承 认 书

APPROVAL SHEET

客户 **CUSTOMER**	标准品 **Standard module**	**DATE OF APPROVAL**

Product Mode	**Transmissive and negative mode** **128*3（RGB）*160 Graphic Dot-matrix 1.77TFT**
Remarks	**Standard module**
Approved signature by customer	

PREPARED BY	**CHECKED BY**	**APPROVED BY**

深圳中意微电子技术有限公司
电话：755-36940931，29379880，18806647643
传真：755-29379880
地址：深圳市宝安区龙华民治街道民康路88号蓝坤大厦10楼1011
网址：http://www.zywlcd.com.cn
联络人：袁生 13728754418
邮箱：yuanxiub@163.com

NO.	**CONTENTS**	Page

1.General Specifications

REV	COMMENT	PAGE	DATE
A	First	20	2009/11/17

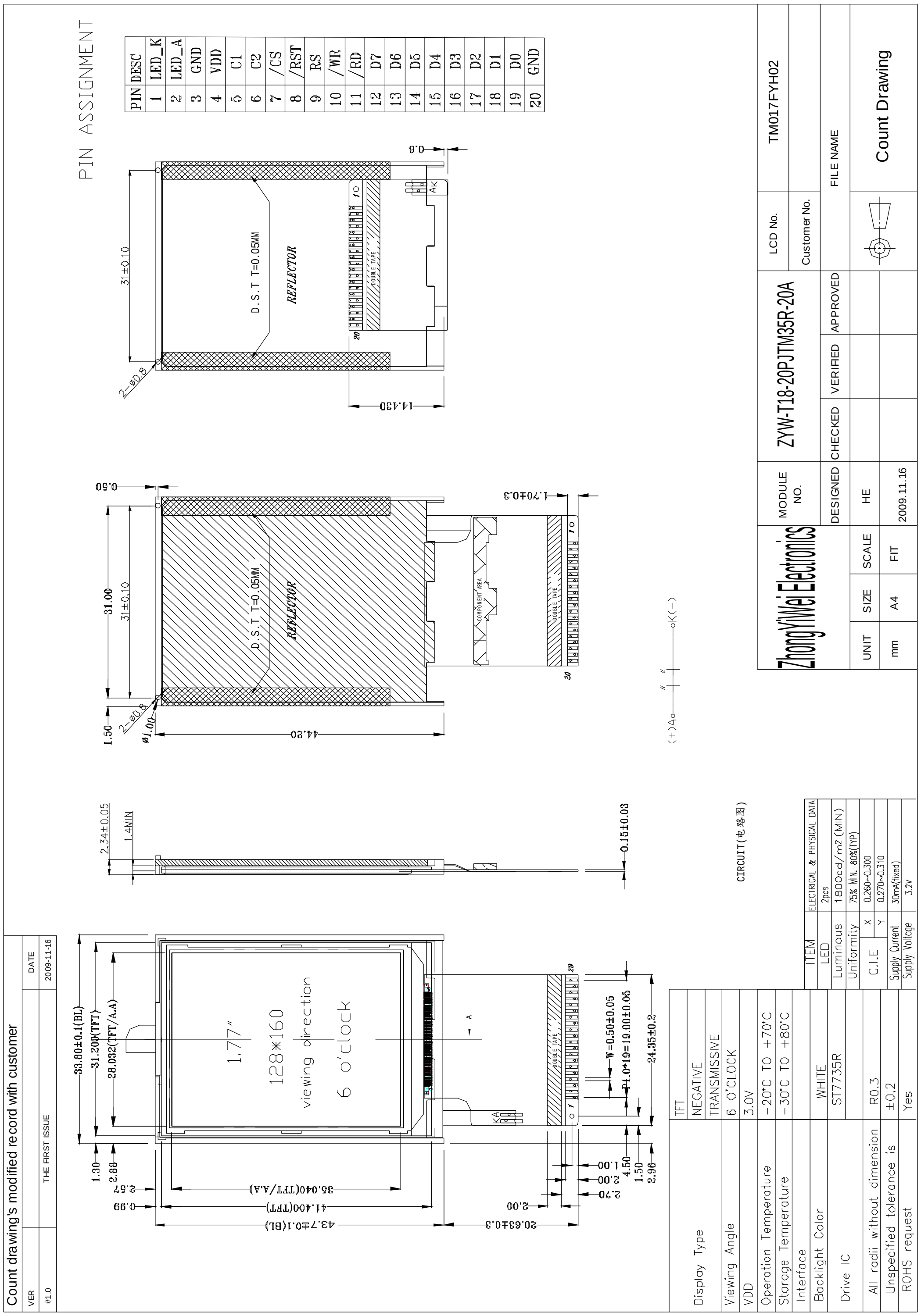
Item	Contents	Unit	Note
LCD Type	TFT	-	
Display color	262K		1
LCD Duty		-	
LCD Bias	-	-	
Viewing Direction	6:00	O'Clock	
Viewing Area(W×H)	-	mm	
Active Area(W×H)	28.032(W) ×35.040(H) mm	mm	
Number of Dots	128 RGB(W) × 160 (H) Dots	mm	
Dot Size(W×H)		um	
Dot Pitch(W×H)	0.219(W)*0.219(H)mm	mm	
Controller	ST7735R	-	
VDD		V	
Vop	-	V	
Outline Dimensions	33.8(W) ×44.2(H)×2.34((D)	mm	
Backlight	LED(white)	-	
Operating Temperature	-20～+70℃	-	
Storage Temperature	-30～+80℃	-	
Weight	TBD	g	2
Data Transfer	8 bits parallel	-	
Polarizer Mode	Transmissive/Negative	-	

