

LEADER TIME SRL

PRODUCT SPECIFICATION

128*128 Characters COG LCD MODULE

MODEL: EX0469-E Ver:1.0

< ◇ > Finally Specification

CUSTOMER'S APPROVAL	
CUSTOMER :	
SIGNATURE:	DATE:

APPROVED BY	PM REVIEWD	PD REVIEWD	PREPARED By

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LEADER TIME SRL

VIA MONS. PROSDOCIMI, 27

36042 BREGANZE (VI)

- This specification is subject to change without notice. Please contact LT or it's representative before designing your product based on this specification.

Revision Status

Version	Revise Date	Page	Content	Modified By
Ver. 1.0	2011.07.03		First Issued	

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1. Features

The features of LCD are as follows

- * Display mode : STN/Gray, Transflective, Positive
- * Drive IC : NT7508
- * Interface Input Data : 6800series
- * Driving Method : 1/128 Duty, 1/12 Bias
- * Viewing Direction : 6 O'clock
- * Backlight : LED Unit/White
- *Sample NO. : EG1212B2SKW6G-B0

2. MECHANICAL SPECIFICATIONS

Item	Specification	Unit
Module Size	69.5(W)×73.2(H)×5.1(T)	mm
Number of Dots	128×128Dots	
View display area	60(W)×58.4(H)	Mm
Activity Display Area	55.01(W)×55.01(H)	mm
Dot Size	0.4(W)×0.4(H)	mm
Dot Pitch	0.43(W)×0.43(H)	mm

3. ELECTRICAL SPECIFICATIONS

3-1 ABSOLUTR MAZIMUM RATINGS (Ta = 25 °C)

Item	Symbol	Standard Value			Unit
		Min.	Typ.	Max.	
Supply Voltage For Logic	$V_{DD} - V_{SS}$	-0.3	-	4.0	V
Supply Voltage For LCD Drive	$V_{op} = V_O - V_{SS}$	-0.3	-	15	V
Input Voltage	V_{in}	-0.3	-	$V_{DD} + 0.3$	V
Operating Temp.	T_{op}	-20	-	+70	°C
Storage Temp.	T_{st}	-30	-	+80	°C

*. NOTE: The response time will be extremely slow when the operating temperature is around -10°C, and the back ground will become darker at high temperature operating.

3-2 ELECTRICAL CHARACTERISTICS

Item	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Logic supply Voltage	$V_{DD} - V_{SS}$		-	3.0	-	V
LCD Drive	$V_{OP} = V_O - V_{SS}$		-	14.3	-	V
Input Voltage	"H" Level	$V_{DD} = 3V \pm 5\%$	$0.8V_{DD}$		V_{DD}	V
	"L" Level		V_{SS}		$0.2V_{DD}$	V
Frame Frequency	f_{FLM}	$V_{DD} = 3V$	-	72	-	Hz
Current Consumption	I_{DD}	$V_{DD} = 3V$	-	1.6	-	mA

3-3. BACKLIGHT

3-3-1. Absolute Maximum Ratings

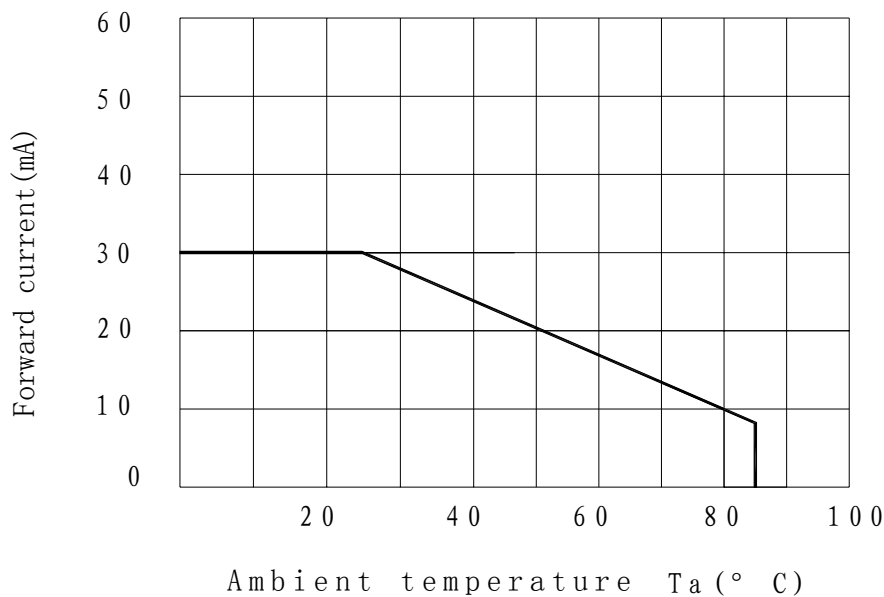
Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Forward Current	IF	$T_a = 25\text{ }^\circ\text{C}$	-	-	100	mA
Reverse Voltage	VR		-	-	5	V
Power Dissipation	PD		-	-	400	mW

