POWERTIP TECH. CORP.

SPECIFICATIONS

CUSTOMER	:	PTC
SAMPLE CODE	:	SH480272T-006-I06Q
MASS PRODUCTION CODE	:	PH480272T-006-I06Q
SAMPLE VERSION	:	03
SPECIFICATIONS EDITION	:	010
DRAWING NO. (Ver.)	:	JLMD-PH480272T-006-I06Q_003
PACKAGING NO. (Ver.)	:	JPKG-PH480272T-006-I06Q_001

Customer Approved

Date:

POWERTIP
2016.02.22
JS RD APPROVED

Approved	Checked	Designer
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□ Preliminary specification for design input

■ Specification for sample approval

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History of Version

Date (mm / dd / yyyy)	Ver.	Edi.	Description	Page	Design by
06/24/2011	01	001	New Drawing.	-	WUZHIJUN
08/16/2011	01	002	New Sample	-	WUZHIJUN
08/31/2011	01	003	Add confirmation for backlight	9~13	WUZHIJUN
05/13//2013	01	004	Add min of Average Brightness	6	趙冬冬
09/04/2013	02	005	Update Average Brightness Of Backlight Change Touch Panel Supplier	9 12,13	劉進
01/28/2014	02	006	Update Touch Panel Characteristics Modify LCD Driver IC On Block Diagram Show Pressing Prohibition Position & Operation Non-guaranteed Position	12~15 16 Appendix	劉進
04/07/2014	02	007	Modify Viewing Angle & Contrast Ratio Show The Information For J2 Connector	6 Appendix	劉進
11/03/2014	03	008	Change AD Converter：HFT012(King Billion)→ TSC2046(Texas Instruction)	-	劉進
08/18/2015	03	009	Show Backlight Life Time	9	劉進
02/22/2016	03	010	Change Backlight Characteristics	6,9	劉進

Total: 34 Pages

Contents

Note : For detailed information please refer to IC data sheet : SOLOMON --- SSD1963

1. SPECIFICATIONS

1.1 Features

Item	Standard Value
Display Type	480 * 3 (RGB) * 272 Dots
LCD Type	a-Si TFT , Normally white, Transmissive type
Screen size(inch)	4.3 inch
Viewing Direction	6 O'clock
Color configuration	RGB-Strip
Interface	Support 16-bit Parallel interface with 8080 or 6800 series MCU
Other(controller/driver IC)	SSD1963/OTA5180A
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	105.5(W) x 67.2 (L) x 9.5(H)MAX	mm

LCD panel

Item	Standard Value	Unit
Active Area	95.04 (W) x 53.856 (L)	mm

Touch panel

Item	Standard Value	Unit
Viewing Area	99.5 (W) * 58.0 (L)	mm
Active Area	97.0 (W) * 55.8 (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	VDDIO	GND=0	-0.3	4.5	V
Operating Temperature	T_{OP}	-	-20	70	°C
Storage Temperature	T_{ST}	-	-30	80	°C

1.4 DC Electrical Characteristics

Module

GND = 0V, Ta = 25°C

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Power Supply Voltage	VDDIO	-	3.0	3.3	3.6	V
Input H/L Level Voltage	VIH	-	0.7VDDIO	-	VDDIO	V
	VIL	-	0	-	0.3VDDIO	V
Output H/L Level Voltage	VOH	-	VDDIO-0.4	-	VDDIO	V
	VOL	-	0	-	GND+0.4	V
Supply Current	I_{DD}	VDDIO = 3.3 V	-	230	250	mA

1.5 Optical Characteristics

TFT LCD Module VDDIO= 3.3 V, Ta=25°C

Item		Symbol	Condition	Min.	Typ.	Max.	unit	-
Response time	Tr+Tf	25℃	-	-	30	45	ms	-
Viewing angle	Top	θY+	CR ≥ 10	-	60	-	Deg.	Note 4
	Bottom	θY-		-	60	-		
	Left	θX-		-	60	-		
	Right	θX+		-	60	-		
Contrast ratio		CR	IF= 20mA	500	600	-	-	Note 3
Color of CIE Coordinate （With B/L & TP）	White	X		0.29	0.34	0.39	-	Note1
		Y		0.31	0.36	0.41		
	Red	X		0.54	0.59	0.64		
		Y		0.29	0.34	0.39		
	Green	X		0.31	0.36	0.41		
		Y		0.51	0.56	0.61		
	Blue	X		0.10	0.15	0.20		
		Y		0.08	0.13	0.18		
Average Brightness Pattern=white display （With B/L & TP）*1		IV	IF= 20mA	200	310	-	cd/m2	Note1
Uniformity （With B/L & TP）*2		△B	IF= 20mA	70	-	-	%	Note1

Note 1:

*1：△B=B(min) / B(max) * 100%

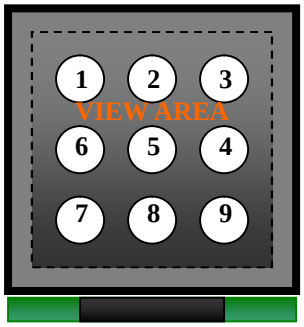
*2：Measurement Condition for Optical Characteristics:

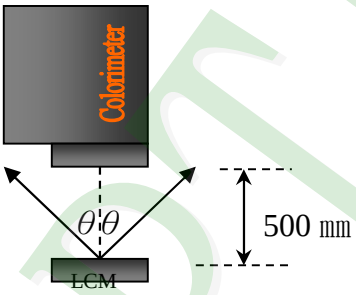
a：Environment: 25℃±5℃ / 60±20%R.H，no wind，dark room below 10 Lux at typical lamp current and typical operating frequency.

b：Measurement Distance: 500 ± 50 ㎜ ，(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%





Colorimeter=BM-7 fast

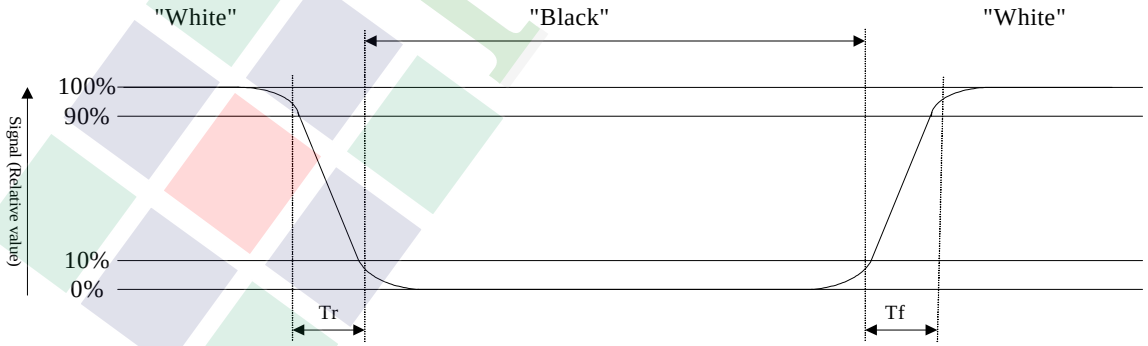
To be measured at the center area of panel with a viewing cone of 1° by Topcon luminance meter BM-7, after 10 minutes operation (module)

Note2: Definition of response time:

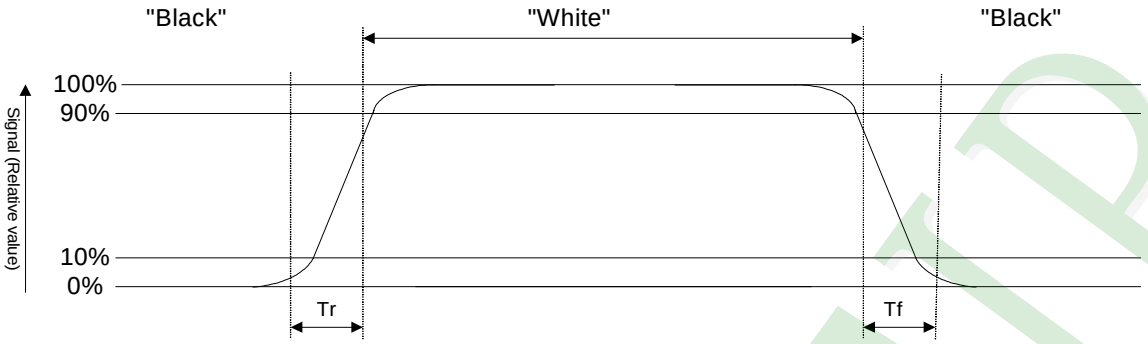
The output signals of photo detector are measured when the input signals are changed from “black” to “white”(falling time) and from “white” to “black”(rising time), respectively. The response time is defined as the time interval between the 10% and 90% of Amplitudes.

