

PRODUCT SPECIFICATION

MODEL: JCB090IPS - 36A

<◇>PRELIMINARY SPECIFICATION  
<◆>APPROVAL SPECIFICATION

| CUSTOMER<br>APPROVED | DESIGNED | CHECKED | APPROVED |
|----------------------|----------|---------|----------|
|                      |          |         |          |

| SUPPLIER<br>APPROVED | DESIGNED | CHECKED | APPROVED |
|----------------------|----------|---------|----------|
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## REVISION STATUS

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|         |             |      |               |             |

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## 1. GENERAL DESCRIPTION

### 1.1 Introduction

BOE Display model JCB090IPS - 36A is a color active matrix thin film Transistor(TFT) liquid crystal display (LCD) that uses amorphous silicom TFT as a Switching device. This model is composed of a TFT LCD panel,a driving circuit and a back light system.This TFT LCD has a 7(16:9) inch diagonally measured active display area with WSVGA (1024 horizontal by 600 vertical pixel) Resolution.

### 1.2 Features

- 9 inch (16:9 diagonal) configuration
- 16.7M color by 8 bit + Hi -FRC input
- RoHS/Halogen Free Compliance

### 1.3 Applications

- Automotive

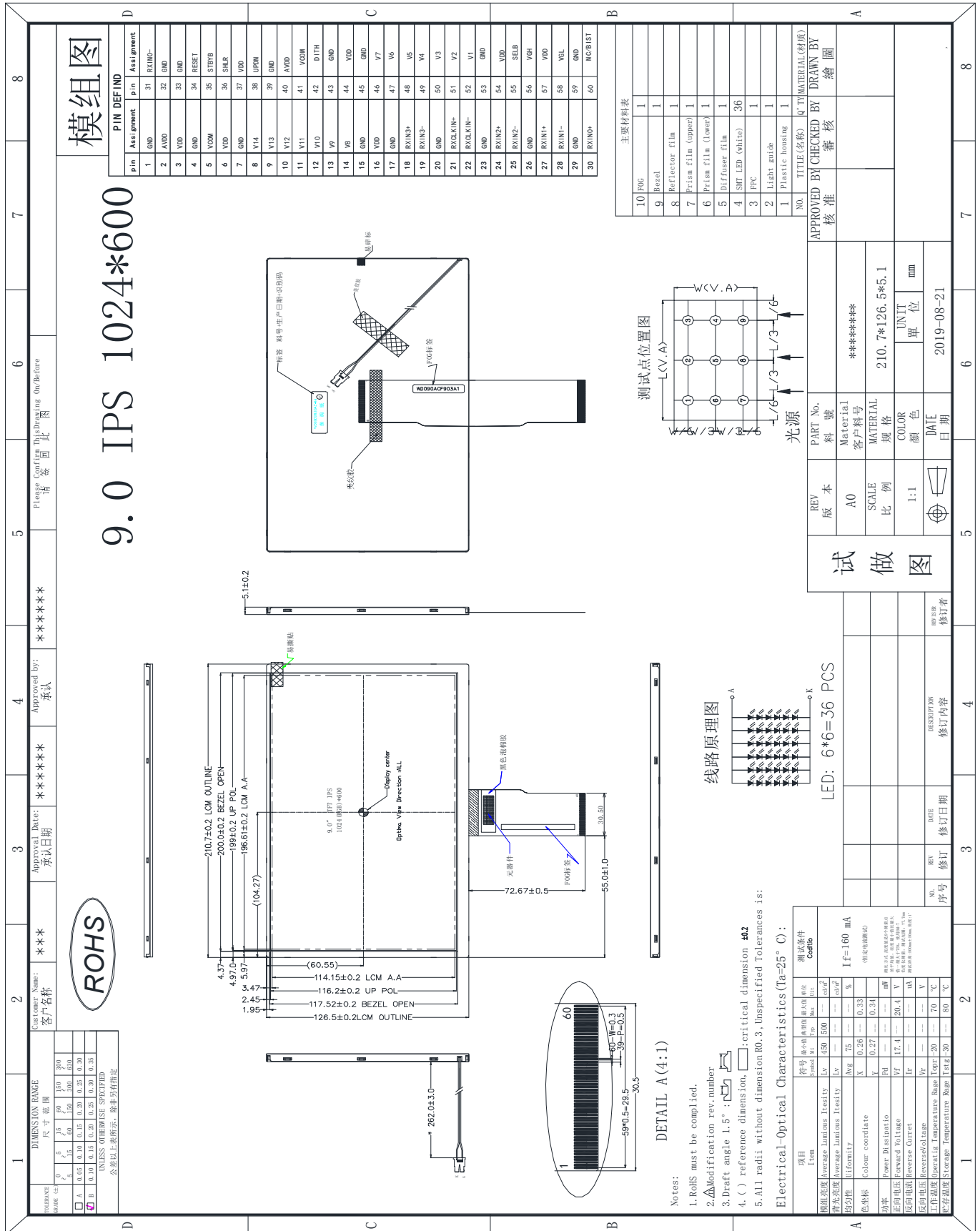
### 1.4 TFT LCD General information

| Item               |           | Specification                             | Unit   |
|--------------------|-----------|-------------------------------------------|--------|
| Outline Dimension  |           | 210.7x126.5 x5.1 (typ)                    | mm     |
| Display area       |           | 196.608(H) x114.5(V)                      | mm     |
| Number of pixel    |           | 1024 RGB (H) x 600(V)                     | pixels |
| Pixel pitch        |           | 0.192 (H) x 0.19025(V)                    | mm     |
| Pixel arrangement  |           | RGB Vertical stripe                       |        |
| Display mode       |           | Normally black                            |        |
| NTSC               |           | 50 (typ.)                                 | %      |
| Surface treatment  |           | Antiglare with IPS Flim                   |        |
| Weight             |           | (146)g ( Typ.)                            | g      |
| Back-light         |           | White LED                                 |        |
| Power Consumpti on | Logic     | 0.5(Max) @ Black pattern .Frame rate 60Hz | W      |
|                    | BL System | 2.3(typ) @ Biack pattern w/o LED driver   | W      |

### 1.5 Mechanical information

| Item        |               | Min.  | Typ.  | Max.  | unit |
|-------------|---------------|-------|-------|-------|------|
| Module size | Horizontal(H) | 210.5 | 210.7 | 210.9 | mm   |
|             | Vertical(V)   | 126.3 | 126.5 | 126.7 | mm   |
|             | Depth(D)      | ---   | 5.1   | 5.3   | mm   |
| weight      |               | ----  | (146) | ---   | g    |

## 2. MECHANICAL SPECIFICATION



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## 3. PIN DESCRIPTION

Lvds Connector HRS Model Number :FH33-60S-0.5SH

| No. | Symbol   | Function                                | Remark |
|-----|----------|-----------------------------------------|--------|
| 1   | AGND     | Analog ground                           |        |
| 2   | AVDD     | Power for Analog Circuit                |        |
| 3   | VDD      | Digital Power                           |        |
| 4   | GND      | Power ground                            |        |
| 5   | VCOM     | Common Voltage                          |        |
| 6   | VDD      | Digital Power                           |        |
| 7   | GND      | Power ground                            |        |
| 8   | NC       | No connection                           |        |
| 9   | NC       | No connection                           |        |
| 10  | NC       | No connection                           |        |
| 11  | NC       | No connection                           |        |
| 12  | NC       | No connection                           |        |
| 13  | NC       | No connection                           |        |
| 14  | NC       | No connection                           |        |
| 15  | GND      | Power ground                            |        |
| 16  | VDD_LVDS | LVDS Power                              |        |
| 17  | GND      | Power ground                            |        |
| 18  | PIND3    | Positive LVDS differential data inputs  |        |
| 19  | NIND3    | Negative LVDS differential data inputs  |        |
| 20  | GND      | Power ground                            |        |
| 21  | PINC     | Positive LVDS differential clock inputs |        |
| 22  | NINC     | Negative LVDS differential clock inputs |        |
| 23  | GND      | Power ground                            |        |
| 24  | PIND2    | Positive LVDS differential data inputs  |        |
| 25  | NIND2    | Negative LVDS differential data inputs  |        |
| 26  | GND      | Power ground                            |        |
| 27  | PIND1    | Positive LVDS differential data inputs  |        |
| 28  | NIND1    | Negative LVDS differential data inputs  |        |
| 29  | GND      | Power ground                            |        |
| 30  | PIND0    | Positive LVDS differential data inputs  |        |
| 31  | NIND0    | Negative LVDS differential data inputs  |        |
| 32  | GND      | Power ground                            |        |

