

**Display Elektronik GmbH**

# DATA SHEET

***TFT MODULE***

**DEM 800480U TMH-PW-N  
(A-TOUCH)**

**5,0“ TFT + TP**

**Product Specification**

**Ver.: 2**

**30.01.2018**

## Revision History

VERSION	DATE	REVISED PAGE NO.	Note
0	29.11.2016		First Issue
1	02.11.2017		Add LED Lifetime
2	30.01.2018		Modify temperature

# **Contents**

1. Summary
2. General Specification
3. Interface
4. Counter Drawing
5. Absolute Maximum Ratings
6. Electrical Characteristics
7. DC Characteristics
8. Optical Characteristics
9. Reliability
10. Touch Panel Information

## **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 23.00 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 Resistive Touch (USB-Interface)
- Surface: Anti-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**

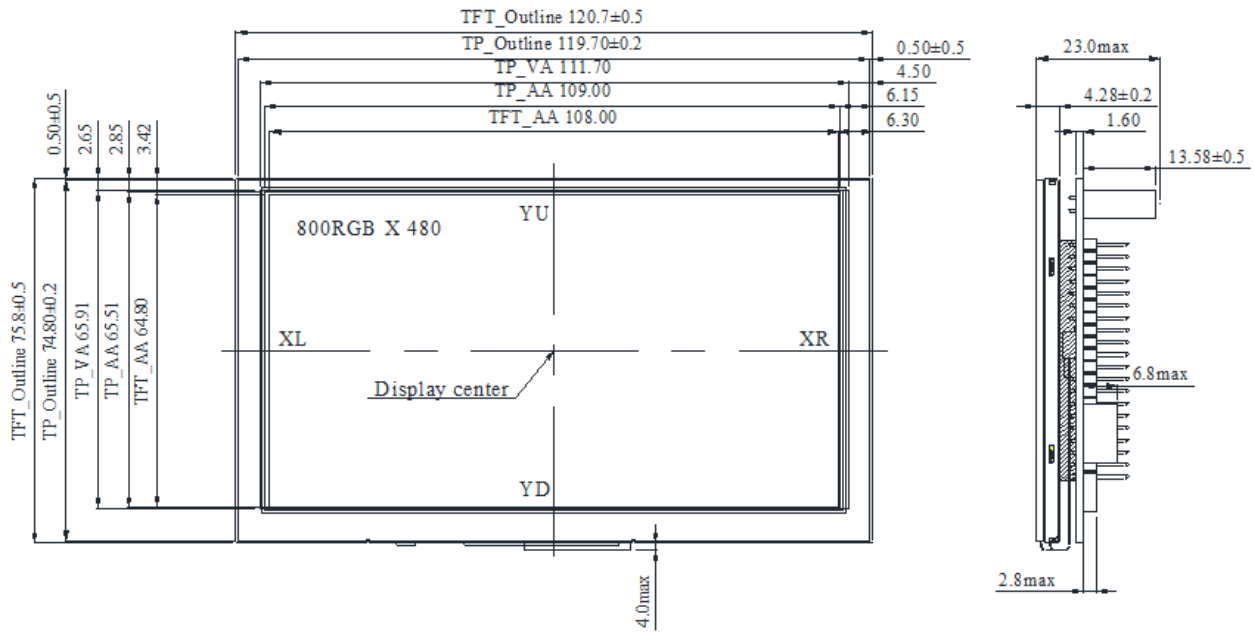
Pin No.	Symbol	I/O	Function	Remark
1	Rx2+	I	+LVDS Differential Data Input	
2	GND	P	Ground	
3	Rx2-	I	-LVDS Differential Data Input	
4	Rx1+	I	+LVDS Differential Data Input	
5	GND	P	Ground	
6	Rx1-	I	-LVDS Differential Data Input	
7	Rx0+	I	+LVDS Differential Data Input	
8	GND	P	Ground	
9	Rx0-	I	-LVDS Differential 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

