

SPECIFICATIONS

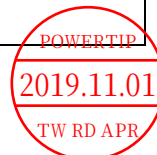
CUSTOMER	:	
SAMPLE CODE	:	SH320240T028-ZHC01
MASS PRODUCTION CODE	:	PH320240T028-ZHC01
SAMPLE VERSION	:	01
SPECIFICATIONS EDITION	:	002
DRAWING NO. (Ver.)	:	LMD-PH320240T028-ZHC01 (Ver.002)
PACKAGING NO. (Ver.)	:	PKG- PH320240T028-ZHC01 (Ver.001)

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

[illegible]

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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	24-bits RGB Interface
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	84.02(W) * 75.35(L) * 5.05(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 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 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	mA
Supply Current for Backlight Unit	ICC	ICC@VCC=5V	-	170	260	
Supply Current for Backlight Unit	ICC	ICC@VCC=12V	-	70	105	
Input Voltage for PWM Signal	V _{PH}	GND=0V	1.2	-	-	V
	V _{PL}	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 $\theta X, \theta Y = 0^\circ$	-	30	40	ms	Note 2
Viewing angle	Top	$\theta Y+$	CR ≥ 10	-	80	-	Deg.	Note 4
	Bottom	$\theta Y-$		-	80	-		
	Left	$\theta X-$		-	80	-		
	Right	$\theta X+$		-	80	-		
Contrast ratio		CR		650	800	-		Note 3
Color of CIE Coordinate (With B/L & TP)	White	X	Ta = 25 °C $\theta X, \theta Y = 0^\circ$	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 TP) *1	IF		VCC=12.0V PWM="High" (Duty=100%)	650	800	-	cd/m ²	Note1
Uniformity (With TP) *2	ΔB		VCC=12.0V PWM="High" (Duty=100%)	(70)	-	-	%	Note1

Note 1:

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

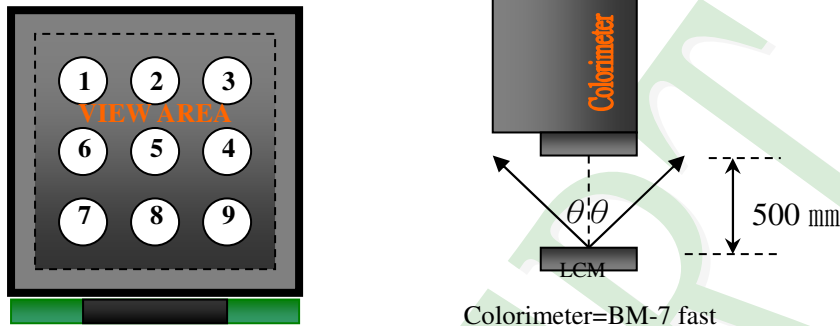
*2 : Measurement Condition for Optical Characteristics:

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

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

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

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



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

Note2: Definition of response time:

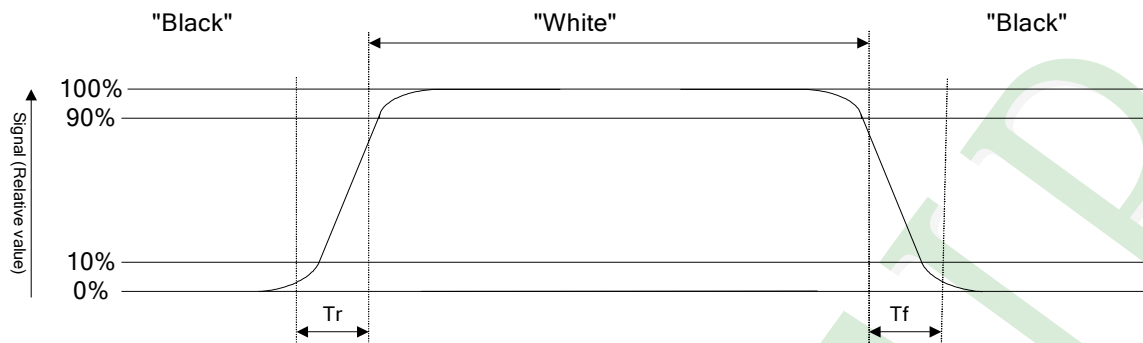
The output signals of photo detector are measured when the input signals are changed from "black" to "white"(falling time) and from "white" to "black"(rising time), respectively. The response time is defined as the time interval between the 10% and 90% of Amplitudes.

Refer to figure as below:

Normally White



Normally Black



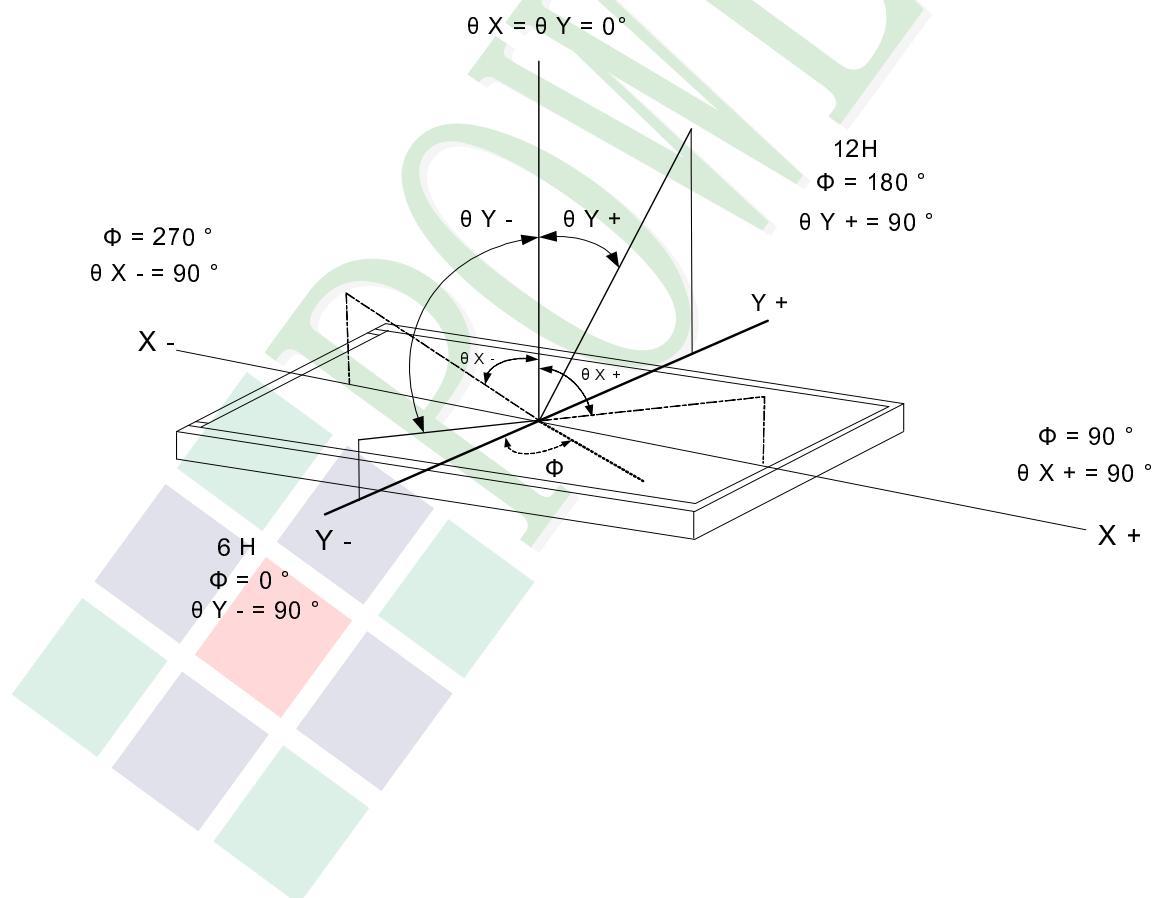
Note3: Definition of contrast ratio:

Contrast ratio is calculated with the following formula

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

Note4: Definition of viewing angle:

Refer to figure as below:



1.6 Backlight Characteristics

Maximum Ratings

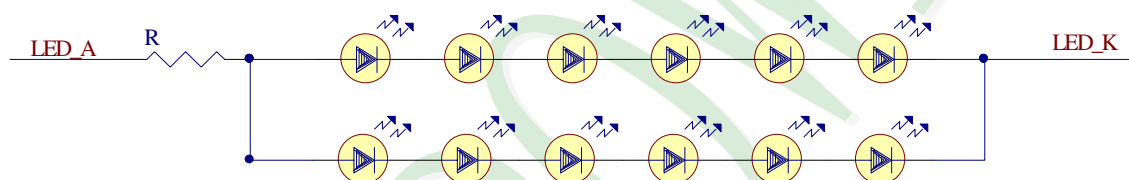
Item	Symbol	Min.	Max.	Unit	Remark
LED Forward Current	I_F	30		mA	One LED
LED Reverse Voltage	V_R	5.0		V	

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 $T_a=25^{\circ}\text{C}$ and $I_L=40\text{ mA}$.

Note 2: The "LED life time" is defined as the module brightness decrease to 50% original brightness at $T_a=25^{\circ}\text{C}$ and $I_L=40\text{ mA}$. The LED life time could be decreased if operating I_L is larger than 40mA.



1.7 Touch Panel Characteristics

Features

Item	Standard Value
Touch Panel Size	3.5"
Touch type	True Multi-Touch Capacitive Touch Panel
Input Method	True Multi-touch with up to 5 Points of Absolution X and Y Coordinates
Output Interface	I ² C
IC	HY4635

I²C 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

Absolute Maximum Ratings

Item	Symbol	Condition	Min.	Max.	Unit
Supply voltage	TPVDD	-	-0.3	3.6	V
Operating Temperature	T _{OP}	Non condensing	-20	70	°C
Storage Temperature	T _{ST}	Non condensing	-30	80	°C

DC Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Power Supply Voltage	TPVDD	-	-	3.3	-	V

Optical Characteristics

Item	Standard Value	Unit
Total light transmittance	85% or more	-
Hardness	≥6H	-

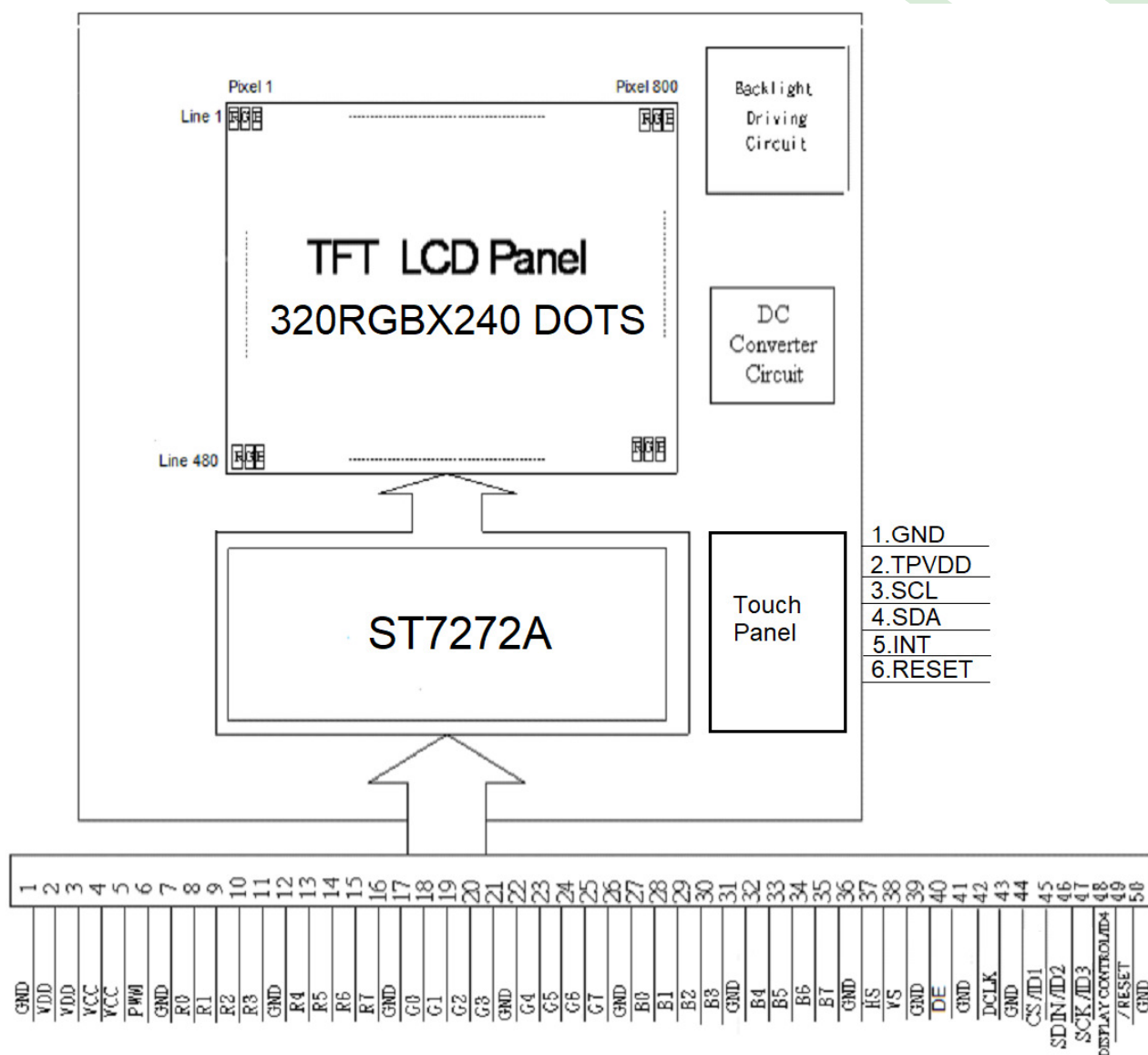
2. MODULE STRUCTURE

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	Display enable pin from controller. Data Input Enable.
42	GND	Power ground.
43	DCLK	Sample clock. Data will be latched at the falling edge of DCLK.
44	GND	Power ground.
45	CS/ ID1	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 ID3
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 .
3. "0"=Pull down , "1"=Pull up

