

Product Specification

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Thin-Film-Transistor LCD Module
Model:XTPQ23SN05-01

Acceptance

Approved and Checked by

Approved by	Checked by		Made by

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1.General Description and Features

XTPQ23SN05-01 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 2.31" contains 320RGBx240 dots and can display up to 262K colors. The following table described the features of XTPQ23SN05-01

LCD Module

Item	Specification	Unit
Screen Size	2.31inches	Diagona
Display Resolution	320RGB(H)x240(V)	Dot
Active Area	46.75 (H) x 35.06 (V)	mm
Outline Dimension	50.9(W) x 45.8(H) x 2.32 (D)	mm
Display Mode	Normally white/Transmissive	--
Pixel Arrangement	RGB-Vertical Stripe	--
Display Color	262K	--
Gray scale inversion Direction	12 o'clock	
Viewing Direction	6 o'clock	--
Drive IC	ILI9342C	--
Surface luminance	250 cd/m ² (TYP)	

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2.Mechanical Information

Item		Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal (H)	--	50.9	--	mm	--
	Vertical (V)	--	45.8	--	mm	(1)
	Thickness (T)	--	2.32	--	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
Operating temperature	T_{OPR}	-20	70	$^\circ\text{C}$	(1)
Storage temperature	T_{STG}	-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°C or less. ($T_a > 40^\circ\text{C}$)
No condensation.

Note (2) In case of below 0° , 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	3.0	V	--

3.2.2 Back-Light Unit

(Ta=25±2°C)

Item	Symbol	Min.	Max.	Unit	Note
Current(1LED)	I _f	--	30	mA	(1)
voltage	V _R	--	5	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 four white LEDs (Light Emitting Diode).

($T_a=25\pm 2^\circ\text{C}$)

Item	Symbol	Value			Unit	Condition
		Min.	Typ.	Max.		
LED Voltage	V_F	2.7	3.0	3.3	V	
LED Current	I_F	-	80	-	mA	
Power Consumption	P_{BL}	-		-	mW	

Note (1) Where $I_F = 80\text{mA}$, $V_F = 3.0\text{V}$ $P_{BL} = V_F \times I_F$

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5 Input Terminal Pin Assignment