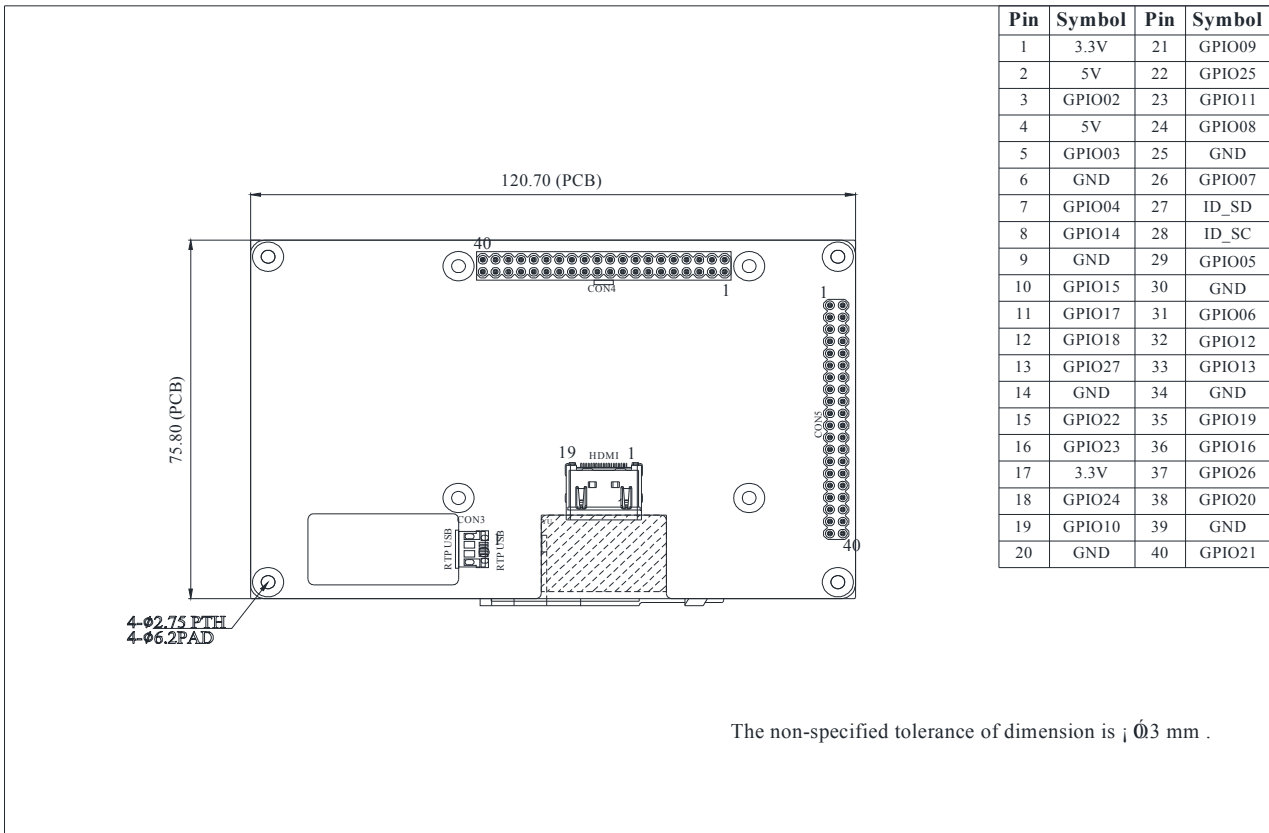
**3.3. RTP USB PIN Definition (CON3)**

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	

### 4. Counter Drawing



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



## 5. Absolute Maximum Ratings

Item	Symbol	Min	Typ	Max	Unit
Operating Temperature	T <sub>OP</sub>	-20	—	+70	°C
Storage Temperature	T <sub>ST</sub>	-20	—	+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	V <sub>DD</sub>	—	4.9	5	5.1	V	-
Supply Current For LCM	I <sub>DD</sub>	—	—	350	380	mA	Note1,2,3
LED Lifetime	—	V <sub>DD</sub> =5V	--	50,000	-	Hr	Note4,5

Note 1: This value is test for V<sub>DD</sub> =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: With regard to the resistive touch panel calibration, please refer to the datasheet of AR1100, which is in the link below:  
<http://ww1.microchip.com/downloads/en/DeviceDoc/41604A.pdf>

Note 4:

The LED Supply Voltage is defined by the number of LED at Ta=+25°C and I<sub>L</sub> =20mA/pcs.

