



**深圳市勋瑞光电科技有限公司**

Xunrui photoelectric technology (shenzhen) CO.,LTD.

## Product Specifications

**Customer:** \_\_\_\_\_

**Model Name:** \_\_\_\_\_ H070BWS40I1K065

**Date:** \_\_\_\_\_ 2023-04-16

**Version:** \_\_\_\_\_ A0

☒ **Preliminary Specification**

☐ **Final Specification**

### For Customer's Acceptance

| Approved by | Comment |
|-------------|---------|
|             |         |

| Approved by | Reviewed by | Prepared by |
|-------------|-------------|-------------|
|             |             |             |



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**Record of Revision**

| Rev | Issued Date | Description    | Editor |
|-----|-------------|----------------|--------|
| A0  | 2023/04/16  | First Release. | gl.Liu |
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## 1. GENERAL DESCRIPTION

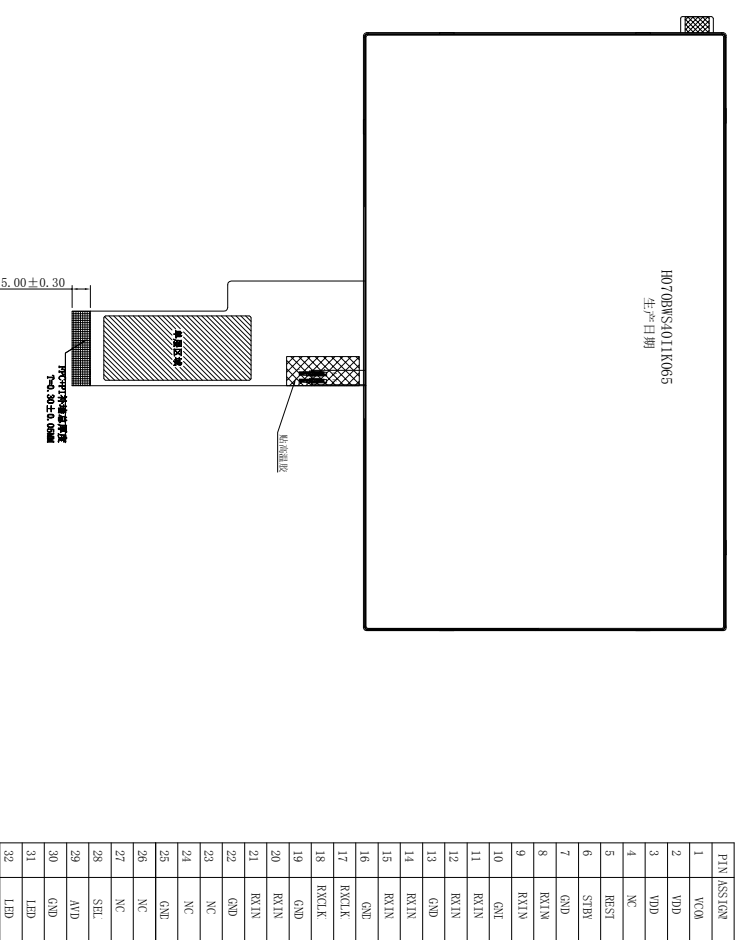
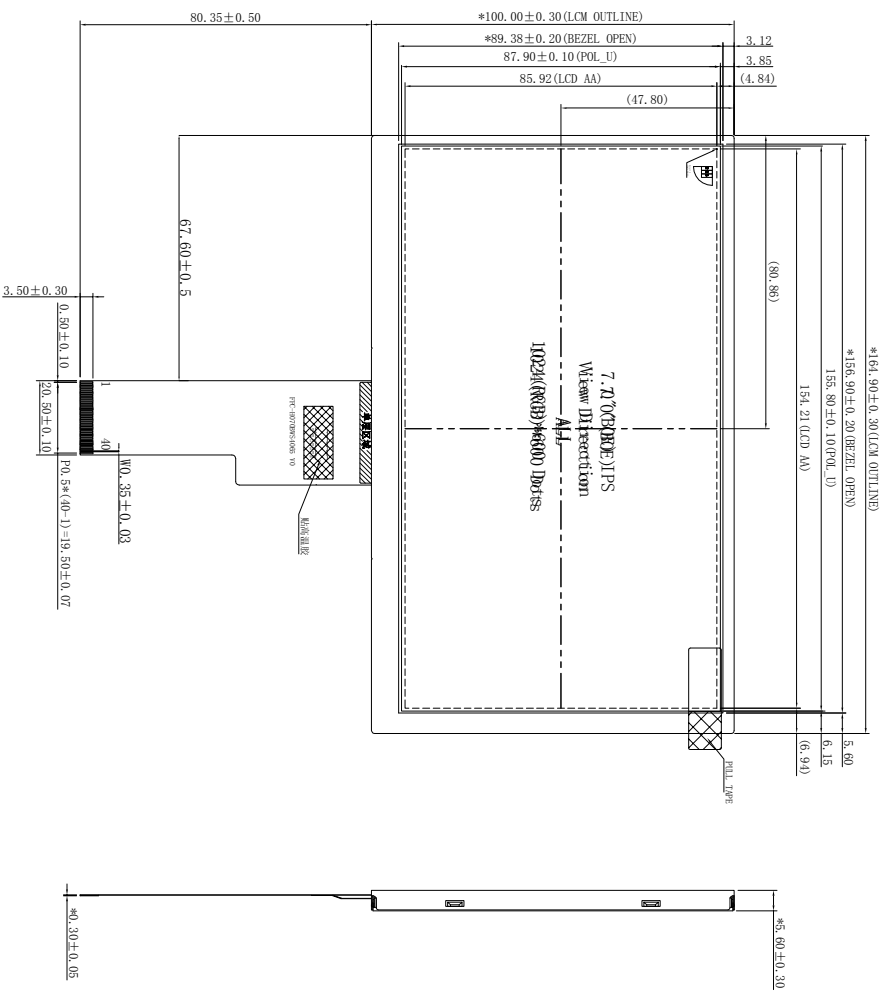
### 1.1 DESCRIPTION

H070BWS4011K065 is a color active matrix thin film transistor (TFT) TN liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. It is composed of a TFT LCD panel, Driver IC ,FPC and Backlight.

