# Specification
# For
# Approval

■ Preliminary specification
□ Final specification

| Title | 10.4XGA ADS TFT-LCD (Module) |
|---|---|

| | |
|---|---|
| **Buyer** | |
| **Model** | |

| | |
|---|---|
| **Supplier** | Cheng Du BOE Optoelectronics Technology CO., LTD |
| **Model** | GV104X0M-N10 |

| TITLE/SIGNATURE | DATE |
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Please return one copy confirmation with signature and

| ITEM | SIGNATURE/DATE |
|---|---|
| Approved | _____ |
| Reviewed | _____ |
| Reviewed | _____ |
| Prepared | _____ |

BOE CHENG DU
Optoelectronics Technology CO., LTD

# CONTENT LIST

| Record of Revisions | | | | |
|---|---|---|---|---|
| Revision | Date | Page | Description | Released by |
| Pre.0 | 2020.10.30 | | Initial Released | Wang Xianliang |
| Pre.1 | 2020.11.12 | | Change pinmap | Wang Xianliang |
| Pre.2 | 2021.06.21 | | SourceIC | Wang Xianliang |
| Pre.3 | 2021.11.29 | | Power on sequence | Wang Xianliang |
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# 1.0 GENERAL DESCRIPTION

## 1.1 Introduction

GV104X0M-N10 is a color active matrix TFT-LCD Panel using amorphous silicon TFT's (Thin Film Transistors) as an active switching devices. This model is composed of a TFT-LCD Panel, a driving circuit and a back light system. It is a transmissive type display operating in the normal black. This TFT-LCD has a 10.4 inch diagonally measured active area with XGA resolutions (1024 horizontal by 768 vertical pixel array). Each pixel is divided into Red, Green, Blue dots which are arranged in 2 domain stripe and this panel can display 16.7M colors.

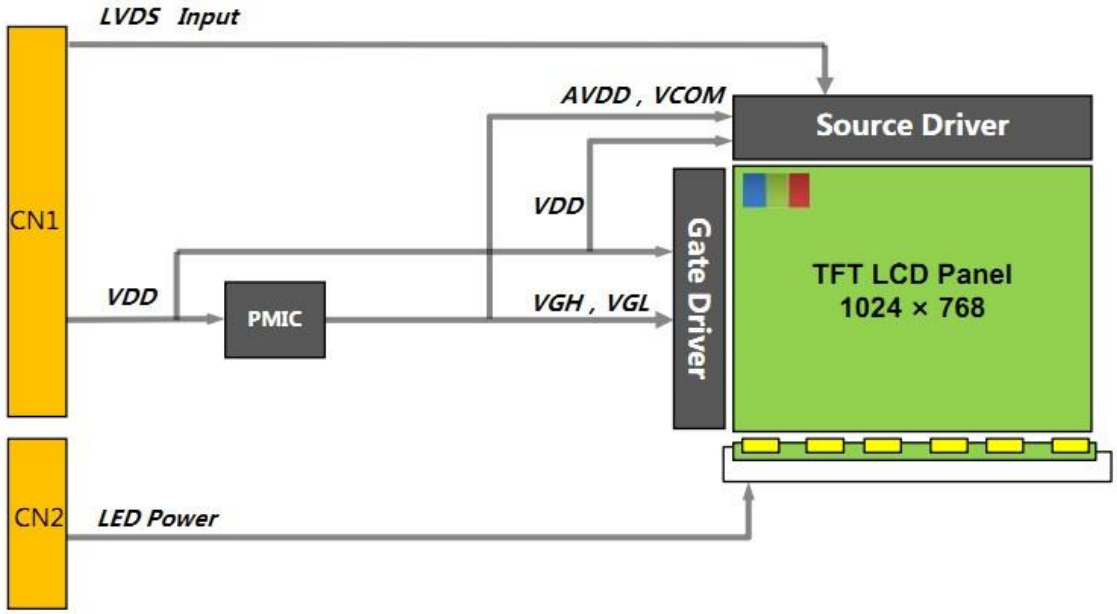



Figure 1. Function Diagram

## 1.2 Features

- 0.5t Glass (Single)
- High contrast ratio, low reflection and wide viewing angle
- Module Design
- RoHS Compliant

## 1.3 Application

- Automotive

**1.4 General Specifications (**H: horizontal length, V: vertical length**)**

Table 1. General Specification

| Parameter | Specification | Unit | Remark |
|---|---|---|---|
| Active Area | 210.432(W) × 157.824(H) | mm | |
| Number of Pixels | 1024RGB × 768 | pixels | |
| Pixel Pitch | 205.5(H) × 205.5(V) | um | |
| Pixel Arrangement | RGB 2domain stripe | | |
| Display Colors | 16.7 M | colors | |
| Color Gamut | 70%(typ.) | | |
| Display Mode | Normally Black, Transmissive mode | | |
| Dimensional Outline | 230×180.2×10.5 | mm | MDL |
| Viewing Direction (Human Eye) | U/D/L/R free viewing direction | | Note 1,2 |
| D-IC | Source: HX8282-A01DPD300-K<br>Gate: HX8695-E01BPD200 | | |
| Weight | 700±5% | gram | |

**Note:**

1. At the U/D/L/R direction, the viewing angle is same;
2. The TFT and CF Align Direction;

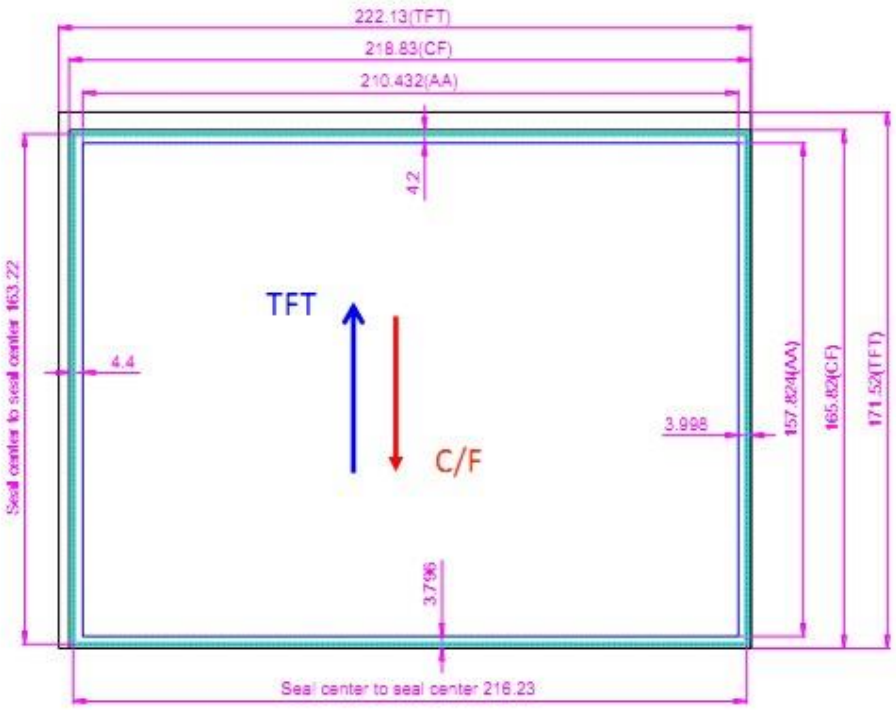



Figure 2. The TFT and CF Align Direction

3. LCM weight tolerance: ± 5%

# 2.0 ABSOLUTE MAXIMUM RATINGS

The absolute maximum ratings are list on table as follows. When used out of the absolute maximum ratings, the LSI may be permanently damaged. Using the LSI within the following electrical characteristics limit is strongly recommended for normal operation. If these electrical characteristic conditions are exceeded during normal operation, the LSI will malfunction and cause poor reliability.

