APPROVAL SHEET
承　认　书

Customer 客户名称	
Part NO. 产品型号	BX203V114C-40P
Product type 产品内容	Mode: Tran missive type .Normally white. TFT LCD Module LCD Module: Graphic 800RGB*480Dot-matrix
Remarks 备注栏	□APPROVAL FOR SEPCIFICATIONS ONLY ■APPROVAL FOR SEPCIFICATIONS AND SAMPLE ■ USED PANNEL: BOE

Signature by Customer:
客户确认签章

Issued by	Checked by	Approved by	
		PD	QA

2. Revision Record

Date	Rev.No.	Page	Revision Items	Prepared
2021.1.18	**V0**		**The first release**	Yang

3. General Specifications

BX203V114C-40P is a TFT-LCD module. It is composed of a TFT-LCD panel, driver IC, FPC, a back light unit. The 7.0′′ display area contains 800 x 480 pixels and can display up to 16.7M colors. This product accords with RoHS environmental criterion.

Note 1: Color tune is slightly changed by temperature and driving voltage.

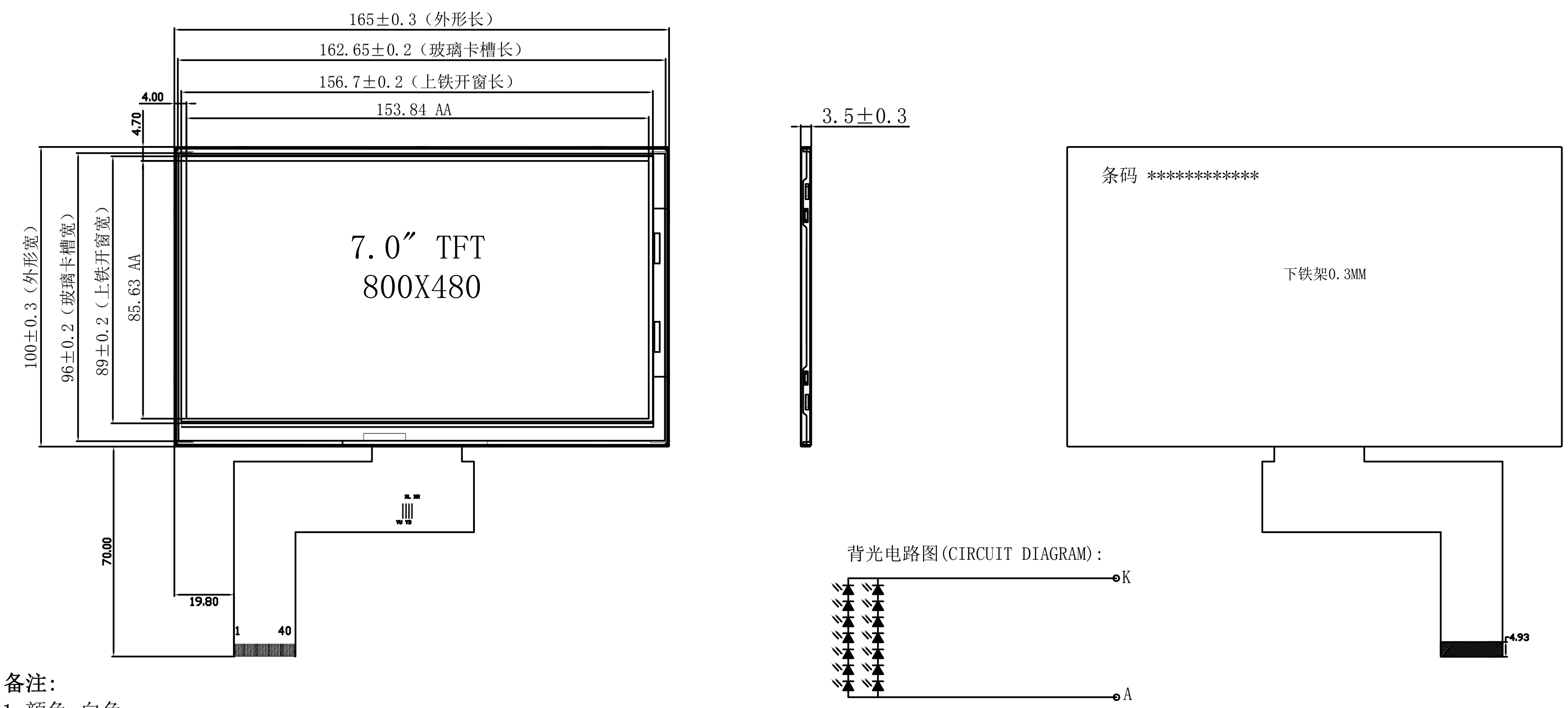
Item	Contents	Unit	Note
LCD Type	TFT	-	
Display color	16.7M		1
Viewing Direction	6	O’Clock	
Operating temperature	-20~+70	℃	
Storage temperature	-30~+80	℃	
Module size	Refer to outline drawing	mm	2
Active Area(W×H)	153.84×85.63	mm	
Number of Dots	800×RGB×480	dots	
Controller	HX8264/HX8664	-	
Power Supply Voltage	2.8	V	
Outline Dimensions	Refer to outline drawing	-	
Backlight	14-LEDs (white)	pcs	
Weight	---	g	
Data Transfer	RGB	-	

Note 2: Without FPC and Solder.

