SPECIFICATIONS

CUSTOMER	:	
SAMPLE CODE	:	SH320240T-023-I03Q
MASS PRODUCTION CODE	:	PH320240T-023-I03Q
SAMPLE VERSION	:	01
SPECIFICATIONS EDITION	:	008
DRAWING NO. (Ver.)	:	LMD-PH320240T-023-I03Q (Ver.003)
PACKAGING NO. (Ver.)	:	PKG-PH320240T-023-I03Q (Ver.001)

Customer Approved

Date:

Approved	Checked	Designer
黃秋源 **Oliver Huang**	石建莊 **Stone Shin**	黃俊清 **Ackey Huang**

POWERTIP
2023.02.09
TWRD APR

☐ Preliminary specification for design input

■ Specification for sample approval

POWERTIP TECH. CORP.

History of Version

Date (mm / dd / yyyy)	Ver.	Edi.	Description	Page	Design by
12/07/2012	01	001	New Drawing.	-	Ackey
12/17/2012	01	002	Modify Interface Pin Description (LEDA->A , LEDK->K , Y2->Y+ , X2->X+ , Y1->Y- , X1->X-)	-	Ackey
01/17/2013	01	003	New Sample.	-	Ackey
04/03/2014	01	004	Modify CR & Viewing Angle. Add CN & Initcode.	6,17 Appendix	Ackey
08/25/2015	01	005	Show Backlight Life Time	8	張斌
02/02/2016	01	006	Modify Initial Code Comment.	14	Ackey
03/22/2018	01	007	Update Optical Characteristics.	6	Ackey
02/07/2023	01	008	Modify Pin 39 Interface Describe.	14	Ackey

Contents

1. SPECIFICATIONS

1.1 Features

Main LCD Panel

Item	Standard Value
Display Type	320* (R、G、B) * 240 Dots
LCD Type	Normally white , Transmissive type
Screen size(inch)	3.5(Diagonal)
Viewing Direction	6 O'clock
Color configuration	R.G.B. vertical stripe
Backlight	White LED
Interface	Digital 24-bits Parallel RGB HSYNC,VSYNC.3Wires SPI
Other (controller / driver IC)	Himax: HX8238-D
ROHS	THIS PRODUCT CONFORMS THE ROHS OF PTC Detail information please refer website : http://www.powertip.com.tw/news_detail.php?Key=1&cID=1

1.2 Mechanical Specifications

Item	Standard Value	Unit
Outline Dimension	76.9(W) * 63.9 (L) * 4.75 (H)(Max)	mm

LCD panel

Item	Standard Value	Unit
Active Area	70.08 (W) * 52.56 (L)	mm

Touch panel

Item	Standard Value	Unit
Viewing Area(T/P)	72.08 (W) x 54.56 (L)	mm
Active Area(T/P)	71.08 (W) x 53.56 (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	GND=0	-0.3	4.0	V
Booster Reference Supply Voltage	VCI	GND=0	GND-0.3	3.96	V
Operating Temperature	T_{OP}	Excluded T/P	-20	70	°C
Storage Temperature	T_{ST}	Excluded T/P	-30	80	°C
Storage Humidity	HD	Ta < 60 °C	20	90	%RH

1.4 DC Electrical Characteristics

Module   GND = 0V, Ta = 25°C

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Power Supply Voltage	VDD	-	3.0	3.3	3.6	V
Booster Reference Supply Voltage	VCI	-	3.0	3.3	3.6	V
V_{COM} High Voltage	V_{COMH}	-	-	-	5.54	V
V_{COM} Low Voltage	V_{COML}	-	-2.8	-	-	V
Input H/L Level Voltage	VIH	-	0.8VDD	-	VDD	V
	VIL	-	0	-	0.2VDD	V
Output H/L Level Voltage	VOH	-	0.9VDD	-	VDD	V
	VOL	-	-	-	0.1VDD	V
Supply Current	IDD	VDD=VCI=3.3V Pattern= black*1	-	9	14	mA

Note1: Maximum current display.

1.5 Optical Characteristics

TFT LCD Panel   VDD=VCI=3.3V, Ta=25°C

Item		Symbol	Condition	Min.	Typ.	Max.	unit	-
Response time		Tr + Tf	Ta = 25°C θX, θY = 0°	-	35	53	ms	Note2
Viewing angle	Top	θY+	CR ≥ 10	-	60	-	Deg.	Note4
	Bottom	θY-		-	60	-		
	Left	θX-		-	60	-		
	Right	θX+		-	60	-		
Contrast ratio		CR		500	600	-	-	Note3
Color of CIE Coordinate (With B/L & TP)	White	X	Ta = 25°C θX , θY = 0°	0.26	0.31	0.36	-	Note1
		Y		0.29	0.34	0.41		
	Red	X		0.59	0.64	0.69		
		Y		0.30	0.35	0.40		
	Green	X		0.29	0.34	0.39		
		Y		0.55	0.60	0.65		
	Blue	X		0.09	0.14	0.19		
		Y		0.03	0.08	0.13		
Average Brightness Pattern=white display		IV	IF= 20 mA	320	400		cd/m^2	Note1
Uniformity		△ B		80	-	-	%	Note1

Note1:

1：△ 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 ㎜ ，(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
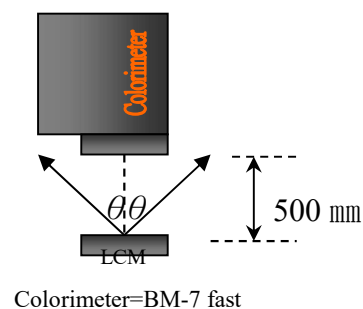
Note2: Definition of response time:
The output signals of photo detector are measured when the input signals are changed from "black" to "white"(falling time) and from "white" to "black"(rising time), respectively. The response time is defined as the time interval between the 10% and 90% of Amplitudes.
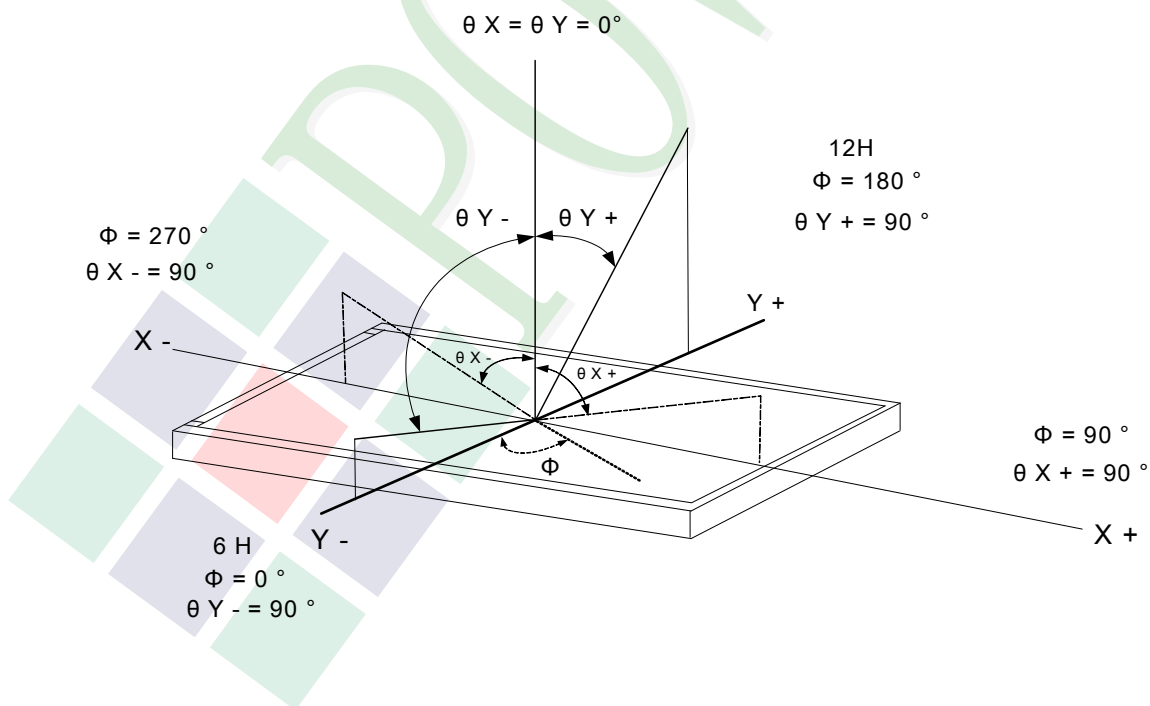Refer to figure as below:
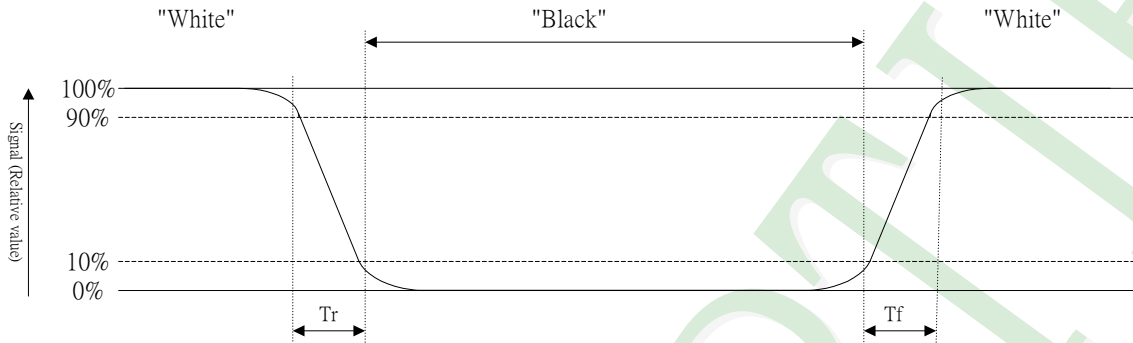
Note3: Definition of contrast ratio:
Contrast ratio is calculated with the following formula

