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EVERBOUQUET INTERNATIONAL CO., LTD.

PART NO.: MC1604C-SERIES

FOR MESSRS.: _____

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ACCEPTED BY: _____

PROPOSED BY : _____

RECORD OF REVISION

| DATE | PAGE | SUMMARY |
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| | | |

3. General specifications

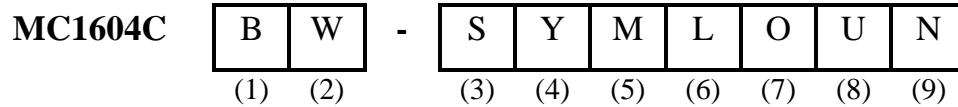
3.1 General specifications

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 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

“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 :

“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(-)---EXCHANGE

4. Mechanical data

- (1) NUMBER OF CHARACTER ----- 16 CH * 4 LINE
- (2) MODULE SIZE ----- 72.0 W * 48.0 H * "C" T (Max) mm
- (3) EFFECTIVE AREA ----- 61.8 W * 25.2 H mm
- (4) CHARACTER PATTERN ----- 5 * 7DOTS + CURSOR
- (5) CHARACTER SIZE ----- 2.96 W * 4.16 H mm
- (6) CHARACTER PITCH ----- 3.55 mm
- (7) DOT SIZE ----- 0.56 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

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 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):

| <i>B.L TYPE</i> | <i>SYMBOL</i> | <i>MAX.</i> | <i>UNIT</i> | <i>COMMENT</i> |
|-----------------|------------------|-------------|------------------|------------------------------------|
| ARRAY LED | V _{LED} | 5.0 | V | YELLOW-GREEN,AMBER,ORANGE,RED |
| EL | V _{EL} | 150 | V _{rms} | f _{EL} : 1.0KHz 60SEC.MAX |
| | f _{EL} | 2.0 | KHz | AC115V _{rms} 60SEC.MAX |

5.2 Environmental absolute maximum ratings

| <i>I T E M</i> | <i>CONDITION</i> | <i>OPERATION</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 (3) | | NOTE (3) | | NO CONDENSATION |
| VIBRATION NOTE (3) | ----- | ----- | 0.5G | ----- | 2G | 10~300Hz XYZ DIRECTIONS 1 Hr EACH |
| SHOCK NOTE (4) | ----- | ----- | 3G | ----- | 50G | 10 msec XYZ DIRECTIONS 1 TIME EACH |
| CORROSIVE GAS | ----- | NOT ACCEPTABLE | | NOT ACCEPTABLE | | ----- |

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

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} | $-I_{OH} = 0.2$ mA | 2.4 | ----- | ----- | V | |
| | V_{OL} | $I_{OL} = 1.2$ mA | ----- | ----- | 0.4 | V | |
| POWER SUPPLY CURRENT | I_{DD} | $V_{DD} = 5.0$ V | ----- | 2.0 | 3.0 | mA | |
| RECOMMENDED LCD DRIVING VOLTAGE, NOTE(1) | $V_{DD} - V_O$ | 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 B.L | NOTE(3) | NOTE(3) | ----- | NOTE(3) | NOTE(3) | NOTE(3) | |

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

(2): = 0° : VIEWING DIRECTION AT 6 O'CLOCK
= 180° : VIEWING DIRECTION AT 12 O'CLOCK

(3): LED CURRENT OF DIFFERENT BACKLIGHT TYPE

| <i>B.L TYPE</i> | <i>SYMBOL</i> | <i>CONDITION</i> | <i>MIN.</i> | <i>TYP.</i> | <i>MAX.</i> | <i>UNIT.</i> | <i>LED COLOR</i> |
|-----------------|---------------|--|-------------|-------------|-------------|--------------|-------------------------------------|
| ARRAY LED | I_{LED} | $V_{LED} = 5.0$ V | ----- | 170 | 220 | mA | YELLOW-GREEN, AMBER, ORANGE, RED |
| EL | I_{EL} | $V_{EL} = 115$ Vrms $f_{EL} = 400$ Hz | ----- | 2.0 | ----- | mArms | ----- |