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

Note 2:TBD- To Be Determined.

Note: 3.Requirements on Environmental Protection:RoHS

2. Outline


PIN ASSIGNMENT
PIN DESC
1 LED_K
2 LED_A
3 GND
4 VDD
5 C1
6 C2
7 /CS
8 /RST
9 RS
10 /WR
11 /RD
12 D7
13 D6
14 D5
15 D4
16 D3
17 D2
18 D1
19 D0
20 GND
1.77"
128*160
viewing direction
6 o'clock
D.S.T T=0.05MM
REFLECTOR
CIRCUIT(电路图)
Display Type
TFT
NEGATIVE
TRANSMISSIVE
Viewing Angle
6 O'CLOCK
VDD
3.0V
Operation Temperature
-20°C TO +70°C
Storage Temperature
-30°C TO +80°C
Interface
Backlight Color
WHITE
Drive IC
ST7735R
All radii without dimension
R0.3
Unspecified tolerance is
±0.2
ROHS request
Yes
Count drawing's modified record with customer
VER
#1.0
THE FIRST ISSUE
DATE
2009-11-16
ZhongYiWei Electronics
MODULE NO.
ZYW-T18-20PJTM35R-20A
LCD No.
TM017FYH02
Customer No.
FILE NAME
Count Drawing
DESIGNED
CHECKED
VERIFIED
APPROVED
HE
2009.11.16
UNIT
mm
SIZE
A4
SCALE
FIT

3. Absolute Maximum Ratings(Ta=25℃)

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage(1)					1,2
Power Supply Voltage(2)	V_{DD}	-0.3	3.3	V	
Power Supply Voltage for LCD	Vop	-	-	V	
Logic Signal Input Voltage	V_I	-0.3	V_{DD}+0.3	V	
Operating Temperature	Top	-20	+70	℃	
Storage Temperature	Tst	-30	+80	℃	

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. VDD >VSS must be maintained.

4. Electrical Specifications and Instruction Code

4.1 Electrical characteristics (Ta=25℃)

Parameter		Symbol	Condition	Min	Typ	Max	Unit	Note
Logic Power supply		VDD	Ta=25℃	-	3.0	-	V	1
Input volta	'H'	V_{IH}	V_{DD}=2.8V	0.8V_{DD}	-	V_{DD}	V	
	'L'	V_{IL}	V_{DD}=2.8V	Vss	-	0.2V_{DD}	V	
Output Volta	'H'	V_{OH}	-	0.8V_{DD}	-	V_{DD}	V	
	'L'	V_{OL}	-	Vss	-	0.2V_{DD}	V	
Current Consumption		I_{CC1}	Normal mode	-	18	23	mA	2
		I_{CC2}	Stand-by mode	-	-	-	mA	3

Note:

1: IC default setting, Duty:

2: Display full white. Backlight on state.

