



## SPECIFICATIONS

CUSTOMER	:	PTC
SAMPLE CODE	:	SH128800T004-ZZC06
MASS PRODUCTION CODE	:	PH128800T004-ZZC06
SAMPLE VERSION	:	01
SPECIFICATIONS EDITION	:	002
DRAWING NO. (Ver.)	:	JLMD-PH128800T004-ZZC06_001
PACKAGING NO. (Ver.)	:	-

**Customer Approved**

**Date:**

Approved	Checked	Designer
閔偉	劉進	陳璐

- Preliminary specification for design input
- Specification for sample approval

### POWERTIP TECH. CORP.

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Appendix : 1. LCM Drawing.

## 1. SPECIFICATIONS

### 1.1 Features

Item	Standard Value
Screen size(Inch)	10.1(Diagonal)
Driver element	Normally Black
Resolution	1280* (R、G、B) * 800 Dots
Display mode	Transmissive, ANTI-GLARE
Color	16.7M
Weight	- g
Interface	LVDS
ROHS	THIS PRODUCT CONFORMS THE ROHS OF PTC Detail information please refer web site : <a href="http://www.powertip.com.tw/news.php?area_id_view=1085560481/">http://www.powertip.com.tw/news.php?area_id_view=1085560481/</a>

### 1.2 Mechanical Specifications

Item	Standard Value	Unit
Outline Dimension	254.96(W) * 173.6 (L) * 10.0 (H)Max	mm

#### LCD panel

Item	Standard Value	Unit
Active Area	216.96 (W) * 135.60 (L)	mm

Note : For detailed information please refer to LCM drawing.

### 1.3 Absolute Maximum Ratings

Item	Symbol	Condition	Min.	Max.	Unit
Power Supply Voltage	VDD	-	-0.3	+4.0	V
Power Supply Voltage for LED Backlight	VLED	-	-0.3	+50	V
Operating Temperature	T <sub>OP</sub>	-	-30	+80	°C
Storage Temperature	T <sub>ST</sub>	-	-30	+80	°C
Storage Humidity	H <sub>D</sub>	T <sub>a</sub> < 60 °C	-	90	%RH

### 1.4 DC Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Power Supply Voltage for LCD	VDD	-	3.0	3.3	3.6	V
Power Supply Voltage for LED Backlight	VLED	-	8.0	12.0	15.0	V
Power Supply Current for LCD	IDD*1	-	(230)	(280)	mA	VDD=3.3V
Power Supply Current for LED Backlight	IVLED	-	(1.2)	(1.3)	A	VLED=8V
EN Signal Voltage	V <sub>IH</sub>	LED_EN	1.65	-	5.25	V
	V <sub>IL</sub>		GND	-	0.4	V
PWM Signal Voltage	V <sub>IH</sub>	LED_PWM	0.8V <sub>EN</sub>	-	5.25	V
	V <sub>IL</sub>		GND	-	0.2V <sub>EN</sub>	V
PWM Frequency	F <sub>PWM</sub>	-	100	-	20000	Hz

Note1: Maximum current display.

## 1.5 Optical Characteristics

### TFT LCD Panel

Ta=25°C

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	-
Response time	Tr + Tf	-	-	25	50	ms	Note2
Viewing angle	Top	ΘY+	-	85	-	Deg.	Note4
	Bottom	ΘY-	-	85	-		
	Left	ΘX-	-	85	-		
	Right	ΘX+	-	85	-		
Contrast ratio	CR		600	800	-	-	Note3
Color of CIE Coordinate (With B/L and TP)	White	X	(0.28)	(0.33)	(0.38)	-	Note1
		Y	(0.31)	(0.36)	(0.41)		
	Red	X	(0.55)	(0.60)	(0.65)		
		Y	(0.29)	(0.34)	(0.39)		
	Green	X	(0.28)	(0.33)	(0.38)		
		Y	(0.53)	(0.58)	(0.63)		
	Blue	X	(0.10)	(0.15)	(0.20)		
		Y	(0.13)	(0.18)	(0.23)		
Average Brightness Pattern=white display (With B/L and TP)	IV	IF= 200mA	(700)	(800)	-	cd/m <sup>2</sup>	Note1
Luminance uniformity	YU	-	70	-	-	%	Note1

Note1:

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

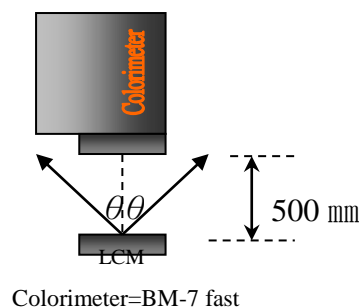
2 : Measurement Condition for Optical Characteristics:

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.

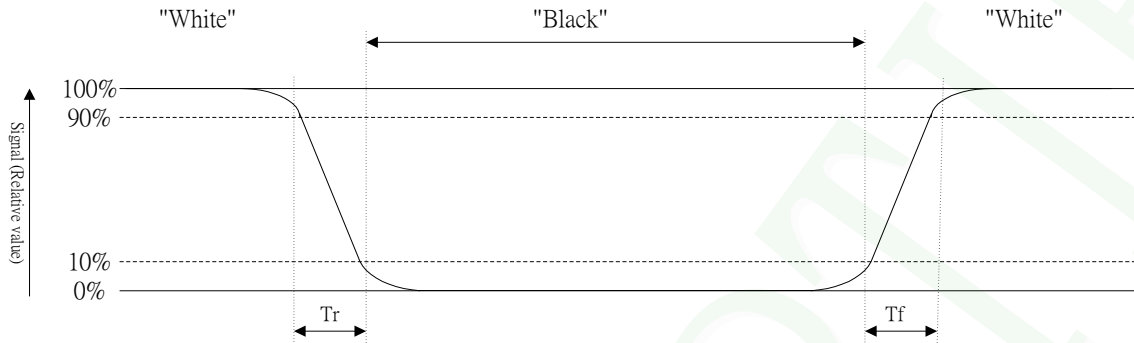
d : The uncertainty of the C.I.E coordinate measurement ± 0.01 , Average Brightness ± 4%



