**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.: WF70ATIAGDNN0#**

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

| SALES BY | APPROVED BY | CHECKED BY | PREPARED BY |
|---|---|---|---|
| | | | 葉虹蘭 |
| **ISSUED DATE:** 2017/01/05 | | | |

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

MODLE NO：

**RECORDS OF REVISION**

**DOC. FIRST ISSUE**

| VERSION | DATE | REVISED PAGE NO. | **SUMMARY** |
|---|---|---|---|
| 0 | 2012/12/21 | | First issue |
| A | 2013/09/12 | | Correct Brightness<br>Updata Rev. |
| B | 2017/01/05 | | Add size & Surface.<br>Modify Block Diagram&<br>Static electricity test. |

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11.Contour Drawing

12.Other

# 1.Module Classification Information

| W | F | 70 | A | T | I | A | G | D | N | N | 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：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 | D: Digital L：LVDS | | | | | | |
| ⑩ | Interface： N：without control board A：8Bit B：16Bit | | | | | | |
| 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 |
|---|---|---|
| Dot Matrix | 800 x RGB x 480 (TFT) | dots |
| Module dimension | 165 x 104.44 x 5.2 | mm |
| Active area | 152.4 x 91.44 | mm |
| Dot pitch | 63.5 x 190.5 | um |
| LCD type | a-Si TFT, Negative, Transmissive | |
| View Direction | 12 o'clock | |
| Gray Scale Inversion Direction | 6 o'clock | |
| Aspect Ratio | 16:9 | |
| Backlight Type | LED ,Normally White | |
| Pixel Configuration | R.G.B. Vertical Stripe | |
| With /Without TP | Without TP | |
| Surface | Anti-Glare | |

*Color tone slight changed by temperature and driving voltage.

# 4.Absolute Maximum Ratings

| Item | Symbol | Condition | Min. | Max. | Unit | Remark |
|---|---|---|---|---|---|---|
| Power Voltage | Vcc | GND=0 | -0.3 | 6 | V | - |
| Input logic | Vi | GND=0 | -0.3 | Vcc+0.3 | V | Note 1 |

Note 1: DCLK, DE, R0~ R5, G0~ G5, B0~ B5.

# 5.Electrical Characteristics

**Recommended Operation condition (GND=0V，Ta=25℃):**

| Parameter | | Symbol | Rating | | | Unit | Condition |
|---|---|---|---|---|---|---|---|
| | | | Min | TYP | max | | |
| Supply Voltage For LCM | | VCC | 3.0 | 3.3 | 3.6 | V | — |
| Input logic voltage | High level | VIH | 0.7VCC | — | VCC | V | Note1 |
| | Low level | VIL | 0 | — | 0.3VCC | V | Note1 |

Note 1: DCLK, DE, R0~ R5, G0~ G5, B0~ B5.

**TFT-LCD current consumption:**

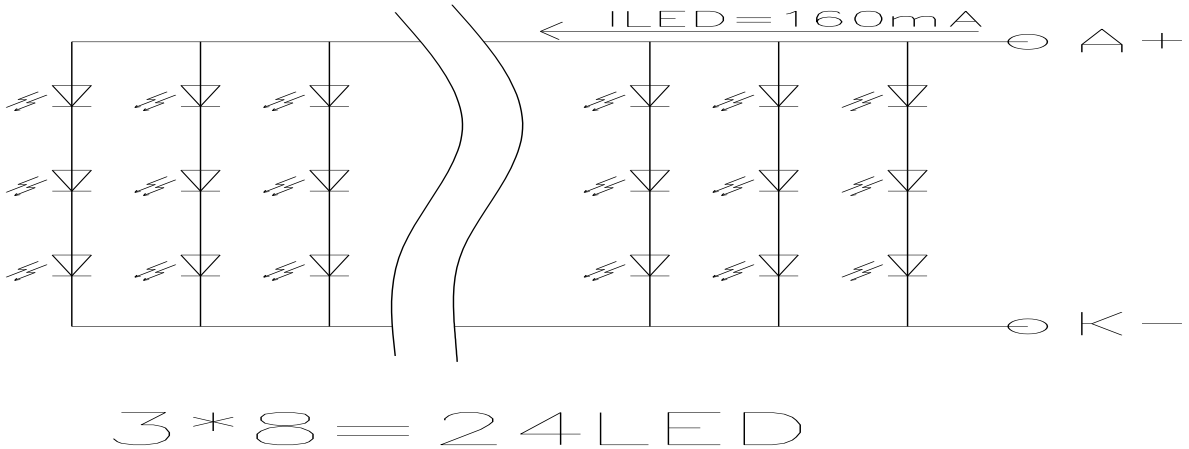
| Parameter | Symbol | Rating | | | Unit | Condition |
|---|---|---|---|---|---|---|
| | | Min | TYP | max | | |
| Supply Current For LCM | Icc | — | 200 | 260 | mA | black pattern |
| Supply Current For B/L | ILED | — | 160 | 200 | mA | — |

