

**Version :1.0****TECHNICAL SPECIFICATION****MODEL NO. : PD035VX3**☐ Customer's ConfirmationCustomer  
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# TECHNICAL SPECIFICATION

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## 1. Application

This data sheet applies to a color TFT LCD module, PD035VX3.

The application of panel are projector and other media application which require high quality flat panel display.

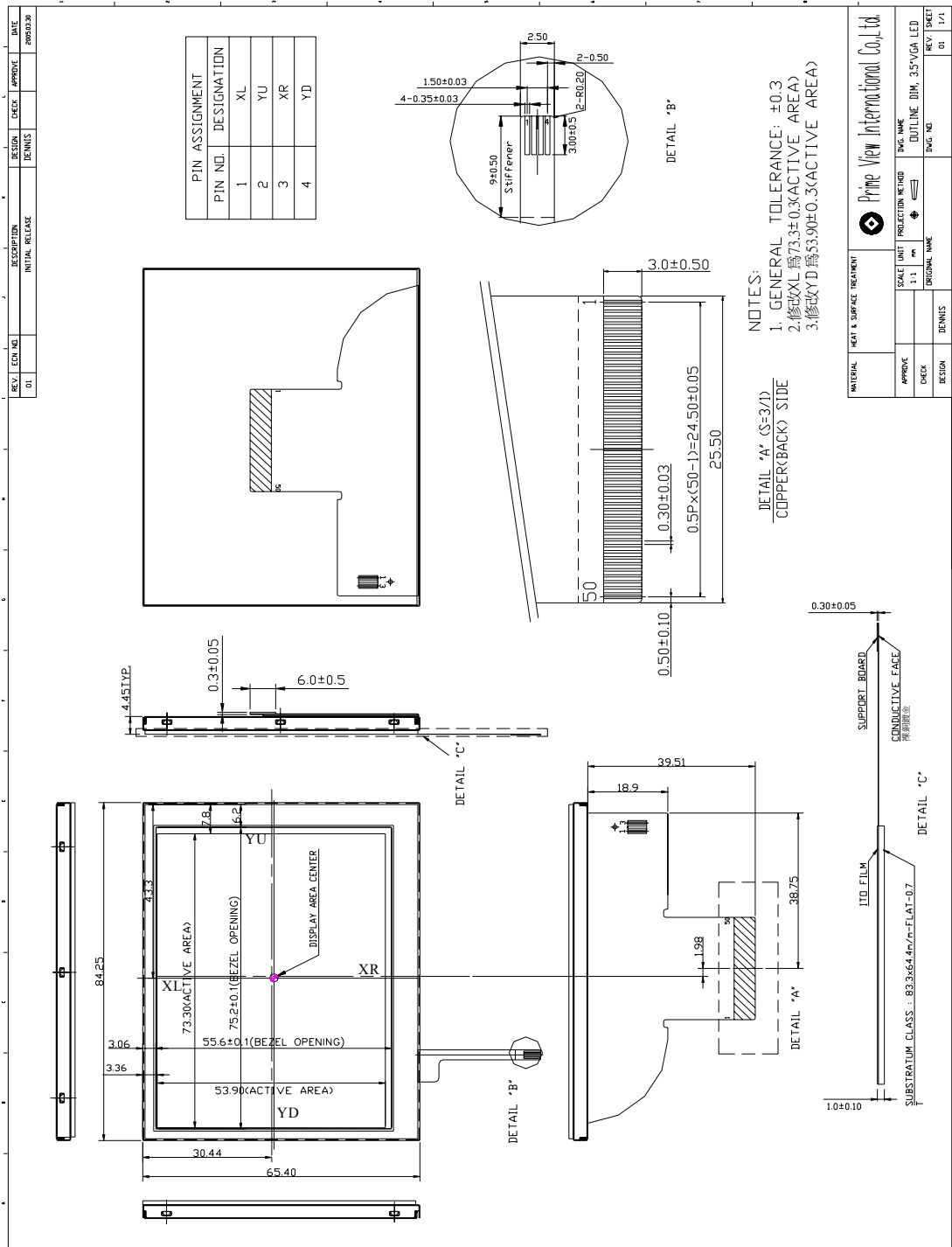
## 2. Features

- . Amorphous silicon TFT LCD panel with LED B/L.
- . Module with resistive type touch panel .
- . Pixel in stripe configuration
- . Display Colors : 262,144 colors
- . Optimum Viewing Direction : 6 o'clock
- . TTL transmission interface

## 3. Mechanical Specifications

| Parameter                        | Specifications                      | Unit |
|----------------------------------|-------------------------------------|------|
| Screen Size                      | 3.5 (diagonal)                      | inch |
| Display Format                   | 640×(R, G, B)×480                   | dot  |
| Display Colors                   | 262,144                             |      |
| Active Area                      | 72 (H)×52.56 (V)                    | mm   |
| Pixel Pitch                      | 0.1125 (H)×0.1095 (V)               | mm   |
| Pixel Configuration              | Stripe                              |      |
| Outline Dimension                | 84.25 (W)×65.40 (H)×4.45 (D) (Typ.) | mm   |
| Weight                           | 52±5                                | g    |
| Surface treatment                | AG                                  |      |
| Surface treatment of Touch Panel | 3H                                  |      |

#### 4.Mechanical Drawing of TFT-LCD Module



**5. Input / Output Terminals**

| Pin No. | Symbol | I/O | Function                                        | Remark     |
|---------|--------|-----|-------------------------------------------------|------------|
| 1       | DIO1   | I/O | Horizontal Start Pulse Signal Input or Output 1 | Note5 - 1  |
| 2       | VSS2   | I   | Ground                                          |            |
| 3       | VDD1   | I   | Power Supply                                    |            |
| 4       | CLK    | I   | Horizontal Shift Clock                          |            |
| 5       | R/L    | I   | Left/Right Selection                            | Note 5 - 1 |
| 6       | R0     | I   | Red Data (LSB)                                  |            |
| 7       | R1     | I   | Red Data                                        |            |
| 8       | R2     | I   | Red Data                                        |            |
| 9       | R3     | I   | Red Data                                        |            |
| 10      | R4     | I   | Red Data                                        |            |
| 11      | R5     | I   | Red Data (MSB)                                  |            |
| 12      | VSS2   | I   | Ground                                          |            |
| 13      | G0     | I   | Green Data (LSB)                                |            |
| 14      | G1     | I   | Green Data                                      |            |
| 15      | G2     | I   | Green Data                                      |            |
| 16      | G3     | I   | Green Data                                      |            |
| 17      | G4     | I   | Green Data                                      |            |
| 18      | G5     | I   | Green Data (MSB)                                |            |
| 19      | B0     | I   | Blue Data (LSB)                                 |            |
| 20      | B1     | I   | Blue Data                                       |            |
| 21      | B2     | I   | Blue Data                                       |            |
| 22      | B3     | I   | Blue Data                                       |            |
| 23      | B4     | I   | Blue Data                                       |            |
| 24      | B5     | I   | Blue Data (MSB)                                 |            |
| 25      | LD     | I   | Load output signal                              | Note5 - 2  |
| 26      | REV    | I   | Data invert control                             | Note5 - 3  |
| 27      | POL    | I   | Polarity selection                              | Note5 - 4  |
| 28      | DIO2   | I/O | Horizontal Start Pulse Signal Input or Output   | Note5 - 1  |
| 29      | VSS2   | I   | Ground                                          |            |
| 30      | V3     | I   | Gamma Voltage 3                                 | Note5 - 5  |
| 31      | V5     | I   | Gamma Voltage 5                                 | Note5 - 5  |
| 32      | V7     | I   | Gamma Voltage 7                                 | Note5 - 5  |
| 33      | V8     | I   | Gamma Voltage 8                                 | Note5 - 5  |
| 34      | V10    | I   | Gamma Voltage 10                                | Note5 - 5  |
| 35      | V12    | I   | Gamma Voltage 12                                | Note5 - 5  |
| 36      | VSS2   | I   | Ground                                          |            |
| 37      | VDD2   | I   | Voltage for analog circuit                      | Note5 - 5  |
| 38      | VCOM   | I   | Common Voltage                                  |            |
| 39      | OE     | I   | Output Enable                                   | Note5 - 6  |
| 40      | U/D    | I   | Up/Down Selection                               | Note 5 - 7 |
| 41      | CKV    | I   | Vertical Shift Clock                            | Note5 - 8  |
| 42      | STVU   | I/O | Vertical Shift Pulse Signal Input or Output     | Note5 - 7  |
| 43      | STVD   | I/O | Vertical Shift Pulse Signal Input or Output     | Note5 - 7  |
| 44      | VGG    | I   | Gate On Voltage                                 | Note5 - 9  |
| 45      | VSS1   | I   | Ground                                          |            |
| 46      | VCC    | I   | Voltage for logic circuit                       |            |
| 47      | VEE    | I   | Gate Off Voltage                                | Note5 - 10 |
| 48      | VLED   | -   | Supply voltage for LED backlight                | Note5 - 11 |
| 49      | GLED2  | -   | Ground for LED backlight                        |            |
| 50      | GLED1  | -   | Ground for LED backlight                        |            |

Note 5-1: Select left or right shift

| R/L | DIO1  | DIO2  | Shift         |
|-----|-------|-------|---------------|
| 1   | Input | Hi-Z  | Left to right |
| 0   | Hi-Z  | Input | Right to left |

Note 5-2: Latch the polarity of outputs and switch the new data to outputs

At the rising edge (LD), latch the “POL” signal to control the polarity of the outputs.

