



Specification for Approval

Customer: _____

Model Name: _____

Supplier Approval			Customer approval
R&D Designed	R&D Approved	QC Approved	
<i>Peter</i>	<i>Peng Jun</i>		

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1. Scope

This specification defines general provisions as well as inspection standards for TFT module supplied by AMSON electronics.

If the event of unforeseen problem or unspecified items may occur, naturally shall negotiate and agree to solution

2. General Information

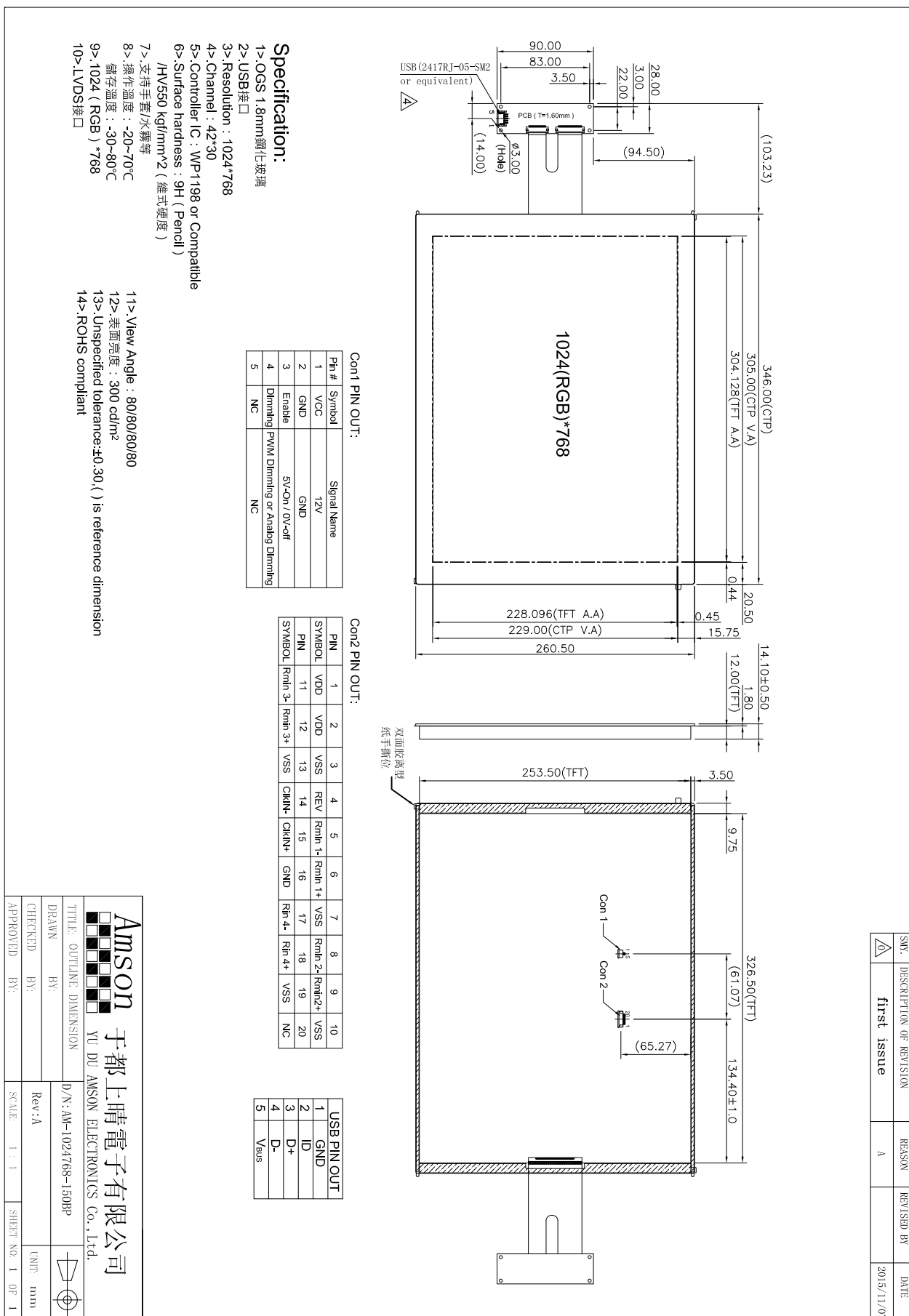
2.1 LCM Specifications

ITEM	STANDARD VALUES	UNITS
LCD type	15.0" TFT	--
Dot arrangement	1024×3(RGB)×768	dots
Color filter array	RGB vertical stripe	--
Display mode	Normally Black	-
Gray Scale Inversion Direction	6 O'clock	--
Eyes Viewing Direction	12 O'clock	--
Module size	346.0(W)×260.5(H)×14.1(T)	mm
Active area	304.128(W)×228.096(H)	mm
Dot pitch	0.297(W)×0.297(H)	mm
Interface	LVDS Interface	--
Operating temperature	-20 ~ +70	°C
Storage temperature	-30 ~ +80	°C
Weight	TBD	g

2.2 CTP Specifications

ITEM	STANDARD VALUES	UNITS
CTP type	OGS 1.8mm(armored glass)	--
CTP Driver IC	WP1198	--
Surface hardness	9H	--
Transmittance	≥85%	--
CTP size	346.0(W)×260.5(H)×2.1(T)	mm
CTP Viewing area	305.0(W)×229.0(H)	mm
CTP Interface	USB	-

