Surenoo HDMI Display Module Series

Model No.: SHD070J-1024600

USER MANUAL

Thin and Light Design

Please click the following image to buy the sample

IPS/QLED Display, 40P/0.5MM FPC Connector Replace HDMI Port

Shenzhen Surenoo Technology Co.,Ltd.
www.surenoo.com

Reference Links

Surenoo HDMI Display Module Selection Guide

CONTENTS

1、GENERAL INFORMATION

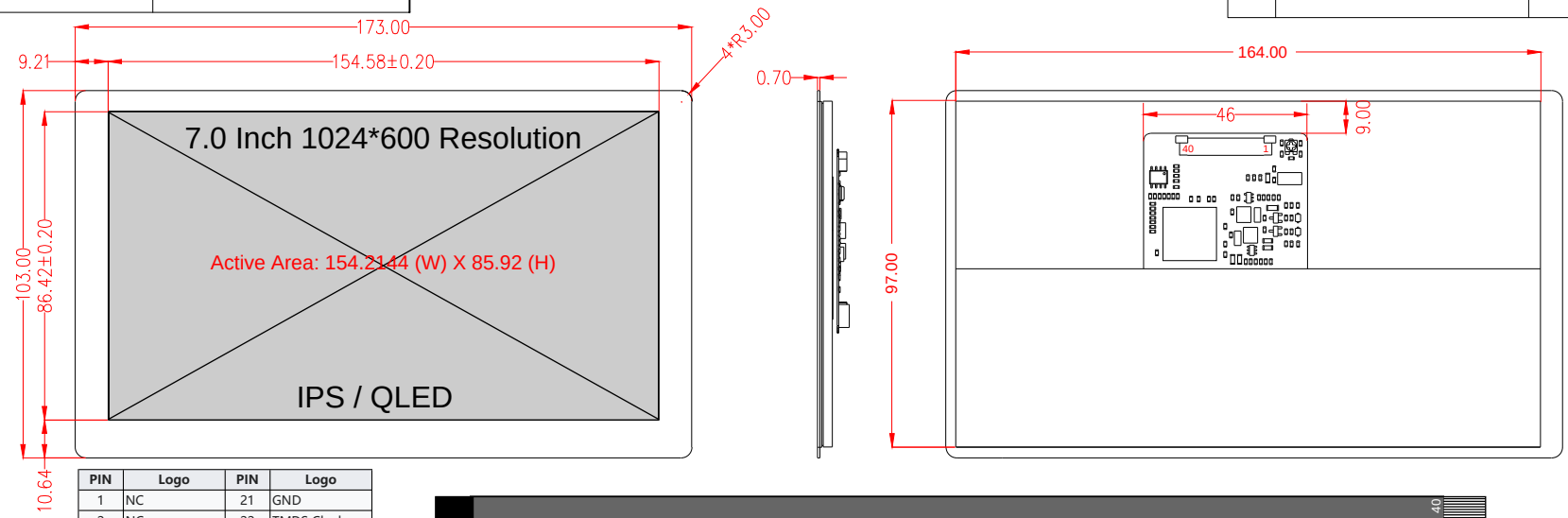
Item of general information	Contents	Unit
LCD Display Size (Diagonal)	7.0 IPS/QLED	inch
Module Structure	LCD Display + FPC + Touch Panel	-
LCD Display Type	TFT/TRANSMISSIVE	-
LCD Display Mode	Normally Black	-
Recommended Viewing Direction	ALL VIEW (IPS/QLED)	o'clock
Module size (W×H×T)	173.00×103.00	mm
Active area (W×H)	154.21×85.92	mm
Number of pixels (Resolution)	1024RGB×600	Pixel
Pixel pitch (W×H)	0.1506×0.1412	mm
Color Pixel Arrangement	RGB Stripe	-
Module Interface Type	40P/0.5MM FPC Connnector	-
Color Gamut	IPS: 45% NTSC / QLED: 78% NTSC	-
Contrast	800:1	-
Power Supply	5.0V	-
Backlight Adjustment Methods	PWM Software Dimming	-
Color Numbers	16.7M	-
Backlight Type	White LED	-

SHD070J-1024600-CTP (IPS/QLED)

