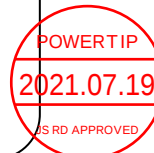


SPECIFICATIONS

CUSTOMER	:	CIT024
SAMPLE CODE	:	SH176220T062-LAB05
MASS PRODUCTION CODE	:	PH176220T062-LAB05
SAMPLE VERSION	:	01
SPECIFICATIONS EDITION	:	002
DRAWING NO. (Ver.)	:	JLMD-PH176220T062-LAB05_001
PACKAGING NO. (Ver.)	:	JPKG-PH176220T062-LAB05_001

Customer Approved

Date:



Approved	Checked	Designer
劉進	劉進	陳璐

- ☐ Preliminary specification for design input
☒ Specification for sample approval

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History of Version

[illegible]

Total: 33 Page

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 - 2. LCM Packaging

1. SPECIFICATIONS

1.1 Features

Main LCD Panel

Item	Standard Value
Display Type	176 * (RGB) * 220 Dots
LCD Type	Color TFT , Positive/Nomal White, Transmissive type
Screen size(inch)	2.0"(Diagonal)
Viewing Direction	12 O'clock
Color configuration	RGB vertical Strip
Interface	SPI 4 interface
Other(controller/driver IC)	ST7775R
ROHS	THIS PRODUCT CONFORMS THE ROHS OF PTC Detail information please refer web site : http://www.powertip.com.tw/news.php?area_id_view=1085560481/

1.2 Mechanical Specifications

Item	Standard Value	Unit
Outline Dimension	41.42(W) x 51.6 (L) x 4.7(H)	mm

LCD panel& Touch Panel

Item	Standard Value	Unit
Viewing Area (TP)	33.02 (W) * 41.2 (L)	mm
Active Area (TP)	32.48 (W) * 40.4 (L)	mm
Active Area (LCD)	31.68 (W) * 39.6 (L)	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	VDD	-	-0.3	+4.6	V
	VDDI	-	-0.3	+4.6	V
	VGH-VGL	-	-0.3	+30	V
Operating Temperature	T _{OP} (Ts)	Note 1	-20	+70	°C
Storage Temperature	T _{ST} (Ta)	Note 2	-30	+80	°C
Storage Humidity	H _D	Ta < 60 °C	10	90	%RH

The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

Note 1 : Ts is the temperature of panel's surface.

Note 2 : Ta is the ambient temperature of samples.

1.4 DC Electrical Characteristics

Module

GND = 0V, Ta = 25°C

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Power Supply Voltage	VDD	-	2.8	3.0	3.3	V
	VDDI	-	2.8	3.0	3.3	
Input H/L Level Voltage	V _{IH}	-	0.8VDDI	-	VDDI	V
	V _{IL}	-	GND	-	0.2VDDI	V
Output H/L Level Voltage	V _{OH}	I _{OH} =-0.1mA	0.8VDDI	-	VDDI	V
	V _{OL}	I _{OL} =0.1mA	GND	-	0.2VDDI	V
Supply Current	I _{DD}	VDD = VDDI = 3.0 V	-	4	6	mA

1.5 Optical Characteristics

TFT LCD Module

VDD = VDDI = 3.0 V, Ta=25°C

Item		Symbol	Condition	Min.	Typ.	Max.	unit	-
Response time		Tr+Tf	-	-	30	45	ms	Note2
Viewing angle	Top	θ+	CR ≥ 10	-	60	-	Deg	Note1
	Bottom	θ-		-	60	-		
	Left	θL		-	60	-		
	Right	θR		-	60	-		
Contrast ratio		CR	-	500	600	-	-	Note3
Color of CIE Coordinate (With B/L&TP)	White	X	IF= 60 mA	0.24	0.29	0.34	-	Note4
		Y		0.27	0.32	0.37		
	Red	X		0.52	0.57	0.62		
		Y		0.28	0.33	0.38		
	Green	X		0.27	0.32	0.37		
		Y		0.55	0.60	0.65		
	Blue	X		0.10	0.15	0.20		
		Y		0.02	0.07	0.12		
Average Brightness Pattern=white display (With B/L&TP)		IV	IF= 60 mA	130	180	-	cd/m2	
Uniformity (With B/L&TP)		△B		80	-	-	%	

Note 1:

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

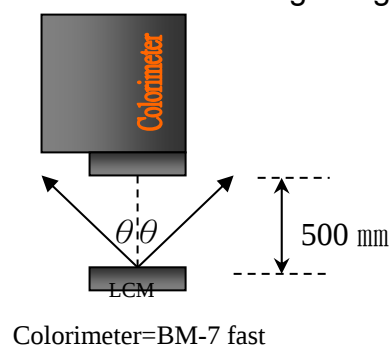
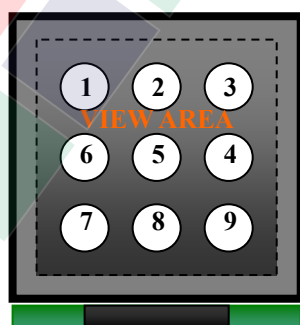
*2 : Measurement Condition for Optical Characteristics:

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 , ($\theta = 0^\circ$)

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

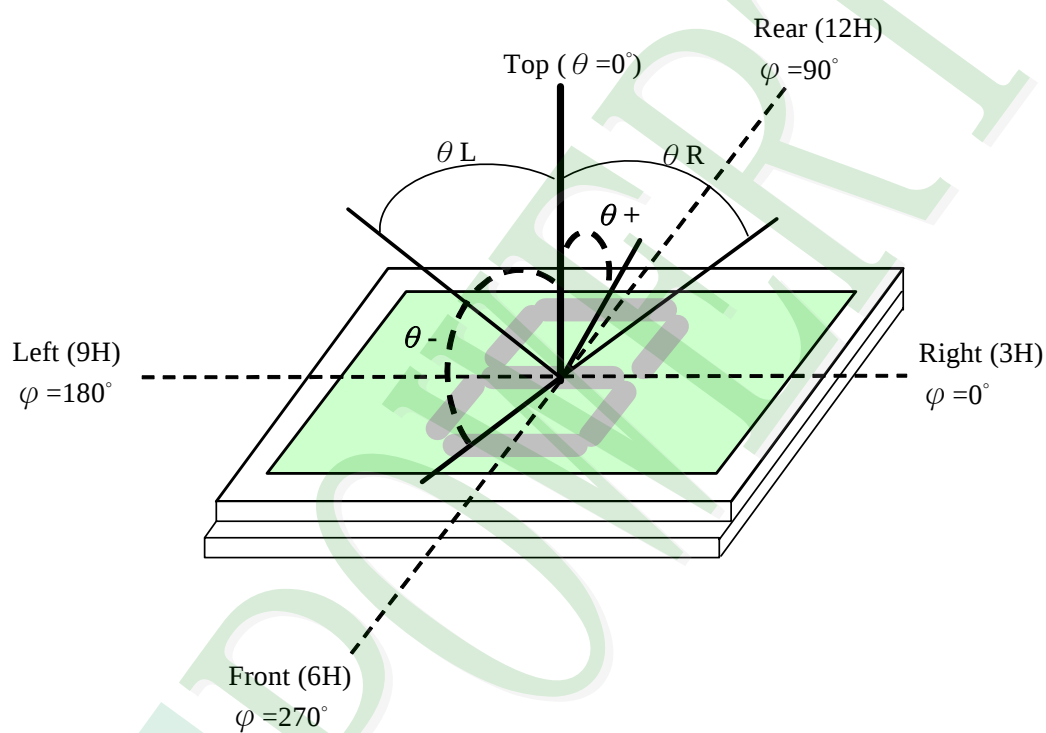
d : The uncertainty of the C.I.E coordinate measurement ± 0.01 , Average Brightness $\pm 4\%$



Note 1.

