

CUSTOMER	:	
MODEL	:	MOG-128GS24Y-A series
DESCRIPTION	:	LCD MODULE

◆ CUSTOMER APPROVAL

	CHECKED	CHECKED	APPROVAL
APPROVAL			
REMARK			

◆ SUPPLIER APPROVAL

PREPARED	CHECKED		APPROVAL

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1. General Specification

(1) Mechanical Dimension

Item	Dimension	Unit
Number of Dots	240 x 128	dots
Module dimension (L x W x H)	170.0 x 103.5 x 14.0(MAX)	mm
View area	128.0 x 75.0	mm
Active area	119.97 x 63.97	mm
Dot size	0.47x 0.47	mm
Dot pitch	0.5 x 0.5	mm

(2) Controller IC: T6963C controller

(3) Temperature Range

	Normal	Wide
Operating	0 ~+50°C	-20 ~+70°C
Storage	-10 ~+60°C	-30 ~+80°C

2. Absolute Maximum Ratings

Item	Symbol	Min	Typ	Max	Unit
Operating Temperature	T _{OP}	0	—	+50	°C
Storage Temperature	T _{ST}	-20	—	+70	°C
Input Voltage	V _I	V _{SS}	—	V _{DD}	V
Supply Voltage For Logic	V _{DD} -V _{SS}	-0.3	—	+7	V
Supply Voltage For LCD	V _{DD} -V _O	—	+18.5	—	V
Negative Voltage Output	V _{EE}	—	-16.0	—	V

3. Electrical Characteristics

Item	Symbol	Condition	Min	Typ	Max	Unit
Supply Voltage For Logic	Vdd-Vss	—	4.75	—	5.25	V
Supply Voltage For LCD	Vdd-Vo	* Ta=-20°C Ta=25°C * Ta=+70°C	— — —	19.5 18.0 16.5	— — —	V
Input High Volt.	V _{IH}	—	2.2	—	Vdd	V
Input Low Volt.	V _{IL}	—	0	—	0.8	V
Output High Volt.	V _{OH}	—	2.4	—	Vdd	V
Output Low Volt.	V _{OL}	—	0	—	0.4	V
Supply Current	I _{dd}	Vdd=5V	—	45	—	mA

4. Optical Characteristics

a. STN

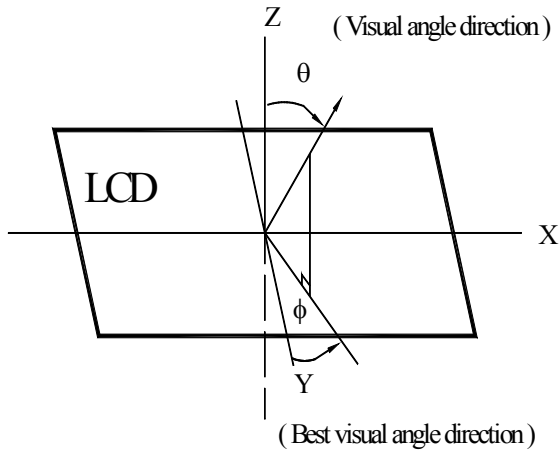
Item	Symbol	Condition	Min.	Typ.	Max.	Unit
View Angle	(V) θ	CR \geq 2	10		45	deg
	(H) φ	CR \geq 2	-30		30	deg
Contrast Ratio	CR	—		3		—
Response Time 25°C	T rise	—		100	150	ms
	T fall	—		150	200	ms

