深 圳 市 艾 斯 迪 科 技 有 限 公 司

LCDGO TECHNOLOGY Co.,Ltd

PRODUCT SPECIFICATIONS

For Customer:_____ ☐ : APPROVAL FOR SPECIFICATION

Customer Model No._____ ☐ : APPROVAL FOR SAMPLE

Module No.: Date : 2019.05.24

Version :1

Table of Contents

For Customer's Acceptance:

Approved By	Comment

PREPARED	CHECKED	VERIFIED BY QA DEPT	VERIFIED BY R&D DEPT

2. Revision Record

Date	Rev.No.	Page	Revision Items	Prepared
2019.05.24	**V1**		**The first release**	**YANG**

3. General Specifications

LCDT1011920M40 is a TFT-LCD module. It is composed of a TFT-LCD panel, driver IC, FPC, a back light unit. The 10.1″ display area contains 1200 x 1920 pixels and can display up to 16.7M colors. This product accords with RoHS environmental criterion.

Item	Contents	Unit	Note
LCD Type	TFT	-	
Display color	16.7M		1
Viewing Direction	IPS	O'Clock	
Operating temperature	-0~+50	℃	
Storage temperature	-20~+60	℃	
Module size	Refer to outline drawing	mm	2
Active Area(W×H)	135.36 x 216.58	mm	
Number of Dots	1200×RGB×1920	dots	
Outline Dimensions	Refer to outline drawing	-	
Backlight	32-LEDs (white)	pcs	
Weight	---	g	
Data Transfer	MIPI	-	

Note 1: Color tune is slightly changed by temperature and driving voltage.
Note 2: Without FPC and Solder.

4.Outline.Drawing

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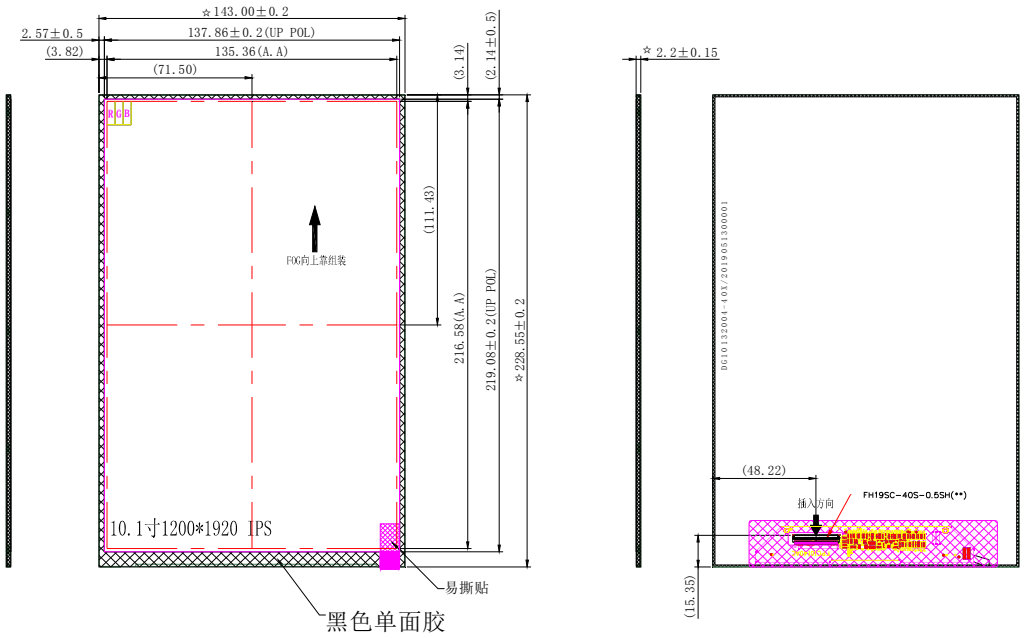
模 组 图

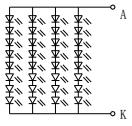
DIMENSIONAL TOLERANCE(±) 尺寸范围(±)						
公差等级	0 ~ 5	5 ~ 15	15 ~ 60	60 ~ 150	150 ~ 300	300 ~ 630
☐ A	0.05	0.10	0.15	0.20	0.25	0.30
☑ B	0.10	0.15	0.20	0.25	0.30	0.35
UNLESS OTHERWISE SPECIFIED 没指定尺寸						



