POWERTIP TECH. CORP.

SPECIFICATIONS

CUSTOMER	:	**PTC**
SAMPLE CODE	:	**SH480272T005-IAC01**
MASS PRODUCTION CODE	:	**PH480272T005-IAC01**
SAMPLE VERSION	:	**01**
SPECIFICATIONS EDITION	:	**003**
DRAWING NO. (Ver.)	:	**JLMD- PH480272T005-IAC01_002**
PACKAGING NO. (Ver.)	:	**JPKG- PH480272T005-IAC01_001**

Customer Approved

Date:

POWERTIP
2018.01.31
JS RD APPROVED

Approved	Checked	Designer
閆偉	劉進	徐明菲

□ Preliminary specification for design input

■ Specification for sample approval

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History of Version

Date	Ver.	Edi.	Description	Page	Design by
11/28/2017	01	001	New Drawing	-	徐明菲
11/30/2017	01	002	Modify Specification(Modify LCM Drawing & 1.6 Backlight Characteristics)	Appendix 8	徐明菲
01/25/2018	01	003	New Sample	-	徐明菲

Total: 34 Page

Contents

Note: For detailed information please refer to IC data sheet:Sitronix--- ST7257

1.1 Features

Item	Standard Value
Display Type	480 * 3 (RGB) * 272 Dots
LCD Type	Normally white TN , Transmissive Type
Screen size(inch)	4.3”(Diagonal)
Viewing Direction	6 O’clock
Color configuration	R,G, B vertical stripe
Backlight	White LED B/L
Display Interface	Digital 24-bits RGB
Driver IC	ST7257
ROHS	THIS PRODUCT CONFORMS THE ROHS OF PTC Detail information please refer website : http://www.powertip.com.tw/news.php?area_id_view=1085560481/

1.2 Mechanical Specifications

Item	Standard Value	Unit
Outline Dimension	115.1 (W) x 78.94 (L) x 4.9 (H)	mm
Ink Opening	97.1 (W) * 55.9 (L)	mm

LCD panel

Item	Standard Value	Unit
Active Area	95.04 (W) x 53.86 (L)	mm
Pixel Size	0.198 (W) * 0.198 (H)	mm

Note : For detailed information please refer to LCM drawing.

1.3 Absolute Maximum Ratings

Module

Item	Symbol	Condition	Min.	Max.	Unit
System Power Supply Voltage	VDD	GND=0	-0.3	+4.6	V
Operating Temperature	T_{OP}	-	-20	+70	°C
Storage Temperature	T_{ST}	-	-30	+80	°C
Storage Humidity	H_D	Ta ≦ 60 °C	-	90	%RH

1.4 DC Electrical Characteristics

Module GND = 0V, Ta = 25°C

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Power supply	VDD	-	3.0	3.3	3.6	V
	VGH	-	12	15	16	V
	VGL	-	-12	-10	-7	V
“H” Input Voltage	VIH	-	0.7*VDD	-	VDD	V
“L” Input Voltage	VIL	-	GND	-	0.3* GND	V
“H” Output Voltage	VOH	-	VDD-0.4	-	VDD	V
“L” Output Voltage	VOL	-	GND	-	GND +0.4	V
Supply Current	IDD	VDD=3.3V	-	30	45	mA

1.5 Optical Characteristics

TFT LCD Panel VDD =3.3V, Ta=25°C

Item		Symbol	Condition	Min.	Typ.	Max.	unit	
Response time		Tr + Tf	-	-	26	39	ms	Note2
Viewing angle	Top	θY+	CR ≥ 10	-	60	-	Deg.	Note4
	Bottom	θY-		-	60	-		
	Left	θX-		-	60	-		
	Right	θX+		-	60	-		
Contrast ratio		CR	IF=20mA	500	600	-	-	-
Color of CIE Coordinate (B/L & LCD & TP)	White	X		0.26	0.31	0.36	-	Note1
		Y		0.28	0.33	0.38		
	Red	X		0.55	0.60	0.65		
		Y		0.31	0.36	0.41		
	Green	X		0.30	0.35	0.40		
		Y		0.53	0.58	0.63		
	Blue	X		0.10	0.15	0.20		
		Y		0.04	0.09	0.14		
Average Brightness Pattern=white display (B/L & LCD & TP)		IV	IF=20mA	190	280	-	-	Note1
Uniformity		△B	IF=20mA	70	-	-	%	Note1

Note1:

1：△B=B(min) / B(max) × 100%

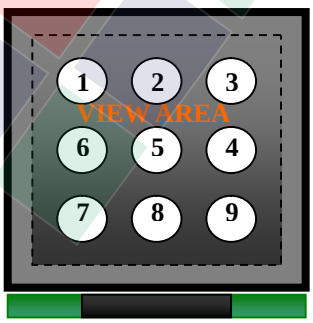
2：Measurement Condition for Optical Characteristics:

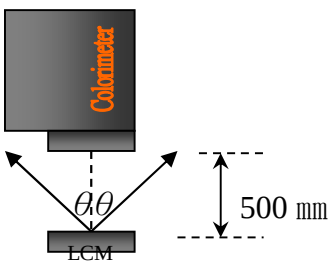
a：Environment: 25℃±5℃ / 60±20%R.H，no wind，dark room below 10 Lux at typical lamp current and typical operating frequency.

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%



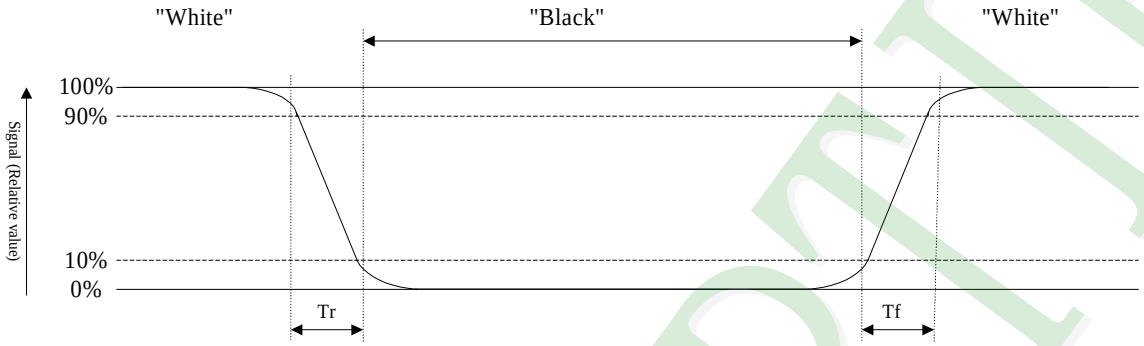


Colorimeter=BM-7 fast

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:



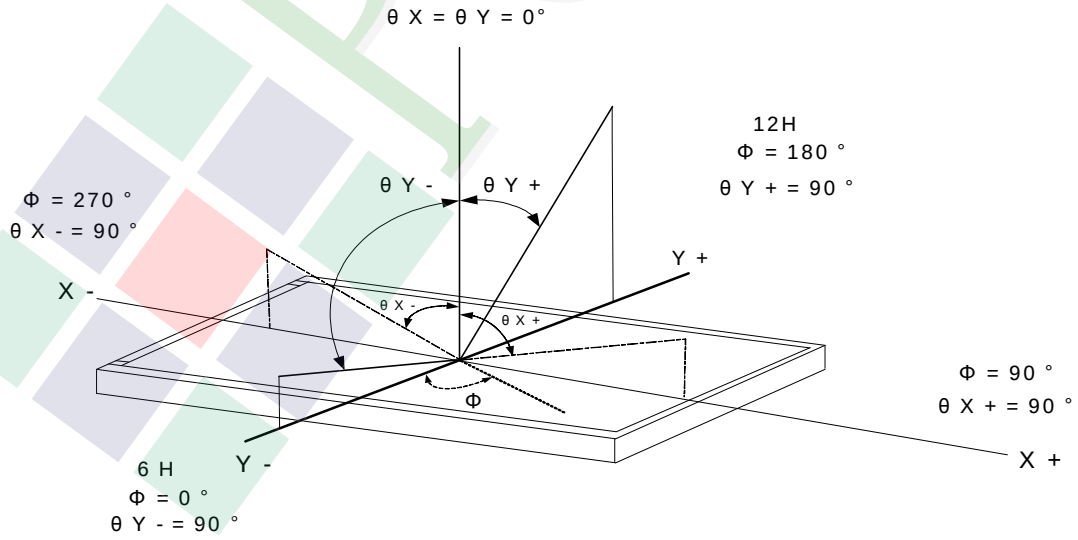
Note3: Definition of contrast ratio:

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 (Each LED)	IF	Ta =25℃	-	30	mA
LED Reverse Voltage (Each LED)	VR	Ta =25℃	-	5	V
Power Dissipation	PD	Ta =25℃	-	100	mW

Electrical / Optical Characteristics

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Forward Voltage	VF	IF=20mA	18.2	22.8	24.5	V
Average Brightness (Without LCD)	IV		4500	5400	-	cd/m^2
CIE Color Coordinate (Without LCD)	X		0.26	0.29	0.32	-
	Y		0.26	0.29	0.32	
Color	White					

Internal Circuit

Other Description

Item	Conditions	Description
Life Time*1	Ta =25℃ IF= 20mA	50,000 hrs

*1：The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and I_L =20mA. The LED lifetime could be decreased if operating I_L is lager than 20 mA.

