ALL SHORE INDUSTRIES

ASI-T-200DA2SMN/AY

ITEM	Standard value	UNIT
LCD Type	IPS TFT Transmissive	---
Driver element	Active matrix	
Number of Dots	240*(RGB)*320	Dots
Pixel Arrangement	RGB Vertical Stripe	
Dot Pitch (W*H)	0.1275*0.1275	mm
Active Area	30.6(H)*40.8(V)	mm
Viewing Area (W*H)	***(H)****(V)	mm
Glass Area (W*H)	33.6*46.6	mm
Viewing Direction	ALL FREE	
Control IC	ST7789V2	
Module Size(W*H*T)	36.05*51.8*2.0	mm
Approx. Weight	TBD	g
Back Light	3 White LED	
Touch Panel Type	----	
Touch Panel Active Area	----	mm
Touch Panel View Area	----	mm

ALL SHORE INDUSTRIES

RECORDS OF REVISION

DATE	REF.PAGE PARAGRAPH DRAWING No.	REVISED No.	SUMMARY	REMARK
2019/06/11	ALL	1	FIRST ISSUE	

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1. Introduction

1.1 Scope of application

This specification applies to the a- TFT transmissive dot matrix LCD module. This LCD module should be designed for mobile machine application. LCD specification: Dots 240xRGBx320. As to basic specification of the driver IC, refer to the IC (SC7283) datasheet.

1.2 Structure:

Display structure:
TFT LCD+IC+FPC+BL
FULL 262K Colors 2.0 inch TFT LCD size for LCD;
One bare chip with gold bump (COG) TECH;
White LED back light;
4W_SPI or MCU 8bit

1.3 TFT features:

TFT PANNEL+IC+FPC;
IPS Tran missive Type LCD
240 dot-source and 320 dot-gate outputs;

1.4 Applications:

Mobile machine

2. General specification

ITEM	Standard value	UNIT
LCD Type	IPS TFT Transmissive	---
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Module Size(W*H*T)	36.05*51.8*2.0	mm
Approx. Weight	TBD	g
Back Light	3 White LED	
Touch Panel Type	----	
Touch Panel Active Area	----	mm
Touch Panel View Area	----	mm

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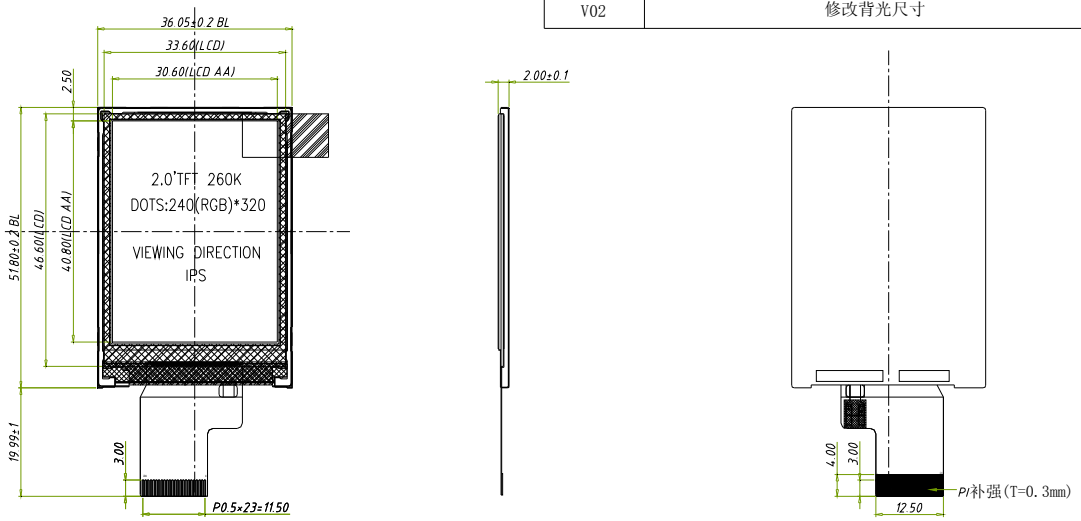
3. Mechanical drawing

Reversion	Dispcription	Date	Signed
V00	首次出图	2019.05.29	T.
V01	修改FPC长度，去掉背光铁框,BL并联	2019.06.01	T.
V02	修改背光尺寸	2019.06.03	T.