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|    |          |                                                                                                                                                           |  |
|----|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| 33 | GND_LVDS | LVDS ground                                                                                                                                               |  |
| 34 | RESET    | Global reset pin. Active low to enter reset state.<br>Suggest to connecting with RC reset circuit for stability.<br>Normally pull high.(R=10KΩ、C=0.1uF)   |  |
| 35 | STBYB    | Standby mode, Normally pulled high<br>STBYB = "1", normal operation<br>STBYB = "0", timing controller, source driver will turn off, all output are High-Z |  |
| 36 | NC       | No connection                                                                                                                                             |  |
| 37 | VDD      | Digital Power                                                                                                                                             |  |
| 38 | NC       | No connection                                                                                                                                             |  |
| 39 | AGND     | Analog ground                                                                                                                                             |  |
| 40 | AVDD     | Power for Analog Circuit                                                                                                                                  |  |
| 41 | VCOM     | Common Voltage                                                                                                                                            |  |
| 42 | DITH     | Dithering function enable control.Normally pull low.<br>DITHER = "1" , LVDS input data is 8 bits<br>DITHER = "0" , LVDS input data is 6 bits              |  |
| 43 | GND      | Power ground                                                                                                                                              |  |
| 44 | VDD      | Digital Power                                                                                                                                             |  |
| 45 | GND      | Power ground                                                                                                                                              |  |
| 46 | NC       | No connection                                                                                                                                             |  |
| 47 | NC       | No connection                                                                                                                                             |  |
| 48 | NC       | No connection                                                                                                                                             |  |
| 49 | NC       | No connection                                                                                                                                             |  |
| 50 | NC       | No connection                                                                                                                                             |  |
| 51 | NC       | No connection                                                                                                                                             |  |
| 52 | NC       | No connection                                                                                                                                             |  |
| 53 | GND      | Power ground                                                                                                                                              |  |
| 54 | VDD      | Digital Power                                                                                                                                             |  |
| 55 | SELB     | 6bit/8bit mode select<br>DINT=0:8-bit<br>DINT=1:6-bit(Default)                                                                                            |  |
| 56 | VGH      | Positive power for TFT                                                                                                                                    |  |
| 57 | VDD      | Digital Power                                                                                                                                             |  |
| 58 | VGL      | Negative power for TFT                                                                                                                                    |  |
| 59 | GND      | Power ground                                                                                                                                              |  |
| 60 | NC/BIST  | No connection                                                                                                                                             |  |

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## 4. ELECTRICAL CHARACTERISTICS

### 4.1 ABSOLUTE MAXIMUM RATINGS

| Item                   | Symbol | Min. | Max. | Unit |
|------------------------|--------|------|------|------|
| Digital Supply Voltage | VDD    | -0.3 | 5.0  | V    |
| Analog supply voltage  | AVDD   | -0.3 | 15   | V    |
| Gate on voltage        | VGH    | -0.3 | 25   | V    |
| Gate off voltage       | VHL    | -20  | 0.3  | V    |

### 4.2 TFT LCD MODULE

#### 4.2.1 OPERATING CONDITIONS

| Parameter                    | Symbol | Min. | Typ. | Max. | Unit |
|------------------------------|--------|------|------|------|------|
| Digital Supply Voltage       | VDD    | 3.0  | 3.3  | 3.6  | V    |
| TFT Gate ON Voltage          | VGH    | -    | 18   | -    | V    |
| TFT Gate OFF Voltage         | VHL    | -    | -8   | -    | V    |
| TFT Common electrode voltage | VCOM   | 3.6  | 4.0  | 4.6  | V    |
| Analog Power Supply voltage  | AVDD   | 9.6  | 10.4 | 13.5 | V    |

#### NOTE

### 4.3 Switching Characteristics for LVDS Receiver

| Symbol | Item                         | Min. | Typ. | Max. | Unit | Remark     |
|--------|------------------------------|------|------|------|------|------------|
| IVGH   | Gate on current              | --   | 1.0  | --   | mA   | VGH=18V    |
| IVGL   | Gate OFF current             | --   | 1.0  | --   | mA   | VGL=-8V    |
| IVDD   | Digital Current              | --   | 35   | --   | mA   | VDD=3.3    |
| IAVDD  | Analog Power Supply voltage  | --   | 70   | --   | mA   | AVDD=10.2V |
| IVCOM  | TFT Common electrode voltage | --   | 3    | --   | mA   | VCOM=4.4V  |

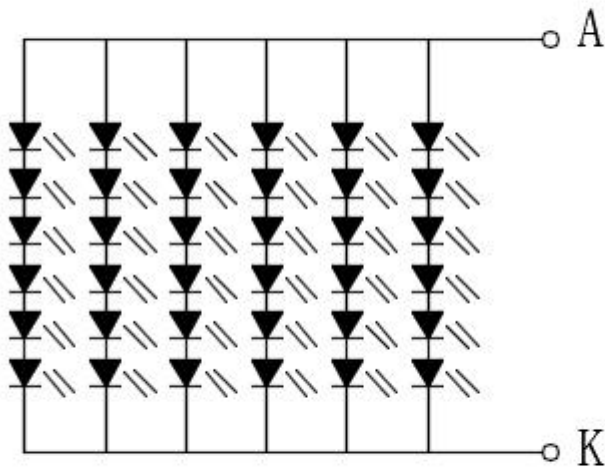
4.4 BACK LIGHT UNIT

Ta=25℃

| Item                 | Symbol           | Min. | Typ. | Max. | Unit | Remark                   |
|----------------------|------------------|------|------|------|------|--------------------------|
| LED current          | I <sub>LED</sub> |      | 160  | 180  | mA   | Total LED                |
| Forward voltage      | V <sub>F</sub>   | 16   | 17   | 19.2 | V    | I <sub>F</sub> =160mA    |
| Reverse current      | I <sub>R</sub>   |      |      | 50   | μA   | V <sub>R</sub> =5V, 1LED |
| Power dissipation    | P <sub>d</sub>   | 2520 |      |      | mW   | Total LED                |
| Peak forward current | I <sub>FP</sub>  | 150  |      |      | mA   | 1LED                     |
| Reverse Voltage      | V <sub>R</sub>   | 5    |      |      | V    | 1LED                     |

