

SPECIFICATIONS

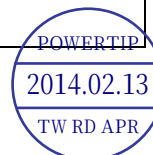
CUSTOMER	: CCN026
SAMPLE CODE	: SE12864WRF-055-H-Q
MASS PRODUCTION CODE	: PE12864WRF-055-H-Q
SAMPLE VERSION	: 03
SPECIFICATIONS EDITION	: 005
DRAWING NO. (Ver.)	: LMD-PE12864WRF-055-H-Q (Ver.001)
PACKAGING NO. (Ver.)	: JPKG-PE12864WRF-055-H-Q (Ver.003)

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

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Note : For detailed information please refer to IC data sheet : Sitronix ST7567-G4

1. SPECIFICATIONS

1.1 Features

Item	Standard Value
Display Type	128 * 64 Dots
LCD Type	FSTN, Positive, Transflective
Driver Condition	LCD Module : 1/65 Duty, 1/9 Bias
Viewing Direction	6 O'clock
Backlight Type	LED (White)
Weight	11 g
Interface	Support 8 bits Parallel interface for 8080 or 6800 series MPU & Serial (4-Line SPI) interface
Controller / Driver IC	Sitronix ST7567-G4
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	55.2 (W) * 39.8 (L) * 5.0 (H)	mm
Viewing Area	45.2 (W) * 27.0 (L)	mm
Active Area	40.95 (W) * 24.31 (L)	mm
Dot Size	0.31 (W) * 0.37 (H)	mm
Dot Pitch	0.32 (W) * 0.38 (H)	mm

Note : For detailed information please refer to LCM drawing

1.3 Absolute Maximum Ratings

Item	Symbol	Condition	Min.	Max.	Unit
Power Supply Voltage	VDD	-	-0.3	+3.6	V
LCD Power Supply Voltage	VLCD	V0-XV0	-0.3	+16	V
LCD Power Driving Voltage	VG, VM	-	-0.3	VDD	V
Operating Temperature	T _{OP}	-	-20	+70	°C
Storage Temperature	T _{ST}	-	-30	+80	°C
Storage Humidity	H _D	Ta < 40 °C	20	90	%RH

1.4 DC Electrical Characteristics

VDD = 3.0V, VSS = 0V, Ta = 25°C

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Logic Supply Voltage	VDD	-	2.7	3.0	3.3	V
“H” Input Voltage	V _{IH}	-	0.7*VDD	-	VDD	V
“L” Input Voltage	V _{IL}	-	VSS	-	0.3*VDD	V
“H” Output Voltage	V _{OH}	IOUT=1mA, VDD=3.0V	0.8*VDD	-	VDD	V
“L” Output Voltage	V _{OL}	IOUT=-1mA, VDD=3.0V	VSS	-	0.2*VDD	V
Supply Current	IDD	VDD= 3.0V; V _{OP} = 9.8V; Pattern= Full display	-	0.3	-	mA
		VDD= 3.0V; V _{OP} = 9.8V; Pattern= Horizontal line *1	-	0.4	0.6	
LCM Driver Voltage	V _{OP} *2	-20°C	9.7	10.0	10.3	V
		+25°C	9.5	9.8	10.1	
		+70°C	8.6	8.9	9.2	

Note : *1. The Maximum current display.

*2. The V_{OP} test point is V0 – XV0.



*3. Initial code

```
MOV    A,#10101110B    ;Display OFF
CALL   WIR
MOV    A,#10100010B    ;Set 1/9 Bias
CALL   WIR
MOV    A,#10100000B    ;SEG DIRECTION
CALL   WIR
MOV    A,#11001000B    ;COM DIRECTION
CALL   WIR
MOV    A,#10100110B    ;INVERSE DISPLAY(NORMAL DISPLAY)
CALL   WIR
MOV    A,#10100100B    ;ALL PIXEL ON(NORMAL DISPLAY)
CALL   WIR
MOV    A,#01000000B    ;SET START LINE (SEG 0)
CALL   WIR
MOV    A,#00100101B    ;Regulation Ratio(RR=5.5)
CALL   WIR
MOV    A,#10000001B    ;Set EV ( $V_0 = RR \times [(99 + EV) / 162] \times 2.1$ )
CALL   WIR
MOV    A,#00101000B    ;40
CALL   WIR
MOV    A,#00101100B    ;Set Power Control
CALL   WIR
NOP
MOV    A,#00101110B    ;Set Power Control
CALL   WIR
NOP
MOV    A,#00101111B    ;Set Power Control
CALL   WIR
NOP
MOV    A,#11111000B    ;SET Booster
CALL   WIR
MOV    A,#00000000B    ;Booster 4X
CALL   WIR
MOV    A,#10101111B    ;Display ON
CALL   WIR
```

1.5 Optical Characteristics

LCD Panel: 1/65 Duty, 1/9 Bias, VLCD = 9.8V, Ta = 25°C

Item		Symbol	Conditions	Min.	Typ.	Max.	Unit	Reference
Response Time	Rise	tr		-	85	128	ms	Note 2
	Fall	tf		-	215	323		
Viewing angle range	Top	$\Theta Y+$	CR $\geq$ 2.0, $\varnothing = 270^\circ$	-	40	-	-	Notes 1
	Bottom	$\Theta Y-$		-	40	-		
	Left	$\Theta X-$		-	40	-		
	Right	$\Theta X+$		-	40	-		
Contrast Ratio		CR	$\theta = 0^\circ$, $\varnothing = 270^\circ$	-	5	-	-	Note 3
Average Brightness (With B/L)		IV	IF=80mA	35	50	-	cd/m ²	-
CIE Color Coordinate (With B/L)	X			0.23	0.28	0.33	-	Note 4
	Y			0.25	0.30	0.35	-	
Uniformity		ΔB	-	70	-	-	%	

Note 4:

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

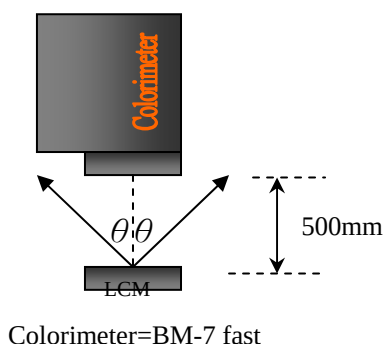
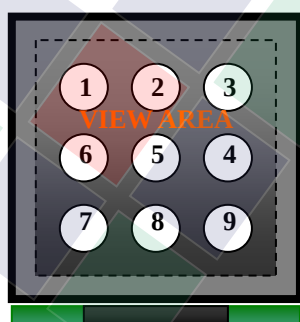
2 : Measurement Condition for Optical Characteristics:

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

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

c : Equipment: TOPCON BM-7 fast , (field 0.2°) , after 10 minutes operation.

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

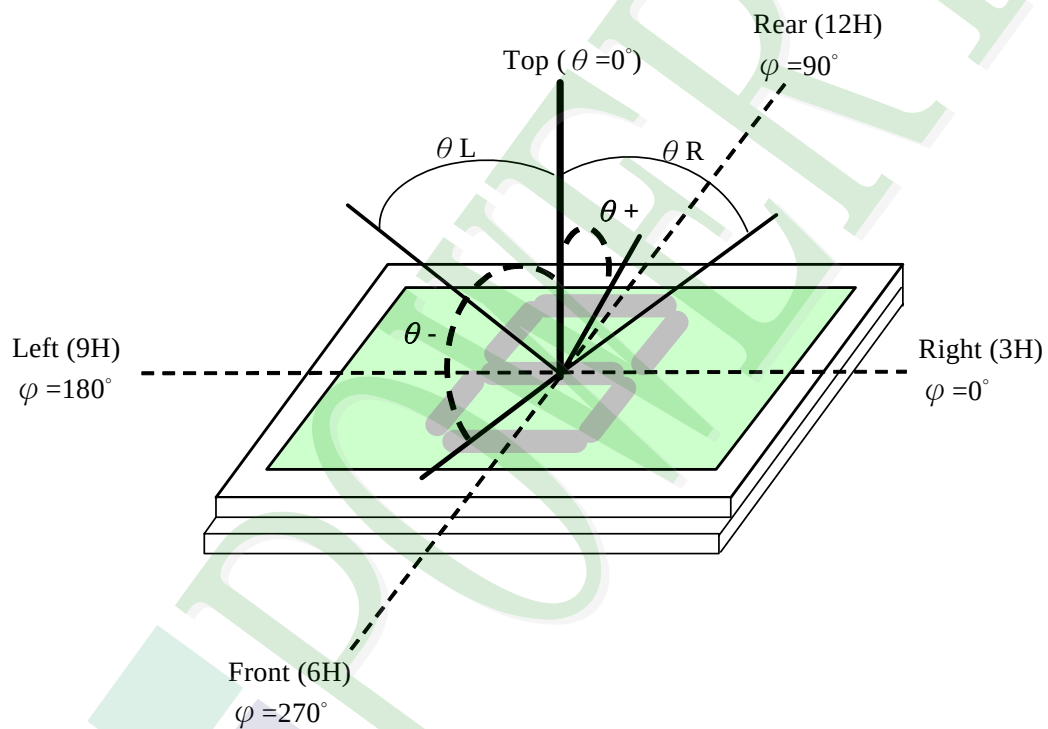




Note 1.

