

# **SPECIFICATION**

# **AGM 0057W**



**RECORDS OF REVISION**

**DOC. FIRST ISSUE**

| VERSION | DATE       | REVISED<br>PAGE NO. | SUMMARY                                                                             |
|---------|------------|---------------------|-------------------------------------------------------------------------------------|
| 0       | 2013/07/02 |                     | First issue                                                                         |
| A       | 2014/05/06 |                     | Modify Package<br>Specification & ptical<br>Characteristics.                        |
| B       | 2015/05/05 |                     | Add size & Surface.<br>Modify Pixel Data Format ,<br>Block Diagram<br>&Reliability. |

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# **1.Summary**

This technical specification applies to 5.7' color TFT-LCD panel. The 5.7' 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.

## **2.General Specifications**

| Item                           | Dimension                         | Unit |
|--------------------------------|-----------------------------------|------|
| Size                           | 5.7                               | inch |
| Dot Matrix                     | 320 x RGBx240(TFT)                | dots |
| Module dimension               | 126.00x 101.55 x 10.5             | mm   |
| Active area                    | 115.2 x 86.4                      | mm   |
| Dot pitch                      | 0.12 x 0.36                       | mm   |
| LCD type                       | TFT, Normally White, Transmissive |      |
| View Direction                 | 12 o'clock                        |      |
| Gray Scale Inversion Direction | 6 o'clock                         |      |
| Backlight Type                 | LED ,Normally White               |      |
| Controller IC                  | SSD1963                           |      |
| Interface                      | Digital 8080 family MPU           |      |
| With /Without TP               | Without TP                        |      |
| Surface                        | Glare                             |      |

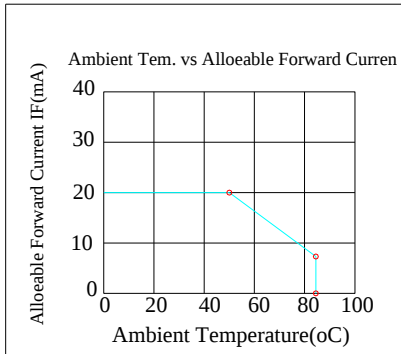
\*Color tone slight changed by temperature and driving voltage.

### 3.Absolute Maximum Ratings

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

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

1. 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

### 4.1. Operating conditions:

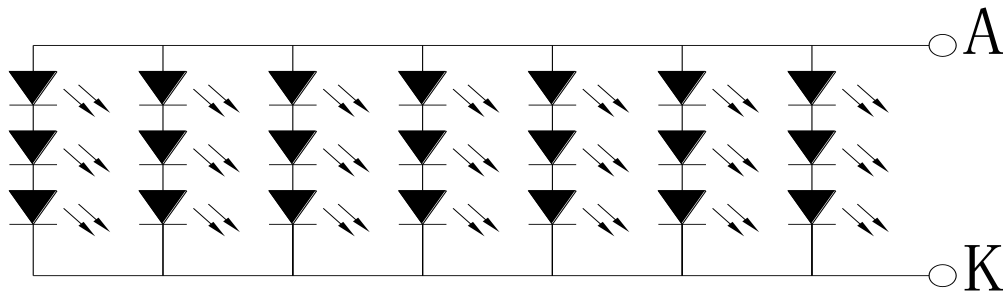
| Item                   | Symbol | Condition | Min | Typ | Max | Unit | Remark |
|------------------------|--------|-----------|-----|-----|-----|------|--------|
| Supply Voltage For LCM | VDD    | —         | 3.0 | 3.3 | 3.6 | V    | -      |
| Supply Current For LCM | IDD    | —         | —   | 120 | 180 | mA   | Note1  |

