

SPECIFICATIONS

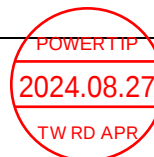
CUSTOMER	:	
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MASS PRODUCTION CODE	:	PH480272T017-ZBB
SAMPLE VERSION	:	01
SPECIFICATIONS EDITION	:	003
DRAWING NO. (Ver.)	:	LMD-PH480272T017-ZBB (Ver.002)
PACKAGING NO. (Ver.)	:	PKG-PH480272T017-ZBB (Ver.001)

Customer Approved

Date:

Approved	Checked	Designer
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- ☐ Preliminary specification for design input
☒ Specification for sample approval



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History of Version

<u>Date</u> (mm / dd / yyyy)	<u>Ver.</u>	<u>Edi.</u>	<u>Description</u>	<u>Page</u>	<u>Design by</u>
04/19/2024	01	001	Preliminary.	-	Quan
05/30/2024	01	002	First Sample.	-	Quan
			Modify Block Diagram. Modify Interface Pin Symbol and Function.	12 14	
08/23/2024	01	003	Modify Reliability Test Condition.	29	Quan

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1. SPECIFICATIONS

1.1 Features

LCD panel

<u>Item</u>	<u>Standard Value</u>
Display Type	480 * 3 (RGB) * 272 Dots
LCD Type	Full Viewing Angle, Normally Black , Transmissive type
Screen size(inch)	4.3"(Diagonal)
Color configuration	R,G, B vertical stripe
Display Interface	Digital 24-bits RGB
Driver IC	ST7282A-G6-E8A
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

LCM module

<u>Item</u>	<u>Standard Value</u>	<u>Unit</u>
Outline Dimension	105.4(W) x 67.15 (L) x 4(H)	mm

Touch panel

<u>Item</u>	<u>Standard Value</u>	<u>Unit</u>
Active Area	96.7 (W) * 55.5 (L)	mm

LCD panel

<u>Item</u>	<u>Standard Value</u>	<u>Unit</u>
Viewing Area	96.7 (W) * 55.5 (L)	mm
Active Area	95.04 (W) x 53.856 (L)	mm

Note : For detailed information please refer to LCM drawing.

1.3 Absolute Maximum Ratings

Module

Item	Symbol	Condition	Min.	Max.	Unit
System Power Supply Voltage	VDD	GND=0	-0.5	+4.6	V
Input Voltage Range	V _{in}	-	-0.5	VDD+0.3	V
Operating Temperature	T _{OP} (Ts)	Note 1	-20	+70	°C
Storage Temperature	T _{ST} (Ta)	Note 2	-30	+80	°C
Storage Humidity	H _D	Ta ≤ 60 °C	10	90	%RH

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.

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 Voltage	VDD	-	3.0	3.3	3.6	
"H" Input Voltage	V _{IH}	-	0.7*VDD	-	VDD	V
"L" Input Voltage	V _{IL}	-	GND	-	0.3*GND	V
"H" Output Voltage	V _{OH}	-	VDD-0.4	-	VDD	V
"L" Output Voltage	V _{OL}	-	GND	-	GND +0.4	V
Supply Current		VDD=3.3V		25	35	mA

1.5 Optical Characteristics

TFT LCD Module

VDD =3.3V, Ta=25°C

Item		Symbol	Condition	Min.	Typ.	Max.	unit	
Response time		Tr + Tf	Ta = 25°C θX, θY = 0°	-	30	35	ms	Note2
Viewing angle	Top	θY+	CR ≥ 10	-	80	-		Note4
	Bottom	θY-		-	80	-		
	Left	θX-		-	80	-		
	Right	θX+		-	80	-		
Contrast ratio		CR	Ta = 25°C θX, θY = 0°	500	600		-	-
Color of CIE Coordinate	White	X		0.27	0.32	0.37	-	Note1
		Y		0.32	0.37	0.42		
	Red	X		0.53	0.58	0.63		
		Y		0.28	0.33	0.38		
	Green	X		0.29	0.34	0.39		
		Y		0.57	0.62	0.67		
	Blue	X		0.08	0.13	0.18		
		Y		0.08	0.13	0.18		
Average Brightness (With LCD) *1		IV	IF= 40mA	280	320	-	cd/m ²	Note1
Uniformity (With LCD) *2		△ B	IF= 40mA	70	-	-	%	Note1

Note1:

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

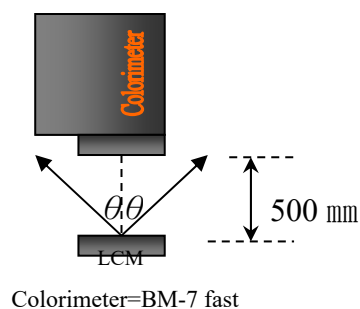
2 : Measurement Condition for Optical Characteristics:

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

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

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

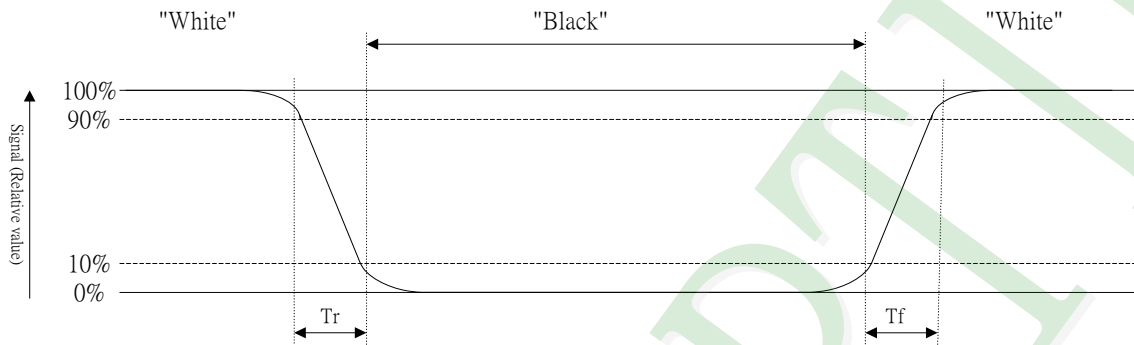
d : The uncertainty of the C.I.E coordinate measurement ±0.01 , Average Brightness ± 4%



Note2: Definition of response time:

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

Refer to figure as below:



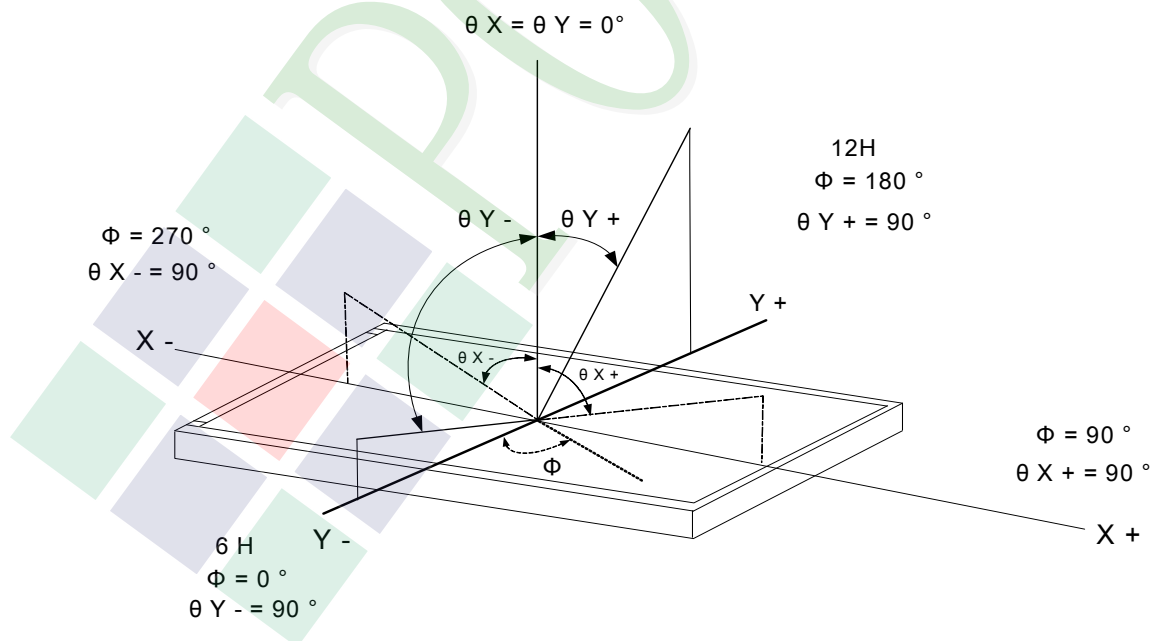
Note3: Definition of contrast ratio:

Contrast ratio is calculated with the following formula

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

Note4: Definition of viewing angle:

Refer to figure as below:



1.6 Backlight Unit Characteristics

Maximum Ratings

Item	Symbol	Conditions	Min.	Max.	Unit
LED Forward Current	IF	Ta =25℃	-	60	mA
LED Reverse Voltage (Each one)	VR	Ta =25℃	-	5	V
Power Dissipation	PD	Ta =25℃	-	990	mW

Electrical / Optical Characteristics

<u>Item</u>	<u>Symbol</u>	<u>Conditions</u>	<u>Min.</u>	<u>Typ.</u>	<u>Max.</u>	<u>Unit</u>
Forward Voltage	VF	IF=40mA	13.5	15	16.5	V
Average Brightness (Without LCD)	IV		6300	7000	-	cd/m ²
CIE Color Coordinate (Without LCD)	X		0.26	0.29	0.32	-
	Y		0.26	0.29	0.32	
Color	White					

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

Internal Circuit Diagram



Other Description

Item	Conditions	Description
Life Time*1	Ta =25℃, IF= 40mA	30,000 hrs

1.7 Touch Panel Characteristics

1.7.1 Optical Characteristics

Item	Standard Value
Transparency	(80%) Min

1.7.2 Mechanical Characteristic

Item	Standard Value
Input Method	Finger or stylus pen
Hardness of surface	3H -pressure 500g of ,45deg.
FPC peeling strength	500gf min(Peeling upward by 90°)
Activation Force	50 gf (Typical 20gf) less individual point with stylus pen(R0.8mm) Activation force guarantee area:5.0mm inside of Active Area.
Linearity Force	100 gf less input with stylus pen(R0.8mm) Linearity force guarantee area:3.0mm inside of Active Area.

1.7.3 Electrical Characteristics

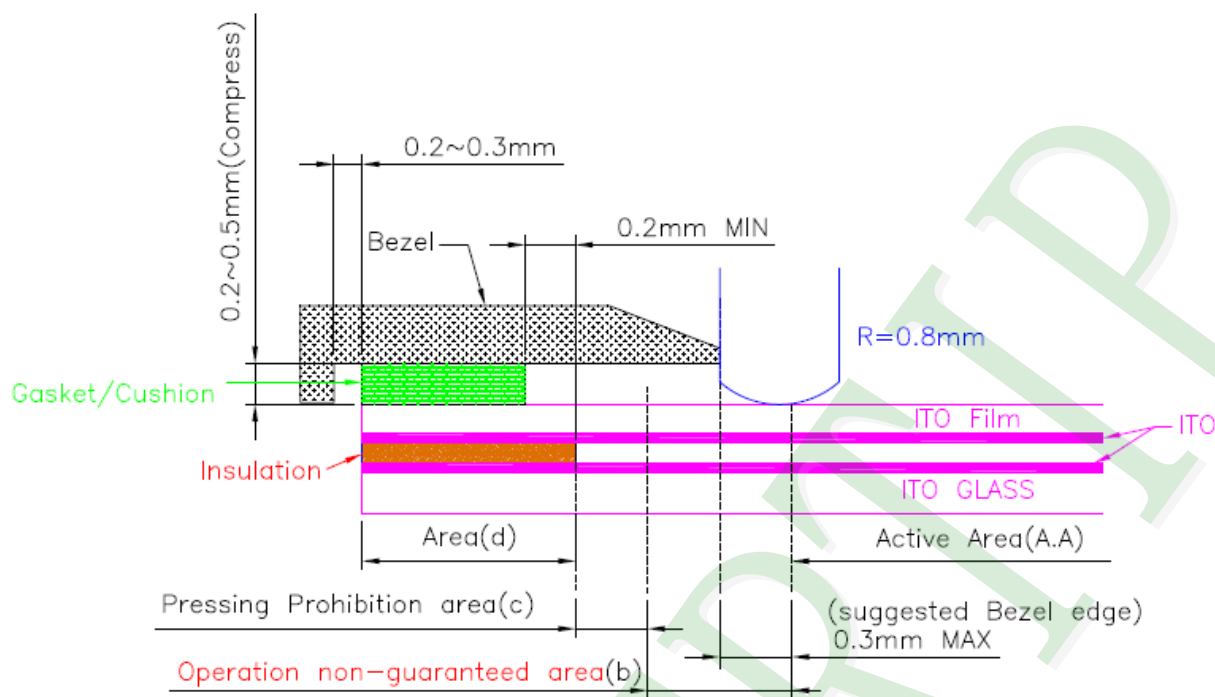
Item	Standard Value
Rated Voltage	DC 5V(DC 7V Max)
Resistance Between Terminals	Direction X (Glass side): (500Ω~ 1250Ω)
Insulation Resistance	Direction Y (Film side): (150Ω~ 450Ω)
Linearity	$\leq 1.5\%$. $\text{Linearity}(\%) = \frac{\Delta V}{(EV-SV)} \times 100$. ΔV : The difference between the ideal voltage and measured voltage on the each measuring line. SV: Voltage of starting Points. EV: Voltage of Ending Points.
Bouncing	<10ms (Tip R 3.75mm, hardness 10°~20°, silicon rubber ,500gf operation : 40 mm/sec)

1.7. 4 Reliability Characteristic

<u>Item</u>	<u>Standard Value</u>
Hitting Durability	1,000,000times min.(Tip R 8mm&R0.8mm)
Pen Sliding Durability	100,000 times min(Tip R0.8mm)
Impact Resistance	No damage when $\varphi 9\text{mm}$ steel ball is dropped on the surface from 30 cm height at 1 time
Flexible pattern Bending Resistance	Bending 3 times by bending radius R1.0 mm
Flexible Pattern Insert/Pull Out Resistance	5 times at least

1.7. 5 Touch Panel Design/Handing 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) he 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) Control signals include SEL6/8 & Reverse.
- (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.

