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CUSTOMER	ACCEPTANCE	SPECIFICATIONS
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MODEL NO. :

24D00(EL TYPES)

FOR MESSRS :

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CUSTOMER'S APPROVAL

DATE :

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BY :

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**EMERGING DISPLAY  
TECHNOLOGIES CORPORATION**

MODEL NO . <b>24D00(EL TYPES)</b>	VERSION <b>2</b>
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<b>RECORDS OF REVISION</b>	DOC . FIRST ISSUE <b>OCT.24,1997</b>
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DATE	REVISED PAGE NO.	SUMMARY
OCT.27,2000	1 , 2 , 3 ,5	THE ENTIRE PAGE REVISED .

NUMBERING SYSTEM

Polarizer Mode	Backlight	Code value
Transflective	EL	E
Transmissive	EL	F

E	W	24	D	00	G	E	W	U
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Viewing direction
NIL : 6 o'clock
U : 12 o'clock

LCD type + LCD color	Code Value
STN + Yellow-Green	Y
STN + Gray	G
STN + Blue	B
FSTN + White	F
FSTN + Black	N

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## 1. GENERAL SPECIFICATIONS

### 1.1 GENERAL SPECIFICATIONS

PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS :

EU - 002 A

### 1.2 APPLICATION NOTES FOR CONTROLLER

PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS :

EU - 110

### 1.3 THIS INDIVIDUAL SPECIFICATION IS PRIOR TO GENERAL SPECIFICATIONS .

## 2. MECHANICAL SPECIFICATIONS

- (1) NUMBER OF DOTS ----- 240W \* 128H DOTS
- (2) MODULE SIZE ----- 144.0W \* 104.0H \* 10.3D mm
- (3) EFFECTIVE AREA ----- 114.0W \* 64.0H mm
- (4) ACTIVE AREA ----- 107.97W \* 57.57H mm
- (5) DOT SIZE ----- 0.42W \* 0.42H mm
- (6) DOT PITCH ----- 0.45W \* 0.45H mm
- (7) LCD TYPE \*
- (8) DRIVING METHOD ----- 1 / 128 DUTY MULTIPLEX DRIVE
- (9) VIEWING DIRECTION \*
- (10) BACKLIGHT ----- EL , COLOR : WHITE

\* PLEASE REFER TO NUMBERING SYSTEM .

### 3. ABSOLUTE MAXIMUM RATINGS

#### 3.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS .

PARAMETER	SYMBOL	MIN .	MAX .	UNIT	REMARK
POWER SUPPLY FOR LOGIC	VDD - VSS	0	6.5	V	
POWER SUPPLY FOR LCD DRIVING	VDD - VEE	0	22.0	V	
INPUT VOLTAGE	VI	VSS	VDD	V	
STATIC ELECTRICITY	—	—	100	V	NOTE (1)
POWER SUPPLY FOR EL BACKLIGHT	VOLTAGE	VEL	AC200	Vrms	fEL=1.0KHZ 60 SEC . MAX
	FREQUENCY	fEL	2.0	KHZ	AC115Vrms 60 SEC . MAX

NOTE (1) : TEST METHOD AND CONDITIONS :  
AFTER CHARGING UP 200 PF CAPACITOR BY STATED VOLTAGE ,  
THE CAPACITOR IS CONNECTED WITH INTERFACE PINS OF THE  
MODULE .

#### 3.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS .

I T E M	OPERATING		STORAGE		REMARK
	MIN .	MAX .	MIN .	MAX .	
AMBIENT TEMPERATURE	-20 °C	60 °C	-30 °C	70 °C	NOTE (2) , (3)
HUMIDITY	—	85 % RH	—	85 % RH	WITHOUT CONDENSATION
VIBRATION	—	2.45 m/s <sup>2</sup> (0.25 G)	—	11.76 m/s <sup>2</sup> (1.2 G)	10~100 HZ XYZ DIRECTIONS 1 Hr . EACH
SHOCK	—	29.4 m/s <sup>2</sup> (3 G)	—	490.0 m/s <sup>2</sup> (50 G)	10 mSECONDS XYZ DIRECTIONS 1 TIME EACH
CORROSIVE GAS	NOT ACCEPTABLE		NOT ACCEPTABLE		

NOTE (2) : Ta AT -30°C : 48HR MAX .  
70°C : 48HR MAX .