Note 1 : This value is test for VDD=3.3V , Ta=25 °C only

### 4.2. LED driving conditions

| Parameter         | Symbol | Min. | Typ.   | Max. | Unit | Remark     |
|-------------------|--------|------|--------|------|------|------------|
| LED current       |        | -    | 140    | -    | mA   |            |
| Power Consumption |        | 1260 | -      | 1470 | mW   |            |
| LED voltage       | VBL+   | 9.0  | -      | 10.5 | 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 CHARACTERISTICS

| Parameter                | Symbol          | Rating |     |        | Unit | Condition |
|--------------------------|-----------------|--------|-----|--------|------|-----------|
|                          |                 | Min    | Typ | Max    |      |           |
| Low level input voltage  | V <sub>IL</sub> | 0      | -   | 0.3VDD | V    |           |
| High level input voltage | V <sub>IH</sub> | 0.7VDD | -   | VDD    | V    |           |

# 6.Interface timing

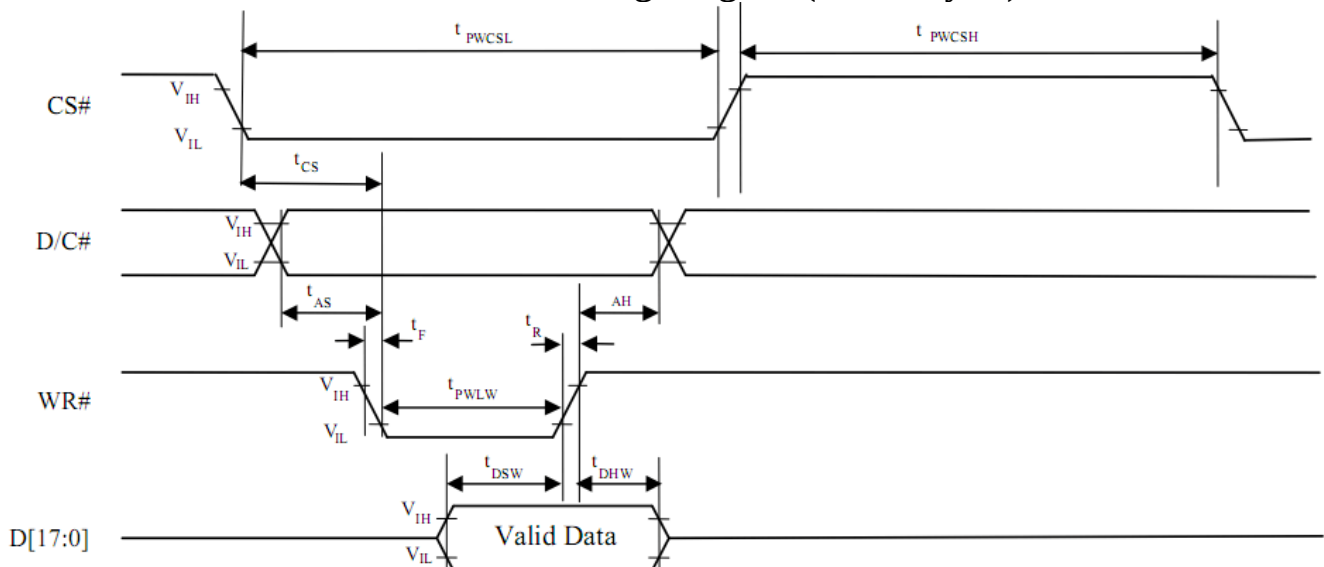
## 6.1. 8080 Mode

The 8080 mode MCU interface consist of CS#, D/C#, RD#, WR#, Data Bus. This interface use WR# to define a write cycle and RD# for read cycle. If the WR# goes low when the CS# signal is low, the data or command will be latched into the system at the rising edge of WR#. Similarly, the read cycle will start when RD# goes low and end at the rising edge of RD#.