4.5 POWER ON/OFF SEQUENCE

线路原理图



LED: 6\*6=36 PCS

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## Power on timing sequenc

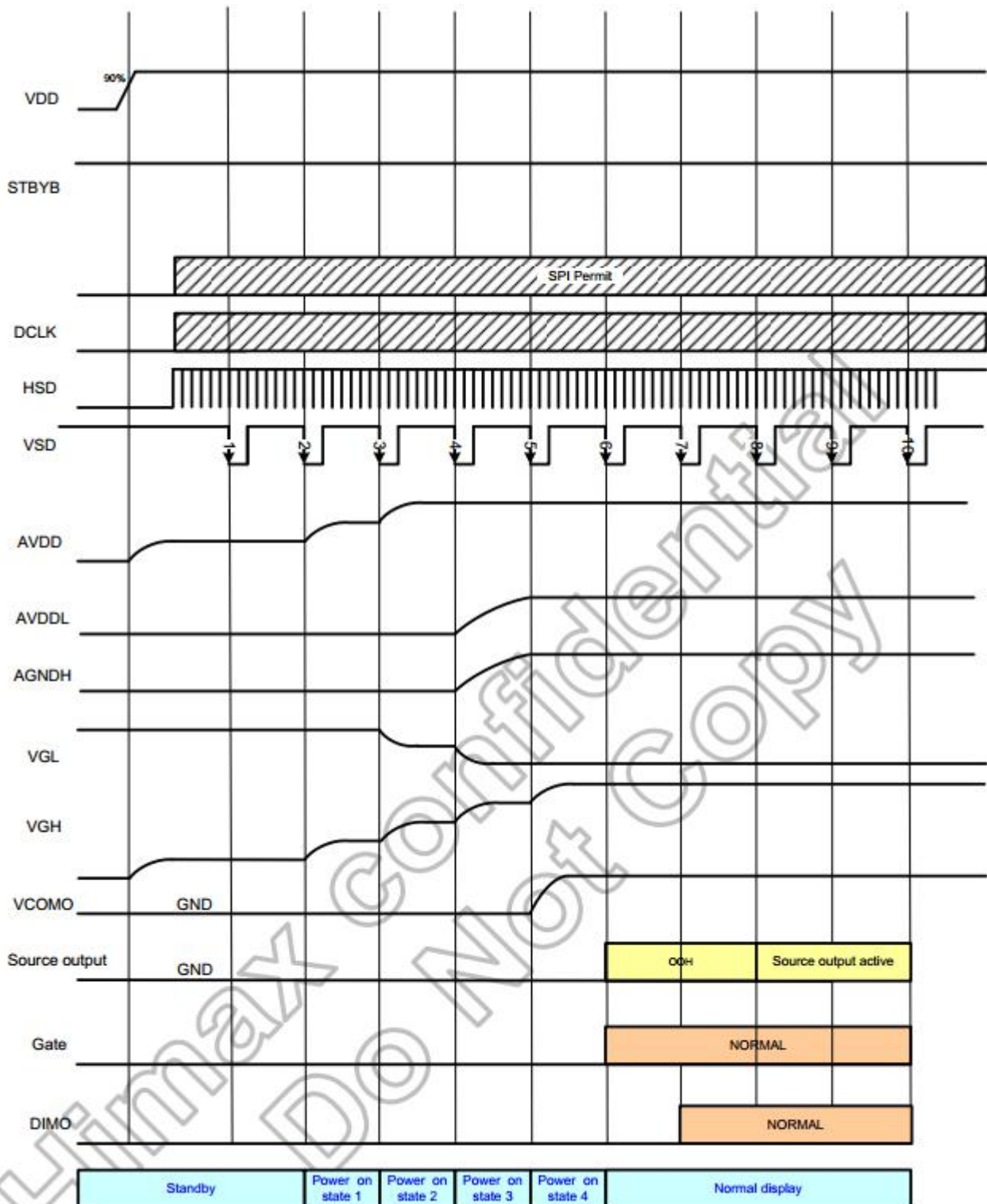
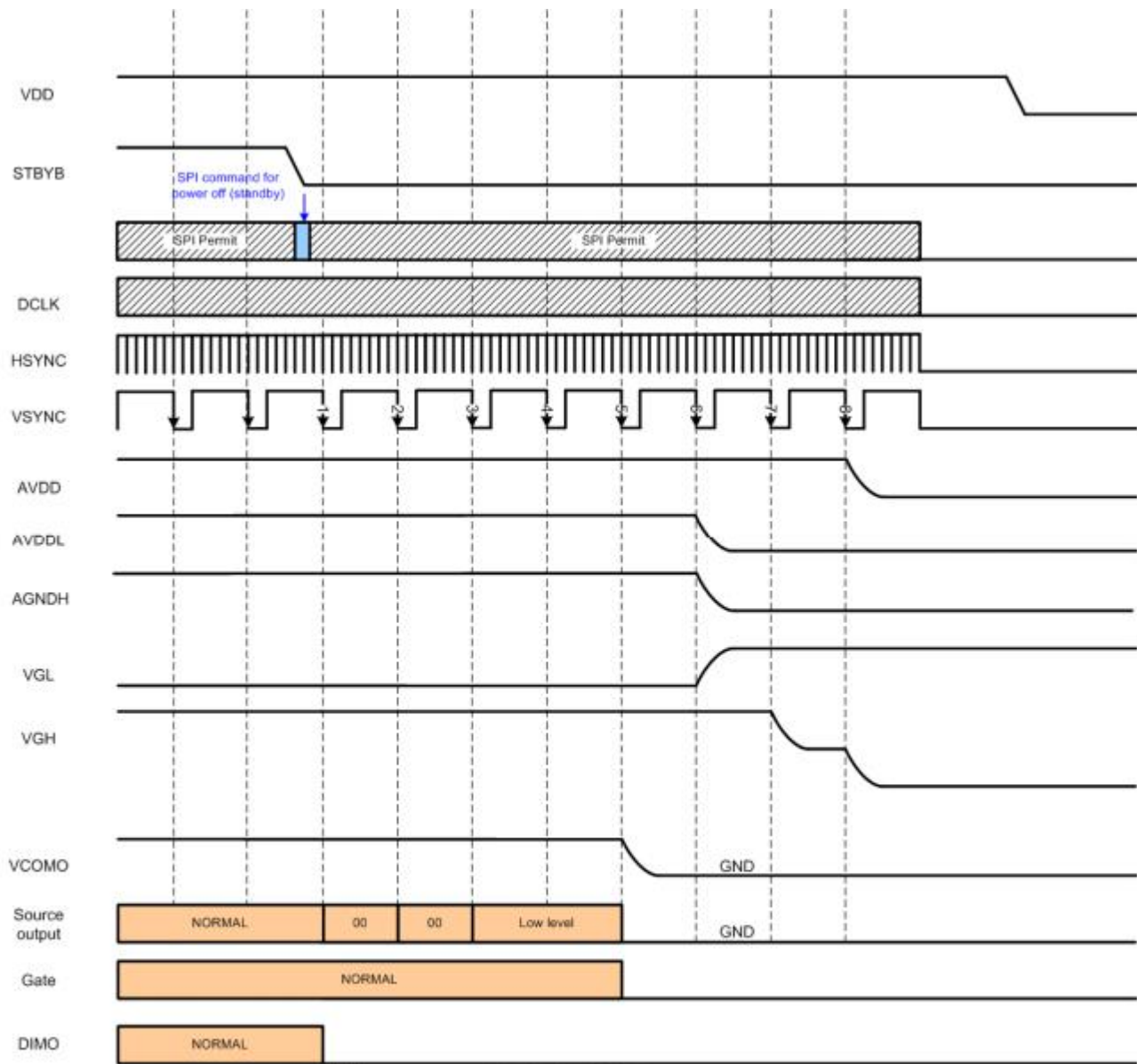


Figure 8.1: Power on timing sequence

## Power off timing sequenc



**Note:** (1) Low level=3FH, when NBW=L. (Normally white)  
(2) Low level=00H, when NBW=H. (Normally black)

**Figure 8.2: Power off timing sequence**

## 5.INPUT SIGNAL TIMING.

### 5.1 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        | $RV_{XILZ}$  | -10          | -    | +10                  | $\mu A$ | -                                 |
| LVDS Digital Operating Current            | $I_{ddlvds}$ | -            | 15   | 30                   | mA      | $F_{clk}=65MHz, VDD=3.3V$         |
| LVDS Digital Stand-by Current             | $I_{stlvds}$ | -            | 10   | 50                   | $\mu A$ | Clock & all Functions are stopped |

