





Polarizer Mode	Backlight	Code value
Transflective	EL	E

E W 13 B 10 G E W

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

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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  
PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS :

EU - 100

1.3 THIS INDIVIDUAL SPECIFICATION IS PRIOR TO GENERAL  
SPECIFICATIONS .

2. MECHANICAL SPECIFICATIONS

- |                       |       |                              |
|-----------------------|-------|------------------------------|
| (1) NUMBER OF DOTS    | ----- | 128W * 64H DOTS              |
| (2) MODULE SIZE       | ----- | 77.8W * 69.8H * 9.5D(max) mm |
| (3) EFFECTIVE AREA    | ----- | 70.7W * 38.8H mm             |
| (4) ACTIVE AREA       | ----- | 65.25W * 32.61H mm           |
| (5) DOT SIZE          | ----- | 0.48W * 0.48H mm             |
| (6) DOT PITCH         | ----- | 0.51W * 0.51H mm             |
| (7) LCD TYPE *        |       |                              |
| (8) DRIVING METHOD    | ----- | 1 / 64 DUTY MULTIPLEX DRIVE  |
| (9) VIEWING DIRECTION | ----- | 6 O'CLOCK                    |

\* 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	
INPUT VOLTAGE		VI	VSS	VDD	V	
STATIC ELECTRICITY		—	—	100	V	NOTE (1)
POWER SUPPLY FOR EL BACKLIGHT	VOLTAGE	VEL	—	AC200	Vrms	fEL=1.0KHZ 60 SEC . MAX
	FREQUENCY	fEL	—	2.0	KHZ	AC115Vrms 60 SEC . MAX

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		COMMENT
	MIN .	MAX .	MIN .	MAX .	
AMBIENT TEMPERATURE	- 20 °C	60 °C	- 30 °	70 °C	NOTE (2) , (3)
HUMIDITY	—	85 % RH	—	85 % RH	WITHOUT CONDENSATION
VIBRATION	—	2.45 m/s <sup>2</sup> (0.25 G)	—	11.76 m/s <sup>2</sup> (1.2 G)	10~100 HZ XYZ DIRECTIONS 1 Hr . EACH
SHOCK	—	29.4 m/s <sup>2</sup> (3 G)	—	490.0 m/s <sup>2</sup> (50 G)	10 mSECONDS XYZ DIRECTIONS 1 TIME EACH
CORROSIVE GAS	NOT ACCEPTABLE		NOT ACCEPTABLE		

NOTE (2) : Ta AT -30°C : 48HR MAX .  
70°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 V

PARAMETER	SYMBOL	CONDITION	MIN .	TYP .	MAX .	UNIT
POWER SUPPLY VOLTAGE FOR LOGIC	VDD – VSS	—	4.75	5.0	5.25	V
INPUT VOLTAGE NOTE ( 1 )	VIH	H LEVEL	0.7*VDD	—	VDD	V
	VIL	L LEVEL	GND	—	0.3*VDD	V
OUTPUT VOLTAGE NOTE ( 1 )	VOH	H LEVEL	VDD-0.4	—	—	V
	VOL	L LEVEL	—	—	0.4	V
POWER SUPPLY CURRENT FOR LOGIC NOTE ( 2 )	IDD	VDD-VSS = 5.0 V VDD-VO = 9.2V	—	7.0	—	mA
RECOMMENDED LCD DRIVING VOLTAGE NOTE ( 3 )	VDD –VO ∅ = 10° θ = 0°	Ta =- 20 °C	—	9.2	—	V
		Ta = 25 °C	—	9.2	—	
		Ta = 60 °C	—	8.4	—	
POWER SUPPLY FOR EL BACKLIGHT	VEL	fEL=400HZ	—	100	—	Vrms
	IEL	VEL=100V fEL=400HZ	—	3.5	—	mArms

NOTE ( 1 ) : APPLIED TO TERMINALS CS1, CS2, R/W, D/I, DB0~DB7, E, RST.

NOTE ( 2 ) : THE DISPLAY PATTERN IS ALL “ON”. / “OFF” .