1.7 Touch Panel Characteristics

Features

Item	Standard Value
Touch Panel Size	4.3”
Touch type	Projective capacitive touch panel True Multi-touch with up to 5 Points of Absolution
Output Interface	I^2C
IC	FT5426(Focal IC)

I^2C Address

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	1	1	1	0	0	0	**R/W**

Bit 0: 0 for Write / 1 for Read

Mechanical Specifications

Item	Standard Value	Unit
Viewing Area	97.10 mm (W) x 55.90 mm (H)	mm
Number of sensing channel	16 (W) x 11 (H)	mm

Absolute Maximum Ratings

Item	Symbol	Condition	Min.	Max.	Unit
Supply voltage	VDD	-	-0.3	3.6	V
Operating Temperature	T_{OP}	-	-20	+70	°C
Storage Temperature	T_{ST}	-	-30	+80	°C

DC Electrical Characteristics

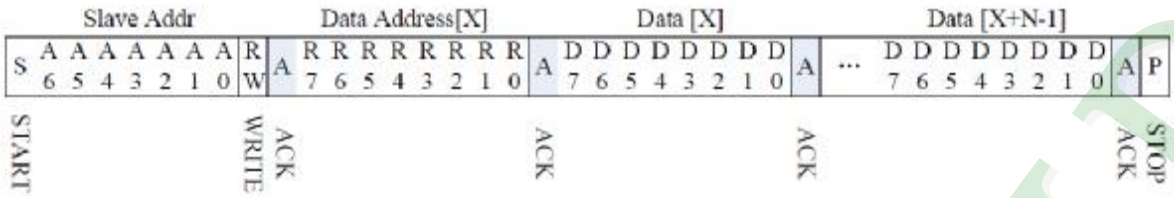
Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Power Supply Voltage	VDD	-	2.8	3.3	3.6	V

T/P PIN

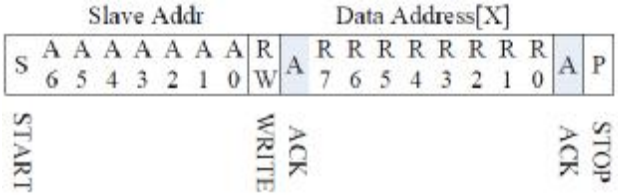
Pin No.	Symbol	Function
1	TPGND	TP Ground
2	SDA	I^2C Data
3	SCL	I^2C Clock
4	TPVDD	TP VDD
5	INT	Interrupt Output
6	XRES	Chip Reset Input, Negative Edge Trigger

I²C Read/Write Interface description

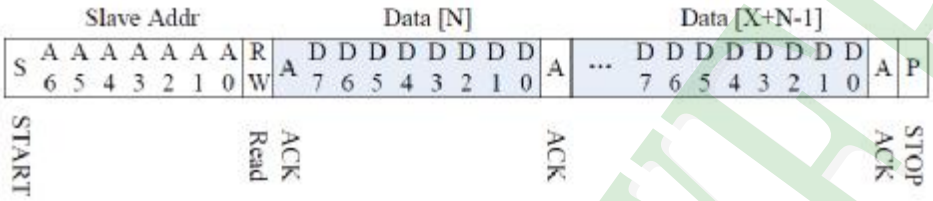
Write N bytes to I2C slave



Set Data Address



Read X bytes from I2C Slave

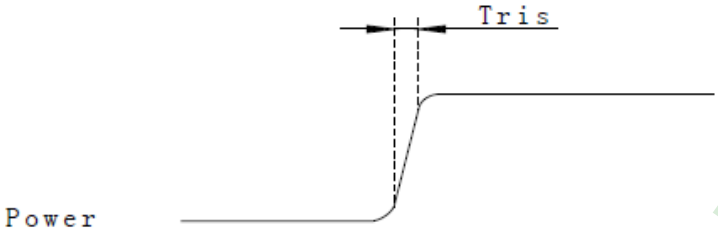


Mnemonics Description

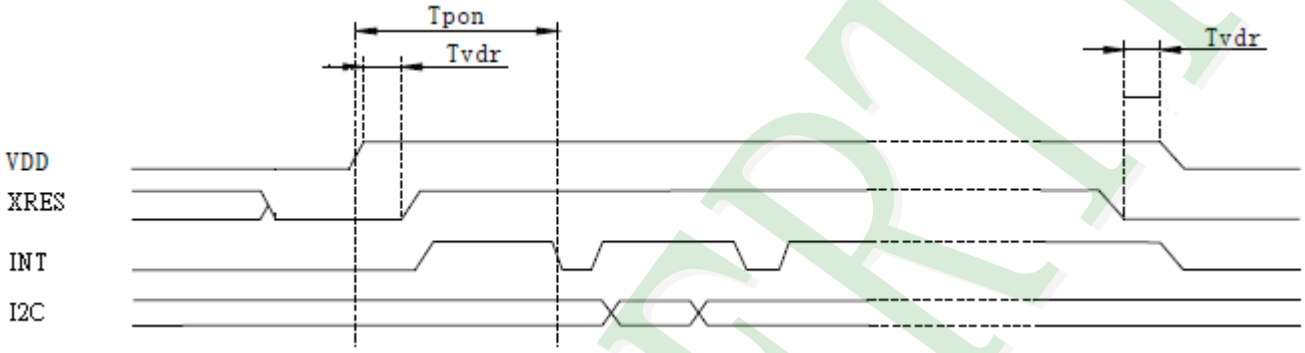
Mnemonics	Description
S	I2C Start or I2C Restart
A[6:0]	Slave address A[6:0]:0111000b
R/ W	'1' for read, '0'for write
A(N)	ACK(NACK)
P	STOP: the indication of the end of a packet (if this bit is missing, S will indicate the end of the current packet and the beginning of the next packet)

Timing Characteristics

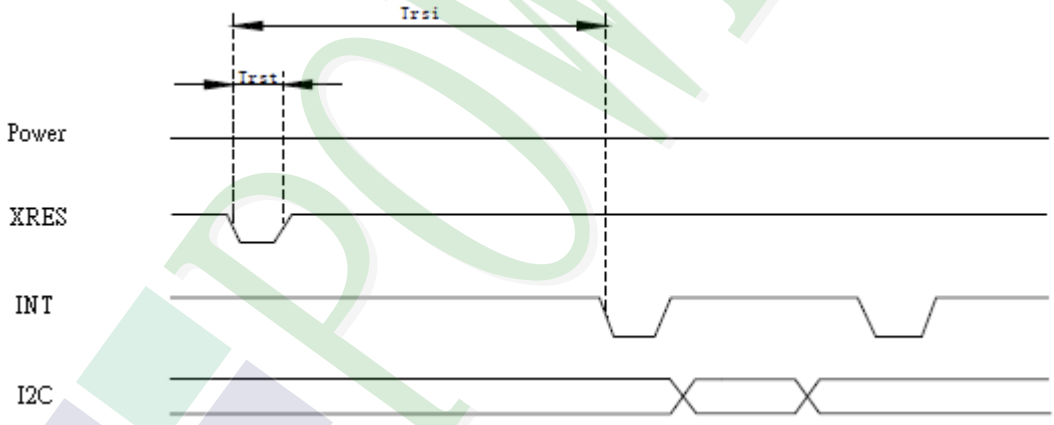
Parameter	Unit	Min	Max
SCL frequency	KHz	0	400
Bus free time between a STOP and START condition	us	4.7	\
Hold time (repeated) START condition	us	4.0	\
Data setup time	ns	250	\
Setup time for a repeated START condition	us	4.7	\
Setup Time for STOP condition	us	4.0	\



Power on time



Power on Sequence



Reset Sequence

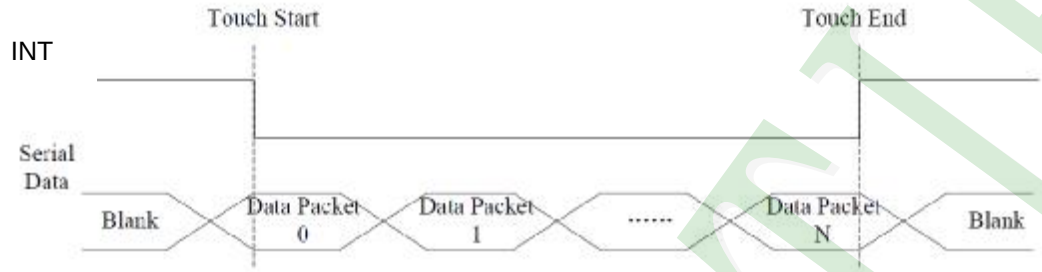
Power on / Reset Sequence Parameters

Parameter	Description	Min	Max	Units
Tris	Rise time from 0.1VDD to 0.9VDD	--	5	ms
Tpon	Time of starting to report point after powering on	200	--	ms
Tvdr	Reset time after VDD powering on	1	--	ms
Trsi	Time of starting to report point after resetting	200	--	ms
Trst	Reset time	1	--	ms

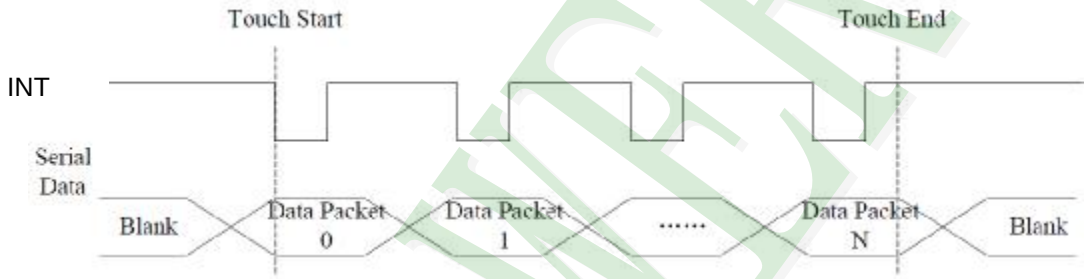
Interrupt signal from CTP to Host

As for standard CTP, host need to use both interrupt control signal and serial data interface to get the touch data. There are two kind of method to use interrupt: interrupt trigger and interrupt query.

Here is the timing to get touch data.



Interrupt query mode



Interrupt trigger mode

Host use general I2C protocol to read the touch data or the information from CTP . CTP will send host a interrupt signal when there is a valid touch. Then host can use the serial data interface to get the touch data. If there is no valid touch detected, the INT will not be pulled up, the host do not need to read the touch data.

NOTE: “valid touch” may have different definition in various systems. For example, in some systems, the valid touch is defined as there is one more valid touch point. But in some other systems, the valid touch is defined as one more valid touch with valid gestures. In usual, INT will be pulled up when there is a valid touch point, and to be low when a touch finishes.

As for interrupt trigger mode, INT signal will be low if there is a touch detected. But for per update of valid touch data, CTP will produce a valid pulse for INT signal, host can read the touch data periodically according to the frequency of this pulse. In this mode, the pulse frequency is the touch data update frequency.

