

PART NO. : DC2002C(MDD989)

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#### 4. Absolute maximum ratings

##### 4.1 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>	4.5	5.0	5.5	-----
INPUT VOLTAGE	V <sub>I</sub>	V <sub>SS</sub>	V <sub>DD</sub>	V	-----
STATIC ELECTRICITY	-----	-----	-----	V	NOTE (1)
POWER SUPPLY FOR BACKLIGHT	V <sub>S</sub>	-----	4.2	V <sub>rms</sub>	-----
	f <sub>FL</sub>	-----	-----	KHz	-----
STARTING VOLTAGE FOR BACKLIGHT	-----	-----	-----	V <sub>rms</sub>	-----
	-----	-----	-----	V <sub>rms</sub>	-----
POWER SUPPLY FOR LCD	V <sub>DD</sub> -V <sub>EE</sub>	-----	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>I T E M</i>	<i>OPERATING</i>		<i>STORAGE</i>		<i>COMMENT</i>
	<i>MIN.</i>	<i>MAX.</i>	<i>MIN.</i>	<i>MAX.</i>	
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): T<sub>a</sub> = 70 : 75% RH MAX.

T<sub>a</sub> > 70 : ABSOLUTE HUMIDITY MUST BE LOWER THAN THE HUMIDITY OF 75% RH AT 70 .

NOTE (3): 1G = 9.8 m/s<sup>2</sup>

### 5. Electrical characteristics

Ta = 25? VDD = 5.0 ± 0.25 V

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Power supply voltage for circuit	VDD-VSS	-----	4.75	5.0	5.25	V
Power supply voltage for LCD drive	VEE-VSS	-----	-----	4.7	-----	V
Input voltage, NOTE (1)	VIH	H LEVEL	0.8VDD	-----	VDD	V
	VIL	L LEVEL	VSS	-----	0.2VDD	V
Power supply current, NOTE (2)	IDD	VDD-VSS = 5.0V	-----	1.44	---	mA
LCD display duty ratio	DUTY	-----	-----	1/16	-----	-----
Recommended LCD driving voltage, NOTE (3)	VDD-VO = 10° = 0°	Ta = 70	-----	-----	-----	V
		Ta = 25	-----	4.7	-----	V
		Ta = -20	-----	-----	-----	V
LED BACKLIGHT	Ifp	I mse plus 10% Dutg cycle		60		mA
		Operating voltage	-----	3.1	-----	V
		Forward current		40		mA
LED Lifetime	-----	-----	-----	100,000	-----	Hr
Power supply LCD current	IEE	-----	-----	0.44		mA

