深圳市中有科技有限公司

specification

TFT-LCD module

Module(型号):	ZSX024-B2283-A
Customer（客户）：	
Customer P/N（客户型号）：	

Approved by（批准）：	
qualified（合格）：	**Unqualified（不合格）：**

PREPARED	CHECKED	APPROVED

1. General Description

ZSX024-B2283-A is a transmissive type a-si TFT-LCD (amorphous silicon thin film transistor liquid crystal display) module, which is composed of a TFT-LCD panel, a driver circuit a backlight unit, The panel size is 2.4inch and the resolution is 240*320. High image quality a-si TFT LCD module. Partial-screen display function is available. sleep and stand-by modes are available for power saving.

1.1 Features

No	Item	specification	Remark
1	Display Mode	Normally Black	
2	screen size	2.4inch (diagonal)	
3	Resolution	240*RGB*320	
4	Color Number	262K	
5	Color Arrangement	TFT Active matrix	
6	Driver IC	NV3031A	
7	Back Light	White LED4	
8	Viewing Direction	ALL DIRECTION	
9	Interface	MCU_8bit	
10	touch panel	/	

2. Outline Dimension

The mechanical detail is shown in Fig. 1 and summarized in Table 1 below.

Parameter	specifications	Unit
Outline dimensions	42.72(W) x58.65(H) x 2.15(D) (LCM, not include FPC.CTP)	mm
Active area	36.72(W) x48.96(H)	mm
Dot size	0.153(H) × 0.153(V)	mm

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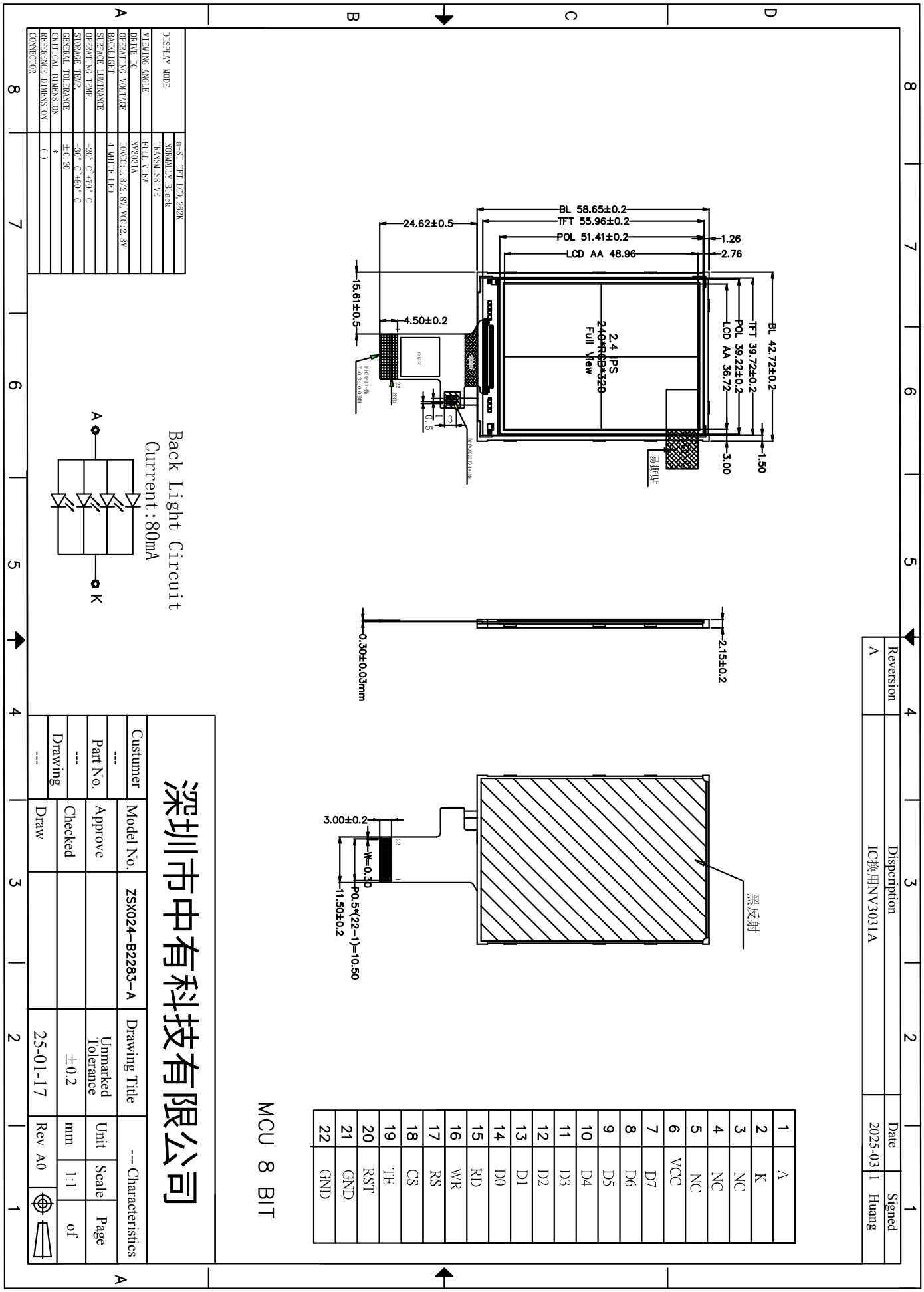
3.Dimensional Drawing



