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PART NO. : MC4004A-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

**MC4004A**

B	W
---	---

 - 

S	Y	M	L	O	U
---	---	---	---	---	---

(1) (2)                      (3) (4) (5) (6) (7) (8)

(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

“R” : REFLECTIVE

(7).BACKLIGHT COLOR :

LED TYPE :

“nil” : YELLOW-GREEN

“A” : AMBER

“B” : BLUE

“G” : GREEN

“O” : ORANGE

“R” : RED

“W” : WHITE

(8).VIEWING DIRECTION :

“nil” : 6 O’CLOCK

“3” : 3 O’CLOCK

“U” : 12 O’CLOCK

“9” : 9 O’CLOCK

#### 4. *Mechanical data*

- (1) NUMBER OF CHARACTERS -----40 CH \* 4 LINE
- (2) MODULE SIZE -----190.0 W \* 54.0 H \* “C” T (Max) mm
- (3) EFFECTIVE AREA-----149.0 W \* 31.0 H mm
- (4) CHARACTER PATTERN-----5 \* 7 DOTS + CURSOR
- (5) CHARACTER SIZE -----2.78 W \* 4.27 H mm
- (6) CHARACTER PITCH-----3.53 W \* 5.49 H mm
- (7) DOT SIZE -----0.50 W \* 0.55 H mm
- (8) DOT PITCH-----0.57 W \* 0.62 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>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 <sub>DD</sub> -V <sub>SS</sub>	0	6.0	V	-----
INPUT VOLTAGE	V <sub>I</sub>	V <sub>SS</sub>	V <sub>DD</sub>	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>CONDITION</i>	<i>OPERATING</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 (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/s<sup>2</sup>

**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	$V_{OH}$	$-I_{OH} = 0.2 \text{ mA}$	2.4	-----	-----	V	
	$V_{OL}$	$I_{OL} = 1.2 \text{ mA}$	-----	-----	0.4	V	
POWER SUPPLY CURRENT	$I_{DD}$	$V_{DD} = 5.0V$	-----	1.5	3.0	mA	
RECOMMENDED LCD DRIVING VOLTAGE, NOTE(1)	$V_{DD} - V_O$	STN/ FSTN DUTY =1/16 =10° NOTE(2)	$T_a = -20^\circ C$	-----	4.8	-----	V
			$T_a = 0^\circ C$	-----	4.7	-----	V
			$T_a = 25^\circ C$	-----	4.5	-----	V
			$T_a = 50^\circ C$	-----	4.3	-----	V
			$T_a = 70^\circ C$	-----	4.2	-----	V
		TN DUTY =1/16 =25° NOTE(2)	$T_a = -20^\circ C$	-----	4.5	-----	V
			$T_a = 0^\circ C$	-----	4.4	-----	V
			$T_a = 25^\circ C$	-----	4.2	-----	V
			$T_a = 50^\circ C$	-----	4.0	-----	V
			$T_a = 70^\circ C$	-----	3.9	-----	V
POWER SUPPLY CURRENT FOR LED	$I_{LED}$	$V_{DD} = 5.0V$	-----	NOTE(3)	NOTE(3)	mA	

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

- (2):  $= 0^\circ$  : VIEWING DIRECTION AT 6 O’CLOCK  
 $= 180^\circ$  : VIEWING DIRECTION AT 12 O’CLOCK

(3): LED CURRENT FOR DIFFERENT LED BACKLIGHT TYPE

<i>LED B.L TYPE</i>	<i>I<sub>LED</sub></i>				<i>LED COLOR</i>
	<i>MIN.</i>	<i>TYP.</i>	<i>MAX.</i>	<i>UNIT.</i>	
LED B.L (ARRAY)	-----	270	400	mA	YELLOW-GREEN、AMBER、ORANGE、RED
LED B.L (EDGE)	-----	60	80	mA	BLUE、WHITE、PURE GREEN

## 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 LED backlight

SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	LED TYPE	NOTE
B	= 0°	5.0	----	----	cd/m <sup>2</sup>	YELLOW-GREEN, RED AMBER, ORANGE	NOTE(2)
	= 0°	6.0	----	----		BLUE, WHITE, PURE GREEN	NOTE(3)

