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		TOTAL PAGE : 9
		VERSION : 3

CUSTOMER ACCEPTANCE SPECIFICATIONS

MODEL NO . :
13B10(EL TYPES)
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FOR MESSRS :

CUSTOMER'S APPROVAL
DATE :

BY :

EMERGING DISPLAY
TECHNOLOGIES CORPORATION

MODEL NO .

13B10(EL TYPES)

VERSION

3

DOC . FIRST ISSUE

APR.10,1998

RECORDS OF REVISION

DATE	REVISED PAGE NO.	SUMMARY
SEP.14,1998	8	10. INTERFACE SIGNALS REVISING THE FUNCTION OF PIN NO. 4 : H : INSTRUCTION REGISTER → H : DATA REGISTER L : DATA REGISTER →L : INSTRUCTION REGISTER
JUN.19,2000	1,2,3,5	ALL NORMAL TEMPERATURE'S DATA WAS DELETED.

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Polarizer Mode	Backlight	Code value
Transflective	EL	E

E W 13 B 10 G E W

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

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TABLE OF CONTENTS

NO.	ITEM	PAGE
1.	GENERAL SPECIFICATIONS -----	1
2.	MECHANICAL SPECIFICATIONS -----	1
3.	ABSOLUTE MAXIMUM RATINGS -----	2
4.	ELECTRICAL CHARACTERISTICS -----	3
5.	INTERFACE TIMING CHARACTERISTICS -----	4
6.	OPTICAL CHARACTERISTICS -----	5
7.	OUTLINE DIMENSION -----	6
8.	BLOCK DIAGRAM -----	7
9.	DETAIL DRAWING OF DOT MATRIX -----	8
10.	INTERFACE SIGNALS -----	8
11.	POWER SUPPLY -----	9

1. GENERAL SPECIFICATIONS

1.1 GENERAL SPECIFICATIONS

PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS :

EU - 002A

1.2 APPLICATION NOTES FOR CONTROLLER

PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS :

EU - 100

1.3 THIS INDIVIDUAL SPECIFICATION IS PRIOR TO GENERAL SPECIFICATIONS .

2. MECHANICAL SPECIFICATIONS

- | | | |
|-----------------------|-------|------------------------------|
| (1) NUMBER OF DOTS | ----- | 128W * 64H DOTS |
| (2) MODULE SIZE | ----- | 77.8W * 69.8H * 9.5D(max) mm |
| (3) EFFECTIVE AREA | ----- | 70.7W * 38.8H mm |
| (4) ACTIVE AREA | ----- | 65.25W * 32.61H mm |
| (5) DOT SIZE | ----- | 0.48W * 0.48H mm |
| (6) DOT PITCH | ----- | 0.51W * 0.51H mm |
| (7) LCD TYPE * | | |
| (8) DRIVING METHOD | ----- | 1 / 64 DUTY MULTIPLEX DRIVE |
| (9) VIEWING DIRECTION | ----- | 6 O'CLOCK |

* PLEASE REFER TO NUMBERING SYSTEM .

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VERSION
3

PAGE
2

3. ABSOLUTE MAXIMUM RATINGS

3.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS .

PARAMETER		SYMBOL	MIN .	MAX .	UNIT	REMARK
POWER SUPPLY FOR LOGIC		VDD-VSS	0	7.0	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		COMMENT
	MIN .	MAX .	MIN .	MAX .	
AMBIENT TEMPERATURE	- 20 °C	60 °C	- 30 °	70 °C	NOTE (2) , (3)
HUMIDITY	—	85 % RH	—	85 % RH	WITHOUT CONDENSATION
VIBRATION	—	2.45 m/s ² (0.25 G)	—	11.76 m/s ² (1.2 G)	10~100 HZ XYZ DIRECTIONS 1 Hr . EACH
SHOCK	—	29.4 m/s ² (3 G)	—	490.0 m/s ² (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 : 168HR MAX .

