



ASI-T-240DA3AN/AY

ITEM	Standard value	UNIT
LCD Type	TFT Transmissive	---
Driver element	a-Si TFT Active matrix	
Number of Dots	240*(RGB)*320	Dots
Pixel Arrangement	RGB Vertical Stripe	
Dot Pitch (W*H)	0.18*0.18	mm
Active Area	36.72(H)*48.96(V)	mm
Glass Area (W*H)	40.58*56.96	mm
Viewing Direction	ALL FREE	
Control IC	ST7789V	
Module Size(W*H*T)	42.72*60.26*2.35	mm
Approx. Weight	TBD	g
Back Light	4 White LED	
Touch Panel Type	----	
Touch Panel Active Area	----	mm
Touch Panel View Area	----	mm



RECORDS OF REVISION

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1. Introduction

1.1 Scope of application

This specification applies to the Positive type TFT transmissive dot matrix LCD module. This LCD module should be designed for mobile phone use. LCD specification: Dots 240xRGBx320.

As to basic specification of the driver IC, refer to the IC (ST7789V) specification and datasheet.

1.2 Structure:

Double display structure:

TFT Module + FPC

FULL 262k Color 2.4 inch TFT LCD size for LCD;

One bare chip with gold bump (COG) TECH;

3W SPI+18BIT RGB

1.3 TFT features:

Structure: TFT PANNEL+IC+FPC;

Transmissive Type LCD

240 dot-source and 320 dot-gate outputs;

262k Color can be selected by software;

White LED back light;