3. External Dimensions



4. Interface Description

4.1 LCM Interface (Con 2)

Pin NO.	SYMBOL	DESCRIPTION
1	VDD	Power supply
2	VDD	Power supply
3	VSS	Ground
4	REV	Reverse scan selection
5	Rin1-	-LVDS differential data input(R0-R5,G0)
6	Rin1+	+LVDS differential data input(R0-R5,G0)
7	VSS	Ground
8	Rin2-	- LVDS differential data input
9	Rin2+	+LVDS differential data input
10	VSS	Ground
11	Rin3-	- LVDS differential data input
12	Rin3+	+LVDS differential data input
13	VSS	Ground
14	ClkIN-	- LVDS differential clock input
15	ClkIN+	+LVDS differential clock input
16	VSS	Ground
17	Rin4-	- LVDS differential data input
18	Rin4+	+LVDS differential data input
19	VSS	Ground
20	NC	No connection

4.1.1 Connector Name / Designation

Item	Designation
Type / Part Number	MSB240420HD
Mating Model Number	P240420 or Compatible

4.2 Black Light Interface (Con 1)

PIN NO.	Symbol	PIN NAME
1	VCC	Power Supply For LED Circuit, 12V (Typ.)
2	GND	Ground
3	EN	On/Off(5V-ON,0V-OFF)
4	Dimming	PWM Dimming or Analog Dimming
5	NC	No Connection

4.2.1 Connector Name / Designation

Connector Name / Designation	LED Driver Connector
Manufacturer	SMT or Compatible
Connector Model Number	MSB24038P5A or Compatible
Mating Model Number	P24038P5A or Compatible

4.3 CTP Interface

PIN NO.	Symbol	PIN NAME
1	GND	Ground
2	ID	No Connection
3	D+	USB Data Positive
4	D-	USB Data Negative
5	VBUS	USB Supply Power

4.3.1 Connector Name / Designation

Connector Name / Designation	Connector
USB	2417RJ-05-SM2 or equivalent

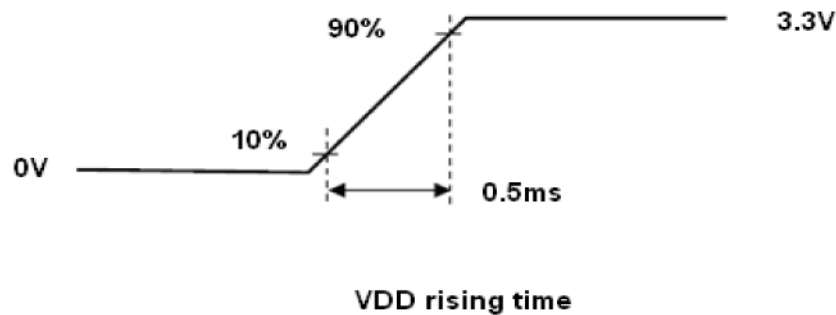
5. Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit
Supply Voltage	VDD	-0.5	5.0	V
Operating Temperature	T _{OP}	-20	70	°C
Storage Temperature	T _{ST}	-30	80	°C
Storage Humidity	HD	10	95	%RH

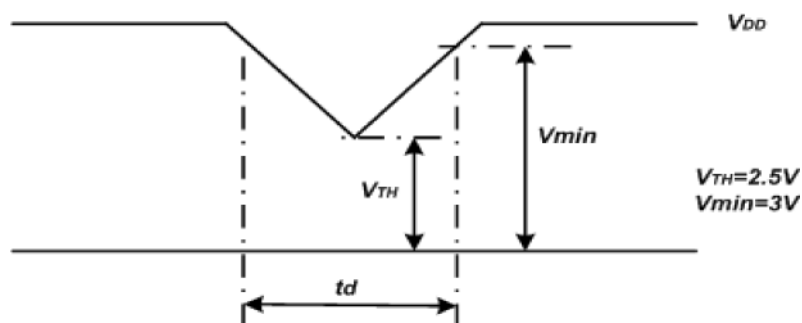
6. DC Characteristics

Item	Symbol	Min	Typ	Max	Unit
Logic/LCD Drive Voltage	VDD	3.0	3.3	3.6	V
VDD current	IDD	-	0.25	-	A
VDD Power	PDD	-	-	1.3	W
Rush Current	I _{rush}	-	-	3	A
Allowable logic/LCD Drive Ripple Voltage	VDD _{rp}	-	-	200	mVp-p

【Note 1】 Measure Condition



【Note 2】 VDD Power Dip Condition

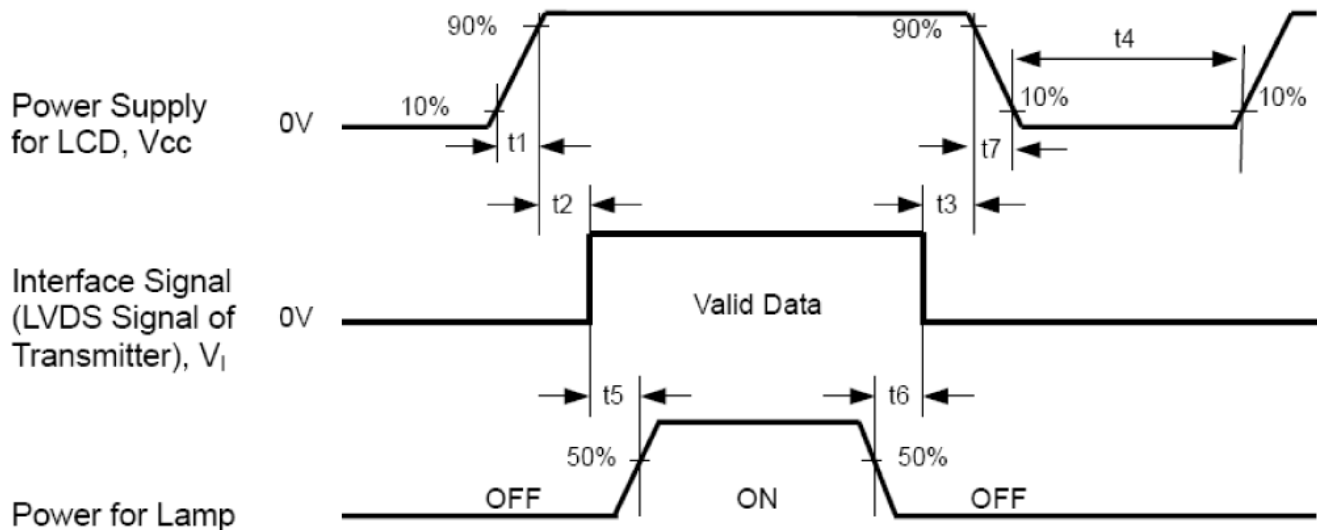


If $V_{TH} < V_{DD} \leq V_{min}$, then $t_d \leq 10ms$; When the voltage returns to normal our panel must revive automatically.

