CUSTOMER :

M O D E L : MOG-3224-R series

DESCRIPTION : LCD MODULE

◆ CUSTOMER APPROVAL

APPROVAL	CHECKED	CHECKED	APPROVAL
REMARK			

◆ SUPPLIER APPROVAL

PREPARED	CHECKED		APPROVAL

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1. Mechanial Data

(1) NUMBER OF DOTS ---------- 320 W * 240 H DOTS

(2) MODULE SIZE ---------- 167.5 W * 109.0 H * 13.0 T (max) mm

(3) EFFECTIVE AREA ---------- 120.5 * 92.0 W(min) H mm

(4) ACTIVE AREA ---------- 115.17 W * 86.37 H mm

(5) DOT SIZE ---------- 0.33 W * 0.33 H mm

(6) DOT PITCH ---------- 0.36 W * 0.36 H mm

(7) PROCESS & MATERIALS---------- RoHS COMPLIANT

2. Absolute Maximum Ratings

2.1 Electrical Absolute Maximum Ratings

I T E M	*SYMBOL*	*MIN.*	*MAX.*	*UNIT*	*COMMENT*
POWER SUPPLY FOR LOGIC	V_{DD}-V_{SS}	0	5.5	V	---------
INPUT VOLTAGE	V_I	V_{SS}	V_{DD}	V	---------
STATIC ELECTRICITY	---------	------	100	V	NOTE (1)
POWER SUPPLY FOR CCFL BACKLIGHT	V_S	------	AC1000	V_{rms}	---------
	f_{FL}	------	55.0	KHz	---------
STARTING VOLTAGE FOR CCFL BACKLIGHT	Vstart1	AC550	------	V_{rms}	Ta = 25℃
	Vstart2	AC700	------	V_{rms}	Ta = 25℃
POWER SUPPLY FOR LED	V_{LED}	------	5.0	V	------

NOTE (1): ELECTRO-STATIC DISCHARGE RESISTANCE IS TESTED BY CHARGING A 200PF CAPACITOR AND DISCHARGING IT BY CONTACT WITH A INTERFACE CONNECTOR PIN.

2.2 Environmental Absolute Maximum Ratings

I T E M	*OPERATING*		*STORAGE*		*COMMENT*
	MIN.	*MAX.*	*MIN.*	*MAX.*	
⚠1 AMBIENT TEMPERATURE	-20℃	70℃	-30℃	80℃	------
HUMIDITY	NOTE (2)		NOTE (2)		NO CONDENSATION
VIBRATION NOTE (3)	------	0.5G	------	2G	10～300HZ XYZ DIRECTIONS 1 Hr EACH
SHOCK NOTE (3)	------	3G	------	50G	10 msec XYZ DIRECTIONS 1 TIME EACH
CORROSIVE GAS	NOT ACCEPTABLE		NOT ACCEPTABLE		------

NOTE (2): Ta ≦ 70℃: 75% RH MAX.

Ta ＞ 70℃: ABSOLUTE HUMIDITY MUST BE LOWER THAN THE HUMIDITY OF 75% RH AT 70℃.

NOTE (3): 1G = 9.8 m/s^2

3. Electrical Characteristics

Ta = 25℃ VDD = 5.0V±0.25 V

I T E M	*SYMBOL*	*CONDITION*		*MIN.*	*TYP.*	*MAX.*	*UNIT*
POWER SUPPLY VOLTAGE FOR CIRCUIT	V_{DD}-V_{SS}	----------		4.75	5.0	5.25	V
INPUT VOLTAGE	V_{IH}	H LEVEL		0.8V_{DD}	------	V_{DD}	V
	V_{IL}	L LEVEL		V_{SS}	------	0.2V_{DD}	V
POWER SUPPLY CURRENT, NOTE (1)	I_{DD}	V_{DD}-V_{SS} = 5.0V		------	70.0	80.0	mA
RECOMMENDED LCD DRIVING VOLTAGE, NOTE(2) NOTE(3)-A	V_O-V_{SS}	DUTY =1/240 Φ=10° NOTE(4)	Ta=-20°C	------	24.3	------	V
			Ta= 25°C	------	22.9	------	V
			Ta= 70°C	------	21.1	------	V
RECOMMENDED LCD DRIVING VOLTAGE, NOTE(2) NOTE(3)-B	V_O-V_{SS}	DUTY =1/240 Φ=10° NOTE(4)	Ta=-20°C	------	24.9	------	V
			Ta= 25°C	------	23.5	------	V
			Ta= 70°C	------	21.7	------	V
CCFL LAMP	V_{FL}	f_{FL} = 35KHz		------	270	------	Vrms
	I_{FL}	V_{FL} = 270 Vrms f_{FL} = 35 KHz		------	5.0	------	mArms
CCFL LIFETIME	------	V_{FL} = 270 Vrms f_{FL} = 35 KHz		------	30,000	------	hr
FLM FREQUENCY	f_{FLM}	----------		70	75	80	Hz
POWER SUPPLY CURRENT FOR LED BACKLIGHT	I_{LED}	V_{LED}= +4.0 V		------	120.0	160.0	mA

