



OKAYA Electric America, Inc.

### SPECIFICATIONS

SAMPLE CODE \_\_\_\_\_

MASS PRODUCTION CODE \_\_\_\_\_

RE9664WRF-004-I02

DRAWING NO. \_\_\_\_\_

Contact Sales@okaya.com

**Customer Approved**

**Date:**

Sales Sign	QC Confirmed	Checked By	Designer

Approval For Specifications Only.

\* This specification is subject to change without notice.

Approval For Specifications and Sample.



Phone: 219-477-4488  
Fax: 219-477-4856  
www.okaya.com



OKAYA ELECTRIC AMERICA  
52 Marks Road, Suite 1  
Valparaiso, Indiana 46383



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## 1. SPECIFICATIONS

### 1.1 Features

Item	Standard Value
Display Type	96*64 Dots
LCD Type	FSTN, Positive, Transflective, Extended Temp.
Driver Condition	LCD Module : 1/68Duty , 1/9Bias
Viewing Direction	6 O'clock
Backlight	White LED B/L
Weight	TBD
Interface	4-Line interface
Other(controller / driver IC)	ST7579
ROHS	THIS PRODUCT CONFORMS THE ROHS OF

### 1.2 Mechanical Specifications

Item	Standard Value	Unit
Outline Dimension	33.35(W)*41.64(L)*3.0(H)MAX	mm
Viewing Area	29.3 (W)* 29.9 (L)	mm
Active Area	27.34(W)*26.86(L)	mm
Dot Size	0.265(L)*0.400(W)	mm
Dot Pitch	0.285(L)*0.420(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	VDD	-	-0.3	3.6	V
LCD Driver Supply Voltage	V <sub>LCD</sub>	-	-0.5	15.0	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> < 60 °C	-	90	%RH

## 1.4 DC Electrical Characteristics

Ta = 25°C

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Logic Supply Voltage	V <sub>DD</sub>	-	2.4	3.3	3.4	V
“H” Input Voltage	V <sub>IH</sub>	-	0.7V <sub>DD</sub>	-	V <sub>DD</sub>	V
“L” Input Voltage	V <sub>IL</sub>	-	V <sub>SS</sub>	-	0.3V <sub>DD</sub>	V
“H” Output Voltage	V <sub>OH</sub>	-	0.8V <sub>DD</sub>	-	V <sub>DD</sub>	V
“L” Output Voltage	V <sub>OL</sub>	-	V <sub>SS</sub>	-	0.2V <sub>DD</sub>	V
Supply Current	I <sub>DD</sub>	V <sub>DD</sub> =3.0V; V <sub>OP</sub> =TBDV; Pattern= Horizontal line*1	-	TBD	TBD	mA
LCM Driver Voltage	V <sub>OP</sub> *2	-20°C	TBD	TBD	TBD	V
		25°C	TBD	TBD	TBD	
		70°C	TBD	TBD	TBD	

NOTE: \*1 The Maximum current display

\*2 The VOP test point is V0-XV0.

## 1.5 Optical Characteristics

LCD Panel: 1/68Duty, 1/9Bias, V<sub>LCD</sub>=8.4V, T<sub>a</sub> =25°C

Item		Symbol	Conditions	Min.	Typ.	Max.	Unit	Reference
Response Time	Rise	tr		-	120	180	ms	Note2
	Fall	tf		-	220	330		
Viewing angle range	Top	∅Y+	C <sub>≥</sub> 2.0, ∅ = 270°	-	40	-	Deg.	Notes 1
	Bottom	∅Y-		-	40	-		
	Left	∅X-		-	35	-		
	Right	∅X+		-	35	-		
Contrast Ratio		C	θ = 0°, ∅ = 270°	-	3.65	-	-	Note 3
Average Brightness (with LCD) *2		IV	IF=40mA	TBD	TBD	-	cd/m <sup>2</sup>	Note 4
CIE Color Coordinate (With LCD) *2	X	TBD		TBD	TBD	-		
	Y	TBD		TBD	TBD	-		
Uniformity *1		△B		70	-	-	%	

Note4:

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

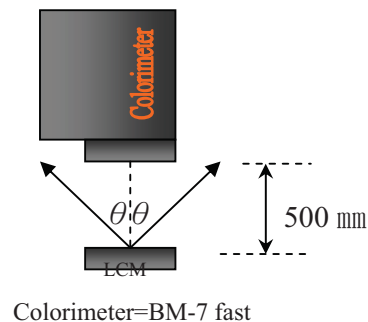
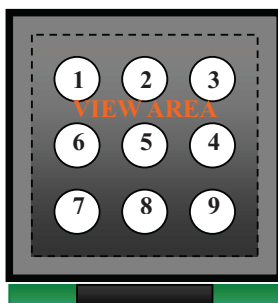
\*2 : Measurement Condition for Optical Characteristics:

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 , (θ = 0°)

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

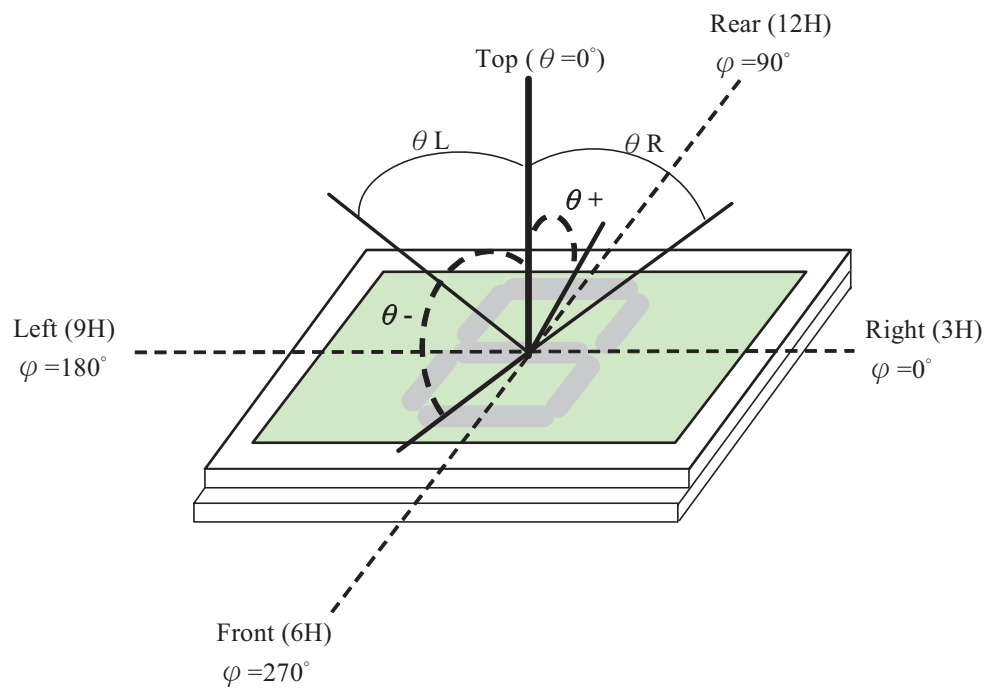
d : The uncertainty of the C.I.E coordinate measurement ± 0.01 , Average Brightness ± 4%



Note 1.