4. Electrical Characteristics

TFT-LCD Module

Item	Symbo	Value			Unit	Notes
		Min	Typ	Max		
supply Voltage for logic	IOVCC	1.65	1.8	3.3	V	
	VCC	2.5	2.8	3.3		
TFT Gate ON Voltage	VGH	12.5	-	14.9	V	
TFT Gate OFF Voltage	VGL	-12.5	-	-7.16	V	
Operating temperature	Top	-20		+70	℃	
storage temperature	Tst	-30		+80	℃	

4.1 Back-Light Unit

Item	symbol	Min.	Typ.	Max.	Unit	Remark
Current	IF	--	80	--	mA	IF=80mA VF=3.0V
Forward voltage	VF	--	3.0	--	V	
Chroma	X	0.250		0.30		
	Y	0.245		0.30		
Brightness	L	--			Cd/m2	
Uniformity	UBL	80			%	

- 4 LEDS used
- The luminous intensity of LED is strongly dependent on the driving current.
- It is recommended the input of backlight to be constant current rather than constant voltage.

5.0 TFT-LCM Interface specification

Nin Do	PymsoI	•esbription	Dote
1	LEDA	Back light power supply positive	
2	LEDk	Back light power supply negative	
3	NC	NC	
4	NC	NC	
5	NC	NC	
6	VCC	LCM Power supply	
7-14	D7--D0	LCM Data	
15	RD	Read enable in 8080 MCU parallel interface	
16	WR	Write enable in MCU parallel interface	
17	RS	Display data/command selection pin in parallel interface	
18	CS	SPI Chip select signal	
19	TE	Tearing effect signal is used to synchronize MCU to frame memory writing.	
20	RESET	Chip reset PIN	
21	GND	Ground	
22	GND	Ground	

