

DOCUMENT NUMBER AND REVISION
VL-FS-MGLS24064-02C REV. A
(MGLS24064-G-LED03-6-SCH C)

DOCUMENT TITLE:
SPECIFICATION
OF
LCD MODULE TYPE
ITEM NO.: MGLS24064-02C

| DEPARTMENT | NAME | SIGNATURE | DATE |
|-------------|----------------|----------------------------|------------|
| PREPARED BY | ZHANG XIAO LAN | <i>XL Zhang</i> | 04-11-29 |
| CHECKED BY | FRANK WANG. | <i>Frank Wang</i> | 2004.11.29 |
| APPROVED BY | DERRICK TAM | <i>Derrick Tam</i> (HE) | 2004/11/30 |

DISTRIBUTION LIST: MARKETING



DOCUMENT REVISION HISTORY 1:

| DOCUMENT REVISION FROM TO | DATE | DESCRIPTION | CHANGED BY | CHECKED BY |
|---------------------------|------------|---|------------------|---------------|
| A | 2004.09.13 | <p>First Release. Based on a.) Test Specification: VL-TS-MGLS24064-XX REV. AA, 2004.10.27. b.) VL-QUA-012A, REV.R, 2004.03.20.</p> <p>According to VL-QUA-012A, LCD size is middle because Unit Per Laminate=6 which is in the range of 2pcs/Liminate to 6pcs/Liminate.</p> | CHEN HUI JUAN | FRANK WANG |



CONTENTS

| | <u>Page No.</u> |
|--|-----------------|
| 1. GENERAL DESCRIPTION | 4 |
| 2. MECHANICAL SPECIFICATIONS | 4 |
| 3. ABSOLUTE MAXIMUM RATINGS | 6 |
| 3.1 ELECTRICAL MAXIMUM RATINGS – FOR IC ONLY | 6 |
| 3.2 ENVIRONMENTAL CONDITION | 6 |
| 4. ELECTRICAL SPECIFICATIONS | 7 |
| 4.1 INTERFACE SIGNALS | 7 |
| 4.2 TYPICAL ELECTRICAL CHARACTERISTICS | 8 |
| 4.3 TIMING SPECIFICATIONS | 9 |
| 4.4 TIMING DIAGRAM OF VDD AGAINST V0 | 10 |
| 5. LCD COSMETIC CONDITIONS | 11 |
| 6. REMARK | 11 |



VARITRONIX LIMITED

Specification of LCD Module Type Item No.: MGLS24064-02C

1. General Description

- 240 x 64 dots STN Positive Transflective Yellow LCD graphic module.
- Driving scheme: 1/64 duty, 1/8.7 bias.
- Viewing direction: 6 O'clock.
- 'TOSHIBA' T6963C flat pack or equivalent LCD controller.
- 'TOSHIBA' T6A39 flat pack or equivalent LCD segment drivers.
- 'TOSHIBA' T6A40 flat pack or equivalent LCD common drivers.
- 8 K byte display SRAM.
- Yellow-Green LED03 backlight.
- 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 | 180.0(W) x 65.0(H) x 14.0 MAX.(D) | mm |
| Viewing area | 132.0(W) x 39.0(H) | mm |
| Active area | 127.15(W) x 33.87(H) | mm |
| Display format | 240 (Horizontal) x 64 (Vertical) | dots |
| Dot size | 0.48(W) x 0.48(H) | mm |
| Dot spacing | 0.05(W) x 0.05(H) | mm |
| Dot Pitch | 0.53(W) x 0.53(H) | mm |
| Weight | TBD | grams |

