CONTENTS

1、GENERAL INFORMATION

Item of general information	Contents		Unit
LCD Display Size (Diagonal)	7		inch
	LCD Display + CTP Touch + PCB		-
LCD Display Type	TFT/TRANSMISSIVE		-
LCD Display Mode	Normally White		-
Recommended Viewing Direction	12		o'clock
Gray inversion Direction	6		o'clock
Module size (W×H×T)	165.30×121.00×7.75		mm
Active area (W×H)	154.2144×85.92		mm
Number of pixels (Resolution)	1024RGB×600		pixel
Pixel pitch (W×H)	0.1506×0.1412		mm
Color Pixel Arrangement	RGB Stripe		-
	LCD Display	HDMI interface	-
	CTP Touch	USB interface	-
	Win7/Win8/Win10(Plug and play)		-
	Android/Linux (need to be configured first)		-
Power Supply	USB(5.0V)		-
Module Power consumption	500(Typ.)		mA
Color Numbers	16.7M		-
Backlight Type	White LED		-

2、EXTERNAL DIMENSIONS

HDMI INTERFACE

PIN	Symbol
1	TMDS Data2+
2	TMDS Data2 Shield
3	TMDS Data2-
4	TMDS Data1+
5	TMDS Data1 Shield
6	TMDS Data1-
7	TMDS Data0+
8	TMDS Data0 Shield
9	TMDS Data0-
10	TMDS Clock+
11	TMDS Clock Shield
12	TMDS Clock-
13	CEC
14	Reserved
15	SCL
16	SDA
17	DDC/CEC Ground
18	+5V Power
19	Hot Plug Detect

USB TOUCH INTERFACE

PIN	Symbol
1	VBUS
2	USB D-
3	USB D+
4	NC
5	GND

Backlight Circuit

VF=9.3V±0.6V;IF=120mA(Typ.)

7" TFT
1024(RGB)X800 pixels
6 o'clock
Viewing Direction

Structure Detail
SCALE 3:1

Pixels Detail
SCALE 100:1

Display Type:	7.0"TFT+CTP+PCB	Driver IC:		Pixel Pitch:	0.1506mm×0.1432mm	Product NO:		70WSV006-WCT		APPD:	Henry
Display Mode:	Transmissive	Operating Temperature:	-20°C to +70°C	LCM Brightness:	200 cd/m^2	Part NO:		CTP Moudel		CHKD:	Eric
Viewing Direction: (Gray Inversion)	6 o'clock	Storage Temperature:	-30°C to +80°C	Backlight:	18 LED	REV:	V0	Unit:	mm	DWN:	Jason
Display Resolution:	1024(RGB)X800 pixels	Structure:	LCD+FPC+BL+CTP+PCB	Material Note:	ROHS Request	Date:	2017-04-11	Scale:	1:1	Sheet:	1 OF 1

Unmarked Tolerance: ±0.20 mm

REV NO.	Contents	Date
V0	First release	2017-04-11

Customer Approved

3、ABSOLUTE MAXIMUM RATINGS

Parameter of absolute maximum ratings	Symbol	Min	Max	Unit
Operating temperature	Top	-20	70	℃
Storage temperature	Tst	-30	80	℃
Humidity	RH	-	90%(Max 60℃)	RH

Note: Absolute maximum ratings mean 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 of DC characteristics	Symbol	Min.	Typ.	Max.	Unit
PCB operating voltage	VUSB	-	5.0	-	V
LCD I/O operating voltage	VDD	3.0	3.3	3.6	V
Input voltage 'H' level	VIH	0.7*VDD	-	VDD	V
Input voltage 'L' level	VIL	VSS	-	0.3*VDD	V
Output voltage 'H' level	VOH	VDD-0.4	-	VDD	V
Output voltage 'L' level	VOL	VSS	-	VSS+0.4	V

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	20~100	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		-	200	-	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	-	60	-	deg	FIG 3.	6
		∅=270(6 o'clock)		-	70	-	deg		
		∅=0(3 o'clock)		-	80	-	deg		
		∅=180(9 o'clock)		-	80	-	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
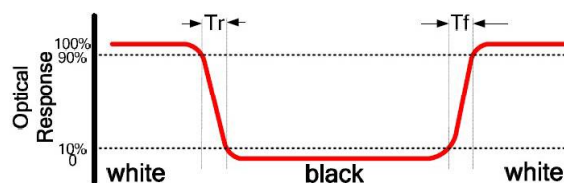
FIG.2. Measuring method for Contrast ratio, surface luminance, Luminance uniformity, CIE (x , y) chromaticity