Optical characteristics-2

Viewing angle

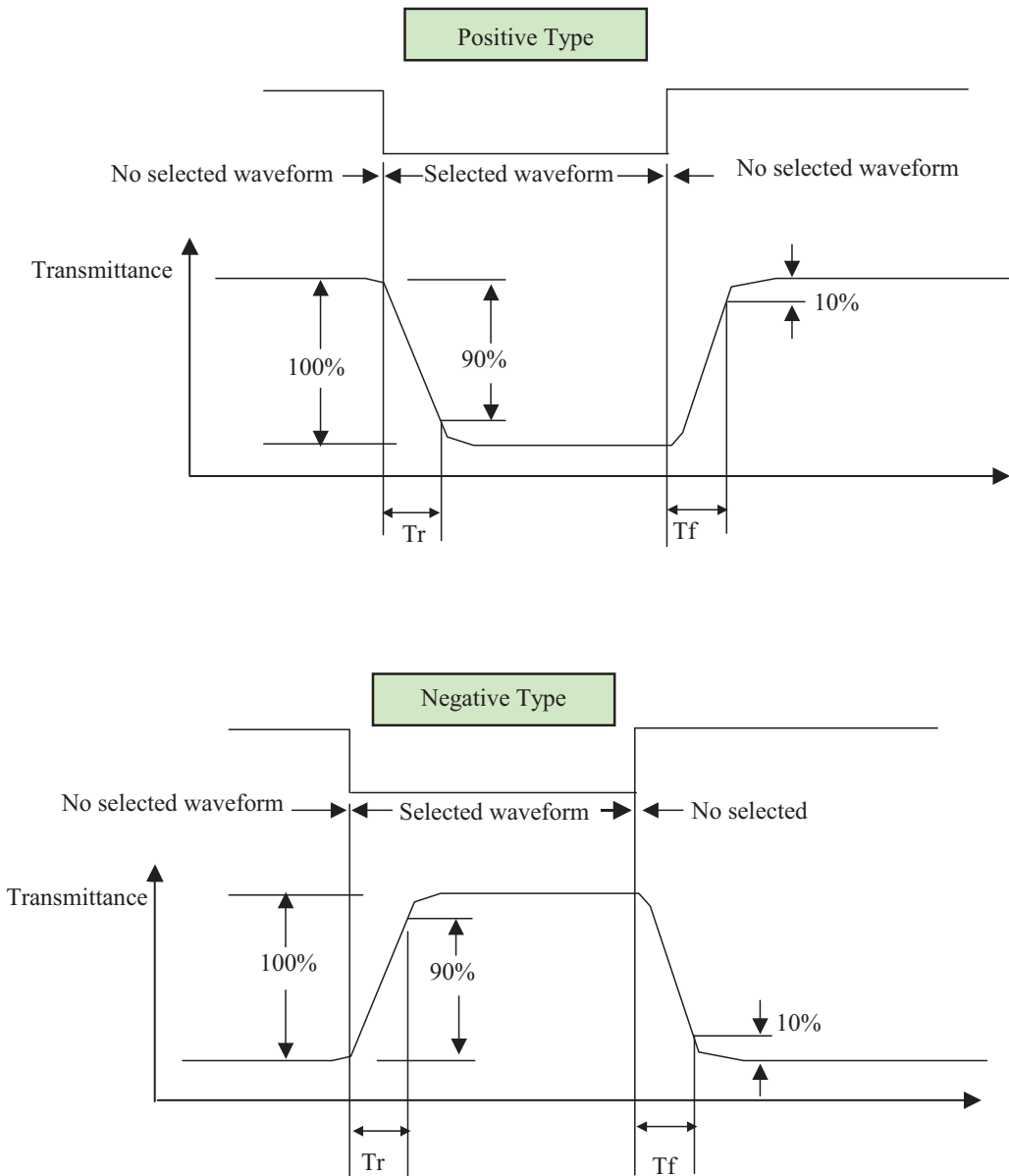


**Viewing angle**

Note 2.

Optical characteristics-3

Fig.2 Definition of response time



Electrical characteristics-2

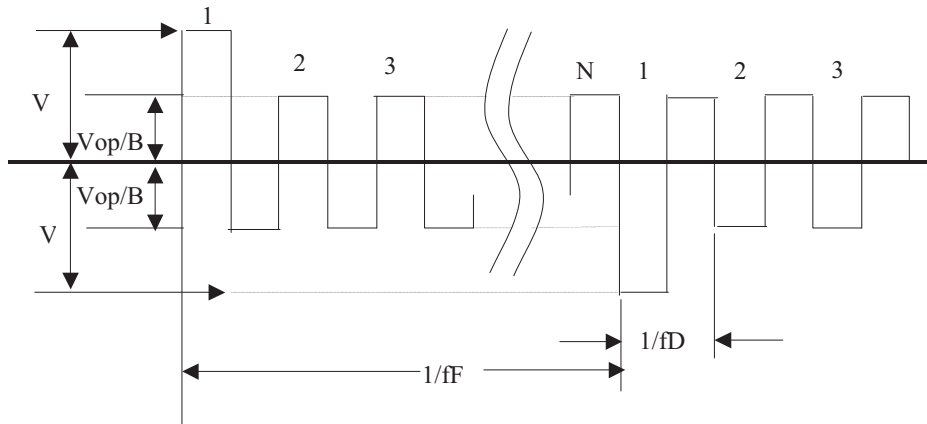
※2 Drive waveform

$V_{op}$ : Drive voltage       $f_F$ : Frame frequency

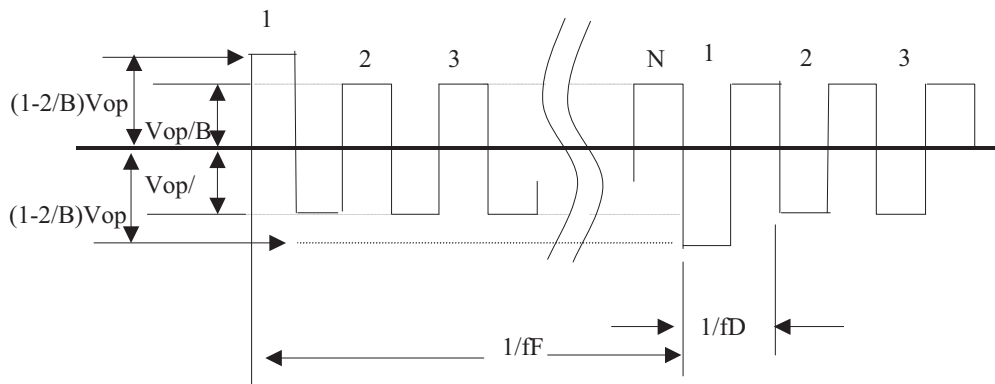
$1/B$ : Bias                       $f_D$ : Drive frequency

