




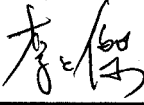

DOCUMENT NUMBER AND REVISION

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
MARKETING (TECHNICAL SUPPORT)	PHILIP CHENG		2002/4/11
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Rev. No.	A	A	A	A	A	A	A	A	A	A

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VARITRONIX LIMITED

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

1. General Description

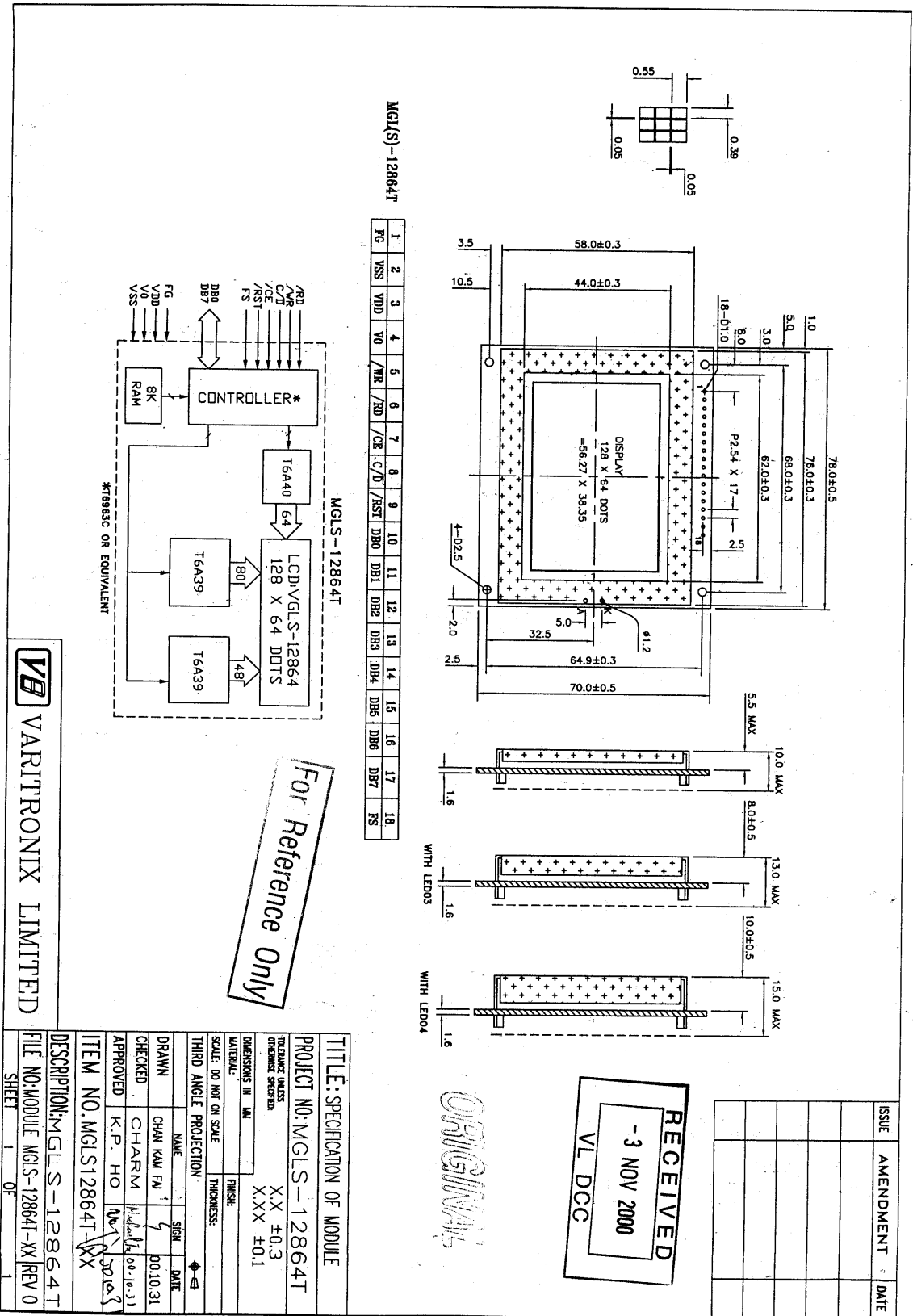
- 128 x 64 dot matrix STN LV2 positive yellow transfective dot matrix LCD graphic module.
- Viewing direction: 6 o'clock.
- Driving scheme: 1/64 multiplexed drive, 1/9 bias.
- 'Toshiba' T6963C flat pack or equivalent dot matrix LCD controller.
- 'Toshiba' T6A39 flat pack or equivalent dot matrix liquid 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



