

Version :5.0

**TECHNICAL SPECIFICATION**

**MODEL NO : PM102ZY3**

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Customer's Confirmation

Customer \_\_\_\_\_

Date \_\_\_\_\_

By \_\_\_\_\_

PVI's Confirmation

**FOR MORE INFORMATION:**  
AZ DISPLAYS, INC.  
75 COLUMBIA, ALISO VIEJO, CA 92656  
[Http://www.AZDISPLAYS.com](http://www.AZDISPLAYS.com)

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



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



## *Revision History*

| <b>Rev.</b> | <b>Issued Date</b> | <b>Revised Content</b>   |
|-------------|--------------------|--|
| 1.0         | Oct 26, 2007       | New  |
| 2.0         | March.24.2008      | Add<br>Page 25 14.Handling Cautions<br>14-1 item d)<br>Modify<br>Page 4 2. Features  |
| 3.0         | June 16,2008       | Delete page: 14<br>10.Block Diagram<br>10-1) TFT-module Black Diagram<br>If you use PM102ZY3, you can apply PVI- 2003A(Timing controller) which will<br>timing signal to support PM102ZY3. |
| 4.0         | Dec.31.2008        | Modify<br>Page 11 6. Absolute Maximum Ratings<br>Add Storage Temperature & Operation Temperature   |
| 5.0         | August.19, 2009    | Modify<br>Page28 16.packing  |

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***TECHNICAL SPECIFICATION***  
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## 1.Application

This data sheet applies to a color TFT LCD module, PM102ZY3. The module applies to OA product, GPS, which require high quality flat panel display. If you must use in high reliability environment can't over reliability test condition.

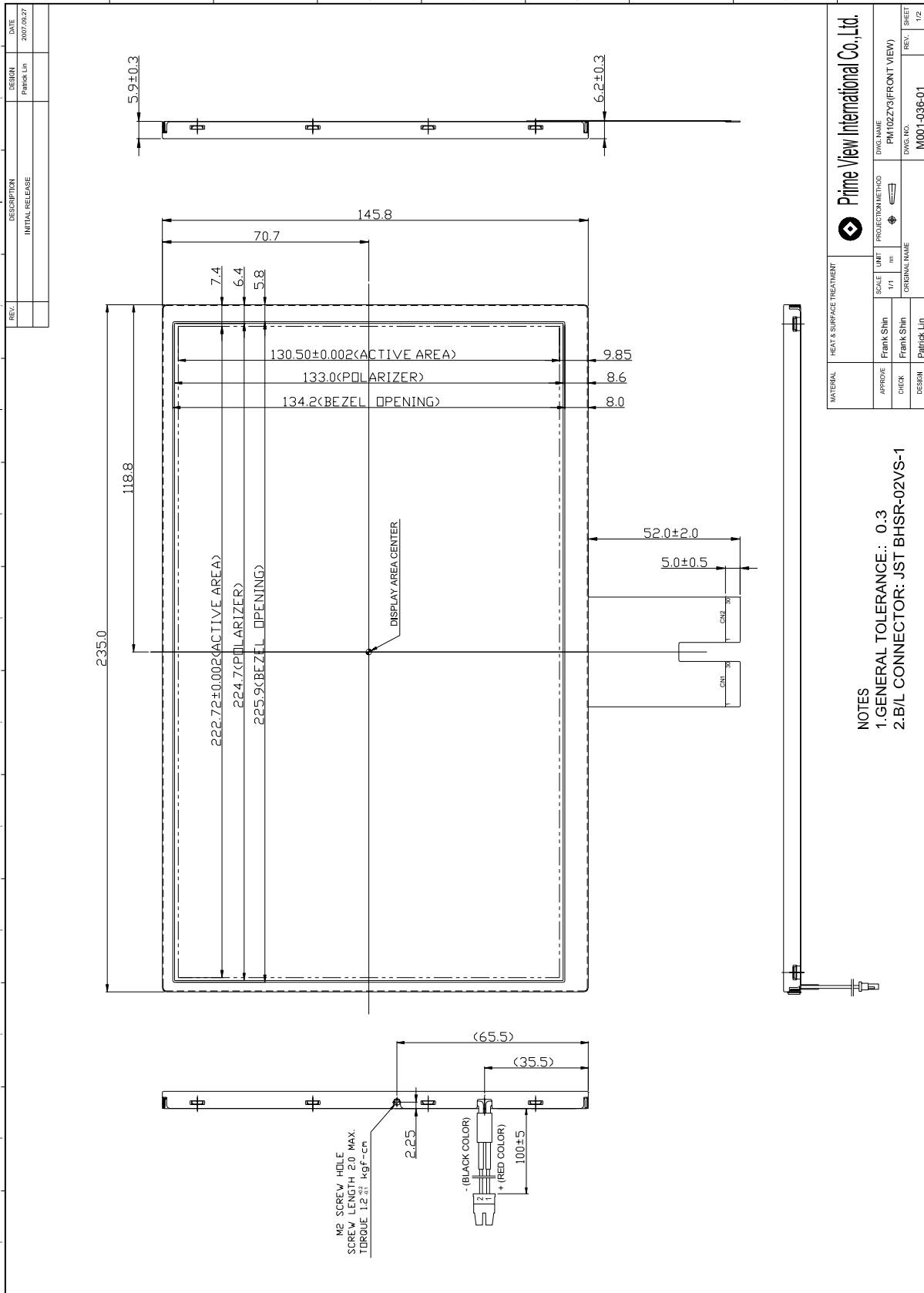
## 2.Features

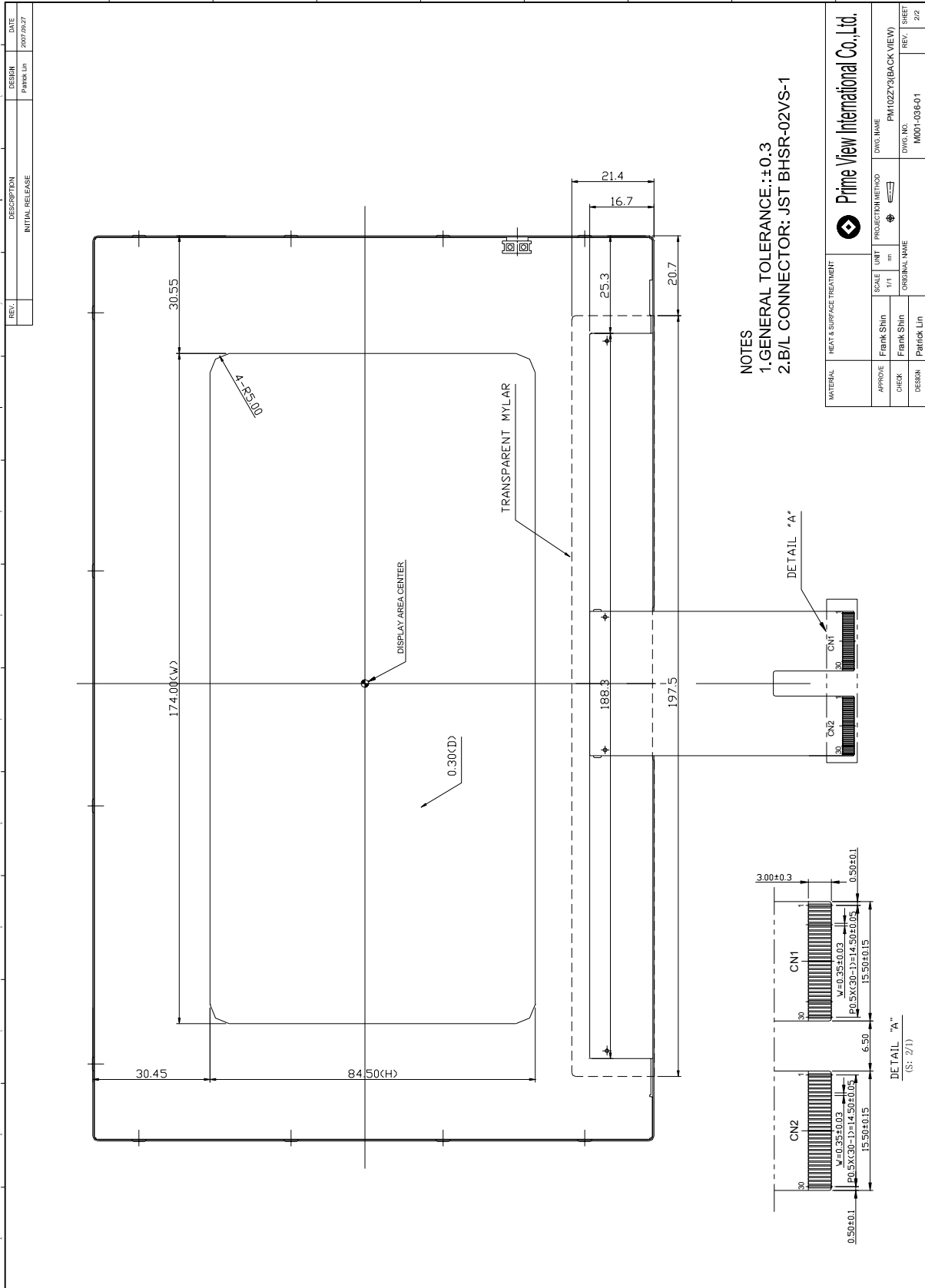
- . WSVGA (1024\*600 pixels) resolution
- . Amorphous silicon TFT LCD panel with LED back-light unit
- . Pixel in stripe configuration
- . Thin and light weight
- . Display Colors : 262,144 colors
- . Optimum Viewing Direction : 6 o'clock
- . Support TTL/RSDS interface.