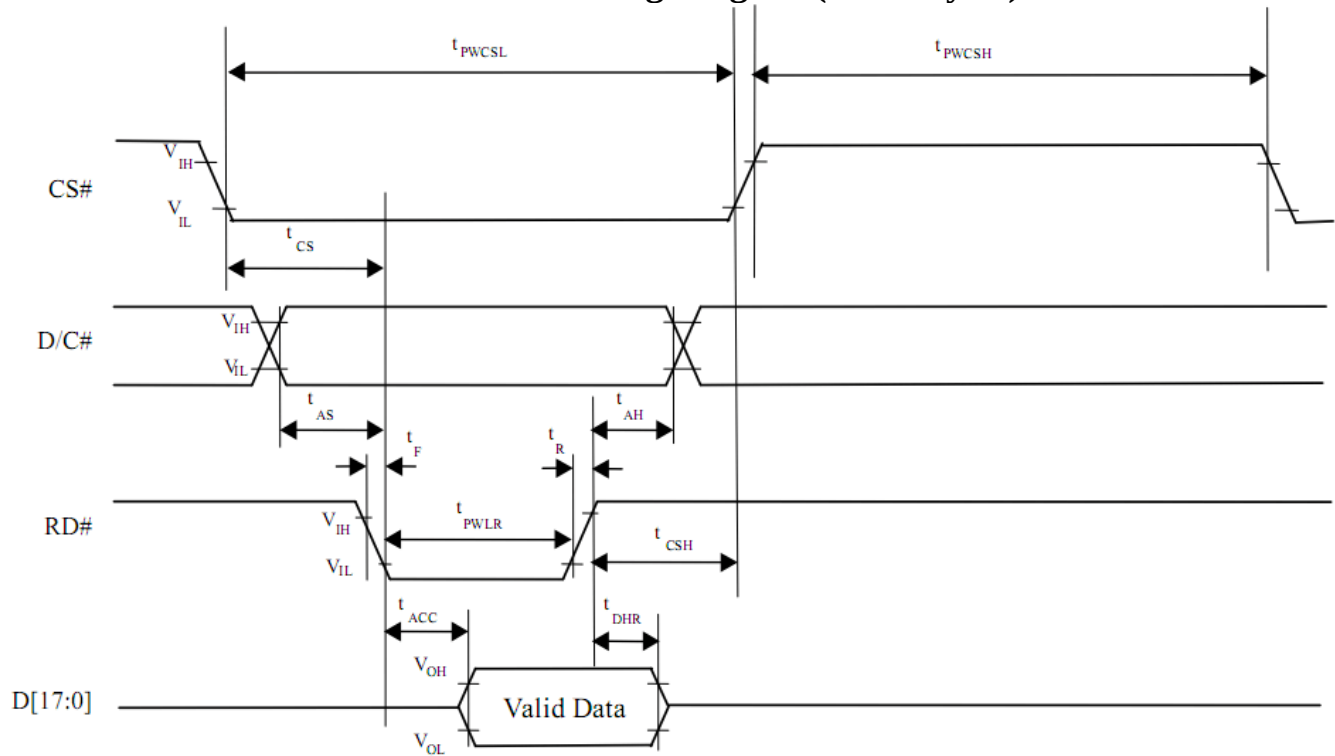
## 6.2. 8080 Mode Write Cycle

| Symbol | Parameter                                                                              | Min            | Typ                                | Max | Unit |
|--------|----------------------------------------------------------------------------------------|----------------|------------------------------------|-----|------|
| fMCLK  | System Clock Frequency                                                                 | 1              | -                                  | 110 | MHz  |
| tMCLK  | System Clock Period                                                                    | 1/ fMCLK       | -                                  | -   | ns   |
| tPWCSH | Control Pulse High Width    Write<br>Read                                              | 13<br>30       | 1.5* tMCLK<br>3.5* tMCLK           | -   | ns   |
| tPWCSL | Control Pulse Low Width    Write (next write cycle)<br>Write (next read cycle)<br>Read | 13<br>80<br>80 | 1.5* tMCLK<br>9* tMCLK<br>9* tMCLK | -   | ns   |
| tAS    | Address Setup Time                                                                     | 1              | -                                  | -   | ns   |
| tAH    | Address Hold Time                                                                      | 2              | -                                  | -   | ns   |
| tDSW   | Write Data Setup Time                                                                  | 4              |                                    |     | ns   |
| tDHW   | Write Data Hold Time                                                                   | 1              | -                                  | -   | ns   |
| tPWLW  | Write Low Time                                                                         | 12             |                                    |     | ns   |
| tDHR   | Read Data Hold Time                                                                    | 1              | -                                  | -   | ns   |
| tACC   | Access Time                                                                            | 32             |                                    |     | ns   |
| tPWLr  | Read Low Time                                                                          | 36             | -                                  | -   | ns   |
| tR     | Rise Time                                                                              | -              |                                    | 0.5 | ns   |
| tF     | Fall Time                                                                              | -              | -                                  | 0.5 | ns   |
| tCS    | Chip select setup time                                                                 | 2              |                                    | -   | ns   |
| tCSH   | Chip select hold time to read signal                                                   | 3              | -                                  | -   | ns   |

