

AZ DISPLAYS, INC.

1. MECHANICAL DATA

(1) Part Name	AGM1264B
(2) Module Size	93.0(W)mm X 70.0(H)mm X MAX8.5(D)mm (W/O,EL B/L) 93.0(W)mm X 70.0(H)mm X MAX14.0(D)mm (W/ LED B/L)
(3) Dot Size	0.48 (W)mm x 0.48 (H)mm
(4) Dot Pitch	0.52 (W)mm x 0.52 (H)mm
(5) Number of Dots	128 (W) x 64 (H)Dots
(6) Duty	1/64
(7) LCD Display Mode	STN: <input type="checkbox"/> Gray Mode <input type="checkbox"/> Yellow Mode <input type="checkbox"/> Blue Mode FSTN: <input type="checkbox"/> Black and White(Normal White/Positive Image) <input type="checkbox"/> Black and White(Normal Black/Negative Image) Rear Polarizer: <input type="checkbox"/> Reflective <input type="checkbox"/> Transflective(High Transparency)
(8) Viewing Direction	<input type="checkbox"/> 6 O'clock <input type="checkbox"/> 12 O'clock
(9) Backlight	<input type="checkbox"/> LED B/L <input type="checkbox"/> EL B/L <input type="checkbox"/> W/O B/L
(10) Weight	W/O B/L: 54.5 g (APPROX.) EL B/L: 56.5 g (APPROX.) LED B/L: 76.5 g (APPROX.)

Revised: January 6, 2003

2. ABSOLUTE MAXIMUM RATINGS

(1) ELECTRICAL ABSOLUTE RATINGS

VSS=0V Standard

ITEM	SYMBOL	MIN	MAX	UNIT	COMMENT
Power Supply for Logic	VDD-VSS	-0.3	7.0	V	
Input Voltage	VI	-0.3	VDD	V	
Static Electricity	-	-	-	-	Note 1

Note 1 LCM should be grounded during handling

(2) ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	NORMAL TEMP.				WIDE TEMP.			
	OPERATING		STORAGE		OPERATING		STORAGE	
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
Ambient Temperature	0	50	-20	70	-20	70	-30	80
Humidity (Without Condensation)	Note 2,4		Note 3,4		Note 4,5		Note 4,6	

Note 2 $T_a \leq 50^\circ\text{C}$: 85%RH max

$T_a > 50^\circ\text{C}$: Absolute humidity must be lower
than the humidity of 85%RH at 50°C

Note 3 T_a at -20°C will be < 48hrs, at 70°C will be < 120hrs

Note 4 Background color changes slightly depending on ambient temperature.
This phenomenon is reversible.

Note 5 $T_a \leq 70^\circ\text{C}$: 75%RH max

$T_a > 70^\circ\text{C}$: Absolute humidity must be lower
than the humidity of 75%RH at 70°C

Note 6 T_a at -30°C will be < 48hrs, at 80°C will be < 120hrs

3-2.ELECTRICAL CHARACTERISTICS OF LED BACKLIGHT

Temp.=25°C

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
Peak forward current	I_P	—	—	540	mA	—
Maximum reverse voltage	V_R	—	—	8	V	—
Applied forward current	I_F	—	250	540	mA	at $V_F = 4.2$ V
Applied forward voltage	V_F	—	4.2	—	V	at $I_F = 250$ mA
LED power consumption	P_F	—	1.1	—	W	—
LED lifetime	L_L	—	40000	—	hrs	at $I_F = 250$ mA (*1)

(*1) LED lifetime is defined as the time taken for the brightness to reduce to 50% of original value.

3-3.ELECTRICAL CHARACTERISTICS OF EL BACKLIGHT

Temp.=25°C

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
Maximum applied voltage	V _L	—	—	150	Vrms	—
Maximum applied frequency	F _L	—	—	1000	Hz	—
EL current	I _L	—	5.0	8.0	mA _{rms}	at 110 Vrms 400 Hz
EL power consumption	P _L	—	0.55	—	W	(*1)
EL lifetime	L _L	—	1000	—	hrs	at 110 Vrms 400 Hz (*2)

(*1) Power consumption excludes inverter loss .

(*2) EL lifetime is defined as the time taken for the brightness to reduce to 50% of original value.