PIN.N O	SYMBOL	I/O/P	FUNCTI	MEMARK																																																																																				
1	LED A	P	POWER FOR BACKLIHT(ANODE)																																																																																					
2	LED K1	P	POWER FOR BACKLIHT(CATHODE)																																																																																					
3	LED K2	P	POWER FOR BACKLIHT(CATHODE)																																																																																					
4	LED K3	P	POWER FOR BACKLIHT(CATHODE)																																																																																					
5	LED K4	P	POWER FOR BACKLIHT(CATHODE)																																																																																					
6	IM0	I	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="5" style="text-align: left;">- Select the MCU interface mode</th> <th colspan="2" style="text-align: center;">DB Pin in use</th> </tr> <tr> <th style="text-align: center;">IM3</th> <th style="text-align: center;">IM2</th> <th style="text-align: center;">IM1</th> <th style="text-align: center;">IM0</th> <th style="text-align: center;">MCU-Interface Mode</th> <th style="text-align: center;">Register/Content</th> <th style="text-align: center;">GRAM</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0</td> <td style="text-align: center;">1</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td>80 MCU 8-bit bus interface I</td> <td style="text-align: center;">D[7:0]</td> <td style="text-align: center;">D[7:0]</td> </tr> <tr> <td style="text-align: center;">0</td> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> <td style="text-align: center;">0</td> <td>80 MCU 16-bit bus interface I</td> <td style="text-align: center;">D[7:0]</td> <td style="text-align: center;">D[15:0]</td> </tr> <tr> <td style="text-align: center;">0</td> <td style="text-align: center;">1</td> <td style="text-align: center;">0</td> <td style="text-align: center;">1</td> <td>80 MCU 9-bit bus interface I</td> <td style="text-align: center;">D[7:0]</td> <td style="text-align: center;">D[8:0]</td> </tr> <tr> <td style="text-align: center;">0</td> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> <td>80 MCU 18-bit bus interface I</td> <td style="text-align: center;">D[7:0]</td> <td style="text-align: center;">D[17:0]</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> <td style="text-align: center;">0</td> <td style="text-align: center;">1</td> <td>3-wire 9-bit data serial interface I</td> <td colspan="2" style="text-align: center;">SDA: In/OUT</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> <td>4-wire 8-bit data serial interface I</td> <td colspan="2" style="text-align: center;">SDA: In/OUT</td> </tr> <tr> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">1</td> <td style="text-align: center;">0</td> <td>80 MCU 16-bit bus interface II</td> <td style="text-align: center;">D[8:1]</td> <td style="text-align: center;">D[17:10] D[8:1]</td> </tr> <tr> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td>80 MCU 8-bit bus interface II</td> <td style="text-align: center;">D[17:10]</td> <td style="text-align: center;">D[17:10]</td> </tr> <tr> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> <td>80 MCU 18-bit bus interface II</td> <td style="text-align: center;">D[8:1]</td> <td style="text-align: center;">D[17:0]</td> </tr> <tr> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">1</td> <td>80 MCU 9-bit bus interface II</td> <td style="text-align: center;">D[17:10]</td> <td style="text-align: center;">D[17:9]</td> </tr> </tbody> </table> <p>MPU Parallel interface bus and serial interface select If use RGB Interface must select serial interface. * : Fix this pin at IOVCC or GND.</p>	- Select the MCU interface mode					DB Pin in use		IM3	IM2	IM1	IM0	MCU-Interface Mode	Register/Content	GRAM	0	1	0	0	80 MCU 8-bit bus interface I	D[7:0]	D[7:0]	0	1	1	0	80 MCU 16-bit bus interface I	D[7:0]	D[15:0]	0	1	0	1	80 MCU 9-bit bus interface I	D[7:0]	D[8:0]	0	1	1	1	80 MCU 18-bit bus interface I	D[7:0]	D[17:0]	1	1	0	1	3-wire 9-bit data serial interface I	SDA: In/OUT		1	1	1	1	4-wire 8-bit data serial interface I	SDA: In/OUT		0	0	1	0	80 MCU 16-bit bus interface II	D[8:1]	D[17:10] D[8:1]	0	0	0	0	80 MCU 8-bit bus interface II	D[17:10]	D[17:10]	0	0	1	1	80 MCU 18-bit bus interface II	D[8:1]	D[17:0]	0	0	0	1	80 MCU 9-bit bus interface II	D[17:10]	D[17:9]	
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7	IM1																																																																																							
8	IM2																																																																																							
9	IM3																																																																																							
10	RESET	I	This signal will reset the device and must be applied to properly initialize the chip. Signal is active low. RESX1 is equal to RESX.																																																																																					
11	VSYNC	I	Frame synchronizing signal for RGB interface operation. <i>Fix to IOVCC or GND level when not in use.</i>																																																																																					
12	HSYNC	I	Line synchronizing signal for RGB interface operation. <i>Fix to IOVCC or GND level when not in use.</i>																																																																																					
13	DOTCLK	I	Dot clock signal for RGB interface operation. <i>Fix to IOVCC or GND level when not in use.</i>																																																																																					
14	DE	I	Data enable signal for RGB interface operation. <i>Fix to IOVCC or GND level when not in use.</i>																																																																																					

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15-32	DB17-DB0	I/O	18-bit parallel bi-directional data bus for MCU system and RGB interface mode <i>Fix to GND level when not in use</i>	
33	NC			
34	SDA	I/O	When IM[3] : High, Serial in/out signal. The data is applied on the rising edge of the SCL signal. If not used, fix this pin at IOVCC or GND.	
35	RD/E	I	8080- I /8080- II system (RDX): Serves as a read signal and MCU read data at the rising edge. <i>Fix to IOVCC or GND level when not in use.</i>	
36	WR	I	8080- I /8080- II system (WRX): Serves as a write signal and writes data at the rising edge. 4-line system (D/CX): Serves as command or parameter select. <i>Fix to IOVCC or GND level when not in use.</i>	
37	D/C(SCL)	I	This pin is used to select "Data or Command" in the parallel interface. When D/CX = '1', data is selected. When D/CX = '0', command is selected. This pin is used serial interface clock in 3-wire 9-bit / 4-wire 8-bit serial data interface. If not used, this pin should be connected to IOVCC or GND. DCX_SCL1 is equal to D/CX(SCL).	
38	CS	I	Chip select input pin ("Low" enable). This pin can be permanently fixed "Low" in MPU interface mode only. CSX1 is equal to CSX. * note1,2	
39	TE	O	Tearing effect output pin to synchronize MPU to frame writing, activated by S/W command. When this pin is not activated, this pin is low. If not used, open this pin. TE1 is equal to TE.	
40	VDDI	P	Low voltage power supply for interface logic circuits (1.65 ~ 2.8 V)	
41	VDDI	P	Low voltage power supply for interface logic circuits (1.65 ~ 2.8 V)	
42	VCI	P	High voltage power supply for analog circuit blocks (2.6 ~ 3.3 V)	
43	GND	P	POWER GROUND	
44	XR(X+)/SCL	-	-----	
45	YD(Y+)/SDA	-	-----	
46	XL(X-)/INT	-	-----	
47	YU(Y-)/RESET	-	-----	