INTERFACE

4W_SPI & 8BIT MCU

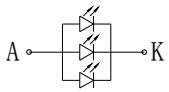


PIN	NAME
1	LEDA
2	LEDK
3	GND
4	VCC2.8V
5	IOVCC1.8V
6	IM12
7	RESET
8	CS
9	DCX(SCL)
10	WR(RS)
11	RD
12	SDA
13	DB0
14	DB1
15	DB2
16	DB3
17	DB4
18	DB5
19	DB6
20	DB7
21	TE
22	NC
23	GND
24	GND

INTERFACE SETTING
IM12=0:8BIT MCU
IM12=1:4W_SPI

NOTES:

1. DISPLAY TYPE: 2.0" TFT,TRANSMISSIVE
2. DRIVER IC:ST7789V2
3. VIEWING DIRECTION: IPS
4. BACKLIGHT: 3 CHIP-WHITE LED
5. BL CURRENT: Vled=3.2V(<60mA)
6. OPERATING TEMP: -20°C~ +70°C
7. STORAGE TEMP: -30°C~ +80°C
8. GENERAL TOLERANCE: ±0.2



VF=3.2V, <=60mA
LED CIRCUIT:

Custumer Ref.	Model No.	ASI-T-200DA2SMN/AY	Drawing Title	--- Characteristics			
---	Approve		Material	Unmarked Tolerance	Unit	Scale	Page
Part No.	Checked			±0.2	mm	1:1	of
---	Draw	TANG	Date		Rev V02		
Drawing No.							
---							

4. ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Unit
Supply voltage for logic	V_{DD}	-0.3	4.6	V
Input voltage for logic	V_{IN}	-0.5	V_{DD} +0.3	V
Supply current (One LED)	I_{LED}	0	20	mA
Operating temperature	T_{OP}	-20	+70	°C
Storage temperature	T_{ST}	-30	+80	°C

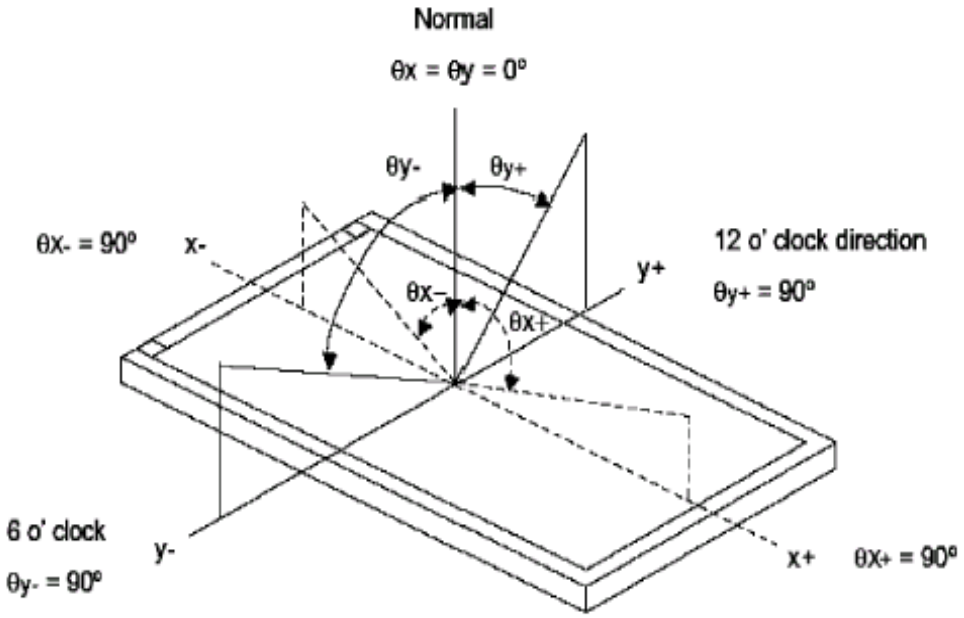
5. ELECTRICAL CHARACTERISTICS

Item	Symbol	Min	Typ	Max	Unit	Applicable terminal
Supply voltage for logic	V_{DD}	1.65	1.8	3.3	V	IOVCC
Supply voltage for analogy	V_{CC}	2.65	2.8	3.3	V	VCC
Input voltage	V_{IL}	-	-	0.2 V_{DD}	V	
	V_{IH}	0.8 V_{DD}	-	V_{DD}	V	
Input current	I_{DD}	-	-	-	mA	
LED Forward voltage	V_f	-	3.2	-	V	--
Input backlight current	I_{LED}	-	45	60	mA	<=60mA
Brightness(Backlight)	L	-	5000	-	Cd/m^2	I_{LED}=60mA
Operating Life time	-	10000	20000	-	Hrs	<45mA