BOM-7测试

参数	SYMBOL	MIN	TYP	MAX	单位	备注
中心点亮度	Iv ■ LCM	230	250		cd/m2	
	Iv ■ LCM				LUX	IF=90mA
背光色坐标范围	X					
	Y					
模组色坐标范围	X	0.260	0.310	0.360		
	Y	0.280	0.330	0.380		
驱动电压	VF	23.2	24.8	26.4	V	
反向电流	IR			50	uA	VR=10V, ※1
均匀性	Iv-m	75	80		%	(min/max)*100
最大额定功率				1260	mW	

电路原理图:



8*4=32PCS

驱动电流：90mA

REVSION 版 本	A0	☑ 正式规格 ☐ 临时规格	REVISE 修订人	MODEL NO 产品料号	APPROVED BY 批 准	CHECKED BY 审 核	DRAWN BY 绘 图
DATE 日 期	2019-05-13		曹岸霖	LCDT1011920M40			
PAGE 頁 碼	2/3						

5.Pin Assignment

SYMBOL	PIN	I/O	DISCRIPTION
NC	1	-	-
VDD	2	P	Power supply for digital block (+3.3V)
VDD	3	P	Power supply for digital block (+3.3V)
GND	4	I	Ground
RESET	5	I	**Global reset pin. Active Low to enter Reset State**.(3.3v)
NC	6	-	-
GND	7	P	Ground
D0N	8	I	Negative MIPI differential Data Input 0
D0P	9	I	Positive MIPI differential Data Input 0
GND	10	P	Ground
D1N	11	I	Negative MIPI differential Data Input 1
D1P	12	I	Positive MIPI differential Data Input 1
GND	13	P	Ground
DCLKN	14	I	Negative MIPI differential Clock Input
DCLKP	15	I	Positive MIPI differential Clock Input
GND	16	P	Ground
D2N	17	I	Negative MIPI differential Data Input 2
D2P	18	I	Positive MIPI differential Data Input 2
GND	19	P	Ground
D3N	20	I	Negative MIPI differential Data Input 3
D3P	21	I	Positive MIPI differential Data Input 3
GND	22	P	Ground
NC	23	-	No Connection
NC	24	-	No Connection
GND	25	P	Ground
NC	26	I	No Connection
PWM	27	O	
NC	28	I	No Connection
NC	29	I	No Connection
GND	30	P	Ground
LED-	31	P	Backlight LED Cathode input pin (-)
LED-	32	P	
NC	33	I	No Connection
NC	34	I	No Connection
NC	35	P	No Connection

NC	36	I	No Connection
NC	37	I	No Connection
NC	38	P	No Connection
LED+	39	P	Backlight LED Anode input pin (+)
LED+	40	P	

6. Absolute Maximum Ratings(Ta=25℃)

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

Item	Symbol	Min.	Typ.	Max	Unit	Note
Power Supply Voltage	V_{DD}	-0.3	3.3	3.6	V	1，2
	AVDD				V	
	VGH				V	
	VGL				V	
	VCOM				V	
Logic Signal Input	V_{IO}	-0.3	3.3	3.6	V	
Current of LED	ILED	0	90	94	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.

6.2 Environmental Absolute Maximum Ratings.

Item	Storage		Operating		Note
	MIN.	MAX.	MIN.	MAX.	
Ambient Temperature	-20℃	60℃	-0℃	50℃	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℃.

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

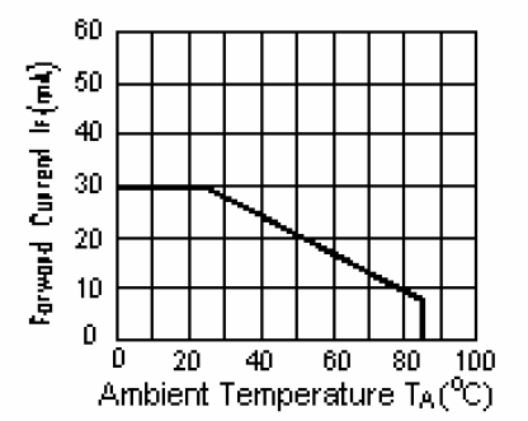
Item		Symbol	Condition	Min	Typ	Max	Unit	Note
Supply voltage		-	-	-	24.8	-	V	1
Supply current		I_f	-	-	90	-	mA	2
Forward current	Normal	I_{pn}	8-chip series x 4	-	-	-	mA	
	Dimming	I_{pd}		-	-	-		

Note:1: $V_{LED}=V_{LED}(+)-V_{LED}(-)$.

