SPECIFICATIONS

CUSTOMER	:	**PTC**
SAMPLE CODE	:	**SH102600T005-ZAA**
MASS PRODUCTION CODE	:	**PH102600T005-ZAA**
SAMPLE VERSION	:	**01**
SPECIFICATIONS EDITION	:	**003**
DRAWING NO. (Ver.)	:	**LMD-PH102600T005-ZAA (Ver.001)**
PACKAGING NO. (Ver.)	:	**PKG-PH102600T005-ZAA (Ver.001)**

Customer Approved

Date:

Approved	Checked	Designer
黃秋源 **Oliver Huang**	石建莊 **Stone Shin**	林佳融 **Ryan Lin**

☐ Preliminary specification for design input

■ Specification for sample approval

POWERTIP TECH. CORP.

NO.PT-A-005-8

History of Version

Date (mm / dd / yyyy)	Ver.	Edi.	Description	Page	Design by
01/23/2015	01	001	New Drawing.	-	Ackey
03/13/2015	01	002	New Sample.	-	Ackey
08/27/2015	01	003	Add LED Life Time	7	Ryan

Total: 25Page

Contents

1. SPECIFICATIONS

1.1 Features

Item	Standard Value
Display Type	1024 * 3 (RGB) * 600 Dots
LCD Type	a-Si TFT , Normally White , Transmissive type
Screen size(inch)	10.1 inch
Color configuration	RGB-Strip
Backlight Type	LED B/L
Interface	LVDS Interface
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	235.0 (W) * 143.0 (L) * 7.54 (H)	mm

LCD panel

Item	Standard Value	Unit
Active Area	222.72 (W) * 125.28 (L)	mm

Note : For detailed information please refer to LCM drawing

1.3   Absolute Maximum Ratings

Module

Item	Symbol	Min.	Max.	Unit
Power Voltage	V_{DD}	-0.3	3.96	V
Power Voltage	V_{EDID_IN}	-0.3	12	V
LVDS Input Signal	VS	-	3.6	V
EN/PWM Voltage	VPWM	-0.3	12	V
Operating Temperature*1	T_{OP}	-20	70	°C
Storage Temperature*1	T_{ST}	-30	80	°C
Storage Humidity*1	H_D	10	90	%RH

Note1: The storage /operating temperature. Maximum Wet-Bulb should be 39 degree C. There is no condensation on the panel surface.

1.4   DC Electrical Characteristics

Module   GND = 0V, Ta = 25°C

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Power Voltage	V_{DD}	-	3.0	3.3	3.6	V	-
Power Voltage Ripple	VRPL	Vp-p	-	-	200	mV	-
Supply Current	IDD	V_{DD} = 3.3 V Pattern= Black *1	-	130	200	mA	

Note1:Maximum current display

LVDS

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Differential Input High Threshold	Vth	Vcm=+1.2V	-	-	100	mV	-
Differential Input Low Threshold	Vtl	Vcm=+1.2V	-100	-	-	mV	-
Magnitude Differential Input	|Vid|	-	200	-	600	mV	-
Common Mode Voltage	Vcm	Vth - Vtl = 200mV	1.0	1.2	1.4	V	
Common Mode Voltage Offset	$\triangle V_{cm}$	Vth - Vtl = 200mV	-50	-	50	mV	

EDID

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Power Supply Voltage	V_{EDID}	-	3.0	-	3.6	V

B/L

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Power Supply Voltage	VLED_IN	-	4.5	5	5.5	V
Power Supply Current	I_{LED-IN}	V_LED=4.5V η =85%	-	-	586	mA
EN/PWM	VH	-	2.0	-	5.0	V
	VL	-	0	-	0.5	V
Life Time	-	IF= 586mA	30000	-	-	hrs

Note: A. Input signals shall be low or Hi-Z state when VIN is off.

　　　B. All electrical characteristics for LVDS signal are defined and shall be measured at the interface connector of LCD.

　　　C. White Pattern at 3.3V driving voltage

1.5 Optical Characteristics

TFT LCD Module   VDD = 3.3 V, Ta=25°C

Item		Symbol	Condition	Min.	Typ.	Max.	unit	
Response time		T_r	Ta = 25°C θX, θY = 0°	-	10	20	ms	Note 2
		T_f		-	20	30		
Viewing angle	Top	θY+	CR ≥ 10	70	80	-	Deg.	Note 4
	Bottom	θY-		70	80	-		
	Left	θX-		70	80	-		
	Right	θX+		70	80	-		
Contrast ratio		CR		400	500	-	-	Note 3
Color of CIE Coordinate (With B/L & CTP)	White	X	Ta = 25°C θX , θY = 0°	0.26	0.31	0.36	-	Note1
		Y		0.30	0.35	0.40		
	Red	X		0.52	0.57	0.62		
		Y		0.26	0.34	0.39		
	Green	X		0.24	0.29	0.34		
		Y		0.44	0.49	0.54		
	Blue	X		0.11	0.16	0.21		
		Y		0.09	0.14	0.19		
Average Brightness Pattern=white display (With LCD)*1		IV	-	300	350	-	cd/m²	Note1
Uniformity (With LCD)*2		△B	-	75	-	-	%	Note1

Note 1:

*1：△B=B(min) / B(max) * 100%

*2：Measurement Condition for Optical Characteristics:

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

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

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

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

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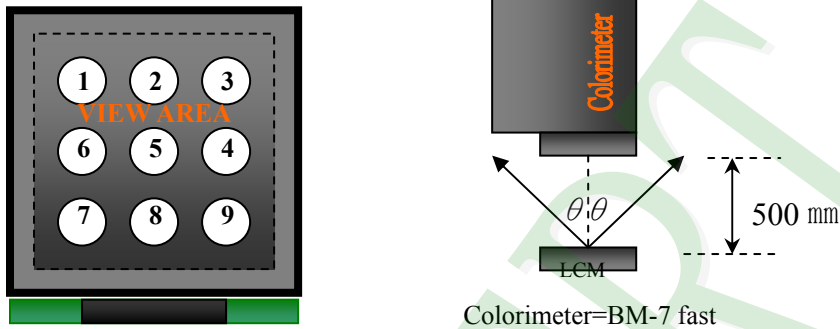
　　To be measured at the center area of panel with a viewing cone of 1° by Topcon luminance meter BM-7, after 10 minutes operation (module)

