DOCUMENT NUMBER AND REVISION

VL-FS-MDLS16268CSP-04 REV. A

(MDLS16268CSP-LV-G-LED04G (BB))

DOCUMENT TITLE:

SPECIFICATION

OF

LCD MODULE TYPE

ITEM NO.: MDLS16268CSP-04

APPROVALS: EFFECTIVE DATE

DEPARTMENT	NAME	SIGNATURE	DATE
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VARITRONIX LIMITED

Specification
of
LCD Module Type
Item No.: MDLS16268CSP-04

1. General Description

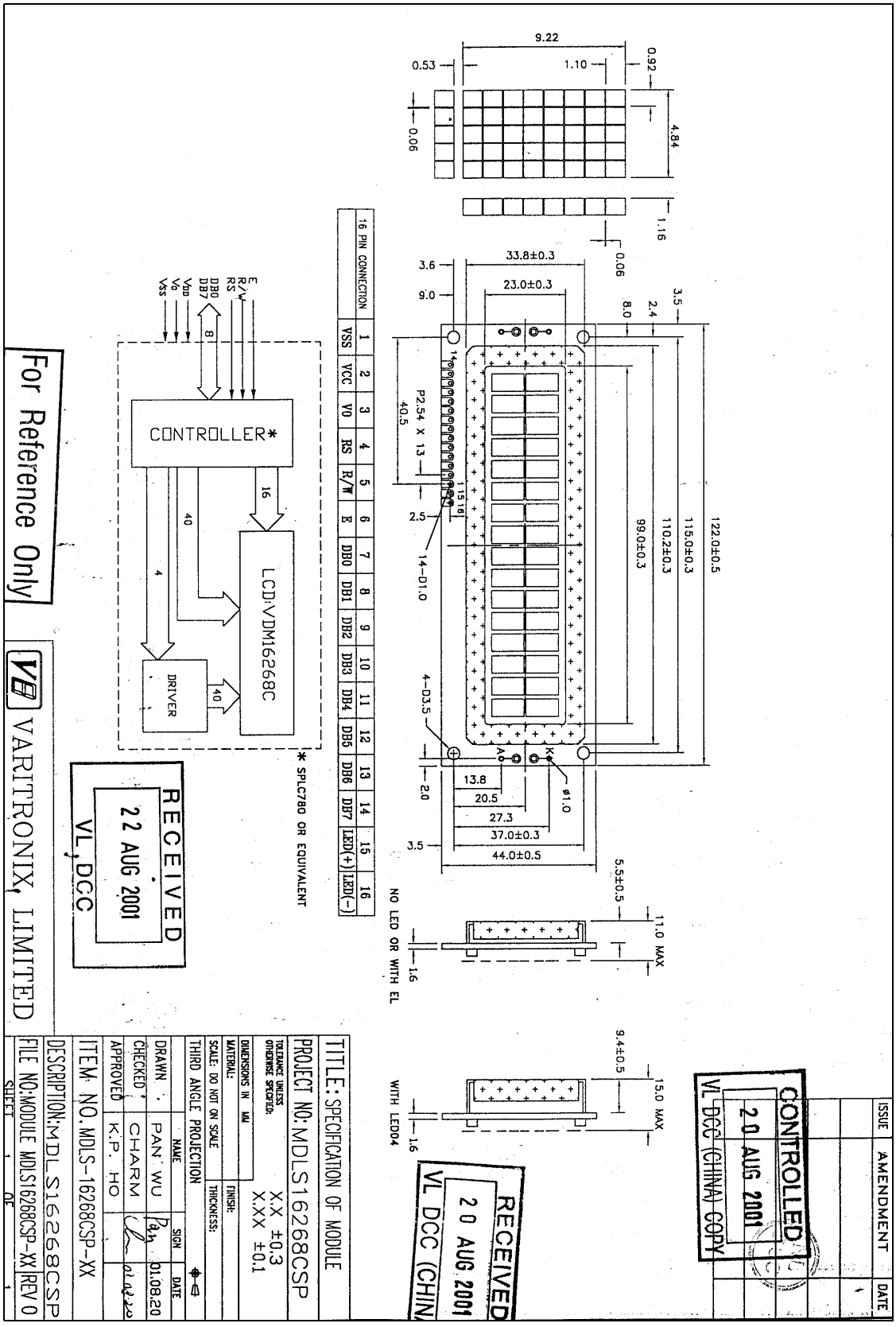
- 16 characters (5 x 8 dots) x 2 lines STN Positive Yellow Transflective LCD Character Module.
- Viewing Angle: 6 o'clock direction.
- Driving duty: 1/16 duty, 1/5 bias.
- 'SUNPLUS' SPLC780A1-01-C(Die form) LCD Controller/Driver or equivalent.
- 'SUNPLUS' SPLC100A2-C(Die form) Segment/Common LCD Driver.
- Yellow-green LED04 backlight.