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

Note4: Definition of viewing angle:
Refer to figure as below:

1.6 Backlight Unit Characteristics

Maximum Ratings

Item	Symbol	Conditions	Min.	Max.	Unit
Forward Current	IF	Ta =25℃	-	48	mA
Power Dissipation	PD	Ta =25℃	-	540	mW

Electrical / Optical Characteristics

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Forward Voltage	VF	IF= 20 mA	-	19.2	21	V
Average Brightness (Without LCD & TP)	IV	IF= 20 mA	3800	4500	-	cd/m^2
Color of CIE Coordinate (Without LCD & TP)	X		0.28	0.30	0.32	-
	Y		0.28	0.30	0.32	
Color		White				

Internal Circuit Diagram

K   A
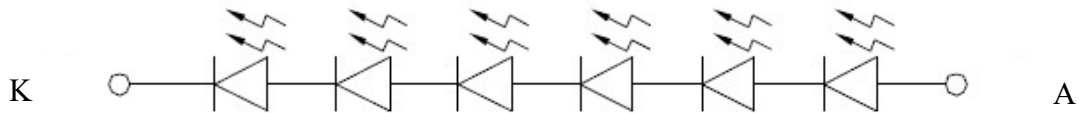
Other Description

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

1.7 Touch Panel Specification

1.7.1 General Standard Specification

Item	Specification
Input Method	Finger or stylus pen
ITO Glass	T=0.7mm , 400Ω/ ±100Ω
ITO Film	T=0.188mm , 400Ω/ ±150Ω Anti
Operating Temperature Range	-20℃~70℃,20~90%RH(Except for dew gathering)
Operating Temperature Range	-30℃~40℃,90%RH↓,41℃~80℃,60%RH↓ (Except for dew gathering)
Surface Hardness	3H-prressure 500gf,45deg.
Hitting Durability	1,000,000 times min. (Tip R 8 mm & R0.8mm)
Pen Sliding Durability	100,000 times min. (Tip R0.8mm)
Insulation Impedance	DC25V 1min,20MΩ ↑
Light Transparency	78%min
Linearity	Linearity Force 172g ±1.5% (±1.5% After environmental and life test)
Linearity Force	80gf less input with stylus pen (R0.8mm) Activation force guarantee area: 3.0mm inside of Active Area.
Activation Force	120gf(Typical 20gf) less individual point on with stylus pen 9RR0.8mm. Activation force guarantee area: 5.0mm inside of Active Area.
Bouncing	<10ms
Impact Resistance	No damage when φ9mm steel ball is dropped on the surface from 30 cm height at 1 time.
Flexible Pattern Heat Seal Peeling Strength	500gf/cm(peeling upward by 90deg)
Flexible Pattern Bending Resistance	Bending 3 times by bending radius R1.0 mm. The requirements in 4-2 shall be satisfied
Flexible Pattern Insert/Pull Out Resistance	5 times at least. The requirements in 4-2 shall be satisfied.
Vibration Resistance	Not in operation: The requirements in 3 to 4 shall be satisfied after sweep vibration of 2G 15~55Hz(1 min.) is given for 30 min. each in the directions of X, Y, Z.
Package Drop	No damage to the product.(1corner edge, 2 ridges, 4 surfaces, drop from 50 cm height)
Static load resistance	After 4.5Kg load for 1 min is applied to the center area (25 cm²) of the Touch panel, the requirements in 3 and 4, shall be satisfied.

AL plate 1.0.5x5cm, Rubber t1.0.5x5cm, touch Panel 2mm
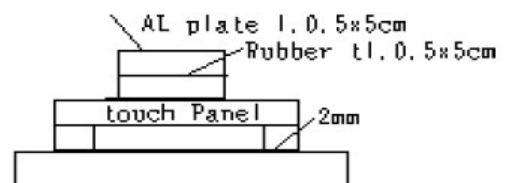
1.7.2 Optical Characteristic

1.7.2.1 test by light measure device and the result should be 80%min.

1.7.3 Electrical Characteristics

1.7.3.1 Insulation Resistance.

10 MΩ or more (DC 25V 1min)

1.7.3.2 Resistance Between Terminals.

Direction X (Film side): 250Ω~ 850Ω

Direction Y (Glass side): 100Ω~ 600Ω

1.7.3.3 Linearity.

$\pm$ 1.5% Measuring method, Linearity(%) = $\dfrac{\triangle V}{EV\text{-}SV}$ X 100

$\pm$ 1.5%(after environmental and life test)

$\triangle$V: The difference between the ideal voltage and measured voltage on the each measuring line.

SV: Voltage of starting Points

EV: Voltage of Ending Points

1.7.3.4 Operating Voltage.

5V DC.

Max Voltage : 7V DC.

1.7.3.5 Bouncing

<10ms

1.7.4 Attention of Mounting Condition

1.7.4.1The gasket support of touch panel must be designed on the outside of Viewable area, as well as to avoid pressing on touch panel accidentally, the enclosure must be designed with enough clearance to panel surface.

To avoid pressing error on touch panel accidentally, please remain space between the surface of panel and the Bezel.

1.7.4.2Bezel opening must be between Viewable area and Active area. Bezel opening must not touch Viewable area.

