

## SPECIFICATIONS

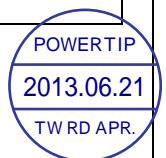
CUSTOMER : CTW1638  
SAMPLE CODE : SE12864WRF-066-H-Q  
MASS PRODUCTION CODE : PE12864WRF-066-H-Q  
SAMPLE VERSION : 01  
SPECIFICATIONS EDITION : 003  
DRAWING NO. (Ver.) : LMD-PE12864WRF-066-H-Q (Ver.002)  
PACKAGING NO. (Ver.) : PKG- PE12864WRF-066-H-Q (Ver.002)

**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

Date	Ver.	Edi.	Description	Page	Design by
05/08/2013	01	001	New Drawing.	-	Howard
05/29/2013	01	002	New Sample Modify DC Electrical Characteristics	- 5	Howard
06/13/2013	01	003	Add Stiffener Modify Packaging Specification	Appendix	Howard

Total : 33 Page



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Note : For detailed information please refer to IC data sheet : Sitronix ST7567-G4B

## 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	9.0g
Interface	Support 8 bits Parallel interface for 8080 or 6800 series MPU & Serial (4-Line SPI) interface
Controller / Driver IC	Sitronix ST7567-G4B
ROHS	THIS PRODUCT CONFORMS THE ROHS OF PTC Detail information please refer website : <a href="http://www.powertip.com.tw/news.php?area_id_view=1085560481/">http://www.powertip.com.tw/news.php?area_id_view=1085560481/</a>

### 1.2 Mechanical Specifications

Item	Standard Value	Unit
Outline Dimension	52.3 (W) * 32.8 (L) * 5.0 (H)	mm
Viewing Area	47.0 (W) * 23.0 (L)	mm
Active Area	40.945 (W) * 20.465 (L)	mm
Dot Size	0.305 (W) * 0.305 (H)	mm
Dot Pitch	0.32 (W) * 0.32 (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 <sub>OP</sub>	-	-20	+70	°C
Storage Temperature	T <sub>ST</sub>	-	-30	+80	°C
Storage Humidity	H <sub>D</sub>	T <sub>a</sub> < 40 °C	20	90	%RH

### 1.4 DC Electrical Characteristics

VDD = 3.3V, VSS = 0V, T<sub>a</sub> = 25°C

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Logic Supply Voltage	VDD	-	2.7	3.3	3.5	V
“H” Input Voltage	V <sub>IH</sub>	-	0.7*VDD	-	VDD	V
“L” Input Voltage	V <sub>IL</sub>	-	VSS	-	0.3*VDD	V
“H” Output Voltage	V <sub>OH</sub>	I <sub>OUT</sub> =1mA, VDD=3.3V	0.8*VDD	-	VDD	V
“L” Output Voltage	V <sub>OL</sub>	I <sub>OUT</sub> =-1mA, VDD=3.3V	VSS	-	0.2*VDD	V
Supply Current	IDD	VDD= 3.3V; V <sub>OP</sub> = 9.8V; Pattern= Full display	-	0.15	-	mA
		VDD= 3.3V; V <sub>OP</sub> = 9.8V; Pattern= Horizontal line *1	-	0.31	0.5	
LCM Driver Voltage	V <sub>op</sub> *2	-20 °C	9.8	10.0	10.2	V
		+25 °C	9.6	9.8	10.0	
		+70 °C	9.0	9.2	9.4	

Note : \*1. The Maximum current display.

\*2. The V<sub>OP</sub> test point is V0 – XV0.

## 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	-	90	135	ms	Note 2	
	Fall	tf	-	220	330			
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	$\theta = 0^\circ$ , $\varnothing = 270^\circ$	-	3	-	-	Note 3	
Average Brightness (With B/L)	IV	VF=3.3V	210	250	-	cd/m <sup>2</sup>	-	
CIE Color Coordinate (With B/L)	X		0.23	0.28	0.33	-	Note 4	
	Y		0.26	0.31	0.36	-		
Uniformity	$\Delta B$	-	70	-	-	%		

Note 4:

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

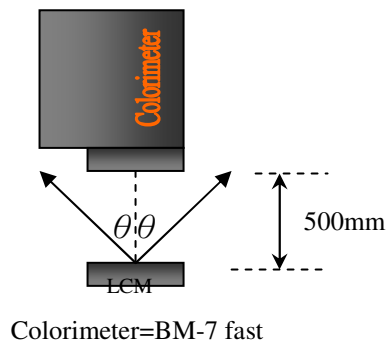
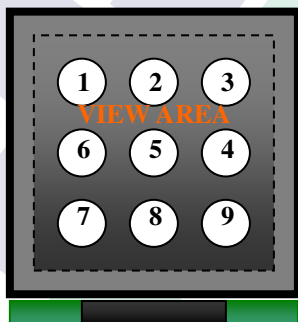
2 : Measurement Condition for Optical Characteristics:

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

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

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

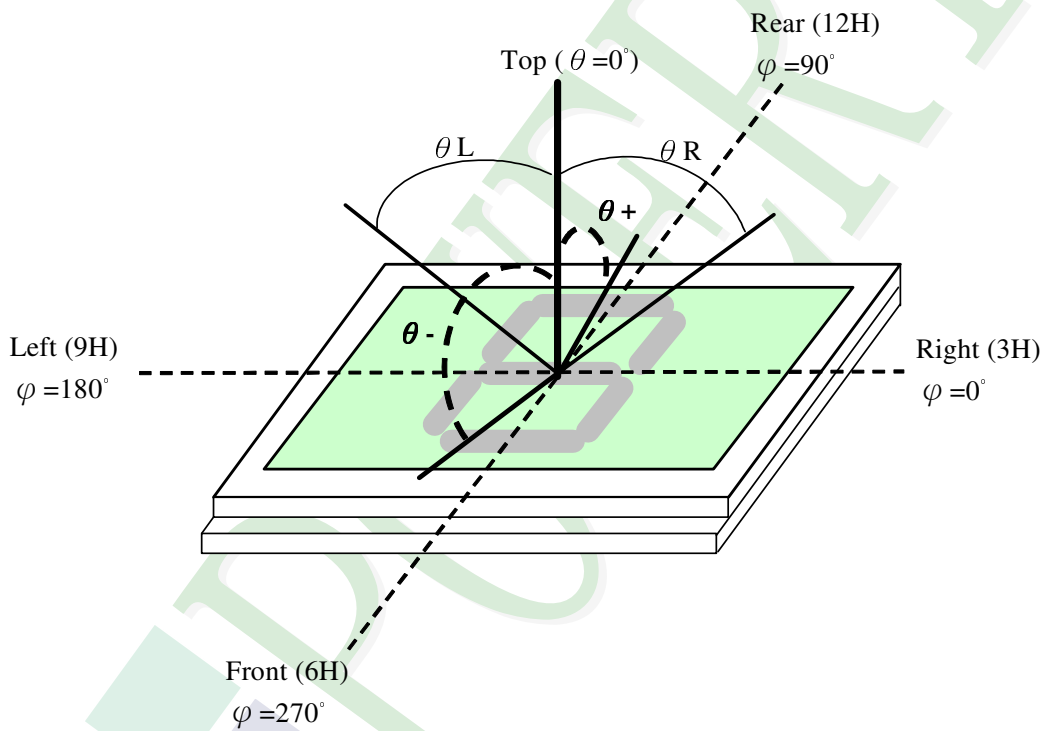
d : The uncertainty of the C.I.E coordinate measurement ± 0.01 , Average Brightness ± 4%



Note 1.