Optical characteristics-2

Viewing angle



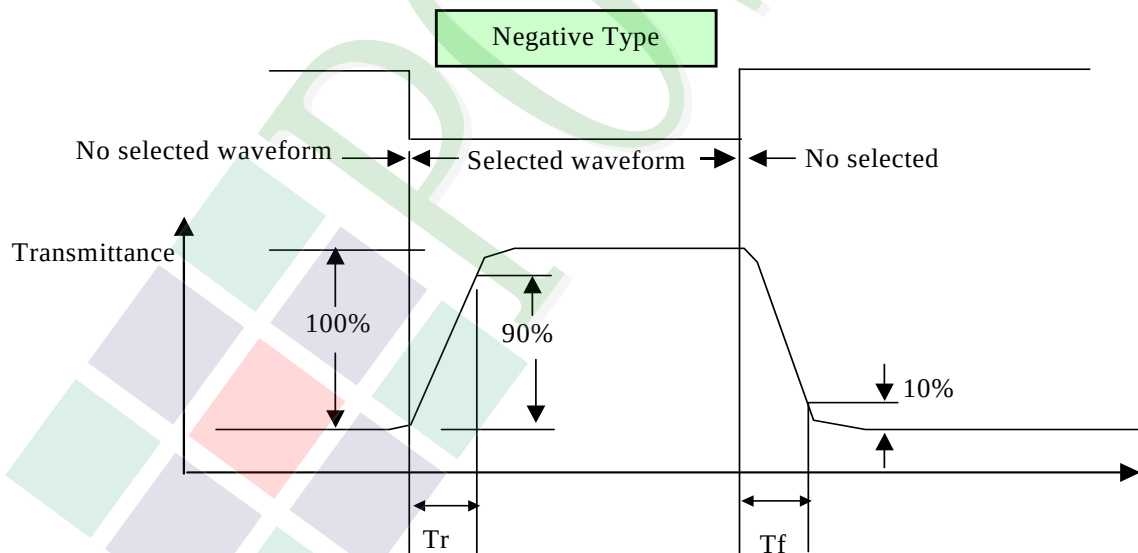
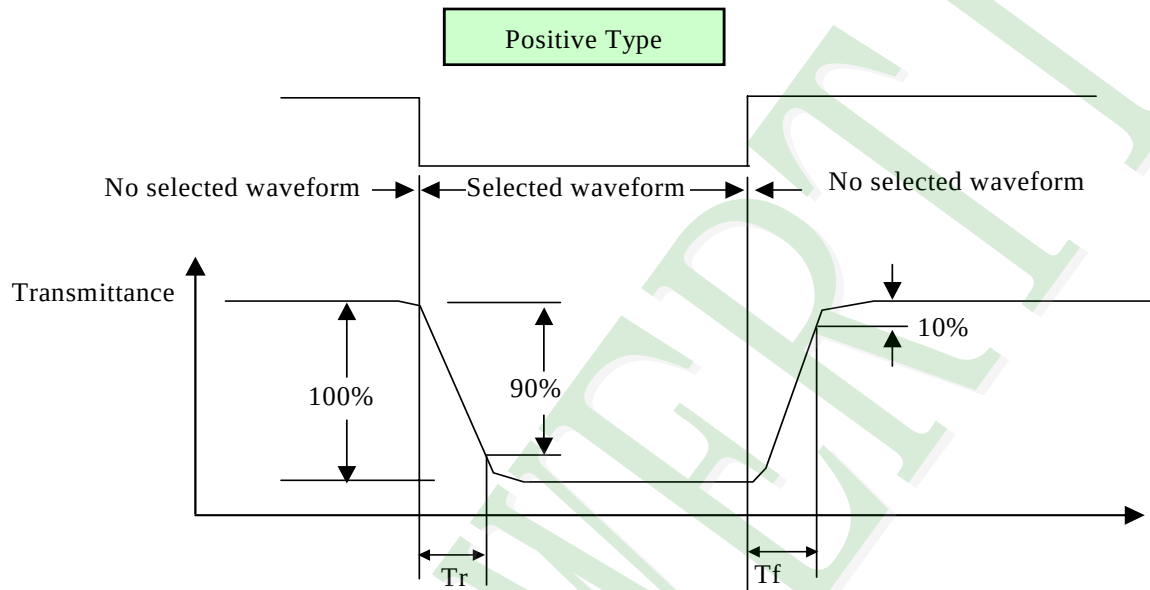
Viewing angle



Note 2.

