# SHENZHEN STARTEK ELECTRONIC TECHNOLOGY CO.,LTD

# SPECIFICATION

# FOR

# LCM Module

| MODULE No: | KD050WVFPA029-06 |
|---|---|
| CUSTOMER: | |

| STARTEK | INITIAL | DATE |
|---|---|---|
| PREPARED BY | | |
| CHECKED BY | | |
| APPROVED BY | | |

| CUSTOMER | INITIAL | DATE |
|---|---|---|
| APPROVED BY | | |

| 常 备 库 存 | 长 期 供 货 | 支持小量 | 品 种 齐 全 |
|---|---|---|---|
| Stock For Sale | Long Time supply | NO MOQ | In Full Range |

# SHENZHEN STARTEK ELECTRONIC TECHNOLOGY CO.,LTD

**Revision History**

| Date | Rev. No. | Page | Summary |
|---|---|---|---|
| 2022.05.05 | V1.0 | ALL | FIRST ISSUE |
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常 备 库 存     长 期 供 货     支持小量     品 种 齐 全
Stock For Sale     Long Time supply     NO MOQ     In Full Range

# SHENZHEN STARTEK ELECTRONIC TECHNOLOGY CO.,LTD

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常 备 库 存　　　　长 期 供 货　　　　支持小量　　　　品 种 齐 全
Stock For Sale　　　Long Time supply　　　NO MOQ　　　In Full Range

# SHENZHEN STARTEK ELECTRONIC TECHNOLOGY CO.,LTD

## * Description

This is a color active matrix TFT (Thin Film Transistor) LCD (liquid crystal display) that uses amorphous silicon TFT as a switching device. This module is composed of a Transmissive type TFT-LCD Panel, driver circuit,back-light unit. The resolution of a 5.0 " TFT-LCD contains 800x480 pixels, and can display up to 16.7M colors.
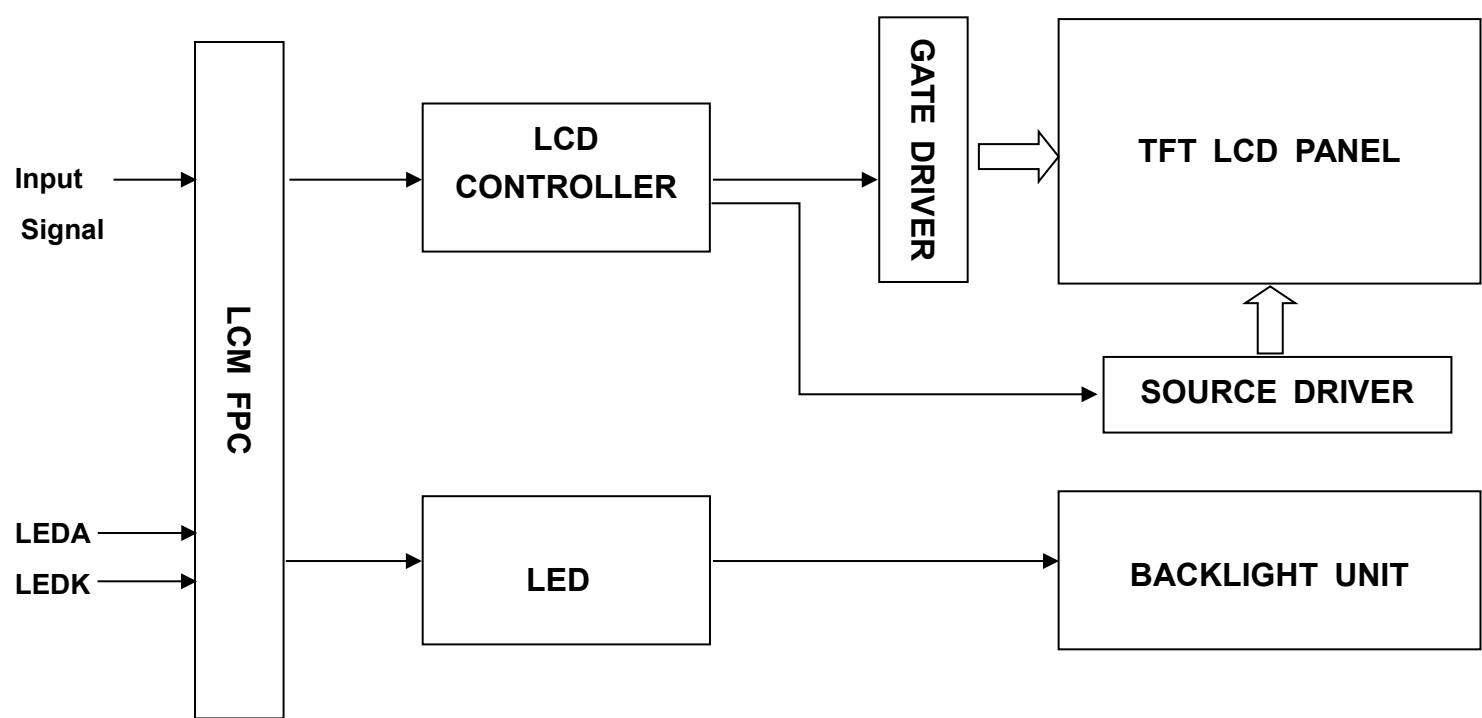
## * TFT Features

| General Information Items | Specification<br>Main Panel | Unit | Note |
|---|---|---|---|
| Display area(AA) | 108.0(H)*64.80(V)   (5.0inch) | mm | |
| Driver element | TFT active matrix | - | |
| Display colors | 16.7M | colors | |
| Number of pixels | 800(RGB)*480 | dots | |
| Pixel arrangement | RGB vertical stripe | - | |
| Pixel pitch | 0.135(H)*0.135(V) | mm | |
| Viewing angle | ALL | o'clock | |
| Controller   IC | ST7262 | - | |
| Display mode | Transmissive / Normally Black | - | |
| LCM Interface | 16/18/24 BIT RGB | - | |
| LCM Operating temperature | -30～+85 | ℃ | |
| LCM Storage temperature | -30～+85 | ℃ | |

## * Mechanical Information

| Item | | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| Module size | Horizontal(H) | - | 120.70 | - | mm | |
| | Vertical(V) | - | 75.90 | - | mm | |
| | Depth(D) | - | 2.95 | - | mm | |
| Weight | | - | TBD | | g | |

常 备 库 存　　　　长 期 供 货　　　　支持小量　　　　品 种 齐 全
Stock  For  Sale　　Long  Time  supply　　NO  MOQ　　In  Full  Range

