

LCD Module

Product Specification

: APPROVAL FOR SPECIFICATION

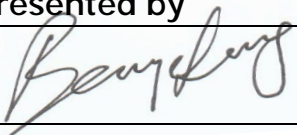
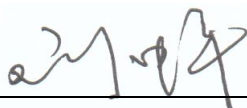
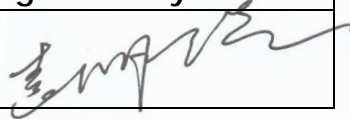
For Customer : _____ : APPROVAL FOR SAMPLE

Module No. : TST430MINI-05D

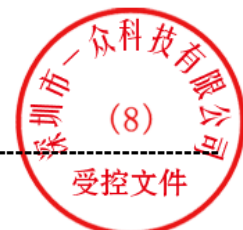
For Customer's Acceptance :

Approved by	Comment

Team Source Display :

Presented by	Reviewed by	Organized by
		

This module uses ROHS material



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1. Introduction

1.1 Scope of application

This specification applies to the Negative type TFT transmissive dot matrix LCD module.

LCD specification: Dots 480xRGBx272.

As to basic specification of the driver IC, refer to the IC (OTA5180A) specification and data sheet.

1.2 Structure:

Double display structure:

TFT Module + FPC +BL

FULL 16.7M Colors 4.3 inch TFT LCD size for main LCD;

One bare chip with gold bump (COG) TECH;

24 BITS RGB interface;

1.3 TFT features:

Structure: TFT PANNEL+IC+FPC+BL;

Transmissive Type LCD

480 dot-source and 272 dot-gate outputs;

16.7M Color

White LED back light;

24 BITS RGB interface;

1.4 Applications:

Mobile phone

PSP

PDA

GPS

Etc...

2. General specification

ITEM	Standard value	UNIT
LCD Type	TFT Transmissive Normal White	---
Driver element	a-Si TFT Active matrix	
Number of Dots	480*(RGB)*272	Dots
Pixel Arrangement	RGB Vertical Stripe	
Active Area	53.86 *95.04	mm
Viewing Direction	12 0' clock	
Driver IC	OTA5180A	
Module Size(W*H*T)	67.2x105.5x2.90	mm
Approx. Weight	TBD	g
Back Light	White LED	
System interface	24 BITS RGB interface	

3. Mechanical drawing

PIN Symbol	Power On Reset (POR)
1 VLED+	Power for LED backlight cathode
2 VLED-	Power for LED backlight anode
3 GND	Power ground
4 VDD	Power (VDD)
5 VDD	Power (VDD)
6 R1	Red data
7 R2	Red data
8 R3	Red data
9 R4	Red data
10 R5	Red data
11 R6	Red data
12 R7	Red data (SSD)
13 G0	Green data
14 G1	Green data
15 G2	Green data
16 G3	Green data
17 G4	Green data
18 G5	Green data
19 G6	Green data
20 G7	Green data (SSD)
21 B0	Blue data
22 B1	Blue data
23 B2	Blue data
24 B3	Blue data
25 B4	Blue data
26 B5	Blue data
27 B6	Blue data
28 B7	Blue data (SSD)
29 B8	Blue data
30 SCLK	Pixel clock
31 DISP	Display on/off
32 RSYS	Horizontal sync signal
33 VSYNC	Vertical sync signal
34 HSYNC	Horizontal sync signal
35 NC	No connect
36 GND	Power ground
37 NC	No connect
38 NC	No connect
39 NC	No connect
40 NC	No connect

Dimensions:

- Top view: 105.50±0.2 (OUT LINE), 98.50±0.2 (OPEN), 95.04(A.A), 62.77, 48.0 (RIP=272), 31.10, 53.86(A.A), 56.60±0.2 (OPEN), 67.20±0.2 (OUT LINE), 18.39±0.50, 0.50, 45.98±0.50, 0.50, 1.15, 3.50, P0.5*(40-1)=19.5±0.05
- Side view: 2.9±0.2, 2.9±0.2, 6.00±0.20, 20.50±0.10, MAX0.9, MAX0.9, 0.30±0.03
- Detail A: W=0.35, P=0.5, P0.5*(40-1)=19.5±0.05, 20.5±0.1, 40, 0.5±0.2

Notes:

- GENERAL TOLERANCE: ± 0.2
- BACKLIGHT: 7 WHITE LED (20MA/CHIP RECOMMENDATION)
- () REFERENCE DIMENSION

Properties:

- Display Type: NORMALLY WHITE TRANSMISSIVE
- Viewing Angle: 12:00 CLOCK
- LCD Driver IC: VDD=3.3V
- Operating Voltage: -20°C TO 70°C
- Storage Temperature: -30°C TO 80°C
- Interface: 24 BIT-RGB
- Backlight: 7-LED WHITE
- Surface luminance: > 350cd/m²
- White X/Y: X 0.30±0.05/Y 0.32±0.05

Approval:

DRAWN	TITLE
ME.CHECKED	MODULE SPEC.
EE.CHECKED	
APPROVED	
CUSTOMER'S APPROVAL	DATE
2013.10.18	

SHENZHEN TEAM SOURCE DISPLAY CO., LTD.

4. Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply voltage for logic	V_{DD}	-0.5	5.0	V
Input voltage for logic	V_{IN}	VSS-0.5	V_{DD}	V
Supply current (One LED)	I_{LED}	--	30	mA
Operating temperature	T_{OP}	-20	+70	°C
Storage temperature	T_{ST}	-30	+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.

5. Operating Specifications

5.1. Electrical Characteristics

Item	Symbol	Min	Typ	Max	Unit	Applicable terminal
Supply voltage for logic	V_{DD}	3.0	3.3	3.6	V	V_{DD}
Input voltage	V_{IL}	VSS	-	$0.3 V_{DD}$	V	
	V_{IH}	$0.7V_{DD}$	-	V_{DD}	V	
Input current	I_{DD}	-	TBD	-	mA	
LED Forward voltage	V_f	3.0	3.2	3.4	V	With One LED
Input backlight current	I_{LED}	-	20	25	mA	With One LED

