



OKAYA

OKAYA Electric America, Inc.

SPECIFICATIONS

SAMPLE CODE

SE9664WRF-004-I02Q

MASS PRODUCTION CODE

RE9664WRF-004-I02

DRAWING NO.

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.



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History of Version

Date (mm / dd / yyyy)	Ver.	Edi.	Description	Page	Design by
06/01/2010	01	001	New Drawing	-	Lori

Total: 29 Page

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Appendix: LCM Drawing

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 _{LCD}	-	-0.5	15.0	V
Operating Temperature	T _{OP}	-	-20	70	°C
Storage Temperature	T _{ST}	-	-30	80	°C
Storage Humidity	H _D	Ta < 60 °C	-	90	%RH

1.4 DC Electrical Characteristics

Ta = 25°C

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Logic Supply Voltage	VDD	-	2.4	3.3	3.4	V
“H” Input Voltage	V _{IH}	-	0.7V _{DD}	-	V _{DD}	V
“L” Input Voltage	V _{IL}	-	V _{SS}	-	0.3V _{DD}	V
“H” Output Voltage	V _{OH}	-	0.8V _{DD}	-	V _{DD}	V
“L” Output Voltage	V _{OL}	-	V _{SS}	-	0.2V _{DD}	V
Supply Current	I _{DD}	V _{DD} =3.0V; V _{OP} =TBDV; Pattern= Horizontal line*1	-	TBD	TBD	mA
LCM Driver Voltage	V _{OP} *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_{LCD}=8.4V, T_a =25℃

Item		Symbol	Conditions	Min.	Typ.	Max.	Unit	Reference
Response Time	Rise	tr	C≥2.0, ∅ = 270°	-	120	180	ms	Note2
	Fall	tf		-	220	330		
Viewing angle range	Top	∅Y+		-	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 ²	Note 4
CIE Color Coordinate (With LCD) *2		X		TBD	TBD	TBD	-	
		Y		TBD	TBD	TBD		
Uniformity *1		△B			70	-	-	

Note4:

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

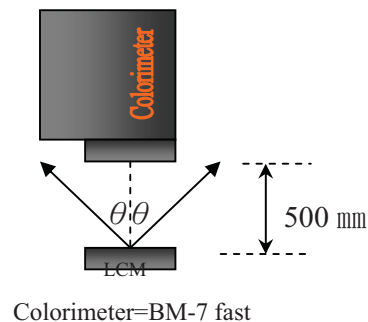
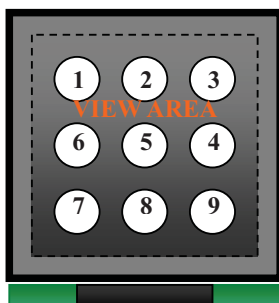
*2 : Measurement Condition for Optical Characteristics:

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

b : Measurement Distance: 500 ± 50 mm , (θ= 0°)

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

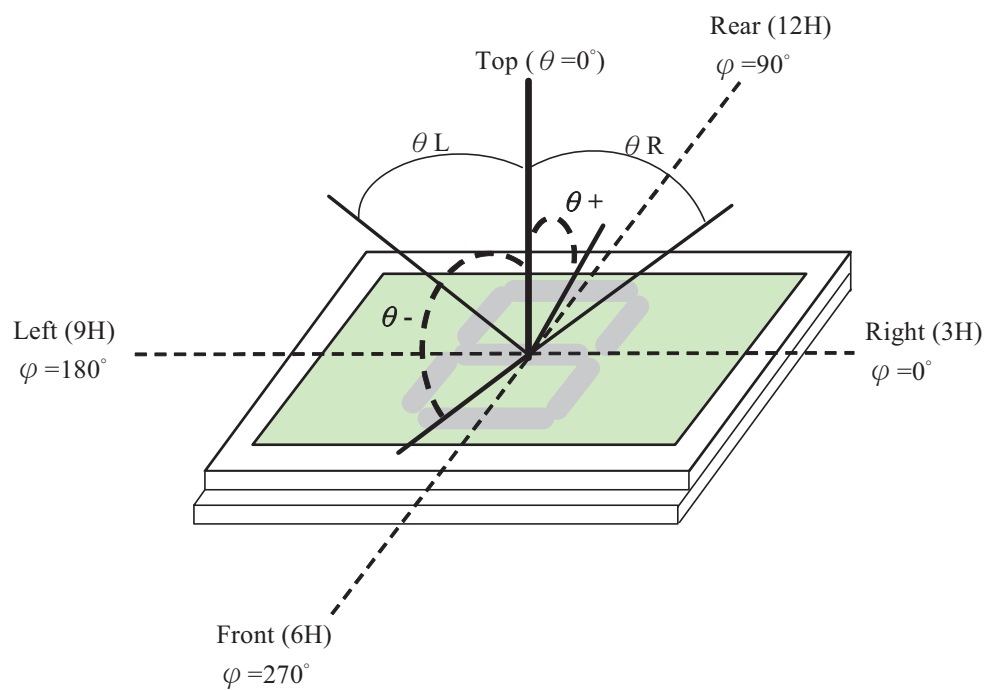
d : The uncertainty of the C.I.E coordinate measurement ±0.01 , Average Brightness ± 4%



Note 1.