3-3-2. Electrical-optical Characteristics

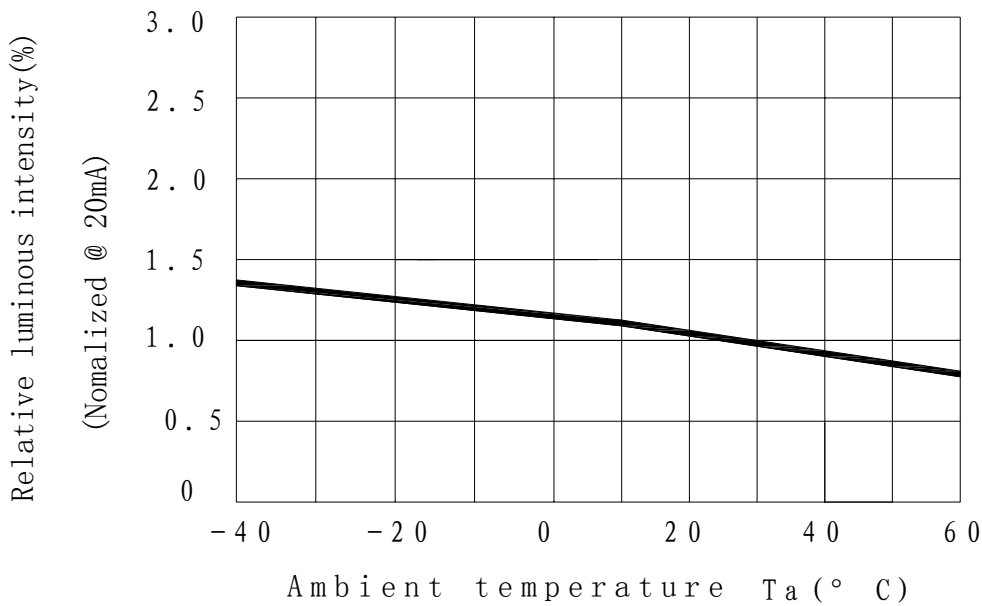
Item	Symbol	Condition	Min.		Typ.		Max.		Unit
Forward Voltage	VF	$I_f = 100\text{mA}$ $T_a = 25\text{ }^\circ\text{C}$	2.9		3.1		3.3		V
Average Luminous Intensity	IV		200		-		-		cd/m ²
Color Coordinates	-		X	Y	X	Y	X	Y	
					0.3	0.3			

3-4-3. Backlighting temperature curve

Forward current derating curve vs. ambient temperature



Luminous intensity vs.ambient temperature



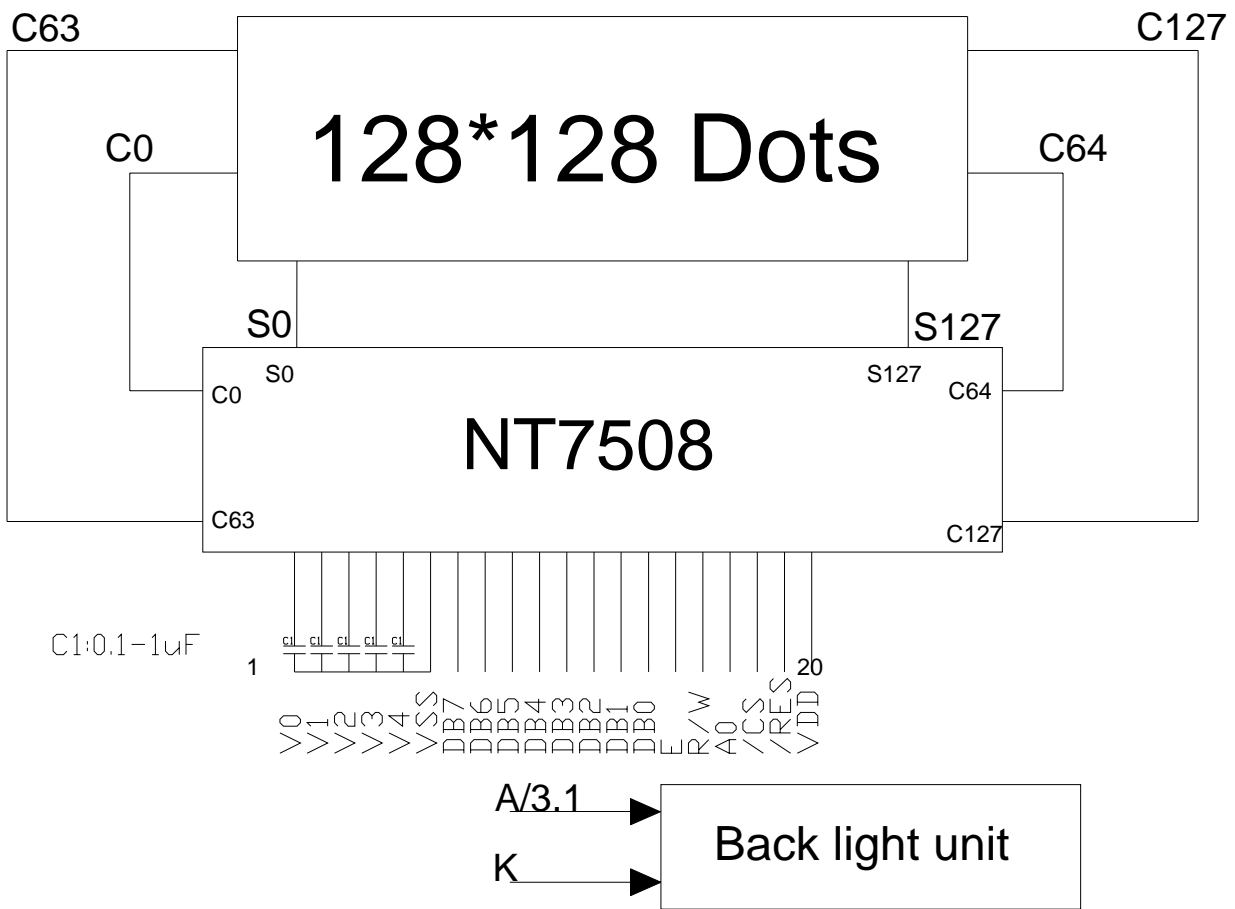
The brightness is measured without LCD panel
For operation above 25 °C, The I_{fm} & P_d must be derated, the current derating is -0.36mA/ °C for DC drive and -0.86mA/ °C for Pulse drive, the Power dissipation is -0.75mW/ °C. The product working current must not more than the 60% of the I_{fm} or I_{fp} according to the working temperature.

