



DOCUMENT NUMBER AND REVISION
VL-FS-MDLS20265D-04 REV. C
(MDLS20265D-LV-LED04)

DOCUMENT TITLE:
SPECIFICATION
OF
LCD MODULE TYPE
MODEL NUMBER: MDLS20265D-04

DEPARTMENT	NAME	SIGNATURE	DATE
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**DOCUMENT REVISION HISTORY 1:**

DOCUMENT REVISION FROM TO	DATE	DESCRIPTION	CHANGED BY	CHECKED BY
0.0	2001.03.05	The specification was modified from MDLS20265-SS-LV-LED04(DOC. REV. 0.0, 1998.06.25).	PHILIP CHENG	K.P.HO
0.0 B	2002.10.18	Items 1 to 5 were updated: (Based on the test specification: VL-TS-MDLS20265D-XX, REV. F, 2002.04.09) 1.)(Whole document) The number of pages , points and table were updated. 2.)(Page 1 & 4) “Preliminary specification” was changed to “Specification”. 3.)(Page 8, table 5) Supply voltage (LCD), supply current (Logic & LCD), supply current (LCD), and supply voltage of backlight were updated. 4.)(Page 11 Point 5.3) Figure 4 was updated. 5.)(Page 12, point 6) Character generator ROM (KS0066U-10B) was added.	PHILIP CHENG	TOM LEE
C	2004/09/08	Items 1 to 5 were updated: (Based on a.) test specification: VL-TS-MDLS20265D-XX, REV. O, 2004.07.10) b.) VL-QUA-012A, REV. W, 2004.03.20 According to VL-QUA-012A, LCD size is small because Unit Per Laminate=24 which is more than 6pcs/Laminate. 1.) (Page 3,contents) was updated. 2.) (Page 5,Figure 1) Module Specification was updated. 3.) (Page7. Point 4.1) was updated. Form Electrical Maximum Ratings (Ta=25°C) to Electrical Maximum Ratings- For IC Only 4.) (Page 8, Point 5.1 Table 5) was updated. 5.) (Page 13, Point 7,8,) was added.	ZHANG XIAO LAN	FRANK WANG



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VARITRONIX LIMITED

**Specification
of
LCD Module Type
Item No.: MDLS20265D-04**

1. General Description

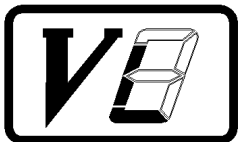
- 20 characters x 2 lines STN LV4 Transflective Positive Yellow-green Dot Matrix LCD module.
- Viewing Angle: 6 O' clock direction.
- Driving duty: 1/16 Duty, 1/5 bias.
- 'SAMSUNG' KS0066UP-10BCC (Die) LCD Controller & Driver or equivalent.
- 'SAMSUNG' KS0065B-PCC (Die) LCD Segment Drivers or equivalent.
- 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	116.0(W) x 37.0(H) x 14.0 MAX.(D)	mm
Viewing area	83.0(W) x 18.6(H)	mm
Display format	20 characters x 2 lines	-
Character size	3.20(W) x 5.55(H) (5 x 8 dots)	mm
Character spacing	0.50(H) x 0.40(H)	mm
Character pitch	3.70(W) x 5.95(H)	mm
Dot size	0.60(W) x 0.65(H)	mm
Dot spacing	0.05(W) x 0.05(H)	mm
Dot pitch	0.65(W) x 0.70(H)	mm
Weight:	TBD	grams



3. Interface signals

Table 2

Pin No.	Symbol	Description
1	VSS	Ground (0V).
2	VDD	Power supply for logic (+5V).
3	V0	Power supply for LCD driver.
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(A)	LED(+)	Anode of backlight.
16(K)	LED(-)	Cathode of backlight.