$N$ : Duty

(1) Selected waveform



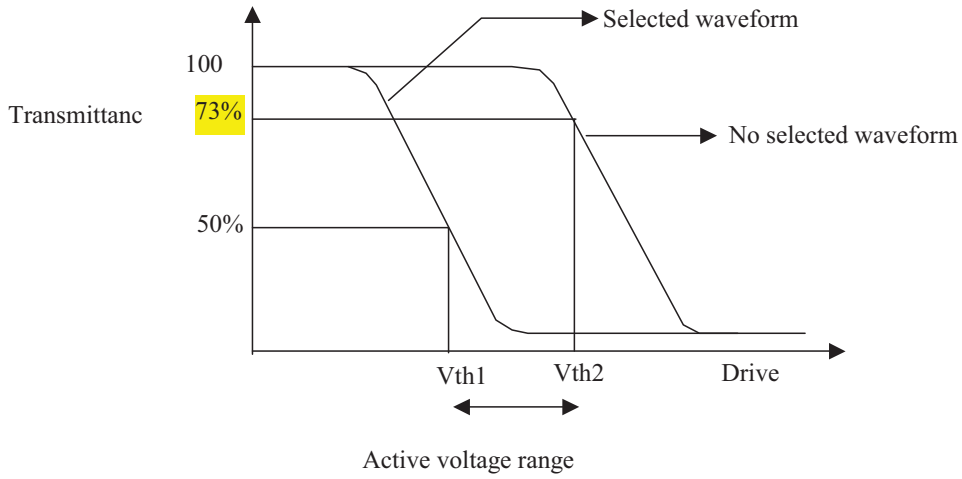
(2) Non- Selected wave form



Note:

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

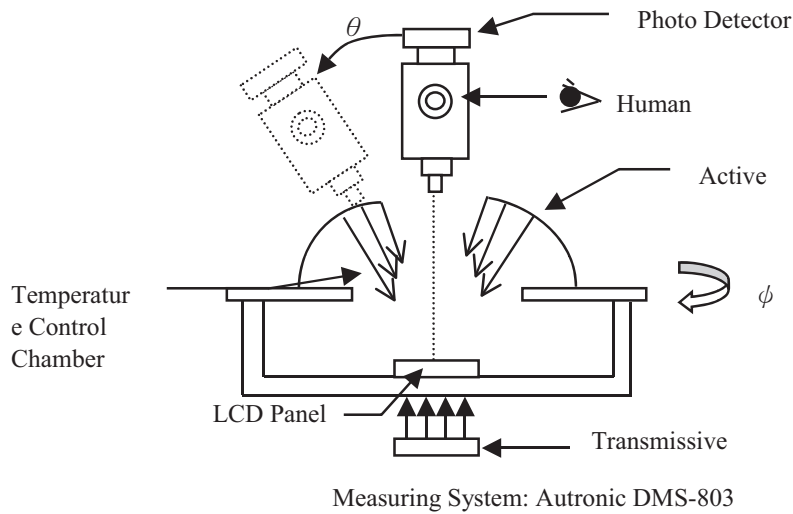
Note 3. : Definition of Vth



	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



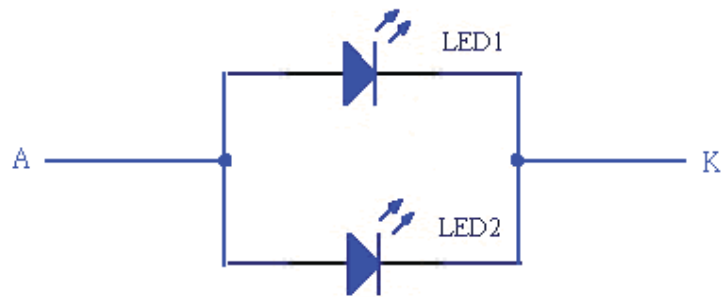
## 1.6 Backlight Characteristics

### Maximum Ratings

Item	Symbol	Conditions	Min.	Max.	Unit
Forward Current	IF	Ta =25°C	-	40	mA
Power Dissipation	PD	Ta =25°C	-	200	mW

### Electrical / Optical Characteristics

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Forward Voltage	VF	IF= 40mA	-	-	4.0	V
Average Brightness (without LCD)	IV		700	800	-	cd/m <sup>2</sup>
Color of CIE Coordinate (Without LCD)	X		0.26	0.31	0.34	-
	Y		0.26	0.31	0.34	
Color	White					



