



VL-FS-MGLS12864T-65 REV. B
(MGLS12864T-FSTN-0.7MM-TDF FILM)

SEP/2004

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DOCUMENT NUMBER AND REVISION
VL-FS-MGLS12864T-65 REV. B
(MGLS12864T-FSTN-0.7MM-TDF FILM)

DOCUMENT TITLE:
SPECIFICATION
OF
LCD MODULE TYPE
ITEM NO.: MGLS12864T-65

APPROVALS:

EFFECTIVE DATE

DEPARTMENT	NAME	SIGNATURE	DATE
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DOCUMENT REVISION HISTORY 1:

DOCUMENT REVISION FROM TO	DATE	DESCRIPTION	CHANGED BY	CHECKED BY
A	2002.01.09	First Release (Based on the test specification VL-TS-MGLS12864T-65, REV. A, 2001.03.14)	PHILIP CHENG	TOM LEE
B	2004.09.17	Items 1 to 6 were updated. Based on a.) VL-TS-MGLS12864T-XX REV.R. 2004.06.05. b.) VL-QUA-012A REV.R. 2004.03.20 According to VL-QUA-012A, LCD size is small because Unit Per Laminate = 12 which is more than 6pcs/Laminate. 1.) (Page3) Contents were updated. 2.) (Page4, Point 1) In general description "FPC connection" was added. 3.) (Page5,Figure1) Module Specification was updated. 4.) (Page6,Point 3.1) "Electrical Maximum Ratings (Ta = 25 °C)" was updated to "Electrical Maximum Ratings – for IC Only" 5.) (Page8, Point 4.2) The value of IDD&I0 were updated. 6.) (Page11, Point 5&6) "LCD commend condition" and "Remark" were added.	ZHANG YAN FANG	FRANK WANG



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VARITRONIX LIMITED

Specification of LCD Module Type Item No.: MGLS12864T-65

1. General Description

- 128 x 64 dot matrix FSTN LV2 positive black & white reflective dot matrix LCD graphic module.
- Viewing direction: 6 o'clock.
- Driving scheme: 1/64 multiplexed drive, 1/9.3 bias.
- 'Toshiba' T6963C flat pack or equivalent dot matrix LCD controller.
- 'Toshiba' T6A39 flat pack or equivalent dot matrix liquid crystal graphic display column drivers.
- 'Toshiba' T6A40 flat pack or equivalent dot matrix liquid crystal graphic display row driver.
- 8K byte display SRAM.
- Enhancement film – TDF '3M'.
- FPC Connection.

2. Mechanical Specifications

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

Table 1

Parameter	Specifications	Unit
Outline dimensions	78.0(W) x 70.0(H) x 10.5 MAX.(D)	mm
Display format	128(Horizontal) x 64(Vertical)	dots
Viewing area	62.0(W) x 44.0(H)	mm
Active area	56.27(W) x 38.35(H)	mm
Dot size	0.39(W) x 0.55(H)	mm
Dot spacing	0.05(W) x 0.05(H)	mm
Dot pitch	0.44(W) x 0.60(H)	mm
Weight:	TBD	grams