## 1. Block Diagram

## 2. Outline dimension



Pin / Name table:

| Pin | Name |
|-----|------|
| 1 | VLED- |
| 2 | VLED+ |
| 3 | GND |
| 4 | VDD |
| 5 | R0 |
| 6 | R1 |
| 7 | R2 |
| 8 | R3 |
| 9 | R4 |
| 10 | R5 |
| 11 | R6 |
| 12 | R7 |
| 13 | G0 |
| 14 | G1 |
| 15 | G2 |
| 16 | G3 |
| 17 | G4 |
| 18 | G5 |
| 19 | G6 |
| 20 | G7 |
| 21 | B0 |
| 22 | B1 |
| 23 | B2 |
| 24 | B3 |
| 25 | B4 |
| 26 | B5 |
| 27 | B6 |
| 28 | B7 |
| 29 | GND |
| 30 | PCLK |
| 31 | DISP |
| 32 | HSYNC |
| 33 | VSYNC |
| 34 | DE |
| 35 | NC |
| 36 | GND |
| 37 | XR(NC) |
| 38 | YD(NC) |
| 39 | XL(NC) |
| 40 | YU(NC) |

NOTES:
1. DISPLAY TYPE: 5.0" TFT-LCD, 16.7M COLORS
2. DISPLAY MODE: NORMALLY BLACK/IPS
3. VIEWING DIRECTION: ALL
4. LCM DRIVER IC: ST7262 (COG)
   LCM Interface: 16/18/24-bits RGB interface
5. VDD:3.3V
6. OPERATING TEMP: -30℃ TO 85℃
   STORAGE TEMP: -30℃ TO 85℃
7. BACK LIGHT: LED WHITE, 16 LED, 40mA, 25.6±0.3V
8. RoHS COMPLIANT.
9. " * "critical dimension;( )reference dimension.

DRAWING NAME: KD050WVFPA029-06
PARTS NO.: 99050043T

深圳市柯达科电子科技有限公司
SHENZHEN STARTEK ELECTRONICS CO.,LTD

TOLERANCE(公差)
TOLERANCE UNLESS: X.X±0.3
OTHERWISE SPECIFIED: X.XX±0.2

Unit: mm
Scale: 1:1   Page: 1/1

B/L Circuit

800 RGB(H) x 480(V)
5.0"

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常 备 库 存    长 期 供 货    支 持 小 量    品 种 齐 全
Stock For Sale    Long Time supply    NO MOQ    In Full Range

# SHENZHEN STARTEK ELECTRONIC TECHNOLOGY CO.,LTD

## 3. Input terminal Pin Assignment

| NO. | SYMBOL | DISCRIPTION | I/O |
|---|---|---|---|
| 1 | VLED- | Cathode pin of backlight. | P |
| 2 | VLED+ | Anode pin of backlight. | P |
| 3 | GND | Ground | P |
| 4 | VDD | Power supply for digital circuits | P |
| 5-12 | R0-R7 | 8 bit data bus display red data. | I |
| 13-20 | G0-G7 | 8 bit data bus display green data. | I |
| 21-28 | B0-B7 | 8 bit data bus display blue data. | I |
| 29 | GND | Ground | P |
| 30 | PCLK | Pixel clock input pin. | I |
| 31 | DISP | DISP sets the display mode.<table><tr><th>DISP</th><th>Function Description</th></tr><tr><td>L</td><td>Standby mode</td></tr><tr><td>H</td><td>Normal display mode</td></tr></table> | I |
| 32 | HSYNC | Horizontal sync signal input PIN. | I |
| 33 | VSYNC | Vertical sync signal input PIN. | I |
| 34 | DE | Data input enable applied to the RGB interface. Display access is enabled when DE is "H". | I |
| 35 | NC | - | - |
| 36 | GND | Ground | P |
| 37 | XR(NC) | Touch panel Right Glass Terminal | -- |
| 38 | YD(NC) | Touch panel Bottom Film Terminal | -- |
| 39 | XL(NC) | Touch panel Left Glass Terminal | -- |
| 40 | YU(NC) | Touch panel Top Film Terminal | -- |

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|---|---|---|---|---|

常 备 库 存    长 期 供 货    支持小量    品 种 齐 全
Stock For Sale    Long Time supply    NO MOQ    In Full Range

## 4. LCD Optical Characteristics

4.1 Optical specification

| Item | | Symbol | Condition | Min. | Typ. | Max. | Unit. | Note |
|---|---|---|---|---|---|---|---|---|
| Contrast Ratio | | CR | $\Theta=0$ | 800 | 1000 | -- | | *(1)(2) |
| Response time | Rising | $T_R+T_F$ | Normal viewing angle | -- | 30 | 40 | msec | *(1)(3) |
| | Falling | | | -- | | | | |
| Uniformity | | S(%) | | 40 | 46 | -- | % | * |
| Color Filter Chromacicity | White | $W_X$ | | 0.2623 | 0.3023 | 0.3423 | | *(1)(4) CA-310 Test |
| | | $W_Y$ | | 0.2817 | 0.3217 | 0.3617 | | |
| | Red | $R_X$ | | 0.5519 | 0.5919 | 0.6319 | | |
| | | $R_Y$ | | 0.3167 | 0.3567 | 0.3967 | | |
| | Green | $G_X$ | | 0.3168 | 0.3568 | 0.3968 | | |
| | | $G_Y$ | | 0.5071 | 0.5471 | 0.5871 | | |
| | Blue | $B_X$ | | 0.1079 | 0.1479 | 0.1879 | | |
| | | $B_Y$ | | 0.0581 | 0.0981 | 0.1381 | | |
| Viewing angle | Hor. | $\Theta L$ | CR>10 | 75 | 80 | -- | | *(1)(4) |
| | | $\Theta R$ | | 75 | 80 | -- | | |
| | Ver. | $\Theta U$ | | 75 | 80 | -- | | |
| | | $\Theta D$ | | 75 | 80 | -- | | |
| Option View Direction | | | ALL | | | | | |

*The data comes from the LCD specification.

**Measuring Condition**

Measuring surrounding : dark room

Ambient temperature : 25±2₀C

15min. warm-up time.

**Measuring Equipment**

FPM520 of Westar Display technologies, INC., which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics.

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|---|---|---|---|---|
| 常 备 库 存 Stock For Sale | 长 期 供 货 Long Time supply | 支持小量 NO MOQ | 品 种 齐 全 In Full Range | |

