深圳市一众显示科技有限公司

SHEN ZHEN TEAM SOURCE DISPLAY TECH. CO, TD.

TFT-LCD Module Specification

Module NO.： TST101WXBH-45C

Version： V1.0

☐ 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
2019-10-21		V1.0	First Issue	

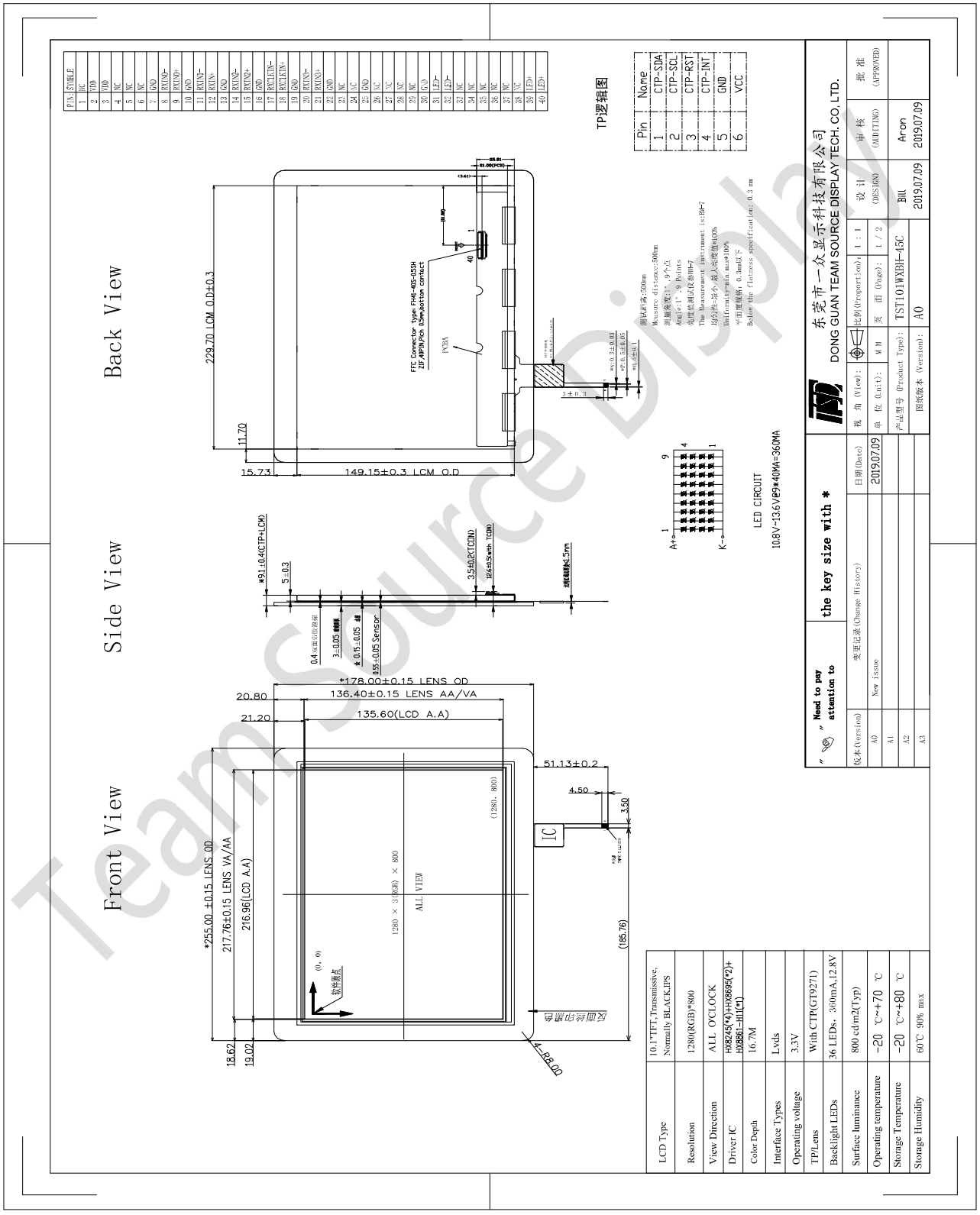
Contents

1. General Specification

ITEM	Specification	Unit
LCD Type	a-Si TFT,Transmissive,Normally black,IPS	-
LCD Size	10.1	inch
Resolution (W x H)	1280(RGB) × 800	pixel
CTP+LCM size	255(H) x 178(V) x 9.1(T)	mm
LCM size	229.7(H) x149.15(V) x 5(T)	mm
Active Area	216.96 (H) x 135.6 V)	mm
Dot Pitch	0.1695(H)x0.1695(V)	mm
Viewing Direction	ALL o'clock	-
Gray Scale Inversion Direction	ALL o'clock	-
Color Depth	16.7M	-
Pixel Arrangement	RGB-stripe	-
Backlight Type	36 LED，360mA	-
Surface Luminance	Typ 800	cd/m2
Surface Treatment	-	-
Interface Type	Lvds	-
Input Voltage	3.3	V
With/Without TP	With CTP(GT9271)	-
Weight	TBD	g