Refer to figure as below:

Normally White



Normally Black



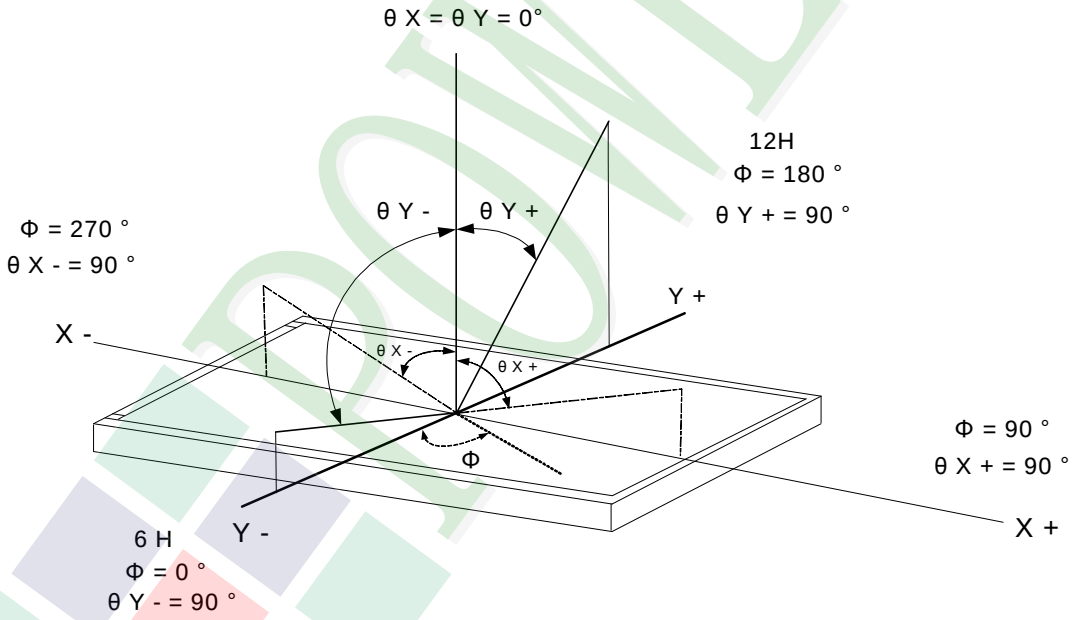
Note3: Definition of contrast ratio:

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

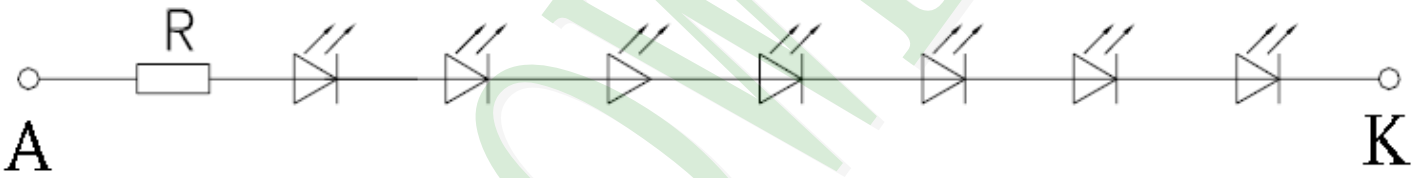
Maximum Ratings

Item	Symbol	Conditions	Min.	Max.	Unit
LED Forward Current	IF	Ta =25℃	-	30	mA
LED Reverse Voltage	VR	Ta =25℃	-	7	V
Power Dissipation	PD	Ta =25℃	-	490	mW

Electrical / Optical Characteristics

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Forward Voltage	VF	IF= 20mA	19.6	22.8	24.5	V
Average Brightness (Without LCD &T/P)	IV		5000	6000	-	cd/m^2
CIE Color Coordinate (Without LCD &T/P)	X		0.26	0.30	0.34	-
	Y		0.26	0.30	0.34	
Color	White					

Circuit diagram



Other Description

Item	Conditions	Description
Life Time	Ta =25℃ IF= 20mA	20000 hrs

Note :

The backlight is driven by FP6745. The LEDs current can be set by modulating the EN pin with a PWM signal. The LED average current increases proportionally with the duty cycle of the PWM signal. The dimming frequency of the PWM signal can up to 50kHz and still retain well linearity. To avoid audio noise, dimming frequency greater than 20kHz is recommended.

The PWM signal is supplied by SSD1963. SSD1963 has a PWM configuration register . See description below.

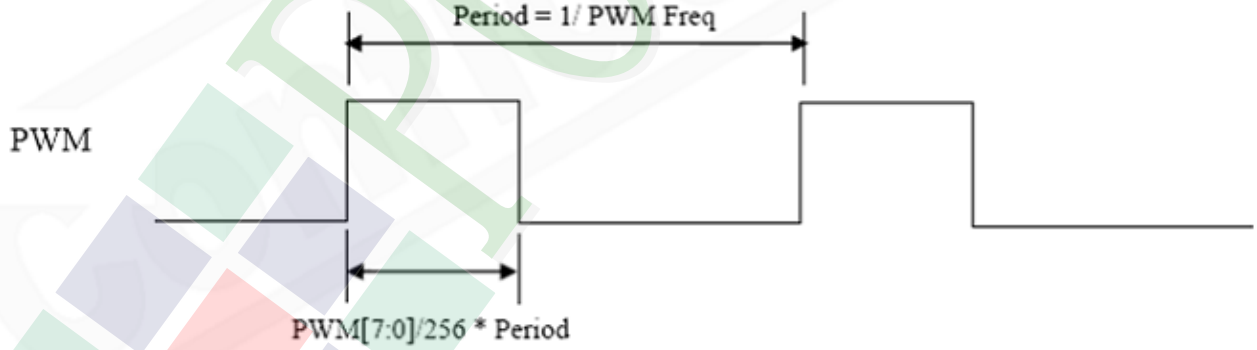
Command BEh
Parameters 6

	D/C	D7	D6	D5	D4	D3	D2	D1	D0	Hex
Command	0	1	0	1	1	1	1	1	0	BE
Parameter 1	1	$PWMF_7$	$PWMF_6$	$PWMF_5$	$PWMF_4$	$PWMF_3$	$PWMF_2$	$PWMF_1$	$PWMF_0$	xx
Parameter 2	1	PWM_7	PWM_6	PWM_5	PWM_4	PWM_3	PWM_2	PWM_1	PWM_0	xx
Parameter 3	1	0	0	0	0	C_3	0	0	C_0	xx
Parameter 4	1	D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0	xx
Parameter 5	1	E_7	E_6	E_5	E_4	E_3	E_2	E_1	E_0	xx
Parameter 6	1	0	0	0	0	F_3	F_2	F_1	F_0	xx

PWMF[7:0] : Set the PWM frequency in system clock (POR = 00000000)
PWM signal frequency = PLL clock / (256 * PWMF[7:0]) / 256

PWM[7:0] : Set the PWM duty cycle (POR = 00000000)
PWM duty cycle = PWM[7:0] / 256
Note : PWM always 0 if PWM[7:0] = 00h

PWM signal



C[3] : PWM configuration (POR = 0)
0 PWM controlled by host
1 PWM controlled by DBC

C[0] : PWM enable (POR = 0)

0	PWM disable
1	PWM enable

D[7:0] : DBC manual brightness (POR = 00000000)

Set the brightness level

00	Dimmest
FF	brightest

E[7:0] : DBC minimum brightness (POR = 00000000)

Set the minimum brightness level

00	Dimmest
FF	Brightest

F[3:0] : Brightness prescaler (POR = 0000)

Set the brightness prescaler

0	Dimmest
F	Brightest

For detailed information please refer to IC datasheet : FP6745 , SSD1963 . The follow confirmation for PWM setting is recommended.

```
MOV     ADDRL,#BEH              ;Set PWM
CALL    WRITE_1963_COM
MOV     ADDRL,#00001000B        ;PWM Freaquency
CALL    WRITE_1963_PAR
MOV     ADDRL,#11111111B        ;PWM Duty= (D0~D7)/256
CALL    WRITE_1963_PAR
MOV     ADDRL,#00000001B        ;D3 -> 0:Host
CALL    WRITE_1963_PAR          ;D0 -> 1:Enable   0: Disable
MOV     ADDRL,#00001111B
CALL    WRITE_1963_PAR
MOV     ADDRL,#00001111B
CALL    WRITE_1963_PAR
MOV     ADDRL,#00001111B
CALL    WRITE_1963_PAR
```

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.Hardness of surface	3H -pressure 500g of ,45deg.
3.Activation Force	50gf（TYP. 20gf）less individual point with stylus pen(R0.8) Activation force guarantee area:5.0mm inside of Active Area.
4.Linearity Force	100gf less input with stylus pen(R0.8) Linearity force guarantee area:3.0mm inside of Active Area.

