



## SPECIFICATIONS

CUSTOMER	:	CFR015
SAMPLE CODE	:	SH320240T-022-I-Q
MASS PRODUCTION CODE	:	PH320240T-022-I-Q
SAMPLE VERSION	:	02
SPECIFICATIONS EDITION	:	004
DRAWING NO. (Ver.)	:	LMD-PH320240T-022-I-Q (Ver.002)
PACKAGING NO. (Ver.)	:	PKG-PH320240T-022-I-Q (Ver.001)

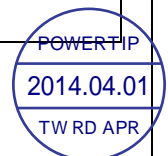
**Customer Approved**

Date:

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

- Preliminary specification for design input
- Specification for sample approval



### POWERTIP TECH. CORP.

<b>Headquarters:</b> No.8, 6 <sup>th</sup> Road, Taichung Industrial Park, Taichung, Taiwan 台中市 407 工業區六路 8 號	TEL: 886-4-2355-8168 FAX: 886-4-2355-8166	E-mail: <a href="mailto:sales@powertip.com.tw">sales@powertip.com.tw</a> Http://www.powertip.com.tw
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Note : For detailed information please refer to IC data sheet :

Primacy(TFT LCD): SSD2119

## 1. SPECIFICATIONS

### 1.1 Features

#### Main LCD Panel

Item	Standard Value
Display Type	320* (R、G、B) * 240 Dots
LCD Type	a-Si TFT , Normally White , TN mode , Transmissive type
Screen size (inch)	3.5 inch
Viewing Direction	6 O'clock
Color configuration	R.G.B. vertical stripe
Backlight	LED B/L
Driver IC	SSD2119 (262K Colors )
Interface	1. 8/ 9/ 16/ 18-bit 6800-series /8080-series Parallel Interface. 2. Serial Peripheral Interface (SPI). 3. 18-/6-bit RGB interface (DEN,DOTCLK, HSYNC, VSYNC, DB[17:0]). 4. VSYNC interface (system interface + VSYNC). 5. WSYNC interface (system interface + WSYNC).
ROHS	THIS PRODUCT CONFORMS THE ROHS OF PTC Detail information please refer website : <a href="http://www.powertip.com.tw/news.php?area_id_view=1085560481/">http://www.powertip.com.tw/news.php?area_id_view=1085560481/</a>

### 1.2 Mechanical Specifications

Item	Standard Value	Unit
Outline Dimension	76.9 (W) * 63.9(L) * 3.5(H)(MAX)	mm

#### LCD Panel

Item	Standard Value	Unit
Active Area	70.08 (W) * 52.56 (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	VDDIO	VSS	-0.3	+4.0	V
Input Voltage	VCI	-	-0.3	+5.0	V
Operating Temperature	T <sub>OP</sub>	-	-20	+70	°C
Storage Temperature	T <sub>ST</sub>	-	-30	+80	°C
Storage Humidity	H <sub>D</sub>	Ta < 60 °C	20	90	%RH

## 1.4 DC Electrical Characteristics

**Module**
**VSS = 0V, Ta = 25°C**

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Power Supply Voltage	VDDIO	-	3.0	3.3	3.6	V
Input High Voltage	V <sub>IH1</sub>	-	0.8* VDDIO	-	VDDIO	V
Input Low Voltage	V <sub>IL1</sub>	-	0	-	0.2* VDDIO	V
Output High Voltage	V <sub>OH1</sub>	I <sub>OH</sub> =-0.1mA	0.9 * VDDIO	-	VDDIO	V
Output Low Voltage	V <sub>OL1</sub>	I <sub>OL</sub> =0.1mA	0	-	0.1* VDDIO	V
Supply Current	IDDIO+ICI	VDDIO/VCI = 3.3 V Pattern= picture	-	7	-	mA
		VDDIO/VCI = 3.3 V Pattern= Black *1	-	9.5	14.3	mA

Note1 : Maximum current display.

## 1.5 Optical Characteristics

### TFT LCD Panel

VDDIO =3.3V, Ta=25°C

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	-
Response time	Tr + Tf	Ta = 25°C θX, θY = 0°	-	30	45	ms	Note2
Viewing angle	Top	θY+	-	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)	White	X	0.26	0.31	0.36	-	Note1
		Y	0.29	0.34	0.39		
	Red	X	0.58	0.63	0.68		
		Y	0.29	0.34	0.39		
	Green	X	0.28	0.33	0.38		
		Y	0.55	0.60	0.65		
	Blue	X	0.10	0.15	0.20		
		Y	0.03	0.08	0.13		
Average Brightness Pattern=white display	IV	IF= 20 mA	220	250	-	cd/m <sup>2</sup>	Note1
Uniformity	B		70	-	-	%	Note1

Note1:

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

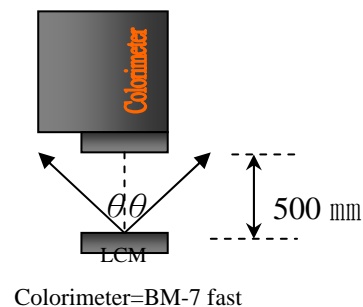
2 : Measurement Condition for Optical Characteristics:

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 mm , (θ= 0°)

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

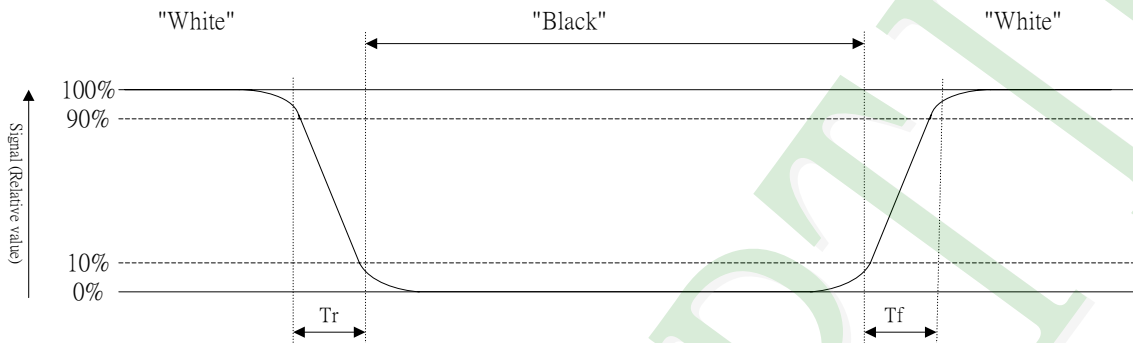
d : The uncertainty of the C.I.E coordinate measurement ±0.01 , Average Brightness ± 4%



**Note2: Definition of response time:**

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

Refer to figure as below:



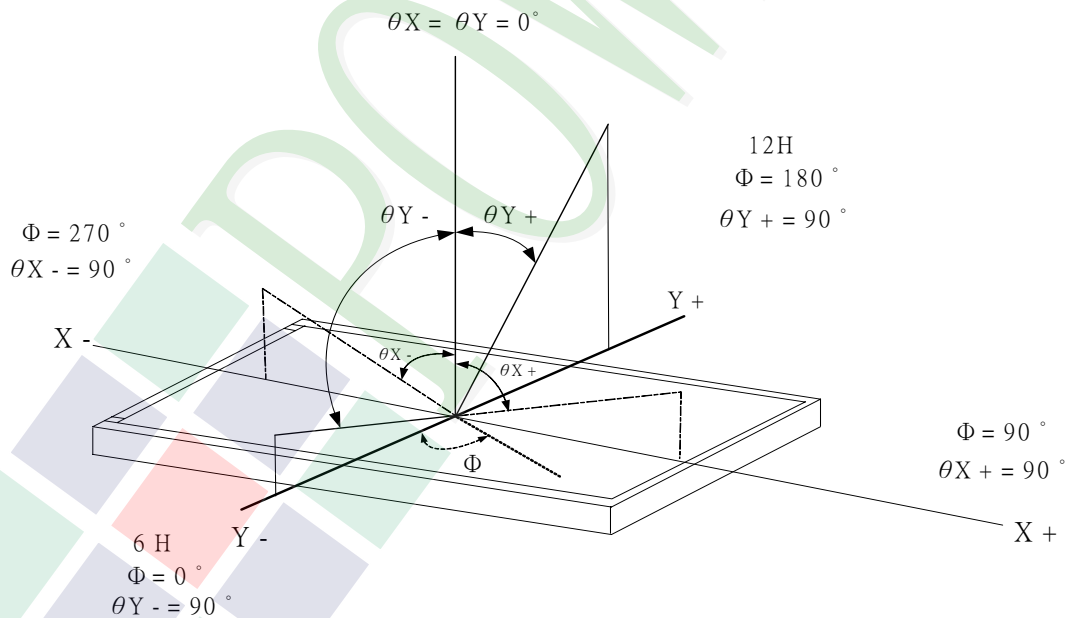
**Note3: Definition of contrast ratio:**

Contrast ratio is calculated with the following formula

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

**Note4: Definition of viewing angle:**

Refer to figure as below:





## 1.6 Backlight Characteristics

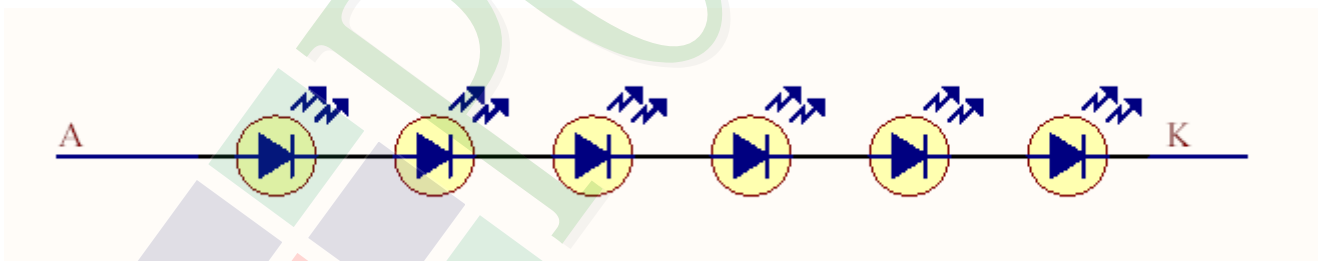
### Maximum Ratings

Item	Symbol	Conditions	Min.	Max.	Unit
LED Forward Current	If	Ta =25°C	-	30	mA
LED Reverse Voltage	Vr		-	5	V
Power Dissipation	Pd			540	mW

### Electrical / Optical Characteristics

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Forward Voltage	VF	If=20mA	-	19.2	20.4	V
Average Brightness (Without LCD &T/P)	IV		4500	5200	-	cd/m <sup>2</sup>
CIE Color Coordinate (Without LCD &T/P)	X		0.27	0.30	0.33	-
	Y		0.28	0.31	0.34	
Color		White				

### Internal Circuit Diagram



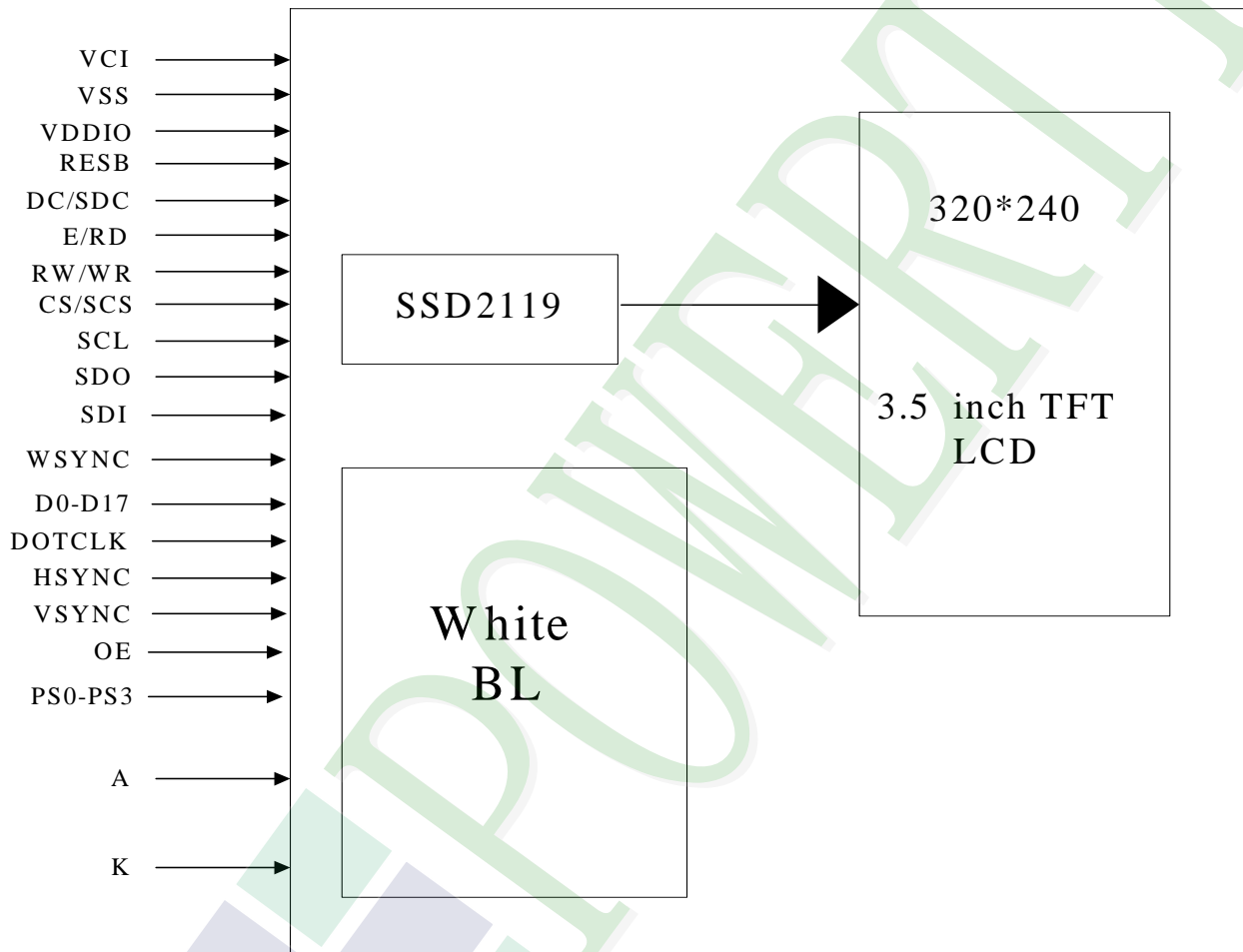
## 2. MODULE STRUCTURE

### 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	VCI	Booster input voltage pin.
2	VCI	Booster input voltage pin.
3	VSS	System ground pin of the IC.
4.	VDDIO	Voltage input pin for logic I/O.
5	VSS	System ground pin of the IC.
6	RESB	System reset pin. - An active low pulse at this pin will reset the IC, Connect to VDDIO in normal operation.
7	DC/SDC	Data or command. DC: Parallel Interface. SDC: Serial Interface.
8	E/RD	6800-system:E(enable signal). 8080-system:RD(read strobe signal). Serial mode: Not used and should be connected to VDDIO or VSS.
9	RW/WR	6800-system: RW(indicates read cycle when High, write cycle when Low). 8080-system: WR(write strobe signal).
10	CS/SCS	CS: Chip Select pin for 6800/8080 Parallel Interface. SCS: Chip select pin for Serial Mode Interface.
11	SCL	Serial clock input.
12	SDO	Data output pin in serial interface.
13	SDI	Data input pin in serial interface.
14	WSYNC	Ram Write Synchronization output. -Leave it OPEN when not used.
15	D17	For parallel mode,8/9/16/18 bit interface. Unused pins should connect to VSS.
16	D16	
17	D15	
18	D14	
19	D13	



Pin No	Symbol	Function
20	D12	For parallel mode,8/9/16/18 bit interface. Unused pins should connect to VSS. Please refer to Table 1.
21	D11	
22	D10	
23	D9	
24	D8	
25	D7	
26	D6	
27	D5	
28	D4	
29	D3	
30	D2	
31	D1	
32	D0	
33	VSS	System ground pin of the IC.
34	DOTCLK	Dot-clock signal and oscillator source.
35	HSYNC	Line Synchronization input.
36	VSYNC	Frame/Ram Write Synchronization input.
37	OE	Display enable pin from controller.
38	VSS	System ground pin of the IC.
39	PS0	Please refer to Table 1.
40	PS1	
41	PS2	
42	PS3	
43	VSS	System ground pin for the IC.
44	NC	No connection, Must be open.
45	NC	No connection, Must be open.

Pin No	Symbol	Function
46	NC	No connection, Must be open.
47	NC	No connection, Must be open.
48	VSS	System ground pin for the IC.
49	K	Backlight LED's cathode.
50	A	Backlight LED's anode.

