

Version : 1.0

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| <p>TECHNICAL SPECIFICATION</p> <p>MODEL NO. : PM070WL2</p> |
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Please contact PVI or its agent for further information.

Customer's Confirmation

Customer \_\_\_\_\_

Date \_\_\_\_\_

By \_\_\_\_\_

PVI's Confirmation

Confirmed By \_\_\_\_\_



Prepared By \_\_\_\_\_



## TECHNICAL SPECIFICATION

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### 1.Application

This data sheet applies to a color TFT LCD module, PM070WL2.

The application of panel are OA product, portable DVD, car TV(must use Analog to Digital driving board), which requires high quality flat panel display.

Prime View assume no responsibility for any damage resulting from the use of the device which dose not comply with the instructions and the precautions in these specification sheet.

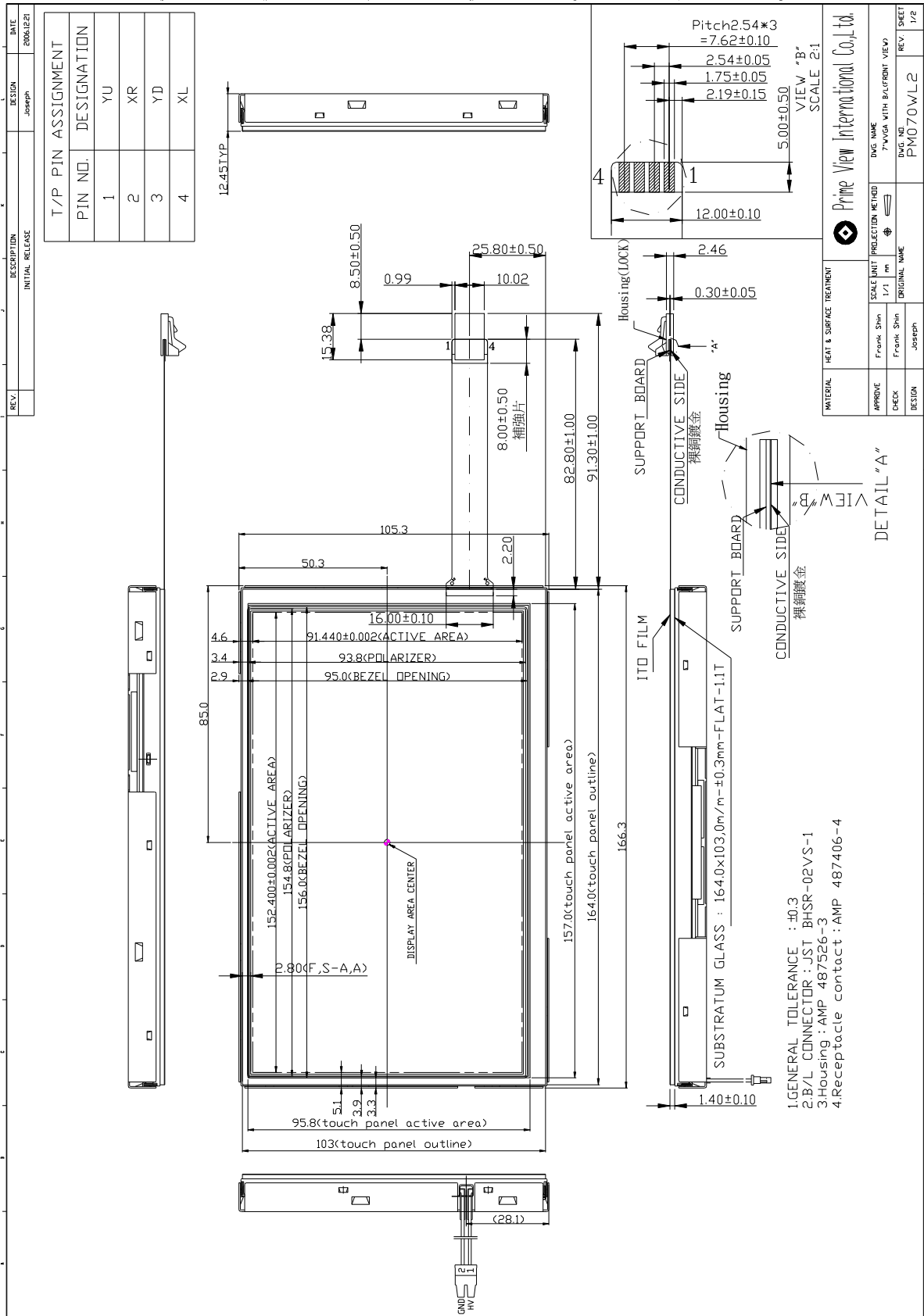
### 2. Features

- . Wide VGA (800\*480 pixels) resolution
- . Amorphous silicon TFT LCD panel with back-light unit
- . Pixel in stripe configuration
- . Thin and light weight
- . Display Colors : 262,144 colors
- . 3.3V LVDS interface standard: THC63LVDF64A as receiver
- . +3.3V DC supply voltage for TFT LCD panel driving
- . Backlight driving DC/AC inverter not included in this module
- . Long Life Lamp
- . Wide viewing angle
- . Module with resistive type touch panel .