Touch Panel Driving

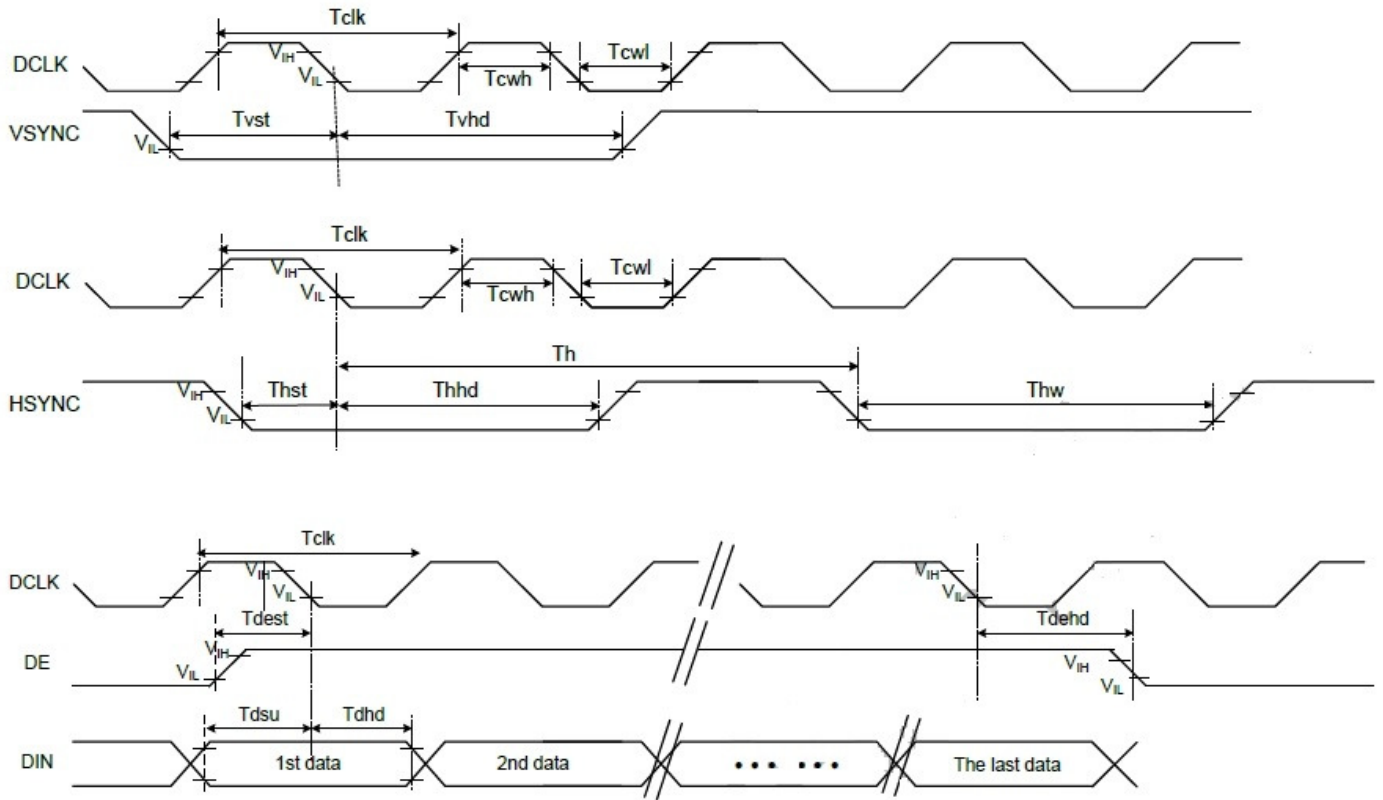
Pin No.	Symbol	Function
1	GND	Ground.
2	TPVDD	Power Supply Voltage (3.3V)
3	SCL	I2C Clock
4	SDA	I2C Data
5	INT	Active Low
6	RESET	Active low global reset signal input.

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

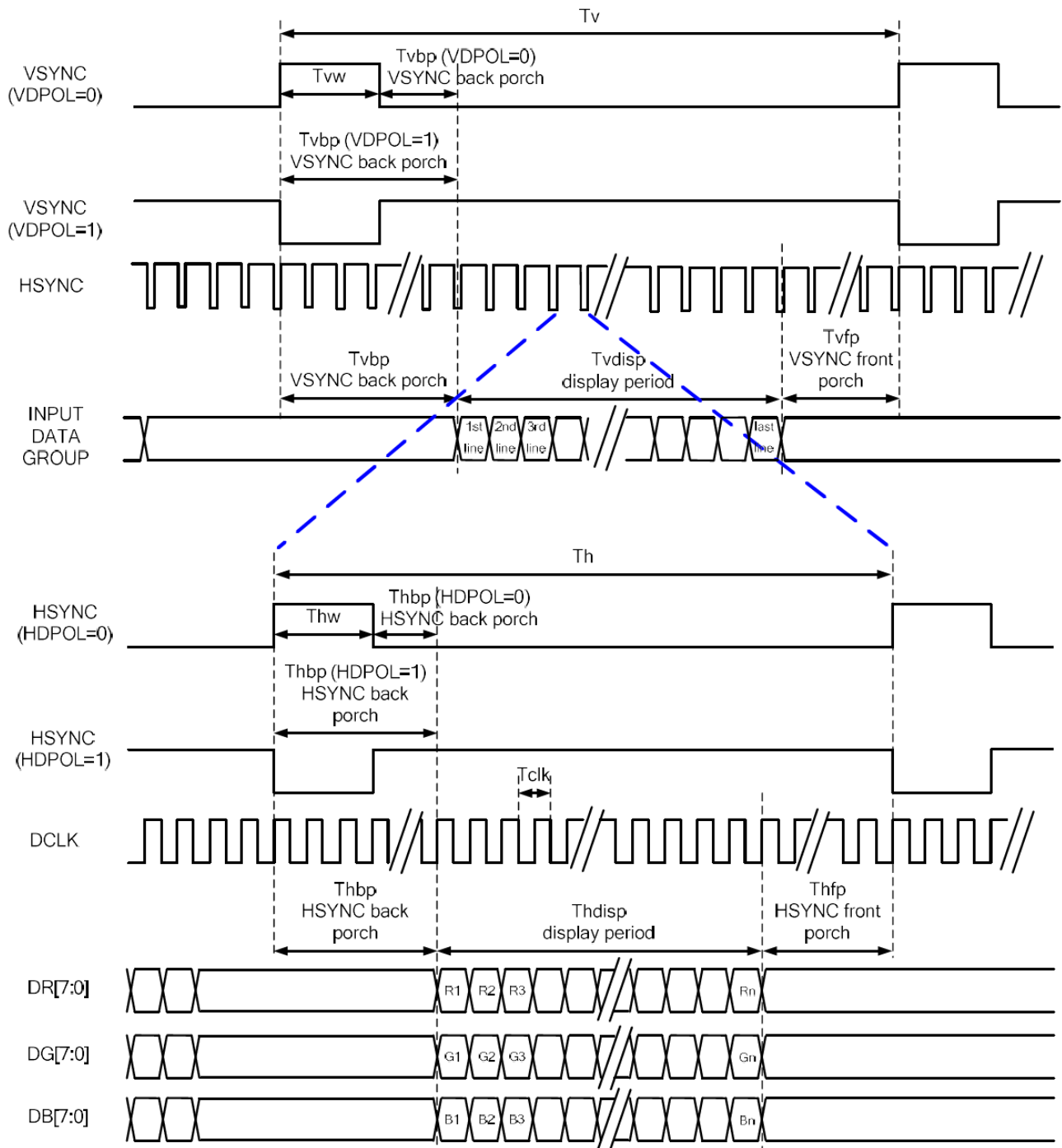
2.3.2 System Bus Timing for RGB Interface



