TFT-LCD Module Datasheet

ITEM NO.: TST50WV03AN

Version: V2.0

ITEM	Specification	Unit
LCD Type	a-Si TFT,Transmissive,Normally white,TN	-
LCD Size	5.0	inch
Resolution (W x H)	800 x (RGB) × 480	pixel
LCM (W × H × D)	120.7(W) x 75.8(H) x 2.9(D)	mm
Active Area (W × H)	108 (W) x 64.8 (H)	mm
Dot Pitch (W × H)	0.045(W) X 0.135(H)	mm
Viewing Direction	6 o'clock	-
Gray Scale Inversion Direction	12 o'clock	-
Viewing Angle	Top:50,Bottom:70; Left/ Right:70	deg.
Color Depth	16.7M	-
Pixel Arrangement	RGB-stripe	-
Backlight Type	18 LEDs	-
Surface Luminance	950	cd/m2
Surface Treatment	Anti-Glare	-
Driver IC	Source: ILI6122 + Gate: ILI5960	-
Interface Type	RGB24-bit	-
Input Voltage	3.3	V
With/Without TP	Optional	-
Weight	54.6	g

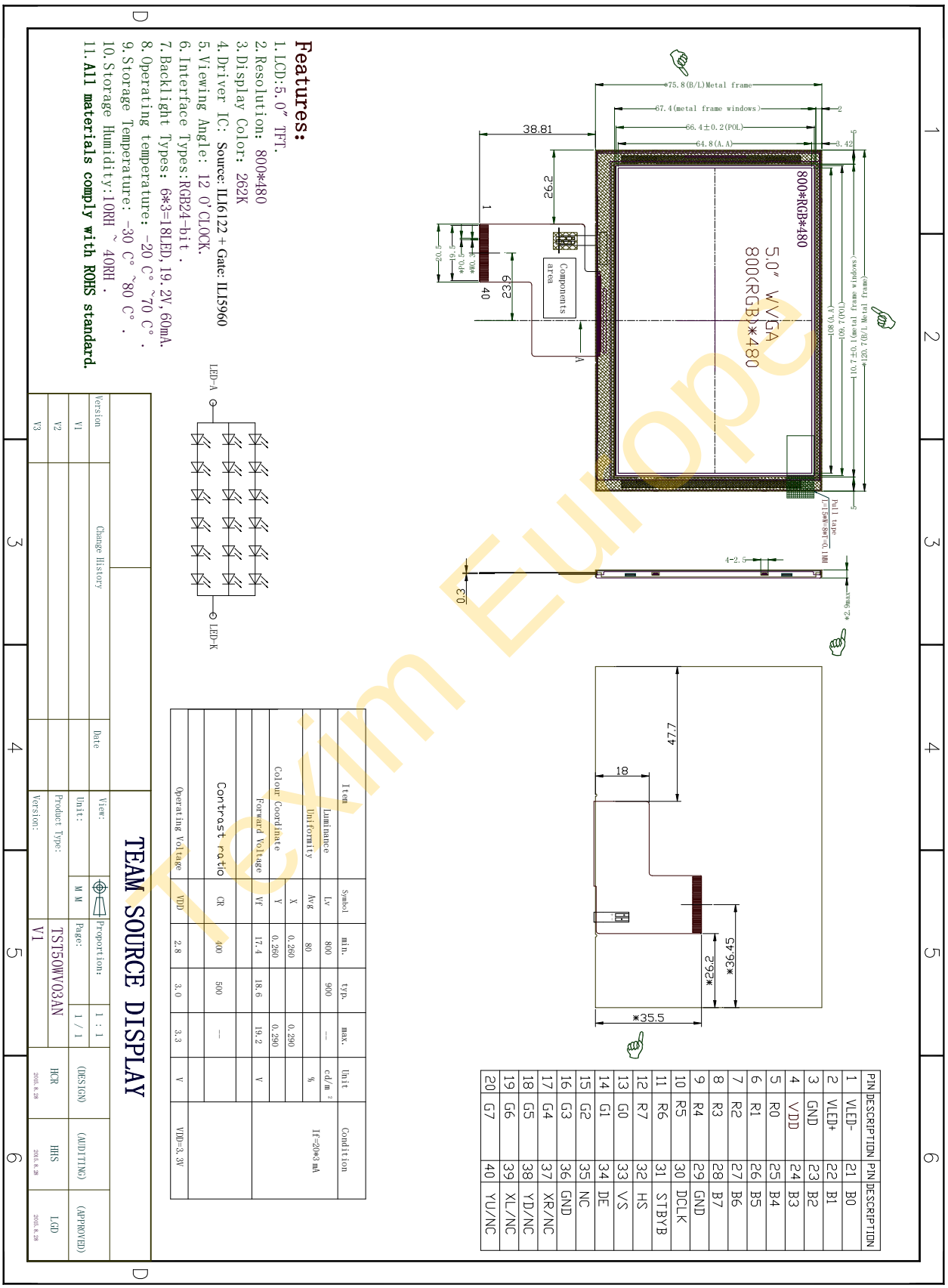
Note 1: RoHS compliant

Note 2: LCM weight tolerance: ± 5%.