1.4 Applications:

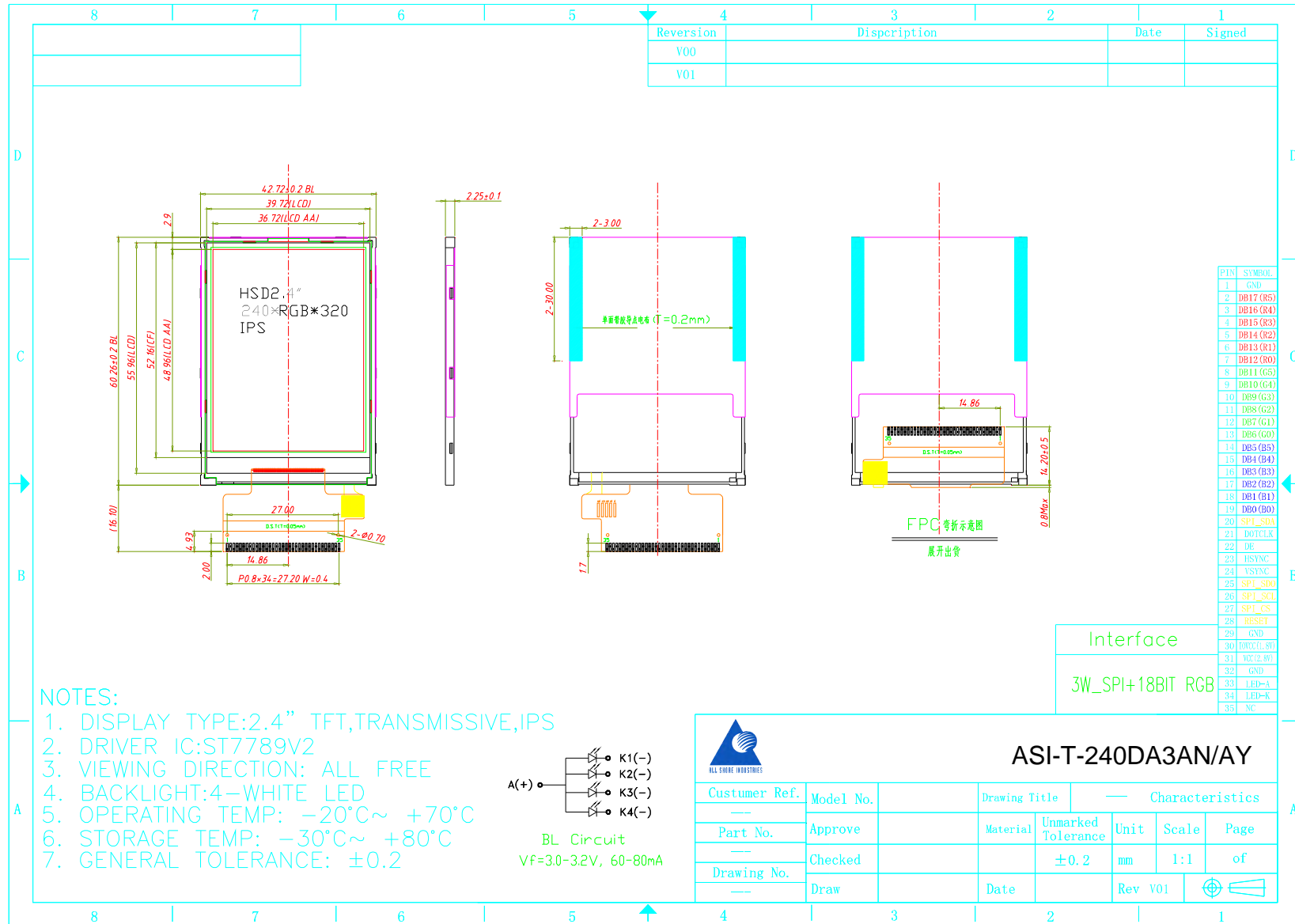
Mobile digital machine



2. General specification

ITEM	Standard value	UNIT
LCD Type	TFT Transmissive	---
Driver element	a-Si TFT Active matrix	
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Approx. Weight	TBD	g
Back Light	4 White LED	
Touch Panel Type	----	
Touch Panel Active Area	----	mm
Touch Panel View Area	----	mm

3. Mechanical drawing



ASI-T-240DA3AN/AY



4. ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Unit
Supply voltage for logic	V_{DD}	-0.3	4.6	V
Input voltage for logic	V_{IN}	-0.5	$V_{DD} + 0.3$	V
Supply current (One LED)	I_{LED}	60	80	mA
Operating temperature	T_{OP}	-20	+70	°C
Storage temperature	T_{ST}	-30	+80	°C

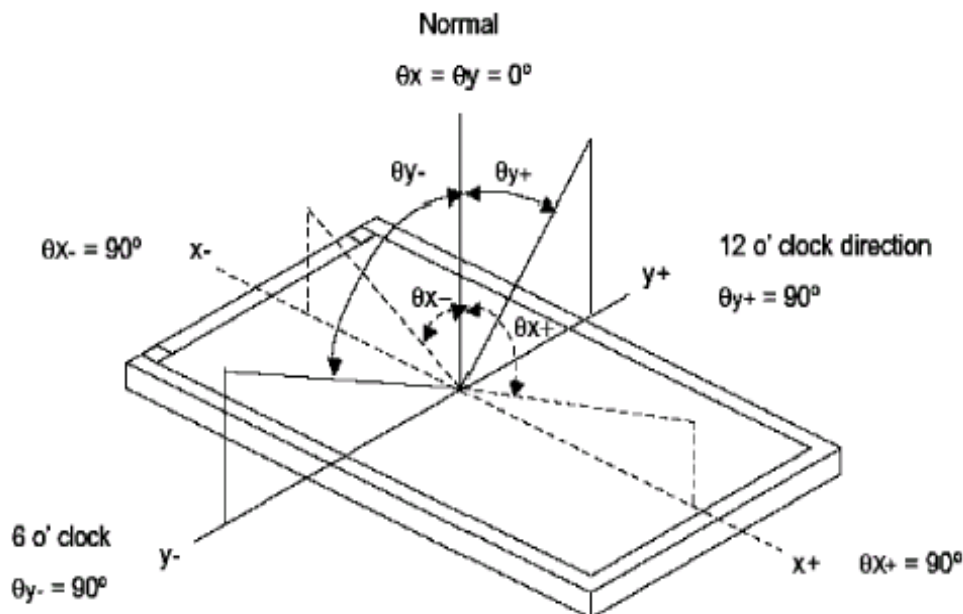
5. ELECTRICAL CHARACTERISTICS

Item	Symbol	Min	Typ	Max	Unit	Applicable terminals
Supply voltage for logic	V_{DD}	2.5	2.8	3.0	V	V_{DD}
Input voltage	V_{IL}	-	-	$0.2 V_{DD}$	V	
	V_{IH}	$0.8 V_{DD}$	-	V_{DD}	V	
Input leakage current	I_{LKG}				μ A	
LED Forward voltage	V_f	3.0	3.2	3.4	V	--
Input backlight current	I_{LED}	-	80	-	mA	

6. OPTICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITIONS	SPECIFICATIONS			UNIT	NOTE	
			MIN.	TYP.	MAX			
Brightness	B	Viewing normal angle	250	300	--	Cd/m ²	All left side data are based on DYX' s product reference only	
Contrast Ratio	CR		400	500	--	--		
Response Time	Tr+Tf		--	16	32	ms		
CIE Color coordinate	Red		X _R		0.626	-		
			Y _R		0.334	-		
	Green		X _G	-	0.277	-		
			Y _G	-	0.549	-		
	Blue		X _B	-	0.142	-		
			Y _B	-	0.122	-		
White	X _W		-	0.303	-			
	Y _W	-	0.325	-				
Viewing Angle	Hor.	θ_{x+}	--	80	--	Deg.		
		θ_x		80	--			
	Ver.	θ_{y+}	--	80	--			
		θ_y	--	80	--			
Uniformity	Un		--	90	--	%		