Note 5-3: Control whether the Data R0~G5 are inverted or not. (PVI suggests connecting to GND)

When “REV=1”, these data will be inverted.

EX: “00”→”3F”, “07”→”38”, “15”→”2A”

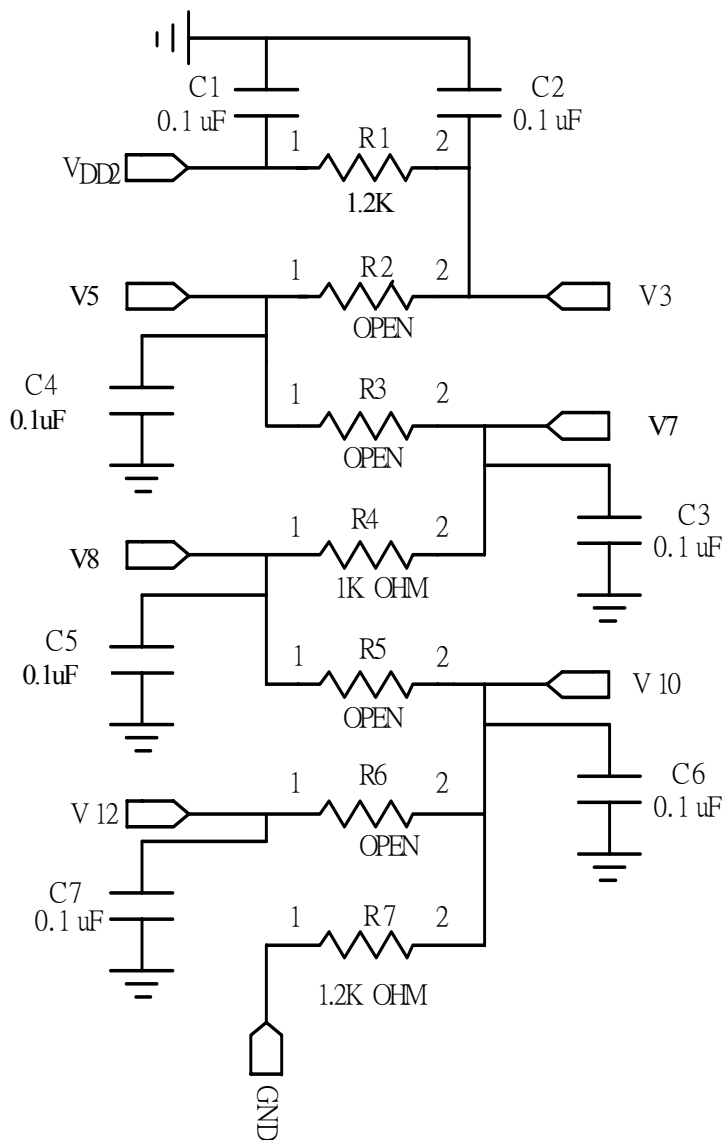
Note 5-4: Polarity selector for dot-inversion control. Available at the rising edge of LD.

When POL=1: Even outputs range from V1~V7, and Odd outputs range from V8~V14;

When POL=0: Even outputs range from V8~V14, and Odd outputs range from V1~V7.

Note 5-5:

Typical Application Circuit



Note 5-6: When OE is connected to high “1”, the driver outputs are disabled (Gate output =  $V_{EE}$ ).  
Under this condition, the operation of registers will not be affected.

Note 5-7: Select up or down shift

| U/D | STVU  | STVD  | Shift      |
|-----|-------|-------|------------|
| 1   | Hi-Z  | Input | Down to Up |
| 0   | Input | Hi-Z  | Up to Down |

Note 5-8: Gate driver shift clock

Note 5-9: Gate on voltage,  $V_{GG} = +17V$ .

Note 5-10: Gate off voltage,  $V_{EE} = -10V$ .

Note 5-11:  $I_{LED}$  TYP.=20mA.

## 6.Touch Panel Characteristics

### 6.1) Pin assignment:

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

### 6.2) Electrical Performance:

| Parameters                | Symbol | MIN. | Typ. | MAX.      | Unit       | Remark   |
|---------------------------|--------|------|------|-----------|------------|----------|
| Terminal Resistance       | X      | 100  | -    | 900       | $\Omega$   |          |
|                           | Y      | 100  | -    | 900       | $\Omega$   |          |
| 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             |        |      |      | 5         | ms         |          |
| Operation Force           |        |      |      | 35        | 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, 200g , 3times/sec .

#### 2. Sliding Durability:

At least 1,00,000 times with R0.8mm polyacetal stylus , 200g , 60mm/sec.

## 7.Absolute Maximum Ratings:

$$V_{SS1}=V_{SS2}=GND=0V, T_a=25^{\circ}C$$

| Parameters     | Symbol          | MIN. | MAX. | Unit | Remark |
|----------------|-----------------|------|------|------|--------|
| Supply Voltage | $V_{DD1}$       | -0.3 | 2    | V    |        |
|                | $V_{CC}$        | -0.3 | 5    | V    |        |
|                | $V_{DD2}$       | -0.5 | 12.0 | V    |        |
|                | $V_{GG}$        | -0.3 | 40.0 | V    |        |
|                | $V_{GG}-V_{EE}$ | -    | 40.0 | V    |        |



|                       |                 |     |     |    |           |
|-----------------------|-----------------|-----|-----|----|-----------|
|                       | V <sub>EE</sub> | -20 | 0.3 | V  |           |
| Storage Temperature   | T <sub>ST</sub> | -20 | 70  | °C |           |
| Operating Temperature | T <sub>OP</sub> | 0   | 60  | °C | Notes 7-1 |

Note7-1 : Operating Temperature define that contrast, response time, other display optical character are Ta=+25.

## 8. Electrical Characteristics

### 8-1) Recommended Operating Conditions:

V<sub>SS1</sub>=V<sub>SS2</sub>=GND = 0V , Ta = 25°C

| Item                             | Symbol           | Min.                | Typ.  | Max.                | Unit | Remark |
|----------------------------------|------------------|---------------------|-------|---------------------|------|--------|
| Supply Voltage for Source Driver | V <sub>DD1</sub> | 3.0                 | 3.3   | 3.6                 | V    |        |
|                                  | V <sub>DD2</sub> | 9.5                 | 10    | 10.5                |      |        |
| Supply Voltage for Gate Driver   | V <sub>GG</sub>  | -                   | +17   | -                   | V    |        |
|                                  | V <sub>EE</sub>  | -                   | -10   | -                   | V    |        |
|                                  | V <sub>CC</sub>  | 3.0                 | 3.3   | 3.6                 | V    |        |
| Supply Voltage for Vcom          | Vcom             |                     | (2.7) |                     | V    |        |
| Digital Input Voltage            | V <sub>IH</sub>  | 0.8V <sub>DD1</sub> | -     | V <sub>DD1</sub>    | V    |        |
|                                  | V <sub>IL</sub>  | 0                   | -     | 0.2V <sub>DD1</sub> | V    |        |

### 8-2) Recommended driving condition for LED backlight

GND = 0 V , Ta = 25°C

| Parameter                       | Symbol            | Min | TYP | MAX  | Unit | Remark                 |
|---------------------------------|-------------------|-----|-----|------|------|------------------------|
| Supply voltage of LED backlight | V <sub>LED</sub>  | 9   | 9.6 | 11.4 | V    | I <sub>L</sub> = 20 mA |
| Supply current of LED backlight | I <sub>LED1</sub> |     | 20  |      | mA   | Note 8-1               |
|                                 | I <sub>LED2</sub> |     |     |      |      |                        |
| Backlight Power Consumption     | P <sub>LED</sub>  | 360 | 384 | 456  | mW   | Note 8-2               |

Note 8-1 : LED B/L applied information , please refer to the appendix at the end .

Note 8-2 : P<sub>LED</sub> = V<sub>LED</sub> \* I<sub>LED1</sub> + V<sub>LED</sub> \* I<sub>LED2</sub> .

