

# INDUSTRIAL STRENGTH... Start Your Application From YOURITECH

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**MODEL NO : ET027HV03-T**

**MODEL VERSION: 01**

**SPEC VERSION : 1.0**

**ISSUED DATE: 2021-07-26**

☐ Preliminary Specification

☒ Final Product Specification

**Customer :** \_\_\_\_\_

| Approved by | Notes |
|-------------|-------|
|             |       |

**Youri Confirmation**

| Prepared by | Reviewed by | Approved by |
|-------------|-------------|-------------|
| John        | Johnny      | Wang        |

## **1. Introduction**

### **1.1 Scope of application**

LCD specification: Dots 320xRGBx240.

As to basic specification of the driver IC, refer to the IC (ILITEK:ILI8961) specification and data book.

All material & processing of the LCD module should be Lead Free.

### **1.2 TFT features:**

Structure: TFT PANNEL+IC +FPC+BL;;

ALL O'CLOCK Type LCD

320dot-segment and 240 dot-common outputs;

16.7M Color can be selected by software;

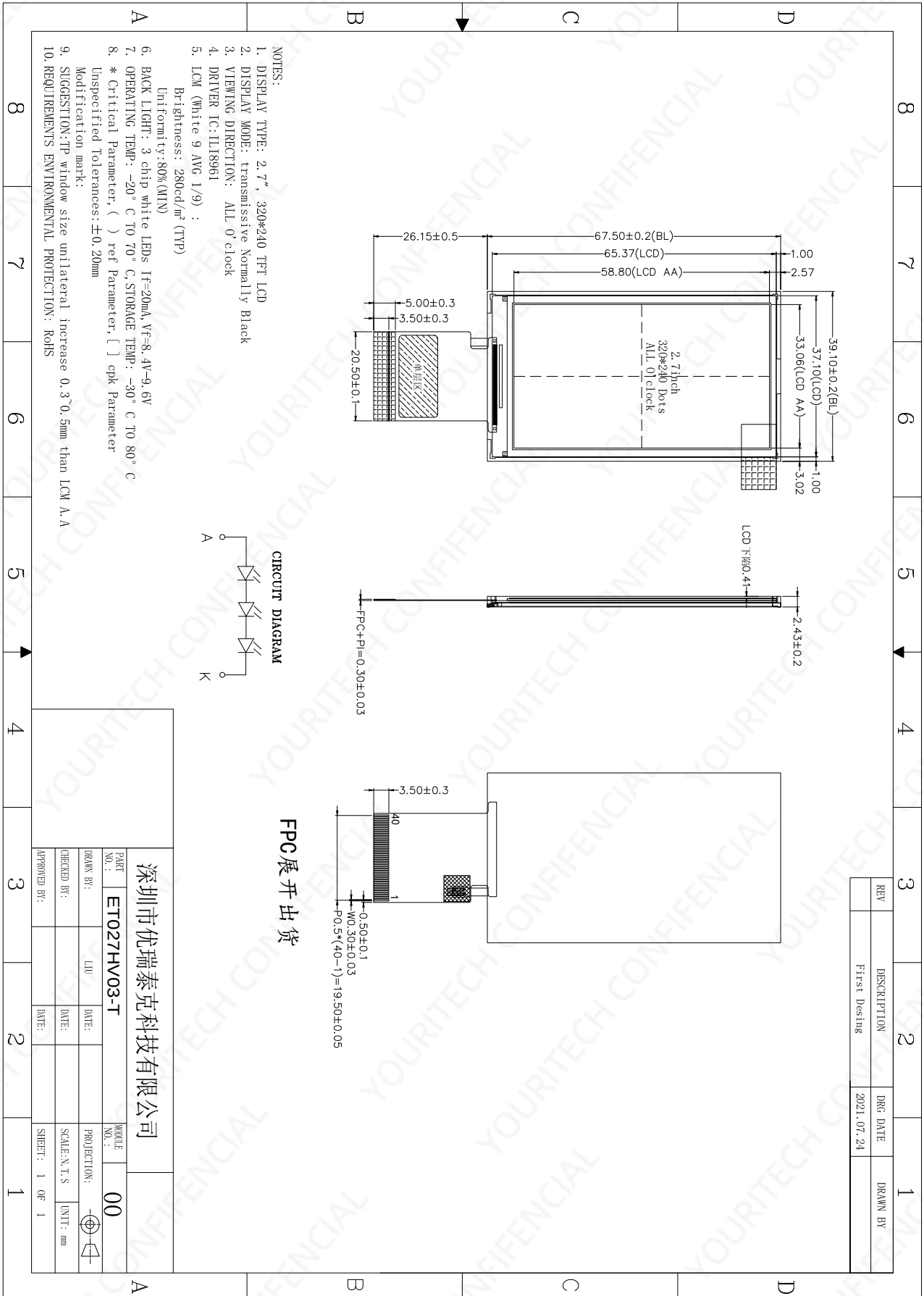
White LED back light;

