

SPECIFICATIONS

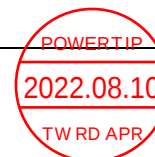
CUSTOMER	:	
SAMPLE CODE	:	SH192108T005-ZFC
MASS PRODUCTION CODE	:	PH192108T005-ZFC
SAMPLE VERSION	:	01
SPECIFICATIONS EDITION	:	003
DRAWING NO. (Ver.)	:	LMD-PH192108T005-ZFC(Ver.004)
PACKAGING NO. (Ver.)	:	PKG-PH192108T005-ZFC(Ver.001)

Customer Approved

Date:

Approved	Checked	Designer
林裘中 Daniel Lin	呂清溪 Marcs Lu	王靖維 Jack Wang

- ☐ Preliminary specification for design input
- ☒ Specification for sample approval



POWERTIP TECH. CORP.

Headquarters: No.8, 6th Road, Taichung Industrial Park,
Taichung, Taiwan
台中市 407 工業區六路 8 號

TEL: 886-4-2355-8168
FAX: 886-4-2355-8166

E-mail: sales@powertip.com.tw
[Http://www.powertip.com.tw](http://www.powertip.com.tw)

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SPEC Edi.003

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1. SPECIFICATIONS

1.1 Features

Item	Standard Value
Screen Size (Inch)	15.6" (Diagonal)
Resolution	1920* (R · G · B) * 1080 Dots
Display Mode	Transmissive, Normally Black
Display Colors	16.2M
Display Interface	Dual-Channel LVDS, 4-lane per Channel
Touch type	Projective capacitive touch panel
Touch Method	Finger / 10 Points touch
Touch Interface	USB
Touch IC	ILI2521
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	385.16(W) * 234.59 (L) * 18.0 (H)Max	mm

LCD panel

Item	Standard Value	Unit
Active Area	344.16 (W) * 193.59 (L)	mm

Note: For detailed information please refer to LCM drawing.

1.3 Absolute ratings of environment

Item	Symbol	Condition	Min.	Max.	Unit
Operating Temperature	T _{OP}	-	-30	+85	°C
Storage Temperature	T _{ST}	-	-40	+90	°C
Storage Humidity	H _D	Ta < 60 °C	-	90	%RH

1.4 TFT LCD Characteristics

Absolute Maximum Ratings

Item	Symbol	Condition	Min.	Max.	Unit
Power Supply Voltage for TFT LCD Module	V _{CC}	-	-0.3	+4.0	V
Logic Input Voltage for TFT LCD Module	V _{IN}	-	-0.3	+4.0	V

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.

LCD ELETRONICS SPECIFICATION

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Power Supply Voltage	V _{CC}	3.15	3.3	3.6	V	
Ripple Voltage	V _{RP}	-	-	150	mV	
Rush Current	I _{RUSH}	-	-	3	A	
Power Supply Current	-	-	1.22	1.5	A	
Power Consumption	PLCD	-	4	5	Watt	

1.5 Optical Characteristics

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	-
Response time		T _r + T _f	-	-	25	35	ms	Note2
Viewing angle	Top	ΘY+	CR ≥ 10	85	89	-	Deg.	Note4
	Bottom	ΘY-		85	89	-		
	Left	ΘX-		85	89	-		
	Right	ΘX+		85	89	-		
Contrast ratio		CR	Ta = 25°C ΘX , ΘY = 0°	600	800	-	-	Note3
Color of CIE Coordinate (With B/L and TP)	White	X		Typ -0.05	0.30	Typ +0.05	-	Note1
		Y			0.33			
	Red	X			0.65			
		Y			0.34			
	Green	X			0.32			
		Y			0.61			
	Blue	X			0.13			
		Y			0.05			
Average Brightness Pattern=white display (With TP)		IV	-	300	380	-	cd/m2	Note1
Uniformity (With TP) *2		ΔB	-	70	-	-	%	Note1

Note1:

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

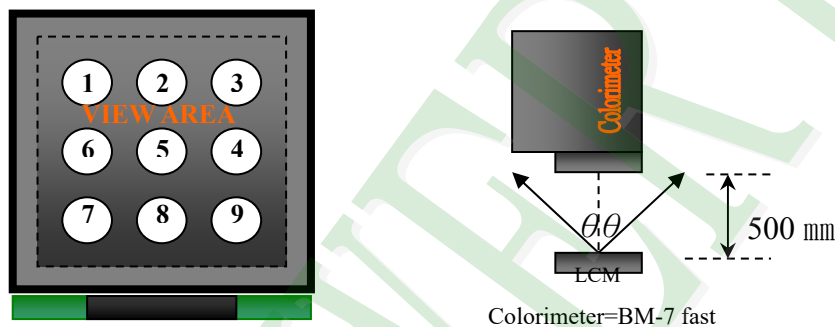
2 : Measurement Condition for Optical Characteristics:

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

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

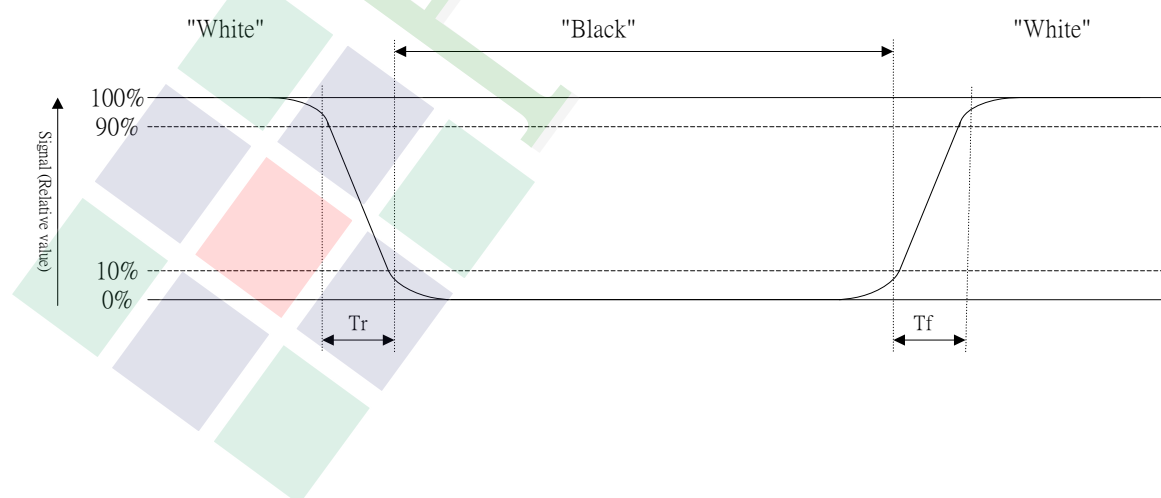
c : Equipment: TOPCON BM-7 fast , (field 1°) , after 10 minutes operation.

