

|                         |            |                    |            |
|-------------------------|------------|--------------------|------------|
| MDT0500D1OSC-PAR        | 800 x 480  | Parallel Interface | TFT Module |
| (MCT050ACA0CW800480LML) |            |                    |            |
| Specification           |            |                    |            |
| Version: 1              |            | Date: 27/04/2019   |            |
| Revision                |            |                    |            |
| 1                       | 25/04/2019 | First issue        |            |

| Display Features      |                         |  |                  |
|-----------------------|-------------------------|-------------------------------------------------------------------------------------|------------------|
| Display Size          | 5.0"                    |                                                                                     |                  |
| Resolution            | 800 x 480               |                                                                                     |                  |
| Orientation           | Landscape               |                                                                                     |                  |
| Appearance            | RGB                     |                                                                                     |                  |
| Logic Voltage         | 3.1V                    |                                                                                     |                  |
| Interface             | Parallel                |                                                                                     |                  |
| Brightness            | 300 cd/m <sup>2</sup>   |                                                                                     |                  |
| Touchscreen           | CTP                     |                                                                                     |                  |
| Module Size           | 120.70 x 75.80 x 9.68mm |                                                                                     |                  |
| Operating Temperature | -20°C ~ +70°C           |                                                                                     |                  |
| Pinout                | 36 way connector        |                                                                                     |                  |
| Pitch                 | ---                     |                                                                                     |                  |
|                       |                         | Box Quantity                                                                        | Weight / Display |
|                       |                         | ---                                                                                 | ---              |

\* - For full design functionality, please use this specification in conjunction with the SSD1963 specification.(Provided Separately)

| Display Accessories                   |                                                                                                                                     |
|---------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| Part Number                           | Description                                                                                                                         |
| MDIB-RPI                              | The MDIB-RPI is a Raspberry Pi interface board designed to provide connectivity and compatibility to a range of MIDAS TFT displays. |
| MCFFC36WA50-1963<br>MCFFC36WA100-1963 | 36 way 100mm FFC with 0.5mm pitch                                                                                                   |
|                                       |                                                                                                                                     |

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

## Summary

TFT 5.0" is a TN transmissive type color active matrix TFT liquid crystal display that use amorphous silicon TFT as switching devices. This module is a composed of a TFT\_LCD module, It is usually designed for industrial application and this module follows RoHs,

## General Specifications

- Size: 5.0 inch
- Dot Matrix: 800 × 3(RGB) × 480 dots
- Module dimension: 120.7 x 75.8 x 9.68 (Max) mm
- Active area: 108.0 x 64.8 mm
- Dot pitch: 0.045 x 0.135 mm
- LCD type: TFT, Normally White, Transmissive
- Aspect Ratio: 16:9
- Backlight Type: LED, Normally White
- Controller IC: SSD1963
- Interface: Digital 8080 family MPU 8bit/16bit
- CTP IC: FT5426DQ8 Or Equal
- CTP Interface: I2C
- CTP FW Version: 2
- With /Without TP: With CTP
- Surface: Glare

