POWERTIP TECH. CORP.

SPECIFICATIONS

CUSTOMER	:	
SAMPLE CODE	:	SH240320T063-LAC
MASS PRODUCTION CODE	:	PH240320T063-LAC
SAMPLE VERSION	:	01
SPECIFICATIONS EDITION	:	002
DRAWING NO. (Ver.)	:	LMD- PH240320T063-LAC (Ver:001)
PACKAGING NO. (Ver.)	:	PKG- PH240320T063-LAC (Ver:001)

Customer Approved

Date:

Approved	Checked	Designer
廖志豪 Rex Liao	廖志豪 Rex Liao	張慶源 Yuan Chang

POWERTIP
2015.08.05
TW RD APR

□ Preliminary specification for design input

■ Specification for sample approval

POWERTIP TECH. CORP.

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History of Version

Date (mm / dd / yyyy)	Ver.	Edi.	Description	Page	Design by
2015/06/24	01	001	New Drawing	-	Yuan
2015/08/04	01	002	First Sample	-	Yuan

Total: 28 Page

Contents

Note : For detailed information please refer to IC data sheet :

Primacy(TFT LCD): Sitronix:ST7789V

1. SPECIFICATIONS

1.1 Features

Main LCD panel

Item	Standard Value
Display Type	240(R、G、B) * 320 Dots
LCD Type	Normally white , Transmissive type
Screen size(inch)	2.8 inch
Viewing Direction	12 O'clock
Color configuration	RGB-Strip
Backlight	LED Backlight
Interface	8/16-bit 80-system I/F
Other(controller/driver IC)	Sitronix:ST7789V
ROHS	THIS PRODUCT CONFORMS THE ROHS OF PTC Detail information please refer websitde : http://www.powertip.com.tw/news.php?area_id_view=1085560481/

1.2 Mechanical Specifications

Item	Standard Value	Unit
Outline Dimension	55.8(W) * 75.0 (L) * 4.25 (H)	mm

LCD panel

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

Touch panel

Item	Standard Value	Unit
View Area	44.2 (W) * 58.6 (L)	mm
Active Area	45.2 (W) * 59.6 (L)	mm

1.3 Absolute Maximum Ratings

Module

Item	Symbol	Condition	Min.	Max.	Unit
System Power Supply Voltage	VCC	-	-0.3	+4.6	V
	VGH ~ VGL	-	-0.3	+30	V
Input Voltage	VIN	-	0.5	IOVCC+0.5	V
Operating Temperature	T_{OP}	-	-20	+70	°C
Storage Temperature	T_{ST}	-	-30	+80	°C
Storage Humidity	H_D	Ta ≦ 40 °C	20	90	%RH

1.4 DC Electrical Characteristics

Module

GND = 0V, Ta = 25°C

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Power Supply Voltage1	VCC	-	-	2.8	-	V
Input High Voltage	V_{IH}	-	0.7 VCC	-	VCC	V
Input Low Voltage	V_{IL}	-	GND	-	0.3 VCC	V
Output High Voltage	V_{OH}	I_{OH}=-0.1mA	0.8*VDD	-	VDD	V
Output Low Voltage	V_{OL}	I_{OL}=0.1mA	GND	-	0.2*VDD	V
Supply Current	ICC	VCC = 2.8V Pattern=full display *1	-	8	10	mA

Note1:Maximum current display

1.5 Optical Characteristics

TFT LCD Module VCC = 2.8V, Ta=25°C

Item		Symbol	Condition	Min.	Typ.	Max.	unit	-
Response time		Tr+ Tf	Ta = 25°C θX, θY = 0°	-	31	47	ms	Note2
Viewing angle	Top	θY+	-	-	60	-	Deg.	Note4
	Bottom	θY-	-	-	60	-		
	Left	θX-	-	-	60	-		
	Right	θX+	-	-	60	-		
Contrast ratio		CR	Ta = 25°C θX , θY = 0°	-	500	600	-	Note3
Color of CIE Coordinate (With B/L&T/P)	White	X	-	0.25	0.30	0.35	-	Note1
		Y		0.28	0.33	0.38		
	Red	X		0.58	0.63	0.68		
		Y		0.30	0.35	0.40		
	Green	X		0.30	0.35	0.40		
		Y		0.56	0.61	0.66		
	Blue	X		0.09	0.14	0.19		
		Y		0.03	0.08	0.13		
Average Brightness Pattern=white display (With B/L&T/P) *1		IV	IF=80 mA	320	350	-	cd/m^2	
Uniformity (With B/L&T/P)*2		△B	IF=80 mA	70	-	-	%	

Note 1:

*1：△B=B(min) / B(max) * 100%

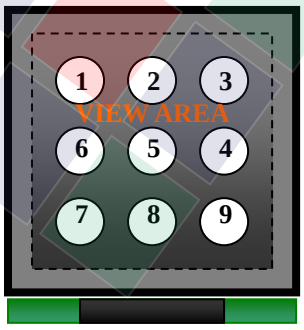
*2：Measurement Condition for Optical Characteristics:

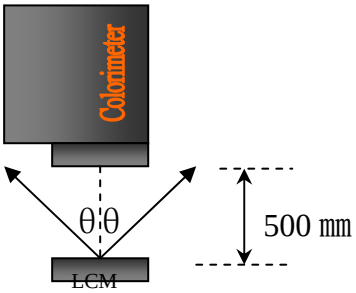
a：Environment: 25℃±5℃ / 60±20%R.H, no wind, dark room below 10 Lux at typical lamp current and typical operating frequency.

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

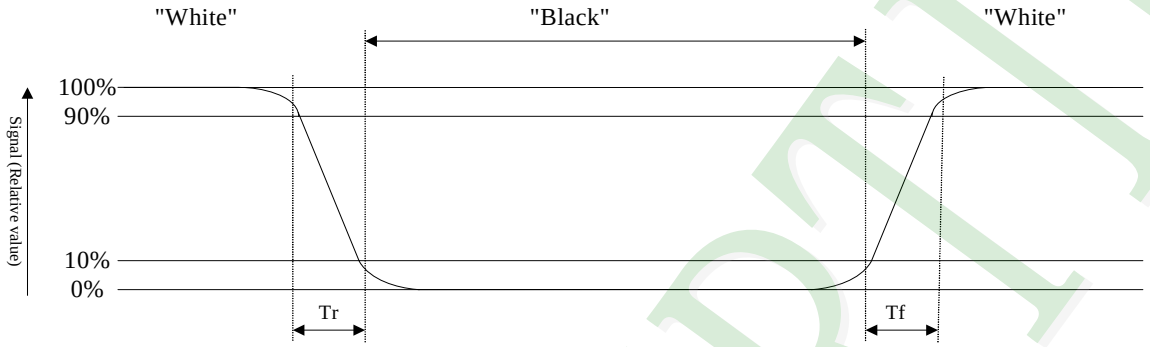
To be measured at the center area of panel with a viewing cone of 1° by Topcon

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:



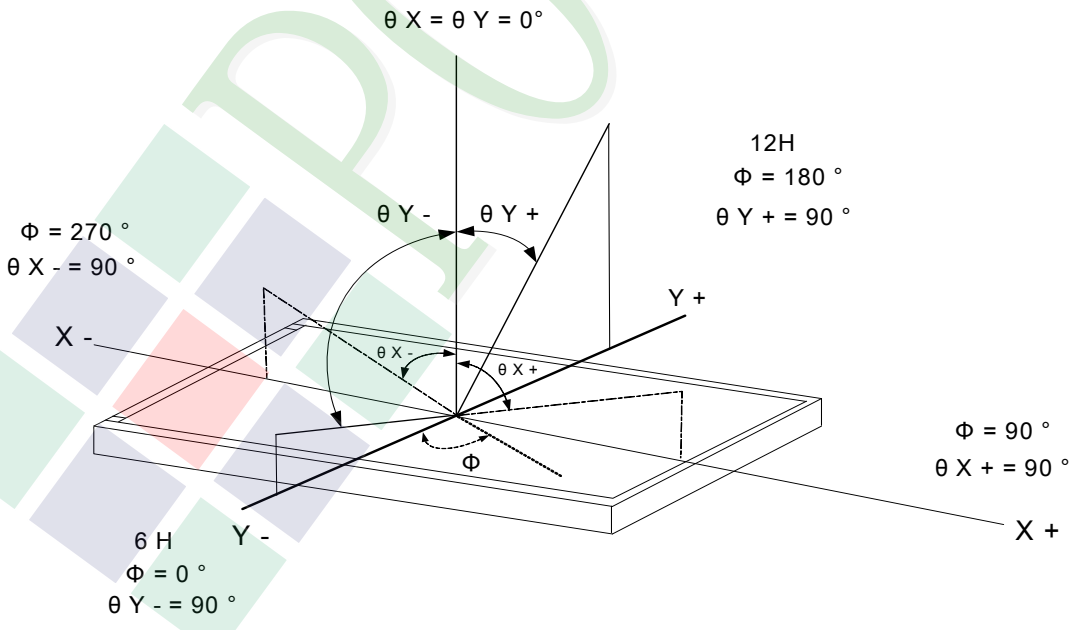
Note3: Definition of contrast ratio:

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:



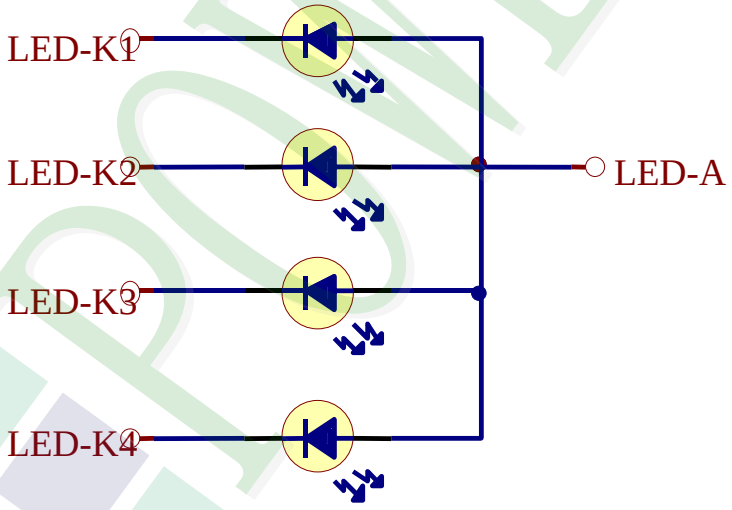
1.6 Backlight Characteristics

Maximum Ratings

Item	Symbol	Conditions	Min.	Max.	Unit
Power Dissipation	PD	Ta =25℃	—	0.288	W

Electrical / Optical Characteristics

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Forward Voltage	VF	IF= 80 mA	2.8	—	3.6	V
Average Brightness (without LCD)	IV		5000	5500	—	cd/m^2
CIE Color Coordinate (Without LCD)	X		0.26	0.28	0.33	-
	Y		0.26	0.28	0.33	
Color	White					



1.7 Touch Panel Characteristics

Features

Item	Standard Value
Touch Panel Size	2.8”
Touch type	Capacitive Touch Panel
Input Method	True Multi-Touch Capacitive Touch Panel True Multi-touch with up to 5 Points of Absolution
Output Interface	I²C
IC	ST1624

Mechanical Specifications

Item	Standard Value	Unit
Active Area	45.2 (W) x 59.6 (L)	mm
Number of sensing channel	-	mm

Absolute Maximum Ratings

Item	Symbol	Condition	Min.	Max.	Unit
Operating Temperature	T_{OP}	-	-20	70	°C
Storage Temperature	T_{ST}	-	-30	70	°C

DC Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
LCM driving voltage	V_{DD} / IOV_{DD}	25°C	--	3.3	--	V
Input Signal Voltage	VIH		0.85 x V_{DD}	--	V_{DD}	V
	VIL		-	--	0.15 x V_{DD}	V

