# TFT DISPLAY SPECIFICATION




WINSTAR Display Co.,Ltd.

華凌光電股份有限公司

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# SPECIFICATION

**CUSTOMER :** _____

**MODULE NO.: WF18GTLAADNF0#**

| | |
|---|---|
| **APPROVED BY:**<br>**( FOR CUSTOMER USE ONLY )** | **PCB VERSION:** **DATA:** |

| SALES BY | APPROVED BY | CHECKED BY | PREPARED BY |
|---|---|---|---|
| | | | 周园园 |
| **ISSUED DATE: 2025/01/03** | | | |

TFT Display Inspection Specification: https://www.winstar.com.tw/technology/download.html
Precaution in use of TFT module: https://www.winstar.com.tw/technology/download/declaration.html

| MODLE NO： |
|---|

| **RECORDS OF REVISION** | **DOC. FIRST ISSUE** |
|---|---|

| VERSION | DATE | REVISED PAGE NO. | **SUMMARY** |
|---|---|---|---|
| 0 | 2022/06/23 | | First issue |
| A | 2025/01/03 | | Modify LED Life Time & Reliability |

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11.Contour Drawing

12.Other

# 1.Module Classification Information

| W | F | 18 | G | T | L | A | A | D | N | F | 0 | # |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ | ⑧ | ⑨ | ⑩ | ⑪ | ⑫ | ⑬ |

| | | | |
|---|---|---|---|
| ① | Brand：WINSTAR DISPLAY CORPORATION | | |
| ② | Display Type：F→TFT Type, J→Custom TFT | | |
| ③ | Display Size：1.8” TFT | | |
| ④ | Model serials no. | | |
| ⑤ | Backlight Type： | F→CCFL, White<br>S→LED, High Light White | T→LED, White<br>Z→Nichia LED, White |
| ⑥ | LCD Polarize Type/ Temperature range/ Gray Scale Inversion Direction | A→Transmissive, N.T, IPS TFT<br>C→Transmissive, N. T, 6:00 ;<br>F→Transmissive, N.T,12:00 ;<br>I→Transmissive, W. T, 6:00<br>K→Transflective, W.T,12:00<br>L→Transmissive, W.T,12:00<br>N→Transmissive, Super W.T, 6:00 | Q→Transmissive, Super W.T, 12:00<br>R→Transmissive, Super W.T, O-TFT<br>V→Transmissive, Super W.T, VA TFT<br>W→Transmissive, Super W.T, IPS TFT<br>X→Transmissive, W.T, VA TFT<br>Y→Transmissive, W.T, IPS TFT<br>Z→Transmissive, W.T, O-TFT |
| ⑦ | A：TFT LCD<br>B：TFT+SCREW HOLES+CONTROL BOARD<br>C：TFT+ SCREW HOLES +A/D BOARD<br>D：TFT+ SCREW HOLES +A/D BOARD+CONTROL BOARD<br>E：TFT+ SCREW HOLES +POWER BOARD | | F：TFT+CONTROL BOARD<br>G：TFT+ SCREW HOLES<br>H：TFT+D/V BOARD<br>I：TFT+ SCREW HOLES +D/V BOARD<br>J：TFT+POWER BD |
| ⑧ | Resolution: | | |
| ⑨ | D: Digital L：LVDS M:MIPI | | |
| ⑩ | Interface: | | |
| ⑪ | TS: | | |
| ⑫ | Version: X:Raspberry pi | | |
| ⑬ | Special Code | #:Fit in with ROHS directive regulations | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | 128160 | B | 320234 | C | 320240 | D | 480234 | E | 480272 | F | 640480 |
| G | 800480 | H | 1024600 | I | 320480 | J | 240320 | K | 800600 | L | 240400 |
| M | 1024768 | N | 128128 | P | 1280800 | Q | 480800 | R | 640320 | S | 480128 |
| T | 800320 | U | 8001280 | **V** | 176220 | W | 1280398 | X | 1024250 | Y | 1920720 |
| Z | 800200 | 2 | 1024324 | 3 | 7201280 | 4 | 19201200 | 5 | 1366768 | 6 | 1280320 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| N | Without control board | A | 8Bit | B | 16Bit | H | HDMI |
| I | I2C Interface | R | RS232 | S | SPI Interface | U | USB |

| | | | | | |
|---|---|---|---|---|---|
| N | Without TS | T | Resistive touch panel | C | Capacitive touch panel (G-F-F) |
| G | Capacitive touch panel (G-G) | F | Capacitive touch panel (G-F) | | |
| C2 | Capacitive touch panel (G-F-F)+OCR | G1 | Capacitive touch panel (G-G)+OCA | | |
| G2 | Capacitive touch panel (G-G)+OCR | B | CTP+GG+USB | | |

# 2.Summary

WF18G is a color active matrix thin film transistor (TFT) liquid crystal display with polarizer. This model is composed of amorphous silicon TFT as a switching device. It is a transmissive type display operating in the normally white mode.

This TFT LCD has a 1.77-inch diagonally measured active display area with 384 x 160 dot (128 vertical by 160 horizontal pixel) resolution. Each pixel is divided into Red, Green, Blue dots which are arranged in vertical stripes.

# 3.General Specifications

| Item | Dimension | Unit |
|---|---|---|
| Size | 1.77 | inch |
| Dot Matrix | 128 x RGB x 160(TFT) | dots |
| Module dimension | 36.5(W) x 47.0(H) x 4.27(D) | mm |
| Active area | 28.03 x 35.04 | mm |
| Dot pitch | 0.073 x 0.219 | mm |
| LCD type | TFT, Normally White, Transmissive | |
| View Direction | 6 o'clock | |
| Gray Scale Inversion Direction | 12 o'clock | |
| Aspect Ratio | Portrait | |
| IC | ST7735S or Equivalent | |
| Interface | SPI | |
| CTP IC | FT6336U or equivalent | |
| CTP FW Version | 0x02 | |
| CTP Resolution | 128*160 | |
| Backlight Type | LED,Normally White | |
| With /Without TP | With CTP | |
| Surface | Glare | |

*Color tone slight changed by temperature and driving voltage.