NOTE ( 3 ) : RECOMMENDED LCD DRIVING VOLTAGE MAY FLUCTUATE ABOUT ± 1.0V BY EACH MODULE .

5. INTERFACE TIMING CHARACTERISTICS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	FIG.
E cycle time	t <sub>CYC</sub>	1000	—	—	nS	1,2
E high level	P <sub>WEH</sub>	450	—	—	nS	1,2
E low level width	P <sub>WEL</sub>	450	—	—	nS	1,2
E rise time	t <sub>r</sub>	—	—	25	nS	1,2
E fall time	t <sub>f</sub>	—	—	25	nS	1,2
Address setup time	t <sub>AS</sub>	140	—	—	nS	1,2
Address hold time	t <sub>AH</sub>	10	—	—	nS	1,2
Data setup time	t <sub>DSW</sub>	200	—	—	nS	1
Data delay time	t <sub>DDR</sub>	—	—	320	nS	2
Data hold time (Write)	t <sub>DHW</sub>	10	—	—	nS	1
Data hold time (Read)	t <sub>DHR</sub>	20	—	—	nS	2

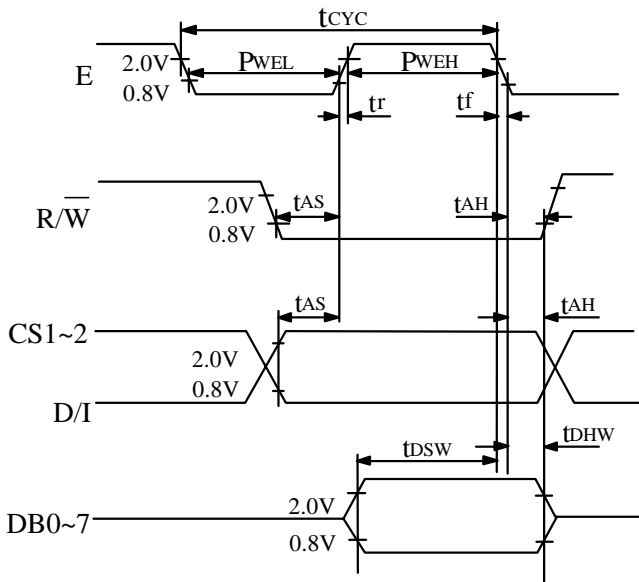


Fig . 1 CPU Write Timing

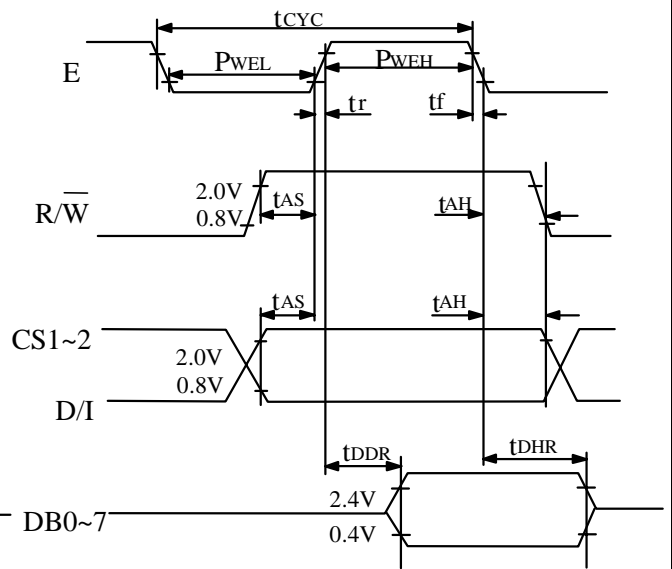


Fig . 1 CPU Read Timing



6. OPTICAL CHARACTERISTICS

Ta = 25 °C

VDD = 5.0 V

VDD - V0 = 9.2V

I T E M		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING AREA	STN	Ø 2 - Ø1	K ≥ 1.4	30	—	—	deg.	1
	FSTN			40	—	—	deg.	1
CONTRAST RATIO	STN	K	Ø = 10° θ = 0°	—	5	—	—	1
	FSTN			—	8	—	—	1
RESPONSE TIME	tr ( rise )	Ø = 10° θ = 0°	Ta = -20°C	—	650	—	ms	1
			Ta = 25°C	—	120	180		
	tf ( fall )		Ta = -20°C	—	2300	—		
			Ta = 25°C	—	240	360		
THE BRIGHTNESS OF BACKLIGHT	B	Ø = 10° θ = 0°	10	—	—	cd/m <sup>2</sup>	2	
			25	—	—		3	