### 1.2 FEATURES:

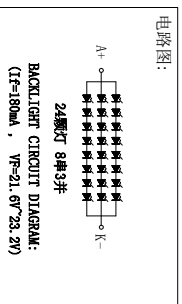
| No. | Item                           | Specification           | Unit   |
|-----|--------------------------------|-------------------------|--------|
| 1   | Panel Size                     | 7"                      | inch   |
| 2   | Number of Pixels               | 1024×RGB (3) ×600       | pixels |
| 3   | Active Area                    | 154.21(H)×85.92(V)      | mm     |
| 4   | Pixel Pitch                    | 0.1506(H)×0.1432(V)     | mm     |
| 5   | Outline Dimension              | 164.9 (W)×100(H)×5.6(D) | mm     |
| 6   | Number of Colors               | 16.7M                   | -      |
| 7   | Display Mode                   | Normally Black          | -      |
| 8   | Viewing Direction              | ALL                     | -      |
| 9   | Display Format                 | RGB vertical stripe     | -      |
| 10  | Luminance (cd/m <sup>2</sup> ) | 1000 (TYP.)             | nit    |
| 11  | Contrast Ratio                 | 800(TYP.)               |        |
| 12  | Surface Treatment              | Anti-Glare              | -      |
| 13  | Interface                      | LVDS                    | -      |
| 14  | Backlight                      | White LED               | -      |
| 15  | Operation Temperature          | -20~70                  | °C     |
| 16  | Storage Temperature            | -30~80                  | °C     |

## 2. MECHANICAL SPECIFICATION



## LCM NOTES:

1. DISPLAY TYPE: 7.0 INCH TFT /BLACK
2. BACKLIGHT: 24 CHIP WHITE LED, IN PARALLEL
3. OPERATING TEMP:  $-20^{\circ}\text{C}$ ~ $+70^{\circ}\text{C}$
4. STORAGE TEMP:  $-30^{\circ}\text{C}$ ~ $+80^{\circ}\text{C}$
5. RESOLUTION: 1024RGBx600
6. LCD IC: TBD
7. Luminous intensity(9 AVG):Module:900cd/m<sup>2</sup>(MIN.), 1000cd/m<sup>2</sup>(TYP.)
8. Uniformity:75%(Min)
9. “( )”reference dimension. “\*” “critical dimension
10. RoHS Compliant



|                      |                |                                                                                                                                                                                                                                                                      |
|----------------------|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| INTERFACE            | LVDS Interface |  <b>深圳市凯恩光电技术有限公司</b><br>Kannu Photoelectric Technology (Shenzhen) Co., Ltd.                                                                                                      |
|                      | FPC Connector  |                                                                                                                                                                                                                                                                      |
| VIEWING DIRECTION    | ALL            | MODEL NAME<br>TFT Display Module<br>H070BWS4011K06E<br>DWN<br>REV. A0<br>SHEET OF 1/1<br>CHKD<br>TOLERANCE UNLESS SPECIFIED<br>±0.3<br>PROJECTION<br>3RD ANGLE  UNIT mm SCALE 1:1 |
| Gray Scale DIRECTION | FREE           |                                                                                                                                                                                                                                                                      |



### 3. PIN DESCRIPTION

FH19SC-40S-0.5SH (05)

| Pin No. | Symbol   | Type | Function                                                                                                                                                              |
|---------|----------|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | VCOM     | P    | Common voltage                                                                                                                                                        |
| 2       | VDD      | P    | Digital power                                                                                                                                                         |
| 3       | VDD      | P    | Digital power                                                                                                                                                         |
| 4       | NC       | -    | Not connect                                                                                                                                                           |
| 5       | REST     | I    | Global reset pin. Active low to enter reset state. Suggest to connecting with an RC reset circuit for stability. Normally pull high. (R=10K $\Omega$ , C=0.1 $\mu$ F) |
| 6       | STBYB    | I    | Standby mode, normally pull high<br>STBYB="1", normal operation<br>STBYB="0", timing control, source driver will turn off, all output are high-Z                      |
| 7       | GND      | P    | Ground                                                                                                                                                                |
| 8       | RXIN0-   | I    | Negative LVDS differential data inputs                                                                                                                                |
| 9       | RXIN0+   | I    | Positive LVDS differential data inputs                                                                                                                                |
| 10      | GND      | P    | Ground                                                                                                                                                                |
| 11      | RXIN1-   | I    | Negative LVDS differential data inputs                                                                                                                                |
| 12      | RXIN1+   | I    | Positive LVDS differential data inputs                                                                                                                                |
| 13      | GND      | P    | Ground                                                                                                                                                                |
| 14      | RXIN2-   | I    | Negative LVDS differential data inputs                                                                                                                                |
| 15      | RXIN2+   | I    | Positive LVDS differential data inputs                                                                                                                                |
| 16      | GND      | P    | Ground                                                                                                                                                                |
| 17      | RXCLKIN- | I    | Negative LVDS differential clock inputs                                                                                                                               |
| 18      | RXCLKIN+ | I    | Positive LVDS differential clock inputs                                                                                                                               |
| 19      | GND      | P    | Ground                                                                                                                                                                |
| 20      | RXIN3-   | I    | Negative LVDS differential data inputs                                                                                                                                |
| 21      | RXIN3+   | I    | Positive LVDS differential data inputs                                                                                                                                |
| 22      | GND      | P    | Ground                                                                                                                                                                |
| 23      | NC       | -    | Not connect                                                                                                                                                           |
| 24      | NC       | -    | Not connect                                                                                                                                                           |
| 25      | GND      | P    | Ground                                                                                                                                                                |
| 26      | NC       | -    | Not connect                                                                                                                                                           |
| 27      | DIMO/NC  | O    | Backlight CABC controller signal output                                                                                                                               |
| 28      | SELB     | I    | 6bit/8bit mode select<br>H : 6bit / L : 8bit                                                                                                                          |
| 29      | AVDD     | P    | Power for Analog Circuit                                                                                                                                              |



|    |            |   |                                 |
|----|------------|---|---------------------------------|
| 30 | GND        | P | Ground                          |
| 31 | LED-       | P | LED Cathode                     |
| 32 | LED-       | P | LED Cathode                     |
| 33 | L/R        | I | Horizontal inversion            |
| 34 | U/D        | I | Vertical inversion              |
| 35 | VGL        | P | Negative power for TFT          |
| 36 | CABCEN1/NC | P | Backlight control signal Note 2 |
| 37 | CABCEN0/NC | P | Backlight control signal Note 2 |
| 38 | VGH        | P | Positive power for TFT          |
| 39 | LED+       | P | LED Anode                       |
| 40 | LED+       | P | LED Anode                       |

I : input , O : output , P : Power

**【Note】**

- \*1) : When L/R="0" , set right to left scan dirction  
 When L/R="1" , set left to right scan dirction  
 When U/D="0" , set top to bottom scan dirction  
 When U/D="1" , set bottom to top scan dirction

Note 2: CABC H/W enable pin,Normally pull low.

When CABC\_EN=00,CABC OFF .(Default mode)

When CABC\_EN=01, Use interface image.

When CABC\_EN=10, Still Picture.

