深圳市一众显示科技有限公司

SHEN ZHEN TEAM SOURCE DISPLAY TECH. CO, LTD.

TFT-LCD Module Specification

Module NO.：TST101WXBN-17

Version：V01

☐ **APPROVAL FOR SPECIFICATION** ☐ **APPROVAL FOR SAMPLE**

For Customer's Acceptance：	
Approved by	**Comment**

Team Source Display：		
Presented by	**Reviewed by**	**Organized by**

Records of Revision

DATE	REF.PAGE PARAGRAPH DRAWING No.	REVISED No.	SUMMARY	REMARK
2018-6-26		V01	First Issue	

Contents

1. General Specification

Item	Contents	Unit
LCD TYPE	TFT/TRANSMISSIVE	
MODULE SIZE (W*H*T)	229.7*149.15*5.0	MM
ACTIVE SIZE (W*H)	216.96*135.6	MM
PIXEL PITCH (W*H)	0.1695*0.1695	MM
NUMBER OF DOTS	1280*800	
DRIVER IC	TBD	
INTERFACE TYPE	LVDS	
TOP POLARIZER TYPE	ANTI-GLARE	
RECOMMEND VIEWING DIRECTION	ALL	O'CLOCK
GRAY SCALE INVERSION DIRECTION	-	O'CLOCK
BACKLIGHT TYPE	36-DIES WHITE LED	
TOUCH PANEL TYPE	WITHOUT	

2. Mechanical Drawing

3. Block Diagram

4.Interface Pin Function

Pin No.	Symbol	Description
1	VCOM	Common Voltage
2	VDD	Logic power 3.3V
3	VDD	Logic power 3.3V
4	NC	No connect
5	NC	No connect
6	NC	No connect
7	GND	Ground
8	RXIN0-	-LVDS differential data input
9	RXIN0+	+ LVDS differential data input
10	GND	Ground
11	RXIN1-	-LVDS differential data input
12	RXIN1+	+ LVDS differential data input
13	GND	Ground
14	RXIN2-	-LVDS differential data input
15	RXIN2+	+ LVDS differential data input
16	GND	Ground
17	RXCLKIN-	-LVDS differential data input
18	RXCLKIN+	+ LVDS differential data input
19	GND	Ground
20	RXIN3-	-LVDS differential data input
21	RXIN3+	+ LVDS differential data input
22	GND	Ground
23	NC	No connect
24	NC	No connect
25	GND	Ground
26	NC	No connect
27	NC	No connect
28	NC	No connect
29	AVDD	Power for Analog Circuit
30	GND	Ground
31	LED-	LED cathode
32	LED+	LED anode
33	NC	No connect
34	NC	No connect
35	VGL	Gate OFF Voltage
36	NC	No connect
37	NC	No connect
38	VGH	Gate ON Voltage
39	LED+	LED anode
40	LED+	LED anode

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5.Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit	
Supply voltage for analog	VDD	-0.3	5	V	
Supply voltage for logic	VDD	-0.5	5	V	
Supply current (One LED)	I_{LED}		60	mA	
Operating temperature	T_{OP}	-20	+60	°C	
Storage temperature	T_{ST}	-20	+80	°C	

Note : The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

6.Electrical Characteristics

6.1 Input Power

Item	Symbol	Min	Typ.	Max	Unit	Applicable terminal
Supply Voltage for Logic	VDD	3.0	3.3	3.6	V	
Supply Voltage for Analog	AVDD	8.3	8.5	8.7	V	
Power supply	VGH	21.5	22	22.5	V	
Power supply	VGL	7.7	8.2	8.7	V	
Power supply	VCOM	3.2	3.4	3.6	V	
Input Voltage	V_{IL}	GND	-	0.3VDD	V	
	V_{IH}	0.7VDD	-	VDD		
Input leakage Current	I_{LKG}	-	-	-	μA	

6.2 Backlight Driving Conditions

Item	Symbol	Value			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED Backlight	V_F	10.8	12.8	13.6	V	I_L =360mA
Current for LED Backlight	I_L		360		mA	
Power Consumption	P		4.608		W	
LED Life Time		30,000	50,000		Hr	Note

Note: Brightness to be decreased to 50% of the initial value at ambient temperature TA=25℃

7.Optical Characteristics

ITEM		SYMBOL	CONDITIONS	SPECIFICATIONS			UNIT	NOTE
				MIN	TYP.	MAX		
Luminance		L	I_L =360mA	800	1000	1200	Cd/m^2	
Contrast Ratio		CR	θ=0°	700	900			
Response Time		T_{ON}	25℃		30		ms	
		T_{OFF}						
CIE Color Coordinate	Red	X_R	Viewing normal angle		TBD			
		Y_R			TBD			
	Green	X_G			TBD			
		Y_G			TBD			
	Blue	X_B			TBD			
		Y_B			TBD			
	White	X_W		0.283	0.303	0.323		
		Y_W		0.319	0.339	0.359		
Viewing Angle	Hor.	θ_{X+}	CR≥10		80		Degree	Gray scale inversion
		θ_{X-}			80			
	Ver.	θ_{Y+}			80			
		θ_{Y-}			80			
Uniformity		Un		75	80		%	