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



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:



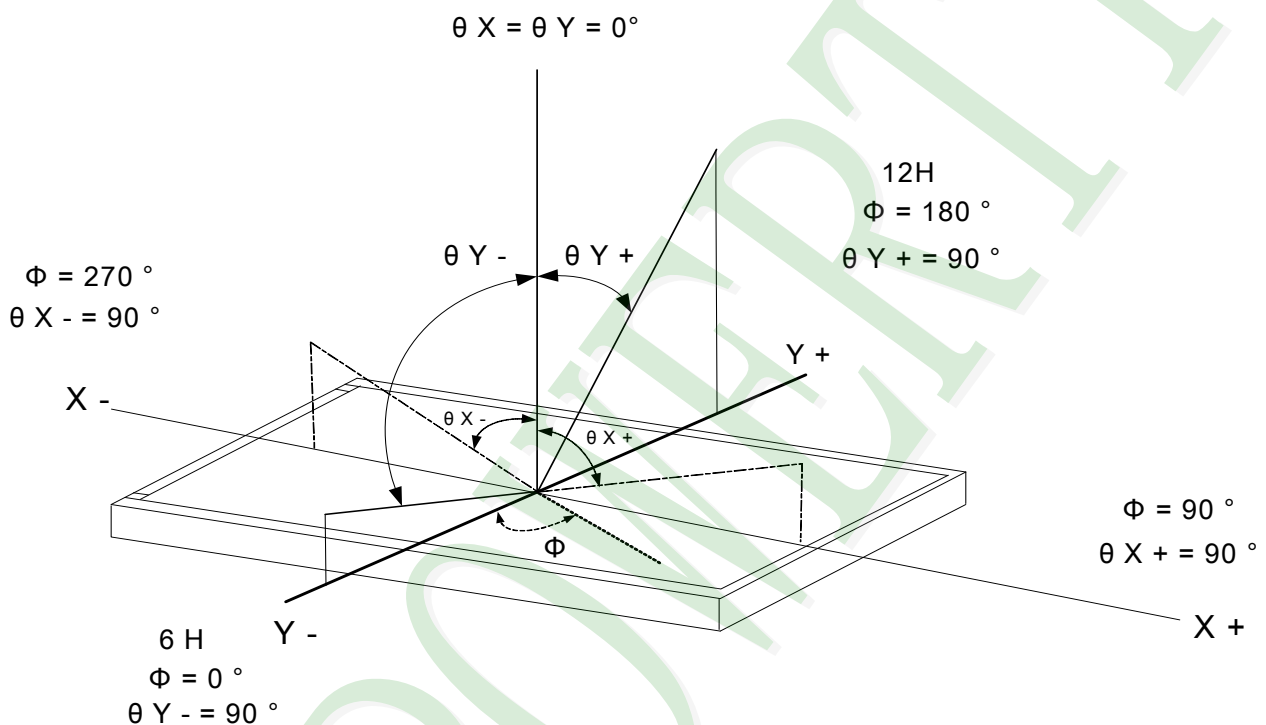
Note3: Definition of contrast ratio:

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

Absolute Maximum Ratings

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Converter Voltage	LED_V _{in}	0	12.0	18.0	V	(1), (2)
Enable Voltage	LED_EN	0	3.3	7	V	Duty=100%
Backlight Adjust	LED_PWM	0	3.3	7	V	(1), (2) Pulse Width ≤ 10msec. And Duty ≤ 10%

Note (1) Permanent damage to the device may occur if maximum values are exceeded. Function operation

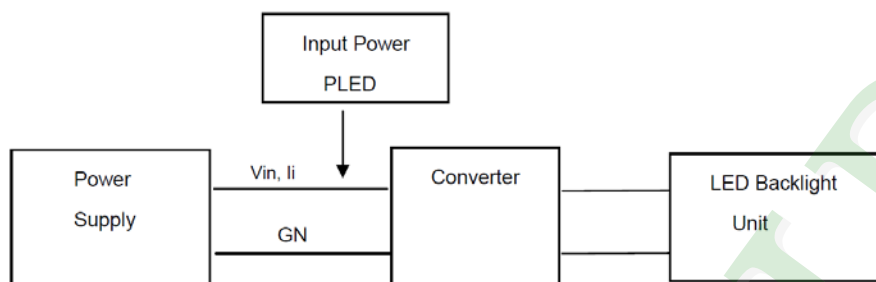
Note (2) Specified values are for input pin of LED light bar at Ta=25±2 °C

Electrical Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Converter Power Supply Voltage	LED_V _{in}	10.8	12.0	13.2	V	
Converter Power Supply Current	I _i	0.8	1.0	1.2	A	@LED_V _{in} =12 Duty=100%
Converter Input Rush Current	I _{irsh}	-	-	3	A	@LED_V _{in} rising =1ms
Power Consumption	P _{LED}	-	12	-	W	@LED_V _{in} =12 Duty=100%
EN Control Level	LED_EN	2.0	5	5.5	V	
PWM Control Level	LED_PWM	2.0	3.3	5.0	V	
PWM Control Duty Ratio	-	10	-	100	%	
PWM Control Frequency	f _{PWM}	190	200	20k	Hz	
LED Life Time	L _L	50,000	-	-	Hrs	(2)

Note (1) LED light bar input voltage and current are measured by utilizing a true RMS multimeter as shown below:

Note (2) The lifetime of LED is estimated data and defined as the time when it continues to operate under the conditions at Ta = 25±2°C and Duty 100% until the brightness becomes ≤ 50% of its original value. Operating LED under high temperature environment will reduce life time and lead to color shift.



1.7 Touch Panel Characteristics

Absolute Maximum Ratings

Item	Symbol	Condition	Min.	Max.	Unit
Supply voltage	VDD	-	-	+6.0	V

Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Power Supply Voltage for USB	VBUS	-	-	5.0	-	V

Optical Characteristics

Item	Standard Value	Unit
Total light transmittance	85% or more	-
Hardness	$\geq 7H$	

