SPEC / HOOK-UP DIAGRAM
FOR LCD-113

Please note: These specs have been modified. They originally applied to modules with LED backlights. Our CAT# LCD-113 has an Electroluminescent backlight which requires an inverter for power. We do not have the specs for that inverter.

2. MECHANICAL SPECIFICATIONS

(1)	NUMBER OF CHARACTER	24 CH * 2 LINES
(2)	MODULE SIZE	118.0W * 36.0H * 14.0D (max.) mm
(3)	EFFECTIVE AREA	94.5W * 17.8H mm
(4)	CHARACTER FONT	5 * 7 DOTS + CURSOR
(5)	CHARACTER SIZE	3.20W * 5.55H mm
(6)	CHARACTER PITCH	3.70W * 5.95H mm
(7)	DOT SIZE	0.60W * 0.65H mm
(8)	DOT PITCH	0.65W * 0.70H mm
(9)	LCD TYPE *	
(10)	DRIVING METHOD	1 / 16 DUTY MULTIPLEX DRIVE
(11)	BACK-LIGHT *	

* PLEASE REFER TO NUMBERING SYSTEM

3. ABSOLUTE MAXIMUM RATINGS

3.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS.

PARAMETER	SYMBOL	MIN.	MAX.	UNIT	REMARK
POWER SUPPLY FOR LOGIC	VDD – VSS	0	7.0	V	
POWER SUPPLY FOR LCD DRIVE	VDD – VO	0	13.0	V	
INPUT VOLTAGE	VI	VSS	VDD	V	
STATIC ELECTRICITY	—	—	100	V	NOTE (1)
~~LED POWER DISSIPATION~~	~~PD~~	~~—~~	~~4.5~~	~~W~~	
~~LED FORWARD CURRENT~~	~~IF~~	~~—~~	~~300~~	~~mA~~	
~~LED REVERSE VOLTAGE~~	~~VR~~	~~—~~	~~8~~	~~V~~	

NOTE (1) : TEST METHOD AND CONDITIONS :
AFTER CHARGING UP 200 pF CAPACITOR BY STATED VOLTAGE, THE CAPACITOR IS CONNECTED WITH INTERFACE PINS OF THE MODULE.

3.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS.

ITEM	OPERATING		STORAGE		REMARK
	MIN.	MAX.	MIN.	MAX.	
AMBIENT TEMPERATURE	-20°C	70°C	-30°C	80°C	NOTE (1), (3)
HUMIDITY	NOTE (2)		NOTE (2)		WITHOUT CONDENSATION
VIBRATION	—	4.9 m/s^2 (0.5G)	—	19.6 m/s^2 (2G)	
SHOCK	—	29.4 m/s^2 (3G)	—	490.0 m/s^2 (50G)	XYZ DIRECTIONS
CORROSIVE GAS	NOT ACCEPTABLE		NOT ACCEPTABLE		

NOTE (1) : BACKGROUND COLOR CHANGES SLIGHTLY DEPENDING ON AMBIENT TEMPERATURE THIS PHENOMENON IS REVERSIBLE.
NOTE (2) : Ta ≤ 60°C : 90%RH (96HR MAX.)
Ta > 60°C : ABSOLUTE HUMIDITY MUST BE LOWER THAN THE HUMIDITY OF 90%RH AT 60°C (96HR MAX.)
NOTE (3) : Ta AT -30°C : WILL BE < 48hrs
80°C : WILL BE < 168hrs