Table 2. Absolute Maximum Ratings

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Power Supply voltage | $V_{CC}$ | 3 ~ 3.6 | V |
| Operating temperature range | $T_{OPR}$ | -30 ~ 85 | ℃ |
| Storage Temperature range | $T_{STG}$ | -40 ~ 90 | ℃ |

**Note:**

If the absolute maximum rating of even is one of the above parameters is exceeded even momentarily, the quality of the product may be degraded. Absolute maximum ratings, therefore, specify the values exceeding which the product may be physically damaged. Be sure to use the product within the range of the absolute maximum ratings.

# 3.0 ELECTRICAL SPECIFICATIONS

## 3.1 Electrical Specifications

Table 3. Electrical Specifications

| Parameter | Symbol | Min | Typ | Max | Unit | Remark |
|---|---|---|---|---|---|---|
| Power Supply Voltage | VCC | 3 | 3.3 | 3.6 | V | Note1 |
| Power Supply Current | IVCC | - | 360 | 550 | mA | |
| Power Consumption | PD | | 0.99 | 1.32 | W | Note2 |
| | PBL | 3.69 | 3.96 | 4.22 | W | |
| | Ptotal | | 4.95 | 5.54 | W | |

**Note:**

1. The supply voltage is measured and specified at the interface connector of LCM.

   The current draw and power consumption specified is for 3.3V 60Hz at 25℃.

   a) Typ : Window XP pattern

   b) Max : Skip 2 dot 255 pattern

2. Frame rate=60HZ, Typ. Pattern: White pattern 25℃.

## 3.2 Backlight Driving Conditions

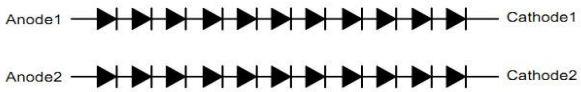
Table 4. Backlight Driving Conditions

| Parameter | Symbol | Min | Typ | Max | Unit | Remark |
|---|---|---|---|---|---|---|
| Backlight Power supply | VLED | 10.8 | 12.0 | 12.8 | V | - |
| Logic Low level ( EN,PWM ) | $V_{IL}$ | - | - | 0.7 | V | - |
| Logic High level ( EN,PWM ) | $V_{IH}$ | 2.0 | 3.3 | - | V | - |
| PWM Frequency | PWM | 200 | - | 25K | Hz | - |
| Backinght Current | $I_{FLED}$ | - | 380 | - | mA | - |
| Backlight Power | $P_{BL}$ | - | 4.6 | - | W | Note 1 |
| LED Life time | Hrs | | 50000 | | H | Note 2 |

**Notes:**

1. Calculator Value for reference ILED×VLED = PLED.

2. The LED Life-time was defined as the estimated time to 50% degradation of initial luminous.




# 4.0 INTERFACE CONNECTION

## 4.1 The LCD Module Electrical Interface Connection

The Recommended connector is IS100-L30R-C23

The connector interface pin assignments are listed in Table 5.

Table 5. Pin Assignments for the LCD Connector

| Pin No | Symbol | I/O | Description | |
|---|---|---|---|---|
| 1 | VCC_3V3 | Power supply for LED | Analog power supply for LCD. | 3.3V |
| 2 | VCC_3V3 | Power supply for LED | Analog power supply for LCD. | 3.3V |
| 3 | VCC_3V3 | Power supply for LED | Analog power supply for LCD. | 3.3V |
| 4 | GND | Power supply | POWER GND | |
| 5 | GND | Power supply | POWER GND | |
| 6 | GND | Power supply | POWER GND | |
| 7 | UPDN | I | setting.Normally pull low,When UPDN =H ,reverse scan. | |
| 8 | SHLR | I | Soure Driver internal shift register,Normally pull high. | |
| 9 | NC | / | NO CONNECTION | |
| 10 | NC | / | NO CONNECTION | |
| 11 | SEL6/8 | I | 6-bit/8-bit input select (Low→8 bit Input Mode , High→6 bit Input Mode) | |
| 12 | GND | Power supply | POWER GND | |
| 13 | NC | / | NO CONNECTION | |
| 14 | GND | Power supply | POWER GND | |
| 15 | RX0N | I | - LVDS differential data input | |
| 16 | RX0P | I | +LVDS differential data input | |
| 17 | GND | Power supply | POWER GROUND | |
| 18 | RX1N | I | - LVDS differential data input | |
| 19 | RX1P | I | +LVDS differential data input | |
| 20 | GND | Power supply | POWER GROUND | |
| 21 | RX2N | I | - LVDS differential data input | |
| 22 | RX2P | I | +LVDS differential data input | |
| 23 | GND | Power supply | POWER GROUND | |
| 24 | RXCLKN | I | -LVDS differential clock input | |
| 25 | RXCLKP | I | +LVDS differential clock input | |
| 26 | GND | Power supply | Digital power supply for LCD. | |
| 27 | RX3N | I | - LVDS differential data input | |
| 28 | RX3P | I | +LVDS differential data input | |
| 29 | GND | Power supply | POWER GND | |
| 30 | NC | / | NO CONNECTION | |

### 4.2 The BL POWER Electrical Interface Connection

The Recommended connector is 3808K-F05N-03L

| LED FPC PIN MAP | |
|---|---|
| PIN | NAME |
| 1 | NC |
| 2 | PWM(typ 3.3V) |
| 3 | EN(typ 3.3V) |
| 4 | GROUND |
| 5 | VLED(typ 12V) |

# 5.0 LVDS SIGNAL SPECIFICATION

## 5.1 LVDS Signal Electrical Characteristics

(VCC=3.0 to 3.6V, GND=0V,TA=-30℃~+85℃)

Table 7. LVDS Signal Electrical Characteristics

| Parameter | Symbol | Spec. | | | Unit | Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Differential input high threshold voltage | $V_{TH}$ | - | - | +0.1 | V | $R_{XVCM}$=1.2V |
| Differential input low threshold voltage | $V_{TL}$ | -0.1 | - | - | V | |
| Differential input common Mode voltage | $V_{IC}$ | 0.7 | - | 1.6 | V | - |
| Differential input voltage | $\|V_{ID}\|$ | 0.1 | - | 0.6 | V | - |