Optical characteristics-3

Fig.2 Definition of response time





Electrical characteristics-2

※2 Drive waveform

V_{op} : Drive voltage

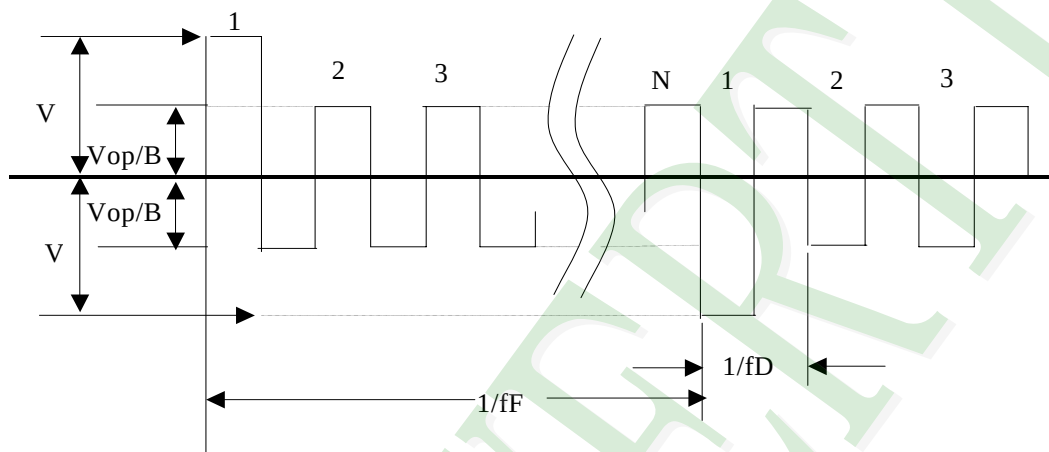
$1/B$: Bias

N : Duty

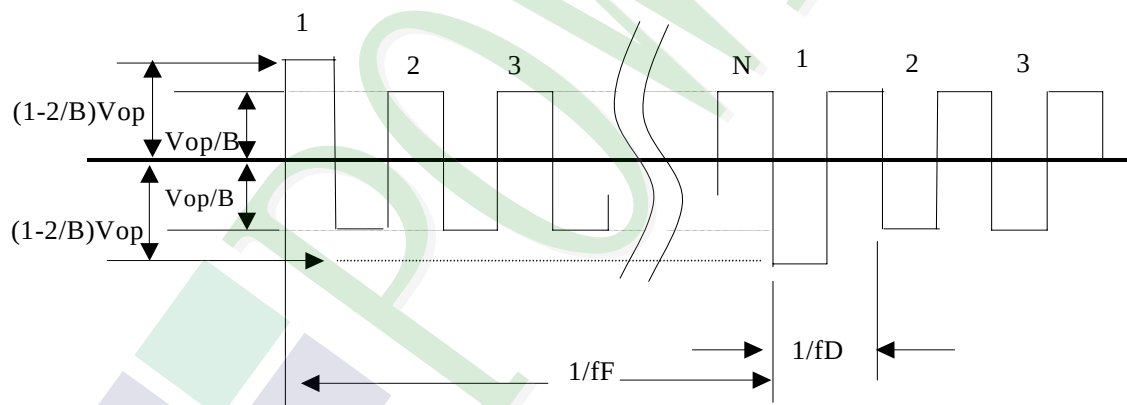
f_F : Frame frequency

f_D : Drive frequency

(1) Selected waveform



(2) Non- Selected wave form

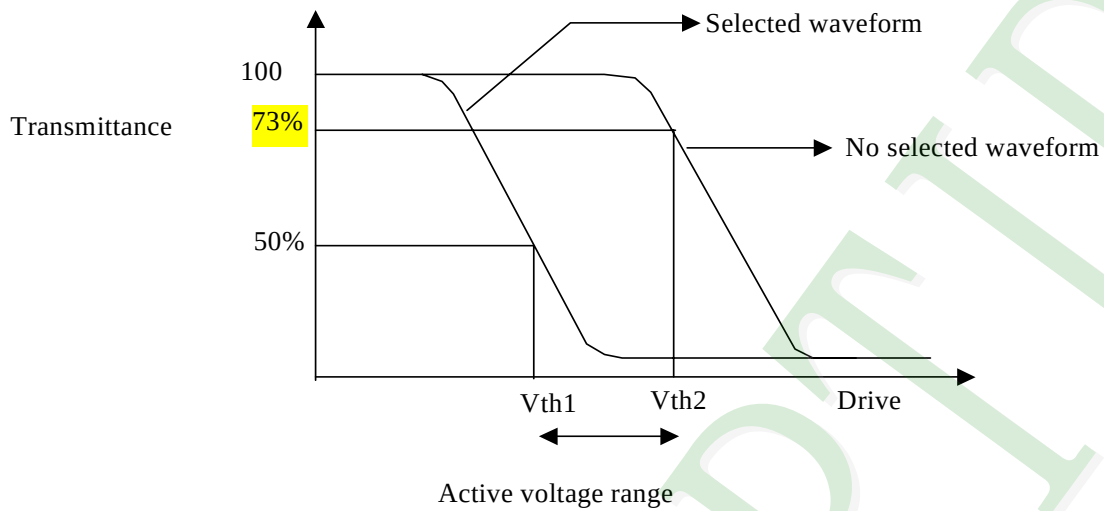


Note:

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



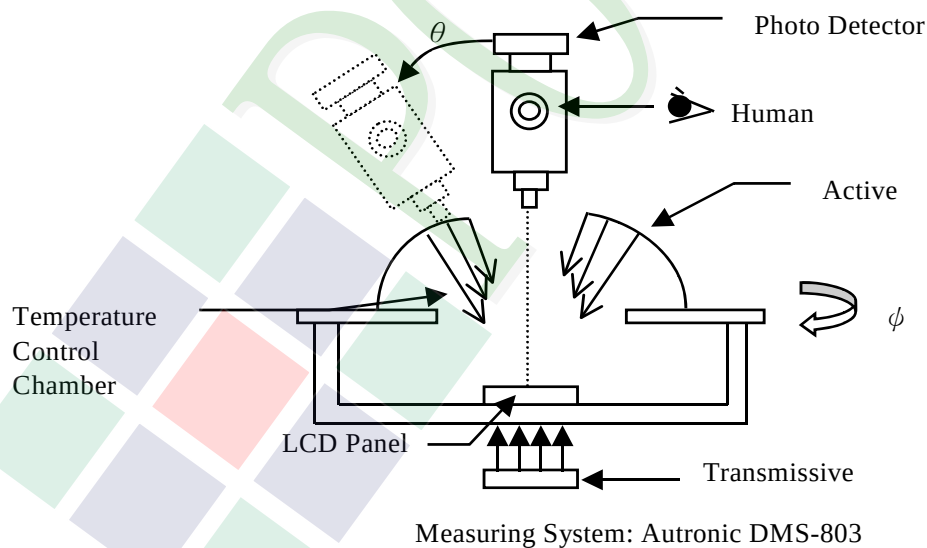
Note 3. : Definition of Vth



	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



1.6 Backlight Characteristics

Maximum Ratings

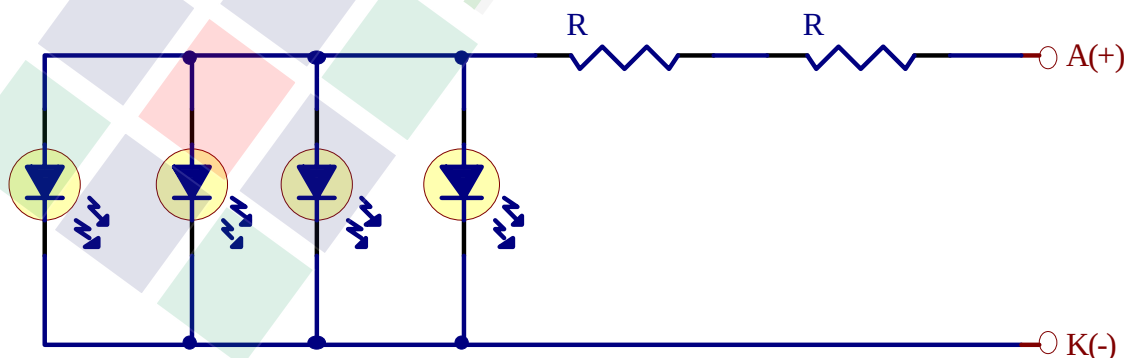
Item	Symbol	Conditions	Min.	Max.	Unit
Peak Forward current	IF	Ta=25°C	—	100	mA
Power dissipation	Pd		—	0.24	W
Reverse Voltage	VR		—	5	V

Electrical / Optical Characteristics

Ta =25°C

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Forward Voltage	VF	IF=80mA	3.9	4.2	4.5	V
Reverse Current (Per LED)	IR	VR= 3V	-	-	10	uA
Average Brightness (Without LCD)	IV	IF=80mA	200	300	-	cd/m ²
CIE Color Coordinate (Without LCD)	X		0.24	0.27	0.30	-
	Y		0.24	0.27	0.31	-
Uniformity	△B		70	-	-	%
Life time	-		-	-	50000	hr
Color	White					

Internal Circuit Diagram:





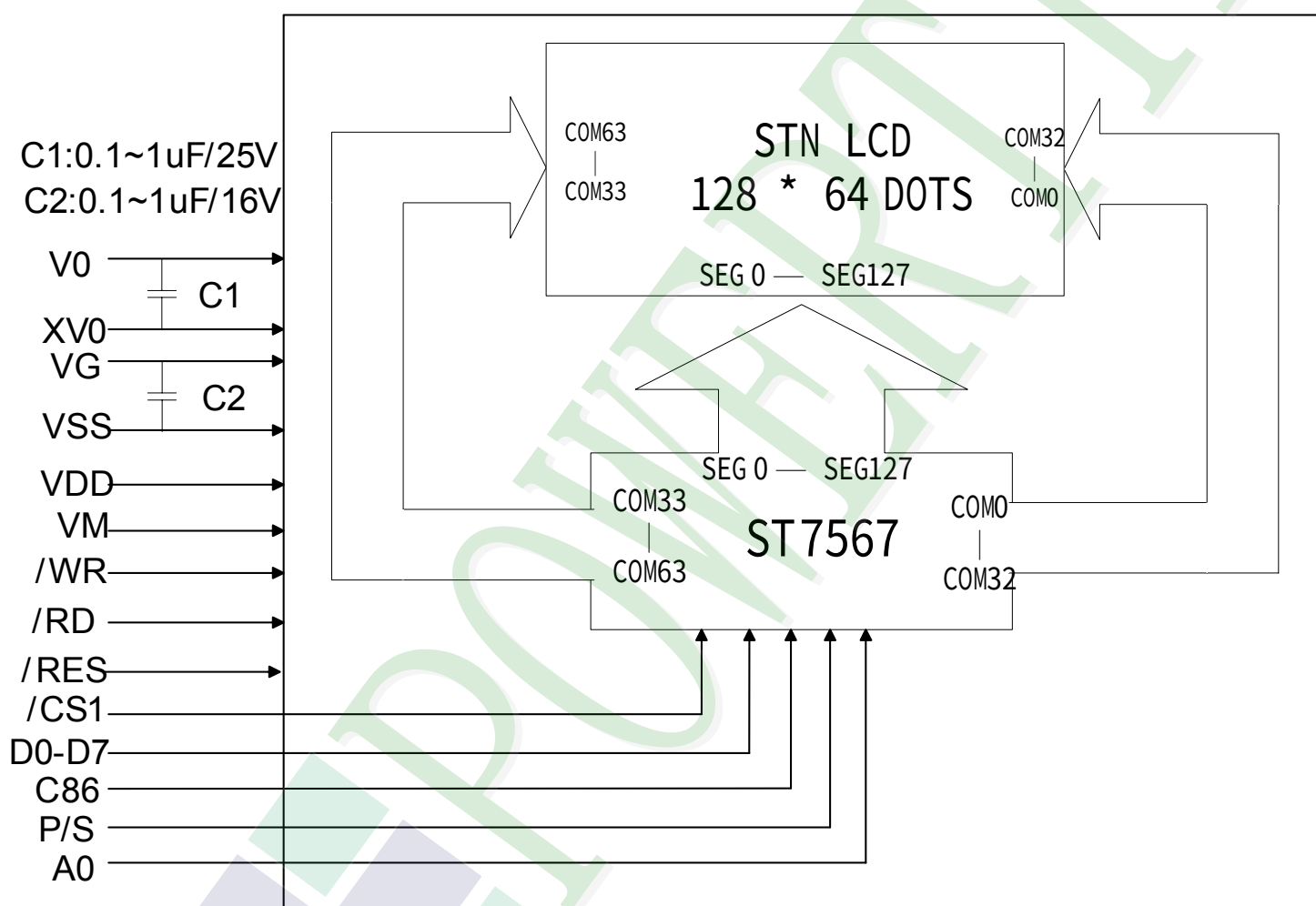
2. MODULE STRUCTURE

2.1 Counter Drawing

2.1.1 LCM Mechanical Diagram

* See Appendix

2.1.2 Block Diagram



2.2 Interface Pin Description

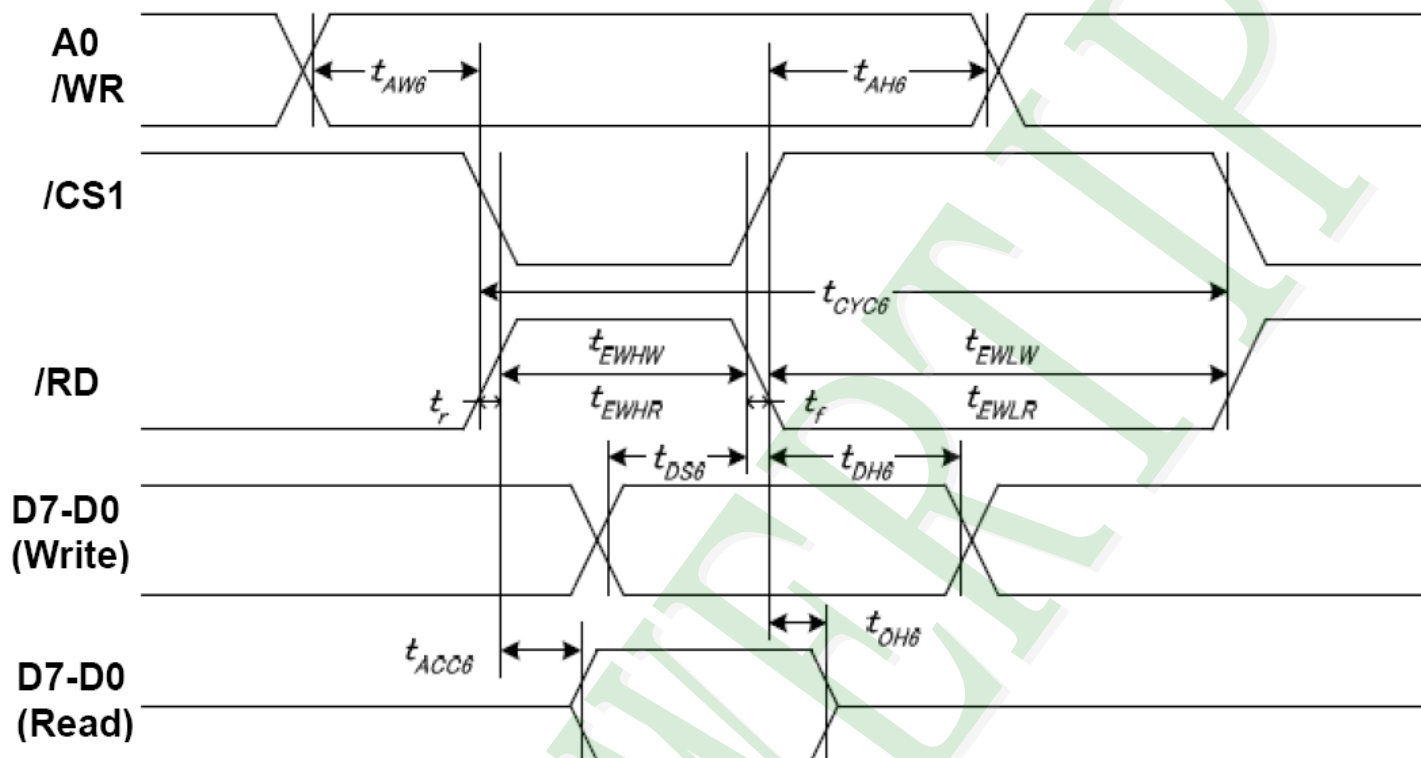
Pin No.	Symbol	Function
1	/CS1	Chip select signal, Active "L".
2	/RES	Reset input pin. When /RES is "L", initialization is executed.
3	A0	It determines whether the access is related to data or command. A0= "H" : display data. A0= "L" : control data.
4	/WR	Write signal input, Active "L".
5	/RD	Read signal input, Active "L".
6	D0	8-bit bi-directional data bus.
7	D1	8-bit bi-directional data bus.
8	D2	8-bit bi-directional data bus.
9	D3	8-bit bi-directional data bus.
10	D4	8-bit bi-directional data bus.
11	D5	8-bit bi-directional data bus.
12	D6	8-bit bi-directional data bus.
13	D7	8-bit bi-directional data bus.
14	VDD	Power supply. (+3.0V)
15	VSS	System ground. (0V)
16	NC	Not connection. (Must be open)
17	NC	Not connection. (Must be open)
18	NC	Not connection. (Must be open)
19	V0	LCD driving voltage for commons at negative frame.
20	XV0	LCD driving voltage for commons at positive frame.
21	NC	Not connection. (Must be open)
22	NC	Not connection. (Must be open)
23	NC	Not connection. (Must be open)
24	NC	Not connection. (Must be open)
25	VM	LCD driving voltage for commons.



