

Display Elektronik GmbH

DATA SHEET

TFT MODULE

DEM 800480U TMH-PW-N (C-TOUCH)

5,0“ TFT + PCT

Product Specification

Ver.: 2

30.01.2018

Revision History

| VERSION | DATE | REVISED PAGE NO. | Note |
|---------|------------|------------------|--------------------|
| 0 | 23.10.2017 | | First Issue |
| 1 | 02.11.2017 | | Add LED Lifetime |
| 2 | 30.01.2018 | | Modify temperature |

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1. 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.

2. General Specifications

- Size: 5.0 Inch
- Dot Matrix: 800 x RGB x 480 Dots
- Module Dimension: 120.70 x 75.80 x 23.20 mm
- Active Area: 108.00 x 64.80 mm
- Dot Pitch: 0.045 x 0.135 mm
- LCD Type: TFT, Normally White TN, 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 Capacitive Touch
- CTP FW Version: A
- Surface: Glare

*Color tone slight changed by temperature and driving voltage.

3. Interface

3.1. LCM PIN Definition (CON5)

| Pin | Symbol | Function | Remark |
|-----|--------|-------------------------|--------|
| 1 | 3.3V | Raspberry Pi:Power 3.3V | |
| 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 | |
| 13 | GPIO27 | Raspberry Pi:GPIO27 | |
| 14 | GND | Raspberry Pi:GND | |
| 15 | GPIO22 | Raspberry Pi:GPIO22 | |
| 16 | GPIO23 | Raspberry Pi:GPIO23 | |
| 17 | 3.3V | Raspberry Pi:3.3V | |
| 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. HDMI