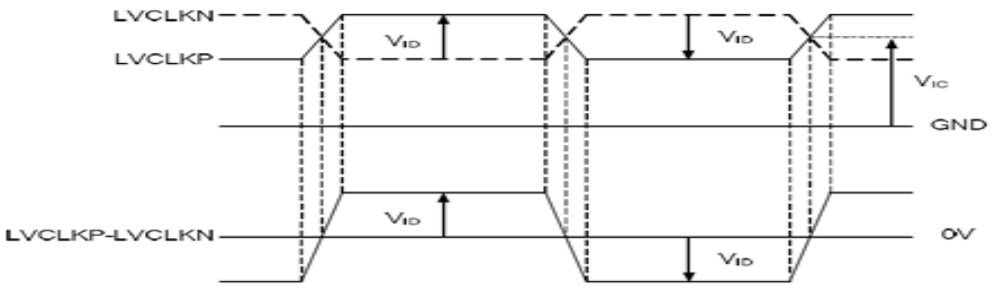


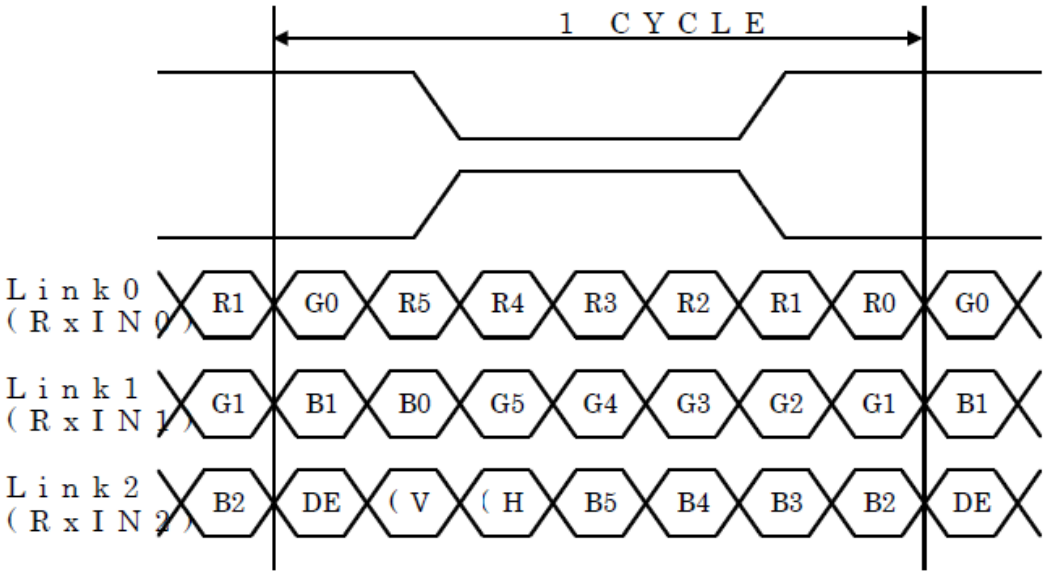

Figure 3. LVDS Signal Electrical Characteristics

## 5.2 LVDS Signal Timing

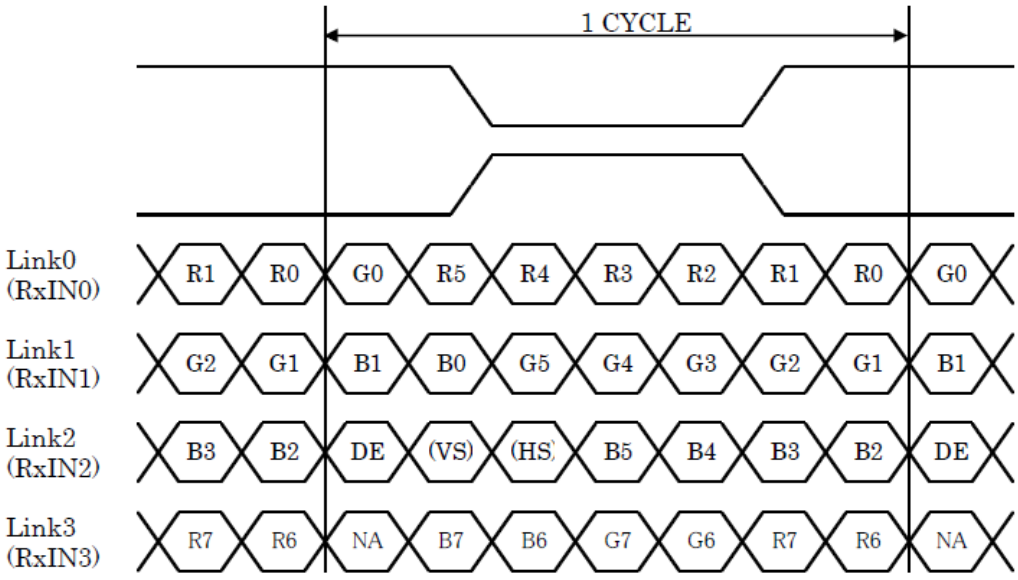
Table 8. LVDS Signal Timing

| | | | | | |
|---|---|---|---|---|---|
| Vertical Display Area | tvd | 768 | | | |
| VS Period | tv | 778 | 806 | 845 | TH |

### 5.3 LVDS Input Signal Format



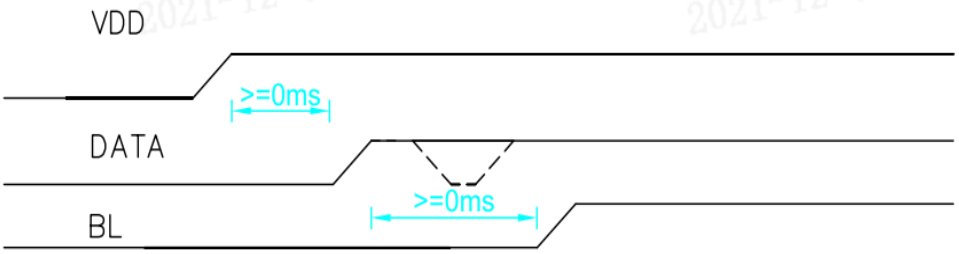

**6bit MODE**



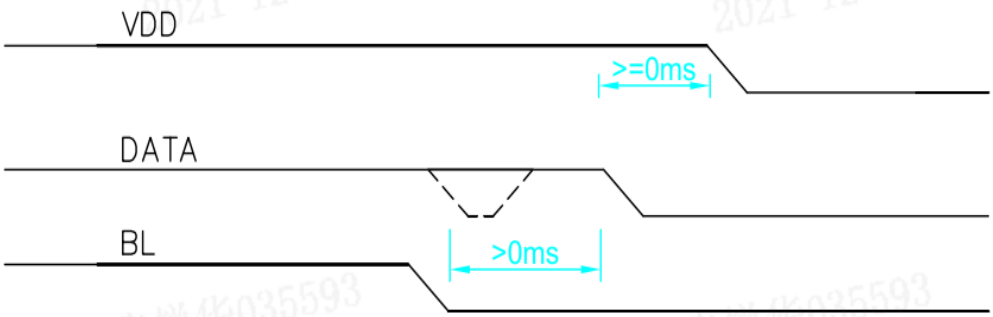

**8bit MODE**

Figure 4. LVDS Input Signal Format

### 5.4 Power on sequence




### 5.5 Power off sequence



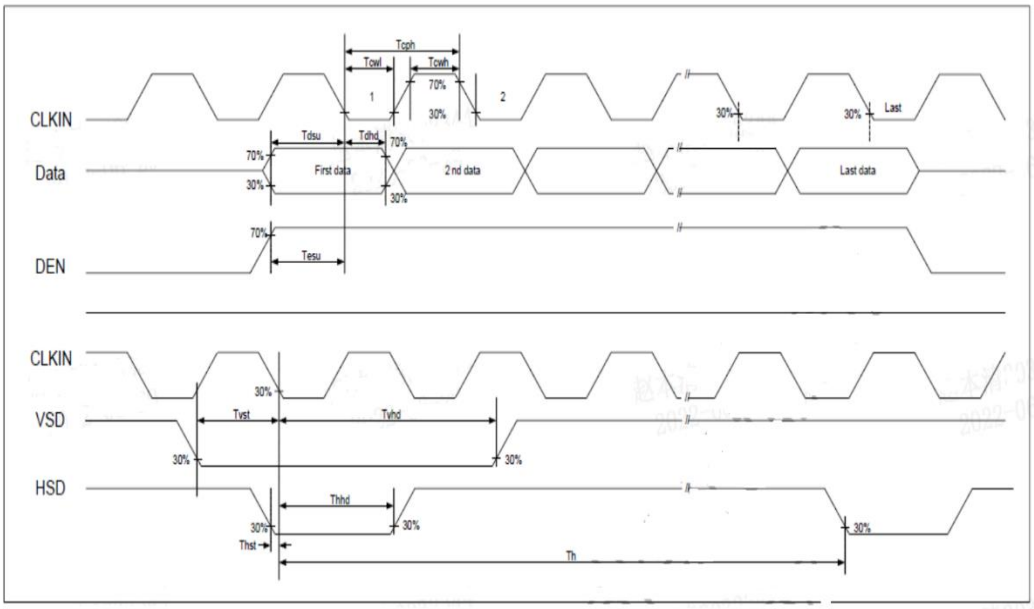
## 5.6 Timing diagram

### 5.6.1 Output timing table

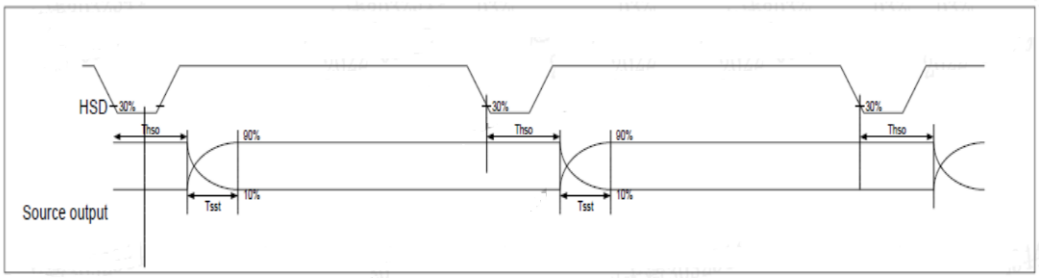
Parallel 24-bit RGB mode

| 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 Puslse With | Twld | 10 | | | CLKIN | - |
| CKV Puslse With | Twckv | 66 | | | CLKIN | - |
| OEV Puslse With | Toev | 74 | | | CLKIN | - |

