


| | | | |
|--|------------|---|------------|
| MCT050HDMI-A-CTP | 800 x 480 | HDMI Interface | TFT Module |
| (MDT0500D2SSC-HDMI) Specification | | | |
| Version: 1 | | Date: 25/10/2019 | |
| Revision | | | |
| 1 | 27/06/2019 | First issue | |
| 2 | 22/10/2019 | Modify Electrical Characteristics (Note2&IDD) | |

| Display Features | |  | |
|-----------------------|--------------------------|---|------------------|
| Display Size | 5.0" | | |
| Resolution | 800 x 480 | | |
| Orientation | Landscape | | |
| Appearance | RGB | | |
| Logic Voltage | 5V | | |
| Interface | HDMI | | |
| Brightness | 400 cd/m ² | | |
| Touchscreen | CTP | | |
| Module Size | 120.70 x 75.80 x 23.20mm | | |
| Operating Temperature | -20°C ~ +70°C | | |
| Pinout | --- | | Box Quantity |
| Pitch | --- | | Weight / Display |

* - For full design functionality, please use this specification in conjunction with the TFP401 specification.(Provided Separately)

| Display Accessories | |
|---------------------|--------------------------------------|
| Part Number | Description |
| MCIB-HDMI/HDMI | Male To Male HDMI Connector. |
| MCIC-USB | USB-to-Micro USB interconnect cable. |
| | |

| 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 23.2 (Max) mm
- Active area: 108.0 x 64.8 mm
- Dot pitch: 0.045 x 0.135 mm
- LCD type: TFT, Normally White, Transmissive
- View Direction: 12 o'clock
- Gray Scale Inversion Direction: 6 o'clock
- Aspect Ratio: 16:9
- Backlight Type: LED, Normally White
- Controller IC: TFP401
- Interface: HDMI
- With /Without TP: With CTP
- CTP IC: FT5426 Or Equal
- CTP Interface: USB
- CTP FW Version: 2
- Surface: Glare

*Color tone slight changed by temperature and driving voltage.



Interface

1. LCM PIN Definition(CON5)

| Pin | Symbol | Function | Remark |
|-----|--------|---|--------|
| 1 | 3.3V | TFT Module Power limit can only output 3.3V,100mA | NOTE1 |
| 2 | 5V | Raspberry Pi:Power 5V | |
| 3 | GPIO02 | Raspberry Pi:GPIO02 | |
| 4 | 5V | Raspberry Pi:Power 5V | |
| 5 | GPIO03 | Raspberry Pi:GPIO03 | |
| 6 | GND | Raspberry Pi:GND | |
| 7 | GPIO04 | Raspberry Pi:GPIO04 | |
| 8 | GPIO14 | Raspberry Pi:GPIO14 | |
| 9 | GND | Raspberry Pi:GND | |
| 10 | GPIO15 | Raspberry Pi:GPIO15 | |
| 11 | GPIO17 | Raspberry Pi:GPIO17 | |
| 12 | GPIO18 | Raspberry Pi:GPIO18 (Backlight Enable) | |
| 13 | GPIO27 | Raspberry Pi:GPIO27 | |
| 14 | GND | Raspberry Pi:GND | |
| 15 | GPIO22 | Raspberry Pi:GPIO22 | |
| 16 | GPIO23 | Raspberry Pi:GPIO23 | |
| 17 | 3.3V | TFT Module Power limit can only output 3.3V,100mA | NOTE1 |
| 18 | GPIO24 | Raspberry Pi:GPIO24 | |
| 19 | GPIO10 | Raspberry Pi:GPIO10 | |
| 20 | GND | Raspberry Pi:GND | |
| 21 | GPIO09 | Raspberry Pi:GPIO09 | |
| 22 | GPIO25 | Raspberry Pi:GPIO25 | |
| 23 | GPIO11 | Raspberry Pi:GPIO11 | |
| 24 | GPIO08 | Raspberry Pi:GPIO08 | |
| 25 | GND | Raspberry Pi:GND | |
| 26 | GPIO07 | Raspberry Pi:GPIO07 | |
| 27 | ID_SD | Raspberry Pi:ID_SD | |
| 28 | ID_SC | Raspberry Pi:ID_SC | |
| 29 | GPIO05 | Raspberry Pi:GPIO05 | |
| 30 | GND | Raspberry Pi:GND | |
| 31 | GPIO06 | Raspberry Pi:GPIO06 | |
| 32 | GPIO12 | Raspberry Pi:GPIO12 | |
| 33 | GPIO13 | Raspberry Pi:GPIO13 | |
| 34 | GND | Raspberry Pi:GND | |
| 35 | GPIO19 | Raspberry Pi:GPIO19 | |
| 36 | GPIO16 | Raspberry Pi:GPIO16 | |
| 37 | GPIO26 | Raspberry Pi:GPIO26 | |
| 38 | GPIO20 | Raspberry Pi:GPIO20 | |
| 39 | GND | Raspberry Pi:GND | |
| 40 | GPIO21 | Raspberry Pi:GPIO21 | |