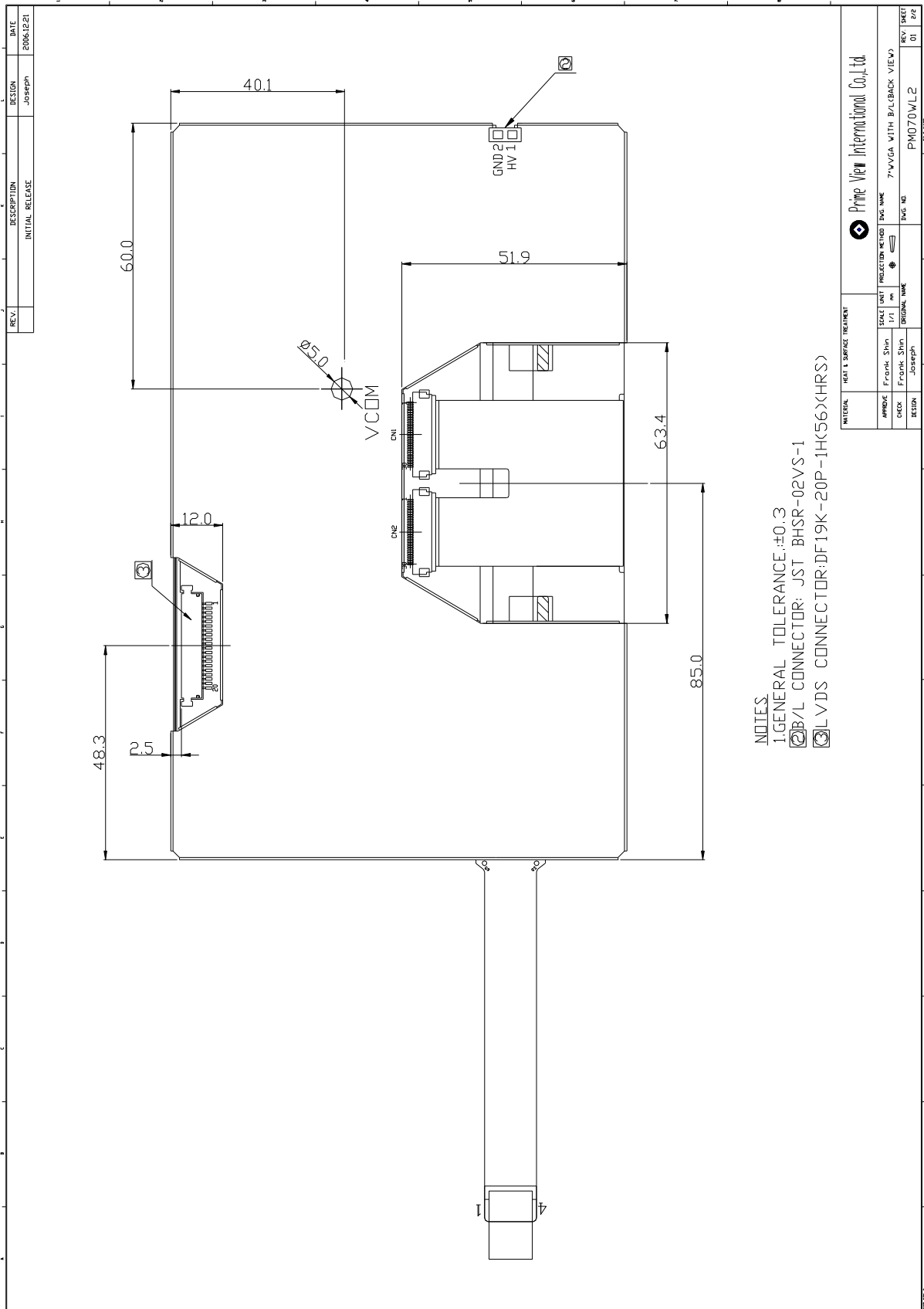
### 3.Mechanical Specifications

| Parameter                        | Specifications                                | Unit |
|----------------------------------|---|------|
| Screen Size                      | 7.0(diagonal)                                 | inch |
| Display Format                   | 800×(R, G, B)×480                             | dot  |
| Display Colors                   | 262,144                                       |      |
| Active Area                      | 152.4(H)×91.44(V)                             | mm   |
| Pixel Pitch                      | 0.1905(H)×0.1905(V)                           | mm   |
| Pixel Configuration              | Stripe  |      |
| Outline Dimension                | 166.3(W)×105.3 (H)×12.45 (typ.) (D)           | mm   |
| Weight                           | 318±15  | g    |
| Back-light                       | CCFL, 1 tube                                  |      |
| Surface treatment                | Anti-glare and Wide View Film                 |      |
| Display mode                     | Normally white                                |      |
| Surface treatment of Touch Panel | 3H  |      |
| Gray scale inversion direction   | 6 o'clock<br>[ ref to Page 17 viewing angle ] |      |

**4.Mechanical Drawing of TFT-LCD Module**  
**Outline Drawing : Front View (unit mm)**



**Outline Drawing : Rear View (unit mm)**

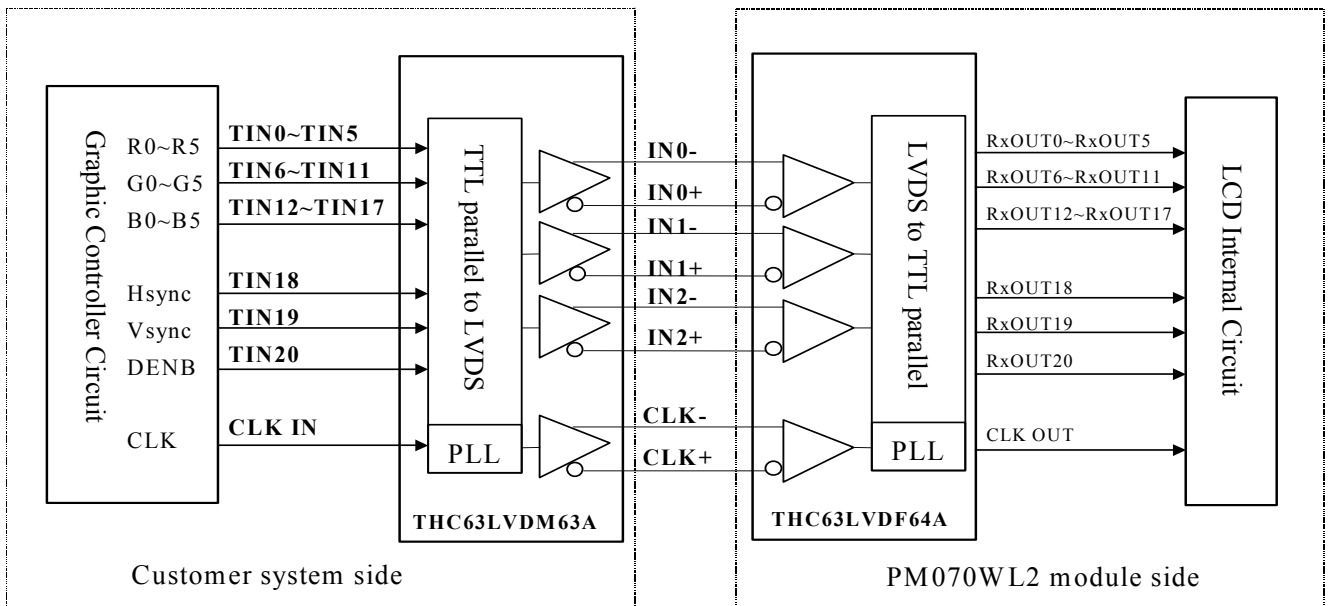


**5.Input Terminals**

5-1) TFT-LCD Panel Driving  
 Connector type: DF19K-20P-1H (56)(HRS)

| Pin No. | Symbol | Function                       | Remark |
|---------|--------|--------------------------------|--------|
| 1       | Vcc    | +3.3V Power Supply             |        |
| 2       | Vcc    | +3.3V Power Supply             |        |
| 3       | GND    | Ground                         |        |
| 4       | GND    | Ground                         |        |
| 5       | INO-   | LVDS receiver signal channel 0 |        |
| 6       | INO+   | LVDS receiver signal channel 0 |        |
| 7       | GND    | Ground                         |        |
| 8       | IN1-   | LVDS receiver signal channel 1 |        |
| 9       | IN1+   | LVDS receiver signal channel 1 |        |
| 10      | GND    | Ground                         |        |
| 11      | IN2-   | LVDS receiver signal channel 2 |        |
| 12      | IN2+   | LVDS receiver signal channel 2 |        |
| 13      | GND    | Ground                         |        |
| 14      | CLK-   | LVDS receiver signal clock     |        |
| 15      | CLK+   | LVDS receiver signal clock     |        |
| 16      | GND    | Ground                         |        |
| 17      | NC     | No connection                  |        |
| 18      | NC     | No connection                  |        |
| 19      | GND    | Ground                         |        |
| 20      | GND    | Ground                         |        |

LVDS Interface Block Diagram

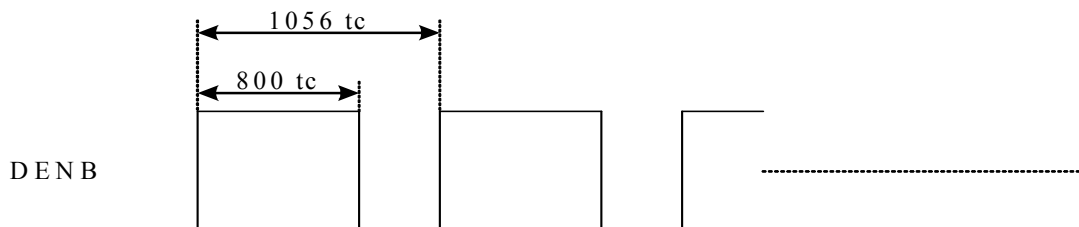


Recommended Transmitter (THC63LVDM63A Thine) to PM070WL2 interface Assignment:

| Input terminal of THC63LVDM63A |     | Graphic controller output signal |                                 | Output signal symbol   | To PM070WL2 interface terminal (Symbol) |
|--------------------------------|-----|----------------------------------|---------------------------------|------------------------|---|
| Symbol                         | No. | Symbol                           | Function                        |                        |   |
| TIN0                           | 44  | R0                               | Red pixel data (LSB)            | } Tout0-<br>} Tout0+   | No.5 : IN0-<br>No.6 : IN0+              |
| TIN1                           | 45  | R1                               | Red pixel data                  |                        |   |
| TIN2                           | 47  | R2                               | Red pixel data                  |                        |   |
| TIN3                           | 48  | R3                               | Red pixel data                  |                        |   |
| TIN4                           | 1   | R4                               | Red pixel data                  |                        |   |
| TIN5                           | 3   | R5                               | Red pixel data(MSB)             |                        |   |
| TIN6                           | 4   | G0                               | Green pixel data (LSB)          | } Tout1-<br>} Tout1+   | No.8 : IN1-<br>No.9 : IN1+              |
| TIN7                           | 6   | G1                               | Green pixel data                |                        |   |
| TIN8                           | 7   | G2                               | Green pixel data                |                        |   |
| TIN9                           | 9   | G3                               | Green pixel data                |                        |   |
| TIN10                          | 10  | G4                               | Green pixel data                |                        |   |
| TIN11                          | 12  | G5                               | Green pixel data(MSB)           |                        |   |
| TIN12                          | 13  | B0                               | Blue pixel data(LSB)            | } Tout2-<br>} Tout2+   | No.11 : IN2-<br>No.12 : IN2+            |
| TIN13                          | 15  | B1                               | Blue pixel data                 |                        |   |
| TIN14                          | 16  | B2                               | Blue pixel data                 |                        |   |
| TIN15                          | 18  | B3                               | Blue pixel data                 |                        |   |
| TIN16                          | 19  | B4                               | Blue pixel data                 |                        |   |
| TIN17                          | 20  | B5                               | Blue pixel data(MSB)            |                        |   |
| TIN18                          | 22  | Hsync                            | Horizontal Synchronous Signal   |                        |   |
| TIN19                          | 23  | Vsync                            | Vertical Synchronous Signal     |                        |   |
| TIN20                          | 25  | DENB                             | Compound Synchronization signal |                        |   |
| CLK in                         | 26  | CLK                              | Data sampling clock             | TCLK out-<br>TCLK out+ | No.14 : CLK -<br>No.15 : CLK+           |

DENB input signal.

