**Winstar Display Co., LTD**
**華凌光電股份有限公司**
WEB: http://www.winstar.com.tw E-mail: winstar@winstar.com.tw

# SPECIFICATION

**CUSTOMER :** _____

**MODULE NO.: WF70BTIFHLHTX#**

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

| SALES BY | APPROVED BY | CHECKED BY | PREPARED BY |
|---|---|---|---|
| | | | 葉虹蘭 |
| **ISSUED DATE: 2017/04/26** | | | |



TFT Display Inspection Specification: http://www.winstar.com.tw/technology/download.html

| Winstar Display Co., LTD 華凌光電股份有限公司 | MODLE NO： |
|---|---|
| **RECORDS OF REVISION** | **DOC. FIRST ISSUE** |

| VERSION | DATE | REVISED PAGE NO. | **SUMMARY** |
|---|---|---|---|
| 0 | 2017/04/07 | | First issue |
| A | 2017/04/26 | | Modify Interface. |

# Contents

# 1.Module Classification Information

| W | F | 70 | B | T | I | F | H | L | H | T | X | # |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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：7.0” TFT | | |
| ④ | Model serials no. | | |
| ⑤ | Backlight Type： | F→CCFL, White<br>S→LED, High Light White | T→LED, White |
| ⑥ | LCD Polarize Type/ Temperature range/ Gray Scale Inversion Direction | C→Transmissive, N. T, 6:00 ; I→Transmissive, W. T, 6:00<br>F→Transmissive, N.T,12:00 ; L→Transmissive, W.T,12:00<br>N→Transmissive, Super W.T, 6:00<br>Q→Transmissive, Super W.T, 12:00<br>X→Transmissive, W.T, VA TFT<br>V→Transmissive, Super W.T, VA TFT<br>R→Transmissive, Super W.T, O-TFT<br>Z→Transmissive, W.T, O-TFT<br>A→Transmissive, N.T, IPS TFT<br>Y→Transmissive, W.T, IPS TFT | |
| ⑦ | A：TFT LCD<br>B：TFT+FR+CONTROL BOARD<br>C：TFT+FR+A/D BOARD<br>D：TFT+FR+A/D BOARD+CONTROL BOARD<br>E：TFT+FR+POWER BOARD<br>F：TFT+CONTROL BOARD | G：TFT+FR<br>H：TFT+D/V BOARD<br>I：TFT+FR+D/V BOARD<br>J：TFT+POWER BD | |
| ⑧ | Resolution: | | |
| | 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 | P :1280800 |
| | S:480128 | T:800320 | | | | | |
| ⑨<br>⑩ | D: Digital L：LVDS<br>Interface： N：without control board A：8Bit B：16Bit H: HDMI | | |
| ⑪ | TS：N：Without TS T：resistive touch panel C：capacitive touch panel (G-F-F)<br>G：capacitive touch panel(G-G) | | |
| ⑫ | Version | | |
| ⑬ | Special Code | #:Fit in with ROHS directive regulations | |

# 2.Summary

TFT 7.0”is a TN transmissive type color active matrix TFT liquid crystal display that use amorphous silicon TFT as switching devices. This module is a composed of a TFT_LCD module, It is usually designed for industrial application and this module follows RoHs.

# 3.General Specifications

| Item | Dimension | Unit |
|---|---|---|
| Size | 7.0 | inch |
| Dot Matrix | 1024 x RGBx600(TFT) | dots |
| Module dimension | 165.0(W) x 99.8(H) x 25.2(D) | mm |
| Active area | 154.2114 x 85.92 | mm |
| Dot pitch | 0.1506 x 0.1432 | mm |
| LCD type | TFT, Normally White, Transmissive | |
| View Direction | 12 o'clock | |
| Gray Scale Inversion Direction | 6 o'clock | |
| Aspect Ratio | 16:9 | |
| Backlight Type | LED, Normally White | |
| With /Without TP | With RTP | |
| Interface | HDMI | |
| Surface | Anti-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. Typical Operation Conditions

| Item | Symbol | Values | | | Unit | Remark |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | MAX. | | |
| Power voltage | VDD | 4.5 | 5.0 | 5.5 | V | Note 2 |