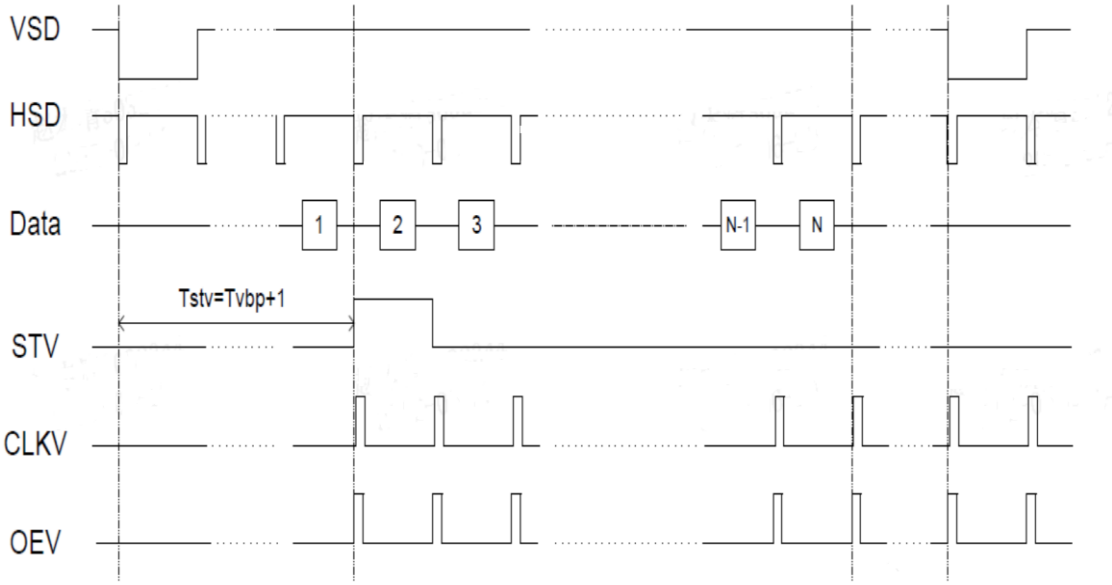
### 5.6.2 input clock and data timing diagram



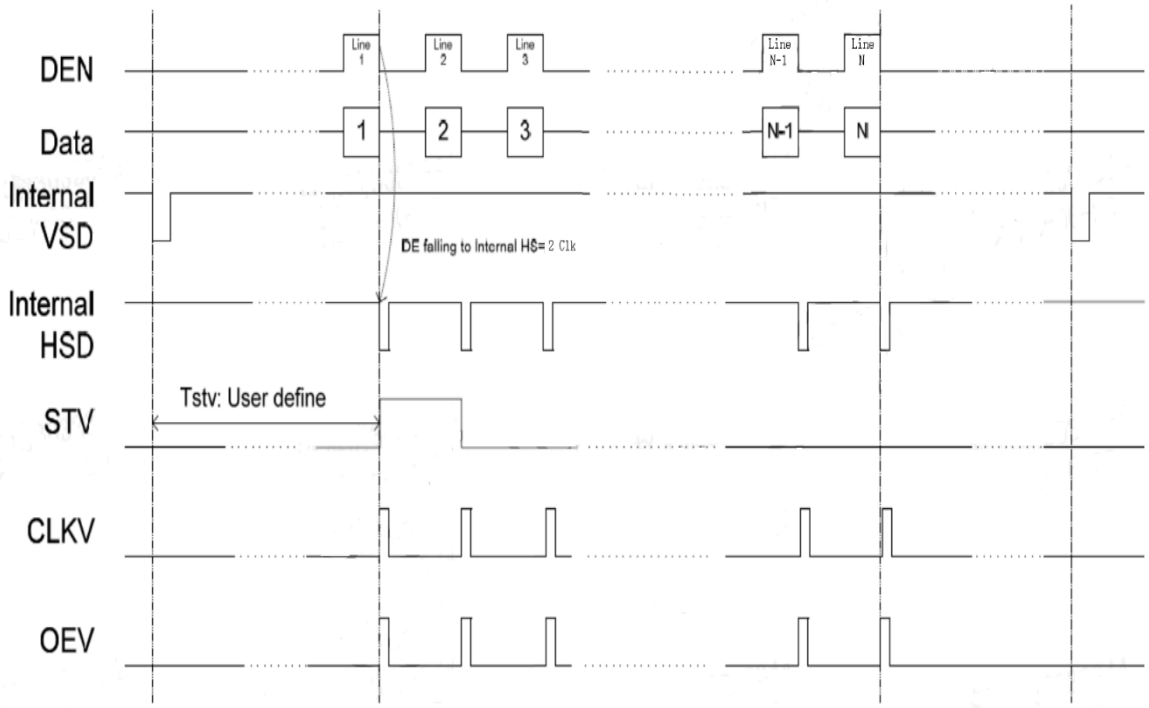

### 5.6.3 Source output timing diagram



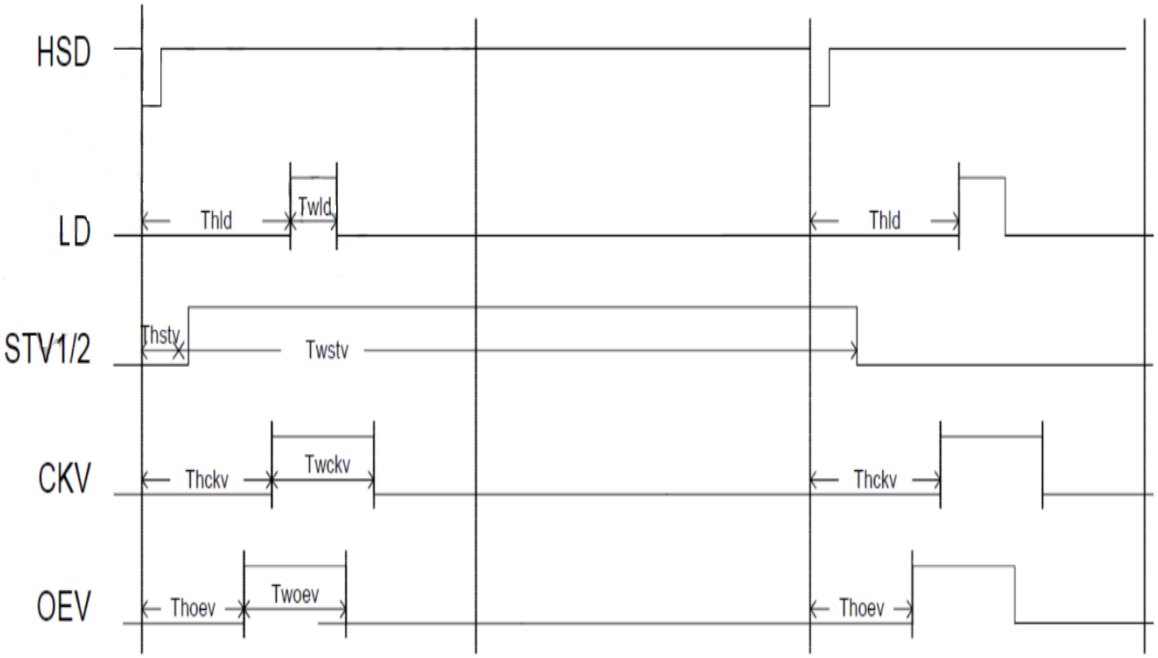

### 5.6.4 Vertical timing diagram HV(Cascade)



### 5.6.5 Vertical timing diagram DE(Cascade)




### 5.6.6 Gate output timing diagram (Cascade)



### 5.6.7 Resolution:1024x768

#### DE mode

| Parameter | Symbol | Spec. | | | Unit |
|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | |
| DCLK Frequency | fclk | 52 | 65 | 71 | MHz |
| Horizontal Display Area | thd | | 1024 | | DCLK |
| HSD Period | th | 1114 | 1344 | 1600 | DCLK |
| HSD Blanking | thb+thfp | 90 | 320 | 376 | DCLK |
| Vertical Display Area | tvd | | 768 | | $T_H$ |
| VSD Period | tv | 778 | 806 | 845 | $T_H$ |
| VSD Blanking | tvbp+tvfp | 10 | 38 | 77 | $T_H$ |