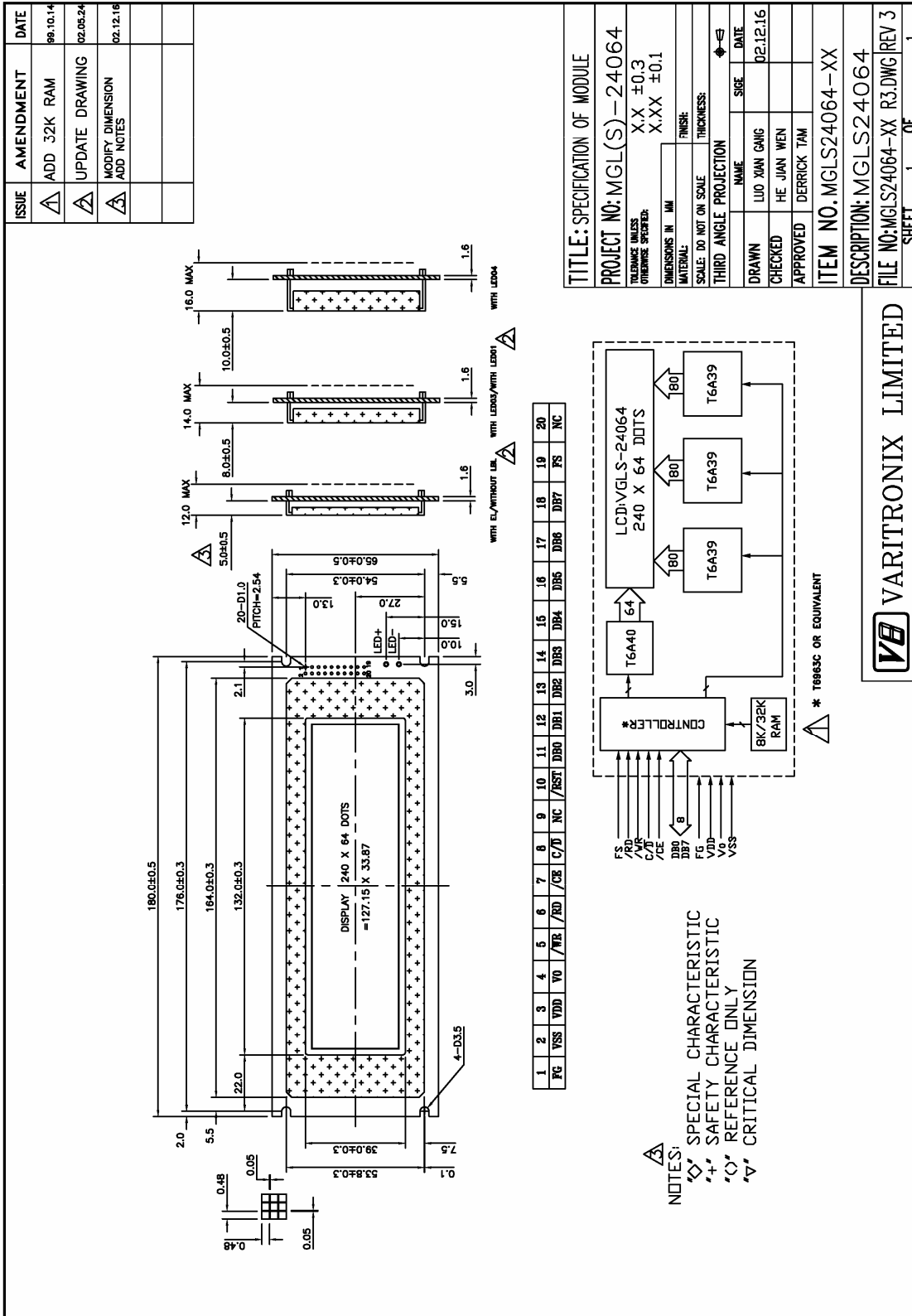


Figure 1: Module Specification



3. Absolute Maximum Ratings

3.1 Electrical Maximum Ratings – for IC Only

Table 2

| Parameter | Symbol | Min. | Max. | Unit |
|----------------------------|---------------|------|----------|------|
| Supply voltage (Logic) | VDD - VSS | -0.3 | +7.0 | V |
| Supply voltage (LCD drive) | 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 (To _{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 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 |
| 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 of controller when “L” |
| 8 | $\overline{\text{C/D}}$ | Command/Data read /write. “H” for command read/write and “L” for data read/write. |
| 9 | NC | No connection. |
| 10 | /RST | Controller reset when “L” |
| 11 | DB0 | Data input/output (LSB) |
| 12 | DB1 | Data input/output |
| 13 | DB2 | Data input/output |
| 14 | DB3 | Data input/output |
| 15 | DB4 | Data input/output |
| 16 | DB5 | Data input/output |
| 17 | DB6 | Data input/output |
| 18 | DB7 | Data input/output (MSB) |
| 19 | FS | Font select. “H” for 6 x 8 font & “L” for 8 x 8 font |
| 20 | NC | No connection. |

