DIGITAL VISION
THE LCD SPECIALIST

PART NO. : DC2002C(MDD989)

CONTENTS

2. General specifications

2.1 General specifications

We are opened to customer specifics

.

3. Mechanical data

(1) NUMBER OF DOTS ---------- 20 Charactor * 2 LINE

(2) MODULE SIZE ---------- 116 W * 37 H * 8.5 T (max) mm

(3) EFFECTIVE AREA ---------- 82.2 W(min) * 18.6 H mm

(4) ACTIVE AREA ---------- 73.5 W * 11.5 H mm

(5) DOT SIZE---------- 0.6 W * 0.65 H mm

(6) DOT PITCH ---------- 0.65 W * 0.7 H mm

(7) VIEWING DIRECTION---------- 6 O'CLOCK

(8) LCD TYPE ---------- STN BLUE Negative Transflective

(9)BACKLIGHT COLOR ---------- white

4. Absolute maximum ratings

4.1 Electrical absolute maximum ratings

I T E M	SYMBOL	MIN.	MAX.	UNIT	COMMENT
POWER SUPPLY FOR LOGIC	V_{DD}-V_{SS}	4.5	5.0	5.5	---------
INPUT VOLTAGE	V_I	V_{SS}	V_{DD}	V	---------
STATIC ELECTRICITY	---------	------	-----	V	NOTE (1)
POWER SUPPLY FOR BACKLIGHT	V_S	------	4.2	V_{rms}	---------
	f_{FL}	------	-----	KHz	---------
STARTING VOLTAGE FOR BACKLIGHT	------	-------	------	V_{rms}	---------
	------	-------	------	V_{rms}	---------
POWER SUPPLY FOR LCD	V_{DD}-V_{EE}	------	4.5	V	---------

NOTE (1): ELECTRO-STATIC DISCHARGE RESISTANCE IS TESTED BY CHARGING A 200PF CAPACITOR AND DISCHARGING IT BY CONTACT WITH A INTERFACE CONNECTOR PIN.

4.2 Environmental absolute maximum ratings

I T E M	OPERATING		STORAGE		COMMENT
	MIN.	MAX.	MIN.	MAX.	
AMBIENT TEMPERATURE	0℃	50℃	-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 ≦ 70℃: 75% RH MAX.

Ta ＞ 70℃: ABSOLUTE HUMIDITY MUST BE LOWER THAN THE HUMIDITY OF 75% RH AT 70℃.

NOTE (3): 1G = 9.8 m/s²

5. Electrical characteristics

Ta = 25? V_{DD} = 5.0±0.25 V

I T E M	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Power supply voltage for circuit	V_{DD}-V_{SS}	------	4.75	5.0	5.25	V
Power supply voltage for LCD drive	V_{EE}-V_{SS}	------	------	4.7	------	V
Input voltage, NOTE (1)	V_{IH}	H LEVEL	0.8V_{DD}	------	V_{DD}	V
	V_{IL}	L LEVEL	V_{SS}	------	0.2V_{DD}	V
Power supply current, NOTE (2)	I_{DD}	V_{DD}-V_{SS} = 5.0V	------	1.44	---	mA
LCD display duty ratio	DUTY	------	------	1/16	------	------
Recommended LCD driving voltage, NOTE (3)	V_{DD}-V_O Φ= 10° θ = 0°	Ta = 70℃	------		------	V
		Ta = 25℃	------	4.7	------	V
		Ta = -20℃	------		------	V
LED BACKLIGHT	Ifp	I mseo plus 10% Dutg cyele		60		mA
		Operating voltage	------	3.1	------	V
		Forward current		40		mA
LED Lifetime	------	------	------	100,000	------	Hr
Power supply LCD current	I_{EE}	-------	------	0.44		mA

NOTE (1): APPLIED TO TERMINALS D0~D3, LOAD, CP, $\overline{\text{DISP OFF}}$

NOTE (2): THE DISPLAY PATTERN IS ALL “ON”, OR ALL “OFF”

NOTE (3): RECOMMENDED LCD DIRVING VOLTGE MAY FLUCTUATE ABOUT±0.5V BY EACH MODULE.