## 3.Mechanical Specifications

| <b>Parameter</b>               | <b>Specifications</b>           | <b>Unit</b> |
|--------------------------------|---------------------------------|-------------|
| Screen Size                    | 10.2" (diagonal)                | inch        |
| Display Format                 | 1024x(RGB)x600                  | dot         |
| Display Colors                 | 262,144                         |             |
| Active Area                    | 222.72(H)x130.5(V)              | mm          |
| Pixel Pitch                    | 0.2175(H)x0.2175(V)             | mm          |
| Pixel Configuration            | Stripe                          |             |
| Outline Dimension              | 235.0(W)x145.8(H)x6.2(D) (typ.) | mm          |
| Weight                         | 314±15                          | g           |
| Surface treatment              | Anti-Glare and E/Wide View Film |             |
| Display mode                   | Normally white                  |             |
| Gray scale inversion direction | 6<br>(ref to Note 13-1)         | o'clock     |
| Back-light                     | 48-LED                          |             |

4. Mechanical Drawing of TFT-LCD Module





**5. Input / Output Terminals**
**5-1) TFT-LCD Panel Driving**

FPC Down Connect, 30 Pins, Pitch: 0.5 mm

CN 1

| Pin No. | Symbol  | I/O | Function                                      | Remark    |
|---------|---------|-----|---|-----------|
| 1       | DIO1    | I/O | Horizontal Start Pulse Signal Input or Output | Note 5-6  |
| 2       | VSS1    | I   | Ground  |           |
| 3       | VDD1    | I   | Power Supply                                  |           |
| 4       | CLK     | I   | Shift Clock input                             | Note 5-10 |
| 5       | CLKN    | I   | RSDS Shift Clock input                        | Note 5-11 |
| 6       | R/L     | I   | Right / Left selection                        | Note 5-6  |
| 7       | R0(D00) | I   | Red Data (LSB)                                | Note 5-13 |
| 8       | R1(D01) | I   | Red Data                                      |           |
| 9       | R2(D02) | I   | Red Data                                      |           |
| 10      | R3(D03) | I   | Red Data                                      |           |
| 11      | R4(D04) | I   | Red Data                                      |           |
| 12      | R5(D05) | I   | Red Data (MSB)                                |           |
| 13      | VSS1    | I   | Ground  |           |
| 14      | G0(D10) | I   | Green Data (LSB)                              | Note 5-13 |
| 15      | G1(D11) | I   | Green Data                                    |           |
| 16      | G2(D12) | I   | Green Data                                    |           |
| 17      | G3(D13) | I   | Green Data                                    |           |
| 18      | G4(D14) | I   | Green Data                                    |           |
| 19      | G5(D15) | I   | Green Data (MSB)                              |           |
| 20      | VSS1    | I   | Ground  |           |
| 21      | B0(D20) | I   | Blue Data (LSB)                               | Note 5-13 |
| 22      | B1(D21) | I   | Blue Data                                     |           |
| 23      | B2(D22) | I   | Blue Data                                     |           |
| 24      | B3(D23) | I   | Blue Data                                     |           |
| 25      | B4(D24) | I   | Blue Data                                     |           |
| 26      | B5(D25) | I   | Blue Data (MSB)                               |           |
| 27      | LD      | I   | Load output signal                            | Note 5-7  |
| 28      | REV     | I   | Data invert control                           | Note 5-8  |
| 29      | POL     | I   | Polarity selection                            | Note 5-9  |
| 30      | DIO2    | I/O | Horizontal Start Pulse Signal Input or Output | Note 5-6  |

CN 2

| Pin No. | Symbol   | I/O | Function                                    | Remark    |
|---------|----------|-----|---|-----------|
| 1       | VSS2     | I   | Ground                                      |           |
| 2       | V1       | I   | Gamma Voltage 1                             | Note 5-14 |
| 3       | V2       | I   | Gamma Voltage 2                             |           |
| 4       | V3       | I   | Gamma Voltage 3                             |           |
| 5       | V4       | I   | Gamma Voltage 4                             |           |
| 6       | V5       | I   | Gamma Voltage 5                             |           |
| 7       | V6       | I   | Gamma Voltage 6                             |           |
| 8       | V7       | I   | Gamma Voltage 7                             |           |
| 9       | VSS2     | I   | Ground                                      |           |
| 10      | V8       | I   | Gamma Voltage 8                             | Note 5-14 |
| 11      | V9       | I   | Gamma Voltage 9                             |           |
| 12      | V10      | I   | Gamma Voltage 10                            |           |
| 13      | V11      | I   | Gamma Voltage 11                            |           |
| 14      | V12      | I   | Gamma Voltage 12                            |           |
| 15      | V13      | I   | Gamma Voltage 13                            |           |
| 16      | V14      | I   | Gamma Voltage 14                            |           |
| 17      | VSS2     | I   | Ground                                      |           |
| 18      | VDD2     | I   | Voltage for analog circuit                  | Note 5-14 |
| 19      | VCOM     | I   | Common Voltage                              |           |
| 20      | TTL/RSDS | I   | TTL / RSDS Input mode Selection             | Note 5-12 |
| 21      | OE       | I   | Output Enable                               | Note 5-5  |
| 22      | U/D      | I   | Up / Down Selection                         | Note 5-3  |
| 23      | CKV      | I   | Vertical Shift Clock                        | Note 5-4  |
| 24      | STVU     | I/O | Vertical Shift Pulse Signal Input or Output | Note 5-3  |
| 25      | STVD     | I/O | Vertical Shift Pulse Signal Input or Output |           |
| 26      | VGG      | I   | Gate On Voltage                             | Note 5-2  |
| 27      | GND      | I   | Ground                                      |           |
| 28      | VCC      | I   | Voltage for logic circuit                   |           |
| 29      | GND      | I   | Ground                                      |           |
| 30      | VEE      | I   | Gate Off Voltage                            | Note 5-1  |



Note 5-1: Gate off voltage, VEE=-5.6V

Note 5-2: Gate on voltage, VGG=17V

Note 5-3: 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 5-4: Gate driver shift clock

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

Note 5-6: 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 5-7: 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 5-8: 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 5-9: Polarity selector for dot-inversion control. Available at the rising edge of LD.

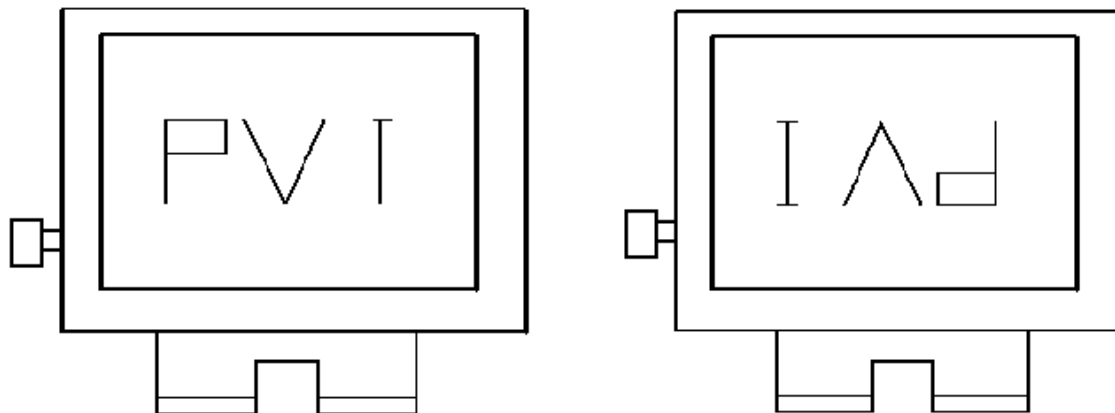
When POL=1: Even outputs range from V1~V7, and Odd outputs range from V8~V14; When POL=0: Even outputs range from V8~V14, and Odd outputs range from V1~V7.

Note 5-10: Clock signal. When RSDS input mode, CLK is used as CLKP input pin.

Note 5-11: The RSDS clock input pairs generate the internal shift clock through the comparison between CLKP and CLKN. When TTL mode, connect to GND.