2:The current of LED is 20mA.

A LED drive in constant current mode is recommended.

3: LED power consumption is around 2.232W.



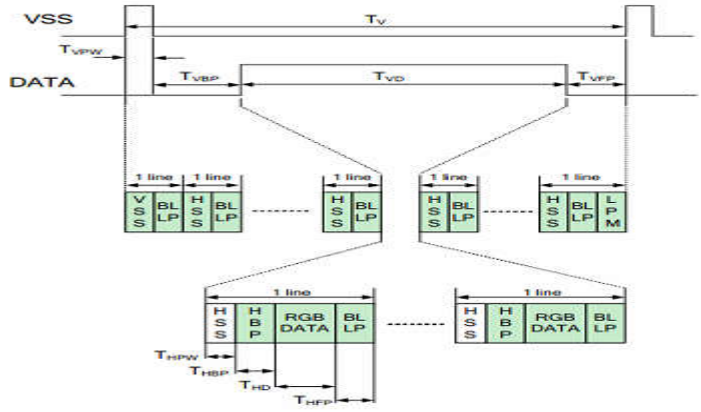
CIRCUIT DIAGRAM

I_{LED} VS TEMP

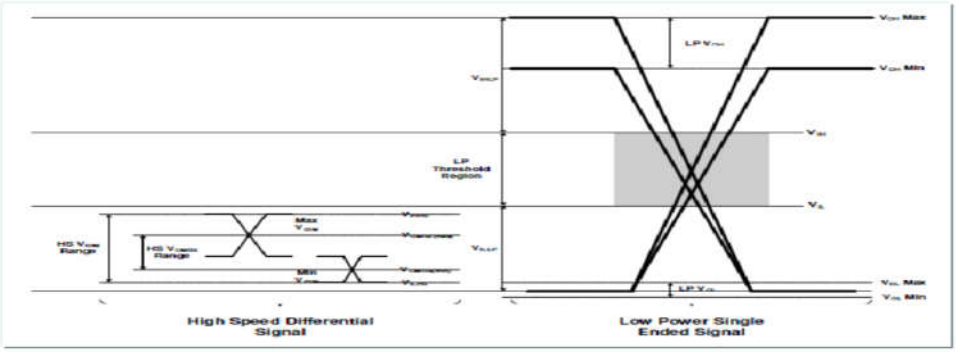
8. SIGNAL TIMING SPECIFICATION

8.1 Signal timing

Parameter	Symbol	Min.	Typ.	Max.	Unit
MIPI data frequency	F_{DATA}	955	999	1000	Mbps
Horizontal display area	T_{HD}		1200		pixel
Hsync period time	T_H	1275	1341	1342	pixel
Hsync pulse width	T_{HPW}	1	1	1	pixel
Hsync back porch	T_{HBP}	32	60	60	pixel
Hsync front porch	T_{HFP}	42	80	81	pixel
Vertical display area	T_{VD}		1920		H
Vsync period time	T_V	1981	1981	1982	H
Vsync pulse width	T_{VPW}	1	1	1	H
Vsync back porch	T_{VBP}		25		H
Vsync front porch	T_{VFP}	35	35	36	H



