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APPROVED BY:		TOTAL PAGE : 7
<i>David Chang</i>		VERSION : 3

CUSTOMER

ACCEPTANCE

SPECIFICATIONS

MODEL :

40400 (LED TYPES)

FOR MESSRS :

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CUSTOMER'S APPROVAL

DATE :

\_\_\_\_\_

BY :

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RECORDS OF REVISION	DOC . FIRST ISSUE	OCT.15,1998
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DATE	REVISED PAGE NO.	SUMMARY
OCT.21,1999	1 ~ 3	THE ENTIRE PAGES REVISED
NOV.11,1999	2	3.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS CHANGE AMBIENT TEMPERATURE OPERATING MIN. -20°C → -30°C , STORAGE MIN. -30°C → -40°C NOTE(2): Ta AT -30°C → Ta AT -40°C
	3	4. ELECTRICAL CHARACTERISTICS ADD RECOMMENDED LCD DRIVING VOLTAGE Ta=-30°C , VDD-V0=5.0 TYP.

NUMBERING SYSTEM

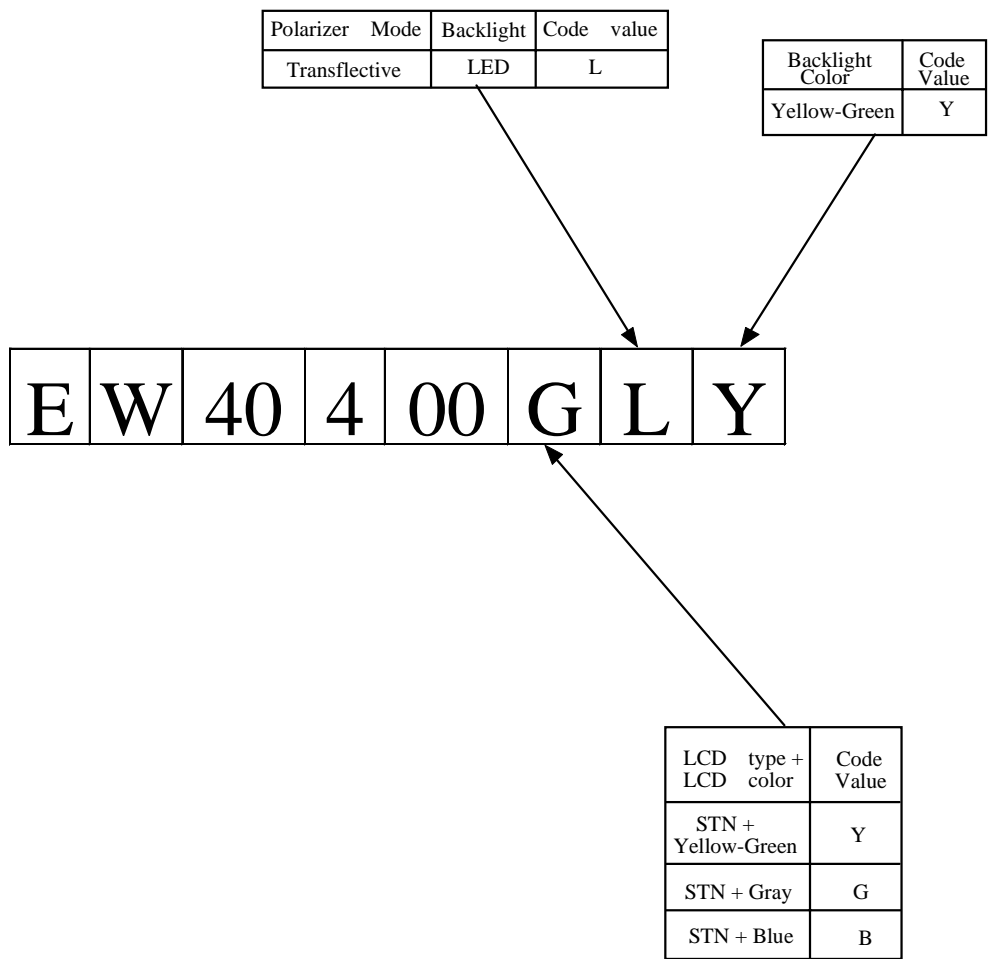


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1. GENERAL SPECIFICATIONS

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 ----- 40 CH \* 4 LINES
- (2) MODULE SIZE ----- 190.0W \* 54.0H \* 14.5D (max.) mm
- (3) EFFECTIVE AREA ----- 149.0W \* 31.0H mm
- (4) CHARACTER FONT ----- 5 \* 7 DOTS + CURSOR
- (5) CHARACTER SIZE ----- 2.78W \* 4.89H mm
- (6) CHARACTER PITCH ----- 3.53W \* 5.49H mm
- (7) DOT SIZE ----- 0.50W \* 0.55H mm
- (8) DOT PITCH ----- 0.57W \* 0.62H mm
- (9) LCD TYPE \*
- (10) DRIVING METHOD ----- 1 / 16 DUTY MULTIPLEX DRIVE
- (11) BACK - LIGHT ----- LED, COLOR : YELLOW-GREEN