Version No.	Date	Content	Remark
V1.0	2015-10-17	Initial Release	
V2.0	2015-12-10	Viewing Direction	

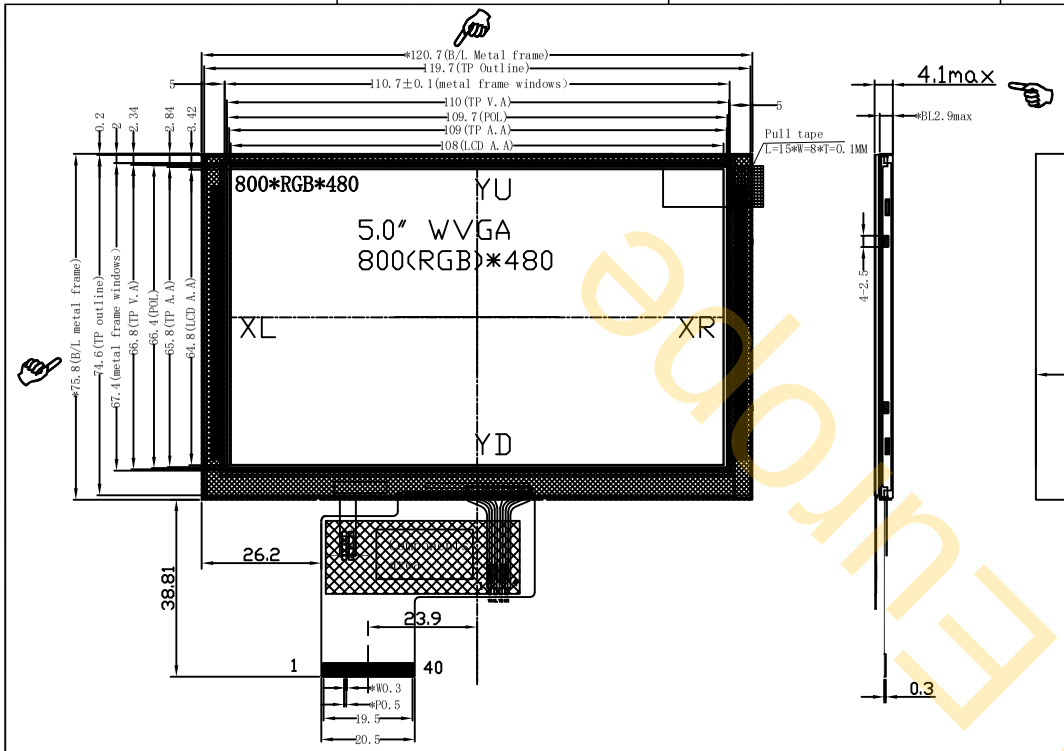
CONTENTS

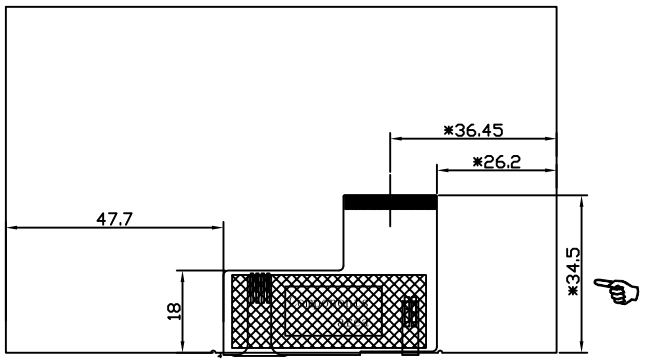
1 Product drawings



Item	Symbol	min.	typ.	max.	Unit	Condition
Luminance	Lv	800	900	—	cd/m²	IF=20*3 mA
Uniformity	Avg	80			%	
Colour Coordinate	X	0.260		0.290		
	Y	0.260		0.290		
Forward Voltage	Vf	17.4	18.6	19.2	V	
Contrast ratio	CR	400	500	—		
Operating Voltage	VDD	2.8	3.0	3.3	V	VDD=3.3V

PIN	DESCRIPTION	PIN	DESCRIPTION
1	VLED-	21	B0
2	VLED+	22	B1
3	GND	23	B2
4	VDD	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	DCLK
11	R6	31	STBYB
12	R7	32	HS
13	G0	33	VS
14	G1	34	DE
15	G2	35	NC
16	G3	36	GND
17	G4	37	XR/NC
18	G5	38	YD/NC
19	G6	39	XL/NC
20	G7	40	YU/NC