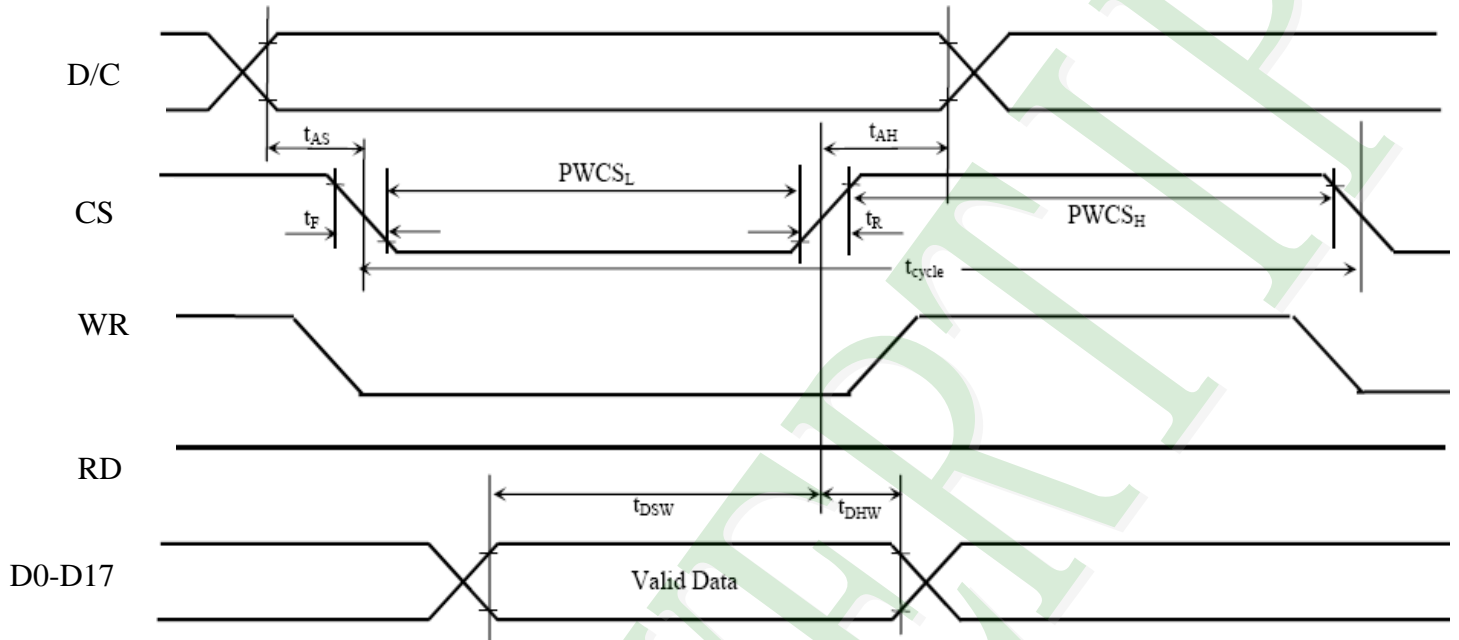
**Table 1**

PS3	PS2	PS1	PS0	Interface Mode	Data bus input
0	0	0	0	16-bit 6800 parallel interface.	D[17:10],D[8:1]
0	0	0	1	8-bit 6800 parallel interface.	D[17:10]
0	0	1	0	16-bit 8080 parallel interface.	D[17:10],D[8:1]
0	0	1	1	8-bit 8080 parallel interface.	D[17:10]
0	1	0	0	9-bit generic D[17:9] (262k color) + 3-wire SPI If 65K color, D12 shorts to D17 internally.	-
0	1	0	1	16-bit generic (262k color)+ 3-wire SPI.	-
0	1	1	0	18-bit generic (262k color)+ 3-wire SPI.	-
0	1	1	1	6-bit generic D[17:12] (262k color) + 3-wire SPI.	-
1	0	0	0	18-bits 6800 parallel interface.	D[17:0]
1	0	0	1	9-bits 6800 parallel interface.	D[17:9]
1	0	1	0	18-bit 8080 parallel interface.	D[17:0]
1	0	1	1	9-bit 8080 parallel interface.	D[17:9]
1	1	1	0	3-wire SPI.	-
1	1	1	1	4-wire SPI.	-

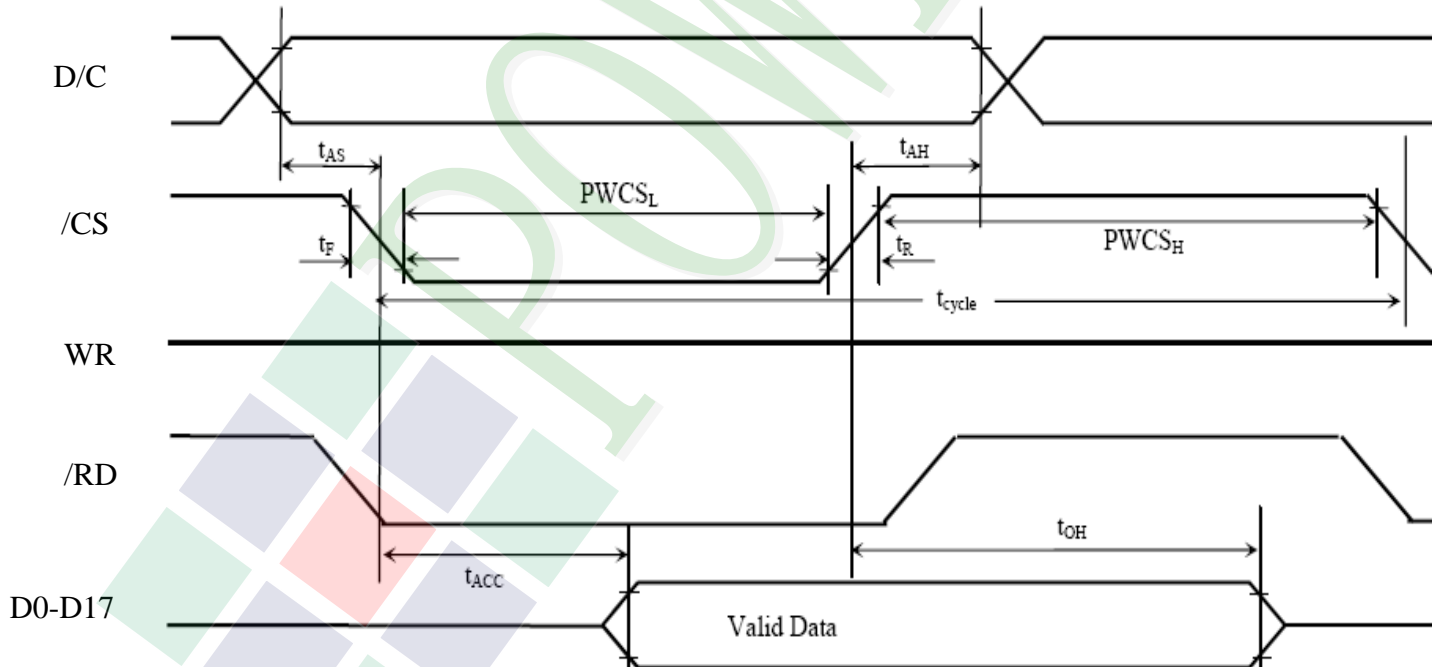
## 2.3 Timing Characteristics

### 2.3.1 8080 Interface Timing

#### Write Cycle



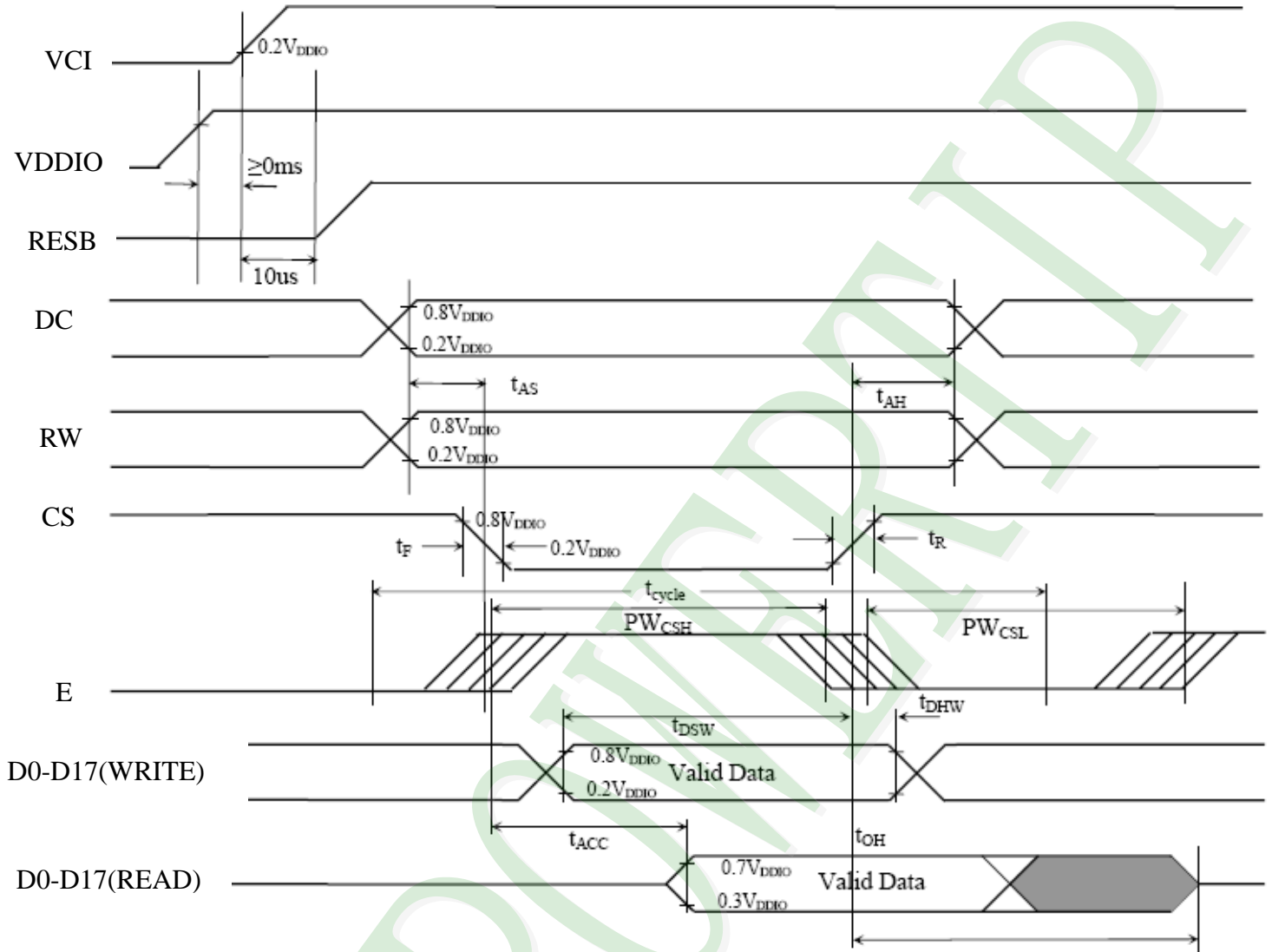
#### Read Cycle



(VDDIO = 3.3V±0.3V, T<sub>A</sub> = -40~85°C)

