



**SPECIFICATION
FOR
LCD Module
TS8101WX026-T**

MODULE:	TS8101WX026-T
CUSTOMER:	
LCD:	
IC:	

TZD	INITIAL	DATE
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REVISION STATUS

Version	Revise Date	Page	Content	Modified by
V1.0	2022.1.18	-		YANG



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1. General Description

* DESCRIPTION

TS8101WX026-T is a color active matrix TFT (Thin Film Transistor) LCD (liquid crystal display) that uses amorphous silicon TFT as a switching device. This model is composed of a Transmissive type TFT-LCD Panel, driver circuit, back-light unit. The resolution of a 10.1" TFT-LCD contains 800*1280 pixels, and can display up to 16.7M colors.

* Features

- Low Input Voltage: VDD: 3.0~3.3V
- Display Colors of TFT LCD: 16.7M colors
- CPU Interface: MIPI

General Information Items	Specification	Unit	Note
	Main Panel		
Display area(AA)	135.36(H)*216.58(V) (10.1inch)	mm	-
Driver element	a-Si TFT active matrix	-	-
Display colors	16.7M	colors	-
Number of pixels	800(RGB) *1280	dots	-
Pixel arrangement	RGB vertical stripe	-	-
Pixel pitch	56.4(V) × 169.2(H)	um	-
Viewing angle	ALL	o'clock	-
Drive IC	FL7705NI	-	-
Display mode	TFT/ Normal BLACK	-	-
Operating temperature	-20~+70	°C	-
Storage temperature	-30~+80	°C	-

Mechanical Information

Item		Min.	Typ.	Max.	Unit	Note
Module size	Horizontal(H)	-	165.36	-	mm	±0.1
	Vertical(V)	-	246.58	-	mm	±0.1
	Depth(D)	-	5.58	-	mm	±0.4
Weight		-	TBD	-	g	-

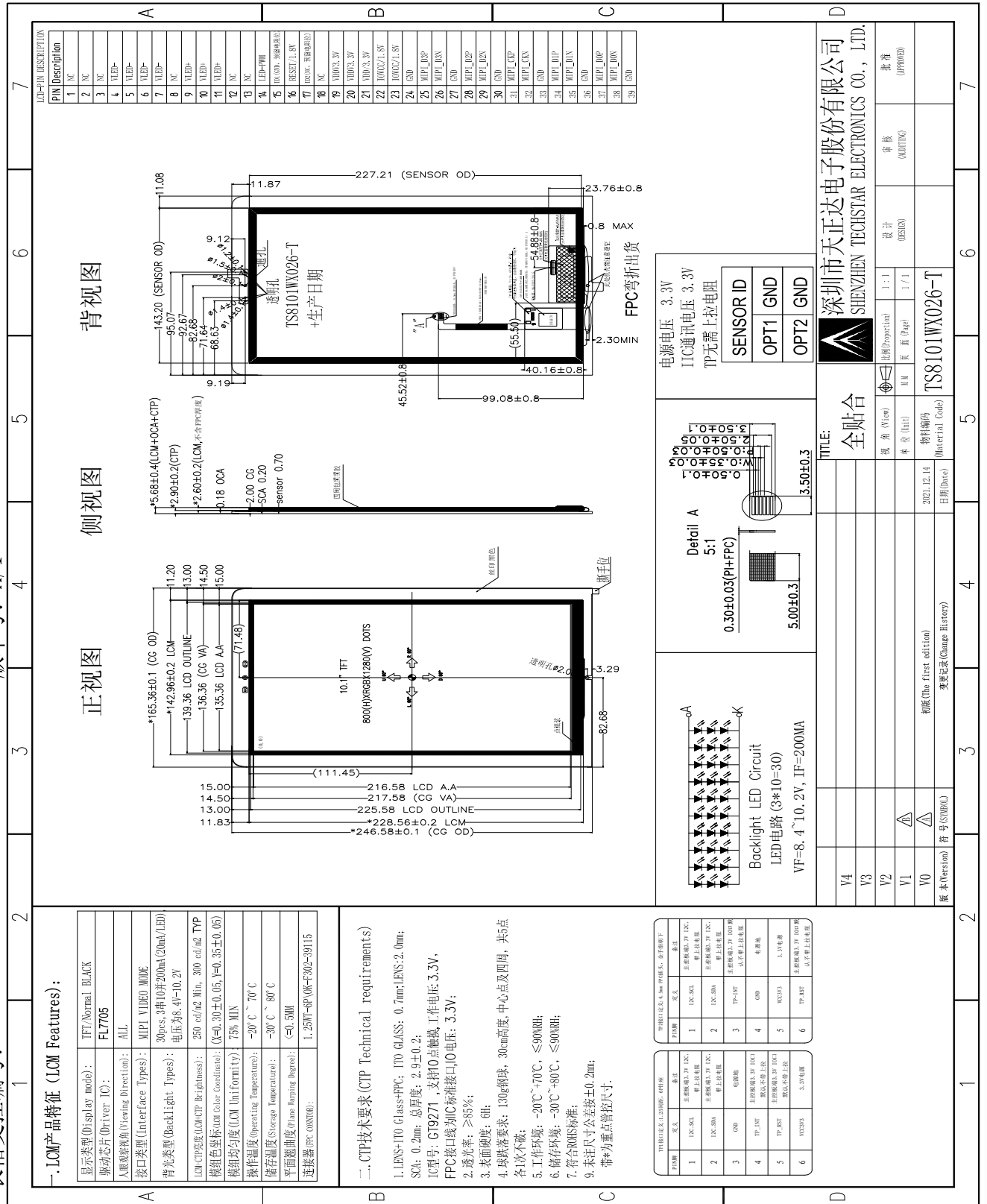


2. Mechanical Specification

保存期限: 三年

版本号: A/1

表格受控编号:





3. PIN DESCRIPTION

3.1 LCM

Pin NO.	Symbol	Level	Remark
1~3	NC	/	/
4~7	VLED-	L	Backlight Cathode
8	NC	/	Not connect
9~11	VLED+	H	Backlight Anode
12	NC	/	Not connect
13	NC	/	Not connect
14	PWM	L	LCD backlight control signal
15	ID1	H/L	Connctet 0K resistance to GND
16	/RESET	H/L	Reset pin
17	ID2	H/L	TBD
18	NC	/	Not connect
19~21	VCC(3.3V)	H	A supply voltage
22	IOVCC(1.8V)	L	A supply voltage
23	IOVCC(1.8V)	L	A supply voltage
24	GND	L	Ground
25	D3_P	H/L	MIPI_DP3+ are differential data signal line
26	D3_N	H/L	MIPI_DP3- are differential data signal line
27	GND	L	Ground
28	D2_P	H/L	MIPI_DP2+ are differential data signal line
29	D2_N	H/L	MIPI_DP2- are differential data signal line
30	GND	L	Ground
31	CLK_P	H/L	CLOCK Lane positive-end input pin
32	CLK_N	H/L	CLOCK Lane negative-end input pin
33	GND	L	Ground
34	D1_P	H/L	MIPI_DP1+ are differential data signal line
35	D1_N	H/L	MIPI_DP1- are differential data signal line
36	GND	L	Ground
37	D0_P	H/L	MIPI_DP+ are differential data signal line
38	D0_N	H/L	MIPI_DP0- are differential data signal line
39	GND	L	Ground

3.2 CTP PIN

1	SCL	H/L	Serial clock input
2	SDA	H/L	Serial data input pin
3	GND	L	Ground
4	INT	H/L	Interrupt pin
5	REST	H/L	Hardware reset pin
6	VCC	H/L	Power supply 3.3V



4. ELECTRICAL CHARACTERISTICS

4.1 ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Values		Unit	Remark
		Min	Max.		
Supply Voltage for Logic circuit	VCI	-0.3	6.6	V	-
Supply Voltage for analog circuit	VDD	-0.3	6.6	V	-

4.2 DC ELECTRICAL CHARACTERISTICS

4.2.1 OPERATING CONDITIONS

Typical Operating Conditions (Ta=25°C)

Item	Symbol	Values			Unit	Remark
		Min	Typ	Max.		
Digital Supply Voltage	IOVCC	1.65	-	3.3	V	
Analog Supply Voltage	VDD	3.0	3.3	3.6	V	
LCM current	VDD	-	-	150	mA	
TFT Gate ON Voltage	VGH	15.5	16	16.5	V	
TFT Gate OFF Voltage	VGL	-1.2	-0.7	-0.2	V	

4.2.2 BACKLIGHT UNIT (GND=0V)

Item	Symbol	Values			Unit	Remark
		Min	Typ	Max.		
Forward supply Voltage	V _f	8.4		10.2	V	
Forward supply Current	I _f	-	200	-	mA	
LCM Luminance(with CTP)	L _v	250	300	-	cd/m ²	I _B =200mA
Uniformity	/	80			%	-
LED Life time	/	-	-	-	H	



4.3 POWER ON/OFF SEQUENCE

Power source IOVCC, VCI can be applied and powered down in any order. IOVCC, VCI can be powered down in any order.

During power off, if LCD is in the Sleep Out mode, IOVCC, VCI must be powered down minimum 120msec after NRESET has been released.

During power off, if LCD is in the Sleep In mode, IOVCC, VCI can be powered down minimum 0msec after NRESET has been released.

NCS can be applied at any timing or can be permanently grounded. NRESET has priority over NCS.