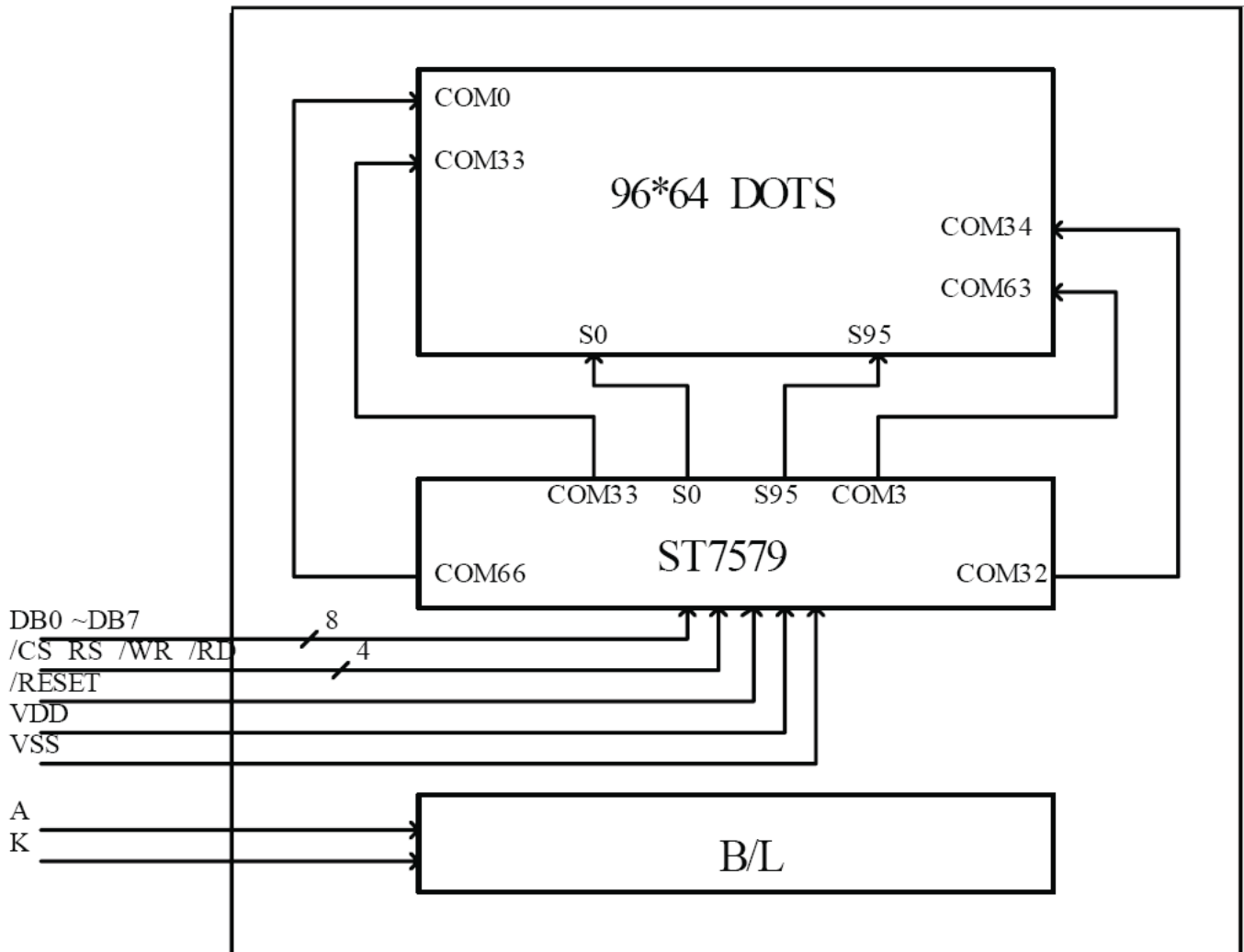
## 2. MODULE STRUCTURE

### 2.1 Counter Drawing

#### 2.1.1 LCM Mechanical Diagram

\* See Appendix

#### 2.1.2 Block Diagram



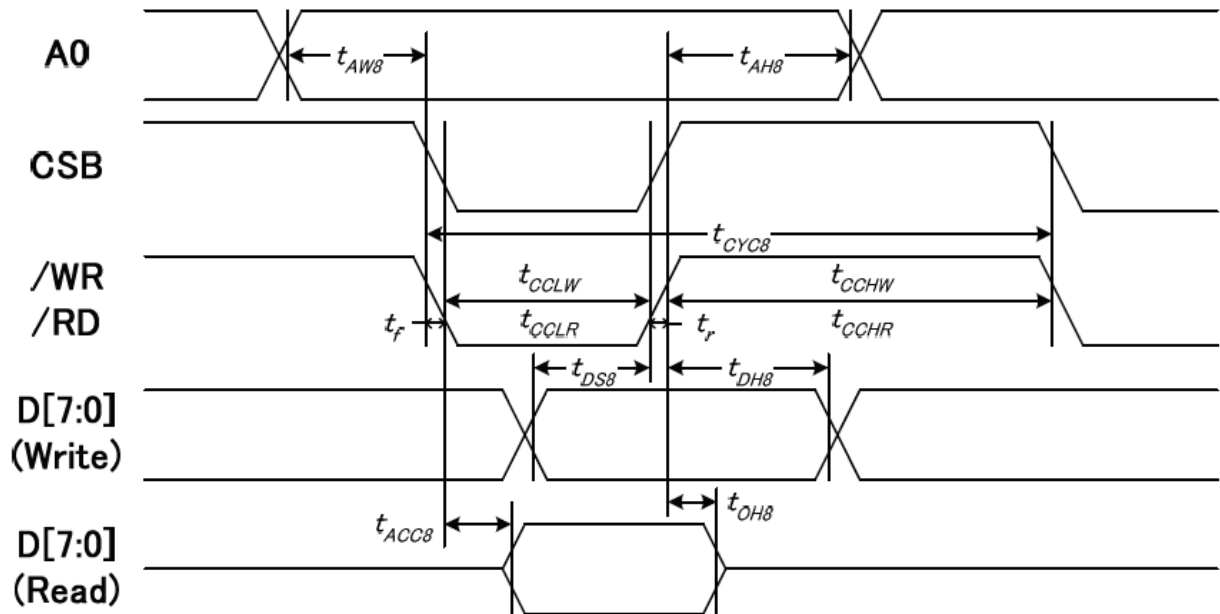
## 2.2 Interface Pin Description

Pin No.	Symbol	Function									
1	A	LED B/L Power supply(Anode).									
2	K	LED B/L Power supply(Cathode).									
3	VSS	System Ground.(0V)									
4	PS2	<table border="1"> <thead> <tr> <th>PS2</th> <th>PS1</th> <th>Selected Interface</th> </tr> </thead> <tbody> <tr> <td>"L"</td> <td>"L"</td> <td>4 Pin-SPI MPU interface</td> </tr> <tr> <td>"H"</td> <td>"L"</td> <td>3 Pin-SPI MPU interface</td> </tr> </tbody> </table>	PS2	PS1	Selected Interface	"L"	"L"	4 Pin-SPI MPU interface	"H"	"L"	3 Pin-SPI MPU interface
PS2	PS1	Selected Interface									
"L"	"L"	4 Pin-SPI MPU interface									
"H"	"L"	3 Pin-SPI MPU interface									
5	PS1	<table border="1"> <tbody> <tr> <td>"L"</td> <td>"H"</td> <td>8080-series parallel MPU interface</td> </tr> <tr> <td>"H"</td> <td>"H"</td> <td>6800-series parallel MPU interface</td> </tr> </tbody> </table>	"L"	"H"	8080-series parallel MPU interface	"H"	"H"	6800-series parallel MPU interface			
"L"	"H"	8080-series parallel MPU interface									
"H"	"H"	6800-series parallel MPU interface									
6	/CS	Chip select signal .Active "L".									
7	/RESET	Reset input pin. When RESB is "L", internal initialization is executed.									
8	RS	It determines whether the access is related to data or command. RS ="H" : Indicates that D[7:0] are display data. RS ="L" : Indicates that D[7:0] are control data. RS is not used in 3-line SPI interface and should fix to "H" by VDD.									
9	/WR	1.Read/Write control input pin in 6800-series parallel MPU interface. /WR="H" : read. /WR="L" : write. 2.Write enable input pin in 8080-series parallel MPU interface. Signals on D[7:0] will be latched at the rising edge of /WR signal. Note : /WR is not used in serial interfaces and should fix to "H" by VDD.									
10	/RD	1. Read/Write control input pin in 6800-series parallel MPU interface. R/W="H": When E is "H", D[7:0] are in an output status. R/W="L": Signals on D[7:0] are latched at the falling edge of E signal. 2. Read enable input pin in 8080-series parallel MPU interface. When /RD is "L", D[7:0] are in output status. Note : /RD is not used in serial interfaces and should fix to "H" by VDD.									

