

EXAMINED BY :  <i>Jony Chen</i>	EMERGING DISPLAY  TECHNOLOGIES CORPORATION	FILE NO . CAS-10178
APPROVED BY:  <i>David Chang</i>		ISSUE : NOV.04,1999
		TOTAL PAGE : 7
		VERSION : 2

CUSTOMER                      ACCEPTANCE                      SPECIFICATIONS

MODEL :

24210(LED 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. 24210(LED TYPES)	VERSION 2
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RECORDS OF REVISION	DOC . FIRST ISSUE JUN.17,1999
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DATE	REVISED PAGE NO.	SUMMARY
NOV.04,1999	1~3	THE ENTIRE PAGES REVISED

NUMBERING SYSTEM

Polarizer Mode	Backlight	Code value
Transflective	LED	L
Transmissive	LED	M

Backlight Color	Code Value
Yellow-Green	Y

E W 2 4 2 1 0 G L Y

LCD type + color	Code Value
STN + Yellow-Green	Y
STN + Gray	G
STN + Blue	B

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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 / DRIVER :

PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS :

EU - KS0066

1.3 THIS INDIVIDUAL SPECIFICATIONS IS PRIOR TO GENERAL SPECIFICATIONS .

2. MECHANICAL SPECIFICATIONS

- (1) NUMBER OF CHARACTER ----- 24 CH \* 2 LINES
- (2) MODULE SIZE ----- 118.0W \* 36.0H \* 14.0D (max.) mm
- (3) EFFECTIVE AREA ----- 94.5W \* 17.8H mm
- (4) CHARACTER FONT ----- 5 \* 7 DOTS + CURSOR
- (5) CHARACTER SIZE ----- 3.20W \* 5.55H mm
- (6) CHARACTER PITCH ----- 3.70W \* 5.95H mm
- (7) DOT SIZE ----- 0.60W \* 0.65H mm
- (8) DOT PITCH ----- 0.65W \* 0.70H mm
- (9) LCD TYPE \*
- (10) DRIVING METHOD ----- 1 / 16 DUTY MULTIPLEX DRIVE
- (11) BACK-LIGHT \*

\* PLEASE REFER TO NUMBERING SYSTEM

### 3. ABSOLUTE MAXIMUM RATINGS

#### 3.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS . ( AT Ta = 25 °C )

PARAMETER	SYMBOL	MIN .	MAX .	UNIT	REMARK
POWER SUPPLY FOR LOGIC	VDD – VSS	0	7.0	V	
POWER SUPPLY FOR LCD DRIVE	VDD – VO	0	13.0	V	
INPUT VOLTAGE	VI	VSS	VDD	V	
STATIC ELECTRICITY	—	—	100	V	NOTE (1)
LED POWER DISSIPATION	PD	—	1.5	W	
LED FORWARD CURRENT	IF	—	300	mA	
LED REVERSE VOLTAGE	VR	—	8	V	

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	70 °C	- 30 °C	80 °C	NOTE (2) , (3)
HUMIDITY	—	90 % RH	—	90 % RH	WITHOUT CONDENSATION
VIBRATION	—	4.9 m/s <sup>2</sup> (0.5 G)	—	19.6 m/s <sup>2</sup> (2 G)	
SHOCK	—	29.4 m/s <sup>2</sup> (3 G)	—	490.0 m/s <sup>2</sup> (50 G)	XYZ DIRECTIONS
CORROSIVE GAS	NOT ACCEPTABLE		NOT ACCEPTABLE		

NOTE (2) : Ta AT -30°C : 48HR MAX .  
80°C : 168HR MAX .

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

#### 4. ELECTRICAL CHARACTERISTICS

Ta = 25°C

VDD = 5.0 ± 0.25 V

PARAMETER	SYMBOL	CONDITION	MIN .	TYP .	MAX .	UNIT
H LEVEL INPUT VOLTAGE	VIH	—	2.2	—	—	V
L LEVEL INPUT VOLTAGE	VIL	—	—	—	0.6	V
H LEVEL OUTPUT VOLTAGE	VOH	-IOH = 0.2 mA	2.4	—	—	V
L LEVEL OUTPUT VOLTAGE	VOL	IOL = 1.2 mA	—	—	0.4	V
POWER SUPPLY CURRENT (LOGIC)	IDD	VDD = 5.0 V	—	2.0	5.0	mA
RECOMMENDED LCD DRIVING VOLTAGE	VDD - VO ∅ = 10°, θ = 0° DUTY= 1/16	Ta = -20 °C	—	4.4	—	V
		Ta = 25 °C	—	4.4	—	V
		Ta = 70 °C	—	4.4	—	V
CLOCK OSCILLATION FREQUENCY	FOSC	Ta = 25°C	—	270	—	KHZ
LED FORWARD VOLTAGE	VF	IF = 150 mA	—	4.2	4.6	V
LED FORWARD CURRENT	IF	—	—	150	—	mA
LED REVERSE CURRENT	IR	VR = 8 V	—	—	150	uA

