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PART NO. : MC1602X-SYR

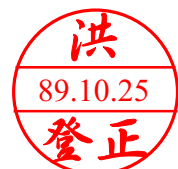
FOR MESSRS. : _____

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ACCEPTED BY : _____

PROPOSED BY : _____



RECORD OF REVISION

DATE	PAGE	SUMMARY

3. General specifications

3.1 General specifications

PLEASE REFER TO:

“CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS (MS-10-12780)”.

3.2 This individual specification is prior to general specifications

4. Mechanical data

- (1) NUMBER OF CHARACTERS -----16 CH * 2 LINE
- (2) MODULE SIZE -----59.0 W * 29.3 H * 4.5 T (Max) mm
- (3) EFFECTIVE AREA -----52.0 W * 15.0 H mm
- (4) CHARACTER PATTERN-----5 * 7 DOTS + CURSOR
- (5) CHARACTER SIZE-----2.45 W * 4.08 H mm
- (6) CHARACTER PITCH -----2.95 mm
- (7) DOT SIZE-----0.45 W * 0.54 H mm
- (8) DOT PITCH -----0.50 W * 0.59 H mm
- (9) VIEWING DIRECTION-----6 O’CLOCK
- (10) LCD TYPE-----STN.YELLOW-GREEN.REFLECTIVE.

5. Absolute maximum ratings

5.1 Electrical absolute maximum ratings

<i>I T E M</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)

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

5.2 Environmental absolute maximum ratings

<i>I T E M</i>	<i>OPERATING</i>		<i>STORAGE</i>		<i>COMMENT</i>
	<i>MIN.</i>	<i>MAX.</i>	<i>MIN.</i>	<i>MAX.</i>	
AMBIENT TEMPERATURE	0°C	50°C	-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) : Ta ≤ 50°C: 85% RH MAX.

Ta > 50°C: ABSOLUTE HUMIDITY MUST BE LOWER THAN THE HUMIDITY OF 85% RH AT 50°C. (50% RH AT 60°C)

NOTE (3): 1G = 9.8 m/s²

6. Electrical characteristics

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

<i>I T E M</i>	<i>SYMBOL</i>	<i>CONDITION</i>	<i>MIN.</i>	<i>TYP.</i>	<i>MAX.</i>	<i>UNIT</i>	
POWER SUPPLY VOLTAGE FOR CIRCUIT	$V_{DD}-V_{SS}$	-----	4.75	5.0	5.25	V	
INPUT VOLTAGE	V_{IH}	-----	2.2	-----	-----	V	
	V_{IL}	-----	-----	-----	0.6	V	
OUTPUT VOLTAGE	V_{OH}	$-I_{OH} = 0.2\text{ mA}$	2.4	-----	-----	V	
	V_{OL}	$I_{OL} = 1.2\text{ mA}$	-----	-----	0.4	V	
POWER SUPPLY CURRENT	I_{DD}	$V_{DD} = 5.0\text{V}$	-----	1.5	2.0	mA	
RECOMMENDED LCD DRIVING VOLTAGE	$V_{DD}-V_O$	DUTY= 1/16 $\Phi=10^\circ$	$T_a=0^\circ\text{C}$	-----	4.9	-----	V
			$T_a=25^\circ\text{C}$	-----	4.5	-----	V
			$T_a=50^\circ\text{C}$	-----	4.1	-----	V