Table 9.3: LVDS mode DC electrical characteristics

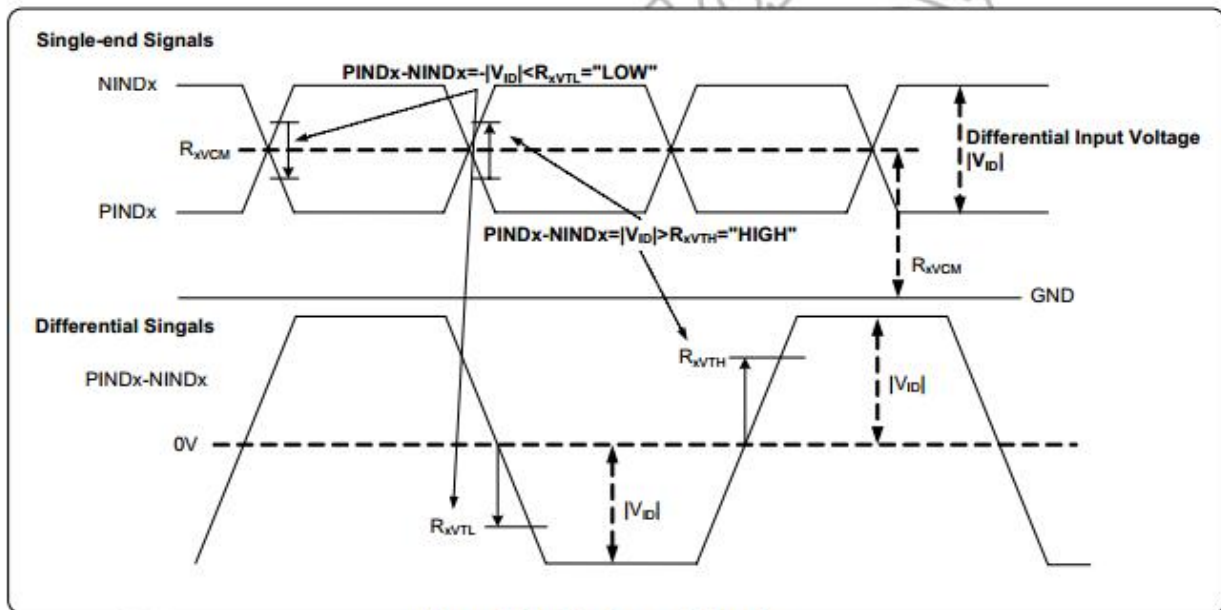


Figure 9.1: Single-end signals

## 5.2 AC CHARACTERISTICS

| Parameter              | Symbol      | Spec. |                         |      | Unit    | Condition                                                |
|------------------------|-------------|-------|-------------------------|------|---------|----------------------------------------------------------|
|                        |             | Min.  | Typ.                    | Max. |         |                                                          |
| Clock frequency        | $R_{XFCLK}$ | 20    | -                       | 71   | MHz     | -                                                        |
| Input data skew margin | $T_{RSKM}$  | 500   | -                       | -    | pS      | $ V_{ID} =400mV$<br>$R_{XVCM}=1.2V$<br>$R_{XFCLK}=71MHz$ |
| Clock high time        | $T_{LVCH}$  | -     | $4/(7 \cdot R_{XFCLK})$ | -    | ns      | -                                                        |
| Clock low time         | $T_{LVCL}$  | -     | $3/(7 \cdot R_{XFCLK})$ | -    | ns      | -                                                        |
| PLL wake-up time       | $T_{emPLL}$ | -     | -                       | 150  | $\mu s$ | -                                                        |

Table 10.2: LVDS mode AC electrical characteristics

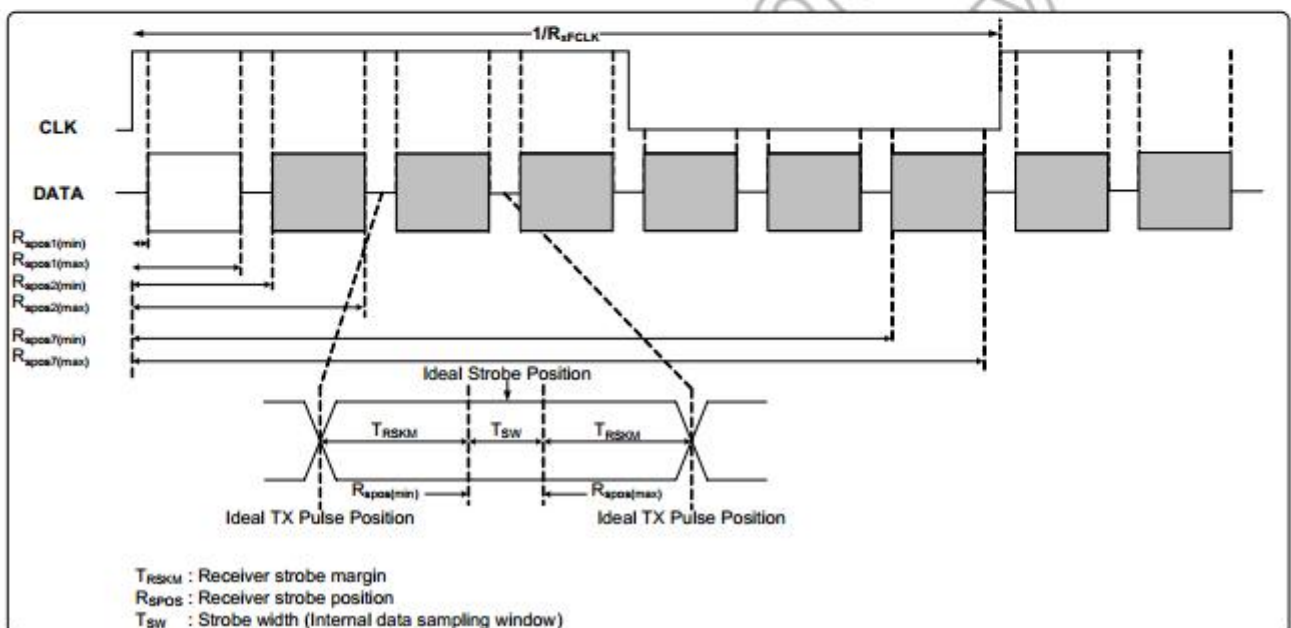
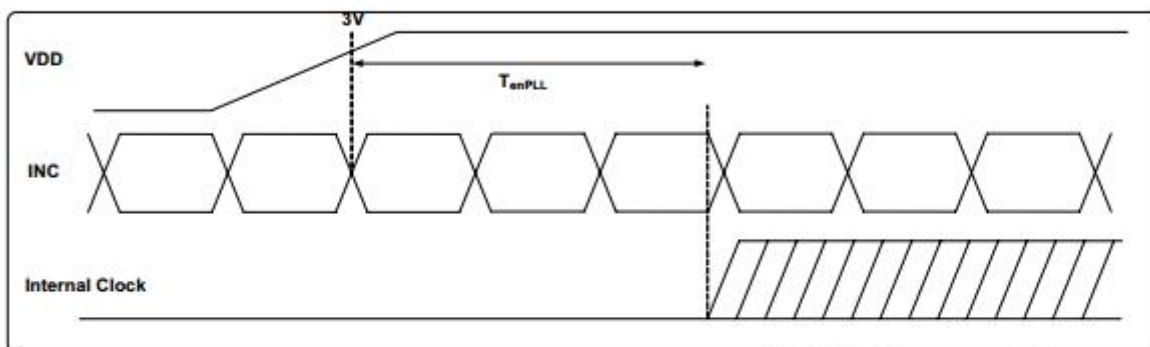
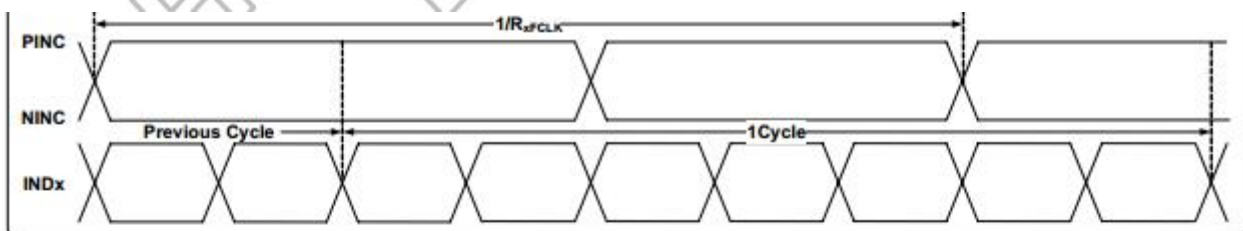
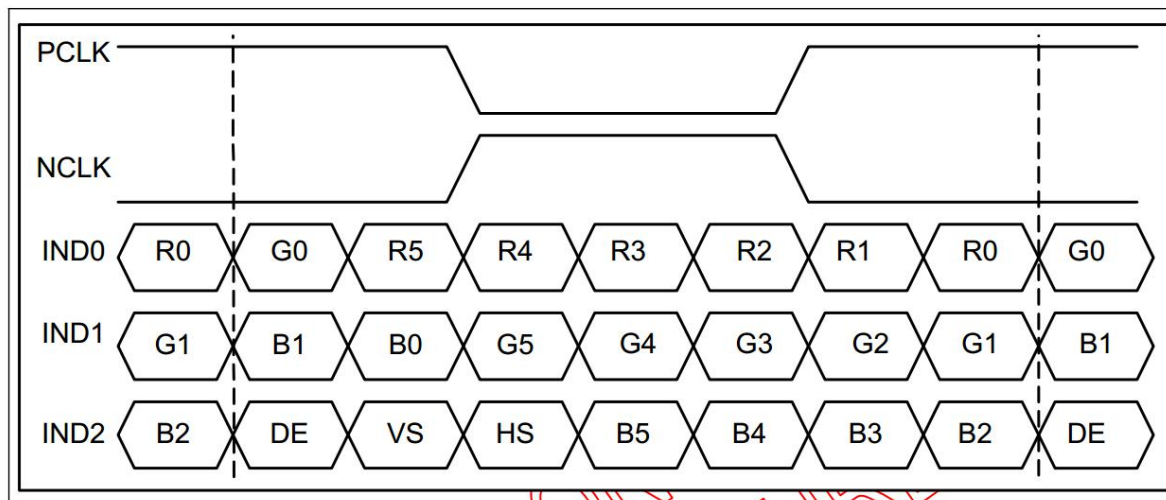