4. ELECTRICAL CHARACTERISTICS

Ta = 25°C VDD = 5.0 ± 0.25 V

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
POWER SUPPLY VOLTAGE FOR LOGIC	VDD	—	4.75	5.0	5.25	V
H LEVEL INPUT VOLTAGE	VIH	—	2.2	—	—	V
L LEVEL INPUT VOLTAGE	VIL	—	—	—	0.6	V
H LEVEL OUTPUT VOLTAGE	VOH	–IOH = 0.2 mA	2.4	—	—	V
L LEVEL OUTPUT VOLTAGE	VOL	IOL = 1.2 mA	—	—	0.4	V
POWER SUPPLY CURRENT (LOGIC)	IDD	VDD = 5.0 V	—	2.0	5.0	mA
RECOMMENDED LCD DRIVING VOLTAGE	VDD – VO	Ta = - 20 °C	3.9	4.4	4.9	V
	θx= 0°, θy-=10°	Ta = 25 °C	3.9	4.4	4.9	V
	DUTY= 1/16	Ta = 70 °C	3.9	4.4	4.9	V
CLOCK OSCILLATION FREQUENCY	FOSC	Ta = 25°C	—	270	—	KHz
~~LED FORWARD VOLTAGE~~	VF	IF = 150 mA	—	~~4.2~~	~~4.6~~	V
LED FORWARD CURRENT	IF		—	150	—	mA
~~LED REVERSE CURRENT~~	IR	VR = 8 V	—	—	~~150~~	uA

5. OPTICAL CHARACTERISTICS.

Ta = 25 °C VDD = 5.0 ± 0.25 V

I T E M	SYMBOL	CONDITION		MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING ANGLE	θy+	K*	θx=0°	(48)	(53)	—	deg.	1
	θy-			(55)	(60)	—		
	θx+		θy=0°	(36)	(41)	—	deg.	1
	θx-			(34)	(59)	—		
CONTRAST RATIO	K	θx = 0°, θy- = 10°		2.2	2.9	—	—	1
RESPONSE TIME	tr (rise)	θx = 0° θy- = 10°	Ta = -20°C	—	5538	7199	ms	1
			Ta = 25°C	—	228	296		
			Ta = 70°C	—	104	135		
	tf (fall)		Ta = -20°C	—	2316	3011		
			Ta = 25°C	—	174	226		
			Ta = 70°C	—	85	111		
THE BRIGHTNESS OF BACK-LIGHT	L	VDD = 5.0 V		15	25	—	cd/m²	1, 2
				22.5	37.5	—		1, 3
PEAK EMISSION WAVELENGTH	λP	VDD = 5.0 V		570	572	575	nm	1