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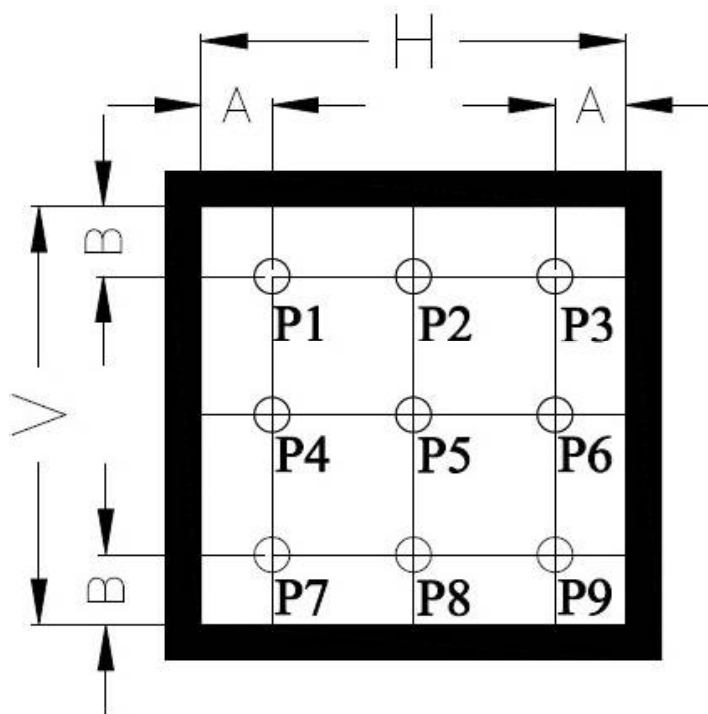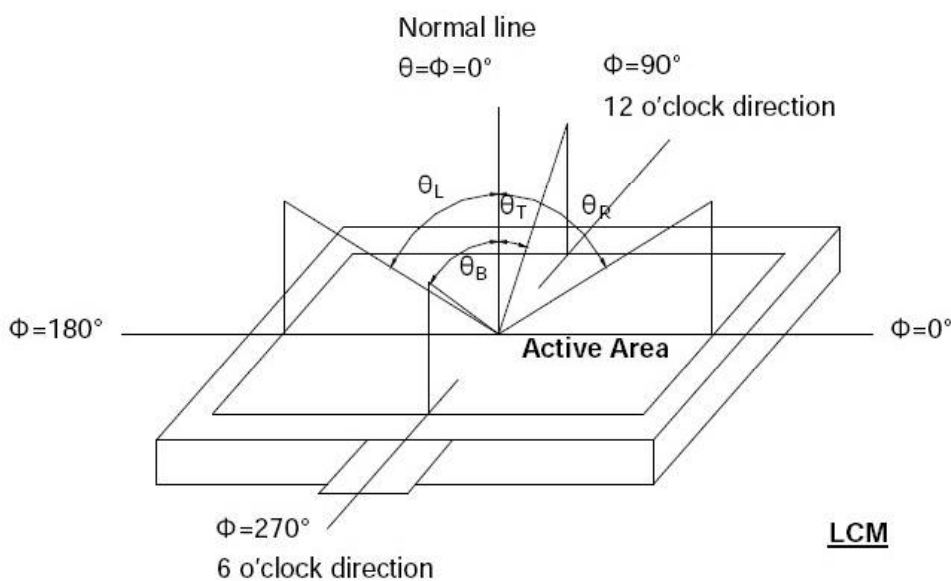*Measurement instrument: BM-7; Light spot size=5mm, 350mm distance from the LCD surface to detector lens.*

FIG.3. The definition of viewing angle

7、INTERFACE DESCRIPTION

A、HDMI Interface Description

NO.	Symbol	DESCRIPTION
1	TMDS Data2+	Positive side of channel 2 TMDS low-voltage signal differential input pair
2	TMDS Data2 Shield	Ground
3	TMDS Data2-	Negative side of channel 2 TMDS low-voltage signal differential input pair
4	TMDS Data1+	Positive side of channel 1 TMDS low-voltage signal differential input pair
5	TMDS Data1 Shield	Ground
6	TMDS Data1-	Negative side of channel 1 TMDS low-voltage signal differential input pair
7	TMDS Data0+	Positive side of channel 0 TMDS low-voltage signal differential input pair
8	TMDS Data0 Shield	Ground
9	TMDS Data0-	Negative side of channel 0 TMDS low-voltage signal differential input pair
10	TMDS Clock+	Positive side of reference clock. TMDS low-voltage signal differential input pair
11	TMDS Clock Shield	Ground
12	TMDS Clock-	Negative side of reference clock. TMDS low-voltage signal differential input pair
13	CEC	No Connection
14	Reserved(N.C.)	No Connection
15	SCL	DDC SCL
16	SDA	DDC SDA
17	DDC/CEC Ground	Ground
18	+5V Power	+5V Power
19	Hot Plug Detect	Hot Plug Detect

