



## SPECIFICATIONS

**CUSTOMER NAME** : \_\_\_\_\_  
**CUSTOMER REFERENCE NO.** : \_\_\_\_\_  
**MODULE NUMBER** : TSG12864-1185-FFDLWS-R  
**SAMPLE VERSION** : NO.1  
**SPECIFICATIONS EDITION** : V0  
**DRAWING NO. (Ver.)** : A1  
**PACKAGING NO. (Ver.)** : TBD

**Customer Approved**

**Date:**

Approved	Checked	Designer
	Aron	Sean

- Preliminary specification for design input
- Full specification for sample approval



## RECORDS OF REVISION

Date YYYY/MMDD	Sample Ver.	Spec. Edi.	Description	CHANGED BY	CHECKED BY
2018.10.31	NO.1	V0	First release	Sean	Aron



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## 1. SPECIFICATIONS

### 1.1 Features

Item	Description
Display Type	128*64 Dots
LCD Type	FSTN /Positive/ Transflective
Driver Condition	1/65 duty, 1/9bais
Viewing Direction	6 O'clock
Backlight Color	White Color
Module weight	About 22.0g
Interface	6800/8080
LCD driver IC	ST7567S-G4
ROHS2.0	YES

### 1.2 Mechanical Specifications

Item	Standard Value	Unit
Outline Dimension	58.20(L) *39.00(w) *8.00 (H) (Exclude the pin)	mm
Viewing Area	50.00(L) * 25.00(w)	mm
Active Area	46.05(L) * 23.01(w)	mm
Dots Size	0.33(L) *0.33(w)	mm
Dots Pitch	0.36(L) *0.36(W)	mm

Note : For detailed information please refer to LCM drawing

### 1.3 Absolute Maximum Ratings

Item	Symbol	Condition	Min.	Max.	Unit
Power Supply Voltage	$V_{DD}$	—	-0.3	4.0	V
LCD Power Supply Voltage	$V_{LCD}, V_0$	—	-0.3	14	V
Any input/output	$V_{IN}/ V_{OUT}$	—	-0.3	$V_{DD}+0.3$	V
Operating Temperature	$T_{OP}$	—	-20	70	°C
Storage Temperature	$T_{ST}$	—	-40	80	°C
Storage Humidity	$H_D$	$T_a < 40\text{ °C}$	-	90	%RH

## 1.4 DC Electrical Characteristics

$V_{DD}=3.0\text{ V} \pm 5\%$  ,  $V_{SS}=0\text{ V}$  ,  $T_a=25^\circ\text{C}$

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating Voltage	$V_{DD}$	-	2.85	3.0	3.15	V
Input High-level Voltage	$V_{IHC}$	-	$0.7V_{DD}$	-	$V_{DD}$	V
Input Low-level Voltage	$V_{ILC}$	-	$V_{SS}$	-	$0.3V_{DD}$	V
Output High-level Voltage	$V_{OHC}$	-	$0.8V_{DD}$	-	$V_{DD}$	V
Output Low-level Voltage	$V_{OLC}$	-	$V_{SS}$	-	$0.2V_{DD}$	V
LCD Supply Power	$V_{LCD}$	-	9.8	10.0	10.2	V
Supply Current	$I_{DD}$	$V_{DD}=3.0\text{V}, V_{op}=10.0\text{V},$ Pattern= Vertical display	-	0.43	0.65	mA

## 1.5 Optical Characteristics

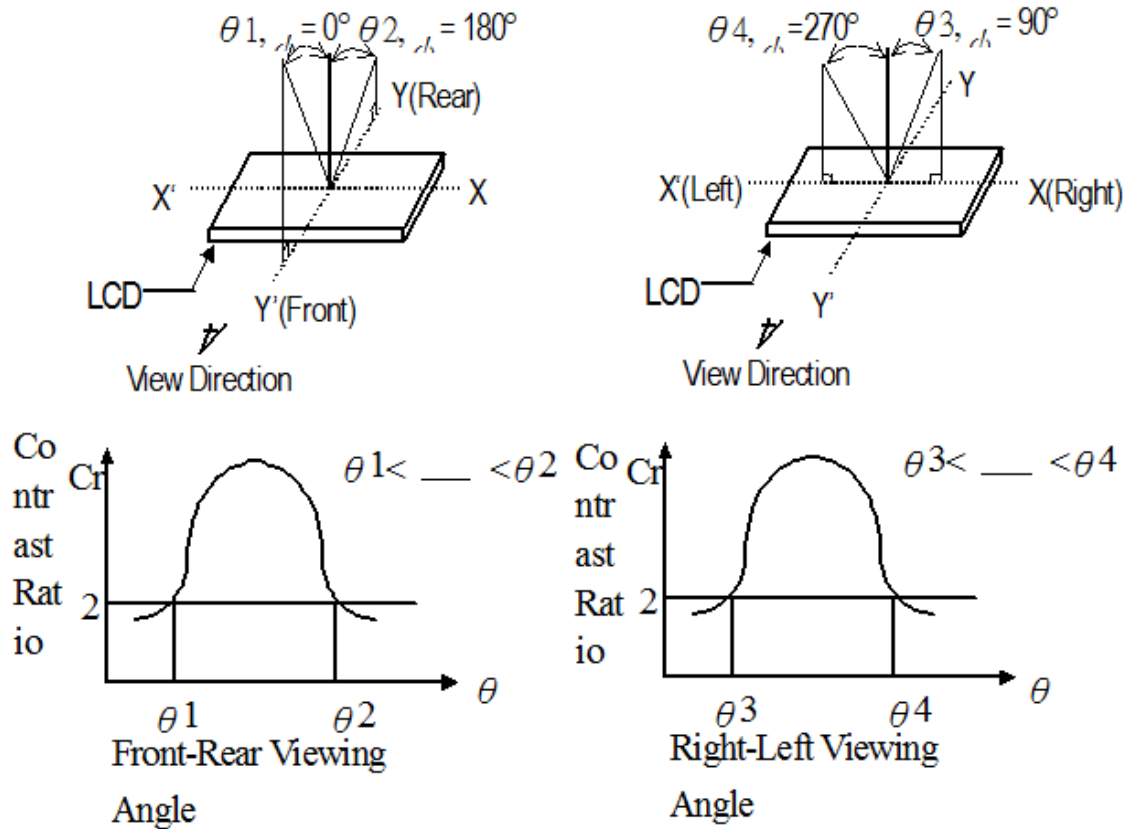
LCD Panel : 1/65Duty , 1/9Bias ,  $V_{OP}=10.0\text{ V}$  ,  $T_a=25^\circ\text{C}$

