



VL-FS-MGLS12864T-14 REV. A  
(MGLS12864T-LV2-LED03)

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DOCUMENT NUMBER AND REVISION

**VL-FS-MGLS12864T-14 REV. A  
(MGLS12864T-LV2-LED03)**

DOCUMENT TITLE:  
**SPECIFICATION  
OF  
LCD MODULE TYPE  
ITEM NO.: MGLS12864T-14**

APPROVALS:

EFFECTIVE DATE

DEPARTMENT	NAME	SIGNATURE	DATE
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## VARITRONIX LIMITED

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### Specification of LCD Module Type Item No.: MGLS12864T-14

#### 1. General Description

- 128 x 64 dot matrix STN LV2 positive yellow transfective dot matrix LCD graphic module.
- Viewing direction: 6 o'clock.
- Driving scheme: 1/64 multiplexed drive, 1/9 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.
- Yellow-green LED03 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 13.0 MAX.(D)	mm
Display format	128(Horizontal) x 64(Vertical)	dots
Effective 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

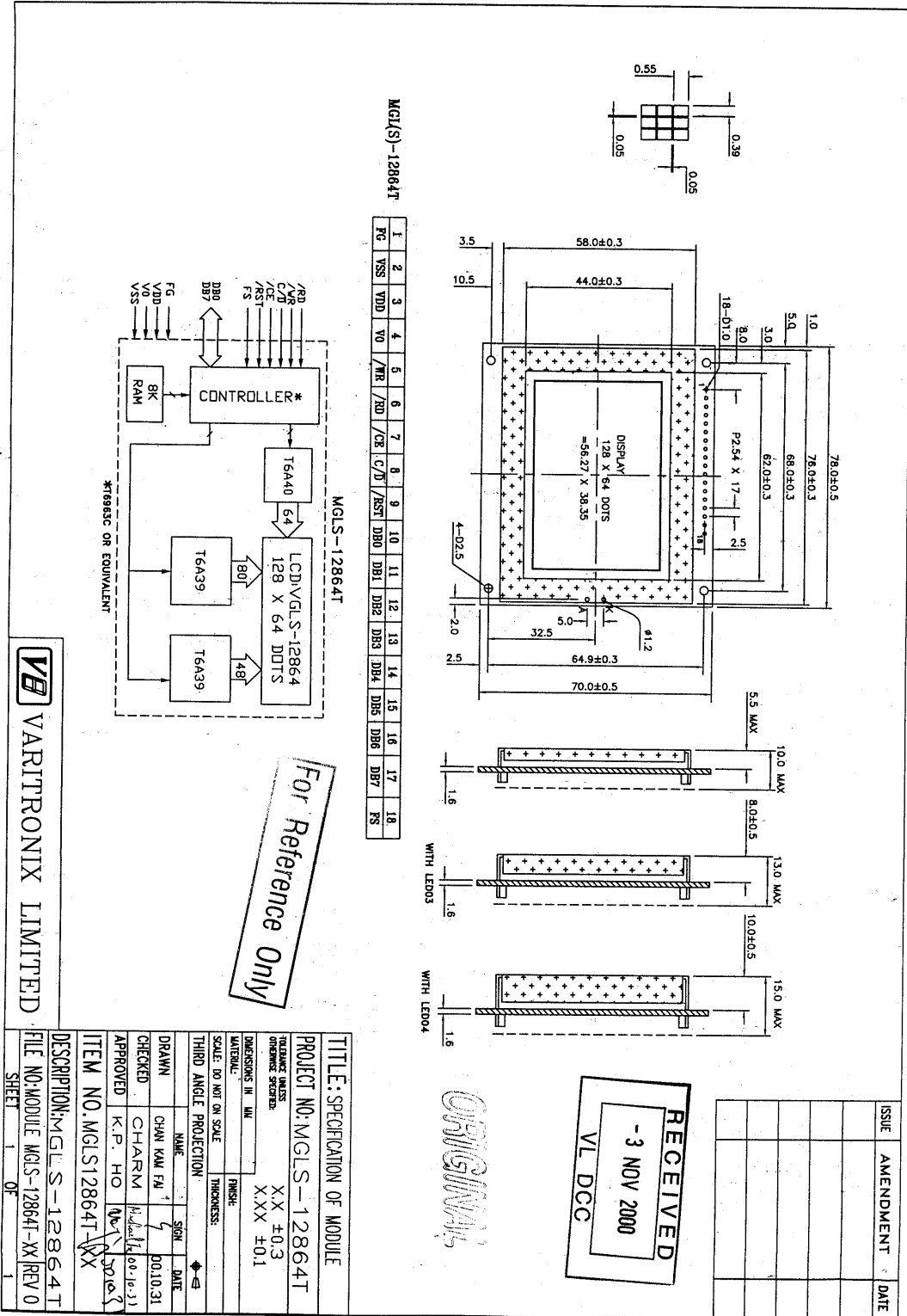


Figure 1: Specification Drawing



### 3. 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 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 / $\bar{D}$	/WR = "Low" ..... C/ $\bar{D}$ ="High": Command Write    C/ $\bar{D}$ ="Low": Data Write. /RD = "Low" ..... C/ $\bar{D}$ ="High": Status Read        C/ $\bar{D}$ ="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. Absolute Maximum Ratings

##### 4.1 Electrical Maximum Ratings(Ta = 25 °C)

Table 3

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.

##### 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 <sup>2</sup> = 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 & 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	9.7	10.2	10.7	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)	$I_{DD}$	Checker board mode, $V_{DD} = 5V$ , Note 1	-	6.38	10	mA
Supply current (LCD)	$I_0$	Checker board mode, $V_{DD} = 5V$ , Note 1	-	2.24	4	mA
Supply voltage of Yellow-green LED03 backlight	$V_{LED}$	Forward current $= 100\text{mA}$  Number of LED dies $= 20$ .	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.





## 5.2 Timing Specifications

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

Refer to Fig. 2, the bus timing diagram.