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
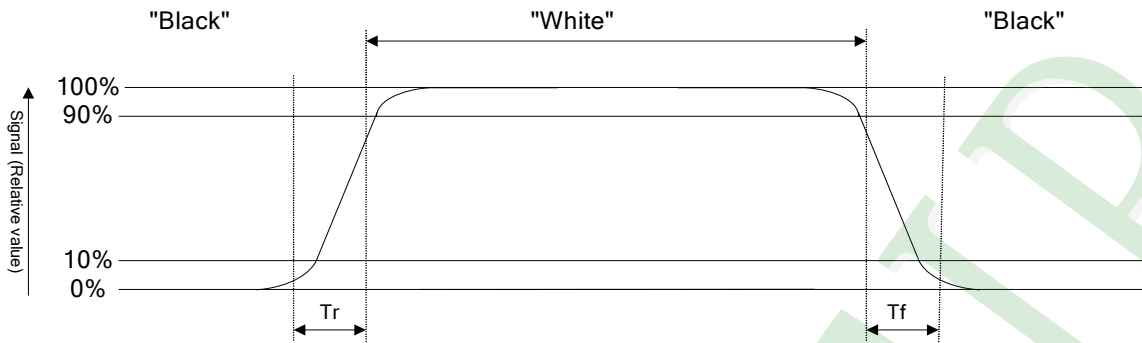
Note3: Definition of contrast ratio:

Contrast ratio is calculated with the following formula

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

Note4: Definition of viewing angle:

Refer to figure as below:
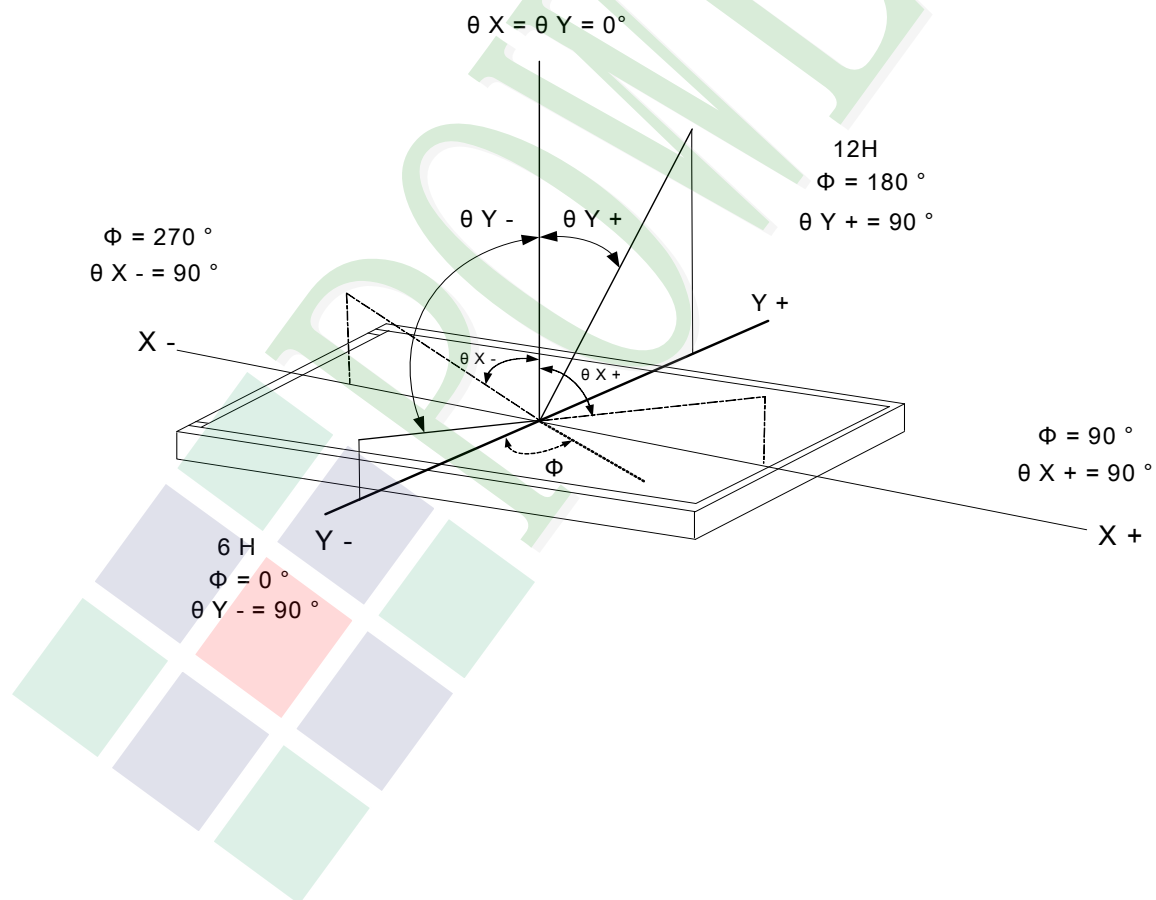
2. MODULE STRUCTURE