6. Optical characteristics

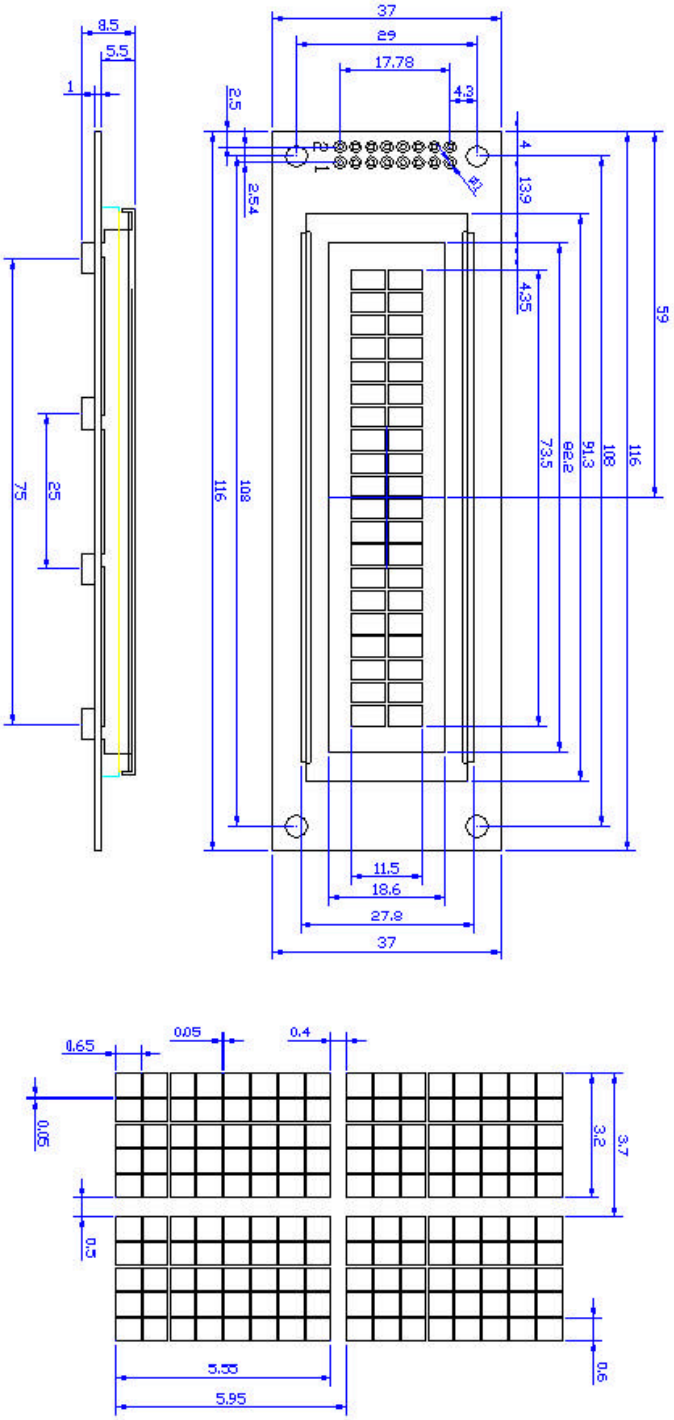
Ta = 25℃ V_{DD}-V_O = 22.3V

I T E M	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Viewing angle	Φ2-Φ1	K ≧ 2.0	40	50	------	deg.	1
Contrast ratio	K	Φ = 10° θ = 0°	5.0	6.0	------	------	1
Response time (at 25℃)	tr (rise)	Φ = 10° θ = 0°	------	215	------	ms	1
	tf (fall)	Φ = 10° θ = 0°	------	150	------	ms	1
The brightness of backlighting source	B	DOTS ALL ON VFL=270Vrms fFL=35KHZ	------	160	------	cd/㎡	2

