CUSTOMER :

M O D E L : MOC-20416D-E Series

DESCRIPTION : LCD MODULE

◆ CUSTOMER APPROVAL

APPROVAL	CHECKED	CHECKED	APPROVAL
REMARK			

◆ SUPPLIER APPROVAL

PREPARED	CHECKED		APPROVAL

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1. Mechanical Data

(1) NUMBER OF CHARACTER ---------- 20 CH * 4 LINE

(2) MODULE SIZE ---------- 98.0 W * 60.0 H * "C" T (max) mm

(3) EFFECTIVE AREA ---------- 76.0 W * 25.2 H mm

(4) CHARACTER PATTERN ---------- 5 * 7 DOTS + CURSOR

(5) CHARACTER SIZE ---------- 2.95 W * 4.15 H mm

(6) CHARACTER PITCH---------- 3.55 mm

(7) DOT SIZE---------- 0.55 W * 0.55 H mm

(8) DOT PITCH ---------- 0.60 W * 0.60 H mm

NOTE：The dimension of "C"，please refer to Outline dimension

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	6.0	V	------
INPUT VOLTAGE	V_I	V_{SS}	V_{DD}	V	------
STATIC ELECTRICITY	------	------	100	V	NOTE(1)
POWER SUPPLY FOR B.L	NOTE(2)	------	NOTE(2)	NOTE(2)	NOTE(2)

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

NOTE (2):

B.L TYPE	*SYMBOL*	*MAX.*	*UNIT*	*COMMENT*
ARRAY LED	V_{LED}	⚠1 6.0	V	YELLOW-GREEN,AMBER,ORANGE,RED
EDGE LED	V_{LED}	⚠1 5.0	V	BLUE,PURE GREEN,WHITE
EL	V_{EL}	AC115V	V	f_{EL}: 1.0KHz 60SEC.MAX
	f_{EL}	2.0	KHz	AC115Vrms 60SEC.MAX

2.2 Environmental absolute maximum ratings

I T E M	*CONDITION*	*OPERATION*		*STORAGE*		*COMMENT*
		MIN.	***MAX.***	***MIN.***	***MAX.***	
AMBIENT TEMPERATURE	NORMAL	0℃	50℃	-20℃	70℃	------
	WIDE	-20℃	70℃			
HUMIDITY	------	NOTE (3)		NOTE (3)		NO CONDENSATION
VIBRATION NOTE (3)	------	------	0.5G	------	2G	10~300Hz XYZ DIRECTIONS 1 Hr EACH
SHOCK NOTE (4)	------	------	3G	------	50G	10 msec XYZ DIRECTIONS 1 TIME EACH
CORROSIVE GAS	------	NOT ACCEPTABLE		NOT ACCEPTABLE		-------

NOTE (3): Ta ≦ 50℃: 90% RH MAX.

Ta ＞ 50℃: ABSOLUTE HUMIDITY MUST BE LOWER THAN THE HUMIDITY OF 90% RH AT 50℃. (80%RH AT 60℃)

NOTE(4):1G=9.8m/s^2

3. Electrical Characteristics

Ta = 25℃ VDD = 5.0±0.25 V

I T E M	*SYMBOL*	*CONDITION*		*MIN.*	*TYP.*	*MAX.*	*UNIT*
INPUT VOLTAGE	VIH	----------		2.2	------	------	V
	VIL			------	------	0.6	V
OUTPUT VOLTAGE	VOH	-IOH =0.2 mA		2.4	------	------	V
	VOL	IOL = 1.2 Ma		------	------	0.4	V
POWER SUPPLY CURRENT	IDD	VDD = 5.0V		------	2.0	3.5	mA
RECOMMENDED LCD DRIVING VOLTAGE, NOTE(1)	VDD-VO	STN/ FSTN DUTY =1/16 Φ=10° NOTE(2)	Ta=-20°C	------	4.8	------	V
			Ta= 0°C	------	4.7	------	V
			Ta= 25°C	------	4.5	------	V
			Ta= 50°C	------	4.3	------	V
			Ta= 70°C	------	4.2	------	V
		TN DUTY =1/16 Φ=25° NOTE(2)	Ta=-20°C	------	4.5	------	V
			Ta= 0°C	------	4.4	------	V
			Ta= 25°C	------	4.2	------	V
			Ta= 50°C	------	4.0	------	V
			Ta= 70°C	------	3.9	------	V
POWER SUPPLY CURRENT FOR B.L	NOTE(3)	NOTE(3)		------	NOTE(3)	NOTE(3)	NOTE(3)

NOTE (1): RECOMMENDED LCD DRIVING VOLTAGE MAY FLUCTUATE ABOUT ±0.5V BY EACH MODULE.