7. Timing Characteristics

7.1 Power ON/OFF sequence

VDD power on/off sequence is as follows. Interface signals are also shown in the chart. Signals from any system shall be Hi-Z state or low level when VDD is off.



Parameter	Symbol	Unit	Min	Typ	Max
VDD Rise Time	T1	ms	0.5	-	10
VDD Good to Signal Valid	T2	ms	0	-	20
Signal Disable to Power Down	T3	ms	0	-	1000
Power off	T4	ms	100	-	
Signal Valid to Backlight On	T5	ms	300	-	
Backlight Off to Signal Disable	T6	ms	200	-	
VDD Fall Time	T7	ms	0	-	100

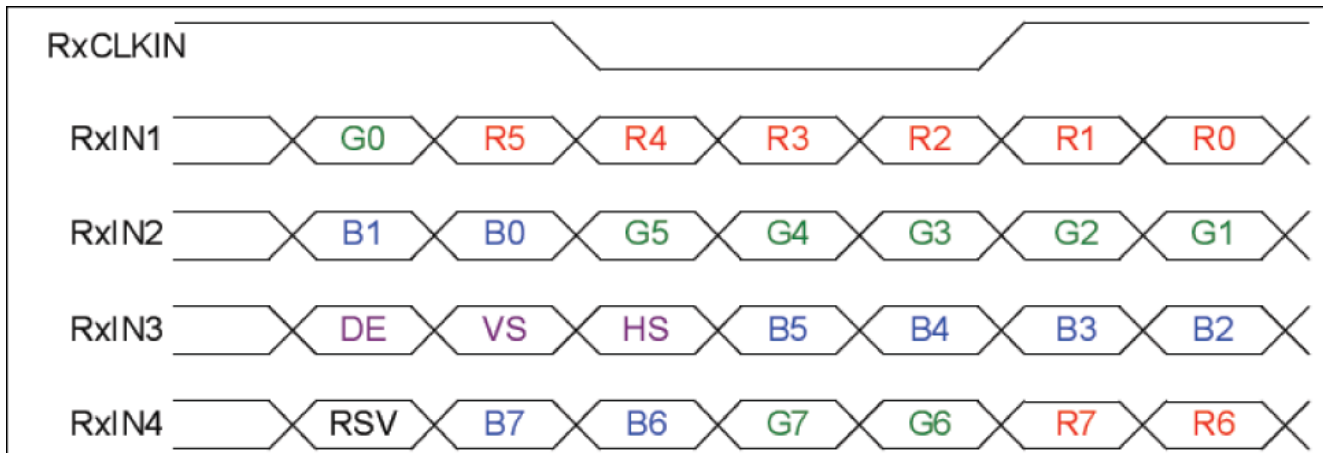
【Note】 H Blank area and V Blank area cannot be changed at every frame

7.2 Timing characteristics

7.2.1 AC Electrical Characteristics

Parameter	Symbol	Unit	Min	Typ	Max
LVDS Clock Frequency<single>	Fdck	MHz	50	65	80
H Total Time	Thp	clocks	1056	1344	1720
H Active Time	HA	clocks	1024	1024	1024
H Front Porch	Thfp	clocks	-	48	-
H Sync Pulse Width	HSPW	clocks	-	32	-
H Back Porch	Thbp	clocks	-	240	-
H Frequency	Fh	KHz	46.32	48.36	59.40
V Total Time	Tvp	lines	772	806	990
V Active Time	VA	lines	768	768	768
V Front Porch	Tvfp	lines	-	3	-
V Sync Pulse Width	VSPW	lines	-	12	-
V Back Porch	Tvbp	lines	-	23	-
V Frequency	fv	Hz	-	60	-

7.2.2 Timing Diagram of Interface Signal



【Note 1】 Follow SPWG

【Note 2】 R/G/B data7: MSB, R/G/B data0: LSB

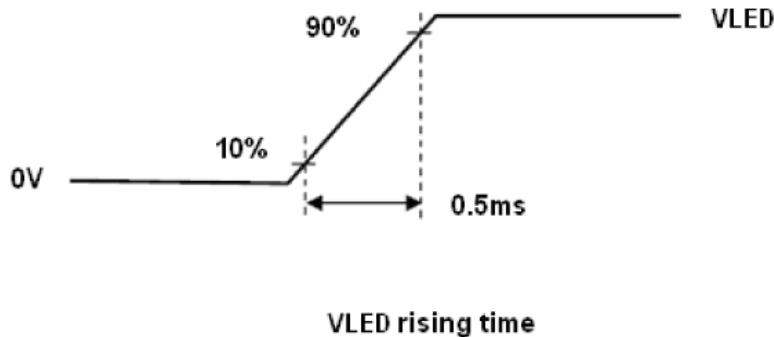
8. Backlight Characteristic

8.1 Parameter Guideline of LED Backlight

Symbol	Parameter		Min	Typ	Max	Units	Condition
VLED	LED Input		10.8	12	12.6	V	Ta=25°C Note B
PLED	LED Power Consumption		-	-	7.5	W	Ta=25°C Note B
VLED_PWM	PWM Signal Voltage	High	4.5	5	5.5	V	Ta=25°C
		Low	-	-	0.8	V	
F _{PWM}	PWM dimming Frequency		200	-	20K	Hz	Ddim≥5%
VLED_EN	LED Enable Voltage	High	2.0	5	5.5	V	-
		Low	-	-	0.8	V	
LT	LED Life Time		30,000	-	-	Hours	Ta=25°C Note A

【Note A】 The LED life time define as the estimated time to 50% degradation of initial luminous.