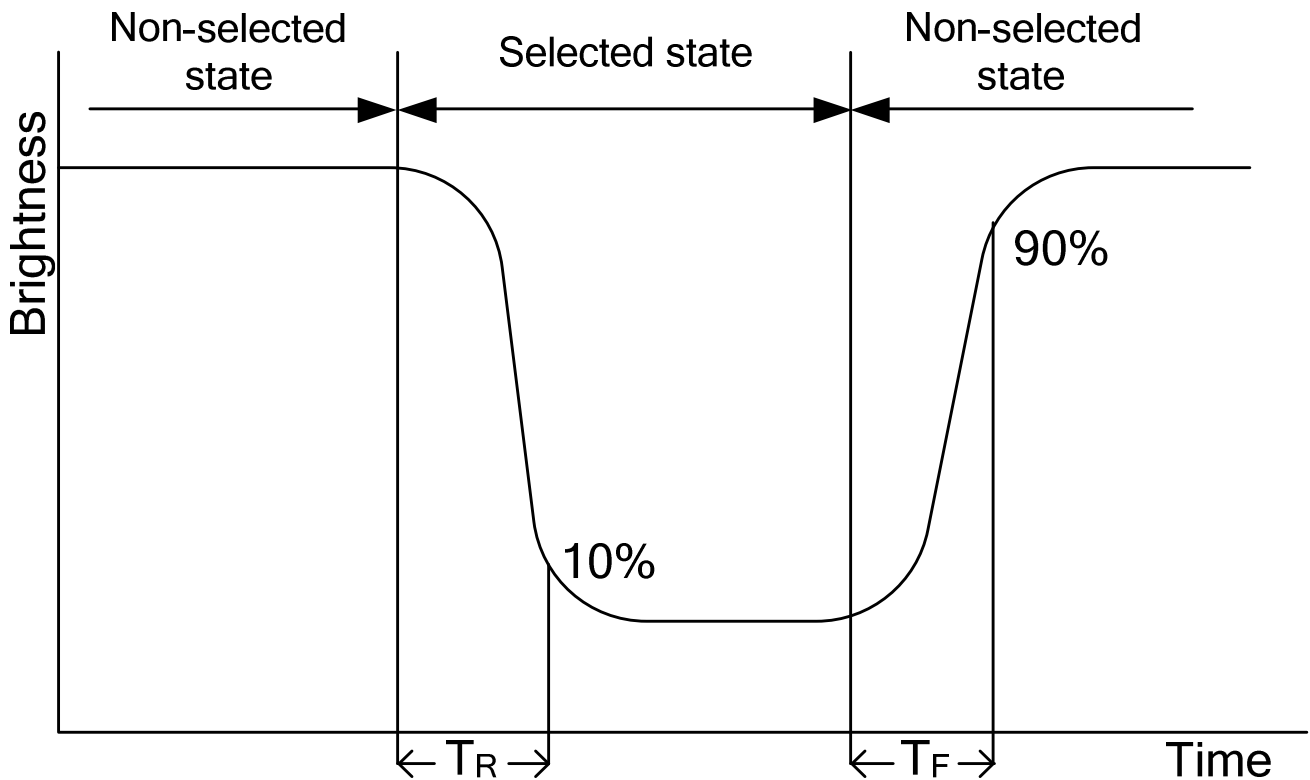
Note 1 : Definition of Viewing Angle θ_x and θ_y :



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)





7. Interface Pin Function

NO.	SYMBOL	Description
1	GND	Ground
2-19	DB17-DB0	18BIT RGB data bus
20	SPI_SDA	The data line of the 3W SPI
21	DOTCLK	Dot clock signal of the RGB interface
22	DEN	Data enable signal of the RGB interface
23	HSYNC	Line sync. signal of the RGB interface
24	VSYNC	Frame sync. signal of the RGB interface
25	SPI_SDO	SPI interface output signal.
26	SPI_SCL	SPI interface clock signal.
27	SPI_CS	chip communication enable signal.
28	RESET	This signal will reset the device.
29	GND	Ground
30	IOVCC	Power Supply2(1.8V)
32	VCC	Power Supply1(2.8V)
33	LED-A	Backlight+
34	LED-K	Backlight-
35	NC	Don' t use