4.Outline.Drawing

第三角法		DATE 日期	2020.03.12	

REF 修改	DATE 日期	DESCRIPTION 描述	NAME 修改人



165±0.3（外形长）
162.65±0.2（玻璃卡槽长）
156.7±0.2（上铁开窗长）
153.84 AA
4.00
4.70
100±0.3（外形宽）
96±0.2（玻璃卡槽宽）
89±0.2（上铁开窗宽）
85.63 AA
7.0″ TFT
800X480
70.00
19.80
1
40
3.5±0.3
条码 ************
下铁架0.3MM
4.93
背光电路图(CIRCUIT DIAGRAM):
K
A

电路图（2并7串）

备注:
1.颜色:白色;
2.单位:mm;
3.未按比例出图;
4.⚠为更改标记;
5.标示 ☝ 请贵司确认;
6.尺寸测量方法: ⊔ ⊓ ;
7.未注尺寸公差±0.20，未注圆角R0.2;
8.( )为参考尺寸,▭为重点控制尺寸;
9.所有材料均符合"RoHS"要求。

NO.	TITLE	QUANTITY
10.	Steel BOX（铁框）	2
9.	REFLECTIVE（反射贴布）	1
8.	THIN BEF-L（下增光膜）	1
7.	THIN BEF-U（上增光膜）	1
6.	DIFFUSER TAPE（扩散贴布）	1
5.	PCB（电路板）	1
4.	FPC（软基板）	1
3.	LIHGT GUIDE（导光板）	1
2.	HOUSING（胶框）	1
1.	SMD LED(020)	18

项目 Item		符号 Symbol	Min	Typ	Max	单位 Unit	测试条件 Condition
正向电压 Forward Voltage		Vf	21.0	21.6	22.2	V	If= 40 mA
反向电流 Reverse Current		Ir	══	══	15*10	uA	Vr= 5 V
色坐标 C I E	X		0.25	--	0.315	══	If= 40 mA
	Y		0.25	--	0.315		
亮度(透过LCD) Luminance		Lv		--	══	cd/m²	
均匀性 Uniformity		Δ	80	--	══	%	
工作温度 Operating Temperature		Topr	-20	══	70	?	══
存储温度 Storage Temperature		Tstg	-30	══	80	?	══

CUSTOMER'S NAME 客户名称	CUSTOMER'S CODE 客户编号	EDITION 版本
BRT.CODE 产品编号	PRODUCT.CODE 产品编号	EDITION 版本
		A
DESIGN 设计	CHECK 审核	REVIEW 确认
杨洋		

＊ 注意保存,保存条件不好时,会降低反射膜(扩散膜)与导光板(胶框）的粘附力;推荐保存条件为:温度: 25° C±10° C,湿度:65%RH±20%RH.

5. Absolute Maximum Ratings(Ta=25℃)

5.1 Electrical Absolute Maximum Ratings.(Vss=0V ,Ta=25℃)

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	V_{CC}	-0.3	3.6	V	1，2
Logic Signal Input /Output Voltage	V_{IOVCC}	-0.3	V_{CC}+0.5	V	
Power Supply Voltage for LCD	Vop	0	2.8	V	
Current of LED	ILED	0	40	mA	

Notes:

1. If the module is above these absolute maximum ratings. It may become permanently damaged. Using the module within the following electrical characteristic conditions are also exceeded, the module will malfunction and cause poor reliability.
2. V_{CC} >V_{SS} must be maintained.
3. Please be sure users are grounded when handing LCD Module.

5.2 Environmental Absolute Maximum Ratings.

Item	Storage		Operating		Note
	MIN.	MAX.	MIN.	MAX.	
Ambient Temperature	-30℃	80℃	-20℃	70℃	1,2
Humidity	-	-	-	-	3

1. The response time will become lower when operated at low temperature.
2. Background color changes slightly depending on ambient temperature.

   The phenomenon is reversible.
3. Ta<=40℃:85%RH MAX.

   Ta>=40℃:Absolute humidity must be lower than the humidity of 85%RH at 40℃.