6. OPTICAL CHARACTERISTICS

ITEM		SYMBOL	CONDITIONS	SPECIFICATIONS			UNIT	NOTE
				MIN.	TYP.	MAX		
Brightness		B	Viewing normal angle	--	220	--	Cd/m^2	
Contrast Ratio		CR		--	800	--	--	
Response Time		Tr+Tf		--	30	40	ms	
CIE Color coordinate	Red	X_R		--	0.654	--		
		Y_R		--	0.319	--		
	Green	X_G		--	0.259	--		
		Y_G		--	0.574	--		
	Blue	X_B		--	0.140	--		
		Y_B		--	0.084	--		
	White	X_W		--	0.303	--		
		Y_W		--	0.323	--		
Viewing Angle	Hor.	θ_{X+}	Center CR>=10	--	80	--	Deg.	
		θ_{X-}		--	80	--		
	Ver.	θ_{Y+}		--	80	--		
		θ_{Y-}		--	80	--		
Uniformity	Un			--	TBD	--	%	

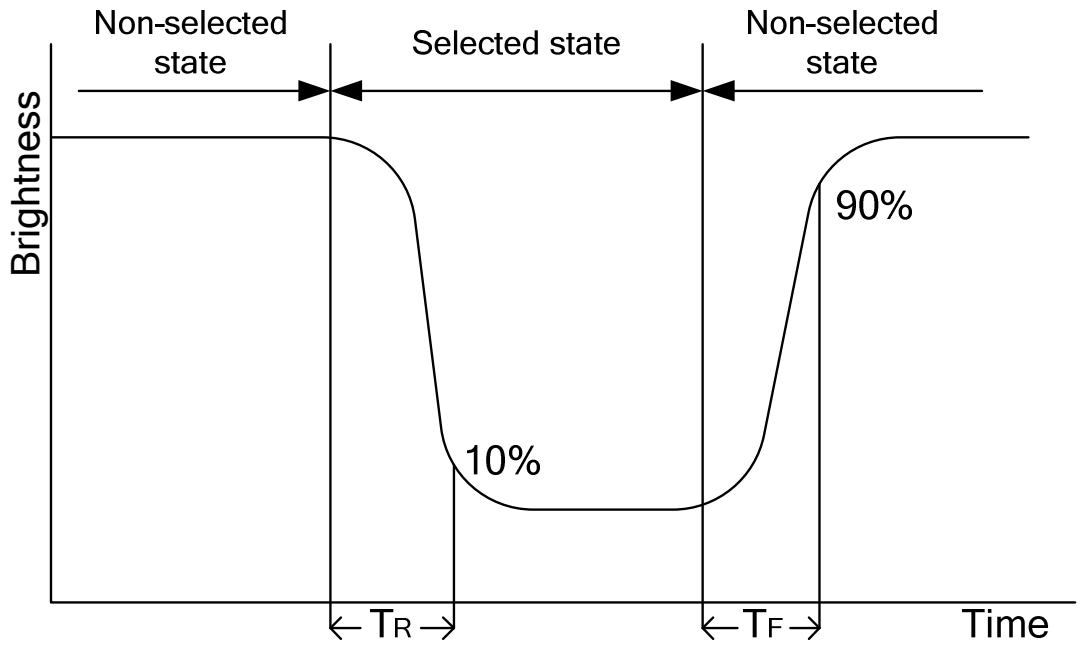
Note 1 : Definition of Viewing Angle θ_x and θ_y :



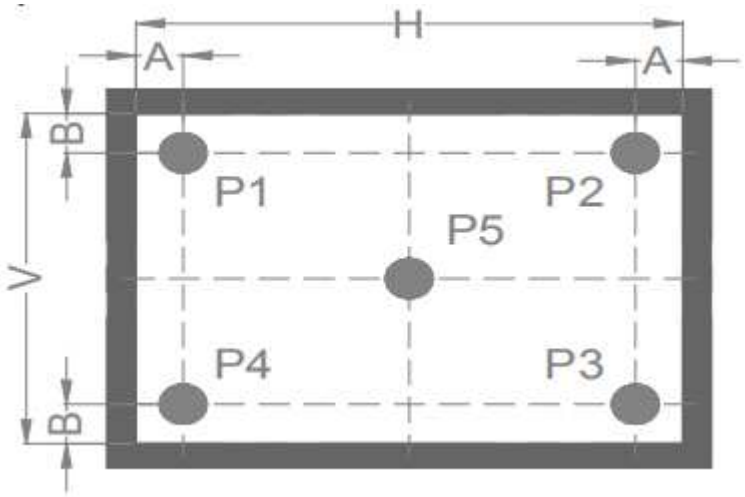
Note 2: Definition of contrast ratio CR:

$$CR = \frac{\text{Brightness of non-selected dots (white)}}{\text{Brightness of selected dots (black)}}$$