Table 6

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

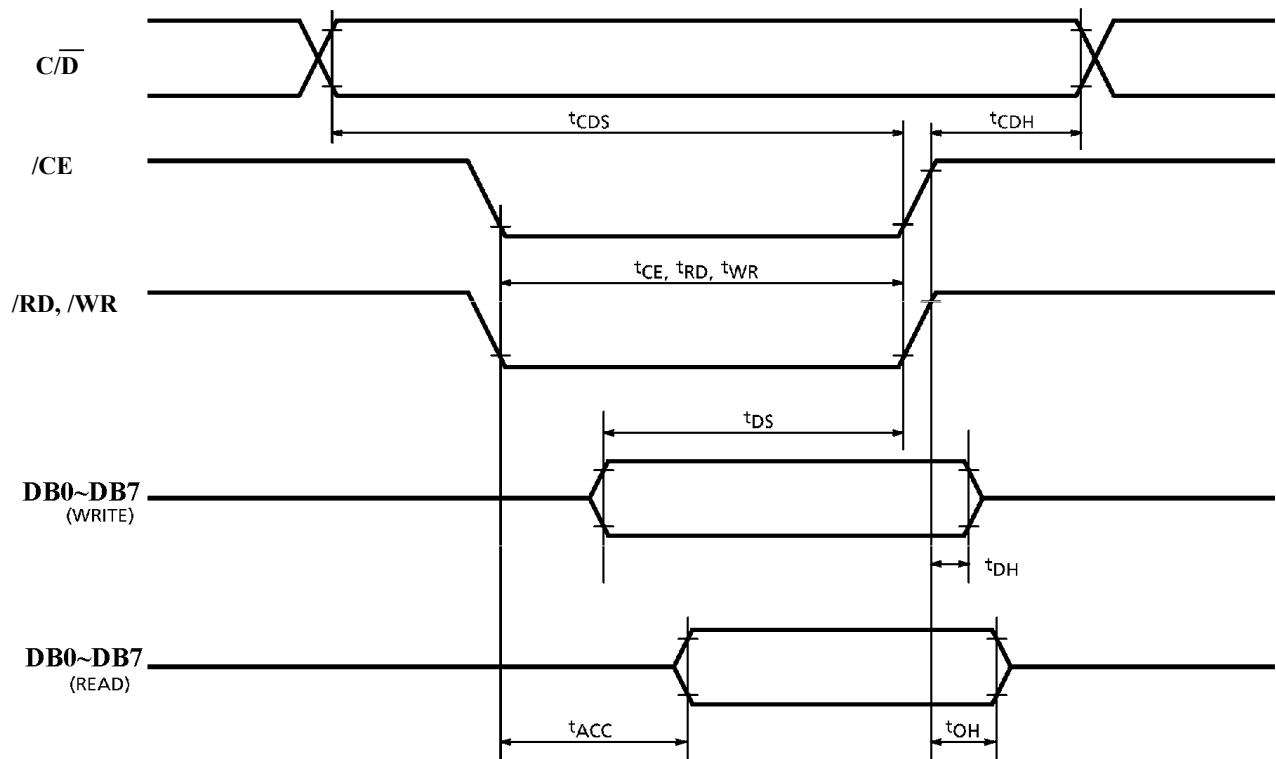


Figure 2: Bus Timing Diagram



### 5.3 Timing Diagram of VDD against V0.