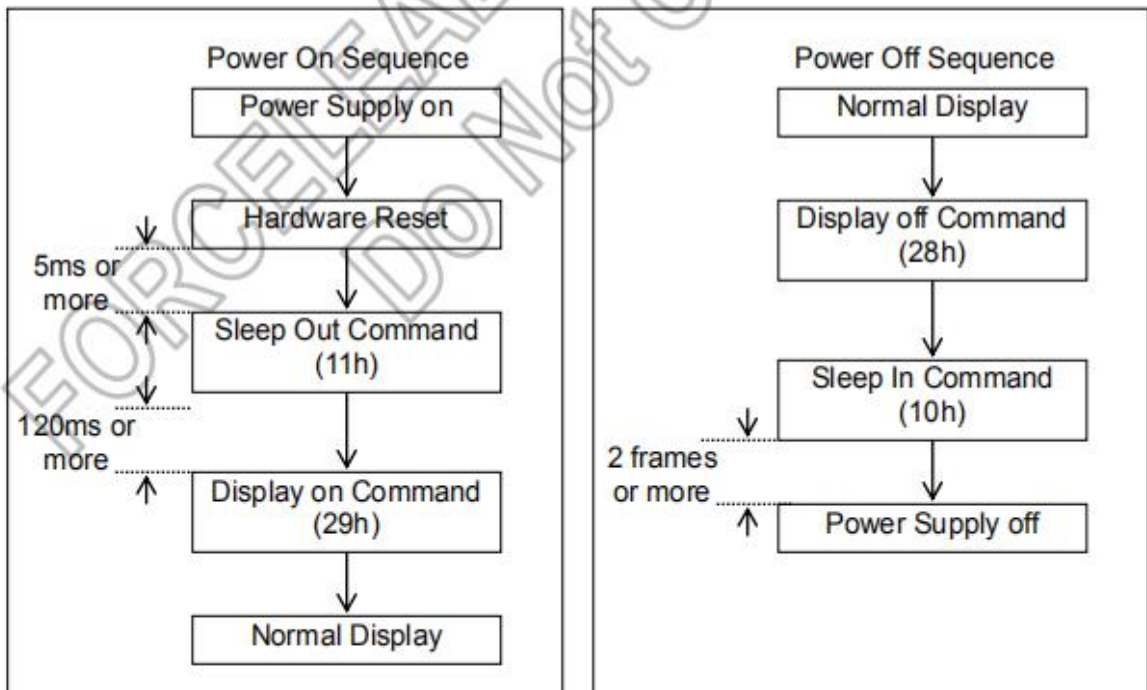
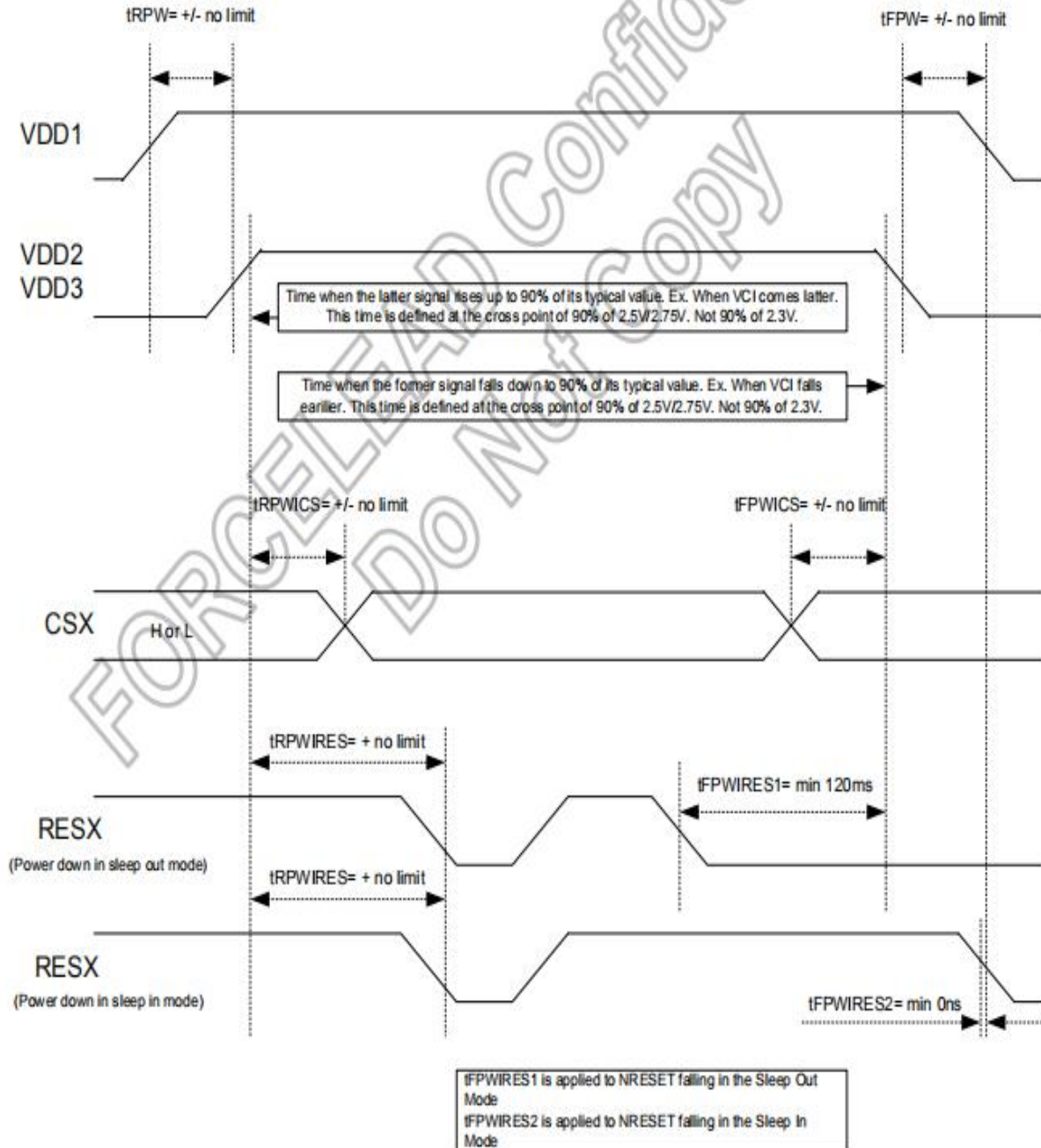


Figure 5-32: The power supply ON/OFF setting for Display ON/OFF and Sleep In/out



5.6.1 Case 1: RESX line is held high or unstable by host at power on

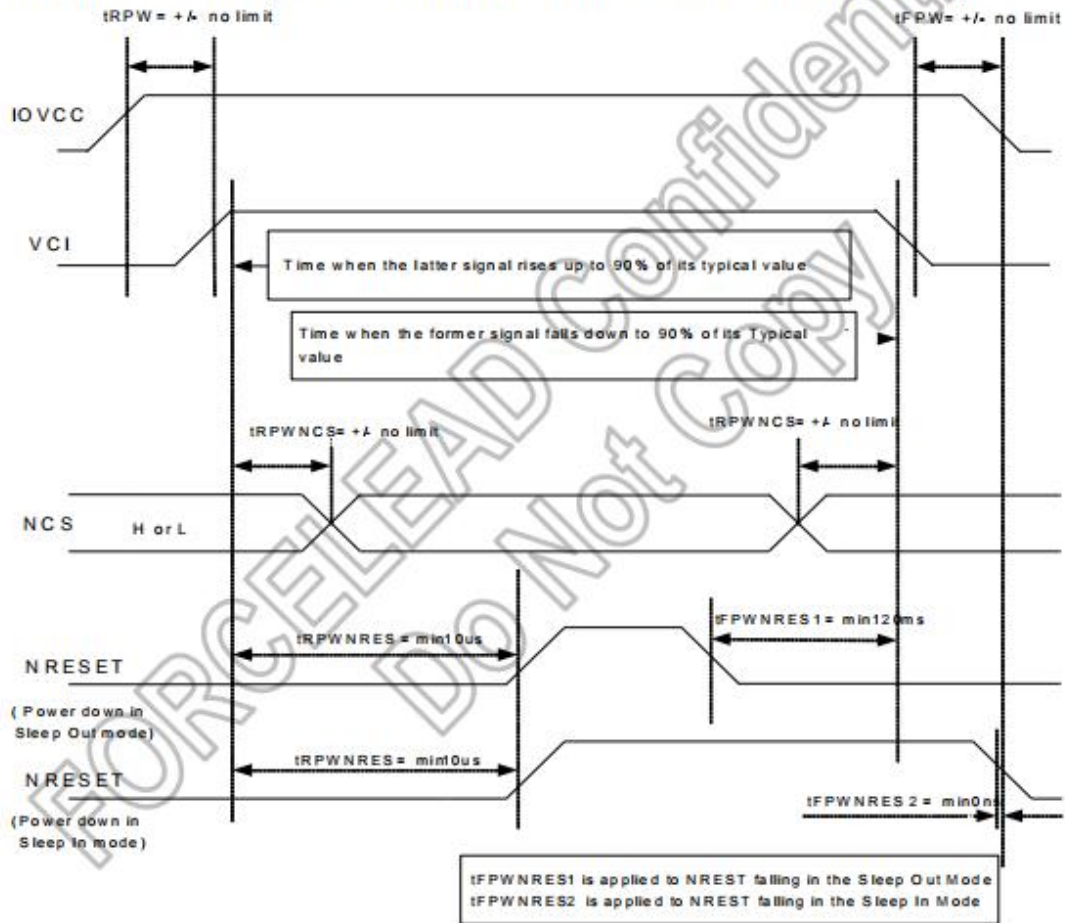
If RESX line is held high or unstable by the host during power on, then a Hardware Reset must be applied after both VDD1, VDD2 and VDD3 have been applied- otherwise correct functionality is not guaranteed. There is no timing restriction upon this hardware reset.