# 4.Absolute Maximum Ratings

| Item | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Operating Temperature | TOP | -20 | — | +70 | ℃ |
| Storage Temperature | TST | -30 | — | +80 | ℃ |

Note: Device is subject to be damaged permanently if stresses beyond those absolute maximum ratings listed above

1. Temp. ≦ 60℃, 90% RH MAX. Temp.＞60℃, Absolute humidity shall be less than 90% RH at 60℃

# 5.Electrical Characteristics

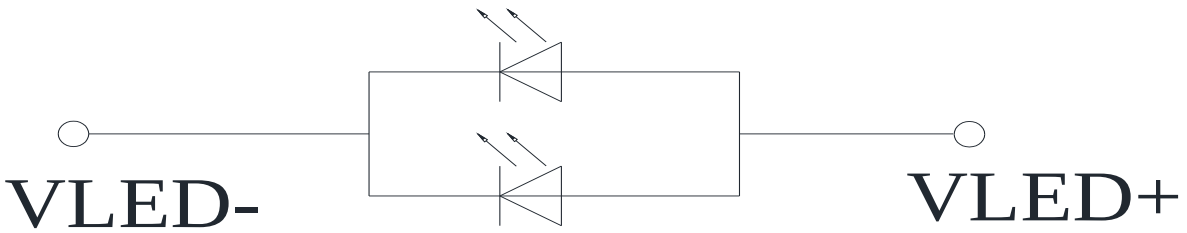
5.1. Operating conditions:

| Item | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Supply Voltage For Analog | VCC | — | 2.5 | 2.75 | 3.7 | V |
| Supply LCM current | ICC | — | - | 0.9 | 2 | mA |
| Supply Voltage For Touch | VDDT | — | 2.8 | — | 3.3 | V |

5.2. LED driving conditions

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Remark |
|---|---|---|---|---|---|---|
| LED current | | - | 40 | - | mA | |
| Power Consumption | | | 128 | - | mW | |
| LED voltage | VBL+ | 2.9 | 3.1 | 3.4 | V | Note 1 |
| LED Life Time | | 50,000 | - | - | Hr | Note 2,3,4 |

Note 1 : There are 1 Groups LED



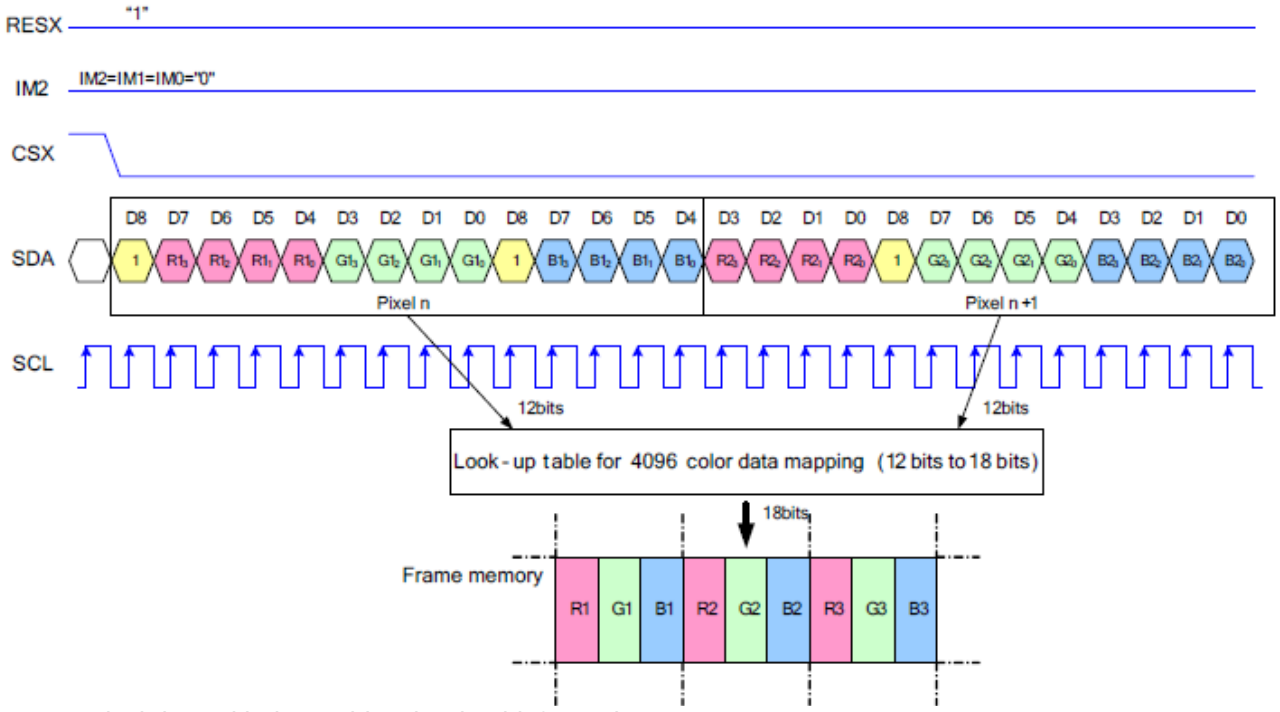

Note 2 : Ta = 25 ℃
Note 3 : Brightness to be decreased to 50% of the initial value
Note 4 : The single LED lamp case