1.7.4.3 We recommend elastic material made support.

1.7.4.4 Do not use adhesive to bond top surface (ITO Film) of touch panel with enclosure.

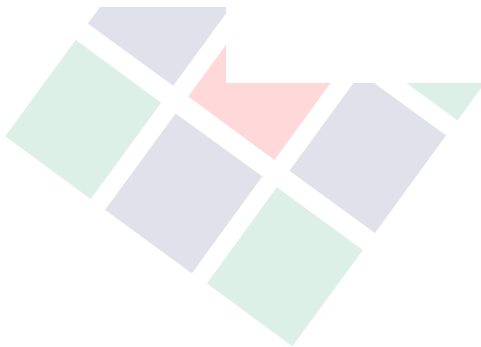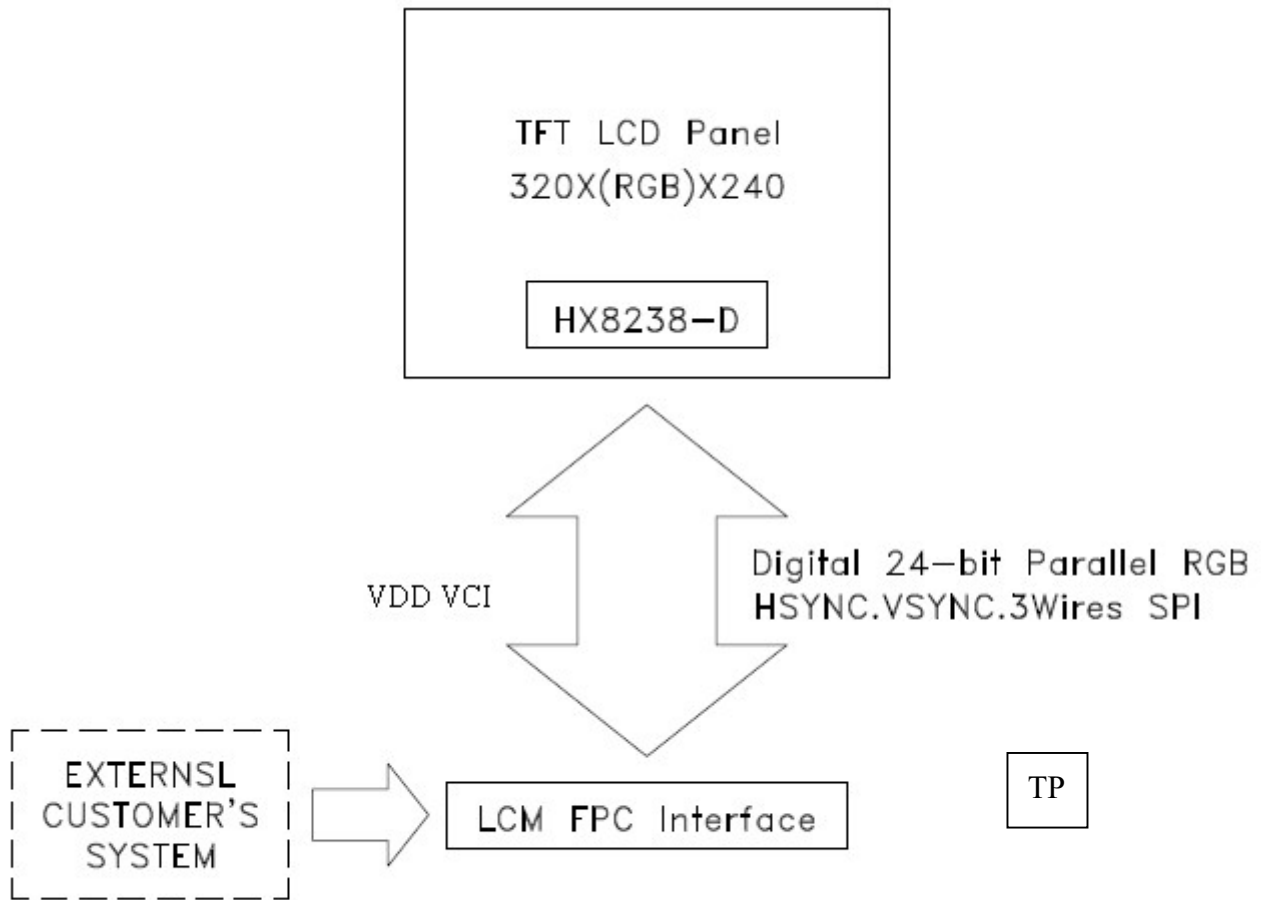1.7.4.5 The edge of touch panel is conductive. Don't touch it with metal after mounting.
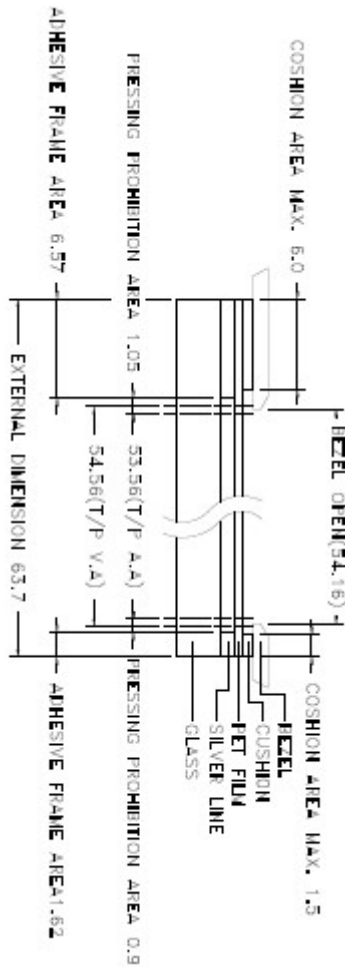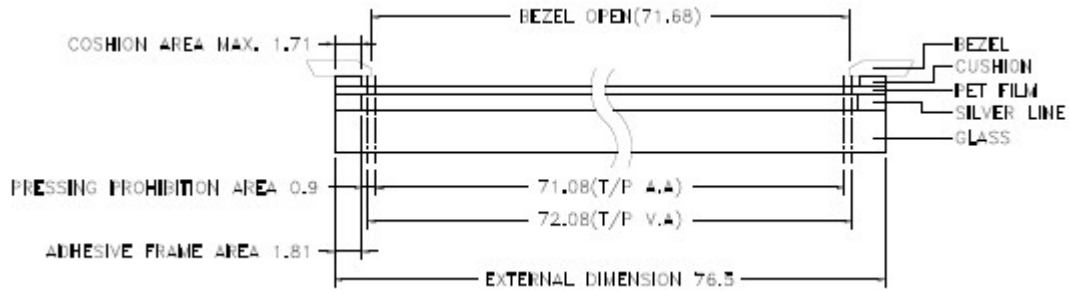
2. MODULE STRUCTURE

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	A	LED Anode.
2	K	LED Cathode.
3	GND	Ground.
4	VCI	Booster Reference Supply Voltage.
5	ID	Note1.
6	VDD	Power Supply Voltage.
7	GND	Ground.
8	RESB	Reset.
9	CSB	Chip select Input: CSB = L - selected and accessible. CSB = H - is not selected and not accessible.
10	SCK	SPI Clock Input.
11	SDO	SPI Data Output. The data is valid on the falling edge of the SCK signal.
12	SDI	SPI Data Input. The data is latched on the rising edge of the SCK signal.
13	GND	Ground.
14	B0	
15	B1	
16	B2	
17	B3	Graphic display Blue data.
18	B4	
19	B5	
20	B6	
21	B7	

Pin No.	Symbol	Function
22	G0	Graphic display Green data.
23	G1	
24	G2	
25	G3	
26	G4	
27	G5	
28	G6	
29	G7	
30	R0	Graphic display Red data.
31	R1	
32	R2	
33	R3	
34	R4	
35	R5	
36	R6	
37	R7	
38	GND	Ground.
39	DCLK	Video Clock Input. Match Programing Initcode the data is latched on the falling edge of DCLK.
40	HSYNC	Horizontal Sync Input.
41	VSYNC	Vertical Sync Input.

Pin No.	Symbol	Function
42	DEN	Video Data Enable Input. VSYNC+HSYNC mode - This pin is shorted to GND normally and the back/front porch is determined by the control register. VSYNC+HSYNC+DE mode - The valid data is determined by the VSYNC+HSYNC+DEN pin. DE mode - VSYNC and HSYNC are unused and shorted to GND. The valid input. data is determined by DEN pin.
43	GND	Ground.
44	SEL0	Note2.
45	SEL1	
46	SEL2	
47	Y+	Touch Panel Y_Top.
48	X+	Touch Panel X_Right.
49	Y-	Touch Panel Y_Bottom.
50	X-	Touch Panel X_Left.

