DATA MODUL

SPECIFICATION

POWERTIP

PH320240T028-ZHA

3.5" – QVGA – RGB,SPI

Version: 00.9
Date: 02.03.2023

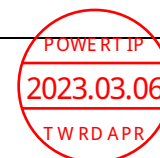Note: This specification is subject to change without prior notice

SPECIFICATIONS

CUSTOMER	:	
SAMPLE CODE	:	SH320240T028-ZHA
MASS PRODUCTION CODE	:	PH320240T028-ZHA
SAMPLE VERSION	:	02
SPECIFICATIONS EDITION	:	009
DRAWING NO. (Ver.)	:	LMD-PH320240T028-ZHA (Ver.002)
PACKAGING NO. (Ver.)	:	PKG-PH320240T028-ZHA (Ver.001)

Customer Approved

Date:

Approved	Checked	Designer
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POWERTIP
2023.03.06
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
05/14/2019	01	001	New Drawing	--	Howard
10/31/2019	01	002	New Sample Add Surface treatment Add Ts Note1 & Ta Note 2 Modify Backlight Characteristics Modify CS/ID1,SDIN/ID2,SCK/ID3 Description Modify Component height and Add Print Line	- 4 5 9 12 Appendix	Howard
03/20/2020	02	003	Second Sample Modify Backlight Characteristics Modify Inspection Specification Add Result Evaluation Criteria Modify PRECAUTION RELATING PRODUCT HANDLING	- 9 23~29 30 32	Howard
04/20/2020	02	004	According to customer request modify Contents	-	Howard
04/29/2020	02	005	LCD Type From Full Viewing Angle modify to IPS	4	Howard
05/14/2020	02	006	LCD Type From IPS modify to Full Viewing Angle	4	Howard
08/05/2022	02	007	Modify System Bus Timing for RGB Interface	14	Howard
08/22/2022	02	008	DCLK polarity from falling modify to rising	12	Howard
03/02/2023	02	009	Modify ID Pins Definition	12	Howard

Contents

Note: For detailed information please refer to IC data sheet:
Primacy(TFT LCD):
Sitronix: ST7272A

1. SPECIFICATIONS

1.1 Features

Item	Standard Value
Display Type	320 * 3 (RGB) * 240 Dots
LCD Type	Full Viewing Angle, Normally Black, Transmissive type
Screen size(inch)	3.5 inch
Surface treatment	Anti-Glare
Color configuration	RGB-Strip
Backlight Type	White LED B/L
Interface	Parallel RGB (Data), SPI (Configuration)
Other(controller/driver IC)	ST7272A (Or Compatible IC)
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) * 3.2(H)	mm

LCD Panel

Item	Standard Value	Unit
Active Area	70.08(W) * 52.56(L)	mm
Pixel Size	0.219(W) * 0.219(H)	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 for TFT Panel	VDD	GND=0	-0.3	4.5	V	
Power Supply for Backlight Unit	VCC	GND=0	-0.3	+20.0	V	-
Operating Temperature	T_{OP} (Ts)	Note 1	-20	70	°C	
Storage Temperature	T_{ST} (Ta)	Note 2	-30	80	°C	

The absolute maximum rating values of this product are not allowed to be exceeded at any time. 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.

Note 1: Ts is the temperature of panel's surface

Note 2: Ta is the ambient temperature of samples

1.4 DC Electrical Characteristics

Module   GND = 0V, Ta = 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_{IH}	GND=0V	0.7VDD	-	VDD	V
	V_{IL}	GND=0V	0	-	0.3VDD	
Supply Current for TFT Panel	IDD	IDD@VDD=3.3V	-	25	40	
Supply Current for Backlight Unit	ICC	ICC@VCC=5V	-	170	260	mA
Supply Current for Backlight Unit	ICC	ICC@VCC=12V	-	70	105	
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

TFT LCD Module   VDD = 3.3 V, Ta=25°C

Item		Symbol	Condition	Min.	Typ.	Max.	unit	
Response time		Tr+Tf	Ta = 25°C θX, θY = 0°	-	30	40	ms	Note 2
Viewing angle	Top	θY+	CR ≥ 10	-	80	-	Deg.	Note 4
	Bottom	θY-		-	80	-		
	Left	θX-		-	80	-		
	Right	θX+		-	80	-		
Contrast ratio		CR		650	800	-		Note 3
Color of CIE Coordinate (With B/L)	White	X	Ta = 25°C θX , θY = 0°	0.23	0.28	0.33	-	Note1
		Y		0.27	0.32	0.37		
	Red	X		0.57	0.62	0.67		
		Y		0.31	0.36	0.41		
	Green	X		0.29	0.34	0.39		
		Y		0.55	0.60	0.65		
	Blue	X		0.09	0.14	0.19		
		Y		0.04	0.09	0.14		
Average Brightness Pattern=white display (With LCD)*1		IF	VCC=12.0V PWM="High" (Duty=100%)	800	1000	-	cd/m^2	Note1
Uniformity (With LCD)*2		△B	VCC=12.0V PWM="High" (Duty=100%)	70	-	-	%	Note1

Note 1:

*1: △B=B(min) / B(max) * 100%

*2: Measurement Condition for Optical Characteristics:

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

   current and typical operating frequency

   b: Measurement Distance: 500 ± 50 ㎜, (θ= 0°)

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

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

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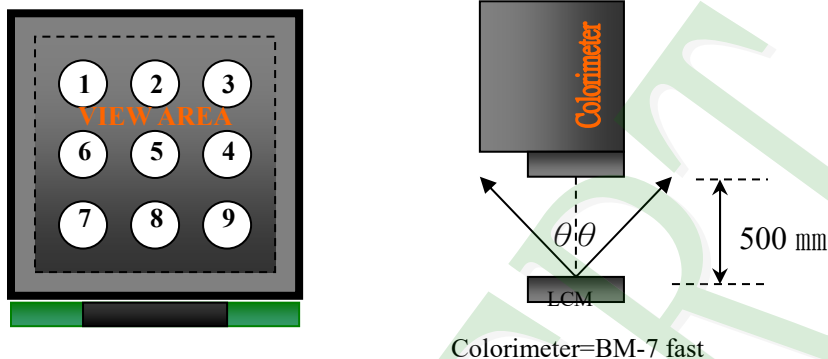
   To be measured at the center area of panel with a viewing cone of 1° by Topcon
   luminance meter BM-7, after 10 minutes operation (module)

Note 2: 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
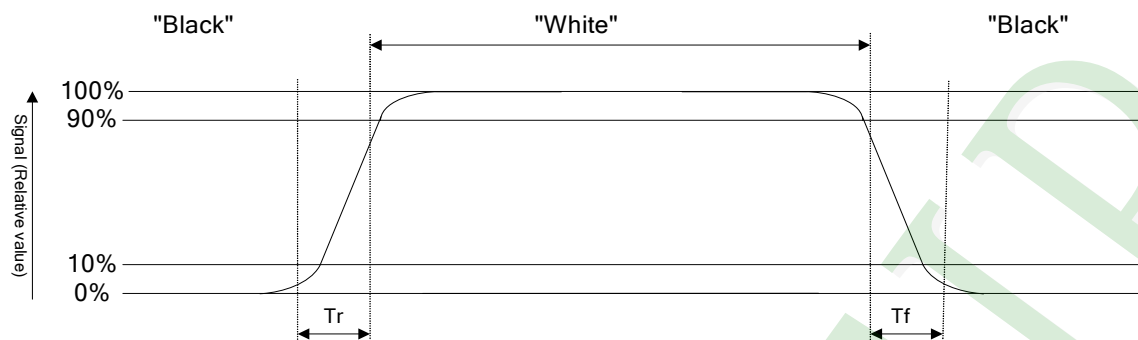
Note 3: Definition of contrast ratio:

Contrast ratio is calculated with the following formula

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

Note 4: Definition of viewing angle:

Refer to figure as below:
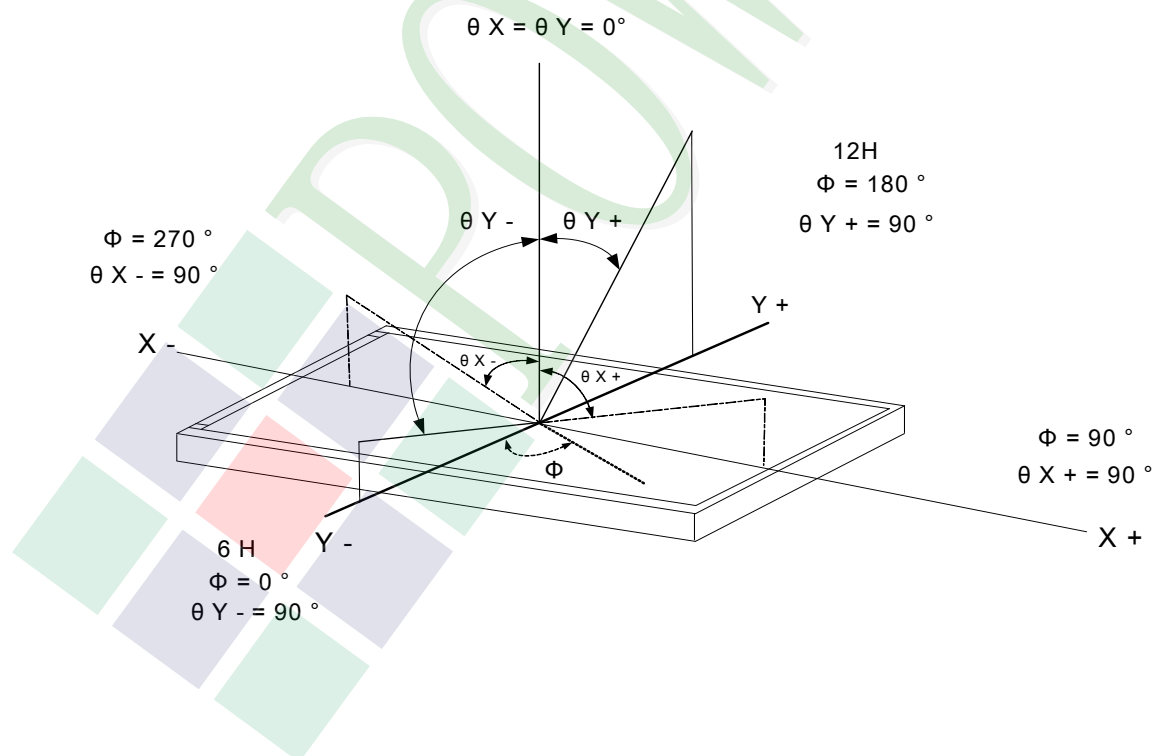
## 1.6 Backlight Characteristics

Maximum Ratings

Item	Symbol	Min.	Max.	Unit	Remark
LED Forward Current	I_F		30	mA	One LED
LED Reverse Voltage	V_R		5.0	V	

Electrical / Optical Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
LED Voltage	V_L	18.0	19.0	-	V	Note1
LED Current	I_L	-	40	-	mA	-
LED life time	-	50,000	-	-	H_r	Note2

Note 1: The LED Supply Voltage is defined by the number of LED at Ta=25℃ and I_L =40 mA

Note 2: The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and I_L =40 mA. The LED life time could be decreased if operating I_L is larger than 40 mA
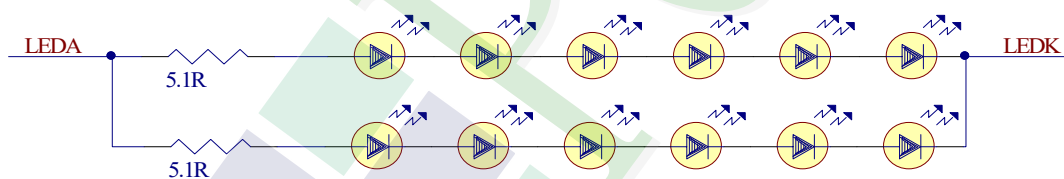
2. Module Structure

2.1 Counter Drawing

2.1.1 LCM Mechanical Diagram

* See Appendix

2.1.2 Block Diagram
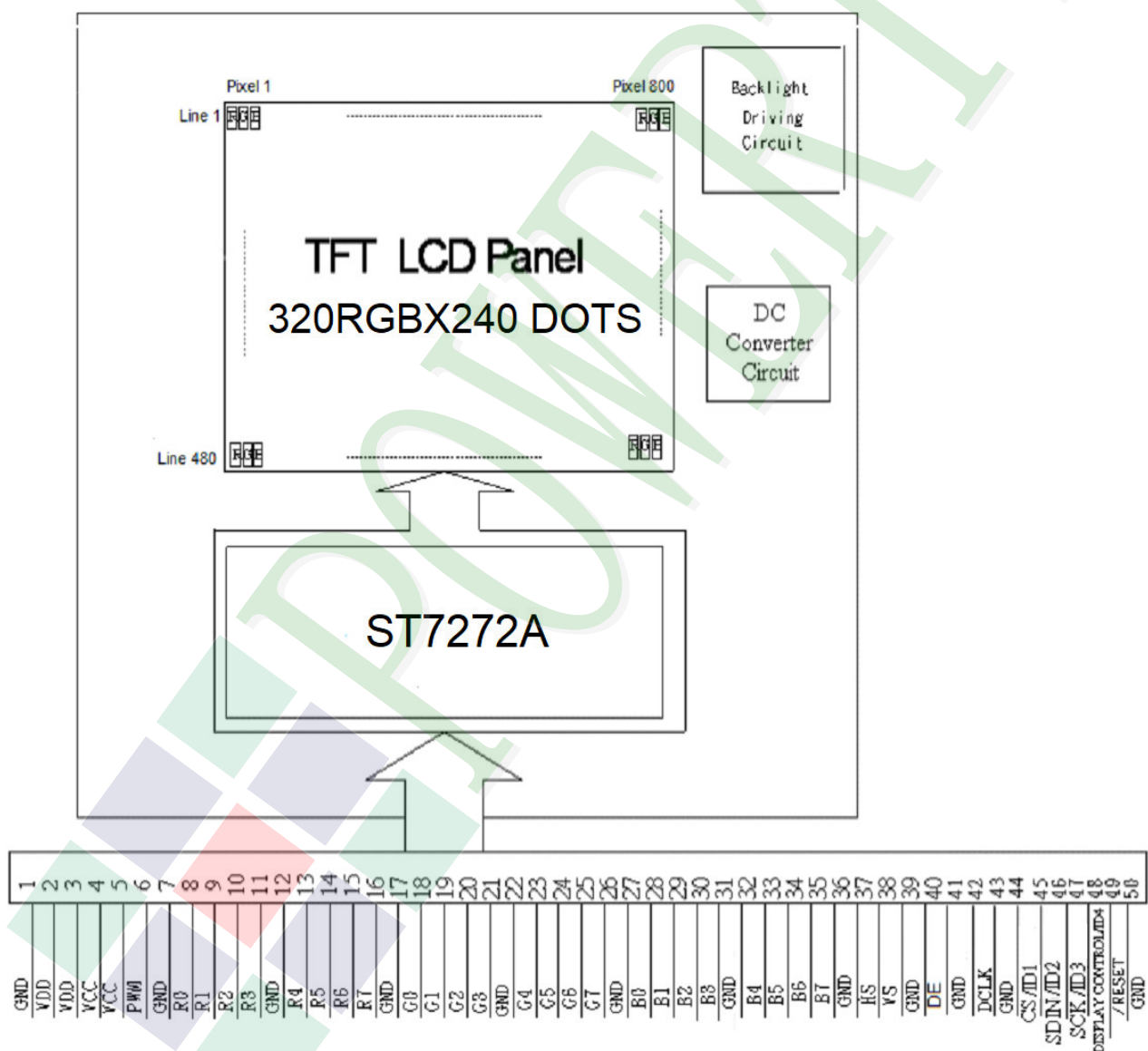
2.2 Interface Pin Description

TFT LCM Interface

Pin#	Name	Description
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#	Name	DESCRIPTION
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	Data Enable.
42	GND	Power ground.
43	DCLK	Sample clock. Data will be latched at the rising edge of DCLK.
44	GND	Power ground.
45	CS/ ID1	Serial communication chip selection/ID[4:1]These pins select LCM type. See NOTE1
46	SDIN/ ID2	Serial communication data/ ID[4:1]These pins select LCM type. See NOTE1
47	SCK/ ID3	Serial communication clock/ ID[4:1]These pins select LCM type. See NOTE1
48	DISPLAY CONTROL / ID4	Display Enable(Hi Active)./ ID[4:1]These pins select LCM type. See NOTE1
49	/RESET	Global Reset (Low Active).
50	GND	Power ground.