If customer wanted to off the DENB mode , you must keep the DENB always High or Low.



(tc: the period of sampling clock)

## 6.Touch Panel Characteristics

### 6.1) Pin assignment:

| Pin | Symbol | Function                      | Remark |
|-----|--------|-------------------------------|--------|
| 1   | YU     | Upper electrode Y(Upper side) |        |
| 2   | XR     | Lower electrode X(Right side) |        |
| 3   | YD     | Upper electrode Y(Down side)  |        |
| 4   | XL     | Lower electrode X(Left side)  |        |

### 6.2) Electrical Performance:

| Parameters                | Symbol | MIN. | Typ. | MAX.      | Unit       | Remark   |
|---------------------------|--------|------|------|-----------|------------|----------|
| Terminal Resistance       | X      | 580  | 840  | 1200      | $\Omega$   |          |
|                           | Y      | 120  | 180  | 260       | $\Omega$   |          |
| Input Voltage             | $V_T$  | -    | 5.0  | 7.0       | V          |          |
| Linearity(X ,Y direction) | -      | -    | -    | $\pm 1.5$ | %          |          |
| Insulation Impedance      | -      | 20   | -    | -         | M $\Omega$ | DC 25V   |
| Response Time             | -      | -    | -    | 15        | ms         |          |
| Operation Force           | -      | -    | -    | 50        | g          | Note 6-1 |

Note 6-1 Input through 0.8R stylus or finger.

### 6.3) Durability Performance

#### 1. Hitting Durability:

At least 1,000,000 times with R8.0mm silicon rubber, 250g , 3times/sec .

#### 2. Sliding Durability:

At least 100,000 times with R0.8mm polyacetal stylus , 250g , 60mm/sec.



**7. Absolute Maximum Ratings:**

GND=0V, Ta=25°C

| Parameters                  | Symbol          | MIN. | MAX.                 | Unit | Remark   |
|-----------------------------|-----------------|------|----------------------|------|----------|
| Supply Voltage              | V <sub>CC</sub> | -0.3 | +4.0                 | V    |          |
| Input Signals Voltage       | V <sub>IN</sub> | -0.3 | V <sub>CC</sub> +0.3 | V    | Note 7-1 |
| Backlight Driving Frequency | F <sub>L</sub>  | 0    | 100                  | KHz  |          |

Note 7-1: LVDS signal.

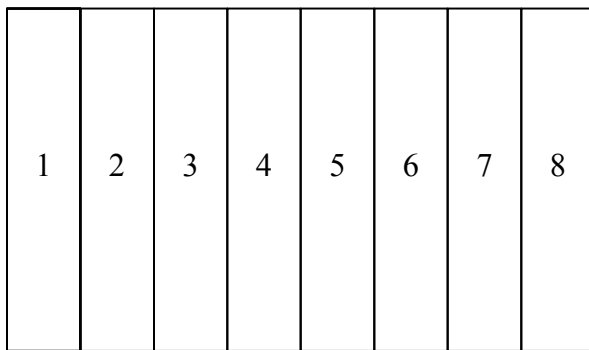
**8. Electrical Characteristics**

8-1) Recommended Operating Conditions:

GND = 0V , Ta = 25°C

| Item                                   | Symbol           | Min. | Typ.  | Max.  | Unit | Remark   |
|--|------------------|------|-------|-------|------|----------|
| Supply Voltage                         | V <sub>CC</sub>  | 3.0  | 3.3   | 3.6   | V    |          |
| Current Dissipation                    | I <sub>CC</sub>  | -    | 199.2 | 217.3 | mA   | Note 8-1 |
| LVDS Differential input high threshold | V <sub>TH</sub>  | -    | -     | 100   | mV   | Note 8-2 |
| LVDS Differential input low threshold  | V <sub>TL</sub>  | -100 | -     | -     |      |          |
| V <sub>com</sub> Voltage               | V <sub>com</sub> | -    | 3.1   | -     | V    |          |

Note 8-1 : To test the current dissipation of V<sub>CC</sub>, using the “color bars” testing pattern shown as below



1. White
2. Yellow
3. Cyan
4. Green
5. Magenta
6. Red
7. Blue
8. Black

I<sub>CC</sub> current dissipation testing pattern

Note 8-2 : Please refers to THC63LVDF64A specification by THINE. This LCD module conforms to LVDS standard.

8-2) Recommended Driving Condition for Back Light

Ta=25°C

| Parameter                                    | Symbol         | Min. | Typ. | Max. | Unit | Remark              |
|--|----------------|------|------|------|------|---------------------|
| Lamp Voltage                                 | V <sub>L</sub> | 522  | 580  | 638  | V    | I <sub>L</sub> =6mA |
| Lamp Current                                 | I <sub>L</sub> | 4    | 6    | 7    | mA   | Note 8-3            |
| Lamp Frequency                               | P <sub>L</sub> | 45   | 60   | 80   | KHz  | Note 8-4            |
| Starting Voltage (25°C)<br>(Reference Value) | Vs             | -    | -    | 1090 | Vrms | Note 8-5            |
| Starting Voltage (0°C)<br>(Reference Value)  | Vs             | -    | -    | 1420 | Vrms | Note 8-5            |

Note 8-3 In order to satisfy the quality of B/L, no matter use what kind of inverter, the output lamp current must between Min. and Max. to avoid the abnormal display image caused by B/L.

Note 8-4: The waveform of lamp driving voltage should be as closed to a perfect sine wave as possible.

Note 8-5 The " Max of starting voltage " means the minimum voltage of inverter to turn on the CCFL. and it should be applied to the lamp for more than 1 second to start up. Otherwise the lamp may not be turned on.

8-3) Backlight driving & Power Consumption

| Pin No | Symbol | Description                       | Remark   |
|--------|--------|-----------------------------------|----------|
| 1      | VL1    | Input terminal (Hi voltage side)  |          |
| 2      | VL2    | Input terminal (Low voltage side) | Note 8-6 |