Note1: The 3.3V supply current is limited; please pay special attention to use



2. LCM PIN Definition(CON4)

| Pin | Symbol | Function | Remark |
|-----|--------|--|--------|
| 1 | NC | No connection | |
| 2 | 5V | Raspberry Pi:Power 5V | |
| 3 | GPIO02 | Raspberry Pi:GPIO02 | |
| 4 | 5V | Raspberry Pi:Power 5V | |
| 5 | GPIO03 | Raspberry Pi:GPIO03 | |
| 6 | GND | Raspberry Pi:GND | |
| 7 | GPIO04 | Raspberry Pi:GPIO04 | |
| 8 | GPIO14 | Raspberry Pi:GPIO14 | |
| 9 | GND | Raspberry Pi:GND | |
| 10 | GPIO15 | Raspberry Pi:GPIO15 | |
| 11 | GPIO17 | Raspberry Pi:GPIO17 | |
| 12 | GPIO18 | Raspberry Pi:GPIO18 (Backlight Enable) | |
| 13 | GPIO27 | Raspberry Pi:GPIO27 | |
| 14 | GND | Raspberry Pi:GND | |
| 15 | GPIO22 | Raspberry Pi:GPIO22 | |
| 16 | GPIO23 | Raspberry Pi:GPIO23 | |
| 17 | NC | No connection | |
| 18 | GPIO24 | Raspberry Pi:GPIO24 | |
| 19 | GPIO10 | Raspberry Pi:GPIO10 | |
| 20 | GND | Raspberry Pi:GND | |
| 21 | GPIO09 | Raspberry Pi:GPIO09 | |
| 22 | GPIO25 | Raspberry Pi:GPIO25 | |
| 23 | GPIO11 | Raspberry Pi:GPIO11 | |
| 24 | GPIO08 | Raspberry Pi:GPIO08 | |
| 25 | GND | Raspberry Pi:GND | |
| 26 | GPIO07 | Raspberry Pi:GPIO07 | |
| 27 | ID_SD | Raspberry Pi:ID_SD | |
| 28 | ID_SC | Raspberry Pi:ID_SC | |
| 29 | GPIO05 | Raspberry Pi:GPIO05 | |
| 30 | GND | Raspberry Pi:GND | |
| 31 | GPIO06 | Raspberry Pi:GPIO06 | |
| 32 | GPIO12 | Raspberry Pi:GPIO12 | |
| 33 | GPIO13 | Raspberry Pi:GPIO13 | |
| 34 | GND | Raspberry Pi:GND | |
| 35 | GPIO19 | Raspberry Pi:GPIO19 | |
| 36 | GPIO16 | Raspberry Pi:GPIO16 | |
| 37 | GPIO26 | Raspberry Pi:GPIO26 | |
| 38 | GPIO20 | Raspberry Pi:GPIO20 | |
| 39 | GND | Raspberry Pi:GND | |
| 40 | GPIO21 | Raspberry Pi:GPIO21 | |



3. CTP USB PIN Definition(CON3)

| Pin | Symbol | Function | Remark |
|-----|--------|---------------|--------|
| 1 | 5V | Power 5V | |
| 2 | D- | Data line - | |
| 3 | D+ | Data line + | |
| 4 | NC | No connection | |
| 5 | GND | Power Ground | |