b. FSTN

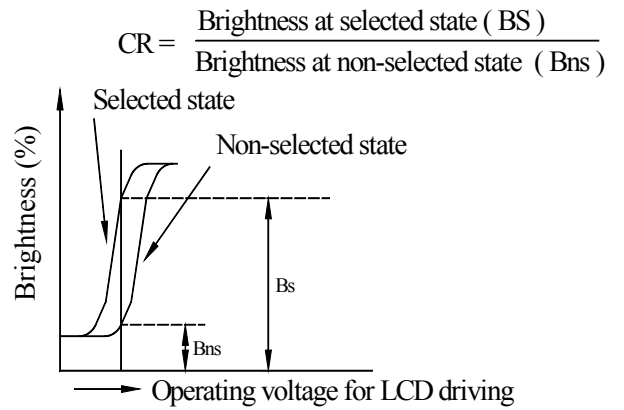
Item	Symbol	Condition	Min.	Typ.	Max.	Unit
View Angle	(V) θ	CR \geq 3	10		60	deg
	(H) φ	CR \geq 3	-45		45	deg
Contrast Ratio	CR	—		5		—
Response Time 25°C	T rise	—		100	150	ms
	T fall	—		150	200	ms

4.1 Definitions

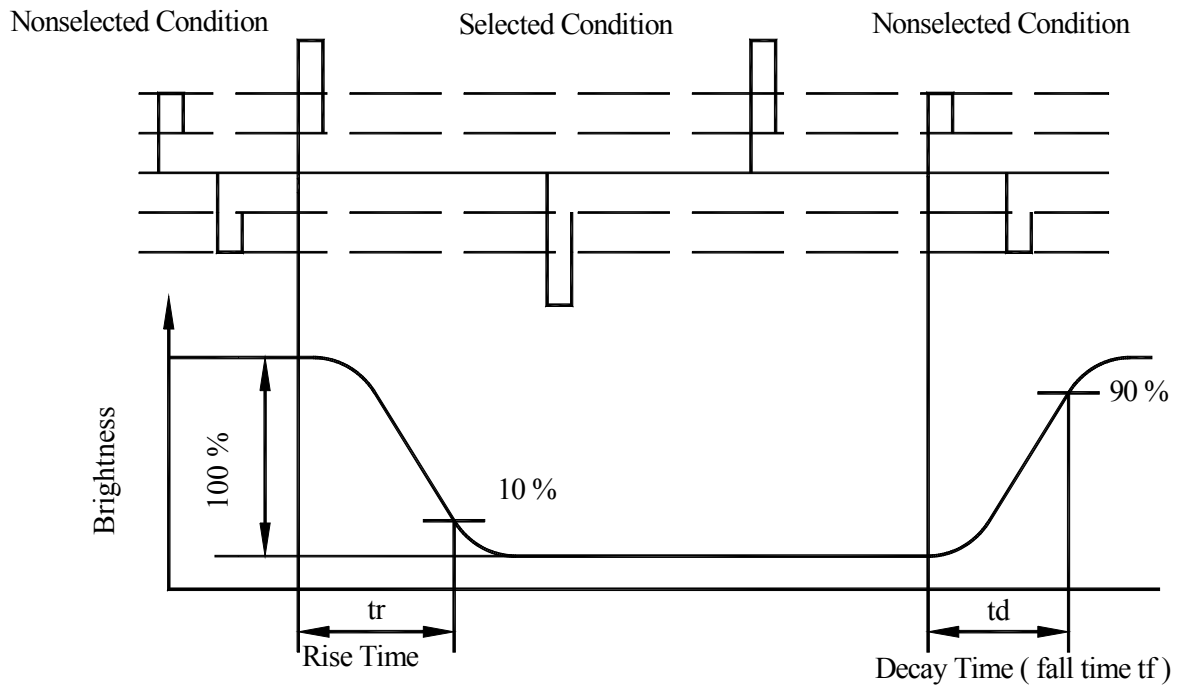
View Angles



Contrast Ratio



Response Time



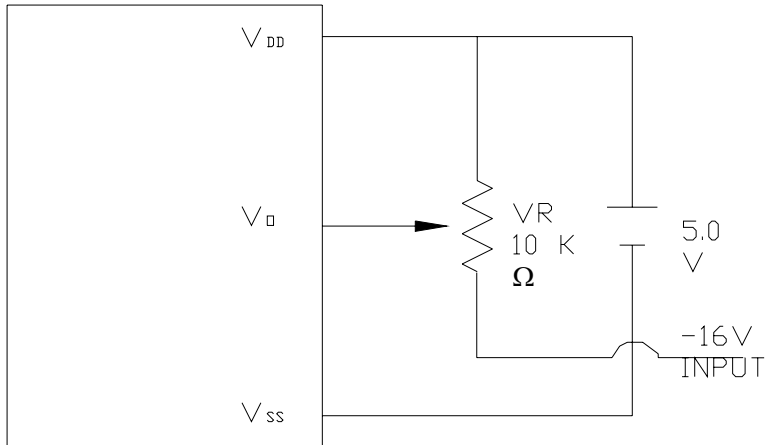
5. Interface Description

Pin No.	Symbol	Level	Description
1	FGND	—	Frame GND
2	Vss	—	Power supply (GND)
3	Vdd	—	Power supply (+5 V)
4	Vo	—	Contrast adjustment
5	/WR	L	Data write. Write data into T6963C when WR = L
6	/RD	L	Data read. Read data from T6963C when RD = L
7	/CE	L	L : Chip enable
8	C/D	H / L	WR=L , C/D=H : Command Write C/D=L: Data write RD=L , C/D=H : Status Read C/D=L: Data read
9	NC/Vee		NC or Negative voltage output -16.0V
10	/RESET	H / L	H : Normal ; L : Initialize T6963C
11	DB0	H / L	Data bus line
12	DB1	H / L	Data bus line
13	DB2	H / L	Data bus line
14	DB3	H / L	Data bus line
15	DB4	H / L	Data bus line
16	DB5	H / L	Data bus line
17	DB6	H / L	Data bus line
18	DB7	H / L	Data bus line
