

## SPECIFICATION

**MODULE NO.: EA TFT043-42ANN**

|                                                             |                                                |
|-------------------------------------------------------------|------------------------------------------------|
| <p><b>APPROVED BY:</b></p> <p>( FOR CUSTOMER USE ONLY )</p> | <p><b>PCB VERSION:</b></p> <p><b>DATA:</b></p> |
|-------------------------------------------------------------|------------------------------------------------|

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|                                       |             |            |             |
| <p><b>ISSUED DATE: 2018/06/18</b></p> |             |            |             |

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# 1. Summary

This technical specification applies to 4.3' color TFT-LCD panel. The 4.3' color TFT-LCD panel is designed for camcorder, digital camera application and other electronic products which require high quality flat panel displays. This module follows RoHS.

## **1.1. Accessories**

ZIF connector for display, bottom contact  
ZIF connector for display, top contact

**EA WF050-40S**  
**EA WF050-40ST**

## 2. General Specifications

| Item                           | Dimension                         | Unit |
|--------------------------------|-----------------------------------|------|
| Size                           | 4.3                               | inch |
| Dot Matrix                     | 480 x RGBx272(TFT)                | dots |
| Module dimension               | 105.5(W) x 67.2(H) x 2.95(D)      | mm   |
| Active area                    | 95.04 x 53.86                     | mm   |
| Dot pitch                      | 0.066 x 0.198                     | mm   |
| LCD type                       | TFT, Normally White, Transmissive |      |
| View Direction                 | 12 o'clock                        |      |
| Gray Scale Inversion Direction | 6 o'clock                         |      |
| Backlight Type                 | LED, Normally White               |      |
| With /Without TP               | Without TP                        |      |
| Surface                        | Anti-Glare                        |      |

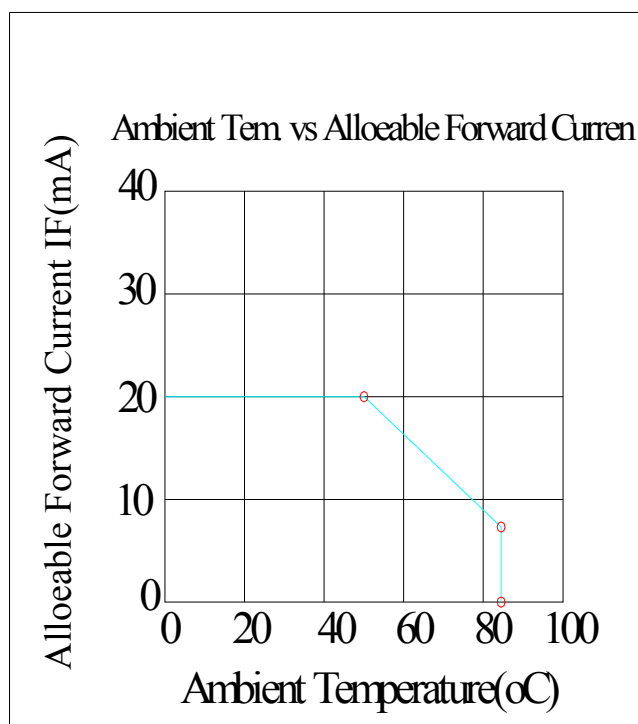
\*Color tone slight changed by temperature and driving voltage.

## 3. 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

- Temp.  $\leq 60^{\circ}\text{C}$ , 90% RH MAX. Temp.  $> 60^{\circ}\text{C}$ , Absolute humidity shall be less than 90% RH at  $60^{\circ}\text{C}$



## 4. Electrical Characteristics

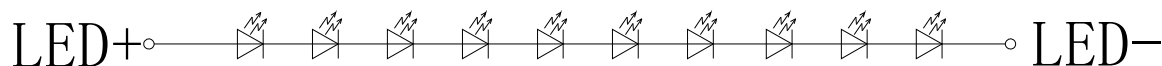
### 5.1. Operating conditions:

| Item                      | Symbol | Condition | Min | Typ | Max | Unit |
|---------------------------|--------|-----------|-----|-----|-----|------|
| Supply Voltage For Logic  | VCC    | —         | 3.0 | 3.3 | 3.5 | V    |
| Digital operation current | Icc    | -         |     | 17  | 25  | mA   |