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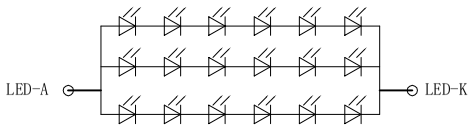
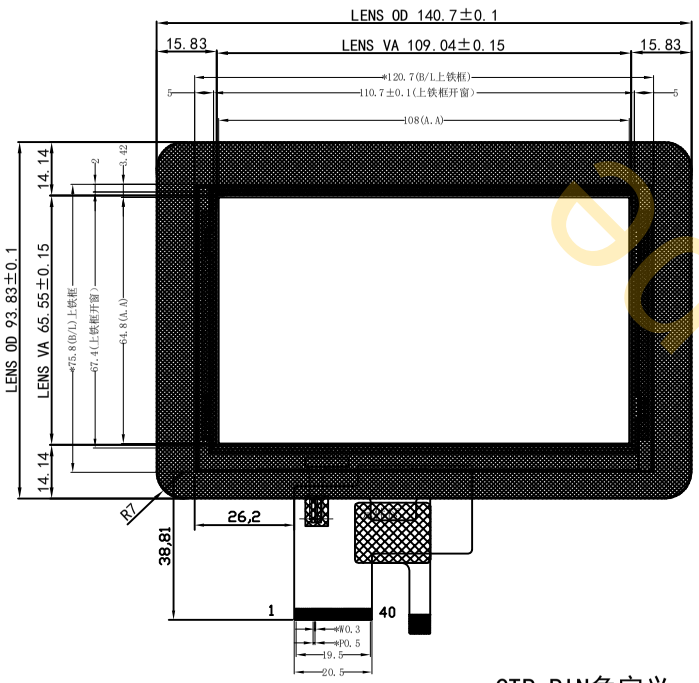
8	R3	28	B7
9	R4	29	GND
10	R5	30	DCLK
11	R6	31	STBYB
12	R7	32	HS
13	G0	33	VS
14	G1	34	DE
15	G2	35	NC
16	G3	36	GND
17	G4	37	XR
18	G5	38	YD
19	G6	39	XL
20	G7	40	YU

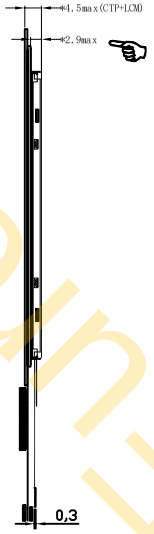
Features:

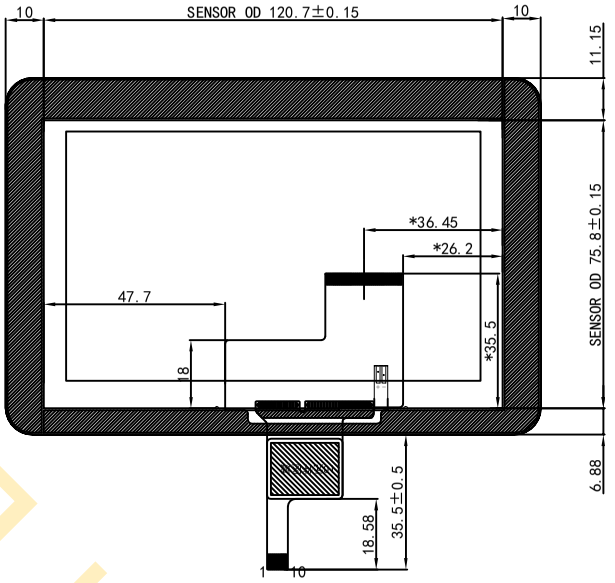
1. LCD:5.0" TFT.
2. Resolution: 800*480
3. Display Color: 262K
4. Driver IC: Source: ILI6122 + Gate: ILI5960
5. Viewing Angle: 6 0'CLOCK.
6. Interface Types: RGB24-bit .
7. Backlight Types: 3*6=18LED, 19.2V, 60mA.
8. Operating temperature: -20 C° ~70 C° .
9. Storage Temperature: -30 C° ~80 C° .
10. Storage Humidity: 10RH ~ 40RH .
11. **All materials comply with ROHS standard.**



Item	Symbol	min.	typ.	max.	Unit	Condition
Luminance	Lv	800	900	--	cd/m ²	If=20*3mA
Uniformity	Avg	80			%	
Colour Coordinate	X	0.260		0.290		
	Y	0.260		0.290		
Forward Voltage	Vf	21	21.7	22.4	V	
Contrast ratio	CR	400	500	--		
Operating Voltage	VDD	2.8	3.0	3.3	V	VDD=3.3V







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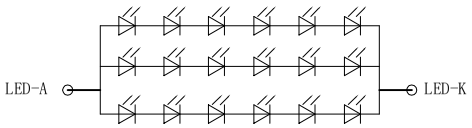
11	R6	31	STBYB
12	R7	32	HS
13	G0	33	VS
14	G1	34	DE
15	G2	35	NC
16	G3	36	GND
17	G4	37	XR/NC
18	G5	38	YD/NC
19	G6	39	XL/NC
20	G7	40	YU/NC

CTP PIN角定义

PIN NO	DINFINATION
1	NC
2	NC
3	RST
4	GND
5	INT
6	SDA
7	SCL
8	GND
9	GND
10	VDD

Features:

1. LCD:5.0″ TFT.
2. Resolution: 800*480
3. Display Color: 262K
4. Driver IC: TBD.
5. Viewing Angle: 6 O'CLOCK.
6. Interface Types:RGB24-bit .
7. Backlight Types: 6*3=18LED,19.2V,60mA.
8. Operating temperature: -20 C° ~70 C° .
9. Storage Temperature: -30 C° ~80 C° .
10. Storage Humidity:10RH ~ 40RH .
11. **All materials comply with ROHS standard.**