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 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) | 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 backlight

| <i>SYMBOL</i> | <i>CONDITION</i> | <i>MIN.</i> | <i>TYP.</i> | <i>MAX.</i> | <i>UNIT</i> | <i>B.L TYPE</i> | <i>NOTE</i> |
|---------------|------------------|-------------|-------------|-------------|-------------------|-----------------|-------------|
| B | = 0° | 4.0 | ---- | ---- | cd/m ² | EL | NOTE(2) |
| | = 0° | 5.0 | ---- | ---- | | LED | NOTE(3) |

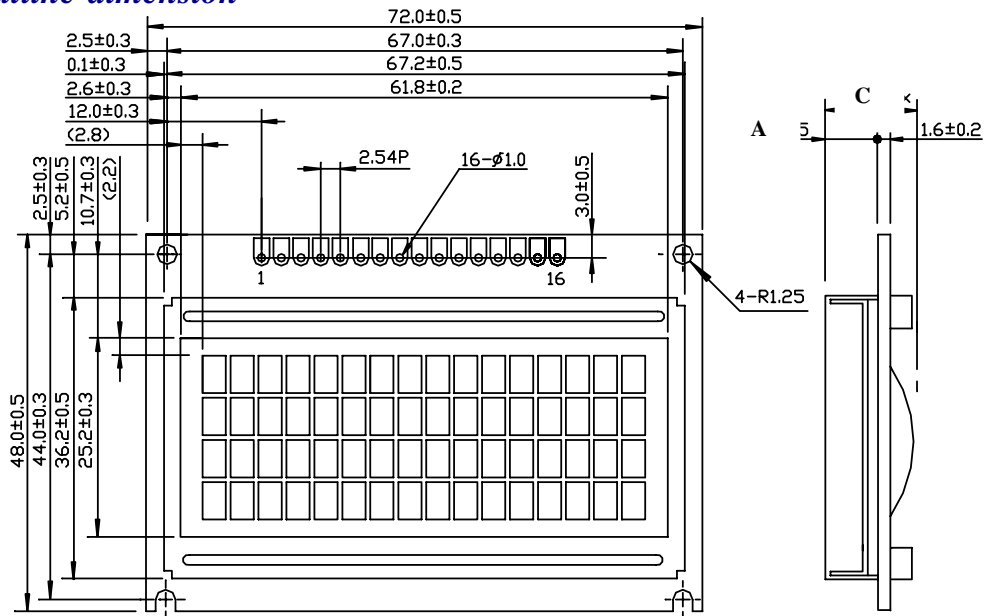
NOTE (1): = 0° : VIEWING DIRECTION AT 6 O'CLOCK

