

CUSTOMER	:	
MODEL	:	MOC-16216D-E Series
DESCRIPTION	:	LCD MODULE

◆ CUSTOMER APPROVAL

	CHECKED	CHECKED	APPROVAL
APPROVAL			
REMARK			

◆ SUPPLIER APPROVAL

PREPARED	CHECKED		APPROVAL

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1. Mechanical data

- (1) NUMBER OF DOT-----16 CH * 2 LINE
- (2) MODULE SIZE -----80.0 W *36.0 H * 10.0 T(max) mm
- (3) EFFECTIVE AREA -----64.5 W * 16.0 H mm
- (4) CHARACTER PATTERN -----5 * 7 DOTS + CURSOR
- (5) CHARACTER SIZE-----2.96W * 4.86 H mm
- (6) CHARACTER PITCH -----3.55 mm
- (7) DOT SIZE-----0.56 W * 0.66 H mm
- (8) DOT PITCH -----0.60W * 0.70H mm

2. Absolute maximum ratings

2.1 Electrical absolute maximum ratings

<i>ITEM</i>	<i>SYMBOL</i>	<i>MIN.</i>	<i>MAX.</i>	<i>UNIT</i>	<i>COMMENT</i>
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 LED	V _{LED}	-----	NOTE(2)	V	-----

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):

<i>SYMBOL</i>	<i>V_{LED} MAX.</i>	<i>LED TYPE</i>
V _{LED}	5.5V	YELLOW-GREEN,AMBER,ORANGE,RED
	5.0V	BLUE,PURE GREEN,WHITE

2.2 Environmental absolute maximum ratings

<i>ITEM</i>	<i>CONDITION</i>	<i>OPERATING</i>		<i>STORAGE</i>		<i>COMMENT</i>
		<i>MIN.</i>	<i>MAX.</i>	<i>MIN.</i>	<i>MAX.</i>	
AMBIENT TEMPERATURE	NORMAL	0°C	50°C	-20°C	70°C	-----
	WIDE	-20°C	70°C			
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): T_a ≤ 50°C: 90% RH MAX.

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

NOTE (3): 1G = 9.8 m/s²

3. Electrical characteristics

$$T_a = 25^{\circ}\text{C} \quad V_{DD} = 5.0\text{V} \pm 0.25\text{V}$$

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	
INPUT VOLTAGE	V_{IH}	-----	2.2	-----	-----	V	
	V_{IL}		-----	-----	0.6	V	
OUTPUT VOLTAGE	V_{OH}	$-I_{OH} = 0.205\text{ mA}$	2.4	-----	-----	V	
	V_{OL}	$I_{OL} = 1.2\text{ mA}$	-----	-----	0.4	V	
POWER SUPPLY CURRENT	I_{DD}	$V_{DD} = 5.0\text{V}$	-----	1.0	1.5	mA	
RECOMMENDED LCD DRIVING VOLTAGE, NOTE(1)	$V_{DD}-V_O$	STN/ FSTN DUTY =1/16 $\Phi=10^{\circ}$ 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 $\Phi=25^{\circ}$ NOTE(2)	Ta=-20°C	-----	4.7	-----	V
			Ta= 0°C	-----	4.6	-----	V
			Ta= 25°C	-----	4.2	-----	V
			Ta= 50°C	-----	3.8	-----	V
			Ta= 70°C	-----	3.7	-----	V
POWER SUPPLY CURRENT FOR NOTE(3)	I_{LED}	NOTE(3)	-----	NOTE(3)	NOTE(3)	mA	

NOTE (1): RECOMMENDED LCD DRIVING VOLTAGE MAY FLUCTUATE ABOUT $\pm 0.5\text{V}$ BY EACH MODULE.

(2): $\theta = 0^{\circ}$: VIEWING ANGLE AT 6 O'CLOCK
 $\theta = 180^{\circ}$: VIEWING ANGLE AT 12 O'CLOCK

(3): LED CURRENT OF DIFFERENT LED TYPE

LED B.L TYPE	V_{LED}	I_{LED}				LED COLOR
		MIN.	TYP.	MAX.	UNIT.	
A	4.8V	----	30	40	mA	YELLOW-GREEN · AMBER · ORANGE · RED
B	4.0V	-----	30	40	mA	BLUE · WHITE · PURE GREEN

4. Optical characteristics

TN TYPE LCD

 $T_a = 25\text{ }^\circ\text{C}$ $V_{DD}-V_O = 4.2V$

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING ANGLE	$\Phi 2-\Phi 1$	K = 1.4 NOTE(1)	20	30	----	deg.	NOTE(2)
CONTRAST RATIO	K	$\Phi = 25^\circ$ NOTE(1)	2.0	3.0	----	----	NOTE(2)
RESPONSE TIME	tr (rise)	$\Phi = 25^\circ$ NOTE(1)	----	150	250	ms	NOTE(2)
	tf (fall)	$\Phi = 25^\circ$ NOTE(1)	----	150	250	ms	NOTE(2)