**Note (1):** Definition of Viewing Angle :
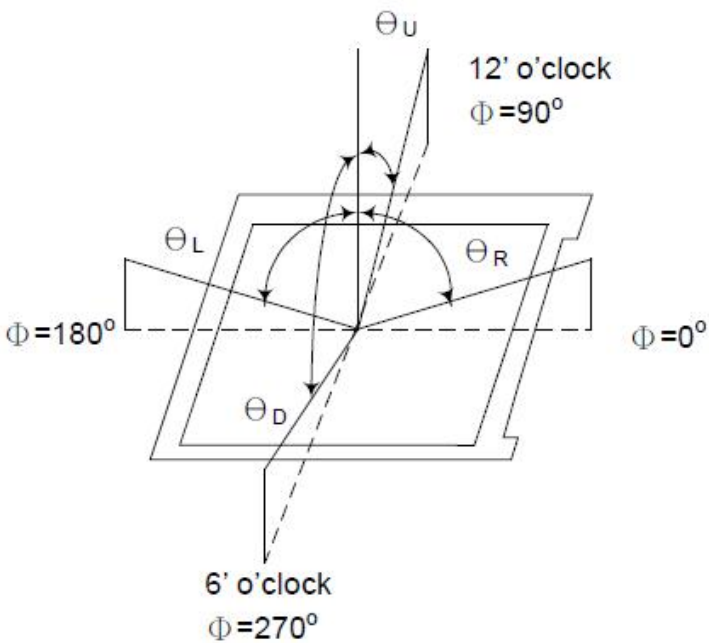


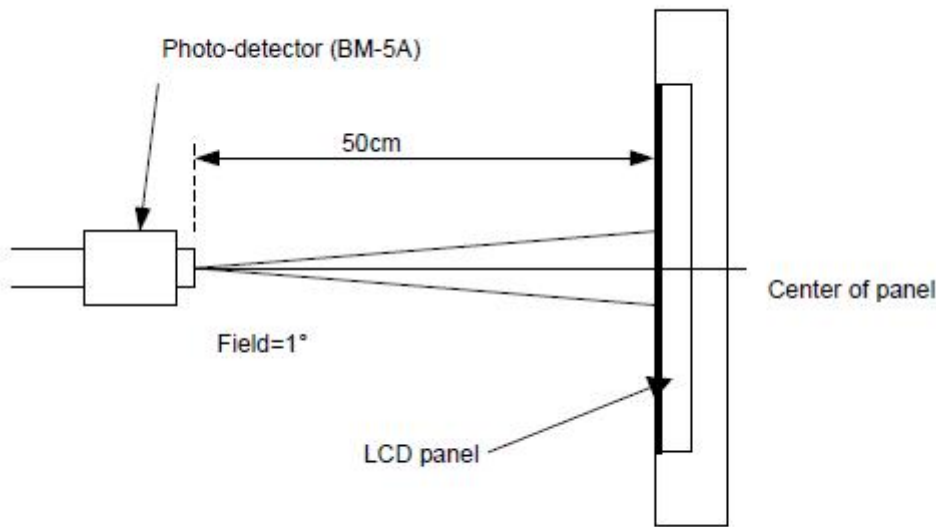**Note (2):** Definition of Contrast Ratio(CR) :measured at the center point of panel

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

**Note (3):** Response Time



| Part. No | KD050WVFPA029-06 | REV | V1.0 | Page 9 of 29 |
|----------|------------------|-----|------|--------------|
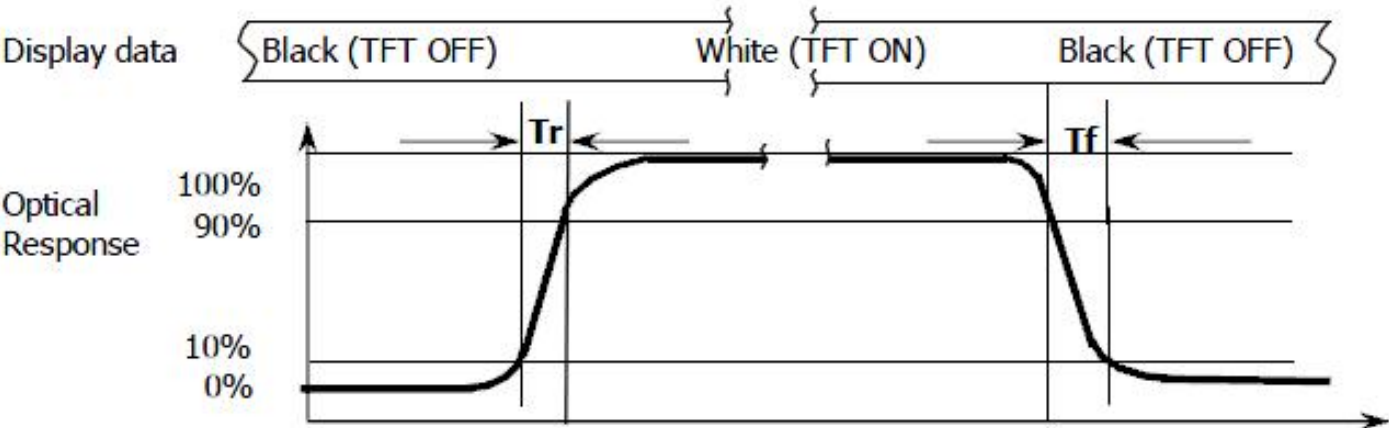
**Note (4):** Definition of optical measurement setup

| 常 备 库 存 | 长 期 供 货 | 支持小量 | 品 种 齐 全 |
|---|---|---|---|
| Stock For Sale | Long Time supply | NO MOQ | In Full Range |

# 5. Electrical Characteristics

## 5.1 Absolute Maximum Rating

| Characteristics | Symbol | Min. | Max. | Unit | Note |
|---|---|---|---|---|---|
| Digital Supply Voltage | VDD | -0.3 | 4.0 | V | Note1 |
| Operating temperature | $T_{OP}$ | -30 | +85 | ℃ | |
| Storage temperature | $T_{ST}$ | -30 | +85 | ℃ | |

NOTE1: 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.

## 5.2 DC Electrical Characteristics

| Characteristics | Symbol | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| Digital Supply Voltage | VDD | 3.3 | -- | 3.6 | V | |
| Normal mode Current consumption | IDD | -- | 60 | 120 | mA | |
| Level input voltage | $V_{IH}$ | 0.7VDD | | VDD | V | |
| | $V_{IL}$ | GND | | 0.3 VDD | V | |
| Level output voltage | $V_{OH}$ | VDD-0.4 | | -- | V | |
| | $V_{OL}$ | GND | | GND+0.4 | V | |

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常 备 库 存　　　　长 期 供 货　　　　支持小量　　　　品 种 齐 全
Stock For Sale　　　Long Time supply　　　NO MOQ　　　In Full Range

## 5.3 LED Backlight Characteristics

The back-light system is edge-lighting type with 16 chips LED

| Item | Symbol | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| Forward Current | $I_F$ | 30 | 40 | -- | mA | |
| Forward Voltage | $V_F$ | -- | 25.6 | -- | V | |
| LCM Luminance | LV | 800 | 850 | -- | cd/m2 | Note3 |
| LED life time | Hr | 50000 | -- | -- | Hour | Note1,2 |
| Uniformity | Avg | 80 | -- | -- | % | Note3 |

Note1: LED life time (Hr) can be defined as the time in which it continues to operate under the condition:

  Ta=25±3 ℃, typical IL value indicated in the above table until the brightness becomes less than 50%.

Note 2: The "LED life time" is defined as the module brightness decrease to 50% original brightness at

  Ta=25℃  and IL=40mA. The LED lifetime could be decreased if operating IL is larger than 40mA. The

  constant current driving method is suggested.