2.1 Counter Drawing

2.1.1 LCM Mechanical Diagram

* See Appendix

2.1.2 Block Diagram
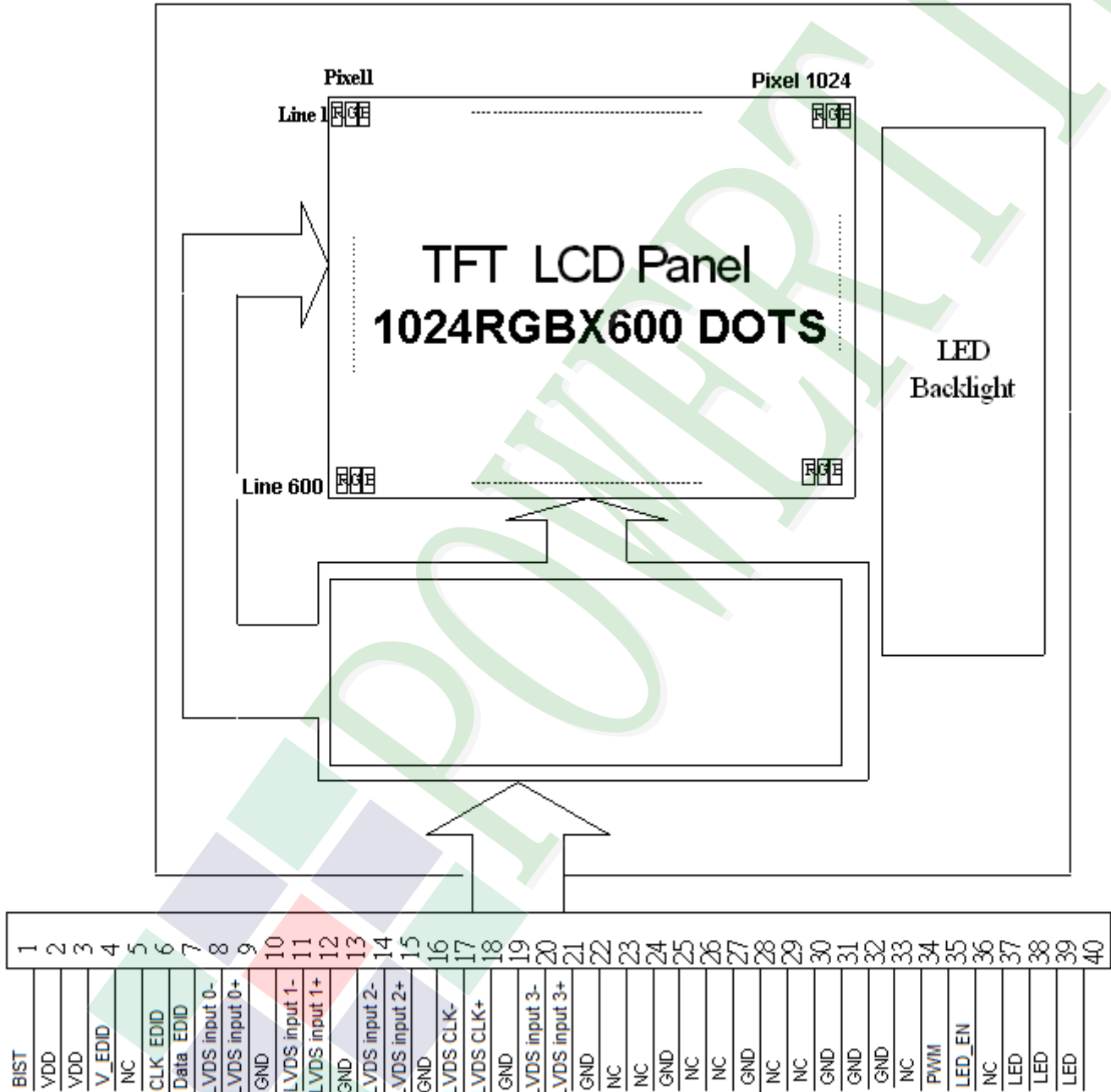
2.2　Interface Pin Description

Pin No.	Symbol	Function
1	BIST	BIST MODE SELECT(High Enable), FOR INTERNAL TEST
2	VDD	LCD power supply (Typ. +3.3V)
3	VDD	LCD power supply (Typ. +3.3V)
4	V_EDID	EDID power supply
5	NC	No connection
6	CLK_EDID	EDID CLK signal
7	Data_EDID	EDID Data signal
8	LVDS input 0-	LVDS CH0 Data signal(-)，R0~R5，G0
9	LVDS input 0+	LVDS CH0 Data signal(+)，R0~R5，G0
10	GND	Ground
11	LVDS input 1-	LVDS CH1 Data signal(-)，G1~G5，B0，B1
12	LVDS input 1+	LVDS CH1 Data signal(+)，G1~G5，B0，B1
13	GND	Ground
14	LVDS input 2-	LVDS CH2 Data signal(-)，B2~B5，DE
15	LVDS input 2+	LVDS CH2 Data signal(+)，B2~B5，DE
16	GND	Ground
17	LVDS CLK-	LVDS CLK data signal(-)
18	LVDS CLK+	LVDS CLK data signal(+)
19	GND	Ground
20	LVDS input 3-	LVDS CH3 data signal(-)，R6~R7，G6~G7，B6
21	LVDS input 3+	LVDS CH3 data signal(+)，R6~R7，G6~G7，B6
22	GND	Ground
23	NC	No connection
24	NC	No connection
25	GND	Ground

Pin No.	Symbol	Function
26	NC	No connection
27	NC	No connection
28	GND	Ground
29	NC	No connection
30	NC	No connection
31	GND	Ground
32	GND	Ground
33	GND	Ground
34	NC	No connection
35	PWM	LED dimming signal
36	LED_EN	LED Enable signal
37	NC	No connection
38	LED	LED power supply (Typ. 5V)
39	LED	LED power supply (Typ. 5V)
40	LED	LED power supply (Typ. 5V)