Note 1: Definition of Viewing Angle **θx** and **θy:**
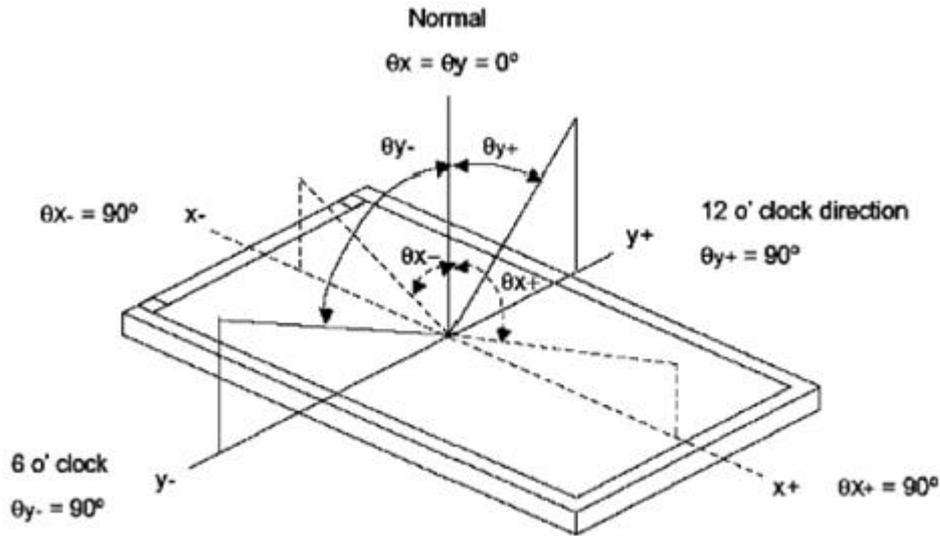
Note 2: Definition of contrast ratio CR:

$$CR = \frac{\text{Luminance of white state}}{\text{Luminance of black state}}$$
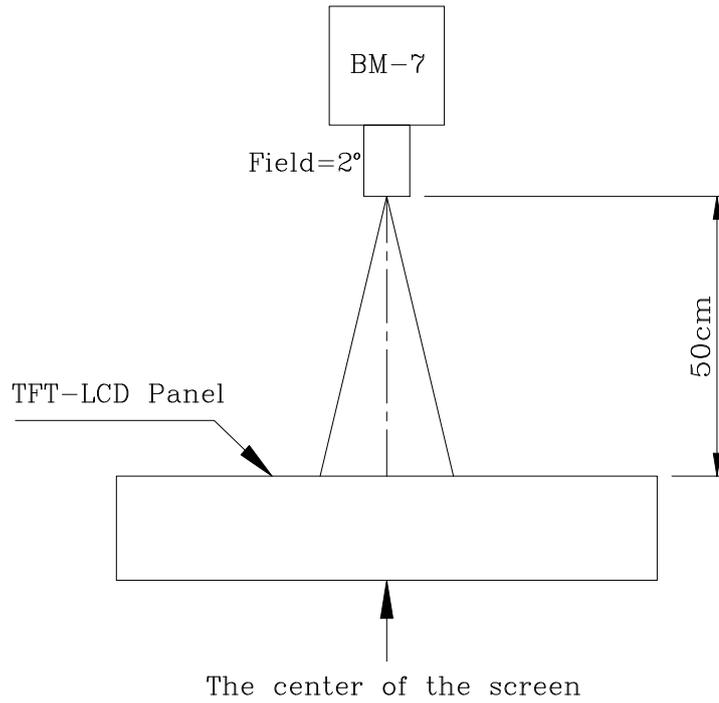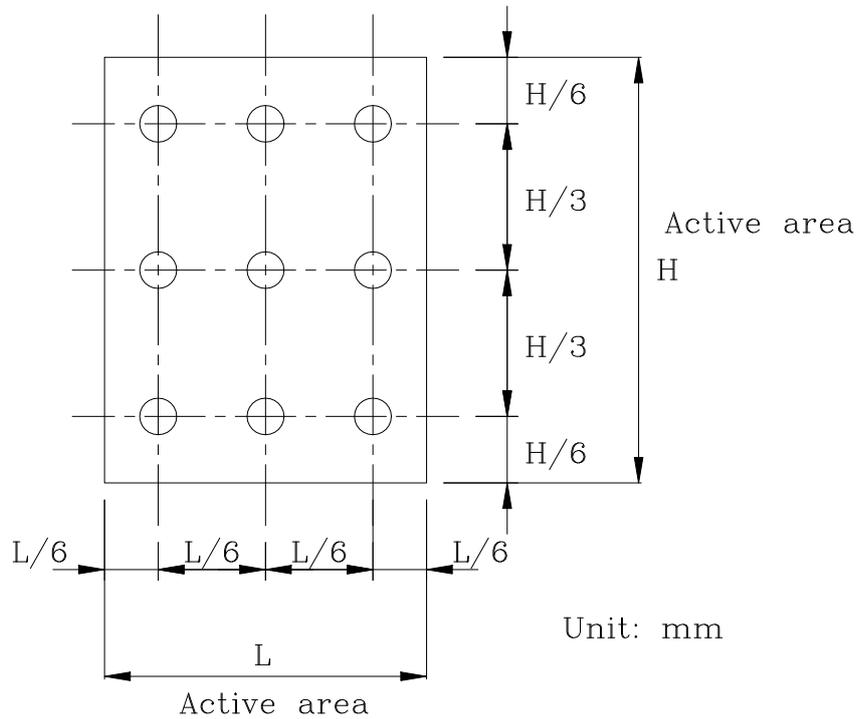
Note 3: Definition of Response Time(Tr,Tf)
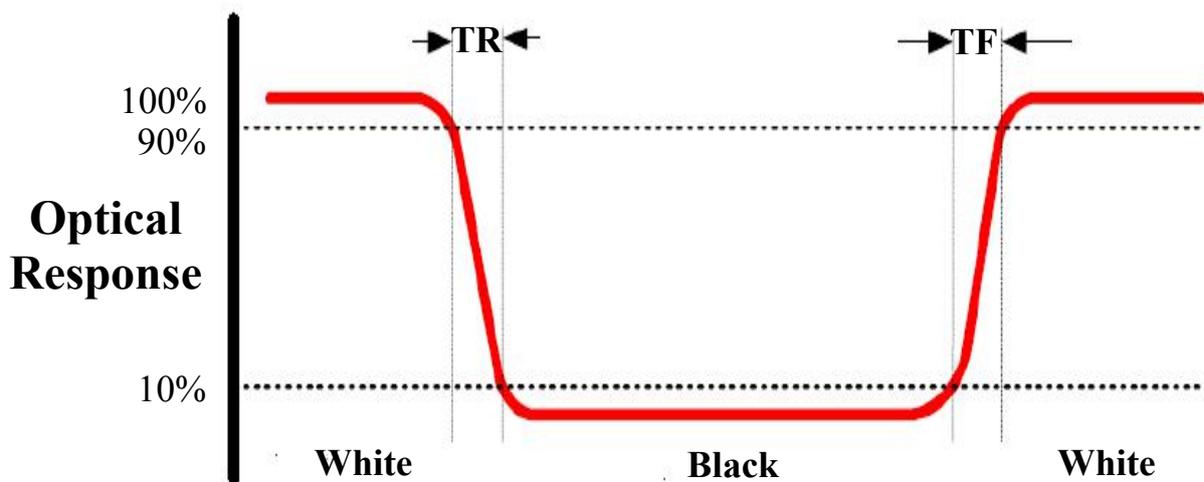
Note 4: Definition of Luminance
①The Brightness Test Equipment Setup

