PART NO. : **MC1602Q-SERIES**

FOR MESSRS. :

CONTENTS

洪 92.04.29 登正

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

MC1602Q	B	W	-	S	Y	M	L	O	U	N
	(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)

(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

"R" : REFLECTIVE

(7).BACKLIGHT COLOR :

LED TYPE :

"nil" : YELLOW-GREEN "A" : AMBER "B" : BLUE

"G" : 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 ----------65.5 W *36.7 H * A T(max) mm

(3) EFFECTIVE AREA ----------51.8.0 W * 14.8 H mm

(4) CHARACTER PATTERN ----------5 * 7 DOTS + CURSOR

(5) CHARACTER SIZE----------2.45W * 4.08 H mm

(6) CHARACTER PITCH ----------2.95 mm

(7) DOT SIZE----------0.45 W * 0.54 H mm

(8) DOT PITCH ----------0.50W * 0.59H mm

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	V_I	V_{SS}	V_{DD}	V	-------
STATIC ELECTRICITY	-------	------	100	V	NOTE (1)
POWER SUPPLY FOR NOTE(2)	V_{LED}	------	NOTE(2)	V	-------

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):

SYMBOL	V_{LED} MAX.	LED TYPE
V_{LED}	6.0V	YELLOW-GREEN,AMBER,ORANGE,RED
	5.0V	BLUE,GREEN,WHITE

5.2 Environmental absolute maximum ratings

I T E M	OPERATING			STORAGE		COMMENT
	CONDITION	MIN.	MAX.	MIN.	MAX.	
AMBIENT TEMPERATURE	NORMAL	0℃	50℃	-20℃	70℃	------
	WIDE	-20℃	70℃			
HUMIDITY	NOTE (3)		NOTE (3)			NO CONDENSATION
VIBRATION NOTE (4)	------	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 = 9.8 m/s^2

6. Electrical characteristics

$Ta = 25℃$ $V_{DD} = 5.0 \pm 0.25\ V$

I T E M	SYMBOL	CONDITION		MIN.	TYP.	MAX.	UNIT
INPUT VOLTAGE	V_{IH}	----------		2.2	------	------	V
	V_{IL}			------	------	0.6	V
OUTPUT VOLTAGE	V_{OH}	$-I_{OH}$ =0.205 mA		2.4	------	------	V
	V_{OL}	I_{OL} = 1.2 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 Φ=10° NOTE(2)	Ta=-20°C	------	4.8	------	V
			Ta= 0°C	------	4.6	------	V
			Ta= 25°C	------	4.5	------	V
			Ta= 50°C	------	4.3	------	V
			Ta= 70°C	------	4.2	------	V
		TN DUTY =1/16 Φ=25° NOTE(2)	Ta=-20°C	------	4.7	------	V
			Ta= 0°C	------	4.5	------	V
			Ta= 25°C	------	4.2	------	V
			Ta= 50°C	------	3.8	------	V
			Ta= 70°C	------	3.7	------	V
POWER SUPPLY CURRENT FOR NOTE(3)	I_{LED}	V_{LED}		------	NOTE(3)	NOTE(3)	NOTE (3)

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

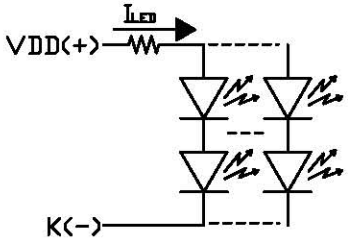
(2): $\theta = 0°$: VIEWING ANGLE AT 6 O'CLOCK

$\theta = 180°$: VIEWING ANGLE AT 12 O'CLOCK

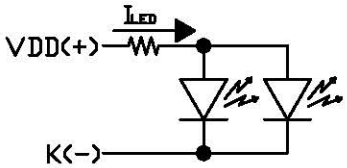
(3):

TYPE	I_{LED} TYP. / MAX.	LED TYPE
A	110mA / 140mA	YELLOW-GREEN、AMBER、ORANGE、RED
B	30mA / 40mA	BLUE、GREEN、WHITE

(A)



(B)



7. Optical characteristics

TN TYPE LCD

$Ta = 25℃$ $V_{DD}-V_O = 4.2V$

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING ANGLE	Φ2-Φ1	K = 1.4 NOTE(1)	20	30	----	deg.	NOTE(2)
CONTRAST RATIO	K	Φ = 25° NOTE(1)	2.0	3.0	----	----	NOTE(2)
RESPONSE TIME	tr (rise)	Φ = 25° NOTE(1)	----	150	250	ms	NOTE(2)
	tf (fall)	Φ = 25° NOTE(1)	----	150	250	ms	NOTE(2)

STN TYPE LCD

$Ta = 25℃$ $V_{DD}-V_O = 4.5V$

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING ANGLE	Φ2-Φ1	K = 2.0 NOTE(1)	30	40	----	deg.	NOTE(2)
CONTRAST RATIO	K	Φ = 10° NOTE(1)	3.0	4.0	----	----	NOTE(2)
RESPONSE TIME	tr (rise)	Φ = 10° NOTE(1)	----	200	350	ms	NOTE(2)
	tf (fall)	Φ = 10° NOTE(1)	----	300	400	ms	NOTE(2)