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

EMERGING DISPLAY TECHNOLOGIES CORPORATION

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13B10(EL TYPES)

VERSION

3

PAGE

3

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
INPUT VOLTAGE NOTE (1)	VIH	H LEVEL	0.7*VDD	—	VDD	V
	VIL	L LEVEL	GND	—	0.3*VDD	V
OUTPUT VOLTAGE NOTE (1)	VOH	H LEVEL	VDD-0.4	—	—	V
	VOL	L LEVEL	—	—	0.4	V
POWER SUPPLY CURRENT FOR LOGIC NOTE (2)	IDD	VDD-VSS = 5.0 V VDD-VO = 9.2V	—	7.0	—	mA
RECOMMENDED LCD DRIVING VOLTAGE NOTE (3)	VDD - VO ∅ = 10° θ = 0°	Ta = -20 °C	—	9.2	—	V
		Ta = 25 °C	—	9.2	—	
		Ta = 60 °C	—	8.4	—	
POWER SUPPLY FOR EL BACKLIGHT	VEL	fEL=400HZ	—	100	—	Vrms
	IEL	VEL=100V fEL=400HZ	—	3.5	—	mArms

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NOTE (1): APPLIED TO TERMINALS CS1, CS2, R/W, D/I, DB0~DB7, E, RST.

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

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

5. INTERFACE TIMING CHARACTERISTICS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	FIG.
E cycle time	t_{CYC}	1000	—	—	nS	1,2
E high level	P_{WEH}	450	—	—	nS	1,2
E low level width	P_{WEL}	450	—	—	nS	1,2
E rise time	t_r	—	—	25	nS	1,2
E fall time	t_f	—	—	25	nS	1,2
Address setup time	t_{AS}	140	—	—	nS	1,2
Address hold time	t_{AH}	10	—	—	nS	1,2
Data setup time	t_{DSW}	200	—	—	nS	1
Data delay time	t_{DDR}	—	—	320	nS	2
Data hold time (Write)	t_{DHW}	10	—	—	nS	1
Data hold time (Read)	t_{DHR}	20	—	—	nS	2

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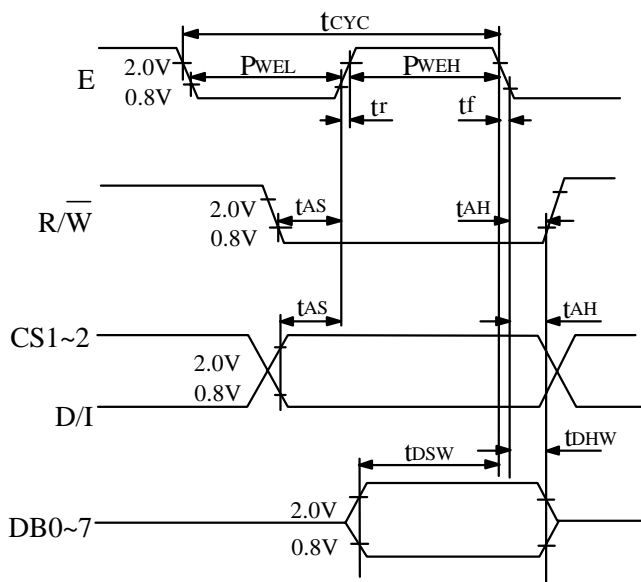