Note 3: Definition of response time (T_R, T_F)



Note 4: Measuring method for luminance, luminance uniformity.



A:5mm /B: 5mm/H,V: active area/Light spot size=Φ5mm
500mm distance from LCD surface to detector lens of the BM-7

7. Interface Pin Function

NO.	SYMBOL	Description
1	LEDA	Backlight power(+)
2	LEDK	Backlight power(-)
3	GND	Power ground
4	VDD	Power supply(+2.8V)
5	IOVCC	Power supply(+1.8V)
6	IM	Interface setting(0: MCU 1: SPI)
7	RESET	Reset signal active low.
8	CS	Chip enable signal.
9	RS(SCL)	Command or data select signal(The clock signal of the SPI interface)
10	WR(RS)	Write enable signal(command or data select signal)
11	RD	Read enable signal.
12	SDA	The data signal of the SPI interface)
13-20	DB0-DB7	The 8bit data bus
21	TE	Frame signal output pin
22	NC	No use
23-24	GND	Power ground

8. AC Characteristics

Please refer the IC ST7789V2 datasheet

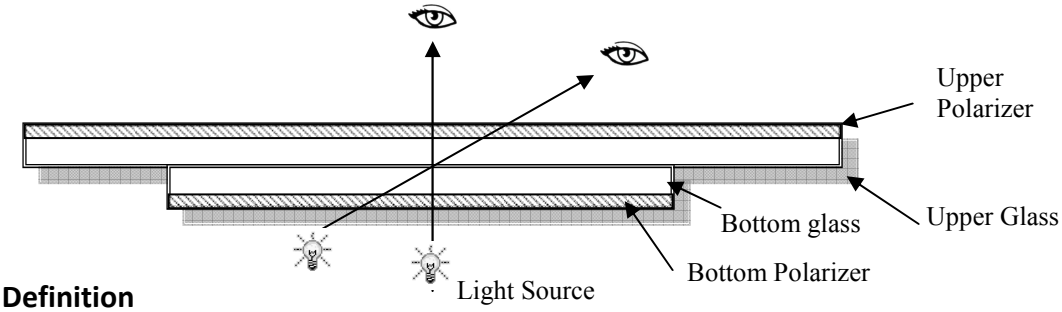
9.LCM Quality Criteria

9.1 VISUAL & FUNCTION INSPECTION STANDARD

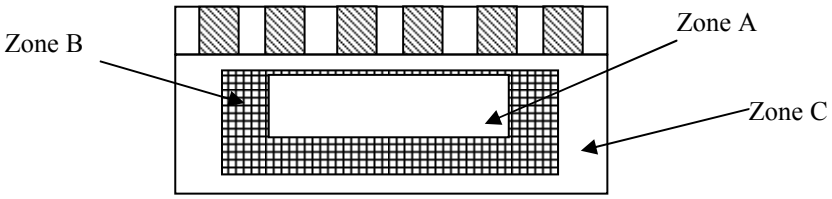
9.1.1 Inspection conditions

Inspection performed under the following conditions is recommended.

Temperature : 25±5℃
Humidity : 65%±10%RH
Viewing Angle : Normal viewing Angle.
Illumination: Single fluorescent lamp (300 to 700Lux)
Viewing distance:30-50cm



9.1.2 Definition



Zone A : Effective Viewing Area(Character or Digit can be seen)
Zone B : Viewing Area except Zone A
Zone C : Outside (Zone A+Zone B) which can not be seen after assembly by customer .)
Note:
As a general rule ,visual defects in Zone C can be ignored when it doesn't effect product function or appearance after assembly by customer.