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:



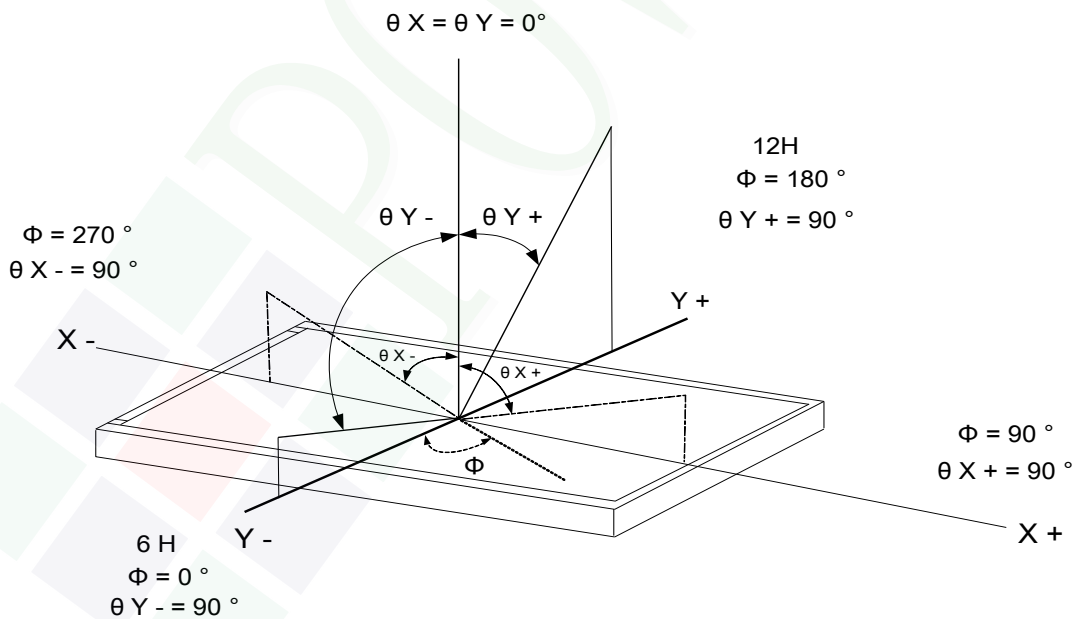
Note3: Definition of contrast ratio:

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 Characteristics

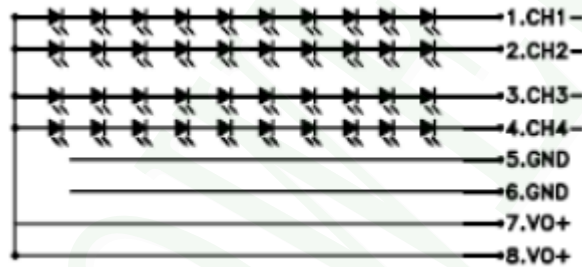
### Maximum Ratings

Item	Symbol	Conditions	Min.	Max.	Unit
Forward Current	IF	Ta =25°C	-	360	mA
Reverse Voltage	VR	Ta =25°C	-	5.0	V
Power Dissipation	PD	Ta =25°C	-	12240	mW

### Electrical / Optical Characteristics

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Forward Voltage	VF	IF=200mA	26	28	30	V
Color	White					

### Internal Circuit Diagram



### Other Description

Item	Conditions	Description
Life Time	Ta =25°C IF= 200mA	70000 hrs



## 1.7 Touch Panel Characteristics

### Features

Item	Standard Value
Touch Panel Size	10.1"
Touch type	Projective capacitive touch panel
Input Method	Finger / 5 Points touch
Output Interface	USB
IC	mxT1066T

### Mechanical Specifications

Item	Standard Value	Unit
Outline Dimension	254.96(W) * 173.6(L)	mm
Viewing Area	217.96 (W) * 136.60 (L)	mm

### Absolute Maximum Ratings

Item	Symbol	Condition	Min.	Max.	Unit
Supply voltage	VDD_5.0	-	-0.3	+6.0	V
Operating Temperature	T <sub>OP</sub>	-	-30	+80	°C
Storage Temperature	T <sub>ST</sub>	-	-30	+80	°C

### DC Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Power Supply Voltage for USB	VBUS	-	-	5.0	-	V

### Optical Characteristics

Item	Standard Value	Unit
Total light transmittance	85% or more	-
Hardness	≥7H	

### Touch Panel IC Read/Write description & Register Mapping

Reference :Atmel Touch Driver Porting Reference Guide.

## 2. MODULE STRUCTURE

### 2.1 Counter Drawing

#### 2.1.1 LCM Mechanical Diagram

\* See Appendix

## 2.2 Interface Pin Description

Pin No.	Symbol	Description
1	NC	No Connection.
2	VDD	Power Supply.
3	VDD	Power Supply.
4	NC	No Connection.
5	NC	No Connection.
6	NC	No Connection.
7	NC	No Connection.
8	RXIN0-	-LVDS Differential Data Input.
9	RXIN0+	+LVDS Differential Data Input.
10	GND	Ground.
11	RXIN1-	-LVDS Differential Data Input.
12	RXIN1+	+LVDS Differential Data Input.
13	GND	Ground.
14	RXIN2-	-LVDS Differential Data Input.
15	RXIN2+	+LVDS Differential Data Input.
16	GND	Ground.
17	RXCLK-	-LVDS Differential Clock Input.
18	RXCLK+	+LVDS Differential Clock Input.
19	GND	Ground.
20	RXIN3-	-LVDS Differential Data Input.
21	RXIN3+	+LVDS Differential Data Input.
22	GND	Ground.
23	LED_GND	Ground for LED Driving
24	LED_GND	Ground for LED Driving
25	LED_GND	Ground for LED Driving
26	NC	No Connection.
27	LED_PWM	LED Backlight PWM control signal for dimming.