# 6.Data Color Coding

### 6.1. 3-line Serial Interface

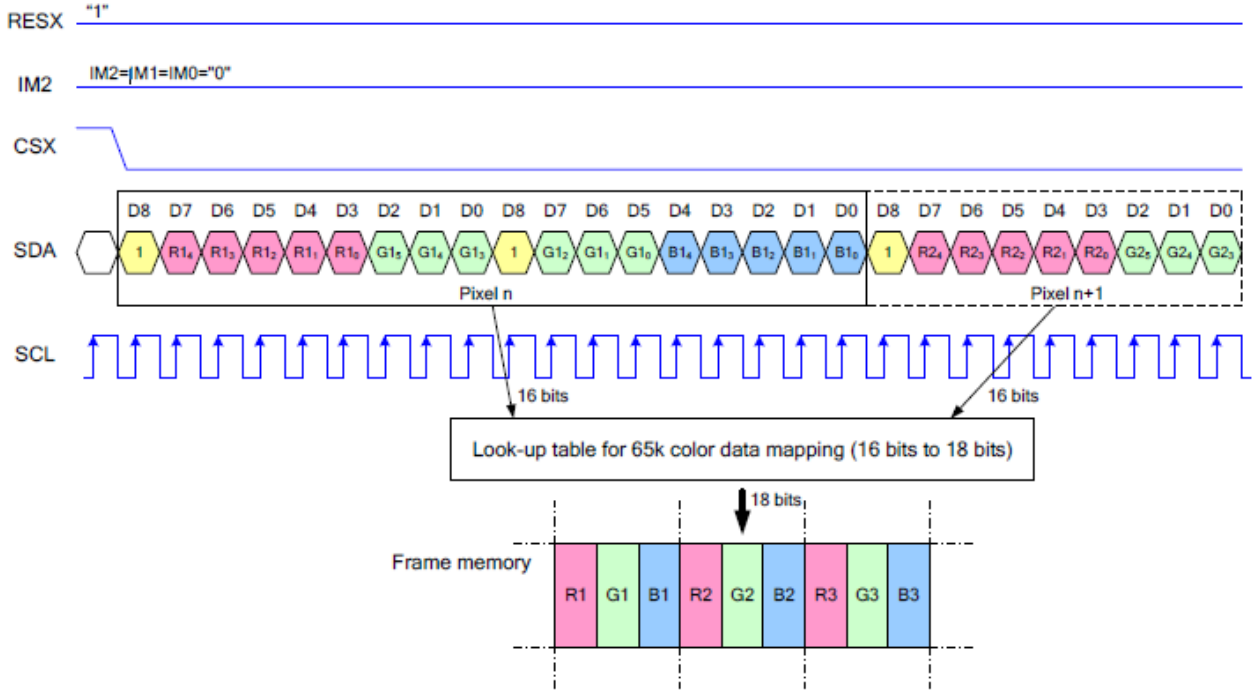
Different display data formats are available for three colors depth supported by the LCM listed below.
4k Colors, RGB 4-4-4-bit Input
65k Colors, RGB 5-6-5-bit Input
262k Colors, RGB 6-6-6-bit Input

**Write Data for 12-bit/Pixel (RGB 4-4-4-bit Input), 4K-Colors, 3AH="03h"**



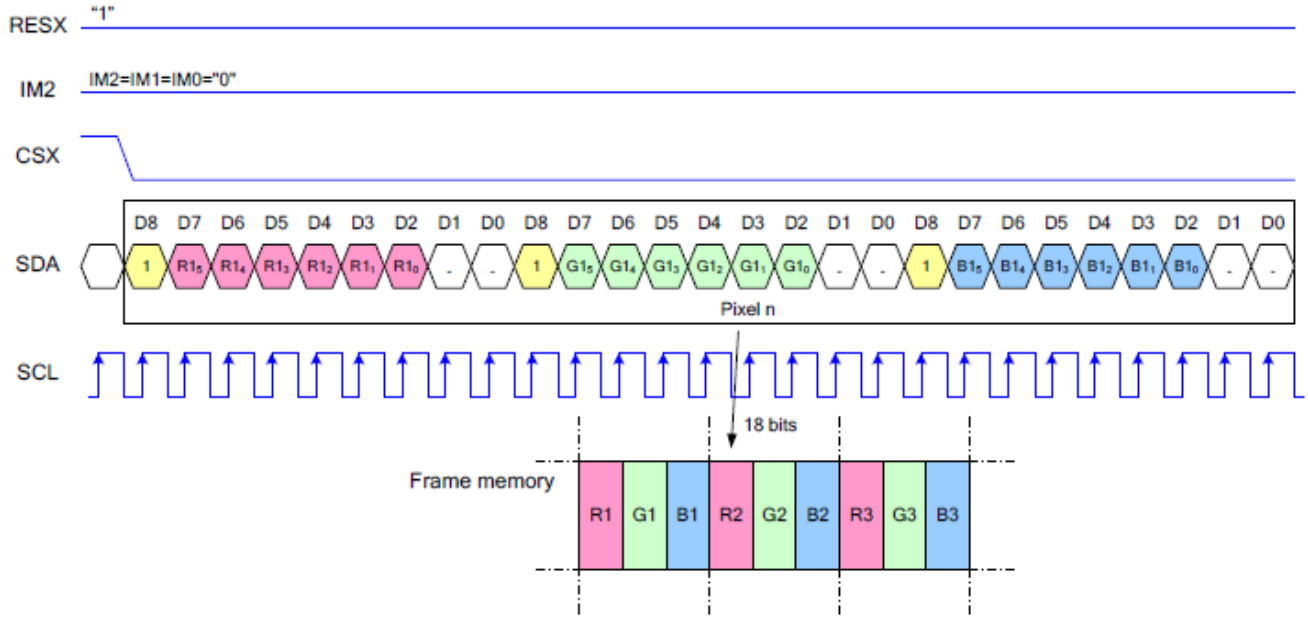

*Note 1: Pixel data with the 12-bit color depthinformation*
*Note 2:The most significant bits are: Rx3, Gx3 and Bx3*
*Note 3:The least significant bits are: Rx0, Gx0 and Bx0*

## Write Data for 16-bit/Pixel (RGB 5-6-5-bit Input), 65K-Colors, 3AH="05h"




*Note 1: Pixel datawith the 16-bit color depth information*
*Note 2:The most significant bits are: Rx4, Gx5 and Bx4*
*Note 3:The least significant bits are: Rx0, Gx0 and Bx0*