Optical characteristics-2

Viewing angle

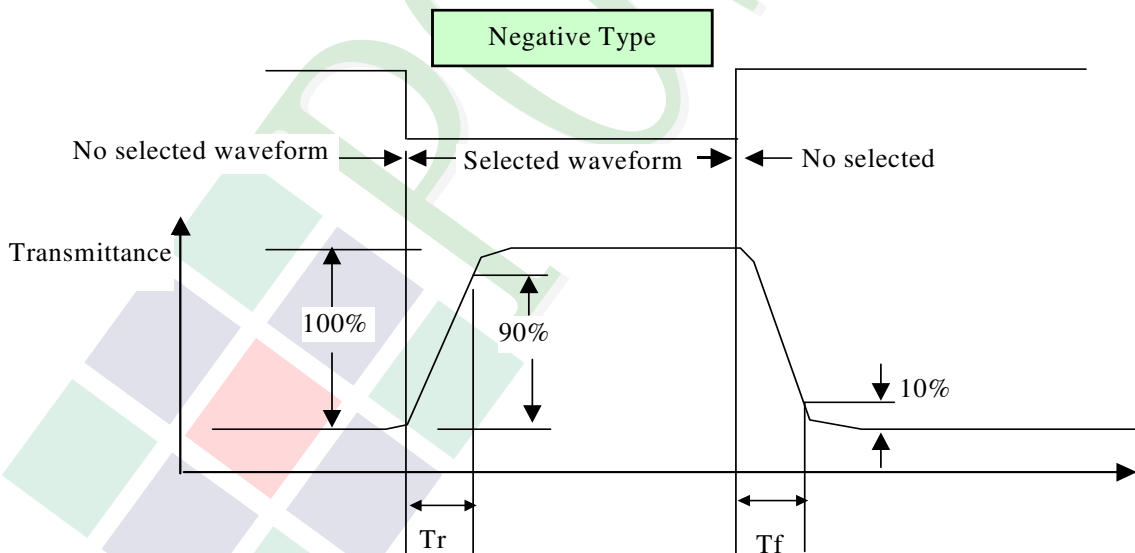
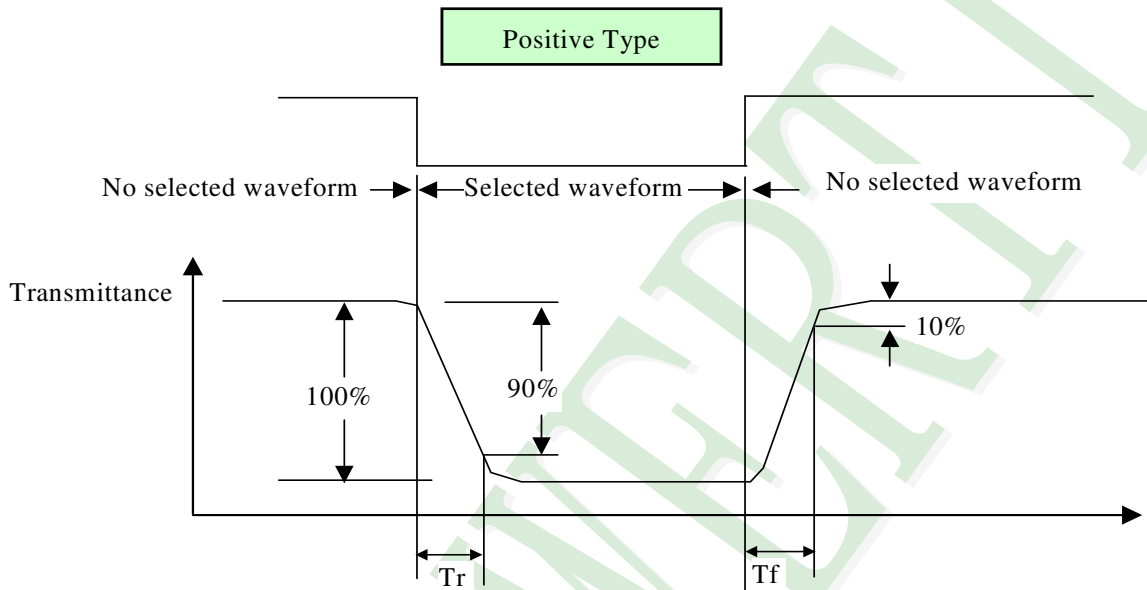


**Viewing angle**

Note 2.

Optical characteristics-3

Fig.2 Definition of response time





Electrical characteristics-2

※2 Drive waveform

$V_{op}$ : Drive voltage

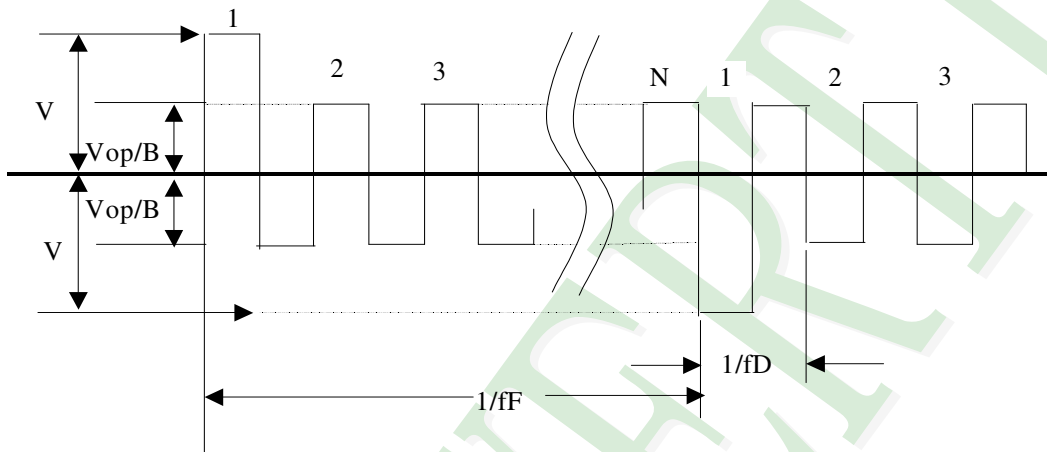
$1/B$ : Bias

$N$ : Duty

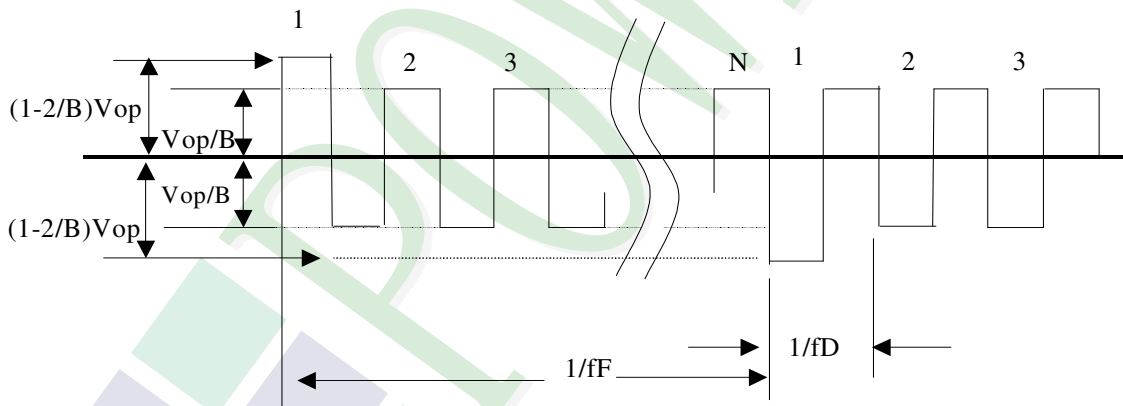
$f_F$ : Frame frequency

$f_D$ : Drive frequency

(1) Selected waveform



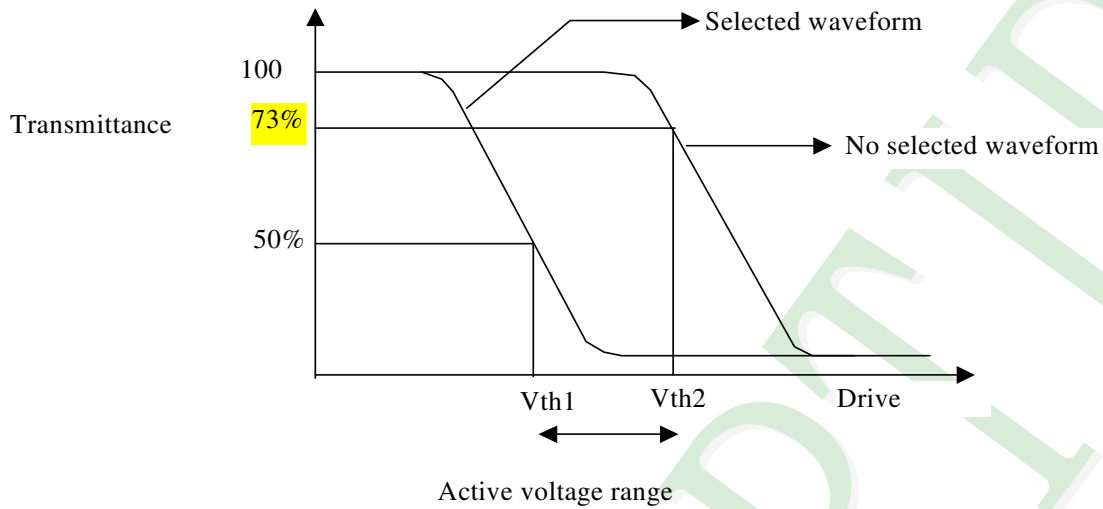
(2) Non- Selected wave form



Note:

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

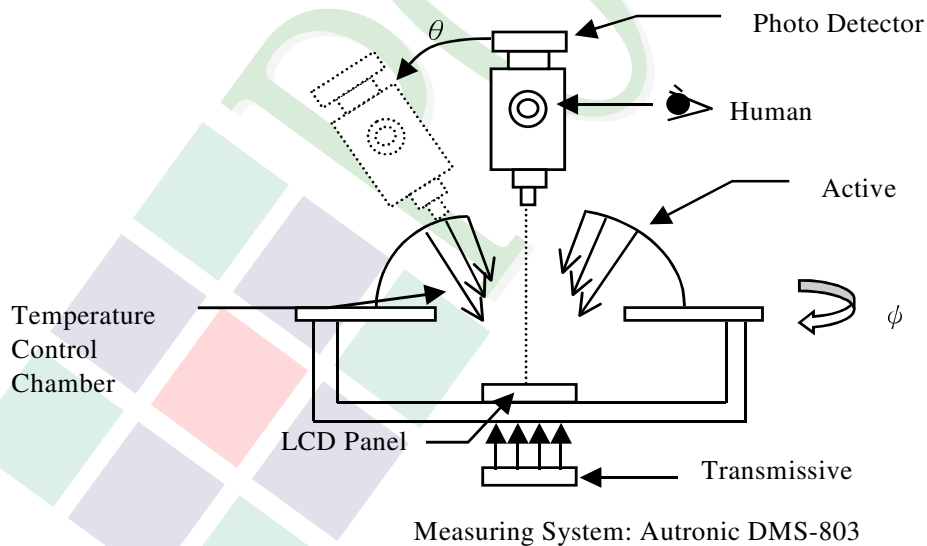
Note 3. : Definition of Vth



	$V_{th1}$	$V_{th2}$
View direction	$10^\circ$	$40^\circ$
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

