



# SPECIFICATION

---



**PH320240T-023-IHB**

**3.5" TFT - 320x240 - 24-Bit RGB**

Version: 6.0

Date: 24.04.2017

Note: This specification is subject to change without prior notice



## SPECIFICATIONS

CUSTOMER	:	CDE012
SAMPLE CODE	:	SH320240T023-IHB
MASS PRODUCTION CODE	:	PH320240T023-IHB
SAMPLE VERSION	:	02
SPECIFICATIONS EDITION	:	006
DRAWING NO. (Ver.)	:	JLMD-PH320240T023-IHB_002
PACKAGING NO. (Ver.)	:	JPKG-PH320240T023-IHB_002

Customer Approved

Date:

POWERTIP  
2017.04.24  
JS RD APPROVED

Approved	Checked	Designer
閔偉	張久慧	劉進

- Preliminary specification for design input  
 Specification for sample approval

## POWERTIP TECH. CORP.

**Headquarters:** 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: [sales@powertip.com.tw](mailto:sales@powertip.com.tw)

[Http://www.powertip.com.tw](http://www.powertip.com.tw)

## History of Version

Date	Ver.	Edi.	Description	Page	Design by
08/29/2016	01	001	New Drawing	-	劉進
09/09/2016	01	002	Modify Specs.(Drawing)	-	劉進
12/02/2016	01	003	New Sample Update VCC & ICC Update Touch Panel Pin	5 14,16,Appendix	劉進
02/12/2017	02	004	Second Sample: Modify Backlight Characteristics & VCC 's Value	5,6,9	劉進
04/12/2017	02	005	Update VCC 's Range	5	劉進
04/24/2017	02	006	Modify Backlight VL & IL	9	劉進

Total: 35 Pages

## Contents

### 1. SPECIFICATIONS

- 1.1 Features
- 1.2 Mechanical Specifications
- 1.3 Absolute Maximum Ratings
- 1.4 DC Electrical Characteristics
- 1.5 Optical Characteristics
- 1.6 Backlight Characteristics
- 1.7 Touch Panel Characteristics

### 2. MODULE STRUCTURE

- 2.1 Counter Drawing
- 2.2 Interface Pin Description
- 2.3 Timing Characteristics
- 2.4 Power Sequence

### 3. QUALITY ASSURANCE SYSTEM

- 3.1 Quality Assurance Flow Chart
- 3.2 Inspection Specification

### 4. RELIABILITY TEST

- 4.1 Reliability Test Condition

### 5. PRECAUTION RELATING PRODUCT HANDLING

- 5.1 Safety
- 5.2 Handling
- 5.3 Storage
- 5.4 Terms of Warranty

Appendix : LCM Drawing  
Packaging

Note : For detailed information please refer to IC data sheet :  
Primacy(TFT LCD): Himax: HX8238-D

## 1. SPECIFICATIONS

### 1.1 Features

Item	Standard Value
Display Resolution	320 * (RGB) * 240 Dots
LCD Type	a-Si TFT , Normally white , Transmissive type
Touch panel	4-Wire Resistive Touch Screen
Screen size(inch)	3.5 inch
Viewing Direction	6 O'clock
Color configuration	R.G.B. Vertical Stripe
Backlight Type	White LED B/L
Weight	-
Interface	24 Bits RGB Interface
Other (controller / driver IC)	Himax: HX8238-D
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) * 4.3(H)	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	Remark
Power Supply Voltage	VDD	GND=0	-0.3	+5.0	V	-
Power Supply Voltage	VCC	GND=0	-0.3	+23.0	V	
Operating Temperature	T <sub>OP</sub>	-	-20	+70	°C	
Storage Temperature	T <sub>ST</sub>	-	-30	+80	°C	

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

### 1.4 DC Electrical Characteristics

#### Module

T<sub>a</sub> = 25°C

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Power Supply for TFT Panel	VDD	GND=0V	3.0	3.3	3.6	V
Power Supply for Backlight Unit	VCC	GND=0V	5	12	15	V
Input Voltage for TFT Panel	V <sub>IH</sub>	GND=0V	0.7VDD	-	VDD	V
	V <sub>IL</sub>	GND=0V	0	-	0.3VDD	V
Supply Current for TFT Panel	IDD	IDD@VDD=3.3V	-	11	17	mA
Supply Current for Backlight Unit	ICC	ICC@VCC=5V	-	100	150	mA
		ICC@VCC=12V	-	50	75	mA
Input Voltage for PWM Signal	VPH	GND=0V	1.2	-	-	V
	VPL	GND=0V	-	-	0.4	V
Dimming Clock Rate	fP	GND=0V	5	-	100	KHz

## 1.5 Optical Characteristics

VDD=3.3V, Ta=25°C

Item	Symbol	Condition	Min.	Typ.	Max.	unit	-	
Response time	Tr + Tf	-	-	40	60	ms	Note2	
Viewing angle	Top	$\theta+$	CR $\geq$ 10	-	60	-	Deg.	Note4
	Bottom	$\theta-$		-	60	-		
	Left	$\theta_L$		-	60	-		
	Right	$\theta_R$		-	60	-		
Contrast ratio	CR	-	500	600	-	-	Note3	
Color of CIE Coordinate (LCD & B/L & T/P)	White	X	VCC=12V PWM="High" (Duty=100%)	0.28	0.33	0.38	-	Note1
		Y		0.33	0.38	0.43		
	Red	X		0.57	0.62	0.67		
		Y		0.32	0.37	0.42		
	Green	X		0.29	0.34	0.39		
		Y		0.57	0.62	0.67		
	Blue	X		0.09	0.14	0.19		
		Y		0.04	0.09	0.14		
Average Brightness Pattern=white display (LCD & B/L & T/P)*1	IV	VCC=12V PWM="High" (Duty=100%)	620	780	-	cd/m <sup>2</sup>		
Uniformity (LCD & B/L & T/P)*2	$\Delta B$		70	-	-	%		

Note 1:

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

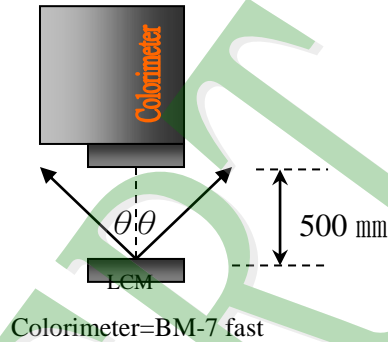
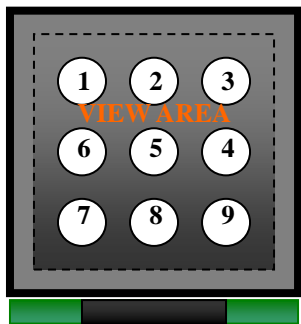
\*2 : Measurement Condition for Optical Characteristics:

a : Environment:  $25^{\circ}\text{C} \pm 5^{\circ}\text{C} / 60 \pm 20\% \text{R.H}$  , no wind , dark room below 10 Lux at typical lamp current and typical operating frequency.

b : Measurement Distance:  $500 \pm 50 \text{ mm}$  , ( $\theta = 0^{\circ}$ )

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

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



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

Note2: Definition of response time:

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

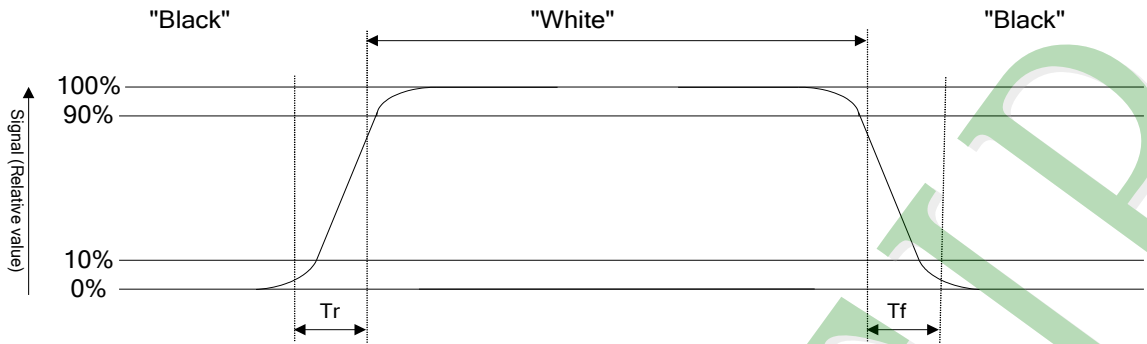
Refer to figure as below:

Normally White





### Normally Black



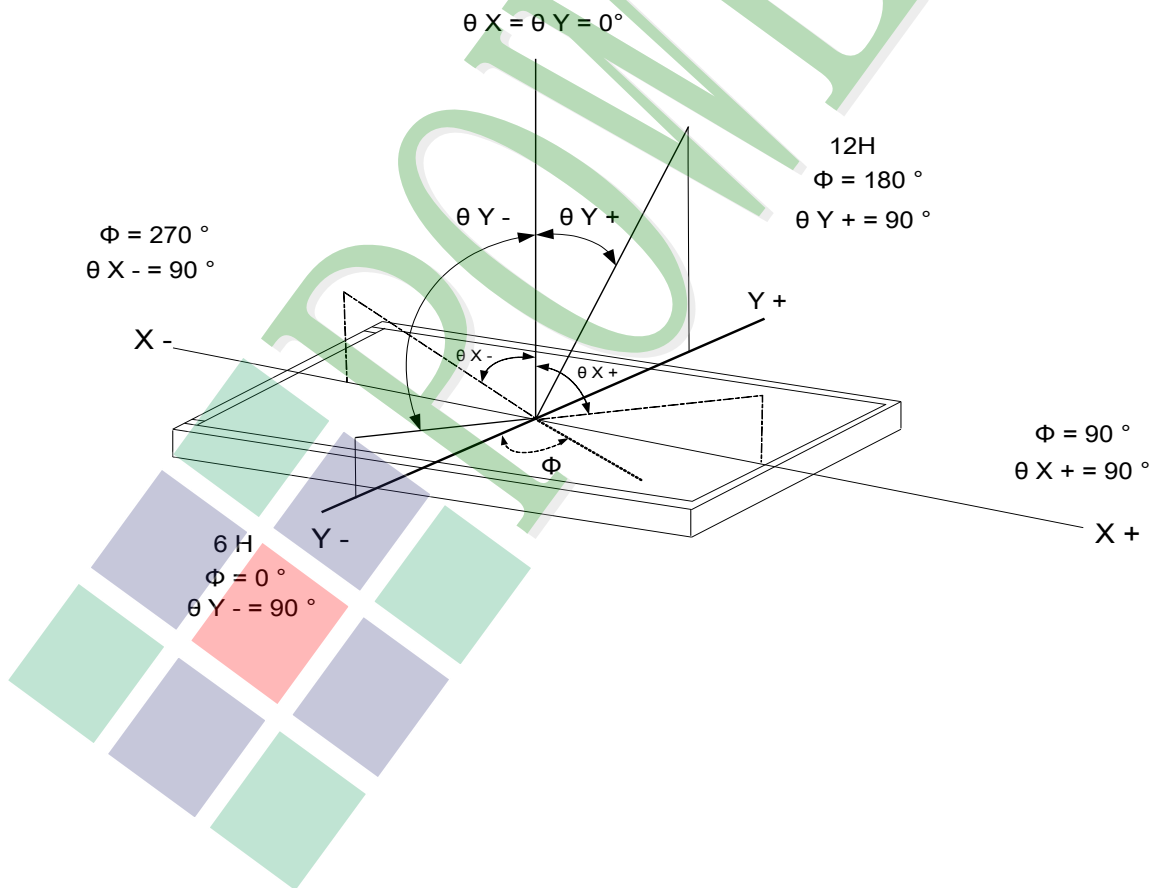
Note3: Definition of contrast ratio:

Contrast ratio is calculated with the following formula

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

Note4: Definition of viewing angle:

Refer to figure as below:



## 1.6 Backlight Characteristics

### Maximum Ratings

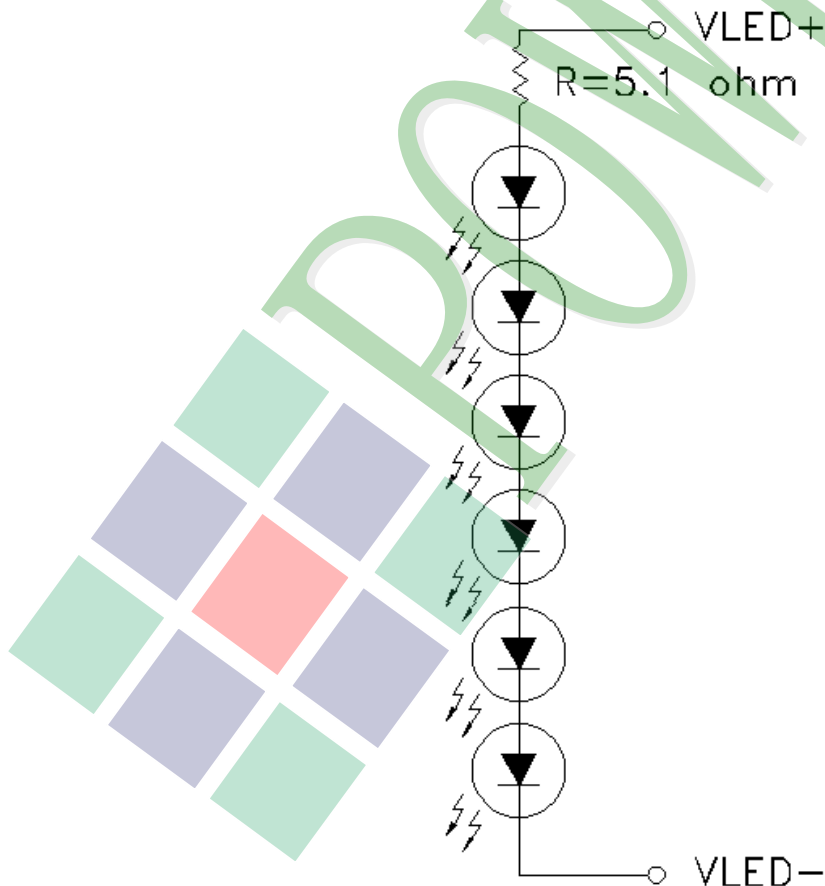
Item	Symbol	Min.	Max.	Unit	Remark
LED Forward Current	$I_F$		30	mA	One LED
LED Reverse Voltage	$V_R$		5	V	

### Electrical / Optical Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
LED Voltage	$V_L$	18	19	19.8	V	Note1
LED Current	$I_L$	-	20	-	mA	-
LED life time	-	50000	-	-	Hr	Note2

Note 1: The LED Supply Voltage is defined by the number of LED at  $T_a=25^\circ\text{C}$  and  $I_L=20\text{ mA}$ .

Note 2: The "LED life time" is defined as the module brightness decrease to 50% original brightness at  $T_a=25^\circ\text{C}$  and  $I_L=20\text{ mA}$ . The LED life time could be decreased if operating  $I_L$  is larger than 20 mA.



## 1.7 Touch Panel Characteristics

### 1.7.1 Optical Characteristics

Item	Specification
1.Transparency	78% Min

### 1.7.2 Mechanical Characteristic

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

### 1.7.3 Electrical Characteristics

Item	Specification
1.Rated Voltage	DC 5V (DC 7V Max)
2.Resistance Between Terminals.	Direction X (Glass side): 300Ω~850Ω Direction Y (Film side): 150Ω~550Ω
3.Insulation Resistance	20 MΩ or more (DC 25V 1min)
4.Linearity	$\leq \pm 1.5\%$ $\text{Linearity}(\%) = \Delta V / (EV - SV) * 100$ $\Delta V$ : The difference between the ideal voltage and measured voltage on the each measuring line. SV: Voltage of starting Points EV: Voltage of Ending Points
5.Bouncing	<10ms (Tip R 3.75mm, hardness 10°~20° ,silicon rubber ,500gf operation : 40 mm/sec )

### 1.7.4 Reliability Characteristic

NO	Test Item	Test Condition	Test Result
1	Hitting Durability	1,000,000times min.(R 8 mm Silicon Rubber Hardness 60°250gf 2times/sec).	Follow 1.7.3 item2 and item4
2	Pen Sliding Durability	100,000 times min(Tip R0.8mm).	Follow 1.7.3 item2 and item4.
3	Impact Resistance	φ9mm steel ball is dropped on the surface from 30 cm height at 1 time.	No Crack
4	Flexible pattern Bending Resistance	Bending 3 times by bending radius R1.0 mm	Follow 1.7.3 item2.

### 1.7.5 Touch Panel Design/Handling Guide

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

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

(2) Insertion a cushion material is recommended.

(3) The cushion material should be limited on the busbar insulation paste area. If it is over the transparent insulation paste area, a “short” may be occurred.

(4) Do not to use an adhesive tape to bond it on the front of T/P and hang it to the housing bezel.

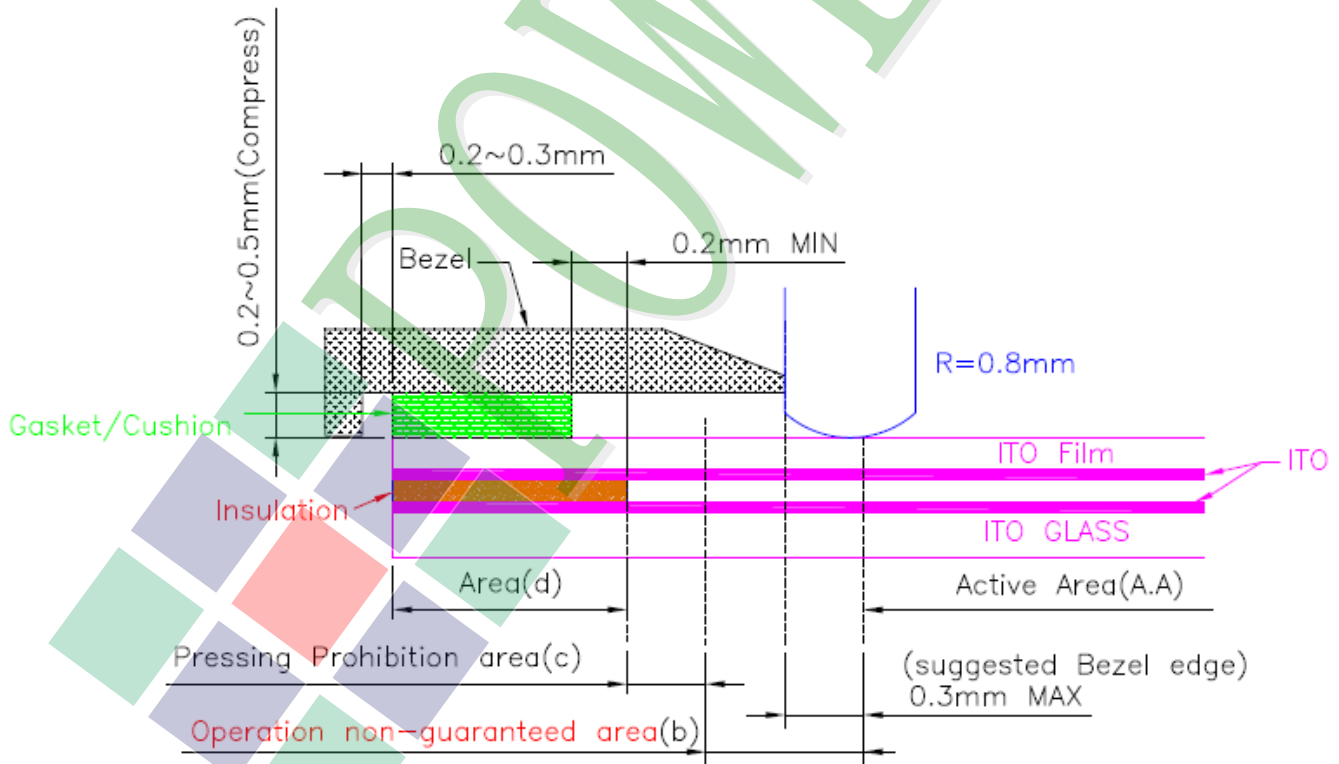
(5) Never expand the T/P top layer (PET Film) like a balloon by internal air pressure. The life of the T/P will extremely decreasing.

(6) Top layer, PET, dimension is changing base on environment temperature and humidity. Please avoid a stress from housing bezel to top layer, because it may cause “waving”.

(7) The input to the Touch Panel sometimes distorts touch panel itself.

(8) To use the stylus pen or fingernail sliding at the edge of the housing is prohibited. It would cause the cracking of the ITO coating and damage the touch panel. It also request not to press this area while assembling

(9) Purpose: In order to prevent accidental use and performance deterioration, please keep the following precautions.



In order to prevent unusual performance degradation and malfunction of a touch panel, please carry out the set case designing and a touch panel assembling method after surely considering the

definition of each area illustrated in above figure.

Area(a) : Active area

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

Area(b) : Operation non-guaranteed area

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

Area(c) : Pressing prohibition area

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

Area(d) : Non-Active area

The area does not activate even if pressed.