9.1.3 Sampling Plan

According to GB/T 2828-2003 ; , normal inspection, Class Ⅱ
AQL:

Major defect	Minor defect
0.65	1.5

LCD: Liquid Crystal Display , TP: Touch Panel , LCM: Liquid Crystal Module

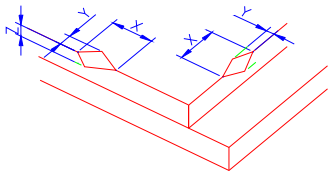
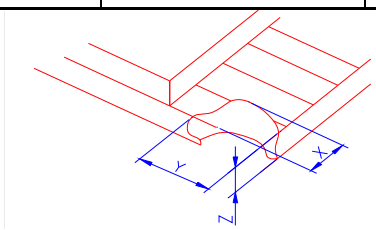
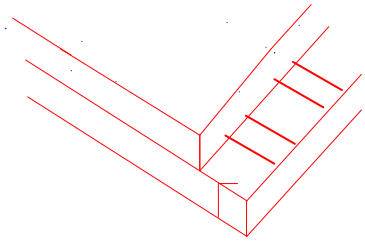
No	Items to be inspected	Criteria	Classification of defects
1	Functional defects	1) No display, Open or miss line 2) Display abnormally, Short 3) Backlight no lighting, abnormal lighting. 4) TP no function	Major
2	Missing	Missing component	
3	Outline dimension	Overall outline dimension beyond the drawing is not allowed	
4	Color tone	Color unevenness, refer to limited sample	Minor
5	Soldering appearance	Good soldering , Peeling off is not allowed.	
6	LCD/Polarizer/TP	Black/White spot/line, scratch, crack, etc.	

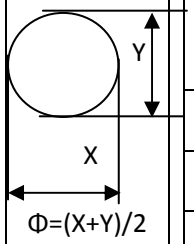
9.1.4 Criteria (Functional items)

Number	Items	Criteria (mm)
1	No display	Not allowed
2	Missing segment	Not allowed
3	Short	Not allowed
4	Backlight no lighting	Not allowed
5	TP no function	Not allowed

9.1.5 Criteria (Visual)

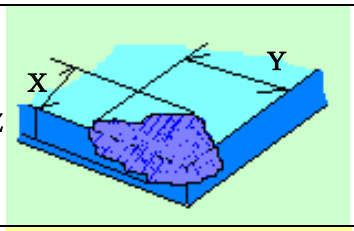
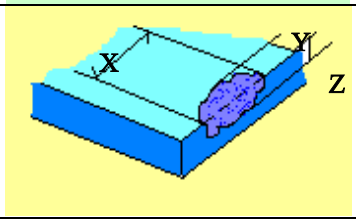
<table>
<tr><th>Number</th><th>Items</th><th>Criteria(mm)</th></tr>
<tr><td rowspan="3">1.0 LCD Crack/Broken

NOTE:
X: Length
Y: Width
Z: Height
L: Length of ITO,
T: Height of LCD</td><td>(1) The edge of LCD broken</td><td> 
<table>
<tr><th>X</th><th>Y</th><th>Z</th></tr>
<tr><td>≤3.0mm</td><td><Inner border line of the seal</td><td>≤T</td></tr>
</table></td></tr>
<tr><td>(2)LCD corner broken</td><td> 
<table>
<tr><th>X</th><th>Y</th><th>Z</th></tr>
<tr><td>≤3.0mm</td><td>≤L</td><td>≤T</td></tr>
</table></td></tr>
<tr><td>(3) LCD crack</td><td> 
Crack
Not allowed</td></tr>
</table>

<table>
<tr><th>Number</th><th>Items</th><th>Criteria (mm)</th></tr>
<tr><td>2.0</td><td>Spot defect</td><td>
① light dot（LCD/TP/Polarizer black/white spot , light dot, pinhole, dent, stain）