6. Electrical Specifications and Instruction Code

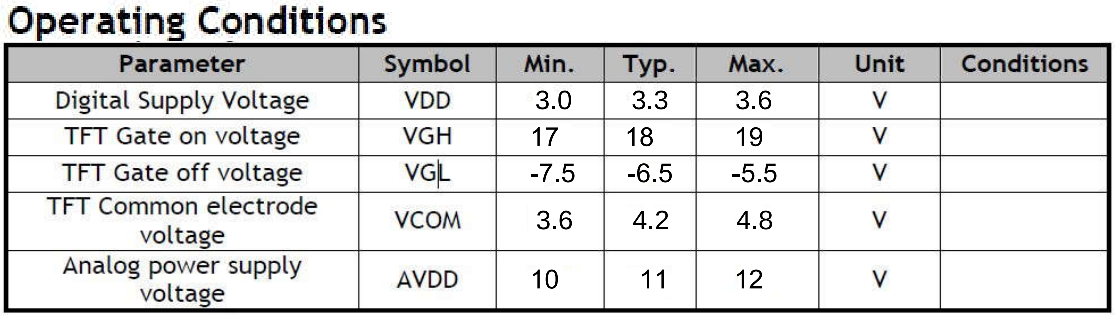
6.1 Electrical characteristics(Vss=0V ,Ta=25℃)

Parameter		Symbol	Condition	Min	Typ	Max	Unit	Note
Power supply		VCC	Ta=25℃	2.6	2.8	3.6	V	
Input voltage	‘H’	V_{IH}	V_{CC}=2.8V	0.8V_{CC}	-	V_{CC}	V	
	‘L’	V_{IL}	V_{CC}=2.8V	0	-	0.2V_{CC}	V	
Current Consumption		I_{CC1}	Normal mode	-	-	-	mA	2
		I_{CC2}	Sleep mode	-	0.03	0.09	mA	2
Clock Frequency		fCLK	-	-	-	-	MHz	

Note:

1:When an optimum contrast is obtained in transmissive mode.

2: Tested in 1×1 chessboard pattern.



Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Digital Supply Voltage	VDD	3.0	3.3	3.6	V	
TFT Gate on voltage	VGH	17	18	19	V	
TFT Gate off voltage	VGL	-7.5	-6.5	-5.5	V	
TFT Common electrode voltage	VCOM	3.6	4.2	4.8	V	
Analog power supply voltage	AVDD	10	11	12	V	

6.2 LED backlight specification(VSS=0V ,Ta=25℃)

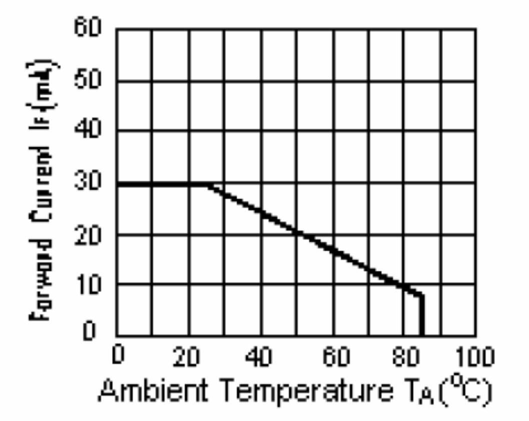
Item		Symbol	Condition	Min	Typ	Max	Unit	Note
Supply voltage		-	-	-	21	-	V	1
Supply current		I_f	-	-	40	-	mA	2
Forward current	Normal	I_{pn}	7-chip series x 2	-	40	-	mA	
	Dimming	I_{pd}		-	-	-		

Note:

1: VLED=VLED(+)-VLED(-).

2:The current of LED is 20mA.
A LED drive in constant current mode is recommended.

3: LED power consumption is around 0.297W.



CIRCUIT DIAGRAM

ILED VS TEMP

6.3 Interface signals

Pin No.	Symbol	Function
1	LED_K	Backlight LED Ground
2	LED_A	Backlight LED Power
3	GND	GND
4	VDD	Power supply
5-12	R0-R7	Red data bus
13-20	G0-G7	Green data bus
21-28	B0-B7	Blue data bus
29	GND	GND
30	PCLK	Data clock
31	DISP	Standby mode select pin
32	HSYNC	Line SYNC signal
33	VSYNC	Frame SYNC signal
34	DE	Data Enable Input
35	NC	NC
36	GND	GND
37	X1	Touch Panel Control Pin
38	Y1	
39	X2	
40	Y2	

7. Optical Characteristics

Item	Symbol	**Condition**	Min.	Typ.	Max.	Unit	Note
Brightness	Bp	θ=0° Φ=0°	-	350	-	Cd/m^2	1
Uniformity	⊿Bp		75	80	-	%	1,2
Viewing	3:00	Cr≥10	-	75	-	Deg	3