## Write Data for 18-bit/Pixel (RGB 6-6-6-bit Input), 262K-Colors, 3AH="06h"



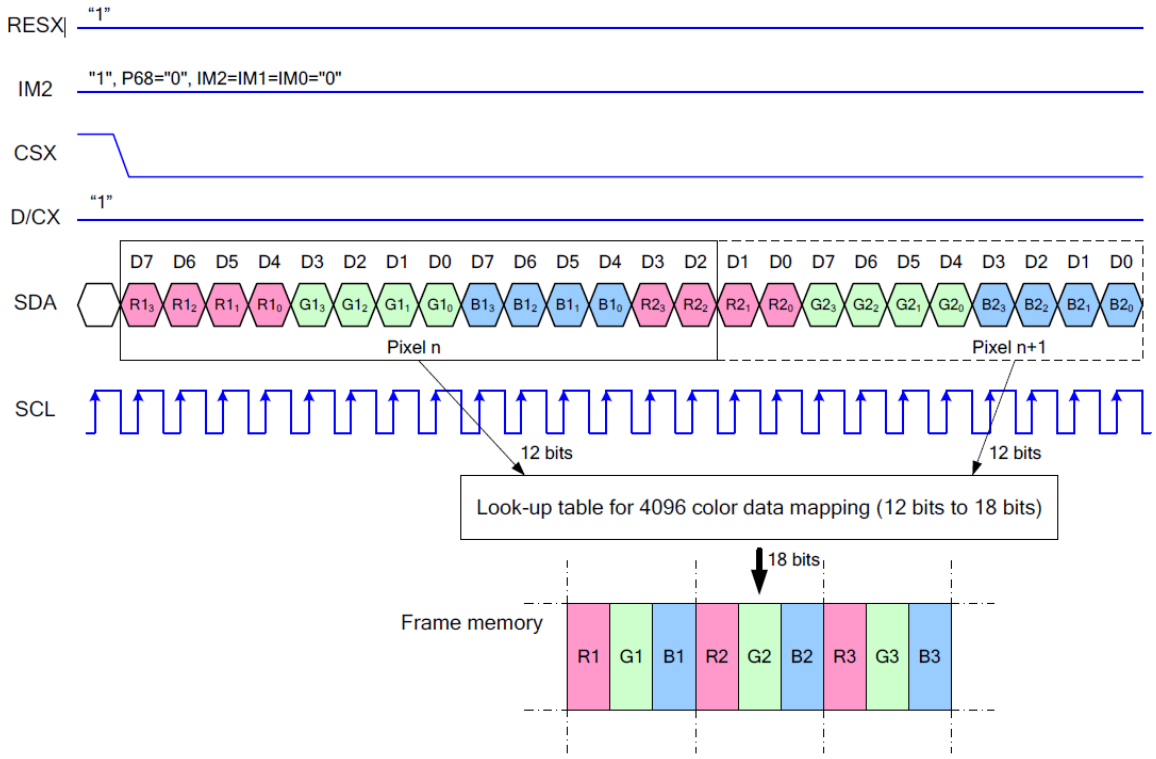

*Note 1: Pixel data with the 18-bit color depth information*
*Note 2:The most significant bits are: Rx5, Gx5 and Bx5*
*Note 3:The least significant bits are: Rx0, Gx0 and Bx0*

### 6.2. 4-line Serial Interface

Different display data formats are available for three colors depth supported by the LCM listed below.

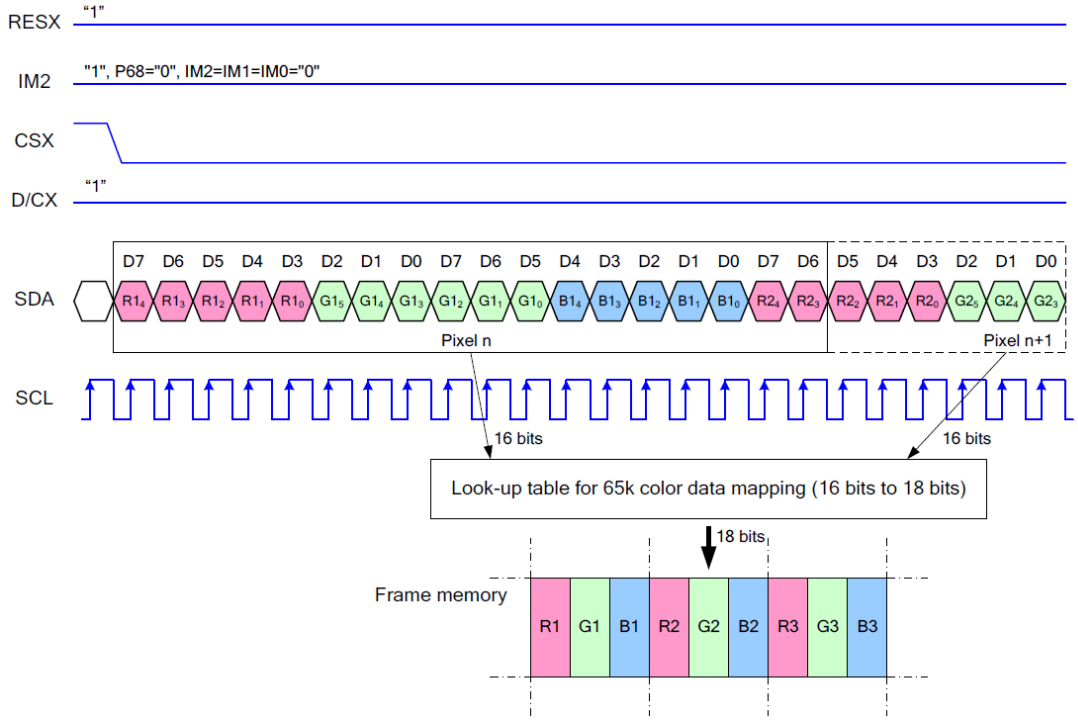
4k Colors, RGB 4-4-4-bit Input
65k Colors, RGB 5-6-5-bit Input
262k Colors, RGB 6-6-6-bit Input