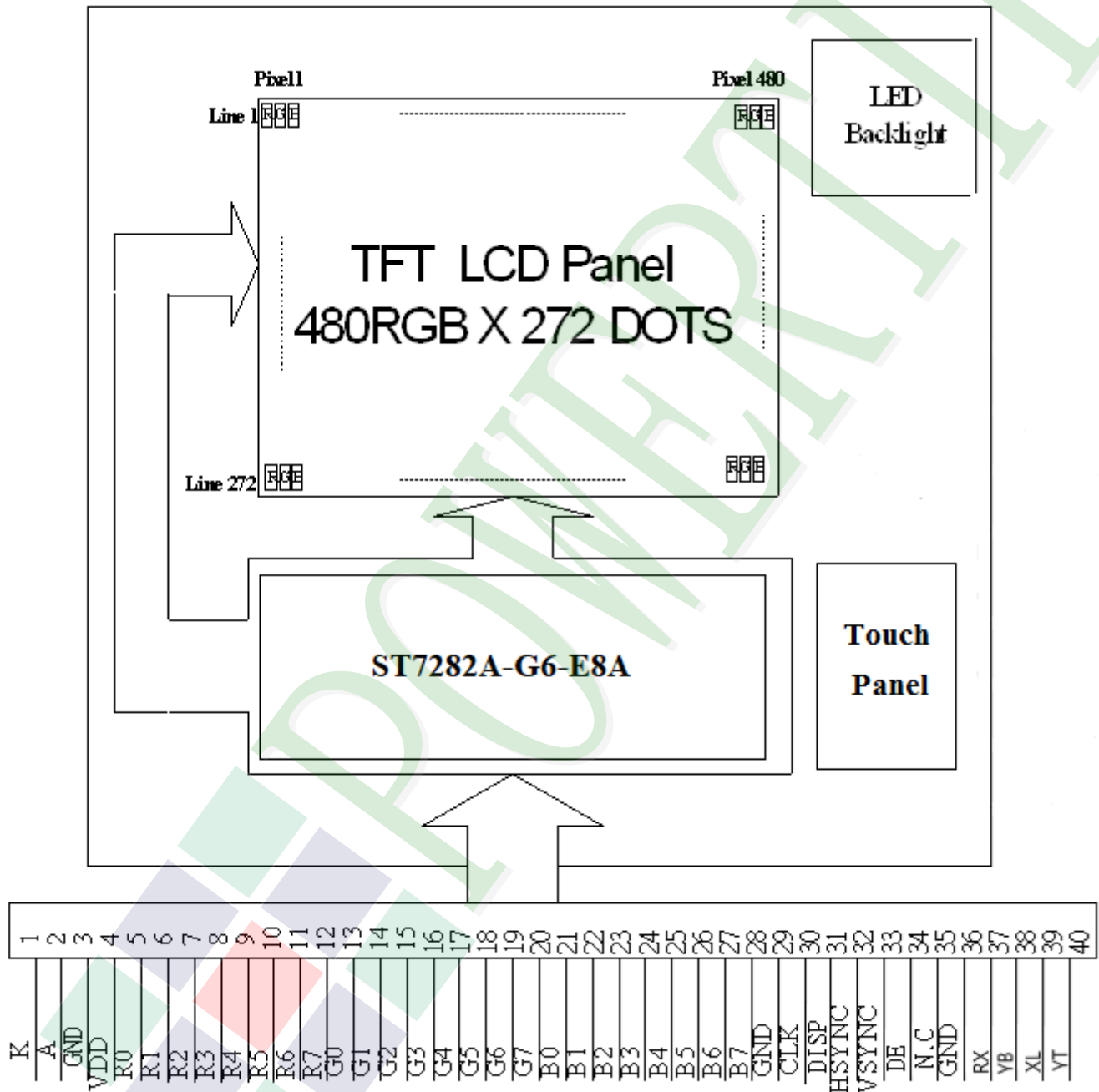
2. MODULE STRUCTURE

2.1 Counter Drawing

2.1.1 LCM Mechanical Diagram

* See Appendix

2.1.2 Block Diagram



2.2 Interface Pin Description

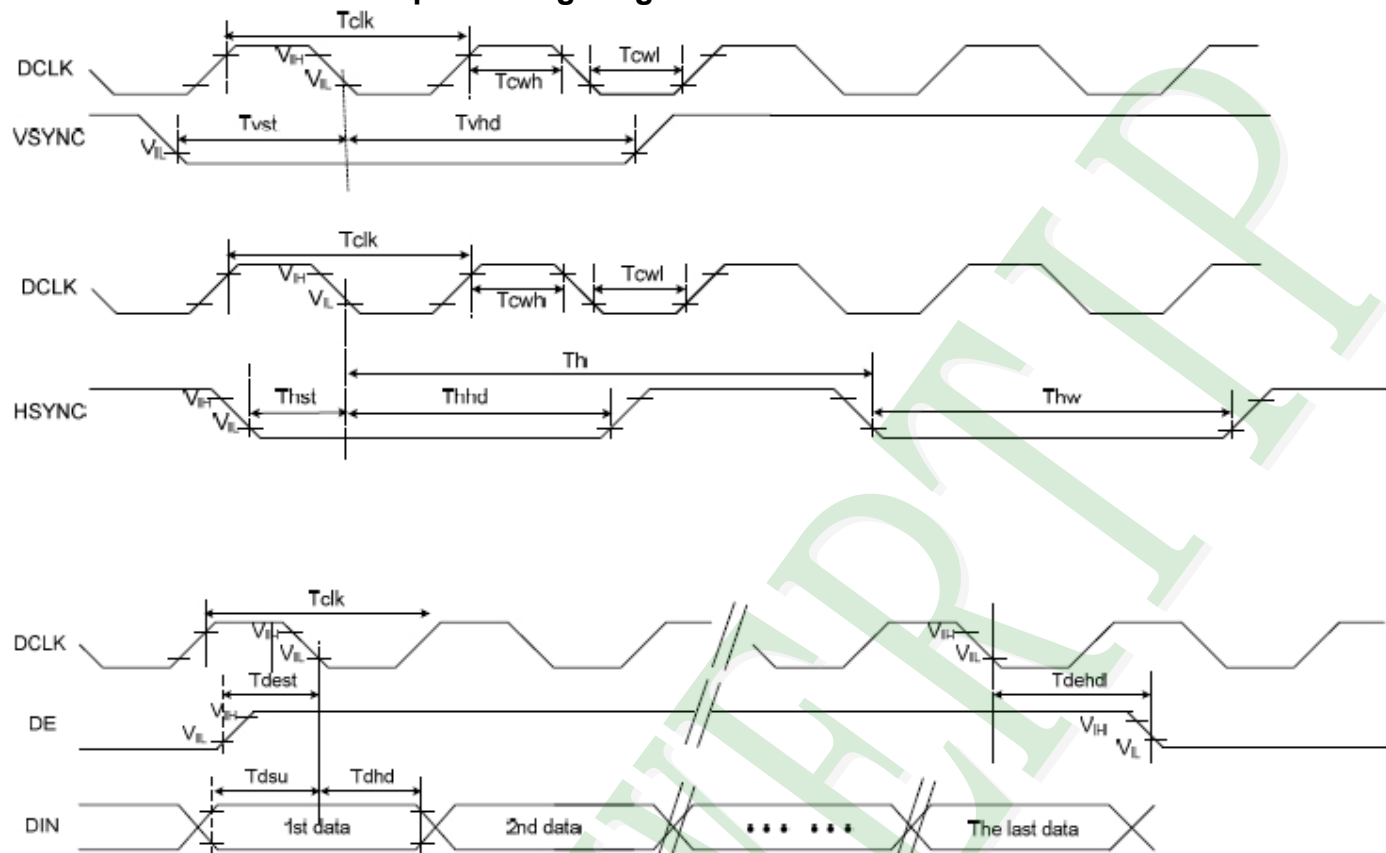
LCM Interface

<u>Pin No.</u>	<u>Symbol</u>	<u>Function</u>
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

<u>Pin No.</u>	<u>Symbol</u>	<u>Function</u>
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	DCLK	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	NC	Not Connection
36	GND	Ground
37	XR	Right side of touch panel
38	YD	Bottom side of touch panel
39	XL	Left side of touch panel
40	YU	Up side of touch panel

2.3 Timing Characteristics

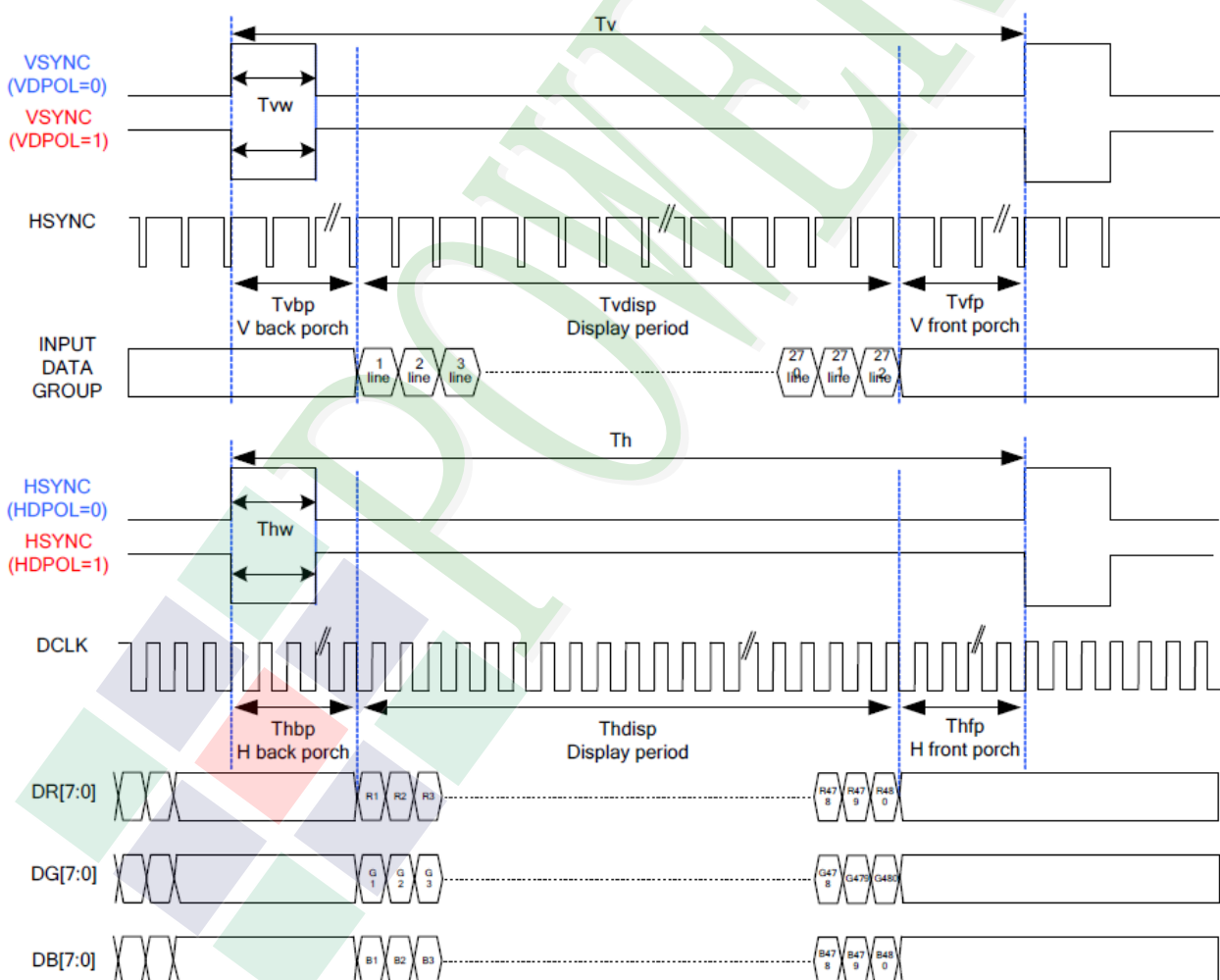
2.3.1 Clock and Data Input Timing Diagram