8.2 MIPI Rx Interface Timing Parameter The specification of the LVDS Rx interface timing parameter is shown in Table 8.

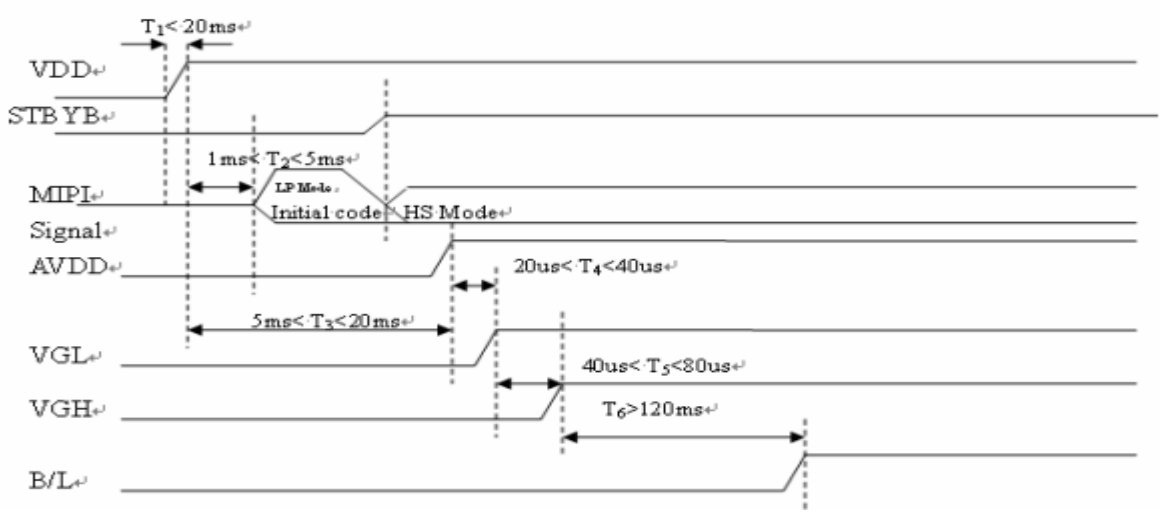


Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
MIPI digital operation current	I_{VCCIF}	-	TBD	TBD	mA	VCC=VCC_IF=1.5V, Data Rate=500Mbps, Input pattern: 55h→AAh→55h→AAh
MIPI digital stand-by current	$I_{VCCIFST}$	-	200	-	uA	VCC_IF input current. All input signal are stopped.
MIPI Characteristics for High Speed Receiver						
Single-endedl input low voltage	V_{ILHS}	-40	-	-	mV	
Single-endedl input high voltage	V_{IHHS}	-	-	460	mV	
Common-mode voltage	V_{CMRXDC}	155	-	330	mV	
Differential input impedance	Z_{ID}	80	100	125	ohm	
Differential input high threshold	V_{IDTH}	-	-	70	mV	
Differential input low threshold	V_{IDTL}	70	-	-	mV	
MIPI Characteristics for Low Power Mode						
Pad signal voltage range	V_I	-50	-	1350	mV	
Ground shift	V_{GNDSH}	-50	-	50	mV	
Output low level	V_{OL}	-150	-	150	mV	
Output high level	V_{OH}	1.1	1.2	1.3	V	

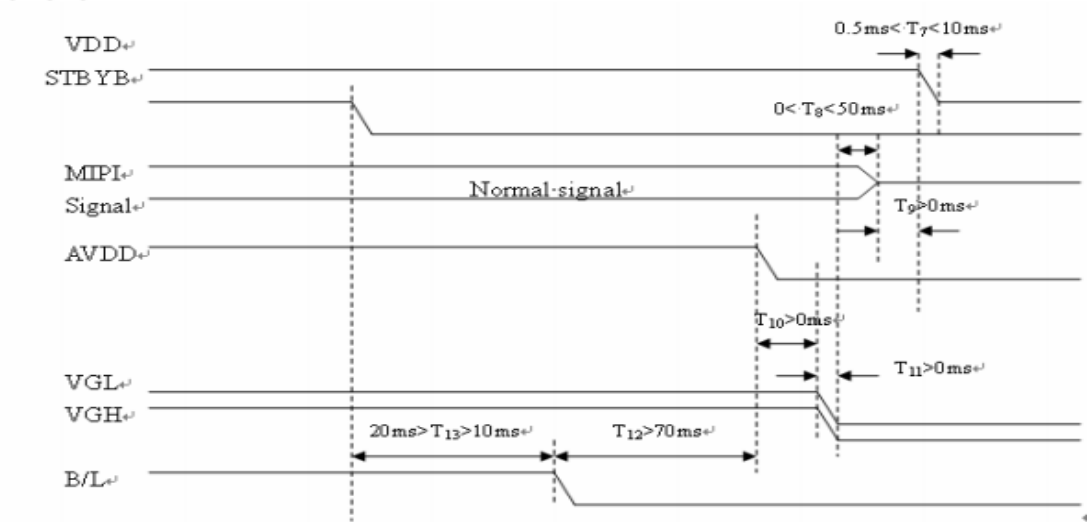
9.0 SIGNAL TIMING WAVEFORMS OF INTERFACE SIGNAL

9.1 Input Clock and Data Timing Diagram

a. Power on:

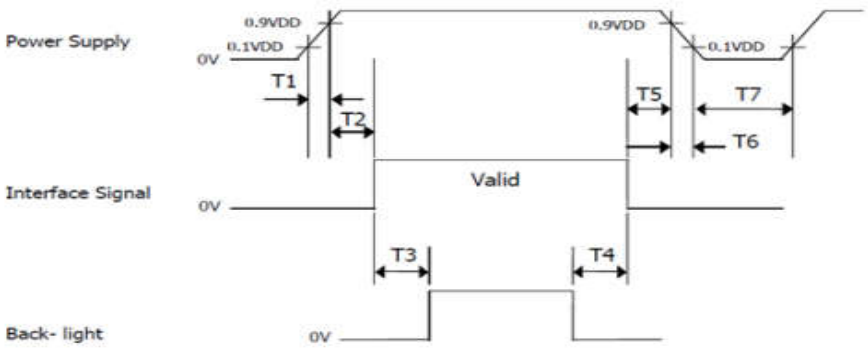


b. Power off:



POWER SEQUENCE To prevent a latch-up or DC operation of the LCD module, the power on/off sequence shall be as shown in below Notes: 1. When the power supply VDD is 0V, keep the level of input signals on the low or keep high impedance. 2. Do not keep the interface signal high impedance when power is on. Back Light must be turn on after power for logic and interface signal are valid.

Power-On/Off Timing Sequence:



Parameter	Values			Units
	Min	Typ	Max	
T1	0	-	10	ms
T2	0	-	50	ms
T3	200	-	-	ms
T4	200	-	-	ms
T5	0.5	-	50	ms
T6	0	-	10	ms
T7	500	-	-	ms

Notes:

1. **When the power supply VDD is 0V,keep the level of input signals on the low or keep high impedance.**
2. **Do not keep the interface signal high impedance when power is on .Back light must be on after power for logic and interface signal are valid.**

10. Optical Characteristics

Item	Symbol		Condition	Min.	Typ.	Max.	Unit	Note
Brightness	Bp		θ=0°	230	250	-	Cd/m^2	1
Uniformity	⊿Bp		Φ=0°	75	80	-	%	1,2
Viewing Angle	Horizontal		Cr≥10		170		Deg	3
	Vertical				170			
Contrast Ratio	Cr		θ=0° Φ=0°	800	1000		-	4
Response Time	T_r			-	25	-	ms	5
	T_f			-		-	ms	
Color of CIE Coordinate	W	x	θ=0° Φ=0°	-0.05	0.310	+0.05		1,6
		y			0.330			
		Y						
	R	x						
		y						
		Y						
	G	x						
		y						
		Y						
	B	x						
		y						
		Y			-			
NTSC Ratio	S			-	58	-	%	

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)

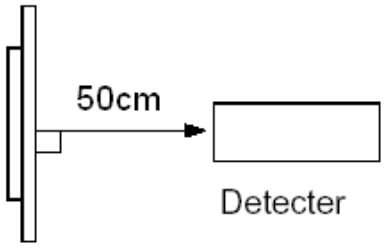
Measuring condition:

① Measuring surroundings: Dark room.

② Measuring temperature: Ta=25℃.

③ 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.

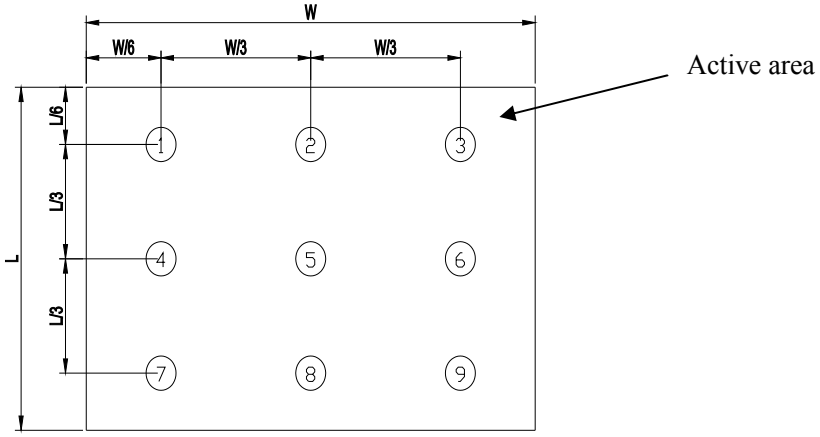


Note 2: The luminance uniformity is calculated by using following formula.