#### 5. OPTICAL CHARACTERISTICS .

Ta = 25 °C

VDD = 5.0 V

ITEM	SYMBOL	CONDITION	MIN .	TYP .	MAX .	UNIT	NOTE	
VIEWING AREA	∅ 2 - ∅ 1	K ≥ 1.4	30	—	—	deg.	1	
CONTRAST RATIO	K	∅ = 10°, θ = 0°	5	—	—	—	1	
RESPONSE TIME	tr ( rise )	∅ = 10° θ = 0°	Ta = -20°C	—	5538	—	ms	1
			Ta = 25°C	—	228	—		
			Ta = 70°C	—	104	—		
	tf ( fall )		Ta = -20°C	—	2316	—		
			Ta = 25°C	—	174	—		
			Ta = 70°C	—	85	—		
THE BRIGHTNESS OF BACK-LIGHT	L	VDD = 5.0 V	—	12	—	cd/m <sup>2</sup>	1, 2	
			—	36	—		1, 3	
PEAK EMISSION WAVELENGTH	λ P	VDD = 5.0 V	—	572	—	nm	1	

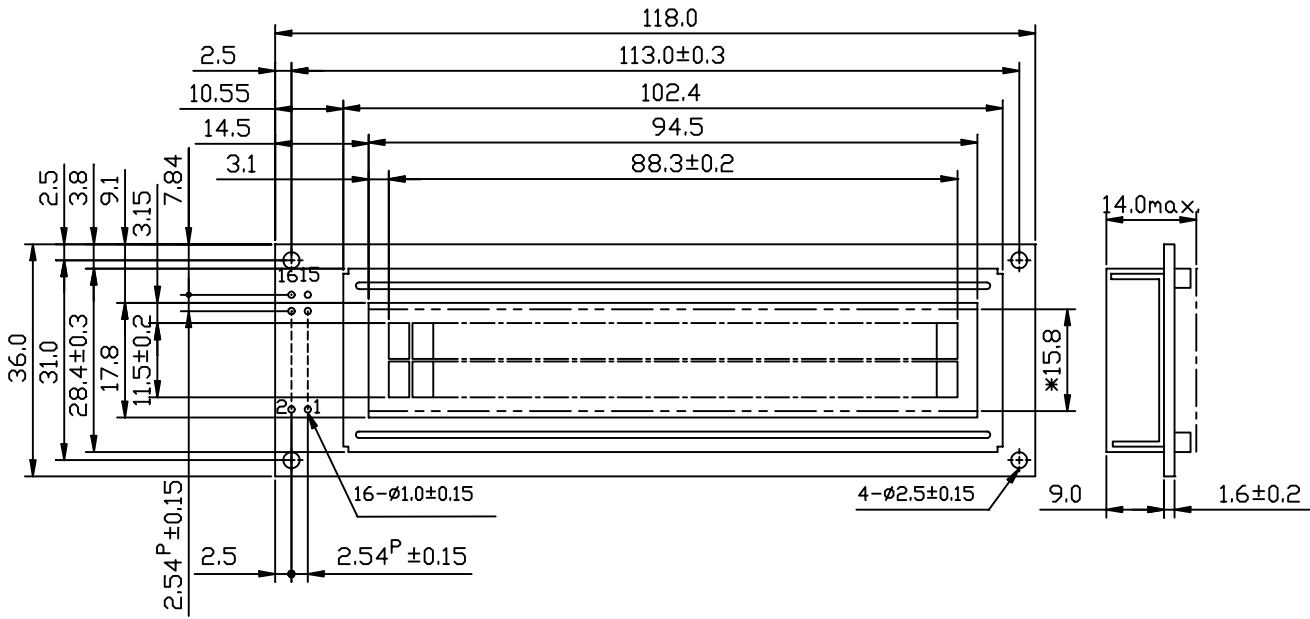
NOTE (1) : PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATION : EU-002A