Fig . 1 CPU Write Timing

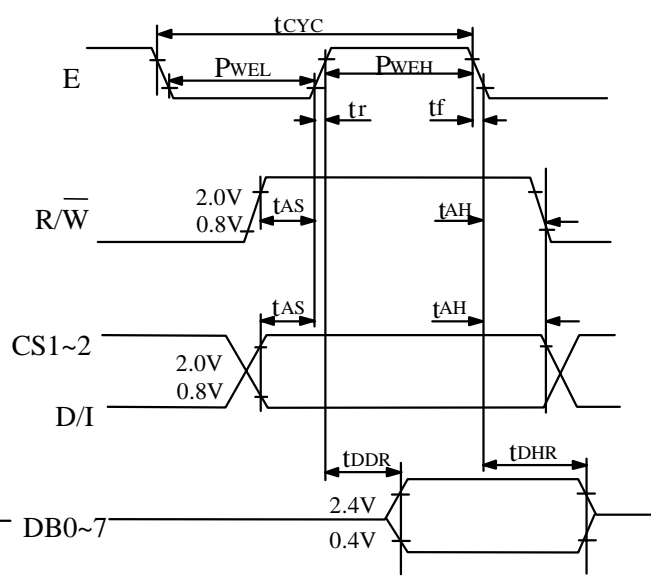


Fig . 1 CPU Read Timing

6. OPTICAL CHARACTERISTICS
 $T_a = 25\text{ }^\circ\text{C}$
 $VDD = 5.0\text{ V}$
 $VDD - V_0 = 9.2\text{V}$

I T E M		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING AREA	STN	$\varnothing 2 - \varnothing 1$	$K \geq 1.4$	30	—	—	deg.	1
	FSTN			40	—	—	deg.	1
CONTRAST RATIO	STN	K	$\varnothing = 10^\circ$ $\theta = 0^\circ$	—	5	—	—	1
	FSTN			—	8	—	—	1
RESPONSE TIME	tr (rise)	$\varnothing = 10^\circ$ $\theta = 0^\circ$	Ta = -20°C	—	650	—	ms	1
			Ta = 25°C	—	120	180		
	tf (fall)		Ta = -20°C	—	2300	—		
			Ta = 25°C	—	240	360		
THE BRIGHTNESS OF BACKLIGHT	B	$\varnothing = 10^\circ$ $\theta = 0^\circ$	10	—	—	cd/m ²	2	
			25	—	—		3	

NOTE (1) : PLEASE REFER TO :

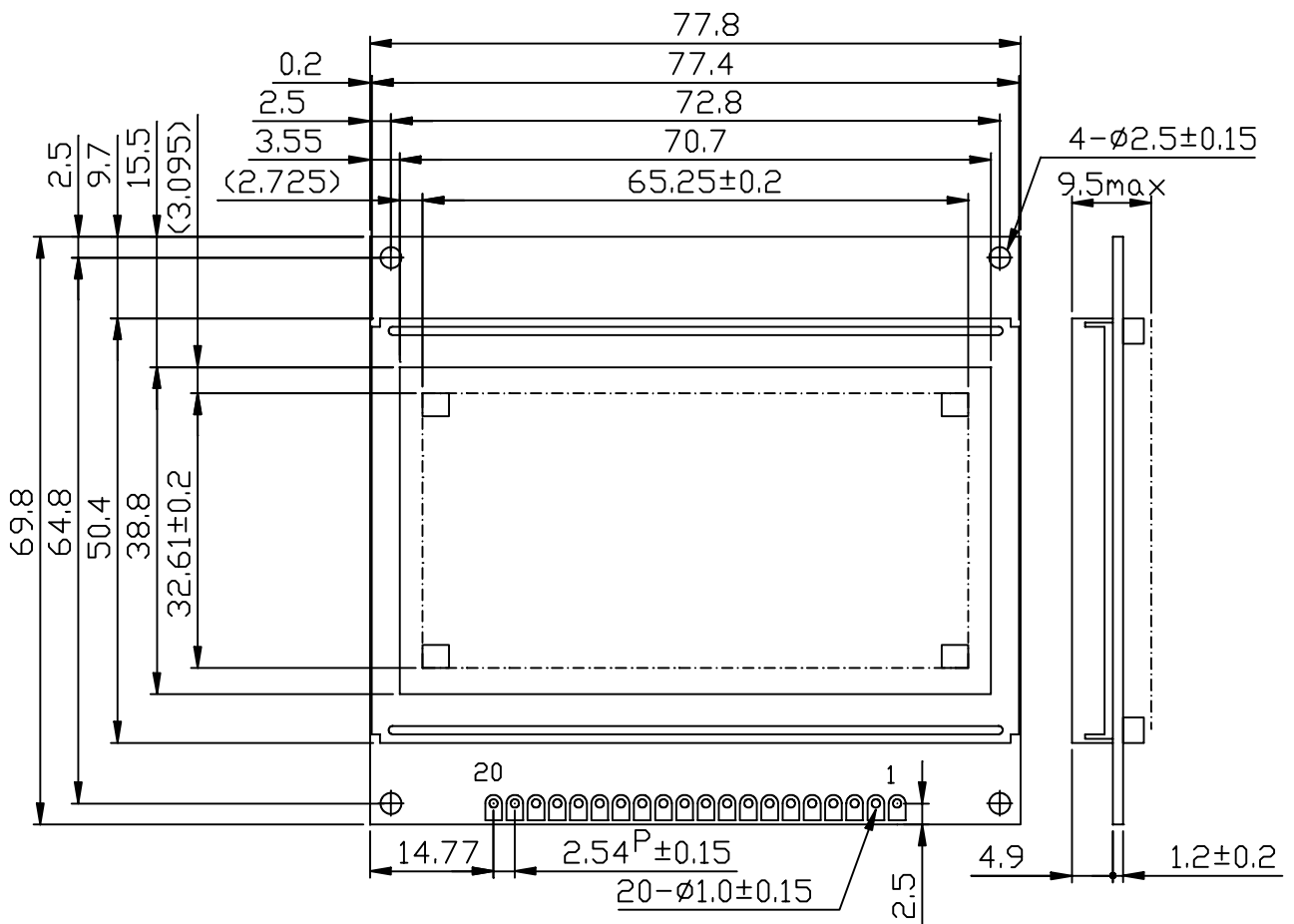
CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS.

