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PART NO. : MG2406B-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-10-79810)”

3.2 This individual specification is prior to general specifications

3.3 NUMBERING SYSTEM

MG2406B	-	S	Y	M	L	W	U
		(1)	(2)	(3)	(4)	(5)	(6)

(1).LCD TYPE :

“S” : STN TYPE

“F” : FSTN TYPE

(2).LCD COLOR :

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

“G” : GRAY “W” : WHITE(FSTN/POSITIVE)

(3).LCD POLARIZE TYPE

“nil” : TRANSFLECTIVE

“M” : TRANSMISSIVE

(4).BACKLIGHT TYPE :

“E” : EL BACKLIGHT

“L” : LED BACKLIGHT

“R” : REFLECTIVE

(5).BACKLIGHT COLOR :

LED TYPE :

“nil” : YELLOW-GREEN “A” : AMBER “B” : BLUE

“G” : PURE-GREEN “O” : ORANGE “R” : RED

“W” : WHITE

EL TYPE :

“nil” : WHITE

“B” : BLUE-GREEN

(6).VIEWING DIRECTION :

“nil” : 6 O’CLOCK

“3” : 3 O’CLOCK

“U” : 12 O’CLOCK

“9” : 9 O’CLOCK

4. Mechanical data

- (1) NUMBER OF DOT----- 240 W* 64 H DOTS
- (2) MODULE SIZE----- 140.0 W * 62.0 H * "C" T (Max) mm
- (3) EFFECTIVE AREA----- 116.0 W * 37.0 H mm
- (4) ACTIVE AREA----- 105.57 W * 31.97 H mm
- (5) DOT SIZE ----- 0.41 W * 0.47 H mm
- (6) DOT PITCH----- 0.44 W * 0.50 H mm

NOTE : The dimension of "C" , please refer to Outline dimension on PAGE 8/11

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 EL BACKLIGHT	V _{EL}	-----	AC200	V _{rms}	f _{EL} =1.0KHz 60 SEC.MAX
	f _{EL}	-----	2.0	KHz	AC115 V _{rms} 60 SEC.MAX
POWER SUPPLY FOR LED	V _{LED}	-----	5.0	V	-----

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	-20	70	-20	70	-----
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 : 90% RH MAX.

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

NOTE (3): 1G = 9.8 m/s²

6. Electrical characteristics

$T_a = 25$

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

<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}	H LEVEL		2.0	-----	V _{DD}	V
	V _{IL}	L LEVEL		0	-----	0.8	V
OUTPUT VOLTAGE	V _{OH}	I _{OH} = -0.3 mA		2.4	-----	V _{DD}	V
	V _{OL}	I _{OH} = 3.0 mA		0	-----	0.4	V
POWER SUPPLY CURRENT	I _{DD}	V _{DD} -V _{SS} = 5.0 V		-----	10.0	20.0	mA
RECOMMENDED LCD DRIVING VOLTAGE, NOTE(1)	V _{DD} -V _O	STN/ FSTN DUTY =1/64 Φ=10° NOTE(2)	Ta=-20°C	-----	8.9	-----	V
			Ta= 25°C	-----	8.5	-----	V
			Ta= 70°C	-----	8.1	-----	V
POWER SUPPLY CURRENT FOR EL BACKLIGHT	I _{EL}	V _{EL} = 115V _{rms} f _{EL} = 400Hz		-----	8.0	-----	mArms
POWER SUPPLY CURRENT FOR LED	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 DIRECTION AT 6 O'CLOCK

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

(3): LED CURRENT FOR DIFFERENT LED BACKLIGHT TYPE

<i>LED B.L TYPE</i>	<i>CONDITION</i>	<i>I_{LED}</i>				<i>LED COLOR</i>
		<i>MIN.</i>	<i>TYP.</i>	<i>MAX.</i>	<i>UNIT.</i>	
LED B.L (ARRAY)	$V_{LED} = 5.0\text{V}$	-----	280	420	mA	YELLOW-GREEN RED, AMBER, ORANGE
LED B.L (EDGE)	$V_{LED} = 4.0\text{V}$	-----	75	100	mA	BLUE、WHITE PURE-GREEN

