

**DISPLAY Elektronik GmbH**

# DATA SHEET

***TFT MODULE***

**DEM 800480Q1 TMH-PW-N  
(A-TOUCH)**

**5,0" TFT + Touch**

**Product Specification**

**Version: 9**

**02.12.2019**

## **Revision History**

<b>VERSION</b>	<b>DATE</b>	<b>REVISED PAGE NO.</b>	<b>Note</b>
0	24.05.2016		First issue
1	30.06.2016		Correct Contour Drawing
2	11.08.2016		Modify Vibration test
3	04.11.2016		Modify Summary
4	19.12.2016		Add Aspect Ratio
5	03.05.2017		Modify HS/VS=NC
6	15.01.2018		Modify interface information.
7	05.09.2018		Add TFT Interface & TFT Driver IC
8	24.06.2019		Add the maximum width of FPC
9	02.12.2019		Modify Contour Drawing

# Contents

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2. General Specification
3. Interface
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# **DEM 800480Q1 TMH-PW-N (A-TOUCH) Product Specification**

## **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**

- n Size: 5.0 inch
- n Dot Matrix: 800 × 3(RGB) × 480 dots
- n Module Dimension: 120.70 × 75.80 × 4.30 mm
- n Active Area: 108.00 × 64.80 mm
- n Dot Pitch: 0.135 × 0.135 mm
- n LCD Type: TFT, Normally White, Transmissive
- n View Direction: 12 o'clock
- n Gray Scale Inversion Direction: 6 o'clock
- n TFT Driver IC: ILI5960 + ILI6122 or equivalent
- n TFT Interface: 24-bit RGB
- n Aspect Ratio: 16:9
- n Backlight Type: LED, Normally White
- n With /Without TP: With RTP
- n Surface: Anti-Glare

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

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## **3. Interface**

### **3.1. LCM PIN Definition**

FPC Connector is used for the module electronics interface.

<b>Pin</b>	<b>Symbol</b>	<b>Function</b>	<b>Remark</b>
1	VLED-	Power for LED backlight (Cathode)	
2	VLED+	Power for LED backlight (Anode)	
3	GND	Power Ground	
4	VDD	Power voltage	
5	R0	Red data (LSB)	
6	R1	Red data	
7	R2	Red data	
8	R3	Red data	
9	R4	Red data	
10	R5	Red data	
11	R6	Red data	
12	R7	Red data(MSB)	
13	G0	Green data(LSB)	
14	G1	Green data	
15	G2	Green data	
16	G3	Green data	
17	G4	Green data	
18	G5	Green data	
19	G6	Green data	
20	G7	Green data(MSB)	
21	B0	Blue data(LSB)	
22	B1	Blue data	
23	B2	Blue data	
24	B3	Blue data	
25	B4	Blue data	
26	B5	Blue data	
27	B6	Blue data	
28	B7	Blue data(MSB)	