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

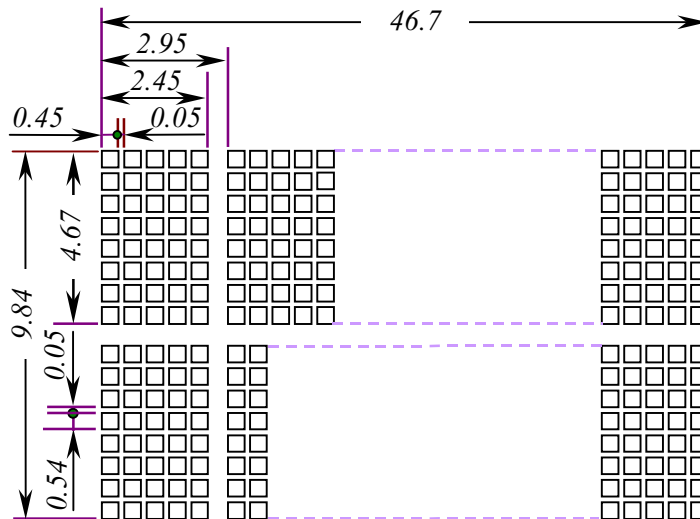
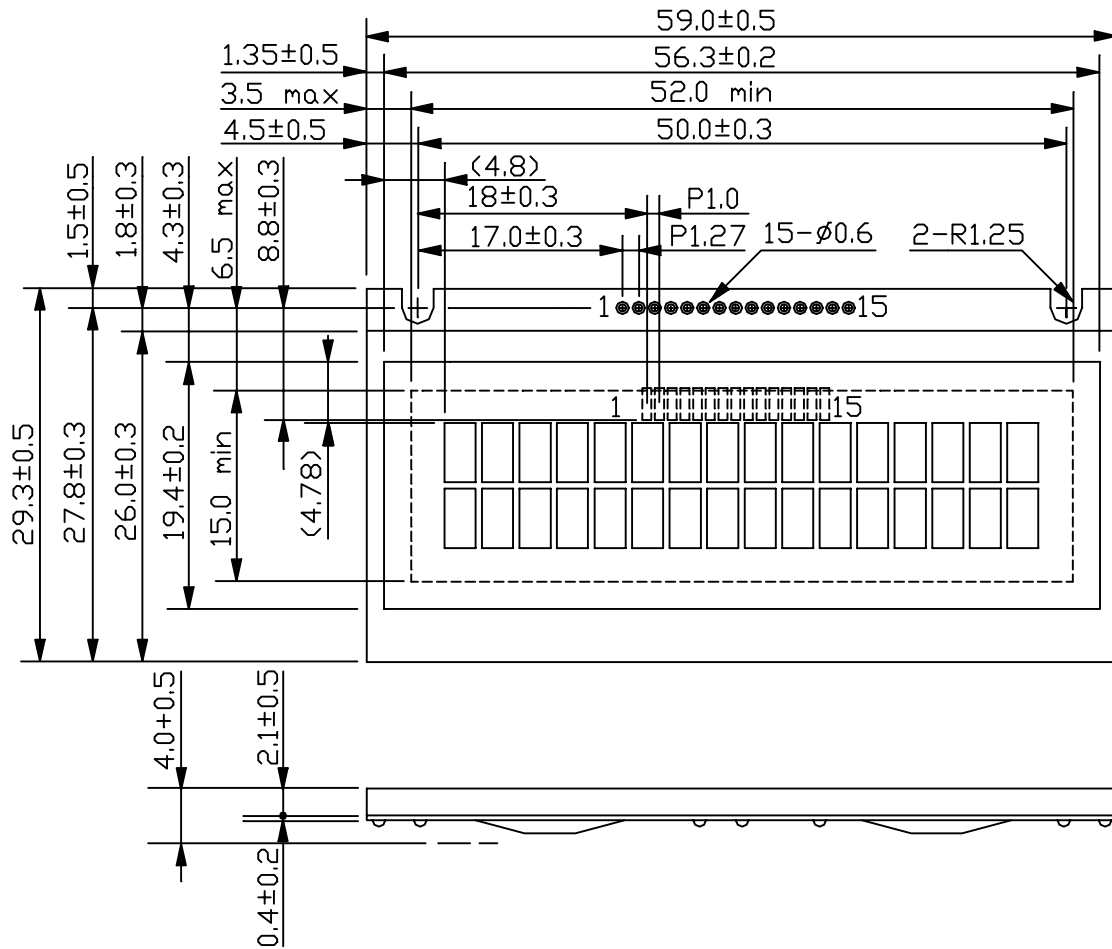
7. Optical characteristics

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

<i>I T E M</i>	<i>SYMBOL</i>	<i>CONDITION</i>	<i>MIN.</i>	<i>TYP.</i>	<i>MAX.</i>	<i>UNIT.</i>	<i>NOTE</i>
VIEWING ANGLE	$\Phi_2-\Phi_1$	$K = 2.0$	30	40	-----	deg.	2
CONTRAST RATIO	K	$\Phi = 10^\circ$ $\theta = 0^\circ$	3	4	-----	-----	2
RESPONSE TIME	tr (rise)	$\Phi = 10^\circ$ $\theta = 0^\circ$	-----	200	350	ms	2
	tf (fall)	$\Phi = 10^\circ$ $\theta = 0^\circ$	-----	300	400	ms	2

NOTE (2): SEE CUSTOMER ACCEPTANCE STANDARD SPECIFICATION FOR DEFINITION OF OPTICAL CHARACTERISTICS.