Note 1: Be sure to apply VDD and VGL to the LCD first, and then apply VGH.
Note 2: VDD setting should match the signals output voltage

### 5.2. Current Consumption

| Item | Symbol | Values | | | Unit | Remark |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | MAX. | | |
| | IVCC | - | 1000 | - | mA | VCC =3.3V |
| | IVDD | - | 1660 | - | mA | VDD =5V |
| | IVLED(5V) | | 1.5 | | A | VLED=5V |

# 6.Optical Characteristics

| Item | | Symbol | Condition. | Min | Typ. | Max. | Unit | Remark |
|---|---|---|---|---|---|---|---|---|
| Response time | | Tr | θ=0°、Φ=0° | - | 25 | 40 | .ms | Note 3 |
| | | Tf | | | | | | |
| Contrast ratio | | CR | At optimized viewing angle | 600 | 800 | - | - | Note 4 |
| Color Chromaticity | White | Wx | θ=0°、Φ=0 | 0.26 | 0.31 | 0.36 | - | Note 2,5,6 |
| | | Wy | | 0.28 | 0.33 | 0.38 | - | |
| Viewing angle (Gray Scale Inversion Direction) | Hor. | ΘR | CR≧10 | 70 | 80 | - | Deg. | Note 1 |
| | | ΘL | | 70 | 80 | - | | |
| | Ver. | ΦT | | 50 | 60 | - | | |
| | | ΦB | | 60 | 70 | - | | |
| Brightness | | - | - | 350 | 400 | - | $cd/m^2$ | Center of display |

Ta=25±2℃,

Note 1: Definition of viewing angle range

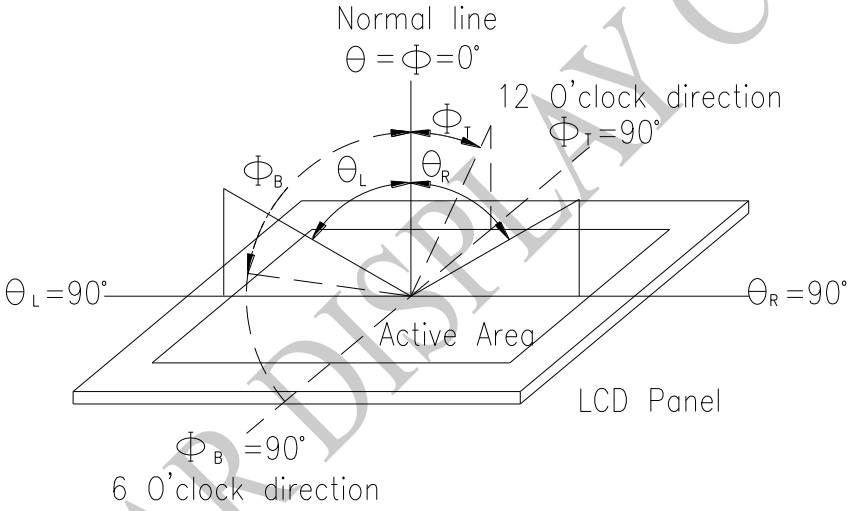



Fig. 6.1. Definition of viewing angle

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.