## 6.3. Parallel 8080-series Interface Timing Diagram(Write Cycle)



## 6.4. Parallel 8080-series Interface Timing Diagram(Read Cycle)



## 6.5. Pixel Data Format

| Interface            | Cycle           | D[15] | D[14] | D[13] | D[12] | D[11] | D[10] | D[9] | D[8] | D[7] | D[6] | D[5] | D[4] | D[3] | D[2] | D[1] | D[0] |
|----------------------|-----------------|-------|-------|-------|-------|-------|-------|------|------|------|------|------|------|------|------|------|------|
| 16 bits (565 format) | 1 <sup>st</sup> | R5    | R4    | R3    | R2    | R1    | G5    | G4   | G3   | G2   | G1   | G0   | B5   | B4   | B3   | B2   | B1   |
| 16 bits              | 1 <sup>st</sup> | R7    | R6    | R5    | R4    | R3    | R2    | R1   | R0   | G7   | G6   | G5   | G4   | G3   | G2   | G1   | G0   |
|                      | 2 <sup>nd</sup> | B7    | B6    | B5    | B4    | B3    | B2    | B1   | B0   | R7   | R6   | R5   | R4   | R3   | R2   | R1   | R0   |
|                      | 3 <sup>rd</sup> | G7    | G6    | G5    | G4    | G3    | G2    | G1   | G0   | B7   | B6   | B5   | B4   | B3   | B2   | B1   | B0   |
| 8 bits               | 1 <sup>st</sup> |       |       |       |       |       |       |      |      | R7   | R6   | R5   | R4   | R3   | R2   | R1   | R0   |
|                      | 2 <sup>nd</sup> |       |       |       |       |       |       |      |      | G7   | G6   | G5   | G4   | G3   | G2   | G1   | G0   |
|                      | 3 <sup>rd</sup> |       |       |       |       |       |       |      |      | B7   | B6   | B5   | B4   | B3   | B2   | B1   | B0   |

# 7.Optical Characteristics

| Item                                              | Symbol | Condition.                              | Min   | Typ.  | Max.  | Unit                  | Remark            |
|---------------------------------------------------|--------|-----------------------------------------|-------|-------|-------|-----------------------|-------------------|
| Response time                                     | Tr     | $\theta = 0^\circ \cdot \Phi = 0^\circ$ | -     | 15    | 30    | ms                    | Note 3,5          |
|                                                   | Tf     |                                         | -     | 35    | 50    | ms                    |                   |
| Contrast ratio                                    | CR     | At optimized viewing angle              | 150   | 250   | -     | -                     | Note 4,5          |
| Color Chromaticity                                | White  | $\theta = 0^\circ \cdot \Phi = 0$       | 0.282 | 0.312 | 0.342 |                       | Note 2,6,7        |
|                                                   |        |                                         | 0.319 | 0.349 | 0.379 |                       |                   |
| Viewing angle<br>(Gray Scale Inversion Direction) | Hor.   | $\Theta_R$                              | 60    | 70    |       | Deg.                  | Note 1            |
|                                                   |        | $\Theta_L$                              | 60    | 70    |       |                       |                   |
|                                                   | Ver.   | $\Phi_T$                                | 40    | 50    |       |                       |                   |
|                                                   |        | $\Phi_B$                                | 60    | 70    |       |                       |                   |
| Brightness                                        | -      | -                                       | 400   | 500   |       | cd/<br>m <sup>2</sup> | Center of display |

