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APPROVED BY: <i>[Signature]</i>		ISSUE : SEP.25,2004
		TOTAL PAGE : 7
		VERSION : 2

CUSTOMER ACCEPTANCE SPECIFICATIONS

MODEL NO. :

20220(LED TYPES)

FOR MESSRS :

CUSTOMER'S APPROVAL

DATE :

BY :

RECORDS OF REVISION	DOC . FIRST ISSUE	JUL.16,2004
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DATE	REVISED PAGE NO.	SUMMARY																																																																
SEP.25,2004	3	<p>5. OPTICAL CHARACTERISTICS</p> <table border="1"> <thead> <tr> <th>I T E M</th> <th>SYMBOL</th> <th>CONDITION</th> <th>MIN.</th> <th>TYP.</th> <th>MAX.</th> <th>UNIT</th> <th>NOTE</th> </tr> </thead> <tbody> <tr> <td rowspan="2">THE BRIGHTNESS OF MODULE</td> <td rowspan="2">L</td> <td rowspan="2">IF = 210 mA</td> <td rowspan="2">Y-G</td> <td>20</td> <td>25</td> <td>—</td> <td rowspan="2">cd/m²</td> </tr> <tr> <td>30</td> <td>37.5</td> <td>—</td> <td>1,2 1,3</td> </tr> <tr> <td rowspan="2">PEAK EMISSION WAVELENGTH</td> <td rowspan="2">λ P</td> <td rowspan="2">IF = 210 mA</td> <td rowspan="2">Y-G</td> <td>—</td> <td>570</td> <td>—</td> <td rowspan="2">nm</td> </tr> <tr> <td>—</td> <td>660</td> <td>—</td> <td>1</td> </tr> </tbody> </table> <p style="text-align: center;">↓</p> <table border="1"> <thead> <tr> <th>I T E M</th> <th>SYMBOL</th> <th>CONDITION</th> <th>MIN.</th> <th>TYP.</th> <th>MAX.</th> <th>UNIT</th> <th>NOTE</th> </tr> </thead> <tbody> <tr> <td rowspan="2">THE BRIGHTNESS OF MODULE</td> <td rowspan="2">L</td> <td rowspan="2">IF = 210 mA</td> <td rowspan="2">Y-G</td> <td>11</td> <td>23</td> <td>—</td> <td rowspan="2">cd/m²</td> </tr> <tr> <td>16.5</td> <td>34.5</td> <td>—</td> <td>1,2 1,3</td> </tr> <tr> <td rowspan="2">PEAK EMISSION WAVELENGTH</td> <td rowspan="2">λ P</td> <td rowspan="2">IF = 210 mA</td> <td rowspan="2">Y-G</td> <td>569</td> <td>572</td> <td>575</td> <td rowspan="2">nm</td> </tr> <tr> <td>—</td> <td>660</td> <td>—</td> <td>1</td> </tr> </tbody> </table>	I T E M	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE	THE BRIGHTNESS OF MODULE	L	IF = 210 mA	Y-G	20	25	—	cd/m ²	30	37.5	—	1,2 1,3	PEAK EMISSION WAVELENGTH	λ P	IF = 210 mA	Y-G	—	570	—	nm	—	660	—	1	I T E M	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE	THE BRIGHTNESS OF MODULE	L	IF = 210 mA	Y-G	11	23	—	cd/m ²	16.5	34.5	—	1,2 1,3	PEAK EMISSION WAVELENGTH	λ P	IF = 210 mA	Y-G	569	572	575	nm	—	660	—	1
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NUMBERING SYSTEM

Polarizer Mode	Backlight	Code value
Transflective	LED	L
Transmissive	LED	M

Backlight Color	Code Value
Yellow-Green	Y
RED	R

E	W	20	2	20	G	L	Y
---	---	----	---	----	---	---	---

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

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1. GENERAL SPECIFICATIONS

1.1 GENERAL SPECIFICATIONS

PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS :

E U - 0 0 2 A

1.2 APPLICATION NOTES FOR CONTROLLER / DRIVER :

PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS :

E U - K S 0 0 6 6 U

1.3 THIS INDIVIDUAL SPECIFICATIONS IS PRIOR TO GENERAL SPECIFICATIONS .

2. MECHANICAL SPECIFICATIONS

- (1) NUMBER OF CHARACTER ----- 20 CH * 2 LINES
- (2) MODULE SIZE ----- 116.0W * 37.0H * 16.0D (max.) mm
- (3) EFFECTIVE AREA ----- 83.0W * 18.6H 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	—	2.4	W	
			2.1		
LED FORWARD CURRENT	IF	—	525	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 ² (0.5 G)	—	19.6 m/s ² (2 G)	
SHOCK	—	29.4 m/s ² (3 G)	—	490.0 m/s ² (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	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 = 210 mA	Y-G	—	4.2	4.6	V
			RED	—	3.6	4.0	
LED FORWARD CURRENT	IF	—	—	210	—	mA	
LED REVERSE CURRENT	IR	VR = 8 V	—	—	0.2	mA	

5. OPTICAL CHARACTERISTICS

Ta = 25 °C

VDD = 5.0 V

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE	
VIEWING ANGLE	∅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	—	4500	9000	ms	1
			Ta = 25°C	—	180	360		
			Ta = 70°C	—	100	200		
	tf (fall)		Ta = -20°C	—	2000	4000		
			Ta = 25°C	—	140	280		
			Ta = 70°C	—	80	160		
THE BRIGHTNESS OF MODULE	L	IF = 210 mA	Y-G	11	23	—	cd/m ²	1,2
				16.5	34.5	—		1,3
			RED	22	28	—		1,2
				33	42	—		1,3
PEAK EMISSION WAVELENGTH	λ P	IF = 210 mA	Y-G	569	572	575	nm	1
			RED	—	660	—		

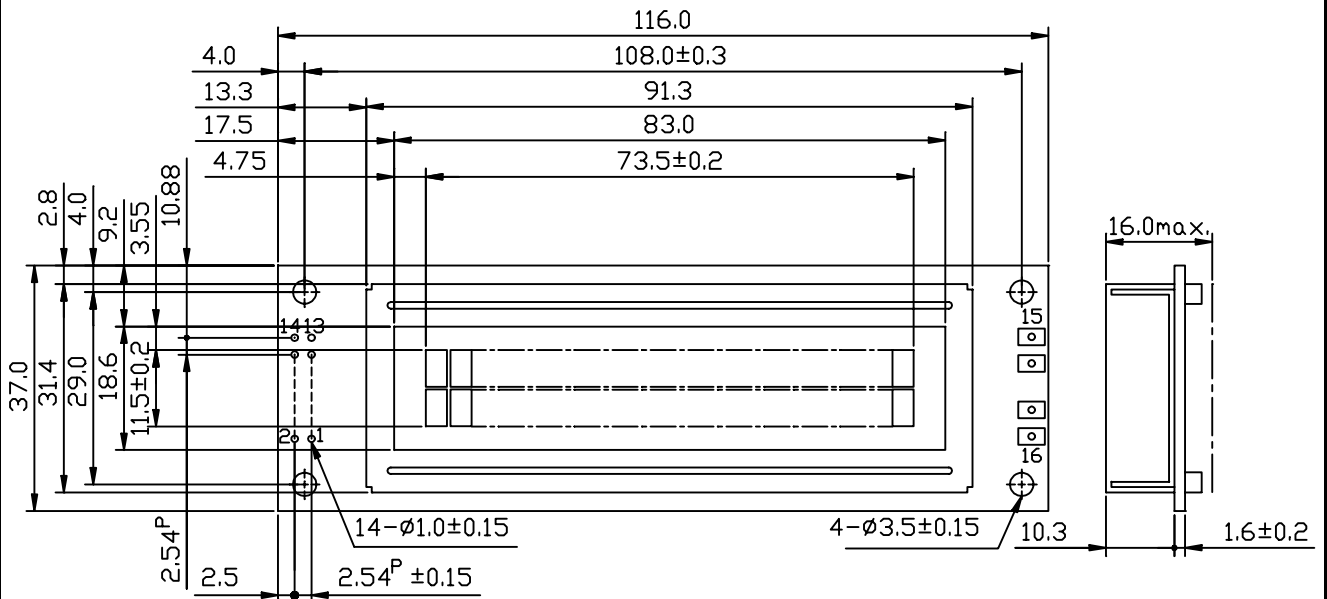
NOTE (1): PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATION : EU-002A

