

# AZ DISPLAYS, INC.

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*COMPLETE LCD SOLUTIONS*

## **SPECIFICATIONS FOR LIQUID CRYSTAL DISPLAY**

PART NUMBER

AGM 1264F SERIES

REVISED:

December 10, 2001

# AGM1264F SERIES GRAPHIC MODULE

## 1.0 MECHANICAL SPECS

2. Overall Module Size	93.0mm(W) x 70.0mm(H) x max 14.0mm(D) for LED backlight version 93.0mm(W) x 70.0mm(H) x max 9.5mm(D) for reflective version
3. Dot Size	0.48mm(W) x 0.48mm(H)
4. Dot Pitch	0.52mm(W) x 0.52mm(H)
5. Duty	1/64
6. Controller IC	KS0108B
7. LC Fluid Options	STN, FSTN
8. Polarizer Options	Reflective, Transflective, Transmissive
9. Backlight Options	LED
10. Temperature Range Options	Standard (0°C ~ 50°C), Wide (-20°C ~ 70°C)

## 2.0 ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Min	Typ	Max	Unit
Operating temperature (Standard)	Top	0	-	50	°C
Storage temperature (Standard)	Tst	-20	-	70	°C
Operating temperature (Wide temperature)	Top	-20	-	70	°C
Storage temperature (Wide temperature)	Tst	-30	-	80	°C
Input voltage	Vin	Vss		Vdd	V
Supply voltage for logic	Vdd- Vss	-0.3	-	7.0	V
Supply voltage for LCD drive	Vdd- Vo	9.5	11.5	14.0	V

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## 3.0 ELECTRICAL CHARACTERISTICS

Item	Symbol	Condition	Min	Typ	Max	Unit
Input voltage (high)	V <sub>ih</sub>	H level	3.5	-	V <sub>dd</sub>	V
Input voltage (low)	V <sub>il</sub>	L level	0	-	1.5	V
Recommended LC Driving Voltage (Standard Temp)	V <sub>dd</sub> - V <sub>o</sub>	0°C	-	12.2	12.8	V
		25°C	-	11.5	-	
		50°C	10.2	10.6	-	
Recommended LC Driving Voltage (Wide Temp)	V <sub>dd</sub> - V <sub>o</sub>	-20°C	-	13.0	14.0	V
		0°C	-	12.2	-	
		50°C	10.2	10.6	-	
		70°C	9.5	10.0	-	
Power Supply Current	I <sub>dd</sub>	V <sub>dd</sub> =5.0V	-	-	15.0	mA
LED Power Supply Voltage	V <sub>fled</sub>	R=6.8Ω	-	4.6	5.0	V
LED Power Supply Current	I <sub>fled</sub>	R=6.8Ω	-	470	560	mA

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## 4.0 OPTICAL CHARACTERISTICS

Mode \ Item		Cr (Contrast Ratio)		$\theta$ (Viewing Angle)		$\phi$ (Viewing Angle)	
		25°C		25°C		25°C	
		MIN.	TYP.	MIN	TYP.	MIN	TYP.
R	A	2.8	3.05	80	85	-	35
	B	7.10	7.70	80	85	-	35
	C	-	-	-	-	-	-
S	A	2.49	2.99	80	85	-	35
	B	7.05	7.55	80	85	-	35
	C	-	-	-	-	-	-