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) | $V_{DD} - V_{SS}$ | | 4.75 | 5.00 | 5.25 | V |
| Supply voltage (LCD) | $V_{LCD} = V_{DD} - V_0$ | $V_{DD} = 5V$, Note 1 | 14.3 | 14.8 | 15.3 | V |
| Input signal voltage | VIN | “H” level | $V_{DD} - 2.2$ | - | VDD | V |
| | | “L” level | 0 | - | 0.8 | V |
| Supply Current (Logic & LCD) | IDD | Character mode, $V_{DD}=5V$, Note 1 | - | 8.9 | 13.3 | mA |
| | | Checkerboard mode, $V_{DD}=5V$, Note 1 | - | 9.4 | 14.1 | mA |
| Supply Current (LCD) | I0 | Character mode, $V_{DD}=5V$, Note 1 | - | 3.4 | 5.0 | mA |
| | | Checkerboard mode, $V_{DD}=5V$, Note 1 | - | 3.5 | 5.2 | mA |
| Supply voltage of yellow-green LED03 backlight | VLED | Forward current =220mA Number of LED dice=2x22=44dies | 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.



4.3 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/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 |

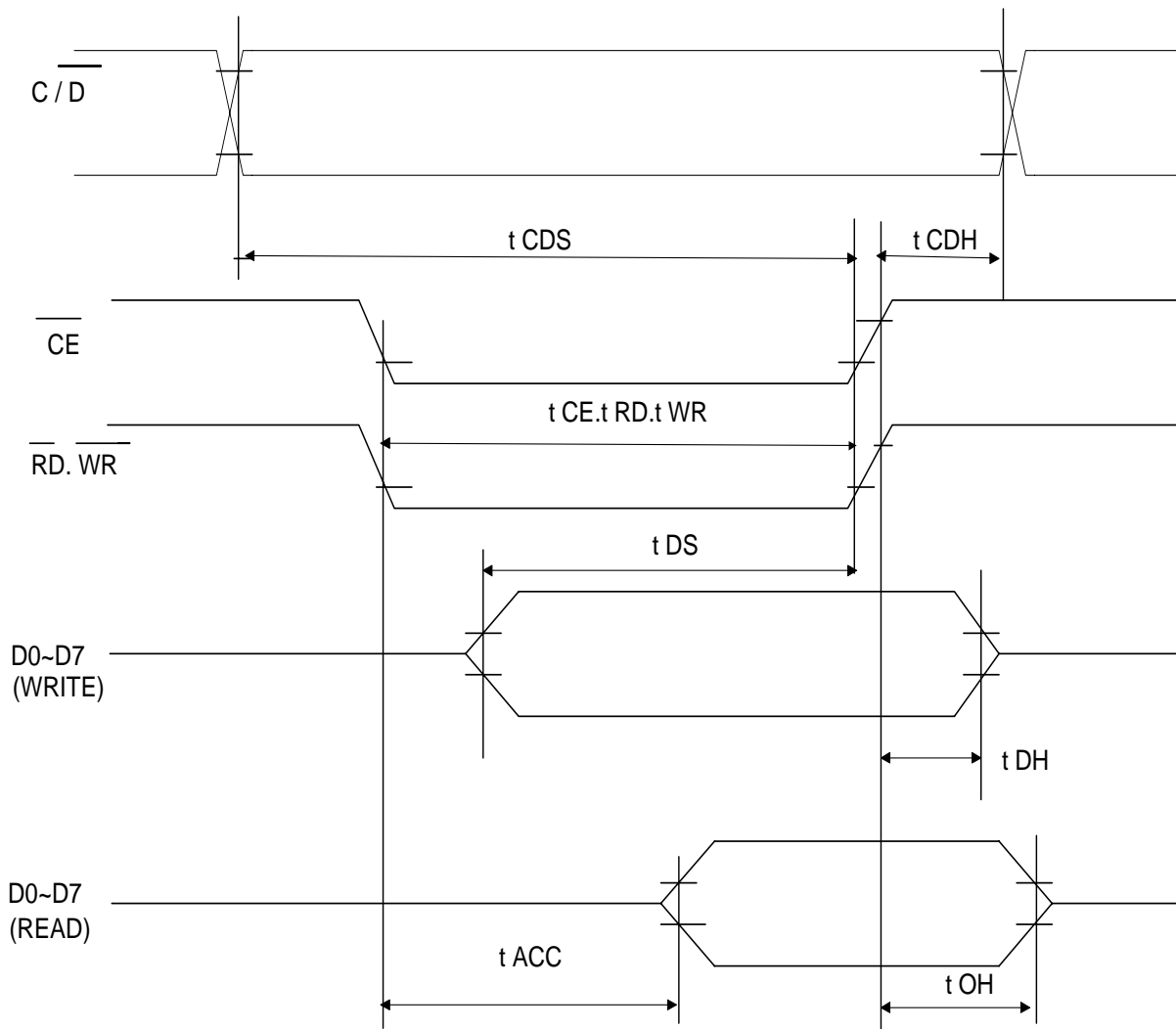


Figure 2: Bus Timing Diagram



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.