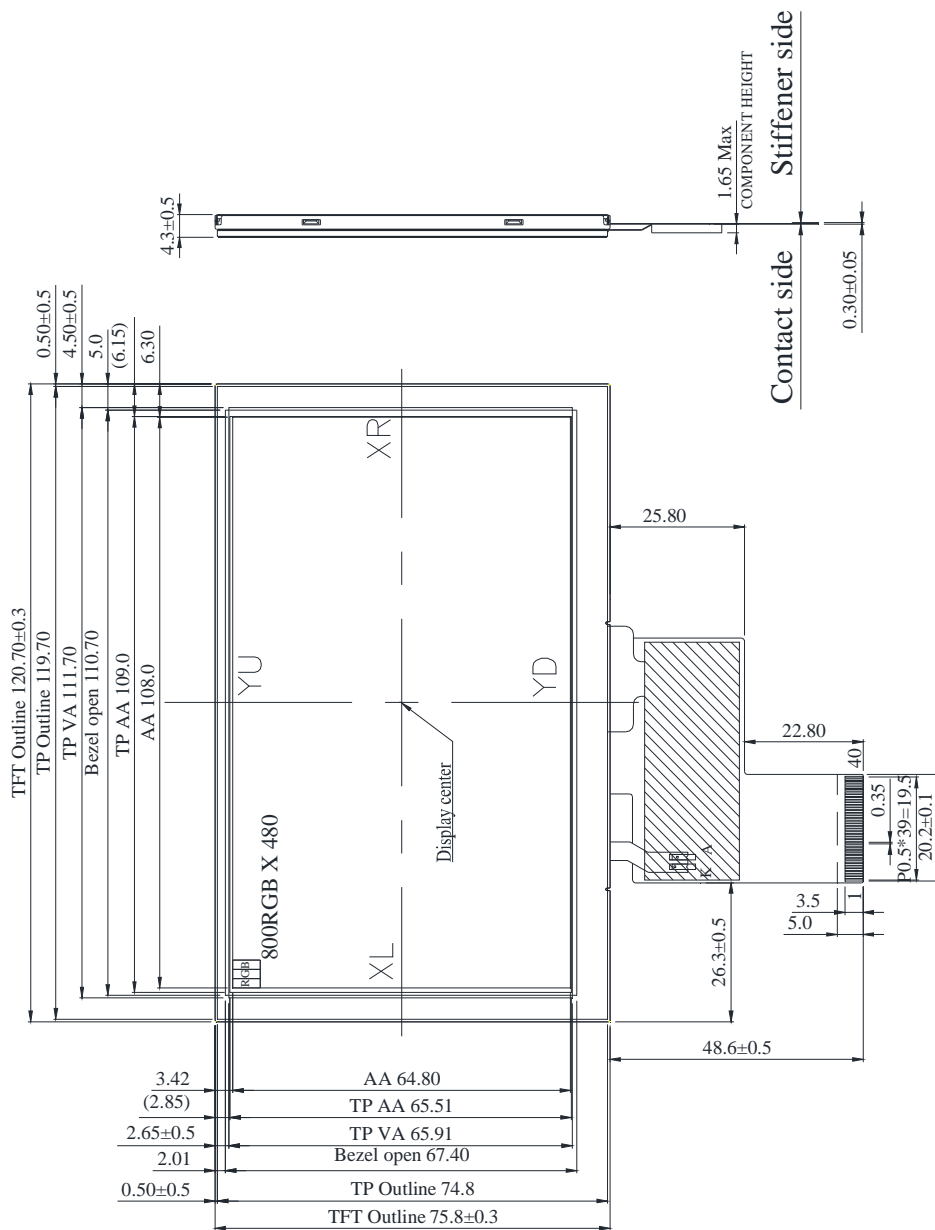
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29	GND	Power Ground	
30	CLK	Sample clock	
31	DISP	Display on/off	
32	NC/HSync	No connection /Horizontal sync input	(Note)
33	NC/VSynC	No connection /Vertical sync input	(Note)
34	DE	Data input enable	
35	NC	No connection	
36	GND	Power Ground	
37	XR	Right electrode	
38	YD	Down electrode	
39	XL	Left electrode	
40	YU	Top electrode	

Note: This module default function is for DE mode, if this module want change to use SYNC mode, the FPC have to modify resistive jumper.

### 4. Contour Drawing

PIN NO.	SYMBOL	PIN NO.	SYMBOL
1	V <sub>LED-</sub>	21	B0
2	V <sub>LED+</sub>	22	B1
3	GND	23	B2
4	V <sub>DD</sub>	24	B3
5	R0	25	B4
6	R1	26	B5
7	R2	27	B6
8	R3	28	B7
9	R4	29	GND
10	R5	30	CLK
11	R6	31	DISP
12	R7	32	NC/H <sub>Sync</sub>
13	G0	33	NC/V <sub>Sync</sub>
14	G1	34	DE
15	G2	35	NC
16	G3	36	GND
17	G4	37	XR
18	G5	38	YD
19	G6	39	XL
20	G7	40	YU



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

## 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.  $\square$ 60°C, 90% RH MAX. Temp. > 60°C, Absolute humidity shall be less than 90% RH at 60°C