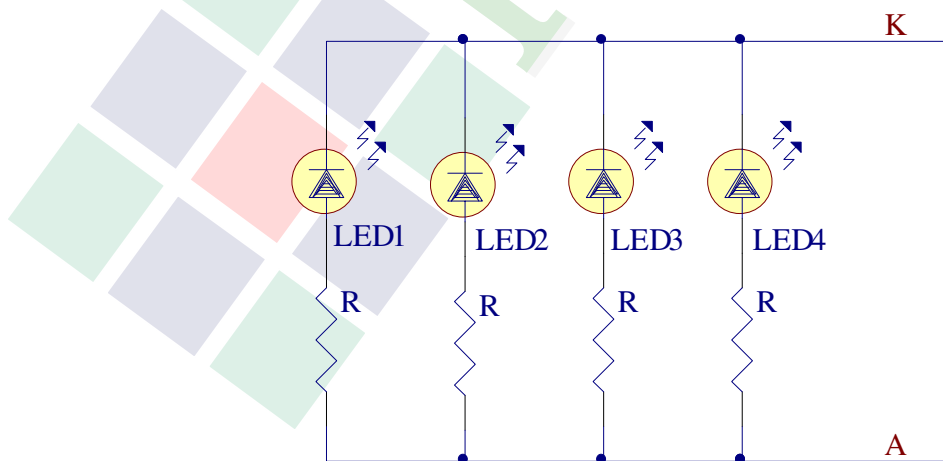
Item	Symbol	Conditions	Min.	Max.	Unit
Peak Forward current	IF	Ta=25°C	—	80	mA
Power dissipation	Pd		—	0.264	W
Reverse Voltage	VR		—	5	V

### Electrical / Optical Characteristics

Ta =25°C

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Forward Voltage	VF	IF= 60 mA	-	3.3	-	V
Reverse Current (Per LED)	IR	VR= 5 V	-	-	40	uA
Average Brightness (Without LCD)	IV	IF= 60 mA	1000	1200	-	cd/m <sup>2</sup>
CIE Color Coordinate (Without LCD)	X		-	0.275	-	-
	Y		-	0.275	-	-
Uniformity	△B		75	-	-	%
Color	White					

### Internal Circuit Diagram:



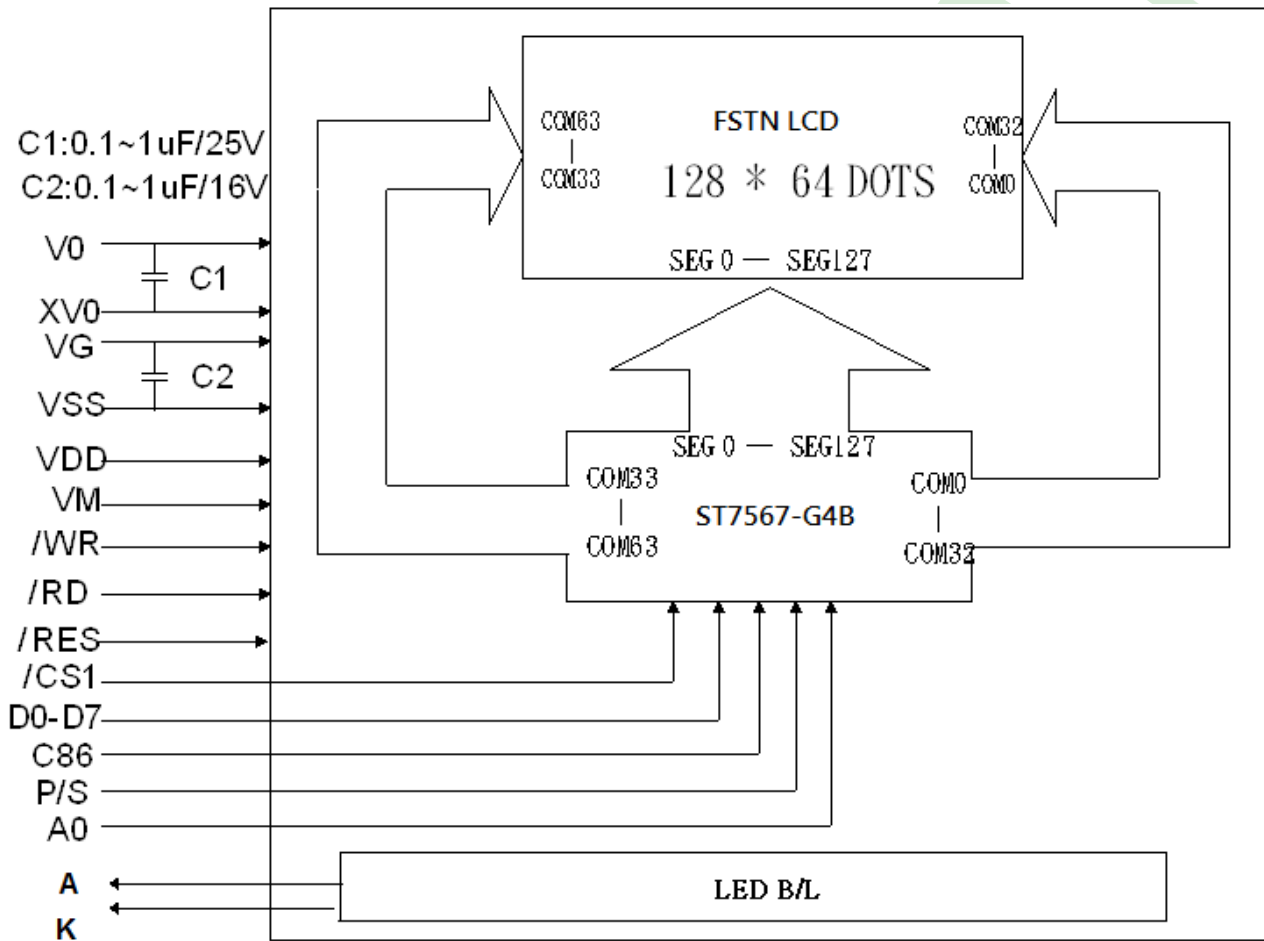
## 2. MODULE STRUCTURE

### 2.1 Counter Drawing

#### 2.1.1 LCM Mechanical Diagram

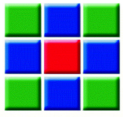
\* See Appendix

#### 2.1.2 Block Diagram



## 2.2 Interface Pin Description

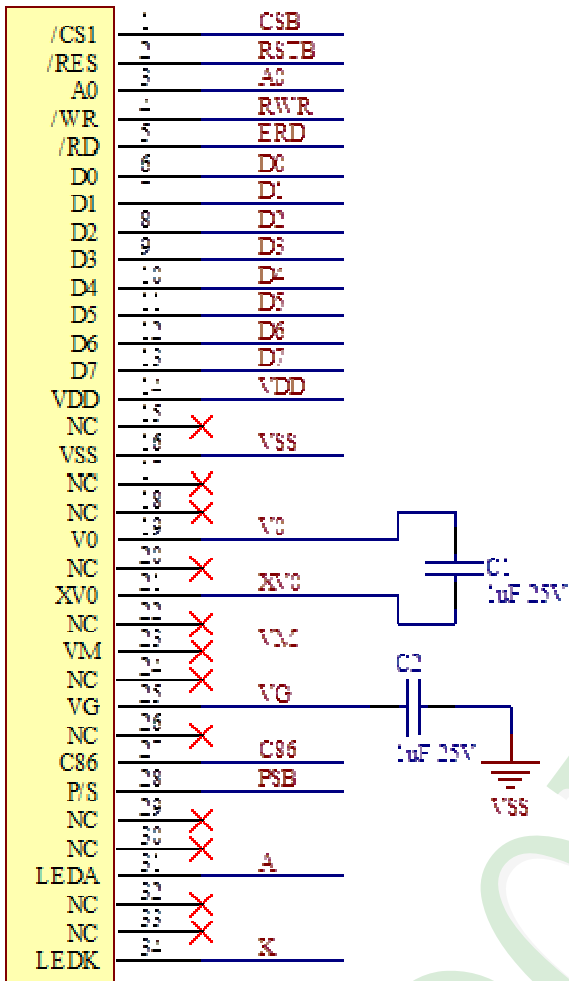
Pin No.	Symbol	Function
1	/CS1	Chip select signal, Active "L".
2	/RES	Reset input pin. When /RES is "L", initialization is executed.
3	A0	It determines whether the access is related to data or command. A0= "H" : display data. A0=" L" : control data.
4	/WR	Write signal input, Active "L".
5	/RD	Read signal input, Active "L".
6	D0	When using 8-bit parallel interface: (6800 or 8080 mode) 8-bit bi-directional data bus. Connect to the data bus of 8-bit microprocessor. When CSB is non-active (CSB="H"), D[7:0] pins are high impedance. When using serial interface : 4-LINE D7=SDA: Serial data input. D6=SCL: Serial clock input. D[5:0] are not used and should connect to "H" by VDD. When CSB is non-active (CSB="H"),D[7:0] pins are high impedance
7	D1	
8	D2	
9	D3	
10	D4	
11	D5	
12	D6	
13	D7	
14	VDD	Power supply. (+3.0V)
15	NC	Not connection. (Must be open)
16	VSS	System ground. (0V)
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	NC	Not connection. (Must be open)
21	XV0	LCD driving voltage for commons at positive frame.
22	NC	Not connection. (Must be open)
23	VM	LCD driving voltage for commons.
24	NC	Not connection. (Must be open)
25	VG	LCD driving voltage for segments.