6.0 APPLICATION POWER CIRCUIT

7.4.1 8080 Series MCU Parallel Interface Characteristics: 18/16/9/8-bit Bus

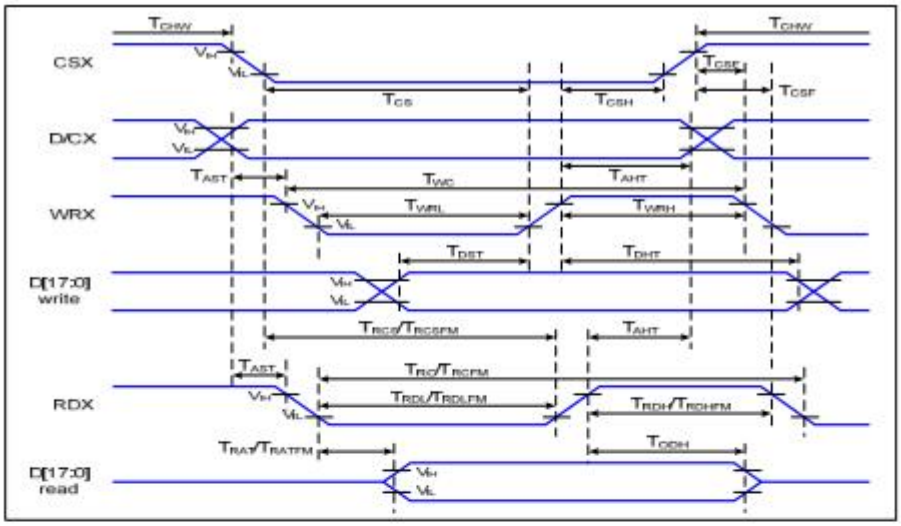


Figure 1 Parallel Interface Timing Characteristics (8080-Series MCU Interface)

VDDI=1.65 to 3.3V, VDD=2.4 to 3.3V, AGND=DGND=0V, Ta=25℃

Signal	Symbol	Parameter	Min	Max	Unit	Description
D/CX	T_{AST}	Address setup time	0		ns	-
	T_{AHT}	Address hold time (Write/Read)	10		ns	
CSX	T_{CHW}	Chip select "H" pulse width	0		ns	-
	T_{CS}	Chip select setup time (Write)	15		ns	
	T_{RCS}	Chip select setup time (Read ID)	45		ns	
	T_{RCSFM}	Chip select setup time (Read FM)	355		ns	
	T_{CSF}	Chip select wait time (Write/Read)	10		ns	
	T_{CSH}	Chip select hold time	10		ns	
WRX	T_{WC}	Write cycle	66		ns	
	T_{WRH}	Control pulse "H" duration	15		ns	
	T_{WRL}	Control pulse "L" duration	15		ns	
RDX (ID)	T_{RC}	Read cycle (ID)	160		ns	When read ID data
	T_{RDH}	Control pulse "H" duration (ID)	90		ns	
	T_{RDL}	Control pulse "L" duration (ID)	45		ns	
RDX (FM)	T_{RCFM}	Read cycle (FM)	450		ns	When read from frame memory
	T_{RDHFM}	Control pulse "H" duration (FM)	90		ns	
	T_{RDLFM}	Control pulse "L" duration (FM)	355		ns	
D[17:0]	T_{DST}	Data setup time	10		ns	For CL=30pF

	T_{DHT}	Data hold time	10		ns	
	T_{RAT}	Read access time (ID)		40	ns	
	T_{RATFM}	Read access time (FM)		340	ns	
	T_{ODH}	Output disable time	20	80	ns	

