

# INDUSTRIAL STRENGTH... Start Your Application From YOURITECH

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Mechanical design  
PCAP  
Production Custom designs Installation



- ☒ Preliminary Specifications  
☐ Final Specifications

|            |                                      |
|------------|--------------------------------------|
| Title      | 15.6-inch LCM Product Specifications |
| Model Name | ET156FH05-R                          |
| Version    | P1                                   |

|                                                                 |       |
|-----------------------------------------------------------------|-------|
| Customer                                                        |       |
| _____                                                           |       |
| Approved by                                                     | Date  |
| _____                                                           | _____ |
| Notice: This Specification is subject to change without notice. |       |

|                   |                      |
|-------------------|----------------------|
| Approved By       | Prepared By          |
| Leo<br>2025-08-17 | Aurice<br>2025-08-17 |



| REV. | ECN NO. | DESCRIPTION OF CHANGES | DATE | PREPARED |
|------|---------|------------------------|------|----------|
|------|---------|------------------------|------|----------|




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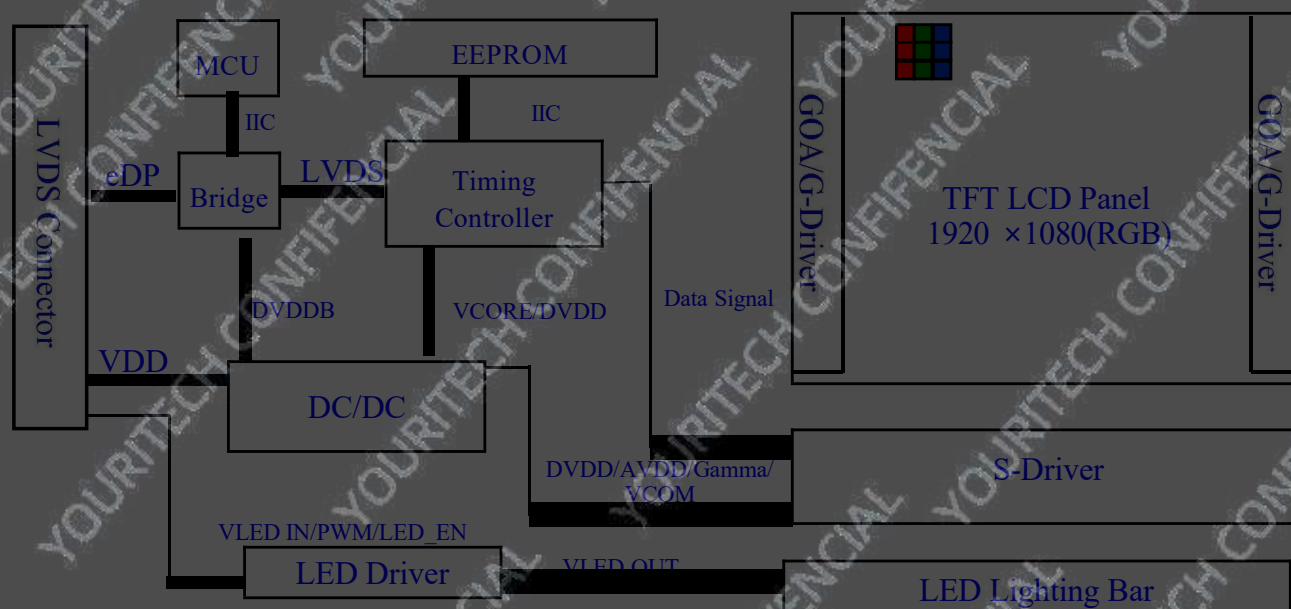
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## 1.0 GENERAL DESCRIPTION

### 1.0.1 Introduction

ET156FH05-R is a color active matrix TFT LCD module using amorphous silicon TFT's (Thin Film Transistors) as an active switching devices. This module has a 15.6 inch diagonally measured active area with FHD resolutions (1920 horizontal by 1080 vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this module can display 16.7 M colors.



### 1.0.2 Features

- ✎ LVDS interface
- ✎ RoHS Compliant

### 1.0.3 Application

- ✎ Charging pile



## 1.0.4 General Specification

< Table 1. General Specifications >

| Parameter                   | Specification        | Unit   | Remarks |
|-----------------------------|----------------------|--------|---------|
| Active area                 | 344.16(H) ×193.59(V) | mm     |         |
| Number of pixels            | 1920 (H) ×1080 (V)   | Pixels |         |
| Pixel pitch                 | 179.25(H) ×179.25(V) | mm     |         |
| Pixel arrangement           | RGB Vertical stripe  |        |         |
| Display colors              | 16.7M(8bit)          | Colors |         |
| Display mode                | Normally Black       |        |         |
| Dimensional outline         | 353.36*208.09*6.6    | mm     |         |
| Backlight power consumption | 12.8W Typ.           | w      |         |
| Weight                      | TBD                  | g      |         |
| Surface treatment           | Anti-Glare           |        |         |



## 2.0 ABSOLUTE MAXIMUM RATINGS

The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit. The operational and non-operational maximum voltage and current values are listed in Table 2.