2. Mechanical Specifications

The mechanical detail is shown in Fig. 1 and summarized in Table 1 below.

Table 1

Parameter	Specifications	Unit
Outline dimensions	122.0(W) x 44.0(H) x 15.0 MAX.(D)	mm
Effective viewing area	99.0(W) x 23.0(H)	mm
Display format	16 characters x 2 lines	-
Character size	4.84(W) x 9.22(H) (5 x 8 dots)	mm
Character spacing	1.16(W) x 0.53(H)	mm
Character pitch	6.00(W) x 9.75(H)	mm
Dot size	0.92(W) x 1.10(H)	mm
Dot spacing	0.06(W) x 0.06(H)	mm
Dot pitch	0.98(W) x 1.16(H)	mm
Weight:	TBD	grams



16 PIN CONNECTION															
VSS	VCC	V0	RS	R/W	E	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7	LED(+)	LED(-)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Figure 1: Specification Drawing

3. Absolute Maximum Ratings

3.1 Electrical Maximum Ratings(Ta = 25 ºC)

Table 2

Parameter	Symbol	Min.	Max.	Unit
Power Supply voltage (Logic)	VCC - VSS	-0.3	+7.0	V
Power Supply voltage (LCD drive)	VLCD =VCC – V0	-0.3	+12.0	V
Input voltage	Vin	-0.3	VCC+0.3	V

Note:

The modules may be destroyed if they are used beyond the absolute maximum ratings.

All voltage values are referenced to VSS = 0V.

3.2 Environmental Condition

Table 3

Item	Operating Temperature (Topr)		Storage Temperature (Tstg)		Remark
	Min.	Max.	Min.	Max.	
Ambient Temperature	0°C	+50°C	-10°C	+60°C	Dry
Humidity	95% max. RH for Ta ≤ 40°C < 95% RH for Ta > 40°C				no condensation
Vibration (IEC 68-2-6) cells must be mounted on a suitable connector	Frequency: 10 ~ 55 Hz Amplitude: 0.75 mm Duration: 20 cycles in each direction.				3 directions
Shock (IEC 68-2-27) Half-sine pulse shape	Pulse duration : 11 ms Peak acceleration: 981 m/s^2 = 100g Number of shocks : 3 shocks in 3 mutually perpendicular axes.				3 directions

4. Electrical Specifications

4.1 Interface signals

Table 4

Pin No.	Symbol	Description
1	VSS	Ground (0V).
2	VCC	Power supply for logic (+5.0V)
3	V0	LCD driving voltage.
4	RS	Register Select Input: ”High’ for Data register (for read and write) ”Low” for Instruction register (for write), Busy flag, address counter (for read)
5	R/W	Read/Write signal: ‘High’ for Read mode. ‘Low’ for Write mode.
6	E	Enable. Start signal for data read /write.
7	DB0	Data input/output (LSB)
8	DB1	Data input/output
9	DB2	Data input/output
10	DB3	Data input/output
11	DB4	Data input/output
12	DB5	Data input/output
13	DB6	Data input/output
14	DB7	Data input/output (MSB)
15	LED(+)	Anode of LED Backlight.
16	LED(-)	Cathode of LED Backlight .

4.2 Typical Electrical Characteristics

At Ta = 25 °C, VCC = 5V±5%, VSS=0V.