# POWER TIP

Pin No.	Symbol	Function												
26	NC	Not connection. (Must be open)												
27	C86	Select the MPU system interface mode.												
		<table border="1"> <thead> <tr> <th>P/S</th> <th>C86</th> <th>Interface</th> </tr> </thead> <tbody> <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> </tbody> </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												
28	P/S													
29	NC	Not connection. (Must be open)												
30	NC	Not connection. (Must be open)												
31	A	Backlight Anode (+3.3 ~ + 3.6V, fix voltage)												
32	NC	Not connection. (Must be open)												
33	NC	Not connection. (Must be open)												
34	K	Backlight Cathode.												

## 2.2.1 Application Notes:



FPC

C86	PSB	Interface Selection
H	H	Parallel 6800 Series MPU Interface
L	H	Parallel 8080 Series MPU Interface
X	L	Series 4-Line SPI Interface

C86 is marked as “X” and can be fixed to “H” or “L”

## 2.2.2 Refer Initial code:

The referential initial code is shown below.

```

void Initial_Main(void)                // For ST7567
{

    WriteCOM_Main(0xAE);    //Display 0:OFF 1:on

    WriteCOM_Main(0xA2);    //SET LCD BIAS=1/9
    WriteCOM_Main(0xF8);    //Booster set
    WriteCOM_Main(0x00);    // 0:4X 1:5X
    WriteCOM_Main(0xA0);    // ADC Select
    WriteCOM_Main(0xC8);    //Common output mode
    WriteCOM_Main(0x40);    //Display start line
    WriteCOM_Main(0x25);    //SELECT REGULATOR REGISTER(1+(RA+RB))PR=5.5
    WriteCOM_Main(0x81);    //SET REFERENCE VOLTAGE Set EV (V0 = RR X [ ( 99 + EV ) /
                            162 ] X 2.1)

    WriteCOM_Main(0x26);

    WriteCOM_Main(0xA6);    //Inverse Display 0: normal 1: inverse display

    WriteCOM_Main(0xA4);    //all pixel on 0: normal Display 1:set all pixel on

    WriteCOM_Main(0x2C);    // Power controller set
    Delay(200);              //VB Built-in booster on

    WriteCOM_Main(0x2E);    // Power controller set
    Delay(200);              // VR Built-in regulatot on

    WriteCOM_Main(0x2F);    // Power controller set
    Delay(200);              // VC Built-in follower on

    //-----Display On-----
    WriteCOM_Main(0xAF);

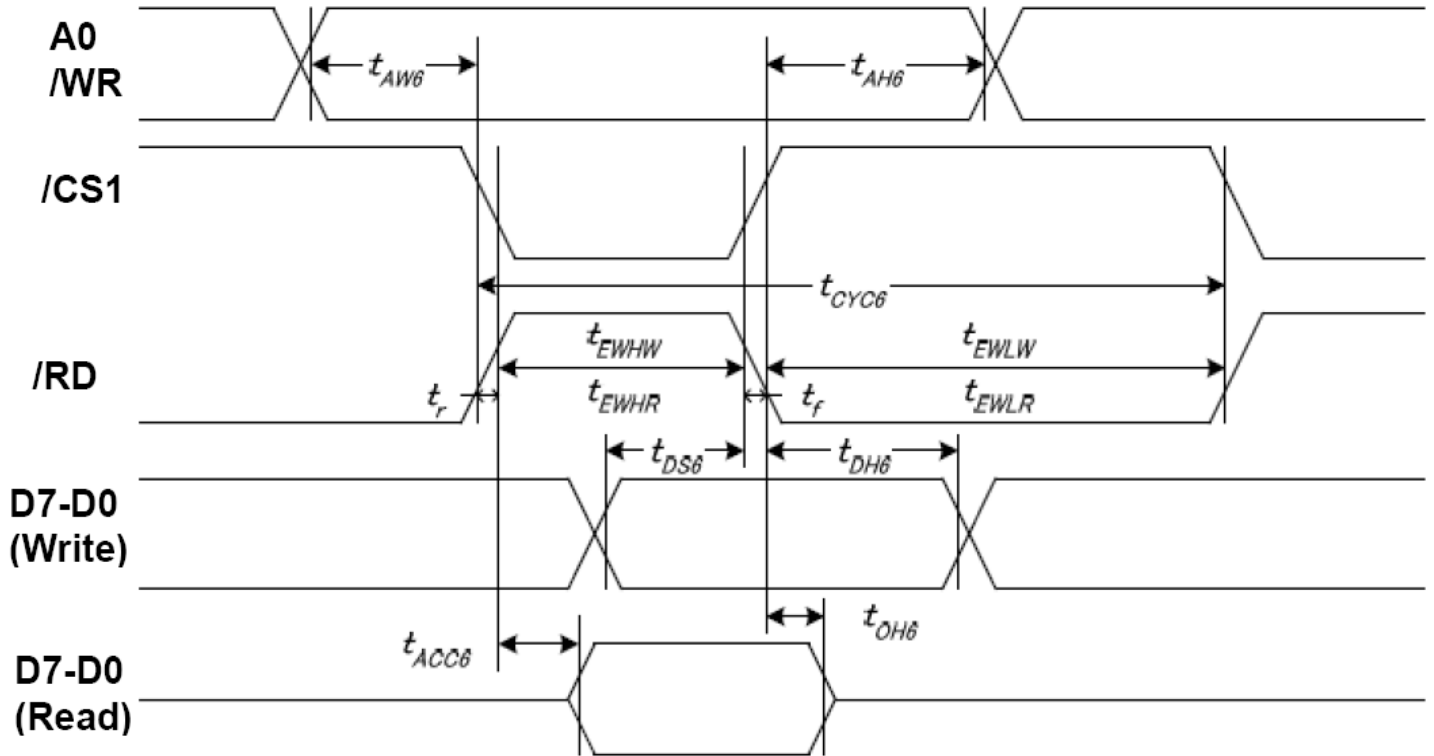
}

```



## 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

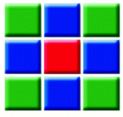
Item	Signal	Symbol	Condition	Min.	Max.	Unit
Address setup time	A0	tAW6		0	—	ns
Address hold time		tAH6		0	—	
System cycle time	/RD	tCYC6		400	—	
Enable L pulse width (WRITE)		tEWLW		220	—	
Enable H pulse width (WRITE)		tEWHW		180	—	
Enable L pulse width (READ)		tEWLR		220	—	
Enable H pulse width (READ)		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.

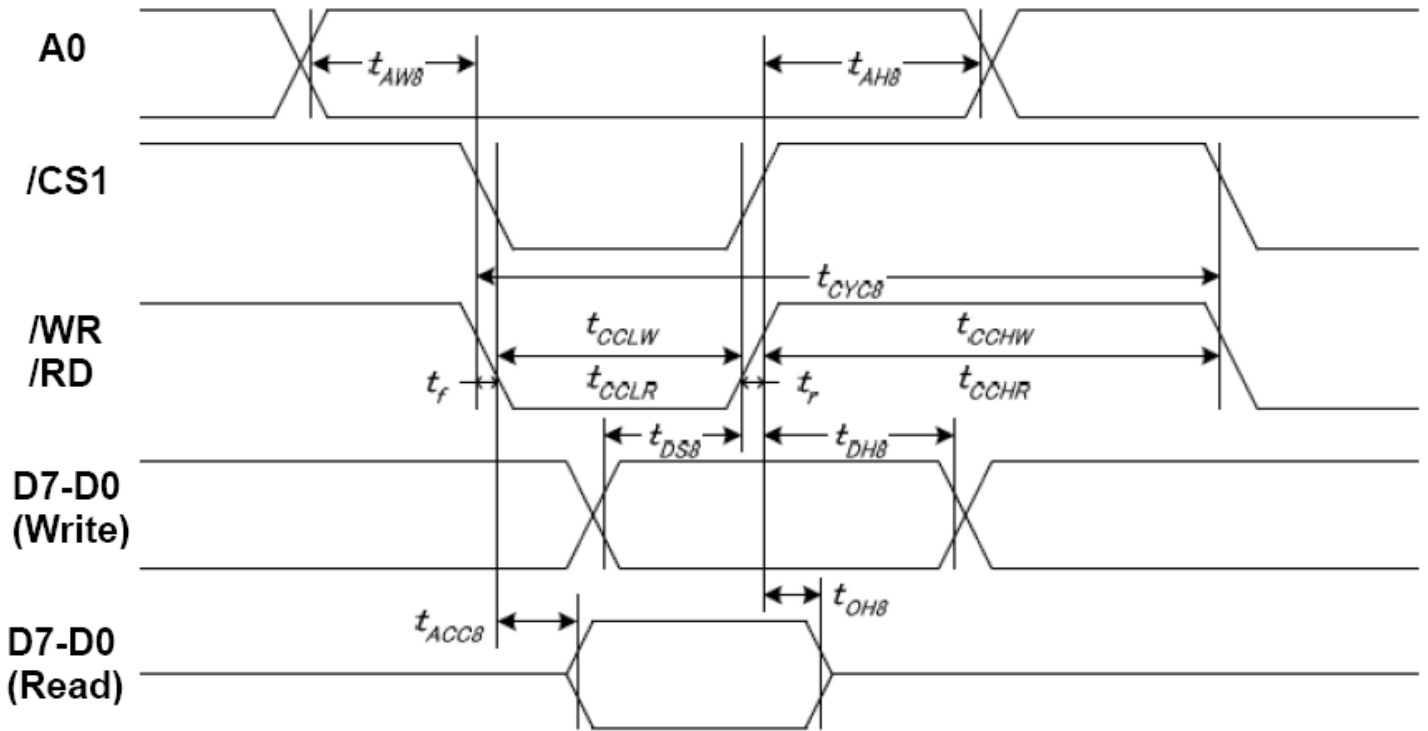
Note 2. All timing is specified using 20% and 80% of VDD1 as the reference.

