



深圳市一众显示科技有限公司

SHEN ZHEN TEAM SOURCE DISPLAY TECH. CO, LTD.

TFT-LCD Module Specification

Module NO.: TST028CMIL-02P

Version: V1.0

APPROVAL FOR SPECIFICATION

APPROVAL FOR SAMPLE

For Customer' s Acceptance:	
Approved by	Comment

Team Source Display:		
Presented by	Reviewed by	Organized by

Version No.	Date	Content	Remark
V1.0	2012-5-18	Initial Release	



Contents

1. SPECIFICATIONS

- 1.1 Features**
- 1.2 Mechanical Specifications**
- 1.3 Absolute Maximum Ratings**
- 1.4 DC Electrical Characteristics**
- 1.5 Optical Characteristics**
- 1.6 Backlight & LED Characteristics**

2. MODULE STRUCTURE

- 2.1 Counter Drawing**
- 2.2 Interface Pin Description**
- 2.3 Timing Characteristics**

3. QUALITY ASSURANCE SYSTEM

- 3.1 Quality Assurance Flow Chart**
- 3.2 Inspection Specification**

4. RELIABILITY TEST

- 4.1 Reliability Test Condition**

5. PRECAUTION RELATING PRODUCT HANDLING

- 5.1 Safety**
- 5.2 Handling**
- 5.3 Storage**
- 5.4 Terms of Warranty**

Appendix : TFT LCD IC:ILI9341

1. SPECIFICATIONS

1.1 Features

Main LCD panel

Item	Standard Value
Display Type	240*(R、 G、 B)*320 Dots
LCD Type	a-si TFT, Positive, Transmissive type
Screen size(inch)	2.8" (Diagonal)
Viewing Direction	6 O'Clock
Color configuration	R.G.B. vertical stripe
Backlight Type	White LED B/L
Interface	8080 8/16Bit data bus
Other(controller/driver IC)	ILI9341

1.2 Mechanical Specifications

Item	Standard Value	Unit
Outline Dimension	50.00(W) *69.2 (L) *3.6max (H)	mm

LCD panel

Item	Standard Value	Unit
Active Area	43.2 (W) *57.6 (L)	mm

Touch panel

Item	Standard Value	Unit
Outline Dimension	49.5*68.75*1.2	mm

Note : For detailed information please refer to LCM drawing

1.3 Absolute Maximum Ratings

Module

Item	Symbol	Condition	Min.	Max.	Unit
System Power Supply Voltage	V _{CI}	-	-0.3	+4.6	V
	V _{GH-VSS}	-	-0.3	+18.5	V
	V _{SS-VGL}	-	-0.3	+18.5	V
Input Voltage	V _{IN}	-	-0.3	V _{CI} +0.3	V
Operating Temperature	T _{OP}	-	-20	+70	°C
Storage Temperature	T _{ST}	-	-30	+80	°C
Storage Humidity	H _D	T _a < 40°C	20	90	%RH

1.4 DC Electrical Characteristics

Module

 V_{SS}= 0V, T_a = 25°C

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Power Supply Voltage	V _{CI}	-	2.6	2.8	3.3	V
Input High Voltage	V _{IH}	-	0.8*V _{CI}	-	V _{CI}	V
Input Low Voltage	V _{IL}	-	-0.3	-	0.2*V _{CI}	V
Output High Voltage	V _{OH}	-	0.8*V _{CI}	-	-	V
Output Low Voltage	V _{OL}	-	-	-	0.2*V _{CI}	V
Supply Current	I _{CC}	V _{CI} =2.8 V Pattern=full display*1	-	TBD	-	mA

Note1:Maximum current display

1.5 Optical Characteristics

TFT LCD panel

VCC=2.8V, Ta=25°C

Item	Symbol	Condition	Min.	Typ.	Max.	unit		
Response time	Tr+Tf	Ta = 25°C θX, θY = 0°	-	30	-	ms	Note2	
Contrast ratio	CR	Ta = 25°C θX, θY = 0°		250	-	-	Note3	
Color of CIE Coordinate (With B/L)	White		X	0.283	0.303	0.323	-	Note1
			Y	0.305	0.325	0.345		
	Red		X	0.606	0.626	0.646		
			Y	0.314	0.334	0.354		
	Green		X	0.257	0.277	0.297		
			Y	0.529	0.549	0.569		
	Blue		X	0.122	0.142	0.162		
			Y	0.102	0.122	0.142		
Average Brightness Pattern=white display (main)	IV	IF= 60mA	-	150	-	cd/m ²	Note1	
Uniformity	△B	IF= 60mA	80	-	-	%	Note1	

Note1:

1 : $\Delta B = B(\min) / B(\max) \times 100\%$

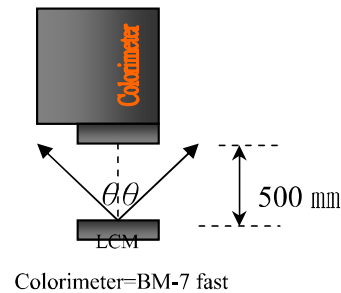
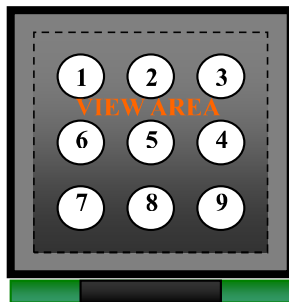
2 : Measurement Condition for Optical Characteristics:

a : Environment: 25°C±5°C / 60±20%R.H , no wind , dark room below 10 Lux at typical lamp current and typical operating frequency.

b : Measurement Distance: 500 ± 50 mm , (θ= 0°)

c : Equipment: TOPCON BM-7 fast , (field 1°) , after 10 minutes operation.