⊿Bp = Bp (Min.) / Bp (Max.)×100 (%)

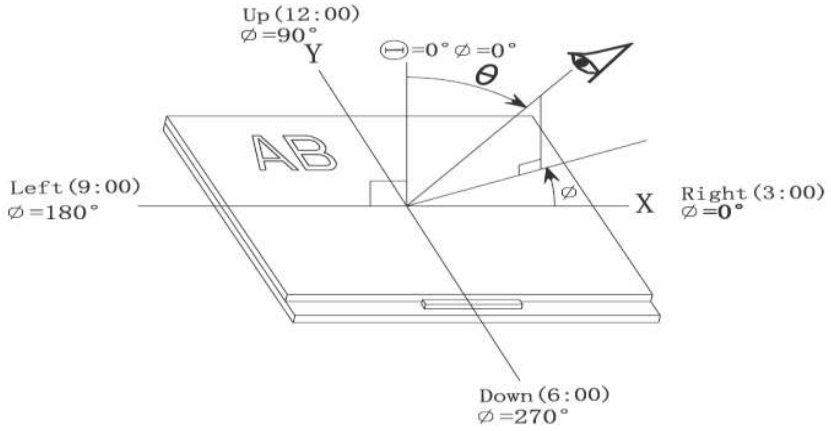
Bp (Max.) = Maximum brightness in 9 measured spots

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

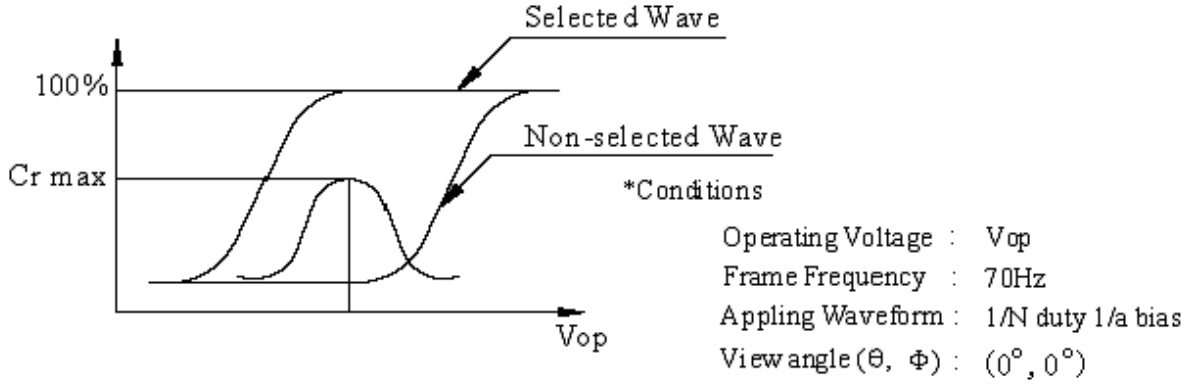


Note 3: The definition of viewing angle:

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



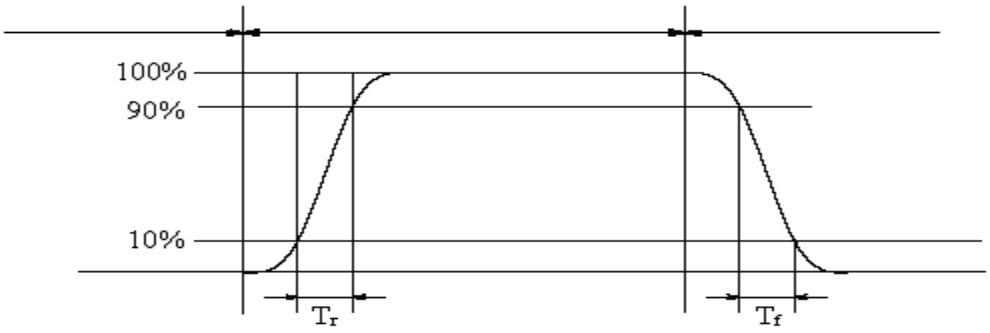
Note 4: Definition of contrast ratio.(Test LCD using DMS501)



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

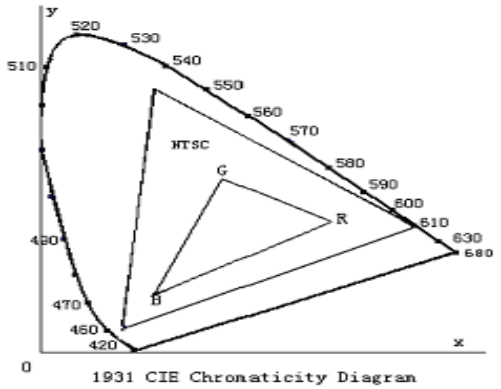
Note 5: Definition of Response time. (Test LCD using DMS501):

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.