4. TERMINAL FUNCTIONS AND BLOCK DIAGRAM

4-1. INTERFACE PIN FUNCTION DESCRIPTION

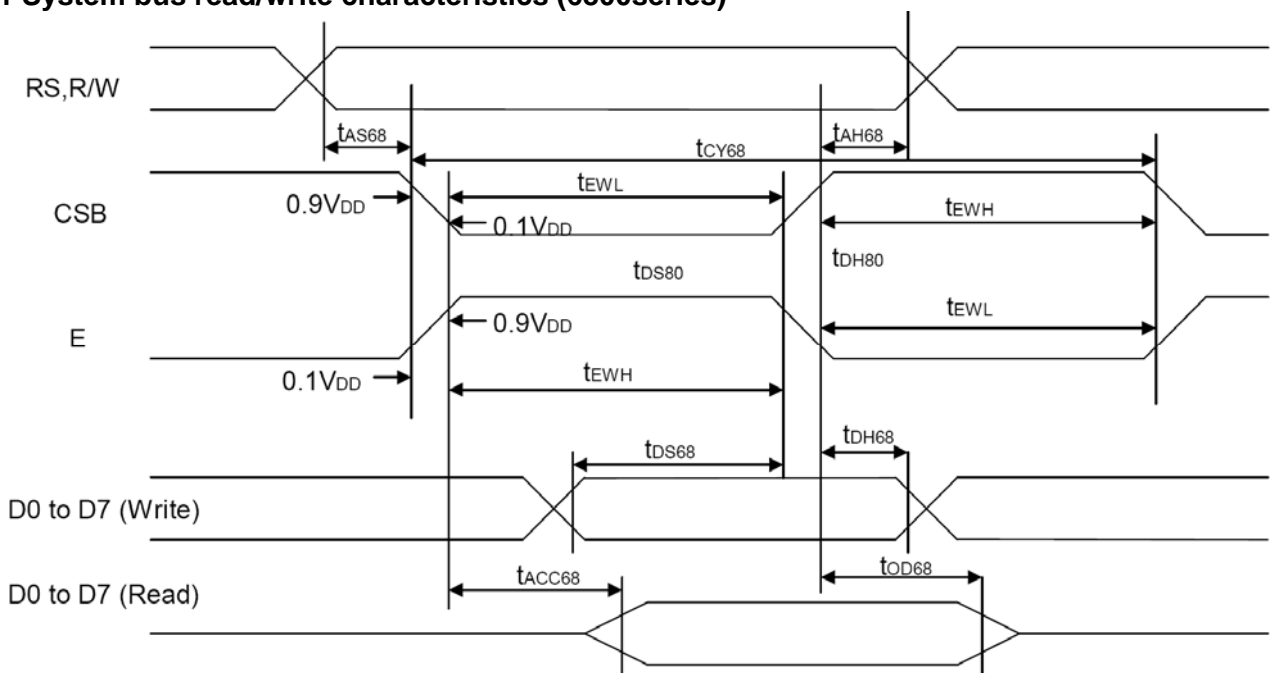
PIN NO.	SYMBOL	FUNCTIONS
1-5	V0-4	Supply voltage for LCD driving
6	VSS	Ground (0V)
7-14	DB0~DB7	Data bus line
15	E	Enable Signal
16	R/W	H: Data Read (LCM to MPU) ; L: Data Write (MPU to LCM)
17	A0	Select register signal
18	/CS	Chip Selection Signal
19	/RST	Reset
20	VDD	Supply voltage for logical circuit(3.0V)
	A	Back light+ (3.0V)
	K	Back light-

4-2. BLOCK DIAGRAM



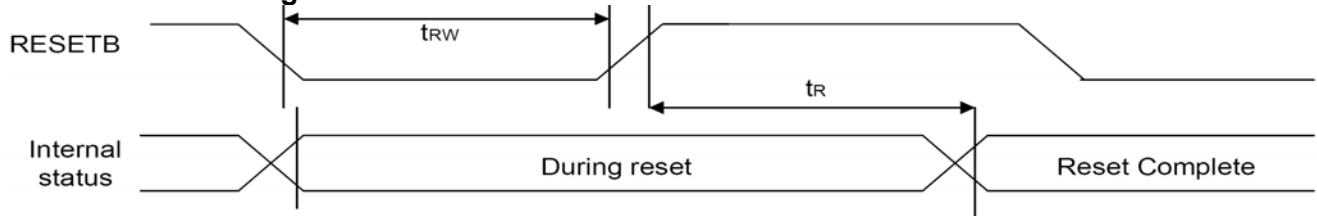
5. TIMING CHARACTERISTICS

5.1 System bus read/write characteristics (6800series)



Symbol	Signal	Parameters	Min.	Typ.	Max.	Unit	Conditions
tAS80	RS	Address setup time	0		-	ns	
tAH80		Address hold time	0		-	ns	
tCY80		System cycle time for write	60		-	ns	
tCY80		System cycle time for read	90		-	ns	
tPWL	/WR	Pulse width low	30		-	ns	
tPWH	/RD	Pulse width time	30		-	ns	
tDS80	DB0 to DB7	Data setup time	20		-	ns	
tDH80		Data hold time	0		-	ns	
tACC80		Read access time	-		50	ns	CL=100pF
tOD80	Output disable time	10		50	ns		

5.4 The Reset Timing



Symbol	Signal	Parameters	Min.	Typ.	Max.	Unit	Conditions
t _{rw}	RESETB	Reset low pulse width	20		-	μs	
t _r	-	Reset time	-		1	μs	