Pin No.	Symbol	Function												
26	NC	Not connection. (Must be open)												
27	NC	Not connection. (Must be open)												
28	NC	Not connection. (Must be open)												
29	VG	LCD driving voltage for segments.												
30	NC	Not connection. (Must be open)												
31	C86	Select the MPU system interface mode. <table><tr><th>P/S</th><th>C86</th><th>Interface</th></tr><tr><td>1</td><td>1</td><td>Parallel 68000 Series MPU Interface</td></tr><tr><td>1</td><td>0</td><td>Parallel 8080 Series MPU Interface</td></tr><tr><td>0</td><td>X</td><td>Serial 4-Line SPI Interface</td></tr></table>	P/S	C86	Interface	1	1	Parallel 68000 Series MPU Interface	1	0	Parallel 8080 Series MPU Interface	0	X	Serial 4-Line SPI Interface
P/S	C86	Interface												
1	1	Parallel 68000 Series MPU Interface												
1	0	Parallel 8080 Series MPU Interface												
0	X	Serial 4-Line SPI Interface												
32	P/S													
33	NC	Not connection. (Must be open)												
34	NC	Not connection. (Must be open)												

2.3 Timing Characteristic

System Bus Timing For 6800 Series MPU



VDD = 3.3V, Ta = 25 °C

Item	Signal	Symbol	Condition	Min.	Max.	Unit
Address setup time	A0	tAW6		0	—	ns
Address hold time		tAH6		10	—	
System cycle time	/RD	tCYC6		240	—	
Enable L pulse width (WRITE)		tEWLW		80	—	
Enable H pulse width (WRITE)		tEWHW		80	—	
Enable L pulse width (READ)		tEWLR		80	—	
Enable H pulse width (READ)		tEWHR		140	—	
Write data setup time	D7-D0	tDS6		40	—	
Write data hold time		tDH6		10	—	
Read data access time		tACC6	CL = 16 pF	—	70	
Read data output disable time		tOH6	CL = 16 pF	5	50	



VDD = 2.8V, Ta = 25 °C

Item	Signal	Symbol	Condition	Min.	Max.	Unit
Address setup time	A0	tAW6		0	—	ns
Address hold time		tAH6		0	—	
System cycle time	/RD	tCYC6		400	—	
Enable L pulse width (WRITE)		tEWLW		220	—	
Enable H pulse width (WRITE)		tEWHW		180	—	
Enable L pulse width (READ)		tEWLR		220	—	
Enable H pulse width (READ)		tEWHR		180	—	
Write data setup time	D7-D0	tDS6		40	—	
Write data hold time		tDH6		20	—	
Read data access time		tACC6	CL = 16 pF	—	140	
Read data output disable time		tOH6	CL = 16 pF	10	100	

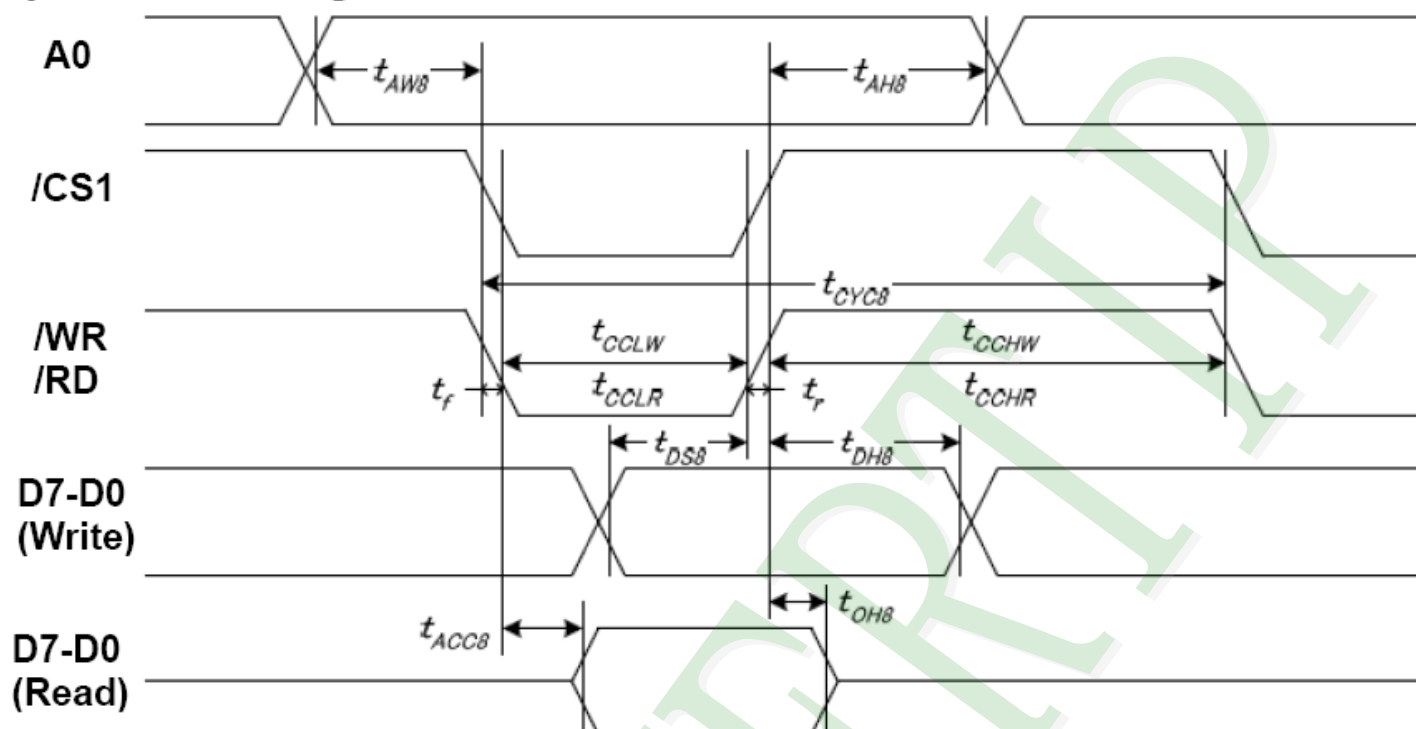
Note 1. The input signal rise time and fall time (t_r , t_f) is specified at 15 ns or less. When the system cycle time is extremely fast, $(t_r + t_f) \leq (t_{CYC6} - t_{EWLW} - t_{EWHW})$ for $(t_r + t_f) \leq (t_{CYC6} - t_{EWLR} - t_{EWHR})$ are specified.

Note 2. All timing is specified using 20% and 80% of VDD1 as the reference.

Note 3. tEWLW and tEWLR are specified as the overlap between CSB being "L" and E.



System Bus Timing For 8080 Series MPU



VDD = 3.3V, Ta = 25 °C

Item	Signal	Symbol	Condition	Min.	Max.	Unit
Address setup time	A0	tAW8		0	—	ns
Address hold time		tAH8		10	—	
System cycle time		tCYC8		240	—	
Enable L pulse width (WRITE)	/WR	tCCLW		80	—	
Enable H pulse width (WRITE)		tCCHW		80	—	
Enable L pulse width (READ)	/RD	tCCLR		140	—	
Enable H pulse width (READ)		tCCHR		80	—	
WRITE Data setup time	D7-D0	tDS8		40	—	
WRITE Data hold time		tDH8		20	—	
READ access time		tACC8	CL = 16 pF	—	70	
READ Output disable time		tOH8	CL = 16 pF	5	50	



VDD = 2.8V, Ta = 25 °C

Item	Signal	Symbol	Condition	Min.	Max.	Unit
Address setup time	A0	tAW8		0	—	ns
Address hold time		tAH8		0	—	
System cycle time	/WR	tCYC8		400	—	
/WR L pulse width (WRITE)		tCCLW		220	—	
/WR H pulse width (WRITE)		tCCHW		180	—	
/RD L pulse width (READ)	RD	tCCLR		220	—	
/RD H pulse width (READ)		tCCHR		180	—	
WRITE Data setup time	D[7:0]	tDS8		40	—	
WRITE Data hold time		tDH8		20	—	
READ access time		tACC8	CL = 16 pF	—	140	
READ Output disable time		tOH8	CL = 16 pF	10	100	

