

|                  |            |                                              |            |
|------------------|------------|----------------------------------------------|------------|
| MDT0430E5IHH-RGB | 800 x 480  | RGB Interface                                | TFT Module |
| Specification    |            |                                              |            |
| Version: 2       |            | Date: 13/01/2023                             |            |
| Revision         |            |                                              |            |
| 1                | 06/06/2022 | First issue.                                 |            |
| 2                | 11/01/2023 | Modify Contour drawing & Color Chromaticity. |            |

| Display Features      |                         |  |                  |
|-----------------------|-------------------------|-------------------------------------------------------------------------------------|------------------|
| Display Size          | 4.30"                   |                                                                                     |                  |
| Resolution            | 800 x 480               |                                                                                     |                  |
| Orientation           | Landscape               |                                                                                     |                  |
| Appearance            | RGB                     |                                                                                     |                  |
| Logic Voltage         | 3.3V                    |                                                                                     |                  |
| Interface             | RGB                     |                                                                                     |                  |
| Brightness            | 1100 cd/m <sup>2</sup>  |                                                                                     |                  |
| Touchscreen           | ---                     |                                                                                     |                  |
| Module Size           | 105.50 x 67.20 x 3.76mm |                                                                                     |                  |
| Operating Temperature | -30°C ~ +80°C           |                                                                                     |                  |
| Pinout                | 40 way FFC              |                                                                                     |                  |
| Pitch                 | 0.5mm                   | Box Quantity                                                                        | Weight / Display |
|                       |                         | ---                                                                                 | ---              |

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\* - For full design functionality, please use this specification in conjunction with the HX8264 + HX8664 specification.(Provided Separately)

| Display Accessories |                                                                                                                                 |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------|
| Part Number         | Description                                                                                                                     |
| MPBV6               | 40 Way FFC to cable and wires.<br>Driven by any driver board that can be wired to a 1mm pitch SHDR-40V-S-B receptacle.          |
| MDIB-CC1            | The MDIB-CC1 is a interconnect board for standard pitch pinouts to fine pitch wires. Ideal for prototyping of TFT and COG LCDs. |
|                     |                                                                                                                                 |

| Optional Variants |         |
|-------------------|---------|
| Appearances       | Voltage |
|                   |         |



## Summary

TFT 4.3" is a color active matrix thin film transistor (TFT) liquid crystal display without polarizer. This model is composed of amorphous silicon TFT as a switching device. It is a transmissive type display operating in the normally black mode.

This TFT LCD has a 4.3-inch diagonally measured active display area with 800 x 480 dot (800 horizontal by 480 vertical pixel) resolution. Each pixel is divided into Red, Green, Blue dots which are arranged in vertical stripes.

## General Specification

- Size: 4.3 inch
- Dot Matrix: 800 x RGB x 480 (TFT) dots
- Module dimension: 105.5(W) x 67.2(H) x 3.76(D) mm
- Active area: 95.04 x 53.856 mm
- Pixel pitch: 0.1188 x 0.1122 mm
- LCD type: TFT, Normally Black, Transmissive
- Viewing Angle: 80/80/80/80
- Aspect Ratio: 16:9
- TFT Driver IC: HX8264+HX8664 or equivalent
- TFT Interface: 24-bit RGB
- Backlight Type: LED, Normally White
- With /Without TP: Without TP
- Surface: Glare

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



# Interface

## 1. LCM PIN Definition

| Pin | Symbol | Function                        | Remark |
|-----|--------|---------------------------------|--------|
| 1   | VLED-  | Power for LED backlight cathode |        |
| 2   | VLED+  | Power for LED backlight anode   |        |
| 3   | GND    | Power ground                    |        |
| 4   | VCC    | Power voltage                   |        |
| 5   | R0     | Red data                        |        |
| 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                        |        |
| 13  | G0     | Green data                      |        |
| 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                      |        |
| 21  | B0     | Blue data                       |        |
| 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                       |        |
| 29  | GND    | Power ground                    |        |
| 30  | CLK    | Pixel clock input pin           |        |



