


|                      |            |                       |            |
|----------------------|------------|-----------------------|------------|
| MDT7000C             | 800 x 480  | 24-Bit RGB Interface  | TFT Module |
| <b>Specification</b> |            |                       |            |
| Version: 2           |            | Date: 03/04/2019      |            |
| <b>Revision</b>      |            |                       |            |
| 1                    | 02/05/2018 | First Issue.          |            |
| 2                    | 03/04/2019 | Updated CTP Driver IC |            |

| Display Features      |                           |  |                  |
|-----------------------|---------------------------|-------------------------------------------------------------------------------------|------------------|
| Display Size          | 7.0"                      |                                                                                     |                  |
| Resolution            | 800 x 480                 |                                                                                     |                  |
| VGA Size              | WVGA                      |                                                                                     |                  |
| Orientation           | Landscape                 |                                                                                     |                  |
| Appearance            | RGB                       |                                                                                     |                  |
| Logic Voltage         | 3.3V                      |                                                                                     |                  |
| Interface             | 24-Bit RGB                |                                                                                     |                  |
| Brightness            | 350 cd/m <sup>2</sup>     |                                                                                     |                  |
| Touchscreen           | CTP                       |                                                                                     |                  |
| Module Size           | 164.90 x 100.00 x 7.10 mm |                                                                                     |                  |
| Operating Temperature | -20°C ~ +70°C             |                                                                                     |                  |
| Pinout                | 40 - Way FFC              |                                                                                     |                  |
|                       |                           | Box Quantity                                                                        | Weight / Display |
|                       |                           | ---                                                                                 | ---              |

| 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. |

| Optional Variants                       |         |
|-----------------------------------------|---------|
| Appearances                             | Voltage |
| No Touch Panel<br>Resistive Touch Panel |         |



## General Specifications

|                                | Feature              | Spec                          |
|--------------------------------|----------------------|-------------------------------|
| Characteristics                | Size                 | 7 inch                        |
|                                | Resolution           | 800(Horizontal)*480(Vertical) |
|                                | Glass Marker         | Innolux                       |
|                                | Interface            | 24bit RGB                     |
|                                | Connect type         | Connector                     |
|                                | Color Depth          | 16.7M                         |
|                                | Technology type      | a-Si                          |
|                                | Pixel pitch (mm)     | 0.192 x 0.1805                |
|                                | Pixel Configuration  | R.G.B. Stripe                 |
|                                | Display Mode         | Normally White                |
|                                | LCD Driver IC        | -                             |
|                                | CTP Driver IC        | GT911                         |
|                                | Luminance            | 350 nits                      |
|                                | Viewing Direction    | 12 O'clock                    |
| Gray Scale Inversion Direction | 6 O'clock            |                               |
| Mechanical                     | LCM (W x H x D) (mm) | 164.9*100*7.1                 |
|                                | Active Area(mm)      | 154.08 x 85.92                |
|                                | With /Without TSP    | With                          |
|                                | Weight (g)           | TBD                           |
|                                | LED Numbers          | 27 LED (3S9P)                 |

Note 1: Viewing direction is follow the data which measured by optics equipment.

Note 2: Requirements on Environmental Protection: RoHS

Note 3: LCM weight tolerance: +/- 5%



## Input/Output Terminals

| No.   | Symbol | Description                     |
|-------|--------|---------------------------------|
| 1     | K      | Power for LED backlight cathode |
| 2     | A      | Power for LED backlight anode   |
| 3     | GND    | Ground                          |
| 4     | VDD    | Power supply                    |
| 5~12  | R0~R7  | Data bus                        |
| 13~20 | G0~G7  | Data bus                        |
| 21~28 | B0~B7  | Data bus                        |
| 29    | DGND   | Ground                          |
| 30    | DOTCLK | Pixel clock                     |
| 31    | DISP   | Display on/ off                 |
| 32    | HSYNC  | Horizontal sync Signal          |
| 33    | VSYNC  | Vertical sync signal            |
| 34    | DE     | Data Enable                     |
| 35    | NC     | No connected                    |
| 36    | GND    | System Ground                   |
| 37    | NC     | -                               |
| 38    | NC     | -                               |
| 39    | NC     | -                               |
| 40    | NC     | -                               |