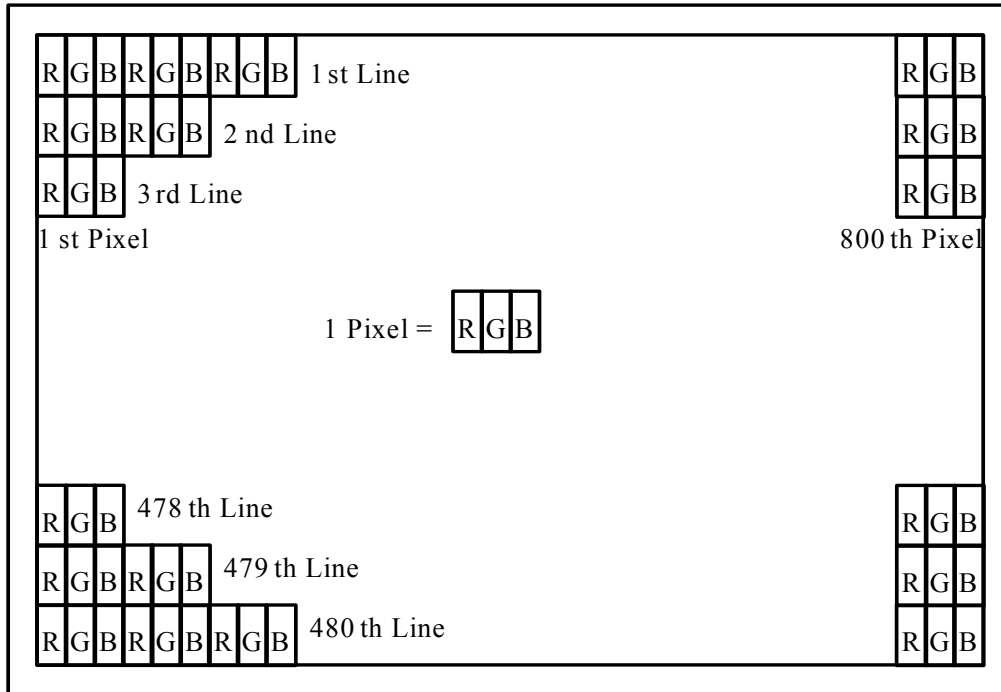
Note8-6 : Low voltage side of backlight inverter connects with ground of inverter circuits.

| Parameter                        | Symbol | Typ. | Max. | Unit | Remark   |
|----------------------------------|--------|------|------|------|----------|
| LCD Power consumption (W/O BL)   | -      | 0.66 | 0.72 | W    |          |
| Backlight Lamp Power Consumption | -      | 3.48 | 4.47 | W    | Note 8-7 |
| Total Power Consumption          | -      | 4.15 | 5.19 | W    |          |

Note8-7: Backlight lamp power consumption is calculated by I<sub>L</sub> x V<sub>L</sub>

### 9. Pixel Arrangement

The LCD module pixel arrangement is the stripe.

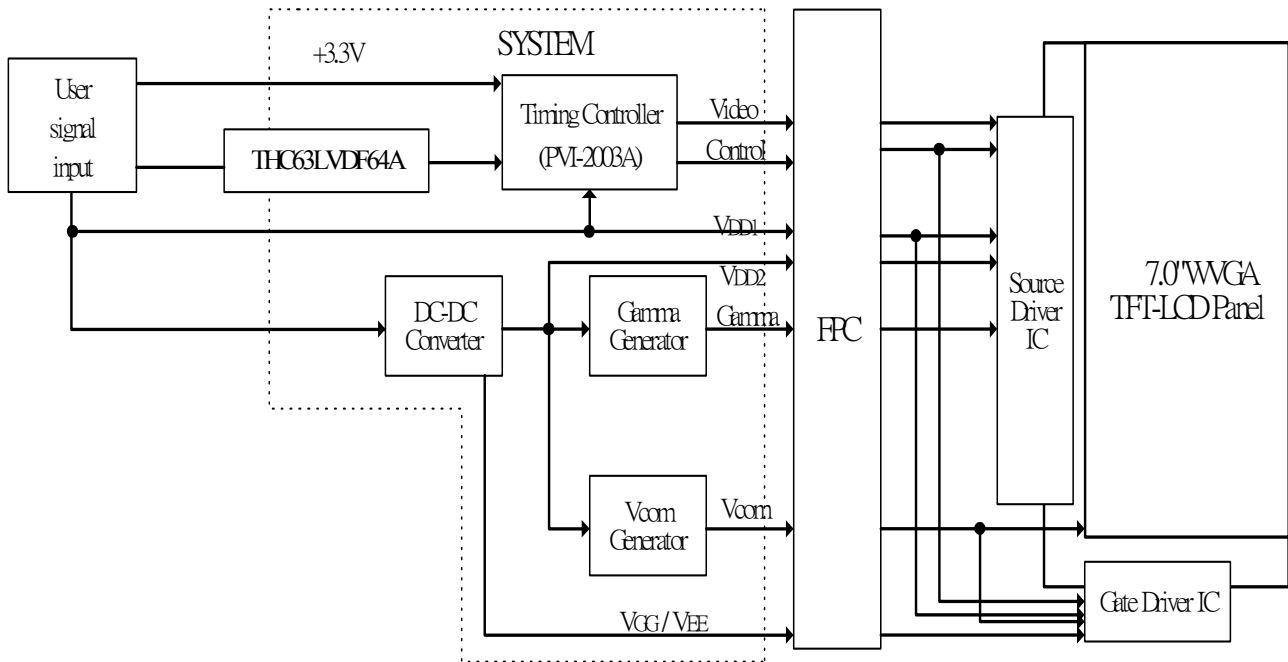


10. Display Color and Gray Scale Reference

| Color        |            | Input Color Data |    |    |    |    |    |       |    |    |    |    |    |      |    |    |    |    |    |
|--------------|------------|------------------|----|----|----|----|----|-------|----|----|----|----|----|------|----|----|----|----|----|
|              |            | 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 (63)   | 1                | 1  | 1  | 1  | 1  | 1  | 0     | 0  | 0  | 0  | 0  | 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  |
|              | Blue (63)  | 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  | 1    | 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  |
| Red          | Red (00)   | 0                | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  |
|              | Red (01)   | 0                | 0  | 0  | 0  | 0  | 1  | 0     | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  |
|              | Red (02)   | 0                | 0  | 0  | 0  | 1  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  |
|              | Darker     |                  |    |    |    |    |    |       |    |    |    |    |    |      |    |    |    |    |    |
|              | ↓          | ↓                | ↓  | ↓  | ↓  | ↓  | ↓  | ↓     | ↓  | ↓  | ↓  | ↓  | ↓  | ↓    | ↓  | ↓  | ↓  | ↓  | ↓  |
|              | Brighter   |                  |    |    |    |    |    |       |    |    |    |    |    |      |    |    |    |    |    |
|              | 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  |    |
| Green        | Green (00) | 0                | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  |
|              | Green (01) | 0                | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 1  | 0    | 0  | 0  | 0  | 0  | 0  |
|              | Green (02) | 0                | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 1  | 0  | 0    | 0  | 0  | 0  | 0  | 0  |
|              | Darker     |                  |    |    |    |    |    |       |    |    |    |    |    |      |    |    |    |    |    |
|              | ↓          | ↓                | ↓  | ↓  | ↓  | ↓  | ↓  | ↓     | ↓  | ↓  | ↓  | ↓  | ↓  | ↓    | ↓  | ↓  | ↓  | ↓  | ↓  |
|              | Brighter   |                  |    |    |    |    |    |       |    |    |    |    |    |      |    |    |    |    |    |
|              | 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  |    |
| Blue         | Blue (00)  | 0                | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  |
|              | Blue (01)  | 0                | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 1  |
|              | Blue (02)  | 0                | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 1  | 0  |
|              | Darker     |                  |    |    |    |    |    |       |    |    |    |    |    |      |    |    |    |    |    |
|              | ↓          | ↓                | ↓  | ↓  | ↓  | ↓  | ↓  | ↓     | ↓  | ↓  | ↓  | ↓  | ↓  | ↓    | ↓  | ↓  | ↓  | ↓  | ↓  |
|              | Brighter   |                  |    |    |    |    |    |       |    |    |    |    |    |      |    |    |    |    |    |
|              | Blue (61)  | 0                | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 1    | 1  | 1  | 1  | 0  | 1  |
|              | Blue (62)  | 0                | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 1    | 1  | 1  | 1  | 1  | 0  |
| Blue (63)    | 0          | 0                | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 1  | 1    | 1  | 1  | 1  | 1  |    |

