

SPECIFICATIONS

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MASS PRODUCTION CODE	:	PH320480T009-LAC11
SAMPLE VERSION	:	01
SPECIFICATIONS EDITION	:	002
DRAWING NO. (Ver.)	:	JLMD-PH320480T009-LAC11_002
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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]

Total: 29 Page

Contents

1. SPECIFICATIONS

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

2. MODULE STRUCTURE

- 2.1 Counter Drawing
- 2.2 Interface Pin Description
- 2.3 Timing Characteristics

3. QUALITY ASSURANCE SYSTEM

- 3.1 Quality Assurance Flow Chart
- 3.2 Inspection Specification

4. RELIABILITY TEST

- 4.1 Reliability Test Condition

5. PRECAUTION RELATING PRODUCT HANDLING

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

Appendix :

- 1. LCM Drawing
- 2. LCM Packaging

Note : For detailed information please refer to IC data sheet : ST7796S-G5

1. SPECIFICATIONS

1.1 Features

Main LCD panel

Item	Standard Value
Display Type	320 * 3 (RGB) * 480 Dots
LCD Type	a-Si TFT , Normally white, Transmissive type
Screen size(inch)	3.5 inch
Viewing Direction	12 O'clock
Color configuration	RGB-Strip
Interface	Parallel 8080-series MCU Interface (8-bit, 9-bit, 16-bit, and 18-bit) 16/18 RGB Interface Serial Peripheral Interface (SPI Interface)
Other(controller/driver IC)	ST7796S-G5
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	58.4(W) x 93.4 (L) x 3.95(H)	mm
Viewing Area	49.96(W) x 74.44(L)	mm
Active Area	48.96(W) x 73.44(L)	mm

Note : For detailed information please refer to LCM drawing

1.3 Absolute Maximum Ratings

Module

Item	Symbol	Condition	Min.	Max.	Unit
Supply Voltage	VDD	-	-0.3	+4.6	V
Supply Voltage(I/O)	VDDI	-	-0.3	+4.6	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	%

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
Supply Voltage	VDD	-	2.5	2.8	3.3	V
Supply Voltage(I/O)	VDDI	-	1.65	1.8	3.3	V
Input High Voltage	V _{IH}	-	0.7 VDDI	-	VDDI	V
Input Low Voltage	V _{IL}	-	GND	-	0.3 VDDI	V
Output High Voltage	V _{OH}	I _{OH} =-0.1mA	0.8*VDDI	-	VDDI	V
Output Low Voltage	V _{OL}	I _{OL} =+0.1mA	GND	-	0.2*VDDI	V
Supply Current	I _{DD}	-	-	16	25	mA

1.5 Optical Characteristics

TFT LCD Module

VDD=VDDI = 3.3V, Ta=25°C

Item		Symbol	Condition	Min.	Typ.	Max.	unit	-
Response time		Tr+ Tf	-	-	25	38	ms	Note2
Viewing angle	Top	θY+	-	-	60	-	Deg.	Note4
	Bottom	θY-		-	60	-		
	Left	θX-		-	60	-		
	Right	θX+		-	60	-		
Contrast ratio		CR	-	500	600	-	-	Note3
Color of CIE Coordinate (BL & LCD & TP)	White	X	IF=120 mA	0.24	0.29	0.34	-	Note1
		Y		0.26	0.31	0.36		
	Red	X		0.54	0.59	0.64		
		Y		0.29	0.34	0.39		
	Green	X		0.28	0.33	0.38		
		Y		0.57	0.62	0.67		
	Blue	X		0.10	0.15	0.20		
		Y		0.01	0.06	0.11		
Average Brightness (BL & LCD & TP) *1		IV	IF=120 mA	260	360	-	cd/m ²	
Uniformity (With LCD) *2		△B	IF=120 mA	70	-	-	%	

Note 1:

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

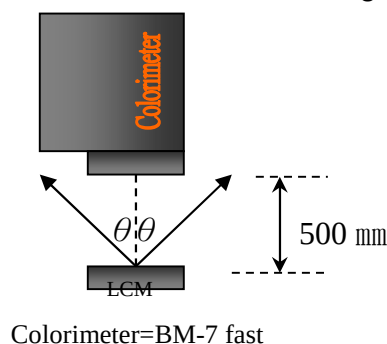
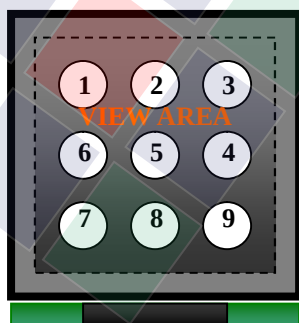
*2 : Measurement Condition for Optical Characteristics:

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%

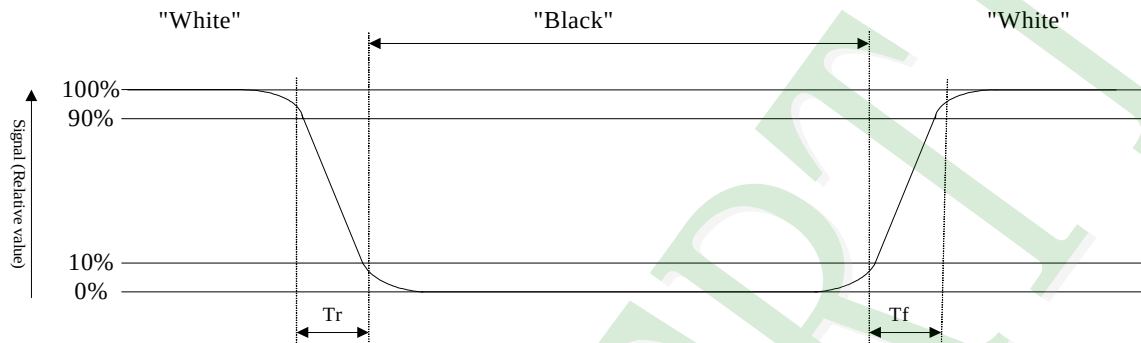


To be measured at the center area of panel with a viewing cone of 1° by Topcon luminance meter BM-7, after 10 minutes operation (module)

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:



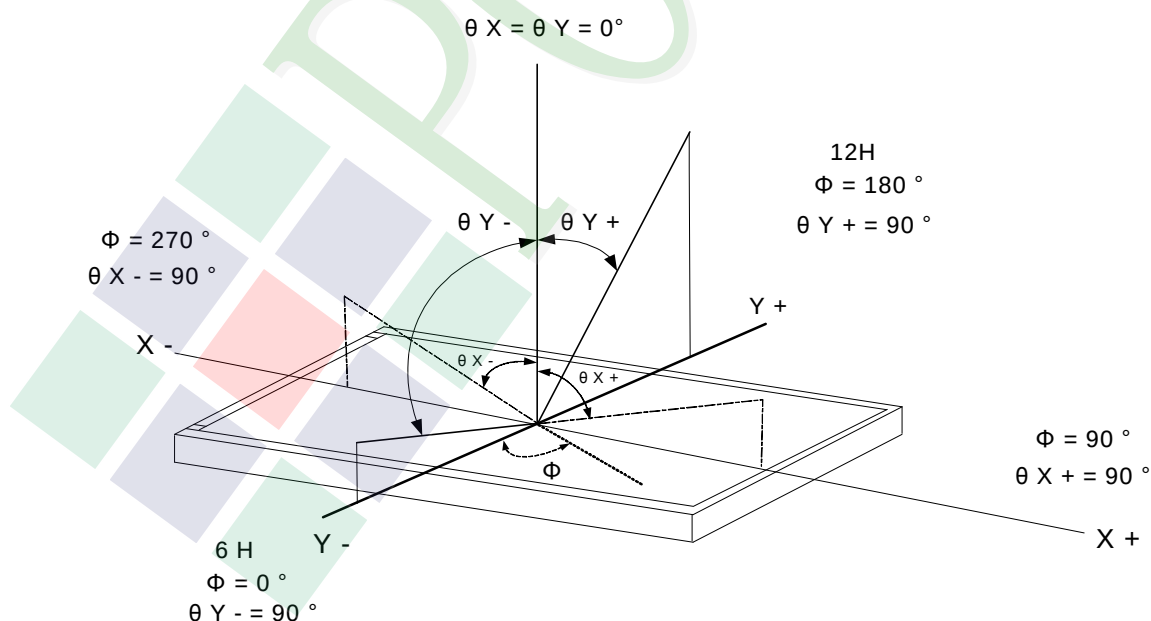
Note3: Definition of contrast ratio:

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

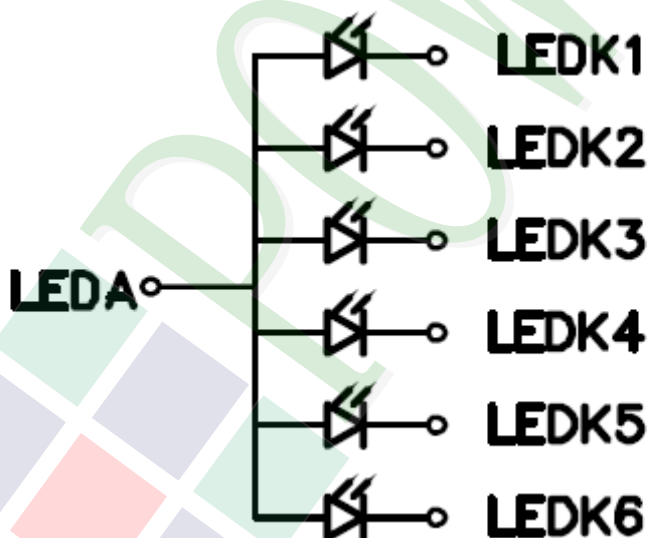
Maximum Ratings

Item	Symbol	Conditions	Min.	Max.	Unit
Forward Current	IF	Ta =25℃	-	25*6	mA
Reverse Voltage	VR	Ta =25℃	-	4	V
Power Dissipation	PD	Ta =25℃	-	540	mW

Electrical / Optical Characteristics

Electrical / Optical Characteristics						
Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Forward Voltage	VF	IF= 120 mA	2.8	3.2	3.6	V
Average Brightness (Without LCD)	IV		6000	7200	-	cd/m ²
CIE Color Coordinate (Without LCD)	X		0.26	0.28	0.32	-
	Y		0.26	0.28	0.32	
Color	White					

Circuit diagram:



Item	Conditions	Description
Life Time	Ta =25℃ IF= 120 mA	20000 hrs

1.7 Touch Panel Characteristics

Features

Item	Standard Value
Touch Panel Size	3.5"
Touch type	Capacitive Touch Panel
Input Method	True Multi-Touch Capacitive Touch Panel True Multi-touch with up to 5 Points of Absolution
Output Interface	I ² C
IC	ST1633

I²C Address

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

Bit 0: 0 for Write / 1 for Read

Mechanical Specifications

Item	Standard Value	Unit
Outline Dimension	93.4mm(L) x 58.4mm(W)	mm
Sensor Dimension	87.90mm(L)x 58.00mm(W)	mm
View Area	74.44mm(L) x 49.96mm(W)	mm
Active Area	75.44mm(L) x 50.96mm(W)	

DC Electrical Characteristics

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

Optical Characteristics

Item	Standard Value	Unit
Response Time	≤5ms	
Transparency	85% or more	-
Surface Hardness	≥6H	

PIN Definition

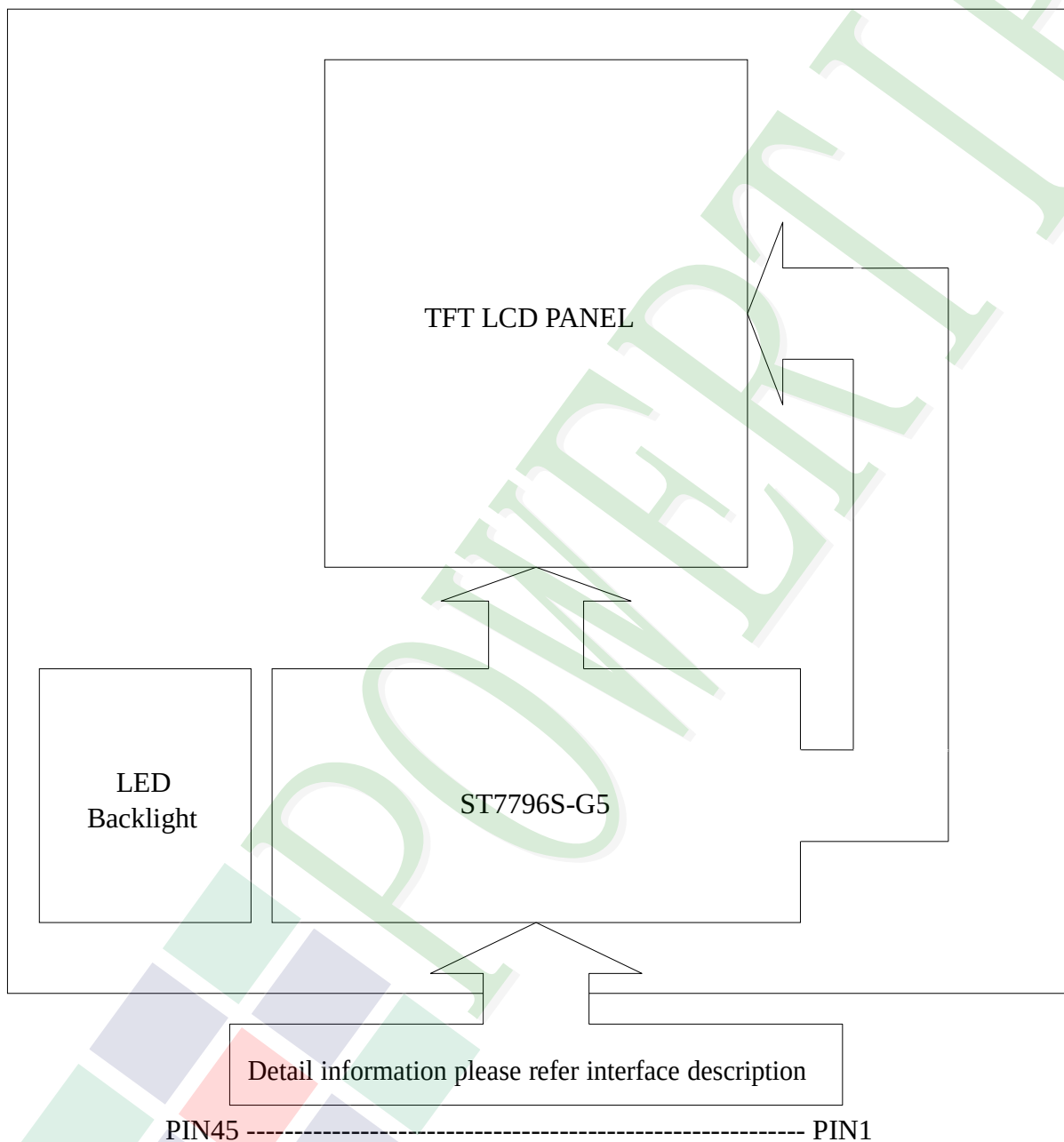
Pin No.	Symbol	Function
1	INT	External interrupt to the host
2	RST	External Reset Low is active
3	SDA	I2C Serial Data Input And Output
4	SCL	I2C Serial Clock Input
5	TPGND	TP Ground Supply
6	TPVDD	TP Voltage