STN TYPE LCD

 $T_a = 25\text{ }^\circ\text{C}$ $V_{DD}-V_O = 4.5V$

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING ANGLE	$\Phi 2-\Phi 1$	K = 2.0 NOTE(1)	30	40	----	deg.	NOTE(2)
CONTRAST RATIO	K	$\Phi = 10^\circ$ NOTE(1)	3.0	4.0	----	----	NOTE(2)
RESPONSE TIME	tr (rise)	$\Phi = 10^\circ$ NOTE(1)	----	200	350	ms	NOTE(2)
	tf (fall)	$\Phi = 10^\circ$ NOTE(1)	----	300	400	ms	NOTE(2)

FSTN/STN BLUE TYPE LCD

 $T_a = 25\text{ }^\circ\text{C}$ $V_{DD}-V_O = 4.5V$

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING ANGLE	$\Phi 2-\Phi 1$	K = 2.0 NOTE(1)	30	40	----	deg.	NOTE(2)
CONTRAST RATIO	K	$\Phi = 10^\circ$ NOTE(1)	4.0	5.0	----	----	NOTE(2)
RESPONSE TIME	tr (rise)	$\Phi = 10^\circ$ NOTE(1)	----	200	350	ms	NOTE(2)
	tf (fall)	$\Phi = 10^\circ$ NOTE(1)	----	300	400	ms	NOTE(2)

Brightness for LCM

SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	LED TYPE	NOTE
B	$\Phi = 0^\circ$	4.0	----	----	cd/m ²	YELLOW-GREEN · RED · AMBER · ORANGE	NOTE(2)
	$\theta = 0^\circ$	6.0	----	----		BLUE · PURE GREEN · WHITE	NOTE(3)

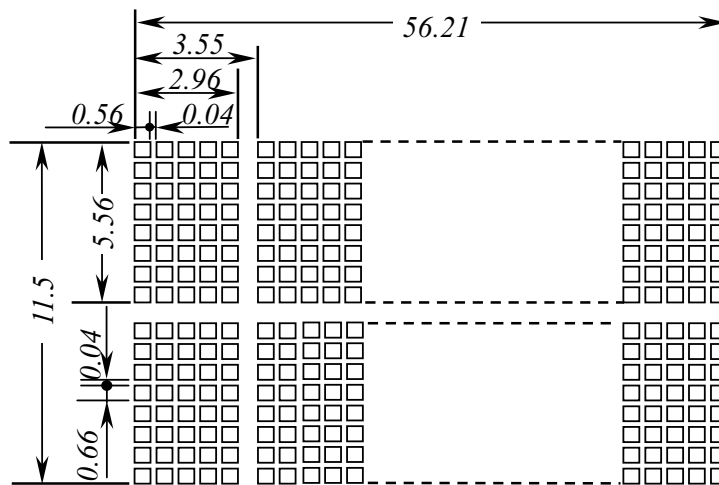
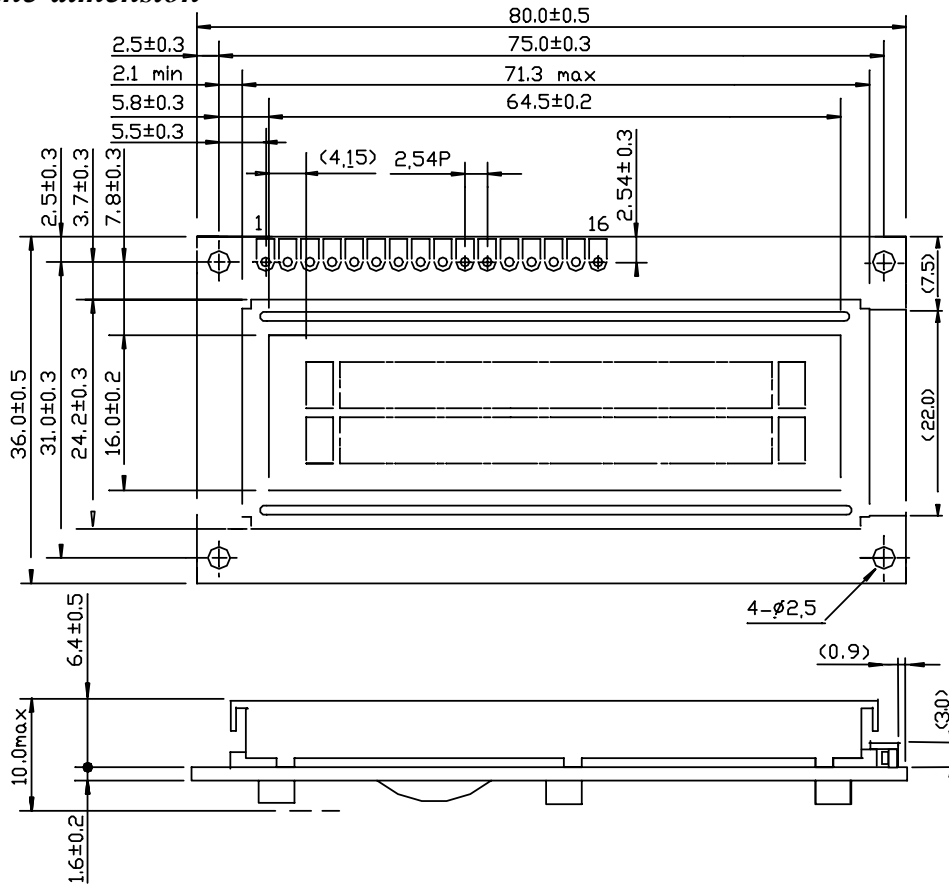
 NOTE (1): $\theta = 0^\circ$ WHEN VIEWING ANGLE AT 6 O'CLOCK