项目 Item	符号 Symbol	最小值 min.	典型值 typ.	最大值 max.	单位 Unit	测定条件 Condition
亮度 Luminance	Lv		855	—	cd/m ²	If=20*3 mA (恒定电流测试)
均匀性 Uniformity	Avg	80			%	
色度坐标 Colour Coordinate	X	0.260		0.290		
	Y	0.260		0.290		
背光正向电压 Forward Voltage	Vf	17.4	18.6	19.2	V	
对比度 Contrast ratio	CR	400	500	—		
工作电压 Operating Voltage	VDD	2.8	3.0	3.3	V	VDD=3.3V

注:标注 请重点确认 | 尺寸中带有"*"为重点管控尺寸

版本(Version)	变更记录(Change History)	日期(Date)
V1	增加标注，修改规格参数	2015.8.28
V2		
V3		

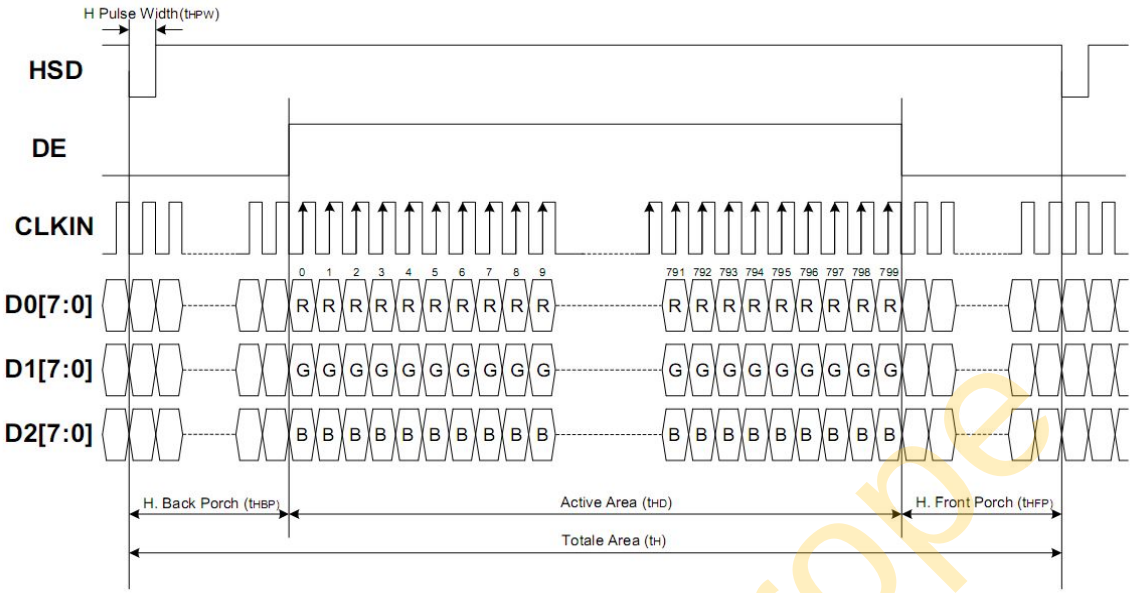
SHENZHEN TEAM SOURCE DISPLAY TECH. CO,LTD

视 角 (View):		比例(Proportion):	1 : 1	设 计 (DESIGN)	审 核 (AUDITING)	批 准 (APPROVED)
单 位 (Unit):	M M	页 面 (Page):	1 / 1			
产品型号 (Product Type):	TST50WV03AC					
版 本 (Version):	V1					

2 Interface description

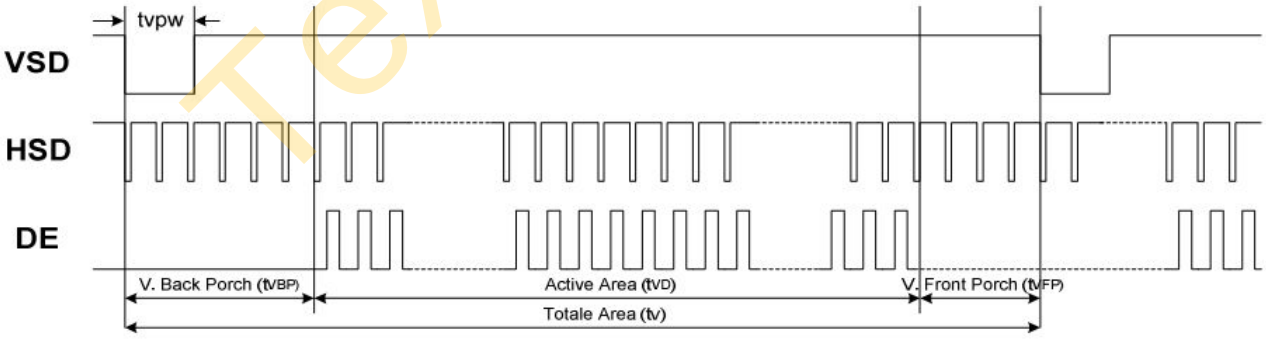
PIN NO.	Symbol	description
1	VLED-	Backlight K Cathode input pin.
2	VLED+	Backlight A Aothod input pin.
3	GND	System Ground. (0V)
4	VDD	Power supply +2.8V
5~12	R0~R7	Red Data BUS
13~20	G0~G7	Green Data BUS
21~28	B0~B7	Blue Data BUS
29	GND	System Ground. (0V)
30	DCLK	Clock for input data. Data latched at rising/falling edge of this signal. Default is falling edge.
31	STBYB	Standby mode control. (Normally pull high) STBYB="L", enter standby mode for power saving. Timing controller and source driver will turn off, all outputs are Hi-Z. STBYB="H", normal operation.
32	HS	Horizontal sync input in digital parallel RGB. Negative polarity.
33	VS	Vertical sync input in digital parallel RGB. Negative polarity.
34	DE	Input data enable control. When DE mode, active High to enable data input. (Normally pull low)
35	NC	
36	GND	System Ground. (0V)
37	XR/NC	NC
38	YD/NC	NC
39	XL/NC	NC
40	YU/NC	NC