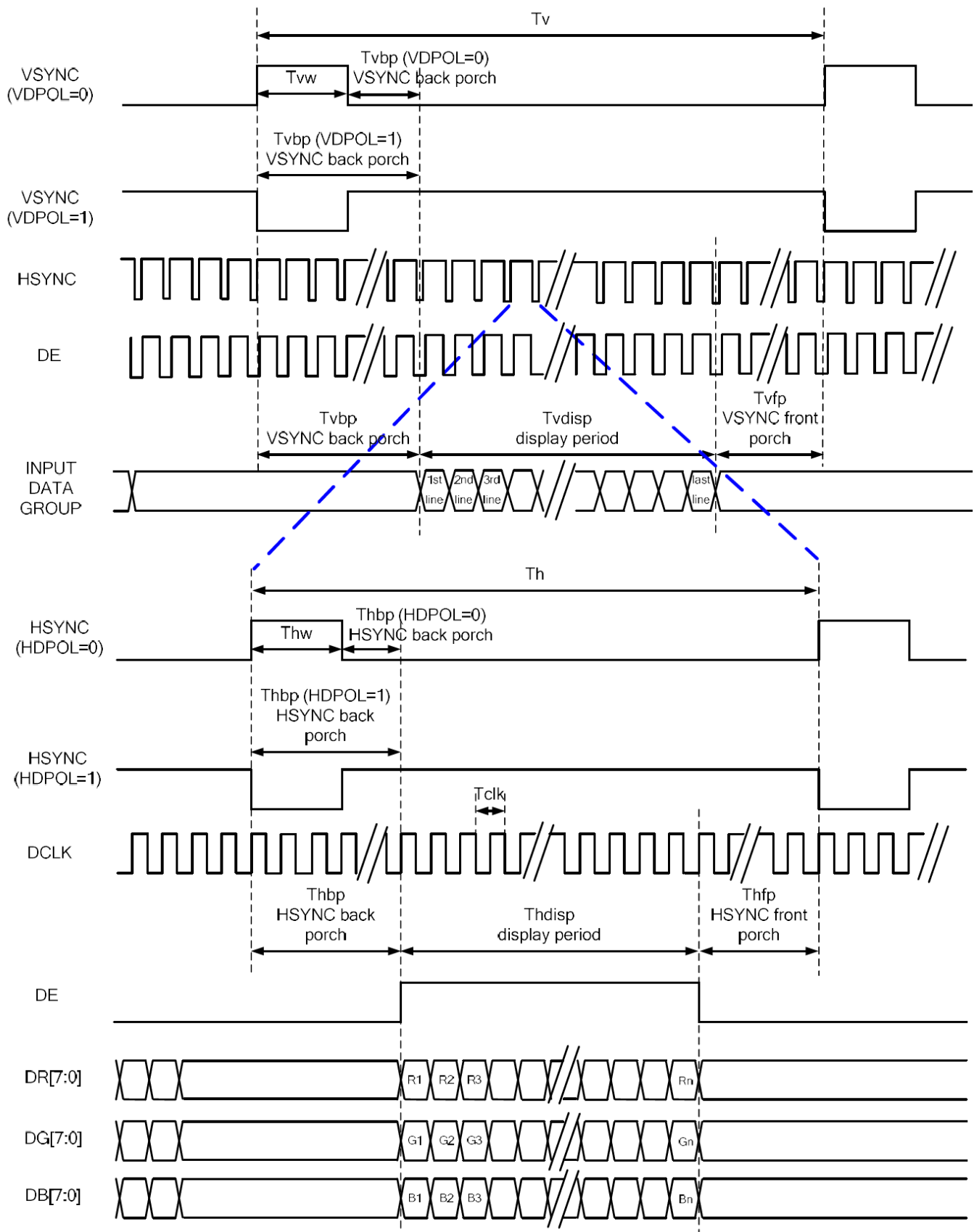
VDD= 3.3V, Ta=25°C

Item	Symbol	Min	Typ.	Max	Unit	Conditions
CLK Pulse Duty	T_{clk}	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}	12	-	-	ns	
DE Hold Time	T_{dehd}	12	-	-	ns	