5.6.2 Case 2: RESX line is held low by host at power on

If RESX line is held low (and stable) by the host during power on, then the RESX must be held low for minimum 10 μ sec after both VDD1, VDD2 and VDD3 have been applied.



Note: Unless otherwise specified timings herein show cross point at 50% of signal/power level

Figure 5-34: Case 2: RESX line is held low by host at power on



4.4 Reset input timing

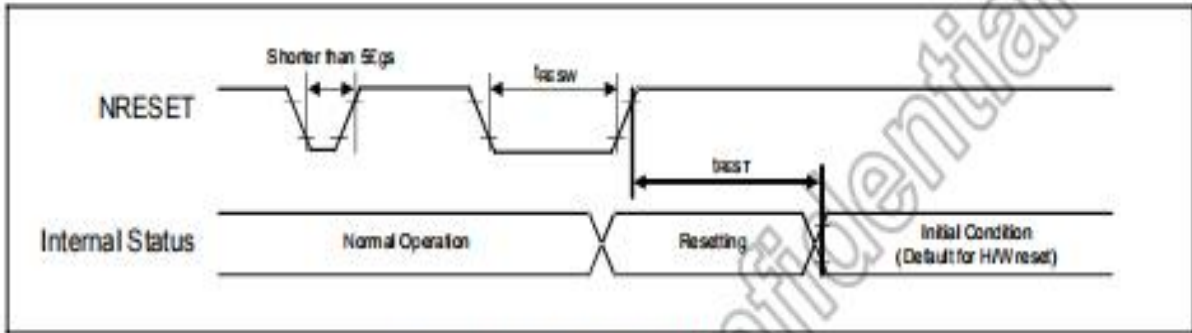


Figure 7-8: Reset input timing

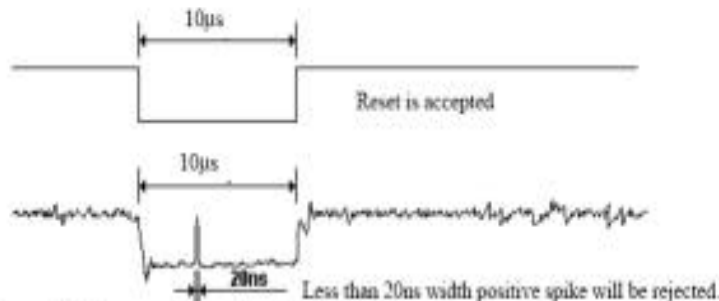
Symbol	Parameter	Related Pins	Spec.			Note	Unit
			Min.	Typ.	Max.		
tRESW	Reset low pulse width ⁽¹⁾	NRESET	10	-	-	-	µs
tREST	Reset complete time ⁽²⁾	-	15	-	-	When reset applied during SLPIN mode	ms
		-	120	-	-	When reset applied during SLPOUT mode	ms

Table 7-8: Reset Input Timing

Note: (1) Spike due to an electrostatic discharge on NRESET line does not cause irregular system reset according to the following table.

NRESET Pulse	Action
Shorter than 5 µs	Reset Rejected
Longer than 10 µs	Reset
Between 5 µs and 10 µs	Reset Start

- (2) During the resetting period, the display will be blanked (The display is entering blanking sequence, which Maximum time is 120 ms, when Reset Starts in Sleep Out -mode. The display remains the blank state in Sleep In -mode) and then return to Default condition for HW reset.
- (3) During Reset Complete Time, ID and VCOM value in OTP will be latched to internal register during this period. This loading is done every time when there is HW reset complete time (tREST) within 15ms after a rising edge of NRESET.
- (4) Spike Rejection also applies during a valid reset pulse as shown as below:



- (5) It is necessary to wait 15msec after releasing NRESET before sending commands. Also Sleep Out command cannot be sent for 120msec.



5. OPTICAL CHARACTERISTICS

(LCD optical characteristics)

Item	Symbol	Conditions	Specifications			Unit	Note	
			Min.	Typ.	Max.			
Transmittance (w/o APCF, w/o DBEF)	T%	Viewing normal angle $\theta_x = \theta_y = 0^\circ$	4.65	5.41	--	%	All left side data are based on Innolux's following condition – 1.LC : AAS 2.Light Source : Innolux Silicate LED 3. Polarizer : CF: SRW062FPN1HC5 TFT: SRW062FPN1HC5 4.Machine :DMS-803/DMS-900 5. By quick VLC dark = 0.3V, VLC white = 4.6V	
Contrast Ratio	CR		800	1000	--	--		
Response Time	$T_{on} + T_{off}$		-	25	35	ms		
Viewing Angle	Hor.	θ_{x+}		80	--	deg.		
		θ_{x-}		80	--			
	Ver.	θ_{y+}		80	--			
		θ_{y-}		80	--			
CF only Color Chromaticity (CIE 1931)	Red	Rx	0.621	0.641	0.661	-		Under C light Simulation
		Ry	0.313	0.333	0.353	-		
	Green	Gx	0.264	0.284	0.304	-		
		Gy	0.529	0.549	0.569	-		
	Blue	Bx	0.120	0.140	0.160	-		
		By	0.081	0.101	0.121	-		
	White	Wx	0.282	0.302	0.322	-		
		Wy	0.309	0.329	0.349	-		
	Color Gamut			60	--	%		