Note1:

ID Pins Definition:

	PIN 45 ID1	PIN 46 ID2	PIN 47 ID3	PIN 48 ID4
3.5" Module	X	0	0	X
4.3" Module	X	1	0	X
5.0" Module	X	0	1	X
7.0" Module	X	1	1	X

1. Resistor = 10k ohm

2. "X" = No use

2.3 Timing Characteristics

2.3.1 RGB Mode Selection Table

RGB Mode Selection Table	DCLK	HSYNC	VSYNC	DE
SYNC - DE Mode	Input	Input	Input	Input
SYNC Mode	Input	Input	Input	GND
DE Mode	Input	GND	GND	Input

2.3.2 System Bus Timing for RGB Interface
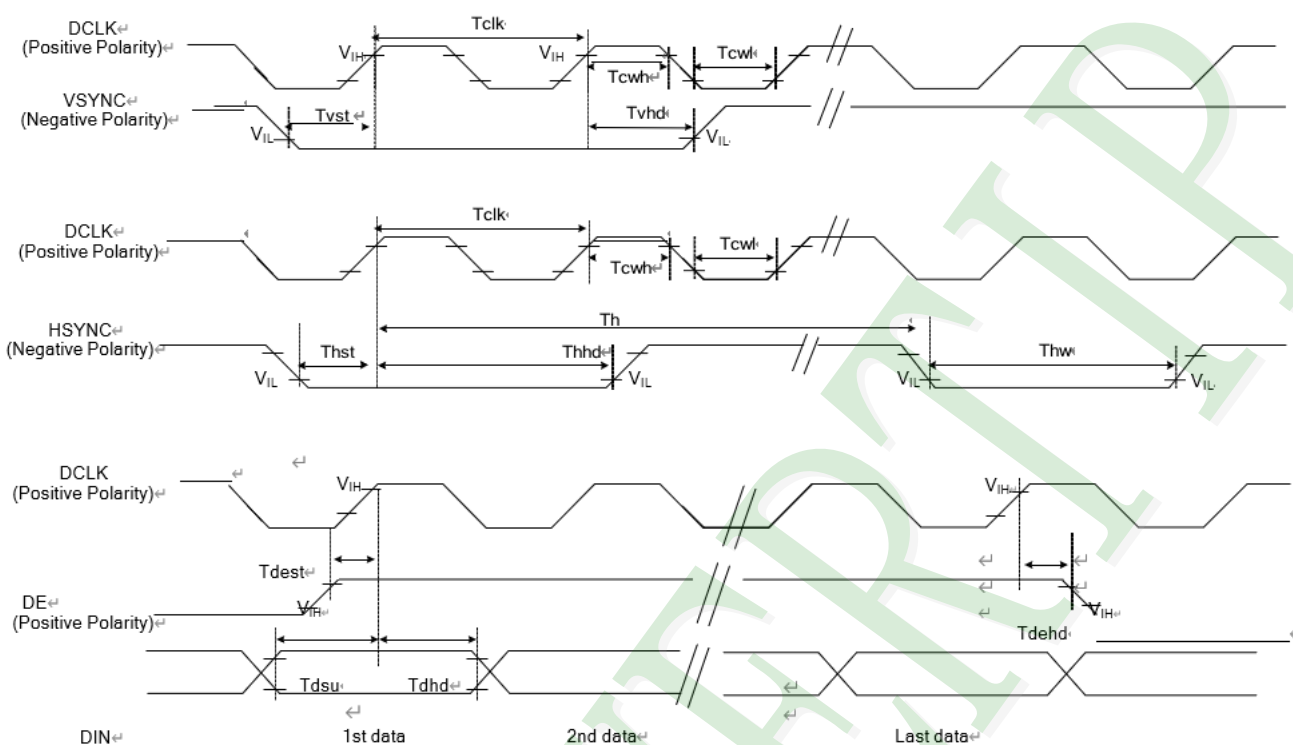
VDD= 3.3V, Ta=25℃

Item	Symbol	Min	Typ.	Max	Unit	Conditions