Table 4 8080 Parallel Interface Characteristics

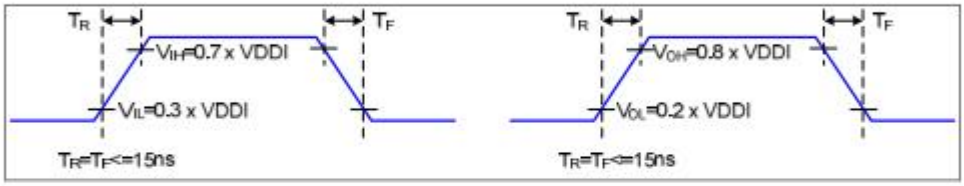


Figure 2 Rising and Falling Timing for I/O Signal

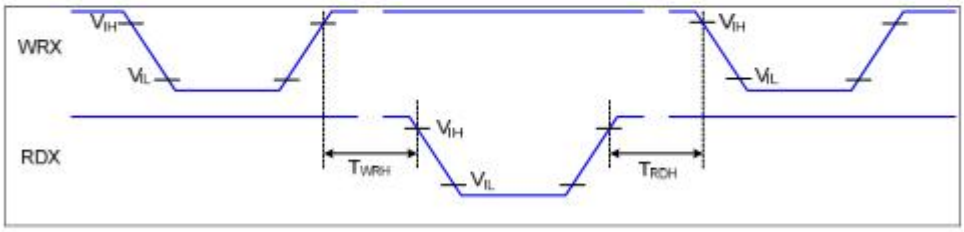


Figure 3 Write-to-Read and Read-to-Write Timing

Note: The rising time and falling time (Tr, Tf) of input signal and fall time are specified at 15 ns or less. Logic high and low levels are specified as 30% and 70% of VDDI for Input signals.

7.0 Optical specification

7.1 Overview

The test of Optical specifications shall be measured in a dark room (ambient luminance1lux and temperature = 25 2℃) with the equipment of Luminance meter system(Goniometer system and TOPCON BM-5) and test unit shall be located at an approximatedistance 50cm from the LCD surface at a viewing angle of θ and Φ equal to 0 . We refer to θ Ø=0 (= θ 3) as the 3 o"clock direction (the "right"), θ Ø=90 (= θ 12) as the 12 o"clockdirection ("upward"), θ Ø=180 (= θ 9) as the 9 o"clock direction ("left") and θ Ø=270(= θ 6) asthe 6 o"clock direction ("bottom"). While scanning θ and/or Ø, the center of the measuringspot on the Display surface shall stay fixed.Optimum viewing angle direction is 6 "clock.

7.2 Optical Specifications

Note :

1. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing angles are determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface (see FIGURE 1).

2. Contrast measurements shall be made at viewing angle of Θ= 0 and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state . (see FIGURE 1) Luminance Contrast Ratio (CR) is defined mathematically.

$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

3. Transmittance is the Value with Polarizer

4. The color chromaticity coordinates specified in Table 5 shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.

5. The electro-optical response time measurements shall be made as FIGURE 3 by switching the "data" input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is Tr, and 90% to 10% is Td.

8. STANDARD SPECIFICATION FOR RELIABILITY

Item	Condition	Time (hrs)	Assessment
High temp. storage	80oC	120	No abnormalities in functions and appearance
High temp. operating	70oC	120	
Low temp. storage	-30oC	120	
Low temp. operating	-20oC	120	
Humidity	40oC/ 90%RH	120	
Thermal shock Temp. Cycle	-20oC → 25oC →70oC (0.5 hour → 5 min → 0.5 hour)	10cycles	

Functions, performance, appearance, etc. shall be free from remarkable deterioration within 50,000 hours under ordinary operating and storage conditions room temperature (25±10℃), normal humidity (45±20% RH), and in area not exposed to direct sun light. (Life time of backlight, please refer to Data about backlight.)

Testing Conditions and Inspection Criteria:

For the final test the testing sample must be stored at room temperature for 24 hours, after the tests listed in up Table, standard specifications for Reliability have been executed in order to ensure stability.

Item	Test Model	In section Criteria
Current Consumption	Refer To specification	The current consumption should conform to the product specification.
Contrast	Refer To specification	After the tests have been executed, the contrast must be larger than half of its initial value prior to the tests.
Appearance	Visual inspection	Defect free.

8. SPECIFICATION OF OUALITY ASSURANCE

8-1 Purpose

This standard for Ouality Assurance should affirm the quality of LCD module products to supply to purchaser by saef Technology Limited.

8-2 standard for 0uality Test

a. Inspection:

Before delivering, the supplier should take the following tests, and affirm the quality of product.

b. Electro-optical Characteristics:

According to the individual specification to test the product.

c. Test of Appearance Characteristics:

According to the individual specification to test the product.

d. Test of Reliability Characteristics:

According to the definition of reliability on the specification for testing products.

e. Delivery Test:

Before delivering, the supplier should take the delivery test.