6. INSTRUCTION SET

6.1 command

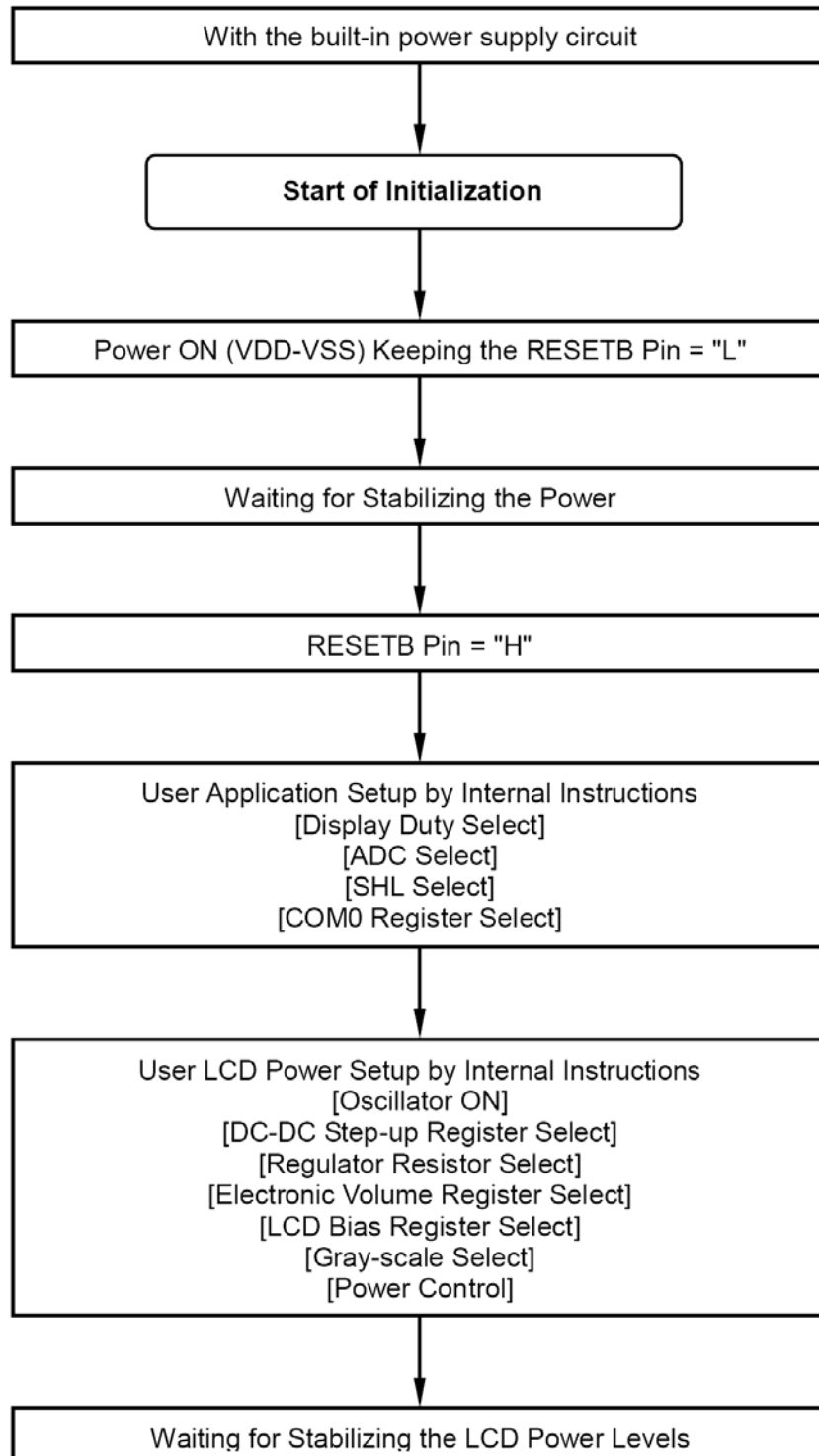
Instruction	RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Hex	Description
Read display data	1	1	Read data								-	Read data from DDRAM
Write display data	1	0	Write data								-	Write data into DDRAM
Read status	0	1	BUSY	ON	RES	0	0	0	1	0	-	Read the internal status
Icon control register ON/OFF	0	0	1	0	1	0	0	0	1	ICON	A2h A3h	ICON=0: ICON disable (default) ICON=1: Icon enable & set the page address to icon page
Set page address	0	0	1	0	1	1	P3	P2	P1	P0	B0h ~ BFh	Set page address
Set column address MSB	0	0	0	0	0	1	0	Y7	Y6	Y5	10h ~ 17h	Set column address MSB
Set column address LSB	0	0	0	0	0	0	Y4	Y3	Y2	Y1	00h ~ 0Fh	Set column address LSB
Set modify-read	0	0	1	1	1	0	0	0	0	0	E0h	Set modify-read mode
Reset modify-read	0	0	1	1	1	0	1	1	1	0	EEh	Release modify-read mode
Display ON/OFF	0	0	1	0	1	0	1	1	1	D	AE AF	D=0:disply OFF D=1:display ON
Set initial display line register	0	0	0	1	0	0	0	0	x	x	40h ~ 43h	2-byte instruction to specify the initial display line to realize vertical scrolling
	0	0	x	S6	S5	S4	S3	S2	S1	S0		
Set initial COM0 Register	0	0	0	1	0	0	0	1	x	x	44h ~ 47h	2-byte instruction to specify the initial COM0 to realize vertical scrolling
	0	0	x	C6	C5	C4	C3	C2	C1	C0		
Set partial display duty ratio	0	0	0	1	0	0	1	0	x	x	48h ~ 4Bh	2-byte instruction to set partial display duty ratio
	0	0	D7	D6	D5	D4	D3	D2	D1	D0		
Set N-line inversion	0	0	0	1	0	0	1	1	x	x	4Ch ~ 4Fh	2-byte instruction to set N-line inversion register
	0	0	x	x	x	N4	N3	N2	N1	N0		
Release N-line inversion	0	0	1	1	1	0	0	1	0	0	E4h	Release N-line inversion mode
Reverse display ON/OFF	0	0	1	0	1	0	0	1	1	REV	A6h A7h	REV=0: normal display REV=1:reverse display
Entire display ON/OFF	0	0	1	0	1	0	0	1	0	EON	A4h A5h	EON=0:normal display EON=1:entire display ON