#### HV mode

Horizontal timing

| Parameter | Symbol | Spec. | | | Unit |
|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | |
| DCLK Frequency | fclk | 57 | 65 | 70.5 | MHz |
| Horizontal Display Area | thd | | 1024 | | DCLK |
| HSD Period | th | 1200 | 1344 | 1400 | DCLK |
| HSD Plus With | thpw | 1 | - | 140 | DCLK |
| HSD Black Porch | Thbp | | 160 | | DCLK |
| HSD front Porch | thfp | 16 | 160 | 216 | DCLK |

Vertical timing

| Parameter | Symbol | Spec. | | | Unit |
|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | |
| Vertical Display Area | tvd | | 768 | | $T_H$ |
| VSD Period | tv | 792 | 806 | 840 | $T_H$ |
| VSD Plus With | tvpw | 1 | - | 20 | $T_H$ |
| VSD Black Porch | Tvbp | | 23 | | $T_H$ |
| VSD front Porch | tvfp | 1 | 15 | 49 | $T_H$ |

# 6.0 OPTICAL SPECIFICATIONS

## 6.1 Overview

The test of Optical specifications shall be measured in a dark room(ambient luminance≤ 1 lux and temperature = 25±2℃) with the equipment of Luminance meter system (Topcon SR-UL1R and Westar TRD-100A) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of θ and Φ equal to 0°.The center of the measuring spot on the Display surface shall stay fixed.

The backlight should be operating for 30 minutes prior to measurement.

## 6.2 Optical Specifications

Table 9. Optical Specifications

| Parameter | | Symbol | Condition | Min. | Typ. | Max. | Unit | Remark |
|---|---|---|---|---|---|---|---|---|
| Viewing Angle | Horizontal | Θ3 | CR>10 | 70 | 85 | | ° | |
| | | Θ9 | | 70 | 85 | | ° | |
| | Vertical | Θ12 | | 70 | 85 | | ° | |
| | | Θ6 | | 70 | 85 | | ° | |
| Contrast Ratio | | CR | Θ= 0° | | 1100 | | | Note 1 |
| Luminance | | cd/m2 | Θ= 0° | 400 | 450 | | nit | Note 2 |
| Uniformity | | % | Θ= 0° | | 80% | | | Note 3 |
| NTSC | | % | Θ= 0° | 65 | 70 | | | |
| Reproduction Of color | Red | Rx | Θ= 0° | 0.626 | 0.656 | 0.686 | | Note 4 * Module |
| | | Ry | | 0.295 | 0.325 | 0.355 | | |
| | Green | Gx | | 0.258 | 0.288 | 0.318 | | |
| | | Gy | | 0.563 | 0.593 | 0.623 | | |
| | Blue | Bx | | 0.108 | 0.138 | 0.168 | | |
| | | By | | 0.078 | 0.108 | 0.138 | | |
| White | | Wx | Θ= 0° | 0.265 | 0.315 | 0.365 | | |
| | | Wy | | 0.29 | 0.34 | 0.39 | | |
| Response Time | | Tr+Tf | Θ= 0° | | 30 | 40 | ms | Note 5 |

**Note:**

1. Contrast measurements shall be made at viewing angle of Θ= 0° and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state. Luminance Contrast Ratio (CR) is defined mathematically.

$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

2. Surface luminance is the center point across the LCD surface 50cm from the surface with all pixels displaying white. This measurement shall be taken at the locations shown in FIG. 5.

3. Uniformity measurement shall be taken at the locations shown in FIG. 6, for a total of the

measurements per display, measure surface luminance of these nine points across the LCD surface 50cm from the surface with all pixels displaying white.

$$\text{Uniformity} = \frac{\text{Min Luminance of 9 points}}{\text{Max Luminance of 9 points}} \times 100\%$$

4. The color chromaticity coordinates specified in Table1 shall be calculated from The spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the Module.

5. The electro-optical response time measurements shall be made as FIG.7 by switching the "data" input signal ON and OFF.

The times needed for the luminance to change from 10% to 90% is Tr and 90% to 10% is Tf.