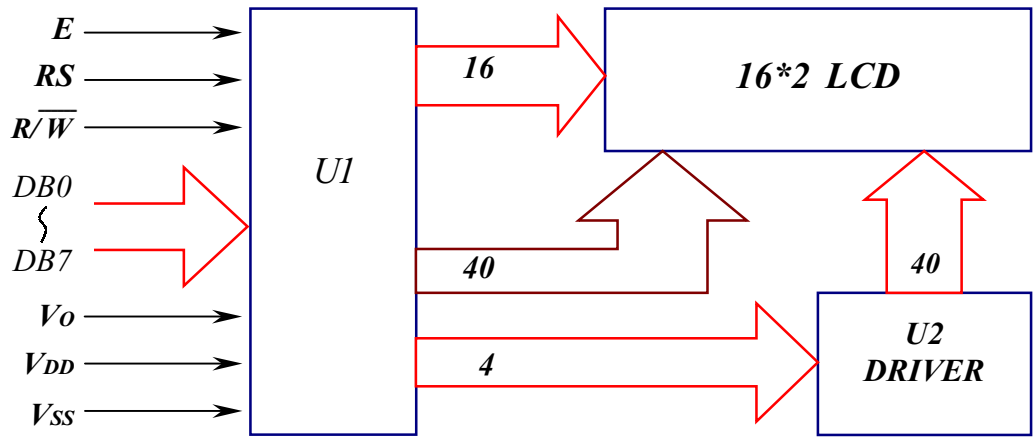
8. Outline dimension



Interface pin connection

PIN NO.	1	2	3	4	5	6	7	8
SYMBOL	N.C	V _{SS}	V _{DD}	V _O	RS	R/W	E	DB0
PIN NO.	9	10	11	12	13	14	15	
SYMBOL	DB1	DB2	DB3	DB4	DB5	DB6	DB7	

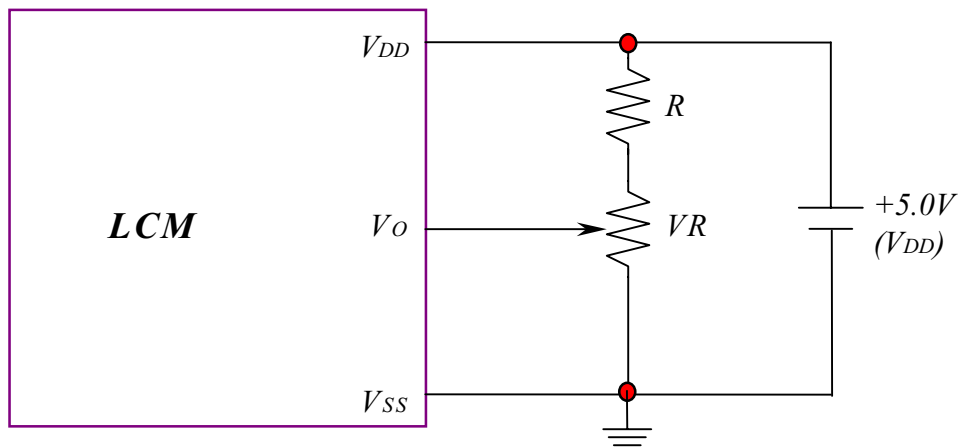
9. Block diagram



Display data address charts

Character	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
LINE 1	80	81	82	83	84	85	86	87	88	89	8A	8B	8C	8D	8E	8F
LINE 2	C0	C1	C2	C3	C4	C5	C6	C7	C8	C9	CA	CB	CC	CD	CE	CF

10. Power supply for LCM



RECOMMENDED RESISTOR R: $V_{DD} - V_O \geq 1.5V$
 $V_{DD} - V_O$: LCD DRIVING VOLTAGE
 VR: $10K\Omega \sim 20K\Omega$