

**Product Specification**

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Thin-Film-Transistor LCD Module  
Model:XTPW50SN04-05

Acceptance

Approved and Checked by

Approved by	Checked by		Made by



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### 1. General Description and Features

XTPW50SN04-05 is a TM (Transmissive) type color active matrix TFT (Thin Film Transistor) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This model is composed of a TFT-LCD module, a driver circuit and a back-light unit . The resolution of a 5.0" contains 800RGBx480 dots . The following table described the features of XTPW50SN04-05

#### LCD Module

Item	Specification	Unit
Screen Size	5.0 inches	Diagona
Display Resolution	800RGB(H)x480(V)	Dot
Active Area	108 (H) x 64.8 (V)	mm
Outline Dimension	126.2(W) x 81.2(H) x 4.69 (D)	mm
Display Mode	Normally white/Transmissive	--
Pixel Arrangement	RGB-Vertical Stripe	--
TP	6WIRE -CTP	--
Gray scale inversion Direction	6 o'clock	
Viewing Direction	12 o'clock	--
Drive IC	ILI6122*1 / ILI5960*1	--
Surface luminance	450 cd/m <sup>2</sup>	

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## 2.Mechanical Information

Item		Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal (H)	--	126.2	--	mm	--
	Vertical (V)	--	81.2	--	mm	(1)
	Thickness (T)	--	4.69	--	mm	(2)
Weight		--	N/A	--	g	--

Note (1) Not include FPC.

Refer to the Outline Dimension for further information.

(2) Back-light unit are included.

## 3.Electrical Specifications

### 3.1 Absolute Max. Ratings

#### 3.1.1 Absolute Ratings of Environment

If the operating condition exceeds the following absolute maximum ratings, the TFT LCD module may be damaged permanently.

( $T_a=25\pm 2^\circ\text{C}$ ,  $V_{SS}=\text{GND}=0$ )

Item	Symbol	Min.	Max.	Unit	Note
Storage temperature	$T_{STG}$	-20	70	$^\circ\text{C}$	(1)
Operating temperature	$T_{OPR}$	-30	80	$^\circ\text{C}$	(1,2,3)

Note (1) 95 % RH Max. ( $40^\circ\text{C} \geq T_a$ ). Maximum wet-bulb temperature at  $39^\circ\text{C}$  or less. ( $T_a > 40^\circ\text{C}$ )  
No condensation.

Note (2) In case of below  $0^\circ$ , the response time of liquid crystal (LC) becomes slower and the color of panel becomes darker than normal one. Level of retardation depends on temperature, because of LC's character

Note (3) Only operation is guaranteed at operating temperature. Contrast, response time, another display quality are evaluated at  $+25^\circ\text{C}$ .

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### 3.2 Electrical Absolute Rating

#### 3.2.1 TFT-LCD Module

(Voltage Referenced to VSS)

Item	Symbol	Value		Unit	Condition
		Min.	Max.		
Digital Power Supply Voltage	VDD	VSS-0.3	5.0	V	--

#### 3.2.2 Back-Light Unit

(Ta=25±2°C)

Item	Symbol	Min.	Max.	Unit	Note
current	I <sub>f</sub>	--	30	mA	(1)
voltage	V <sub>R</sub>	--	5.0	V	(1)

Note (1) Permanent damage to the device may occur if maximum values are exceeded or reverse voltage is loaded. Functional operation should be restricted to the conditions described under normal operating conditions.

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### 4 Electrical Characteristics

#### 4.1 Backlight Unit

The back-light system is an edge-lighting type with six white LEDs (Light Emitting Diode).

(Ta=25±2°C)

Item	Symbol	Value			Unit	Condition
		Min.	Typ.	Max.		
LED Voltage	V <sub>F</sub>	16.2	18.6	19.8	V	
LED Current	I <sub>F</sub>	-	40	-	mA	
Power Consumption	P <sub>BL</sub>	-	744	-	mW	

Note (1) Where I<sub>F</sub> = 40A, V<sub>F</sub> = 18.6V P<sub>BL</sub> = V<sub>F</sub> × I<sub>F</sub>

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### 5 Input Terminal Pin Assignment