### 5.2. LED driving conditions

| Parameter         | Symbol | Min. | Typ.   | Max. | Unit | Remark     |
|-------------------|--------|------|--------|------|------|------------|
| LED current       |        | -    | 20     | -    | mA   |            |
| Power Consumption |        |      | 640    | 680  | mW   |            |
| LED voltage       | VBL+   | 30   | 32     | 34   | V    | Note 1     |
| LED Life Time     |        | -    | 50,000 | -    | Hr   | Note 2,3,4 |

Note 1 : There are 1 Groups LED



Note 2 : Ta = 25 °C

Note 3 : Brightness to be decreased to 50% of the initial value

Note 4 : The single LED lamp case

## 5.DC CHARATERISTICS

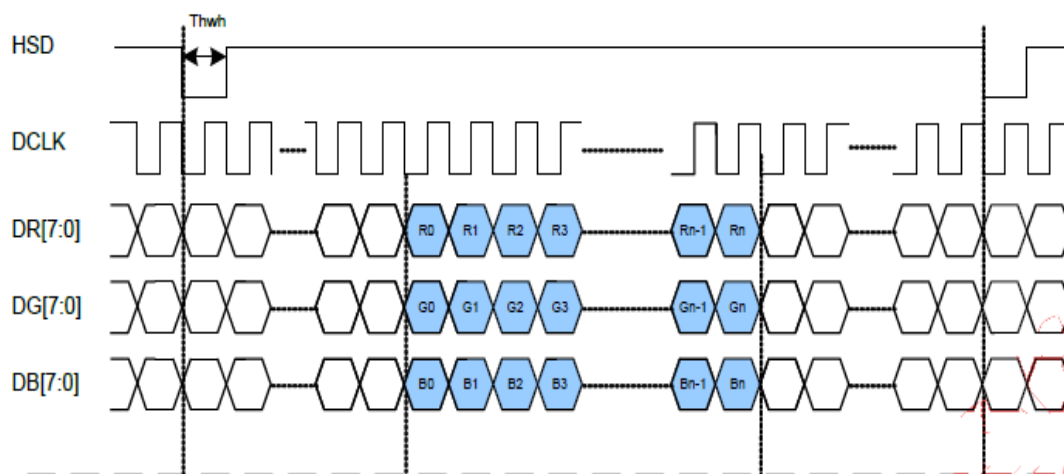
| Parameter                | Symbol   | Rating |     |        | Unit | Condition |
|--------------------------|----------|--------|-----|--------|------|-----------|
|                          |          | Min    | Typ | Max    |      |           |
| Low level input voltage  | $V_{IL}$ | 0      | -   | 0.2VCC | V    |           |
| High level input voltage | $V_{IH}$ | 0.7VCC | -   | VCC    | V    |           |

## 6.AC CHARATERISTICS

### 6.1. Parallel SYNC mode RGB input timing table

| Signal                    | Symbol | Min | Typ | Max | Unit |
|---------------------------|--------|-----|-----|-----|------|
| DCLK frequency            | fclk   | 5   | 9   | 12  | MHz  |
| VSD period time           | Tv     | 277 | 288 | 400 | H    |
| VSD display area          | Tvd    | 272 |     |     | H    |
| VSD back porch            | Tvb    | 3   | 8   | 31  | H    |
| VSD front porch           | Tvfp   | 2   | 8   | 97  | H    |
| HSD display area          | Thd    | 480 |     |     | CLK  |
| HSD period time           | Thb    | 520 | 525 | 800 | CLK  |
| HSD back porch            | Thbp   | 36  | 49  | 255 | CLK  |
| HSD front porch           | Thfp   | 4   | 5   | 65  | CLK  |
| CLK cycle time            | Tclk   | 83  | 110 | 200 | ns   |
| Clock width of high level | Tewh   | 40  | -   | 60  | %    |
| Clock width of low level  | Tcwl   | 40  | -   | 60  | %    |
| Clock rising time         | trck   | 9   | -   | -   | ns   |
| Clock falling time        | tfck   | 9   | -   | -   | ns   |
| Data Setup Time           | tdesu  | 12  | -   | -   | ns   |
| Data Hold Time            | tdahd  | 12  | -   | -   | ns   |

