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PART NO. : MC16011A-SERIES

FOR MESSRS. : \_\_\_\_\_

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ACCEPTED BY: \_\_\_\_\_

PROPOSED BY : \_\_\_\_\_



## RECORD OF REVISION

DATE	PAGE	SUMMARY

### 3. General specifications

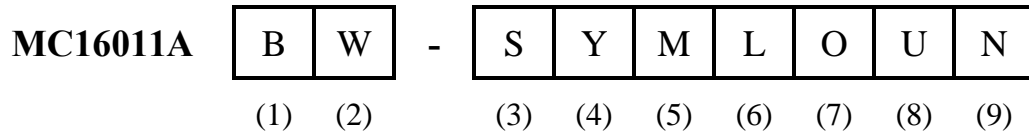
#### 3.1 General specifications

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

“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 DOT----- 16 CH \* 1 LINE
- (2) MODULE SIZE ----- 80.0 W \*36.0 H \* "C" T(max) mm
- (3) EFFECTIVE AREA ----- 64.5 W \* 16.0 H mm
- (4) CHARACTER PATTERN ----- 5 \* 7 DOTS + CURSOR
- (5) CHARACTER SIZE----- 3.07 W \* 5.73 H mm
- (6) CHARACTER PITCH ----- 3.77 mm
- (7) DOT SIZE----- 0.55 W \* 0.75 H mm
- (8) DOT PITCH ----- 0.63W \* 0.83H 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)
POWER SUPPLY FOR LED	V <sub>LED</sub>	-----	6.0	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>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	$V_{OH}$	$-I_{OH} = 0.205 \text{ mA}$	2.4	-----	-----	V	
	$V_{OL}$	$I_{OL} = 1.2 \text{ mA}$	-----	-----	0.4	V	
POWER SUPPLY CURRENT	$I_{DD}$	$V_{DD} = 5.0V$	-----	1.0	1.5	mA	
RECOMMENDED LCD DRIVING VOLTAGE, NOTE(1)	$V_{DD} - V_O$	STN/ FSTN DUTY =1/16 =10° NOTE(2)	$T_a = -20^\circ\text{C}$	-----	4.8	-----	V
			$T_a = 0^\circ\text{C}$	-----	4.7	-----	V
			$T_a = 25^\circ\text{C}$	-----	4.5	-----	V
			$T_a = 50^\circ\text{C}$	-----	4.3	-----	V
			$T_a = 70^\circ\text{C}$	-----	4.2	-----	V
		TN DUTY =1/16 =25° NOTE(2)	$T_a = -20^\circ\text{C}$	-----	4.7	-----	V
			$T_a = 0^\circ\text{C}$	-----	4.6	-----	V
			$T_a = 25^\circ\text{C}$	-----	4.2	-----	V
			$T_a = 50^\circ\text{C}$	-----	3.8	-----	V
			$T_a = 70^\circ\text{C}$	-----	3.7	-----	V
POWER SUPPLY CURRENT FOR B.L.	$I_{LED}$	$V_{LED} = 5.0 V$	-----	120	150	mA	

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

(2):  $= 0^\circ$  : VIEWING ANGLE AT 6 O' CLOCK  
 $= 180^\circ$  : VIEWING ANGLE AT 12 O' CLOCK

## 7. Optical characteristics

### TN TYPE LCD

$T_a = 25$

$V_{DD}-V_O = 4.2V$

<i>I T E M</i>	<i>SYMBOL</i>	<i>CONDITION</i>	<i>MIN.</i>	<i>TYP.</i>	<i>MAX.</i>	<i>UNIT</i>	<i>NOTE</i>
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

$T_a = 25$

$V_{DD}-V_O = 4.5V$

<i>I T E M</i>	<i>SYMBOL</i>	<i>CONDITION</i>	<i>MIN.</i>	<i>TYP.</i>	<i>MAX.</i>	<i>UNIT</i>	<i>NOTE</i>
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 BLUETYPE LCD

$T_a = 25$

$V_{DD}-V_O = 4.5V$

<i>I T E M</i>	<i>SYMBOL</i>	<i>CONDITION</i>	<i>MIN.</i>	<i>TYP.</i>	<i>MAX.</i>	<i>UNIT</i>	<i>NOTE</i>
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 LCM

