Product Specification

Part Name: 8.80 inch TFT Display Module
Customer Part ID:
Topovision Part ID: TVT0880A
Ver: B

Customer:
Approved by

From: Topovision Technology Co.,Ltd.
Approved by

Notes:

1. Please contact Topovision Technology Co., Ltd. before assigning your product based on this module specification
2. The information contained herein is presented merely to indicate the characteristics and performance of our products. No responsibility is assumed by Topovision Technology Co., Ltd. for any intellectual property claims or other problems that may result from application based on the module described herein.

Contents

Revision History

Rev.	Date	Contents	Written	Approved
A	2017/07/06	Preliminary Specification	ZHENG	YUAN
B	2017/08/10	Update Input/Output Terminals	ZHENG	YUAN

Special Notes

Note1.	

2. General Specifications

Feature		Spec
Characteristics	Size	8.8 inch
	Resolution	1280(horizontal)*320(Vertical)
	Interface	LVDS
	Connect type	Connector
	Display Colors	16.7M
	Technology type	a-Si
	Pixel pitch (mm)	0.1695*0.1695
	Pixel Configuration	R.G.B.-Stripe
	Display Mode	Normally White
	Driver IC	EK79202
	Viewing Direction	6 O'clock
Mechanical	LCM (W x H x D) (mm)	229.66*67.50*3.50
	Active Area(mm)	216.96*54.24
	Weight (g)	97g
	LED Numbers	36 LEDs

Note 1: Requirements on Environmental Protection: RoHs
Note 2: LCM weight tolerance: +/- 5%

3. Input/Output Terminals

Pin No	Signal	I/O	Description
1	NC	P	No connection
2~3	VDD	P	DC-DC circuit supply voltage(2.3-3.6V)
4	NC	/	No connection
5	RESET	P	Global reset pin
6	STBYB	P	Standby mode
7	GND	P	Ground
8	RXIN0-	I	- LVDS differential data input
9	RXIN0+	I	+ LVDS differential data input
10	GND	P	Ground
11	RXIN1-	I	- LVDS differential data input
12	RXIN1+	I	+ LVDS differential data input
13	GND	P	Ground
14	RXIN2-	I	- LVDS differential data input
15	RXIN2+	P	+ LVDS differential data input
16	GND	I	GND
17	RXCLKIN-	I	- LVDS differential clock input
18	RXCLKIN+	P	+ LVDS differential clock input
19	GND	I	GND
20	RXIN3-	I	- LVDS differential data input
21	RXIN3+	I	+ LVDS differential data input
22	GND	P	Ground
23	SDA	P	Serial Data
24	SCL	P	Serial Clock.
25	GND	P	Ground
26	CS	I	Chip select
27	NC	/	No connection
28	LVBIT	/	6-bit / 8-bit input select for LVDS mode
29	NC	I	No connection
30	GND	P	Ground
31	LEDK-	P	LED Cathode
32	LEDK-	P	LED Cathode
33	NC	/	No connection
34	NC	/	No connection
35	NC	P	No connection
36	NC	/	No connection
37	NC	/	No connection
38	NC	P	No connection
39	LEDA+	P	LED Anode
40	LEDA+	P	LED Anode

4. Absolute Maximum Rating

Item	Symbol	MIN	Typ	MAX	Unit	Remark
Supply Voltage	V_{DD}	2.3	-	3.6	V	-
Operating Temperature	T_{OPR}	-20	-	70	℃	-
Storage Temperature	T_{STG}	-30	-	80	℃	

5. Timing characteristics

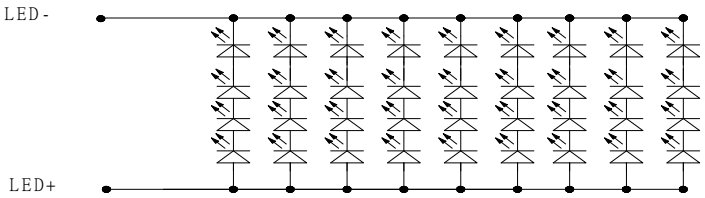
5.1 ELECTRICAL CHARACTERISTICS

Item	Symbol	MIN	TYP	MAX	Unit	Remark
VDD Voltage	VDD	-	3.3	-	V	
VDDIO Voltage	VDDIO	-	3.3	-	V	
VSP Voltage	VSP	4.5	5.0	6	V	
VSN Voltage	VSN	-6	-5.0	-4.5	V	
VGH Voltage	VGH	11	18	24	V	
VGL Voltage	VGL	-17	-12	-6	V	
VGL_REG Voltage	VGL_REG	-15	-10	-4.5	V	

5.2 LED Driving Conditions

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	I_F	-	180	-	mA	
Forward Voltage	V_F	-	12.8	-	V	
Backlight Power consumption	W_{BL}	-	2.304	-	W	
LED Lifetime		-	25000	-	Hrs	

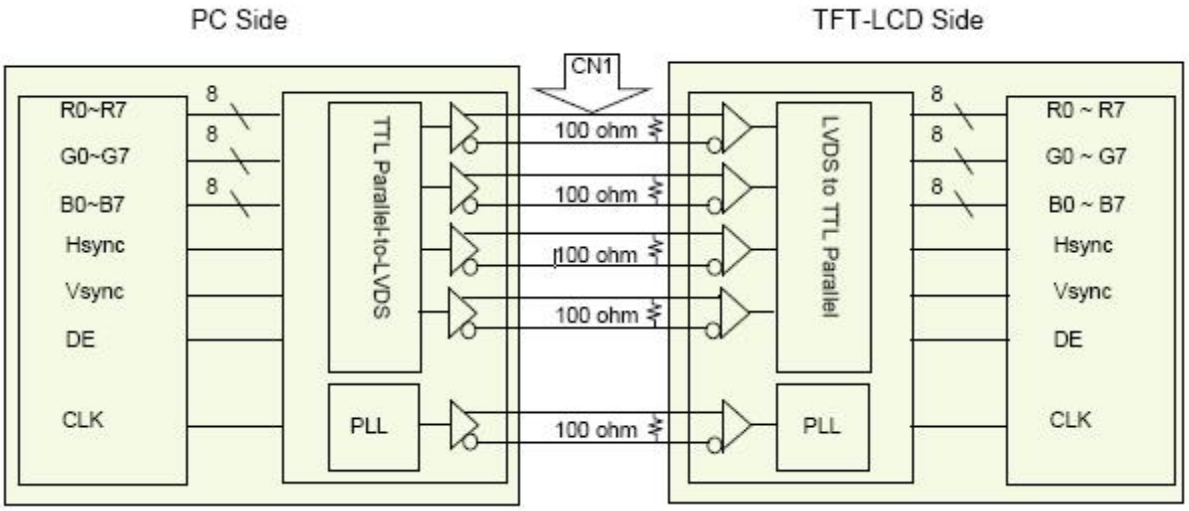
Note 1: Each LED: IF =20 mA, VF =3.2+/0.2V.
Note 2: Optical performance should be evaluated at Ta=25℃ only.
Note 3: If LED is driven by high current, high ambient temperature & humidity condition. The life Time of LED will be reduced. Operating life means brightness goes down to 50% initial brightness. Typical operating life time is estimated data.