Note 5-12: TTL/RSDS=H: RSDS data input  
 TTL/RSDS=L or open: TTL data input

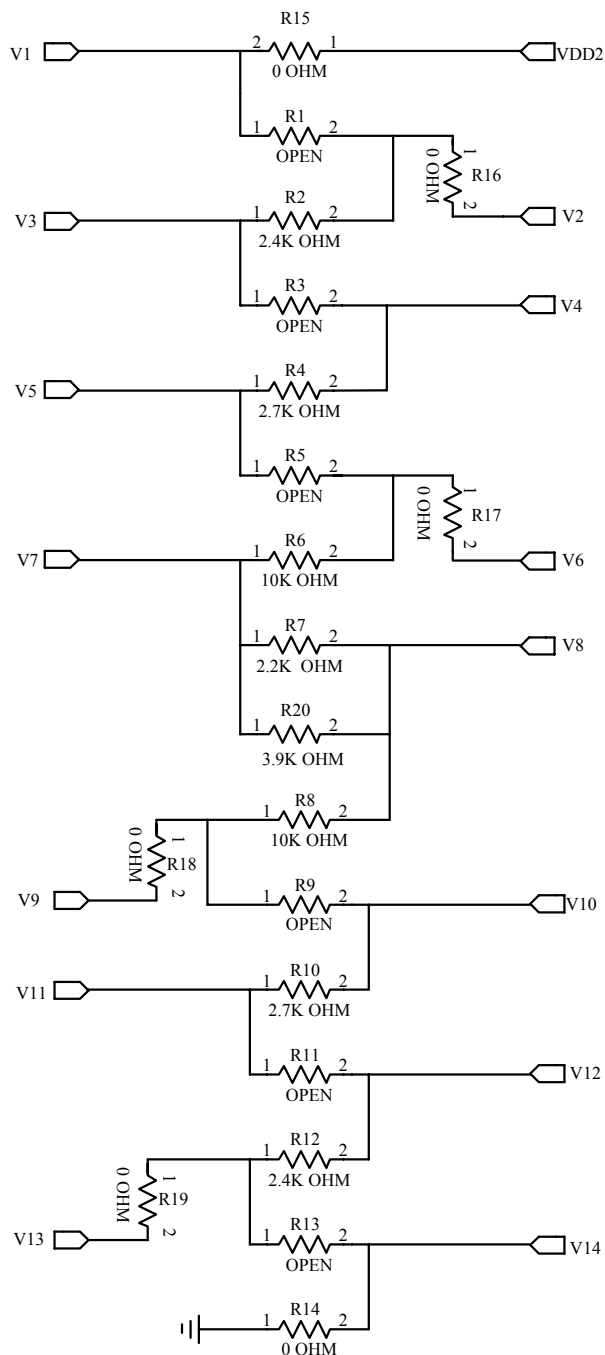
U/D CN2(PIN22)=0 R/L CN1(PIN6)=1 U/D CN2(PIN22)=1 R/L CN1(PIN6)=0



Note 5-13:

| Pin name    | RSDS input mode<br>TTLRSDS = H | TTL input mode<br>TTLRSDS = L |
|-------------|--------------------------------|-------------------------------|
| D04,D02,D00 | D0[2:0]N                       | D04,D02,D00                   |
| D05,D03,D01 | D0[2:0]P                       | D05,D03,D01                   |
| D14,D12,D10 | D1[2:0]N                       | D14,D12,D10                   |
| D15,D13,D11 | D1[2:0]P                       | D15,D13,D11                   |
| D24,D22,D20 | D2[2:0]N                       | D24,D22,D20                   |
| D25,D23,D21 | D2[2:0]P                       | D25,D23,D21                   |

Note 5-14: Typical Application Circuit (When VDD2 = 9.1V)



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## 5-2) Backlight driving

Connector type: JST BHSR-02VS-1

| Pin No | Symbol | Description              | Remark |
|--------|--------|--------------------------|--------|
| 1      | +      | Input terminal (Anode)   | Red    |
| 2      | -      | Input terminal (Cathode) | Black  |

## 6. Absolute Maximum Ratings:

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

| Parameters            | Symbol          | MIN. | MAX. | Unit | Remark |
|-----------------------|-----------------|------|------|------|--------|
| Supply Voltage        | VDD1            | -0.5 | 5.0  | V    |        |
|                       | VCC             | -0.3 | 6.0  | V    |        |
|                       | VDD2            | -0.5 | 12.0 | V    |        |
|                       | VGG             | -0.3 | 40.0 | V    |        |
|                       | VGG-VEE         | -0.3 | 40.0 | V    |        |
|                       | VEE             | -20  | 0.3  | V    |        |
| Storage Temperature   | T <sub>st</sub> | -30  | +80  | °C   |        |
| Operation Temperature | T <sub>op</sub> | -20  | +80  | °C   |        |

## 7. Electrical Characteristics

## 7-1) Recommended Operating Conditions :

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

| Item                             | Symbol          | Min.                | Typ. | Max.                | Unit | Remark |
|----------------------------------|-----------------|---------------------|------|---------------------|------|--------|
| Supply Voltage for Source Driver | VDD1            | 3.0                 | 3.3  | 3.6                 | V    |        |
|                                  | VDD2            | 8.6                 | 9.1  | 9.6                 | V    |        |
| Supply Voltage for Gate Driver   | VGG             | -                   | 17   | -                   | V    |        |
|                                  | VEE             | -                   | -5.6 | -                   | V    |        |
|                                  | VCC             | 3.0                 | 3.3  | 3.6                 | V    |        |
| VCOM Voltage                     | VCOM            | -                   | 3.6  | -                   | V    |        |
| Digital Input Voltage            | V <sub>IH</sub> | 0.7 V <sub>CC</sub> | -    | V <sub>CC</sub>     | V    |        |
|                                  | V <sub>IL</sub> | 0                   | -    | 0.3 V <sub>CC</sub> | V    |        |

## 7-2) Recommended driving condition for LED back light

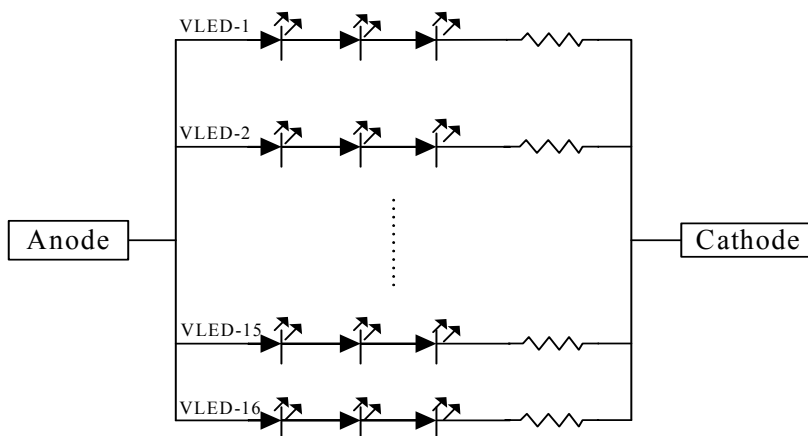
 $T_a = 25^{\circ}C$ 

| Parameter                       | Symbol           | Min | TYP | MAX    | Unit | Remark             |
|---------------------------------|------------------|-----|-----|--------|------|--------------------|
| Supply voltage of LED backlight | V <sub>LED</sub> | -   | -   | (11.0) | V    | Note 7-1           |
| Supply current of LED backlight | I <sub>LED</sub> | -   | 20  |        | mA   | Note 7-2           |
| Backlight Power Consumption     | P <sub>LED</sub> | -   | -   | 3.52   | W    | Note 7-1, Note 7-3 |

 Note 7-1 I<sub>LED</sub> = 20mA, Constant Current

Note 7-2 : The LED driving condition is defined for each LED module. (3 LED Serial) Input current = 20mA \* 16 = 320mA

 Note 7-3 :  $P_{LED} = V_{LED-1} * I_{LED-1} + V_{LED-2} * I_{LED-2} + \dots + V_{LED-15} * I_{LED-15} + V_{LED-16} * I_{LED-16}$