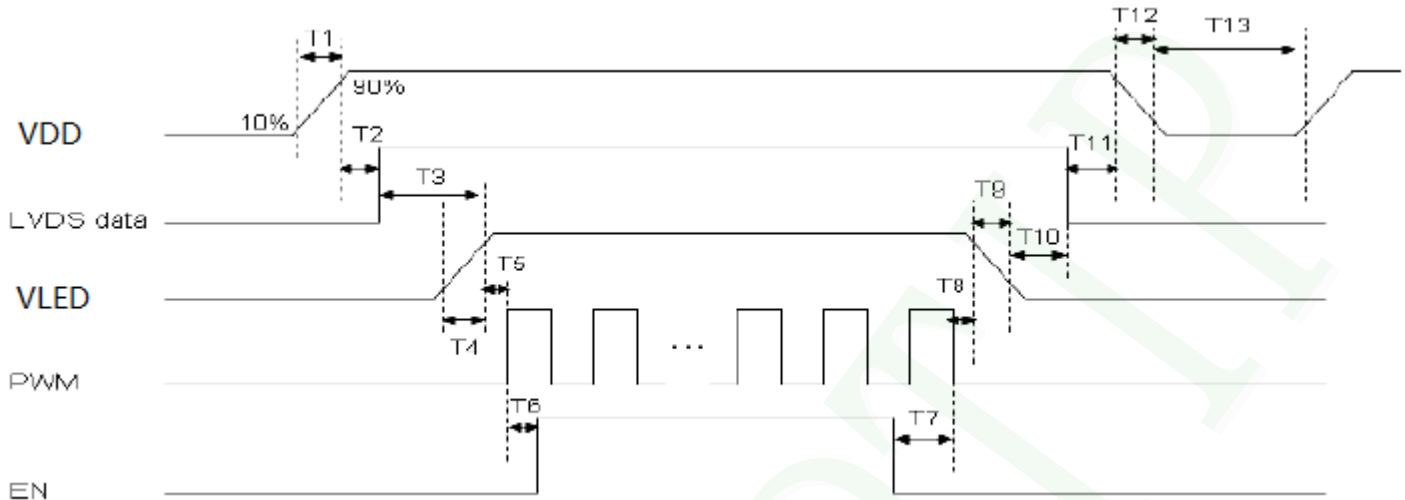
Pin No.	Symbol	Description
28	LED_EN	LED Backlight Enable Input.
29	NC	No Connection.
30	NC	No Connection.
31	VLED	Power Supply for LED Backlight driving.
32	VLED	Power Supply for LED Backlight driving.
33	VLED	Power Supply for LED Backlight driving.
34	NC	No Connection.
35	BIST	No Connection.
36	NC	No Connection.
37	NC	No Connection.
38	NC	No Connection.
39	NC	No Connection.
40	NC	No Connection.

**CN1(CTP USB Interface):**

Pin No.	Symbol	Description
1	VDD	Power Supply.(+5.0V)
2	D-	D- Differential Data Input.
3	D+	D+ Differential Data Input.
4	NC	No Connection.
5	GND	Ground.
6	NC	No Connection.

## 2.3 Timing Characteristics

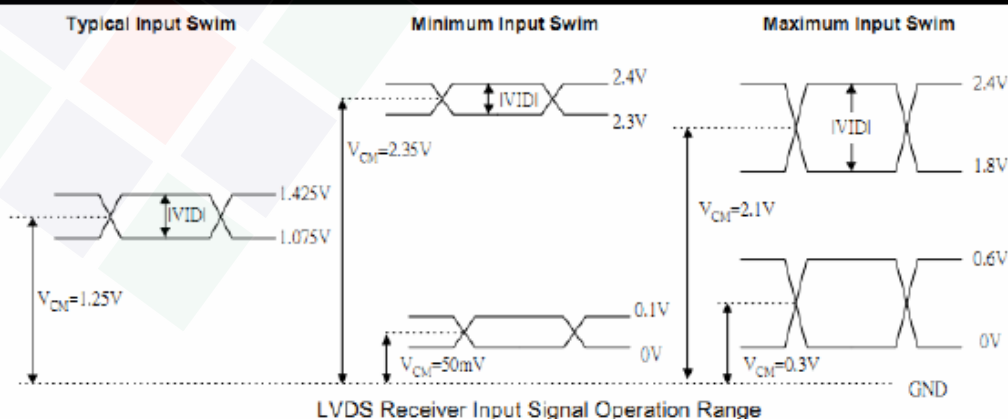
### 2.3.1 Power On and Reset Timing



Parameter	Symbol	Unit	Min	Typ.	Max
VDD Rise Time	T1	ms	0.5	--	10
VDD Good to Signal Valid	T2	ms	30	--	90
Signal Valid to Backlight On	T3	ms	200	--	--
Backlight Power On Time	T4	ms	0.5	--	--
Backlight VDD Good to System PWM On	T5	ms	10	--	--
System PWM ON to Backlight Enable ON	T6	ms	10	--	--
Backlight Enable Off to System PWM Off	T7	ms	0	--	--
System PWM Off to B/L Power Disable	T8	ms	10	--	--
Backlight Power Off Time	T9	ms	0.5	10	30
Backlight Off to Signal Disable	T10	ms	200	--	--
Signal Disable to Power Down	T11	ms	0	--	50
VDD Fall Time	T12	ms	0.5	10	30
Power Off	T13	ms	500	--	--

