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PART NO. : MC1602F7-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

<b>MC1602F</b>	<table border="1"><tr><td>B</td><td>W</td></tr></table>	B	W	7-	<table border="1"><tr><td>S</td><td>Y</td><td>M</td><td>L</td><td>W</td><td>U</td><td>N</td></tr></table>	S	Y	M	L	W	U	N
B	W											
S	Y	M	L	W	U	N						
	(1) (2)		(3) (4) (5) (6) (7) (8) (9)									

(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

(7).BACKLIGHT COLOR :

LED TYPE :

“nil” : YELLOW-GREEN

“A” : AMBER

“B” : BLUE

“G” : PURE GREEN

“O” : ORANGE

“R” : RED

“W” : WHITE

(8).VIEWING ANGLE :

“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 \* 2 LINE
- (2) MODULE SIZE -----85.0 W \* 36.0 H \* 10.0T(max) mm
- (3) EFFECTIVE AREA -----64.5 W \* 16.0 H mm
- (4) CHARACTER PATTERN -----5 \* 7 DOTS + CURSOR
- (5) CHARACTER SIZE-----2.96W \* 4.86 H mm
- (6) CHARACTER PITCH -----3.55 mm
- (7) DOT SIZE-----0.56 W \* 0.66 H mm
- (8) DOT PITCH -----0.60 W \* 0.70H mm

## 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>OPERATING</i>			<i>STORAGE</i>		<i>COMMENT</i>
	<i>CONDITION</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

Ta = 25

VDD = 5.0 ± 0.25 V

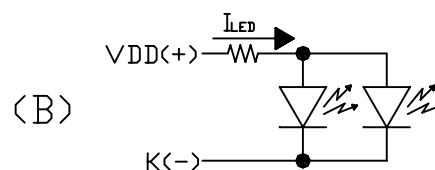
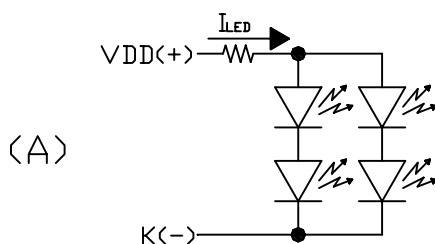
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	
INPUT VOLTAGE	V <sub>IH</sub>	-----	2.2	-----	-----	V	
	V <sub>IL</sub>	-----	-----	-----	0.6	V	
OUTPUT VOLTAGE	V <sub>OH</sub>	-I <sub>OH</sub> = 0.205 mA	2.4	-----	-----	V	
	V <sub>OL</sub>	I <sub>OL</sub> = 1.2 mA	-----	-----	0.4	V	
POWER SUPPLY CURRENT	I <sub>DD</sub>	V <sub>DD</sub> = 5.0V	-----	1.0	1.5	mA	
RECOMMENDED LCD DRIVING VOLTAGE, NOTE(1)	V <sub>DD</sub> -V <sub>O</sub>	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 LED	I <sub>LED</sub>	V <sub>DD</sub> = 5.0V	-----	NOTE(3)	NOTE(3)	mA	

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

(2): = 0° : VIEWING ANGLE AT 6 O’CLOCK  
 = 180° : VIEWING ANGLE AT 12 O’CLOCK

(3): LED CURRENT OF DEFFERENT LED TYPE

TYPE	I <sub>LED</sub> TYP. / MAX.	LED TYPE
A	30mA / 40mA	YELLOW-GREEN, AMBER, ORANGE, RED
B	30mA / 40mA	BLUE, PURE GREEN, WHITE