## PCAP I/F Signals

| Pin | Signal | Description                   |
|-----|--------|-------------------------------|
| 1   | VSS    | Ground                        |
| 2   | SDA    | P I2C data input and output   |
| 3   | SCL    | I2C clock input               |
| 4   | VDD    | Power supply 3.2V             |
| 5   | INT    | Interrupt request to the host |
| 6   | RST    | Reset Pin for CTP             |



## Absolute Maximum Ratings

### Driving TFT LCD Panel

| Item                | Symbol   | MIN  | MAX          | Unit | Remark |
|---------------------|----------|------|--------------|------|--------|
| Supply Voltage      | $V_{CC}$ | -0.3 | 5            | V    |        |
| Input logic Voltage | $V_i$    | -0.3 | $V_{CC}+0.3$ | V    | Not1   |

## Electrical Characteristics

### Driving TFT LCD Panel

| Item                  | Symbol    | MIN  | MAX  | Unit | Remark |
|-----------------------|-----------|------|------|------|--------|
| Power voltage         | $V_{DD}$  | -0.3 | 5.0  | V    |        |
|                       | AVDD      | 6.5  | 13.5 | V    |        |
|                       | VGH       | -0.3 | 40   | V    |        |
|                       | VGL       | -20  | 0.3  | V    |        |
|                       | VGH-VGL   | -    | 40   | V    |        |
| Operating Temperature | $T_{OPR}$ | -20  | 60   | °C   |        |
| Storage Temperature   | $T_{STG}$ | -30  | 70   | °C   |        |

design • manufacture • supply  $T_a = 25\text{ }^\circ\text{C}$



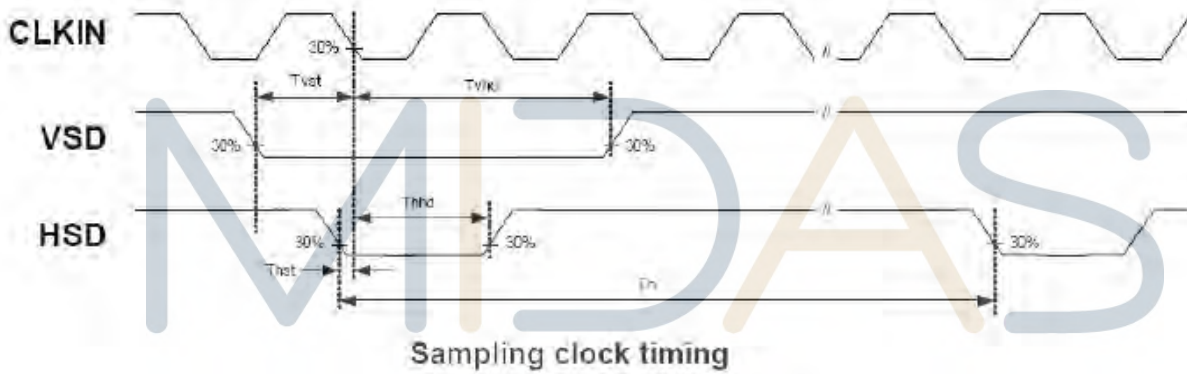
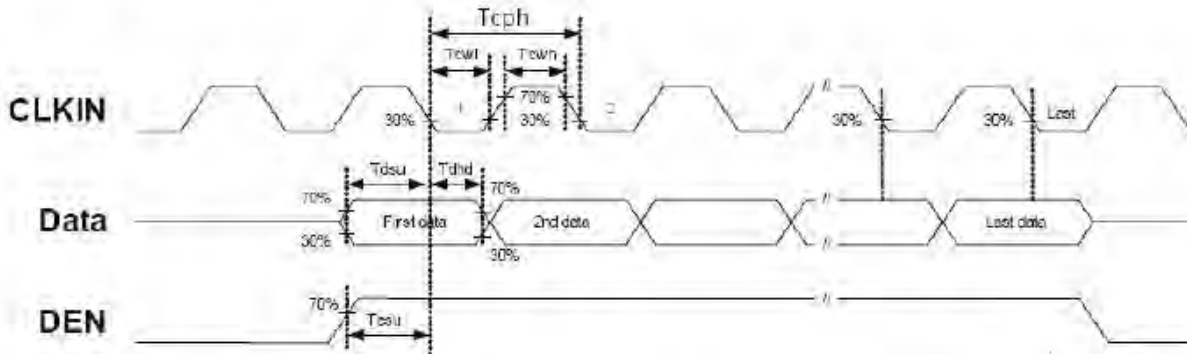
## Interface Timing