NOTE (1): THE DISPLAY PATTERN IS ALL “ON”, OR ALL “OFF”

(2): RECOMMENDED LCD DIRVING VOLTGE MAY FLUCTUATE ABOUT ±0.5V BY EACH MODULE.

(3): RECOMMENDED LCD DIRVING VOLTGE FOR DEFFERENT LCD TYPE

	LCD TYPE	*LCD COLOR*
A	FSTN	BLACK(NEGATIVE)
B	FSTN	WHITE(POSITIVE)
	STN	BLUE(NEGATIVE)

(4): θ = 0° : VIEWING ANGLE AT 6 O’CLOCK
θ = 180° : VIEWING ANGLE AT 12 O’CLOCK

4. Optical Characteristics

STN TYPE LCD *Ta = 25℃*

I T E M	*SYMBOL*	*CONDITION*	*MIN.*	*TYP.*	*MAX.*	*UNIT*	*NOTE*
VIEWING ANGLE	Φ2-Φ1	K = 2.0 NOTE(1)	30	40	----	deg.	NOTE(2)
CONTRAST RATIO	K	Φ = 10° NOTE(1)	3.0	4.0	----	----	NOTE(2)
RESPONSE TIME	tr (rise)	Φ = 10° NOTE(1)	----	200	350	ms	NOTE(2)
	tf (fall)	Φ = 10° NOTE(1)	----	300	400	ms	NOTE(2)

FSTN TYPE LCD *Ta = 25℃*

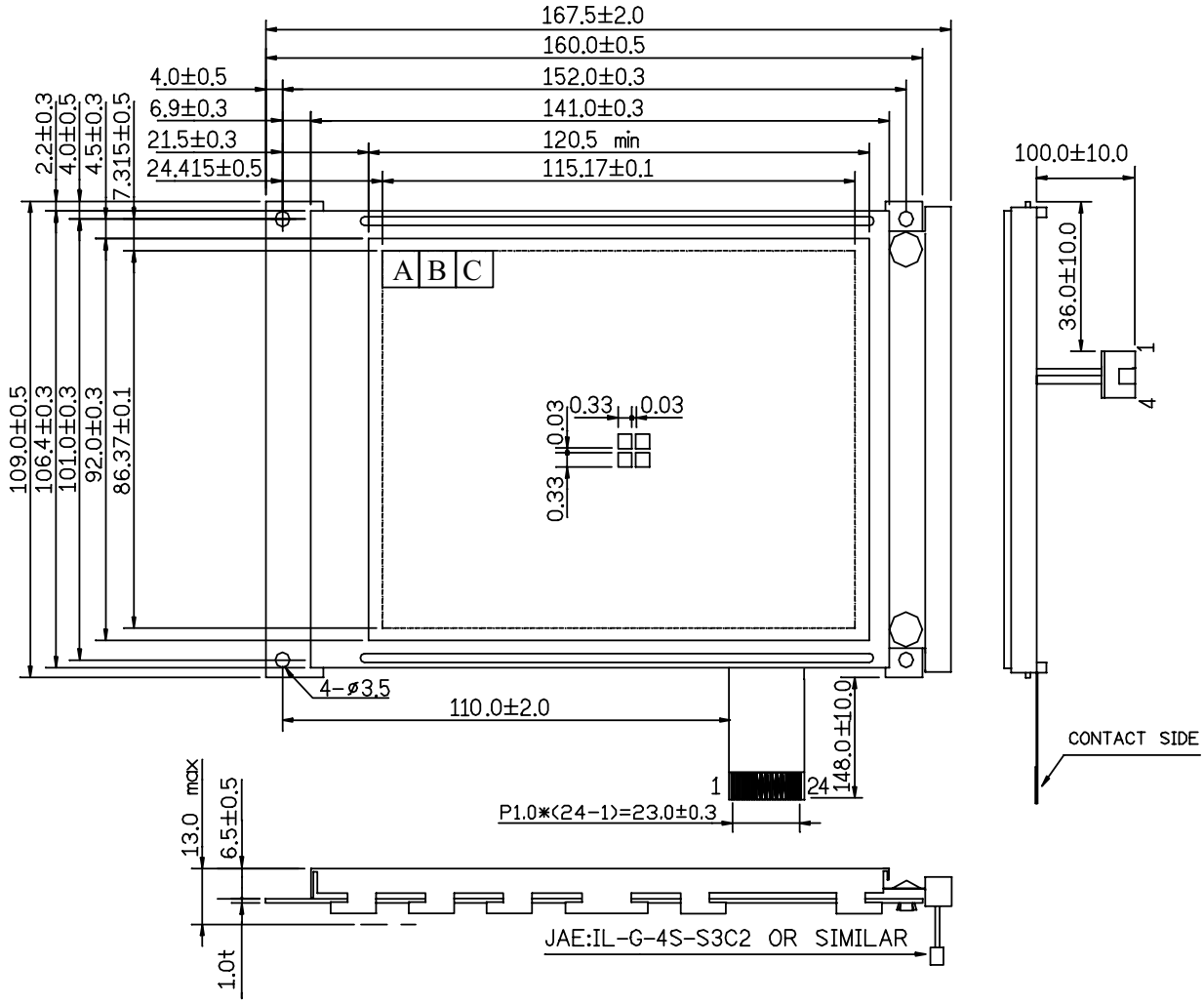
I T E M	*SYMBOL*	*CONDITION*	*MIN.*	*TYP.*	*MAX.*	*UNIT*	*NOTE*
VIEWING ANGLE	Φ2-Φ1	K = 2.0 NOTE(1)	30	40	----	deg.	NOTE(2)
CONTRAST RATIO	K	Φ = 10° NOTE(1)	4.0	5.0	----	----	NOTE(2)
RESPONSE TIME	tr (rise)	Φ = 10° NOTE(1)	----	200	350	ms	NOTE(2)
	tf (fall)	Φ = 10° NOTE(1)	----	300	400	ms	NOTE(2)