For Reference Only

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- 3 NOV 2000
VL DCC

ORIGINAL

TITLE: SPECIFICATION OF MODULE	
PROJECT NO.: MGLS-12864T	
TOLERANCE UNLESS OTHERWISE SPECIFIED:	XX ±0.3
DIMENSIONS IN MM:	XXX ±0.1
SCALE: DO NOT ON SCALE	THICKNESS:
THIRD ANGLE PROJECTION:	
DRAWN: CHAN KAM FW	SIGN: DATE
CHECKED: CHARM	001031
APPROVED: K.P. HO	16/10/01
ITEM NO.: MGLS12864T-XX	
DESCRIPTION: MGLS-12864T	
FILE NO.: MODULE MGLS-12864T-XX REV. 0	
SHEET 1 OF 1	

Vairtronix Limited

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 ² = 100g Number of shocks : 3 shocks in 3 mutually perpendicular axes.				3 directions



5. Electrical Specifications

5.1 Typical Electrical Characteristics

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

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)	$V_{LCD} = V_{DD} - V_0$	$V_{DD} = 5\text{V}$, 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, $V_{DD} = 5\text{V}$, Note 1	-	6.38	10	mA
Supply current (LCD)	I_0	Checker board mode, $V_{DD} = 5\text{V}$, 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/ \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

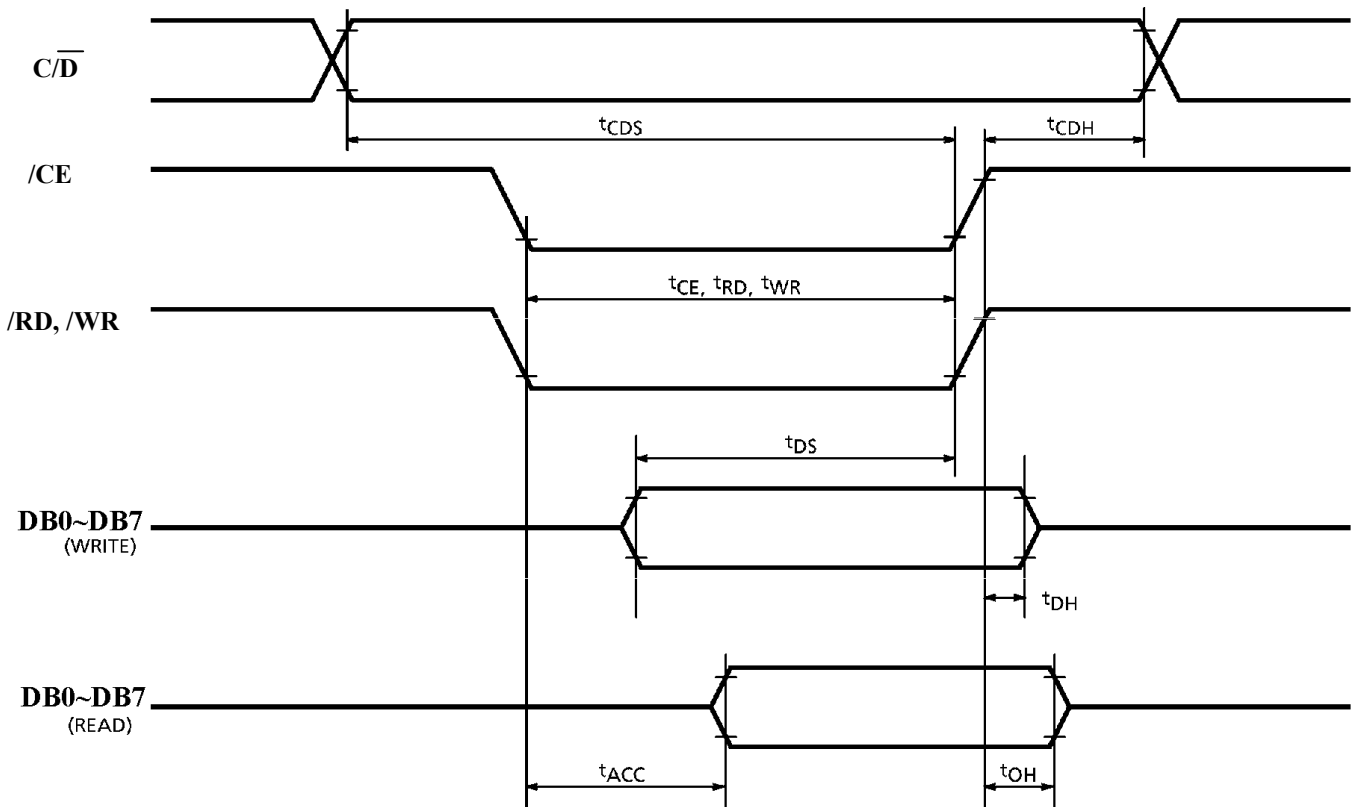


Figure 2: Bus Timing Diagram



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.