NOTE (1) : PLEASE REFER TO :

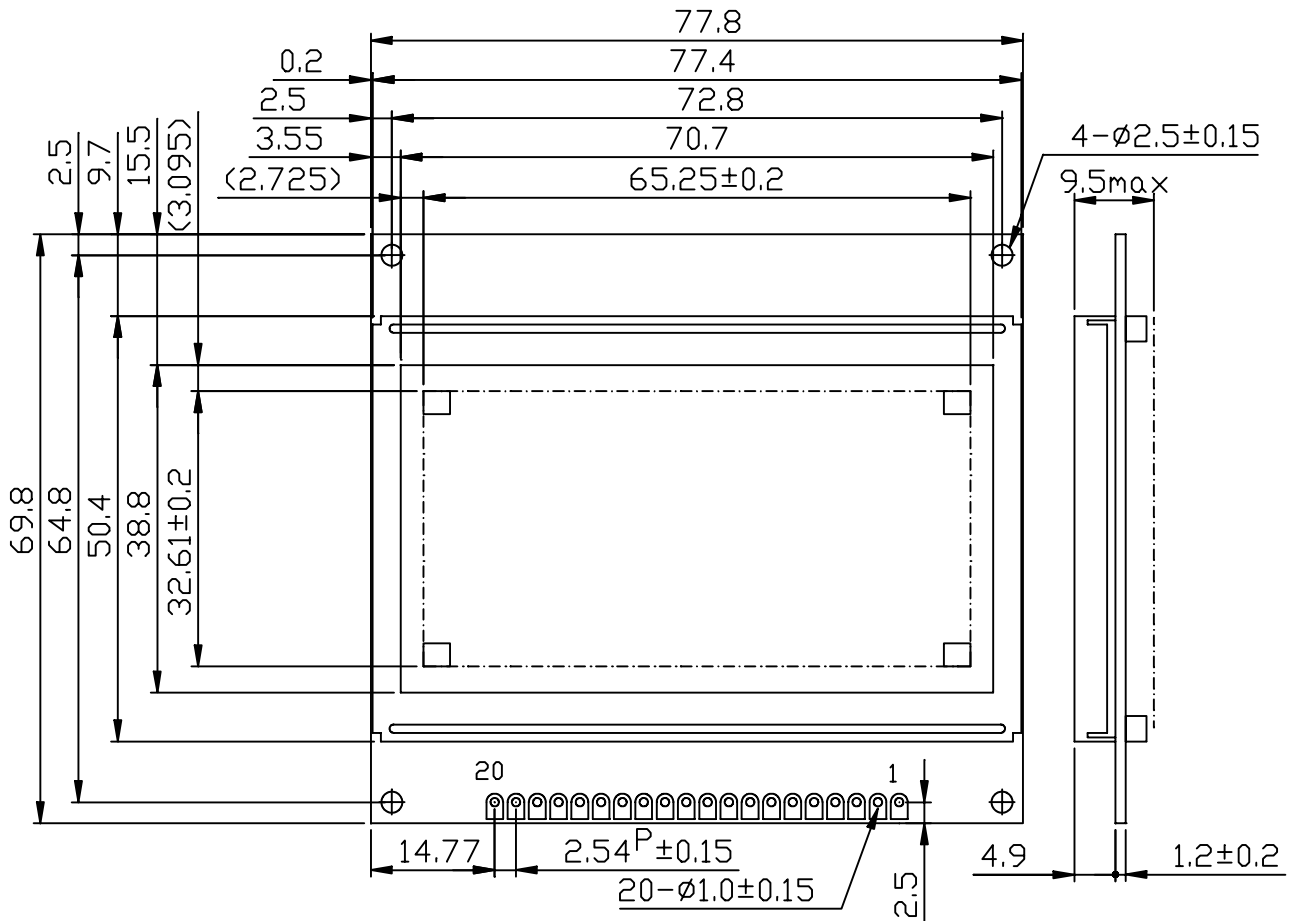
CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS.