When CABC\_EN=11, Moving image\



## 4. ELECTRICAL CHARACTERISTICS

### 4.1 ABSOLUTE MAXIMUM RATINGS

| Item                        | Symbol | Min. | Max. | Unit | Conditions |
|-----------------------------|--------|------|------|------|------------|
| Digital Supply Voltage      | VDD    | -0.5 | 3.96 | V    |            |
| TFT Gate on voltage         | VGH    | -0.3 | 40   | V    |            |
| TFT Gate off voltage        | VGL    | -20  | 0.3  | V    |            |
| Analog power supply voltage | AVDD   | -0.5 | 15   | V    |            |

### 4.2 TFT LCD MODULE

#### 4.2.1 Operating Conditions

| Parameter                    | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|------------------------------|--------|------|------|------|------|------------|
| Digital Supply Voltage       | VDD    | 3.0  | 3.3  | 3.6  | V    |            |
| TFT Gate on voltage          | VGH    | 17   | 18   | 19   | V    |            |
| TFT Gate off voltage         | VGL    | -7   | -6   | -5   | V    |            |
| TFT Common electrode voltage | VCOM   | 3.1  | -    | 3.3  | V    |            |
| Analog power supply voltage  | AVDD   | 6.5  | 9.6  | 13.5 | V    |            |

#### 4.3 Current Consumption

| Item                   | Symbol | Condition  | Values |      |      | Unit | Remark |
|------------------------|--------|------------|--------|------|------|------|--------|
|                        |        |            | Min.   | Typ. | Max. |      |        |
| Gate on power Current  | IVGH   | VGH =18 V  | -      | 0.5  | 1    | mA   |        |
| Gate off power current | IVGL   | VGL= -6V   | -      | 1    | 2    | mA   |        |
| Digital power current  | IVDD   | VDD = 3.3V | -      | 15   | 30   | mA   |        |
| Analog power current   | IAVDD  | AVDD =9.6V | -      | 35   | 45   | mA   |        |

Notes :

1. VGH is TFT Gate operating voltage.
2. VGL is TFT Gate operating voltage. The low voltage level of VGL signal must be fluctuates with same phase as Vcom.
3. Vcom must be adjusted to optimize display quality, as Crosstalk and Contrast Ratio etc..
4. The value is just the reference value. The customer can optimize the setting value by the different D-IC.