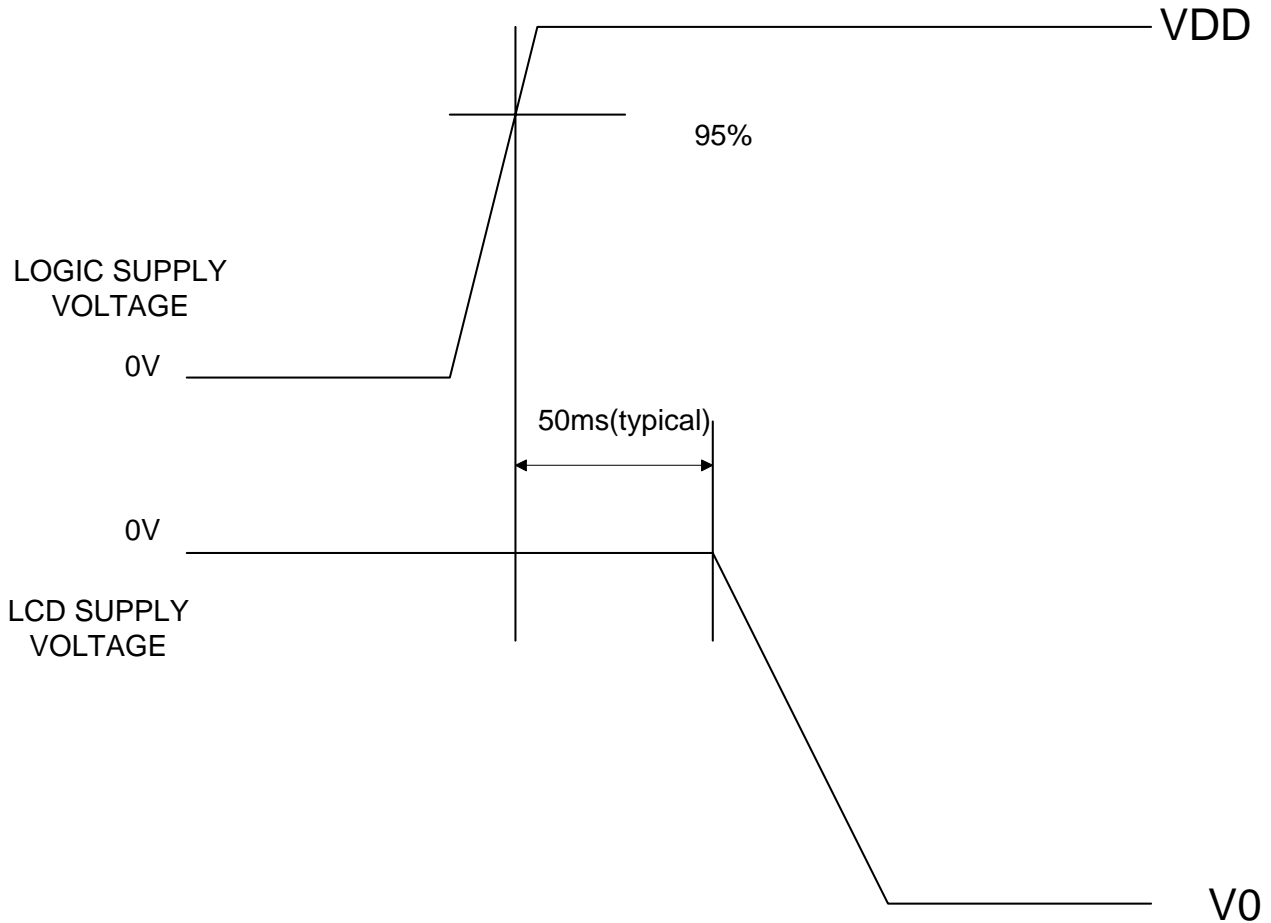


Figure 3: Timing Diagram of VDD Against V0.



5. LCD Cosmetic Conditions

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

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.
- c.) The stiffener on FPC/FFC/COF must not be bent during or after assembly.

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

FAX:(852) 2343-9555.

URL:<http://www.varitronix.com>

- END -