EU - 002 A

NOTE (2) : POLARIZER MODE : TRANSFLECTIVE

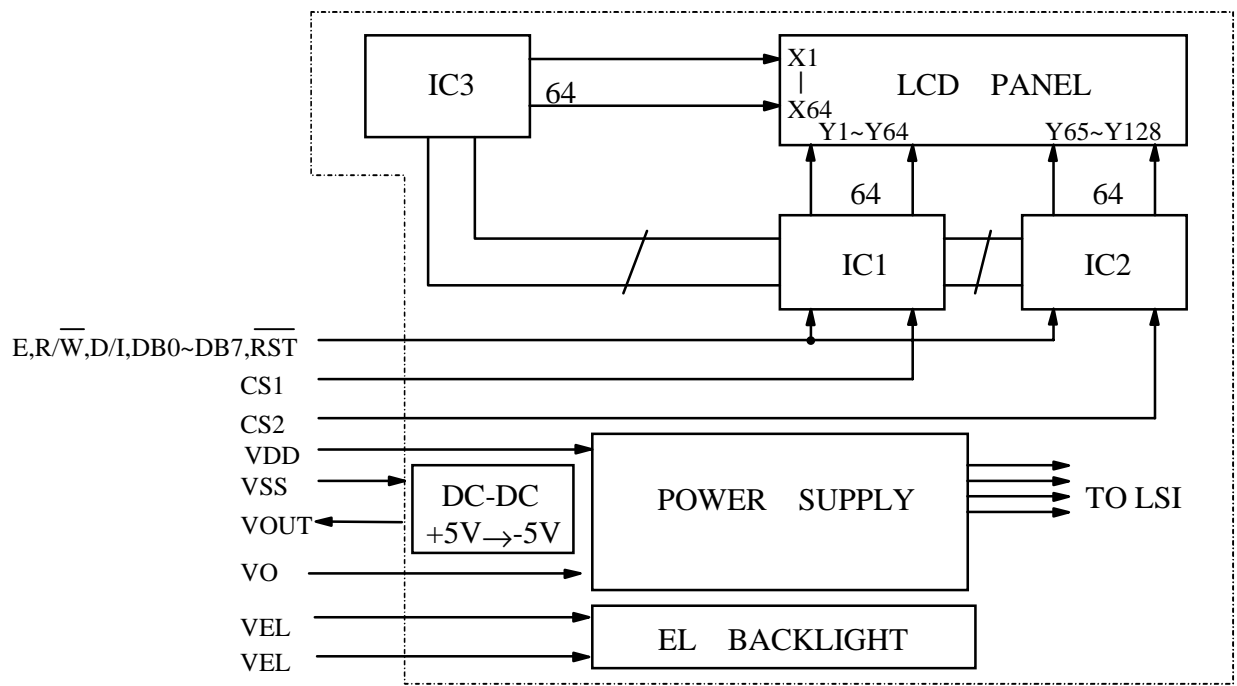
NOTE (3) : POLARIZER MODE : TRANSMISSIVE