B/L Circuit

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|---|---|---|---|---|

常 备 库 存　　　　　长 期 供 货　　　　　支持小量　　　　　品 种 齐 全
Stock For Sale　　　Long Time supply　　　NO MOQ　　　In Full Range
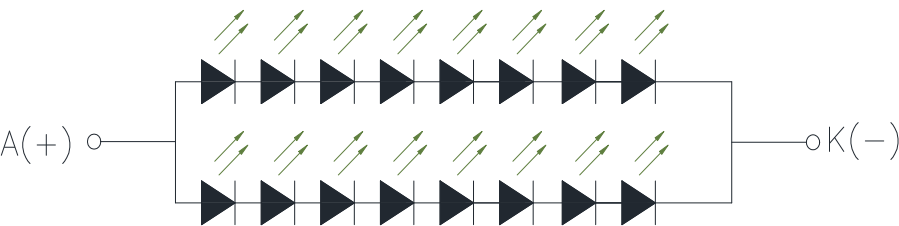
Note (3)    Luminance Uniformity of these 9 points is defined as below:
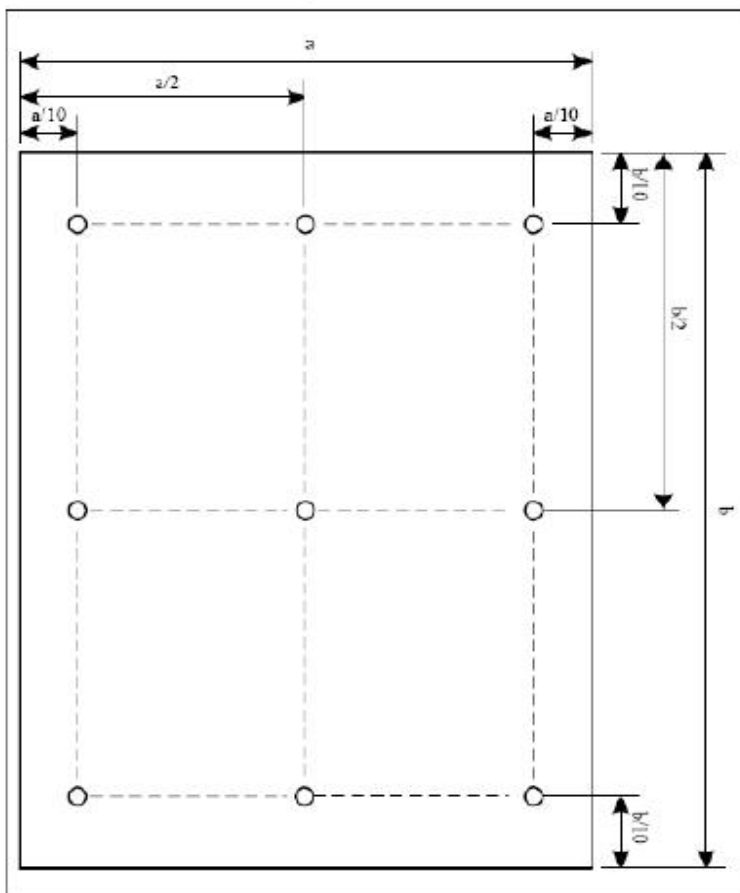


$$Uniformity = \frac{minimum\ luminance\ in\ 9\ points\ (1\text{-}9)}{maximum\ luminance\ in\ 9\ points\ (1\text{-}9)}$$

$$Luminance = \frac{Total\ Luminance\ of\ 9\ points}{9}$$

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| 常 备 库 存 | 长 期 供 货 | 支持小量 | 品 种 齐 全 |
|---|---|---|---|
| Stock For Sale | Long Time supply | NO MOQ | In Full Range |

## 6. RGB Interface Characteristics

| RGB Mode Selection Table | DCLK | HSYNC | VSYNC | DE |
|---|---|---|---|---|
| SYNC - DE Mode | Input | Input | Input | Input |
| SYNC Mode | Input | Input | Input | GND |
| DE Mode | Input | GND | GND | Input |