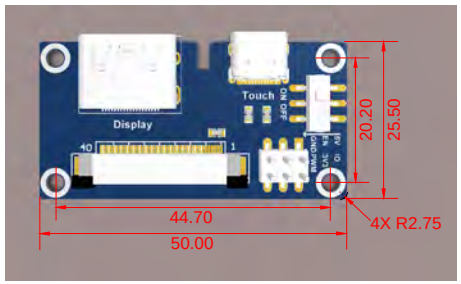
2、EXTERNAL DIMENSIONS

REV NO.	Contents	Date
V0	First release	2018-03-02

Customer Approved



PIN	Logo	PIN	Logo
1	NC	21	GND
2	NC	22	TMDS Clock-
3	NC	23	CEC
4	5V IN	24	SCL
5	5V IN	25	SDA
6	5V IN	26	GND
7	3V3 OUT	27	+5V Power
8	GND	28	Hot Plug Detect
9	GND	29	NC
10	GND	30	NC
11	TMDS Data2+	31	NC
12	GND	32	NC
13	TMDS Data2-	33	D+
14	TMDS Data1+	34	D-
15	GND	35	GND
16	TMDS Data1-	36	BL_PWM
17	TMDS Data0+	37	BL_EN
18	GND	38	NC
19	TMDS Data0-	39	NC
20	TMDS Clock+	40	NC



1. Backlight Adjustment Method: PWM Software Dimming
2. Contrast: 800:1
3. Color Gamut (IPS Version): 45% NTSC
4. Color Gamut (QLED Version): 78% NTSC

SHENZHEN SURENOO TECHNOLOGY CO.,LTD.
深圳市襄诺科技有限公司

Display Type	7.0" IPS/QLED	Interface	40PIN 0.5mm FPC	Pixel Pitch	0.1506mm×0.1432mm	Product NO:	SHD070J-1024600-CTP(IPS/QLED)		
Display Mode	Normally Black	Operating Temperature	-10°C to +70°C	Brightness	350 cd/m^2	Part NO:	CTP Moudel	APPD:	Henry
Viewing Direction	ALL VIEW	Storage Temperature	-20°C to +80°C	Backlight	21 LED	REV: V0	Unit: mm	CHKD:	Eric
Resolution	1024(RGB)X600 Pixels	Structure	LCD+CTP+FPC	Material Note	ROHS Request	Date: 2019-05-10	Scale: 1:1	DWN:	Jason
THIS DRAWING IS PROPERTY OF SURENOO TECHNOLOGY, IT CANNOT BE REPRODUCED WITHOUT PERMISSION.						Unmarked Tolerance±0.20 mm		Sheet:	1 OF 1

3、ABSOLUTE MAXIMUM RATINGS

Parameter of absolute maximum ratings	Symbol	Min	Max	Unit
Operating temperature	Top	-10	70	℃
Storage temperature	Tst	-20	80	℃
Humidity	RH	-	90%(Max 60℃)	RH

Note: Absolute maximum ratings means the product can withstand short-term, not more than 120 hours. If the product is a long time to withstand these conditions, the life time would be shorter.

4、ELECTRICAL CHARACTERISTICS(DC CHARACTERISTICS)

Parameter	Minimum Value	Standard Value	Max Value	Unit	Note
Input Voltage	4.75	5.00	5.25	V	Note 1
Input Current	500	500	TBD	mA	Note 2
Output Voltage	3.1	3.3	3.5	V	Note 1
Output Current	0	200	200	mA	Note 3
Operating temperature	-10	25	70	℃	Note 4
Storage temperature	-20	25	80	℃	Note 4
Operating Humidity	10	60	90	%RH	Note 4

Note 1: Input voltage/output voltage exceeding the maximum value or improper operation may cause permanent damage to the device.

Note 2: Input current/output current must be greater than 500mA, otherwise it will cause startup failure or abnormal display, and it may cause permanent damage to the device if it is in an abnormal state for a long time.

Note 3: The output current needs to be less than 200mA, otherwise it will fail to be started or display abnormally, and it may cause permanent damage to the device if it is in an abnormal state for a long time.

Note 4: Please do not store the display in a high-temperature and high-humidity environment for a long time. The display must work within the limited value range, otherwise, the display may be damaged.