Note 1: Only supports Raspberry Pi series

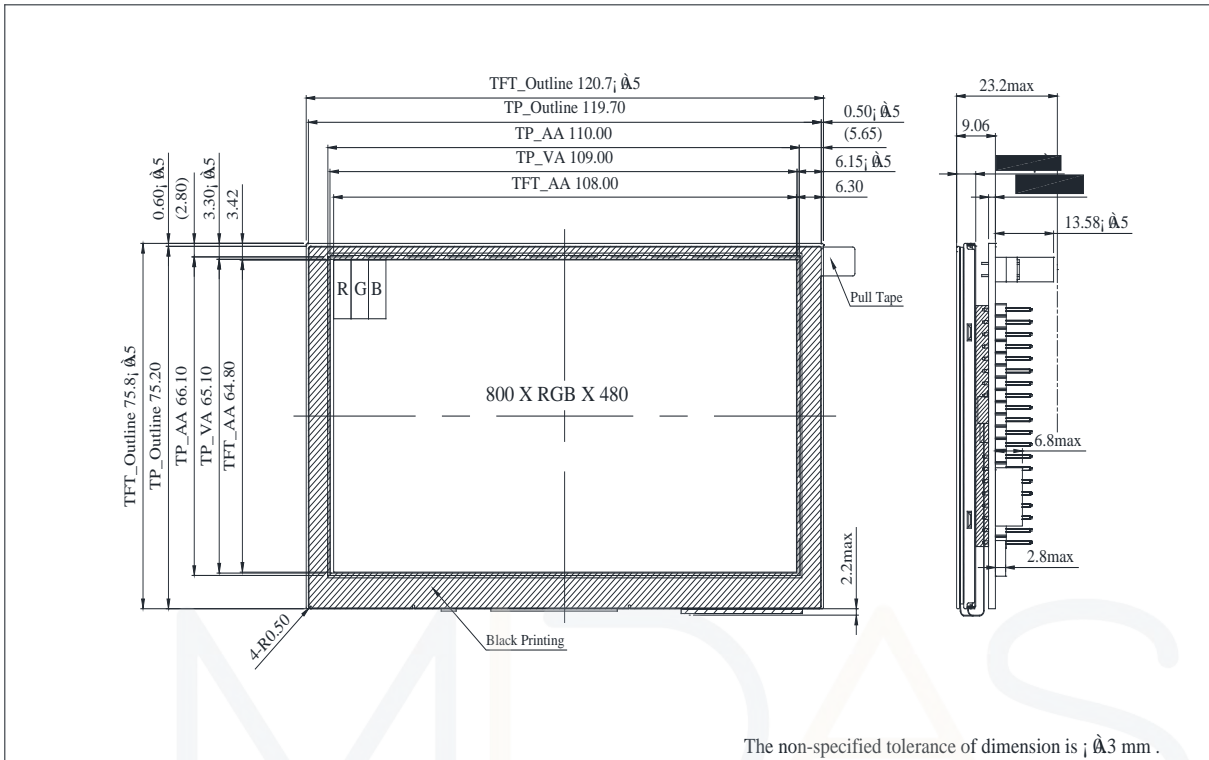
4. HDMI

| Pin No. | Symbol | I/O | Function | Remark |
|---------|--------|-----|---------------------------------|--------|
| 1 | Rx2+ | I | +LVDS Differential Data Input | |
| 2 | GND | P | Ground | |
| 3 | Rx2- | I | -LVDS Differential Data Input | |
| 4 | Rx1+ | I | +LVDS Differential Data Input | |
| 5 | GND | P | Ground | |
| 6 | Rx1- | I | -LVDS Differential Data Input | |
| 7 | Rx0+ | I | +LVDS Differential Data Input | |
| 8 | GND | P | Ground | |
| 9 | Rx0- | I | -LVDS Differential Data Input | |
| 10 | RxC+ | I | +LVDS Differential Clock Input | |
| 11 | GND | P | Ground | |
| 12 | RxC- | I | -LVDS Differential Clock Input | |
| 13-14 | NC | - | No connection | |
| 15 | SCL | I/O | DDC(Data Display Channel) Clock | |
| 16 | SDA | I/O | DDC(Data Display Channel) Data | |
| 17 | GND | P | Ground | |
| 18 | 5V | P | Power Supply | |
| 19 | Detect | I/O | Hot plug detect | |