PIN.N O	SYMBOL	I/O/P	FUNCTI	MEMARK
1	VLED-	P	POWER FOR BACKLIGHT (GROUN)	
2	VLED+	P	POWER FOR BACKLIGHT(ANODE)	
3	GND	P	GROUN	
4	VDD	P	VOLTAGE	
5-12	R0-R7	I/O	RED DATA	
13-20	G0-G7	I/O	GRREN DATA	
21-28	B0-B7	I/O	BIUE DATA	
29	GND	P	GROUN	
30	DCLK	I	Clock for input data. Data latched at rising/falling edge of this signal. Default is falling edge.	
31	DISP		DISPLAY ON/OFF	
32	HSYN	I	Horizontal sync input in digital parallel RGB. Negative polarity. <sup>1</sup>	
33	VSYN	I	Vertical sync input in digital parallel RGB. Negative polarity.	
34	DE	I	Input data enable control. When DE mode, active High to enable data input. (Normally pull low)	
35	NC			
36	GND	P	GROUN	
37	XR		NO TP	
38	YD		NO TP	
39	XL		NO TP	
40	YU		NO TP	

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<b>CTP IC:</b>	<b>GT911</b>
<b>PIN1</b>	<b>RST</b>
<b>PIN2</b>	<b>INT</b>
<b>PIN3</b>	<b>VDD</b>
<b>PIN4</b>	<b>GND</b>
<b>PIN5</b>	<b>SCL</b>
<b>PIN6</b>	<b>SDA</b>

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### 6 Optical Characteristics

Item	Symbol	Condition	Values			Unit	Remark
			Min.	Typ.	Max.		
Viewing angle (CR $\geq$ 10)	$\theta_L$	$\Phi=180^\circ$ (9 o'clock)	60	70	-	degree	Note 1
	$\theta_R$	$\Phi=0^\circ$ (3 o'clock)	60	70	-		
	$\theta_T$	$\Phi=90^\circ$ (12 o'clock)	40	50	-		
	$\theta_B$	$\Phi=270^\circ$ (6 o'clock)	60	70	-		
Response time	$T_{ON}$	Normal $\theta=\Phi=0^\circ$	-	10	20	msec	Note 2 Note 3
	$T_{OFF}$		-	15	30		
Contrast ratio	CR		400	500	-	-	Note 4
Color chromaticity	$W_X$		0.26	0.31	0.36	-	Note 5
	$W_Y$		0.28	0.33	0.38	-	
Transmittance	Tr		3.73	4.66		%	

**Test Conditions:**

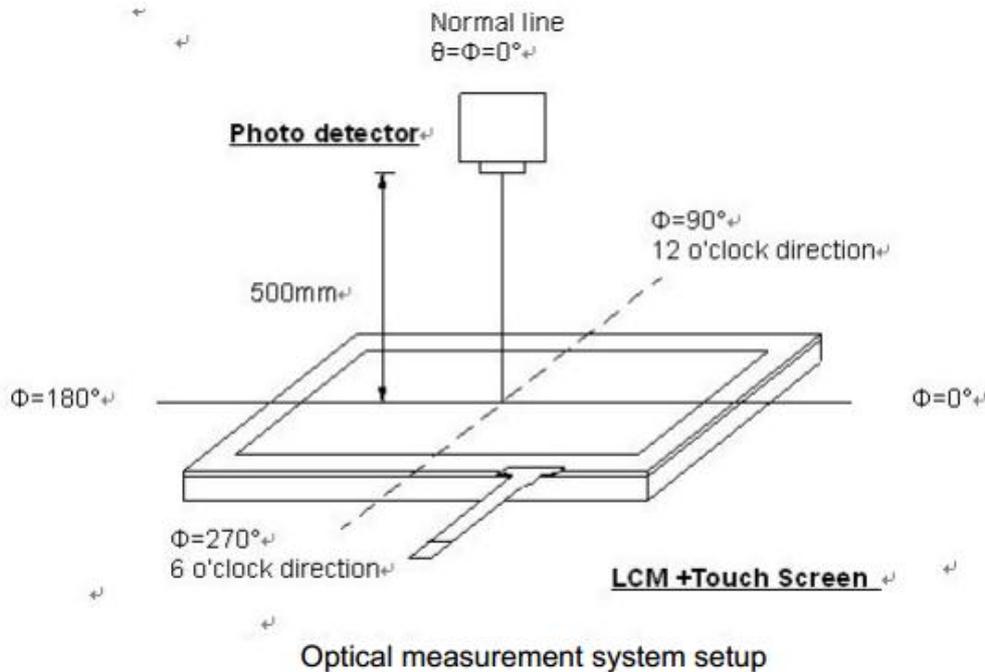
1.  $V_{CC}=3.3V$ ,  $V_{LED}=5.0V$ .The ambient temperature is  $25^\circ C$ .
2. The test systems refer to Note 2.