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit	Reference	
Response Time	$T_{on}$	$C \geq 2.0$	-	150	250	ms	Note3	
	$T_{off}$		-	170	300			
Viewing angle range	=0(6H)		Y'	20	35	-	Deg.	Note1
	=90(3H)		X	20	35	-		
	=180(12H)	Y	10	25	-			
	=270(9H)	X'	20	35	-			
Contrast Ratio	C	$\theta = 0^\circ$	4	6	-	-	Note2	
Average Brightness (with LCD)	IV	IF=15mA	30	50	-	Cd/m2	Note4	
Uniformity(with LCD)	$\Delta B$		70	75	-	%		



Note 1

Definition of viewing angle

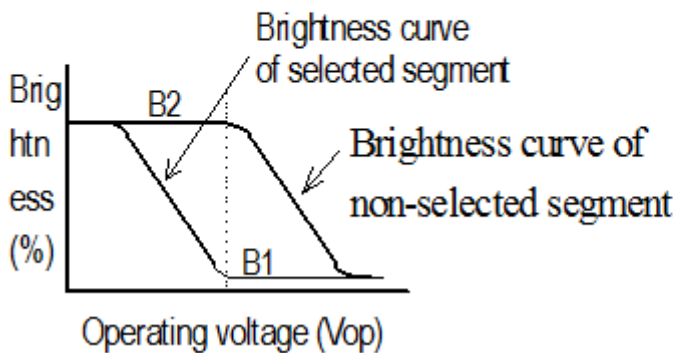


Note 2

Definition of contrast

RATIO

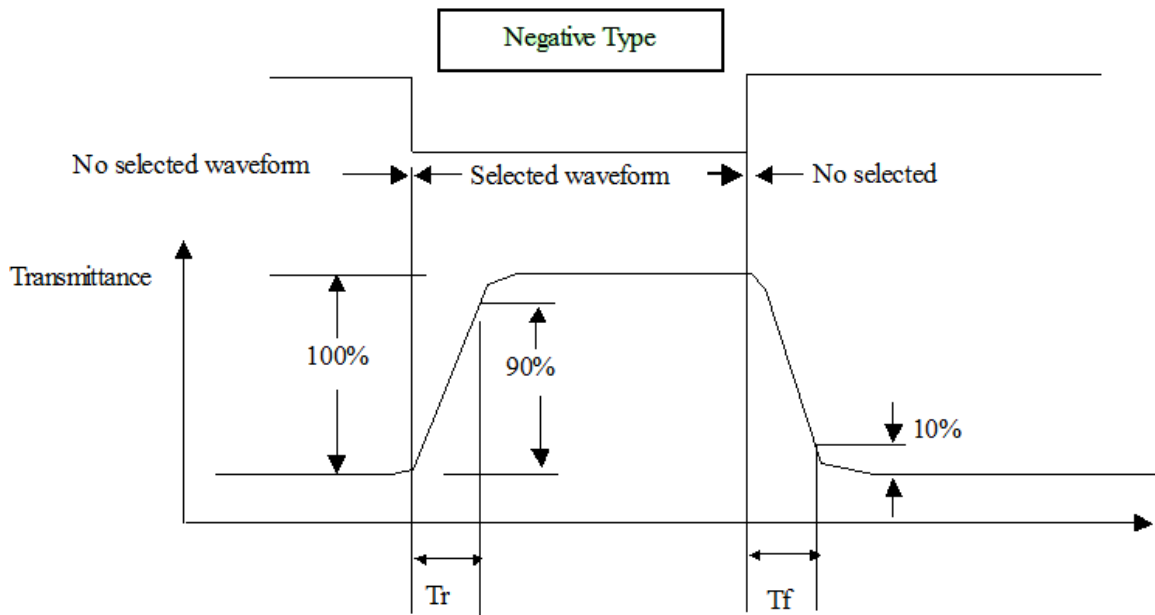
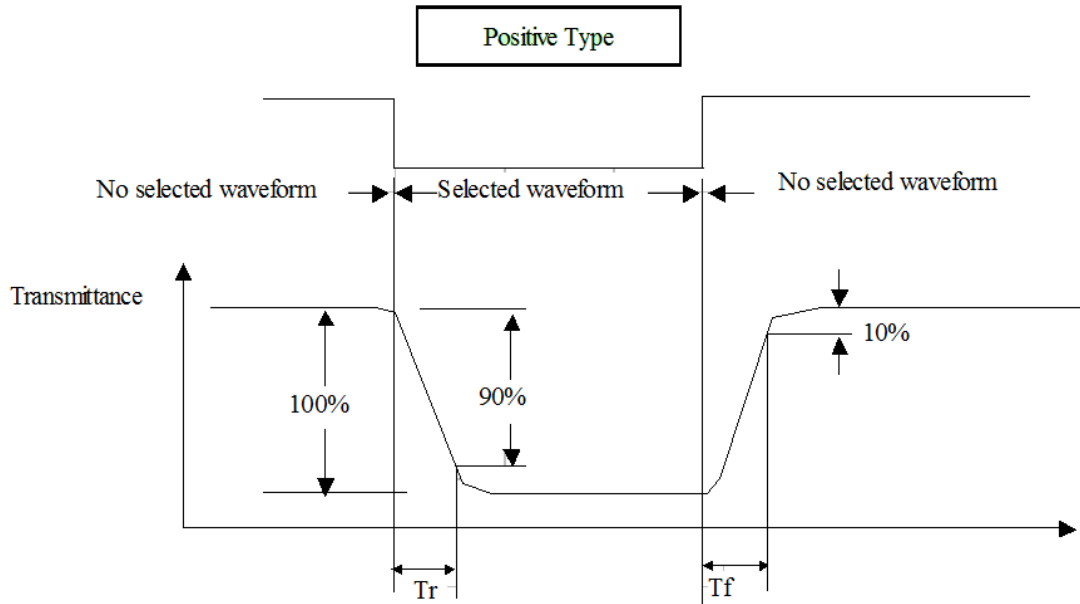
$$C.R = \frac{\text{Brightness of nonselected segment (B2)}}{\text{Brightness of selected segment}}$$