NOTE (1): SEE CUSTOMER ACCEPTANCE STANDARD SPECIFICATION FOR DEFINITION OF OPTICAL CHARACTERISTICS

NOTE (2): UNDER NORMAL TEMPERATURE AND HUMIDITY IN A DARK ROOM

7. Outline dimension



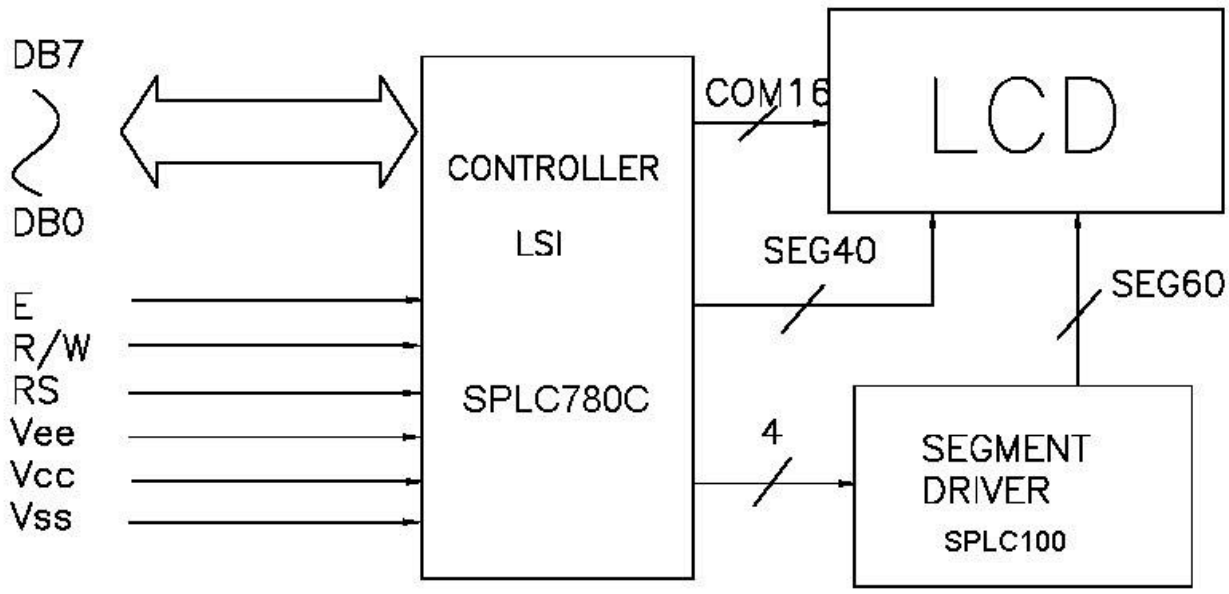
UNIT:mm

7.1 Interface

Pin Assignment

PIN NO.	*SYMBOL*	*FUNCTION*
1	VSS	GROUND
2	VDD	POWER SUPPLY FOR LOGIC AND LCD(+)
3	V0	POWER SUPPLY FOR LCD(-)
4	RS	SELECTS REGISTERS (H: DATA L: INSTRUCTION)
5	R/W	SELECTS READ OR WRITE
6	E	STARTS DATA READ/WRITE
7	DB0	DISPLAY DATA
8	DB1	DISPLAY DATA
9	DB2	DISPLAY DATA
10	DB3	DISPLAY DATA
11	DB4	DISPLAY DATA
12	DB5	DISPLAY DATA
13	DB6	DISPLAY DATA
14	DB7	DISPLAY DATA
15	A	POWER SUPPLY FOR LED(+)
16	K	POWER SUPPLY FOR LED(-)

8. Block diagram



9. Timing characteristic

. Write mode (Writing Data from MPU to SPLC780C)

Characteristics	Symbol	Limit			Unit	Test Condition
		Min.	Typ.	Max.		
E Cycle Time	t_C	500	-	-	ns	Pin E
E Pulse Width	t_{PW}	230	-	-	ns	Pin E
E Rise/Fall Time	t_R, t_F	-	-	20	ns	Pin E
Address Setup Time	t_{SP1}	40	-	-	ns	Pins: RS, R/W, E
Address Hold Time	t_{HD1}	10	-	-	ns	Pins: RS, R/W, E
Data Setup Time	t_{SP2}	80	-	-	ns	Pins: DB0 - DB7
Data Hold Time	t_{HD2}	10	-	-	ns	Pins: DB0 - DB7