| Item                    | Symbol | Min. | Typ. | Max. | Unit | Note |
|-------------------------|--------|------|------|------|------|------|
| DCLK cycle time         | Tcph   | 25   |      |      | ns   |      |
| DCLK frequency          | fclk   |      | 30   | 40   | MHz  |      |
| DCLK pulse duty         | Tcwh   | 40   | 50   | 60   | %    |      |
| VSD setup time          | Tvst   | 8    |      |      | ns   |      |
| VSD hold time           | Tvhd   | 8    |      |      | ns   |      |
| HSD setup time          | Thst   | 8    |      |      | ns   |      |
| HSD hold time           | Thhd   | 8    |      |      | ns   |      |
| Data setup time         | Tdsu   | 8    |      |      | ns   |      |
| Data hold time          | Tdhd   | 8    |      |      | ns   |      |
| DE setup time           | Tesu   | 8    |      |      | ns   |      |
| DE hold time            | Tehd   | 8    |      |      | ns   |      |
| Horizontal display area | thd    |      | 800  |      | Tcph |      |
| HSD period time         | th     |      | 928  |      | Tcph |      |
| HSD pulse width         | thpw   | 1    | 48   |      | Tcph |      |
| HSD back porch          | thb    |      | 40   |      | Tcph |      |
| HSD front porch         | thfp   |      | 40   |      | Tcph |      |
| Vertical display area   | tvd    |      | 480  |      | th   |      |
| VSD period time         | tv     |      | 525  |      | th   |      |
| VSD pulse width         | tvpw   |      | 3    |      | th   |      |
| VSD back porch          | tvb    |      | 29   |      | th   |      |
| VSD front porch         | tvfp   |      | 13   |      | th   |      |