Item	Symbol	Condition	Rating		Units
			Min.	Max.	
Clock Cycle Time	t <sub>cycle</sub>	-	77	-	ns
Serial Clock Cycle Time SPI Clock tolerance = +/- 2 ppm	f <sub>CLK</sub>		-	15	MHz
Register select Setup Time	t <sub>AS</sub>		4	-	ns
Register select Hold Time	t <sub>AH</sub>	-	5	-	
Chip Select Setup Time	t <sub>CSS</sub>	-	2	-	
Chip Select Hold Time	t <sub>CSH</sub>	-	10	-	
Write Data Setup Time	t <sub>DSW</sub>	-	5	-	
Write Data Hold Time	t <sub>OHW</sub>	-	10	-	
Clock Low Time	t <sub>CLKL</sub>	-	38	-	
Clock High Time	t <sub>CLKH</sub>	-	38	-	
Rise time	t <sub>R</sub>	-	-	4	
Fall time	t <sub>F</sub>	-	-	4	

### 2.3.2 6800 Interface Timing

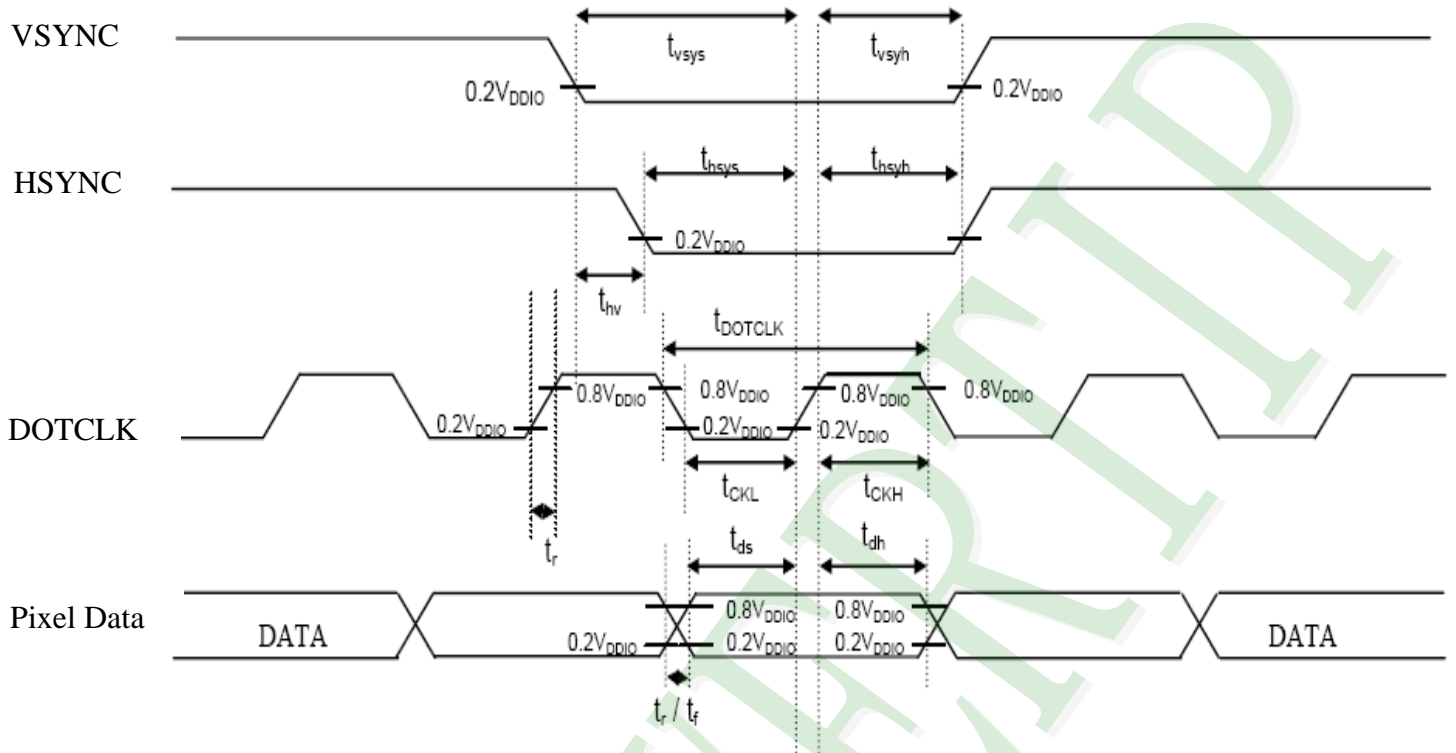




(VDDIO = 3.3V±0.3V, T<sub>A</sub> = -40~85°C)

Item	Symbol	Condition	Rating		Units
			Min.	Max.	
Clock Cycle Time(write cycle)	tcycle	-	77	-	ns
Clock Cycle Time(read cycle)	tcycle	-	450	-	MHz
Address Setup Time(RW)	tAS	-	0	-	ns
Address Hold Time(RW)	tAH	-	0	-	
Data Setup Time(D0-D17,WRITE)	tDSW	-	5	-	
Data Hold Time(D0-D17,WRITE)	tDHW	-	5	-	
Data Access Time(D0-D17,READ)	tACC	-	250	-	
Output Hold time(D0-D17,READ)	tOH	-	100	-	
Pulse width CS low(write cycle)	PW <sub>scL</sub>	-	40	-	
Pulse width CS high(write cycle)	PW <sub>scH</sub>	-	25	-	
Pulse width CS low(read cycle)	PW <sub>scL</sub>	-	500	-	
Pulse width CS high(read cycle)	PW <sub>scH</sub>	-	500	-	
Rise time	tR	-	-	4	
Fall time	tF	-	-	4	

