

Display Elektronik GmbH

DATA SHEET

TFT MODULE

**DEM 800480G2 TMH-PW-N
(C-TOUCH)**

7,0“ TFT + CTP

Product Specification

Ver.: 3

12.06.2023

Revision History

| VERSION | DATE | REVISED PAGE NO. | Note |
|---------|------------|------------------|---|
| 0 | 21.06.2019 | | First issue |
| 1 | 17.08.2020 | | Add the HDMI interface description →HDMI(only for DVI) |
| 2 | 17.05.2021 | | Modify CTP & IDD |
| 3 | 12.06.2023 | | Modify Pin Function(DVI) |

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1.Summary

TFT 7.0" is a TN transmissive type color active matrix TFT liquid crystal display that uses amorphous silicon TFT as switching devices. This module is composed of a TFT_LCD module, it is usually designed for industrial application and this module follows RoHS.

2.General Specifications

- n Size: 7.0 inch
- n Dot Matrix: 800 x RGBx480(TFT) dots
- n Module dimension: 165.00 x 100.00 x 26.60 max mm
- n Active area: 154.08 x 85.92 mm
- n Dot pitch: 0.0642 x 0.179mm
- n LCD type: TFT, Normally White, Transmissive
- n View Direction: 12 o'clock
- n Gray Scale Inversion Direction: 6 o'clock
- n Aspect Ratio: 16:9
- n Controller IC: TFP401 or equivalent
- n Backlight Type: LED,Normally White
- n Interface: HDMI(only for DVI)
- n CTP IC: ILI2130 or equivalent
- n CTP FW Version: 0x07.0x00.0x00.0x00.0x65.0x90.0x00.0x01
- n CTP Interface: USB
- n CTP Resolution: 16384*16384
- n With /Without TP: With CTP
- n Surface: Anti- Glare

*Color tone slight changed by temperature and driving voltage.

3.Interface

3.1. LCM PIN Definition(CON6)

| 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 | |

3.2. 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

3.3. DVI

| Pin No. | Symbol | I/O | Function | Remark |
|---------|--------|-----|---|--------|
| 1 | Rx2+ | I | Channel-2 positive receiver input; low-voltage signal differential- input pair. | |
| 2 | GND | P | Ground | |
| 3 | Rx2- | I | Channel-2 negative receiver input; low-voltage signal differential- input pair. | |
| 4 | Rx1+ | I | Channel-1 positive receiver input; low-voltage signal differential- input pair. | |
| 5 | GND | P | Ground | |
| 6 | Rx1- | I | Channel-1 negative receiver input; low-voltage signal differential- input pair. | |
| 7 | Rx0+ | I | Channel-0 positive receiver input; low-voltage signal differential- input pair. | |
| 8 | GND | P | Ground | |
| 9 | Rx0- | I | Channel-0 negative receiver input; low-voltage signal differential- input pair. | |
| 10 | RxC+ | I | Clock positive receiver input; low-voltage signal differential- input pair. | |
| 11 | GND | P | Ground | |
| 12 | RxC- | I | Clock negative receiver input; low-voltage signal differential- input pair. | |
| 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