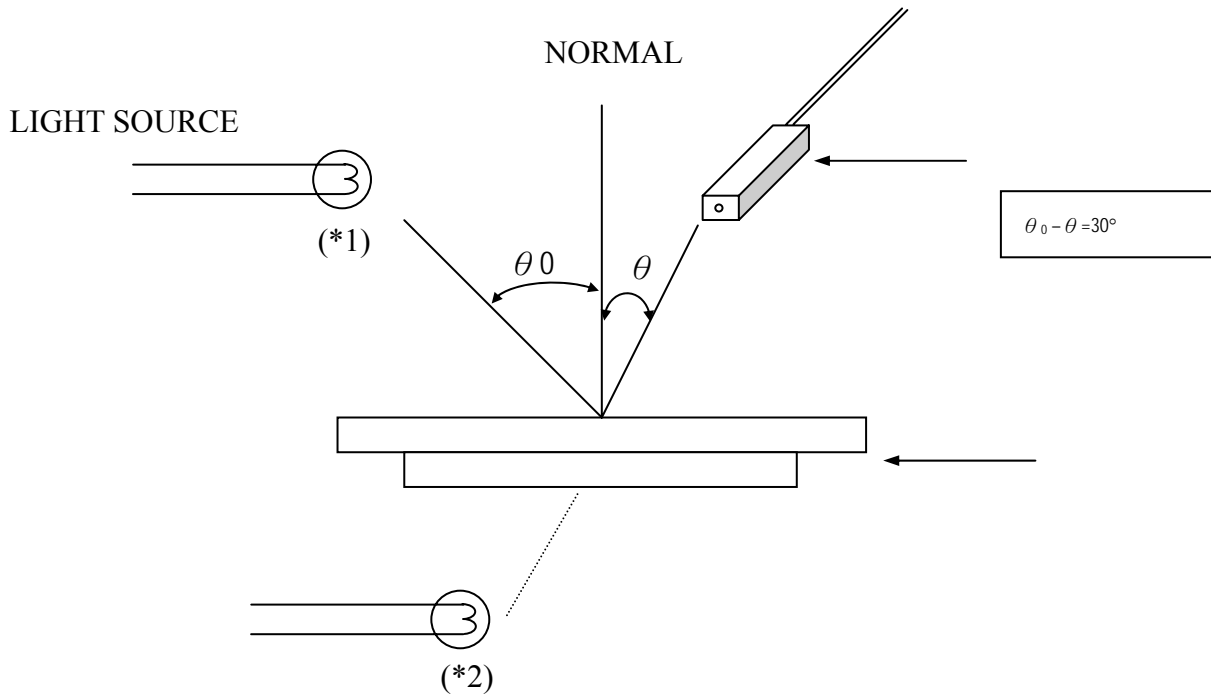
Note 3

Definition of response time



Note 4

Measuring Instruments For Electro-optical Characteristics



\*1.Light source position for measuring the reflective type of LCD panel

\*2.Light source position for measuring the transfective / transmissive types of LCD panel





### 1.6 Backlight Characteristics

LCD Module with LED Backlight

Maximum Ratings

Item	Symbol	Conditions	Min.	Max.	Unit
Forward Current	IF	Ta =25℃	-	20	mA
Reverse Voltage	VR	Ta =25℃	-	5.0	V
Reverse Current	IR	VR= 5V	-	10	uA
Power Dissipation	PD	Ta =25℃	-	64	mW

Electrical / Optical Characteristics

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Forward Voltage	IF	IF=15mA	2.8	3.0	3.2	V
Average Brightness (without LCD)	IV	IF=15mA	55	-	-	cd/m <sup>2</sup>
Color Coordinates (Without LCD)	Hue	IF=15mA	X=0.26 Y=0.26	X=0.29 Y=0.29	X=0.32 Y=0.32	nm
Color	White					