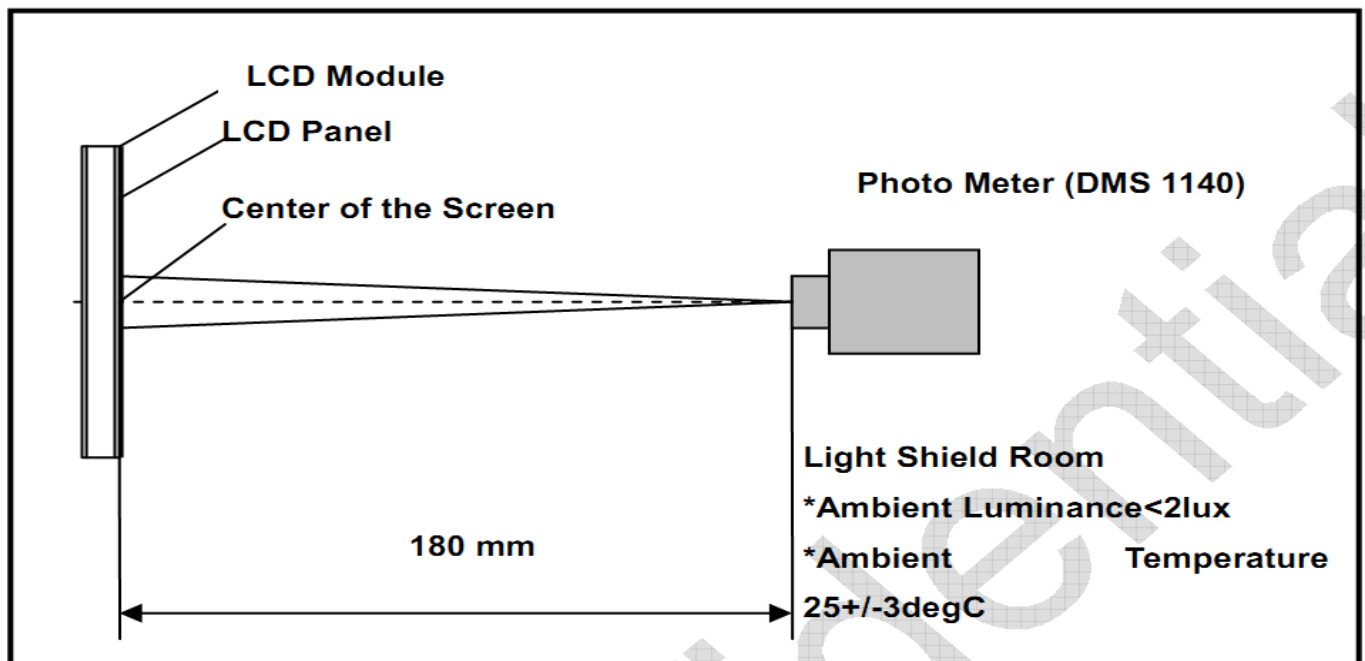
【Note B】 A higher LED power supply voltage will result in better power efficiency. Keep the VLED between 12V and 12.6V is strongly recommended.