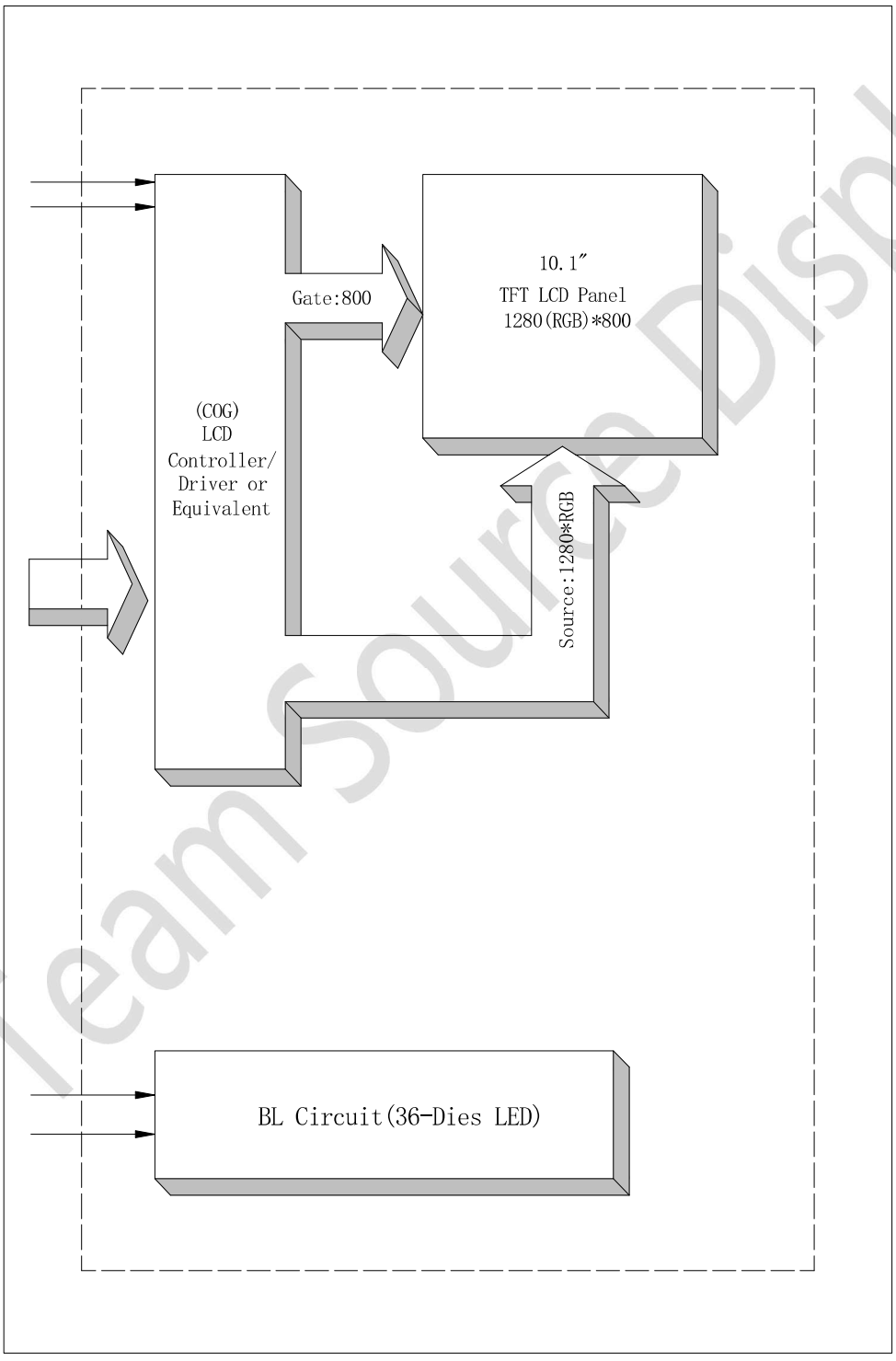
Note 1: RoHS compliant
Note 2: LCM weight tolerance: ± 5%.

2. Mechanical Drawing



LCD Type	10.1"TFT,Transmissive, Normally BLACK,IPS
Resolution	1280(RGB)*800
View Direction	ALL OCLOCK
Driver IC	HX8245(*4)+HX8695(*2)+HX8861-H1(*1)
Color Depth	16.7M
Interface Types	Lvds
Operating voltage	3.3V
TP/Lens	With CTP(GT9271)
Backlight LEDs	36 LEDs，360mA,12.8V
Surface luminance	800 cd/m2(Typ)
Operating temperature	-20 ℃~+70 ℃
Storage Temperature	-20 ℃~+80 ℃
Storage Humidity	60℃ 90% max

3. Block Diagram



4. Interface Pin Function

Pin No.	Symbol	Description
1	NC(VCOM)	No connect
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	NC(AVDD)	No connect
30	GND	Ground
31	LED-	LED cathode
32	LED-	LED cathode
33	NC	No connect
34	NC	No connect
35	NC(VGL)	No connect
36	NC	No connect
37	NC	No connect
38	NC(VGH)	No connect
39	LED+	LED anode
40	LED+	LED anode

5. bsolute 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	VDD	3.0	3.3	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

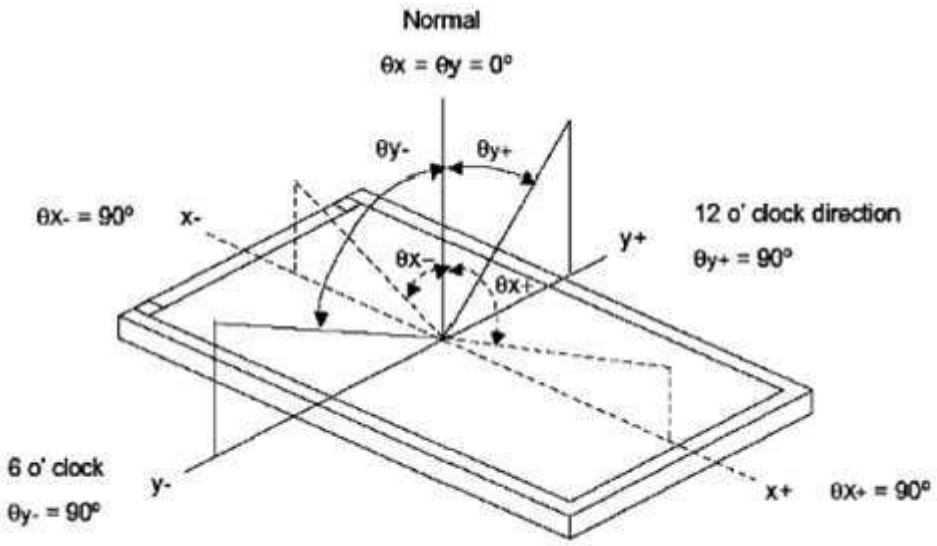
Item	Symbol	Value			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED Backlight	V_F	10.8	12.8	13.6	V	I_L =360mA
Current for LED Backlight	I_L		360		mA	
Power Consumption	P		4.608		W	
LED Life Time		30,000	50,000		Hr	Note