< Table 2. Environment Absolute Maximum Ratings> [Ta =25 : 2 °C]

| Parameter                  | Symbol          | Min. | Max. | Unit | Remarks                           |
|----------------------------|-----------------|------|------|------|-----------------------------------|
| Operating Temperature      | T <sub>OP</sub> | -20  | +70  | °C   | Environment Temperature           |
| Storage Temperature        | T <sub>ST</sub> | -30  | +80  | °C   |                                   |
| Operating Ambient Humidity | H <sub>OP</sub> | -20  | +80  | %RH  |                                   |
| Storage Humidity           | H <sub>ST</sub> | -30  | +85  | %RH  |                                   |
| Heat Release Requirement   | Trls            | 15   |      | °C   | Note3<br>仅适用于Q/Sin<br>gle/FOG出货项目 |

Note:

1. These range above is maximum value not the actual operating temperature . Actual Operating temperature is no more than 40°C and temperature refers to the LCM surface temperature ;
- 2.BOE is not responsible for product problems beyond the use conditions.
- 3.When the ambient temperature is T °C , the surface temperature of Panel can not exceed (T+15)°C .



## 3.0 ELECTRICAL SPECIFICATIONS

### 3.0.1 TFT LCD Module

< Table 3. LCD Module Electrical Specifications >

[Ta =25 : 2 °C]

| Parameter                   |        |             | Min. | Typ. | Max. | Unit | Remarks |
|-----------------------------|--------|-------------|------|------|------|------|---------|
| Power Supply Voltage        |        | $V_{DD}$    | 3.0  | 3.3  | 3.4  | V    | Note 1  |
| Power Supply Inrush Current |        | $I_{rush}$  | -    | -    | 3    | A    | Note3   |
| Power Supply Current        | Mosaic | $I_{DD}$    | -    | 326  | 420  | mA   | Note 1  |
|                             | RGB    |             | -    | 478  | 620  | mA   |         |
| Power Consumption           | Mosaic | $P_M$       | -    | 1.08 | 1.40 | W    |         |
|                             | RGB    | $P_{RGB}$   | -    | 1.57 | 2.10 | W    |         |
|                             | BLU    | $P_{BL}$    | -    | -    | -    | W    | Note 2  |
|                             | Total  | $P_{Total}$ | -    | -    | -    | W    | @Mosaic |

### 3.0.2 Backlight Driving

The backlight system is an edge-lighting type with white-LED.

(It is usually required to measure under the following condition: Ta=25°C±2°C)

| Parameter                           |                | Symbol       | Min.   | Typ. | Max. | Unit | Remark |
|-------------------------------------|----------------|--------------|--------|------|------|------|--------|
| Power supply voltage for LED Driver |                | $V_{LED}$    |        | TBD  |      | V    |        |
| LED Power consumption               |                | $P_{LED}$    | -      | -    | 12.8 | W    |        |
| EN Control Level                    |                | Backlight on |        |      |      | V    |        |
| LED Forward Voltage                 |                | $V_F$        | -      | 30.0 | 32.0 | V    |        |
| LED Forward Current                 |                | $I_F$        | -      | 400  | -    | mA   |        |
| LED Lifetime                        |                | N/A          | 50,000 | -    | -    | Hour |        |
| PWM Control Level                   | PWM High Level |              | 2      |      |      | V    |        |
|                                     | PWM Low Level  |              | 0      |      | 0.8  | V    |        |
| PWM Control Frequency               | $F_{PWM}$      |              | 200    |      | 20   | KHz  |        |
| Duty Ratio                          |                | -            | 25     |      | 100  | %    |        |



### 3.0 ELECTRICAL SPECIFICATIONS

#### 3.1 Electrical Specifications

Notes :

1. The supply voltage is measured and specified at the interface connector of LCM.

The current draw and power consumption specified is for 3.3V at 25 ° C.

a) Mosaic pattern 8\*8

b) R/G/B patterns



Figure 3. Power Measure Patterns

2. Calculated value for reference ( $V_{LED} \times I_{LED}$ )

3. Measure condition (Figure 4)

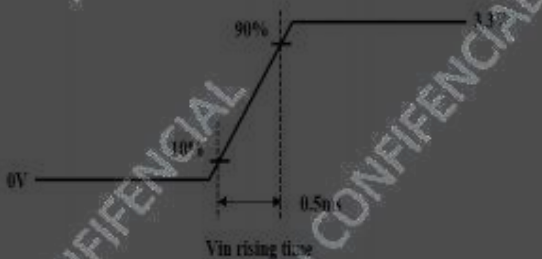


Figure 4. Inrush Measure Condition



## 4.0 INTERFACE CONNECTION.

### 4.0.1 Electrical Interface Connection

The electronics interface connector is 20455-040E.