NOTE (3) : BACKGROUND COLOR CHANGES SLIGHTLY DEPENDING ON AMBIENT  
TEMPERATURE THIS PHENOMENON IS REVERSIBLE .

#### 4. ELECTRICAL CHARACTERISTICS

Ta = 25 °C

VDD = 5.0 V

PARAMETER	SYMBOL	CONDITION	MIN .	TYP .	MAX .	UNIT
POWER SUPPLY VOLTAGE FOR LOGIC	VDD - VSS	—	4.75	5.0	5.25	V
POWER SUPPLY VOLTAGE FOR LCD DRIVE	VEE - VSS	—	- 15.5	- 16.0	- 16.5	V
INPUT VOLTAGE NOTE (1)	VIH	H LEVEL	2.2	—	—	V
	VIL	L LEVEL	—	—	0.8	V
OUTPUT VOLTAGE NOTE (1)	VOH	H LEVEL	2.4	—	VCC	V
	VOL	L LEVEL	0	—	0.4	V
POWER SUPPLY CURRENT FOR LOGIC NOTE (2)	IDD	VDD - VSS = 5.0 V VDD - VO = 18.2V	—	6.0	—	mA
POWER SUPPLY CURRENT FOR LCD DRIVE NOTE (2)	IEE	VDD - VSS = 5.0 V VDD - VO = 18.2V	—	5.0	—	mA
RECOMMENDED LCD DRIVING VOLTAGE NOTE (3)	VDD-V0 ∅ = 10° θ* = 0°	Ta = - 20 °C	—	18.2	—	V
		Ta = 25 °C	—	18.2	—	V
		Ta = 60 °C	—	15.5	—	V
CLOCK OSCILLATION FREQUENCY	fosc	—	—	2	—	MHZ
POWER SUPPLY FOR EL BACKLIGHT	VEL	fEL=400HZ	—	100	—	Vrms
	IEL	VEL=100V fEL=400HZ	—	7	—	mArms

\* θ = 180° WHEN VIEWING DIRECTION IS 12 O'CLOCK .

NOTE (1) : APPLIED TO TERMINALS E,  $\overline{CS}$ ,  $\overline{R/W}$ , RS, DB0~DB7,  $\overline{RES}$ .

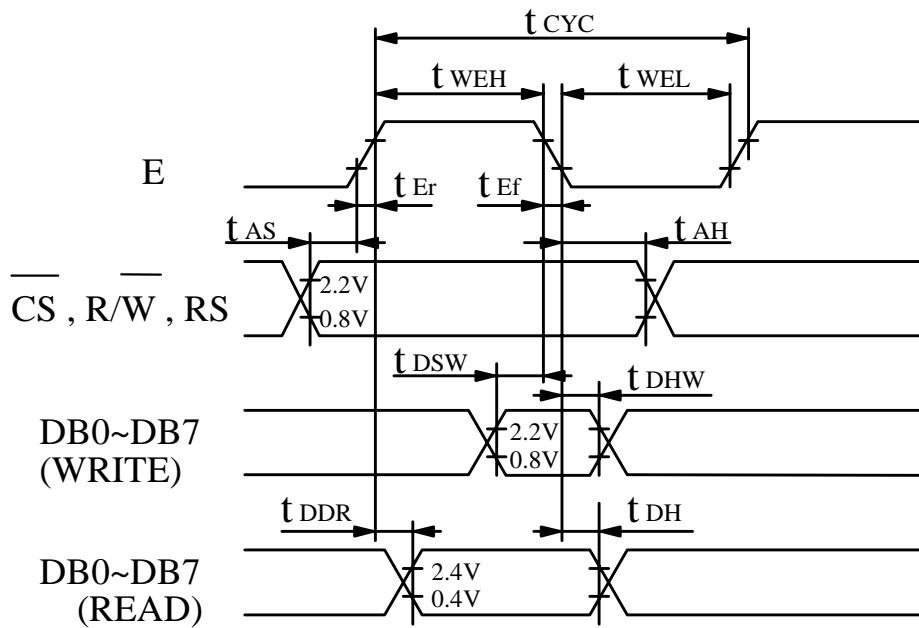
NOTE (2) : THE DISPLAY PATTERN IS ALL "OFF" / "ON" .