# 2. MODULE STRUCTURE

## 2.1 Counter Drawing

### 2.1.1 LCM Mechanical Diagram

**All Pages Of This Edition Approved**

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

REV. DESCRIPTION REVISER DATE

A0 New Drawing kuangshenggen 2018/09/15

A1 IC被零件改为ST7567S,增加黑圈贴 kuangshenggen 2018/10/31

**SPECIFICATION:**

Display Type	FSTN	White Color: Uniformity: 70%(MIN)
Drive Method	Positive Transistechde	Backlight
Viewing Direction	1/6SDuty	Luminance: 55cd/m2(MIN)
Vop	1/9Bias	IF: 15mA, VF: 3.0±0.2V
Vdd	6.00 O'clock	X: 0.26~0.32 Y: 0.26~0.32
Drive IC	ST7567S-G4	Customer NO.
Environmental protection requirements:	ROHS 2.0 REACH	Top
		Bottom
		Important Dimension
		Reference Dimension
		With (" )

**COM & SEG LAYOUT**

**BIL. CIRCUIT DIAGRAM**

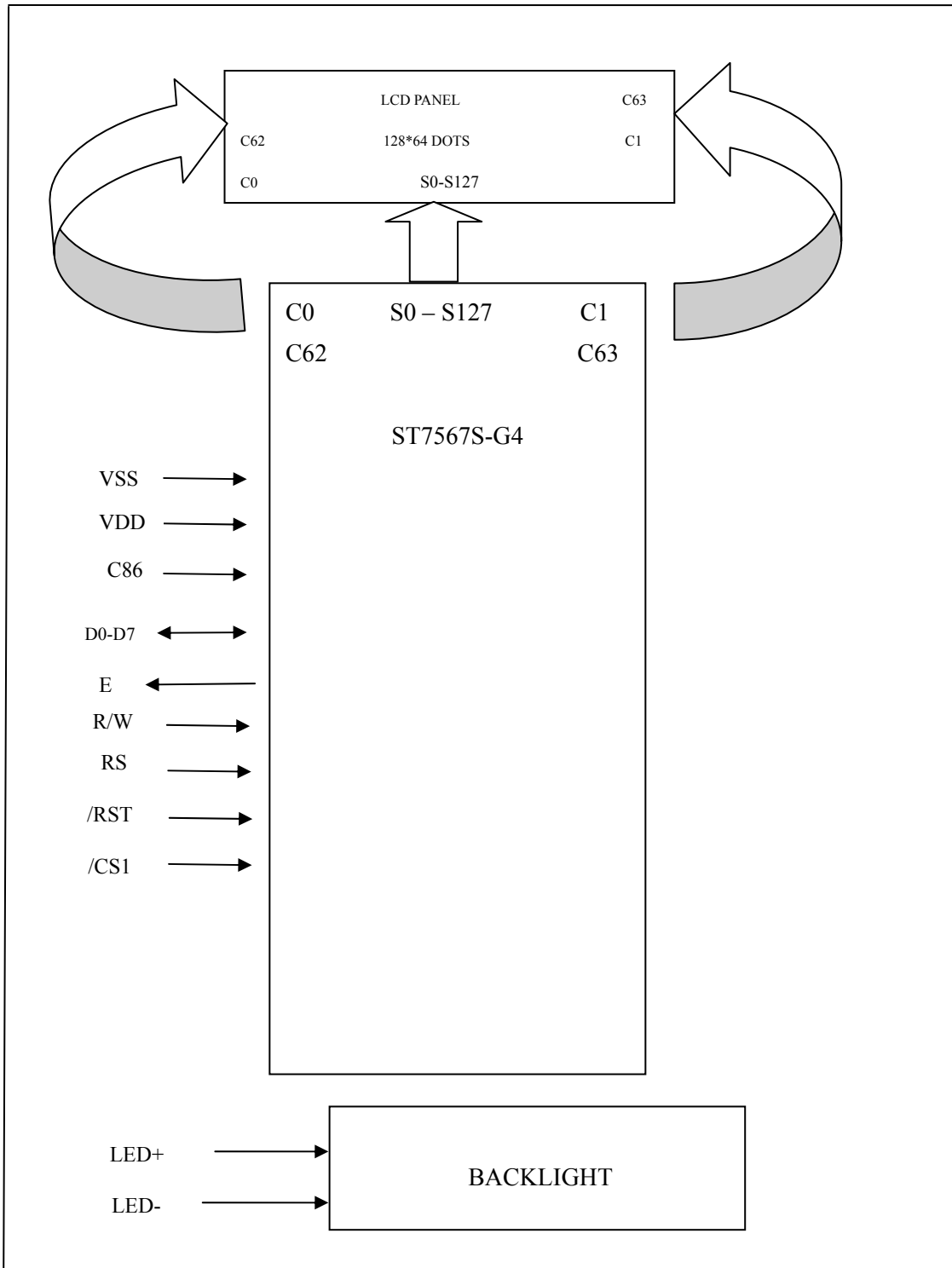
**PIN DEFINITION**

1	VSS
2	VDD
3	C86
4	DB7
5	DB6
6	DB5
7	DB4
8	DB3
9	DB2
10	DB1
11	DB0
12	E
13	RW
14	RS
15	RST
16	CS1
17	LED+
18	LED-

**东莞市一众显示科技有限公司**  
DONG GUAN TEAM SOURCE DISPLAY TECH. CO, LTD.



### 2.1.2 Block Diagram



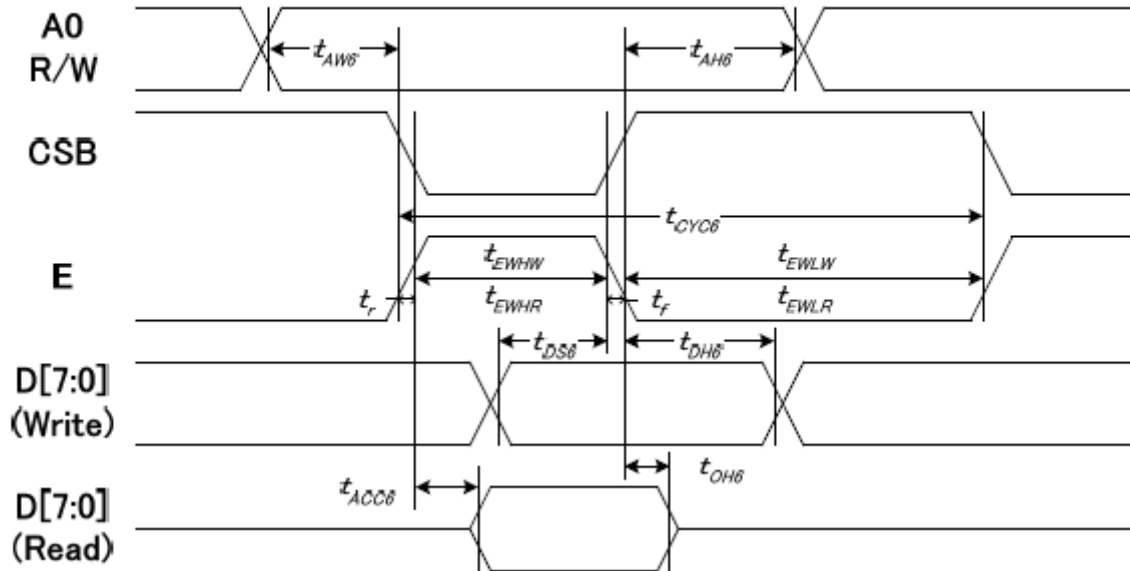


## 2.2 Interface Pin Description

Pin No.	Symbol	Signal Description
1	VSS	Power Ground
2	VDD	Main Power supply for the LCM
3	C86	This is the MPU interface selection pin. C86 = "H": 6800 Series MPU interface. C86 = "L": 8080 Series MPU interface.
4	DB7	8-bit Bi-direction databus D[7:0].
5	DB6	
6	DB5	
7	DB4	
8	DB3	
9	DB2	
10	DB1	
11	DB0	
12	RD(E)	Enable clock input for 6800 series MPU
13	RW(R/W)	Read/Write signal for 6800 series MPU.