<Table 6. Pin Assignments for the Interface Connector>

| Terminal | Symbol  | Functions                      |
|----------|---------|--------------------------------|
| Pin No.  | Symbol  | Description                    |
| 1        | LED_VCC | LED Power Supply,12V(typical)  |
| 2        | LED_VCC | LED Power Supply,12V(typical)  |
| 3        | LED_VCC | LED Power Supply,12V(typical)  |
| 4        | LED_VCC | LED Power Supply,12V(typical)  |
| 5        | GND     | Ground                         |
| 6        | GND     | Ground                         |
| 7        | GND     | Ground                         |
| 8        | GND     | Ground                         |
| 9        | LED_EN  | LED Enable                     |
| 10       | LED_PWM | LED PWM Control                |
| 11       | LCD_VCC | LCD Power Supply,3.3V(typical) |
| 12       | LCD_VCC | LCD Power Supply,3.3V(typical) |
| 13       | LCD_VCC | LCD Power Supply,3.3V(typical) |
| 14       | NC      | No Connection                  |
| 15       | NC      | No Connection                  |
| 16       | NC      | No Connection                  |
| 17       | GND     | Ground                         |
| 18       | RX00-   | -LVDS differential data input  |
| 19       | RX00+   | +LVDS differential data input  |
| 20       | RX01-   | -LVDS differential data input  |



## 4.0 INTERFACE CONNECTION.

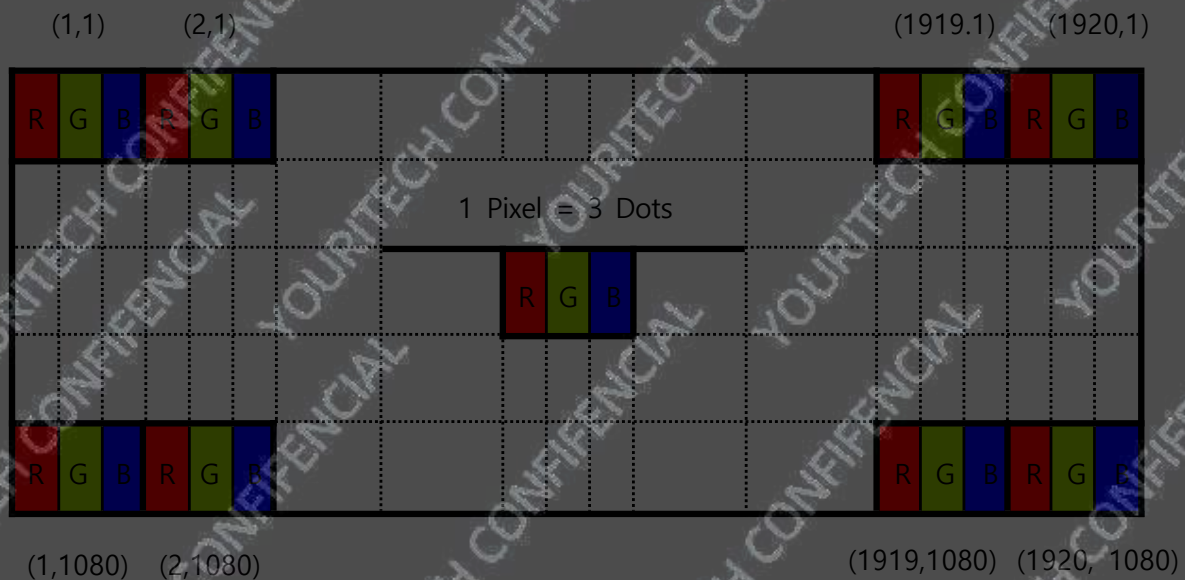
### 4.0.1 Electrical Interface Connection.

| Terminal | Symbol | Functions                      |
|----------|--------|--------------------------------|
| Pin No.  | Symbol | Description                    |
| 21       | RXO1+  | +LVDS differential data input  |
| 22       | RXO2-  | -LVDS differential data input  |
| 23       | RXO2+  | +LVDS differential data input  |
| 24       | GND    | Ground                         |
| 25       | RXOC-  | -LVDS differential clock input |
| 26       | RXOC+  | +LVDS differential clock input |
| 27       | GND    | Ground                         |
| 28       | RXO3-  | -LVDS differential data input  |
| 29       | RXO3+  | +LVDS differential data input  |
| 30       | RXE0-  | -LVDS differential data input  |
| 31       | RXE0+  | +LVDS differential data input  |
| 32       | RXE1-  | -LVDS differential data input  |
| 33       | RXE1+  | +LVDS differential data input  |
| 34       | GND    | Ground                         |
| 35       | RXE2-  | -LVDS differential data input  |
| 36       | RXE2+  | +LVDS differential data input  |
| 37       | RXEC-  | -LVDS differential clock input |
| 38       | RXEC+  | +LVDS differential clock input |
| 39       | RXE3-  | -LVDS differential data input  |
| 40       | RXE3+  | +LVDS differential data input  |