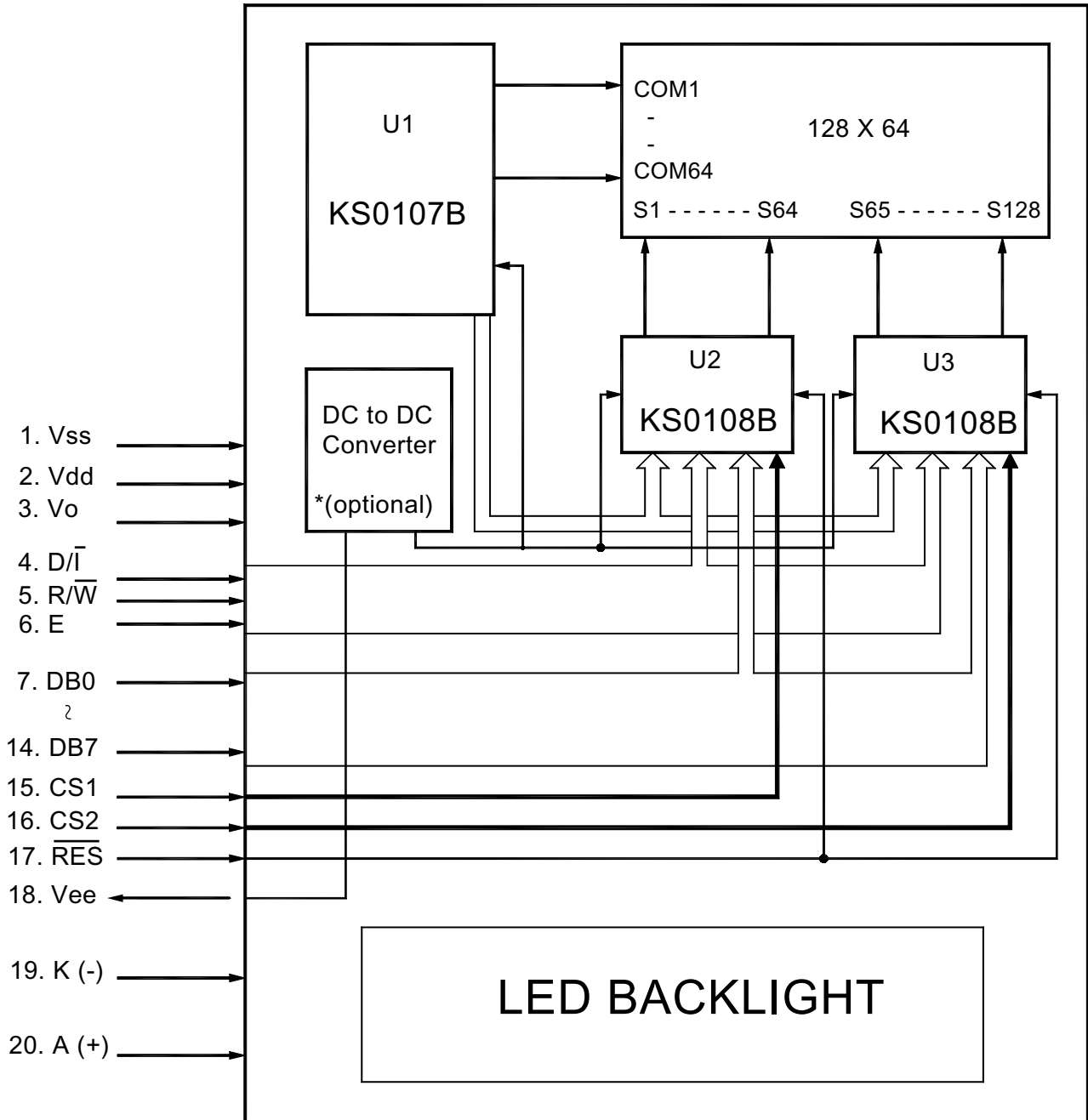
Note:

- R: Reflective
- S: Transflective
- A: STN Gray
- B: STN Yellow
- C: FSTN

At:  $\phi=0^\circ, \theta=0^\circ$

Item	Symbol	Condition	Min	Typ	Max	Unit
Response time (rise)	Tr	25°C	-	140	280	ms
Response time (fall)	Tf	25°C	-	80	160	ms