Note1: ID code Circuit

Vendor ID (On FPC, ID resistor as specified in vendor table shall be connected to this pin, and other side of the resistor shall be connected to GND)
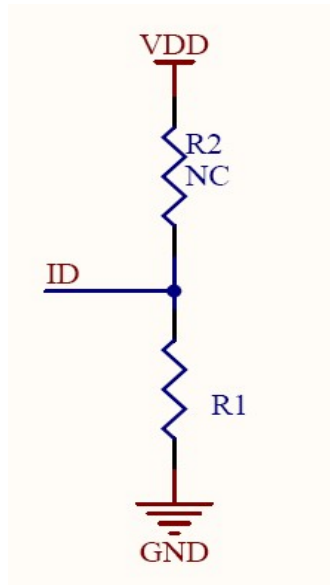
R1=44.2KΩ

Note2: Define the input interface mode

SEL2	SEL1	SEL0	Format	Operating frequency
0	0	0	Parallel-RGB data format	6.5MHz
0	0	1	Serial-RGB data format	19.5MHz
0	1	0	CCIR 656 data format(640RGB)	24.54MHz
0	1	1	CCIR 656 data format(720RGB)	27MHz
1	0	0	YUV mode A data format(Cr-Y-Cb-Y)	24.54MHz
1	0	1	YUV mode A data format(Cr-Y-Cb-Y)	27MHz
1	1	0	YUV mode B data format(Cr-Y-Cr-Y)	27MHz
1	1	1	YUV mode B data format(Cr-Y-Cr-Y)	24.54MHz

Input format	DOTCLK Freq(MHz)	Display data	Active area(DOTCLK)
YUV mode	24.54	640	1280
	27	720	1440

2.2.1 Refer Initial code:

```
//Initial------------------------------------------------------------------
\void Initial_Main(void)                            // For HX8238-D
{
    MOV      DPH,#00H                   ;Register 0001

    MOV      DPL,#01H

    CALL     COM_SER

    MOV      DPH,#63H

    MOV      DPL,#00H

    CALL     DATA_SER


    MOV      DPH,#00H                   ;Register 0002

    MOV      DPL,#02H

    CALL     COM_SER

    MOV      DPH,#02H

    MOV      DPL,#00H

    CALL     DATA_SER


    MOV      DPH,#00H                   ;Register 0003

    MOV      DPL,#03H

    CALL     COM_SER

    MOV      DPH,#01100100B             ;DB3 ~ DB0

    MOV      DPL,#01100100B

    CALL     DATA_SER
```

```
MOV     DPH,#00H              ;Register 0004

MOV     DPL,#04H

CALL    COM_SER

MOV     DPH,#04H

MOV     DPL,#C7H              ;Parallel 24 bits

CALL    DATA_SER


MOV     DPH,#00H              ;Register 0005

MOV     DPL,#05H

CALL    COM_SER

MOV     DPH,#FCH

MOV     DPL,#80H

CALL    DATA_SER


MOV     DPH,#00H              ;Register 000A

MOV     DPL,#0AH

CALL    COM_SER

MOV     DPH,#40H

MOV     DPL,#08H

CALL    DATA_SER


MOV     DPH,#00H              ;Register 000D

MOV     DPL,#0DH

CALL    COM_SER

MOV     DPH,#00000010B

MOV     DPL,#00110001B        ;DB5 ~ DB0   VLCD63
```

```
CALL        DATA_SER


MOV         DPH,#00H                ;Register 000E

MOV         DPL,#0EH

CALL        COM_SER

MOV         DPH,#00101110B          ;DB4 ~ DB0 VCOM

MOV         DPL,#10000000B          ;DB7 ~ DB6

CALL        DATA_SER


CALL        DELAY2

}
```

2.3 Timing Characteristics
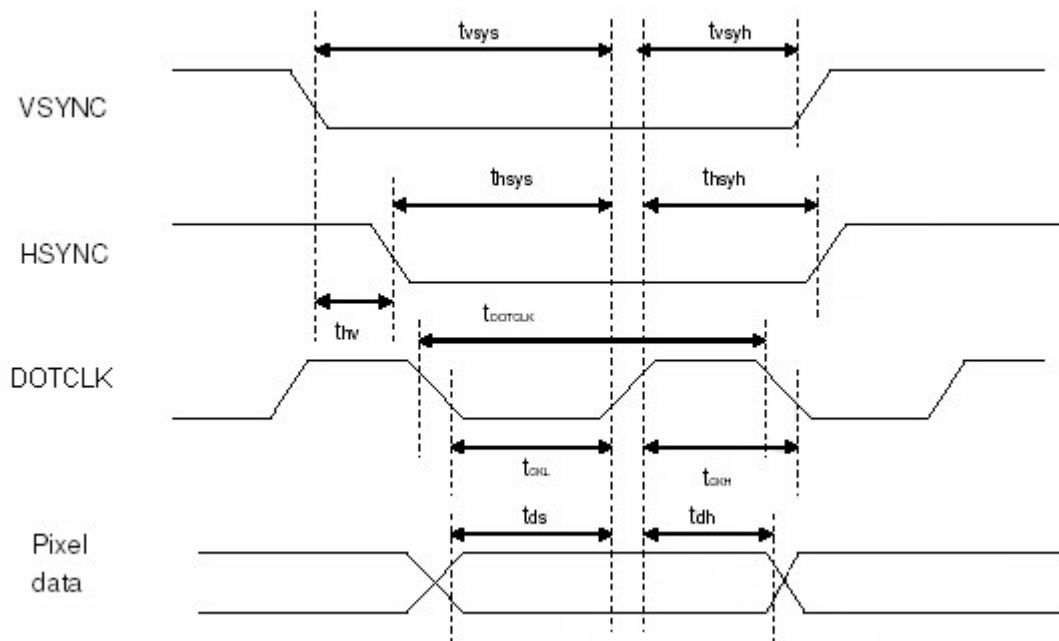
Characteristics	Symbol	Min.		Typ.		Max.		Unit
		24 bit	8 bit	24 bit	8 bit	24 bit	8 bit	
DOTCLK Frequency	tDOTCLK	-		6.5	19.5	10	30	MHz
DOTCLK Period	tDOTCLK	100	33.3	154	51.3	-		ns
Vertical Sync Setup Time	tvsys	20	10	-		-		ns
Vertical Sync Hold Time	tvsyh	20	10	-		-		ns
Horizontal Sync Setup Time	thsys	20	10	-		-		ns
Horizontal Sync Hold Time	thsyh	20	10	-		-		ns
Phase difference of Sync Signal Falling Edge	thv	1		-		240		tDOTCLK
DOTCLK Low Period	tCKL	50	15	-		-		ns
DOTCLK High Period	tCKH	50	15	-		-		ns
Data Setup Time	tds	12	10	-		-		ns
Data hold Time	tdh	12	10	-		-		ns
Reset pulse width	tRES	10		-		-		ns

Note：The interface of this module can drive by digital 24-bit data.

$H_{cycle} = 408$

$t_{HBP} = 68$ $H_{DISP} = 320$ $t_{HFP} = 20$

DCLK

HSYNC

Pixel Data

Dummy   D0 D1 ---------- D318 D319 D320   Dummy
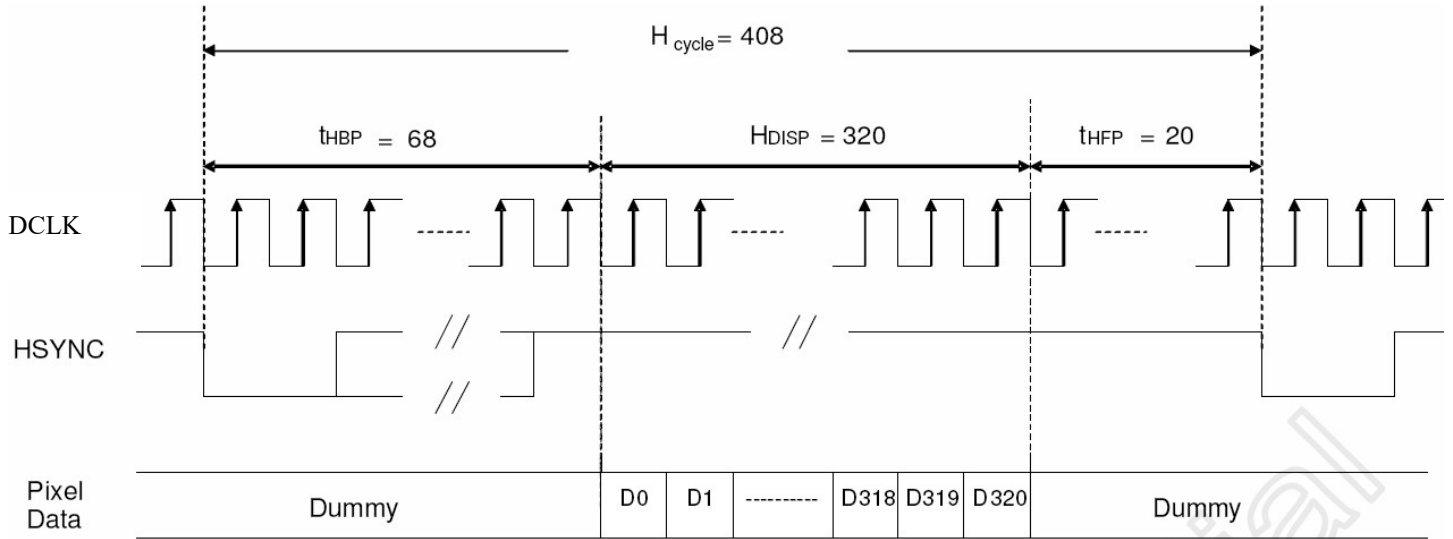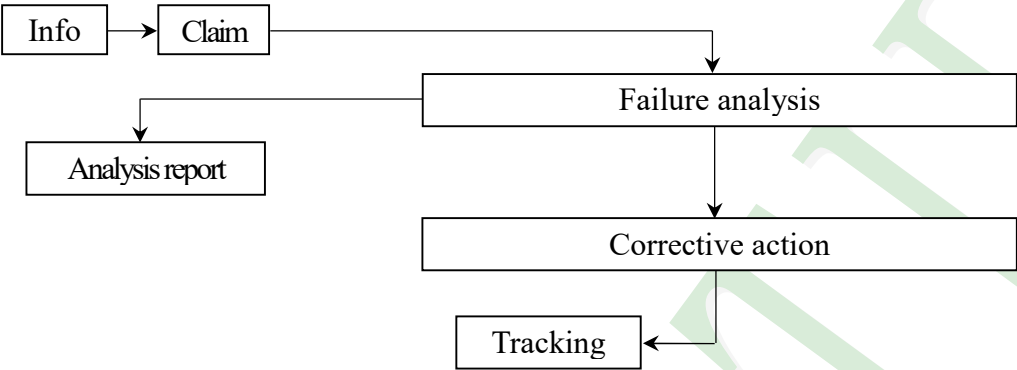
a) Horizontal Data Transaction Timing