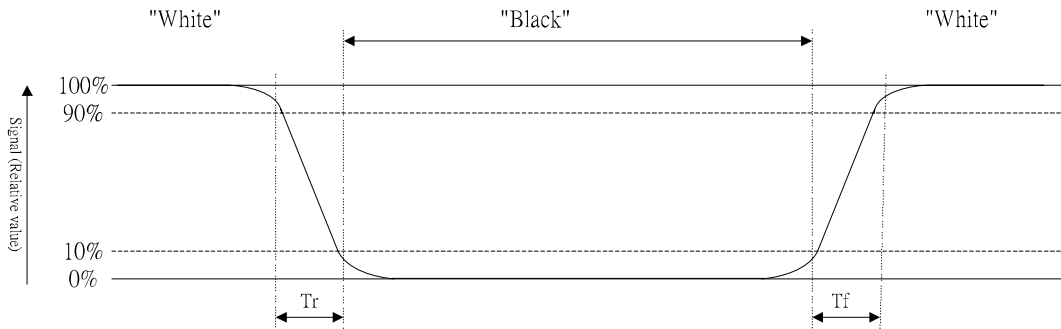
d : The uncertainty of the C.I.E coordinate measurement ±0.01 , Average Brightness ± 4%



Note2: Definition of response time:

The output signals of photo detector are measured when the input signals are changed from “black” to “white”(falling time) and from “white” to “black”(rising time), respectively. The response time is defined as the time interval between the 10% and 90% of Amplitudes.

Refer to figure as below:



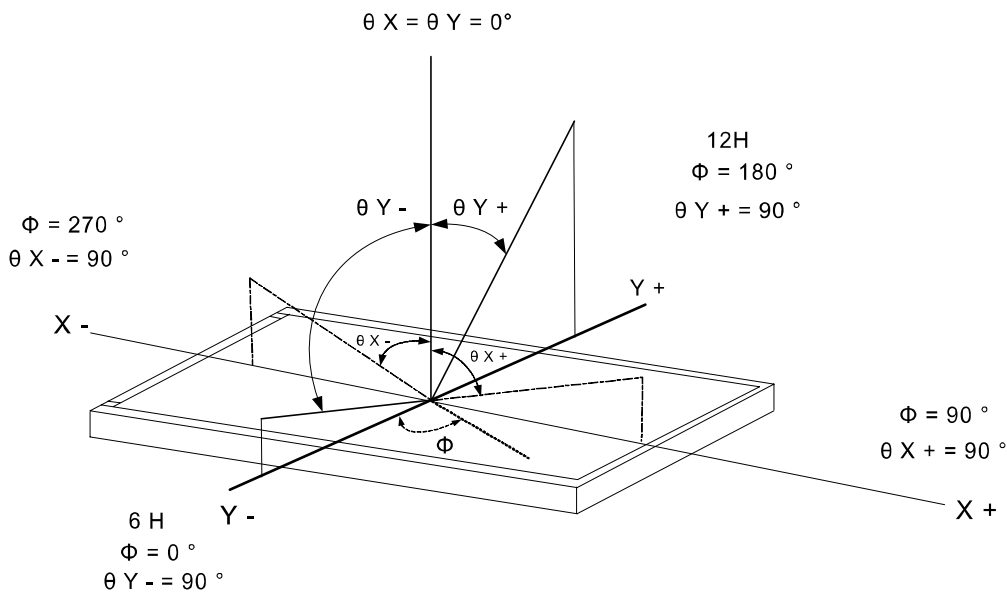
Note3: Definition of contrast ratio:

Contrast ratio is calculated with the following formula

$$\text{Contrast ratio (CR)} = \frac{\text{Photo detector output when LCD is at "White" state}}{\text{Photo detector output when LCD is at "Black" state}}$$

Note4: Definition of viewing angle:

Refer to figure as below:



1.6 Backlight & LED Characteristics

LCD Module with LED Backlight

Maximum Ratings

Item	Symbol	Conditions	Min.	Max.	Unit
Forward Current	IF	Ta =25°C	-	60	mA
Forward Voltage	VF	Ta =25°C	-	3.5	V
Power Dissipation	PD	Ta =25°C	-	210	mW