5.2. Backlight Driving Conditions

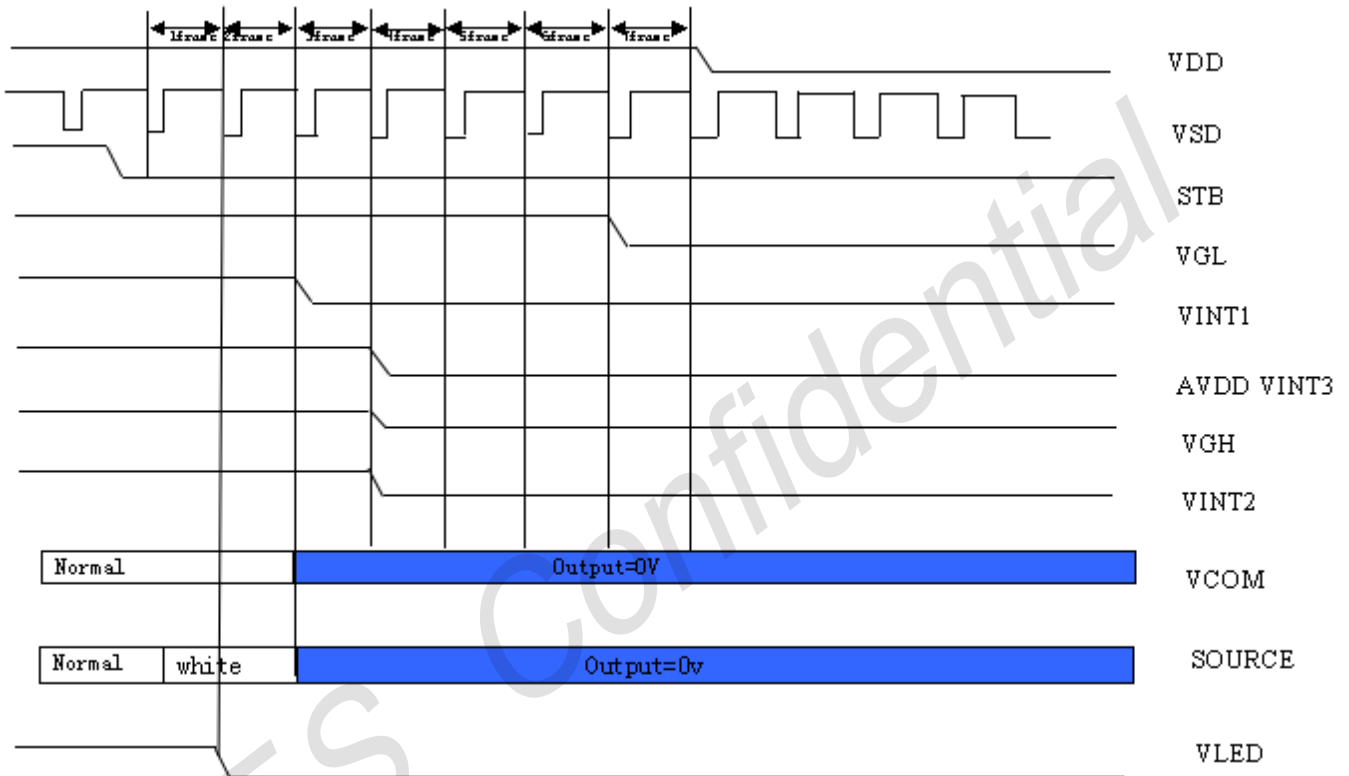
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED backlight	V_L	21	22.4	23.8	V	Note 1
Current for LED backlight	I_L	18	20	25	mA	
LED life time	-	20,000	-	-	Hr	Note 2

Note 1: The LED Supply Voltage is defined by the number of LED at $T_a=25^{\circ}\text{C}$ and $I_L=20\text{mA}$.

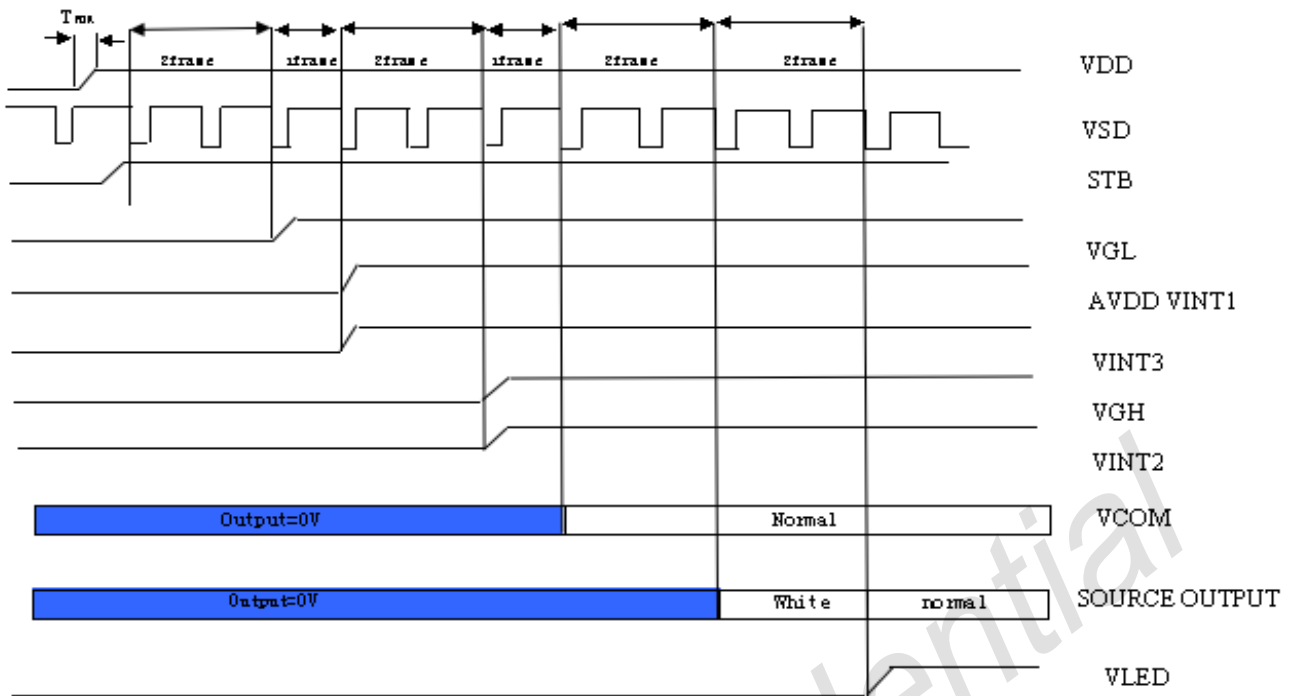
Note 2: The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25°C and I_L =20mA. The LED lifetime could be decreased if operating I_L is larger than 20 mA.