= 180° : VIEWING DIRECTION AT 12 O'CLOCK

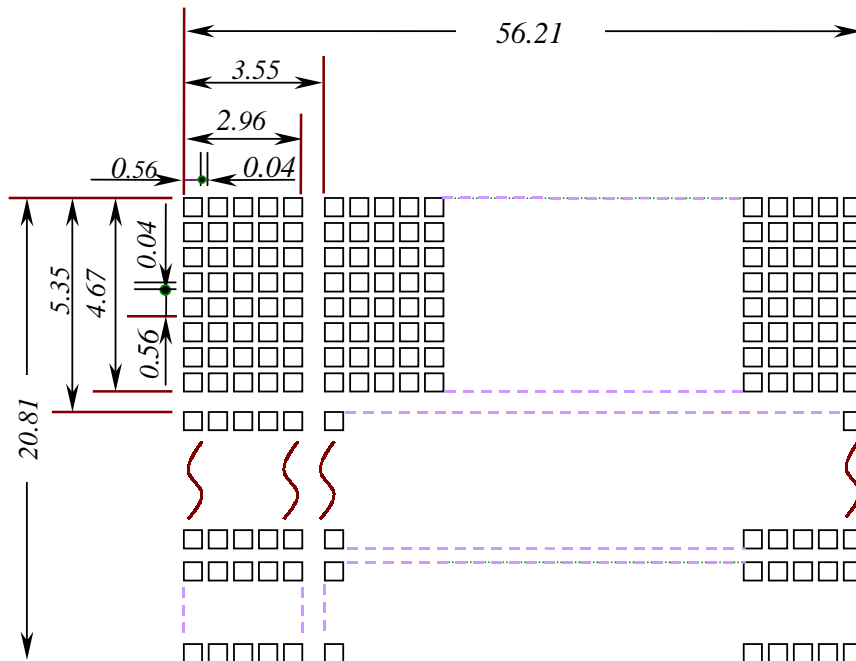
NOTE (2):SEE CUSTOMER ACCEPTANCE STANDARD SPECIFICATION FOR DEFINITION OF OPTICAL CHARACTERISTICS.

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

8. Outline dimension



| TYPE | A | C |
|-------------|-----|------|
| LED B.L | 9.0 | 15.0 |
| EL & NO B.L | 4.9 | 10.0 |

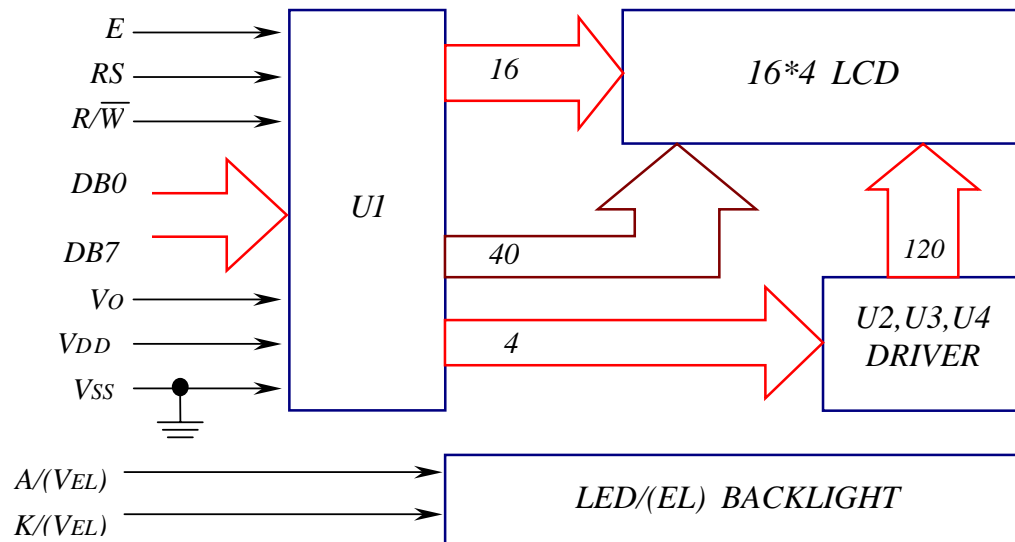


NOTE :
 1.UNIT : mm
 2.SCALE : NTS

Interface pin connection

| | | | | | | | | |
|----------------|-----------------|-----------------|----------------|-----------|-------------------|-----------|-----------|-----------|
| PIN NO. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| SYMBOL | V _{SS} | V _{DD} | V ₀ | RS | R/ \overline{W} | E | DB0 | DB1 |
| PIN NO. | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| SYMBOL | DB2 | DB3 | DB4 | DB5 | DB6 | DB7 | A/(VEL) | K/(VEL) |