2.3 Power ON/OFF Sequence

2.3.1 Power seqence
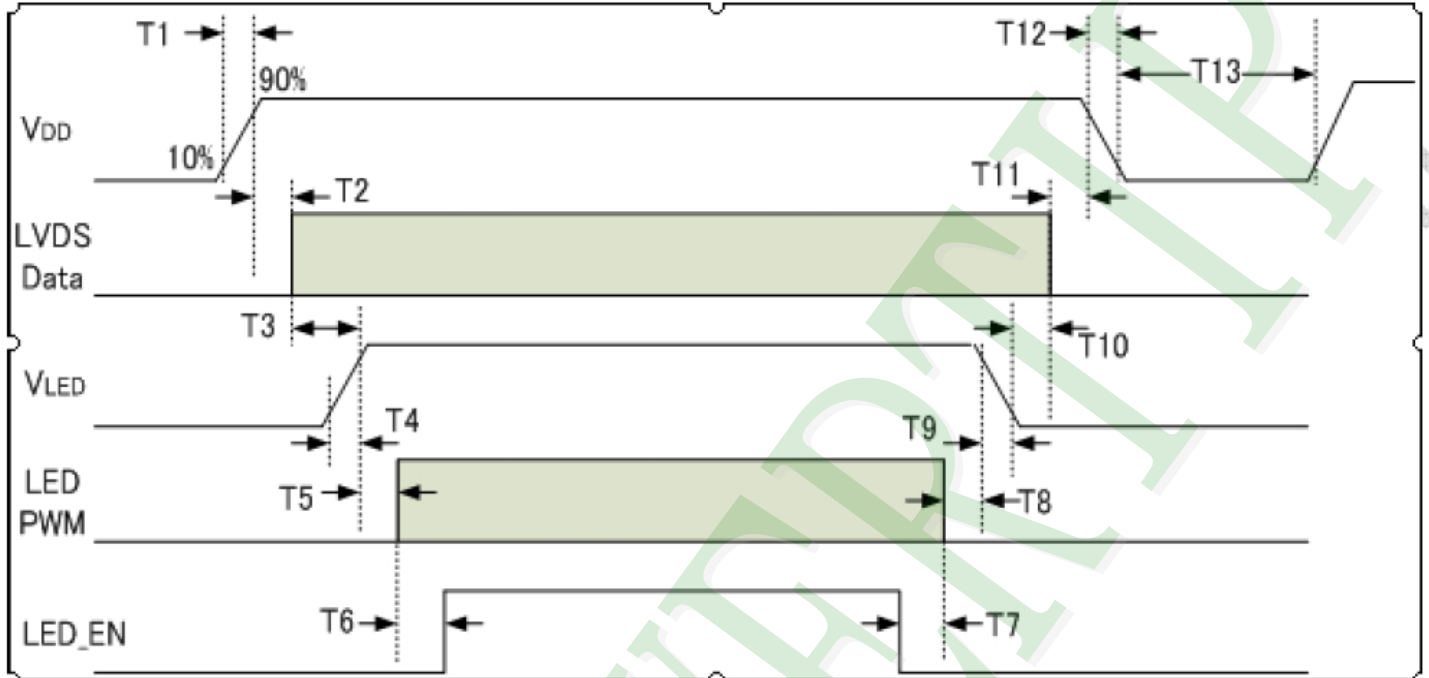
Parameter	Symbol	Unit	min	Typ.	max
VDD rising Time	T1	ms	0.5	--	10
VDD Good to Signal Valid	T2	ms	30	--	90
Signal Valid to Backlight on	T3	ms	200	--	--
Backlight Power on time	T4	ms	0.5	--	--
Backlight VDD Good to System PWM on	T5	ms	10	--	--
System PWM on to Backlight Enable on	T6	ms	10	--	--
Backlight Enable off to System PWM off	T7	ms	0	--	--
System PWM off to B/L Power Disable	T8	ms	10	--	--
Backlight Power off time	T9	ms	1	10	30
Backlight off to signal Disable	T10	ms	200	--	--
Signal Disable to Power Down	T11	ms	0	--	50
VDD Falling Time	T12	ms	1	10	30
Power Off	T13	ms	500	--	--

2.4 Timing Characteristics

2.4.1 Interface Timings

Synchronization Method: DE only

Parameter	Symbol	Min.	Typ.	Max.	Unit
LVDS Clock Frequency <single>	fdck	45	51.2	65	MHz
H Total Time	Thp	1324	1344	1364	clocks
H Active Time	HA	1024	1024	1024	clocks
H Blanking Time	THBLANK	300	320	340	clocks
V Total Time	Tvp	615	635	645	lines
V Active Time	VA	600	600	600	lines
V Blanking Time	TVBLANK	15	35	45	lines
V Frequency	fv	55	60	65	Hz

