C1-L01)                 | 10 | 00010000 |
| 11 | 0B | ID product code (hex LSB first; G141C1-L01)  | 14 | 00010100 |
| 12 | 0C | ID S/N (fixed "0")                           | 00 | 00000000 |
| 13 | 0D | ID S/N (fixed "0")                           | 00 | 00000000 |
| 14 | 0E | ID S/N (fixed "0")                           | 00 | 00000000 |
| 15 | 0F | ID S/N (fixed "0")                           | 00 | 00000000 |
| 16 | 10 | Week of manufacture (fixed week code)        | 06 | 00000110 |
| 17 | 11 | Year of manufacture (fixed year code)        | 14 | 00010100 |
| 18 | 12 | EDID structure version # ("1")               | 01 | 00000001 |
| 19 | 13 | EDID revision # ("3")                        | 03 | 00000011 |
| 20 | 14 | Video I/P definition ("digital")             | 80 | 10000000 |
| 21 | 15 | Active area horizontal 30.348cm              | 1E | 00011110 |
| 22 | 16 | Active area vertical 18.9675cm               | 13 | 00010011 |
| 23 | 17 | Display Gamma (Gamma = "2.2")                | 78 | 01111000 |
| 24 | 18 | Feature support ("Active off, RGB Color")    | 0A | 00001010 |
| 25 | 19 | Rx1 Rx0 Ry1 Ry0 Gx1 Gx0 Gy1 Gy0              | 0E | 00001110 |
| 26 | 1A | Bx1 Bx0 By1 By0 Wx1 Wx0 Wy1 Wy0              | 05 | 00000101 |
| 27 | 1B | Rx=0.590                                     | 97 | 10010111 |
| 28 | 1C | Ry=0.340                                     | 57 | 01010111 |
| 29 | 1D | Gx=0.319                                     | 51 | 01010001 |
| 30 | 1E | Gy=0.541                                     | 8A | 10001010 |
| 31 | 1F | Bx=0.152                                     | 27 | 00100111 |
| 32 | 20 | By=0.125                                     | 20 | 00100000 |
| 33 | 21 | Wx=0.313                                     | 50 | 01010000 |
| 34 | 22 | Wy=0.329                                     | 54 | 01010100 |
| 35 | 23 | Established timings 1                        | 00 | 00000000 |
| 36 | 24 | Established timings 2                        | 00 | 00000000 |
| 37 | 25 | Manufacturer's reserved timings              | 00 | 00000000 |
| 38 | 26 | Standard timing ID # 1                       | 01 | 00000001 |
| 39 | 27 | Standard timing ID # 1                       | 01 | 00000001 |
| 40 | 28 | Standard timing ID # 2                       | 01 | 00000001 |
| 41 | 29 | Standard timing ID # 2                       | 01 | 00000001 |
| 42 | 2A | Standard timing ID # 3                       | 01 | 00000001 |
| 43 | 2B | Standard timing ID # 3                       | 01 | 00000001 |
| 44 | 2C | Standard timing ID # 4                       | 01 | 00000001 |
| 45 | 2D | Standard timing ID # 4                       | 01 | 00000001 |
| 46 | 2E | Standard timing ID # 5                       | 01 | 00000001 |
| 47 | 2F | Standard timing ID # 5                       | 01 | 00000001 |
| 48 | 30 | Standard timing ID # 6                       | 01 | 00000001 |
| 49 | 31 | Standard timing ID # 6                       | 01 | 00000001 |
| 50 | 32 | Standard timing ID # 7                       | 01 | 00000001 |
| 51 | 33 | Standard timing ID # 7                       | 01 | 00000001 |
| 52 | 34 | Standard timing ID # 8                       | 01 | 00000001 |
| 53 | 35 | Standard timing ID # 8                       | 01 | 00000001 |



|    |    |   |    |          |
|----|----|---|----|----------|
| 54 | 36 | Detailed timing description # 1 Pixel clock ("106.5MHz", According to VESA Rev12)         | 9A | 10011010 |
| 55 | 37 | # 1 Pixel clock (hex LSB first)   | 29 | 00101001 |
| 56 | 38 | # 1 H active ("1440")   | A0 | 10100000 |
| 57 | 39 | # 1 H blank ("464")   | D0 | 11010000 |
| 58 | 3A | # 1 H active : H blank ("1440 : 464")   | 51 | 01010001 |
| 59 | 3B | # 1 V active ("900")  | 84 | 10000100 |
| 60 | 3C | # 1 V blank ("34")  | 22 | 00100010 |
| 61 | 3D | # 1 V active : V blank ("900 :34")  | 30 | 00110000 |
| 62 | 3E | # 1 H sync offset ("80")  | 50 | 01010000 |
| 63 | 3F | # 1 H sync pulse width ("152")  | 98 | 10011000 |
| 64 | 40 | # 1 V sync offset : V sync pulse width (" 3 : 6")   | 36 | 00110110 |
| 65 | 41 | # 1 H sync offset : H sync pulse width : V sync offset : V sync width ("80: 152 : 3 : 6") | 00 | 00000000 |
| 66 | 42 | # 1 H image size ("303 mm")   | 2F | 00101111 |
| 67 | 43 | # 1 V image size ("190 mm")   | BE | 10111110 |
| 68 | 44 | # 1 H image size : V image size ("303 : 190")   | 10 | 00010000 |
| 69 | 45 | # 1 H boarder ("0")   | 00 | 00000000 |
| 70 | 46 | # 1 V boarder ("0")   | 00 | 00000000 |
| 71 | 47 | # 1 Non-interlaced, Normal, no stereo, Separate sync, H/V pol Negatives                   | 18 | 00011000 |
| 72 | 48 | Detailed timing description # 2   | 00 | 00000000 |
| 73 | 49 | # 2 Flag  | 00 | 00000000 |
| 74 | 4A | # 2 Reserved  | 00 | 00000000 |
| 75 | 4B | # 2 FE (hex) defines ASCII string (Model Name "G141C1-L01", ASCII)                        | FE | 11111110 |
| 76 | 4C | # 2 Flag  | 00 | 00000000 |
| 77 | 4D | # 2 1st character of name ("G")   | 47 | 01000111 |
| 78 | 4E | # 2 2nd character of name ("1")   | 31 | 00110001 |
| 79 | 4F | # 2 3rd character of name ("4")   | 34 | 00110100 |
| 80 | 50 | # 2 4th character of name ("1")   | 31 | 00110001 |
| 81 | 51 | # 2 5th character of name ("C")   | 43 | 01000011 |
| 82 | 52 | # 2 6th character of name ("1")   | 31 | 00110001 |
| 83 | 53 | # 2 7th character of name ("-")   | 2D | 00101101 |
| 84 | 54 | # 2 8th character of name ("L")   | 4C | 01001100 |
| 85 | 55 | # 2 9th character of name ("0")   | 30 | 00110000 |
| 86 | 56 | # 2 9th character of name ("1")   | 31 | 00110001 |
| 87 | 57 | # 2 New line character indicates end of ASCII string                                      | 0A | 00001010 |
| 88 | 58 | # 2 Padding with "Blank" character  | 20 | 00100000 |
| 89 | 59 | # 2 Padding with "Blank" character  | 20 | 00100000 |
| 90 | 5A | Detailed timing description # 3   | 00 | 00000000 |
| 91 | 5B | # 3 Flag  | 00 | 00000000 |
| 92 | 5C | # 3 Reserved  | 00 | 00000000 |
| 93 | 5D | # 3 FE (hex) defines ASCII string (Vendor "CMO", ASCII)                                   | FE | 11111110 |
| 94 | 5E | # 3 Flag  | 00 | 00000000 |
| 95 | 5F | # 3 1st character of string ("C")   | 43 | 01000011 |
| 96 | 60 | # 3 2nd character of string ("M")   | 4D | 01001101 |
| 97 | 61 | # 3 3rd character of string ("O")   | 4F | 01001111 |
| 98 | 62 | # 3 New line character indicates end of ASCII string                                      | 0A | 00001010 |
| 99 | 63 | # 3 Padding with "Blank" character  | 20 | 00100000 |