V<sub>LED</sub>  G<sub>LED1</sub>

V<sub>LED</sub>  G<sub>LED2</sub>

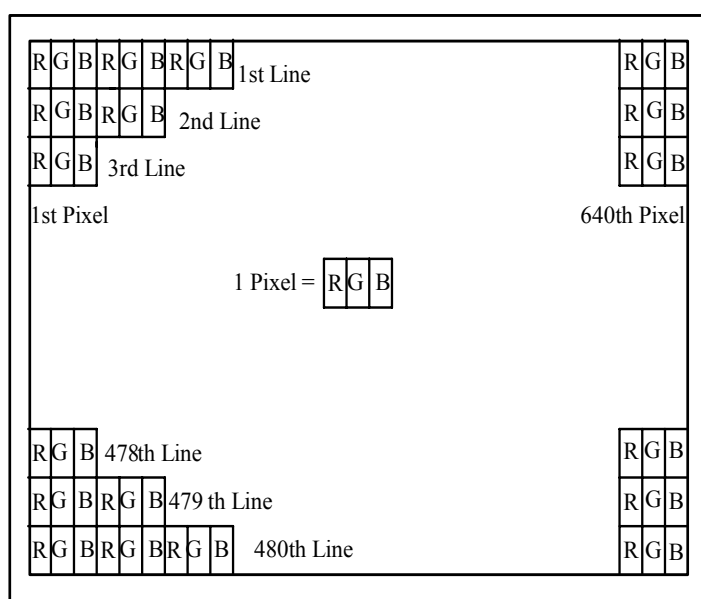
### 8-3) Power Consumption

| Parameter                                  | Symbol           | Condition               | Typ. | Max. | Unit | Remark |
|--------------------------------------------|------------------|-------------------------|------|------|------|--------|
| Supply Current for Gate Driver (Hi level)  | I <sub>GG</sub>  | V <sub>GG</sub> =+17V   | 0.12 | 0.15 | mA   |        |
| Supply Current for Gate Driver (Low level) | I <sub>EE</sub>  | V <sub>EE</sub> =-10V   | 0.15 | 0.19 | mA   |        |
| Supply Current for Source Driver (Digital) | I <sub>DD1</sub> | V <sub>DD1</sub> =+3.3V | 4.8  | 8.0  | mA   |        |

|                                           |           |                |      |      |    |  |
|-------------------------------------------|-----------|----------------|------|------|----|--|
| Supply Current for Source Driver (Analog) | $I_{DD2}$ | $V_{DD2}=+10V$ | 16.0 | 30.0 | mA |  |
| Supply Current for Gate Driver (Digital)  | $I_{CC}$  | $V_{CC}=+3.3V$ | 0.17 | 0.21 | mA |  |
| LCD Panel Power Consumption               |           |                | 180  | 332  | mW |  |
| Backlight Power Consumption               | $P_{LED}$ |                | 384  | 456  | mW |  |
| Total Power Consumption                   |           |                | 564  | 788  | mW |  |

## 9. Pixel Arrangement

The LCD module pixel arrangement is the stripe.

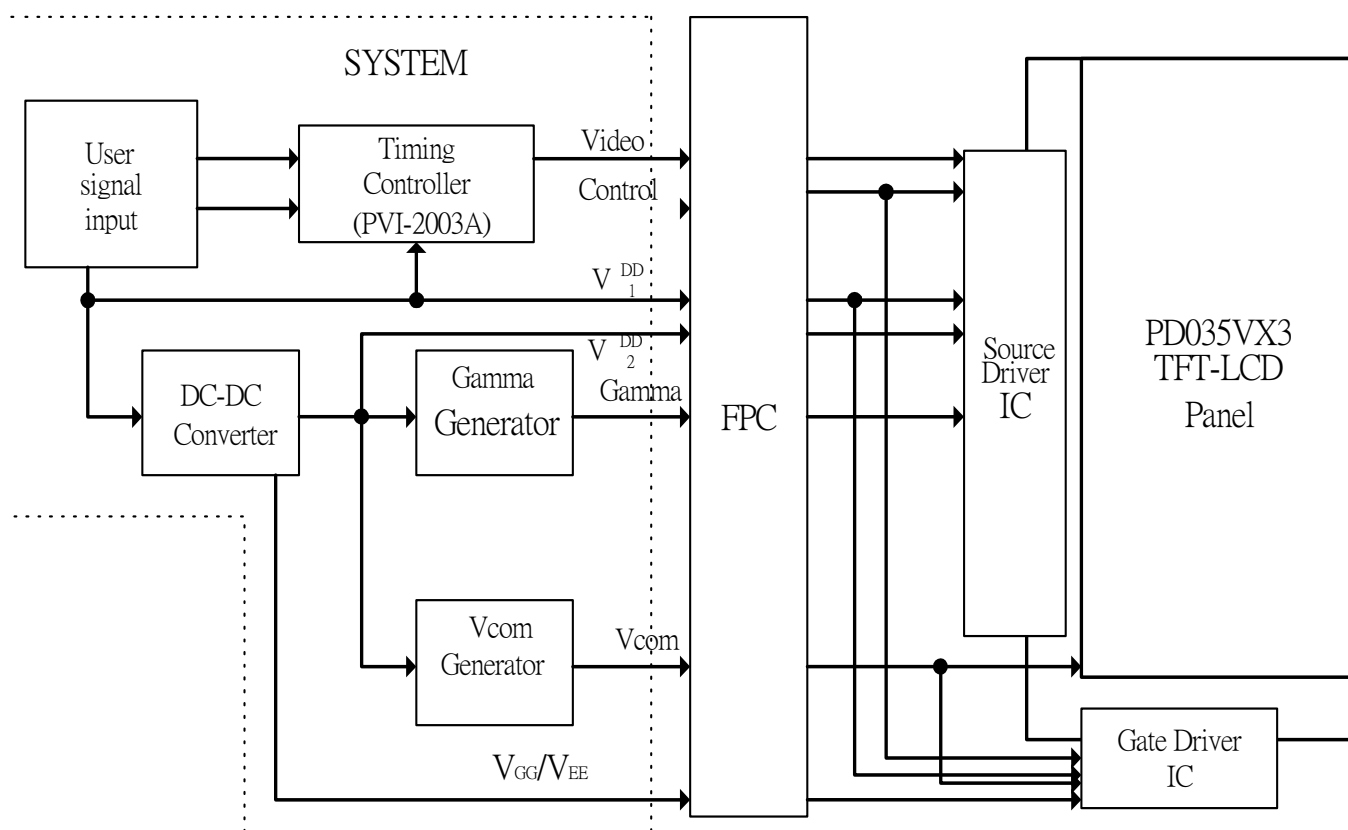


## 10. Display Color and Gray Scale Reference

| 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 |
|       | 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  |

|              |            |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--------------|------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Basic Colors | 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 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|              | Green (02) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 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 | 1 | 0 |
|              | Blue (02)  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 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



## 12. Interface Timing

### 12.1) Timing Parameters

AC Electrical Characteristics ( $V_{CC}=V_{DD1}=3.3V$ ,  $V_{DD2}=10V$ ,  $GND=V_{SS1}=V_{SS2}=0V$ ,  $T_a=25^{\circ}C$ )

| Parameter                      | Symbol                      | Min. | Typ. | Max. | Unit             |
|--------------------------------|-----------------------------|------|------|------|------------------|
| CLK Frequency                  | Fclk                        | -    | 25   | 40   | MHz              |
| CLK Pulse Width                | T <sub>CPH</sub>            | 25   | -    | -    | ns               |
| Data Set-up Time               | T <sub>su</sub>             | 4    | -    | -    | ns               |
| Data Hold Time                 | T <sub>hd</sub>             | 2    | -    | -    | ns               |
| Propagation Delay of DIO2/1    | T <sub>phl</sub>            | 6    | 10   | 15   | ns               |
| Time That The Last Data to LD  | T <sub>ld</sub>             | 1    | -    | -    | T <sub>CPH</sub> |
| Pulse width of LD              | T <sub>wld</sub>            | 2    | -    | -    | T <sub>CPH</sub> |
| Time That LD to DIO1/2         | T <sub>lds</sub>            | 5    | -    | -    | T <sub>CPH</sub> |
| POL Set-up Time                | T <sub>psu</sub>            | 6    | -    | -    | ns               |
| POL Hold Time                  | T <sub>phd</sub>            | 6    | -    | -    | ns               |
| OE Pulse Width                 | T <sub>OE<sub>V</sub></sub> | 1    | -    | -    | μs               |
| CKV Pulse Width                | T <sub>CKV</sub>            | 500  | -    | -    | ns               |
| STV Set-up Time                | T <sub>SUV</sub>            | 400  | -    | -    | ns               |
| STV Hold Time                  | T <sub>HDV</sub>            | 400  | -    | -    | ns               |
| Horizontal Display Period      | T <sub>HDP</sub>            | -    | 640  | -    | T <sub>CPH</sub> |
| Horizontal Period Timing Range | T <sub>HP</sub>             | -    | 800  | -    | T <sub>CPH</sub> |
| Horizontal Lines Per Field     | T <sub>V</sub>              | 520  | 525  | 640  | T <sub>HP</sub>  |
| Vertical Display Timing Range  | T <sub>DV</sub>             | -    | 480  | -    | T <sub>HP</sub>  |