CTP Register Mapping

Address	Name	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0	Host Access
00h	DEVIDE_MODE	-	Device Mode[2:0]			-	-	-	-	WR
01h	TD_STATUS	-	-	-	-	Number of touch points[3:0]				R
02h	TOUCH1_XH	1st Event Flag		-	-	1st Touch X Position[11:8]				R
03h	TOUCH1_XL	1st Touch X Position[7:0]								R
04h	TOUCH1_YH	1st Touch ID[3:0]				1st Touch Y Position[11:8]				R
05h	TOUCH1_YL	1st Touch Y Position[7:0]								R
06h	-	-								R
07h	-	-								R
08h	TOUCH2_XH	2st Event Flag		-	-	2st Touch X Position[11:8]				R
09h	TOUCH2_XL	2st Touch X Position[7:0]								R
0Ah	TOUCH2_YH	2st Touch ID[3:0]				2st Touch Y Position[11:8]				R
0Bh	TOUCH2_YL	2st Touch Y Position[7:0]								R
0Ch	-	-								R
0Dh		-								R
0Eh	TOUCH3_XH	3st Event Flag		-	-	3st Touch X Position[11:8]				R
0Fh	TOUCH3_XL	3st Touch X Position[7:0]								R
10h	TOUCH3_YH	3st Touch ID[3:0]				3st Touch Y Position[11:8]				R
11h	TOUCH3_YL	3st Touch Y Position[7:0]								R
12h	-	-								R
13h	-	-								R
14h	TOUCH4_XH	4st Event Flag		-	-	4st Touch X Position[11:8]				R
15h	TOUCH4_XL	4st Touch X Position[7:0]								R
16h	TOUCH4_YH	4st Touch ID[3:0]				4st Touch Y Position[11:8]				R
17h	TOUCH4_YL	4st Touch Y Position[7:0]								R
18h	-	-								R
19h	-	-								R
1Ah	TOUCH5_XH	5st Event Flag		-	-	5st Touch X Position[11:8]				R
1Bh	TOUCH5_XL	5st Touch X Position[7:0]								R
1Ch	TOUCH5_YH	5st Touch ID[3:0]				5st Touch Y Position[11:8]				R
1Dh	TOUCH5_YL	5st Touch Y Position[7:0]								R
1Eh	-	-								R
1Fh	-	-								R

DEVICE_MODE

This register is the device mode register, configure it to determine the current mode of the chip.

Address	Bit Address	Register Name	Description
00h	6 : 4	Device Mode [2:0]	000b Work Mode 100b Factory Mode – read raw data

TD_STATUS

This register is the Touch Data status register.

Address	Bit Address	Register Name	Description
01h	7 : 4	Reserved	
	3 : 0	Number of touch points[3:0]	How many points detected. 1-5 is valid.

TOUCHn_XH

This register describes MSB of the X coordinate of the nth touch point and the corresponding event flag.

Address	Bit Address	Register Name	Description
02h	7 : 6	Event Flag	00b: Put Down 01b: Put Up 10b: Contact 11b: Reserved
	5 : 4		Reserved
	3 : 0	Touch X Position [11:8]	MSB of Touch X Position in pixels

TOUCHn_XL

This register describes LSB of the X coordinate of the nth touch point

Address	Bit Address	Register Name	Description
03h	7 : 0	Touch X Position [7:0]	LSB of the Touch X Position in pixels

TOUCHn_YH

This register describes MSB of the Y coordinate of the nth touch point and corresponding touch ID.

Address	Bit Address	Register Name	Description
04h	7 : 4	Touch ID[3:0]	Touch ID of Touch Point
	3 : 0	Touch Y Position [11:8]	MSB of Touch Y Position in pixels

TOUCHn_YL

This register describes LSB of the Y coordinate of the nth touch point.

Address	Bit Address	Register Name	Description
05h~	7:0	Touch Y Position[7:0]	LSB of The Touch Y Position in pixels

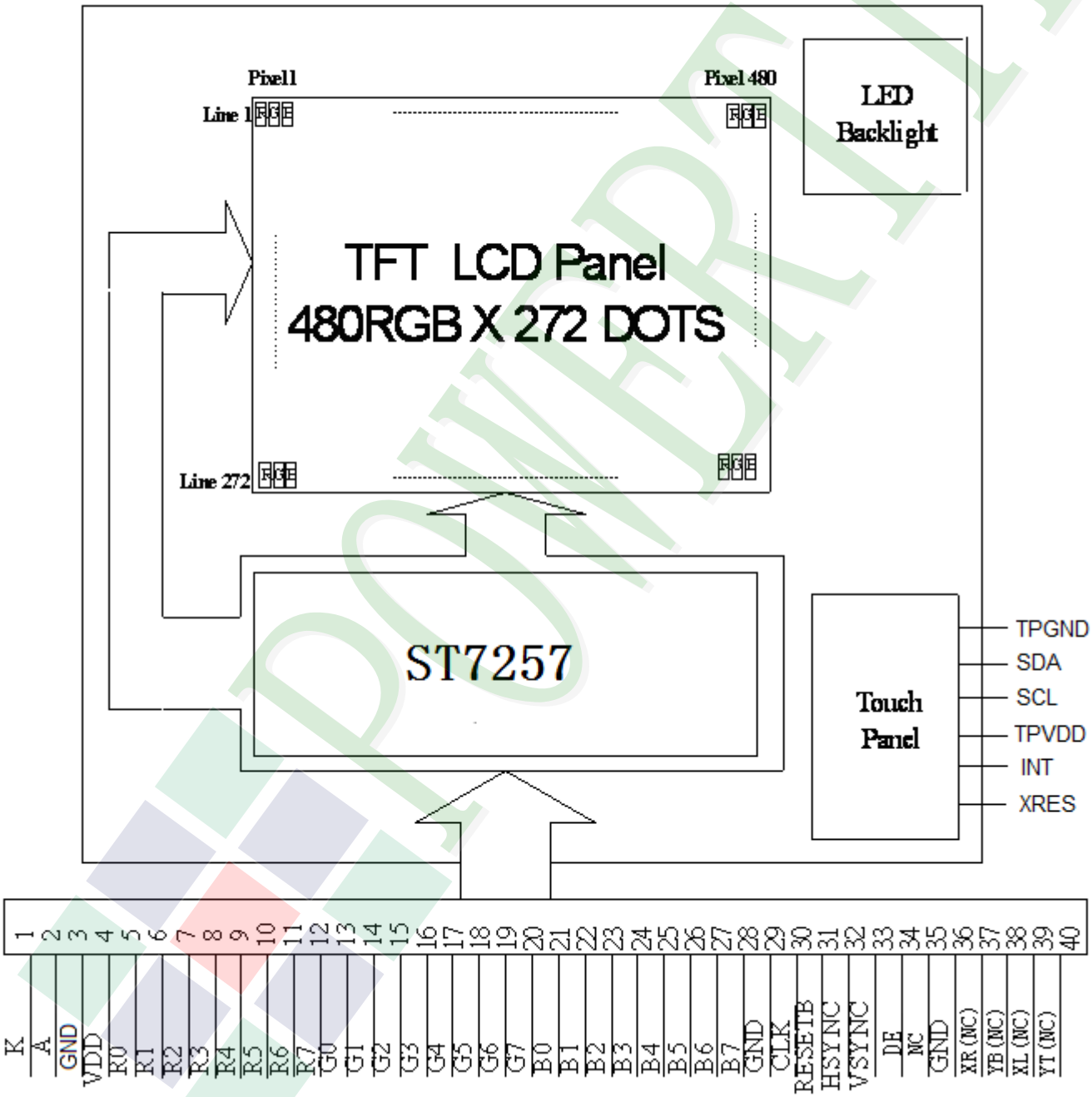
2. MODULE STRUCTURE

2.1 Counter Drawing

2.1.1 LCM Mechanical Diagram

* See Appendix

2.1.2 Block Diagram



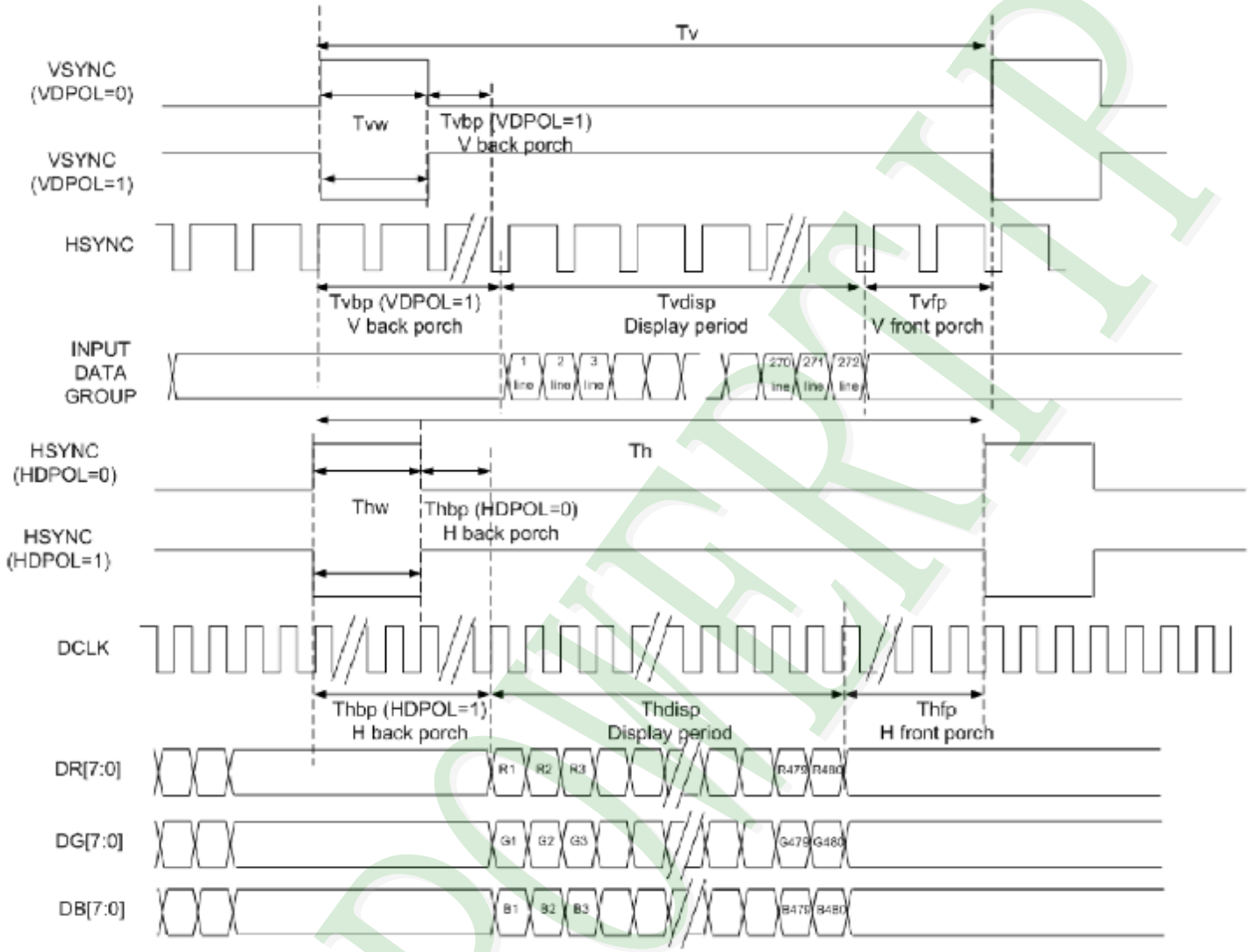
2.2 Interface Pin Description

Pin No.	Symbol	Function
1	K	Power supply for LED Backlight cathode input
2	A	Power supply for LED Backlight anode input
3	GND	Ground
4	VDD	Digital power
5	R0	Red data bit 0
6	R1	Red data bit 1
7	R2	Red data bit 2
8	R3	Red data bit 3
9	R4	Red data bit 4
10	R5	Red data bit 5
11	R6	Red data bit 6
12	R7	Red data bit 7
13	G0	Green data bit 0
14	G1	Green data bit 1
15	G2	Green data bit 2
16	G3	Green data bit 3
17	G4	Green data bit 4
18	G5	Green data bit 5
19	G6	Green data bit 6
20	G7	Green data bit 7