4. OPTICAL CHARACTERISTICS

 AT V_{OP}

ITEM MODE		Cr(Contrast Ratio)										θ (Viewing Angle)		ϕ (Viewing Angle)	
		-20°C		0°C		25°C		50°C		70°C		25°		25°	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
H	A	2.0	3.0	2.5	3.5	3.0	4.0	2.5	3.5	1.5	2.5	-	28-20	-	±22
H	C	2.5	3.5	3.0	4.0	3.5	4.5	3.0	4.0	2.0	3.0	-	31-23	-	±25
Note		NOTE 6										NOTE 5			

Note:

H: Transflective(High Transparency)

A: Gray , 6 Clock

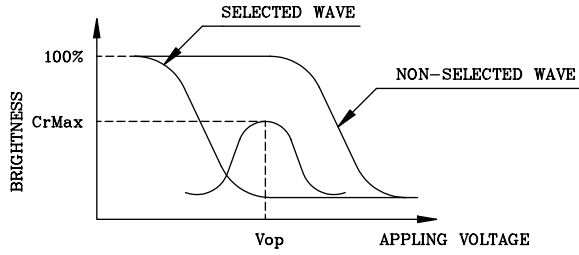
C: Yellow , 6 O'clock

 AT $\phi=0^\circ$ $\theta=0^\circ$

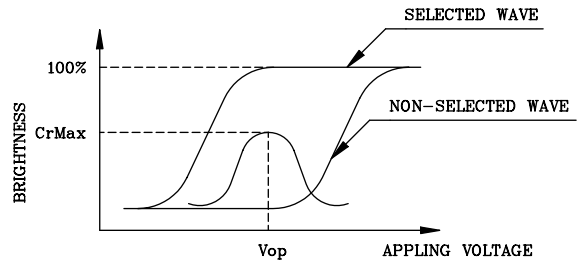
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	-20°C	2800	3500	5200	ms	Fig. 2
		0°C	680	850	1270		
		25°C	160	200	300		
		50°C	95	120	180		
		70°C	45	60	90		
Response Time (fall)	Tf	-20°C	1900	2400	3600	ms	Fig. 2
		0°C	400	500	600		
		25°C	95	120	180		
		50°C	40	50	75		
		70°C	30	40	60		

(NOTE 1)

Definition of Operation Voltage(V_{op})



(positive type)



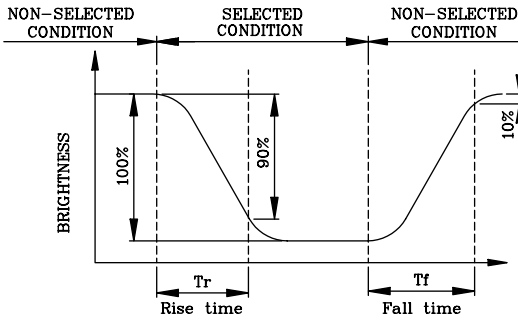
(negative type)

*Conditions

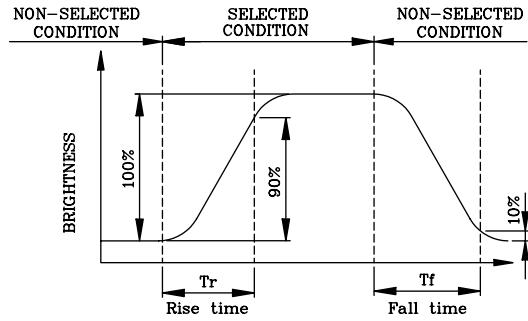
Viewing Angle : 0
 Frame Frequency : 70Hz
 Applied Waveform : I/N duty 1/a bias

(NOTE 2)

Definition of Response Time(T_r, T_f)



(positive type)



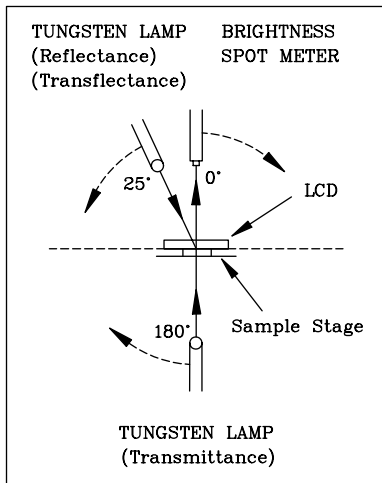
(negative type)

*Conditions

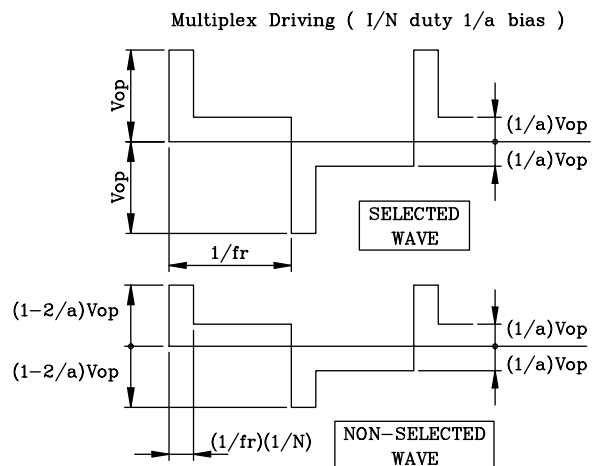
Operating Voltage : V_{op}
 Viewing Angle (θ, θ) : (0,0)
 Frame Frequency : 70Hz
 Applied Waveform : I/N duty 1/a bias

