



一众显示科技有限公司

TEAM SOURCE DISPLAY TECH. CO, LTD.

# TFT-LCD Module Specification

**Module NO.:** TST080HDBV-22

**Version:** V1.0

APPROVAL FOR SPECIFICATION

APPROVAL FOR SAMPLE

| For Customer' s Acceptance: |         |
|-----------------------------|---------|
| Approved by                 | Comment |
|                             |         |

| Team Source Display: |         |          |
|----------------------|---------|----------|
| Designer             | Checked | Approved |
|                      |         |          |



## Contents

| <b>No.</b> | <b>Items</b>               | <b>Page</b> |
|------------|----------------------------|-------------|
| 1.0        | General Description        | 4           |
| 2.0        | Absolute Maximum Ratings   | 6           |
| 3.0        | Electrical Specifications. | 7           |
| 4.0        | Optical Specifications.    | 8           |
| 5.0        | Optical Test Appendix      | 10          |
| 6.0        | Mechanical Characteristics | 12          |
| 7.0        | MDL Outline Dimension      | 13          |
| 8.0        | Reliability Test           | 14          |
| 9.0        | Interface Connection       | 15          |
| 10.0       | Signal Specification       | 18          |
| 11.0       | Power on/off Sequence      | 19          |
| 12.0       | Package                    | 21          |

## 1.0 GENERAL DESCRIPTION

### 1.1 Introduction

8 inch module is a color active matrix TFT LCD module using amorphous silicon TFT's (Thin Film Transistors) as an active switching devices. It is a transmissive type display operating in the normal black. The TFT-LCD has a 8 inch diagonally measured active area with resolutions (1280 horizontal by 720 vertical pixel arrays). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this panel can display 16.7M colors.

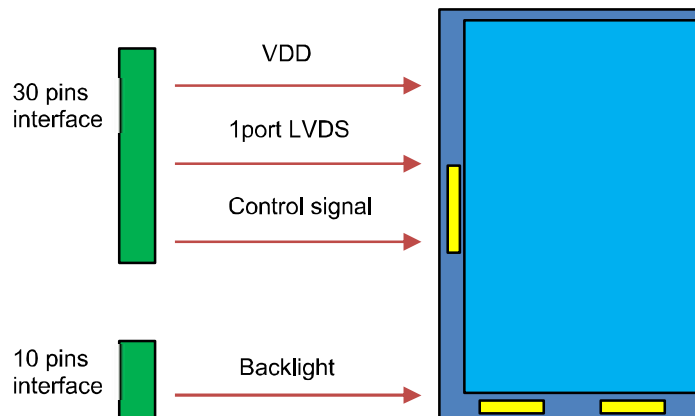


Figure 1-1 Block Diagram

### 1.2 Features

- Wide viewing angle (U/D/L/R) : 85/85/85/85
- Color Gamut : 70% Min.
- Cell thickness : 1.0t
- LVDS Interface

### 1.3 Application

- Vehicle-mounted Production

### 1.4 General Specification

<Table 1-1 General Specifications>

| Parameter                        | Specification                                | Unit   | Remarks |
|----------------------------------|--|--------|---------|
| Active area                      | 176.64 (H) × 99.36 (V)                       | mm     | 16 : 9  |
| Number of pixels                 | 1280(H) × RGB × 720(V)                       | pixels |         |
| Pixel pitch                      | 0.138(H) × 0.138 (V)                         | mm     |         |
| Pixel arrangement                | RGB Vertical stripe                          |        |         |
| Display colors                   | 16.7M  | colors |         |
| Color gamut                      | 70%  | %      | Min.    |
| Display mode                     | Normally black                               |        |         |
| Module outline                   | 192.8(H) x 116.9 (V)                         | mm     |         |
| Viewing Direction<br>(Human Eye) | U/D/L/R Min. 75/75/75/75<br>Typ. 85/85/85/85 |        |         |
| Surface Treatment                | CF: HC<br>TFT: AG                            |        |         |

Note:

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

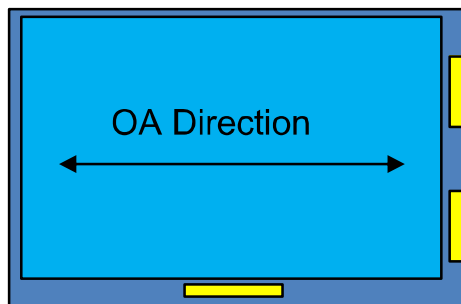


Figure 1-2 The TFT and CF Align Direction

## 2.0 ABSOLUTE MAXIMUM RATINGS

The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit. The operational and non-operational maximum voltage and current values are listed in Table 2-1

< Table 2-1 Environment Absolute Maximum Ratings >

| Parameter                        | Symbol          | Min. | Max. | Unit | Remarks     |
|----------------------------------|-----------------|------|------|------|-------------|
| LC operating Voltage *1)         | V <sub>OP</sub> | -    | 5.8  | V    | Ta=25+/-2°C |
| Operating Temperature (Humidity) | T <sub>OP</sub> | -40  | +85  | °C   |             |
|                                  | RH              | -    | 90   | %    | At 60°C     |
| Storage Temperature (Humidity)   | T <sub>ST</sub> | -40  | +90  | °C   |             |
|                                  | RH              | -    | 90   | %    | At 60°C     |

\*1)Liquid Crystal driving voltage

Due to the characteristics of LC Material, this voltage varies with environmental temperature.

### 3.0 ELECTRICAL SPECIFICATIONS

#### 3.1 Electrical Specifications

Ta=25+/-2°C

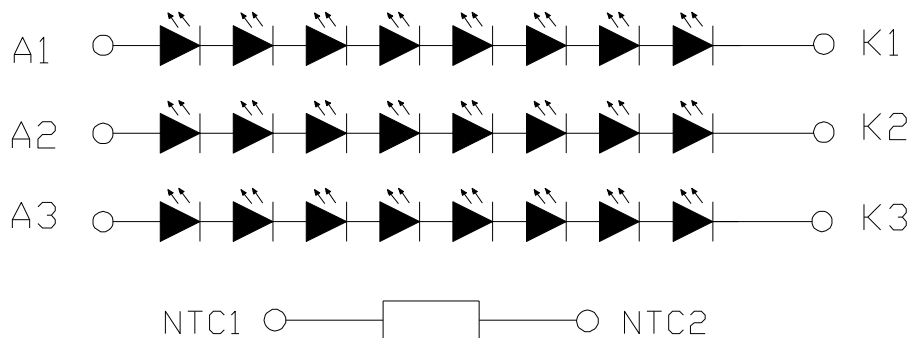
| Parameter                             | Symbol                 | Values |      |      | Unit | Notes    |
|---------------------------------------|------------------------|--------|------|------|------|----------|
|                                       |                        | Min    | Typ. | Max  |      |          |
| Voltage of VCC                        |                        | 3      | 3.3  | 3.5  | V    |          |
| Current of VCC                        |                        | -      | 240  | 360  | mA   |          |
| Supply current of LED backlight       | Per string             |        | 75   |      | mA   |          |
| Total Supply current of LED Backlight | I <sub>LED</sub> Total |        | 225  |      | mA   | 3strings |
| Supply voltage of LED backlight       | Per string             | 22.1   | 24   | 26.7 | V    |          |
| LED Life time                         | L50                    | 30000  | -    | -    | hr   |          |

Notes :

1: Frame rate=60HZ

2: BLU LED :Backlight current = 225 mA, Number of LED dies = 24 pcs

3: The “LED Life Time” is defined as the time period when the brightness decrease to 50% of the initial value under continuous lighting at 25°C



NTC reference : NCP18XH103F0SRB

Figure 3-1 LED&NTC Diagram

## 4.0 OPTICAL SPECIFICATION

### 4.1 Overview

The test of Optical specifications shall be measured in a dark room (ambient luminance  $\leq 1$ lux and temperature =  $25\pm 2^\circ\text{C}$ ) with the equipment of Luminance meter system (Goniometer system and TOPCON BM-5) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of  $\theta$  and  $\Phi$  equal to  $0^\circ$ . The center of the measuring spot on the Display surface shall stay fixed.