**Backlight Information**

**Specification:**

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Remark |
|---|---|---|---|---|---|---|
| Supply Current For B/L | ILED | — | 160 | — | mA | Note 1 |
| Supply Current For B/L | VLED | —- | 9.9 | — | V | — |
| LED Life Time | — | 10,000 | 20,000 | — | Hr | Note 2 |

Note 1: There are 8 Groups LED shown as below, VLED=9.9V, ILED=160mA.




Note 2: Brightness to be decreased to 50% of the initial value.

# 6.AC CHARATERISTICS

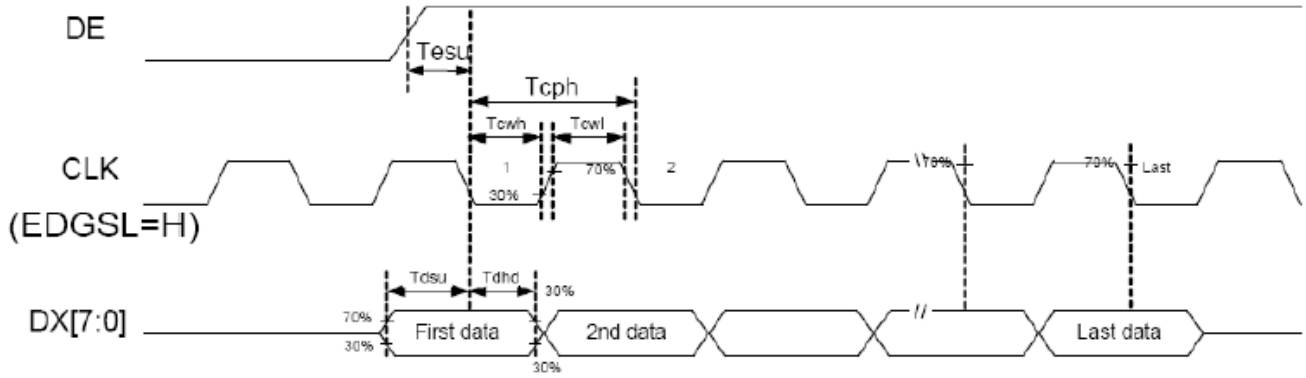
**AC Electrical CHARATERISTICS**

Frame rate range：60Hz~65Hz

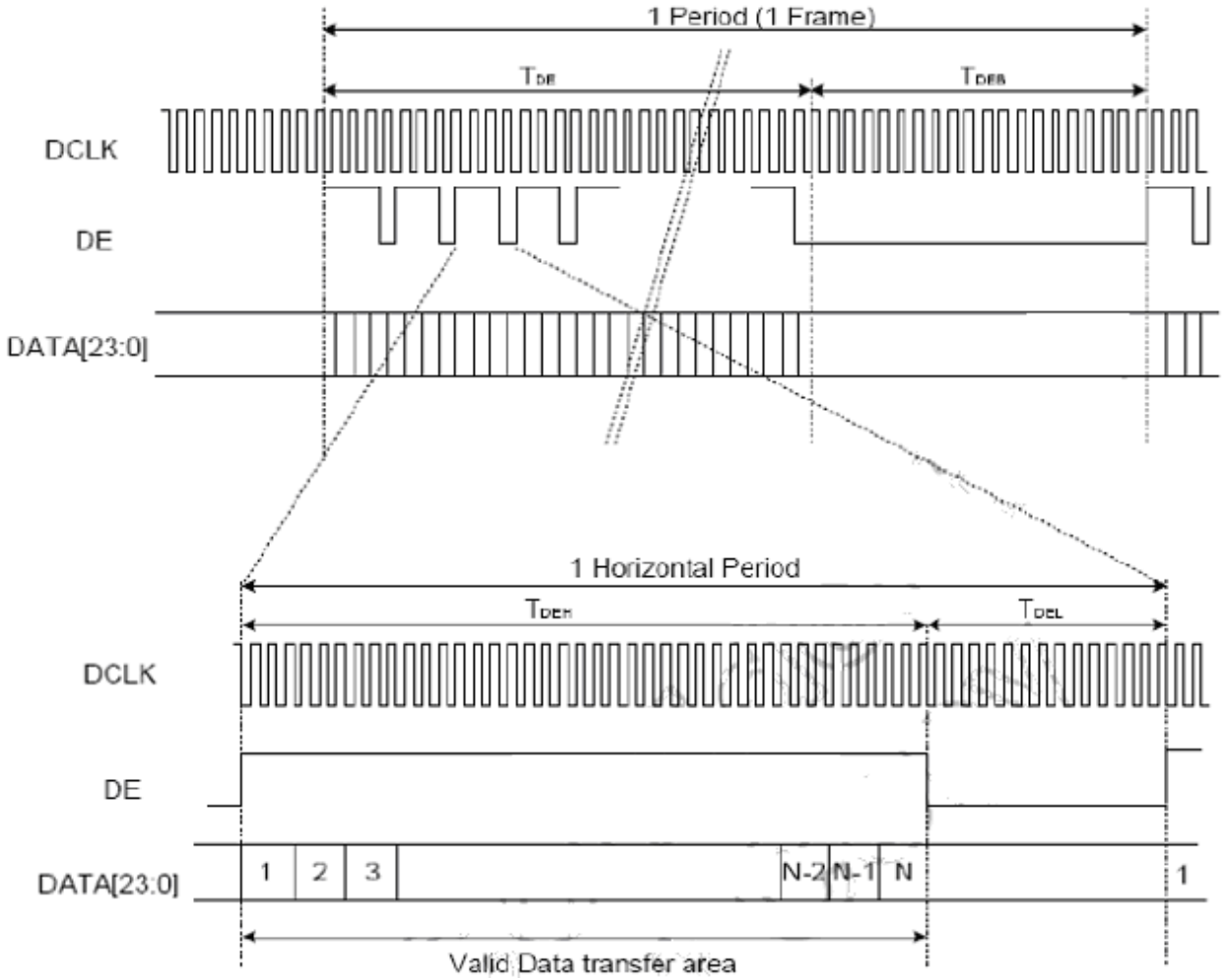
| Parameter | Symbol | Rating | | | Unit |
|---|---|---|---|---|---|
| | | Min | TYP | max | |
| Data setup time | Tdsu | 6 | — | — | ns |
| Data hold time | Tdhd | 6 | — | — | ns |
| DE setup time | Tesu | 6 | — | — | ns |
| CLK frequency | FCPH | 29.4 | 33.26 | 42.48 | MHz |
| CLK period | TCPH | 23.54 | 30.06 | 34.01 | ns |
| CLK pulse duty | TCWH | 40 | 50 | 60 | % |
| CLK pulse duty | TCWL | 40 | 50 | 60 | % |
| DE period | TDEH+TDEL | 1000 | 1056 | 1200 | TCPH |
| DE pulse width | TDEH | — | 800 | — | TCPH |
| DE frame blanking | TDEB | 10 | 45 | 110 | TDEH+TDEL |
| DE frame width | TDE | — | 480 | — | TDEH+TDEL |

Note：We suggest using the typical value, so it can have better performance.