CIRCUIT DIAGRAM(4串 9并)

Figure: LED connection of backlight(Constant Current)

5.3 LVDS Interface



5.4 LVDS mode AC electrical Characteristics

Parameter	Symbol	Spec.			Unit	Condition
		Min.	Typ.	Max.		
Clock frequency	R_{xFCLK}	30	-	TBD	MHz	Refer to input timing table for each display resolution
Input data skew margin	T_{RSKM}	500	-	-	ps	|VID| = 200mV RxVCM = 1.2V RxFCLK = 81MHz
Clock high time	T_{LVCH}	-	4/(7* R_{xFCLK})	-	ns	
Clock low time	T_{LVCL}	-	3/(7* R_{xFCLK})	-	ns	
PLL wake-up time	T_{enPLL}	-	-	150	us	

Table 13.1: LVDS mode AC electrical characteristics

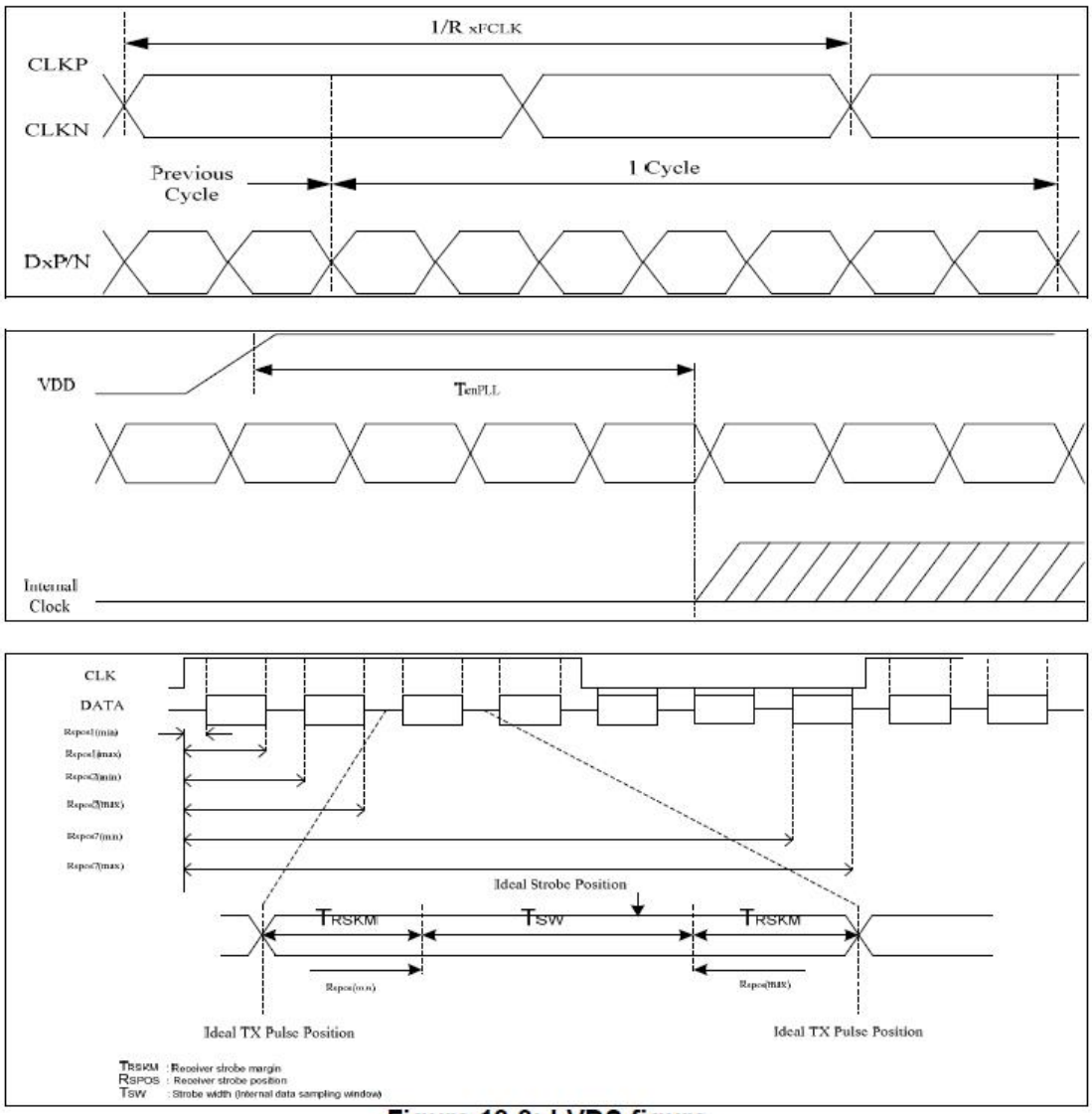


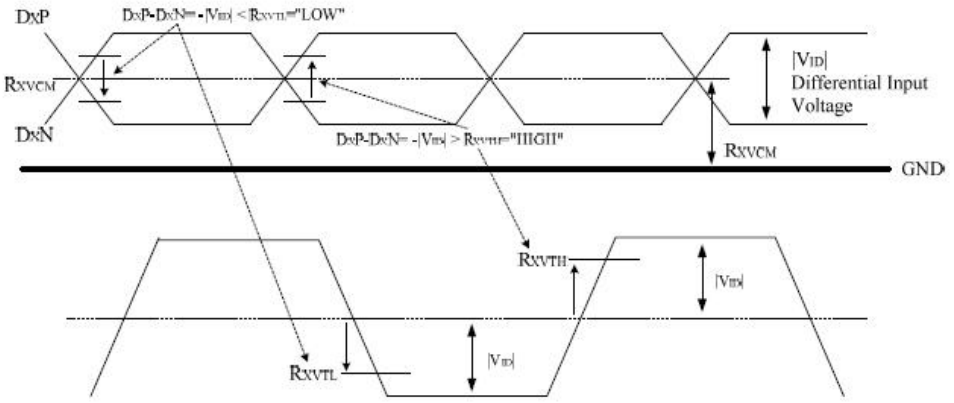
Figure 13.3: LVDS figure

5.5 LVDS DC electrical Characteristics

(VDD=VDDIO=VDDIF=2.3 to 3.6V, VSS=VSSA=VSS_IF=0V, TA=-20 to +85℃)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Differential input high threshold voltage	R_{XVTH}	+0.1	0.2	0.3	V	R_{XVCM}=1.2V
Differential input low threshold voltage	R_{XVTL}	-0.3	-0.2	-0.1	V	
Input voltage range (singled-end)	R_{XVIN}	0.7	-	1.7	V	
Differential input common mode voltage	R_{XVCM}	1	1.2	1.4	V	$\|V_{ID}\|$=0.2
Differential input impedance	Z_{ID}	80	100	125	ohm	
Differential input voltage	$\|V_{ID}\|$	0.2	-	0.6	V	
Differential input leakage current	I_{LCLVDS}	-10	-	+10	uA	
LVDS Digital Operating Current	$I_{VDDMIPI}$	-	15	20	mA	F_{DCLK}=80MHz,VDD=3.3V, Input pattern: 55h->Aah->55h->Aah
LVDS Digital Stand-by Current	I_{STMIPI}	-	-	250	uA	Clock & all Functions are stopped