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Note 1: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 30 minutes operation, the optical properties are measured at the center point of the LCD screen. (Response time is measured by Photo detector TOPCON BM-7, other items are measured by BM-5A/Field of view: 1° /Height: 500mm.)



Note 2: Definition of color chromaticity (CIE1931)

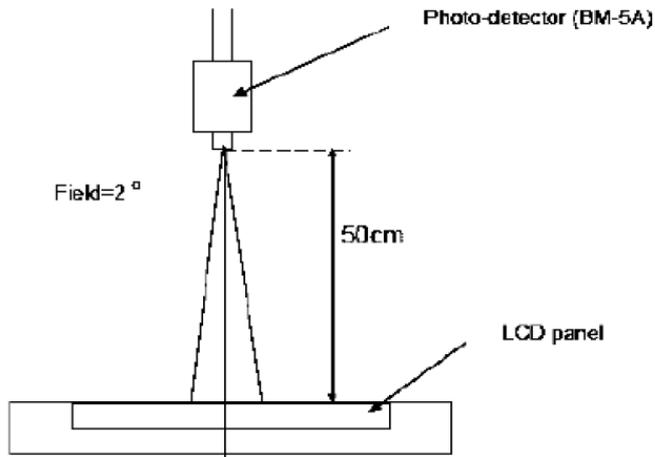
Color coordinates measured at center point of LCD.

Note 3: All input terminals LCD panel must be ground while measuring the center area of the panel. The LED driving condition is  $V_{LED} = 5.0V$ .

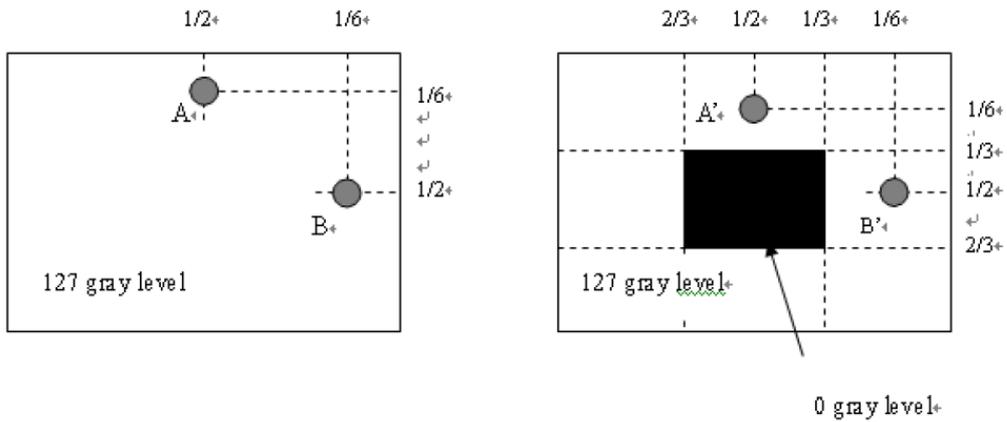
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Note 9: Optical characteristic measurement setup.



Note 10:



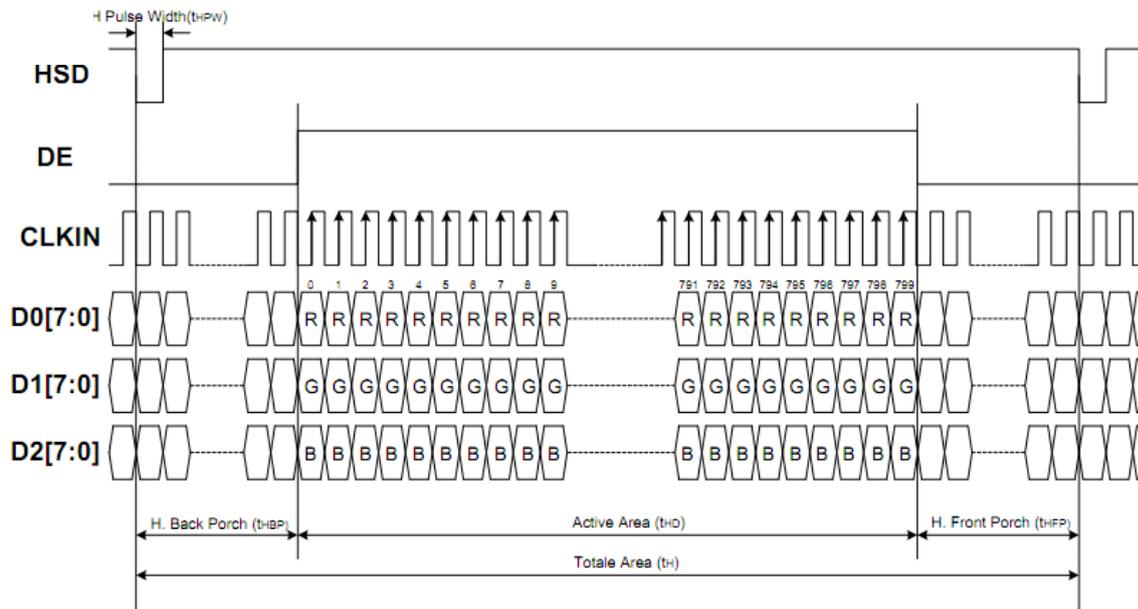
$|LA-LA'| / LA \times 100\% = 2\% \text{ max.}$ , LA and LA' are brightness at location A and A'

$|LB-LB'| / LB \times 100\% = 2\% \text{ max.}$ , LB and LB' are brightness at location B and B'

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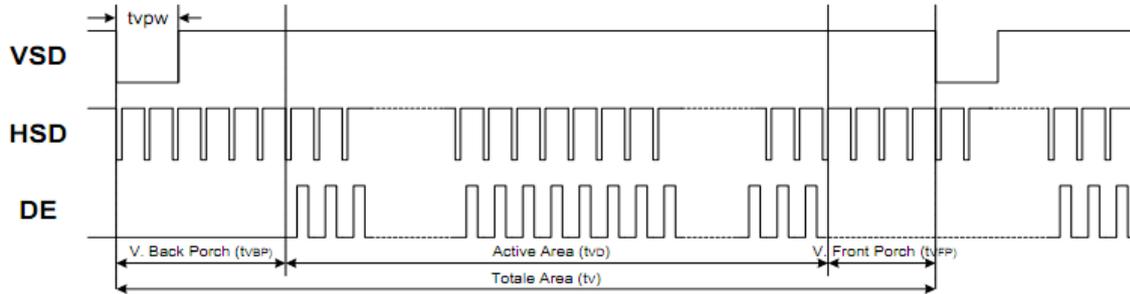
## 7 Interface Timing



Horizontal Input Timing						
Parameter	Symbol	Value			Unit	
		Min.	Typ.	Max.		
Horizontal display area	$t_{HD}$	--	800	--	CLKIN	
CLKIN frequency	$f_{CLK}$	--	33.3	50	MHz	
1 Horizontal line period	$t_H$	862	1056	1200	CLKIN	
HSD pulse width		Min.	--	1	--	CLKIN
		Typ.	--	--	--	CLKIN
		Max.	--	40	--	CLKIN
HSD back porch	SYNC	$t_{HBP}$	46	46	46	CLKIN
HSD front porch	SYNC	$t_{HFP}$	16	210	354	CLKIN

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Vertical Input Timing					
Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
Vertical display area	$t_{VD}$	--	480	--	HSD
VSD period time	$t_V$	510	525	650	HSD
VSD pulse width	$t_{VPW}$	1	--	20	HSD
VSD back porch	$t_{VBP}$	23	23	23	HSD
VSD front porch	$t_{VFP}$	7	22	147	HSD

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### 8 Reliability Condition for LCD

No change on display and in operation under the following test condition.