Optical characteristics-2

Viewing angle

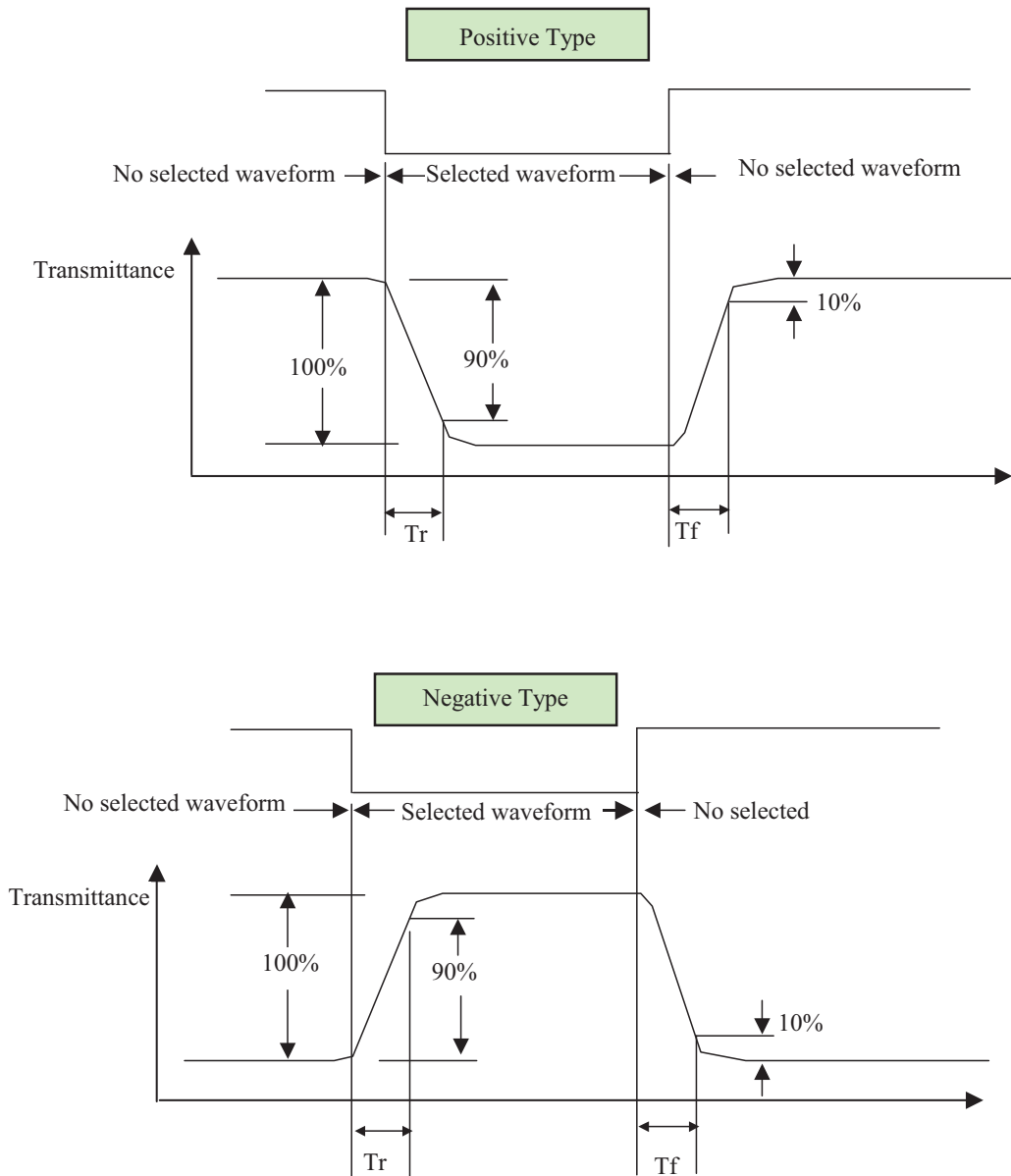


Viewing angle

Note 2.