(i) Test method: According to mIL-sTD105E.General Inspection Level Ⅰ take a single time.

(ii) The defects classify of AOL as following:

major defect: AOL = 0.65

minor defect: AOL = 2.5 Total

defects: AOL = 2.5

8-3. Nonconforming Analysis & Deal Ｗith manners

a. Nonconforming Analysis:

(i) Purchaser should supply the detail data of non- conforming sample and the non- conforming.

(ii) After accepting the detail data from purchaser, the analysis of nonconforming should be finished in two weeks.

(iii) If supplier can not finish analysis on time, must announce purchaser before two weeks.

b. Disposition of nonconforming:

(i) If find any product defect of supplier during assembly time, supplier must change the good product for every defect after recognition.

(ii) Both supplier and customer should analyze the reason and discuss the disposition of nonconforming when the reason of nonconforming is not sure.

8-4. Agreement items

Both sides should discuss together when the following problems happen.

a. There is any problem of standard of quality assurance, and both sides think that it must be modified.

b. There is any argument item which does not record in the standard of quality assurance.

c. Any other special problem.

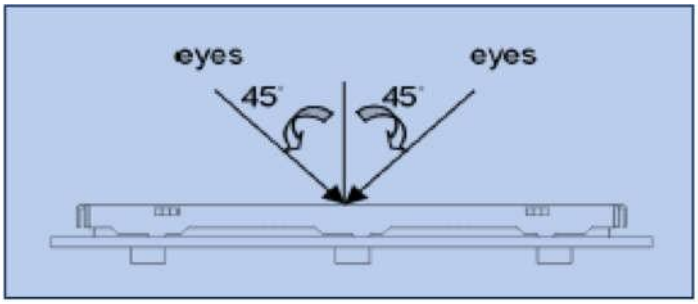
8-5 standard of The Product Appearance Test

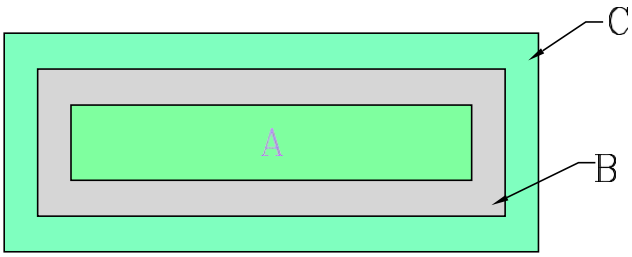
a. manner of appearance test: This specification should be applied for both light on and off situation.

(i) The test must be under 20 w x 2 or 40 w fluorescent light, and the distance of

(ii) view mustbe at 30±5cm .

(iii) w hen test the model of transmissive product must add the reflective plate. (iii)The test direction is base on about around 10o of vertical line (Left graph) (iiii)Temperature: 25±5 ℃ Humidity: 65±





10%RH

(iv) Definition of area (Right graph)

A. Area: Viewing area. B. Area: out of viewing area.(outside viewing area)

b. Basic principle:

(i) It will accord to the AOL when the standard can not be described.

(ii) The sample of the lowest acceptable quality level must be discussed by both supplier and customer when any dispute happened.

(iii) must add new item on time when it is necessary.

c. standard of inspection: (Unit: mm)

Allowable limits defined in follow Dot defect Table should be met for each white, black , R, G, B raster. The limits apply to the entire area. missing white in 60% or more of typical (one color, R or G or B) pixel aperture is defined as a bright defect, less than 60% is acceptable .Black spot in 60% or more of typical pixel aperture is defined as a dark defect, less than 60% is acceptable.

Dot defect table:

Item		w hite dot defect	Black dot defect	Total
1	Defec t count s	3	3	3
2	Combine d defect Counts	No combined dot defect allowed. Two single dot defect that within 5mm during each dot defect should becounted as combined dot defect.		