Instruction	RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Hex	Description
Power control	0	0	0	0	1	0	1	VC	VR	VF	28h ~ 2Fh	Control power circuit operation
Select DC-DC step-up	0	0	0	1	1	0	DC2	1	DC1	DC0	64h ~ 6Fh	Select the step-up of the internal voltage converter
Select regulator resistor	0	0	0	0	1	0	0	R2	R1	R0	20h ~ 27h	Select internal resistance ratio of the regulator resistor
Set electronic volume register	0	0	1	0	0	0	0	0	0	1	81h	2-byte instruction to specify the reference voltage
	0	0	x	x	EV5	EV4	EV3	EV2	EV1	EV0		
Select LCD bias	0	0	0	1	0	1	0	B2	B1	B0	50h ~ 57h	Select LCD bias
SHL select	0	0	1	1	0	0	SHL	x	x	x	C0h ~ CFh	COM bi-directional selection SHL=0: normal direction SHL=1: reverse direction
ADC select	0	0	1	0	1	0	0	0	0	ADC	A0h A1h	SEG bi-directional selection ADC=0: normal direction ADC=1: reverse direction
Oscillator on start	0	0	1	0	1	0	1	0	1	1	ABh	Start the built-in Oscillator
Set power save mode	0	0	1	0	1	0	1	0	0	P	A8h A9h	P=0: normal mode P=1: power save mode
Release power save mode	0	0	1	1	1	0	0	0	0	1	E1h	Release power save mode
Reset	0	0	1	1	1	0	0	0	1	0	E2h	Initialize the internal functions
Set data direction & display data length (DDL)	x	x	1	1	1	0	1	0	0	0	E8h	2-byte instruction to specify the number of data bytes
	x	x	D7	D6	D5	D4	D3	D2	D1	D0		
NOP	0	0	1	1	1	0	0	0	1	1	E3h	No operation
Test Instruction	0	0	1	1	1	1	x	x	x	x	F0h ~ FFh	Don't use this instruction
Set FRC and PWM	0	0	1	0	0	1	0	FRC	PWM 1	PWM 0	90h ~ 97h	FRC (1: 3 FRC, 0: 4 FRC) PWM1 PWM0 0 0 9PWM 0 1 9PWM 1 0 12PWM 1 1 15PWM

Instruction	RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Hex	Description
Set white mode and 1 st /2 nd frame, set pulse width	0	0	1	0	0	0	1	0	0	0	88h	Set white mode and 1 st /2 nd frame
	0	0	WB3	WB2	WB1	WB0	WA3	WA2	WA1	WA0		
Set white mode and 3 rd /4 th frame, set pulse width	0	0	1	0	0	0	1	0	0	1	89h	Set white mode and 3 rd /4 th frame
	0	0	WD3	WD2	WD1	WD0	WC3	WC2	WC1	WC0		
Set light gray mode and 1 st /2 nd frame, set pulse width	0	0	1	0	0	0	1	0	1	0	8Ah	Set light gray mode and 1 st /2 nd frame
	0	0	LB3	LB2	LB1	LB0	LA3	LA2	LA1	LA0		
Set light gray mode and 3 rd /4 th frame, set pulse width	0	0	1	0	0	0	1	0	1	1	8Bh	Set light gray mode and 3 rd /4 th frame
	0	0	LD3	LD2	LD1	LD0	LC3	LC2	LC1	LC0		
Set dark gray mode and 1 st /2 nd frame, set pulse width	0	0	1	0	0	0	1	1	0	0	8Ch	Set dark gray mode and 1 st /2 nd frame
	0	0	DB3	DB2	DB1	DB0	DA3	DA2	DA1	DA0		
Set dark gray mode and 3 rd /4 th frame, set pulse width	0	0	1	0	0	0	1	1	0	1	8Dh	Set dark gray mode and 3 rd /4 th frame
	0	0	DD3	DD2	DD1	DD0	DC3	DC2	DC1	DC0		
Set black mode and 1 st /2 nd frame, set pulse width	0	0	1	0	0	0	1	1	1	0	8Eh	Set black mode and 1 st /2 nd frame
	0	0	BB3	BB2	BB1	BB0	BA3	BA2	BA1	BA0		
Set black mode and 3 rd /4 th frame, set pulse width	0	0	1	0	0	0	1	1	1	1	8Fh	Set black mode and 3 rd /4 th frame
	0	0	BD3	BD2	BD1	BD0	BC3	BC2	BC1	BC0		
Set Temperature Coefficient Value	0	0	1	1	1	1	0	0	0	1	F1h	0: -0.125%/°C 1: -0.05%/°C
	0	0	0	0	0	0	0	0	0	TC		
Select Oscillator Source	0	0	1	1	1	1	0	1	1	1	F7h	RC: 0: Internal OSC 1: External OSC FR Mode: 0: Mode 0 1: Mode 1
	0	0	0	0	0	0	0	0	FR Mode	RC		
Frame Frequency Adjust	0	0	1	1	1	1	0	1	1	0	F6h	OSC frequency select and frame divider select
	0	0	0	0	0	F4	F3	F2	F1	F0		
OTP Calibration Set	0	0	1	1	1	1	0	0	1	1	F3h	Set V0 OTP Data
	0	0	0	0	0	0	V0 OTP Data [3:0]					
Programming Set	0	0	1	1	1	1	0	1	0	0	F4h	OTP Programming
	0	0	0	0	0	0	0	0	PG	EN		

6.2 Initialization Sequence

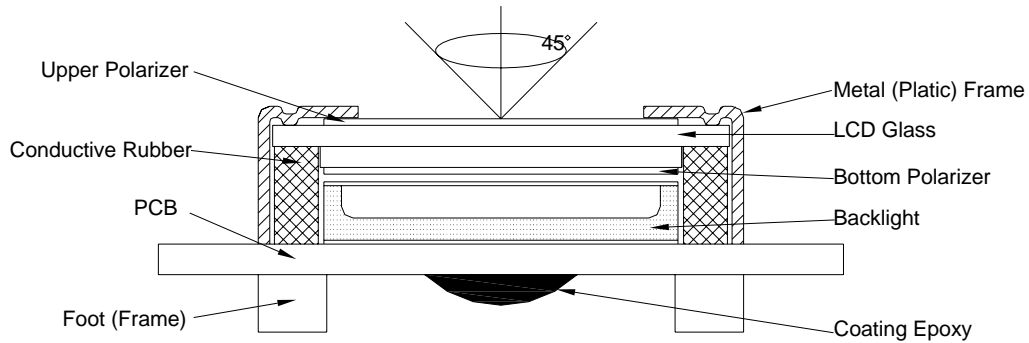
Referential Instruction Set-up Flow: Initializing with the built-in Power Supply Circuits