|     |    |   |    |          |
|-----|----|---|----|----------|
| 100 | 64 | # 3 Padding with "Blank" character                                | 20 | 00100000 |
| 101 | 65 | # 3 Padding with "Blank" character                                | 20 | 00100000 |
| 102 | 66 | # 3 Padding with "Blank" character                                | 20 | 00100000 |
| 103 | 67 | # 3 Padding with "Blank" character                                | 20 | 00100000 |
| 104 | 68 | # 3 Padding with "Blank" character                                | 20 | 00100000 |
| 105 | 69 | # 3 Padding with "Blank" character                                | 20 | 00100000 |
| 106 | 6A | # 3 Padding with "Blank" character                                | 20 | 00100000 |
| 107 | 6B | # 3 Padding with "Blank" character                                | 20 | 00100000 |
| 108 | 6C | Detailed timing description # 4                                   | 00 | 00000000 |
| 109 | 6D | # 4 Flag  | 00 | 00000000 |
| 110 | 6E | # 4 Reserved  | 00 | 00000000 |
| 111 | 6F | # 4 FE (hex) defines ASCII string (Model Name"G141C3-L01", ASCII) | FE | 11111110 |
| 112 | 70 | # 4 Flag  | 00 | 00000000 |
| 113 | 71 | # 4 1st character of name ("G")                                   | 47 | 01000111 |
| 114 | 72 | # 4 2nd character of name ("1")                                   | 31 | 00110001 |
| 115 | 73 | # 4 3rd character of name ("4")                                   | 34 | 00110100 |
| 116 | 74 | # 4 4th character of name ("1")                                   | 31 | 00110001 |
| 117 | 75 | # 4 5th character of name ("C")                                   | 43 | 01000011 |
| 118 | 76 | # 4 6th character of name ("1")                                   | 31 | 00110001 |
| 119 | 77 | # 4 7th character of name ("-")                                   | 2D | 00101101 |
| 120 | 78 | # 4 8th character of name ("L")                                   | 4C | 01001100 |
| 121 | 79 | # 4 9th character of name ("0")                                   | 30 | 00110000 |
| 122 | 7A | # 4 9th character of name ("1")                                   | 31 | 00110001 |
| 123 | 7B | # 4 New line character indicates end of ASCII string              | 0A | 00001010 |
| 124 | 7C | # 4 Padding with "Blank" character                                | 20 | 00100000 |
| 125 | 7D | # 4 Padding with "Blank" character                                | 20 | 00100000 |
| 126 | 7E | Extension flag  | 00 | 00000000 |
| 127 | 7F | Checksum  | 84 | 10000100 |