|    |       |                                          |                      |  |
|----|-------|------------------------------------------|----------------------|--|
| 31 | DISP  | DISP sets the display mode.              |                      |  |
|    |       | DISP                                     | Function Description |  |
|    |       | L                                        | Standby mode         |  |
|    |       | H                                        | Normal display mode  |  |
| 32 | HSYNC | Horizontal Sync Input. Negative polarity |                      |  |
| 33 | VSYNC | Vertical Sync Input. Negative polarity.  |                      |  |
| 34 | NC    | No connection                            |                      |  |
| 35 | NC    | No connection                            |                      |  |
| 36 | GND   | Power ground                             |                      |  |
| 37 | NC    | No connection                            |                      |  |
| 38 | NC    | No connection                            |                      |  |
| 39 | NC    | No connection                            |                      |  |
| 40 | NC    | No connection                            |                      |  |

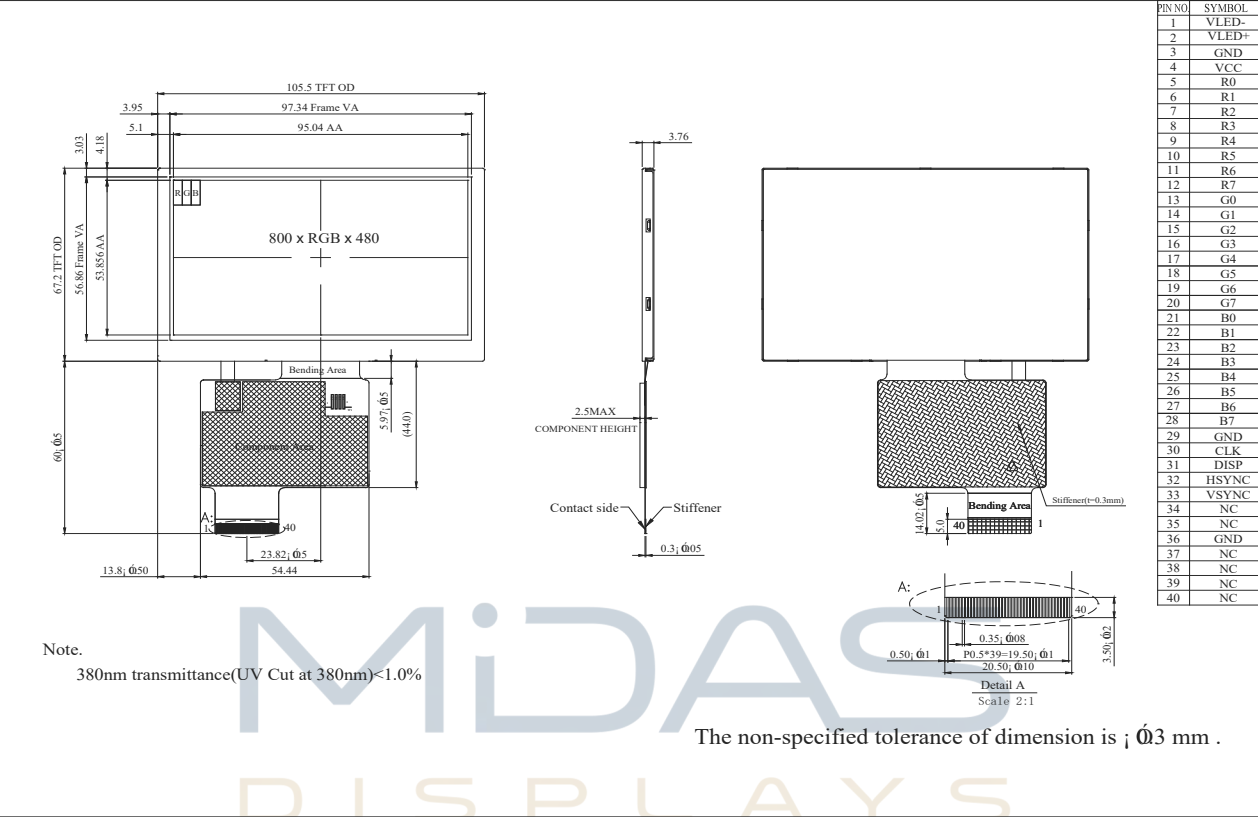
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DISPLAYS