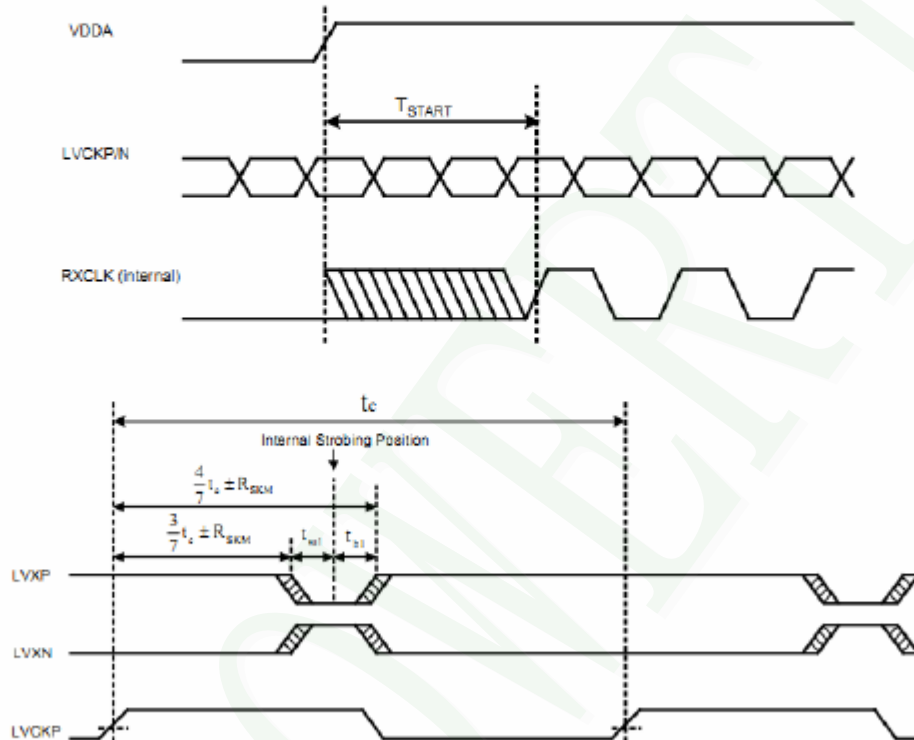
### 2.3.2 LVDS Signal Timing Characteristics DC Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max	Unit
$V_{TH}$	Differential Input High Threshold	$V_{CM} = +1.2V$	-	-	100	mV
$V_{TL}$	Differential Input Low Threshold		-100	-	-	mV
$I_{CC}$	Average Supply Current		-	TBD	-	mA



## AC Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max	Unit
F <sub>OP</sub>	Input Operating Frequency range	RX_HF=0	25	-	100	MHz
		RX_HF=1	100	-	170	MHz
R <sub>SKM</sub>	Receiver Skew Margin	85MHz,  VID =400mV, V <sub>CM</sub> =1.2V	450	-	-	pS
		150MHz,  VID =400mV, V <sub>CM</sub> =1.2V	267	-	-	pS
T <sub>STRAT</sub>	Receiver startup time (after a valid LVDS clock is applied)		-	-	10	mS



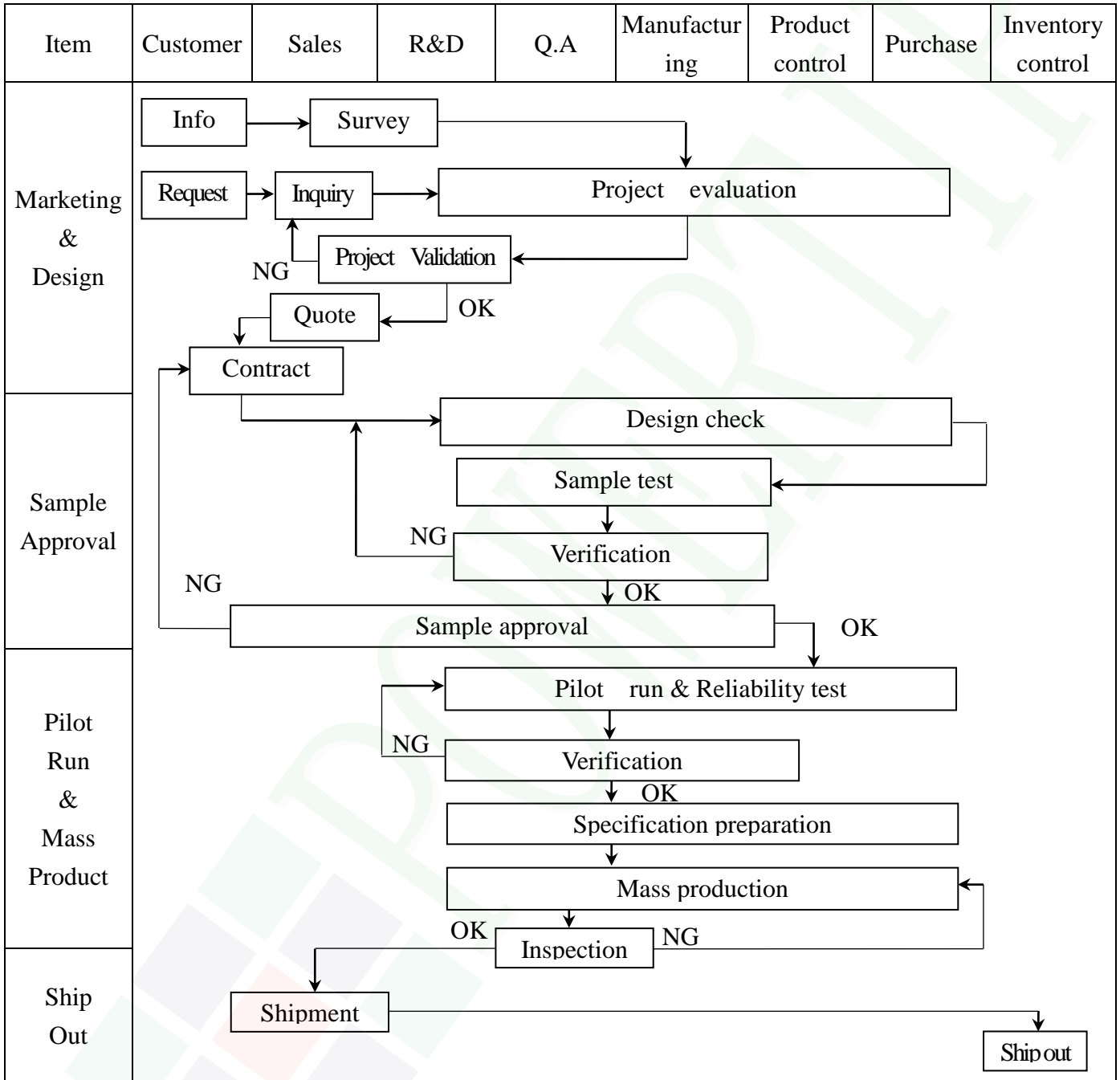
NOTE: LVCK is advanced or delayed with respect to data until errors are observed at the receiver outputs. The advance or delay is then reduced until there are no data errors observed. The magnitude of the advance or delay is RSKM.