Note: "Input" means these signals are driven by host side

## 6.1 SYNC Mode



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|---|---|---|---|---|

## 6.2 SYNC-DE Mode
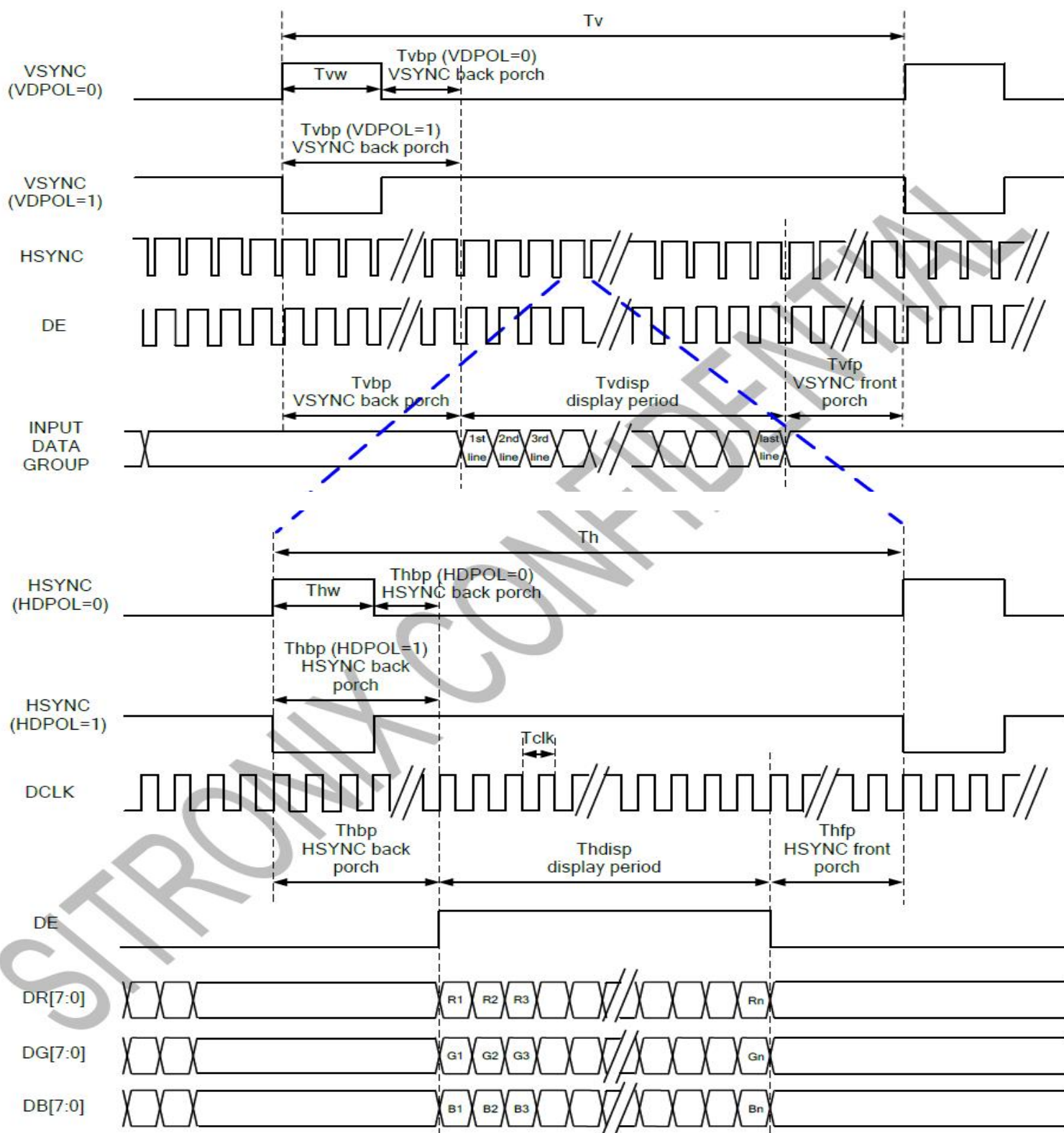


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| 常 备 库 存 Stock For Sale | 长 期 供 货 Long Time supply | 支持小量 NO MOQ | | 品 种 齐 全 In Full Range |

## 6.3 DE Mode
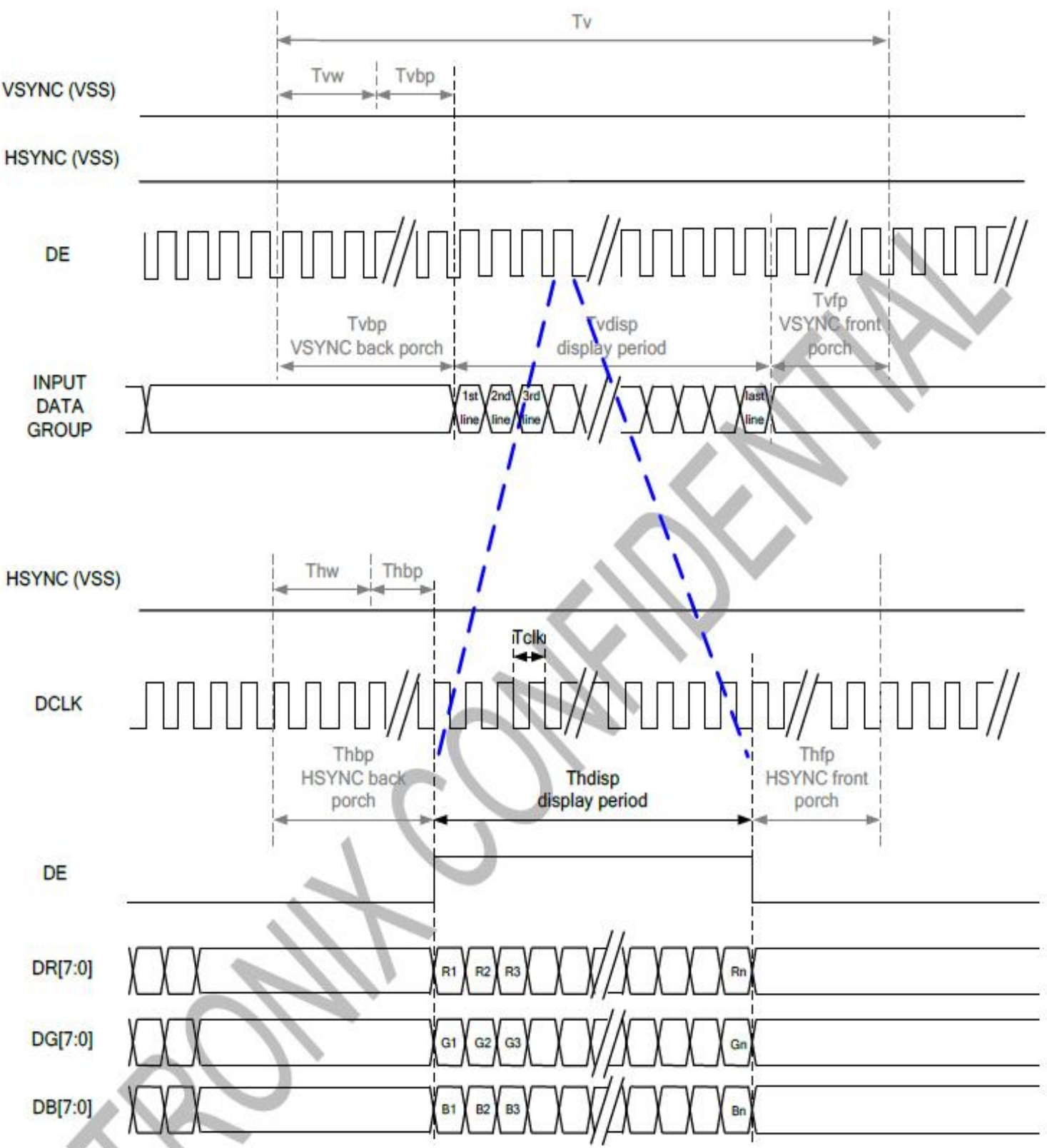


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| 常 备 库 存<br>Stock For Sale | 长 期 供 货<br>Long Time supply | | 支持小量<br>NO MOQ | 品 种 齐 全<br>In Full Range |

## 6.4 Parallel 24-bit RGB Input Timing Table

Parallel 24-bit RGB Input Timing (PVDD=PVDD1=VDD=VDDI= 3.3V, AGND= 0V, TA=25°C)

| Parallel 24-bit RGB Interface Timing Table | | | | | | |
|---|---|---|---|---|---|---|
| Item | | Symbol | Min. | Typ. | Max. | Unit | Remark |
| DCLK Frequency | | Fclk | 23 | 25 | 27 | MHz | |
| HSYNC | Period Time | Th | 808 | 816 | 896 | DCLK | |
| | Display Period | Thdisp | | 800 | | DCLK | |
| | Back Porch | Thbp | 4 | 8 | 48 | DCLK | |
| | Front Porch | Thfp | 4 | 8 | 48 | DCLK | |
| | Pulse Width | Thw | 2 | 4 | 8 | DCLK | |
| VSYNC | Period Time | Tv | 488 | 496 | 504 | HSYNC | |
| | Display Period | Tvdisp | | 480 | | HSYNC | |
| | Back Porch | Tvbp | 4 | 8 | 12 | HSYNC | |
| | Front Porch | Tvfp | 4 | 8 | 12 | HSYNC | |
| | Pulse Width | Tvw | 2 | 4 | 8 | HSYNC | |

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| 常 备 库 存 | 长 期 供 货 | 支持小量 | 品 种 齐 全 |
|---|---|---|---|
| Stock For Sale | Long Time supply | NO MOQ | In Full Range |