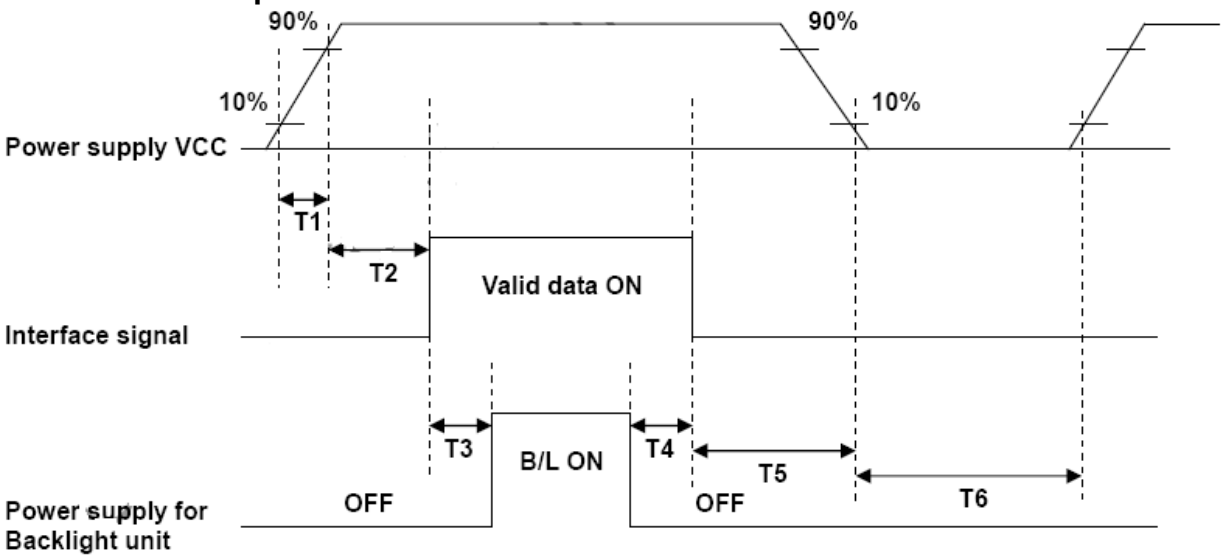
**Timing Controller Timing Chart**
**Clock and Data input waveforms:**




**Data input format:**



**Power ON/OFF sequence:**




| Parameter | SPEC | | | Unit |
|---|---|---|---|---|
| | Min. | Typ. | Max. | |
| T1 | 1 | — | 2 | ms |
| T2 | 0 | 60 | — | ms |
| T3 | 200 | — | — | ms |
| T4 | 200 | — | — | ms |
| T5 | 1 | — | — | ms |
| T6 | 1000 | — | — | ms |

# 7.Optical Characteristics

### 7.1. TFT LCD characteristic (Without Touch Panel)

| Item | | Symbol | Condition. | Min | Typ. | Max. | Unit | Remark |
|---|---|---|---|---|---|---|---|---|
| Response time | | Tr | θ =0°、Φ=0° | - | 5 | 10 | .ms | Note 3,5 |
| | | Tf | | - | 11 | 16 | .ms | |
| Contrast ratio | | CR | At optimized viewing angle | 250 | 400 | - | - | Note 4,5 |
| Color Chromaticity | White | Wx | θ =0°、Φ=0 | 0.249 | 0.299 | 0.349 | | Note 2,6,7 |
| | | Wy | | 0.278 | 0.328 | 0.378 | | |
| Viewing angle (Gray Scale Inversion Direction) | Hor. | Θ R | CR≧10 | 60 | 70 | | Deg. | Note 1 |
| | | Θ L | | 60 | 70 | | | |
| | Ver. | Φ T | | 50 | 60 | | | |
| | | Φ B | | 60 | 70 | | | |
| Brightness | | - | - | 300 | 350 | | cd/m$^2$ | Center of display |

Ta=25±2℃, IL=160mA

Note 1: Definition of viewing angle range

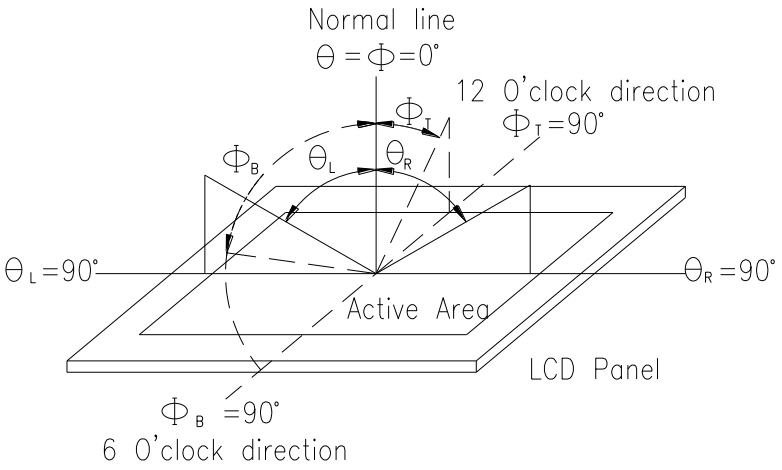



Fig.7.1. Definition of viewing angle

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.