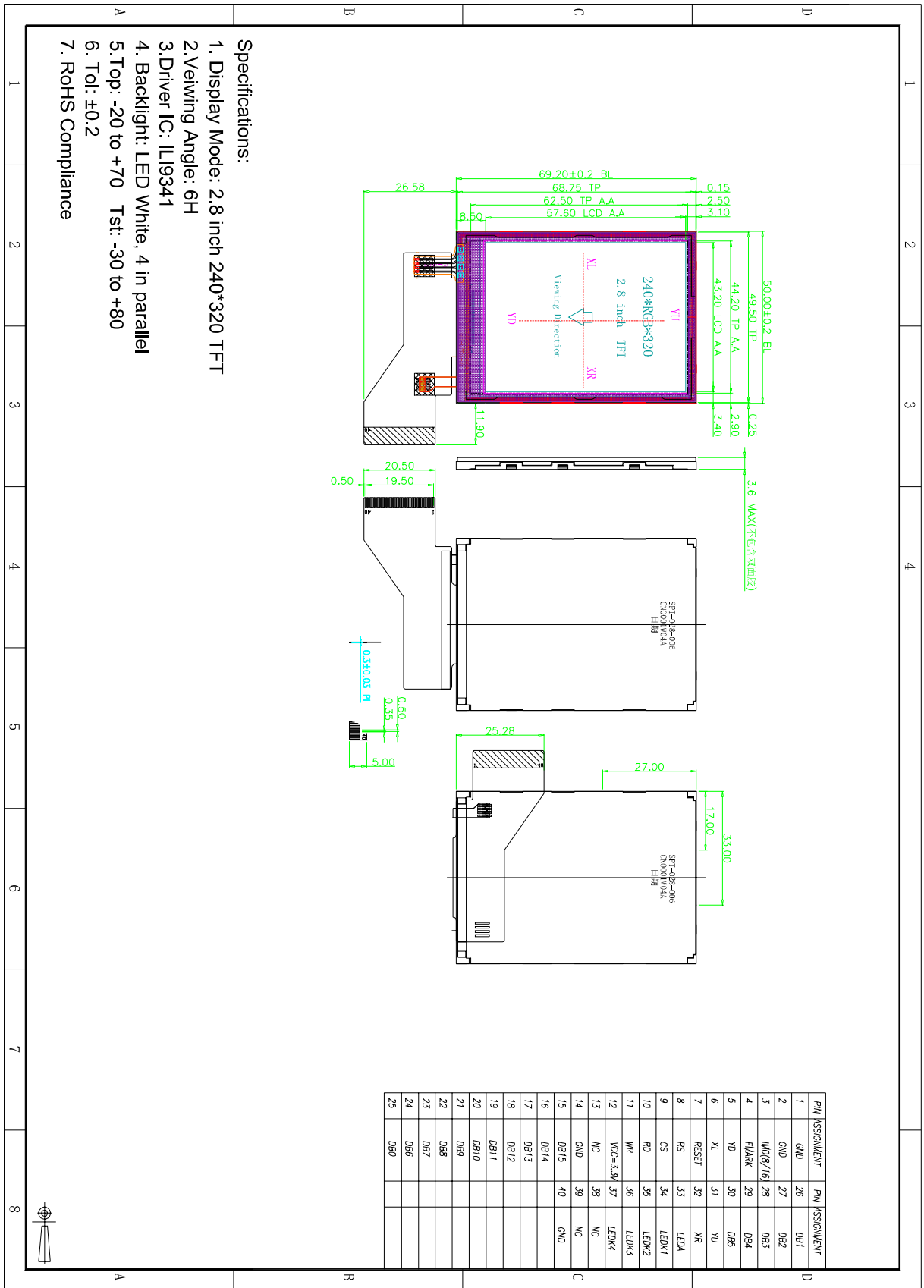
Electrical / Optical Characteristics

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Forward Voltage	VF	IF=60mA VF=3.2 V 4 white leds Ta =25°C	2.8	3.2	3.5	V
Average Brightness (Without LCD)	IV		3500	-	-	cd/m ²
Color of CIE Coordinate (without LCD)	X		0.26	-	0.31	-
	Y		0.26	-	0.31	
Color	White					

2. MODULE STRUCTURE

2.1 Counter Drawing

2.1.1 LCM Mechanical Diagram



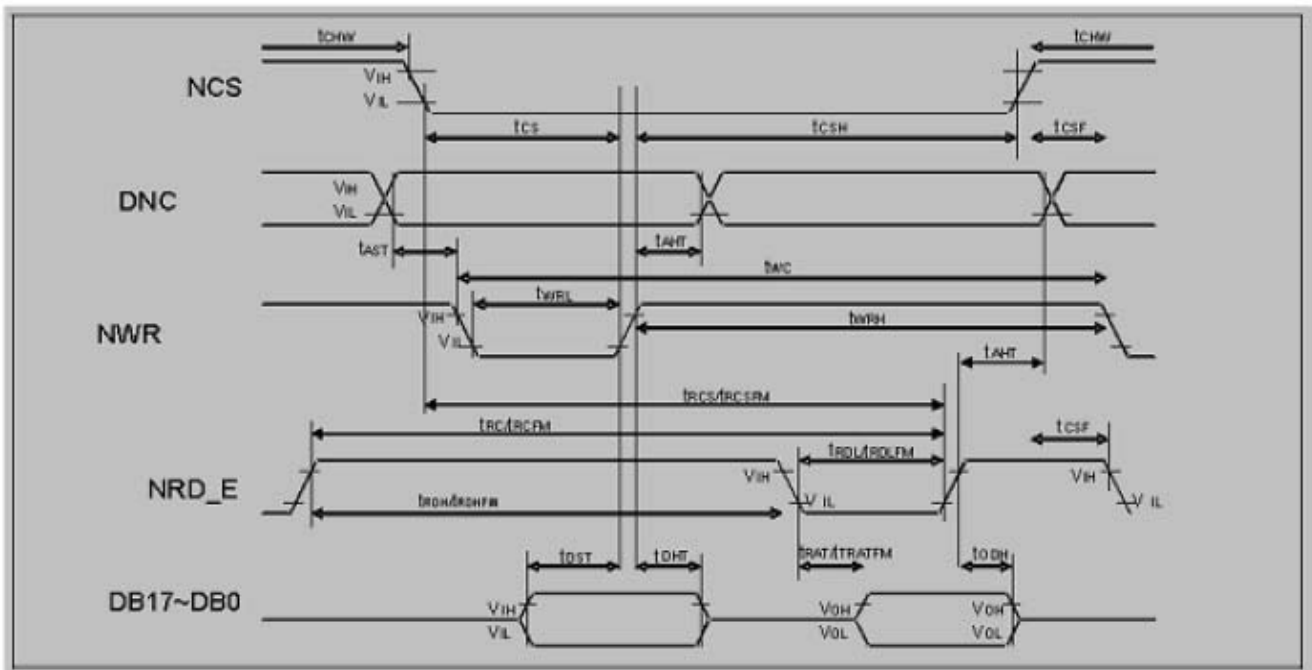
2.2 Interface Pin Description

Pin No.	Symbol	Function
1	GND	System Ground.(0V)
2	GND	System Ground.(0V)
3	IM0(8/16)	Interface Mode
4	FMARK	Output a frame head pulse signal.
5	YD	TOUCH PANEL SIGNAL OUTPUT PIN
6	XL	TOUCH PANEL SIGNAL OUTPUT PIN
7	RESET	RESET SIGNAL
8	RS	Register selecte siganl
9	CS	Chip selecte signal
10	RD	Read signal
11	WR	Write signal
12	VCC=3.3V	Analog power supply.
13	NC	NO Connection
14	GND	System Ground.(0V)
15~22	DB15~DB8	Data Bus Bit
23	DB7	Data Bus Bit
24	DB6	Data Bus Bit
25	DB0	Data Bus Bit
26	DB1	Data Bus Bit
27	DB2	Data Bus Bit
28	DB3	Data Bus Bit
29	DB4	Data Bus Bit
30	DB5	Data Bus Bit
31	YU	TOUCH PANEL SIGNAL OUTPUT PIN
32	XR	TOUCH PANEL SIGNAL OUTPUT PIN
33	LEDA	POWER SUPPLYFOR LED BACKLIGHT+
34	LEDK1	POWER SUPPLYFOR LED BACKLIGHT-
35	LEDK2	POWER SUPPLYFOR LED BACKLIGHT-

36	LEDK3	POWER SUPPLYFOR LED BACKLIGHT-
37	LEDK4	POWER SUPPLYFOR LED BACKLIGHT-
38	NC	NO Connection
39	NC	NO Connection
40	GND	System Ground.(0V)

