SPECIFICATIONS

CUSTOMER	:	**CNO003**
SAMPLE CODE	:	**SE240128WRF-002-KQ**
MASS PRODUCTION CODE	:	**PE240128WRF-002-KQ**
SAMPLE VERSION	:	**05**
SPECIFICATIONS EDITION	:	**011**
DRAWING NO. (Ver.)	:	**HLMD-PE240128WRF-002-KQ_003**
PACKAGING NO. (Ver.)	:	**HPKG-PE240128WRF-002-KQ_001**

Customer Approved

Date:

POWERTIP
2012.07.17
JS RD APPROVED

Approved	Checked	Designer
閆偉	張久慧	劉進

☐ 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

PS0812017

NO.PT-A-005-8

RECORDS OF REVISION

Date (mm / dd / yyyy)	Ver.	Edi.	Description	Page	Design by
07/30/2008	01	001	New Drawing	-	張恒
08/13/2008	01	002	It has changed the content of Drawing	-	張恒
08/22/2008	01	003	It has changed the Type of FPC	-	張恒
10/28/2008	01	004	It has changed the length of FPC	-	張恒
12/23/2008	01	005	New Sample	-	魏永超
06/30/2009	02	006	Low temperature display improvement, include B/L & LCD	-	Wesley
07/13/2009	02	007	Add Pull Tape	LCM Drawing	Wesley
08/27/2009	03	008	Add Silicone	-	Wesley
10/20/2009	04	009	Add tape on B/L Remove the Silicone of the sample Ver.03	LCM Drawing	Wesley
03/09/2012	05	010	Change the supplier of FPC	-	汪秀俊
07/11/2012	05	011	Add EEPROM Read Operation Instruction	21	劉進

Total：30Page

Contents

1. SPECIFICATIONS

1.1 Features

Item	Standard Value
Display Type	240*128 Dots
LCD Type	FSTN,Positive,White,Transflective, Extended Temp.
Driver Condition	LCD Module :1/160Duty,1/14Bias
Viewing Direction	12 O'clock
Backlight	White LED Backlight
Weight	41g
Interface	Support 8 Bit Parallel interface with 8080 or 6800 series MPU
Other(controller / driver IC)	SITRONIX - ST7529-G
ROHS	THIS PRODUCT CONFORMS THE ROHS OF PTC Detail information please refer web side : http://www.powertip.com.tw/news/LatestNews.asp

1.2 Mechanical Specifications

Item	Standard Value	Unit
Outline Dimension	74.5(L)*54.5 (W)*9.8 (H)(max)	mm
Viewing Area	68.0(L)* 40.0(W)	mm
Active Area	61.18(L)* 36.46(W)	mm
Dot Size	0.235(W)*0.265 (L)	mm
Dot Pitch	0.255(W)*0.285 (L)	mm

Note：For detailed information please refer to LCM drawing

1.3 Absolute Maximum Ratings

Item	Symbol	Condition	Min.	Max.	Unit
Power Supply Voltage	V_{DD}	—	-0.5	4.0	V
LCD Driver Supply Voltage	V_{LCD}	—	-0.5	20.0	V
Input Voltage	V_{IN}	—	-0.5	$V_{DD}+0.5$	V
Operating Temperature	T_{OP}	—	-30	80	℃
Storage Temperature	T_{ST}	—	-35	80	℃
Storage Humidity	H_D	Ta＜60 ℃	-	90	%RH

1.4 DC Electrical Characteristics

$$V_{DD}=3.0\pm0.3V, V_{SS}=0V, Ta = 25°C$$

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Logic Supply Voltage	V_{DD}	Ta = 25°C	2.7	3.0	3.3	V
"H" Input Voltage	V_{IH}	Ta = 25°C	$0.7V_{DD}$	-	V_{DD}	V
"L" Input Voltage	V_{IL}	Ta = 25°C	V_{SS}	-	$0.3 V_{DD}$	V
High-level Output Current	I_{OH}	VDD=2.7V VOH=2.2V	0.5	-	-	mA
Low-level Output Current	I_{OL}	VDD=2.7V VOL=0.5V	-	-	-0.5	mA
Supply Current	I_{DD}	$V_{DD}=3.0V; V_{OP}=14V;$ Pattern= Full display	-	0.13	-	mA
		$V_{DD}=3.0V; V_{OP}= 14V$ Pattern= Horizontal line*1	-	0.15	1.5	
LCM Driver Voltage	V_{OP} *2	-30°C	14.9	15.1	15.3	V
		25°C	13.8	14	14.2	
		80°C	13.5	13.7	13.9	

NOTE: *1 The Maximum current display

*2 The VOP test point is V_0-V_{SS}.

1.5 Optical Characteristics

LCD Panel：1/160Duty，1/14Bias，V_{LCD} =14V，Ta =25℃

Item		Symbol	Conditions	Min.	Typ.	Max.	Unit	Reference
Response Time	Rise	tr		-	130	195	ms	Note2
	Fall	tf		-	290	435		
Viewing angle range	Top	ΘY+	C≥2.0, ∅ =90°	-	40	-	Deg.	Notes 1
	Bottom	ΘY-		-	40	-		
	Left	ΘX-		-	40	-		
	Right	ΘX+		-	40	-		
Contrast Ratio		C	θ = 0°, ∅ =90°	-	3	-	-	Note 3
Average Brightness (with LCD) *1		IV		125	-	-	cd/m^2	Note 4
CIE Color Coordinate (With LCD) *1		X		0.25	0.30	0.35		
		Y		0.27	0.32	0.37		
Uniformity *2		△B		70	-	-	%	

Note 4 ：

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°)

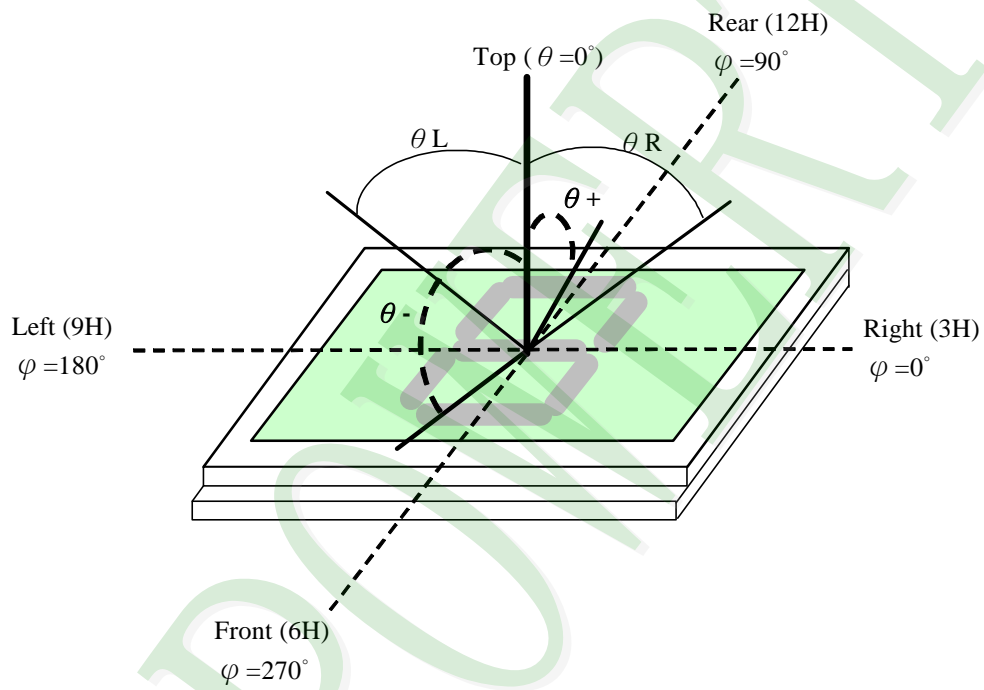   c：Equipment: TOPCON BM-7 fast，(field 1°)，after 10 minutes operation.

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

Colorimeter=BM-7 fast
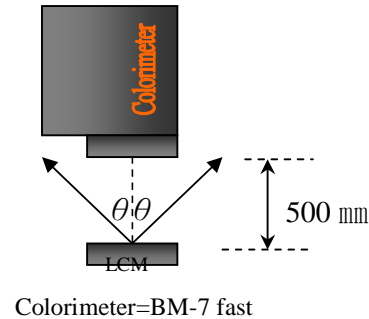
Note 1.