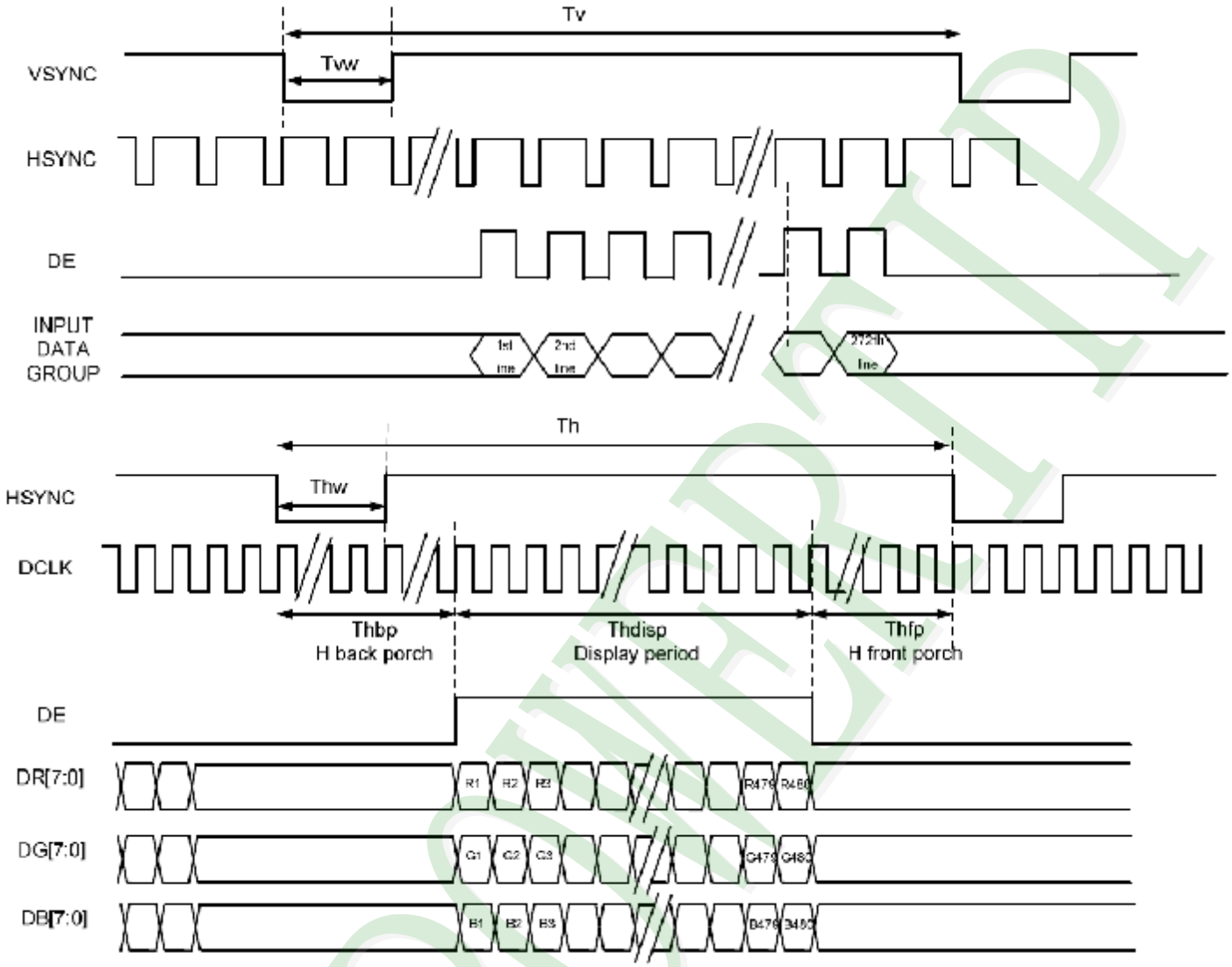
Pin No.	Symbol	Function
21	B0	Blue data bit 0
22	B1	Blue data bit 1
23	B2	Blue data bit 2
24	B3	Blue data bit 3
25	B4	Blue data bit 4
26	B5	Blue data bit 5
27	B6	Blue data bit 6
28	B7	Blue data bit 7
29	GND	Ground
30	CLK	Dot data clock
31	DISP	Display control / standby mode selection “High” : Normal display
32	HSYNC	Horizontal sync input
33	VSYNC	Vertical sync input
34	DE	Data input enable. Active High to enable the data input
35	N.C	Not Connect.
36	GND	Ground
37	XR	Not Connect.
38	YB	Not Connect.
39	XL	Not Connect.
40	YT	Not Connect.

2.3 Timing Characteristics

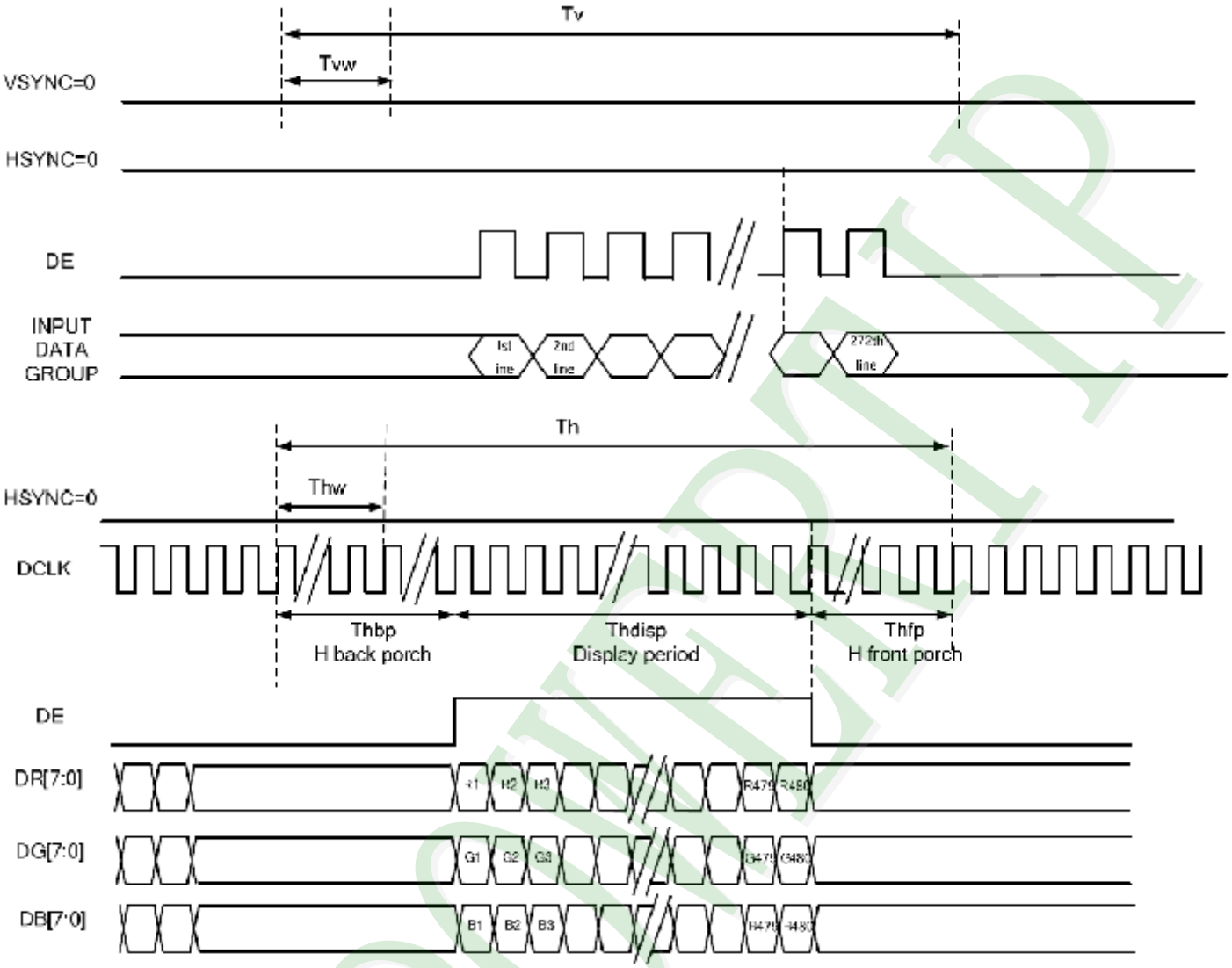
2.3.1 SYNC Mode



2.3.2 SYNC-DE Mode



2.3.3 DE Mode


Tv
Tvw
VSYNC=0
HSYNC=0
DE
INPUT
DATA
GROUP
1st line
2nd line
272th line
Th
Thw
HSYNC=0
DCLK
Thbp
H back porch
Thdisp
Display period
Thfp
H front porch
DE
DR[7:0]
DG[7:0]
DB[7:0]