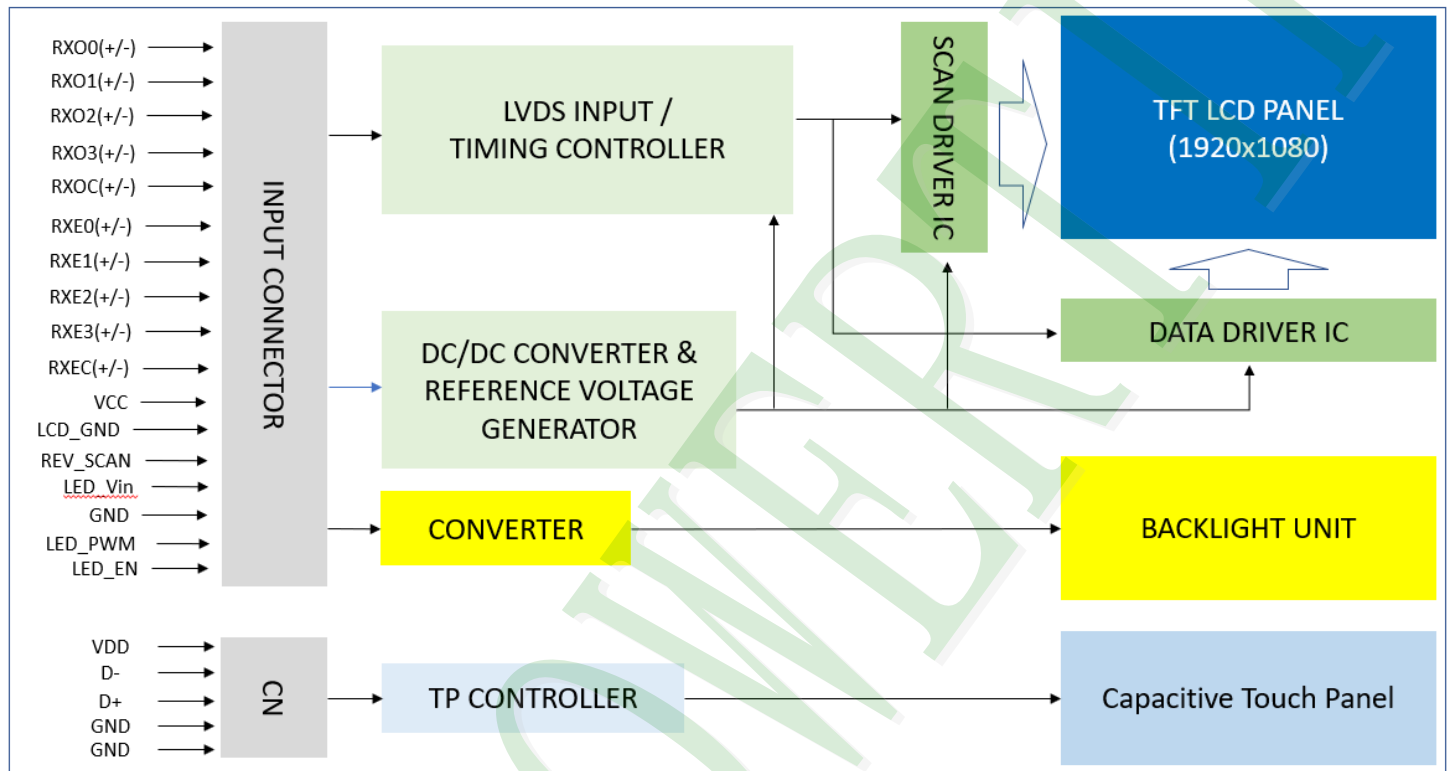
2. MODULE STRUCTURE

2.1 Counter Drawing

LCM Mechanical Diagram

* See Appendix

Block Diagram



2.2 Interface Pin Description

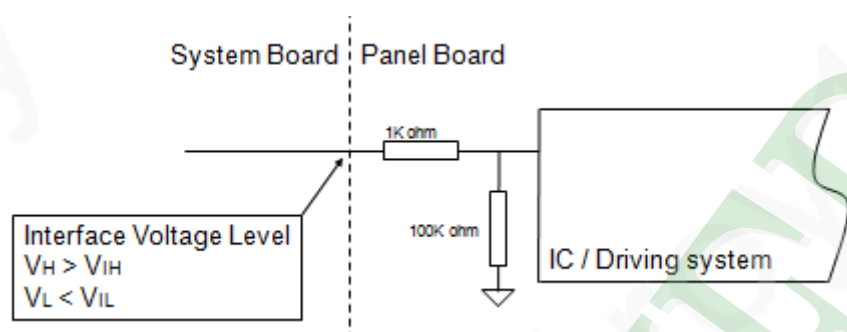
● LCM

Pin No.	Symbol	Description	Note
1	LED_Vin	+12V Power Supply.	
2	LED_Vin	+12V Power Supply.	
3	LED_Vin	+12V Power Supply.	
4	LED_Vin	+12V Power Supply.	
5	GND	Ground	
6	GND	Ground	
7	GND	Ground	
8	GND	Ground	
9	LED_EN	LED Backlight Enable Input.	
10	LED_PWM	LED Backlight PWM Control Signal for Dimming.	
11	VCC	LCD Logic and Driver Power 3.3V	
12	VCC	LCD Logic and Driver Power 3.3V	
13	VCC	LCD Logic and Driver Power 3.3V	
14	NC	Not connection, this pin should be open	
15	NC	Not connection, this pin should be open	
16	NC	Not connection, this pin should be open	
17	REV_SCAN	Low or NC → Normal Mode. High → Horizontal & Vertical Reverse Scan	(1)
18	RX00-	Negative LVDS differential data input. Channel O0 (odd)	
19	RX00+	Positive LVDS differential data input. Channel O0 (odd)	
20	RX01-	Negative LVDS differential data input. Channel O1 (odd)	
21	RX01+	Positive LVDS differential data input. Channel O1 (odd)	
22	RX02-	Negative LVDS differential data input. Channel O2 (odd)	
23	RX02+	Positive LVDS differential data input. Channel O2 (odd)	
24	LCD_GND	LCD logic and driver ground	
25	RXOC-	Negative LVDS differential clock input. (odd)	
26	RXOC+	Positive LVDS differential clock input. (odd)	
27	LCD_GND	LCD logic and driver ground	
28	RX03-	Negative LVDS differential data input. Channel O3(odd)	
29	RX03+	Positive LVDS differential data input. Channel O3 (odd)	
30	RXE0-	Negative LVDS differential data input. Channel E0 (even)	
31	RXE0+	Positive LVDS differential data input. Channel E0 (even)	
32	RXE1-	Negative LVDS differential data input. Channel E1 (even)	
33	RXE1+	Positive LVDS differential data input. Channel E1 (even)	

34	LCD_GND	LCD logic and driver ground	
35	RXE2-	Negative LVDS differential data input. Channel E2 (even)	
36	RXE2+	Positive LVDS differential data input. Channel E2 (even)	
37	RXEC-	Negative LVDS differential clock input. (even)	
38	RXEC+	Positive LVDS differential clock input. (even)	
39	RXE3-	Negative LVDS differential data input. Channel E3 (even)	
40	RXE3+	Positive LVDS differential data input. Channel E3 (even)	

Note (1) "Low" stands for 0V. "High" stands for 3.3V. "NC" stands for "No Connected".