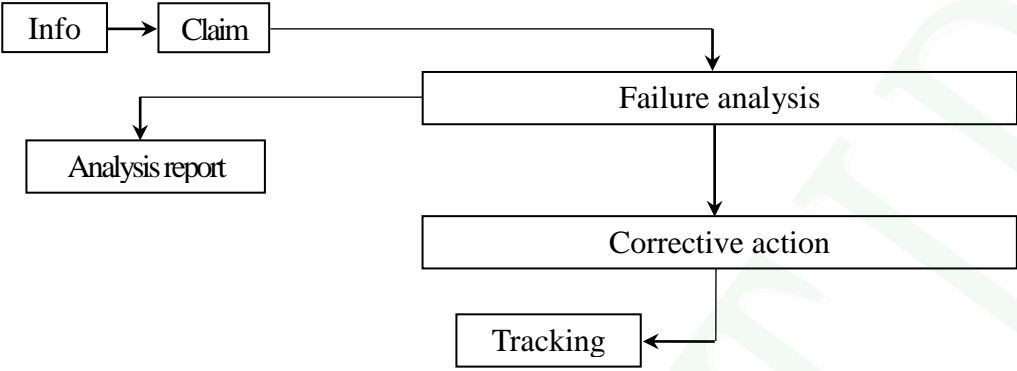
### 2.3.3 Interface Timings

Parameter	Symbol	Unit	Min.	Typ.	Max.
Frame Rate	--	Hz	-	60	-
Frame Period	t <sub>V</sub>	line	(815)	(823)	(1023)
Vertical Display Time	t <sub>VD</sub>	line	800		
Vertical Blanking Time	t <sub>VW</sub> +t <sub>VBP</sub> +t <sub>VFP</sub>	line	(15)	(23)	(33)
1 Line Scanning Time	t <sub>H</sub>	clock	(1410)	(1440)	(1470)
Horizontal Display Time	t <sub>HD</sub>	clock	1280		
Horizontal Blanking Time	t <sub>HW</sub> +t <sub>HBP</sub> +t <sub>HFP</sub>	clock	(60)	(160)	(190)
Clock Rate	1/T <sub>C</sub>	MHz	(68.9)	(71.1)	(73.4)

### 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] --&gt; Claim[Claim]     Claim --&gt; Failure[Failure analysis]     Failure --&gt; Report[Analysis report]     Failure --&gt; Action[Corrective action]     Action --&gt; Tracking[Tracking]           </pre>							
Q.A Activity	1. ISO 9001 Maintenance Activities 3. Equipment calibration 5. Standardization Management				2. Process improvement proposal 4. Education And Training Activities			



### 3.2. Inspection Specification

◆Scope : The document shall be applied to TFT-LCD Module for 3.5" ~15" (Ver.B01).

◆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

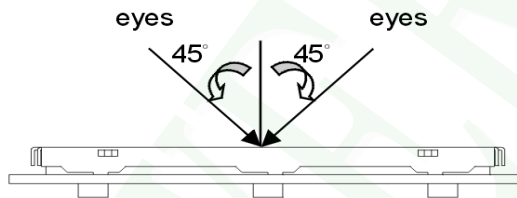
◆OUT Going Defect Level : Sampling.

◆Standard of the product appearance test :

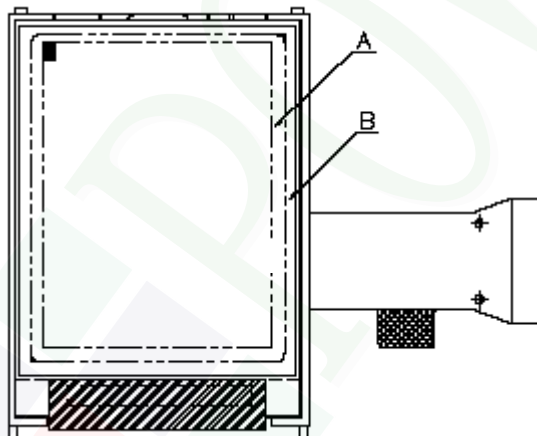
a. Manner of appearance test :

(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

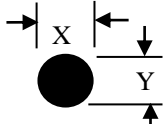
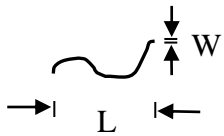
**B** area : Outside of viewing area