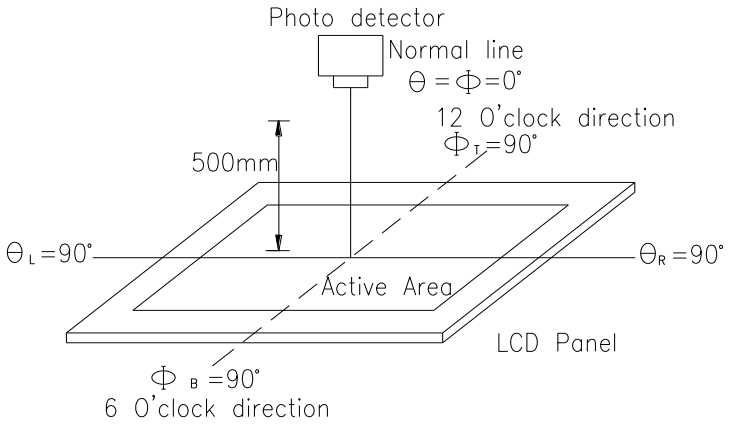
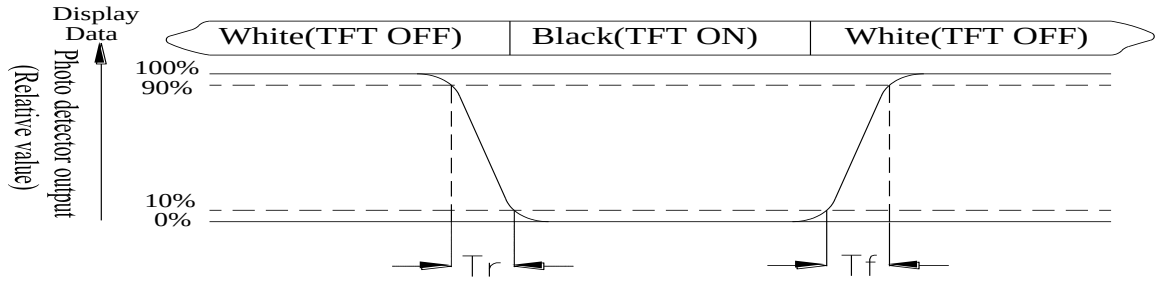



Fig. 7.2. Optical measurement system setup

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: 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.

# 8.Interface

**LCM PIN Definition:**

| Pin No. | Symbol | Description | Remark |
|---|---|---|---|
| 1 | GND | Power ground | — |
| 2 | GND | Power ground | — |
| 3 | NC | Not connect | — |
| 4 | VCC | Power supply for Digital Circuit | — |
| 5 | VCC | Power supply for Digital Circuit | — |
| 6 | VCC | Power supply for Digital Circuit | — |
| 7 | VCC | Power supply for Digital Circuit | — |
| 8 | NC | Not connect | — |
| 9 | DE | Data enable signal | — |
| 10 | GND | Power ground | — |
| 11 | GND | Power ground | — |
| 12 | GND | Power ground | — |
| 13 | B5 | Blue Data 5 (MSB) | — |
| 14 | B4 | Blue Data 4 | — |
| 15 | B3 | Blue Data 4 | — |
| 16 | GND | Power ground | — |
| 17 | B2 | Blue Data 2 | — |
| 18 | B1 | Blue Data 1 | — |
| 19 | B0 | Blue Data 0 (LSB) | — |
| 20 | GND | Power ground | — |
| 21 | G5 | Green Data 5 (MSB) | — |
| 22 | G4 | Green Data 4 | — |
| 23 | G3 | Green Data 4 | — |
| 24 | GND | Power ground | — |
| 25 | G2 | Green Data 2 | — |
| 26 | G1 | Green Data 1 | — |
| 27 | G0 | Green Data 0 (LSB) | — |
| 28 | GND | Power ground | — |
| 29 | R5 | Red Data 5 (MSB) | — |
| 30 | R4 | Red Data 4 | — |
| 31 | R3 | Red Data 4 | — |
| 32 | GND | Power ground | — |
| 33 | R2 | Red Data 2 | — |
| 34 | R1 | Red Data 1 | — |
| 35 | R0 | Red Data 0 (LSB) | — |
| 36 | GND | Power ground | — |
| 37 | GND | Power ground | — |
| 38 | DCLK | Clock Signals; Latch Data at the falling edge | — |

| | | | |
|---|---|---|---|
| 39 | GND | Power ground | — |
| 40 | GND | Power ground | — |