Angle	6:00			-	75	-		
	9:00			-	75	-		
	12:00			-	70	-		
Contrast Ratio	Cr		θ=0° Φ=0°	400	500		-	4
Response Time	T_r			-	25	-	ms	5
	T_f			-	-	-	ms	
Color of CIE Coordinate	W	x	θ=0° Φ=0°	0.294	0.304	0.314	-	1,6
		y		0.329	0.339	0.349	-	
		Y		-	-	-		
	R	x		0.586	0.601	0.616	-	
		y		0.309	0.324	0.339	-	
		Y		-	-	-		
	G	x		0.291	0.301	0.311	-	
		y		0.552	0.567	0.582	-	
		Y		-	-	-		
	B	x		0.133	0.143	0.153	-	
		y		0.159	0.174	0.189	-	
		Y		-	-	-		
NTSC Ratio	S			-	50	-	%	

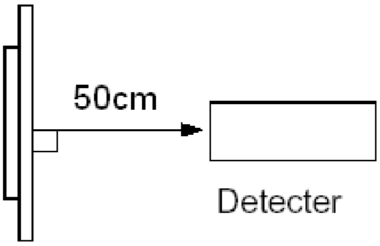
Note：The parameter is slightly changed by temperature, driving voltage and materiel

Note 1: The data are measured after LEDs are turned on for 5 minutes. LCM displays full white. The brightness is the average value of 9 measured spots. Measurement equipment PR-705 (Φ8mm)

Measuring condition:

- Measuring surroundings: Dark room.
- Measuring temperature: Ta=25℃.
- Adjust operating voltage to get optimum contrast at the center of the display.

Measured value at the center point of LCD panel after more than 5 minutes while backlight turning on.

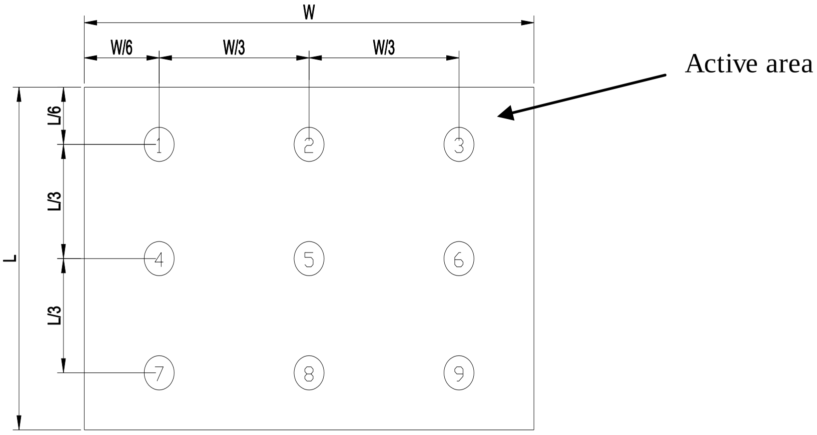

50cm
Detecter

Note 2: The luminance uniformity is calculated by using following formula.

⊿Bp = Bp (Min.) / Bp (Max.)×100 (%)

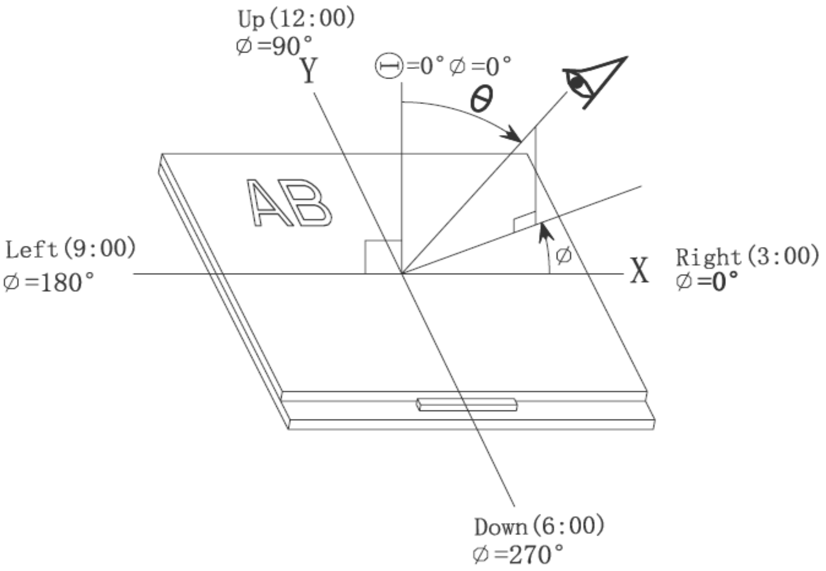
Bp (Max.) = Maximum brightness in 9 measured spots

Bp (Min.) = Minimum brightness in 9 measured spots.