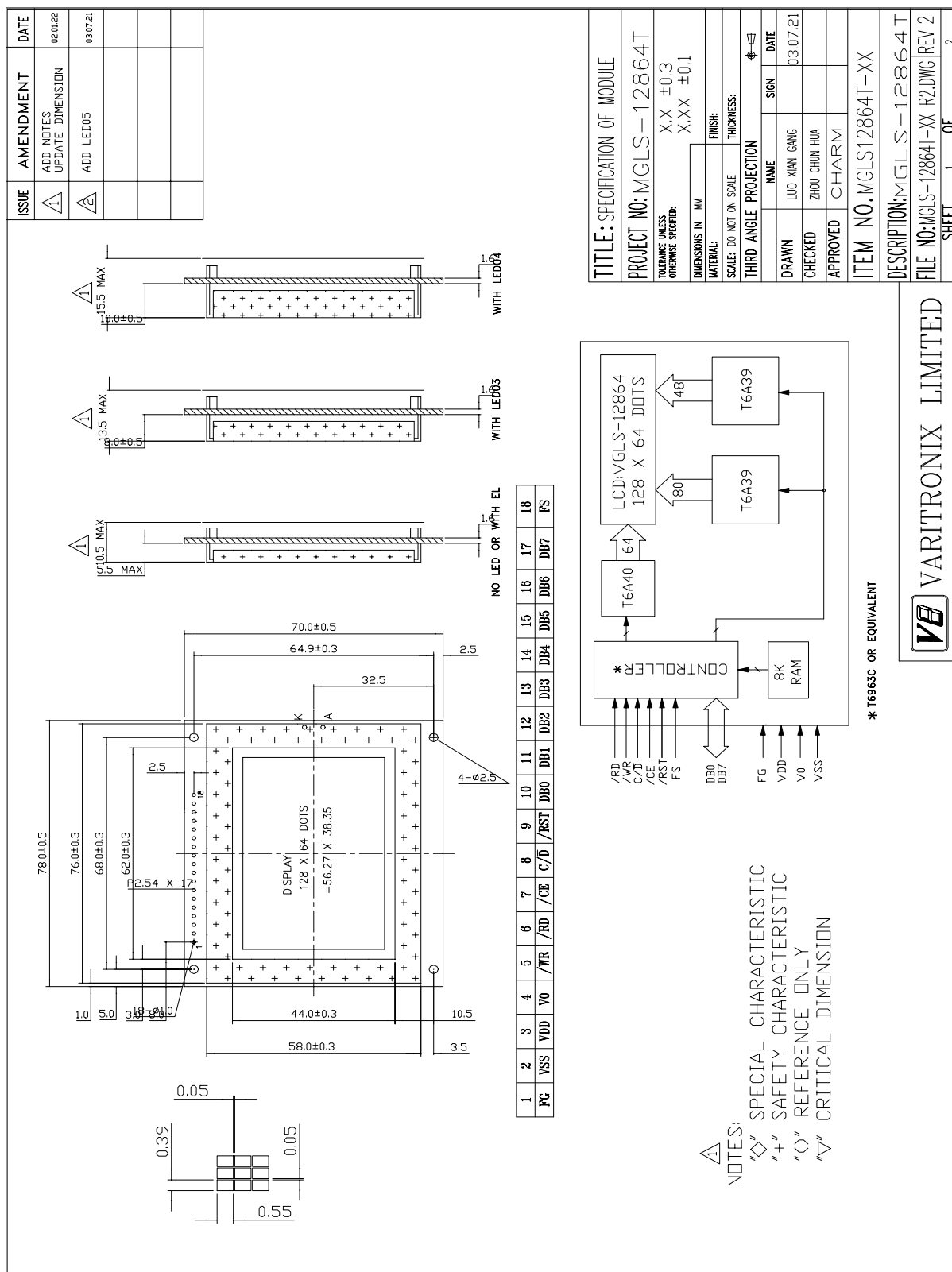


Figure 1: Specification Drawing



3. Absolute Maximum Ratings

3.1 Electrical Maximum Ratings – for IC Only

Table 2

Parameter	Symbol	Min.	Max.	Unit
Supply voltage (Logic & LCD)	VDD - VSS	-0.3	+7.0	V
Supply voltage (LCD drive) (Built-in)	VLCD =VDD - V0	-0.3	+30.0	V
Input voltage	Vin	-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.

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	FG	Frame ground (see note 1).
2	VSS	Ground (0V).
3	VDD	Power supply for logic (+5V).
4	V0	Power supply for LCD drive
5	/WR	Data Write. Write data into T6963C when /WR="Low".
6	/RD	Data Read. Read data from T6963C when /RD="Low".
7	/CE	Chip enable for T6963C. /CE must be "Low" when CPU communicates with T6963C.
8	C / $\overline{D}$	/WR = "Low" C/ $\overline{D}$ ="High": Command Write C/ $\overline{D}$ ="Low": Data Write. /RD = "Low" C/ $\overline{D}$ ="High": Status Read C/ $\overline{D}$ ="Low": Data Read.
9	/RST	"High": Normal (T6963C has internal pull-up resistor). "Low": Initialize T6963C. Text and graphic have addresses and text and graphic area settings are retained.
10	DB0	Data input/output (LSB).
11	DB1	Data input/output.
12	DB2	Data input/output.
13	DB3	Data input/output.
14	DB4	Data input/output.
15	DB5	Data input/output.
16	DB6	Data input/output.
17	DB7	Data input/output (MSB).
18	FS	Font select. "High" for 6 x 8 font & "Low" for 8 x 8 font.
-	A	Anode of backlight
-	K	Cathode of backlight

Note 1: This pin is electrically connected to the metal bezel (frame).

User can choose to connect this pin to VSS or leave it open.



4.2 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 & LCD)	$V_{DD} - V_{SS}$		4.75	5.00	5.25	V
Supply voltage (LCD)	$V_{LCD} = V_{DD} - V_0$	$V_{DD} = 5V$, Note 1	9.5	10.0	10.5	V
Input signal voltage	V_{IH}	"H" level	$V_{DD} - 2.2$	-	V_{DD}	V
	V_{IL}	"L" level	0	-	0.8	V
Supply current (Logic & LCD)	I_{DD}	Character mode, $V_{DD} = 5V$, Note 1	-	7.0	10.0	mA
		Checker board mode, $V_{DD} = 5V$, Note 1	-	7.6	11.4	mA
Supply current (LCD)	I_0	Character mode, $V_{DD} = 5V$, Note 1	-	2.8	4.2	mA
		Checker board mode, $V_{DD} = 5V$, Note 1	-	2.8	4.2	mA

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

Refer to Fig. 2, the bus timing diagram.