3 Display Timing characteristics



Horizontal Input Timing

Parameter		Symbol	min	Typ.	max	Unit
Horizontal display area		tHD	-	800	-	CLKIN
CLKIN frequency		f_{clk}	-	33.3	50	MHz
1 Horizontal line period		t_H	862	1056	1200	CLKIN
HSD pulse width	Min.	t_{HPW}	-	1	-	
	Typ.		-	-	-	
	Max.		-	40	-	
HSD back porch		t_{HBP}	46	46	46	
HSD front porch		t_{HFP}	16	210	354	



Vertical Input Timing

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

4 INITIAL CODE

Don't need to be initialized

5 Absolute Maximum Ratings

PARAMETER	SYMBOL	MIN	MAX	UNIT
Supply Voltage (Analog)	VDD~GND	-0.5	+5.0	V
Logic signal voltage(I/O)	IOVDD~GND	-0.5	+5.0	V
Operating Temperature	TOP	-20	70	° C
Storage Temperature	TST	-30	80	° C
Humidity	RH	-	90%(Max 60° C)	RH

6 Electrical Characteristics

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Analog operating voltage	VDD	3.0	3.3	3.6	V
Logic operating voltage	IOVDD	3.0	3.3	3.6	V
Input Current	IDD	-	TBD	-	mA
Input Voltage ' H ' level	VIH	0.7VDD	-	VDD	V
Input Voltage ' L ' level	VIL	GND	-	0.3VDD	
Output Voltage ' H ' level	VOH	VDD-0.4	-	--	
Output Voltage ' L ' level	VOL	--	-	GND+0.4	

7 Backlight Characteristics

ITEM	SYMBOL	MIN	TYP	MAX	UNIT
Voltage for LED backlight	V_f	-	18.6	19.2	V
Current for LED backlight	I_f	-	60	-	mA
Power consumption	Wbl	-	1116	-	mW
Uniformity	Avg	80	-	-	%
LED Life Time	-	30000	40000	-	Hrs

Note:

1.The LED life time is defined as the module brightness decrease to 50% original brightness at Ta=25°C, 60%RH ±5 %.

2. The life time of LED will be reduced if LED is driven by high current, high ambient temperature and humidity conditions.

3. Typical operating life time is an estimated data.

4. 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.

8 LCD Optical specifications

Without touch panel

Item	Symbol	Condition	Specification			Unit	Remark
			Min	Typ	Max		
Response time (By Quick)	Tr+Tf	θ = 0°	-	10	20	ms	Note 2
Contrast ratio	CR	θ = 0°	400	500	-		Note 3
Viewing angle	Top	CR≧10	40	50	-	Deg.	Note 4
	Bottom	CR≧10	60	70	-		
	Left	CR≧10	60	70	-		
	Right	CR≧10	60	70	-		
Color chromaticity (CF only with ITO, light source is C light, CIE 1931)	Wx	θ = 0°	0.26	0.31	0.36		Note 1
	Wy		0.28	0.33	0.38		
	Rx		0.600	0.620	0.640		
	Ry		0.324	0.344	0.364		
	Gx		0.286	0.306	0.326		
	Gy		0.543	0.563	0.583		
	Bx		0.113	0.133	0.153		
	By		0.129	0.149	0.169		
NTSC			57%	60%	-		
Transmittance	Trans		3.73	4.66	-	%	
Luminous	L	Viewing normal angle	---	950	--	Cd/m2	

With Resistive touch panel

Item	Symbol	Condition	Specification			Unit	Remark
			Min.	Typ.	Max.		
Viewing angle	Top	CR≧10	-	45	-	Deg.	Note 2,6,7
	Bottom	CR≧10	-	65	-		
	Left	CR≧10	-	65	-		
	Right	CR≧10	-	65	-		
Luminous	L	Viewing normal angle	---	874	--	Cd/m2	