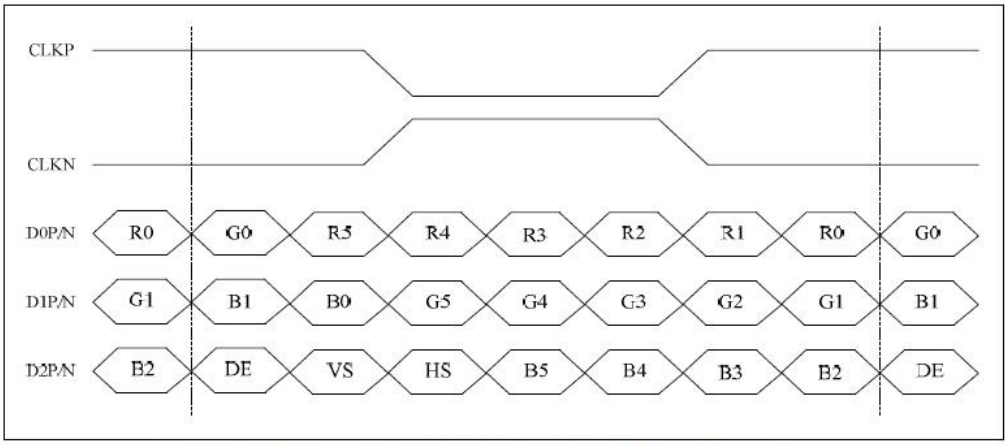
Single-end Signals



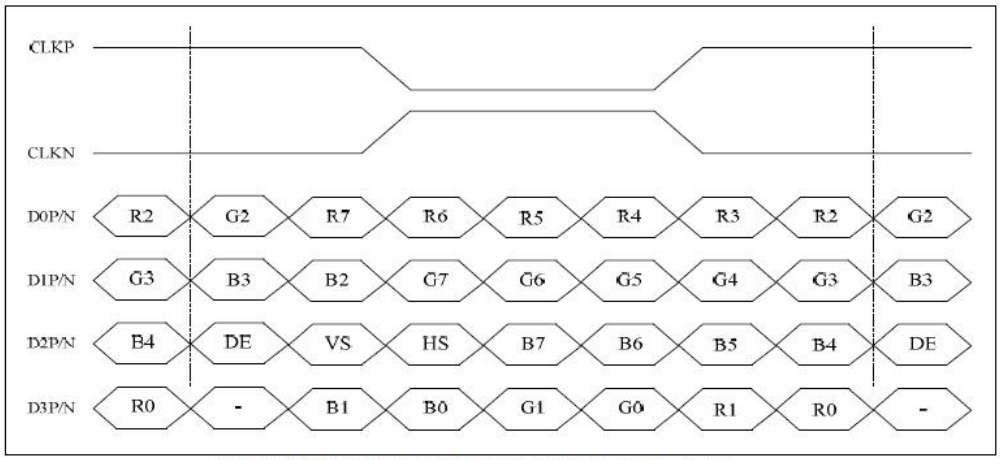
5.6 Timing

Parameter		Symbol	Value			Unit
			Min.	Typ.	Max.	
DCLK frequency @Frame rate=60Hz (LVDS)		F_{DCLK}	66.3	72.4	78.9	MHz
HSYNC period time		T_H	1380	1440	1500	DCLK
Horizontal display area		T_{HD}		1280		DCLK
HSYNC pulse width	Min.	T_{HPW}		1		
	Typ.			-		
	Max.			40		
HSYNC back porch(with pulse width)		T_{HBP}	88	88	88	DCLK
HSYNC front porch		T_{HFP}	12	72	132	DCLK
VSYNC period time		T_V	824	838	872	H
Vertical display area		T_{VD}		800		H
VSYNC pulse width	Min.	T_{VPW}		1		H
	Typ.			-		
	Max.			20		
VSYNC back porch(with pulse width)		T_{VBP}	23	23	23	H
VSYNC front porch		T_{VFP}	1	15	49	H

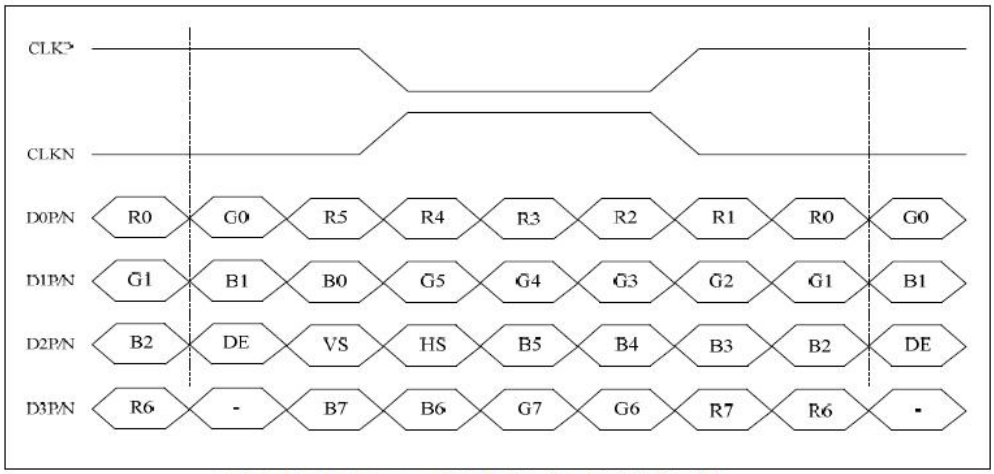
5.7 Data input format for LVDS



6-bit LVDS input (LVBIT=L, LVFMT=Don't care)



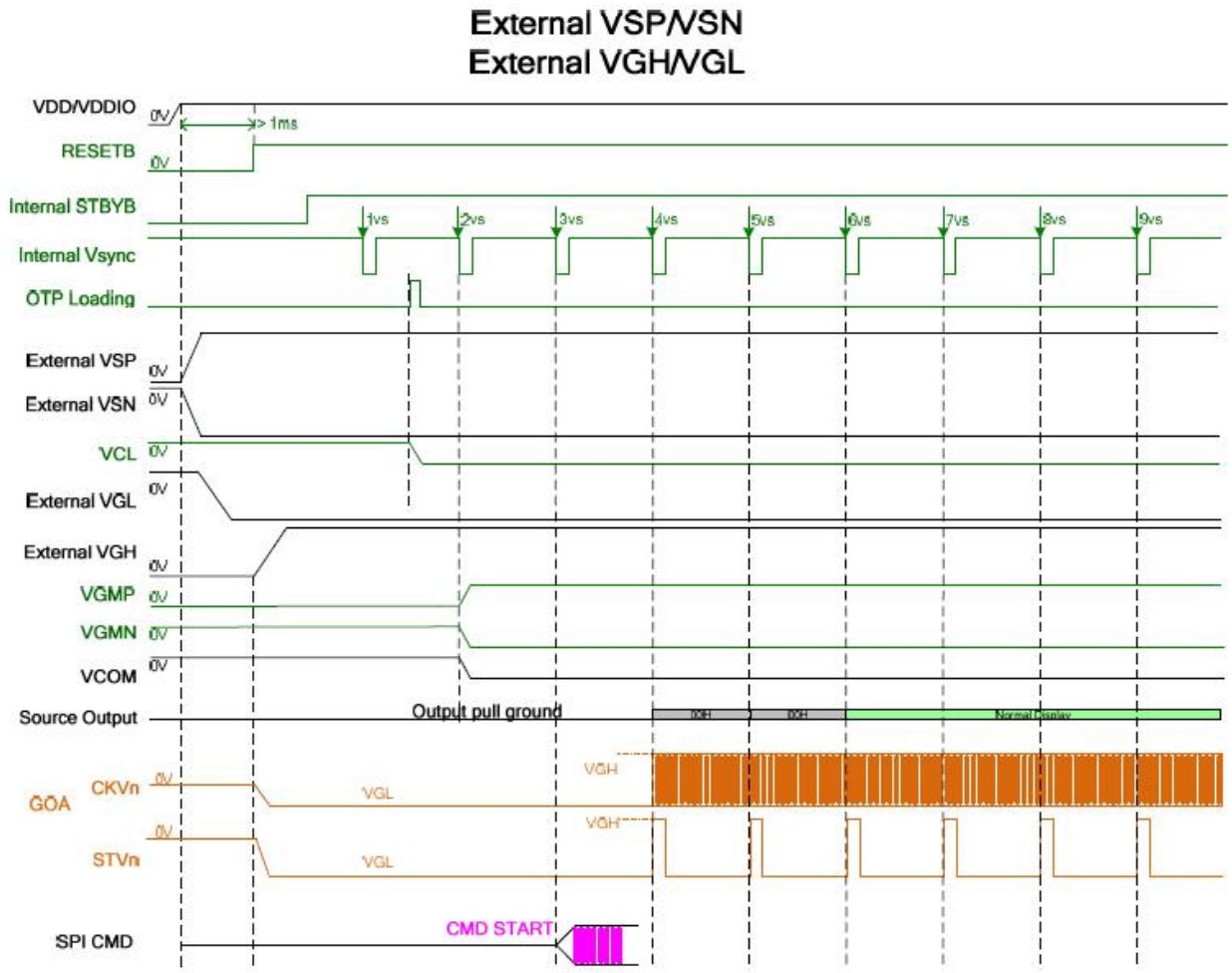
8-bit LVDS input (LVBIT=H, LVFMT=L)