7. QUALITY SPECIFICATIONS

7-1. LCM Appearance and Electric inspection Condition

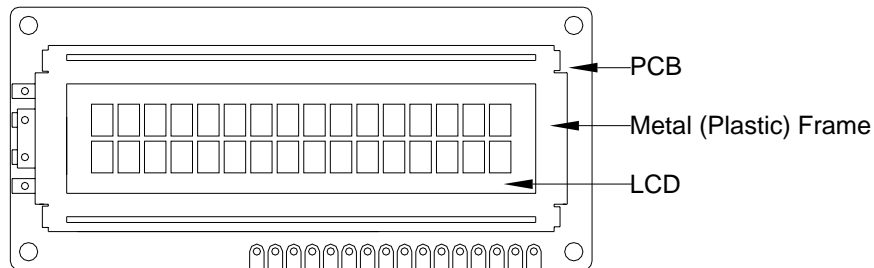
1. Inspection will be done by placing LCM 30cm away from inspector's eyeballs under normal illumination.



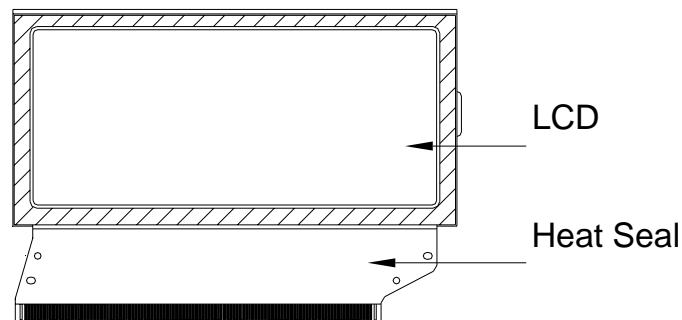
2. View Angle: with in 45° around perpendicular line.

7-2. Definition

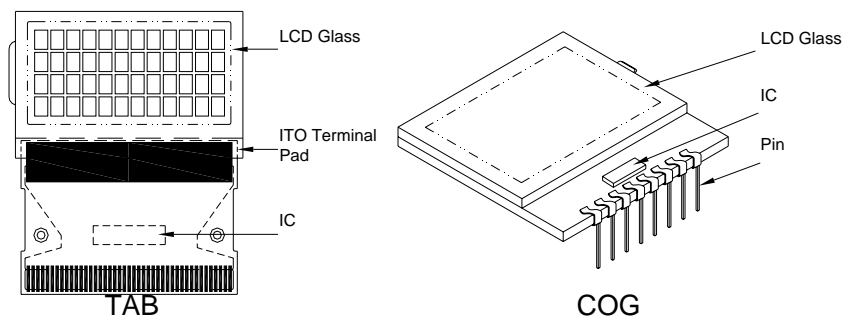
1. COB



2. Heat Seal



3. TAB and COG



7-3. Sampling Plan and Acceptance

1. Sampling Plan

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

2. Acceptance

Major defect: AQL = 0.25%

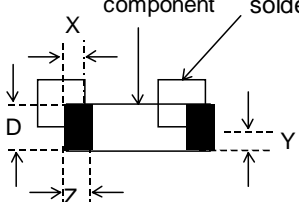
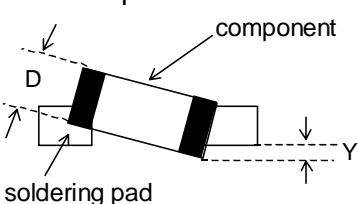
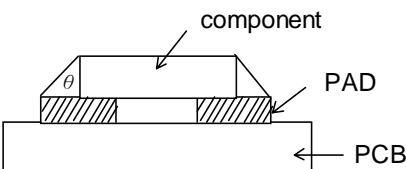
Minor defect: AQL = 0.65%

7-4. Criteria

1. COB

Defect	Inspection Item	Inspection Standards	
Major	PCB copper flakes peeling off	Any copper flake in viewing Area should be greater than 1.0mm ²	Reject
Major	Height of coating epoxy	Exceed the dimension of drawing	Reject
Major	Void or hole of coating epoxy	Expose bonding wire or IC	Reject
Major	PCB cutting defect	Exceed the dimension of drawing	Reject

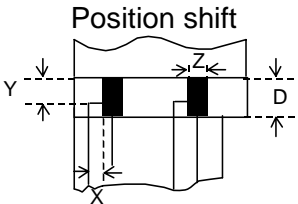
2. SMT

Defect	Inspection Item	Inspection Standards	
Minor	Component marking not readable		Reject
Minor	Component height	Exceed the dimension Of drawing	Reject
Major	Component solder defect (missing , extra, wrong component or wrong orientation)		Reject
Minor	<p>Component position shift</p> 	$X < 3/4Z$ $Y > 1/3D$	Reject Reject
Minor	<p>Component tilt</p> 	$Y > 1/3D$	Reject
Minor	<p>Insufficient solder</p> 	$\theta \leq 20^\circ$	Reject

3. Metal (Plastic) Frame

Defect	Inspection Item	Inspection Standards		
Major	Crack / breakage	Anywhere		
			Reject	
Minor	Frame Scratch	W	L	Acceptable of Scratch
		$w < 0.1\text{mm}$	Any	Ignore
		$0.1 \leq w < 0.2\text{mm}$	$L \leq 5.0\text{mm}$	2
		$0.2 \leq w < 0.3\text{mm}$	$L \leq 3.0\text{mm}$	1
		$w \geq 0.3\text{mm}$	Any	0
Note : 1. Above criteria applicable to scratch lines with distance greater than 5mm. 2. Scratch on the back side of frame (not visible) can be ignored .				
Minor	Frame Dent , Prick $\Phi = \frac{L + W}{2}$			Acceptable of Dents / Pricks
		$\Phi \leq 1.0\text{mm}$		2
		$1.0 < \Phi \leq 1.5\text{mm}$		1
		$1.5\text{mm} < \Phi$		0
Note : 1. Above criteria applicable to any two dents / pricks with distance greater than 5mm 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		