7. Optical characteristics

STN TYPE LCD

$T_a = 25$

$V_{DD}-V_O = 8.5V$

I T E M	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

$T_a = 25$

$V_{DD}-V_O = 8.5V$

I T E M	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 backlight

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

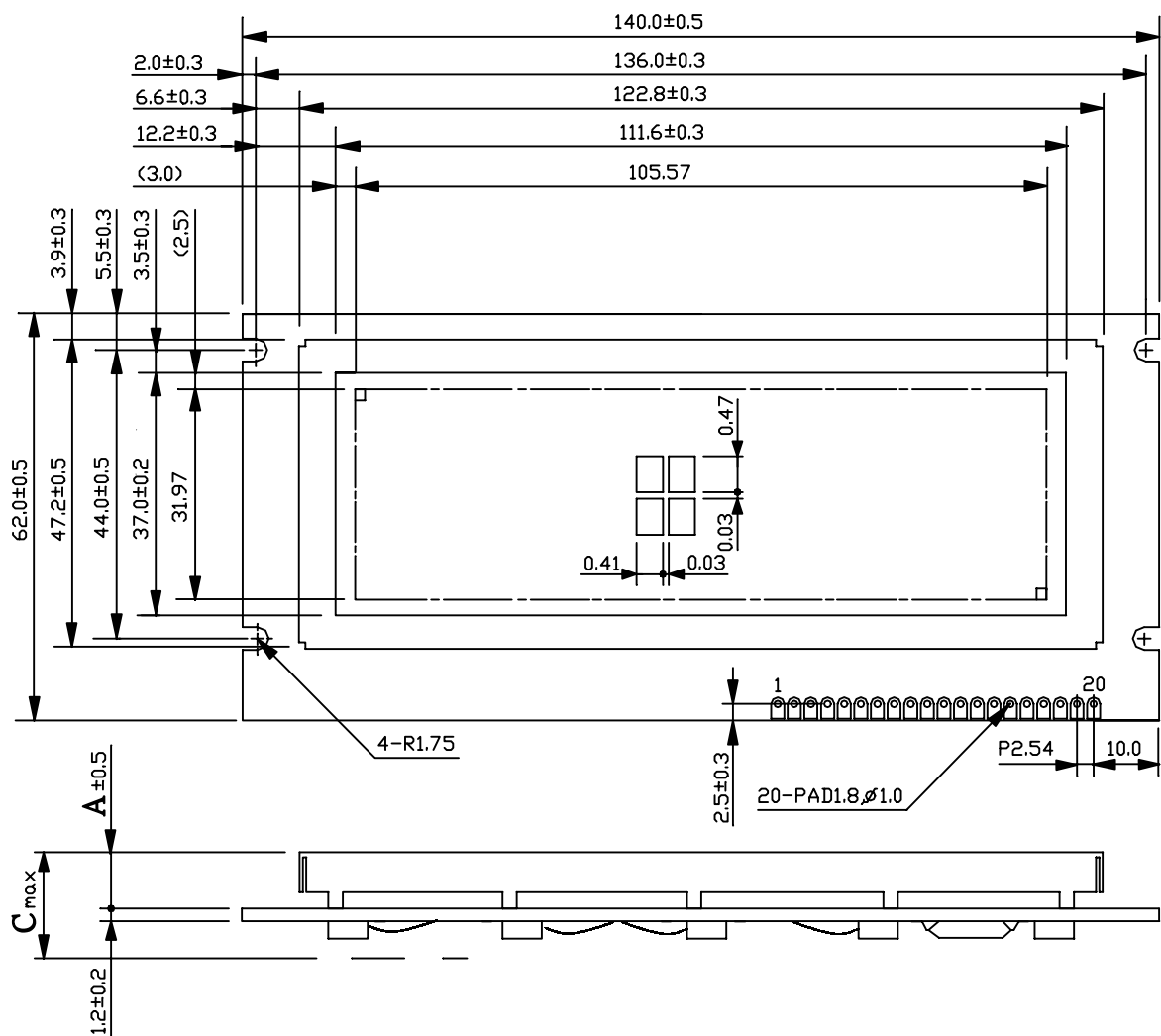
NOTE (1): $\theta = 0^\circ$: VIEWING DIRECTION AT 6 O'CLOCK

$\theta = 180^\circ$: 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	10.0	15.0
EL & NO B.L	4.9	9.5

NOTE :

