

EXAMINED BY :  <i>Yung Chang Hu</i>	EMERGING DISPLAY  TECHNOLOGIES CORPORATION	FILE NO . CAS-10438
APPROVED BY:  <i>Eric Lee</i>		ISSUE : OCT.13,2005
		TOTAL PAGE : 7
		VERSION : 1

CUSTOMER                      ACCEPTANCE                      SPECIFICATIONS

MODEL NO. :  
  
20400 (LED TYPES)  
(RoHS)  
FOR MESSRS :  
  
\_\_\_\_\_

CUSTOMER'S APPROVAL

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

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

EMERGING DISPLAY  
TECHNOLOGIES CORPORATION

MODEL NO.	VERSION	PAGE
20400 (LED TYPES)(RoHS)	1	0-1

RECORDS OF REVISION	DOC . FIRST ISSUE	OCT.13,2005
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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
RED	R

E	W	2	0	4	0	0	G	L	Y
---	---	---	---	---	---	---	---	---	---

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

MODEL NO.	VERSION	PAGE
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1. GENERAL SPECIFICATIONS

1.1 GENERAL SPECIFICATIONS  
PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS :

EU - 002B

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 .

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 | ----- | 20 CH * 4 LINES                 |
| (2) MODULE SIZE         | ----- | 98.0W * 60.0H * 14.0D (max.) mm |
| (3) EFFECTIVE AREA      | ----- | 76.0W * 25.2H mm                |
| (4) CHARACTER FONT      | ----- | 5 * 7 DOTS + CURSOR             |
| (5) CHARACTER SIZE      | ----- | 2.95W * 4.75H mm                |
| (6) CHARACTER PITCH     | ----- | 3.55W * 5.35H mm                |
| (7) DOT SIZE            | ----- | 0.55W * 0.55H mm                |
| (8) DOT PITCH           | ----- | 0.60W * 0.60H 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	—	2.7	W	
			2.1		
LED FORWARD CURRENT	IF	—	600	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 MAX (96 HRS MAX)

Ta > 60°C : ABSOLUTE HUMIDITY MUST BE LOWER THAN THE  
HUMIDITY OF 90% RH AT 60°C (96 HRS 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 = 5.0V	—	2.0	5.0	mA	
RECOMMENDED LCD DRIVING VOLTAGE	VDD - VO θy=10°,θx = 0° 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	Y-G RED	IF = 240 mA	—	4.2	4.6	V
				—	3.4	3.6	
LED FORWARD CURRENT	IF	—	—	240	—	mA	
LED REVERSE CURRENT	IR	VR = 8 V	—	—	0.2	mA	

5. OPTICAL CHARACTERISTICS .

Ta = 25 °C

VDD = 5.0±0.25V

I T E M	SYMBOL	CONDITION	MIN .	TYP .	MAX .	UNIT	NOTE					
VIEWING ANGLE	θy+	K*	θx = 0°	(60)	(65)	—	deg.	1				
	θy-			(50)	(55)	—	deg.	1				
	θx+		θy= 0°	(35)	(40)	—	deg.	1				
	θx-			(40)	(45)	—	deg.	1				
CONTRAST RATIO	K	STN FSTN	θx = 0° , θy= 10°	1.8	3.2	—	—	1				
				2.9	4.9	—	—	1				
RESPONSE TIME	tr ( rise )	θy= 10° θx = 0°	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 MODULE	L	IF = 240 mA	Y-G	20.9	26.5	36.0	cd/m <sup>2</sup>	1, 2				
				31.4	39.8	54		1, 3				
			RED	26	32.5	—		1, 2				
				39	48.8	—		1, 3				
			PEAK EMISSION WAVELENGTH	λP	IF = 240 mA	Y-G		569	572	575	nm	1
						RED		657	660	663		