### 12.2) Timing Diagram

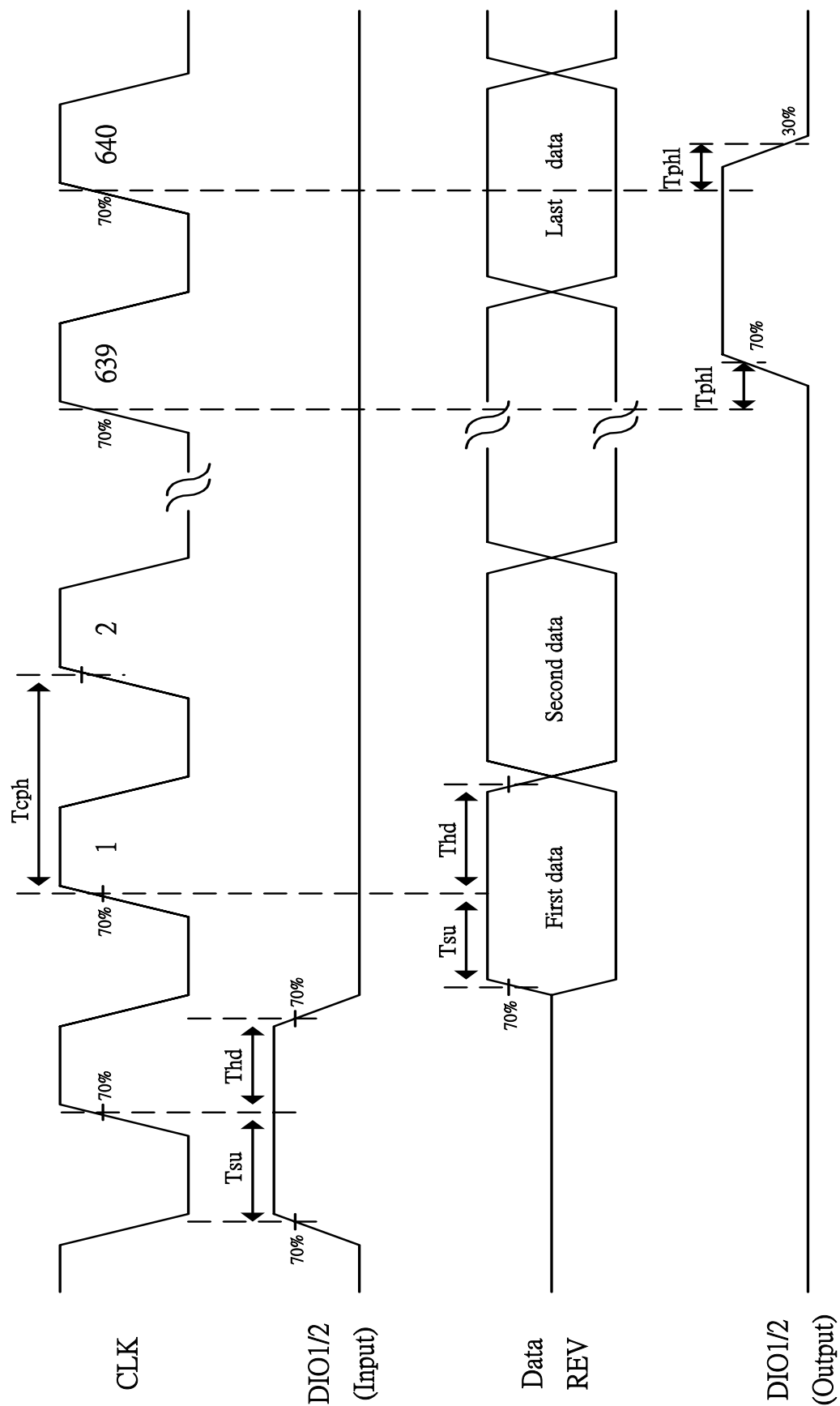


Fig. 1 1-1 Horizontal timing(1)

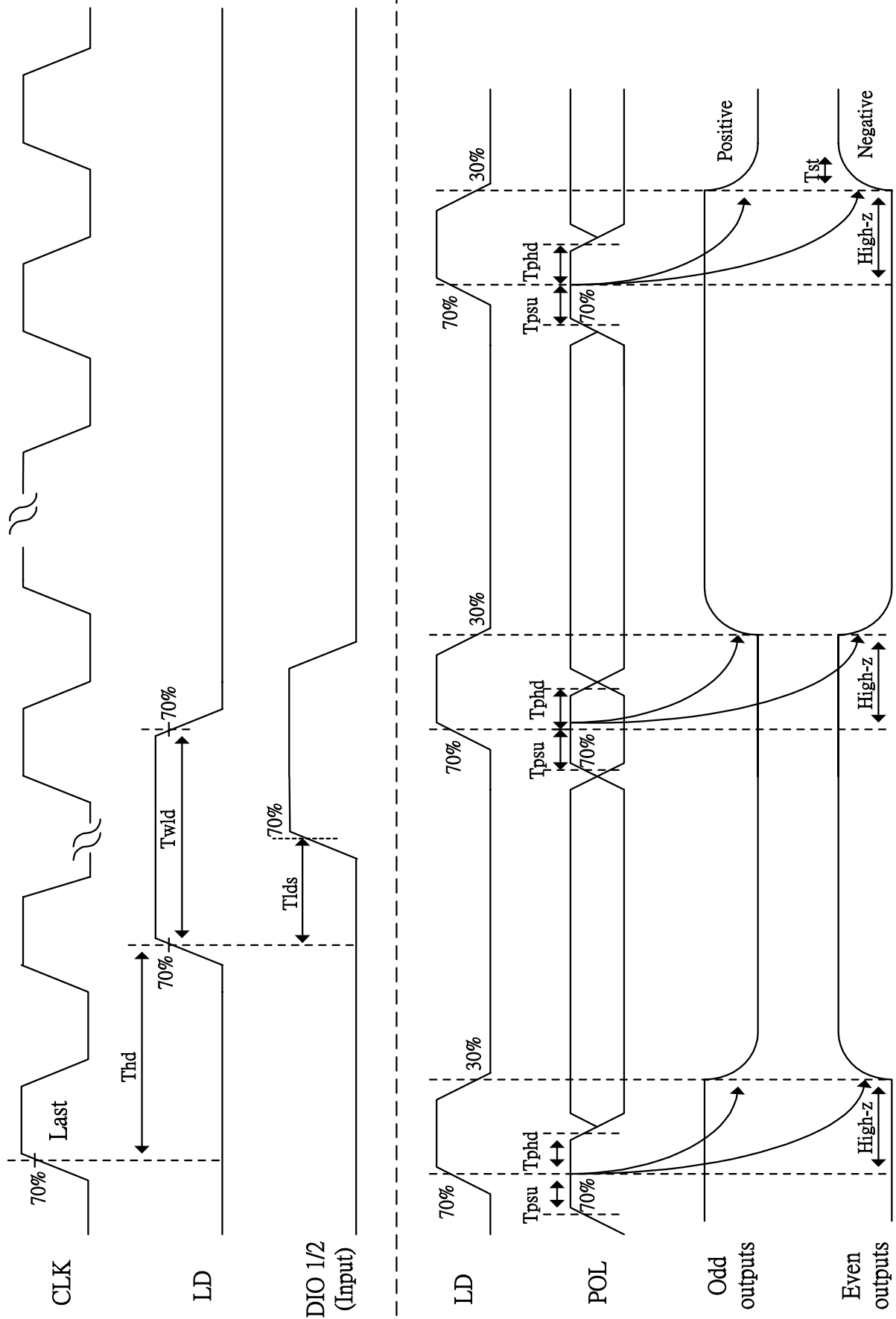


Fig. 11-2 Horizontal timing(2)