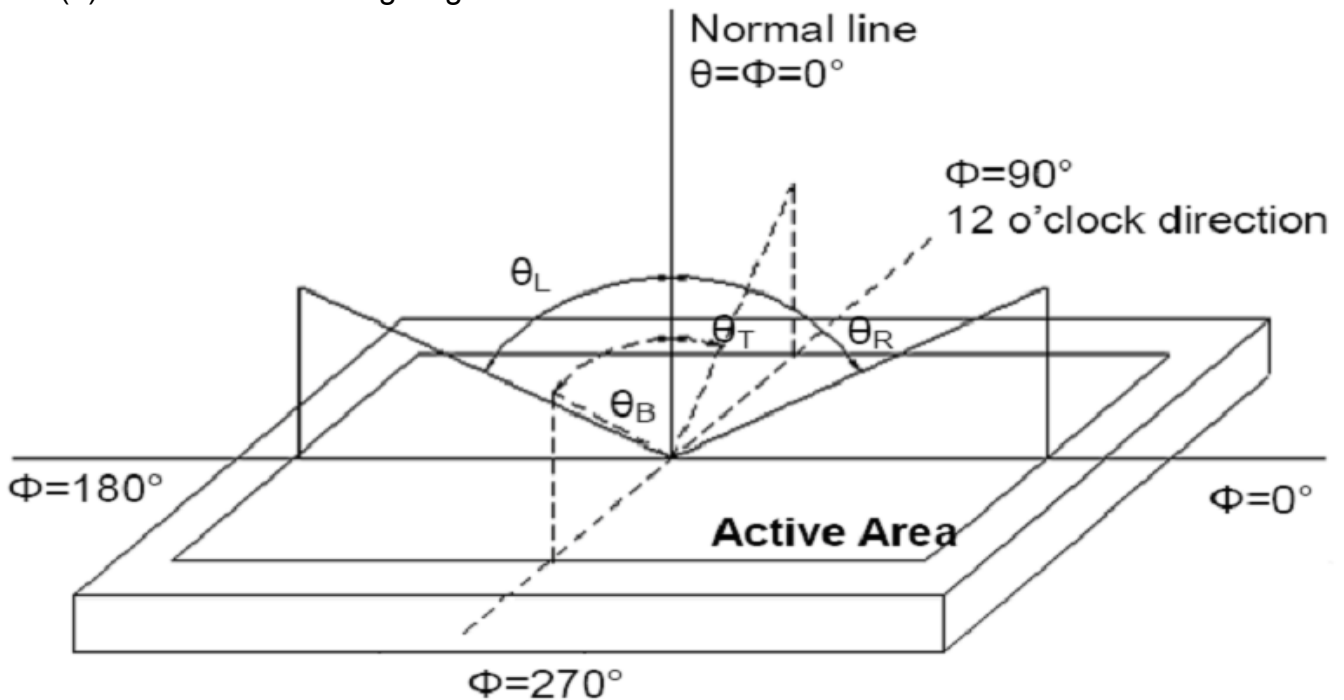
9. Optical Characteristics

Item	Conditions	Min.	Typ.	Max.	Unit	Note
Viewing Angle (CR>10)	Horizontal	θ_L	70	80	-	degree (1),(2),(6)
		θ_R	70	80	-	
	Vertical	θ_T	70	80	-	
		θ_B	60	80	-	
Contrast Ratio	Center	450	800	-	-	(1),(3),(6)
LCM Luminance	Center point	200	300	-	Cd/m ²	
Response Time	Rising + Falling	-	16	-	ms	(1),(4),(6)
CF Color Chromaticity (CIE1931)	Red x	Typ. -0.05	0.625	Typ. +0.05	-	(1), (6)
	Red y		0.352		-	
	Green x		0.315		-	
	Green y		0.630		-	
	Blue x		0.149		-	
	Blue y		0.067		-	
	White x		0.305		-	
	White y		0.325		-	
NTSC	CIE1931	-	70	-	%	(1),(6)

Note (1) Measurement Setup: The LCD module should be stabilized at given temp. 25°C for 15 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 15 minutes in a windless room



Note (2) Definition of Viewing Angle



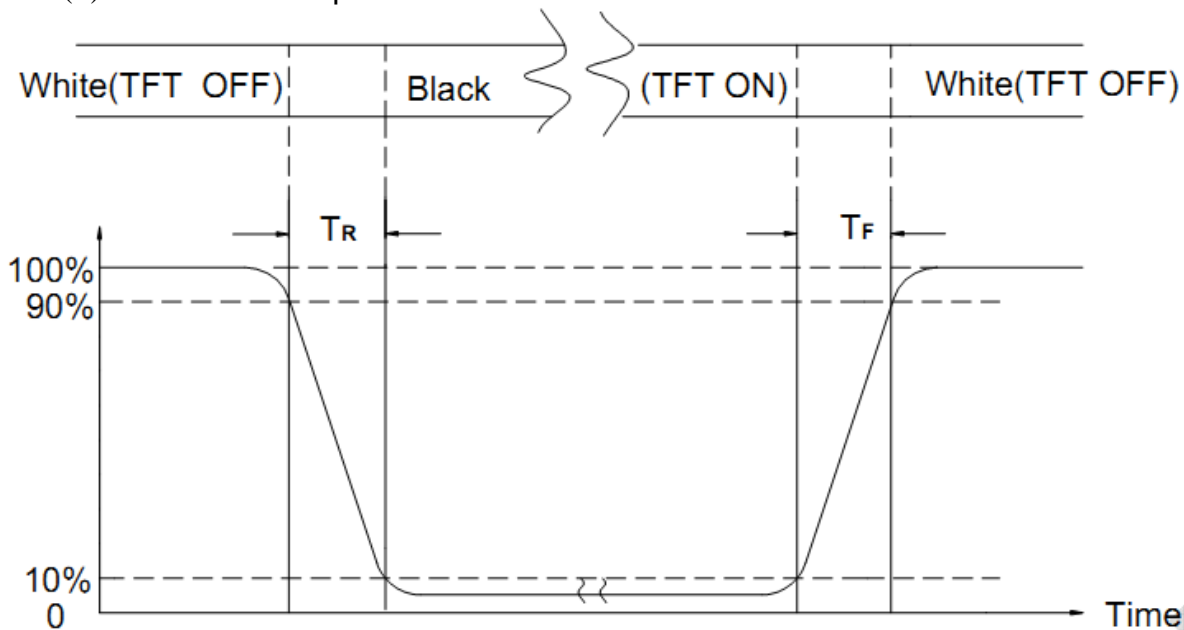
Note (3) Definition of Contrast Ratio (CR)

The contrast ratio can be calculated by the following expression

Contrast Ratio (CR) = L_{63} / L_0

L_{63} : Luminance of gray level 63, L_0 : Luminance of gray level 0

Note (4) Definition of response time



Note (5) Definition of Transmittance (Module is without signal input)

Transmittance = Center Luminance of LCD / Center Luminance of Back Light x 100%

Note (6) Definition of color chromaticity (CIE1931)

Color coordinates measured at the center point of LCD

10. Reliability Test Conditions and Methods

NO.	TEST ITEMS	TEST CONDITION	INSPECTION AFTER TEST
<input type="checkbox"/>	High Temperature Storage	80°C±2°C×200Hours	Inspection after 2~4hours storage at room temperature, the samples should be free from defects: 1, Air bubble in the LCD. 2, Seal leak. 3, Non-display. 4, Missing segments. 5, Glass crack. 6, Current IDD is twice higher than initial value. 7, The surface shall be free from damage. 8, The electric characteristic requirements shall be satisfied.
<input type="checkbox"/>	Low Temperature Storage	-30°C±2°C×200Hours	
<input type="checkbox"/>	High Temperature Operating	70°C±2°C×120Hours	
<input type="checkbox"/>	Low Temperature Operating	-20°C±2°C×120Hours	
<input type="checkbox"/>	Temperature Cycle(Storage)	-20°C \longleftrightarrow 25°C \longleftrightarrow 70°C (30min) (5min) (30min) 1cycle Total 10cycle	
<input type="checkbox"/>	Damp Proof Test (Storage)	50°C±5°C×90%RH×120Hours	
<input type="checkbox"/>	Vibration Test	Frequency:10Hz~55Hz Amplitude:1.5mm Sweep time:12min X,Y,Z direction for total 2hours (packing condition test will be tested by a carton)	
<input type="checkbox"/>	Drooping Test	Drop to the ground from 1M height one time every side of carton. (packing condition test will be tested by a carton)	
<input type="checkbox"/>	ESD Test	Voltage:±6KV,R:330Ω,C:150PF,Air Mode,5times	