Optical characteristics-2

Viewing angle

Top ($\theta = 0°$)

Rear (12H)
$\varphi = 90°$

θ L

θ R

θ +

Left (9H)
$\varphi = 180°$

θ -

Right (3H)
$\varphi = 0°$

Front (6H)
$\varphi = 270°$

Viewing angle

Note 2.

Optical characteristics-3
    Fig.2 Definition of response time

Positive Type

No selected waveform → ← Selected waveform → ← No selected waveform

Transmittance

100%   90%   10%

Tr   Tf

Negative Type

No selected waveform → ← Selected waveform → ← No selected

Transmittance

100%   90%   10%

Tr   Tf
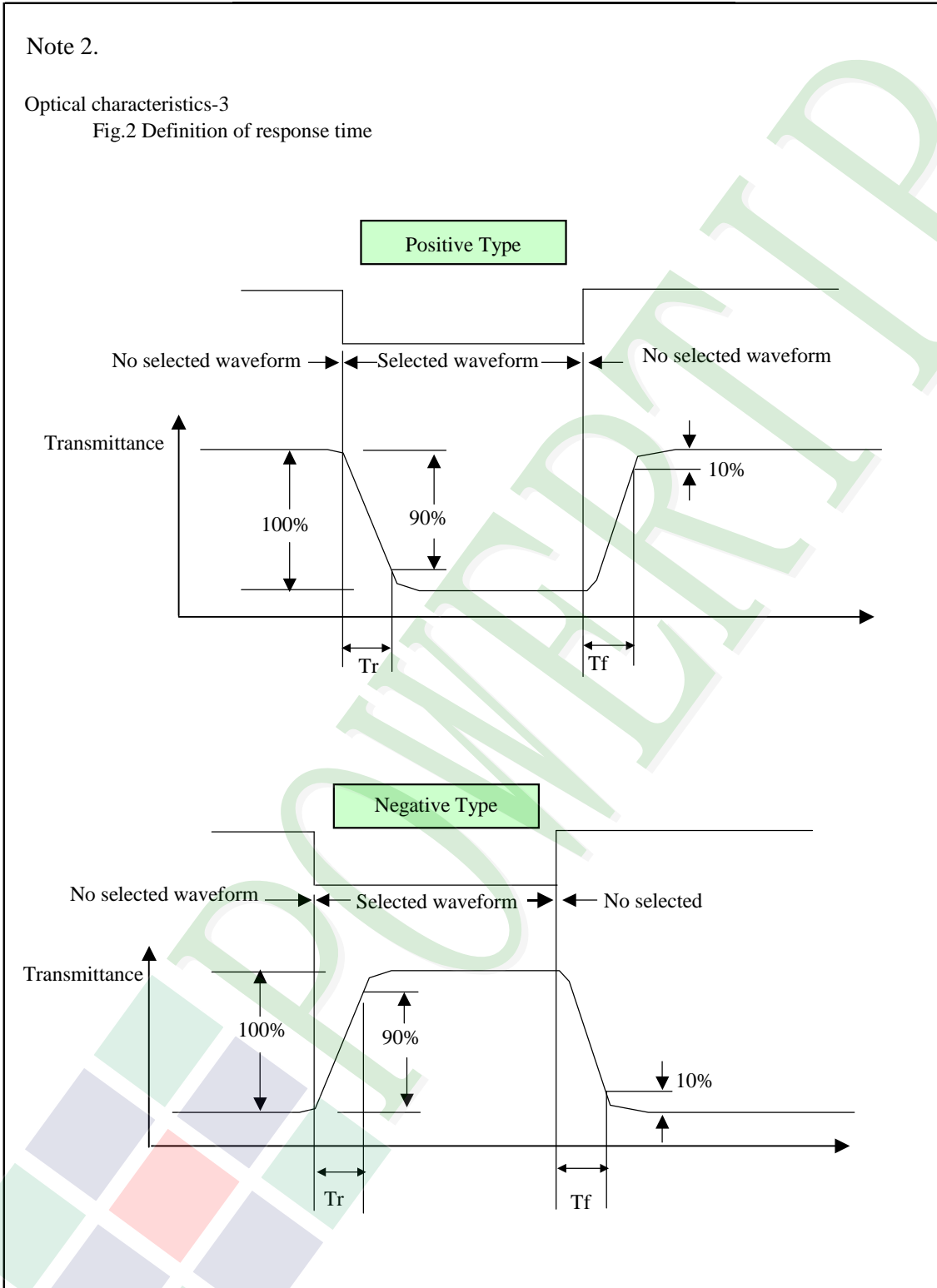
Electrical characteristics-2

　※2 Drive waveform

Vop: Drive voltage　　fF: Frame frequency

1/B: Bias　　　　　　fD: Drive frequency

N: Duty

(1) Selected waveform
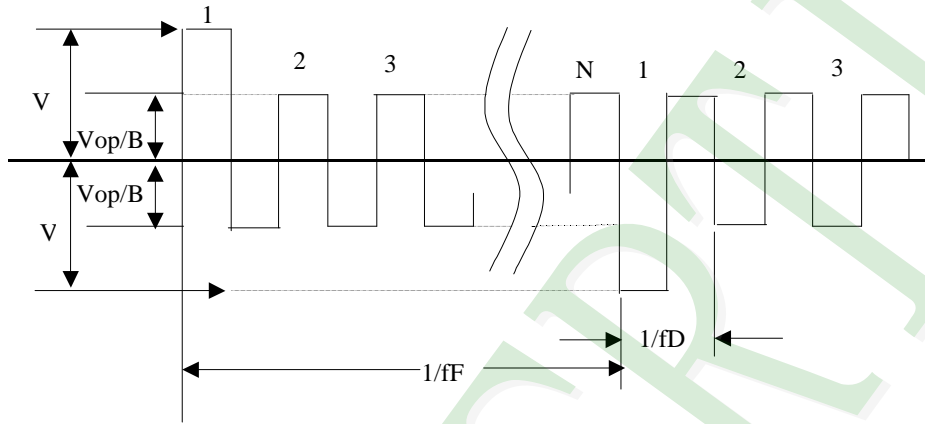
(2) Non- Selected wave form
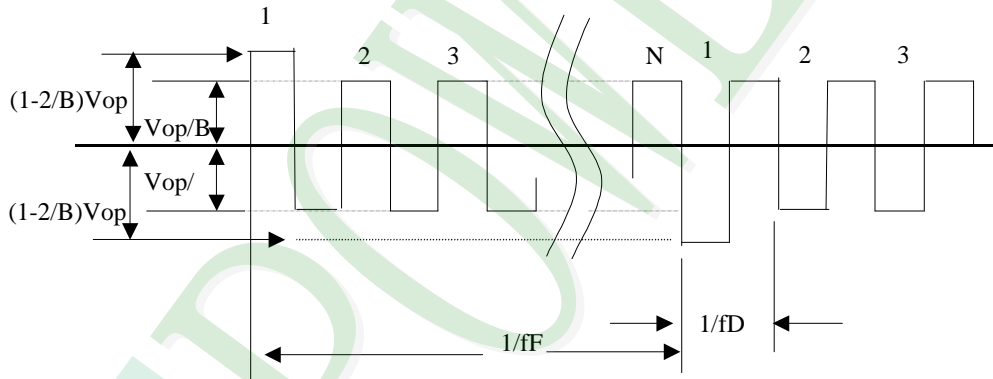
Note:

Frame frequency is defined as follows: Common side supply
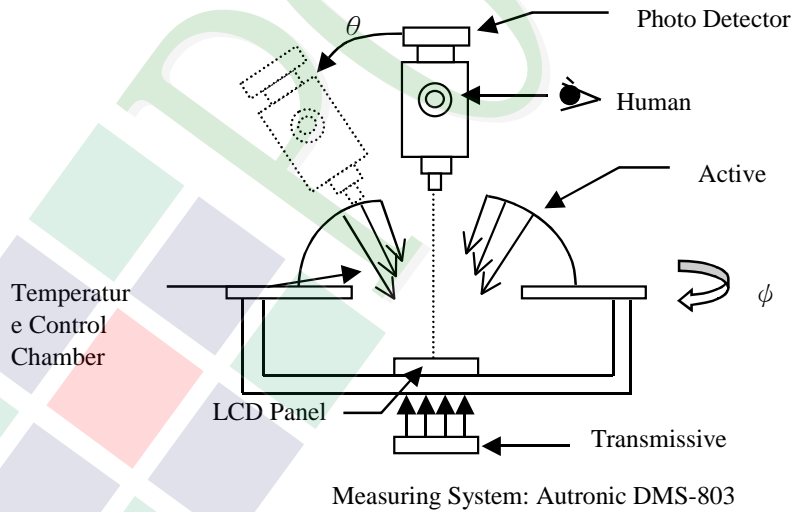
voltage peak - to - peak /2 = 1 period