(2): $\theta = 0°$ ：VIEWING DIRECTION AT 6 O'CLOCK

$\theta = 180°$：VIEWING DIRECTION AT 12 O'CLOCK

(3): LED CURRENT OF DIFFERENT BACKLIGHT TYPE

B.L TYPE	*SYMBOL*	*CONDITION*	*MIN.*	*TYP.*	*MAX.*	*UNIT.*	*LED COLOR*
ARRAY LED	ILED	VLED =5.0V	-----	150	200	mA	YELLOW-GREEN、AMBER、ORANGE、RED
EDGE LED	ILED	VLED =4.0V	-----	60	80	mA	BLUE、WHITE、PURE GREEN
EL	IEL	VEL =AC115V fEL = 400Hz	-----	230	350	mA	----------

4. Optical Characteristics

TN TYPE LCD *Ta = 25℃ V_{DD}-V_O =4.2V*

I T E M	*SYMBOL*	*CONDITION*	*MIN.*	*TYP.*	*MAX.*	*UNIT*	*NOTE*
VIEWING ANGLE	Φ2-Φ1	K = 1.4 NOTE(1)	20	30	----	deg.	NOTE(2)
CONTRAST RATIO	K	Φ = 25° NOTE(1)	2.0	3.0	----	----	NOTE(2)
RESPONSE TIME	tr (rise)	Φ = 25° NOTE(1)	----	150	250	ms	NOTE(2)
	tf (fall)	Φ = 25° NOTE(1)	----	150	250	ms	NOTE(2)

STN TYPE LCD *Ta = 25℃ V_{DD}-V_O =4.5V*

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℃ V_{DD}-V_O =4.5V*

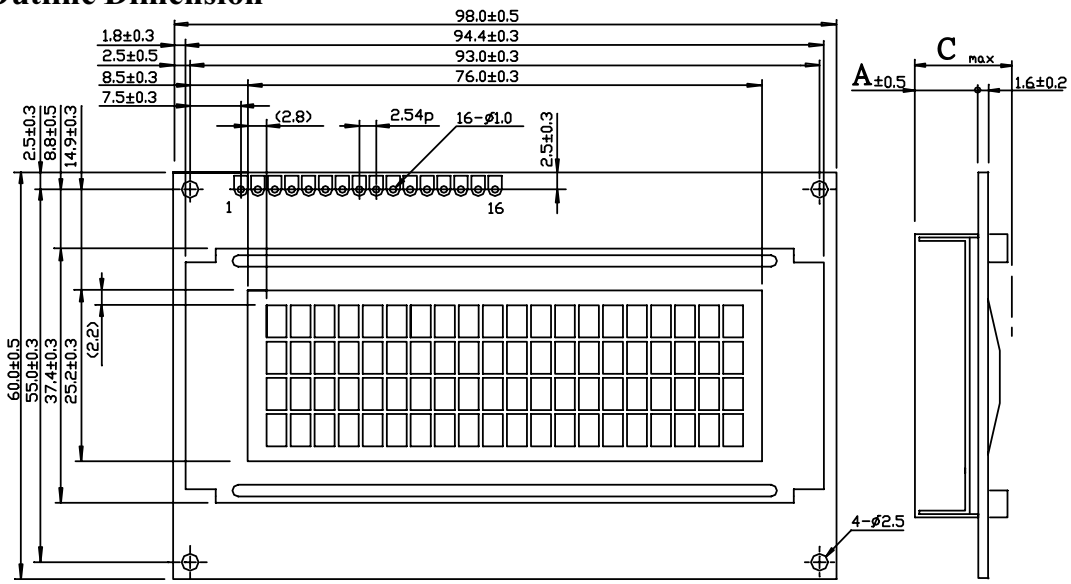
I T E M	*SYMBOL*	*CONDITION*	*MIN.*	*TYP.*	*MAX.*	*UNIT*	*NOTE*
VIEWING ANGLE	Φ2-Φ1	K = 2.0 NOTE(1)	30	40	----	deg.	NOTE(2)
CONTRAST RATIO	K	Φ = 10° NOTE(1)	4.0	5.0	----	----	NOTE(2)
RESPONSE TIME	tr (rise)	Φ = 10° NOTE(1)	----	200	350	ms	NOTE(2)
	tf (fall)	Φ = 10° NOTE(1)	----	300	400	ms	NOTE(2)