FSTN TYPE LCD

$Ta = 25℃$ $V_{DD}-V_O = 4.5V$

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING ANGLE	Φ2-Φ1	K = 2.0 NOTE(1)	30	40	----	deg.	NOTE(2)
CONTRAST RATIO	K	Φ = 10° NOTE(1)	4.0	5.0	----	----	NOTE(2)
RESPONSE TIME	tr (rise)	Φ = 10° NOTE(1)	----	200	350	ms	NOTE(2)
	tf (fall)	Φ = 10° NOTE(1)	----	300	400	ms	NOTE(2)

Brightness for backlight

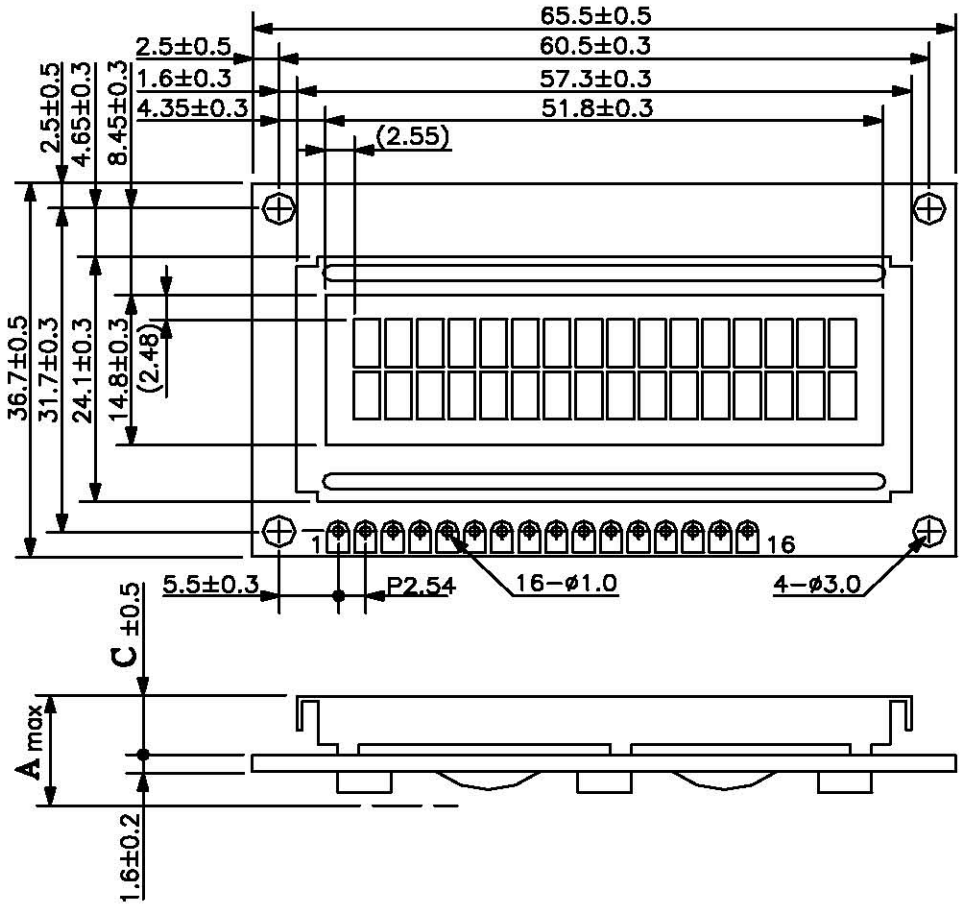
SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	LED TYPE	NOTE
B	Φ = 0° θ = 0°	5.0	----	----	cd/m²	YELLOW-GREEN、RED、AMBER、ORANGE	NOTE(2) NOTE(3)
		6.0	----	----		BLUE、GREEN、WHITE	

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

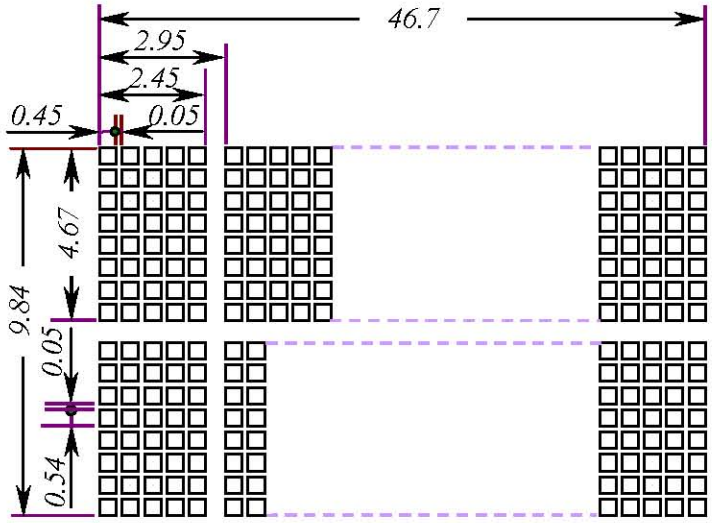
(2): SEE CUSTOMER ACCEPTANCE STANDARD SPECIFICATION FOR DEFINITION OF OPTICAL CHARACTERISTICS.