Note 5:

The “LED life time” is defined as the module brightness decrease to 50% Original brightness at Ta=+25°C and I<sub>L</sub> =20mA/pcs. The LED lifetime could be decreased if operating I<sub>L</sub> is larger than 25mA/pcs.



**7. 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	

### 8. Optical Characteristics

Item	Symbol	Condition.	Min	Typ.	Max.	Unit	Remark	
Response Time	Tr	$\theta=0^\circ \cdot \phi=0^\circ$	-	10	20	.ms	Note 3,5	
	Tf		-	15	30	.ms		
Contrast Ratio	CR	At optimized viewing angle	400	500	-	-	Note 4,5	
Color Chromaticity	White	$\theta=0^\circ \cdot \phi=0$	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.	$CR \geq 10$	$\Theta_R$	60	70	-	Deg.	Note 1
			$\Theta_L$	60	70	-		
	Ver.		$\Phi_T$	40	50	-		
			$\Phi_B$	60	70	-		
Brightness	-	-	250	350	-	cd/m <sup>2</sup>	Center of display	

Ta=+25°C±2°C

Note 1: Definition of viewing angle range

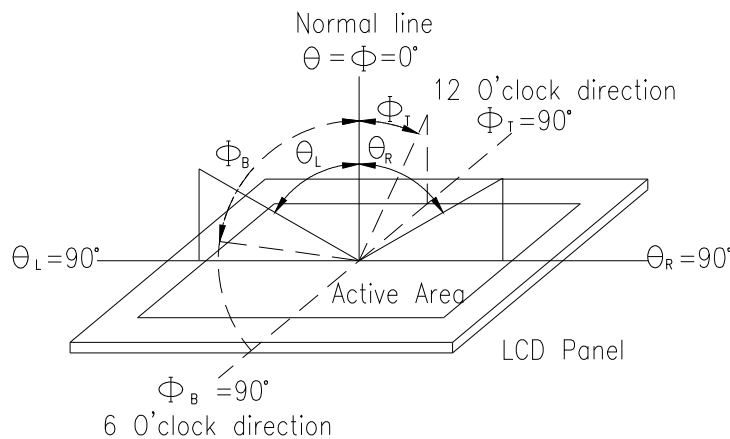


Fig. 9.1. Definition of viewing angle

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.

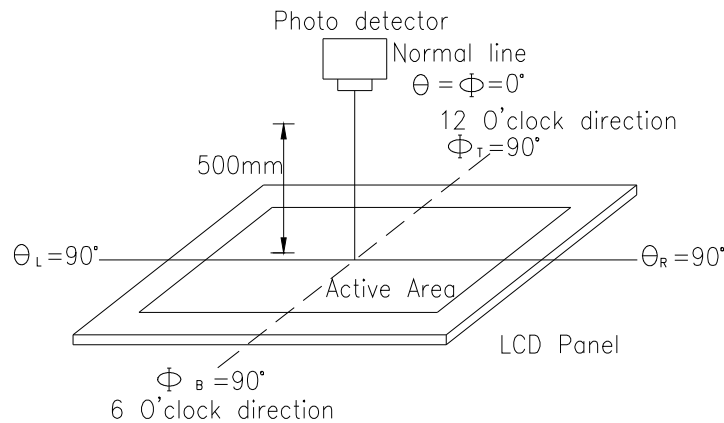
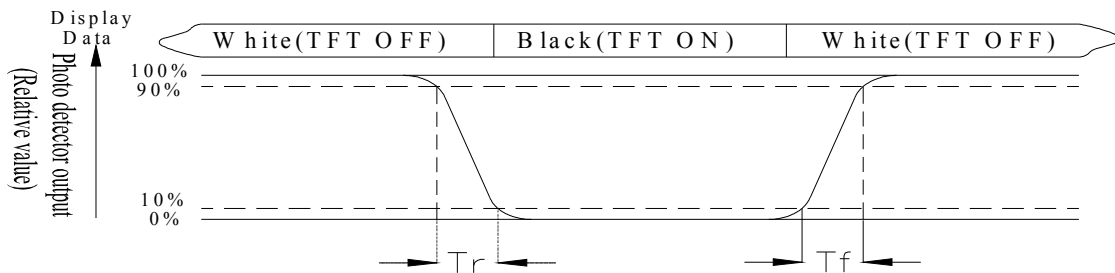


Fig. 9.2. Optical measurement system setup

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)