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	
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	0.556	0.596	0.636		
		Y_R		0.308	0.348	0.388		
	Green	X_G		0.277	0.317	0.357		
		Y_G		0.530	0.570	0.610		
	Blue	X_B		0.108	0.148	0.188		
		Y_B		0.107	0.147	0.187		
	White	X_W		0.223	0.303	0.383		
		Y_W		0.259	0.339	0.419		
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		%	

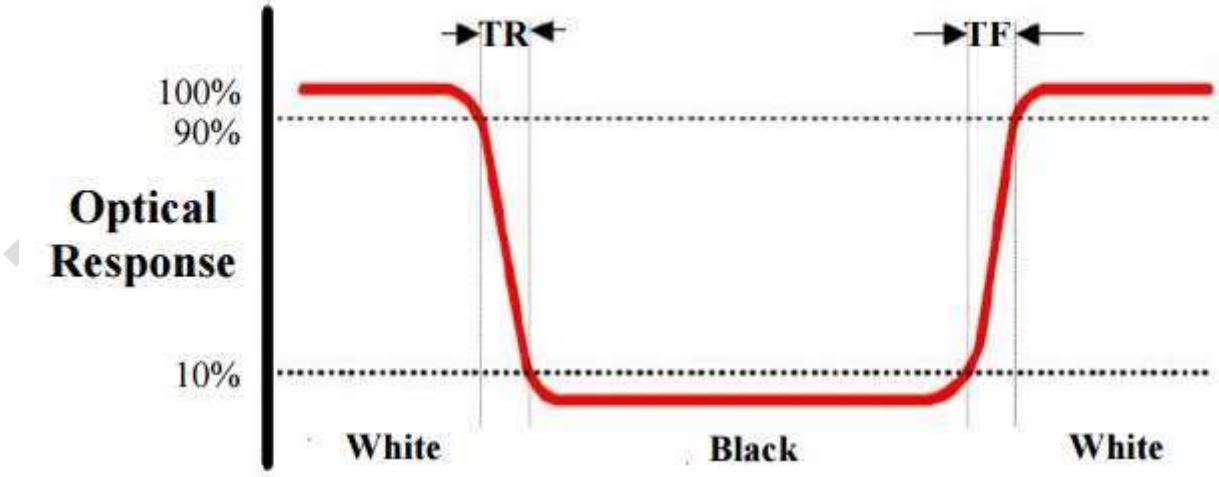
Note 1: Definition of Viewing Angle θx and θy:



Note 2: Definition of contrast ratio CR:

$$CR = \frac{\text{Luminance of white state}}{\text{Luminance of black state}}$$

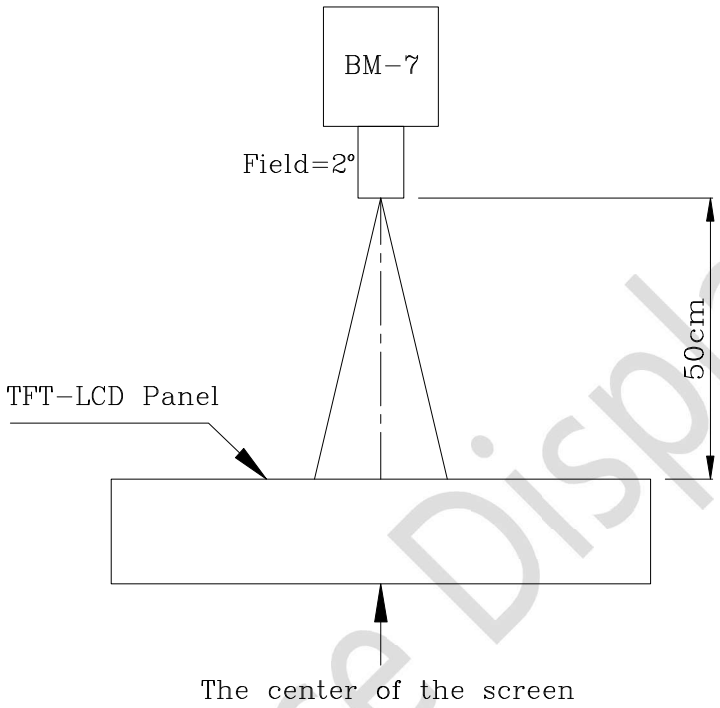
Note 3: Definition of Response Time(Tr,Tf)