NOTE (3) : RECOMMENDED LCD DRIVING VOLTAGE MAY FLUCTUATE ABOUT ± 1.0V BY EACH MODULE .

5. INTERFACE TIMING CHARACTERISTICS

V<sub>CC</sub> = 5.0 V, T<sub>a</sub> = -20 ~ 75 °C

ITEM	SYMBOL	MIN	TYP	MAX	UNIT
Enable cycle time	t <sub>CYC</sub>	1.0	—	—	uS
Enable pulse width	H LEVEL	t <sub>WEH</sub>	0.45	—	uS
	L LEVEL	t <sub>WEL</sub>	0.45	—	uS
Enable rise time	t <sub>Er</sub>	—	—	25	nS
Enable fall time	t <sub>Ef</sub>	—	—	25	nS
Setup time	t <sub>AS</sub>	140	—	—	nS
Data setup time	t <sub>DSW</sub>	225	—	—	nS
Data delay time	t <sub>DDR</sub>	—	—	225	nS
Data hold time	t <sub>DHW</sub>	10	—	—	nS
Address hold time	t <sub>AH</sub>	10	—	—	nS
Data hold time	t <sub>DH</sub>	20	—	—	nS





6. OPTICAL CHARACTERISTICS

I T E M		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING AREA	STN	$\varnothing 2 - \varnothing 1$	$K \geq 1.4$	40	—	—	deg.	1
	FSTN			50	—	—	deg.	1
CONTRAST RATIO	STN	K	$\varnothing = 10^\circ$ $\theta^* = 0^\circ$	—	5	—	—	1
	FSTN			5	—	—	—	1
RESPONSE TIME	tr ( rise )	$\varnothing = 10^\circ$ $\theta^* = 0^\circ$	Ta = -20°C	—	2886	—	ms	1
			Ta = 25°C	—	259	—	ms	1
			Ta = 60°C	—	156	—	ms	1
	tf ( fall )		Ta = -20°C	—	2193	—	ms	1
			Ta = 25°C	—	177	—	ms	1
			Ta = 60°C	—	84	—	ms	1
THE BRIGHTNESS OF BACKLIGHT	B	$\varnothing = 10^\circ$ $\theta^* = 0^\circ$	10	—	—	cd/m <sup>2</sup>	2	
			25	—	—		3	

\*  $\theta = 180^\circ$  WHEN VIEWING DIRECTION IS 12 O'CLOCK.

NOTE (1) : PLEASE REFER TO :