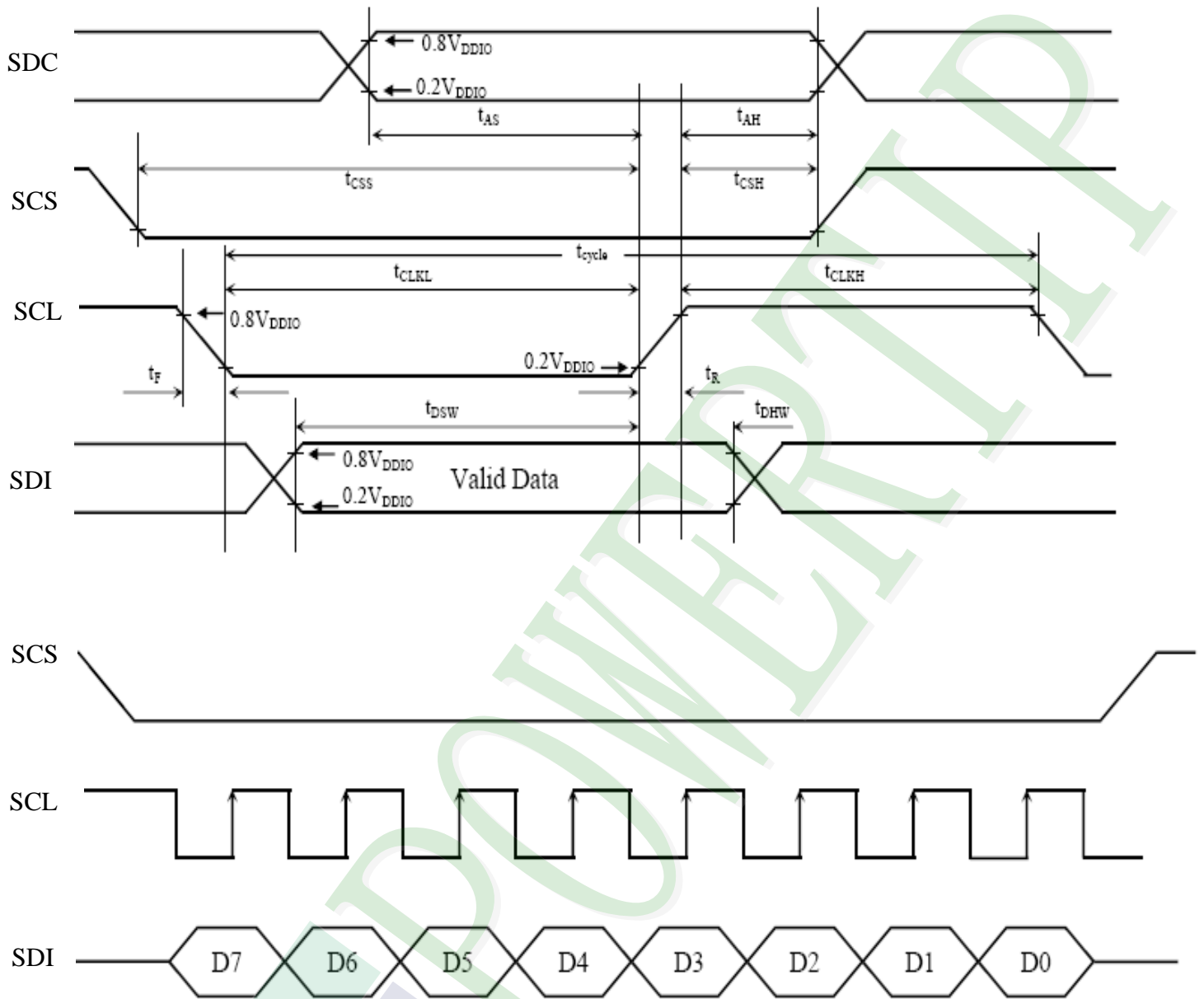
### 2.3.3 RGB Interface Timing



(V<sub>DDIO</sub> = 3.3V±0.3V, T<sub>A</sub> = -40~85°C)

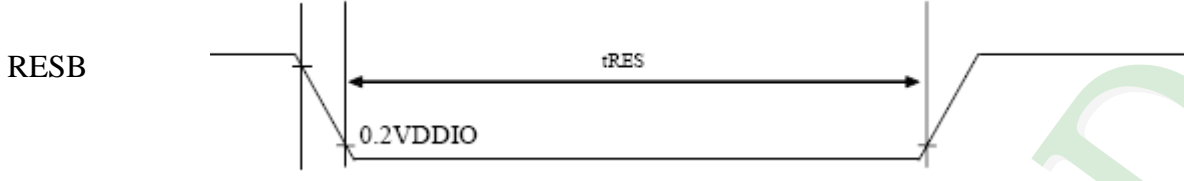
Item	Symbol	Condition	Rating			Units
			Min.	Typ.	Max.	
DOTCLK Frequency (70Hz frame rate)	$f_{DOTCLK}$	-	1	5.5	8.2	MHz
DOTCLK Period	$f_{DOTCLK}$	-	122	182	1000	ns
Vertical Sync Setup Time	$t_{vsys}$	-	20	-	-	ns
Vertical Sync Hold Time	$t_{vsyh}$	-	20	-	-	
Horizontal Sync Setup Time	$t_{hsys}$	-	20	-	-	
Horizontal Sync Hold Time	$t_{hsyh}$	-	20	-	-	
Phase difference of Sync Signal Falling Edge	$t_{hv}$	-	0	-	320	$t_{DOTCLK}$
DOTCLK Low Period	$t_{CLK}$	-	61	-	-	ns
DOTCLK High Period	$t_{CKH}$	-	61	-	-	
Data Setup Time	$t_{DS}$	-	25	-	-	
Data hold Time	$t_{DH}$	-	25	-	-	

## 2.3.4 Serial Interface Timing



(VDDIO = 3.3V±0.3V, T<sub>A</sub> = -40~85°C)

Item	Symbol	Condition	Rating			Units
			Min.	Typ.	Max.	
Clock Cycle Time	t <sub>cycle</sub>		77	-	-	ns
Serial Clock Cycle Time SPI Clock tolerance=+/-2 ppm	f <sub>CLK</sub>	-	-	-	15	MHz
Register select Setup Time	t <sub>AS</sub>		4	-	-	ns
Register select Hold Time	t <sub>AH</sub>		5	-	-	
Chip Select Setup Time	t <sub>CSS</sub>	-	2	-	-	
Chip Select Hold Time	t <sub>CSH</sub>	-	10	-	-	
Write Data Setup Time	t <sub>OSW</sub>	-	5	-	-	
Write Data Hold Time	t <sub>OHW</sub>	-	10	-	-	
Clock Low Time	t <sub>CLKL</sub>	-	38	-	-	
Clock High Time	T <sub>CLKH</sub>	-	38	-	-	
Rise time	t <sub>R</sub>	-	-	-	4	
Fall time	t <sub>F</sub>	-	-	-	4	



( $V_{DDIO} = 3.3V \pm 0.3V$ ,  $T_A = -40 \sim 85^\circ C$ )

Item	Symbol	Condition	Rating		Units
			Min.	Max.	
Reset pulse duration	$t_{RES}$	-	15	-	us

## 2.4 Programming Init code

;For SSD2119---16-bit 8080-series Parallel Interface.

INIT\_MAIN

```

MOV    ADDRH,#00H
MOV    ADDR, #28H
CALL   WRITE_COMMAND
MOV    ADDRH,#00H
MOV    ADDR, #06H
CALL   WRITE_DATA

MOV    ADDRH,#00H
MOV    ADDR, #00H
CALL   WRITE_COMMAND
MOV    ADDRH,#00H
MOV    ADDR, #01H
CALL   WRITE_DATA

MOV    ADDRH,#00H
MOV    ADDR, #01H
CALL   WRITE_COMMAND
MOV    ADDRH,#00111010b
MOV    ADDR, #efH;EFH
CALL   WRITE_DATA

MOV    ADDRH,#00H
MOV    ADDR, #02H
CALL   WRITE_COMMAND
MOV    ADDRH,#06H
MOV    ADDR, #00H
CALL   WRITE_DATA

MOV    ADDRH,#00H
MOV    ADDR, #03H    ;VGH/VGL Voltage Setting
CALL   WRITE_COMMAND
MOV    ADDRH,#64H
MOV    ADDR, #64H
CALL   WRITE_DATA

MOV    ADDRH,#00H
MOV    ADDR, #10H
CALL   WRITE_COMMAND
MOV    ADDRH,#00H
MOV    ADDR, #00H
CALL   WRITE_DATA

MOV    ADDRH,#00H
MOV    ADDR, #11H
CALL   WRITE_COMMAND
MOV    ADDRH,#64H
MOV    ADDR, #30H

```



```

CALL    WRITE_DATA
CALL    DELAY
CALL    DELAY

MOV     ADDRH,#00H
MOV     ADDRL,#07H
CALL    WRITE_COMMAND
MOV     ADDRH,#00H
MOV     ADDRL,#33H
CALL    WRITE_DATA
CALL    DELAY

MOV     ADDRH,#00H
MOV     ADDRL,#25H
CALL    WRITE_COMMAND
MOV     ADDRH,#e0H
MOV     ADDRL,#00H
CALL    WRITE_DATA

MOV     ADDRH,#00H
MOV     ADDRL,#0bH
CALL    WRITE_COMMAND
MOV     ADDRH,#53H
MOV     ADDRL,#08H
CALL    WRITE_DATA

```

;----- Adjust the Gamma Curve -----;

```

MOV     ADDRH,#00H
MOV     ADDRL,#30H
CALL    WRITE_COMMAND
MOV     ADDRH,#BFH
MOV     ADDRL,#BDH
CALL    WRITE_DATA

MOV     ADDRH,#00H
MOV     ADDRL,#31H
CALL    WRITE_COMMAND
MOV     ADDRH,#52H
MOV     ADDRL,#47H
CALL    WRITE_DATA

MOV     ADDRH,#00H
MOV     ADDRL,#32H
CALL    WRITE_COMMAND
MOV     ADDRH,#DDH
MOV     ADDRL,#BAH
CALL    WRITE_DATA

MOV     ADDRH,#00H
MOV     ADDRL,#33H
CALL    WRITE_COMMAND

```



```

MOV   ADDRH,#35H
MOV   ADDRL,#0EH
CALL  WRITE_DATA

```

```

MOV   ADDRH,#00H
MOV   ADDRL,#34H
CALL  WRITE_COMMAND
MOV   ADDRH,#A6H
MOV   ADDRL,#BFH
CALL  WRITE_DATA

```

```

MOV   ADDRH,#00H
MOV   ADDRL,#35H
CALL  WRITE_COMMAND
MOV   ADDRH,#39H
MOV   ADDRL,#BCH
CALL  WRITE_DATA

```

```

MOV   ADDRH,#00H
MOV   ADDRL,#36H
CALL  WRITE_COMMAND
MOV   ADDRH,#C5H
MOV   ADDRL,#20H
CALL  WRITE_DATA

```

```

MOV   ADDRH,#00H
MOV   ADDRL,#37H
CALL  WRITE_COMMAND
MOV   ADDRH,#34H
MOV   ADDRL,#1EH
CALL  WRITE_DATA

```

;------power on sequence-----;

```

MOV   ADDRH,#00H
MOV   ADDRL,#0CH
CALL  WRITE_COMMAND
MOV   ADDRH,#00H
MOV   ADDRL,#05H
CALL  WRITE_DATA
CALL  DELAY
CALL  DELAY
CALL  DELAY