Optical Characteristics

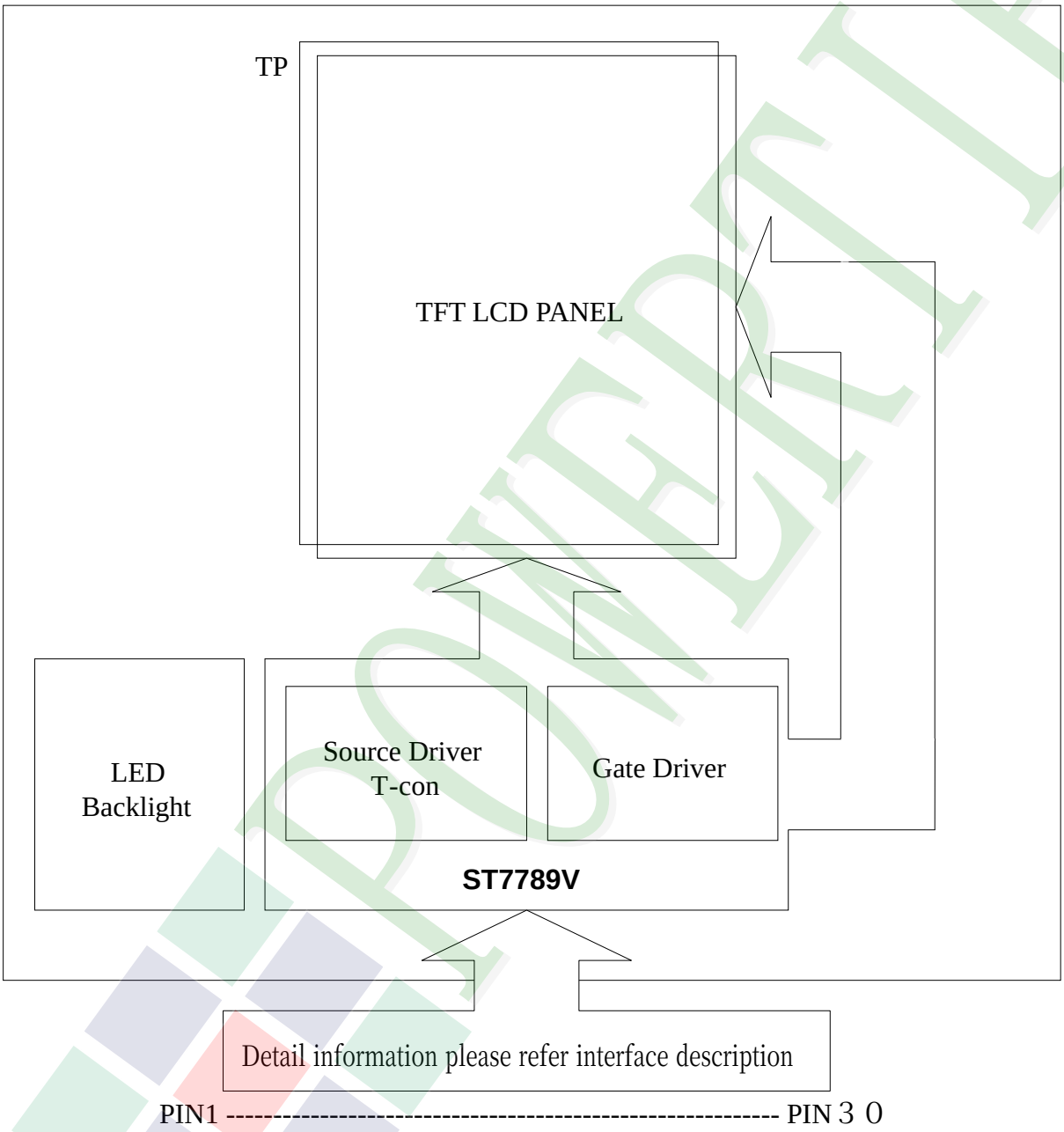
Item	Standard Value	Unit
Response Time	≤25ms	
Total light transmittance	85% or more	-
Surface Hardness	≥6H	-

2.1 Counter Drawing

2.1.1 LCM Mechanical Diagram

* See Appendix

2.1.2 Block Diagram



2.2 Interface Pin Description

LCM

Pin No.	Symbol	Function
1	LEDK1-4	Power supply for LED Backlight Cathode input
2	LEDA	Power supply for LED Backlight Anode input
3	GND	Signal ground.(0V)
4	IM0	MCU interface mode select , When IM0=0:16bit , When IM0=1: 8bit
5	RESET	Reset input pin for TFT LCD. When RESET is “L”, initialization is executed.
6	CS	Chip select signal , Active at ”L”
7	RS	When RS = 0: Command. When RS = 1: Display data.
8	WR	Write signal input, active at Low.
9	RD	Read signal input, active at Low.
10	GND	Signal ground.(0V)
11	DB1	Bi-directional data bus
12	DB2	
13	DB3	
14	DB4	
15	DB5	
16	DB6	
17	DB7	
18	DB8	
19	DB10	
20	DB11	
21	DB12	
22	DB13	
23	DB14	
24	DB15	
25	DB16	
26	DB17	

Pin No.	Symbol	Function
27	GND	Signal ground.(0V)
28	2.8 /VCC	Power supply for the internal logic circuit.
29	2.8 /VCC	Power supply for the internal logic circuit.
30	2.8 /VCC	Power supply for the internal logic circuit.

Touch Panel

Pin No.	Symbol	Function
1	Shield	ESD Ground.
2	SCL	I2C serial clock.
3	SDA	I2C serial data.
4	VDD	Power supply.
5	RESET	System reset signal input, active low.
6	INT	Indicate coordinate data ready.
7	IOVDD	I/O power supply.
8	NC	No connection.

2.3 Timing Characteristics

2.3 Timing Characteristics

8080 Series MCU Parallel Interface Characteristics: 16 / 8 bit Bus

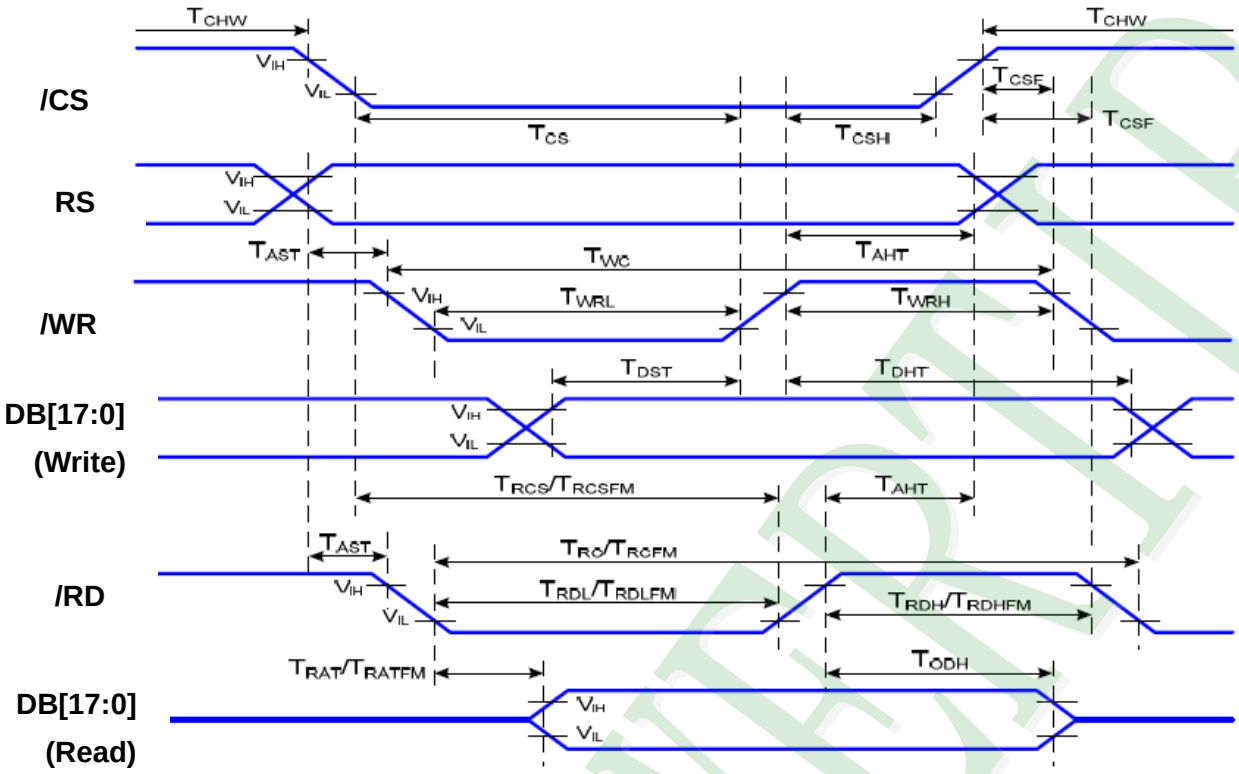


Figure 1 Parallel Interface Timing Characteristics (8080-Series MCU Interface)

