Recode of Revision

WY1208Y3FSY6G-B			
Date	Revision	Author	Description
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1. FEATURES

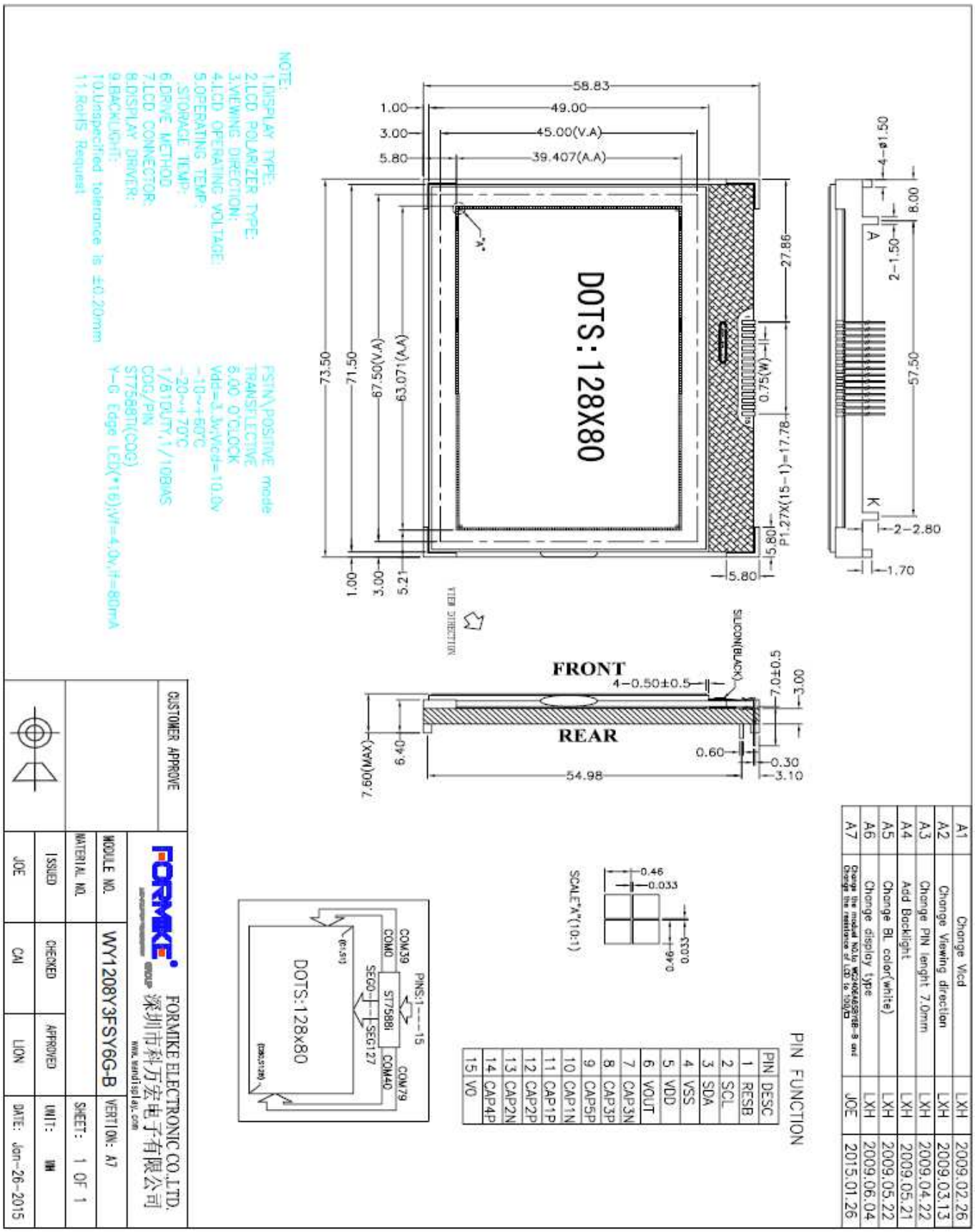
1.1. Description

WY1208Y3FSY6G-B is a Positive Transflective type FSTN Grey LCD. This product is composed of a FSTN LCD panel, driver IC, and backlight unit . The following table described the features of **WY1208Y3FSY6G-B**. Assemblies shall comply with RoHS requirements.

1.2. Features

Features	Description	Units
Number of dots	128 * 80	Dots
Module Dimension	73.50(L)*58.83(W)*7.6(H)	mm
View Display Area	67.50(L)×45.00(W)	mm
Dot size	0.33 (L) ×0.33 (W)	mm
Dot pitch	0.45 (L) ×0.46 (W)	mm
Operating Temperature	-10 ~ +60	°C
Storage Temperature	-20 ~ +70	°C
Driver IC	ST7588TI	-
Driving method	1/81 Duty, 1/10 Bias, VOP=10.0V	-
Viewing direction	6 o'clock	
Display Mode	FSTN Grey	-
Display Type	Positive Transflective	-
Glass ITO Resistance	10	Ω
Back Light	Y-G edge LED (*16); Vf=4.0V, If-80mA	-

