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PART NO.:	MC1604C-SERIES
MESSES ·	

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RECORD OF REVISION

DATE	PAGE	SUMMARY	

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3. General specifications

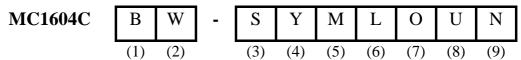
3.1 General specifications

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 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
"E" : EL BACKLIGHT
"R" : REFLECTIVE

(7).BACKLIGHT COLOR:

LED TYPE:

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

EL TYPE:

"nil": WHITE "B": BLUE-GREEN

(8). VIEWING DIRECTION:

(9).BACKLIGHT TYPE:

"nil": LED(+),LED(-)---NORMAL "N": LED(+),LED(-)---EXCHANGE

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4. Mechanical data

(1) NUMBER OF CHARACTER 16 CH * 4 LINE
(2) MODULE SIZE 72.0 W * 48.0 H * " \mathbf{C} " T (Max) mm
(3) EFFECTIVE AREA 61.8 W * 25.2 H mm
(4) CHARACTER PATTERN 5 * 7DOTS + CURSOR
(5) CHARACTER SIZE2.96 W * 4.16 H mm
(6) CHARACTER PITCH 3.55 mm
(7) DOT SIZE0.56 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

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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	VI	Vss	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):

B.L TYPE	SYMBOL	MAX.	UNIT	COMMENT
ARRAY LED	VLED	5.0	V	YELLOW-GREEN,AMBER,ORANGE,RED
EL	VEL	150	Vrms	fel: 1.0KHz 60SEC.MAX
LiL	feL	2.0	KHz	AC115Vrms 60SEC.MAX

5.2 Environmental absolute maximum ratings

ITEM	CONDITION	OPER	OPERATION		RAGE	COMMENT	
	CONDITION	MIN.	MAX.	MIN.	MAX.	COMMINICATI	
AMBIENT	NORMAL	0	50	-20	70		
TEMPERATURE	WIDE	-20	70	-20	70		
HUMIDITY		NOT	F (3)	NOT	E (3)	NO	
HOMIDITI		NOTE (3)		NOT	L (3)	CONDENSATION	
VIBRATION						10~300Hz XYZ	
NOTE (3)			0.5G		2G	DIRECTIONS	
1101L (3)						1 Hr EACH	
SHOCK						10 msec XYZ	
NOTE (4)			3G		50G	DIRECTIONS	
NOIE (4)						1 TIME EACH	
CORROSIVE			NOT				
GAS		ACCEPTABLE		ACCEP	TABLE		

NOTE (3): 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(4):1G=9.8m/s²

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6. Electrical characteristics

Ta = 25 $V_{DD} = 5.0 \pm 0.25 V$

I T E M	SYMBOL	COND	ITION	MIN.	TYP.	MAX.	UNIT
INPUT VOLTAGE	V_{IH}			2.2			V
INI UT VOLIAGE	VIL					0.6	V
OUTPUT VOLTAGE	Vон	-Іон =	0.2 mA	2.4			V
OUTIOT VOLIAGE	Vol	IoL = 1	.2 mA			0.4	V
POWER SUPPLY CURRENT	Idd	Vdd =	= 5.0V		2.0	3.0	mA
		STN/	Ta=-20°C		4.8	0.6 0.4 3.0 	V
		FSTN	Ta= 0°C		4.7		V
		DUTY =1/16	Ta= 25°C		4.5		V
		=10° NOTE(2)	Ta= 50°C		4.3		V
RECOMMENDED LCD DRIVING	V_{DD} - V_{O}	NOTE(2)	Ta= 70°C		4.2		V
VOLTAGE, NOTE(1)	A DD- A O		Ta=-20°C		4.5		V
		TN DUTY	Ta= 0°C		4.4		V
		=1/16	Ta= 25°C		4.2		V
		=25° NOTE(2)	Ta= 50°C		4.0		V
			Ta= 70°C		3.9		V
POWER SUPPLY CURRENT FOR B.L	NOTE(3)	NOT	TE(3)		NOTE(3)	NOTE(3)	NOTE(3)

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

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

(3): LED CURRENT OF DIFFERENT BACKLIGHT TYPE

B.L TYPE	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT.	LED COLOR
ARRAY LED	ILED	VLED=5.0V		170	220	m A	YELLOW-GREEN, AMBER ORANGE RED
EL	IEL	VEL =115Vrms fel = 400Hz		2.0		mArms	

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7. Optical characteristics

TN TYPE LCD	Ta = 25	$V_{DD} - V_{O} = 4.2 V$

I T E M	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)
RESPONSE HIME	tf (fall)	= 25° NOTE(1)		150	250	ms	NOTE(2)

STN TYPE LCD $Ta = 25 \qquad V_{DD} - V_O = 4.5V$

					-	• DD	
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)
RESPONSE TIME	tf (fall)	= 10° NOTE(1)		300	400	ms	NOTE(2)

FSTN TYPE LCD $Ta = 25 \qquad V_{DD}-V_O = 4.5V$

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE	
VIEWING ANGLE	2- 1	K = 2.0	30	40		deg.	NOTE(2)	
		NOTE(1)		_			, - ()	
CONTRAST RATIO	K	$= 10^{\circ}$	4.0	5.0			NOTE(2)	
CONTRAST RATIO	V	NOTE(1)	4.0	3.0			NOTE(2)	
		$=10^{\circ}$		200	250		NOTE(A)	
RESPONSE TIME	tr (rise)	NOTE(1)		200	350	ms	NOTE(2)	
	4£ (£-11)	$=10^{\circ}$		200	400		NOTE(2)	
	tf (fall)	NOTE(1)		300	400	ms	NOTE(2)	