14	RS	Command/Data selection control pin.H for display data and L for command data
15	/RST	Hardware reset pin. Low active
16	/CS1	Chip selection control pin. Low active
17	LED+	LED anode.
18	LED-	LED cathode

## 2.3 Timing Characteristics

### 14-1 System Bus Timing for 6800 Series MPU



(VDD1 = 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	E	tCYC6		240	—	
Enable L pulse width (WRITE)		tEHLW		80	—	
Enable H pulse width (WRITE)		tEHWL		80	—	
Enable L pulse width (READ)		tEHLR		80	—	
Enable H pulse width (READ)	tEHWL		140	—		
Write data setup time	D[7:0]	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	



(VDD1 = 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	E	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		D[7:0]	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	

(VDD1 = 1.8V , 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	E	tCYC6		640	—	
Enable L pulse width (WRITE)		tEWLW		360	—	
Enable H pulse width (WRITE)		tEWHW		280	—	
Enable L pulse width (READ)		tEWLR		360	—	
Enable H pulse width (READ)		tEWHR		280	—	
Write data setup time		D[7:0]	tDS6		80	
Write data hold time	tDH6			20	—	
Read data access time	tACC6		CL = 16 pF	—	240	
Read data output disable time	tOH6		CL = 16 pF	10	200	

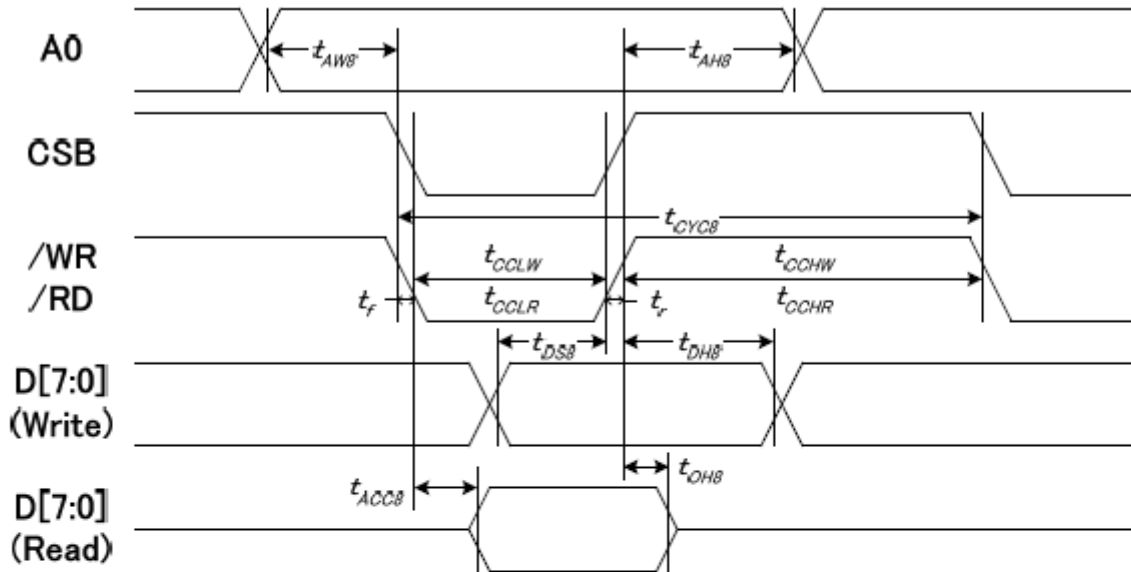
\*1 The input signal rise time and fall time (tr, tf) is specified at 15 ns or less. When the system cycle time is extremely fast,  $(tr + tf) \leq (tCYC6 - tEWLW - tEWHW)$  for  $(tr + tf) \leq (tCYC6 - tEWLR - tEWHR)$  are specified.