Brightness for backlight

Symbol	*Condition*		*MIN.*	*TYP.*	*MAX.*	*UNIT*	*Backlight Type*	*Note*
B	V_{FL}=270Vrms f_{FL}=35KHz STN/FSTN POSITIVE	Dots all on	------	5	------	cd/m²	CCFL	Note(2) Note(3)
		Dots all off	------	60	------			
	V_{FL}=270Vrms f_{FL}=35KHz STN/FSTN NEGATIVE	Dots all on	------	160	------			
		Dots all off	------	60	------			
	Φ = 0° θ = 0° STN/FSTN POSITIVE	Dots all on	------	5	------		LED (WHITE)	
		Dots all off	------	160	------			
	Φ = 0° θ = 0° STN/FSTN NEGATIVE	Dots all on	------	160	------			
		Dots all off	------	5	------			

Note (1): θ = 0° WHEN VIEWING ANGLE AT 6 O'CLOCK
θ = 180° WHEN VIEWING ANGLE AT 12 O'CLOCK
(2): SEE CUSTOMER ACCEPTANCE STANDARD SPECIFICATION FOR DEFINITION OF OPTICAL CHARACTERISTICS.
(3): UNDER NORMAL TEMPERATURE AND HUMIDITY IN A DARK ROOM.

5. Outline Dimension



NOTE :
1.UNIT : mm
2.SCALE : NTS

5.1 Interface

(a) Pin Assignment

PIN NO.	*SYMBOL*	*FUNCTION*
1	V_{SS}	POWER SUPPLY (GND)
2	V_{DD}	POWER SUPPLY
3	V_O	OPERATING VOLTAGE FOR LCD DRIVING
4	A_O	DATA TYPE SELECTION
5	$\overline{WR}$(R/$\overline{W}$)	(When 8080-series) : $\overline{WR}$ IS (L) (When 6800-series) : Read mode : R/$\overline{W}$ IS (H) Write mode : R/$\overline{W}$ IS (L)
6	$\overline{RD}$/E	$\overline{RD}$:(When to 8080-series) E : (When to 6800-series)
7	D0	DATA INPUT/OUTPUT
8	D1	DATA INPUT/OUTPUT
9	D2	DATA INPUT/OUTPUT
10	D3	DATA INPUT/OUTPUT
11	D4	DATA INPUT/OUTPUT
12	D5	DATA INPUT/OUTPUT
13	D6	DATA INPUT/OUTPUT
14	D7	DATA INPUT/OUTPUT
15	$\overline{CS}$	L:CHIP SELECTION
16	$\overline{RES}$	L: RESET
17	V_{EE}	POWER SUPPLY FOR LCD DRIVING (OUTPUT)
18	SEL1	8080 OR 6800 FAMILY INTERFACE SELECT L:80 SERIES , H:68 SERIES
19	F.G	FRAME GROUND
20	/WAIT	WAIT
21	N.C	NO CONNECTION
22	N.C	NO CONNECTION
23	N.C	NO CONNECTION
24	N.C	NO CONNECTION