*Note(1) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

$$\text{Contrast Ratio (CR)} = L_{255} / L_0$$

L255 : Luminance of gray level 255

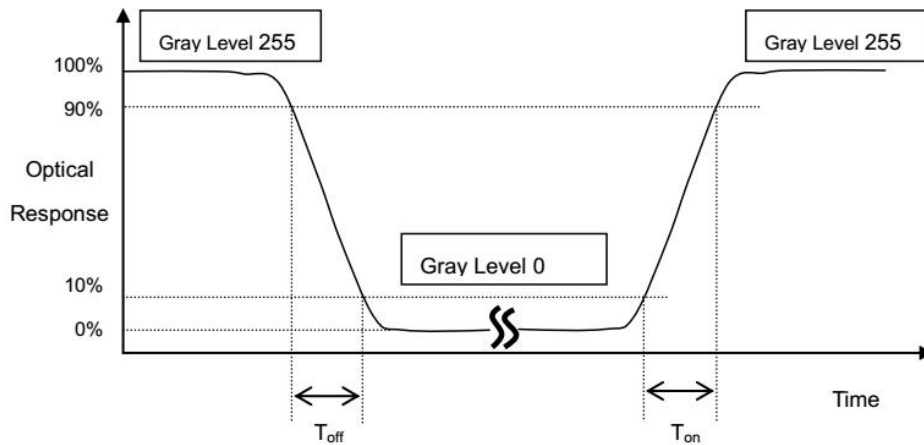
L 0: Luminance of gray level 0

$$CR = CR (5)$$

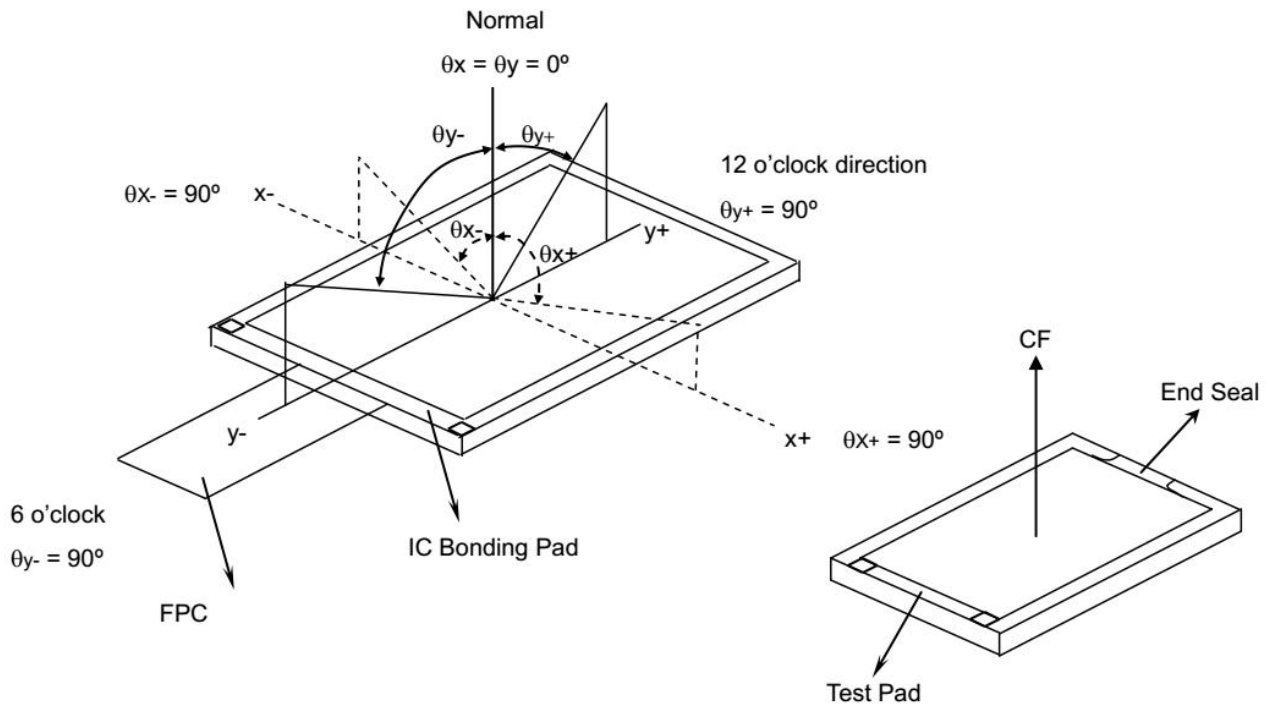
CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (5).



*Note (2) Definition of Response Time (T_{on} , T_{off}):



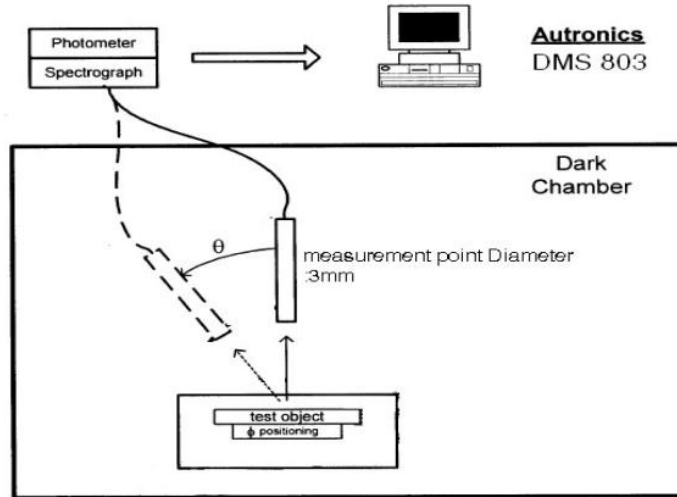
*Note(3) Definition of Viewing Angle



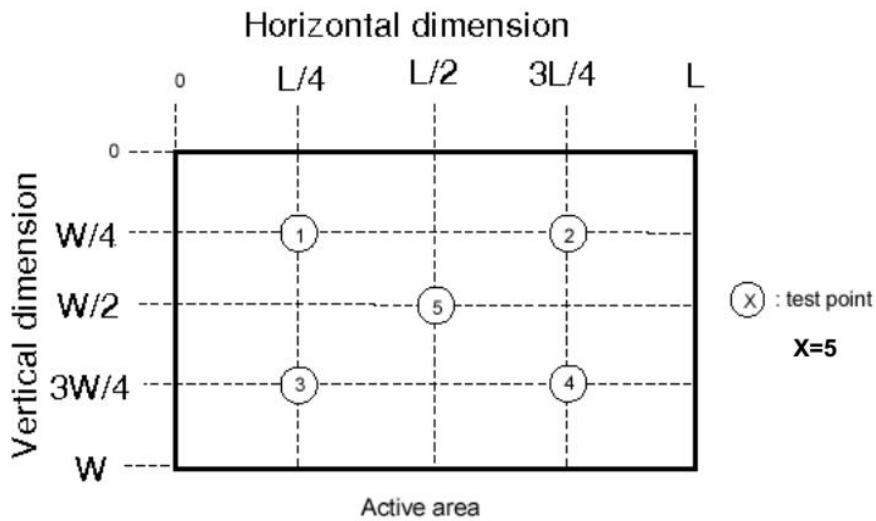


*Note (4) Measurement Set-Up:

The LCD module should be stabilized at a given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room.