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48	GND	P	POWER GROUND	
49	GND	P	POWER GROUND	
50	GND	P	POWER GROUND	

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6 Optical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Transmittance (without Polarizer)	T(%)	—	—	15.20%	—	—	
Contrast Ratio	CR	$\theta = 0$	400	500	—	—	(1)(2)
Response time	Rising	T_R	—	4	8	msec	(1)(3)
	Falling	T_F	—	12	20		
Color gamut	S(%)			50		%	
Color chromaticity (CIE1931)	White	W_x		0.283	0.303	0.323	(1)(4) CF glass
		W_y		0.304	0.324	0.344	
	Red	R_x		0.589	0.609	0.629	
		R_y		0.310	0.330	0.350	
	Green	G_x		0.267	0.287	0.307	
		G_y		0.507	0.527	0.547	
Blue	B_x		0.127	0.147	0.167		
	B_y		0.118	0.138	0.158		
Viewing angle	Hor.	θ_L	CR>10	60	70	—	Viewing Angle base on using EWV Polarizer , Reference Only
		θ_R		60	70	—	
	Ver.	θ_U		60	70	—	
		θ_D		50	60	—	
Optima View Direction	12 O'clock						(5)

Measuring Condition

- Measuring surrounding : dark room
- Ambient temperature : 25±2°C
- 15min. warm-up time.

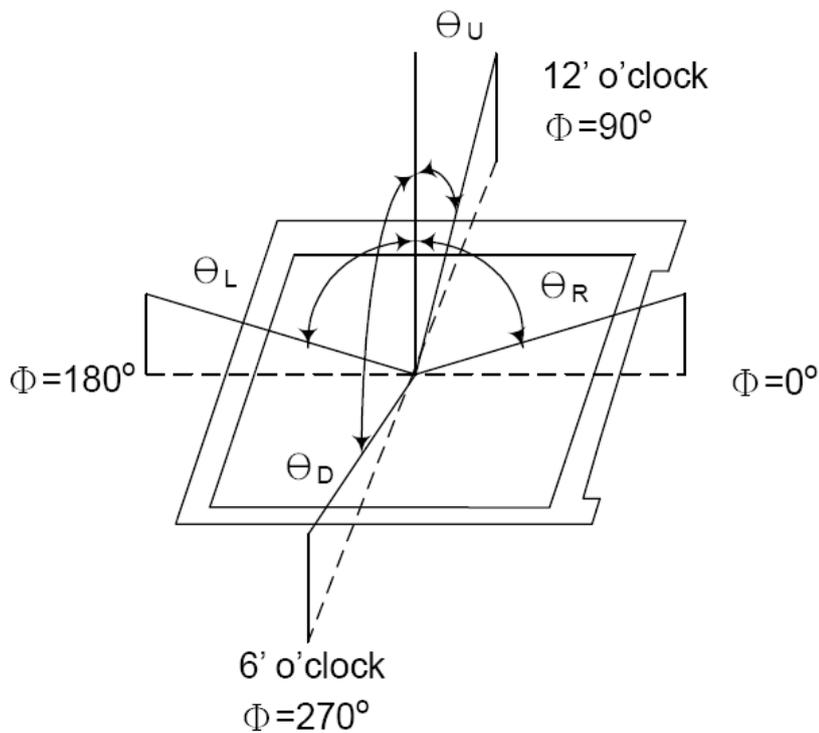
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Measuring Equipment

FPM520 of Westar Display technologies, INC., which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics.