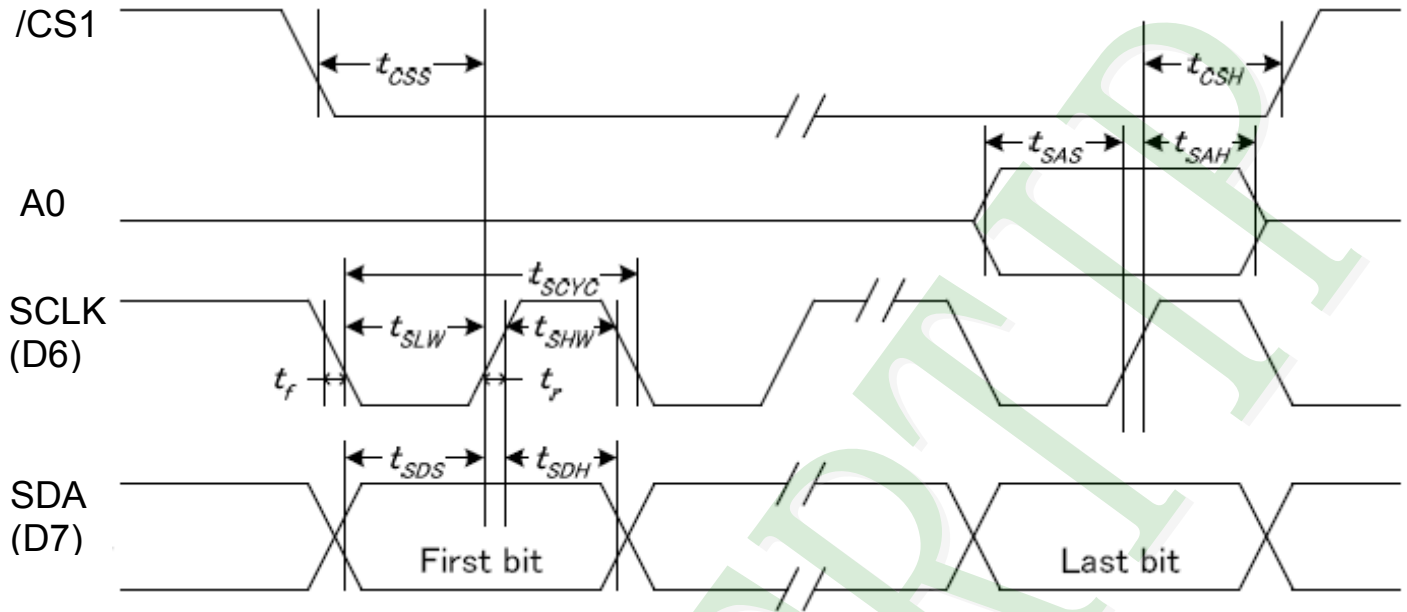
Note 1. The input signal rise time and fall time (t_r , t_f) is specified at 15 ns or less. When the system cycle time is extremely fast, $(t_r + t_f) \leq (t_{CYC8} - t_{CCLW} - t_{CCHW})$ for $(t_r + t_f) \leq (t_{CYC8} - t_{CCLR} - t_{CCHR})$ are specified.

Note 2. All timing is specified using 20% and 80% of VDD1 as the reference.

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



System Bus Timing For 4-Line Serial Interface





VDD = 3.3V, Ta = 25 °C

Item	Signal	Symbol	Condition	Min.	Max.	Unit
Serial clock period	SCLK	tSCYC		50	—	ns
SCLK "H" pulse width		tSHW		25	—	
SCLK "L" pulse width		tSLW		25	—	
Address setup time	A0	tSAS		20	—	
Address hold time		tSAH		10	—	
Data setup time	SDA	tSDS		20	—	
Data hold time		tSDH		10	—	
CSB-SCLK time	/CS1	tCSS		20	—	
CSB-SCLK time		tCSH		40	—	

VDD = 2.8V, Ta = 25 °C

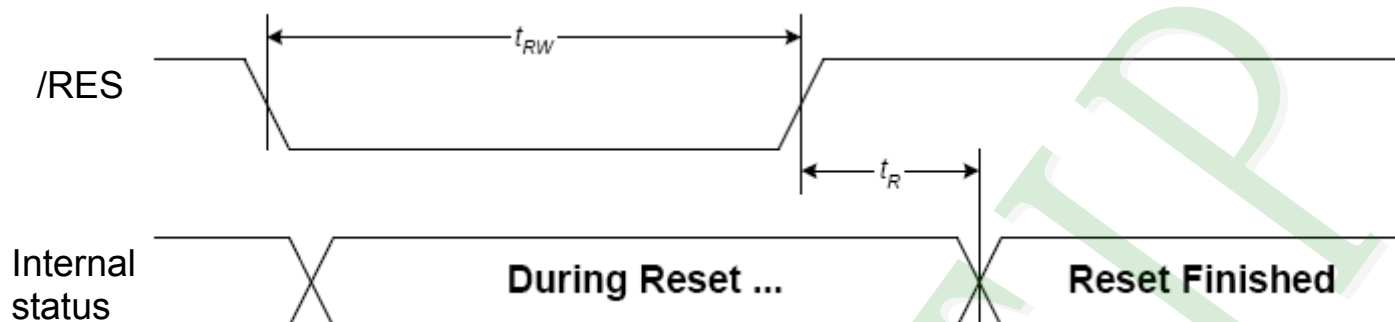
Item	Signal	Symbol	Condition	Min.	Max.	Unit
Serial clock period	SCLK	tSCYC		100	—	ns
SCLK "H" pulse width		tSHW		50	—	
SCLK "L" pulse width		tSLW		50	—	
Address setup time	A0	tSAS		30	—	
Address hold time		tSAH		20	—	
Data setup time	SDA	tSDS		30	—	
Data hold time		tSDH		20	—	
CSB-SCLK time	/CS1	tCSS		30	—	
CSB-SCLK time		tCSH		60	—	

Note 1. The input signal rise and fall time (tr, tf) are specified at 15 ns or less.

Note 2. All timing is specified using 20% and 80% of VDD as the standard.



Reset Timing



VDD = 3.3V, Ta = 25 °C

Item	Symbol	Condition	Min.	Max.	Unit
Reset time	tR		—	1.0	us
Reset "L" pulse width	tRW		1.0	—	

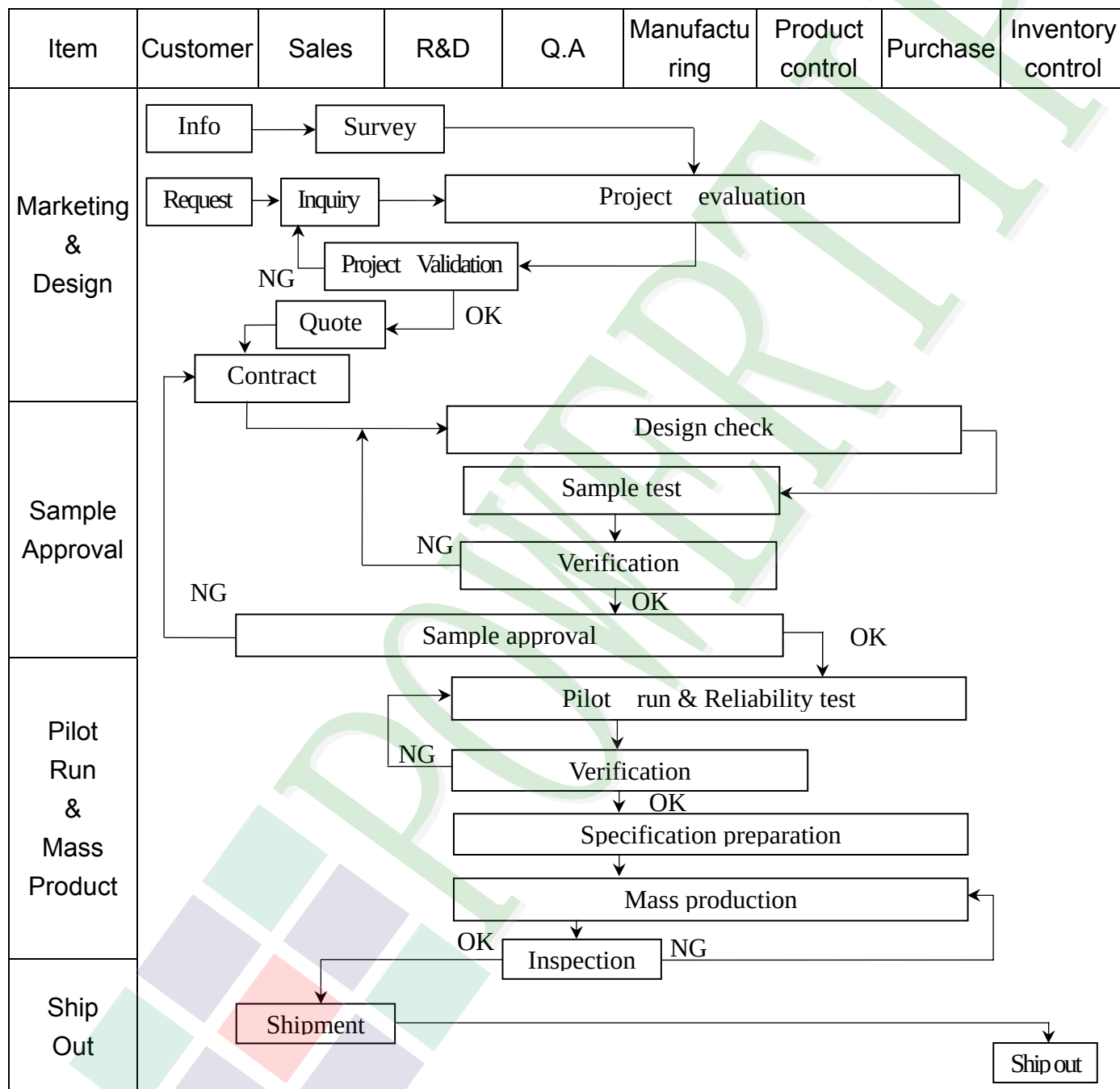
VDD = 2.8V, Ta = 25 °C

Item	Symbol	Condition	Min.	Max.	Unit
Reset time	tR		—	2.0	us
Reset "L" pulse width	tRW		2.0	—	