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

<Table 4-1 Optical Specifications>

| Parameter                           |            | Symbol        | Condition  | Min.       | Typ.       | Ma<br>x. | Unit | Remark  |        |    |                  |    |        |  |  |   |   |
|-------------------------------------|------------|---------------|--|------------|------------|----------|------|---------|--------|----|------------------|----|--------|--|--|---|---|
| Viewing Angle<br>range              | Horizontal | $\Theta_3$    | CR > 10  | 75         | 85         | -        | Deg. | Note 1  |        |    |                  |    |        |  |  |   |   |
|                                     |            | $\Theta_9$    |  | 75         | 85         | -        | Deg. |         |        |    |                  |    |        |  |  |   |   |
|                                     | Vertical   | $\Theta_{12}$ |  | 75         | 85         | -        | Deg. |         |        |    |                  |    |        |  |  |   |   |
|                                     |            | $\Theta_6$    |  | 75         | 85         | -        | Deg. |         |        |    |                  |    |        |  |  |   |   |
| Luminance Contrast ratio            |            | CR            | $\Theta = 0^\circ$<br>(Center)<br>Normal<br>Viewing<br>Angle | 600        | 900        | -        | -    | Note 2- |        |    |                  |    |        |  |  |   |   |
| Luminance                           |            | nit           |  | <b>600</b> | <b>800</b> |          |      |         | Note 3 |    |                  |    |        |  |  |   |   |
| White luminance uniformity          |            | $\Delta Y$    |  | <b>75</b>  | <b>80</b>  | -        | %    |         | Note 4 |    |                  |    |        |  |  |   |   |
| NTSC                                |            | %             |  | 70%        | -          | -        |      |         |        |    |                  |    |        |  |  |   |   |
| White Chromaticity                  |            | $x_w$         |  | Typ-0.03   |            | Typ+0.03 |      | -       | Note 5 |    |                  |    |        |  |  |   |   |
|                                     |            | $y_w$         |  |            |            |          |      | -       |        |    |                  |    |        |  |  |   |   |
| Reproduction<br>of color            | Red        | $x_R$         |  |            |            |          |      |         |        |    |                  |    | -      |  |  |   |   |
|                                     |            | $y_R$         |  |            |            |          |      |         |        |    |                  |    | -      |  |  |   |   |
|                                     | Green      | $x_G$         |  |            |            |          |      |         |        |    |                  |    |        |  |  |   | - |
|                                     |            | $y_G$         |  |            |            |          |      |         |        |    |                  |    |        |  |  |   | - |
|                                     | Blue       | $x_B$         |  |            |            |          |      |         |        |    |                  |    |        |  |  | - |   |
|                                     |            | $y_B$         |  |            |            |          |      |         |        |    |                  |    |        |  |  | - |   |
| Response Time<br>(Rising / Falling) |            | $T_{RT}$      | 25°C<br>-20°C<br>-30°C                                       |            |            |          |      | -       |        | 25 | 35<br>250<br>500 | ms | Note 6 |  |  |   |   |



| Parameter | Condition | Min. | Typ | Max. | Remark   |
|-----------|-----------|------|-----|------|--|
| Flicker   | 25°C      | -    | -   | 15%  | Interval Gray Pattern between L0 and L127, after 30s light up stably, tested at panel center |

|           |      |     |     |     |  |
|-----------|------|-----|-----|-----|--|
| Gamma     | 25°C | 1.9 | 2.2 | 2.5 |  |
| Crosstalk | 25°C |     |     | 2%  |  |

**Note :**

- Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing are determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface.
- Contrast measurements shall be made at viewing angle of  $\theta = 0^\circ$  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. (See FIGURE 1 shown in Appendix) Luminance Contrast Ratio (CR) is defined mathematically.

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

- Center trans of white is defined as the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 4 for a total of the measurements per display.
- The White luminance uniformity on LCD surface is then expressed as :  
 $\Delta Y = ( \text{Minimum Luminance of 9points} / \text{Maximum Luminance of 9points} ) * 100$
- The color chromaticity coordinates specified in Table 4. shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurement condition is C - light source.
- The electro-optical response time measurements shall be made as FIGURE 5 shown in Appendix by switching the "data" input signal ON and OFF. The times needed for the transmittance to change from 10% to 90% is Tr, and 90% to 10% is Tf.