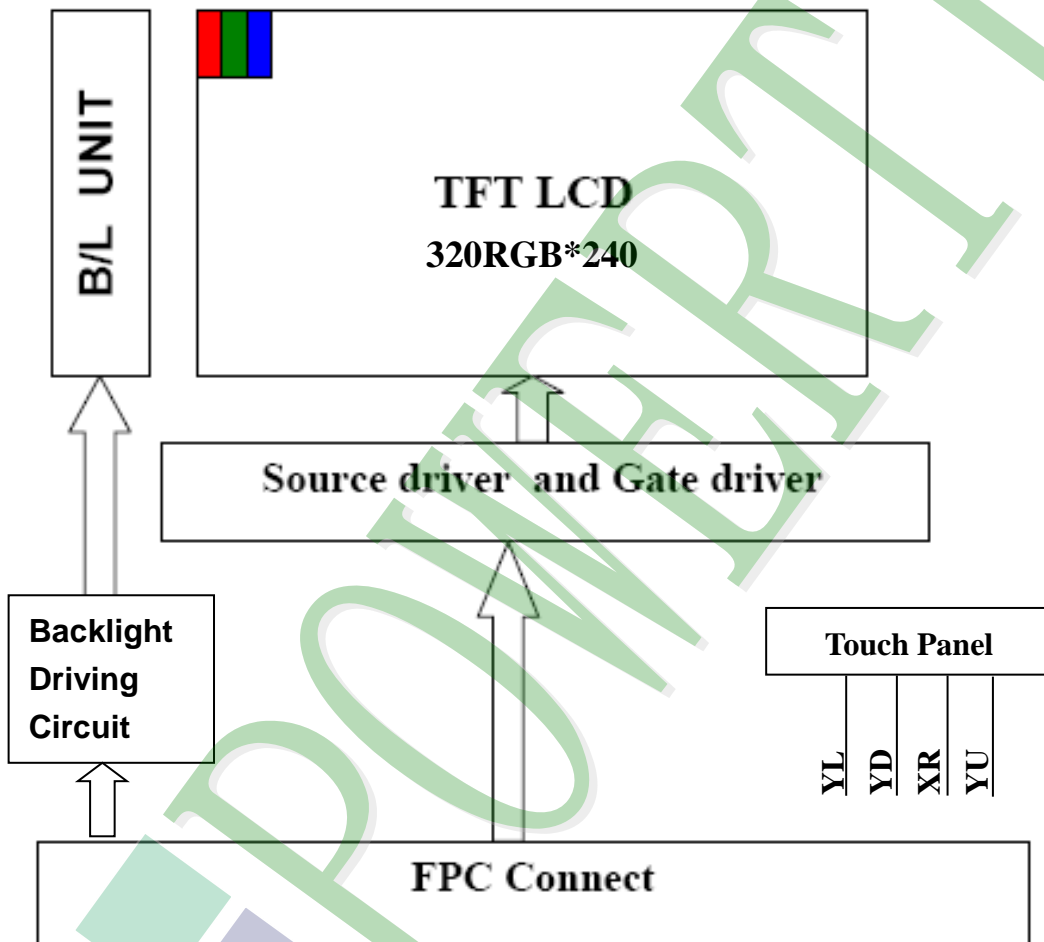
## 2. MODULE STRUCTURE

### 2.1 Counter Drawing

#### 2.1.1 LCM Mechanical Diagram

\* See Appendix

#### 2.1.2 Block Diagram



## 2.2 Interface Pin Description

### TFT LCM Interface

Pin No.	Symbol	Function
1	GND	Power ground.
2	VDD	Power for Digital Circuit.
3	VDD	Power for Digital Circuit.
4	VCC	Power For LED backlight.
5	VCC	Power For LED backlight.
6	PWM	Shutdown & Dimming control input for backlight. Do not allow this pin to float. "Hi" =100%, "Low" = 0%.
7	GND	Power ground.
8	R0	Red Data.
9	R1	Red Data.
10	R2	Red Data.
11	R3	Red Data.
12	GND	Power ground.
13	R4	Red Data.
14	R5	Red Data.
15	R6	Red Data.
16	R7	Red Data.
17	GND	Power ground.
18	G0	Green Data.
19	G1	Green Data.
20	G2	Green Data.
21	G3	Green Data.
22	GND	Power ground.
23	G4	Green Data.
24	G5	Green Data.
25	G6	Green Data.
26	G7	Green Data.
27	GND	Power ground.
28	B0	Blue Data.
29	B1	Blue Data.



Pin No.	Symbol	Function
30	B2	Blue Data.
31	B3	Blue Data.
32	GND	Power ground.
33	B4	Blue Data.
34	B5	Blue Data.
35	B6	Blue Data.
36	B7	Blue Data.
37	GND	Power ground.
38	HS	Line synchronization signal. Horizontal Sync Input.
39	VS	Frame synchronization signal. Vertical Sync Input.
40	GND	Power ground.
41	DE	Display enable pin from controller. Data Input Enable.
42	GND	Power ground.
43	DCLK	Sample clock. Data will be latched at the falling edge of DCLK.
44	GND	Power ground.
45	CS / ID1	Chip Select/ ID[4:1]These pins select LCM type.
46	SDIN / ID2	SPI Data/ ID[4:1]These pins select LCM type.
47	SCK / ID3	SPI Clock/ ID[4:1]These pins select LCM type.
48	DISPLAY CONTROL / ID4	Display Enable (Hi Active) / ID[4:1]These pins select LCM type.
49	/RESET	Global Reset (Low Active).
50	GND	Power ground.

#### 4-Wire Resistive Touch Screen (RTP) Interface

Pin No.	Symbol	Function
1	YU	Up side of touch panel.
2	XR	Right side of touch panel.
3	YD	Bottom side of touch panel.
4	XL	Left side of touch panel.

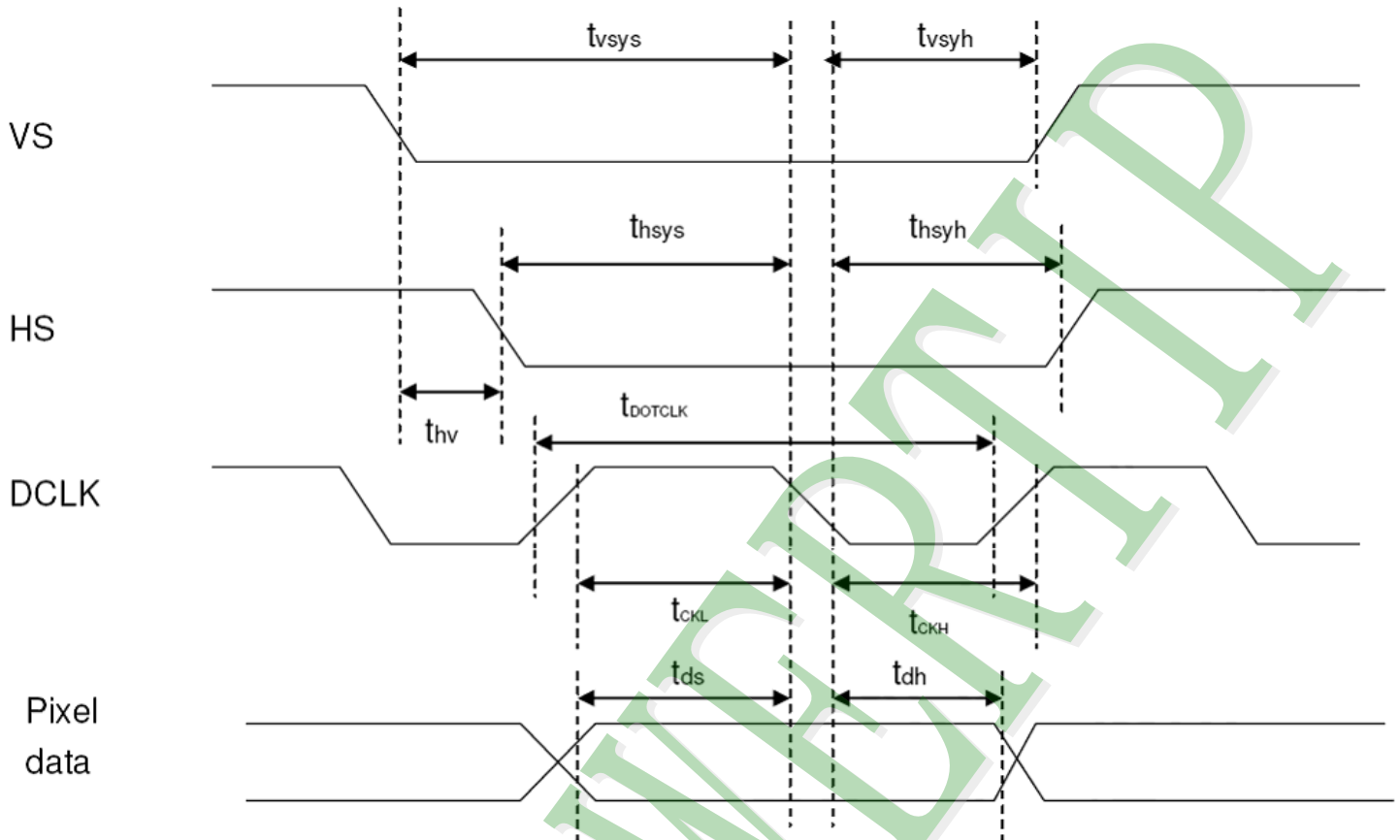
### 2.2.1 Refer Initial Code

HX8238-D register configuration is recommended to use the default value (HSP=0, VSP=0, CKP=0, DEP=0).

Note:  
HSP: When HSP=0, HS(HSYNC) is negative polarity. When HSP=1, HS(HSYNC) is positive polarity.  
VSP: When VSP=0, VS(VSYNC) is negative polarity. When VSP=1, VS(VSYNC) is positive polarity.  
CKP: When CKP=0, data is latched in DCLK falling edge. When CKP=1, data is latched in DCLK rising edge.  
DEP: When DEP=0, DE is negative polarity active. When DEP=1, DE is positive polarity active.

## 2.3 Timing Characteristics

### 2.3.1 Pixel timing for HX8238-D

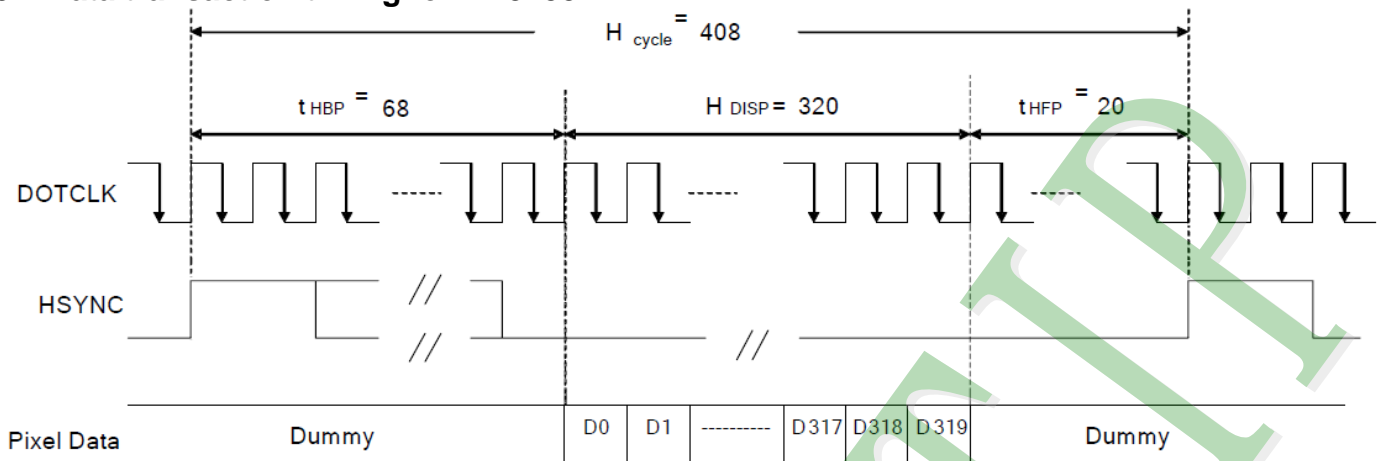


Characteristics	Symbol	Min	Typ	Max	Unit
DCLK Frequency	f <sub>DCLK</sub>	-	6.5	10	MHz
DCLK Period	t <sub>DCLK</sub>	100	154	-	ns
Vertical Sync Setup Time	t <sub>vsys</sub>	20	-	-	ns
Vertical Sync Hold Time	t <sub>vsyh</sub>	20	-	-	ns
Horizontal Sync Setup Time	t <sub>hsys</sub>	20	-	-	ns
Horizontal Sync Hold Time	t <sub>hsyh</sub>	20	-	-	ns
Phase difference of Sync Signal Falling Edge	t <sub>thv</sub>	1	-	240	t <sub>DCLK</sub>
DCLK Low Period	t <sub>ckl</sub>	50	-	-	ns
DCLK High Period	t <sub>ckh</sub>	50	-	-	ns
Data Setup Time	t <sub>ds</sub>	12	-	-	ns
Data hold Time	t <sub>dh</sub>	12	-	-	ns
Reset pulse width	t <sub>RES</sub>	10	-	-	us

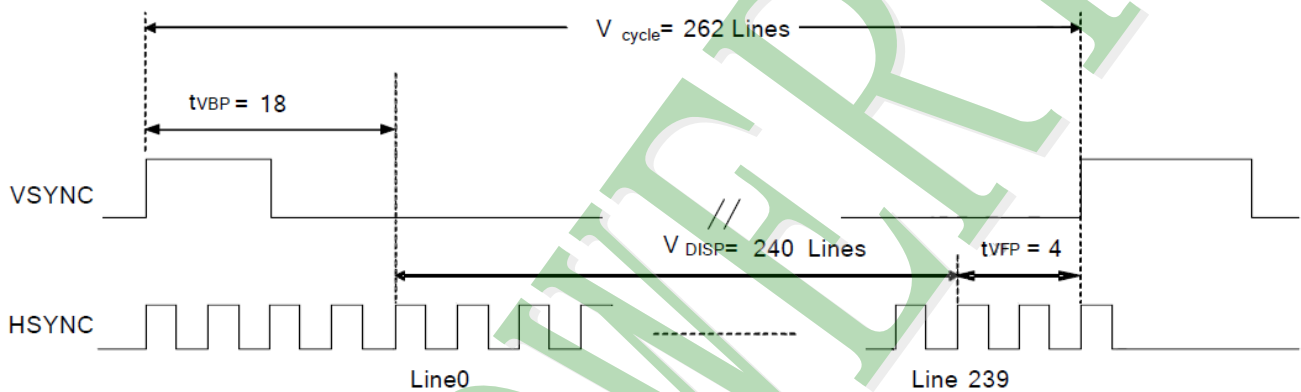
**Note:** External clock source must be provided to DOTCLK pin of HX8238-A. The driver will not operate if absent of the clocking signal.