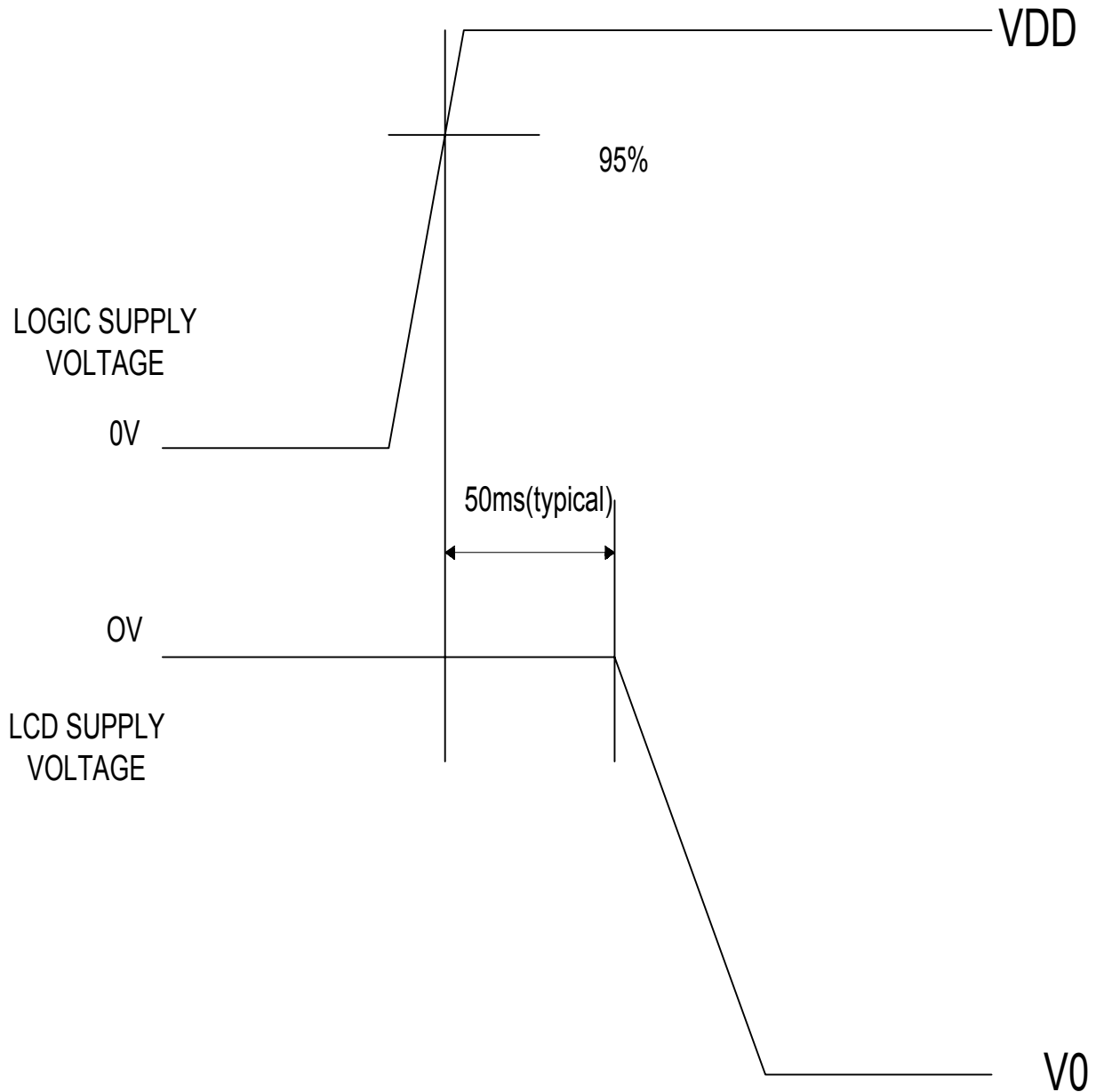


Figure 3: Timing diagram of VDD against V0.