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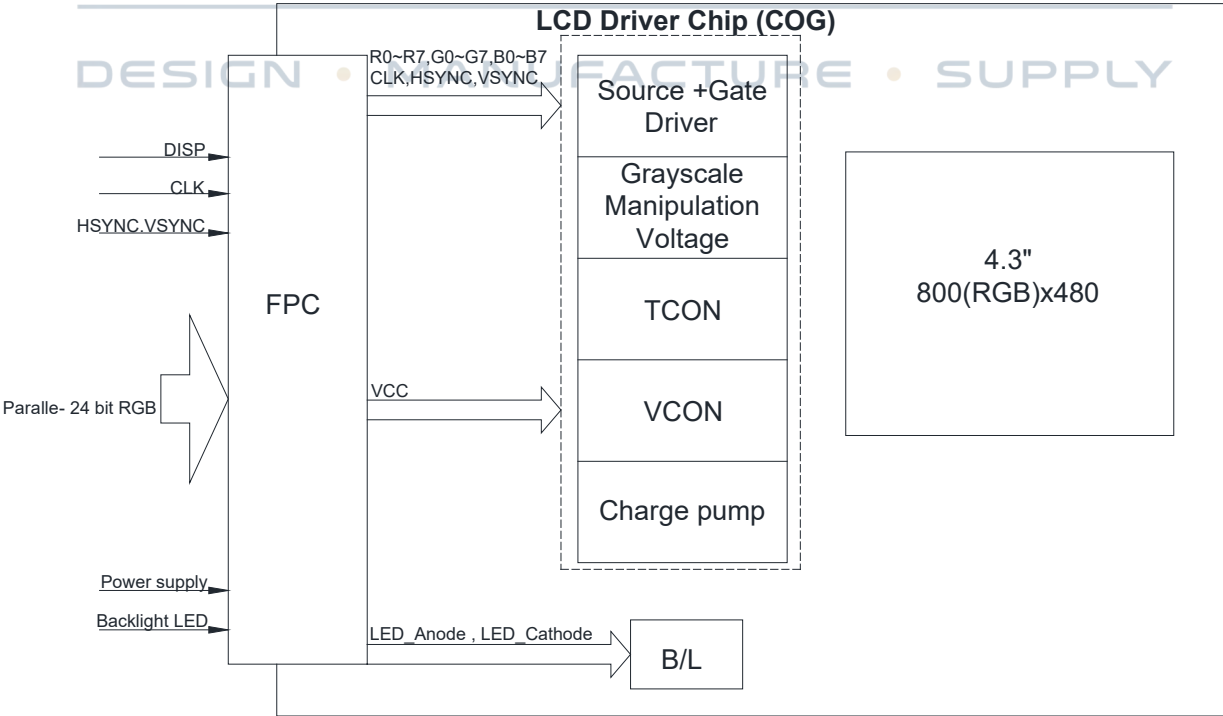
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# Contour Drawing



# Block Diagram



## Absolute Maximum Ratings

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

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  $60^{\circ}\text{C}$

## Electrical Characteristics

### 1. Operating conditions:

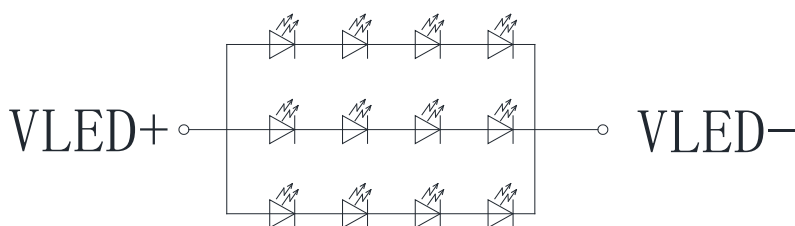
| Item                   | Symbol | Min | Typ | Max | Unit | Remark |
|------------------------|--------|-----|-----|-----|------|--------|
| Supply Voltage For LCM | VCC    | 3.0 | 3.3 | 3.6 | V    |        |
| Supply Current For LCM | ICC    | -   | 60  | 90  | mA   | Note1  |