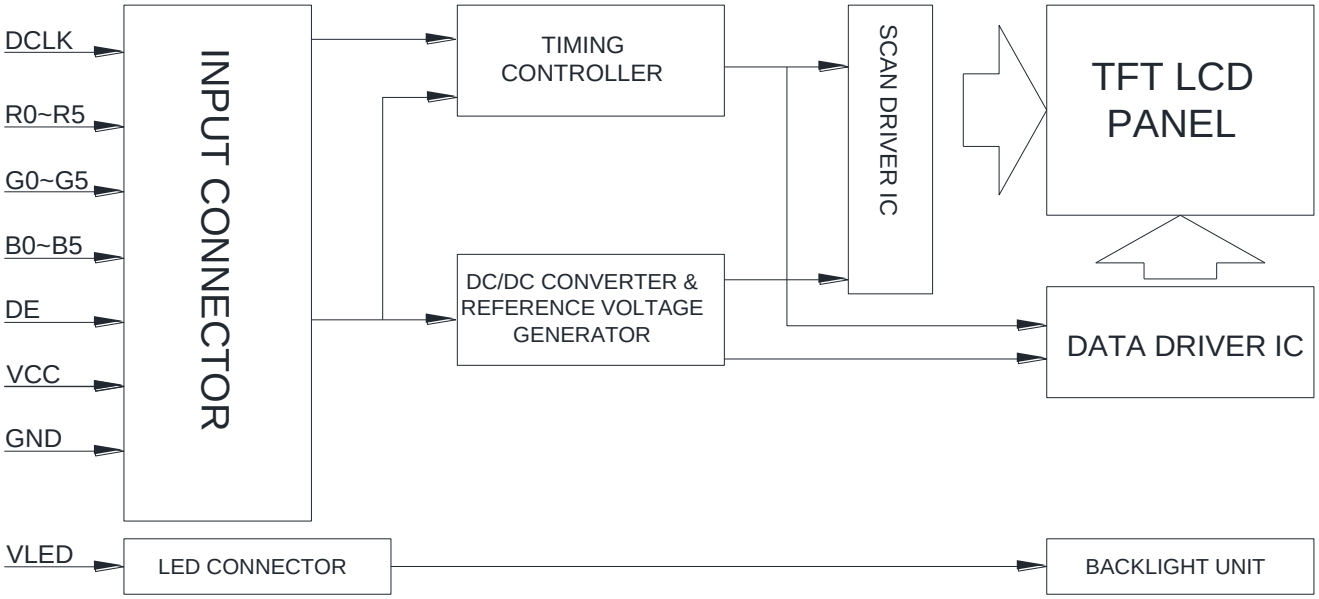
Note: User's connector part number is **PF050-40ZSG-F09-S** manufactured by UJU or equivalent.

**Backlight Driving Part:**

| Pin No. | Symbol | Description |
|---|---|---|
| 1 | VLED+ | Red, LED_ Anode |
| 2 | VLED- | White, LED_ Cathode |

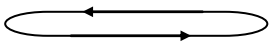
Note: The backlight interface connector is a model **BHSR-02VS-1**manufactured by JST or equivalent. The matching connector part number is **SM02B-BHSS-1-TB** manufactured by JST or equivalent.