\* 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	—	4.4	W	
LED FORWARD CURRENT	IF	—	880	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	-30 °C	70 °C	-40 °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 -40°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	—	4.0	10.0	mA
RECOMMENDED LCD DRIVING VOLTAGE	VDD - VO ∅ = 10° θ = 0° DUTY= 1/16	Ta = -30 °C	—	5.0	—	V
		Ta = -20 °C	—	4.4	—	V
		Ta = 25 °C	—	4.4	—	V
		Ta = 70 °C	—	4.4	—	V
CLOCK OSCILLATION FREQUENCY	F <sub>osc</sub>	Ta = 25 °C	—	270	—	KHZ
LED FORWARD VOLTAGE	VF	IF = 460 mA	—	4.2	4.6	V
LED FORWARD CURRENT	IF	—	—	460	—	mA
LED REVERSE CURRENT	IR	VR = 8 V	—	—	200	uA

#### 5. OPTICAL CHARACTERISTICS .

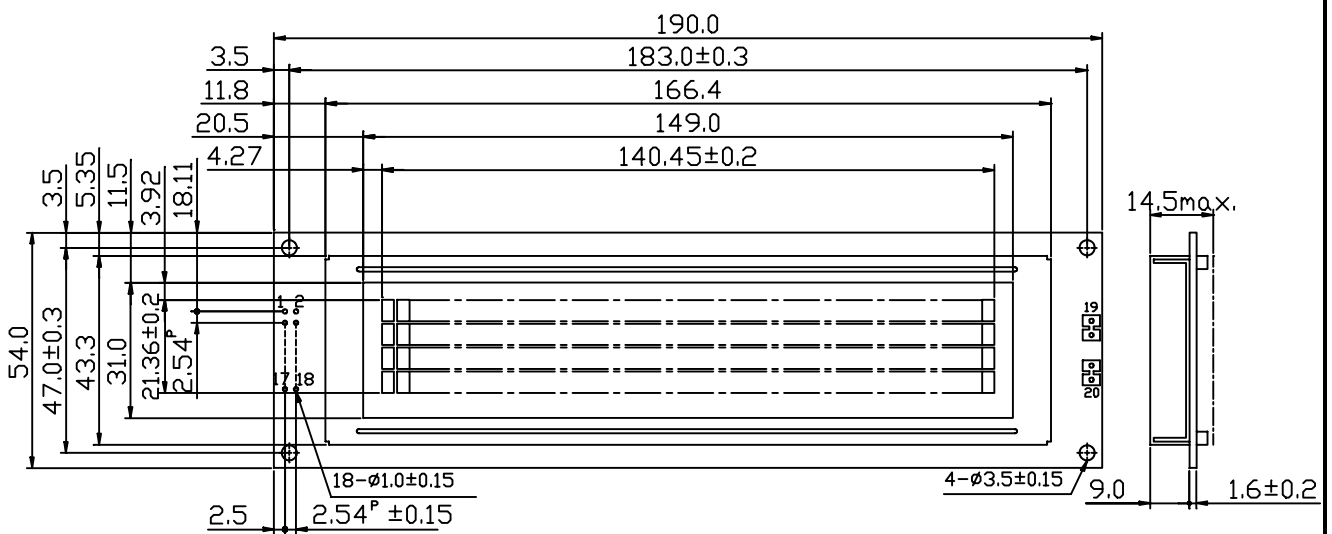
Ta = 25 °C

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	—			
	Ta = -20°C		—	2316	—			
	Ta = 25°C		—	174	—			
	Ta = 70°C		—	85	—			
THE BRIGHTNESS OF BACKLIGHT	L	IF = 460 mA	35	50	—	cd/m <sup>2</sup>	1,2	
PEAK EMISSION WAVELENGTH	λ P	IF = 460 mA	—	570	—	nm	1	

NOTE (1) : PLEASE REFER TO :  
CUSTOMER ACCEPTANCE STANDARD SPECIFICATION : EU-002A  
NOTE (2) : POLARIZER MODE : TRANSFLECTIVE