5.3. Power Sequence

5.3.1. power off sequence



5.3.2. Power on sequence

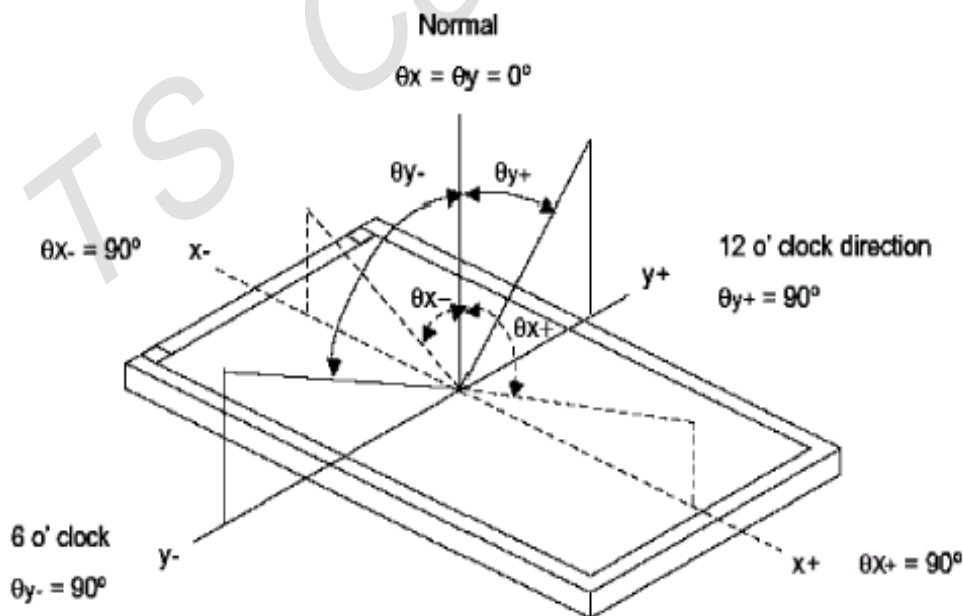


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6. Optical Characteristics

ITEM	SYMBOL	CONDITIONS	SPECIFICATIONS			UNIT	NOTE
			MIN.	TYP.	MAX		
Brightness	B		350	380	—	Cd/m ²	All left side data are based on Innolux's product reference only
Contrast Ratio	CR		400	500	—	—	
Response Time	Tr+Tf		—	25	30	ms	
Chromaticity Coordinate (Transmissive)	Red	X	0.551	0.591	0.631		
		Y	0.270	0.310	0.350		
	Green	X	0.302	0.342	0.382		
		Y	0.516	0.561	0.601		
	Blue	X	0.105	0.145	0.185		
		Y	0.047	0.087	0.127		
White	X	0.250	0.300	0.350			
	Y	0.270	0.320	0.370			
Viewing Angle	Hor.	θ_{x+}	60	70	—	Deg.	
		θ_{x-}	60	70	—		
	Ver.	θ_{y+}	40	50	—		
		θ_{y-}	60	70	—		
Uniformity	Un		80	—	%		

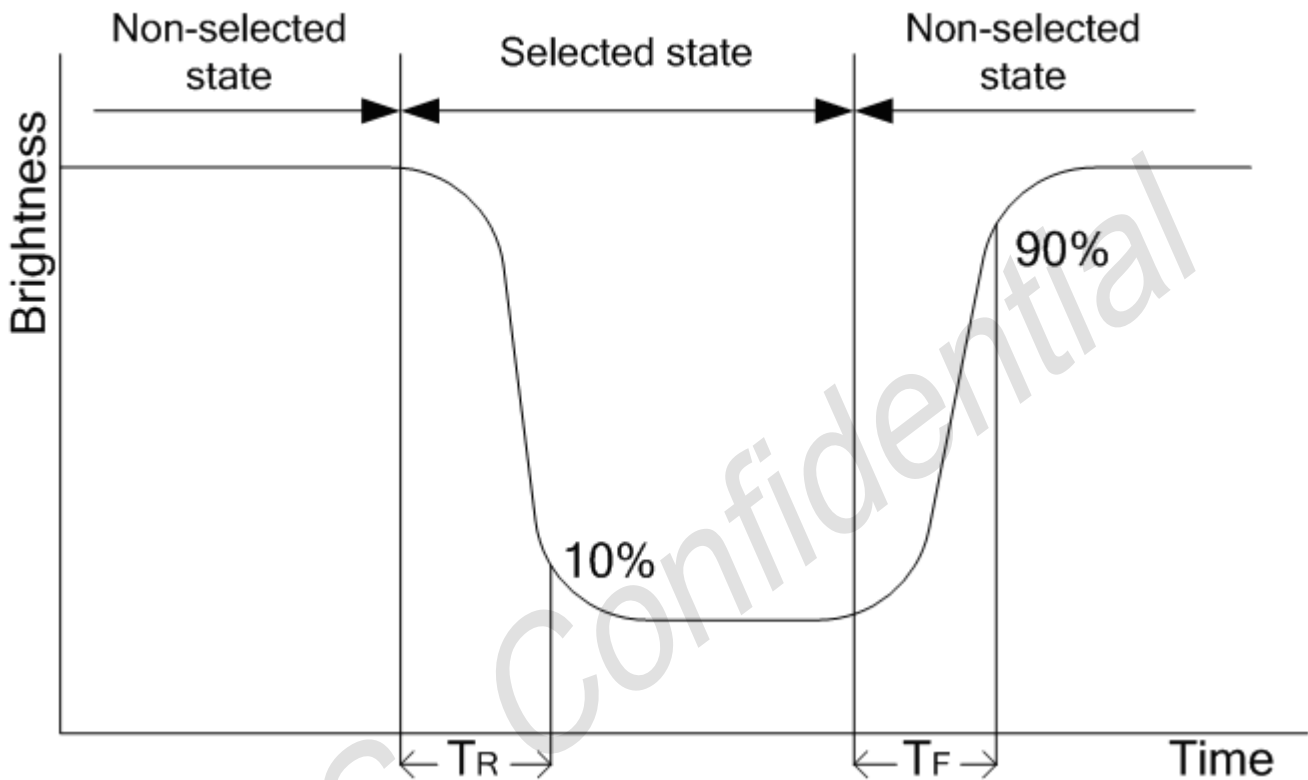
Note 1 : Definition of Viewing Angle θ_x and θ_y :



Note 2: Definition of contrast ratio CR:

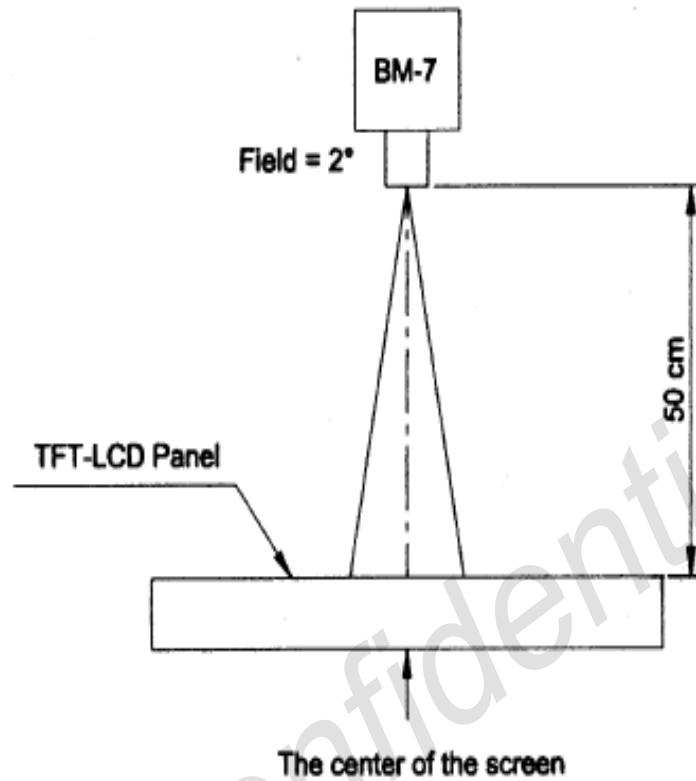
$$CR = \frac{\text{Brightness of non-selected dots (white)}}{\text{Brightness of selected dots (black)}}$$

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

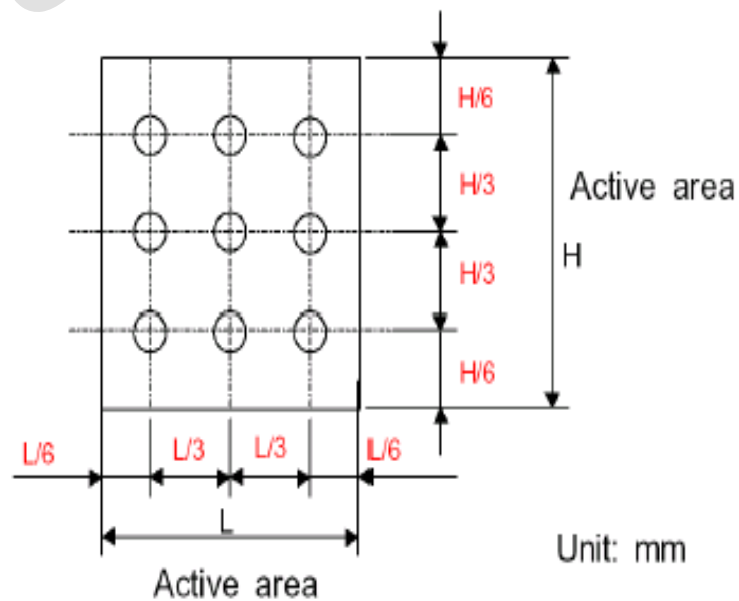


: The brightness test equipment setup

20mA Field=2° (As measuring "black" image, field=2° is the best testing condition)



Note 4 :