2.1 Counter Drawing

2.1.1 LCM Mechanical Diagram

* See Appendix

2.1.2 Block Diagram



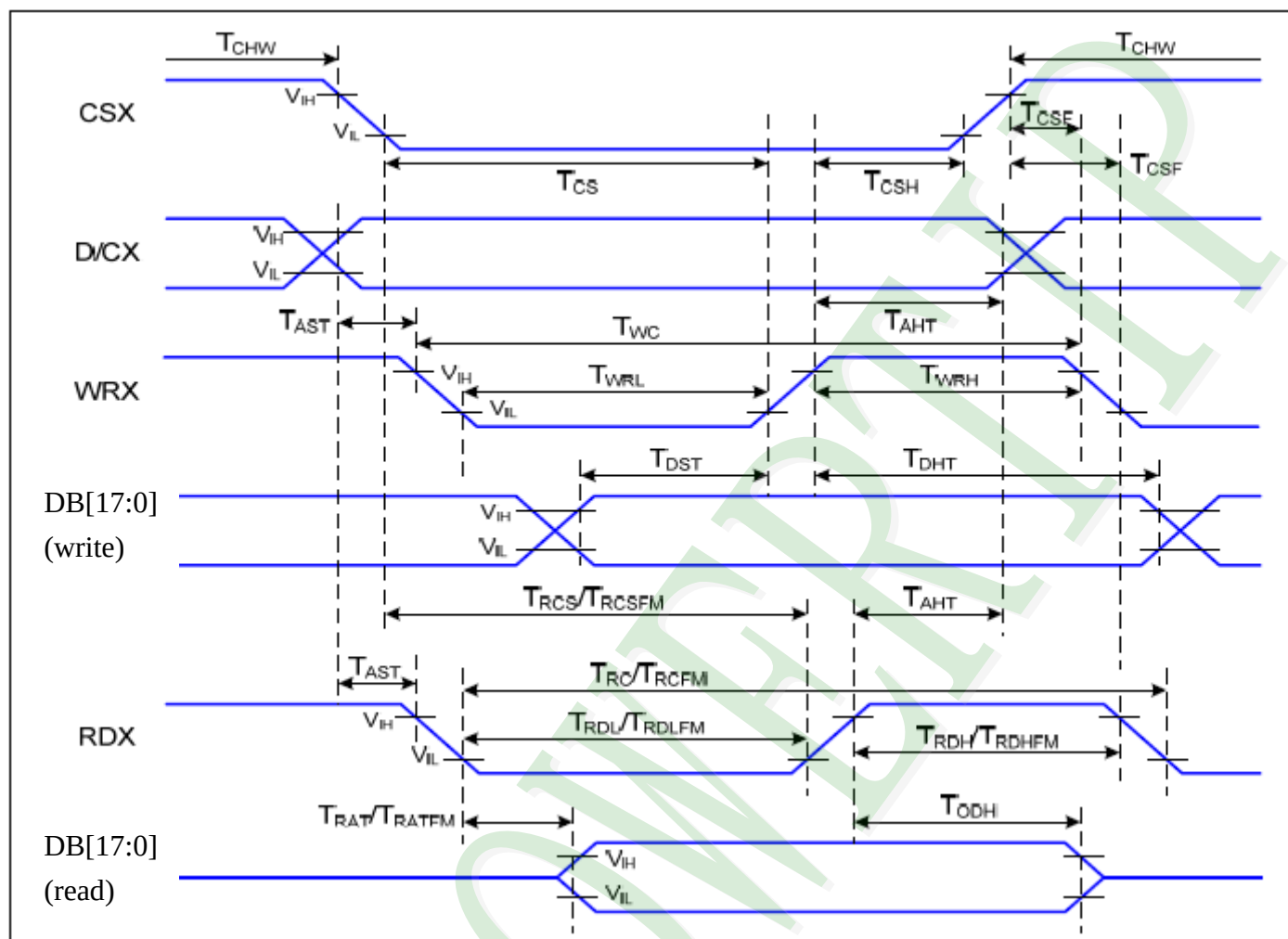
2.2 Interface Pin Description

Pin No.	Symbol	Function
1	LEDK6-	Power supply for LED Backlight cathode input
2	LEDK5-	
3	LEDK4-	
4	LEDK3-	
5	LEDK2-	
6	LEDK1-	
7	LEDA	Power supply for LED Backlight anode input
8	GND	Ground
9	VDD	Power supply for analog and booster circuits
10	VDDI	Power supply for I/O system. VDDI must be lower than or equal to VDD.
11	TE	Tearing Effect output signal. Leave the pin open when not in use.
12	CSX	Chip selection pin. Low-active. If not used, please fix this pin at VDDI or DGND level.
13	DCX	Display data/command selection (RS) pin in MCU interface. DCX='1': display data or parameter. DCX='0': register index / command. If not used, please fix this pin at VDDI or DGND level.
14	WRX/SCL	Write enable in MCU parallel interface. In SPI mode, this pin is used as SCL. If not used, please fix this pin at VDDI or DGND level.
15	RDX	Read enable in 8080 MCU parallel interface. Low-active. If not used, please fix this pin at VDDI or DGND level.
16	SDA	SPI interface input/output pin. The data is latched on the rising edge of the SCL signal. If not used, please fix this pin at VDDI or DGND level.
17	SDO	SPI interface output pin. The data is outputted on the falling edge of the SCL signal. If not used, please fix this pin at floating.
18	DB0	Data bus Fix to GND level when not in use.
19	DB1	
20	DB2	
21	DB3	

22	DB4	Data bus Fix to GND level when not in use.																																								
23	DB5																																									
24	DB6																																									
25	DB7																																									
26	DB8																																									
27	DB9																																									
28	DB10																																									
29	DB11																																									
30	DB12																																									
31	DB13																																									
32	DB14	<table><tr><th>IM2</th><th>IM1</th><th>IM0</th><th>MPU Interface Mode</th><th>Data pin</th></tr><tr><td>0</td><td>0</td><td>0</td><td>8080 18-bit Interface</td><td>DB[17:0]</td></tr><tr><td>0</td><td>0</td><td>1</td><td>8080 9-bit Interface</td><td>DB[8:0]</td></tr><tr><td>0</td><td>1</td><td>0</td><td>8080 16-bit Interface</td><td>DB[15:0]</td></tr><tr><td>0</td><td>1</td><td>1</td><td>8080 8-bit Interface</td><td>DB[7:0],</td></tr><tr><td>1</td><td>0</td><td>0</td><td>Reserve</td><td>--</td></tr><tr><td>1</td><td>0</td><td>1</td><td>3SPI</td><td>SDA, SDO</td></tr><tr><td>1</td><td>1</td><td>1</td><td>4Line SPI</td><td>SDA, SDO</td></tr></table>	IM2	IM1	IM0	MPU Interface Mode	Data pin	0	0	0	8080 18-bit Interface	DB[17:0]	0	0	1	8080 9-bit Interface	DB[8:0]	0	1	0	8080 16-bit Interface	DB[15:0]	0	1	1	8080 8-bit Interface	DB[7:0],	1	0	0	Reserve	--	1	0	1	3SPI	SDA, SDO	1	1	1	4Line SPI	SDA, SDO
IM2	IM1	IM0	MPU Interface Mode	Data pin																																						
0	0	0	8080 18-bit Interface	DB[17:0]																																						
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1	1	1	4Line SPI	SDA, SDO																																						
33	DB15																																									
34	DB16																																									
35	DB17																																									
36	ENABLE	Data enable signal for RGB interface operation. If not used, please fix this pin at VDDI or DGND.																																								
37	DOTLCK	Dot clock signal for RGB interface operation. If not used, please fix this pin at VDDI or DGND.																																								
38	HSYNC	Horizontal synchronizing input signal for RGB interface operation. If not used, please fix to VDDI or DGND.																																								
39	GND	Ground																																								
40	VSYNC	Vertical synchronizing input signal for RGB interface operation. If not used, please fix to the VDDI or DGND.																																								
41	RESET	This signal will reset the device and it must be applied to properly initialize the chip. Signal is active low.																																								
42	IM2	The MCU interface mode select.																																								
43	IM1																																									
44	IM0																																									
45	GND	Ground																																								