<table>
<tr><th rowspan="2">Zone
Size (mm)</th><th colspan="3">Acceptable Qty</th></tr>
<tr><th>A</th><th>B</th><th>C</th></tr>
<tr><td>Φ≤0.10</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr>
<tr><td>0.10<Φ≤0.15</td><td colspan="2">3(distance≧10mm)</td></tr>
<tr><td>0.15<Φ≤0.2</td><td colspan="2">1</td></tr>
<tr><td>0.2<Φ</td><td colspan="2">0</td></tr>
</table>
②Dim spot（LCD/TP/Polarizer dim dot, light leakage、dark spot）
<table>
<tr><th rowspan="2">Zone
Size (mm)</th><th colspan="3">Acceptable Qty</th></tr>
<tr><th>A</th><th>B</th><th>C</th></tr>
<tr><td>Φ≤0.1</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr>
<tr><td>0.1<Φ≤0.2</td><td colspan="2">2(distance≧10mm)</td></tr>
<tr><td>0.2<Φ≤0.3</td><td colspan="2">1</td></tr>
<tr><td>Φ＞0.3</td><td colspan="2">0</td></tr>
</table>
③ Polarizer accidented spot
<table>
<tr><th rowspan="2">Zone
Size (mm)</th><th colspan="3">Acceptable Qty</th></tr>
<tr><th>A</th><th>B</th><th>C</th></tr>
<tr><td>Φ≤0.2</td><td colspan="2">Ignore</td><td rowspan="3">Ignore</td></tr>
<tr><td>0.2<Φ≤0.5</td><td colspan="2">2(distance≧10mm)</td></tr>
<tr><td>Φ>0.5</td><td colspan="2">0</td></tr>
</table>
</td></tr>
<tr><td></td><td>Line defect (LCD/TP /Polarizer black/white line, scratch, stain)</td><td>
<table>
<tr><th rowspan="2">Width(mm)</th><th rowspan="2">Length(mm)</th><th colspan="3">Acceptable Qty</th></tr>
<tr><th>A</th><th>B</th><th>C</th></tr>
<tr><td>Φ≤0.03</td><td>Ignore</td><td colspan="2">Ignore</td><td rowspan="3">Ignore</td></tr>
<tr><td>0.03<W≤0.05</td><td>L≤3.0</td><td colspan="2">N≤2</td></tr>
<tr><td>0.05<W≤0.08</td><td>L≤2.0</td><td colspan="2">N≤2</td></tr>
<tr><td>0.08<W</td><td colspan="4">Define as spot defect</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Number</th><th>Items</th><th colspan="3">Criteria (mm)</th></tr>
<tr><td>3.0</td><td>Polarizer Bubble</td><td colspan="3">
<table>
<tr><td rowspan="2">Zone
Size (mm)</td><td colspan="3">Acceptable Qty</td></tr>
<tr><td>A</td><td>B</td><td>C</td></tr>
<tr><td>Φ≤0.2</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr>
<tr><td>0.2<Φ≤0.4</td><td colspan="2">2(distance≧10mm)</td></tr>
<tr><td>0.4<Φ≤0.6</td><td colspan="2">1</td></tr>
<tr><td>0.6<Φ</td><td colspan="2">0</td></tr>
</table>
</td></tr>
<tr><td>4.0</td><td>SMT</td><td colspan="3">According to IPC-A-610C class Ⅱ standard . Function defect and missing part are major defect ,the others are minor defect.</td></tr>
<tr><td rowspan="3">5.0</td><td rowspan="3">TP Related</td><td>TP bubble/ accidented spot</td><td colspan="2">
<table>
<tr><td rowspan="2">Size Φ(mm)</td><td colspan="3">Acceptable Qty</td></tr>
<tr><td>A</td><td>B</td><td>C</td></tr>
<tr><td>Φ≤0.1</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr>
<tr><td>0.1<Φ≤0.2</td><td colspan="2">2</td></tr>
<tr><td>0.2<Φ≤0.3</td><td colspan="2">1</td></tr>
<tr><td>0.3<Φ</td><td colspan="2">0</td></tr>
</table>
</td></tr>
<tr><td>Assembly deflection</td><td colspan="2">beyond the edge of backlight ≤0.15mm</td></tr>
<tr><td>Newton Ring</td><td>Newton Ring area>1/3 TP area NG
Newton Ring area≤1/3 TP area OK</td><td> 
</td></tr>
</table>

		TP corner broken X：length Y：width Z：height	* <table><tr><th>X</th><th>Y</th><th>Z</th></tr><tr><td>X≤3.0mm</td><td>Y≤3.0mm</td><td>Z<LCD thickness</td></tr></table> Circuitry broken is not allowed.	
		TP edge broken X：length Y：width Z：height	<table><tr><th>X</th><th>Y</th><th>Z</th></tr><tr><td>X≤6.0mm</td><td>Y≤2.0mm</td><td>Z<LCD thickness</td></tr></table> * Circuitry broken is not allowed.	