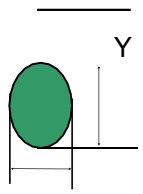
8-6 Inspection specification

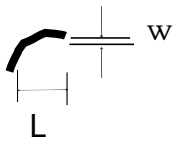
AQL inspection standard

sampling method: mIL-sTD-105E, Level II, single sampling

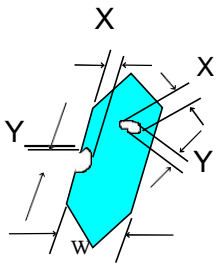
Classify	Item		Note	A0L
major	Display state	short or open circuit	1	0.65
		Contrast defect (dim, ghost)		
		LC leakage		
		Flickering		
		No display		
		Wrong viewing direction	2	
		Wrong Back-light	7	
	Non-display	Flat cable or pin reverse	9	
		Wrong or missing component	10	
minor	Display state	Background color deviation	2	2.5
		Black spot and dust	3	
		Line defect	4	
		scratch		
		Rainbow	5	
		Pin hole	6	
	Polarizer	Bubble and foreign material	3	
		scratch	4	
	PCB,FPC	scratch	4	
	soldering	Poor connection	8	
	wire	Poor connection	9	
	LCD	CHIP OUT	11	

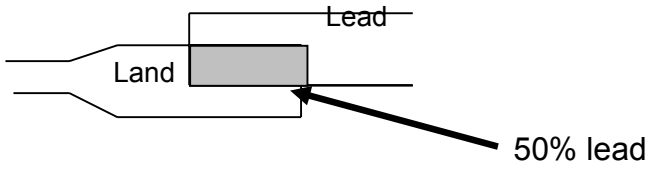
Note on defect classification:

<table>
<tr><th>No.</th><th>Item</th><th>Criterion</th></tr>
<tr><td rowspan="6">1</td><td>short or open circuit</td><td rowspan="6">Not allow</td></tr>
<tr><td>LC leakage</td></tr>
<tr><td>Flickering</td></tr>
<tr><td>No display</td></tr>
<tr><td>Wrong viewing direction</td></tr>
<tr><td>Wrong Back-light</td></tr>
<tr><td rowspan="2">2</td><td>Contrast defect</td><td rowspan="2">Refer to approval sample</td></tr>
<tr><td>Background color deviation</td></tr>
<tr><td>3</td><td>Point defect, Black spot, dust (incl. Polarizer) ex.: dirt under polarizer, Pinhole of reflector ,glass scratch, dirt under glass,scratch on polarizer
6 = (X+Y)I2</td><td> 

<table>
<tr><th>Point</th><th>Acceptable Oty.</th></tr>
<tr><td>size</td><td></td></tr>
<tr><td>6≤0.10</td><td>Disregard</td></tr>
<tr><td>0.10<6s0.20</td><td>3</td></tr>
<tr><td>0.20<6s0.25</td><td>2</td></tr>
</table>
Unit: mm</td></tr>
<tr><td>4</td><td>Line defect</td><td> 

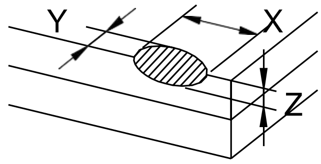
<table>
<tr><th></th><th>Line</th><th>Acceptable Oty.</th></tr>
<tr><td>L</td><td>w</td><td></td></tr>
<tr><td>---</td><td>0.015> w</td><td>Disregard</td></tr>
<tr><td>3.0>L</td><td>0.03> w</td><td rowspan="2">2</td></tr>
<tr><td>2.0>L</td><td>0.05> w</td></tr>
<tr><td>1.0>L</td><td>0.1> w</td><td>1</td></tr>
<tr><td>---</td><td>0.05< w</td><td>Applied as point</td></tr>
</table>
Unit: mm</td></tr>
<tr><td>5</td><td>Rainbow</td><td>Not more than two color changes across the viewing area</td></tr>
<tr><th>No.</th><th>Item</th><th>Criterion</th></tr>
</table>

