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PART NO.: MC1604B-SERIES

FOR MESSRS.: _____

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ACCEPTED BY: _____

PROPOSED BY : _____

RECORD OF REVISION

DATE	PAGE	SUMMARY

3. General specifications

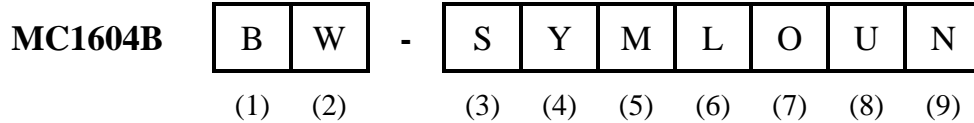
3.1 General specifications

PLEASE REFER TO:

“CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS (MS-10-0069)”

3.2 This individual specification is prior to general specifications

3.3 NUMBERING SYSTEM



(1).CHARACTER FONTS :

PLEASE REFER 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

“E” : EL BACKLIGHT

“R” : REFLECTIVE

(7).BACKLIGHT COLOR :

LED TYPE :

“nil” : YELLOW-GREEN

“A” : AMBER

“W” : WHITE

“O” : ORANGE

“R” : RED

“G” : PURE-GREEN

“B” : BLUE

EL TYPE :

“nil” : WHITE

“B” : BLUE-GREEN

(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 * 4 LINE
- (2) MODULE SIZE ----- 87.0 W * 60.0 H * "C" T (max) mm
- (3) EFFECTIVE AREA ----- 61.8 W * 25.2 H mm
- (4) CHARACTER PATTERN ----- 5 * 7 DOTS + CURSOR
- (5) CHARACTER SIZE----- 2.96 W * 4.16 H mm
- (6) CHARACTER PITCH----- 3.55 mm
- (7) DOT SIZE----- 0.56 W * 0.56 H mm
- (8) DOT PITCH ----- 0.60 W * 0.60 H mm

NOTE : The dimension of "C" , please refer to Outline dimension on PAGE 8/10

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)
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):

<i>B.L TYPE</i>	<i>SYMBOL</i>	<i>MAX.</i>	<i>UNIT</i>	<i>COMMENT</i>
ARRAY LED	V _{LED}	5.0	V	YELLOW-GREEN,AMBER,ORANGE,RED
EDGE LED	V _{LED}	6.0	V	BLUE,PURE GREEN,WHITE
EL	V _{EL}	AC115V	V	f _{EL} : 1.0KHz 60SEC.MAX
	f _{EL}	2.0	KHz	AC115V _{rms} 60SEC.MAX

5.2 Environmental absolute maximum ratings

<i>I T E M</i>	<i>CONDITION</i>	<i>OPERATION</i>		<i>STORAGE</i>		<i>COMMENT</i>
		<i>MIN.</i>	<i>MAX.</i>	<i>MIN.</i>	<i>MAX.</i>	
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): T_a 50 : 90% RH MAX.

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

NOTE(4):1G=9.8m/s²

6. Electrical characteristics

$T_a = 25$

$V_{DD} = 5.0 \pm 0.25 V$

<i>I T E M</i>	<i>SYMBOL</i>	<i>CONDITION</i>	<i>MIN.</i>	<i>TYP.</i>	<i>MAX.</i>	<i>UNIT</i>	
INPUT VOLTAGE	V _{IH}	-----	2.2	-----	-----	V	
	V _{IL}		-----	-----	0.6	V	
OUTPUT VOLTAGE	V _{OH}	-I _{OH} = 0.2 mA	2.4	-----	-----	V	
	V _{OL}	I _{OL} = 1.2 mA	-----	-----	0.4	V	
POWER SUPPLY CURRENT	I _{DD}	V _{DD} = 5.0V	-----	1.5	2.0	mA	
RECOMMENDED LCD DRIVING VOLTAGE, NOTE(1)	V _{DD} -V _O	STN/ FSTN DUTY =1/16 =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 =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): = 0° : VIEWING DIRECTION AT 6 O’CLOCK
= 180° : VIEWING DIRECTION AT 12 O’CLOCK

(3): LED CURRENT OF DIFFERENT BACKLIGHT TYPE

<i>B.L TYPE</i>	<i>SYMBOL</i>	<i>CONDITION</i>	<i>MIN.</i>	<i>TYP.</i>	<i>MAX.</i>	<i>UNIT.</i>	<i>LED COLOR</i>
ARRAY LED	I _{LED}	V _{LED} = 5.0V	-----	170	220	mA	YELLOW-GREEN, AMBER, ORANGE, RED
EDGE LED	I _{LED}	V _{LED} = 4.0V	-----	45	60	mA	BLUE, WHITE, PURE GREEN
EL	I _{EL}	V _{EL} = 115V _{rms} f _{EL} = 400Hz	-----	2.0	-----	mArms	-----