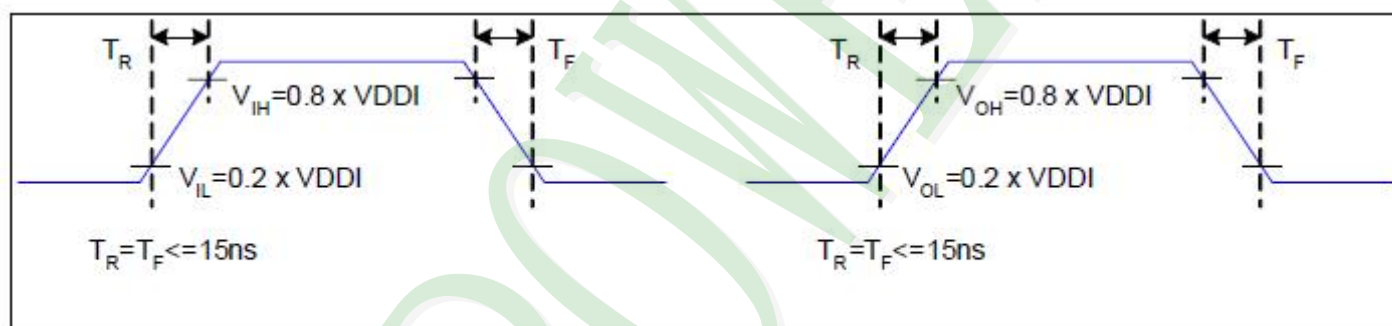
2.3 Timing Characteristics

8080 Series MCU Parallel Interface Characteristics: 18/16/9/8-bit Bus



Signal	Symbol	Parameter	Min	Max	Unit	Description
D/CX	T_{AST}	Address setup time	0		ns	
	T_{AHT}	Address hold time (Write/Read)	10		ns	
CSX	T_{CHW}	Chip select "H" pulse width	0		ns	
	T_{CS}	Chip select setup time (Write)	15		ns	
	T_{RCS}	Chip select setup time (Read ID)	45		ns	
	T_{RCSFM}	Chip select setup time (Read FM)	355		ns	
	T_{CSF}	Chip select wait time (Write/Read)	10		ns	
	T_{CSH}	Chip select hold time	10		ns	
WRX	T_{WC}	Write cycle	66		ns	
	T_{WRH}	Control pulse "H" duration	15		ns	

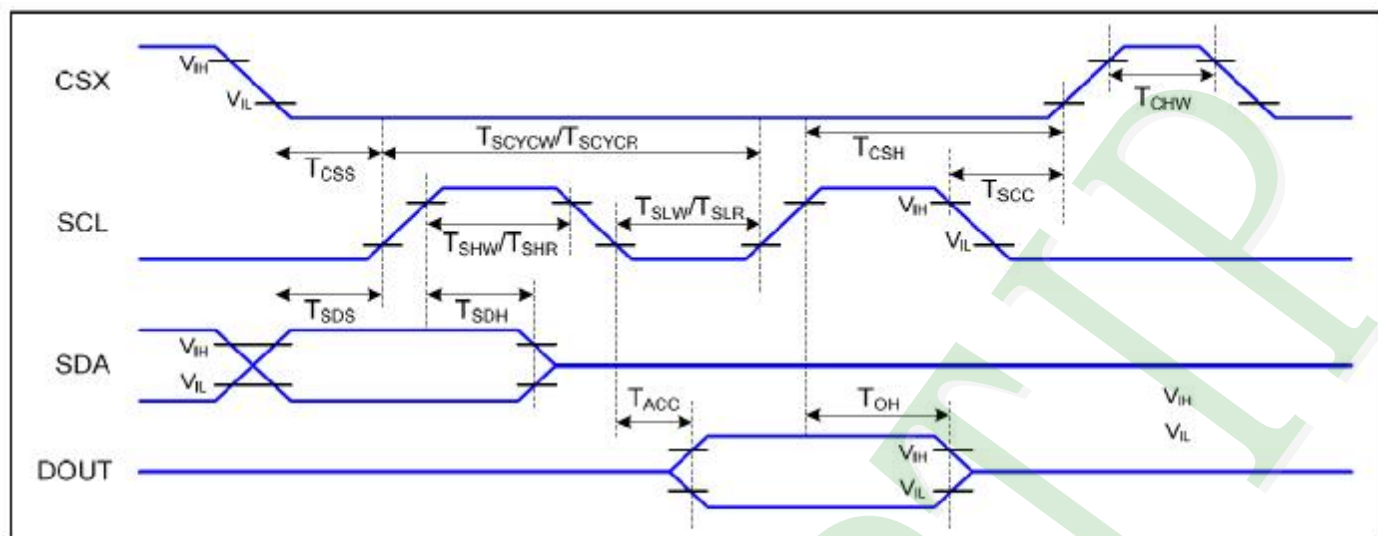
	T_{WRL}	Control pulse "L" duration	15		ns	
RDX (ID)	T_{RC}	Read cycle (ID)	160		ns	When read ID data
	T_{RDH}	Control pulse "H" duration (ID)	90		ns	
	T_{RDL}	Control pulse "L" duration (ID)	45		ns	
RDX (FM)	T_{RCFM}	Read cycle (FM)	450		ns	When read from frame memory
	T_{RDHFM}	Control pulse "H" duration (FM)	90		ns	
	T_{RDLFM}	Control pulse "L" duration (FM)	355		ns	
DB[17:0]	T_{DST}	Data setup time	10		ns	For CL=30pF
	T_{DHT}	Data hold time	10		ns	
	T_{RAT}	Read access time (ID)	-	40	ns	
	T_{RATFM}	Read access time (FM)	-	340	ns	
	T_{ODH}	Output disable time	20	80	ns	



Rising and Falling Timing for I/O Signal

Note: The rising time and falling time (T_r , T_f) of input signal and fall time are specified at 15 ns or less. Logic high and low levels are specified as 20% and 80% of VDDI for Input signals.