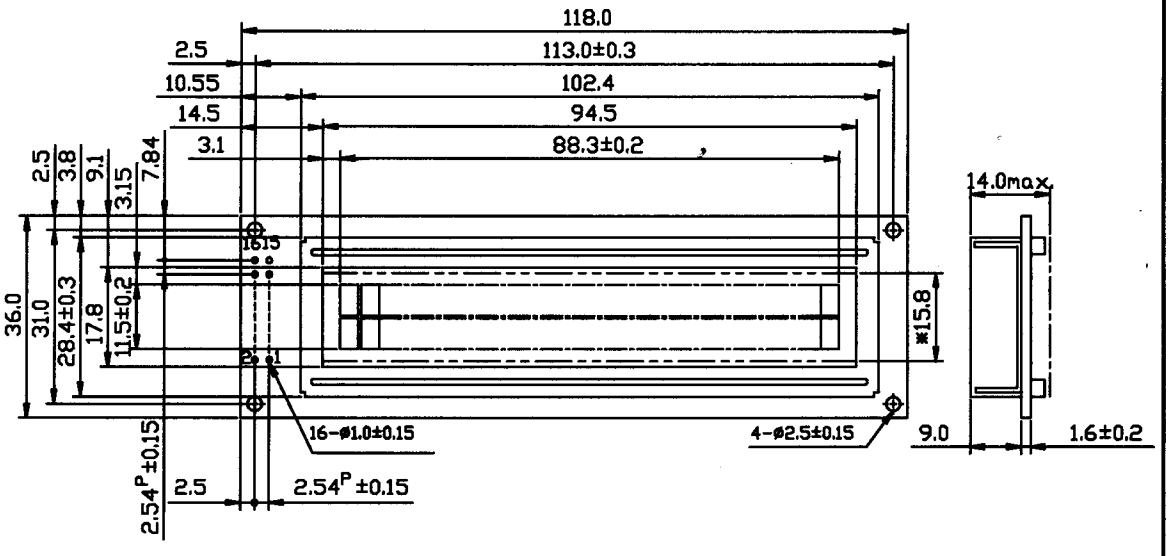
K*: STN : K ≥ 1.5
FSTN : K ≥ 2.0

NOTE (1): PLEASE REFER TO :
CUSTOMER ACCEPTANCE STANDARD SPECIFICATION: EU-002B

NOTE (2): POLARIZER MODE : TRANSFLECTIVE

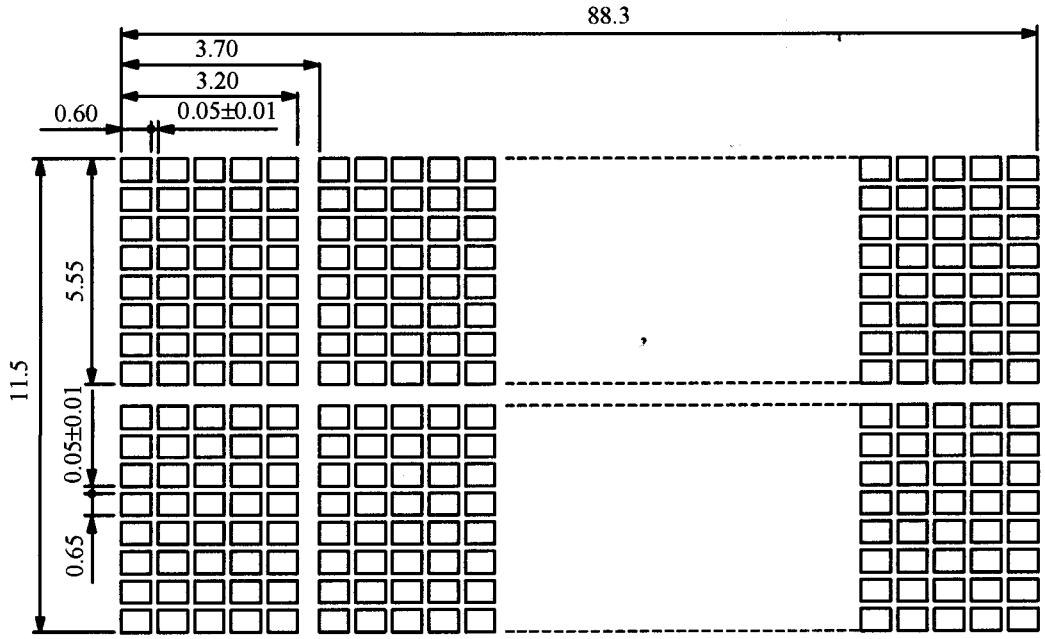
NOTE (3): POLARIZER MODE : TRANSMISSIVE

6. OUTLINE DIMENSION



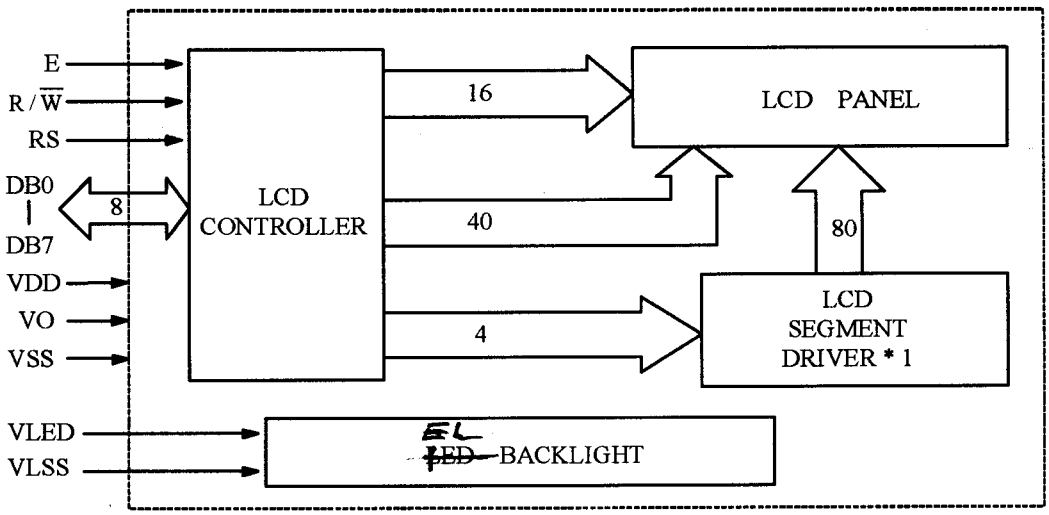
*LIGHTING AREA WHEN LED B/L IS ON
UNIT : mm
SCALE : NTS
NOT SPECIFIED TOLERANCE IS ± 0.5