EU-002A

NOTE (2) : POLARIZER MODE : TRANSFLECTIVE

NOTE (3) : POLARIZER MODE : TRANSMISSIVE

7. OUTLINE DIMENSION

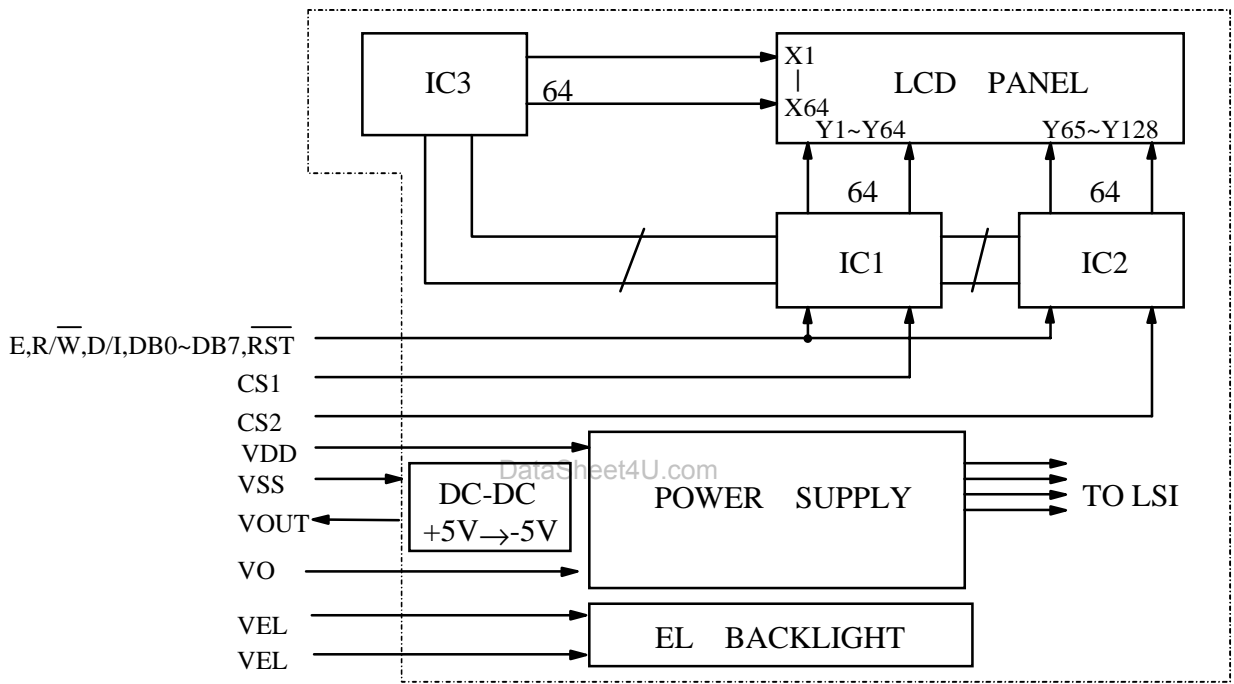


UNIT: mm
SCALE: NTS
NOT SPECIFIED TOLERANCE IS ±0.5mm

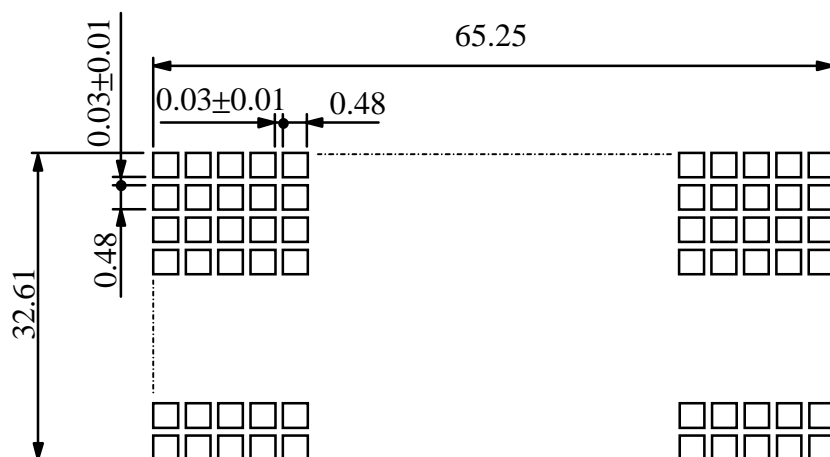
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8. BLOCK DIAGRAM



9. DETAIL DRAWING OF DOT MATRIX



UNIT : mm

SCALE : NTS

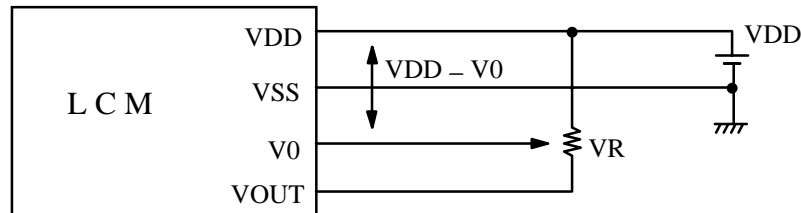
NOT SPECIFIED TOLERANCE IS ± 0.1

10. INTERFACE SIGNALS

PIN NO	SYMBOL	LEVEL	FUNCTION
1	VSS	—	GROUND
2	VDD	—	POWER SUPPLY FOR LOGIC CIRCUIT
3	VO	—	OPERATING VOLTAGE FOR LCD DRIVING
4	D / I	H / L	H : DATA INPUT L : INSTRUCTION CODE INPUT