CLK Pulse Duty	Tclk	40	50	60	%	
HSYNC Width	Thw	2	-	-	DCLK	
HSYNC Period	Th	55	60	65	us	
VSYNC Setup Time	Tvst	12	-	-	ns	
VSYNC Hold Time	Tvhd	12	-	-	ns	
HSYNC Setup Time	Thst	12	-	-	ns	
HSYNC Hold Time	Thhd	12	-	-	ns	
Data Setup Time	Tdsu	12	-	-	ns	
Data Hold Time	Tdhd	12	-	-	ns	
DE Setup Time	Tdest	12	-	-	ns	
DE Hold Time	Tdehd	12	-	-	ns	
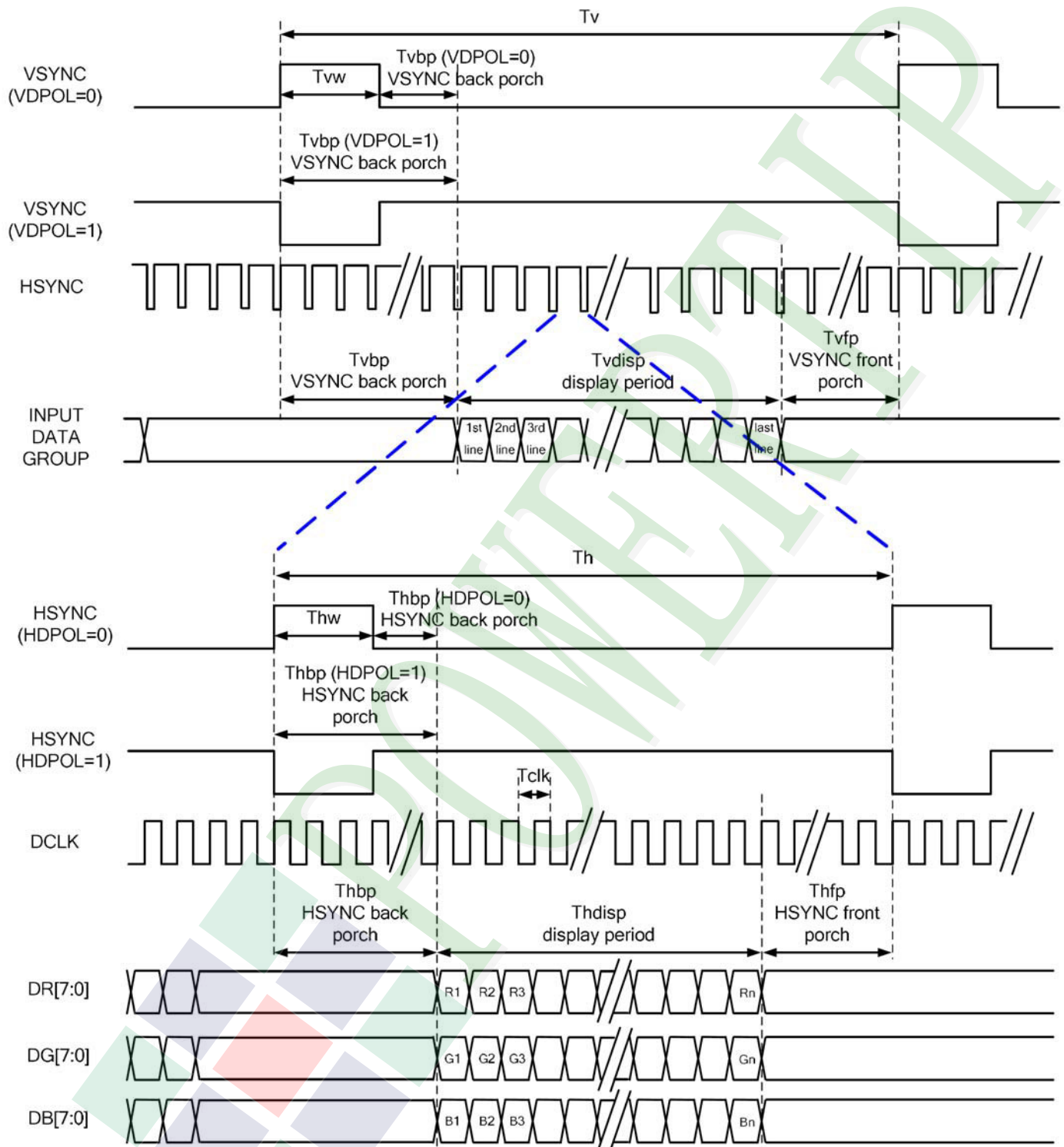
2.3.4 Parallel RGB SYNC-DE Mode
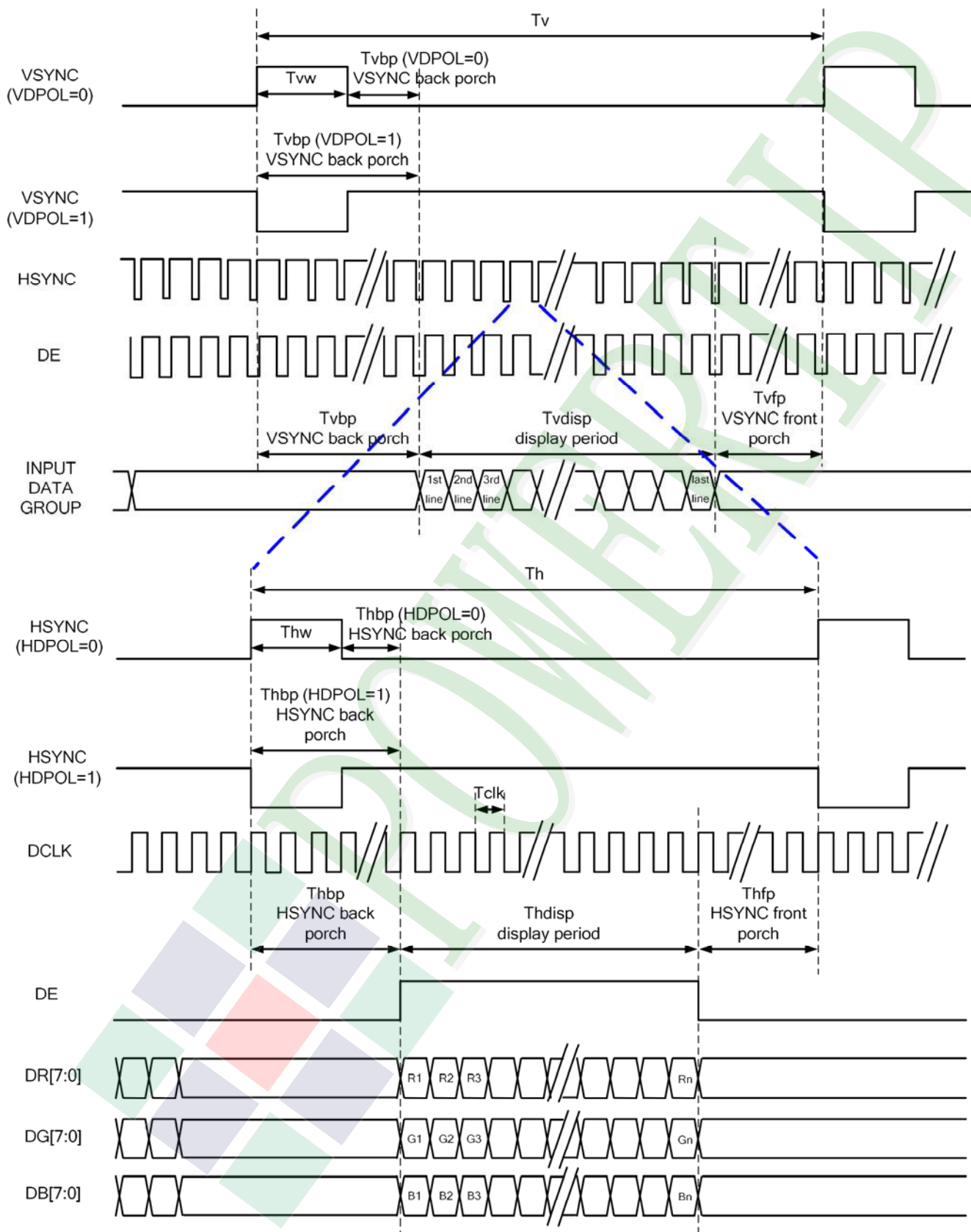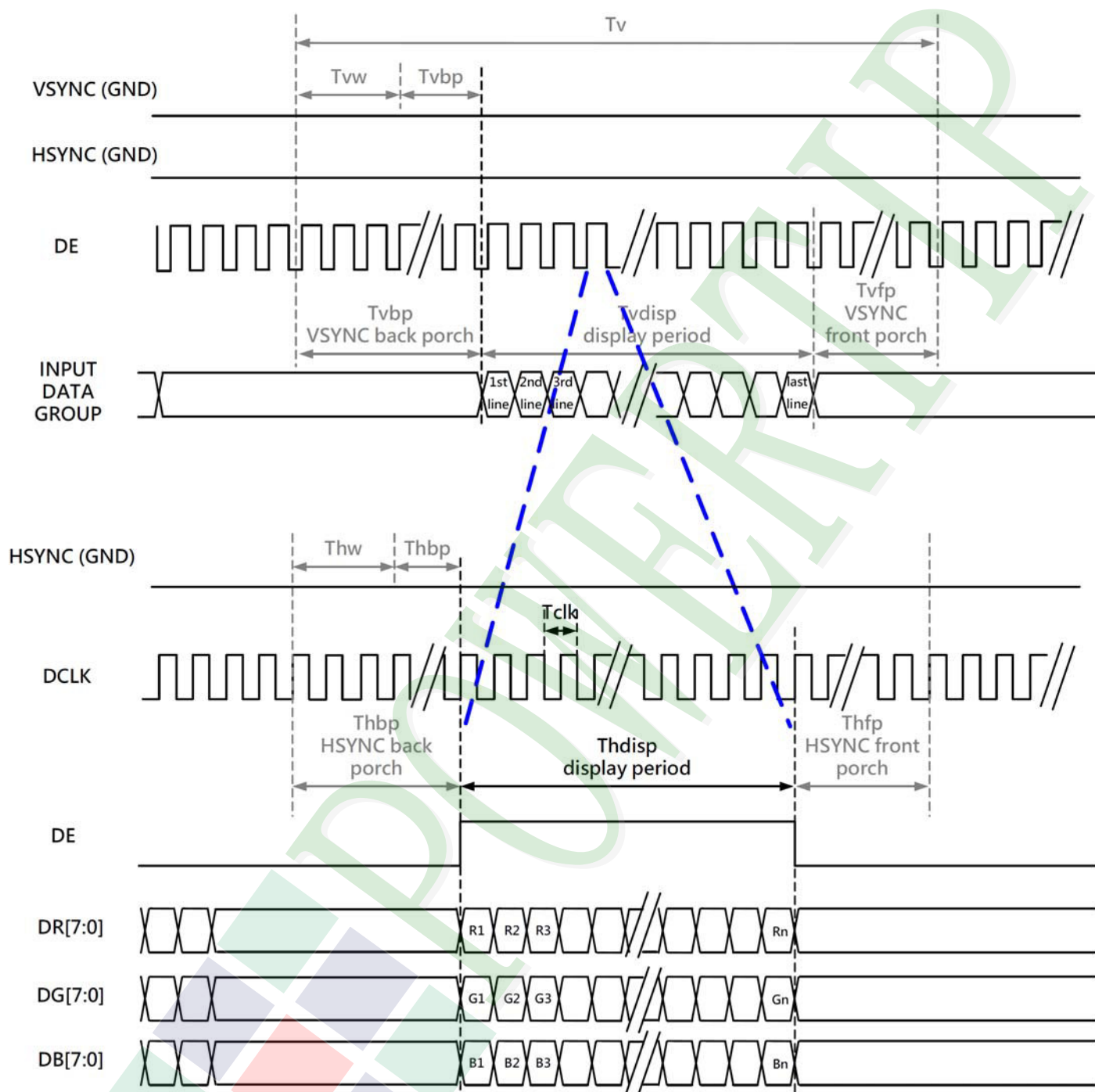
2.3.6 Parallel RGB Input Timing Table