7. DETAIL DRAWING OF DOT MATRIX



UNIT : mm
SCALE : NTS
NOT SPECIFIED TOLERANCE IS ± 0.1

8. BLOCK DIAGRAM

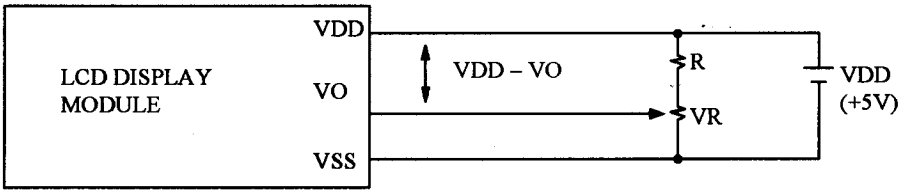


9. INTERFACE SIGNALS

PIN NO.	SYMBOL	DESCRIPTION	FUNCTION
1	VSS	GROUND	0V (GND)
2	VDD	POWER SUPPLY FOR LOGIC CIRCUIT	+5V
3	VO	LCD CONTRAST ADJUSTMENT	
4	RS	INSTRUCTION/DATA REGISTER SELECTION	RS = 0 : INSTRUCTION REGISTER RS = 1: DATA REGISTER
5	R/$\overline{W}$	READ/WRITE SELECTION	R/$\overline{W}$ = 0 : REGISTER WRITE R/$\overline{W}$ = 1 : REGISTER READ
6	E	ENABLE INPUT	
7 | 14	DB0 | DB7	DATA INPUT/OUTPUT LINES	4 BIT/ 8 BIT SELECTABLE 4 BIT:DB4-DB7 8 BIT:DB0-DB7
~~15~~	~~VLED~~	~~POWER SUPPLY FOR LED BACKLIGHT (ANODE)~~	
~~16~~	~~VLSS~~	~~POWER SUPPLY FOR LED BACKLIGHT (CATHODE)~~	0V (GND)

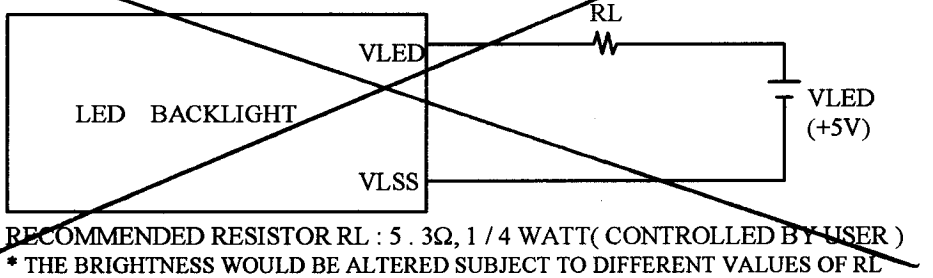
10. POWER SUPPLY

10.1 POWER SUPPLY FOR LCD MODULE



VDD – VO : LCD DRIVING VOLTAGE
VR : 10KΩ ~ 20KΩ
RECOMMENDED RESISTOR R : VDD – VO ≥ 1 . 5 V

10.2 POWER SUPPLY FOR LED BACK- LIGHT



RECOMMENDED RESISTOR RL : 5 . 3Ω, 1 / 4 WATT(CONTROLLED BY USER)
* THE BRIGHTNESS WOULD BE ALTERED SUBJECT TO DIFFERENT VALUES OF RL

11. DISPLAY DATA RAM ADDRESS

CHARACTER	1	2	3	4	5	6	7	8	9	10	11	12
LINE 1	80	81	82	83	84	85	86	87	88	89	8A	8B
LINE 2	C0	C1	C2	C3	C4	C5	C6	C7	C8	C9	CA	CB
CHARACTER	13	14	15	16	17	18	19	20	21	22	23	24
LINE 1	8C	8D	8E	8F	90	91	92	93	94	95	96	97
LINE 2	CC	CD	CE	CF	D0	D1	D2	D3	D4	D5	D6	D7