3: IC on standby mode.

4.2 LED backlight specification

Item		Symbol	Condition	Min	Typ	Max	Unit	Note
Forward voltage		V_f	I_f=15mA		6V		V	
Reverse voltage		V_r				4	V	
Forward current	Normal	I_{pn}	2-chip		15		mA	
	Dimming	I_{pd}						
Reverse Current		I_r	V_r=6V			15	μA	
Uniformity			I_f=15mA	80%				

4.3 Interface Signals

PIN NO.	PIN OUT	FUNCTION DESCRIPTION
1	LED-K	LED Negative
2	LED-A	LED Positive
3	GND	Ground
4	VDD	Power Supply
5	C1	Connected with a capacitor (10v/1uf,the other side connect with ground)
6	C2	Connected with a capacitor (10v/1uf,the other side connect with ground)
7	/CS	Chip select input pin
8	/RST	System Reset Pin
9	RS	Data/Command Write Select pin
10	/WR	Write execution control pin
11	/RD	Read execution control pin
12	DB7	Data Bus
13	DB6	Data Bus
14	DB5	Data Bus
15	DB4	Data Bus
16	DB3	Data Bus
17	DB2	Data Bus
18	DB1	Data Bus
19	DB0	Data Bus
20	GND	Ground

5. Optical Characteristics

5.1 Optical specification

Light source : C-light, Color filter: CF side:TEG1465DUHC,TFT: TEG1465DU . Ta=25℃

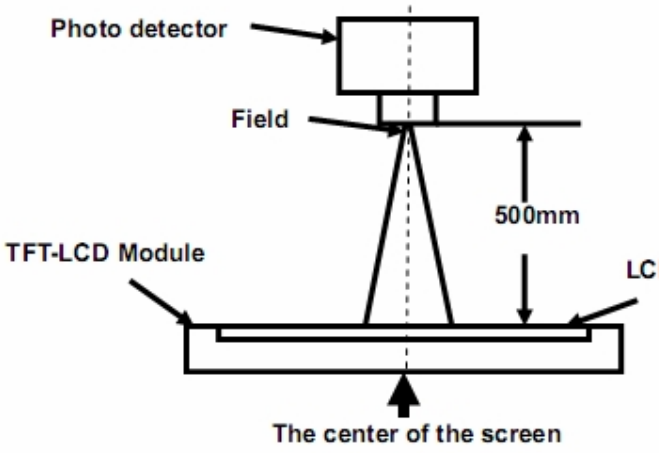
Item		Symbol	Condition	Min	Typ.	Max.	Unit	Remark
View Angles		ΘT	CR≧10	35	40	-	Degree	Note 2
		ΘB		15	20	-		
		ΘL		40	45	-		
		θR		40	45	-		
Contrast Ratio		CR	θ=0°	200	350	-		Note1 Note3
Response Time		Ton	25℃	-	25	40	ms	Note1 Note4
		Toff						
Chromaticity	White	x	Brightness is on		0.317			Note5, Note1
		y			0.361			
	RED	x			0.65			
		y			0.319			
	GREEN	x			0.302			
		y			0.556			
	BLUE	x			0.14			
		y			0.115			
NTSC					60		%	Note 5
Transmittance		T			5.0%		%	Note1 Note7

Test Conditions:

1. The ambient temperature is 25℃.
2. The test systems refer to Note 1 and Note 2.

5.3 Defidnition of optical measurement system

The optical characteristics should be measured in dark room. After 5 minutes operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.