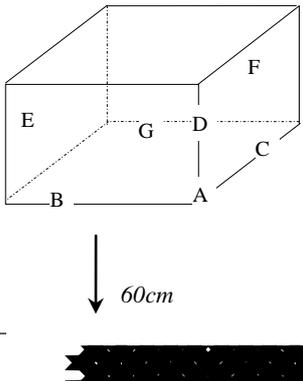
Condition: Unless otherwise specified, tests will be conducted under the following condition.

Temperature: 20±5°C

Humidity: 65±5%RH

Tests will be not conducted under functioning state.

No.	Parameter	Condition	Notes
1	High Temperature Operating	70°C±2°C, 240hrs (Operation state)	--
2	Low Temperature Operating	-20°C±2°C, 240hrs (Operation state)	--
3	High Temperature Storage	80°C±2°C, 240hrs	--
4	Low Temperature Storage	-30°C±2°C, 240hrs	--
5	High Temperature and High Humidity Operation Test	60°C±2°C, 90%, 240hrs	--
6	Vibration Test	Total fixed amplitude: 1.5mm Vibration Frequency: 10~55Hz One cycle 60 seconds to 3 direction of X, Y, Z each 15 minutes.	--

7.	Drop Test	<p>To be measured after dropping from 60cm high on the concrete surface in packing state.</p> <div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <p><i>Dropping method corner dropping</i></p> <p><i>A corner: once</i></p> <p><i>Edge dropping</i></p> <p><i>B, C, D edge: once</i></p> <p><i>Face dropping</i></p> <p><i>E, F, G face: once</i></p> </div> </div> <p style="text-align: center;"><i>Concrete Surface</i></p>	--
----	-----------	--	----

Notes: 1. No dew condensation to be observed.

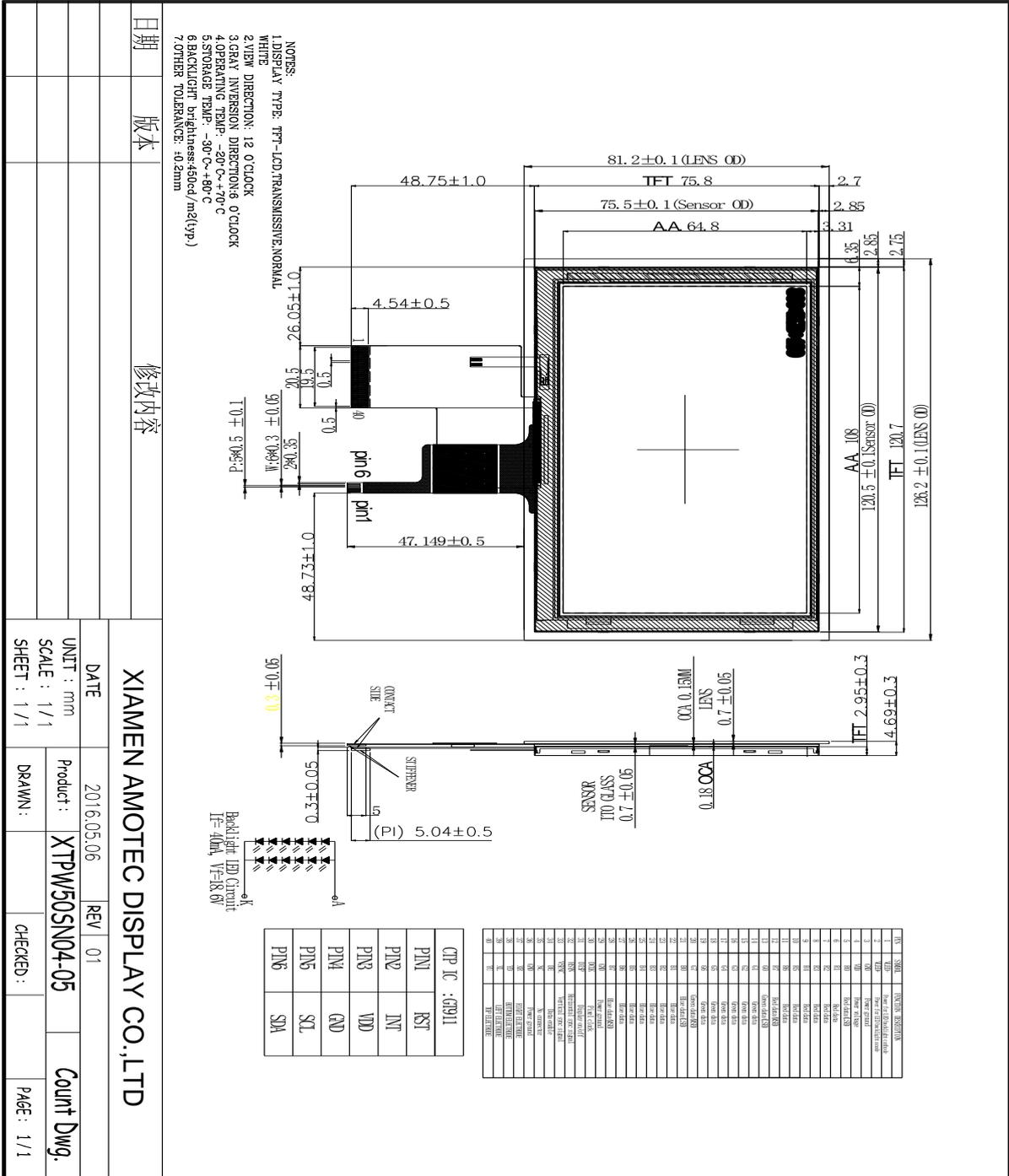
2. The function test shall be conducted after 4 hours storage at the normal temperature and humidity after removed from the test chamber.