3-SPI Serial Data Transfer Interface Characteristics:



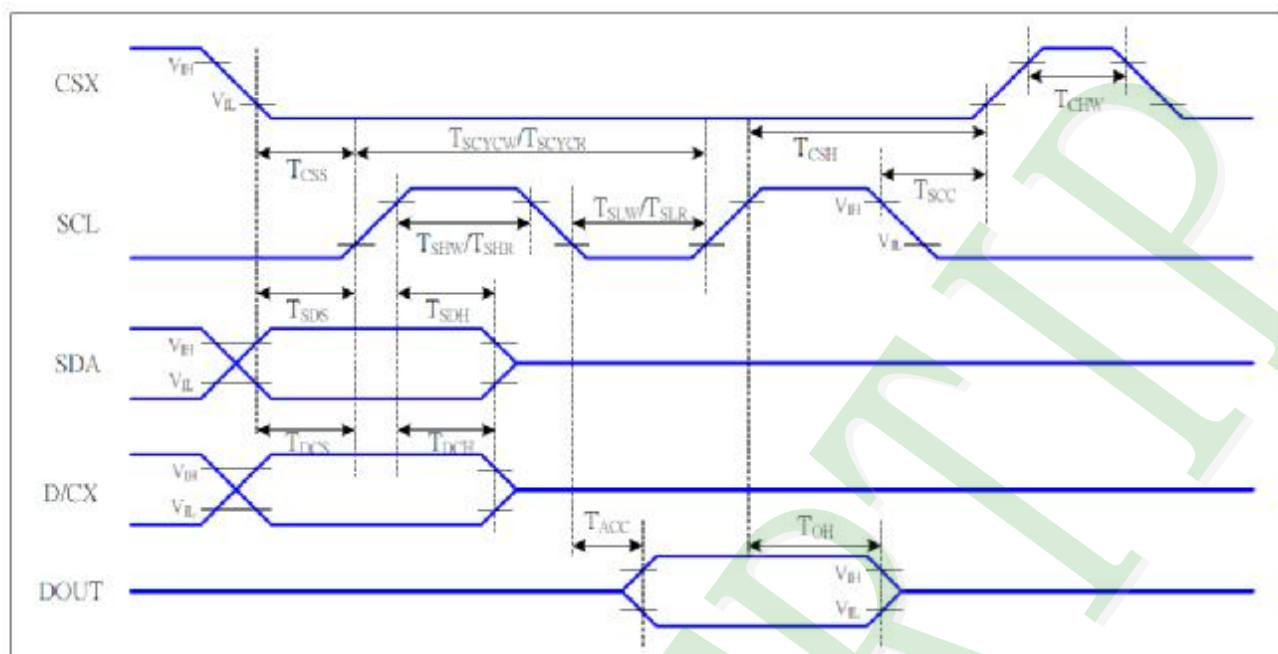
3-SPI Interface Timing Characteristics

VDDI=1.8V, VDDA=2.8V, AGND=DGND=0V, Ta=25 °C

Signal	Symbol	Parameter	Min	Max	Unit	Description
CSX	T_{CSS}	Chip select setup time (write)	15		ns	
	T_{CSH}	Chip select hold time (write)	15		ns	
	T_{CSS}	Chip select setup time (read)	60		ns	
	T_{SCC}	Chip select hold time (read)	65		ns	
	T_{CHW}	Chip select "H" pulse width	40		ns	
SCL	T_{SCYCW}	Serial clock cycle (Write)	66		ns	
	T_{SHW}	SCL "H" pulse width (Write)	15		ns	
	T_{SLW}	SCL "L" pulse width (Write)	15		ns	
	T_{SCYCR}	Serial clock cycle (Read)	150		ns	
	T_{SHR}	SCL "H" pulse width (Read)	60		ns	
	T_{SLR}	SCL "L" pulse width (Read)	60		ns	
SDA (DIN) DOUT	T_{SDS}	Data setup time	10		ns	For maximum CL=30pF For minimum CL=8pF
	T_{SDH}	Data hold time	10		ns	
	T_{ACC}	Access time	10	50	ns	
	T_{OH}	Output disable time	15	50	ns	

3-SPI Interface Characteristics

4-SPI Serial Data Transfer Interface Characteristics:

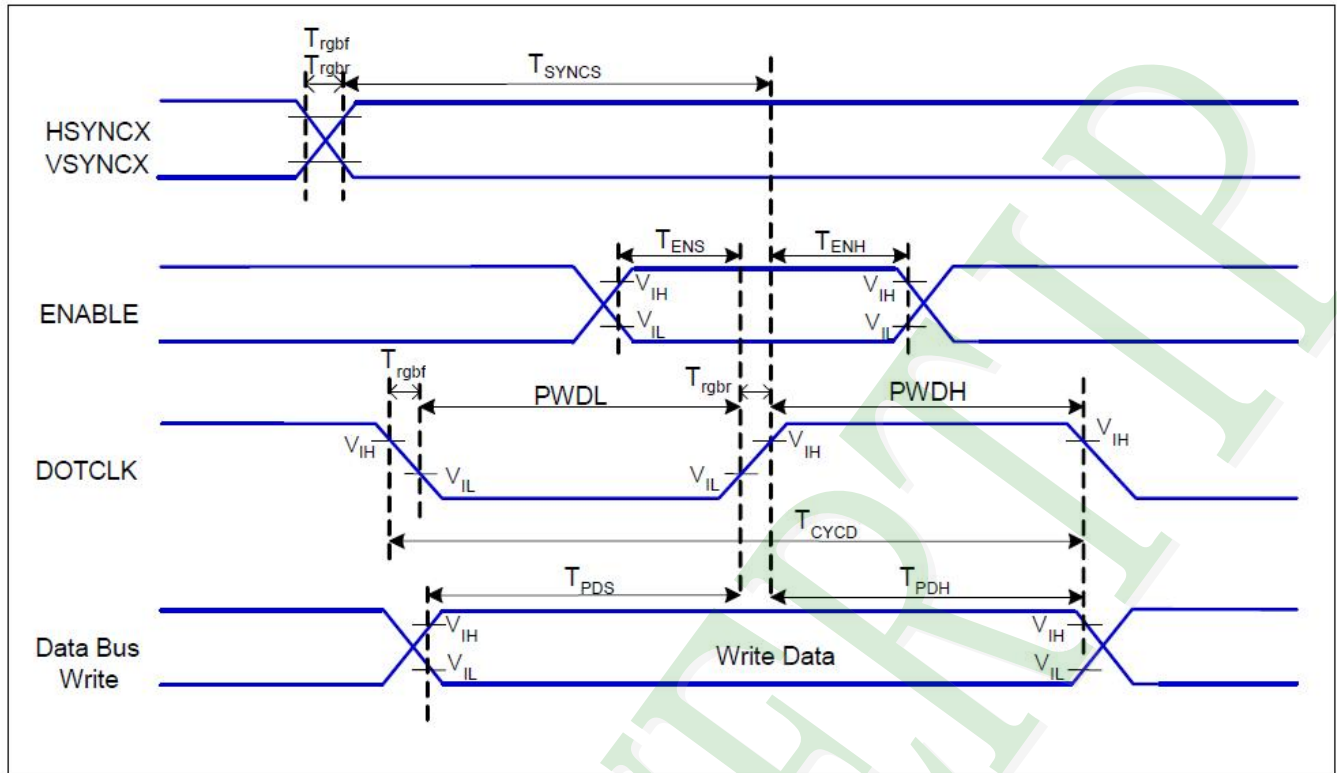


4-SPI Interface Timing Characteristics

$V_{DDI}=1.8V, V_{DDA}=2.8V, AGND=DGND=0V, T_a=25^\circ C$

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
CSX	T_{CSS}	Chip select setup time (write)	15		ns	
	T_{CSH}	Chip select hold time (write)	15		ns	
	T_{CSS}	Chip select setup time (read)	60		ns	
	T_{SCC}	Chip select hold time (read)	65		ns	
	T_{CHW}	Chip select "H" pulse width	40		ns	
SCL	T_{SCYCW}	Serial clock cycle (Write)	66		ns	-write command & data ram
	T_{SHW}	SCL "H" pulse width (Write)	15		ns	
	T_{SLW}	SCL "L" pulse width (Write)	15		ns	
	T_{SCYCR}	Serial clock cycle (Read)	150		ns	-read command & data ram
	T_{SHR}	SCL "H" pulse width (Read)	60		ns	
	T_{SLR}	SCL "L" pulse width (Read)	60		ns	
D/CX	T_{DCS}	D/CX setup time	10		ns	
	T_{DCH}	D/CX hold time	10		ns	
SDA (DIN)	T_{SDS}	Data setup time	10		ns	
	T_{SDH}	Data hold time	10		ns	
DOUT	T_{ACC}	Access time	10	50	ns	For maximum CL=30pF
	T_{OH}	Output disable time	15	50	ns	For minimum CL=8pF