2.4.2 DE-only timing mode
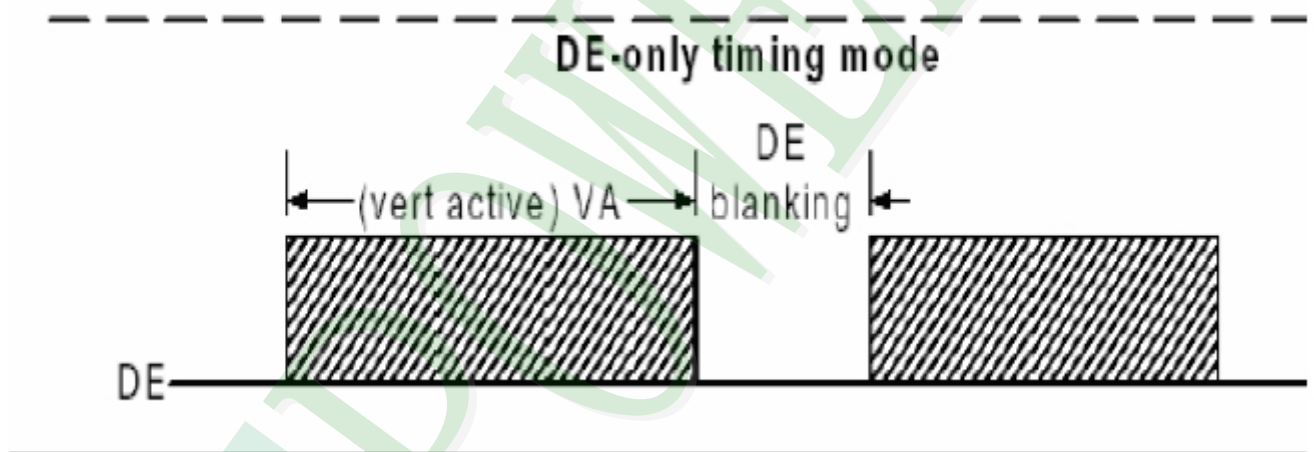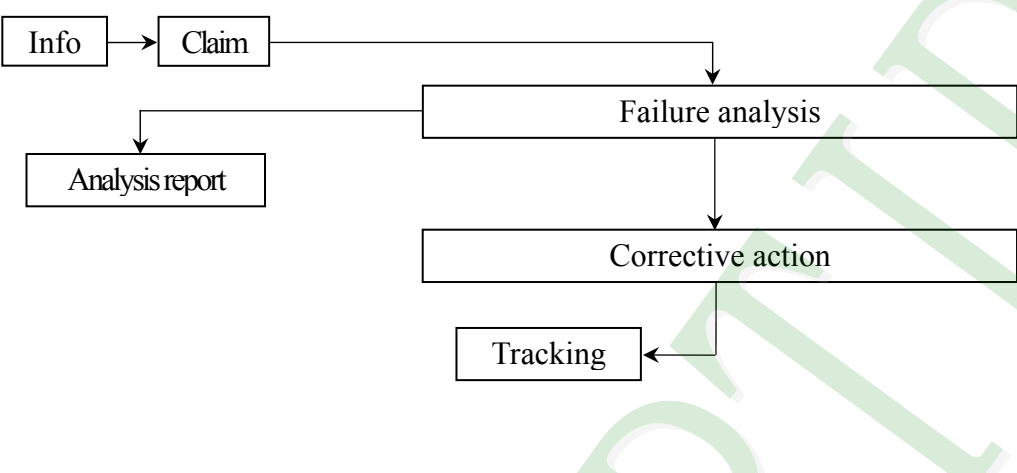
2.4.3 Timing Diagram of Interface Signal
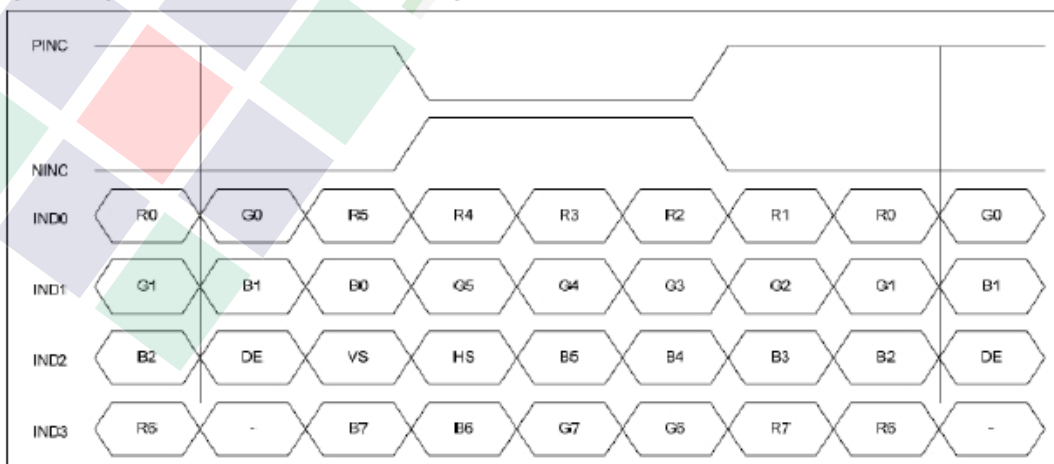
3. QUALITY ASSURANCE SYSTEM

3.1 Quality Assurance Flow Chart

Item	Customer	Sales	R&D	Q.A	Manufacturing	Product control	Purchase	Inventory control
Marketing & Design	Info → Survey; Request → Inquiry		Project evaluation; Project Validation (NG/OK); Quote → Contract					
Sample Approval	Contract		Design check; Sample test; Verification (NG/OK); Sample approval					
Pilot Run & Mass Product			Pilot run & Reliability test; Verification (NG/OK); Specification preparation; Mass production; Inspection (OK/NG)					
Ship Out	Shipment							Ship out

Item	Customer	Sales	R&D	Q.A	Manufact uring	Product control	Purchase	Inventory control
Sales Service	Info → Claim ... Analysis report ... Failure analysis ... Corrective action ... Tracking							
Q.A Activity	1. ISO 9001 Maintenance Activities 2. Process improvement proposal 3. Equipment calibration 4. Education And Training Activities 5. Standardization Management							

3.2. Inspection Specification

◆Scope：The document shall be applied to TFT-LCD Module for 3.5″ ~10″ (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.
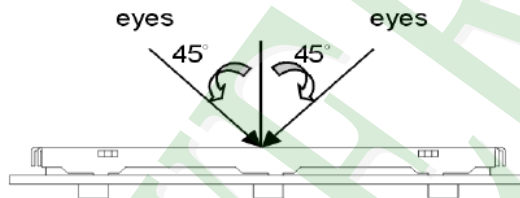
　（3）. Definition of area.
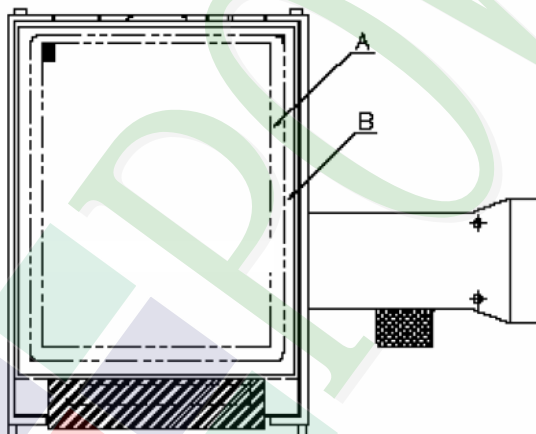
A area : viewing area