## 6. Electrical Characteristics

### 6.1. Typical Operation Conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power Voltage	VDD	3.1	3.3	3.5	V	
Current for Driver(Black)	I <sub>dd</sub>	-	110	170	mA	VDD=3.3V
Input Logic High Voltage	V <sub>IH</sub>	0.7 VDD	-	VDD	V	Note 1
Input Logic Low Voltage	V <sub>IL</sub>	0	-	0.3 VDD		

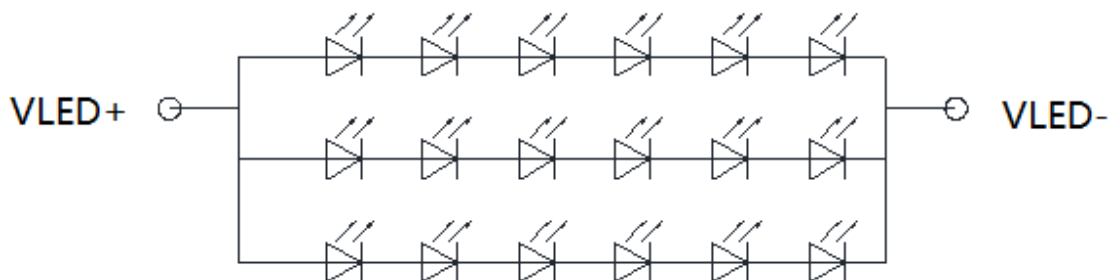
Note1: CLK, DE, R0~R7, G0~7, B0~7.

### 6.2. Backlight Driving Conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED Backlight	V <sub>L</sub>	18	19.2	20	V	Note 1
Current for LED Backlight	I <sub>L</sub>	--	60	--	mA	
LED Lifetime	-	--	50,000	-	Hr	Note 2

Note 1: The LED Supply Voltage is defined by the number of LED at Ta=25°C and I<sub>L</sub>=20ma/pcs.

Note 2: 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.