With Capacitive touch panel

Item	Symbol	Condition	Specification			Unit	Remark
			Min.	Typ.	Max.		
Viewing angle	Top	CR≧10	-	40	-	Deg.	Note 2,6,7
	Bottom	CR≧10	-	60	-		
	Left	CR≧10	-	60	-		
	Right	CR≧10	-	60	-		
Luminous	L	Viewing normal angle	---	855	--	Cd/m2	

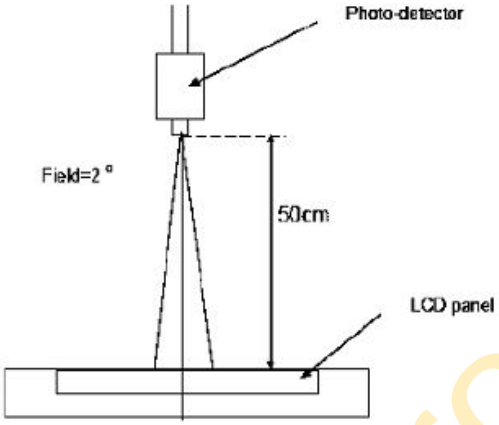
Test Conditions:

1. VCC=3.3V, VLED=5.0V.The ambient temperature is 25. ℃

2. The test systems refer to Note 2.

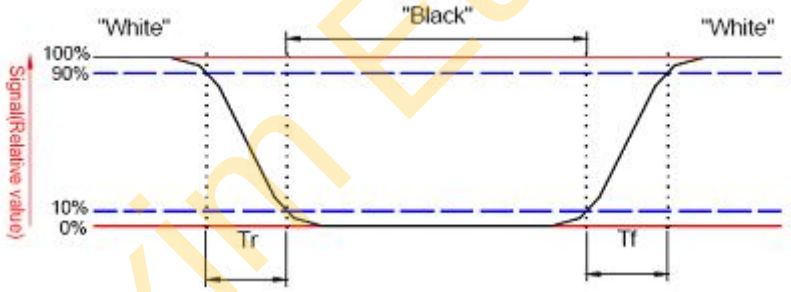
Note 1: Definition of optical measurement system.

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.

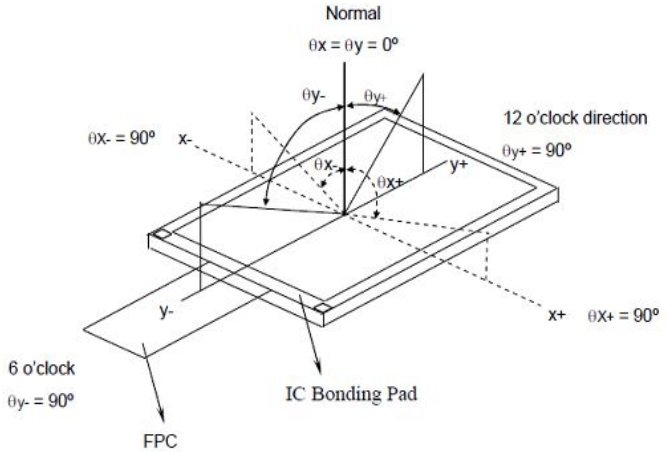


Note 3: Definition of contrast ratio:

Contrast ratio is calculated by the following formula.

$$\text{Contrast ratio (CR)} = \frac{\text{Brightness on the "white" state}}{\text{Brightness on the "black" state}}$$

Note 4: Definition of viewing angle



Resistive Touch Panel Specifications

ITEM	VALUE			UNIT	REMARK
	Min	Typ	Max		
Linearity	-	-	1.5	%	Analog X and Y directions
Terminal Resistance	400	-	1000	Ω	x
	150	-	400		y
Insulation Resistance	20	-	-	MΩ	DC 25V
Voltage	-	3	10	V	DC
Chattering	-	-	10	ms	100kΩ pull-up
Transparency	90	-	-	%	-
Operation Force	30	-	120	g	-
Endurance	1,000,000	-	-	Touches	100g Operation Force
	-	-	30,000	Slides	
Surface Hardness	3	-	-	H	-

Capacitive Touch Panel specifications

Mechanical characteristics

DESCRIPTION	INL SPECIFICATION	REMARK
Touch Panel Size	5.0	
Outline Dimension (OD)	140.7x93.83mm	Cover Lens Outline
Product Thickness	1.6mm(max)	
Glass Thickness	0.7mm	
Ink View Area	109.04x65.55mm	
Sensor Active Area	109.04x65.55mm	
Input Method	5 Fingers	
Activation Force	Touch	
Surface Hardness	≥6H	

Electrical characteristics

DESCRIPTION		SPECIFICATION
Operating Voltage		DC 2.8~3.3V
Power Consumption (IDD)	Active Mode	12~4.5mA
	Sleep Mode	TBD
Interface		I^2C
Controller IC		FT5336
I^2C address		0x70
Resolution		800x480

Interface description

PIN NO.	SYMBOL	DESCRIPTION	REMARK
1	NC	Not Connected	
2	NC	Not Connected	
3	RST	Reset pin	
4	GND	Ground	
5	INT	Interrupt signal from CTP	
6	SDA	I2C data signal	
7	SCL	I2C clock input	
8	GND	Ground	
9	GND	Ground	
10	VCC	Power supply	