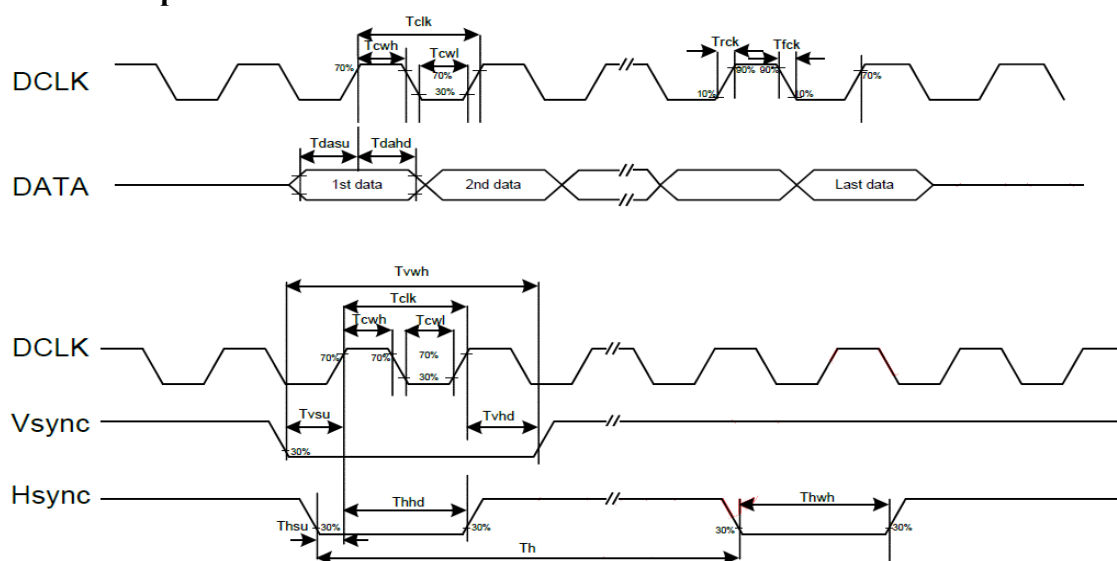
(HV Mode)