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 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)

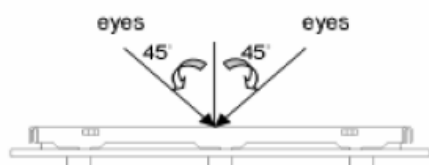


Fig.1

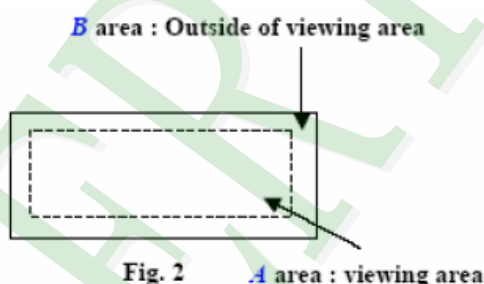


Fig. 2

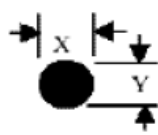
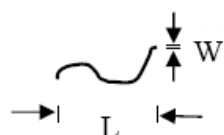
◆ Specification:

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	5. 1 Round type: 5. 1. 1 display only : • White and black spots on display ≤ 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 :	Minor																			
	Round type  $\Phi=(x+y)/2$	<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>$\Phi \leq 0.10$</td><td>Accept no dense</td><td rowspan="3">Ignore</td></tr><tr><td>$0.10 < \Phi \leq 0.20$</td><td>3</td></tr><tr><td>$0.20 < \Phi \leq 0.30$</td><td>2</td></tr><tr><td>Total quantity</td><td>4</td><td></td></tr></table>		Dimension (diameter : Φ)	Acceptance (Q'ty)		A area	B area	$\Phi \leq 0.10$	Accept no dense	Ignore	$0.10 < \Phi \leq 0.20$	3	$0.20 < \Phi \leq 0.30$	2	Total quantity	4					
	Dimension (diameter : Φ)	Acceptance (Q'ty)																				
A area		B area																				
$\Phi \leq 0.10$	Accept no dense	Ignore																				
$0.10 < \Phi \leq 0.20$	3																					
$0.20 < \Phi \leq 0.30$	2																					
Total quantity	4																					
Line type 	5. 1. 3 Line type: <table><tr><th colspan="2">Dimension</th><th colspan="2">Acceptance (Q'ty)</th></tr><tr><th>Length (L)</th><th>Width (W)</th><th>A area</th><th>B area</th></tr><tr><td>---</td><td>$W \leq 0.03$</td><td>Accept no dense</td><td rowspan="3">Ignore</td></tr><tr><td>$L \leq 3.0$</td><td>$0.03 < W \leq 0.05$</td><td rowspan="2">4</td></tr><tr><td>$L \leq 2.5$</td><td>$0.05 < W \leq 0.075$</td></tr><tr><td>---</td><td>$W > 0.075$</td><td colspan="2">As round type</td></tr></table>	Dimension		Acceptance (Q'ty)		Length (L)	Width (W)	A area	B area	---	$W \leq 0.03$	Accept no dense	Ignore	$L \leq 3.0$	$0.03 < W \leq 0.05$	4	$L \leq 2.5$	$0.05 < W \leq 0.075$	---	$W > 0.075$	As round type	
Dimension		Acceptance (Q'ty)																				
Length (L)	Width (W)	A area	B area																			
---	$W \leq 0.03$	Accept no dense	Ignore																			
$L \leq 3.0$	$0.03 < W \leq 0.05$	4																				
$L \leq 2.5$	$0.05 < W \leq 0.075$																					
---	$W > 0.075$	As round type																				
06	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>$\Phi \leq 0.20$</td><td>Accept no dense</td><td rowspan="4">Ignore</td></tr><tr><td>$0.20 < \Phi \leq 0.50$</td><td>3</td></tr><tr><td>$0.50 < \Phi \leq 1.00$</td><td>2</td></tr><tr><td>$\Phi > 1.00$</td><td>0</td></tr><tr><td>Total quantity</td><td>4</td><td></td></tr></table>	Dimension (diameter : Φ)	Acceptance (Q'ty)		A area	B area	$\Phi \leq 0.20$	Accept no dense	Ignore	$0.20 < \Phi \leq 0.50$	3	$0.50 < \Phi \leq 1.00$	2	$\Phi > 1.00$	0	Total quantity	4		Minor		
Dimension (diameter : Φ)	Acceptance (Q'ty)																					
	A area	B area																				
$\Phi \leq 0.20$	Accept no dense	Ignore																				
$0.20 < \Phi \leq 0.50$	3																					
$0.50 < \Phi \leq 1.00$	2																					
$\Phi > 1.00$	0																					
Total quantity	4																					



◆ Specification For Monotype and Color STN :

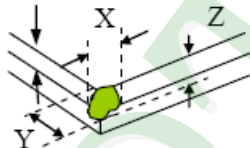
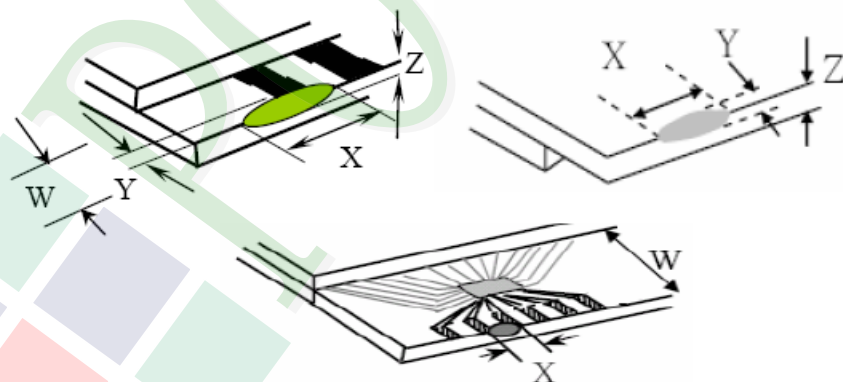
(Ver. B01)

NO	Item	Criterion	Level						
07	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						
		7.1 General glass chip : 7.1.1 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 Monotype and Color STN :

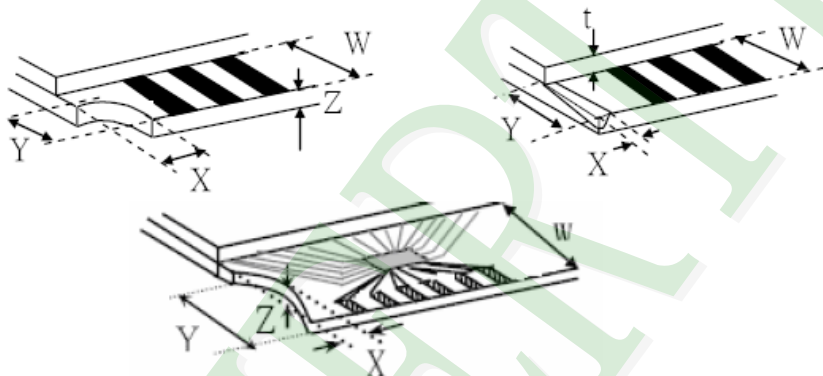
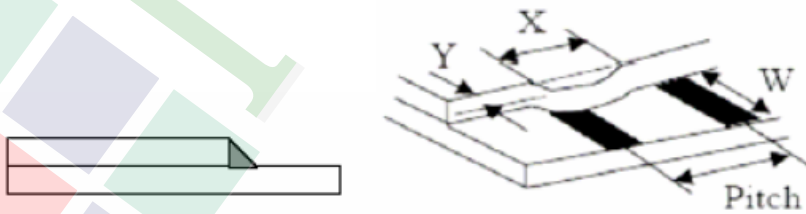
(Ver. B01)