RGB Interface Characteristics:



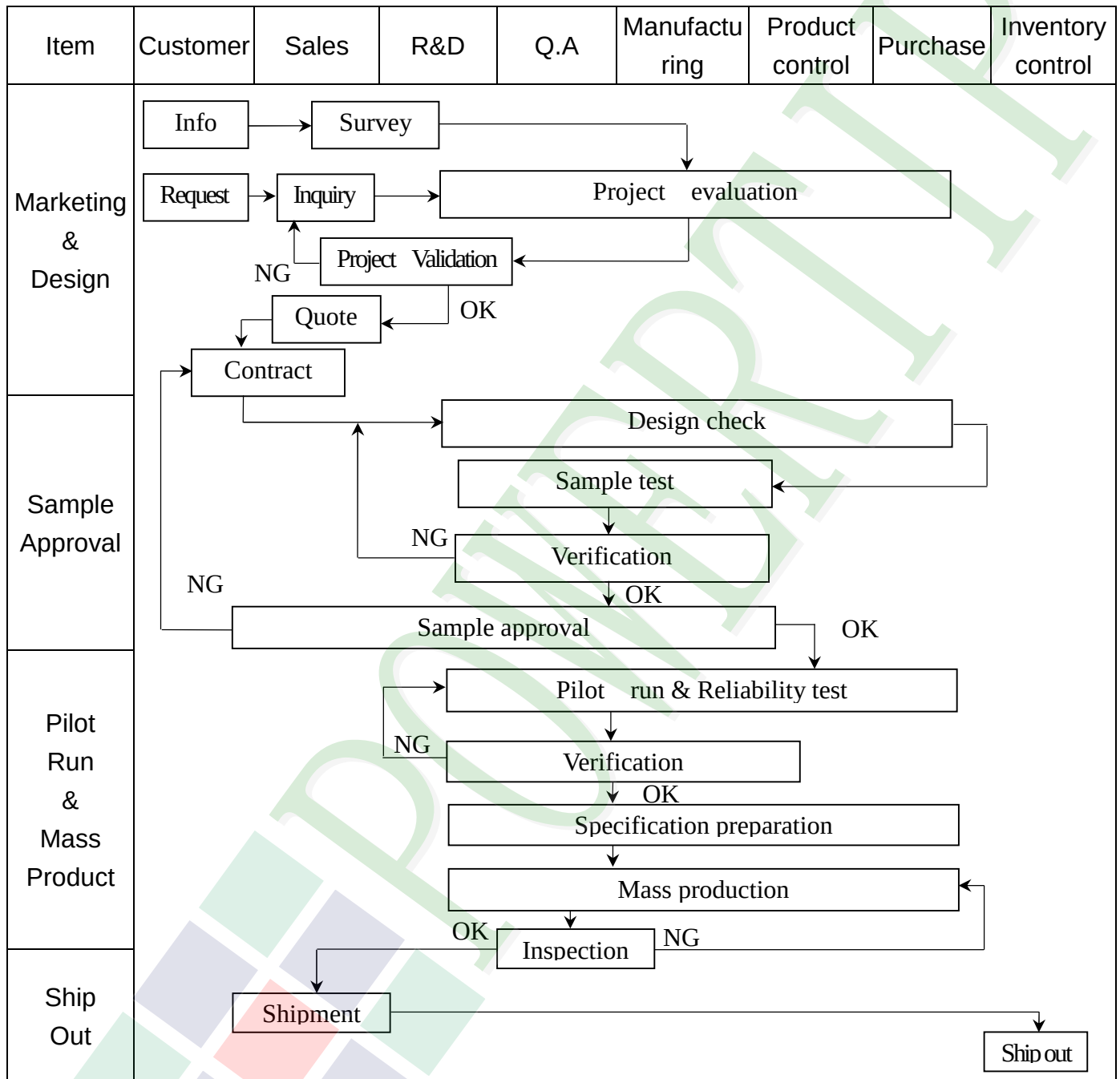
$V_{DDI}=1.8V, V_{DDA}=2.8V, A_{GND}=D_{GND}=0V, T_a=25^{\circ}C$

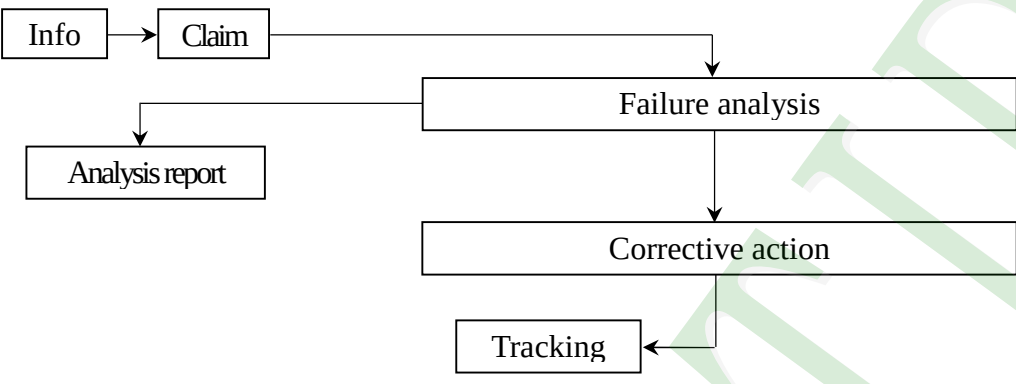
Signal	Symbol	Parameter	MIN	MAX	Unit	Description
HSYNC, VSYNC	T_{SYNCX}	VSYNC, HSYNC Setup Time	15	-	ns	
ENABLE	T_{ENS}	Enable Setup Time	15	-	ns	
	T_{ENH}	Enable Hold Time	15	-	ns	
DOTCLK	PWDH	DOTCLK High-level Pulse Width	30	-	ns	
	PWDL	DOTCLK Low-level Pulse Width	30	-	ns	
	T_{CYCD}	DOTCLK Cycle Time	66	-	ns	
	Trghr, Trghf	DOTCLK Rise/Fall time	-	15	ns	
DB	T_{PDS}	PD Data Setup Time	15	-	ns	
	T_{PDH}	PD Data Hold Time	15	-	ns	