5、CTP CHARACTERISTICS

Item of CTP characteristics	Specification	Unit	Remark
Panel Type	Glass Cover + Glass Sensor	-	-
Resolution	1024 × 600	pixel	-
Surface Hardness	≥6H	-	-
Transparency	＞82%	-	-
Driver IC	-	-	-
Interface Type	USB	-	-
Support Points	5	-	-
Sampling Rate	100	Hz	-
Supply voltage	3.3	V	-

6、ELECTRO-OPTICAL CHARACTERISTICS

Item of electro-optical characteristics		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark	Note
Response time		Tr+Tf	θ=0 ∅=0 Ta=25℃	-	25	40	ms	FIG 1.	4
Contrast Ratio		CR		-	320	-	-	FIG 2.	1
Luminance uniformity		δWHITE		-	80	-	%	FIG 2.	3
Surface Luminance		Lv		-	300	-	cd/m2	FIG 2.	2
CIE (x, y) chromaticity	White	White x	θ=0 ∅=0 Ta=25℃	-	0.302	-	-	FIG 2.	5
		White y		-	0.338	-			
	Red	Red x		-	0.606	-			
		Red y		-	0.325	-			
	Green	Green x		-	0.303	-			
		Green y		-	0.567	-			
	Blue	Blue x		-	0.147	-			
		Blue y		-	0.161	-			
Viewing angle range	∅=90(12 o'clock)		CR ≥ 10	-	70	-	deg	FIG 3.	6
	∅=270(6 o'clock)			-	75	-	deg		
	∅=0(3 o'clock)			-	75	-	deg		
	∅=180(9 o'clock)			-	75	-	deg		
NTSC ratio	-		-	-	50	-	%	-	-

Note 1. *Contrast Ratio(CR) is defined mathematically by the following formula. For more information see FIG 2.:*

$$\text{Contrast Ratio(CR)} = \frac{\text{Average Surface Luminance with all white pixels(P1,P2,P3,P4,P5,P6,P7,P8,P9)}}{\text{Average Surface Luminance with all black pixels(P1,P2,P3,P4,P5,P6,P7,P8,P9)}}$$

Note 2. *Surface luminance is the LCD surface from the surface with all pixels displaying white. For more information see FIG 2.*

Lv=Average Surface Luminance with all white pixels (P1,P2,P3,P4,P5,P6,P7,P8,P9)

Note 3. *The uniformity in surface luminance（δWHITE）is determined by measuring*

luminance at each test position 1 through 9, and then dividing the maximum luminance of 9points luminance by minimum luminance of 9 points luminance. For more information see FIG 2.

$$\delta WHITE = \frac{Minimum\ Surface\ Luminance\ with\ all\ white\ pixels\ (P1, P2, P3, P4, P5, P6, P7, P8, P9)}{Maximum\ Surface\ Luminance\ with\ all\ white\ pixels\ (P1, P2, P3, P4, P5, P6, P7, P8, P9)}$$

Note 4. *Response time is the time required for the display to transition from White to black(Rise Time, Tr) and from black to white(Decay Time, Tf). For additional information see FIG 1.*

Note 5. *CIE (x, y) chromaticity ,The x,y value is determined by screen active area position 5. For more information see FIG 2.*

Note 6. *Viewing angle is the angle at which the contrast ratio is greater than a specific value. For TFT module, the specific value of contrast ratio is 10.The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface. For more information see FIG 3.*

Note 7. *For Viewing angle and response time testing, the testing data is base on Autronic-Melchers's ConoScope. Series Instruments. For contrast ratio, Surface Luminance, Luminance uniformity and CIE， the testing data is base on BM-7 photo detector.*

Note 8. *For TN type TFT transmissive module, Gray scale reverse occurs in the direction of panel viewing angle.*

FIG.1. The definition of Response Time

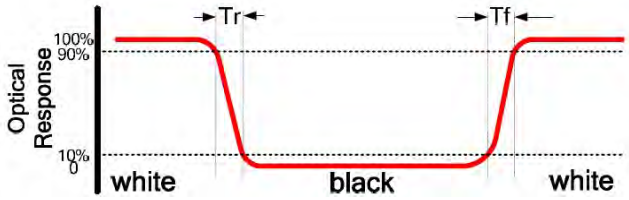


FIG.2. Measuring method for Contrast ratio, surface luminance, Luminance uniformity, CIE (x , y) chromaticity

A : H/6 ;
B : V/6 ;
H,V : Active Area(AA) size
Measurement instrument: BM-7; Light spot size=5mm, 350mm distance from the LCD surface to detector lens.