REV_SCAN PIN :

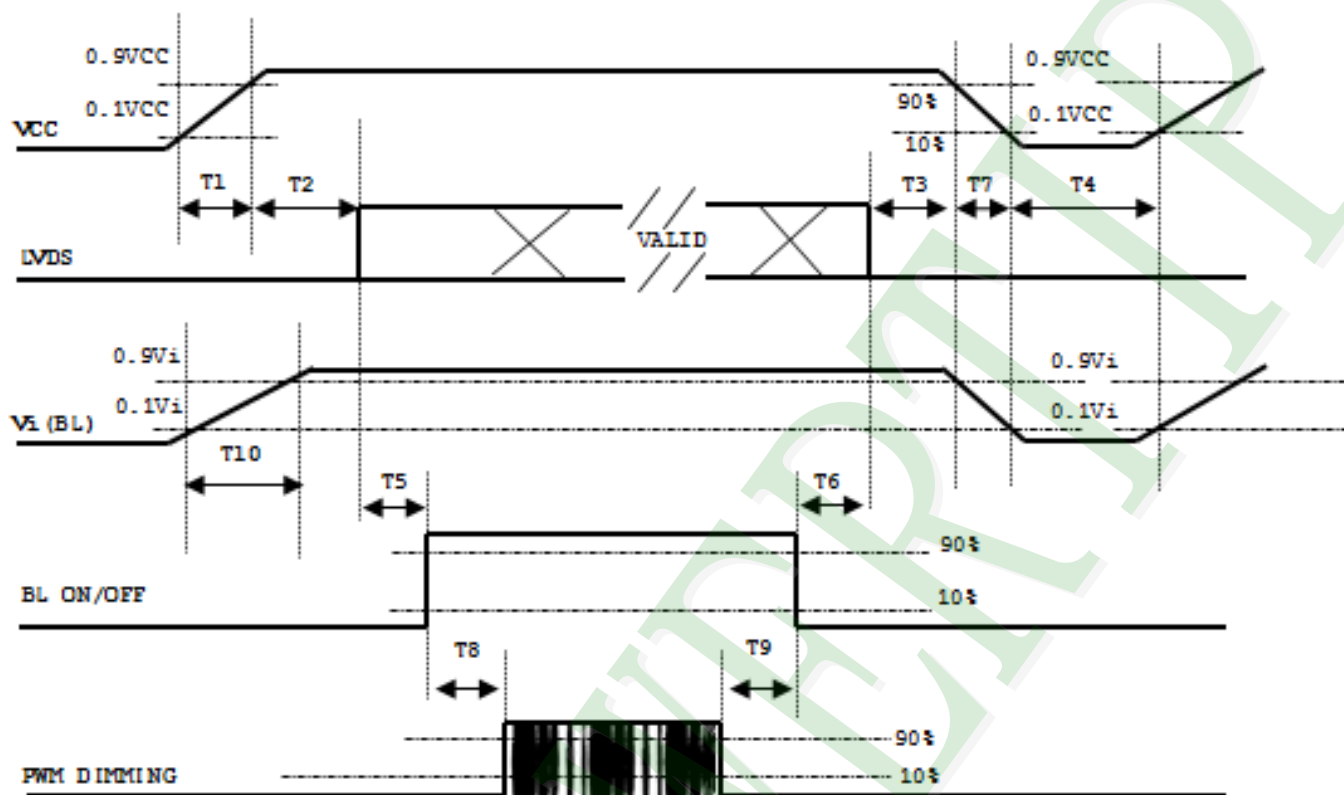


● J3 - Capacitive Touch Panel (CTP) Interface

Pin No.	Symbol	Description
1	VDD	Power Supply. (+5.0V)
2	D-	D- Differential Data Input.
3	D+	D+ Differential Data Input.
4	GND	Ground.
5	GND	Ground.

2.3 Power Supply Characteristics

POWER ON/OFF SEQUENCE



Timing Specifications:

Item	Min.	Typ.	Max.	Units
T1	0.5	-	10	ms
T2	0	-	50	ms
T3	0	-	50	ms
T4	500	-	-	ms
T5	450	-	-	ms
T6	200	-	-	ms
T7	10	-	100	ms
T8	10	-	-	ms
T9	10	-	-	ms
T10	20	-	50	ms

2.4 Timing Characteristics

LVDS DATA MAPPING TABLE

LVDS Channel O0	LVDS output	D7	D6	D4	D3	D2	D1	D0
	Data order	OG0	OR5	OR4	OR3	OR2	OR1	OR0
LVDS Channel O1	LVDS output	D18	D15	D14	D13	D12	D9	D8
	Data order	OB1	OB0	OG5	OG4	OG3	OG2	OG1
LVDS Channel O2	LVDS output	D26	D25	D24	D22	D21	D20	D19
	Data order	DE	NA	NA	OB5	OB4	OB3	OB2
LVDS Channel O3	LVDS output	D23	D17	D16	D11	D10	D5	D27
	Data order	NA	OB7	OB6	OG7	OG6	OR7	OR6
LVDS Channel E0	LVDS output	D7	D6	D4	D3	D2	D1	D0
	Data order	EG0	ER5	ER4	ER3	ER2	ER1	ER0
LVDS Channel E1	LVDS output	D18	D15	D14	D13	D12	D9	D8
	Data order	EB1	EB0	EG5	EG4	EG3	EG2	EG1
LVDS Channel E2	LVDS output	D26	D25	D24	D22	D21	D20	D19
	Data order	DE	NA	NA	EB5	EB4	EB3	EB2
LVDS Channel E3	LVDS output	D23	D17	D16	D11	D10	D5	D27
	Data order	NA	EB7	EB6	EG7	EG6	ER7	ER6