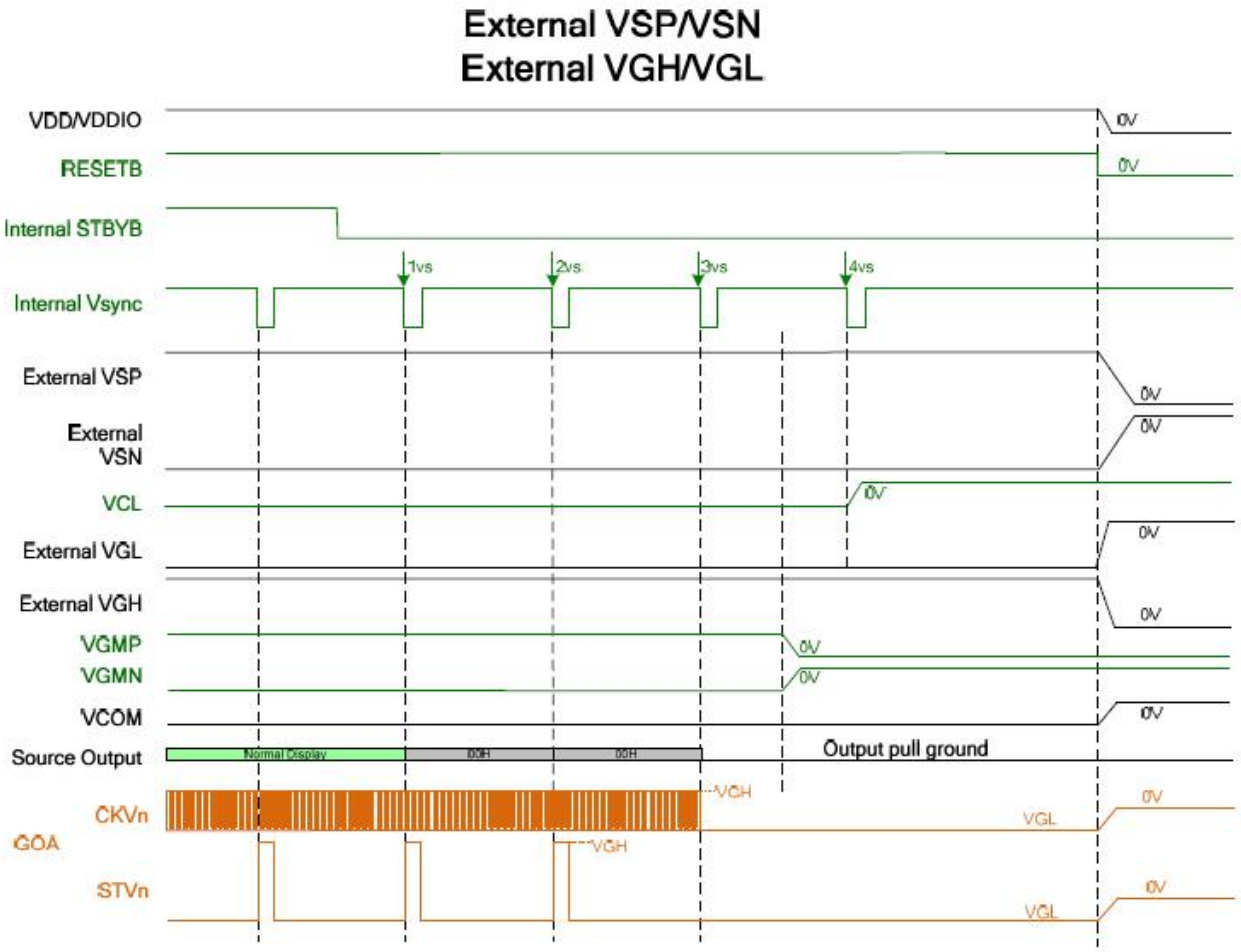
8-bit LVDS input(LVBIT=H, LVFMT=H)

5.8 Power Sequence

5.8.1 Power on Sequence



5.8.2 Power off Sequence



6 Optical Characteristics

Items		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark	Note
Response time		Tr+Tf	-	-	TBD	-	ms	FIG.1	Note4
Contrast Ratio		CR		-	TBD	-	-	FIG.2	Note1
Surface luminance		LV	θ =0°	360	400	-	cd/m2	FIG.2	Note2
Luminance uniformity		Yu	θ =0°	-	TBD	-	%	FIG.2	Note3
NTSC		-	θ =0°	-	TBD	-	%	FIG.2	Note5
Viewing angle		θ Cr>10	∅=90°	-	TBD	-	deg	FIG.3	Note6
			∅=270°	-	TBD	-	deg	FIG.3	
			∅=0°	-	TBD	-	deg	FIG.3	
			∅=180°	-	TBD	-	deg	FIG.3	
Chromaticity	Red	R_X	θ =0° ∅=0° Ta=25°	0.574	0.594	0.614	-	FIG.2 CIE1931	Note5
		R_Y		0.288	0.308	0.328	-		
	Green	G_X		0.296	0.316	0.336	-		
		G_Y		0.550	0.570	0.590	-		
	Blue	B_X		0.118	0.138	0.158	-		
		B_Y		0.133	0.153	0.173	-		
	White	W_X		0.281	0.301	0.321	-		
		W_Y		0.316	0.336	0.356	-		

Note1. Definition of contrast ratio

Contrast ratio(Cr) is defined mathematically by the following formula. For more information see FIG.2.

$$\text{Contrast ratio} = \frac{\text{Luminance measured when LCD on the “White” state}}{\text{Luminance measured when LCD on the “Black” state}}$$

For contrast ratio, Surface Luminance, Luminance uniformity and CIE,the testing data is base on TOPCON’s BM-5 or BM-7 photo detector or compatible.