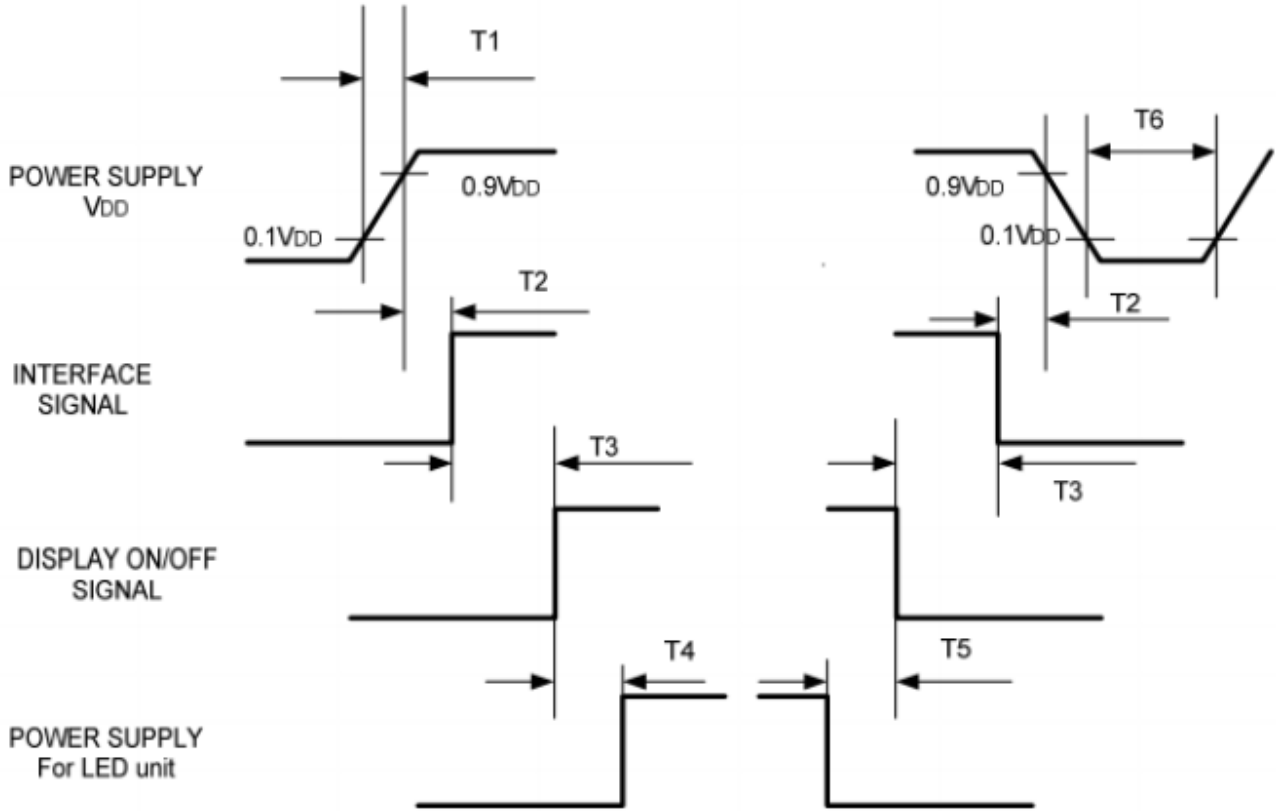


**CIRCUIT DIAGRAM : 6\*3 Dice**

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## 6.3. Power Sequence

To prevent a latch-up or DC operation of the LCD module, the power on/off sequence should be as the diagram below.



Symbol	Specification	Symbol	Specification
T1	$0 \leq T1 \leq 10 \text{ msec}$	T4	$200 \text{ msec} \leq T4$
T2	$16 \leq T2 \leq 100 \text{ msec}$	T5	$100 \text{ msec} \leq T5$
T3	$0 \leq T3 \leq 200 \text{ msec}$	T6	$16 \text{ msec} \leq T6$

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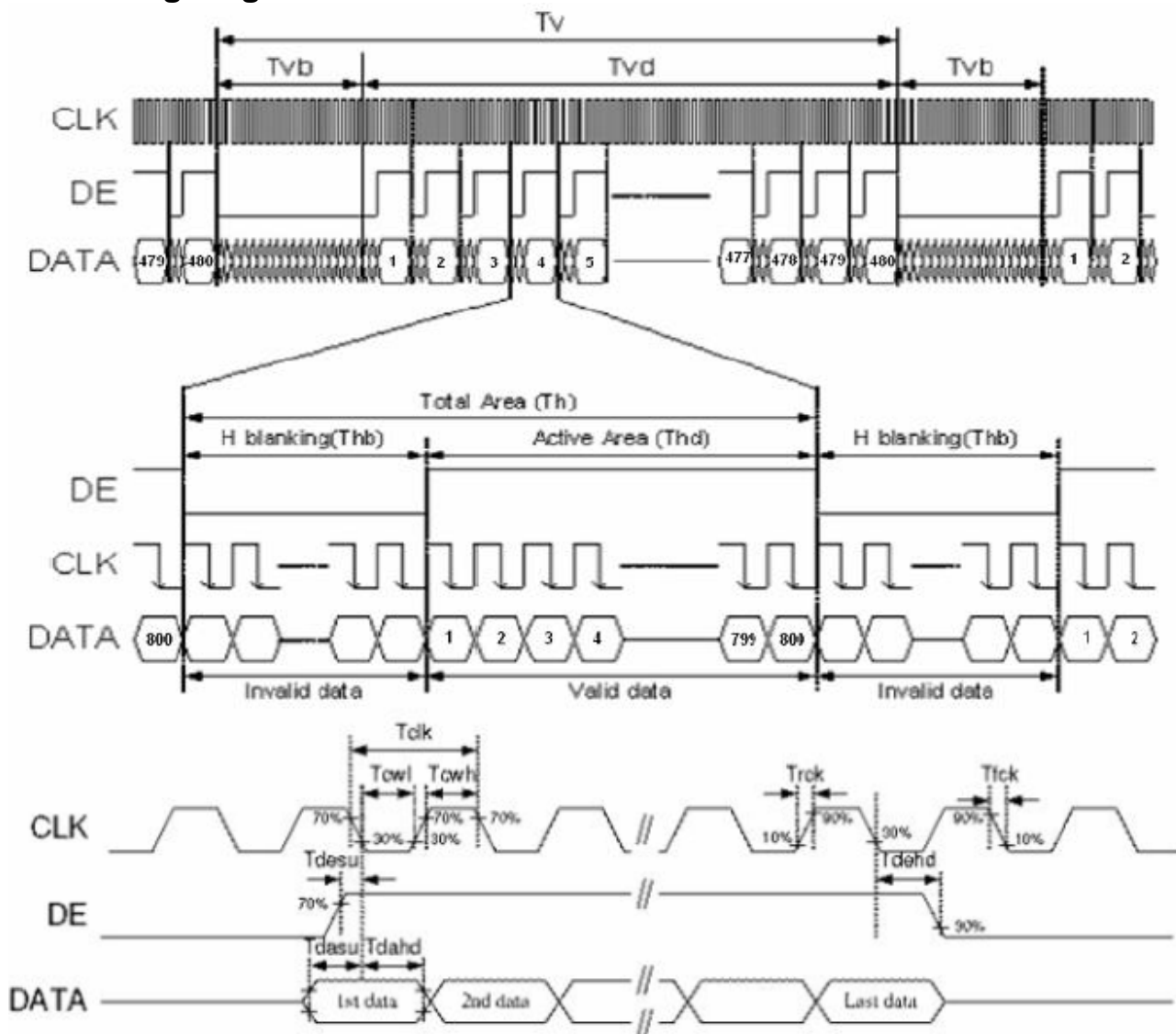
## **6.4. Timing Characteristics**