 $\theta = 180^\circ$ 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 :

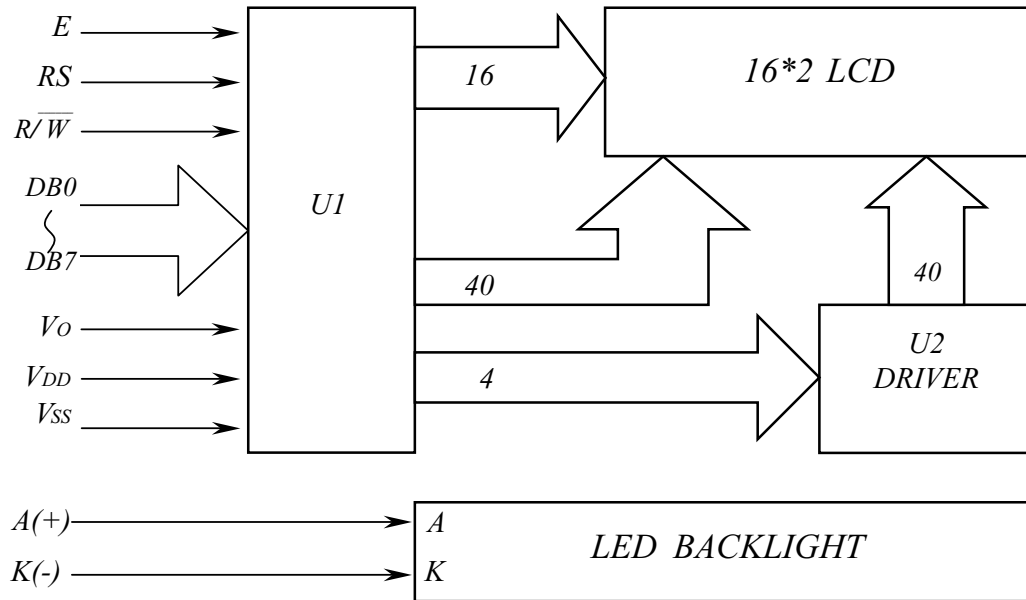
1.UNIT : mm

2.SCALE : NTS

Interface pin connection

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

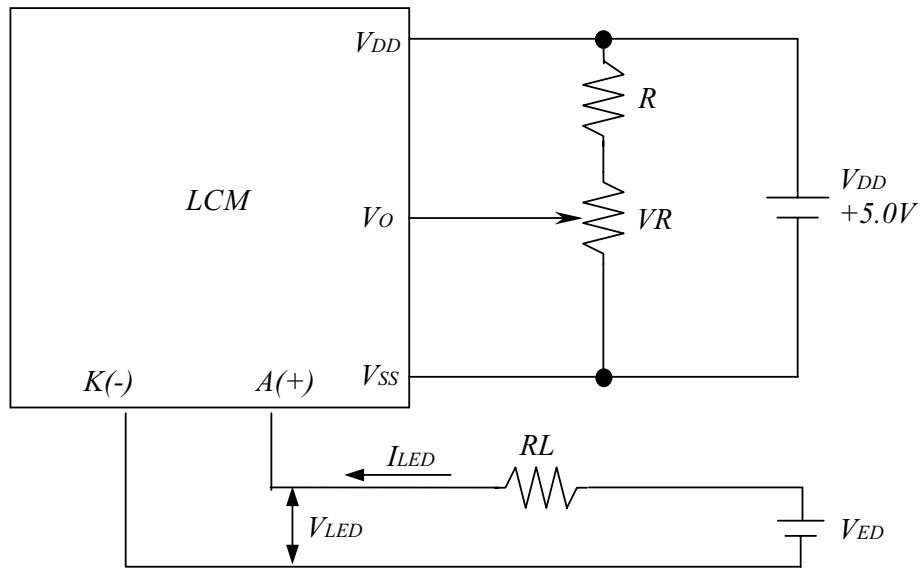
6. Block diagram



Display data address charts

Character	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
LINE 1	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
LINE 2	40	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F

7. Power supply for LCM



RECOMMENDED RESISTOR R : $V_{DD}-V_o \geq 1.5V$

$V_{DD}-V_o$: LCD DRIVING VOLTAGE

ITEM	LED TYPE	CONDITION
Limit resistor of LED (RL)	A	$RL \geq ((V_{ED}-4.8V) / I_{LED}) , I_{LED} \leq 40mA$
	B	$RL \geq ((V_{ED}-4.0V) / I_{LED}) , I_{LED} \leq 40mA$

VR:
10K
Ω

~20KΩ