# 9.Block Diagram



# 10.Reliability

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

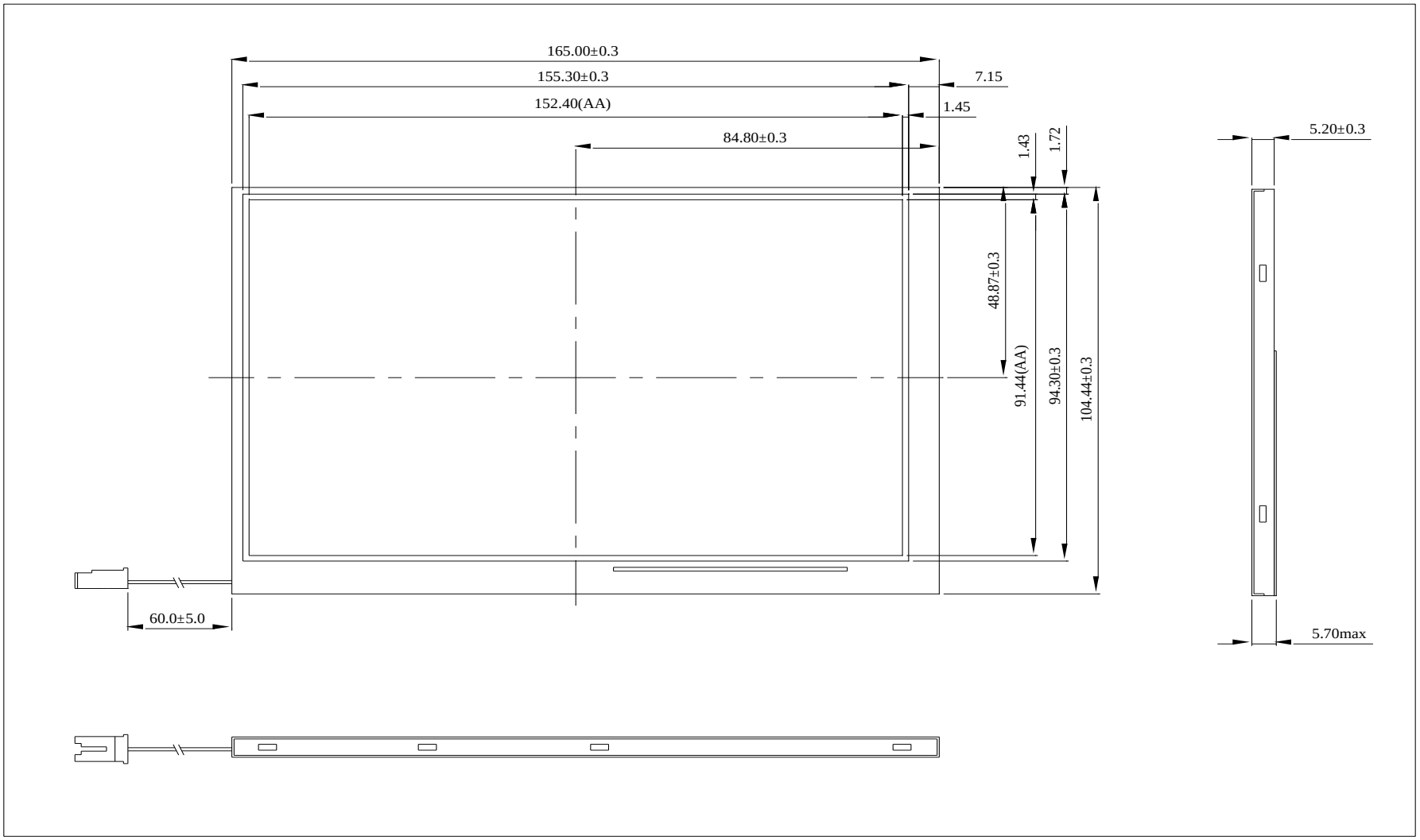
| **Environmental Test** | | | |
|---|---|---|---|
| **Test Item** | **Content of Test** | **Test Condition** | **Note** |
| High Temperature storage | Endurance test applying the high storage temperature for a long time. | 80℃<br>200hrs | 2 |
| Low Temperature storage | Endurance test applying the low 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 | —— |