**Write Data for 12-bit/Pixel (RGB 4-4-4-bit Input), 4K-Colors, 3AH="03h"**



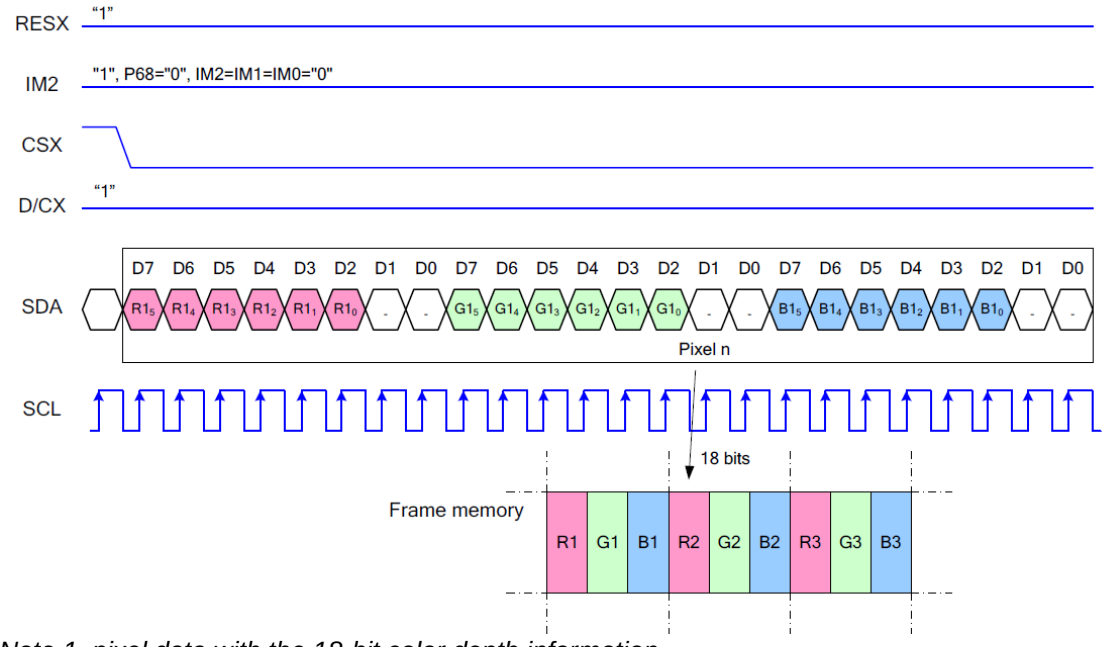

*Note 1. pixel data with the 12-bit color depth information*
*Note 2. The most significant bits are: Rx3, Gx3 and Bx3*
*Note 3. The least significant bits are: Rx0, Gx0 and Bx0*

## Write Data for 16-bit/Pixel (RGB 5-6-5-bit Input), 65K-Colors, 3AH="05h"




*Note 1. pixel data with the 16-bit color depth information*
*Note 2. The most significant bits are: Rx4, Gx5 and Bx4*
*Note 3. The least significant bits are: Rx0, Gx0 and Bx0*

## Write Data for 18-bit/Pixel (RGB 6-6-6-bit Input), 262K-Colors, 3AH="06h"




*Note 1. pixel data with the 18-bit color depth information*
*Note 2. The most significant bits are: Rx5, Gx5 and Bx5*
*Note 3. The least significant bits are: Rx0, Gx0 and Bx0*

# 7.Optical Characteristics

| Item | | Symbol | Condition. | Min | Typ. | Max. | Unit | Remark |
|---|---|---|---|---|---|---|---|---|
| Response time | | Tr | θ=0°、Φ=0° | - | 2 | 4 | .ms | Note 3,5 |
| | | Tf | | | 6 | 12 | .ms | |
| Contrast ratio | | CR | At optimized viewing angle | 400 | 500 | - | - | Note 4,5 |
| Color Chromaticity | White | Wx | θ=0°、Φ=0 | 0.26 | 0.31 | 0.36 | | Note 2,6,7 |
| | | Wy | | 0.28 | 0.33 | 0.38 | | |
| Viewing angle (Gray Scale Inversion Direction) | Hor. | ΘR | CR≧10 | 35 | 45 | | Deg. | Note 1 |
| | | ΘL | | 35 | 45 | | | |
| | Ver. | ΦT | | 35 | 45 | | | |
| | | ΦB | | 10 | 20 | | | |
| Brightness | | - | - | 350 | 400 | - | $Cd/m^2$ | Center of display |
| Uniformity | | (U) | - | 75 | - | - | % | Note 5 |

Ta=25±2℃

Note 1: Definition of viewing angle range

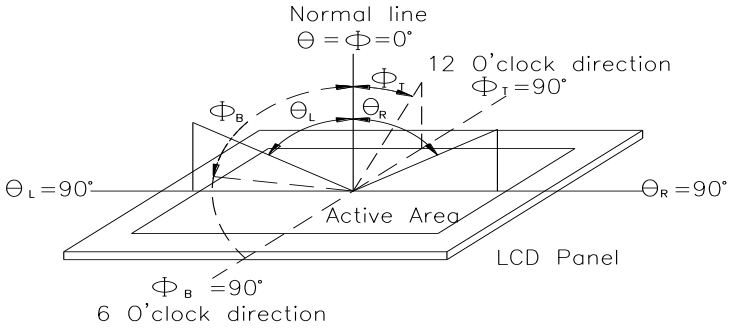



Fig.7.1. Definition of viewing angle

Note 2: Test equipment setup:

After stabilizing and leaving the panel alone at a driven temperature for 10 minutes, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical specifications are measured by Topcon BM-7orBM-5 luminance meter 1.0° field of view at a distance of 50cm and normal direction.

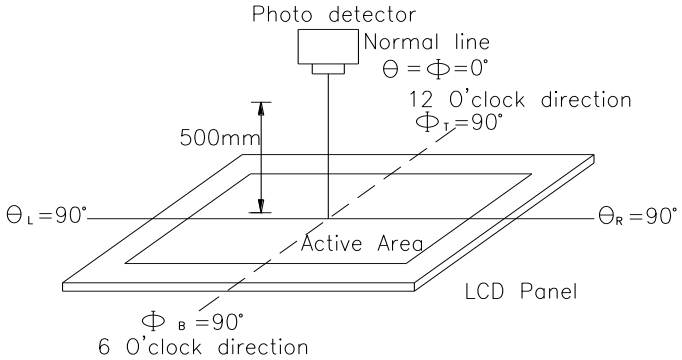
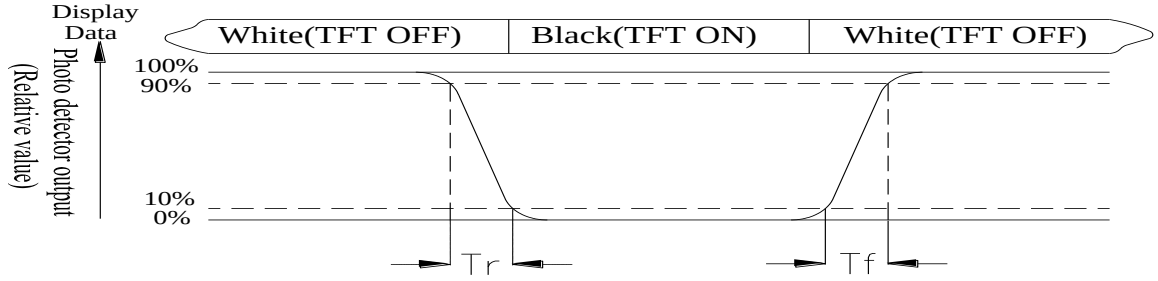