Optical characteristics-3

Fig.2 Definition of response time



Electrical characteristics-2

※2 Drive waveform

V_{op} : Drive voltage

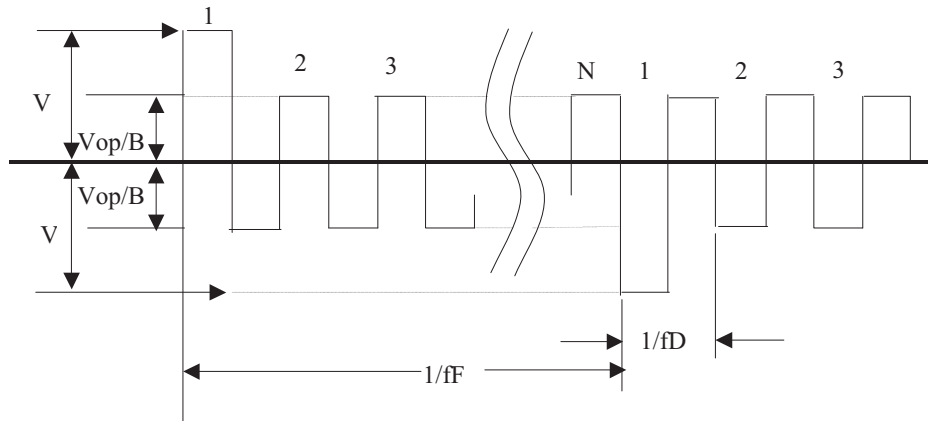
f_F : Frame frequency

$1/B$: Bias

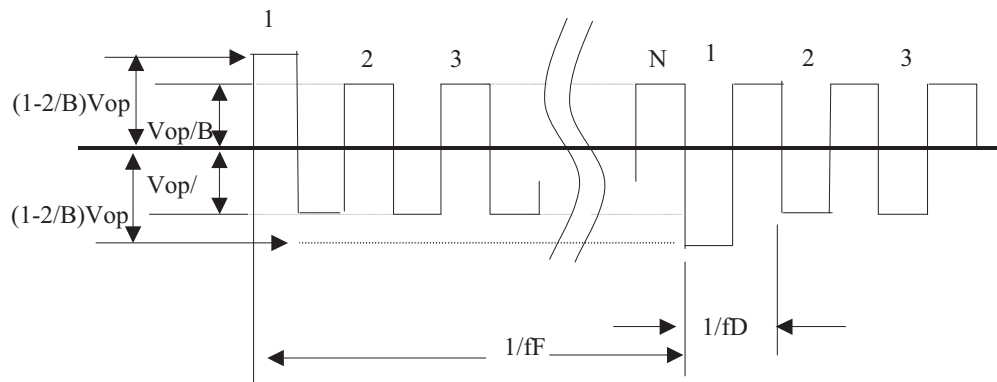
f_D : Drive frequency

N : Duty

(1) Selected waveform



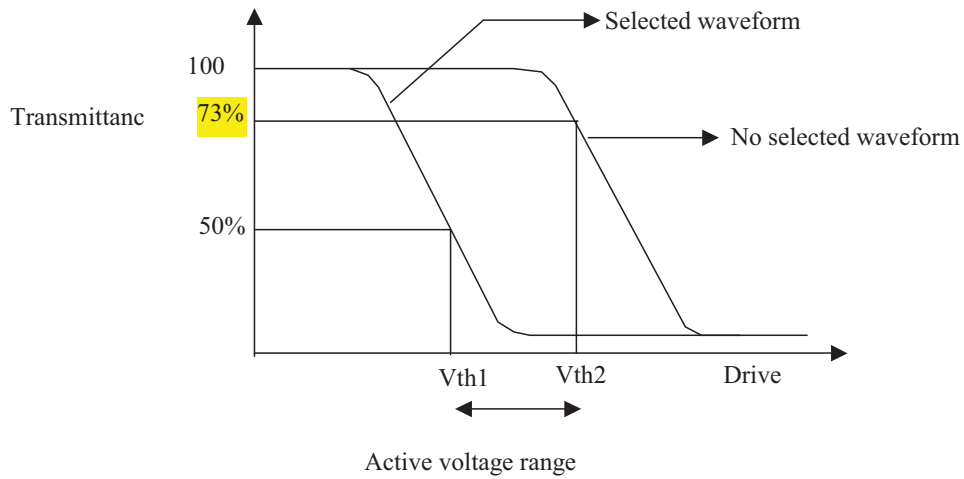
(2) Non- Selected wave form



Note:

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

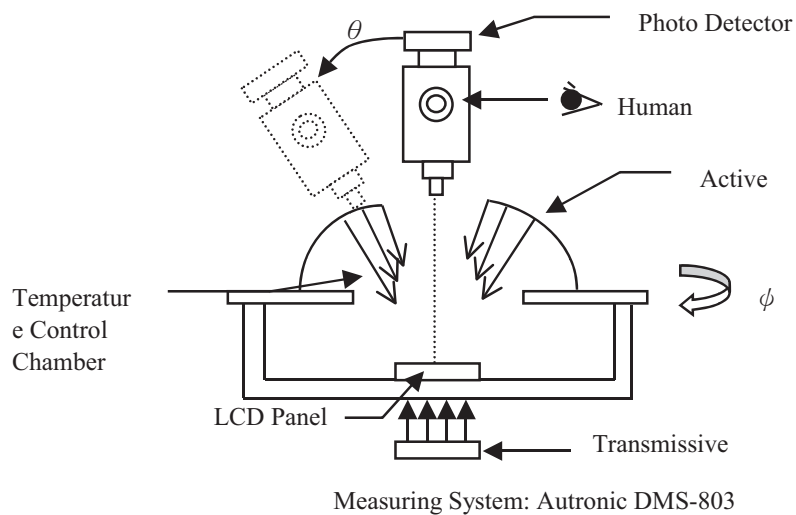
Note 3. : Definition of V_{th}



	V_{th1}	V_{th2}
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



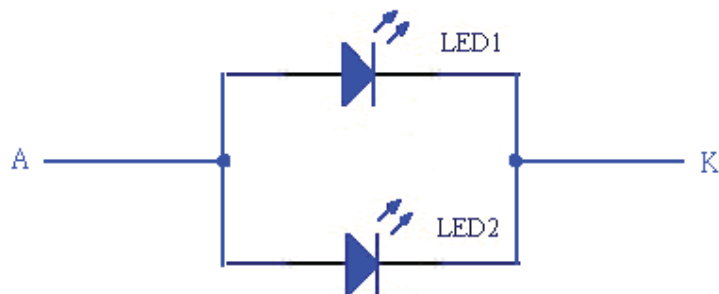
1.6 Backlight Characteristics

Maximum Ratings

Item	Symbol	Conditions	Min.	Max.	Unit
Forward Current	IF	Ta =25℃	-	40	mA
Power Dissipation	PD	Ta =25℃	-	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 ²
Color of CIE Coordinate (Without LCD)	X		0.26	0.31	0.34	-
	Y		0.26	0.31	0.34	
Color	White					