REMARK:

- 1, The Test samples should be applied to only one test item.
- 2, Sample side for each test item is 5~10pcs.
- 3,For Damp Proof Test, Pure water(Resistance > 10MΩ)should be used.
- 4,In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judge as a good part.
- 5, EL evaluation should be accepted from reliability test with humidity and temperature: Some defects such as black spot/blemish can happen by natural chemical reaction with humidity and Fluorescence EL has.
- 6, Failure Judgment Criterion: Basic Specification Electrical Characteristic, Mechanical Characteristic, Optical Characteristic.

11. Inspection Standard

11-1. Purpose

This standard for Quality Assurance should affirm the quality of LCD module products to supply to purchaser by AMSON (Supplier).

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

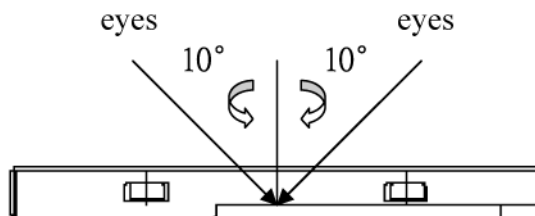
a. Manner of appearance test:

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

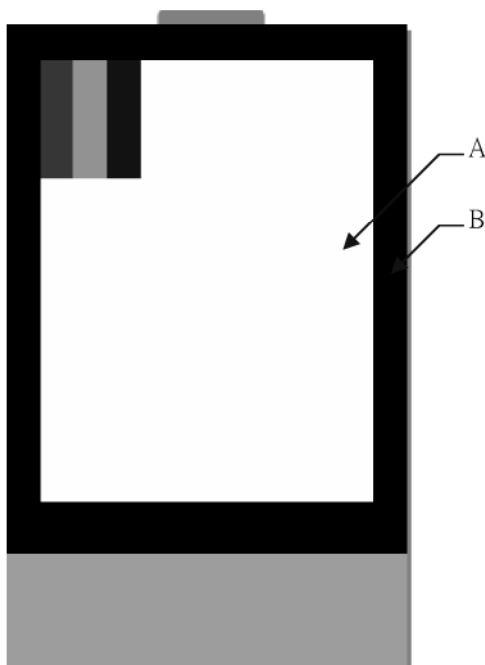
(ii) When test the model of transmissive product must add the reflective plate.

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

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



(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.

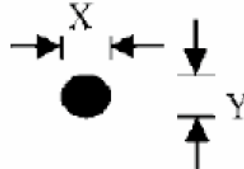
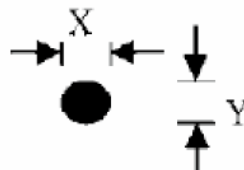
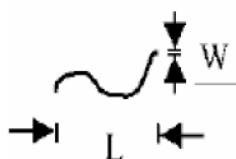
(ii) The sample of the lowest acceptable quality level must be discussed by both supplier and customer when any dispute happened.

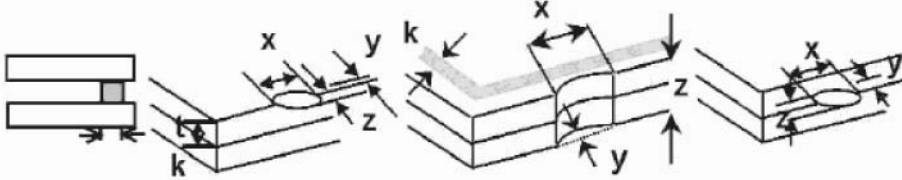
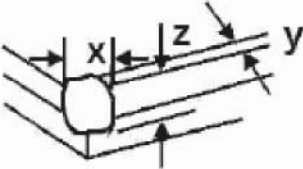
(iii) Must add new item on time when it is necessary.

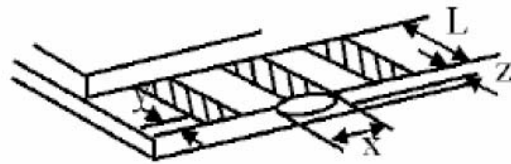
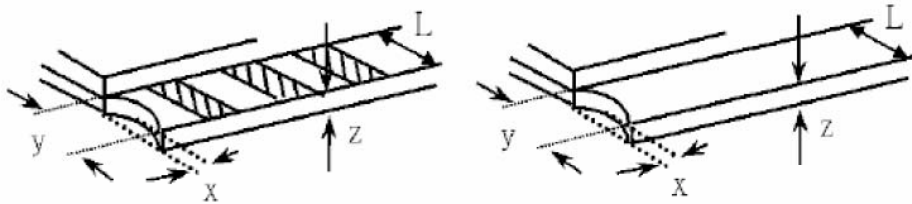
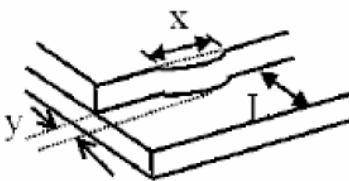
c. Standard of inspection: (Unit: mm)

11-6. Inspection specification

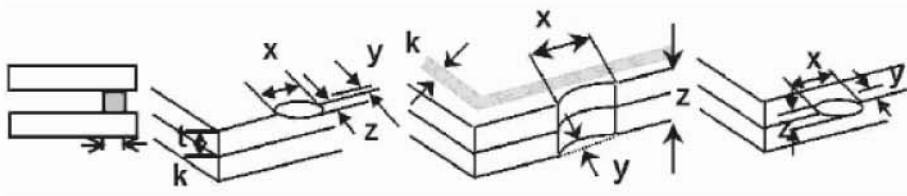
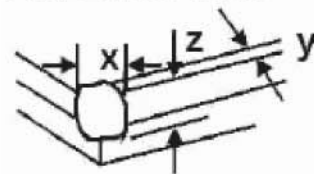
Defect out of viewing area can be neglected.