Optical characteristics-2

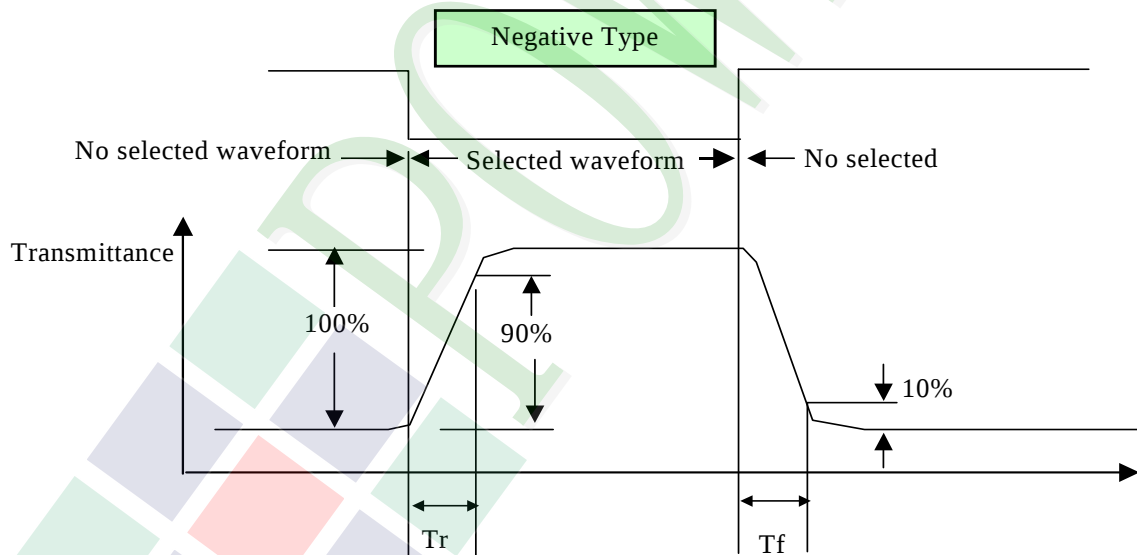
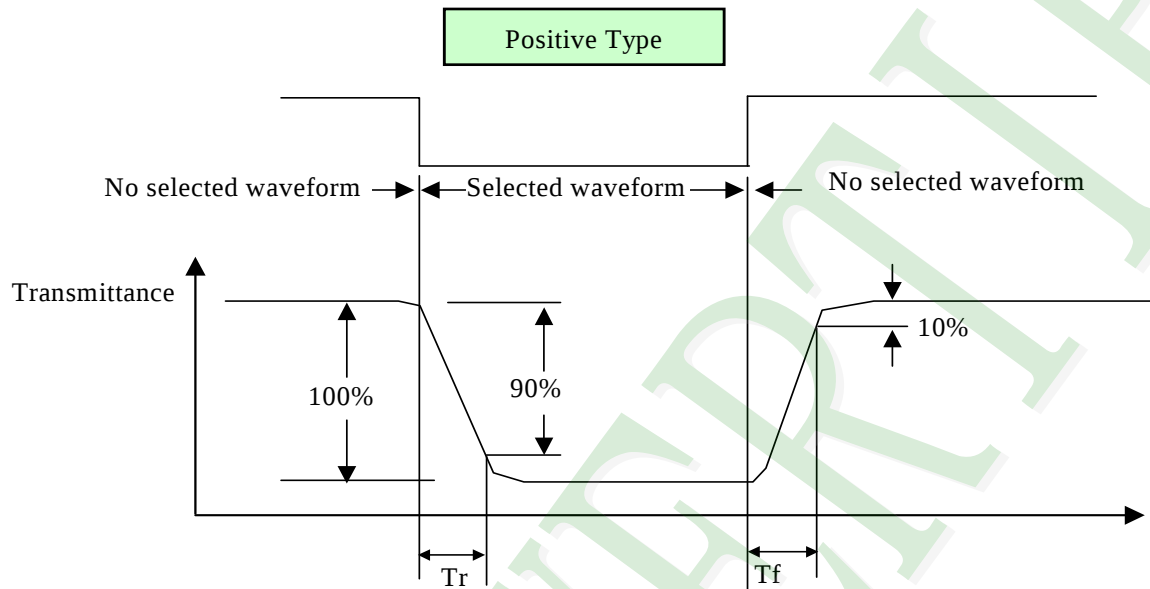
Viewing angle



Note 2.

Optical characteristics-3

Fig.2 Definition of response time



Electrical characteristics-2

※2 Drive waveform

V_{op} : Drive voltage

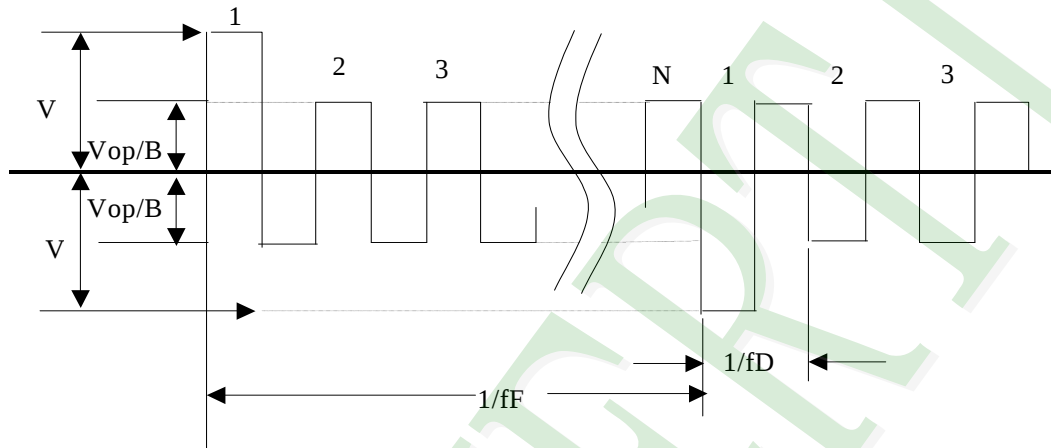
$1/B$: Bias

N : Duty

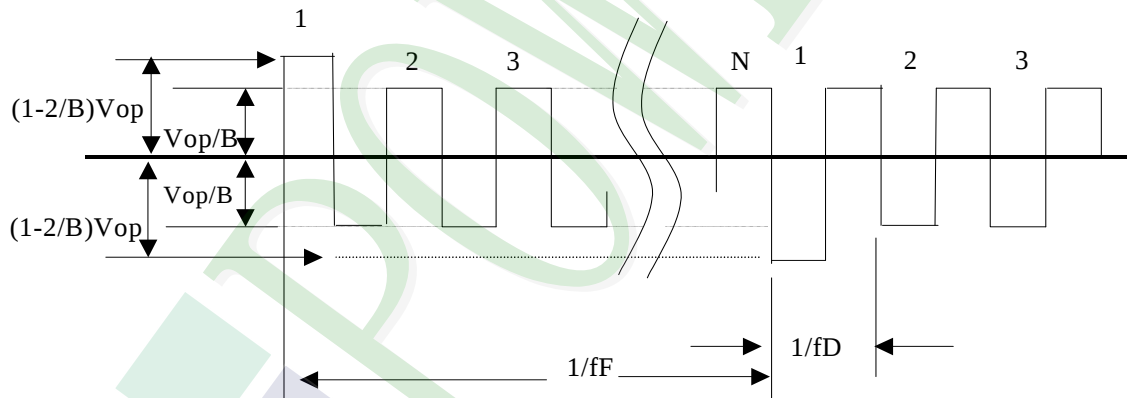
f_F : Frame frequency

f_D : Drive frequency

(1) Selected waveform



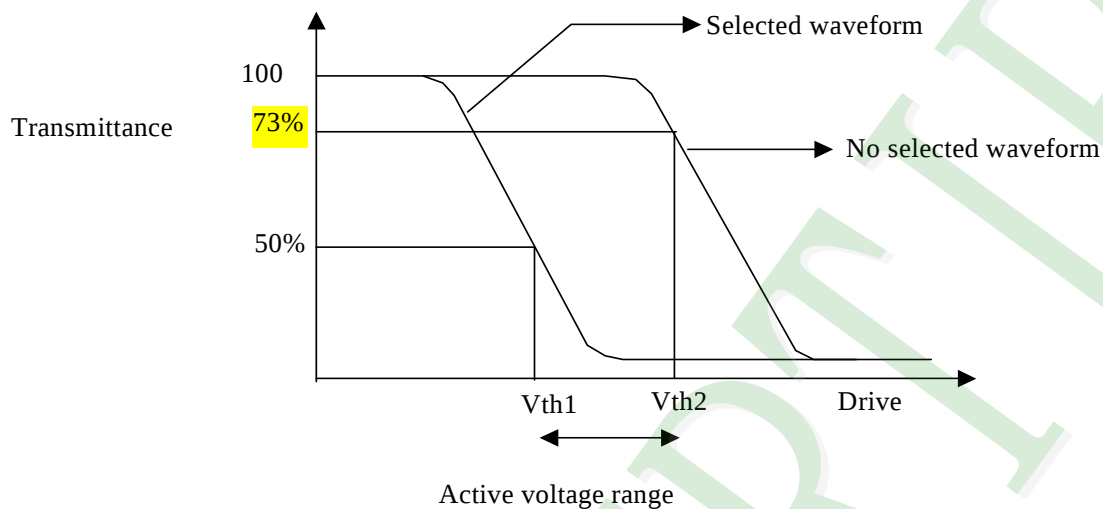
(2) Non- Selected wave form



Note:

Frame frequency is defined as follows: Common side supply voltage peak - to - peak / 2 = 1 period

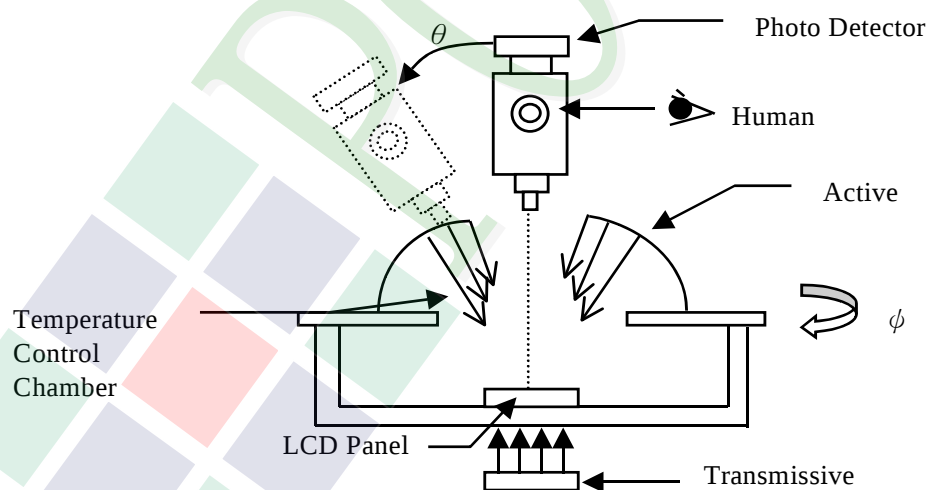
Note 3. : Definition of Vth



	Vth1	Vth2
View direction	10°	40°
Drive waveform	(Selected waveform)	(No selected waveform)
Transmittance	50%	73%

※1 Contrast ratio
= (Brightness in OFF state) / (Brightness in ON state)

Outline of Electro-Optical Characteristics Measuring System



1.6 Backlight Characteristics

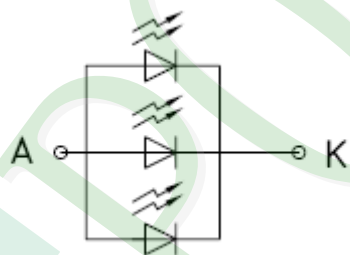
Maximum Ratings

Item	Symbol	Conditions	Min.	Max.	Unit
LED Forward Current	IF	Ta =25°C	-	75	mA
LED Reverse Voltage	VR	Ta =25°C	-	4	V
Power Dissipation	PD	Ta =25°C	-	260	mW

Electrical / Optical Characteristics

Electrical / Optical Characteristics						
Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Forward Voltage	VF	IF= 60mA	2.65	3.0	3.5	V
Average Brightness (Without LCD)	IV		3500	4200	-	cd/m ²
CIE Color Coordinate (Without LCD)	X		0.25	0.27	0.295	-
	Y		0.25	0.27	0.295	
Color	White					

Circuit diagram



1.7 Touch Panel Characteristics

1.7.1 Optical Characteristics

Item	Specification
1. Transparency	80% Min

1.7.2 Mechanical Characteristic

Item	Specification
1. Input Method	Finger or stylus pen
2. ITO Glass	T=0.7mm
3. ITO Film	T=0.188mm, NITTO V270
4. Touch Panel Supplier	Raece
5. Silicone using in Touch panel	Dow Corning 734
6. Hardness of surface	3H -pressure 500g of ,45deg.
7. Activation Force	50gf less individual point with stylus pen(R0.8) Activation force guarantee area:2.0mm inside of Active Area.
8. Linearity Force	80gf less input with stylus pen(R0.8) Activation force guarantee area:3.0mm inside of Active Area.

1.7.3 Electrical Characteristics

Item	Specification
1. Rated Voltage	DC 5V(DC 7V Max)
2. Resistance Between Terminals.	Direction X (Glass side): 100Ω~ 600Ω
	Direction Y (Film side): 250Ω~ 900Ω
3. Insulation Resistance	20 MΩ or more (DC 25V 1min)
4. Linearity	$\pm 1.5\%$ $\text{Linearity}(\%) = \Delta V / (EV - SV) * 100.$ ΔV : The difference between the ideal voltage and measured voltage on the each measuring line. SV : Voltage of starting Points. EV : Voltage of Ending Points. (Test condition refers to 1.7.2 item5)
5. Bouncing	<10ms (Tip R 3.75mm, hardness 10°~20° ,silicon rubber ,500gf operation : 40 mm/sec)

1.7.4 Reliability Characteristic

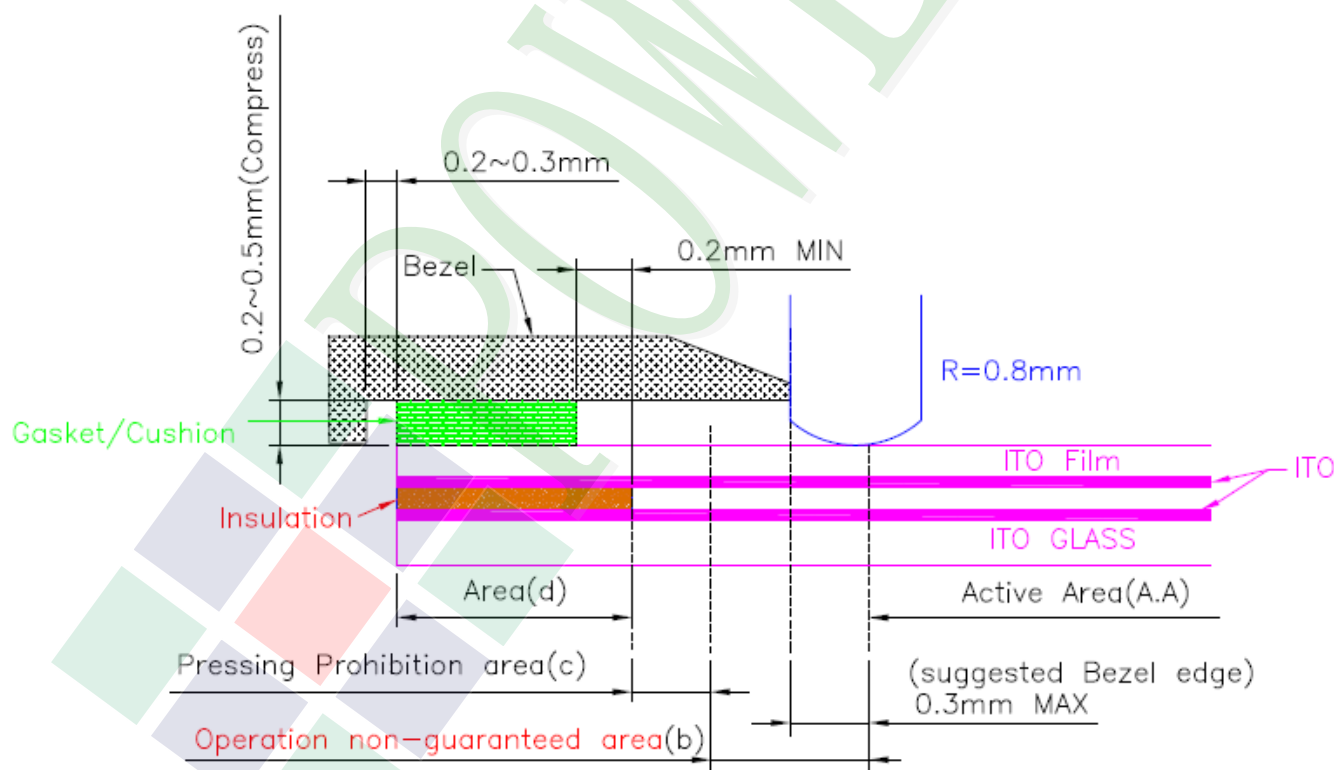
NO	Test Item	Test Condition	Test Result
1	Hitting Durability	1,000,000times min.(R 8 mm Silicon Rubber Hardness 60°250gf 2times/sec).	Follow 1.7.3 item2 and item4.
2	Impact Resistance	φ9mm steel ball is dropped on the surface from 30 cm height at 1 time.	No Crack
3	Flexible pattern Bending Resistance	Bending 3 times by bending radius R1.0 mm	Follow 1.7.3 item2.