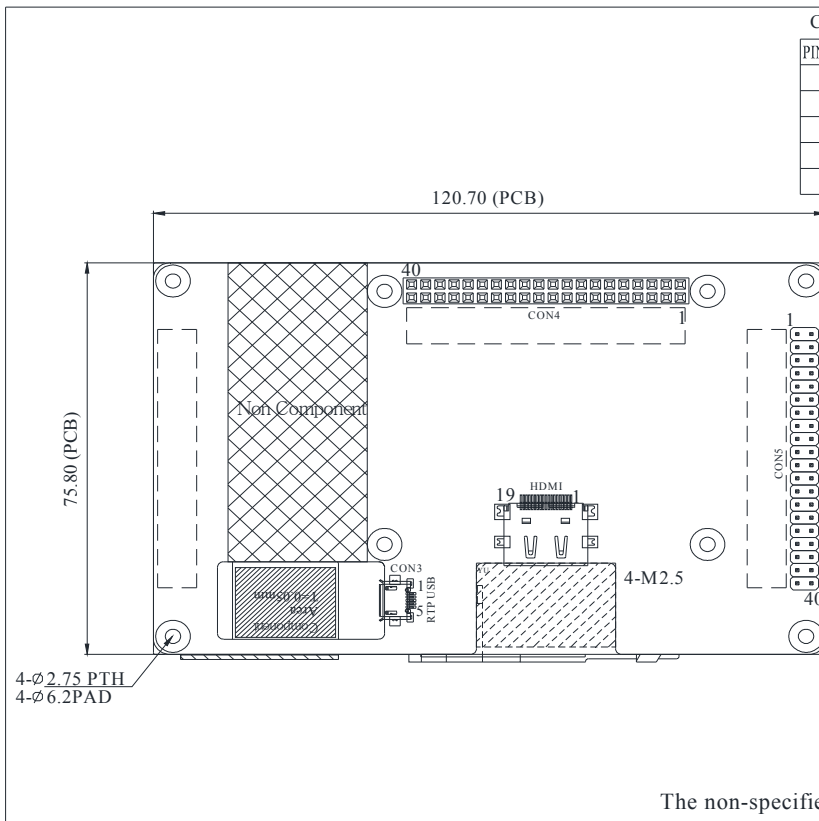
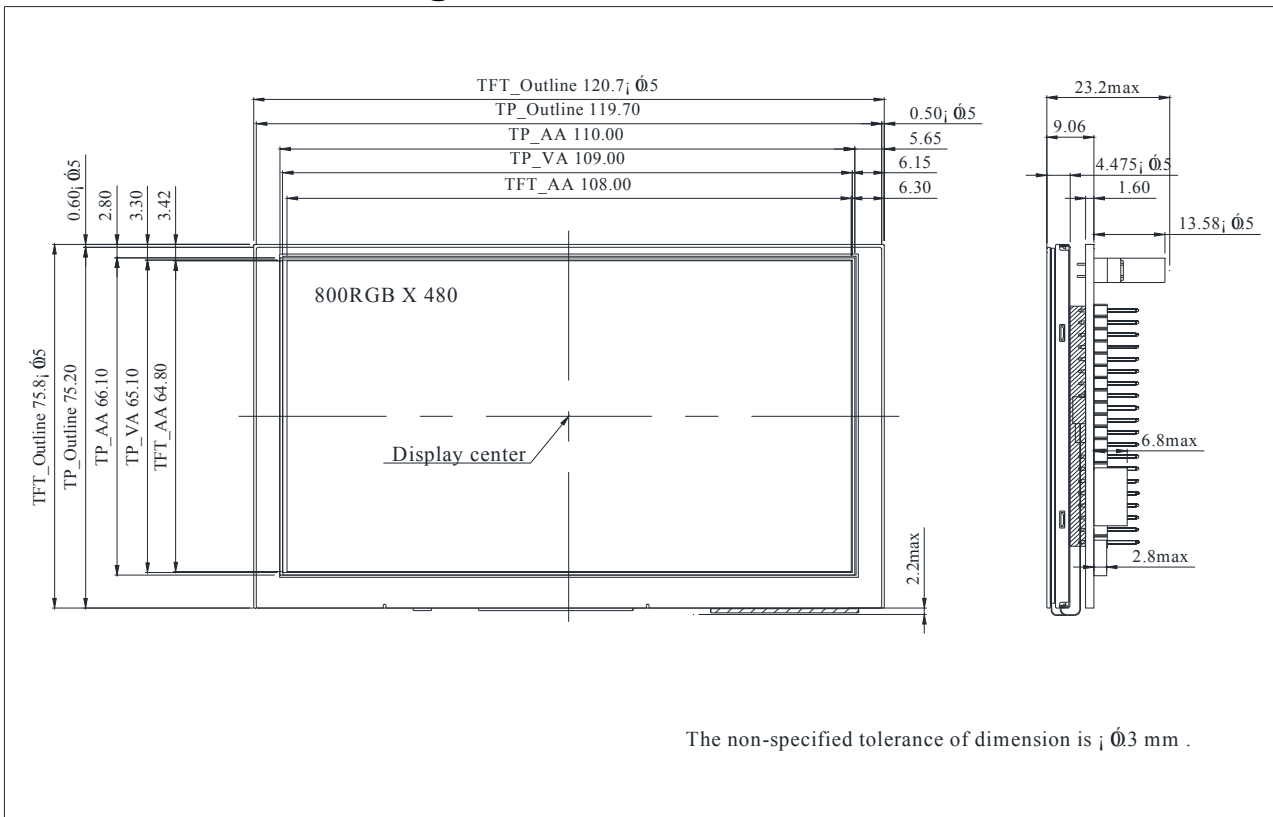
| Pin No. | Symbol | I/O | Function | Remark |
|---------|--------|-----|---------------------------------|--------|
| 1 | Rx2+ | I | +LVDS Differential Data Input | |
| 2 | GND | P | Ground | |
| 3 | Rx2- | I | -LVDS Differential Data Input | |
| 4 | Rx1+ | I | +LVDS Differential Data Input | |
| 5 | 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

3.3. 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 | |

4. Counter Drawing



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

| 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 .

5. Absolute Maximum Ratings

| Item | Symbol | Min | Typ | Max | Unit |
|-----------------------|-----------------|-----|-----|-----|------|
| Operating Temperature | T _{OP} | -20 | — | +70 | °C |
| Storage Temperature | T _{ST} | -30 | — | +80 | °C |

Note: Device is subject to be damaged permanently if stresses beyond those absolute maximum ratings listed above

1. Temp. $\leq +60^{\circ}\text{C}$, 90% RH MAX. Temp. $> +60^{\circ}\text{C}$, Absolute humidity shall be less than 90% RH at $+60^{\circ}\text{C}$

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 | — | — | 350 | 380 | mA | Note1,2,3 |
| LED Lifetime | — | VDD=5V | -- | 50,000 | - | Hr | Note4,5 |

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

Note 2: Display with Raspberry pi the driver power is over USB, first make sure you have a 2A power supply, with a good quality USB cable, a thin wire power cable is no good. Make sure its 24AWG or smaller, shorter USB cables are better too.

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 Supply Voltage is defined by the number of LED at Ta=+25°C and I_L =20mA/pcs.

Note 5: The “LED Lifetime” is defined as the module brightness decrease to 50% Original brightness at Ta=+25°C and I_L =20mA/pcs. The LED lifetime could be decreased if operating I_L is lager than 25mA/pcs.