Figure 10.1: LVDS figure

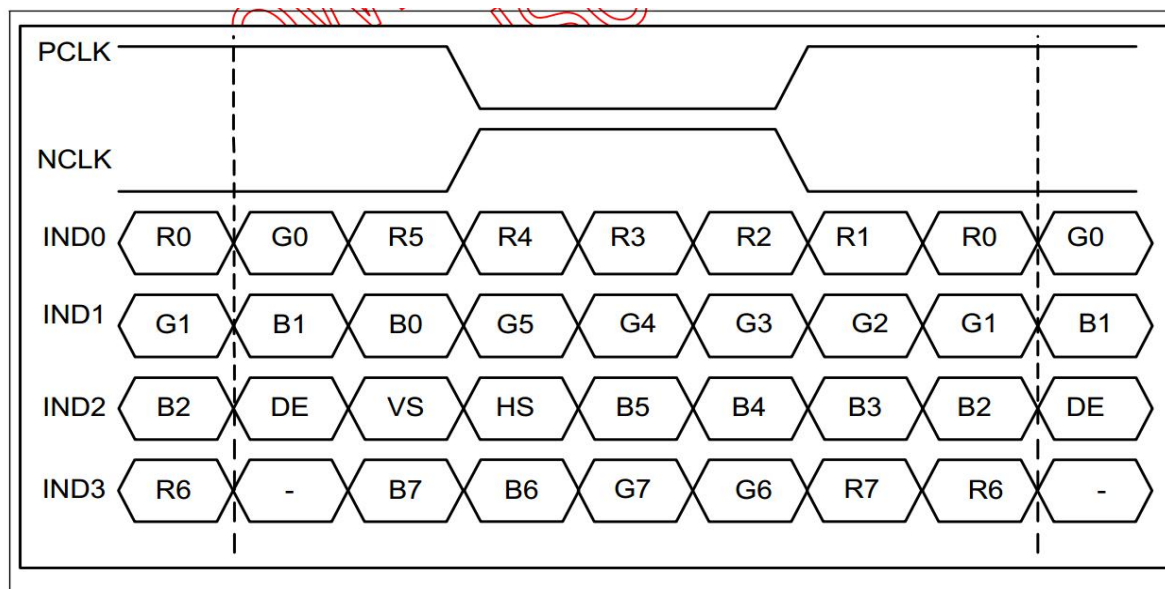
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## 5.3 Bit LVDS INPUT

### 5.3.1 6bit LVDS input (SELB="1")



### 5.3.1 8BIT LVDS INPUT (SELB="0")



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## 5.4 INTERFACE TIMING DE MODE

| Parameter               | Symbol     | Spec. |      |      | Unit           |
|-------------------------|------------|-------|------|------|----------------|
|                         |            | Min.  | Typ. | Max. |                |
| DCLK Frequency          | fclk       | 40.8  | 51.2 | 67.2 | MHz            |
| Horizontal Display Area | thd        | 1024  |      |      | DCLK           |
| HSD Period              | th         | 1114  | 1344 | 1400 | DCLK           |
| HSD Blanking            | thb+ thfp  | 90    | 320  | 376  | DCLK           |
| Vertical Display Area   | tvd        | 600   |      |      | T <sub>H</sub> |
| VSD Period              | tv         | 610   | 635  | 800  | T <sub>H</sub> |
| VSD Blanking            | tvbp+ tvfp | 10    | 35   | 200  | T <sub>H</sub> |

Table 10.4: DE mode (1024x600)

## HV mode

### Horizontal timing

| Parameter               | Symbol | Spec. |      |      | Unit |
|-------------------------|--------|-------|------|------|------|
|                         |        | Min.  | Typ. | Max. |      |
| DCLK Frequency          | fclk   | 44.9  | 51.2 | 63   | MHz  |
| Horizontal Display Area | thd    | 1024  |      |      | DCLK |
| HSD Period              | th     | 1200  | 1344 | 1400 | DCLK |
| HSD Pulse Width         | thpw   | 1     | -    | 140  | DCLK |
| HSD Back Porch          | thbp   | 160   |      |      | DCLK |
| HSD Front Porch         | thfp   | 16    | 160  | 216  | DCLK |

Table 10.5: HV mode horizontal timing (1024x600)

### Vertical Timing

| Parameter             | Symbol | Spec. |      |      | Unit           |
|-----------------------|--------|-------|------|------|----------------|
|                       |        | Min.  | Typ. | Max. |                |
| Vertical Display Area | tvd    | 600   |      |      | T <sub>H</sub> |
| VSD Period            | tv     | 624   | 635  | 750  | T <sub>H</sub> |
| VSD Pulse Width       | tvpw   | 1     | -    | 20   | T <sub>H</sub> |
| VSD Back Porch        | tvbp   | 23    |      |      | T <sub>H</sub> |
| VSD Front Porch       | tvfp   | 1     | 12   | 127  | T <sub>H</sub> |

Table 10.6: HV Mode Vertical Timing (1024x600)

## Parallel 24-bit RGB mode

| Parameter                      | Symbol | Spec. |      |      | Unit  | Conditions    |
|--------------------------------|--------|-------|------|------|-------|---------------|
|                                |        | Min.  | Typ. | Max. |       |               |
| CLKIN Frequency                | Fclk   | -     | 65   | 71   | MHz   | VDD=3.0V~3.6V |
| CLKIN Cycle Time               | Tclk   | 14.1  | 15.4 | -    | ns    | -             |
| CLKIN Pulse Duty               | Tcwh   | 40    | 50   | 60   | %     | Tclk          |
| Time from HSD to Source Output | Thso   | 64    |      |      | CLKIN | -             |
| Time from HSD to LD            | Thld   | 64    |      |      | CLKIN | -             |
| Time from HSD to STV           | Thstv  | 2     |      |      | CLKIN | -             |
| Time from HSD to CKV           | Thckv  | 20    |      |      | CLKIN | -             |
| Time from HSD to OEV           | Thoev  | 4     |      |      | CLKIN | -             |
| LD Pulse Width                 | Twld   | 10    |      |      | CLKIN | -             |
| CKV Pulse Width                | Twckv  | 66    |      |      | CLKIN | -             |
| OEV Pulse Width                | Twoev  | 74    |      |      | CLKIN | -             |