Ta=25±2℃, IL=140mA

Note 1: Definition of viewing angle range

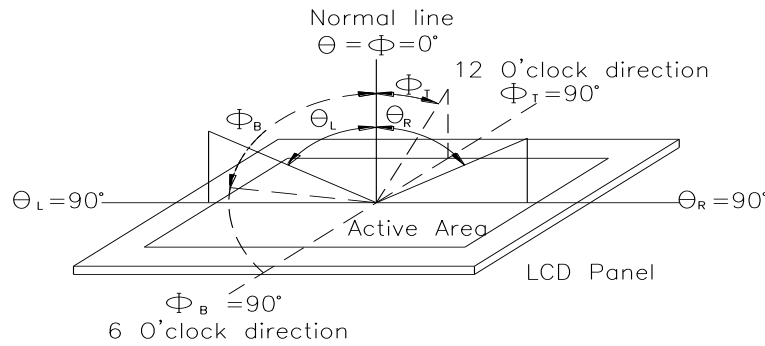


Fig.8.1. Definition of viewing angle

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

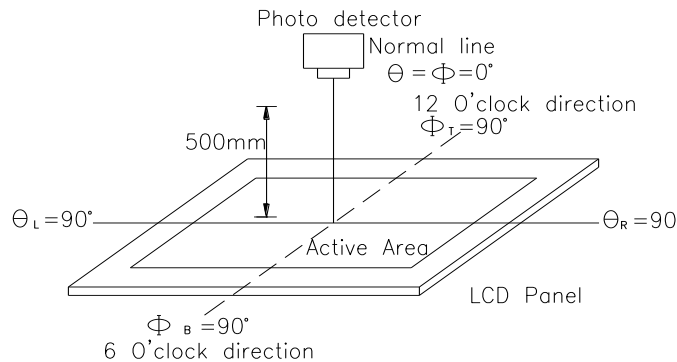
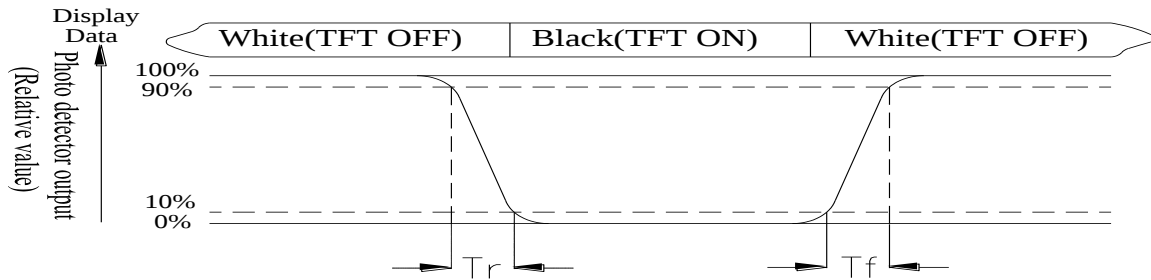


Fig. 8.2. Optical measurement system setup

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, 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  $V_i = V_{i50} \pm 1.5V$

