

EXAMINED BY :  <i>Kevin Kuo</i>	EMERGING DISPLAY  TECHNOLOGIES CORPORATION	FILE NO . CAS-10422
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		TOTAL PAGE : 7
		VERSION : 1

CUSTOMER                      ACCEPTANCE                      SPECIFICATIONS

MODEL :

24210(LED TYPES)  
(RoHS)

FOR MESSRS :

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CUSTOMER'S APPROVAL

DATE : \_\_\_\_\_

BY : \_\_\_\_\_

EMERGING DISPLAY  
TECHNOLOGIES CORPORATION

MODEL NO.	VERSION	PAGE
24210(LED TYPES) (RoHS)	1	0-1

RECORDS OF REVISION	DOC . FIRST ISSUE	SEP.06,2005
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DATE	REVISED PAGE NO.	SUMMARY

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 + LCD 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 :

E U - 0 0 2 B

1.2 APPLICATION NOTES FOR CONTROLLER / DRIVER :  
PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS :

E U - K S 0 0 6 6

1.3 THIS INDIVIDUAL SPECIFICATIONS IS PRIOR TO GENERAL  
SPECIFICATIONS.

1.4 MATERIAL SAFETY DESCRIPTION  
ASSEMBLIES SHALL COMPLY WITH EUROPEAN ROHS REQUIREMENTS,  
INCLUDING PROHIBITED MATERIALS/COMPONENTS CONTAINING  
LEAD, MERCURY, CADMIUM, HEXAVALENT CHROMIUM,  
POLYBROMINATED BIPHENYLS (PBB) AND POLYBROMINATED  
DIPHENYL ETHERS (PBDE)

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.

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 (1) , (3)
HUMIDITY	NOTE (2)		NOTE (2)		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 (1) : BACKGROUND COLOR CHANGES SLIGHTLY DEPENDING ON AMBIENT  
TEMPERATURE THIS PHENOMENON IS REVERSIBLE .

NOTE (2) : Ta ≤ 60°C : 90%RH (96HR MAX.)  
Ta > 60°C : ABSOLUTE HUMIDITY MUST BE  
LOWER THAN THE HUMIDITY OF 90%RH AT 60°C (96HR MAX.)

NOTE (3) : Ta AT -30°C : WILL BE < 48hrs  
80°C : WILL BE < 168hrs

4. ELECTRICAL CHARACTERISTICS

Ta = 25°C VDD = 5.0 ± 0.25 V

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
POWER SUPPLY VOLTAGE FOR LOGIC	VDD	—	4.75	5.0	5.25	V
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 θx= 0°, θy=10° DUTY= 1/16	Ta = -20 °C	3.9	4.4	4.9	V
		Ta = 25 °C	3.9	4.4	4.9	V
		Ta = 70 °C	3.9	4.4	4.9	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 ± 0.25 V

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE	
VIEWING ANGLE	θy+	K*	θx=0°	(48)	(53)	—	deg.	1
	θy-			(55)	(60)	—		
	θx+	K*	θy=0°	(36)	(41)	—	deg.	1
	θx-			(34)	(59)	—		
CONTRAST RATIO	K	θx = 0°, θy = 10°	2.2	2.9	—	—	1	
RESPONSE TIME	tr ( rise )	θx = 0° θy = 10°	Ta = -20°C	—	5538	7199	ms	1
			Ta = 25°C	—	228	296		
			Ta = 70°C	—	104	135		
	tf ( fall )		Ta = -20°C	—	2316	3011		
			Ta = 25°C	—	174	226		
			Ta = 70°C	—	85	111		
THE BRIGHTNESS OF BACK-LIGHT	L	VDD = 5.0 V	15	25	—	cd/m <sup>2</sup>	1, 2	
			22.5	37.5	—		1, 3	
PEAK EMISSION WAVELENGTH	λP	VDD = 5.0 V	570	572	575	nm	1	