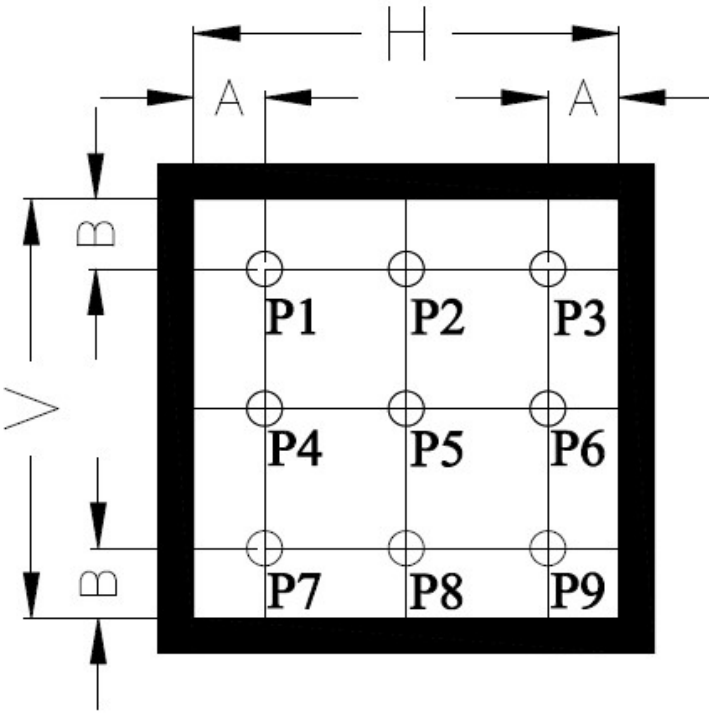
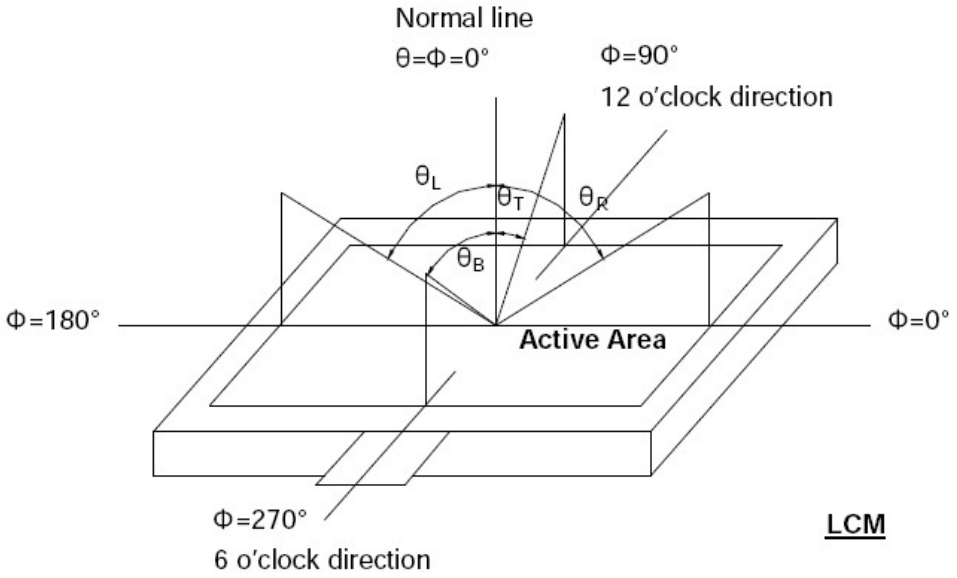