(NOTE 3)

Description of Measuring Equipment and Driving Waveforms

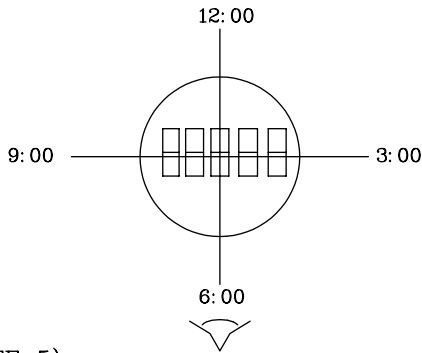


CONST.
 TEMP.
 CHAMBER



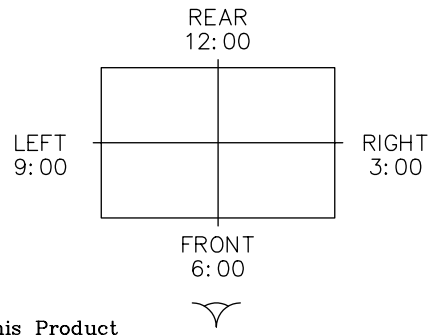
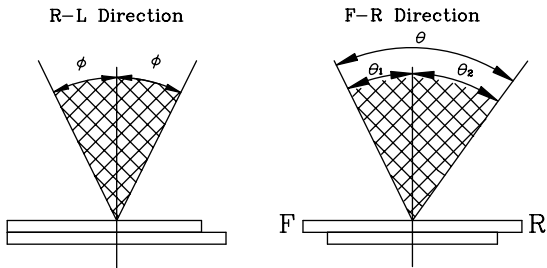
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle



*For This Product
The Viewing Direction Is 6 O'clock
So $\theta_1 > \theta_2$

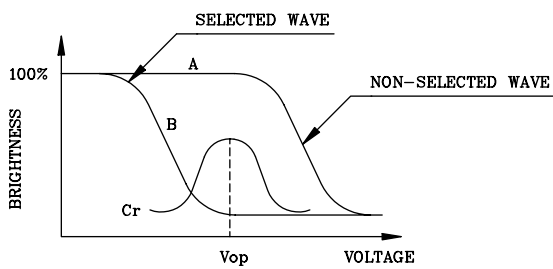
$$\theta = \theta_1 + \theta_2$$

*Conditions

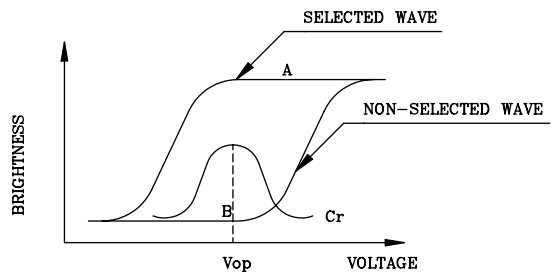
Operating Voltage : V_{op}
Frame Frequency : 70Hz
Applied Waveform : 1/N duty 1/a bias
Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type)