1.7.5 Touch Panel Design/Handling Guide

- (1) Keep the gap, for example 0.2 to 0.3mm, between bezel edge and T/P edge.

The reason is to avoid the bezel edge from contacting T/P surface that may cause “short” with bottom layer

- (2) Insertion a cushion material is recommended.
- (3) The cushion material should be limited on the busbar insulation paste area. If it is over the transparent insulation paste area, a “short” may be occurred.
- (4) Do not to use an adhesive tape to bond it on the front of T/P and hang it to the housing bezel.
- (5) Never expand the T/P top layer (PET Film) like a balloon by internal air pressure. The life of the T/P will extremely decreasing.
- (6) Top layer, PET, dimension is changing base on environment temperature and humidity. Please avoid a stress from housing bezel to top layer, because it may cause “waving”.
- (7) The input to the Touch Panel sometimes distorts touch panel itself.
- (8) To use the stylus pen or fingernail sliding at the edge of the housing is prohibited. It would cause the cracking of the ITO coating and damage the touch panel. It also request not to press this area while assembling
- (9) Purpose: In order to prevent accidental use and performance deterioration, please keep the following precautions.



In order to prevent unusual performance degradation and malfunction of a touch panel, please carry out the set case designing and a touch panel assembling method after surely considering the definition of each area illustrated in above figure.

Area(a) : Active area

The active area is guaranteed the position data detectable precision, operation force and other operations. it is strongly recommended to place the operation button or menu keys within the active area. Due to structure, the active area is less durable at the edge or close to the edge.

Area(b) : Operation non-guaranteed area

This area does not guarantee a touch panel operation and its function. When this area is pressed, touch panel shows degradation of its performance and durability such as a pen sliding durability becomes about one-tenth compared with the active area (area-(a) as guaranteed area) and its operation force requires about double. About 0.5 mm outside from a boundary of the active area corresponds to this area.

Area(c) : Pressing prohibition area

The area which forbids pressing, because an excessive load is applied to a transparent electrode (ITO) and a serious damage is given to a touch panel function by pressing. About 0.5 mm outside from Operation non-guaranteed area .

The space(0.2mm min) of pressing prohibition area and gasket opening is based on the typical design. If considering the tolerance, then the gasket opening do not exceed the pressing prohibition area.

Area(d) : Non-Active area

The area does not activate even if pressed.



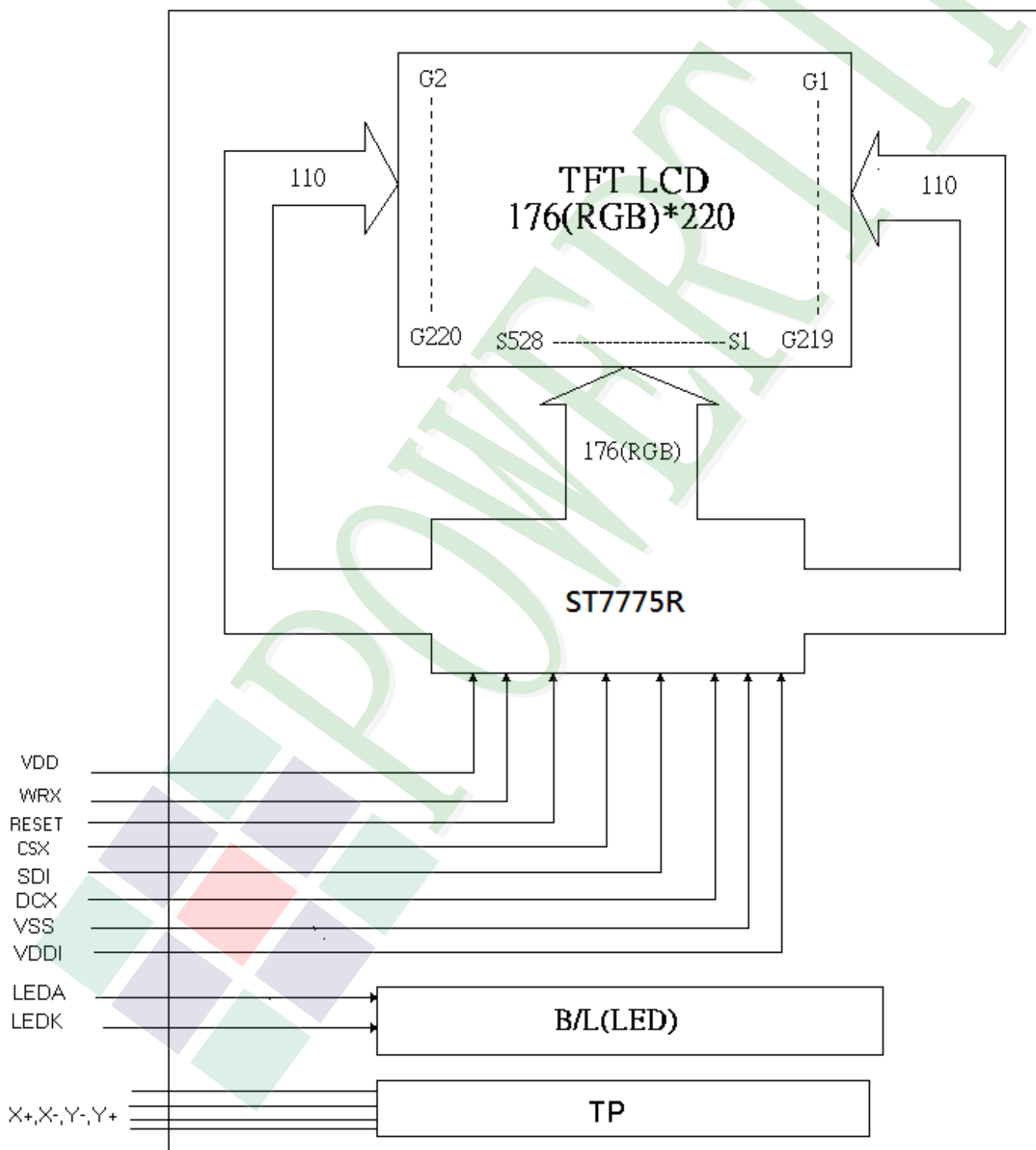
2. MODULE STRUCTURE

2.1 Counter Drawing

2.1.1 LCM Mechanical Diagram

* See Appendix

2.1.2 Block Diagram



2.2 Interface Pin Description

Pin No.	Symbol	Function
1	LEDA	LED Backlight anode
2	LEDK	LED Backlight cathode
3	VDD	Power Supply for Analog, Digital System and Booster Circuit
4	WRX (SCL)	-Write enable in MCU parallel interface. In SPI mode, this is used as SCL.
5	RESET	-This signal will reset the device and it must be applied to properly initialize the chip. -Signal is active low.
6	CSX	-Chip selection pin Low enable. High disable.
7	SDI	-SPI interface input pin. -The data is latched on the rising edge of the SCL signal.
8	DCX (RS)	-Display data/command selection pin in MCU interface. DCX='1': display data or parameter. DCX='0': command data. -If not used, please fix this pin at VDDI or DGND level.
9	VSS	System Ground
10	VDDI	Power Supply for I/O system
11	X-	Touch Panel :X Right Side
12	Y-	Touch Panel :Y Down Side
13	X+	Touch Panel :X Left Side
14	Y+	Touch Panel :Y Up Side