### Pixel timing

### 2.3.2 Data transaction timing for HX8238-D



(a) Horizontal Data Transaction Timing



(b) Vertical Data Transaction Timing

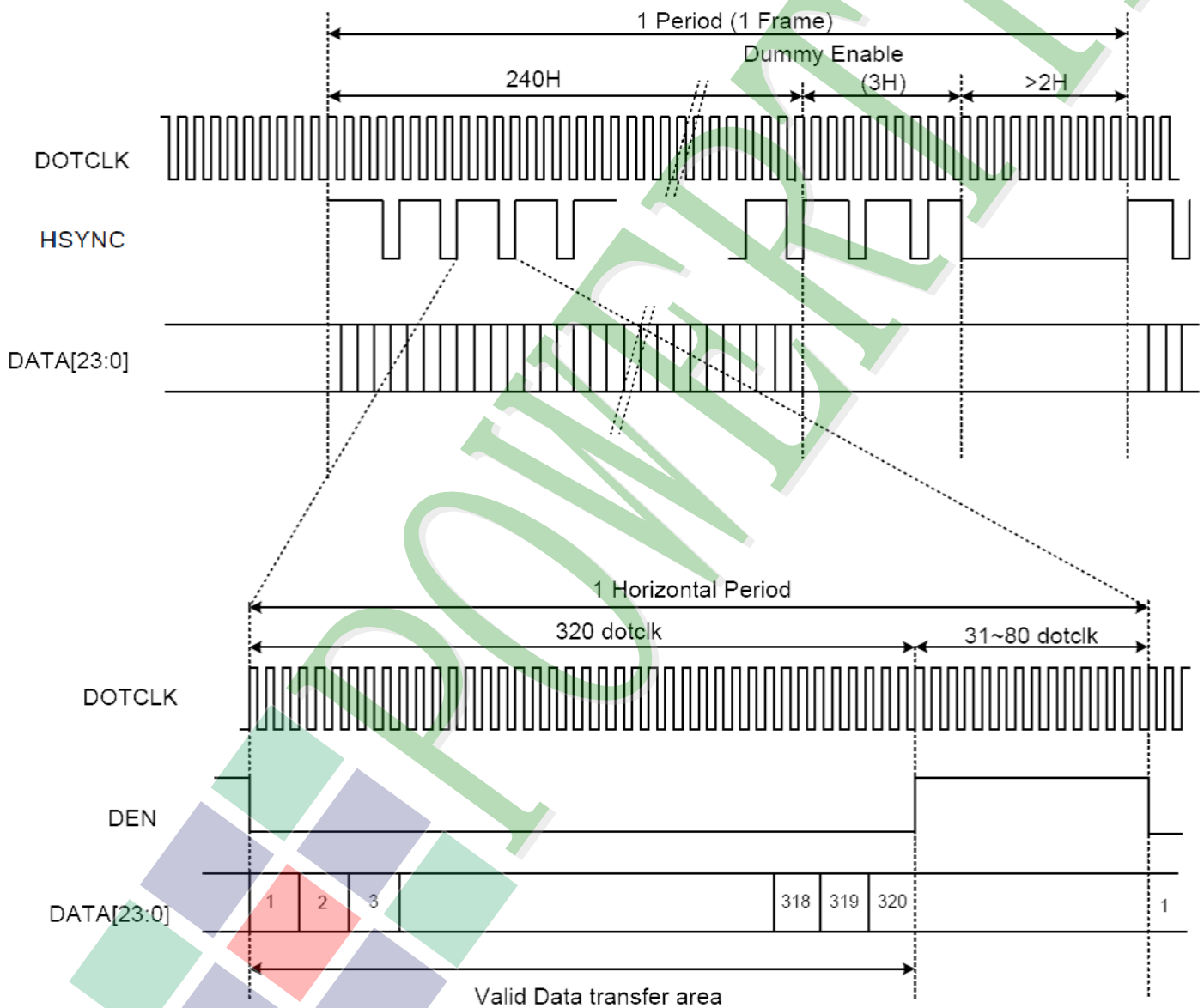
#### Data transaction timing in parallel RGB (24 bit) interface (SYNC mode)

Characteristics	Symbol	Min	Typ	Max	Unit
DOTCLK Frequency	f <sub>DOTCLK</sub>	-	6.5	10	MHz
DOTCLK Period	t <sub>DOTCLK</sub>	100	154	-	ns
Horizontal Frequency (Line)	f <sub>H</sub>	-	14.9	22.35	KHz
Vertical Frequency (Refresh)	f <sub>V</sub>	-	60	90	Hz
Horizontal Back Porch	t <sub>HBP</sub>	-	68	-	t <sub>DOTCLK</sub>
Horizontal Front Porch	t <sub>HFP</sub>	-	20	-	t <sub>DOTCLK</sub>
Horizontal Data Start Point	t <sub>HBP</sub>	-	68	-	t <sub>DOTCLK</sub>
Horizontal Blanking Period	t <sub>HBP</sub> + t <sub>HFP</sub>	-	88	-	t <sub>DOTCLK</sub>
Horizontal Display Area	H <sub>DISP</sub>	-	320	-	t <sub>DOTCLK</sub>
Horizontal Cycle	H <sub>cycle</sub>	-	408	450	t <sub>DOTCLK</sub>
Vertical Back Porch	t <sub>VBP</sub>	-	18	-	Lines
Vertical Front Porch	t <sub>VFP</sub>	-	4	-	Lines
Vertical Data Start Point	t <sub>VBP</sub>	-	18	-	Lines
Vertical Blanking Period	t <sub>VBP</sub> + t <sub>VFP</sub>	-	22	-	Lines
Vertical Display Area	V <sub>DISP</sub>	-	240	-	Lines
Vertical Cycle	V <sub>cycle</sub>	-	262	350	Lines

#### Data transaction timing in normal operating mode

Characteristics	Symbol	Min.	Typ.	Max.	Unit
DOTCLK Frequency	fDOTCLK	-	6.5	10	MHz
DOTCLK Period	tDOTCLK	100	154	-	ns
Horizontal Blanking Period	tHBP + tHFP	52	88	180	tDOTCLK
Horizontal Display Area	HDISP	-	320	-	tDOTCLK
Horizontal Cycle	Hcycle	372	408	500	tDOTCLK
Vertical Blanking Period	tVBP + tVFP	2	-	47	Lines
Vertical Display Area	VDISP	-	240	-	Lines
Vertical Cycle	Vcycle	242	-	287	Lines

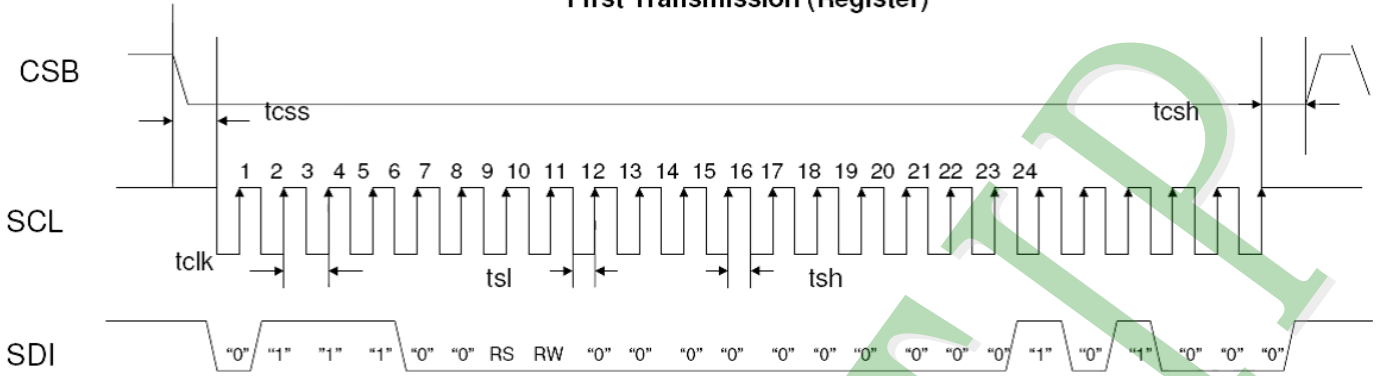
**Data transaction timing in DE only operating mode**



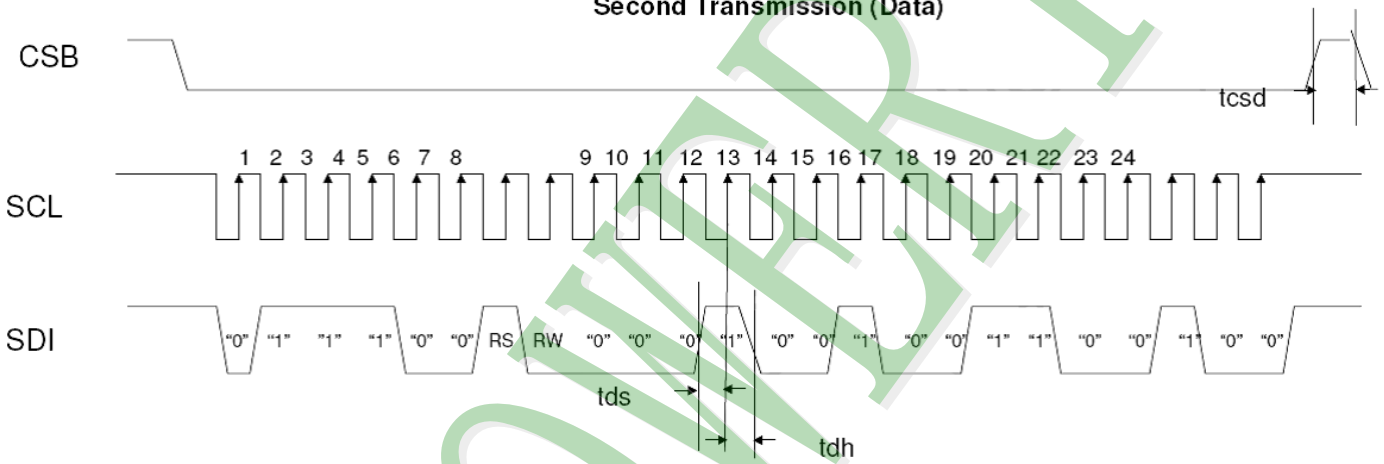
**Signal timing in DE mode**

### 2.3.3 SPI Timing Characteristics for HX8238-D

First Transmission (Register)