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	/WR	tCYC8		240	—	
Enable L pulse width (WRITE)		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	

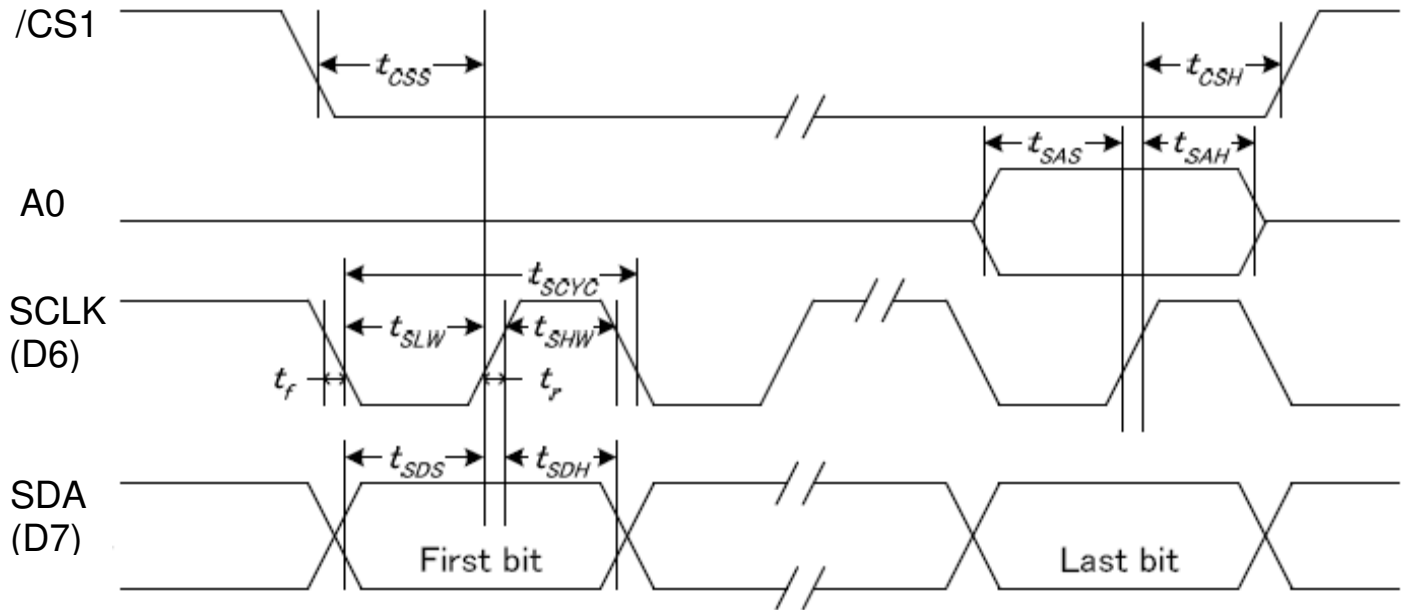
Note 1. The input signal rise time and fall time ( $t_r$ ,  $t_f$ ) is specified at 15 ns or less. When the system cycle time is extremely fast,  $(t_r + t_f) \leq (t_{CYC8} - t_{CCLW} - t_{CCHW})$  for  $(t_r + t_f) \leq (t_{CYC8} - t_{CCLR} - t_{CCHR})$  are specified.

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	—	

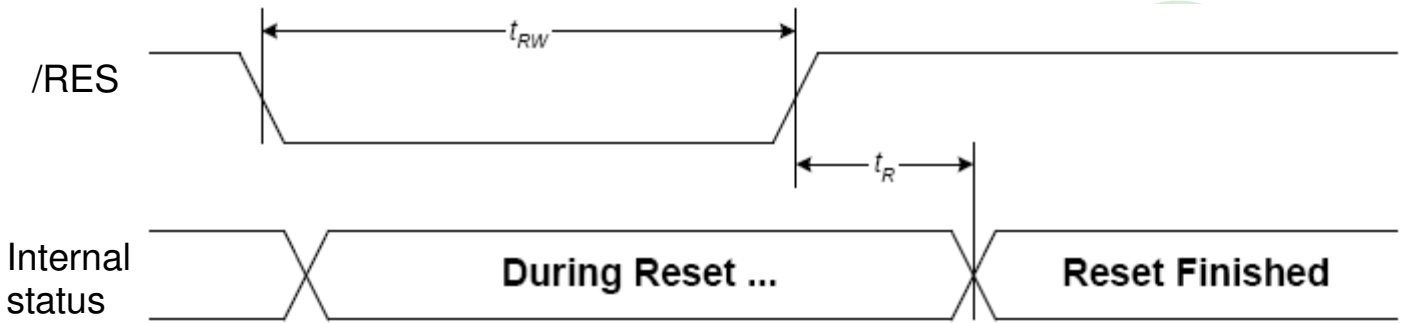
VDD = 2.8V, Ta = 25 °C

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

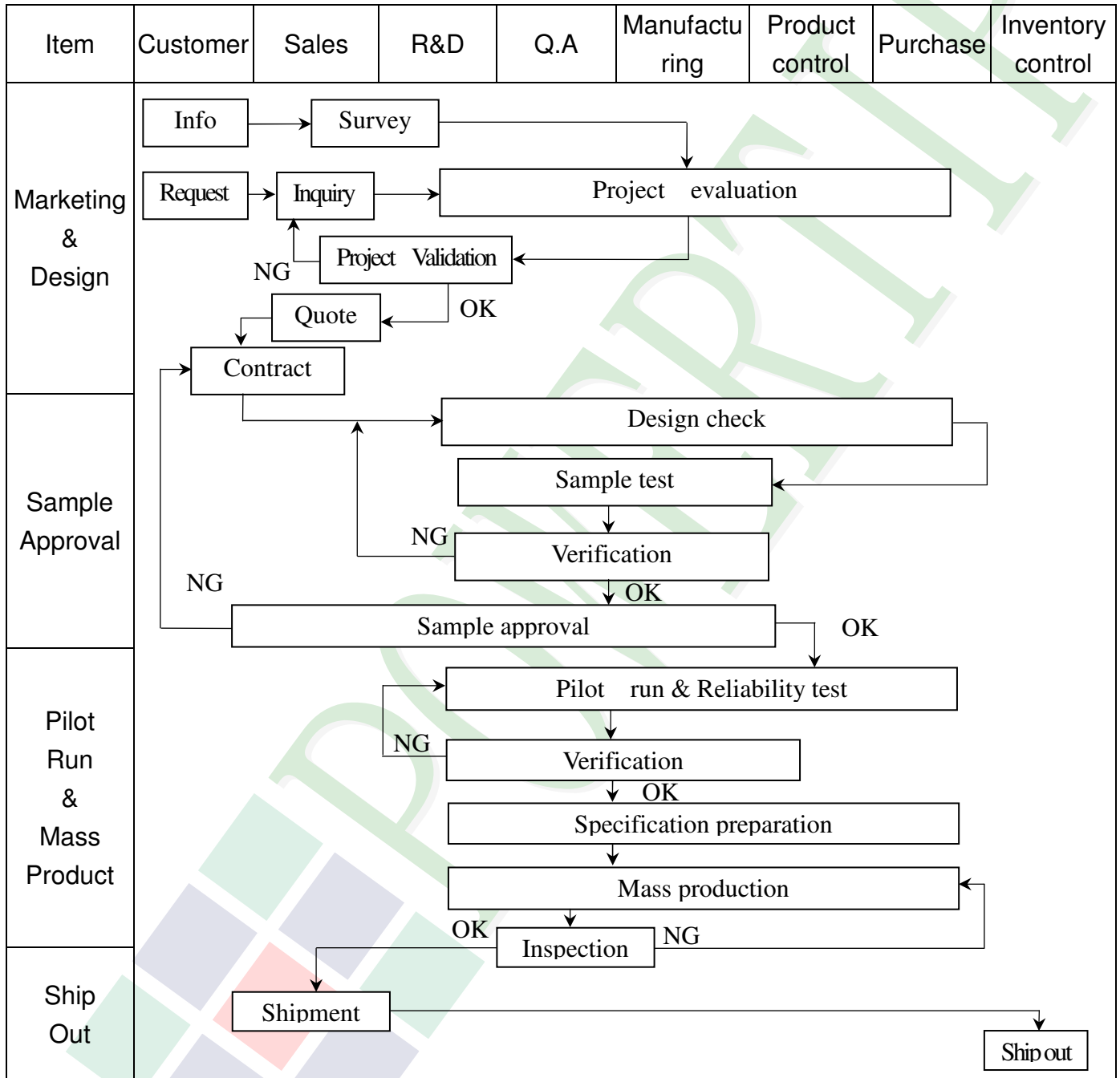
Item	Symbol	Condition	Min.	Max.	Unit
Reset time	tR		—	1.0	us
Reset "L" pulse width	tRW		1.0	—	