Interface timing characteristics

PARAMETER	MIN	MAX	UNIT
SCL Frequency	-	400K	Hz
Bus Free Time Between a STOP and START Condition	4.7	-	uS
Hold Time (repeated) START Condition	4.0	-	uS
Data Setup Time	250	-	nS
Setup Time for Repeated START Condition	4.7	-	uS
Setup Time for STOP Condition	2.0	-	uS

9 RELIABILITY TEST

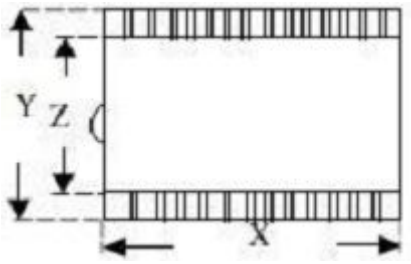
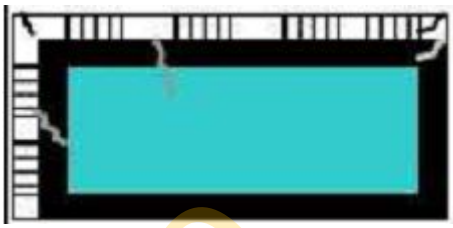
NO.	TEST ITEM	TEST CONDITION	INSPECTION AFTER TEST
1	High Temperature Storage	80±2°C/96 hours	Inspection after 2~4 hours storage at room temperature and humidity. The condensation is not accepted. The sample shall be free from defects: 1. Air bubble in the LCD 2. Seal leak 3. Non-display 4. Missing segments 5. Glass crack
2	Low Temperature Storage	-30±2°C/96 hours	
3	High Temperature Operating	70±2°C/96 hours	
4	Low Temperature Operating	-20±2°C/96 hours	
5	Temperature Cycle	-30±2°C ~ 25~ 80± 2°C × 10 cycles (30 min.) (5min.) (30min.)	
6	Damp Proof Test	60°C ±5°C × 90%RH/96 hours	
7	Vibration Test	Frequency 10Hz~55Hz Stroke: 1.5mm Sweep: 10Hz~150 Hz~10Hz 2 hours For each direction of X, Y, Z	
8	Shock Test	Half-sine, wave, 300m/s	
9	Packing Drop Test	Height: 80 cm 1 corner, concrete floor	
10	Electrostatic Discharge Test	C=150pF, R=330 Ω Air: ±8KV 150pF/330Ω 30 times Contact: ±4KV,20 times	

10 Inspection standards

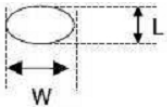
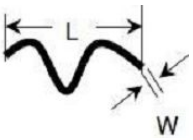
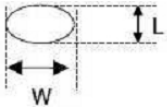
10.1 Visual inspection criterion in cosmetic

10.1.1 Glass defect

NO.	Defect	Criteria	Remark

1	Dimension(Minor)	By engineering diagram	
2	Cracks(Major)	Extensive crack [Reject]	

10.1.2 LCM appearance defect

NO.	Defect	Criteria		Remark
		Spec	Permissible Qty	
1	Round type(Minor)	ϕ ≤0.1mm	Disregard	1. ϕ=(W+L)/2, L:Length,W=Width 2.Disregard if out of A.A 
		0.1mm< ϕ ≤0.2mm	3	
		ϕ >0.2mm	0	
2	Line type(Minor)	W ≤0.03mm	Disregard	
		L≤ 3.0mm and 0.03mm<W≤0.05mm	2	1. L:Length,W=Width 2.Disregard if out of A.A 
		L≤ 3.0mm and 0.05mm<W≤0.1mm	1	
		W>0.10mm or L>3.0mm	0	
3	Polarizer dent(Minor)	ϕ ≤0.2mm	Disregard	1. ϕ=(W+L)/2, L:Length,W=Width 2.Disregard if out of A.A 
		0.2mm< ϕ ≤0.3mm	2	
		0.3mm< ϕ ≤0.5mm	1	
		ϕ >0.5mm	0	

10.1.3 FPC

NO.	Defect	Criteria	Remark
1	Copper peeling(Minor)	Copper peeling [Reject]	
2	Damaged	Damaged[Reject]	

10.1.4 Black tape

NO.	Defect	Criteria	Remark

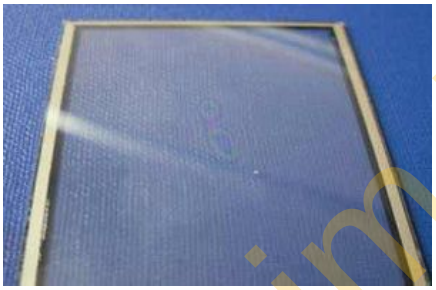
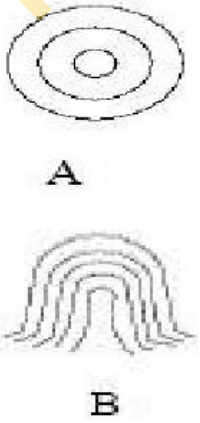
1	Shift(Minor)	IC exposed [Reject]	
2	No black tape(Minor)	No black tape [Reject]	