NOTE (2) : POLARIZER MODE : TRANSLLECTIVE

NOTE (3) : POLARIZER MODE : TRANSMISSIVE

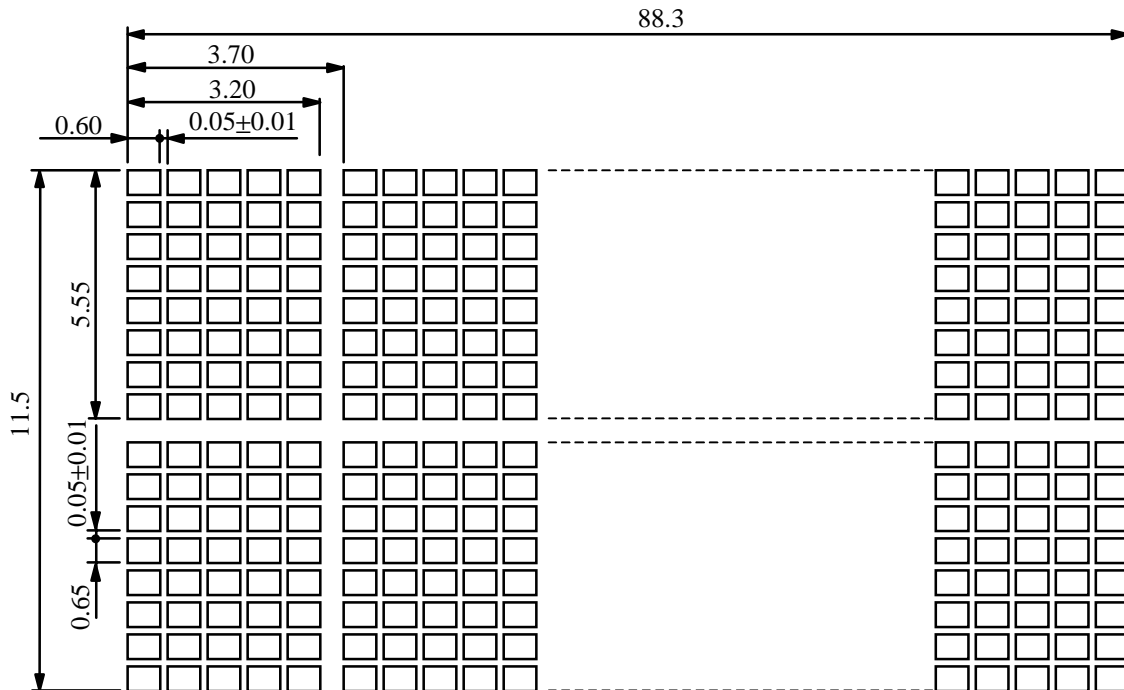
6. OUTLINE DIMENSION



\*LIGHTING AREA WHEN LED B/L IS ON  
UNIT : mm  
SCALE : NTS  
NOT SPECIFIED TOLERANCE IS ± 0.5

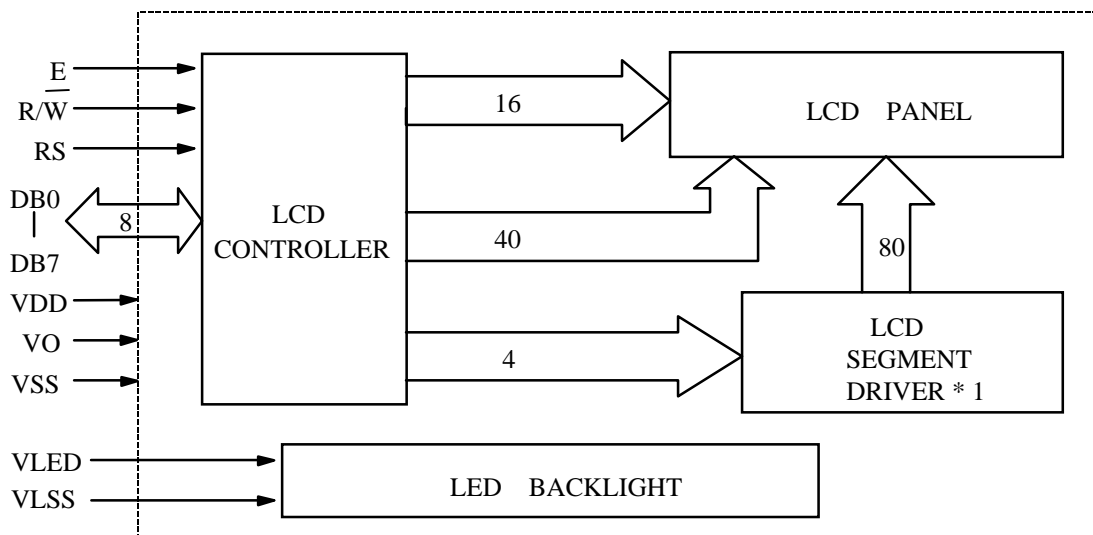


7. DETAIL DRAWING OF DOT MATRIX



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

8. BLOCK DIAGRAM

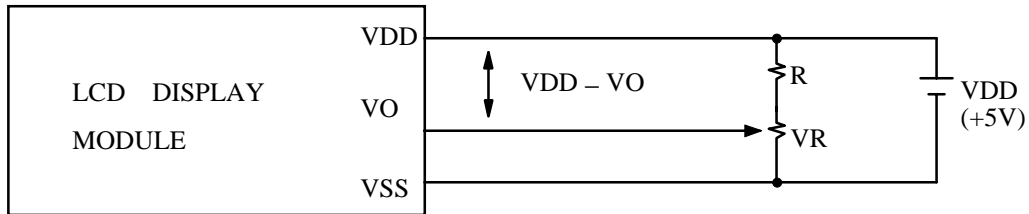


9. INTERFACE SIGNALS

PIN NO.	SYMBOL	DESCRIPTION	FUNCTION
1	VSS	GROUND	0V (GND)
2	VDD	POWER SUPPLY FOR LOGIC CIRCUIT	+5V
3	VO	LCD CONTRAST ADJUSTMENT	
4	RS	INSTRUCTION/DATA REGISTER SELECTION	RS = 0 : INSTRUCTION REGISTER RS = 1: DATA REGISTER
5	$\overline{R/W}$	READ/WRITE SELECTION	$\overline{R/W}$ = 0 : REGISTER WRITE $\overline{R/W}$ = 1 : REGISTER READ
6	E	ENABLE INPUT	