19	FS	MD2	Pins for selection of font; H : 6 x 8 , L : 8 x 8
20	RV	H / L	H:Reverse L:Normal

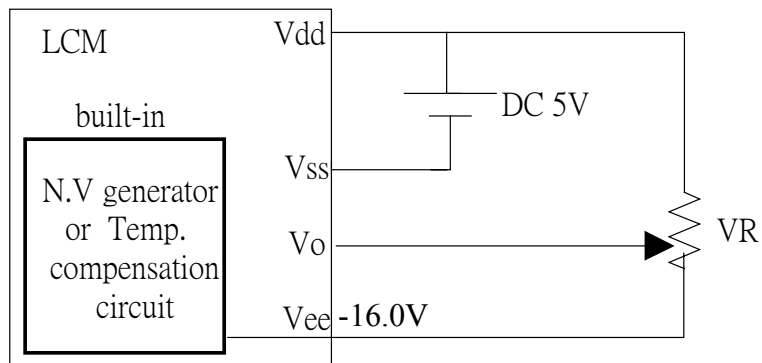
6. Power Supply for LCD Module and LCD Operating Voltage a Adjustment

- * LCM operating on " DC 5V " input with external negative voltage

LCD Module block diagram



- * (Option) LCM operating on " DC 5V " input with built-in negative voltage



7. Backlight Information

7.1 Specification CCFL/white

No.2 3 4 5 shall be lighted at constant lamp current (IL : 5.0 mA) and shall be measured 3 minutes after the table below. The measurement shall be conducted on the condition that ambient temperature : 25 ± 2 °C humidity : 30 ~ 85%, with no wind.

NO	Items	Requirements	Remarks
1	Lamp Current (IL)	5.0 ± 0.5 (mArms)	
2	Lamp Voltage (VL)	205 ± 20 (Vrms)	
3	Lamp Power (P) (Reference Value)	1.03 (Wrms)	VL * IL
4	Luminance	150 min (cd/m)	Note 1
5	Chromaticity (X) (Y)	0.308 ± 0.01 0.330 ± 0.01	Note 2
6	Starting Voltage (VS)	400 MAX (25°C) (Vrms) 600 MAX (0°C) (Vrms)	Note 3
7	Life time	10000 min (h)	Note 4

Note 1. The average value is measured though the glass.