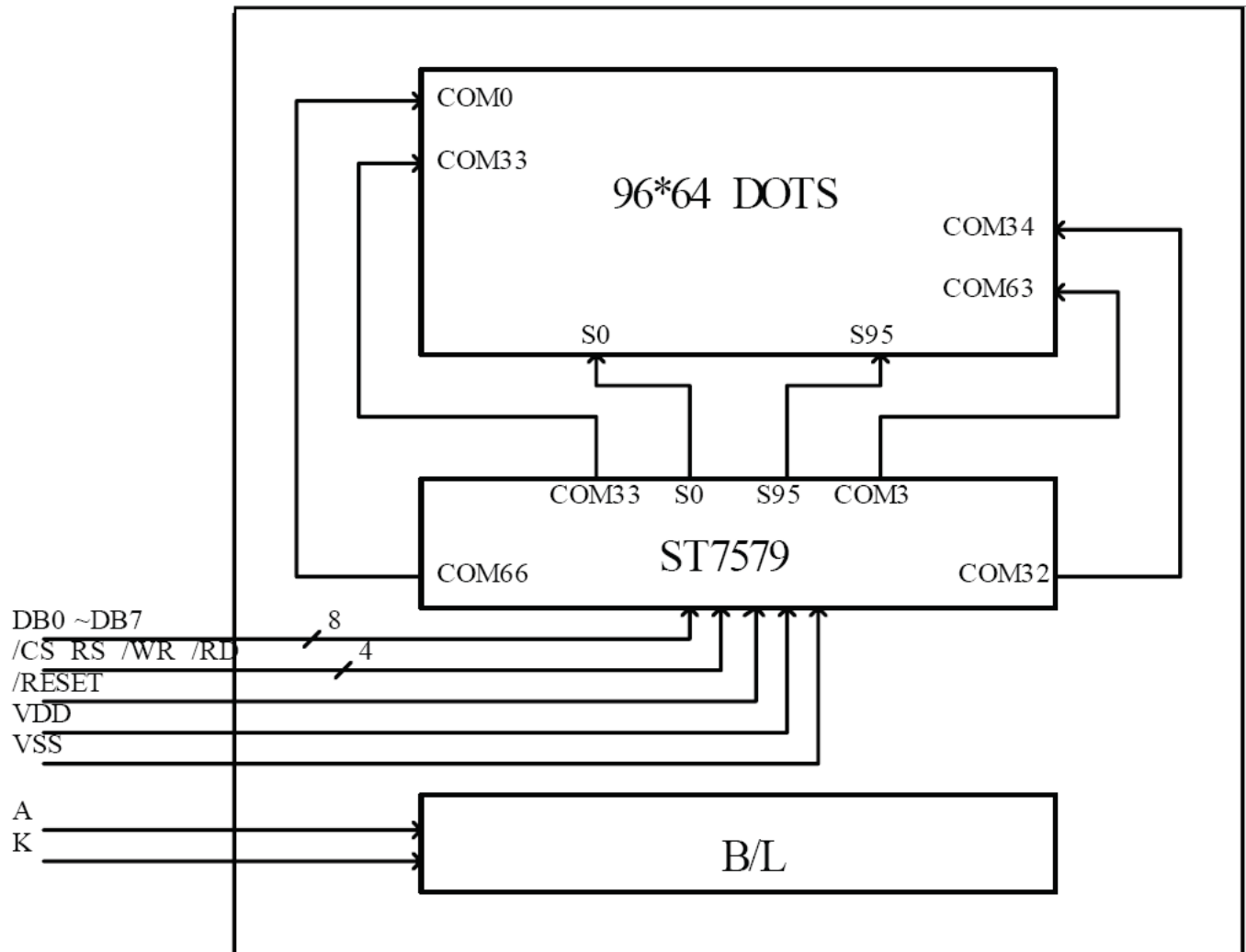
2. MODULE STRUCTURE

2.1 Counter Drawing

2.1.1 LCM Mechanical Diagram

* See Appendix

2.1.2 Block Diagram



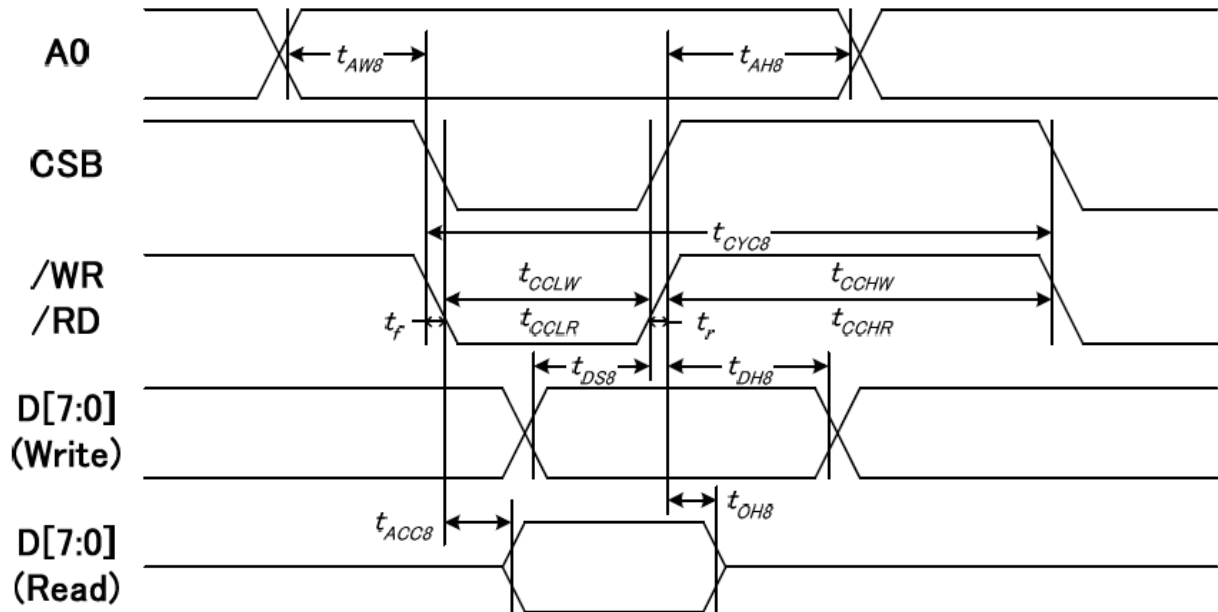
2.2 Interface Pin Description

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> <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>	PS2	PS1	Selected Interface	"L"	"L"	4 Pin-SPI MPU interface	"H"	"L"	3 Pin-SPI MPU interface	"L"	"H"	8080-series parallel MPU interface	"H"	"H"	6800-series parallel MPU interface
PS2	PS1	Selected Interface															
"L"	"L"	4 Pin-SPI MPU interface															
"H"	"L"	3 Pin-SPI MPU interface															