3.4. USB

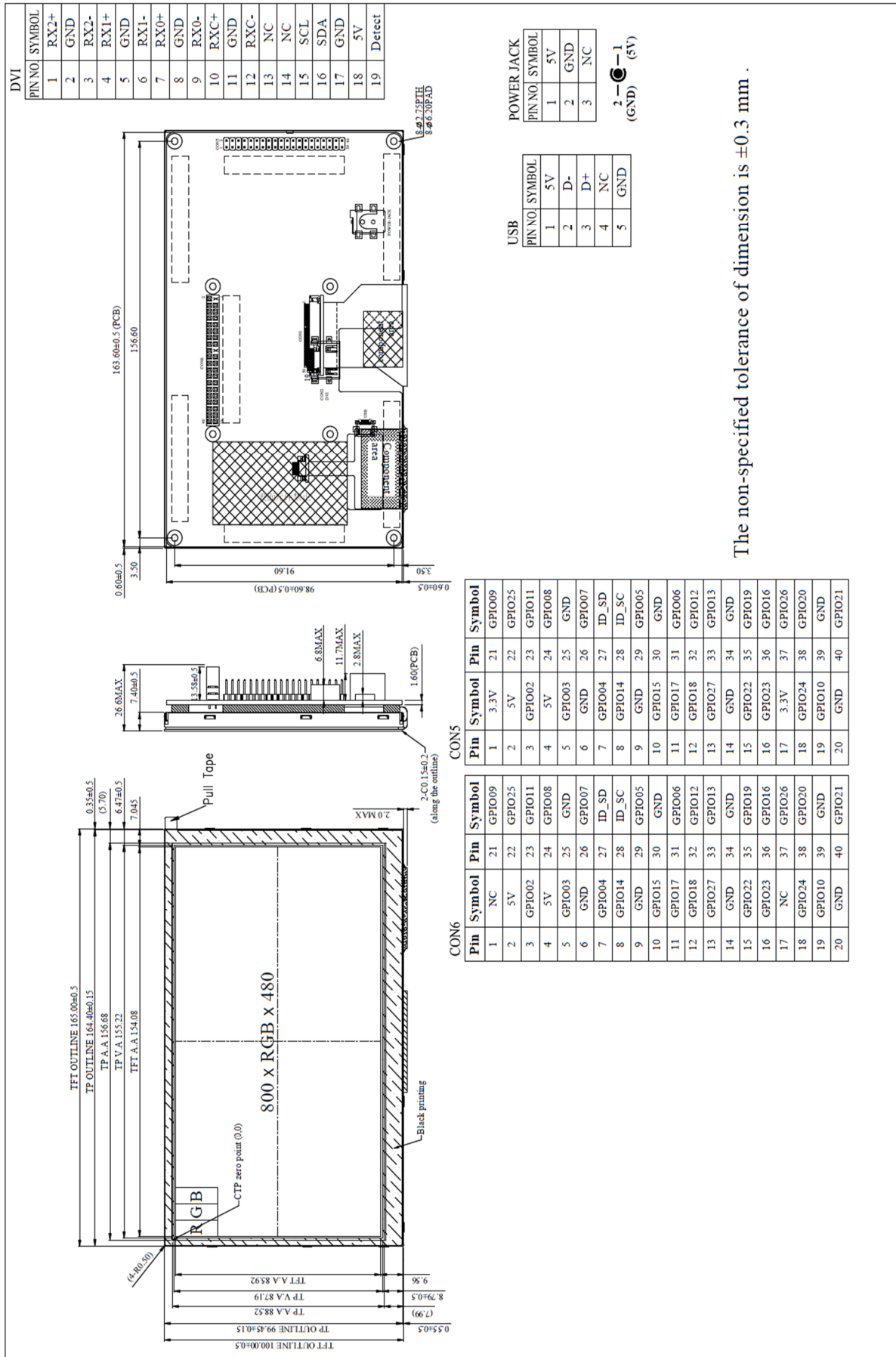
| Pin No. | Symbol | I/O | Function | Remark |
|---------|--------|-----|---------------|--------|
| 1 | 5V | P | Power Supply | |
| 2 | D- | I/O | USB Data - | |
| 3 | D+ | I/O | USB Data + | |
| 4 | NC | - | No connection | |
| 5 | GND | P | Ground | |

3.5. POWER JACK

| Pin No. | Symbol | I/O | Function | Remark |
|---------|--------|-----|-------------------|--------|
| 1 | 5V | P | Power Supply (5V) | |
| 2 | GND | P | Ground | |
| 3 | NC | | No connection | |

* Display need to use power jack to power on due to HDMI port not able to fulfill the supply current

4. Contour Drawing



5. 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

6. Electrical Characteristics

6.1. 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 | - | - | 830 | 1250 | 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 : Touch Panel 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 =180mA. The LED lifetime could be decreased if operating IL is lager than 180mA.

7.Optical Characteristics

| Item | Symbol | Condition. | Min | Typ. | Max. | Unit | Remark | |
|--|--------|-----------------------------------|-----------------------------|------|------|-------------------|-------------------|------------|
| Response time | Tr+Tf | $\theta=0^\circ$ 、 $\phi=0^\circ$ | - | 25 | 50 | .ms | Note 3 | |
| | | | - | | | .ms | | |
| Contrast ratio | CR | At optimized viewing angle | 500 | 800 | - | - | Note 4 | |
| Color Chromaticity | White | Wx | $\theta=0^\circ$ 、 $\phi=0$ | 0.26 | 0.31 | 0.36 | - | Note 2,5,6 |
| | | Wy | | 0.28 | 0.33 | 0.38 | - | |
| Viewing angle (Gray Scale Inversion Direction) | Hor. | θ_R | $CR \geq 10$ | 60 | 70 | - | Deg. | Note 1 |
| | | θ_L | | 60 | 70 | - | | |
| | Ver. | ϕ_T | | 50 | 60 | - | | |
| | | ϕ_B | | 60 | 70 | - | | |
| Brightness | - | - | 250 | 350 | - | cd/m ² | Center of display | |
| Uniformity | (U) | - | 70 | - | - | % | Note 5 | |