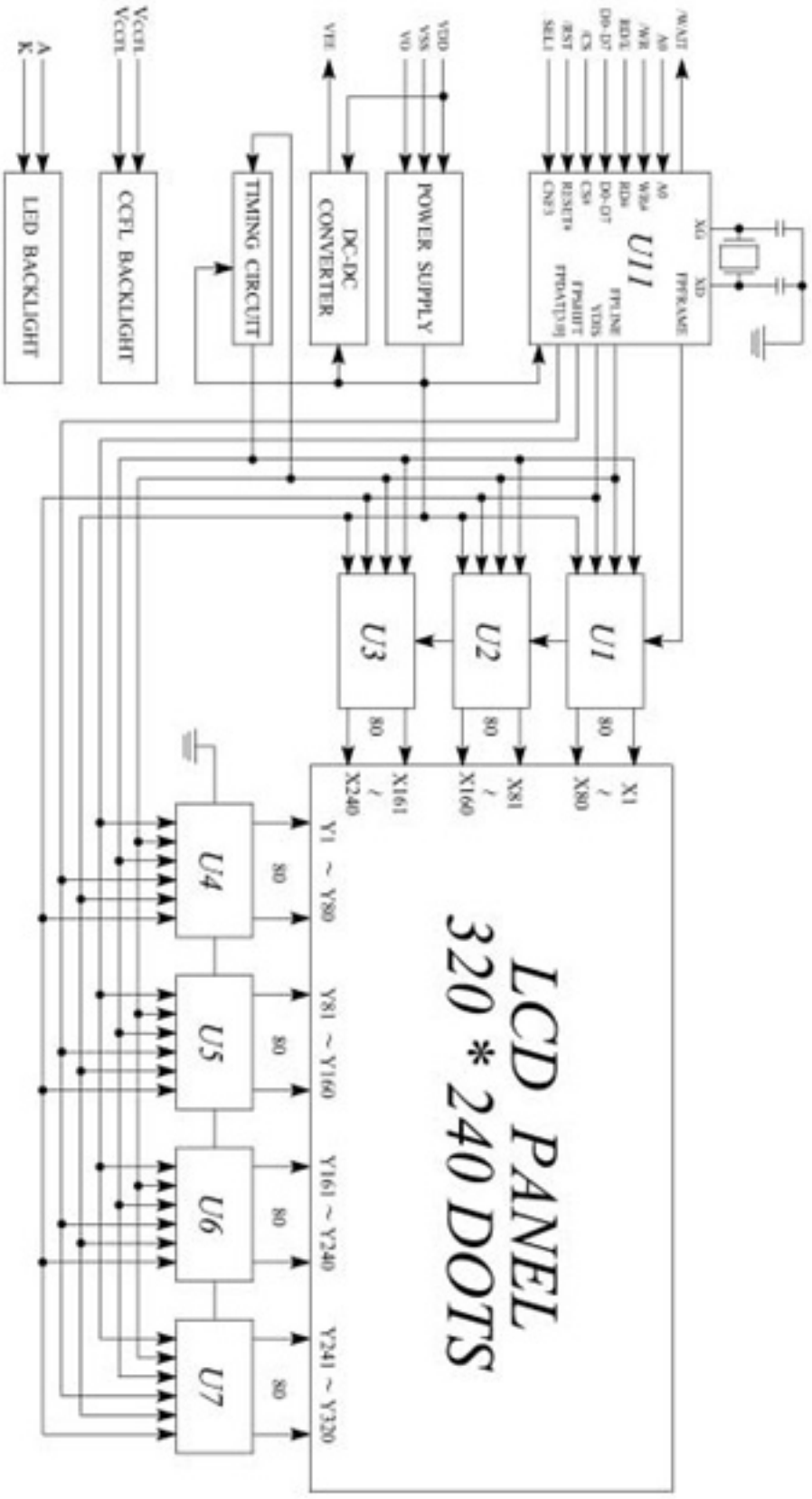
(b) CCFL Connector

PIN NO.	*SYMBOL*	*FUNCTION*
1	V_{CCFL}	POWER SUPPLY VOLTAGE FOR CCFL
2	N.C	NO CONNECTION
3	N.C	NO CONNECTION
4	V_{CCFL}	POWER SUPPLY VOLTAGE FOR CCFL