10.Reliability Test Items

Test Item	Test Condition	Test result
High temperature storage	80±3℃, 24H ;	Inspection after 2~4hours storage at room temperature, the sample shall be free from defects: 1.Air bubble in the LCD; 2.Non-display; 3.Glass crack; 4. The electrical characteristics requirements shall be satisfied.
Low temperature storage	-30±3℃, 24H ;	
High temperature operation	70±3℃, 24H ;	
Low temperature operation	-20±3℃, 24H ;	
High temperature /humidity	60℃±3℃,90%±3%RH, 48H ;	
Thermal Shock	-30℃/0.5h~+80℃/0.5h for a total 24 cycles ;	
Vibration Test	Frequency 10Hz~55Hz~10Hz Amplitude：1.5mm, X, Y, Z direction for total 1H ; (Packing condition)	
ESD test	±4KV, Human Body Mode, 150pF/330Ω ; ±8KV, Air Mode, 150pF/330Ω ;	

Remark:

1. The test samples should be applied to only one test item.

2. Sample size for each test item is 2pcs.

3. Failure Judgment Criterion: Basic Specification, Electrical Characteristic, Mechanical Characteristic, Optical Characteristic.

11.Suggestions for using LCD modules

11.1 The display panel is made of glass and polarizer. As glass is fragile. It tends to become or chipped during handling especially on the edges. Please avoid dropping or jarring. Do not subject it to a mechanical shock by dropping it or impact.

11.2 If the display panel is damaged and the liquid crystal substance leaks out, be sure not to get any in your mouth. If the substance contacts your skin or clothes, wash it off using soap and water.

11.3 Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary. Do not touch the display with bare hands. This will stain the display area and degraded insulation between terminals (some cosmetics are determined to the polarizer).

11.4 The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully. Do not touch, push or rub the exposed polarizers with anything harder than an HB pencil lead (glass, tweezers, etc.). Do not put or attach anything on the display area to avoid leaving marks on it. Condensation on the surface and contact with terminals due to cold will damage, stain or dirty the polarizer. After products are tested at low temperature they must be warmed up in a container before coming in to contact with room temperature air.

11.5 If the display surface becomes contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If it is heavily contaminated, moisten cloth with one of the following solvents
Isopropyl alcohol/ Ethyl alcohol
Do not scrub hard to avoid damaging the display surface.

11.6 Solvents other than those above-mentioned may damage the polarizer. Especially, do not use the following.
Water/ Ketene/ Aromatic solvents
Wipe off saliva or water drops immediately, contact with water over a long period of time may cause deformation or color fading. Avoid contact with oil and fats.

11.7 Exercise care to minimize corrosion of the electrode. Corrosion of the electrodes is accelerated by water droplets, moisture condensation or a current flow in a high-humidity environment.

11.8 Install the LCD Module by using the mounting holes. When mounting the LCD module make sure it is free of twisting, warping and distortion. In particular, do not forcibly pull or bend the I O cable or the backlight cable.

11.9 Do not attempt to disassemble or process the LCD module.

11.10 NC terminal should be open. Do not connect anything.

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

11.12 Electro-Static Discharge Control, Since this module uses a CMOS LSI, the same careful attention should be paid to electrostatic discharge as for an ordinary CMOS IC. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

Before removing LCM from its packing case or incorporating it into a set, be sure the module and your body have the same electric potential. Be sure to ground the body when handling the LCD modules.

Tools required for assembling, such as soldering irons, must be properly grounded. Make certain the AC power source for the soldering iron does not leak. When using an electric screwdriver to attach LCM, the screwdriver should be of ground potentiality to minimize as much as possible any transmission of electromagnetic waves produced sparks coming from the commutator of the motor.

To reduce the amount of static electricity generated, do not conduct assembling and other work under dry conditions. To reduce the generation of static electricity be careful that the air in the work is not too dry. A relative humidity of 50%-60% is recommended. As far as possible make the electric potential of your work clothes and that of the work bench the ground potential.

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

11.13 Since LCM has been assembled and adjusted with a high degree of precision, avoid applying excessive shocks to the module or making any alterations or modifications to it.

Do not alter, modify or change the shape of the tab on the metal frame.

Do not make extra holes on the printed circuit board, modify its shape or change the positions of components to be attached.

Do not damage or modify the pattern writing on the printed circuit board.

Absolutely do not modify the zebra rubber strip (conductive rubber) or heat seal connector.

Except for soldering the interface, do not make any alterations or modifications with a soldering iron.