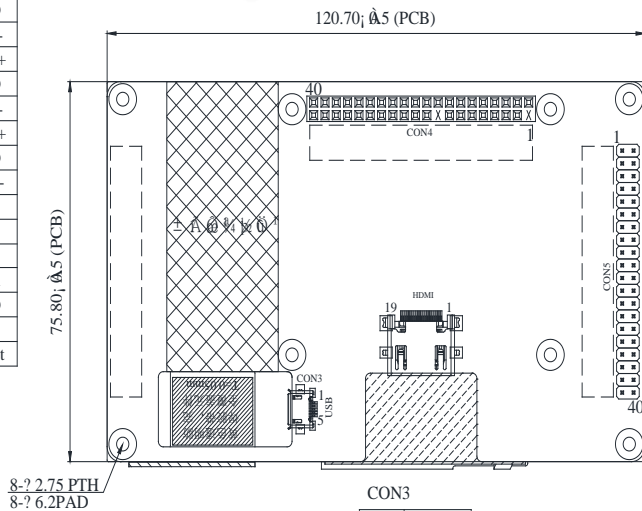
I: input, O: output, P: Power



Contour Drawing



| HDMI | |
|---------|--------|
| PIN NO. | SYMBOL |
| 1 | RX2+ |
| 2 | GND |
| 3 | RX2- |
| 4 | RX1+ |
| 5 | GND |
| 6 | RX1- |
| 7 | RX0+ |
| 8 | GND |
| 9 | RX0- |
| 10 | RXC+ |
| 11 | GND |
| 12 | RXC- |
| 13 | NC |
| 14 | NC |
| 15 | SCL |
| 16 | SDA |
| 17 | GND |
| 18 | 5V |
| 19 | Detect |



| CON3 | |
|---------|--------|
| PIN NO. | SYMBOL |
| 1 | 5V |
| 2 | D- |
| 3 | D+ |
| 4 | NC |
| 5 | GND |

CON4

| Pin | Symbol | Pin | Symbol |
|-----|--------|-----|--------|
| 1 | NC | 21 | GPIO09 |
| 2 | 5V | 22 | GPIO25 |
| 3 | GPIO02 | 23 | GPIO11 |
| 4 | 5V | 24 | GPIO08 |
| 5 | GPIO03 | 25 | GND |
| 6 | GND | 26 | GPIO07 |
| 7 | GPIO04 | 27 | ID_SD |
| 8 | GPIO14 | 28 | ID_SC |
| 9 | GND | 29 | GPIO05 |
| 10 | GPIO15 | 30 | GND |
| 11 | GPIO17 | 31 | GPIO06 |
| 12 | GPIO18 | 32 | GPIO12 |
| 13 | GPIO27 | 33 | GPIO13 |
| 14 | GND | 34 | GND |
| 15 | GPIO22 | 35 | GPIO19 |
| 16 | GPIO23 | 36 | GPIO16 |
| 17 | NC | 37 | GPIO26 |
| 18 | GPIO24 | 38 | GPIO20 |
| 19 | GPIO10 | 39 | GND |
| 20 | GND | 40 | GPIO21 |

CON5

| Pin | Symbol | Pin | Symbol |
|-----|--------|-----|--------|
| 1 | 3.3V | 21 | GPIO09 |
| 2 | 5V | 22 | GPIO25 |
| 3 | GPIO02 | 23 | GPIO11 |
| 4 | 5V | 24 | GPIO08 |
| 5 | GPIO03 | 25 | GND |
| 6 | GND | 26 | GPIO07 |
| 7 | GPIO04 | 27 | ID_SD |
| 8 | GPIO14 | 28 | ID_SC |
| 9 | GND | 29 | GPIO05 |
| 10 | GPIO15 | 30 | GND |
| 11 | GPIO17 | 31 | GPIO06 |
| 12 | GPIO18 | 32 | GPIO12 |
| 13 | GPIO27 | 33 | GPIO13 |
| 14 | GND | 34 | GND |
| 15 | GPIO22 | 35 | GPIO19 |
| 16 | GPIO23 | 36 | GPIO16 |
| 17 | 3.3V | 37 | GPIO26 |
| 18 | GPIO24 | 38 | GPIO20 |
| 19 | GPIO10 | 39 | GND |
| 20 | GND | 40 | GPIO21 |

The non-specified tolerance of dimension is ± 0.3 mm.