Parallel 24-bit RGB Input Timing Table						
Parameter		Symbol	Min	Typ	Max	Unit	Note
DCLK frequency		Fclk	5	6	8	MHz	
DCLK Period		Tclk	125	167	200	ns	
HSYNC	Period Time	Th	325	371	438	DCLK	
	Display Period	Thdisp		320			
	Back Porch	Thbp	3	43	43		SYNC mode back porch control by H_BLANKING[7:0] setting Thbp= H_BLANKING[7:0]
	Front Porch	Thfb	2	8	75		
	Pulse Width	Thw	2	4	43		
VSYNC	Period Time	Tv	244	260	289	HSYNC	
	Display Period	Tvdisp		240			
	Back Porch	Tvbp	2	12	12		SYNC mode back porch control by V_BLANKING[7:0] setting Thbp= V_BLANKING[7:0]
	Front Porch	Tvfb	2	8	37		
	Pulse Width	Tvw	2	4	12		

2.3.7 Power ON/OFF Sequence

Power ON Sequence
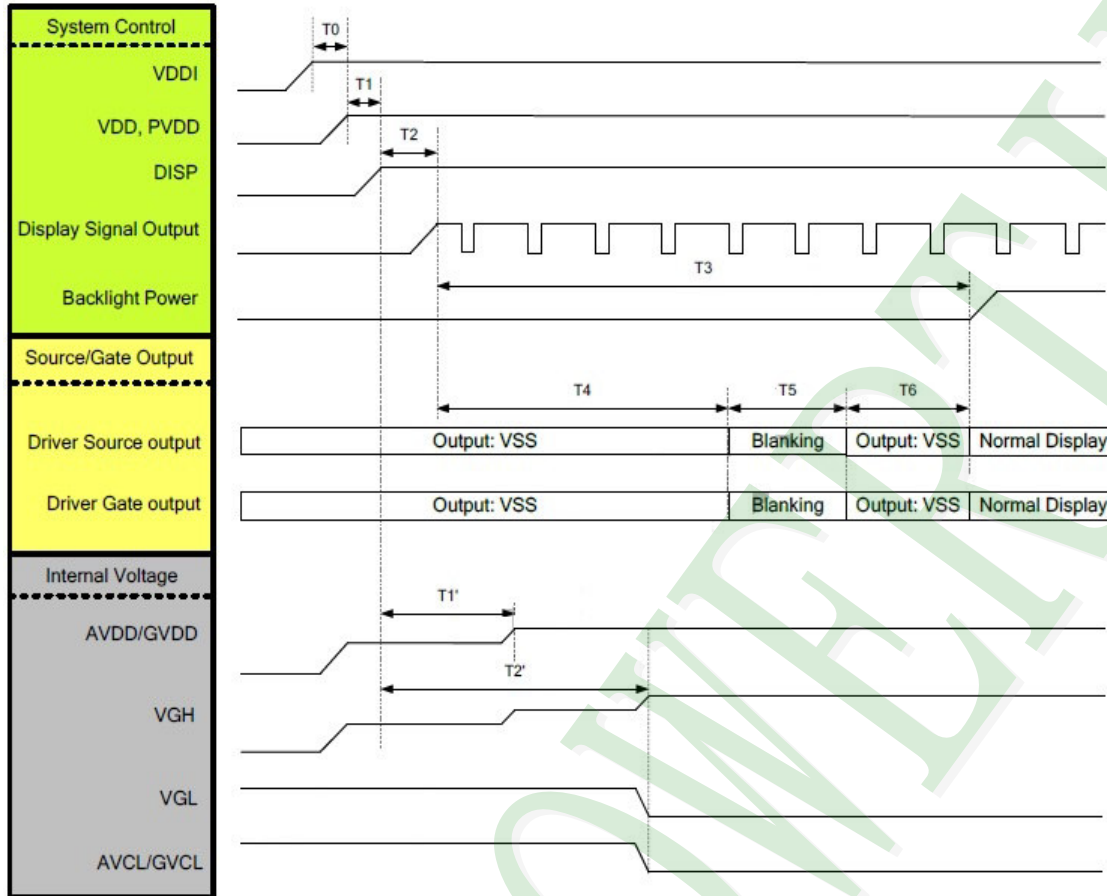
Symbol	Description	Min. Time	Unit
T0	Analog power on delay time	0	ms
T1	System power stability to DISP= "High"	0	ms
T2	DISP= "High" to display signal output	10	ms
T3	Display signal output to backlight power on	250	ms
T4	Display signal output to source output	100	ms
T5	Source/ Gate blanking time	30	ms
T6	Source/ Gate automatic output VSS	80	ms
T1'	DISP= "High" to AVDD/GVDD voltage stable time	20	ms
T2'	DISP= "High" to VGH/VGL/AVCL/GVCL voltage stable time	60	ms

Power OFF Sequence
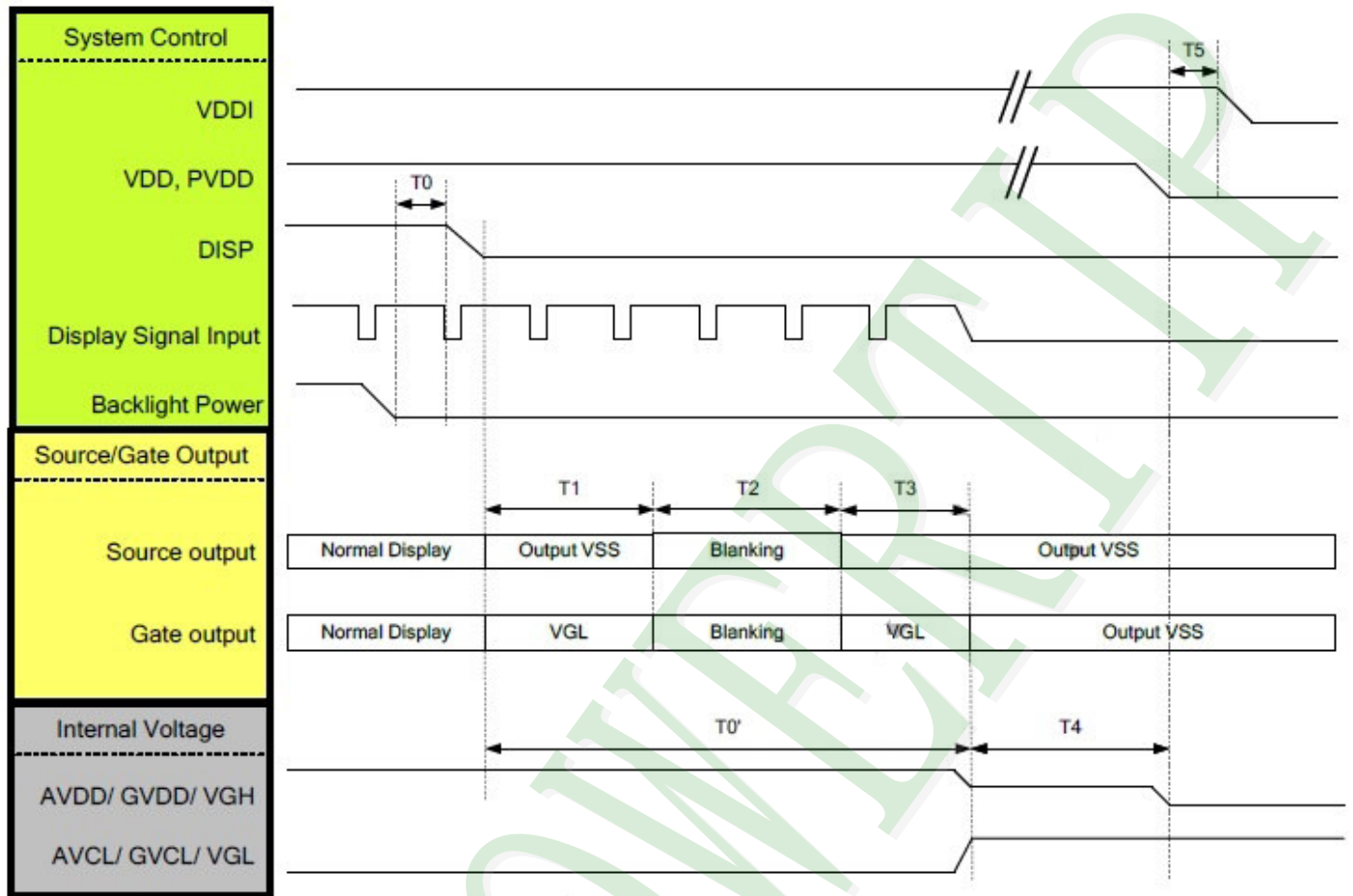
Symbol	Description	Min. Time	Unit
T0	Backlight power off to DISP off	5	ms
T1	Source voltage output VSS and Gate voltage output VGL	30	ms
T2	Source/ Gate blanking time	30	ms
T3	Source voltage output VSS and Gate voltage output VGL	20	ms
T4	AVDD/ GVDD/ VGH discharge time	5	ms
T5	Analog power off to digital power off time	0	ms
T0'	Source and Gate voltage discharge complete width	80	ms