7. Optical characteristics

TN TYPE LCD

$T_a = 25$ $V_{DD}-V_O = 4.2V$

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

STN TYPE LCD

$T_a = 25$ $V_{DD}-V_O = 4.5V$

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

FSTN, STN BLUE TYPE LCD

$T_a = 25$ $V_{DD}-V_O = 4.5V$

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

Brightness for backlight

SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	B.L TYPE	NOTE
B	= 0° = 0°	4.0	----	----	cd/m ²	EL	NOTE(2) NOTE(3)
		5.0	----	----		EDGE LED	
		6.0	----	----		ARRAY LED	

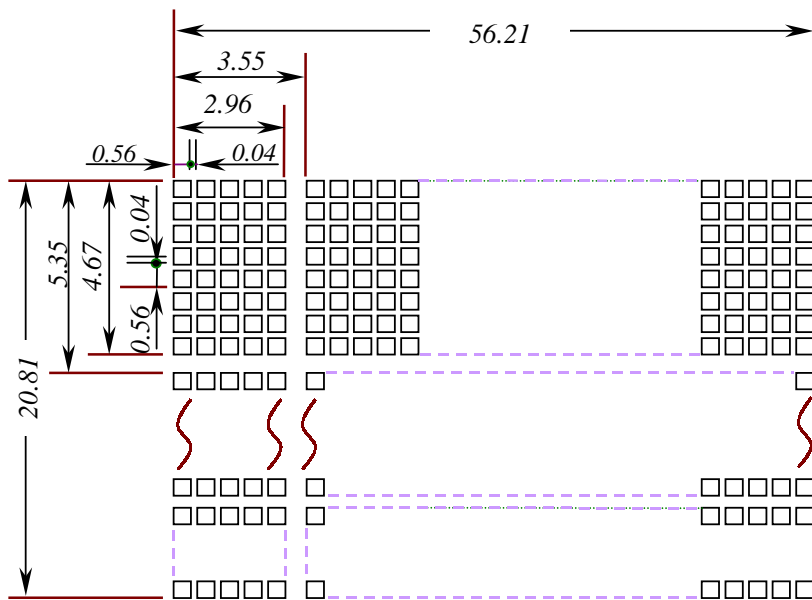
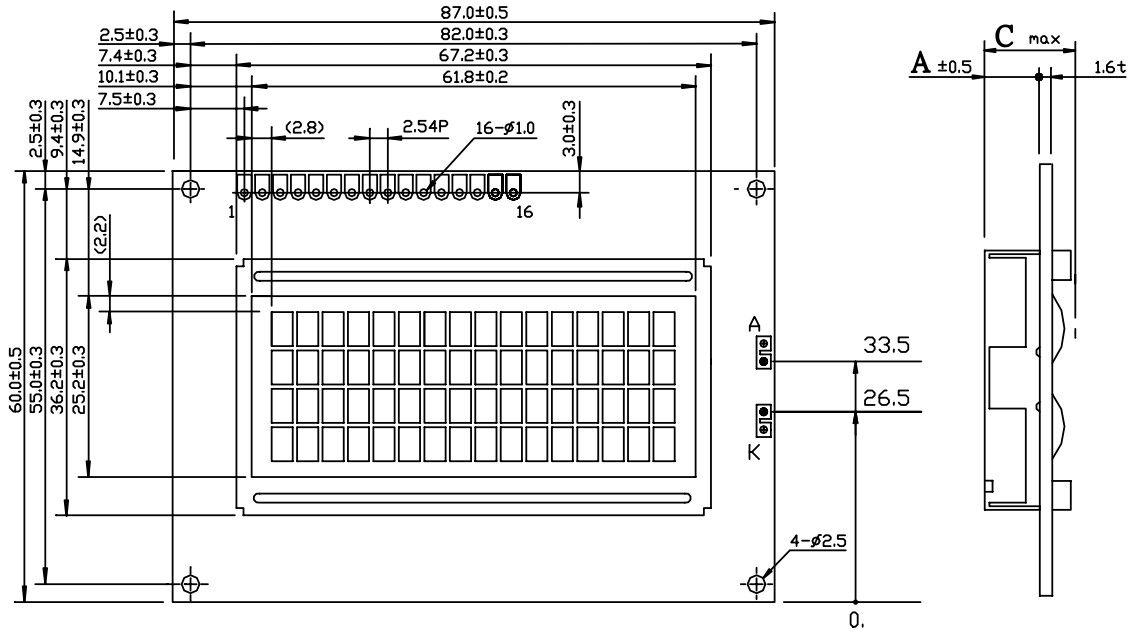
NOTE (1): = 0° : VIEWING DIRECTION AT 6 O'CLOCK

= 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.