Note2. Definition of surface luminance.

Surface luminance is the luminance with all pixels displaying white. For more information see FIG.2.

Lv = Average Surface Luminance with all white pixels(P1,P2,P3, ...,Pn)

Note3. Definition of luminance uniformity

The luminance uniformity in surface luminance is determined by measuring luminance at each test position 1 through n, and then dividing the maximum luminance of n points luminance by minimum luminance of n points luminance.For more information see FIG.2.

$$YU = \frac{\text{Minimum surface luminance with all white pixels (P1,P2,P3,.....,Pn)}}{\text{Maximum surface luminance with all white pixels (P1,P2,P3,.....,Pn)}}$$

Note4. Definition of response time

The response time is defined as the LCD optical switching time interval between “White” state and “Black”state.Rise time (Tr) is the time between photo detector output intensity changed from 90% to 10%. And fall time (Tf) is the time between photo detector output intensity changed from 10% to 90%.

For additional information see FIG1.

Note5. Definition of color chromaticity (CIE1931)

CIE (x,y) chromaticity,The x,y value is determined by screen active area center position P5.For more information see FIG.2.

Note6. Definition of viewing angle

Viewing angle is the angle at which the contrast ratio is greater than 10. Angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface. For more information see FIG.3.

For viewing angle and response time testing, the testing data is base on Autronic-Melchers’s ConoScope or DMS series Instruments or compatible.

FIG.1.The definition of response Time

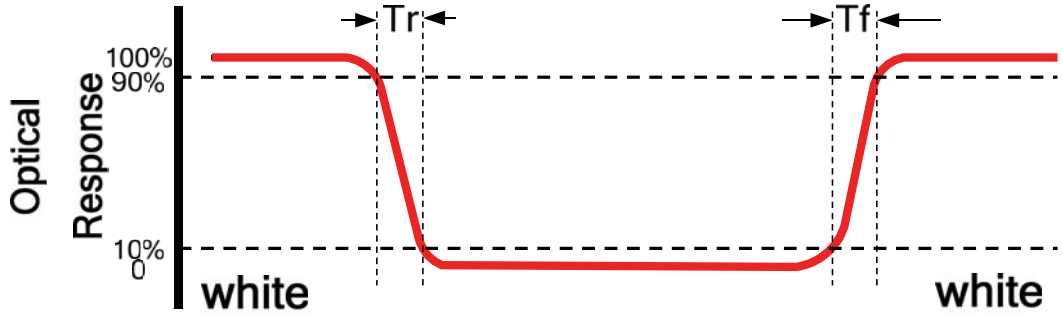


FIG.2. Measuring method for contrast ratio, surface luminance, luminance uniformity, CIE (x,y) chromaticity

Size : S≤5"(see Figure a) A : 5 mm B : 5 mm
H,V : Active area
Light spot size ∅=5mm(BM-5) or ∅=7.7mm (BM-7)50cm distance or compatible distance from the LCD surface to detector lens.
test spot position : see Figure a.
measurement instrument : TOPCON's luminance meter BM-5 or BM-7 or compatible (see Figure c).

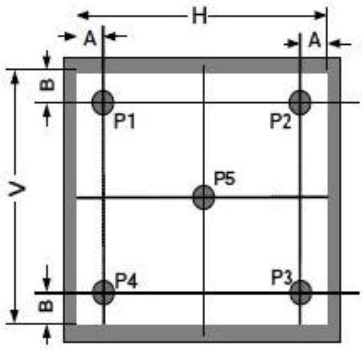


Figure a

Size : 5"＜S≤12.3"(see Figure b) H,V : Active area
Light spot size ∅=5mm(BM-5) or ∅=7.7mm (BM-7)50cm distance or compatible distance from the LCD surface to detector lens.
test spot position : see Figure b.
measurement instrument : TOPCON's luminance meter BM-5 or BM-7 or compatible (see Figure c).

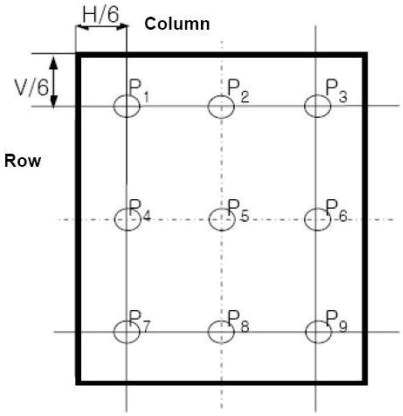


Figure b

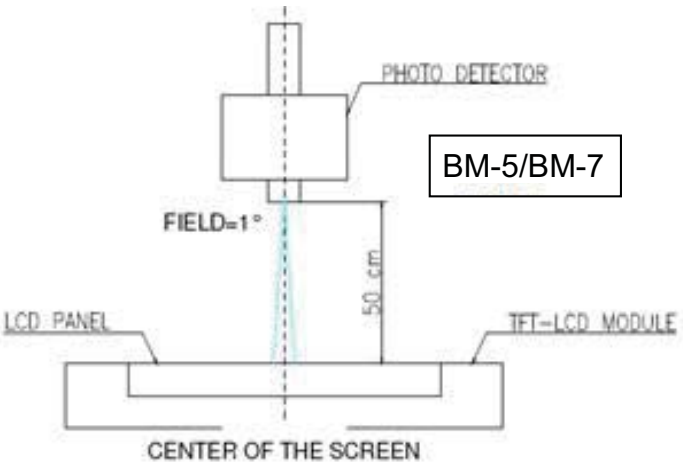
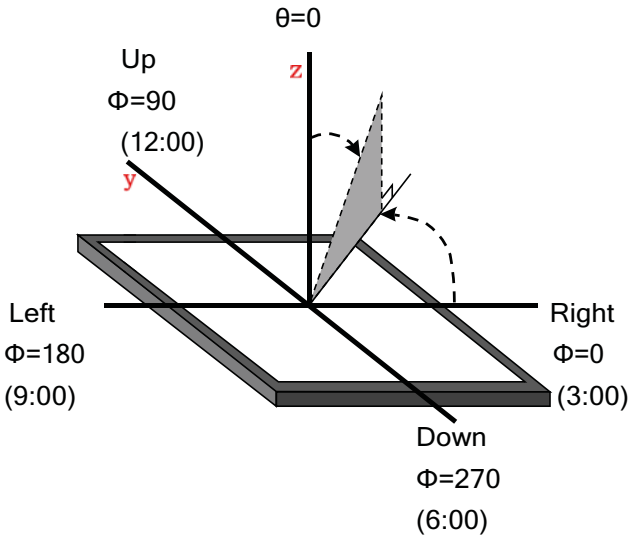