Parameters	Symbol	Spec			Unit	Conditions
		Min.	Typ.	Max.		
CLK pulse duty	T_{cw}	40	50	60	%	
Hsync width	T_{hw}	2			DCLK	
HSYNC period	T_h	55	60	65	us	
VSYNC setup time	T_{vst}	12	--	--	ns	
VSYNC hold time	T_{vhd}	12	--	--	ns	
HSYNC setup time	T_{hst}	12	--	--	ns	
HSYNC hold time	T_{hhd}	12	--	--	ns	
Data setup time	T_{dsu}	12	--	--	ns	
Data hold time	T_{dhhd}	12	--	--	ns	
DE setup time	T_{dest}	10	--	--	ns	
DE hold time	T_{dehd}	10	--	--	ns	

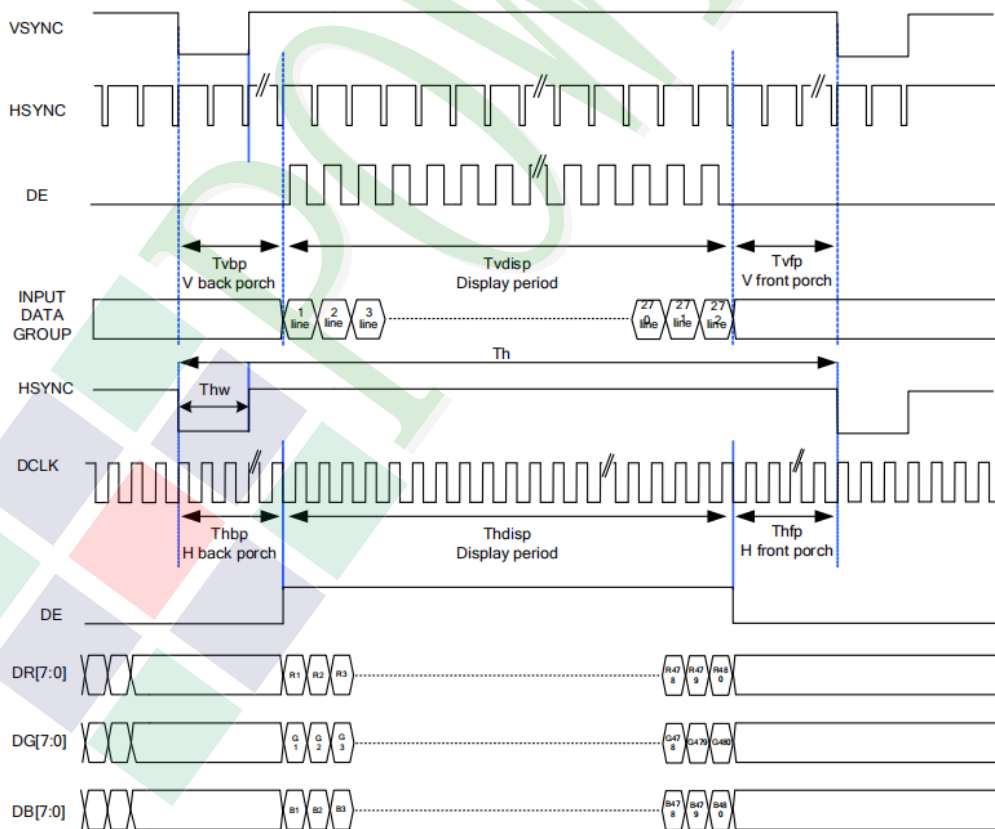
Parallel 24-bit RGB Input Timing Table

Parameters		Symbol	Value			Unit
			Min.	Typ.	Max.	
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
	Front Porch	Thfp	2	8	75	DCLK
	Pulse Width	Thw	2	4	75	DCLK
VSYNC	Period Time	Tvdisp	276	292	321	H
	Display Period	Tvbp		272		H
	Back Porch	Tvfp	2	12	12	H
	Front Porch	Tvw	2	8	37	H
	Pulse Width	Tvdisp	2	4	37	H


