DOCUMENT NUMBER AND REVISION

VL-FS-MGLS12864TZ-04 REV. A
(MGLS12864TZ-FSTN-3M FILM WITH
DIE FROM IC&CABLE)

DOCUMENT TITLE:

SPECIFICATION
OF
LCD MODULE TYPE
MODULE NO.: MGLS12864TZ-04

DEPARTMENT	NAME	SIGNATURE	DATE
PREPARED BY	HELEN HE	Helen He	2003.09.15
CHECKED BY	HE ZUO BING	He Zuo Bing	03.9.15
APPROVED BY	WONG MAN CHARM	Wong Man Charm	2003/9/15

DISTRIBUTION LIST: MARKETING

DOCUMENT REVISION HISTORY 1:

DOCUMENT REVISION FROM TO	DATE	DESCRIPTION	CHANGED BY	CHECKED BY
A	2003.09.15	First Release. (Based on Test Specification: VL-TS-MGLS12864TZ-XX, REV. C, 2003.08.20)	HELEN HE	HE ZUO BING

CONTENTS

VARITRONIX LIMITED

Specification
of
LCD Module Type
Model No.: MGLS12864TZ-04

1. General Description

- 128 x 64 dot matrix FSTN Positive Black & White LCD graphic module.
- Back Polarizer: 3M TDF.
- Driving scheme: 1/64 duty, 1/9.3 bias.
- Viewing direction: 6 O'clock.
- 'TOSHIBA' T6963C-0101 (Flat pack) or equivalent LCD controller.
- 'DRAGON DRIVER' SA3086 (Die form) LCD Segment/Common Drivers or equivalent.
- 8K bytes display SRAM.
- Flat cable.
- No 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	78.0(W) x 70.0(H) x 10.5 MAX. (D)(Excluded Cable) 78.0(W) x 70.0(H) x 47.50 (D)(Included Cable)	mm
Viewing area	62.0(W) x 44.0(H)	mm
Active area	56.27(W) x 38.35(H)	mm
Display format	128(Horizontal) x 64(Vertical)	dots
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