Table 11.1: Parallel 24-bit RGB mode

## 11.2.1 Input clock and data timing diagram

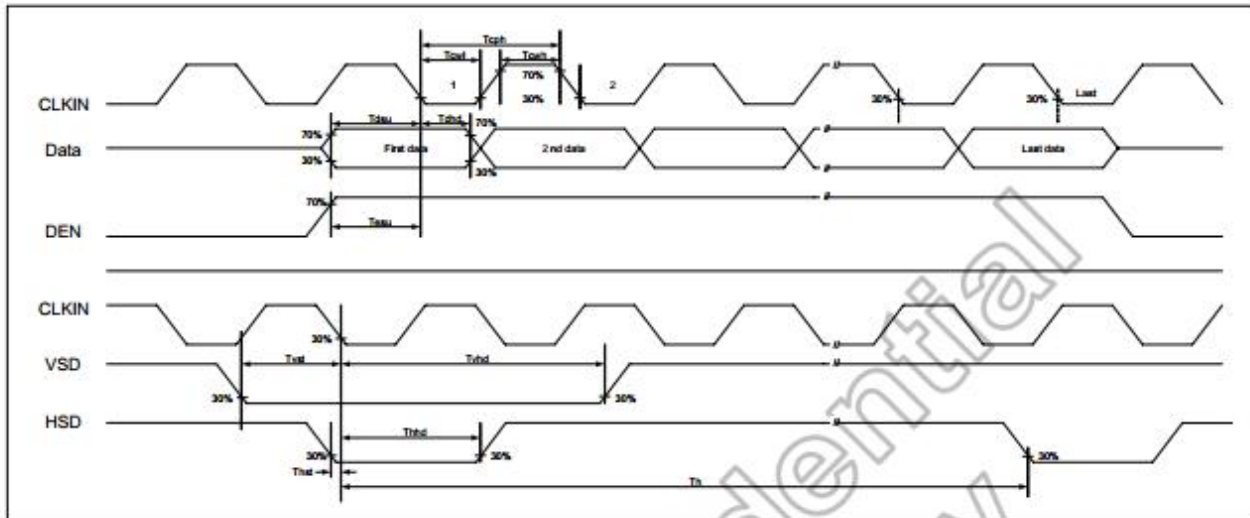


Figure 11.1: Input clock and data timing diagram

## 11.2.2 Source output timing diagram (Cascade)

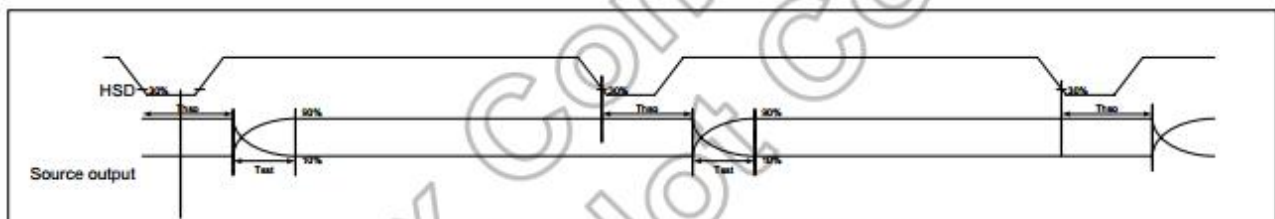


Figure 11.2: Source output timing diagram

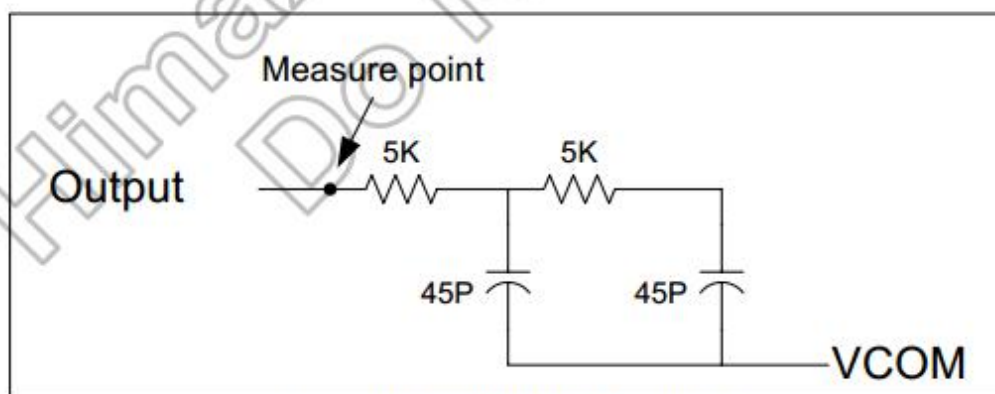


Figure 11.3: Output load condition

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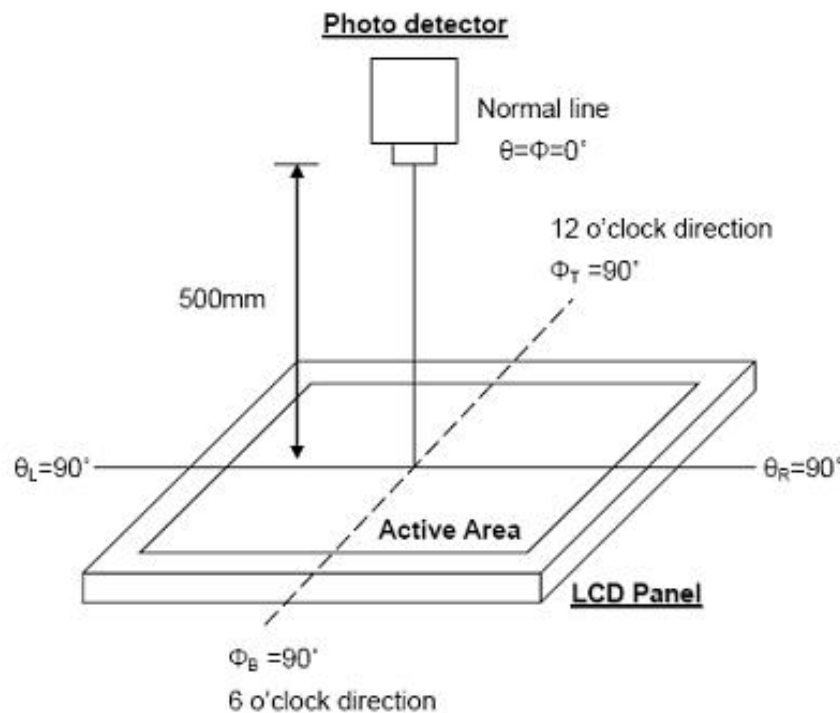
## 6.OPTICAL CHARACTERISTICS

Ta=25±2℃

| Item                                 |            | Symbol           | Min.         | Typ.  | Max.         | Unit   | Note                    |
|--------------------------------------|------------|------------------|--------------|-------|--------------|--------|-------------------------|
| Contrast Ratio                       |            | CR               | -            | 800   | -            |        | Note1<br>Note3          |
| Luminance(center)                    |            | L                | 400          | 450   | -            | cd/m2  | Note1<br>Note5<br>Note7 |
| Luminous tolerance                   |            | LU               | 70           | 75    |              | %      | Note7                   |
| Response Time                        |            | Rising + Falling | -            | 30    | 40           | ms     | Note1<br>Note4          |
| Viewing Angle<br>K=Contrast Ratio>10 | Horizontal | $\theta x^{+}$   |              | 85    | -            | degree | Note2                   |
|                                      |            | $\theta x^{-}$   |              | 85    | -            |        |                         |
|                                      | Vertical   | $\theta y^{+}$   |              | 85    | -            |        |                         |
|                                      |            | $\theta y^{-}$   |              | 85    | -            |        |                         |
| Color Chromaticity<br>(CIE1931)      | Red        | x                | Typ-<br>0.05 | 0.617 | Typ+<br>0.05 |        | Note1<br>Note5<br>Note7 |
|                                      |            | y                |              | 0.327 |              |        |                         |
|                                      | Green      | x                |              | 0.332 |              |        |                         |
|                                      |            | y                |              | 0.600 |              |        |                         |
|                                      | Blue       | x                |              | 0.146 |              |        |                         |
|                                      |            | y                |              | 0.056 |              |        |                         |
|                                      | White      | x                |              | 0.299 |              |        |                         |
|                                      |            | y                |              | 0.331 |              |        |                         |
| Color gamut<br>(NTSC ratio)          |            |                  |              | 50    |              | %      |                         |
| Optima View Direction                |            | free             |              |       |              |        |                         |

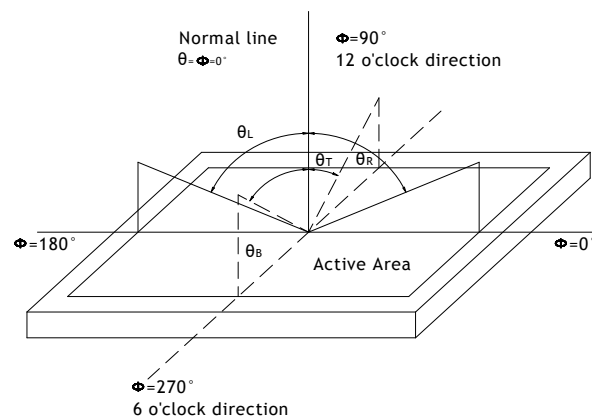
Note1: Definition of optical measurement system (BM-7)

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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 90% to 10%. And fall time (TOFF) is the time between photo detector output intensity changed from 10% to 90%.