Fig. 7.2. Optical measurement system setup

Note 3: Definition of Response time:
The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time, Tr, is the time between photo detector output intensity changed from 90%to 10%. And fall time, Tf, is the time between photo detector output intensity changed from 10%to 90%




Note 4: Definition of contrast ratio:
The contrast ratio is defined as the following expression.

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

Note 5: Definition of Luminance Uniformity
Active area is divided into 9measuring areas (reference the picture in below). Every measuring point is placed at the center of each measuring area.
Luminance Uniformity (U) = Lmin/Lmax x100%
L = Active area length
W = Active area width

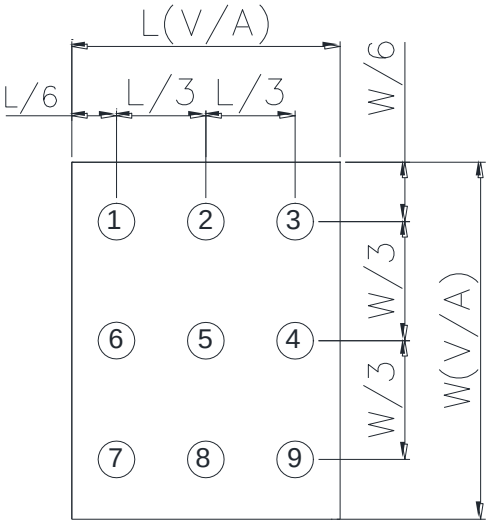



Fig7.3. Definition of uniformity

Note 6: Definition of color chromaticity (CIE 1931)
Color coordinates measured at the center point of LCD

Note 7: Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

# 8.Interface

### 8.1. LCM PIN Definition

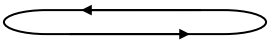
| Pin | Symbol | I/O | Function | Remark |
|---|---|---|---|---|
| 1 | LED+ | P | Back light anode | |
| 2 | LED- | P | Back light cathode | |
| 3 | SPI4W<br>(VCC=4 WIRE) | I | - SPI4W='0', 3-line SPI Enable.<br>- SPI4W='1', 4-line SPI Enable. | |
| 4 | VCC | P | Power Supply. | |
| 5 | GND | P | Ground | |
| 6 | CS | I | Chip enable (CSX) | |
| 7 | RST | I | Reset signal (RESX) | |
| 8 | SDA | I/O | Serial input/output signal in serial interface mode. | |
| 9 | SCL | I | In Serial Interface, this is used as SCL. | |
| 10 | D/C | I | Data/ command selection. (D/CX) | |

### 8.2. CTP PIN Definition

| Pin | Symbol | Function | Remark |
|---|---|---|---|
| 1 | VSS | Ground for analog circuit | |
| 2 | VDDT | Power Supply : +3.3V | |
| 3 | SCL | I2C clock inputI2C clock input | |
| 4 | SDA | I2C data input and output | |
| 5 | /RST | External reset signal, active low | |
| 6 | /INT | External interrupt to the host | |

# 9.Reliability

Content of Reliability Test (Wide temperature, -20℃~70℃)

| **Environmental Test** | | | |
|---|---|---|---|
| **Test Item** | **Content of Test** | **Test Condition** | **Note** |
| High Temperature storage | Endurance test applying the high storage temperature for a long time. | 80℃<br>200hrs | 2 |
| Low Temperature storage | Endurance test applying the low storage temperature for a long time. | -30℃<br>200hrs | 1,2 |
| High Temperature Operation | Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time. | 70℃<br>200hrs | 2 |
| Low Temperature Operation | Endurance test applying the electric stress under low temperature for a long time. | -20℃<br>200hrs | 1,2 |
| High Temperature/ Humidity Operation | The module should be allowed to stand at 60℃,90%RH max | 60℃,90%RH<br>96hrs | 1,2 |
| Thermal shock resistance | The sample should be allowed stand the following 10 cycles of operation<br>-20℃ 25℃ 70℃<br><br>30min 5min 30min<br>1 cycle | -20℃/70℃<br>10 cycles | 2 |
| Vibration test | Endurance test applying the vibration during transportation and using. | Total fixed amplitude : 1.5mm<br>Vibration Frequency :<br>10~55Hz<br>One cycle 60 seconds to 3 directions of X,Y,Z for Each 15 minutes | 3 |
| Static electricity test | Endurance test applying the electric stress to the terminal. | VS=±2KV(contact), ±2KV(air),<br>RS=330Ω<br>CS=150pF<br>10 times | 4 |