Item	Photo detector	Field
Contrast Ratio	SR-3A	1°
Luminance		
Chromaticity		
Lum Uniformity		
Response Time	BM-7A	2°

5.4 Definition of viewing angle range and measurement system

viewing angle is measured at the center point of the LCD by CONOSCOPE(ergo-80)。

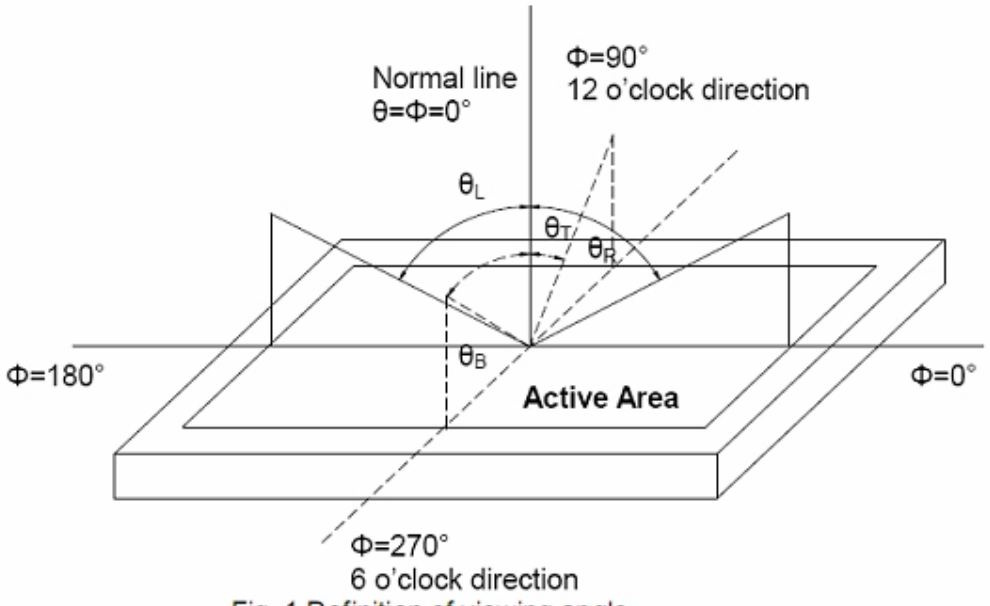


Fig. 1 Definition of viewing angle

5.5 Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD is on the "White" state}}{\text{Luminance measured when LCD is on the "Black" state}}$$

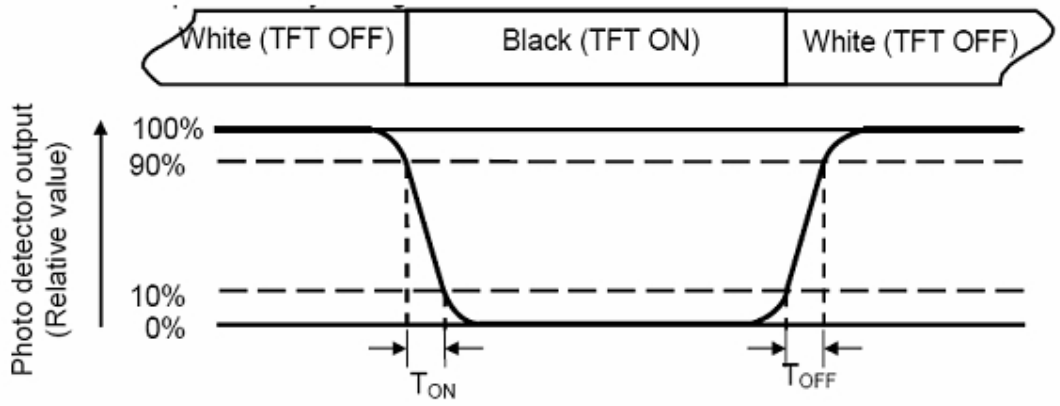
"White state ":The state is that the LCD should driven by Vwhite.

"Black state": The state is that the LCD should driven by Vblack.

Vwhite: To be determined Vblack: To be determined.

5.6 Definition of response time

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



5.7 Definition of color chromaticity(CIE1931)

Color coordinates measured at center point of LCD

5.8 Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the center of each measuring area.