Second Transmission (Data)



**Note:** The example transmit "0x1264h" to register R28h.  
SPID connected to VSS.

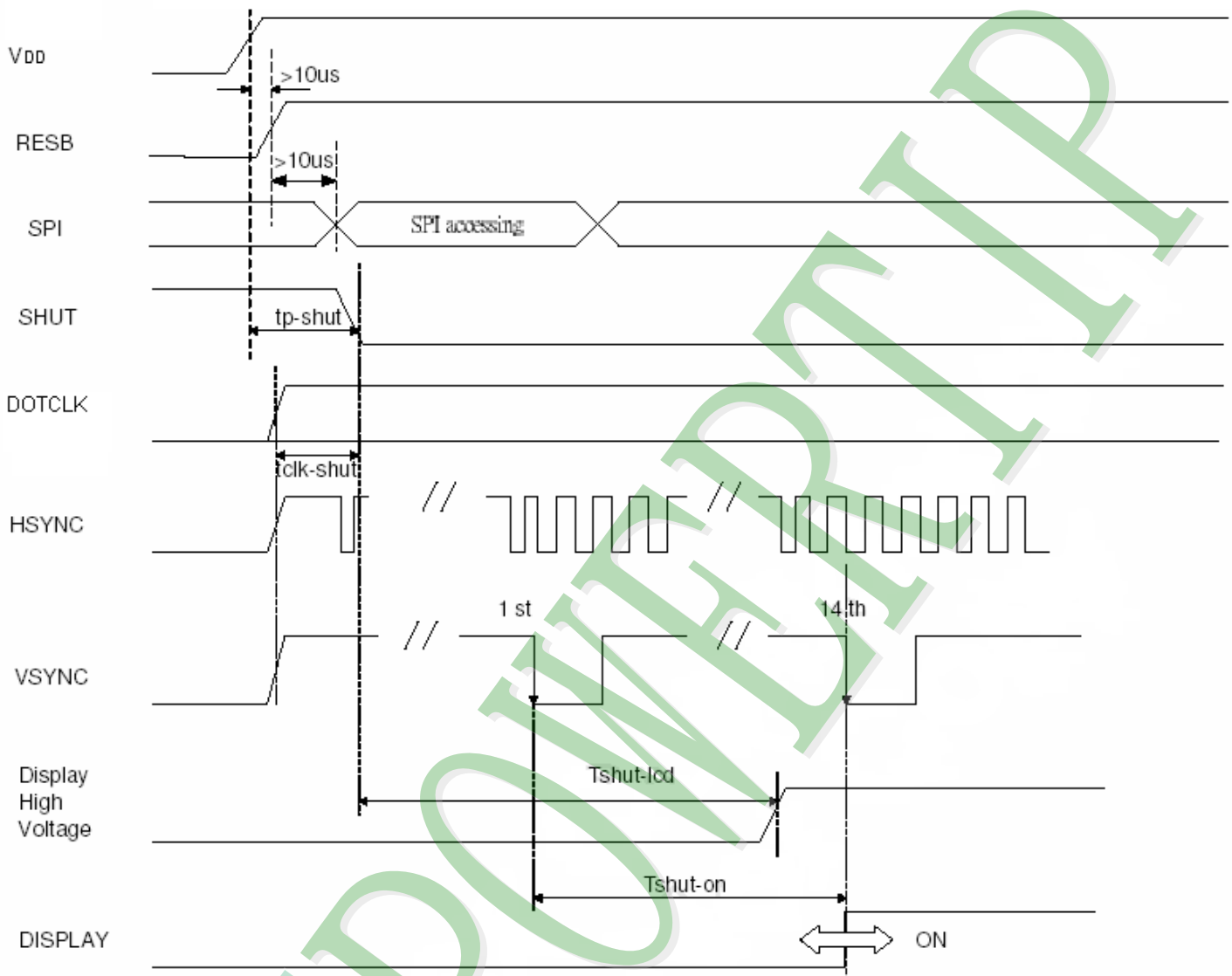
SPI interface timing diagram & transaction example

Characteristics	Symbol	Min	Typ	Max	Unit
Serial Clock Frequency	fclk	-	-	20	MHz
Serial Clock Cycle Time	tclk	50	-	-	ns
Clock Low Width	tsl	25	-	-	ns
Clock High Width	tsh	25	-	-	ns
Chip Select Setup Time	tcss	0	-	-	ns
Chip Select Hold Time	tcsh	10	-	-	ns
Chip Select High Delay Time	tcshd	20	-	-	ns
Data Setup Time	tds	5	-	-	ns
Data Hold Time	tdh	10	-	-	ns

SPI timing

## 2.4 Power Sequence

### 2.4.1 Power up sequence

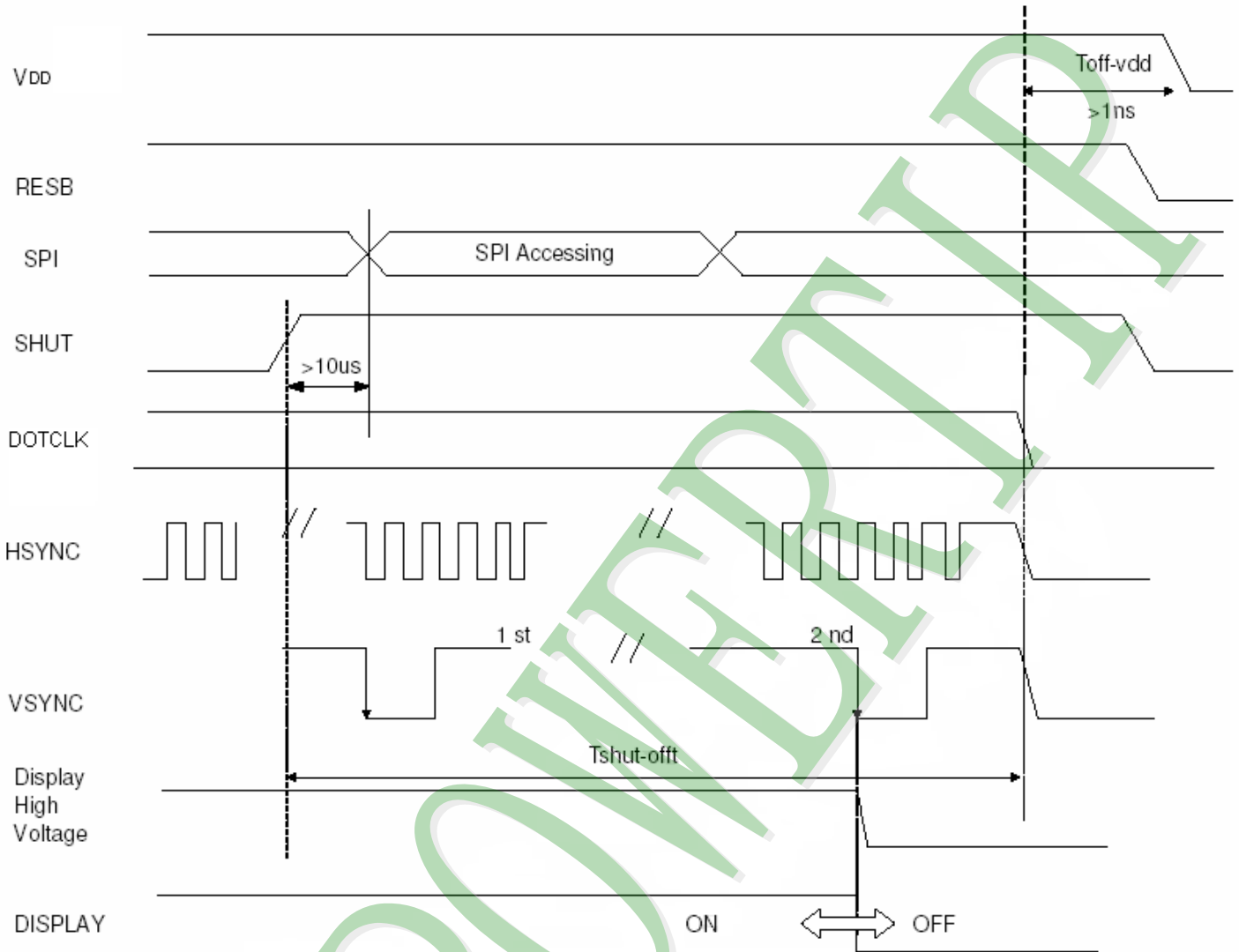


Characteristics	Symbol	Min	Typ	Max	Units
VDD on to falling edge of SHUT	$t_{\text{p-shut}}$	1	-	-	us
DOTCLK	$t_{\text{clk-shut}}$	1	-	-	clk
Falling edge of SHUT to LCD power on	$t_{\text{shut-lcd}}$	-	-	128	ms
Falling edge of SHUT to display start	$t_{\text{shut-on}}$	-	-	14	frame
- 1 line: 408 clk		-	166	232.4	ms
- 1 frame: 262 line - DOTCLK = 6.5MHz		-	-	-	-

**Note:** It is necessary to input DOTCLK before the falling edge of SHUT.  
Display starts at 10th falling edge of VSYNC after the falling edge of SHUT.

**Interface PIN No. 48 "Display control" have connected Inverters logic gates to the "SHUT" pin.**

## 2.4.2 Power down sequence



Characteristics	Symbol	Min	Typ	Max	Uni
Rising edge of SHUT to display off	tshut-offt	2	-	-	frame
- 1 line: 408 clk - 1 frame: 262 line - DOTCLK = 6.5MHz		33.4	-	-	ms
Input-signal-off to VDD off	toff-vdd	1	-	-	us

**Note:** DOTCLK must be maintained at least 2 frames after the rising edge of SHUT.

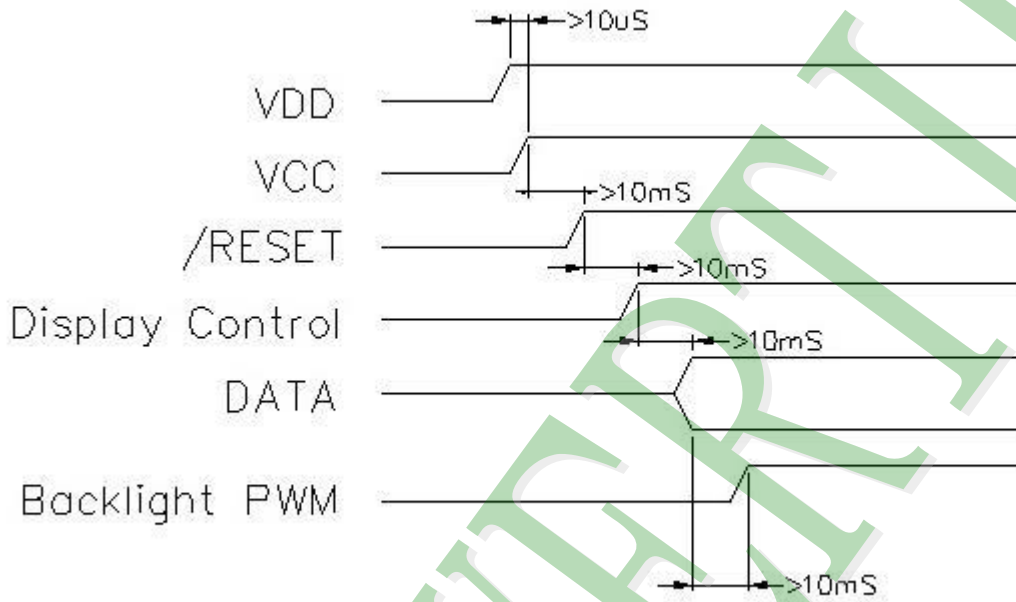
Display become off at the 2nd falling edge of VSYNC after the falling edge of SHUT.