7. OUTLINE DIMENSION

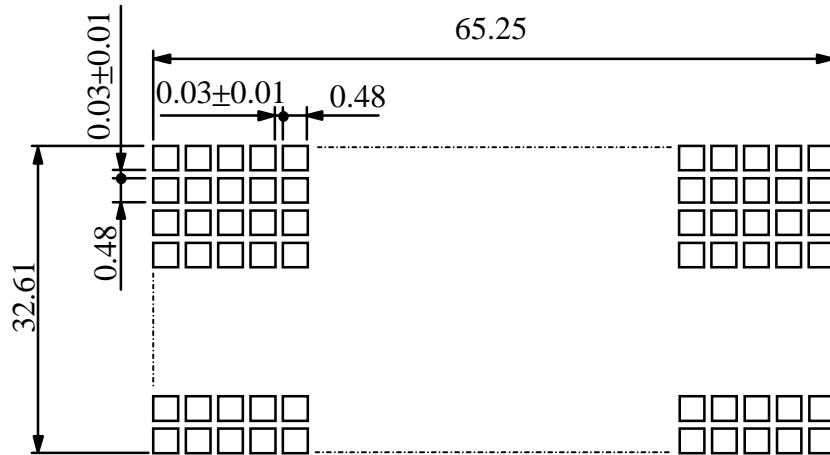


UNIT: mm  
SCALE: NTS  
NOT SPECIFIED TOLERANCE IS ±0.5mm

8. BLOCK DIAGRAM



9. DETAIL DRAWING OF DOT MATRIX



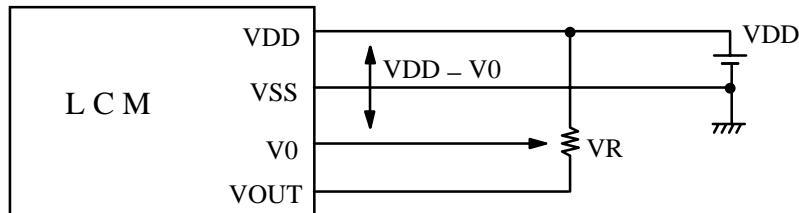
UNIT : mm  
SCALE : NTS  
NOT SPECIFIED TOLERANCE IS  $\pm 0.1$

10. INTERFACE SIGNALS

PIN NO	SYMBOL	LEVEL	FUNCTION
1	VSS	—	GROUND
2	VDD	—	POWER SUPPLY FOR LOGIC CIRCUIT
3	VO	—	OPERATING VOLTAGE FOR LCD DRIVING
4	D / I	H / L	H : DATA INPUT L : INSTRUCTION CODE INPUT
5	R / $\overline{W}$	H / L	H : DATA READ ( LCD MODULE $\rightarrow$ MPU ) L : DATA WRITE ( LCD MODULE $\leftarrow$ MPU)
6	E	H,H $\rightarrow$ L	ENABLE SIGNAL
7   14	DB0   DB7	H / L	DATA BUS LINE
15	CS1	H	CHIP SELECTION FOR IC1
16	CS2	H	CHIP SELECTION FOR IC2
17	$\overline{RST}$	L	RESET
18	VOUT	—	POWER SUPPLY FOR LCD DRIVING
19	NC	—	—
20	NC	—	—
21	VEL	—	POWER SUPPLY FOR EL BACKLIGHT
22	VEL	—	POWER SUPPLY FOR EL BACKLIGHT

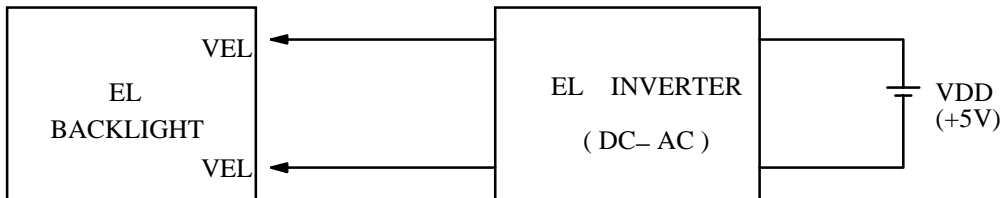
1 1 . POWER SUPPLY

1 1 . 1 POWER SUPPLY FOR LCM



VDD-V0 : LCD DRIVING VOLTAGE  
VR : 10K ~ 20KΩ

1 1 . 2 POWER SUPPLY FOR EL BACK - LIGHT



RECOMMENDED INVERTER : SOUN50350

1 1 . 3 TIMING OF POWER SUPPLY AND INTERFACE SIGNAL