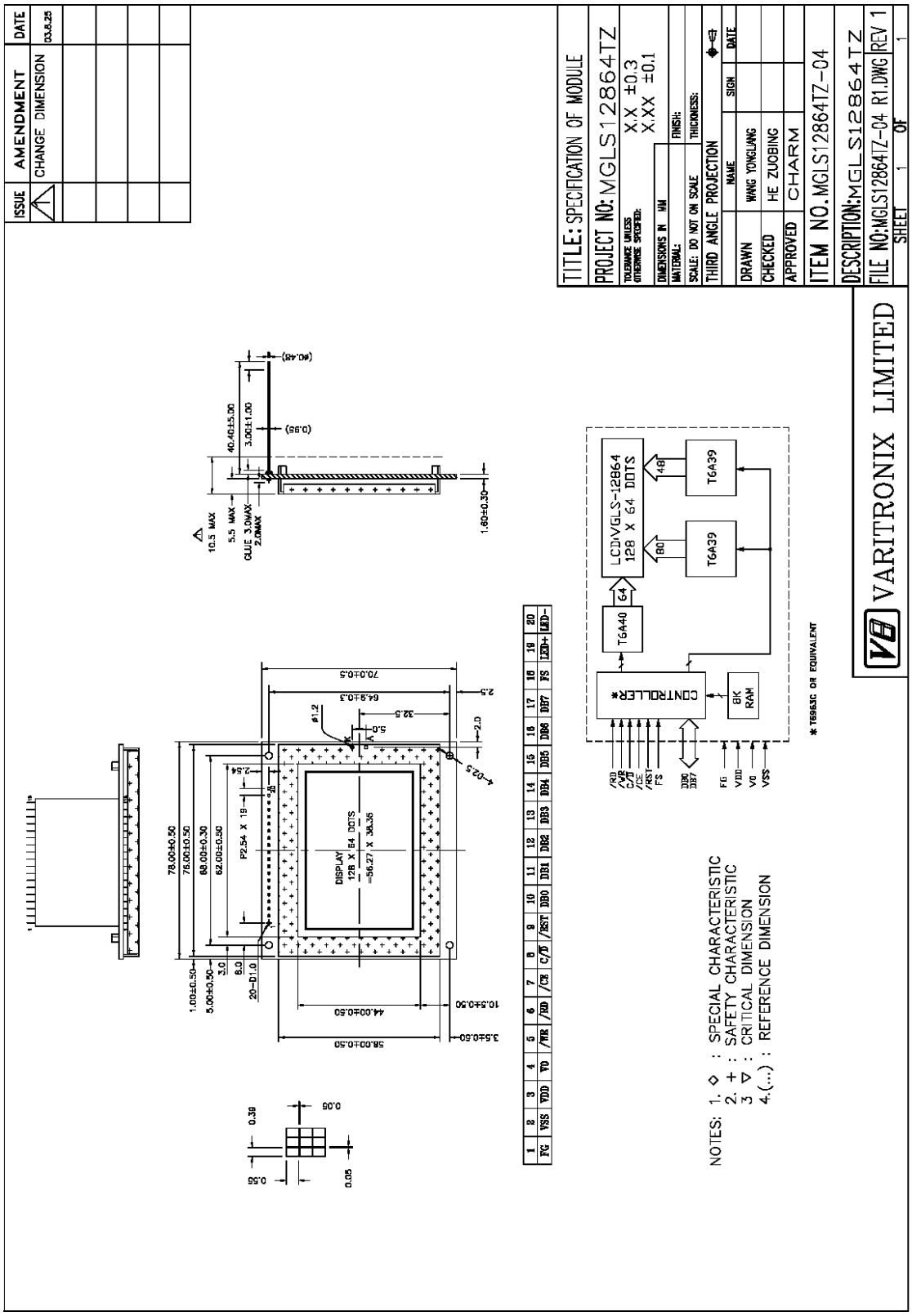

Figure 1: Module Specification

3. Interface signals

Table 2

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 to controller T6963C when “L”.
6	/RD	Data read. Read data from controller T6963C when “L”.
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. “H” for 6 x 8 font & “L” for 8 x 8 font
19	LED+	Anode of LED backlight
20	LED-	Cathode of LED 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. Absolute Maximum Ratings

4.1 Electrical Maximum Ratings (Ta = 25 ºC)

Table 3

Parameter	Symbol	Min.	Max.	Unit
Supply voltage (Logic)	VDD - VSS	-0.3	+7.0	V
Supply voltage (LCD drive)	VLCD=VDD – V0	0	+30.0	V
Input voltage	Vin	-0.3	VDD +3.0	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 (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

5. Electrical Specifications

5.1 Typical Electrical Characteristics

At Ta = 25 °C, VDD = 5V±5%,VSS = 0V.

Table 5

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply voltage (Logic)	VDD-VSS		4.75	5.0	5.25	V
Supply voltage (LCD)	VLCD =VDD-V0	VDD = 5V, Note (1)	9.5	10.0	10.5	V
Input signal voltage	VIN	"H" level	VDD-2.2	-	VDD	V
		"L" level	0	-	0.8	V
Supply current (Logic & LCD)	IDD	Character mode, VDD = 5V. Note (1)	-	6.0	9.0	mA
		Checker board mode, VDD = 5V. Note (1)	-	6.1	9.2	mA
Supply Current (LCD)	I0	Character mode, Note (1)	-	2.0	3.0	mA
		Checker board mode, Note (1)	-	2.0	3.0	mA

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 Ta = 0°C To +50°C, VDD = 5V±5%, VSS=0V

Refer to Fig. 3, the bus timing diagram.