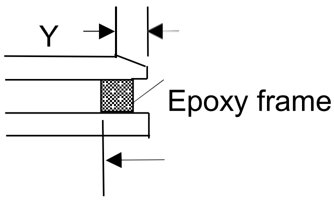
<table>
<tr><td>6</td><td>segmen
t
pattern
W = segment
width
6 = (X+Y)I2</td><td>(1) Pin hole
6 ＜0.15mm is acceptable.
 

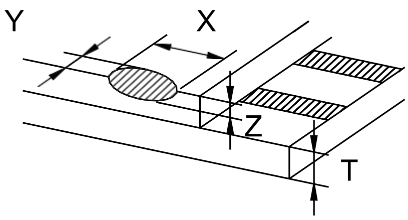
<table>
<tr><td>Point size</td><td>Acceptable Oty</td></tr>
<tr><td>6s1/4 w</td><td>Disregard</td></tr>
<tr><td>1/4 w ＜6s1/2 w</td><td>1</td></tr>
</table>
Unit: mm</td></tr>
<tr><td>7</td><td>Back-light</td><td>(1) The color of backlight should correspond its specification.
(2) Not allow flickering</td></tr>
<tr><td>8</td><td>soldering</td><td>(1) Not allow heavy dirty and solder ball on PCB or FPC. (The size of dirty refer to point and dust defect)
(2) over 50% of lead should be soldered on Land.
 
</td></tr>
<tr><td>9</td><td>Wire</td><td>(1) Copper wire should not be rusted
(2) Not allow crack on copper wire connection.
(3) Not allow reversing the position of the flat cable.
(4) Not allow exposed copper wire inside the flat cable.</td></tr>
<tr><td>10</td><td>PCB,FPC</td><td>(1) Not allow screw rust or damage.
(2) Not allow missing or wrong putting of component.</td></tr>
</table>

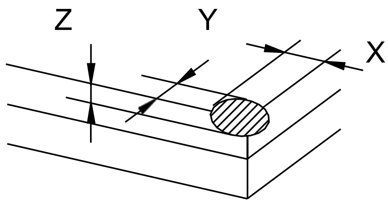
11 LCD

- **chip on the surface**



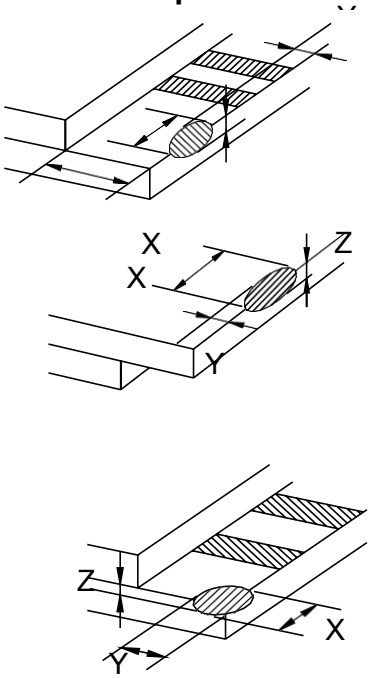
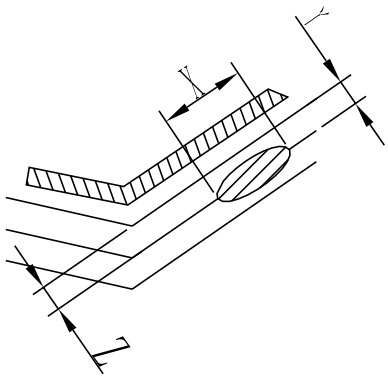