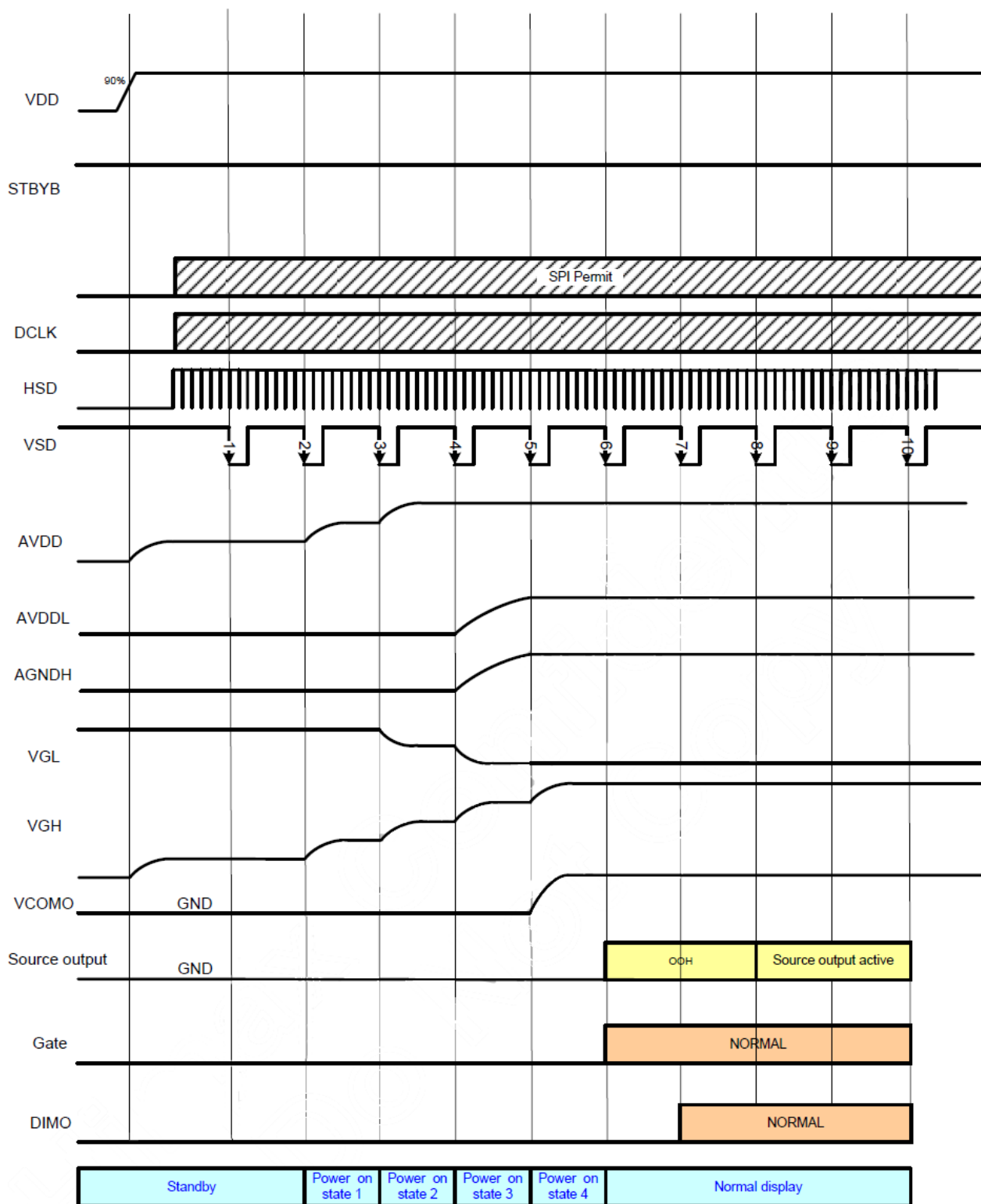


#### 4.4 POWER ON/OFF SEQUENCE

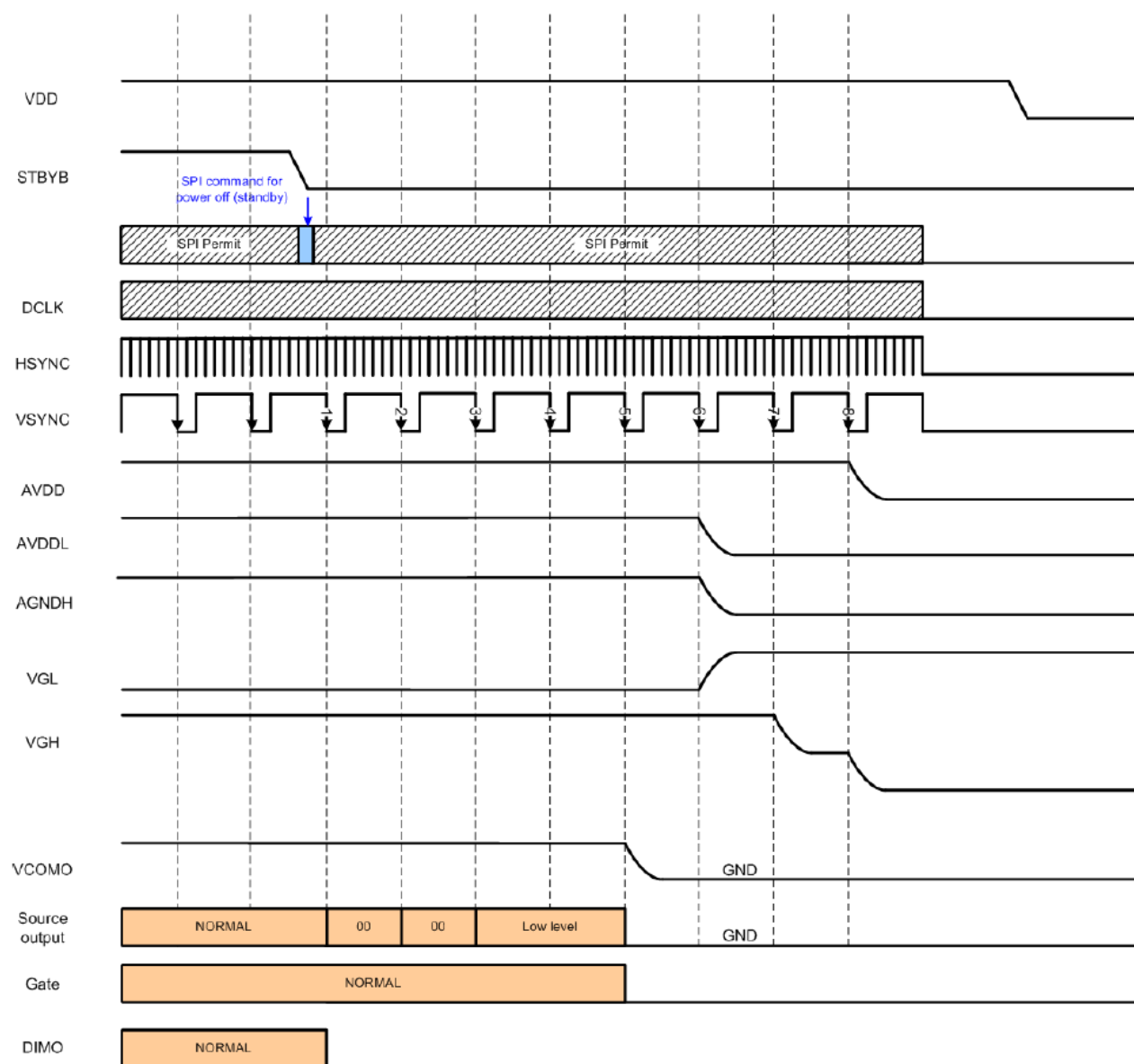
To prevent the device damage from latch up, the power on/off sequence shown below must be followed.

Power on: VDD, GND → AVDD, AGND → V1 to V14

Power off: V1 to V14 → AVDD, AGND → VDD, GND



Power on timing sequence



Power off timing sequence

Note: Low level=3FH, when NBW=L (Normally white)

Low level=00H, when NBW=H (Normally black)



## 4.5 BACK LIGHT UNIT

Ta=25℃

| Item                 | Symbol           | Min. | Typ. | Max. | Unit | Remark                          |
|----------------------|------------------|------|------|------|------|---------------------------------|
| LED current          | I <sub>LED</sub> | -    | 180  | -    | mA   | 27LEDS                          |
| Forward voltage      | V <sub>F</sub>   | 21.6 | 24   | 23.2 | V    | I <sub>F</sub> =540mA<br>27LEDS |
| Reverse current      | I <sub>R</sub>   | -    | -    | 50   | μA   | V <sub>R</sub> =3V,1LED         |
| Power dissipation    | P <sub>d</sub>   | 4320 |      |      | mW   | 27LEDS                          |
| Peak forward current | I <sub>FP</sub>  | 60   |      |      | mA   | 1LED                            |
| Reverse Voltage      | V <sub>R</sub>   | 3    |      |      | V    | 1LED                            |

### 4.5.1 Internal Circuit Diagram

电路图:



24颗灯 8串3并

BACKLIGHT CIRCUIT DIAGRAM:  
(I<sub>f</sub>=180mA , V<sub>F</sub>=21.6V~23.2V)

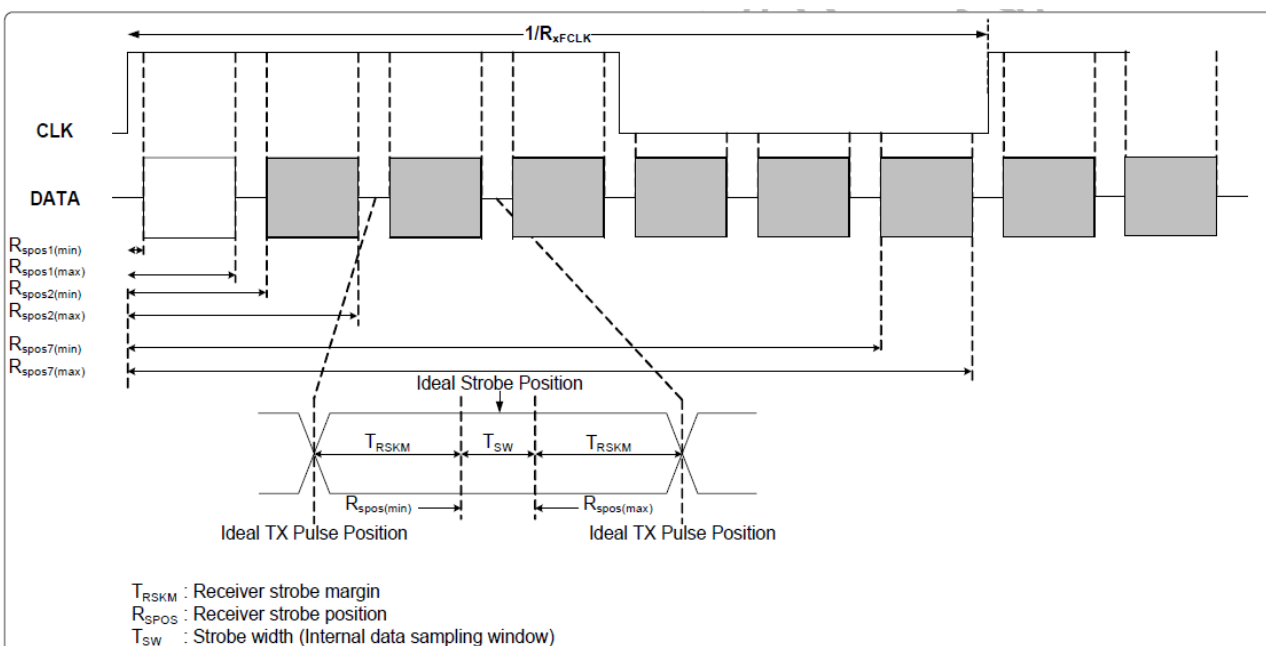
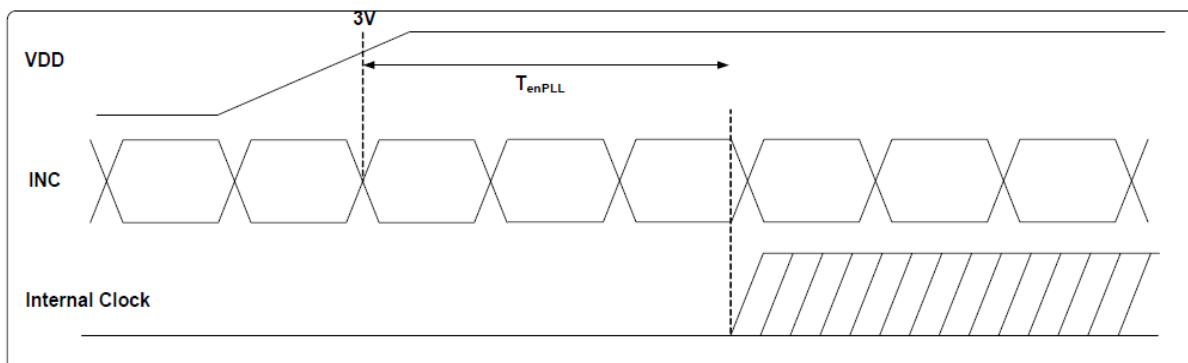
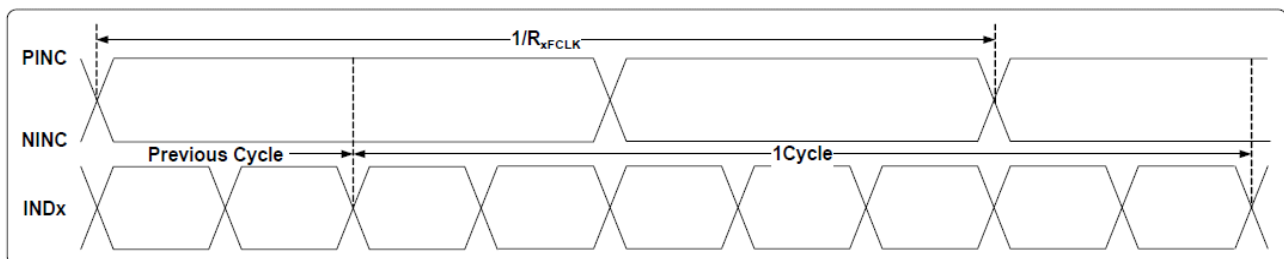