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

8. Outline dimension



TYPE	A	C
LED BL	13.0	8.0
NO BL	10.0	4.9

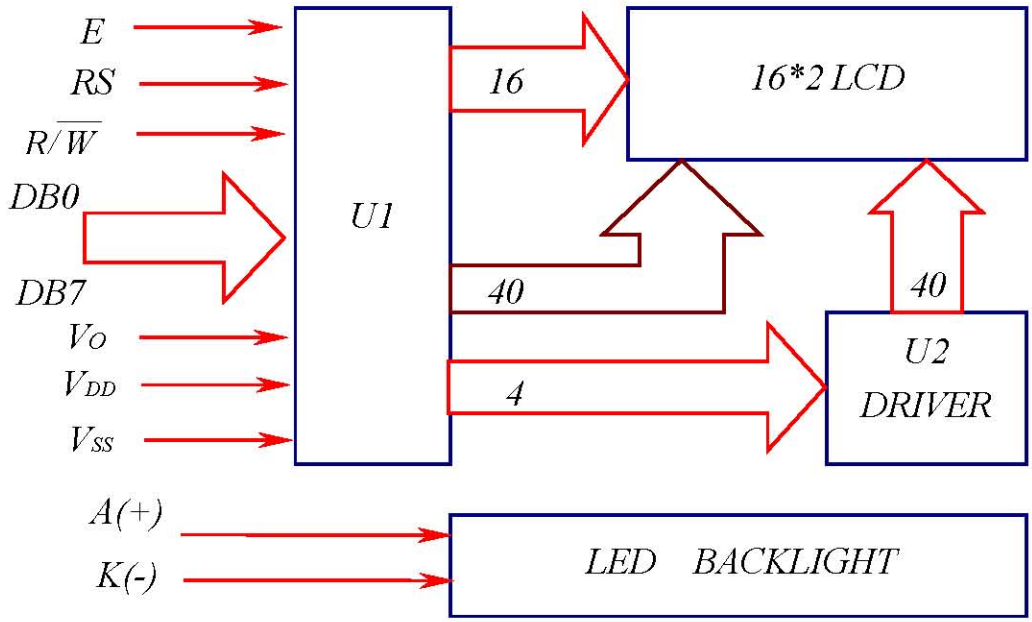


NOTE :
1.UNIT : mm
2.SCALE : NTS

Interface pin connection

PIN NO.	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
SYMBOL	V_{SS}	V_{DD}	V_O	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	K

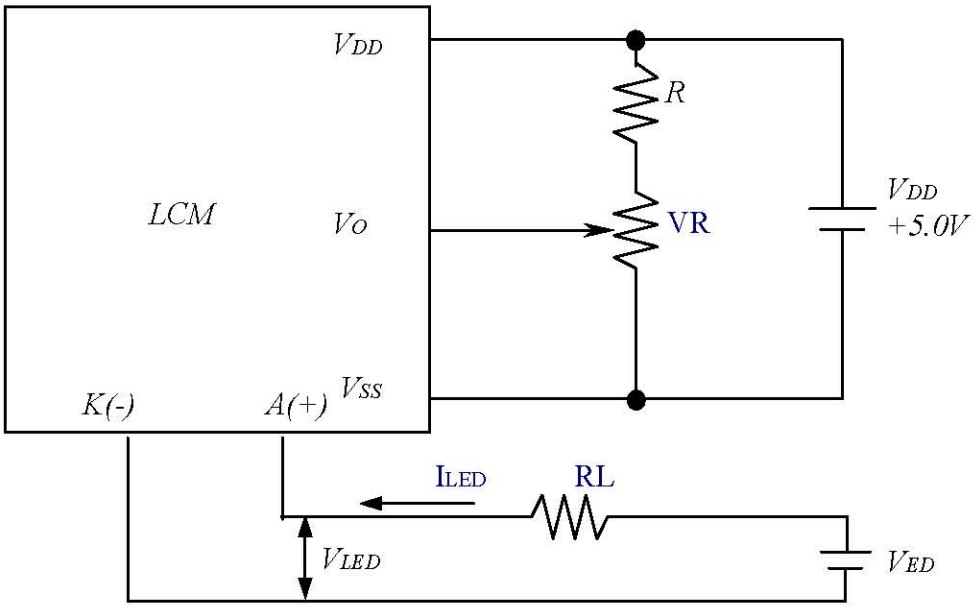
9. Block diagram



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}–Vo≧1.5V
V_{DD}–Vo: LCD DRIVING VOLTAGE
VR: 10KΩ~20KΩ

ITEM	*LED TYPE*	*CONDITION*
Limit resister of LED **(RL)**	**A**	RL=0
	B	RL≧((VED-4.0V) / ILED)，ILED≦40mA