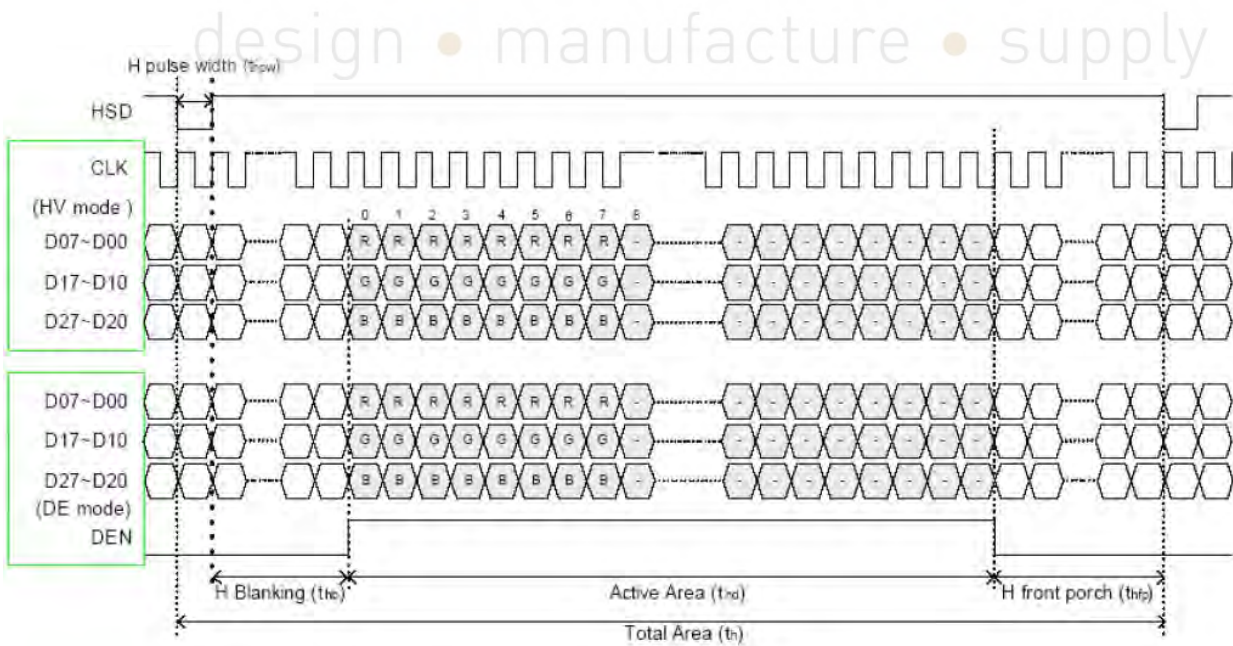
design • manufacture • supply



## Timing Diagram of Interface Signal

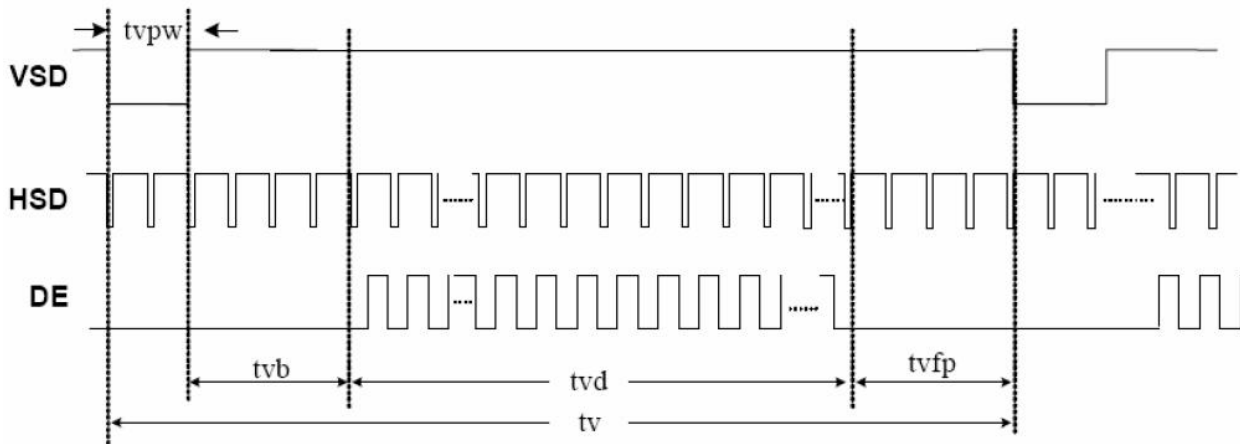


Sampling clock timing



Horizontal display timing range





Vertical timing

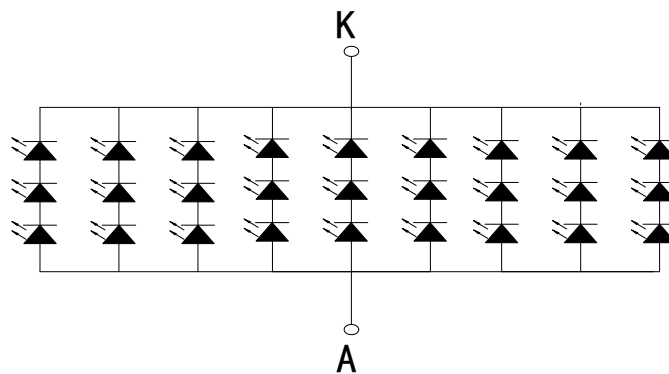
### Driving Backlight

| Item                        | Symbol   | MIN   | TYP   | MAX  | Unit | Remark |
|-----------------------------|----------|-------|-------|------|------|--------|
| Forward Current             | $I_F$    | 160   | 180   | 200  | mA   |        |
| Forward Voltage             | $V_F$    | 9.3   | 9.6   | 9.9  | V    |        |
| Backlight Power consumption | $W_{BL}$ | 1.488 | 1.728 | 1.98 | W    |        |
| LED Lifetime                | L        | 25000 | -     | -    | Hrs  |        |

Note 1: Each LED :  $I_F = 20 \text{ mA}$ ,  $V_F = 3.2 \text{ V}$ .

Note 2: Optical performance should be evaluated at  $T_a = 25^\circ \text{C}$  only.

Note 3: If LED is driven by high current, high ambient temperature & humidity condition. The life time of LED will be reduced. Operating life means brightness goes down to 50% initial brightness. Typical operating life time is estimated data.