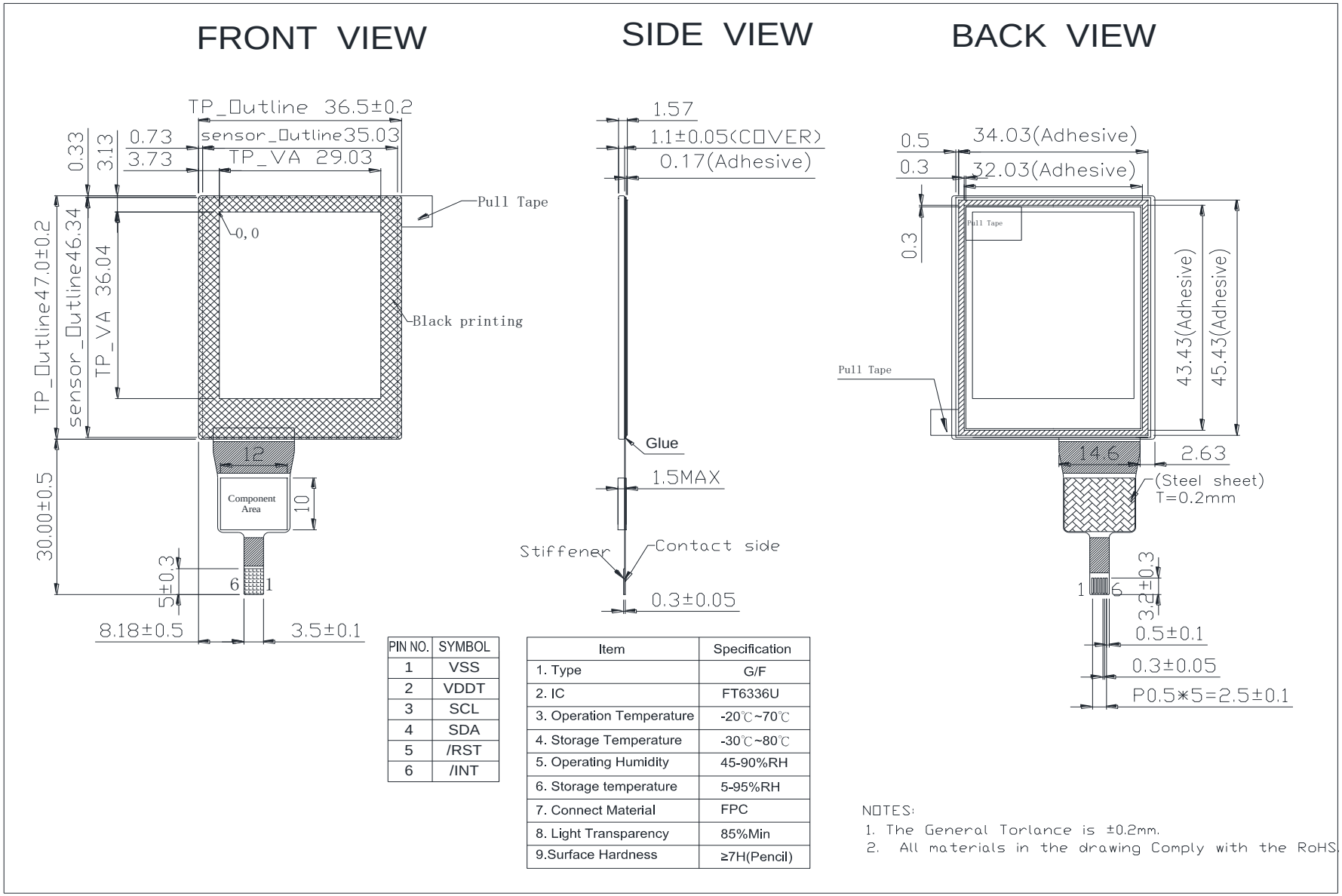
Note1: No dew condensation to be observed.

Note2: The function test shall be conducted after 4 hours storage at the normal Temperature and humidity after remove from the test chamber.

Note3: The packing have to including into the vibration testing.

Note4: Endurance test applying the electric stress to the finished product housing