4. Absolute Maximum Ratings

4.1 Electrical Maximum Ratings -For IC Only

Table 3

Parameter	Symbol	Min.	Max.	Unit
Power Supply voltage (Logic)	VDD - VSS	-0.3	+7.0	V
Power Supply voltage (LCD drive)	VLCD =VDD - V0	-0.3	+15.0	V
Input voltage	V _{in}	-0.3	VDD+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.

4.2 Environmental Condition

Table 4

Item	Operating Temperature (T _{opr})		Storage Temperature (T _{stg})		Remark
	Min.	Max.	Min.	Max.	
Ambient Temperature	0°C	+50°C	-10°C	+60°C	Dry
Humidity	95% max. RH for T _a ≤ 40°C < 95% RH for T _a > 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



5. Electrical Specifications

5.1 Typical Electrical Characteristics

At $T_a = 25\text{ }^\circ\text{C}$, $V_{DD} = 5V \pm 5\%$, $V_{SS} = 0V$.

Table 5

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply voltage (Logic)	$V_{DD} - V_{SS}$		4.75	5.0	5.25	V
Supply voltage (LCD)	$V_{LCD} = V_{DD} - V_0$	$V_{DD} = 5V$, Note (1)	3.9	4.2	4.5	V
Input signal voltage (except OSC1)	V_{IH1}	“High” level	2.2	-	V_{DD}	V
	V_{IL1}	“Low” level	-0.3	-	0.6	V
Supply Current (Logic & LCD)	IDD	Character mode, $V_{DD} = 5V$	-	1.0	1.5	mA
		Checker board mode, $V_{DD} = 5V$	-	1.1	1.6	mA
Supply Current (LCD)	I0	Character mode, $V_{DD} = 5V$, Note (1)	-	0.2	0.3	mA
		Checker board mode, $V_{DD} = 5V$, Note (1)	-	0.2	0.3	mA
Supply voltage of yellow-green LED04 backlight	VLED	Forward current = 180mA Number of LED dies = 36	4.0	4.1	4.2	V

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



5.2 Timing Specifications

At $T_a = 0\text{ }^{\circ}\text{C}$ To $+50\text{ }^{\circ}\text{C}$, $V_{DD} = +5\text{V} \pm 5\%$, $V_{SS} = 0\text{V}$.

Refer to Fig. 2, the bus timing diagram for write mode.

Table 6

Parameter	Symbol	Min.	Max.	Unit
E Cycle Time	t_c	500	-	ns
E Rise/Fall Time	t_R, t_F	-	20	ns
E Pulse Width(high, low)	t_w	230	-	ns
R/W and RS Setup Time	t_{SU1}	40	-	ns
R/W and RS Hold Time	t_{H1}	10	-	ns
Data Set-up Time	t_{SU2}	80	-	ns
Data Hold Time	t_{H2}	10	-	ns

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Refer to Fig. 3, the bus timing diagram for read mode.

Table 7

Parameter	Symbol	Min.	Max.	Unit
E Cycle Time	t_c	500	-	ns
E Rise/Fall Time	t_R, t_F	-	20	ns
E Pulse Width(high, low)	t_w	230	-	ns
R/W and RS Setup Time	t_{SU}	40	-	ns
R/W and RS Hold Time	t_H	10	-	ns
Data Output Delay Time	t_D	-	120	ns
Data Hold Time	t_{DH}	5	-	ns