*Note (5)





6. QUALITY SPECIFICATIONS

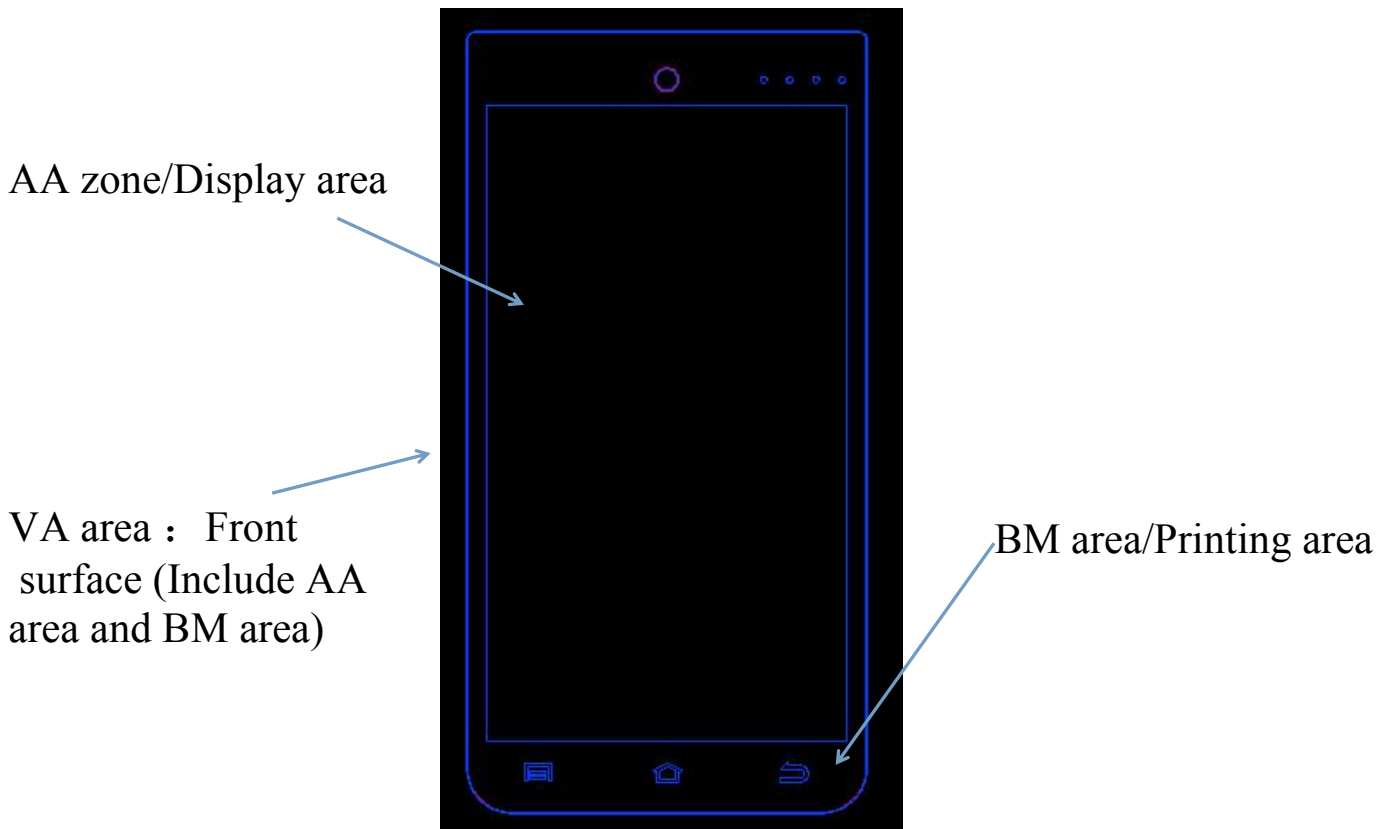
1. Inspection condition

1.1:Cosmetic inspection: viewing distance is about 30cm with bare eyes, and under an environment of 20~40W light intensity (600~1200LUX) , all directions for inspecting the sample should be within 45° against perpendicular line.

6.1.2:Function inspection: viewing distance is about 30cm with bare eyes, and under an environment of 300LUX light intensity, all directions for inspecting the sample should be within 45° against perpendicular line.

2. Definition of Inspection Item.

2.1 Definition of Inspection zone in I-touch module.



AA zone: Character/Display area

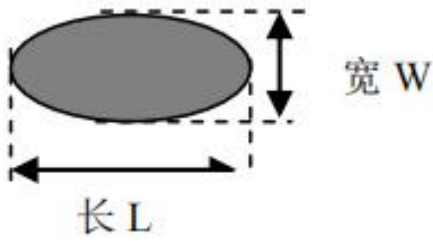
BM zone: Printing area

VA zone: Viewing area (AA area + BM area = viewing area)