3. Vibration test will be conducted to the product itself without putting I in a container.

### 9 Dimensional outlines

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日期 版本 修改内容

**XIAMEN AMOTEC DISPLAY CO.,LTD**

DATE: 2016.05.06 REV: 01

UNIT: mm SCALE: 1/1

SHEET: 1/1

Product: XTPW50SN04-05

DRAWN: Count Dwg.

CHECKED: PAGE: 1/1

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### 11.1 VISUAL & FUNCTION INSPECTION STANDARD

#### 11.1.1 Inspection conditions

Inspection performed under the following conditions is recommended.

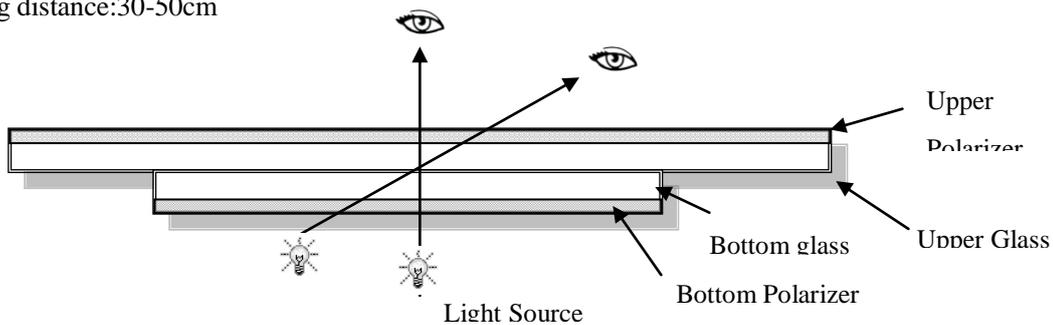
Temperature :  $25 \pm 5^{\circ}\text{C}$

Humidity :  $65\% \pm 10\% \text{RH}$

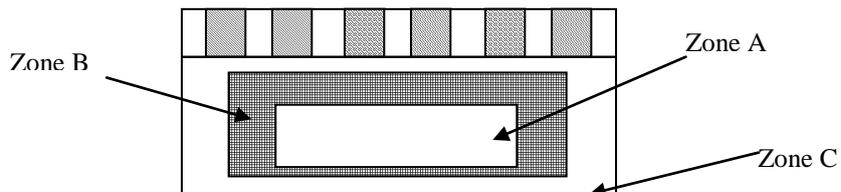
Viewing Angle : Normal viewing Angle.

Illumination: Single fluorescent lamp (300 to 700Lux)

Viewing distance:30-50cm



#### 11.1.2 Definition



Zone A : Effective Viewing Area(Character or Digit can be seen)

Zone B : Viewing Area except Zone A

Zone C : Outside (Zone A+Zone B) which can not be seen after assembly by customer .)