2. EXTERNAL DIMENTSIONS



3. INTERFACE DESCRIPTION

PIN NO.	PIN Name	Description
1	RESB	Reset Input pin : When RESB is “LOW”, initialization is executed
2	SCL	I2C Interface mode Clock
3	SDA	I2C Interface mode Data
4	VSS	Power Ground
5	VDD	Power Supply
6	VOUT	DC/DC Voltage Converter
7	CAP3N	
8	CAP3P	
9	CAP5P	
10	CAP1N	
11	CAP1P	
12	CAP2P	
13	CAP2N	
14	CAP	
15	VO	LED Drive voltage

4. ABSOLUTE MAXIMUM RATINGS(T=25°C)

Characteristic	Symbol	Spec.			Unit	Note
		Min.	Typ.	Max.		
Power Supply Voltage	V0, VOUT	-0.5	-	+13.5	V	

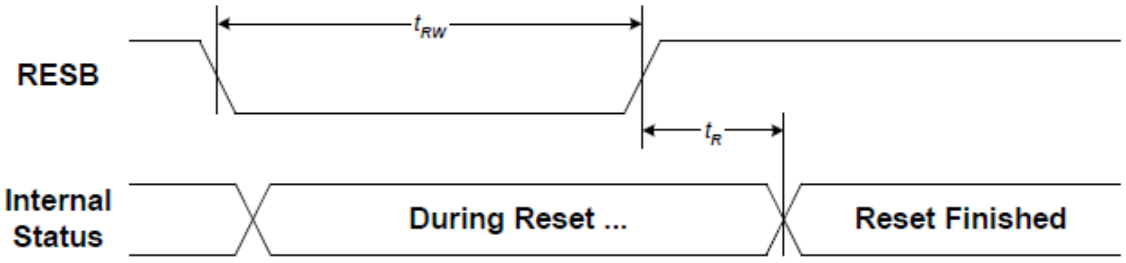
Logic Input Voltage	VDD	-0.3	-	+3.6V	V	-
Operating Temperature	TOP	-10	-	+60	°C	
Storage Temperature	TST	-20	-	+70	°C	

5. ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	Conditions	Spec.			Unit
			Min.	Typ.	Max.	
Power & Operating Voltages						
LCM Operating Voltage	VDD-VSS	Ta=+25°C	3.1	3.3	3.5	V
LCD Driving Voltage	VO-VSS	Ta=+25°C	8.8	10.0	9.2	V
LED Driving Voltage	VA-VK	Ta=+25°C	3.8	4.0	4.2	V
Forward Current for LED	VA-VK	Ta=+25°C	-	80	-	mA
Input / Output						
High level input voltage	VIH	-	0.7VDD	-	VDD	V
Low level input voltage	VIL	-	VSS	-	0.3VSS	
High level output voltage	VOH	IOH=0.5uA	0. 7VDD	-	VDD	
Low level output voltage	VOL	IOL=0.5uA	VSS	-	0.3VSS	

6. TIMING CHARACTERISTICS

6.1. Reset Timing Characteristics



(VDD=3.3V, Ta=-30~85 °C)

Symbol	Parameter	Related Pins	Spec.			Note	Unit
			Min.	Typ.	Max.		
tR	Reset time		-	-	400	-	ns
tRW	Reset “L” pulse width	RESB	1200	-	-	-	

(VDD=2.7, Ta=-30~85 °C)

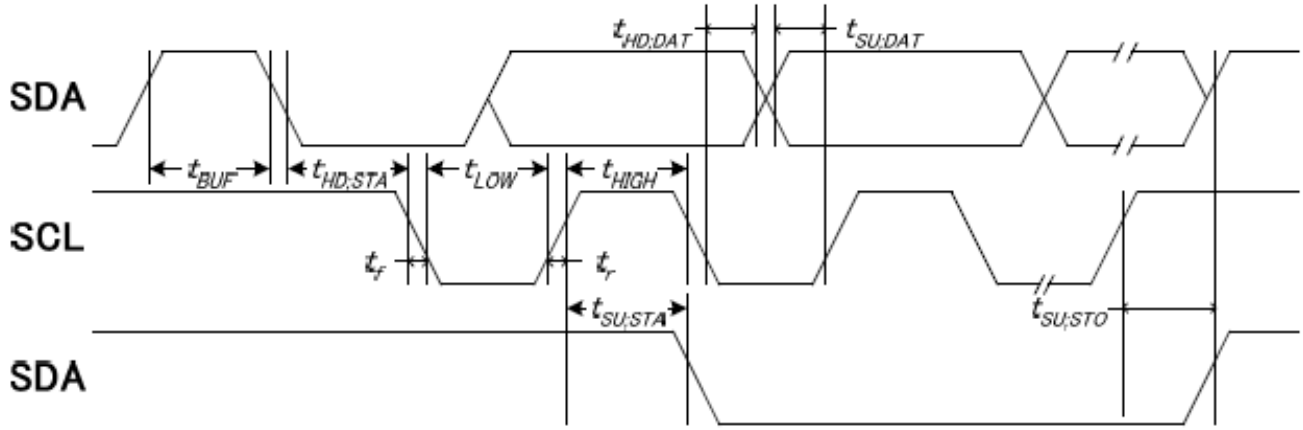
Symbol	Parameter	Related Pins	Spec.			Note	Unit
			Min.	Typ.	Max.		
tR	Reset time		-	-	350	-	ns
tRW	Reset “L” pulse width	RESB	1600	-	-	-	