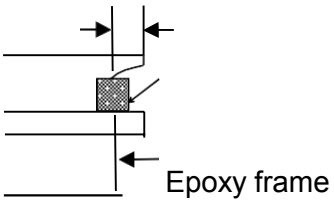


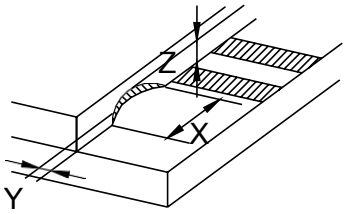


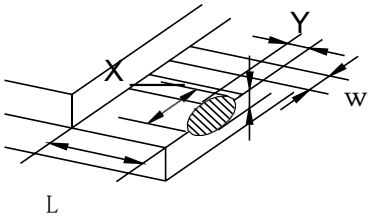
Note: A:LCD Length

X	**Y**	Z
> 1/8A	s0.3mm	s1/2 T
s1/8A	Not enter into epoxy frame	sT
	Not enter into the inner edge of epoxy	s1/2 T

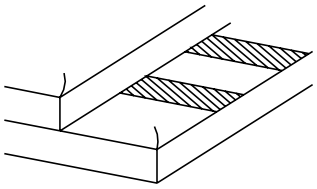
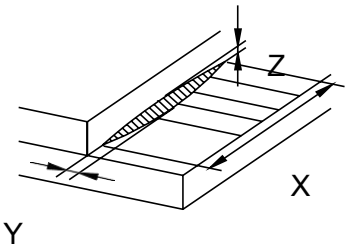
11	LCD	**2.1.2chip on the terminal**  x: > 1/8A; Y: ≤0.3mm; Z: ≤1/2T x: ≤1/8A; Y: ≤1/2L; Z: ≤T x: ≤1/8A& ≤1mm; Y: ≤L; Z: ≤T x: ≤1/8A& ≤2mm; Y: ≤L; Z: ≤1/2T Note: A:LCD Length. the distance between crack and contact pad must be greater than the width of 1st contact pad. **2.1.3chip out on between side** 

<table>
<tr>
<td>11</td>
<td>LCD</td>
<td>Y
 



<table>
<tr><th>X</th><th>Y</th><th>Z</th></tr>
<tr><td rowspan="2">≤
1/8A</td><td>Not enter into epoxy frame</td><td>Z≤2T</td></tr>
<tr><td>Not enter into 1/2</td><td>Z≤1/2T</td></tr>
</table>
Note: A : LCD Length
2.1.4 including corner chip and side chip


Note: A:LCD Length
<table>
<tr><th>X</th><th>Y</th><th>Z</th></tr>
<tr><td>> 1/8A</td><td>s1/6L</td><td rowspan="3">s1/2T</td></tr>
<tr><td>s1/8A</td><td>s1/3L</td></tr>
<tr><td>s1/4
W</td><td>s2/3L</td></tr>
</table>
</td>
</tr>
</table>

<table>
<tr><td rowspan="2">11</td><td rowspan="2">LCD</td><td>2.2 Chip out
 
1) Chip out is that crackles extend to inner edge.
2) Crackles round epoxy frame will be rejected.
3) Chip out on the terminal will be rejected: Z=T length > 1mm or Z<T length >2mm
4) The chip out at ITO will be rejected.</td></tr>
<tr><td>2.3 Poor cutting
 

<table>
<tr><th>X</th><th>Y</th><th>Z</th></tr>
<tr><td>> 1/8 A</td><td>s0.3</td><td>s1/2T</td></tr>
<tr><td>s1/8 A</td><td>According to drawing</td><td>1/2TsZs T</td></tr>
</table>
Note : A: LCD Length.</td></tr>
<tr><td>12</td><td>SMT</td><td>According to the <Acceptable of electronic assemblies> IPC-A-610C class 2 stander. Component missing or function defect are major defect ,the others are minor defect.</td></tr>
<tr><td colspan="3">Any one out of the specification will be rejected.</td></tr>
</table>