K\* : STN : K≥1.5 , FSTN : K≥2.0

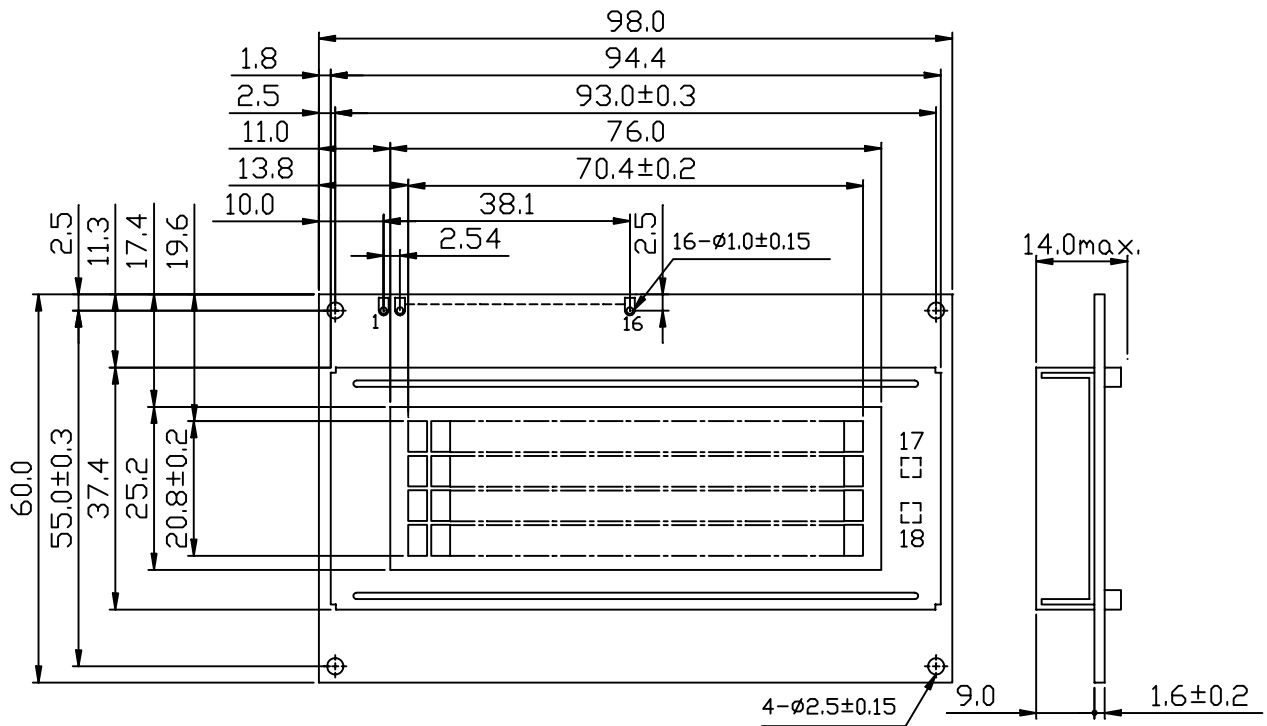
NOTE (1) : PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATION : EU-002B