8. AC Characteristics

8.1 Serial Interface

7.4.2 Serial Interface Characteristics (3-line serial):

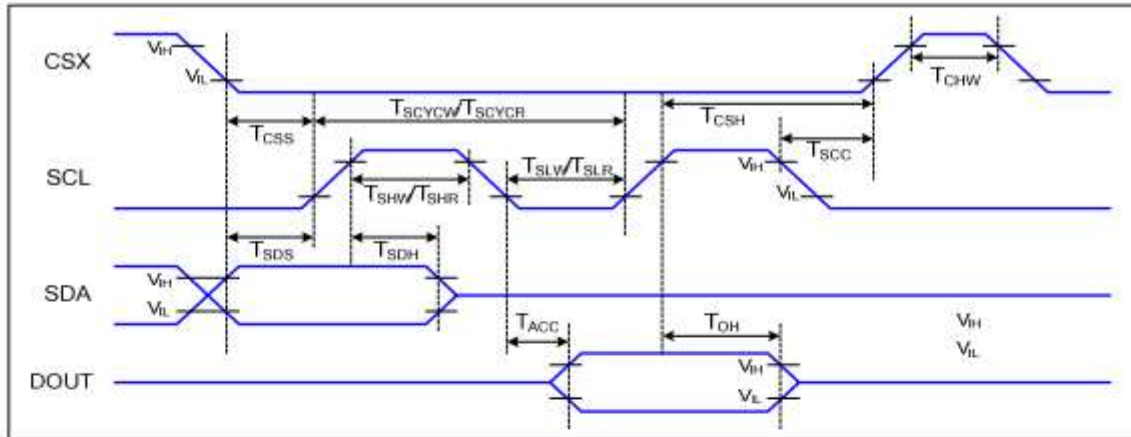


Figure 4 3-line serial Interface Timing Characteristics

V_{DDI}=1.65 to 3.3V, V_{DD}=2.4 to 3.3V, AGND=DGND=0V, T_a=-30 to 70 °C

Signal	Symbol	Parameter	Min	Max	Unit	Description
CSX	T _{CSS}	Chip select setup time (write)	15		ns	
	T _{CSH}	Chip select hold time (write)	15		ns	
	T _{CSS}	Chip select setup time (read)	60		ns	
	T _{SCC}	Chip select hold time (read)	65		ns	
	T _{CHW}	Chip select "H" pulse width	40		ns	
SCL	T _{SCYC_W}	Serial clock cycle (Write)	66		ns	
	T _{SHW}	SCL "H" pulse width (Write)	15		ns	
	T _{SLW}	SCL "L" pulse width (Write)	15		ns	
	T _{SCYC_R}	Serial clock cycle (Read)	150		ns	
	T _{SHR}	SCL "H" pulse width (Read)	60		ns	
	T _{SLR}	SCL "L" pulse width (Read)	60		ns	
SDA (DIN)	T _{SDS}	Data setup time	10		ns	
	T _{SDH}	Data hold time	10		ns	
DOUT	T _{ACC}	Access time	10	50	ns	For maximum CL=30pF
	T _{OH}	Output disable time	15	50	ns	For minimum CL=8pF