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

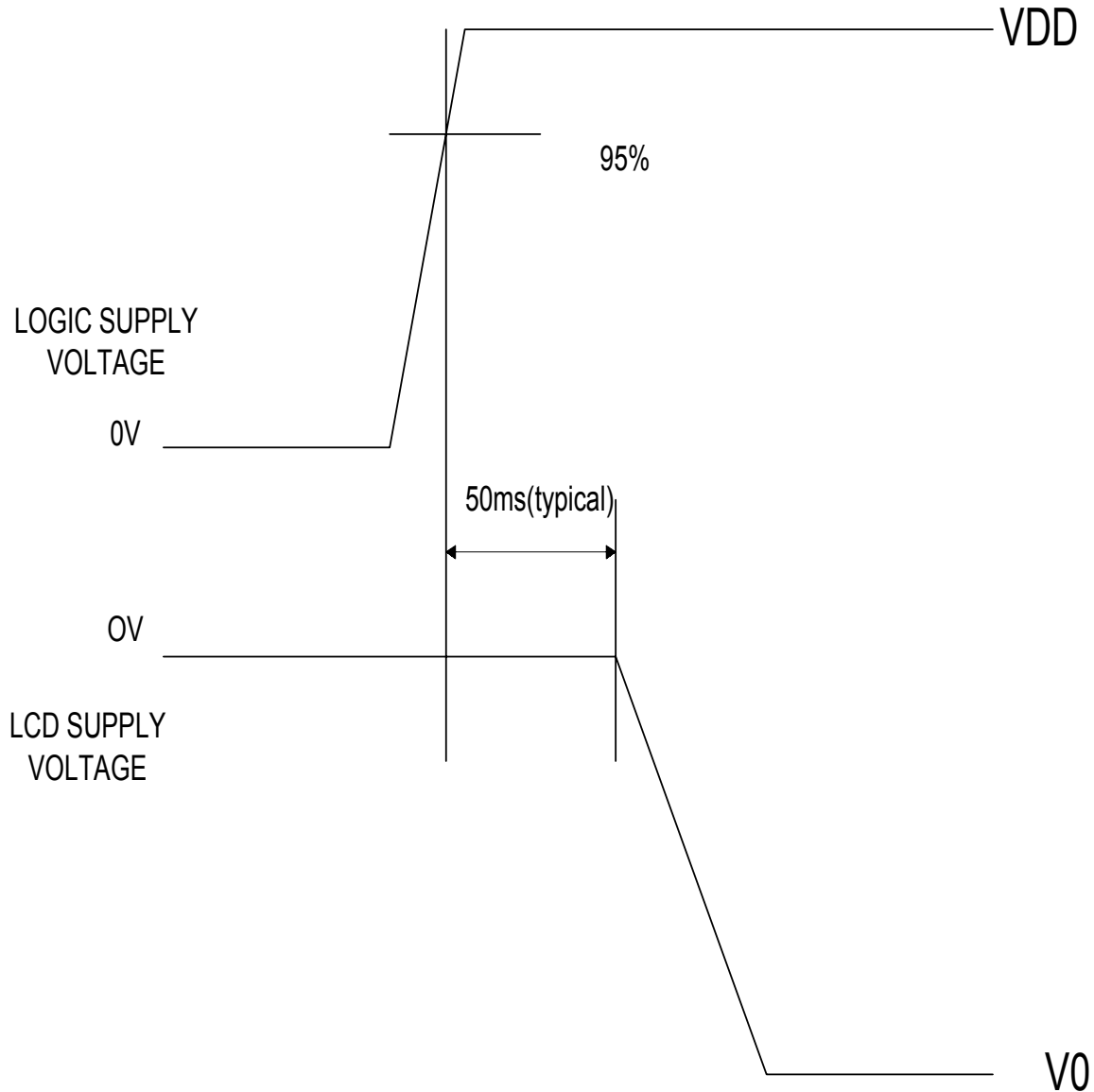


Figure 3: Timing diagram of VDD against V0.

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