VDDI=1.65 to 3.3V, VDD=2.4 to 3.3V, AGND=DGND=0V, Ta= -30 to 70 ℃

Signal	Symbol	Parameter	Min	Max	Unit	Description
RS	T_{AST}	Address setup time	0		ns	-
	T_{AHT}	Address hold time (Write/Read)	10		ns	
/CS	T_{CHW}	Chip select “H” pulse width	0		ns	-
	T_{CS}	Chip select setup time (Write)	15		ns	
	T_{RCS}	Chip select setup time (Read ID)	45		ns	
	T_{RCSFM}	Chip select setup time (Read FM)	355		ns	
	T_{CSF}	Chip select wait time (Write/Read)	10		ns	
	T_{CSH}	Chip select hold time	10		ns	
/WR	T_{WC}	Write cycle	66		ns	-
	T_{WRH}	Control pulse “H” duration	15		ns	
	T_{WRL}	Control pulse “L” duration	15		ns	
/RD (ID)	T_{RC}	Read cycle (ID)	160		ns	When read ID data
	T_{RDH}	Control pulse “H” duration (ID)	90		ns	
	T_{RDL}	Control pulse “L” duration (ID)	45		ns	
/RD (FM)	T_{RCFM}	Read cycle (FM)	450		ns	When read from frame memory
	T_{RDHFM}	Control pulse “H” duration (FM)	90		ns	
	T_{RDLFM}	Control pulse “L” duration (FM)	355		ns	
DB[17:0]	T_{DST}	Data setup time	10		ns	For CL=30pF
	T_{DHT}	Data hold time	10		ns	
	T_{RAT}	Read access time (ID)		40	ns	
	T_{RATFM}	Read access time (FM)		340	ns	
	T_{ODH}	Output disable time	20	80	ns	

Reset Timing

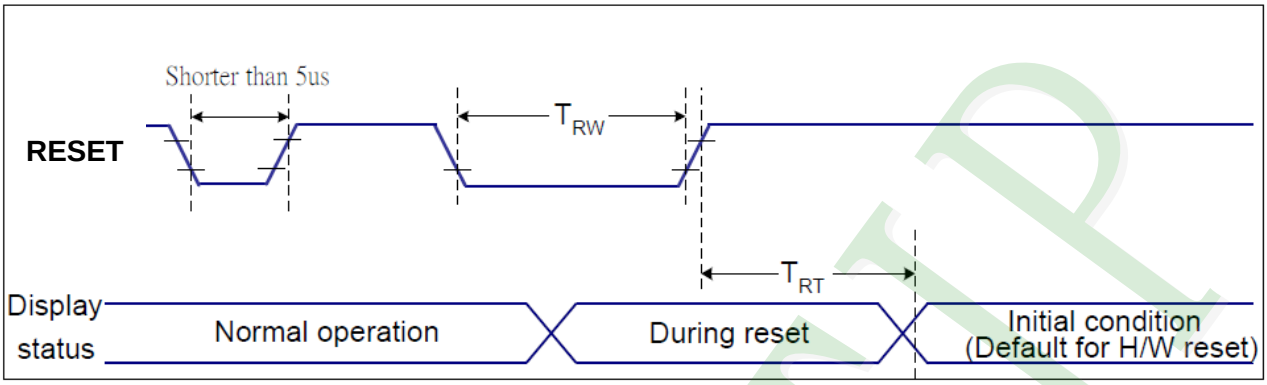


Figure 7 Reset Timing

VDDI=1.65 to 3.3V, VDD=2.4 to 3.3V, AGND=DGND=0V, Ta=-30 ~ 70 ℃

Related Pins	Symbol	Parameter	MIN	MAX	Unit
RESET	TRW	Reset pulse duration	10	-	us
	TRT	Reset cancel	-	5 (Note 1, 5)	ms
				120 (Note 1, 6, 7)	ms

Table 8 Reset Timing

Notes:

1. The reset cancel includes also required time for loading ID bytes, VCOM setting and other settings from NVM (or similar device) to registers. This loading is done every time when there is HW reset cancel time (tRT) within 5 ms after a rising edge of RESX.

2. Spike due to an electrostatic discharge on RESX line does not cause irregular system reset according to the table below:

RESX Pulse	Action
Shorter than 5us	Reset Rejected
Longer than 9us	Reset
Between 5us and 9us	Reset starts

3. During the Resetting period, the display will be blanked (The display is entering blanking sequence, which maximum time is 120 ms, when Reset Starts in Sleep Out –mode. The display remains the blank state in Sleep In –mode.) and then return to Default condition for Hardware Reset.

4. Spike Rejection also applies during a valid reset pulse as shown below:

2.4 Reference Initial code

```
                MOV     ADDRH,#00H
                MOV     ADDRL,#11H
                CALL    WRITE_COMMAND
                CALL    DELAY
                CALL    DELAY
;//----display and color format setting--------------------//
                MOV     ADDRL,#36H
                CALL    WRITE_COMMAND
                MOV     ADDRL,#00H
                CALL    WRITE_DATA
                MOV     ADDRL,#3aH
                CALL    WRITE_COMMAND
                MOV     ADDRL,#05H
                CALL    WRITE_DATA
;//------ST7789V Frame rate setting-------------------//
                MOV     ADDRL,#B2H
                CALL    WRITE_COMMAND
                MOV     ADDRL,#0cH
                CALL    WRITE_DATA
                MOV     ADDRL,#0cH
                CALL    WRITE_DATA
                MOV     ADDRL,#00H
                CALL    WRITE_DATA
                MOV     ADDRL,#33H
                CALL    WRITE_DATA
                MOV     ADDRL,#33H
                CALL    WRITE_DATA
                MOV     ADDRL,#B7H
                CALL    WRITE_COMMAND
                MOV     ADDRL,#35H
                CALL    WRITE_DATA
;//-----ST7789V Power setting----------------------//
                MOV     ADDRL,#BBH
                CALL    WRITE_COMMAND
                MOV     ADDRL,#1fH
                CALL    WRITE_DATA
                MOV     ADDRL,#C0H
                CALL    WRITE_COMMAND
                MOV     ADDRL,#2CH
                CALL    WRITE_DATA
                MOV     ADDRL,#C2H
                CALL    WRITE_COMMAND
                MOV     ADDRL,#01H
                CALL    WRITE_DATA
                MOV     ADDRL,#C3H
                CALL    WRITE_COMMAND
                MOV     ADDRL,#11H
                CALL    WRITE_DATA
                MOV     ADDRL,#C4H
                CALL    WRITE_COMMAND
                MOV     ADDRL,#20H
                CALL    WRITE_DATA
                MOV     ADDRL,#C6H
                CALL    WRITE_COMMAND
                MOV     ADDRL,#0fH
                CALL    WRITE_DATA
```