Backlight Circuit diagram

Figure : LED connection of backlight



## Optical Characteristics

| Items          | Symbol           | Condition              | Min.           | Typ. | Max. | Unit    | Remark          |                 |
|----------------|------------------|------------------------|----------------|------|------|---------|-----------------|-----------------|
| Viewing angles | $\theta_T$       | Center<br>CR $\geq$ 10 |                | 50   | -    | Degree. | Note2           |                 |
|                | $\theta_B$       |                        |                | 70   | -    |         |                 |                 |
|                | $\theta_L$       |                        |                | 70   | -    |         |                 |                 |
|                | $\theta_R$       |                        |                | 70   | -    |         |                 |                 |
| Contrast Ratio | CR               | $\Theta = 0$           | 400            | 500  | -    | -       | Note1,<br>Note3 |                 |
| Response Time  | T <sub>ON</sub>  | 25°C                   | -              | 10   | 20   | ms      | Note1,<br>Note4 |                 |
|                | T <sub>OFF</sub> |                        | -              | 15   | 30   |         |                 |                 |
| Chromaticity   | White            | Backlight<br>is on     | X <sub>W</sub> | TBD  | TBD  | TBD     | -               | Note1,<br>Note5 |
|                |                  |                        | Y <sub>W</sub> | TBD  | TBD  | TBD     | -               |                 |
|                | Red              |                        | X <sub>R</sub> | TBD  | TBD  | TBD     | -               |                 |
|                |                  |                        | Y <sub>R</sub> | TBD  | TBD  | TBD     | -               |                 |
|                | Green            |                        | X <sub>G</sub> | TBD  | TBD  | TBD     | -               |                 |
|                |                  |                        | Y <sub>G</sub> | TBD  | TBD  | TBD     | -               |                 |
|                | Blue             |                        | X <sub>B</sub> | TBD  | TBD  | TBD     | -               |                 |
|                |                  |                        | Y <sub>B</sub> | TBD  | TBD  | TBD     | -               |                 |
| Uniformity     | U                |                        | 80             | -    | -    | %       | Note1,<br>Note6 |                 |
| Luminance      | L                |                        | -              | 350  |      |         | Note1,<br>Note7 |                 |

### Test Conditions:

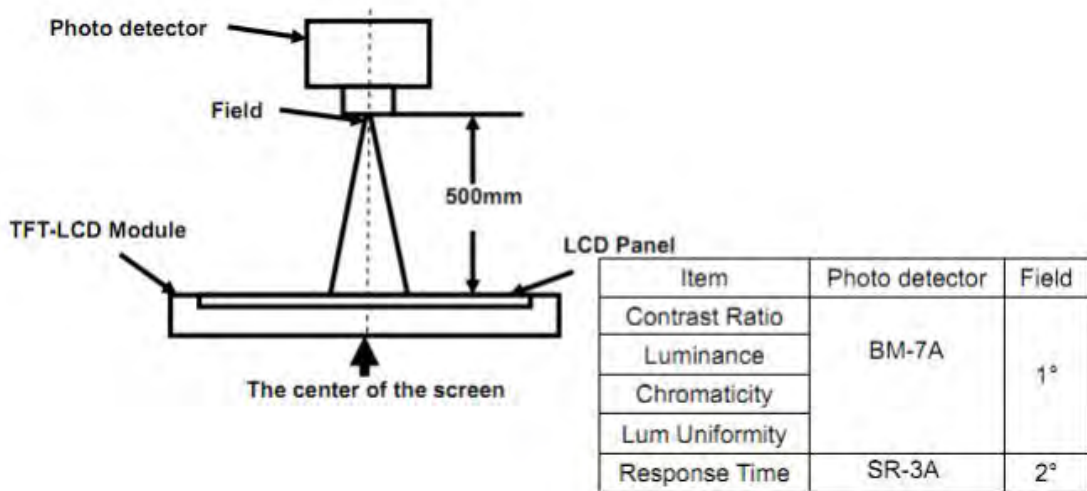
1. IF= 20mA(one channel),the ambient temperature is 25°C.
2. The test systems refer to Note 1 and Note 2.

Note 1:Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 5 minutes operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.







Note 2: Definition of viewing angle range and measurement system.  
viewing angle is measured at the center point of the LCD by CONOSCOPE(ergo-80).