2.3 Timing Characteristics

2.3.1 Parallel 8080 Timing Characteristics



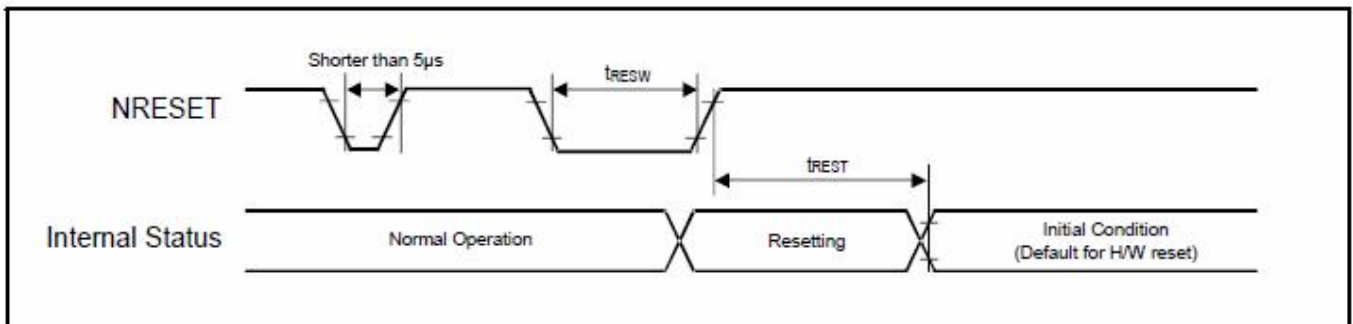
(VSSA=0V, IOVCC=1.65V to 3.6V, VCI=2.5V to 3.6V, Ta = -30 to 70°C)

Signal	Symbol	Parameter	Min.	Max.	Unit	Description
DNC	tAST	Address setup time	0	-	ns	-
	tAHT	Address hold time (Write/Read)	10	-		
NCS	tCHW	Chip select "H" pulse width	0	-	ns	-
	tCS	Chip select setup time (Write)	15	-		
	tRCS	Chip select setup time (Read ID)	45	-		
	tRCSFM	Chip select setup time (Read FM)	355	-		
	tCSF	Chip select wait time (Write/Read)	10	-		
	tCSH	Chip select hold time	10	-		
NWR_RNW	tWC	Write cycle	66	-	ns	-
	tWRH	Control pulse "H" duration	15	-		
	tWRL	Control pulse "L" duration	15	-		
NRD_E (ID)	tRC	Read cycle (ID)	160	-	ns	When read ID data
	tRDH	Control pulse "H" duration (ID)	90	-		
	tRDL	Control pulse "L" duration (ID)	45	-		
NRD_E (FM)	tRCFM	Read cycle (FM)	450	-	ns	When read from frame memory
	tRDHFM	Control pulse "H" duration (FM)	90	-		
	tRDLFM	Control pulse "L" duration (FM)	355	-		
D15 to D0	tDST	Data setup time	10	-	ns	For maximum CL=30pF For minimum CL=8pF
	tDHT	Data hold time	10	-		
	tRAT	Read access time (ID)	-	40		
	tRATFM	Read access time (FM)	-	340		
	tODH	Output disable time	20	80		

Note: The input signal rise time and fall time (tr, tf) is specified at 15 ns or less.

Logic high and low levels are specified as 30% and 70% of IOVCC for Input signals.

2.3.2 Reset Timing Characteristics

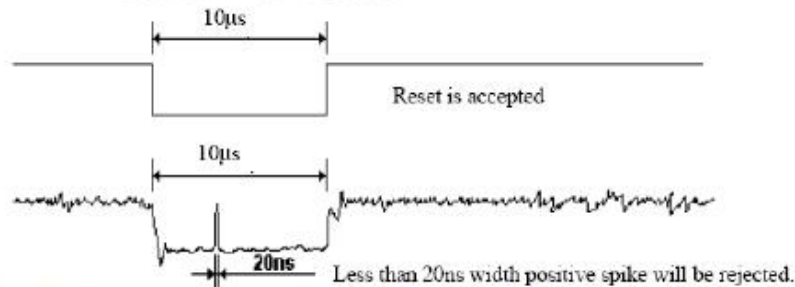


Symbol	Parameter	Related Pins	Min.	Typ.	Max.	Note	Unit
t _{RESW}	Reset low pulse width ⁽¹⁾	NRESET	10	-	-	-	μs
t _{REST}	Reset complete time ⁽²⁾	-	-	-	5	When reset applied during Sleep In mode	ms
		-	-	-	120	When reset applied during Sleep Out mode	ms