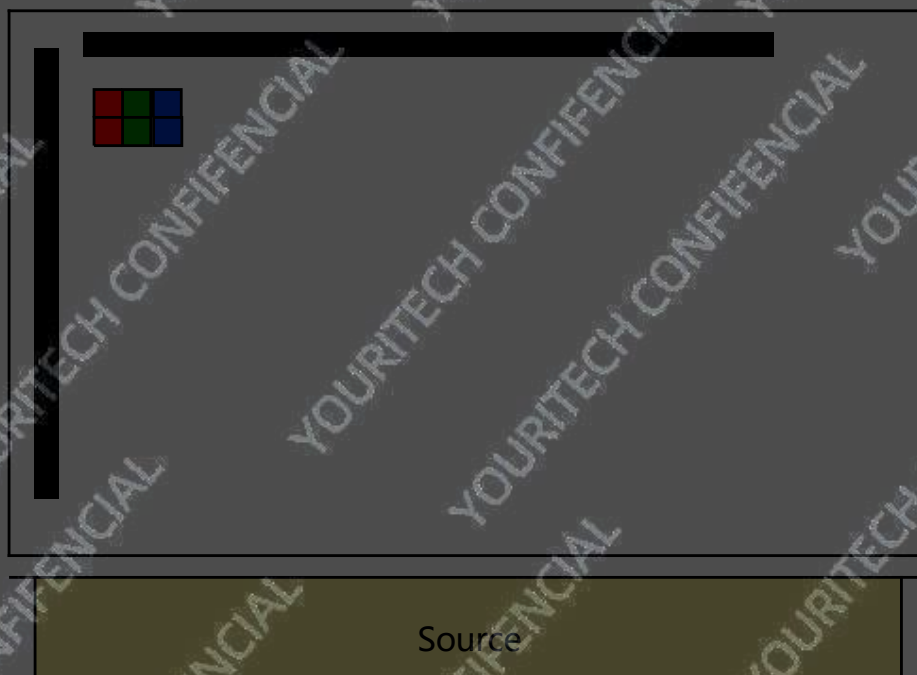
## 4.2 Data Input Format

**Figure 5. Pixel Format**



Display Position of Input Data (V-H)

**Figure 6. Scan direction**



## 5.0 SIGNAL TIMING SPECIFICATION

5.0.1 The GV156FHB-N10 is operated by the DE only.

| Item                      |           | Symbols | Min   | Typ   | Max   | Unit   |
|---------------------------|-----------|---------|-------|-------|-------|--------|
| Clock                     | Frequency | 1/Tc    | 141.8 | 143.8 | 145.7 | MHz    |
| Frame Period              |           | Tv      | 1118  | 1128  | 1138  | lines  |
|                           |           |         | -     | 60    | -     | Hz     |
|                           |           |         | -     | 16.67 | -     | ms     |
| Vertical Display Period   |           | Tvd     | -     | 1080  | -     | lines  |
| One line Scanning Period  |           | Th      | 2114  | 2124  | 2134  | clocks |
| Horizontal Display Period |           | Thd     | -     | 1920  | -     | clocks |



## 5.02 LVDS Electrical Specification

The specification of the LVDS Rx interface timing parameter is shown in Table 4.

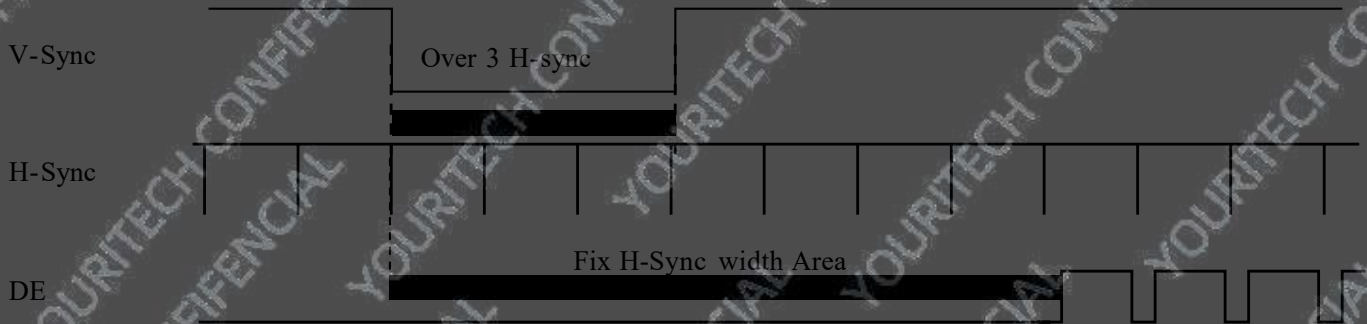
<Table 4. LVDS Rx Interface Timing Specification>

| Symbol | Symbol                            | Min  | Typ | Max  | Unit |
|--------|-----------------------------------|------|-----|------|------|
| Rate   | LVDS data rate per pair           | 400  | -   | 1000 | Mbps |
| Fclk   | LVDS input clock frequency        | 57   | -   | 143  | MHz  |
| Vth    | Differential input high threshold | -    | -   | 0.1  | V    |
| Vtl    | Differential input low threshold  | -0.1 | -   | -    | V    |
| Vcm    | LVDS common mode voltage          | 0.9  | -   | 1.4  | V    |