Timing conditions

Parallel DE mode RGB input timing table

Parameter	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
CLK Frequency	Fclk	26.4	33.3	46.8	MHz	
DEV Period Time	Tv	510	525	650	H	
DEV Display Area	Tvd	480			H	
DEV Blanking	Tvd	30	45	170	H	
DEH Period Time	Th	862	1056	1200	CLK	
DEH Display Area	Thd	800			CLK	
DEH Blanking	THb	62	256	400	CLK	
CLK Cycle Time	Tclk	21.3	30	37.8	ns	
Clock Width of High Level	Tcwh	40	50	60	%	
Clock Width of Low Level	Tcwl	40	50	60	%	
Clock Rising Time	Trck	8	-	-	ns	
Clock Falling Time	Tfck	8	-	-	ns	
Data Setup Time	Tdasu	8	-	-	ns	
Data Hold Time	Tdahd	8	-	-	ns	
DE Setup Time	Tdesu	8	-	-	ns	
DE Hold Time	Tdehd	8	-	-	ns	

**6.5. Timing diagram**



**7. 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	$\theta=0^\circ, \Phi=0^\circ$	0.26	0.31	0.36		Note 2,6,7
		Wy		0.28	0.33	0.38		
Viewing Angle (Gray Scale Inversion Direction)	Hor.	$\Theta_R$	$CR \geq 10$	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
Uniformity		(U)	-	75	-	-	%	Note5