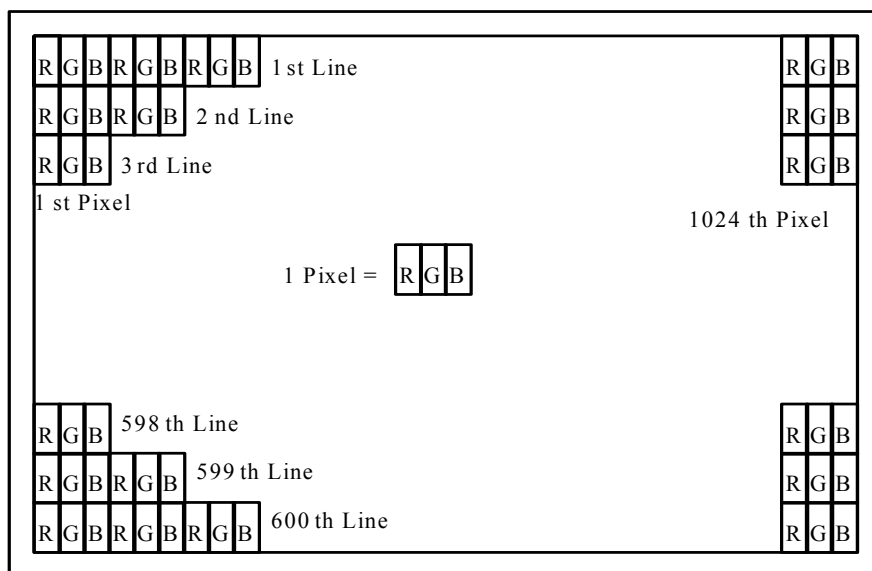
7-3) Power Consumption

| Parameter                                  | Symbol | Condition  | Typ.  | Max.  | Unit | Remark   |
|--|--------|------------|-------|-------|------|----------|
| Supply Current for Gate Driver (Hi level)  | IGG    | VGG= 17V   | 0.19  | 0.57  | mA   |          |
| Supply Current for Gate Driver (Low level) | IEE    | VEE=-5.6V  | 0.98  | 2.94  | mA   |          |
| Supply Current for Source Driver (Digital) | IDD1   | VDD1= 3.3V | 8.36  | 16.72 | mA   |          |
| Supply Current for Source Driver (Analog)  | IDD2   | VDD2= 9.1V | 35.07 | 70.14 | mA   |          |
| Supply Current for Gate Driver (Digital)   | ICC    | VCC= 3.3V  | 0.02  | 0.06  | mA   |          |
| LCD Panel Power Consumption                | -      | -          | 355.5 | 719.8 | mW   | Note 7-4 |
| Back Light LED Power Consumption           | -      | -          | -     | 3.52  | W    | Note 7-5 |
| Total Power Consumption                    | -      | -          | -     | 4.24  | W    |          |

Note 7-4: The power consumption for backlight is not included.

Note 7-5: Back light power consumption is calculated by  $I_L \times V_L$ .

8. Pixel Arrangement

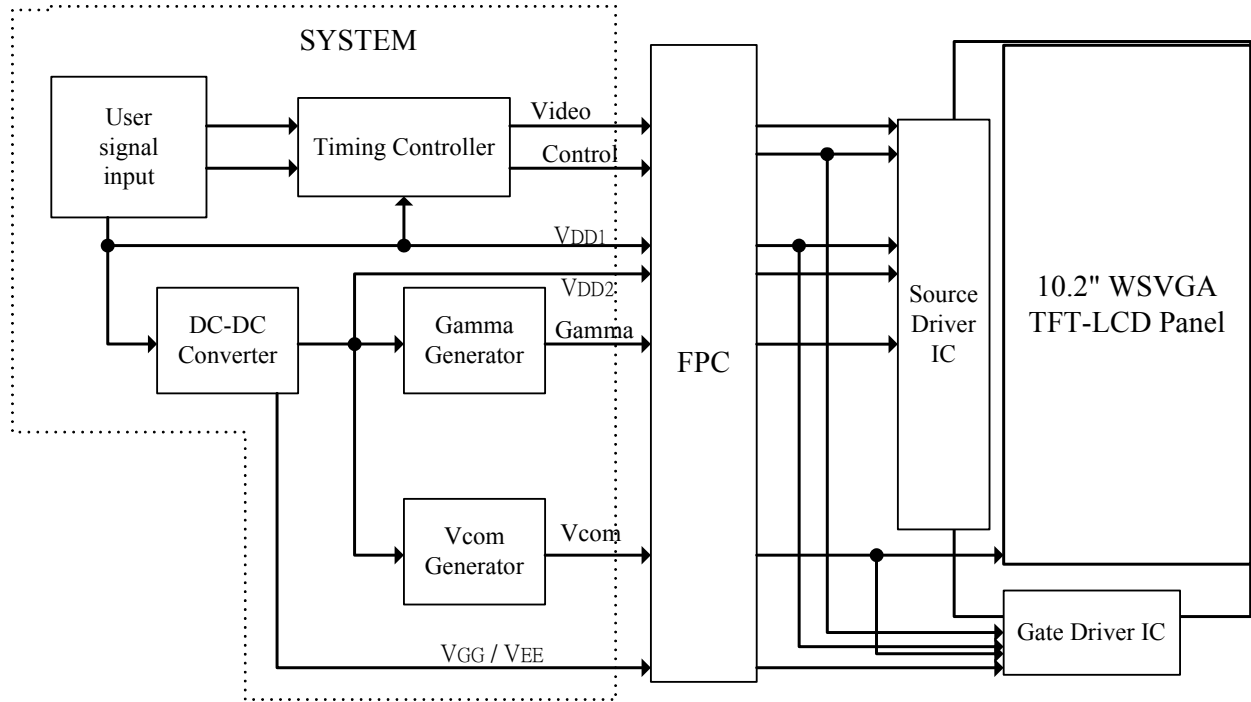


**9. Display Color and Gray Scale Reference**

| 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  |

10. Block Diagram

10-1) TFT-module Block Diagram



## 11. Interface Timing

## 11-1) Timing Parameters

AC Electrical Characteristics (VDD1=VCC=3.3V, VDD2=9.1V, GND=VSS1=VSS2=0V) Ta=25°C

| Parameter                      | Symbol           | Min.     | Typ. | Max.     | Unit            | Conditions                   |
|--------------------------------|------------------|----------|------|----------|-----------------|------------------------------|
| CLK Frequency                  | Fclk             | -        | 50   | 55       | MHz             |                              |
| CLK Pulse Width                | Tcw              | 18       | -    | -        | ns              |                              |
| Data Set-up Time               | Tsu              | 4        | -    | -        | ns              |                              |
| Data Hold Time                 | Thd              | 2        | -    | -        | ns              |                              |
| Propagation Delay of DIO2/1    | Tphl             | 6        | 10   | 15       | ns              |                              |
| Time That The Last Data to LD  | Tld              | 1        | -    | -        | Tcw             |                              |
| Pulse width of LD              | Twld             | 2        | -    | -        | Tcw             |                              |
| Time That LD to DIO1/2         | Tlds             | 5        | -    | -        | Tcw             |                              |
| POL Set-up Time                | Tpsu             | 6        | -    | -        | ns              |                              |
| POL Hold Time                  | Tphd             | 6        | -    | -        | ns              |                              |
| OE Pulse Width                 | T <sub>OE</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>H</sub>   | 400      | -    | -        | ns              |                              |
| Horizontal Display Period      | T <sub>HDP</sub> | 1024     | 1024 | 1024     | Tcw             |                              |
| Horizontal Period Timing Range | T <sub>HP</sub>  | 1200     | 1344 | 1466     | Tcw             |                              |
| Horizontal Lines Per Field     | T <sub>V</sub>   | -        | 625  | -        | T <sub>HP</sub> |                              |
| Vertical Display Timing Range  | T <sub>DV</sub>  | 600      | 600  | 600      | T <sub>HP</sub> |                              |
| RSDS Low level Input Voltage   | Vilrsds          | -        | -200 | -100     | mV              | D2[2:0]P,D2[2:0]N, CLKP,CLKN |
| RSDS High level Input Voltage  | Vihrsds          | 100      | 200  | -        | mV              | D2[2:0]P,D2[2:0]N, CLKP,CLKN |
| RSDS reference Voltage         | Vcomrsds         | VSS1+0.1 | 1.2  | VDD1-1.2 | V               | D2[2:0]P,D2[2:0]N, CLKP,CLKN |

## 11-2) Timing Diagram

- $V_{CMRSDS} = (V_{CLKP} + V_{CLKN}) / 2$  or  $V_{CMRSDS} = (V_{DxxP} + V_{DxxN}) / 2$
- $V_{DIFFRSDS} = V_{CLKP} - V_{CLKN}$  or  $V_{DIFFRSDS} = V_{DxxP} - V_{DxxN}$