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



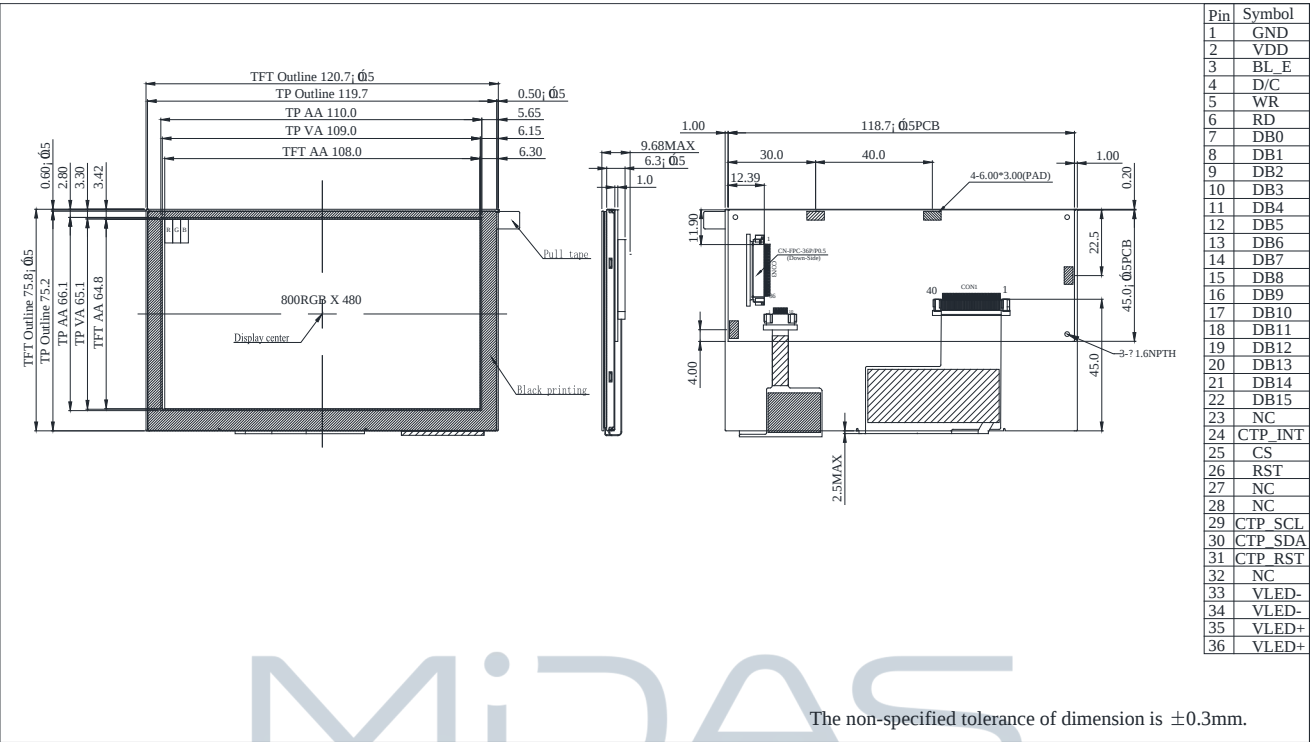
## Interface

### LCM PIN Definition (CON3)

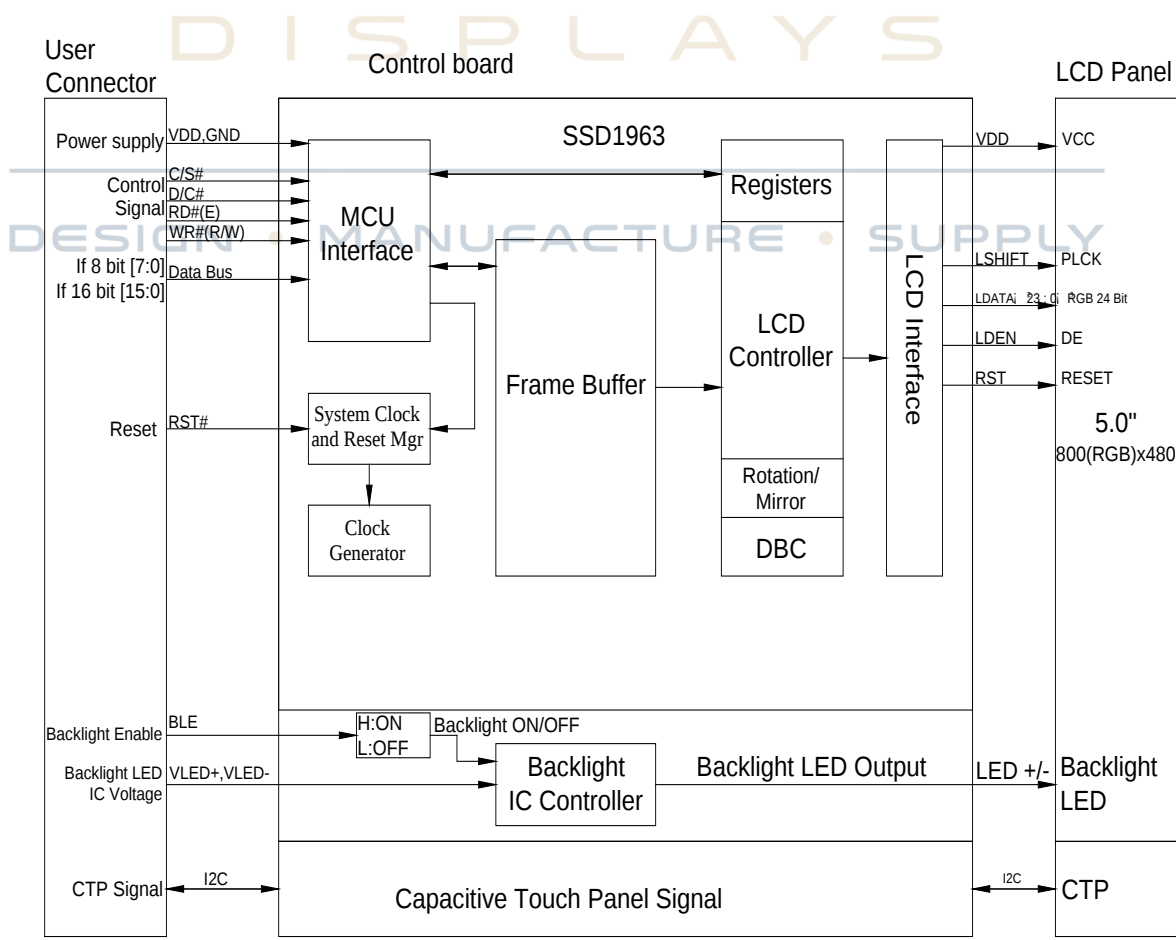
| Pin | Symbol  | Function                                                 | Remark |
|-----|---------|----------------------------------------------------------|--------|
| 1   | GND     | System round pin of the IC.<br>Connect to system ground. |        |
| 2   | VDD     | Power Supply : +3.3V                                     |        |
| 3   | BL_E    | Backlight control signal , H: On \ L: Off                |        |
| 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  | DB8     | Data bus (When select 8bits mode, this pin is NC)        | Note1  |
| 16  | DB9     | Data bus (When select 8bits mode, this pin is NC)        | Note1  |
| 17  | DB10    | Data bus (When select 8bits mode, this pin is NC)        | Note1  |
| 18  | DB11    | Data bus (When select 8bits mode, this pin is NC)        | Note1  |
| 19  | DB12    | Data bus (When select 8bits mode, this pin is NC)        | Note1  |
| 20  | DB13    | Data bus (When select 8bits mode, this pin is NC)        | Note1  |
| 21  | DB14    | Data bus (When select 8bits mode, this pin is NC)        | Note1  |
| 22  | DB15    | Data bus (When select 8bits mode, this pin is NC)        | Note1  |
| 23  | NC      | No connection                                            |        |
| 24  | CTP_INT | External interrupt to the host                           |        |
| 25  | CS      | Chip select                                              |        |
| 26  | RST     | Hardware reset                                           |        |
| 27  | NC      | No connection                                            |        |
| 28  | NC      | No connection                                            |        |