Note (1) Definition of Viewing Angle :



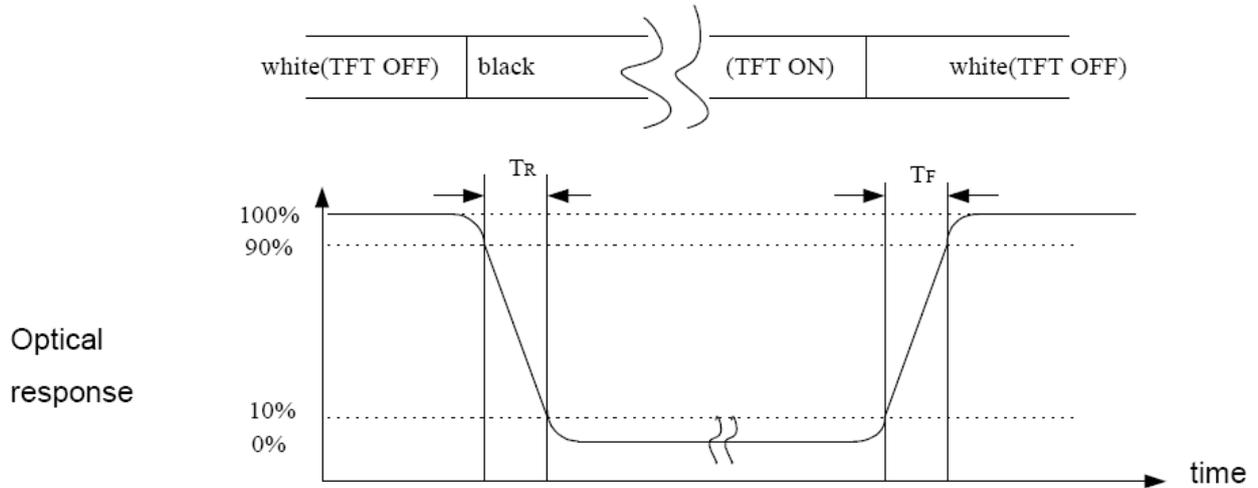
Note (2) Definition of Contrast Ratio(CR) :
measured at the center point of panel

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

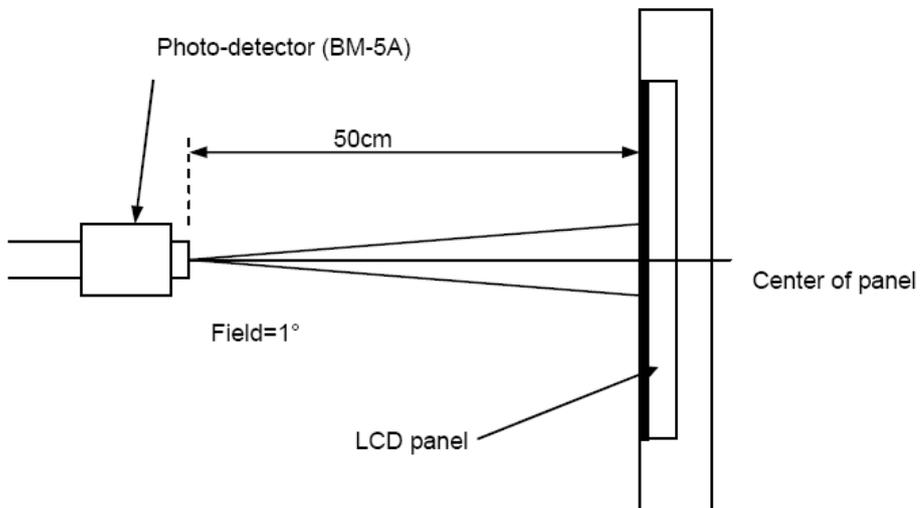
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Note (3) Definition of Response Time : Sum of T_R and T_F