NOTE (2) : POLARIZER MODE : TRANSFLECTIVE

NOTE (3) : POLARIZER MODE : TRANSMISSIVE

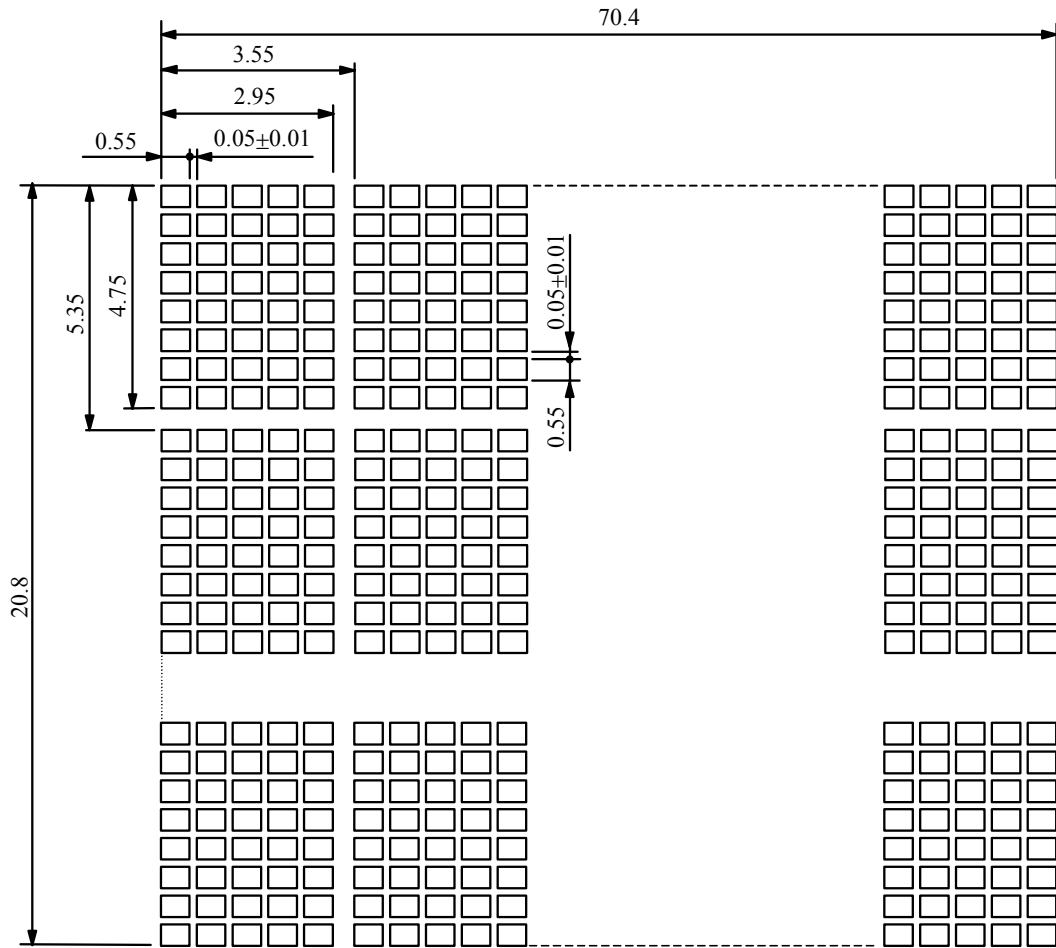
6. OUTLINE DIMENSIONS



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

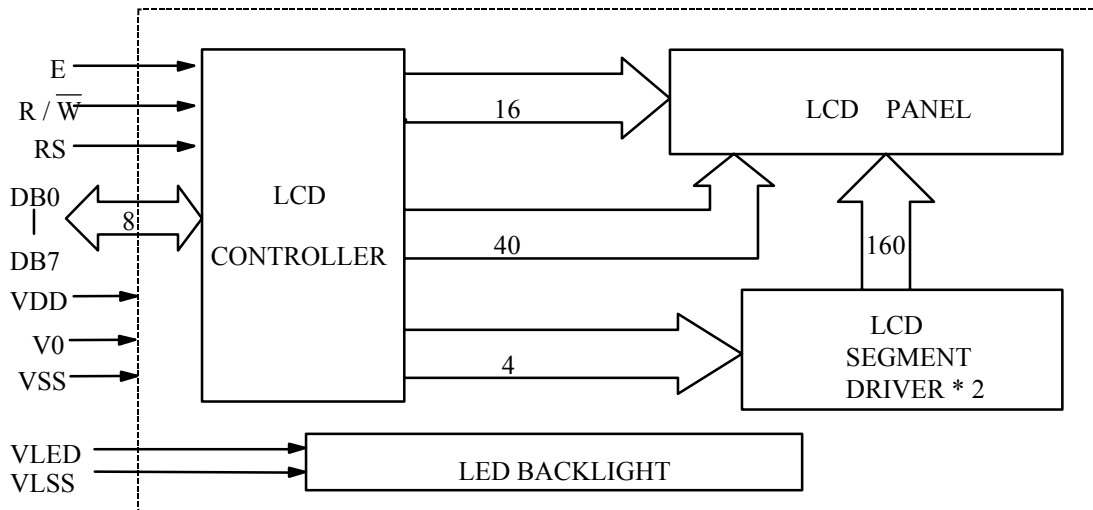


7. DETAIL DRAWING OF DOT MATRIX



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

8. BLOCK DIAGRAM

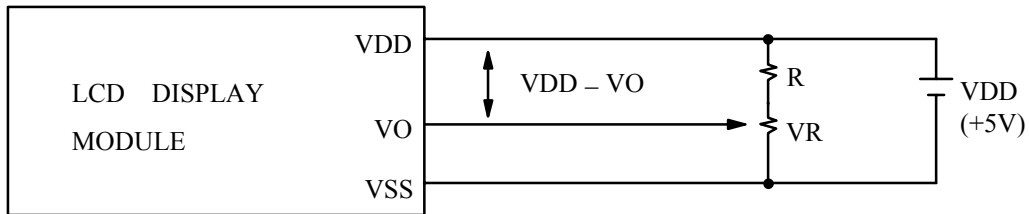


9. INTERFACE SIGNALS

PIN NO.	SYMBOL	DESCRIPTION	FUNCTION
1	VSS	GROUND	0V (GND)
2	VDD	POWER SUPPLY FOR LOGIC CIRCUIT	+5V
3	V0	LCD CONTRAST FOR LOGIC CIRCUIT	
4	RS	INSTRUCTION/DATA REGISTER SELECTION	RS = 0 : INSTRUCTION REGISTER RS = 1 : DATA REGISTER
5	R / $\overline{W}$	READ/WRITE SELECTION	R / $\overline{W}$ = 0 : REGISTER WRITE R / $\overline{W}$ = 1 : REGISTER READ
6	E	ENABLE INPUT	
7	DB0	DATA INPUT/OUTPUT LINES	4 BIT/8BIT SELECTABLE 4 BIT : DB4 - DB7 8 BIT : DB0 - DB7
8	DB1		
9	DB2		
10	DB3		
11	DB4		