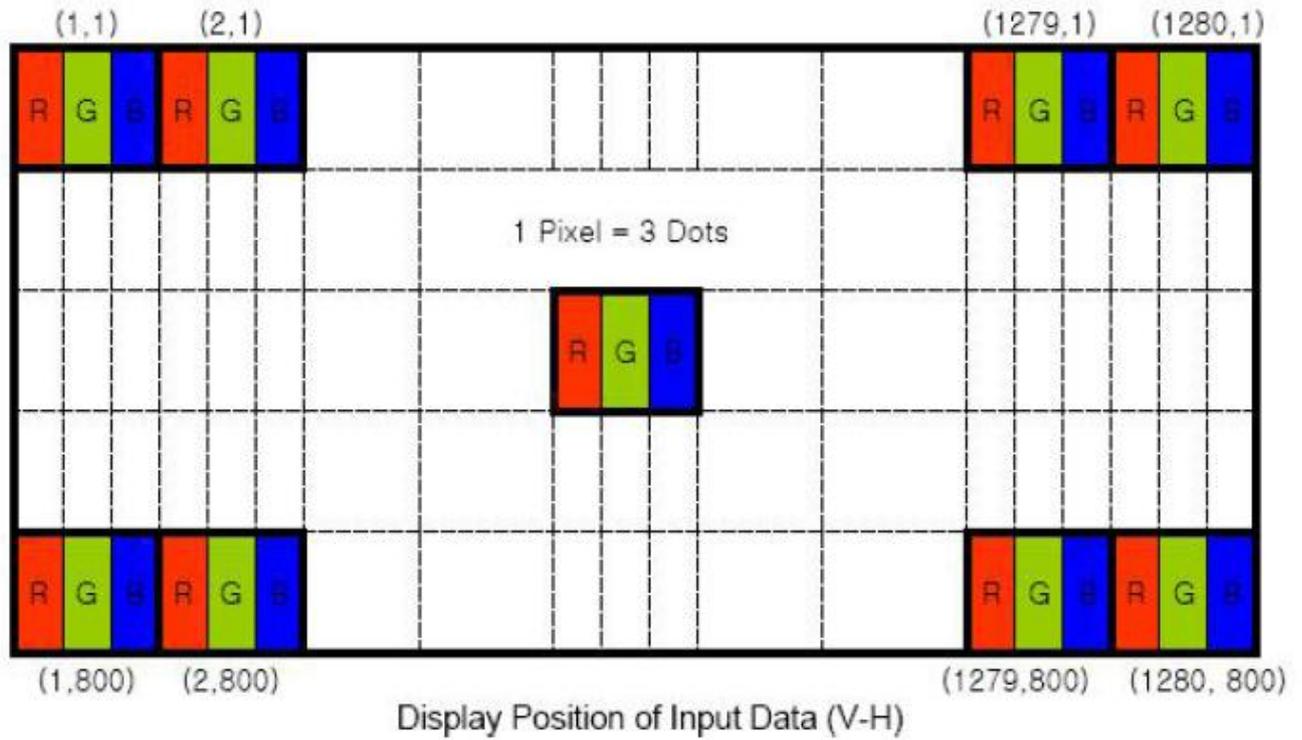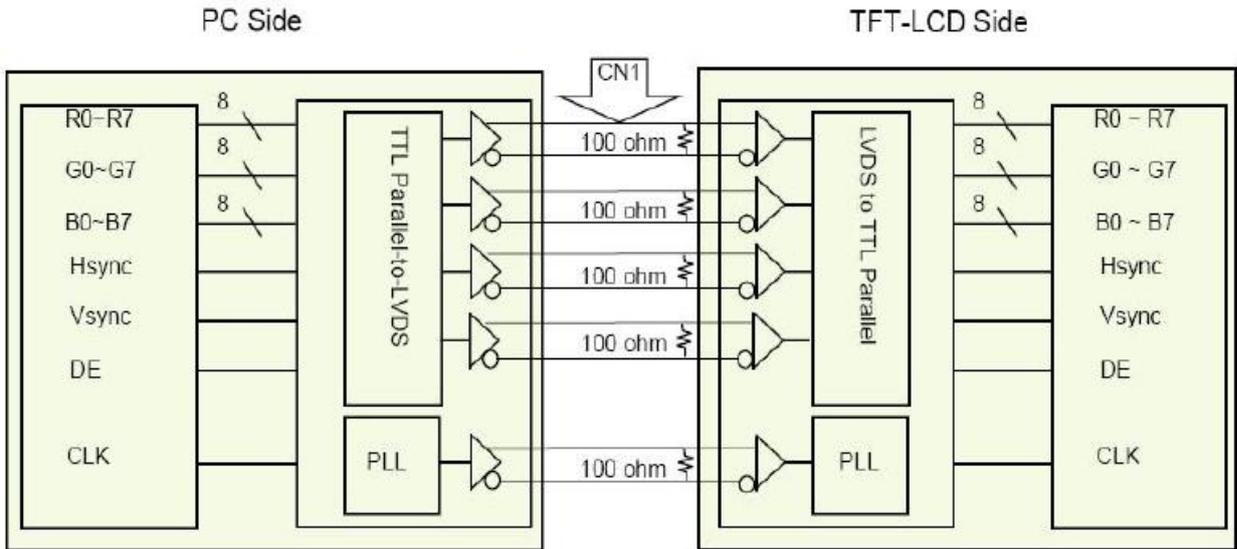Field=2° (As measuring "black" image, field=2° is the best testing condition)