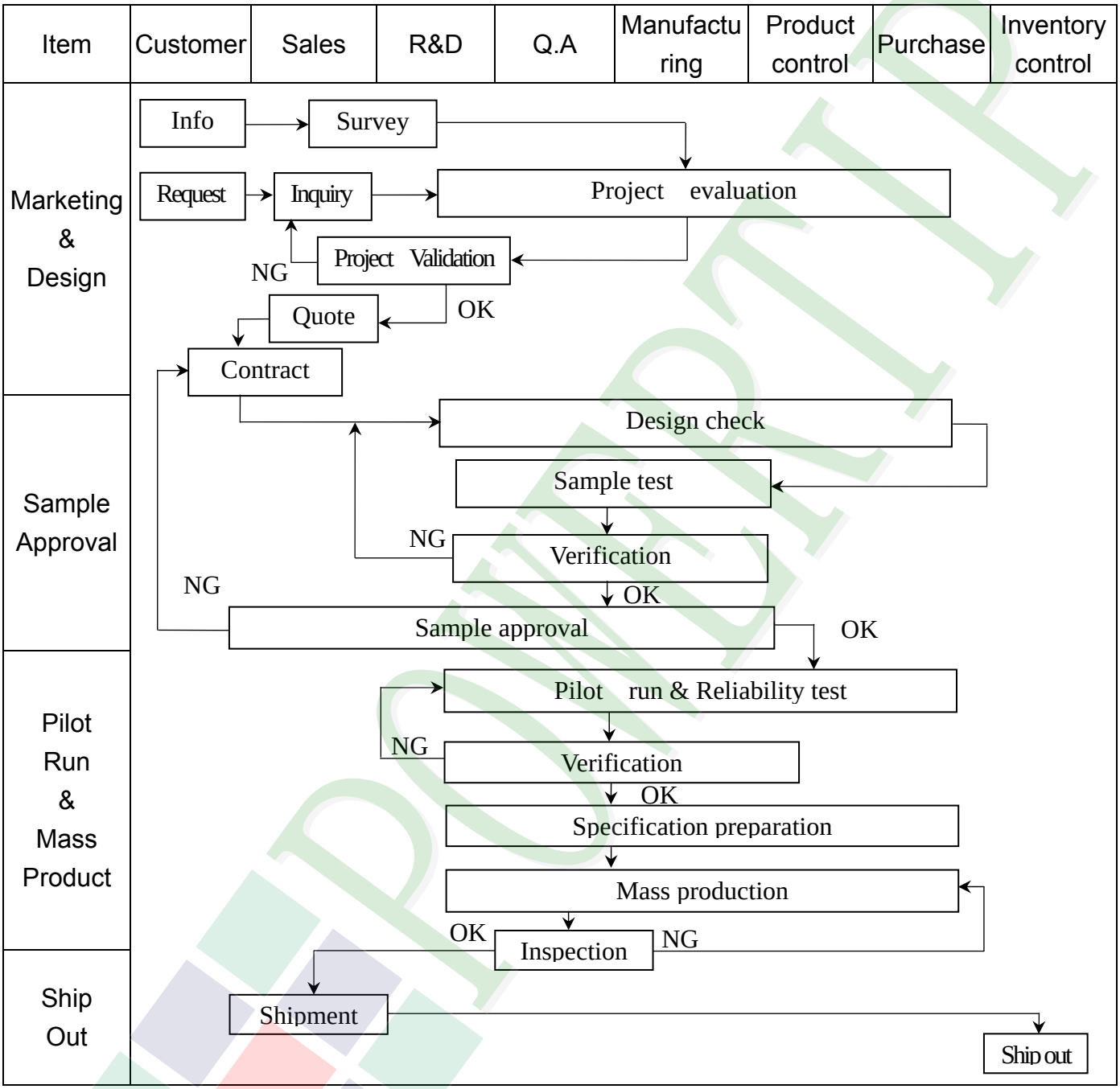
```
                MOV     ADDRL,#D0H
                CALL    WRITE_COMMAND
                MOV     ADDRL,#A4H
                CALL    WRITE_DATA
                MOV     ADDRL,#A1H
                CALL    WRITE_DATA
;//-------ST7789V gamma setting--------------------------------------//
                MOV     ADDRH,#00H
                MOV     ADDRL,#E0H
                CALL    WRITE_COMMAND
                MOV     ADDRL,#D0H
                CALL    WRITE_DATA
                MOV     ADDRL,#00H
                CALL    WRITE_DATA
                MOV     ADDRL,#14H
                CALL    WRITE_DATA
                MOV     ADDRL,#15H
                CALL    WRITE_DATA
                MOV     ADDRL,#13H
                CALL    WRITE_DATA
                MOV     ADDRL,#2CH
                CALL    WRITE_DATA
                MOV     ADDRL,#42H
                CALL    WRITE_DATA
                MOV     ADDRL,#43H
                CALL    WRITE_DATA
                MOV     ADDRL,#4EH
                CALL    WRITE_DATA
                MOV     ADDRL,#09H
                CALL    WRITE_DATA
                MOV     ADDRL,#16H
                CALL    WRITE_DATA
                MOV     ADDRL,#14H
                CALL    WRITE_DATA
                MOV     ADDRL,#18H
                CALL    WRITE_DATA
                MOV     ADDRL,#21H
                CALL    WRITE_DATA
                MOV     ADDRH,#00H
                MOV     ADDRL,#E1H
                CALL    WRITE_COMMAND
                MOV     ADDRL,#D0H
                CALL    WRITE_DATA
                MOV     ADDRL,#00H
                CALL    WRITE_DATA
                MOV     ADDRL,#14H
                CALL    WRITE_DATA
                MOV     ADDRL,#15H
                CALL    WRITE_DATA
                MOV     ADDRL,#13H
                CALL    WRITE_DATA
                MOV     ADDRL,#0BH
                CALL    WRITE_DATA
                MOV     ADDRL,#43H
                CALL    WRITE_DATA
                MOV     ADDRL,#55H
                CALL    WRITE_DATA
                MOV     ADDRL,#53H
                CALL    WRITE_DATA
```

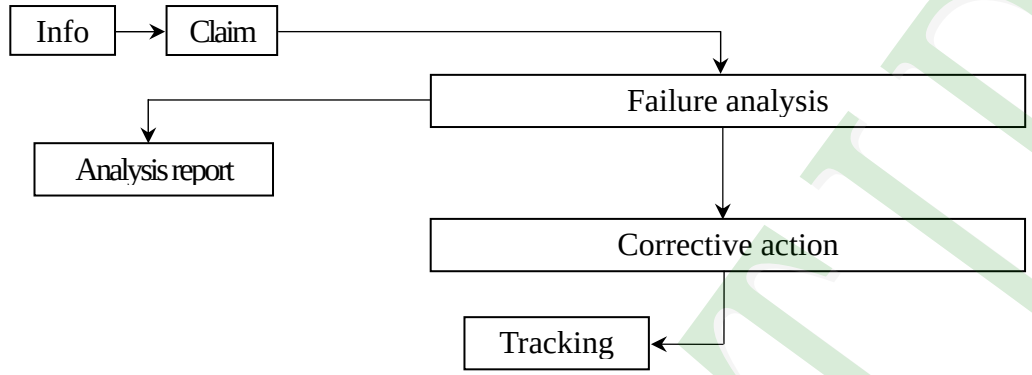
```
MOV     ADDRL,#0CH
CALL    WRITE_DATA
MOV     ADDRL,#17H
CALL    WRITE_DATA
MOV     ADDRL,#14H
CALL    WRITE_DATA
MOV     ADDRL,#23H
CALL    WRITE_DATA
MOV     ADDRL,#20H
CALL    WRITE_DATA

MOV     ADDRH,#00H
MOV     ADDRL,#29H
CALL    WRITE_COMMAND
```