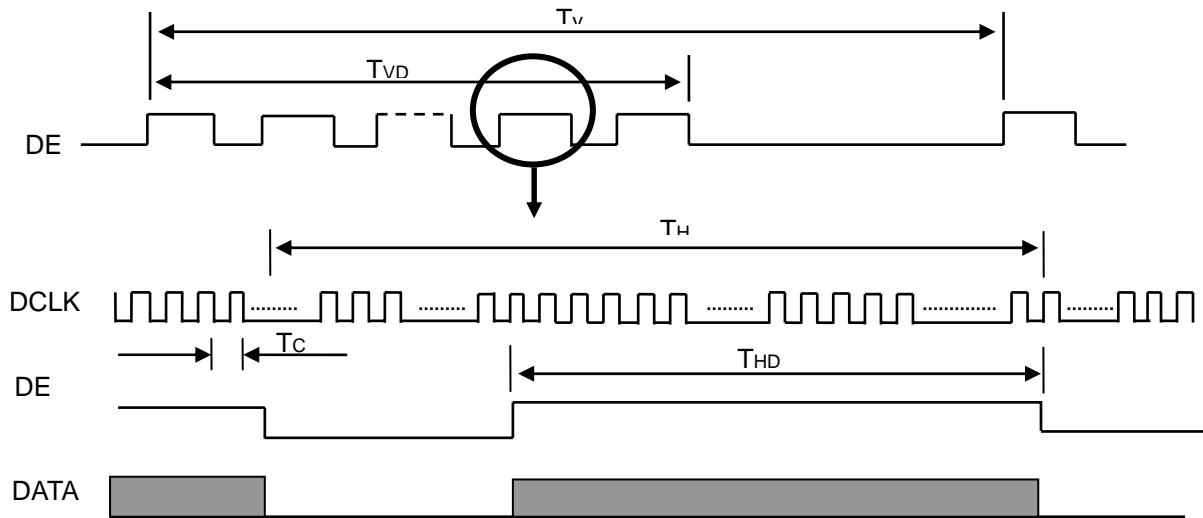
## 6 INTERFACE TIMING

### 6.1 INPUT SIGNAL TIMING SPECIFICATIONS

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

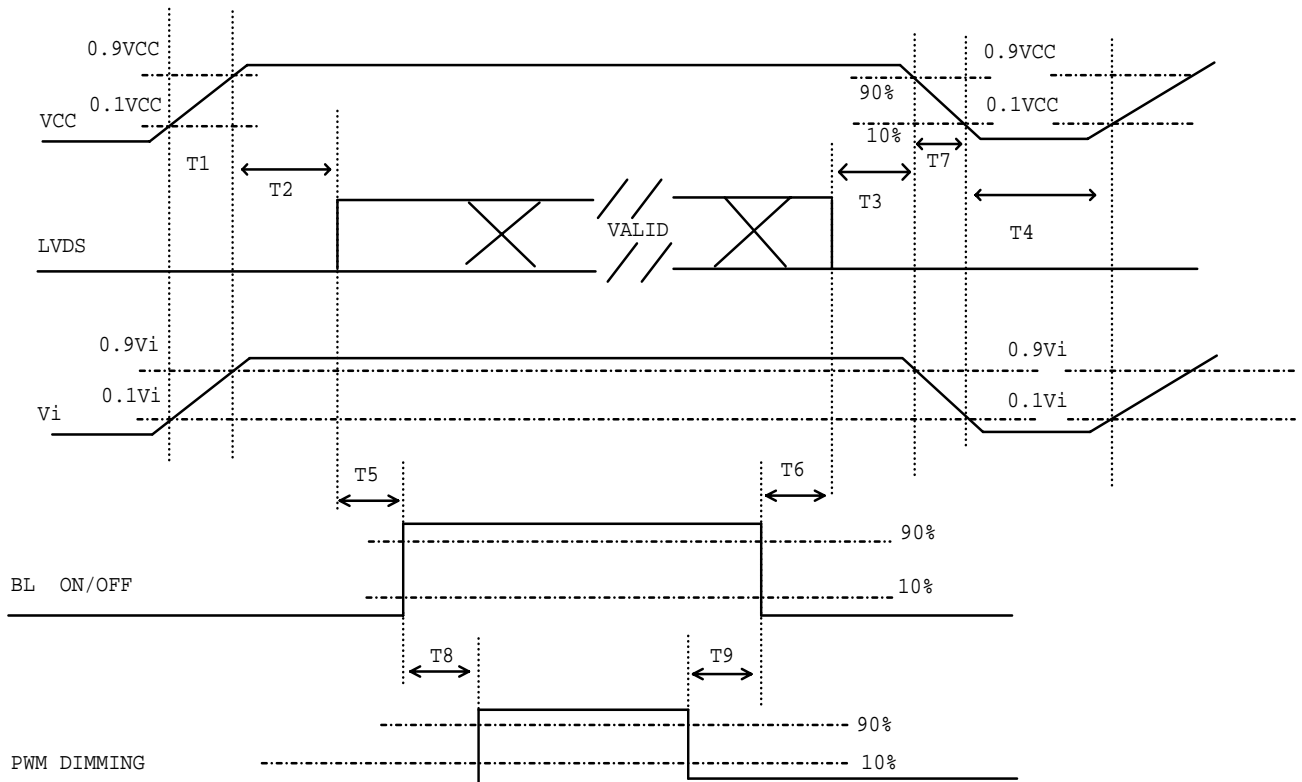
| Signal                         | Item      | Symbol | Min.   | Typ.  | Max.   | Unit | Note       |
|--------------------------------|-----------|--------|--------|-------|--------|------|------------|
| DCLK                           | Frequency | Fc     | 40     | 53.25 | 65     | MHz  |            |
|                                | Total     | Tv     | 915    | 934   | 990    | Th   | Tv=Tvd+Tvb |
| Vertical Active Display Term   | Display   | Tvd    | 900    | 900   | 900    | Th   |            |
|                                | Blank     | Tvb    | Tv-Tvd | 34    | Tv-Tvd | Th   |            |
|                                | Total     | Th     | 1700   | 1904  | 2100   | Tc   | Th=Thd+Thb |
| Horizontal Active Display Term | Display   | Thd    | 1440   | 1440  | 1440   | Tc   |            |
|                                | Blank     | Thb    | Th-Thd | 464   | Th-Thd | Tc   |            |
|                                |           |        |        |       |        |      |            |

### INPUT SIGNAL 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 follow the conditions shown in the following diagram.



Power ON/OFF sequence

Note (1) Please avoid floating state of interface signal at invalid period.

Note (2) When the interface signal is invalid, be sure to pull down the power supply of LCD VCC to 0 V.

Note (3) The Backlight converter power must be turned on after the power supply for the logic and the interface signal is valid. The Backlight converter power must be turned off before the power supply for the logic and the interface signal is invalid.

| Parameter | Value |     |     | Units |
|-----------|-------|-----|-----|-------|
|           | Min   | Typ | Max |       |
| T1        | 0.5   | --- | 10  | ms    |
| T2        | 0     | --- | 50  | ms    |
| T3        | 0     | --- | 50  | ms    |
| T4        | 500   | --- | --- | ms    |
| T5        | 200   | --- | --- | ms    |
| T6        | 20    | --- | --- | ms    |
| T7        | 5     | --- | 300 | ms    |
| T8        | 10    | --- | --- | ms    |
| T9        | 10    | --- | --- | ms    |

## 7 OPTICAL CHARACTERISTICS

### 7.1 TEST CONDITIONS

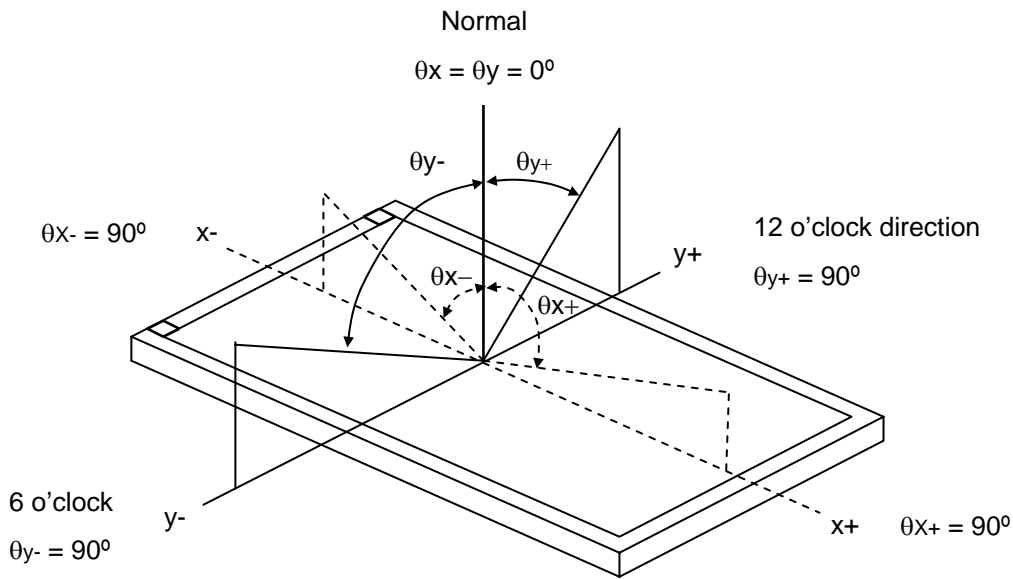
| Item                       | Symbol  | Value | Unit |
|----------------------------|---|-------|------|
| Ambient Temperature        | Ta  | 25±2  | °C   |
| Ambient Humidity           | Ha  | 50±10 | %RH  |
| Supply Voltage             | V <sub>CC</sub>   | 3.3   | V    |
| Input Signal               | According to typical value in "3. ELECTRICAL CHARACTERISTICS" |       |      |
| Inverter Current           | I <sub>L</sub>  | 20    | mA   |
| Inverter Driving Frequency | F <sub>L</sub>  | 61    | KHz  |
| Inverter                   | Sumida H05-4915   |       |      |

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 Note (6).

## 7.2 OPTICAL SPECIFICATIONS

| Item                       |            | Symbol            | Condition   | Min.         | Typ.  | Max.         | Unit              | Note     |
|----------------------------|------------|-------------------|---|--------------|-------|--------------|-------------------|----------|
| Contrast Ratio             |            | CR                | $\theta_x=0^\circ, \theta_y=0^\circ$<br>Viewing Normal<br>Angle |              | 1000  | -            | -                 | (2), (6) |
| Response Time              |            | $T_R$             |   | -            | 14    | 19           | ms                | (3)      |
|                            |            | $T_F$             |   | -            | 11    | 16           | ms                |          |
| Average Luminance of White |            | $L_{AVE}$         |   |              | 250   | -            | cd/m <sup>2</sup> | (4), (6) |
| White Variation            |            | $\delta W$   5pts |   |              | -     | -            | 1.4               | -        |
| Color Chromaticity         | Red        | Rx                | $\theta_x=0^\circ, \theta_y=0^\circ$<br>Viewing Normal<br>Angle | TYP<br>-0.05 | 0.580 | TYP<br>+0.05 | -                 | (1), (6) |
|                            |            | Ry                |   |              | 0.365 |              | -                 |          |
|                            | Green      | Gx                |   |              | 0.360 |              | -                 |          |
|                            |            | Gy                |   |              | 0.553 |              | -                 |          |
|                            | Blue       | Bx                |   |              | 0.152 |              | -                 |          |
|                            |            | By                |   |              | 0.127 |              | -                 |          |
|                            | White      | Wx                |   |              | 0.313 |              | -                 |          |
|                            |            | Wy                |   |              | 0.329 |              | -                 |          |
| Viewing Angle              | Horizontal | $\theta_{x+}$     | CR $\geq$ 10  | 80           | 88    | -            | Deg.              |          |
|                            |            | $\theta_{x-}$     |   | 80           | 88    | -            |                   |          |
|                            | Vertical   | $\theta_{y+}$     |   | 80           | 88    | -            |                   |          |
|                            |            | $\theta_{y-}$     |   | 80           | 88    | -            |                   |          |