Figure c

FIG.3.The definition of viewing angle

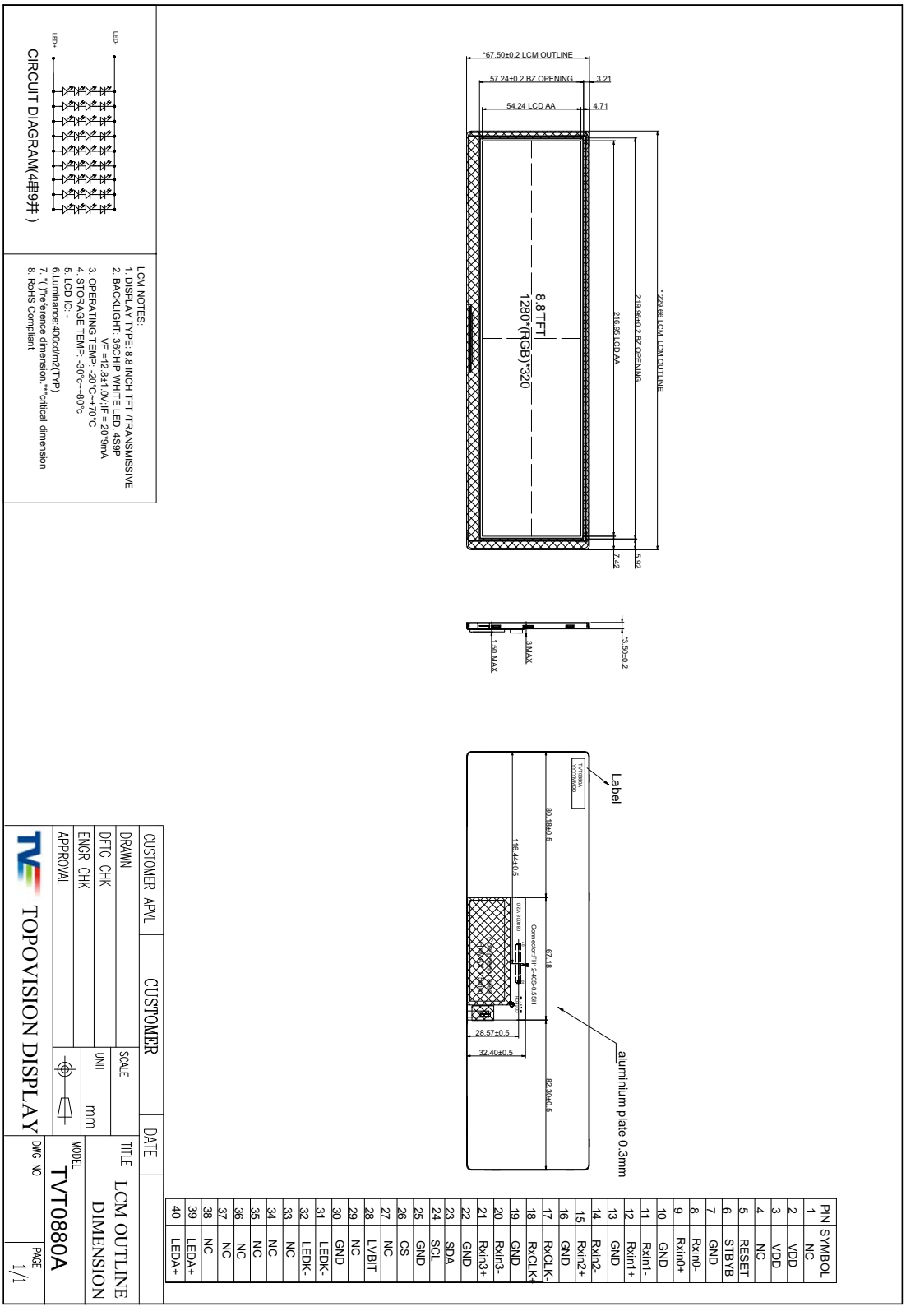


7 Environmental / Reliability Tests

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts= +70℃, 96hrs	Note 1 IEC60068-2-2, GB2423. 2-89
2	Low Temperature Operation	Ta= -20℃, 96hrs	Note 2 IEC60068-2-1 GB2423.1-89
3	High Temperature Storage	Ta= +80℃, 120hrs	IEC60068-2-2 GB2423. 2-89
4	Low Temperature Storage	Ta= -30℃, 120hrs	IEC60068-2-1 GB/T2423.1-89
5	High Temperature & Humidity Storage	Ta= +40℃, 90% RH max,120 hours	IEC60068-2-3 GB/T2423.3-2006
6	Thermal Shock (Non-operation)	-20℃ 30 min ~ +60℃ 30 min Change time: 5min, 30 Cycle	Start with cold temperature, end with high temperature IEC60068-2-14, GB2423.22-87
7	Electro Static Discharge (Operation)	C=150pF, R=330 Ω, 5 points/panel Air:±8KV, 5 times; Contact: ±4KV, 5 times; (Environment: 15℃ ~ 35℃, 30% ~ 60%, 86Kpa ~ 106Kpa)	IEC61000-4-2 GB/T17626.2-1998
8	Vibration (Non-operation)	Frequency range: 10~55Hz, Stroke: 1.mm Sweep: 10Hz~55Hz~10Hz 2 hours for each direction of X .Y. Z. (package condition)	IEC60068-2-6 GB/T2423.5-1995
9	Shock (Non-operation)	60G 6ms, ± X, ±Y , ± Z 3 times for each direction	IEC60068-2-27 GB/T2423.5-1995
10	Package Drop Test	Height: 80 cm, 1 corner, 3 edges, 6 surfaces	IEC60068-2-32 GB/T2423.8-1995

Note:1. Ts is the temperature of panel's surface.
2. Ta is the ambient temperature of sample.
3. The size of sample is 5pcs.