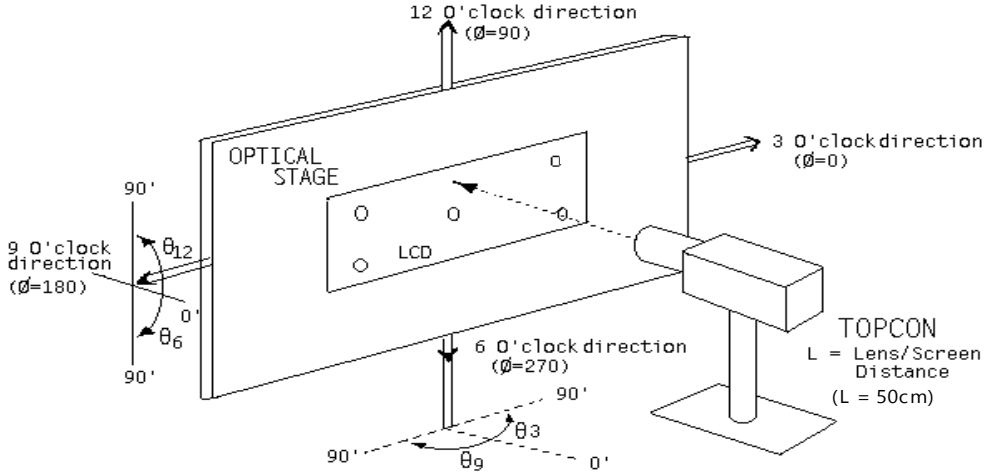



Figure 5. Measurement Set Up

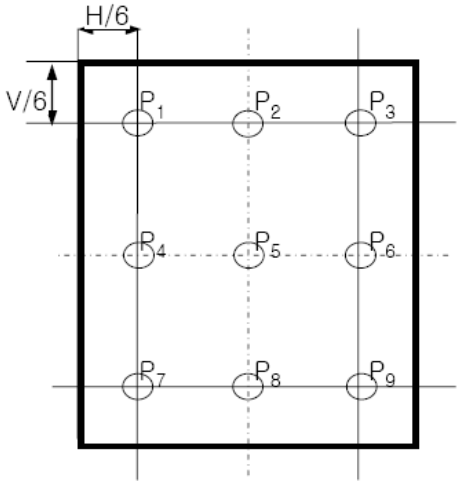


Figure 6. Uniformity Measurement Locations

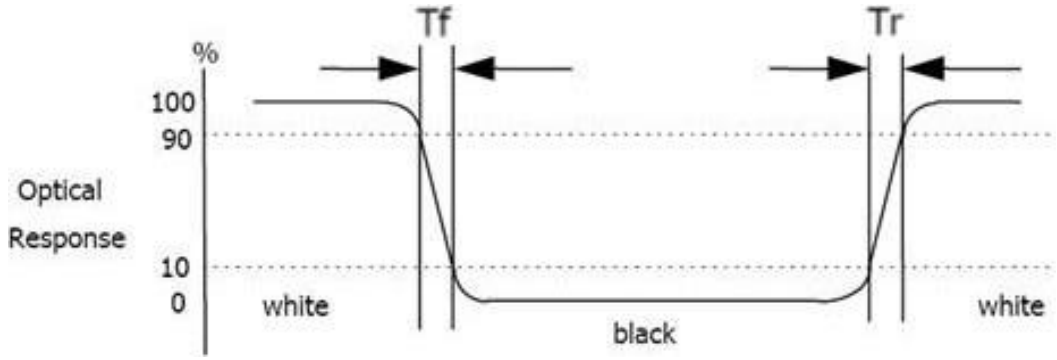



Figure 7. Response Time Testing

# 7.0 MECHANICAL CHARACTERISTICS

## 7.1 Dimension Requirements for LCD Part

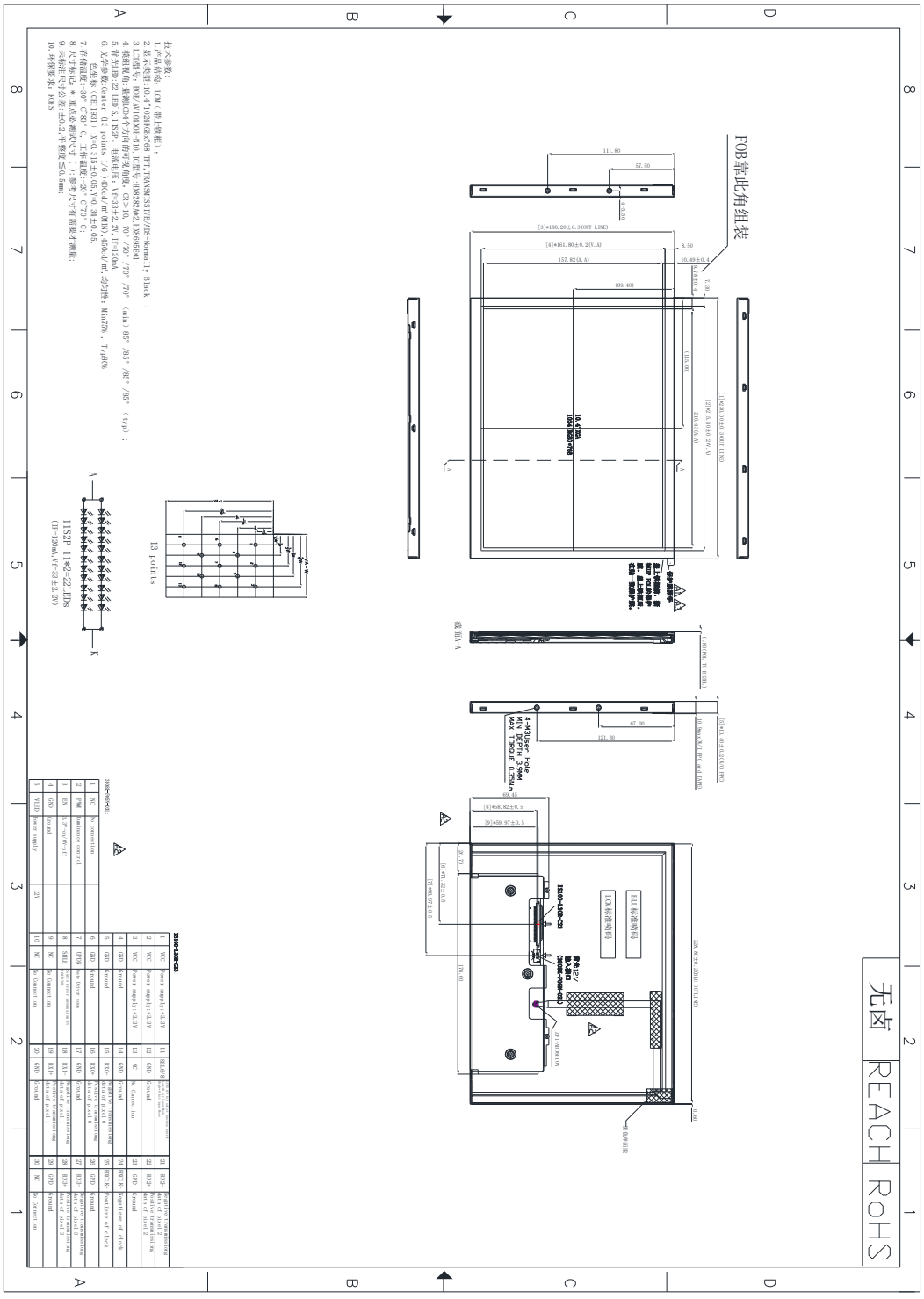
Mechanical outlines for the panel **(**H: horizontal length, V: Vertical length**)**

Table 10. Dimension Requirements for LCD Part

| Parameter | Specification | Unit | Remark |
|---|---|---|---|
| Panel size | 222.13(W) × 171.52(H) | mm | |
| CF size | 218.83(W) × 165.82(H) | mm | |
| Active area | 210.432(W) × 157.824(H) | mm | |
| Number of pixels | 1024RGB × 768 | pixels | |
| | (1 pixel = R + G + B dots) | | |
| Pixel pitch | 205.5 ×205.5 | um | |
| Pixel arrangement | RGB 2 domain Stripe | | |
| Panel ID | 1.6 × 10 | mm | |
| COG pad area(G/S) | 3.3/5.7 | mm | |
| D-IC to FPC distance | 0.7 | mm | Source |
| D-IC width(G/S) | 0.59/ 0.62 | mm | |
| D-IC to CF edge(G/S) | 2.11/ 2.98 | mm | |
| FPC to Glass edge | 0.3 | mm | Source |
| FPC width | 1.1 | mm | Source |
| Seal Area (U/D/L/R) | 4.2/3.796/4.4/3.998 | mm | |
| Dimension Outline | 230 (W) x 180.2(H)× 10.5(D) | mm | |
| Display mode | Normally Black | | |

**Note:**

1. Source pad down
2. The size specified is calculated by IC–driver Source: HX8282A, Gate: HX8695E, the size maybe changed if customer use other IC.


FOB靠此角组装
无卤 REACH RoHS

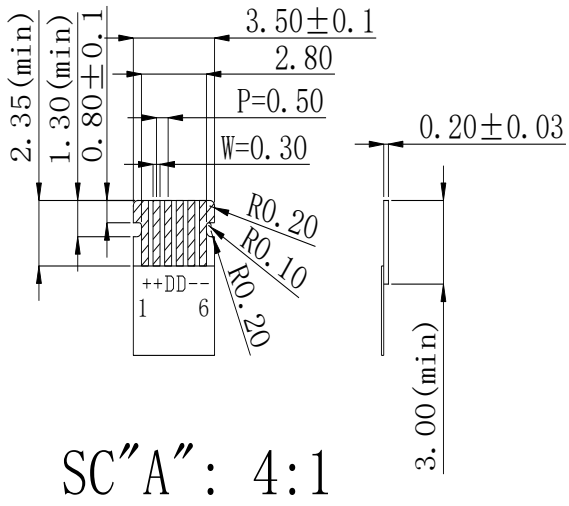
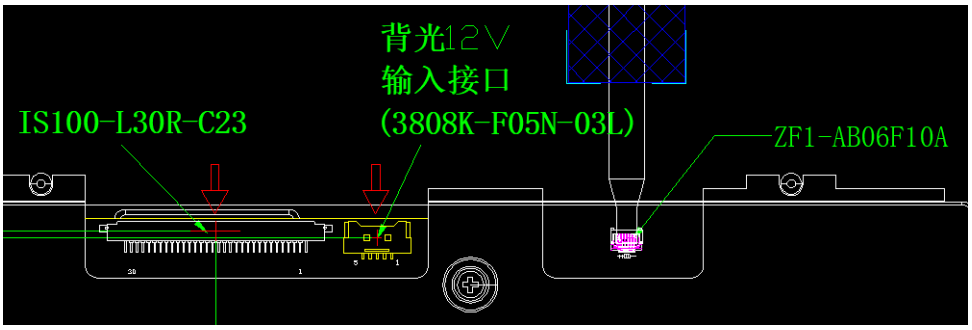