Note 3. : Definition of Vth

Active voltage range
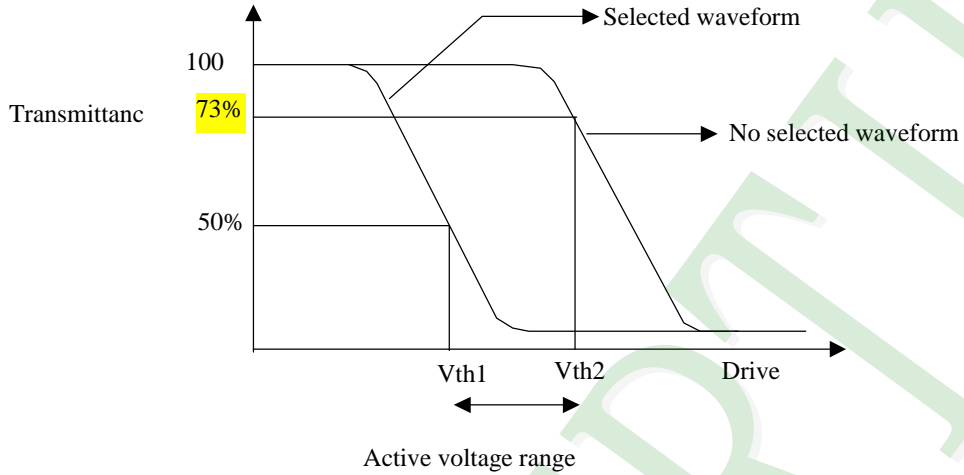
	Vth1	Vth2
View direction	10°	40°
Drive waveform	(Selected waveform)	(No selected waveform)
Transmittance	50%	73%

※1 Contrast ratio
= (Brightness in OFF state) / (Brightness in ON state)

Outline of Electro-Optical Characteristics Measuring System

Measuring System: Autronic DMS-803

1.6 Backlight Characteristics

LCD Module with LED Backlight

Maximum Ratings

Item	Symbol	Conditions	Min.	Max.	Unit
Forward Current	IF	Ta =25℃	-	90	mA
Reverse Voltage	VR	Ta =25℃	-	5	V
Power Dissipation	PD	Ta =25℃	-	420	mW

Electrical / Optical Characteristics

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Forward Voltage	VF	IF= 90mA	2.3	3.3	3.5	V
Average Brightness (without LCD)	IV	IF= 90mA	800	-	-	cd/m^2
CIE Color Coordinate (Without LCD)	X	IF= 90mA	0.24	0.27	0.30	-
	Y		0.25	0.28	0.31	
Color	White					

2. MODULE STRUCTURE

2.1 Counter Drawing

2.1.1 LCM mechanical diagram
*See appendix
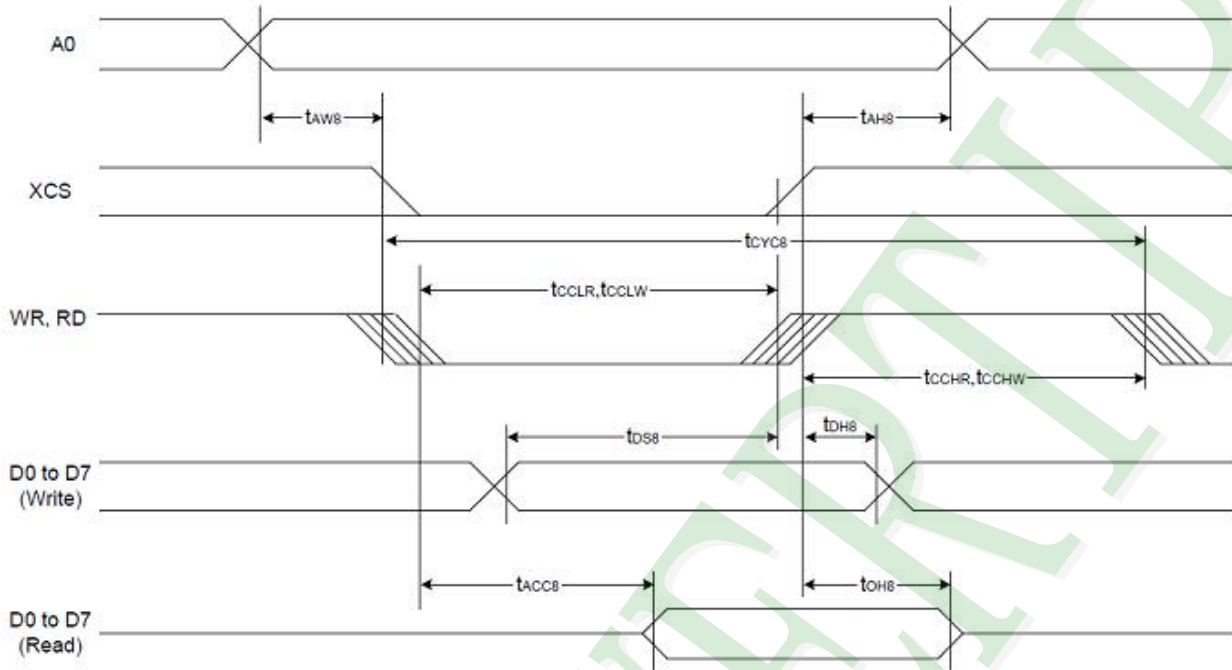
2.1.2 Block diagram
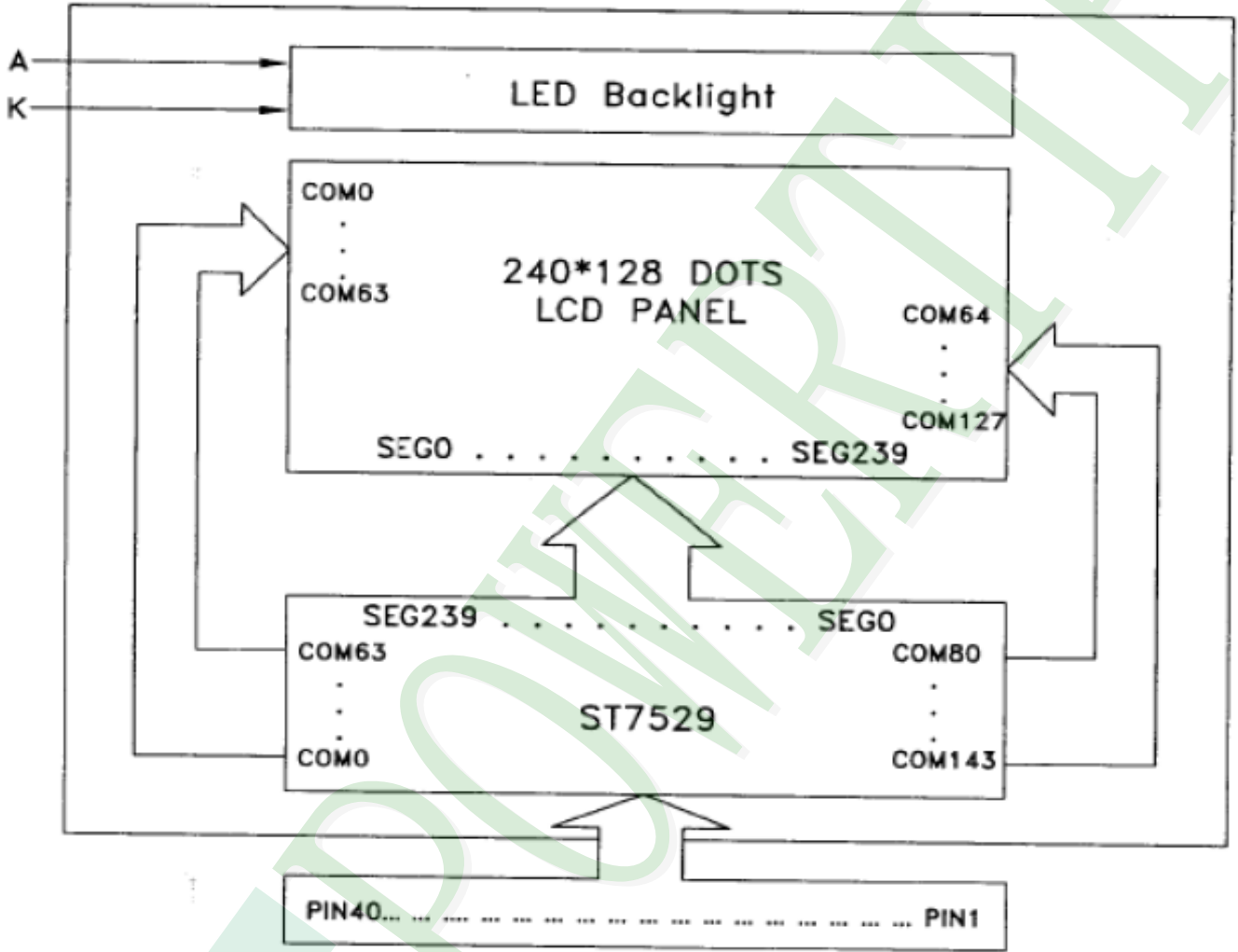
2.2 Interface Pin Description