$V_{cycle} = 262$ Lines

$t_{VBP} = 18$

VSYNC

$V_{DISP} = 240$ Lines $t_{VFP} = 4$

HSYNC

Line 0   Line 239
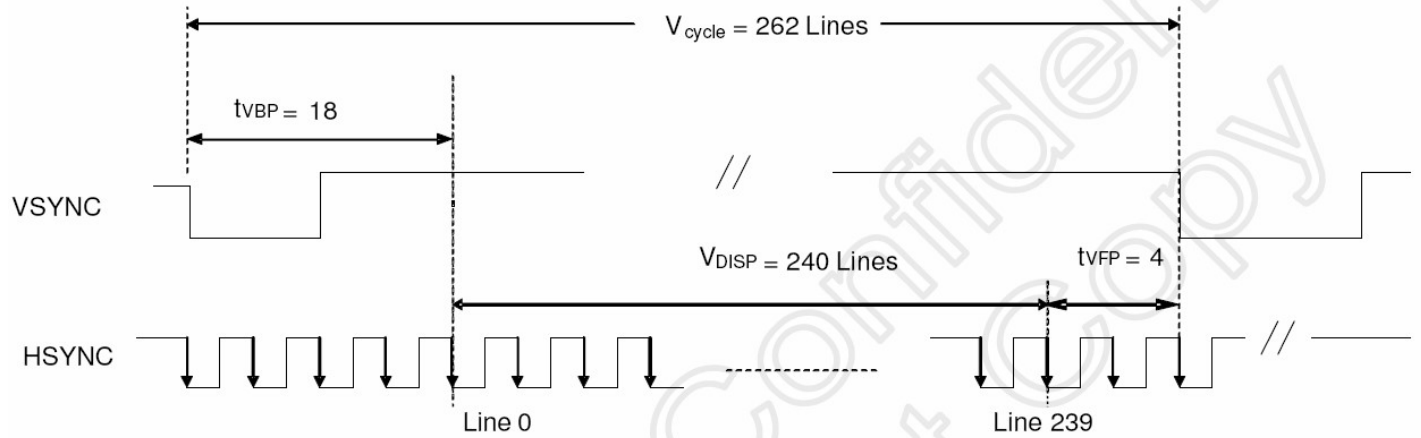
b) Vertical Data Transaction Timing

Data transaction timing in parallel RGB (24 bit) interface (SYNC mode)

3. Quality Assurance System

3.1 Quality Assurance Flow Chart

Item	Customer	Sales	R&D	Q.A	Manufacturing	Product control	Purchase	Inventory control
Marketing & Design	Info → Survey; Request;	Inquiry; Quote	Project Validation		Project evaluation			
Sample Approval	Contract			Design check; Sample test; Verification; Sample approval				
Pilot Run & Mass Product				Pilot run & Reliability test; Verification; Specification preparation; Mass production; Inspection				
Ship Out		Shipment						Ship out

Item	Customer	Sales	R&D	Q.A	Manufacturing	Product control	Purchase	Inventory control
Sales Service	Info → Claim → Failure analysis → Analysis report → Corrective action → Tracking							
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″ ~15″ (Ver.B01).

◆Inspection Standard：MIL-STD-105E Table Normal Inspection Single Sampling Level Ⅱ.

◆Equipment：Gauge、MIL-STD、Powertip Tester、Sample

◆Defect Level：Major Defect AQL：0.4 ; Minor Defect AQL：1.5

◆OUT Going Defect Level：Sampling.