8.2 RGB Interface Characteristics

7.4.4 RGB Interface Characteristics:

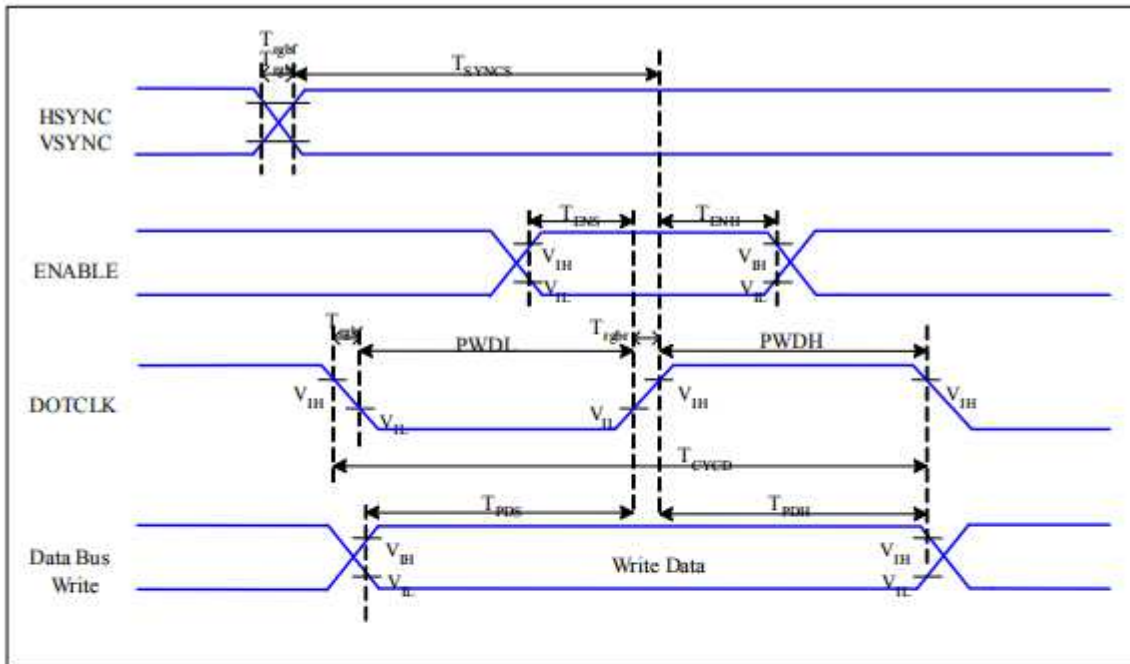


Figure 6 RGB Interface Timing Characteristics

$V_{DD1}=1.65$ to $3.3V$, $V_{DD}=2.4$ to $3.3V$, $AGND=DGND=0V$, $T_a=30 - 70\text{ }^{\circ}C$

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
HSYNC, VSYNC	T_{SYNC}	VSYNC, HSYNC Setup Time	30	-	ns	
ENABLE	T_{ENS}	Enable Setup Time	25	-	ns	
	T_{ENH}	Enable Hold Time	25	-	ns	
DOTCLK	PWDH	DOTCLK High-level Pulse Width	60	-	ns	
	PWDL	DOTCLK Low-level Pulse Width	60	-	ns	
	T_{CYCD}	DOTCLK Cycle Time	120	-	ns	
	Trghr, Trghf	DOTCLK Rise/Fall time	-	20	ns	
DB	T_{PDS}	PD Data Setup Time	50	-	ns	
	T_{PDH}	PD Data Hold Time	50	-	ns	

9.LCM Quality Criteria

9.1 VISUAL & FUNCTION INSPECTION STANDARD

9.1.1 Inspection conditions

Inspection performed under the following conditions is recommended.

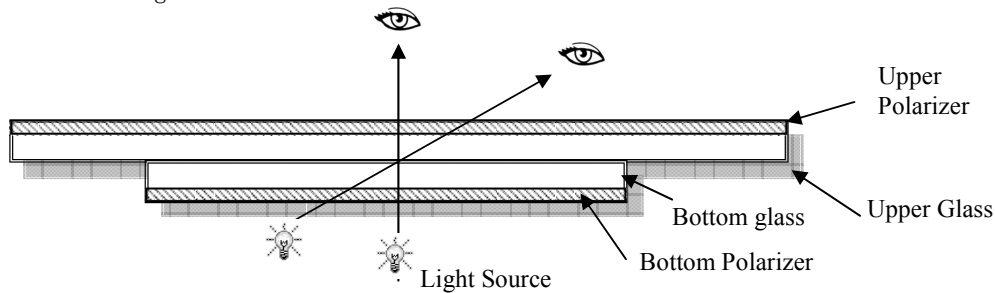
Temperature : $25 \pm 5^{\circ}\text{C}$

Humidity : $65\% \pm 10\% \text{RH}$

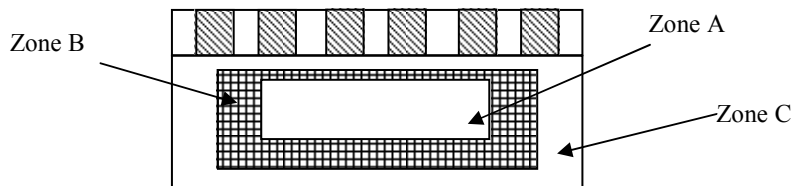
Viewing Angle : Normal viewing Angle.

Illumination: Single fluorescent lamp (300 to 700Lux)

Viewing distance:30-50cm



9.1.2 Definition



Zone A : Effective Viewing Area(Character or Digit can be seen)

Zone B : Viewing Area except Zone A

Zone C : Outside (Zone A+Zone B) which can not be seen after assembly by customer .)

Note:

As a general rule ,visual defects in Zone C can be ignored when it doesn' t effect product function

or appearance after assembly by customer.