Luminance Uniformity(U) = Lmin/ Lmax

L-------Active area length W----- Active area width

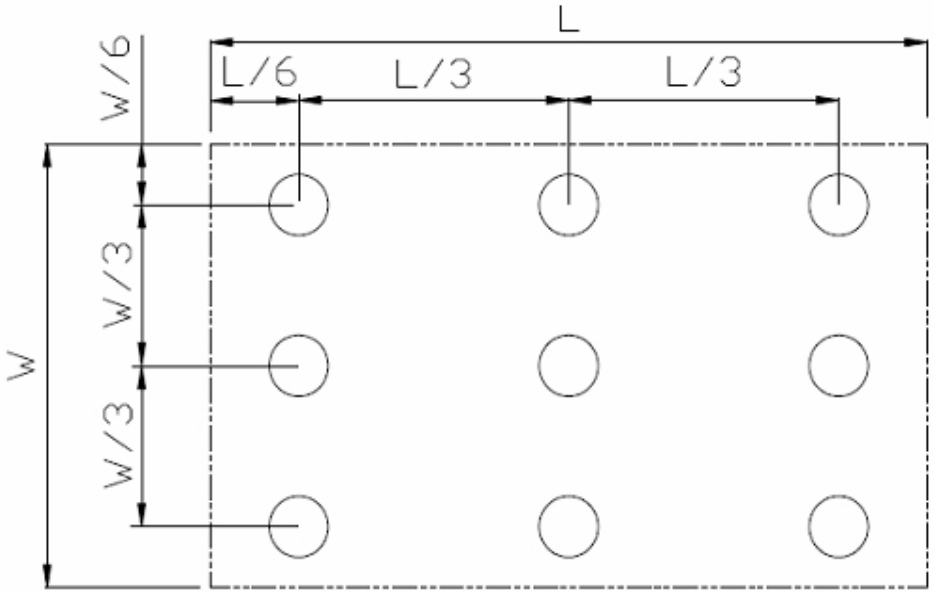


Fig. 2 Definition of uniformity

Lmax: The measured maximum luminance of all measurement position.

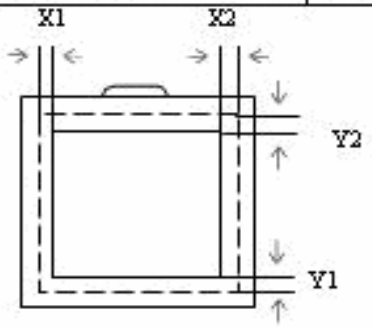
Lmin: The measured minimum luminance of all measurement position.

6. Reliability

No.	Test Item	Test condition	Criterion
1	High Temperature Storage	80℃±2℃96H Restore 4H at 25℃	1. After testing, cosmetic defects should not happen. 2.Total current consumption should not be over 10% of initial value.
2	Low Temperature	-30℃±2℃ 96H Restore 4H at 25℃	
3	High Temperature Operation	70℃±2℃ 48H Restore 4H at 25℃	
4	Low Temperature	-20℃±2℃ 48H Restore 4H at 25℃	
5	High Temperature /Humidity Storage	40℃±2℃ 90%RH 48H	
6	Temperature Cycle	-30℃←→25℃←→80℃ 5min 30min ←→25℃ , 5min after 10cycle, Restore 4H at 25℃	
7	Vibration Test (package state)	10Hz~150Hz, 100m/s2, 120min	Not allowed cosmetic and electrical defects.
8	Shock Test (package state)	Half- sine wave, 300m/s2, 18ms	
9	Atmospheric Pressure Test	25kPa 16H Restore 2H	

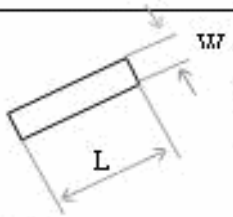
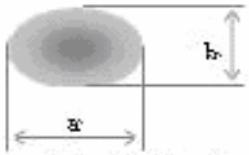
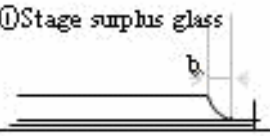
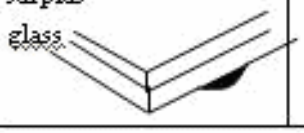
7 Quality level