NO	Item	Criterion	Level									
07	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 7.1.2 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.	$1/2 t < Z \leq 2 t$										
7.2 Protrusion over terminal : 7.2.1 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 colspan="3">Neglect</td></tr></table>		X	Y	Z	Front	$\leq a$	$\leq 1/2 W$	$\leq t$	Back	Neglect		
	X	Y	Z									
Front	$\leq a$	$\leq 1/2 W$	$\leq t$									
Back	Neglect											



◆ Specification For Monotype and Color STN :

(Ver. B01)

NO	Item	Criterion	Level									
07	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									
		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>		X	Y	Z	$\leq 1/3 a$	$\leq W$	$\leq t$	X	Y	Z
X	Y	Z										
$\leq 1/3 a$	$\leq W$	$\leq t$										
X	Y	Z										
$\leq a$	$\leq 1/3 W$	$\leq t$										



◆ Specification For Monotype and Color STN :

(Ver. B01)

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

(Ver.B01)

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 +60 ℃ / 90% R.H duration for 96 hrs Surrounding temperature, then storage at normal condition 4hrs. (Excluding the polarizer)											
4	Temperature Cycling Storage Test	-30℃ → +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 ambience : 15℃ ~35℃ 2. Humidity relative : 30% ~60% 3. Energy Storage Capacitance(Cs+Cd) : 150pF±10% 4. Discharge Resistance(Rd) : 330Ω±10% 5. Discharge, mode of operation : Single Discharge (time between successive discharges at least 1 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>		Packing Weight (Kg)	Drop Height (cm)	0 ~ 45.4	122	45.4 ~ 90.8	76	90.8 ~ 454	61	Over 454	46
		Packing Weight (Kg)	Drop Height (cm)										
0 ~ 45.4	122												
45.4 ~ 90.8	76												
90.8 ~ 454	61												
Over 454	46												
		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 $320 \pm 10^{\circ}\text{C}$ and 3-5 sec.
- 5.2.9 To avoid liquid (include organic solvent) stained on LCM

5.3 STORAGE

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

5.4 TERMS OF WARRANTY

- 5.4.1 Applicable warrant period
The period is within thirteen months since the date of shipping out under normal using and storage conditions.
- 5.4.2 Unaccepted responsibility
This product has been manufactured to your company's specification as a part for use in your company's general electronic products. It is guaranteed to perform according to delivery specifications. For any other use apart from general electronic equipment, we cannot take responsibility if the product is used in nuclear power control equipment, aerospace equipment , fire and security systems or any other applications in which there is a direct risk to human life and where extremely high levels of reliability are required. and where extremely high levels of reliability are required.

[illegible]

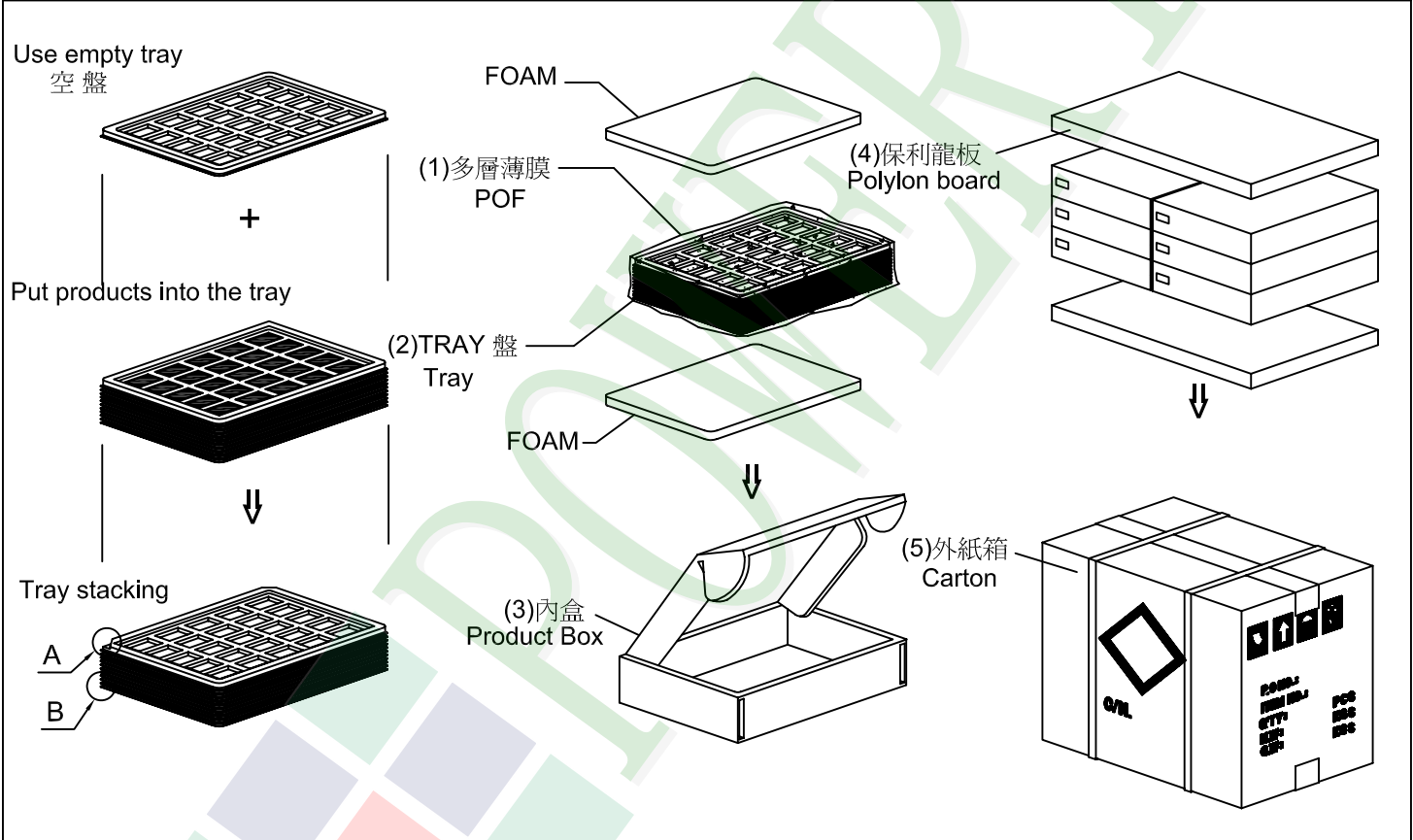
1.包裝材料規格表 (Packaging Material) : (per carton)

No.	Item	Model	Dimensions (mm)	1Pcs Weight	Quantity	Total Weight
1	成品 (LCM)	PE12864WRF-055-H-Q	55.2 X39.8X5.0	0.0115	360	4.14
2	多層薄膜(1)POF	OTFILM0BA03ABA	19"X350X0.015	——	6	——
3	TRAY 盤 (2)Tray	TYPE12806401BA	352 X 260 X 10.8	0.1	36	3.6
4	內盒(3)Product Box	BX36627063ABBA	393 X 274 X 68	0.2692	6	1.6152
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	1.4208	1	1.4208
7	FOAM	FOAM000000047	350 X 255 X 5	0.0018	12	0.0216
8						
9						

2.一整箱總重量 (Total LCD Weight in carton) : 10.85 Kg±10% 取小數2位

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

(1)LCM quantity per box : no per tray	12	x no of tray	5	=	60
(2)Total LCM quantity in carton : quantity per box	60	x no of boxes	6	=	360



特 記 事 項 (REMARK)

1. Label Specifications :

MODEL:
LOT NO:
QUANTITY:
CHECK:

2. 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.