## 6.2. Waveform

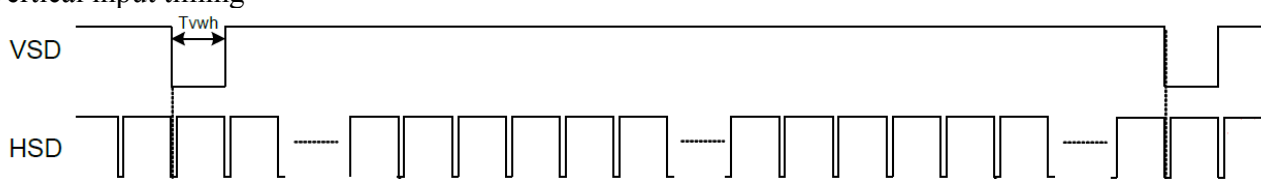
### Timing Chart

#### Clock and Data Input Waveforms



### Data Input Format

#### Vertical input timing



## 7. Optical Characteristics

| Item                                              | Symbol | Condition.                        | Min   | Typ.  | Max.  | Unit              | Remark            |
|---------------------------------------------------|--------|-----------------------------------|-------|-------|-------|-------------------|-------------------|
| Response time                                     | Tr     | $\theta=0^\circ$ 、 $\Phi=0^\circ$ | -     | 4     | 7     | ms                | Note 3            |
|                                                   | Tf     |                                   | -     | 11    | 17    | ms                |                   |
| Contrast ratio                                    | CR     | At optimized viewing angle        | 300   | 500   | -     | -                 | Note 4            |
| Color Chromaticity                                | White  | $\theta=0^\circ$ 、 $\Phi=0^\circ$ | 0.281 | 0.311 | 0.341 | -                 | Note 2,5          |
|                                                   | Wy     |                                   | 0.300 | 0.330 | 0.360 | -                 |                   |
| Viewing angle<br>(Gray Scale Inversion Direction) | Hor.   | $\Theta_R$                        | -     | 70    | -     | Deg.              | Note 1            |
|                                                   |        | $\Theta_L$                        | -     | 70    | -     |                   |                   |
|                                                   | Ver.   | $\Phi_T$                          | -     | 50    | -     |                   |                   |
|                                                   |        | $\Phi_B$                          | -     | 70    | -     |                   |                   |
| Brightness                                        | -      | -                                 | 400   | 500   | -     | cd/m <sup>2</sup> | Center of display |

Ta=25±2℃, IL=20mA

Note 1: Definition of viewing angle range

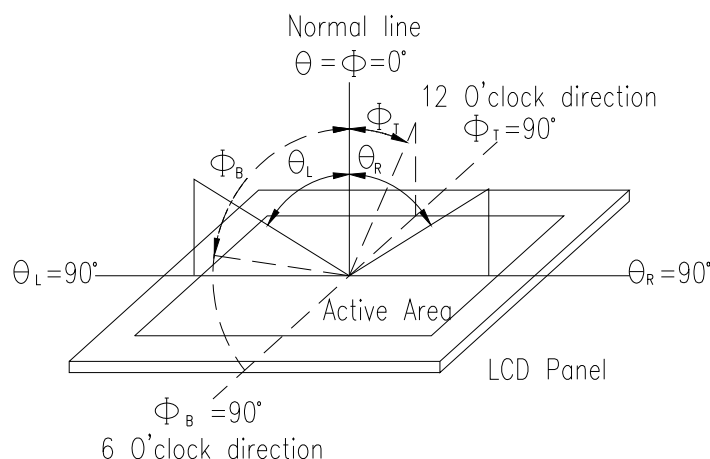


Fig. 8.1. Definition of viewing angle

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-7 or BM-5 luminance meter 1.0° field of view at a distance of 50cm and normal direction.

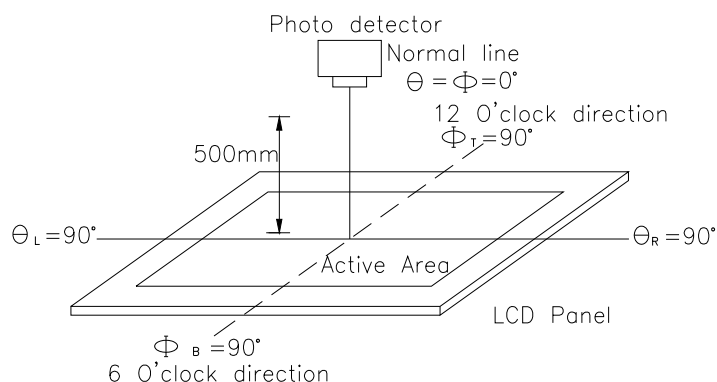
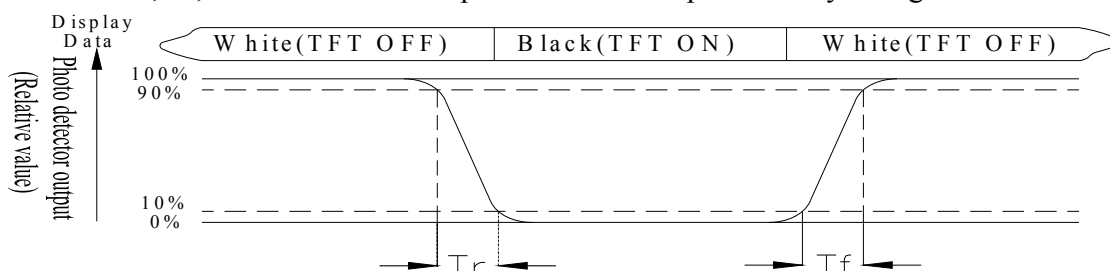