Pin No.	Symbol	Function
1	A0	Register select input pin − A0 = "H": D0 to D8 or SI are display data − A0 = "L": D0 to D8 or SI are control data
2	RW_WR	Read / Write execution control pin | MPU Type	RW_WR	Description
6800	RW	Read / Write control input pin RW = "H" : read RW = "L" : write
8080	/WR	Write enable clock input pin The data on DB0 to DB8 are latched at the rising edge of the /WR signal.	
3	D0	
4	D1	
5	D2	
6	D3	They connect to the standard 8-bit MPU bus via the 8 bit bi-directional bus. When the following interface is selected and the XCS pin is high, the following pins become high impedance, which should be fixed to VDD or VSS.
7	D4	
8	D5	
9	D6	
10	D7	
11	E_RD	Read / Write execution control pin | MPU Type	RW_WR	Description
6800	E	Read / Write control input pin -RW = "H": When E is "H", D0 to D8 are in an output status. -RW = "L": The data on D0 to D8 are latched at the falling edge of the E signal.
8080	/RD	Read enable clock input pin When /RD is "L", D0 to D8 are in an output status.	
12	RST	Reset input pin. When RST is "L", initialization is executed.

Pin No.	Symbol	Function		
13	IF1			
		IF1	IF3	MPU interface type
		H	L	80 series 8-bit parallel
14	IF3	L	H	68 series 8-bit parallel
15	XCS	Chip select input pins Data/instruction I/O is enabled only when XCS is "L". When chip select is non-active, D0 to D8 may be high impedance.		
16	VSS	Power supply (VSS=0)		
17	VDD	Power supply (VDD=3.0V)		
18	C7P	DC / DC voltage converter. Connect a capacitor between this terminal and the ≦7X VLCD; 8X C1N terminal.		
19	C1N	DC / DC voltage converter. Connect a capacitor between this terminal and the ≦5X OPEN;≧6X also C5P; ≧8X also C7P terminal.		
20	C5P	DC / DC voltage converter. Connect a capacitor between this terminal and the ≦5X VLCD; ≧6X C1N terminal.		
21	C3P	DC / DC voltage converter. Connect a capacitor between this terminal and the ≦3X VLCD; ≧4X C1N1 terminal.		
22	C1N1	DC / DC voltage converter. Connect a capacitor between this terminal and the C1P terminal.		
23	C1P	DC / DC voltage converter. Connect a capacitor between this terminal and the C1N1 terminal.		
24	C2P	DC / DC voltage converter. Connect a capacitor between this terminal and the 2X VLCD; ≧3X C2N terminal.		
25	C2N	DC / DC voltage converter. Connect a capacitor between this terminal and the ≦2X VLCD; ≧3X C2P terminal.		
26	C4P	DC / DC voltage converter. Connect a capacitor between this terminal and the ≦4X VLCD; ≧5X C2N terminal.		
27	C2N1	DC / DC voltage converter. Connect a capacitor between this terminal and the ≦6X VLCD; ≧7X C6P terminal.		
28	C6P	DC / DC voltage converter. Connect a capacitor between this terminal and the ≦6X VLCD; ≧7X C2N1 terminal.		
29	VLCDIN	An external LCD supply voltage can be supplied using the VLCDIN pad. In this case, VLCDOUT has to be left open, and the internal voltage generator has to be programmed to zero. (SET register V B=0)		

Pin No.	Symbol	Function
30	VLCDOUT	If the internal voltage generator is used, the V LCDIN & VLCDOUT must be connected together. If an external supply is used, this pin must be left open.
31	V4	LCD driver supply voltages V0In & V0out should be connected together in FPC area. Voltages should have the following relationship: $V0 \geqq V1 \geqq V2 \geqq V3 \geqq V4 \geqq VSS$ When the internal power circuit is active, these voltages are generated as the following table according to the state of LCD bias.
32	V3	
33	V2	
34	V1	<table><tr><td>LCD Bias</td><td>V1</td><td>V2</td><td>V3</td><td>V4</td></tr><tr><td>1/N Bias</td><td>(N-1) / N x V0</td><td>(N-2) / N x V0</td><td>(2/N) x V0</td><td>(1/N) x V0</td></tr></table>
35	V0OUT	NOTE: N = 5 to 14
36	V0IN	
37	A	Power supply for LED backlight Anode input
38	A	
39	K	Power supply for LED backlight Cathnode input
40	K	

2.3   Timing Characteristics

l   System Bus Read/Write Characteristics 1 (For the 8080 Series MPU)

(VDD = 3.3V , Ta =25°C)

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Address hold time	A0	tAH8		20	—	ns
Address setup time		tAW8		20	—	
System cycle time		tCYC8		200	—	
Enable L pulse width (WRITE)	WR	tCCLW		100	—	
Enable H pulse width (WRITE)		tCCHW		100	—	
Enable L pulse width (READ)	RD	tCCLR		100	—	
Enable H pulse width (READ)		tCCHR		100	—	
WRITE Data setup time	D0 to D7	tDS8		150	—	
WRITE Address hold time		tDH8		20	—	
READ access time		tACC8	CL = 100 pF		40	
READ Output disable time		tOH8	CL = 100 pF		30	

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Address hold time	A0	tAH8	-	20	-	
Address setup time		tAW8	-	30	-	
System cycle time		tCYC8	-	250	-	
Enable L pulse width (WRITE)	WR	tCCLW	-	150	-	
Enable H pulse width (WRITE)		tCCHW	-	100	-	
Enable L pulse width (READ)	RD	tCCLR	-	150	-	ns
Enable H pulse width (READ)		tCCHR	-	100	-	
WRITE Data setup time	D0 to D7	tDS8	-	200	-	
WRITE Address hold time		tDH8	-	20	-	
READ access time		tACC8	CL = 100 pF	-	40	
READ Output disable time		tOH8	CL = 100 pF	-	30	

*1 The input signal rise time and fall time (tr, tf) is specified at 15 ns or less. When the system cycle time is extremely fast, (tr +tf) ≦ (tCYC8 – tCCLW – tCCHW) for (tr + tf) ≦ (tCYC8 – tCCLR – tCCHR) are specified.

*2 All timing is specified using 20% and 80% of VDD as the reference.

*3 tCCLW and tCCLR are specified as the overlap between XCS being "L" and WR and RD being at the "L" level.