Table 6

Parameter	Symbol	Min.	Max.	Unit
C/$\overline{D}$ Set-up time	t_{CDS}	100	-	ns
C/$\overline{D}$ 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

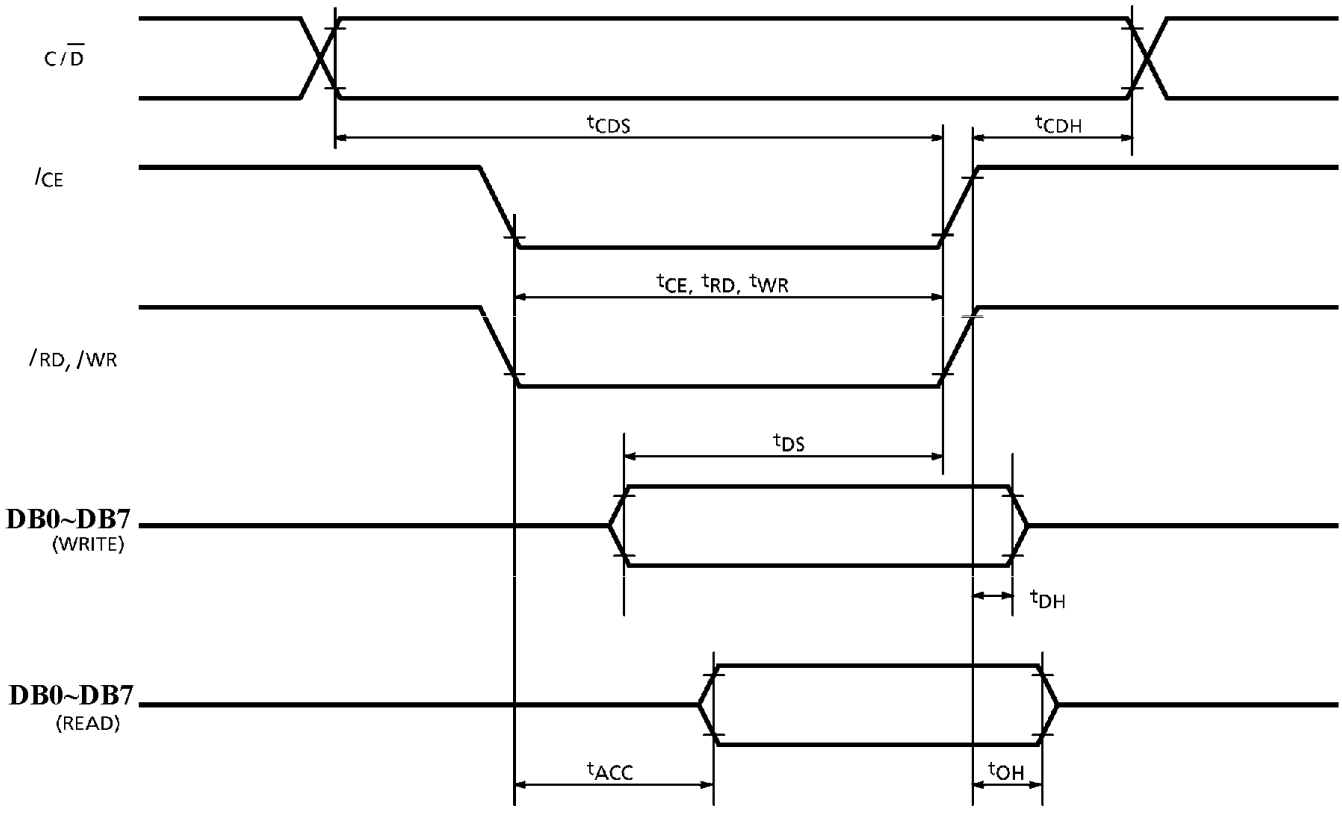

Figure 3: Bus Timing Diagram

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.