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 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

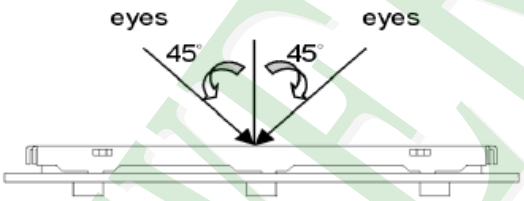
◆OUT Going Defect Level：Sampling.

◆Standard of the product appearance test：

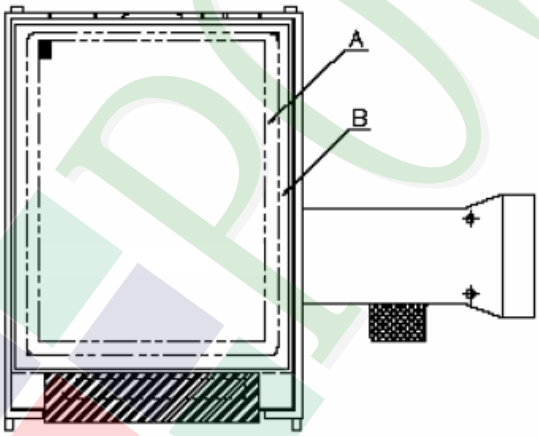
a. Manner of appearance test：

(1). The test best be under 20W×2 fluorescent light，and distance of view must be at 30 cm.

(2). The test direction is base on about around 45° of vertical line.



(3). Definition of area.



A area：viewing area

B area：Outside of viewing area

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

◆Specification For TFT-LCD Module Less Than 3.5″ : (Ver.B01)

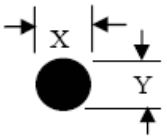
<table>
<tr><th>NO</th><th>Item</th><th>Criterion</th><th>Level</th></tr>
<tr><td rowspan="3">01</td><td rowspan="3">Product condition</td><td>1.1 The part number is inconsistent with work order of production.</td><td>Major</td></tr>
<tr><td>1.2 Mixed product types.</td><td>Major</td></tr>
<tr><td>1.3 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)

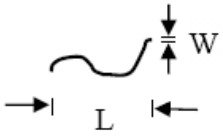
On -display</td><td>
<table>
<tr><th colspan="2">Item</th><th>Acceptance (Q'ty)</th></tr>
<tr><td rowspan="4">Dot Defect</td><td>Bright Dot</td><td>≦ 2</td></tr>
<tr><td>Dark Dot</td><td>≦ 3</td></tr>
<tr><td>Joint Dot</td><td>≦ 2</td></tr>
<tr><td>Total</td><td>≦ 3</td></tr>
</table>
5.1 Inspection 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 Less Than 3.5″ : (Ver.B01)

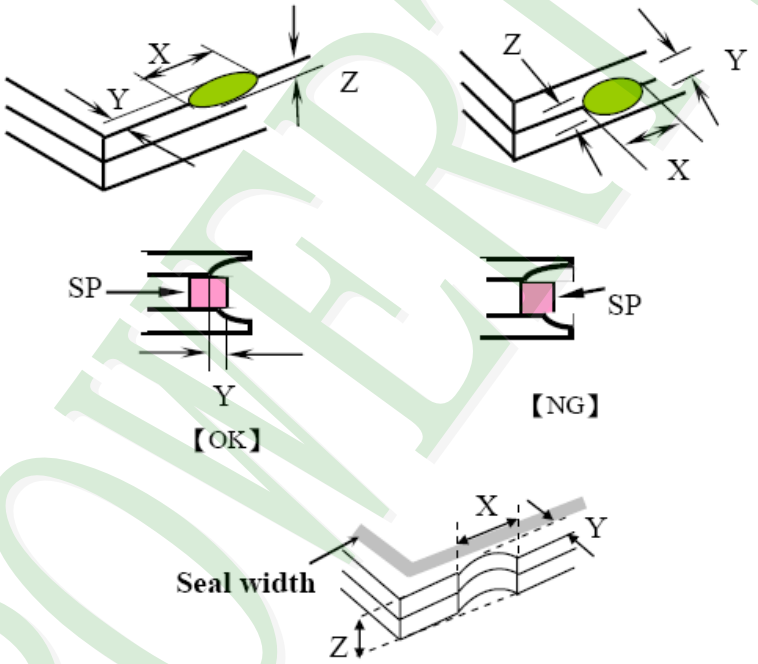
<table>
<tr><th>NO</th><th>Item</th><th>Criterion</th><th>Level</th></tr>
<tr><td>06</td><td>Black or white dot、scratch、contamination

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 ≦ 0.15</td><td>Ignore</td><td rowspan="4">Ignore</td></tr><tr><td>0.15 < Φ ≦ 0.20</td><td>2</td></tr><tr><td>0.20 < Φ ≦ 0.30</td><td>2</td></tr><tr><td>Φ > 0.30</td><td>0</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 ≦ 0.03</td><td>Ignore</td><td rowspan="4">Ignore</td></tr><tr><td>L ≦5.0</td><td>0.03 <W ≦ 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></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 ≦ 0.20</td><td>Ignore</td><td rowspan="4">Ignore</td></tr><tr><td>0.20 < Φ ≦ 0.50</td><td>3</td></tr><tr><td>Φ > 0.50</td><td>0</td></tr><tr><td>Total</td><td>3</td></tr></table></td><td>Minor</td></tr>
</table>

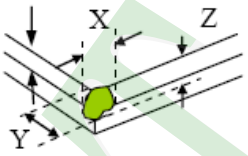
◆Specification For TFT-LCD Module Less Than 3.5″ : (Ver.B01)