BM-7

Field=2°

50cm

TFT-LCD Panel

The center of the screen

②The Brightness Test Point Setup

H/6

H/3

Active area
H

H/3

H/6

Active area
H

L/6   L/6   L/6   L/6

Unit: mm

L

Active area

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8.Timing Characteristics

8.1 DATA input format

Display Position of Input Data (V-H)

8.2 LVDS interface

8.3 LVDS input signal
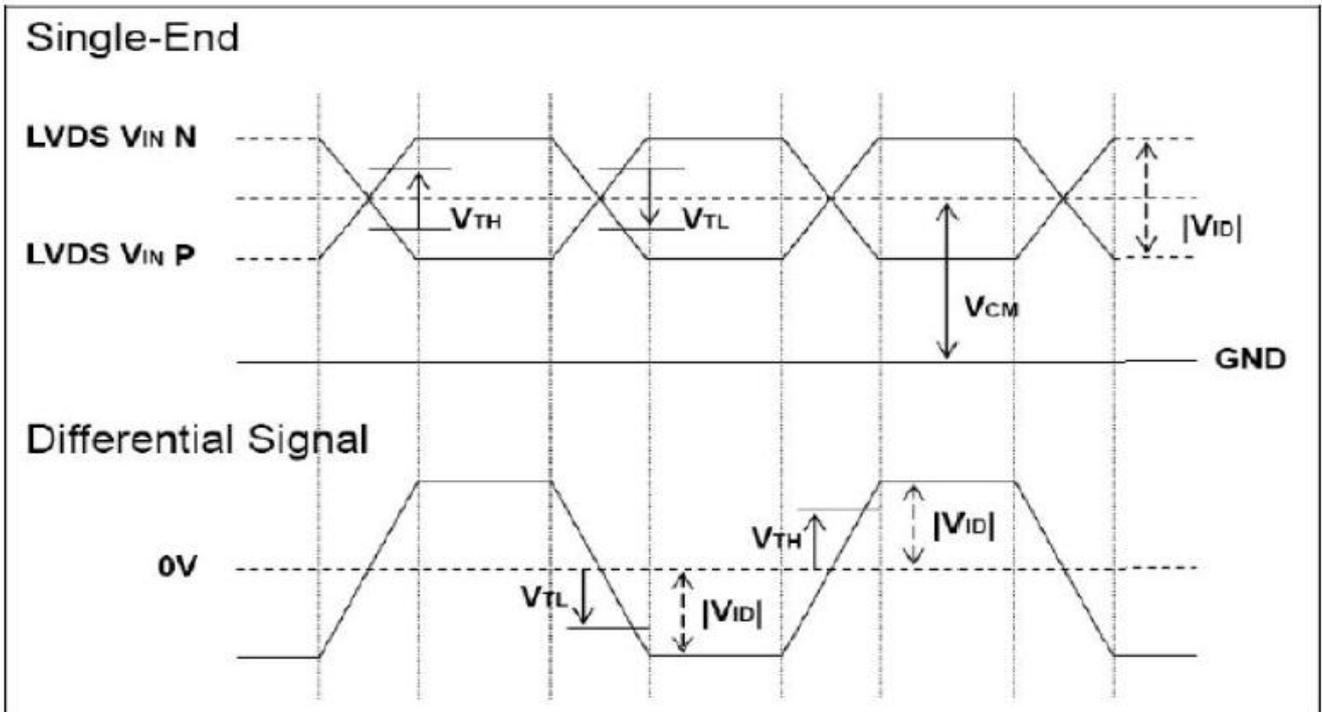
8.4 LVDS timing specification

Signal	Item	Symbol	Min	Type	Max	Unit
DCLK	Frequency	1/TC	60	65	70	MHz
	Cycle	Tc	16.66	15.38	14.3	ns
DE	Horizontal Period	THd	1280	1280	1280	Tc
	Horizontal Cycle	TH	1310	1330	1560	Tc
		TH_time	19.5	20.46	21.83	ns
	Vertical Period	TVd	800	800	800	Tc
	Vertical Cycle	TV	-	812	-	Tc