2.4 3-wire Serial Interface (SPI)

R/W: Read/Write mode control bit.
R/W=1: Read mode
R/W=0: Write mode

Read Mode

CS

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

SCL

SDA   R A6 A5 A4 A3 A2 A1 A0 D7 D6 D5 D4 D3 D2 D1 D0

Next Command

Write Mode

CS

SCL

SDA   W A6 A5 A4 A3 A2 A1 A0 D7 D6 D5 D4 D3 D2 D1 D0
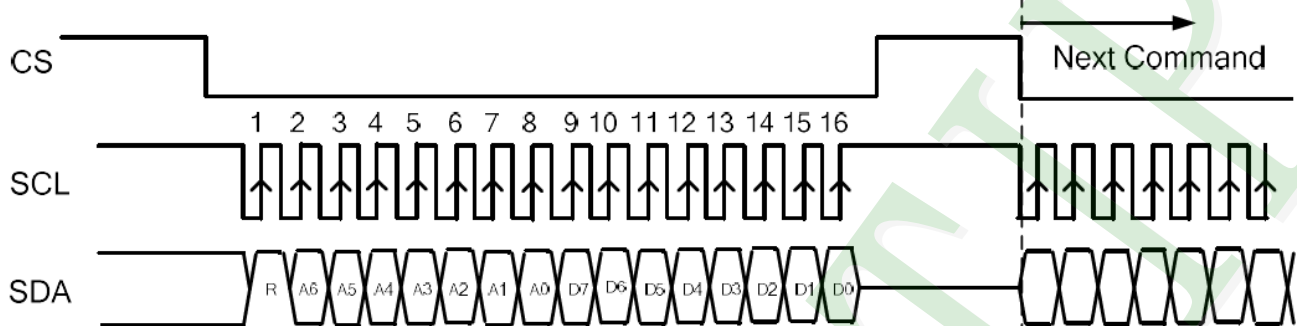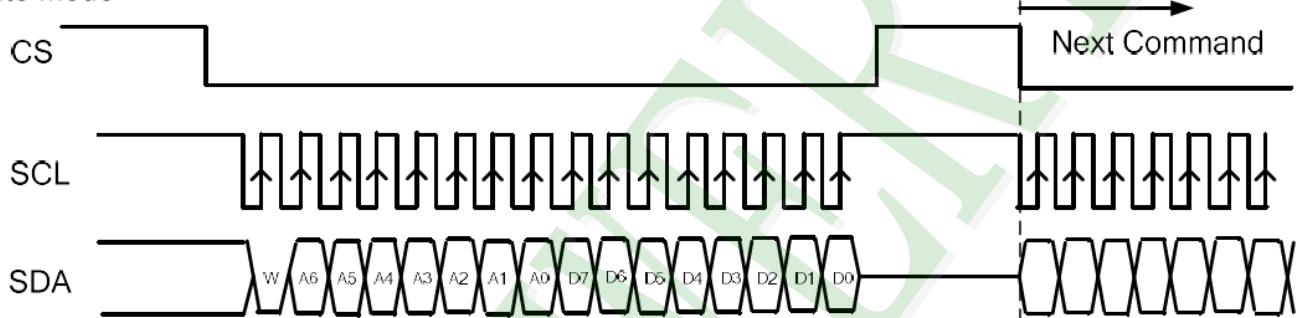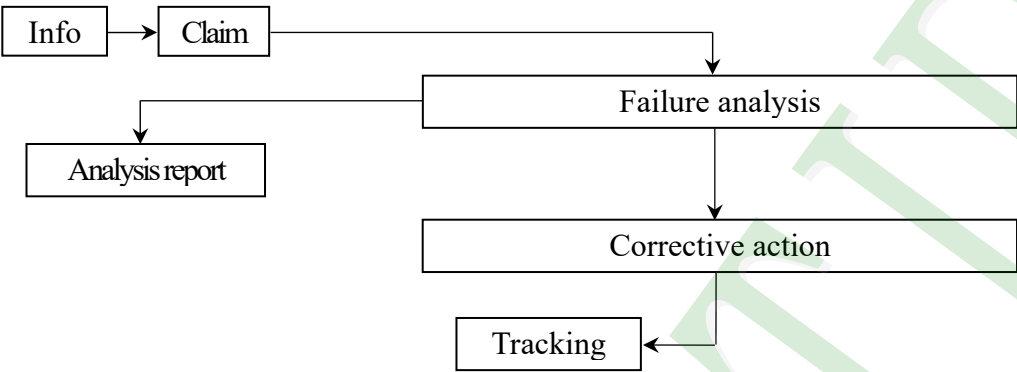
Next Command

a. Each serial command consists of 16 bits of data which is loaded one bit a time at the rising edge of serial clock SCL.

b. Common loading operation starts from the falling edge of CS and is completed at the next rising edge of CS.

c. The serial control block is operational after power on reset, but commands are established by the VSYNC signal. If command is transferred multiple times for the same register, the last command before the VSYNC signal is valid.

d. If less than 16 bits of SCL are input while CS is low, the transferred data is ignored.

e. If 16 bits or more of SCL are input while CS is low, the previous 16 bits of transferred data before then rising edge of CS pulse are valid data.

f. Serial block operates with SCL clock.

g. Serial data can be accepted in the power save mode.

h. After power on reset or GRB reset, it is required 100ms delay to begin SPI communication.