10.1.5 **Silicon**

NO.	Defect	Criteria	Remark
1	Amount of silicon (Minor)	ITO exposed [Reject]	

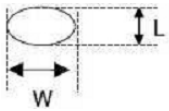
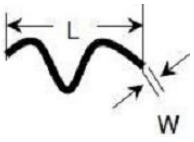
10.1.6 Touch Panel

Defect	Criteria	Remark
TP shift	Click on the TP, the distance between the show position and click position>1.5mm [Reject]	

<table>
<tr>
<td>TP Circle, Dent Dot, Bubble MI</td>
<td>
<table>
<tr><th>Size(mm)</th><th>Accessible QTY</th></tr>
<tr><td>D ≤0.20</td><td>Access</td></tr>
<tr><td>0.2＜D≤0.3</td><td>2</td></tr>
<tr><td>0.3＜D≤0.5</td><td>1</td></tr>
<tr><td>D>0.5</td><td>0</td></tr>
</table>
</td>
<td> 
</td>
</tr>
<tr>
<td>TP Ripple MI</td>
<td>1.(Figure A): Ripple D>5mm [Reject]
2.(Figure B): Ripple area<1/7 TP area and not impact fonts display effect [Access]
  </td>
<td> 
</td>
</tr>
<tr>
<td colspan="3">Remark: Tear up the protective film to inspect.
The distance of two dirt must>10mm;
The white dot found in manufacture is conformity to 0.1mm, if >0.1mm [Reject]</td>
</tr>
</table>

10.2 Visual inspection criterion in electrical display

NO.	Defect	Criteria		Remark
		Spec.	Permissible Qty	
1	No display (Major)	Not allowed		
2	Missing line (Major)	Not allowed		
3	Darker or lighter Line (Major)	Not allowed		
4	Weak line(Major)	By limited sample		
5	Bright / Dark point (Minor)	Bright point	1	1:1sub-pixel: 1R or 1G or 1B 2:Point defect area 1/2 sub pixel.
		Dark point	2	

6	Round type (Minor)	ϕ ≤0.1mm	Disregard	1. ϕ=(W+L)/2, L:Length,W=Width 2.Disregard if out of A.A 
		0.1＜ ϕ ≤0.2	3	
		ϕ >0.2mm	0	
7	Line type (Minor)	W ≤0.03mm	Disregard	1. L:Length,W=Width 2.Disregard if out of A.A 
		L≤ 3.0mm and 0.03mm<W≤0.05mm	2	
		L≤ 3.0mm and 0.05mm<W≤0.1mm	1	
		W>0.10mm or L>3.0mm	0	
8	Mura (Minor)	By 5% ND filter invisible		

10.3 Others

1. Issues that are not defined in this document shall be discussed and agreed with both parties. (Customer and supplier)
2. Unless otherwise agreed upon in writing, the criteria shall be applied to both parties. (Customer and supplier)

11 Suggestions for using LCD modules

11.1 Handling of LCM

1. The LCD screen is made of glass. Don't give excessive external shock, or drop from a high place.
2. If the LCD screen is damaged and the liquid crystal leaks out, do not lick and swallow. When the liquid is attach to your hand, skin, cloth etc, wash it off by using soap and water thoroughly and immediately.
3. Don't apply excessive force on the surface of the LCM.
4. If the surface is contaminated, clean it with soft cloth. If the LCM is severely contaminated, use Isopropyl alcohol/Ethyl alcohol to clean. Other solvents may damage the polarizer. The following solvents is especially prohibited: water , ketone Aromatic solvents etc.
5. Exercise care to minimize corrosion of the electrode. Corrosion of the electrodes is accelerated by water droplets, moisture condensation or a current flow in a high-humidity environment.
6. Install the LCD Module by using the mounting holes. When mounting the LCD module make sure it is free of twisting, warping and distortion. In particular, do not forcibly pull or bend the I/O cable or the backlight cable.
7. Don't disassemble the LCM.
8. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.
- Be sure to ground the body when handling the LCD modules.
- Tools required for assembling, such as soldering irons, must be properly grounded.
- To reduce the amount of static electricity generated, do not conduct assembling and other work under dry conditions.
- The LCD module is coated with a film to protect the display surface. Exercise care when peeling off this protective film since static electricity may be generated.

9. Do not alter, modify or change the the shape of the tab on the metal frame.
10. Do not make extra holes on the printed circuit board, modify its shape or change the positions of

components to be attached.

11. Do not damage or modify the pattern writing on the printed circuit board.
12. Absolutely do not modify the zebra rubber strip (conductive rubber) or heat seal connector
13. Except for soldering the interface, do not make any alterations or modifications with a soldering iron.
14. Do not drop, bend or twist LCM.

11.2 Storage

1. Store in an ambient temperature of 5 to 45 C, and in a relative humidity of 40% to 60%. Don't expose to sunlight or fluorescent light.
2. Storage in a clean environment, free from dust, active gas, and solvent.
3. Store in antistatic container.