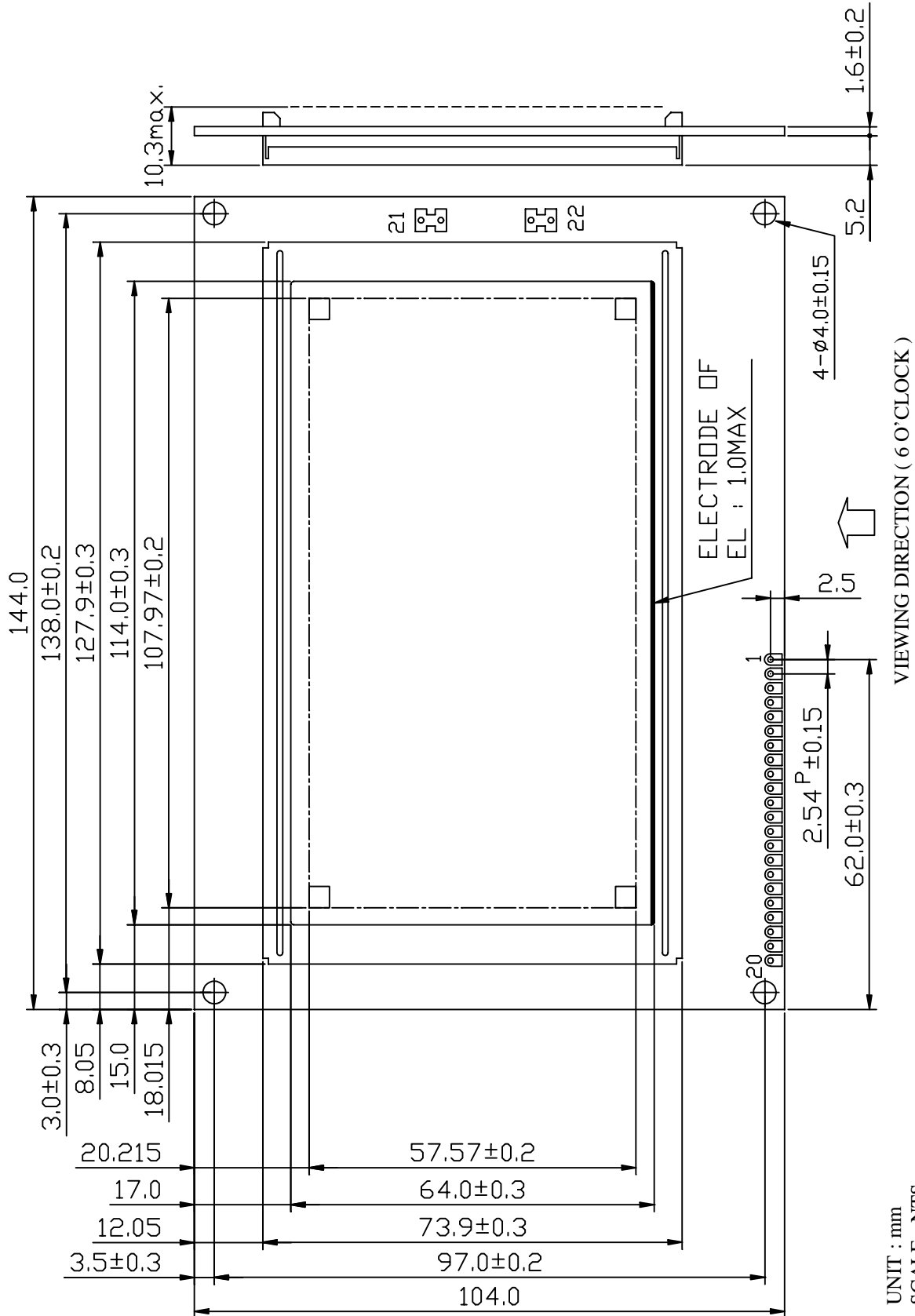
CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS.