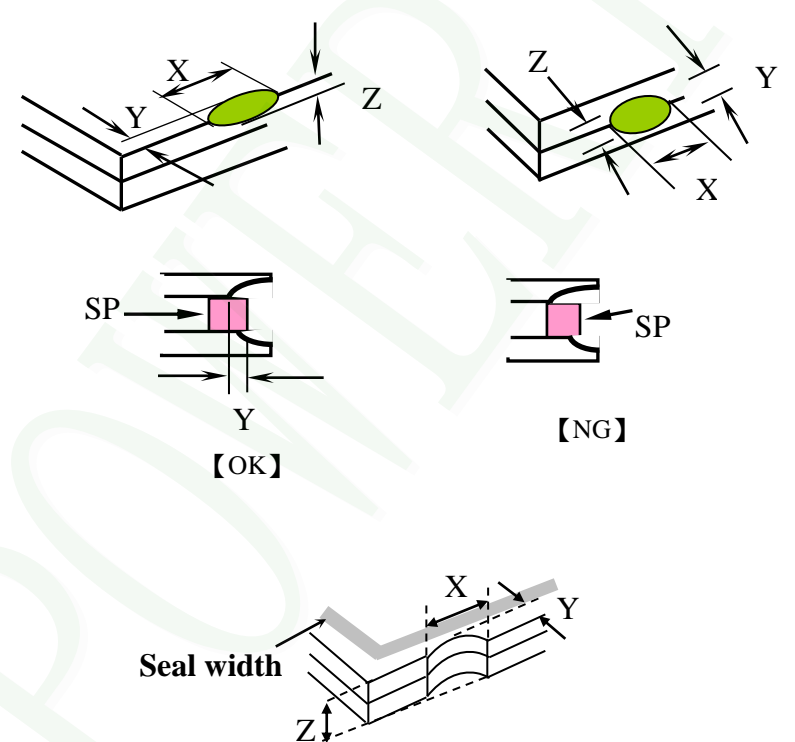
(4). Standard of inspection : (Unit : mm)

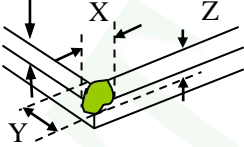
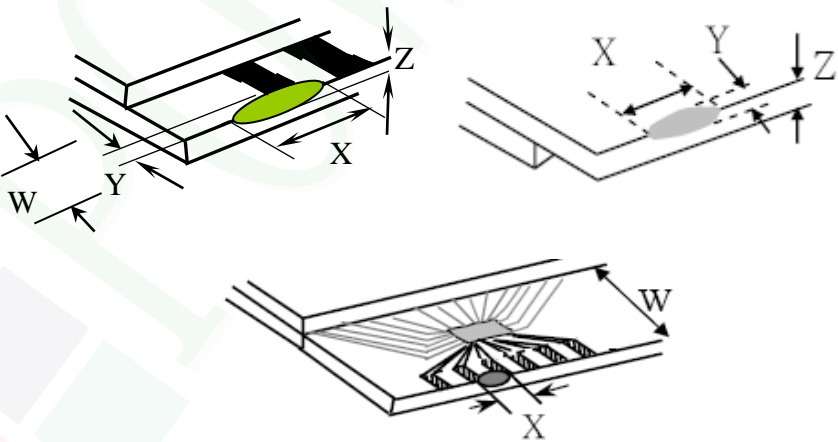
◆Specification For TFT-LCD Module 3.5" ~15" :

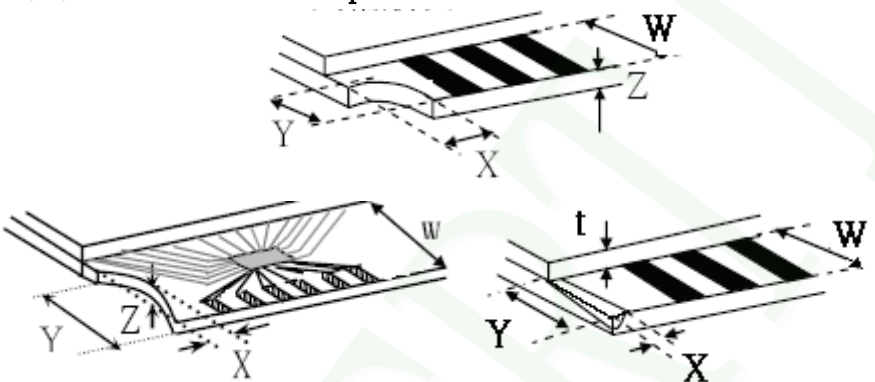
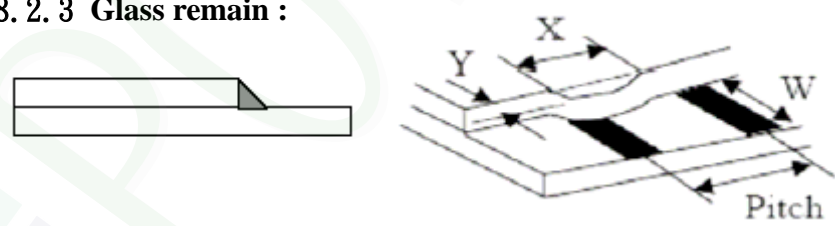

(Ver.B01)

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												
		4. 6 Mura can not be seen through 5% ND filter. (Mura : Under the normal examination angle of view, the picture has the non-uniform phenomenon.)	Minor												
05	Dot defect (Bright dot 、 Dark dot)  On -display	<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;"><math>\leq 4</math></td> </tr> <tr> <td style="text-align: center;">Dark Dot</td> <td style="text-align: center;"><math>\leq 5</math></td> </tr> <tr> <td style="text-align: center;">Joint Dot</td> <td style="text-align: center;"><math>\leq 3</math></td> </tr> <tr> <td style="text-align: center;">Total</td> <td style="text-align: center;"><math>\leq 7</math></td> </tr> </tbody> </table>	Item		Acceptance (Q'ty)	Dot Defect	Bright Dot	$\leq 4$	Dark Dot	$\leq 5$	Joint Dot	$\leq 3$	Total	$\leq 7$	Minor
		Item		Acceptance (Q'ty)											
Dot Defect	Bright Dot	$\leq 4$													
	Dark Dot	$\leq 5$													
	Joint Dot	$\leq 3$													
	Total	$\leq 7$													
<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 <math>&gt; 1/2</math> dot.</p> <p>5. 3 The distance between two dot defect <math>\geq 5</math> mm.</p> <p>5. 4 Bright dot that can not be seen through 5% ND filter.</p>															