## 5.0 OPTICAL TEST APPENDIX

Figure 5-1 The Definition of  $V_{th}$  &  $V_{sat}$

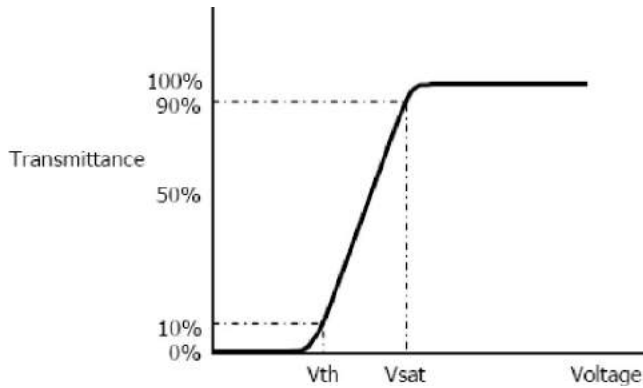


Figure 5-2 Measurement Set Up

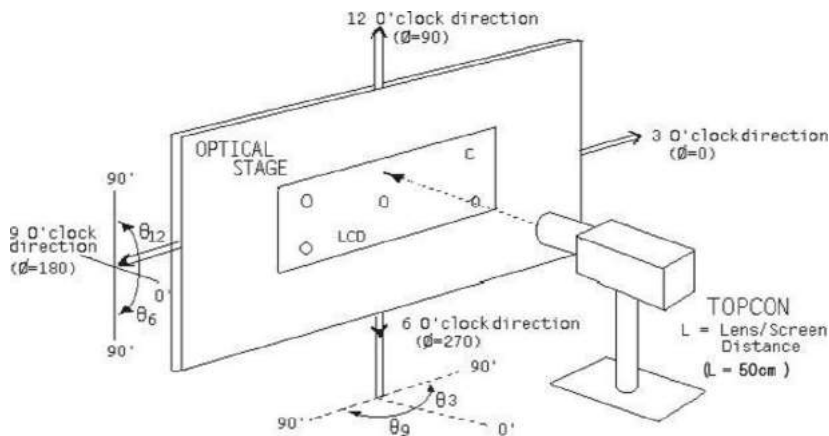


Figure 5-3 Response Time Testing

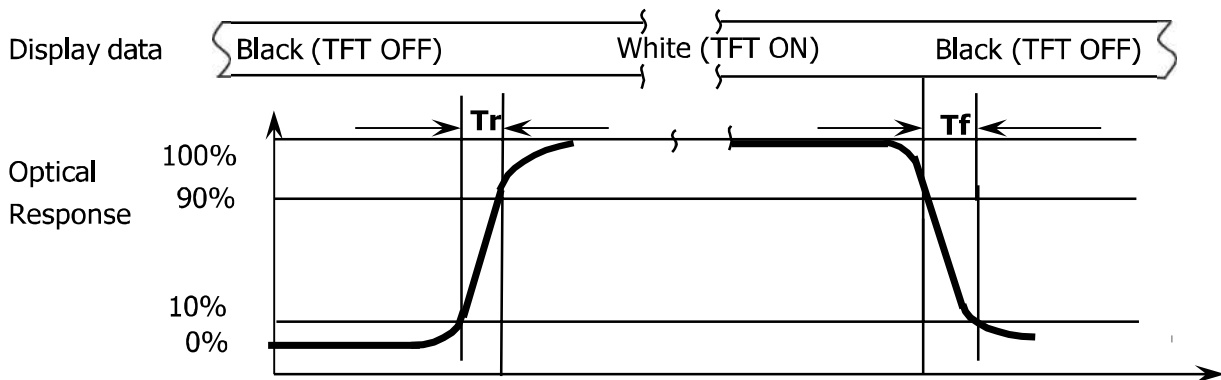
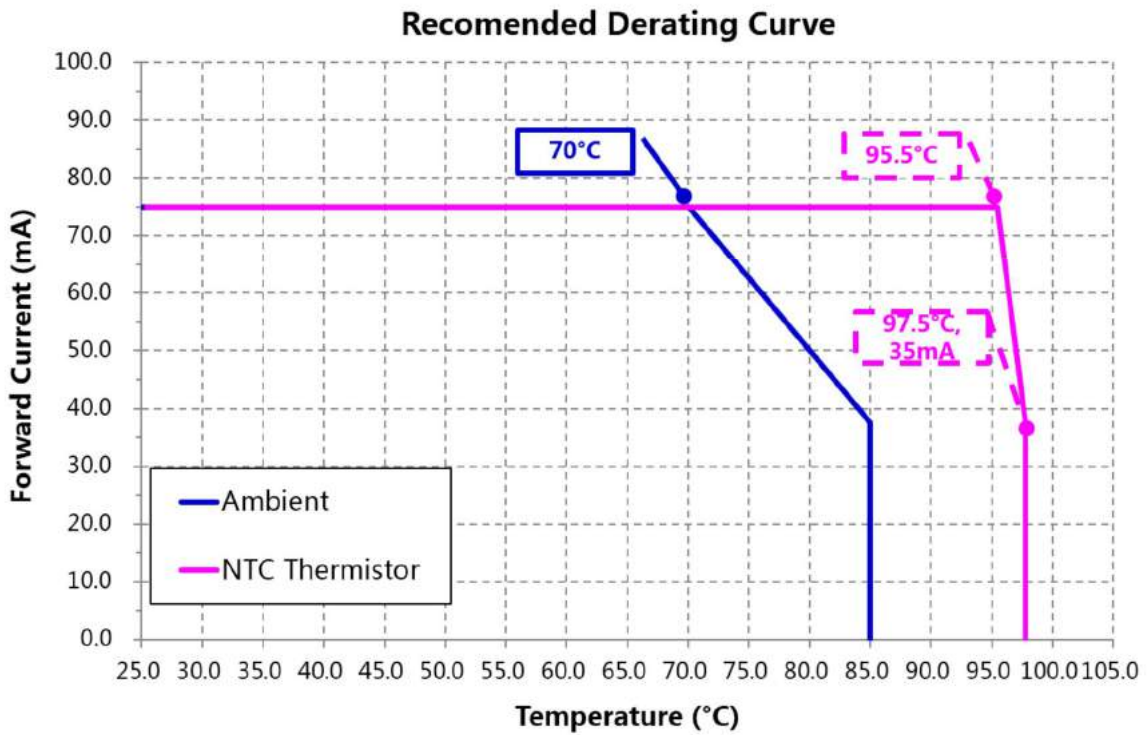


Figure 5-4 Derating.



## 6.0 MECHANICAL CHARACTERISTICS

### 6.1 Dimensional Requirements

Figure in next page shows mechanical outlines for the panel

<Table 6-1 Dimensional Parameters>

| Parameter                 | Specification             | Unit   |
|---------------------------|---------------------------|--------|
| Active Area               | 176.64 (H) × 99.36 (V)    | mm     |
| Number of pixels          | 1280(H) × 720(V)          | Pixels |
| Pixel pitch               | 0.138(H) × RGB × 0.138(V) | mm     |
| Pixel arrangement         | RGB Vertical stripe       |        |
| Display colors            | 16.7M                     | colors |
| Display mode              | Normally black            |        |
| Module thickness          | 6.4 (body)                | mm     |
| Module outline            | 192.8x116.9               | mm     |
| AA-MDL outline<br>L/R/U/D | 6.55/9.61/6.84/10.7       | mm     |