## 5.INPUT SIGNAL TIMING

### 5.1AC ELECTRICAL CHARACTERISTICS

#### 5.1. 1. LVDS mode AC electrical characteristics

| Parameter              | Symbol | Min  | Typ                          | Max  | Unit | Condition                                  |
|------------------------|--------|------|------------------------------|------|------|--------------------------------------------|
| Clock frequency        | RxFCLK | 40.8 | 51.2                         | 67.2 | MHz  |                                            |
| Input data skew margin | TRSKM  | 500  | -                            | -    | ps   | VID =400mV<br>RxVCM=1.2V<br>RxFCLK=51.2MHz |
| Clock high time        | TLVCH  | -    | $\frac{4}{(7 \cdot RxFCLK)}$ |      | ns   |                                            |
| Clock low time         | TLVCL  |      | $\frac{3}{(7 \cdot RxFCLK)}$ |      | ns   |                                            |
| PLL wake-up time       | TenPLL |      |                              | 150  | us   |                                            |



LVDS figure

### 5.1. 2 LVDS mode DC electrical characteristics

| Parameter                                 | Symbol         | Spec.        |      |                      | Unit    | Condition                         |
|-------------------------------------------|----------------|--------------|------|----------------------|---------|-----------------------------------|
|                                           |                | Min.         | Typ. | Max.                 |         |                                   |
| Differential input high Threshold voltage | $R_{XVTH}$     | -            | -    | +0.1                 | V       | $R_{XVCM}=1.2V$                   |
| Differential input low threshold voltage  | $R_{XVTL}$     | -0.1         | -    | -                    | V       |                                   |
| Input voltage range (singled-end)         | $R_{XVIN}$     | 0            | -    | $VDD-1.2+ V_{ID} /2$ | V       | -                                 |
| Differential input common Mode voltage    | $R_{XVCM}$     | $ V_{ID} /2$ | -    | $VDD-1.2$            | V       | -                                 |
| Differential input voltage                | $ V_{ID} $     | 0.2          | -    | 0.6                  | V       | -                                 |
| Differential input leakage Current        | $R_{V_{XIIz}}$ | -10          | -    | +10                  | $\mu A$ | -                                 |
| LVDS Digital Operating Current            | $I_{ddlvds}$   | -            | 15   | 30                   | mA      | Fclk=65MHz, VDD=3.3V              |
| LVDS Digital Stand-by Current             | $I_{stlvds}$   | -            | 10   | 50                   | $\mu A$ | Clock & all Functions are stopped |

Table 9.3: LVDS mode DC electrical characteristics

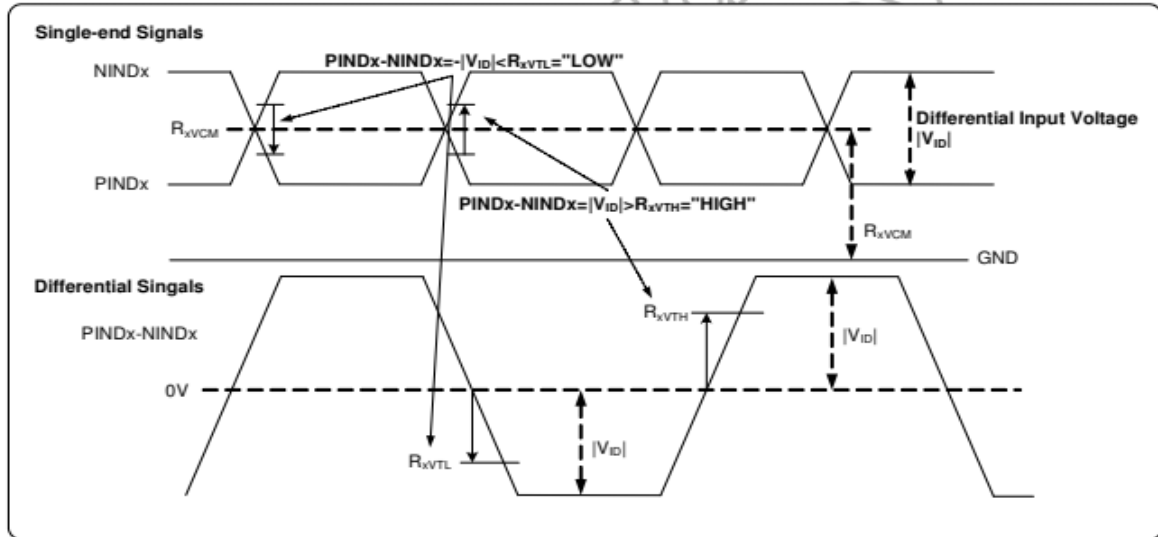
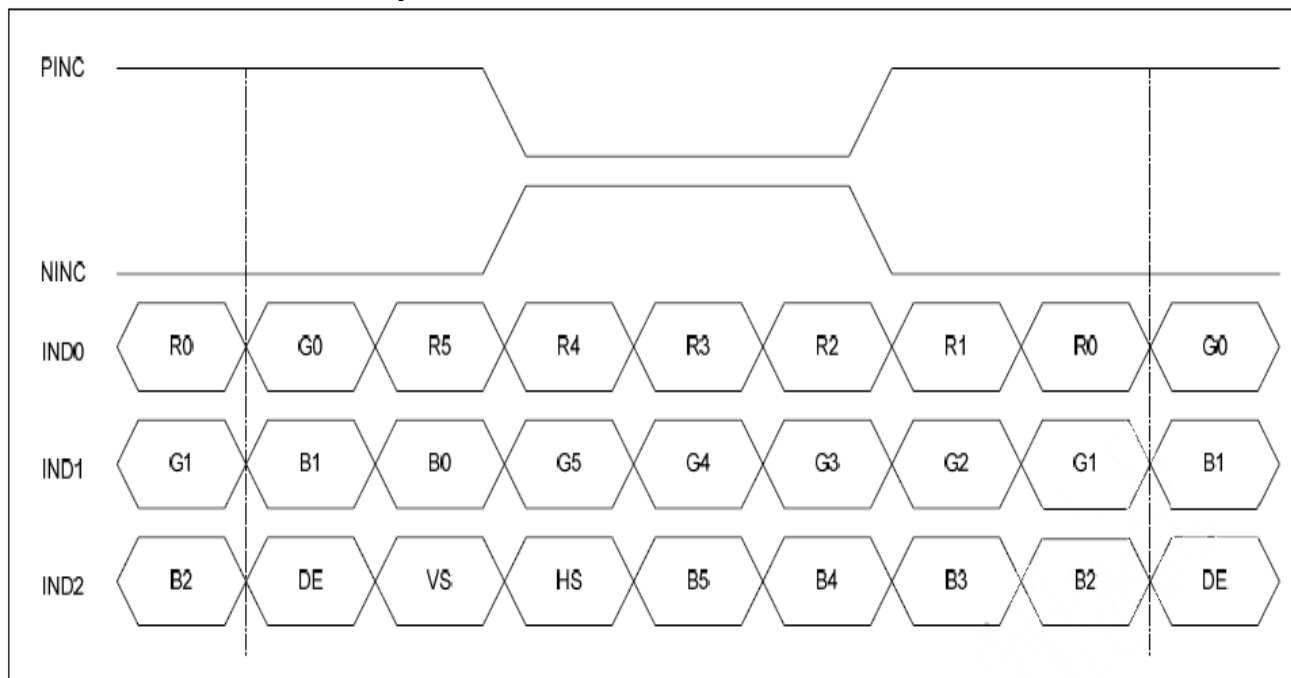