NOTE (1): APPLIED TO TERMINALS D0~D3, LOAD, CP, 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 VDD-VO = 22.3V

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

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

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

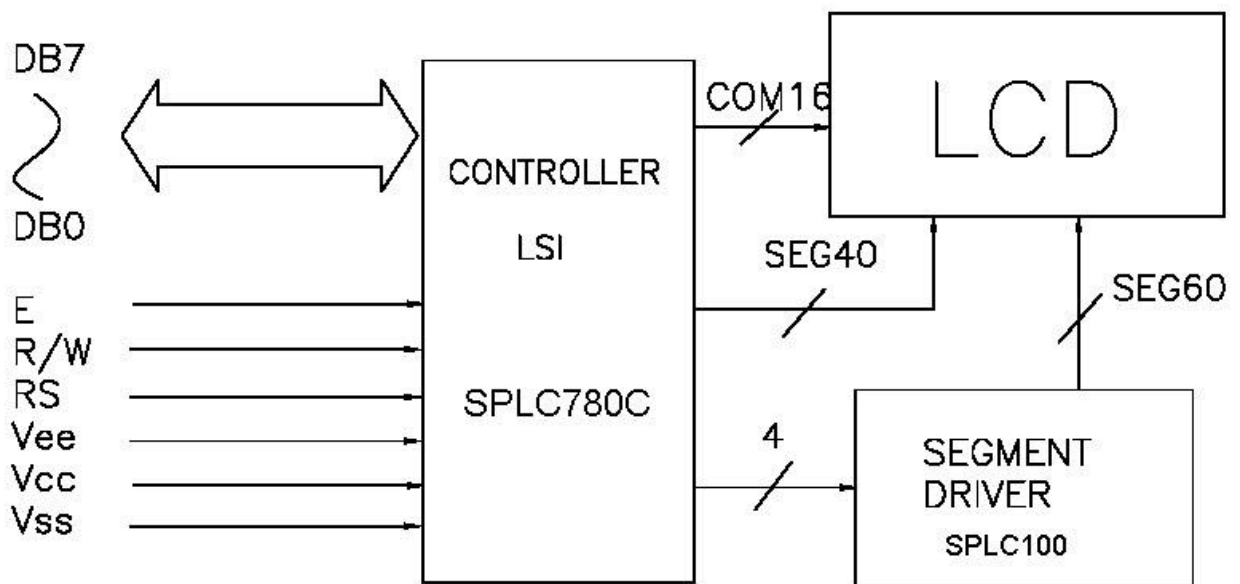


## 7.1 Interface

### 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	$t_{PW}$	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 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	$t_{DH}$	300	-	-	ns	Pins: D
M delay time	$t_D$	-1000	-	1000	ns	Pins: M

### 9.1 Interface timing chart

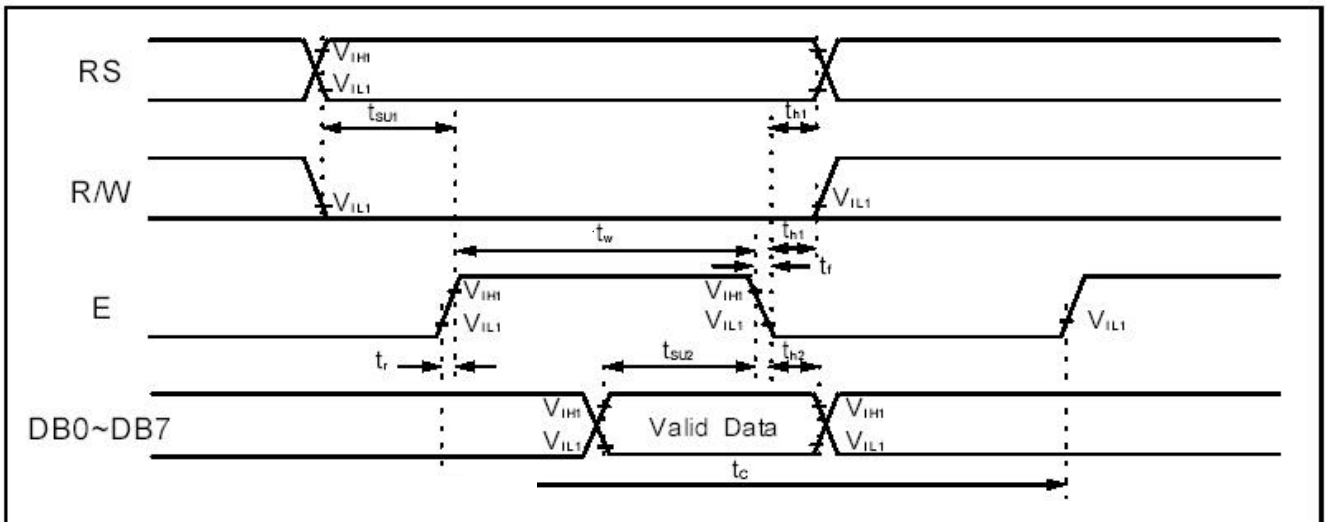


Figure 6 . Write Mode Timing Diagram

10. Power supply for LCM

*Power supply sequency*