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] --&gt; Claim[Claim]     Claim --&gt; Failure[Failure analysis]     Failure --&gt; Report[Analysis report]     Failure --&gt; Action[Corrective action]     Action --&gt; 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)

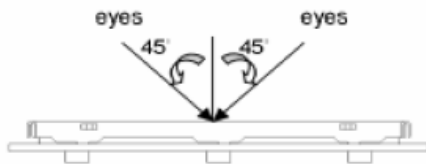


Fig.1

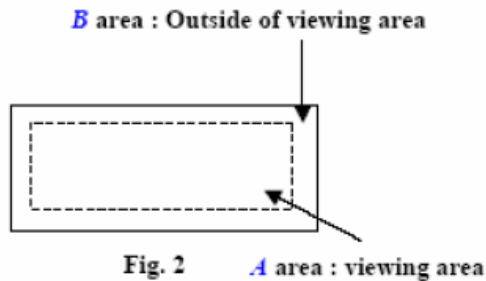
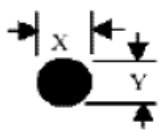
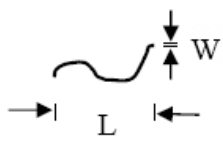
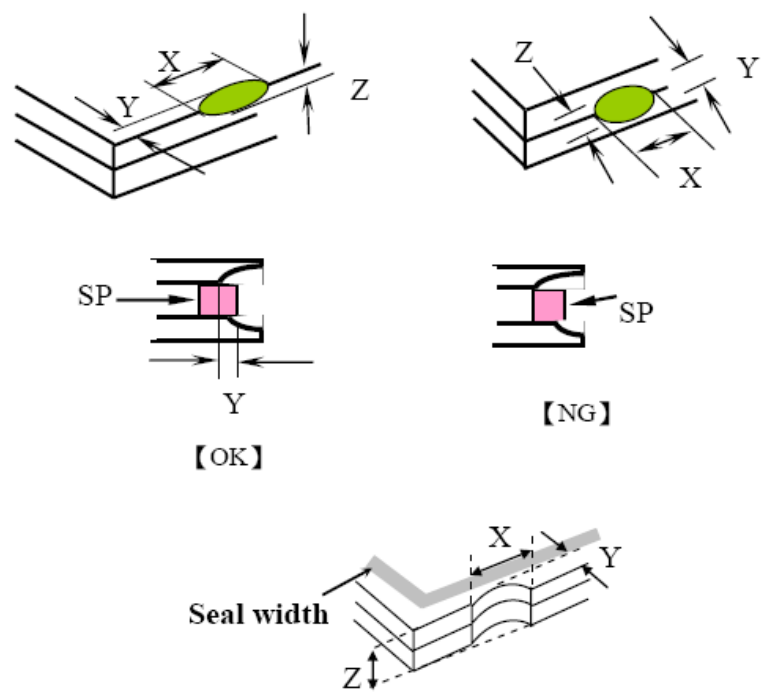


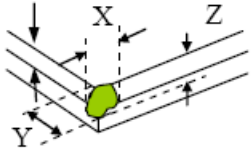
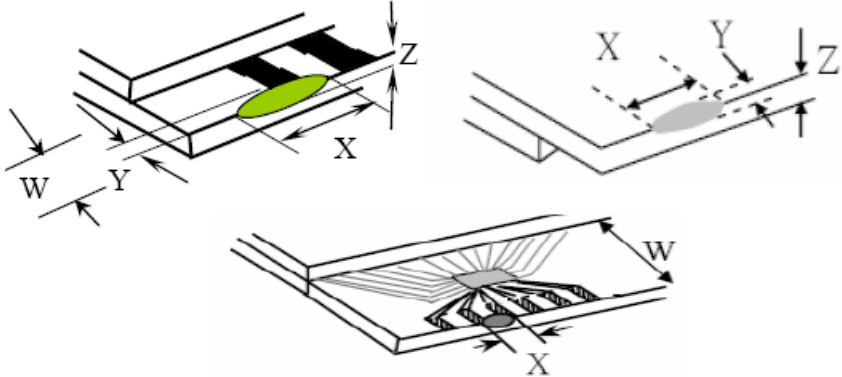
Fig. 2

◆ 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

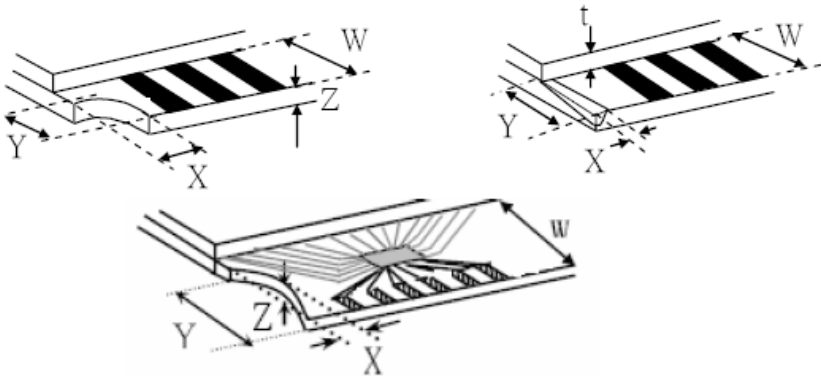
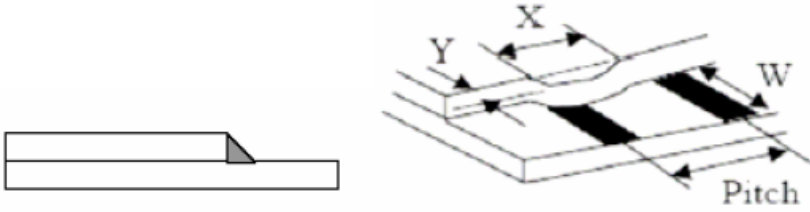
NO	Item	Criterion	Level																																						
05	<p><b>Black or white dot、scratch、contamination</b></p> <p><b>Round type</b></p>  <p><math>\Phi = (x+y)/2</math></p> <p><b>Line type</b></p> 	<p>5. 1 Round type:</p> <p>5. 1. 1 display only :</p> <ul style="list-style-type: none"> <li>• White and black spots on display <math>\leq 0.30</math> mm , no more than 4 white or black spots present.</li> <li>• Densely spaced : NO more than two spots or lines within 3 mm.</li> </ul> <p>5. 1. 2 Non-display :</p> <table border="1"> <thead> <tr> <th rowspan="2">Dimension (diameter : <math>\Phi</math>)</th> <th colspan="2">Acceptance (Q'ty)</th> </tr> <tr> <th>A area</th> <th>B area</th> </tr> </thead> <tbody> <tr> <td><math>\Phi \leq 0.10</math></td> <td colspan="2">Accept no dense</td> </tr> <tr> <td><math>0.10 &lt; \Phi \leq 0.20</math></td> <td>3</td> <td rowspan="2">Ignore</td> </tr> <tr> <td><math>0.20 &lt; \Phi \leq 0.30</math></td> <td>2</td> </tr> <tr> <td><b>Total quantity</b></td> <td colspan="2">4</td> </tr> </tbody> </table> <p>5. 1. 3 Line type:</p> <table border="1"> <thead> <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> </thead> <tbody> <tr> <td>---</td> <td><math>W \leq 0.03</math></td> <td>Accept no dense</td> <td rowspan="2">Ignore</td> </tr> <tr> <td><math>L \leq 3.0</math></td> <td><math>0.03 &lt; W \leq 0.05</math></td> <td rowspan="2">4</td> </tr> <tr> <td><math>L \leq 2.5</math></td> <td><math>0.05 &lt; W \leq 0.075</math></td> <td></td> </tr> <tr> <td>---</td> <td><math>W &gt; 0.075</math></td> <td colspan="2">As round type</td> </tr> </tbody> </table>	Dimension (diameter : $\Phi$ )	Acceptance (Q'ty)		A area	B area	$\Phi \leq 0.10$	Accept no dense		$0.10 < \Phi \leq 0.20$	3	Ignore	$0.20 < \Phi \leq 0.30$	2	<b>Total quantity</b>	4		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		Minor
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07	The crack of glass	<p><b>Symbols :</b></p> <p><b>X : The length of crack</b>                      <b>Y : The width of crack.</b>  <b>Z : The thickness of crack</b>                      <b>W : terminal length</b>  <b>t : The thickness of glass</b>                      <b>a : LCD side length</b></p>	Minor						
		<p>7.1 General glass chip :</p> <p>7.1.1 Chip on panel surface and crack between panels:</p> <div style="text-align: center;">  </div> <table border="1" data-bbox="502 1534 1300 1825" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td><math>\leq a</math></td> <td>Crack can't enter viewing area</td> <td><math>\leq 1/2 t</math></td> </tr> <tr> <td><math>\leq a</math></td> <td>Crack can't exceed the half of SP width.</td> <td><math>1/2 t &lt; Z \leq 2 t</math></td> </tr> </tbody> </table>		X	Y	Z	$\leq a$	Crack can't enter viewing area	$\leq 1/2 t$
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<p>7.2 Protrusion over terminal :</p> <p>7.2.1 Chip on electrode pad :</p>  <table border="1" data-bbox="464 1722 1254 1895"> <thead> <tr> <th></th> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>Front</td> <td><math>\leq a</math></td> <td><math>\leq 1/2 W</math></td> <td><math>\leq t</math></td> </tr> <tr> <td>Back</td> <td colspan="3">Neglect</td> </tr> </tbody> </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	<p>Symbols :</p> <p><b>X</b> : The length of crack                      <b>Y</b> : The width of crack.  <b>Z</b> : The thickness of crack                    <b>W</b> : terminal length  <b>t</b> : The thickness of glass                    <b>a</b> : LCD side length</p>	Minor										
		<p>7.2.2 Non-conductive portion :</p>  <table border="1" data-bbox="579 1081 1206 1234"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td><math>\leq 1/3 a</math></td> <td><math>\leq W</math></td> <td><math>\leq t</math></td> </tr> </tbody> </table> <p>⊙ If the chipped area touches the ITO terminal, over 2/3 of the ITO must remain and be inspected according to electrode terminal specifications.</p> <p>7.2.3 Glass remain :</p>  <table border="1" data-bbox="499 1760 1189 1901"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td><math>\leq a</math></td> <td><math>\leq 1/3 W</math></td> <td><math>\leq t</math></td> </tr> </tbody> </table>		X	Y	Z	$\leq 1/3 a$	$\leq W$	$\leq t$	X	Y	Z	$\leq a$
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$\leq 1/3 a$	$\leq W$	$\leq t$											
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 $\leq 1.5$ mm.	Minor