RGB Interface Timing Characteristics

3. QUALITY ASSURANCE SYSTEM

3.1 Quality Assurance Flow Chart



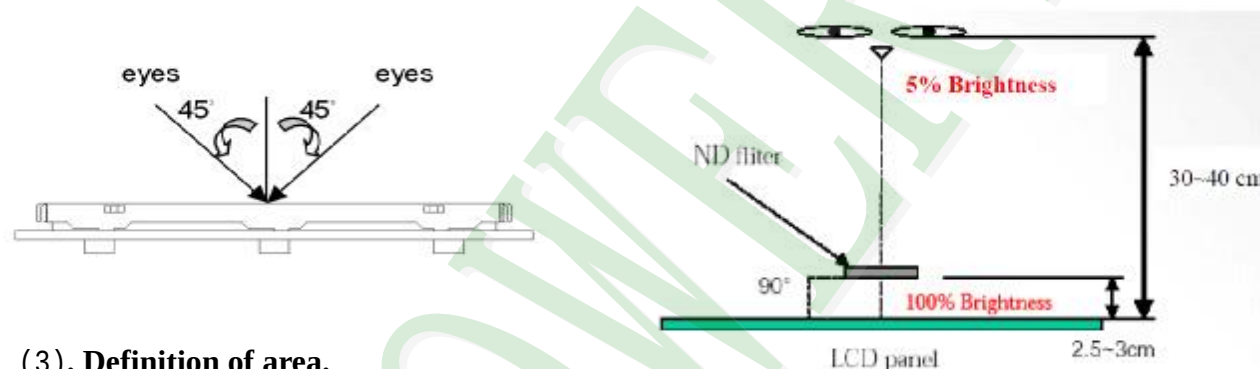
Item	Customer	Sales	R&D	Q.A	Manufacturing	Product control	Purchase	Inventory control
Sales Service	 <pre> graph TD Info[Info] --> Claim[Claim] Claim --> FA[Failure analysis] Claim --> AR[Analysis report] FA --> CA[Corrective action] CA --> Tracking[Tracking] </pre>							
Q.A Activity	1. ISO 9001 Maintenance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

3.2 Inspection Specification

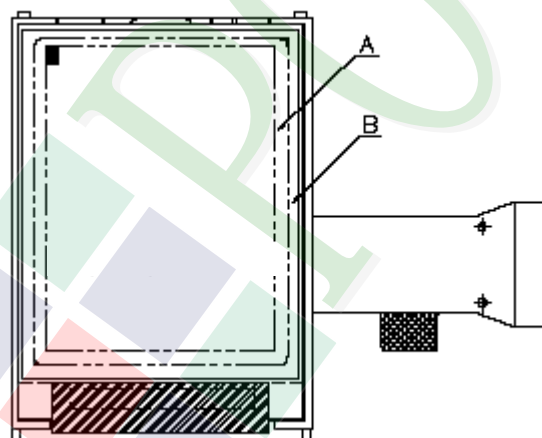
- ◆Scope: The document shall be applied to TFT-LCD Module for 3.5" -15" (Ver.B01).
- ◆Inspection Standard: MIL-STD-105E Table Normal Inspection Single Sampling Level II.
- ◆Equipment: Gauge, MIL-STD, Powertip Tester, Sample
- ◆Defect Level: Major Defect AQL: 0.4; Minor Defect AQL: 1.5
- ◆OUT Going Defect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

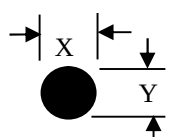
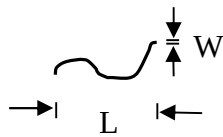
B area: Outside of viewing area

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

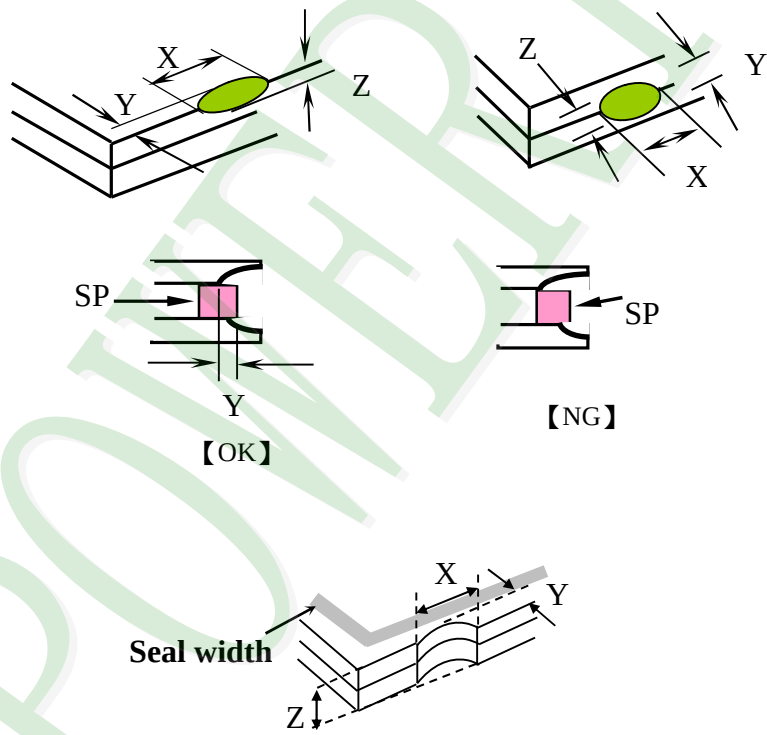
◆Specification For TFT-LCD Module 3.5" ~15" :
(Ver.B01)

NO	Item	Criterion	Level												
01	Product condition	1.1The 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	3.1Product 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												
		4.6Mura cannot be seen through 5% ND filter at 50% Gray , should be judged by the viewing angle of 90 degree.	Minor												
05	Dot defect (Bright dot, Dark dot) On -display	<table><tr><th colspan="2">Item</th><th>Acceptance (Q'ty)</th></tr><tr><td rowspan="4">Dot Defect</td><td>Bright Dot</td><td>≤ 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.															

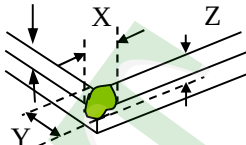
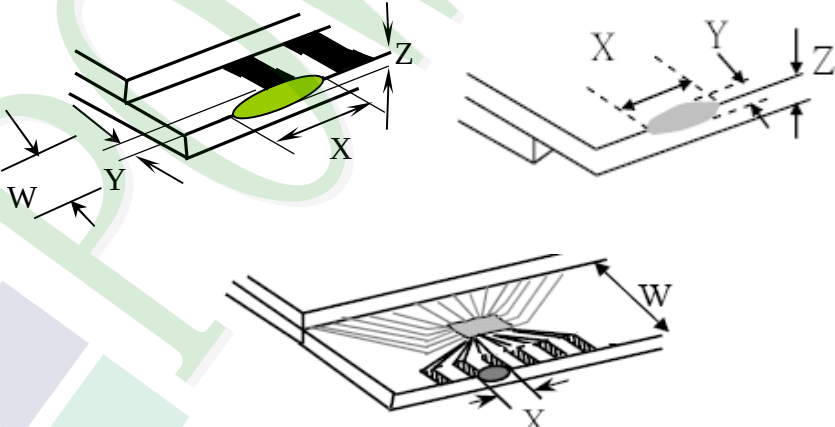
◆Specification For TFT-LCD Module 3.5" ~15" :
(Ver.B01)