K\* : STN : K ≥ 1.5

FSTN : K ≥ 2.0

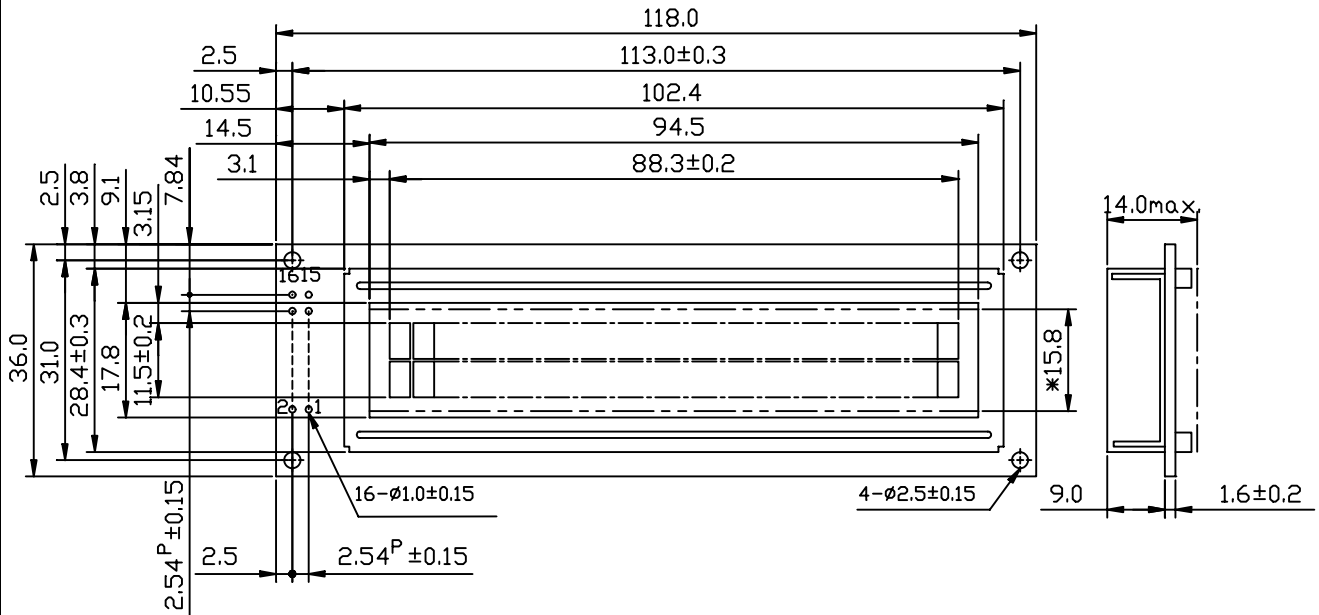
NOTE (1) : PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATION : EU-002B