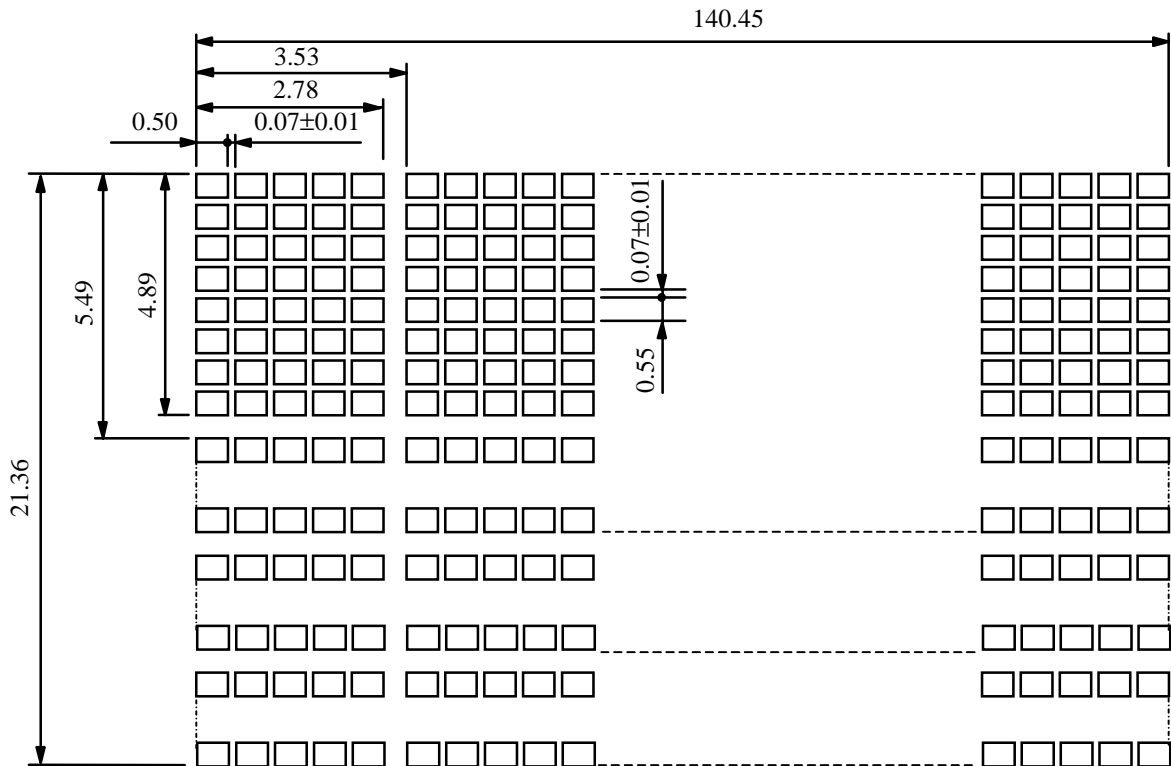
6. OUTLINE DIMENSION



UNIT : mm  
SCALE : NTS  
NOT SPECIFIED TOLERANCE IS  $\pm 0.5$

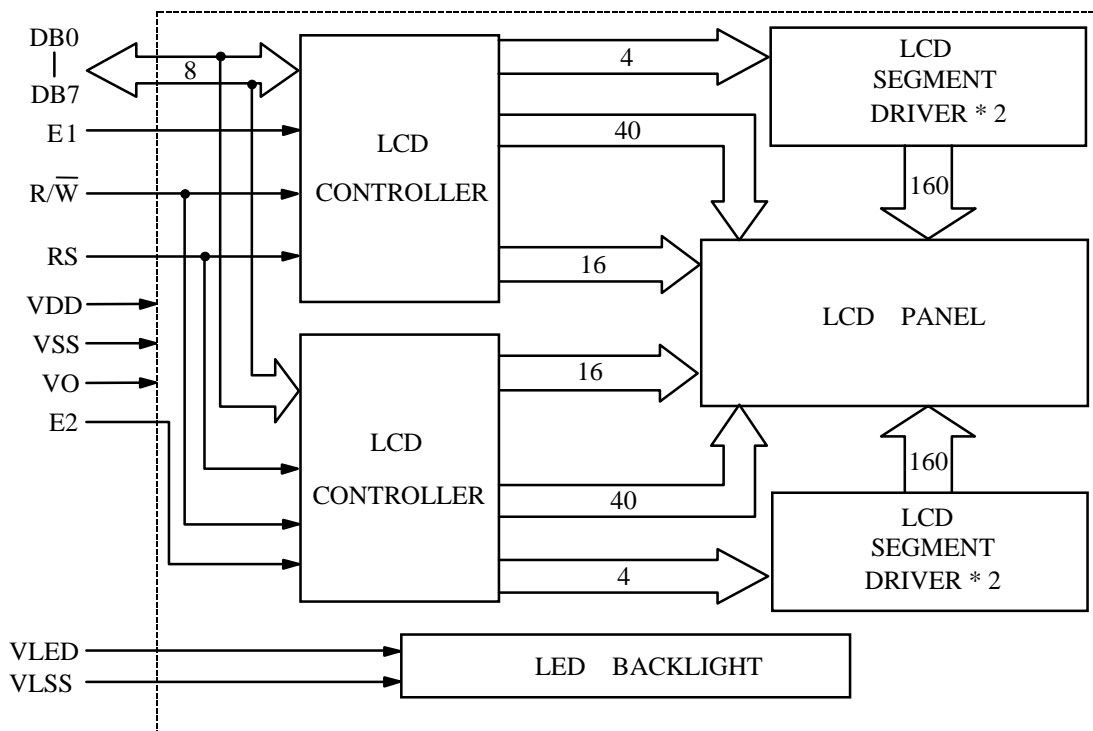


7. DETAIL DRAWING OF DOT MATRIX



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

8. BLOCK DIAGRAM

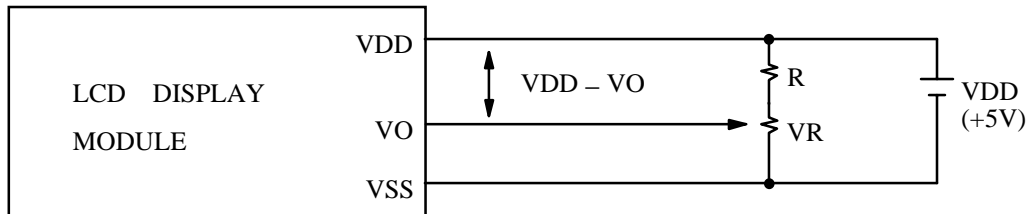


9. INTERFACE SIGNALS

PIN NO.	SYMBOL	DESCRIPTION	FUNCTION
1	DB7	DATA INPUT/OUTPUT LINES	4 BIT/8BIT SELECTABLE  4 BIT : DB4 - DB7 8 BIT : DB0 - DB7
2	DB6		
3	DB5		
4	DB4		
5	DB3		
6	DB2		
7	DB1		
8	DB0		
9	E1	ENABLE INPUT	
10	$\overline{R/W}$	READ/WRITE SELECTION	$\overline{R/W} = 0$ : REGISTER WRITE $\overline{R/W} = 1$ : REGISTER READ
11	RS	INSTRUCTION/DATA REGISTER SELECTION	RS = 0 : INSTRUCTION REGISTER RS = 1 : DATA REGISTER
12	VO	LCD CONTRAST ADJUSTMENT	
13	VSS	GROUND	0V (GND)
14	VDD	POWER SUPPLY FOR LOGIC CIRCUIT	+5V
15	E2	ENABLE INPUT	
16	NC	NO CONNECTION	