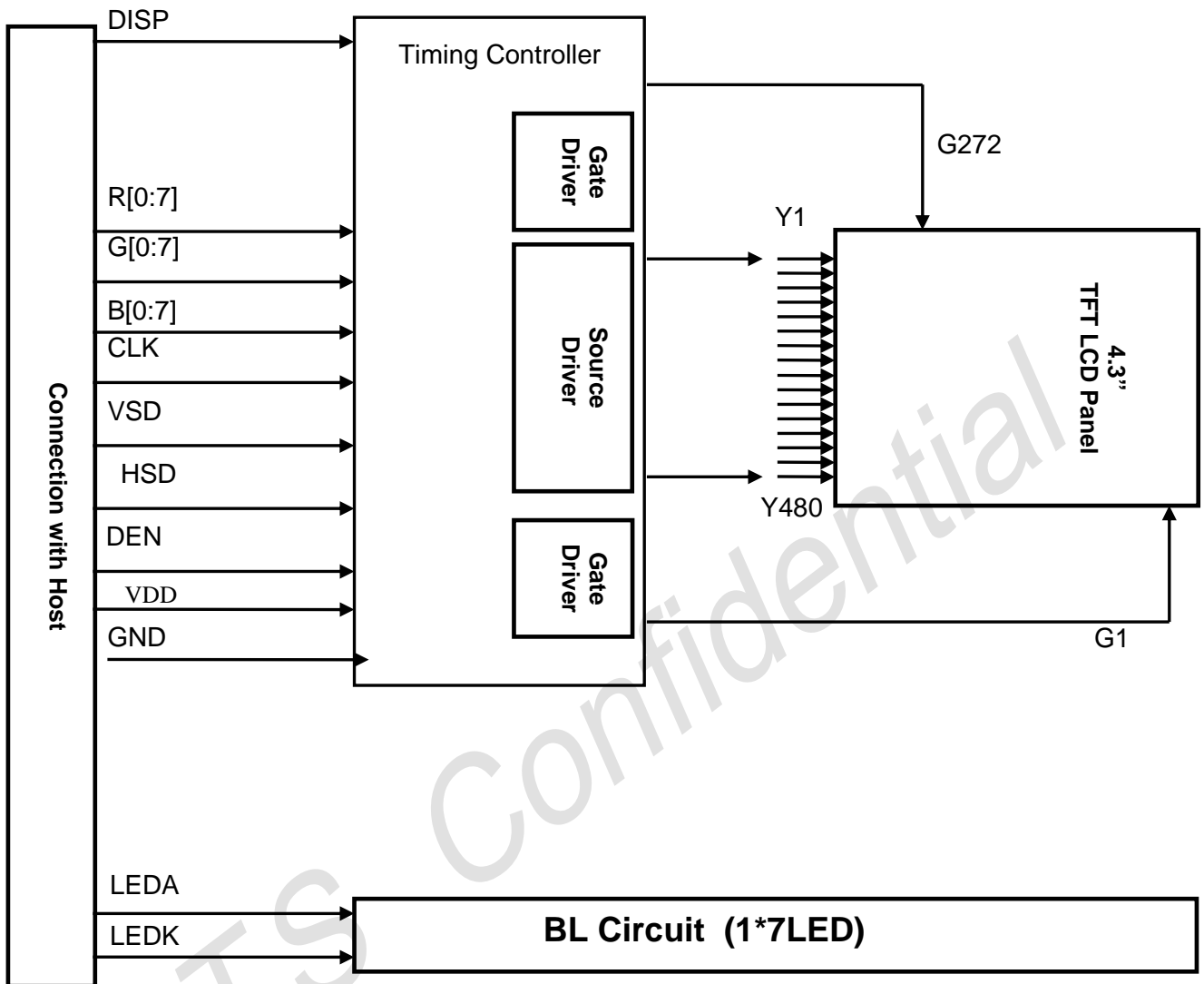


7. Pin Assignment

. Table 2: Pin assignment

Pin No.	Symbol	Description
1	VLED-	Cathode of LED backlight
2	VLED+	Anode of LED backlight
3	GND	Power ground
4	VDD	Power voltage
5	R0	Red data (LSB)
6	R1	Red data
7	R2	Red data
8	R3	Red data
9	R4	Red data
10	R5	Red data
11	R6	Red data
12	R7	Red data (MSB)
13	G0	Green data (LSB)
14	G1	Green data
15	G2	Green data
16	G3	Green data
17	G4	Green data
18	G5	Green data
19	G6	Green data
20	G7	Green data (MSB)
21	B0	Blue data (LSB)
22	B1	Blue data
23	B2	Blue data
24	B3	Blue data
25	B4	Blue data
26	B5	Blue data
27	B6	Blue data
28	B7	Blue data (MSB)
29	GND	Power ground
30	DCLK	Pixel clock
31	DISP	Display on/off
32	HSYN	Horizontal sync signal
33	VSYNC	Vertical sync signal
34	DE	Data enable
35	NC	NO connect
36	GND	Power ground
37	NC	NO connect
38	NC	NO connect
39	NC	NO connect
40	NC	NO connect

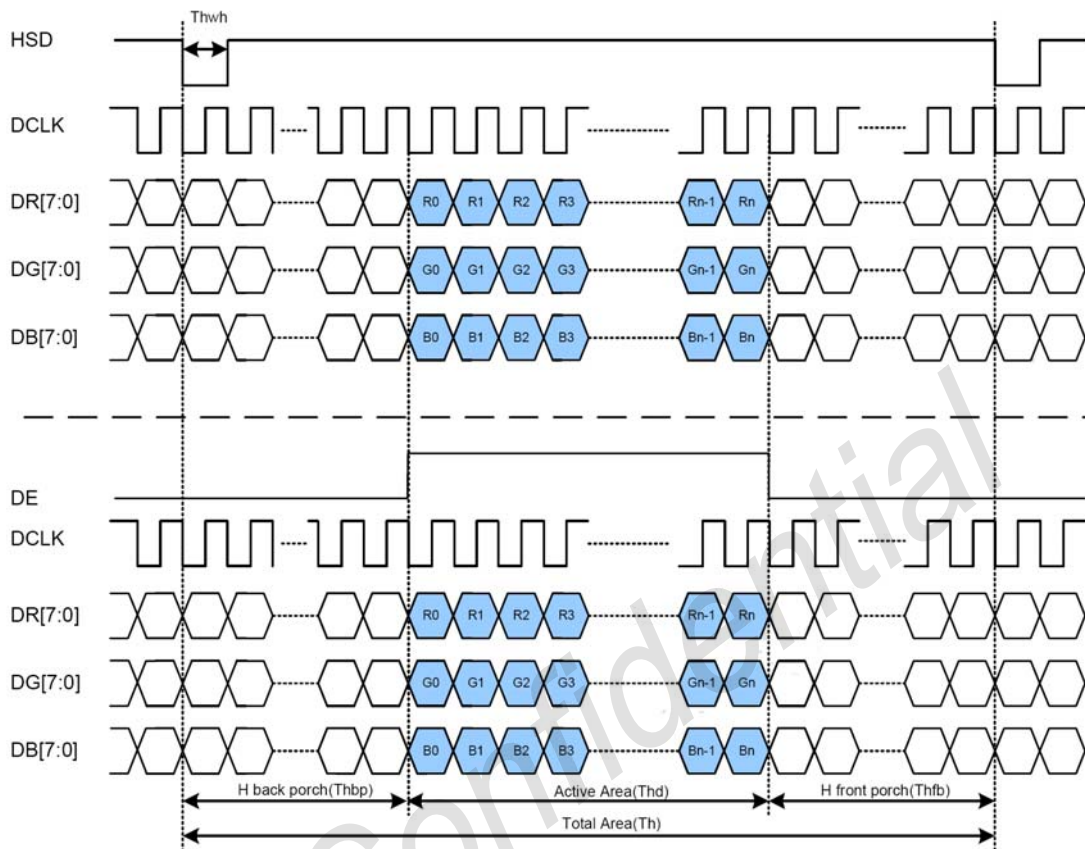
8. Block Diagram



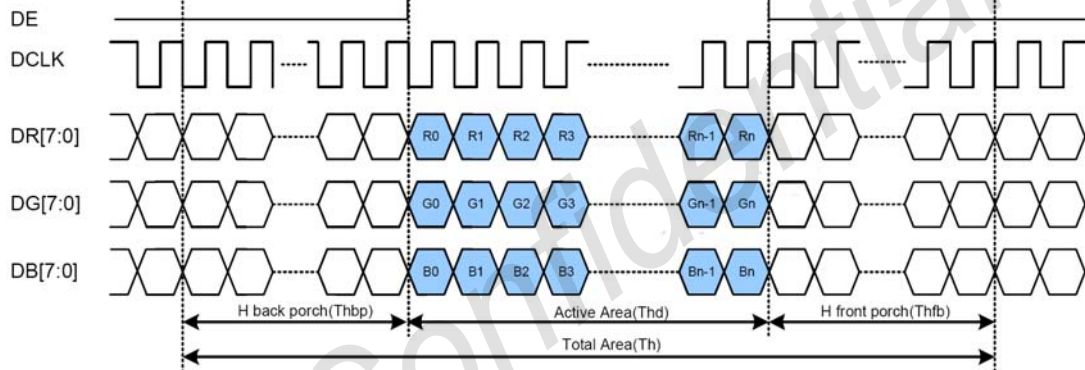
9. Timing/Characteristics

9.1 Clock and data input time diagram

(HV Mode)



(DE Mode)



9.2 Parallel RGB input timing table

Parameter	Symbol	Min	Typ	Max	Unit
DCLK frequency	Fclk	5	9	12	MZH
VSD period time	Tv	277	288	400	H
VSD display area	Tvd	272			H
VSD back porch	Tvb	3	8	31	H
VSD front porch	Tvfp	2	8	97	H
HSD period time	Th	520	525	800	DCLK
HSD display area	Thd	480			DCLK
HSD back porch	Thbp	36	40	255	DCLK
HSD front porch	Thfp	4	5	65	DCLK