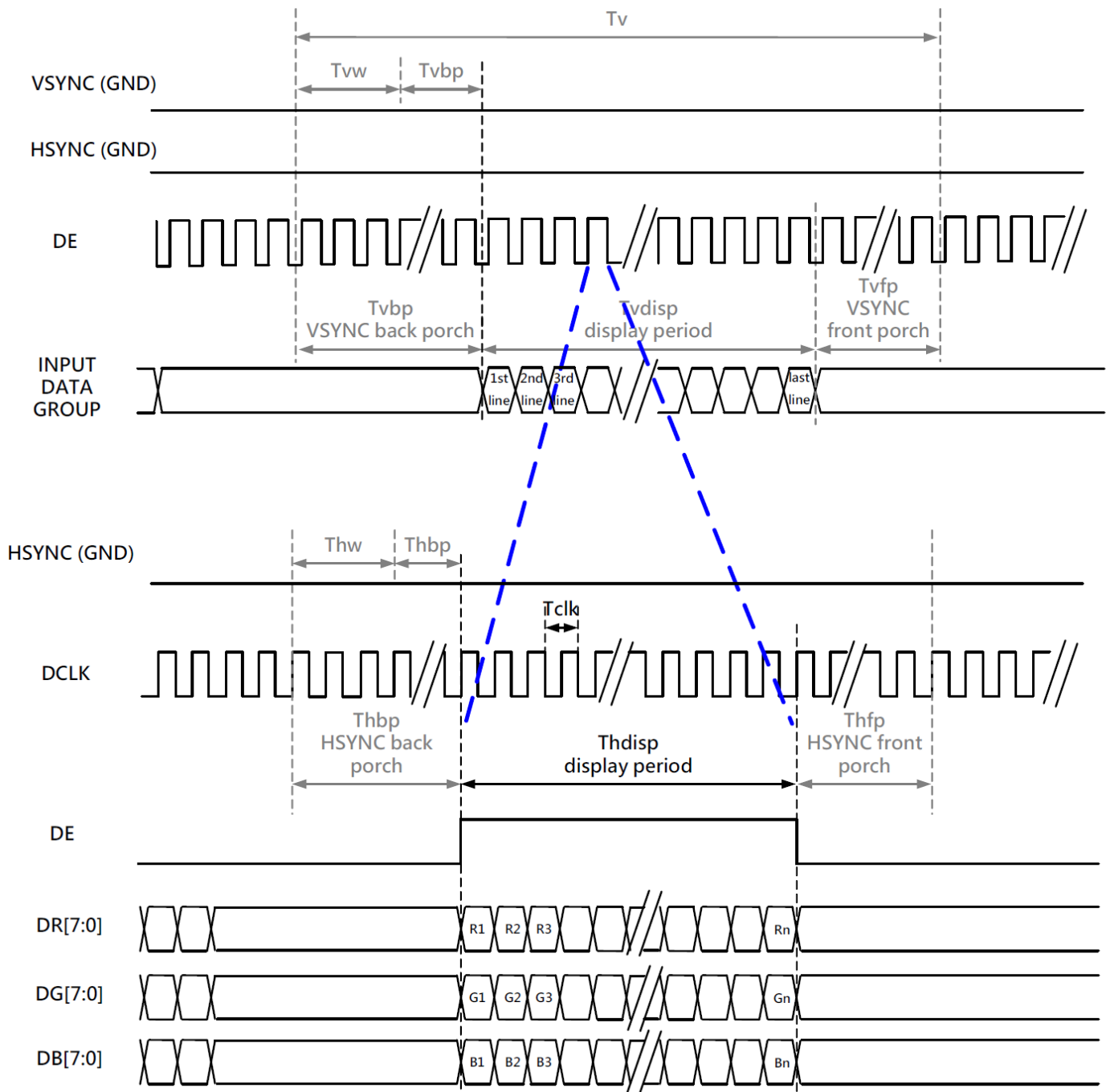
2.3.3 Parallel RGB SYNC Mode



2.3.4 Parallel RGB SYNC-DE Mode



2.3.5 Parallel RGB DE Mode

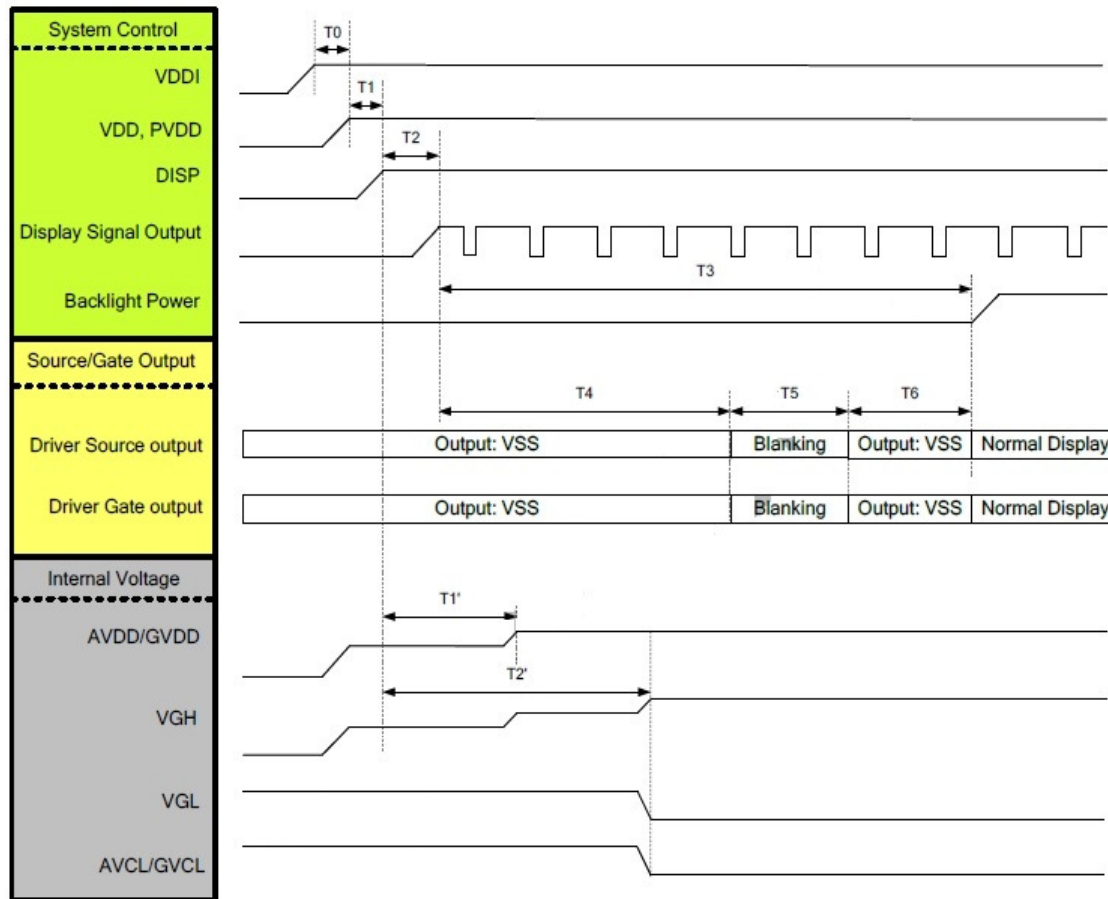


2.3.6 Parallel RGB Input Timing Table

Parallel 24-bit RGB Input Timing Table						
Parameter		Symbol	Min	Typ	Max	Unit
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	
	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	
	Front Porch	Tvfb	2	8	37	
	Pulse Width	Tvw	2	4	12	
						SYNC mode back porch control by H_BLANKING[7:0] setting Thbp= H_BLANKING[7:0]
						SYNC mode back porch control by V_BLANKING[7:0] setting Thbp= V_BLANKING[7:0]