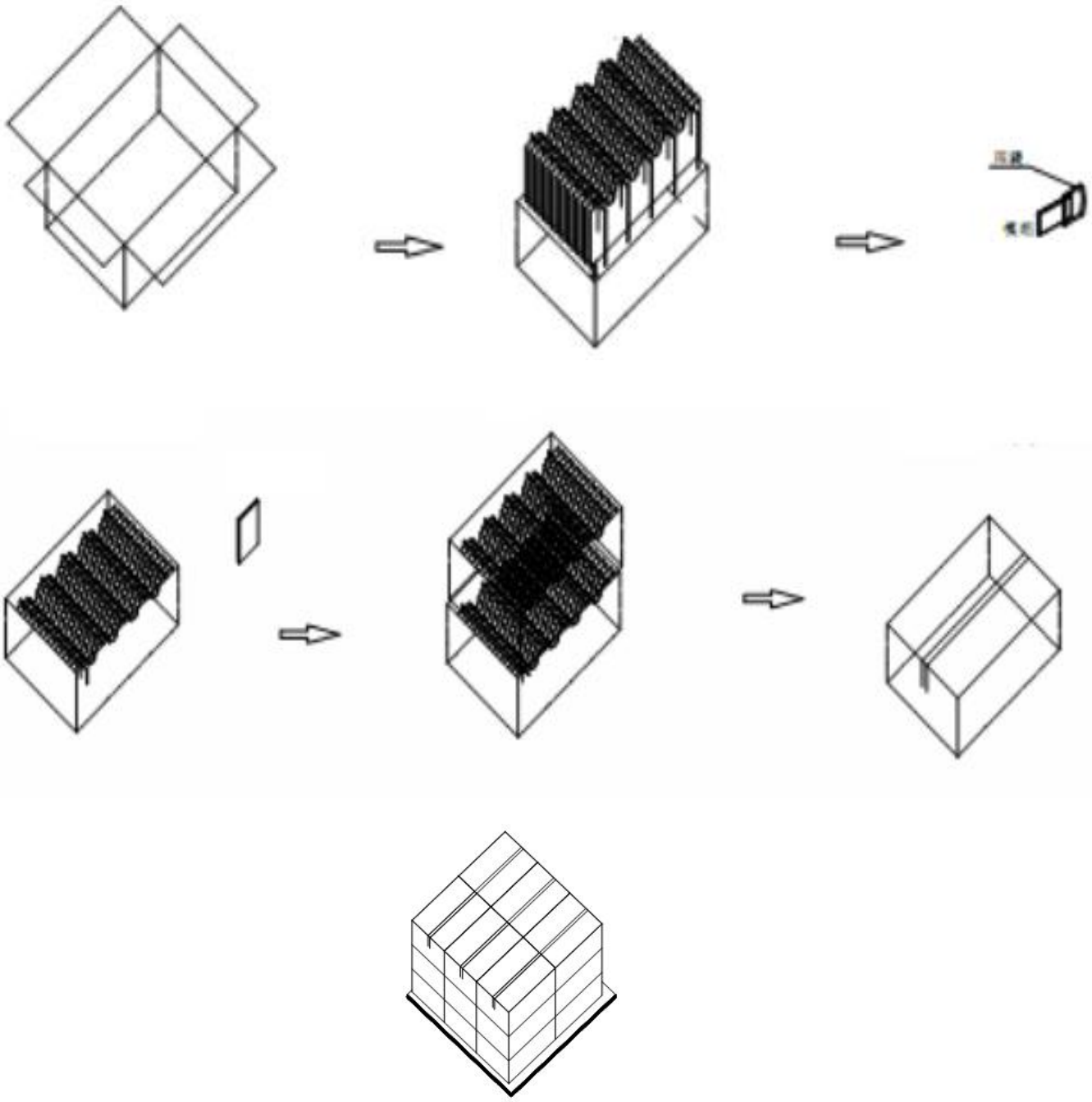
8 Mechanical Drawing



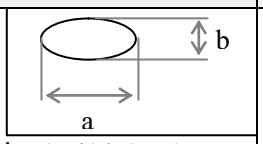
PIN	SYMBOL
1	NC
2	VDD
3	VDD
4	NC
5	RESET
6	STBYB
7	GND
8	Rxin0-
9	Rxin0+
10	GND
11	Rxin1-
12	Rxin1+
13	GND
14	Rxin2-
15	Rxin2+
16	GND
17	RxCLK-
18	RxCLK+
19	GND
20	Rxin3-
21	Rxin3+
22	GND
23	SDA
24	SCL
25	GND
26	CS
27	NC
28	LVBIT
29	NC
30	GND
31	LEDK-
32	LEDK-
33	NC
34	NC
35	NC
36	NC
37	NC
38	NC
39	LEDA+
40	LEDA+

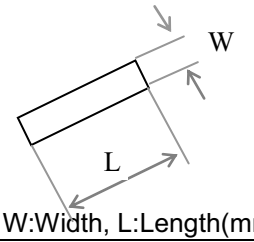
9 Packing

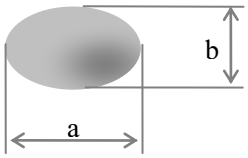
Packing Method



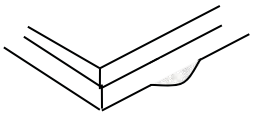
10 .TFT-LCD Module Inspection Criteria

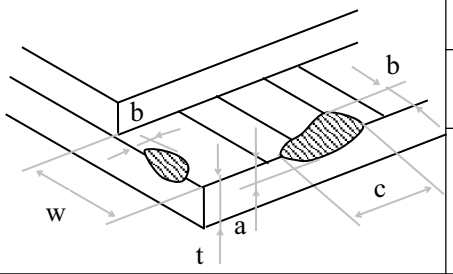
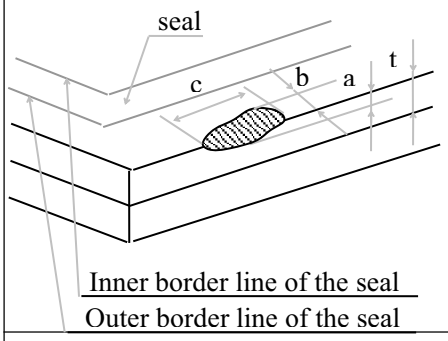
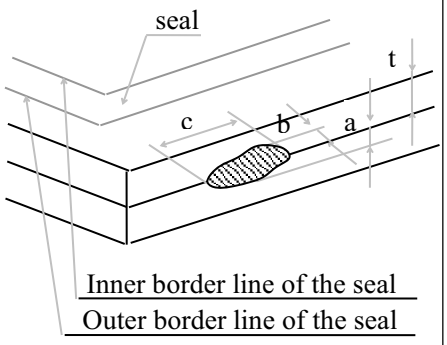
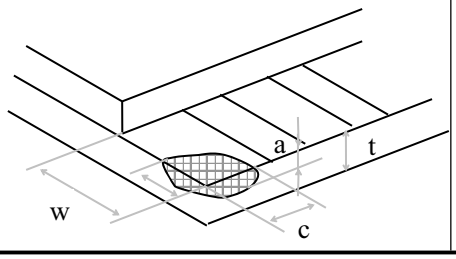
<table>
<tr><th colspan="3" rowspan="3">Inspection item</th><th colspan="3">Judgement standard</th></tr>
<tr><th colspan="2" rowspan="2">Category</th><th colspan="2">Acceptable number</th></tr>
<tr><th>A zone</th><th>B zone</th></tr>
<tr><td rowspan="6">1</td><td rowspan="5">Black spot, White spot, Bright Spot, Pinhole Foreign Particle, Bubble and Particle Between polarizer and glass, scratch on polarizer</td><td rowspan="5"> 

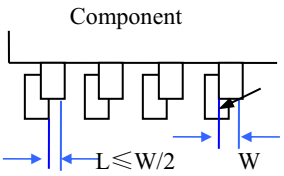
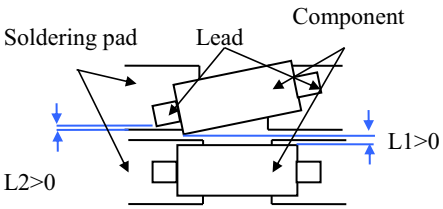
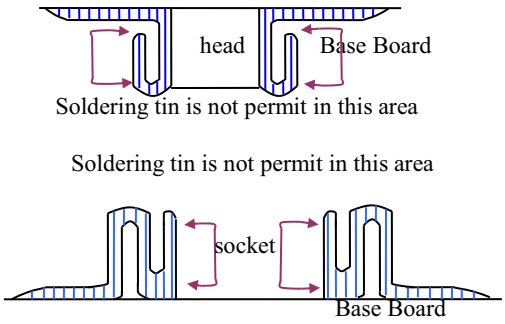
Φ=(a+b)/2(mm)</td><td>A
B
C
D</td><td>Φ≦0.15
0.15<Φ≦0.20
0.20<Φ≦0.30
0.30<Φ</td><td>Ignored
2
1
0</td><td rowspan="5">Ignored</td></tr>
<tr><td colspan="2">Total defective point(B,C)</td><td>3</td></tr>
<tr><td rowspan="5">Pixel point defect</td><td>Bright spot</td><td>0.15<Φ≦0.20</td><td>N≤0</td><td rowspan="5">Ignored</td></tr>
<tr><td>Dark spot/ Black spot</td><td>0.15<Φ≦0.20</td><td>N≤2</td></tr>
<tr><td>Attached to the two pixels are bright spots</td><td>0.15<Φ≦0.20</td><td>N≤0</td></tr>
<tr><td>Even a two pixel is dark</td><td>0.15<Φ≦0.20</td><td>N≤0</td></tr>
<tr><td>Pixel total number</td><td>0.15<Φ≦0.20</td><td>N≤2</td></tr>
<tr><td colspan="5">Note1: the spot defect caused by foreign matter is judged according to the defect of the foreign body.
Note 2: when the light is not wired to show the type of defects.</td></tr>
<tr><td>2</td><td>Black line, White line, Bubble and Particle Between Polarizer and glass, Scratch on polarizer</td><td> 