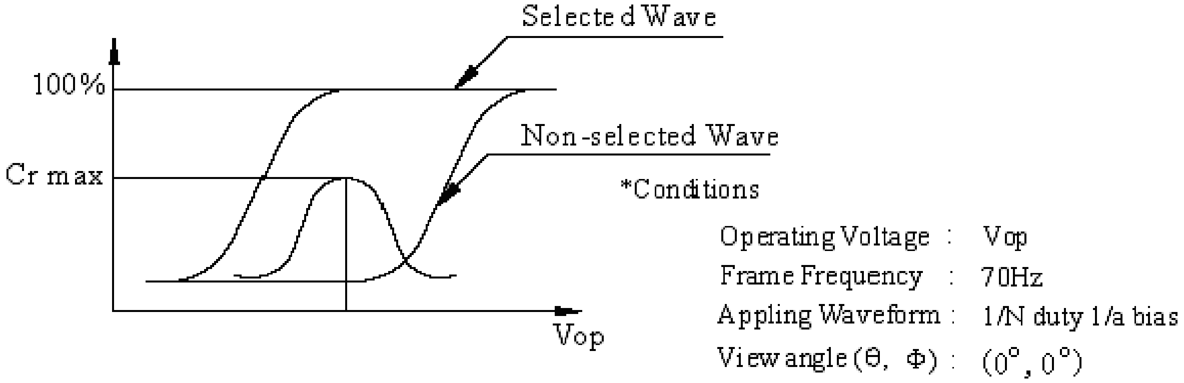

W
W/6
W/3
W/3
L/6
L/3
L/3
L
①
②
③
④
⑤
⑥
⑦
⑧
⑨
Active area

Note 3: The definition of viewing angle:

Refer to the graph below marked by *θ* and *Φ*


Up (12:00)
∅=90°
Y
Θ=0° ∅=0°
θ
AB
Left (9:00)
∅=180°
∅
X
Right (3:00)
∅=0°
Down (6:00)
∅=270°

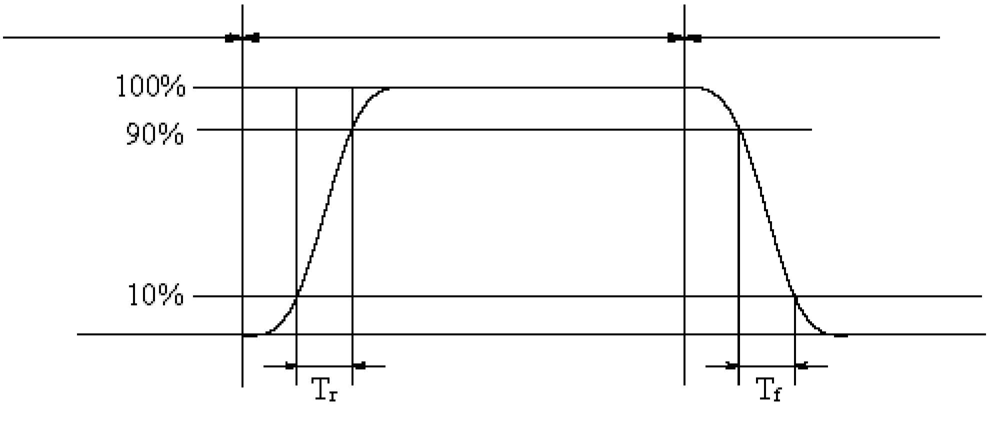
Note 4: Definition of contrast ratio.(Test LCD using DMS501)


Selected Wave
100%
Cr max
Non-selected Wave
Vop
*Conditions
Operating Voltage : Vop
Frame Frequency : 70Hz
Appling Waveform : 1/N duty 1/a bias
View angle (θ, Φ) : (0°, 0°)

$$\text{Contrast ratio}(Cr) = \frac{\text{Brightness of selected dots}}{\text{Brightness of non-selected dots}}$$

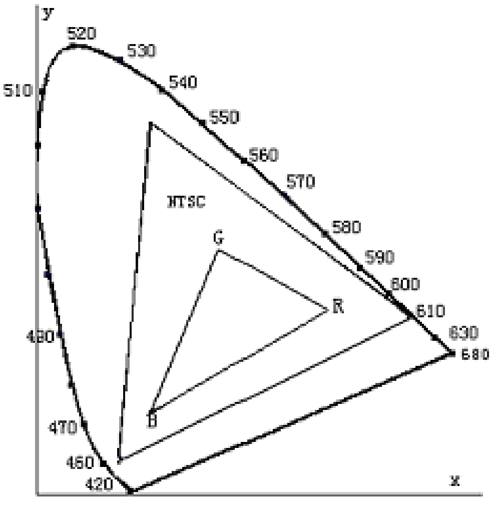
Note 5: Definition of Response time. (Test LCD using DMS501):

The output signals of photo detector are measured when the input signals are changed from “black” to “white”(falling time) and from “white” to “black”(rising time), respectively. The response time is defined as the time interval between the 10% and 90% of amplitudes.Refer to figure as below.