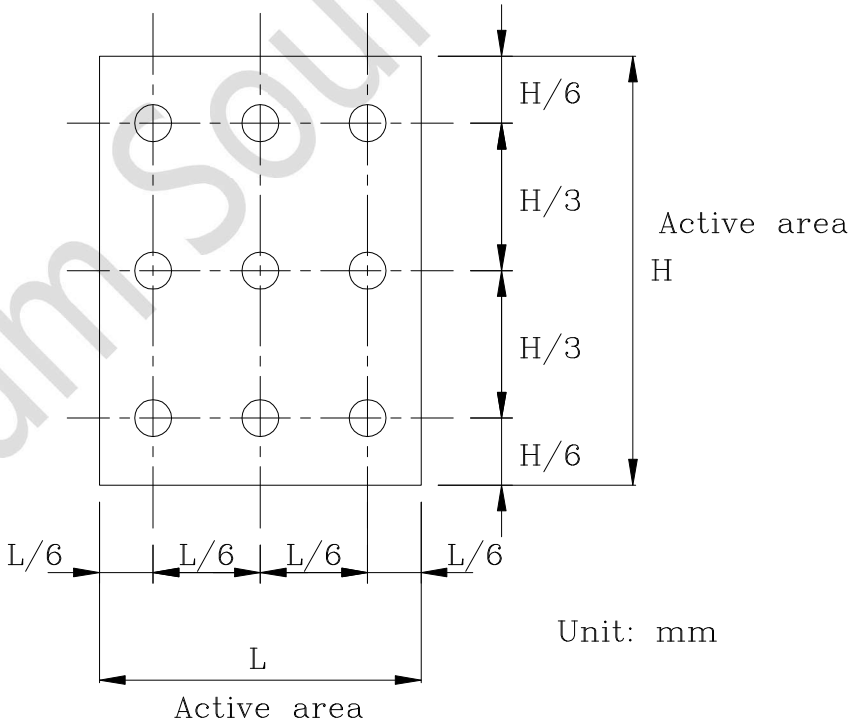
Note 4: Definition of Luminance

①The Brightness Test Equipment Setup

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

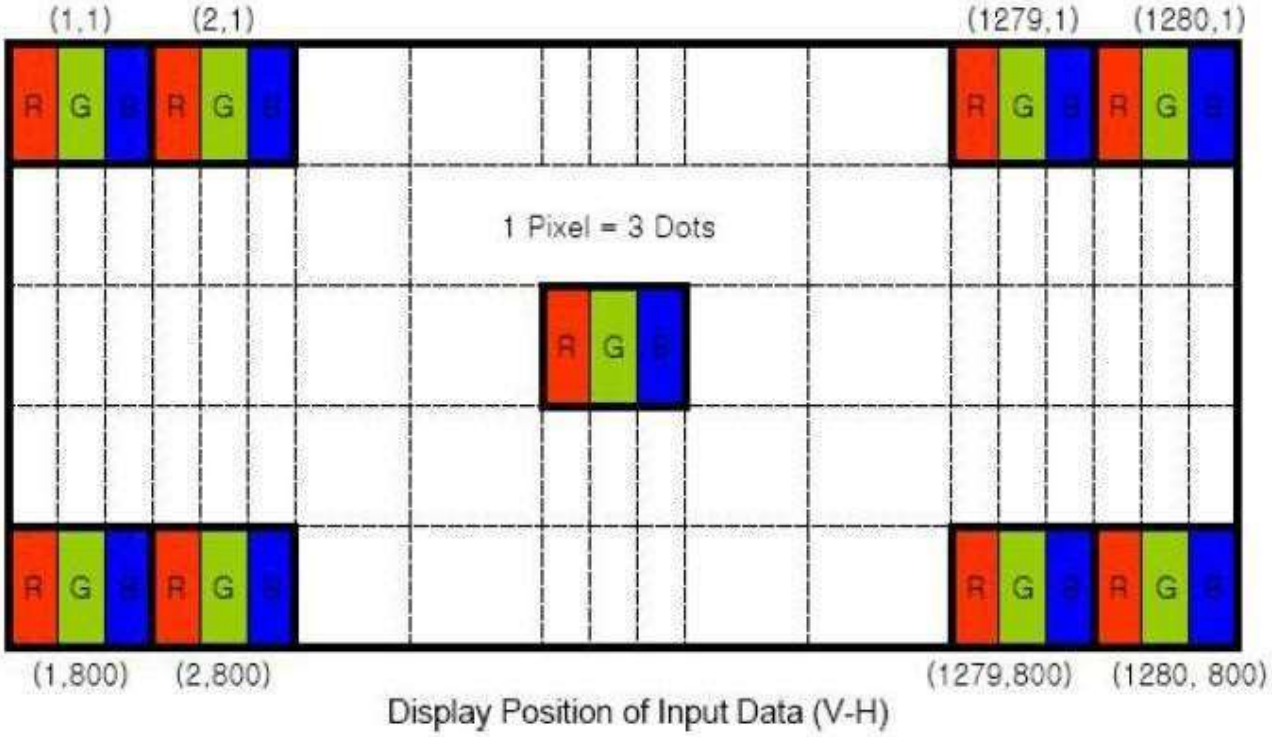


②The Brightness Test Point Setup

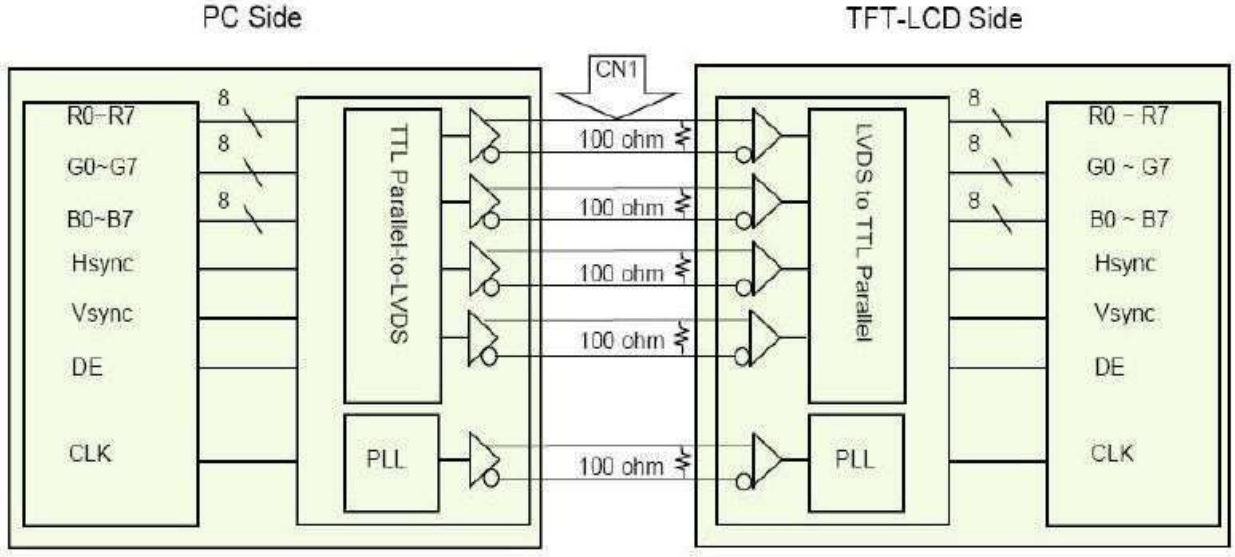


8. Timing Characteristics

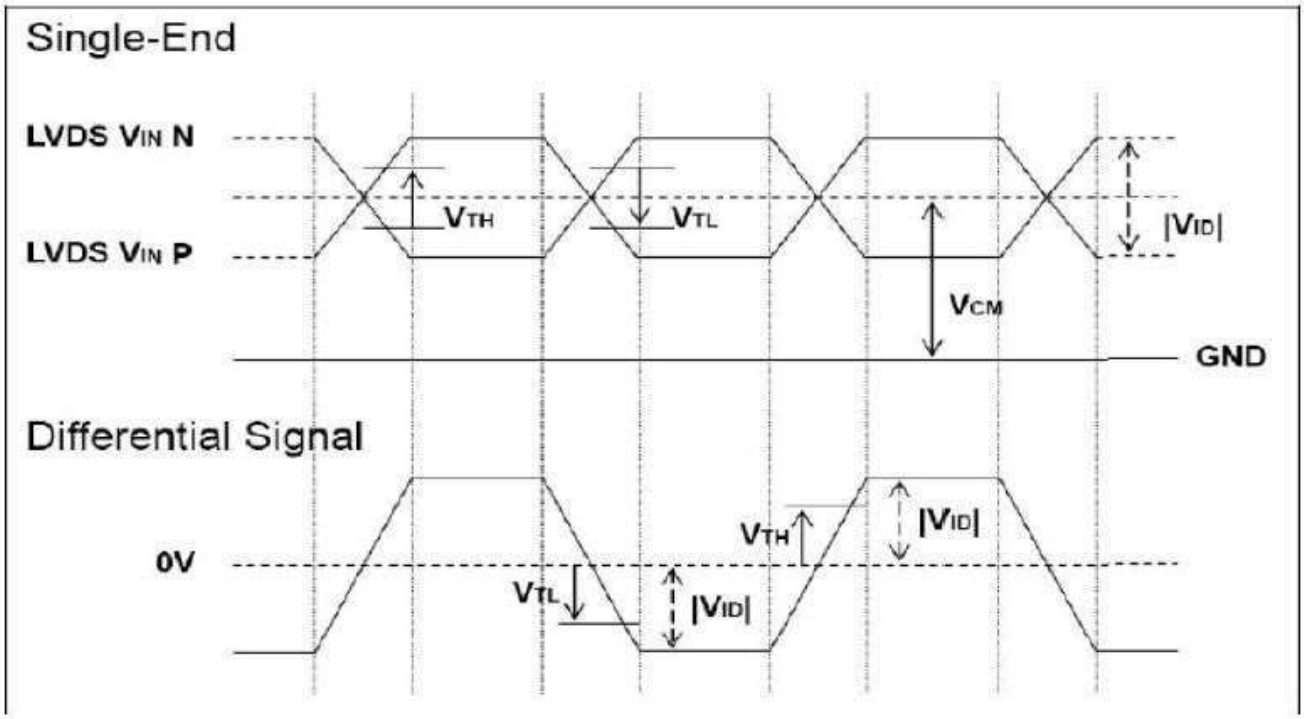
8.1DATA input format



8.2 LVDS interface

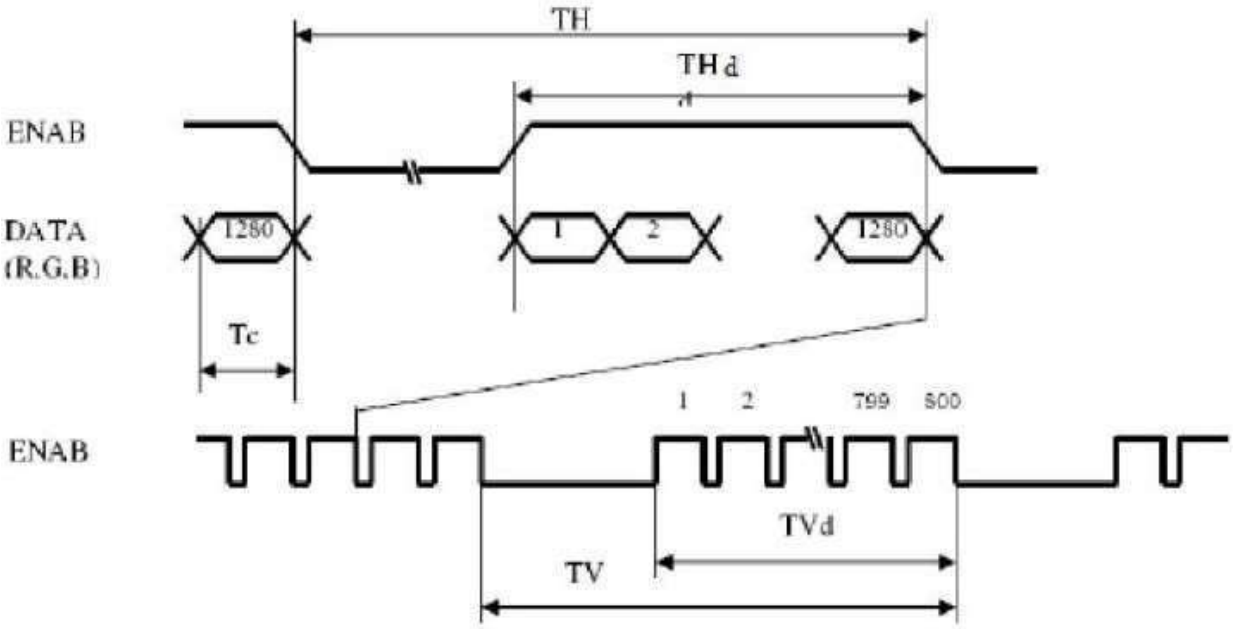


8.3 LVDS input signal



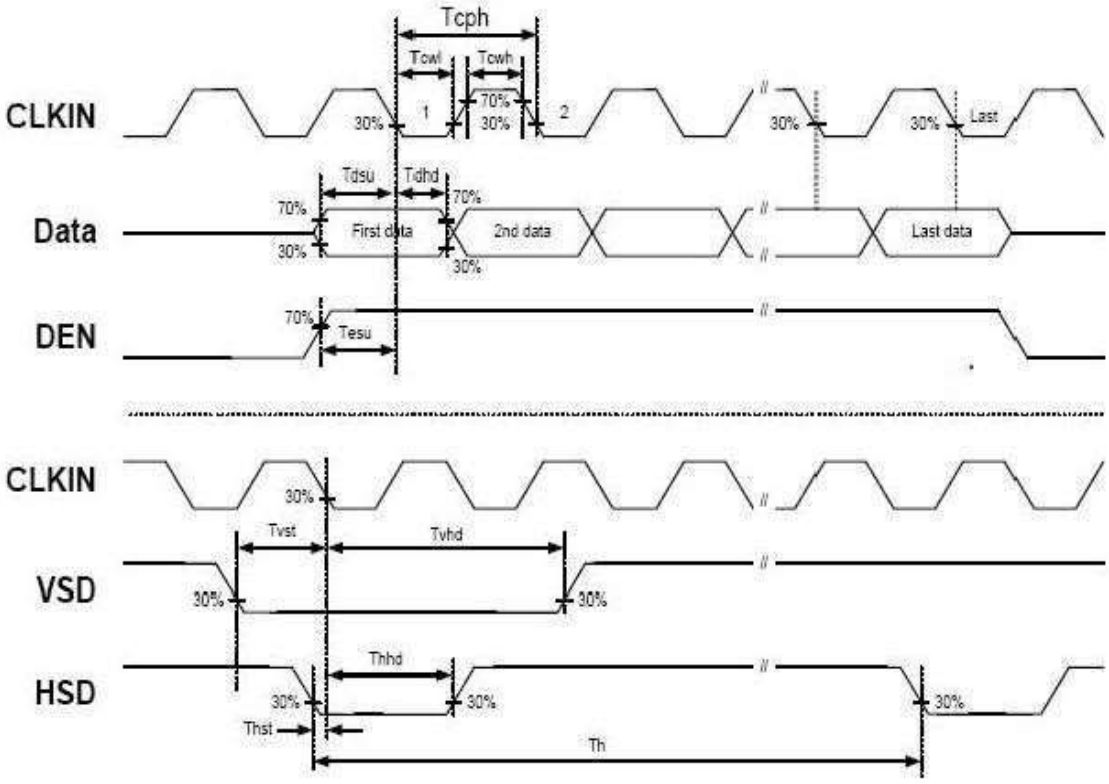
8.4 LVDS timing specification

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

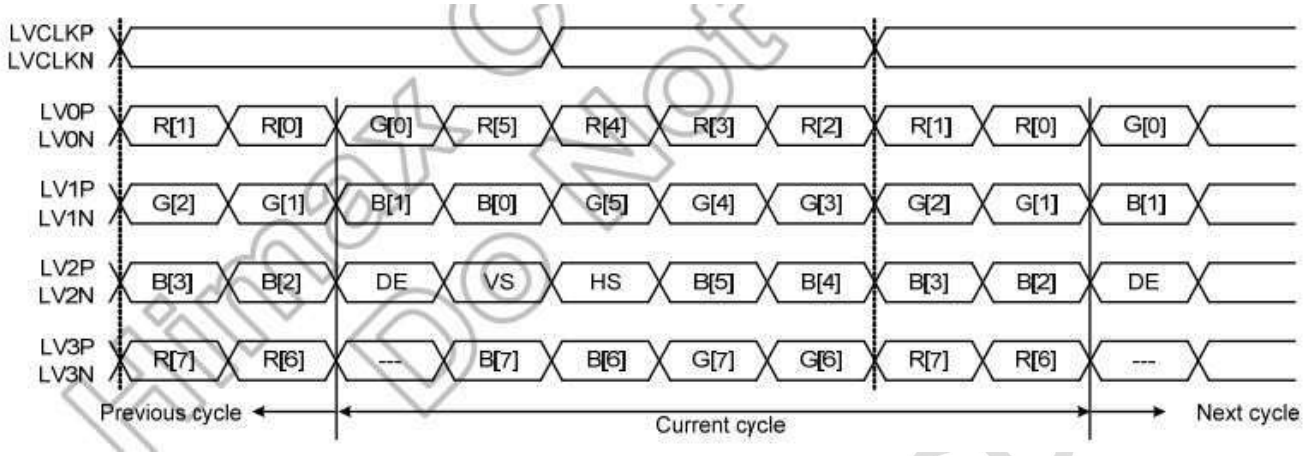