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 No. | Symbol | Description                                            | Remark   |
|---------|--------|--------------------------------------------------------|----------|
| 1       | GND    | System ground pin of the IC. Connect to system ground. |          |
| 2       | VDD    | Power Supply : +3.3V                                   |          |
| 3       | NC     | No connection                                          |          |
| 4       | D/C    | Data/Command select                                    |          |
| 5       | WR     | Write strobe signal                                    |          |
| 6       | RD     | Read strobe signal                                     |          |
| 7       | DB0    | Data bus                                               |          |
| 8       | DB1    | Data bus                                               |          |
| 9       | DB2    | Data bus                                               |          |
| 10      | DB3    | Data bus                                               |          |
| 11      | DB4    | Data bus                                               |          |
| 12      | DB5    | Data bus                                               |          |
| 13      | DB6    | Data bus                                               |          |
| 14      | DB7    | Data bus                                               |          |
| 15      | CS     | Chip select                                            |          |
| 16      | RST    | Hardware reset                                         | Note 1   |
| 17      | NC     | No connection                                          |          |
| 18      | RL     | Left /right selection; Scan Direction;<br>Default RL=H | Note 2,3 |
| 19      | UD     | Up/down selection; Scan Direction;<br>Default UD=L     | Note 2,3 |
| 20      | NC     | No connection                                          |          |

Note 1: Global reset pin. Active low to enter reset state. Suggest to connect with an RC reset circuit for stability. Normally pull high.

Note 2: Selection of scanning mode

| Setting of scan control input |     | Scanning direction        |
|-------------------------------|-----|---------------------------|
| U/D                           | L/R |                           |
| GND                           | VDD | Up to down, left to right |
| VDD                           | GND | Down to up, right to left |
| GND                           | GND | Up to down, right to left |
| VDD                           | VDD | Down to up, left to right |

Note 3: Definition of scanning direction. Refer to the figure as below:



U/D=L, L/R=H



U/D=L, L/R=L

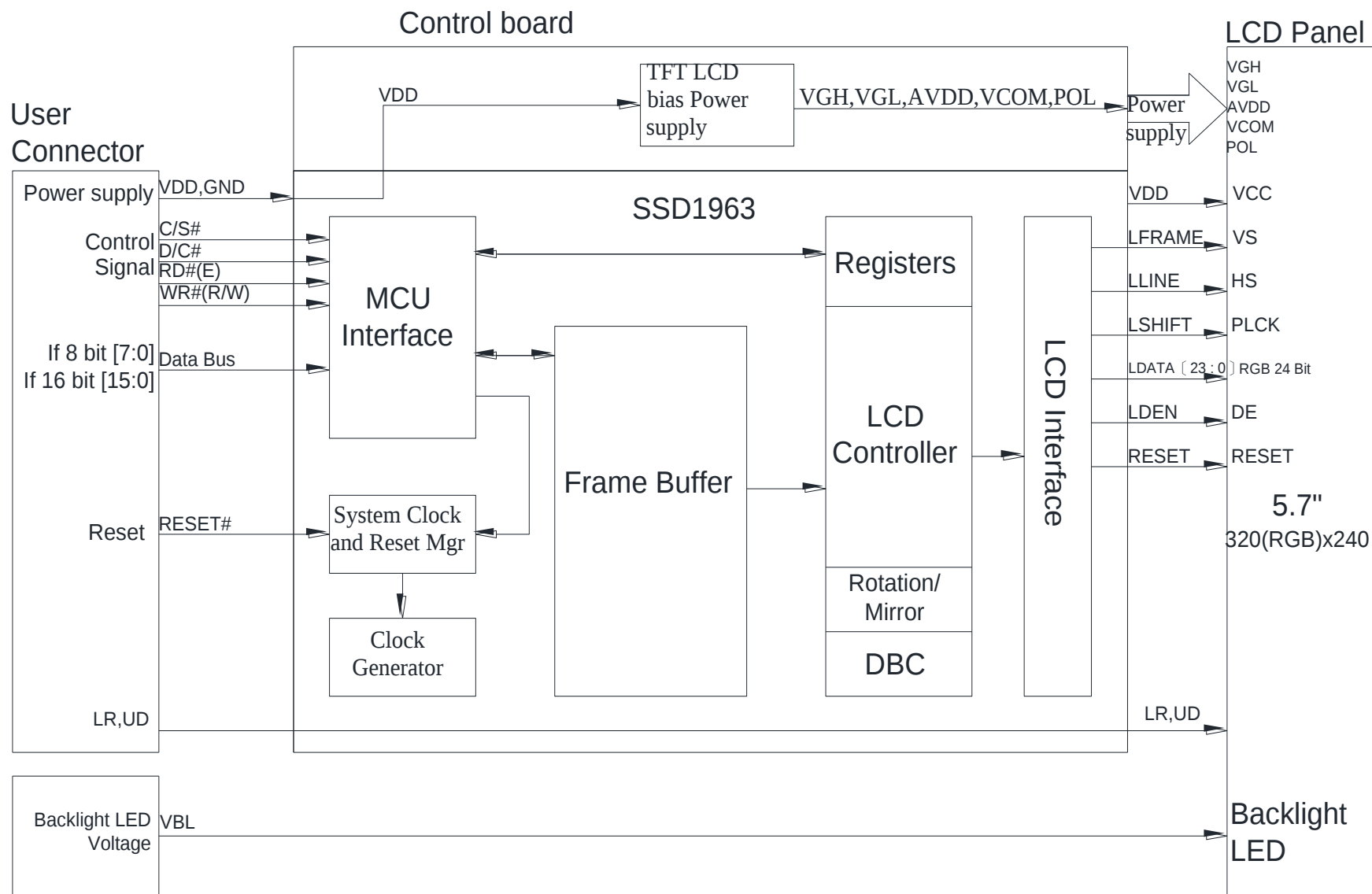


U/D=H, L/R=H



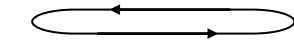
U/D=H, L/R=L

## 9. Block Diagram



# 10. Reliability

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

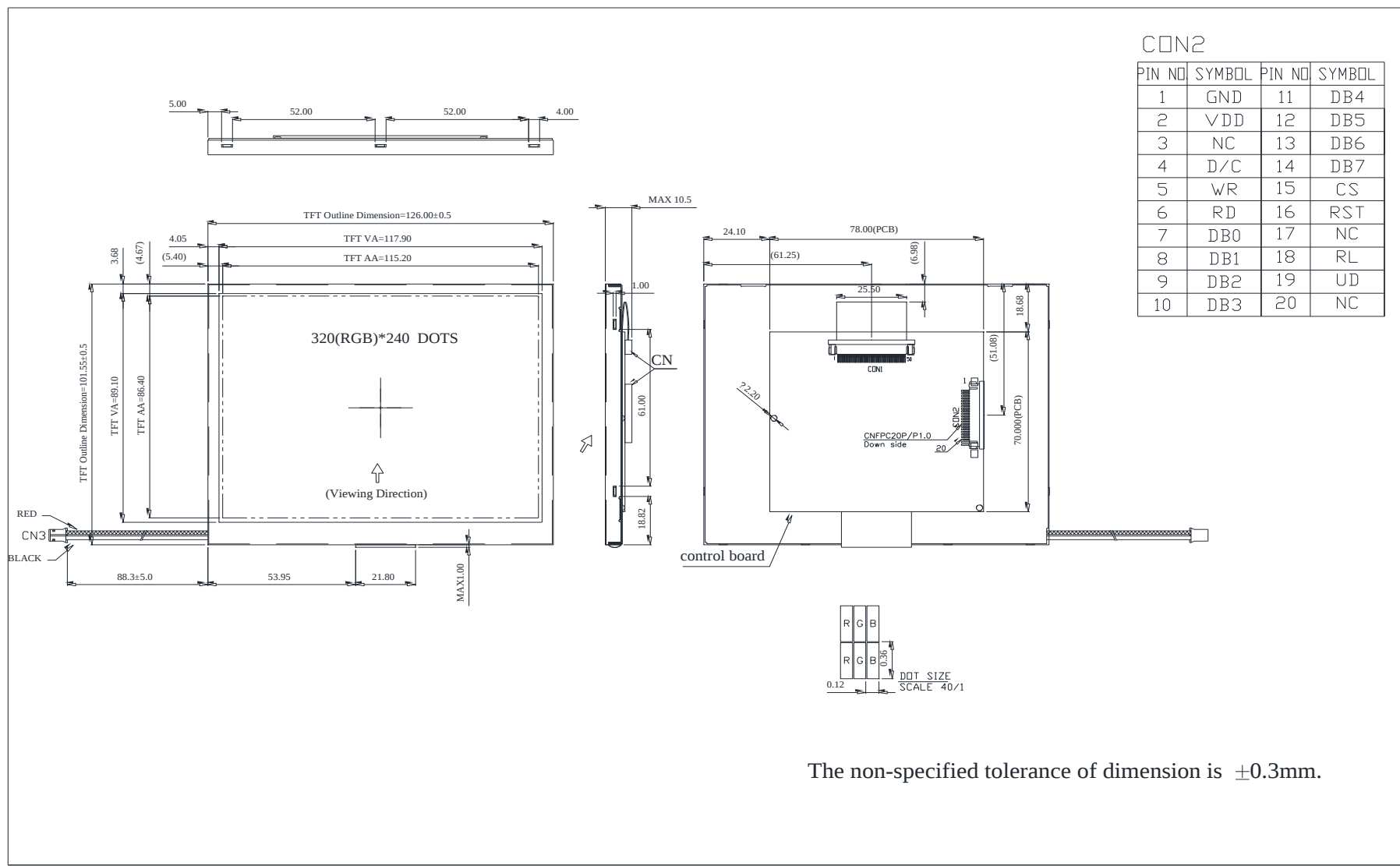
| Environmental Test                   |                                                                                                                                                                                                                                                                                          |                                                                                                                                    |      |
|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|------|
| 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/ 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             | <p>The sample should be allowed stand the following 10 cycles of operation</p> <div style="text-align: center;"> <p>-20°C      25°C      70°C</p>  <p>30min    5min    30min</p> <p>1 cycle</p> </div> | -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=800V,<br>RS=1.5kΩ<br>CS=100pF<br>1 time                                                                                         | —    |