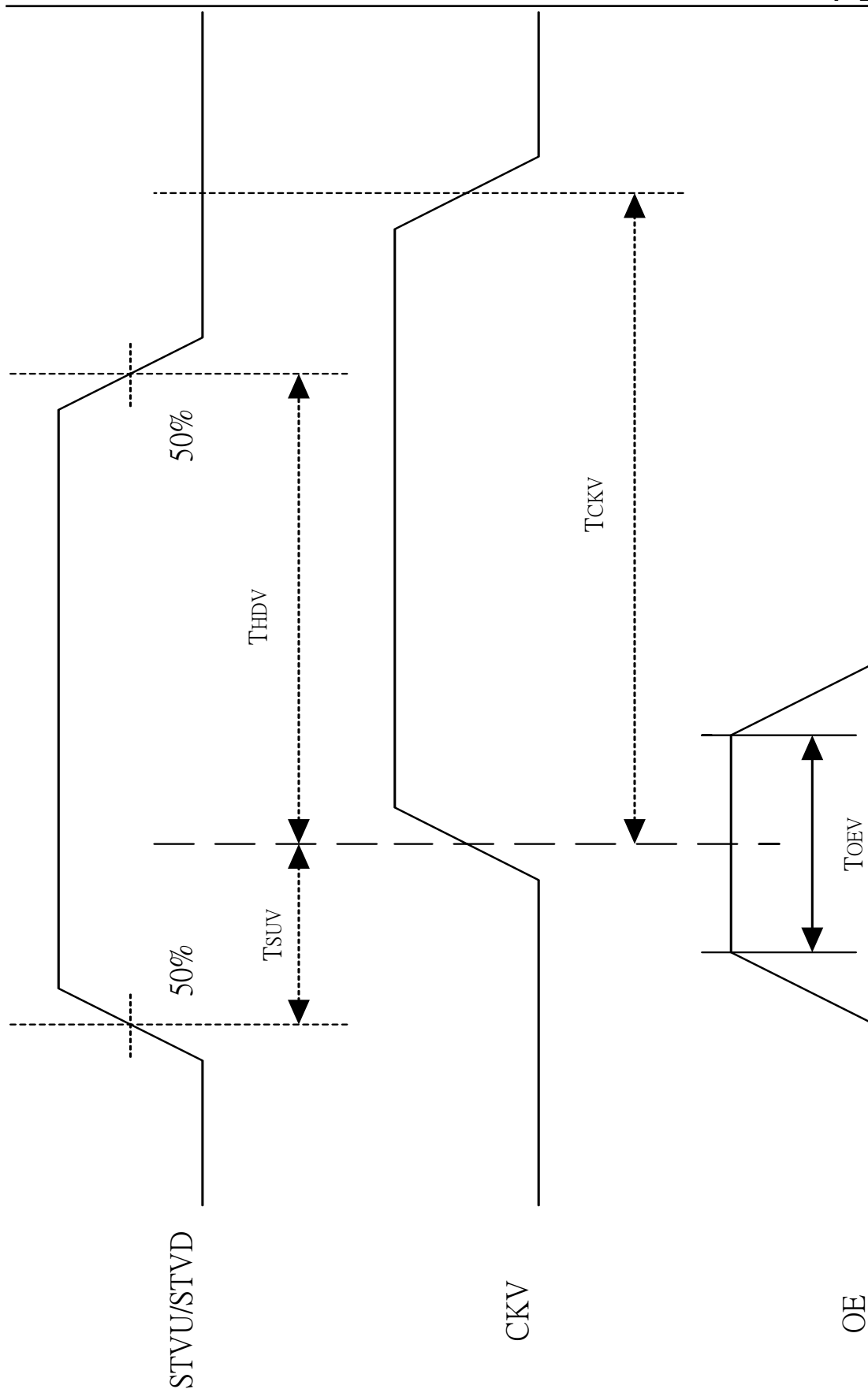


Fig. 11-3 Vertical shift clock timing



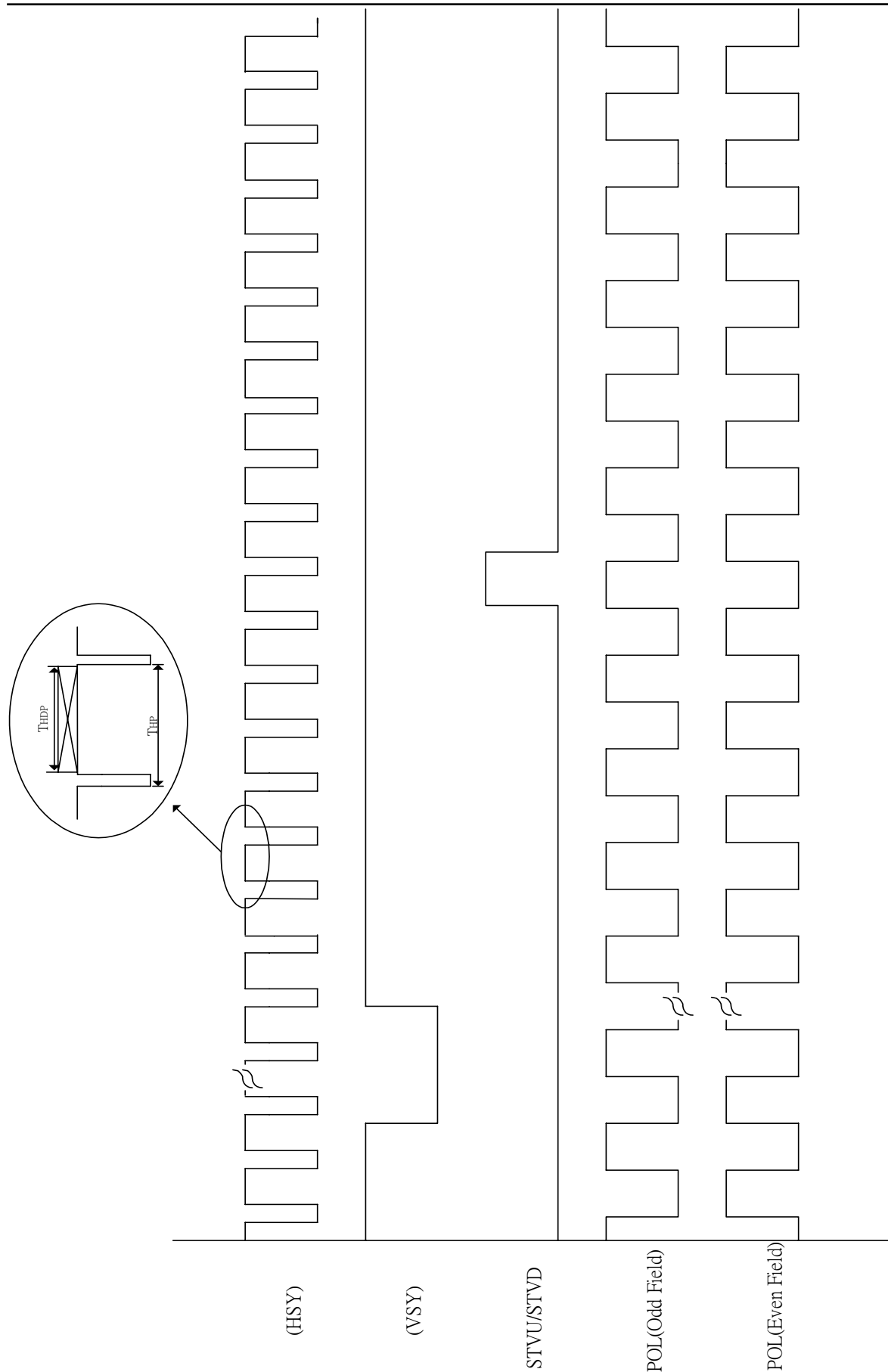
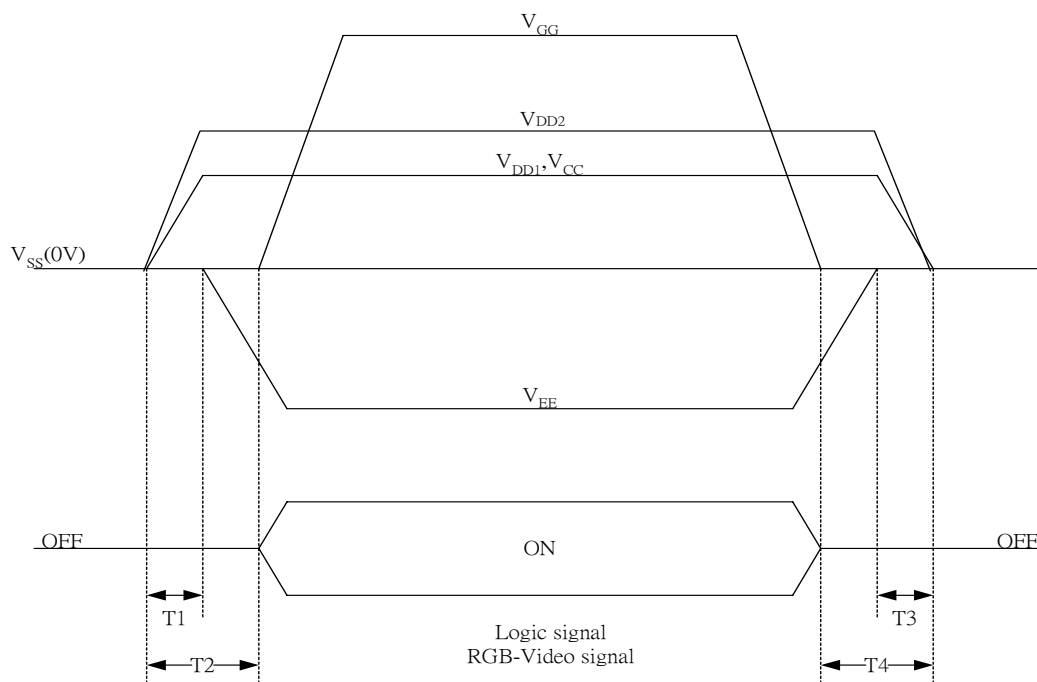