2.2.1 Refer Initial code

```
void LCD_Init(void)
{
    lcddev.width=176;
    lcddev.height=220;

    SPI_WR_REG(0x00d0);
    SPI_WR_DATA(0x0003);

    SPI_WR_REG(0x00eb);
    SPI_WR_DATA(0x0b00);

    SPI_WR_REG(0x00ec);
    SPI_WR_DATA(0x004f);

    SPI_WR_REG(0x00c7);
    SPI_WR_DATA(0x030f);

    SPI_WR_REG(0x0001); // Driver Output Control
    SPI_WR_DATA(0x011c); // set SS and NL bit

    SPI_WR_REG(0x0002); // Driver Output Control
    SPI_WR_DATA(0x0100); // set 1 line inversion

    SPI_WR_REG(0x0003); // Entry Mode
    SPI_WR_DATA(0x1030); // set GRAM write direction and BGR=1.

    SPI_WR_REG(0x0008); // Blank Period Control 1
    SPI_WR_DATA(0x0808); // set BP and FP

    SPI_WR_REG(0x000f);
    SPI_WR_DATA(0x0901);

    SPI_WR_REG(0x0020);
    SPI_WR_DATA(0x0000);

    SPI_WR_REG(0x0021);
    SPI_WR_DATA(0x0000);

    SPI_WR_REG(0x0007);
```

```
SPI_WR_DATA(0x1017);
delay_ms(50);
//*****Power On sequence *****//
SPI_WR_REG(0x0010);
SPI_WR_DATA(0x0000);

SPI_WR_REG(0x0011);
SPI_WR_DATA(0x1b07);

SPI_WR_REG(0x0012);
SPI_WR_DATA(0x000e);

SPI_WR_REG(0x0013);
SPI_WR_DATA(0x0052);

SPI_WR_REG(0x0014);
SPI_WR_DATA(0x5a66);
//----- Set GRAM area -----//
SPI_WR_REG(0x0030);
SPI_WR_DATA(0x0000);

SPI_WR_REG(0x0031);
SPI_WR_DATA(0x00db);

SPI_WR_REG(0x0032);
SPI_WR_DATA(0x0000);

SPI_WR_REG(0x0033);
SPI_WR_DATA(0x0000);

SPI_WR_REG(0x0034);
SPI_WR_DATA(0x00db);

SPI_WR_REG(0x0035);
SPI_WR_DATA(0x0000);

SPI_WR_REG(0x0036);
SPI_WR_DATA(0x00af);
SPI_WR_REG(0x0037);
```

```
SPI_WR_DATA(0x0000);

SPI_WR_REG(0x0038);
SPI_WR_DATA(0x00db);

SPI_WR_REG(0x0039);
SPI_WR_DATA(0x0000);
// ----- Adjust the Gamma Curve -----//
SPI_WR_REG(0x0050);
SPI_WR_DATA(0x0000);

SPI_WR_REG(0x0051);
SPI_WR_DATA(0x010c);

SPI_WR_REG(0x0052);
SPI_WR_DATA(0x0a01);

SPI_WR_REG(0x0053);
SPI_WR_DATA(0x0401);

SPI_WR_REG(0x0054);
SPI_WR_DATA(0x020a);

SPI_WR_REG(0x0055);
SPI_WR_DATA(0x0b00);

SPI_WR_REG(0x0056);
SPI_WR_DATA(0x0000);

SPI_WR_REG(0x0057);
SPI_WR_DATA(0x0104);

SPI_WR_REG(0x0058);
SPI_WR_DATA(0x0e05);

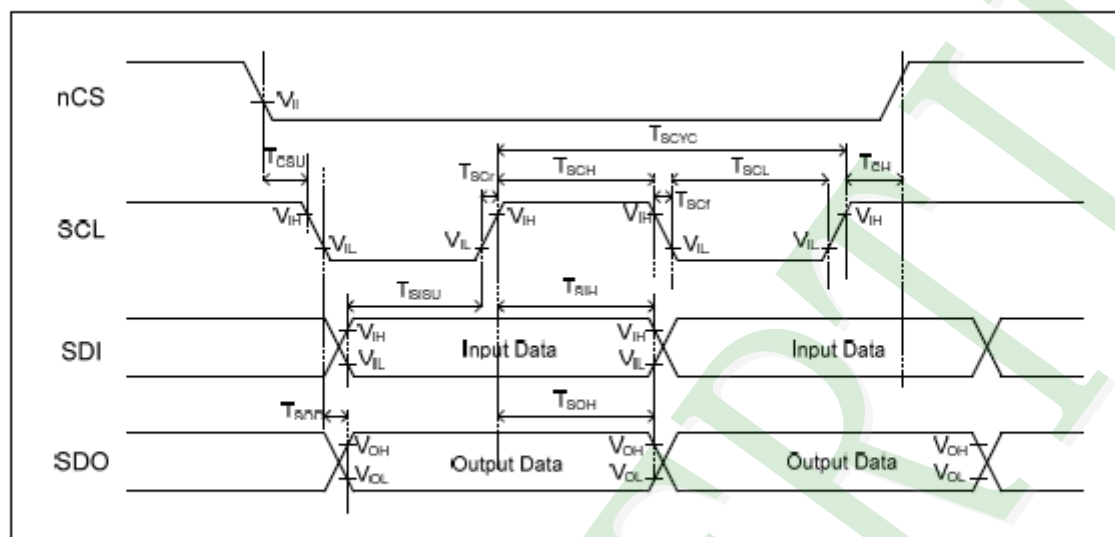
SPI_WR_REG(0x0059);
SPI_WR_DATA(0x050e);
SPI_WR_REG(0x0022);

}
```

2.3 Timing Characteristics

2.3.1 Serial Data Transfer Interface Characteristics:

Serial Data Transfer Interface Characteristics:



SPI Interface Timing Characteristics

VDDI=1.65 to 3.3V, VDD=2.5 to 3.3V, AGND=DGND=0V, Ta=25 °C

Signal	Symbol	Parameter	Min	Max	Unit	Description
CSX	TCSU	Chip Select Setup Time	10		ns	-
	TCH	Chip Select Hold Time	50		ns	
SCL	TSCr, TSCf	Serial clock rise/fall time		5	ns	
	TSCH	SCL "H" pulse width (Write)	40		ns	
	TSCH	SCL "H" pulse width (Read)	100		ns	
	TSCYC	Serial clock cycle (Write)	80		ns	
	TSCYC	Serial clock cycle (Read)	200		ns	
	TSCL	SCL "L" pulse width (Write)	40		ns	
	TSCL	SCL "L" pulse width (Read)	100		ns	
SDI	TSISU	Serial Input Data Setup Time	20		ns	
	TSIH	Serial Input Data Hold Time	20		ns	
SDO	TSOD	Serial Output Data Setup Time		100	ns	
	TSOH	Serial Output Data Hold Time	5		ns	