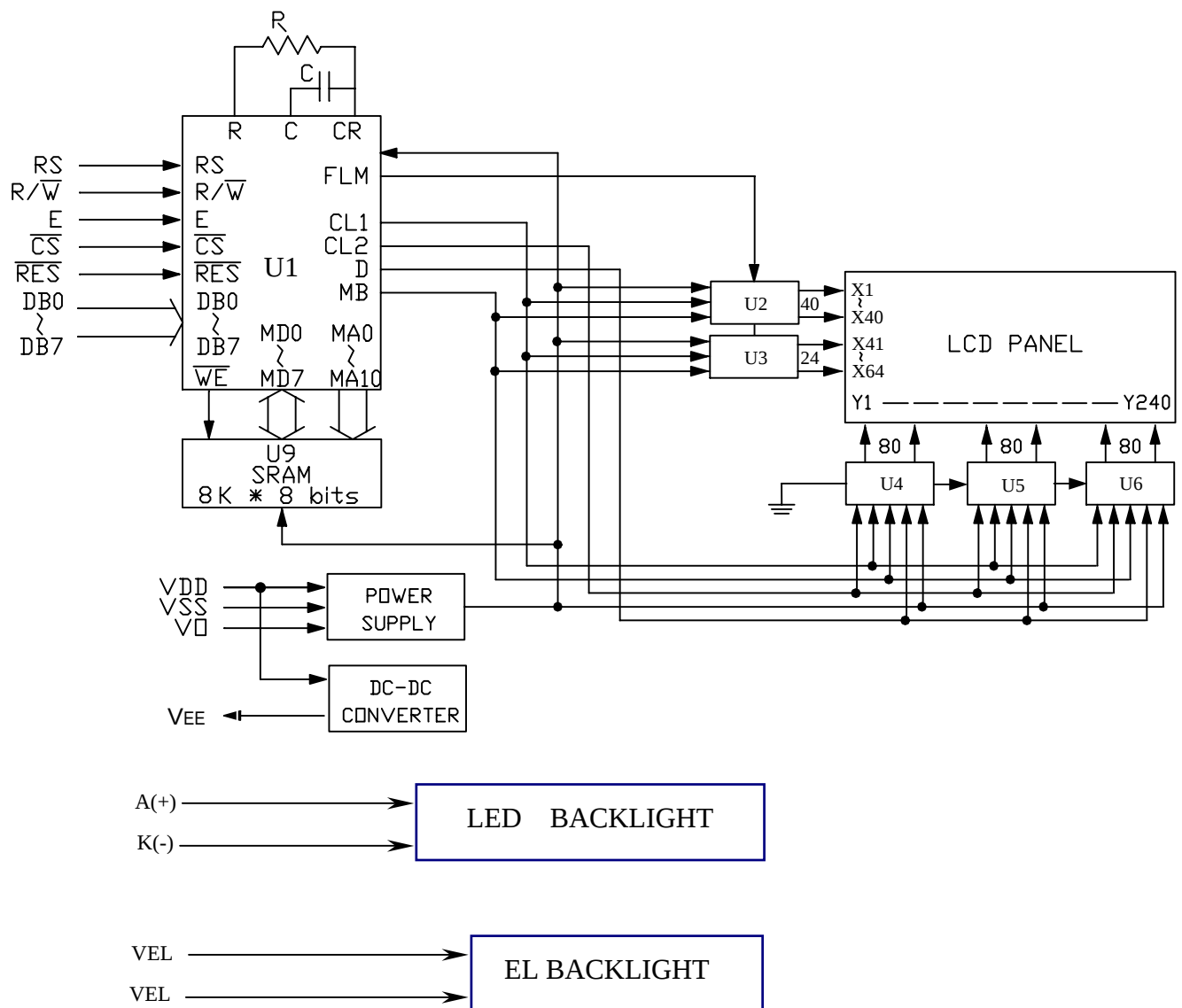
1.UNIT : mm

2.SCALE : NTS

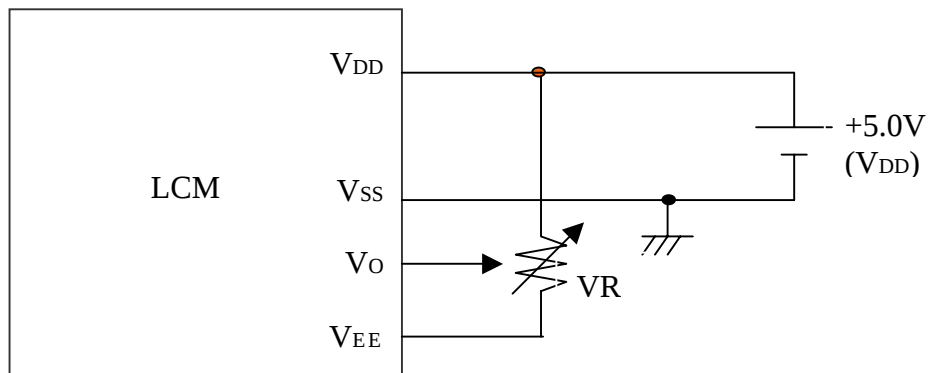
Interface pin connection

PIN NO.	SYMBOL	FUNCTION
1	V _{SS}	POWER SUPPLY (GND)
2	V _{DD}	POWER SUPPLY (+5.0V)
3	V _O	OPERATING VOLTAGE FOR LCD DRIVING
4	RS	L : DATA INPUT H : INSTRUCTION CODE INPUT
5	$\overline{R/W}$	H: DATA READ (LCD MODULE → MPU) L: DATA WRITE (LCD MODULE ← MPU)
6	E	ENABLE SINGAL
7	DB0	DATA INPUT/OUTPUT (LSB)
8	DB1	DATA INPUT/OUTPUT
9	DB2	DATA INPUT/OUTPUT
10	DB3	DATA INPUT/OUTPUT
11	DB4	DATA INPUT/OUTPUT
12	DB5	DATA INPUT/OUTPUT
13	DB6	DATA INPUT/OUTPUT
14	DB7	DATA INPUT/OUTPUT (MSB)
15	$\overline{CS}$	L: CHIP ENABLE