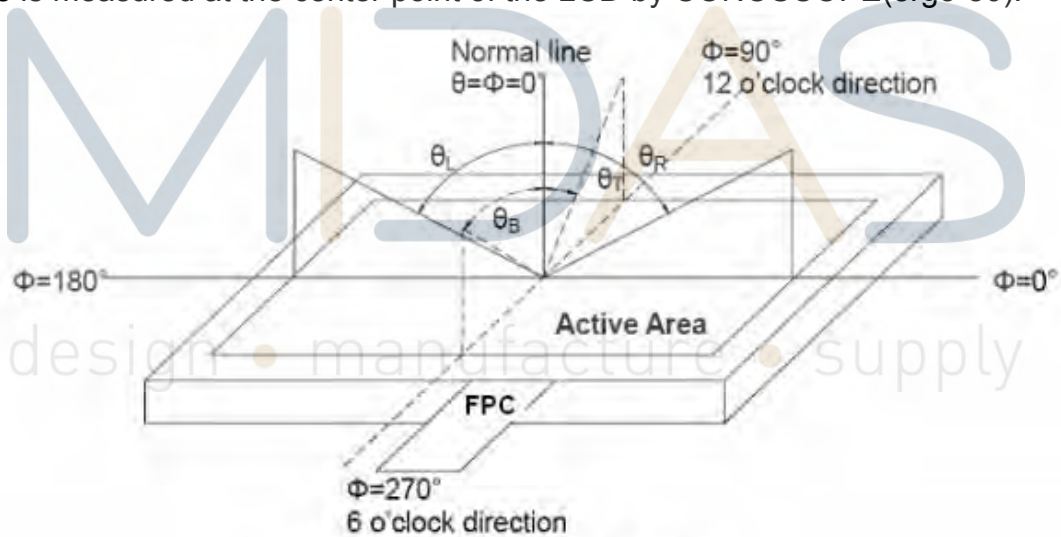


Fig. 1 Definition of viewing angle

Note 3: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD is on the "White" state}}{\text{Luminance measured when LCD is on the "Black" state}}$$

“White state “:The state is that the LCD should driven by  $V_{white}$ .

“Black state”: The state is that the LCD should driven by  $V_{black}$ .

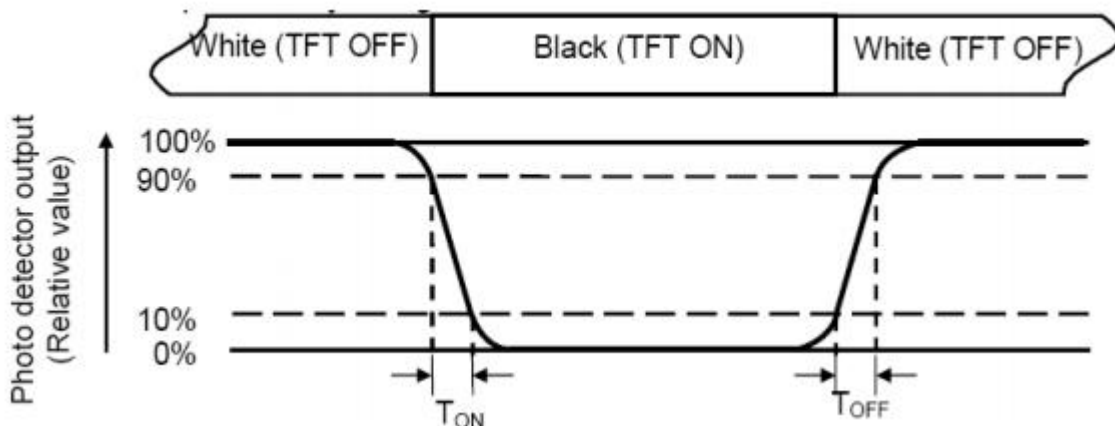
$V_{white}$ : To be determined     $V_{black}$ : To be determined.

Note 4: Definition of Response time

The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time ( $T_{ON}$ ) is the time between photo detector output intensity changed from



90% to 10%. And fall time (TOFF) is the time between photo detector output intensity changed from 10% to 90%.



Note 5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note 6: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer Fig. 2). 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