"L"	"H"	8080-series parallel MPU interface															
"H"	"H"	6800-series parallel MPU interface															
5	PS1																
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</p> <p>D[7:4] : Not used and should fix to "H" by VDD.</p> <p>D[3:1] =SDA : Serial data input, must be connected together.</p> <p>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

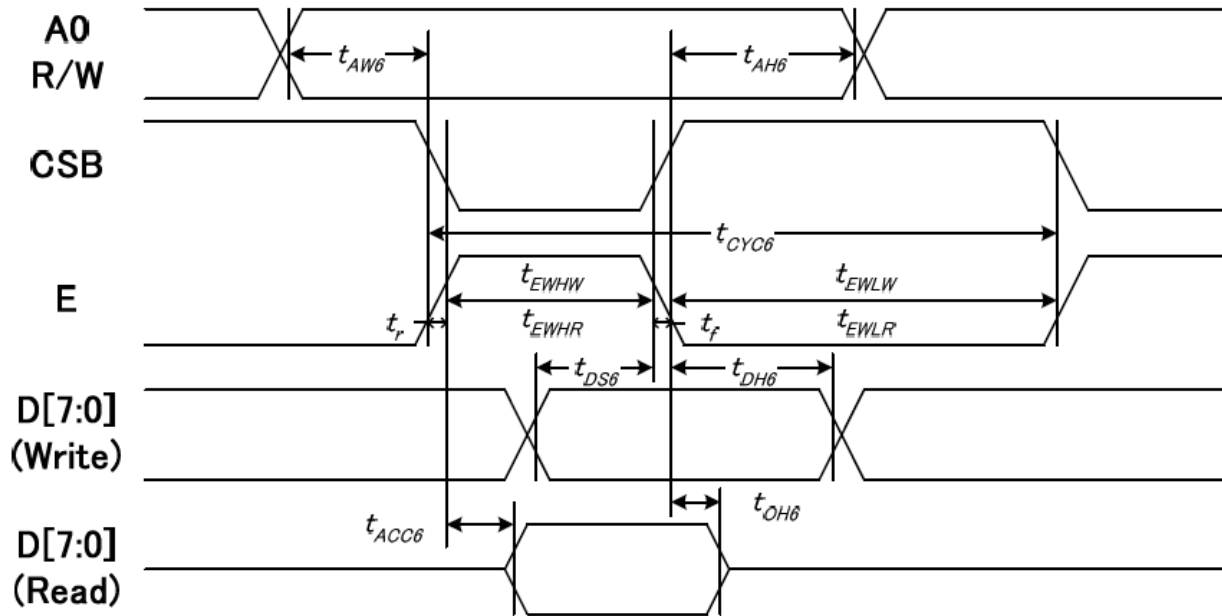
System Bus Read/Write Characteristics 1 (For the 8080 Series MPU)



(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	

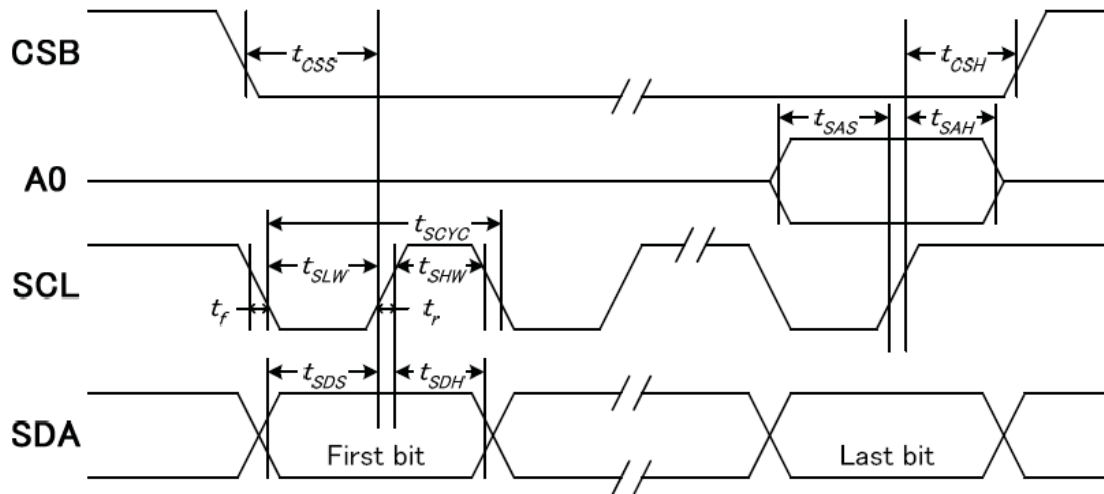
System Bus Read/Write Characteristics 1 (For the 6800 Series MPU)