(VDD=1.8V, Ta=-30~85 °C)

Symbol	Parameter	Related Pins	Spec.			Note	Unit
			Min.	Typ.	Max.		
tR	Reset time		-	-	140	-	ns
tRW	Reset “L” pulse width	RESB	4500	-	-	-	

* All timing is specified using 20% and 80% of VDD1 as the standard

6.2. Serial Interface (I2C) Timing Characteristics



(VDD=3.3V, Ta=-30~85 °C)

Signal	Symbol	Parameter	Spec.			Unit
			Min.	Typ.	Max.	
SCL	fSCLK	SCL Clock Frequency	DC	-	400	KHz
	tLOW	SCL Clock Low Period	150	-	-	ns
	tHIGH	SCL Clock High Period	100	-	-	ns
SDA	tSU:DAT	Data Set-Up Time	90	-	-	ns
	tHD:DAT	Data Hold Time	40	-	-	ns
	tSU:STA	Setup Time for a REPEATED START condition	70	-	-	ns
	tHD:STA	START condition hold time	170	-	-	ns
	tDST	Setup time for STOP condition	90	-	-	ns
SCL	tBUF	BUS Free time between a STOP and START condition	70	-	-	ns

(VDD=2.7V, Ta=-30~85 °C)

Signal	Symbol	Parameter	Spec.			Unit
			Min.	Typ.	Max.	

SCL	fSCLK	SCL Clock Frequency	DC	-	400	KHz
	tLOW	SCL Clock Low Period	190	-	-	ns
	tHIGH	SCL Clock High Period	110	-	-	ns
SDA	tSU:DAT	Data Set-Up Time	110	-	-	ns
	tHD:DAT	Data Hold Time	30	-	-	ns
	tSU:STA	Setup Time for a REPEATED START condition	90	-	-	ns
	tHD:STA	START condition hold time	220	-	-	ns
	tDST	Setup time for STOP condition	110	-	-	ns
SCL	tBUF	BUS Free time between a STOP and START condition	90	-	-	ns

(VDD=1.8V, Ta=-30~85 °C)

Signal	Symbol	Parameter	Spec.			Unit
			Min.	Typ.	Max.	
SCL	fSCLK	SCL Clock Frequency	DC	-	400	KHz
	tLOW	SCL Clock Low Period	500	-	-	ns
	tHIGH	SCL Clock High Period	250	-	-	ns
SDA	tSU:DAT	Data Set-Up Time	270	-	-	ns
	tHD:DAT	Data Hold Time	80	-	-	ns
	tSU:STA	Setup Time for a REPEATED START condition	230	-	-	ns
	tHD:STA	START condition hold time	480	-	-	ns
	tDST	Setup time for STOP condition	270	-	-	ns
SCL	tBUF	BUS Free time between a STOP and START condition	210	-	-	ns

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

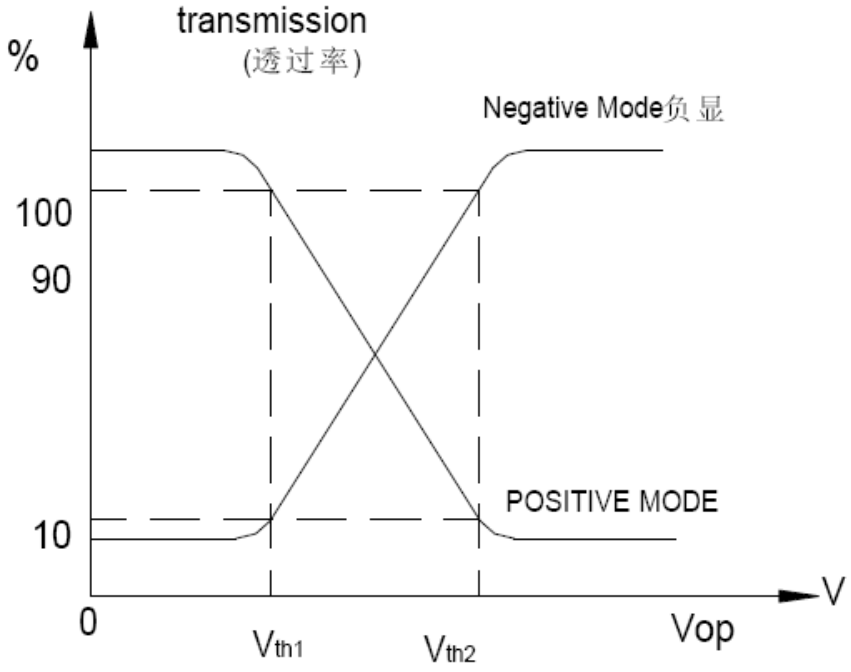
*2 All timing is specified using 20% and 80% of VDD as the standard.