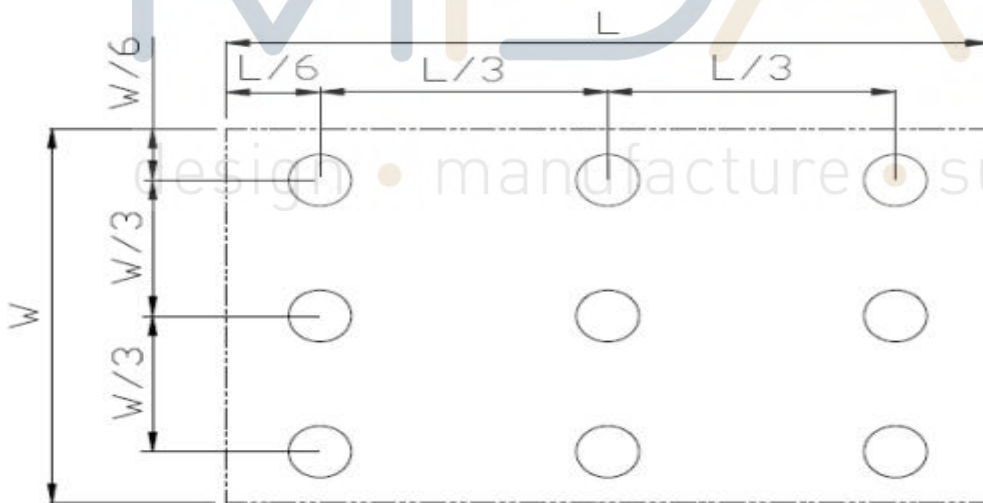


Fig. 2 Definition of uniformity

$L_{max}$ : The measured maximum luminance of all measurement position.

$L_{min}$ : The measured minimum luminance of all measurement position.

Note 7: Definition of Luminance :

Measure the luminance of white state at center point.