Fig. 8.2. Optical measurement system setup

**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,  $T_r$ , is the time between photo detector output intensity changed from 90% to 10%. And fall time,  $T_f$ , 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  $V_i = V_{i50} \pm 1.5V$**

**Black  $V_i = V_{i50} \pm 2.0V$**

“±” 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.**

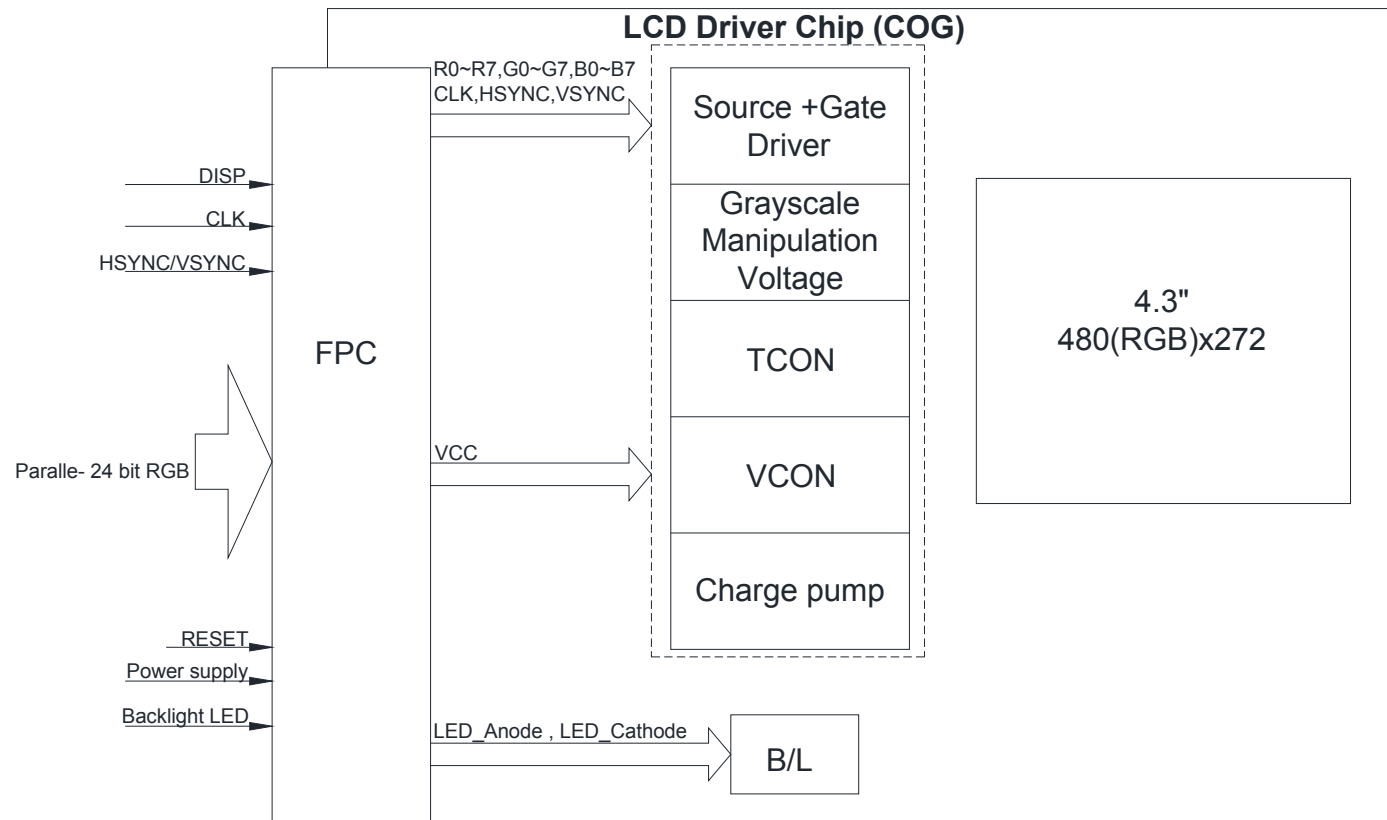
## 8.Interface

### 8.1. LCM PIN Definition

| Pin | Symbol | Function                        | Remark |
|-----|--------|---------------------------------|--------|
| 1   | VLED-  | Power for LED backlight cathode |        |
| 1   | VLED+  | Power for LED backlight anode   |        |
| 3   | GND    | Power ground                    |        |
| 4   | VCC    | Power voltage                   |        |
| 5   | R0     | Red data (LSB)                  |        |
| 6   | R1     | Red data                        |        |
| 7   | R2     | Red data                        |        |
| 8   | R3     | Red data                        |        |
| 9   | R4     | Red data                        |        |
| 10  | R5     | Red data                        |        |
| 11  | R6     | Red data                        |        |
| 12  | R7     | Red data (MSB)                  |        |
| 13  | G0     | Green data (LSB)                |        |
| 14  | G1     | Green data                      |        |
| 15  | G2     | Green data                      |        |
| 16  | G3     | Green data                      |        |
| 17  | G4     | Green data                      |        |
| 18  | G5     | Green data                      |        |
| 19  | G6     | Green data                      |        |
| 20  | G7     | Green data (MSB)                |        |
| 21  | B0     | Blue data (LSB)                 |        |
| 22  | B1     | Blue data                       |        |
| 23  | B2     | Blue data                       |        |
| 24  | B3     | Blue data                       |        |
| 25  | B4     | Blue data                       |        |
| 26  | B5     | Blue data                       |        |
| 27  | B6     | Blue data                       |        |
| 28  | B7     | Blue data (MSB)                 |        |
| 29  | GND    | Power ground                    |        |
| 30  | CLK    | Pixel clock                     |        |
| 31  | DISP   | Display on/off                  |        |
| 32  | Hsync  | Horizontal sync signal          |        |
| 33  | Vsync  | Vertical sync signal            |        |
| 34  | NC     | No connection                   |        |
| 35  | NC     | No connection                   |        |
| 36  | RESET  | Hardware reset                  |        |
| 37  | NC     | No connection                   |        |
| 38  | NC     | No connection                   |        |
| 39  | NC     | No connection                   |        |
| 40  | NC     | No connection                   |        |