5.0 BLOCK DIAGRAM

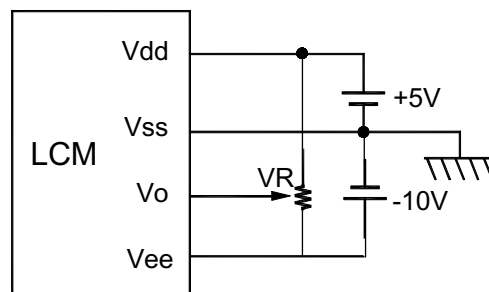


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## 6.0 PIN ASSIGNMENT

Pin No.	Symbol	Function	Level
1	Vss	Ground	-
2	Vdd	+5V	-
3	Vo	LCD contrast adjust	-
4	D/I	H: Data input L: Instruction code input	H/L
5	R/W	H: Data read L: Data write	H/L
6	E	Enable signal	H/L
7	DB0	Data bit 0	H/L
8	DB1	Data bit 1	H/L
9	DB2	Data bit 2	H/L
10	DB3	Data bit 3	H/L
11	DB4	Data bit 4	H/L
12	DB5	Data bit 5	H/L
13	DB6	Data bit 6	H/L
14	DB7	Data bit 7	H/L
15	CS1	Chip selection for IC1	H
16	CS2	Chip selection for IC2	H
17	RST	Reset	L
18	Vee	Power supply for LCD driving	-
19	BL-	Power Supply for BL-	-
20	BL+	Power Supply for BL+	-

## 7.0 POWER SUPPLY



VR=10K~20K

## 8.0 TIMING CHARACTERISTICS

Item	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Enable cycle time	$t_{CYC}$	Fig. a, Fig. b	1000	-	-	ns
E high level width	$t_{WH}$	Fig. a, Fig. b	450	-	-	ns
E low level width	$t_{WL}$	Fig. a, Fig. b	450	-	-	ns
Enable 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 (Write)	$t_{DHW}$	Fig. a	10	-	-	ns
Data hold time (Read)	$t_{DHR}$	Fig. b	20	-	-	ns