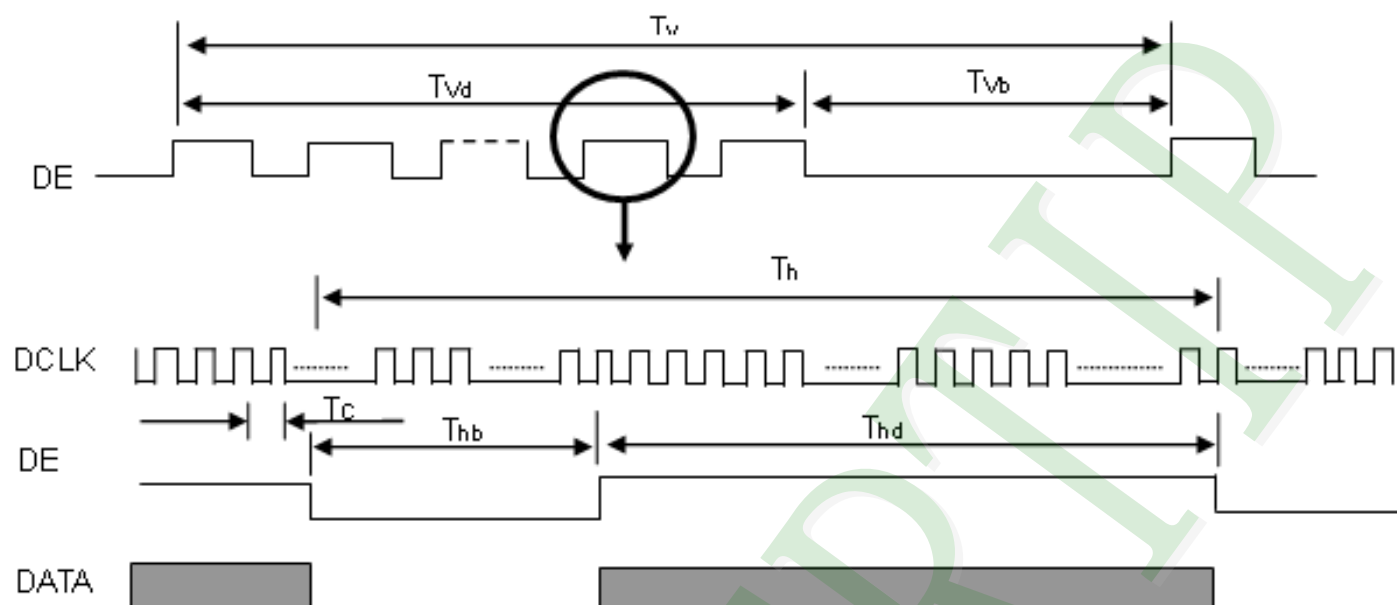
DISPLAY TIMING SPECIFICATIONS

Signal	Item	Symbol	Min.	Typ.	Max	Unit	Note
LVDS Clock	Frequency	F_C	60	70.93	75	MHz	-
	Period	T_C	-	14.1	-	ns	
	Input cycle to cycle jitter	T_{rcl}	$-0.02 * T_C$	-	$0.02 * T_C$	ns	(3)
	Input clock to data skew	TLVCCS	$-0.02 * T_C$	-	$0.02 * T_C$	ns	(4)
	Spread spectrum modulation range	F_{clkin_mod}	$F_C * 98\%$	-	$F_C * 102\%$	MHz	(5)
	Spread spectrum modulation frequency	F_{SSM}	-	-	200	KHz	
Vertical Display Term	Frame	Fr	50	60	60	Hz	$T_v = T_{vd} + T_{vb}$
	Total	T_v	1090	1110	1130	Th	-
	Active Display	T_{vd}	1080	1080	1080	Th	-
	Blank	T_{vb}	$T_v - T_{vd}$	30	$T_v - T_{vd}$	Th	-
Horizontal Display Term	Total	Th	1050	1065	1075	T_c	$Th = Th_d + Th_b$
	Active Display	Th_d	960	960	960	T_c	-
	Blank	Th_b	$Th - Th_d$	105	$Th - Th_d$	T_c	-

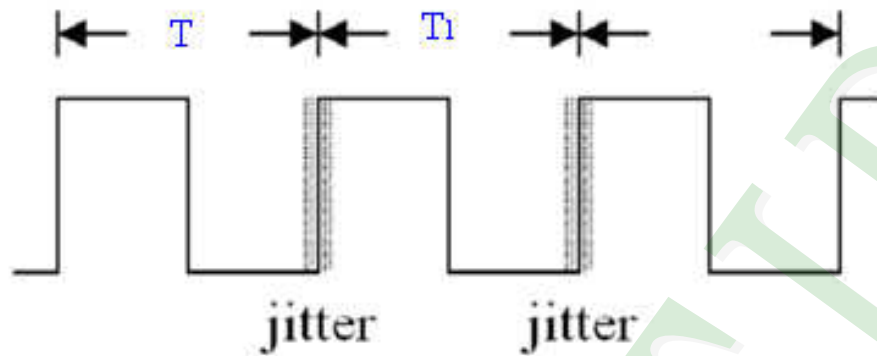
Note (1) Because this module is operated by DE only mode, Hsync and Vsync input signals are ignored.

Note (2) The T_v ($T_{vd} + T_{vb}$) must be integer, otherwise, this module would operate abnormally.

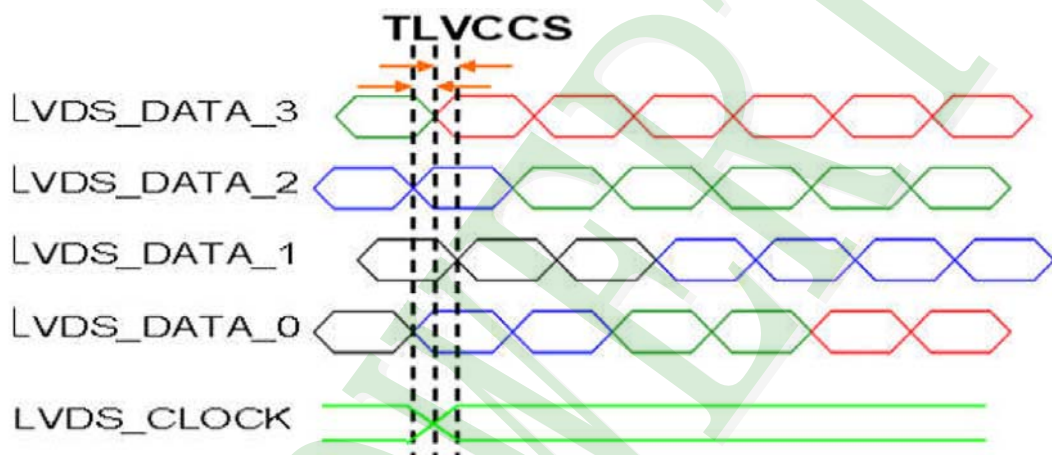
INPUT SIGNAL TIMING DIAGRAM



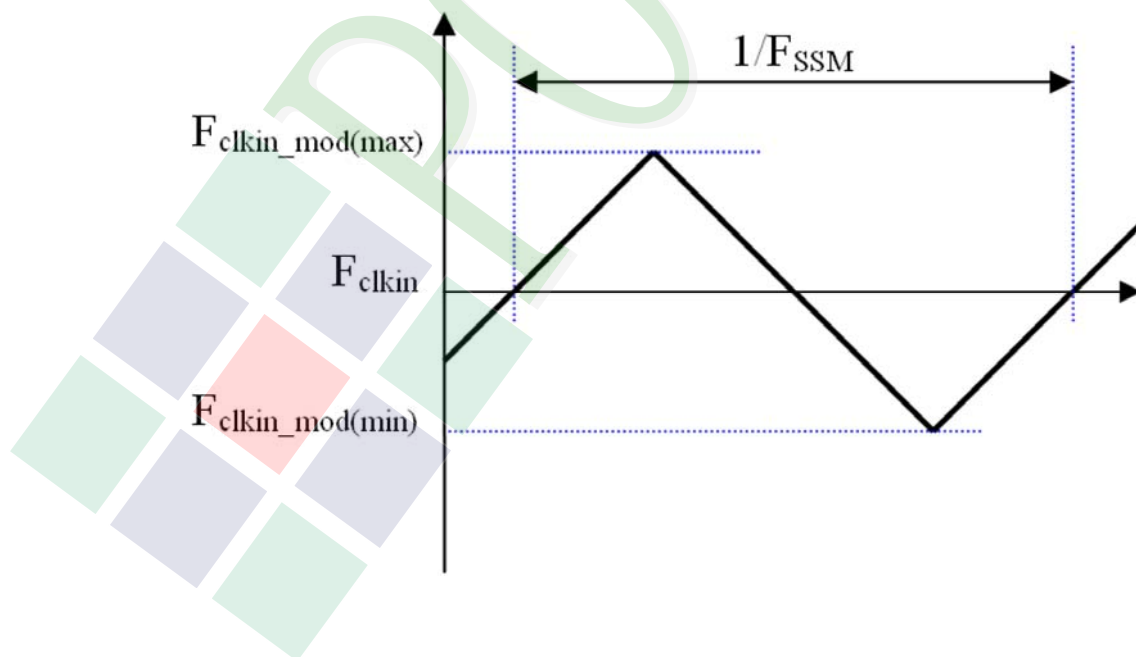
Note (3) The input clock cycle-to-cycle jitter is defined as below figures. $Trcl = |T_1 - T|$



Note (4) Input Clock to data skew is defined as below figures.