NOTE (2): POLARIZER MODE : TRANSFLECTIVE

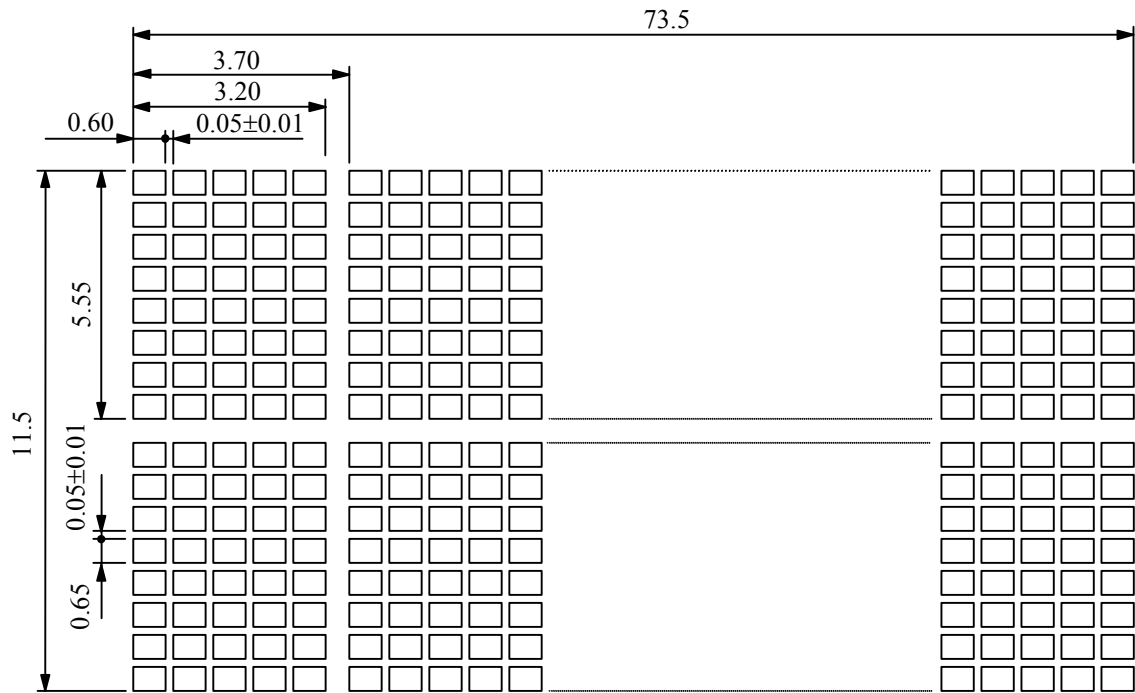
NOTE (3): POLARIZER MODE : TRANSMISSIVE

6. OUTLINE DIMENSIONS



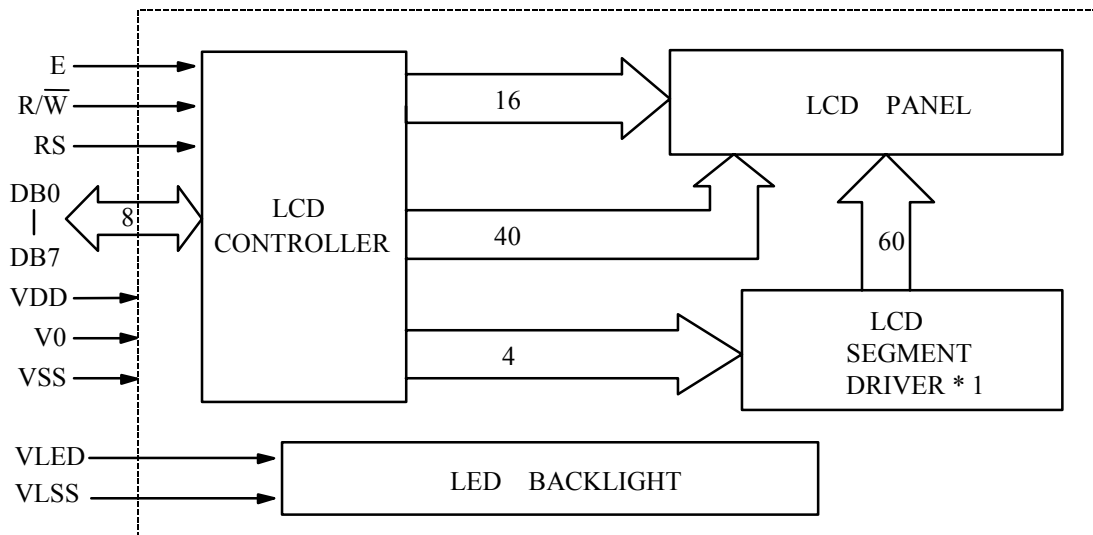
UNIT : mm
SCALE : NTS
NOT SPECIFIED TOLERANCE IS ± 0.5

7. DETAIL DRAWING OF DOT MATRIX



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

8. BLOCK DIAGRAM

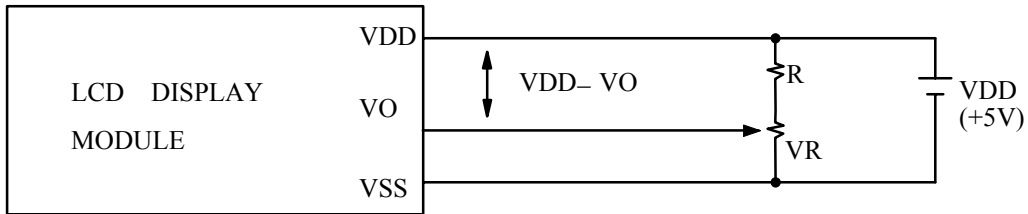


9. INTERFACE SIGNALS

PIN NO.	SYMBOL	DESCRIPTION	FUNCTION
1	VSS	GROUND	0V (GND)
2	VDD	POWER SUPPLY FOR LOGIC CIRCUIT	+5V
3	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	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)

10. POWER SUPPLY

10.1 POWER SUPPLY FOR LCD MODULE

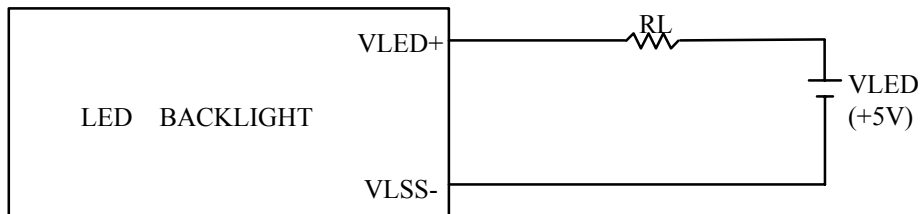


VDD – VO : LCD DRIVING VOLTAGE

VR : 10KΩ~20KΩ

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

10.2 POWER SUPPLY FOR LED BACK-LIGHT



RECOMMENDED RESISTOR RL : 6~3Ω, 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