Figure 9.1: Single-end signals

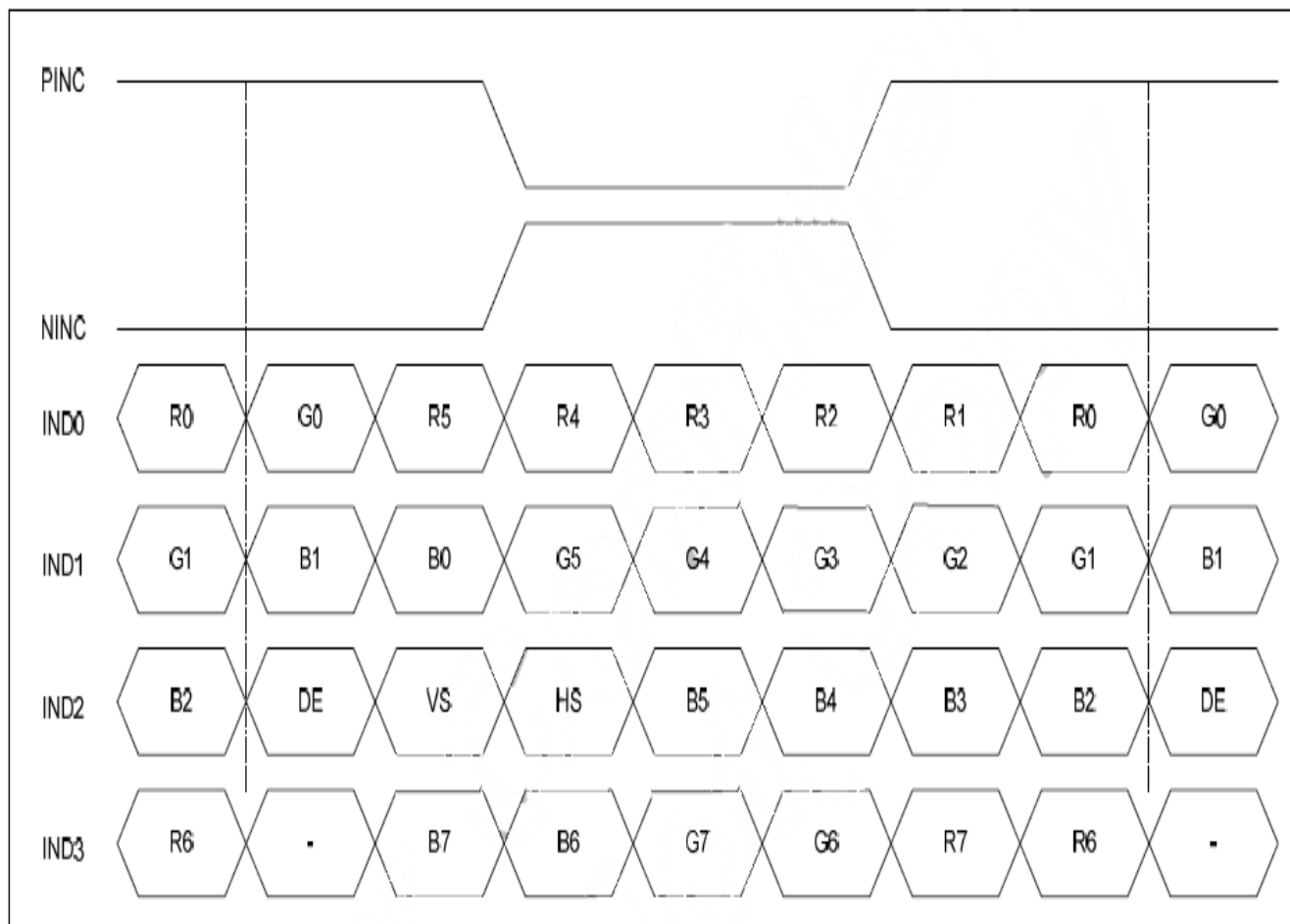


## 5.2 DATA INPUT FORMAT

### LVDS mode data input format



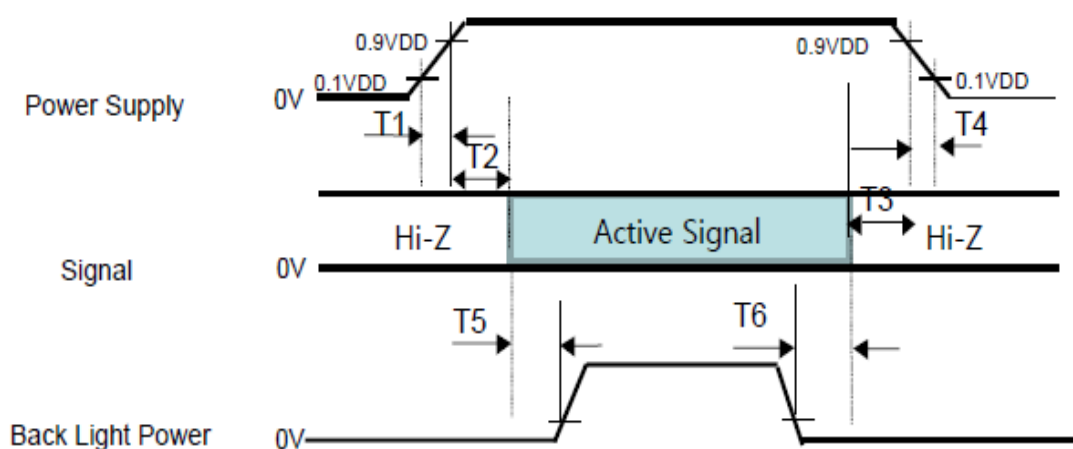
6-bit LVDS input



8-bit LVDS Input



### 5.3 POWER SEQUENCE



- $0.5\text{ms} \leq T1 \leq 10\text{ms}$
- $10\text{ms} \leq T2$
- $10\text{ms} \leq T3$
- $0\text{ms} \leq T4 \leq 10\text{ms}$
- $100\text{ms} \leq T5$
- $100\text{ms} \leq T6$

#### Notes:

1. When the power supply VDD is 0V, keep the level of input signals on the low or keep high impedance.
2. Do not keep the interface signal high impedance when power is on. Back Light must be turn on after power for logic and interface signal are valid.