Interface Timing
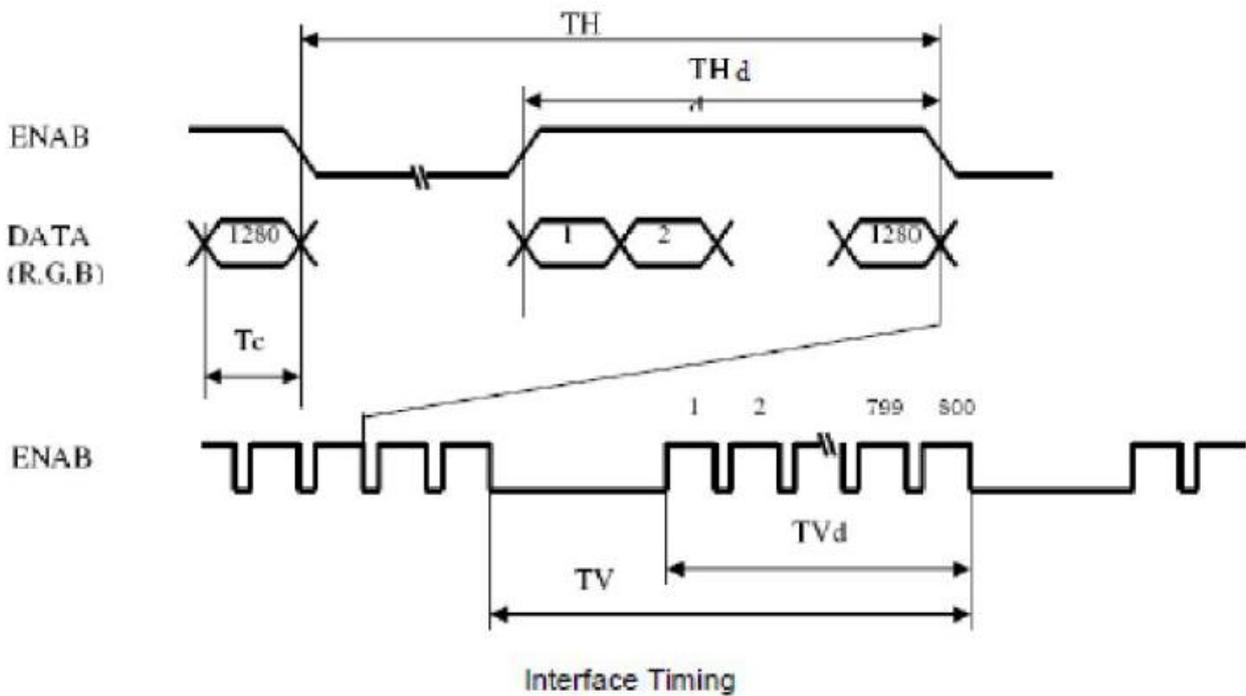
8.5 INPUT clock and timing diagram
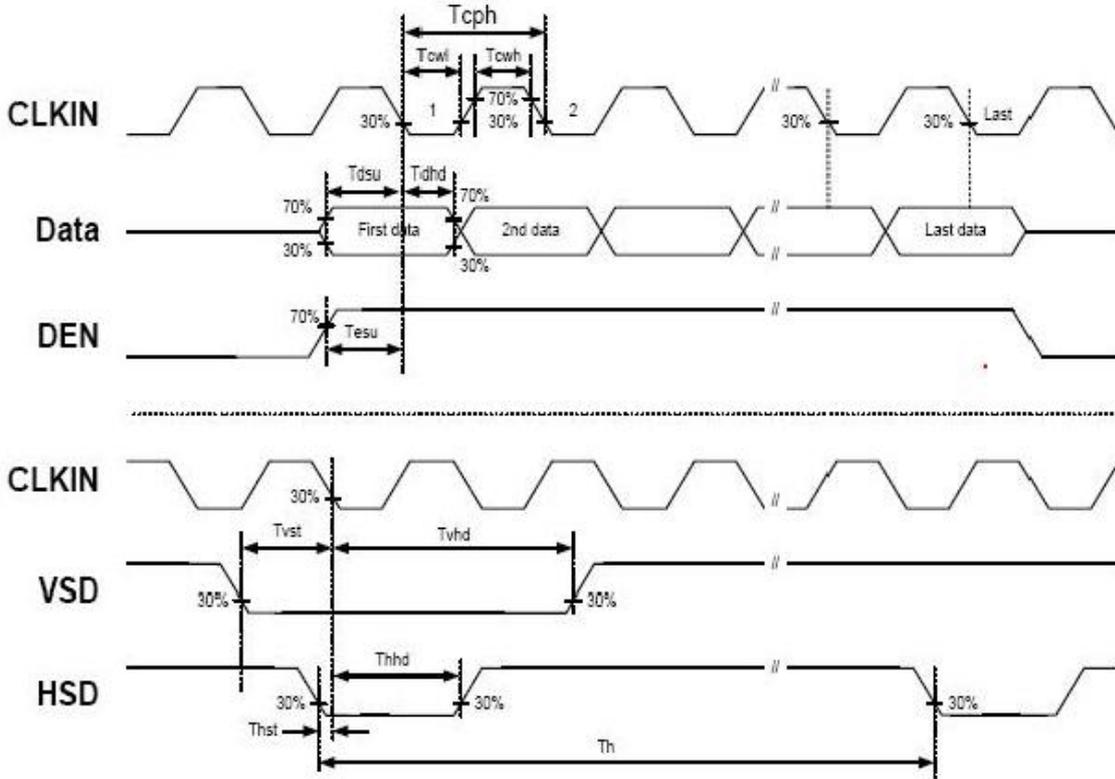
9.Standard Specification for Reliability
9.1 Standard Specification for Reliability of LCD Module

No.	Item	Description	Remarks
01	High temperature operation	Ts=+60℃, 240hrs.	Note1, IEC60068-2-2,GB2423.2—89
02	Low temperature operation	Ta=-20℃, 240hrs	Note2, IEC60068-2-1,GB2423.1—89
03	High temperature storage	Ta=+80℃, 240hrs	IEC 60068-2-2, GB2423.2-89
04	Low temperature storage	Ta=-20℃, 240hrs	IEC 60068-2-1, GB2423.1-89
05	High Temperature & High Humidity（NonOperation）	+60℃, 90% RH max,240 hours	IEC60068-2-3, GB/T2423.3—2006
06	Thermal Shock (Nonoperation)	-20℃ 30 min~+80℃ 30 min, Change time:5min, 30 Cycle	Start with cold temperature, end with high temperature IEC60068214,GB2423.22—87
07	Electro Static Discharge (Operation)	C=150pF, R=330Ω，5points/panel Air:±8KV，5times;Contact:±4KV，5 times;（Environment: 15℃～35℃， 30%～60%，86Kpa～106Kpa）	IEC 61000-4-2 GB/T17626.2-1998
08	Vibration (Nonoperation)	Frequency range:10~55Hz, Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X.Y.Z.(packagecondition)	IEC60068-2-6 GB/T2423.10—1995
09	Shock (Nonoperation)	60G 6ms, ±X,±Y,±Z 3times for each direction	IEC60068-2-27 GB/T2423.5—1995
10	Package Drop Test	Height:80 cm，1 corner, 3 edges, 6 surfaces	IEC60068-2-32 GB/T2423.8—1995

Note1: Ts is the temperature of panel's surface.
Note2: Ta is the ambient temperature of sample.