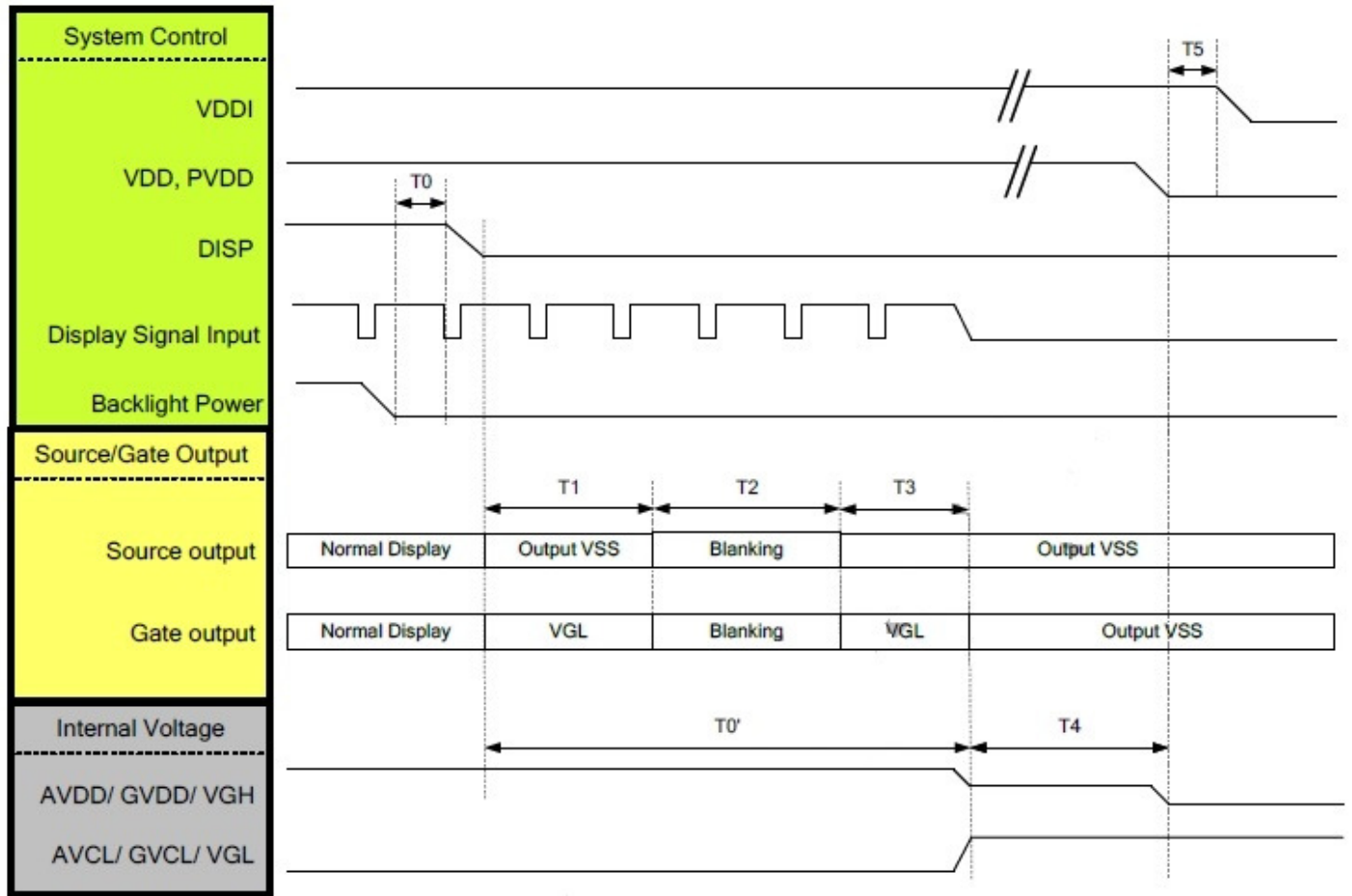
2.3.7 POWER ON/OFF SEQUENCE

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

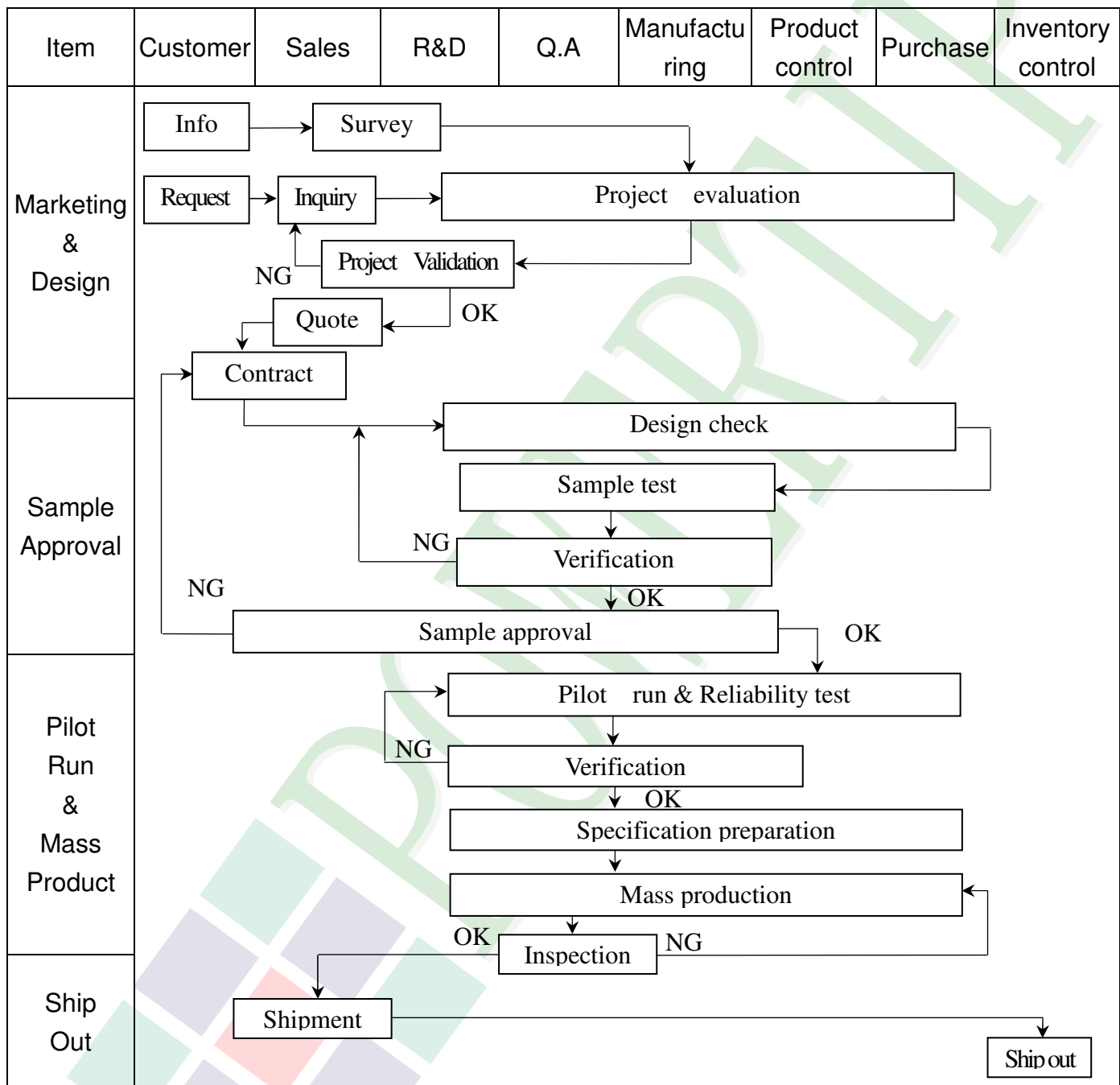
Power OFF Sequence

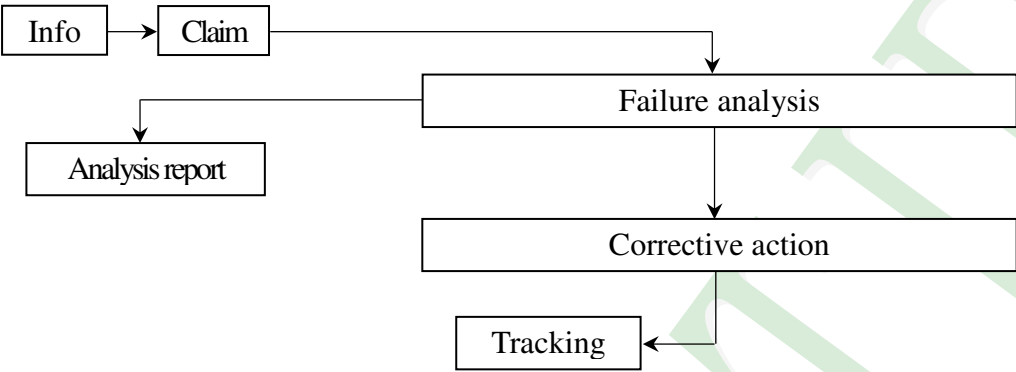


Symbol	Description	Min. Time	Unit
T0	Backlight power off to DISP off	5	ms
T1	Source voltage output VSS and Gate voltage output VGL	30	ms
T2	Source/ Gate blanking time	30	ms
T3	Source voltage output VSS and Gate voltage output VGL	20	ms
T4	AVDD/ GVDD/ VGH discharge time	5	ms
T5	Analog power off to digital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

3. QUALITY ASSURANCE SYSTEM

3.1 Quality Assurance Flow Chart



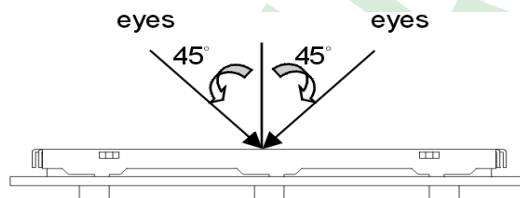
Item	Customer	Sales	R&D	Q.A	Manufacturing	Product control	Purchase	Inventory control
Sales Service	 <pre> graph TD Info[Info] --> Claim[Claim] Claim --> Failure[Failure analysis] Claim --> Report[Analysis report] Failure --> Action[Corrective action] Action --> Tracking[Tracking] </pre>							
Q.A Activity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

3.2. Inspection Specification

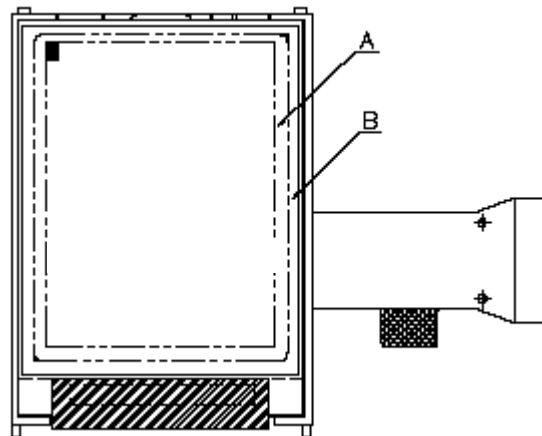
- ◆Scope : The document shall be applied to TFT-LCD Module for 3.5" ~15" (Ver.B01).
- ◆Inspection Standard : MIL-STD-105E Table Normal Inspection Single Sampling Level II.
- ◆Equipment : Gauge 、MIL-STD 、Powertip Tester 、Sample
- ◆Defect Level : Major Defect AQL : 0.4 ; Minor Defect AQL : 1.5
- ◆OUT Going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

a. Manner of appearance test :

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

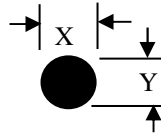
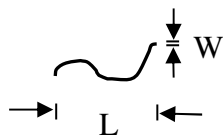
(4). Standard of inspection : (Unit : mm)

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

NO	Item	Criterion	Level												
01	Product condition	1. 1The 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. 1The 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 can not be seen through 5% ND filter. (Mura : Under the normal examination angle of view,the picture has the non-uniform phenomenon.)	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>≤ 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)	Dot Defect	Bright Dot	≤ 4	Dark Dot	≤ 5	Joint Dot	≤ 3	Total	≤ 7	Minor
		Item		Acceptance (Q'ty)											
Dot Defect	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 that can not be seen through 5% ND filter.															