8bit RGB interface

### **1.3 Applications:**

## 2. LCM General specification

| ITEM              | Standard value              | Unit |
|-------------------|-----------------------------|------|
| LCD Type          | Normally White              | --   |
| Drive element     | TFT active matrix           | --   |
| Number of pixels  | 320*3RGB(H)X240(V)          | Dots |
| Pixel arrangement | RGB stripe                  | --   |
| Pixel Pitch (H*V) | 0.06125 × 0.13775           | mm   |
| Active area       | 58.80(H) x33.06(V)          | mm   |
| Viewing direction | ALL O'CLOCK                 | -    |
| TFT Driver IC     | ILI8961                     |      |
| TFT interface     | 8bit RGB interface          | -    |
| Approx. Weight    | TBD                         | g    |
| LCM Size(W*H*T)   | 67.50W) x 39.10(H) x2.43(T) | mm   |
| Touch structure   | --                          |      |
| Touch Driver IC   |                             |      |
| Touch Interface   |                             |      |



### 3.Absolute Maximum Rating

| Characteristics           | Symbol           | Min. | Max. | Unit |
|---------------------------|------------------|------|------|------|
| LCM Operating Temperature | T <sub>OPR</sub> | -20  | +70  | °C   |
| LCM Storage Temperature   | T <sub>STG</sub> | -30  | +80  | °C   |
| Humidity                  | RH               | -    | 90   | %    |

### 4.Electrical Characteristics

#### 4.1 TFT DC Characteristics

| Characteristics           | Symbol | Min. | Typ. | Max. | Unit |
|---------------------------|--------|------|------|------|------|
| Supply Voltage for I/O    | VDDIO  | 1.65 | 1.8  | 3.6  | V    |
| Supply Voltage for(DC/DC) | VDD    | 2.7  | 2.8  | 3.6  | V    |
| Supply Voltage for(DC/DC) | AVDD   |      |      |      | V    |
| Supply Voltage for(DC/DC) | AVEE   |      |      |      | V    |

#### 4.2Back-Light Unit Characeristics

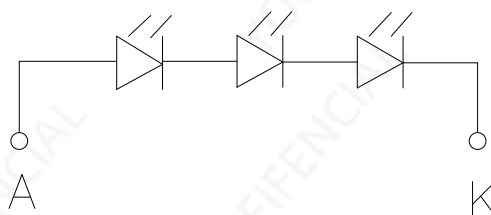
The back-light system is an edge-lighting type with white 3 LEDs. The characteristics of the back-light are shown in the following tables.

| Characteristics     | Symbol         | Min. | Type   | Max. | Unit              | Notes  |
|---------------------|----------------|------|--------|------|-------------------|--------|
| Forward Voltage     | V <sub>F</sub> | 8.4  | --     | 9.6  | V                 | -      |
| Forward current     | I <sub>F</sub> | --   | 20     | -    | mA                | -      |
| Luminance(With LCD) | L <sub>v</sub> |      | 280    | --   | cd/m <sup>2</sup> | -      |
| LED life time       | N/A            | ---- | 30,000 | --   | Hr                | Note 1 |

Note:

- (1) The “LED life time” is defined as the module brightness decrease to 50% of original brightness at I<sub>L</sub>=20mA/LED. The LED life time could be decreased if operating I<sub>L</sub> is larger than 25mA/LED.