10. Standard Specification for Reliability :

10-1. Standard Specifications for Reliability of LCD Module

No	Item	Description
01	High temperature operation	The sample should be allowed to stand at 70°C for 96 hours under driving condition and then returning it to normal temperature condition, and allowing it stand for 2 hours.
02	Low temperature operation	The sample should be allowed to stand at -20°C for 96 hours under driving condition and then returning it to normal temperature condition, and allowing it stand for 2 hours.
03	High temperature storage	The sample should be allowed to stand at 80°C for 96 hours under no-load condition, and then returning it to normal temperature condition, and allowing it stand for 2 hours.
04	Low temperature storage	The sample should be allowed to stand at -30°C for 96 hours under no-load condition, then returning it to normal temperature condition, and allowing it stand for 2 hours.
05	Moisture storage	The sample should be allowed to stand at 60°C, 90%RH MAX for 96 hours under no-load condition, then taking it out and drying it at normal temperature for 2 hours.
06	Thermal shock storage	The sample should be allowed to stand the following 10 cycles : -30°C for 30 minutes → normal temperature for 5 minutes → +80°C for 30 minutes → normal temperature for 5 minutes, as one cycle.
07	Packing vibration	Frequency range : 10Hz ~ 55Hz Amplitude of vibration : 1.5mm Sweep time: 12 min X, Y, Z 2 hours for each direction.
08	Packing drop test	According to ISTA 1A 2001.
09	Electrical Static Discharge	Air: ±4KV 150pF/330Ω 5 times
		Contact: ±2KV 150pF/330Ω 5 time

*Sample size for each test item is 3~5pcs

10 - 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 12.2, Standard specifications for Reliability have been 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.

10- 3. MTBF

MTBF	Functions, performance, appearance, etc. shall be free from remarkable deterioration within 10,000 hours under ordinary operating and storage conditions room temperature ($25 \pm 5^{\circ}\text{C}$), normal humidity ($50 \pm 10\% \text{ RH}$), and in area not exposed to direct sun light.
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11. Specification of Quality Assurance:

11-1. Purpose

This standard for Quality Assurance should affirm the quality of LCD module products to supply to purchaser by Team Source Display.

11-2. Standard for Quality 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 II take a single time.

(ii) The defects classify of AQL as following:

Major defect: AQL = 0.65

Minor defect: AQL = 2.5

Total defects: AQL = 2.5

11-3. Non-conforming Analysis & Deal With Manners

a. Non-conforming 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 non-conforming should be finished in two weeks.

(iii) If supplier can not finish analysis on time, must announce purchaser before 3 days.

b. Disposition of non-conforming:

(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 non-conforming when the reason of nonconforming is not sure.

11-4. 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 should think that must be modified.

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

c. Any other special problem.

11-5. Standard of The Product Appearance Test

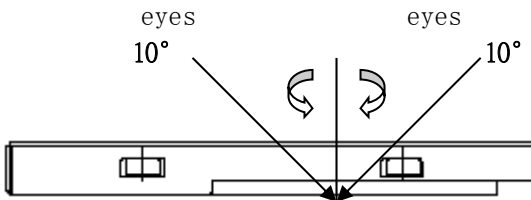
a. Manner of appearance test:

(i) The test must be under 20W × 2 or 40W fluorescent light, and the distance of view must be at 30 ± 5 cm.

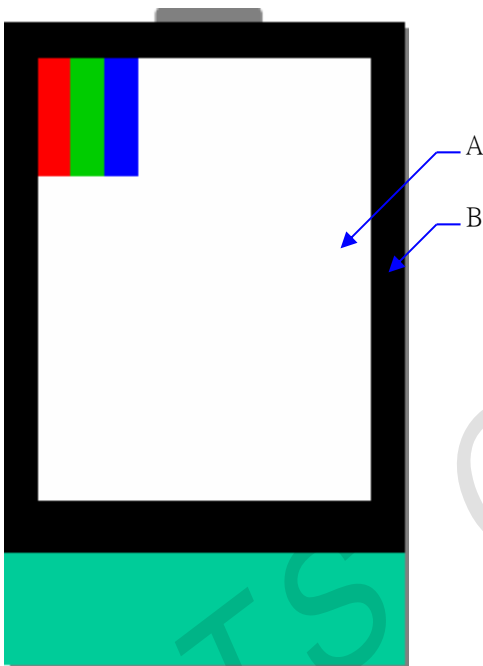
(ii) When test the model of transmissive product must add the reflective plate.

(iii) The test direction is base on around 10° of vertical line.

(iiii) Temperature: $25 \pm 5^\circ\text{C}$ Humidity: $60 \pm 10\% \text{RH}$



(iv) Definition of area:



A. Area: Viewing area.

B. Area: Out of viewing area.
(Outside viewing area)

b. Basic principle:

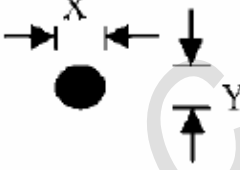
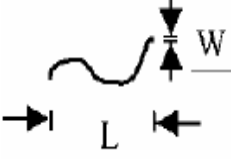
(i) It will accord to the AQL when the standard can not be described.

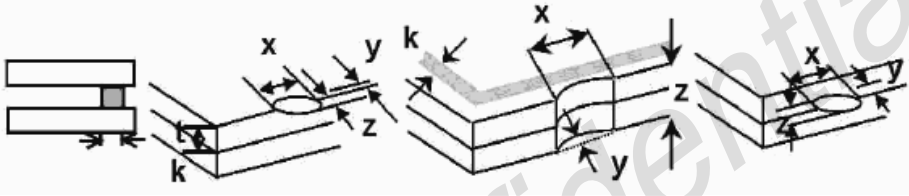
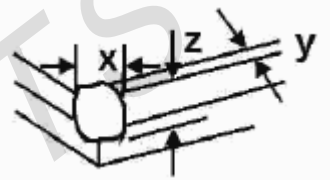
(ii) The sample of the lowest acceptable quality level must be discussed by both supplier and customer when any dispute happened.