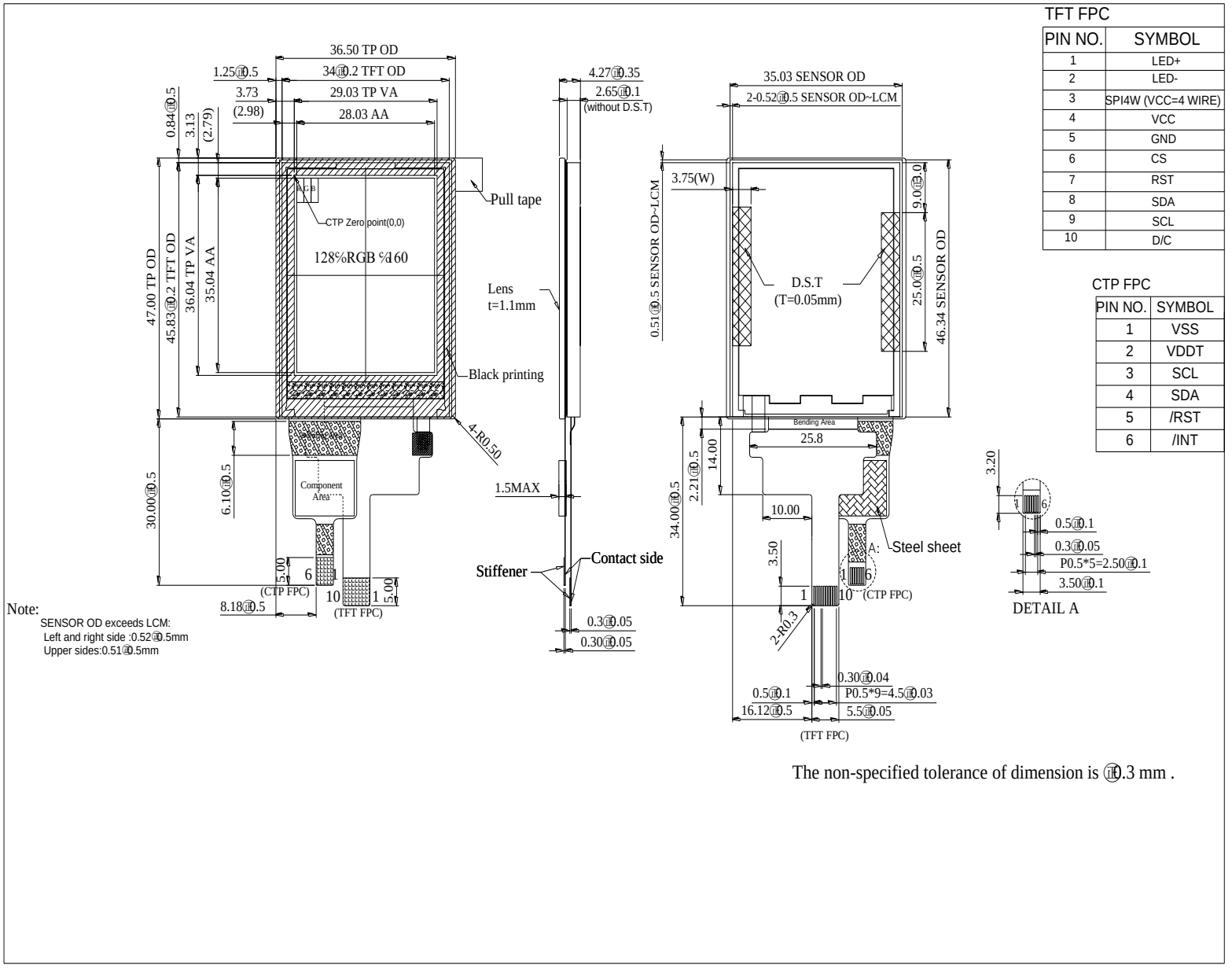
# 10.Touch Panel Information




| PIN NO. | SYMBOL |
|---|---|
| 1 | VSS |
| 2 | VDDT |
| 3 | SCL |
| 4 | SDA |
| 5 | /RST |
| 6 | /INT |

| Item | Specification |
|---|---|
| 1. Type | G/F |
| 2. IC | FT6336U |
| 3. Operation Temperature | -20℃~70℃ |
| 4. Storage Temperature | -30℃~80℃ |
| 5. Operating Humidity | 45-90%RH |
| 6. Storage temperature | 5-95%RH |
| 7. Connect Material | FPC |
| 8. Light Transparency | 85%Min |
| 9.Surface Hardness | ≥7H(Pencil) |

# 11.Contour Drawing




TFT FPC

| PIN NO. | SYMBOL |
|---|---|
| 1 | LED+ |
| 2 | LED- |
| 3 | SPI4W (VCC=4 WIRE) |
| 4 | VCC |
| 5 | GND |
| 6 | CS |
| 7 | RST |
| 8 | SDA |
| 9 | SCL |
| 10 | D/C |

CTP FPC

| PIN NO. | SYMBOL |
|---|---|
| 1 | VSS |
| 2 | VDDT |
| 3 | SCL |
| 4 | SDA |
| 5 | /RST |
| 6 | /INT |

Note:
SENSOR OD exceeds LCM:
Left and right side :0.52±0.5mm
Upper sides:0.51±0.5mm

The non-specified tolerance of dimension is ±0.3 mm .

winstar

# LCM Sample Estimate Feedback Sheet

**Module Number：** _____ **Page: 1**

## 1、Panel Specification：

| | | | |
|---|---|---|---|
| 1. | Panel Type： | □ Pass | □ NG , _____ |
| 2. | View Direction： | □ Pass | □ NG , _____ |
| 3. | Numbers of Dots： | □ Pass | □ NG , _____ |
| 4. | View Area： | □ Pass | □ NG , _____ |
| 5. | Active Area： | □ Pass | □ NG , _____ |
| 6. | Operating Temperature： | □ Pass | □ NG , _____ |
| 7. | Storage Temperature： | □ Pass | □ NG , _____ |
| 8. | Others： _____ | | |

## 2、Mechanical

| | | | |
|---|---|---|---|
| 1. | PCB Size： | □ Pass | □ NG , _____ |
| 2. | Frame Size： | □ Pass | □ NG , _____ |
| 3. | Material of Frame： | □ Pass | □ NG , _____ |
| 4. | Connector Position： | □ Pass | □ NG , _____ |
| 5. | Fix Hole Position： | □ Pass | □ NG , _____ |
| 6. | Backlight Position： | □ Pass | □ NG , _____ |
| 7. | Thickness of PCB： | □ Pass | □ NG , _____ |
| 8. | Height of Frame to PCB： | □ Pass | □ NG , _____ |
| 9. | Height of Module： | □ Pass | □ NG , _____ |
| 10. | Others： | □ Pass | □ NG , _____ |

## 3、Relative Hole Size：

| | | | |
|---|---|---|---|
| 1. | Pitch of Connector： | □ Pass | □ NG , _____ |
| 2. | Hole size of Connector： | □ Pass | □ NG , _____ |
| 3. | Mounting Hole size： | □ Pass | □ NG , _____ |
| 4. | Mounting Hole Type： | □ Pass | □ NG , _____ |
| 5. | Others： | □ Pass | □ NG , _____ |

## 4、Backlight Specification：

| | | | |
|---|---|---|---|
| 1. | B/L Type： | □ Pass | □ NG , _____ |
| 2. | B/L Color： | □ Pass | □ NG , _____ |
| 3. | B/L Driving Voltage (Reference for LED Type)： | □ Pass | □ NG , _____ |
| 4. | B/L Driving Current： | □ Pass | □ NG , _____ |
| 5. | Brightness of B/L： | □ Pass | □ NG , _____ |
| 6. | B/L Solder Method： | □ Pass | □ NG , _____ |
| 7. | Others： | □ Pass | □ NG , _____ |

>> **Go to page 2** <<

## 5、Electronic Characteristics of Module：

| | | | |
|---|---|---|---|
| 1. | Input Voltage： | □ Pass | □ NG ,_____ |
| 2. | Supply Current： | □ Pass | □ NG ,_____ |
| 3. | Driving Voltage for LCD： | □ Pass | □ NG ,_____ |
| 4. | Contrast for LCD： | □ Pass | □ NG ,_____ |
| 5. | B/L Driving Method： | □ Pass | □ NG ,_____ |
| 6. | Negative Voltage Output： | □ Pass | □ NG ,_____ |
| 7. | Interface Function： | □ Pass | □ NG ,_____ |
| 8. | LCD Uniformity： | □ Pass | □ NG ,_____ |
| 9. | ESD test： | □ Pass | □ NG ,_____ |
| 10. | Others： | □ Pass | □ NG ,_____ |

## 6、Summary：

**Sales signature：**_____

**Customer Signature：**_____ **Date：** / /