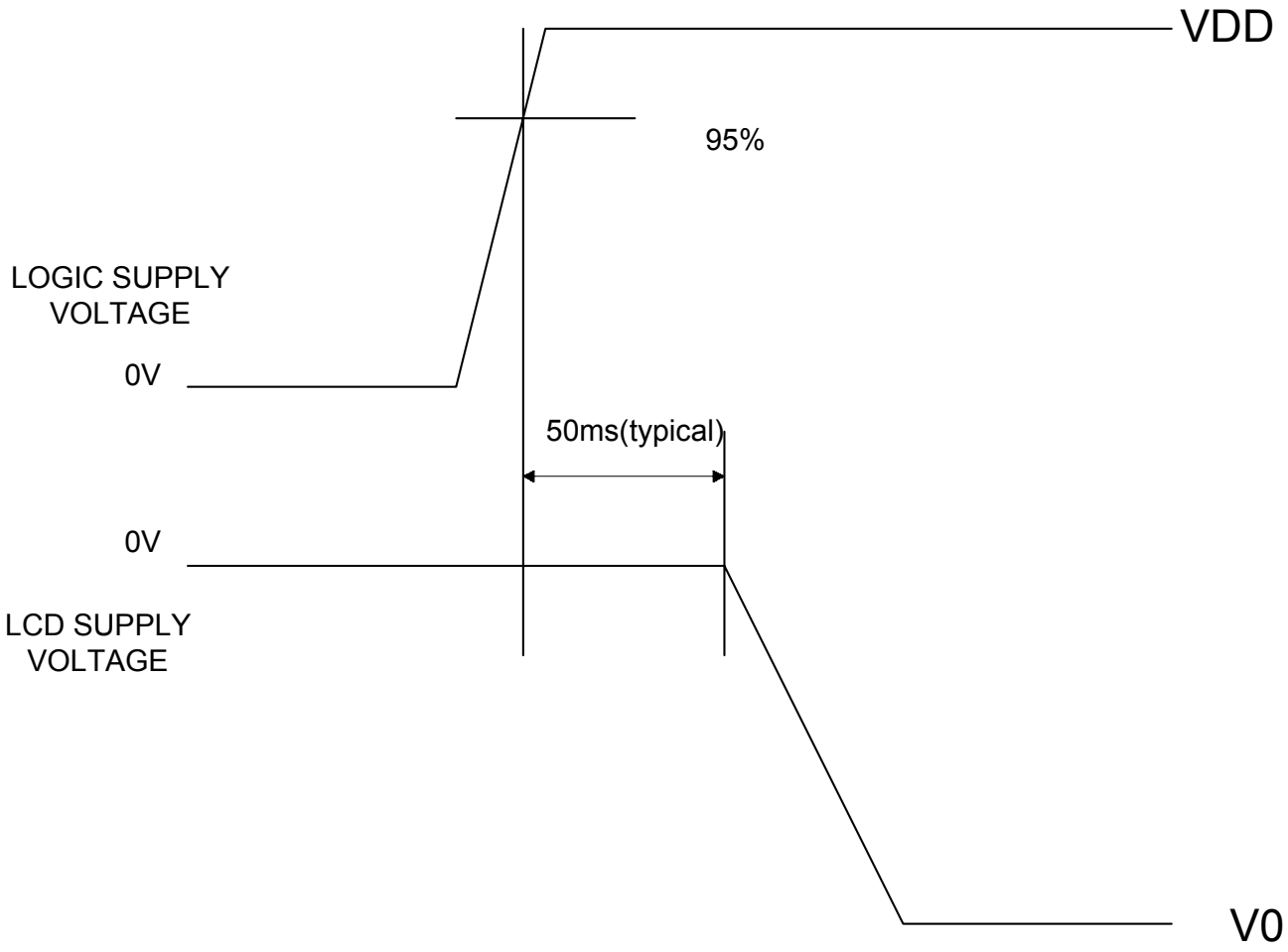

Figure 4: Timing Diagram of VDD Against V0.