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

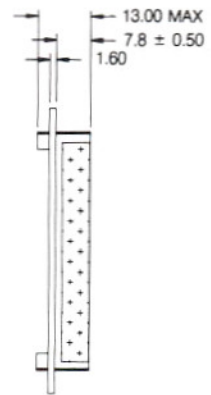
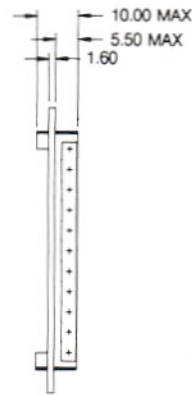
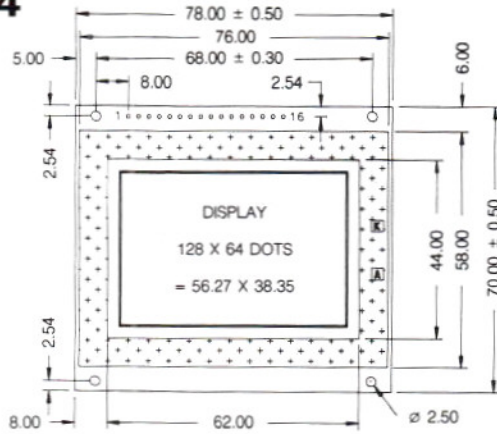
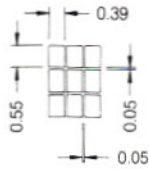
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- END -

STANDARD GRAPHIC MODULES

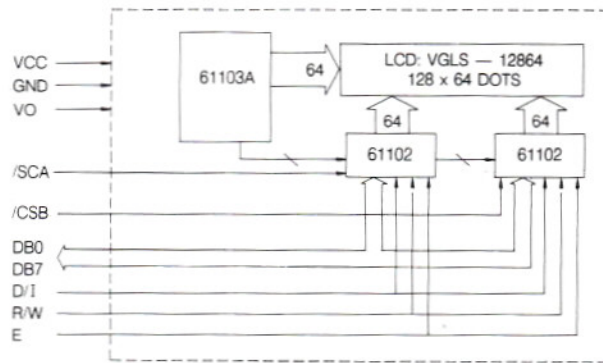
MGL(S)-12864

128 X 64 DOTS



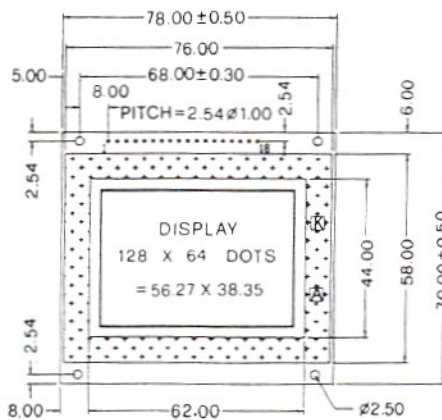
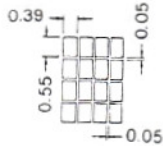
WITH LED 03

16 PIN CONNECTION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	/CSA	/CSB	GND	VCC	VO	D/I	R/W	E	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7