Backlight circuit diagram shown in below:

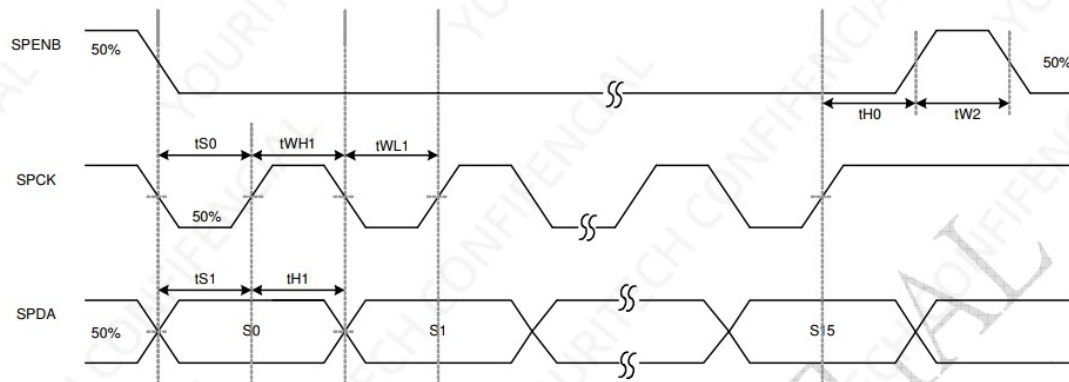


## 5. Module Function Description

| Pin No. | Symbol  | Description                                                  |
|---------|---------|--------------------------------------------------------------|
| 1       | VCOM    | TFT common lane                                              |
| 2       | LEDK    | POWER SUPPLY- FOR BACKLIGHT cathode                          |
| 3       | LEDA    | POWER SUPPLY+ FOR BACKLIGHT ANODE                            |
| 4       | DRV     | Power transistor signal for back light power boost converter |
| 5       | VCAC    | Power setting capacitor for vcom AC.                         |
| 6       | COMDC   | VCOM DC output.                                              |
| 7       | FRP     | Frame polarity output for panel vcom.                        |
| 8       | AGND    | Ground for analog circuit.                                   |
| 9       | VGL     | Power setting capacitor connect pin.                         |
| 10      | VGH     | Power setting capacitor connect pin.                         |
| 11-12   | C4M/C4P | C4M/C4P capacitor connect pin for internal charge pump       |
| 13      | VINT3   | VINT3,Floating this pin.                                     |
| 14      | VINT4   | VINT4,Floating this pin.                                     |
| 15-16   | C3M/C3P | C3M/C3P capacitor connect pin for internal charge pump       |
| 17      | VINT1   | VINT1,Power setting capacitor connect pin.                   |
| 18-19   | C2M/C2P | C2M/C2P capacitor connect pin for internal charge pump       |
| 20-21   | C1M-C1P | C1M/C1P capacitor connect pin for internal charge pump       |
| 22      | DVDD    | Power supply for analog circuit.                             |
| 23      | IOVCC   | POWER SUPPLY (1.8V/2.8V)                                     |
| 24      | VCI     | PINPOWER SUPPLY (2.8V)                                       |
| 25      | GND     | Gound                                                        |
| 26-33   | DB0-DB7 | 8-bit digital data input.                                    |
| 34      | DCLK    | Clock signal. Latching data at the rising edge.              |
| 35      | VSYNC   | Vertical sync input. Negative polarity.                      |
| 36      | HSYNC   | Horizontal Sync input. Negative polarity.                    |
| 37      | SCL     | Serial communication clock input.                            |
| 38      | SDA     | Serial communication data input.                             |
| 39      | CS      | CHIP SELECT                                                  |
| 40      | VCOM    | TFT common plane.                                            |