B area : Outside of viewing area

　（4）. Standard of inspection：　(Unit：mm)
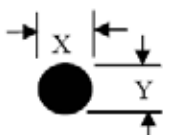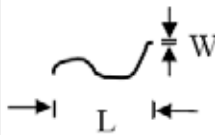
◆Specification For TFT-LCD Module 3.5″ ~10″ : (Ver.B01)

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
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> 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.	Minor
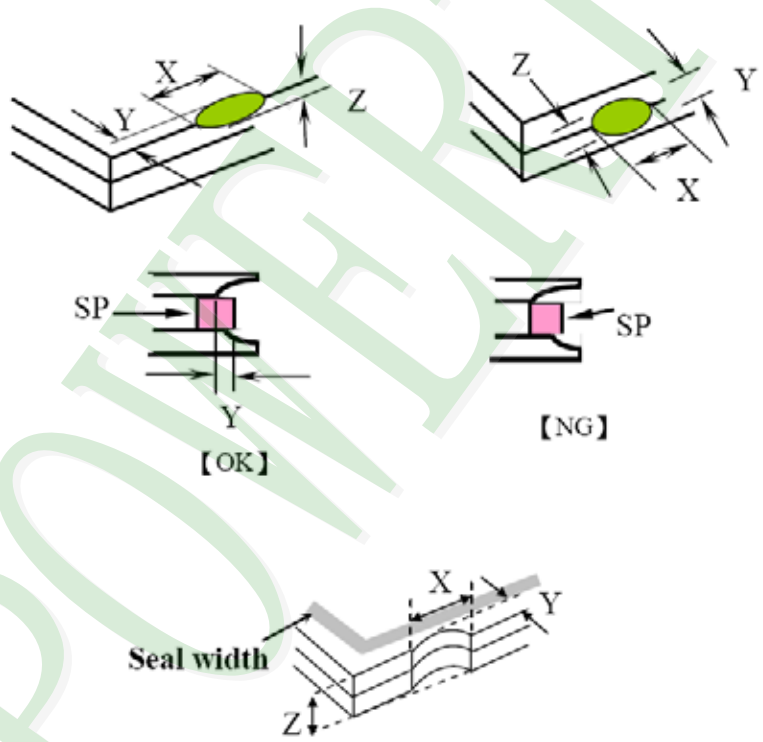
NO	Item	Criterion	Level
06	**Black or white dot、scratch、contamination** **Round type** $\Phi=(x+y)/2$ **Line type** 	**6.1 Round type (Non-display or display)**: 6.2 Line type	**Minor**
07	**Polarizer Bubble**		**Minor**

6.1 Round type (Non-display or display):

Dimension (diameter：Φ)	Acceptance (Q'ty)	
	A area	B area
$\Phi \leqq 0.25$	Ignore	Ignore
$0.25 < \Phi \leqq 0.50$	5	
$\Phi > 0.50$	0	
Total	5	

6.2 Line type(Non-display or display):

Length (L)	Width (W)	Acceptance (Q'ty)	
		A area	B area
---	$W \leqq 0.03$	Ignore	Ignore
$L \leqq 10.0$	$0.03 < W \leqq 0.05$	4	
$L \leqq 5.0$	$0.05 < W \leqq 0.10$	2	
---	$W > 0.10$	As round type	
	Total	5	

Polarizer Bubble

Dimension (diameter：Φ)	Acceptance (Q'ty)	
	A area	B area
$\Phi \leqq 0.25$	Ignore	Ignore
$0.25 < \Phi \leqq 0.50$	4	
$0.50 < \Phi \leqq 0.80$	1	
$\Phi > 0.80$	0	
Total	5	

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

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

NO	Item	Criterion	Level
08	The crack of glass	Symbols : X : The length of crack Y : The width of crack. Z : The thickness of crack W : terminal length t : The thickness of glass a : LCD side length 8.1.2 Corner crack : _table below_ 8.2 Protrusion over terminal : 8.2.1 Chip on electrode pad : _table below_	Minor

8.1.2 Corner crack :

X	Y	Z
≦1/5 a	Crack can't enter viewing area	Z ≦ 1/2 t
≦1/5 a	Crack can't exceed the half of SP width.	1/2 t < Z ≦ 2 t

8.2.1 Chip on electrode pad :

	X	Y	Z
Front	≦ a	≦ 1/2 W	≦ t
Back	≦ a	≦ W	≦ 1/2 t

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 : 	Minor

8.2.2 Non-conductive portion :

X	Y	Z
$\leq 1/3$ a	$\leq$ W	$\leq$ t

⊙ If the chipped area touches the ITO terminal, over 2/3 of

the ITO must remain and be inspected according to electrode

terminal specifications.