◆Standard of the product appearance test：

　a. Manner of appearance test：

（1）. The test best be under 20W×2 fluorescent light(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.
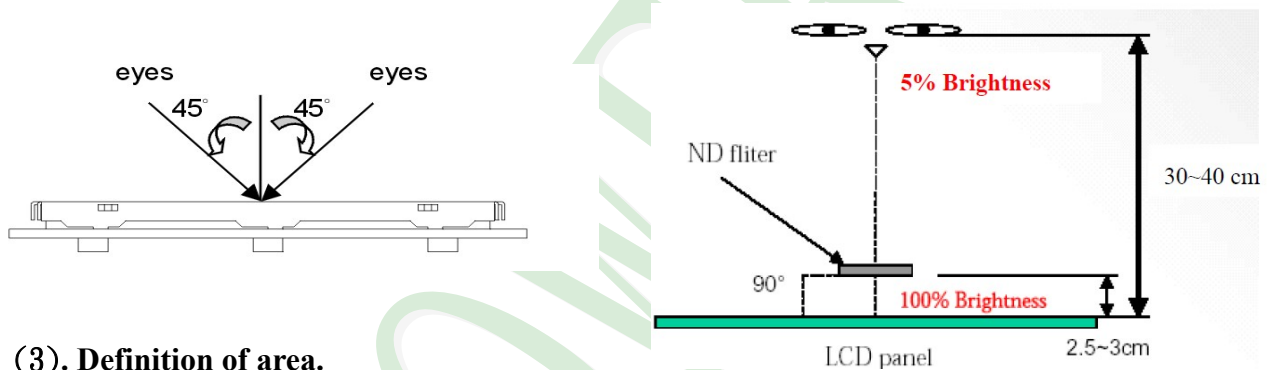
（3）. Definition of area.
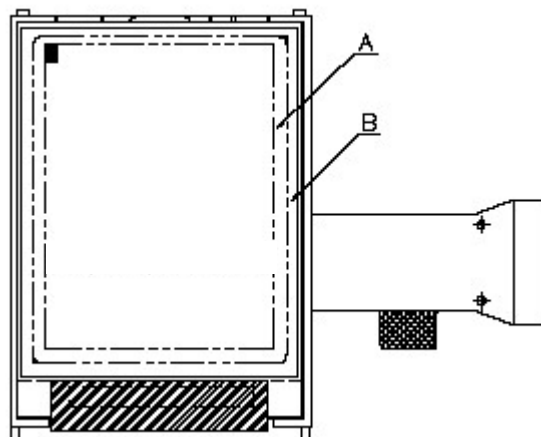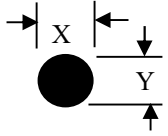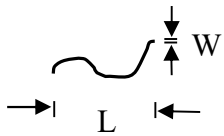
A area : viewing area
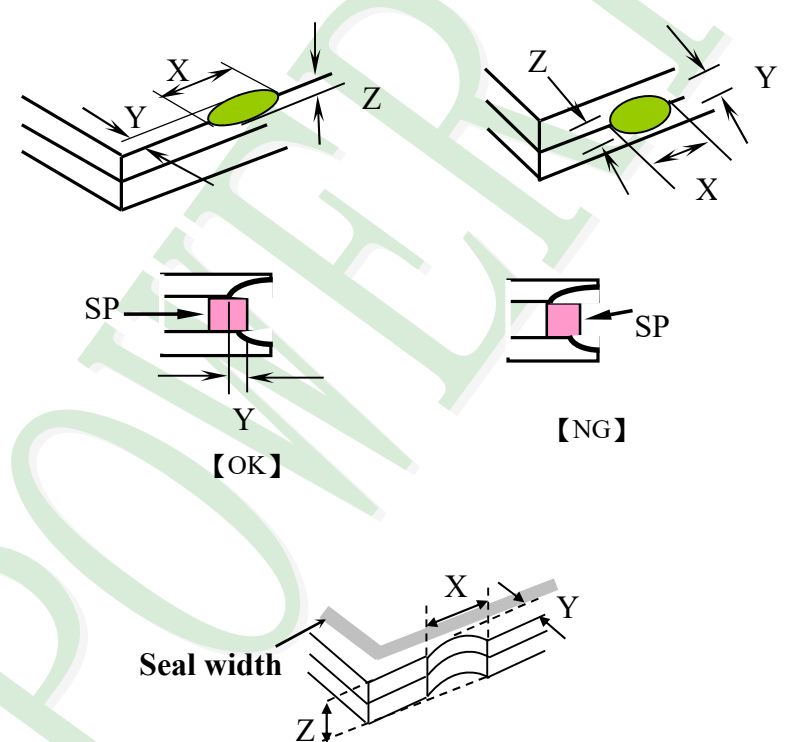
B area : Outside of viewing area
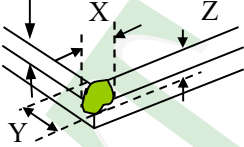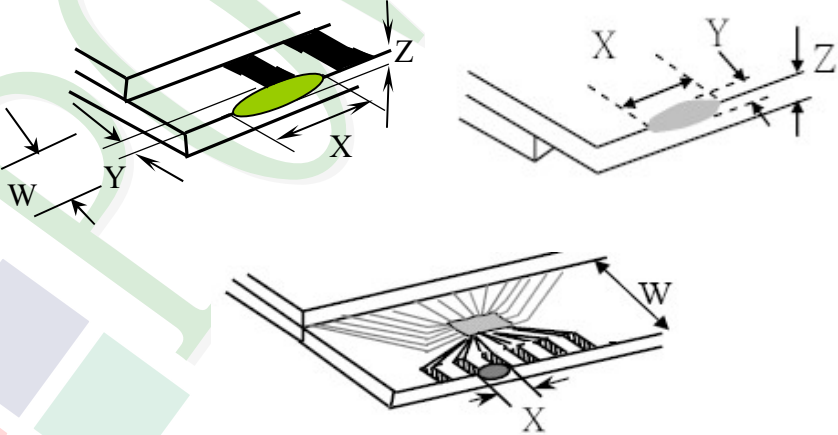
（4）. Standard of inspection： (Unit：mm)
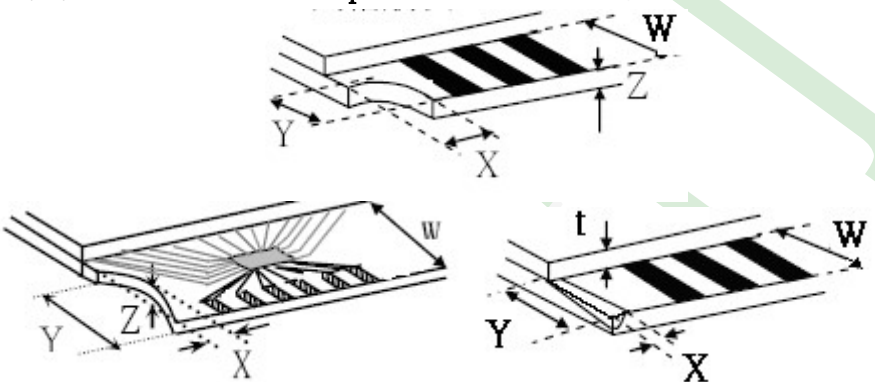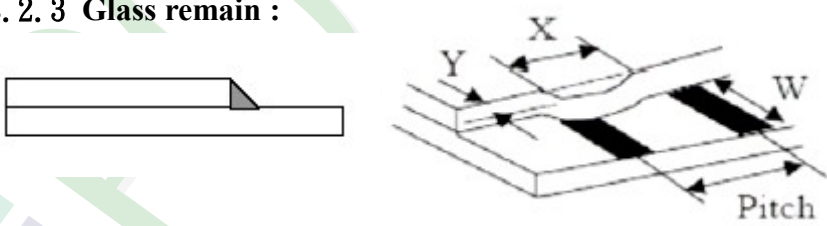
NO	Item	Criterion	Level
01	**Product condition**	1.1The part number is inconsistent with work order of production.	Major
		1.2 Mixed product types.	Major
		1.3 Assembled in inverse direction.	Major
02	**Quantity**	2.1The quantity is inconsistent with work order of production.	Major
03	**Outline dimension**	3.1 Product dimension and structure must conform to structure diagram.	Major
04	**Electrical Testing**	4.1 Missing line character and icon.	Major
		4.2 No function or no display.	Major
		4.3 Display malfunction.	Major
		4.4 LCD viewing angle defect.	Major
		4.5 Current consumption exceeds product specifications.	Major
		4.6 Mura can not be seen through 5% ND filter at 50% Gray screen , should be judged by the viewing angle of 90 degree.	Minor
05	Dot defect **(Bright dot、** **Dark dot)** **On -display**	<table><tr><th>Item</th><th>Acceptance (Q'ty)</th></tr><tr><td rowspan="4">**Dot Defect**</td></tr></table> **Item** / **Acceptance (Q'ty)** **Bright Dot** $\leqq$ 4 **Dark Dot** $\leqq$ 5 **Joint Dot** $\leqq$ 3 **Total** $\leqq$ 7 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 $\geqq$5 mm. 5.4 Bright dot that can not be seen through 5% ND filter.	Minor

Dot Defect table:

Item	Acceptance (Q'ty)
Bright Dot	$\leqq$ 4
Dark Dot	$\leqq$ 5
Joint Dot	$\leqq$ 3
Total	$\leqq$ 7

NO	Item	Criterion	Level
06	**Black or white dot、scratch、contamination** **Round type** **Φ＝(x＋y) / 2** **Line type** 	**6.1 Round type (Non-display or display)：** **6.2 Line type(Non-display or display)：**	**Minor**
07	**Polarizer Bubble**		**Minor**

6.1 Round type (Non-display or display)：

Dimension (diameter：Φ)	Acceptance (Q'ty)	
	A area	**B area**
Φ ≦ 0.25	Ignore	Ignore
0.25 ＜ Φ ≦ 0.50	**5**	
Φ ＞ 0.50	**0**	
Total	**5**	

6.2 Line type(Non-display or display)：

module size	Length (L)	Width (W)	Acceptance (Q'ty)	
			A area	**B area**
3.5" to less 9"	---	**W ≦ 0.03**	Ignore	Ignore
	L ≦ 10.0	**0.03 ＜W ≦ 0.05**	**4**	
	L ≦ 5.0	**0.05 ＜W ≦ 0.10**	**2**	
	---	**W ＞ 0.10**	**As round type**	
	Total		**5**	
9" to 15"	---	**W ≦ 0.05**	Ignore	**Ignore**
	L ≦ 10.0	**0.05 ＜W ≦ 0.10**	**5**	
	---	**W ＞ 0.10**	**As round type**	
	Total		**5**	

Polarizer Bubble:

Dimension (diameter：Φ)	Acceptance (Q'ty)	
	A area	**B area**
Φ ≦ 0.25	Ignore	Ignore
0.25 ＜ Φ ≦ 0.50	**4**	
0.50 ＜ Φ ≦ 0.80	**1**	
Φ ＞ 0.80	**0**	
Total	**5**	

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:** 【OK】　　　　【NG】 **Seal width**	**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

NO	Item	Criterion	Level
08	The crack of glass	(see below)	Minor

Criterion (cell content):

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：

X	Y	Z
$\leqq 1/5\ a$	Crack can't enter viewing area	$Z \leqq 1/2\ t$
$\leqq 1/5\ a$	Crack can't exceed the half of SP width.	$1/2\ t < Z \leqq 2\ t$

8.2 Protrusion over terminal：

8.2.1 Chip on electrode pad：

	X	Y	Z
Front	$\leqq a$	$\leqq 1/2\ W$	$\leqq t$
Back	$\leqq a$	$\leqq W$	$\leqq 1/2\ t$