EU-002A

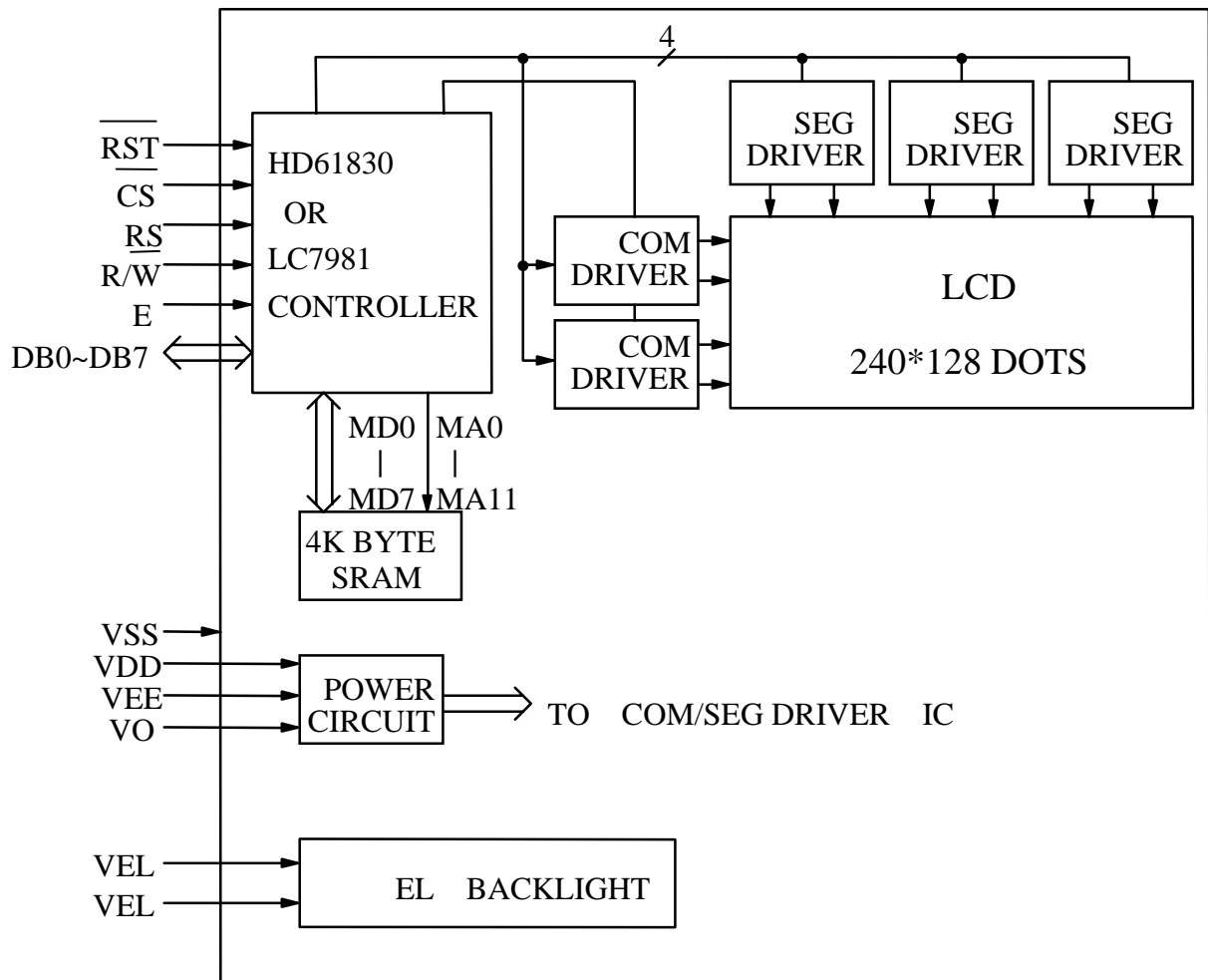
NOTE (2) : POLARIZER MODE : TRANSFLECTIVE