2.3.4 Parallel 24-bit RGB Input Timing Table

480RGB X 272 Resolution Timing Table							
Item		Symbol	Min.	Typ.	Max.	Unit	Remark
DCLK Frequency		Fclk	8	9	12	MHz	
DCLK Period		Tclk	83	111	125	ns	
HSYNC	Period Time	Th	485	531	598	DCLK	
	Display Period	Thdisp		480		DCLK	
	Back Porch	Thbp	3	43	43	DCLK	By H_Blanking setting
	Front Porch	Thfp	2	8	75	DCLK	
	Pulse Width	Thw	2	4	75	DCLK	
VSYNC	Period Time	Tv	276	292	321	H	
	Display Period	Tvdisp		272		H	
	Back Porch	Tvbp	2	12	12	H	By V_Blanking setting
	Front Porch	Tvfp	2	8	37	H	
	Pulse Width	Tvw	2	4	37	H	

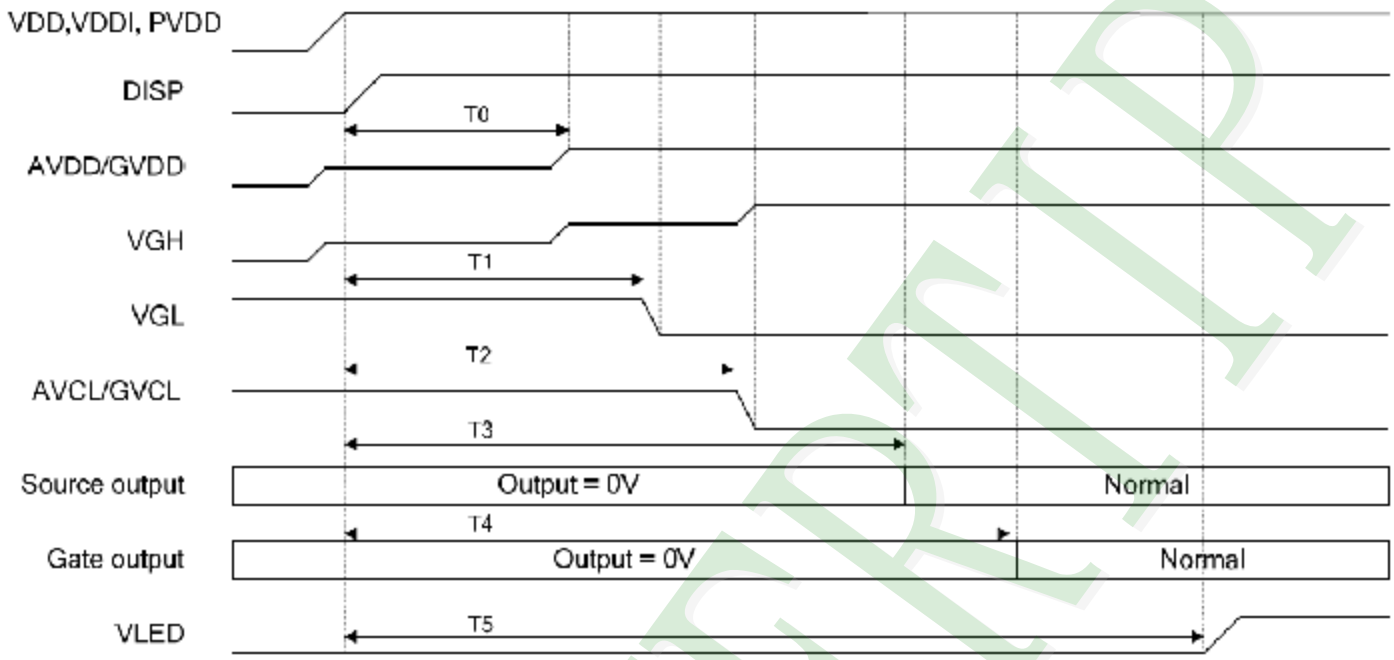
Note: It is necessary to keep Tvbp =12 and Thbp =43 in sync mode. DE mode is unnecessary to keep it.

480RGB X 240 Resolution Timing Table							
Item		Symbol	Min.	Typ.	Max.	Unit	Remark
DCLK Frequency		Fclk	8	9	12	MHz	
DCLK Period		Tclk	83	111	125	ns	
HSYNC	Period Time	Th	485	531	598	DCLK	
	Display Period	Thdisp		480		DCLK	
	Back Porch	Thbp	3	43	43	DCLK	By H_Blanking setting
	Front Porch	Thfp	2	8	75	DCLK	
	Pulse Width	Thw	2	4	75	DCLK	
VSYNC	Period Time	Tv	244	260	321	H	
	Display Period	Tvdisp		240		H	
	Back Porch	Tvbp	2	12	12	H	By V_Blanking setting
	Front Porch	Tvfp	2	8	37	H	
	Pulse Width	Tvw	2	4	37	H	

Note: It is necessary to keep Tvbp =12 and Thbp =43 in sync mode. DE mode is unnecessary to keep it.

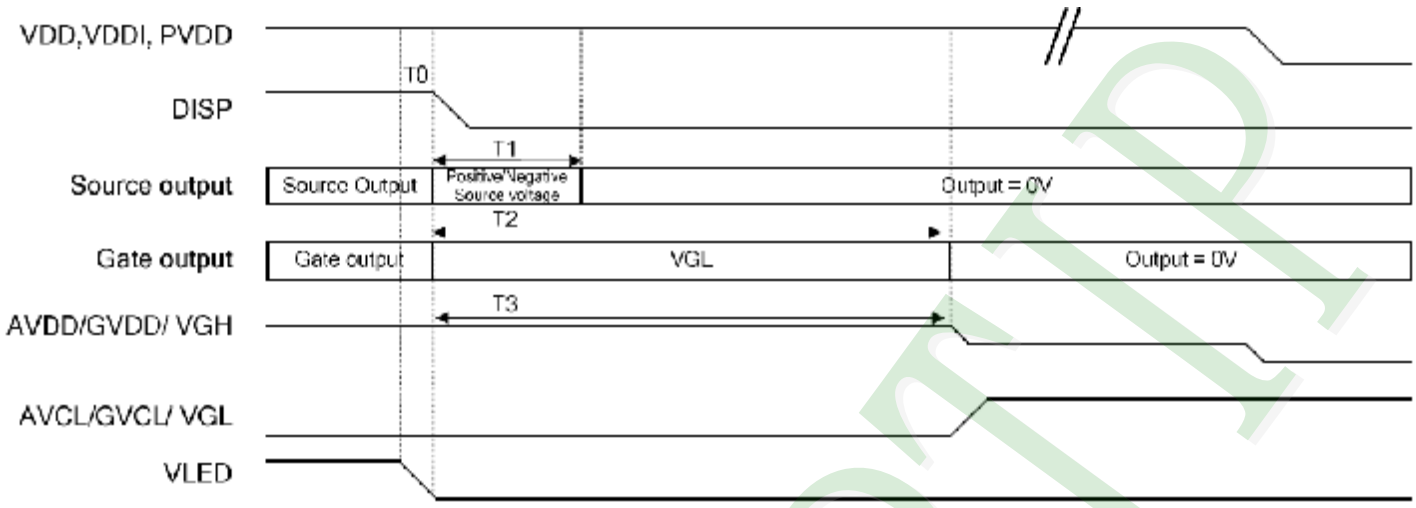
2.3.5 Power Sequence

POWER ON



Symbol	Description	Min. Time	Unit
T0	DISP="High" to AVDD/GVDD voltage stability	40	ms
T1	DISP="High" to VGL voltage stability	50	ms
T2	DISP="High" to AVCL/GVCL stability	70	ms
T3	DISP="High" to Source output	100	ms
T4	DISP="High" to Gate output	110	ms
T5	Black Turn on	130	ms