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 8.2.2 Non-conductive portion： <table><tr><td>X</td><td>Y</td><td>Z</td></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><td>X</td><td>Y</td><td>Z</td></tr><tr><td>≦ a</td><td>≦ 1/3 W</td><td>≦ t</td></tr></table> **8.2.4 Cracking** **Not Allowed**	Minor

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)

NO.	TEST ITEM	TEST CONDITION
1	High Temperature Storage Test	Keep in 80 ±5℃ 240 hrs
2	Low Temperature Storage Test	Keep in −30 ±5℃ 240 hrs
3	High Temperature / High Humidity Storage Test	Keep in 60 ℃ / 90% R.H duration for 240 hrs (Excluding the polarizer)
4	Temperature Cycling Storage Test	−30℃ → +25℃ → 80℃ → +25℃ (30mins)　(5mins)　(30mins)　(5mins) 20 Cycle
5	ESD Test	**Condition A – Bare Display** **Air Discharge:** Apply 2 KV with 5 times Discharge for each polarity +/-　　**Contact Discharge:** Apply 250V with 5 times discharge for each polarity +/- **Condition A:** Product features can be operated normally after the test and the testing process. No function to reduce or abnormal phenomenon is occurred. No impact from ESD discharge. **Condition B –**With complete application/product designed by customer Ladwig which meet global ESD standard XXXXXXXX to sustain below Air and Contact discharge criteria. Such test will be performed at customer side directly. **Air Discharge:** Apply 15KV with 5 times Discharge for each polarity +/-　　**Contact Discharge:** Apply 8KV with 5 times discharge for each polarity +/- **Condition B:** Product features may be operating normally before the test, but the testing process affected by ESD discharge and resulted in reducing or abnormal function. Auto-reply function must be done to reset (Re-set) or via the operator's move, the function will go back to normal. Application / Product itself should include ESD protection design to meet international standard of each product category.

NO.	TEST ITEM	TEST CONDITION
6	**Vibration Test (Packaged)**	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
7	**Drop Test (Packaged)**	<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

◎Result Evaluation Criteria :

Under the display quality test conditions with normal operations with normal operation state.

Do not change these conditions as such changes may affect practical display function.

(Normal operation state)

Temperature : +20~30℃

Humidity : 50~70%

Atmospheric pressure : 86~106Kpa

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 $320 \pm 10°C$ 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 $25°C \pm 5°C$ 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.
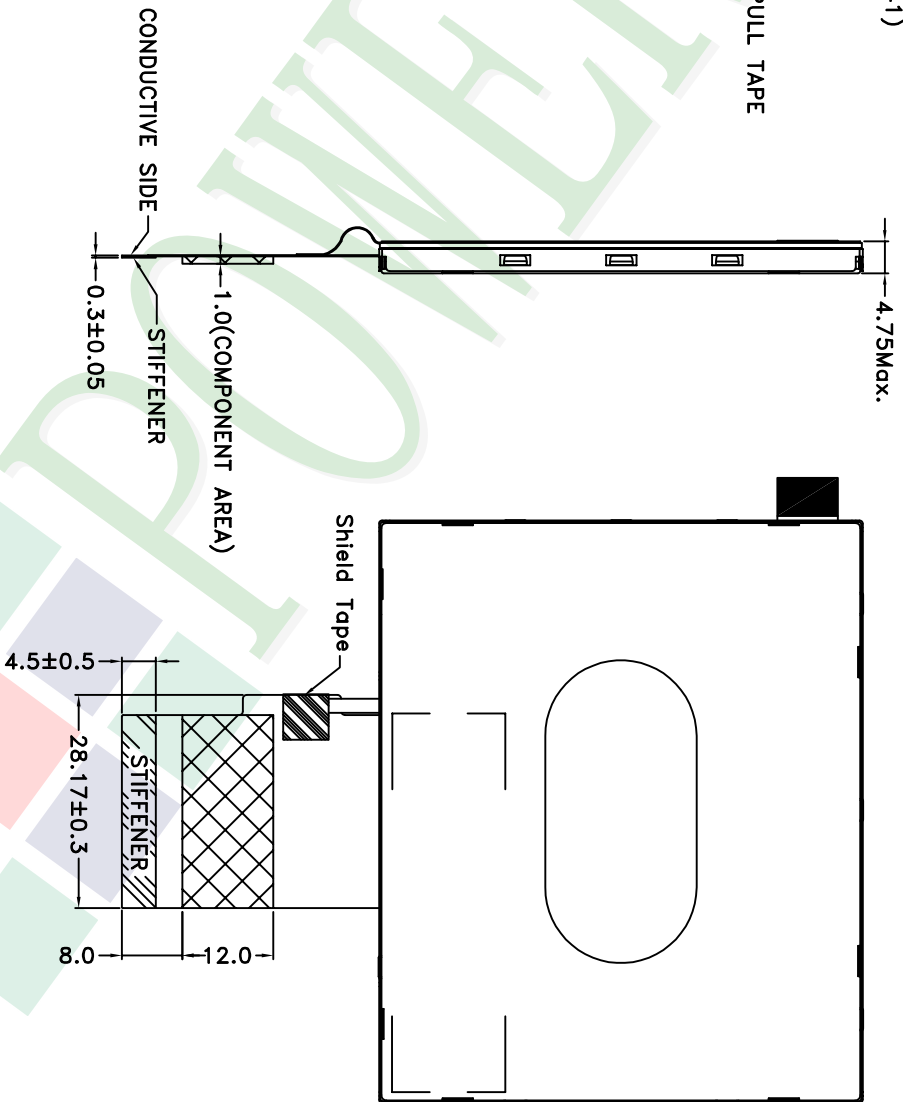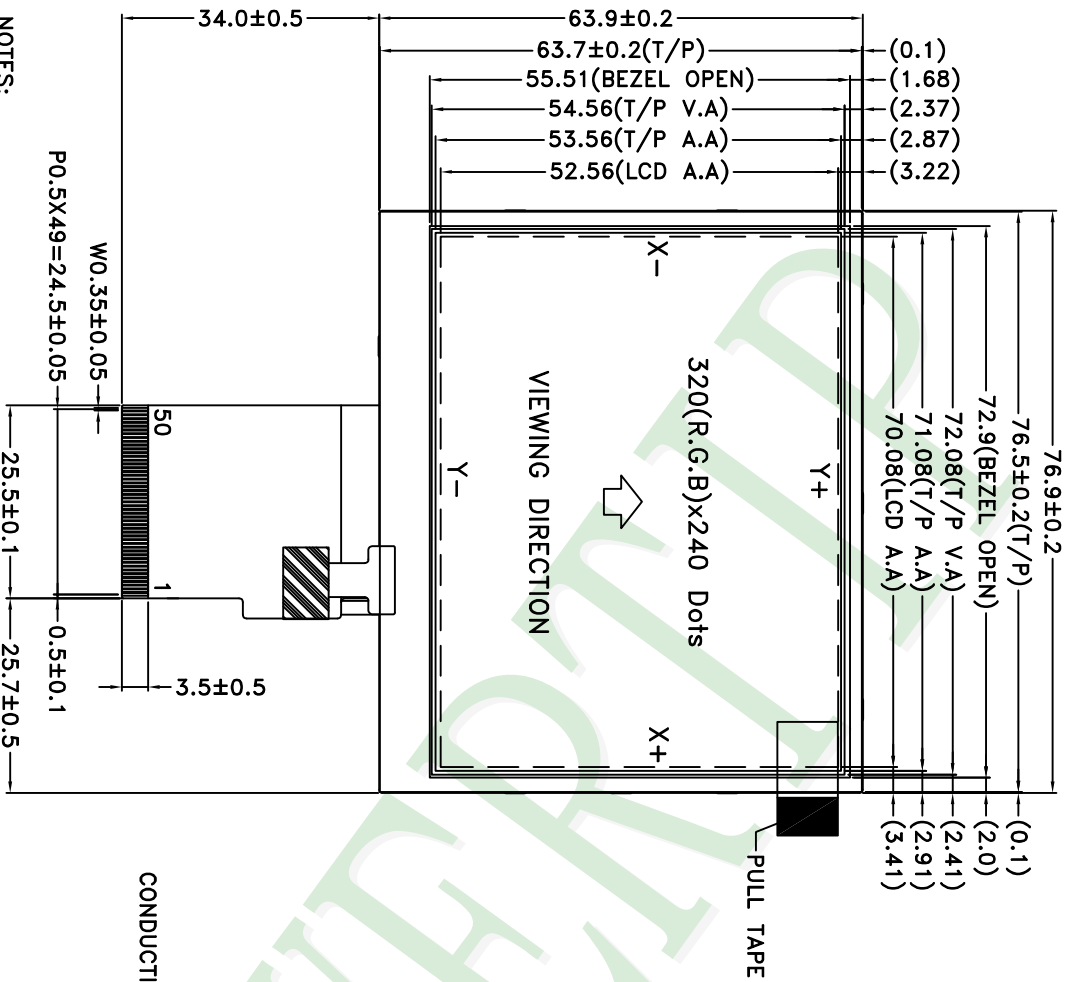
NOTES:
1.LCD TYPE: α-SI TFT
2.LCD DISPLAY:POSITIVE/ TRANSMISSIVE
3.The tolerance unless classified ±0.2mm
△4.FPC Matching Connector: Kyocera 08 6282 050 340 829+ or EQUIVALENT