The definition of response time

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

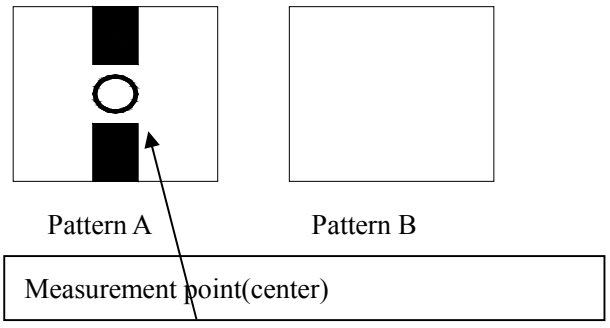


Color gamut:

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

Note 7: Definition of cross talk.

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



Electric volume value=3F+/-3Hex

11. Reliability Test Items and Criteria

No	Test Item	Test condition	Criterion

1	High Temperature Storage	60℃±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	-20℃±2℃ 96H Restore 2H at 25℃ Power off	
3	High Temperature Operation	50℃±2℃ 96H Restore 2H at 25℃ Power on	
4	Low Temperature Operation	-00℃±2℃ 96H Restore 4H at 25℃ Power on	
5	High Temperature/Humidity Operation	40℃±2℃ 90%RH 96H Power on	
6	Temperature Cycle	-0℃←————→50℃ 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:+/-6KV, Contact discharge:2KV	

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

12 Quality level

12.1 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.

12.2 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

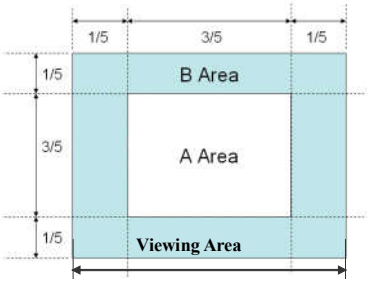


Figure 1

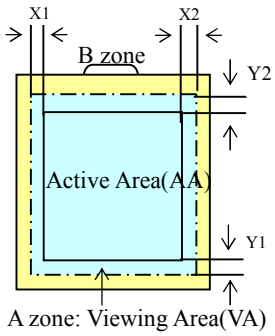


Figure 2

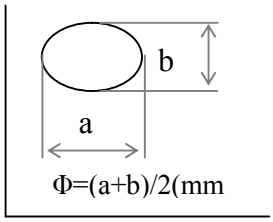
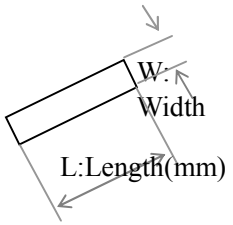
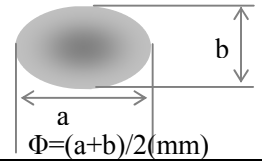
12.3 Inspection items and general notes

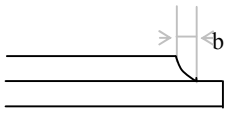
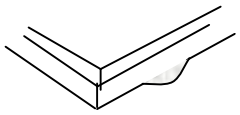
General notes	1.Should any defects which are not specified in this standard happen, additional standard shall be determined by mutual agreement between customer and HNH. 2.Viewing area should be the area which HNH guarantees. 3.Limit sample should be prior to this Inspection standard. 4.Viewing judgment should be under static pattern. 5.Inspection conditions Inspection distance: 250 mm (from the sample) Temperature : 25±5 ºC Inspection angle : 45 degrees in 12 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

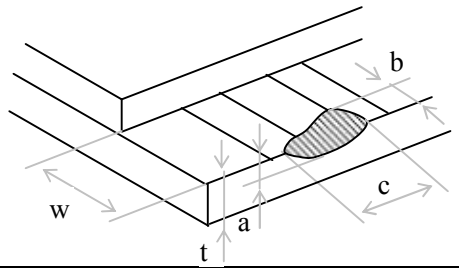
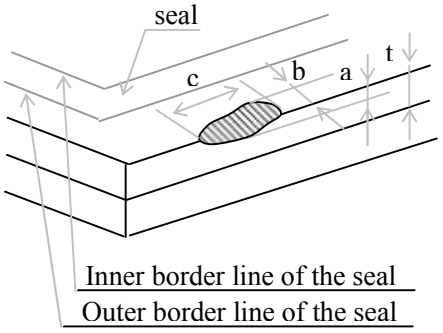
12.4 Outgoing Inspection level