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 → Project evaluation

Project Validation — NG / OK

Quote

Contract

Sample Approval

Design check

Sample test

Verification — NG / OK

Sample approval — NG / OK

Pilot Run & Mass Product

Pilot run & Reliability test

Verification — NG / OK

Specification preparation

Mass production

Inspection — OK / NG

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; Failure analysis → 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.**
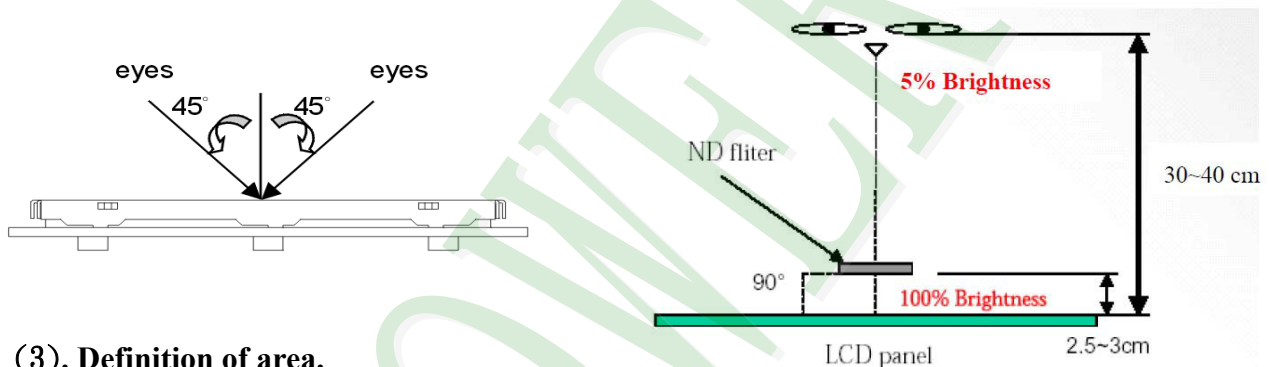
　（3）. **Definition of area.**
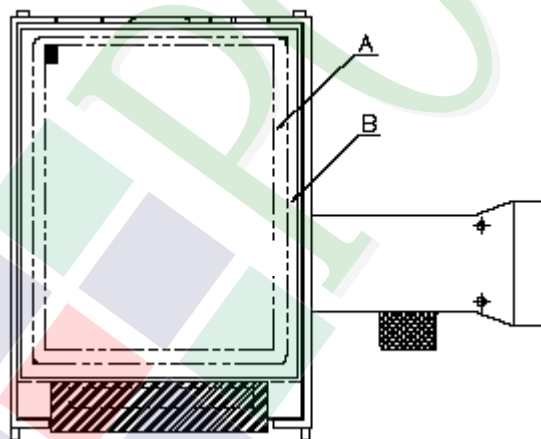
A area: viewing area

B area: Outside of viewing area
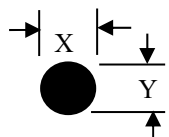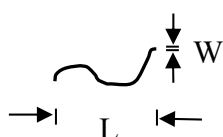
　（4）. **Standard of inspection： (Unit：mm)**

◆**Specification For TFT-LCD Module 3.5"~15"** :   **(Ver.B01)**
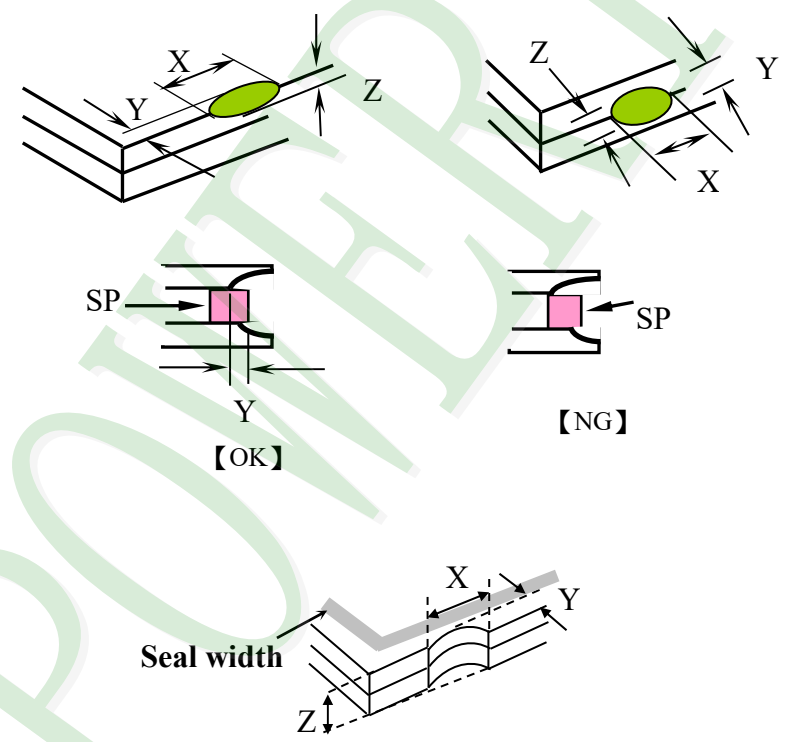
NO	Item	Criterion	Level
01	Product condition	1.1 The part number is inconsistent with work order of production.	Major
		1.2 Mixed product types.	Major
		1.3 Assembled in inverse direction.	Major
02	Quantity	2.1 The quantity is inconsistent with work order of production.	Major
03	Outline dimension	3.1 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
		4.6 Mura cannot be seen through 5% ND filter at 50% Gray, should be judged by the viewing angle of 90 degree.	Minor
05	Dot defect (Bright dot, Dark dot) On -display	<table><tr><th colspan="2">Item</th><th>Acceptance (Q'ty)</th></tr><tr><td rowspan="4">Dot Defect</td><td>Bright Dot</td><td>$\leqq 4$</td></tr><tr><td>Dark Dot</td><td>$\leqq 5$</td></tr><tr><td>Joint Dot</td><td>$\leqq 3$</td></tr><tr><td>Total</td><td>$\leqq 7$</td></tr></table> 5.1 Inspection pattern: full white, full black, Red, Green and blue screens. 5.2 It is defined as dot defect if defect area $> 1/2$ dot. 5.3 The distance between two dot defect $\geqq 5$ mm. 5.4 Bright dot that can not be seen through 5% ND filter.	Minor

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
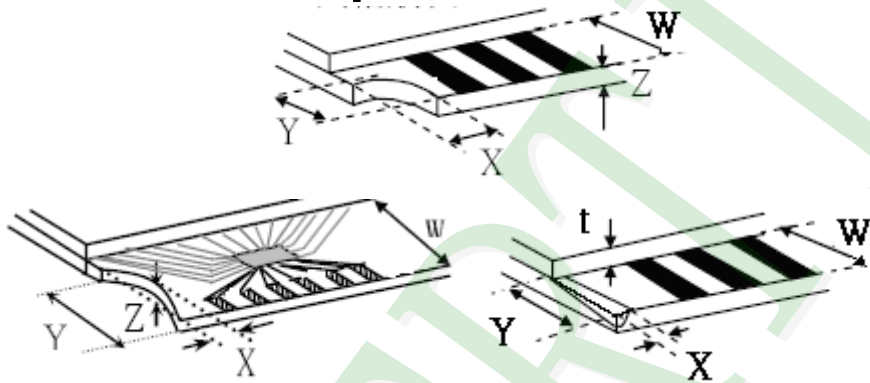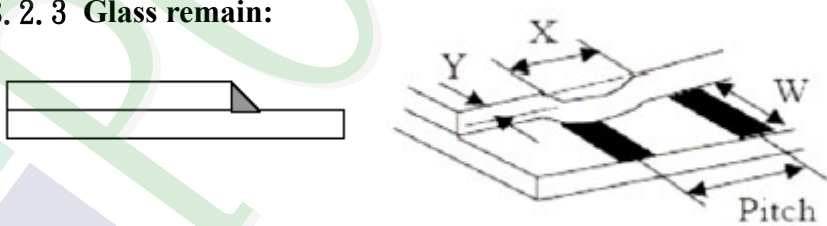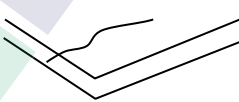
NO	Item	Criterion	Level
08	The crack of glass	Symbols： X: The length of crack　　Y: The width of crack. Z: The thickness of crack　W: terminal length t: The thickness of glass　　a: LCD side length 8.1.2 Corner crack:	Minor

8.1.2 Corner crack:

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

8.2 Protrusion over terminal:

8.2.1 Chip on electrode pad:

	X	Y	Z
Front	≦ a	≦ 1/2 W	≦ t
Back	≦ a	≦ W	≦ 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: | X	Y	Z | |---|---|---| | $\leqq 1/3\ a$ | $\leqq W$ | $\leqq t$ | 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: | X	Y	Z | |---|---|---| | $\leqq a$ | $\leqq 1/3\ W$ | $\leqq t$ | 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: 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	**Air Discharge:** Apply 2 KV with 5 times Discharge for each polarity +/- **Contact Discharge:** Apply 250 V with 5 times discharge for each polarity +/- 1. Temperature ambiance: 15℃～35℃ 2. Humidity relative: 30%～60% 3. Energy Storage Capacitance(Cs+Cd): 150pF±10% 4. Discharge Resistance(Rd): 330Ω±10% 5. Discharge, mode of operation: Single Discharge (time between successive discharges at least 1 sec) (Tolerance if the output voltage indication: ±5%)
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><td>Packing Weight (Kg)</td><td>Drop Height (cm)</td></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 ± 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.