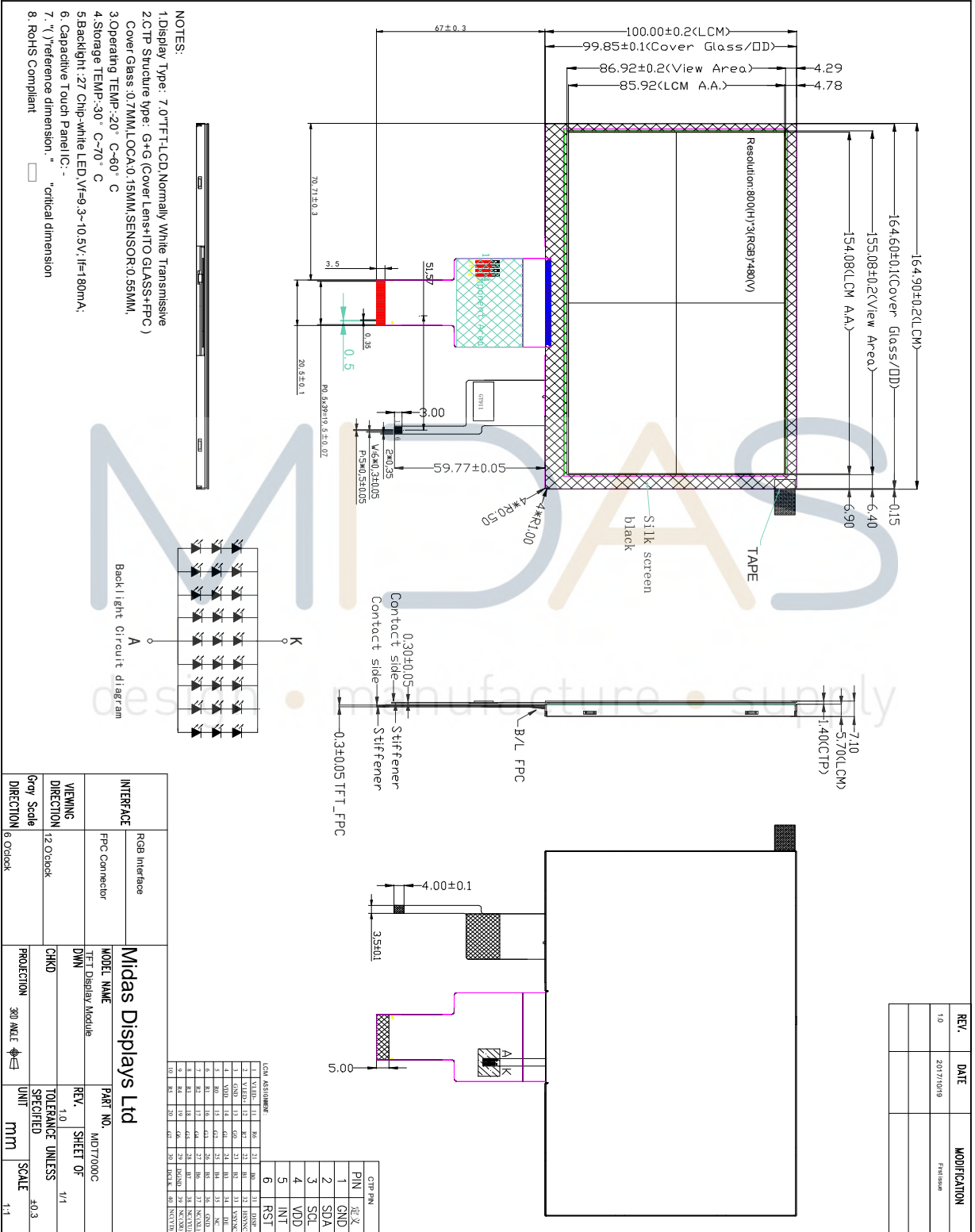
## Environmental / Reliability Tests

| No | Test Item                            | Condition                                                                                                                            | Remarks                                                                                 |
|----|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1  | High Temperature Opeartion           | Ts= +60°C, 240hrs                                                                                                                    | Note 1<br>IEC60068-2-2,<br>GB2423. 2-89                                                 |
| 2  | Low Temperature Opeartion            | Ta= -20°C, 240hrs                                                                                                                    | Note 2 IEC60068-2-1<br>GB2423.1-89                                                      |
| 3  | High Temperature Storage             | Ta= +70°C, 240hrs                                                                                                                    | IEC60068-2-2<br>GB2423. 2-89                                                            |
| 4  | Low Temperature Storage              | Ta= -30°C, 240hrs                                                                                                                    | IEC60068-2-1<br>GB/T2423.1-89                                                           |
| 5  | High Temperature & Humidity Storage  | Ta= +60°C, 90% RH max, 160 hours                                                                                                     | IEC60068-2-3<br>GB/T2423.3-2006                                                         |
| 6  | Thermal Shock (Non-operation)        | -30°C 30 min ~ +80°C 30 min<br>Change time: 5min, 30 Cycle                                                                           | Start with cold temperature,end with high temperature<br>IEC60068-2-14,<br>GB2423.22-87 |
| 7  | Electro Discharge (Opeartion) Static | C=150pF, R=330 Ω, 5 points/panel<br>Air:±8KV, 5 times; Contact: ±4KV, 5 times; (Environment: 15°C ~ 35°C, 30% ~ 60%, 86Kpa ~ 106Kpa) | IEC61000-4-2<br>GB/T17626.2-1998                                                        |
| 8  | Vibration (Non-operation)            | Frequency range: 10~55Hz, Stroke: 1.mm Sweep: 10Hz~55Hz~10Hz<br>2 hours for each direction of X .Y. Z. (package condition)           | IEC60068-2-6<br>GB/T2423.5-1995                                                         |
| 9  | Shock (Non-operation)                | 60G 6ms, ± X, ±Y , ± Z<br>3 times for each direction                                                                                 | IEC60068-2-27<br>GB/T2423.5-1995                                                        |
| 10 | Package Drop Test                    | Height: 80 cm, 1 corner, 3 edges, 6 surfaces                                                                                         | IEC60068-2-32<br>GB/T2423.8-1995                                                        |

Note: 1. Ts is the temperature of panel's surface.  
2. Ta is the ambient temperature of sample.



# Mechanical Drawing



| REV. | DATE       | MODIFICATION |
|------|------------|--------------|
| 1.0  | 2017/10/19 | Final Issue  |



# Precautions For Use of LCD modules

## 1 Handling Precautions

- 1.1. The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.
- 1.2. If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.
- 1.3. Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.
- 1.4. The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.
- 1.5. If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:
  - Isopropyl alcohol
  - Ethyl alcoholSolvents other than those mentioned above may damage the polarizer. Especially, do not use the following:
  - Water
  - Ketone
  - Aromatic solvents
- 1.6. Do not attempt to disassemble the LCD Module.
- 1.7. If the logic circuit power is off, do not apply the input signals.
- 1.8. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.
  - 1.8.1. Be sure to ground the body when handling the LCD Modules.
  - 1.8.2. Tools required for assembly, such as soldering irons, must be properly ground.
  - 1.8.3. To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.
  - 1.8.4. The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

## 2 Storage Precautions

- 2.1. When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.
- 2.2. The LCD modules should be stored under the storage temperature range. If the LCD modules will be stored for a long time, the recommend condition is:  
Temperature : 0°C ~ 40°C Relatively humidity: ≤80%
- 2.3. The LCD modules should be stored in the room without acid, alkali and harmful gas.

## 3 Transportation Precautions

The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.