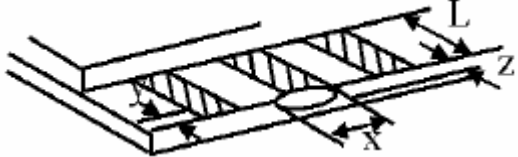
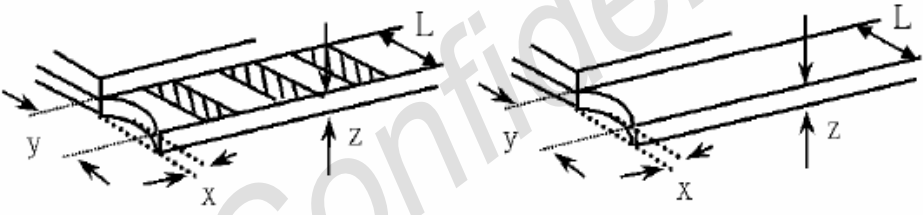
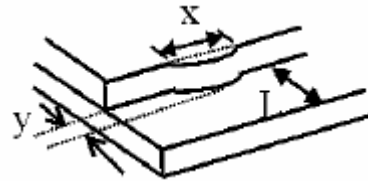
(iii) Must add new item on time when it is necessary.

c. Standard of inspection: (Unit: mm)

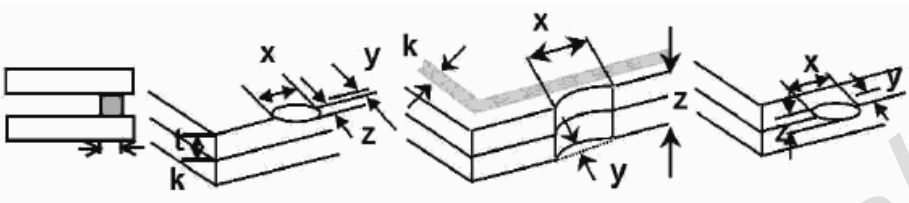
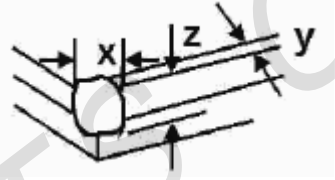
11-6. Inspection specification

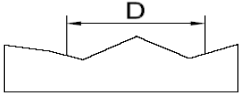
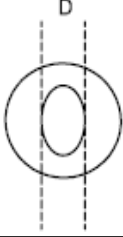
NO	Item	Criterion	AQL																										
01	Electrical Testing	1.1 Missing vertical, horizontal segment, segment contrast defect. 1.2 Missing character, dot or icon. 1.3 Display malfunction. 1.4 No function or no display. 1.5 Current consumption exceeds product specifications. 1.6 LCD viewing 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 $\leq 0.25\text{mm}$, no more than Five spots. 2.2 Densely spaced: No more than three spots within 3mm.	2.5																										
03	LCD and Touch Panel black spots, white spots, contamination (non - display)	<p>3.1 Round type: As following drawing $\Phi = (X+Y) / 2$</p>  <table border="1" data-bbox="805 1052 1337 1276"> <thead> <tr> <th>Size(mm)</th> <th>Acceptable Q' ty</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.10$</td> <td>Accept no dense</td> </tr> <tr> <td>$0.10 < \Phi \leq 0.20$</td> <td>2</td> </tr> <tr> <td>$0.20 < \Phi \leq 0.25$</td> <td>2</td> </tr> <tr> <td>$0.25 < \Phi \leq 0.30$</td> <td>1</td> </tr> <tr> <td>$0.30 < \Phi$</td> <td>0</td> </tr> </tbody> </table> <p>* Densely spaced: No more than two spots within 3mm.</p> <p>3.2 Line type: (As following drawing)</p>  <table border="1" data-bbox="710 1411 1337 1635"> <thead> <tr> <th>Length(m)</th> <th>Width(mm)</th> <th>Acceptable Q' ty</th> </tr> </thead> <tbody> <tr> <td>---</td> <td>$W \leq 0.02$</td> <td>Accept no dense</td> </tr> <tr> <td>$L \leq 3.0$</td> <td>$0.02 < W \leq 0.05$</td> <td rowspan="2">2</td> </tr> <tr> <td>$L \leq 2.5$</td> <td>$0.03 < W \leq 0.08$</td> </tr> <tr> <td>---</td> <td>$0.08 < W$</td> <td>Rejection</td> </tr> </tbody> </table> <p>* Densely spaced: No more than two lines within 3mm.</p>	Size(mm)	Acceptable Q' ty	$\Phi \leq 0.10$	Accept no dense	$0.10 < \Phi \leq 0.20$	2	$0.20 < \Phi \leq 0.25$	2	$0.25 < \Phi \leq 0.30$	1	$0.30 < \Phi$	0	Length(m)	Width(mm)	Acceptable Q' ty	---	$W \leq 0.02$	Accept no dense	$L \leq 3.0$	$0.02 < W \leq 0.05$	2	$L \leq 2.5$	$0.03 < W \leq 0.08$	---	$0.08 < W$	Rejection	2.5
Size(mm)	Acceptable Q' ty																												
$\Phi \leq 0.10$	Accept no dense																												
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$0.20 < \Phi \leq 0.25$	2																												
$0.25 < \Phi \leq 0.30$	1																												
$0.30 < \Phi$	0																												
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---	$W \leq 0.02$	Accept no dense																											
$L \leq 3.0$	$0.02 < W \leq 0.05$	2																											
$L \leq 2.5$	$0.03 < W \leq 0.08$																												
---	$0.08 < W$	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 <table border="1" data-bbox="874 309 1372 533" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Size Φ (mm)</th> <th>Acceptable Q' ty</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.20$</td> <td>Accept no dense</td> </tr> <tr> <td>$0.20 < \Phi \leq 0.50$</td> <td>3</td> </tr> <tr> <td>$0.50 < \Phi \leq 1.00$</td> <td>2</td> </tr> <tr> <td>$1.00 < \Phi$</td> <td>0</td> </tr> <tr> <td>Total Q' ty</td> <td>3</td> </tr> </tbody> </table>	Size Φ (mm)	Acceptable Q' ty	$\Phi \leq 0.20$	Accept no dense	$0.20 < \Phi \leq 0.50$	3	$0.50 < \Phi \leq 1.00$	2	$1.00 < \Phi$	0	Total Q' ty	3	2.5						
Size Φ (mm)	Acceptable Q' ty																				
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Total Q' ty	3																				
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 border="1" data-bbox="363 1019 1181 1205" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>z: Chip thickness</th> <th>y: Chip width</th> <th>x: Chip length</th> </tr> </thead> <tbody> <tr> <td>$Z \leq 1/2t$</td> <td>Not over viewing area</td> <td>$x \leq 1/8a$</td> </tr> <tr> <td>$1/2t < z \leq 2t$</td> <td>Not exceed $1/3k$</td> <td>$x \leq 1/8a$</td> </tr> </tbody> </table> ☉ Unit: mm ☉ If there are 2 or more chips, x is the total length of each chip 6.1.2 Corner crack:  <table border="1" data-bbox="363 1523 1181 1709" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>z: Chip thickness</th> <th>y: Chip width</th> <th>x: Chip length</th> </tr> </thead> <tbody> <tr> <td>$Z \leq 1/2t$</td> <td>Not over viewing area</td> <td>$x \leq 1/8a$</td> </tr> <tr> <td>$1/2t < z \leq 2t$</td> <td>Not exceed $1/3k$</td> <td>$x \leq 1/8a$</td> </tr> </tbody> </table> ☉ Unit: mm ☉ If there are 2 or more chips, x is the total length of each chip	z: Chip thickness	y: Chip width	x: Chip length	$Z \leq 1/2t$	Not over viewing area	$x \leq 1/8a$	$1/2t < z \leq 2t$	Not exceed $1/3k$	$x \leq 1/8a$	z: Chip thickness	y: Chip width	x: Chip length	$Z \leq 1/2t$	Not over viewing area	$x \leq 1/8a$	$1/2t < z \leq 2t$	Not exceed $1/3k$	$x \leq 1/8a$	2.5
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NO	Item	Criterion	AQL																
07	Glass crack	<p>Symbols: x: Chip length y: Chip width z: Chip thickness k: Seal width t: Glass thickness a: LCD side length L: Electrode pad length</p> <p>7.2 Protrusion over terminal: 7.2.1 Chip on electrode pad:</p>  <table border="1" data-bbox="544 701 1230 857"> <tr> <td>y: Chip width</td> <td>x: Chip length</td> <td>z: Chip thickness</td> </tr> <tr> <td>$y \leq 0.5\text{mm}$</td> <td>$x \leq 1/8a$</td> <td>$0 < z \leq t$</td> </tr> </table> <p>7.2.2 Non-conductive portion:</p>  <table border="1" data-bbox="544 1216 1230 1373"> <tr> <td>y: Chip width</td> <td>x: Chip length</td> <td>z: Chip thickness</td> </tr> <tr> <td>$y \leq L$</td> <td>$x \leq 1/8a$</td> <td>$0 < z \leq t$</td> </tr> </table> <p>⊙ 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 not be damaged.</p> <p>7.2.3 Substrate protuberance and internal crack</p>  <table border="1" data-bbox="858 1675 1300 1832"> <tr> <td>y: width</td> <td>x: length</td> </tr> <tr> <td>$y \leq 1/3L$</td> <td>$X \leq a$</td> </tr> </table>	y: Chip width	x: Chip length	z: Chip thickness	$y \leq 0.5\text{mm}$	$x \leq 1/8a$	$0 < z \leq t$	y: Chip width	x: Chip length	z: Chip thickness	$y \leq L$	$x \leq 1/8a$	$0 < z \leq t$	y: width	x: length	$y \leq 1/3L$	$X \leq a$	2.5
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NO	Item	Criterion	AQL
08	Cracked glass	The LCD with extensive crack is not acceptable.	2.5
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.	2.5 2.5 0.65
10	Bezel	Bezel must comply with product specifications.	2.5
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.	2.5 2.5 2.5 2.5 0.65 0.65
12	FPC	12.1 FPC terminal damage \leq 1/2 FPC terminal width and can not affect the function , we judge accept. 12.2 FPC alignment hole damage \leq 1/2 alignment area and can not affect the function , we judge accept.	2.5 2.5
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.	2.5 0.65