**11. Block Diagram**

**11-1) TFT-module Block Diagram**



## 12. Interface Timing

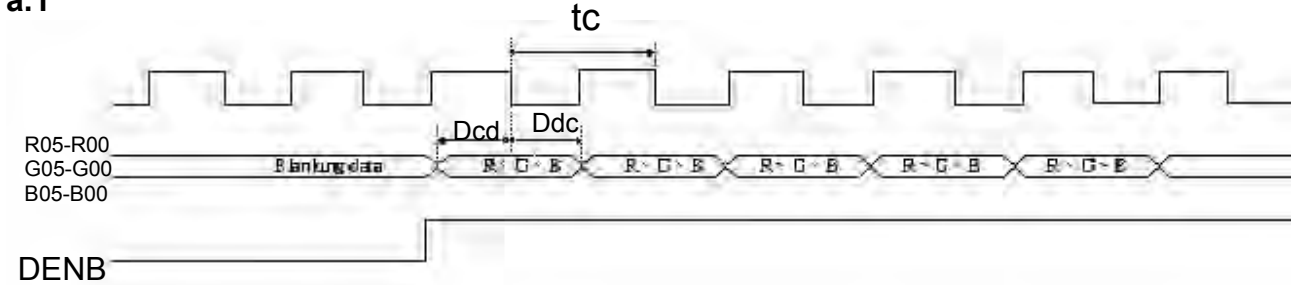
### 12.1) Timing Parameters

|              |                            | Symbol | Min. | Typ.   | Max.  | Unit | Remark |  |
|--------------|----------------------------|--------|------|--------|-------|------|--------|--|
| Power supply |                            | VCC    | 3.0  | 3.3    | 3.6   | V    |        |  |
| CLK          | Frequency                  | 1/tc   | -    | 32     | -     | MHz  |        |  |
|              |                            | tc     | -    | 31.25  | -     | ns   |        |  |
| HSYNC        | Period                     | Hp     | -    | 33     | -     | us   |        |  |
|              |                            |        | -    | 1056   | -     | tc   |        |  |
|              | Display period             | Hdp    | -    | 800    | -     | tc   |        |  |
|              | Pulse width                | Hpw    | -    | 128    | -     | tc   |        |  |
|              | Back-porch                 | Hbp    | -    | 86     | -     | tc   |        |  |
|              | Front-porch                | Hfp    | -    | 42     | -     | tc   |        |  |
|              | Hpw+Hbp                    |        |      | -      | 214   | -    | tc     |  |
|              | Hsync-CLK                  | Hhc    | 10   | -      | Tc-10 | ns   |        |  |
|              | Vsync-Hsync                | Hvh    | 0    | 0      | 200   | tc   |        |  |
| VSYNC        | Period                     | Vp     | -    | 17.325 | -     | ms   |        |  |
|              |                            |        | -    | 525    | -     | Hp   |        |  |
|              | Display period             | Vdp    | -    | 480    | -     | Hp   |        |  |
|              | Pulse width                | Vpw    | -    | 2      | -     | Hp   |        |  |
|              | Back-porch                 | Vbp    | -    | 33     | -     | Hp   |        |  |
|              | Front-porch                | Vfp    | -    | 10     | -     | Hp   |        |  |
|              | Vpw+Vbp                    |        |      | -      | 35    | -    | Hp     |  |
| DENB         | Horizontal scanning period | T1     | 860  | 1056   | 1064  | tc   |        |  |
|              | Horizontal display period  | T2     | -    | 800    | -     | tc   |        |  |
|              | Vertical display period    | T3     | -    | 480    | -     | T1   |        |  |
|              | Frame cycling period       | T4     | 520  | 525    | 800   | T1   |        |  |
| R,G,B        | CLK-DATA                   | Dcd    | 10   | -      | -     | ns   |        |  |
|              | DATA-CLK                   | Ddc    | 8    | -      | -     | ns   |        |  |