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

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



14-2 System Bus Timing for 8080 Series MPU



(VDD1 = 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	—	
/WR L pulse width (WRITE)		tCCLW		80	—	
/WR H pulse width (WRITE)		tCCHW		80	—	
/RD L pulse width (READ)		RD	tCCLR		140	
/RD H pulse width (READ)	tCCHR			80	—	
WRITE Data setup time	D[7:0]	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	

(VDD1 = 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	



(VDD1 = 1.8V, 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		640	—	
/WR L pulse width (WRITE)		tCCLW		360	—	
/WR H pulse width (WRITE)		tCCHW		280	—	
/RD L pulse width (READ)	RD	tCCLR		360	—	
/RD H pulse width (READ)		tCCHR		280	—	
WRITE Data setup time	D[7:0]	tDS8		80	—	
WRITE Data hold time		tDH8		20	—	
READ access time		tACC8	CL = 16 pF	—	240	
READ Output disable time		tOH8	CL = 16 pF	10	200	

\*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.

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

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





### 3. Inspection Specification

AQL inspection standard

Sampling method: GB/T2828.1-2012, Level II, single sampling

Defect classification :

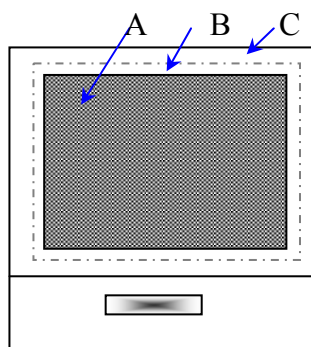
Classify	Item	Note	AQL
Major	Short or open circuit	1	0.65
	LC Leakage		
	Display flickering		
	No display		
	Wrong viewing direction		
	Wrong Back-light color		
Minor	Contrast defect(dim,ghost)	2	1.0
	Background color deviation	2	
	black & white spot, dust	3	
	Black,white line defect	4	
	Rainbow	5	
	Chip	6	
	Pin hole	7	
	Cross talk	Refer to sample	

Definition:

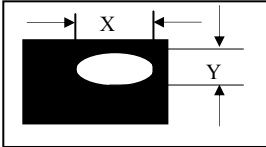
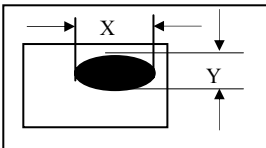
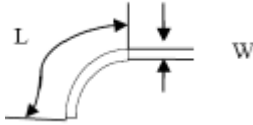
Zone A: Active Area

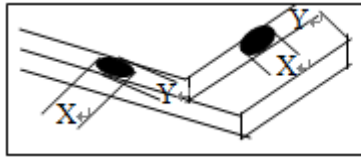
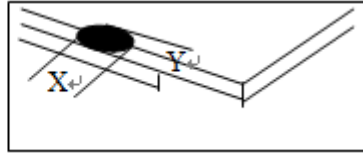
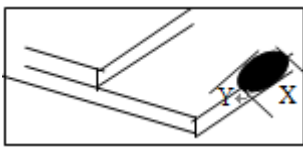
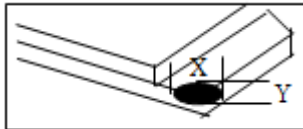
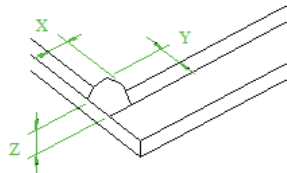
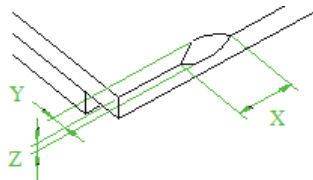
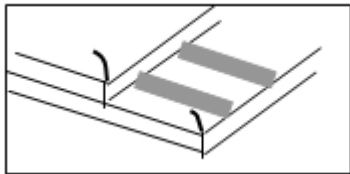
Zone B: Visible Area