REV		REV BY		DATE		
001	NEW DRAWING	Stone	REVISER	2012/12/07	DATE	
002	ADD T/P MARKED	Stone	Stone	2012/12/17		
003	MODIFY NOTE	Stone		2014/03/31		
004						
005						
006						
007						

PART NO.: PH320240T-023-I03Q
DRAWING NAME:: LMD-PH320240T-023-I03Q
TITLE: LCD MODULE DRAWING

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

	Design	Check	Approve			
	Stone	Sam	Oliver			
	Surface	Material	Thickness	Quantity		
	(3)	MM	FIT	1/2	250	
		Unit	Scale	Page	Quantity	

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

Dimensions:
34.0±0.5
63.9±0.2
63.7±0.2(T/P)
55.51(BEZEL OPEN)
54.56(T/P V.A)
53.56(T/P A.A)
52.56(LCD A.A)
(0.1)
(1.68)
(2.37)
(2.87)
(3.22)
76.9±0.2
76.5±0.2(T/P)
72.9(BEZEL OPEN)
72.08(T/P V.A)
71.08(T/P A.A)
70.08(LCD A.A)
(0.1)
(2.0)
(2.41)
(2.91)
(3.41)

320(R.G.B)x240 Dots
VIEWING DIRECTION
X- Y+ Y- X+
PULL TAPE

W0.35±0.05
P0.5X49=24.5±0.05
50
1
25.5±0.1
25.7±0.5
3.5±0.5
0.5±0.1

CONDUCTIVE SIDE
STIFFENER
0.3±0.05
1.0(COMPONENT AREA)
4.75Max.

Shield Tape
4.5±0.5
28.17±0.3
STIFFENER
8.0
12.0

PT-A-054-01

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)	PH320240T-023-I03Q	76.9 X 63.9	0.0408	252	10.2816
2	多層薄膜(1)POF	OTFILM0BA03ABA	19"X350X0.015	——	6	——
3	TRAY 盤 (2)Tray	TYPH32024002BB	352 X 260 X 12.8	0.0999	48	4.7952
4	內盒(3)Product Box	BX36627063ABBA	393 X 274 X 68	0.2692	6	1.6152
5	保利龍板(4)Polylon board	OTPLB00PL08ABA	550 X 393 X 20	0.0284	2	0.0568
6	外紙箱(5)Carton	BX57041027CCBA	570 X 410 X 265	1.4208	1	1.4208
7						
8						
9						

2.一 整箱總重量 (Total LCD Weight in carton) : 18.17 Kg±10%

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

(1)LCM quantity per box : no per tray 6 x no of tray 7 = 42

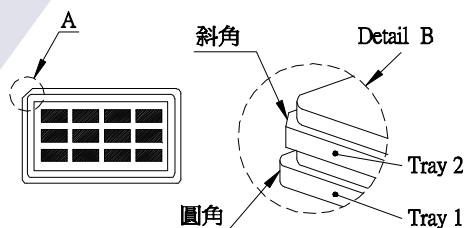(2)Total LCM quantity in carton : quantity per box 42 x no of boxes 6 = 252

Use empty tray 空 盤

+

Put products into the tray

Tray stacking

A

B

(1)多層薄膜 POF

(2)TRAY 盤 Tray

(3)內盒 Product Box

(4)保利龍板 Polylon board

(5)外紙箱 Carton
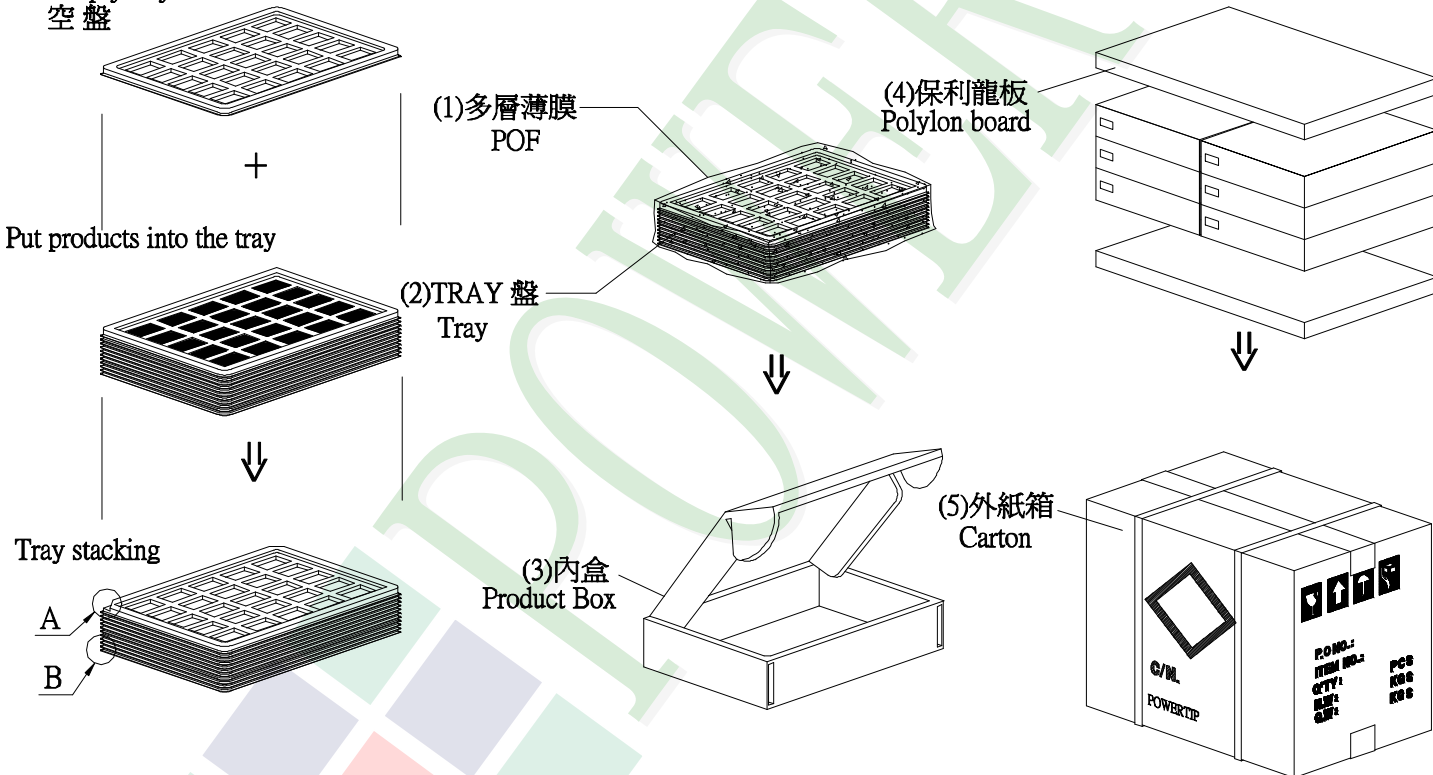
特 記 事 項 (REMARK)

4. Label Specifications :

TYPE		
ID.NO		S/O
Q'TY	Pcs	Date
Lot.NO		
Note		

參照"成品包裝點檢作業標準書"內容

A

斜角

圓角

Detail B

Tray 2

Tray 1

5.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.