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PART NO. : **MC1602J-SERIES**

FOR MESSRS. :

CONTENTS

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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-10-0069)".

3.2 This individual specification is prior to general specifications

3.3 NUMBERING SYSTEM

MC1602J	B	W	-	S	Y	M	L	O	U	N
	(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)

(1).CHARACTER FONTS：

PLEASE ERFER TO

"CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS (MS-10-0069)"

(2).LCM TEMPERATURE：

"nil" ： NORMAL TEMP

"W" ： WIDE TEMP

(3).LCD TYPE：

"T" ： TN TYPE "S" ： STN TYPE

"H" ： HTN TYPE "F" ： FSTN TYPE

(4).LCD COLOR：

"Y" ： YELLOW-GREEN "B" ： BLUE(STN/NEGATIVE)/BLACK(FSTN/NEGATIVE)

"G" ： GRAY "W" ： WHITE(FSTN/POSITIVE)

(5)LCD POLARIZE TYPE

"nil" ： TRANSFLECTIVE

"M" ： TRANSMISSIVE

(6).BACKLIGHT TYPE：

"L" ： LED BACKLIGHT

"R" ： REFLECTIVE

(7).BACKLIGHT COLOR：

LED TYPE：

"nil" ： YELLOW-GREEN "A" ： AMBER "O" ： ORANGE

"R" ： RED

(8).VIEWING DIRECTION：

"nil" ： 6 O'CLOCK "3" ： 3 O'CLOCK

"U" ： 12 O'CLOCK "9" ： 9 O'CLOCK

(9).BACKLIGHT TYPE：

"nil" ： LED(+),LED(-)---NORMAL

"N" ： LED(+),LED(-)---CHANGE

4. Mechanical data

(1) NUMBER OF CHARACTER ---------- 16 CH * 2 LINE

(2) MODULE SIZE ---------- 122.0 W * 44.0 H * 15.0 T (max) mm

(3) EFFECTIVE AREA ---------- 99.0 W * 24.0 H mm

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

(5) CHARACTER SIZE ---------- 4.84 W * 8.06 H mm

(6) CHARACTER PITCH ---------- 6.0 mm

(7) DOT SIZE ---------- 0.92 W * 1.10 H mm

(8) DOT PITCH ----------0.98 W * 1.16 H mm

NOTE：The dimension of "C"， please refer to Outline dimension on PAGE 8/9

5. Absolute maximum ratings

5.1 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)

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 T E M	CONDITION	OPERATING		STORAGE		COMMENT
		MIN.	MAX.	MIN.	MAX.	
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): Ta $\leqq$ 50°C: 90% RH MAX.

Ta $>$ 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/s^2

6. 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 =0.205 mA		2.4	------	------	V
	VOL	IOL = 1.2 mA		------	------	0.4	V
POWER SUPPLY CURRENT	IDD	VDD = 5.0V		------	1.0	1.5	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	------	4.7	------	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 LED	ILED	VDD =5.0 V		------	170	270	mA