## 6. SIGNAL TIMING WAVEFORMS OF INTERFACE SIGNAL

### 6.01 Sync Timing Waveforms

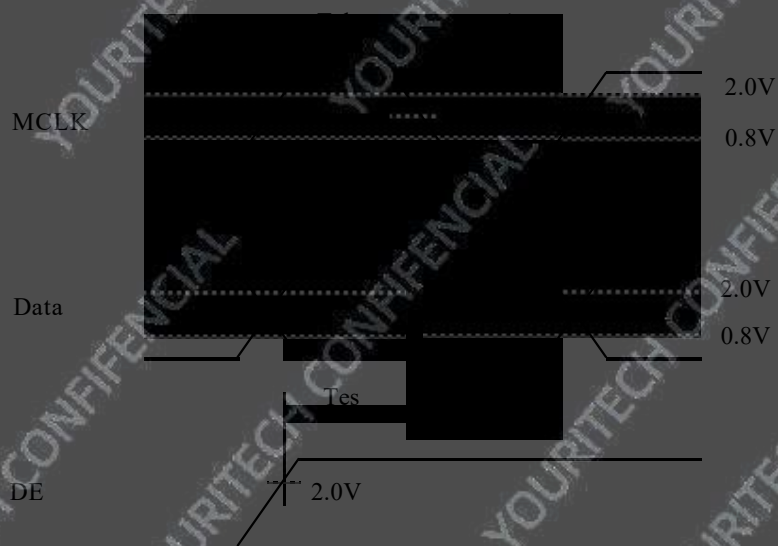


- 1) Need over 3 H-Sync during V-Sync Low
- 2) Fix H-Sync width from V-Sync falling edge to first rising edge

### 6.02 Vertical Timing Waveforms

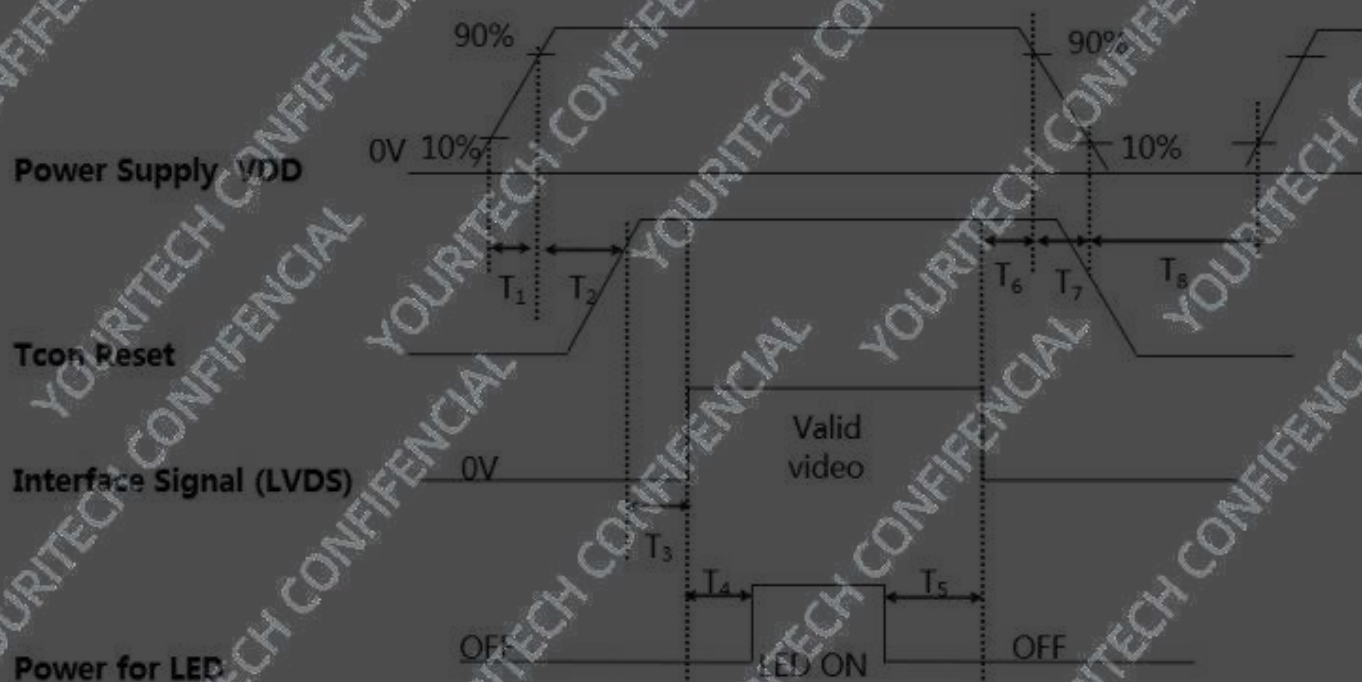


## 6.03 Horizontal Timing Waveforms



## 7.0 POWER SEQUENCE

To prevent a latch-up or DC operation of the LCD module, the power on/off sequences shall be as shown in below



| Parameter | Value |      |      | Units |
|-----------|-------|------|------|-------|
|           | Min.  | Typ. | Max. |       |
| T1        | 0.1   | -    | 8    | (ms)  |
| T2        | -     | 8    | -    | (ms)  |
| T3        | 0     | -    | -    | (ms)  |
| T4        | 300   | -    | -    | (ms)  |
| T5        | 300   | -    | -    | (ms)  |
| T6        | 0     | -    | 50   | (ms)  |
| T7        | 0     | -    | 10   | (ms)  |
| T8        | 500   | -    | -    | (ms)  |



