EXAMINED BY : Jason Ma.	EMERGING DISPLAY	FILE NO . CAS-10088
		ISSUE : JUN.19 ,2000
APPROVED BY: David Chang	TECHNOLOGIES CORPORATION	TOTAL PAGE : 9
		VERSION : 3

CUSTOMER ACCEPTANCE SPECIFICATIONS

MODEL NO . :

13B10(EL TYPES)

FOR MESSRS :

_____

CUSTOMER'S APPROVAL

DATE :

_____

BY :

_____

EMERGING DISPLAY TECHNOLOGIES CORPORATION	MODEL NO. 13B10(EL TYPES)	VERSION 3
RECORDS OF REVISION	DOC. FIRST ISSUE APR.10,1998	

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.

EMERGING DISPLAY TECHNOLOGIES CORPORATION	MODEL NO. 13B10(EL TYPES)	VERSION 3

Polarizer Mode	Backlight	Code value
Transflective	EL	E

E	W	13	B	10	G	E	W

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

EMERGING DISPLAY TECHNOLOGIES CORPORATION	MODEL NO. 13B10(EL TYPES)	VERSION 3

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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.

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.

ITEM	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/s² (0.25 G)	—	11.76 m/s² (1.2 G)	10~100 HZ XYZ DIRECTIONS 1 Hr. EACH
SHOCK	—	29.4 m/s² (3 G)	—	490.0 m/s² (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.

4. ELECTRICAL CHARACTERISTICS

Ta = 2 5 °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 –V0 ∅ = 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

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

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	tr	—	—	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