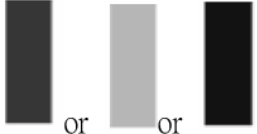
NO	Item	Criterion	AQL																							
01	Electrical Testing	1.1 Missing vertical, horizontal segment, segment contrast defect. 1.2 Missing character, dot or icon. 1.3 Display malfunction. 1.4 No function or no display. 1.5 Current consumption exceeds product specifications. 1.6 LCD viewing angle 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 Dot dimension as below drawing: $\Phi = (X+Y) / 2$ <div>  <table border="1"> <thead> <tr> <th>Size(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>5</td> </tr> <tr> <td>$0.50 < \Phi$</td> <td>0</td> </tr> </tbody> </table> </div> <p>* Densely spaced: No more than two spots within 3mm.</p>	Size(mm)	Acceptable Q'ty	$\Phi \leq 0.20$	Accept no dense	$0.20 < \Phi \leq 0.50$	5	$0.50 < \Phi$	0	2.5															
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03	LCD and Touch Panel black spots, white spots, contamination (non – display)	<div> 3.1 Round type: As following drawing $\Phi = (X+Y) / 2$ <div>  <table border="1"> <thead> <tr> <th>Size(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>5</td> </tr> <tr> <td>$0.50 < \Phi$</td> <td>0</td> </tr> </tbody> </table> </div> <p>* Densely spaced: No more than two spots within 3mm.</p> </div> <div> 3.2 Line type: (As following drawing) <div>  <table border="1"> <thead> <tr> <th>Length(mm)</th> <th>Width(mm)</th> <th>Acceptable Q'ty</th> </tr> </thead> <tbody> <tr> <td>$L \leq 10$</td> <td>$W \leq 0.1$</td> <td>Accept no dense</td> </tr> <tr> <td>$L \leq 10.0$</td> <td>$0.1 < W \leq 0.25$</td> <td>4</td> </tr> <tr> <td>$L > 10$</td> <td>----</td> <td>Rejection</td> </tr> <tr> <td>----</td> <td>$0.25 < W$</td> <td>Rejection</td> </tr> </tbody> </table> </div> <p>* Densely spaced: No more than two lines within 3mm.</p> </div>	Size(mm)	Acceptable Q'ty	$\Phi \leq 0.20$	Accept no dense	$0.20 < \Phi \leq 0.50$	5	$0.50 < \Phi$	0	Length(mm)	Width(mm)	Acceptable Q'ty	$L \leq 10$	$W \leq 0.1$	Accept no dense	$L \leq 10.0$	$0.1 < W \leq 0.25$	4	$L > 10$	----	Rejection	----	$0.25 < W$	Rejection	2.5
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----	$0.25 < W$	Rejection																								

NO	Item	Criterion	AQL																		
04	Polarizer bubbles	<div><div>If bubbles are visible, judge using black spot specifications, not easy to find, must check in specify direction</div><table><tr><th>Size Φ(mm)</th><th>Acceptable Q'ty</th></tr><tr><td>$\Phi \leq 0.20$</td><td>Accept no dense</td></tr><tr><td>$0.20 < \Phi \leq 0.50$</td><td>4</td></tr><tr><td>$0.50 < \Phi \leq 1.00$</td><td>3</td></tr><tr><td>$1.00 < \Phi$</td><td>0</td></tr><tr><td>Total Q'ty</td><td>4</td></tr></table></div>	Size Φ (mm)	Acceptable Q'ty	$\Phi \leq 0.20$	Accept no dense	$0.20 < \Phi \leq 0.50$	4	$0.50 < \Phi \leq 1.00$	3	$1.00 < \Phi$	0	Total Q'ty	4	2.5						
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$1.00 < \Phi$	0																				
Total Q'ty	4																				
05	Scratches	Follow NO.3 -2 Line Type.																			
06	Chipped glass	<div><div>Symbols: x: Chip length y: Chip width z: Chip thickness k: Seal width t: Glass thickness a: LCD side length L: Electrode pad length</div><div>6.1 General glass chip: 6.1.1 Chip on panel surface and crack between panels:</div><div></div><div><table><tr><th>z: Chip thickness</th><th>y: Chip width</th><th>x: Chip length</th></tr><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></table><div><div>⊙ Unit: mm</div><div>⊙ If there are 2 or more chips, x is the total length of each chip</div></div></div><div><div>6.1.2 Corner crack:</div><div></div><div><table><tr><th>z: Chip thickness</th><th>y: Chip width</th><th>x: Chip length</th></tr><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></table><div><div>⊙ Unit: mm</div><div>⊙ If there are 2 or more chips, x is the total length of each chip</div></div></div></div></div>	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
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	$x \leq 1/8a$																			

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><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><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><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
		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																		
$y \leq 1/3L$	$X \leq a$																		

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><tr><td>z: Chip thickness</td><td>y: Chip width</td><td>x: Chip length</td></tr><tr><td>$Z \leq t$</td><td>$\leq 1/2 k$ and not over viewing area</td><td>$x \leq 1/8a$</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><tr><td>z: Chip thickness</td><td>y: Chip width</td><td>x: Chip length</td></tr><tr><td>$z \leq t$</td><td>$\leq 1/2 k$ and not over viewing area</td><td>$x \leq 1/8a$</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
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	$x \leq 1/8a$													