100%
90%
10%
Tr
Tf

The definition of response time

Note 6: Definition of Color of CIE Coordinate and NTSC Ratio.



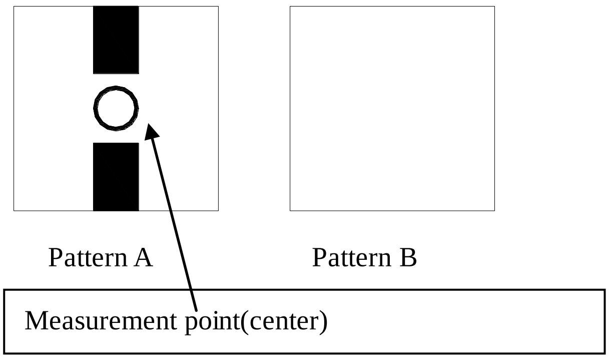
1931 CIE Chromaticity Diagram

Color gamut:

$$S = \frac{\text{area of RGB triangle}}{\text{area of NTSC triangle}} \times 100\%$$

Note 7: Definition of cross talk.

Cross talk ratio(%)=|pattern A Brightness-pattern B Brightness|/pattern A Brightness*100



Electric volume value=3F+/-3Hex

8. Reliability Test Items and Criteria

No	Test Item	Test condition	Criterion
1	High Temperature Storage	80℃±2℃ 96H Restore 2H at 25℃ Power off	1. After testing, cosmetic and electrical defects should not happen. 2. Total current consumption should not be more than twice of initial value.
2	Low Temperature Storage	-30℃±2℃ 96H Restore 2H at 25℃ Power off	
3	High Temperature Operation	70℃±2℃ 96H Restore 2H at 25℃ Power on	
4	Low Temperature Operation	-20℃±2℃ 96H Restore 4H at 25℃ Power on	

5	High Temperature/Humidity Operation	60℃±2℃ 90%RH 96H Power on	
6	Temperature Cycle	-30℃ ←——→ 80℃ 30min 5min 30min after 5 cycle, Restore 2H at 25℃ Power off	
7	Vibration Test	10Hz~150Hz, 100m/s^2, 120min	Not allowed cosmetic and electrical defects.
8	Shock Test	Half- sine wave,300m/s^2,11ms	
9	ESD Test	Air discharge:+/-8KV, Contact discharge:4KV	

Note: Operation: Supply 2.8V for logic system.

The inspection terms after reliability test, as below

ITEM	Inspection
Contrast	CR>50%
IDD	IDD<200%
Brightness	Brightness>60%
Color Tone	Color Tone+/-0,05

9 Quality level

9.1 Classification of defects

Major defects (MA): A major defect refers to a defect that may substantially degrade usability for product applications, including all functional defects(such as no display, abnormal display, open or missing segment, short circuit, missing component), outline dimension beyond the drawing, progressive defects and those affecting reliability.

Minor defects (MI): A minor defect refers to a defect which is not considered to be able to substantially degrade the product application or a defect that deviates from existing standards almost unrelated to the effective use of the product or its operation, such as black spot, white spot, bright spot, pinhole, black line, white line, contrast variation, glass defect, polarizer defect, etc.

9.2 Definition of inspection range

For dot defect of TFT LCD which is not smaller than 3 inches, dividing three areas to make a judgment (according to figure 1).

A area : center of viewing area

B area : periphery of viewing area

C area : Outside viewing area

For other defects, dividing two areas to make a judgment (according figure 2).