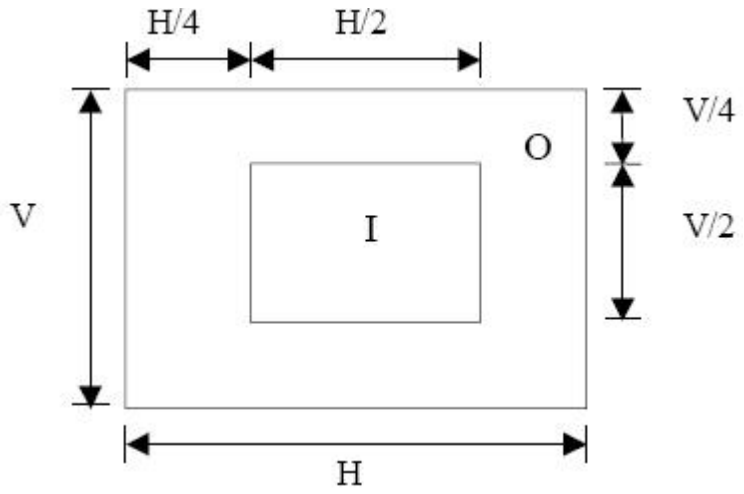
W:Width, L:Length(mm)</td><td>A
B
C
D</td><td>W≦0.01
0.01<W≦0.03 L≦3.0
0.03<W≦0.05 L≦3.0
0.05<W</td><td>Ignored
2
1
0</td><td>Ignored</td></tr>
<tr><td colspan="2">Total defective point(B,C)</td><td>2</td><td></td></tr>
<tr><td>3</td><td>Contrast variation</td><td> 

Φ=(a+b)/2(mm)</td><td>A
B
C
D</td><td>Φ≦0.2
0.2<Φ≦0.3
0.3<Φ≦0.4
0.4<Φ</td><td>Ignored
2
1
0</td><td>Ignored</td></tr>
<tr><td colspan="2">Total defective point(B,C)</td><td>3</td><td></td></tr>
<tr><td>4</td><td>Bubble inside cell</td><td></td><td colspan="2">any size</td><td>none</td><td>none</td></tr>
<tr><td rowspan="4">5</td><td rowspan="4">Polarizer defect (if Polarizer is used)</td><td>Scratch and damage on polarizer, particle on polarizer or between polarizer and glass.</td><td colspan="4">Refer to item 1 and item 2.</td></tr>
<tr><td rowspan="3">Bubble, dent and convex</td><td>A
B
C</td><td>Φ≦0.2
0.2<Φ≦0.3 distance >5
0.3<Φ</td><td>Ignored
5
0</td><td>Ignored</td></tr>
<tr><td colspan="2">Total defective point(B,C)</td><td>3</td><td></td></tr>
</table>

Inspection item		Judgement standard		
		Category	Acceptable number	
			A zone	B zone
6	Surplus glass	①Stage surplus glass 	b≦0.3mm	
		②Surrounding surplus glass 	Should not influence outline dimension and assembling.	
7	MURA	①MURA	Naked eye examination: red, green, blue screen does not allow the appearance, black screen requires visual is not obvious, the specific reference limit samples. Note: the principle of closing the sample is to be installed on the whole machine and the end user will not find it in the normal usage scenario. Inspection basis: 6%ND (MURA mainly in the black screen and indoor light is relatively dark will be found, it is recommended to turn off the indoor lighting inspection.)	
		②Point Black / White / point(MURA)	1, under the black / gray screen check: D≦0.10mm Ignored; 0.10mm<D≦0.3mm, N≦2; D>0.3mm: Unqualified。 2, switch to the red, green, blue in which any one of the screen appears black or white or point to point white or point of failure. 	

<table>
<tr><th colspan="3" rowspan="2">Inspection item</th><th colspan="2">Judgment standard</th></tr>
<tr><th colspan="2">Category(application: B zone)</th></tr>
<tr><td rowspan="5">8</td><td rowspan="5">Glass defect crack</td><td rowspan="4">①The front of lead terminals
 
</td><td>A</td><td>If a≦t and b ≦1.0, c is not limited</td></tr>
<tr><td>B</td><td>a≦t, 1≦b≦2mm, c≦3mm</td></tr>
<tr><td>C</td><td>If glass crack cover alignment mark, b≦0.5mm.</td></tr>
<tr><td>D</td><td>Crack at two sids of lead terminals should not cover patterns and alignment mark</td></tr>
<tr><td>②Surrounding crack—non-contact side
 
</td><td colspan="2">b < Inner borderline of the seal</td></tr>
<tr><td>③ Surrounding crack— contact side
 
</td><td colspan="2">b < Outer borderline of the seal</td></tr>
<tr><td>④Corner
 
</td><td>A</td><td>a ≦ t, b ≦ 3.0, c ≦ 3.0
*Glass crack should not cover patterns used for</td></tr>
</table>

Inspection item			Judgement standard
9	FPC defect	Component soldering: No cold soldering, short/open circuit, burr, tin ball. The flat encapsulation component position deviation must be less than 1/2 width of the pin (Pic.1)； The sheet component deviation: pin deviates from the pad and contact with the near components is not permitted（Pic.2）	
		lead defect: The lead lack must be less than 1/2of its width; The lead burr must be less than 1/2 of the seam; Impurities connect with the near leads is not permitted	
		Connector soldering: Soldering tin is at contact position of the plug and socket is not permitted No foundation is scald Serious cave distortion on plug and socket contact pin is not permitted	



I area & O area

Note: 1). Dot defect is defined as the defective area of the dot area is larger than 50% of the dot area.

2). The distance between two bright dot defects (red, green, blue, and white) should be larger than 15mm.

3). The distance between black dot defects or black and bright dot defects should be more than 5mm apart.

4). Polarizer bubble is defined as the bubble appears on active display area. The defect of polarizer bubble shall be ignored if the polarizer bubble appears on the outside of active display area.

10.6 Mechanics specification

As for the outside dimension, weight of the modules, please refer to product specification For more details

11. Precautions for Use of LCD modules

11.1 Handling Precautions

11.1.1. The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

11.1.2. If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.

11.1.3. Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

11.1.4. The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

11.1.5. If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:

- Isopropyl alcohol
- Ethyl alcohol

Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:

- Water
- Ketene
- Aromatic solvents

11.1.6. Do not attempt to disassemble the LCD Module.

11.1.7. If the logic circuit power is off, do not apply the input signals.

11.1.8. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

11.1.8.1. Be sure to ground the body when handling the LCD Modules.

11.1.8.2. Tools required for assembly, such as soldering irons, must be properly ground.

11.1.8.3. To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

11.1.8.4. The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

11.2 Storage Precautions

11.2.1. When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

11.2.2. The LCD modules should be stored under the storage temperature range If the LCD modules will be stored for a long time, the recommend condition is:

Temperature : 0℃ ～ 40℃ Relatively humidity: ≤80%

11.2.3. The LCD modules should be stored in the room without acid, alkali and harmful gas.

11.3 Transportation Precautions

The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.