NO	Item	Criterion		AQL
15	Touch Panel(Fish eye)	SIZE(mm)	Acceptable Q'ty	2.5
		$L \leq 1.0$	Accept no dense	
		$L > 1.0\text{mm}$	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: 10~100g		2.5
19	General appearance	19.1 Pin type must match type in specification sheet.		0.65
		19.2 LCD pin loose or missing pins.		0.65
		19.3 Product packaging must the same as specified on packaging specification sheet.		0.65
		19.4 Product dimension and structure must conform to product specification sheet.		0.65
20	Definition of Pixel	Pixel : Group of Three Sub-pixels (Red, Green ,Blue): 		
		Dot : Red or Green or Blue 		
		Dot : Any sub-pixel		
		Bright Dot Defects Dots (sub-pixels) on display which is bright in the picture and visible at Black Pattern. Dark Dot Defects Dots(sub-pixels) on display which is dark in the picture and visible at Red/Green/Black/White Pattern. Neighbour Dot Defects Two or three neighbour dots (dot: sub-pixel) cluster(R&G,G&B,B&R,or		



		<p>R&G&B).Dot Defects Inspection Criteria NOTE : Dot out of VA can be ignored.</p> <table><tr><th rowspan="2">Items</th><th colspan="2">Inspection Criteria</th></tr><tr><th>Details</th><th>Allowed quantity</th></tr><tr><td>Bright Dot</td><td>Not Neighbour Dot</td><td>2</td></tr><tr><td>Dark Dot</td><td>Not Neighbour Dot</td><td>3</td></tr><tr><td colspan="2">Total acceptable Qty</td><td>5</td></tr></table> <ul style="list-style-type: none">● Size of dot defect is larger than half of one sub-pixel.	Items	Inspection Criteria		Details	Allowed quantity	Bright Dot	Not Neighbour Dot	2	Dark Dot	Not Neighbour Dot	3	Total acceptable Qty		5
Items	Inspection Criteria															
	Details	Allowed quantity														
Bright Dot	Not Neighbour Dot	2														
Dark Dot	Not Neighbour Dot	3														
Total acceptable Qty		5														

12. Handling Precautions

12.1 Mounting method

The LCD panel of AMSON TFT module consists of two thin glass plates with polarizers which easily be damaged. And since the module is so constructed as to be fixed by utilizing fitting holes in the printed circuit board.

Extreme care should be needed when handling the LCD modules.

12.2 Caution of LCD handling and cleaning

When cleaning the display surface, Use soft cloth with solvent

[Recommended below] and wipe lightly

- Isopropyl alcohol
- Ethyl alcohol

Do not wipe the display surface with dry or hard materials that will damage the polarizer surface.

Do not use the following solvent:

- Water
- Aromatics

Do not wipe ITO pad area with the dry or hard materials that will damage the ITO patterns

Do not use the following solvent on the pad or prevent it from being contaminated:

- Soldering flux
- Chlorine (Cl) , Sulfur (S)

If goods were sent without being silicon coated on the pad, ITO patterns could be damaged due to the corrosion as time goes on.

If ITO corrosion happens by miss-handling or using some materials such as Chlorine (Cl), Sulfur (S) from customer, Responsibility is on customer.

12.3 Caution against static charge

The LCD module uses C-MOS LSI drivers, so we recommend that you:

Connect any unused input terminal to VDD or GND, do not input any signals before power is turned on, and ground your body, work/assembly areas, and assembly equipment to protect against static electricity.

12.4 packing

- Module employs LCD elements and must be treated as such.
- Avoid intense shock and falls from a height.
- To prevent modules from degradation, do not operate or store them exposed direct to sunshine or high temperature/humidity

12.5 Caution for operation

- It is an indispensable condition to drive LCD's within the specified voltage limit since the higher voltage than the limit causes the shorter LCD life.
- An electrochemical reaction due to direct current causes LCD's undesirable deterioration, so that the use of direct current drive should be avoided.
- Response time will be extremely delayed at lower temperature than the operating temperature range and on the other hand at higher temperature LCD's show dark color in them. However those phenomena do not mean malfunction or out of order with LCD's, which will come back in the specified operation temperature.
- If the display area is pushed hard during operation, some font will be abnormally displayed but it resumes normal condition after turning off once.
- Slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit.

Usage under the maximum operating temperature, 50%Rh or less is required.

12.6 storing

In the case of storing for a long period of time for instance, for years for the purpose or replacement use, the following ways are recommended.

- Storage in a polyethylene bag with the opening sealed so as not to enter fresh air outside in it. And with no desiccant.
- Placing in a dark place where neither exposure to direct sunlight nor light's keeping the storage temperature range.
- Storing with no touch on polarizer surface by the anything else.
[It is recommended to store them as they have been contained in the inner container at the time of delivery from us

12.7 Safety

- It is recommendable to crash damaged or unnecessary LCD's into pieces and wash off liquid crystal by either of solvents such as acetone and ethanol, which should be burned up later.
- When any liquid leaked out of a damaged glass cell comes in contact with your hands, please wash it off well with soap and water

13. Precaution for Use

13.1

A limit sample should be provided by the both parties on an occasion when the both parties agreed its necessity. Judgment by a limit sample shall take effect after the limit sample has been established and confirmed by the both parties.

13.2

On the following occasions, the handing of problem should be decided through discussion and agreement between responsible of the both parties.

- When a question is arisen in this specification
- When a new problem is arisen which is not specified in this specifications
- When an inspection specifications change or operating condition change in customer is reported to AMSON TFT , and some problem is arisen in this specification due to the change
- When a new problem is arisen at the customer's operating set for sample evaluation in the customer site.

14. Packing Method

TBD