## 8.0 RELIABILITY TEST

<Table 8-1 Reliability test>

| No | Test Items                                      | Conditions  | Remark |
|----|---|---|--------|
| 1  | High temperature storage test                   | Ta = 90 °C, 504 hrs   | Note1  |
| 2  | Low temperature storage test                    | Ta = -40 °C, 504 hrs  |        |
| 3  | High temperature operation test                 | Ta = 85°C, 504 hrs  |        |
| 4  | Low temperature operation test                  | Ta = -40 °C, 504 hrs  |        |
| 5  | High temperature & high humidity operation test | Ta = 60 °C, 90%RH, 504 hrs  |        |
| 6  | Thermal shock                                   | -40°C ~ +85°C,<br>30min/5min/30min,300cycles<br>Non-operation                     |        |
| 7  | Image Sticking                                  | 5*5 Pattern, 1hrs 60°C<br>check pattern Gray 127,Spec:≤L2                         |        |
| 8  | ESD test  | Air Voltage:±15KV<br>Contact Voltage:±8KV<br>R: 330Ω C: 150pF 5 time              | Note2  |
| 9  | Vibration Test                                  | 加速度有效值: 27.4m/s <sup>2</sup> ; 频率从<br>10Hz~1000Hz, X, Y, Z 每面各8h<br>Non-operation |        |
| 10 | Mechanical Shock                                | 50G,6ms, half sin wave,<br>±XYZ*3 times   |        |
| 11 | UV exposure resistance                          | 765 W/m <sup>2</sup> , 168h   | Note3  |

**Note1:** The test result shall be evaluated after the sample has been left at room temperature and humidity for 2 hours.; -40°C~ -30°C之间，仅保证功能OK，不保证画面品质；

**Note2:** Class B，有异常而可恢复，比如闪屏

因为整机ESD水平不仅与模组相关，也与系统相关。此处承诺配合客户整机，与屏相关的ESD问题, TSD可配合改善。

**Note3:** 客户提供装机测试角度

## 9.0 INTERFACE CONNECTION

### 9.1 The LCD Module Electrical Interface Connection

The Recommended connector is Hirose FH28-30S-0.5SH(0.5)

The connector interface pin assignments are listed in Table 9-1

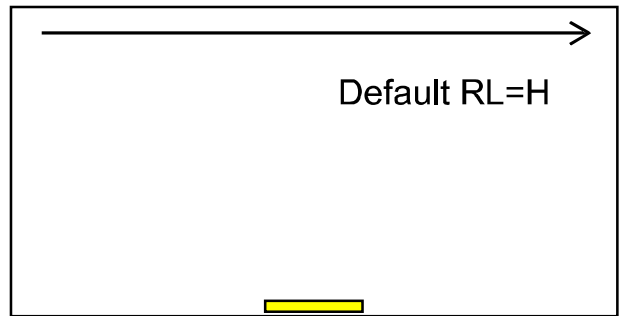
Table 9-1 Pin Assignments for the LCD Connector

| PIN | SYMBOL | Description                          | Remark    |
|-----|--------|--------------------------------------|-----------|
| 1   | NC     | No connect                           |           |
| 2   | VDD    | Power pin                            | 3.3V typ. |
| 3   | VDD    | Power pin                            | 3.3V typ. |
| 4   | GND    | Ground                               |           |
| 5   | RESET  | Reset Pin                            |           |
| 6   | STBYB  | Standby Pin                          |           |
| 7   | GND    | Power pin                            |           |
| 8   | SDA    | SPI Data pin                         |           |
| 9   | SCL    | SPI Clock pin                        |           |
| 10  | CSB    | SPI chip select pin                  |           |
| 11  | GND    | Ground                               |           |
| 12  | TB     | Vertical shift direction selection   | Note1     |
| 13  | RL     | Horizontal shift direction selection |           |
| 14  | GND    | Ground                               |           |
| 15  | LV0N   | LVDS Data channel 0 -                |           |
| 16  | LV0P   | LVDS Data channel 0 +                |           |
| 17  | GND    | Ground                               |           |
| 18  | LV1N   | LVDS Data channel 1 -                |           |
| 19  | LV1P   | LVDS Data channel 1 +                |           |
| 20  | GND    | Ground                               |           |
| 21  | LV2N   | LVDS Data channel 2 -                |           |
| 22  | LV2P   | LVDS Data channel 2 +                |           |
| 23  | GND    | Ground                               |           |
| 24  | CLKN   | LVDS CLOCK -                         |           |
| 25  | CLKP   | LVDS CLOCK +                         |           |



| PIN | SYMBOL | Description                     | Remark    |
|-----|--------|---------------------------------|-----------|
| 26  | GND    | Ground                          |           |
| 27  | LV3N   | LVDS Data channel 3 -           |           |
| 28  | LV3P   | LVDS Data channel 3 +           |           |
| 29  | GND    | Ground                          |           |
| 30  | VDDOTP | Power input for OTP programming | Please NC |