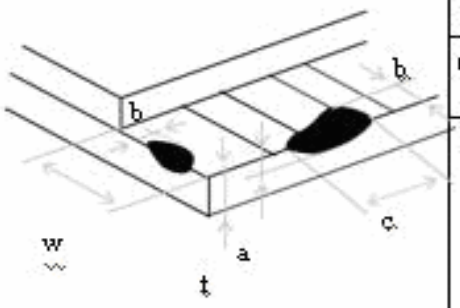
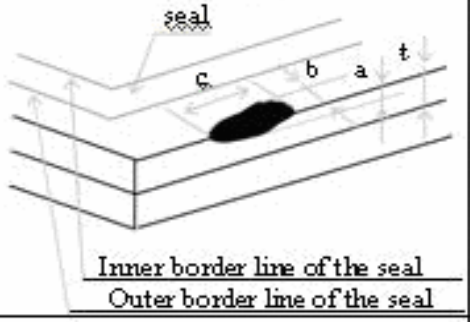
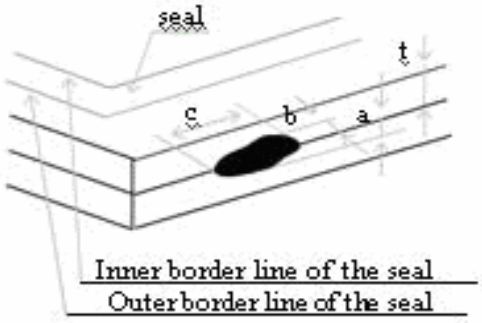
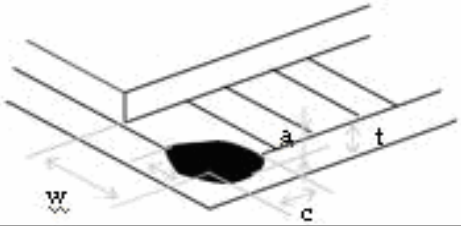
7.1 Notes for quality standard

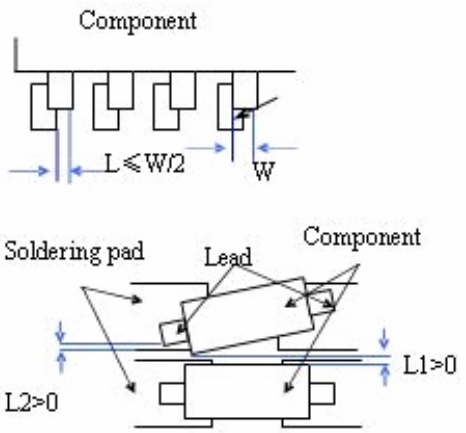
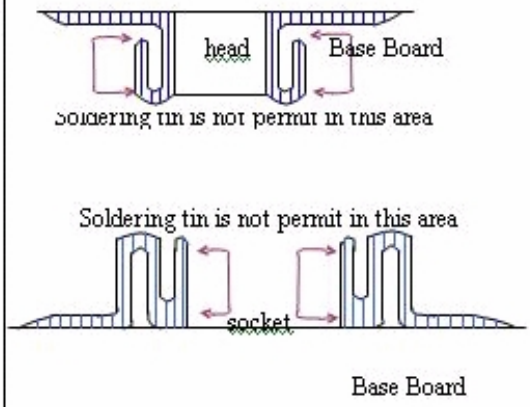
<table>
<tr><th></th><th colspan="2">Note</th></tr>
<tr><td>General</td><td colspan="2">1. Should any defects which are not specified in this standard happen, additional standard shall be determined by mutual agreement between customer and JLS
2. Viewing Area should be the area which JLS guarantees.
3. Limited sample should be prior to this Inspection standard.
4. Viewing Judgement should be under static pattern.
5. Inspection conditions
Inspection distance : 250 mm (from the sample)
Temperature : 25±5℃
Inspection angle : 45degrees in LCD view direction</td></tr>
<tr><td rowspan="4">Definitions of Inspection items</td><td>Pinhole, Bright spot, Black spot, White spot, Black line, White Line, Foreign particle, Bubble</td><td>The color of a small area is different from the remainder.
The phenomenon dose not change with voltage.</td></tr>
<tr><td>Contrast variation</td><td>The color of a small area is different from the remainder.
The phenomenon changes with voltage.</td></tr>
<tr><td>Polarizer defect</td><td>Scratch, Dirt, Particle, Bubble on polarizer or between polarizer and glass.</td></tr>
<tr><td>Glass defect</td><td>Glass crack, Shaved corner of glass, Surplus glass</td></tr>
<tr><td>Definitions of Inspection ranges</td><td colspan="2"> 