SPI Interface Characteristics

LCD Reset

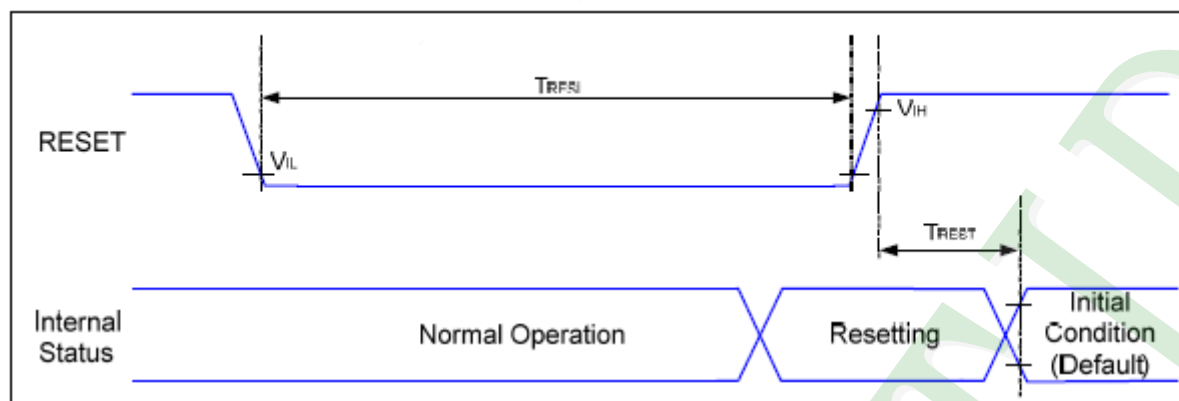


Figure 51 Reset Timing

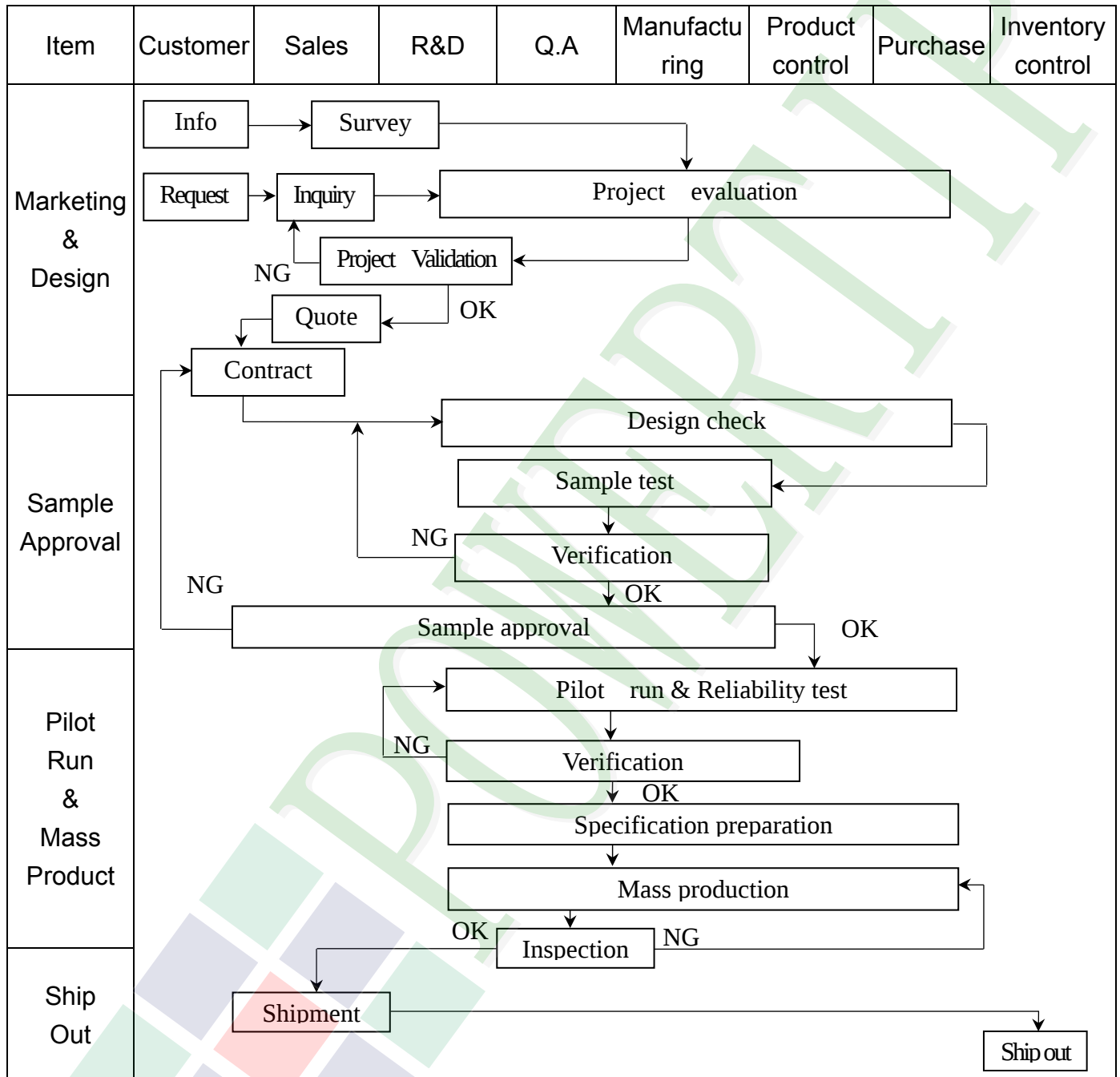
VDDI=1.65 to 3.3V, VDD=2.5 to 3.3V, AGND=DGND=0V, Ta=25°C

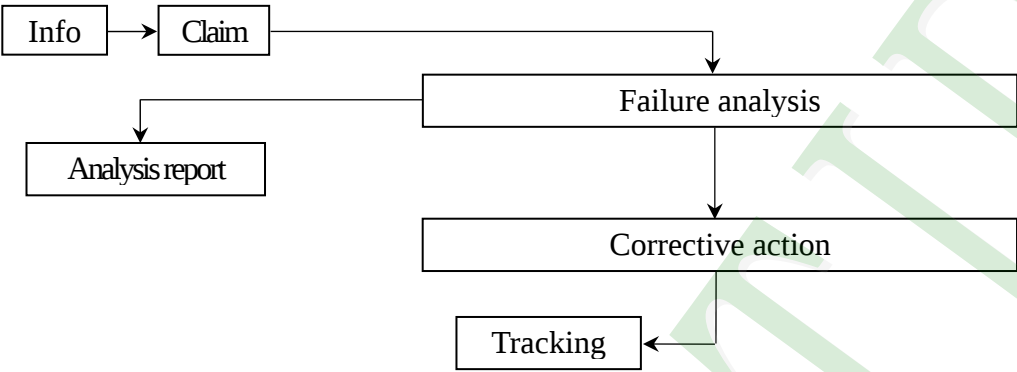
Signal	Symbol	Parameter	Min	Max	Unit	Description
RESET	TRESL	Reset Low Level Width	1	-	ms	-
	TREST	Reset Complete Time	1	-	ms	

Table 11 Reset timing Characteristics

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 --> Failure[Failure analysis] Claim --> Report[Analysis report] Failure --> Action[Corrective action] Action --> 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

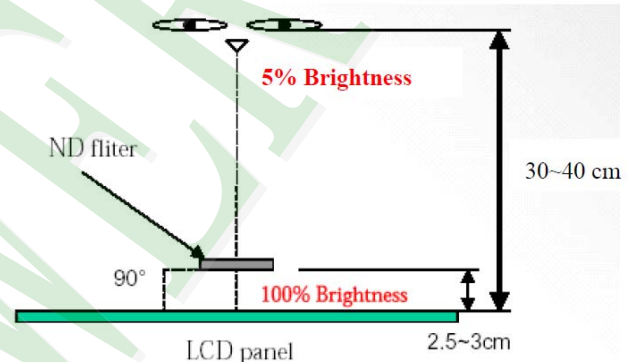
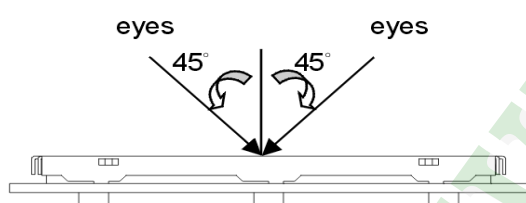
- ◆Scope : The document shall be applied to TFT-LCD Module for less than 3.5" (Ver.B01).
- ◆Inspection Standard : MIL-STD-105E Table Normal Inspection Single Sampling Level II.
- ◆Equipment : Gauge 、MIL-STD 、Powertip Tester 、Sample
- ◆Defect Level : Major Defect AQL : 0.4 ; Minor Defect AQL : 1.5
- ◆OUT Going Defect Level: Sampling.
- ◆Standard of the product appearance test :

a. Manner of appearance test :