| 29  | CTP_SCL | I2C clock input                                          |        |
| 30  | CTP_SDA | I2C data input and output                                |        |
| 31  | CTP_RST | External Reset, Low is active                            |        |
| 32  | NC      | No connection                                            |        |
| 33  | VLED-   | VLED- for B/L LED inverter (GND)                         |        |
| 34  | VLED-   | VLED- for B/L LED inverter (GND)                         |        |
| 35  | VLED+   | VLED+ for B/L LED inverter                               |        |
| 36  | VLED+   | VLED+ for B/L LED inverter                               |        |

Note1: When select 8bit mode, DB0~DB7 be used, DB8~DB15 no connect  
When select 16bit mode, DB0~DB15 be used

# Contour Drawing



# Block Diagram



## 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

- 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

Operating conditions: (CON3.Pin1=GND, Pin2=VDD)

| Item                   | Symbol | Condition | Min | Typ | Max | Unit | Remark |
|------------------------|--------|-----------|-----|-----|-----|------|--------|
| Supply Voltage For LCM | VDD    | —         | 3.0 | 3.1 | 3.3 | V    | -      |
| Supply Current For LCM | IDD    | —         | —   | 150 | 230 | mA   | Note1  |

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

Backlight driving conditions (CON3.Pin33,34=VLED-, Pin35,36=VLED+)

| Parameter                        | Symbol  | Min. | Typ.   | Max. | Unit | Remark     |
|----------------------------------|---------|------|--------|------|------|------------|
| Operation Current For LED Driver | VLED=5V | 200  | -      | 300  | mA   | Note 1,2   |
| Supply Voltage For LED Driver    | VLED+   | —    | 5      | —    | V    |            |
| LED Life Time                    |         | —    | 50,000 | -    | Hr   | Note 2,3,4 |