SYNC Mode Timing Diagram



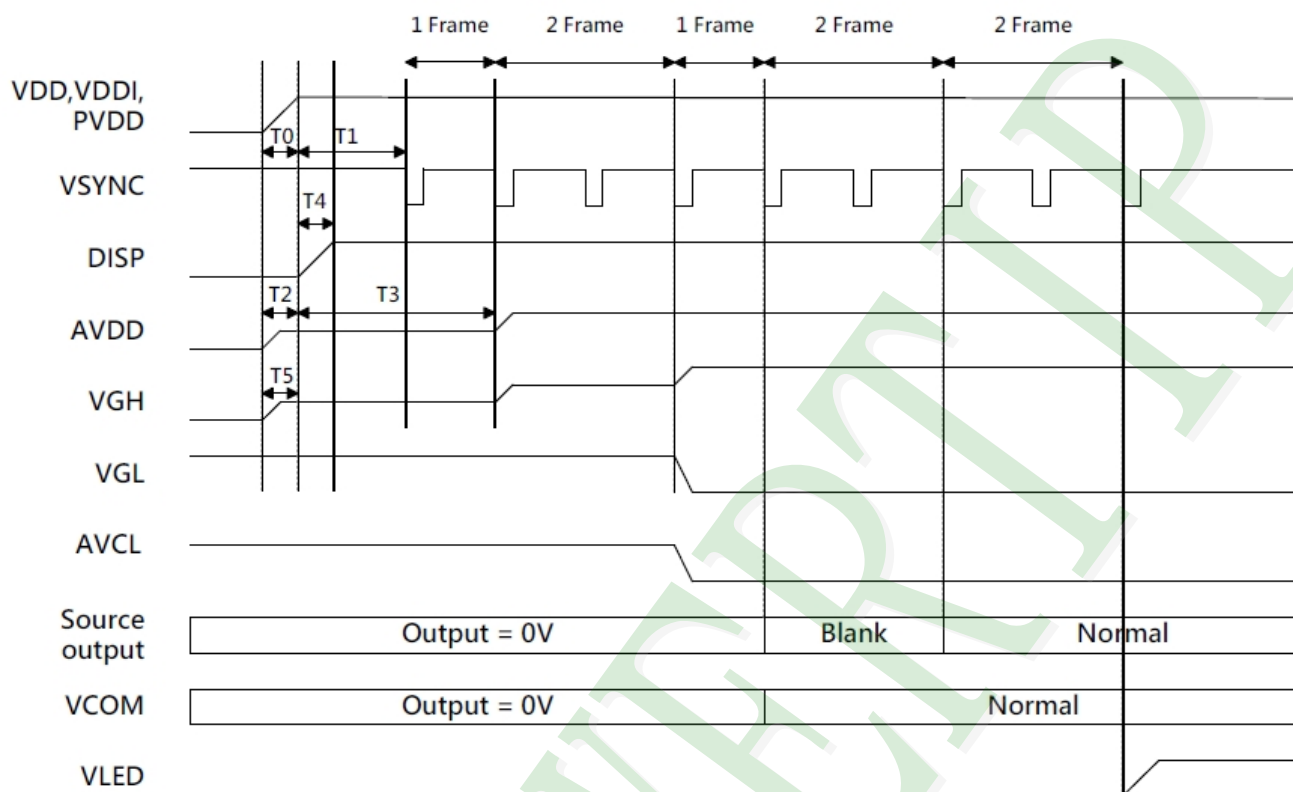
DE Mode Timing Diagram



SYNC-DE Mode Timing Diagram

2.4 POWER ON/OFF SEQUENCE

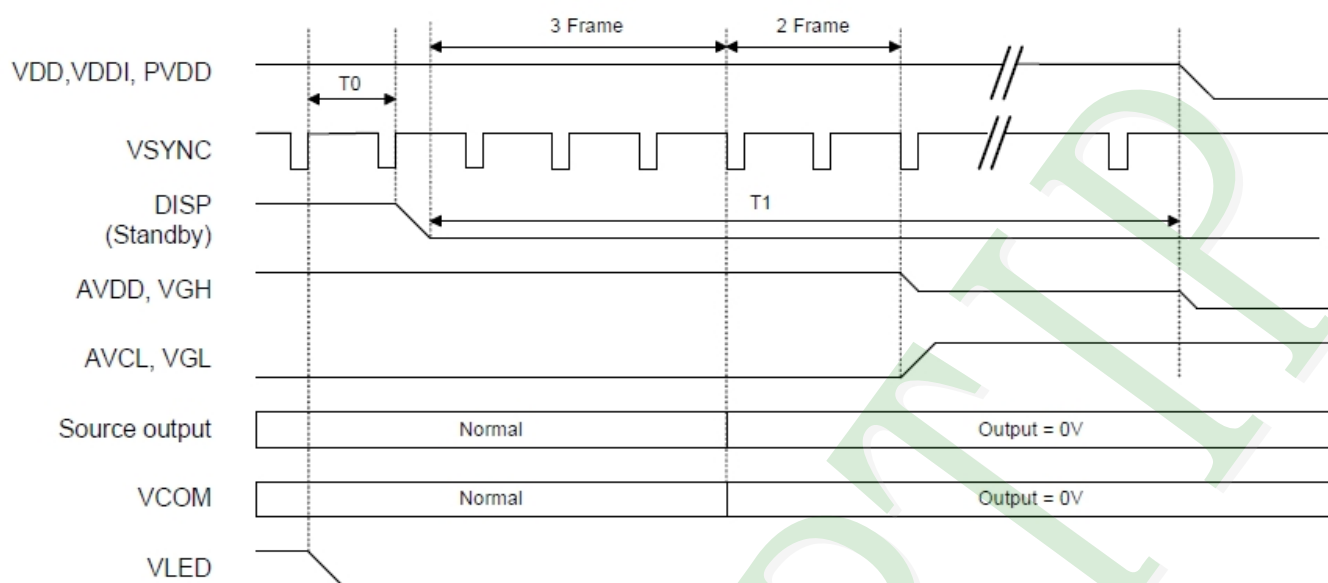
2.4.1 Power On Sequence



Symbol	Description	Min. Time
T0	Determined by the external power	
T1	Time from stable VDD, VDDI, PVDD set-up to the first VSYNC	T1=0
T2	Time from AVDD=0V to AVDD=3.3V	T2=T0
T3	Time from AVDD=3.3V to AVDD=6.0V	T3=T1+ (1*Frame)
T4	Time from stable VDD, VDDI, PVDD set-up to DISP asserted	T4=0
T5	Time from VGH=0V to VGH=3.3V	T5=T0

Note: Recommend the LCM power on rise time T0 = 0 ~ 1ms.

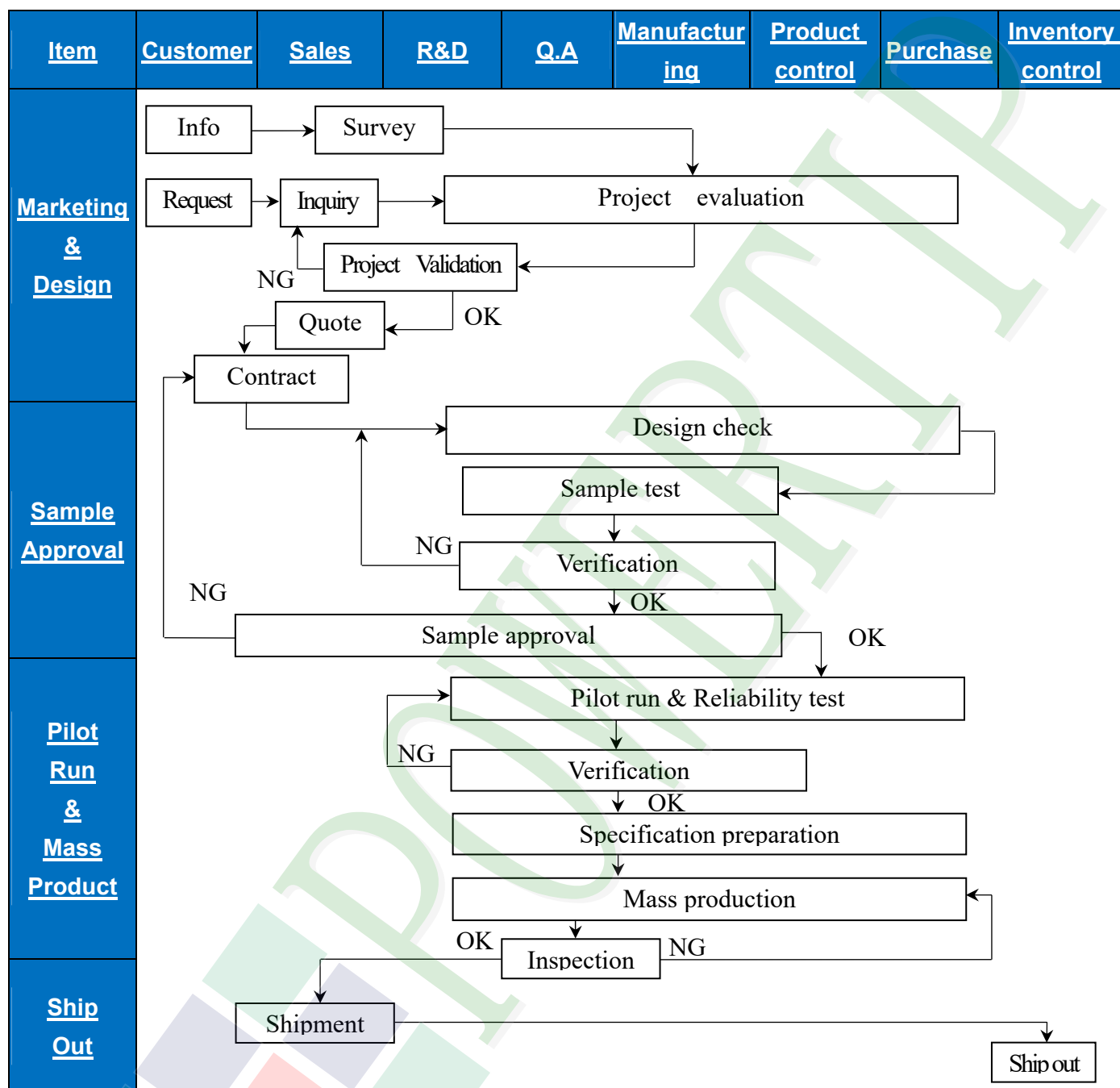
2.4.2 Power Off Sequence

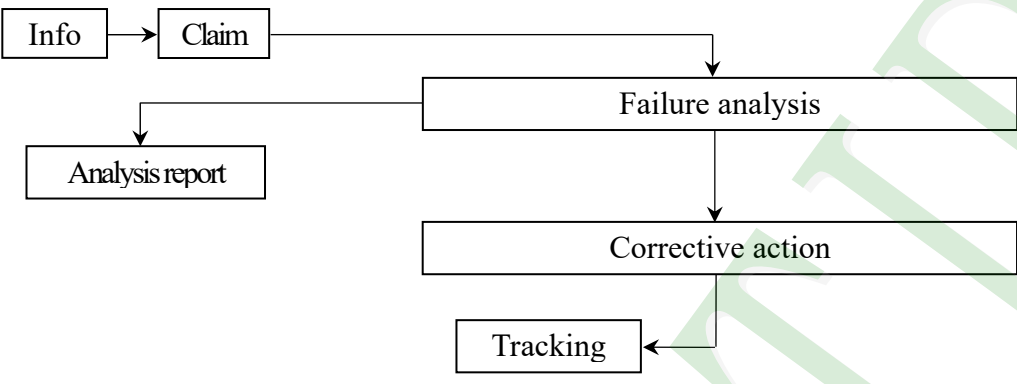


Symbol	Description	Min. Time
T0	Time from backlight power off to DISP="L"	1*Frame
T1	Time from DISP="L" to LCM Power off	5*Frame