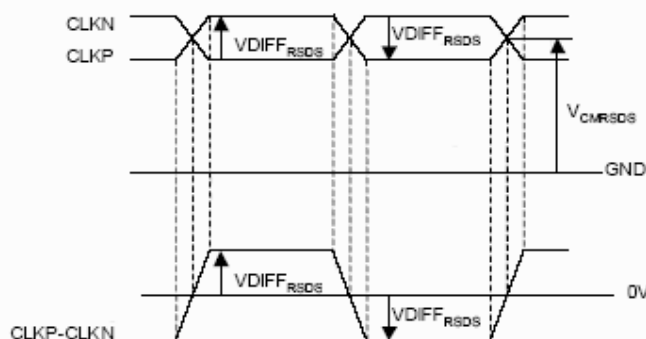


Figure11-1 RSDS clock

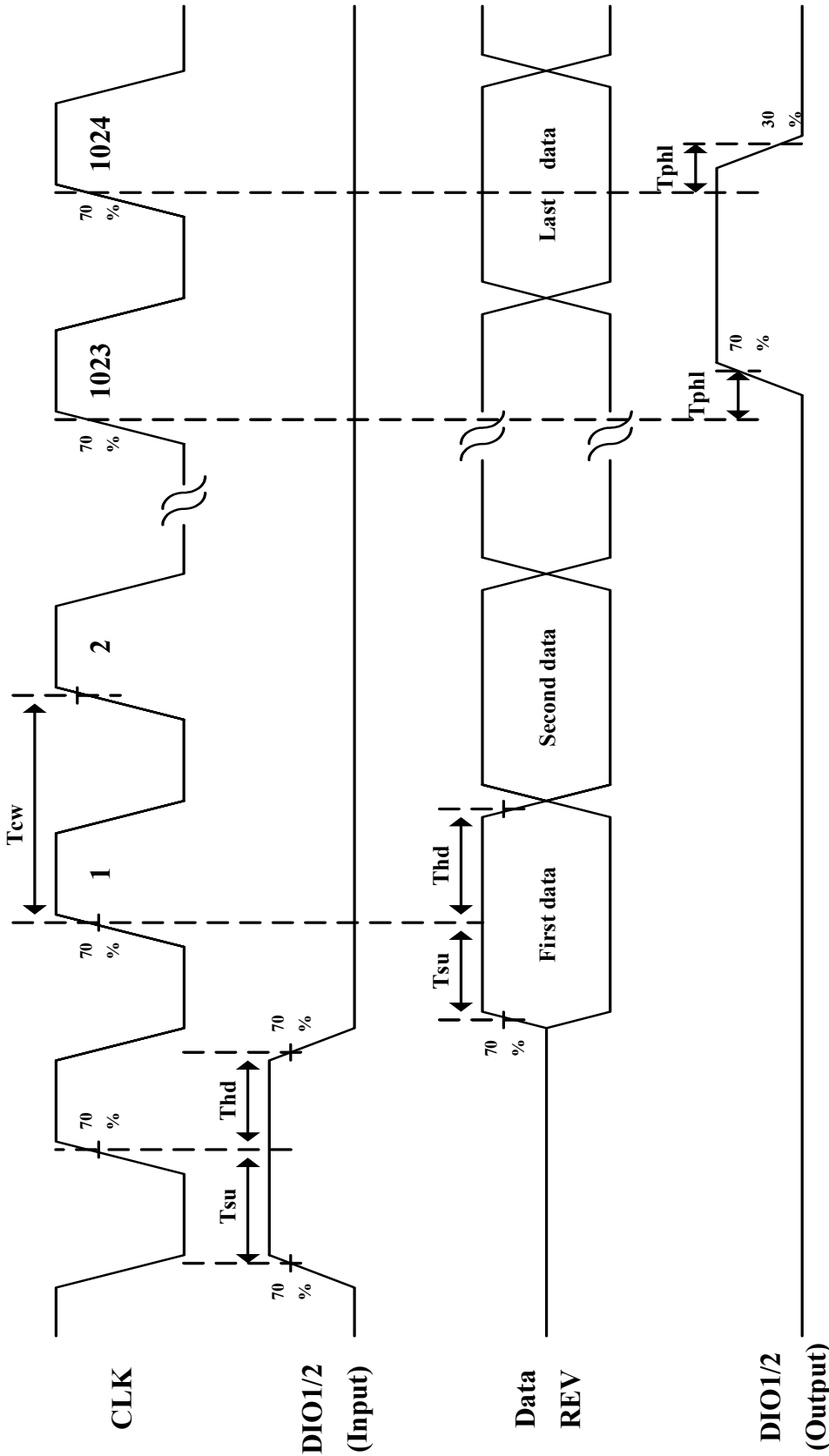
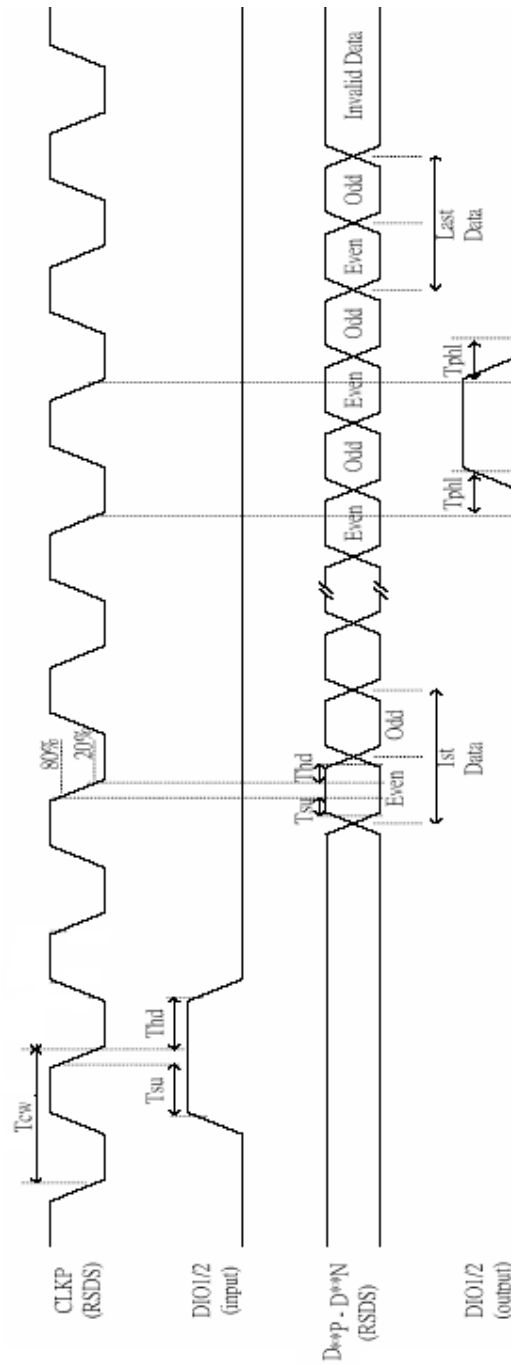


Fig. 11-2 Horizontal timing-TTL(I)