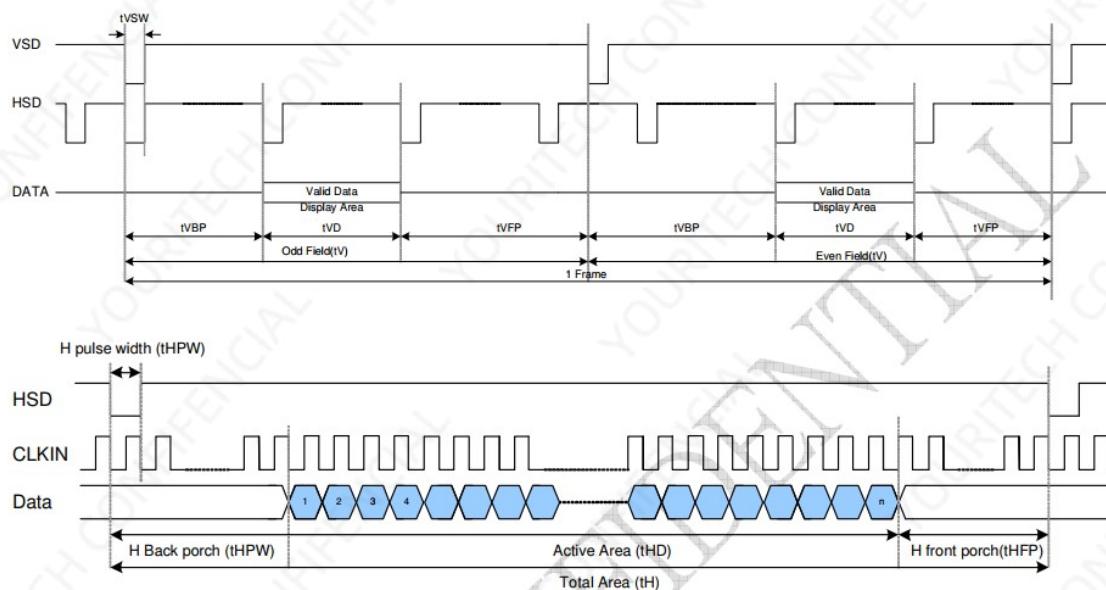
## 6. Timing Characteristics

### Serial Control Timing



| Item                         | symbol    | Min. | Typ. | Max. | Unit |
|------------------------------|-----------|------|------|------|------|
| SPENB input setup time       | $t_{S0}$  | 50   |      |      | ns   |
| Serial data input setup time | $t_{S1}$  | 50   |      |      | ns   |
| SPENB input hold time        | $t_{H0}$  | 50   |      |      | ns   |
| Serial Data Input hold time  | $t_{H1}$  | 50   |      |      | ns   |
| SPCK pulse high width        | $t_{WH1}$ | 50   |      |      | ns   |
| SPCK pulse low width         | $t_{WL1}$ | 50   |      |      | ns   |
| SPENB pulse high width       | $t_{W2}$  | 400  |      |      | ns   |

### 8-bit RGB/8-bit Dummy RGB/YUV /Parallel RGB Input Timing Chart



| Parameter             | Symbol | Interface |        |        | Unit  |
|-----------------------|--------|-----------|--------|--------|-------|
|                       |        | Min.      | Typ.   | Max.   |       |
| CLKIN frequency       | fCLKIN | 13.5      | 27     | 27.19  | MHz   |
| HSD period            | tH     | 1024      | 1716   | 1728   | CLKIN |
| HSD display period    | tHD    |           | 960    |        | CLKIN |
| HSD back porch        | tHBP   | 50        | 70     | 255    | CLKIN |
| HSD front porch       | tHFP   | 14        | 686    | 718    | CLKIN |
| HSD pulse width       | tHSW   | 1         | 1      | tHBP-1 | CLKIN |
| VSD period time       | tV     | 242.5     | 262.5  | 450.5  | H     |
| Vertical display area | tVD    |           | 240    |        | H     |
| VSD back porch        | tVBP   | 1         | 21     | 31     | H     |
| Odd field             |        | 1.5       | 21.5   | 31.5   |       |
| VSD front porch       | tVFP   | 1.5       | 1.5    | 179.5  | H     |
| Odd field             |        | 1         | 1      | 179    |       |
| VSD pulse width       | tVSW   | 1CLKIN    | 1CLKIN | 6H     |       |
| 1 Frame               |        | 485       | 525    | 901    | H     |