❚ **System Bus Read/Write Characteristics 1 (For the 6800 Series MPU)**
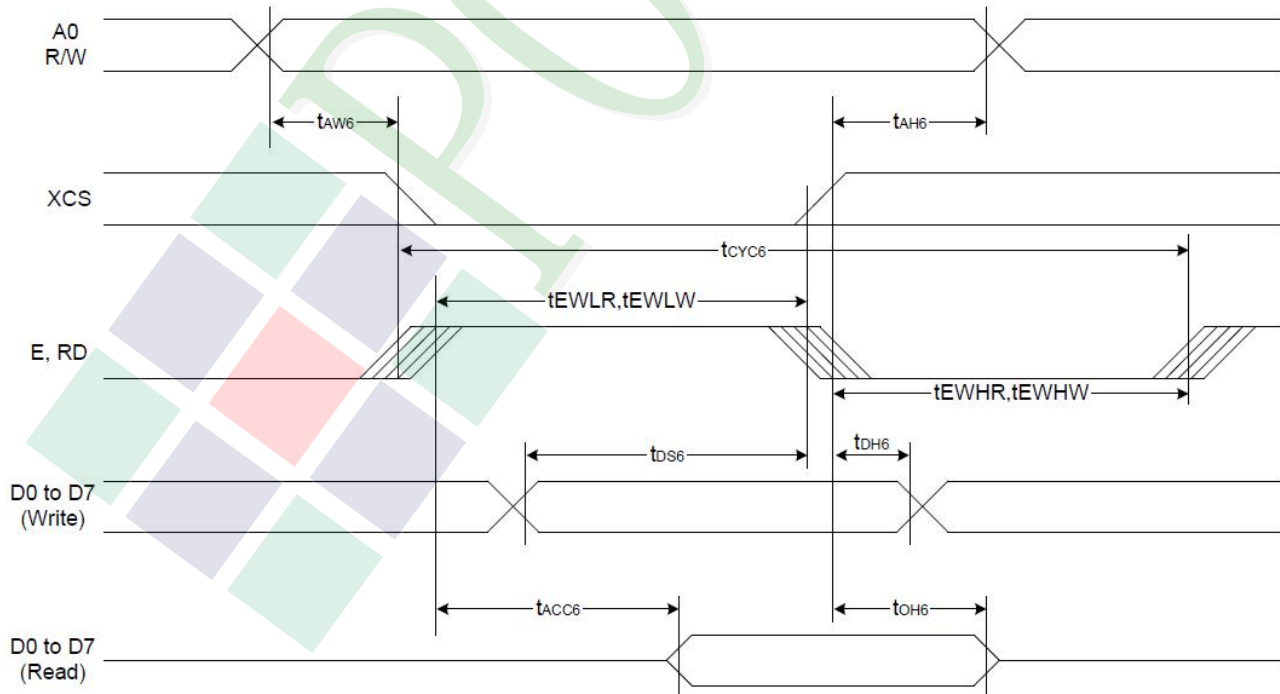
(VDD = 3.3V , Ta =25°C)

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Address hold time	A0	tAH6		20	—	ns
Address setup time		tAW6		20	—	
System cycle time		tCYC6		200	—	
Enable L pulse width (WRITE)	WR	tCCLW		100	—	
Enable H pulse width (WRITE)		tCCHW		100	—	
Enable L pulse width (READ)	RD	tCCLR		100	—	
Enable H pulse width (READ)		tCCHR		100	—	
WRITE Data setup time	D0 to D7	tDS6		150	—	
WRITE Address hold time		tDH6		20	—	
READ access time		tACC6	CL = 100 pF		40	
READ Output disable time		tOH6	CL = 100 pF		30	

(VDD = 2.7V , Ta =25°C)

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Address hold time	A0	tAH6	-	20	-	ns
Address setup time		tAW6	-	30	-	
System cycle time		tCYC6	-	250	-	
Enable L pulse width (WRITE)	E	tEWLW	-	150	-	
Enable H pulse width (WRITE)		tEWHW	-	100	-	
Enable L pulse width (READ)	RD	tEWLR	-	150	-	
Enable H pulse width (READ)		tEWHR	-	100	-	
WRITE Data setup time	D0 to D7	tDS6	-	200	-	
WRITE Address hold time		tDH6	-	20	-	
READ access time		tACC6	CL = 100 pF	-	40	
READ Output disable time		tOH6	CL = 100 pF	-	30	

*1 The input signal rise time and fall time (tr, tf) is specified at 15 ns or less. When the system cycle time is extremely fast, (tr +tf) $\leqq$ (tCYC6 – tEWLW – tEWHW) for (tr + tf) $\leqq$ (tCYC6 – tEWLR – tEWHR) are specified.

*2 All timing is specified using 20% and 80% of VDD as the reference.

*3 tEWLW and tEWLR are specified as the overlap between XCS being "L" and E.
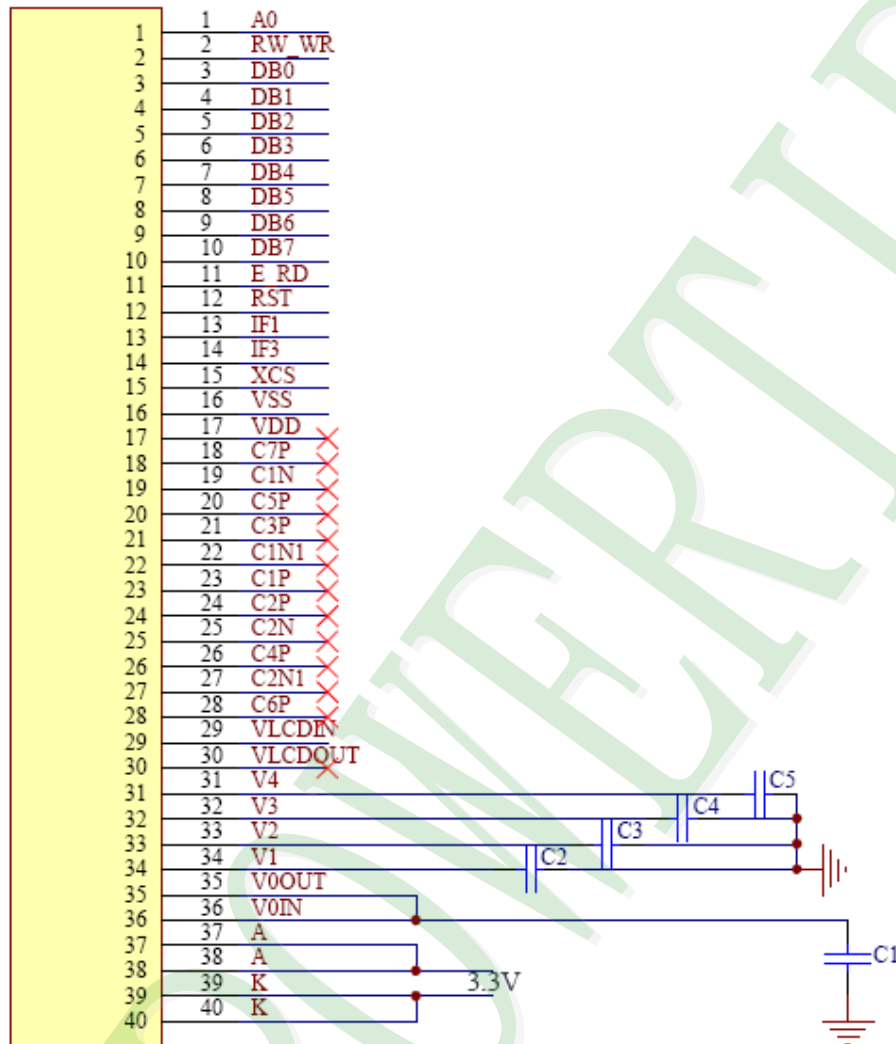
l Reset Timing
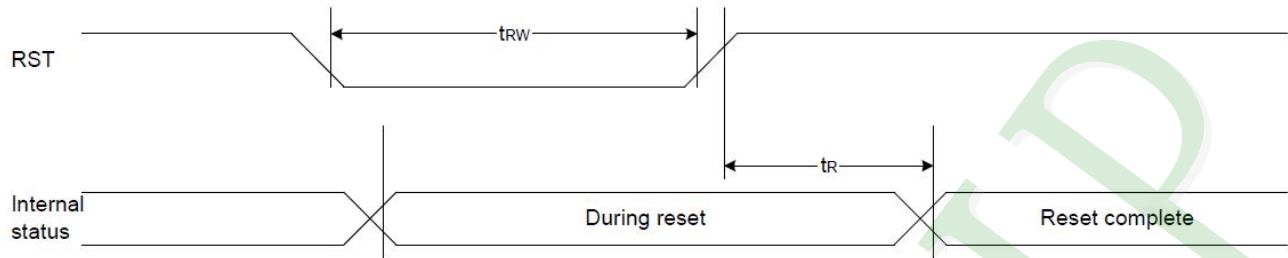
(VDD = 3.3V, Ta =-20 to 70℃)

Item	Signal	Symbol	Condition	Rating			Units
				Min.	Typ.	Max.	
Reset time		tR		—	—	1.0	us
Reset "L" pulse width	/RES	tRW		1.0	—	—	us

(VDD = 2.7V, Ta =-20 to 70℃)

Item	Signal	Symbol	Condition	Rating			Units
				Min.	Typ.	Max.	
Reset time		tR	-	-	-	1.5	us
Reset "L" pulse width	RST	tRW	-	1.5	-	-	us

Note：For detailed information please refer to IC datasheet：ST7529 Ver 2.1a.