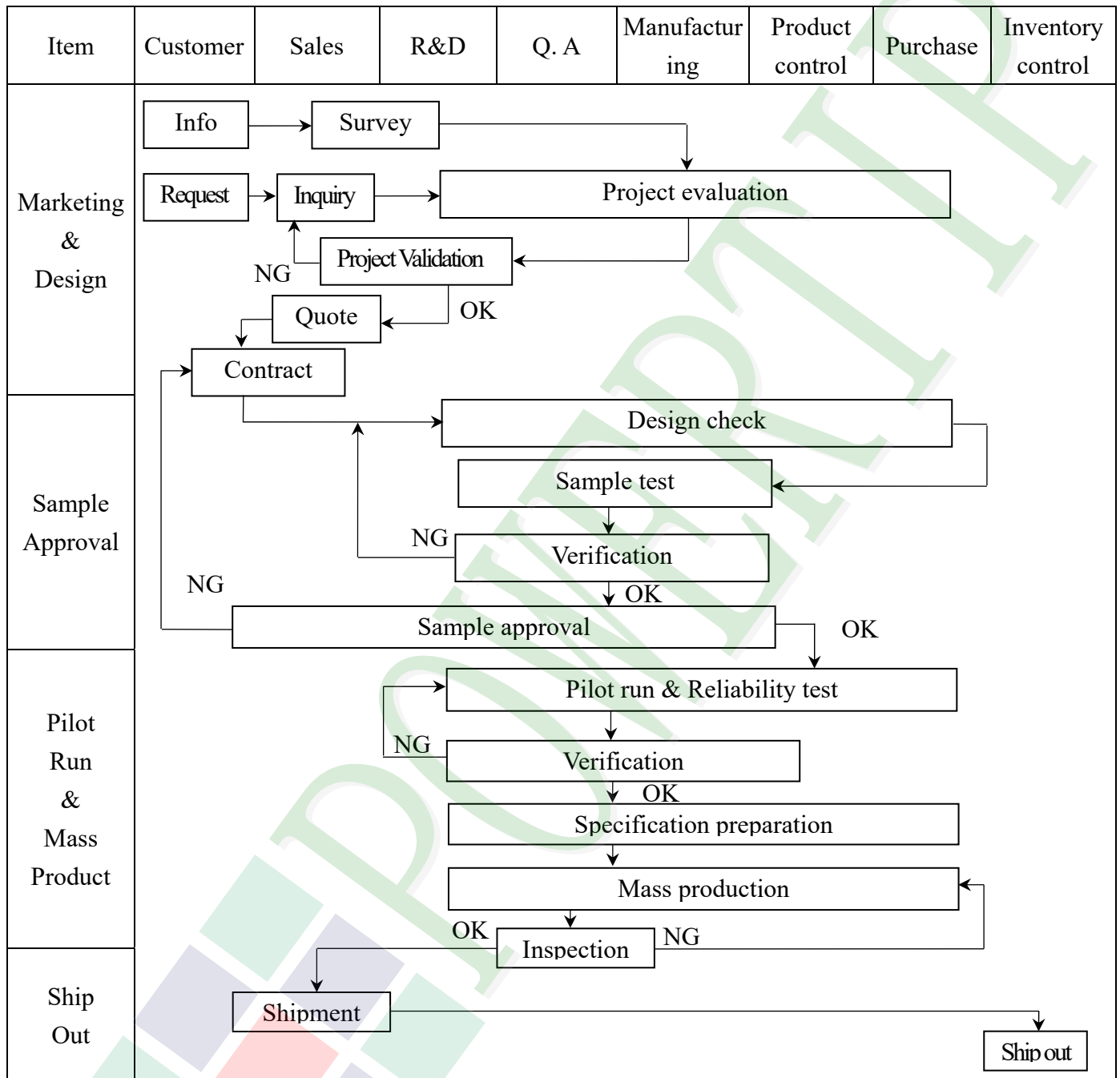


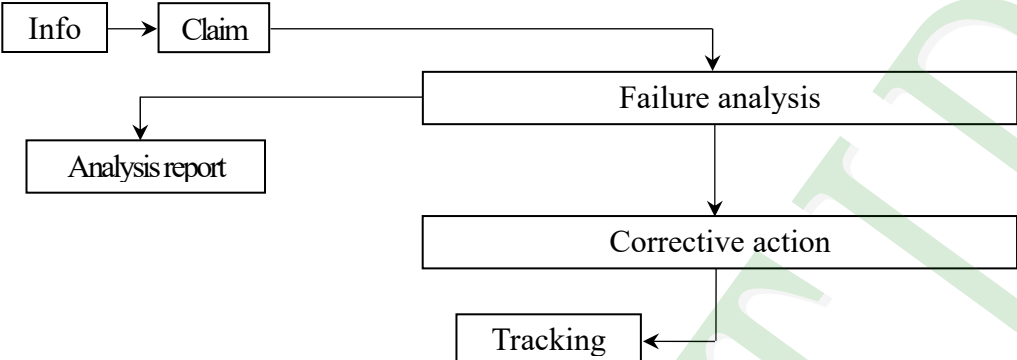
Note (5) The SSCG (Spread spectrum clock generator) is defined as below figures.