Brightness for backlight

SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	B.L TYPE	NOTE	
D	$=0^{\circ}$	4.0			a d /m²	EL	NOTE(2)	
В	$=0^{\circ}$	5.0			cd/m ²	LED	NOTE(3)	

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

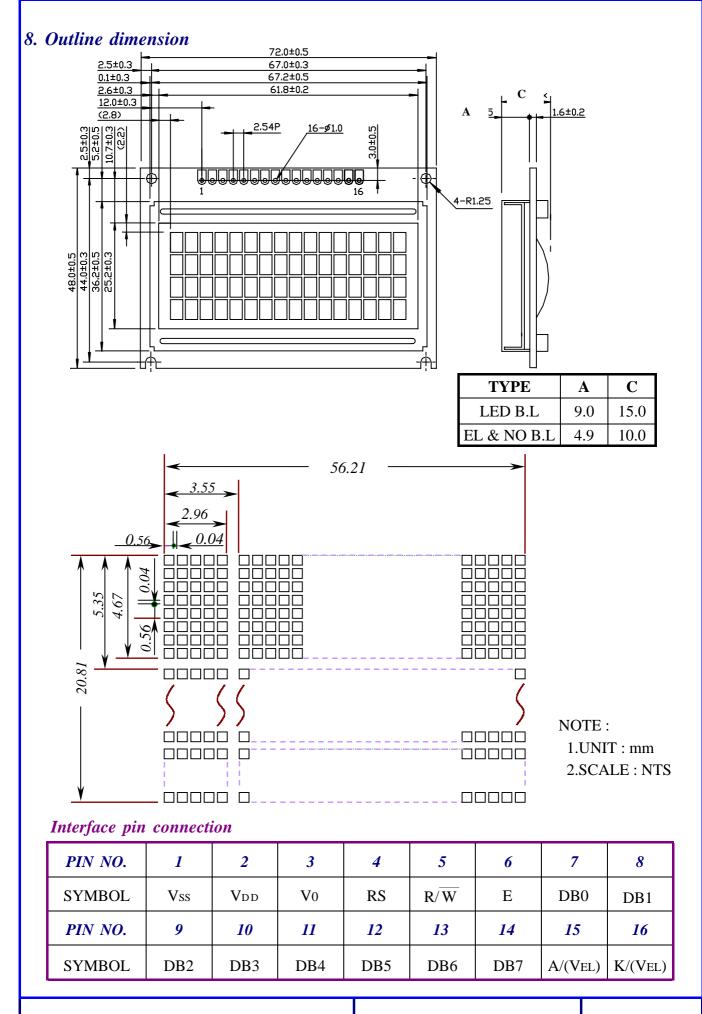
= 180°: VIEWING DIRECTION AT 12 O'CLOCK

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

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

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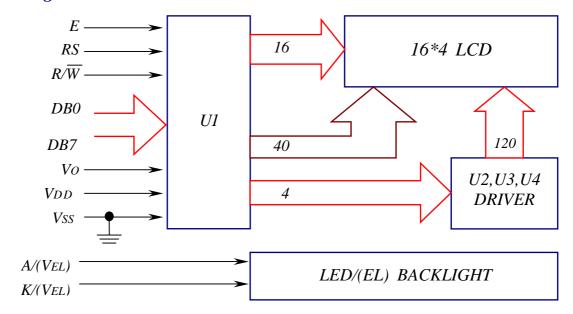
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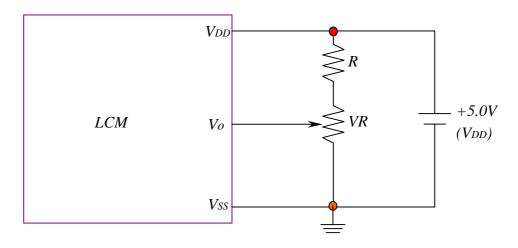
9. Block diagram



Display data address charts

Character	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
LINE 1	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F	10	11	12	13
LINE 2	40	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F	50	51	52	53
LINE 3	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F	20	21	22	23	24	25	26	27
LINE 4	54	55	56	57	58	59	5A	5B	5C	5D	5E	5F	60	61	62	63	64	65	66	67

10. Power supply for LCM



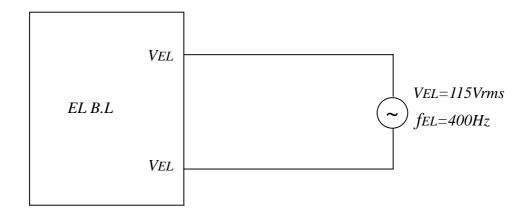
RECOMMENDED RESISTOR R: VDD-VO 1.5V

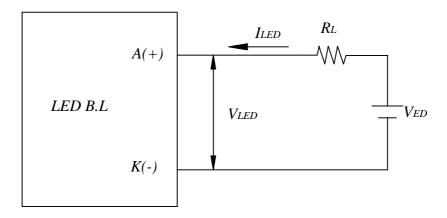
VDD-VO: LCD DRIVING VOLTAGE

VR: 10K ~20K

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10.1 Power supply for backlight





ITEM	LED TYPE	CONDITION
Limit resister of LED (R _L)	ARRAY LED	RL $\left(\left(V_{\text{ED}}-5.0V\right)/\text{ Iled}\right)$, Iled 220mA