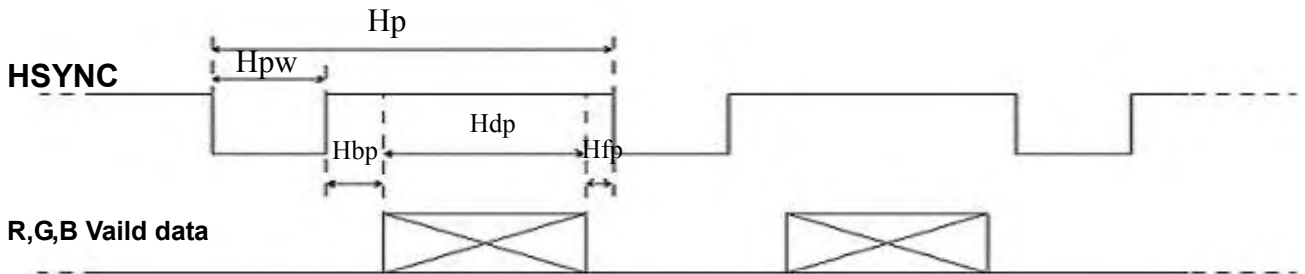
**12.2) The Timing Diagram**

**a. Input signal range**

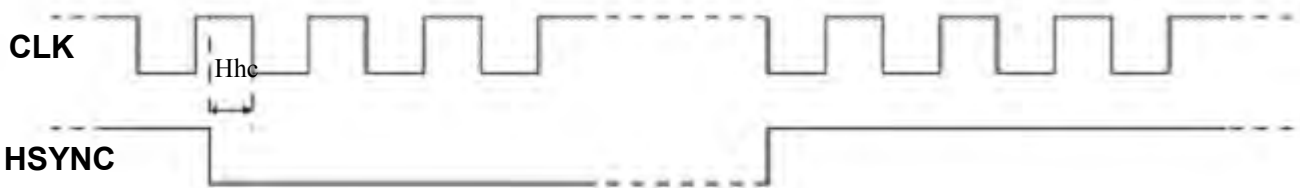
**a.1**



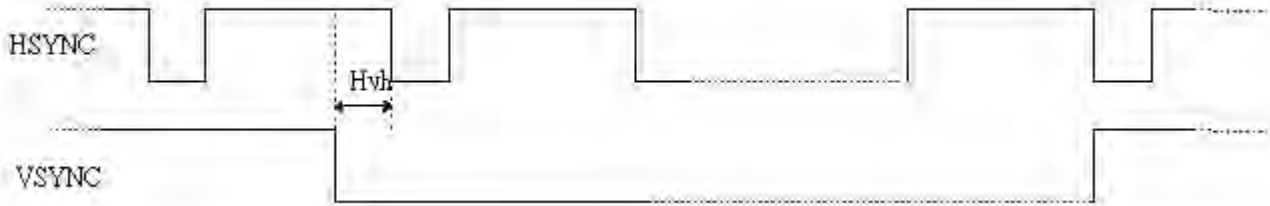
**a.2 HSYNC timing**



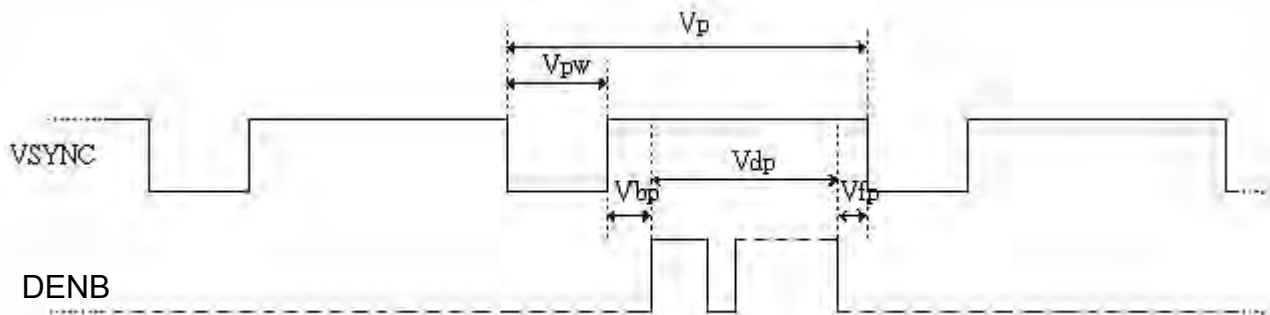
**a.3 CLK, HSYNC relationship**



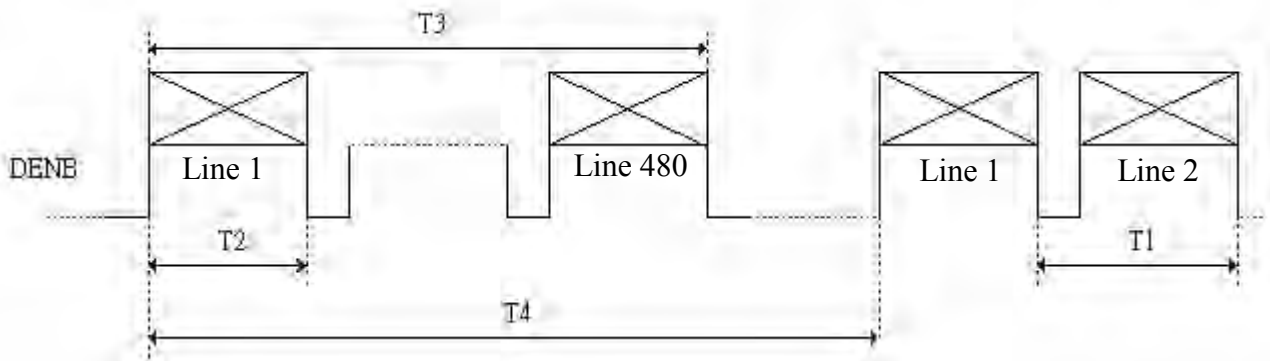
**a.4 HSYNC, VSYNC relationship**



**a.5 VSYNC timing**

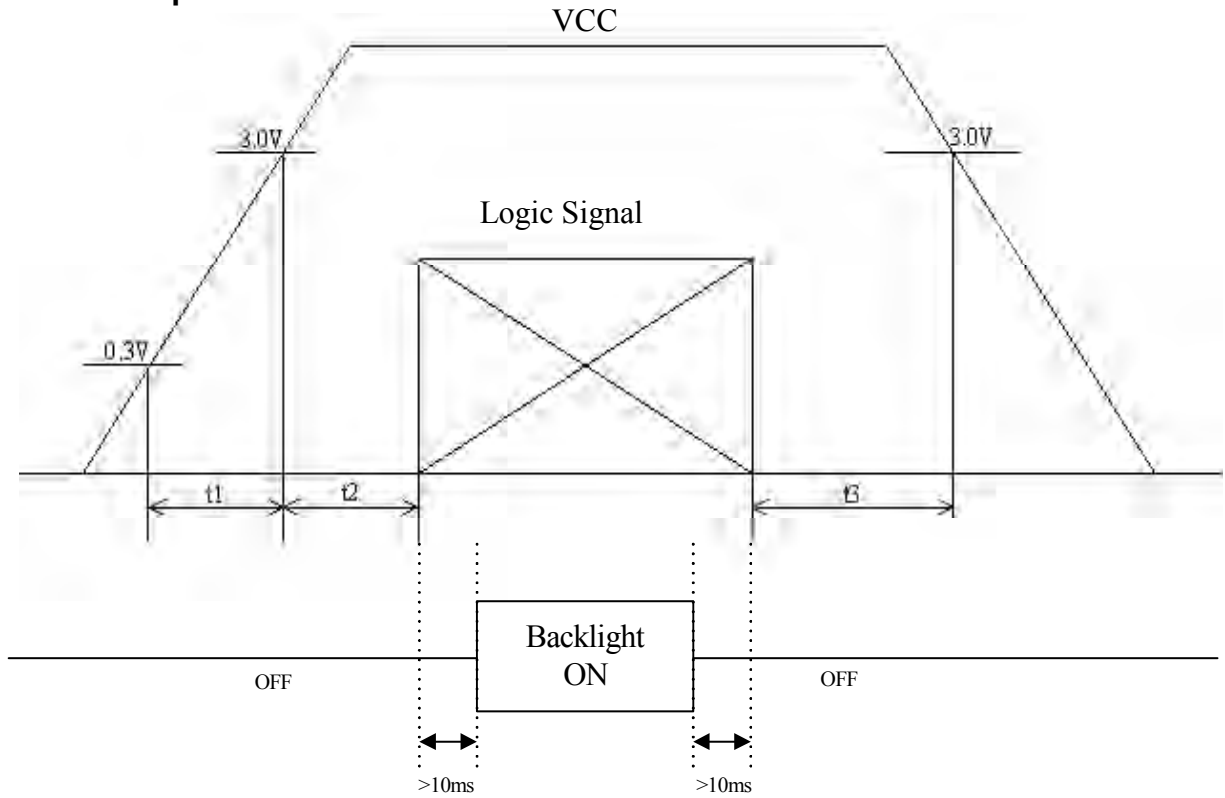


**a.6 DENB timing**





**13. Power On Sequence**



1.  $0 < t_1 \leq 20\text{ms}$
2.  $0 < t_2 \leq 50\text{ms}$
3.  $0 < t_3 \leq 1\text{s}$

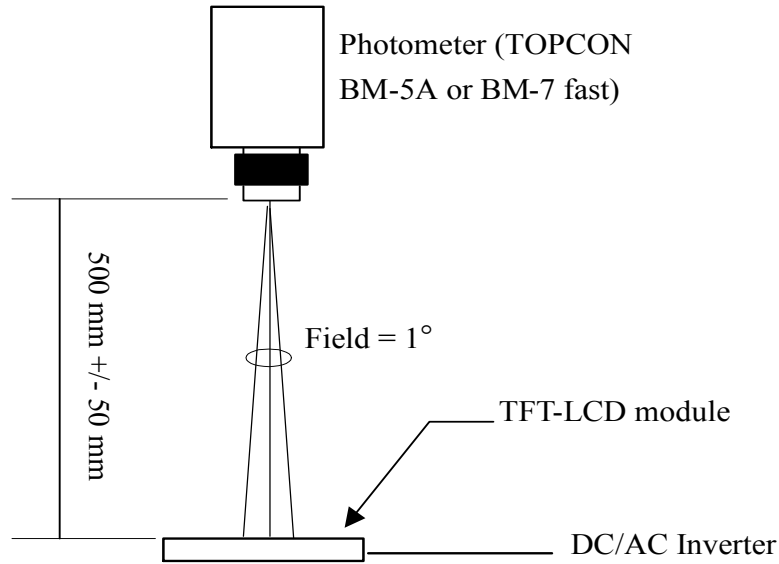
**14. Optical Characteristics**

**14.1) Specification:**

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

| Parameter            | Symbol     | Condition                        | MIN.     | TYP.     | MAX. | Unit                   | Remarks   |
|----------------------|------------|----------------------------------|----------|----------|------|------------------------|-----------|
| Viewing Angle        | Horizontal | $\theta 21.22$                   | $\pm 55$ | $\pm 60$ | -    | deg                    | Note 14-1 |
|                      | Vertical   | $\theta 12$<br>(to 12 o'clock)   | 35       | 40       | -    | deg                    |           |
|                      |            | $\theta 11$<br>(to 6 o'clock)    | 50       | 55       | -    | deg                    |           |
| Contrast Ratio       | CR         | $\theta = 0^\circ / \varphi = 0$ | 250      | 400      | -    | -                      | Note 14-2 |
| Response time        | Rise       | $T_r$                            | -        | 15       | 30   | ms                     | Note 14-3 |
|                      | Fall       | $T_f$                            | -        | 25       | 50   | ms                     |           |
| Brightness           | L          | $\theta = 0^\circ / \varphi = 0$ | 280      | 330      | -    | $\text{cd}/\text{m}^2$ |           |
| Luminance Uniformity | U          | -                                | 70       | 75       | -    | %                      | Note 14-4 |
| Lamp Life Time       | -          | -                                | 25000    | -        | -    | hr                     | At 6mA    |
| White Chromaticity   | x          | $\theta = 0^\circ / \varphi = 0$ | 0.27     | 0.30     | 0.33 | -                      |           |
|                      | y          |                                  | 0.30     | 0.33     | 0.36 | -                      |           |
| Cross Talk           | -          | $\theta = 0^\circ$               | -        | -        | 3.5  | %                      | Note 14-5 |