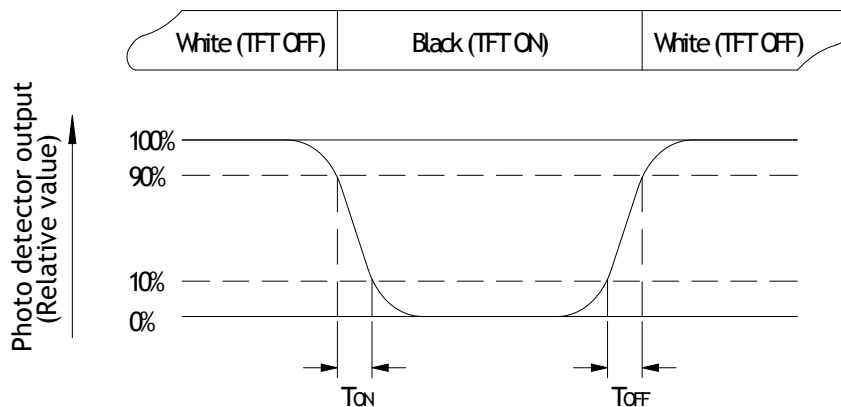


Fig. 6-3 Definition of response time

Note4: Definition of contrast ratio

Contrast ratio(CR)=错误! 未找到引用源。

“White state “: The state is that the LCD should drive by  $V_{white}$ .

“Black state”: The state is that the LCD should drive by  $V_{black}$ .

$V_{white}$ : To be determined  $V_{black}$ : To be determined.

Note5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

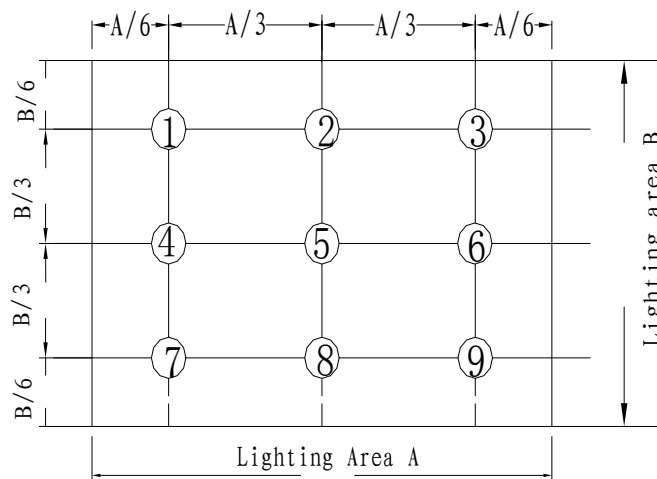
Note6: All input terminals LCD panel must be ground while measuring the center area of the panel. The LED driving condition is  $I_L=180mA$

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



$B_{max}$ : The measured maximum luminance of all measurement position.

$B_{min}$ : The measured minimum luminance of all measurement position.

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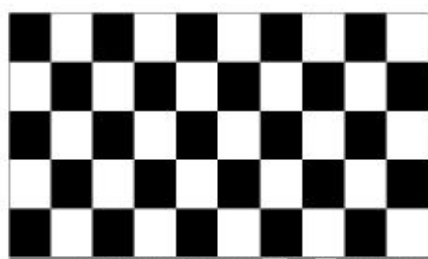
## 7.RELIABILITY TEST ITEMS

### 7.1 TEMPERATURE AND HUMIDITY

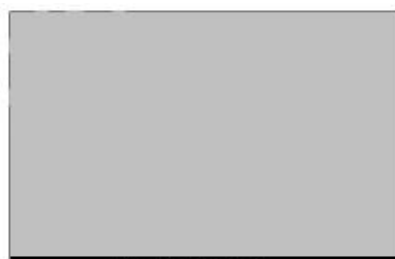
| Test Item                                | Test Condition                           | Remark                                                                                           |
|------------------------------------------|------------------------------------------|--------------------------------------------------------------------------------------------------|
| High Temperature Storage                 | Ta=80℃; 12hrs                            | IEC60068-2-1: 2007<br>GB2423.2-2008                                                              |
| Low Temperature Storage                  | Ta=-30℃;12hrs                            | IEC60068-2-1: 2007<br>GB2423.1-2008                                                              |
| High Temperature Operation               | Ta=70℃, 24Hrs                            | IEC60068-2-1: 2007<br>GB2423.2-2008                                                              |
| Low Temperature Operation                | Ta=-20℃; 24hrs                           | IEC60068-2-1: 2007<br>GB2423.1-2008                                                              |
| High Temperature High Humidity Operation | Ta=50℃, 90%RH,<br>24Hrs(no condensation) | IEC60068-2-78: 2001<br>GB/T2423.3-2006                                                           |
| Thermal Shock                            | -30℃ (0.5h) ~ 80℃ (0.5h)<br>/ 50 cycles  | Start with cold temperature ,<br>End with high temperature,<br>IEC60068-2-14:1984,GB2423.22-2002 |
| Image Sticking                           | 25℃ ; 1hrs                               | Note1                                                                                            |

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

Operation with test pattern sustained for 1hrs,then change to gray pattern immediately.after 15 mins,the mura 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 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 Discharge Test<br>(non-operation) | 150pF, 330Ω,<br>Contact:±2KV,Air:±4KV | 1      | Class C |
|                                                  | 200pF, 0Ω, ±200V contact test         | 2      |         |

Note: Measure point :

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

3. ESD class C: To allow a temporary loss of function, the equipment to be measured may stop working but should be able to automatic or manual intervention reset back to normal after

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operation.

## 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  $23 \pm 5^{\circ} \text{C}$  and The humidity is below  $50 \pm 20\% \text{RH}$ .
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 ketonics 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