7. 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 | |

8. Optical Characteristics

| Item | Symbol | Condition. | Min | Typ. | Max. | Unit | Remark | |
|--|--------|-----------------------------------|------------|------|------|-----------------------|-------------------|------------|
| Response Time | Tr | $\theta=0^\circ$ 、 $\phi=0^\circ$ | - | 10 | 20 | .ms | Note 3,5 | |
| | Tf | | - | 15 | 30 | .ms | | |
| Contrast Ratio | CR | At optimized viewing angle | 400 | 500 | - | - | Note 4,5 | |
| Color Chromaticity | White | $\theta=0^\circ$ 、 $\phi=0^\circ$ | Wx | 0.26 | 0.31 | 0.36 | | Note 2,6,7 |
| | | | Wy | 0.28 | 0.33 | 0.38 | | |
| Viewing Angle (Gray Scale Inversion Direction) | Hor. | $CR \geq 10$ | Θ_R | 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 | |

Ta=+25°C±2°C

Note 1: Definition of viewing angle range

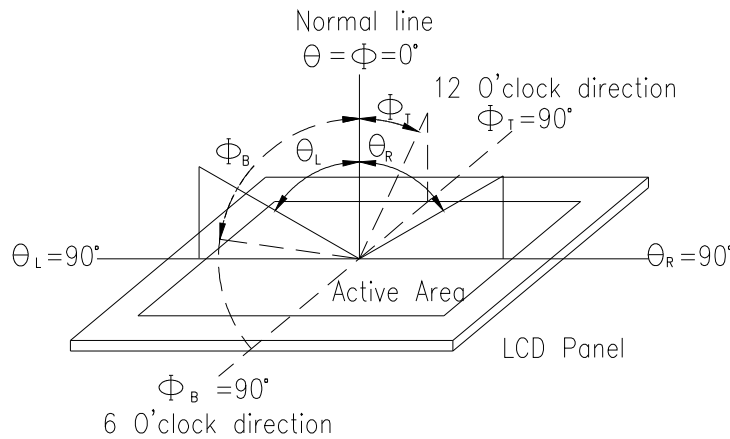


Fig. 9.1. Definition of viewing angle

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.

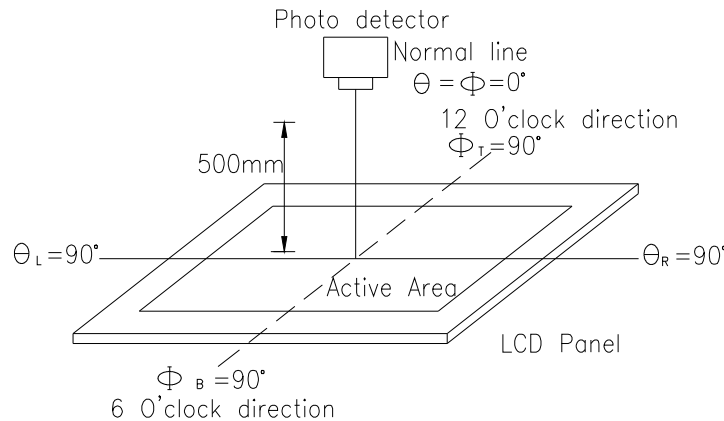
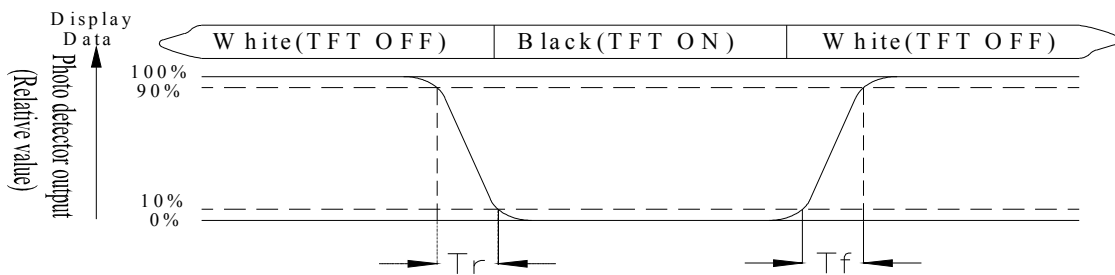


Fig. 9.2. Optical measurement system setup

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: White $V_i = V_{i50} \pm 1.5V$

Black $V_i = V_{i50} \pm 2.0V$

“±” means that the analog input signal swings in phase with VCOM signal.

“±” means that the analog input signal swings out of phase with VCOM signal.

The 100% transmission is defined as the transmission of LCD panel when all the input terminals of module are electrically opened.


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.

9. 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 -20°C +25°C +70°C  30min 5min 30min 1 cycle | -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.