9.1.3 Sampling Plan

According to GB/T 2828-2003 ; , normal inspection, Class II

AQL:

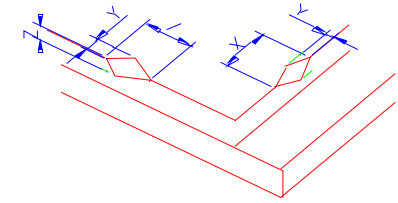
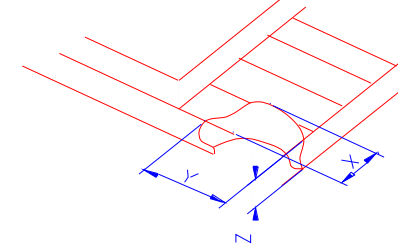
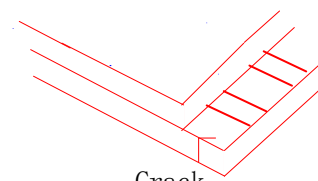
Major defect	Minor defect
0.65	1.5

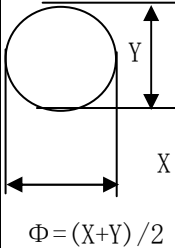
LCD: Liquid Crystal Display , TP: Touch Panel , LCM: Liquid Crystal Module

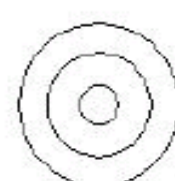


No	Items to be inspected	Criteria	Classification of defects
1	Functional defects	1) No display, Open or miss line 2) Display abnormally, Short 3) Backlight no lighting, abnormal lighting. 4) TP no function	Major
2	Missing	Missing component	
3	Outline dimension	Overall outline dimension beyond the drawing is not allowed	

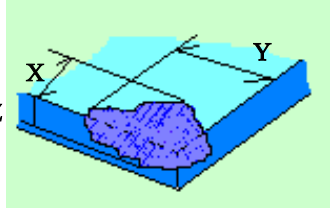
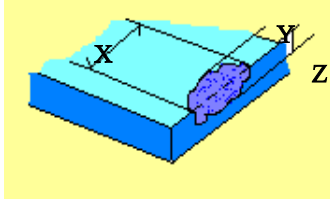
4	Color tone	Color unevenness, refer to limited sample	Minor
5	Soldering appearance	Good soldering , Peeling off is not allowed.	
6	LCD/Polarizer/TP	Black/White spot/line, scratch, crack, etc.	

9.1.4 Criteria (Visual)

Number	Items	Criteria (mm)						
1.0 LCD Crack/Broken	(1) The edge of LCD broken	 <table border="1" data-bbox="845 884 1396 1041"> <tr> <td>X</td> <td>Y</td> <td>Z</td> </tr> <tr> <td>≤3.0mm</td> <td><Inner border line of the seal</td> <td>≤T</td> </tr> </table>	X	Y	Z	≤3.0mm	<Inner border line of the seal	≤T
X	Y	Z						
≤3.0mm	<Inner border line of the seal	≤T						
NOTE: X: Length Y: Width Z: Height L: Length of ITO, T: Height of LCD	(2) LCD corner broken	 <table border="1" data-bbox="901 1332 1332 1411"> <tr> <td>X</td> <td>Y</td> <td>Z</td> </tr> <tr> <td>≤3.0mm</td> <td>≤L</td> <td>≤T</td> </tr> </table>	X	Y	Z	≤3.0mm	≤L	≤T
X	Y	Z						
≤3.0mm	≤L	≤T						
	(3) LCD crack	 <p>Crack Not allowed</p>						