3. QUALITY ASSURANCE SYSTEM

3.1 Quality Assurance Flow Chart



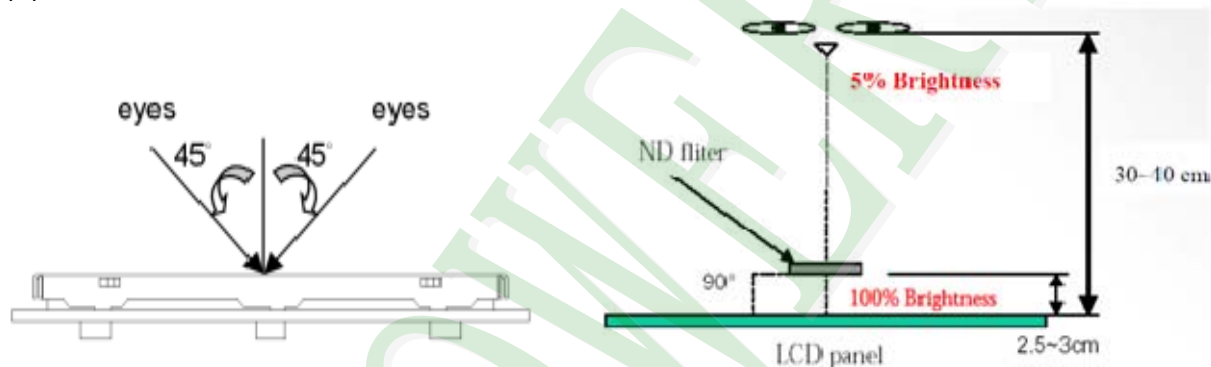
Item	Customer	Sales	R&D	Q.A	Manufacturing	Product control	Purchase	Inventory control
Sales Service	 <pre> graph TD Info[Info] --> Claim[Claim] Claim --> Failure[Failure analysis] Failure --> Analysis[Analysis report] Failure --> Corrective[Corrective action] Corrective --> Tracking[Tracking] </pre>							
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

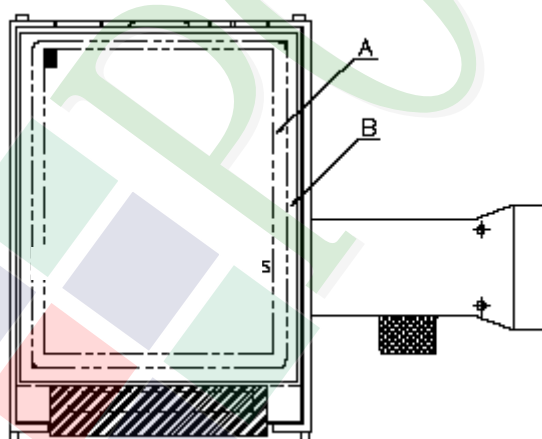
- ◆Scope: The document shall be applied to TFT-LCD Module for 3.5"~15" (Ver.B01).
- ◆Inspection Standard: MIL-STD-105E Table Normal Inspection Single Sampling Level II.
- ◆Equipment: Gauge, MIL-STD, Powertip Tester, Sample
- ◆Defect Level: Major Defect AQL: 0.4; Minor Defect AQL: 1.5
- ◆OUT Going Defect 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)

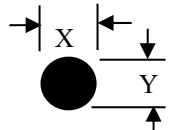
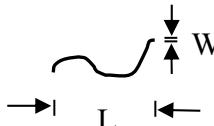
◆ Specification For TFT-LCD Module 3.5"~15":

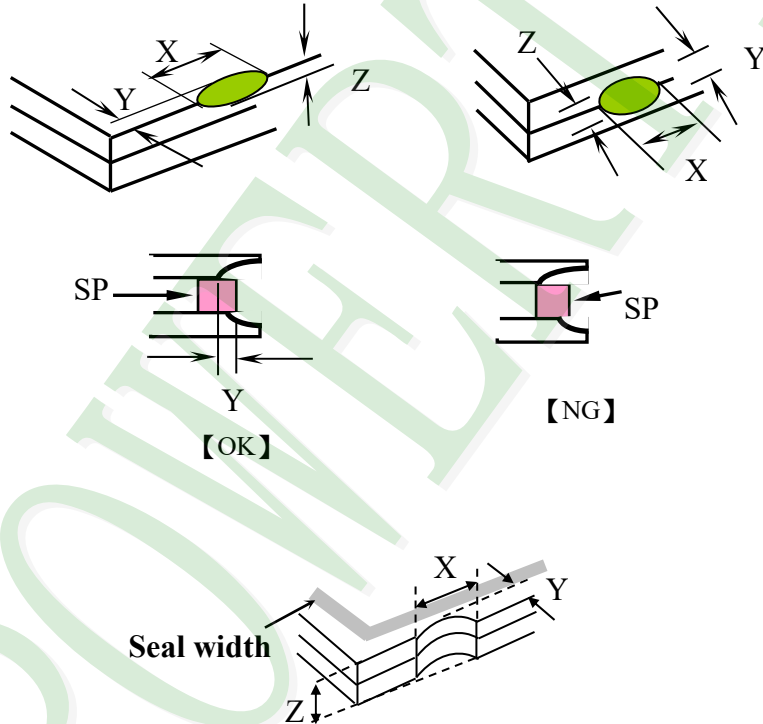
(Ver.B01)

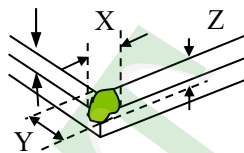
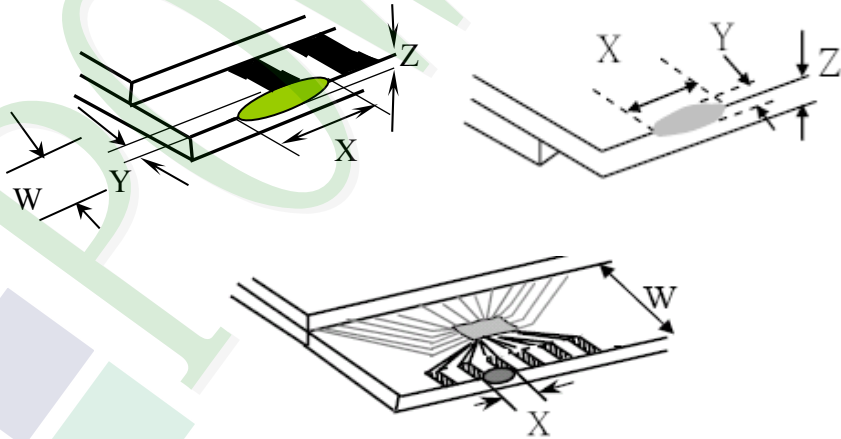
NO	Item	Criterion	Level										
01	Product condition	1.1 The part number is inconsistent with work order of production.	Major										
		1.2 Mixed product types.	Major										
		1.3 Assembled in inverse direction.	Major										
02	Quantity	2.1 The quantity is inconsistent with work order of production.	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>Item</th><th>Acceptance (Q'ty)</th></tr><tr><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>	Item	Acceptance (Q'ty)	Bright Dot	≤ 4	Dark Dot	≤ 5	Joint Dot	≤ 3	Total	≤ 7	Minor
		Item	Acceptance (Q'ty)										
Bright Dot	≤ 4												
Dark Dot	≤ 5												
Joint Dot	≤ 3												
Total	≤ 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 ≥ 5 mm. 5.4 Bright dot : Dots appear bright and unchanged in visible with 5% ND filter is defined. 5.5 Tiny bright dot: bright dot area ≤ 1/2 dot. a. Dots appear bright and unchanged in visible with 5% ND filter is defined defect and is judged in accordance with 6.1 b. Dots invisible with 5% ND Filter is Ignored													