NO	Item	Criterion	Level																																																													
06	<p>Black or white dot、scratch、contamination</p> <p>Round type</p>  <p><math>\Phi = (x + y) / 2</math></p> <p>Line type</p> 	<p>6.1 Round type ( Non-display or display ) :</p> <table border="1" data-bbox="512 434 1289 712"> <thead> <tr> <th rowspan="2">Dimension (diameter : <math>\Phi</math>)</th> <th colspan="2">Acceptance (Q'ty)</th> </tr> <tr> <th>A area</th> <th>B area</th> </tr> </thead> <tbody> <tr> <td><math>\Phi \leq 0.25</math></td> <td colspan="2">Ignore</td> </tr> <tr> <td><math>0.25 &lt; \Phi \leq 0.50</math></td> <td>5</td> <td rowspan="3">Ignore</td> </tr> <tr> <td><math>\Phi &gt; 0.50</math></td> <td>0</td> </tr> <tr> <td><b>Total</b></td> <td>5</td> </tr> </tbody> </table> <p>6.2 Line type( Non-display or display ) :</p> <table border="1" data-bbox="434 831 1366 1368"> <thead> <tr> <th rowspan="2">module size</th> <th rowspan="2">Length (L)</th> <th rowspan="2">Width (W)</th> <th colspan="2">Acceptance (Q'ty)</th> </tr> <tr> <th>A area</th> <th>B area</th> </tr> </thead> <tbody> <tr> <td rowspan="4">3.5" to less 9"</td> <td>---</td> <td><math>W \leq 0.03</math></td> <td colspan="2">Ignore</td> </tr> <tr> <td><math>L \leq 10.0</math></td> <td><math>0.03 &lt; W \leq 0.05</math></td> <td>4</td> <td rowspan="3">Ignore</td> </tr> <tr> <td><math>L \leq 5.0</math></td> <td><math>0.05 &lt; W \leq 0.10</math></td> <td>2</td> </tr> <tr> <td>---</td> <td><math>W &gt; 0.10</math></td> <td colspan="2">As round type</td> </tr> <tr> <td colspan="3"><b>Total</b></td> <td colspan="2">5</td> </tr> <tr> <td rowspan="4">9" to 15"</td> <td>---</td> <td><math>W \leq 0.05</math></td> <td colspan="2">Ignore</td> </tr> <tr> <td><math>L \leq 10.0</math></td> <td><math>0.05 &lt; W \leq 0.10</math></td> <td>5</td> <td rowspan="3">Ignore</td> </tr> <tr> <td>---</td> <td><math>W &gt; 0.10</math></td> <td colspan="2">As round type</td> </tr> <tr> <td colspan="3"><b>Total</b></td> <td colspan="2">5</td> </tr> </tbody> </table>	Dimension (diameter : $\Phi$ )	Acceptance (Q'ty)		A area	B area	$\Phi \leq 0.25$	Ignore		$0.25 < \Phi \leq 0.50$	5	Ignore	$\Phi > 0.50$	0	<b>Total</b>	5	module size	Length (L)	Width (W)	Acceptance (Q'ty)		A area	B area	3.5" to less 9"	---	$W \leq 0.03$	Ignore		$L \leq 10.0$	$0.03 < W \leq 0.05$	4	Ignore	$L \leq 5.0$	$0.05 < W \leq 0.10$	2	---	$W > 0.10$	As round type		<b>Total</b>			5		9" to 15"	---	$W \leq 0.05$	Ignore		$L \leq 10.0$	$0.05 < W \leq 0.10$	5	Ignore	---	$W > 0.10$	As round type		<b>Total</b>			5		Minor
Dimension (diameter : $\Phi$ )	Acceptance (Q'ty)																																																															
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<b>Total</b>	5																																																															
module size	Length (L)	Width (W)	Acceptance (Q'ty)																																																													
			A area	B area																																																												
3.5" to less 9"	---	$W \leq 0.03$	Ignore																																																													
	$L \leq 10.0$	$0.03 < W \leq 0.05$	4	Ignore																																																												
	$L \leq 5.0$	$0.05 < W \leq 0.10$	2																																																													
	---	$W > 0.10$	As round type																																																													
<b>Total</b>			5																																																													
9" to 15"	---	$W \leq 0.05$	Ignore																																																													
	$L \leq 10.0$	$0.05 < W \leq 0.10$	5	Ignore																																																												
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	<b>Total</b>				5																																																											
07	Polarizer Bubble	<table border="1" data-bbox="478 1512 1323 1933"> <thead> <tr> <th rowspan="2">Dimension (diameter : <math>\Phi</math>)</th> <th colspan="2">Acceptance (Q'ty)</th> </tr> <tr> <th>A area</th> <th>B area</th> </tr> </thead> <tbody> <tr> <td><math>\Phi \leq 0.25</math></td> <td colspan="2">Ignore</td> </tr> <tr> <td><math>0.25 &lt; \Phi \leq 0.50</math></td> <td>4</td> <td rowspan="3">Ignore</td> </tr> <tr> <td><math>0.50 &lt; \Phi \leq 0.80</math></td> <td>1</td> </tr> <tr> <td><math>\Phi &gt; 0.80</math></td> <td>0</td> </tr> <tr> <td><b>Total</b></td> <td colspan="2">5</td> </tr> </tbody> </table>	Dimension (diameter : $\Phi$ )	Acceptance (Q'ty)		A area	B area	$\Phi \leq 0.25$	Ignore		$0.25 < \Phi \leq 0.50$	4	Ignore	$0.50 < \Phi \leq 0.80$	1	$\Phi > 0.80$	0	<b>Total</b>	5		Minor																																											
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NO	Item	Criterion	Level						
08	The crack of glass	<p><b>Symbols :</b></p> <p><b>X :</b> The length of crack  <b>Z :</b> The thickness of crack  <b>t :</b> The thickness of glass</p> <p><b>Y :</b> The width of crack.  <b>W :</b> terminal length  <b>a :</b> 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="539 1590 1353 1881"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td><math>\leq a</math></td> <td>Crack can't enter viewing area</td> <td><math>\leq 1/2 t</math></td> </tr> <tr> <td><math>\leq a</math></td> <td>Crack can't exceed the half of SP width.</td> <td><math>1/2 t &lt; Z \leq 2 t</math></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	$\leq 1/2 t$							
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		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="560 1711 1347 1883"> <thead> <tr> <th></th> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>Front</td> <td><math>\leq a</math></td> <td><math>\leq 1/2 W</math></td> <td><math>\leq t</math></td> </tr> <tr> <td>Back</td> <td><math>\leq a</math></td> <td><math>\leq W</math></td> <td><math>\leq 1/2 t</math></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										
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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 3.5" ~15" :