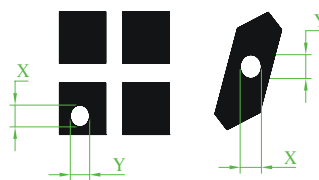
Zone C: outside of Visible Area





No.	Item	Criterion																										
1	Short or open circuit	Not allowed																										
	LC leakage																											
	Flickering																											
	No display																											
	Wrong viewing direction																											
	Wrong Back-light color																											
2	Contrast defect	Refer to approval sample																										
	Background color deviation																											
3	black & white spot, dust(including polarizer). $\phi = (X + Y) / 2$	  <table border="1" data-bbox="954 891 1417 1182"> <thead> <tr> <th rowspan="2">Point size</th> <th colspan="3">Acceptable QTY</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td><math>\Phi \leq 0.1</math></td> <td colspan="2">Any</td> <td rowspan="3">Any</td> </tr> <tr> <td><math>0.1 &lt; \Phi \leq 0.15</math></td> <td>2</td> <td>3</td> </tr> <tr> <td><math>0.15 &lt; \Phi \leq 0.2</math></td> <td>0</td> <td>1</td> </tr> </tbody> </table> <p>Unit:mm</p>	Point size	Acceptable QTY			A	B	C	$\Phi \leq 0.1$	Any		Any	$0.1 < \Phi \leq 0.15$	2	3	$0.15 < \Phi \leq 0.2$	0	1									
Point size	Acceptable QTY																											
	A	B	C																									
$\Phi \leq 0.1$	Any		Any																									
$0.1 < \Phi \leq 0.15$	2	3																										
$0.15 < \Phi \leq 0.2$	0	1																										
4	Black,white line defect	 <table border="1" data-bbox="826 1294 1417 1585"> <thead> <tr> <th colspan="2">Size</th> <th colspan="3">Acceptable QTY</th> </tr> <tr> <th>L</th> <th>W</th> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>Any</td> <td><math>W \leq 0.01</math></td> <td>Any</td> <td>Any</td> <td rowspan="3">Any</td> </tr> <tr> <td rowspan="2"><math>L \leq 2</math></td> <td><math>0.01 &lt; W \leq 0.02</math></td> <td>2</td> <td>4</td> </tr> <tr> <td><math>0.02 &lt; W \leq 0.03</math></td> <td>1</td> <td>2</td> </tr> <tr> <td></td> <td><math>0.03 &lt; W</math></td> <td>0</td> <td>0</td> </tr> </tbody> </table> <p>Unit:mm Remark: While <math>W &gt; 0.03</math>, refer to point defect</p>	Size		Acceptable QTY			L	W	A	B	C	Any	$W \leq 0.01$	Any	Any	Any	$L \leq 2$	$0.01 < W \leq 0.02$	2	4	$0.02 < W \leq 0.03$	1	2		$0.03 < W$	0	0
Size		Acceptable QTY																										
L	W	A	B	C																								
Any	$W \leq 0.01$	Any	Any	Any																								
$L \leq 2$	$0.01 < W \leq 0.02$	2	4																									
	$0.02 < W \leq 0.03$	1	2																									
	$0.03 < W$	0	0																									
5	Rainbow	Not more than two colors change across the viewing area																										

<p>6</p> <p>Chip</p> <p>Remark:</p> <p>T: glass thickness</p> <p>X: Notch in X direction</p> <p>Y : Notch in Y direction</p> <p>Z : Notch in Z direction</p>	<p>A type and B type :General</p> <div style="display: flex; justify-content: space-around;">   </div> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Any</td> <td><math>\leq 2.0</math></td> <td><math>\leq 1/2t</math></td> </tr> <tr> <td>2</td> <td><math>\leq 1/8 X</math> direction glass length</td> <td>Can not reach the Visible area</td> <td><math>\leq t</math></td> </tr> </tbody> </table>		X	Y	Z	1	Any	$\leq 2.0$	$\leq 1/2t$	2	$\leq 1/8 X$ direction glass length	Can not reach the Visible area	$\leq t$
		X	Y	Z									
	1	Any	$\leq 2.0$	$\leq 1/2t$									
	2	$\leq 1/8 X$ direction glass length	Can not reach the Visible area	$\leq t$									
	<p>C Type :ITO terminal</p> <div style="display: flex; justify-content: space-between;">  <table border="1" style="width: 80%; border-collapse: collapse;"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>Any</td> <td><math>\leq 0.3</math></td> <td><math>\leq 1/2t</math></td> </tr> <tr> <td><math>\leq 1/8X</math> direction (or <math>X \leq 2</math>)</td> <td><math>\leq 1/5t</math></td> <td><math>\leq t</math></td> </tr> </tbody> </table> </div>	X	Y	Z	Any	$\leq 0.3$	$\leq 1/2t$	$\leq 1/8X$ direction (or $X \leq 2$ )	$\leq 1/5t$	$\leq t$			
	X	Y	Z										
	Any	$\leq 0.3$	$\leq 1/2t$										
$\leq 1/8X$ direction (or $X \leq 2$ )	$\leq 1/5t$	$\leq t$											
<p>D Type :Corner 1 ( on ledge)</p> <div style="display: flex; justify-content: space-between;">  <table border="1" style="width: 80%; border-collapse: collapse;"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td><math>\leq 2</math></td> <td><math>\leq 1.5</math> (Can not reach ITO terminal)</td> <td><math>\leq t</math></td> </tr> </tbody> </table> </div>	X	Y	Z	$\leq 2$	$\leq 1.5$ (Can not reach ITO terminal)	$\leq t$							
X	Y	Z											
$\leq 2$	$\leq 1.5$ (Can not reach ITO terminal)	$\leq t$											
<p>E Type:Corner 2 (beside seal)</p> <div style="display: flex; justify-content: space-between;">  <table border="1" style="width: 80%; border-collapse: collapse;"> <thead> <tr> <th>X</th> <th>Y</th> <th>Acceptable QTY</th> </tr> </thead> <tbody> <tr> <td><math>\leq 3.0</math></td> <td>Can not reach seal</td> <td>Any</td> </tr> </tbody> </table> </div>	X	Y	Acceptable QTY	$\leq 3.0$	Can not reach seal	Any							
X	Y	Acceptable QTY											
$\leq 3.0$	Can not reach seal	Any											
<p>F Type :Back of the ITO terminal</p> <div style="display: flex; justify-content: space-between;">  <table border="1" style="width: 80%; border-collapse: collapse;"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> <th>Acceptable QTY</th> </tr> </thead> <tbody> <tr> <td><math>\leq 3.0</math></td> <td><math>\leq 1.0</math></td> <td><math>Z \leq 1/2t</math></td> <td>Any</td> </tr> </tbody> </table> </div>	X	Y	Z	Acceptable QTY	$\leq 3.0$	$\leq 1.0$	$Z \leq 1/2t$	Any					
X	Y	Z	Acceptable QTY										
$\leq 3.0$	$\leq 1.0$	$Z \leq 1/2t$	Any										
<p>G Tyep:Crack</p> <div style="display: flex; justify-content: space-between;">  <p style="text-align: right;">Can not accept any crack at anywhere</p> </div>													