Pin No.	Symbol	Function
11	D0/SCLK	<p>1. 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.</p> <p>When CSB is non-active (CSB="H"), D[7:0] pins are high impedance.</p> <p>2. When using serial interface: 4-LINE or 3-LINE D[7:4] : Not used and should fix to "H" by VDD. D[3:1] =SDA : Serial data input, must be connected together. D0=SCLK : Serial clock input.</p> <p>When CSB is non-active (CSB="H"), D[7:0] pins are high impedance.</p>
12	D1/SDA	
13	D2/SDA	
14	D3/SDA	
15	D4	
16	D5	
17	D6	
18	D7	
19	VSS	System Ground.(0V)
20	VDD	Power Supply.(3.3V)

## 2.3 Timing Characteristics

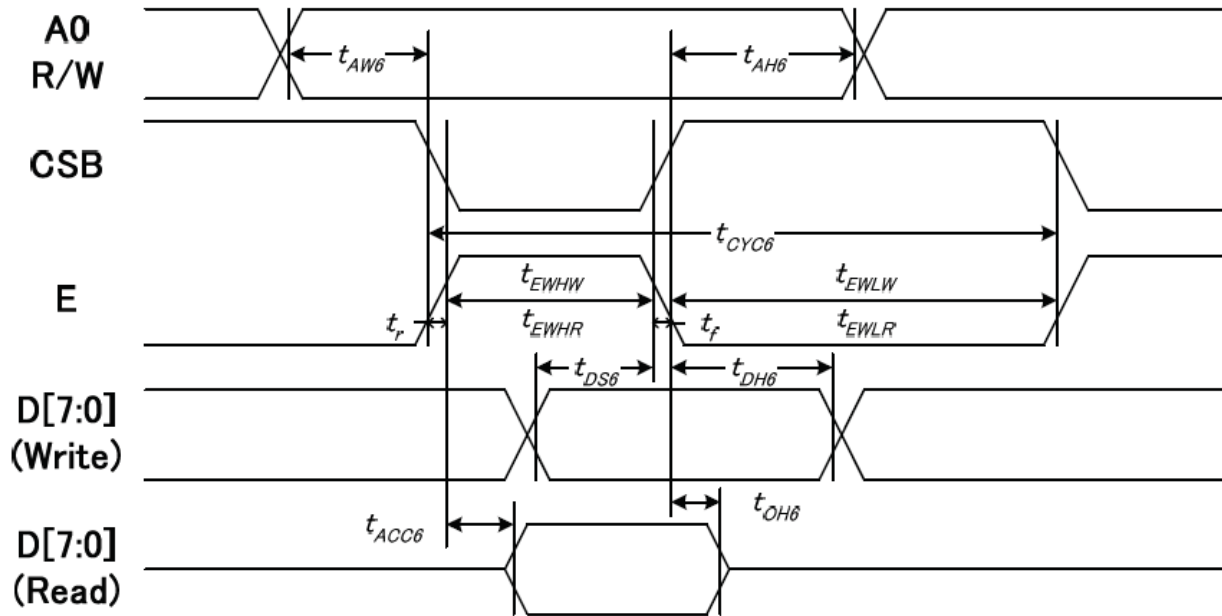
### System Bus Read/Write Characteristics 1 (For the 8080 Series MPU)



(VDD = 3.3V, Ta = -30~85°C)

Item	Signal	Symbol	Condition	Min.	Max.	Unit
Address setup time	A0	tAW8		80	—	ns
Address hold time		tAH8		10	—	
System cycle time	/WR	tCYC8		350	—	
Enable L pulse width (WRITE)		tCCLW		70	—	
Enable H pulse width (WRITE)		tCCHW		50	—	
Enable L pulse width (READ)		RD	tCCLR		120	
Enable H pulse width (READ)	tCCHR			50	—	
WRITE Data setup time	D[7:0]	tDS8		60	—	
WRITE Data hold time		tDH8		10	—	
READ access time		tACC8	CL = 16 pF	—	70	
READ Output disable time		tOH8	CL = 16 pF	10	50	

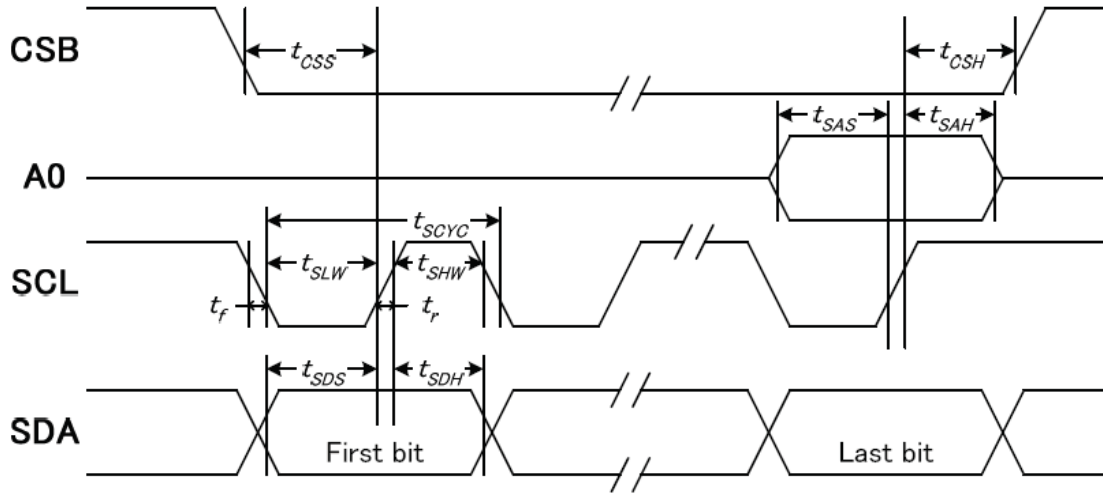
### System Bus Read/Write Characteristics 1 (For the 6800 Series MPU)



(VDD = 3.3V , Ta = -30~85°C)

Item	Signal	Symbol	Condition	Min.	Max.	Unit
Address setup time	A0	tAW6		80	—	ns
Address hold time		tAH6		10	—	
System cycle time	E	tCYC6		240	—	
Enable L pulse width (WRITE)		tEHLW		70	—	
Enable H pulse width (WRITE)		tEHWLW		50	—	
Enable L pulse width (READ)		tEHLR		70	—	
Enable H pulse width (READ)	tEHWLR		130	—		
Write data setup time	D[7:0]	tDS6		60	—	
Write data hold time		tDH6		10	—	
Read data access time		tACC6	CL = 16 pF	—	70	
Read data output disable time		tOH6	CL = 16 pF	10	50	