```

```

MOV   ADDRH,#00H
MOV   ADDRL,#0dH
CALL  WRITE_COMMAND
MOV   ADDRH,#00H
MOV   ADDRL,#12H
CALL  WRITE_DATA
CALL  DELAY

```





```
CALL    DELAY
CALL    DELAY

MOV     ADDRH,#00H
MOV     ADDRL,#1eH      ;VCOMH setup
CALL    WRITE_COMMAND
MOV     ADDRH,#00H
MOV     ADDRL,#E6H
CALL    WRITE_DATA
CALL    DELAY

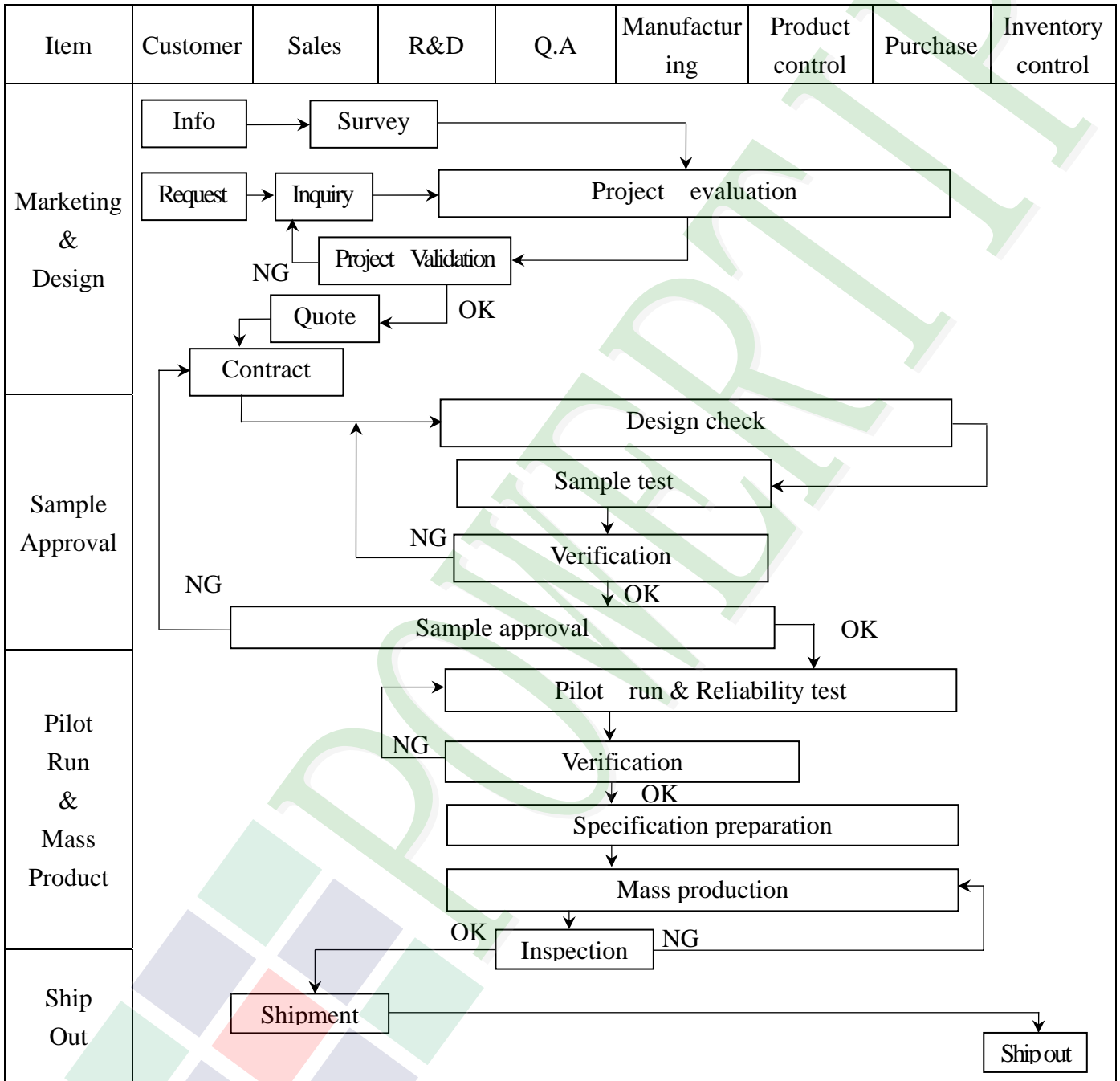
MOV     ADDRH,#00H
MOV     ADDRL,#0eH     ;VCOML setup
CALL    WRITE_COMMAND
MOV     ADDRH,#29H
MOV     ADDRL,#00H
CALL    WRITE_DATA
CALL    DELAY

MOV     ADDRH,#00H
MOV     ADDRL,#26H
CALL    WRITE_COMMAND
MOV     ADDRH,#7cH
MOV     ADDRL,#00H
CALL    WRITE_DATA

MOV     ADDRH,#00H
MOV     ADDRL,#27H
CALL    WRITE_COMMAND
MOV     ADDRH,#00H
MOV     ADDRL,#6dH
CALL    WRITE_DATA
```

### 3. QUALITY ASSURANCE SYSTEM

#### 3.1 Quality Assurance Flow Chart





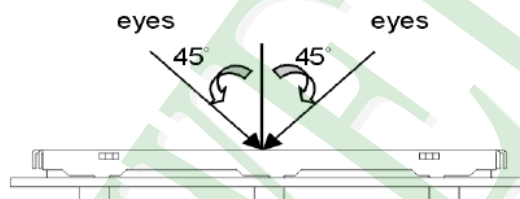
Item	Customer	Sales	R&D	Q.A	Manufacturing	Product control	Purchase	Inventory control
Sales Service	<pre> graph TD     Info[Info] --&gt; Claim[Claim]     Claim --&gt; FA[Failure analysis]     Claim --&gt; AR[Analysis report]     FA --&gt; CA[Corrective action]     CA --&gt; Tracking[Tracking]           </pre>							
Q.A Activity	1. ISO 9001 Maintenance Activities 3. Equipment calibration 5. Standardization Management				2. Process improvement proposal 4. Education And Training Activities			

### 3.2. Inspection Specification

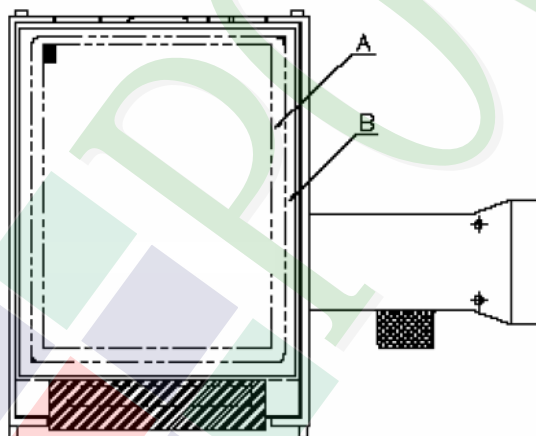
- ◆ Scope : The document shall be applied to TFT-LCD Module for 3.5" ~10" (Ver.B01).
- ◆ Inspection Standard : MIL-STD-105E Table Normal Inspection Single Sampling Level II .
- ◆ Equipment : Gauge 、 MIL-STD 、 Powertip Tester 、 Sample
- ◆ Defect Level : Major Defect AQL : 0.4 ; Minor Defect AQL : 1.5
- ◆ 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" :

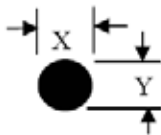
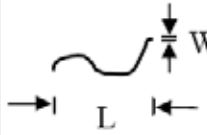
(Ver.B01)

NO	Item	Criterion	Level												
01	Product condition	1. 1 The part number is inconsistent with work order of production.	Major												
		1. 2 Mixed product types.	Major												
		1. 3 Assembled in inverse direction.	Major												
02	Quantity	2. 1 The quantity is inconsistent with work order of production.	Major												
03	Outline dimension	3. 1 Product dimension and structure must conform to structure diagram.	Major												
04	Electrical Testing	4. 1 Missing line character and icon.	Major												
		4. 2 No function or no display.	Major												
		4. 3 Display malfunction.	Major												
		4. 4 LCD viewing angle defect.	Major												
		4. 5 Current consumption exceeds product specifications.	Major												
05	Dot defect (Bright dot , Dark dot)  On -display	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2">Item</th> <th>Acceptance (Q'ty)</th> </tr> </thead> <tbody> <tr> <td rowspan="4" style="text-align: center;">Dot Defect</td> <td style="text-align: center;">Bright Dot</td> <td style="text-align: center;"><math>\leq 4</math></td> </tr> <tr> <td style="text-align: center;">Dark Dot</td> <td style="text-align: center;"><math>\leq 5</math></td> </tr> <tr> <td style="text-align: center;">Joint Dot</td> <td style="text-align: center;"><math>\leq 3</math></td> </tr> <tr> <td style="text-align: center;">Total</td> <td style="text-align: center;"><math>\leq 7</math></td> </tr> </tbody> </table>	Item		Acceptance (Q'ty)	Dot Defect	Bright Dot	$\leq 4$	Dark Dot	$\leq 5$	Joint Dot	$\leq 3$	Total	$\leq 7$	Minor
		Item		Acceptance (Q'ty)											
		Dot Defect	Bright Dot	$\leq 4$											
			Dark Dot	$\leq 5$											
			Joint Dot	$\leq 3$											
Total	$\leq 7$														
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 $\geq 5$ mm.															