## 8.0 OPTICAL SPECIFICATION

### 8.0.1 Overview

The test of view angle range shall be measured in a dark room (ambient luminance < 1lux and temperature = 25±2°C) with the equipment of Luminance meter system (Goniometer system and TOPCON CS2000/CA310) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of  $\theta$  and  $\Phi$  equal to 0°. We refer to  $\theta=0$  ( $=\theta_3$ ) as the 3 o'clock direction (the "right"),  $\theta=90$  ( $=\theta_{12}$ ) as the 12 o'clock direction ("upward"),  $\theta=180$  ( $=\theta_9$ ) as the 9 o'clock direction ("left") and  $\theta=270$  ( $=\theta_6$ ) as the 6 o'clock direction ("bottom"). While scanning  $\theta$  and/or  $\Phi$ , the center of the measuring spot on the Display surface shall stay fixed. The luminance, color and uniformity (etc) should be tested by CS2000/CA310. The backlight should be operating for 10 minutes prior to measurement. VDD shall be 3.3 : 0.3V at 25. C. Optimum viewing angle direction is 6 'clock

<Table 5. Optical Specifications>

| Parameter                 |            | Symbol         | Condition                       | Min.         | Typ.  | Max.         | Unit              | Remark          |
|---------------------------|------------|----------------|---------------------------------|--------------|-------|--------------|-------------------|-----------------|
| Viewing Angle range       | Horizontal | $\Theta_3$     | CR > 10                         | 85           | 89    | -            | Deg.              | Note 1          |
|                           |            | $\Theta_9$     |                                 | 85           | 89    | -            | Deg.              |                 |
|                           | Vertical   | $\Theta_{12}$  |                                 | 85           | 89    | -            | Deg.              |                 |
|                           |            | $\Theta_6$     |                                 | 85           | 89    | -            | Deg.              |                 |
| Luminance Contrast ratio  |            | CR             | $\Theta = 0^\circ$              | 1000         | 1200  | -            |                   | Note 2          |
| Luminance (AA Center)     |            | L              |                                 |              | 1500  |              | cd/m <sup>2</sup> |                 |
| Luminance uniformity 13pt |            | Y <sub>u</sub> |                                 | 68           | 74    |              | %                 |                 |
| Color Gamut               | sRGB       | CIE1931        | $\Theta = 0^\circ$              | 76           | 81    | -            | %                 | Only CF@C Light |
| Reproduction of color     | White      | W <sub>x</sub> | $\Theta = 0^\circ$              | Typ<br>-0.04 | 0.345 | Typ<br>+0.04 |                   |                 |
|                           |            | W <sub>y</sub> |                                 |              | 0.355 |              |                   |                 |
| Response Time             |            | Tr+Td          | Ta= 25. C<br>$\Theta = 0^\circ$ | -            | 30    | 35           | ms                | Note 6          |

Notes : 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 FIGURE 1) Luminance Contrast Ratio (CR) is defined mathematically.

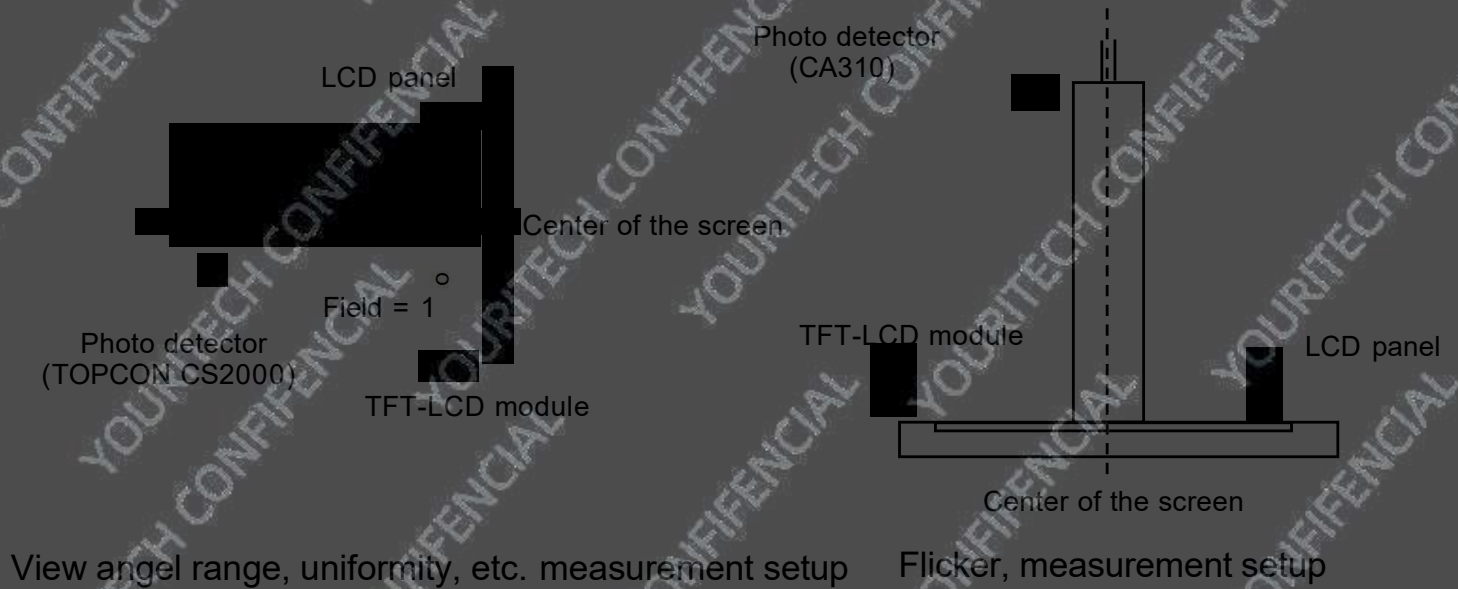
$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