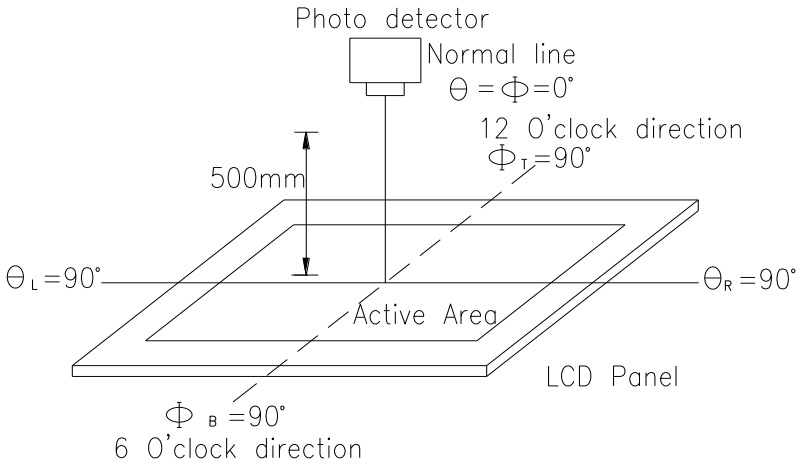
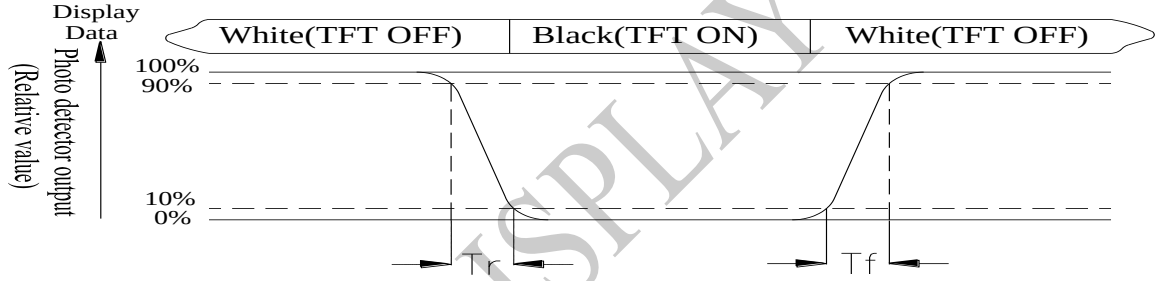



Fig. 6.2. Optical measurement system setup

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: White Vi = Vi50 ± 1.5V

Black Vi = Vi50 ± 2.0V

"±" means that the analog input signal swings in phase with VCOM signal.

"±" means that the analog input signal swings out of phase with VCOM signal.

The 100% transmission is defined as the transmission of LCD panel when all the input terminals of module are electrically opened.

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.

# 7.Interface

### 7.1. CON5/CON6

| Pin No. | Symbol | Function | Remark |
|---|---|---|---|
| 1 | 3.3V | Raspberry Pi:Power 3.3V | |
| 2 | 5V | Raspberry Pi:Power 5V | |
| 3 | SDA | CTP_SDA (For CTP type Reserved) | |
| 4 | 5V | Raspberry Pi:Power 5V | |
| 5 | SCL | CTP_SCL (For CTP type Reserved) | |
| 6 | GND | Raspberry Pi:GND | |
| 7 | GPIO04 | Raspberry Pi:GPIO04 | |
| 8 | GPIO14 | Raspberry Pi:GPIO14 | |
| 9 | GND | Raspberry Pi:GND | |
| 10 | GPIO15 | Raspberry Pi:GPIO15 | |
| 11 | RST | CTP_RST (For CTP type Reserved) | |
| 12 | ACTIVE | GPIO | |
| 13 | WAKE | CTP_WAKE (For CTP type Reserved) | |
| 14 | GND | Raspberry Pi:GND | |
| 15 | INT | CTP_INT (For CTP type Reserved) | |
| 16 | GPIO23 | Raspberry Pi:GPIO23 | |
| 17 | 3.3V | Power Supply | |
| 18 | GPIO24 | Raspberry Pi:GPIO24 | |
| 19 | GPIO10 | Raspberry Pi:GPIO10 | |
| 20 | GND | Raspberry Pi:GND | |
| 21 | GPIO09 | Raspberry Pi:GPIO09 | |
| 22 | GPIO25 | Raspberry Pi:GPIO25 | |
| 23 | GPIO11 | Raspberry Pi:GPIO11 | |
| 24 | GPIO08 | Raspberry Pi:GPIO08 | |
| 25 | GND | Raspberry Pi:GND | |
| 26 | GPIO07 | Raspberry Pi:GPIO07 | |
| 27 | ID_SD | Raspberry Pi:ID_SD | |
| 28 | ID_SC | Raspberry Pi:ID_SC | |
| 29 | GPIO05 | Raspberry Pi:GPIO05 | |