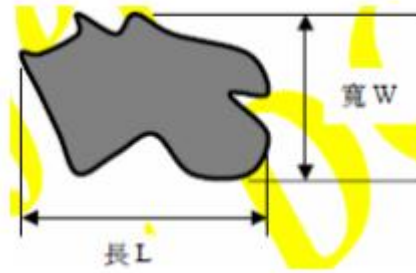


3. Defect definition

3.1 Circular defect

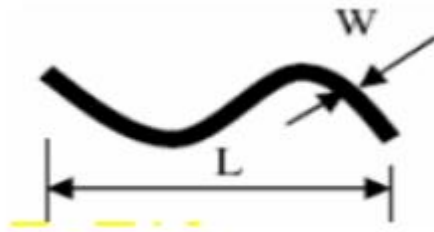


Diameter $\Phi = 1/2(L+W)$

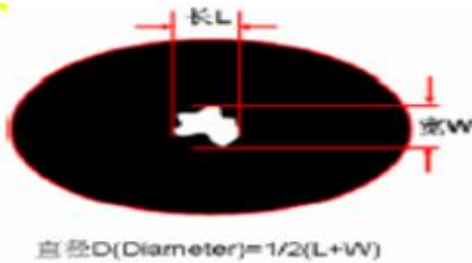


Diameter $\Phi = 1/2(L+W)$

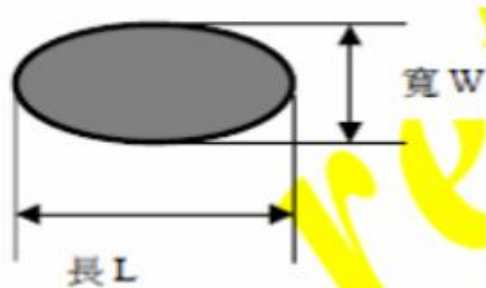
3.2 Linear defect



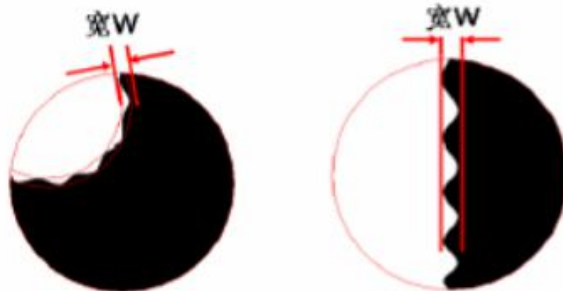
3.3 Pin hole



直径D(Diameter) = $1/2(L+W)$



3.4 Zigzag





4. Inspection standards

4.1 Major defect

-Item -No	Items to be inspected	Inspection Standard	Classification of defects
4.1.1	All functional defects	1) No display 2) Display abnormally 3) Missing vertical, horizontal segment 4) Short circuit 5) Back-light no lighting, flickering and abnormal lighting. 6) Touch panel abnormal.	Major
4.1.2	Missing	Missing component	
4.1.3	Outline dimension	Overall outline dimension beyond the drawing is not allowed.	
4.1.4	LCD Mura	LCD Mura according to ND 5% keep out to determine, if keep out distance at 30cm be seen by eyes is NG, otherwise will be ok if invisible.	

4.2 Cosmetic defect

Item No	Items to be inspected	Inspection Standard	Classification of defects												
4.2.1	Dot defect	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th style="width: 50%;">Zone</th> <th style="width: 50%;">VA area</th> </tr> <tr> <th>Size(mm)</th> <th>Acceptable Qty</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.1$</td> <td>Ignore</td> </tr> <tr> <td>$0.10 < \Phi \leq 0.25$</td> <td>3</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>	Zone	VA area	Size(mm)	Acceptable Qty	$\Phi \leq 0.1$	Ignore	$0.10 < \Phi \leq 0.25$	3	$0.25 < \Phi \leq 0.30$	1	$0.30 < \Phi$	0	Minor
		Zone	VA area												
		Size(mm)	Acceptable Qty												
		$\Phi \leq 0.1$	Ignore												
		$0.10 < \Phi \leq 0.25$	3												
		$0.25 < \Phi \leq 0.30$	1												
$0.30 < \Phi$	0														



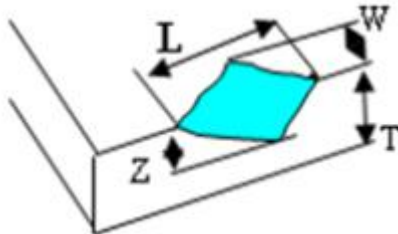
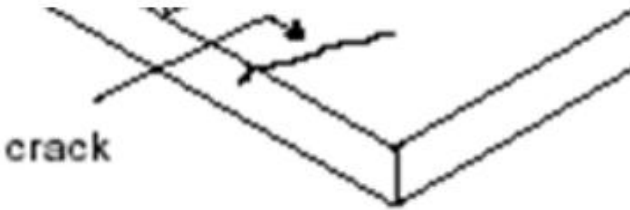
深圳市天正达电子股份有限公司
SHENZHEN TECHSTAR ELECTRONICS CO., LTD.

4.2.2	Dim Spots: Circle shaped and dim edged defects	Zone		VA area	Minor
		Size(mm)		Acceptable Qty	
		$\Phi \leq 0.20$		Ignore	
		$0.20 < \Phi \leq 0.40$		3	
		$0.40 < \Phi \leq 0.60$		2	
		$0.60 < \Phi$		0	
Item No	Items to be inspected	Inspection Standard			Classification of defects
4.2.3	Dent Spot Fish eye	Zone		VA area	Minor
		Size(mm)		Acceptable Qty	
		$\Phi \leq 0.10$		Ignore	
		$0.10 < \Phi \leq 0.20$		3	
		$0.20 < \Phi \leq 0.30$		2	
$0.30 < \Phi$		0			
4.2.4	Line defect	Zone		VA area	Minor
		Size(mm)		Acceptable Qty	
		L (Length)	W (Width)	Ignore	
		Ignore	$W \leq 0.03$	Ignore	
		$L \leq 5.0$	$0.03 < W \leq 0.05$	3	
		$L \leq 3.0$	$0.05 < W \leq 0.07$	1	
/	$0.07 < W$	Define as spot defect			




4.2.5	Scratch	<p>If the scratch can be seen after mobile phone cover assembling or in the operating condition, judged as the line defect of 4.2.4.</p> <p>If the scratch can be seen only in non-operating condition or some special angle, judged as the following table.</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th colspan="2" style="text-align: center;">Size (mm)</th> <th style="text-align: center;">VA area</th> </tr> <tr> <th style="text-align: center;">L (Length)</th> <th style="text-align: center;">Acceptable Qty</th> <th style="text-align: center;">Acceptable Qty</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Ignore</td> <td style="text-align: center;">$W \leq 0.03$</td> <td style="text-align: center;">Ignore</td> </tr> <tr> <td style="text-align: center;">$5.0 < L \leq 10.0$</td> <td style="text-align: center;">$0.03 < W \leq 0.05$</td> <td style="text-align: center;">2</td> </tr> <tr> <td style="text-align: center;">$L \leq 5.0$</td> <td style="text-align: center;">$0.05 < W \leq 0.08$</td> <td style="text-align: center;">1</td> </tr> <tr> <td style="text-align: center;">/</td> <td style="text-align: center;">$W > 0.08$</td> <td style="text-align: center;">0</td> </tr> </tbody> </table>	Size (mm)		VA area	L (Length)	Acceptable Qty	Acceptable Qty	Ignore	$W \leq 0.03$	Ignore	$5.0 < L \leq 10.0$	$0.03 < W \leq 0.05$	2	$L \leq 5.0$	$0.05 < W \leq 0.08$	1	/	$W > 0.08$	0	Minor
Size (mm)		VA area																			
L (Length)	Acceptable Qty	Acceptable Qty																			
Ignore	$W \leq 0.03$	Ignore																			
$5.0 < L \leq 10.0$	$0.03 < W \leq 0.05$	2																			
$L \leq 5.0$	$0.05 < W \leq 0.08$	1																			
/	$W > 0.08$	0																			