Fig. 11-4 Vertical timing

### 13. Power On Sequence

1)  $10\text{ms} \leq T1 < T2$



2)  $0\text{ms} < T3 \leq T4 \leq 10\text{ms}$

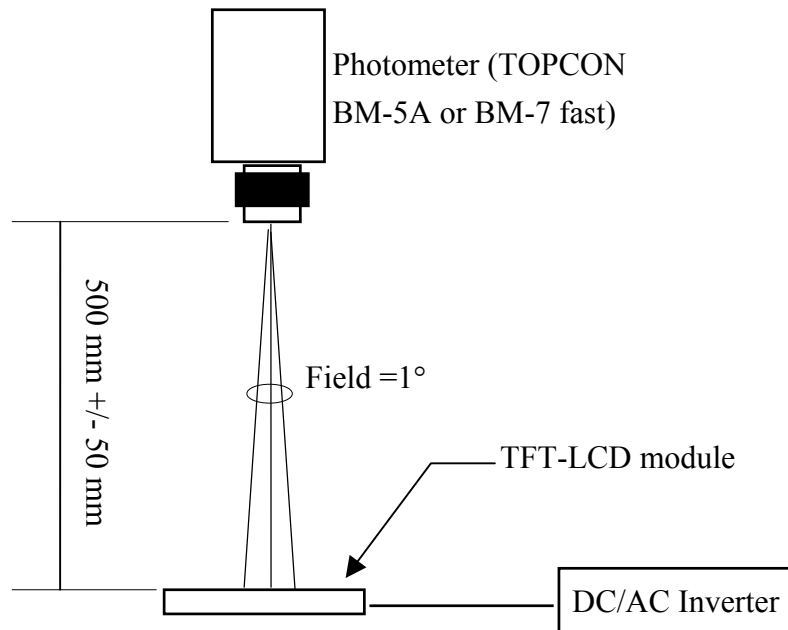
## 14. Optical Characteristics

### 14-1) Specification:

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

| Parameter          |            | Symbol                     | Condition          | MIN. | TYP.  | MAX. | Unit              | Remarks   |
|--------------------|------------|----------------------------|--------------------|------|-------|------|-------------------|-----------|
| Viewing Angle      | Horizontal | $\theta$                   | CR > 10            | ±45  | ±50   |      | deg               | Note 14-2 |
|                    | Vertical   | $\theta$ 12(to 12 o'clock) |                    | 10   | 15    | -    | deg               |           |
|                    |            | $\theta$ 11(to 6 o'clock)  |                    | 30   | 35    | -    | deg               |           |
| Contrast Ratio     |            | CR                         |                    | 200  | 400   | -    | -                 | Note 14-4 |
| Response time      | Rise       | Tr                         | $\theta = 0^\circ$ | -    | 15    | 30   | ms                | Note 14-3 |
|                    | Fall       | Tf                         |                    | -    | 25    | 50   | ms                |           |
| Brightness         |            |                            | $\theta = 0^\circ$ | 180  | 210   |      | cd/m <sup>2</sup> | Note 14-1 |
| Uniformity         |            | U                          | $\theta = 0^\circ$ | 70   | 75    |      | %                 | Note 14-5 |
| Cross Talk         |            |                            | $\theta = 0^\circ$ | -    | -     | 3    | %                 | Note 14-6 |
| White Chromaticity |            | x                          |                    | 0.28 | 0.31  | 0.34 | -                 | Note 14-1 |
|                    |            | y                          |                    | 0.30 | 0.33  | 0.36 | -                 |           |
| LED Life Time      | Ta=25℃     |                            |                    | -    | 10000 | -    | hrs               |           |

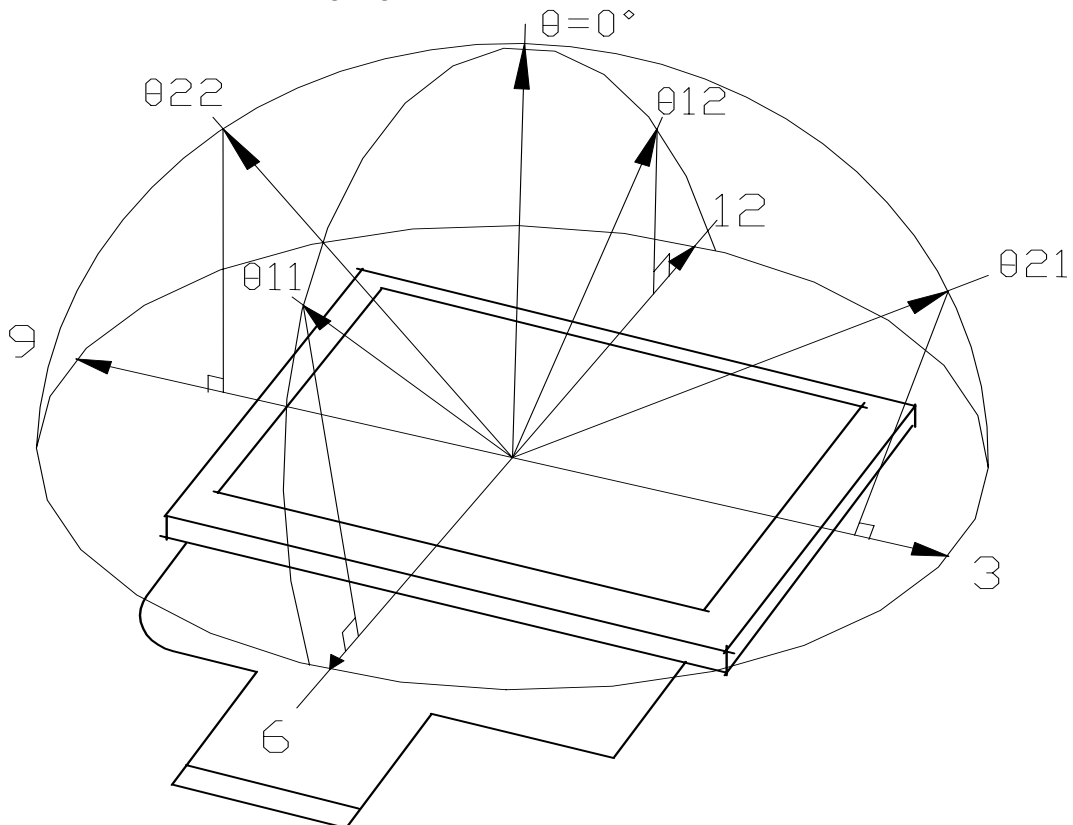
All the optical measurement shall be executed 1 minute after backlight being turn-on. The optical characteristics shall be measured in dark room (ambient illumination on panel surface less than 1 Lux). The measuring configuration shows as following figure.



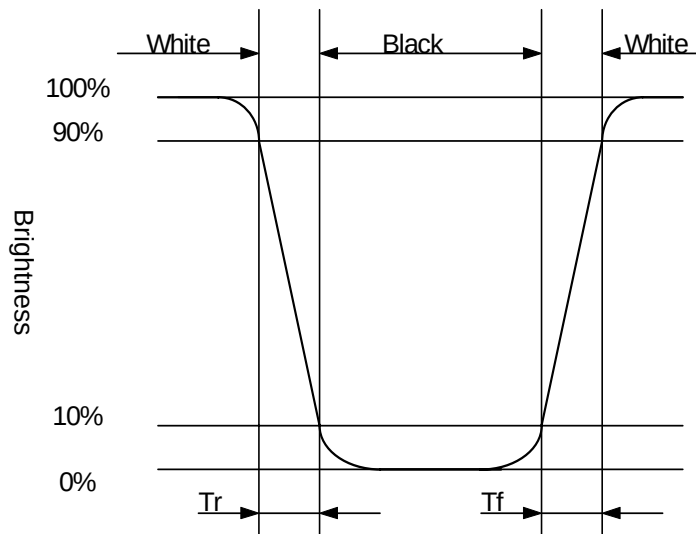
Optical characteristics measuring configuration

Note 14-1: 1.Topcon BM-5A or BM-7 fast luminance meter 1° field of view is used in the testing (after 1 minute operation).