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

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

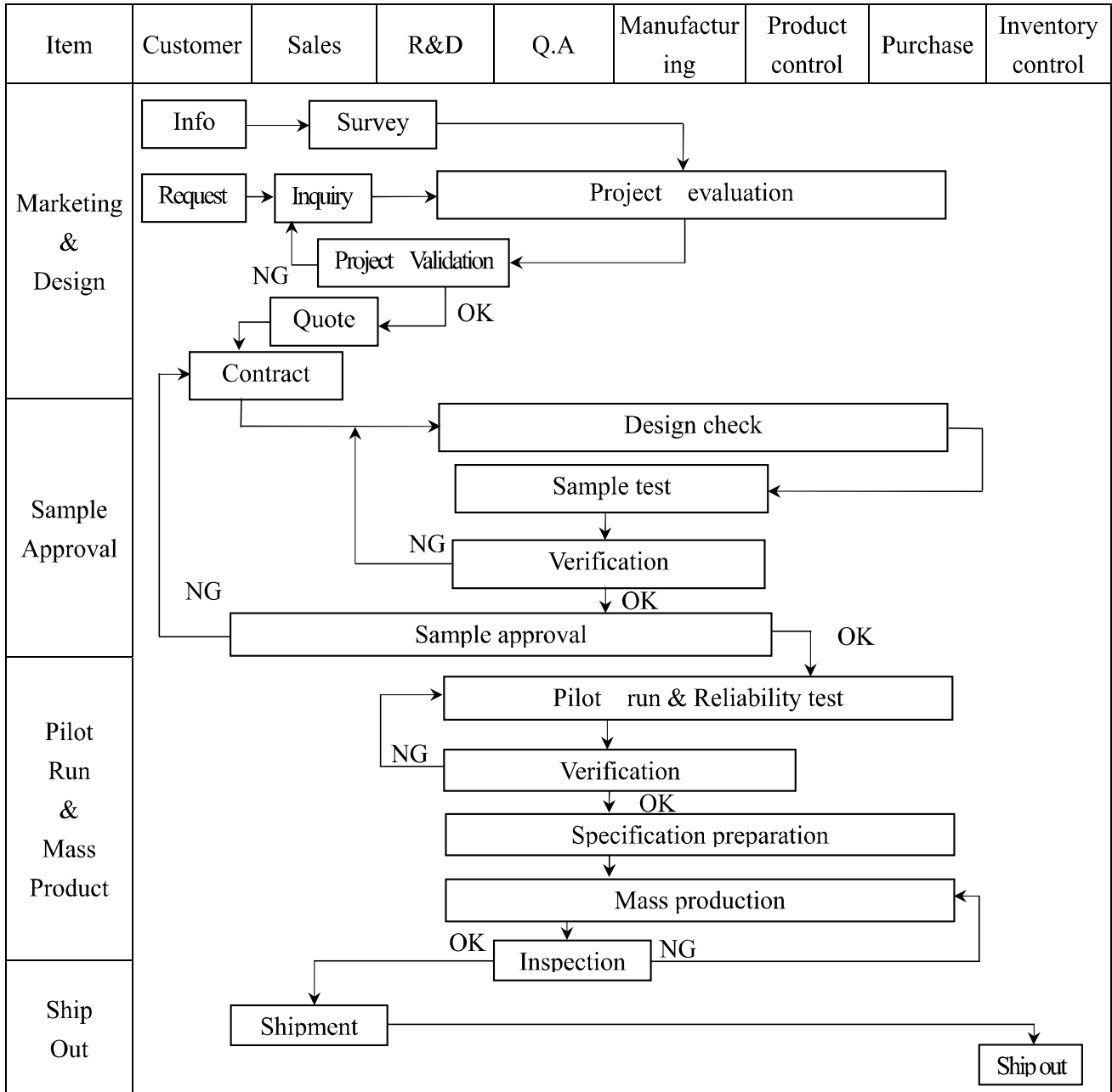
- (2) During the resetting period, the display will be blanked (The display is entering blanking sequence, which maximum time is 120 ms, when Reset Starts in Sleep out –mode. The display remains the blank state in Sleep In –mode) and then return to Default condition for H/W reset.
- (3) During Reset Complete Time, ID2 and VCOMOF value in OTP will be latched to internal register during this period. This loading is done every time when there is H/W reset complete time (t_{REST}) within 5ms after a rising edge of RESET.
- (4) Spike Rejection also applies during a valid reset pulse as shown as below:



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

3. QUALITY ASSURANCE SYSTEM

3.1 Quality Assurance Flow Chart





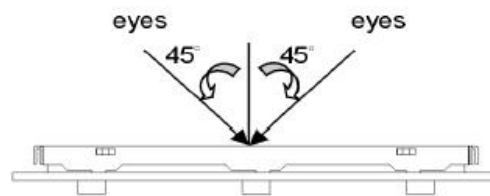
Item	Customer	Sales	R&D	Q.A	Manufacturing	Product control	Purchase	Inventory control
Sales Service	<pre> graph TD Info[Info] --> Claim[Claim] Claim --> FA[Failure analysis] Claim --> AR[Analysis report] FA --> CA[Corrective action] CA --> Tracking[Tracking] </pre>							
Q.A Activity	<ol style="list-style-type: none"> 1. Process improvement proposal 2. Equipment calibration 3. Education And Training Activities 4. Standardization Management 							

3.2 Inspection Specification

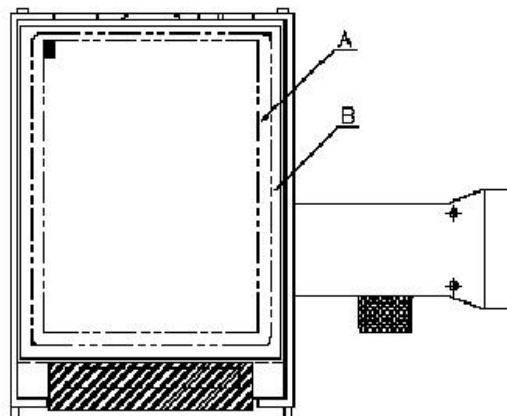
- ◆Scope : The document shall be applied to TFT-LCD Module for less than 3.5" (Ver.02).
- ◆Inspection Standard : MIL-STD-105E Table Normal Inspection Single Sampling Level II.
- ◆Equipment : Gauge 、MIL-STD 、Powertip Tester 、Sample
- ◆Defect Level : Major Defect AQL : 0.4 ; Minor Defect AQL : 1.5
- ◆OUT Going Defect Level : Sampling.
- ◆Standard of the product appearance test :

a. Manner of appearance test :

- (1). The test best be under 20W×2 fluorescent light , and distance of view must be at 30 cm.
- (2). The test direction is base on about around 45° of vertical line.



(3). Definition of area.



A area : viewing area

B area : Outside of viewing area

(4). Standard of inspection : (Unit : mm)

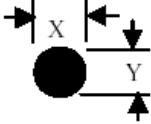

◆Specification For TFT-LCD Module Less Than 3.5" :

(Ver. 02)