1.7.3 Electrical Characteristics

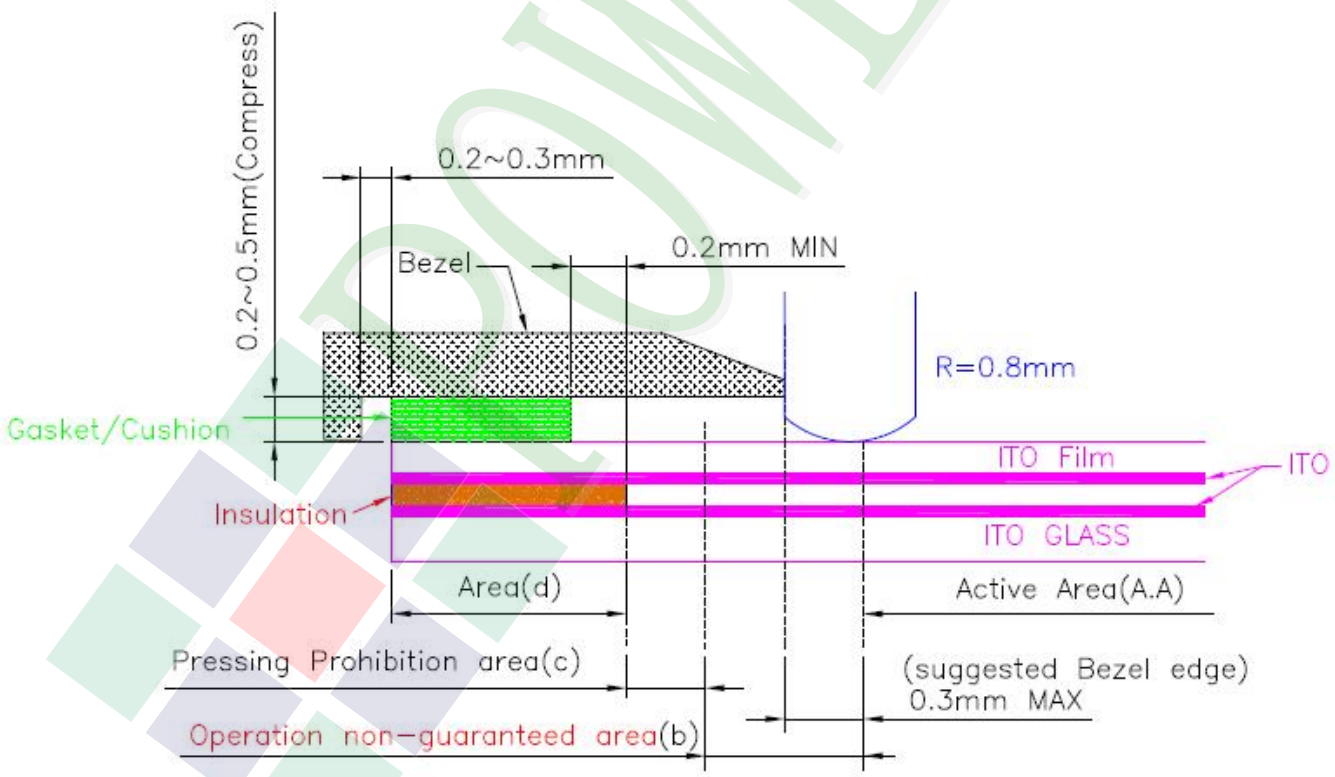
Item	Specification
1.Rated Voltage	DC 5V(DC 7V Max)
2.Resistance Between Terminals.	Direction X (Glass side): 260Ω~1240Ω
	Direction Y (Film side): 160Ω~640Ω
3.Insulation Resistance	20 MΩ or more (DC 25V 1min)
4.Linearity	± 1.5% Measuring method, Linearity(%)= ΔV/（EV-SV） *100 ± 1.5%(after environmental and life test) 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
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	Pen Sliding Durability	100,000 times min(Tip R0.8mm).	Follow 1.7.3 item2 and item4.
3	Impact Resistance	ψ9mm steel ball is dropped on the surface from 30 cm height at 1 time.	No Crack
4	Flexible pattern Bending Resistance	Bending 3 times by bending radius R1.0 mm	Follow 1.7.3 item2.

1.7.5 Touch Panel Design/Handing 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 .

Area(d)：Non-Active area

The area does not activate even if pressed.

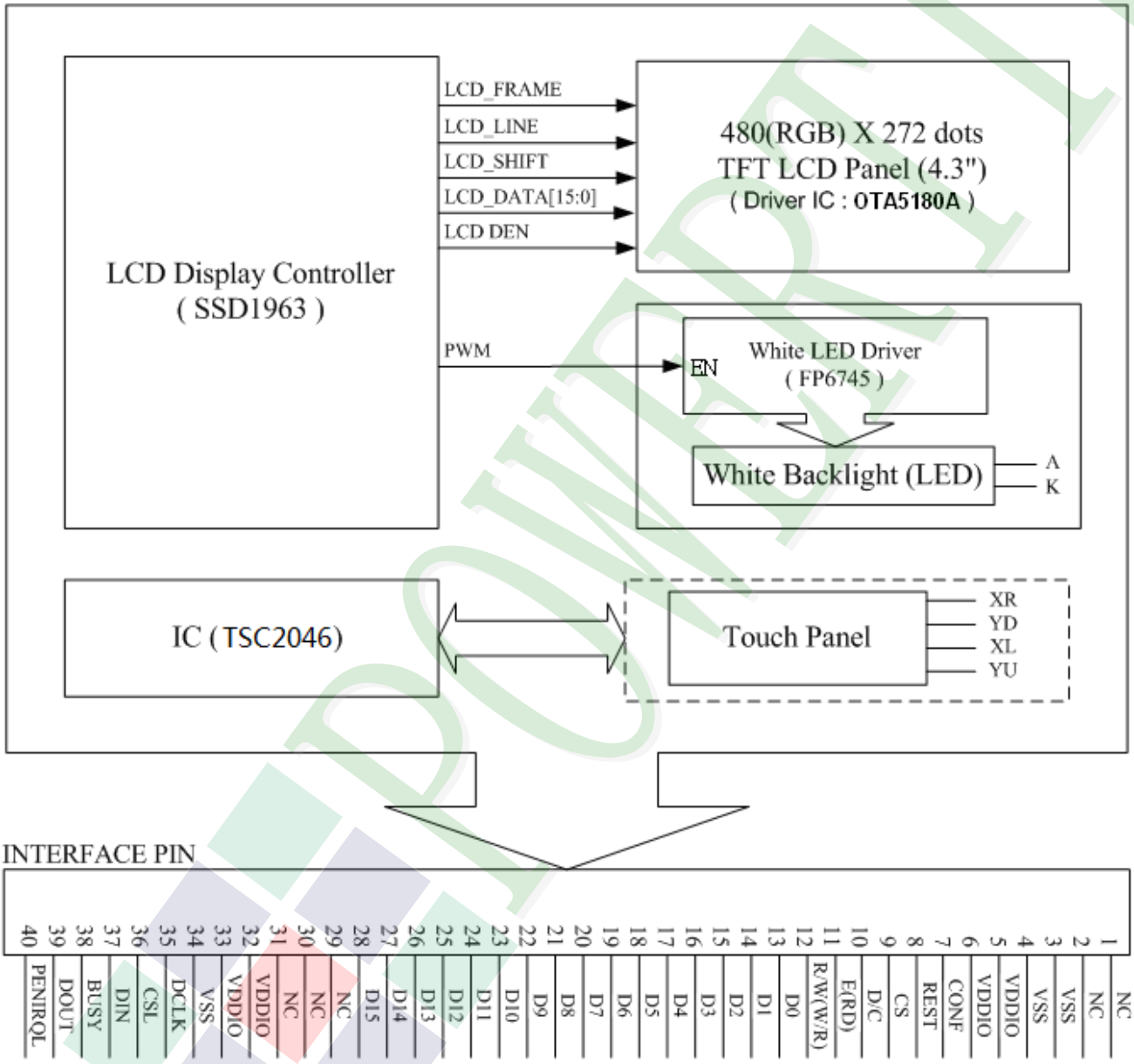
2. MODULE STRUCTURE

2.1 Counter Drawing

2.1.1 LCM Mechanical Diagram

* See Appendix

2.1.2 Block Diagram



INTERFACE PIN

40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
PENIRQL	DOUT	BUSY	DIN	CSL	DCLK	VSS	VDDIO	VDDIO	NC	NC	NC	D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0	R/W(W/R)	E(RD)	D/C	CS	REST	CONF	VDDIO	VDDIO	VSS	VSS	NC	NC

2.2 Interface Pin Description

Pin No.	Symbol	Function
1	NC	Not Connect
2	NC	Not Connect
3	VSS	Ground
4	VSS	Ground
5	VDDIO	Power Supply Voltage.
6	VDDIO	Power Supply Voltage.
7	CONF	MCU interface configuration 0: 6800 Interface 1: 8080 Interface
8	RESET	Master synchronize reset.
9	CS	Chip select.
10	D/C	Data/Command select.
11	E (RD)	6800 mode: E (enable signal) 8080 mode: RD (read strobe signal)
12	R/W (W/R)	6800 mode: R/W 0: Write cycle 1: Read cycle 8080 mode: WR (write strobe signal)
13	D0	Data bus.
14	D1	Data bus.
15	D2	Data bus.
16	D3	Data bus.
17	D4	Data bus.
18	D5	Data bus.
19	D6	Data bus.
20	D7	Data bus.
21	D8	Data bus.
22	D9	Data bus.
23	D10	Data bus.