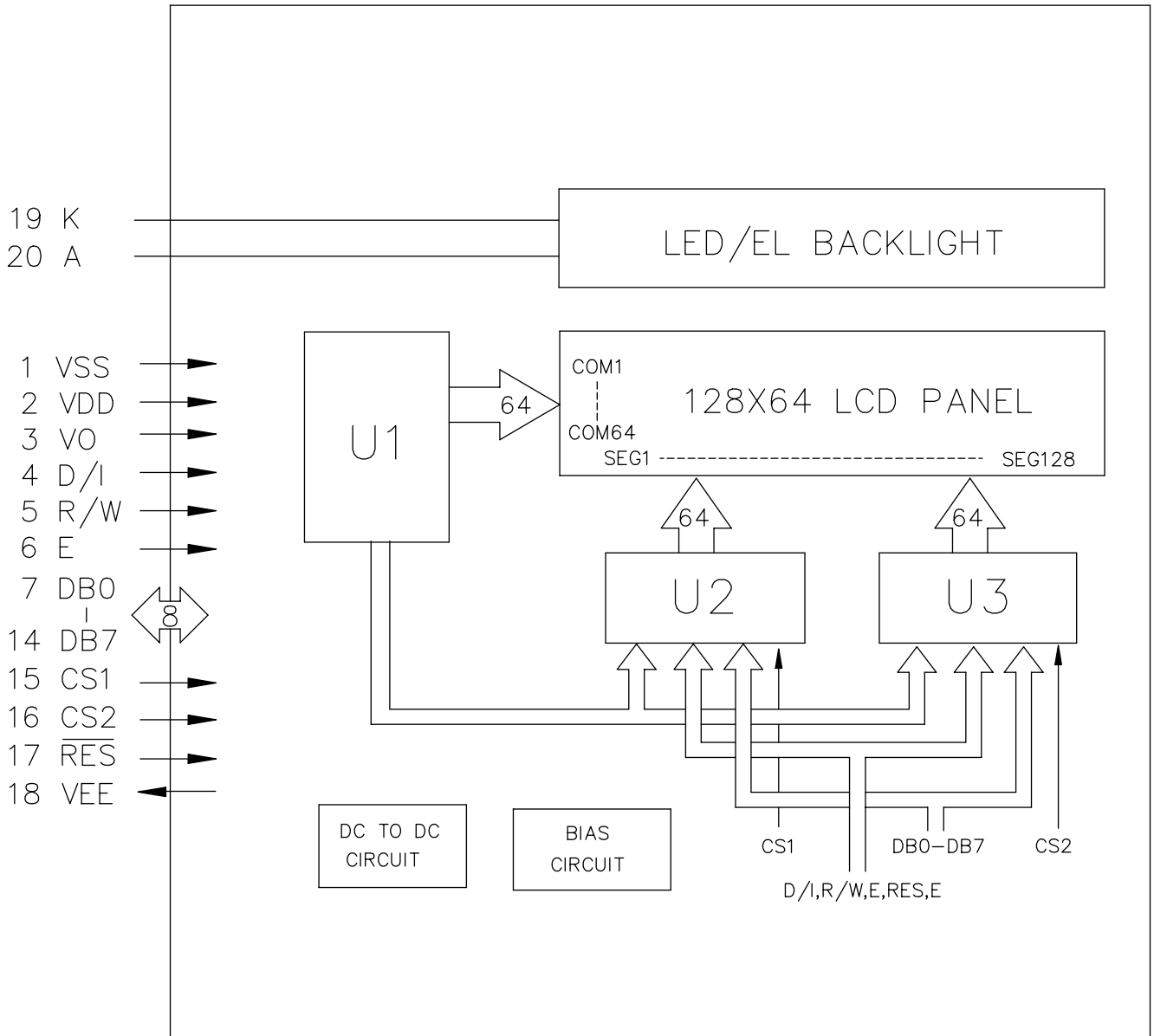
(negative type)