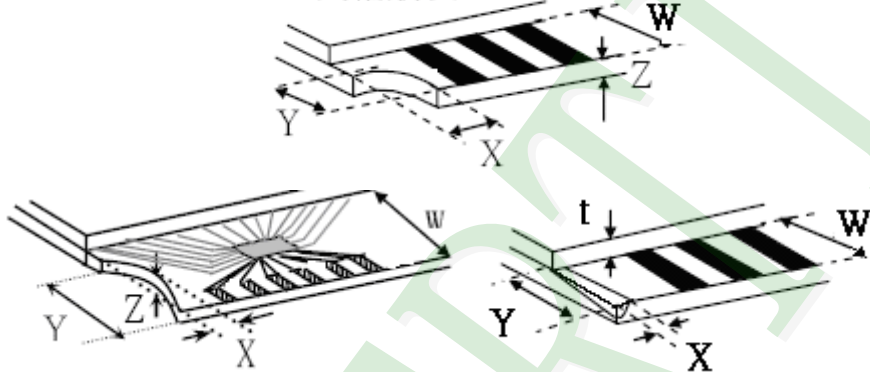
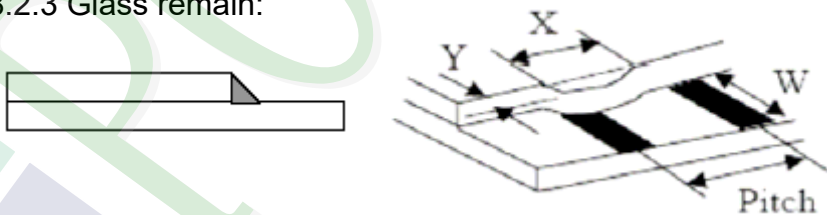
◆ Specification For TFT-LCD Module 3.5"~15":

(Ver.B01)

NO	Item	Criterion	Level																																																							
06	Black or white Dot, scratch, contamination Round type  $\Phi = (x + y) / 2$ Line type 	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>$\Phi \leq 0.25$</td> <td>Ignore</td> <td rowspan="4">Ignore</td> </tr> <tr> <td>$0.25 < \Phi \leq 0.50$</td> <td>5</td> </tr> <tr> <td>$\Phi > 0.50$</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>module size</th> <th>Length (L)</th> <th>Width (W)</th> <th colspan="2">Acceptance (Q'ty)</th> </tr> <tr> <th></th> <th></th> <th></th> <th>A area</th> <th>B area</th> </tr> <tr> <td rowspan="5">3.5" to less 9"</td> <td>---</td> <td>$W \leq 0.03$</td> <td>Ignore</td> <td rowspan="5">Ignore</td> </tr> <tr> <td>$L \leq 10.0$</td> <td>$0.03 < W \leq 0.05$</td> <td>4</td> </tr> <tr> <td>$L \leq 5.0$</td> <td>$0.05 < W \leq 0.10$</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>$W \leq 0.05$</td> <td>Ignore</td> <td rowspan="4">Ignore</td> </tr> <tr> <td>$L \leq 10.0$</td> <td>$0.05 < W \leq 0.10$</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>	Dimension (diameter: Φ)	Acceptance (Q'ty)		A area	B area	$\Phi \leq 0.25$	Ignore	Ignore	$0.25 < \Phi \leq 0.50$	5	$\Phi > 0.50$	0	Total	5	module size	Length (L)	Width (W)	Acceptance (Q'ty)					A area	B area	3.5" to less 9"	---	$W \leq 0.03$	Ignore	Ignore	$L \leq 10.0$	$0.03 < W \leq 0.05$	4	$L \leq 5.0$	$0.05 < W \leq 0.10$	2	---	$W > 0.10$	As round type	Total		5	9" to 15"	---	$W \leq 0.05$	Ignore	Ignore	$L \leq 10.0$	$0.05 < W \leq 0.10$	5	---	$W > 0.10$	As round type	Total		5	Minor
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NO	Item	Criterion	Level									
08	The crack of glass	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 8.1 General glass chip: 8.1.1 Chip on panel surface and crack between panels:  <table><thead><tr><th><u>X</u></th><th><u>Y</u></th><th><u>Z</u></th></tr></thead><tbody><tr><td>$\leq \leq a$</td><td>Crack can't enter viewing area</td><td>$\leq 1/2 t$</td></tr><tr><td>$\leq a$</td><td>Crack can't exceed the half of SP width.</td><td>$1/2 t < Z \leq 2 t$</td></tr></tbody></table>	<u>X</u>	<u>Y</u>	<u>Z</u>	$\leq \leq a$	Crack can't enter viewing area	$\leq 1/2 t$	$\leq a$	Crack can't exceed the half of SP width.	$1/2 t < Z \leq 2 t$	Minor
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NO	Item	Criterion	Level									
08	The crack of glass	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 8.1.2 Corner crack:  <table><thead><tr><th>X</th><th>Y</th><th>Z</th></tr></thead><tbody><tr><td>$\leq 1/5 a$</td><td>Crack can't enter viewing area</td><td>$Z \leq 1/2 t$</td></tr><tr><td>$\leq 1/5 a$</td><td>Crack can't exceed the half of SP width.</td><td>$1/2 t < Z \leq 2 t$</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.	$1/2 t < Z \leq 2 t$	Minor
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8.2 Protrusion over terminal: 8.2.1 Chip on electrode pad:  <table><thead><tr><th></th><th>X</th><th>Y</th><th>Z</th></tr></thead><tbody><tr><td>Front</td><td>$\leq a$</td><td>$\leq 1/2 W$</td><td>$\leq t$</td></tr><tr><td>Back</td><td>$\leq a$</td><td>$\leq W$</td><td>$\leq 1/2 t$</td></tr></tbody></table>		X	Y	Z	Front	$\leq a$	$\leq 1/2 W$	$\leq t$	Back	$\leq a$	$\leq W$	$\leq 1/2 t$
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Front	$\leq a$	$\leq 1/2 W$	$\leq t$									
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NO	Item	Criterion	Level												
08	The crack of glass	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 8.2.2 Non-conductive portion:  <table><tr><th><u>X</u></th><th><u>Y</u></th><th><u>Z</u></th></tr><tr><td>$\leq 1/3 a$</td><td>$\leq W$</td><td>$\leq t$</td></tr></table> If the chipped area touches the ITO terminal, over 2/3 of the ITO must remain and be inspected according to electrode terminal specifications. 8.2.3 Glass remain:  <table><tr><th><u>X</u></th><th><u>Y</u></th><th><u>Z</u></th></tr><tr><td>$\leq a$</td><td>$\leq 1/3 W$</td><td>$\leq t$</td></tr></table> 8.2.4 Cracking:  Not Allowed	<u>X</u>	<u>Y</u>	<u>Z</u>	$\leq 1/3 a$	$\leq W$	$\leq t$	<u>X</u>	<u>Y</u>	<u>Z</u>	$\leq a$	$\leq 1/3 W$	$\leq t$	Minor
<u>X</u>	<u>Y</u>	<u>Z</u>													
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$\leq a$	$\leq 1/3 W$	$\leq t$													

◆ 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: 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 ambience: 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><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>		Packing Weight (Kg)	Drop Height (cm)	0 ~ 45.4	122	45.4 ~ 90.8	76	90.8 ~ 454	61	Over 454	46
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		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 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 : $+20 \sim 30^{\circ}\text{C}$