7. OPTICAL CHARACTERISTICS

DUTY = 1/81, BIAS = 1/10

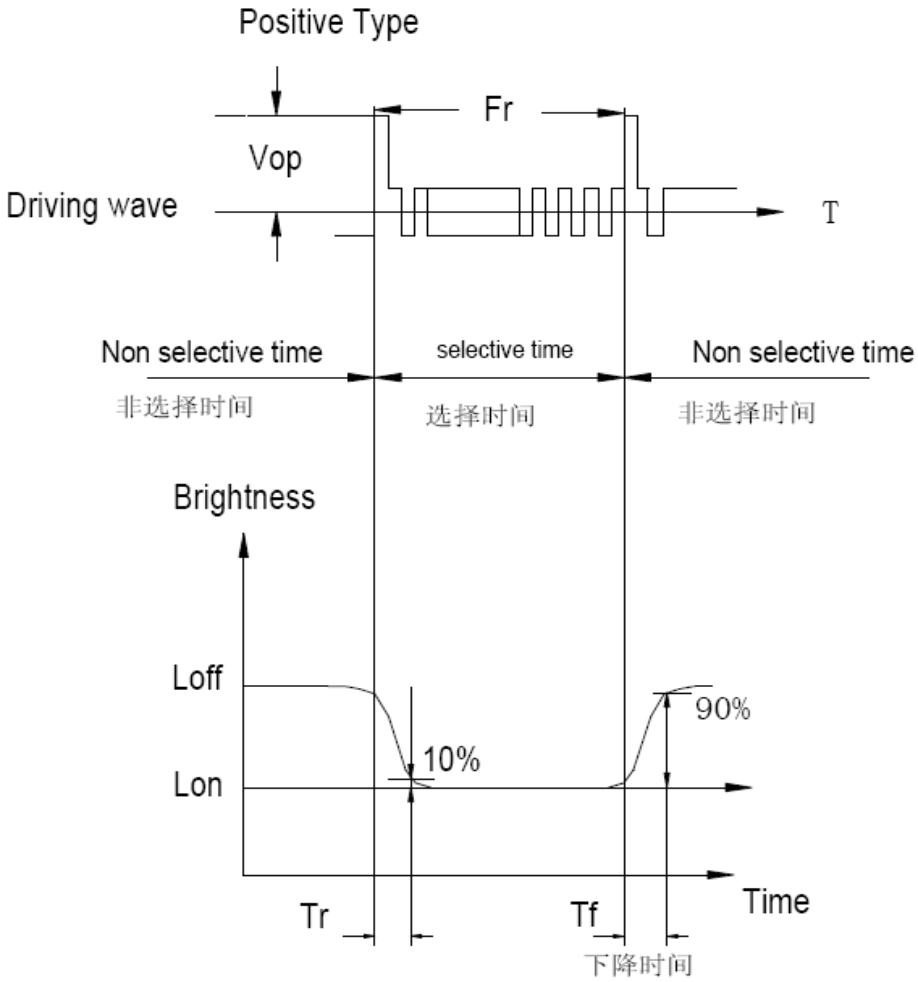
Characteristic		Symbol	Condition	Spec.			Unit	Note
				Min.	Typ.	Max.		
Operating Voltage Range (LCD)		Vop	25℃	-	10.0	-	V	(2)
Vth		Vth1	25℃	0.7VDD	-	VDD	V	(1)
		Vth2		VSS	-	0.3VDD		
Response Time	Rising	Tr	25℃	-	200	-	ms	(2)
	Falling	Tf		-	250	-		
Contrast Ratio		Cr	25℃	3	5	-		(3)
Viewing Angle (6 o'clock)	Left-Right	$Ø_x$	25℃	-	60	-	Deg	(4)
	Top-Bottom	$Ø_y$	25℃	-	45	-		