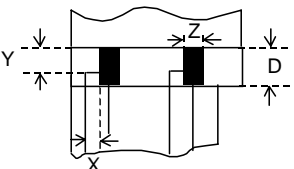
4. Flexible Film Connector (FFC)

Defect	Inspection Item	Inspection Standards	
Minor	Tilted soldering	Within the angle $+5^\circ$	Acceptable
Minor	Uneven solder joint /bump		Reject
Minor	Hole $\Phi = \frac{L + W}{2}$	Expose the conductive line	Reject
		$\Phi > 1.0\text{mm}$	Reject
Minor	 <p>Position shift</p>	$Y > 1/3D$	Reject
		$X > 1/2Z$	Reject

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

6. Heatseal 、TCP 、FPC

Defect	Inspection Item	Inspection Standards	
Major	Scratch expose conductive layer		Reject
Minor	HS Hole $\Phi = \frac{L+W}{2}$	$\Phi > 0.5\text{mm}$	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

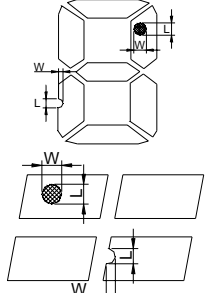
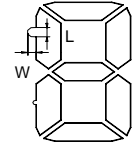
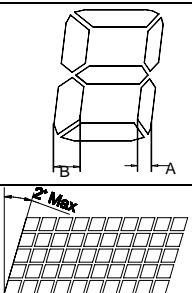
7. LED Backing Protective Film and Others

Defect	Inspection Item	Inspection Standards	
Minor	LED dirty, prick	Acceptable number of units	
		$\Phi \leq 0.10\text{mm}$	Ignore
		$0.10 < \Phi \leq 0.15\text{mm}$	2
		$0.15 < \Phi \leq 0.2\text{mm}$	1
		$\Phi > 0.2\text{mm}$	0
		The distance between any two spots should be $\geq 5\text{mm}$ 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

8. Electric Inspection

Defect	Inspection Item	Inspection Standards	
Major	Short		Reject
Major	Open		Reject

9. Inspection Specification of LCD

Defect	Inspect Item	Inspection Standards				
Minor	Linear Defect * Glass Scratch * Polarizer Scratch * Fiber and Linear material	W	$W \leq 0.03$	$0.03 < W \leq 0.05$	$W > 0.05$	
		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 and glass * Polarizer hole or protuberance by external force	Φ	$\Phi \leq 0.1$	$0.1 < \Phi \leq 0.15$	$0.15 < \Phi \leq 0.2$	$\Phi > 0.2$
		ACC. NO.	3EA / 100mm ²	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	$\Phi \leq 0.3$	$0.3 < \Phi \leq 0.5$	$0.5 < \Phi$	
		ACC. NO.	3EA / 100mm ²	1	0	
		Note	Φ is the average diameter of the defect. Distance between two defects > 10mm.			
Minor	Segment Defect 	Φ	$\Phi \leq 0.10$	$0.10 < \Phi \leq 0.20$	$0.20 < \Phi \leq 0.25$	$\Phi > 0.25$
		ACC. NO.	3EA / 100mm ²	2	1	0
		Note	W is more than 1/2 segment width			Reject
		Note	$\Phi = \frac{L + W}{2}$ Distance between two defect is 10mm			
Minor	Protuberant Segment  $\Phi = (L + W) / 2$	Φ	$\Phi \leq 0.10$	$0.10 < \Phi \leq 0.20$	$0.20 < \Phi \leq 0.25$	$\Phi > 0.25$
		W	Glue	$W \leq 1/2$ Seg $W \leq 0.2$	$W \leq 1/2$ Seg $W \leq 0.2$	Ignore
		ACC. NO.	3EA / 100mm ²	2	1	0
Minor	Assembly Mis-alignment 	1. Segment				
		B	$B \leq 0.4\text{mm}$	$0.4 < B \leq 1.0\text{mm}$	$B > 1.0\text{mm}$	
		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"				

8. RELIABILITY

NO.	Item	Condition	Criterion
1	High Temperature Operating	70°C, 96Hrs	No defect in cosmetic and operational function allowable.
2	Low Temperature Operating	-20°C, 96Hrs	
3	High Humidity	60°C, 90%RH, 96Hrs	
4	High Temperature Storage	80°C, 96Hrs	
5	Low Temperature Storage	-30°C, 96Hrs	
6	Vibration	Random wave 10 ~ 100Hz Acceleration: 2g 2 Hrs per direction(X,Y,Z)	Total current Consumption should be below double of initial value.
7	Thermal Shock	-20°C to 25°C to 70°C (60Min) (5Min) (60Min) 16Cycles	
8	ESD Testing	Contract Discharge Voltage: +1 ~ 5kV and -1 ~ -5kV	There will be discharged ten times at every discharging voltage cycle. The voltage gap is 1kV.
		Air Discharge Voltage: +1 ~ 8kV and -1 ~ -8kV	

Note: 1) Above conditions are suitable for our company standard products.
2) For restrict products, the test conditions listed as above must be revised.

9. HANDLING PRECAUTION

(1) Mounting Method

The panel of the LCD Module consists of two thin glass plates with polarizers which easily get damaged since the Module is fixed by utilizing fitting holes in the printed circuit board. Extreme care should be taken when handling the LCD Modules.

(2) Caution of LCD handling & cleaning

When cleaning the display surface, use soft cloth with solvent (recommended below) and wipe lightly.

- Isopropyl alcohol
- Ethyl alcohol
- Trichloro triflurothane

Do not wipe the display surface with dry or hard materials that will damage the polarizer surface.

Do not use the following solvent:

- Water- Ketone- Aromatics

(3) Caution against static charge

The LCD Module use C-MOS LSI drivers, so we recommend that you connect any unused input terminal to VDD or VSS, do not input any signals before power is turned on. And ground your body, Work/assembly table. And assembly equipment to protect against static electricity.

(4) Packaging

- Modules use LCD elements, and must be treated as such. Avoid intense shock and falls from a height.
- To prevent modules from degradation. Do not operate or store them exposed directly to sunshine or high temperature/humidity.