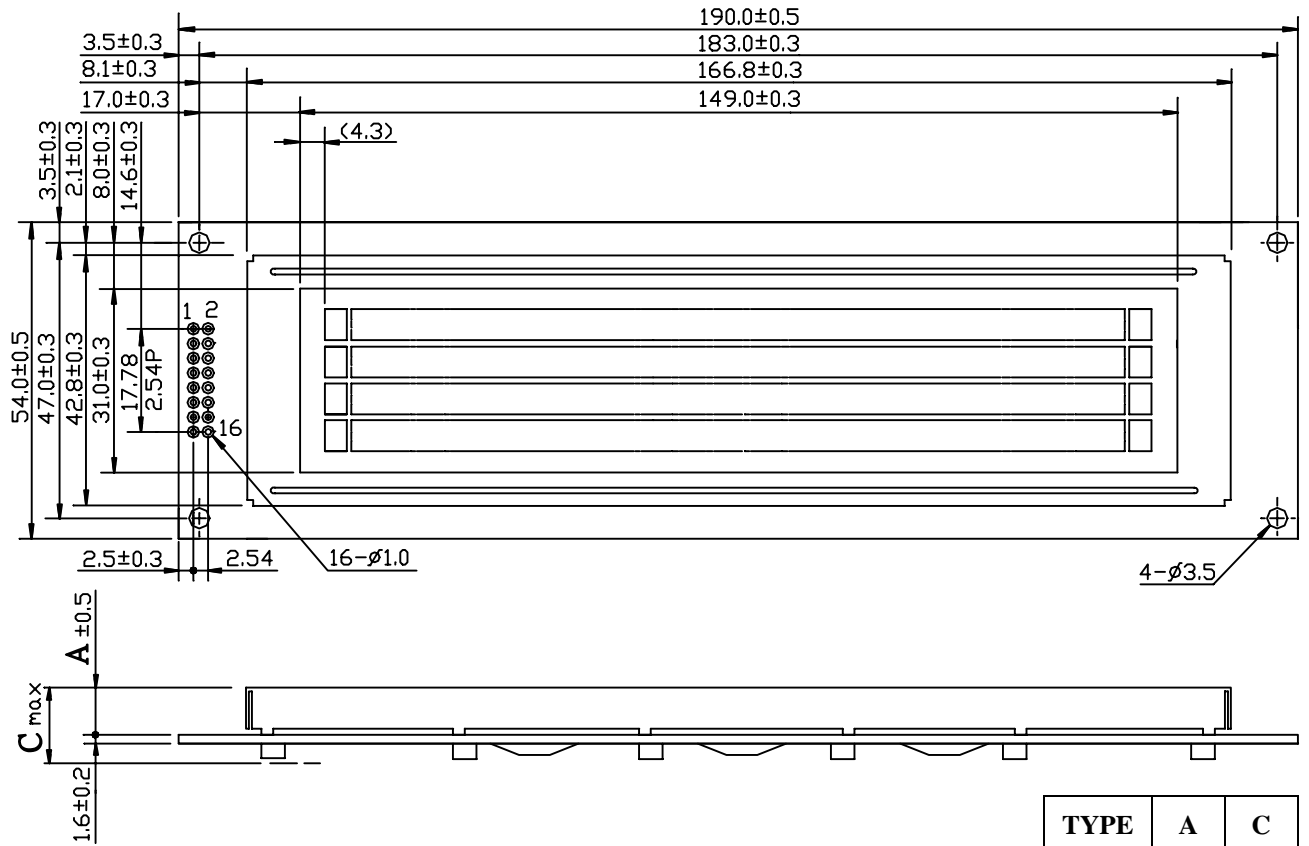
NOTE (1): = 0° : VIEWING DIRECTION AT 6 O'CLOCK

= 180° : VIEWING DIRECTION AT 12 O'CLOCK

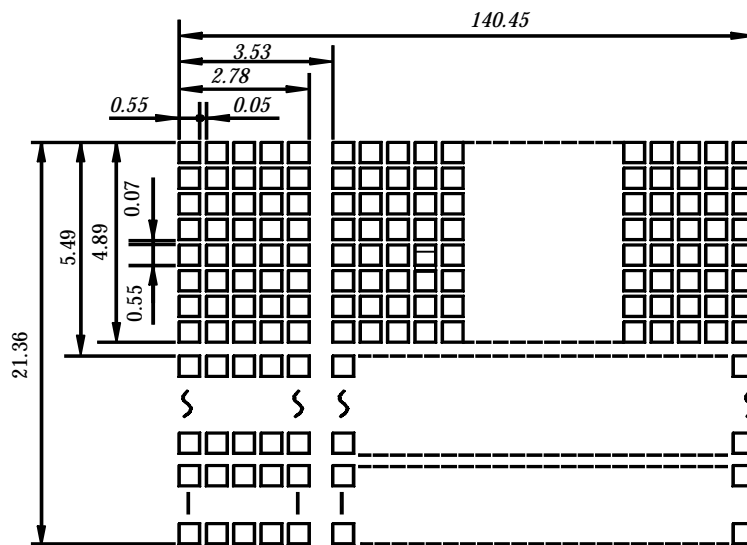
NOTE (2): SEE CUSTOMER ACCEPTANCE STANDARD SPECIFICATION FOR DEFINITION OF OPTICAL CHARACTERISTICS.