Note 1 : Base on VLED=5.0V for the back light driver IC specification

Note 2 : Ta = 25 °C

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

Note 4 : The single LED lamp case

## DC CHARATERISTICS

| 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    |           |

## Interface timing

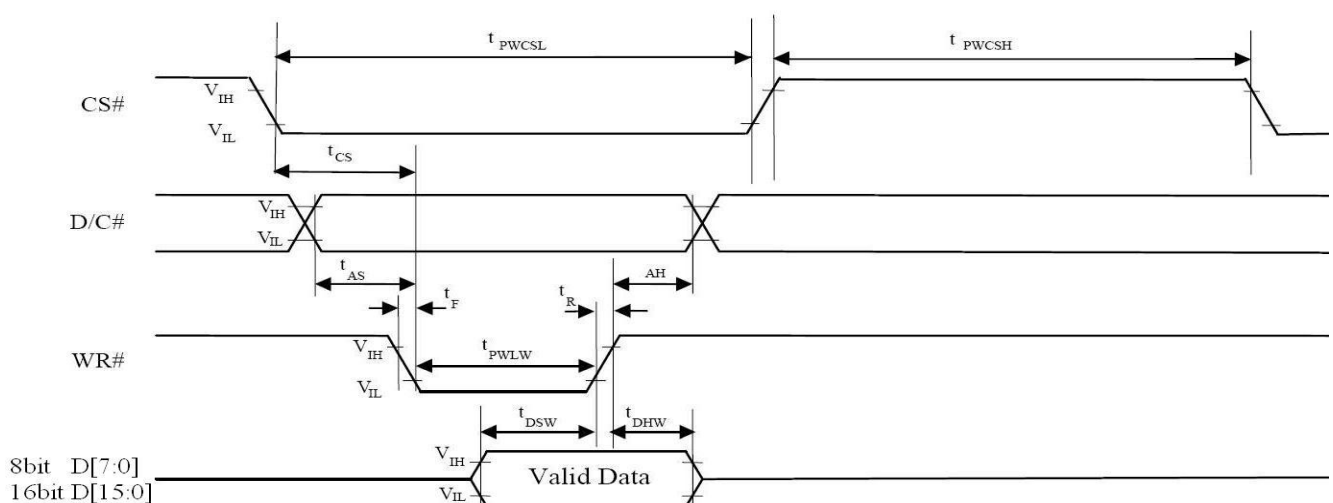
## 8080 Mode 8bit/16bit

The 8080 mode MCU interface consist of CS#, D/C#, RD#, WR#, Data Bus signals. 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#.