17	NC	NO CONNECTION	
18	NC	NO CONNECTION	
19	VLED	POWER SUPPLY FOR LED BACKLIGHT ( ANODE )	
20	VLSS	POWER SUPPLY FOR LED BACKLIGHT ( CATHODE )	0V ( GND )

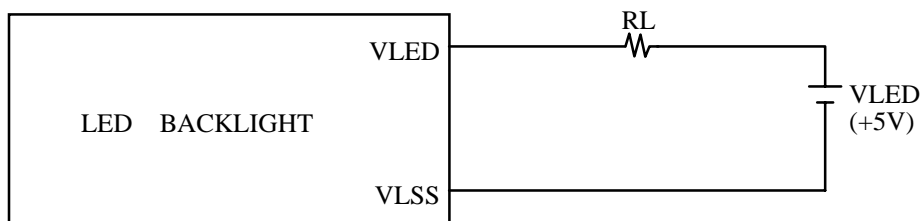
10. POWER SUPPLY

10.1 POWER SUPPLY FOR LCD MODULE



VDD - VO : LCD DRIVING VOLTAGE  
RECOMMENDED RESISTOR R :  $VDD - VO \geq 1.5 V$   
VR : 10KΩ ~ 20KΩ

10.2 POWER SUPPLY FOR EL BACKLIGHT



RECOMMENDED RESISTOR RL : 2.3 Ω, 1/2 WATT (CONTROLLED BY USER)

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	80	81	82	83	84	85	86	87	88	89	8A	8B	8C	8D	8E	8F	90	91	92	93
LINE 4	C0	C1	C2	C3	C4	C5	C6	C7	C8	C9	CA	CB	CC	CD	CE	CF	D0	D1	D2	D3
CHARACTER	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
LINE 1	94	95	96	97	98	99	8A	9B	9C	9D	9E	9F	A0	A1	A2	A3	A4	A5	A6	A7
LINE 2	D4	D5	D6	D7	D8	D9	DA	DB	DC	DD	DE	DF	E0	E1	E2	E3	E4	E5	E6	E7
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