## 7. Optical Characteristics

### 7.1 Optical Specification

| Parameter                           |            | Symbol                          | Condition           | Min.  | Typ.  | Max.  | Unit | Remark    |
|-------------------------------------|------------|---------------------------------|---------------------|-------|-------|-------|------|-----------|
| Viewing Angle Range                 | Horizontal | Θ3                              | CR>10               | 70    | 80    | -     | Deg. | Note1     |
|                                     |            | Θ9                              |                     | 70    | 80    | -     | Deg. |           |
|                                     | Vertical   | Θ12                             |                     | 70    | 80    | -     | Deg. |           |
|                                     |            | Θ6                              |                     | 70    | 80    | -     | Deg. |           |
| Contrast ratio                      |            | CR                              | Θ = 0°              | 700   | 1200  | -     |      | Note2     |
| Transmittance                       |            | Tr                              |                     | 5.3   | 6.3   | -     | %    | Note3     |
| Color Gamut                         |            | CG                              |                     | 55.0  | 60.4  | -     | %    | CF@C<br>光 |
| Reproduction of color               | Red        | Rx                              | Θ = 0°              | 0.605 | 0.635 | 0.665 |      |           |
|                                     |            | Ry                              |                     | 0.306 | 0.336 | 0.366 |      |           |
|                                     | Green      | Gx                              |                     | 0.268 | 0.298 | 0.328 |      |           |
|                                     |            | Gy                              |                     | 0.546 | 0.576 | 0.606 |      |           |
|                                     | Blue       | Bx                              |                     | 0.104 | 0.134 | 0.164 |      |           |
|                                     |            | By                              |                     | 0.095 | 0.125 | 0.155 |      |           |
|                                     |            |                                 |                     |       |       |       |      |           |
| White Chromaticity                  |            | Wx                              | Θ = 0°              | 0.290 | 0.320 | 0.350 |      | CF@C光     |
|                                     |            | Wy                              |                     | 0.311 | 0.341 | 0.371 |      |           |
| Response Time<br>(Rising + Falling) |            | T <sub>r</sub> + T <sub>f</sub> | Ta= 25° C<br>Θ = 0° |       | 30    | 40    |      | Note 5    |