Note 1 : Threshold Voltage : Vth

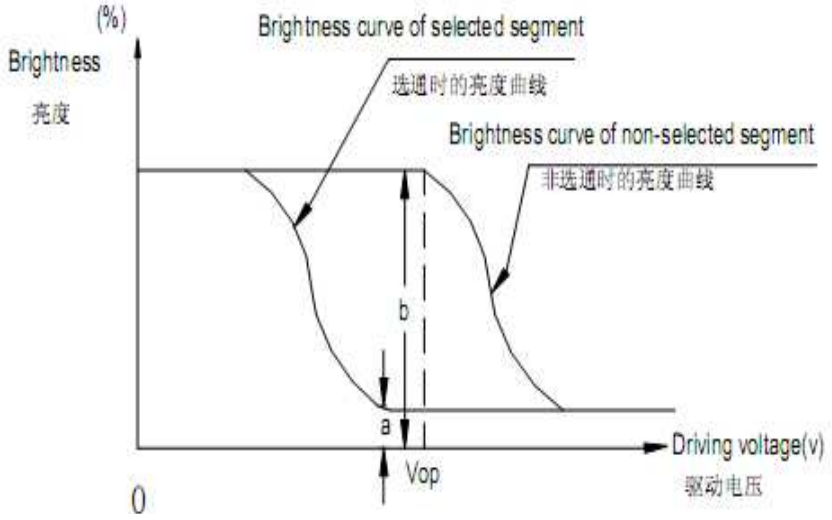


Note 2 : Operating Voltage and Frequency : Vop, Fr

Response Time : Tr, Tf



Note 3 : Contrast Ratio

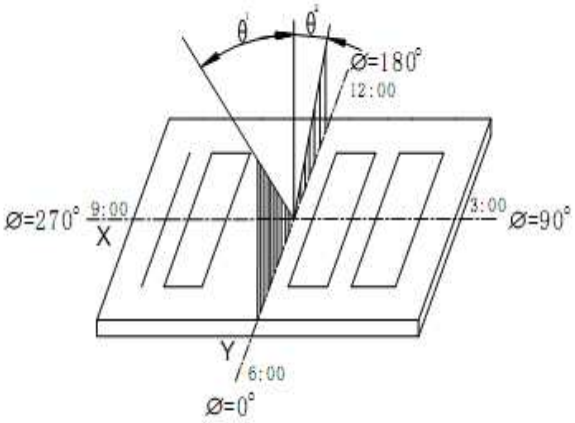


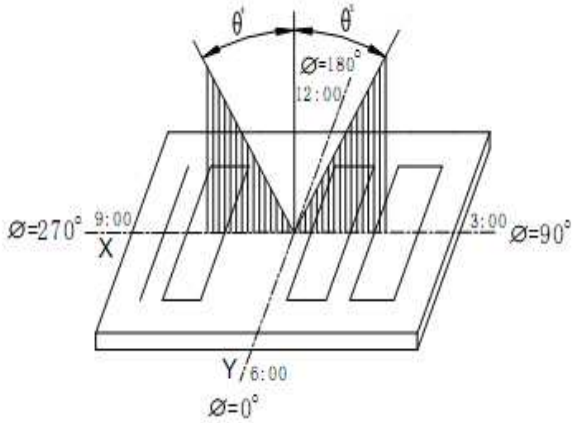
$$Contrast\ Ratop = \frac{\text{Brightness in OFF Static b}}{\text{Brightness in ON Static a}}$$

Note 4 : Viewing direction

θ Viewing Angle

φ Direction Angle





8. RELIABILITY TEST CONDITIONS AND METHODS

No.	Test Items	Test condition
1	High Temperature Storage	70℃±2℃ x 96Hours
2	Low Temperature Storage	-20℃±2℃ x 96Hours
3	High Temperature Operating	60℃±2℃ x 96Hours
4	Low Temperature Operating	-10℃±2℃ x 96Hours
5	Temperature Cycle (Storage)	1 Cycle : -20℃±2℃(30min) ↔ 25℃±2℃ (5min) ↔ 70℃±2℃(30min) : Total 5 Cycles
6	Vibration Test at LCM Level	Frequency : 10Hz~55Hz~10Hz Sweep mode Linear Displacement : 1.5mm p-p 1 hour each for X, Y, Z : Total 30 Minutes
7	FPC of LCD bending Test	Try 20 times for bending FPC along the LCD as the bending radius is at least 0.5mm
Criteria of judgment: 1,All of the segments shall not be blurred; 2,All segments shall be usually displayed; Judgment shall be made after exposure in room temperature condition for 2 hours;		

9. COMMAND Table

INSTRUCTION	A0	R/W	COMMAND BYTE								DESCRIPTION
			D7	D6	D5	D4	D3	D2	D1	D0	
H independent instruction											
Write data	1	0	D7	D6	D5	D4	D3	D2	D1	D0	Write Data to RAM
Read data	1	1	D7	D6	D5	D4	D3	D2	D1	D0	Read Data from RAM
Read Status byte	0	1	PD	0	V	D	E	MX	MY	D0	Read Status byte
Function Set	0	0	0	0	1	MX	MY	PD	H1	H0	Mirror X, Mirror Y, Power Down, Extended table
H[1:0] = [0:0]											
Set V0(Vop) range	0	0	0	0	0	0	0	1	0	PRS	V0(Vop) 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
SI3-8bit data(L) & start	0	0	0	1	0	1	DA3	DA2	DA1	DA0	Set the number of data bytes, Low-bit
SI3-8bit data(M)	0	0	0	1	1	0	DA7	DA6	DA5	DA4	Set the number of data bytes, Middle-bit
SI3-8bit data(H)	0	0	0	1	1	1	0	DA 10	DA9	DA8	Set the number of data bytes, High-bit
Set Y address	0	0	0	1	0	0	Y3	Y2	Y1	Y0	Set Y address of RAM 0 ≤ Y ≤ 9
Set X address (L)	0	0	1	1	1	0	X3	X2	X1	X0	Set X address of RAM Low-bit; 0 ≤ X ≤ 131
Set X address (H)	0	0	1	1	1	1	X7	X6	X5	X4	Set X address of RAM Low-bit; 0 ≤ X ≤ 131
H[1:0] = [0:1]											
Display configuration	0	0	0	0	0	0	1	DO	0	V	Top/Bottom row mode set data order
Bias system	0	0	0	0	0	1	0	BS2	BS1	BS0	Sets Bias system
Set V0(V_{OP})	0	0	1	V_{OPS}	V_{OPS}	V_{OP4}	V_{OP3}	V_{OP2}	V_{OP1}	V_{OP0}	Write V0 to register