◆Specification For TFT-LCD Module 3.5" ~10" :

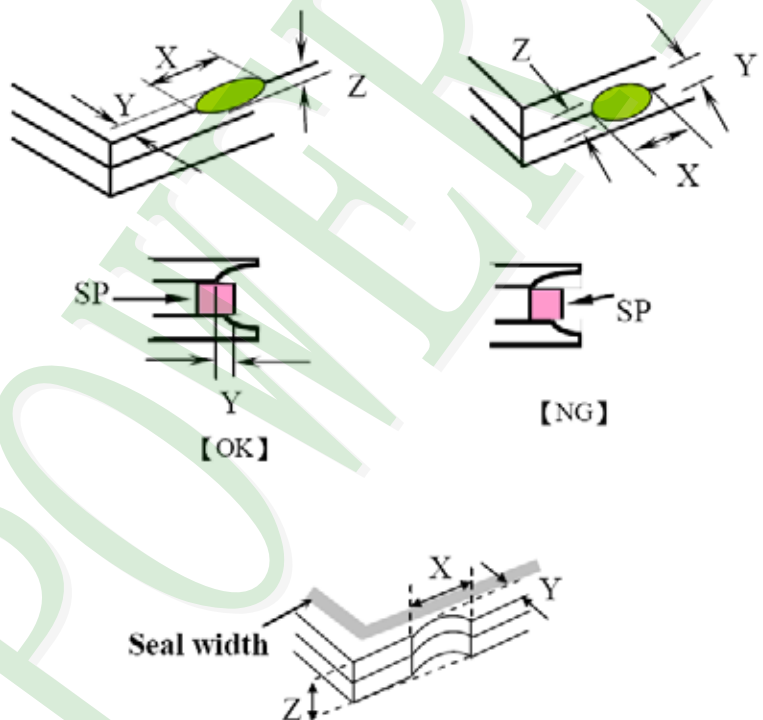
(Ver.B01)

NO	Item	Criterion	Level																																							
06	<p>Black or white dot、scratch、contamination</p> <p>Round type</p>  <p><math>\Phi = (x + y) / 2</math></p> <p>Line type</p> 	<p>6.1 Round type ( Non-display or display ) :</p> <table border="1"> <thead> <tr> <th rowspan="2">Dimension (diameter : <math>\Phi</math>)</th> <th colspan="2">Acceptance (Q'ty)</th> </tr> <tr> <th>A area</th> <th>B area</th> </tr> </thead> <tbody> <tr> <td><math>\Phi \leq 0.25</math></td> <td colspan="2">Ignore</td> </tr> <tr> <td><math>0.25 &lt; \Phi \leq 0.50</math></td> <td>5</td> <td rowspan="2">Ignore</td> </tr> <tr> <td><math>\Phi &gt; 0.50</math></td> <td>0</td> </tr> <tr> <td><b>Total</b></td> <td>5</td> <td></td> </tr> </tbody> </table> <p>6.2 Line type( Non-display or display ) :</p> <table border="1"> <thead> <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> </thead> <tbody> <tr> <td>---</td> <td><math>W \leq 0.03</math></td> <td>Ignore</td> <td rowspan="4">Ignore</td> </tr> <tr> <td><math>L \leq 10.0</math></td> <td><math>0.03 &lt; W \leq 0.05</math></td> <td>4</td> </tr> <tr> <td><math>L \leq 5.0</math></td> <td><math>0.05 &lt; W \leq 0.10</math></td> <td>2</td> </tr> <tr> <td>---</td> <td><math>W &gt; 0.10</math></td> <td>As round type</td> </tr> <tr> <td colspan="2"><b>Total</b></td> <td>5</td> <td></td> </tr> </tbody> </table>	Dimension (diameter : $\Phi$ )	Acceptance (Q'ty)		A area	B area	$\Phi \leq 0.25$	Ignore		$0.25 < \Phi \leq 0.50$	5	Ignore	$\Phi > 0.50$	0	<b>Total</b>	5		Length (L)	Width (W)	Acceptance (Q'ty)		A area	B area	---	$W \leq 0.03$	Ignore	Ignore	$L \leq 10.0$	$0.03 < W \leq 0.05$	4	$L \leq 5.0$	$0.05 < W \leq 0.10$	2	---	$W > 0.10$	As round type	<b>Total</b>		5		Minor
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07	Polarizer Bubble	<table border="1"> <thead> <tr> <th rowspan="2">Dimension (diameter : <math>\Phi</math>)</th> <th colspan="2">Acceptance (Q'ty)</th> </tr> <tr> <th>A area</th> <th>B area</th> </tr> </thead> <tbody> <tr> <td><math>\Phi \leq 0.25</math></td> <td>Ignore</td> <td rowspan="4">Ignore</td> </tr> <tr> <td><math>0.25 &lt; \Phi \leq 0.50</math></td> <td>4</td> </tr> <tr> <td><math>0.50 &lt; \Phi \leq 0.80</math></td> <td>1</td> </tr> <tr> <td><math>\Phi &gt; 0.80</math></td> <td>0</td> </tr> <tr> <td><b>Total</b></td> <td>5</td> <td></td> </tr> </tbody> </table>	Dimension (diameter : $\Phi$ )	Acceptance (Q'ty)		A area	B area	$\Phi \leq 0.25$	Ignore	Ignore	$0.25 < \Phi \leq 0.50$	4	$0.50 < \Phi \leq 0.80$	1	$\Phi > 0.80$	0	<b>Total</b>	5		Minor																						
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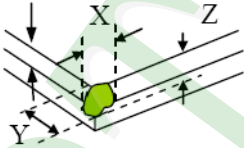
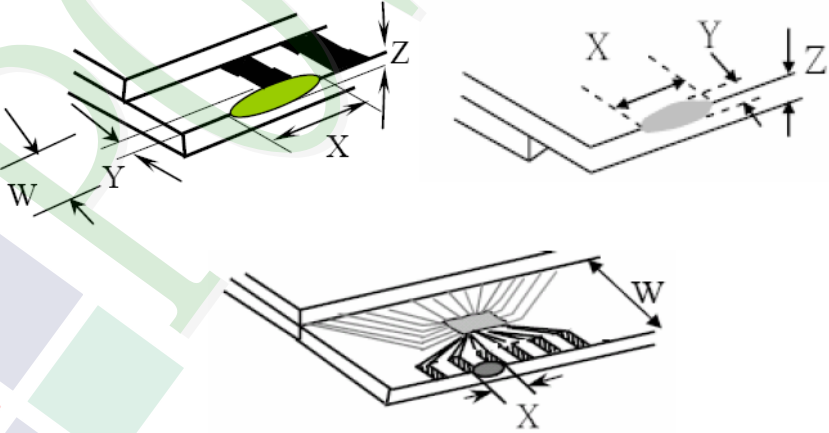
◆ Specification For TFT-LCD Module 3.5" ~10" :

(Ver.B01)

NO	Item	Criterion	Level						
08	The crack of glass	<p><b>Symbols :</b></p> <p><b>X : The length of crack</b>  <b>Z : The thickness of crack</b>  <b>t : The thickness of glass</b></p> <p><b>Y : The width of crack.</b>  <b>W : terminal length</b>  <b>a : LCD side length</b></p>	Minor						
		<p>8.1 General glass chip :</p> <p>8.1.1 Chip on panel surface and crack between panels:</p>  <table border="1" data-bbox="542 1601 1348 1904"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td><math>\leq a</math></td> <td>Crack can't enter viewing area</td> <td><math>\leq 1/2 t</math></td> </tr> <tr> <td><math>\leq a</math></td> <td>Crack can't exceed the half of SP width.</td> <td><math>1/2 t &lt; Z \leq 2 t</math></td> </tr> </tbody> </table>		X	Y	Z	$\leq a$	Crack can't enter viewing area	$\leq 1/2 t$
X	Y	Z							
$\leq a$	Crack can't enter viewing area	$\leq 1/2 t$							
$\leq a$	Crack can't exceed the half of SP width.	$1/2 t < Z \leq 2 t$							