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

(2): θ = 0° : VIEWING ANGLE AT 6 O'CLOCK

θ = 180° : VIEWING ANGLE AT 12 O'CLOCK

7. 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

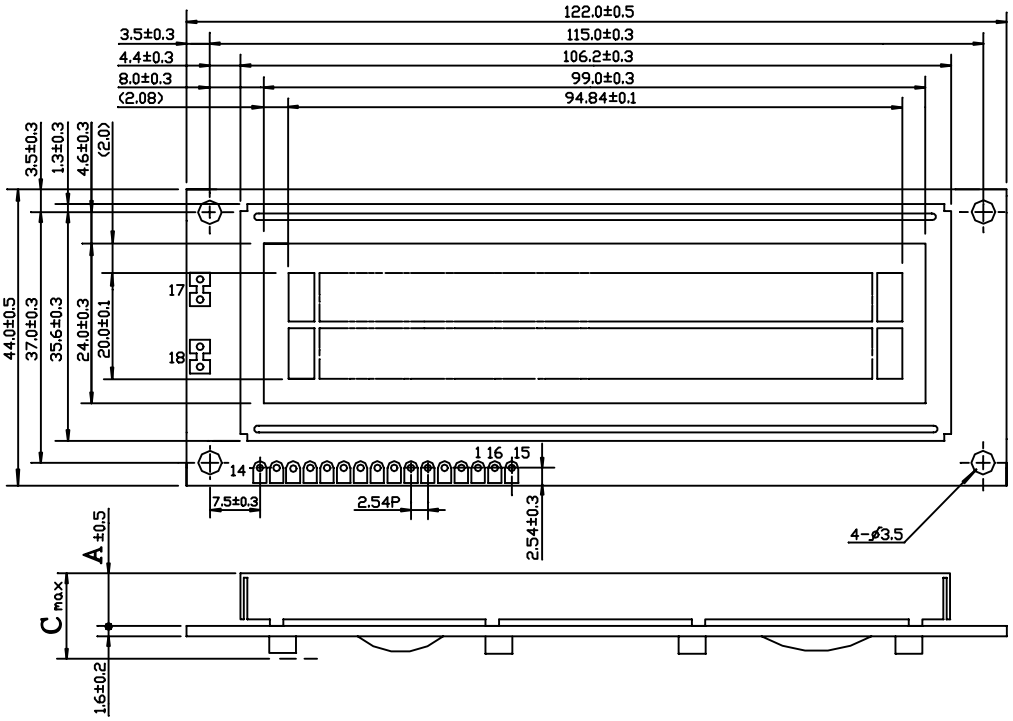
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
LED	B	Φ = 0° θ = 0°	5.0	----	----	cd/m^2	NOTE(2) NOTE(3)

NOTE (1): θ = 0° WHEN VIEWING ANGLE AT 6 O'CLOCK
θ = 180° WHEN VIEWING ANGLE AT 12 O'CLOCK

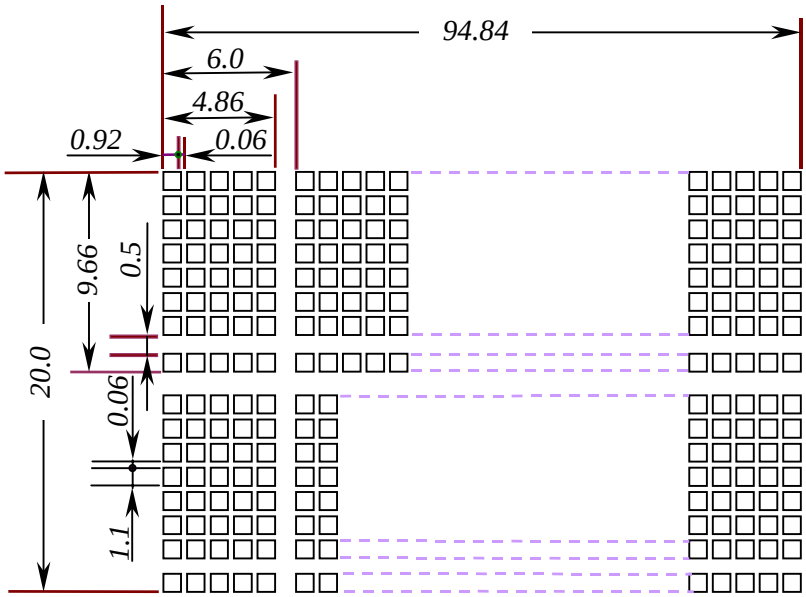
(2): SEE CUSTOMER ACCEPTANCE STANDARD SPECIFICATION FOR DEFINITION OF OPTICAL CHARACTERISTICS.

(3): UNDER NORMAL TEMPERATURE AND HUMIDITY IN A DARK ROOM.