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

### 2. LED driving conditions

| Parameter     | Symbol | Min. | Typ.   | Max. | Unit | Remark     |
|---------------|--------|------|--------|------|------|------------|
| LED current   | -      | -    | 60     | -    | mA   | -          |
| LED voltage   | VLED+  | 21.6 | 24.0   | 26.0 | V    | Note 1     |
| LED Life Time | -      | -    | 50,000 | -    | Hr   | Note 2,3,4 |

Note 1 : There are 1 Groups LED



CIRCUIT DIAGRAM

Note 2 : Ta = 25 °C

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

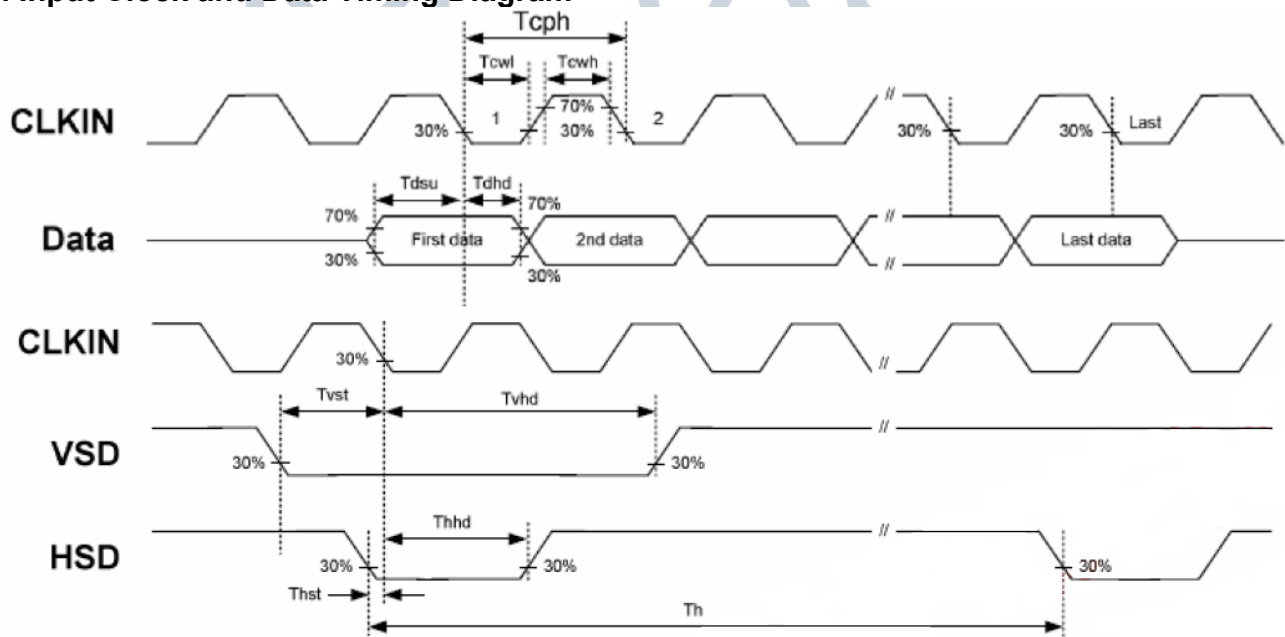
Note 4 : The single LED lamp case

# AC Characteristics

## 1. AC Electrical Characteristics

| Signal                 | Symbol | Min | Typ | Max | Unit |
|------------------------|--------|-----|-----|-----|------|
| HS setup time          | Thst   | 8   | -   | -   | ns   |
| HS hold time           | Thhd   | 8   | -   | -   | ns   |
| VS setup time          | Tvst   | 8   | -   | -   | ns   |
| VS hold time           | Tvhd   | 8   | -   | -   | ns   |
| Data setup time        | Tdsu   | 8   | -   | -   | ns   |
| Data hold time         | Tdhd   | 8   | -   | -   | ns   |
| VCC Power On Slew rate | TPOR   | -   | -   | 20  | ms   |
| RESET pulse width      | TRst   | 1   | -   | -   | ms   |
| DCLK cycle time        | Tcoh   | 20  | -   | -   | ns   |
| DCLK pulse duty        | Tcwh   | 40  | 50  | 60  | %    |