| | | | |
|---|---|---|---|
| 30 | GND | Raspberry Pi:GND | |
| 31 | GPIO06 | Raspberry Pi:GPIO06 | |
| 32 | GPIO12 | Raspberry Pi:GPIO12 | |
| 33 | GPIO13 | Raspberry Pi:GPIO13 | |
| 34 | GND | Raspberry Pi:GND | |
| 35 | GPIO19 | Raspberry Pi:GPIO19 | |
| 36 | GPIO16 | Raspberry Pi:GPIO16 | |
| 37 | GPIO26 | Raspberry Pi:GPIO26 | |
| 38 | GPIO20 | Raspberry Pi:GPIO20 | |
| 39 | GND | Raspberry Pi:GND | |
| 40 | GPIO21 | Raspberry Pi:GPIO21 | |

**7.2. HDMI**

| Pin No. | Symbol | I/O | Function | Remark |
|---|---|---|---|---|
| 1 | Rx2+ | I | +LVDS Differential Data Input | |
| 2 | GND | P | Ground | |
| 3 | Rx2- | I | -LVDS Differential Data Input | |
| 4 | Rx1+ | I | +LVDS Differential Data Input | |
| 5 | GND | P | Ground | |
| 6 | Rx1- | I | -LVDS Differential Data Input | |
| 7 | Rx0+ | I | +LVDS Differential Data Input | |
| 8 | GND | P | Ground | |
| 9 | Rx0- | I | -LVDS Differential Data Input | |
| 10 | RxC+ | I | +LVDS Differential Clock Input | |
| 11 | GND | P | Ground | |
| 12 | RxC- | I | -LVDS Differential Clock Input | |
| 13-14 | NC | - | No connection | |
| 15 | SCL | I/O | DDC(Data Display Channel) Clock | |
| 16 | SDA | I/O | DDC(Data Display Channel) Data | |
| 17 | GND | P | Ground | |
| 18 | 5V | P | Power Supply | |
| 19 | Detect | I/O | Hot plug detect | |

I: input, O: output, P: Power

### 7.3. USB

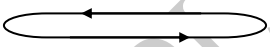
| Pin No. | Symbol | I/O | Function | Remark |
|---|---|---|---|---|
| 1 | 5V | P | Power Supply | |
| 2 | D- | I/O | USB Data - | |
| 3 | D+ | I/O | USB Data + | |
| 4 | NC | - | No connection | |
| 5 | GND | P | Ground | |

### 7.4. POWER JACK

| Pin No. | Symbol | I/O | Function | Remark |
|---|---|---|---|---|
| 1 | VLED+ | P | Power Supply | |
| 2 | VLED- | P | Ground | |
| 3 | NC | | No connection | |