FIG.3. The definition of viewing angle



7、INTERFACE DESCRIPTION

40P/0.5 FPC Interface Description

PIN	Logo	Function Description	PIN	Logo	Function Description
1	NC	Not connect	21	GND	Ground (0V)
2	NC	Not connect	22	TMDS Clock-	Differential data signal
3	NC	Not connect	23	CEC	Consumer electronics control signals
4	5V IN	DC 5V power input	24	SCL	I2C clock line, internal 10kΩ pull-up
5	5V IN	DC 5V power input	25	SDA	I2C data line, internal 10kΩ pull-up
6	5V IN	DC 5V power input	26	GND	Ground (0V)
7	3V3 OUT	DC 3.3V power output	27	+5V Power	With HPD to achieve insertion detection
8	GND	Ground (0V)	28	Hot Plug Detect	Hot plug detect signal
9	GND	Ground (0V)	29	NC	Not Connect
10	GND	Ground (0V)	30	NC	Not Connect
11	TMDS Data2+	Differential data signal	31	NC	Not Connect
12	GND	Ground (0V)	32	NC	Not Connect
13	TMDS Data2-	Differential data signal	33	D+	USB differential data signal
14	TMDS Data1+	Differential data signal	34	D-	USB differential data signal
15	GND	Ground (0V)	35	GND	Ground (0V)
16	TMDS Data1-	Differential data signal	36	BL_PWM	Display backlight adjustment
17	TMDS Data0+	Differential data signal	37	BL_EN	Display backlight enable
18	GND	Ground (0V)	38	NC	Not connect
19	TMDS Data0-	Differential data signal	39	NC	Not connect
20	TMDS Clock+	Differential data signal	40	NC	Not connect

If you are using the SHD070J-1024600 series touch display screen for the first time, it is recommended to use it with the development accessories:

Adapter Board Pin Header

Definition	Function Introduction
5V	DC 5V Power Input
3V3	DC 3.3V Power Output
GND	Ground (0V)
EN	Backlight Enable
PWM	Backlight Adjustment
IO	NC

8、LCD TIMING

Horizontal input Timing table

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK frequency@ Frame rate=60Hz	DCLK	44.9	51.2	63	MHz
Horizontal display area	thd		1024		DCLK
1 Horizontal Line	th	1200	1344	1400	DCLK
HSYNC pulse width	thpw	1	-	140	DCLK
HSYNC Blanking	thb	160	160	160	DCLK
HSYNC Front Porch	thfp	16	160	216	DCLK
Vertical display area	tvd		600		H
VSYNC period time	tv	624	635	750	H
VSYNC pulse width	tvpw	1	-	20	H
VSYNC Blanking	tvb	23	23	23	H
VSYNC Front Porch	tvfp	1	12	127	H

Vertical input Timing table

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK frequency@ Frame rate=60Hz	DCLK	40.8	51.2	67.2	MHz
Horizontal display area	thd		1024		DCLK
HSYNC period time	th	1114	1344	1400	DCLK
HSYNC Blanking	thb + thfp	90	320	376	DCLK
Vertical display area	tvd		600		H
VSYNC period time	tv	610	635	800	H
VSYNC Blanking	tvb + tvfp	10	35	200	H

9、RELIABILITY TEST CONDITIONS

No.	Test Item	Test Condition
1	High Temperature Storage	80℃/120 hours
2	Low Temperature Storage	-30℃/120 hours
3	High Temperature Operating	70℃/120 hours
4	Low Temperature Operating	-20℃/120 hours
5	Temperature Cycle Storage	-20℃(30min.)~25(5min.)~70℃(30min.)×10cycles

A、Inspection after test:

Inspection after 2~4 hours storage at room temperature, the sample shall be free from defects:

- Air bubble in the LCD;
- Sealleak;
- Non-display;
- Missing segments;
- Glass crack;
- Current is twice higher than initial value.

B、Remark:

- The test samples should be applied to only one test item.
- Sample size for each test item is 5~10pcs.
- Failure Judgment Criterion: Basic Specification, Electrical Characteristic, Mechanical Characteristic, Optical Characteristic.

10、INSPECTION CRITERION

This specification is made to be used as the standard of acceptance/rejection criteria for TFT-LCD/IPS TFT-LCD module product, and this specification is applicable only in the case that the size of module equal to or exceed than 3.5 inch.