Read mode (Reading Data from SPLC780C to MPU)

Characteristics	Symbol	Limit			Unit	Test Condition
		Min.	Typ.	Max.		
E Cycle Time	t_C	500	-	-	ns	Pin E
E Pulse Width	t_W	230	-	-	ns	Pin E
E Rise/Fall Time	t_R, t_F	-	-	20	ns	Pin E
Address Setup Time	t_{SP1}	40	-	-	ns	Pins: RS, R/W, E
Address Hold Time	t_{HD1}	10	-	-	ns	Pins: RS, R/W, E
Data Output Delay Time	t_D	-	-	120	ns	Pins: DB0 - DB7
Data hold time	t_{HD2}	5.0	-	-	ns	Pin DB0 - DB7

Interface mode with LCD Driver (SPLC100A1)

Characteristics	Symbol	Limit			Unit	Test Condition
		Min.	Typ.	Max.		
Clock pulse width high	t_{PWH}	800	-	-	ns	Pins: CL1, CL2
Clock pulse width low	t_{PWL}	800	-	-	ns	Pins: CL1, CL2
Clock setup time	t_{CSP}	500	-	-	ns	Pins: CL1, CL2
Data setup time	t_{DSP}	300	-	-	ns	Pins: D
Data hold time	t_{HD}	300	-	-	ns	Pins: D
M delay time	t_D	-1000	-	1000	ns	Pins: M

9.1 Interface timing chart

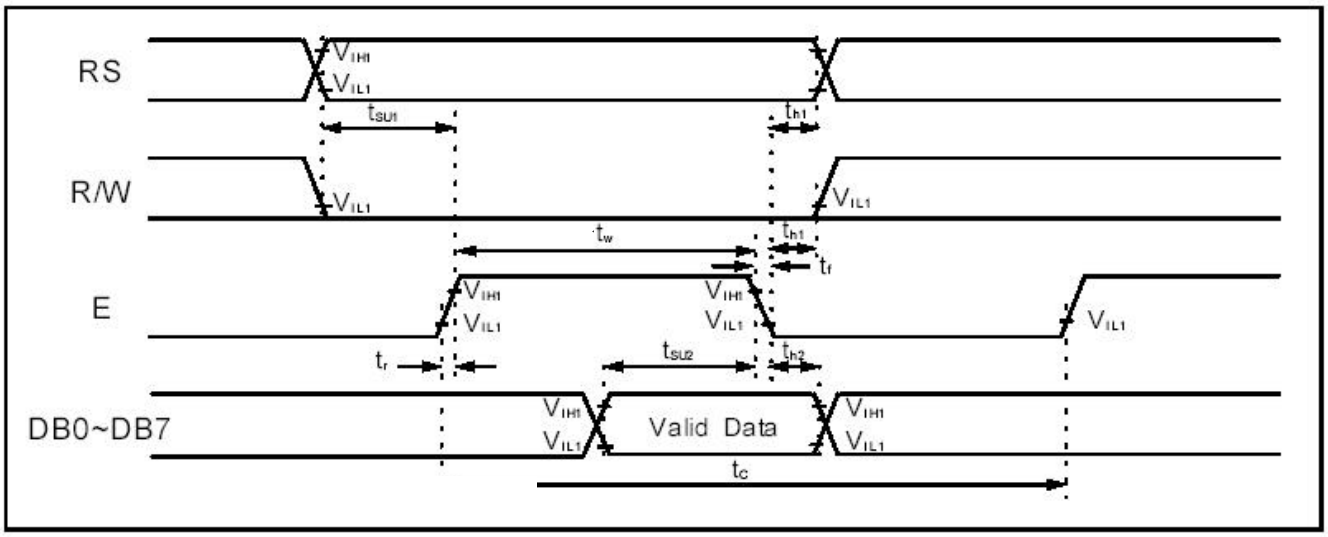


Figure 6 . Write Mode Timing Diagram

10. Power supply for LCM

Power supply sequency