Number	Items	Criteria (mm)																											
2.0	Spot defect  $\Phi = (X+Y)/2$	① light dot (LCD/TP/Polarizer black/white spot , light dot, pinhole, dent, stain) <table border="1" data-bbox="448 423 1235 788"> <thead> <tr> <th rowspan="2">Zone Size (mm)</th> <th colspan="3">Acceptable Qty</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.10$</td> <td colspan="3">Ignore</td> </tr> <tr> <td>$0.10 < \Phi \leq 0.15$</td> <td colspan="3">3 (distance $\geq 10\text{mm}$)</td> </tr> <tr> <td>$0.15 < \Phi \leq 0.2$</td> <td colspan="3">1</td> </tr> <tr> <td>$0.2 < \Phi$</td> <td colspan="3">0</td> </tr> </tbody> </table>	Zone Size (mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.10$	Ignore			$0.10 < \Phi \leq 0.15$	3 (distance $\geq 10\text{mm}$)			$0.15 < \Phi \leq 0.2$	1			$0.2 < \Phi$	0						
		Zone Size (mm)		Acceptable Qty																									
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		$0.10 < \Phi \leq 0.15$	3 (distance $\geq 10\text{mm}$)																										
		$0.15 < \Phi \leq 0.2$	1																										
		$0.2 < \Phi$	0																										
		② Dim spot (LCD/TP/Polarizer dim dot, light leakage, dark spot) <table border="1" data-bbox="448 860 1235 1225"> <thead> <tr> <th rowspan="2">Zone Size (mm)</th> <th colspan="3">Acceptable Qty</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.1$</td> <td colspan="3">Ignore</td> </tr> <tr> <td>$0.1 < \Phi \leq 0.2$</td> <td colspan="3">2 (distance $\geq 10\text{mm}$)</td> </tr> <tr> <td>$0.2 < \Phi \leq 0.3$</td> <td colspan="3">1</td> </tr> <tr> <td>$\Phi > 0.3$</td> <td colspan="3">0</td> </tr> </tbody> </table>	Zone Size (mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.1$	Ignore			$0.1 < \Phi \leq 0.2$	2 (distance $\geq 10\text{mm}$)			$0.2 < \Phi \leq 0.3$	1			$\Phi > 0.3$	0						
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$\Phi > 0.3$	0																												
③ Polarizer accidented spot <table border="1" data-bbox="448 1296 1235 1599"> <thead> <tr> <th rowspan="2">Zone Size (mm)</th> <th colspan="3">Acceptable Qty</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.2$</td> <td colspan="3">Ignore</td> </tr> <tr> <td>$0.2 < \Phi \leq 0.5$</td> <td colspan="3">2 (distance $\geq 10\text{mm}$)</td> </tr> <tr> <td>$\Phi > 0.5$</td> <td colspan="3">0</td> </tr> </tbody> </table>	Zone Size (mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.2$	Ignore			$0.2 < \Phi \leq 0.5$	2 (distance $\geq 10\text{mm}$)			$\Phi > 0.5$	0												
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$0.2 < \Phi \leq 0.5$	2 (distance $\geq 10\text{mm}$)																												
$\Phi > 0.5$	0																												
Line defect (LCD/TP /Polarizer black/white line, scratch, stain)	<table border="1" data-bbox="448 1635 1235 2000"> <thead> <tr> <th rowspan="2">Width (mm)</th> <th rowspan="2">Length (mm)</th> <th colspan="3">Acceptable Qty</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.03$</td> <td>Ignore</td> <td colspan="3">Ignore</td> </tr> <tr> <td>$0.03 < W \leq 0.05$</td> <td>$L \leq 3.0$</td> <td colspan="3">$N \leq 2$</td> </tr> <tr> <td>$0.05 < W \leq 0.08$</td> <td>$L \leq 2.0$</td> <td colspan="3">$N \leq 2$</td> </tr> <tr> <td>$0.08 < W$</td> <td colspan="4">Define as spot defect</td> </tr> </tbody> </table>	Width (mm)	Length (mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.03$	Ignore	Ignore			$0.03 < W \leq 0.05$	$L \leq 3.0$	$N \leq 2$			$0.05 < W \leq 0.08$	$L \leq 2.0$	$N \leq 2$			$0.08 < W$	Define as spot defect			
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$0.05 < W \leq 0.08$	$L \leq 2.0$	$N \leq 2$																											
$0.08 < W$	Define as spot defect																												

3.0	Polarizer Bubble	<table border="1"> <thead> <tr> <th rowspan="2">Zone Size (mm)</th> <th colspan="3">Acceptable Qty</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.2$</td> <td colspan="3">Ignore</td> </tr> <tr> <td>$0.2 < \Phi \leq 0.4$</td> <td colspan="3">2 (distance $\geq 10\text{mm}$)</td> </tr> <tr> <td>$0.4 < \Phi \leq 0.6$</td> <td colspan="3">1</td> </tr> <tr> <td>$0.6 < \Phi$</td> <td colspan="3">0</td> </tr> </tbody> </table>			Zone Size (mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.2$	Ignore			$0.2 < \Phi \leq 0.4$	2 (distance $\geq 10\text{mm}$)			$0.4 < \Phi \leq 0.6$	1			$0.6 < \Phi$	0			
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			A	B	C																							
		$\Phi \leq 0.2$	Ignore																									
		$0.2 < \Phi \leq 0.4$	2 (distance $\geq 10\text{mm}$)																									
$0.4 < \Phi \leq 0.6$	1																											
$0.6 < \Phi$	0																											
4.0	SMT	According to IPC-A-610C class II standard . Function defect and missing part are major defect , the others are minor defect.																										
5.0	TP Related	TP bubble/ accidented spot	<table border="1"> <thead> <tr> <th rowspan="2">Size Φ (mm)</th> <th colspan="3">Acceptable Qty</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.1$</td> <td colspan="3">Ignore</td> </tr> <tr> <td>$0.1 < \Phi \leq 0.2$</td> <td colspan="3">2</td> </tr> <tr> <td>$0.2 < \Phi \leq 0.3$</td> <td colspan="3">1</td> </tr> <tr> <td>$0.3 < \Phi$</td> <td colspan="3">0</td> </tr> </tbody> </table>			Size Φ (mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.1$	Ignore			$0.1 < \Phi \leq 0.2$	2			$0.2 < \Phi \leq 0.3$	1			$0.3 < \Phi$	0		
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$0.2 < \Phi \leq 0.3$	1																											
$0.3 < \Phi$	0																											
Assembly deflection	beyond the edge of backlight $\leq 0.15\text{mm}$																											
Newton Ring	Newton Ring area $> 1/3$ TP area NG	Newton Ring area $\leq 1/3$ TP area OK	 1 规律性  2 非规律性  似牛顿环																									