8.2.3 Glass remain :

X	Y	Z
$\leq$ a	$\leq 1/3$ W	$\leq$ t

◆Specification For TFT-LCD Module 3.5″ ~10″ :   (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 Storage Test**	**Keep in +80 ±2℃ 96 hrs** **Surrounding temperature, then storage at normal condition 4hrs.**	
2	**Low Temperature Storage Test**	**Keep in -30 ±2℃ 96 hrs** **Surrounding temperature, then storage at normal condition 4hrs.**	
3	**High Temperature / High Humidity Storage Test**	**Keep in +40℃ / 90% R.H duration for 96 hrs** **Surrounding temperature, then storage at normal condition 2hrs.**	
4	**ESD Test**	**Air Discharge:** **Apply 2 KV** **Discharge for each polarity +/-**	**Contact Discharge:** **Apply 250V** **discharge for each polarity +/-**
		1.Temperature ambiance:15℃～35℃ **2.Humidity relative:30%～60%** **3.Energy Storage Capacitance(Cs+Cd):150pF±10%** **4.Discharge Resistance(Rd):330Ω±10%**	
5	**Thermal Shock**	**-30℃/30 min ~ +80℃/30 min for a total 100 cycles, Start with cold temperature and end with high temperature.**	
6	**Vibration Test**	**1. Sine wave 10～55 Hz frequency** **2. The amplitude of vibration :1.5 mm** **3. Each direction (X、Y、Z) duration for 2 Hrs**	
7	**Drop Test (Packaged)**	**Height:60 cm** **1 corner, 3 edges, 6 surfaces**	

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 $320\pm10^{\circ}C$ 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 $25^{\circ}C \pm5^{\circ}C$ 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.
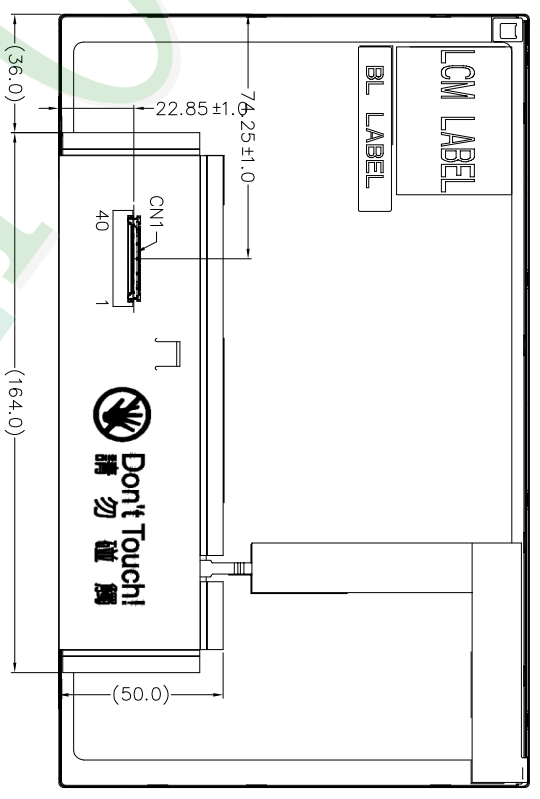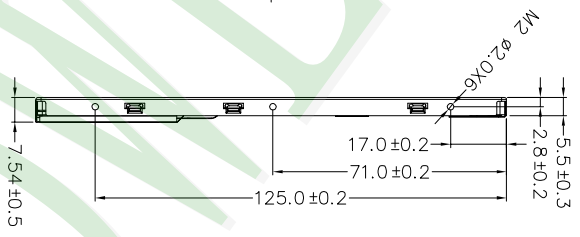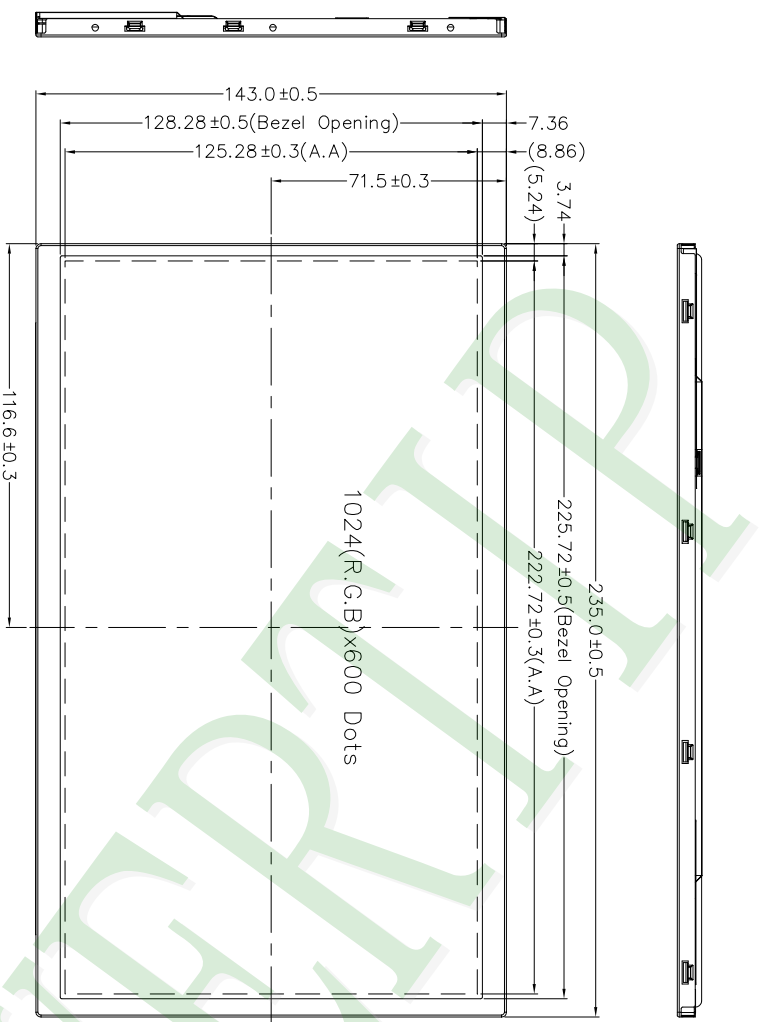
NOTES:
1.LCD TYPE: TFT LCD
2.LCD DISPLAY: Normally White
3.The tolerance unless classified ±0.5mm
4.CN1: STM MSAK24025P40D