9.2 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 Table 9.2, standard specifications for reliability will be executed in order to ensure stability.

No.	Item	Test Model	In section Criteria
01	Current Consumption	Refer To Specification	The current consumption should conform to the product specification.
02	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.
03	Appearance	Visual inspection	Defect free.

9.3 MTBF

MTBF	Functions, performance, appearance, etc. shall be free from remarkable deterioration within 50,000 hours under ordinary operating and storage conditions room temperature (25±5℃), normal humidity (50±10% RH), and in area not exposed to direct sun light.

10.Specification of Quality Assurance

This standard of Quality Assurance confirms to the quality of LCD module products supplied by Tecenstar.

10.1 Quality Test

Before delivering, the supplier should conduct the following tests to confirm the quality of products.

- Electrical-Optical Characteristics: According to the individual specification to test the product.
- Appearance Characteristics: According to the individual specification to test the product.
- Reliability Characteristics: According to the definition of reliability on the specification for testing products.

10.2 Delivery Test

Before delivering, the supplier should conduct the delivery test.

- Test method: According to MIL-STD105E.General Inspection Level Ⅱ take a single Time.
- The defects classify of AQL as following:
  Major defect: AQL = 0.65
  Minor defect: AQL = 1.5
  Total defects: AQL = 1.5

10.3 Non-conforming Analysis & Deal With Manners

10.3.1 Non-conforming Analysis

- Purchaser should provide the data detail of non-conforming sample and the non-conforming.
- After receiving the data detail from purchaser, the analysis of non-conforming should be finished within two weeks.
- If the analysis can't be finished on time, supplier must notice purchaser 3 days in advance.

10.3.2 Disposition of non-conforming

- If any product defect be found during assembling, supplier must change the good for every defect after confirmation.
- Both supplier and customer should analyze the reason and discuss the disposition of non-conforming when the reason of nonconforming is not sure.

10.4 Agreement items

Both parties should negotiate together when the following problems happen.

- There is any problem of standard of quality assurance, and both sides should agree that it must be modified.
- There is any argument item which does not record in the standard of quality assurance.
- Any other special problem.

10.5 Standard of The Product Appearance Test

10.5.1 Manner of appearance test

- The test must be under 20W × 2 or 40W fluorescent light, and the distance of view must be at 30±5cm.
- When test the model of transmissive product must add the reflective plate.
- The test direction is base on around 10° of vertical line.
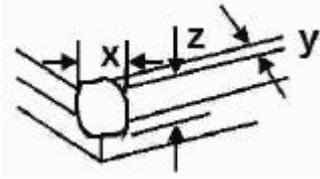- Temperature: 25±5℃   Humidity: 60±10%RH

● Definition of area:
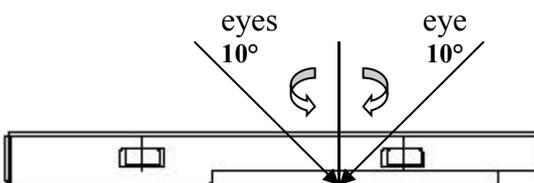
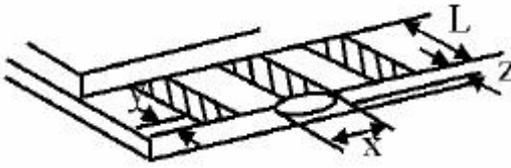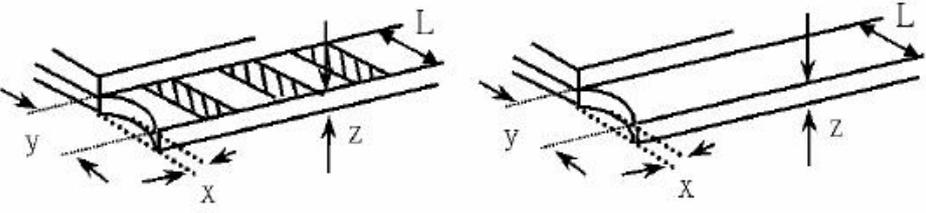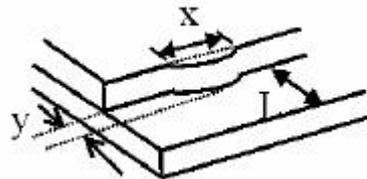**A**: Viewing area B: Outside viewing area
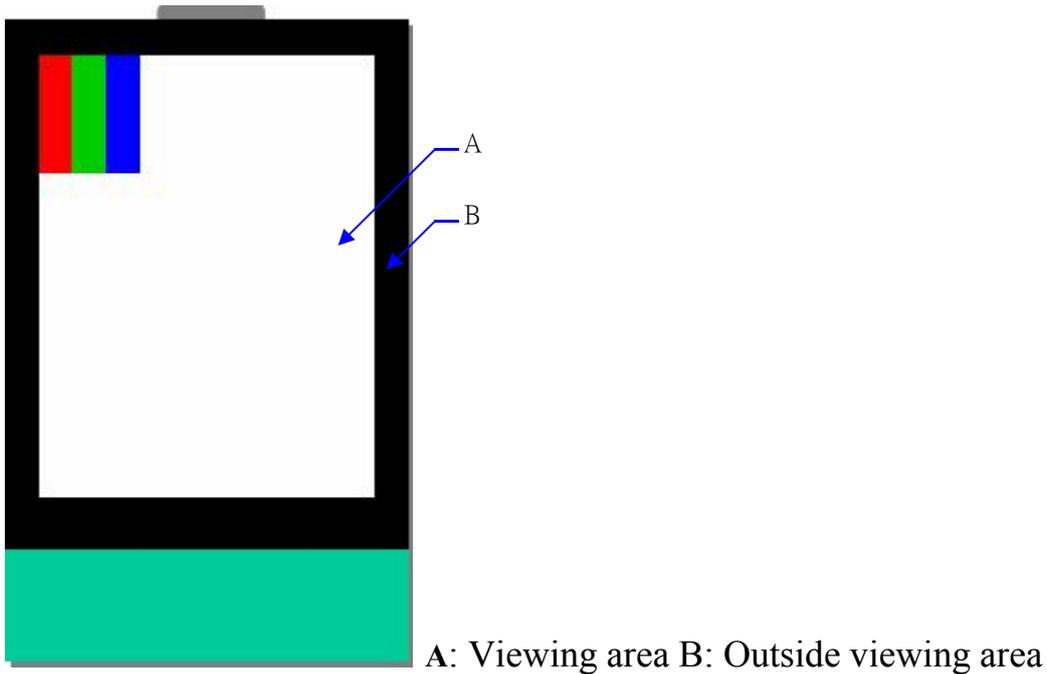
10.5.2 Basic principle