# 7. AC Electrical Characteristics

## 7.1 System Bus Timing for RGB Interface
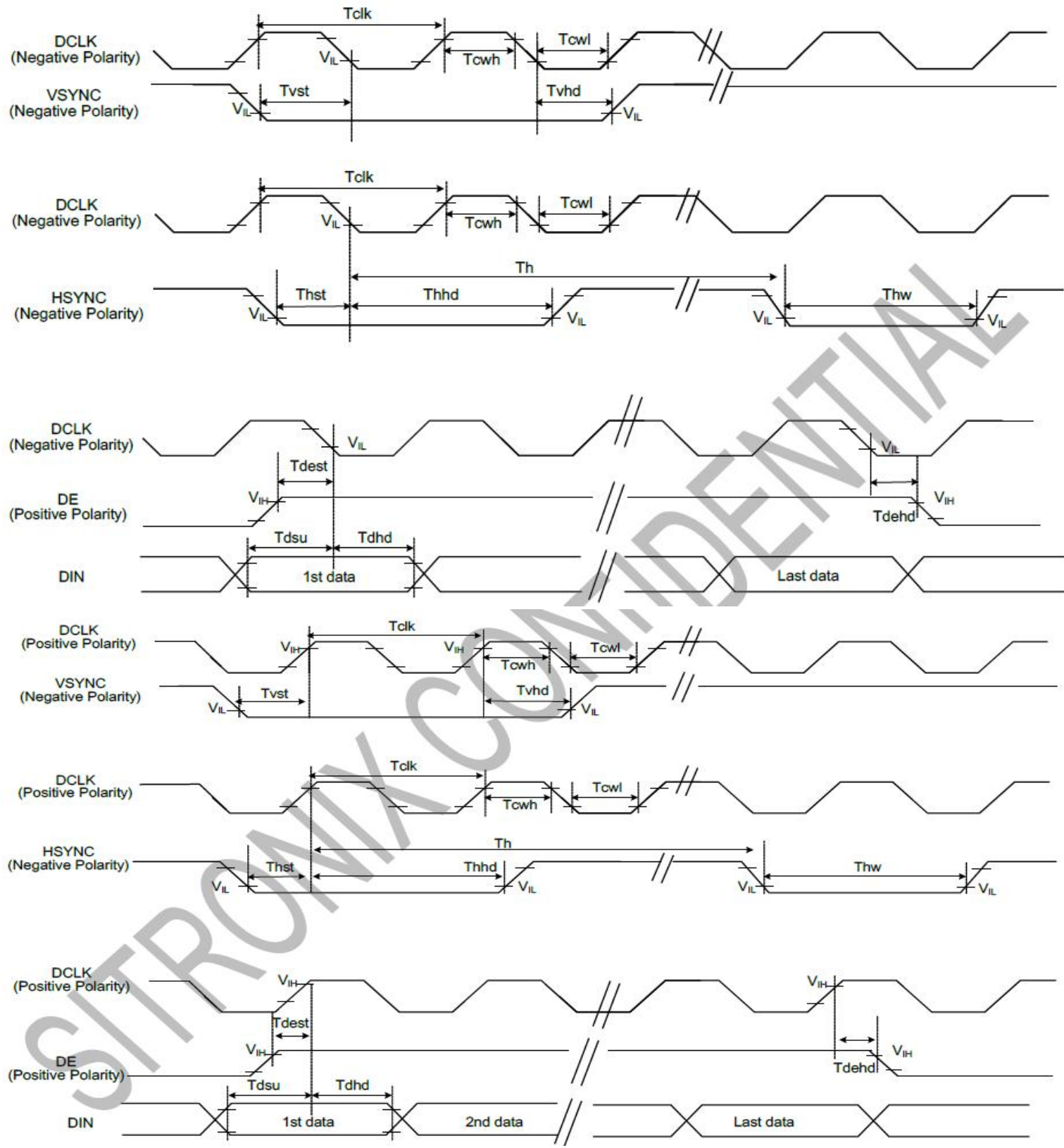


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| 常 备 库 存 | 长 期 供 货 | 支持小量 | 品 种 齐 全 |
|---|---|---|---|
| Stock For Sale | Long Time supply | NO MOQ | In Full Range |

# SHENZHEN STARTEK ELECTRONIC TECHNOLOGY CO.,LTD

| Item | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|------|--------|------|------|------|------|------------|
| CLK Pulse Duty | Tcw | 40 | 50 | 60 | % | |
| HSYNC Width | Thw | 2 | - | - | DCLK | |
| HSYNC Period | Th | 55 | 60 | 65 | us | |
| VSYNC Setup Time | Tvst | 12 | - | - | ns | |
| VSYNC Hold Time | Tvhd | 12 | - | - | ns | |
| HSYNC Setup Time | Thst | 12 | - | - | ns | |
| HSYNC Hold Time | Thhd | 12 | - | - | ns | |
| Data Setup Time | Tdsu | 12 | - | - | ns | |
| Data Hold Time | Tdhd | 12 | - | - | ns | |
| DE Setup Time | Tdest | 12 | - | - | ns | |
| DE Hold Time | Tdehd | 12 | - | - | ns | |

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常 备 库 存　　　　长 期 供 货　　　　支持小量　　　　品 种 齐 全
Stock For Sale　　Long Time supply　　NO MOQ　　In Full Range

# 8. POWER ON/OFF SEQUENCE

## 8.1 Power On Sequence



| Symbol | Description | Min. Time | Unit |
|--------|-------------|-----------|------|
| T0 | System power stability to GRB RESET signal | 0 | ms |
| T1 | GRB RESET= "High" to DISP="High" | 10 | ms |
| T2 | Display Signal output to Backlight Power on | 250 | ms |

*Note: RGB interface Display signal: DCLK; VSYNC; HSYNC; DE; DR[7:0]; DG[7:0]; DB[7:0]*

## 8.2 Power Off Sequence



| Symbol | Description | Min. Time | Unit |
|--------|-------------|-----------|------|
| T0 | Backlight Power off to DISP="Low" | 5 | ms |
| T1 | DISP="Low" to IC internal voltage discharge complete | 100 | ms |

*Note: RGB interface Display signal: DCLK; VSYNC; HSYNC; DE; DR[7:0]; DG[7:0]; DB[7:0]*

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| 常 备 库 存 | 长 期 供 货 | 支持小量 | 品 种 齐 全 |
|-----------|-----------|----------|-----------|
| Stock For Sale | Long Time supply | NO MOQ | In Full Range |

# 9. LCD Module Out-Going Quality Level

## 9.1 VISUAL & FUNCTION INSPECTION STANDARD

### 9.1.1 Inspection conditions

Inspection performed under the following conditions is recommended.

Temperature : 25±5℃

Humidity :　65%±10%RH

Viewing Angle : Normal viewing Angle.