A zone : Inside Viewing area

B zone : Outside Viewing area

X1(A.A~V.A): 2mm X2(A.A~V.A): 2mm

Y1(A.A~V.A): 2mm Y2(A.A~V.A): 2mm

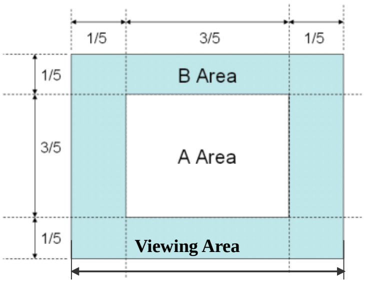


Figure 1

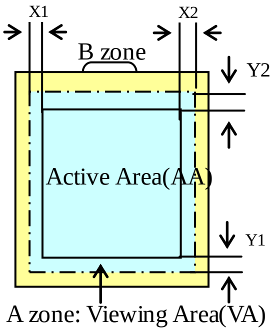


Figure 2

9.3 Inspection items and general notes

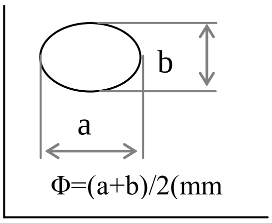
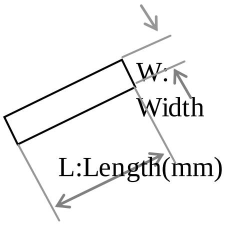
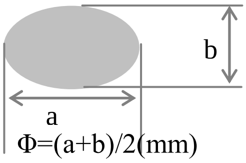
General notes	1.Should any defects which are not specified in this standard happen, additional standard shall be determined by mutual agreement between customer and TIANMA. 2.Viewing area should be the area which TIANMA guarantees. 3.Limit sample should be prior to this Inspection standard. 4.Viewing judgment should be under static pattern. 5.Inspection conditions Inspection distance: 250 mm (from the sample) Temperature : 25±5 ºC Inspection angle : 45 degrees in 6 o′clock direction (all defects in viewing area should be inspected from this direction)	
Inspection items	Pinhole, Bright spot, Black spot, White spot, Black line, White Line, Foreign particle, Bubble	The color of a small area is different from the remainder. The phenomenon doesn't change with voltage
	Contrast variation	The color of a small area is different from the remainder. The phenomenon changes with voltage
	Polarizer defect	Scratch, Dirt, Particle, Bubble on polarizer or between polarizer and glass
	Dot defect (TFT LCD)	The pixel appears bright or dark abnormally when display
	Functional defect	No display, Abnormal display, Open or missing segment, Short circuit, False viewing direction
	Glass defect	Glass crack, Shaved corner of glass, Surplus glass
	PCB defect	Components assembly defect

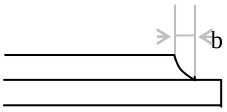
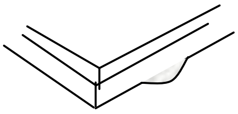
9.4 Outgoing Inspection level

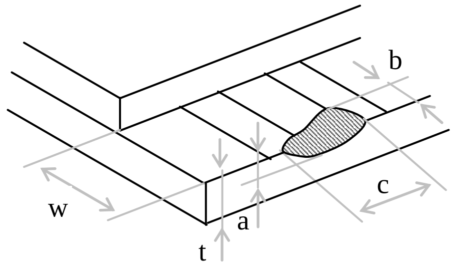
Outgoing Inspection standard	Inspection conditions	Inspection				
		Min.	Max.	Unit	IL	AQL
Major Defects	See 8.3 general notes	See 8.5			II	0.065

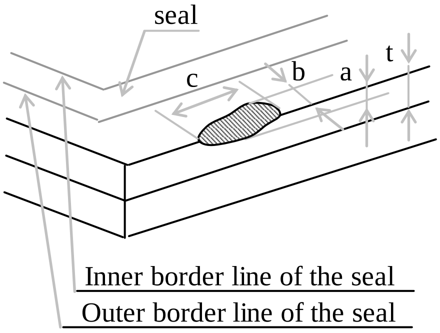
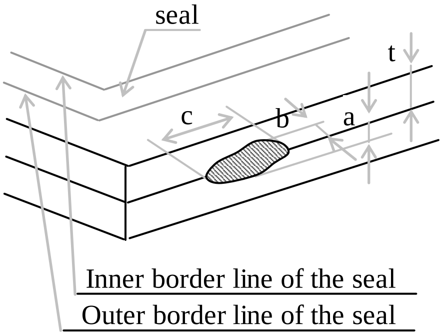
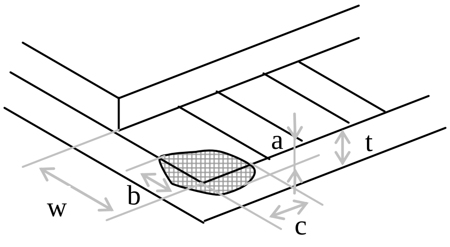
Minor Defects	See 8.3 general notes	See 8.5	II	0.065
Note：Sampling standard conforms to GB2828				