Interface Timing

8.5 INPUT clock and timing diagram



8.6 LVDS input data mapping



Capacitive Touch Panel specifications

1.1 Mechanical characteristics

DESCRIPTION	INL SPECIFICATION	REMARK
Touch Panel Size	10.1	
Outline Dimension (OD)	255(H) x 178(V) mm	Cover Lens Outline
Product Thickness	3.7mm	With FPC and frame D.S.T
Glass Thickness	3.0mm	
View Area	217.76x135.6mm	
Input Method	5 Fingers	
Activation Force	Touch	
Surface Hardness	≥6H	

1.2 Electrical characteristics

DESCRIPTION		SPECIFICATION
Operating Voltage		DC 2.8~3.3V
Power Consumption (IDD)	Active Mode	2.8-3.3mA
	Sleep Mode	50-100uA
Interface		I^2C
Controller IC		GT9271
I^2C address		-
Resolution		1280*800

1.3 Interface timing characteristics

PARAMETER	MIN	MAX	UNIT
SCL Frequency	-	400K	Hz
Bus Free Time Between a STOP and START Condition	4.7	-	uS
Hold Time (repeated) START Condition	4.0	-	uS
Data Setup Time	250	-	nS
Setup Time for Repeated START Condition	4.7	-	uS
Setup Time for STOP Condition	4.0	-	uS

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. General Precautions

10.1. Safety

- Liquid crystal is poisonous. Do not put it in your mouth. If liquid crystal touches your skin or clothes, wash it off immediately by using soap and water.