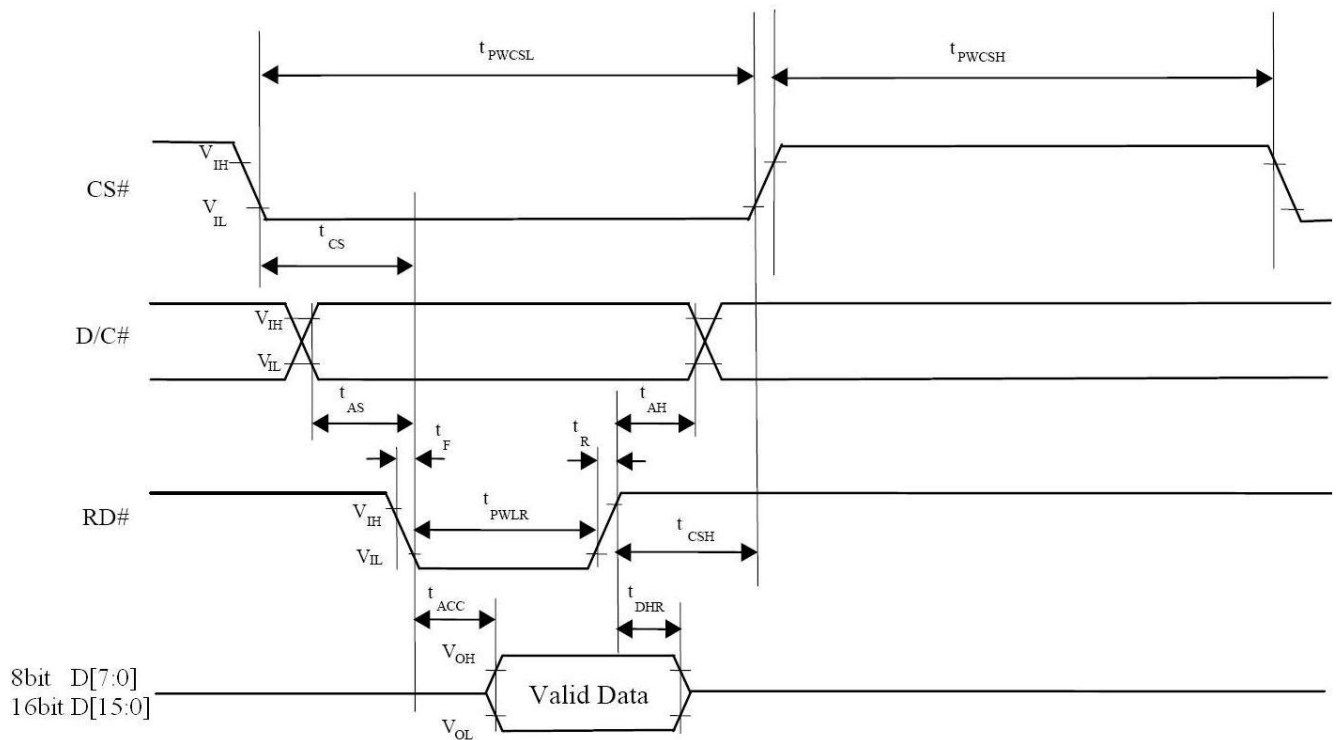
## 8080 Mode Write Cycle

| <b>Symbol</b> | <b>Parameter</b>                                                                       | <b>Min</b>     | <b>Typ</b>                         | <b>Max</b> | <b>Unit</b> |
|---------------|----------------------------------------------------------------------------------------|----------------|------------------------------------|------------|-------------|
| 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          |

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



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



## 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   |

## Optical Characteristics

| Item               |       | Symbol     | Condition.                            | Min  | Typ. | Max. | Unit              | Remark            |
|--------------------|-------|------------|---------------------------------------|------|------|------|-------------------|-------------------|
| Response time      |       | Tr         | $\theta=0^{\circ}$ 、 $\Phi=0^{\circ}$ | -    | 10   | 20   | .ms               | Note 3            |
|                    |       | Tf         |                                       | -    | 15   | 30   | .ms               |                   |
| Contrast ratio     |       | CR         | At optimized viewing angle            | 400  | 500  | -    | -                 | Note 4            |
| Color Chromaticity | White | Wx         | $\theta=0^{\circ}$ 、 $\Phi=0$         | 0.26 | 0.31 | 0.36 |                   | Note 2,6,7        |
|                    |       | Wy         |                                       | 0.28 | 0.33 | 0.38 |                   |                   |
| Viewing angle      | Hor.  | $\Theta R$ | $CR \geq 10$                          | -    | 75   | -    | Deg.              | Note 1            |
|                    |       | $\Theta L$ |                                       | -    | 75   | -    |                   |                   |
|                    | Ver.  | $\Phi T$   |                                       | -    | 75   | -    |                   |                   |
|                    |       | $\Phi B$   |                                       | -    | 75   | -    |                   |                   |
| Brightness         |       | -          | -                                     | 250  | 300  | -    | cd/m <sup>2</sup> | Center of display |
| Uniformity         |       | (U)        | -                                     | 75   | -    | -    | %                 | Note5             |