● When the standard can not be described, AQL will be applied.
● The sample of the lowest acceptable quality level must be negotiated by both supplier and customer when any dispute happened.
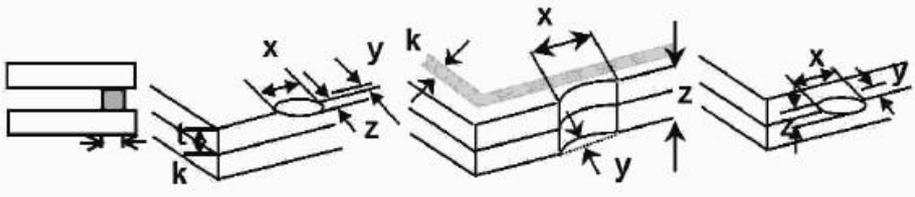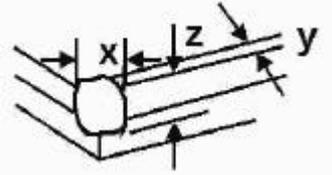● New item must be added on time when it is necessary.
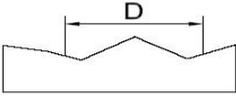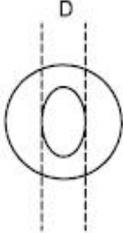
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10.6 Inspection Specification

NO.	Item	Criterion	AQL
01	Electrical Testing	1.1 Missing vertical, horizontal segment, segment contrast defect. 1.2 Missing character, dot or icon. 1.3 Display malfunction. 1.4 No function or no display. 1.5 Current consumption exceeds product specifications. 1.6 LCD viewing angle defect. 1.7 Mixed product types. 1.8 Flicker	**0.65**
02	Black or White spots or Bright spots or Color spots on LCD (Display only)	2.1 White and black or color spots on display < 0.25mm, no more than one spots. 2.2 Densely spaced: No more than three spots within 3mm.	**1.5**
03	LCD and Touch Panel black spots, white spots, contamination (non – display)	3.1 Round type: As following drawing $\Phi = (X+Y) / 2$ *Densely spaced: No more than two spots within 3mm. 3.2 Line type: (As following drawing) * Densely spaced: No more than two lines within 3mm.	**1.5** / **1.5**

Table for 3.1 Round type:
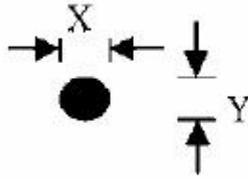
Size(mm)	Acceptable Q'ty
$\Phi \leqq 0.10$	Accept no dense
$0.10 < \Phi \leqq 0.20$	1
$0.20 < \Phi \leqq 0.25$	1
$0.25 < \Phi \leqq 0.30$	1
$0.30 < \Phi$	0

Table for 3.2 Line type:
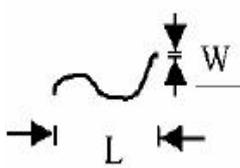
Length(mm)	Width(mm)	Acceptable Q'ty
---	$W \leqq 0.02$	Accept no dense
L<2.5	W<0.08	1
---	$0.08 \leqq W$	Rejection

NO.	Item	Criterion			AQL
04	Polarizer bubbles	If bubbles are visible, judge using black spot specifications, not easy to find, must check in specify direction	Size Φ(mm)	Acceptable Q'ty	1.5
			Φ≦0.30	Accept no dense	
			0.30< Φ≦0.50	0	
			0.50< Φ≦1.00	0	
			1.00< Φ	0	
			Total Q'ty	0	
05	Scratches	Follow NO.3 -2 Line Type.			
06	Chipped glass	Symbols: x: Chip length y: Chip width z: Chip thickness k: Seal width t: Glass thickness a: LCD side length L: Electrode pad length 6.1 General glass chip: 6.1.1 Chip on panel surface and crack between panels: <table><tr><td>z: Chip thickness</td><td>y: Chip width</td><td>x: Chip length</td></tr><tr><td>Z≦1/2t</td><td>Not over viewing area</td><td>x≦1/8a</td></tr><tr><td>1/2t< z≦2t</td><td>Not exceed 1/3k</td><td>x≦1/8a</td></tr></table> ⊙ Unit: mm ⊙ If there are 2 or more chips, x is the total length of each chip 6.1.2 Corner crack: <table><tr><td>z: Chip thickness</td><td>y: Chip width</td><td>x: Chip length</td></tr><tr><td>Z≦1/2t</td><td>Not over viewing area</td><td>x≦1/8a</td></tr><tr><td>1/2t< z≦2t</td><td>Not exceed 1/3k</td><td>x≦1/8a</td></tr></table> ⊙ Unit: mm ⊙ If there are 2 or more chips, x is the total length of each chip			1.5