Note (1) Definition of Viewing Angle ( $\theta_x, \theta_y$ ):



Note (2) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

$$\text{Contrast Ratio (CR)} = L_{63} / L_0$$

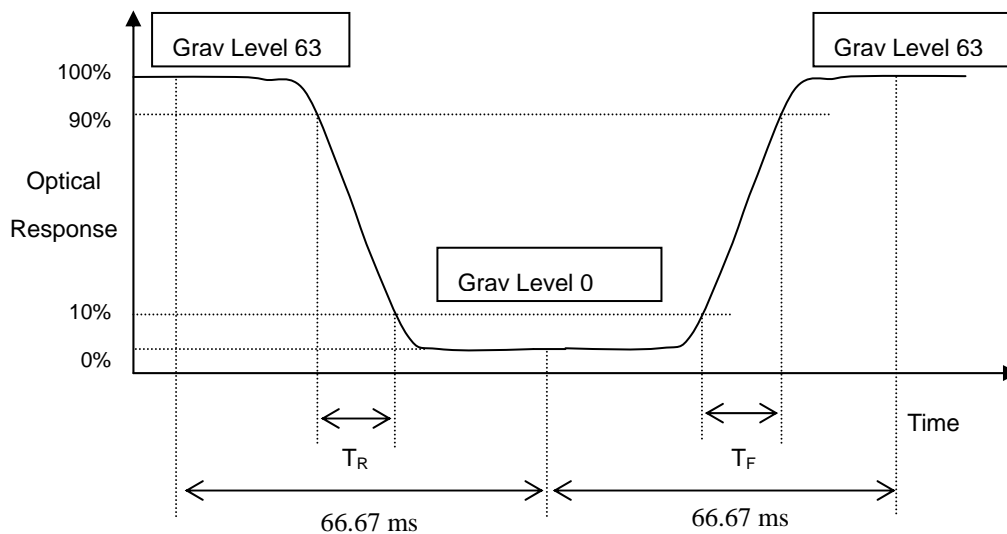
L63: Luminance of gray level 63

L 0: Luminance of gray level 0

$$\text{CR} = \text{CR} (5)$$

CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (5).

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



Note (4) Definition of Average Luminance of White ( $L_{AVE}$ ):

Measure the luminance of gray level 63 at 5 points

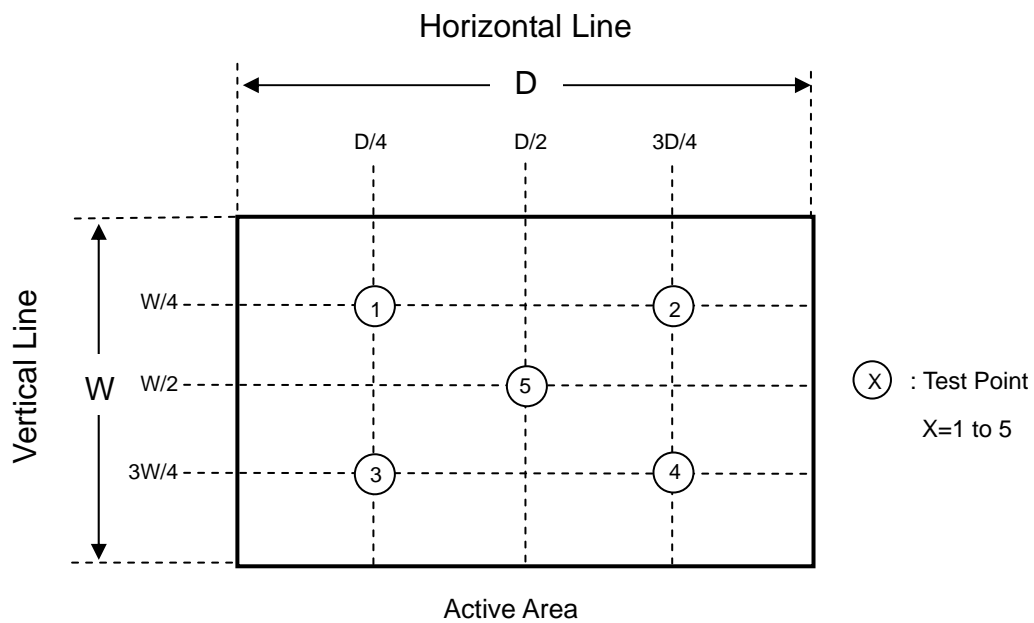
$$L_{AVE} = [L(1) + L(2) + L(3) + L(4) + L(5)] / 5$$

L(x) is corresponding to the luminance of the point X at Figure in Note (5)

Note (5) Definition of White Variation ( $\delta W$ ):

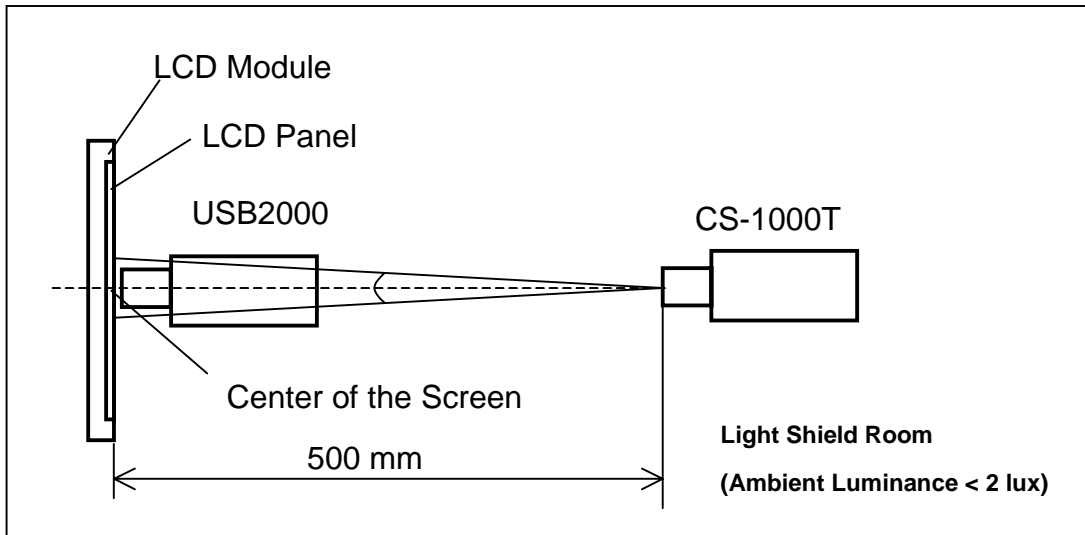
Measure the luminance of gray level 63 at 5 points

$$\delta W = \text{Maximum} [L(1), L(2), L(3), L(4), L(5)] / \text{Minimum} [L(1), L(2), L(3), L(4), L(5)]$$



Note (6) Measurement Setup:

The LCD module should be stabilized at given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room.