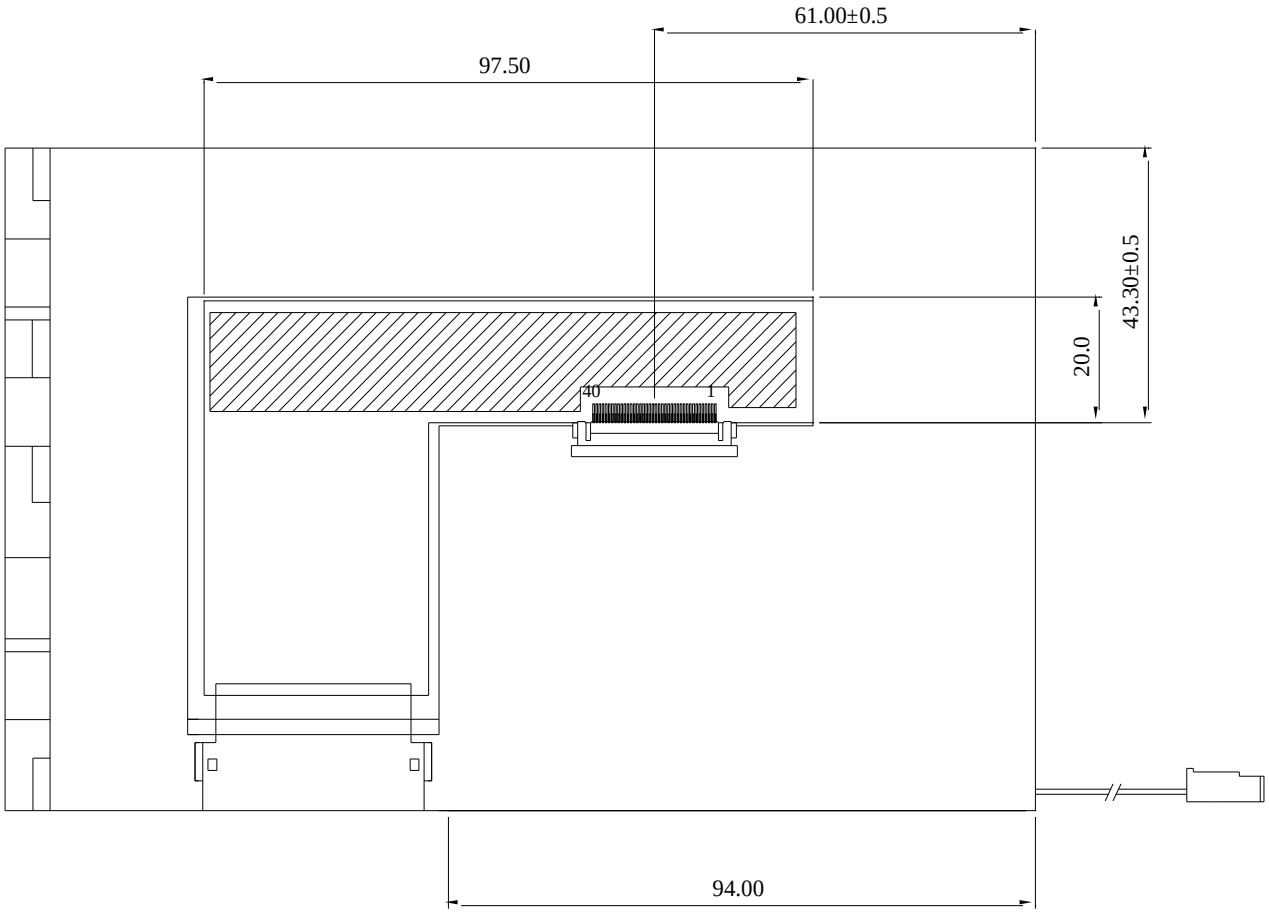
Note1: No dew condensation to be observed.

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

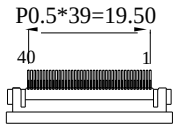
Note3: The packing have to including into the vibration testing.

# 11.Contour Drawing






| PIN NO. | SYMBOL | PIN NO. | SYMBOL |
|---|---|---|---|
| 1 | GND | 21 | G5 |
| 2 | GND | 22 | G4 |
| 3 | NC | 23 | G3 |
| 4 | VCC | 24 | GND |
| 5 | VCC | 25 | G2 |
| 6 | VCC | 26 | G1 |
| 7 | VCC | 27 | G0 |
| 8 | NC | 28 | GND |
| 9 | DE | 29 | R5 |
| 10 | GND | 30 | R4 |
| 11 | GND | 31 | R3 |
| 12 | GND | 32 | GND |
| 13 | B5 | 33 | R2 |
| 14 | B4 | 34 | R1 |
| 15 | B3 | 35 | R0 |
| 16 | GND | 36 | GND |
| 17 | B2 | 37 | GND |
| 18 | B1 | 38 | DCLK |
| 19 | B0 | 39 | GND |
| 20 | GND | 40 | GND |



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 Specification：

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**：____/____/____