Note 2. The tube center / center point shall be measured.

Note 3. All the tubes shall be lighted. Slide in method shall be used for voltage application.

Note 4. Life

Judgement conditions.

- A The luminance becomes 50% of the initial luminance.
- B Not normal lighting.
- C When a severe appearance failure is found.

LED edge white

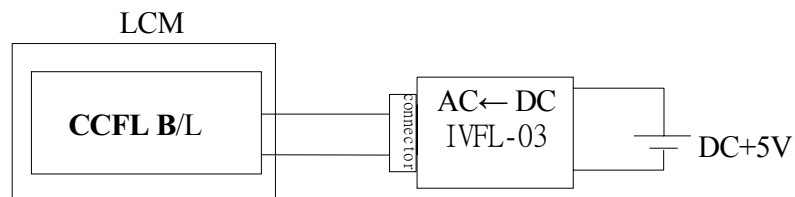
Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Supply Current	I _{LED}	—	200	250	mA	V=3.2V
Supply Voltage	V	—	3.2	3.4	V	
Reverse Voltage	V _R	—	—	8	V	
Luminous Intensity (backlight only)	I _V	150	200	—	cd/m ²	I _{LED} =200mA
Luminous Intensity (measure on LCD)	I _V	30	40	—	cd/m ²	I _{LED} =200mA
Wave Length	λ _p				nm	I _{LED} =200mA
Life Time		—	20000	—	Hr.	V ≤ 3.2V
Color	White					

EL white / blue

Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Voltage	Vrms	--	110 (AC)		--	
Frequency	HZ	--	400		--	
Brightness*	cd/m ²	48	60		--	110Vrms 400Hz
CIE Chromaticity Diagram	X	--	0.3019(white)		--	
			0.330 (blue)			
CIE Chromaticity Diagram	Y	--	0.3929(white)		--	
			0.365 (blue)			
Current Dissipation	mA/cm ²	--	3.63		--	
Power Dissipation	mW/cm ²	--	71.71		--	
Color	Blue , white					

7.2 Backlight driving methods

CCFL backlight



LED white backlight

Drived from LED backlight connecter(input 3.2V(DC))