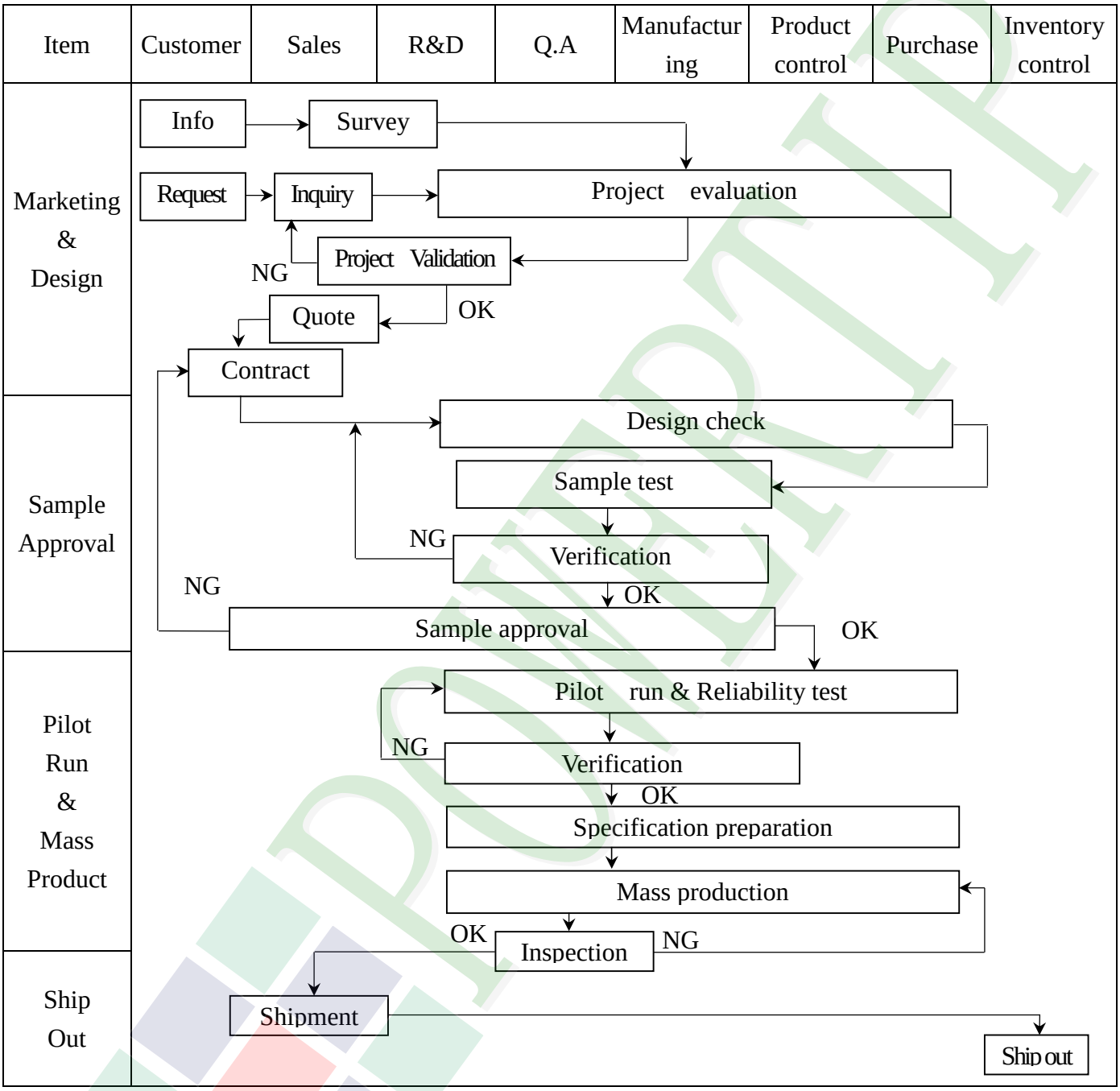
POWER OFF

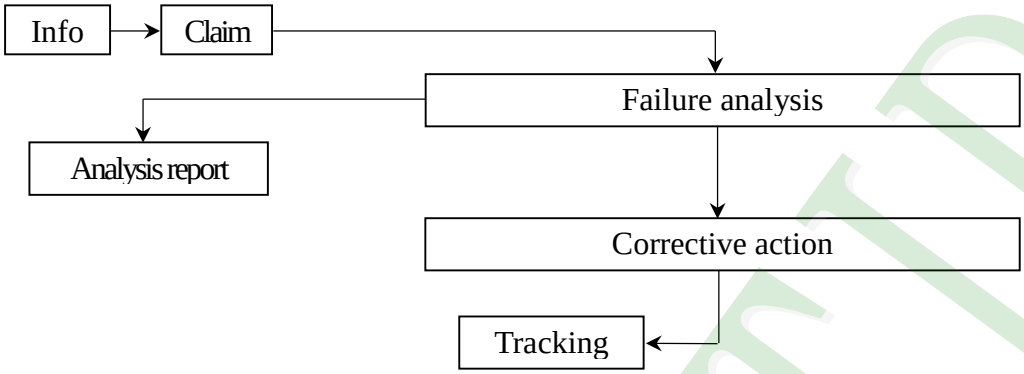


Symbol	Description	Min. Time	Unit
T0	Backlight turn off to DISP="Low"	5	ms
T1	DISP="Low" to Source output disable	20	ms
T2	DISP="Low" to Gate output disable	50	ms
T3	DISP="Low" to Gate output disable	50	ms

3. QUALITY ASSURANCE SYSTEM

3.1 Quality Assurance Flow Chart



Item	Customer	Sales	R&D	Q.A	Manufactu ring	Product control	Purchase	Inventory control
Sales Service								
Q.A Activity	1. ISO 9001 Maintenance Activities 2. Process improvement proposal 3. Equipment calibration 4. Education And Training Activities 5. Standardization Management							

3.2. Inspection Specification

◆Scope：The document shall be applied to TFT-LCD Module for 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

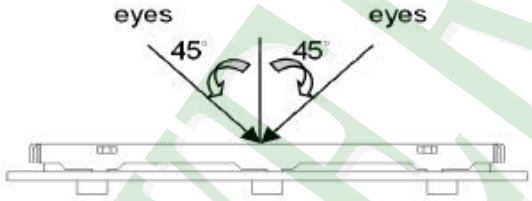
◆OUT Going Defect Level：Sampling.

◆Standard of the product appearance test：

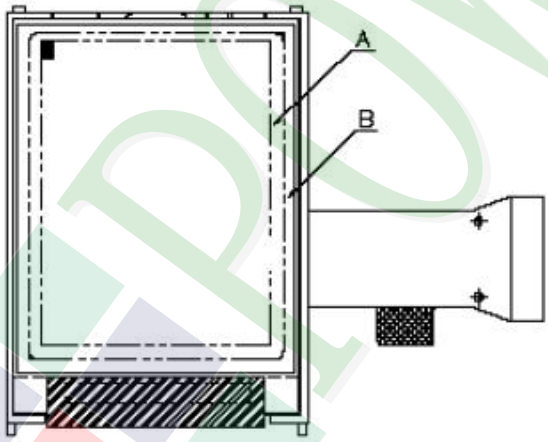
a. Manner of appearance test：

(1). The test best be under 20W×2 fluorescent light，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)

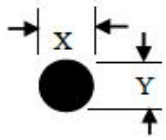
◆Specification For TFT-LCD Module 3.5″ ~15″ : (Ver.B01)

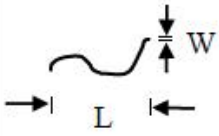
<table>
<tr><th>NO</th><th>Item</th><th>Criterion</th><th>Level</th></tr>
<tr><td rowspan="3">01</td><td rowspan="3">Product condition</td><td>1.1 The part number is inconsistent with work order of production.</td><td>Major</td></tr>
<tr><td>1.2 Mixed product types.</td><td>Major</td></tr>
<tr><td>1.3 Assembled in inverse direction.</td><td>Major</td></tr>
<tr><td>02</td><td>Quantity</td><td>2.1 The quantity is inconsistent with work order of production.</td><td>Major</td></tr>
<tr><td>03</td><td>Outline dimension</td><td>3.1 Product dimension and structure must conform to structure diagram.</td><td>Major</td></tr>
<tr><td rowspan="6">04</td><td rowspan="6">Electrical Testing</td><td>4.1 Missing line character and icon.</td><td>Major</td></tr>
<tr><td>4.2 No function or no display.</td><td>Major</td></tr>
<tr><td>4.3 Display malfunction.</td><td>Major</td></tr>
<tr><td>4.4 LCD viewing angle defect.</td><td>Major</td></tr>
<tr><td>4.5 Current consumption exceeds product specifications.</td><td>Major</td></tr>
<tr><td>4.6 Mura can not be seen through 5% ND filter.
(Mura : Under the normal examination angle of view,the picture has the non-uniform phenomenon.)</td><td>Minor</td></tr>
<tr><td>05</td><td>Dot defect

(Bright dot、Dark dot)

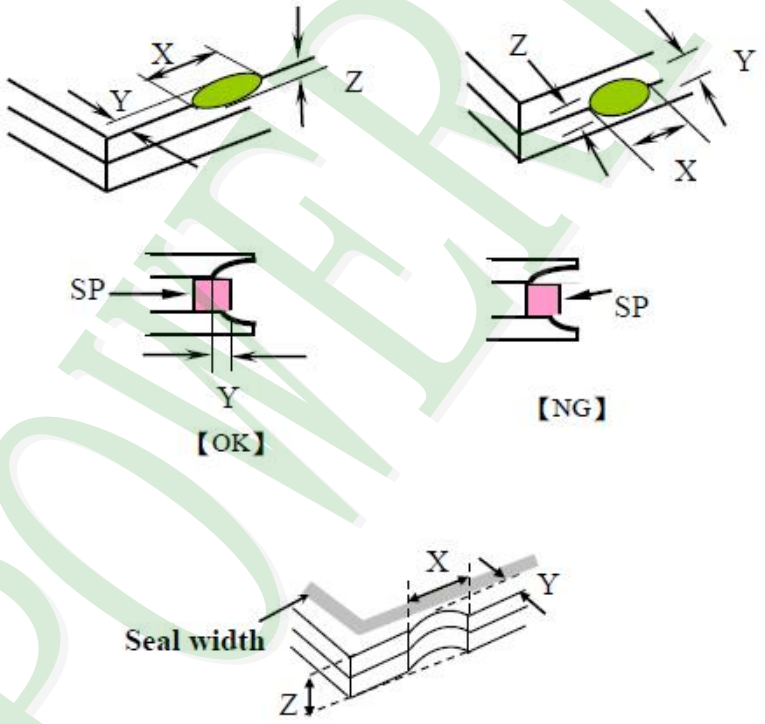
On -display</td><td>
<table>
<tr><th colspan="2">Item</th><th>Acceptance (Q'ty)</th></tr>
<tr><td rowspan="4">Dot Defect</td><td>Bright Dot</td><td>≦ 4</td></tr>
<tr><td>Dark Dot</td><td>≦ 5</td></tr>
<tr><td>Joint Dot</td><td>≦ 3</td></tr>
<tr><td>Total</td><td>≦ 7</td></tr>
</table>
5.1 Inspection 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 ≧5 mm.
5.4 Bright dot that can not be seen through 5% ND filter.
</td><td>Minor</td></tr>
</table>

◆Specification For TFT-LCD Module 3.5″ ~15″ : (Ver.B01)

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

Φ=(x+y) / 2
Line type
 
</td><td>6.1 Round type (Non-display or display) :
<table>
<tr><th rowspan="2">Dimension (diameter : Φ)</th><th colspan="2">Acceptance (Q'ty)</th></tr>
<tr><th>A area</th><th>B area</th></tr>
<tr><td>Φ ≦ 0.25</td><td>Ignore</td><td rowspan="4">Ignore</td></tr>
<tr><td>0.25 < Φ ≦ 0.50</td><td>5</td></tr>
<tr><td>Φ > 0.50</td><td>0</td></tr>
<tr><td>Total</td><td>5</td></tr>
</table>
6.2 Line type(Non-display or display) :
<table>
<tr><th rowspan="2">module size</th><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>
<tr><td rowspan="5">3.5" to less 9"</td><td>---</td><td>W ≦ 0.03</td><td>Ignore</td><td rowspan="5">Ignore</td></tr>
<tr><td>L ≦10.0</td><td>0.03 <W ≦ 0.05</td><td>4</td></tr>
<tr><td>L ≦5.0</td><td>0.05 <W ≦ 0.10</td><td>2</td></tr>
<tr><td>---</td><td>W >0.10</td><td>As round type</td></tr>
<tr><td colspan="2">Total</td><td>5</td></tr>
<tr><td rowspan="4">9" to 15"</td><td>---</td><td>W ≦ 0.05</td><td>Ignore</td><td rowspan="4">Ignore</td></tr>
<tr><td>L ≦10.0</td><td>0.05 <W ≦ 0.10</td><td>5</td></tr>
<tr><td>---</td><td>W >0.10</td><td>As round type</td></tr>
<tr><td colspan="2">Total</td><td>5</td></tr>
</table></td><td>Minor</td></tr>
<tr><td>07</td><td>Polarizer Bubble</td><td>
<table>
<tr><th rowspan="2">Dimension (diameter : Φ)</th><th colspan="2">Acceptance (Q'ty)</th></tr>
<tr><th>A area</th><th>B area</th></tr>
<tr><td>Φ ≦ 0.25</td><td>Ignore</td><td rowspan="5">Ignore</td></tr>
<tr><td>0.25 < Φ ≦ 0.50</td><td>4</td></tr>
<tr><td>0.50 < Φ ≦ 0.80</td><td>1</td></tr>
<tr><td>Φ > 0.80</td><td>0</td></tr>
<tr><td>Total</td><td>5</td></tr>
</table></td><td>Minor</td></tr>
</table>