(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	

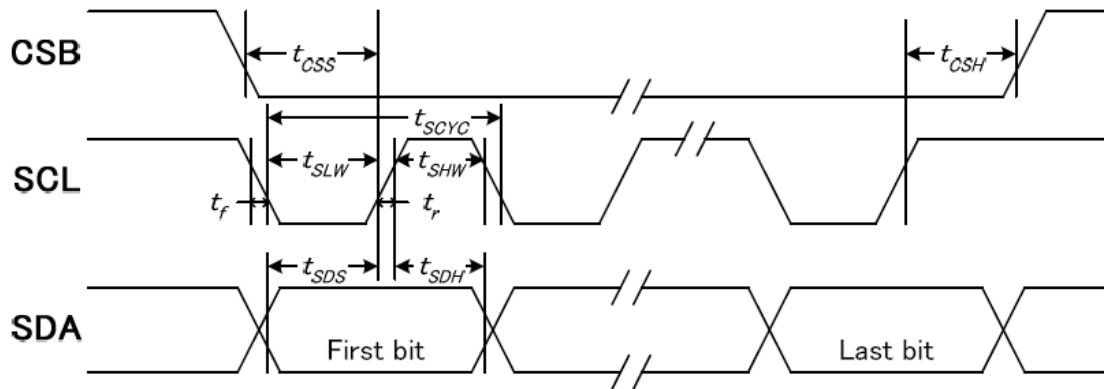
SERIAL INTERFACE (4-Line Interface)



(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	—	

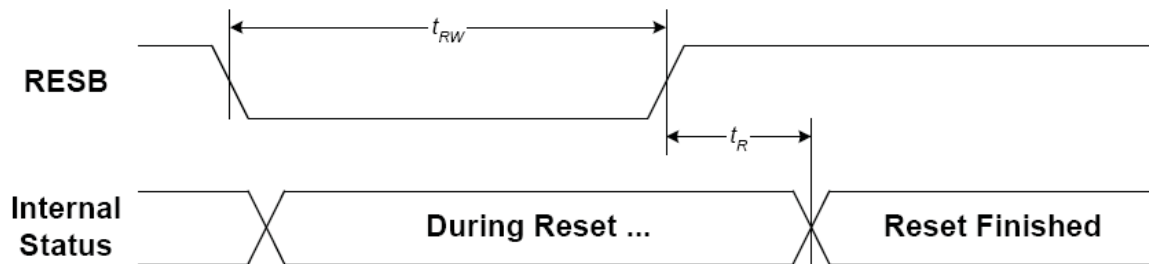
SERIAL INTERFACE (3-Line Interface)



(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



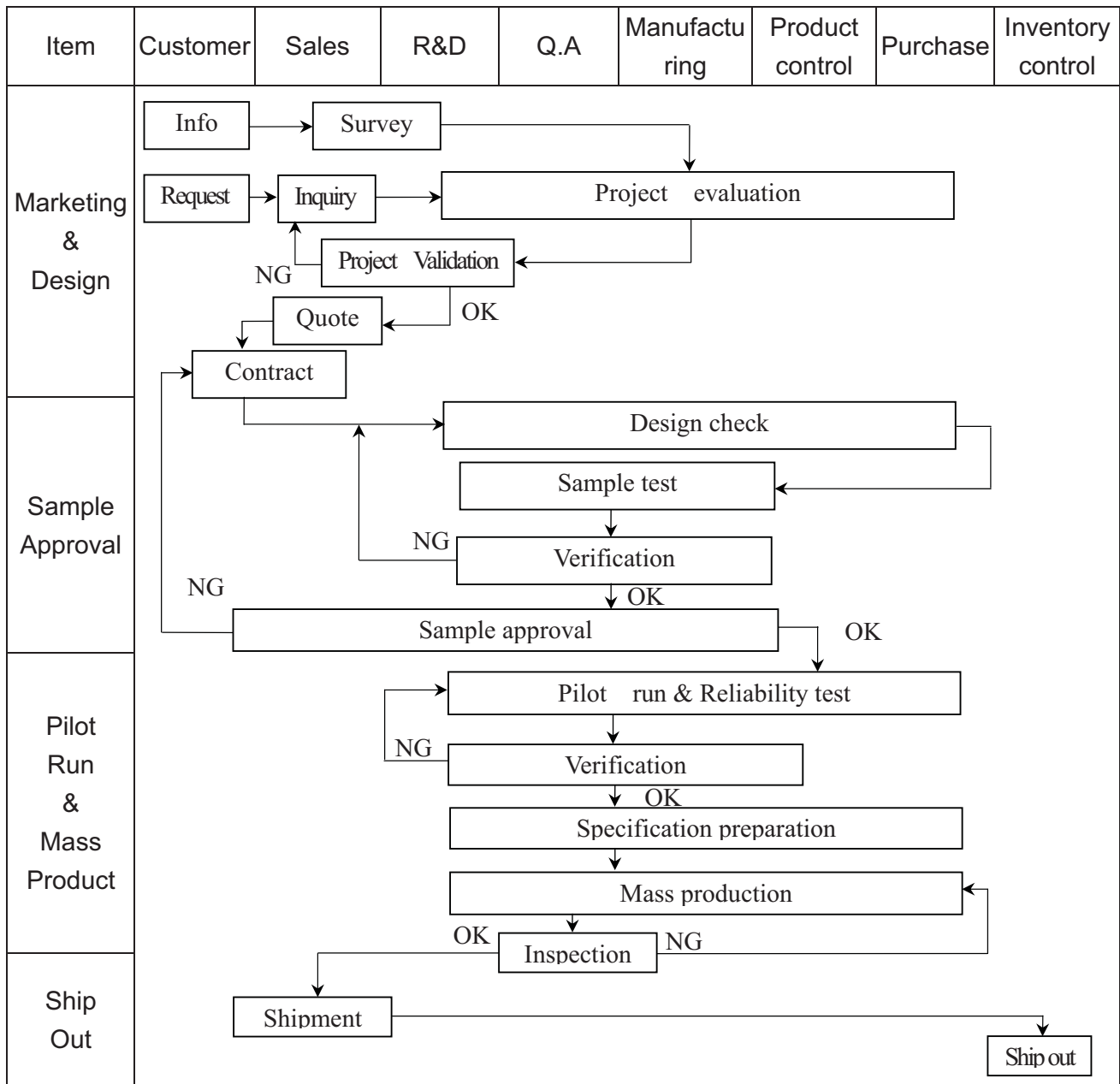
(VDD = 3.3V, Ta = -30~85°C)