7   14	DB0   DB7	DATA INPUT/OUTPUT LINES	4 BIT/ 8 BIT SELECTABLE 4 BIT:DB4-DB7 8 BIT:DB0-DB7
15	VLED	POWER SUPPLY FOR LED BACKLIGHT ( ANODE )	
16	VLSS	POWER SUPPLY FOR LED BACKLIGHT ( CATHODE )	0V (GND)

## 10. POWER SUPPLY

### 10.1 POWER SUPPLY FOR LCD MODULE

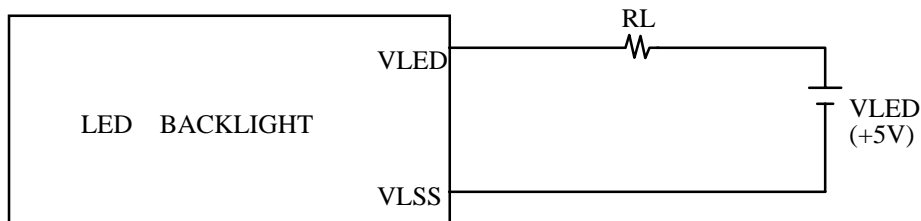


VDD - VO : LCD DRIVING VOLTAGE

VR : 10K $\Omega$  ~ 20K $\Omega$

RECOMMENDED RESISTOR R : VDD - VO  $\geq$  1.5 V

### 10.2 POWER SUPPLY FOR LED BACK-LIGHT



RECOMMENDED RESISTOR RL : 5 . 3 $\Omega$ , 1 / 4 WATT( CONTROLLED BY USER )

\* THE BRIGHTNESS WOULD BE ALTERED SUBJECT TO DIFFERENT VALUES OF RL

## 11. DISPLAY DATA RAM ADDRESS

CHARACTER	1	2	3	4	5	6	7	8	9	10	11	12
LINE 1	80	81	82	83	84	85	86	87	88	89	8A	8B
LINE 2	C0	C1	C2	C3	C4	C5	C6	C7	C8	C9	CA	CB
CHARACTER	13	14	15	16	17	18	19	20	21	22	23	24
LINE 1	8C	8D	8E	8F	90	91	92	93	94	95	96	97
LINE 2	CC	CD	CE	CF	D0	D1	D2	D3	D4	D5	D6	D7