Pin No.	Symbol	Function
24	D11	Data bus.
25	D12	Data bus.
26	D13	Data bus.
27	D14	Data bus.
28	D15	Data bus.
29	NC	Not Connect
30	NC	Not Connect
31	NC	Not Connect
32	VDDIO	Power Supply Voltage. (For T/P)
33	VDDIO	Power Supply Voltage. (For T/P)
34	VSS	Ground. (For T/P)
35	DCLK	Serial Interface Clock Input. (For T/P)
36	CSL	Chip Select Input (Active Low); this pin is used to initialize the transmission and ADC conversion, don't tied to GND directly. (For T/P)
37	DIN	Serial Data Input. (For T/P)
38	BUSY	Busy Output. High impedance when CSL is high. (For T/P)
39	DOUT	Serial Data output. High impedance when CSL is high. (For T/P)
40	PENIRQL	Pen Interrupt. (For T/P)

2.2.1 Refer Initial Code

```
#define  line          480                    //Set LCD Horizontal Pixel
#define  row           272                    //Set LCD Vertical Pixel
#define  VSYNC         75                     //Set Frame Freqence. HSYNC=VSYNC*VT
#define  fosc          10000000
#define  PLL_N         46                     //Set PLL M
#define  PLL_M         11//4                  //Set PLL N
#define  PLL           (fosc*PLL_N/PLL_M)
#define PWMF           64                     //Set PWM Freqence
#define  HPS           44                     //Set Horizontal no-display area
#define  HPW           10                     //Set HSYNC pulse width
#define  HT            (line+HPS+8)           //HSYNC Front Porch=8
#define  VPS           12                     //Set Vertical no-display area
#define  VPW           10                     //Set VSYNC pulse width
#define  VT            (row+VPS+4)            //VSYNC Front Porch=4
float VTT=VT;
float HTT=HT;
long FPR;
float DCLK,FPRF;

long count_freq(VF)
{
      DCLK=VTT*HTT*VF;
      FPRF=((DCLK*1024*1024)/PLL)-1;
      FPR=FPRF;
      return FPR;
}
.
.
.
void int_ssd1963()
{     write_com1963(0xe2);
      write_dat1963(PLL_N-1);
      write_dat1963(PLL_M-1);
      write_dat1963(0x54);

      write_com1963(0xe0);
      write_dat1963(0x01);                    //;D0=1 Enable PLL
```

```
delay(10);

write_com1963(0xe0);
write_dat1963(0x03);                    //;D1=1 Use PLL output as system clock

write_com1963(0xe6);
write_dat1963(count_freq(VSYNC)/65536);
write_dat1963((count_freq(VSYNC)%65536)/256);
write_dat1963((count_freq(VSYNC)%65536)%256);

write_com1963(0xb0);
write_dat1963(0x28);
write_dat1963(0x00);
write_dat1963((line-1)/256);
write_dat1963((line-1)%256);
write_dat1963((row-1)/256);
write_dat1963((row-1)%256);
write_dat1963(0x2d);

write_com1963(0xb4);
write_dat1963((HT-1)/256);
write_dat1963((HT-1)%256);
write_dat1963(0x00);
write_dat1963(HPS-1);
write_dat1963(HPW-1);
write_dat1963(0x00);
write_dat1963(0x00);
write_dat1963(0x00);

write_com1963(0xb6);
write_dat1963(VT/256);
write_dat1963(VT%256);
write_dat1963(0x00);
write_dat1963(VPS);
write_dat1963(VPW-1);
write_dat1963(0x00);
write_dat1963(0x00);

write_com1963(0x11);
```

```
    write_com1963(0x36);
    write_dat1963(0x00);

    write_com1963(0x3a);
    write_dat1963(0x70);

    write_com1963(0xf0);
    write_dat1963(0x03);                    //Set 16 bit databus

    write_com1963(0x2a);
    write_dat1963(0x00);
    write_dat1963(0x00);
    write_dat1963((line-1)/256);
    write_dat1963((line-1)%256);

    write_com1963(0x2b);
    write_dat1963(0x00);
    write_dat1963(0x00);
    write_dat1963((row-1)/256);
    write_dat1963((row-1)%256);

    write_com1963(0xbe);                    //Set PWM frequence and duty
    write_dat1963(PLL/65536/PWMF);
    write_dat1963(255);                     // PWM Duty= (D0~D7)/256
    write_dat1963(0x01);                    //Set PWM by host
    write_dat1963(0x10);
    write_dat1963(0x10);
    write_dat1963(0x00);

    write_com1963(0x29);
}
```

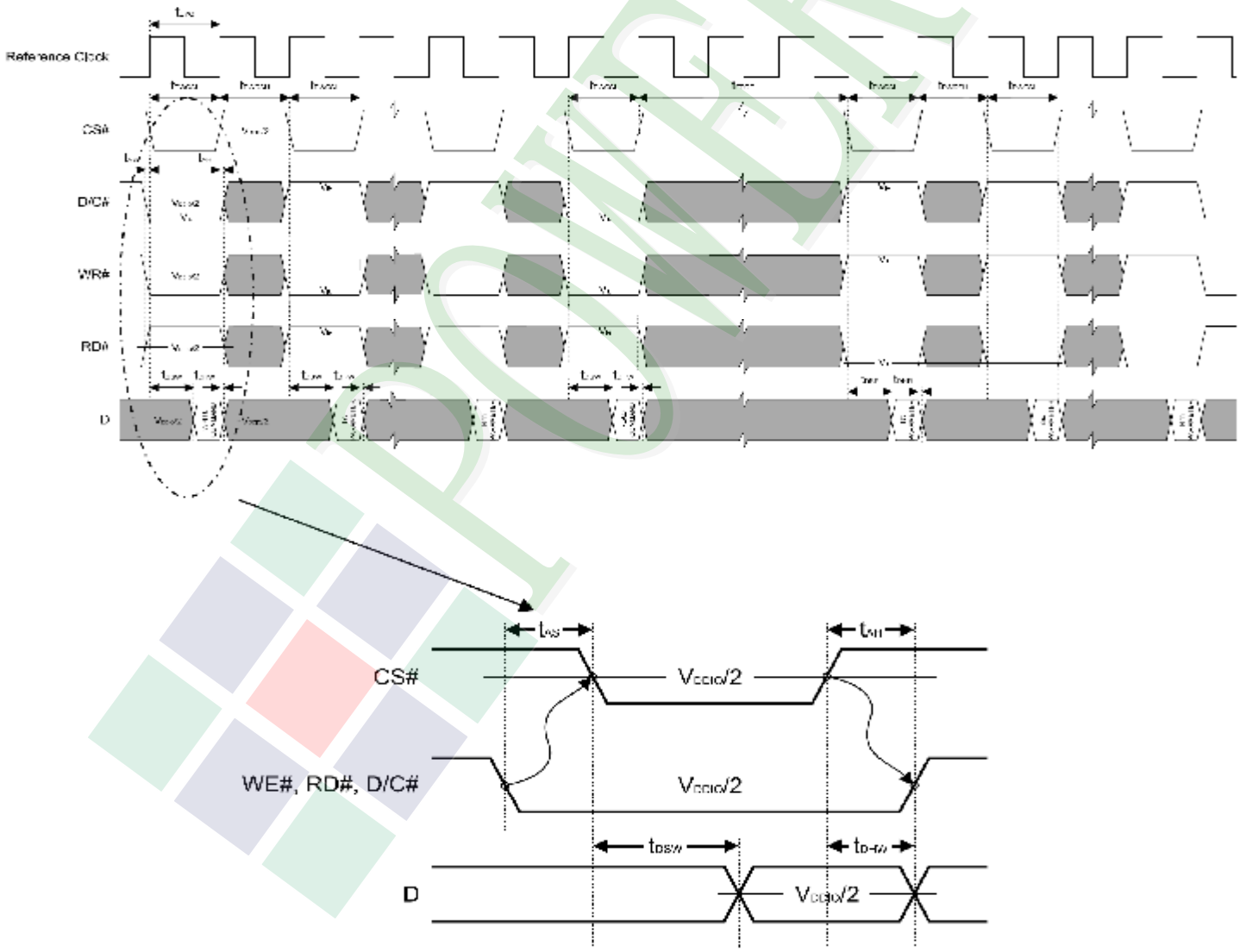
2.3 Timing Characteristics

2.3.1 8080 Mode

8080 Mode Timing

Symbol	Parameter	Min	Typ	Max	Unit
t_{cyc}	Reference Clock Cycle Time	9	-	-	ns
t_{PWCSL}	Pulse width CS# low	1	-	-	t_{CYC}
t_{PWCSH}	Pulse width CS# high	1	-	-	t_{CYC}
t_{FDRD}	First Read Data Delay	5	-	-	t_{CYC}
t_{AS}	Address Setup Time	1	-	-	ns
t_{AH}	Address Hold Time	1	-	-	ns
t_{DSW}	Data Setup Time	4	-	-	ns
t_{DHW}	Data Hold Time	1	-	-	ns
t_{DSR}	Data Access Time	-	-	5	ns
t_{DHR}	Output Hold time	1	-	-	ns