If RESET signal is necessary for power down, provide it after the 2-frames-cycle of the SHUT period.

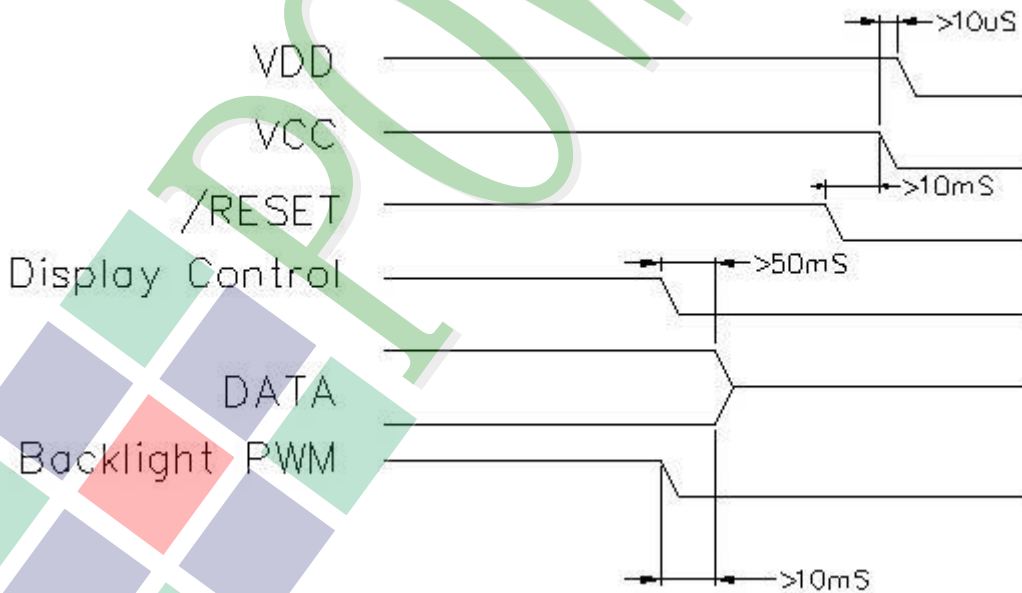


### 2.4.3 Power Timing Characteristics of Backlight

POWER ON

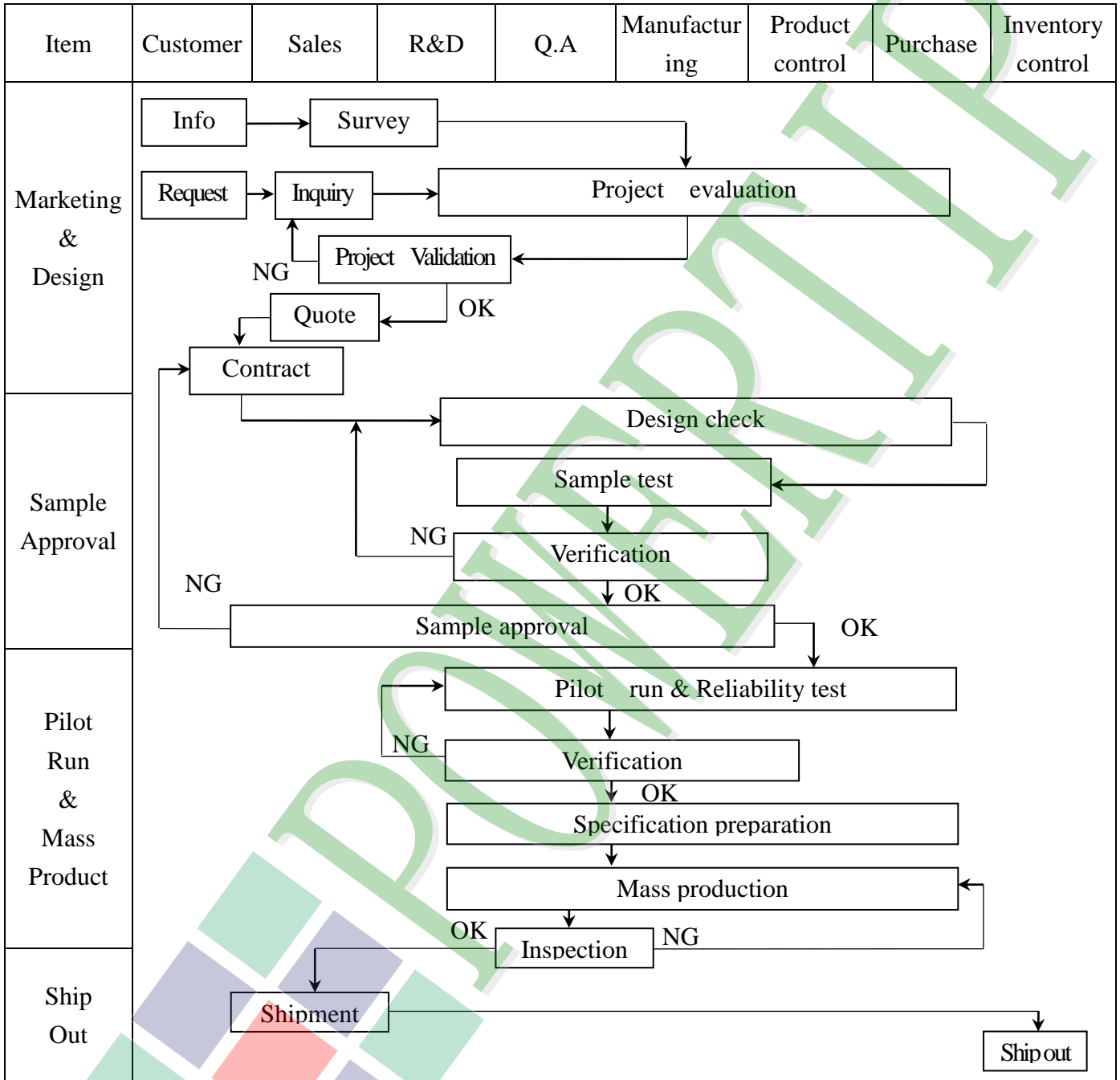


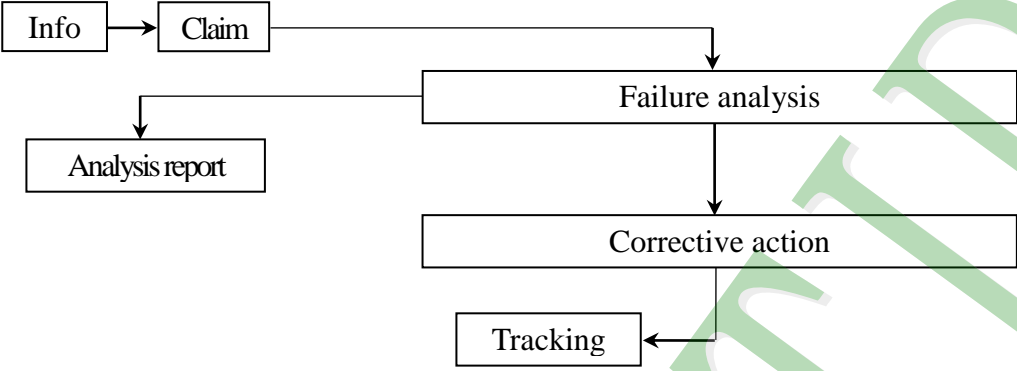
POWER OFF



### 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			

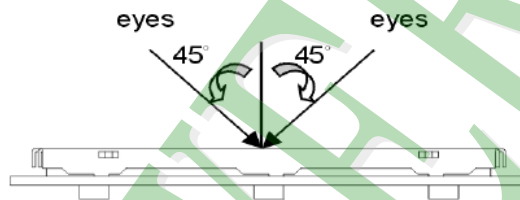


### 3.2 Inspection Specification

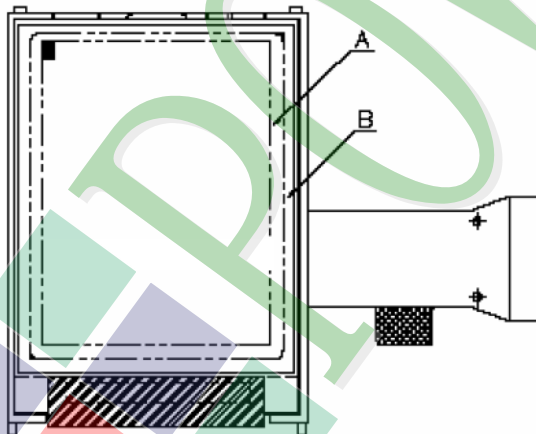
- ◆Scope : The document shall be applied to TFT-LCD Module for 3.5" ~10" (Ver.B01).
- ◆Inspection Standard : MIL-STD-105E Table Normal Inspection Single Sampling Level II.
- ◆Equipment : Gauge 、 MIL-STD 、 Powertip Tester 、 Sample
- ◆Defect Level : Major Defect AQL : 0.4 ; Minor Defect AQL : 1.5
- ◆OUT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

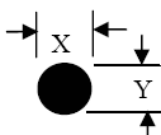
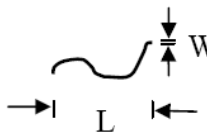
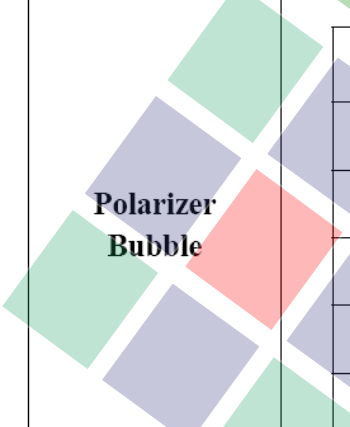
◆ Specification For TFT-LCD Module 3.5" ~10" :

(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"> <thead> <tr> <th>Item</th> <th>Acceptance (Q'ty)</th> </tr> </thead> <tbody> <tr> <td>Bright Dot</td> <td><math>\leq 4</math></td> </tr> <tr> <td>Dark Dot</td> <td><math>\leq 5</math></td> </tr> <tr> <td>Joint Dot</td> <td><math>\leq 3</math></td> </tr> <tr> <td>Total</td> <td><math>\leq 7</math></td> </tr> </tbody> </table>	Item	Acceptance (Q'ty)	Bright Dot	$\leq 4$	Dark Dot	$\leq 5$	Joint Dot	$\leq 3$	Total	$\leq 7$	Minor
		Item	Acceptance (Q'ty)										
		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.													