NO	Item	Criterion	Level																																																				
06	Black or white Dot, scratch, contamination Round type  Φ=(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>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>	Dimension (diameter : Φ)	Acceptance (Q'ty)		A area	B area	Φ ≤ 0.25	Ignore	Ignore	0.25 < Φ ≤ 0.50	5	Φ > 0.50	0	Total	5	module size	Length (L)	Width (W)	Acceptance (Q'ty)		A area	B area	3.5” to less 9”	---	W ≤ 0.03	Ignore	Ignore	L ≤ 10.0	0.03 < W ≤ 0.05	4	L ≤ 5.0	0.05 < W ≤ 0.10	2	---	W > 0.10	As round type	Total		5	9” to 15”	---	W ≤ 0.05	Ignore	Ignore	L ≤ 10.0	0.05 < W ≤ 0.10	5	---	W > 0.10	As round type	Total		5	Minor
		Dimension (diameter : Φ)		Acceptance (Q'ty)																																																			
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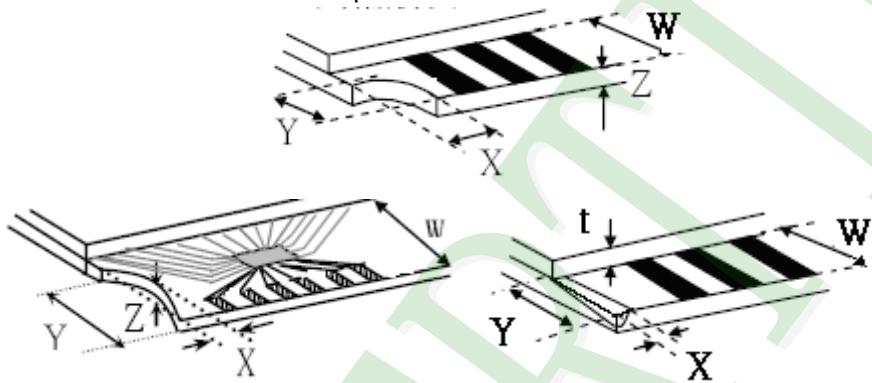
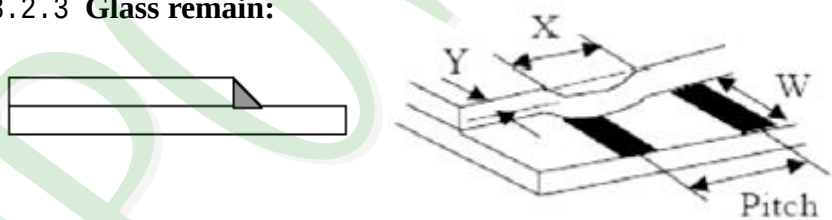
◆Specification For TFT-LCD Module 3.5" ~15" :
(Ver.B01)

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> <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> <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: 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

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 .
- 5.2.10 Caution!(LCM products with Capacitive Touch Panel)
Strong EMI-sources such as switch-mode power supplies (SMPS) can lead to touch malfunction (e.g. ghost-touches).
Therefore, the touch needs to be thoroughly tested inside the target application.
- 5.2.11 Do not let the LCD screen display static images (text, logos or pictures) for a prolonged period of time to prevent possible image burn-in.

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	LCM包裝規格書		Approve	Check	Contact
Documents NO. JPKG-PH320480T009-LAC11	LCM Packaging Specifications (For Tray)		Terry	Air	Sally

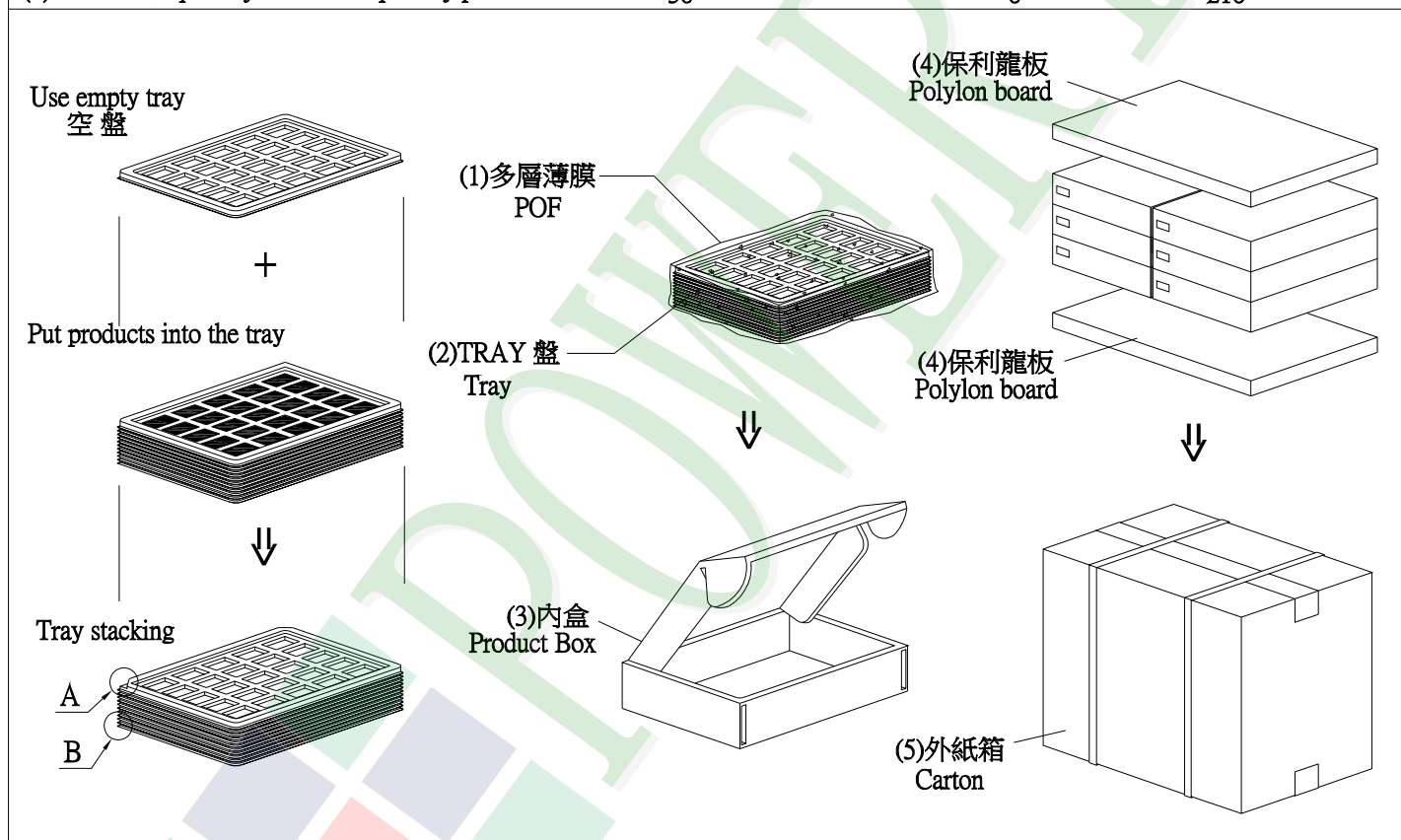
1.包裝材料規格表 (Packaging Material) : (per carton)

No.	Item	Model	Dimensions (mm)	1Pcs Weight	Quantity	Total Weight
1	成品 (LCM)	PH320480T009-LAC11	93.4 X 58.4 X 4.15	0.03	216	6.48
2	多層薄膜(1)POF	OTFILM0BA03ABA	19"X350X0.015	——	6	——
3	TRAY 盤 (2)Tray	TYSG000000423	352 X 260 X 13.2	0.08	42	3.36
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) : 11.99 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	6	=	36
(2)Total LCM quantity in carton : quantity per box	36	x no of boxes	6	=	216



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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