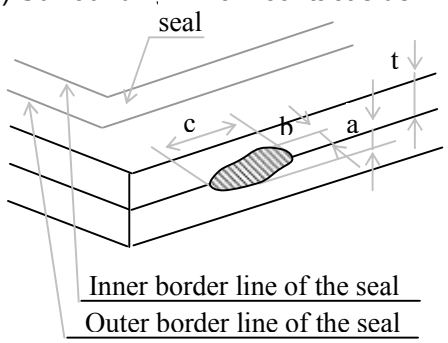
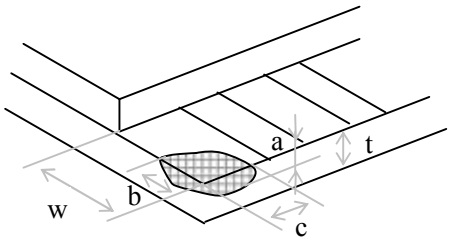
Outgoing Inspection standard	Inspection conditions	Inspection				
		Min.	Max.	Unit	IL	AQL
Major Defects	See 8.3 general notes	See 8.5			II	0.065
Minor Defects	See 8.3 general notes	See 8.5			II	0.065
Note：Sampling standard conforms to GB2828						

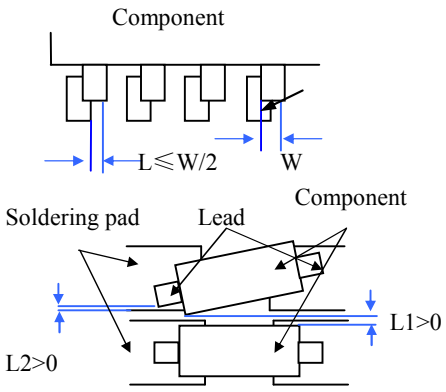
12.5 Inspection Items and Criteria

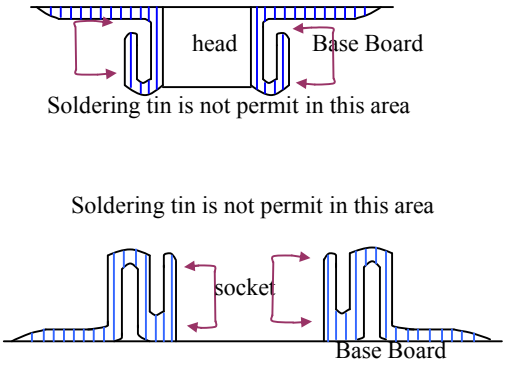
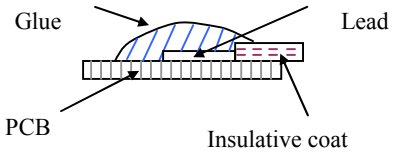
Inspection items			Judgment standard			
			Category		Acceptable number	
					A zone	B zone
1	Black spot, White spot, Pinhole, Foreign Particle, Particle in or on glass, Scratch on glass	 (a/b<2.5)	A	Φ<=0.20	Neglected	Neglected
			B	0.20<Φ<=0.25		Neglected
			C	0.25<Φ<=0.3		Neglected
			D	0.3<Φ<=0.4		
			E	0.4<Φ<=0.5		
			Total defective point(B,C)			-
2	Black line, White line, and Particle Between Polarizer and glass, Scratch on glass	 L/W>=2.5	A	W<=0.03	Neglected	Neglected
			B	0.03<W<=0.05 L<=3.0	-	Neglected
			C	0.05<W<=0.1 L<=3.0	-	Neglected
			D	0.05<W<=0.1 L<=4.0	-	-
			E	W>0.1 L>4.0	-	-
			Total defective point(B,C)		-	-
3	Bright spot		any size		none	none
4	Contrast variation		A	Φ<0.2	Neglected	Neglected
			B	0.2<Φ<=0.3	-	
			C	0.3<Φ<=0.4	-	
			D	0.4<Φ	-	
			Total defective point(B,C)		-	
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	A	Φ<=0.1	Neglected	Neglected

		convex	B	0.1 <Φ<=0.2	-	Neglected
			C	0.2 <Φ<=0.3	-	-
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 	b < Inner borderline of the seal		

		iii) Surrounding crack- contact side  	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）	
		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	
		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.	

13. Precautions for Use of LCD Modules

13.1 Handling Precautions

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

13.1.2 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.

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

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

13.1.5 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

13.1.6 Do not attempt to disassemble the LCD Module.

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

13.1.8 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.

13.2 Storage precautions

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

12.2.2 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%

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

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