## 8 PRECAUTIONS

### 8.1 ASSEMBLY AND HANDLING PRECAUTIONS

- (1) The module should be assembled into the system firmly by using every mounting hole. Be careful not to twist or bend the module.
- (2) While assembling or installing modules, it can only be in the clean area. The dust and oil may cause electrical short or damage the polarizer.
- (3) Use fingerstalls or soft gloves in order to keep display clean during the incoming inspection and assembly process.
- (4) Do not press or scratch the surface harder than a HB pencil lead on the panel because the polarizer is very soft and easily scratched.
- (5) If the surface of the polarizer is dirty, please clean it by some absorbent cotton or soft cloth. Do not use Ketone type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanently damage the polarizer due to chemical reaction.
- (6) Wipe off water droplets or oil immediately. Staining and discoloration may occur if they left on panel for a long time.
- (7) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contacting with hands, legs or clothes, it must be washed away thoroughly with soap.
- (8) Protect the module from static electricity, it may cause damage to the C-MOS Gate Array IC.
- (9) Do not disassemble the module.
- (10) Do not pull or fold the lamp wire.
- (11) Pins of I/F connector should not be touched directly with bare hands.

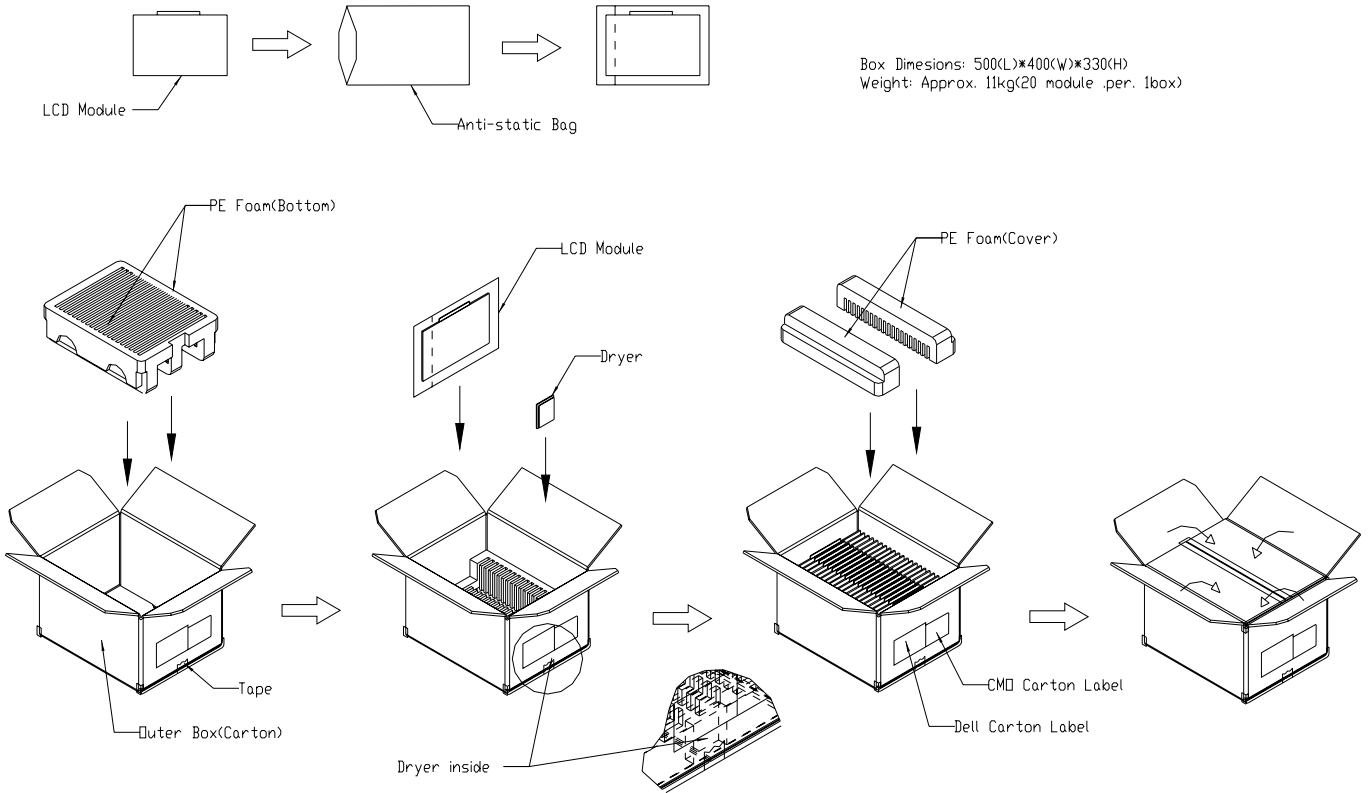
### 8.2 SAFETY PRECAUTIONS

- (1) High temperature or humidity may reduce the performance of module. Please store LCD module within the specified storage conditions.
- (2) It is dangerous that moisture come into or contacted the LCD module, because the moisture may damage LCD module when it is operating.
- (3) It may reduce the display quality if the ambient temperature is lower than 10 °C. For example, the response time will become slowly, and the starting voltage of lamp will be higher than the room temperature.