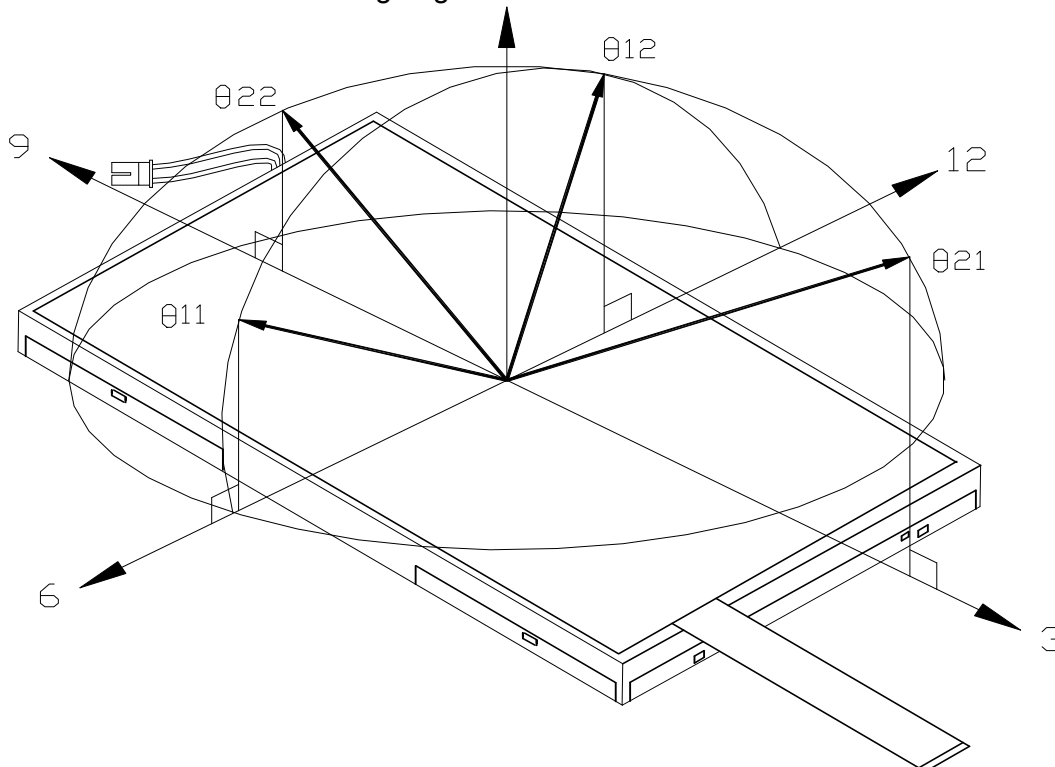
All the optical measurement shall be executed 30 minutes after backlight being turn-on. The optical characteristics shall be measured in dark room (ambient illumination on panel surface less than 1 Lux). The measuring configuration shows as following figure.



Optical characteristics measuring configuration

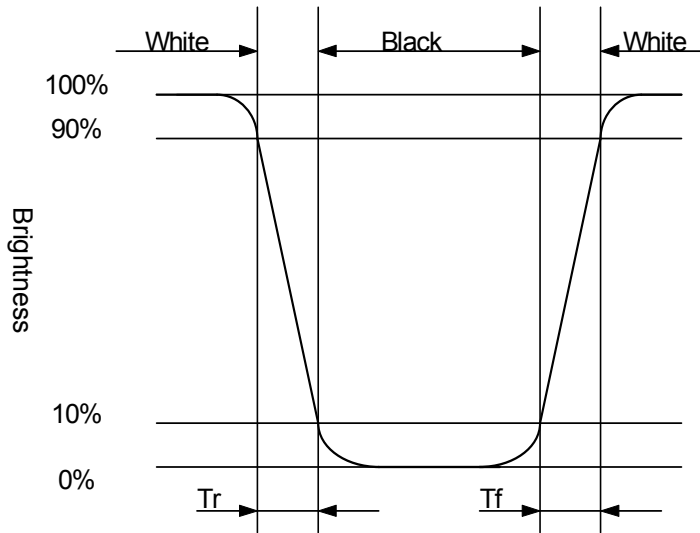
Topcon BM-5A or BM-7 fast luminance meter 1° field of view is used in the testing (after 30 minutes' operation). The typical luminance value is measured at lamp current 6.0 mA.

Note 14-1: The definitions of viewing angles are as follow.



Note 14-2: The definition of contrast ratio  $CR = \frac{\text{Luminance at gray level 63}}{\text{Luminance at gray level 0}}$

Note 14-3: Definition of Response Time  $T_r$  and  $T_f$ :



Note 14-4: The uniformity of LCD is defined as

$$U = \frac{\text{The Minimum Brightness of the 9 testing Points}}{\text{The Maximum Brightness of the 9 testing Points}}$$

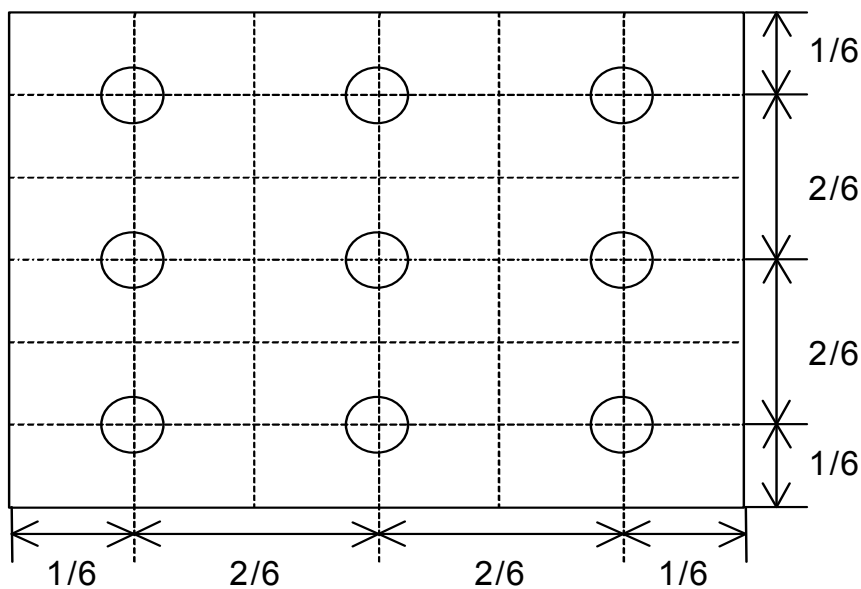
Luminance meter : BM-5A or BM-7 fast(TOPCON)

Measurement distance : 500 mm +/- 50 mm

Ambient illumination : < 1 Lux

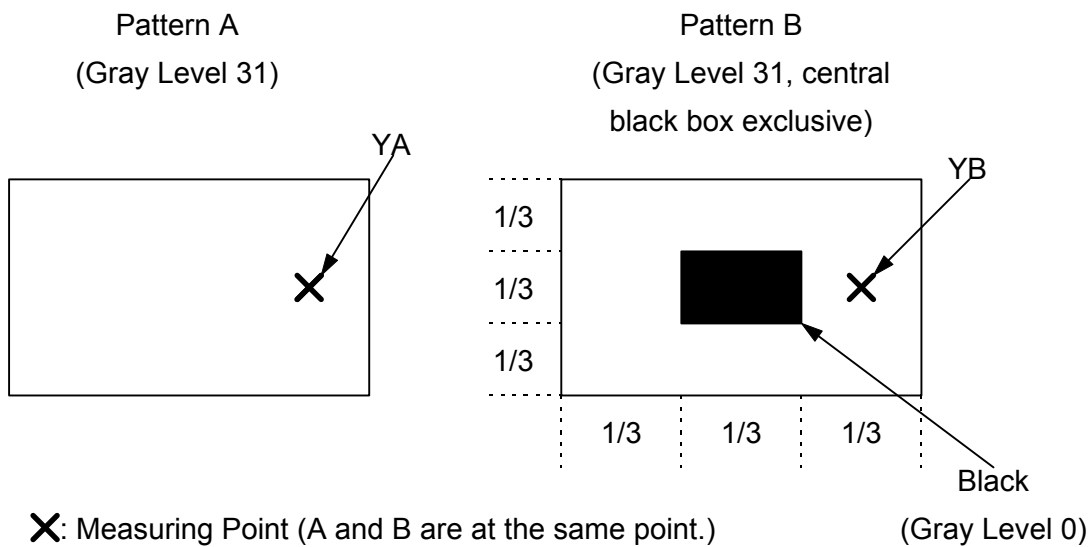
Measuring direction : Perpendicular to the surface of module

The test pattern is white (Gray Level 63).