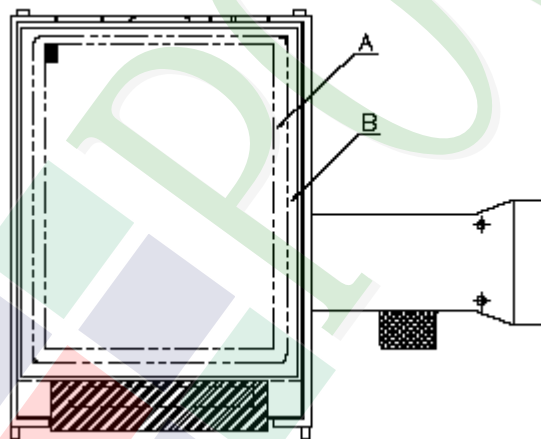
(1). The test best be under 20W×2 fluorescent light (about 300lux ~500lux)

， and distance of view must be at 30~40 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

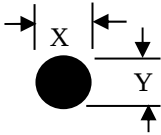
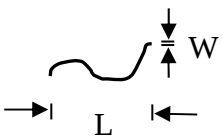
(4). Standard of inspection : (Unit : mm)

◆Specification For TFT-LCD Module Less Than 3.5" :
(Ver.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 cannot be seen through 5% ND filter at 50% Gray , should be judged by the viewing angle of 90 degree.	Minor												
05	Dot defect (Bright dot 、 Dark dot) On -display	<table><tr><th colspan="2">Item</th><th>Acceptance (Q'ty)</th></tr><tr><td rowspan="4">Dot Defect</td><td>Bright Dot</td><td>≤ 2</td></tr><tr><td>Dark Dot</td><td>≤ 3</td></tr><tr><td>Joint Dot</td><td>≤ 2</td></tr><tr><td>Total</td><td>≤ 3</td></tr></table>	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													
5. 1 Inspection pattern : full white , full black , Red , Green and blue screens. 5. 2 It is defined as dot defect if defect area > 1/2 dot. 5. 3 The distance between two dot defect ≥ 5 mm. 5. 4 Bright dot that can not be seen through 5% ND filter.															

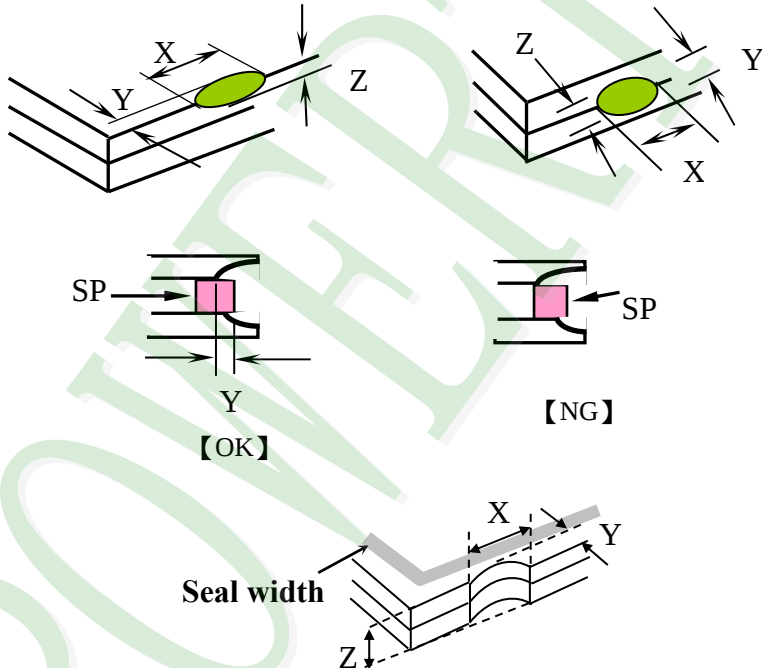
◆Specification For TFT-LCD Module Less Than 3.5" :

(Ver.B01)

NO	Item	Criterion	Level																																			
06	Black or white dot、scratch、contamination Round type  $\Phi=(x+y) / 2$ Line type 	6. 1 Round type (Non-display or display) : <table> <tr> <th rowspan="2">Dimension (diameter : Φ)</th> <th colspan="2">Acceptance (Q'ty)</th> </tr> <tr> <th>A area</th> <th>B area</th> </tr> <tr> <td>$\Phi \leq 0.15$</td> <td colspan="2" rowspan="4">Ignore</td> </tr> <tr> <td>$0.15 < \Phi \leq 0.20$</td> </tr> <tr> <td>$0.20 < \Phi \leq 0.30$</td> </tr> <tr> <td>$\Phi > 0.30$</td> </tr> <tr> <td>Total</td> <td>3</td> <td></td> </tr> </table> 6. 2 Line type(Non-display or display) : <table> <tr> <th colspan="2">Dimension</th> <th colspan="2">Acceptance (Q'ty)</th> </tr> <tr> <th>Length (L)</th> <th>Width (W)</th> <th>A area</th> <th>B area</th> </tr> <tr> <td>---</td> <td>$W \leq 0.03$</td> <td>Ignore</td> <td rowspan="4">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> </table>	Dimension (diameter : Φ)	Acceptance (Q'ty)		A area	B area	$\Phi \leq 0.15$	Ignore		$0.15 < \Phi \leq 0.20$	$0.20 < \Phi \leq 0.30$	$\Phi > 0.30$	Total	3		Dimension		Acceptance (Q'ty)		Length (L)	Width (W)	A area	B area	---	$W \leq 0.03$	Ignore	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)																																				
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Total		3																																				
07	Polarizer Bubble	<table> <tr> <th rowspan="2">Dimension (diameter : Φ)</th> <th colspan="2">Acceptance (Q'ty)</th> </tr> <tr> <th>A area</th> <th>B area</th> </tr> <tr> <td>$\Phi \leq 0.20$</td> <td>Ignore</td> <td rowspan="4">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> </table>	Dimension (diameter : Φ)	Acceptance (Q'ty)		A area	B area	$\Phi \leq 0.20$	Ignore	Ignore	$0.20 < \Phi \leq 0.50$	3	$\Phi > 0.50$	0	Total	3	Minor																					
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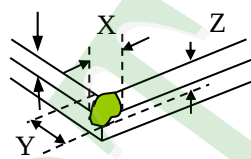
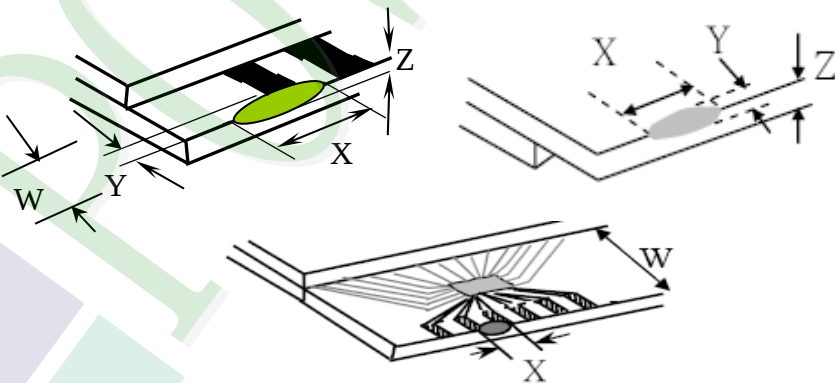
◆Specification For TFT-LCD Module Less Than 3.5" :

(Ver.B01)

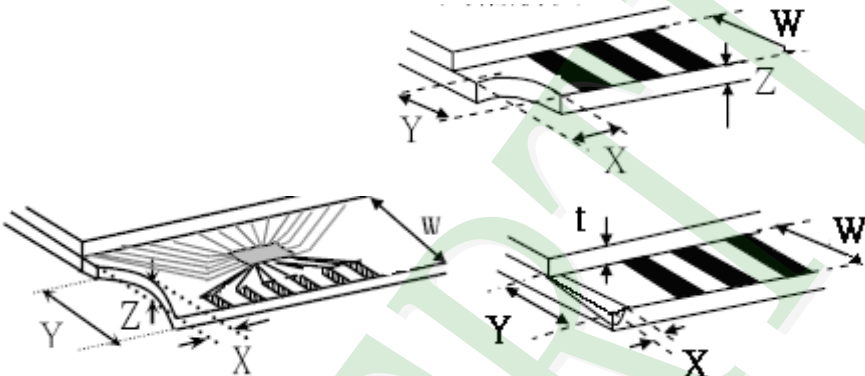
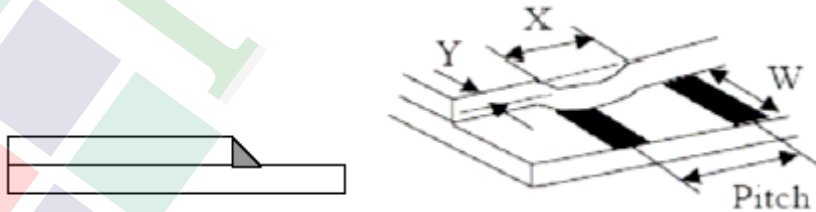
NO	Item	Criterion	Level						
08	The crack of glass	Symbols : X : The length of crack Z : The thickness of crack t : The thickness of glass Y : The width of crack. W : terminal length a : LCD side length 8.1 General glass chip : 8.1.1 Chip on panel surface and crack between panels: 	Minor						
		<table><tr><th>X</th><th>Y</th><th>Z</th></tr><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></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.B01)