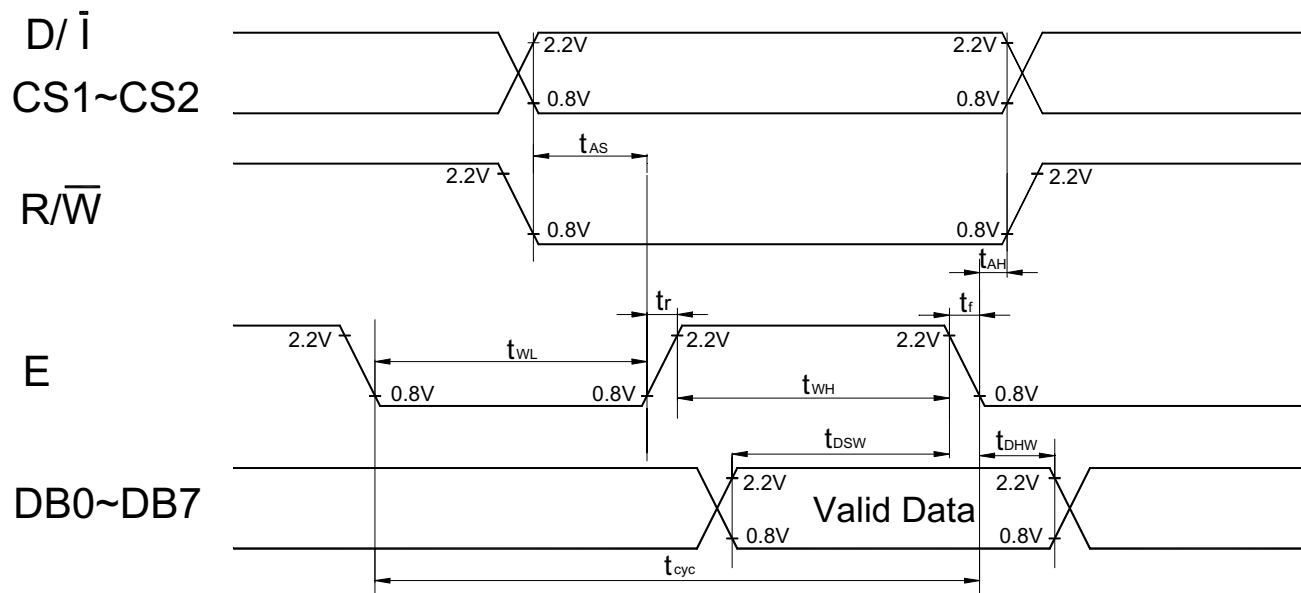


Fig. a Interface timing (data write)

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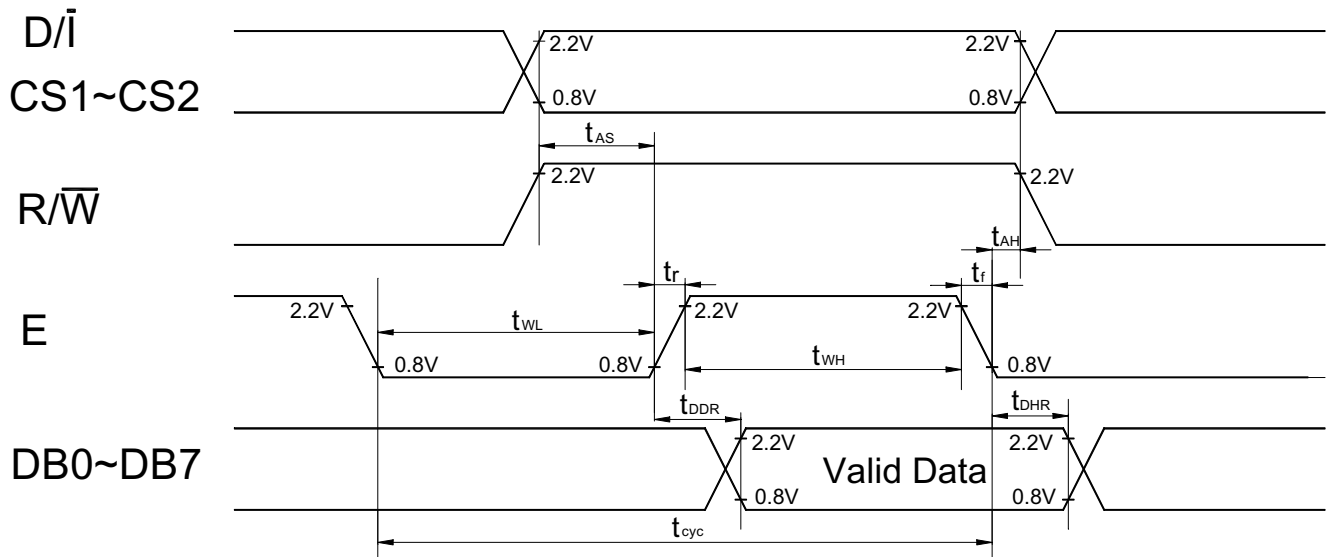


Fig. b Interface timing (data read)

## 9.0 RELIABILITY TEST

Storage Condition	Content	Evaluations and Assessment*		
		Current Consumption	Contrast	Other Appearances
Operation at high temperature and humidity	40°C, 90% RH, 240hrs	Twice initial value or less	More than 80% of initial value	No abnormality
High temperature storage	60°C, 240hrs	Twice initial value or less	More than 80% of initial value	No abnormality
Low temperature storage	-20°C, 240hrs	Twice initial value or less	More than 80% of initial value	No abnormality