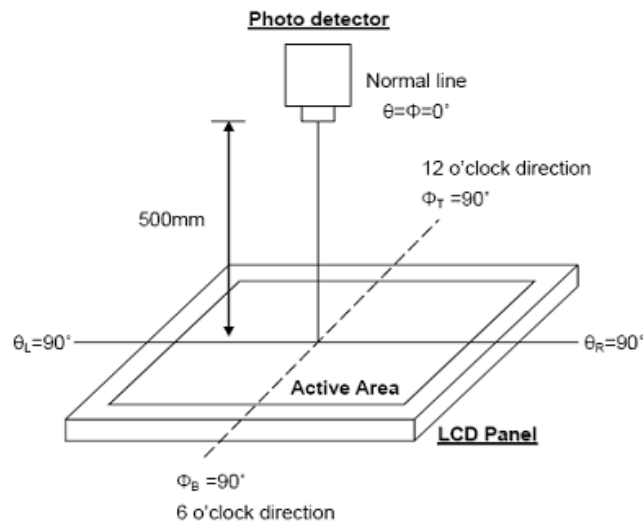


## 6. OPTICAL CHARACTERISTICS

Ta=25°C±2

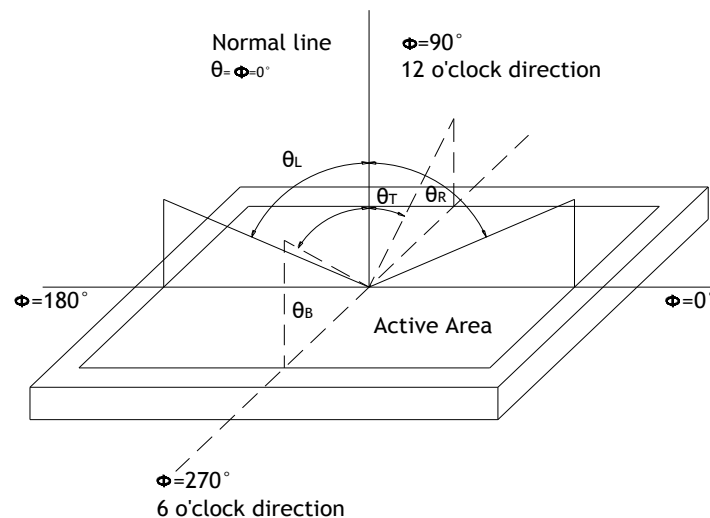
| Item                                |       | Symbol          | Condition                        | Min.  | Typ.  | Max.  | Unit   | Note                    |
|-------------------------------------|-------|-----------------|----------------------------------|-------|-------|-------|--------|-------------------------|
| Contrast Ratio                      |       | CR              | $\Theta = 0^{\circ}$             | 600   | 800   | -     |        | Note1<br>Note4          |
| Luminance                           |       | YL              |                                  | 900   | 1000  | -     | cd/m2  | Note1<br>Note6<br>Note7 |
| Luminance Uniformity                |       | IV-M            |                                  | 75    | 80    |       | %      |                         |
| Response Time<br>(Rising + Falling) |       | T <sub>RT</sub> | Ta= 25°C<br>$\Theta = 0^{\circ}$ | -     | 30    | 40    | ms     | Note1<br>Note3          |
| Viewing<br>Angle range              | Left  | $\Theta$        | CR > 10                          | 80    | 85    | -     | degree | Note2                   |
|                                     | Right | $\Theta$        |                                  | 80    | 85    | -     | degree |                         |
|                                     | Up    | $\Phi$          |                                  | 80    | 85    | -     | degree |                         |
|                                     | Down  | $\Phi$          |                                  | 80    | 85    | -     | degree |                         |
| Color<br>Chromaticity<br>(CIE1931)  | White | x               |                                  | 0.249 | 0.279 | 0.309 |        | Note1<br>Note5<br>Note7 |
|                                     |       | y               |                                  | 0.275 | 0.305 | 0.335 |        |                         |
|                                     | Red   | x               |                                  | 0.585 | 0.615 | 0.645 |        |                         |
|                                     |       | y               |                                  | 0.290 | 0.320 | 0.350 |        |                         |
|                                     | Green | x               |                                  | 0.266 | 0.296 | 0.326 |        |                         |
|                                     |       | y               |                                  | 0.539 | 0.569 | 0.599 |        |                         |
|                                     | Blue  | x               |                                  | 0.112 | 0.142 | 0.172 |        |                         |
|                                     |       | y               |                                  | 0.144 | 0.174 | 0.204 |        |                         |
| NTSC                                |       |                 |                                  | 45    | 50    |       | %      |                         |

Note1: Definition of optical measurement system



Note2: Definition of viewing angle range and measurement system

Viewing angle is measured at the center point of the LCD by CONOSCOPE (ergo-80).



Note3: Definition of Response time

The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time (TON) is the time between photo detector output intensity changed from 10% to 90%. And fall time (TOFF) is the time between photo detector output intensity changed from 90% to 10%.

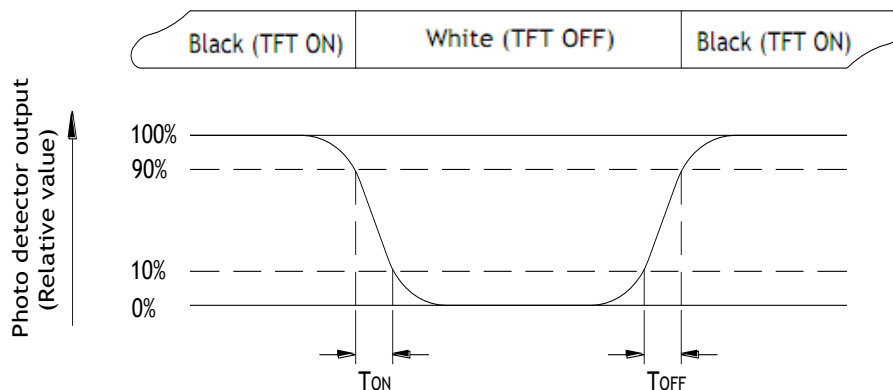


Fig. 6-3 Definition of response time



Note4: Definition of contrast ratio

$$\text{Contrast ratio(CR)} = \frac{\text{Luminance measured when LCD on the Whitestate}}{\text{Luminance measured when LCD on the Blackstate}}$$

“White state “: The state is that the LCD should drive by Vwhite.