Table 5

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply voltage (Logic)	VCC -VSS		4.75	5.0	5.25	V
Supply voltage (LCD)	VLCD =VCC –V0	VCC = 5V, Note 1.	4.75	5.0	5.25	V
Input signal voltage 1 for E,DB0-DB7,R/W,RS.	V_{IH1}	”H” level	2.2	-	VCC	V
	V_{IL1}	” L” level	-0.3	-	0.6	V
Input signal voltage 2 for OSC1.	V_{IH2}	” H” level	VCC –1	-	VCC	V
	V_{IL2}	” L” level	-0.2	-	1.0	V
Supply current (Logic & LCD)	ICC	Character mode	-	1.75	2.25	mA
		Checker mode	-	1.8	2.7	mA
Supply current (LCD)	I0	Character mode, note 1	-	0.5	0.75	µA
		Checker mode, Note 1	-	0.5	0.75	µA
Supply Voltage of yellow-green LED04 backlight	VLED04	Forward current =315mA. Number of LED chips =2x21 =42.	3.9	4.1	4.3	V

Note (1) : There is tolerance in optimum LCD driving voltage during production and it will be within the specified range.

4.3 Timing Specifications

At Ta = 0 °C to +50 °C , VCC = 5V±5% ,VSS = 0V.

Refer to Fig. 2, the bus timing diagram for write mode (Writing data from MPU to SPLC780A1).

Table 6

Parameter	Symbol	Min.	Max.	Unit	Test Condition
E cycle time	t_C	400	-	ns	E
E pulse width	t_{PW}	150	-	ns	
E rise time	t_R	-	25	ns	
E fall time	t_F	-	25	ns	
Address set-up time)	t_{SP1}	30	-	ns	RS, R/W, E
Address hold time	t_{HD1}	10	-	ns	
Data set-up time	t_{SP2}	40	-	ns	DB0~DB7
Data hold time	t_{HD2}	10	-	ns	

Refer to Fig. 3, the bus timing diagram for read mode (Reading data from SPLC780A1 to MPU).

Table 7

Parameter	Symbol	Min.	Max.	Unit	Test Condition
E cycle time	t_C	400	-	ns	E
E pulse width	t_{PW}	150	-	ns	
E rise time	t_R	-	25	ns	
E fall time	t_F	-	25	ns	
Address set-up time	t_{SP1}	30	-	ns	RS, R/W, E
Address hold time	t_{HD1}	10	-	ns	
Data output delay time	t_D	-	100	ns	DB0~DB7
Data hold time	t_{HD2}	20	-	ns	