NOTE (3) : POLARIZER MODE : TRANSMISSIVE

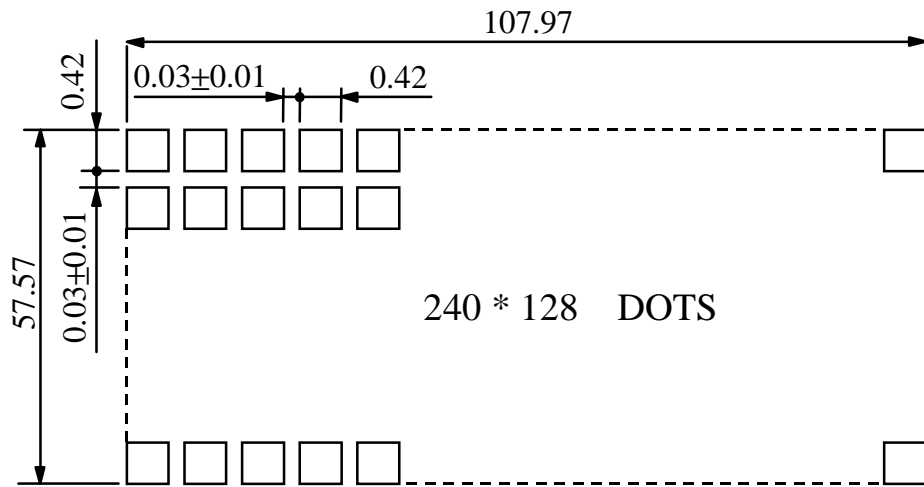
7. OUTLINE DMENSION



8. BLOCK DIAGRAM



9. DETAIL DRAWING OF DOT MATRIX



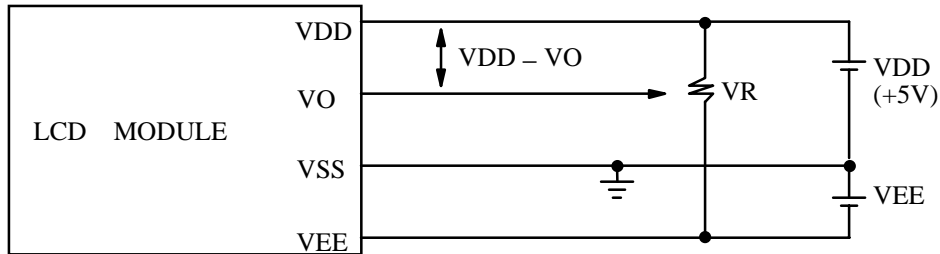
UNIT : mm  
SCALE : NTS  
NOT SPECIFIED TOLERANCE IS  $\pm 0.1$

10. INTERFACE SIGNALS

PIN NO	SYMBOL	LEVEL	FUNCTION
1	VSS	—	GROUND
2	VDD	—	POWER SUPPLY FOR LOGIC CIRCUIT
3	V0	—	OPERATING VOLTAGE FOR LCD DRIVE
4	RS	H/L	H : INSTRUCTION REGISTER L : DATA REGISTER
5	$R\bar{W}$	H/L	H : DATA READ (LCD MODULE → MPU) L : DATA WRITE (LCD MODULE ← MPU)
6	E	H,H→L	ENABLE SIGNAL
7   14	DB0   DB7	H/L	DATA BUS LINE
15	$\bar{CS}$	H→L	CHIP SELECTION
16	$\bar{RST}$	L	RESET
17	VEE	—	POWER SUPPLY FOR LCD DRIVE
18   20	N.C	—	—————
21	VEL	—	POWER SUPPLY FOR EL BACKLIGHT
22	VEL		

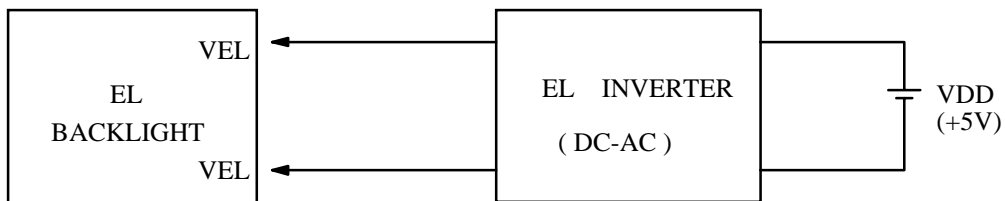
1 1 . POWER SUPPLY

1 1 . 1 POWER SUPPLY FOR LCM



VDD - VO : LCD DRIVING VOLTAGE  
VR : 20KΩ

1 1 . 2 POWER SUPPLY FOR EL BACK - LIGHT



RECOMMENDED INVERTER : SOUN50700

1 1 . 3 TIMING OF POWER SUPPLY AND INTERFACE SIGNAL