$$\text{Contrast Ratio : } Cr = A/B$$

*Conditions

Viewing Angle : 0
Frame Frequency : 70Hz
Applied Waveform : 1/N duty 1/a bias

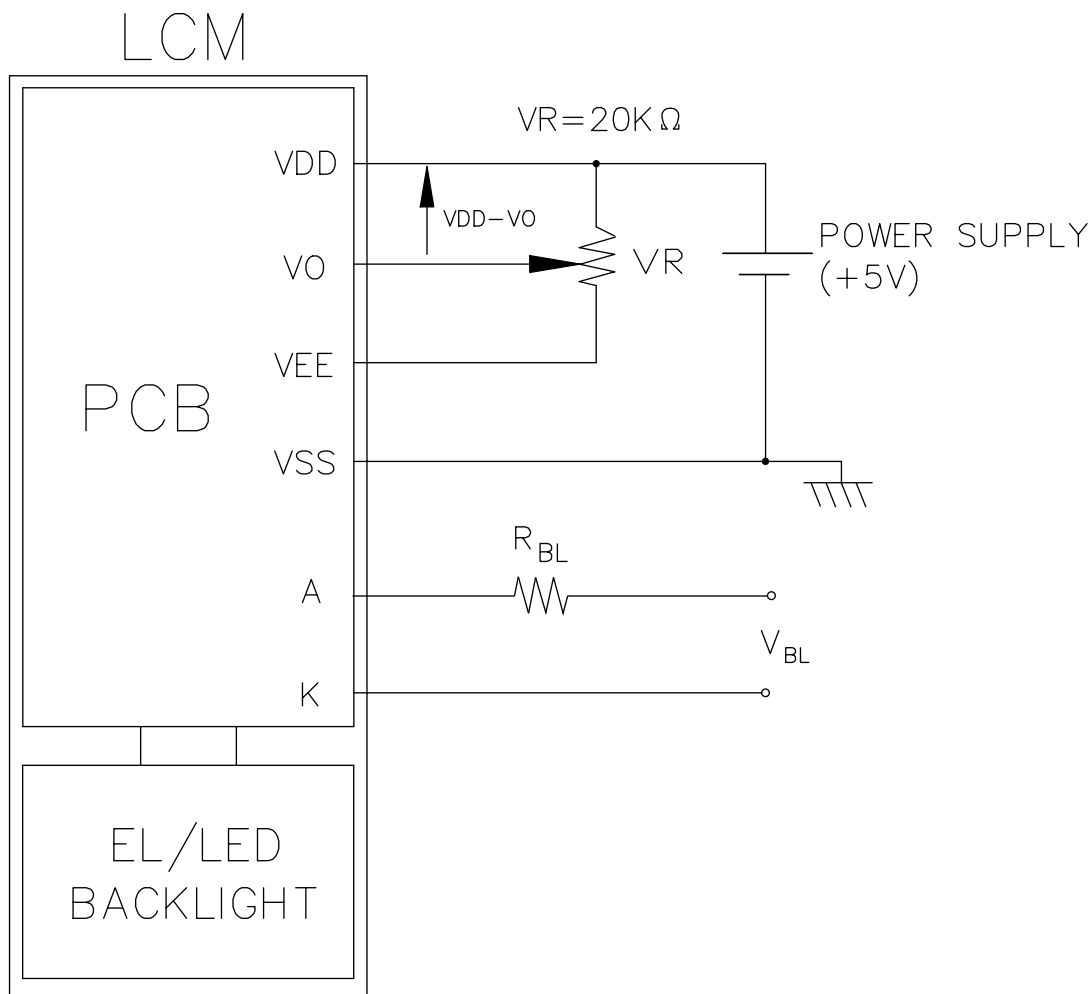
5. BLOCK DIAGRAM



6. INTERNAL PIN CONNECTION

Pin No.	Symbol	Level	Function	
1	V _{SS}	—	0V	Power Supply
2	V _{DD}	—	+5V	
3	V _O	—	OPERATING VOLTAGE FOR LCD DRIVING	
4	D/I	H/L	H: DATA INPUT L: INSTRUCTION CODE INPUT	
5	R/W	H/L	H: DATA READ (LCM TO MPU) L: DATA WRITE (MPU TO LCM)	
6	E	H, H→L	ENABLE SIGNAL	
7	DB0	H/L	DATA BUS LINE	
8	DB1	H/L		
9	DB2	H/L		
10	DB3	H/L		
11	DB4	H/L		
12	DB5	H/L		
13	DB6	H/L		
14	DB7	H/L		
15	CS1	H	CHIP SELECT FOR IC1	
16	CS2	H	CHIP SELECT FOR IC2	
17	$\overline{\text{RES}}$	L	RESET ACTIVE "L"	
18	VEE	—	NEGATIVE VOLTAGE OUTPUT	
19	K	—	CATHODE FOR EL/LED BACKLIGHT	
20	A	—	ANODE FOR EL/LED BACKLIGHT	

7. POWER SUPPLY



Recommended Value for R_{BL} and V_{BL}

ITEM Back Light Interface	R_{BL}		V_{BL}	
	EL	LED	EL	LED
19,20 PIN	0Ω	5Ω	110 Vac 400Hz	5Vdc

8. TIMING CHARACTERISTICS

8-1 INTERFACE TIMING

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Enable cycle time	t_{eye}	Fig.a , Fig.b	1000	-	-	ns
E high level width	P_{WEH}	Fig.a , Fig.b	450	-	-	ns
E low level width	P_{WEL}	Fig.a , Fig.b	450	-	-	ns
E rise/fall time	t_r, t_f	Fig.a , Fig.b	-	-	25	ns
Address set up time	t_{AS}	Fig.a , Fig.b	140	-	-	ns
Address hold time	t_{AH}	Fig.a , Fig.b	10	-	-	ns
Data delay time	t_{DDR}	Fig.b	-	-	320	ns
Data set up time	t_{DSW}	Fig.a	200	-	-	ns
Data hold time (WR)	t_{DHW}	Fig.a	10	-	-	ns
Data hold time (RD)	t_{DHR}	Fig.b	20	-	-	ns

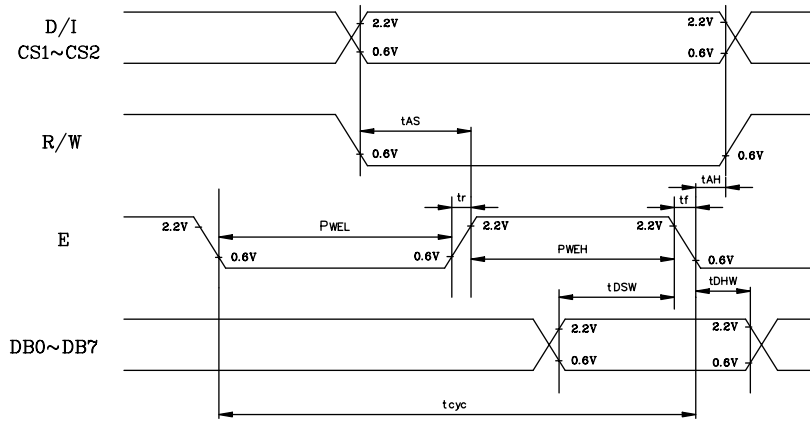


Fig . a Interface timing (data write)