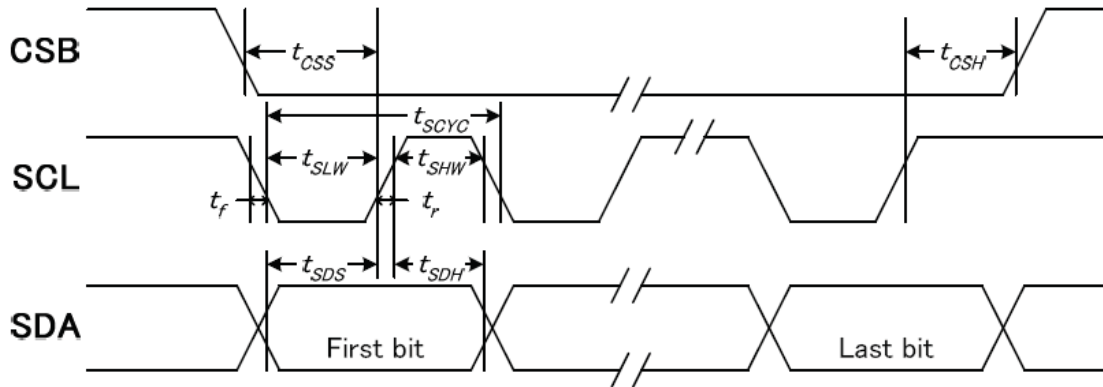
## SERIAL INTERFACE (4-Line Interface)



(VDD = 3.3V, Ta = -30~85°C)

Item	Signal	Symbol	Condition	Min.	Max.	Unit
Serial clock period	SCLK	tSCYC		120	—	ns
SCLK "H" pulse width		tSHW		60	—	
SCLK "L" pulse width		tSLW		60	—	
Address setup time	A0	tSAS		20	—	
Address hold time		tSAH		90	—	
Data setup time	SDA	tSDS		20	—	
Data hold time		tSDH		10	—	
CSB-SCLK time	CSB	tCSS		20	—	
CSB-SCLK time		tCSH		120	—	

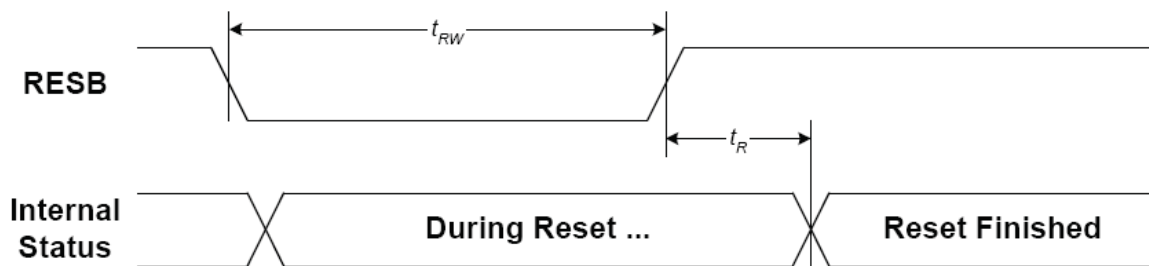
## SERIAL INTERFACE (3-Line Interface)



(VDD = 3.3V, Ta = -30~85°C)

Item	Signal	Symbol	Condition	Min.	Max.	Unit
Serial clock period	SCLK	tSCYC		120	—	ns
SCLK "H" pulse width		tSHW		60	—	
SCLK "L" pulse width		tSLW		60	—	
Data setup time	SDA	tSDS		20	—	
Data hold time		tSDH		10	—	
CSB-SCLK time	CSB	tCSS		20	—	
CSB-SCLK time		tCSH		130	—	

## RESET TIMING



(VDD = 3.3V, Ta = -30~85°C)

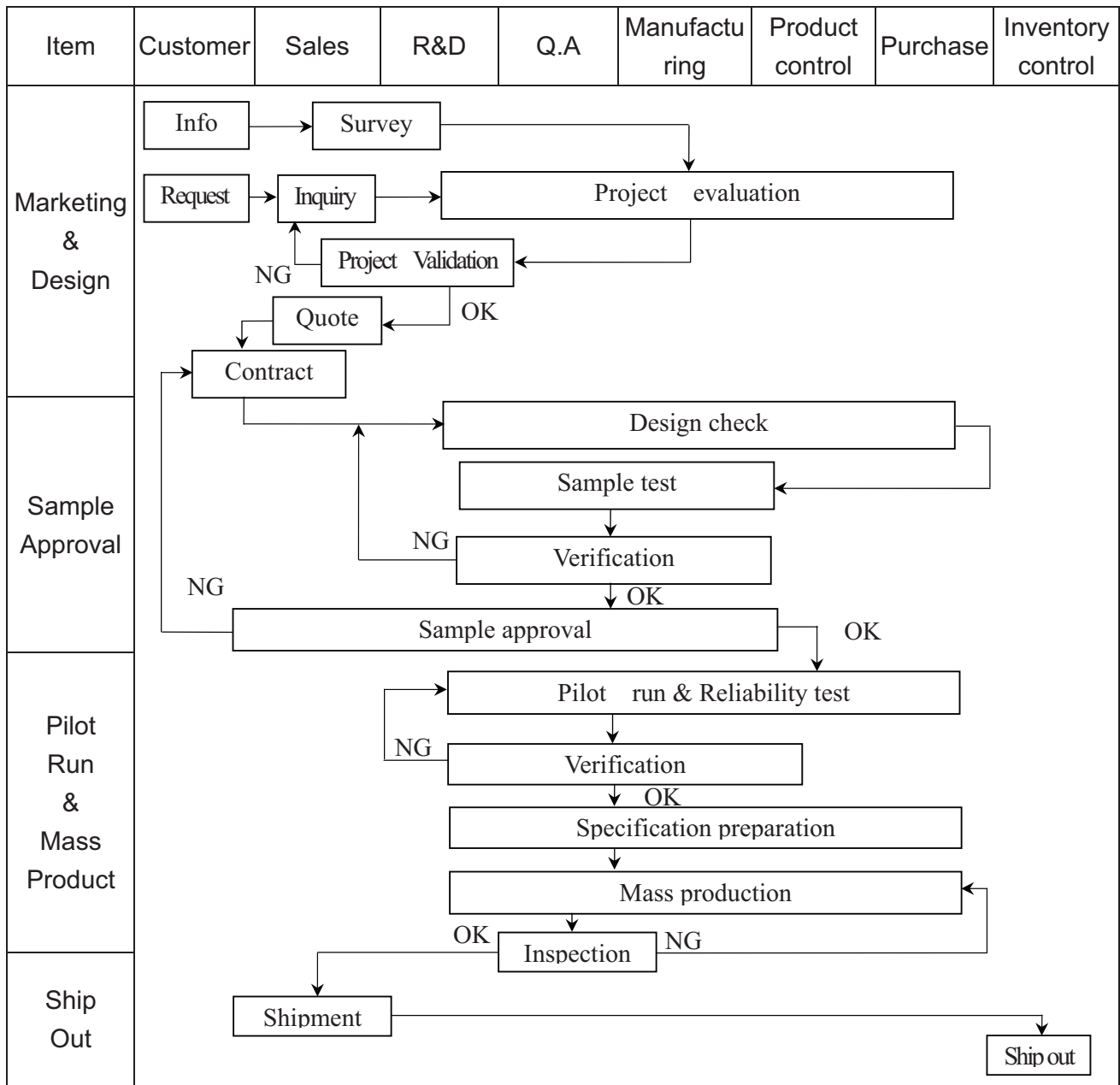
Item	Symbol	Condition	Min.	Max.	Unit
Reset time	tR		—	1.5	us
Reset "L" pulse width	tRW		1.5	—	