**Figure 11-2 Horizontal timing-RSDS(2)**

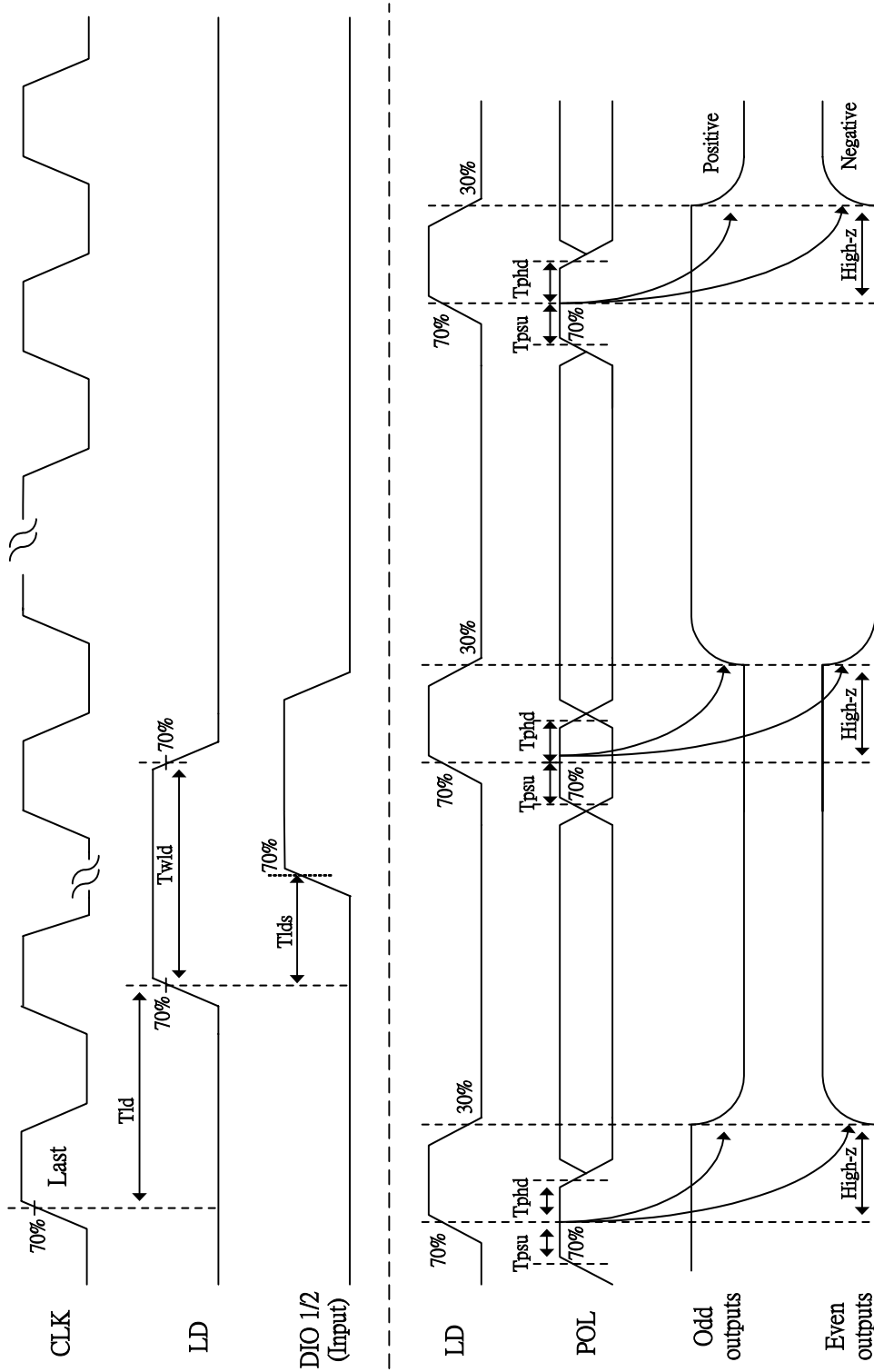


Fig. 11-3 Horizontal timing

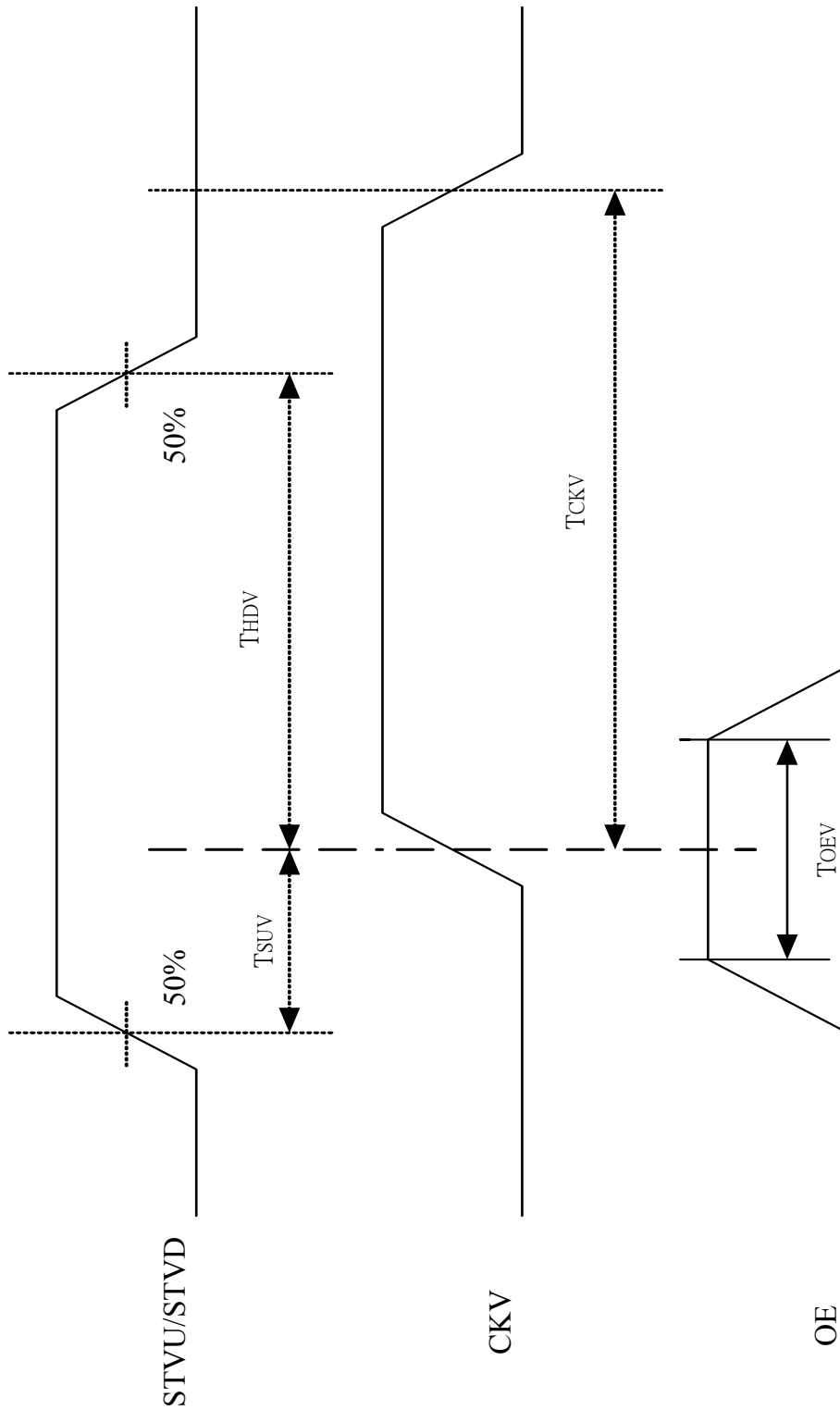


Fig. 11-4 Vertical shift clock timing

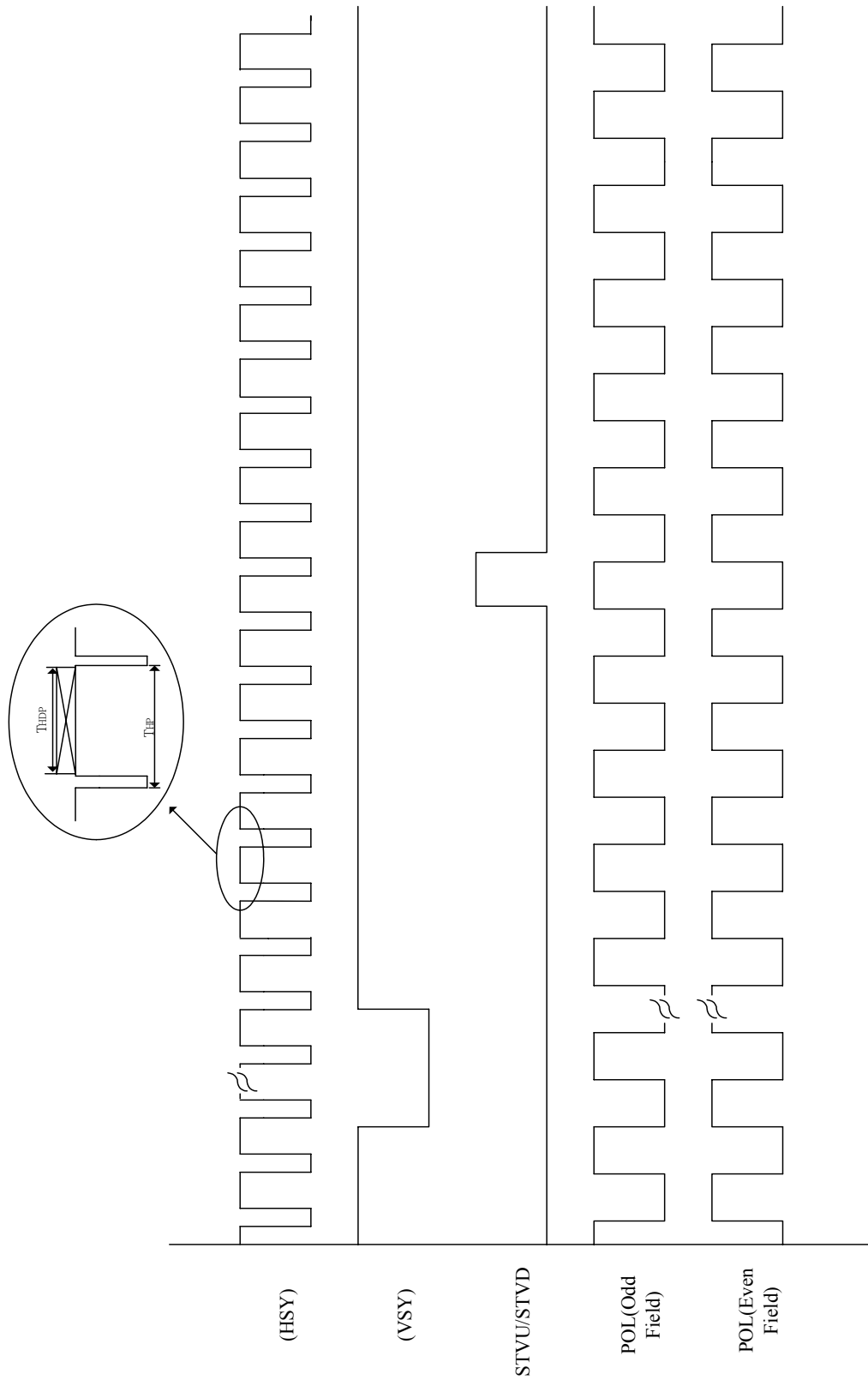
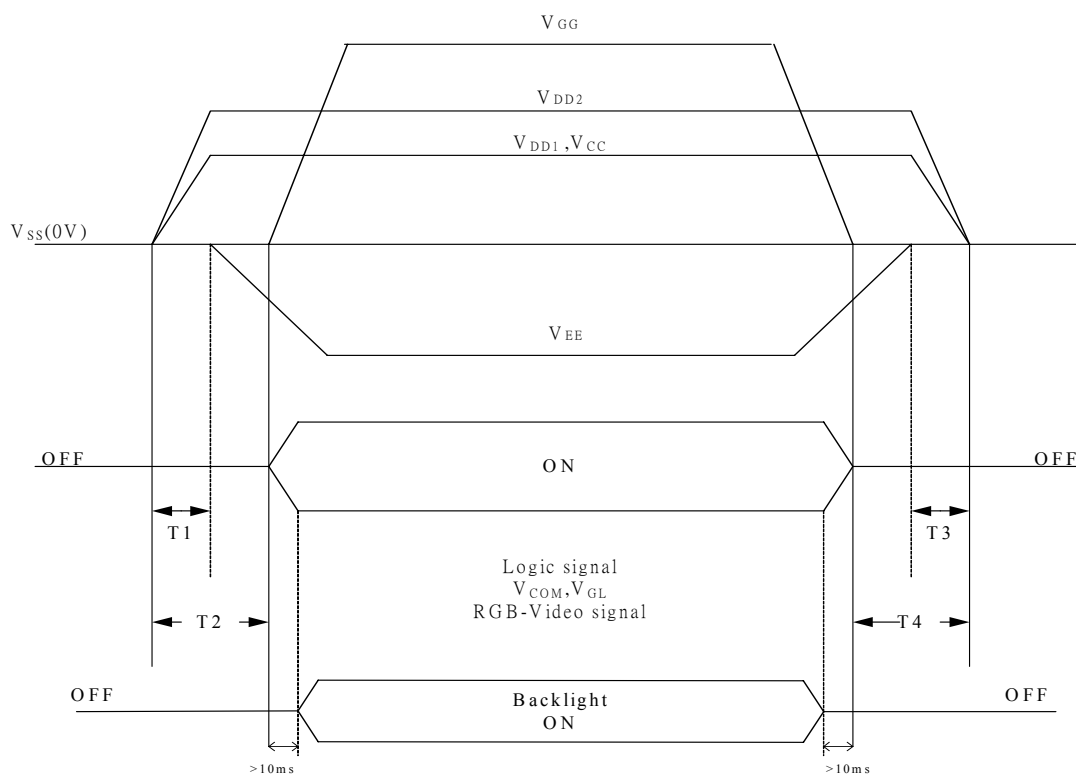