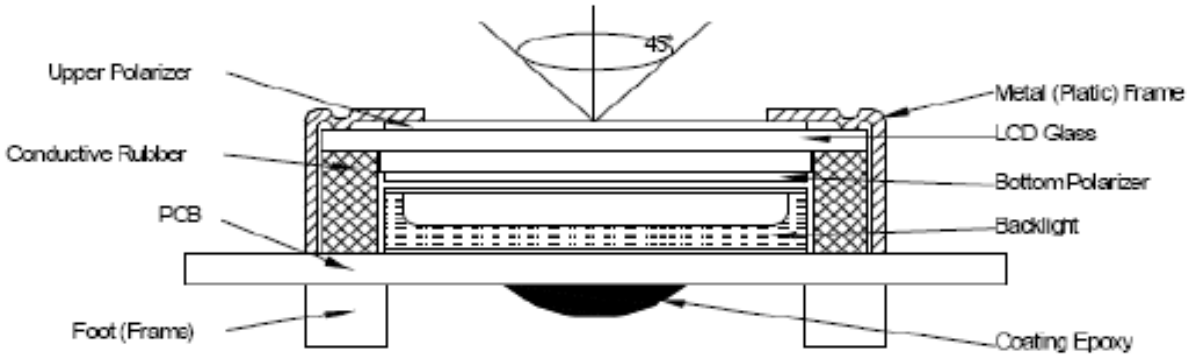
H[1:0] = [1:0]											
Set Partial screen mode	0	0	0	0	0	0	0	1	0	PS	PS=1: Enable Partial Screen mode
Partial Display	0	0	0	0	0	0	1	0	0	WS	Set Partial Screen Size
Set Partial Display part	0	0	0	0	0	1	DS3	DS2	DS1	DS0	Set Display area for Partial Screen mode
Set Start Line	0	0	1	S6	S5	S4	S3	S2	S1	S0	Specify the initial display line to realize vertical scrolling
H[1:0] = [1:1]											
RESET	0	0	0	0	0	0	0	0	1	1	Software reset
High Power Mode	0	0	1	0	1	1	0	HP	0	0	High Power mode Set
Frame Rate	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

10. INSPECTION STANDARD

General specifications

A.1. LCM Appearance and Electric Inspection condition:

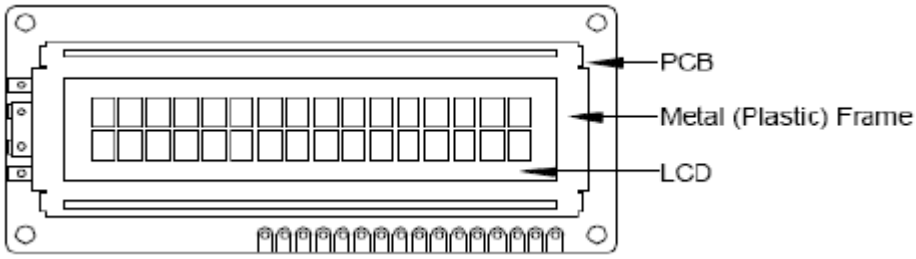
A.1.1. Inspection will be done by placing LCM 30cm away from inspector's eyeballs under normal illumination.



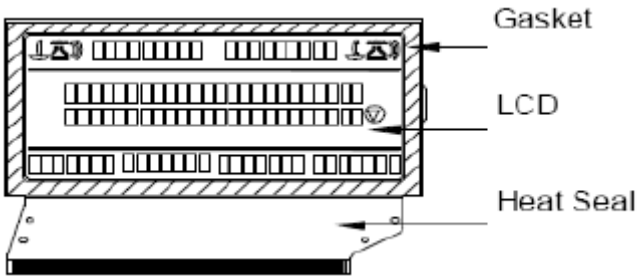
A1.2. View angle: within 45° around perpendicular line.

B.2. Definition:

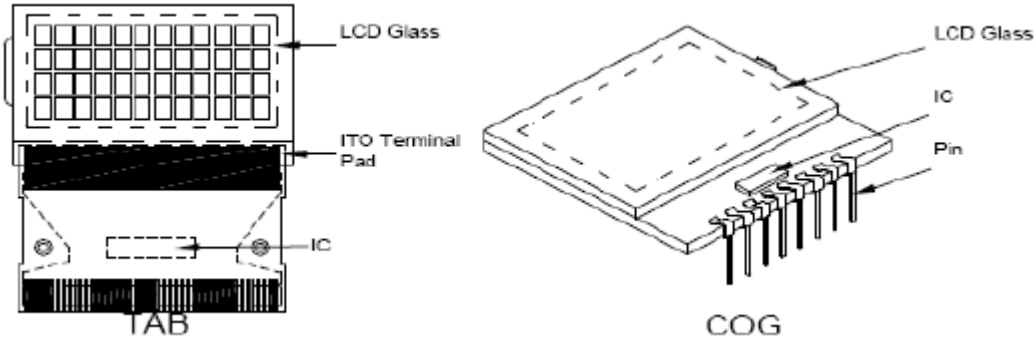
B.2.1. COB



B.2.2. Heat Seal



B.2.3. TAB and COG.