3. QUALITY ASSURANCE SYSTEM

3.1 Quality Assurance Flow Chart



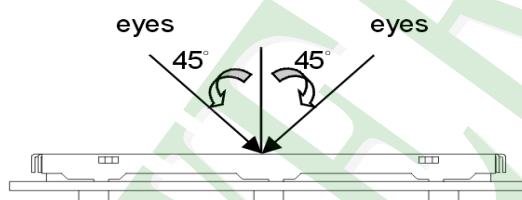
Item	Customer	Sales	R&D	Q. A	Manufacturing	Product control	Purchase	Inventory control
Sales Service	 <pre> graph TD Info[Info] --> Claim[Claim] Claim --> Failure[Failure analysis] Claim --> Report[Analysis report] Failure --> Action[Corrective action] Action --> Tracking[Tracking] </pre>							
Q.A Activity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

3.2. Inspection Specification

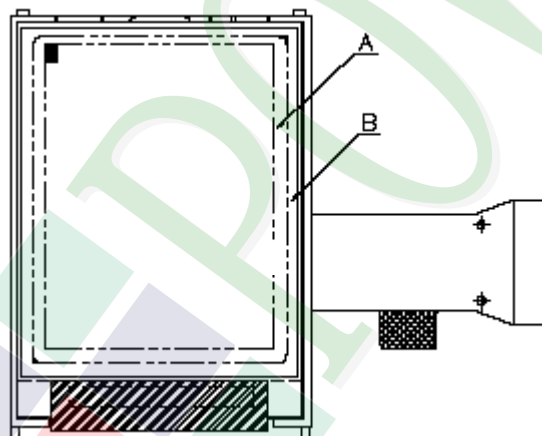
- ◆Scope : The document shall be applied to TFT-LCD Module for 3.5" ~15" (Ver.B01).
- ◆Inspection Standard : MIL-STD-105E Table Normal Inspection Single Sampling Level II.
- ◆Equipment : Gauge 、MIL-STD 、Powertip Tester 、Sample
- ◆Defect Level : Major Defect AQL : 0.4 ; Minor Defect AQL : 1.5
- ◆OUT Going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

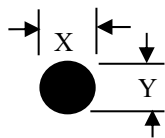
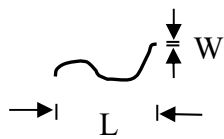
◆Specification For TFT-LCD Module 3.5" ~15" :

(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												
		4.6 Mura cannot be seen through 5% ND filter at 50% Gray , should be judged by the viewing angle of 90 degree.	Minor												
05	Dot defect (Bright dot, Dark dot) On -display	<table><tr><th colspan="2">Item</th><th>Acceptance (Q'ty)</th></tr><tr><td rowspan="4">Dot Defect</td><td>Bright Dot</td><td>≤ 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: 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.															

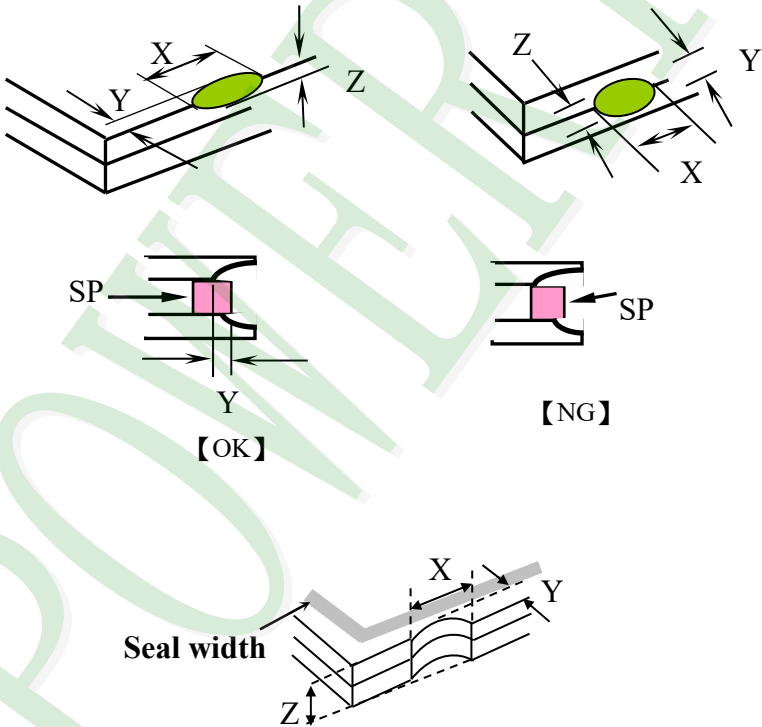
◆Specification For TFT-LCD Module 3.5" ~15" :

(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 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="4">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><td></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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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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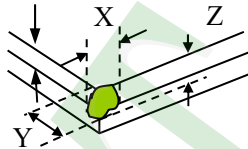
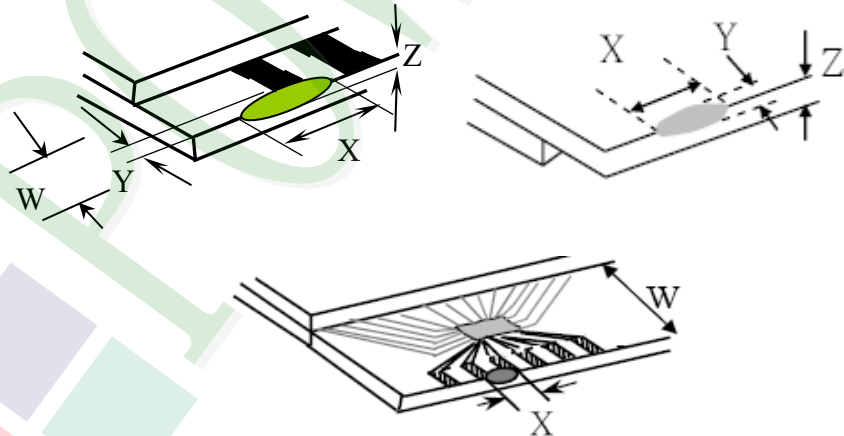
◆Specification For TFT-LCD Module 3. 5" ~15" :

(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 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	$\leq 1/2 t$	$\leq a$	Crack can't exceed the half of SP width.	$1/2 t < Z \leq 2 t$	Minor
		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.	$1/2 t < Z \leq 2 t$										

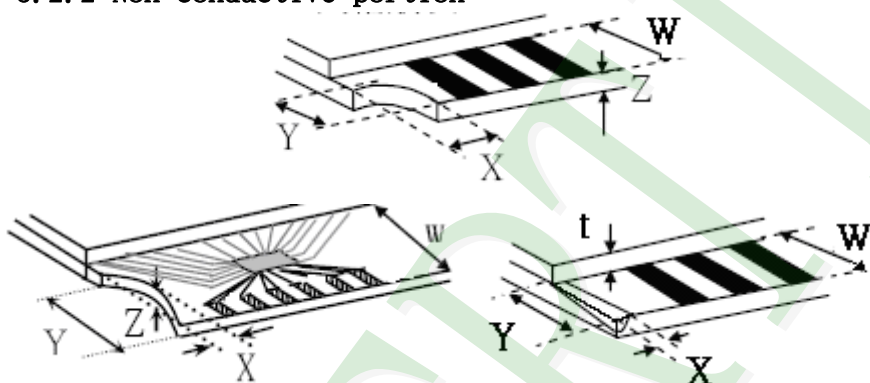
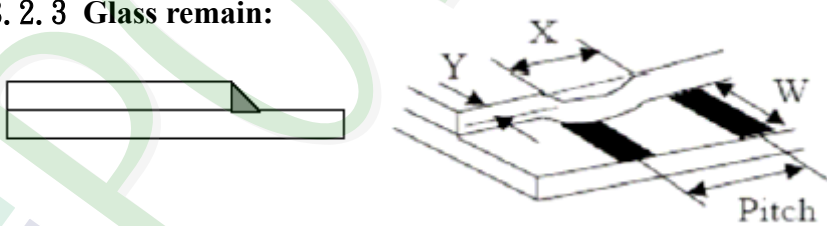
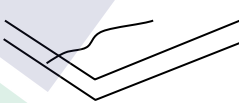
◆Specification For TFT-LCD Module 3.5" ~15" :