Table 6

Parameter	Symbol	Min.	Max.	Unit
C/D Set-up time	t_{CDS}	100	-	ns
C/D Hold Time	t_{CDH}	10	-	ns
/CE,/RD,/WR Pulse Width	t_{CE}, t_{RD}, t_{WR}	80	-	ns
Data Set-up Time	t_{DS}	80	-	ns
Data Hold Time	t_{DH}	40	-	ns
Access Time	t_{ACC}	-	150	ns
Output Hold Time	t_{OH}	10	50	ns

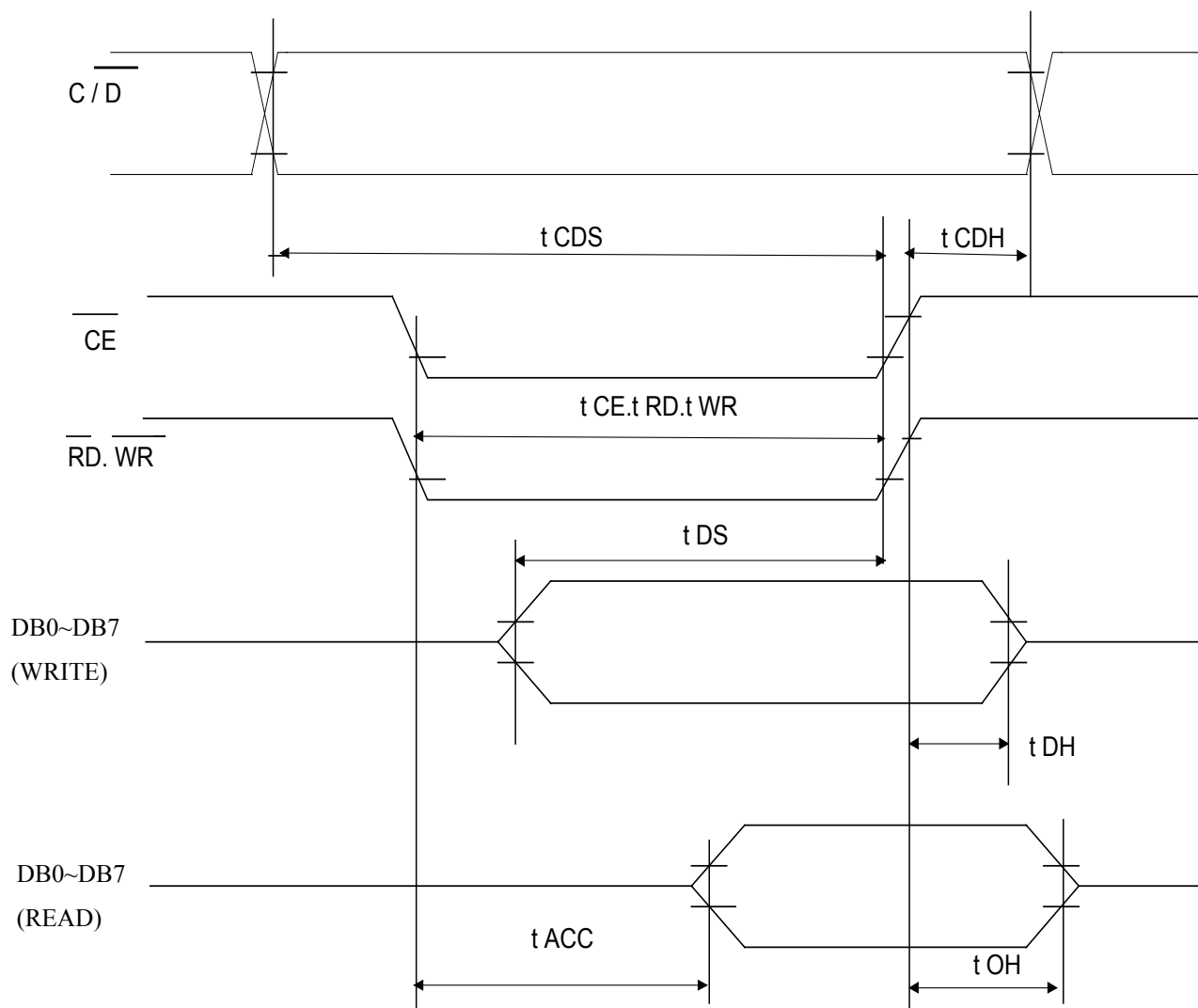
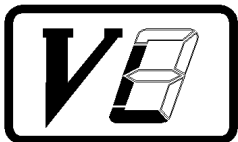
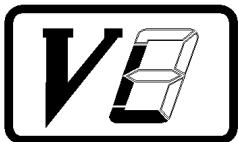


Figure 2: Bus Timing Diagram



4.4 Timing Diagram of VDD against V0.

Power on sequence shall meet the requirement of Figure 3, the timing diagram of VDD against V0.