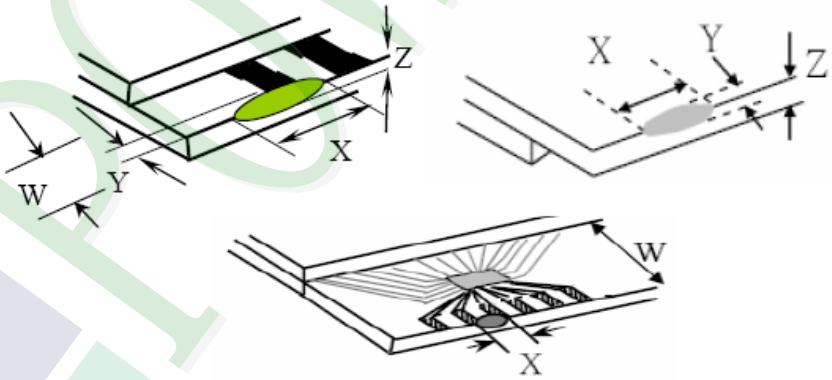
NO	Item	Criterion	Level
08	The crack of glass	Symbols : X : The length of crack Y : The width of crack. Z : The thickness of crack W : terminal length t : The thickness of glass a : LCD side length 8.1 General glass chip : 8.1.1 Chip on panel surface and crack between panels: 	Minor

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 Less Than 3.5″ : (Ver.B01)

<table>
<tr><th>NO</th><th>Item</th><th>Criterion</th><th>Level</th></tr>
<tr><td rowspan="3">08</td><td rowspan="3">The crack of glass</td><td>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</td><td rowspan="3">Minor</td></tr>
<tr><td>8.1.2 Corner crack :
 

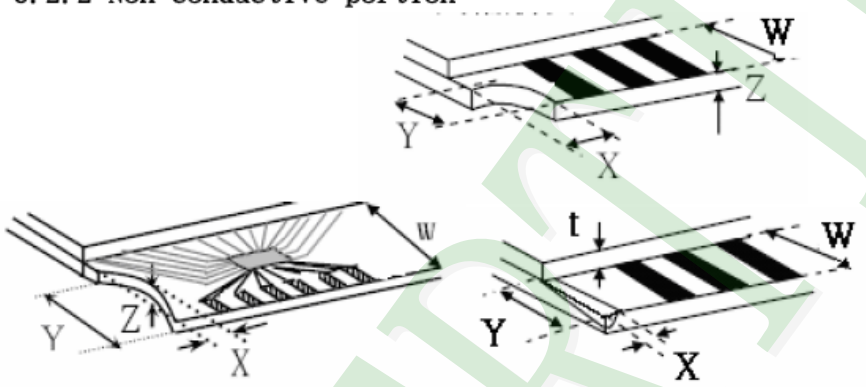
<table>
<tr><th>X</th><th>Y</th><th>Z</th></tr>
<tr><td>≦1/5 a</td><td>Crack can’t enter viewing area</td><td>Z ≦ 1/2 t</td></tr>
<tr><td>≦1/5 a</td><td>Crack can’t exceed the half of SP width.</td><td>1/2 t < Z ≦ 2 t</td></tr>
</table></td></tr>
<tr><td>8.2 Protrusion over terminal :
8.2.1 Chip on electrode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

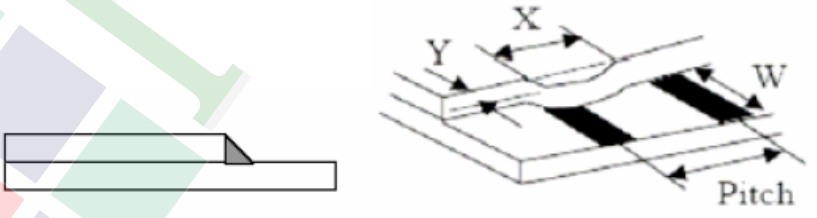
◆Specification For TFT-LCD Module Less Than 3.5″ : (Ver.B01)

<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 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 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>TEST CONDITION</th></tr>
<tr><td>1</td><td>High Temperature Storage Test</td><td>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>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>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>-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>0ver 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.

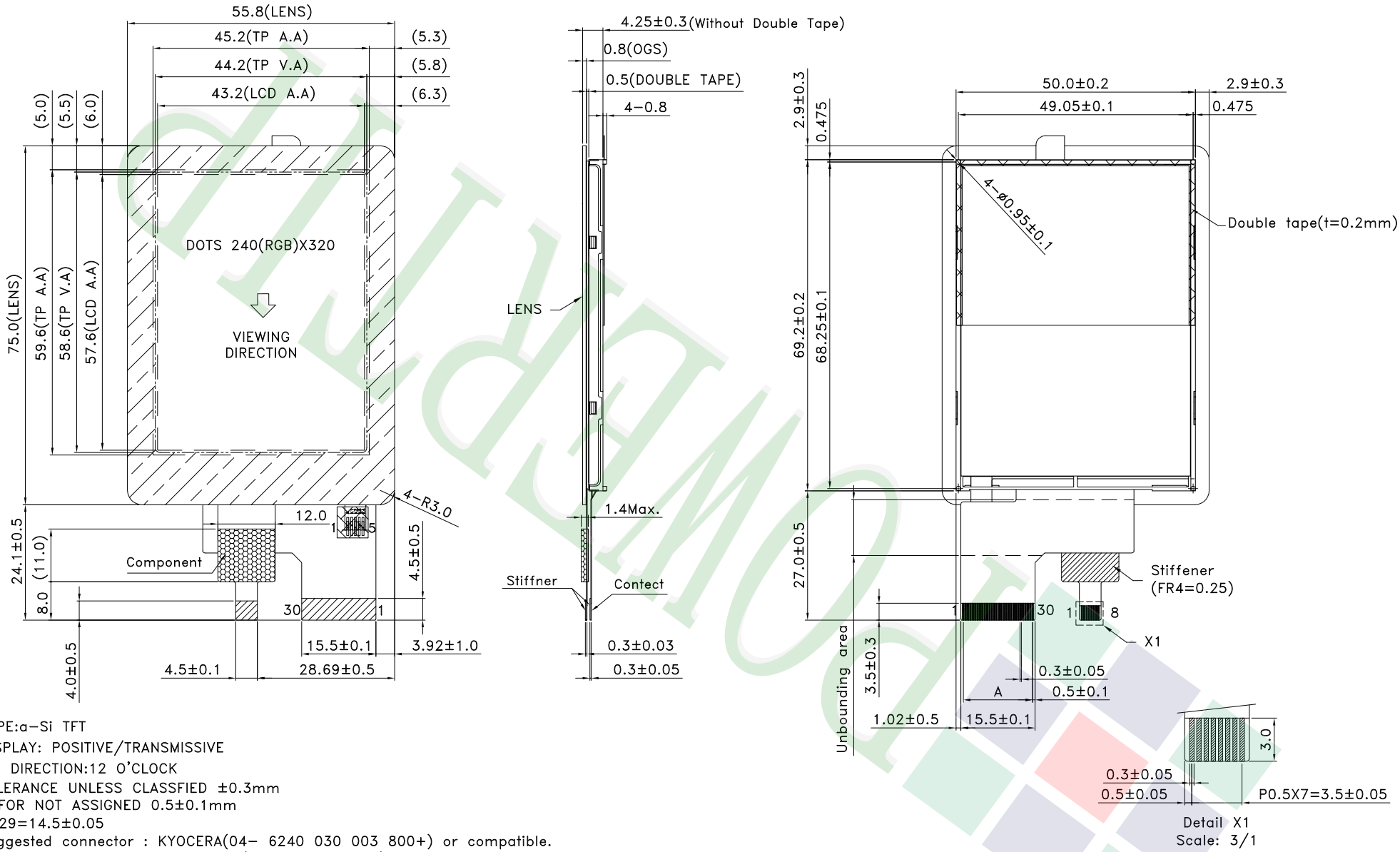
5.4 TERMS OF WARRANTY

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.