Dividing A zone and B zone proceed to make a judgment.
A zone : Inside Viewing area
B zone : Outside Viewing area
X1(A.A~V.A): mm
X2(A.A~V.A): mm
Y1(A.A~V.A): mm
Y2(A.A~V.A): mm</td></tr>
<tr><td>Outgoing Inspection standard</td><td colspan="2">Inspection level Ⅱ Normal Inspection Sampling standard conforms to GB2828
<table>
<tr><th>Rank</th><th>Inspection Item</th><th>AQL(Number of defective LCMs counted)</th></tr>
<tr><td>Major defect</td><td>All Functional defects(Such as No display, Display abnormally, Open or missing segment, Short circuit , Missing component, No sound, Blight</td><td>0.65</td></tr>
<tr><td>Minor defect</td><td>Appearance defects, such as Black/White spot, Bright spot, Pinhole, Black/White line, Contrast variation, Bubble Glass defect, Polarizer defect,</td><td>1.50</td></tr>
</table></td></tr>
</table>

7.2Standards of inspection items

Inspection item			Judgement standard			
			Category		Acceptable number	
					A zone	B zone
1	Black spot, White spot Bright Spot, Pinhole Foreign Particle, Bubble and Particle Between polarizer and glass, Scratch on polarizer	 Φ =(a+b)/2(mm)	A	Φ≦0.15	Neglecte	Neglected
			B	0.15<Φ≦0.20	2	
			C	0.20<Φ≦0.30	1	
			D	0.30<Φ	0	
			Total defective point(B,C)		3	
2	Black line, White line, Bubble and Particle Between Polarizer and glass, Scratch on polarizer	 W:Width, L:Length(mm)	A	W≥0.10	Neglected	Neglected
			B	0.01<W≥0.03 L≥3.0	2	
			C	0.03<W≥0.05 L≥3.0	1	
			D	0.05<W	0	
			Total defective point(B,C)		2	
3	Contrast variation	 Φ=(a+b)/2(mm)	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	
4	Bubble inside cell		any size		none	none
5	Polarizer defect (if Polarizer is used)	Scratch and damage on polarizer, Particle on polarizer or between polarizer and glass. Bubble, dent and convex	Refer to item 1 and item 2.			
			A	Φ≥0.3	Neglected	Neglected
			B	0.3≥Φ≥0.7	2	
			C	0.7<Φ	0	
			Total defective point(B,C)		2	
6	Surplus glass	①Stage surplus glass 	b ≥0.3mm			
		②Surrounding surplus glass 	Should not influence outline dimension and assembling.			

Inspection item			Judgment standard	
			Category(application: B zone)	
7	Glass defect crack	①The front of lead terminals 	A	If a ≤ t and b ≤ 1.0
			B	a ≤ t, 1 ≤b ≤2mm, c ≤3mm
			C	If glass crack cover alignment mark, b ≤0.5mm.
			D	Crack at two sids of lead terminals should not cover patterns and alignment mark
		②Surrounding crack—non-contact side 	b < Inner borderline of the seal	
		③ Surrounding crack— contact side 	b < Outer borderline of the seal	
		④Corner 	~~A~~ ~~a ≤ t, b ≤ 3.0, c ≤ 3.0~~ *Glass crack should not cover patterns used for	

Inspection item			Judgement standard
8	PCB 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	

8. Precautions for Use of LCD Modules

8.1 Handling Precautions

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

8.1.2 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.

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

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

8.1.5 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

8.1.6 Do not attempt to disassemble the LCD Module.

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

8.1.8 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.

8.2 Storage precautions

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

8.2.2 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%

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

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