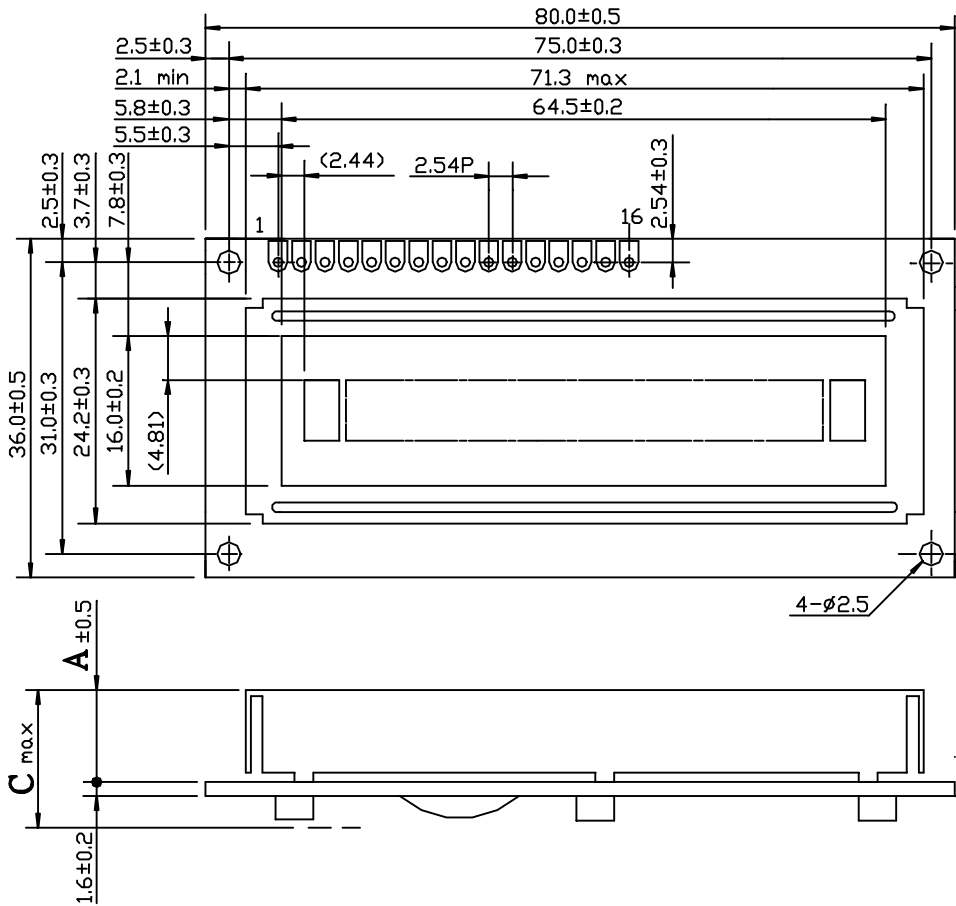
<i>SYMBOL</i>	<i>CONDITION</i>	<i>MIN.</i>	<i>TYP.</i>	<i>MAX.</i>	<i>UNIT</i>	<i>LED TYPE</i>	<i>NOTE</i>
B	= 0° = 0°	5.0	----	----	cd/m <sup>2</sup>	YELLOW-GREEN, RED, AMBER, ORANGE	NOTE(2) NOTE(3)

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

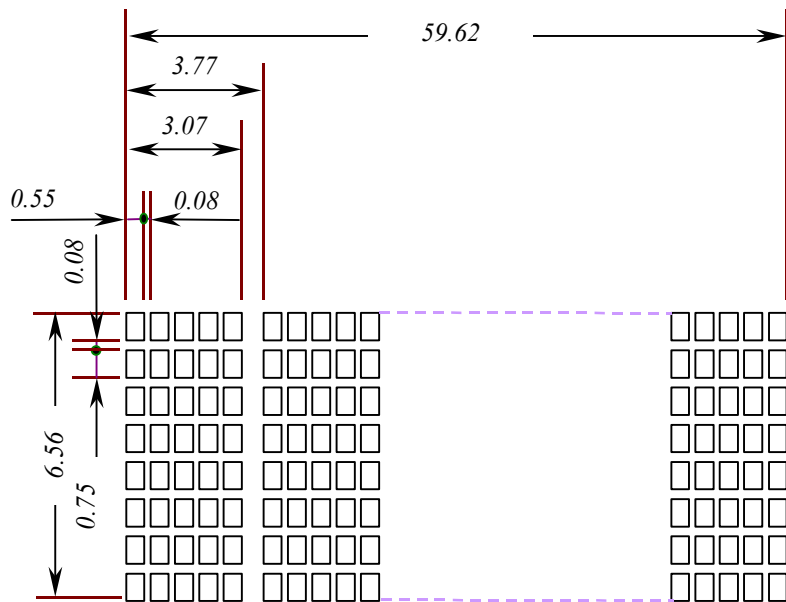
(2): SEE CUSTOMER ACCEPTANCE STANDARD SPECIFICATION FOR DEFINITION OF OPTICAL CHARACTERISTICS.