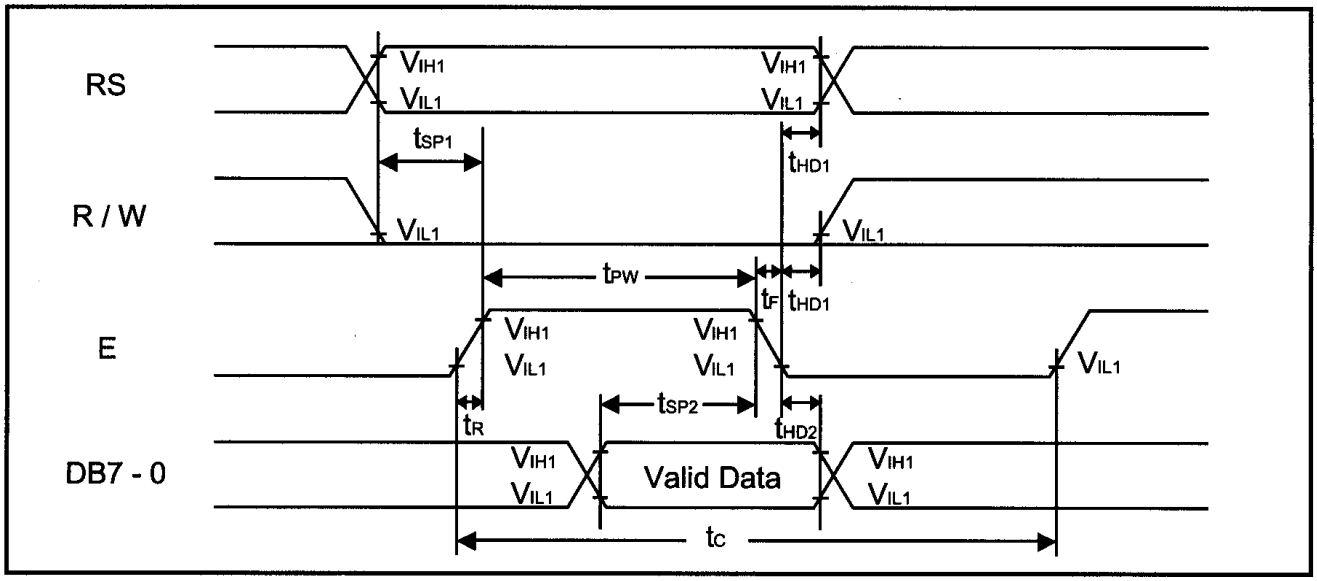


Figure 2: Bus timing diagram for write mode (Writing data from MPU to SPLC780A1).

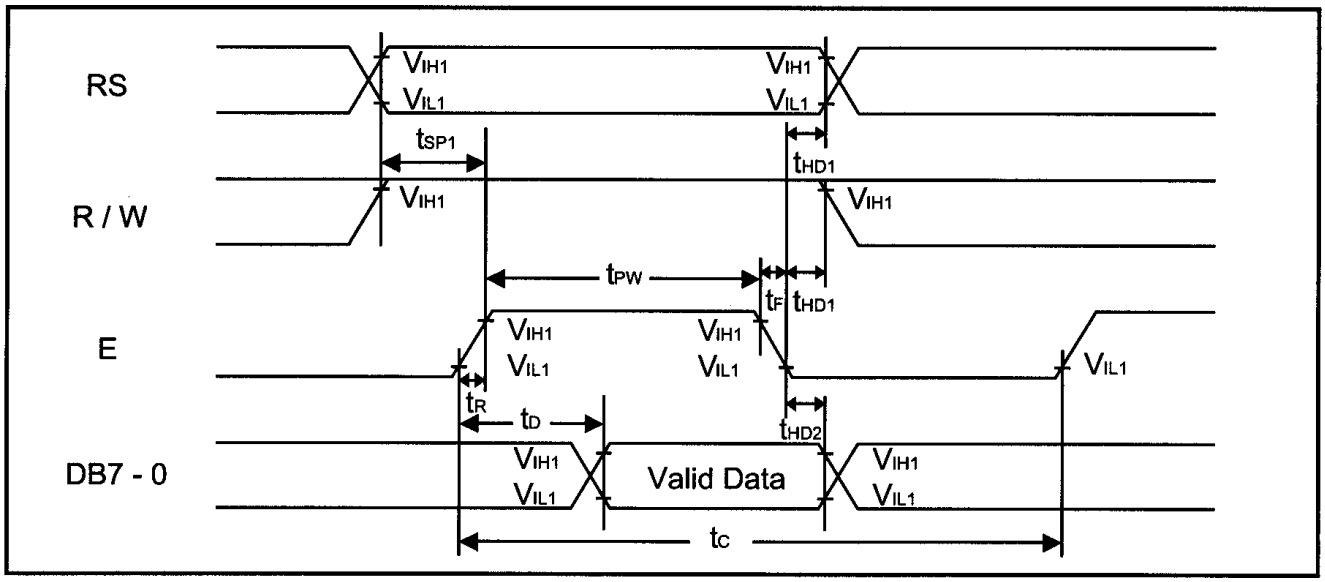


Figure 3: Bus timing diagram for read mode (Reading data from SPLC780A1 to MPU).

4.4 Timing Diagram of VCC Against V0.

Power on sequence shall meet the requirement of Figure 4, the timing diagram of VCC against V0.