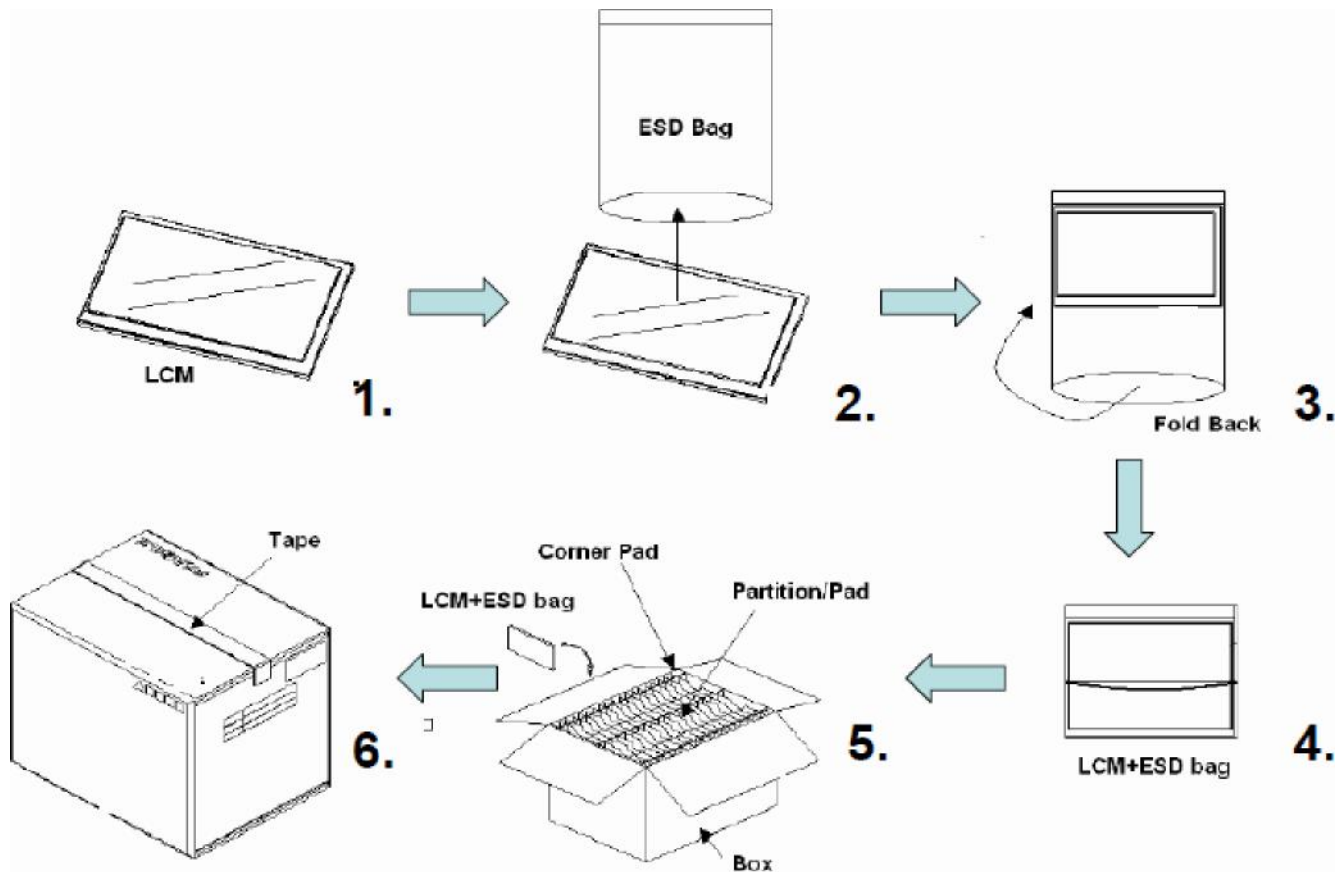
1. The period is within twelve months since the date of shipping out under normal using and storage conditions.
2. Do not repaired or modified the LCM. It may cause function to lose efficacy, Starry does not warrant the LCM.
3. All process and material comply ROHS.

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## 9. PACKAGE DRAWING

### Packing form

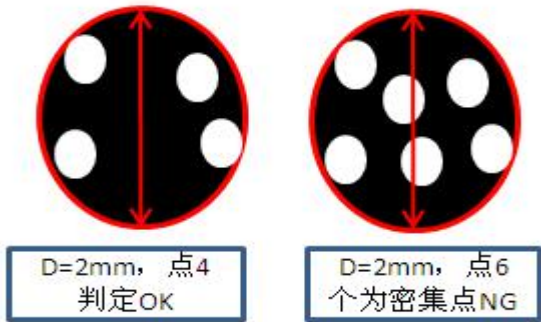
| LCM Model | LCM Qty. in the box | Inner Box Size ( mm ) | Notice |
|-----------|---------------------|-----------------------|--------|
|           | 50 pcs/box          | 455±5 x 305±5 x 205±5 |        |



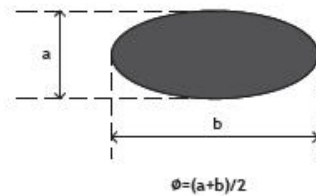
| Items         | Material               | Notice   |
|---------------|------------------------|----------|
| Box           | Corrugated Paper Board | AB Flute |
| Partition/Pad | Corrugated Paper Board | B Flute  |
| Corner Pad    | Corrugated Paper Board | AB Flute |
| ESD bag       | PE                     |          |

## INCOMING INSPECTION STANDARDS

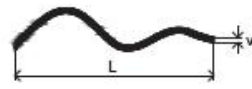
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|                                                                                                                                                                                        |             |                                                                                    |        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------------------------------------------------------------------------|--------|
|                                                                                                                                                                                        | Dense point | Using ND5 % visible by intensive foreign standard judgement, ND5 % invisible OK    | Note 4 |
|                                                                                                                                                                                        |             |  |        |
| <p>(1) One pixel consists of 3 sub-pixel, including r, g, and b dot. (sub-pixel=dot)</p> <p>(2) Panel is acceptable if distance between 2 dot defects are greater or equal to 5mm.</p> |             |                                                                                    |        |

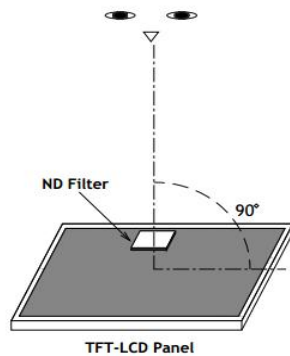
Note1 : W : Width[mm], L : Length[mm], N : Number,  $\phi$ : Average Diameter



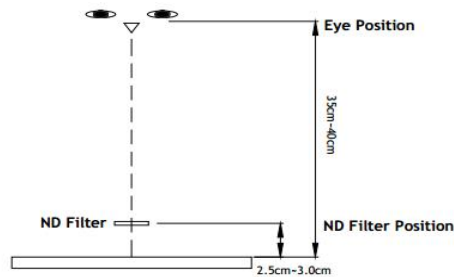
1. (White ,Black) Spot  
2. Polarizer Bubble



Scratch & Fiber

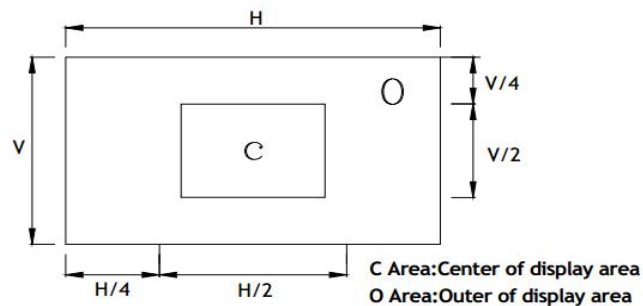


TFT-LCD Panel



TFT-LCD Panel

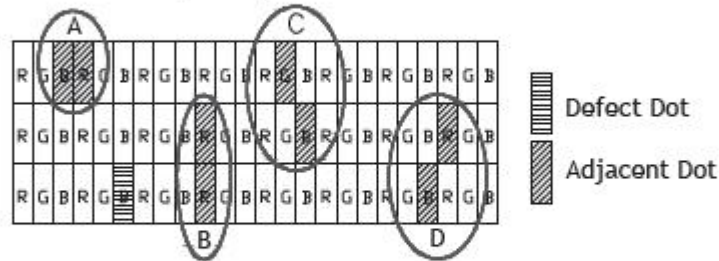
Note3 :



C Area:Center of display area  
O Area:Outer of display area

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Note4 : Judge defect dot and adjacent dot as following. Allow below (as A, B, C and D status) adjacent defect dots, including bright and dark adjacent dot. And they will be counted 2 defect dots in total quantity.



Note5 : Other condition

- (1) The defects that are not defined above and considered to be problem shall be reviewed and discussed by both parties.
- (2) Defects on the Black Matrix, out of Display area, are not considered as a defect or counted.

## 5. HANDLING PRECAUTION

- (1) Don't disassemble and reassemble the module by self  
(禁止自行拆解)
- (2) Acid, alkali, alcohol or touched directly by hand will damage the display.  
(酸性、碱性、酒精或手的直接接触将会损伤显示面)
- (3) Static electricity will damage the module. Please configure grounding device.  
(静电会损伤模组，请装配接地设备)
- (4) The strong vibration, shock, twist or bend will cause material damage, even module broken.  
(强烈的撞击、震动、扭转或弯曲将会造成原材损伤，甚至面板破裂)
- (5) It is easy to cause image sticking while displaying the same pattern for very long time.  
(长期显示同一画面会造成影像残留)
- (6) The response time, brightness and performance will vary from different temperature.  
(响应时间、亮度与均匀性会因温度而有所改变)
- (7) The Period within 12 months since the date of shipping out under normal using And Storage conditions.  
(从出货之日开始,在正常使用和存储条件下,产品保质期为12个月)