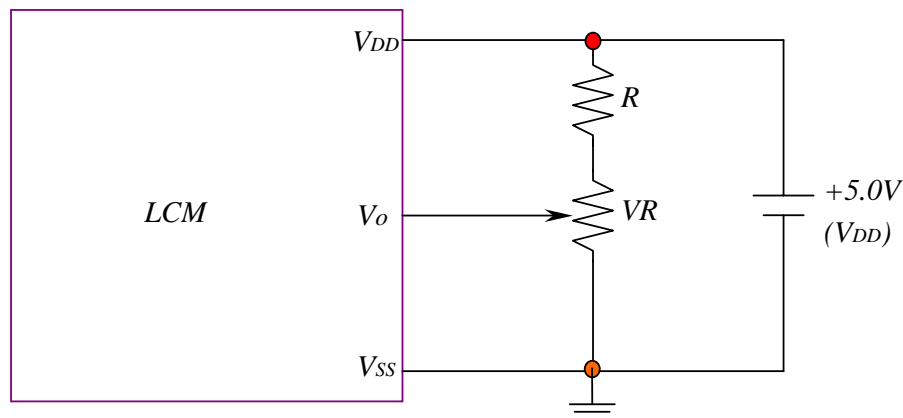
9. Block diagram



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

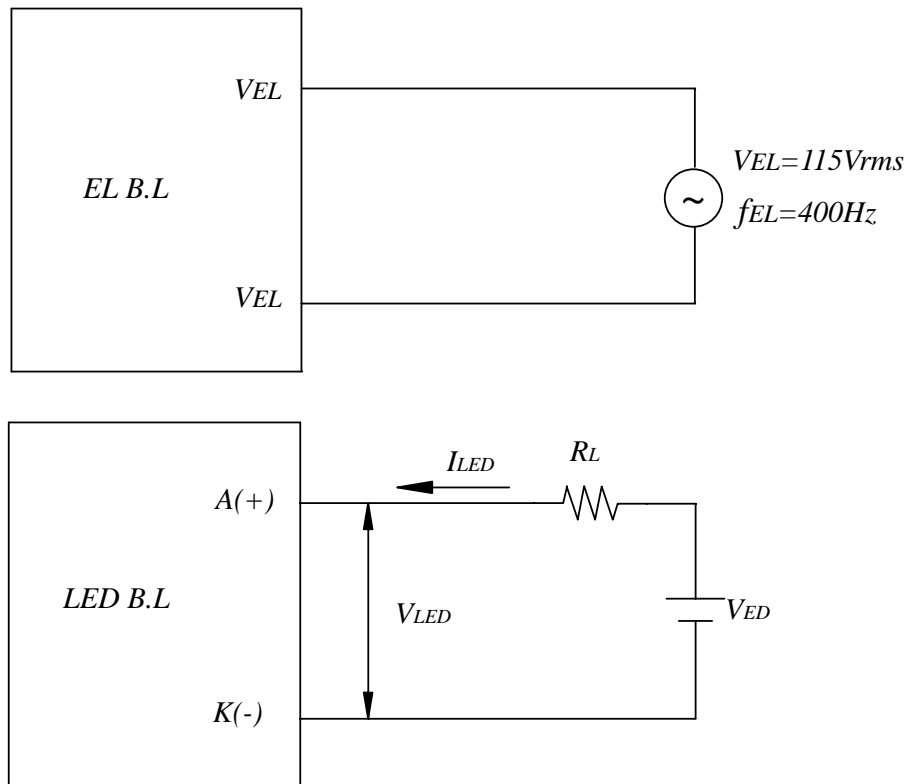


RECOMMENDED RESISTOR R: $V_{DD}-V_o$ 1.5V

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

VR: 10K ~20K

10.1 Power supply for backlight



| <i>ITEM</i> | <i>LED TYPE</i> | <i>CONDITION</i> |
|---------------------------------|-----------------|---|
| Limit resistor of LED (R_L) | ARRAY LED | $R_L = ((V_{ED} - 5.0V) / I_{LED})$, $I_{LED} = 220mA$ |