(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 Y : The width of crack. Z : The thickness of crack W : terminal length t : The thickness of glass a : LCD side length 8.2.2 Non-conductive portion :  <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 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

NO.	TEST ITEM	TEST CONDITION
1	High Temperature Operation Test	Keep in +85 ±2℃ 240 hrs, Display ON Surrounding temperature, then storage at normal condition 4hrs.
2	Low Temperature Operation Test	Keep in -30 ±2℃ 240 hrs, Display ON Surrounding temperature, then storage at normal condition 4hrs.
3	High Temperature Storage Test	Keep in +90 ±2℃ 240 hrs Surrounding temperature, then storage at normal condition 4hrs.
4	Low Temperature Storage Test	Keep in -40 ±2℃ 240 hrs Surrounding temperature, then storage at normal condition 4hrs.
5	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)
6	Temperature Cycling Storage Test	-40℃ → +25℃ → +90℃ → +25℃ (30mins) (5mins) (30mins) (5mins) ←————— 20 Cycle —————→ Surrounding temperature, then storage at normal condition 4hrs.
7	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

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.

[illegible]

Ver.001		LCM包裝規格書 LCM Packaging Specifications	Approve	Check	Contact
Documents NO.	PKG-PH192108T005-ZFC		Marcus	Bright	Nini

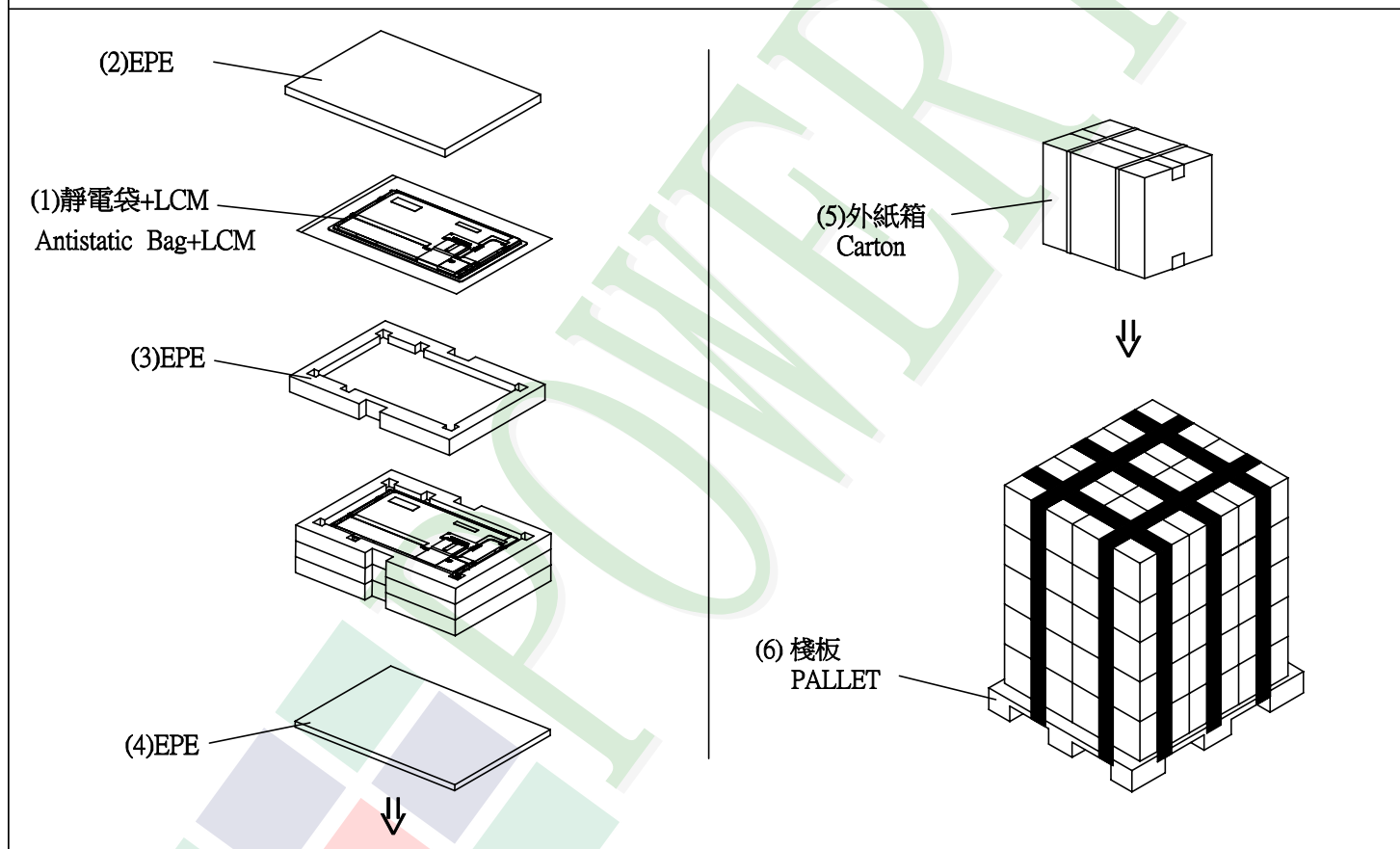
1.包裝材料規格表 (Packaging Material) : (per carton)

No.	Item	Model	Dimensions (mm)	1Pcs Weight	Quantity	Total Weight
1	模組 (LCM)	PH192108T005-ZFC	385.16 X 234.56 X 17.5	1.7	120	204
2	抗靜電袋(1)Antistatic Bag	BAG0000000053	350 X 450	0.02	120	2.4
3	舒美墊(2) EPE	FOAM000000280	460 X 335 X 20	0.05	30	1.5
4	舒美墊(3) EPE	FOAM000000279	460 X 335 X 40	0.11	120	13.2
5	舒美墊(4) EPE	FOAM000000281	460 X 335 X 15	0.075	30	2.25
6	外紙箱(5)Carton	BX47334524CCBA	473X 345 X 240	1.0	30	30.0
7	棧板(6)PALLET	OTPALLET005ABA	1200 X 1000 X 140	8.0	1	8.0
8						

2.一 整箱總重量 (Total LCD Weight in carton)： 261.35 Kg±10%

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

(1)LCM quantity in carton : quantity per EPE	1	x no of carton	4	=	4
(2)Total LCM quantity in pallet : quantity per carton	4	x no. of cartons	30	=	120



特 記 事 項 (REMARK)

- 外箱擺放方式:一層擺放6箱外箱，共5層。
6箱 X 5層 =30箱外箱
- 不滿一棧板之尾數箱，需用棧板出貨。
- 外圍加打包帶及外部封塑膠膜。