NO.	Item	Criterion	AQL
07	Glass crack	Symbols: x: Chip length y: Chip width z: Chip thickness k: Seal width t: Glass thickness a: LCD side length L: Electrode pad length 7.2 Protrusion over terminal: 7.2.1 Chip on electrode pad: <table><tr><td>y: Chip width</td><td>x: Chip length</td><td>z: Chip thickness</td></tr><tr><td>y ≦ 0.5mm</td><td>x ≦ 1/8a</td><td>0< z ≦ t</td></tr></table> 7.2.2 Non-conductive portion: <table><tr><td>y: Chip width</td><td>x: Chip length</td><td>z: Chip thickness</td></tr><tr><td>y ≦ L</td><td>x ≦ 1/8a</td><td>0< z ≦ t</td></tr></table> ⊙ If there chipped area touches the ITO terminal, over 2/3 of the ITO must remain and be inspected according to electrode terminal specifications. ⊙ If the product will be heat sealed by the customer, the alignment mark must mot be damaged. 7.2.3 Substrate protuberance and internal crack <table><tr><td>y: width</td><td>x: length</td></tr><tr><td>y ≦ 1/3L</td><td>X ≦ a</td></tr></table>	1.5

NO.	Item	Criterion	AQL
08	Cracked glass	No crack is allowed.	1.5
09	Backlight elements	9.1 Illumination source flickers when lit. 9.2 Spots or scratches that appear when lit must be judged. Using LCD spot, lines and contamination standards. 9.3 Backlight doesn't light or color is wrong.	1.5 1.5 0.65
10	Bezel	No scratches with W>0.1 and Length>2.5mm.	1.5
11	PCB、COB	11.1 COB seal may not have pinholes larger than 0.2mm or contamination. 11.2 COB seal surface may not have pinholes through to the IC. 11.3 The height of the COB should not exceed the height indicated in the assembly diagram. 11.4 There may not be more than 2mm of sealant outside the seal area on PCB. And there should be no more than three places. 11.5 Parts on PCB must be the same as on the production characteristic chart, There should be no wrong parts, missing parts or excess parts. 11.6 The jumper on the PCB should conform to the product characteristic chart.	1.5 1.5 1.5 1.5 0.65 0.65
12	FPC	FPC damage per IPC guidelines.(IPC-A-610) Nicks or damage along the edges of the flexible printed cir-cuitry and cutouts,providing the penetration does not exceed 50% of the distance from the edge to the nearest conductor to 2.5mm[0.1in], Whichever is less.	1.5
13	Soldering	13.1 No cold solder joints, missing solder connections, oxidation or icicle. 13.2 No short circuits in components on PCB or FPC. 13.3 Soldering per IPC guidelines.(IPC-A-610)	1.5 0.65

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NO.	Item	Criterion	AQL
14	Touch Panel Chipped glass	Symbols: x: Chip length y: Chip width z: Chip thickness k: Seal width t: Touch Panel Total thickness a: LCD side length L: Electrode pad length 14.1 General glass chip: 14.1.1 Chip on panel surface and crack between panels: <table><tr><td>z: Chip thickness</td><td>y: Chip width</td><td>x: Chip length</td></tr><tr><td>Z≦t</td><td>≦1/2 k and not over viewing area</td><td>x≦1/8a</td></tr></table> ⊙ Unit: mm ⊙ If there are 2 or more chips, x is the total length of each chip 14.1.2 Corner crack: <table><tr><td>z: Chip thickness</td><td>y: Chip width</td><td>x: Chip length</td></tr><tr><td>z≦t</td><td>≦1/2 k and not over viewing area</td><td>x≦1/8a</td></tr></table> ⊙ Unit: mm ⊙ If there are 2 or more chips, x is the total length of each chip	1.5

NO.	Item	Criterion	AQL
15	Touch Panel(Fish eye、dent and bubble on film)	<table><tr><td>SIZE(mm)</td><td>Acceptable Q'ty</td></tr><tr><td>Φ≦0.2</td><td>Accept no dense</td></tr><tr><td>0.2< D ≦0.4</td><td>5</td></tr><tr><td>0.4< D ≦0.5</td><td>2</td></tr><tr><td>0.5< D</td><td>0</td></tr></table>	1.5
16	Touch Panel Newton ring	Newton ring dimension ≦ 1/2 touch panel area and not affect font and line distortion(≦2.5%) , it is acceptable.	1.5
17	Touch Panel Linearity	Less than 2.5% is acceptable.	1.5
18	LCD Ripple	Touch the touch panel , can not see the LCD ripple. Pen: R 1.0mm silicon rubber. Operation Force: 80g	1.5
19	General appearance	19.1 Pin type must match type in specification sheet. 19.2 LCD pin loose or missing pins. 19.3 Product packaging must the same as specified on packaging specification sheet. 19.4 Product dimension and structure must conform to product specification sheet. 19.5 Product packaging shall be by trays sized to protect TFT and FPC cable. 19.6 Cable shall not be bent during transportation. 19.7 Top tray must be empty.	0.65 0.65 0.65 0.65

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11.Handling Precaution

11.1 Handling of LCM

- Avoid external shock.
- Don't apply excessive force on the surface.
- Liquid in LCD is hazardous substance, do not lick or swallow. When the liquid is attaching to your hand, skin, cloth, etc., wash it thoroughly and immediately.
- Don't operate it above the absolute maximum rating.
- Don't disassemble the LCM.
- The operators should wear protections whenever he/she comes into contact with the module. Never touch any of the conductive parts such as the LSI pads, the copper leads on the PCB and the interface terminals with any parts of the human body.
- The modules should be kept in antistatic bags or other containers resistant to static for storage.
- The module is coated with a film to protect the display surface, be careful when peeling off this protective film since static electricity may be generated.

11.2 Storage

- Store it in an ambient temperature of 25±10℃, and in a relative humidity of 50±10%RH. Don't expose to sunlight or fluorescent light.
- Store it in a clean environment, free from dust, active gas, and solvent.
- Store it in anti-static electricity container.
- Store it without any physical load.

11.3 Soldering

- Use only soldering irons with proper grounding and no leakage.
- Iron: no higher than 280±10℃ and less than 3 sec during hand soldering.
- Rewiring: no more than 2 times.

12.Packing Method

No.	Item	Dimensions(mm)	Quantity	Remark
1	LCM Module	229.7*149.15*5	12PCS	
2	PALLET	344*285*175 (include 12pcs products/one pallet)	1PCS	
3	LARGE CARTON	385*315*227 (include 12pcs products/one carton)	1PCS	