Note 1:



### 9.2 LED Backlight Driving

The Recommended connector is Hirose FH28-10S-0.5SH(0.5)  
 The connector interface pin assignments are listed in Table 9-2

Table 9-2 Pin Assignment for Backlight FPC

| PIN | SYMBOL | Description               | Remark |
|-----|--------|---------------------------|--------|
| 1   | A1     | LED string 1 Anode        |        |
| 2   | A2     | LED string 2 Anode        |        |
| 3   | A3     | LED string 3 Anode        |        |
| 4   | NC     | No connect                |        |
| 5   | NTC+   | NTC thermistor terminal 1 |        |
| 6   | NTC-   | NTC thermistor terminal 2 |        |
| 7   | NC     | No connect                |        |
| 8   | C3     | LED string 3 Cathode      |        |
| 9   | C2     | LED string 2 Cathode      |        |
| 10  | C1     | LED string 1 Cathode      |        |

## 10.0 SIGNAL SPECIFICATION

### 10.1 LVDS Signal Timing

Table 10-1 LVDS Signal Timing(DE mode)

| Parameter               | Symbol              | Min.  | Typ. | Max.  | Unit | Condition |
|-------------------------|---------------------|-------|------|-------|------|-----------|
| Clock frequency         | RxFCLK              | 57.1  | 58.1 | 85    | MHz  |           |
| Horizontal Display Area | thd                 | 1280  |      |       | DCLK |           |
| HS Period               | th                  | 1309  | 1322 | 1664  | DCLK |           |
| HS Blanking             | Thb+thfp            |       | 42   |       | DCLK |           |
| Vertical Display Area   | tvd                 | 720   |      |       | TH   |           |
| VS Period               | tv                  | 727   | 733  | 936   | TH   |           |
| VS Blanking             | Tvbp+tvfp           |       | 13   |       | TH   |           |
| Clock period            | TLVCYC              | 11.76 |      | 17.51 | ns   |           |
| Clock high time         | TLVCH               | 2.8   | 4    | 4.2   | UI   |           |
| Clock low time          | TLVCL               | 2.8   | 3    | 4.2   | UI   |           |
| LVDS wake-up time       | T <sub>ENLVDS</sub> |       |      | 150   | us   |           |