NO	Item	Criterion	Level												
01	Product condition	1. 1 The part number is inconsistent with work order of production.	Major												
		1. 2 Mixed product types.	Major												
		1. 3 Assembled in inverse direction.	Major												
02	Quantity	2. 1 The quantity is inconsistent with work order of production.	Major												
03	Outline dimension	3. 1 Product dimension and structure must conform to structure diagram.	Major												
04	Electrical Testing	4. 1 Missing line character and icon.	Major												
		4. 2 No function or no display.	Major												
		4. 3 Display malfunction.	Major												
		4. 4 LCD viewing angle defect.	Major												
		4. 5 Current consumption exceeds product specifications.	Major												
05	<p>Dot defect (Bright dot 、 Dark dot)</p> <p>On -display</p>	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2">Item</th> <th>Acceptance (Q'ty)</th> </tr> </thead> <tbody> <tr> <td rowspan="4" style="text-align: center; vertical-align: middle;">Dot Defect</td> <td style="text-align: center;">Bright Dot</td> <td style="text-align: center;">≤ 2</td> </tr> <tr> <td style="text-align: center;">Dark Dot</td> <td style="text-align: center;">≤ 3</td> </tr> <tr> <td style="text-align: center;">Joint Dot</td> <td style="text-align: center;">≤ 2</td> </tr> <tr> <td style="text-align: center;">Total</td> <td style="text-align: center;">≤ 3</td> </tr> </tbody> </table> <p>5. 1 Inspection pattern : full white , full black , Red , Green and blue screens.</p> <p>5. 2 It is defined as dot defect if defect area $> 1/2$ dot.</p> <p>5. 3 The distance between two dot defect ≥ 5 mm.</p>	Item		Acceptance (Q'ty)	Dot Defect	Bright Dot	≤ 2	Dark Dot	≤ 3	Joint Dot	≤ 2	Total	≤ 3	Minor
Item		Acceptance (Q'ty)													
Dot Defect	Bright Dot	≤ 2													
	Dark Dot	≤ 3													
	Joint Dot	≤ 2													
	Total	≤ 3													

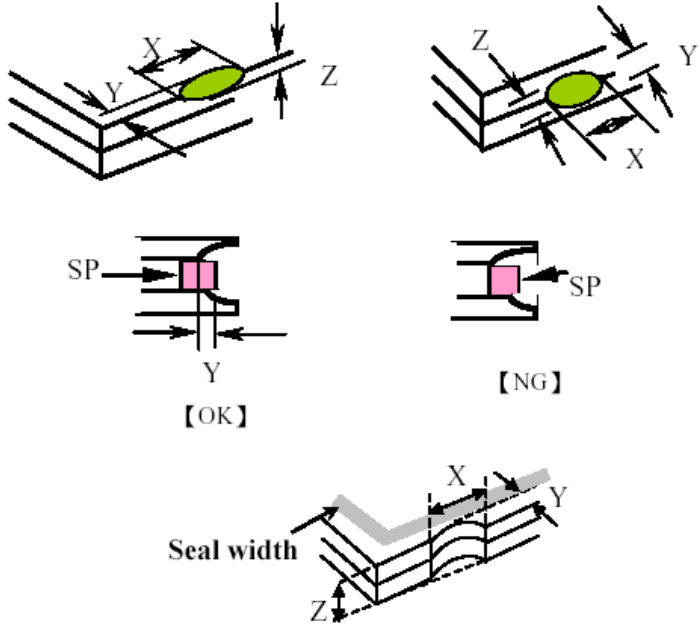
◆Specification For TFT-LCD Module Less Than 3.5" :

(Ver. 02)

NO	Item	Criterion	Level																											
06	<p>Black or white dot、scratch、contamination</p> <p>Round type</p>  <p>$\Phi = (x + y) / 2$</p> <p>Line type</p> 	<p>6.1 Round type (Non-display or display) :</p> <table border="1" data-bbox="576 472 1291 891"> <thead> <tr> <th>Dimension (diameter : Φ)</th> <th>Acceptance (Q'ty)</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.15$</td> <td>Ignore</td> </tr> <tr> <td>$0.15 < \Phi \leq 0.20$</td> <td>2</td> </tr> <tr> <td>$0.20 < \Phi \leq 0.30$</td> <td>2</td> </tr> <tr> <td>$\Phi > 0.30$</td> <td>0</td> </tr> <tr> <td>Total</td> <td>3</td> </tr> </tbody> </table> <p>6.2 Line type(Non-display or display) :</p> <table border="1" data-bbox="550 1041 1316 1391"> <thead> <tr> <th>Length (L)</th> <th>Width (W)</th> <th>Acceptance (Q'ty)</th> </tr> </thead> <tbody> <tr> <td>---</td> <td>$W \leq 0.03$</td> <td>Ignore</td> </tr> <tr> <td>$L \leq 5.0$</td> <td>$0.03 < W \leq 0.05$</td> <td>3</td> </tr> <tr> <td>---</td> <td>$W > 0.05$</td> <td>As round type</td> </tr> <tr> <td colspan="2">Total</td> <td>3</td> </tr> </tbody> </table>	Dimension (diameter : Φ)	Acceptance (Q'ty)	$\Phi \leq 0.15$	Ignore	$0.15 < \Phi \leq 0.20$	2	$0.20 < \Phi \leq 0.30$	2	$\Phi > 0.30$	0	Total	3	Length (L)	Width (W)	Acceptance (Q'ty)	---	$W \leq 0.03$	Ignore	$L \leq 5.0$	$0.03 < W \leq 0.05$	3	---	$W > 0.05$	As round type	Total		3	Minor
Dimension (diameter : Φ)	Acceptance (Q'ty)																													
$\Phi \leq 0.15$	Ignore																													
$0.15 < \Phi \leq 0.20$	2																													
$0.20 < \Phi \leq 0.30$	2																													
$\Phi > 0.30$	0																													
Total	3																													
Length (L)	Width (W)	Acceptance (Q'ty)																												
---	$W \leq 0.03$	Ignore																												
$L \leq 5.0$	$0.03 < W \leq 0.05$	3																												
---	$W > 0.05$	As round type																												
Total		3																												
07	Polarizer Bubble	<table border="1" data-bbox="544 1476 1323 1825"> <thead> <tr> <th>Dimension (diameter : Φ)</th> <th>Acceptance (Q'ty)</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.20$</td> <td>Ignore</td> </tr> <tr> <td>$0.20 < \Phi \leq 0.50$</td> <td>3</td> </tr> <tr> <td>$\Phi > 0.50$</td> <td>0</td> </tr> <tr> <td>Total</td> <td>3</td> </tr> </tbody> </table>	Dimension (diameter : Φ)	Acceptance (Q'ty)	$\Phi \leq 0.20$	Ignore	$0.20 < \Phi \leq 0.50$	3	$\Phi > 0.50$	0	Total	3	Minor																	
Dimension (diameter : Φ)	Acceptance (Q'ty)																													
$\Phi \leq 0.20$	Ignore																													
$0.20 < \Phi \leq 0.50$	3																													
$\Phi > 0.50$	0																													
Total	3																													