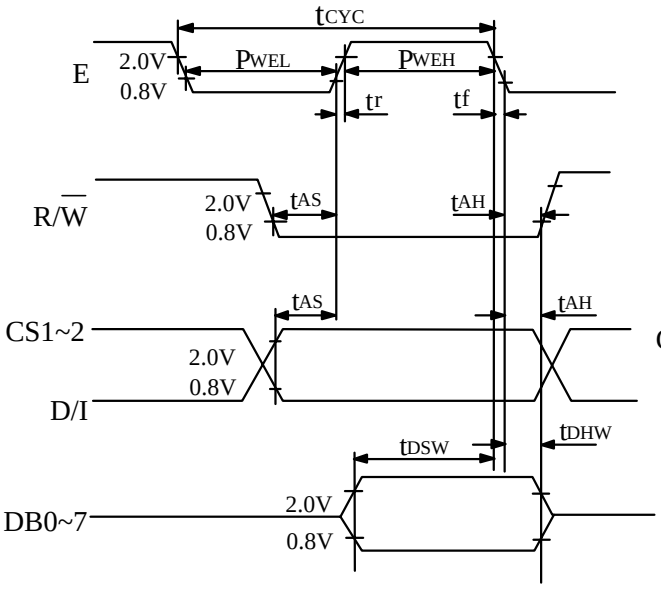


Fig . 1 CPU Write Timing

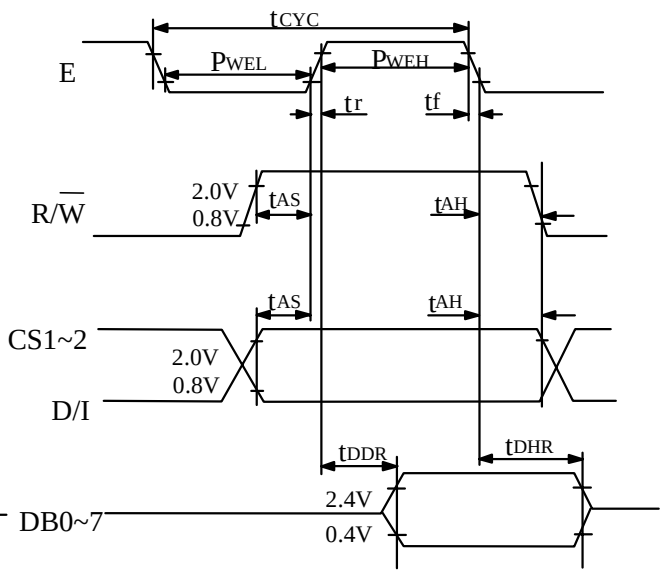


Fig . 1 CPU Read Timing

6. OPTICAL CHARACTERISTICS

Ta = 25 °C VDD = 5.0 V VDD – V0 = 9.2V

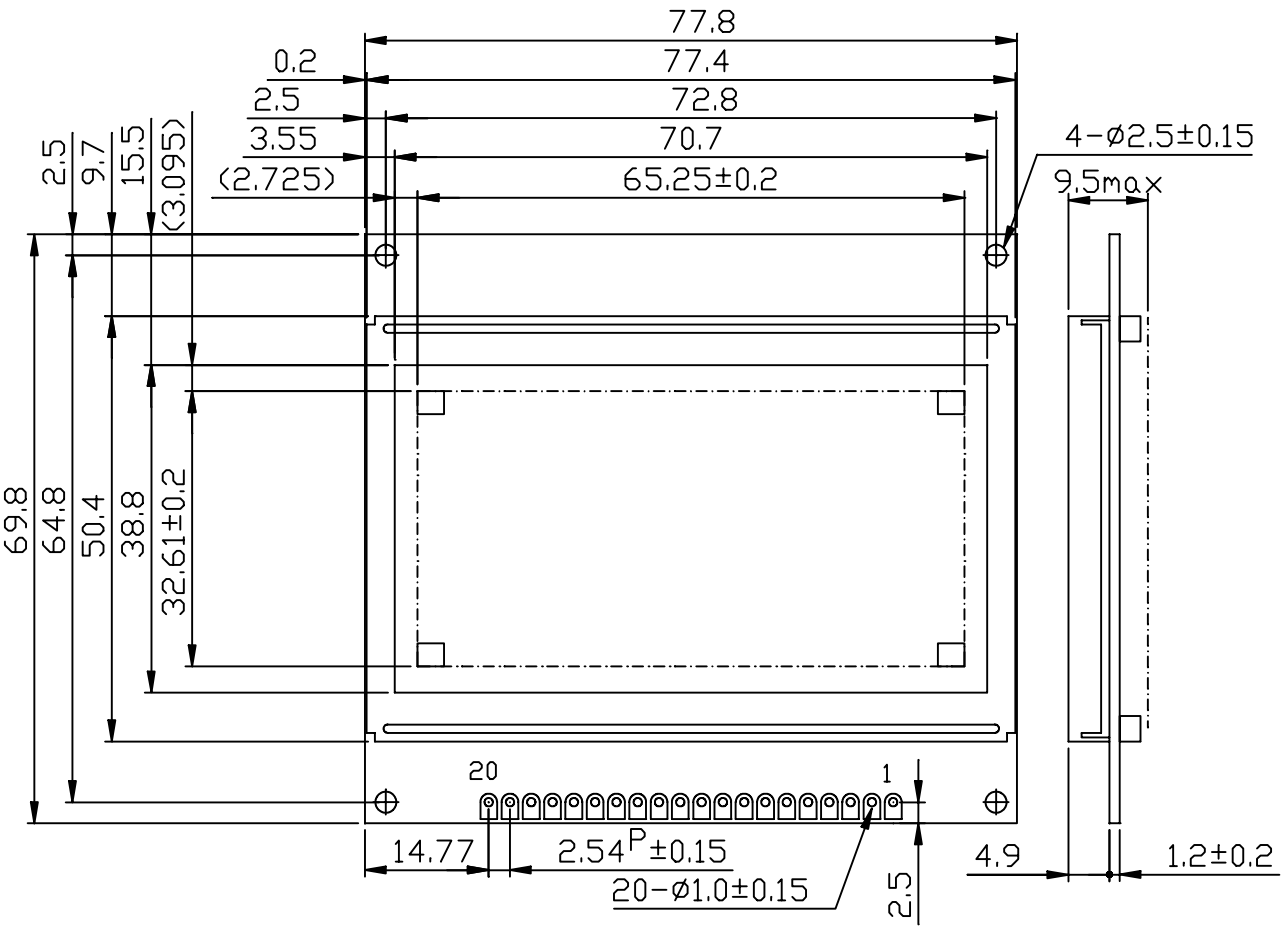
ITEM		SYMBOL	CONDITION		MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING AREA	STN	∅2 - ∅1	K ≥ 1.4		30	—	—	deg.	1
	FSTN				40	—	—	deg.	1
CONTRAST RATIO	STN	K	∅ = 10°		—	5	—	—	1
	FSTN		θ = 0°		—	8	—	—	1
RESPONSE TIME		tr (rise)	∅ =10° θ = 0°	Ta = -20°C	—	650	—	ms	1
				Ta = 25°C	—	120	180		
		tf (fall)		Ta = -20°C	—	2300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

NOTE (1) : PLEASE REFER TO :
CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS.
EU-002A