## 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 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

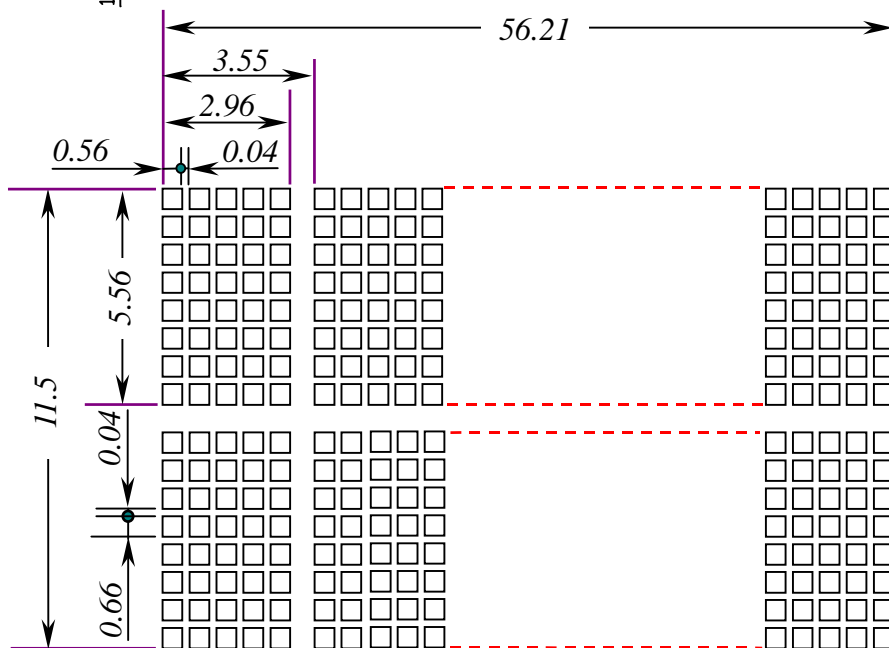
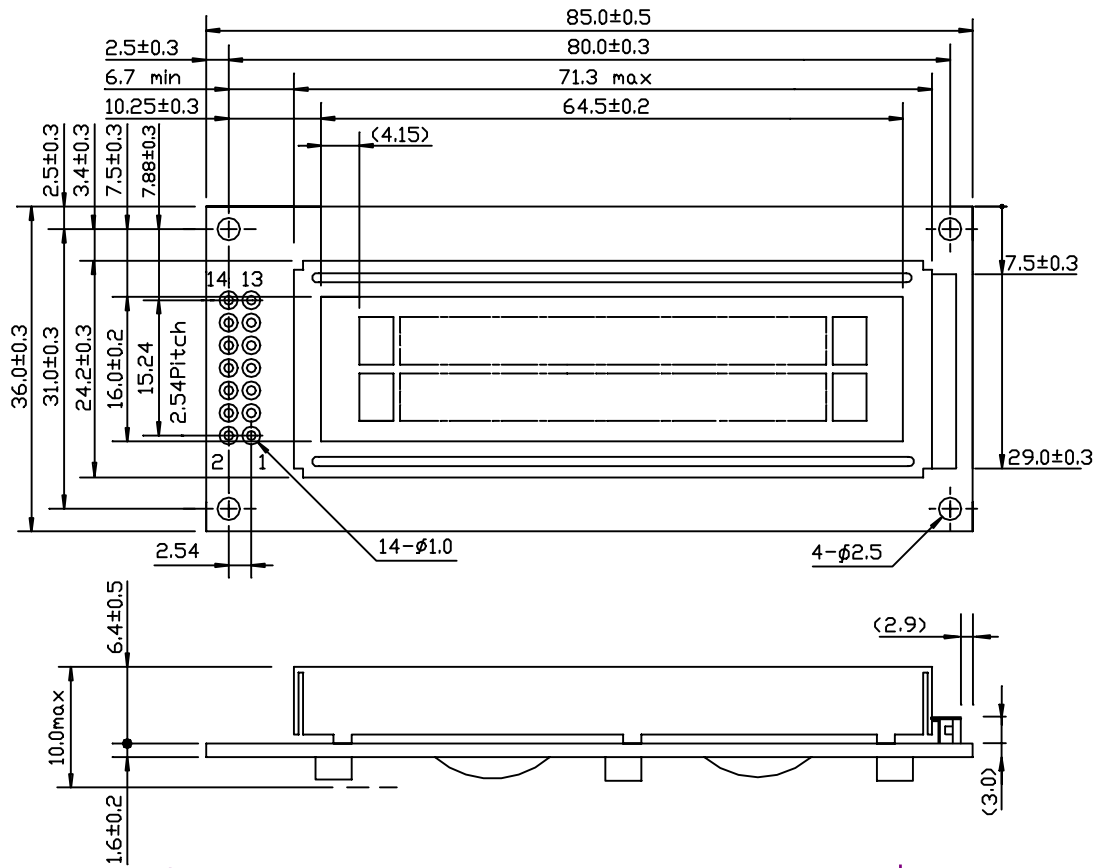
SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	LED TYPE	NOTE
B	= 0°	4.0	----	----	cd/m <sup>2</sup>	YELLOW-GREEN, RED, AMBER, ORANGE	NOTE(2)
	= 0°	6.0	----	----		BLUE, PURE GREEN, WHITE	NOTE(3)