### 8.3 OPERATION PRECAUTIONS

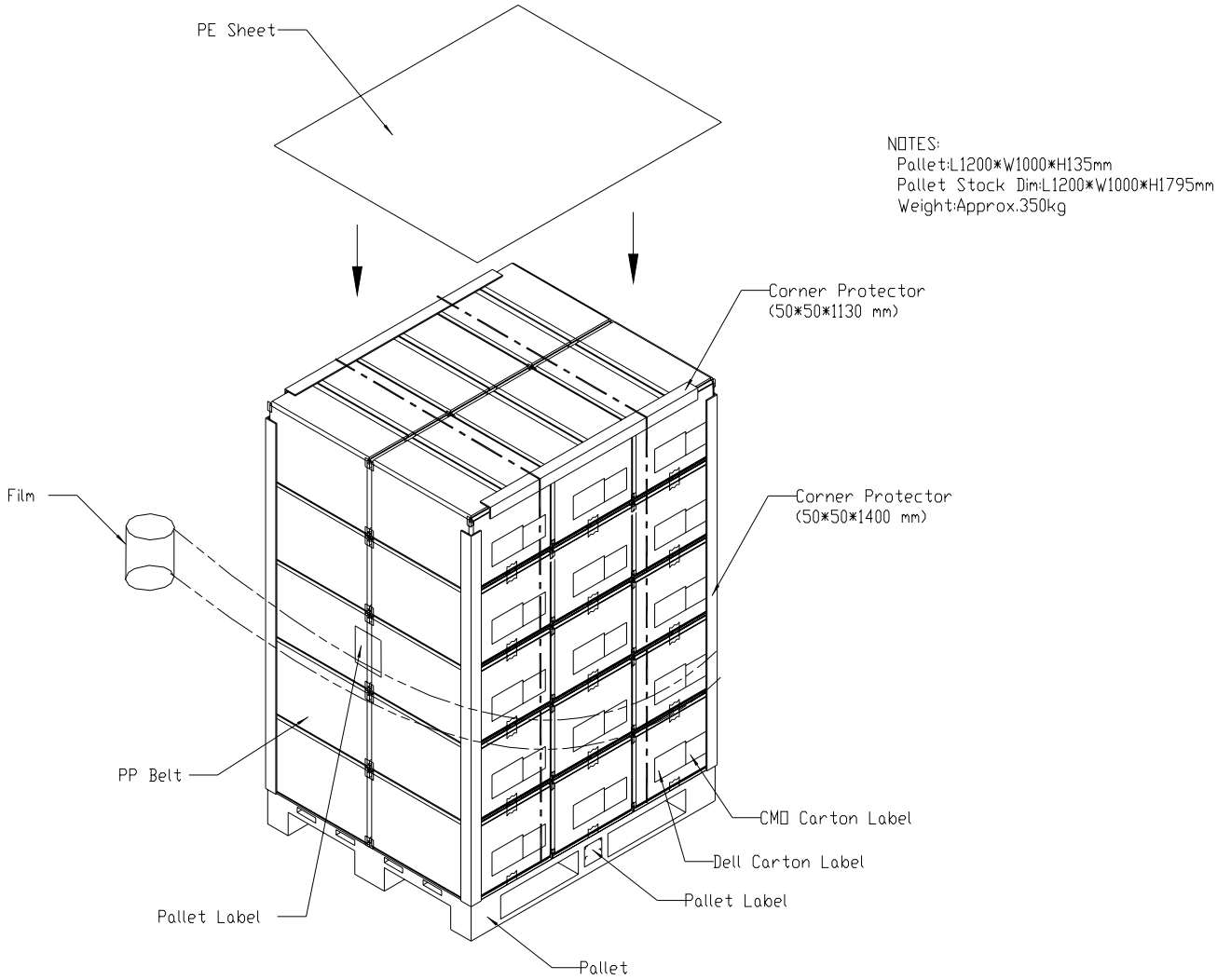
- (1) Do not pull the I/F connector in or out while the module is operating.
- (2) Always follow the correct power on/off sequence when LCD module is connecting and operating. This can prevent the CMOS LSI chips from damage during latch-up.
- (3) The startup voltage of Backlight is approximately 1000 Volts. It may cause electrical shock while assembling with inverter. Do not disassemble the module or insert anything into the Backlight unit.