Figure 8. LCM Outline Dimension (unit: mm)

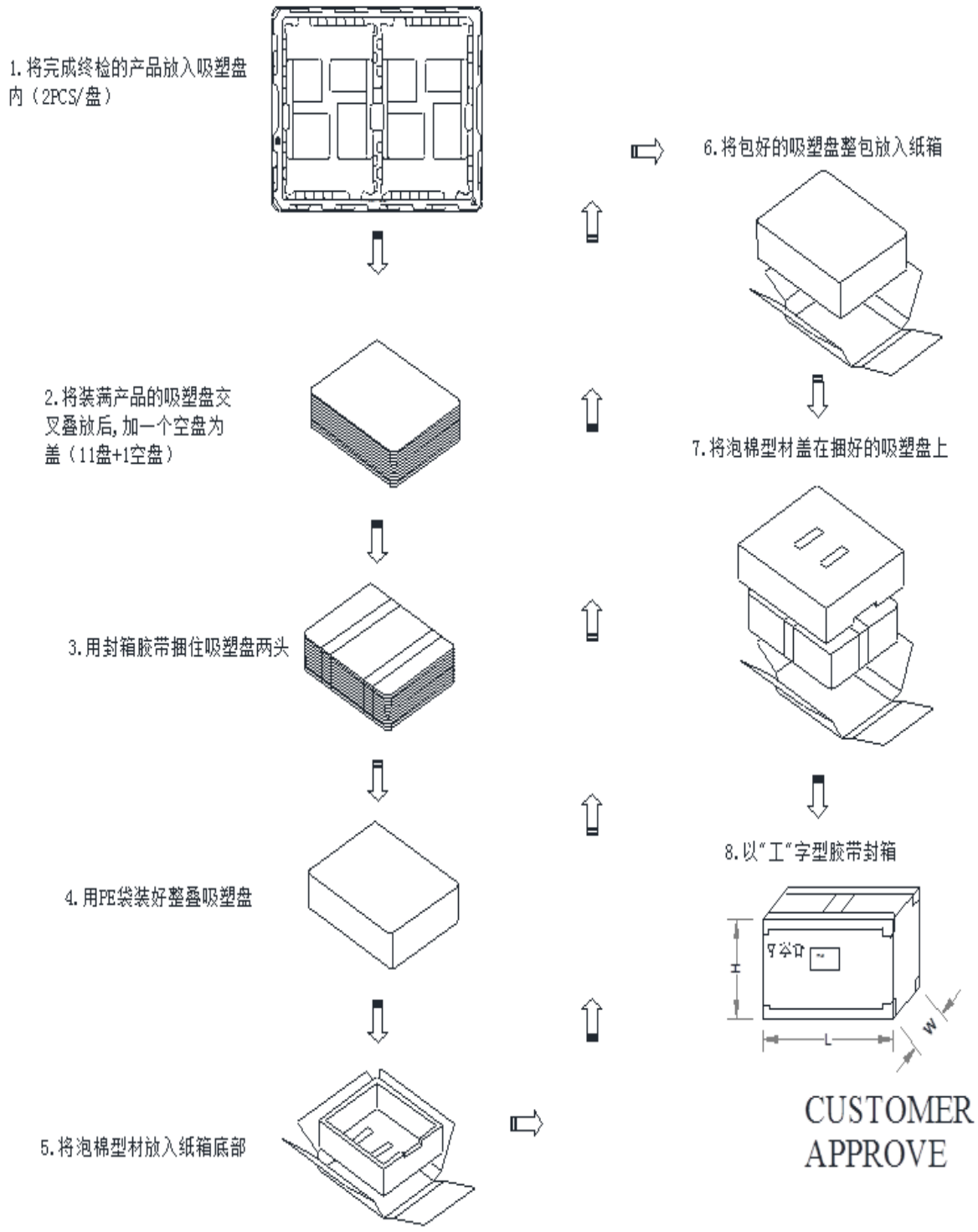


# 8.0 RELIABILITY TEST

Table 11. RELIABILITY TEST

| 实验项目 | 测试条件 | 数量 |
|---|---|---|
| 高温存储 | ，+80℃, 240h | 5 |
| 低温存储 | ，-30℃, 240h | 5 |
| 高温运行 | ，+70℃, 240h | 5 |
| 低温运行 | ，-20℃, 240h | 5 |
| 高温高湿运行 | ，+50℃, 80%RH max, 240h | 5 |
| 冷热冲击 | ，-20℃(30min)~+60℃(30min)Change time:5min, 20 Cycle | 5 |
| ESD | C=150pF, R=330Ω,<br>产品通电白屏测试打正面<br>Air: AA 区 9 点均匀分布<br>Contact: 铁框边缘 9 点 | 5 |
| 包装震动 | 200Hz,1.47G,Random,+X+Y±Z, each directions 30min | 一箱 |
| 包装跌落 | Height: 60cm,<br>1corner, 3edges, 6surfaces | 一箱 |