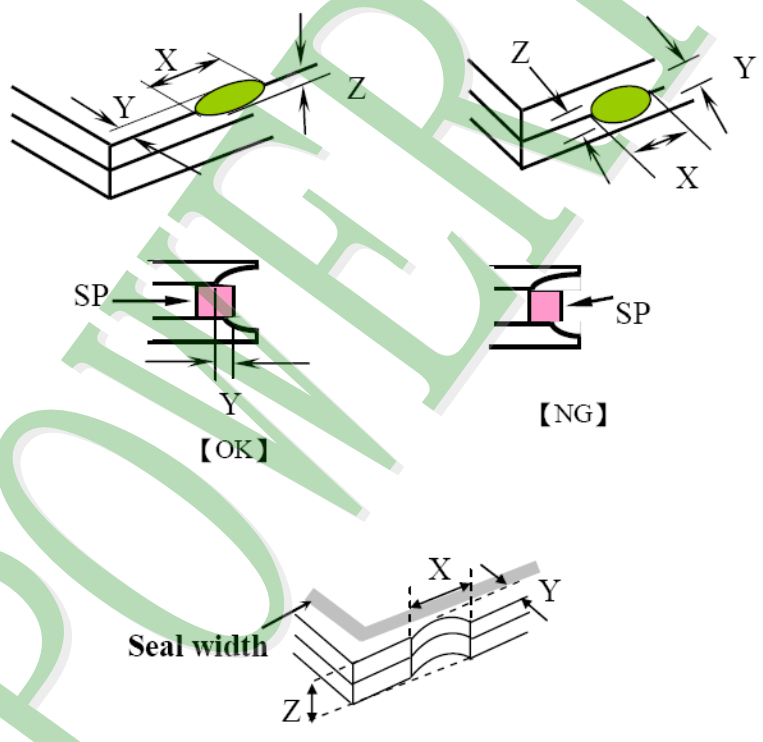
◆ Specification For TFT-LCD Module 3.5" ~10" :

(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" data-bbox="539 432 1299 840"> <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 colspan="2">5</td> </tr> </tbody> </table> <p>6.2 Line type( Non-display or display ) :</p> <table border="1" data-bbox="512 956 1326 1413"> <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 colspan="2">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> <td rowspan="3">Ignore</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 colspan="2">As round type</td> </tr> <tr> <td colspan="2"><b>Total</b></td> <td colspan="2">5</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		$L \leq 10.0$	$0.03 < W \leq 0.05$	4	Ignore	$L \leq 5.0$	$0.05 < W \leq 0.10$	2	---	$W > 0.10$	As round type		<b>Total</b>		5		Minor
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																																										
$L \leq 10.0$	$0.03 < W \leq 0.05$	4	Ignore																																									
$L \leq 5.0$	$0.05 < W \leq 0.10$	2																																										
---	$W > 0.10$	As round type																																										
<b>Total</b>		5																																										
07	<p>Polarizer Bubble</p> 	<table border="1" data-bbox="505 1480 1334 1892"> <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>4</td> <td rowspan="3">Ignore</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 colspan="2">5</td> </tr> </tbody> </table>	Dimension (diameter : $\Phi$ )	Acceptance (Q'ty)		A area	B area	$\Phi \leq 0.25$	Ignore		$0.25 < \Phi \leq 0.50$	4	Ignore	$0.50 < \Phi \leq 0.80$	1	$\Phi > 0.80$	0	<b>Total</b>	5		Minor																							
Dimension (diameter : $\Phi$ )	Acceptance (Q'ty)																																											
	A area	B area																																										
$\Phi \leq 0.25$	Ignore																																											
$0.25 < \Phi \leq 0.50$	4	Ignore																																										
$0.50 < \Phi \leq 0.80$	1																																											
$\Phi > 0.80$	0																																											
<b>Total</b>	5																																											

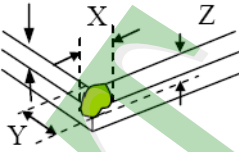
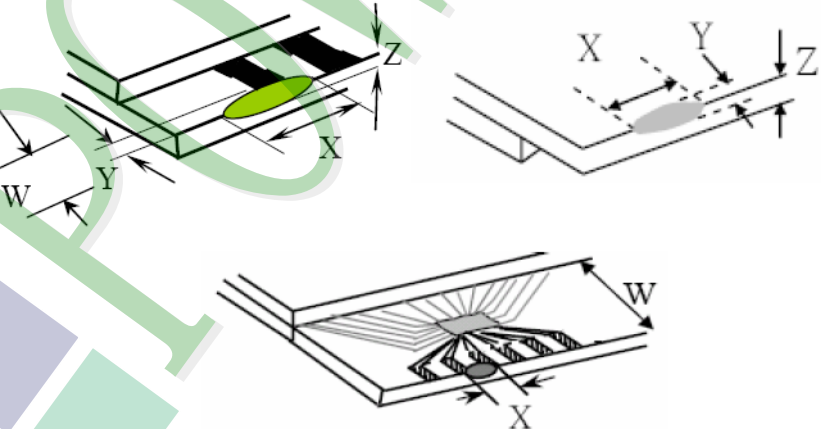
◆Specification For TFT-LCD Module 3.5" ~10" :

(Ver.B01)

NO	Item	Criterion	Level						
08	The crack of glass	<p><b>Symbols :</b></p> <p><b>X :</b> The length of crack  <b>Z :</b> The thickness of crack  <b>t :</b> The thickness of glass</p> <p><b>Y :</b> The width of crack.  <b>W :</b> terminal length  <b>a :</b> LCD side length</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 1568 1340 1859"> <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" :

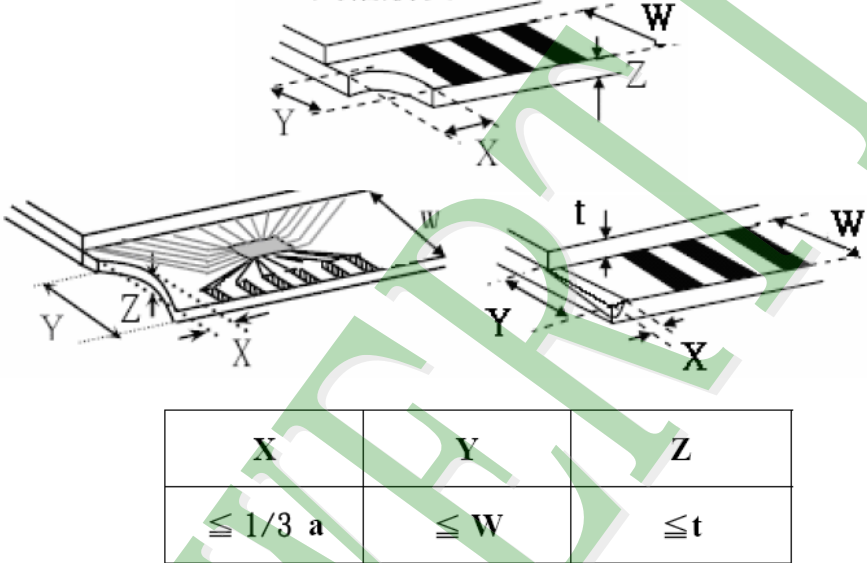
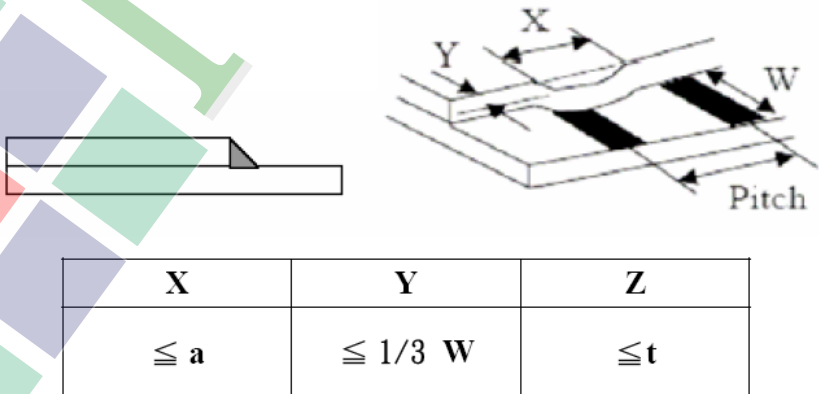
(Ver.B01)

NO	Item	Criterion	Level												
08	The crack of glass	<p><b>Symbols :</b></p> <p><b>X :</b> The length of crack  <b>Z :</b> The thickness of crack  <b>t :</b> The thickness of glass</p> <p><b>Y :</b> The width of crack.  <b>W :</b> terminal length  <b>a :</b> LCD side length</p> <hr/> <p>8.1.2 Corner crack :</p>  <table border="1" data-bbox="523 770 1331 1061"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td><math>\leq 1/5 a</math></td> <td>Crack can't enter viewing area</td> <td><math>Z \leq 1/2 t</math></td> </tr> <tr> <td><math>\leq 1/5 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	$\leq 1/5 a$	Crack can't enter viewing area	$Z \leq 1/2 t$	$\leq 1/5 a$	Crack can't exceed the half of SP width.	$1/2 t < Z \leq 2 t$				
		X	Y	Z											
$\leq 1/5 a$	Crack can't enter viewing area	$Z \leq 1/2 t$													
$\leq 1/5 a$	Crack can't exceed the half of SP width.	$1/2 t < Z \leq 2 t$													
		<p>8.2 Protrusion over terminal :</p> <p>8.2.1 Chip on electrode pad :</p>  <table border="1" data-bbox="561 1688 1340 1868"> <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	$\leq a$	$\leq W$	$\leq 1/2 t$	Minor
	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 :</b> The length of crack                      <b>Y :</b> The width of crack.  <b>Z :</b> The thickness of crack                <b>W :</b> terminal length  <b>t :</b> The thickness of glass                <b>a :</b> LCD side length</p> <hr/> <p>8.2.2 Non-conductive portion :</p>  <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>8.2.3 Glass remain :</p> 	Minor

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

(Ver.B01)

NO	Item	Criterion	Level
09	Backlight elements	9.1 Backlight can't work normally.	Major
		9.2 Backlight doesn't light or color is wrong.	Major
		9.3 Illumination source flickers when lit.	Major
10	General appearance	10.1 Pin type、quantity、dimension must match type in structure diagram.	Major
		10.2 No short circuits in components on PCB or FPC .	Major
		10.3 Parts on PCB or FPC must be the same as on the production characteristic chart .There should be no wrong parts , missing parts or excess parts.	Major
		10.4 Product packaging must the same as specified on packaging specification sheet.	Minor
		10.5 The folding and peeled off in polarizer are not acceptable.	Minor
		10.6 The PCB or FPC between B/L assembled distance(PCB or FPC ) is $\leq 1.5$ 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 ±2°C 96 hrs Surrounding temperature, then storage at normal condition 4hrs.										
2	Low Temperature Storage Test	Keep in -30 ±2°C 96 hrs Surrounding temperature, then storage at normal condition 4hrs.										
3	High Temperature / High Humidity Storage Test	Keep in +60°C / 90% R.H duration for 96 hrs Surrounding temperature, then storage at normal condition 4hrs. (Excluding the polarizer)										
4	Temperature Cycling Storage Test	<p style="text-align: center;"> <math>-30^{\circ}\text{C} \rightarrow +25^{\circ}\text{C} \rightarrow +80^{\circ}\text{C} \rightarrow +25^{\circ}\text{C}</math>            (30mins) (5mins) (30mins) (5mins)  <math>\longleftrightarrow</math>            10 Cycle         </p> <p>Surrounding temperature, then storage at normal condition 4hrs.</p>										
5	ESD Test	<b>Air Discharge:</b> Apply 2 KV with 5 times Discharge for each polarity +/-										
		<b>Contact Discharge:</b> Apply 250 V with 5 times discharge for each polarity +/-  1. Temperature ambience : 15°C ~ 35°C 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%)										
6	Vibration Test (Packaged)	1. Sine wave 10~55 Hz frequency (1 min) 2. The amplitude of vibration : 1.5 mm 3. Each direction (X、Y、Z) duration for 2 Hrs										
7	Drop Test (Packaged)	<table border="1" style="width: 100%;"> <thead> <tr> <th>Packing Weight (Kg)</th> <th>Drop Height (cm)</th> </tr> </thead> <tbody> <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> </tbody> </table>	Packing Weight (Kg)	Drop Height (cm)	0 ~ 45.4	122	45.4 ~ 90.8	76	90.8 ~ 454	61	Over 454	46
		Packing Weight (Kg)	Drop Height (cm)									
0 ~ 45.4	122											
45.4 ~ 90.8	76											
90.8 ~ 454	61											
Over 454	46											
Drop direction : ※1 corner / 3 edges / 6 sides each 1times												