8080 Mode Timing Diagram

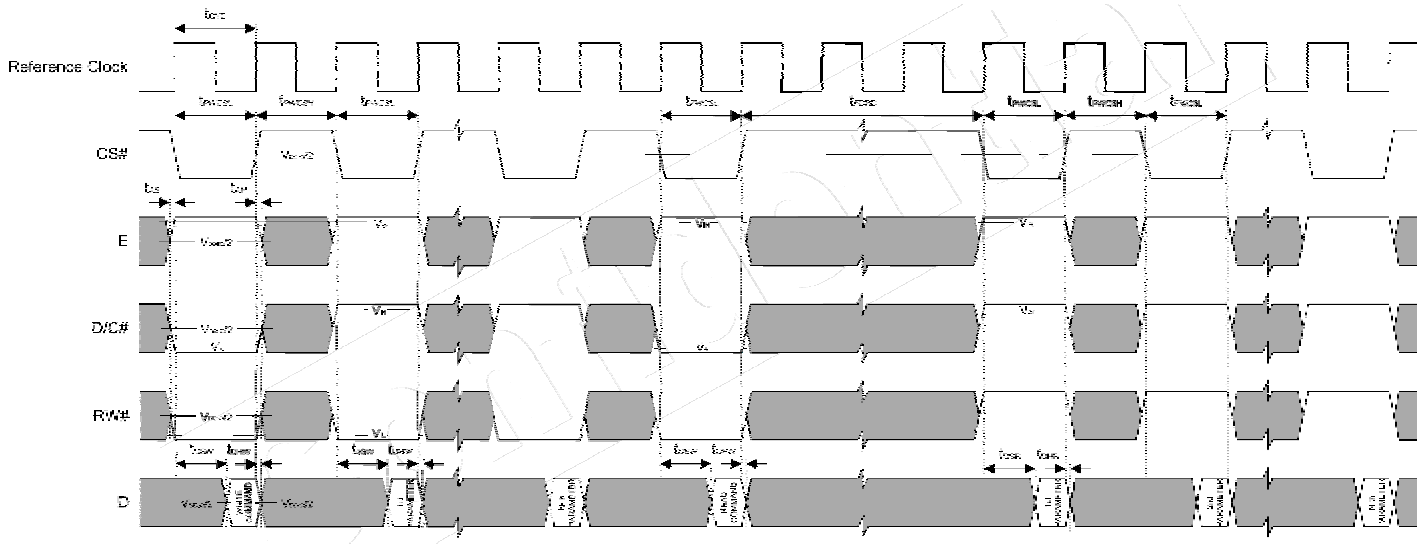


2.3.2 6800 Mode

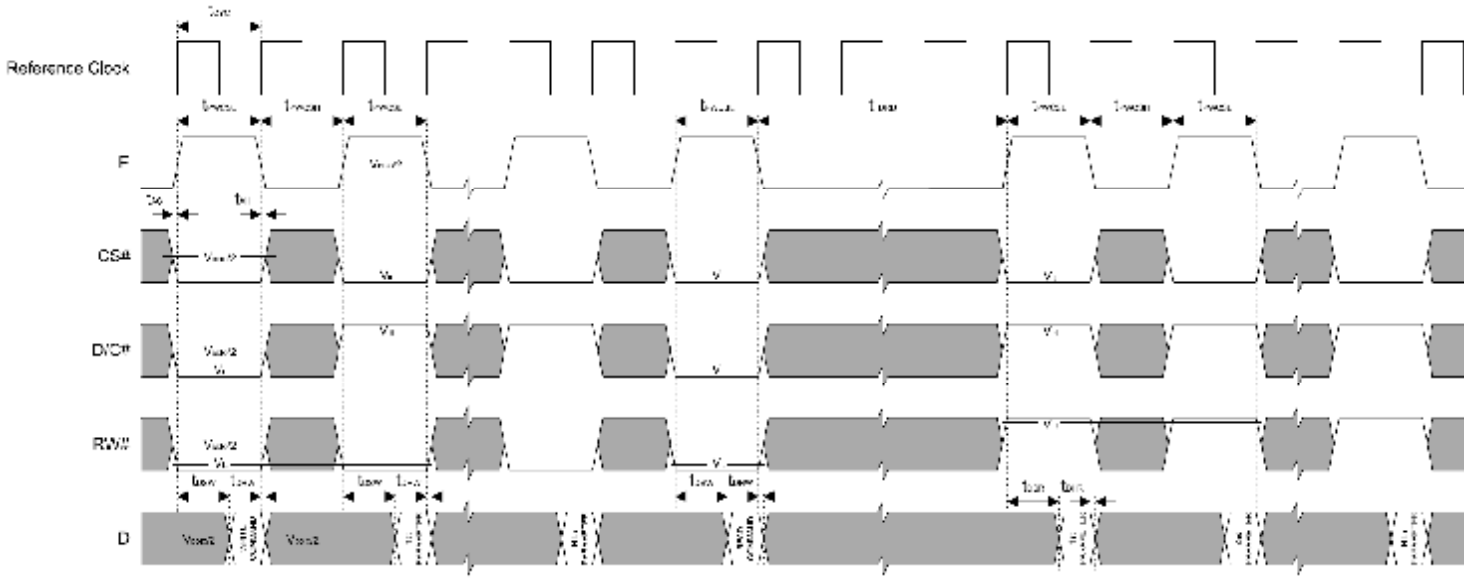
6800 Mode Timing

Symbol	Parameter	Min	Typ	Max	Unit
t_{CYC}	Reference Clock Cycle Time	9	-	-	ns
t_{PWCSL}	Pulse width CS# or E low	1	-	-	t_{CYC}
t_{PWCSH}	Pulse width CS# or E high	1	-	-	t_{CYC}
t_{HDRD}	First Data Read Delay	5	-	-	t_{CYC}
t_{AS}	Address Setup Time	1	-	-	ns
t_{AH}	Address Hold Time	1	-	-	ns
t_{DSW}	Data Setup Time	4	-	-	ns
t_{DHW}	Data Hold Time	1	-	-	ns
t_{DSR}	Data Access Time	-	-	5	ns
t_{DHR}	Output Hold time	1	-	-	ns