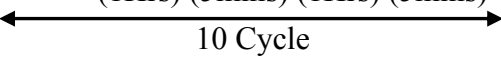
No.	Item	Criterion								
7	Pin hole	 <p> <math>D=(X+Y)/2</math>            X:pin hole length            Y:pin hole width            d:pattern(segments,dot) width         </p> <table border="1" data-bbox="941 425 1420 672"> <thead> <tr> <th>D</th> <th>Acceptable QTY</th> </tr> </thead> <tbody> <tr> <td><math>D \leq 1/5d</math> and <math>D \leq 0.15</math></td> <td>Any</td> </tr> <tr> <td><math>D \leq 1/5d</math> and <math>0.15 &lt; D &lt; 0.2</math></td> <td>1</td> </tr> <tr> <td><math>D &gt; 1/5d</math> or <math>D \geq 0.2</math></td> <td>0</td> </tr> </tbody> </table>	D	Acceptable QTY	$D \leq 1/5d$ and $D \leq 0.15$	Any	$D \leq 1/5d$ and $0.15 < D < 0.2$	1	$D > 1/5d$ or $D \geq 0.2$	0
D	Acceptable QTY									
$D \leq 1/5d$ and $D \leq 0.15$	Any									
$D \leq 1/5d$ and $0.15 < D < 0.2$	1									
$D > 1/5d$ or $D \geq 0.2$	0									
8	Total number of acceptable defect	<p>A area(active area)            Maximum 2 minor non-conformities per one unit.            Defect distance: should be over 10 mm between each point</p> <p>B area(Visible area)            It is acceptable when it is no trouble for quality and assembly in customer's end product</p>								

## 4. RELIABILITY TEST

### 4.1 Reliability Test Condition

NO.	TEST ITEM	TEST CONDITION
1	High Temperature Storage Test	Keep in $80 \pm 2^\circ\text{C}$ 96 hrs Surrounding temperature, then storage at normal condition 4hrs
2	Low Temperature Storage Test	Keep in $-40 \pm 2^\circ\text{C}$ 96 hrs Surrounding temperature, then storage at normal condition 4hrs
3	High Temperature Operation	Endurance test of electrical stress (Voltage & Current) and the thermal stress to the elemen Keep in $70^\circ\text{C} \pm 2^\circ\text{C}$ 96 hrs
4	Low Temperature Operation	Endurance test of electrical stress (Voltage & Current) and the thermal stress to the element. Keep in $-20 \pm 2^\circ\text{C}$ 96 hrs
5	High Humidity Storage	Keep in $+40^\circ\text{C}/90\%\text{RH}$ duration for 96 hrs Surrounding temperature, then storage at normal condition 4hrs(excluding the polarizer)



6	Thermal shock	<p style="text-align: center;">-40℃→25℃ → 80℃ → 25℃          (1Hrs) (5mins) (1Hrs) (5mins)            Surrounding temperature, then storage at normal condition 4hrs</p>
7	Vibration Test (Packaged)	<p>1. Sine wave 10~50HZ frequency (1 min)          2. The amplitude of vibration :1.5 mm          3. Each direction (XYZ) duration for 2 Hrs</p>

## 5. PRECAUTION RELATING PRODUCT HANDLING

The following precautions should be followed, since this module contains precise parts.

(1) Do not store module for an extended periods of time under the conditions of high temperature and high humidity.

(2) Avoid using or storing the module in areas that expose it to direct sunlight or ultraviolet rays.

(3) Use protective finger covers when handling the module to avoid scratching or staining the module.

(4) Care should be taken not to expose the module to static electricity, because the module contains C-MOS LSI's.

(5) The LSI is sensitive to light.

The user's product should be designed so that LSI is not exposed to any light during operation.

(6) During installation, cover the display area with acrylic protection plates to protect the polarizer plate and LCD cells.

(7) Do not apply any excessive shocks to the module because the module contains sensitive LCD cells.

Do not use a module, which has experienced strong mechanical shock.

(8) Care should be taken when the power supply turns on as following.

(a) Do not apply any input signals before the supplying voltage is applied.

(b) Do not turn off the power supply while any input signals are applied.

### Caution

(1) Dangerous. Do not shock glass because glass can break.

(2) If module breaks, do not touch it directly.

(Glass could stick or cut skin.)

(3) Do not swallow Liquid Crystal.

(In case of broken LCD panel, do not swallow liquid crystal even if there is no proof that



liquid crystal is poisonous.)

- (4) If liquid crystal is exposed to skin, wash the area thoroughly with alcohol or soap.
- (5) When disposing of the product, please observe industrial waste disposal laws in each country and district.
- (6) In case of injury, give immediate treatment and consult with a doctor.
- (7) This product is constructed precisely. Don't disassemble or modify.

※ Neglecting this mark can cause injury to humans and damage to materials

## 6.0 PACKING SPECIFICATION

TBD