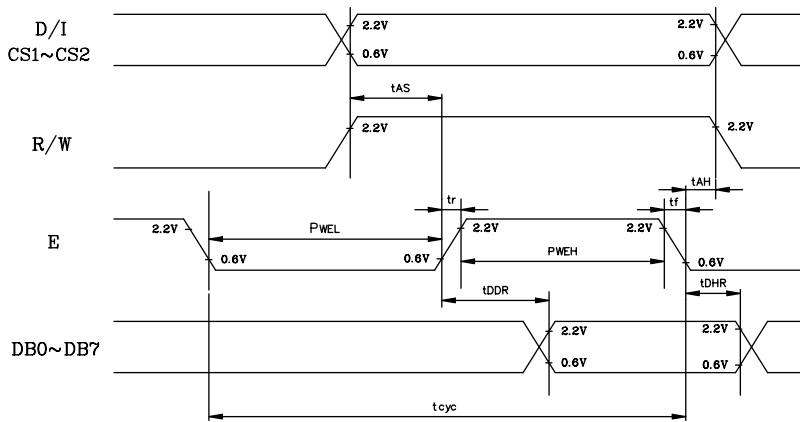
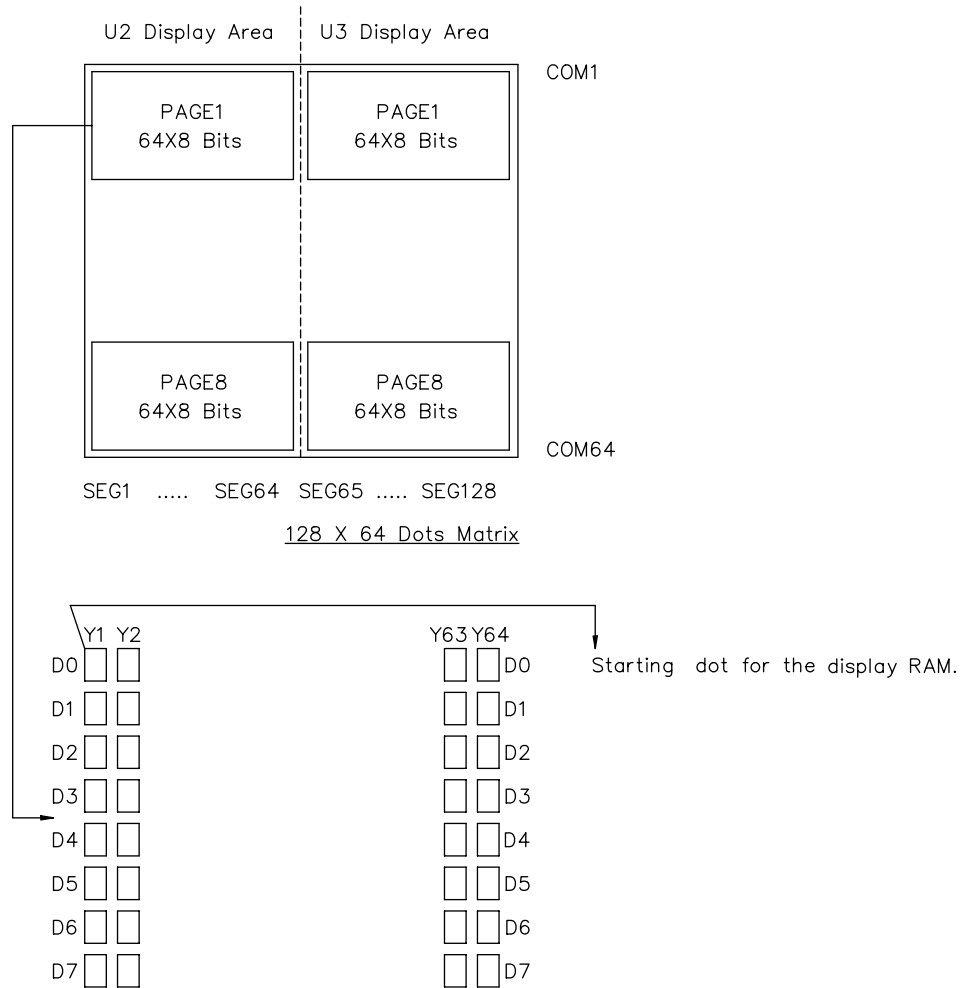