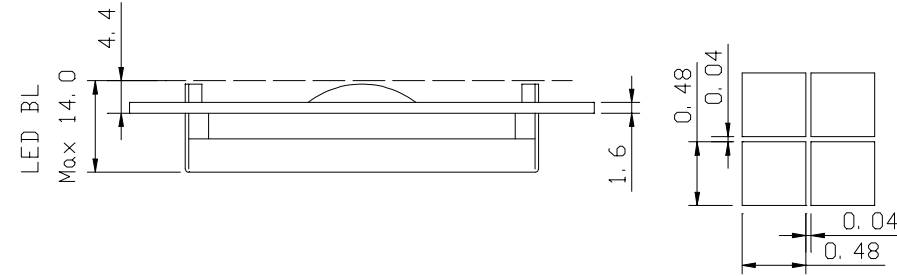
\*Evaluations and assessment to be made two hours after returning to room temperature (25°C–5°C).

\*The LCDs subjected to the test must not have dew condensation.

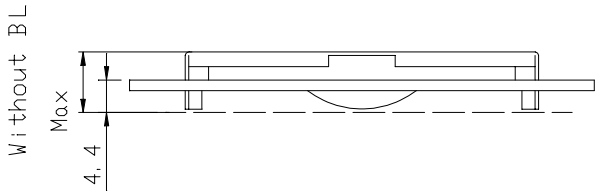
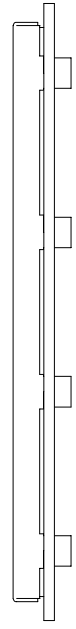
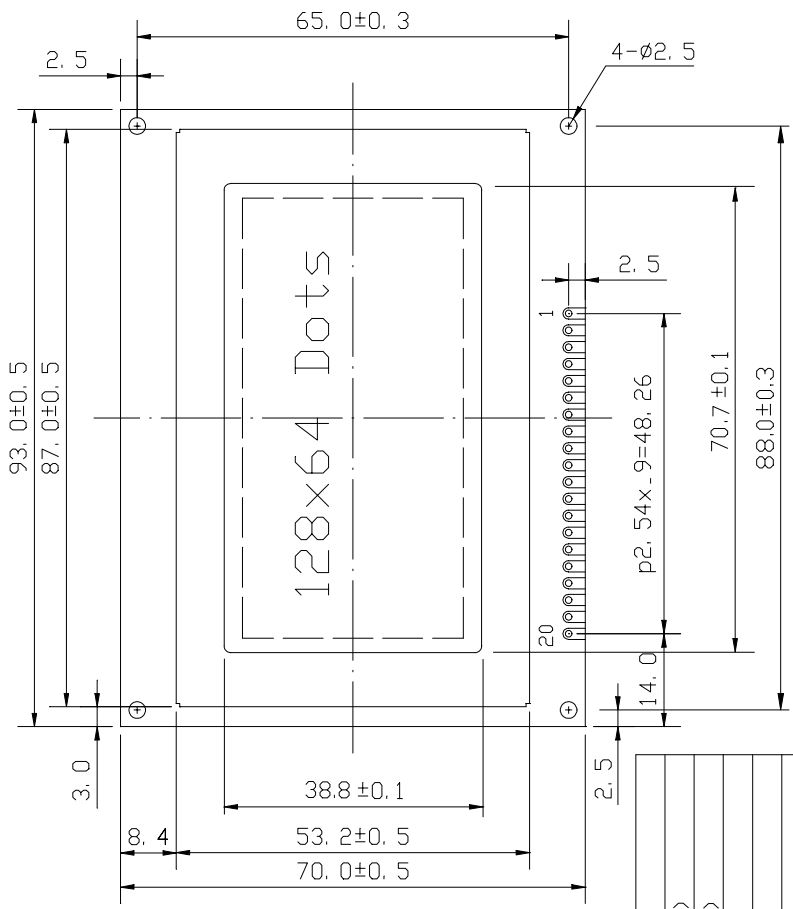