8. Outline dimension



TYPE	A	C
LED BL	9.5	15.0
NO BL	4.9	10.0

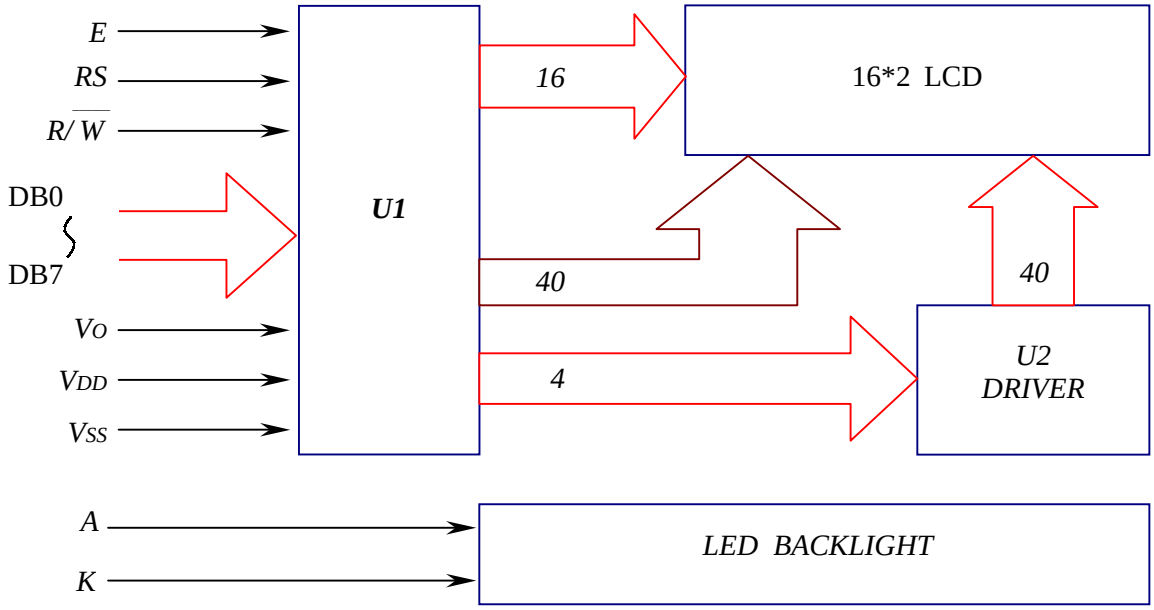


NOTE :
1.UNIT : mm
2.SCALE : NTS

Interface pin connection

PIN NO.	1	2	3	4	5	6	7	8
SYMBOL	VSS	VDD	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	NC	NC

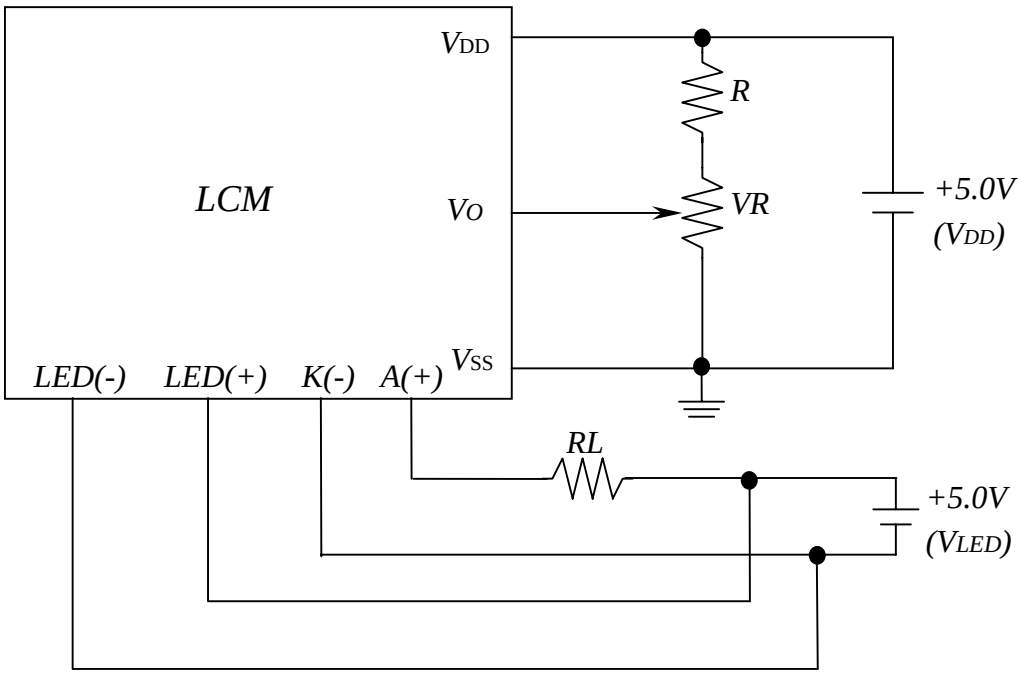
9. Block diagram



Display data address charts

Character	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
LINE 1	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

10. Power supply for LCM



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

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

VR: 10KΩ~20KΩ