**◆ Specification For TFT-LCD Module 3.5" ~10" :**

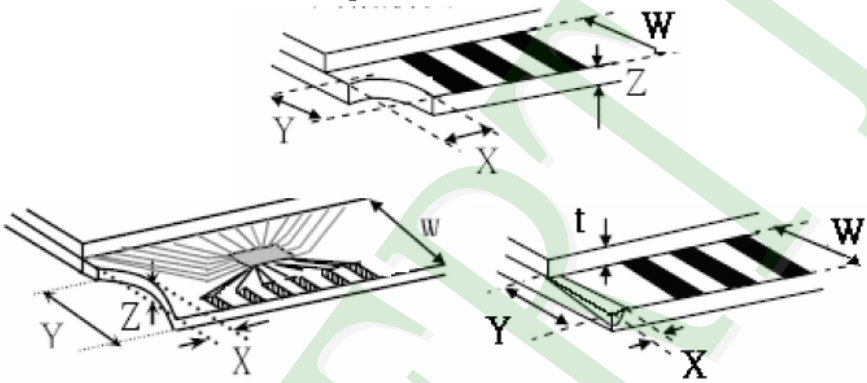
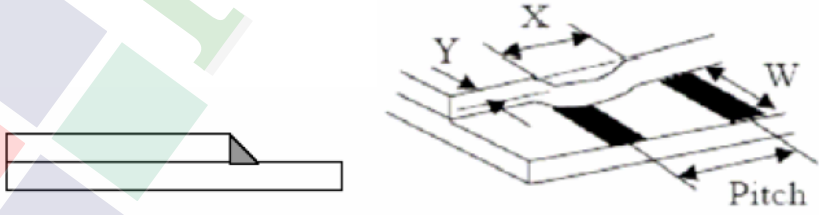
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		X	Y	Z								
$\leq 1/5 a$	Crack can't enter viewing area	$Z \leq 1/2 t$										
$\leq 1/5 a$	Crack can't exceed the half of SP width.	$1/2 t < Z \leq 2 t$										
<p>8.2 Protrusion over terminal :</p> <p>8.2.1 Chip on electrode pad :</p>  <table border="1" data-bbox="563 1731 1345 1906"> <thead> <tr> <th></th> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>Front</td> <td><math>\leq a</math></td> <td><math>\leq 1/2 W</math></td> <td><math>\leq t</math></td> </tr> <tr> <td>Back</td> <td><math>\leq a</math></td> <td><math>\leq W</math></td> <td><math>\leq 1/2 t</math></td> </tr> </tbody> </table>		X	Y	Z	Front	$\leq a$	$\leq 1/2 W$	$\leq t$	Back	$\leq a$	$\leq W$	$\leq 1/2 t$
	X	Y	Z									
Front	$\leq a$	$\leq 1/2 W$	$\leq t$									
Back	$\leq a$	$\leq W$	$\leq 1/2 t$									



**◆ Specification For TFT-LCD Module 3.5" ~10" :**

(Ver.B01)

NO	Item	Criterion	Level									
08	The crack of glass	<p><b>Symbols :</b></p> <p><b>X : The length of crack</b>                      <b>Y : The width of crack.</b>  <b>Z : The thickness of crack</b>                  <b>W : terminal length</b>  <b>t : The thickness of glass</b>                    <b>a : LCD side length</b></p>	Minor									
		<p><b>8.2.2 Non-conductive portion :</b></p>  <table border="1" data-bbox="635 1019 1264 1176"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td><math>\leq 1/3 a</math></td> <td><math>\leq W</math></td> <td><math>\leq t</math></td> </tr> </tbody> </table> <p>⊙ If the chipped area touches the ITO terminal, over 2/3 of the ITO must remain and be inspected according to electrode terminal specifications.</p> <p><b>8.2.3 Glass remain :</b></p>  <table border="1" data-bbox="555 1796 1248 1937"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td><math>\leq a</math></td> <td><math>\leq 1/3 W</math></td> <td><math>\leq t</math></td> </tr> </tbody> </table>		X	Y	Z	$\leq 1/3 a$	$\leq W$	$\leq t$	X	Y	Z
X	Y	Z										
$\leq 1/3 a$	$\leq W$	$\leq t$										
X	Y	Z										
$\leq a$	$\leq 1/3 W$	$\leq t$										



## 5. PRECAUTION RELATING PRODUCT HANDLING

### 5.1 SAFETY

- 5.1.1 If the LCD panel breaks , be careful not to get the liquid crystal to touch your skin.
- 5.1.2 If the liquid crystal touches your skin or clothes , please wash it off immediately by using soap and water.

### 5.2 HANDLING

- 5.2.1 Avoid any strong mechanical shock which can break the glass.
- 5.2.2 Avoid static electricity which can damage the CMOS LSI—When working with the module , be sure to ground your body and any electrical equipment you may be using.
- 5.2.3 Do not remove the panel or frame from the module.
- 5.2.4 The polarizing plate of the display is very fragile. So , please handle it very carefully, do not touch , push or rub the exposed polarizing with anything harder than an HB pencil lead (glass , tweezers , etc.)
- 5.2.5 Do not wipe the polarizing plate with a dry cloth , as it may easily scratch the surface of plate.
- 5.2.6 Do not touch the display area with bare hands , this will stain the display area.
- 5.2.7 Do not use ketonics solvent & aromatic solvent. Use with a soft cloth soaked with a cleaning naphtha solvent.
- 5.2.8 To control temperature and time of soldering is  $320 \pm 10^{\circ}\text{C}$  and 3-5 sec.
- 5.2.9 To avoid liquid (include organic solvent) stained on LCM.

### 5.3 STORAGE

- 5.3.1 Store the panel or module in a dark place where the temperature is  $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$  and the humidity is below 65% RH.
- 5.3.2 Do not place the module near organics solvents or corrosive gases.
- 5.3.3 Do not crush , shake , or jolt the module.

### 5.4 TERMS OF WARRANTY

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



Approve	Check	Contact
Linda	Tina	Mag

Documents NO. PKG-PH320240T-022-I-Q

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

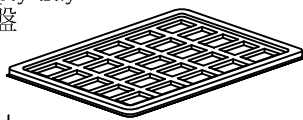
No.	Item	Model	Dimensions (mm)	1Pcs Weight	Quantity	Total Weight
1	成品 (LCM)	PH320240T-022-I-Q	76.9 X 63.9	0.031	288	8.928
2	多層薄膜(1)POF	OTFILM0BA03ABA	19"X350X0.015	—	6	—
3	TRAY 盤 (2)Tray	TY32024001TZBA	352 X 260 X 10.8	0.0967	54	5.2218
4	內盒(3)Product Box	BX36627063ABBA	383 X 270 X 66	0.2692	6	1.6152
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) : 17.24 Kg±10%

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

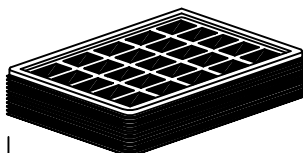
(1) LCM quantity per box : no per tray	6	x no of tray	8	=	48
(2) Total LCM quantity in carton : quantity per box	48	x no of boxes	6	=	288

Use empty tray  
空盤



+

Put products into the tray

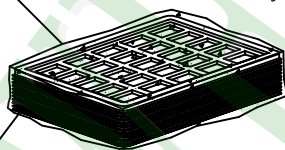


↓

Tray stacking

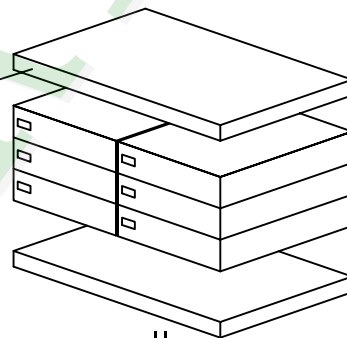


(1) 多層薄膜  
POF

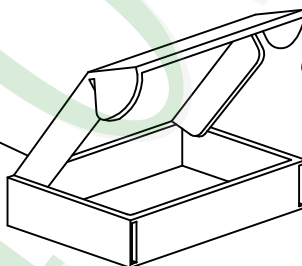


(2) TRAY 盤  
Tray

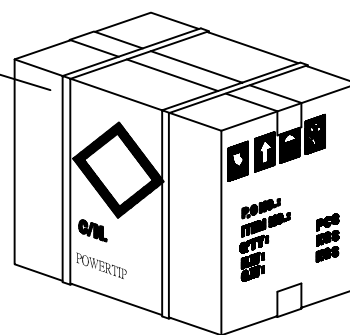
(4) 保利龍板  
Polylon board



(3) 內盒  
Product Box



(5) 外紙箱  
Carton

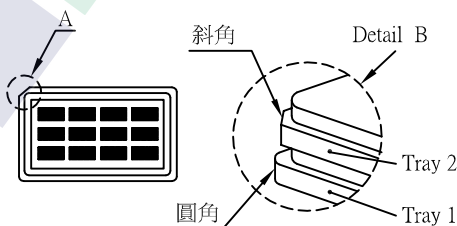


### 特 記 事 項 (REMARK)

#### 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



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.

6. Tray料號:  
Tray Number:PH320240T-001