Note 14-5: Cross Talk (CTK) =  $\frac{|YA-YB|}{YA} \times 100\%$

YA: Brightness of Pattern A  
 YB: Brightness of Pattern B  
 Luminance meter : BM 5A or BM-7 fast (TOPCON)  
 Measurement distance : 500 mm +/- 50 mm  
 Ambient illumination : < 1 Lux  
 Measuring direction : Perpendicular to the surface of module



**15. Handling Cautions**

## 15-1) Mounting of module

- a) Please power off the module when you connect the input/output connector.
- b) Please connect the ground pattern of the inverter circuit surely. If the connection is not perfect, some following problems may happen possibly.
  - 1.The noise from the backlight unit will increase.
  - 2.The output from inverter circuit will be unstable.
  - 3.In some cases a part of module will heat.
- c) Polarizer which is made of soft material and susceptible to flaw must be handled carefully.
- d) Protective film (Laminator) is applied on surface to protect it against scratches and dirt. It is recommended to peel off the laminator before use and taking care of static electricity.

## 15-2) Precautions in mounting

- a) When metal part of the TFT-LCD module (shielding lid and rear case) is soiled, wipe it with soft dry cloth.
- b) Wipe off water drops or finger grease immediately. Long contact with water may cause discoloration or spots.
- c) TFT-LCD module uses glass which breaks or cracks easily if dropped or bumped on hard surface. Please handle with care.
- d) Since CMOS LSI is used in the module. So take care of static electricity and earth yourself when handling.

## 15-3) Adjusting module

- a) Adjusting volumes on the rear face of the module have been set optimally before shipment.
- b) Therefore, do not change any adjusted values. If adjusted values are changed, the specifications described may not be satisfied.

## 15-4) Others

- a) Do not expose the module to direct sunlight or intensive ultraviolet rays for many hours.
- b) Store the module at a room temperature place.
- c) The voltage of beginning electric discharge may over the normal voltage because of leakage current from approach conductor by to draw lump read lead line around.
- d) If LCD panel breaks, it is possibly that the liquid crystal escapes from the panel. Avoid putting it into eyes or mouth. When liquid crystal sticks on hands, clothes or feet. Wash it out immediately with soap.
- e) Observe all other precautionary requirements in handling general electronic components.
- f) Please adjust the voltage of common electrode as material of attachment by 1 module.

### 16. Reliability Test

| No | Test Item                                       | Test Condition   | Remark |
|----|---|--|--------|
| 1  | High Temperature Storage Test                   | Ta = +80°C, 240 hrs  |        |
| 2  | Low Temperature Storage Test                    | Ta = -30°C, 240 hrs  |        |
| 3  | High Temperature Operation Test                 | Ta = +70°C, 240 hrs  |        |
| 4  | Low Temperature Operation Test                  | Ta = -20°C, 240 hrs  |        |
| 5  | High Temperature & High Humidity Operation Test | Ta = +60°C, 90%RH, 240 hrs<br>(No Condensation)  |        |
| 6  | Thermal Cycling Test<br>(non-operating)         | -30°C → +80°C, 100 Cycles<br>30min 30min   |        |
| 7  | Vibration Test<br>(non-operating)               | Frequency : 10 ~ 55 Hz,<br>Amplitude : 1 mm<br>Sweep time: 11 min<br>Test Period: 6 Cycles for each direction of X, Y, Z |        |
| 8  | Shock Test<br>(non-operating)                   | 100G, 6ms<br>Direction: ±X, ±Y, ±Z Cycle: 3 times  |        |
| 9  | Electrostatic Discharge Test<br>(non-operating) | Contact mode: ±8KV, 10times/point<br>, 9 points/panel face<br>Air mode: 150pF, 330Ω Air : ±15KV                          |        |
| 10 | Hitting Durability Test<br>( Touch panel)       | 1,000,000 times, with R 8.0 mm silicon rubber,<br>250g, 3times/sec   |        |
| 11 | Sliding Durability Test<br>( Touch panel)       | 100,000 times, with R 0.8 mm polyacetal stylus,<br>250g, 60mm/sec  |        |

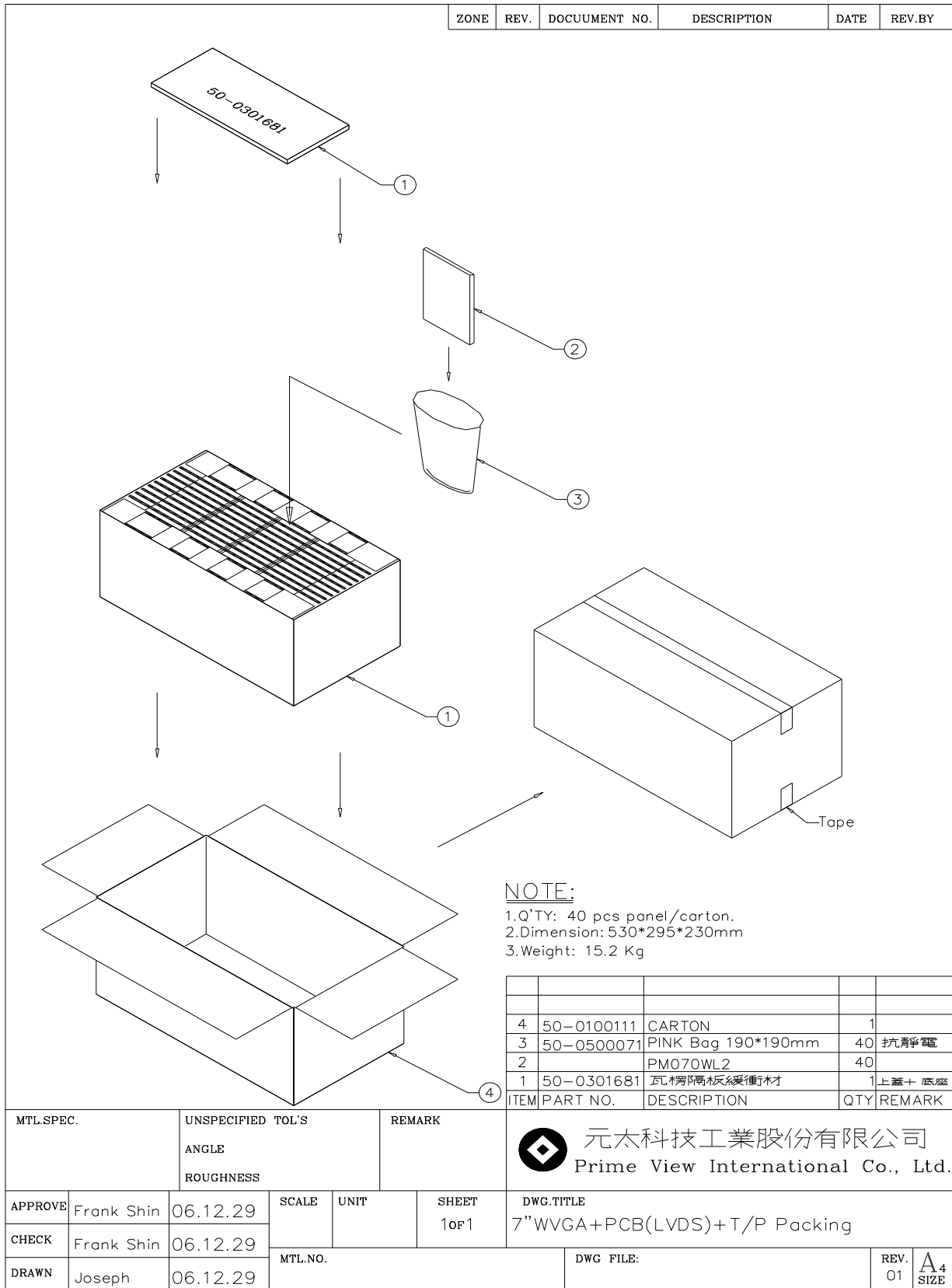
Ta: ambient temperature

Note: The protective film must be removed before temperature test.

[Criteria]

In the standard conditions, there is not display function NG issue occurred. (including : line defect ,no image), All the cosmetic specification is judged before the reliability stress.

**17. Packing Diagram**



## Revision History

| <b>Rev.</b> | <b>Eng.</b> | <b>Issued Date</b> | <b>Revised Contents</b> |
|-------------|-------------|--------------------|-------------------------|
| 0.1         | 蔡弘毅         | Oct.27.2006        | New                     |
| 1.0         | 蔡弘毅         | Jan.03,2006        | Release version         |