Fig. 11-5 Vertical timing

## 12. Power On Sequence



1.  $10\text{ms} \leq T_1 < T_2$
2.  $0\text{ms} < T_3 \leq T_4 \leq 10\text{ms}$

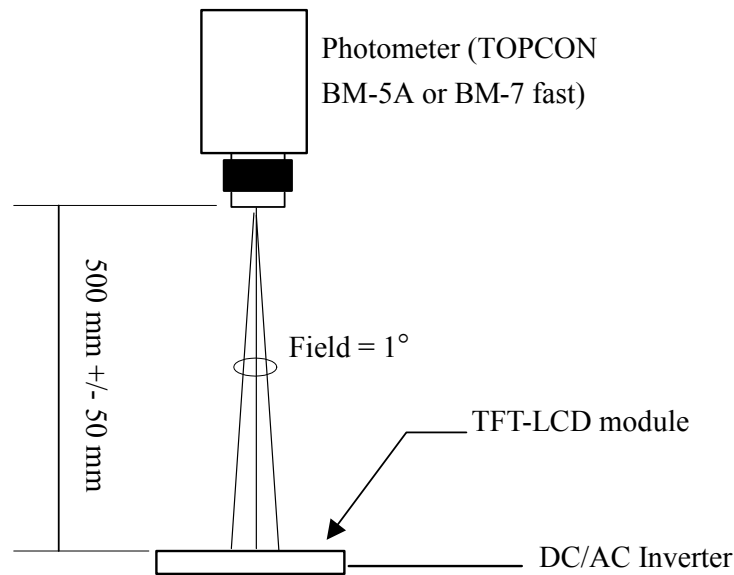
## 13. Optical Characteristics

## 13-1) Specification:

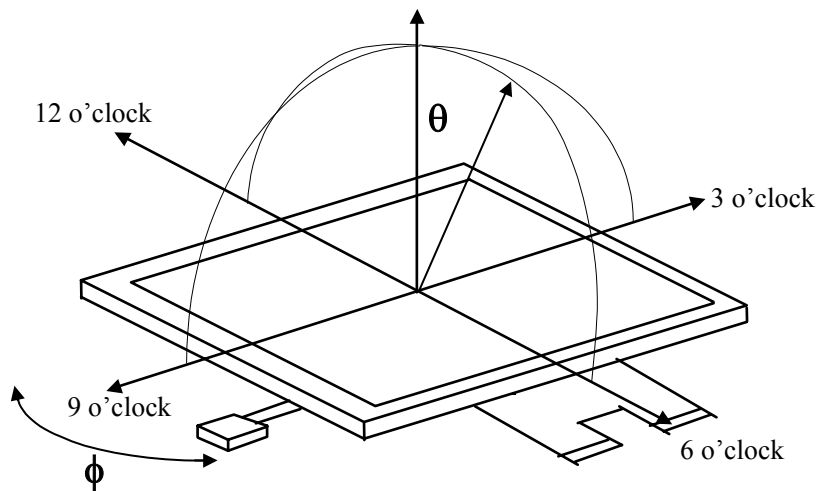
Ta = 25°C

| Parameter            | Symbol     | Condition                              | MIN.  | TYP.  | MAX.  | Unit              | Remarks   |
|----------------------|------------|--|-------|-------|-------|-------------------|-----------|
| Viewing Angle        | Horizontal | $\theta$                               | 55    | 60    | -     | deg               | Note 13-1 |
|                      | Vertical   | $\theta$ (to 12 o'clock)               | 35    | 40    | -     | deg               |           |
|                      |            | $\theta$ (to 6 o'clock)                | 50    | 55    | -     | deg               |           |
| Contrast Ratio       | CR         | At optimized Viewing angle             | 200   | 600   | -     | -                 | Note 13-2 |
| Brightness           | L          | $\theta = 0^\circ / \varphi = 0^\circ$ | 300   | 350   | -     | cd/m <sup>2</sup> | Note 13-4 |
| Response time        | Rise       | $\theta = 0^\circ / \varphi = 0^\circ$ | -     | 15    | 30    | ms                | Note 13-3 |
|                      | Fall       |  | -     | 25    | 50    | ms                |           |
| Cross Talk Ratio     | CTK        | -                                      | -     | -     | 3.5   | %                 | Note 13-5 |
| Luminance Uniformity | U          | -                                      | 75    | 80    | -     | %                 | Note 13-6 |
| White Chromaticity   | x          | $\theta = 0^\circ / \varphi = 0^\circ$ | 0.265 | 0.305 | 0.345 | -                 | Note 13-4 |
|                      | y          |  | 0.300 | 0.340 | 0.380 | -                 |           |
| LED Life Time        |            | 25°C                                   | 20000 | 30000 | -     | hrs               | Note 13-7 |

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.

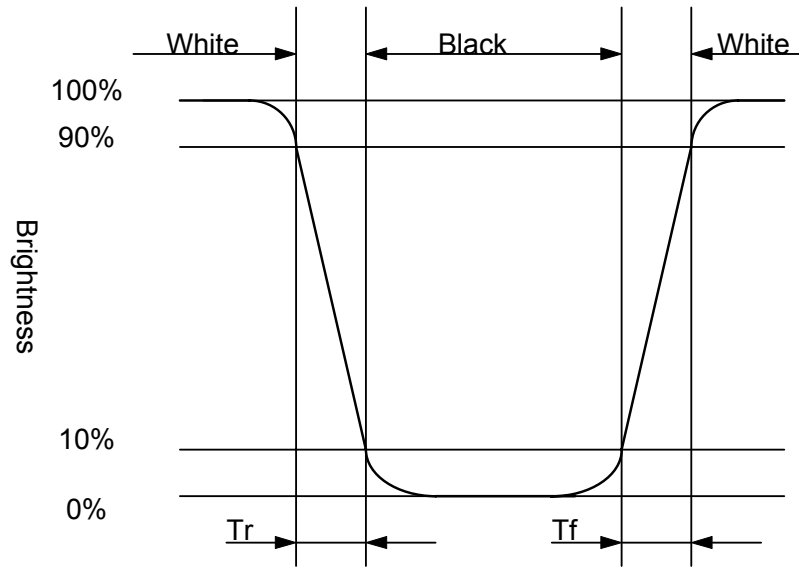


Note 13-1: The definition of viewing angles are as follow



Note 13-2 : The definition of contrast ratio  $CR = \frac{\text{Luminance at gray level 63}}{\text{Luminance at gray level 0}}$