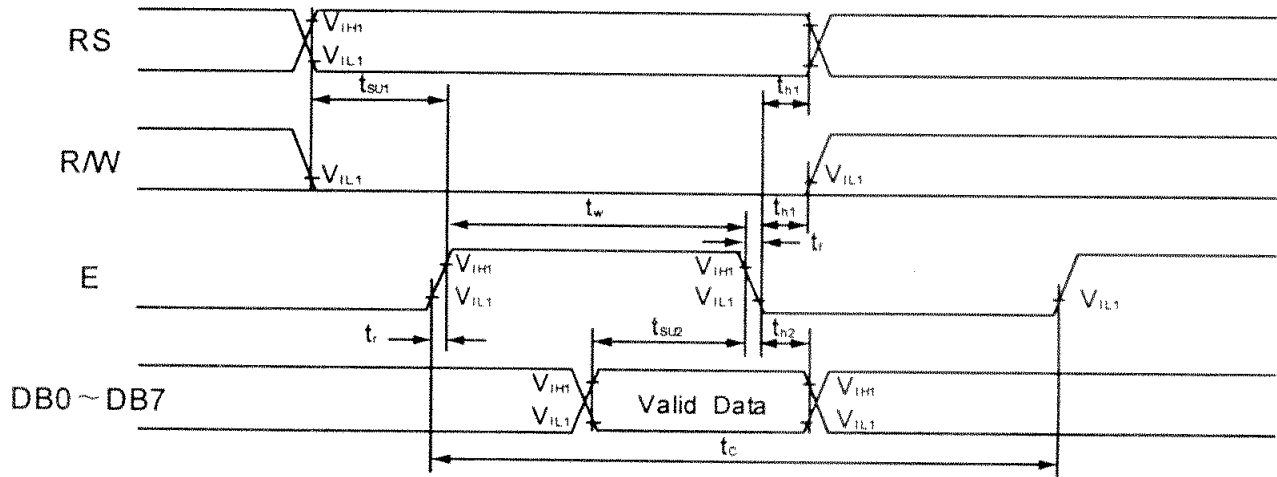


Figure 2 : Write Mode Timing Diagram

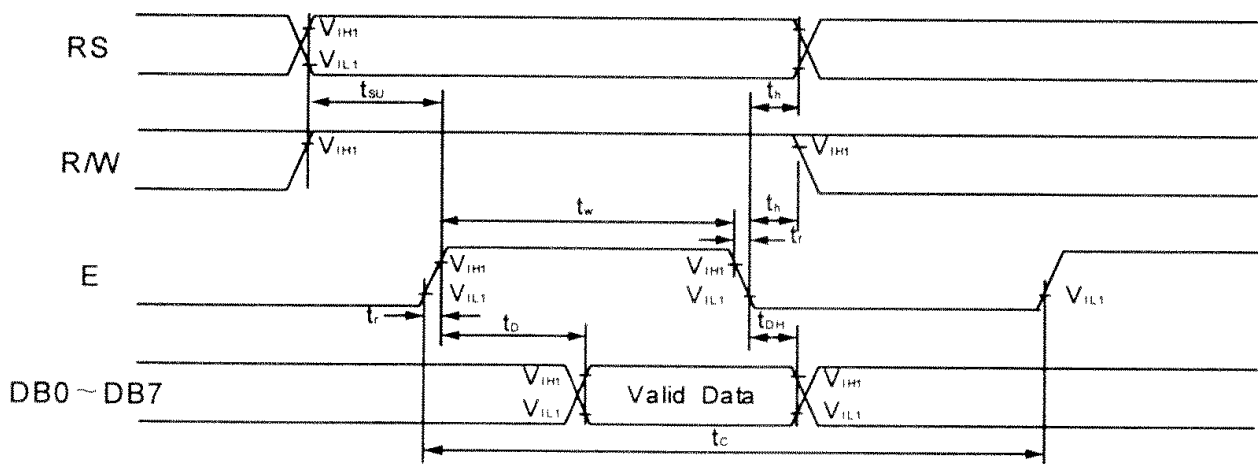


Figure 3 : Read Mode Timing Diagram



5.3 Timing Diagram of VDD Against V0.

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

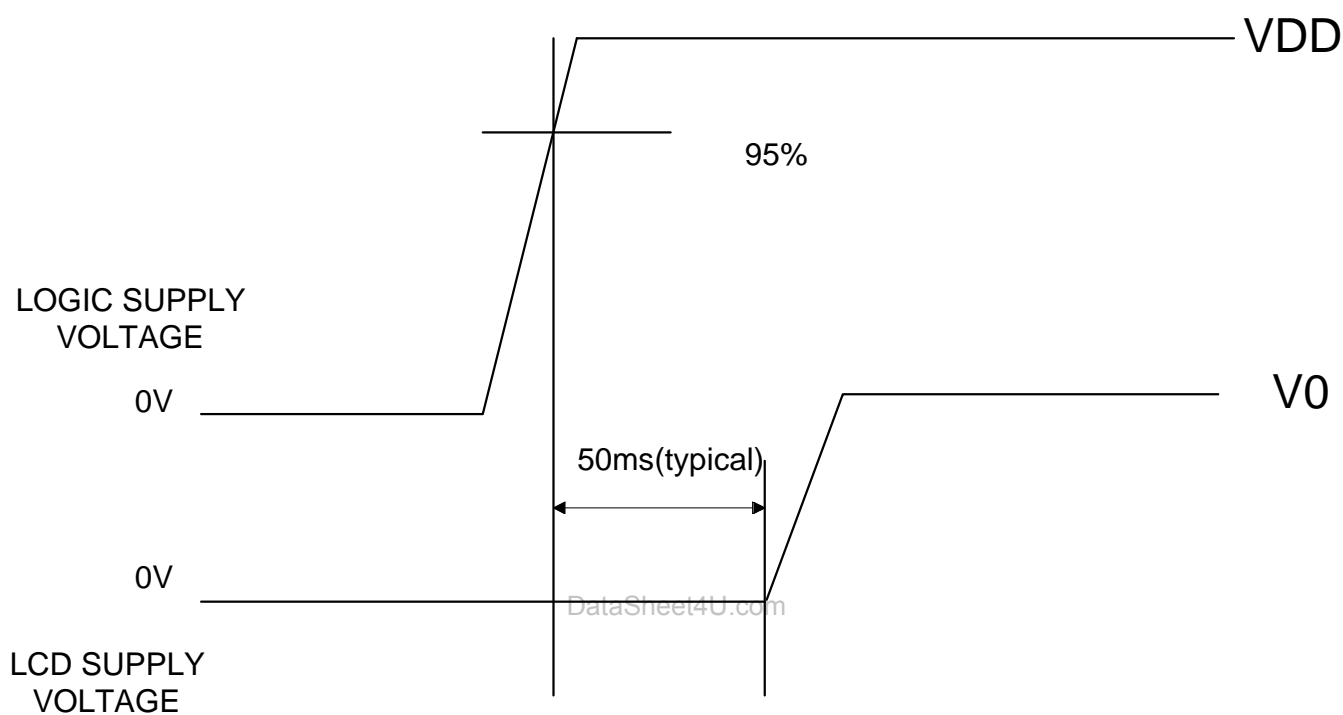


Figure 4: Timing Diagram of VDD Against V0.



6. Character Generator ROM (KS0066U-10B)

Upper 4bit / Lower 4bit	LLLL	LLHL	LLHH	LHLL	LHLH	LHHL	LHHH	HLLL	HLLH	HLHL	HLHH	HHLL	HHLH	HHHL	HHHH
LLLL	CG RAM (1)														
LLLH	(2)														
LLHL	(3)														
LLHH	(4)														
LHLL	(5)														
LHLH	(6)														
LHHL	(7)														
LHHH	(8)														
HLLL	(1)														
HLLH	(2)														
HLHL	(3)														
HLHH	(4)														
HHLL	(5)														
HHLH	(6)														
HHHL	(7)														
HHHH	(8)														

**7. LCD Cosmetic Conditions**

- a.) Reference document follow VL-QUA-012A.
- b.) LCD size of the product is small.

8. Remark:

- a. Identification labels will be stuck on the module without obstructing the viewing area of display,
- b. Varitronix does not responsible for any polarizer defect after the protective film has been removed from the display.

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“Varitronix Limited reserves the right to change this specification.”

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