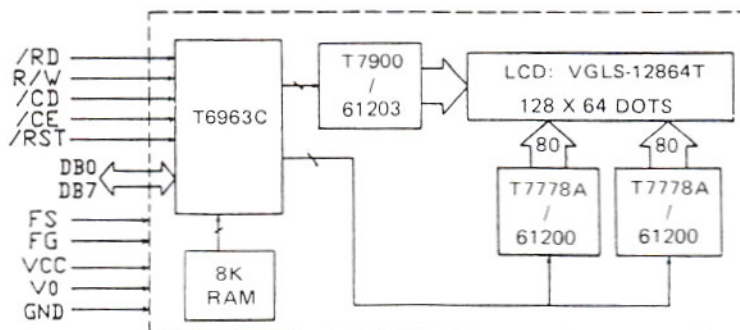
MGL(S)-12864T

128 X 64 DOTS



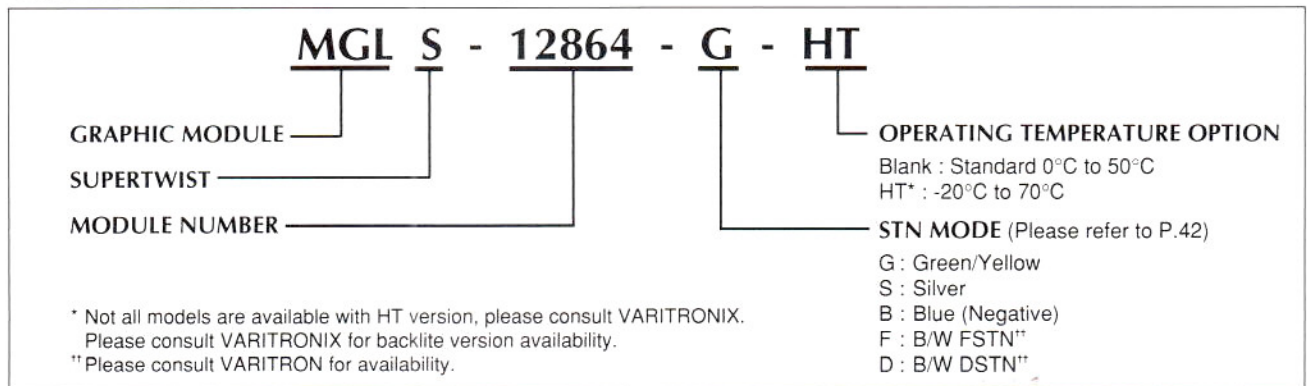
WITH LED03

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
FG	GND	VCC	VO	/WR	/RD	/CE	C/D	/RST	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7	FS



SPECIFICATIONS OF GRAPHIC MODULES

GRAPHIC MODEL NUMBER NOTATION



SUPERTWIST GRAPHIC MODULE PRODUCT GUIDE

MODEL	DOTS	DOT SIZE W X H	DOT PITCH	EFFECTIVE VIEWING AREA	MODULE SIZE	BUILT-IN CONTROLLER	SRAM 8K	STN STD	STN HT	EL	LED BACKLIGHT				
											01	02	03	04	
MGLS - 8032A	80x32	0.43x0.43	0.48x0.48	46x18	84x44	----		○	○	○		○			
MGLS - 8032B	80x32	0.43x0.43	0.48x0.48	46x18	84x44	HD61830	○	○	○	○		○			
MGLS - 8464	84x64	0.50x0.50	0.55x0.55	51x40	90x60	HD61830	○	○		○					
MGLS - 10032A	100x32	0.50x0.60	0.55x0.65	60x26.5	75x54	----		○	○	○				○	
MGLS - 10032B	100x32	0.62x0.56	0.72x0.66	76x25.2	98x50	----		○	○	○		○	○	○	
MGLS - 12032A	120x32	0.6x0.425	0.65x0.475	60x26.5	75x54	----		○	○					○	
MGLS - 12032B	120x32	0.56x0.55	0.61x0.60	76x25.2	98x50	----		○	○			○	○	○	
MGLS - 12864	128x64	0.39x0.55	0.44x0.60	62x44	78x70	----		○		○				○	
MGLS - 12864T	128x64	0.39x0.55	0.44x0.60	62x44	78x70	T6963C	○	○						○	
MGLS - 19264	192x64	0.36x0.36	0.41x0.41	84x31	100x60	----		○		○				○	
MGLS - 24064	240x64	0.48x0.48	0.53x0.53	132x39	176x65	T6963C	○	○		○				○	
MGLS - 32064	320x64	0.36x0.36	0.41x0.41	136.8x33.60	165x45	HD61830	○	○		○					
MGLS - 240128	240x128	0.40x0.40	0.45x0.45	114x64	144x104	HD61830	○	○		○				○	

■ ELECTRICAL CHARACTERISTICS†

Ta = 25°C

Item	Symbol	Condition	Standard value (STD, HT)			Unit
			Min	Typ	Max	
Supply Voltage (Logic)	V _{CC} - V _{SS}	----	4.5	5.0	5.5	V
Supply Voltage (LCD Drive)	V _{CC} - V _{EE}	----	8.0	----	26	V
Supply Current	I _{CC}	----	----	5.0	----	mA
	I _{EE}	----	----	----	30	mA
Input Voltage "H" Level	V _{IH}	High Level	V _{CC} - 2.2	----	V _{CC}	V
Input Voltage "L" Level	V _{IL}	Low Level	0	----	0.8	V
Supply Voltage for LCD Drive 1/32 duty	V _{CC} - V _{EE}	Ta = 0°C	----	(8.0,10.5)	(9.0,11.5)	V
		Ta = 25°C	----	----	----	V
		Ta = 50°C	(7.0,9.5)	----	----	V
Supply Voltage for LCD Drive 1/64 duty	V _{CC} - V _{EE}	Ta = 0°C	----	----	(11.5,16)	V
		Ta = 25°C	----	(10.8,15)	----	V
		Ta = 50°C	(9.3,14)	----	----	V
Supply Voltage for LCD Drive 1/128 duty	V _{CC} - V _{EE}	Ta = 0°C	----	----	(----,21.5)	V
		Ta = 25°C	----	(----,20.5)	----	V
		Ta = 50°C	(----,19.5)	----	----	V

† Minimum environmental mechanical specifications as listed on P.22. Please consult VARITRONIX for special requests. These are typical values and under constant improvement, specifications are subjected to change without prior notice.