Item No	Items to be inspected	Inspection Standard	Classification of defect										
4.2.6	Bubble	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Zone</th> <th style="width: 50%;">VA area</th> </tr> <tr> <th style="text-align: center;">Size(mm)</th> <th style="text-align: center;">Acceptable Qty</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">$\Phi \leq 0.15$</td> <td style="text-align: center;">Ignore</td> </tr> <tr> <td style="text-align: center;">$0.15 < \Phi \leq 0.25$</td> <td style="text-align: center;">2</td> </tr> <tr> <td style="text-align: center;">$0.25 < \Phi$</td> <td style="text-align: center;">0</td> </tr> </tbody> </table>	Zone	VA area	Size(mm)	Acceptable Qty	$\Phi \leq 0.15$	Ignore	$0.15 < \Phi \leq 0.25$	2	$0.25 < \Phi$	0	
Zone	VA area												
Size(mm)	Acceptable Qty												
$\Phi \leq 0.15$	Ignore												
$0.15 < \Phi \leq 0.25$	2												
$0.25 < \Phi$	0												
4.2.7	Glass defect	<p>4.2.7a Chip on corner or surface</p>  <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="width: 33%;">L(length)</th> <th style="width: 33%;">W(width)</th> <th style="width: 33%;">Z(thickness)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">$L \leq 0.30$</td> <td style="text-align: center;">$W \leq 0.20$</td> <td style="text-align: center;">T/2</td> </tr> </tbody> </table> <p>Notes: T=Lens thickness, $\Phi \leq 0.10$ ignore Acceptable Qty: Single edge $N \leq 2$, Total $N \leq 4$</p> <p>4.2.7b Cracks Cracks tend to break are not allowed.</p> 	L(length)	W(width)	Z(thickness)	$L \leq 0.30$	$W \leq 0.20$	T/2	Minor				
L(length)	W(width)	Z(thickness)											
$L \leq 0.30$	$W \leq 0.20$	T/2											



Item No	Items to be inspected	Inspection Standard	Classification of defect
4.2.8	Parts alignment	1) Not allow IC and FPC/heat-seal lead width is more than 50% beyond lead pattern. 2) Not allow chip or solder component is off center more than 50% of the pad outline.	Minor
4.2.9 view area/ printing area of front surface and view area of rear surface	LOGO Pattern	<p>Dot: according to Dot spec. Thickness odds:</p> $\frac{ \text{Spec pattern width} - \text{Print pattern width} \times 100\%}{\text{Spec pattern width}} \leq 30\%$ <p>Drawing slant:</p> <p>Print pattern length $\leq 10\text{mm}$, slant angle $\leq 3^\circ$; $10\text{mm} < \text{Print pattern length} \leq 20\text{mm}$, slant angle $\leq 1.5^\circ$</p>  <p>Pattern serration: $H \leq 0.05 \text{ mm}$</p> <p>Pattern leak print/ error/overprint: not allowed</p> <p>Pattern break line: width $\leq 0.10 \text{ mm}$</p> <p>Logo pattern color windage / color thin: Follow the limit samples.</p>	Minor



Item No	Items to be inspected	Inspection Standard	Classification of defects
	Surface dirty	1. Dirty can not be cleaned follow the dot spec. 2. Accept while the dirty can be cleaned. 3. The quality guarantee period of protective film is 3months, during the period, the spot or contamination is not allowed.	
	Printing area Light leakage	Follow the dot defect spec, MAX, Severity - see light leakage limit sample	
	Ink overflow	Visual inspection 30cm not allowed	
	Color discordant	Obvious color difference in the BM area is not allowed	
	Icon scratch of printing logo area	Icon printing logo area is not allow penetrability scratch	



7. RELIABILITY

Test Item	Test Condition
High Temperature Operation	70°C for 96 hours
Low Temperature Operation	-20°C for 96 hours
High Temperature Storage	80°C for 96 hours
Low Temperature Storage	-30°C for 96 hours
High Temperature Operation Humidity Operation	60°C, 90%RH for 72 hours
Thermal Shock	-10°C (30min) ~+25°C (5min)~ +60°C (30min) for 10 cycles



8. HANDLING PRECAUTION

8.1 SAFETY

- (1) Do not swallow any liquid crystal, even if there is no proof that liquid crystal is poisonous.
- (2) If the LCD panel breaks, be careful not to get liquid crystal to touch your skin.
- (3) If skin is exposed to liquid crystal, wash the area thoroughly with alcohol or soap.

8.2 STORAGE CONDITIONS

- (1) Store the panel or module in a dark place where the temperature is $23\pm 5^{\circ}\text{C}$ and the humidity is below $50\pm 20\% \text{RH}$.
- (2) Store in anti-static electricity container.
- (3) Store in clean environment, free from dust, active gas, and solvent.
- (4) Do not place the module near organics solvents or corrosive gases.
- (5) Do not crush, shake, or jolt the module.

8.3 HANDLING PRECAUTIONS

- (1) Avoid static electricity which can damage the CMOS LSI.
- (2) The polarizing plate of the display is very fragile. So, please handle it very carefully.
- (3) Do not give external shock.
- (4) Do not apply excessive force on the surface.
- (5) Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate.
- (6) Do not use ketonic solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.
- (7) Do not operate it above the absolute maximum rating.
- (8) Do not remove the panel or frame from the module.

8.4 WARRANTY

- 1) The period is within twelve months since the date of shipping out under normal using and storage conditions.
- 2) According to Techstar TFT LCD quality standard, Techstar will rework or exchange for functional defect goods since within one year.

9. PACKAGE DRAWING

TBD