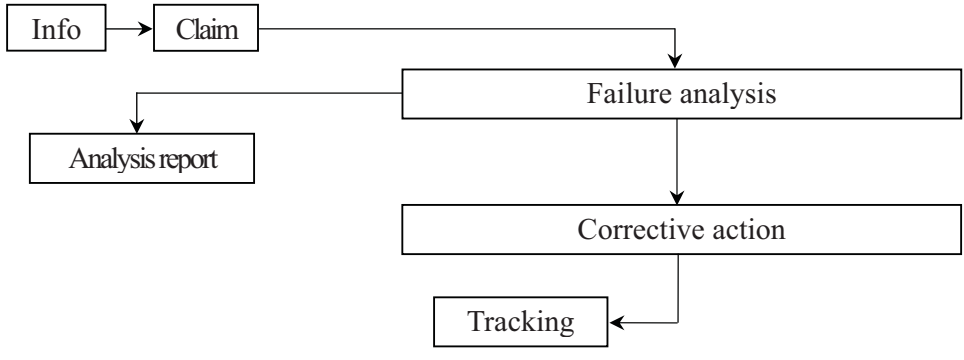
Item	Symbol	Condition	Min.	Max.	Unit
Reset time	tR		—	1.5	us
Reset "L" pulse width	tRW		1.5	—	

2.4 Display Command

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)

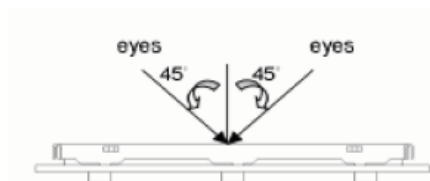


Fig.1

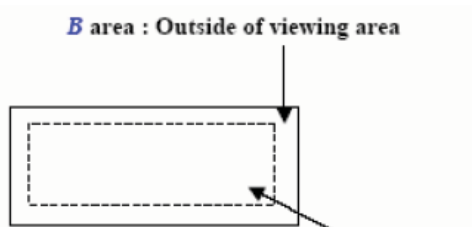


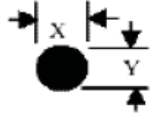
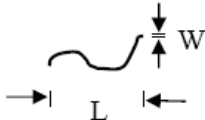
Fig. 2 A area : viewing area

◆ Specification:

NO	Item	Criterion	Level
01	Product condition	1. 1 The part number is inconsistent with work order of Production.	Major
		1. 2 Mixed production types.	Major
		1. 3 Assembled in inverse direction.	Major
02	Quantity	2. 1 The quantity is inconsistent with work order of production.	Major
03	Outline dimension	3. 1 Product dimension and structure must conform to Structure diagram.	Major
04	Electrical Testing	4. 1 Missing line character and icon.	Major
		4. 2 No function or no display.	Major
		4. 3 Output data is error.	Major
		4. 4 LCD viewing angle defect.	Major
		4. 5 Current consumption exceeds product specifications.	Major

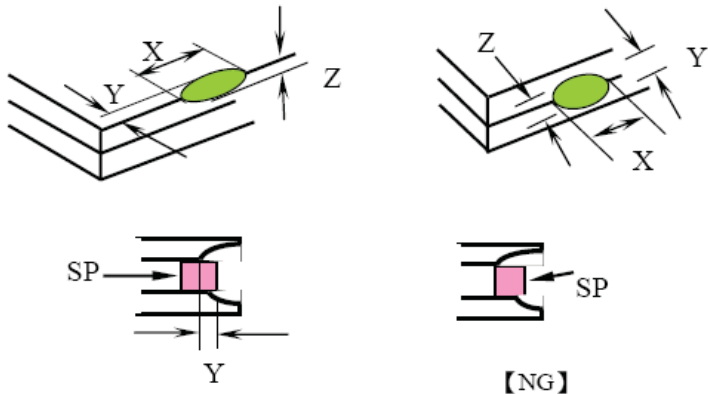
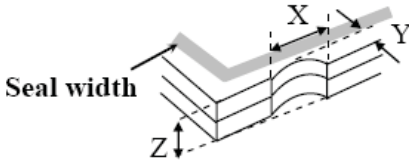
◆ Specification For Monotype and Color STN :