### 10.2 Signal Format

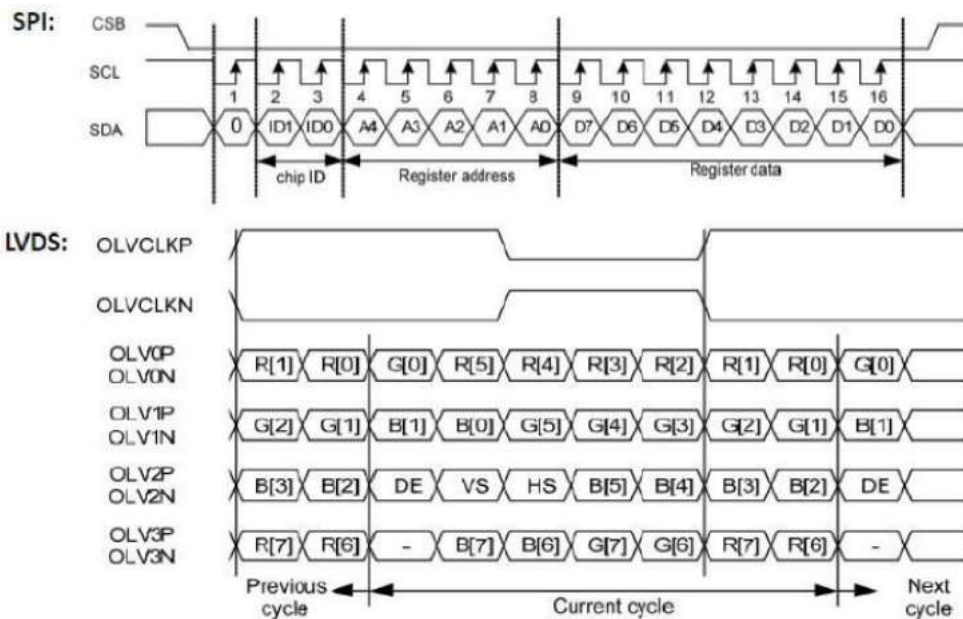
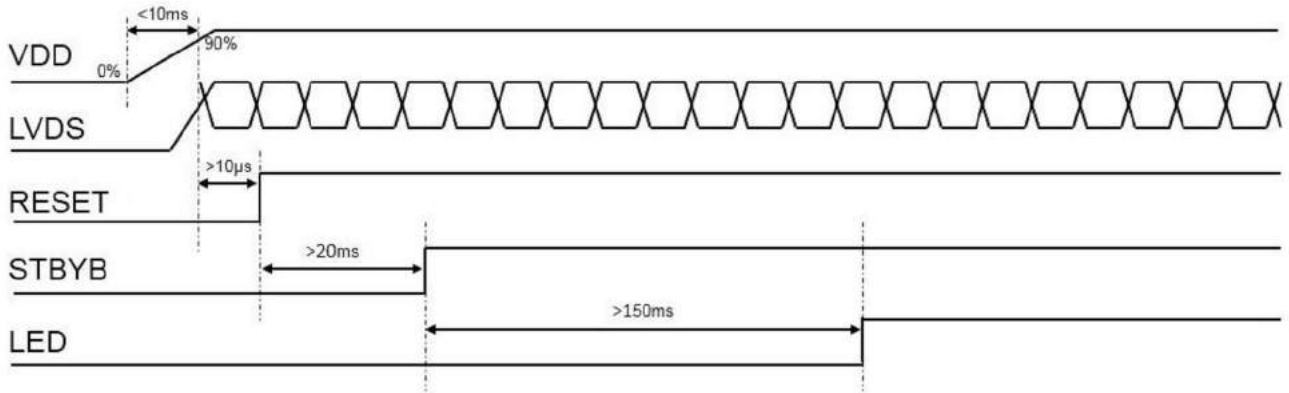


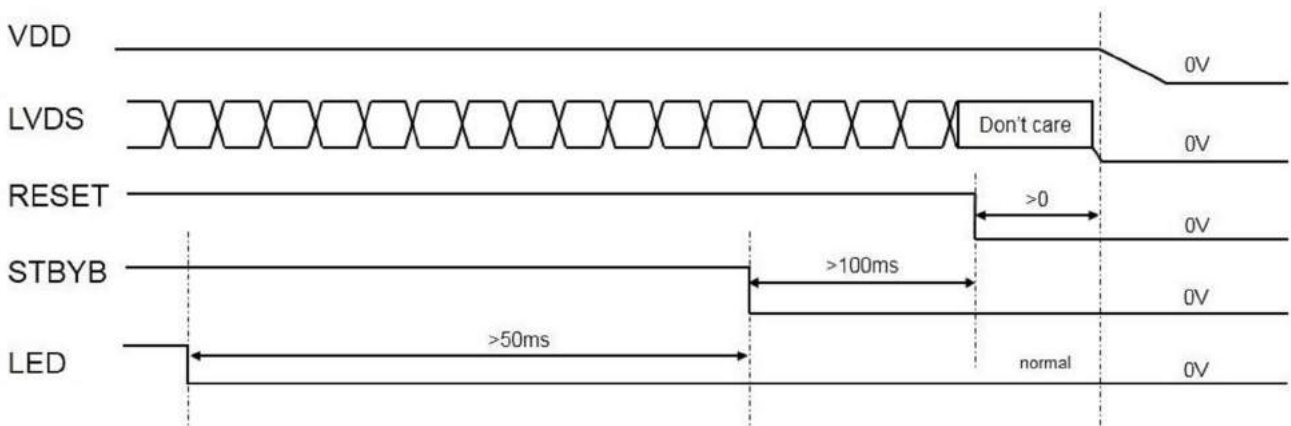
Table 10-2 Signal Format, VESA format

## 11.0 POWER ON/OFF SEQUENCE

### 11.1 POWER ON SEQUENCE



### 11.2 POWER OFF SEQUENCE



Remark: power off sequence, standby 拉Low后, >100ms, then LVDS off

## 12.0 PACKING

TBD.