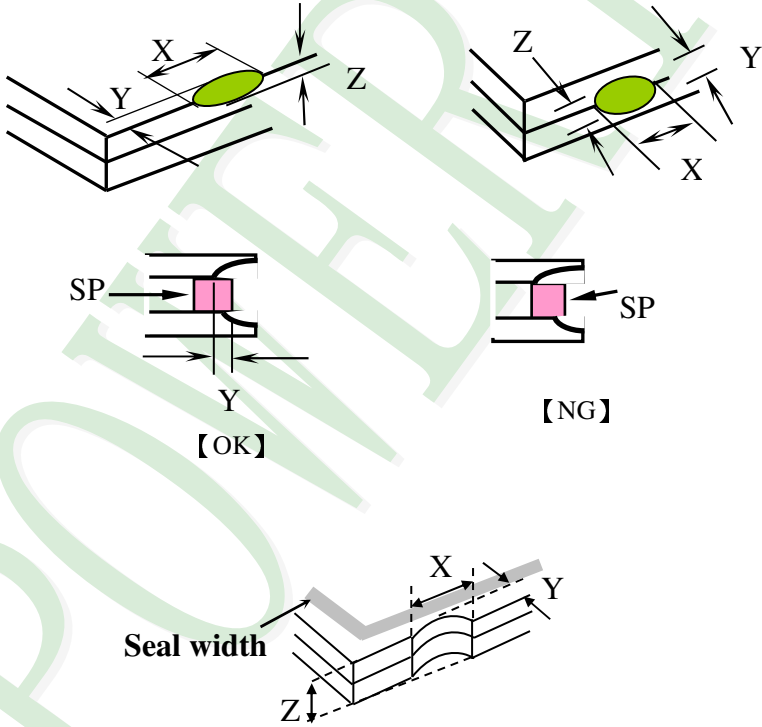
◆Specification For TFT-LCD Module 3.5" ~15" :

(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 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>$W \leq 0.03$</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
		Dimension (diameter : Φ)		Acceptance (Q'ty)																																																			
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07	Polarizer Bubble <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="5">Ignore</td></tr><tr><td>$0.25 < \Phi \leq 0.50$</td><td>4</td></tr><tr><td>$0.50 < \Phi \leq 0.80$</td><td>1</td></tr><tr><td>$\Phi > 0.80$</td><td>0</td></tr><tr><td>Total</td><td>5</td></tr></table>	Dimension (diameter : Φ)	Acceptance (Q'ty)		A area	B area	$\Phi \leq 0.25$	Ignore	Ignore	$0.25 < \Phi \leq 0.50$	4	$0.50 < \Phi \leq 0.80$	1	$\Phi > 0.80$	0	Total	5	Minor																																					
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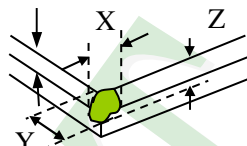
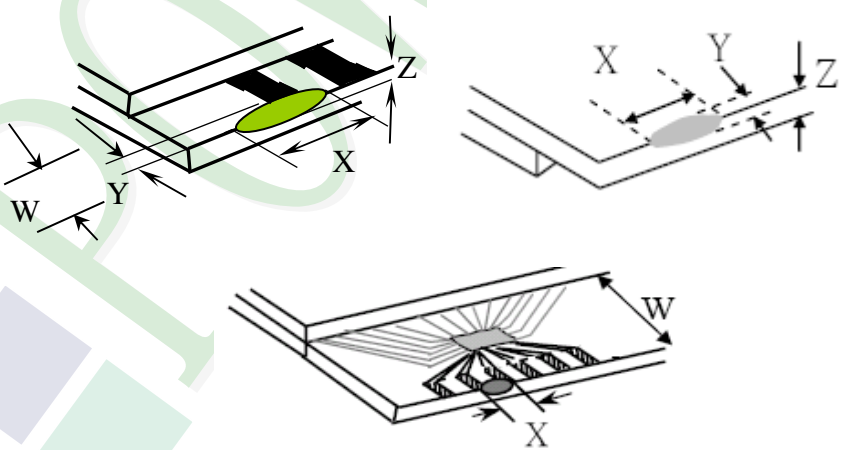
◆Specification For TFT-LCD Module 3.5" ~15" :

(Ver.B01)

NO	Item	Criterion	Level						
08	The crack of glass	Symbols : X : The length of crack Z : The thickness of crack t : The thickness of glass Y : The width of crack. W : terminal length a : LCD side length	Minor						
		8.1 General glass chip : 8.1.1 Chip on panel surface and crack between panels:  <table><tr><th>X</th><th>Y</th><th>Z</th></tr><tr><td>$\leq a$</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></table>		X	Y	Z	$\leq a$	Crack can't enter viewing area	$\leq 1/2 t$
X	Y	Z							
$\leq a$	Crack can't enter viewing area	$\leq 1/2 t$							
$\leq a$	Crack can't exceed the half of SP width.	$1/2 t < Z \leq 2 t$							

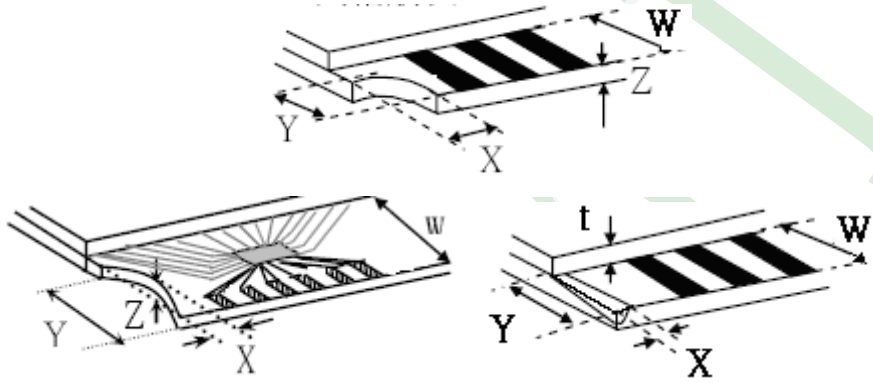
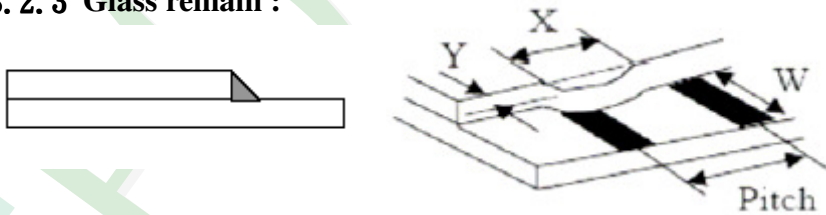
◆Specification For TFT-LCD Module 3.5" ~15" :