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



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

# **12.Initial Code For Reference**

```
void Initial_SSD1963()
{

    Write_Command(0x01);
    Delay_ms(10);
    Write_Command(0xe0);
    Write_Parameter(0x01);
    Delay_ms(50);
    Write_Command(0xe0);
    Write_Parameter(0x03);
    Delay_ms(5);

    Write_Command(0xb0);
    Write_Parameter(0x0c);
    Write_Parameter(0x80);
    Write_Parameter(0x01);
    Write_Parameter(0x3f);
    Write_Parameter(0x00);
    Write_Parameter(0xef);
    Write_Parameter(0x00);

    Write_Command(0xf0);
    Write_Parameter(0x03);

    Write_Command(0xe2);
    Write_Parameter(0x1d);
    Write_Parameter(0x02);
    Write_Parameter(0x54);

    Write_Command(0xe6);
    Write_Parameter(0x01);
    Write_Parameter(0x40);
    Write_Parameter(0xff);

    Write_Command(0xb4);
    Write_Parameter(0x01);
    Write_Parameter(0xb8);
    Write_Parameter(0x00);
    Write_Parameter(0x44);
    Write_Parameter(0x07);
    Write_Parameter(0x00);
    Write_Parameter(0x00);
    Write_Parameter(0x00);

    Write_Command(0xb6);
    Write_Parameter(0x01);
    Write_Parameter(0x08);
    Write_Parameter(0x00);
```

```
Write_Parameter(0x13);  
Write_Parameter(0x07);  
Write_Parameter(0x00);  
Write_Parameter(0x00);
```

```
Write_Command(0x2a);  
Write_Parameter(0x00);  
Write_Parameter(0x00);  
Write_Parameter(0x01);  
Write_Parameter(0x3f);
```

```
Write_Command(0x2b);  
Write_Parameter(0x00);  
Write_Parameter(0x00);  
Write_Parameter(0x00);  
Write_Parameter(0xef);
```

```
Write_Command(0x29);  
Write_Command(0x2c);
```

```
}
```