6800 Mode Timing Diagram (Use CS# as Clock)

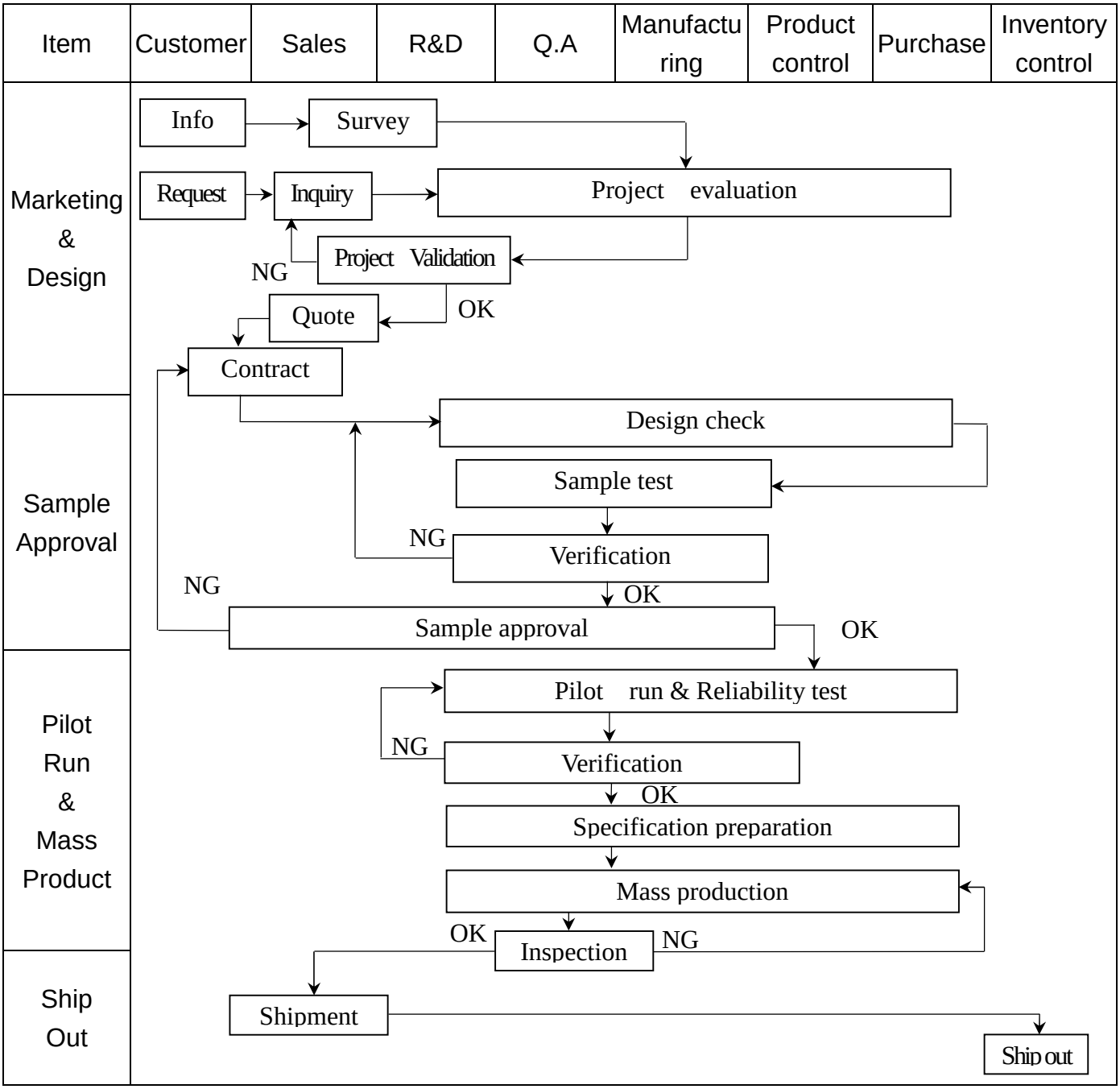


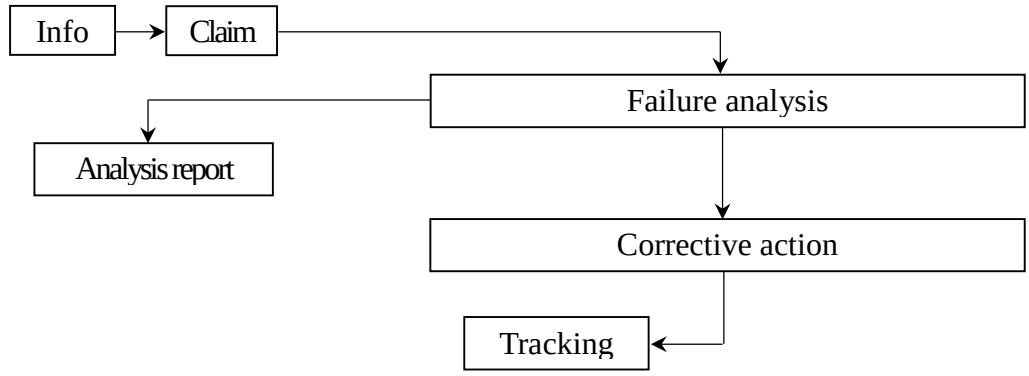
6800 Mode Timing Diagram (Use E as Clock)



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								
Q.A Activity	1. ISO 9001 Maintenance Activities 2. Process improvement proposal 3. Equipment calibration 4. Education And Training Activities 5. Standardization Management							

3.2 Inspection Specification

◆Scope：The document shall be applied to TFT-LCD Module for 3.5″ ~10″ (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

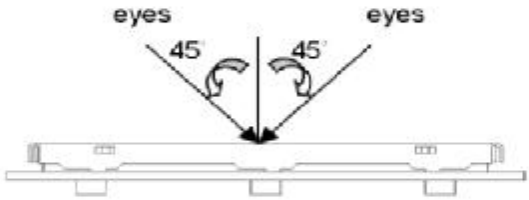
◆OUT Going Defect Level：Sampling.

◆Standard of the product appearance test：

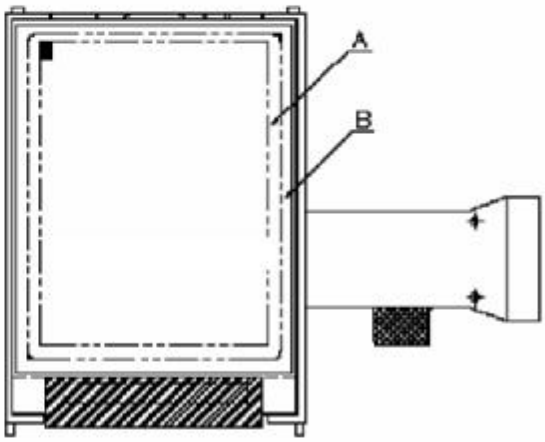
a. Manner of appearance test：

(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

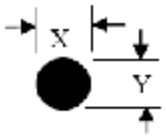
(4). Standard of inspection： (Unit：mm)

◆Specification For TFT-LCD Module 3.5″ ~10″ : (Ver.B01)

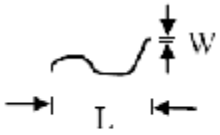
<table>
<tr><th>NO</th><th>Item</th><th>Criterion</th><th>Level</th></tr>
<tr><td rowspan="3">01</td><td rowspan="3">Product condition</td><td>1.1 The part number is inconsistent with work order of production.</td><td>Major</td></tr>
<tr><td>1.2 Mixed product types.</td><td>Major</td></tr>
<tr><td>1.3 Assembled in inverse direction.</td><td>Major</td></tr>
<tr><td>02</td><td>Quantity</td><td>2.1 The quantity is inconsistent with work order of production.</td><td>Major</td></tr>
<tr><td>03</td><td>Outline dimension</td><td>3.1 Product dimension and structure must conform to structure diagram.</td><td>Major</td></tr>
<tr><td rowspan="5">04</td><td rowspan="5">Electrical Testing</td><td>4.1 Missing line character and icon.</td><td>Major</td></tr>
<tr><td>4.2 No function or no display.</td><td>Major</td></tr>
<tr><td>4.3 Display malfunction.</td><td>Major</td></tr>
<tr><td>4.4 LCD viewing angle defect.</td><td>Major</td></tr>
<tr><td>4.5 Current consumption exceeds product specifications.</td><td>Major</td></tr>
<tr><td>05</td><td>Dot defect
(Bright dot、Dark dot)
On -display</td><td>
<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>≦ 4</td></tr>
<tr><td>Dark Dot</td><td>≦ 5</td></tr>
<tr><td>Joint Dot</td><td>≦ 3</td></tr>
<tr><td>Total</td><td>≦ 7</td></tr>
</table>
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.
</td><td>Minor</td></tr>
</table>

◆Specification For TFT-LCD Module 3.5″ ~10″ : (Ver.B01)

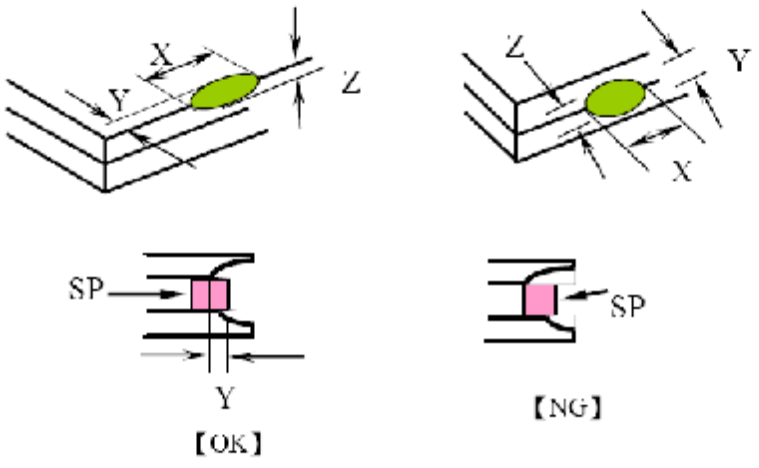
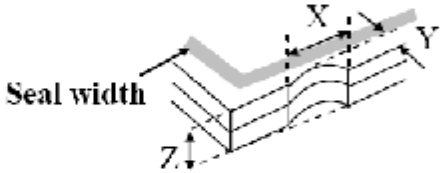
<table>
<tr><th>NO</th><th>Item</th><th>Criterion</th><th>Level</th></tr>
<tr><td>06</td><td>Black or white dot、scratch、contamination