NOTE (2) : POLARIZER MODE : TRANSFLECTIVE

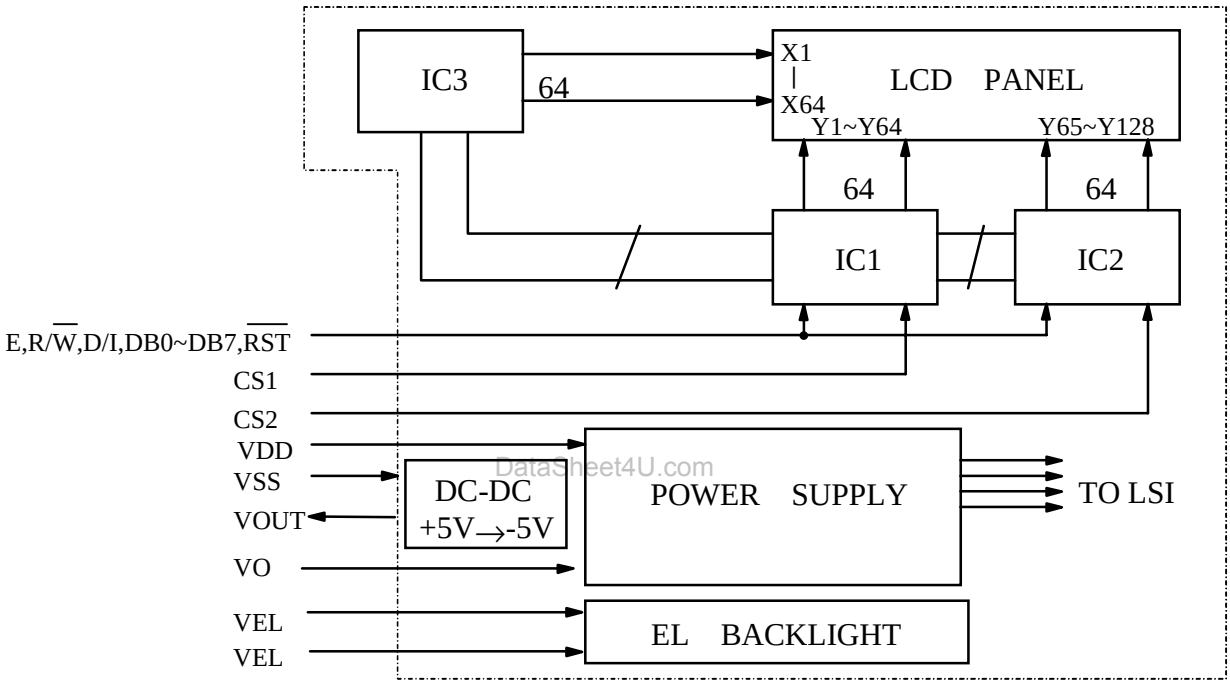
NOTE (3) : POLARIZER MODE : TRANSMISSIVE

7. OUTLINE DIMENSION

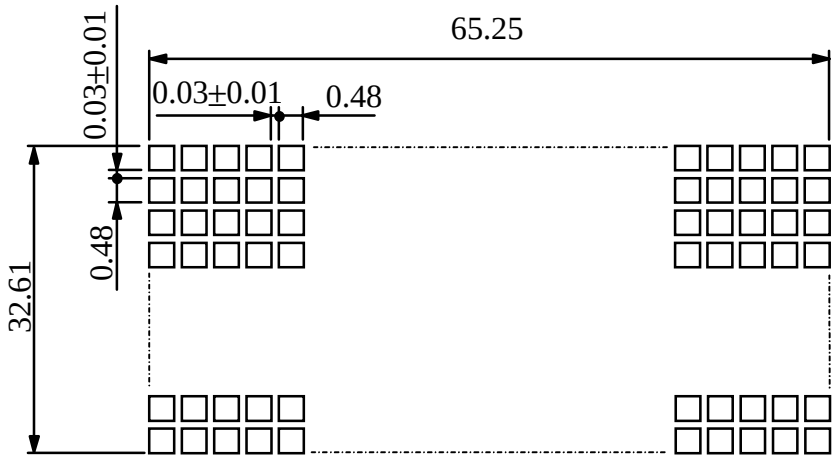


UNIT: mm
SCALE: NTS
NOT SPECIFIED TLERANCE IS ±0.5mm

8. BLOCK DIAGRAM



9. DETAIL DRAWING OF DOT MATRIX



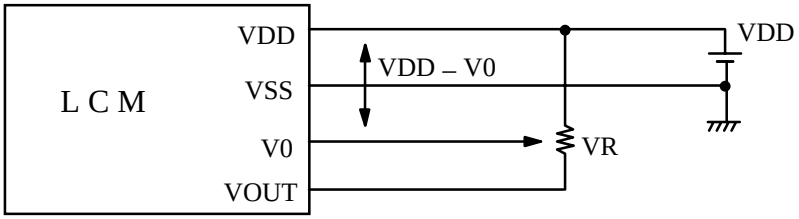
UNIT : mm
SCALE : NTS
NOT SPECIFIED TOLERANCE IS ± 0.1

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 → MPU) L : DATA WRITE (LCD MODULE ← MPU)
6	E	H,H→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

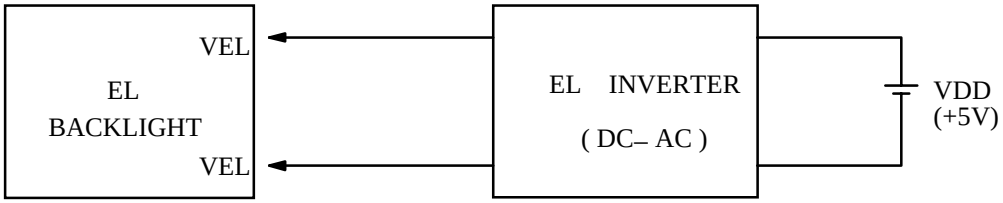
11. POWER SUPPLY

11.1 POWER SUPPLY FOR LCM



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

11.2 POWER SUPPLY FOR EL BACK - LIGHT



RECOMMENDED INVERTER : SOUN50350

11.3 TIMING OF POWER SUPPLY AND INTERFACE SIGNAL