	TP corner broken X: length Y: width Z: height	<table border="1"> <tr> <td>X</td> <td>Y</td> <td>Z</td> </tr> <tr> <td>$X \leq 3.0\text{mm}$</td> <td>$Y \leq 3.0\text{mm}$</td> <td>$Z < \text{LCD thickness}$</td> </tr> </table>	X	Y	Z	$X \leq 3.0\text{mm}$	$Y \leq 3.0\text{mm}$	$Z < \text{LCD thickness}$	
		X	Y	Z					
$X \leq 3.0\text{mm}$	$Y \leq 3.0\text{mm}$	$Z < \text{LCD thickness}$							
* Circuitry broken is not allowed.									
	TP edge broken X: length Y: width Z: height	<table border="1"> <tr> <td>X</td> <td>Y</td> <td>Z</td> </tr> <tr> <td>$X \leq 6.0\text{mm}$</td> <td>$Y \leq 2.0\text{mm}$</td> <td>$Z < \text{LCD thickness}$</td> </tr> </table>	X	Y	Z	$X \leq 6.0\text{mm}$	$Y \leq 2.0\text{mm}$	$Z < \text{LCD thickness}$	
		X	Y	Z					
$X \leq 6.0\text{mm}$	$Y \leq 2.0\text{mm}$	$Z < \text{LCD thickness}$							
* Circuitry broken is not allowed.									

Criteria (functional items)

Number	Items	Criteria (mm)
1	No display	Not allowed
2	Missing segment	Not allowed
3	Short	Not allowed
4	Backlight no lighting	Not allowed
5	TP no function	Not allowed

9.2 Handling Precautions

9.2.1 Avoid static electricity damaging the LSI.

9.2.2 Do not remove the panel or frame from the module .

9.2.3 The polarizing plate of the display is very fragile . So, please handle it very carefully.

9.2.4 Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of the plate.

9.2.5 The color tone of display and background of LCM has the possibility to be changed in the storage temperature range.

9.2.6 Pay attention to the working environment, as the element may be destroyed by static electricity.

--Be sure to ground human body and electric appliance during work.

--Avoid working in a dry environment to minimize the generations of static electricity.

--Static electricity may be generated when the protective film is fast peeled off.

9.2.7 When soldering the terminal of LCM, make certain the AC power source of soldering iron does not leak.

10.4.8 If the display surface becomes contaminated ,breathe on the surface and gently wipe it with a soft-dry- clean cloth .If it is heavily contaminated ,moisten cloth with the following solvent(ex:Ethyl alcohol).Solvents other than those above-mentioned may damage the polarizer(Especially ,do not use them .ex: Warter / Ketone)

9.3 Operation instructions

9.3.1 It is recommended to drive the LCD within the specified voltage limits, try to adjust the operating voltage for the optimal contrast, the color and contrast of LCD panel will varies at different temperature.

9.3.2 Response time is greatly delayed at low operating temperature range. However, this does not mean the LCD will be out of the order, It will recover when it returns to the specified temperature range.

9.3.3 If the display area is pushed hard during operation, the display will become abnormal.



9.3.4 Do not operate the LCD at the environments over the specified conditions, this may cause damage on the LCD and shorten the lifetime.

9.4 Storage instructions:

9.4.1 Store LCDs in a sealed polyethylene bag.

9.4.2 Store LCDs in a dark place, Do not expose to sunlight or fluorescent light. Keep the temperature between 0°C and 35°C.

9.4.3 Avoid the polarizer touch any other object, (It is recommended to store them in the container in which they were shipped.)