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°C

Electrical Characteristics

1. Operating conditions:

| Item | Symbol | Condition | Min | Typ | Max | Unit | Remark |
|------------------------|--------|-----------|-----|--------|-----|------|--------|
| Supply Voltage For LCM | VDD | — | 4.9 | 5 | 5.1 | V | — |
| Supply Current For LCM | IDD | — | — | 450 | 680 | mA | Note 1 |
| LED life time | — | — | — | 50,000 | — | Hr | Note 4 |

Note 1 : This value is test for VDD =5.0V , Ta=25°C only

Note 2 : Please make sure to support enough current.

Note3 : CTP driver is base on the mouse driver program and through USB port connect to PC or embedded board.Can only support the single touch.

Note 4: The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25°C and IL =60mA. The LED lifetime could be decreased if operating IL is lager than 60mA.

DC CHARATERISTICS

| Parameter | Symbol | Rating | | | Unit | Condition |
|--------------------------|-----------------|--------|-----|--------|------|-----------|
| | | Min | Typ | Max | | |
| Low level input voltage | V _{IL} | 0 | - | 0.3VDD | V | |
| High level input voltage | V _{IH} | 0.7VDD | - | VDD | V | |



Optical Characteristics

| Item | Symbol | Condition. | Min | Typ. | Max. | Unit | Remark | |
|--|--------|-------------------------------------|-------------------------------|------|------|-------------------|-------------------|--------|
| Response time | Tr | $\theta=0^\circ \cdot \phi=0^\circ$ | - | 10 | 20 | .ms | Note 3 | |
| | Tf | | - | 15 | 30 | .ms | | |
| Contrast ratio | CR | At optimized viewing angle | 400 | 500 | - | - | Note 4 | |
| Color Chromaticity | White | Wx | $\theta=0^\circ \cdot \phi=0$ | 0.26 | 0.31 | 0.36 | Note 2,6,7 | |
| | | Wy | | 0.28 | 0.33 | 0.38 | | |
| Viewing angle (Gray Scale Inversion Direction) | Hor. | Θ_R | CR ≥ 10 | 60 | 70 | - | Deg. | Note 1 |
| | | Θ_L | | 60 | 70 | - | | |
| | Ver. | Φ_T | | 40 | 50 | - | | |
| | | Φ_B | | 60 | 70 | - | | |
| Brightness | - | - | 300 | 400 | - | cd/m ² | Center of display | |
| Uniformity | (U) | - | 75 | - | - | % | Note5 | |

Ta=25±2°C

Note 1: Definition of viewing angle range

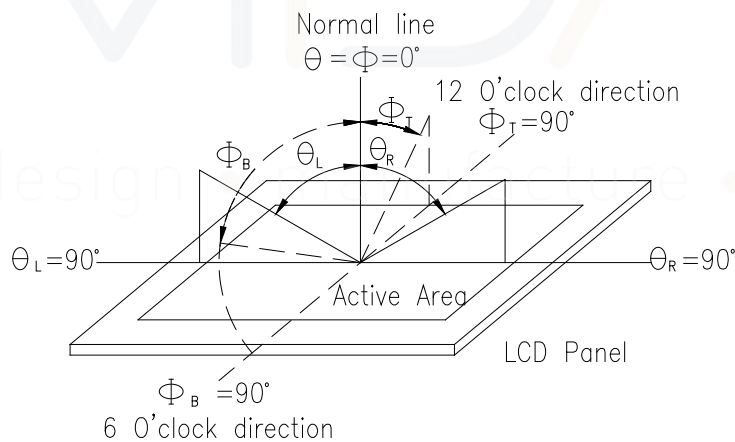


Fig. 9.1. Definition of viewing angle

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.