Note:

As a general rule ,visual defects in Zone C can be ignored when it doesn't effect product function or appearance after assembly by customer.

#### 11.1.3 Sampling Plan

According to GB/T 2828-2003 ; , normal inspection, Class II

AQL:

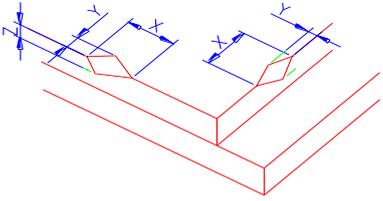
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Major defect	Minor defect
0.65	1.5

LCD: Liquid Crystal Display , TP: Touch Panel , LCM: Liquid Crystal Module

No	Items to be inspected	Criteria	Classification of defects
1	Functional defects	1) No display, Open or miss line 2) Display abnormally, Short 3) Backlight no lighting, abnormal lighting. 4) TP no function	Major
2	Missing	Missing component	
3	Outline dimension	Overall outline dimension beyond the drawing is not allowed	
4	Color tone	Color unevenness, refer to limited sample	Minor
5	Soldering appearance	Good soldering , Peeling off is not allowed.	
6	LCD/Polarizer/TP	Black/White spot/line, scratch, crack, etc.	

#### 11.1.4 Criteria (Visual)

Number	Items	Criteria(mm)						
1.0 LCD Crack/Broken	(1) The edge of LCD broken	 <table border="1" data-bbox="847 1621 1391 1774"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>≤3.0mm</td> <td>&lt;Inner border line of the seal</td> <td>≤T</td> </tr> </tbody> </table>	X	Y	Z	≤3.0mm	<Inner border line of the seal	≤T
X	Y	Z						
≤3.0mm	<Inner border line of the seal	≤T						

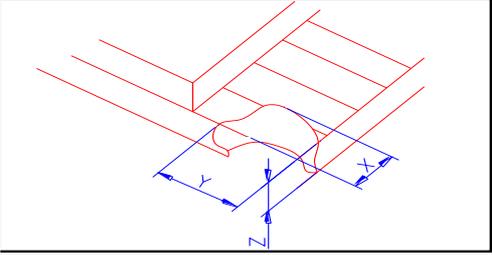
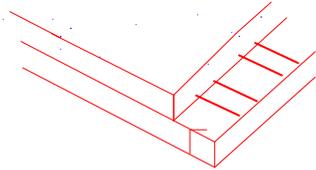
NOTE:

X: Length

Y: Width

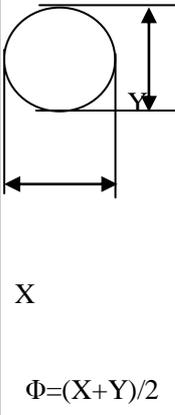
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<p>Z: Height L: Length of ITO, T: Height of LCD</p>	<p>(2) LCD corner broken</p>	 <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <thead> <tr> <th style="padding: 5px;">X</th> <th style="padding: 5px;">Y</th> <th style="padding: 5px;">Z</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;"><math>\leq 3.0\text{mm}</math></td> <td style="padding: 5px;"><math>\leq L</math></td> <td style="padding: 5px;"><math>\leq T</math></td> </tr> </tbody> </table>	X	Y	Z	$\leq 3.0\text{mm}$	$\leq L$	$\leq T$
	X	Y	Z					
$\leq 3.0\text{mm}$	$\leq L$	$\leq T$						
<p>(3) LCD crack</p>	 <p style="text-align: center;">Crack Not allowed</p>							