NOTE (2) : POLARIZER MODE : TRANSFLECTIVE

NOTE (3) : POLARIZER MODE : TRANSMISSIVE

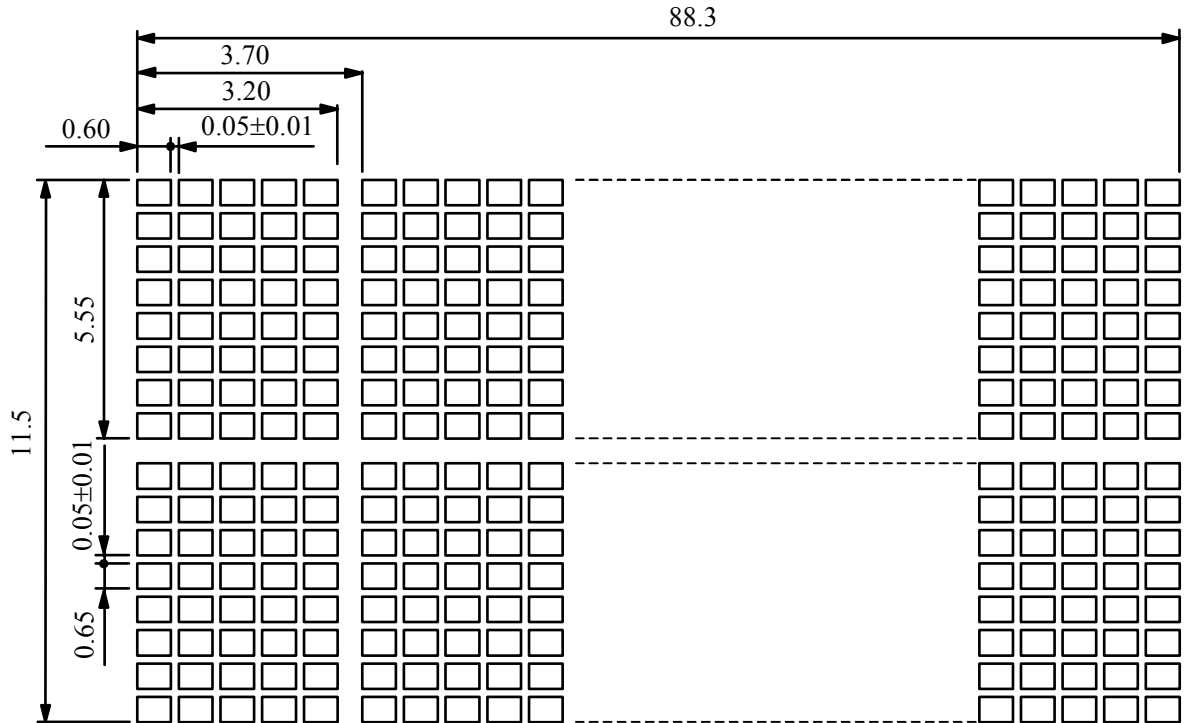
6. OUTLINE DIMENSION



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

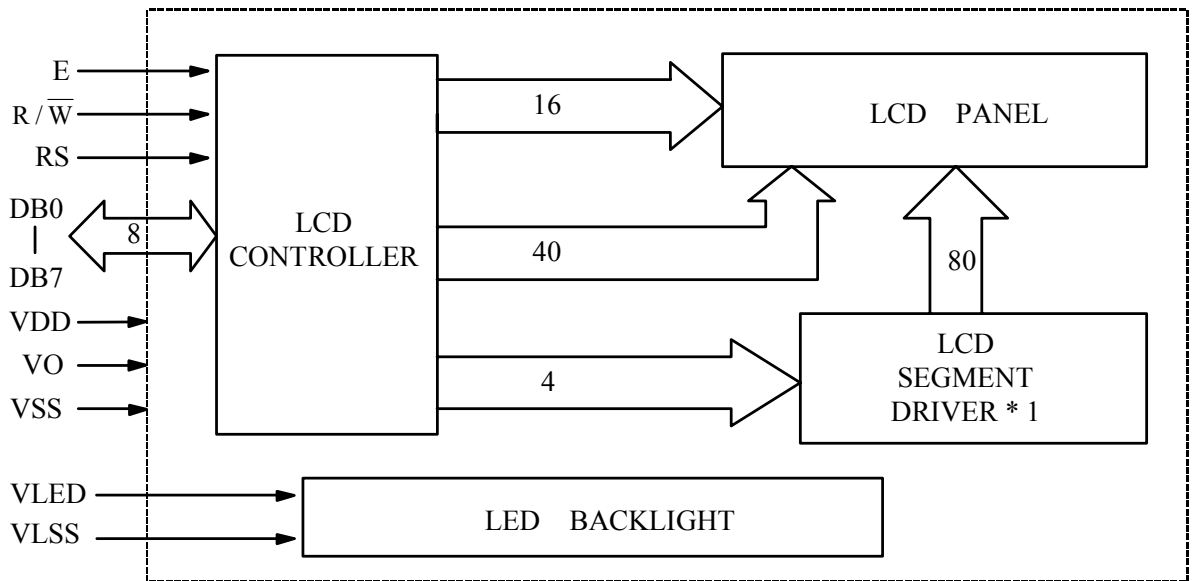


7. DETAIL DRAWING OF DOT MATRIX



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

8. BLOCK DIAGRAM

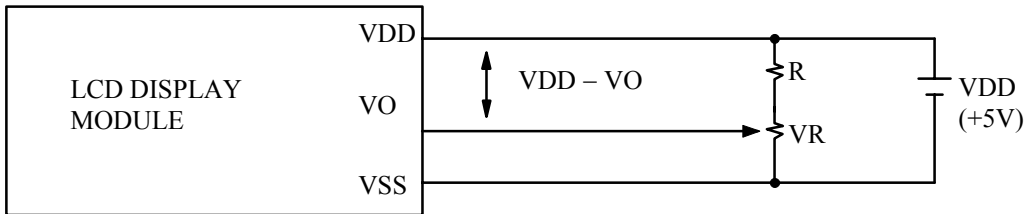


9. INTERFACE SIGNALS

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	R/ $\bar{W}$	READ/WRITE SELECTION	R/ $\bar{W}$ = 0 : REGISTER WRITE R/ $\bar{W}$ = 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

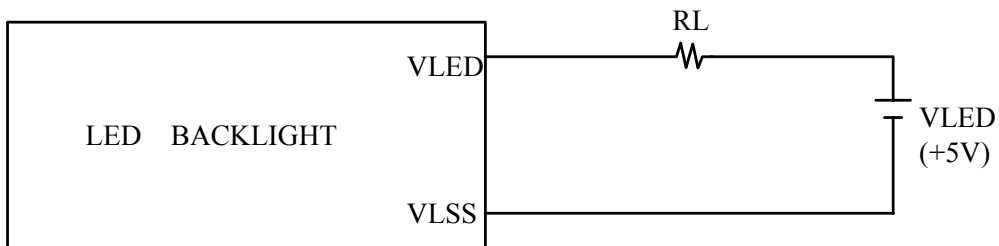


VDD - VO : LCD DRIVING VOLTAGE

VR : 10KΩ ~ 20KΩ

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

### 10.2 POWER SUPPLY FOR LED BACK-LIGHT



RECOMMENDED RESISTOR RL : 5.3Ω, 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