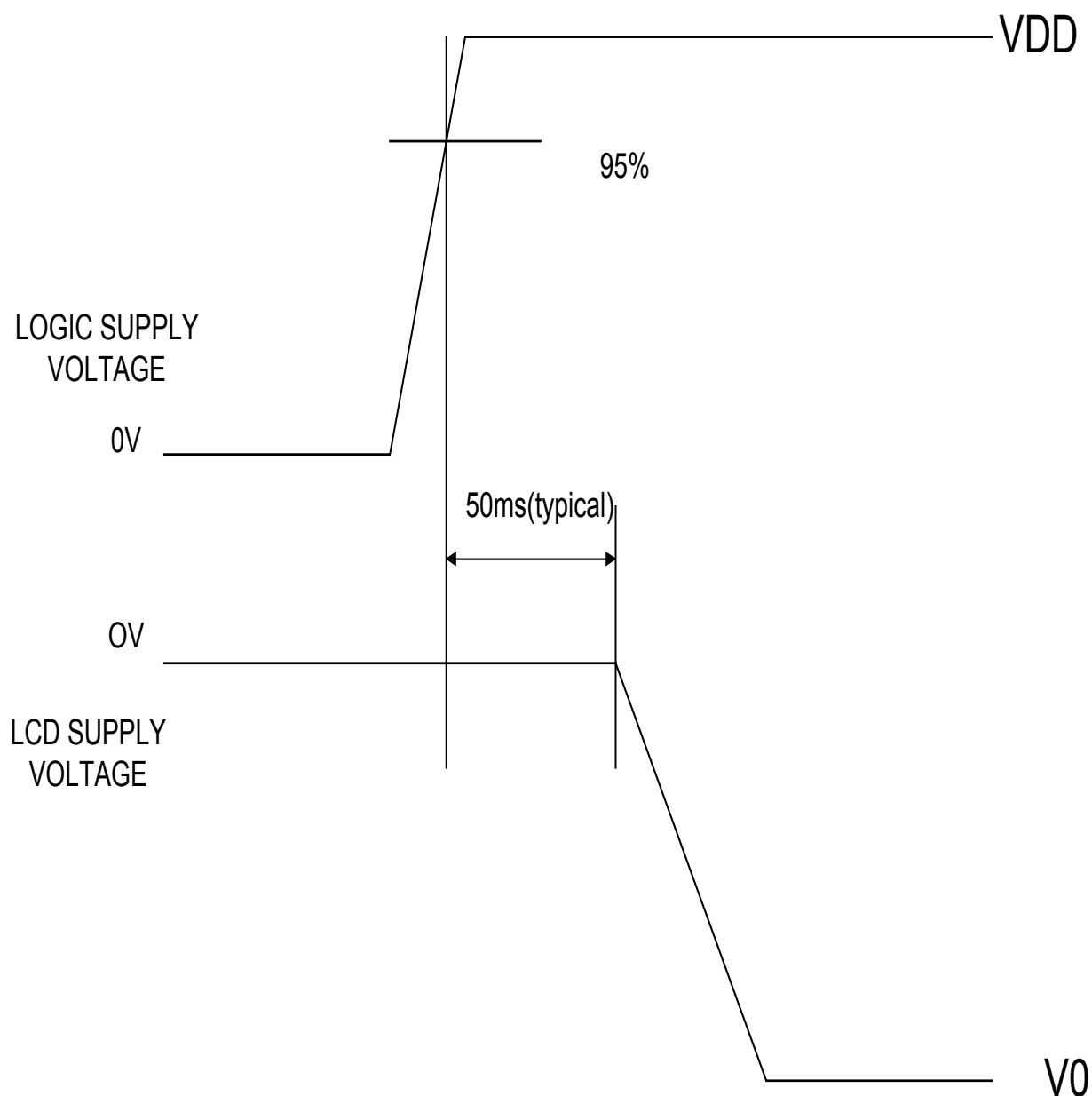


Figure 3: Timing diagram of VDD against V0.



5 LCD Cosmetic Conditions

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

6. 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.

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

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