2.4 Power supply circuit

Pin	Signal
1	A0
2	RW_WR
3	DB0
4	DB1
5	DB2
6	DB3
7	DB4
8	DB5
9	DB6
10	DB7
11	E_RD
12	RST
13	IF1
14	IF3
15	XCS
16	VSS
17	VDD
18	C7P
19	C1N
20	C5P
21	C3P
22	C1N1
23	C1P
24	C2P
25	C2N
26	C4P
27	C2N1
28	C6P
29	VLCDIN
30	VLCDOUT
31	V4
32	V3
33	V2
34	V1
35	V0OUT
36	V0IN
37	A
38	A
39	K
40	K

C5, C4, C3, C2, C1, 3.3V

Note: The regulating capacitance on V0 ~ V4 should be between 1.0 to 2.2 μF.

2.5 EEPROM Read Operation Instruction

Read EEPROM after reset must be done when using ST7529. If ST7529 did not read EEPROM for VOP calibration, that will cause VOP variation and affect the display quality. The following instruction is a example for EEPROM read operation.
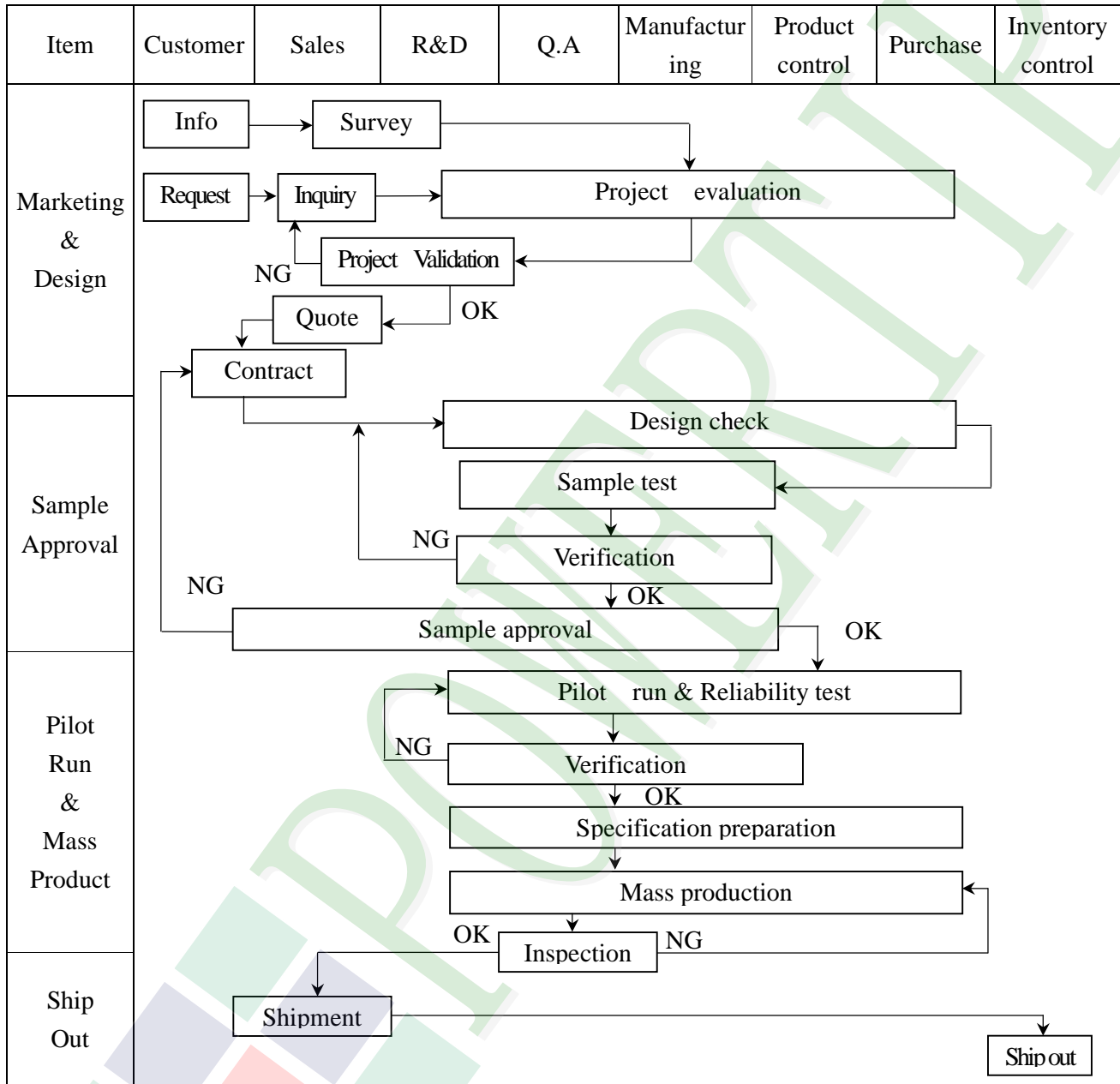
```
void ReadEEPROM( void )
{
Write( COMMAND, 0x0030 ); // Ext = 0
Write( COMMAND, 0x0007 ); // Initial code (1)
Write( DATA, 0x0019 );
Write( COMMAND, 0x0031 ); // Ext = 1
Write( COMMAND, 0x00CD ); // EEPROM ON
Write( DATA, 0x0000 ); // Entry "Read Mode"
Delay( 100ms ); // Waite for EEPROM Operation ( 100ms )
Write( COMMAND, 0x00FD ); // Start EEPROM Reading Operation
Delay( 100ms ); // Waite for EEPROM Operation ( 100ms )
Write( COMMAND, 0x00CC ); // Exist EEPORM Mode
Write( COMMAND, 0x0030 ); // Ext = 0
}
```
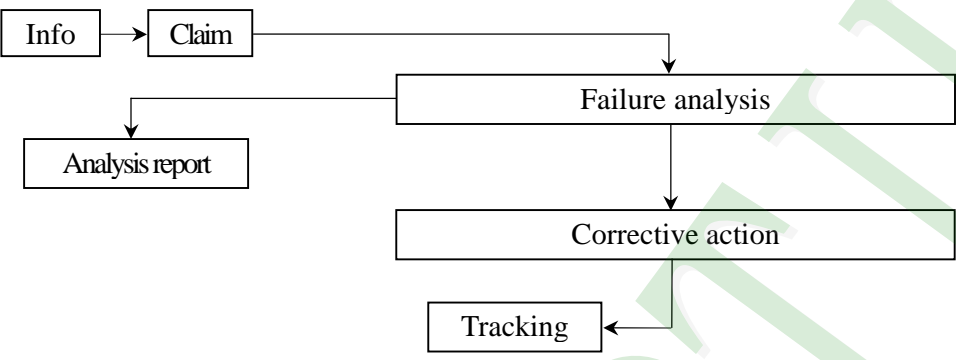
Note :

1. The EEPROM must be read in the initial flow for calibration.

2. When "Reading" value from EEPROM, the voltage of VLCDIN (PIN29) must be more than 6V. For detailed information please refer to 8.2.1 EEPROM Setting Flow on page 52 of the ST7529 datasheet Ver 2.1a.