(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



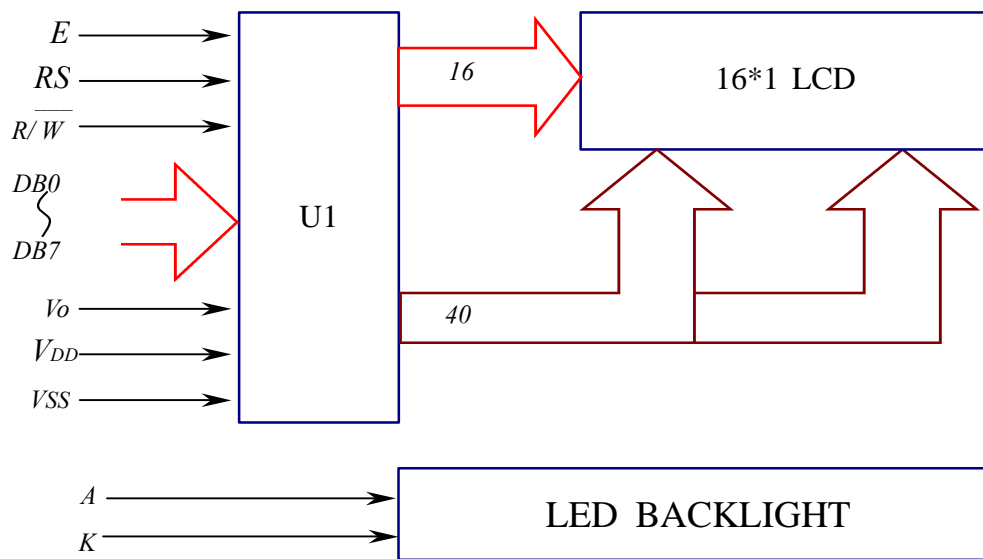
NOTE :  
 1.UNIT : mm  
 2.SCALE : NTS

### Interface pin connection

<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>		
SYMBOL	V <sub>SS</sub>	V <sub>DD</sub>	V <sub>O</sub>	RS	R/W	E	DB0		
<b>PIN NO.</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>		<b>15</b>
SYMBOL	DB1	DB2	DB3	DB4	DB5	DB6	DB7	LED B.L.	A
								NO B.L.	N.C
									K
									N.C



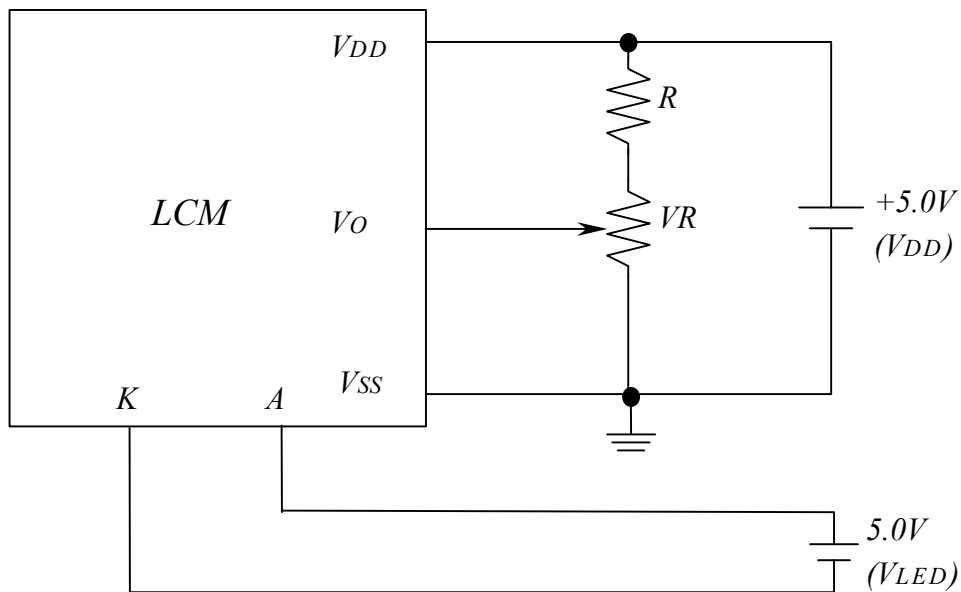
### 9. Block diagram



### 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

### 10. Power supply for LCM



RECOMMENDED RESISTOR R :  $V_{DD}-V_o$  1.5V  
 $V_{DD}-V_o$ : LCD DRIVING VOLTAGE  
 VR: 10K ~20K

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