## 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

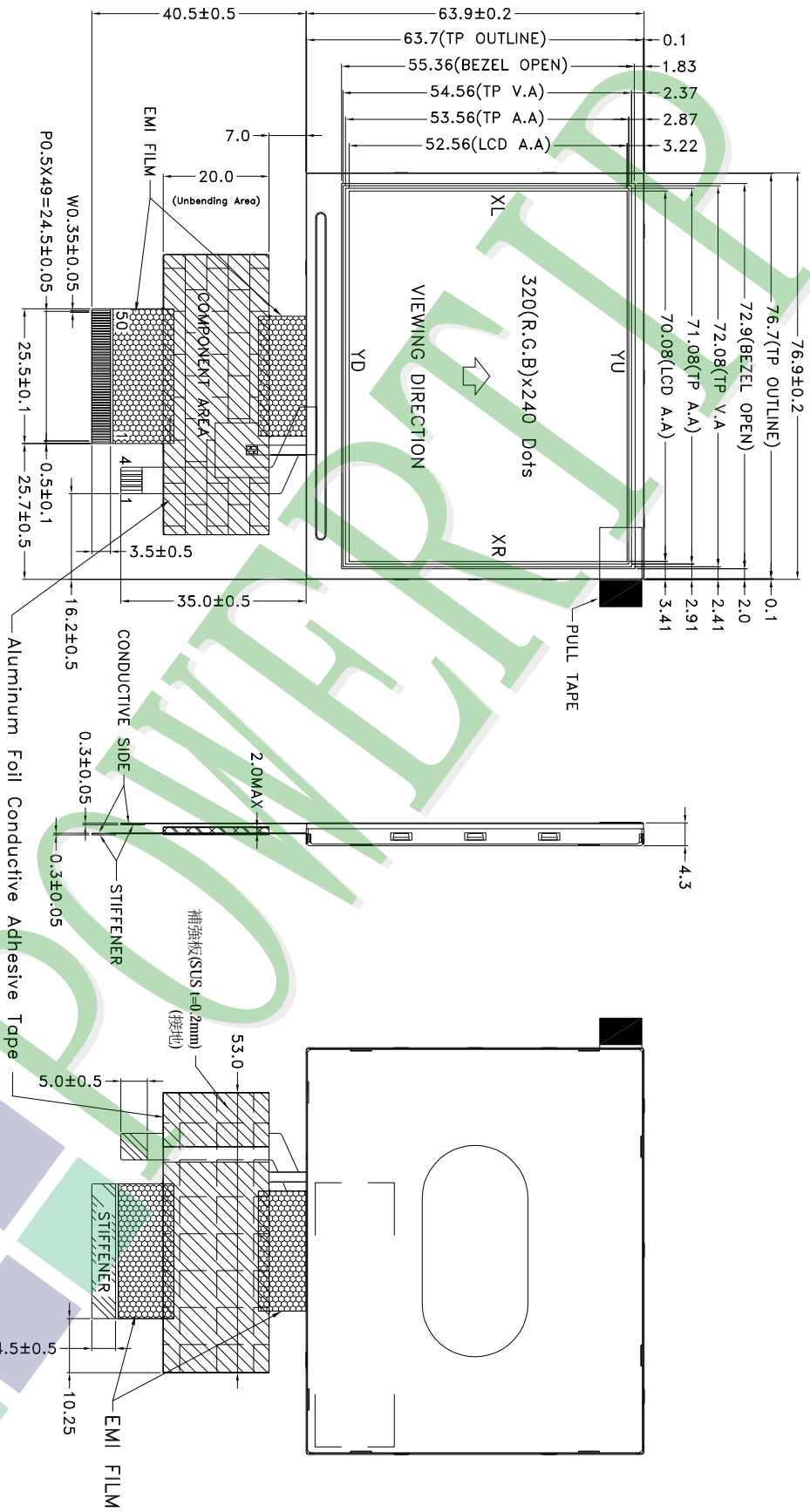
- 5.2.1 Avoid any strong mechanical shock which can break the glass.
- 5.2.2 Avoid static electricity which can damage the CMOS LSI—When working with the module , be sure to ground your body and any electrical equipment you may be using.
- 5.2.3 Do not remove the panel or frame from the module.
- 5.2.4 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.



- NOTES:
- 1.LCD TYPE: a-SI TFT
  - 2.LCD DISPLAY: POSITIVE / TRANSMISSIVE
  - 3.The tolerance unless classified ±0.2mm
  - 4.LCM FPC Matching Connector: Kyocera 08 6282 050 340 829+ or EQUIVALENT  
TP FPC Matching Connector: Kyocera 04 6227 004 100 800+ or EQUIVALENT

007		PART NO:	PH320240T023-IHB	久正光电股份有限公司 POWER TIP TECHNOLOGY CORPORATION	Design	Terry	(3)	Surface		Precision Level 1 ~ 4 4 ~ 16 16 ~ 63 63 ~ 250 250 ~ 1000
006		DRAWING NAME:	JLMD-PH320240T023-IHB		Check	Eddy		Unit	MM	
005		TITLE:	LCD MODULE DRAWING	Approve	Ryan	Scale	FIT	Thickness	-	
004						Page	1/2	Quantity	-	
003										
002	UPDATE DRAWING									
001	NEW DRAWING	REV BY	REV BY							
REV										



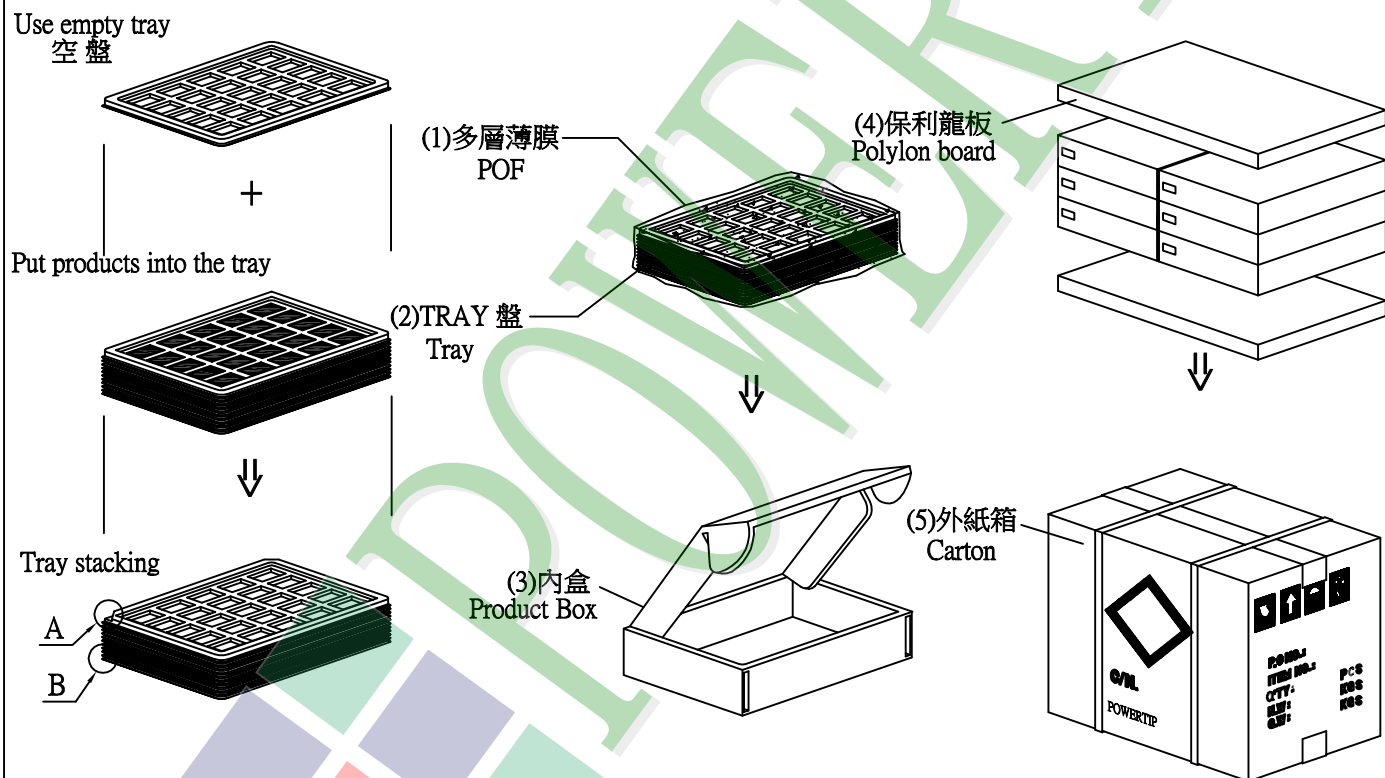
### 1. 包裝材料規格表 (Packaging Material) : (per carton)

No.	Item	Model	Dimensions (mm)	1Pcs Weight	Quantity	Total Weight
1	成品 (LCM)	PH320240T023-IHB	76.9 X 63.9 X 4.3	0.0425	252	10.71
2	多層薄膜(1)POF	OTFILM0BA03ABA	19"X350X0.015	—	6	—
3	TRAY 盤 (2)Tray	TYPH32024002BB	352 X 260 X 12.8	0.1	48	4.8
4	內盒(3)Product Box	BX36627063ABBA	393 X 274 X 68	0.182	6	1.092
5	保利龍板(4)Pollyon board	OTPLB00PL08ABA	550 X 393 X 20	0.0284	2	0.0568
6	外紙箱(5)Carton	BX57041027CCBA	570 X 410 X 265	1.0	1	1.0
7						
8						
9						

2. 一整箱總重量 (Total LCD Weight in carton) : 17.66 Kg±10%

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

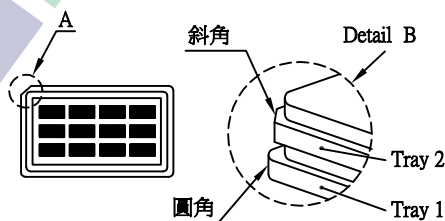
(1) LCM quantity per box : no per tray	6	x no of tray	7	=	42
(2) Total LCM quantity in carton : quantity per box	42	x no of boxes	6	=	252



### 特 記 事 項 (REMARK)

#### 4. Label Specifications :

依廠內標準作業



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.

# DATA MODUL



ALL TECHNOLOGIES. ALL COMPETENCIES. ONE SPECIALIST.



DATA MODUL AG  
Landsberger Straße 322  
DE-80687 Munich  
Phone: +49-89-56017-0

DATA MODUL WEIKERSHEIM GMBH  
Lindenstraße 8  
DE-97990 Weikersheim  
Phone: +49-7934-101-0



More information and worldwide locations can be found at

[www.data-modul.com](http://www.data-modul.com)