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## 10.0 MECHANICAL DIAGRAM



Display Pattern

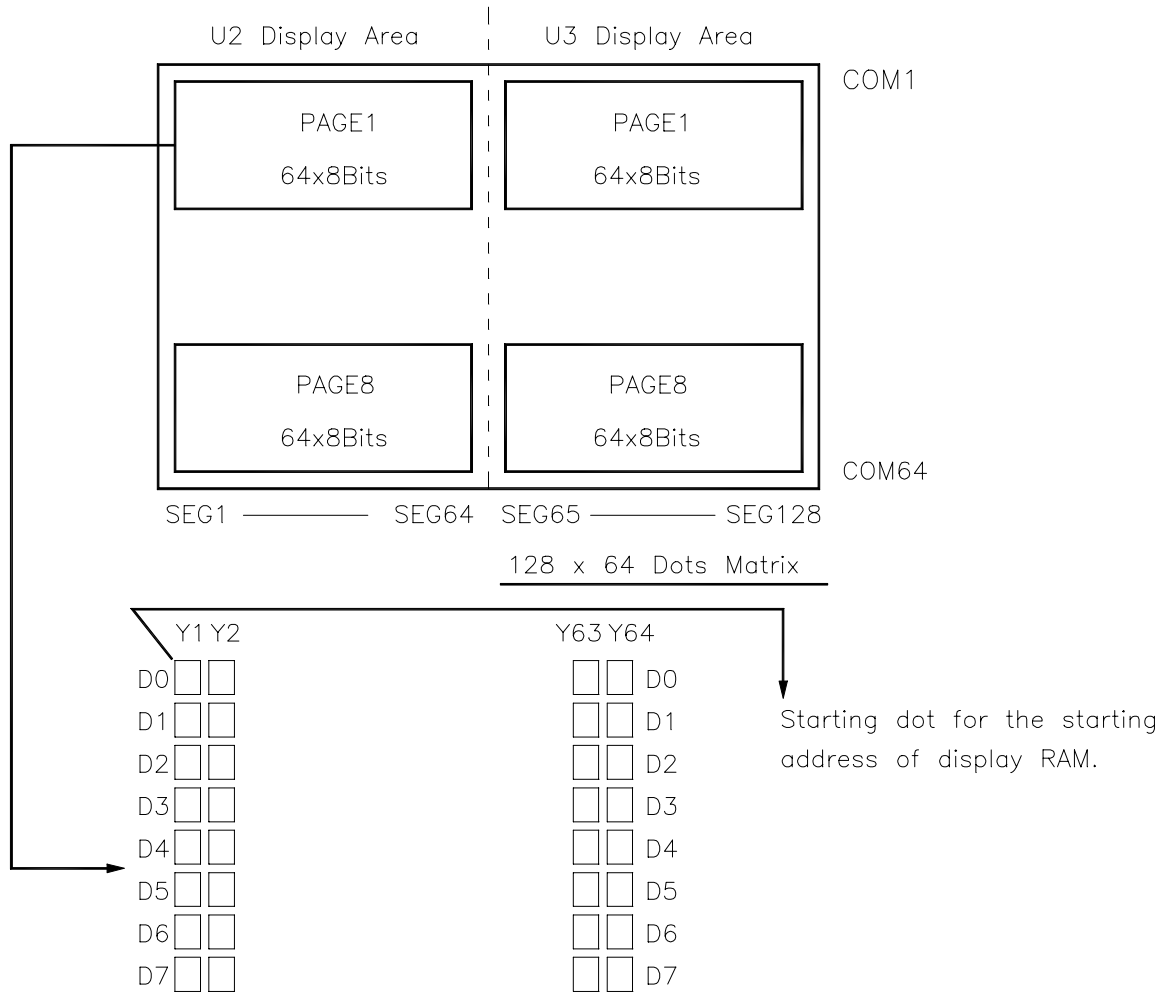


PIN SYMBOL	FUNCTION
1	V <sub>ss</sub> POWER SUPPLY (GND)
2	V <sub>dd</sub> POWER SUPPLY (+5V)
3	V <sub>o</sub> CONTRAST ADJUST
4	D/I DATA/INSTRUCTION
5	R/W READ/WRITE SIGNAL
6	E ENABLE SIGNAL
7	DB0
8	DB1
9	DB2
10	DB3
11	DB4
12	DB5
13	DB6
14	DB7
15	CS1 CHIP SELECT FOR IC1
16	CS2 CHIP SELECT FOR IC2
17	RES RESET
18	V <sub>ee</sub> POWER SUPPLY FOR LCD DRIVING
19	BL- POWER SUPPLY LED-
20	BL+ POWER SUPPLY LED+

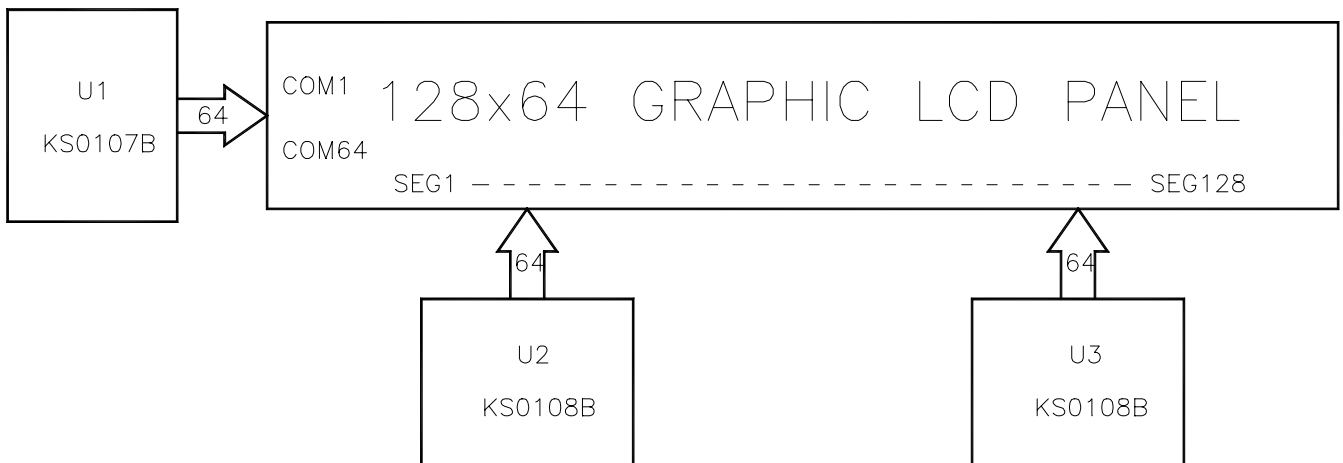
Part No: AGM1264F		AZ DISPLAYS, INC.	
		REVISION RECORD	NAME DATE
1	REVISION: VER. 1		
2			
3			
4			
		DRAWN BY:	DATE:
		CHECKED BY:	DATE:
		APPROVED BY:	DATE:
		UNIT: MM	
		SCALE:	

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## 11.0 RELATION BETWEEN DISPLAY PATTERN AND DRIVERS



Each segment driver has 8 pages RAM, and each page has 64x8 bits RAM.  
 D0~D7 are 8 bits transmitted data, where D0 is LSB and D7 is MSB.



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## 12.0 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	DESCRIPTION	
Display ON/OFF	0	0	0	0	1	1	1	1	1	1	Controls the display on or off. Display RAM data and internal status is not affected. 0: OFF. 1:ON	
Set Address	0	0	0	1	Y address (0~63)						Sets the Y address at 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 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~DB7 into display data RAM. After writing instruction, Y address is increased by 1 automatically.
Read Display Data	1	1	Read Data									Reads data DB0~DB7 from display data RAM to the data bus.