Note 13-3: Definition of Response Time Tr and Tf:



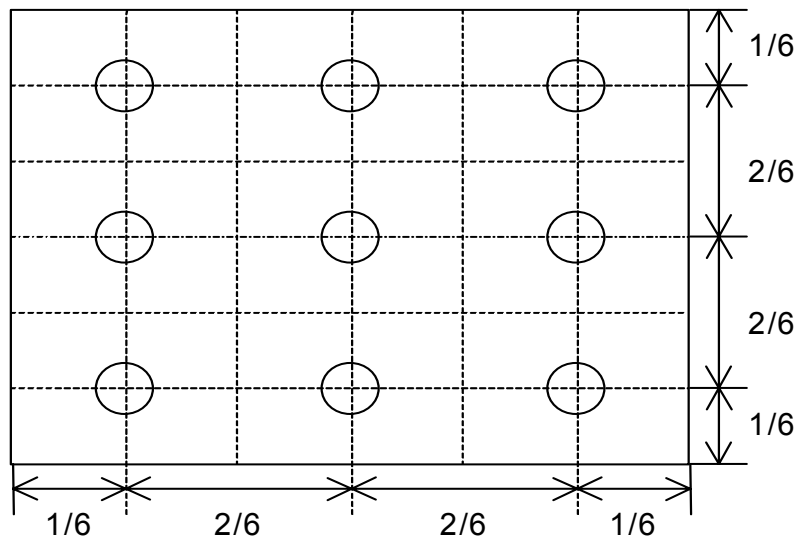
Note 13-4 : 1.Topcon BM-7(fast) luminance meter 1° field of view is used in the testing

Note 13-5 : The uniformity of LCD is defined as

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

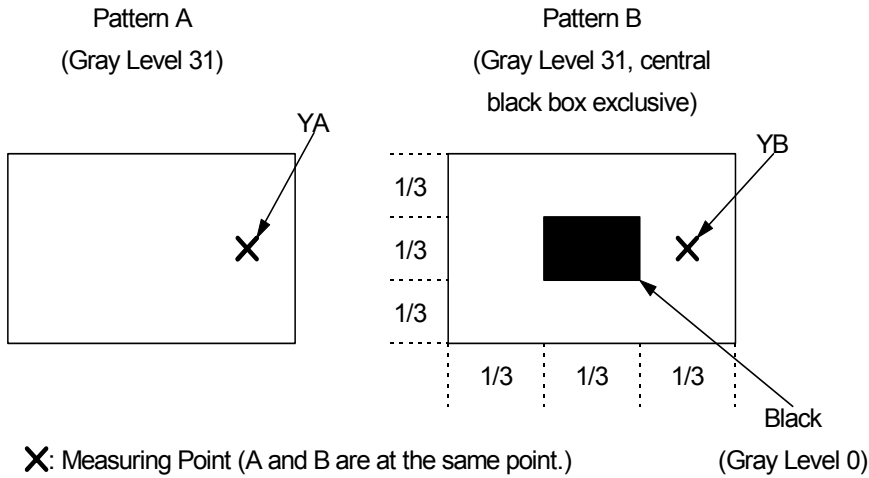
- Luminance meter : BM-5A or BM-7 fast (TOPCON)
- Measurement distance : 500 mm +/- 50 mm
- Ambient illumination : < 1 Lux
- Measuring direction : Perpendicular to the surface of module

The test pattern is white (Gray Level 63).



Note 13-5: Cross Talk (CTK) =  $\frac{|YA-YB|}{YA} \times 100\%$

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



Note 13-7: The “LED Life time “ is defined as the module brightness decrease to 50% original Brightness that the ambient temperature is 25°C and I<sub>LED</sub> =320mA.



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## 14. Handling Cautions

### 14-1) 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.
- d) Please following the tear off direction as figure 14-1 to remove the protective film as slowly as possible, so that electrostatic charge can be minimized.

### 14-2) 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.

### 14-3) 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.

### 14-4) 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.

### 14-5) Polarizer mark

The polarizer mark is to describe the direction of wide view angle film how to match up with the rubbing direction.

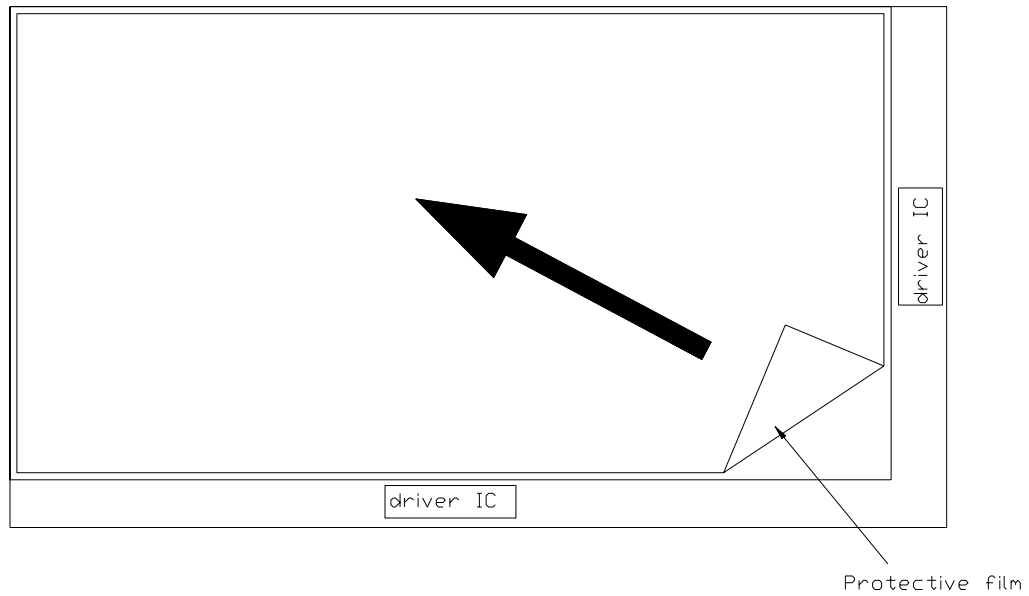


Figure 14-1 the way to peel off protective film

**15. Reliability Test**

| No | Test Item                                       | Test Condition  |
|----|---|---|
| 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 = +80°C, 240 hrs   |
| 4  | Low Temperature Operation Test                  | Ta = -20°C, 240 hrs   |
| 5  | High Temperature & High Humidity Operation Test | Ta = +50°C, 80%RH, 240 hrs  |
| 6  | Thermal Cycling Test (non-operating)            | 0°C → +60°C, 50 Cycles<br>1hr 1hr   |
| 7  | Vibration Test (non-operating)                  | Frequency : 10 ~ 57 Hz,<br>Amplitude : 0.5 mm 58~500Hz, 1G<br>Sweep time: 11 min<br>Test Period: 3 hrs (1 hr for each direction of X, Y, Z) |
| 8  | Shock Test (non-operating)                      | 80G, 6ms, X,Y, Z<br>1 times for each direction  |
| 9  | Electrostatic Discharge Test (non-operating)    | 200pF, 0Ω ±200V<br>1 time / each terminal   |

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.

16.Packing

| REV | DESCRIPTION                  | DESIGN      | DATE       |
|-----|------------------------------|-------------|------------|
| 01  | INITIAL RELRASE              | Patrick Lin | 2007.10.26 |
| △02 | CHG 50-0500161 to 50-0510162 | Patrick Lin | 2009.08.14 |

**NOTE:**  
 1.Q'TY: 20 pcs panel/carton.  
 2.Dimension: 530\*295\*230mm  
 3.Weight: 9.0 Kg

| ITEM | PART NO.   | DESCRIPTION       | QTY | REMARK |
|------|------------|-------------------|-----|--------|
| 4    | 50-0100111 | CARTON            | 1   |        |
| 3    | 50-0510162 | 防静电气泡袋 Pink       | 20  | 防静电    |
| 2    | PM102ZY3   | 10.2"WSVGA Module | 20  |        |
| 1    | 50-0301051 | 瓦楞隔板缓冲材           | 1   | 上盖+底座  |

|           |            |                   |           |        |           |
|-----------|------------|-------------------|-----------|--------|-----------|
| MTL.SPEC. |            | UNSPECIFIED TOL'S |           | REMARK |           |
|           |            | ANGLE             |           |        |           |
|           |            | ROUGHNESS         |           |        |           |
| APPROVE   | Frank Shin | '07.10.26         | SCALE     | UNIT   | SHEET     |
| CHECK     | Frank Shin | '07.10.26         |           |        | 1 OF 1    |
| DRAWN     | Patrick    | '07.10.26         | MTL.NO.   |        | DWG TITLE |
|           |            |                   | DWG FILE: |        | REV. 01   |
|           |            |                   |           |        | A4 SIZE   |

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