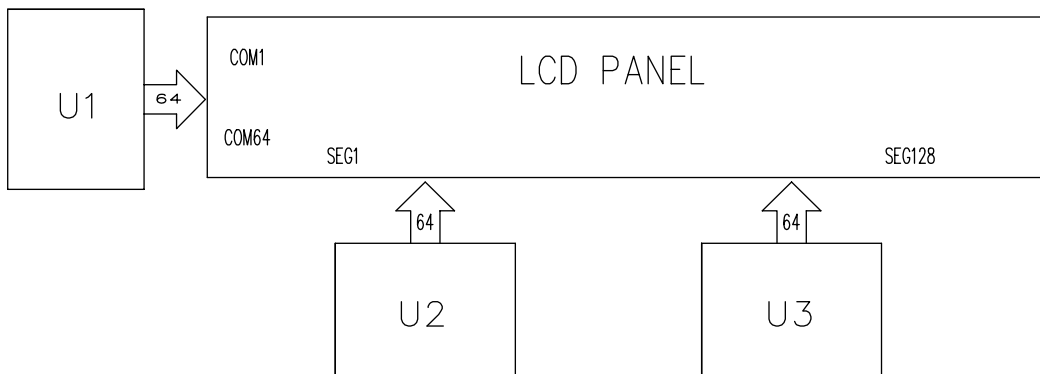
Fig . b Interface timing (data read)

Fig. b Interface timing (data read)

8-2 DISPLAY PATTERN



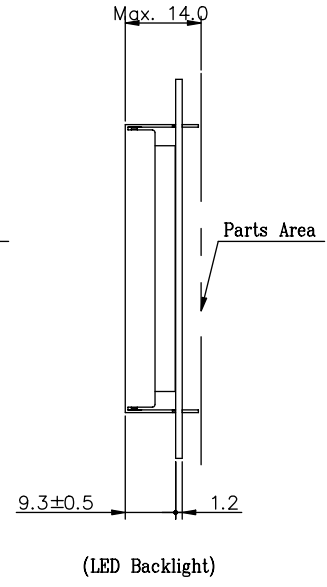
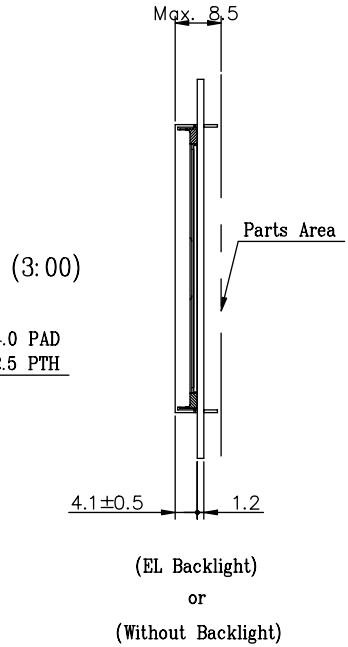
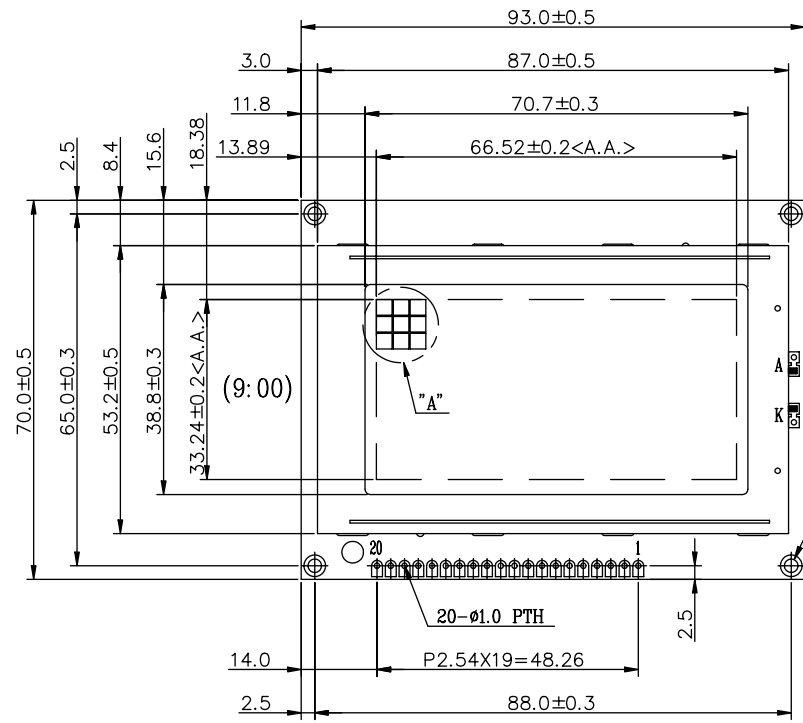
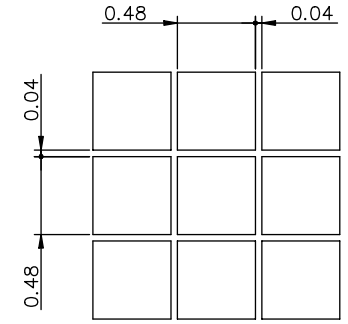
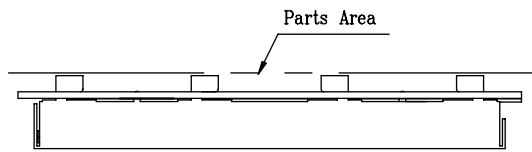
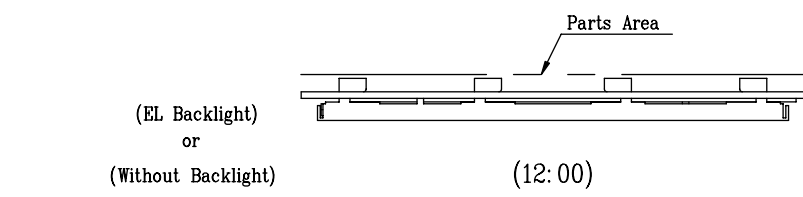
Each segment driver has 8 pages RAM , and each page has 64 x 8 bits RAM .
 D0~D7 are 8 bits transmitted data , where D0 is LSB and D7 is MSB .