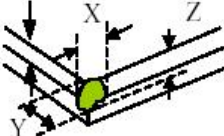
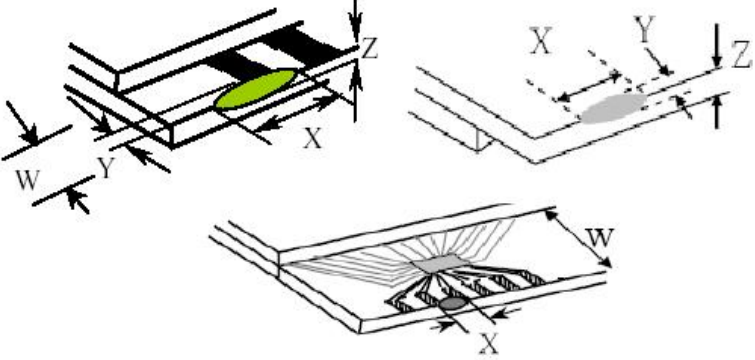
◆Specification For TFT-LCD Module Less Than 3.5" :

(Ver. 02)

NO	Item	Criterion	Level						
08	The crack of glass	<p>Symbols :</p> <p>X : The length of crack Y : The width of crack. Z : The thickness of crack W : terminal length t : The thickness of glass a : LCD side length</p>	Minor						
		<p>8.1 General glass chip :</p> <p>8.1.1 Chip on panel surface and crack between panels:</p>  <table border="1" data-bbox="560 1496 1305 1771"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>$\leq a$</td> <td>Crack can't enter viewing area</td> <td>$\leq 1/2 t$</td> </tr> <tr> <td>$\leq a$</td> <td>Crack can't exceed the half of SP width.</td> <td>$1/2 t < Z \leq 2 t$</td> </tr> </tbody> </table>		X	Y	Z	$\leq a$	Crack can't enter viewing area	$\leq 1/2 t$
X	Y	Z							
$\leq a$	Crack can't enter viewing area	$\leq 1/2 t$							
$\leq a$	Crack can't exceed the half of SP width.	$1/2 t < Z \leq 2 t$							

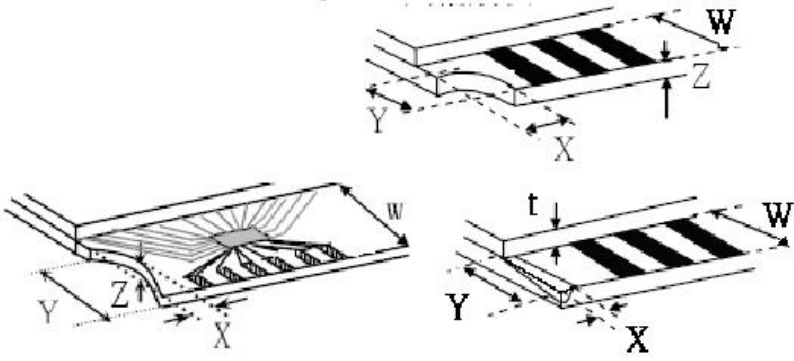
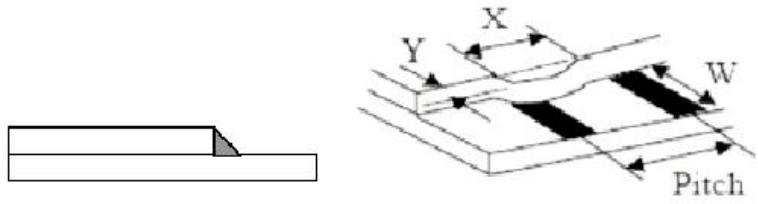
◆Specification For TFT-LCD Module Less Than 3.5" :

(Ver. 02)

NO	Item	Criterion	Level									
08	The crack of glass	<p>Symbols :</p> <p>X : The length of crack Z : The thickness of crack t : The thickness of glass</p> <p>Y : The width of crack. W : terminal length a : LCD side length</p> <hr/> <p>8.1.2 Corner crack :</p>  <table border="1" data-bbox="550 831 1294 1111"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>$\leq 1/5 a$</td> <td>Crack can't enter viewing area</td> <td>$Z \leq 1/2 t$</td> </tr> <tr> <td>$\leq 1/5 a$</td> <td>Crack can't exceed the half of SP width.</td> <td>$1/2 t < Z \leq 2 t$</td> </tr> </tbody> </table>	X	Y	Z	$\leq 1/5 a$	Crack can't enter viewing area	$Z \leq 1/2 t$	$\leq 1/5 a$	Crack can't exceed the half of SP width.	$1/2 t < Z \leq 2 t$	Minor
		X	Y	Z								
$\leq 1/5 a$	Crack can't enter viewing area	$Z \leq 1/2 t$										
$\leq 1/5 a$	Crack can't exceed the half of SP width.	$1/2 t < Z \leq 2 t$										
<p>8.2 Protrusion over terminal :</p> <p>8.2.1 Chip on electrode pad :</p>  <table border="1" data-bbox="584 1673 1302 1839"> <thead> <tr> <th></th> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>Front</td> <td>$\leq a$</td> <td>$\leq 1/2 W$</td> <td>$\leq t$</td> </tr> <tr> <td>Back</td> <td>$\leq a$</td> <td>$\leq W$</td> <td>$\leq 1/2 t$</td> </tr> </tbody> </table>		X	Y	Z	Front	$\leq a$	$\leq 1/2 W$	$\leq t$	Back	$\leq a$	$\leq W$	$\leq 1/2 t$
	X	Y	Z									
Front	$\leq a$	$\leq 1/2 W$	$\leq t$									
Back	$\leq a$	$\leq W$	$\leq 1/2 t$									

◆ Specification For TFT-LCD Module Less Than 3.5" :

(Ver. 02)