Round type
 

Φ=(x+y) / 2

Line type
 
</td><td>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>Φ ≦ 0.25</td><td>Ignore</td><td rowspan="4">Ignore</td></tr><tr><td>0.25 < Φ ≦ 0.50</td><td>5</td></tr><tr><td>Φ > 0.50</td><td>0</td></tr><tr><td>Total</td><td>5</td></tr></table>
6.2 Line type(Non-display or display) :
<table><tr><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><tr><td>---</td><td>W ≦ 0.03</td><td>Ignore</td><td rowspan="4">Ignore</td></tr><tr><td>L ≦10.0</td><td>0.03 < W ≦ 0.05</td><td>4</td></tr><tr><td>L ≦5.0</td><td>0.05 < W ≦ 0.10</td><td>2</td></tr><tr><td>---</td><td>W >0.10</td><td>As round type</td></tr><tr><td colspan="2">Total</td><td>5</td></tr></table></td><td>Minor</td></tr>
<tr><td>07</td><td>Polarizer Bubble</td><td><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>Φ ≦ 0.25</td><td>Ignore</td><td rowspan="4">Ignore</td></tr><tr><td>0.25 < Φ ≦ 0.50</td><td>4</td></tr><tr><td>0.50 < Φ ≦ 0.80</td><td>1</td></tr><tr><td>Φ > 0.80</td><td>0</td></tr><tr><td>Total</td><td>5</td></tr></table></td><td>Minor</td></tr>
</table>

◆Specification For TFT-LCD Module 3.5″ ~10″ : (Ver:B01)

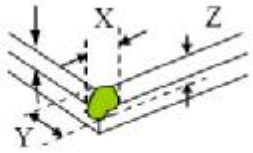
NO	Item	Criterion	Level
08	The crack of glass	Symbols : X : The length of crack Y : The width of crack. Z : The thickness of crack W : terminal length t : The thickness of glass a : LCD side length 8.1 General glass chip : 8.1.1 Chip on panel surface and crack between panels:  	Minor

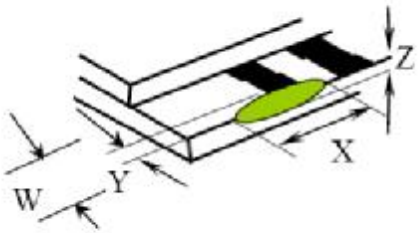
X	Y	Z
≦ a	Crack can't enter viewing area	≤1/2 t
≦ a	Crack can't exceed the half of SP width.	1/2 t < Z ≦2 t

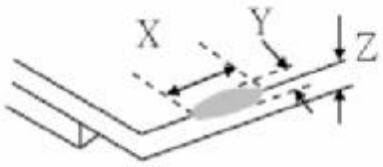
◆Specification For TFT-LCD Module 3.5″ ~10″ : (Ver.B01)

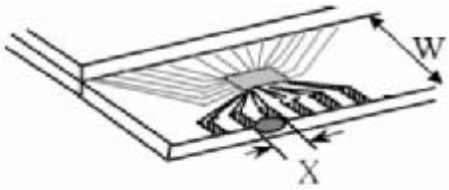
<table>
<tr><th>NO</th><th>Item</th><th>Criterion</th><th>Level</th></tr>
<tr><td rowspan="2">08</td><td rowspan="2">The crack of glass</td><td>
Symbols :

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

8.1.2 Corner crack :


<table>
<tr><th>X</th><th>Y</th><th>Z</th></tr>
<tr><td>≦1/5 a</td><td>Crack can't enter viewing area</td><td>Z ≦ 1/2 t</td></tr>
<tr><td>≦1/5 a</td><td>Crack can't exceed the half of SP width.</td><td>1/2 t < Z ≦ 2 t</td></tr>
</table>
</td><td rowspan="2">Minor</td></tr>
<tr><td>
8.2 Protrusion over terminal :
8.2.1 Chip on electrode pad :




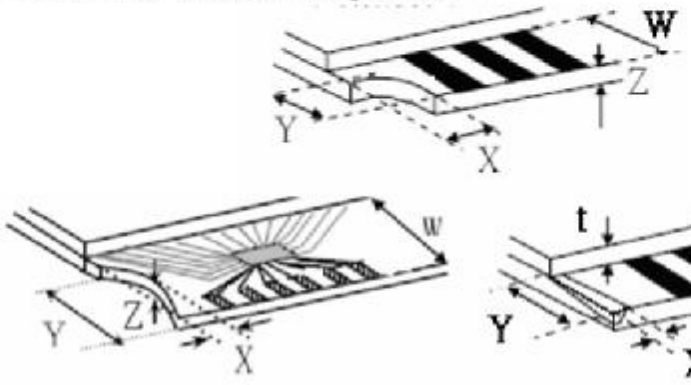


<table>
<tr><th></th><th>X</th><th>Y</th><th>Z</th></tr>
<tr><td>Front</td><td>≦ a</td><td>≦ 1/2 W</td><td>≦ t</td></tr>
<tr><td>Back</td><td>≦ a</td><td>≦ W</td><td>≦ 1/2 t</td></tr>
</table>
</td></tr>
</table>

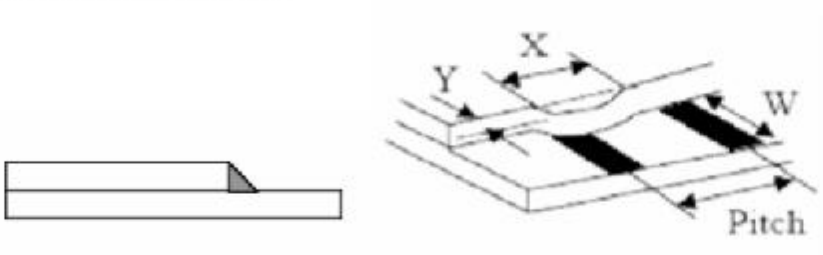
◆Specification For TFT-LCD Module 3.5″ ~10″ : (Ver.B01)

<table>
<tr><th>NO</th><th>Item</th><th>Criterion</th><th>Level</th></tr>
<tr><td>08</td><td>The crack of glass</td><td>
Symbols :

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

8.2.2 Non-conductive portion :


<table>
<tr><th>X</th><th>Y</th><th>Z</th></tr>
<tr><td>≦ 1/3 a</td><td>≦ W</td><td>≦t</td></tr>
</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>
<tr><th>X</th><th>Y</th><th>Z</th></tr>
<tr><td>≦ a</td><td>≦ 1/3 W</td><td>≦t</td></tr>
</table>
</td><td>Minor</td></tr>
</table>

◆Specification For TFT-LCD Module 3.5″ ~10″ : (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 ≦1.5 mm.	Minor

4. RELIABILITY TEST

4.1 Reliability Test Condition (Ver.B01)

<table>
<tr><th>NO.</th><th>TEST ITEM</th><th colspan="2">TEST CONDITION</th></tr>
<tr><td>1</td><td>High Temperature Storage Test</td><td colspan="2">Keep in +80 ±2℃ 96 hrs
Surrounding temperature, then storage at normal condition 4hrs.</td></tr>
<tr><td>2</td><td>Low Temperature Storage Test</td><td colspan="2">Keep in -30 ±2℃ 96 hrs
Surrounding temperature, then storage at normal condition 4hrs.</td></tr>
<tr><td>3</td><td>High Temperature / High Humidity Storage Test</td><td colspan="2">Keep in +60 ℃ / 90% R.H duration for 96 hrs
Surrounding temperature, then storage at normal condition 4hrs.
(Excluding the polarizer)</td></tr>
<tr><td>4</td><td>Temperature Cycling Storage Test</td><td colspan="2">-30℃ → +25℃ → +80℃ → +25℃
(30mins) (5mins) (30mins) (5mins)
10 Cycle
Surrounding temperature, then storage at normal condition 4hrs.</td></tr>
<tr><td rowspan="2">5</td><td rowspan="2">ESD Test</td><td>Air Discharge:
Apply 2 KV with 5 times Discharge for each polarity +/-</td><td>Contact Discharge:
Apply 250 V with 5 times discharge for each polarity +/-</td></tr>
<tr><td colspan="2">1. Temperature ambiance : 15℃～35℃
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 sec) (Tolerance if the output voltage indication : ±5%)</td></tr>
<tr><td>6</td><td>Vibration Test (Packaged)</td><td colspan="2">1. Sine wave 10～55 Hz frequency (1 min/sweep)
2. The amplitude of vibration :1.5 mm
3. Each direction (X、Y、Z) duration for 2 Hrs</td></tr>
<tr><td>7</td><td>Drop Test (Packaged)</td><td colspan="2"><table><tr><th>Packing Weight (Kg)</th><th>Drop Height (cm)</th></tr><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></table>Drop Direction :※1 corner / 3 edges / 6 sides each 1time</td></tr>
</table>

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±10℃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℃ ±5℃ 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.