10.1 Sample plan

Sampling plan according to GB/T2828.1-2003/ISO 2859-1：1999 and ANSI/ASQC Z1.4-1993,normal level 2 and based on:

Major defect: AQL 0.65

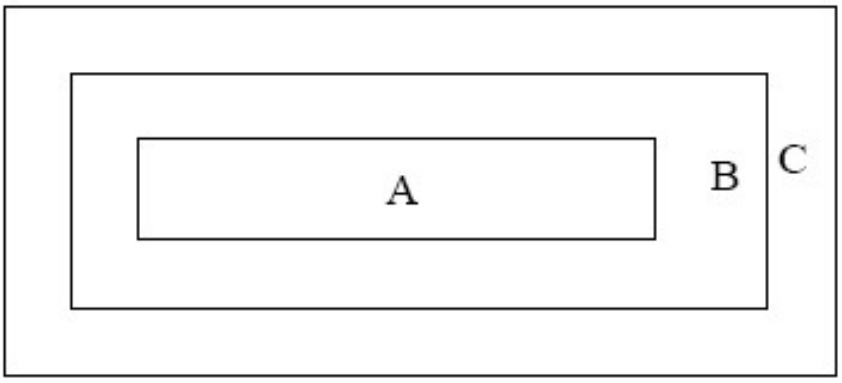
Minor defect: AQL 1.5

10.2 Inspection condition

Viewing distance for cosmetic inspection is about 30cm with bare eyes, and under an environment of 20~40W light intensity, all directions for inspecting the sample should be within 45°against perpendicular line. (Normal temperature 20~25℃and normal humidity 60 ±15%RH)

10.3 Definition of Inspection Item.

A、Definition of inspection zone in LCD.



Zone A: character/Digit area

Zone B: viewing area except Zone A (Zone A + Zone B=minimum Viewing area)

Zone C: Outside viewing area (invisible area after assembly in customer's product)

Fig.1 Inspection zones in an LCD

Note: As a general rule, visual defects in Zone C are permissible, when it is no trouble for quality and assembly of customer's product.

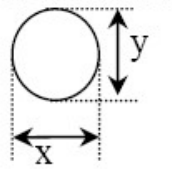
B、 Definition of some visual defect

Bright dot	*Because of losing all or part function, bad pixel dots appear bright and the size is more than 50% of one dot in which LCD panel is displaying under black pattern.*
Dark dot	*Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green, blue picture, or pure whiter picture.*

10.4 Major Defect

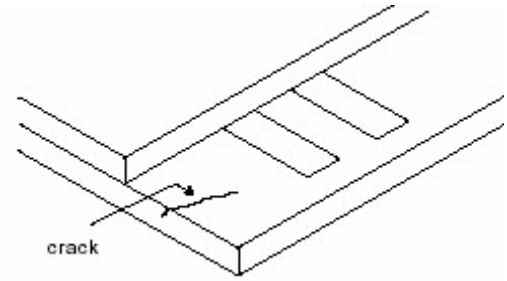
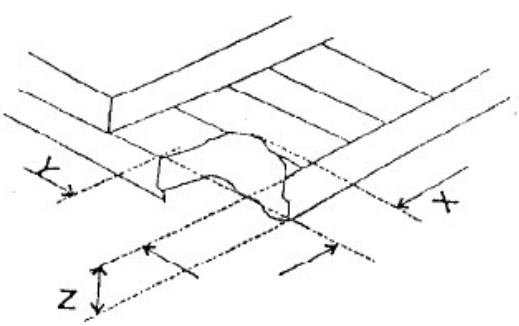
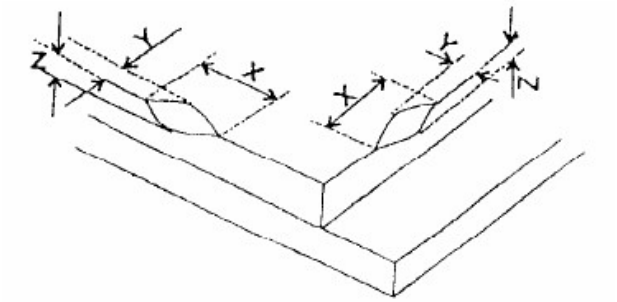
Item No.	***Items to be inspected***	***Inspection standard***	***Classification of defects***
1	*Functional defects*	*1) No display* *2) Display abnormally* *3) Missing vertical, horizontal segment* *4) Short circuit* *5) Excess power consumption* *6)Backlight no lighting, flickering and abnormal lighting*	*major*
2	*Missing*	*Missing component*	
3	*Outline dimension*	*Overall outline dimension beyond the drawing is not allowed*	