## 2. Input Clock and Data Timing Diagram



### 3. Timing

| Item                    | Symbol | Values |      |      | Unit | Remark |
|-------------------------|--------|--------|------|------|------|--------|
|                         |        | Min.   | Typ. | Max. |      |        |
| CLK Frequency (DCLK)    | fclk   |        | 30   | 50   | MHz  |        |
| Horizontal Display Area | thd    | 800    |      |      | CLK  |        |
| One Horizontal Line     | th     | 889    | 928  | 1143 | CLK  |        |
| HS pulse width          | thpw   | 1      | 48   | 255  | CLK  |        |
| HS Blanking             | thb    | 88     |      |      | CLK  |        |
| HS Front Porch          | thfp   | 1      | 40   | 255  | CLK  |        |
| Vertical Display Area   | tvd    | 480    |      |      | TH   |        |
| VS period time          | tv     | 513    | 525  | 767  | TH   |        |
| VS pulse width          | tvpw   | 3      | 3    | 255  | TH   |        |
| VS Blanking             | tvb    | 32     |      |      | TH   |        |
| VS Front Porch          | tvfp   | 1      | 13   | 255  | TH   |        |

### 4. Data Input Format

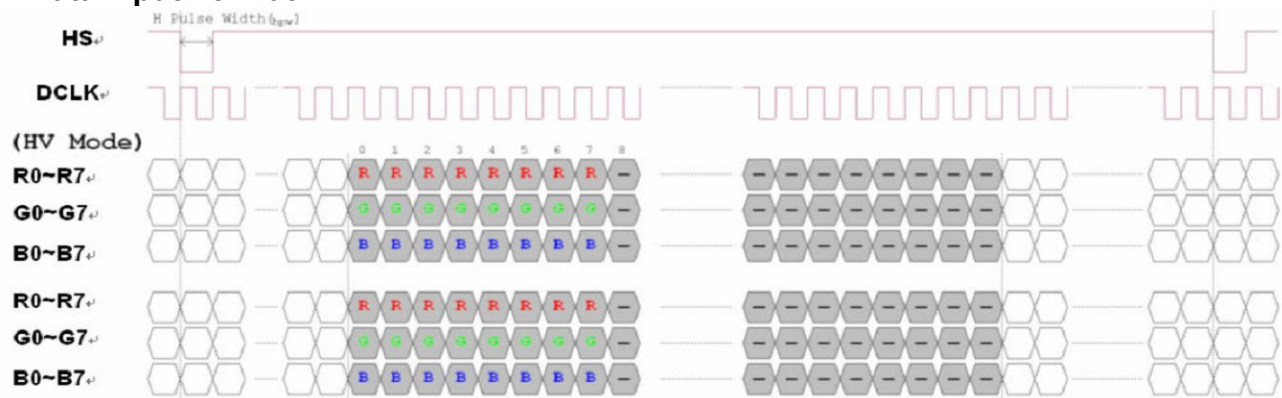


Fig. Horizontal input timing diagram

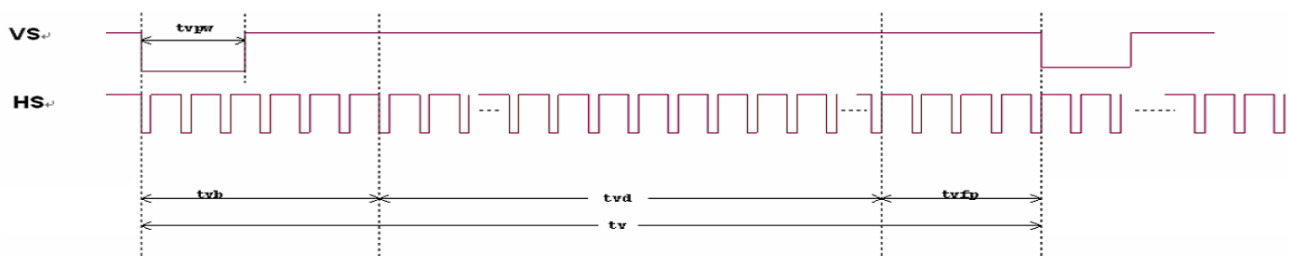


Fig. Vertical input timing diagram





## Optical Characteristics

| Item               |       | Symbol     | Condition.                            | Min   | Typ.  | Max.  | Unit              | Remark            |
|--------------------|-------|------------|---------------------------------------|-------|-------|-------|-------------------|-------------------|