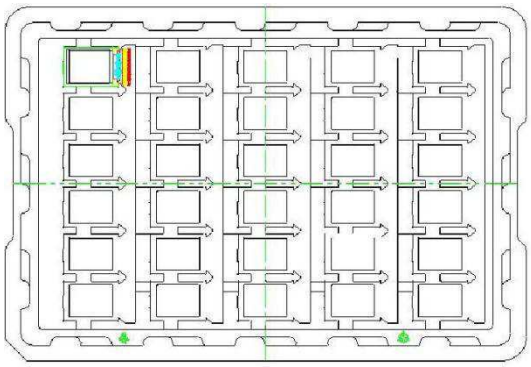
Do not drop, bend or twist the LCM.

ALL SHORE INDUSTRIES

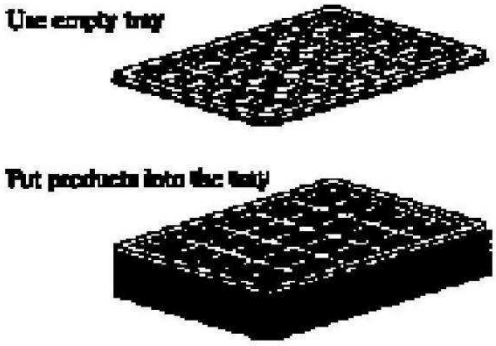
12.Packing and Storage Specification

12.1 Packing Method Reference Only)

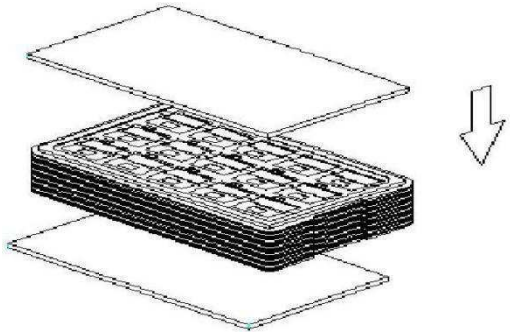
(1)



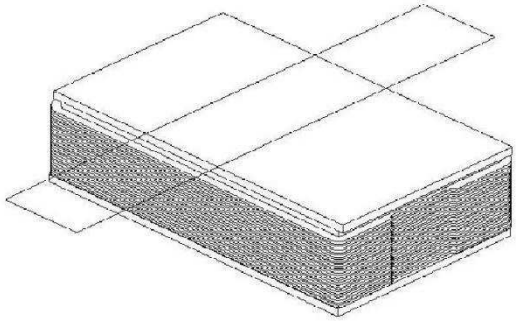
(2)



(3)



(4)



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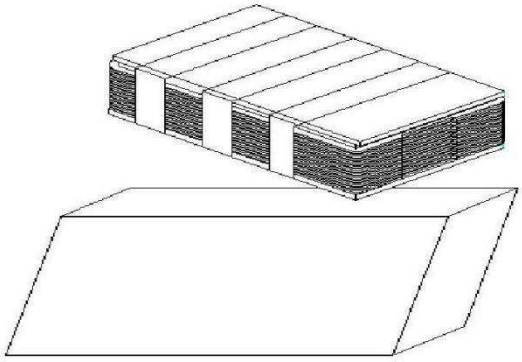
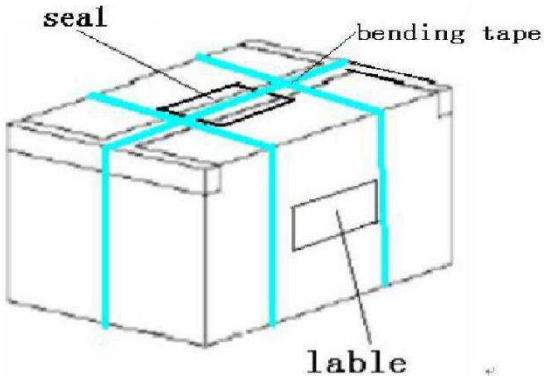


(6)



1. Put module into tray cavity. .
2. Tray stacking. .
3. Put 1 foam under the tray stack and 1 foam above. .
4. Fix the cardboard to the tray stack with adhesive tape. .
5. Put the tray stack into carton. .
6. Carton sealing with adhesive tape. .

12.2 Storage Method

1. Store in an ambient temperature of 23°C±5°C, and in a relative humidity of 55%± 15%. Don't exceed 12 months and expose to sunlight or fluorescent light.

2. Store in a clean environment, free from dust, active gas, and solvent.

3. Store in antistatic container.