10.5 Minor Defect

<table>
<tr><th>Item No.</th><th>Items to be inspected</th><th>Inspection standard</th><th>Classification of defects</th></tr>
<tr><td>1</td><td>Bright dot /dark dot defect</td><td>
<table>
<tr><td rowspan="2">Zone</td><td colspan="3">Acceptable Qty</td></tr>
<tr><td colspan="3">A+B</td><td rowspan="2">C</td></tr>
<tr><td>3.5” ～ 7”</td><td>7～10.1”</td><td>＞10.1”</td></tr>
<tr><td>Bright pixel dot</td><td>1</td><td>2</td><td>3</td><td rowspan="5">Acceptable</td></tr>
<tr><td>Dark pixel dot</td><td>4</td><td>4</td><td>4</td></tr>
<tr><td>2bright dots adjacent</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>2dark dots adjacent</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Total bright and dark dots</td><td>5</td><td>6</td><td>7</td></tr>
</table>
Note: Minimum distance between defective dots is more than 5mm; Pixel dots’ function is normal, but bright dots caused by foreign material and other reasons are judged by the dot defect of 5.2.
</td><td>Minor</td></tr>
<tr><td>2</td><td>Dot defect
 

Φ=(x+y) /2</td><td>
<table>
<tr><td rowspan="2">Zone
Size(mm)</td><td colspan="3">Acceptable Qty</td></tr>
<tr><td colspan="3">A+B</td><td rowspan="2">C</td></tr>
<tr><td>3.5”～7”</td><td>7～10.1”</td><td>＞10.1”</td></tr>
<tr><td>Φ≤0.2</td><td>Acceptable</td><td>Acceptable</td><td>Acceptable</td><td rowspan="3">Acceptable</td></tr>
<tr><td>0.2＜Φ≤0.5</td><td>4</td><td>5</td><td>6</td></tr>
<tr><td>Φ＞0.5</td><td>0</td><td>0</td><td>0</td></tr>
</table>
Note:
1. Minimum distance between defective dots is more than 5 mm;
2. The quantity of defect is zero in operating condition.
</td><td>Minor</td></tr>
<tr><td>3</td><td>Linear defect</td><td>
<table>
<tr><td colspan="2" rowspan="2">Zone
Size (mm)</td><td colspan="3">Acceptable Qty</td></tr>
<tr><td colspan="3">A+B</td><td rowspan="2">C</td></tr>
<tr><td>Length</td><td>Width</td><td>3.5”～7”</td><td>7～10.1”</td><td>＞10.1”</td></tr>
<tr><td>Ignore</td><td>W≤0.05</td><td>Acceptable</td><td>Acceptable</td><td>Acceptable</td><td rowspan="3">Acceptable</td></tr>
<tr><td>L≤5.0</td><td>0.05＜W≤0.1</td><td>4</td><td>5</td><td>6</td></tr>
<tr><td>L＞5.0</td><td>W＞0.1</td><td>0</td><td>0</td><td>0</td></tr>
</table>
</td><td>Minor</td></tr>
</table>

<table>
<tr>
<td>4</td>
<td>Polarizer defect</td>
<td>
5.4.1 Polarizer Position
(i) Shifting in position should not exceed the glass outline dimension.
(ii) Incomplete covering of the viewing area due to shifting is not allowed.
5.4.2 Dirt on polarizer
Dirt which can be wiped easily should be acceptable.
5.4.3 Polarizer Dent & Air bubble
<table>
<tr><td rowspan="2">Zone
Size(mm)</td><td colspan="3">Acceptable Qty</td></tr>
<tr><td colspan="3">A+B</td><td>C</td></tr>
<tr><td></td><td>3.5”~7”</td><td>7~10.1”</td><td>>10.1”</td><td></td></tr>
<tr><td>Φ≤0.2</td><td>Acceptable</td><td>Acceptable</td><td>Acceptable</td><td rowspan="3">Acceptable</td></tr>
<tr><td>0.2＜Φ≤0.5</td><td>4</td><td>5</td><td>6</td></tr>
<tr><td>Φ＞0.5</td><td>0</td><td>0</td><td>0</td></tr>
</table>
5.4.4 Polarizer scratch
(i) If the polarizer scratch can be seen after cover assembling or in the operating condition, judge by the linear defect of 5.3.
(ii)If the polarizer scratch can be seen only in non-operating condition or some special angle, judge by the following:
<table>
<tr><td colspan="2" rowspan="2">Zone
Size (mm)</td><td colspan="3">Acceptable Qty</td></tr>
<tr><td colspan="3">A+B</td><td>C</td></tr>
<tr><td>Length</td><td>Width</td><td>3.5”~7”</td><td>7~10.1”</td><td>>10.1”</td><td></td></tr>
<tr><td>Ignore</td><td>W≤0.05</td><td>Acceptable</td><td>Acceptable</td><td>Acceptable</td><td rowspan="3">Acceptable</td></tr>
<tr><td>1.0＜L≤5.0</td><td>0.05＜W≤0.20</td><td>4</td><td>5</td><td>6</td></tr>
<tr><td>L＞5.0</td><td>W＞0.2</td><td>0</td><td>0</td><td>0</td></tr>
</table>
</td>
<td>Minor</td>
</tr>
<tr>
<td rowspan="2">5</td>
<td>MURA</td>
<td>Using 3% ND filter, it’s NG if it can be seen in R,G,B picture.</td>
<td rowspan="2">Minor</td>
</tr>
<tr>
<td>White/Black dot（MURA）</td>
<td>Visible under：ND3%；D≦0.15mm, Acceptable；
0.15mm<D≦0.5mm, N≦4；D>0.5mm, Not allowable.</td>
</tr>
</table>