# 8.Reliability

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

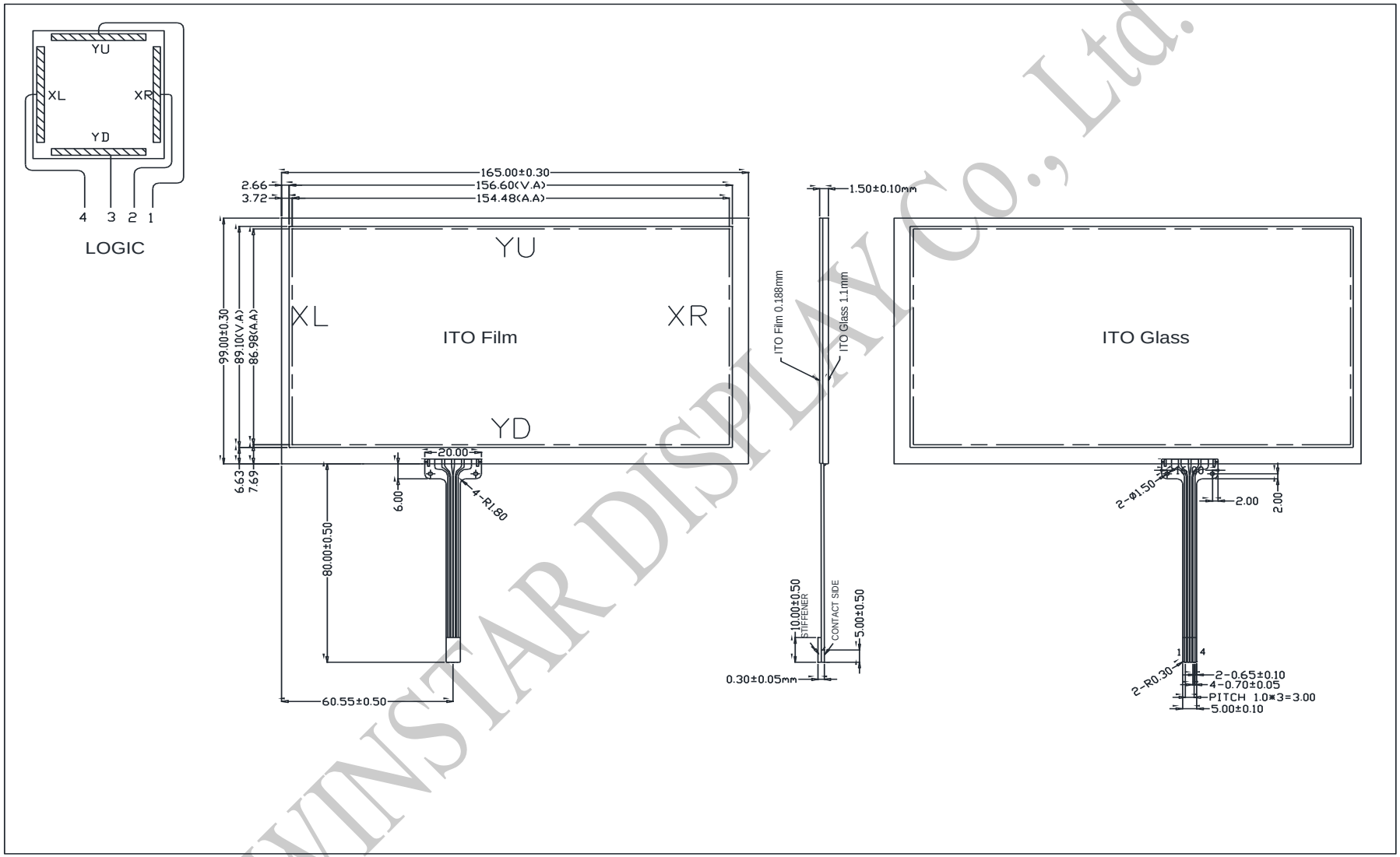
| **Environmental Test** | | | |
|---|---|---|---|
| **Test Item** | **Content of Test** | **Test Condition** | **Note** |
| High Temperature storage | Endurance test applying the high storage temperature for a long time. | 80℃<br>200hrs | 2 |
| Low Temperature storage | Endurance test applying the low 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 | —— |
| Low Temperature Operation | Endurance test applying the electric stress under low temperature for a long time. | -20℃<br>200hrs | 1 |
| 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 | —— |
| Vibration test | Endurance test applying the vibration during transportation and using. | Total fixed amplitude : 1.5mm<br>Vibration Frequency : 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=±600V(contact), ±800v(air),<br>RS=330Ω<br>CS=150pF<br>10 times | —— |

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.