Ta=25±2°C

Note 1: Definition of viewing angle range

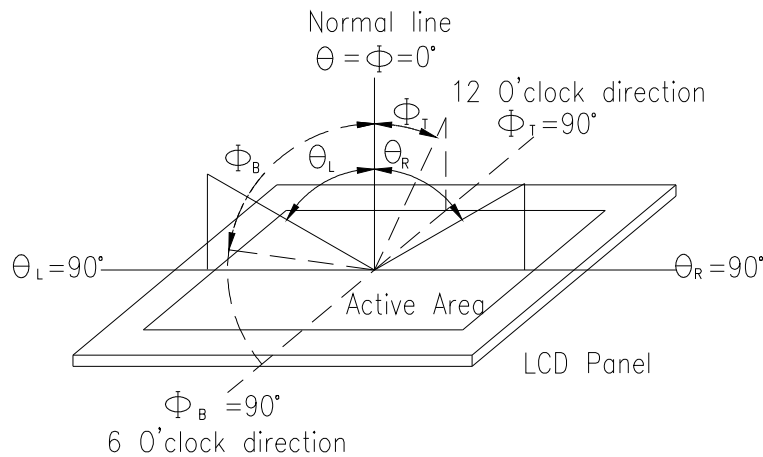


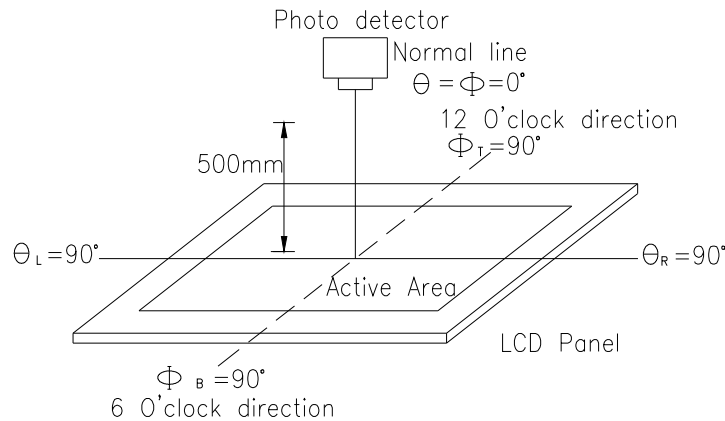
Fig. 8.1. Definition of viewing angle

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-7or BM-5 luminance

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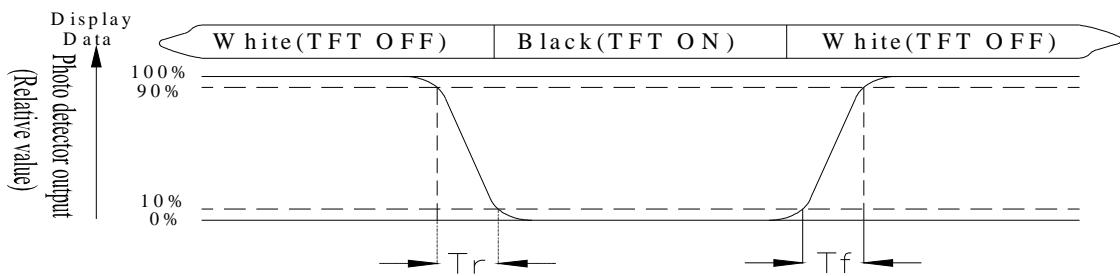
meter 1.0° field of view at a distance of 50cm and normal direction.



**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.

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

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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

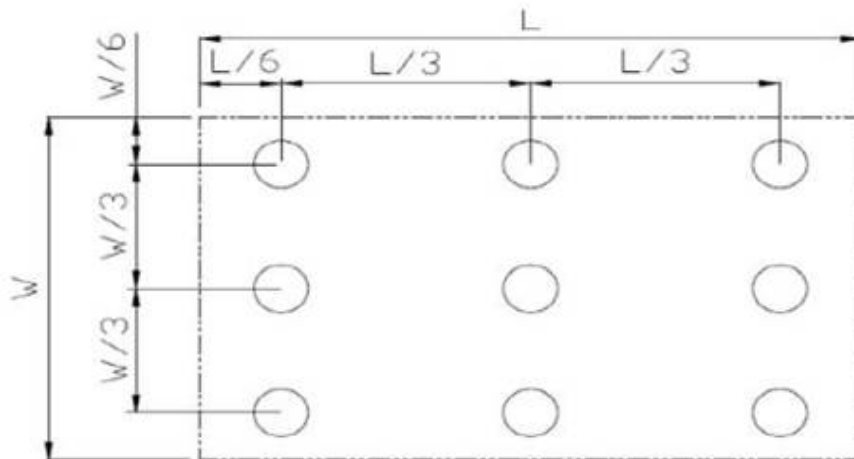


Fig8.3. Definition of uniformity

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.