Illumination: Single fluorescent lamp (300 to 700Lux)

Viewing distance:30-50cm
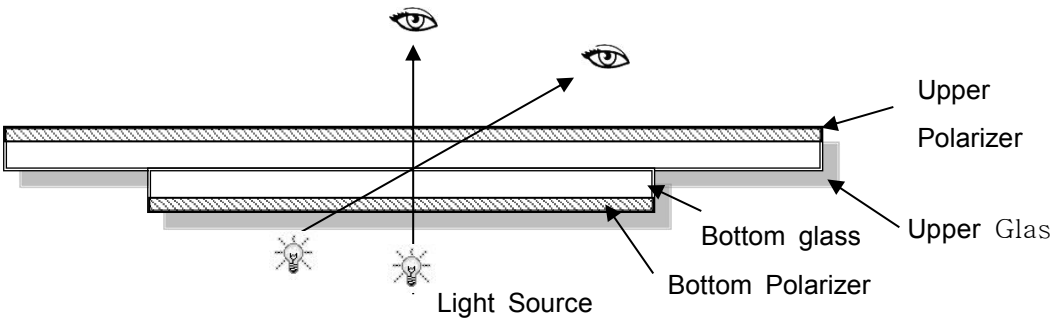


### 9.1.2 Definition
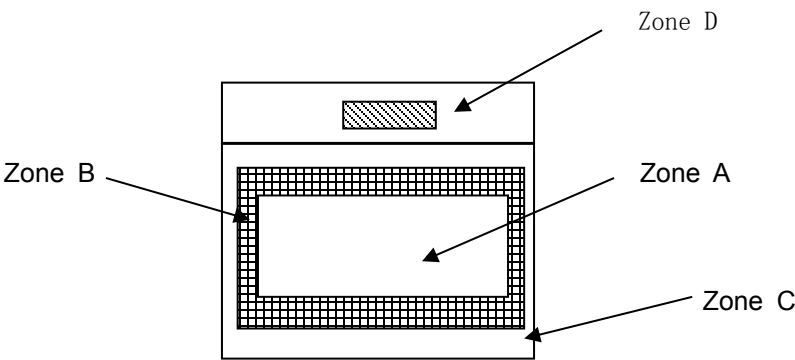


Zone A : Effective Viewing  Area(Character or Digit can be seen)

Zone B : Viewing Area except Zone A

Zone C : Outside (Zone A+Zone B) which can not be seen after assembly by customer .)

Zone D : IC Bonding Area

Note:As a general rule ,visual defects in Zone C can be ignored when it doesn't effect product function or appearance after assembly by customer

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|----------|------------------|-----|------|---------------|

## 9.1.3 Sampling Plan

According to GB/T 2828-2003 ; , normal inspection, Class Ⅱ

AQL:

| Major defect | Minor defect |
|---|---|
| 0.65 | 1.5 |

LCD: Liquid Crystal Display , LCM: Liquid Crystal Module, CTP: Capacitive Touch Panel
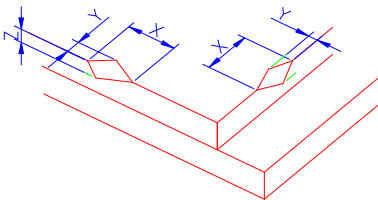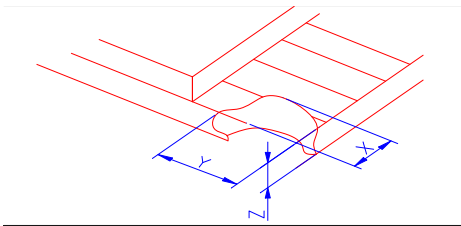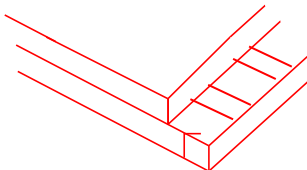
| No | Items to be inspected | Criteria | Classification of defects |
|---|---|---|---|
| 1 | Functional defects | 1) No display, Open or miss line<br>2) Display abnormally, Short<br>3) Backlight no lighting, abnormal lighting. etc | Major |
| 2 | Missing | Missing components and etc | |
| 3 | Outline dimension | Overall outline dimension beyond the drawing is not allowed,deformation and etc | |
| 4 | Color tone | Color unevenness, refer to limited sample | Minor |
| 5 | Spot/Line defect | Light dot,Dim spot,(Note1)<br>Polarizer Air Bubble,<br>Polarizer accidented spot and etc | |
| 6 | Soldering appearance | Good soldering , Peeling off is not allowed  and etc | |
| 7 | LCD/Polarizer/CTP | Black/White spot/line, scratch, crack, etc. | |

**Note1:** a) Light dot：Dots appear bright and unchanged in size in which LCD panel is displaying under black pattern.

b) Dim dot: Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green, blue picture.

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|---|---|---|---|---|

| 常 备 库 存 | 长 期 供 货 | 支持小量 | 品 种 齐 全 |
|---|---|---|---|
| Stock For Sale | Long Time supply | NO MOQ | In Full Range |

**9.1.4 Criteria (Visual)**

| Number | Items | Criteria(mm) |
|---|---|---|
| 1.0    LCD Crack/Broken<br>NOTE:<br>X: Length<br>Y: Width<br>Z: Height<br>L: Length of ITO,<br>T: Height of LCD | (1) The edge of LCD broken | <br><br>| X | Y | Z |<br>|---|---|---|<br>| ≤3.0mm | <Inner border line of the seal | ≤T | |
| | (2)LCD corner broken | <br><br>| X | Y | Z |<br>|---|---|---|<br>| ≤3.0mm | ≤L | ≤T | |
| | (3) LCD crack | <br><br>Crack<br>Not allowed |

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|---|---|---|---|---|

| 2.0 | Spot defect |
|-----|-------------|

Y

X

$\Phi=(X+Y)/2$

① light dot ( black/white spot , pinhole, stain，etc.)

| Zone / Size (mm) | Acceptable Qty | | |
|---|---|---|---|
| | A | B | C |
| Φ≤0.15 | Ignore | | |
| 0.15<Φ≤0.25 | 3(distance≧10mm) | Ignore | |
| 0.25<Φ≤0.4 | 2(distance≧10mm) | | |
| Φ>0.4 | 0 | | |

② Dim spot (light leakage、dent、dark spot，etc)

| Zone / Size (mm) | Acceptable Qty | | |
|---|---|---|---|
| | A | B | C |
| Φ≤0.15 | Ignore | | |
| 0.15<Φ≤0.25 | 3( distance≧10mm) | Ignore | |
| 0.25<Φ≤0.4 | 2( distance≧10mm) | | |
| Φ>0.4 | 0 | | |
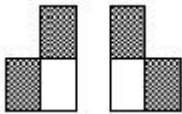
③ Polarizer accidented spot

| Zone / Size (mm) | Acceptable Qty | | |
|---|---|---|---|
| | A | B | C |
| Φ≤0.2 | Ignore | | |
| 0.2<Φ≤0.5 | 2( distance≧10mm) | | Ignore |
| Φ>0.5 | 0 | | |

④Polarizer Bubble

| Zone / Size (mm) | Acceptable Qty | | |
|---|---|---|---|
| | A | B | C |
| Φ≤0.2 | Ignore | | |
| 0.2<Φ≤0.4 | 2(distance≧10mm) | | Ignore |
| Φ>0.4 | 0 | | |

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|----------|------------------|-----|------|---------------|

| 常 备 库 存 | 长 期 供 货 | 支持小量 | 品 种 齐 全 |
|---|---|---|---|
| Stock For Sale | Long Time supply | NO MOQ | In Full Range |

# SHENZHEN STARTEK ELECTRONIC TECHNOLOGY CO.,LTD

| 3.0 | LCD Pixel defect | Pixel bad points |

| Item | Zone  A | | Acceptable Qt |
|------|---------|---|---------------|
| Bright dot | Random | | N≤2 |
| | 2 dots adjacent | | N≤0 |
| | 3 dots adjacent | | N≤0 |
| Dark dot | Random | | N≤3 |
| | 2 dots adjacent | | N≤0 |
| | 3 dots adjacent | | N≤0 |
| Distance | 1. Minimum Distance Between Bright dots.<br>2. Minimum Distance Between dark dots<br>3. Minimum Distance Between dark and bright dot. | | 5mm |
| Total bright and dark dot | | | N≤4 |

Note:

A) Bright dot : Dots appear bright and unchanged in size in which LCD panel is displaying under black pattern.