Ta=25±2℃

Note 1: Definition of viewing angle range

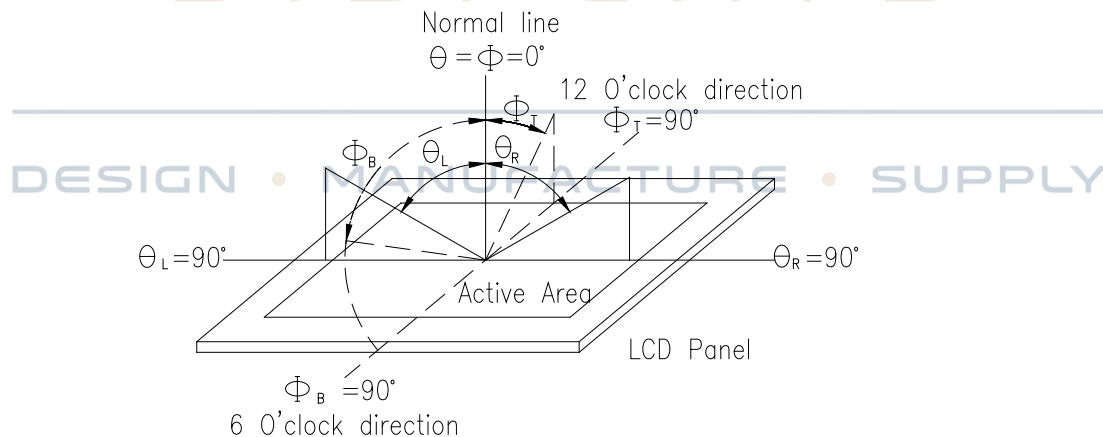


Fig. 11.1. Definition of viewing angle

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

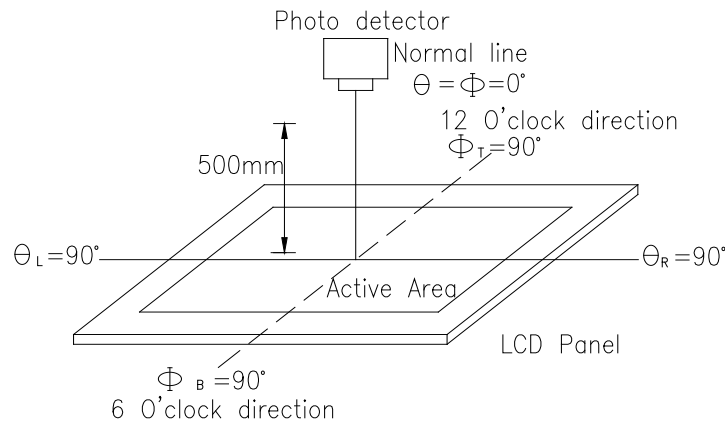
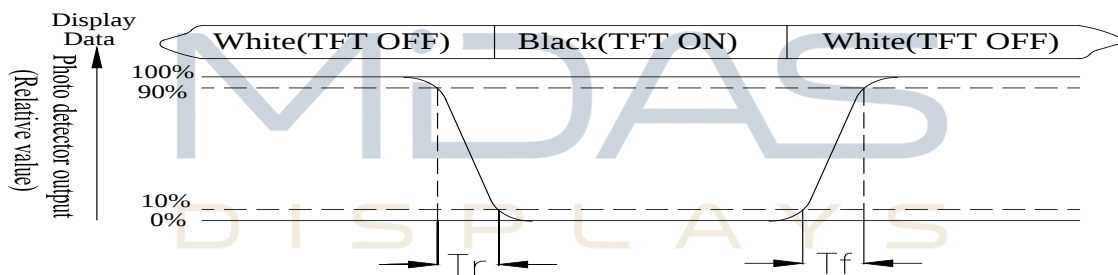


Fig. 11.2. Optical measurement system setup

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

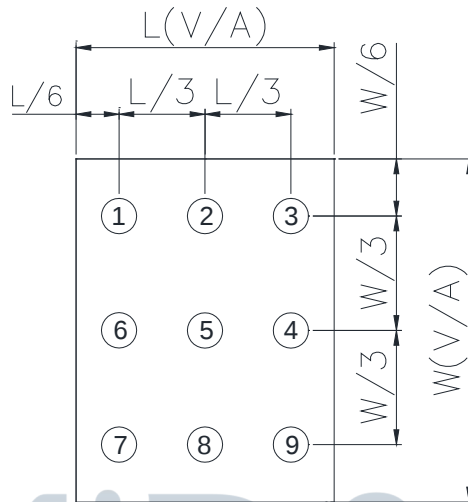


Fig.11.3. Definition of uniformity

Note 6: Definition of color chromaticity (CIE 1931)

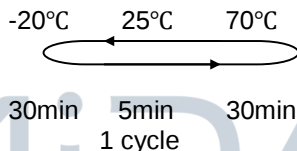
Color coordinates measured at the center point of LCD

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 (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>  | -20°C/70°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.

The drawing illustrates the mechanical specifications of the MIDAS module. It includes three views: a top view showing the overall dimensions and internal layout, a front view showing the module's profile and layer thicknesses, and a back view showing the sensor and adhesive layers. Key dimensions include a total width of 119.70±0.15mm and a height of 75.20±0.15mm. The module features a pull tape for handling and black printing for identification. The pinout table specifies 10 pins for logic functions.

| PIN | Logic |
|-----|-------|
| 1   | VSS   |
| 2   | VDDT  |
| 3   | SCL   |
| 4   | NC    |
| 5   | SDA   |
| 6   | NC    |
| 7   | /RST  |
| 8   | NC    |
| 9   | /INT  |
| 10  | VSS   |

MIDAS  
DISPLAYS

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