10.2. Handling

- The LCD panel is plate glass. Do not subject the panel to mechanical shock or to excessive force on its surface.
- The polarizer attached to the display is easily damaged. Please handle it carefully to avoid scratch or other damages.
- To avoid contamination on the display surface, do not touch the module surface with bare hands.
- Keep a space so that the LCD panels do not touch other components.
- Put cover board such as acrylic board on the surface of LCD panel to protect panel from damages.
- Transparent electrodes may be disconnected if you use the LCD panel under environmental conditions where the condensation of dew occurs.
- Do not leave module in direct sunlight to avoid malfunction of the ICs.

10.3. Static Electricity

- Be sure to ground module before turning on power or operating module.
- Do not apply voltage which exceeds the absolute maximum rating value.

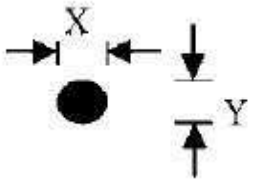
10.4. Storage

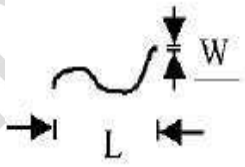
- Store the module in a dark room where must keep at 25±10°C and 65%RH or less.
- Do not store the module in surroundings containing organic solvent or corrosive gas.
- Store the module in an anti-electrostatic container or bag.

10.5. Cleaning

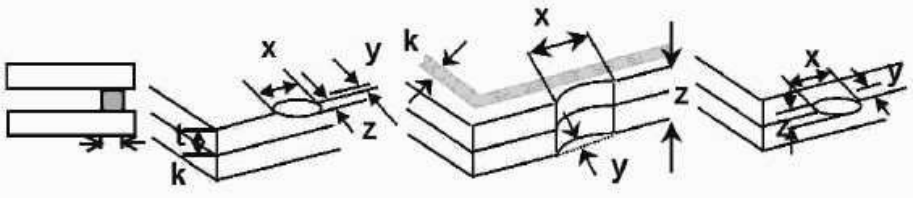
- Do not wipe the polarizer with dry cloth. It might cause scratch.

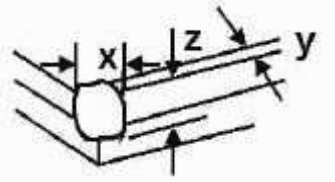
10.6 Inspection Specification

<table>
<tr><th>NO.</th><th>Item</th><th>Criterion</th><th>AQL</th></tr>
<tr><td>01</td><td>Electrical Testing</td><td>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</td><td>0.65</td></tr>
<tr><td>02</td><td>Black or White spots or Bright spots or Color spots on LCD (Display only)</td><td>2.1 White and black or color spots on display ≦ 0.25mm, no more than Five spots.
2.2 Densely spaced: No more than three spots within 3mm.</td><td>1.5</td></tr>
<tr><td rowspan="2">03</td><td rowspan="2">LCD and Touch Panel black spots, white spots, contaminati on (non – display)</td><td>3.1 Round type: As following drawing
Φ = (X+Y) / 2
 

<table>
<tr><th>Size(mm)</th><th>Acceptable Q'ty</th></tr>
<tr><td>Φ≦0.10</td><td>Accept no dense</td></tr>
<tr><td>0.10< Φ≦0.20</td><td>2</td></tr>
<tr><td>0.20< Φ≦0.25</td><td>2</td></tr>
<tr><td>0.25< Φ≦0.30</td><td>1</td></tr>
<tr><td>0.30< Φ</td><td>0</td></tr>
</table>
* Densely spaced: No more than two spots within 3mm.</td><td>1.5</td></tr>
<tr><td>3.2 Line type: (As following drawing)
 

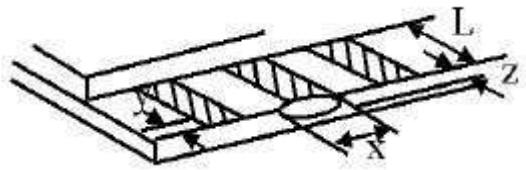
<table>
<tr><th>Length(mm)</th><th>Width(mm)</th><th>Acceptable Q'ty</th></tr>
<tr><td>---</td><td>W≦0.02</td><td>Accept no dense</td></tr>
<tr><td>L≦3.0</td><td>0.02<W≦0.05</td><td rowspan="2">2</td></tr>
<tr><td>L≦2.5</td><td>0.03<W≦0.08</td></tr>
<tr><td>---</td><td>0.08<W</td><td>Rejection</td></tr>
</table>
* Densely spaced: No more than two lines within 3mm.</td><td>2.5</td></tr>
</table>