“Black state”: The state is that the LCD should drive by Vblack.

Vwhite: To be determined Vblack: To be determined.

Note5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

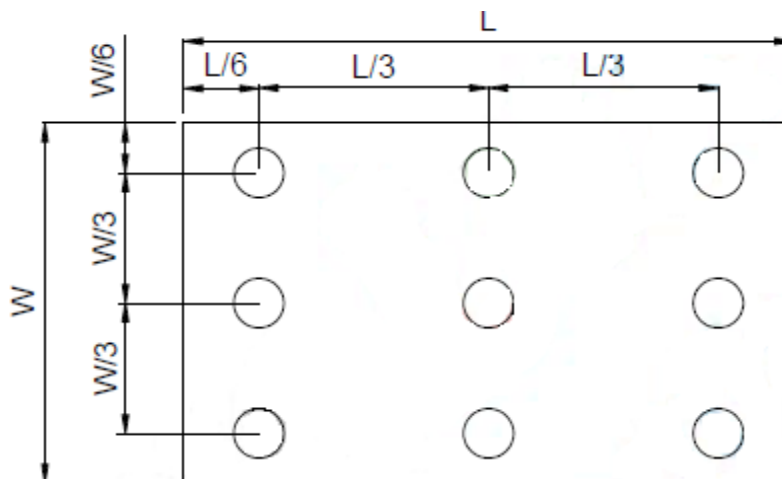
Note6: All input terminals LCD panel must be ground while measuring the center area of the panel. The LED driving condition is IL=180mA.

Note7: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas. Every measuring point is placed at the center of each measuring area.

Luminance Uniformity (U) =  $L_{\min} / L_{\max}$

L----Active area length, W---- Active area width



Bmax: The measured maximum luminance of all measurement position.

Bmin: The measured minimum luminance of all measurement position.



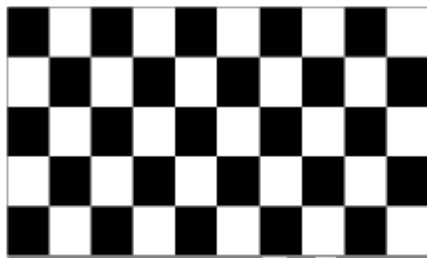
## 7. RELIABILITY TEST ITEMS

### 7.1 TEMPERATURE AND HUMIDITY

| Test Item                                | Test Condition                             | Remark                                                                                            |
|------------------------------------------|--------------------------------------------|---------------------------------------------------------------------------------------------------|
| High Temperature Storage                 | Ta=80℃; 48hrs                              | IEC60068-2-1 : 2007<br>GB2423.2-2008                                                              |
| Low Temperature Storage                  | Ta=-30℃; 48hrs                             | IEC60068-2-1 : 2007<br>GB2423.1-2008                                                              |
| High Temperature Operation               | Ta=70℃; 48Hrs                              | IEC60068-2-1 : 2007<br>GB2423.2-2008                                                              |
| Low Temperature Operation                | Ta=-20℃; 48hrs                             | IEC60068-2-1 : 2007<br>GB2423.1-2008                                                              |
| High Temperature High Humidity Operation | Ta=60℃ , 90%RH ,<br>48Hrs(no condensation) | IEC60068-2-78 : 2001<br>GB/T2423.3-2006                                                           |
| Thermal Shock                            | -20℃ (0.5h) ~ 70℃ (0.5h)<br>/ 10 cycles    | Start with cold temperature ,<br>End with high temperature ,<br>IEC60068-2-14:1984,GB2423.22-2002 |
| Image Sticking                           | 25℃ ; 4hrs                                 | Note1                                                                                             |

Note1:Condition of image sticking test :25℃±2℃

Operation with test pattern sustained for 2hrs,then change to gray pattern immediately.after5 mins,themura must be disappeared completely



(a) Test Pattern (chess board Pattern )



(b) Gray Pattern

### 7.2 VIBRATION&SHOCK

| Test item                               | Conditions                                                                                       | Remark                                  |
|-----------------------------------------|--------------------------------------------------------------------------------------------------|-----------------------------------------|
| Packing Shock<br>(non-operation)        | 980m/s <sup>2</sup> ,6ms, ±x,y,z 3times for<br>direction                                         | IEC60068-2-27 : 1987<br>GB/T2423.5-1995 |
| Packing<br>Vibration<br>(non-operation) | Frequency range:10 HZ~50HZ<br>Stroke:1.0mm,sweep:10 HZ ~50HZ<br>x,y,z 2 hours for each direction | IEC60068-2-32 : 1990<br>GB/T2423.8-1995 |

### 7.3ESD

| Test item                                           | Conditions                              | Remark |                                         |
|-----------------------------------------------------|-----------------------------------------|--------|-----------------------------------------|
| Electro Static<br>Discharge Test<br>(non-operation) | 150pF , 330Ω ,<br>Contact:±4KV,Air:±8KV | 1      | IEC61000-4-2 : 2001<br>GB/T17626.2-2006 |
|                                                     | 200pF , 0Ω , ±200V contact test         | 2      |                                         |

Note: Measure point :

1. LCD glass and metal bezel
2. IF connector pins



## **8. GENERAL PRECAUTION**

### **8.1 SAFETY**

1. Do not swallow any liquid crystal, even if there is no proof that liquid crystal is poisonous.
2. If the LCD panel breaks, be careful not to get liquid crystal to touch your skin.
3. If skin is exposed to liquid crystal, wash the area thoroughly with alcohol or soap.

### **8.2 STORAGE CONDITIONS**

1. Store the panel or module in a dark place where the temperature is  $23\pm5^{\circ}\text{C}$  and the humidity is below  $50\pm20\%\text{RH}$ .
2. Store in anti-static electricity container.
3. Store in clean environment, free from dust, active gas, and solvent.
4. Do not place the module near organics solvents or corrosive gases.
5. Do not crush, shake, or jolt the module.

### **8.3 HANDLING PRECAUTIONS**

- (1) Avoid static electricity which can damage the CMOS LSI.
- (2) The polarizing plate of the display is very fragile. So, please handle it very carefully.
- (3) Do not give external shock.
- (4) Do not apply excessive force on the surface.
- (5) Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate.
- (6) Do not use ketone solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.
- (7) Do not operate it above the absolute maximum rating.
- (8) Do not remove the panel or frame from the module.
- (9) When the module is assembled, it should be attached to the system firmly, Be careful not to twist and bend the module.
- (10) Wipe off water droplets or oil immediately. If you leave the droplets for a long time, staining and discoloration may occur.
- (11) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, legs or clothes, it must be washed away thoroughly with soap.

### **8.4 WARRANTY**

- (1) The period is within twelve months since the date of shipping out under normal using and storage conditions.
- (2) Do not repaired or modified the LCM. It may cause function to lose efficacy, XianChuang does not warrant the LCM.
- (3) All process and material comply ROHS.



## 9. PACKAGE DRAWING