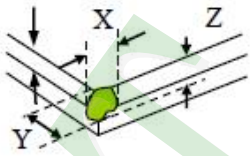
◆Specification For TFT-LCD Module 3.5″ ~15″ : (Ver.B01)

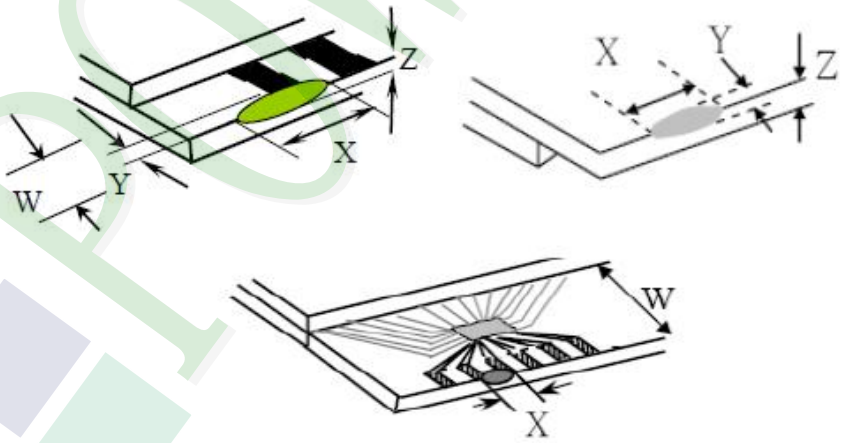
NO	Item	Criterion	Level
08	The crack of glass	Symbols : X : The length of crack Y : The width of crack. Z : The thickness of crack W : terminal length t : The thickness of glass a : LCD side length 8.1 General glass chip : 8.1.1 Chip on panel surface and crack between panels:  	Minor

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

◆Specification For TFT-LCD Module 3.5″ ~15″ : (Ver.B01)

<table>
<tr><th>NO</th><th>Item</th><th>Criterion</th><th>Level</th></tr>
<tr><td rowspan="2">08</td><td rowspan="2">The crack of glass</td><td>Symbols :

X : The length of crack
Z : The thickness of crack
t : The thickness of glass
Y : The width of crack.
W : terminal length
a : LCD side length</td><td rowspan="2">Minor</td></tr>
<tr><td>8.1.2 Corner crack :
 

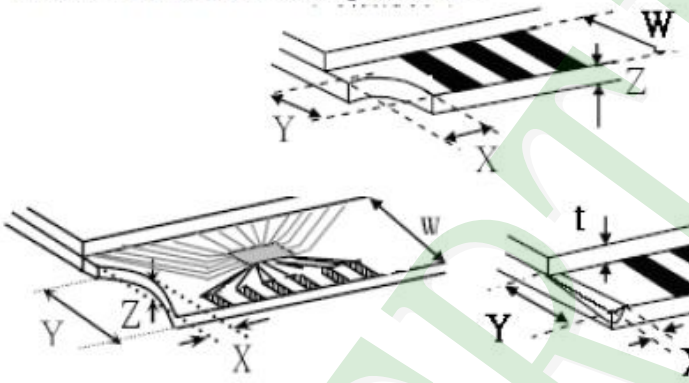
<table>
<tr><th>X</th><th>Y</th><th>Z</th></tr>
<tr><td>≦1/5 a</td><td>Crack can’t enter viewing area</td><td>Z ≦ 1/2 t</td></tr>
<tr><td>≦1/5 a</td><td>Crack can’t exceed the half of SP width.</td><td>1/2 t < Z ≦ 2 t</td></tr>
</table>
8.2 Protrusion over terminal :
8.2.1 Chip on electrode pad :
 

<table>
<tr><th></th><th>X</th><th>Y</th><th>Z</th></tr>
<tr><td>Front</td><td>≦ a</td><td>≦ 1/2 W</td><td>≦ t</td></tr>
<tr><td>Back</td><td>≦ a</td><td>≦ W</td><td>≦ 1/2 t</td></tr>
</table></td></tr>
</table>

◆Specification For TFT-LCD Module 3.5″ ~15″ : (Ver.B01)

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

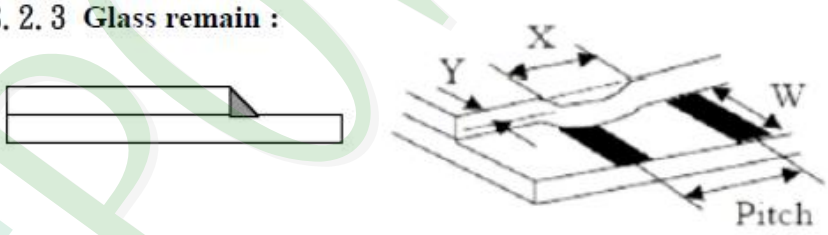
8.2.2 Non-conductive portion :



X	Y	Z
≦ 1/3 a	≦ W	≦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
≦ a	≦ 1/3 W	≦t

8.2.4 Cracking

Not Allowed

◆Specification For TFT-LCD Module 3.5″ ~15″ : (Ver.B01)

NO	Item	Criterion	Level
09	Backlight elements	9.1 Backlight can't work normally.	Major
		9.2 Backlight doesn't light or color is wrong.	Major
		9.3 Illumination source flickers when lit.	Major
10	General appearance	10.1 Pin type、quantity、dimension must match type in structure diagram.	Major
		10.2 No short circuits in components on PCB or FPC .	Major
		10.3 Parts on PCB or FPC must be the same as on the production characteristic chart .There should be no wrong parts , missing parts or excess parts.	Major
		10.4 Product packaging must the same as specified on packaging specification sheet.	Minor
		10.5 The folding and peeled off in polarizer are not acceptable.	Minor
		10.6 The PCB or FPC between B/L assembled distance(PCB or FPC) is ≦1.5 mm.	Minor

4. RELIABILITY TEST

4.1 Reliability Test Condition (Ver.B01)

<table>
<tr><th>NO.</th><th>TEST ITEM</th><th>TEST CONDITION</th></tr>
<tr><td>1</td><td>High Temperature Storage Test</td><td>Keep in +80 ±2℃ 240 hrs
Surrounding temperature, then storage at normal condition 4hrs.</td></tr>
<tr><td>2</td><td>Low Temperature Storage Test</td><td>Keep in -30 ±2℃ 240 hrs
Surrounding temperature, then storage at normal condition 4hrs.</td></tr>
<tr><td>3</td><td>High Temperature / High Humidity Storage Test</td><td>Keep in +60℃ / 90% R.H duration for 240 hrs
Surrounding temperature, then storage at normal condition 4hrs.</td></tr>
<tr><td>4</td><td>Temperature Cycling Storage Test</td><td>-30℃ → +25℃ → +80℃ → +25℃
(30mins) (5mins) (30mins) (5mins)
20 Cycle
Surrounding temperature, then storage at normal condition 4hrs.</td></tr>
<tr><td rowspan="2">5</td><td rowspan="2">ESD Test</td><td>Air Discharge:
Apply 15 KV with 10 times
Discharge for each polarity +/-

Contact Discharge:
Apply 10 KV with 10 times
discharge for each polarity +/-</td></tr>
<tr><td>1. Temperature ambiance : 15℃～35℃
2. Humidity relative : 30%～60%
3. Energy Storage Capacitance(Cs+Cd) : 150pF±10%
4. Discharge Resistance(Rd) : 330Ω±10%
5. Discharge, mode of operation :
Single Discharge (time between successive discharges at least 1 sec)
(Tolerance if the output voltage indication : ±5%)</td></tr>
<tr><td>6</td><td>Vibration Test (Packaged)</td><td>1. Sine wave 10～55 Hz frequency (1 min/sweep)
2. The amplitude of vibration :1.5 mm
3. Each direction (X、Y、Z) duration for 2 Hrs</td></tr>
<tr><td>7</td><td>Drop Test (Packaged)</td><td><table><tr><th>Packing Weight (Kg)</th><th>Drop Height (cm)</th></tr><tr><td>0 ~ 45.4</td><td>122</td></tr><tr><td>45.4 ~ 90.8</td><td>76</td></tr><tr><td>90.8 ~ 454</td><td>61</td></tr><tr><td>Over 454</td><td>46</td></tr></table>Drop Direction :※1 corner / 3 edges / 6 sides each 1time</td></tr>
</table>

5. PRECAUTION RELATING PRODUCT HANDLING

5.1 SAFETY

5.1.1 If the LCD panel breaks , be careful not to get the liquid crystal to touch your skin.

5.1.2 If the liquid crystal touches your skin or clothes , please wash it off immediately by using soap and water.

5.2 HANDLING

5.2.1 Avoid any strong mechanical shock which can break the glass.

5.2.2 Avoid static electricity which can damage the CMOS LSI—When working with the module , be sure to ground your body and any electrical equipment you may be using.

5.2.3 Do not remove the panel or frame from the module.

5.2.4 The polarizing plate of the display is very fragile. So , please handle it very carefully ,do not touch , push or rub the exposed polarizing with anything harder than an HB pencil lead (glass , tweezers , etc.)