10.1. QUALITY SPECIFICATION

10.1.1 Sampling Plan and Acceptance

Sampling Plan

MIL-STD-105E( ) ordinary single inspection is used

Acceptance

Major defect: AQL = 0.25%

Minor defect: AQL = 0.65%

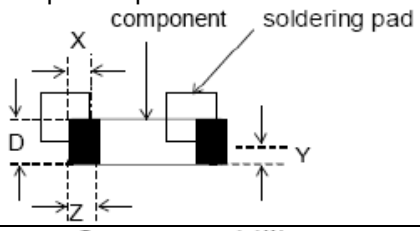
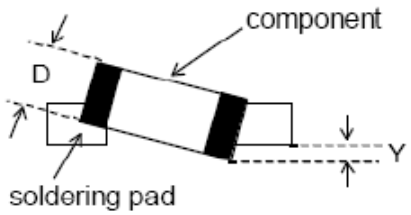
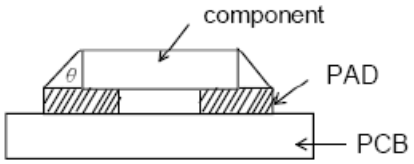
10.2 Criteria

10.2.1 COB

Defect.	Inspection Item	Inspection Standards

Major	PCB copper flakes peeling off	Any copper flake in viewing Area should be greater than 1.0 ㎟	Reject.
Major	Height of coating epoxy	Exceed the dimension of drawing	Reject
Major	Void or hole of coating epoxy	Exposed bonding wire or IC	Reject
Major	PCB cutting defect	Exceed the dimension of drawing	Reject

10.2.2 SMT

Defect.	Inspection Item	Inspection Standards	
Minor	Component marking nor readable		Reject.
Minor	Component Height	Exceed the dimension of drawing	Reject
Major	Component solder defect(missing, extra wrong component or wrong orientation)		Reject
Minor	Component position shift 	X < 3/4Z Y > 1/3D	Reject Reject
Minor	Component tilt 	Y > 1/3D	Reject
Minor	Insufficient solder 	Φ≤ 20°	Reject

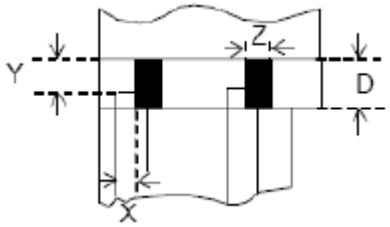
10.3 Metal (Plastic) Frame

Defect.	Inspection Item	Inspection Standards		
Major	Crack / Breakage	Anywhere		Reject.
Minor	Frame Scratch	W	L	Acceptable of Scratch

		W < 0.1mm	Any	Ignore
		0.1≤W<0.2mm	L≤5.0mm	2
		0.2≤W<0.3mm	L≤3.0mm	1
		W≥0.3mm	Any	0
		Note(1) Above criteria applicable to scratch lines with distance greater than 5mm Note(2) Scratch on the back side of frame(not visible) can be ignored		
Minor	Frame Dent, Prick Φ= (L+W)/2			Acceptable of Dents / Pricks
		Φ≤1.0mm		2
		1.0<Φ≤1.5mm		1
		1.5mm<Φ		0
		Note(1) Above criteria applicable to any tow dents / pricks with distance greater than 5mm Note(2) Dent / Prick on the back side of frame(not visible) can be ignored		
Minor	Frame Deformation	Exceed the dimension of drawing		
Minor	Metal Frame Oxidation	Any rust		

10.4 Flexible Film Connector (FFC)

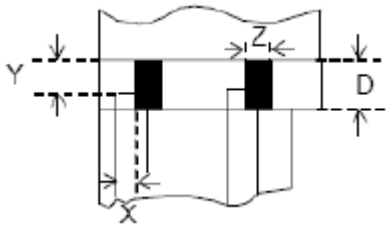
Defect.	**Inspection Item**		**Inspection Standards**	
Minor	Tilted soldering		Within the angle +5°	Acceptable.
Minor	Uneven solder joint / bump			Reject
Minor	Hole	Φ= (L+W)/2	Expose the conductive line	Reject
			Φ>1.0mm	Reject
Minor	Position Shift		Y > 1/3D	Reject
			X > 1/2Z	Reject

10.5 Screw

Defect.	Inspection Item	Inspection Standards	
Major	Screw missing / loosen		Reject.
Minor	Screw oxidation	Any rust	Reject
Minor	Screw deformation	Difficult to accept screw driver	Reject

10.6 Heat Seal, TCP, FPC

Defect.	Inspection Item		Inspection Standards	
Major	Scratch expose conductive layer			Reject.
Minor	HS Hole	Φ= (L+W)/2	Φ>0.2mm	Reject
Major	Adhesion strength		Less than the specification	Reject
Minor	Position Shift 		Y > 1/3D	Reject
			X > 1/2Z	Reject
Major	Conductive line break			Reject

10.7 LED Backing Protective Film and Others

Defect.	Inspection Item	Inspection Standards	
Minor	LED dirty, prick	Acceptable number of units	
		Φ≤0.10mm	Ignore
		0.10<Φ≤0.15mm	2