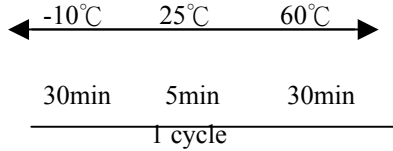
8. Quality Assurance

Screen Cosmetic Criteria

No.	Defect	Judgement Criterion	Partition																				
1	Spots	<p>A)Clear</p> <table border="1"> <thead> <tr> <th>Size:d mm</th> <th>Acceptable Qty in active area</th> </tr> </thead> <tbody> <tr> <td>$d \leq 0.1$</td> <td>Disregard</td> </tr> <tr> <td>$0.1 < d \leq 0.2$</td> <td>6</td> </tr> <tr> <td>$0.2 < d \leq 0.3$</td> <td>2</td> </tr> <tr> <td>$0.3 < d$</td> <td>0</td> </tr> </tbody> </table> <p>Note:Including pin holes and defective dots which must be within one pixel size.</p> <p>B)Unclear</p> <table border="1"> <thead> <tr> <th>Size:d mm</th> <th>Acceptable Qty in active area</th> </tr> </thead> <tbody> <tr> <td>$d \leq 0.2$</td> <td>Disregard</td> </tr> <tr> <td>$0.2 < d \leq 0.5$</td> <td>6</td> </tr> <tr> <td>$0.5 < d \leq 0.7$</td> <td>2</td> </tr> <tr> <td>$0.7 < d$</td> <td>0</td> </tr> </tbody> </table>	Size:d mm	Acceptable Qty in active area	$d \leq 0.1$	Disregard	$0.1 < d \leq 0.2$	6	$0.2 < d \leq 0.3$	2	$0.3 < d$	0	Size:d mm	Acceptable Qty in active area	$d \leq 0.2$	Disregard	$0.2 < d \leq 0.5$	6	$0.5 < d \leq 0.7$	2	$0.7 < d$	0	Minor
Size:d mm	Acceptable Qty in active area																						
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$0.5 < d \leq 0.7$	2																						
$0.7 < d$	0																						
2	Bubbles in Polarizer	<table border="1"> <thead> <tr> <th>Size:d mm</th> <th>Acceptable Qty in active area</th> </tr> </thead> <tbody> <tr> <td>$d \leq 0.3$</td> <td>Disregard</td> </tr> <tr> <td>$0.3 < d \leq 1.0$</td> <td>3</td> </tr> <tr> <td>$1.0 < d \leq 1.5$</td> <td>1</td> </tr> <tr> <td>$1.5 < d$</td> <td>0</td> </tr> </tbody> </table>	Size:d mm	Acceptable Qty in active area	$d \leq 0.3$	Disregard	$0.3 < d \leq 1.0$	3	$1.0 < d \leq 1.5$	1	$1.5 < d$	0	Minor										
Size:d mm	Acceptable Qty in active area																						
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$0.3 < d \leq 1.0$	3																						
$1.0 < d \leq 1.5$	1																						
$1.5 < d$	0																						
3	Scratch	In accordance with spots cosmetic criteria. When the light reflects on the panel surface, the scratches are not to be remarkable.	Minor																				
4	Allowable Density	Above defects should be separated more than 30mm each other.	Minor																				
5	Coloration	<p>Not to be noticeable coloration in the viewing area of the LCD panels.</p> <p>Back-light type should be judged with back-light on state only.</p>	Minor																				

9. Reliability

Content of Reliability Test

Environmental Test				
No.	Test Item	Content of Test	Test Condition	Applicable Standard
1	High Temperature storage	Endurance test applying the high storage temperature for a long time.	60°C 200hrs	—
2	Low Temperature storage	Endurance test applying the high storage temperature for a long time.	-10°C 200hrs	—
3	High Temperature Operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	50°C 200hrs	—
4	Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	0°C 200hrs	—
5	High Temperature/ Humidity Storage	Endurance test applying the high temperature and high humidity storage for a long time.	70°C, 90%RH 96hrs	—
6	High Temperature/ Humidity Operation	Endurance test applying the electric stress (Voltage & Current) and temperature / humidity stress to the element for a long time.	40°C, 90%RH 96hrs	—
7	Temperature Cycle	Endurance test applying the low and high temperature cycle. 	-10°C/60°C 10 cycles	—
Mechanical Test				
8	Vibration test	Endurance test applying the vibration during transportation and using.	10~22Hz→1.5mmp-p 22~500Hz→1.5G Total 0.5hrs	—
9	Shock test	Constructional and mechanical endurance test applying the shock during transportation.	50G Half sign wave 11 msdc 3 times of each direction	—
10	Atmospheric pressure test	Endurance test applying the atmospheric pressure during transportation by air.	115mbar 40hrs	—
Others				
11	Static electricity test	Endurance test applying the electric stress to the terminal.	VS=800V, RS=1.5kΩ CS=100pF 1 time	—

***Supply voltage for logic system=5V. Supply voltage for LCD system = Operating voltage at 25°C

10. External Dimension

PTN NO	SYMBOL
1	FGND
2	GND
3	Vdd
4	Vee
5	WR
6	RD
7	CE
8	C/D
9	NC
10	RESET
11	DB0
12	DB1
13	DB2
14	DB3
15	DB4
16	DB5
17	DB6
18	DB7
19	FS
20	RV