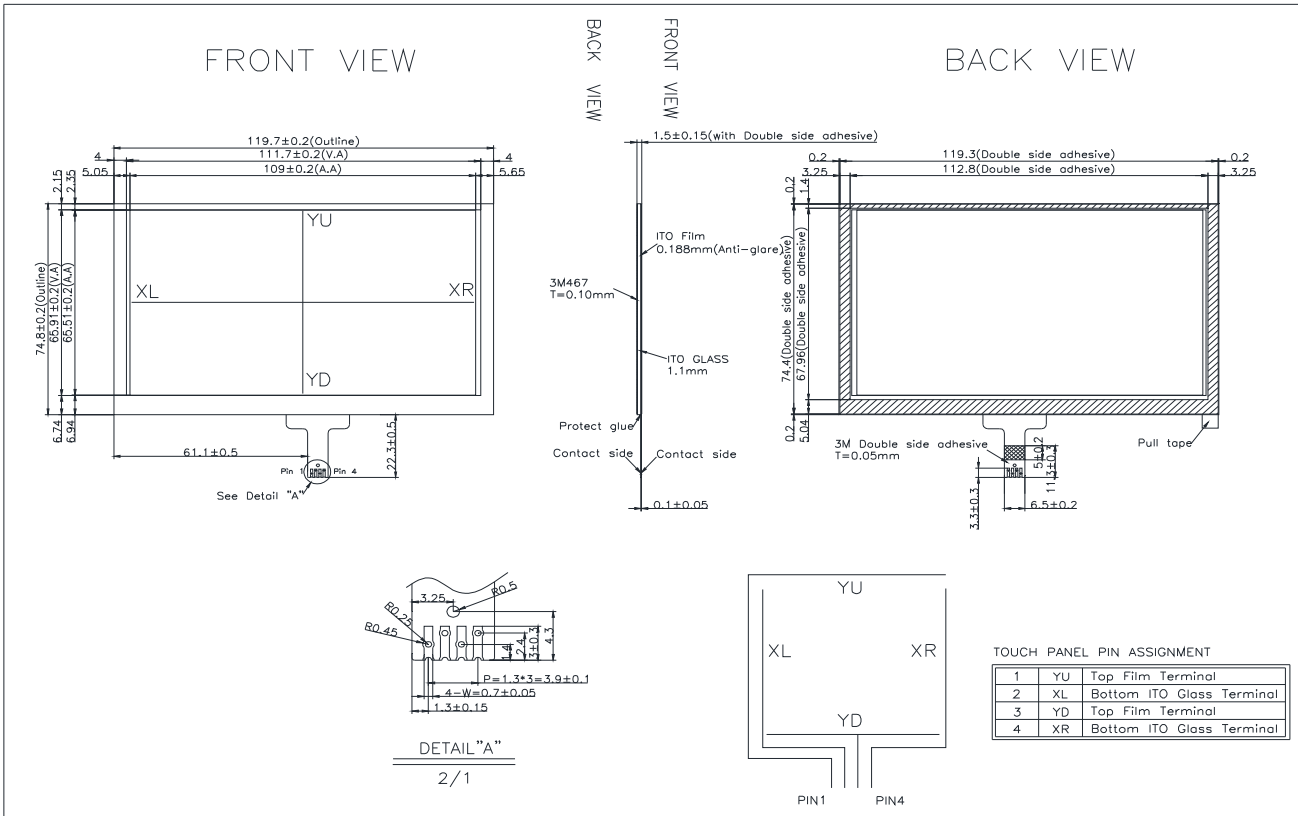
Environmental Test			
Test Item	Content of Test	Test Condition	Note
High Temperature storage	Endurance test applying the high storage temperature for a long time.	+80°C 200hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30°C 200hrs	1,2
High Temperature 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 <div style="text-align: center;"> <p style="margin-left: 100px;">30min   5min   30min</p> <p style="margin-left: 100px;">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.

# 10. Touch Panel Information



## 10.1. Resistance Touch Panel General Specifications

Item	Description
Insulating Resistance	> 20MΩ · 25V(DC)
Light Transparence	Min 70%
Structure Type	Anti-Glare
X Resistance	200 Ω ~ 1200 Ω
Y Resistance	100 Ω ~ 900 Ω

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