| Response time      |       | Tr+ Tf     | $\theta=0^{\circ}$ 、 $\Phi=0^{\circ}$ | -     | 30    | 40    | ms                | Note 3            |
| Contrast ratio     |       | CR         | At optimized viewing angle            | 640   | 800   | -     | -                 | Note 4            |
| Color Chromaticity | White | Wx         | $\theta=0^{\circ}$ 、 $\Phi=0$         | 0.275 | 0.325 | 0.375 | -                 | Note 2,6,7        |
|                    |       | Wy         |                                       | 0.298 | 0.348 | 0.398 | -                 |                   |
| Viewing angle      | Hor.  | $\Theta R$ | $CR\geq 10$                           | 70    | 80    | -     | Deg.              | Note 1            |
|                    |       | $\Theta L$ |                                       | 70    | 80    | -     |                   |                   |
|                    | Ver.  | $\Phi T$   |                                       | 70    | 80    | -     |                   |                   |
|                    |       | $\Phi B$   |                                       | 70    | 80    | -     |                   |                   |
| Brightness         |       | -          | -                                     | 1000  | 1100  | -     | cd/m <sup>2</sup> | Center of display |
| Uniformity         |       | (U)        | -                                     | 75    | -     | -     | %                 | Note 5            |

Ta=25±2°C, IL=60mA

Note 1: Definition of viewing angle range

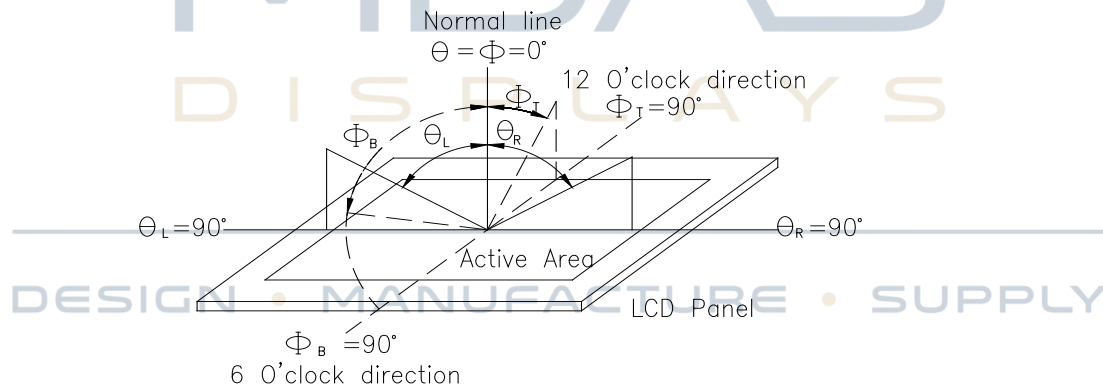


Fig. 10.1. Definition of viewing angle

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.