Note 14-2: The definitions of viewing angles are as follow



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



Note 14-4: The definition of contrast ratio  $CR = \frac{\text{Luminance at gray level 63}}{\text{Luminance at gray level 0}}$

Note 14-5 : The uniformity of LCD is defined as

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

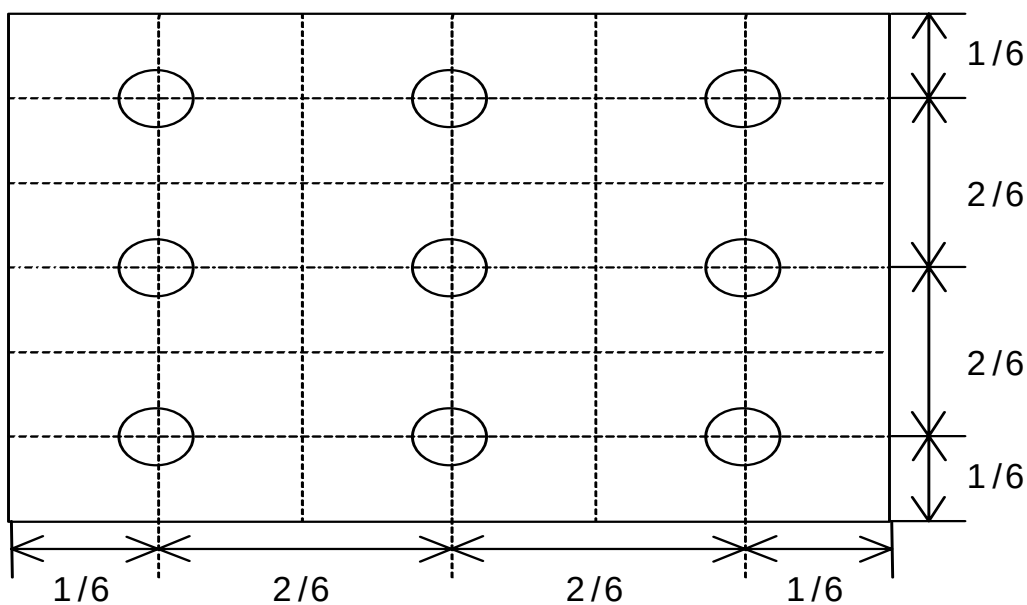
Luminance meter : BM-5A or BM-7 fast (TOPCON)

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 14-6 : Cross Talk (CTK) =  $\frac{|YA-YB|}{YA} \times 100\%$

YA : Brightness of Pattern A

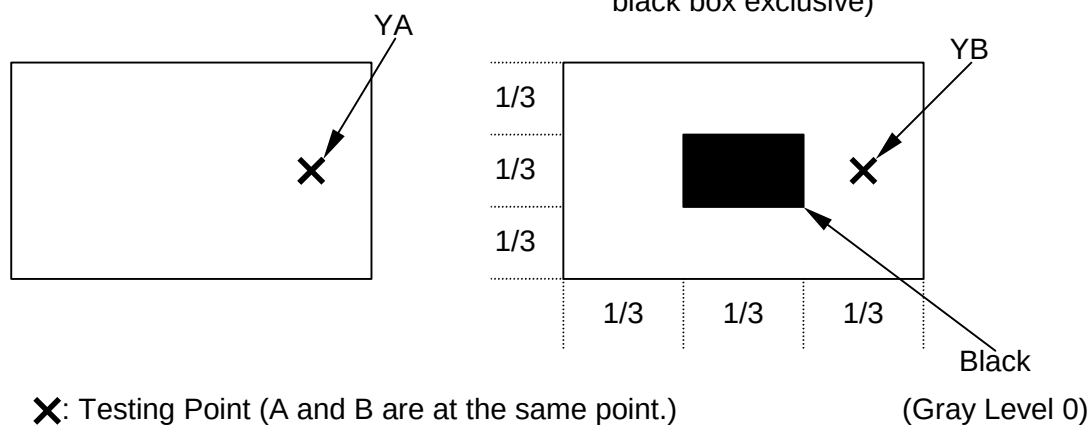
YB : Brightness of Pattern B

Pattern A

(Gray Level 31)

Pattern B

(Gray Level 31, central  
black box exclusive)



**15. Handling Cautions****15-1) Mounting of module**

- a) Please power off the module when you connect the input/output connector.
- b) Polarizer which is made of soft material and susceptible to flaw must be handled carefully.
- c) 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) Wipe off water drops or finger grease immediately. Long contact with water may cause discoloration or spots.
- b) TFT-LCD module uses glass which breaks or cracks easily if dropped or bumped on hard surface. Please handle with care.
- c) Since CMOS LSI is used in the module. So take care of static electricity and earth yourself when handling.

**15-3) Precautions about touch panel**

- a) Input must be performed through a special designed stylus only. Do not pile up the products or put any heavy things on it.

**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.

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**16. Reliability Test**

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| No | Test Item                                       | Test Condition                                                                                                               |
|----|-------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| 1  | High Temperature Storage Test                   | Ta = +70°C, 240 hrs                                                                                                          |
| 2  | Low Temperature Storage Test                    | Ta = -20°C, 240 hrs                                                                                                          |
| 3  | Low Temperature Operation Test                  | Ta = 0°C, 240 hrs                                                                                                            |
| 4  | High Temperature & High Humidity Operation Test | Ta = +60°C, 90%RH, 240 hrs<br>(No Condensation)                                                                              |
| 5  | Thermal Cycling Test<br>(non-operating)         | -20°C → +70°C, 100 Cycles<br>30min 30min                                                                                     |
| 6  | Vibration Test<br>(non-operating)               | Frequency : 10 ~ 55 Hz<br>Amplitude : 1.0 mm<br>Sweep time : 11 mins<br>Test Period : 6 Cycles for each direction of X, Y, Z |
| 7  | Shock Test<br>(non-operating)                   | 100G, 6ms<br>Direction : ±X, ±Y, ±Z<br>Cycle : 3 times                                                                       |
| 8  | Electrostatic Discharge Test<br>(non-operating) | 200pF, 0Ω<br>±200V<br>1 time / each terminal                                                                                 |
| 9  | Hitting Durability Test<br>( Touch panel)       | 1,000,000 times, with R 8.0 mm silicon rubber,<br>200g, 3times/sec                                                           |
| 10 | Sliding Durability Test<br>( Touch panel)       | 1,00,000 times, with R 0.8 mm polyacetal stylus,<br>200g, 60mm/sec                                                           |