## 4. RELIABILITY TEST

### 4.1 Reliability Test Condition

(Ver.B01)

NO.	TEST ITEM	TEST CONDITION										
1	High Temperature Storage Test	Keep in <b>+80 ±2°C</b> 96 hrs Surrounding temperature, then storage at normal condition 4hrs.										
2	Low Temperature Storage Test	Keep in <b>-30 ±2°C</b> 96 hrs Surrounding temperature, then storage at normal condition 4hrs.										
3	High Temperature / High Humidity Storage Test	Keep in <b>+60 °C / 90% R.H</b> duration for 96 hrs Surrounding temperature, then storage at normal condition 4hrs. (Excluding the polarizer)										
4	Temperature Cycling Storage Test	$\begin{array}{ccccccc} & -30^{\circ}\text{C} & \rightarrow & +25^{\circ}\text{C} & \rightarrow & +80^{\circ}\text{C} & \rightarrow & +25^{\circ}\text{C} \\ & (30\text{mins}) & & (5\text{mins}) & & (30\text{mins}) & & (5\text{mins}) \\ & \longleftarrow & & & & & & \longrightarrow \\ & & & & & \text{10 Cycle} & & \end{array}$ Surrounding temperature, then storage at normal condition 4hrs.										
5	ESD Test	<table border="1"><tr><td><b>Air Discharge:</b> Apply <b>2 KV</b> with 5 times Discharge for each polarity +/-</td><td><b>Contact Discharge:</b> Apply <b>250 V</b> with 5 times discharge for each polarity +/-</td></tr></table> <ol style="list-style-type: none"><li>Temperature ambiance : <b>15°C ~ 35°C</b></li><li>Humidity relative : <b>30% ~ 60%</b></li><li>Energy Storage Capacitance(Cs+Cd) : <b>150pF±10%</b></li><li>Discharge Resistance(Rd) : <b>330Ω±10%</b></li><li>Discharge, mode of operation : Single Discharge (time between successive discharges at least 1 sec) (Tolerance if the output voltage indication : <b>±5%</b>)</li></ol>	<b>Air Discharge:</b> Apply <b>2 KV</b> with 5 times Discharge for each polarity +/-	<b>Contact Discharge:</b> Apply <b>250 V</b> with 5 times discharge for each polarity +/-								
<b>Air Discharge:</b> Apply <b>2 KV</b> with 5 times Discharge for each polarity +/-	<b>Contact Discharge:</b> Apply <b>250 V</b> with 5 times discharge for each polarity +/-											
6	Vibration Test (Packaged)	<ol style="list-style-type: none"><li>Sine wave <b>10~55 Hz</b> frequency (1 min/sweep)</li><li>The amplitude of vibration : <b>1.5 mm</b></li><li>Each direction (X 、 Y 、 Z) duration for <b>2 Hrs</b></li></ol>										
7	Drop Test (Packaged)	<table border="1"><thead><tr><th>Packing Weight (Kg)</th><th>Drop Height (cm)</th></tr></thead><tbody><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></tbody></table> <p>Drop Direction : ※1 corner / 3 edges / 6 sides each 1time</p>	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											



## 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

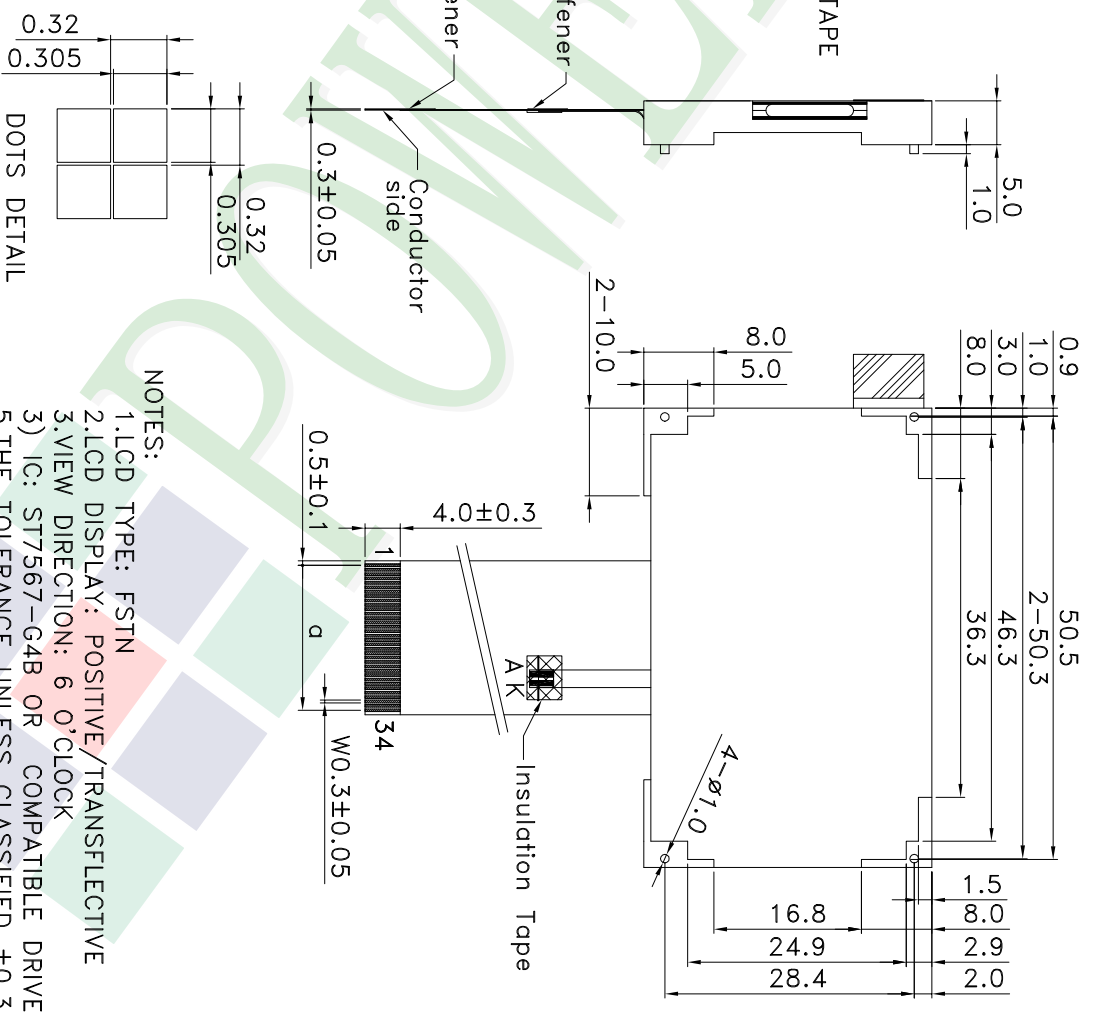
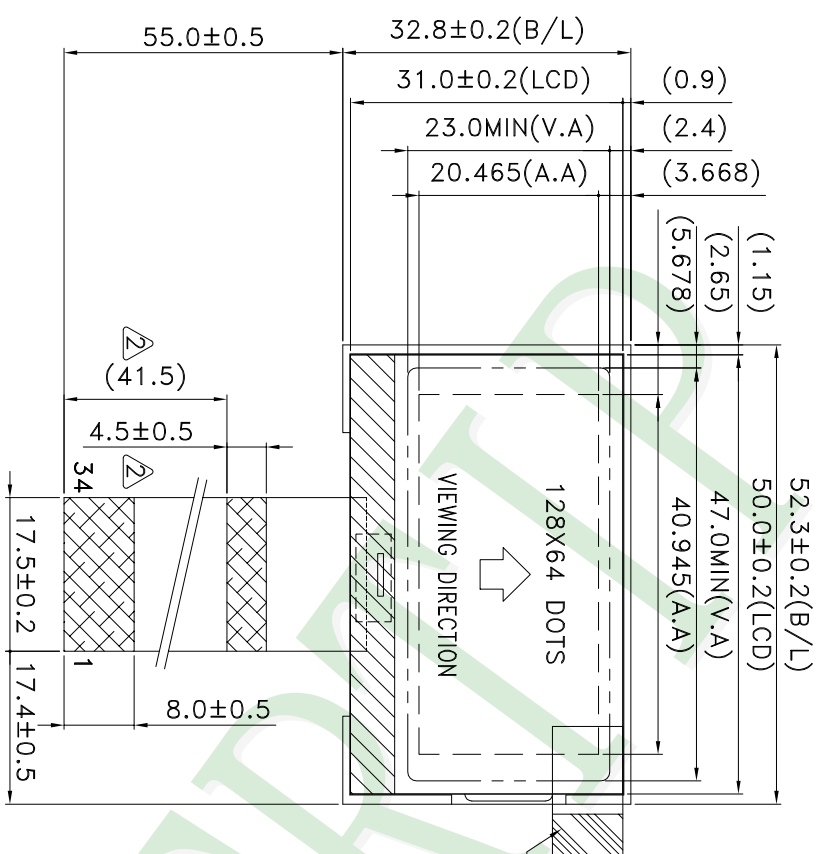
### 5.3 STORAGE