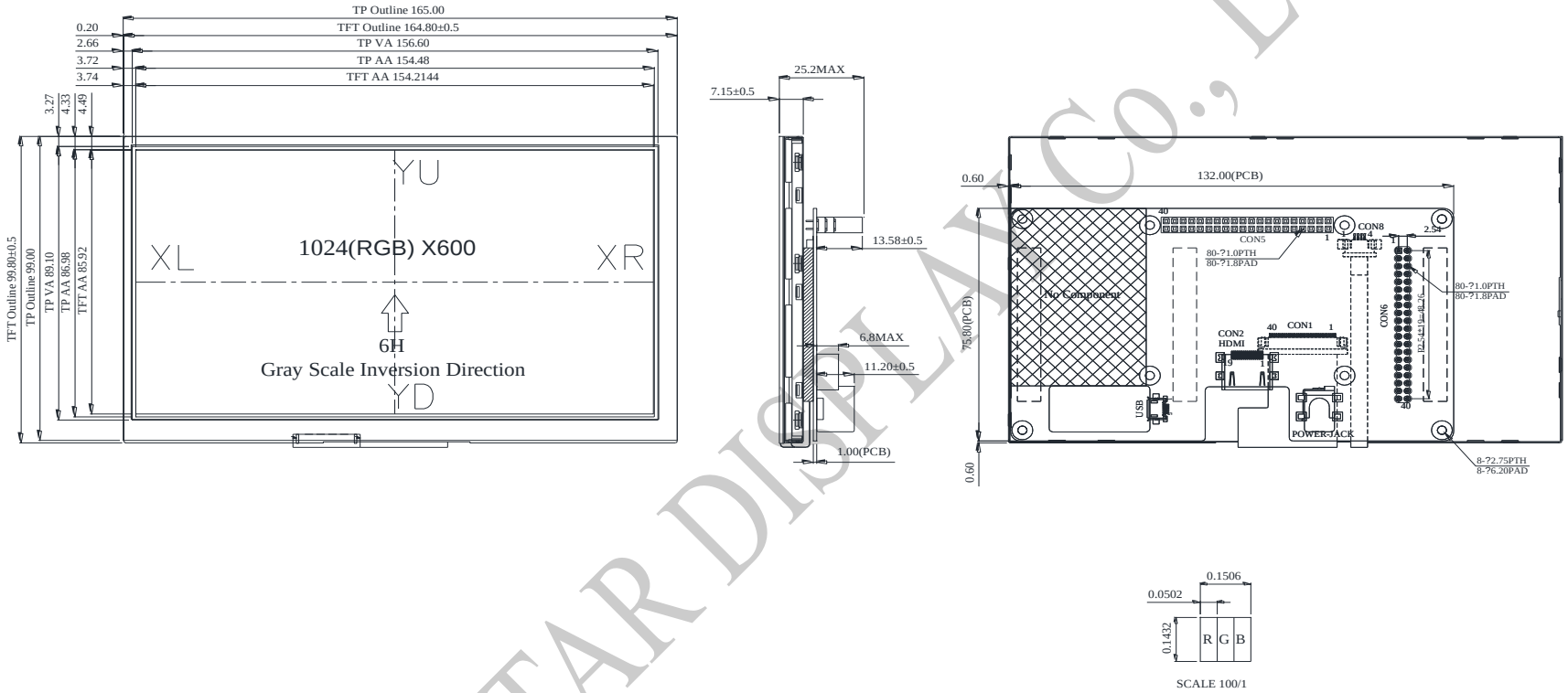
# 9.Touch Panel Information



9.1. Resistance Touch Panel General Specifications

| Item | Description |
|---|---|
| Driving condition | DC3~7V |
| Operating force | 30~80g |
| Linearity max | ≤±1.5% |
| Insulating resistance | ＞10MΩ，25V(DC) |
| Light transparence | 70% |
| Structure type | ITO Film/ITO Glass(F/G) |
| Surface Hardness | 3H typ |
| Pen Hitting Durability (with the silicon rubber) | ＞1000,000 times |
| X Axis resistance | 430~910Ω |
| Y Axis resistance | 150~530Ω |

# 10.Contour Drawing




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

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# 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：** / /