5.2.5 Do not wipe the polarizing plate with a dry cloth , as it may easily scratch the surface of plate.

5.2.6 Do not touch the display area with bare hands , this will stain the display area.

5.2.7 Do not use ketonics solvent & aromatic solvent. Use with a soft cloth soaked with a cleaning naphtha solvent.

5.2.8 To control temperature and time of soldering is 320±10℃and 3-5 sec.

5.2.9 To avoid liquid (include organic solvent) stained on LCM .

5.3 STORAGE

5.3.1 Store the panel or module in a dark place where the temperature is 25℃ ±5℃ and the humidity is below 65% RH.

5.3.2 Do not place the module near organics solvents or corrosive gases.

5.3.3 Do not crush , shake , or jolt the module.

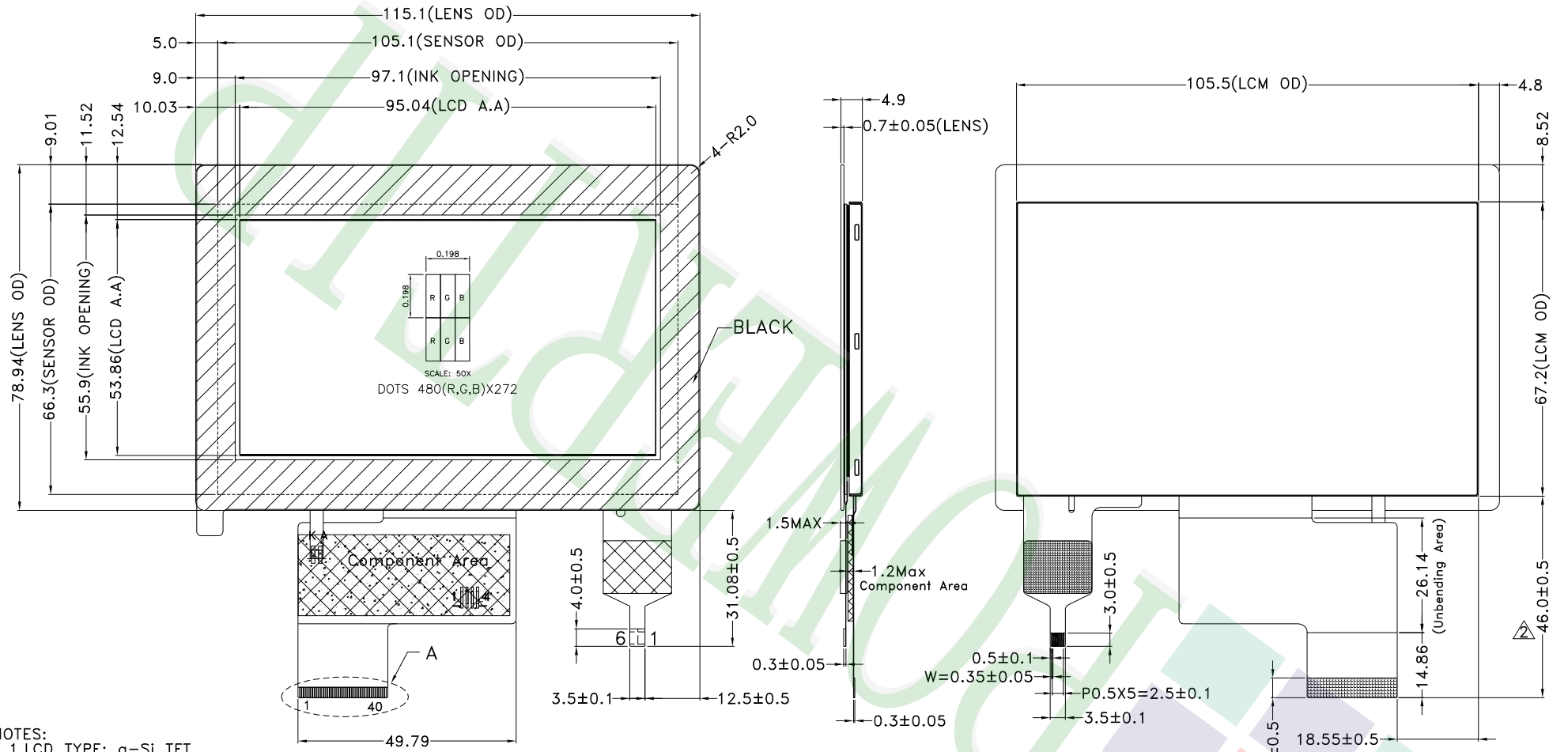
5.4 TERMS OF WARRANTY

5.4.1 Applicable warrant period

The period is within thirteen months since the date of shipping out under normal using and storage conditions.

5.4.2 Unaccepted responsibility

This product has been manufactured to your company's specification as a part for use in your company's general electronic products. It is guaranteed to perform according to delivery specifications. For any other use apart from general electronic equipment , we cannot take responsibility if the product is used in nuclear power control equipment , aerospace equipment , fire and security systems or any other applications in which there is a direct risk to human life and where extremely high levels of reliability are required.



NOTES:
1.LCD TYPE: a-Si TFT
2.LCD DISPLAY:POSITIVE/TRANSMISSIVE
3.VIEW DIRECTION: 6 O'CLOCK
4.The tolerance unless classified ±0.3mm
6.FPC suggested connector :
08 6262 040 340 846+(KYOCERA) or compatible
7.TP PIN CN : ENTERY:6701K-E06N-00L OR EQUIVALENT

REV	REV BY	REVISER	DATE
007			
006			
005			
004			
003			
002	Modify DRAWING	Sally	2017/12/01
001	NEW DRAWING	Sally	2017/11/27

PART NO: PH480272T005-IAC01

DRAWING NAME : JLMD-PH480272T005-IAC01

TITLE: LCD Module Drawing

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

Design	Sally	⟨3⟩	Surface		
Check	Terry	Unit	MM	Material	
Approve	Ryan	Scale	1:1	Thickness	
		Page	1/1	Quantity	

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

PT-A-054-01

Ver.001

Documents NO.	JPKG-PH480272T005-IAC01

LCM包裝規格書
LCM Packaging Specifications (For Tray)

Approve	Check	Contact
Ryan	Terry	Sally

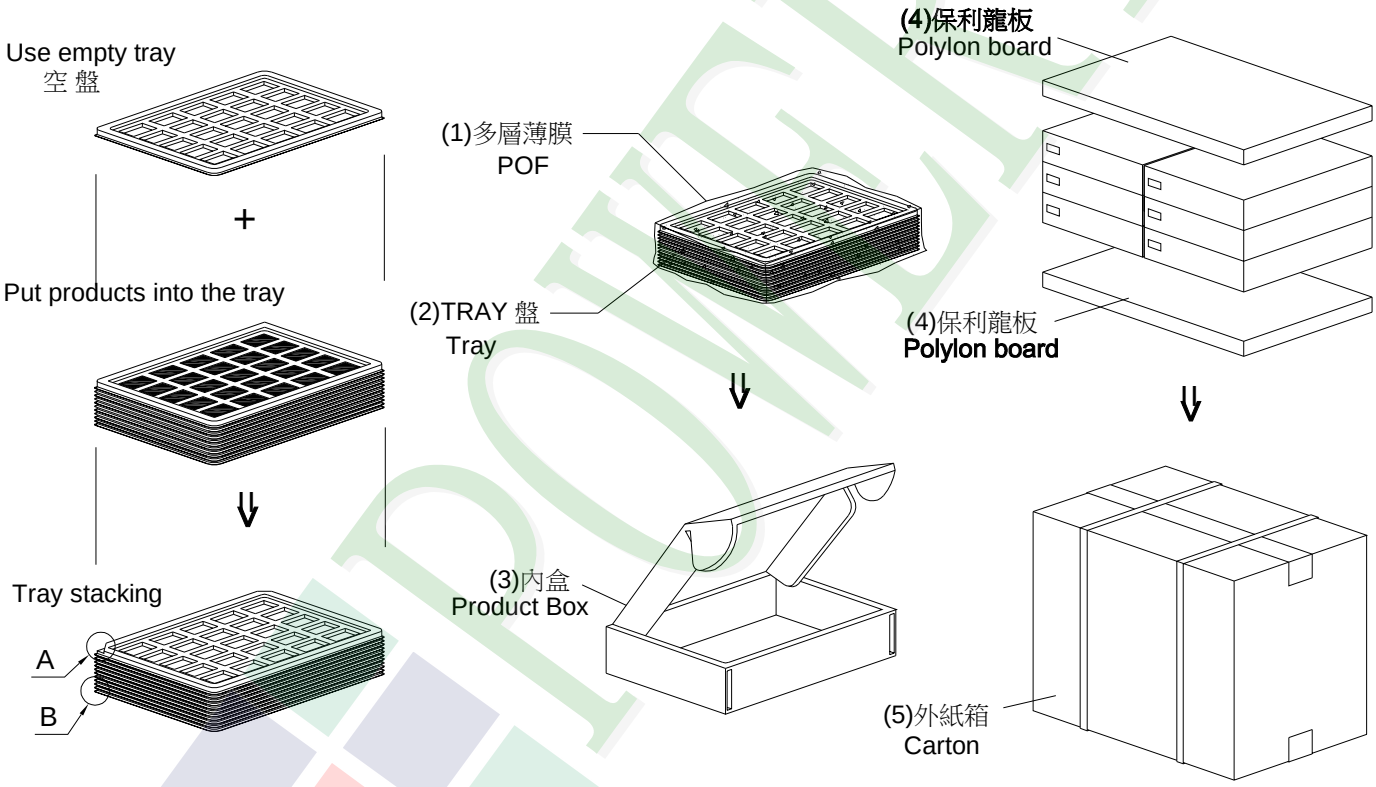
1.包裝材料規格表 (Packaging Material) : (per carton)

No.	Item	Model	Dimensions (mm)	1Pcs Weight	Quantity	Total Weight
1	成品 (LCM)	PH480272T005-IAC01	115.1X78.94X4.9	0.075	144	10.8
2	多層薄膜(1)POF	OTFILM0BA03ABA	19"X350X0.015	——	6	——
3	TRAY 盤 (2)Tray	TY00000000381	352 X 260 X 13.5	0.1	42	4.2
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						

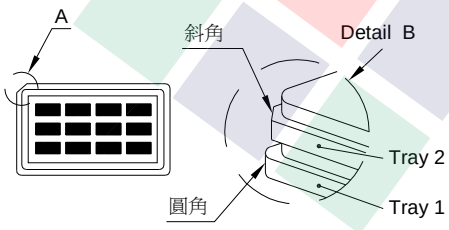
2.一 整箱總重量 (Total LCD Weight in carton) : 17.15 Kg±10%

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

(1)LCM quantity per box : no per tray	4	x no of tray	6	=	24
(2)Total LCM quantity in carton : quantity per box	24	x no of boxes	6	=	144



特 記 事 項 (REMARK)



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.