B、USB Interface Description

NO.	Symbol	DESCRIPTION
1	VUSB	USB Power
2	D-	USB Data-
3	D+	USB Data+
4	NC	No connection
5	GND	Power Ground

Application Note: Please connect the USB first, and then connect the HDMI interface.

8、

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.
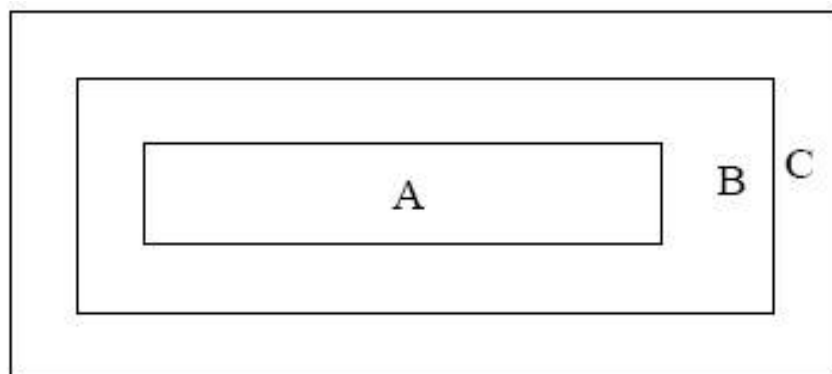
Zone A: character/Digit area

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.
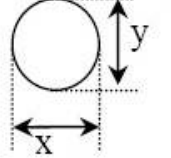
B、 *Definition of some visual defect*

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

Item No.	Items to be inspected	Inspection standard					Classification of defects

Item No.	Items to be inspected	Inspection standard	Classification of defects
1	Bright dot /dark dot defect	<table><tr><td>Zone</td><td colspan="3">Acceptable Qty</td><td rowspan="2">C</td></tr><tr><td></td><td colspan="3">A+B</td></tr><tr><td></td><td>3.5～7"</td><td>7～10.1"</td><td>>10.1"</td><td></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.	Minor
2	Dot defect $\Phi=(x+y)/2$ Linear defect	<table><tr><td>Zone</td><td colspan="3">Acceptable Qty</td><td rowspan="2">C</td></tr><tr><td></td><td colspan="3">A+B</td></tr><tr><td>Size(mm)</td><td>3.5"～7"</td><td>7～10.1"</td><td>>10.1"</td><td></td></tr><tr><td>$\Phi\leqslant0.2$</td><td>Acceptable</td><td>Acceptable</td><td>Acceptable</td><td rowspan="3">Acceptable</td></tr><tr><td>$0.2<\Phi\leqslant0.5$</td><td>4</td><td>5</td><td>6</td></tr><tr><td>$\Phi>0.5$</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.	Minor
3	Linear defect	<table><tr><td colspan="2">Zone</td><td colspan="3">Acceptable Qty</td><td rowspan="2">C</td></tr><tr><td colspan="2"></td><td colspan="3">A+B</td></tr><tr><td colspan="2">Size (mm)</td><td></td><td></td><td></td><td></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>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>	Minor

		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		

5.4.3 Polarizer Dent & Air bubble

Zone Size(mm)	A+B			C
	3.5"~7"	7~10.1"	>10.1"	
Φ≦0.2	Acceptable	Acceptable	Acceptable	Acceptable
0.2<*Φ*≦0.5	4	5	6	
Φ>0.5	0	0	0	

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:

Zone Size (mm)		A+B			C
Length	Width	3.5"~7"	7~10.1"	>10.1"	
Ignore	W≤0.05	Acceptable	Acceptable	Acceptable	Acceptable
1.0<L ≤5.0	0.05< W≤0.20	4	5	6	
L>5.0	W>0.2	0	0	0	

No.	Item	Description	Class
4	Polarizer defect	(see above)	Minor
5	MURA	Using 3% ND filter, it's NG if it can be seen in R,G,B picture.	Minor
	White/Black dot（MURA）	Visible under: ND3%; D≦0.15mm, Acceptable; 0.15mm<D≦0.5mm, N≦4; D>0.5mm, Not allowable.	