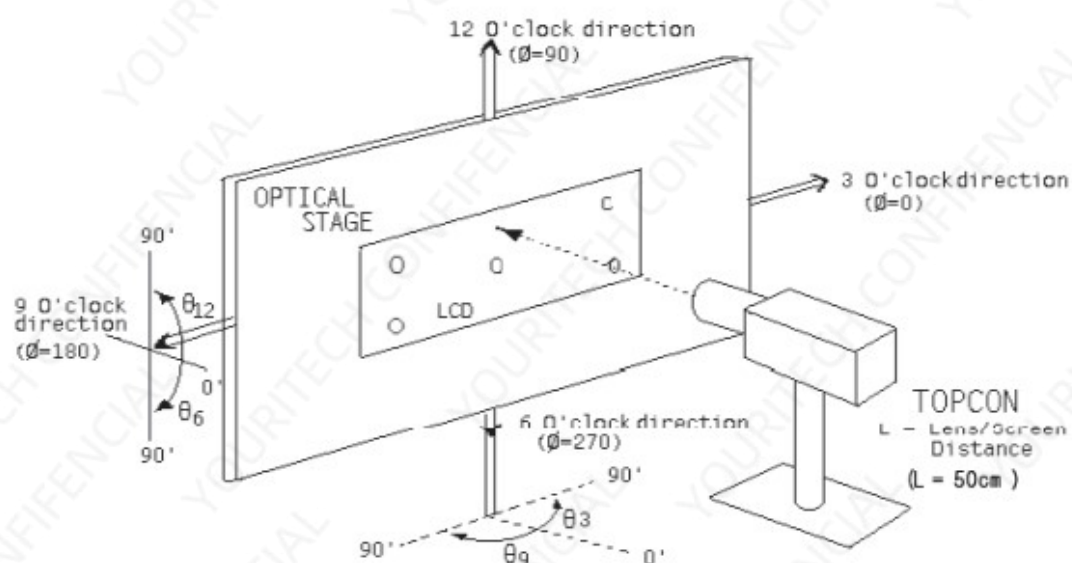
**Note:**

1. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing angles are determined for the horizontal or 3, 9 o' clock direction and the vertical or 6, 12 o' clock direction with respect to the optical axis which is normal to the LCD surface (see FIGURE 1).
2. Contrast measurements shall be made at viewing angle of  $\Theta = 0$  and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state . (see FIGUR 1)  
 Luminance Contrast Ratio (CR) is defined mathematically.

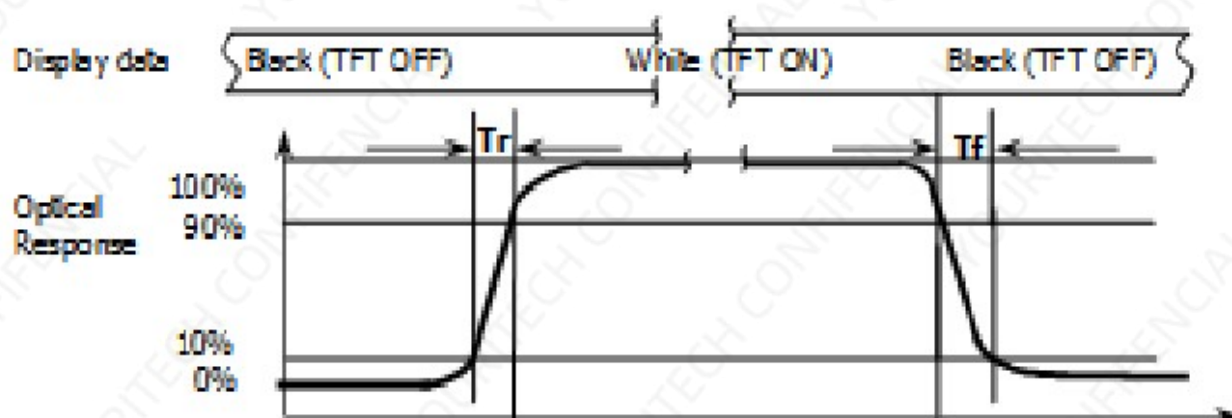
$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

3. Transmittance is the Value with APF and without CG.
4. The color chromaticity coordinates specified in the above table shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.
5. The electro-optical response time measurements shall be made as FIGURE 2 by switching the "data" input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is  $T_r$ , and 90% to 10% is  $T_f$ .

**Figure1 Measurement Set Up**



**Figure2 Response Time Testing**



## 8. Reliability Test Item

| No. | Test Item                              | Test Condition                                          | Notes                                                                                                                                                                                                                                   |
|-----|----------------------------------------|---------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | High Temp. Storage                     | +80°C / 96H                                             | 1. Functional test is OK.<br>Missing Segment, short,<br>unclear segment<br>non-display, display abnormally<br>and liquid crystal leakage<br>un-allowed.<br>2. No low<br>temperature bubbles, end seal<br>loose and fall, frame rainbow. |
| 2   | Low Temp. Storage                      | -30°C / 96H                                             |                                                                                                                                                                                                                                         |
| 3   | High Temp. Operating                   | +70°C / 96H                                             |                                                                                                                                                                                                                                         |
| 4   | Low Temp. Operating                    | -20°C / 96H                                             |                                                                                                                                                                                                                                         |
| 5   | High Temperature<br>/ Humidity storage | 50°C x 90%RH / 96H                                      |                                                                                                                                                                                                                                         |
| 6   | Thermal and cold shock                 | Static state, -20°C (30min) ~60°C<br>(30min), 50 cycles |                                                                                                                                                                                                                                         |

## 9. Packing Method----TBD

- END -