1024(R.G.B)×600 Dots

143.0 ±0.5
128.28 ±0.5(Bezel Opening)
125.28 ±0.3(A.A)
71.5 ±0.3
7.36
(8.86)
(5.24)
3.74
235.0 ±0.5
225.72 ±0.5(Bezel Opening)
222.72 ±0.3(A.A)
116.6 ±0.3

M2.0X6
17.0 ±0.2
2.8 ±0.2
5.5 ±0.3
71.0 ±0.2
125.0 ±0.2
7.54 ±0.5

(36.0)
22.85 ±1.0
74.25 ±1.0
(164.0)
CN1
40
1
LCM LABEL
BL LABEL
Don't Touch!
請勿觸摸
(50.0)

PART NO:	PH102600T005-ZAA			Surface		1 ~ 4	-
DRAWING NAME:	LMD-PH102600T005-ZAA			Material		4 ~ 16	-
TITLE:	LCD MODULE DRAWING			Thickness	16 ~ 63	-
				Quantity	63 ~ 250	-
					250 ~ 1000	-

007		
006		
005		
004		
003		
002		
001	NEW DRAWING	Stone	2015/01/23
REV	REV BY	DATE
	REVISER	

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

Design	Stone
Check	Sam
Approve	Oliver

Unit	MM
Scale	1:1
Page	1/1

Length(Min)
(mm)
Tolerance/Precision
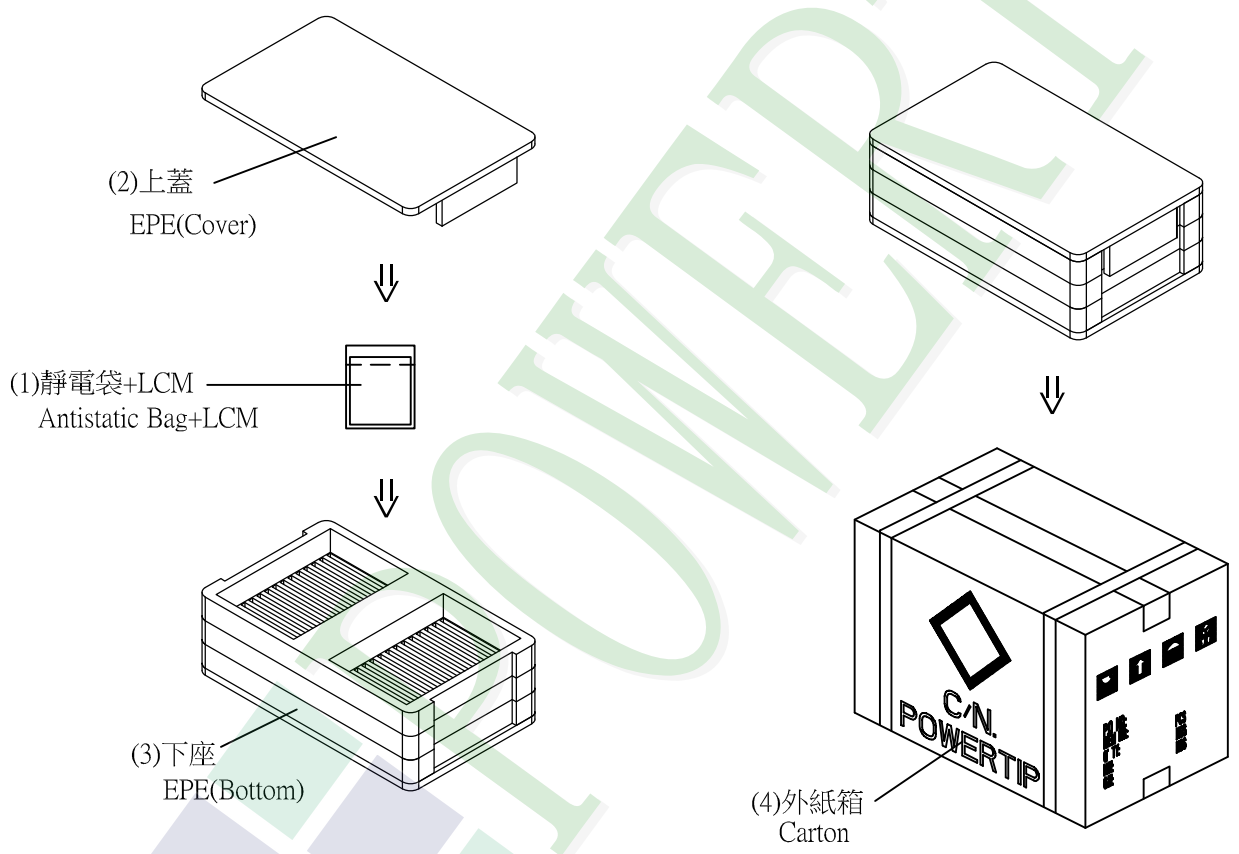Precision Level

PT-A-054-01

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)	PH102600T005-ZAA	235.0 X 143.0	0.31	20	6.2
2	靜電袋(1)Antistatic Bag	BAG0000000021	240 X 300	0.008	20	0.16
3	上蓋(2)EPE(Cover)	FOAM000000132	520 X 315 X 65	0.108	1	0.108
4	下座(3)EPE(Bottom)	FOAM000000133	520 X 315 X 330	0.85	1	0.85
5	外紙箱(4)Carton	BX52732536CCBA	527 X 325 X 360	1.092	1	1.092
6						

2.一 整箱總重量 (Total LCD Weight in carton) :　8.41　Kg±10%

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

　　Total LCM quantity in carton : quantity per EPE　20　x no of EPE　1　=　20

(2)上蓋
EPE(Cover)

(1)靜電袋+LCM
Antistatic Bag+LCM

(3)下座
EPE(Bottom)

(4)外紙箱
Carton

C/N.
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特　記　事　項 (REMARK)

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