- 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.

A B C D E F G H



DOTS DETAIL  
SCALE: 20X

- NOTES:
- 1.LCD TYPE: FSTN
  - 2.LCD DISPLAY: POSITIVE/TRANSPARENT
  - 3.VIEW DIRECTION: 6 O'CLOCK
  - 3) IC: ST7567-G4B OR COMPATIBLE DRIVER IC
  - 5.THE TOLERANCE UNLESS CLASSIFIED ±0.3mm
  - 6.g: P0.5x33=16.5±0.05

007		PART NO:	PE12864WRF-066-H-Q	Design	Winnie Cheng	久正光電股份有限公司 POWER TIP TECHNOLOGY CORPORATION	Surface		Tolerance (mm)	Precision Level
006		DRAWING NAME :	LMD-PE12864WRF-066-H-Q	Check	Tina Chen		Unit	MM	1 ~ 4	-
005		TITLE:	LCD MODULE DRAWING	Approve	Linda Lee	Scale	FIT	4 ~ 16	-	
004						Page	1/1	16 ~ 63	-	
003						Quantity		63 ~ 250	-	
002	Add Stiffener		Winnie					250 ~ 1000	-	
001	NEW DRAWING		Winnie							
REV/		REV BY	REVISER	DATE						

Approve	Check	Contact
Linda Lee	Tina Chen	Winnie Chang

Documents NO. PKG-PE12864WRF-066-H-Q

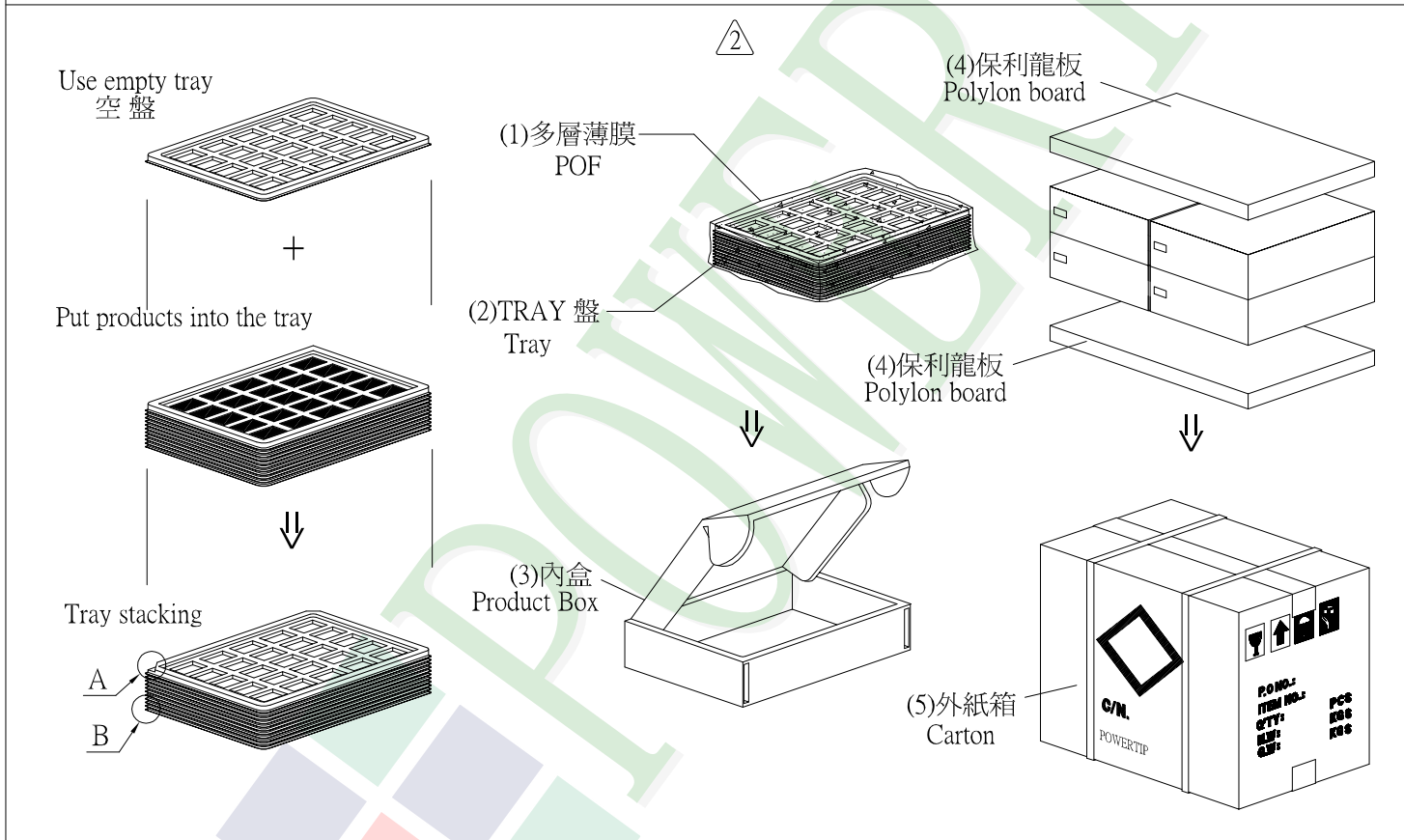
### 1. 包裝材料規格表 (Packaging Material) : (per carton) $\triangle$

No.	Item	Model	Dimensions (mm)	IPcs Weight	Quantity	Total Weight
1	成品 (LCM)	PE12864WRF-066-H-Q	52.3X32.8	0.009	600	5.4
2	多層薄膜(1)POF	OTFILM0BA03ABA	19"X350X0.015	—	4	—
3	TRAY 盤 (2)Tray	TY00000000215	352 X 260 X 12.8	0.1	44	4.4
4	內盒(3)Product Box	BX00000000022	393 X 274 X 107	0.25	4	1.0
5	保利龍板(4)Pollylon board	OTPLB000000008	550 X 393 X 15	0.022	2	0.044
6	外紙箱(5)Carton	BX57041027CCBA	570 X 410 X 265	1.0	1	1.0
7						
8						
9						

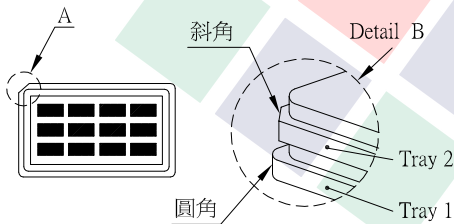
2. 一整箱總重量 (Total LCD Weight in carton) : 11.84 Kg $\pm$ 10%  $\triangle$

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

(1) LCM quantity per box : no per tray	15	x no of tray	10	=	150	$\triangle$
(2) Total LCM quantity in carton : quantity per box	150	x no of boxes	4	=	600	$\triangle$



### 特 記 事 項 (REMARK)



4. TRAY盤相疊時, 需旋轉180度, 請詳見B視圖  
Rotate tray 180 degrees and place on top of stack.  
Check the tray stack using Fig. B.