(Ver.B01)

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 $\leq 1.5$ mm.	Minor

## 4. RELIABILITY TEST

### 4.1 Reliability Test Condition

(Ver.A01)

NO.	TEST ITEM	TEST CONDITION	
1	High Temperature Storage Test	Keep in $80^{\circ}\text{C} \pm 2^{\circ}\text{C}$ 240 hrs Surrounding temperature, then storage at normal condition 4hrs.	
2	High Temperature Operating Test	Keep in $80^{\circ}\text{C} \pm 2^{\circ}\text{C}$ 240 hrs Surrounding temperature, then storage at normal condition 4hrs.	
3	Low Temperature Storage Test	Keep in $-30^{\circ}\text{C} \pm 2^{\circ}\text{C}$ 240 hrs Surrounding temperature, then storage at normal condition 4hrs.	
4	Low Temperature Operating Test	Keep in $-30^{\circ}\text{C} \pm 2^{\circ}\text{C}$ 240 hrs Surrounding temperature, then storage at normal condition 4hrs.	
5	High Temperature / High Humidity Storage Test	Keep in $+60^{\circ}\text{C}$ / 90% R.H duration for 240 hrs Surrounding temperature, then storage at normal condition 4hrs. (Excluding the polarizer)	
6	High Temperature / High Humidity Operating Test	Keep in $+60^{\circ}\text{C}$ / 90% R.H duration for 240 hrs Surrounding temperature, then storage at normal condition 4hrs. (Excluding the polarizer)	
7	Temperature Cycling Storage Test	$  \begin{array}{ccccccc}  & -30^{\circ}\text{C} & \rightarrow & +25^{\circ}\text{C} & \rightarrow & +80^{\circ}\text{C} & \rightarrow & +25^{\circ}\text{C} \\  & (30\text{mins}) & & (5\text{mins}) & & (30\text{mins}) & & (5\text{mins}) \\  & \longleftarrow & & \longleftarrow & & \longleftarrow & & \longleftarrow \\  & & & & & & & 25 \text{ Cycle}  \end{array}  $ Surrounding temperature, then storage at normal condition 4hrs.	
8	Temperature Cycling Operating Test	$  \begin{array}{ccccccc}  & -30^{\circ}\text{C} & \rightarrow & +25^{\circ}\text{C} & \rightarrow & +80^{\circ}\text{C} & \rightarrow & +25^{\circ}\text{C} \\  & (30\text{mins}) & & (5\text{mins}) & & (30\text{mins}) & & (5\text{mins}) \\  & \longleftarrow & & \longleftarrow & & \longleftarrow & & \longleftarrow \\  & & & & & & & 25 \text{ Cycle}  \end{array}  $ Surrounding temperature, then storage at normal condition 4hrs.	
9	ESD Test	<b>Air Discharge:</b> Apply 2 KV with 5 times Discharge for each polarity +/-	<b>Contact Discharge:</b> Apply 250 V with 5 times discharge for each polarity +/-
		<ol style="list-style-type: none"> <li>Temperature ambience : <math>15^{\circ}\text{C} \sim 35^{\circ}\text{C}</math></li> <li>Humidity relative : 30% ~ 60%</li> <li>Energy Storage Capacitance(<math>C_s+C_d</math>) : 150pF<math>\pm</math> 10%</li> <li>Discharge Resistance(<math>R_d</math>) : <math>330\Omega \pm 10\%</math></li> <li>Discharge, mode of operation :</li> </ol> Single Discharge (time between successive discharges at least 1 sec) (Tolerance if the output voltage indication : $\pm 5\%$ )	
10	Vibration Test (Packaged)	<ol style="list-style-type: none"> <li>Sine wave 10 ~ 55 Hz frequency (1 min/sweep)</li> <li>The amplitude of vibration : 1.5 mm</li> <li>Each direction (X、Y、Z) duration for 2 Hrs</li> </ol>	



11	<b>Drop Test (Packaged)</b>	<b>Packing Weight (Kg)</b>	<b>Drop Height (cm)</b>
		0 ~ 45.4	122
		45.4 ~ 90.8	76
		90.8 ~ 454	61
		Over 454	46
<b>Drop Direction : ※1 corner / 3 edges / 6 sides each 1time</b>			

## **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.

### **5.4 TERMS OF WARRANTY**

- 5.4.1 Applicable warrant period  
The period is within thirteen months since the date of shipping out under normal using and storage conditions.
- 5.4.2 Unaccepted responsibility  
This product has been manufactured to your company's specification as a part for use in your company's general electronic products. It is guaranteed to perform according to delivery specifications. For any other use apart from general electronic equipment , we cannot take responsibility if the product is used in nuclear power control equipment , aerospace equipment , fire and security systems or any other applications in which there is a direct risk to human life and where extremely high levels of reliability are required.



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