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## **8. Reliability**

Content of Reliability Test (Wide temperature, -20°C~70°C)

<b>Environmental Test</b>			
<b>Test Item</b>	<b>Content of Test</b>	<b>Test Condition</b>	<b>Note</b>
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;">←—————→</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	—

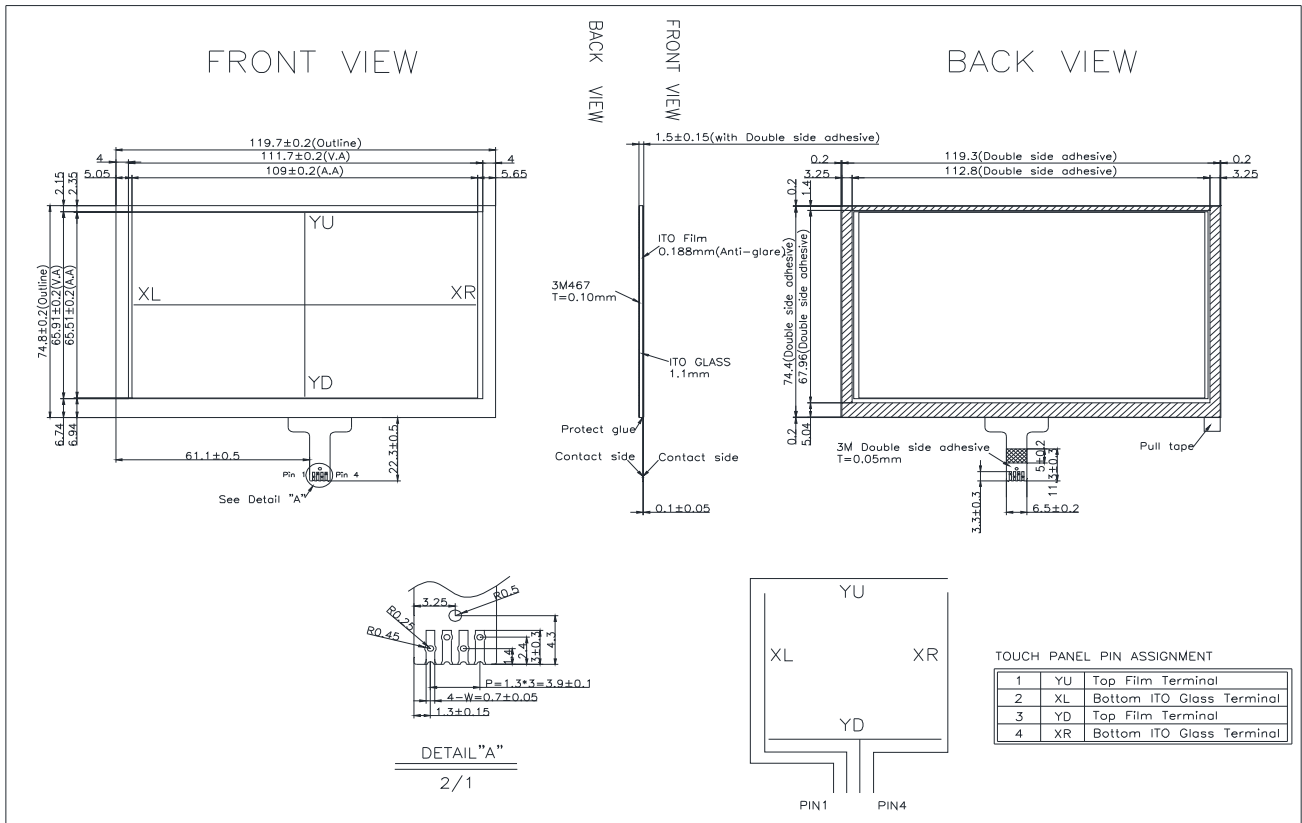
Note1: No dew condensation to be observed.

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.



**9. Touch Panel Information**



**9.1. Resistance Touch Panel General Specifications**

Item	Description
Insulating resistance	> 20MΩ , 25V(DC)
Light transparence	Min 70%
Structure type	Anti-Glare
X resistance	200~1200Ω
Y resistance	100~900Ω