5.3 Storage
　5.3.1　Store the panel or module in a dark place where the temperature is 25°C ± 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.

007			
006			
005			
004			
003			
002	Modify Component height and Add Print Line	Tina	2019/10/24
001	NEW DRAWING	Tina	2019/05/13
REV	REV BY	REVISER	DATE

40.5±0.5
63.9(O.D)
55.51(Frame V.A)
53.56(LCM V.A)
52.56(LCD A.A)

1.68
2.72
3.22

76.9(O.D)
72.9(Frame V.A)
71.08(LCM V.A)
70.08(LCD A.A)

2.0
2.91
3.41

320(R.G.B)x240 Dots

COMPONENT AREA

25.7±0.5
3.5
50
25.5±0.5
A
25.5±0.1
1
0.5±0.1

AK

Pull Tape

2.0

Conductor
0.3±0.05
Stiffener

Component height
2.2 Max

3.2

4.5±0.5
1
50
White Print Line

Detail Dots
Scale 50X
0.219
0.219
R G B

NOTES:
1. LCD TYPE: TFT
2. LCD DISPLAY:Nomally Black/TRANSMISSIVE
3. A=0.5X49=24.5±0.05 ; W=0.35±0.05
4. The tolerance unless classified ±0.3mm
5. ▨:Shielding tape;▨:Component area; ▨:Stiffener(SUS t=0.2mm to GND)
   ▨:Aluminum Foil Conductive Adhesive Tape;⬡:EMI Film
6. FPC Matching Connector : HIROSE FH12A-50S-0.5H OR EQUIVALENT

PART NO:
PH320240T028-ZHA

DRAWING NAME::
LMD-PH320240T028-ZHA

TITLE:
LCD MODULE DRAWING

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

| | Design | Check | Approve |
| Tina | Jimmy | Jimmy |

| Unit | Scale | Page |
| MM | FIT | 1/2 |

| Surface | Material | Thickness | Quantity |
| | | | |

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

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)	PH320240T028-ZHA	76.9 X 63.9	0.026	288	7.488
2	多層薄膜(1)POF	OTFILM0BA03ABA	19"X350X0.015	——	6	——
3	TRAY 盤 (2)Tray	TYSG000000014	352 X 260 X 10.8	0.1	54	5.4
4	內盒(3)Product Box	BX36627063ABBA	383 X 270 X 66	0.182	6	1.092
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	1.0	1	1.0
7						
8						
9						

2.一 整箱總重量 (Total LCD Weight in carton) :　15.04　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

A
B

(1)多層薄膜
POF

(2)TRAY 盤
Tray

⇩

(3)內盒
Product Box

(4)保利龍板
Polylon board

(4)保利龍板
Polylon board

⇩

(5)外紙箱
Carton

特 記 事 項 (REMARK)

A

斜角　Detail B

Tray 2

圓角　Tray 1
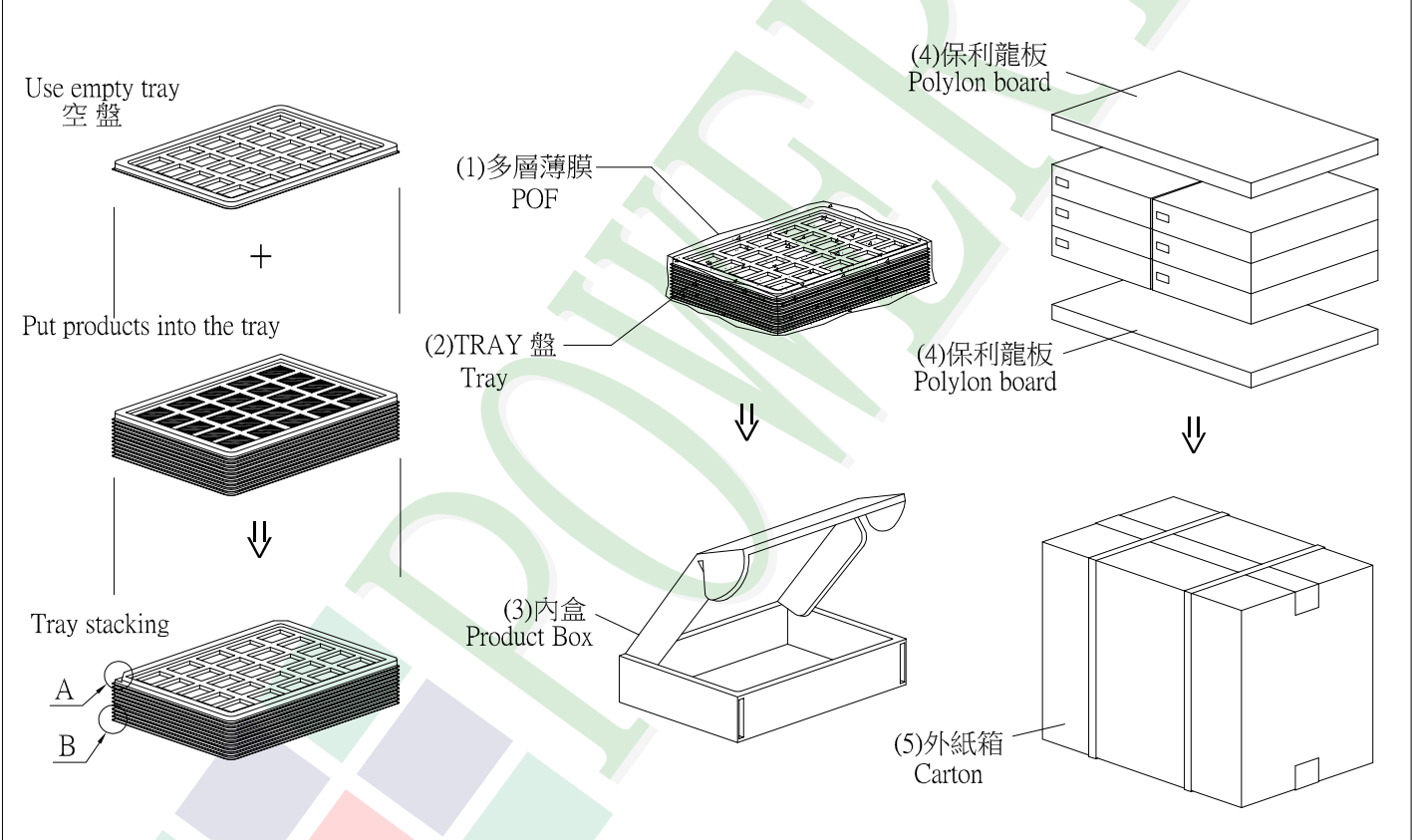
4.TRAY盤相疊時,需旋轉180度,請詳見B視圖
　Rotate tray 180 degrees and place on top of stack.
　Check the tray stack using Fig. B.

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ALL TECHNOLOGIES. ALL COMPETENCIES. ONE
SPECIALIST.
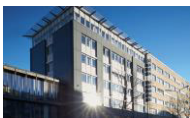
More information and worldwide locations can
be found at

www.data-modul.com