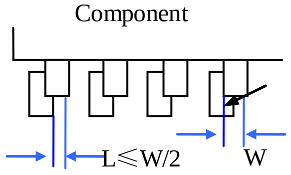
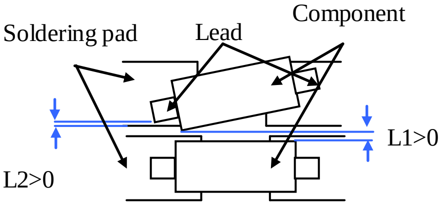
9.5 Inspection Items and Criteria

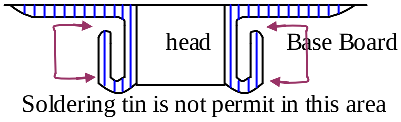
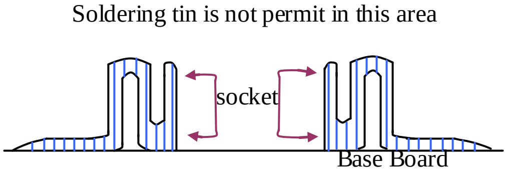
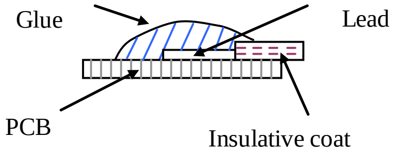
Inspection items			Judgment standard			
			Category		Acceptable number	
					A zone	B zone
1	Black spot, White spot, Pinhole, Foreign Particle, Particle in or on glass, Scratch on glass		A	Φ<=0.10	Neglected	Neglected
			B	0.10<Φ<=0.15	2	
			C	0.15<Φ<=0.2	1	
			D	0.2<Φ	0	
			Total defective point(B,C)		1	
2	Black line, White line, and Particle Between Polarizer and glass, Scratch on glass		A	W<=0.02	Neglected	Neglected
			B	0.02<W<=0.03 L<=1.0	1	
			C	0.03<W<=0.05 L>1.0	0	
			D	0.05<W, 1.0<L	0	
			Total defective point(B,C)		1	
3	Bright spot		any size		none	none
4	Contrast variation		A	Φ<0.2	Neglected	Neglected
			B	0.2<Φ<=0.3	2	
			C	0.3<Φ<=0.4	1	
			D	0.4<Φ	0	
			Total defective point(B,C)		3	
5	Bubble inside cell		any size		none	none
6	Polarizer defect (if Polarizer is used)	Scratch ,damage on polarizer, Particle on polarizer or between polarizer and glass.	Refer to item 1 and item 2.			
		Bubble, dent and convex	A	Φ<=0.1	Neglected	Neglected

			B	0.1 <Φ<=0.2	1	
			C	0.2 <Φ	0	
7	Surplus glass	Stage surplus glass  	B<=0.3mm			
		Surrounding surplus glass 	Should not influence outline dimension and assembling.			
8	Open segment or open common		Not permitted			
9	Short circuit		Not permitted			
10	False viewing direction		Not permitted			
11	Contrast ratio uneven		According to the limit specimen			
12	Crosstalk		According to the limit specimen			
13	Black /White spot(display)		Refer to item 1			
14	Black /White line(display)		Refer to item 2			

Inspection items			Judgment standard		
			Category(application: B zone)		Acceptable number
15	Glass defect crack	i ）The front of lead terminals  	A	a≤ t, b≤1/5W, c≤3mm	Max.3 defects allowed
			B	Crack at two sides of lead terminals should not cover patterns and alignment mark	

		ii) Surrounding crack−non-contact side  seal c b a t Inner border line of the seal Outer border line of the seal	b < Inner borderline of the seal		
		iii）Surrounding crack− contact side  seal t c b a Inner border line of the seal Outer border line of the seal	b < Outer borderline of the seal		
		iv) Corner 	A	a <= t, b <= 3.0, c <= 3.0	
			B	Glass crack should not cover patterns u and alignment mark and patterns.	

Inspection items			Judgment standard
			Category(application: B zone)
16	PCB defect	Component soldering: No cold soldering、short、open circuit、burr、tin ball The flat encapsulation component position deviation must be less than 1/3 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）	 Component L≤W/2 W  Component Soldering pad Lead L1>0 L2>0

		lead defect: The lead lack must be less than 1/3 of its width; The lead burr must be less than 1/3 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	 head Base Board Soldering tin is not permit in this area Soldering tin is not permit in this area socket Base Board
		Glue on root of the speaker receiver and motor lead: The insulative coat of the lead must join into the PCB; the protected glue must envelop to the insulative coat.	 Glue Lead PCB Insulative coat

10. Precautions for Use of LCD Modules

10.1 Handling Precautions

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

10.1.2 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.

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

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

10.1.5 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

— Ketone

— Aromatic solvents

10.1.6 Do not attempt to disassemble the LCD Module.

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

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

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

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

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

d. 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.

10.2 Storage precautions

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

10.2.2 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%