NOTES:

1.)LCD TYPE:a-Si TFT
2.)LCD DISPLAY: POSITIVE/TRANSMISSIVE
3.)VIEWING DIRECTION:12 O'CLOCK
4.)THE TOLERANCE UNLESS CLASSFIED ±0.3mm
THE R FOR NOT ASSIGNED 0.5±0.1mm
5.)A:P0.5X29=14.5±0.05
8.)FPC suggested connector : KYOCERA(04- 6240 030 003 800+) or compatible.
9.)T/P FPC suggested connector: CviLux (CF39082D0R0-NH)or compatible.

REV	REV BY	REVISER	DATE
007			
006			
005			
004			
003			
002			
001	NEW DRAWING	Eva	2015/06/24

PART NO: PH240320T063-LAC

DRAWING NAME : LMD-PH240320T063-LAC

TITLE: LCD MODULE DRAWING

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

Design	Eva Liao	(3)	Surface		
Check	Tina Chen	Unit	MM	Material	
Approve	Linda Lee	Scale	FIT	Thickness	
		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.	PKG-PH240320T063-LAC

LCM包裝規格書
LCM Packaging Specifications

Approve	Check	Contact
Linda Lee	Tina Chen	Eva Liao

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

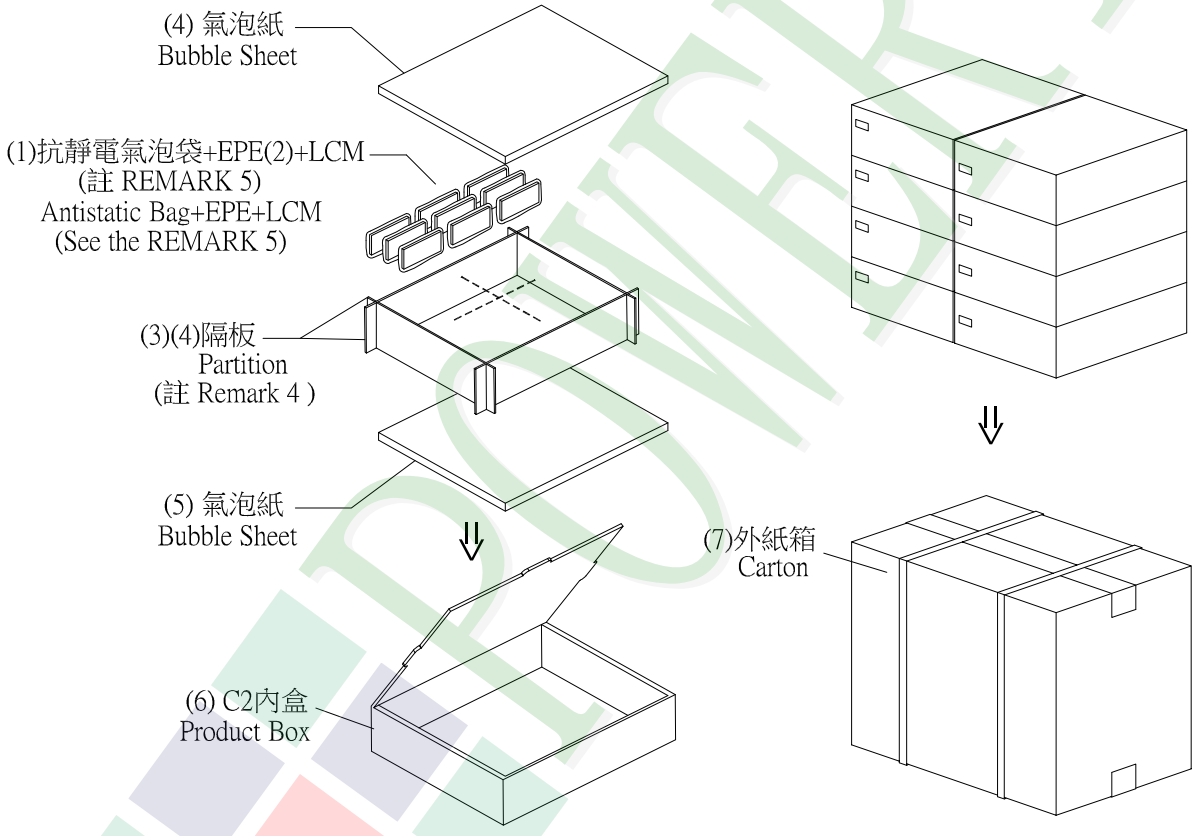
No.	Item	Model	Dimensions (mm)	1Pcs Weight	Quantity	Total Weight
1	成品 (LCM)	PH240320T063-LAC	75.0 X 55.8	0.021	192	4.032
2	抗靜電氣泡(1)Bubble Bag	BAG100080BWABA	100 X 80	0.0012	192	0.3456
3	舒美墊(2) EPE	OTFOAMEP0002BA	333 X 218 X 5	0.011	20	0.22
4	A2-1隔板(3)A2-1 Partition	BX29500072BZBA	295 X 72 X 3.0	0.0109	56	1.1336
5	B2-1隔板(4)B2-1 Partition	BX24500072BZBA	245 X 72 X 3.0	0.0094	24	0.3008
6	氣泡紙(5)Bubble Sheet	BAG280240BWABA	280 X 240	0.006	16	0.096
7	C2內盒(6)Product Box	BX31025580AABA	310 X 255 X 86	0.16	8	1.28
8	外紙箱(7)Carton	BX52732536CCBA	527 X 325 X 360	0.83	1	0.83
9						

2.一 整箱總重量 (Total LCD Weight in carton) : 8.24 Kg±10%

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

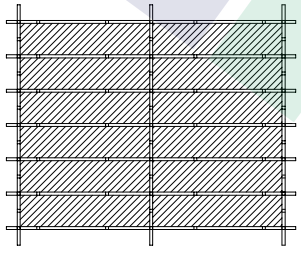
(1)Quantity Of Spacer : A2-1隔板 X 7 , B2-2隔板 X 3

(2)Total LCM quantity in carton : quantity per box 24 x no of boxes 8 = 192



特 記 事 項 (REMARK)

4. LCM排放示意圖(前後間隔不放置):
4. LCM placed as figure showing:
(First and last slot should be empty)



模組(LCM) X 2 pcs.

5.EPE裁成Size:109X60mm(可裁10片),將EPE放置背光下方,再裝入靜電袋裡.

5.EPE cut to size 109X60mm, can be cut to 10 pcs, placed under the backlight, and then put the antistatic bag.