12	DB5		
13	DB6		
14	DB7		
15	VLED	POWER SUPPLY FOR LED BACKLIGHT (ANODE)	
16	VLSS	POWER SUPPLY FOR LED BACKLIGHT (CATHODE)	0V (GND)
17	VLED	POWER SUPPLY FOR LED BACKLIGHT (ANODE)	
18	VLSS	POWER SUPPLY FOR LED BACKLIGHT (CATHODE)	0V (GND)

## 10. POWER SUPPLY

### 10.1 POWER SUPPLY FOR LCD MODULE

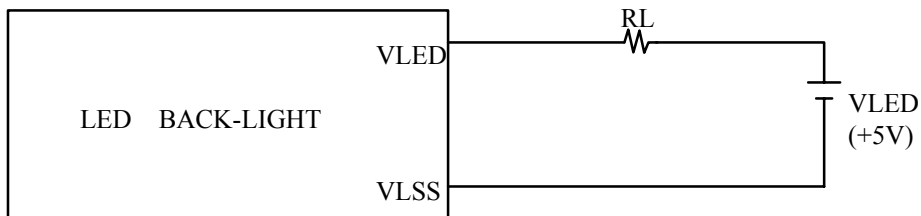


VDD - VO : LCD DRIVING VOLTAGE

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

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

### 10.2 POWER SUPPLY FOR LED BACKLIGHT



RECOMMENDED RESISTOR RL : 3~6.8 $\Omega$ , 1/2 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	13	14	15	16	17	18	19	20
LINE 1	80	81	82	83	84	85	86	87	88	89	8A	8B	8C	8D	8E	8F	90	91	92	93
LINE 2	C0	C1	C2	C3	C4	C5	C6	C7	C8	C9	CA	CB	CC	CD	CE	CF	D0	D1	D2	D3
LINE 3	94	95	96	97	98	99	8A	9B	9C	9D	9E	9F	A0	A1	A2	A3	A4	A5	A6	A7
LINE 4	D4	D5	D6	D7	D8	D9	DA	DB	DC	DD	DE	DF	E0	E1	E2	E3	E4	E5	E6	E7