<table>
<tr>
<td rowspan="3">6</td>
<td rowspan="3">Glass defect</td>
<td>(i) Crack
Cracks are not allowed.
 
</td>
<td>Minor</td>
</tr>
<tr>
<td>(ii) TFT chips on corner
 
<table>
<tr><th>X</th><th>Y</th><th>Z</th><th>Acceptable</th></tr>
<tr><td>≤3.0</td><td>≤3.0</td><td>Not more than the thickness of glass</td><td>N≤3</td></tr>
</table>
Chips on the corner of terminal shall not be allowed to extend into the ITO pad or expose perimeter seal.</td>
<td>Minor</td>
</tr>
<tr>
<td>(iii) Usual surface crack
 
<table>
<tr><th>X</th><th>Y</th><th>Z</th><th>Acceptable</th></tr>
<tr><td>≤1.5</td><td>≤1.5</td><td>Not more than the thickness of glass</td><td>N≤4</td></tr>
</table>
It is only applicable to the upper glass of LCD.</td>
<td>Minor</td>
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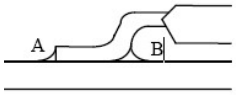
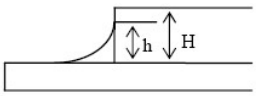
10.6 Module Cosmetic Criteria

Item No.	Items to be inspected	Inspection Standard	Classification of defects
1	Difference in Spec.	Not allowable	Major
2	Pattern peeling	No substrate pattern peeling and floating	Major
3	Soldering defects	No soldering missing	Major
		No soldering bridge	Major
		No cold soldering	Minor
4	Resist flaw on PCB	Visible copper foil (Φ0.5 mm or more) on substrate pattern is not allowed	Minor
5	FPC gold finger	No dirt, breaking, oxidation lead to black	Major
6	Backlight plastic frame	No deformation, crack, breaking, backlight positioning column breaking, obvious nick.	Minor
7	Marking printing effect	No dark marking, incomplete, deformation lead to unable to judge	Minor
8	Accretion of metallic Foreign matter	No accretion of metallic foreign matter (Not exceed Φ0.2mm)	Minor
9	Stain	No stain to spoil cosmetic badly	Minor
10	Plate discoloring	No plate fading, rusting and discoloring	Minor
11	1. Lead parts	a. Soldering side of PCB Solder to form a 'Filet' all around the lead. Solder should not hide the lead form perfectly.	Minor
		b. Components side(In case of 'Through Hole PCB') Solder to reach the Components side of PCB.	Minor
	2. Flat packages	Either 'Toe'(A) or 'Seal'(B)of the lead to be covered by "Filet". Lead form to be assume over Solder. 	Minor
	3. Chips	(3/2) H ≥h ≥(1/2) H 	Minor
	4. Solder ball/Solder splash	a. The spacing between solder ball and the conductor or solder pad h ≥0.13 mm. The diameter of solder ball d ≤0.15 mm.	Minor
		b. The quantity of solder balls or solder splashes isn't beyond 5 in 600 mm2.	Minor
		c. Solder balls/Solder splashes do not violate minimum electrical clearance.	Major