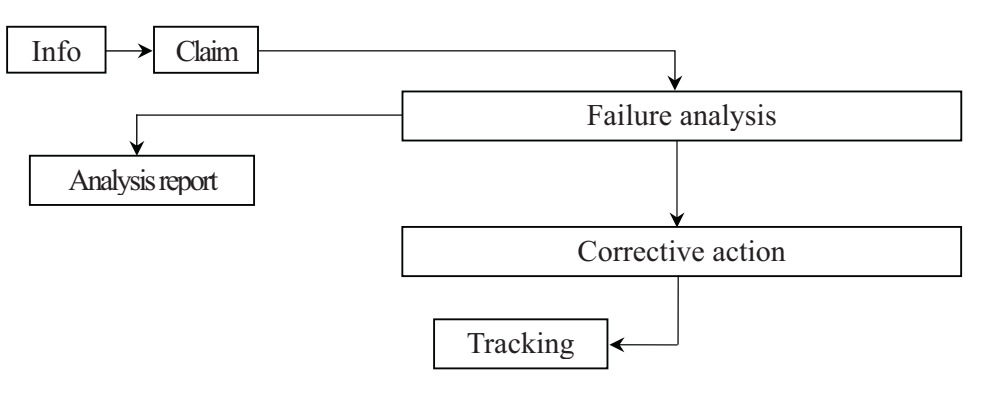
## 2.4 Display Command

INSTRUCTION	A0	R/W (RWR)	COMMAND BYTE								DESCRIPTION	
			D7	D6	D5	D4	D3	D2	D1	D0		
<b>H[1:0] Independent Instruction</b>												
NOP	0	0	0	0	0	0	0	0	0	0	0	No operation
Reserved	0	0	0	0	0	0	0	0	0	0	1	Do not use
Function Set	0	0	0	0	1	MX	MY	PD	H1	H0		Power down; entry mode; Select instruction table
Read Status	0	1	PD	0	0	D	E	MX	MY	DO		Read status byte
Read Data	1	1	D7	D6	D5	D4	D3	D2	D1	D0		Read data to RAM
Write Data	1	0	D7	D6	D5	D4	D3	D2	D1	D0		Write data to RAM
<b>H[1:0] = (0,0)</b>												
Reserved	0	0	0	0	0	0	0	0	1	X		Do not use
Set V0 Range	0	0	0	0	0	0	0	1	0	PRS		V0 range L/H select
END	0	0	0	0	0	0	0	1	1	0		Release read/modify/write
Read-modify-Write	0	0	0	0	0	0	0	1	1	1		RAM address at R:+0 , W:+1
Display Control	0	0	0	0	0	0	1	D	0	E		Sets display configuration
Reserved	0	0	0	0	0	1	0	0	X	X		Do not use
Set Y Address of RAM	0	0	0	1	0	0	Y3	Y2	Y1	Y0		Sets Y address of RAM 0≤Y≤9
Set X Address of RAM	0	0	1	X6	X5	X4	X3	X2	X1	X0		Sets X address of RAM 0≤X≤101
<b>H[1:0] = (0,1)</b>												
Reserved	0	0	0	0	0	0	0	0	1	X		Do not use
Display Configuration	0	0	0	0	0	0	1	DO	X	X		Top/bottom row mode set data order
Bias System	0	0	0	0	0	1	0	BS2	BS1	BS0		Set bias system (BSx)
Set Start Line (high)	0	0	0	0	0	0	0	1	0	S6		Specify the initial display line S6
Set Start Line (low)	0	0	0	1	S5	S4	S3	S2	S1	S0		Specify the initial display line to realize vertical scrolling
Set V0	0	0	1	V <sub>OP6</sub>	V <sub>OP5</sub>	V <sub>OP4</sub>	V <sub>OP3</sub>	V <sub>OP2</sub>	V <sub>OP1</sub>	V <sub>OP0</sub>		Set V <sub>OP</sub> parameter to register
<b>H[1:0] = (1,0)</b>												
Reserved	0	0	0	0	0	0	0	0	1	X		Do not use
Partial Screen Mode	0	0	0	0	0	0	0	1	0	PS		Partial screen enable
Partial Screen Size	0	0	0	0	0	0	1	0	0	WS		Set partial screen size
Display Part	0	0	0	0	0	1	0	DP2	DP1	DP0		Set display part for partial screen mode
<b>H[1:0] = (1,1)</b>												
Reserved	0	0	0	0	0	0	0	0	0	X		Do not use
RESET	0	0	0	0	0	0	0	0	1	1		Software reset
Frame Control	0	0	0	0	0	0	1	FR2	FR1	FR0		Frame rate control
N-Line Inversion	0	0	0	1	0	NL4	NL3	NL2	NL1	NL0		Sets N-Line inversion
Booster Efficiency & Booster Stage	0	0	1	0	0	1	BE1	BE0	PC1	PC0		Booster Efficiency Set
Reserved	0	0	1	X	X	X	X	X	X	X		Do not use

### 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]     Claim --&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 .

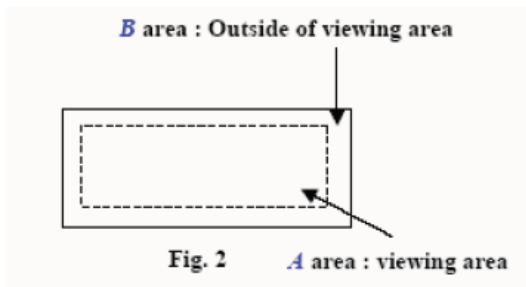
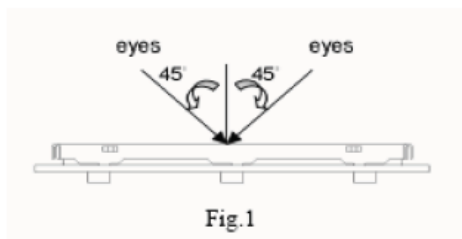
◆ **Manner of appearance test** :

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

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

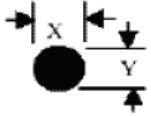
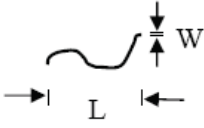
(3). The test direction is base on about around 45° of vertical line. (Fig. 1)