NO	Item	Criterion	Level												
08	The crack of glass	Symbols : X : The length of crack Z : The thickness of crack t : The thickness of glass Y : The width of crack. W : terminal length a : LCD side length	Minor												
		8.1.2 Corner crack :  <table><tr><th>X</th><th>Y</th><th>Z</th></tr><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></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.	$1/2 t < Z \leq 2 t$			
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.	$1/2 t < Z \leq 2 t$													
		8.2 Protrusion over terminal : 8.2.1 Chip on electrode pad :  <table><tr><th></th><th>X</th><th>Y</th><th>Z</th></tr><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></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.B01)

NO	Item	Criterion	Level									
08	The crack of glass	Symbols : X : The length of crack Z : The thickness of crack t : The thickness of glass Y : The width of crack. W : terminal length a : LCD side length	Minor									
		8.2.2 Non-conductive portion :  <table border="1"> <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> ⊙ If the chipped area touches the ITO terminal, over 2/3 of the ITO must remain and be inspected according to electrode terminal specifications. 8.2.3 Glass remain :  <table border="1"> <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
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.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: 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

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
- 5.2.10 Caution!(LCM products with Capacitive Touch Panel)
Strong EMI-sources such as switch-mode power supplies (SMPS) can lead to touch malfunction (e.g. ghost-touches).
Therefore, the touch needs to be thoroughly tested inside the target application.
- 5.2.11 CAUTION: Continuously displaying same static image will result in high possibility of image sticking/image burn-in effect due to TFT panel characteristic.
- 5.2.12 Double-sided tape designed to be attach with the customer's mechanical device, please follow up the rules and regulations published by the original manufacturer of double-sided tape for the attachment operation.

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.

Ver.001

Documents NO. JPKG-PH176220T062-LAB05

LCM包裝規格書

LCM Packaging Specifications
(For Tray)

Approve	Check	Contact
Liu Jin	Air	Crystal

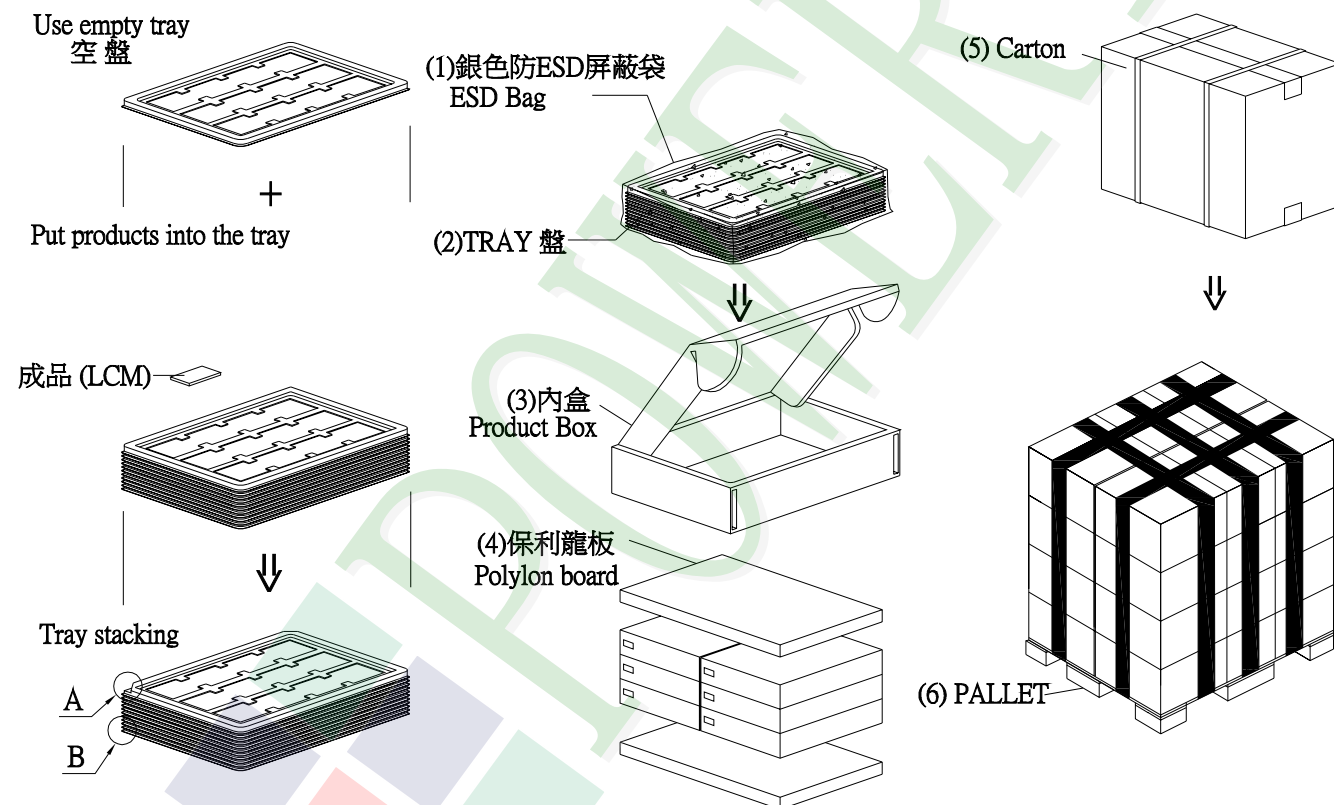
1. 包裝材料規格表 (Packaging Material) : (per carton)

No.	Item	Model	Dimensions (mm)	1Pcs Weight	Quantity	Total Weight
1	成品 (LCM)	PH176220T062-LAB05	41.42 X 51.6 X 4.7	0.013	13824	179.712
2	銀色防ESD屏蔽袋 (1) ESD Bag	BAG0000000027	510 X 430	0.0303	144	4.3632
3	TRAY 盤 (2)Tray	TYSG000000138	352 X 260 X 13.8	0.1	1008	100.8
4	內盒(3)Product Box	BX36627063ABBA	393 X 274 X 68	0.2692	144	38.7648
5	保利龍板(4)Polylon board	OTPLB00PL08ABA	550 X 393 X 20	0.0284	48	1.3632
6	外紙箱(5)Carton	BX57041027CCBA	570 X 410 X 265	1.26	24	30.24
7	棧板(6)PALLET	OTPALLET00003	1300 X 1100 X 140	10.5	1	10.5
8						

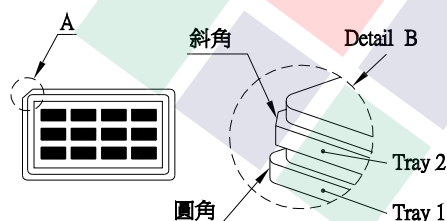
2. 一整箱總重量 (Total LCD Weight in carton) : 365.74 Kg $\pm$ 10%

3. 單箱數量規格表 (Packaging Specifications and Quantity) :

(1) LCM quantity per box : no per tray	16	x no of tray	6	=	96
(2) Total LCM quantity in carton : quantity per box	96	x no of boxes	6	=	576
(3) Total LCM quantity in pallet : quantity per carton	576	x no. of cartons	24	=	13824



特 記 事 項 (REMARK)



4. TRAY盤相疊時,需旋轉180度,請詳見B視圖
Rotate tray 180 degrees and place on top of stack.
Check the tray stack using Fig. B.