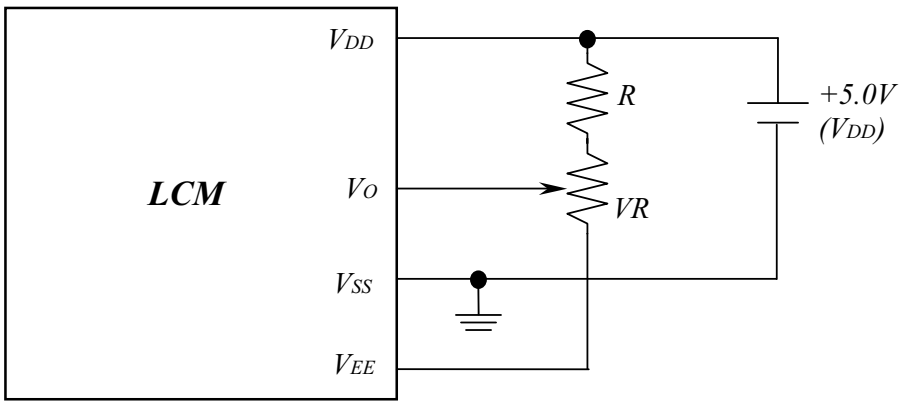
(c) LED Connector

PIN NO.	*SYMBOL*	*FUNCTION*
1	A	POWER SUPPLY VOLTAGE FOR LED(+)
2	N.C	NO CONNECTED
3	N.C	NO CONNECTED
4	K	POWER SUPPLY VOLTAGE FOR LED(-)

6. Block Diagram

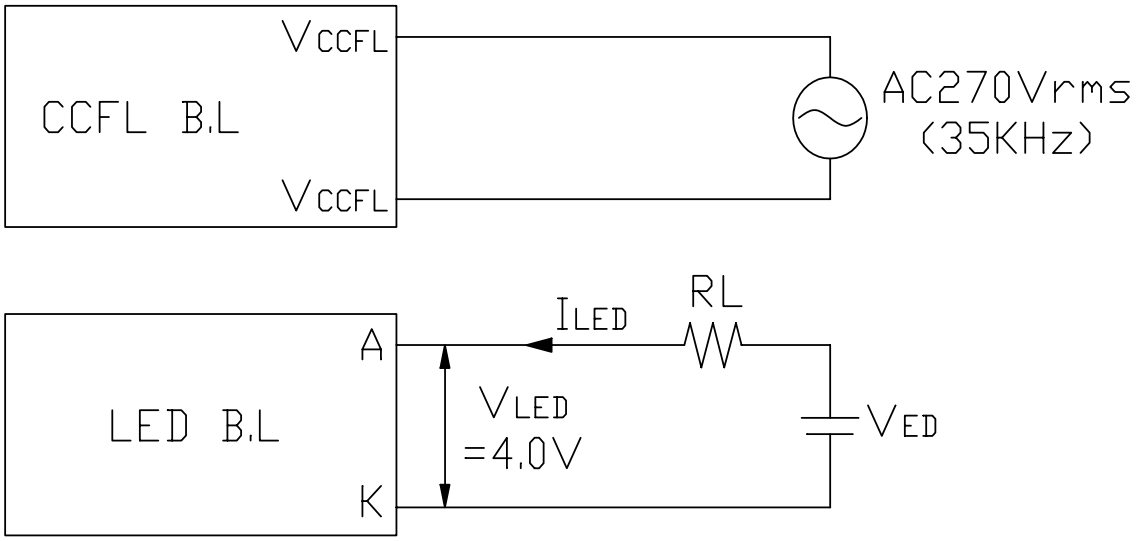


7. Power Supply for LCM



VO–VSS: LCD DRIVING VOLTAGE
RECOMMEND RESISTOR R: VDD-VO≧1.5V
VR: 200KΩ

7.1 Power Supply for Backlight



RL≧(VED-VLED) / ILED , ILED ≤ 160.0 mA (max)