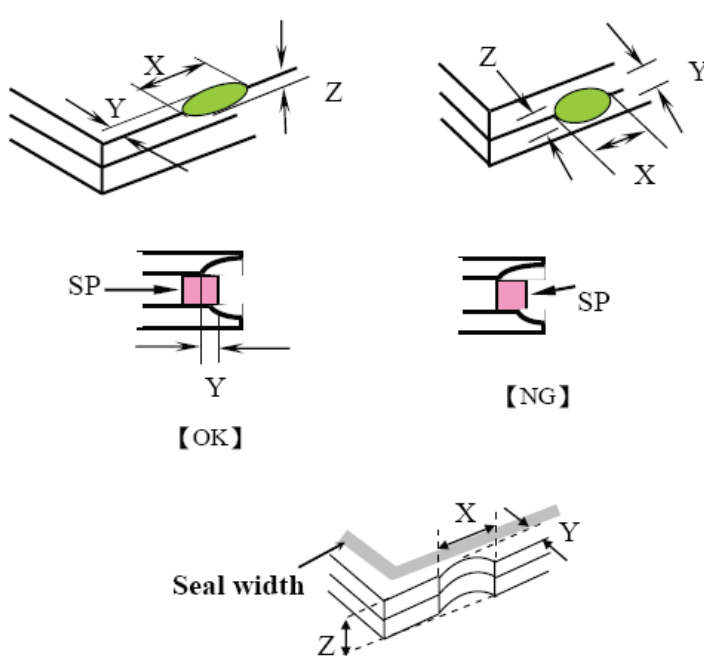
(4). Definition of area . (Fig. 2)

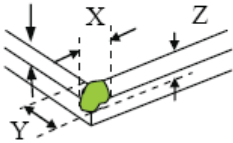
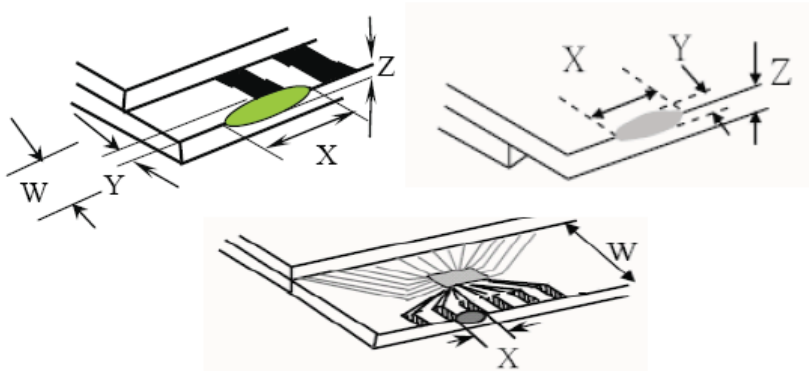


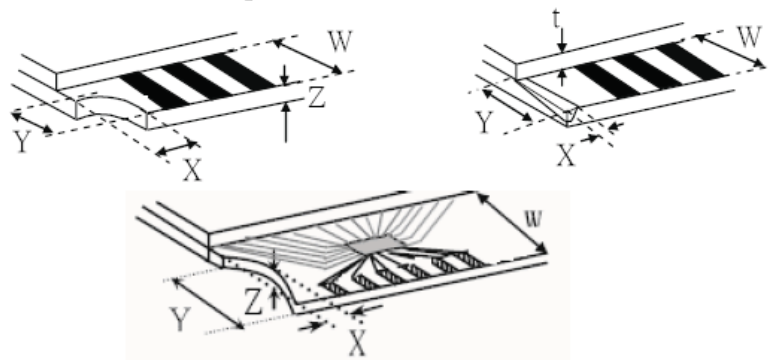
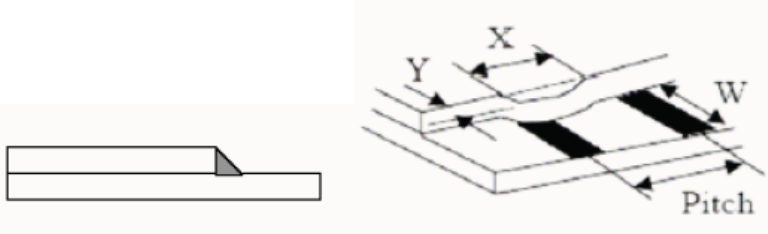
◆ **Specification:**

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>Black or white dot、scratch、contamination</p> <p>Round type</p>  <p><math>\Phi = (x+y)/2</math></p> <p>Line type</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" data-bbox="521 625 1305 945"> <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>Total quantity</td> <td colspan="2">4</td> </tr> </tbody> </table> <p>5. 1. 3 Line type:</p> <table border="1" data-bbox="477 1016 1352 1329"> <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="3">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> </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	Total quantity	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>Symbols :</p> <p><b>X</b> : The length of crack  <b>Z</b> : The thickness of crack  <b>t</b> : The thickness of glass</p> <p><b>Y</b> : The width of crack.  <b>W</b> : terminal length  <b>a</b> : LCD side length</p> <hr/> <p>7.1 General glass chip :</p> <p>7.1.1 Chip on panel surface and crack between panels:</p>  <table border="1" data-bbox="532 1402 1279 1675"> <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	$\leq 1/2 t$	$\leq a$	Crack can't exceed the half of SP width.	$1/2 t < Z \leq 2 t$	Minor
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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="503 1581 1235 1745"> <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		
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		<p>7.2.2 Non-conductive portion :</p>  <table border="1" data-bbox="609 976 1193 1123"> <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="535 1617 1177 1753"> <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
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◆ 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 $+80 \pm 2^{\circ}\text{C}$ 96 hrs Surrounding temperature, then storage at normal condition 4hrs.											
2	Low Temperature Storage Test	Keep in $-30 \pm 2^{\circ}\text{C}$ 96 hrs Surrounding temperature, then storage at normal condition 4hrs.											
3	High Temperature / High Humidity Storage Test	Keep in $+60^{\circ}\text{C}$ / 90% R.H 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 \\  & & & & & & & 10 \text{ Cycle}  \end{array}  $ Surrounding temperature, then storage at normal condition 4hrs.											
5	ESD Test	<b>Air Discharge:</b> Apply 2 KV with 5 times Discharge for each polarity +/-	<b>Contact Discharge:</b> Apply 250 V with 5 times discharge for each polarity +/-										
		1. Temperature ambience : $15^{\circ}\text{C} \sim 35^{\circ}\text{C}$ 2. Humidity relative : 30%~60% 3. Energy Storage Capacitance(Cs+Cd) : $150\text{pF} \pm 10\%$ 4. Discharge Resistance(Rd) : $330\Omega \pm 10\%$ 5. Discharge, mode of operation : Single Discharge (time between successive discharges at least 1 sec) (Tolerance if the output voltage indication : $\pm 5\%$ )											
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 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>		Packing Weight (Kg)	Drop Height (cm)	0 ~ 45.4	122	45.4 ~ 90.8	76	90.8 ~ 454	61	Over 454	46
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		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.
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