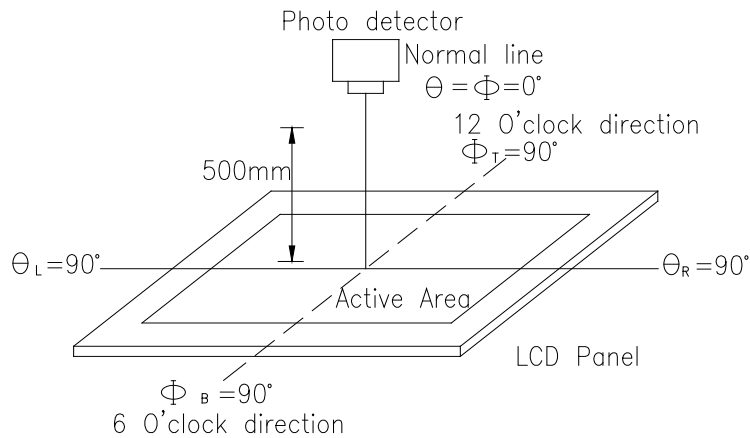
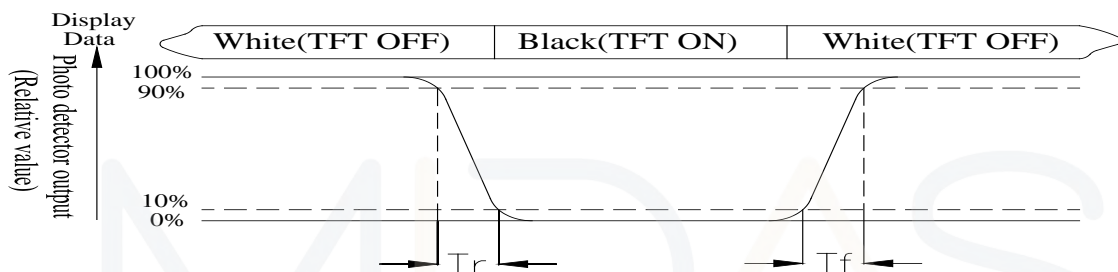


Fig. 9.2. Optical measurement system setup

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.

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

L = Active area length

W = Active area width

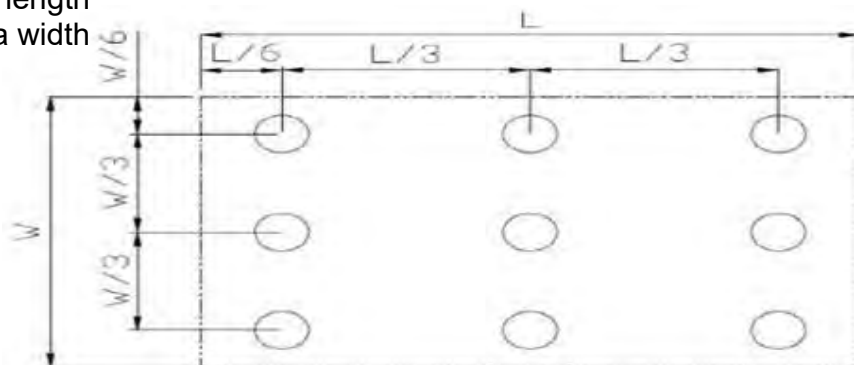


Fig9.3. . Definition of uniformity

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.



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 200hrs | 2 |
| Low Temperature storage | Endurance test applying the low storage temperature for a long time. | -30°C 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 200hrs | — |
| Low Temperature Operation | Endurance test applying the electric stress under low temperature for a long time. | -20°C 200hrs | 1 |
| High Temperature/ Humidity Operation | The module should be allowed to stand at 60°C,90%RH max | 60°C,90%RH 96hrs | 1,2 |
| Thermal shock resistance | The sample should be allowed stand the following 10 cycles of operation <div style="text-align: center;"> <p style="margin: 0;">-20°C 25°C 70°C</p> <p style="margin: 0;">30min 5min 30min</p> <p style="margin: 0;">1 cycle</p> </div> | -20°C/70°C 10 cycles | — |
| Vibration test | Endurance test applying the vibration during transportation and using. | Total fixed amplitude : 3 1.5mm Vibration Frequency : 10~55Hz 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) ,±800v(air), RS=330Ω CS=150pF 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.