(Ver.B01)

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><tr><th>X</th><th>Y</th><th>Z</th></tr><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></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
		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.	$1/2 t < Z \leq 2 t$										
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>$\leq a$</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></table>		X	Y	Z	Front	$\leq a$	$\leq 1/2 W$	$\leq t$	Back	$\leq a$	$\leq W$	$\leq 1/2 t$
	X	Y	Z									
Front	$\leq a$	$\leq 1/2 W$	$\leq t$									
Back	$\leq a$	$\leq W$	$\leq 1/2 t$									

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

(Ver.B01)

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 border="1"> <tr> <th>X</th> <th>Y</th> <th>Z</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 border="1"> <tr> <th>X</th> <th>Y</th> <th>Z</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	X	Y	Z	$\leq 1/3 a$	$\leq W$	$\leq t$	X	Y	Z	$\leq a$	$\leq 1/3 W$	$\leq t$	Minor
		X	Y	Z											
$\leq 1/3 a$	$\leq W$	$\leq t$													
X	Y	Z													
$\leq a$	$\leq 1/3 W$	$\leq t$													

◆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 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)

NO.	TEST ITEM	TEST CONDITION											
1	High Temperature Storage Test	Keep in +80 ±2℃ 240 hrs Surrounding temperature, then storage at normal condition 4hrs.											
2	Low Temperature Storage Test	Keep in -30 ±2℃ 240 hrs Surrounding temperature, then storage at normal condition 4hrs.											
3	High Temperature / High Humidity Storage Test	Keep in +60℃ / 90% R.H duration for 240 hrs Surrounding temperature, then storage at normal condition 4hrs. (Excluding the polarizer)											
4	ESD Test	Air Discharge: (include mobile phone) Apply 2 KV with 5 times Discharge for each polarity +/-	Contact Discharge: (include mobile phone) Apply 250V 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 s) (Tolerance if the output voltage indication: ±5%)											
5	Temperature Cycling Storage Test	-30℃ → +25℃ → +80℃ → +25℃ (30mins) (5mins) (30mins) (5mins) ← 20 Cycle → Surrounding temperature, then storage at normal condition 4hrs.											
6	Vibration Test (Packaged)	1. Sine wave 10~55 Hz frequency (1 min) 2. The amplitude of vibration :1.5 mm 3. Each direction (X、Y、Z) duration for 2 Hrs											
7	Drop Test (Packaged)	<table><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 1times		Packing Weight (Kg)	Drop Height (cm)	0 ~ 45.4	122	45.4 ~ 90.8	76	90.8 ~ 454	61	Over 454	46
Packing Weight (Kg)	Drop Height (cm)												
0 ~ 45.4	122												
45.4 ~ 90.8	76												
90.8 ~ 454	61												
Over 454	46												

5. PRECAUTION RELATING PRODUCT HANDLING

5.1 SAFETY

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

5.2 HANDLING

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

5.3 STORAGE

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

5.4 TERMS OF WARRANTY

5.4.1 Applicable warrant period

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

5.4.2 Unaccepted responsibility

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

[illegible]

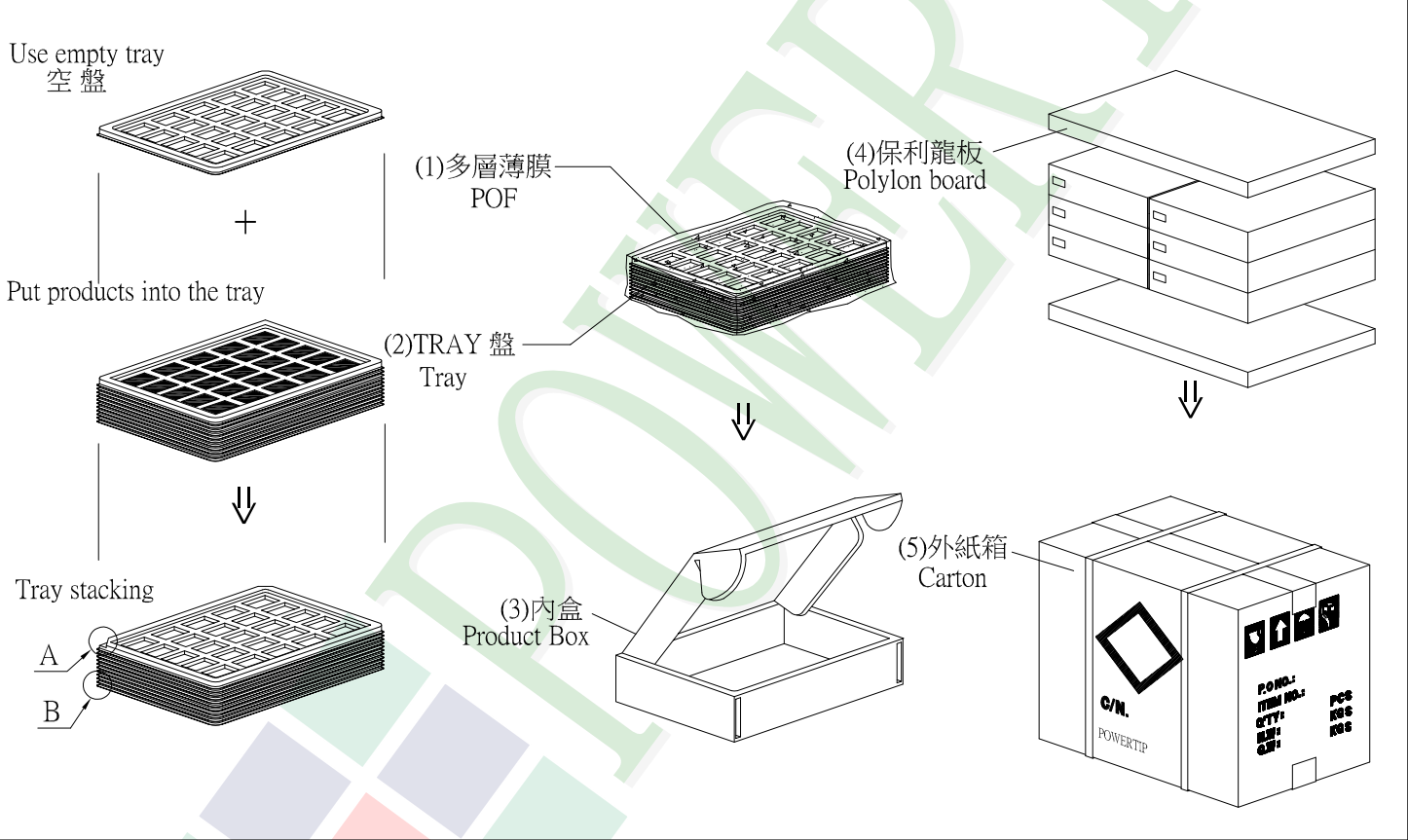
1.包裝材料規格表 (Packaging Material) : (per carton)

No.	Item	Model	Dimensions (mm)	1Pcs Weight	Quantity	Total Weight
1	成品 (LCM)	PH320240T028-ZHC01	76.9X63.9X5.05	0.046	252	11.592
2	多層薄膜(1)POF	OTFILM0BA03ABA	19"X350X0.015	——	6	——
3	TRAY 盤 (2)Tray	TYSG000000137	352 X 260 X 12.3	0.1	48	4.8
4	內盒(3)Product Box	BX36627063ABBA	393 X 274 X 68	0.182	6	1.092
5	保利龍板(4)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) : 18.54 Kg±10%

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

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



特 記 事 項 (REMARK)

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.