Note (4) Definition of optical measurement setup

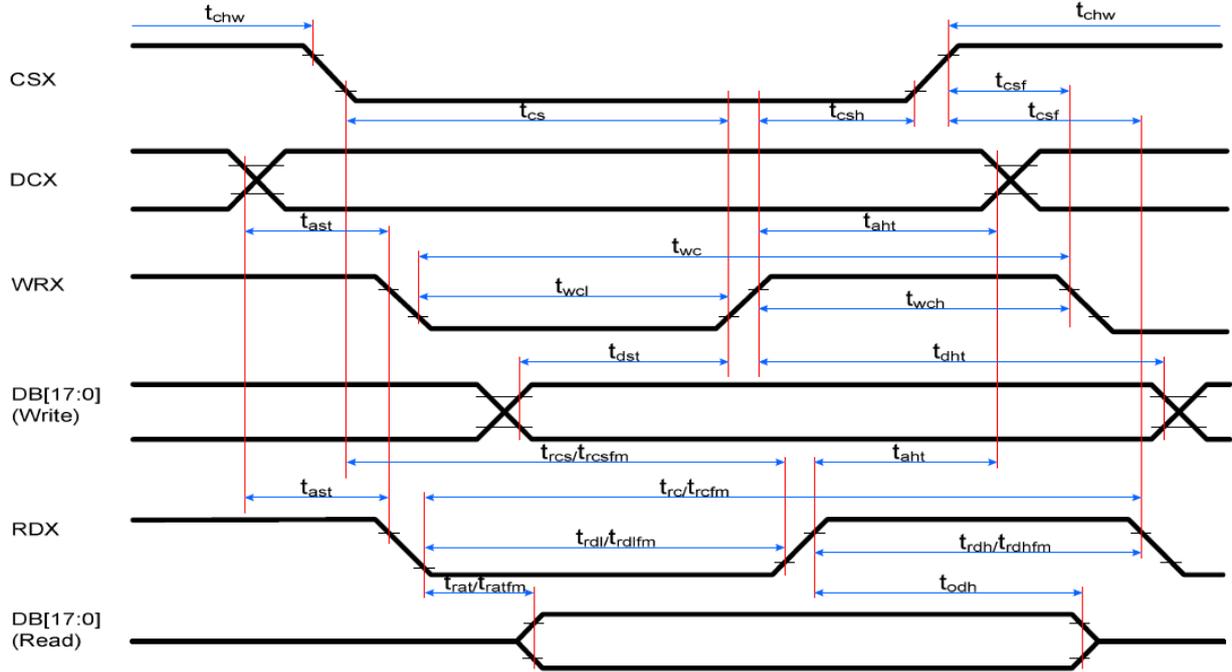


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7 Interface Timing

Display Parallel 18/16/9/8-bit Interface Timing Characteristics(8080- II system)

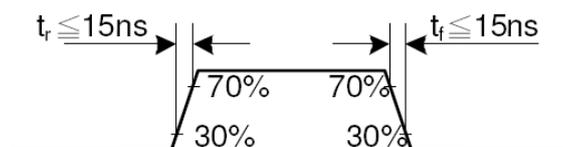


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Signal	Symbol	Parameter	min	max	Unit	Description
DCX	tast	Address setup time	0	-	ns	
	taht	Address hold time (Write/Read)	10	-	ns	
CSX	tchw	CSX "H" pulse width	0	-	ns	
	tcs	Chip Select setup time (Write)	15	-	ns	
	trcs	Chip Select setup time (Read ID)	45	-	ns	
	trcsfm	Chip Select setup time (Read FM)	355	-	ns	
	tcsf	Chip Select Wait time (Write/Read)	10	-	ns	
WRX	twc	Write cycle	66	-	ns	
	twrh	Write Control pulse H duration	15	-	ns	
	twrl	Write Control pulse L duration	15	-	ns	
RDX (FM)	trcfm	Read Cycle (FM)	450	-	ns	
	trdhfm	Read Control H duration (FM)	90	-	ns	
	trdlfm	Read Control L duration (FM)	355	-	ns	
RDX (ID)	trc	Read cycle (ID)	160	-	ns	
	trdh	Read Control pulse H duration	90	-	ns	
	trdl	Read Control pulse L duration	45	-	ns	
D[17:0], D[17:10]&D[8:1], D[17:10], D[17:9]	tdst	Write data setup time	10	-	ns	For maximum CL=30pF For minimum CL=8pF
	tdht	Write data hold time	10	-	ns	
	trat	Read access time	-	40	ns	
	tratfm	Read access time	-	340	ns	
	trod	Read output disable time	20	80	ns	

Note: $T_a = -30$ to 70 °C, $IOVCC=1.65V$ to $2.8V$, $VCI=2.6V$ to $3.3V$, $GND=0V$.