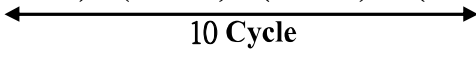
NO	Item	Criterion	Level												
08	The crack of glass	<p>Symbols :</p> <p>X : The length of crack Y : The width of crack. Z : The thickness of crack W : terminal length t : The thickness of glass a : LCD side length</p> <hr/> <p>8.2.2 Non-conductive portion :</p>  <table border="1" data-bbox="635 1048 1216 1191"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>$\leq 1/3 a$</td> <td>$\leq W$</td> <td>$\leq t$</td> </tr> </tbody> </table> <p>⊙ If the chipped area touches the ITO terminal, over 2/3 of the ITO must remain and be inspected according to electrode terminal specifications.</p> <p>8.2.3 Glass remain :</p>  <table border="1" data-bbox="561 1729 1200 1863"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>$\leq a$</td> <td>$\leq 1/3 W$</td> <td>$\leq t$</td> </tr> </tbody> </table>	X	Y	Z	$\leq 1/3 a$	$\leq W$	$\leq t$	X	Y	Z	$\leq a$	$\leq 1/3 W$	$\leq t$	Minor
		X	Y	Z											
$\leq 1/3 a$	$\leq W$	$\leq t$													
X	Y	Z													
$\leq a$	$\leq 1/3 W$	$\leq t$													

◆Specification For TFT-LCD Module Less Than 3, 5" :

(Ver. 02)

NO	Item	Criterion	Level
09	Backlight elements	9. 1 Backlight can't work normally.	Major
		9. 2 Backlight doesn't light or color is wrong.	Major
		9. 3 Illumination source flickers when lit.	Major
10	General appearance	10. 1 Pin type 、 quantity 、 dimension must match type in structure diagram.	Major
		10. 2 No short circuits in components on PCB or FPC .	Major
		10. 3 Parts on PCB or FPC must be the same as on the production characteristic chart .There should be no wrong parts , missing parts or excess parts.	Major
		10. 4 Product packaging must the same as specified on packaging specification sheet.	Minor
		10. 5 The folding and peeled off in polarizer are not acceptable.	Minor
		10. 6 The PCB or FPC between B/L assembled distance(PCB or FPC) is ≤ 1.5 mm.	Minor

4.1 Reliability Test Condition

NO.	TEST ITEM	TEST CONDITION											
1	High Temperature Storage Test	Keep in +80 ±2°C 96 hrs Surrounding temperature, then storage at normal condition 4hrs.											
2	Low Temperature Storage Test	Keep in -30 ±2°C 96 hrs Surrounding temperature, then storage at normal condition 4hrs.											
3	High Temperature / High Humidity Storage Test	Keep in +60°C / 90% R.H duration for 96 hrs Surrounding temperature, then storage at normal condition 4hrs. (Excluding the polarizer & T/P)											
4	ESD Test	Air Discharge: (include mobile phone) Apply 2 KV with 5 times Discharge for each polarity +/-	Contact Discharge: (include mobile phone) Apply 250V with 5 times discharge for each polarity +/-										
		1. Temperature ambience:15°C ~35°C 2. Humidity relative:30% ~60% 3. Energy Storage Capacitance(Cs+Cd):150pF±10% 4. Discharge Resistance(Rd):330Ω±10% 5. Discharge, mode of operation: Single Discharge (time between successive discharges at least 1 s) (Tolerance if the output voltage indication: ±5%)											
5	Temperature Cycling Storage Test	-20°C → +25°C → +70°C → +25°C (30mins) (30mins) (30mins) (30mins)  Surrounding temperature, then storage at normal condition 4hrs.											
6	Vibration Test (Packaged)	1. Sine wave 10~55 Hz frequency (1 min) 2. The amplitude of vibration :1.5 mm 3. Each direction (X、Y、Z) duration for 2 Hrs											
7	Drop Test (Packaged)	<table border="1"> <thead> <tr> <th>Packing Weight (Kg)</th> <th>Drop Height (cm)</th> </tr> </thead> <tbody> <tr> <td>0 ~ 45.4</td> <td>122</td> </tr> <tr> <td>45.4 ~ 90.8</td> <td>76</td> </tr> <tr> <td>90.8 ~ 454</td> <td>61</td> </tr> <tr> <td>Over 454</td> <td>46</td> </tr> </tbody> </table>		Packing Weight (Kg)	Drop Height (cm)	0 ~ 45.4	122	45.4 ~ 90.8	76	90.8 ~ 454	61	Over 454	46
		Packing Weight (Kg)	Drop Height (cm)										
0 ~ 45.4	122												
45.4 ~ 90.8	76												
90.8 ~ 454	61												
Over 454	46												
		Drop direction :※ 1 corner / 3 edges / 6 sides each 1times											

5. PRECAUTION RELATING PRODUCT HANDLING

5.1 SAFETY

- 5.1.1 If the LCD panel breaks , be careful not to get the liquid crystal to touch your skin.
- 5.1.2 If the liquid crystal touches your skin or clothes , please wash it off immediately by using soap and water.

5.2 HANDLING

- 5.2.1 Avoid any strong mechanical shock which can break the glass.
- 5.2.2 Avoid static electricity which can damage the CMOS LSI—When working with the module , be sure to ground your body and any electrical equipment you may be using.
- 5.2.3 Do not remove the panel or frame from the module.
- 5.2.4 The polarizing plate of the display is very fragile. So , please handle it very carefully, do not touch , push or rub the exposed polarizing with anything harder than an HB pencil lead (glass , tweezers , etc.)
- 5.2.5 Do not wipe the polarizing plate with a dry cloth , as it may easily scratch the surface of plate.
- 5.2.6 Do not touch the display area with bare hands , this will stain the display area.
- 5.2.7 Do not use ketonics solvent & aromatic solvent. Use with a soft cloth soaked with a cleaning naphtha solvent.
- 5.2.8 To control temperature and time of soldering is $320 \pm 10^{\circ}\text{C}$ and 3-5 sec.
- 5.2.9 To avoid liquid (include organic solvent) stained on LCM

5.3 STORAGE

- 5.3.1 Store the panel or module in a dark place where the temperature is $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ and the humidity is below 65% RH.
- 5.3.2 Do not place the module near organics solvents or corrosive gases.
- 5.3.3 Do not crush , shake , or jolt the module.

Packing

PARAMETER	Specification	Unit
Outside box	390(L) x 350(W) x 480(H)	mm
Inside pearl wool box	330(L)x185(W)x110(H)	mm
Product quantity of Inside box	64	pcs
Total product quantity	64*8=512	pcs
Total weight	13.5 ± 0.5	Kg