(Ver. B01)

NO	Item	Criterion	Level																																			
05	<p>Black or white dot 、 scratch 、 contamination</p> <p>Round type</p>  <p>$\Phi=(x+y)/2$</p> <p>Line type</p> 	<p>5. 1 Round type:</p> <p>5. 1. 1 display only :</p> <ul style="list-style-type: none">• 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. <p>5. 1. 2 Non-display :</p> <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="4">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></tr></table> <p>5. 1. 3 Line type:</p> <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 (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		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
Dimension (diameter : Φ)	Acceptance (Q'ty)																																					
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06	<p>Polarizer Bubble</p>	<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="5">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></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																			
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$\Phi \leq 0.20$	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																																					

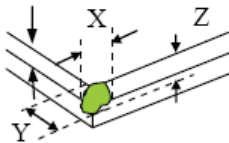
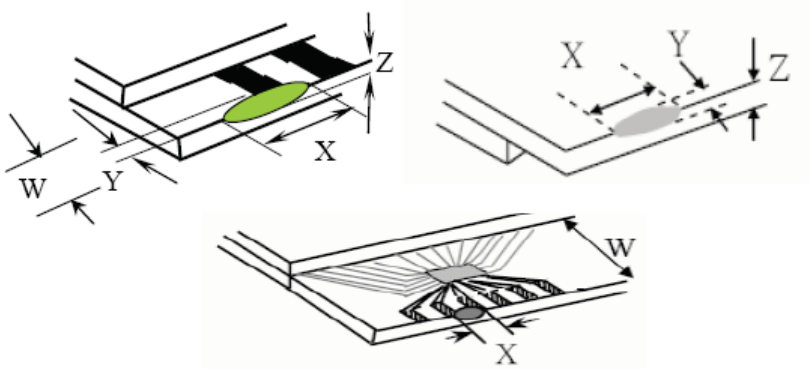
◆ Specification For Monotype and Color STN :

(Ver. B01)

NO	Item	Criterion	Level						
07	The crack of glass	<p>Symbols :</p> <p>X : The length of crack Z : The thickness of crack t : The thickness of glass</p> <p>Y : The width of crack. W : terminal length a : LCD side length</p>	Minor						
		<p>7.1 General glass chip :</p> <p>7.1.1 Chip on panel surface and crack between panels:</p> <div></div> <div></div> <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.	$1/2 t < Z \leq 2 t$							

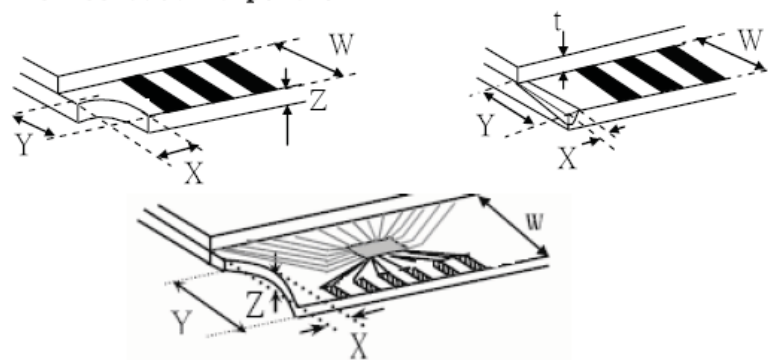
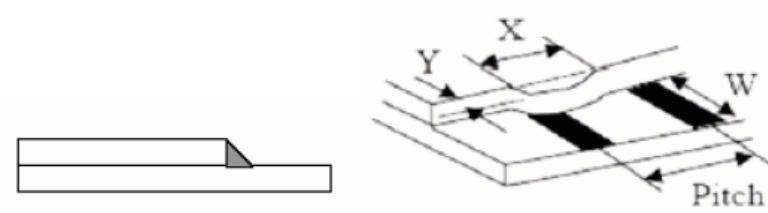
◆Specification For Monotype and Color STN :

(Ver. B01)

NO	Item	Criterion	Level									
07	The crack of glass	<p>Symbols :</p> <p>X : The length of crack Z : The thickness of crack t : The thickness of glass</p> <p>Y : The width of crack. W : terminal length a : LCD side length</p> <p>7.1.2 Corner crack :</p>  <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.	$1/2 t < Z \leq 2 t$										
<p>7.2 Protrusion over terminal :</p> <p>7.2.1 Chip on electrode pad :</p>  <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	<p>Symbols :</p> <p>X : The length of crack Z : The thickness of crack t : The thickness of glass</p> <p>Y : The width of crack. W : terminal length a : LCD side length</p>	Minor									
		<p>7.2.2 Non-conductive portion :</p>  <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> <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><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	<div><div>-30℃ → +25℃ → +80℃ → +25℃</div><div>(30mins) (5mins) (30mins) (5mins)</div><div>← 10 Cycle →</div></div> 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.
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