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 NG ← Project Validation Quote ← OK Contract		Project evaluation Project evaluation (OK)					
Sample Approval	NG		Design check Sample test NG → Verification → OK Sample approval				OK	
Pilot Run & Mass Product			Pilot run & Reliability test NG → Verification → OK Specification preparation Mass production OK → Inspection → NG					
Ship Out		Shipment						Ship out

Item	Customer	Sales	R&D	Q.A	Manufacturing	Product control	Purchase	Inventory control
Sales Service								
Q.A Activity	1. ISO 9001 Maintenance Activities 2. Process improvement proposal 3. Equipment calibration 4. Education And Training Activities 5. Standardization Management							

Sales Service flow:

Info → Claim → Failure analysis

Failure analysis → Analysis report

Failure analysis → Corrective action

Corrective action → Tracking

3.2 Inspection Specification

◆Scope : The document shall be applied to LCD Module for Monotype and Color STN(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 .

◆Manner of appearance test :

（1）. The test be under 20W×2 fluorescent light ' and distance of view must be at 30 cm.

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

（3）. The test direction is base on about around 45°of vertical line. (Fig. 1)
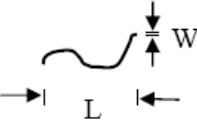
（4）. Definition of area . (Fig. 2)

Fig.1

Fig. 2

B area : Outside of viewing area

A area : viewing area
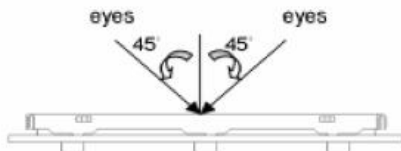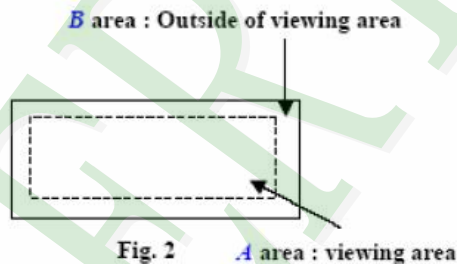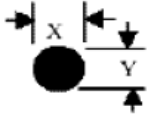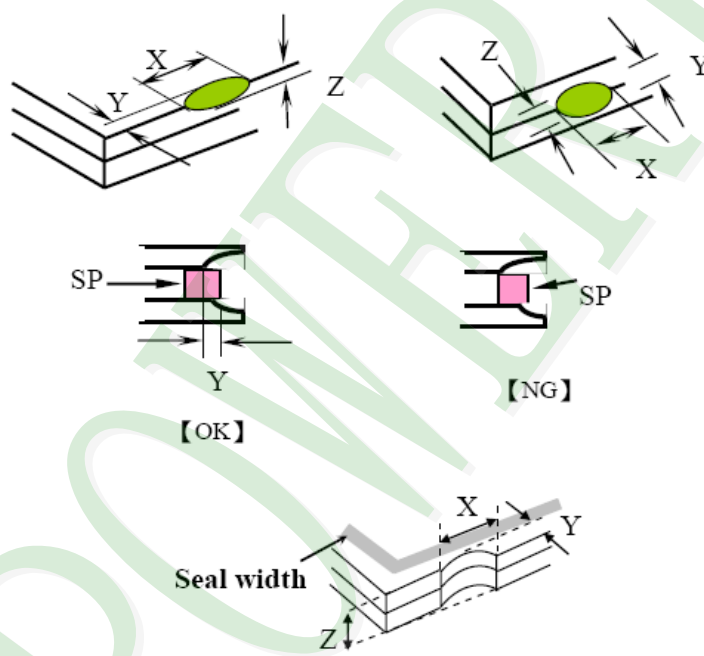
◆ Specification:

NO	Item	Criterion	Level
01	Product condition	1.1 The part number is inconsistent with work order of Production.	Major
		1.2 Mixed production 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 Output data is error.	Major
		4.4 LCD viewing angle defect.	Major
		4.5 Current consumption exceeds product specifications.	Major

◆Specification For Monotype and Color STN：   （Ver.B01）

NO	Item	Criterion	Level
05	Black or white dot、scratch、contamination Round type $\Phi=(x+y)/2$ Line type	5.1 Round type: 　5.1.1 display only： 　・White and black spots on display $\leqq 0.30$ mm，no more than 4 white or black spots present. 　・Densely spaced：NO more than two spots or lines within 3 mm. 　5.1.2 Non-display： （table below） 5.1.3 Line type: （table below）	Minor

5.1.2 Non-display：

Dimension (diameter : Φ)	Acceptance (Q'ty)	
	A area	B area
$\Phi \leqq 0.10$	Accept no dense	Ignore
$0.10 < \Phi \leqq 0.20$	3	
$0.20 < \Phi \leqq 0.30$	2	
Total quantity	4	

5.1.3 Line type:

Dimension		Acceptance (Q'ty)	
Length (L)	Width (W)	A area	B area
---	$W \leqq 0.03$	Accept no dense	Ignore
$L \leqq 3.0$	$0.03 < W \leqq 0.05$	4	
$L \leqq 2.5$	$0.05 < W \leqq 0.075$		
---	$W > 0.075$	As round type	

NO	Item	Criterion	Level
06	Polarizer Bubble	（table below）	Minor

Dimension (diameter : Φ)	Acceptance (Q'ty)	
	A area	B area
$\Phi \leqq 0.20$	Accept no dense	Ignore
$0.20 < \Phi \leqq 0.50$	3	
$0.50 < \Phi \leqq 1.00$	2	
$\Phi > 1.00$	0	
Total quantity	4	

NO	Item	Criterion	Level
07	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 7.1 General glass chip： 7.1.1 Chip on panel surface and crack between panels: 【OK】 【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
07	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 7.1.2 Corner crack： 7.2 Protrusion over terminal： 7.2.1 Chip on electrode pad： 	Minor

Corner crack table:

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

Chip on electrode pad table:

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

NO	Item	Criterion	Level
07	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 7.2.2 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. 7.2.3 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>	Minor

NO	Item	Criterion	Level
08	Backlight elements	8.1 Backlight can't work normally.	Major
		8.2 Backlight doesn't light or color is wrong.	Major
		8.3 Illumination source flickers when lit.	Major
09	General appearance	9.1 Pin type must match type in specification sheet.	Major
		9.2 No short circuits in components on PCB or FPC.	Major
		9.3 Product packaging must the same as specified on packaging specification sheet.	Minor
		9.4 The folding and peeled off in polarizer are not acceptable.	Minor
		9.5 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 -35 ±2℃ 96 hrs** **Surrounding temperature, then storage at normal condition 4hrs.**
3	**High Temperature / High Humidity Storage Test**	**Keep in 60 ℃ / 90% R.H duration for 96 hrs** **Surrounding temperature, then storage at normal condition 4hrs.** **(Excluding the polarizer)**
4	**Temperature Cycling Storage Test**	**-35(min) → +25℃ → 80 → +25℃** **(30mins) (5mins) (30mins) (5mins)** ⟷ **10 Cycle** **Surrounding temperature, then storage at normal condition 4hrs.**
5	**ESD Test**	**Air Discharge:** **Apply 2 KV with 5 times** **Discharge for each polarity +/-** **Contact Discharge:** **Apply 250 V with 5 times** **discharge for each polarity +/-** 1. **Temperature ambiance : 15℃～35℃** 2. **Humidity relative : 30%～60%** 3. **Energy Storage Capacitance(Cs+Cd) : 150pF±10%** 4. **Discharge Resistance(Rd) : 330Ω±10%** 5. **Discharge, mode of operation :** **Single Discharge (time between successive discharges at least 1 sec)** **(Tolerance if the output voltage indication : ±5%)**
6	**Vibration Test (Packaged)**	1. **Sine wave 10～55 Hz frequency (1 min/sweep)** 2. **The amplitude of vibration :1.5 mm** 3. **Each direction (X、Y、Z) duration for 2 Hrs**
7	**Drop Test (Packaged)**	<table><tr><th>Packing Weight (Kg)</th><th>Drop Height (cm)</th></tr><tr><td>0 ~ 45.4</td><td>122</td></tr><tr><td>45.4 ~ 90.8</td><td>76</td></tr><tr><td>90.8 ~ 454</td><td>61</td></tr><tr><td>Over 454</td><td>46</td></tr></table> **Drop Direction :※1 corner / 3 edges / 6 sides each 1time**

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 $320\pm10℃$ 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 $25℃ \pm5℃$ 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.