16	$\overline{RES}$	L: RESET
17	V _{EE}	POWER SUPPLY FOR LCD DRIVING OUTPUT
18	N.C	NO CONNECTION
19	A(+) (V _{EL})	POWER SUPPLY FOR LED BACKLIGHT (+) (POWER SUPPLY FOR EL)
20	K(-) (V _{EL})	POWER SUPPLY FOR LED BACKLIGHT (-) (POWER SUPPLY FOR EL)

9. Block diagram



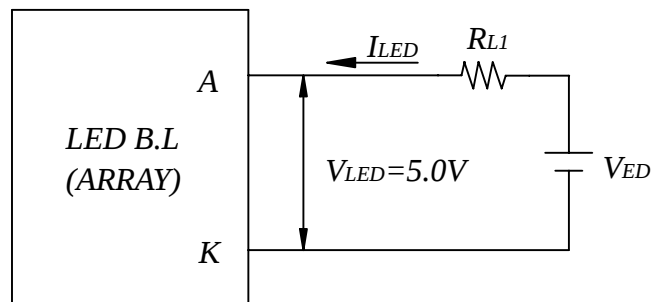
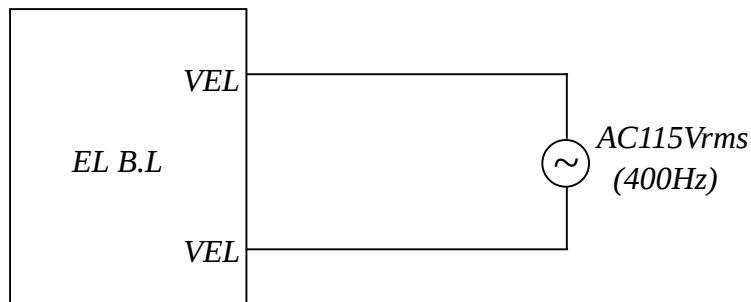
10. Power supply for LCM



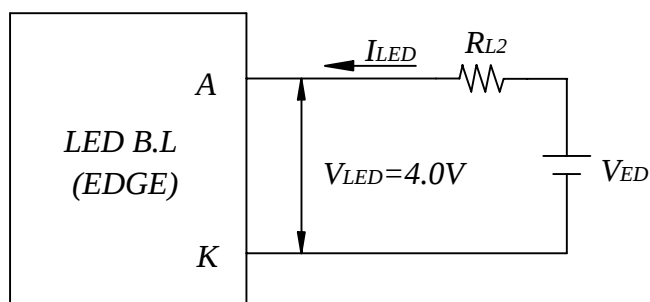
$V_{DD}-V_O$: LCD DRIVING VOLTAGE

VR : 200K Ω

10.1 Power supply for backlight



$RL1 = (V_{ED}-V_{LED}) / I_{LED}$, $I_{LED} = 420.0 \text{ mA (max)}$



$RL2 = (V_{ED}-V_{LED}) / I_{LED}$, $I_{LED} = 100.0 \text{ mA (max)}$