# 9.0 PACKING METHOD



栈板包装规格和数量：22pcs/box*6box*4层=528PCS

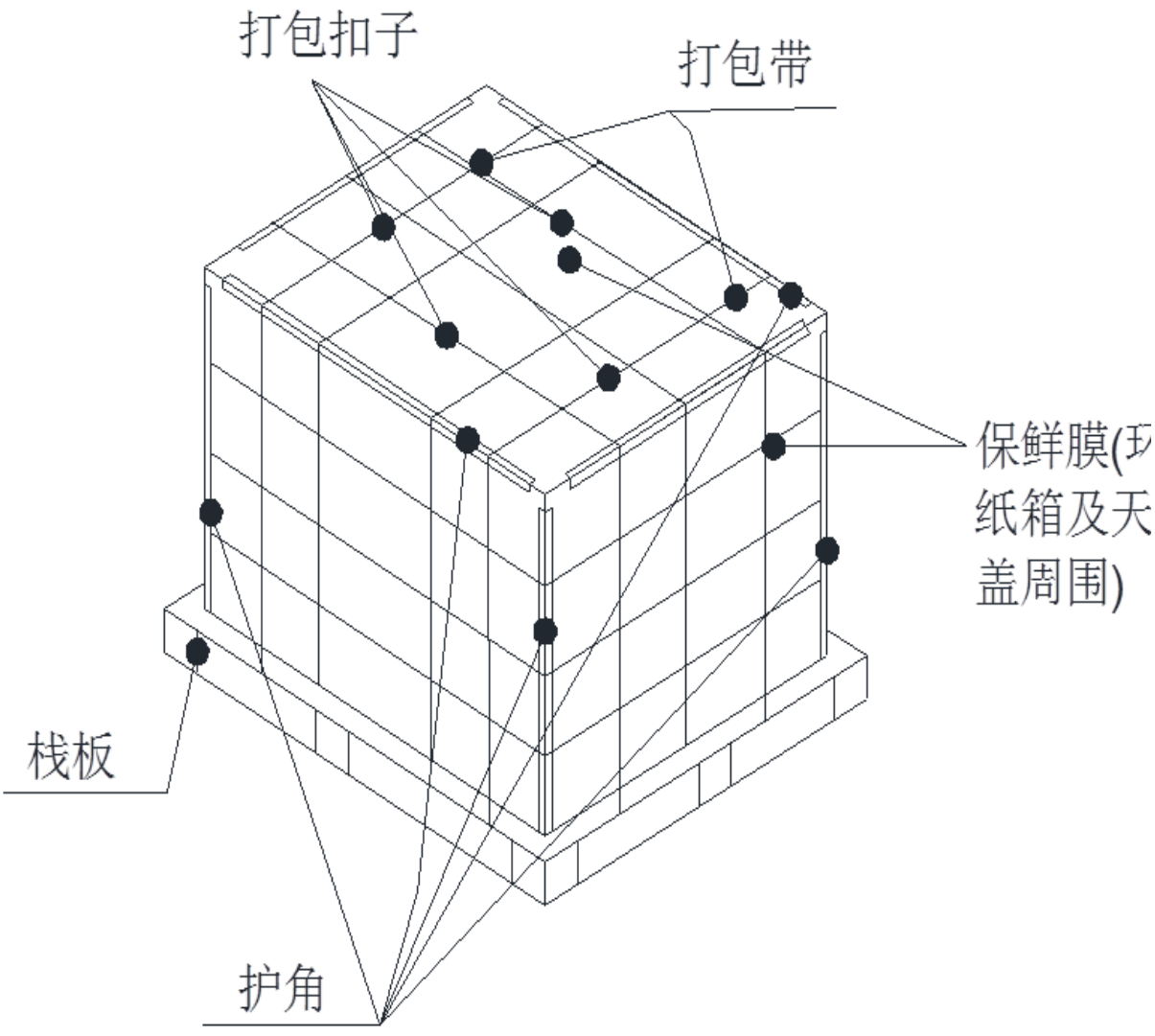



Figure 9. Packing Method

# 10.0 PRODUCT ID RULE

G V 104 X0M -N10

1 2 3 4 5 6 7 8

1 <Application area>

| Code | Description |
|---|---|
| G | Industrial |
| A | Automotive |
| H | TV |

2 <Mode>

| Code | Description |
|---|---|
| V | ADS-a Si |
| T | TN-a Si |
| S | ADS-LTPS |

3 <Size>

| Code | Description |
|---|---|
| 104 | 10.4inch |

4 <Resolution>

| Code | Description |
|---|---|
| X0 | XGA |

5 <Product type>

| Code | Description |
|---|---|
| M | Module |

6 <Production state>

| Code | Description |
|---|---|
| N | Normal |
| T | Touch on cell |

7 <Product THK>

| Code | Description |
|---|---|
| 1 | 1.0mm |

8 <Product Rev>

| Code | Description |
|---|---|
| 0 | First Mode |
| 1 | Second Mode |
| 2 | Third Mode |

# 11.0 HANDDLING & CAUTIONS

## 11.1 Mounting Method

● The panel of the LCM consists of two thin glasses with polarizer which easily get damaged. So extreme care should be taken when handling the LCM.

● Excessive stress or pressure on the glass of the LCM should be avoided. Care must be taken to insure that no torsional or compressive forces are applied to the LCM unit when it is mounted.

● If the customer's set presses the main parts of the LCM, the LCM may show the abnormal display. But this phenomenon does not mean the malfunction of the LCM and should be pressed by the way of mutual agreement.

● To determine the optimum mounting angle, refer to the viewing angle range in the specification for each model.

● Mount a LCM with the specified mounting parts.

## 11.2 Caution of LCM Handling and Cleaning

● Since the LCM is made of glass, do not apply strong mechanical impact or static load onto it.

Handling with care since shock, vibration, and careless handling may seriously affect the product. If it falls from a high place or receives a strong shock, the glass maybe broken.

● The polarizer on the surface of panel are made from organic substances. Be very careful for chemicals not to touch the polarizer or it leads the polarizer to be deteriorated.

● If the use of a chemical is unavoidable, use soft cloth with solvent recommended below to clean the LCM's surface with wipe lightly.

-IPA (Isopropyl Alcohol), Ethyl Alcohol, Tri-chloro, tri-florothane.

● Do not wipe the LCM's surface with dry or hard materials that will damage the polarizer and others. Do not use the following solvent—Water, acetone, Aromatics.

● It is recommended that the LCM be handled with soft gloves during assembly, etc.

The polarizer on the LCM's surface are vulnerable to scratch and thus to be damaged by shape particles.

● Do not drop water or any chemicals onto the LCM's surface.

● A protective film is supplied on the LCM and should be left in place until the LCM is required for operation.

● The ITO pad area needs special careful caution because it could be easily corroded. Do not contact the ITO pad area with HCFC, Soldering flux, Chlorine, Sulfur, saliva or fingerprint. To

prevent from the ITO corrosion, customers are recommended that the ITO area would be covered by UV or silicon.

- Please handle FPC with care.

### 11.3 Caution Against Static Charge

- The LCM use C-MOS LSI drivers, so customers are recommended that any unused input terminal would be connected to Vdd or Vss, do not input any signals before power is turn on, and ground you body, work/assembly area, assembly equipments to protect against static electricity.
- Remove the protective film slowly, keeping the removing direction approximate 30-degree not vertical from panel surface, if possible, under ESD control device like ion blower, and the humidity of working room should be kept over 50%RH to reduce the risk of static charge.
- Avoid the use work clothing made of synthetic fibers. We recommend cotton clothing or other conductivity-treated fibers.
- In handling the LCM, wear non-charged material gloves. And the conducting wrist to the earth and the conducting shoes to the earth are necessary.

### 11.4 Caution For Operation

- It is indispensable to drive the LCM within the specified voltage limit since the higher voltage than the limit causes LCM's life shorter. An electro-chemical reaction due to DC causes undesirable deterioration of the LCM so that the use of DC drive should avoid.
- Do not connect or disconnect the LCM to or from the system when power is on.
- Never use the LCM under abnormal conditions of high temperature and high humidity.
- When expose to drastic fluctuation of temperature(hot to cold or cold to hot), the LCM may be affected; specifically, drastic temperature fluctuation from cold to hot, produces dew on the LCM's surface which may affect the operation of the polarizer on the LCM.
- Response time will be extremely delay at lower temperature than the operating temperature range and on the other hand LCM may turn black at temperature above its operational range. However those phenomenon do not mean malfunction or out of order with the LCM. The LCM will revert to normal operation once the temperature returns to the recommended temperature range for normal operation.
- Do not display the fixed pattern for a long time because it may develop image sticking due to the LCM structure. If the screen is displayed with fixed pattern, use a screen saver.
- Do not disassemble and/or re-assemble LCM module

### 11.5 Packaging

- Modules use LCM element, and must be treated as such.

-Avoid intense shock and falls from a height.

-To prevent modules from degradation, do not operate or store them exposed directly to sunshine or high temperature/humidity for long periods.

### 11.6 Storage

- A slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit. Relative humidity of the environment should therefore be kept below 60%RH.
- Original protective film should be used on LCM's surface (polarizer). Adhesive type protective film should be avoided, because it may change color and/or properties of the polarizer.
- Do not store the LCM near organic solvents or corrosive gasses.
- Keep the LCM safe from vibration, shock and pressure.
- Black or white air-bubbles may be produced if the LCM is stored for long time in the lower temperature or mechanical shocks are applied onto the LCM.
- In the case of storing for a long period of time for the purpose or replacement use, the following ways are recommended.

-Store in a polyethylene bag with sealed so as not to enter fresh air outside in it.

-Store in a dark place where neither exposure to direct sunlight nor light is.

-Keep temperature in the specified storage temperature range.

-Store with no touch on polarizer surface by the anything else. If possible, store the LCM in the packaging situation when it was delivered.

### 11.7 Safety

- For the crash damaged or unnecessary LCM, it is recommended to wash off liquid crystal by either of solvents such as acetone and ethanol an should be burned up later.
- In the case of LCM is broken, watch out whether liquid crystal leaks out or not. If your hands touch the liquid crystal, wash your hands cleanly with water and soap as soon as possible.
- If you should swallow the liquid crystal, first, wash your mouth thoroughly with water, then drink a lot of water and induce vomiting, and then, consult a physician.
- If the liquid crystal get in your eyes, flush your eyes with running water for at least fifteen minutes.
- If the liquid crystal touches your skin or clothes, remove it and wash the affected part of

your skin or clothes with soap and running water.

# 12.0 Applicable Scope

- This product specification only applies to the products manufactured and sold by our company.
- Any specification, quality etc. about other parts mentioned in this product spec are no concern of our company.