Revision Table

004					
003	Add tape.		Air	09.10.22	
002	Add pull tape.		Tang yunxian	09.7.10	
001	Modify FPC length		李小云	08.10.27	
B	Modify FPC		李小云	08.8.22	
A	Modify the pin definition and storage temperature		李小云	08.8.13	
0	NEW DRAWING		李小云	08.8.03	
REV	REV BY		REVISER	DATE	

NOTES:
1. LCD type:FSTN,Positive,Transflective.
2. LCD Module:1/160Duty,1/14Bias;
3. Viewing direction:12H;
4. T_OP=-30°C~80°C, T_ST=-35°C~80°C;
5. The tolerance unless classified ±0.2mm; Unspecified radii:0.2
6. This product conforms ROHS;
7. Frame material:PC White; Lightguide material:TARFLON LC-1700

PART NO: **PE240128WRF-002-KQ**

DRAWING NAME: **HLMD-PE240128WRF-002-KQ**

TITLE: **LCD MODULE DRAWING**

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

	Design	Check	Approve		
	Tang yunxian	Eddy	Ryan		
	Unit	Scale	Page	Quantity	
	MM	1:1	1/1		

VIEWING DIRECTION
240128 DOTS

DOTS DETAIL
SCALE:20/1
0.255
0.235
0.265
0.285

SCALE:2/1 R0.2MAX
FPC CONDUCTOR SIDE
P0.5*39=19.5±0.05
W=0.35±0.05
22.1±0.1
1.4±0.1
2.8±0.1
4±0.3
C0.5MAX
0.5±0.1

Stiffener
FPC
Conductor
0.3±0.05
9.8
3.3±0.1

SCALE"B":2/1
SECTION:A-A
9.2
6.7
6.8
9.6
R0.5
R1

74.5
72.0(LCD)
68.0(V.A)
61.18(A.A)
54.5
52.0(LCD)
40.0(V.A)
36.46(A.A)
23.0±1.0
(2.0)
(3.5)
(27.0)
20.5±0.07
1.0MAX
6.0±0.5
Silicon

82.0
31.7±0.5
18.2±0.5
6.1±0.5
33.0
9.75
4-ø3.7±0.1
TAPE

		Length(Min)	Tolerance Precision	Precision Level
		1 ~ 4	4	-
		4 ~ 16	16	-
		16 ~ 63	63	-
		63 ~ 250	250	-
		250 ~ 1000	-	-

PT-A-054-01

LCM包裝規格書
LCM Packaging Specifications

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)	PE240128WRF-002-KQ	91.2X77.5X9.8	0.0407	144	5.8608
2	靜電袋(1)Antistatic Bag	BAG150100ARABA	150 X 120	0.002	144	0.288
3	氣泡袋(2)Bubble Bag	BAG170150BRABA	150X(170+65)	0.0033	144	0.4752
4	A7刀卡(3)A7 Partition	BX29300086BZBA	293 X 86 X 3.0	0.012	78	0.936
5	B7刀卡(4)B7 Partition	BX24600086BZBA	246 X 86 X 3.0	0.011	18	0.198
6	海綿墊(5)Foam Rubber Cushion	OTFOAM00006ABA	290 X 240 X 10	0.02	12	0.24
7	C3內盒(6)Product Box	BX31025510AABA	310 X 255 X 105	0.263	6	1.578
8	外紙箱(7)Carton	BX52532536CCBA	525 X 325 X 360	1.092	1	1.092
9						

2.一 整箱總重量 (Total LCD Weight in carton) : 10.67 Kg±10%

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

(1)Quantity Of Spacer : A7刀卡 X 13 , B7刀卡 X 3

(2)Total LCM quantity in carton : quantity per box 24 x no. of boxes 6 = 144

(5) 海綿墊
Foam Rubber Cushion

(1)靜電袋+(2)氣泡紙+LCM
Antistatic Bag+Bubble Bag+LCM

(4) B7刀卡
B2 Partition

(3) A7刀卡
A2 Partition

(5) 海綿墊
Foam Rubber Cushion

(6)C3內盒
Product Box

(7)外紙箱
Carton
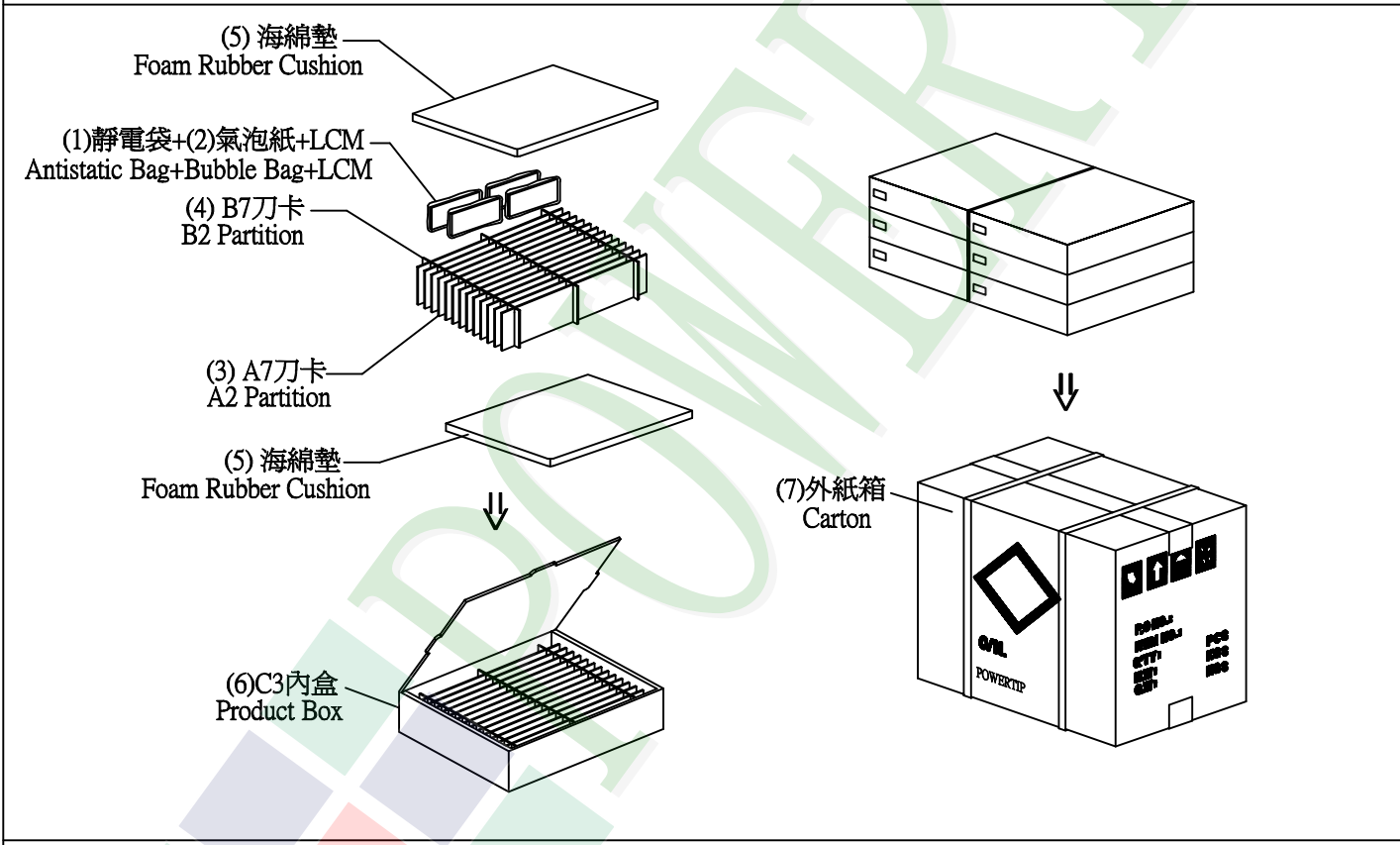
特 記 事 項 (REMARK)

1. Label Specifications :

MODEL:
LOT NO:
QUANTITY:
CHECK:

包裝袋須用透明膠帶封口

周圍空格不放產品

POWERTIP TECH. CORP.