NO	Item	Criterion	AQL												
14	Touch Panel Chipped glass	<p>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</p> <p>14.1 General glass chip: 14.1.1 Chip on panel surface and crack between panels:</p>  <table border="1" data-bbox="363 817 1181 1034"> <tr> <td style="text-align: center;">z: Chip thickness</td> <td style="text-align: center;">y: Chip width</td> <td style="text-align: center;">x: Chip length</td> </tr> <tr> <td style="text-align: center;">$z \leq t$</td> <td style="text-align: center;">$\leq 1/2 k$ and not over viewing area</td> <td style="text-align: center;">$x \leq 1/8a$</td> </tr> </table> <p>⊙ Unit: mm ⊙ If there are 2 or more chips, x is the total length of each chip</p> <p>14.1.2 Corner crack:</p>  <table border="1" data-bbox="363 1400 1181 1617"> <tr> <td style="text-align: center;">z: Chip thickness</td> <td style="text-align: center;">y: Chip width</td> <td style="text-align: center;">x: Chip length</td> </tr> <tr> <td style="text-align: center;">$z \leq t$</td> <td style="text-align: center;">$\leq 1/2 k$ and not over viewing area</td> <td style="text-align: center;">$x \leq 1/8a$</td> </tr> </table> <p>⊙ Unit: mm ⊙ If there are 2 or more chips, x is the total length of each chip</p>	z: Chip thickness	y: Chip width	x: Chip length	$z \leq t$	$\leq 1/2 k$ and not over viewing area	$x \leq 1/8a$	z: Chip thickness	y: Chip width	x: Chip length	$z \leq t$	$\leq 1/2 k$ and not over viewing area	$x \leq 1/8a$	2.5
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NO	Item	Criterion	AQL										
15	Touch Panel (Fish eye, dent and bubble on film)	<table border="1" data-bbox="384 293 916 483"> <thead> <tr> <th>SIZE (mm)</th> <th>Acceptable Q' ty</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.2$</td> <td>Accept no dense</td> </tr> <tr> <td>$0.2 < D \leq 0.4$</td> <td>5</td> </tr> <tr> <td>$0.4 < D \leq 0.5$</td> <td>2</td> </tr> <tr> <td>$0.5 < D$</td> <td>0</td> </tr> </tbody> </table>  	SIZE (mm)	Acceptable Q' ty	$\Phi \leq 0.2$	Accept no dense	$0.2 < D \leq 0.4$	5	$0.4 < D \leq 0.5$	2	$0.5 < D$	0	2.5
SIZE (mm)	Acceptable Q' ty												
$\Phi \leq 0.2$	Accept no dense												
$0.2 < D \leq 0.4$	5												
$0.4 < D \leq 0.5$	2												
$0.5 < D$	0												
16	Touch Panel Newton ring	Newton ring dimension $\leq 1/2$ touch panel area and not affect font and line distortion ($\leq 2.5\%$), it is acceptable.	2.5										
17	Touch Panel Linearity	Less than 2.5% is acceptable.	2.5										
18	LCD Ripple	Touch the touch panel, can not see the LCD ripple. Pen: R 1.0mm silicon rubber. Operation Force: 80g	2.5										
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.	0.65 0.65 0.65 0.65										

12. General Precautions

12.1. 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.

12.2. Handling

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

12.3. Static Electricity

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

12.4. Storage

1. Store the module in a dark room where must keep at $25\pm 10^{\circ}\text{C}$ and 65%RH or less.
2. Do not store the module in surroundings containing organic solvent or corrosive gas.
3. Store the module in an anti-electrostatic container or bag.

12.5. Cleaning

1. Do not wipe the polarizer with dry cloth. It might cause scratch.
2. Only use a soft sloth with IPA to wipe the polarizer, other chemicals might permanent damage to the polarizer .