Brightness for backlight

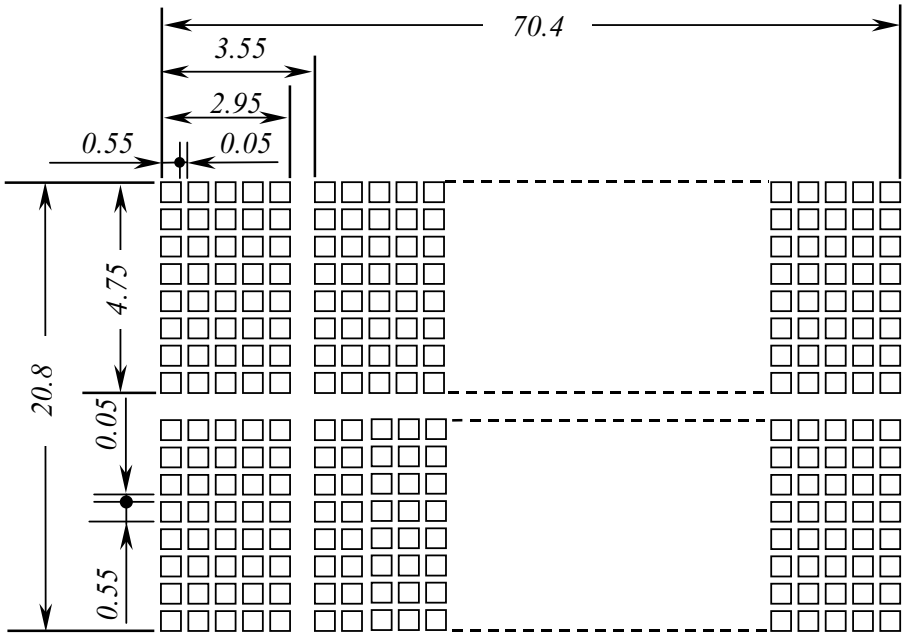
SYMBOL	*CONDITION*	*MIN.*	*TYP.*	*MAX.*	*UNIT*	*B.L TYPE*	*NOTE*
B	Φ = 0° θ = 0°	4.0	----	----	cd/m^2	EL	NOTE(2) NOTE(3)
		5.0	----	----		LED	