9 PACKAGING  
 9.1 CARTON



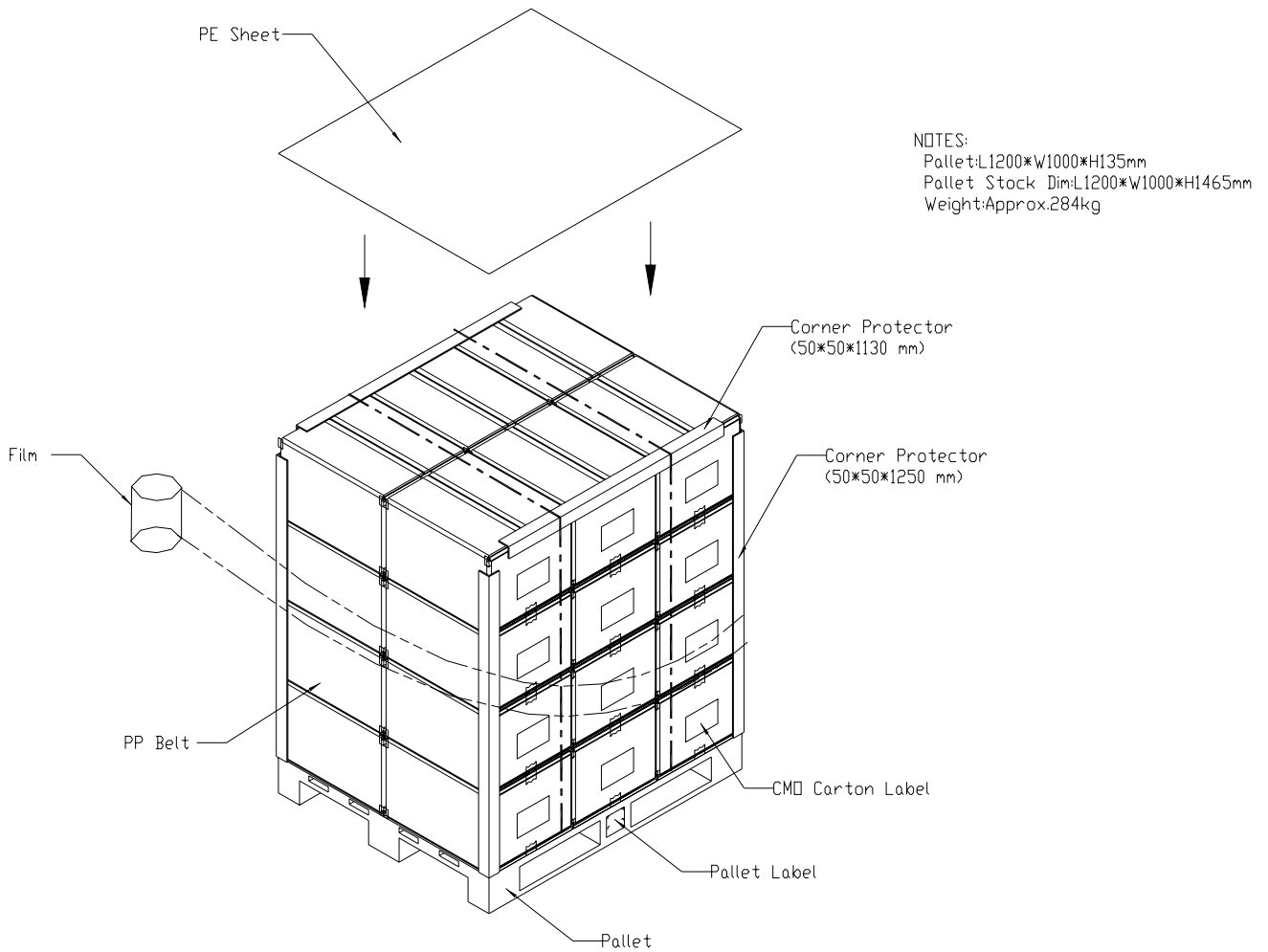
**Figure. 9-1 Packing method**

### 9.2 PALLET FOR SEA FREIGHT



**Figure. 9-2 Packing method**

### 9.3 PALLET FOR AIR FREIGHT



**Figure. 9-3 Packing method**

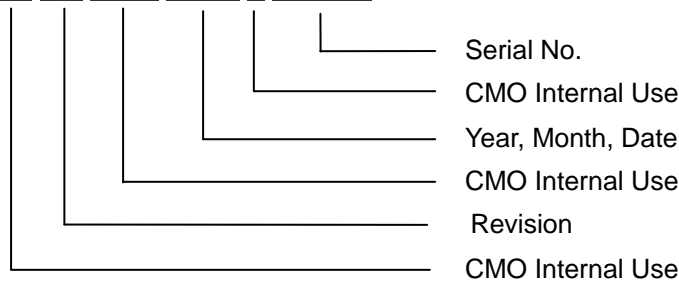
## 10 DEFINITION OF LABELS

### 10.1 CMO MODULE LABEL

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

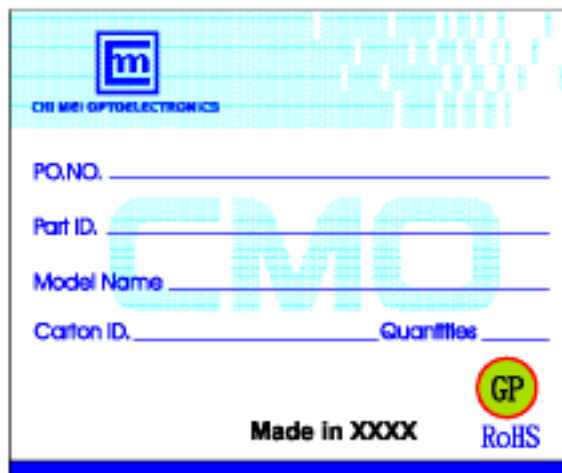


- (a) Model Name: G141C1 - L01
- (b) Revision: Rev. XX, for example: A1, ..., C1, C2 ...etc.
- (c) Serial ID: XXXXXXYMDXXXX

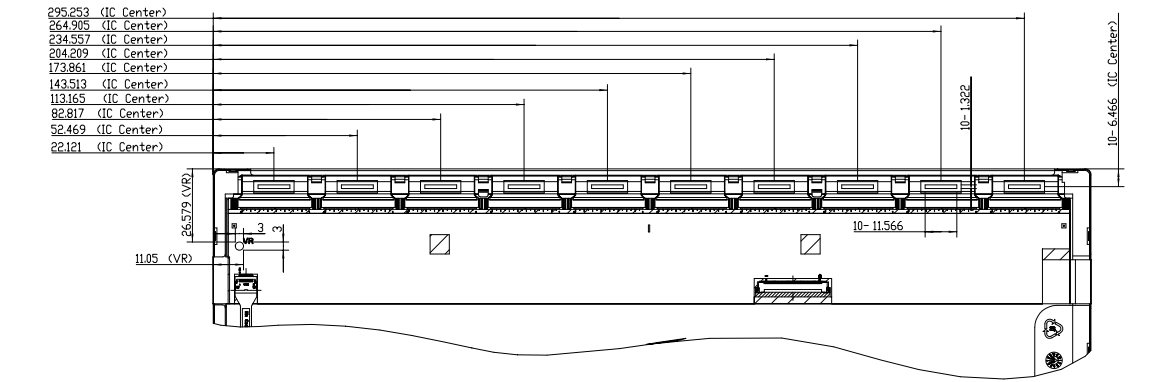
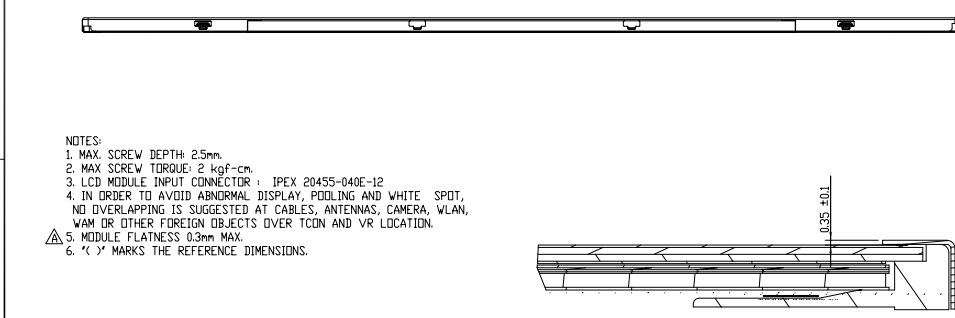
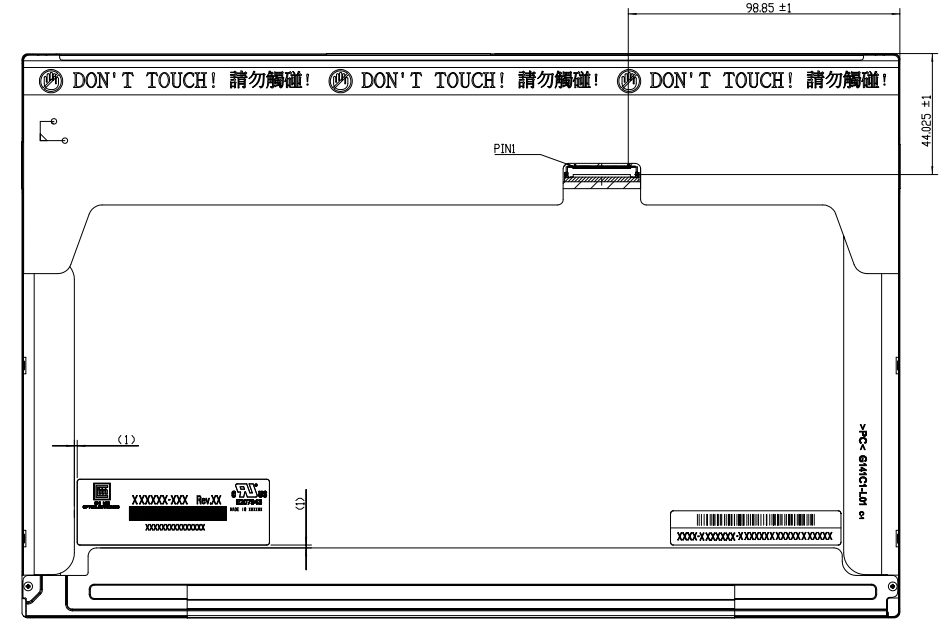
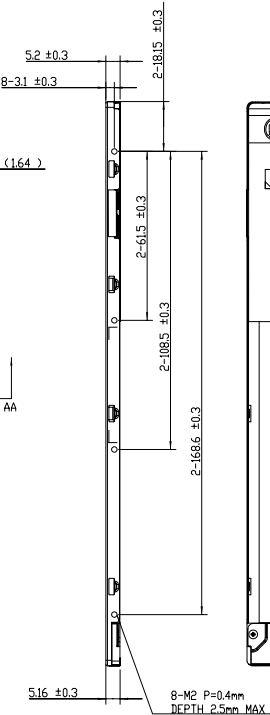
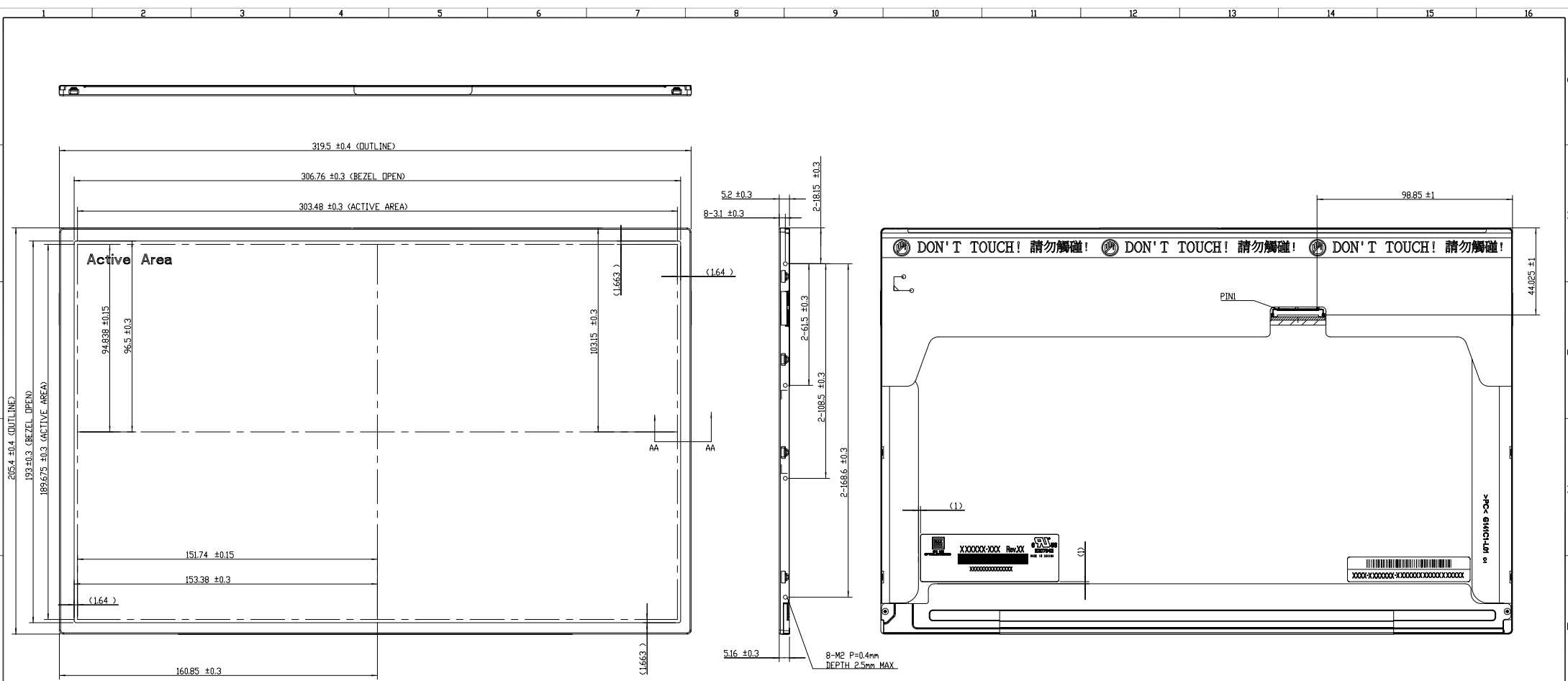