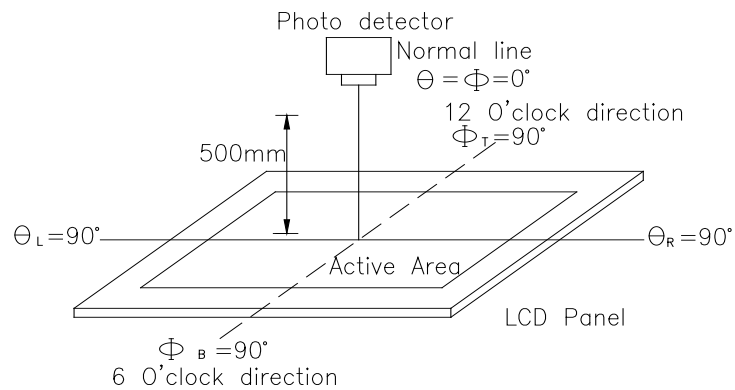
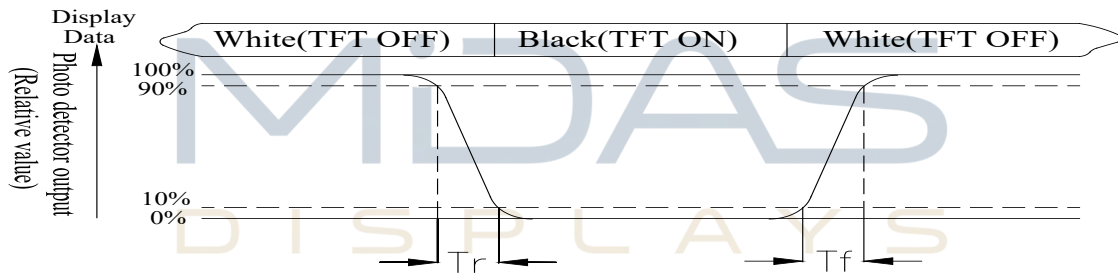


Fig. 10.2. Optical measurement system setup

**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: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (reference the picture in below). Every measuring point is placed at the center of each measuring area.

Luminance Uniformity (U) =  $L_{min}/L_{max} \times 100\%$

L = Active area length

W = Active area width

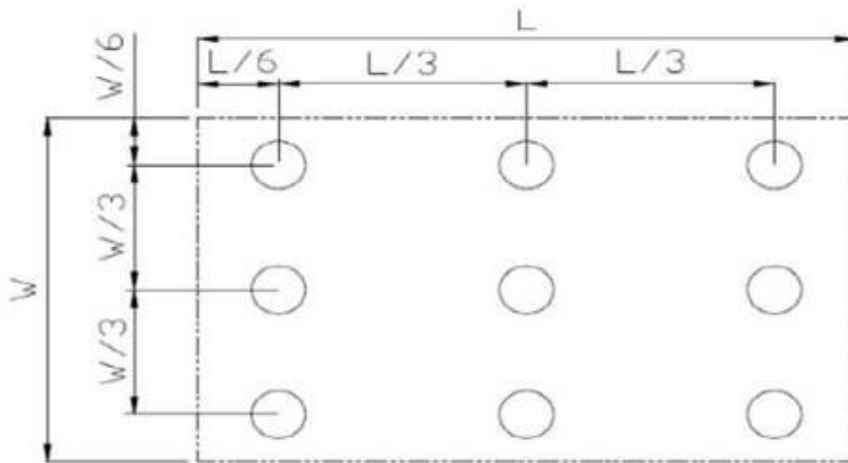


Fig 10.3. Definition of uniformity

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.

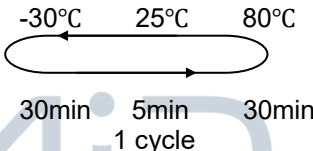
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# Reliability

Content of Reliability Test (Super Wide temperature, -30°C~80°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.                                       | 80°C<br>200hrs                                                                                                                      | —    |
| Low Temperature Operation          | Endurance test applying the electric stress under low temperature for a long time.                                                                           | -30°C<br>200hrs                                                                                                                     | 1    |
| High Temperature/ Humidity storage | 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> | -30°C/80°C<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)<br>,±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.