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Number	Items	Criteria (mm)																																																																	
2.0	Spot defect  <p style="text-align: center;"><math>\Phi = (X+Y)/2</math></p>	<p>① light dot (LCD/TP/Polarizer black/white spot , light dot, pinhole, dent, stain)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2" style="text-align: center;">Zone Size (mm)</th> <th colspan="3" style="text-align: center;">Acceptable Qty</th> </tr> <tr> <th style="text-align: center;">A</th> <th style="text-align: center;">B</th> <th style="text-align: center;">C</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><math>\Phi \leq 0.10</math></td> <td colspan="3" style="text-align: center;">Ignore</td> </tr> <tr> <td style="text-align: center;"><math>0.10 &lt; \Phi \leq 0.15</math></td> <td colspan="3" style="text-align: center;">3( distance <math>\geq 10\text{mm}</math>)</td> </tr> <tr> <td style="text-align: center;"><math>0.15 &lt; \Phi \leq 0.2</math></td> <td colspan="3" style="text-align: center;">1</td> </tr> <tr> <td style="text-align: center;"><math>0.2 &lt; \Phi</math></td> <td colspan="3" style="text-align: center;">0</td> </tr> </tbody> </table> <p>② Dim spot (LCD/TP/Polarizer dim dot, light leakage, dark spot)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2" style="text-align: center;">Zone Size (mm)</th> <th colspan="3" style="text-align: center;">Acceptable Qty</th> </tr> <tr> <th style="text-align: center;">A</th> <th style="text-align: center;">B</th> <th style="text-align: center;">C</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><math>\Phi \leq 0.1</math></td> <td colspan="3" style="text-align: center;">Ignore</td> </tr> <tr> <td style="text-align: center;"><math>0.1 &lt; \Phi \leq 0.2</math></td> <td colspan="3" style="text-align: center;">2( distance <math>\geq 10\text{mm}</math>)</td> </tr> <tr> <td style="text-align: center;"><math>0.2 &lt; \Phi \leq 0.3</math></td> <td colspan="3" style="text-align: center;">1</td> </tr> <tr> <td style="text-align: center;"><math>\Phi &gt; 0.3</math></td> <td colspan="3" style="text-align: center;">0</td> </tr> </tbody> </table> <p>③ Polarizer accidented spot</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2" style="text-align: center;">Zone Size (mm)</th> <th colspan="3" style="text-align: center;">Acceptable Qty</th> </tr> <tr> <th style="text-align: center;">A</th> <th style="text-align: center;">B</th> <th style="text-align: center;">C</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><math>\Phi \leq 0.2</math></td> <td colspan="3" style="text-align: center;">Ignore</td> </tr> <tr> <td style="text-align: center;"><math>0.2 &lt; \Phi \leq 0.5</math></td> <td colspan="3" style="text-align: center;">2( distance <math>\geq 10\text{mm}</math>)</td> </tr> <tr> <td style="text-align: center;"><math>\Phi &gt; 0.5</math></td> <td colspan="3" style="text-align: center;">0</td> </tr> </tbody> </table>	Zone Size (mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.10$	Ignore			$0.10 < \Phi \leq 0.15$	3( distance $\geq 10\text{mm}$ )			$0.15 < \Phi \leq 0.2$	1			$0.2 < \Phi$	0			Zone Size (mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.1$	Ignore			$0.1 < \Phi \leq 0.2$	2( distance $\geq 10\text{mm}$ )			$0.2 < \Phi \leq 0.3$	1			$\Phi > 0.3$	0			Zone Size (mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.2$	Ignore			$0.2 < \Phi \leq 0.5$	2( distance $\geq 10\text{mm}$ )			$\Phi > 0.5$	0		
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	Line defect (LCD/TP /Polarizer black/white line, scratch, stain)	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th rowspan="2">Width(mm)</th> <th rowspan="2">Length(mm)</th> <th colspan="3">Acceptable Qty</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td><math>\Phi \leq 0.03</math></td> <td>Ignore</td> <td colspan="3">Ignore</td> </tr> <tr> <td><math>0.03 &lt; W \leq 0.05</math></td> <td><math>L \leq 3.0</math></td> <td colspan="2"><math>N \leq 2</math></td> <td rowspan="2">Ignore</td> </tr> <tr> <td><math>0.05 &lt; W \leq 0.08</math></td> <td><math>L \leq 2.0</math></td> <td colspan="2"><math>N \leq 2</math></td> </tr> <tr> <td><math>0.08 &lt; W</math></td> <td colspan="4">Define as spot defect</td> </tr> </tbody> </table>	Width(mm)	Length(mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.03$	Ignore	Ignore			$0.03 < W \leq 0.05$	$L \leq 3.0$	$N \leq 2$		Ignore	$0.05 < W \leq 0.08$	$L \leq 2.0$	$N \leq 2$		$0.08 < W$	Define as spot defect			
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4.0	SMT	According to IPC-A-610C class II standard . Function defect and missing part are major defect ,the others are minor defect.																											