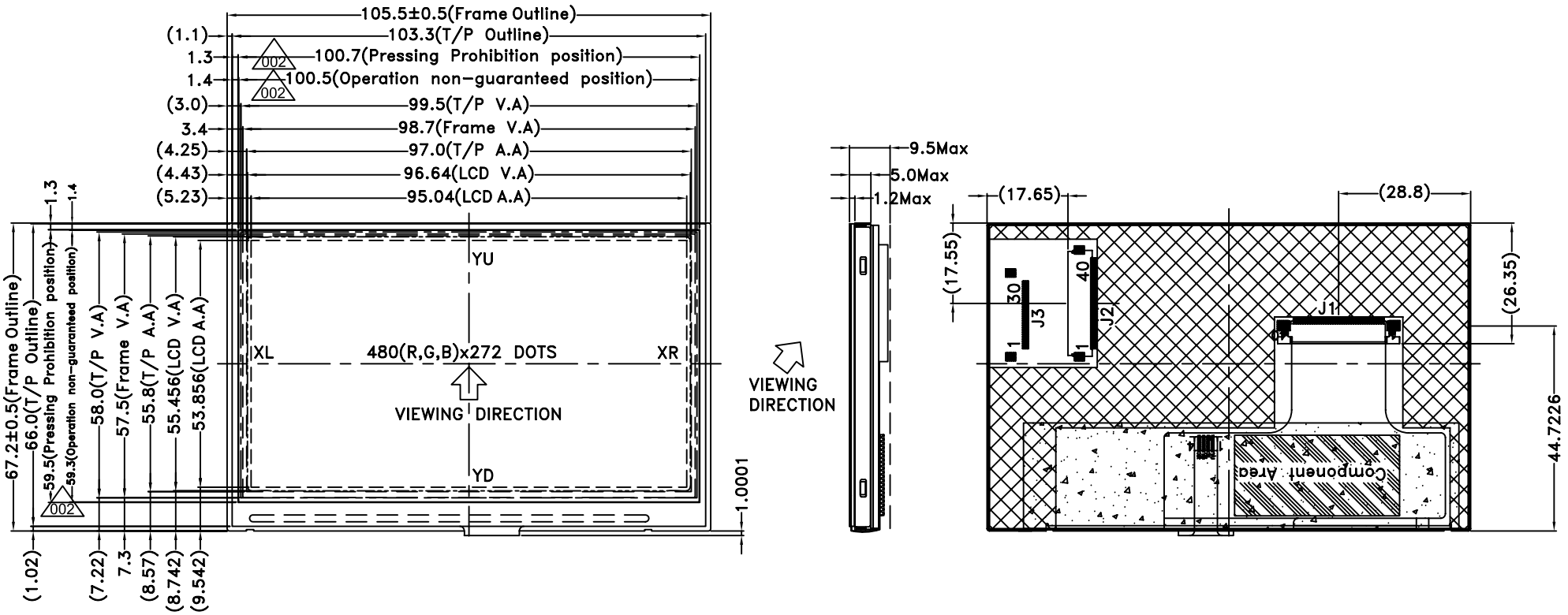
5.4 TERMS OF WARRANTY

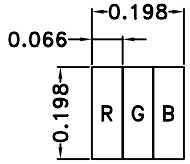
5.4.1 Applicable warrant period

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.





PIXEL Detail
SCALE:80/1

NOTES:
1.LCD TYPE: a-Si TFT
2.LCD DISPLAY:POSITIVE/TRANSMISSIVE
3.VIEW DIRECTION: 6 O'CLOCK
4.Top: -20~70°C Tst:-30~80°C
5.The tolerance unless classified ±0.2mm
6.IC NO.: OTA5180A
7. FPC Component Area
Shield tape
8.J2:IRISO:IMSA-9637S-40Y923 003

REV	REV BY	REVISER	DATE
007			
006			
005			
004			
003	ADD NOTE 8	Air	2014/04/10
002	ADD DIMENSION	Air	2014/01/27
001	NEW DRAWING	Air	2011/06/24

PART NO: PH480272T-006-I06Q

DRAWING NAME : JLMD-PH480272T-006-I06Q

TITLE: LCD Module Drawing

久正光電股份有限公司
POWERTIP TECHNOLOGY CORPORATION

Design	Air	⟨3⟩	Surface		
Check	Terry	Unit	MM	Material	
		Scale	1:1.3	Thickness	
Approve	Ryan	Page	1/1	Quantity	

Length(Min) (mm) / Tolerance / Precision	Precision Level
1 ~ 4	-
4 ~ 16	-
16 ~ 63	-
63 ~ 250	-
250 ~ 1000	-

Ver.001	
Documents NO.	JPKG-PH480272T-006-I06Q

LCM包裝規格書
LCM Packaging Specifications

Approve	Check	Contact
Ryan	Eddy	Air

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

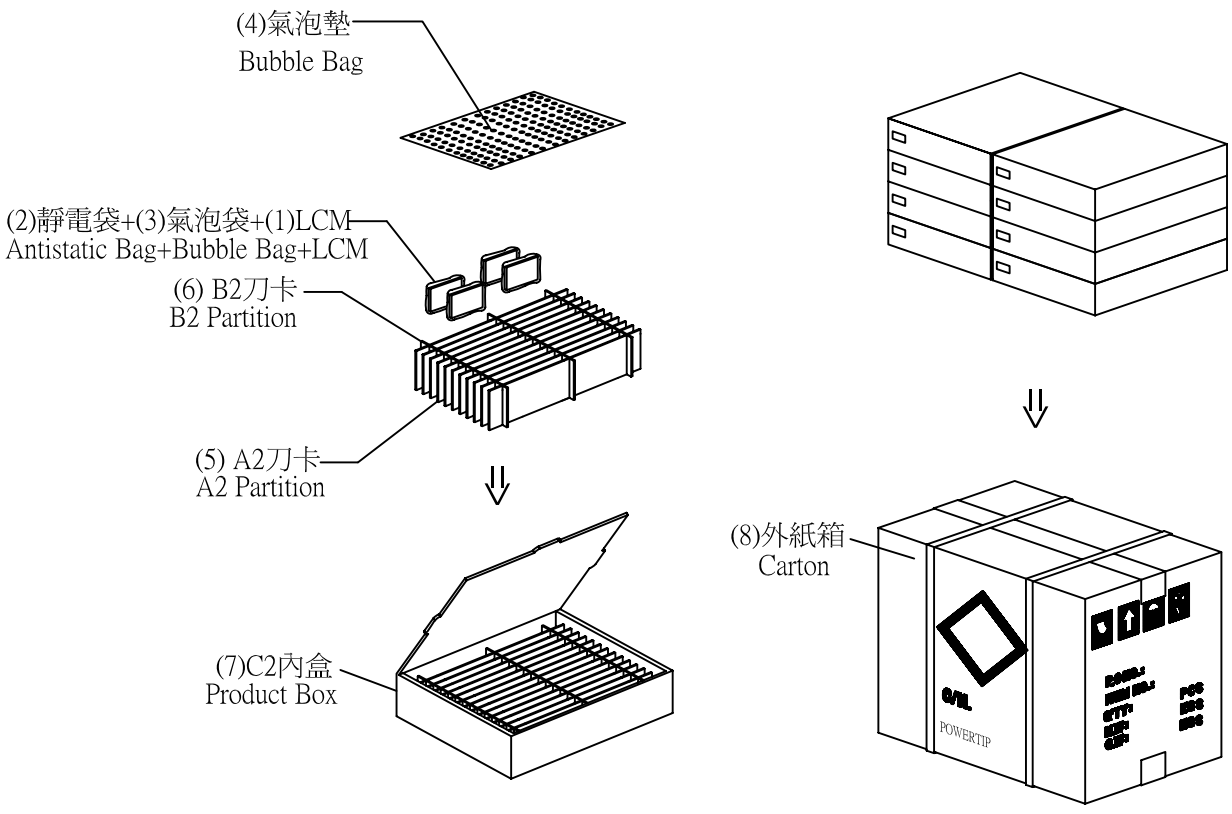
No.	Item	Model	Dimensions (mm)	1Pcs Weight	Quantity	Total Weight
1	成品(1) (LCM)	PH480272T-006-I06Q	105.5*67.2*9.5	0.0917	128	11.7376
2	靜電袋(2)Antistatic Bag	BAG150100ARABA	150*120*0.05	0.0024	128	0.3072
3	氣泡袋(3)Bubble Bag	BAG0000000005	120*(120+30)	0.0016	128	0.2048
4	氣泡墊(4)Bubble Bag	BAG290240BRBBA	240*290*5	0.0029	16	0.0464
5	刀卡A2(5)A2 Partition	BX29500072BZBA	295*72*3	0.0065	104	0.676
6	刀卡B2(6)B2 Partition	BX24500072BZBA	245*72*3	0.009	24	0.216
7	C2內盒(7)Product Box	BX31025580AABA	310*255*86	0.1428	8	1.1424
8	外紙箱(8)Carton	BX52532536CCBA	525*325*360	1.092	1	1.092
9						

2.一 整箱總重量 (Total LCD Weight in carton) : 15.42 Kg±10%

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

(1)Quantity Of Spacer : A1刀卡 X 13 , B1刀卡 X 3

(2)Total LCM quantity in carton : quantity per box 16 x no. of boxes 8 = 128



特 記 事 項 (REMARK)

1. Label Specifications :

MODEL:
LOT NO:
QUANTITY:
CHECK:

前、后各空一格

每裝兩片模組空一格，如右圖所示