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8 Reliability Condition for LCD

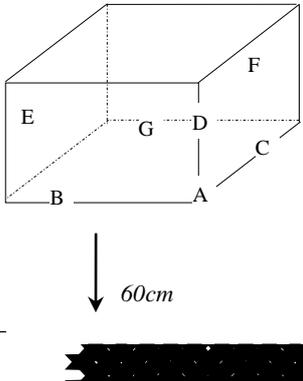
No change on display and in operation under the following test condition.

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="text-align: center;">  </div> <p style="text-align: right; margin-right: 20px;"> <i>Dropping method corner dropping</i> <i>A corner: once</i> <i>Edge dropping</i> <i>B, C, D edge: once</i> <i>Face dropping</i> <i>E, F, G face: once</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.

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9 Dimensional outlines

NOTES:

1. Display type: 262K / 65K TFT
2. Driver IC: ILI9342C
3. Operation Voltage: 2.8V~3.3
4. Operating temperature: -20.~+70.
Storage temperature: -30.~+80.
5. ROHS must be complied (Use lead-free process)
6. Interface: 8080/6800 8-bit , 9-bit , 16-bit , 18-bit Parallel , 3-Wire Serial SPI, RGB

1. Pin out diagram

NO.	SIGNAL	NO.	SIGNAL
1	LED0	26	DB6
2	LED01	27	DB5
3	LED02	28	DB4
4	LED03	29	DB3
5	LED04	30	DB2
6	MD	31	DB1
7	MU	32	DB0
8	MV	33	NC
9	MW	34	SSA
10	RESET	35	RD/E
11	HSYNC	36	WR/RB/WD/C3
12	HSYNC	37	OC/CS0
13	DOTCLK	38	CS
14	DE	39	CS
15	DB7	40	MD
16	DB6	41	MD
17	DB5	42	MD
18	DB4	43	MD
19	DB3	44	XBR(K+)/SCL
20	DB2	45	VO(X+)/SDA
21	DB1	46	K1(X-)/INT
22	DB0	47	MU(X-)/RESET
23	DB9	48	MD
24	DB8	49	MD
25	DB7	50	MD

XIAMEN AMOTEC DISPLAY CO.,LTD

DATE: 2017.03.05

UNIT: mm

SCALE: 1/1

SHEET: 1/1

REV: 01

DRAWN:

CHECKED:

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Count Dwg.

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10 Incoming Inspection Standards

11.1 VISUAL & FUNCTION INSPECTION STANDARD

11.1.1 Inspection conditions

Inspection performed under the following conditions is recommended.

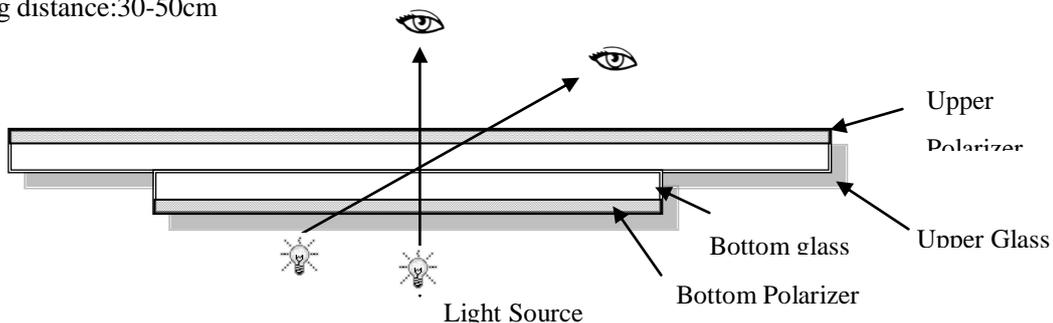
Temperature : $25 \pm 5^{\circ}\text{C}$

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

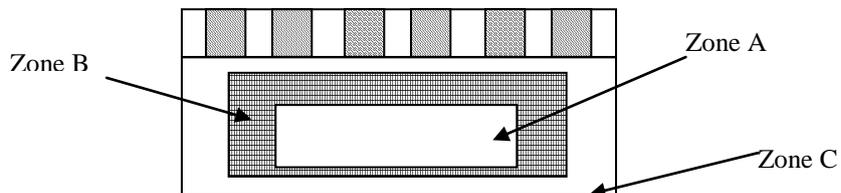
Viewing Angle : Normal viewing Angle.