- (d) Production Location: MADE IN XXXX. XXXX stands for production location.
- (e) Serial ID includes the information as below:
  - (a) Manufactured Date: Year: 1~9, for 2001~2009  
Month: 1~9, A~C, for Jan. ~ Dec.  
Day: 1~9, A~Y, for 1<sup>st</sup> to 31<sup>st</sup>, exclude I , O and U
  - (b) Revision Code: cover all the change
  - (c) Serial No.: Manufacturing sequence of product

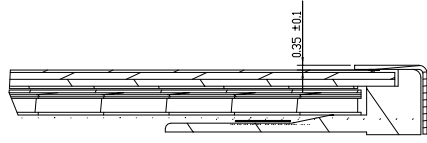
### 10.2 CMO CARTON LABEL



- (a) Production location: Made In XXXX. XXXX stands for production location.



- NOTES:
1. MAX. SCREW DEPTH: 2.5mm.
  2. MAX SCREW TORQUE: 2 kgf-cm.
  3. LCD MODULE INPUT CONNECTOR: IPEX 20455-040E-12
  4. IN ORDER TO AVOID ABNORMAL DISPLAY, POOLING AND WHITE SPOT, NO OVERLAPPING IS SUGGESTED AT CABLES, ANTENNAS, CAMERA, WLAN, WAM OR OTHER FOREIGN OBJECTS OVER TCON AND VR LOCATION.
  5. MODULE FLATNESS 0.3mm MAX.
  6. 'X' MARKS THE REFERENCE DIMENSIONS.



SECTION AA-AA  
SCALE: 5:1

- 295.253 (IC Center)
- 264.905 (IC Center)
- 234.557 (IC Center)
- 204.209 (IC Center)
- 173.861 (IC Center)
- 143.513 (IC Center)
- 113.165 (IC Center)
- 82.817 (IC Center)
- 52.469 (IC Center)
- 22.121 (IC Center)

| Mark | Description               | Date       | Changed_By | Approved_By | ECN No.   | Remark |
|------|---------------------------|------------|------------|-------------|-----------|--------|
| △    | Modified note description | 2010/07/30 | Morris Lin | Shunnan     | EA0061932 |        |

|  |            |                                     |
|--|------------|-------------------------------------|
| TITLE: MODULE OUTLINE DRAWING G141C1-L01 |            | RD REV: 1.0                         |
|  |            | SD REV: 1.0                         |
| Approved                                 | Shunnan    | Drawing No. G14124024               |
| Checked                                  | Shunnan    | Part No. NA                         |
| Drawer                                   | Morris_Lin | Material NA                         |
| Designer                                 | Morris_Lin | Date 30-JULY-2010 Scale 1:1 Unit mm |

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Our company network supports you worldwide with offices in Germany, Austria, Switzerland, the UK and the USA. For more information please contact:

## Headquarters

Germany



**FORTEC Elektronik AG**

Lechwiesenstr. 9  
86899 Landsberg am Lech

Phone: +49 8191 91172-0  
E-Mail: [sales@forteca.de](mailto:sales@forteca.de)  
Internet: [www.forteca.de](http://www.forteca.de)

## Fortec Group Members

Austria



**FORTEC Elektronik AG**

**Office Vienna**

Nuschinggasse 12  
1230 Wien

Phone: +43 1 8673492-0  
E-Mail: [office@fortec.at](mailto:office@fortec.at)  
Internet: [www.fortec.at](http://www.fortec.at)

Germany



**Distec GmbH**

Augsburger Str. 2b  
82110 Germering

Phone: +49 89 894363-0  
E-Mail: [info@distec.de](mailto:info@distec.de)  
Internet: [www.distec.de](http://www.distec.de)

Switzerland



**ALTRAC AG**

Bahnhofstraße 3  
5436 Würenlos

Phone: +41 44 7446111  
E-Mail: [info@altrac.ch](mailto:info@altrac.ch)  
Internet: [www.altrac.ch](http://www.altrac.ch)

United Kingdom



**Display Technology Ltd.**

Osprey House, 1 Osprey Court  
Hichingbrooke Business Park  
Huntingdon, Cambridgeshire, PE29 6FN

Phone: +44 1480 411600  
E-Mail: [info@displaytechnology.co.uk](mailto:info@displaytechnology.co.uk)  
Internet: [www.displaytechnology.co.uk](http://www.displaytechnology.co.uk)

USA



**Apollo Display Technologies, Corp.**

87 Raynor Avenue,  
Unit 1 Ronkonkoma,  
NY 11779

Phone: +1 631 5804360  
E-Mail: [info@apolloDisplays.com](mailto:info@apolloDisplays.com)  
Internet: [www.apolloDisplays.com](http://www.apolloDisplays.com)