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

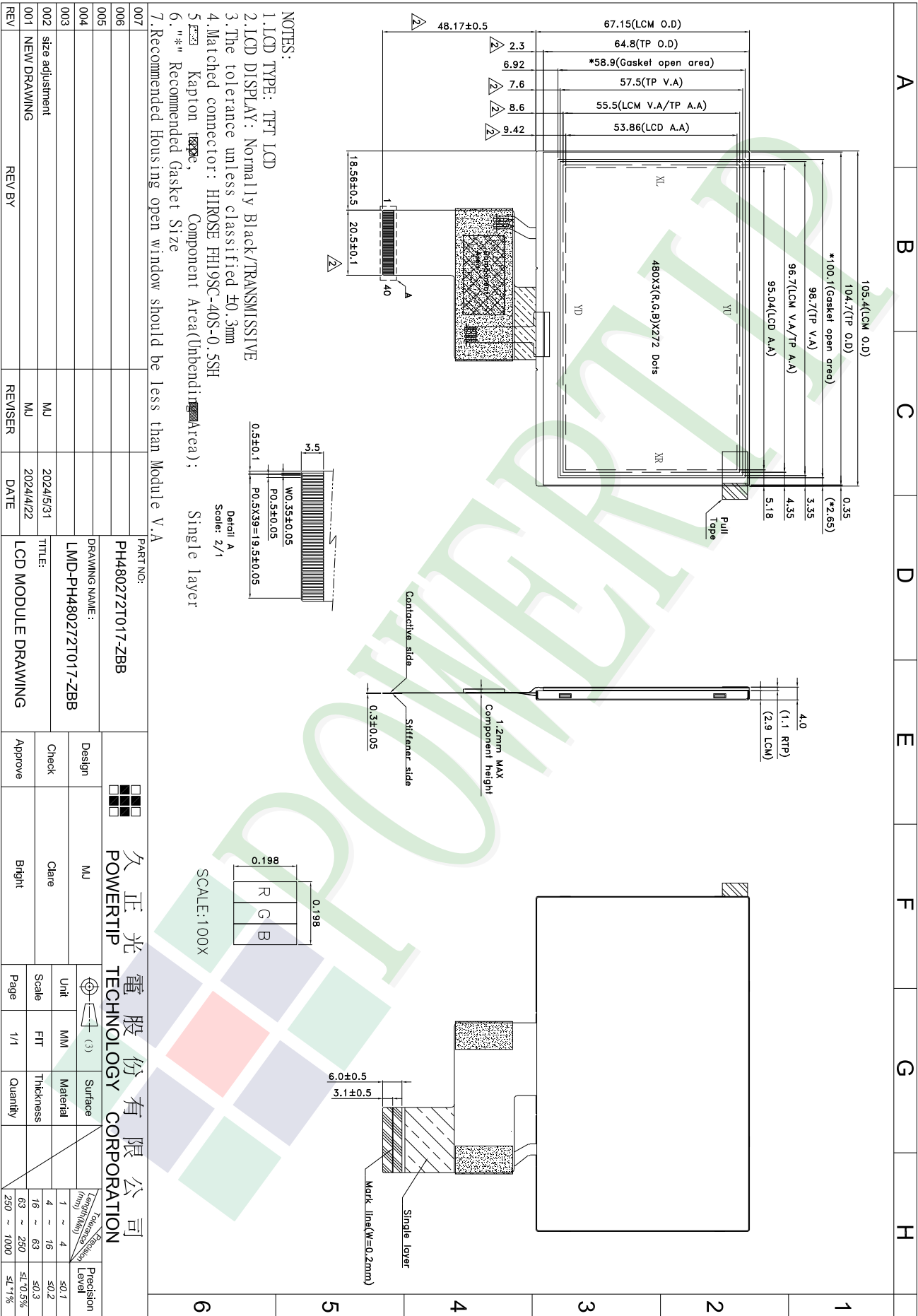
- 5.2.1 Avoid any strong mechanical shock which can break the glass.
- 5.2.2 Avoid static electricity which can damage the CMOS LSI—When working with the module, be sure to ground your body and any electrical equipment you may be using.
- 5.2.3 Do not remove the panel or frame from the module.
- 5.2.4 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 ketonic 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.
- 5.2.10 Caution! (LCM products with Capacitive Touch Panel)
Strong EMI-sources such as switch-mode power supplies (SPS) can lead to touch malfunction (e.g., ghost-touches). Therefore, the touch needs to be thoroughly tested inside the target application.
- 5.2.11 CAUTION: Continuously displaying same static image will result in high possibility of image sticking/image burn-in effect due to TFT panel characteristic.
- 5.2.12 Double-sided tape designed to be attached with the customer's mechanical device, please follow up the rules and regulations published by the original manufacturer of double-side tape for the attachment operation.

5.3 STORAGE

- 5.3.1 Store the panel or module in a dark place where the temperature is $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ 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.



Ver.001		Packaging Specifications	Approve	Check	Contact
Documents NO.	PKG-PH480272T017-ZBB		Bright	Clare	MJ

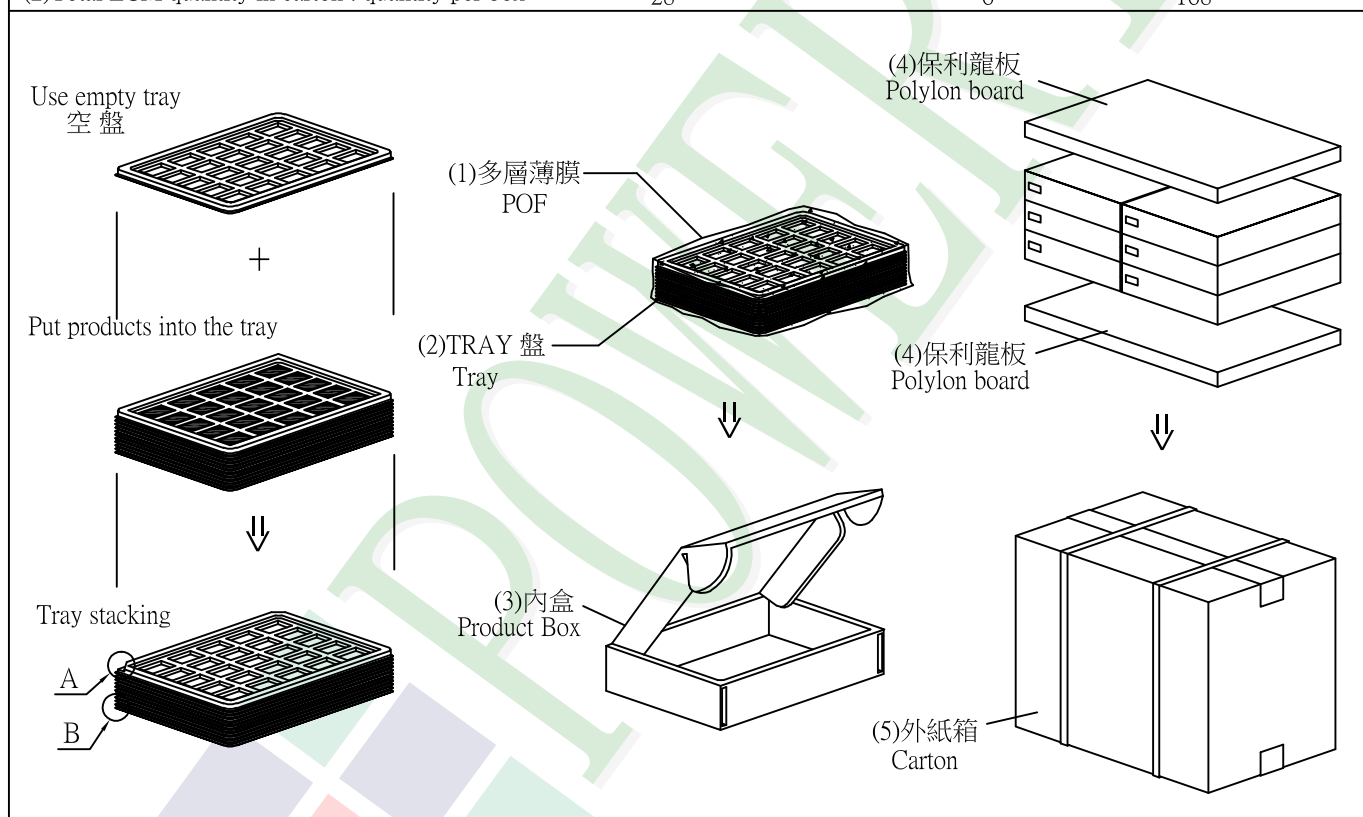
1.包裝材料規格表 (Packaging Material) : (per carton)

No.	Item	Model	Dimensions (mm)	1Pcs Weight	Quantity	Total Weight
1	成品 (LCM)	PH480272T017-ZBB	105.4 X 67.15	0.0545	168	9.156
2	多層薄膜(1)POF	OTFILM0BA03ABA	19"X350X0.015	—	6	—
3	TRAY 盤 (2)Tray	TYSG000000089	352 X 260 X 12.3	0.0947	48	4.5456
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) : 15.85 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	7	=	28
(2)Total LCM quantity in carton : quantity per box	28	x no of boxes	6	=	168



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.	
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