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

## 8. Outline dimension



TYPE	A	C
LED B.L	9.5	15.0
NO B.L	4.9	10.0



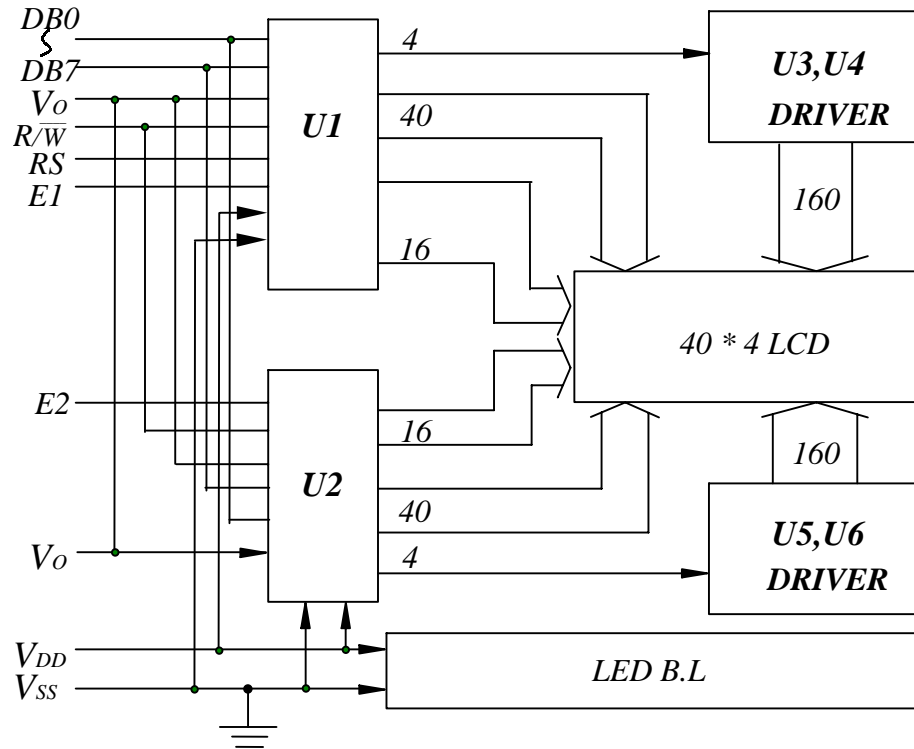
NOTE :  
 1.UNIT : mm  
 2.SCALE : NTS

### Interface pin connection

<b>PIN NO.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>
SYMBOL	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
<b>PIN NO.</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>
SYMBOL	E1	R/W	RS	Vo	Vss	Vcc	E2	NC



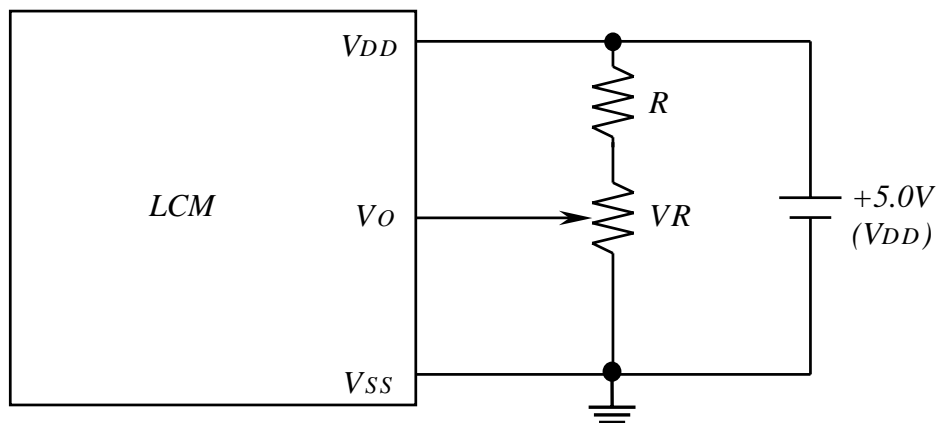
## 9 Block diagram



## Display data address charts

Character	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
LINE1	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F	10	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F	20	21	22	23	24	25	26	27
LINE2	40	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F	50	51	52	53	54	55	56	57	58	59	5A	5B	5C	5D	5E	5F	60	61	62	63	64	65	66	67
LINE3	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F	10	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F	20	21	22	23	24	25	26	27
LINE4	40	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F	50	51	52	53	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:  $V_{DD}-V_0$  1.5V

$V_{DD}-V_0$ : LCD DRIVING VOLTAGE

VR: 10K ~20K