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

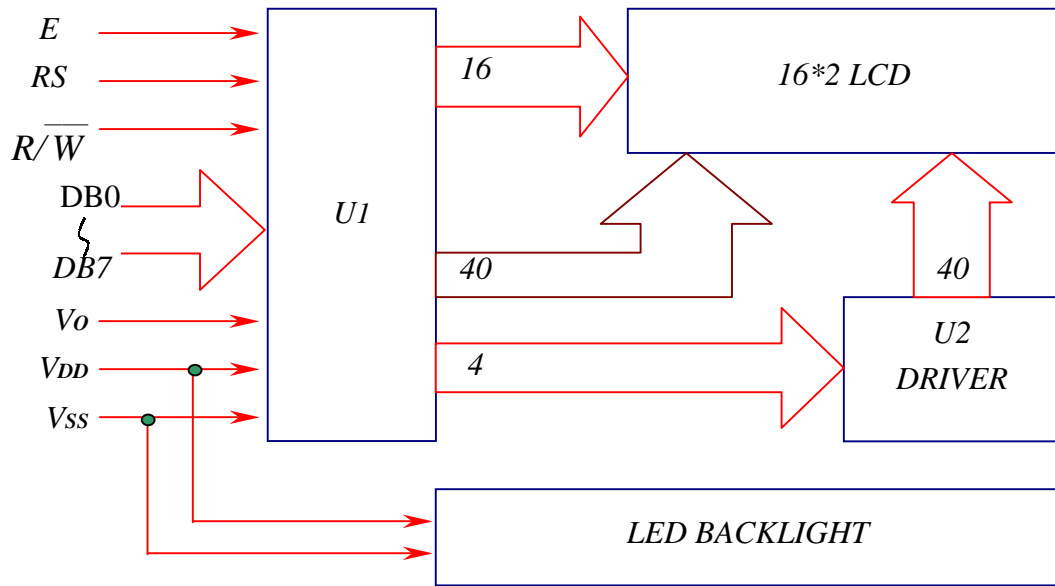


NOTE :  
 1.UNIT : mm  
 2.SCALE : NTS

### 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/ $\overline{W}$	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>
SYMBOL	DB1	DB2	DB3	DB4	DB5	DB6	DB7

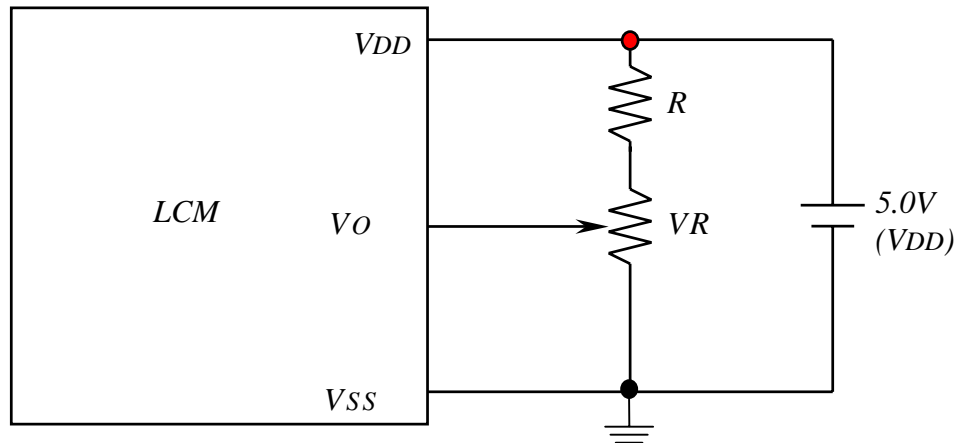
## 9. Block diagram



## 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

## 10. Power supply for LCM



RECOMMENDED RESISTOR R :  $V_{DD}-V_o$  1.5V

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

VR: 10K ~20K