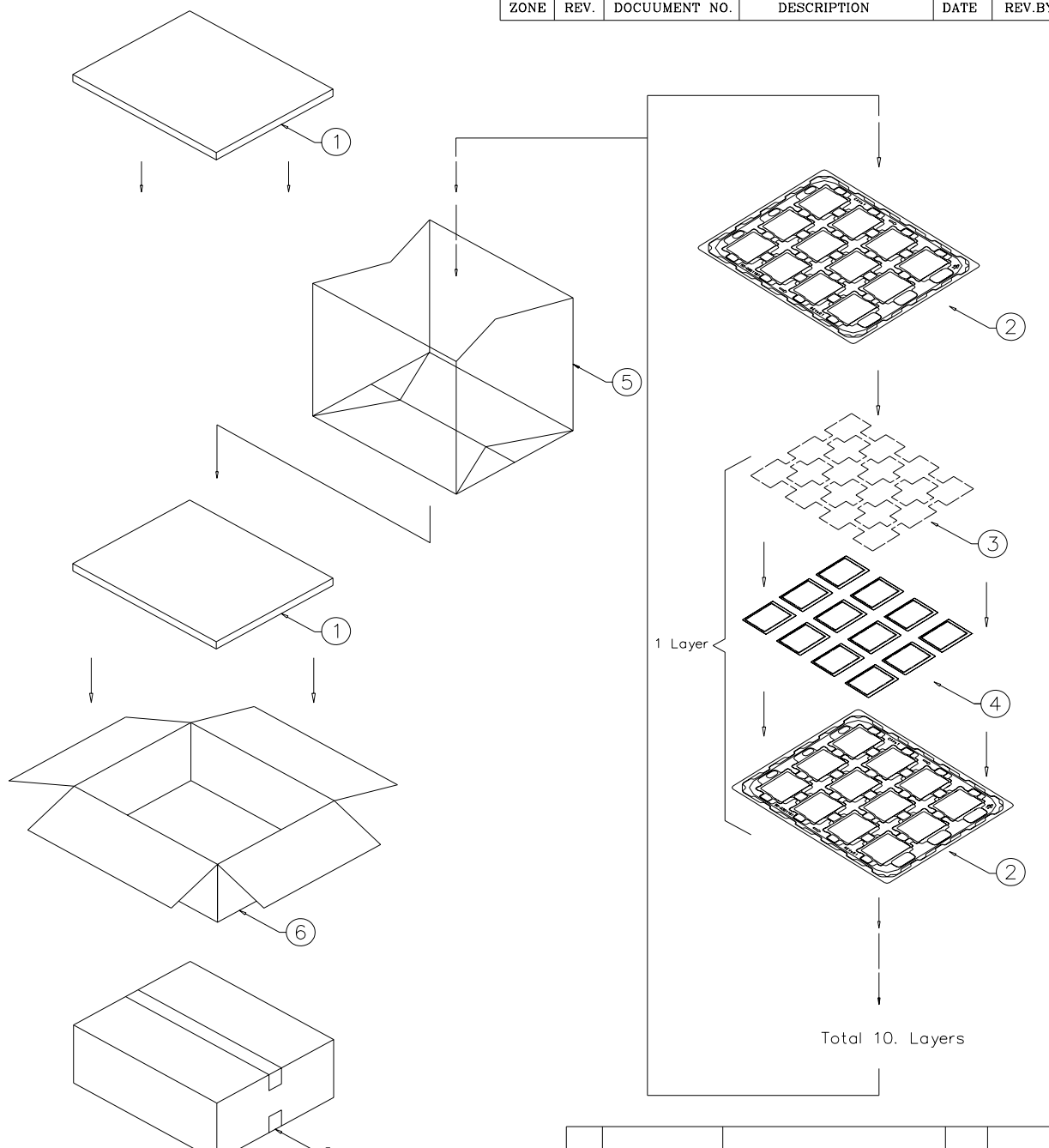
Ta: ambient temperature

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

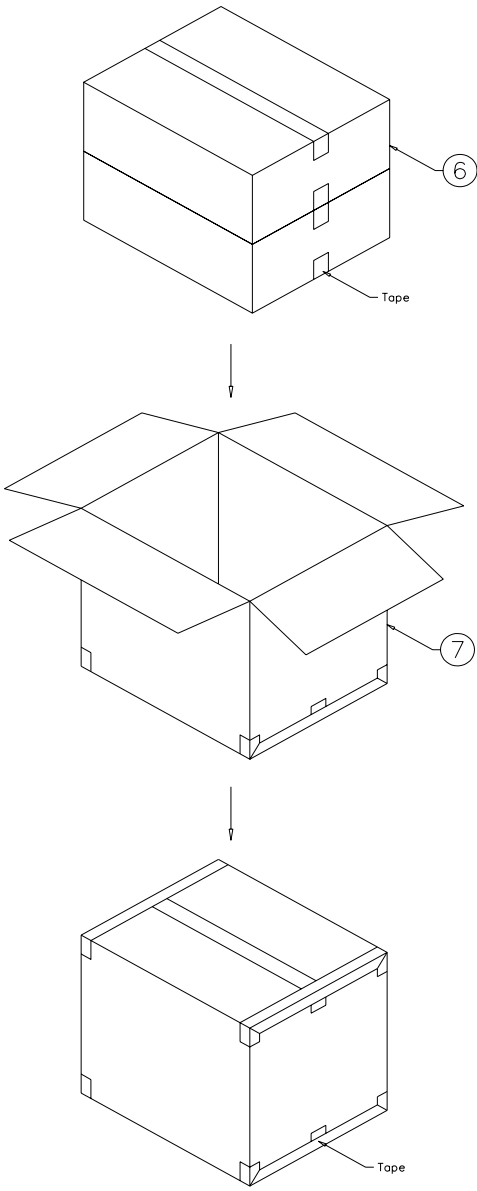
[Judgement Criteria]

Under the display quality test conditions with normal operation state , there should be no change which may affect practical display function.

**17. Packing**

| ZONE                                                                                                                                                                                                            | REV.   | DOCUMENT NO.      | DESCRIPTION | DATE    | REV.BY               |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-------------------|-------------|---------|----------------------|
|                                                                                                                              |        |                   |             |         |                      |
| <p><b>NOTE:</b></p> <p>1. One layer include: 1 piece of cushion sheet, 12pcs panel &amp; 1 piece of tray.</p> <p>2. Q'TY: 120 pcs panel/carton.</p> <p>3. Dimension: 455*375*190mm</p> <p>4. Weight: 7.7 KG</p> |        |                   |             |         |                      |
| MTL.SPEC.                                                                                                                                                                                                       |        | UNSPECIFIED TOL'S |             | REMARK  |                      |
|                                                                                                                                                                                                                 |        | ANGLE             |             |         |                      |
|                                                                                                                                                                                                                 |        | ROUGHNESS         |             |         |                      |
| APPROVE                                                                                                                                                                                                         |        | SCALE             | UNIT        | SHEET   | DWG.TITLE            |
| CHECK                                                                                                                                                                                                           |        |                   |             | 1 OF 2  | PA035VX2 PACKING Dim |
| DESIGN                                                                                                                                                                                                          | Dennis | MTL.NO.           |             | DWG.NO. | REV. 01              |
|                                                                                                                                                                                                                 |        |                   |             |         | A <sub>4</sub> SIZE  |



| ZONE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | REV.       | DOCUMENT NO.                            | DESCRIPTION | DATE   | REV.BY                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |            |                 |   |  |      |          |             |     |        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------------------------------------|-------------|--------|-----------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---|------------|-----------------|---|--|------|----------|-------------|-----|--------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                |            |                                         |             |        |                                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |            |                 |   |  |      |          |             |     |        |
| <p><b>NOTE:</b></p> <p>1. Q'TY: 240 pcs panel/carton.<br/>                 2. Dimension: 480*396*405mm<br/>                 3. Weight: 16.3 KG</p>                                                                                                                                                                                                                                                                                                                                                               |            |                                         |             |        |                                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |            |                 |   |  |      |          |             |     |        |
| <table border="1" style="width:100%; border-collapse: collapse;"> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr> <td>7</td> <td>50-0100101</td> <td>CARTON EXTERNAL</td> <td>1</td> <td> </td> </tr> <tr> <td>ITEM</td> <td>PART NO.</td> <td>DESCRIPTION</td> <td>QTY</td> <td>REMARK</td> </tr> </table> |            |                                         |             |        |                                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 7 | 50-0100101 | CARTON EXTERNAL | 1 |  | ITEM | PART NO. | DESCRIPTION | QTY | REMARK |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |            |                                         |             |        |                                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |            |                 |   |  |      |          |             |     |        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |            |                                         |             |        |                                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |            |                 |   |  |      |          |             |     |        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |            |                                         |             |        |                                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |            |                 |   |  |      |          |             |     |        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |            |                                         |             |        |                                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |            |                 |   |  |      |          |             |     |        |
| 7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 50-0100101 | CARTON EXTERNAL                         | 1           |        |                                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |            |                 |   |  |      |          |             |     |        |
| ITEM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | PART NO.   | DESCRIPTION                             | QTY         | REMARK |                                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |            |                 |   |  |      |          |             |     |        |
| MTL.SPEC.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |            | UNSPECIFIED TOL'S<br>ANGLE<br>ROUGHNESS |             | REMARK |                                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |            |                 |   |  |      |          |             |     |        |
| APPROVE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |            |                                         | SCALE       | UNIT   | SHEET                             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |            |                 |   |  |      |          |             |     |        |
| CHECK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |            |                                         |             |        | 2 OF 2                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |            |                 |   |  |      |          |             |     |        |
| DESIGN                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Dennis     | '05.01.21                               | MTL.NO.     |        | DWG.NO.                           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |            |                 |   |  |      |          |             |     |        |
| <div style="display: flex; align-items: center;"> <div>                         元太科技股份有限公司<br/>                         Prime View International Co.,Ltd.                     </div> </div>                                                                                                                                                                                                                                                                                                                      |            |                                         |             |        | DWG.TITLE<br>PA035VX2 PACKING Dim |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |            |                 |   |  |      |          |             |     |        |
| REV. 01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |            |                                         |             |        | A <sub>4</sub><br>SIZE            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |            |                 |   |  |      |          |             |     |        |

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### Revision History

| Rev. | Issued Date    | Revised Contents |
|------|----------------|------------------|
| 0.1  | Apr. 12 , 2005 | Preliminary      |
| 1.0  | July.15 , 2005 | Release version  |

## Appendix