(5) Caution for operation

- It is indispensable to drive LCD's within the specified voltage limit since the higher voltage than the limit shorten LCD life. An electrochemical reaction due to direct current causes LCD deterioration, Avoid the use of direct current drive.
- Response time will be extremely delayed at lower temperature than the operating temperature range and on the other hand at higher temperature LCD's show dark color in them. However those phenomena do not mean malfunction or out of order with LCD's. Which will come back in the specified operating temperature range.
- If the display area is pushed hard during operation, some font will be abnormally displayed but it resumes normal condition after turning off once.
- A slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit.

Usage under the relative condition of 40°C, 50%RH or less is required.

(6) Storage

In the case of storing for a long period of time (for instance.) For years) for the purpose or replacement use, The following ways are recommended.

- Storage in a polyethylene bag with sealed so as not to enter fresh air outside in it, And with no desiccant.
- Placing in a dark place where neither exposure to direct sunlight nor light is. Keeping temperature in the specified storage temperature range.
- Storing with no touch on polarizer surface by the anything else. (It is recommended to store them as they have been contained in the inner container at the time of delivery)

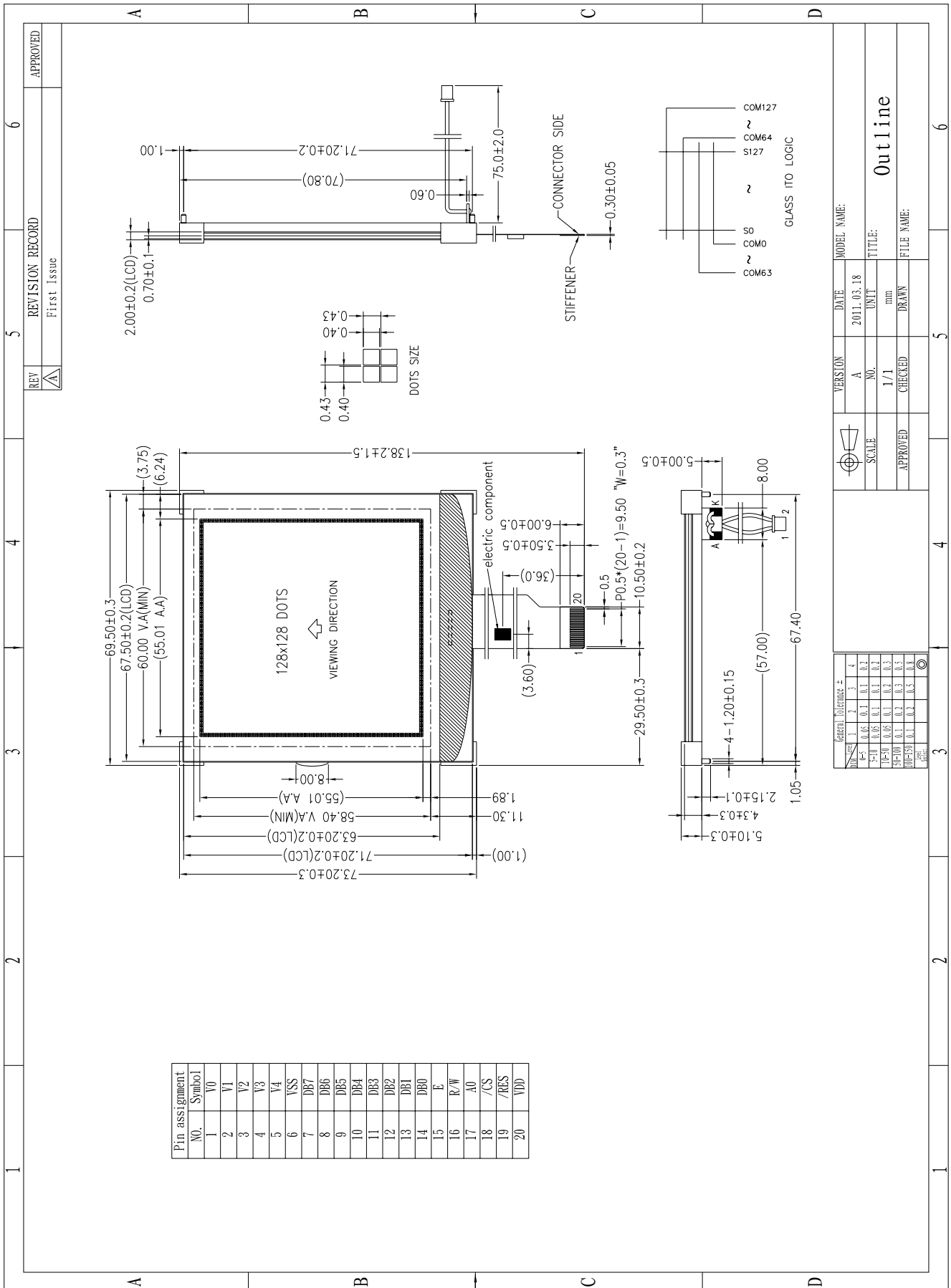
(7) Safety

- It is recommendable to crash damaged or unnecessary LCD into pieces and wash off liquid crystal by using solvents such as acetone and ethanol.

Which should be burned up later.

- When any liquid crystal leaked out of a damaged glass cell comes in contact with your hands, please wash it off well with soap and water.

10. OUTLINE DIMENSION



REVISION RECORD	REV	DATE	DESCRIPTION
First Issue	A	2011.03.18	

VERSION	DATE	MODEL NAME
A	2011.03.18	

NO.	UNIT	TITLE
1/1	mm	Outline

CHECKED	DRAWN	FILE NAME

General Tolerance ±	1	2	3	4
0-5	0.05	0.1	0.1	0.2
5-10	0.05	0.1	0.1	0.2
10-50	0.05	0.1	0.2	0.3
50-100	0.1	0.2	0.3	0.5
100-500	0.1	0.2	0.3	0.5
500-1000	0.1	0.2	0.3	0.5