8-3 DISPLAY CONTROL INSTRUCTION

The display control instructions control the internal state of the KS0108B. Instructions are received from MPU to KS0108B for the display control.

Instruction	D/I	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	FUNCTION	
Display ON/OFF	0	0	0	0	1	1	1	1	1	0/1	Controls the display on or off. Internal status and display RAM data is not affected. 0: OFF , 1: ON	
Set Address	0	0	0	1	Y address(0~63)						Sets the Y address in the Y address counter.	
Set Page (X address)	0	0	1	0	1	1	1	Page(0~7)			Sets the X address at the X address register.	
Display Start Line	0	0	1	1	Display start line(0~63)						Indicates the display data RAM displayed at the top of the the screen.	
Status Read	0	1	BUSY	0	ON/OFF	RESET	0	0	0	0	Read status. BUSY 0: Ready 1: In operation ON/OFF 0: Display ON 1: Display OFF RESET 0: Normal 1: Reset	
Write Display Data	1	0	Write Data									Writes data(DB0:7) into display data RAM. After writing instruction, Y address is increased by 1 automatically.
Read Display Data	1	1	Read Data									Reads data(DB0:7) from display data RAM to the data bus.



Notes :

- Resolution : 128 × 64 Dots
- Backlight : EL (White)
LED (Yellow-Green ; Red/Yellow-Green)
Yellow-Green : M436-L5A ; M436-L13A
Red/Yellow-Green : M436-L0A
- Frame : SPCC (0.5 t)
- DC/DC Converter : Built-In

View Direction (6:00)

Pin No.	Symbol	Level	Function	Pin No.	Symbol	Level	Function
1	VSS	-	0V	10	DB3	H/L	Data Bus Line
2	VDD	-	+5V	11	DB4		
3	VO	-	Operating Voltage for LCD Driving	12	DB5		
4	D/I	H/L	H : Data Input L : Instruction Code Input	13	DB6		
5	R/W	H/L	H : Data Read (LCM to MPU) L : Data Write (MPU to LCM)	14	DB7		
6	E	H/L	Enable Signal	15	CS1	H	Chip Select for IC1
7	DB0	H/L	Data Bus Line	16	CS2	H	Chip Select for IC2
8	DB1						
9	DB2						
17	RES	L	Reset Active "L"	18	VEE	-	Negative Voltage Output
19	K	-	Cathode for EL/LED Backlight	20	A	-	Anode for EL/LED Backlight

GENERAL TOLERANCE LIST

DIMENSION	TOLERANCE
L ≤ 6	±0.25 (mm)
6 < L ≤ 18	±0.3 (mm)
18 < L ≤ 50	±0.4 (mm)
50 < L ≤ 125	±0.5 (mm)
125 < L	±0.6 (mm)
ANGLE	±1° (DEG)

AZ DISPLAYS, INC.

AGM1264B

REV. NO.	DESCRIPTION	DATE	DESIGN	CHECK	APPROVE	DWG. NO.	SCALE	UNIT
						M436DD0A	1/1	mm