B) Dark dot: Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green, blue picture.

C) 2 dot adjacent = 1 pair = 2 dots

Picture:

2 dot adjacent                    2 dot adjacent

2 dot adjacent (vertical)         2 dot adjacent (slant)

| 常 备 库 存<br>Stock For Sale | 长 期 供 货<br>Long Time supply | 支持小量<br>NO MOQ | 品 种 齐 全<br>In Full Range |

| | Line defect (LCD /Polarizer backlight black/white line, scratch, stain) <br><br> W: width, L : length <br><br> N：Count | Width(mm) | Length(mm) | Acceptable Qty | | |
|---|---|---|---|---|---|---|
| | | | | A | B | C |
| 4.0 | | Φ≤0.05 | Ignore | Ignore | | Ignore |
| | | 0.05<W≤0.06 | L≤5.0 | N≤3 | | |
| | | 0.06<W≤0.08 | L≤4.0 | N≤2 | | |
| | | W>0.08 | Define as spot defect | | | |

| 5.0 | Electronic Components SMT. | Not allow missing parts，solderless connection，cold solder joint，mismatch，The positive and negative polarity opposite |
|---|---|---|
| 6.0 | Display color& Brightness. | 1. Color：Measuring the color coordinates, The measurement standard according to the datasheet or samples. <br><br> 2. Brightness：Measuring the brightness of White screen, The measurement standard according to the datasheet or Samples. |
| 7.0 | LCD Mura/Waving/ Hot spot | Not visible through 5% ND filter in 50% gray or judge by limit sample if necessary. |

Criteria ( functional items)

| Number | Items | Criteria (mm) |
|---|---|---|
| 1 | No display | Not allowed |
| 2 | Missing segment | Not allowed |
| 3 | Short | Not allowed |
| 4 | Backlight no lighting | Not allowed |
| 5 | CTP no function | Not allowed |

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|---|---|---|---|

## 10. Reliability Test Result

| Item | Condition | Inspection after test |
|---|---|---|
| High Temperature Operating | 85℃,96H | Inspection after 2~4hours storage at room temperature, the sample shall be free from defects:<br>1.Air bubble in the LCD;<br>2.Non-display;<br>3.Missing segments/line;<br>4.Glass crack;<br>5.Current IDD is twice higher than initial value. |
| Low Temperature Operating | -30℃, 96HR | |
| High Temperature Storage | 85℃, 96HR | |
| Low Temperature Storage | -30℃, 96HR | |
| High Temperature & High Humidity Operating | +60℃, 90% RH ,96 hours. | |
| Thermal Shock (Non-operation) | -10℃,30 min ↔ 60℃,30 min,<br>Change time:5min 20CYC. | |
| ESD test | C=150pF, R=330,5points/panel<br>Air:±8KV, 5times; Contact:±6KV, 5 times;<br>(Environment: 15℃~35℃, 30%~60%). | |
| Vibration (Non-operation) | Frequency range:10~55Hz, Stroke:1.5mm<br>Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X.Y.Z. (6 hours for total) (Package condition). | |
| Box Drop Test | 1 Corner 3 Edges 6 faces,80㎝(MEDIUM BOX) | |

Remark:

1.The test samples should be applied to only one test item.

2.Sample size for each test item is 5~10pcs.

3.For Damp Proof Test, Pure water(Resistance＞10MΩ) should be used.

4.In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judged as a good part.

5.Failure Judgment Criterion: Basic Specification, Electrical Characteristic, Mechanical Characteristic, Optical Characteristic.

6. The color fading mura of polarizing filter should not care.

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| 常 备 库 存 | 长 期 供 货 | 支持小量 | 品 种 齐 全 |
|---|---|---|---|
| Stock For Sale | Long Time supply | NO MOQ | In Full Range |

# 11. Cautions and Handling Precautions

## 11.1 Handling and Operating the Module

(1) When the module is assembled, it should be attached to the system firmly.

Do not warp or twist the module during assembly work.

(2) Protect the module from physical shock or any force. In addition to damage, this may cause improper operation or damage to the module and back-light unit.

(3) Note that polarizer is very fragile and could be easily damaged. Do not press or scratch the surface.

(4) Do not allow drops of water or chemicals to remain on the display surface.

If you have the droplets for a long time, staining and discoloration may occur.

(5) If the surface of the polarizer is dirty, clean it using some absorbent cotton or soft cloth.

(6) The desirable cleaners are water, IPA (Isopropyl Alcohol) or Hexane.

Do not use ketene type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanent damage to the polarizer due to chemical reaction.

(7) 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) Protect the module from static; it may cause damage to the CMOS ICs.

(9) Use finger-stalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.

(10) Do not disassemble the module.

(11) Protection film for polarizer on the module shall be slowly peeled off just before use so that the electrostatic charge can be minimized.

(12) Pins of I/F connector shall not be touched directly with bare hands.

(13) Do not connect, disconnect the module in the "Power ON" condition.

(14) Power supply should always be turned on/off by the item 6.1 Power On Sequence &6.2 Power Off Sequence

## 11.2 Storage and Transportation.

(1) Do not leave the panel in high temperature, and high humidity for a long time.

It is highly recommended to store the module with temperature from 0 to 35 ℃ and relative humidity of less than 70%

(2) Do not store the TFT-LCD module in direct sunlight.

(3) The module shall be stored in a dark place. When storing the modules for a long time, be sure to adopt effective measures for protecting the modules from strong ultraviolet radiation, sunlight, or fluorescent light.

(4) It is recommended that the modules should be stored under a condition where no condensation is allowed. Formation of dewdrops may cause an abnormal operation or a failure of the module.

In particular, the greatest possible care should be taken to prevent any module from being operated where condensation has occurred inside.

(5) This panel has its circuitry FPC on the bottom side and should be handled carefully in order not to be stressed.

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## 12. Packing

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| 常 备 库 存 | 长 期 供 货 | 支持小量 | 品 种 齐 全 |
| Stock For Sale | Long Time supply | NO MOQ | In Full Range |