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

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

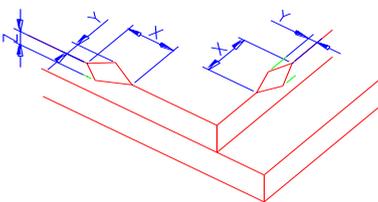
AQL:

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 1715 1391 1868"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>≤3.0mm</td> <td><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						

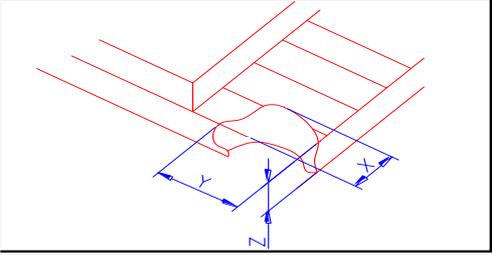
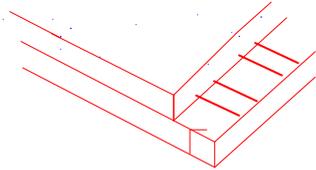
NOTE:

X: Length

Y: Width

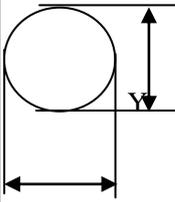
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<p>Z: Height L: Length of ITO, T: Height of LCD</p>	<p>(2)LCD corner broken</p>	 <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <thead> <tr> <th style="padding: 5px;">X</th> <th style="padding: 5px;">Y</th> <th style="padding: 5px;">Z</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">$\leq 3.0\text{mm}$</td> <td style="padding: 5px;">$\leq L$</td> <td style="padding: 5px;">$\leq T$</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  $\Phi = (X+Y)/2$	① light dot (LCD/TP/Polarizer black/white spot , light dot, pinhole, dent, stain) <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;">$\Phi \leq 0.10$</td> <td colspan="3" style="text-align: center;">Ignore</td> </tr> <tr> <td style="text-align: center;">$0.10 < \Phi \leq 0.15$</td> <td colspan="3" style="text-align: center;">3(distance $\geq 10\text{mm}$)</td> </tr> <tr> <td style="text-align: center;">$0.15 < \Phi \leq 0.2$</td> <td colspan="3" style="text-align: center;">1</td> </tr> <tr> <td style="text-align: center;">$0.2 < \Phi$</td> <td colspan="3" style="text-align: center;">0</td> </tr> </tbody> </table> ② Dim spot (LCD/TP/Polarizer dim dot, light leakage、 dark spot) <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;">$\Phi \leq 0.1$</td> <td colspan="3" style="text-align: center;">Ignore</td> </tr> <tr> <td style="text-align: center;">$0.1 < \Phi \leq 0.2$</td> <td colspan="3" style="text-align: center;">2(distance $\geq 10\text{mm}$)</td> </tr> <tr> <td style="text-align: center;">$0.2 < \Phi \leq 0.3$</td> <td colspan="3" style="text-align: center;">1</td> </tr> <tr> <td style="text-align: center;">$\Phi > 0.3$</td> <td colspan="3" style="text-align: center;">0</td> </tr> </tbody> </table> ③ Polarizer accidented spot <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;">$\Phi \leq 0.2$</td> <td colspan="3" style="text-align: center;">Ignore</td> </tr> <tr> <td style="text-align: center;">$0.2 < \Phi \leq 0.5$</td> <td colspan="3" style="text-align: center;">2(distance $\geq 10\text{mm}$)</td> </tr> <tr> <td style="text-align: center;">$\Phi > 0.5$</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>$\Phi \leq 0.03$</td> <td>Ignore</td> <td colspan="3">Ignore</td> </tr> <tr> <td>$0.03 < W \leq 0.05$</td> <td>$L \leq 3.0$</td> <td colspan="2">$N \leq 2$</td> <td rowspan="2">Ignore</td> </tr> <tr> <td>$0.05 < W \leq 0.08$</td> <td>$L \leq 2.0$</td> <td colspan="2">$N \leq 2$</td> </tr> <tr> <td>$0.08 < W$</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.																												