8. Outline dimension



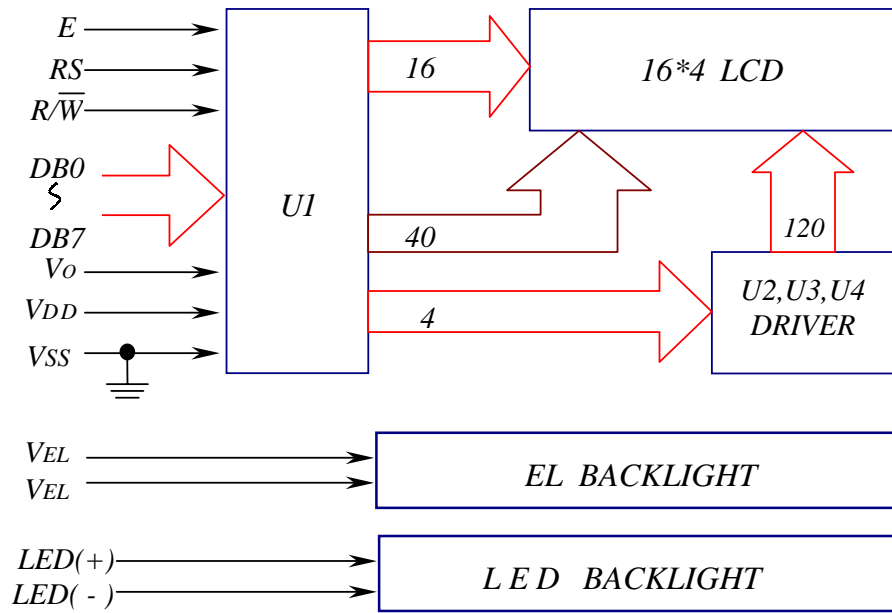
TYPE	A	C
LED B.L	9.0	15.0
EL & NO B.L	5.1	10.0

UNIT : mm
SCALE : NTS

Interface pin connection

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

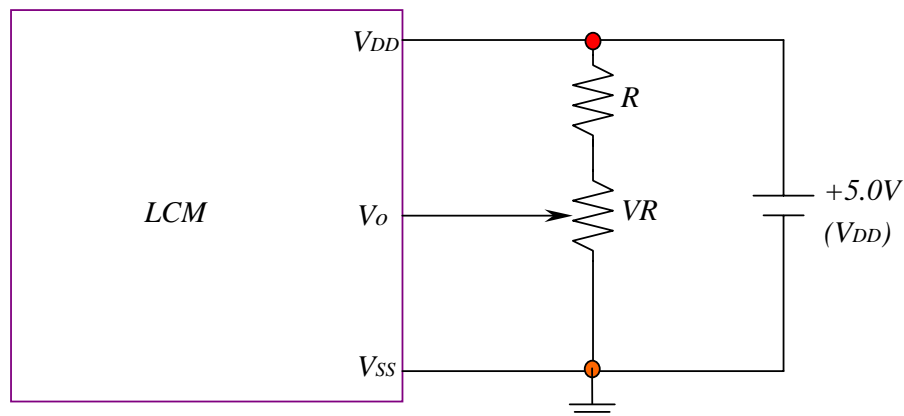
9. Block diagram



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
LINE 3	10	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F
LINE 4	50	51	52	53	54	55	56	57	58	59	5A	5B	5C	5D	5E	5F

10. Power supply for LCM

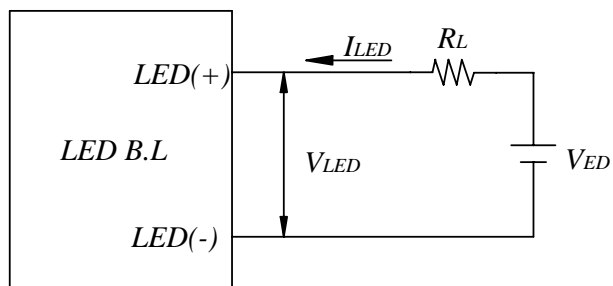
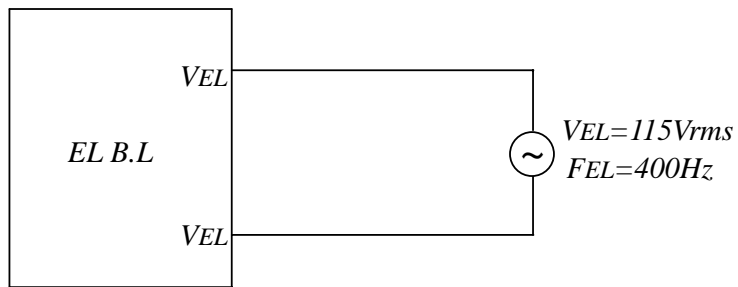


RECOMMENDED RESISTOR R: $V_{DD} - V_O \approx 1.5V$

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

VR: 10K ~20K

10.1 Power supply for backlight



<i>ITEM</i>	<i>LED TYPE</i>	<i>CONDITION</i>
Limit resistor of LED (R _L)	ARRAY LED	R _L ((V _{ED} -5.0V) / I _{LED}) , I _{LED} 220mA
	EDGE LED	R _L ((V _{ED} -4.0V) / I _{LED}) , I _{LED} 60mA