## 9. Block Diagram

### LCD Panel



## 10. Reliability

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

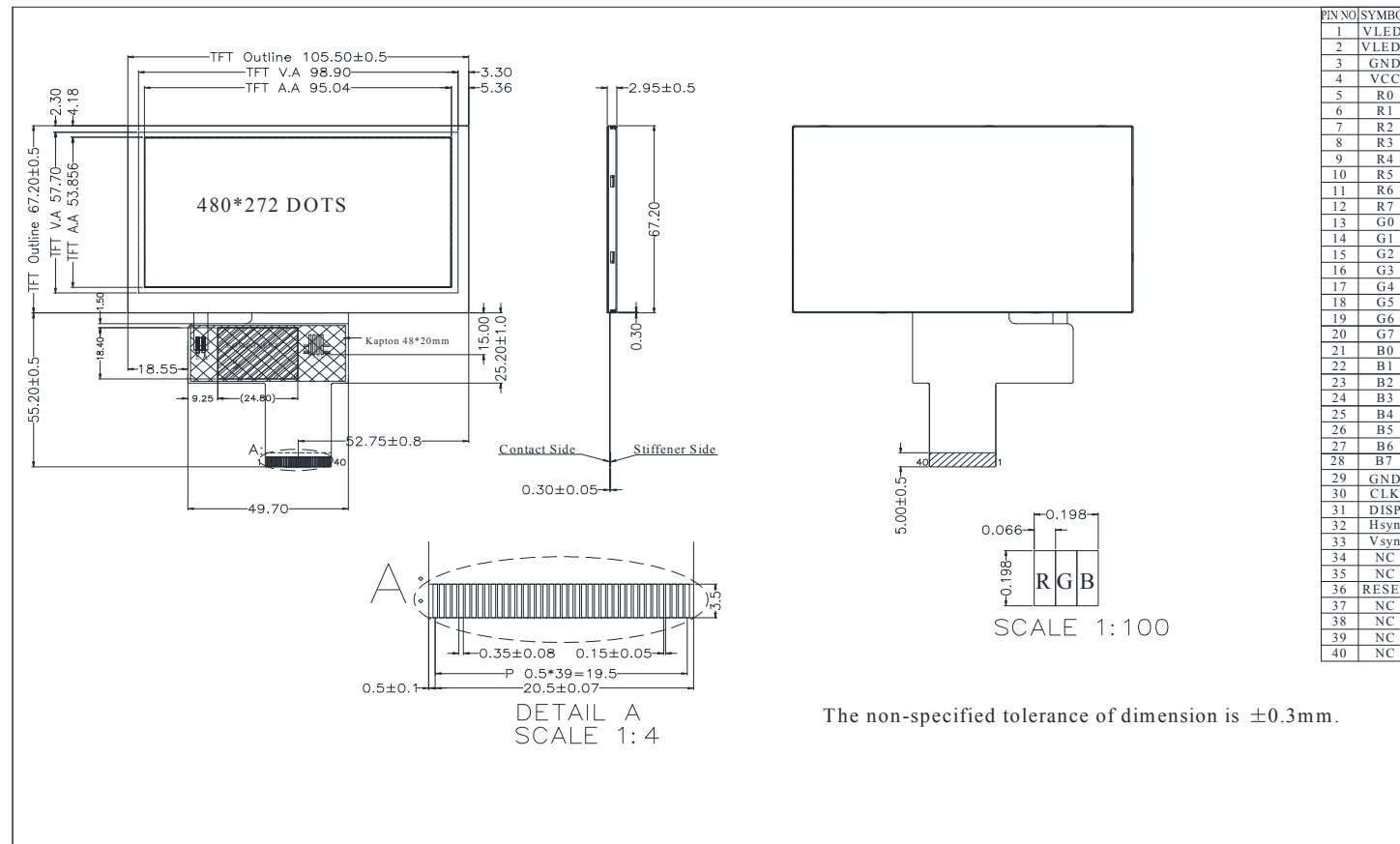
| Environmental Test                      |                                                                                                                                           |                                                                                                                                    |      |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|------|
| Test Item                               | Content of Test                                                                                                                           | Test Condition                                                                                                                     | Note |
| High Temperature storage                | Endurance test applying the high storage temperature for a long time.                                                                     | 80°C<br>200hrs                                                                                                                     | 2    |
| Low Temperature storage                 | Endurance test applying the low storage temperature for a long time.                                                                      | -30°C<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°C<br>200hrs                                                                                                                     | —    |
| Low Temperature Operation               | Endurance test applying the electric stress under low temperature for a long time.                                                        | -20°C<br>200hrs                                                                                                                    | 1    |
| High Temperature/<br>Humidity Operation | The module should be allowed to stand at 60 °C, 90%RH max                                                                                 | 60°C, 90%RH<br>96hrs                                                                                                               | 1,2  |
| Thermal shock resistance                | The sample should be allowed stand the following 10 cycles of operation<br>-20°C    25°C    70°C<br><br>30min    5min    30min<br>1 cycle | -20°C/70°C<br>10 cycles                                                                                                            | —    |
| Vibration test                          | Endurance test applying the vibration during transportation and using.                                                                    | Total fixed amplitude : 15mm<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),<br>±800v(air),<br>RS=330Ω<br>CS=150nF                                                                           | —    |

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



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### Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: [info@moschip.ru](mailto:info@moschip.ru)

Skype отдела продаж:

moschip.ru

moschip.ru\_4

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