| 6 | Glass defect | (i) Crack
Cracks are not allowed.
 | Minor |
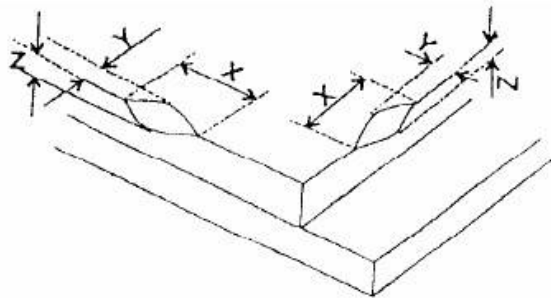| | | (ii) TFT chips on corner
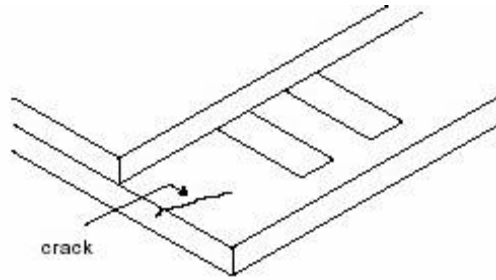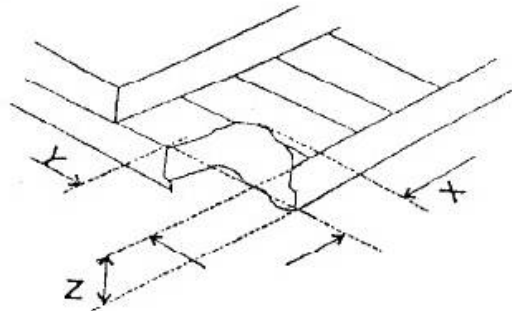
X	Y	Z	Acceptable
≤3.0	≤3.0	Not more than the thickness of glass	N≤3

Chips on the corner of terminal shall not be allowed to extend into the ITO pad or expose perimeter seal. | Minor |
| | | (iii) Usual surface crack

X	Y	Z	Acceptable
≤1.5	≤1.5	Not more than the thickness of glass	N≤4

It is only applicable to the upper glass of LCD. | Minor |

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
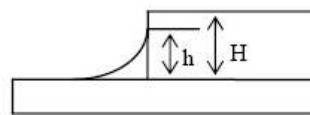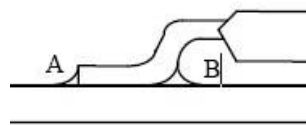
11、PRODUCT PHOTOS

PRODUCT
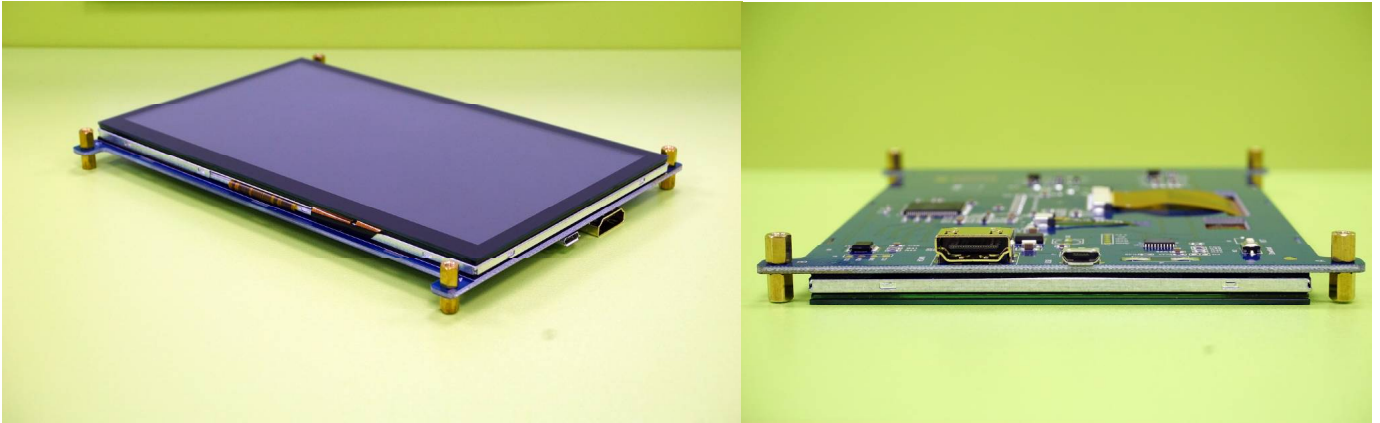
APPLICATION CASE

Driven by Raspberry Pi (linux) & win7/win8/win10 systems