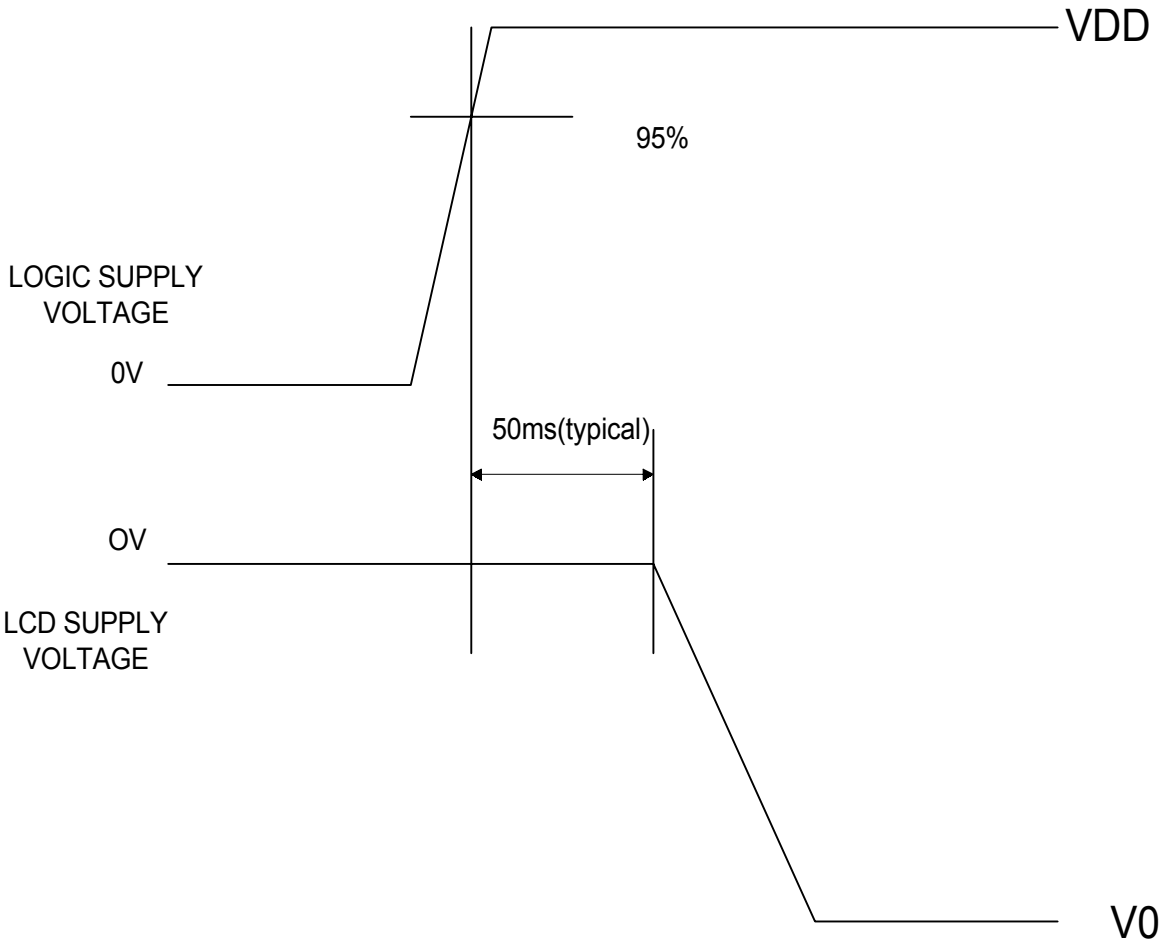


Figure 4: Timing Diagram of VCC Against V0.

5. Correspondence between Character Codes and Character Patterns (ROM Code: 01)

b7-b4 / b3-b0	0000	0010	0011	0100	0101	0110	0111	1010	1011	1100	1101	1110	1111
0000	CG RAM (1)												
0001	(2)												
0010	(3)												
0011	(4)												
0100	(5)												
0101	(6)												
0110	(7)												
0111	CG RAM (8)												
1000	CG RAM (1)												
1001	(2)												
1010	(3)												
1011	(4)												
1100	(5)												
1101	(6)												
1110	(7)												
1111	CG RAM (8)												

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