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

5. Outline Dimension



TYPE	A	C
LED B.L	9.0	15.0
EL & NO B.L	5.1	10.0

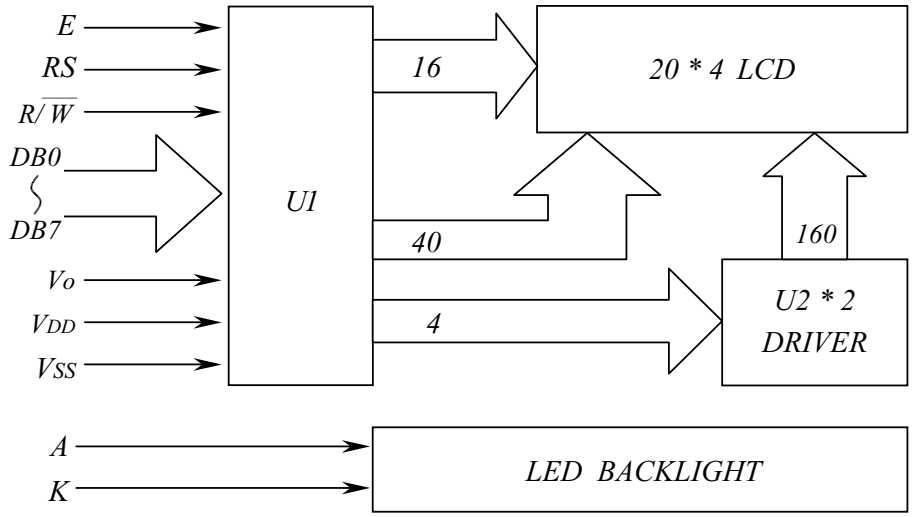


NOTE :
1.UNIT : mm
2.SCALE : NTS

Interface pin connection

PIN NO.	***1***	***2***	***3***	***4***	***5***	***6***	***7***	***8***
SYMBOL	V_{SS}	V_{DD}	Vo	RS	R/$\overline{W}$	E	DB0	DB1
PIN NO.	***9***	***10***	***11***	***12***	***13***	***14***	***15***	***16***
SYMBOL	DB2	DB3	DB4	DB5	DB6	DB7	A(+)	K(-)

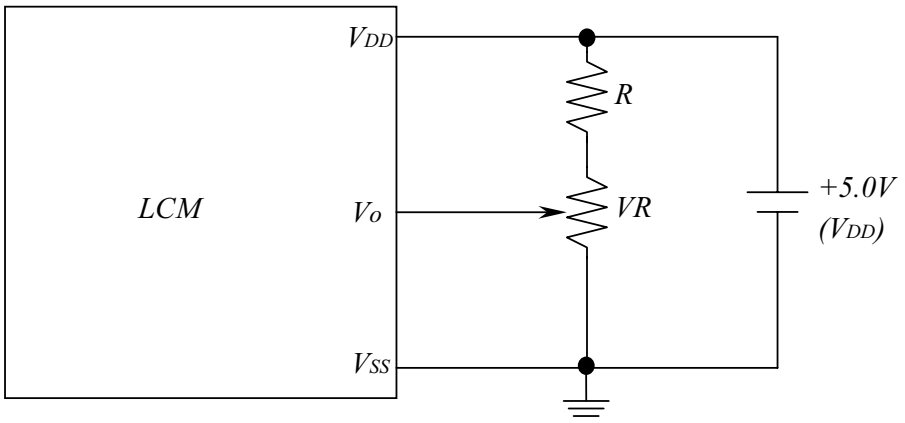
6. Block Diagram



Display data address charts

Character	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
LINE 1	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F	10	11	12	13
LINE 2	40	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F	50	51	52	53
LINE 3	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F	20	21	22	23	24	25	26	27
LINE 4	54	55	56	57	58	59	5A	5B	5C	5D	5E	5F	60	61	62	63	64	65	66	67

7. Power Supply for LCM

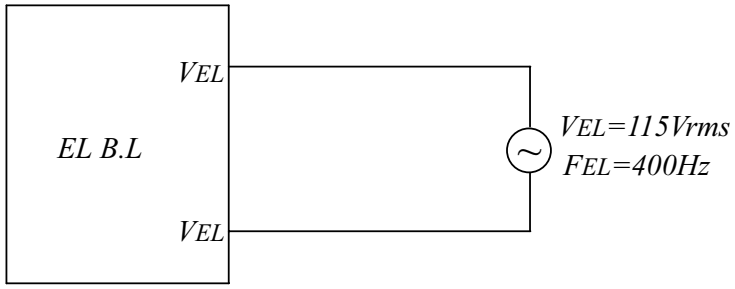


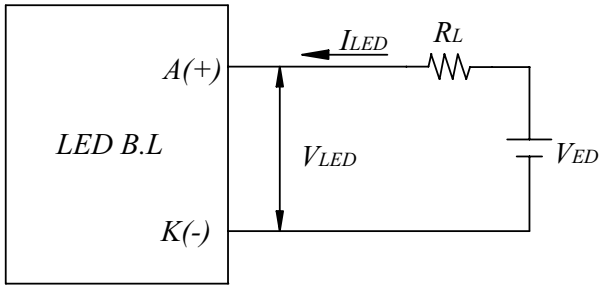
RECOMMENDED RESISTOR R: V_{DD}-$V_O \geqq 1.5V$

V_{DD}–V_O: LCD DRIVING VOLTAGE

VR: 10KΩ~20KΩ

7.1 Power Supply for Backlight





ITEM	LED TYPE	CONDITION
Limit resister of LED (RL)	ARRAY LED	RL≧((VED-5.0V) / ILED)，ILED≦200mA
	EDGE LED	RL≧((VED-4.0V) / ILED)，ILED≦80mA