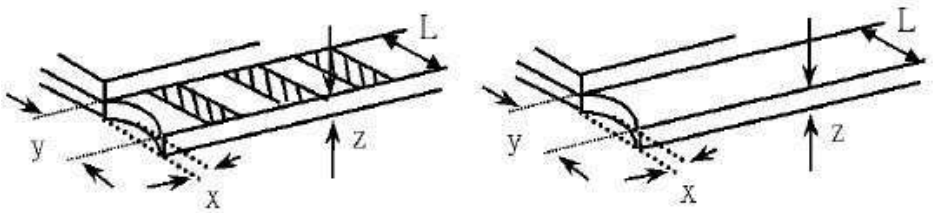
<table>
<tr><th>NO.</th><th>Item</th><th colspan="3">Criterion</th><th>AQL</th></tr>
<tr><td>04</td><td>Polarizer bubbles</td><td>If bubbles are visible, judge using black spot specifications, not easy to find, must check in specify direction</td><td>Size Φ(mm)
Φ≦0.20
0.20< Φ≦0.50
0.50< Φ≦1.00
1.00< Φ
Total Q’ty</td><td>Acceptable Q'ty
Accept no dense
3
2
0
3</td><td>1.5</td></tr>
<tr><td>05</td><td>Scratches</td><td colspan="3">Follow NO.3 -2 Line Type.</td><td></td></tr>
<tr><td>06</td><td>Chipped glass</td><td colspan="3">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:
 

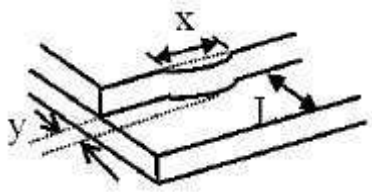
z: Chip thickness | y: Chip width | x: Chip length
Z≦1/2t | Not over viewing area | x≦1/8a
1/2t< z≦2t | Not exceed 1/3k | x≦1/8a
⊙ Unit: mm
⊙ If there are 2 or more chips, x is the total length of each chip
6.1.2 Corner crack:
 

z: Chip thickness | y: Chip width | x: Chip length
Z≦1/2t | Not over viewing area | x≦1/8a
1/2t< z≦2t | Not exceed 1/3k | x≦1/8a
⊙ Unit: mm
⊙ If there are 2 or more chips, x is the total length of each chip</td><td>1.5</td></tr>
</table>

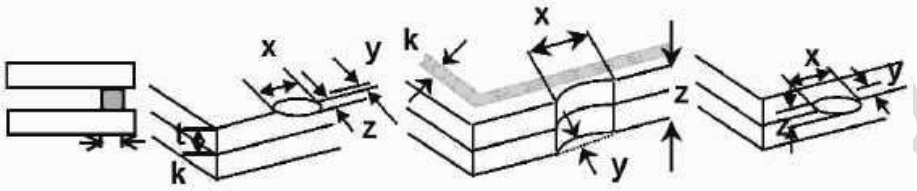
NO.	Item	Criterion	AQL
08	Cracked glass	The LCD with extensive crack is not acceptable.	1.5
09	Backlight elements	9.1 Illumination source flickers when lit. 9.2 Spots or scratches that appear when lit must be judged. Using LCD spot, lines and contamination standards. 9.3 Backlight doesn't light or color is wrong.	1.5 1.5 0.65
10	Bezel	Bezel must comply with product specifications.	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	12.1 FPC terminal damage ≦ 1/2 FPC terminal width and can not affect the function , we judge accept. 12.2 FPC alignment hole damage ≦ 1/2 alignment area and can not affect the function , we judge accept.	1.5 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.	1.5 0.65

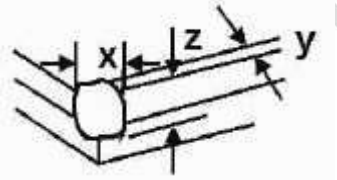
<table>
<tr><th>NO.</th><th>Item</th><th>Criterion</th><th>AQL</th></tr>
<tr><td>07</td><td>Glass crack</td><td>
Symbols:
x: Chip length y: Chip width z: Chip thickness
k: Seal width t: Glass thickness a: LCD side length
L: Electrode pad length
7.2 Protrusion over terminal:
7.2.1 Chip on electrode pad:


<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:


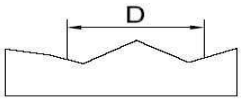
<table>
<tr><td>y: Chip width</td><td>x: Chip length</td><td>z: Chip thickness</td></tr>
<tr><td>y≦L</td><td>x≦1/8a</td><td>0< z≦t</td></tr>
</table>
⊙ If there chipped area touches the ITO terminal, over 2/3 of the ITO must remain and be inspected according to electrode terminal specifications.
⊙ If the product will be heat sealed by the customer, the alignment mark must mot be damaged.
7.2.3 Substrate protuberance and internal crack


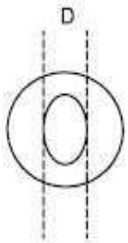
<table>
<tr><td>y: width</td><td>x: length</td></tr>
<tr><td>y≦1/3L</td><td>X≦a</td></tr>
</table>
</td><td>1.5</td></tr>
</table>

<table>
<tr><th>NO.</th><th>Item</th><th>Criterion</th><th>AQL</th></tr>
<tr><td>14</td><td>Touch Panel Chipped glass</td><td>
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
</td><td>1.5</td></tr>
</table>

<table>
<tr><th>NO.</th><th>Item</th><th>Criterion</th><th>AQL</th></tr>
<tr><td>15</td><td>Touch Panel(Fish eye、dent and bubble on film)</td><td>
<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>




</td><td>1.5</td></tr>
<tr><td>16</td><td>Touch Panel Newton ring</td><td>Newton ring dimension ≦ 1/2 touch panel area and not affect font and line distortion(≦2.5%) , it is acceptable.</td><td>1.5</td></tr>
<tr><td>17</td><td>Touch Panel Linearity</td><td>Less than 2.5% is acceptable.</td><td>1.5</td></tr>
<tr><td>18</td><td>LCD Ripple</td><td>Touch the touch panel , can not see the LCD ripple.
Pen: R 1.0mm silicon rubber.
Operation Force: 80g</td><td>1.5</td></tr>
<tr><td>19</td><td>General appearance</td><td>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.</td><td>0.65
0.65
0.65
0.65</td></tr>
</table>

- Only use a soft sloth with IPA to wipe the polarizer, other chemicals might permanent damage to the polarizer.

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°C, 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°C and less than 3 sec during hand soldering.
- Rewiring: no more than 2 times.

12. Packing Method

TBD