5	R / \overline{W}	H / L	H : DATA READ (LCD MODULE \rightarrow MPU) L : DATA WRITE (LCD MODULE \leftarrow MPU)
6	E	H,H \rightarrow L	ENABLE SIGNAL
7 14	DB0 DB7	H / L	DATA BUS LINE
15	CS1	H	CHIP SELECTION FOR IC1
16	CS2	H	CHIP SELECTION FOR IC2
17	\overline{RST}	L	RESET
18	VOUT	—	POWER SUPPLY FOR LCD DRIVING
19	NC	—	—
20	NC	—	—
21	VEL	—	POWER SUPPLY FOR EL BACKLIGHT
22	VEL	—	POWER SUPPLY FOR EL BACKLIGHT

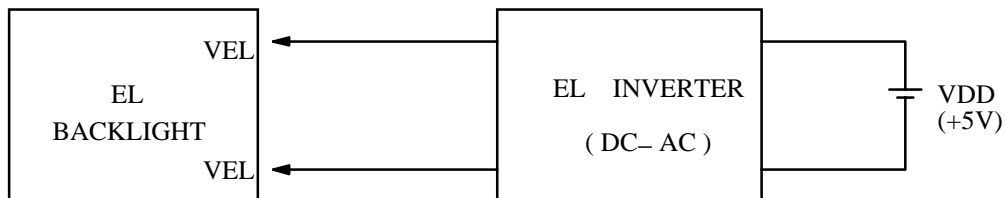
1 1 . POWER SUPPLY

1 1 . 1 POWER SUPPLY FOR LCM



VDD-V0 : LCD DRIVING VOLTAGE
VR : 10K ~ 20K Ω

1 1 . 2 POWER SUPPLY FOR EL BACK - LIGHT



RECOMMENDED INVERTER : SOUN50350

1 1 . 3 TIMING OF POWER SUPPLY AND INTERFACE SIGNAL