Ta=25±2°C, IL=180mA

Note 1: Definition of viewing angle range

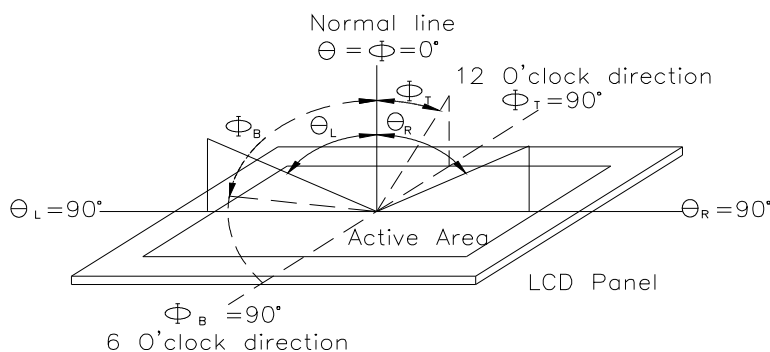


Fig.8.1. Definition of viewing angle

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

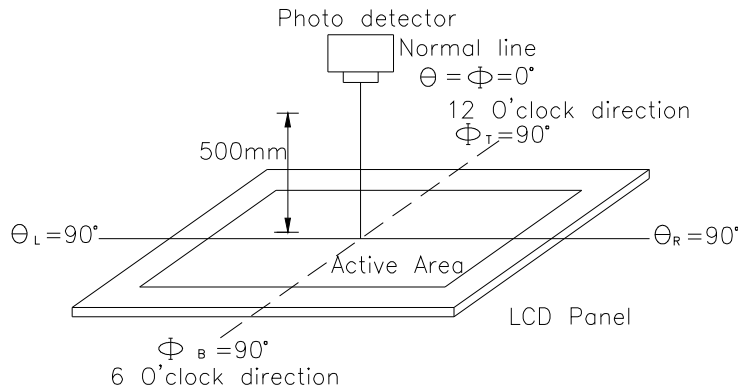
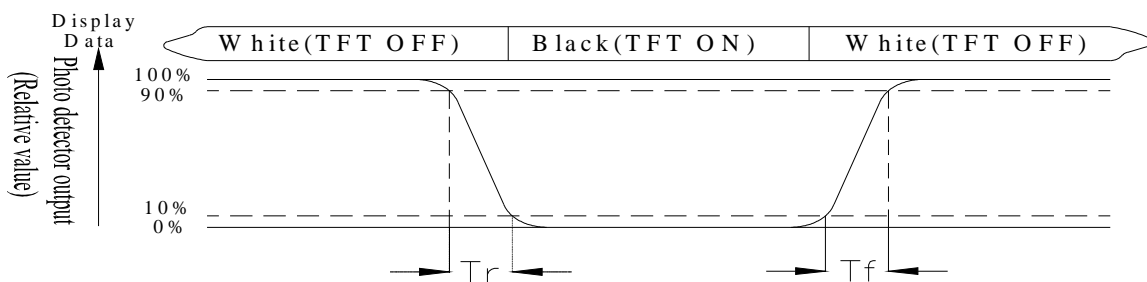


Fig. 8.2. Optical measurement system setup

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

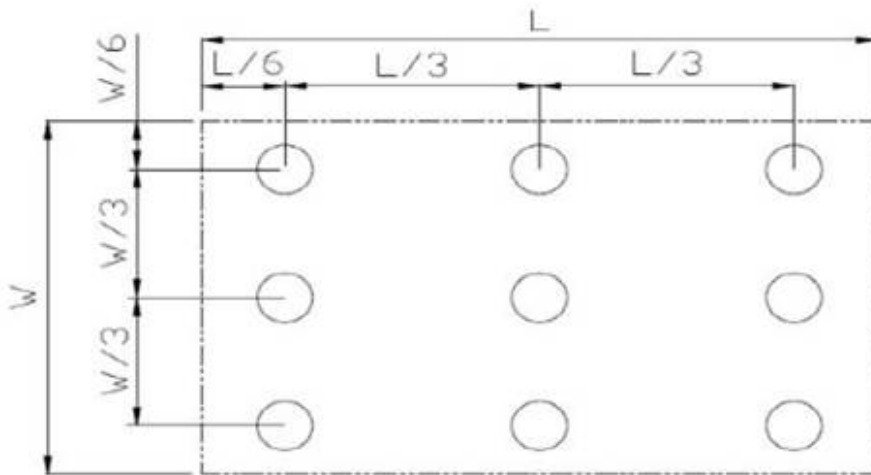


Fig8.3. . Definition of uniformity

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.

8. 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□,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 : 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.