3. The color chromaticity coordinates specified in Table 5. 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.
4. 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  $T_d$ .



## 8.0.2 Optical measurements

**Figure 1. Measurement Set Up**



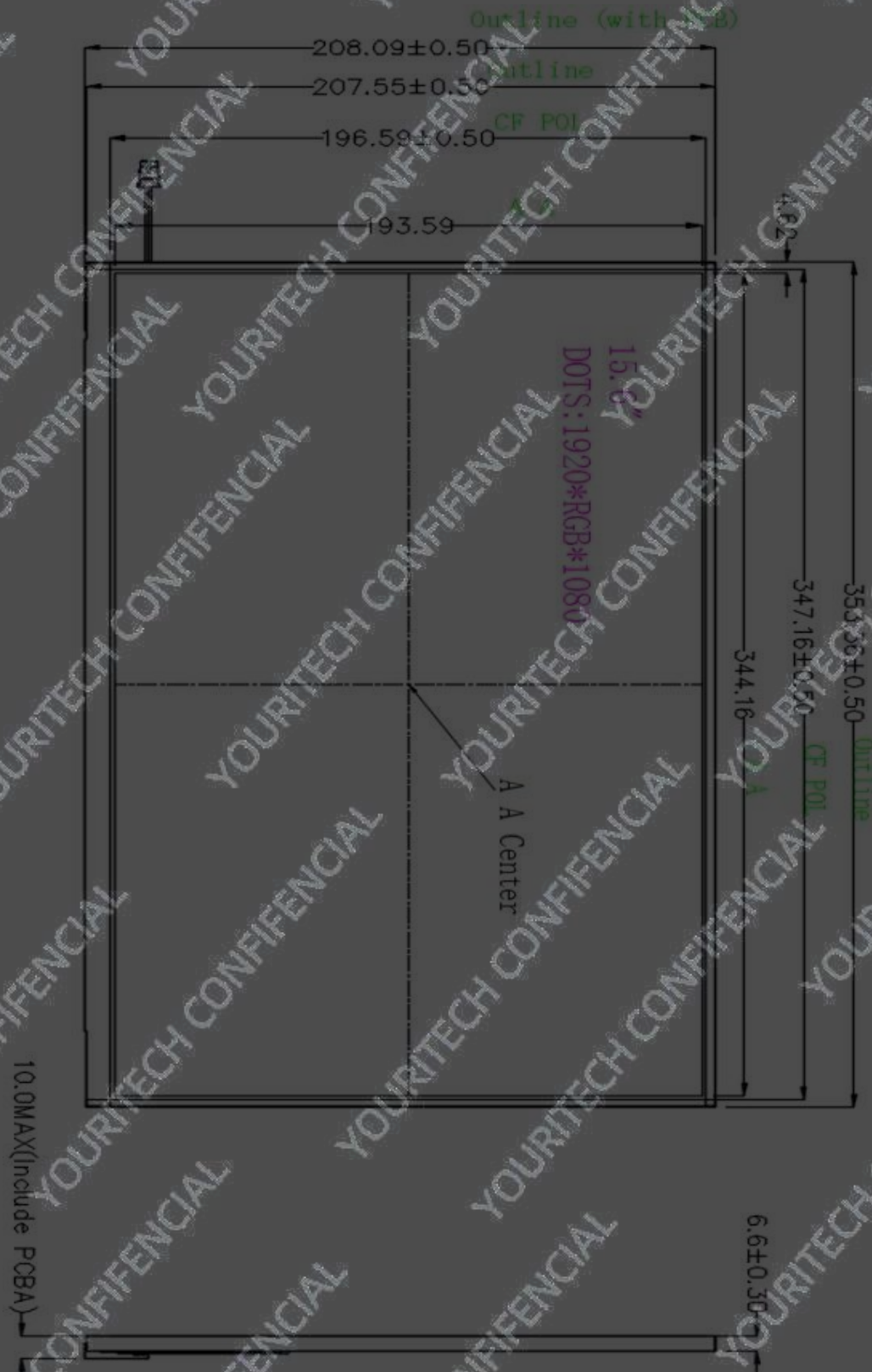
**Figure 2. Response Time Testing**

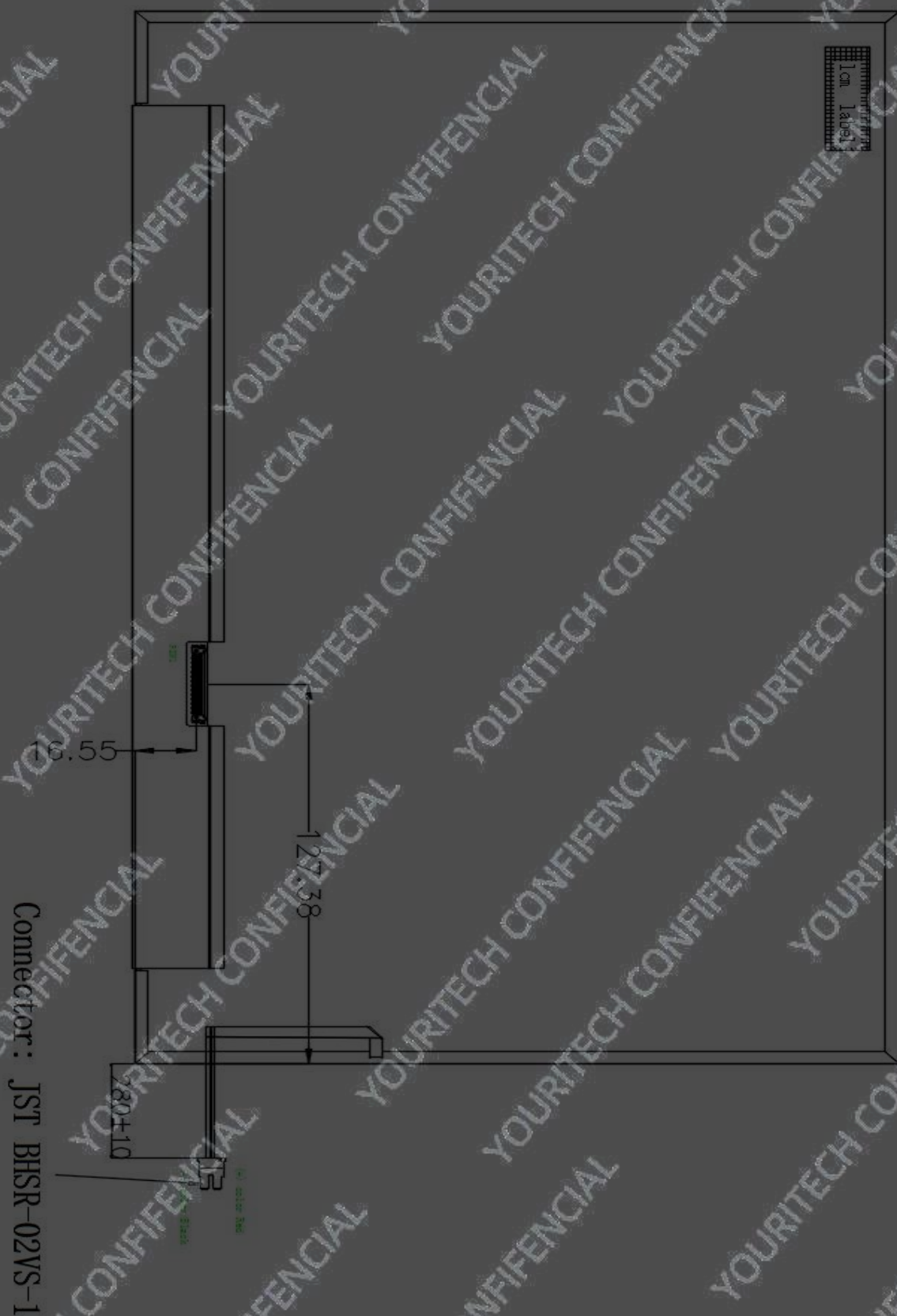


The electro-optical response time measurements shall be made as shown in FIGURE 3 by switching the “data” input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is  $T_r$  and 90% to 10% is  $T_d$ .



## 9.0 MECHANICAL OUTLINE DIMENSION





## 10.0 RELIABILITY TEST

The Reliability test items and its conditions are shown in below.

<Table 9. Reliability test>

| No | Test Items                                      | Conditions                                                                                                  | Remark        |
|----|-------------------------------------------------|-------------------------------------------------------------------------------------------------------------|---------------|
| 1  | High temperature storage test                   | Ta = 80°C, 240 hrs                                                                                          |               |
| 2  | Low temperature storage test                    | Ta = -30 °C, 240 hrs                                                                                        |               |
| 3  | High temperature operation test                 | Ta = 70°C, 240 hrs                                                                                          |               |
| 4  | Low temperature operation test                  | Ta = -20 °C, 240 hrs                                                                                        |               |
| 5  | High temperature & high humidity operation test | Ta = 60 °C, 90%RH, 240 hrs                                                                                  |               |
| 6  | Thermal shock                                   | Ta = -30 °C ↔ 80°C (0.5 hr), 100 cycle                                                                      | Non-operation |
| 7  | Image Sticking                                  | 5*5 Pattern, 2hrs 25°C : 2°C, check Pattern Gray 127, after 5 mins, the mura must be disappeared completely |               |

Note : After the reliability test, the product only guarantee function normally without any fatal defect (non-display, line defect, abnormal display etc ). All the cosmetic specification is judged before the reliability test.