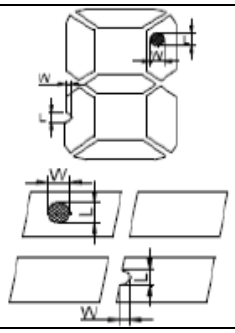
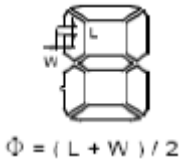
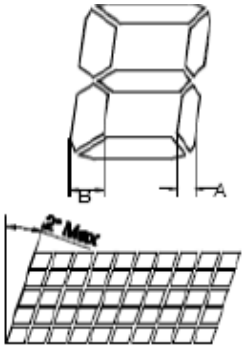
		0.15<Φ≤0.20mm	1
		Φ>0.20mm	0
		The distance between any two spots should be≥ 10mm Any Spot/dot/void outside of viewing area is acceptable	
Minor	Protective film tilt	Not fully cover LCD	Reject
Major	COG coating	Not fully cover ITO circuit	Reject

10.8 Electric Inspection

Defect.	Inspection Item	Inspection Standards	
Major	Short		Reject
Major	Open		Reject

10.9 Inspection Specification of LCD

Defect.	Inspection Item		Inspection Standards			
Minor	Linear Defect	*Glass Scratch *Polarizer Scratch *Fiber and Linear Material	W	W≤0.03	0.03<W≤0.05	W>0.05
			L	L<5	L<3	Any
			ACC No	1	1	Reject
			Note : L is the length and W is the width of the defect			
Minor	Black Spot and Polarizer Pricked	*Foreign material between glass and polarizer or glass *Polarizer hole or protuberance by external force	Φ	Φ≤0.1	0.1<Φ≤0.15	0.15<Φ≤0.2 / Φ>0.2
			ACC No	3ea/100 ㎟	2	1 / 0
			Note : Φ is the average diameter of the defect. Distance between two defects < 10mm			
Minor	White Spot and Bubble in Polarizer	*Unobvious transparent foreign material between glass and glass or glass and polarizer *Air protuberance between polarizer and glass	Φ	Φ≤0.3	0.3<Φ≤0.5	Φ>0.5
			ACC No	3ea/100 ㎟	1	0
			Note : Φ is the average diameter of the defect. Distance between two defects < 10mm			

Minor	Segment Defect		Φ	Φ≤0.10	0.10<Φ≤ 0.20	0.20<Φ≤ 0.25	Φ>0.25
			ACC No	3ea/ 100 ㎟	2	1	0
			Note	W is more than 1/2 segment width			Reject
				Φ= (L+W)/2 Distance between two defect is 10mm			
Minor	Protuberant Segment		Φ	Φ≤0.10	0.10<Φ≤ 0.20	0.20<Φ≤ 0.25	Φ>0.25
			W	Glue	W≤1/2Seg W≤0.2	W≤1/2Seg W≤0.2	Ignore
			ACC No	3ea/ 100 ㎟	2	1	0
Minor	Assembly Mis-alignment		1.Segment				
			B	B≤0.4mm	0.4<B≤ 1.0mm		B>1.0mm
			B-A	B-A<1/2B	B-A<0.2		B-A<0.25
			Judge	Acceptable	Acceptable		Acceptable
			2.Dot Matrix				
			Deformation > 2°				Reject
Minor	Stain on LCD Panel Surface		Accept when stains can be wiped lightly with a soft cloth or a similar one. Otherwise, judged according to the above items: “Black spot” and “White spot”				

11. HANDLING PRECAUTIONS

11.1 Safety

11.1.1 If the LCD panel breaks, be careful not to get the liquid crystal to touch your skin.

11.1.2 If the liquid crystal touches your skin or clothes, please wash it off immediately by using soap and water

11.2 Handling

11.2.1 Avoid any strong mechanical shock which can break the glass

11.2.2 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

11.2.3 Do not remove the panel or frame from the module

11.2.4 The polarizing plate of the display is very fragile. So, please handle it very carefully

11.2.5 Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate

11.2.6 Do not touch the display area with bare hands, this will stain the display area

11.2.7 Do not use ketonics solvent & aromatic solvent. Use with a soft cloth soaked with a cleaning naphtha, solvent

11.2.8 To control temperature and time of soldering is 320±10℃ and 3-5 sec

11.2.9 To avoid liquid (include organic solvent) stained on LCM

11.3 Storage

11.3.1 Store the panel or module in a dark place where the temperature is 25℃±5℃ and the humidity is below

65% RH

11.3.2 Do not place the module near organics solvents or corrosive gases

11.3.3 Do not crush, shake, or jolt the module

11.4 Terms of warranty

11.4.1 Applicable warrant period

The period is within thirteen months since the date of shipping out order normal using and storage conditions

11.4.2 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.

12. PRECAUTION FOR USE

12.1

A limit sample should be provided by the both parties on an occasion when the both parties agreed its necessity.

Judgment by a limit sample shall take effect after the limit sample has been established and confirmed by the both parties.

12.2

On the following occasions, the handing of problem should be decided through discussion and agreement between responsible of the both parties.

- When a question is arisen in this specification
- When a new problem is arisen which is not specified in this specifications
- When an inspection specifications change or operating condition change in customer is reported to nSYSTechnologies Co.,Ltd. and some problem is arisen in this specification due to the change

- When a new problem is arisen at the customer's operating set for sample evaluation in the customer site.