

AZ Displays, Inc.

1. MECHANICAL DATA

(1) Product No.	AGM1532A
(2) Module Size	116.50 (W)mm x 42.0 (H)mm x MAX15.0 (D)mm (LED B.L.) 116.50 (W)mm x 42.0 (H)mm x MAX9.5 (D)mm (W/O B.L.)
(3) Dot Size	0.50 (W)mm x 0.55 (H)mm
(4) Dot Pitch	0.55 (W)mm x 0.60 (H)mm
(5) Duty	1/32
(6) LCD Display Mode	STN: ☐ Gray Mode ☐ Yellow Mode ☐ Blue Mode FSTN: ☐ Black and White(Normal White/Positive Image) ☐ Black and White(Normal Black/Negative Image)
(7) Viewing Direction	Rear Polarizer: ☐ Reflective ☐ Transflective ☐ Transmissive ☐ 6 O'clock ☐ 12 O'clock ☐ ____O'clock
(8) Backlight	☐ W/O ☐ LED ☐ EL
(9) Weight	LED B/L: 70.0 g W/O B/L: 54.5 g

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2.ABSOLUTE MAXIMUM RATINGS

(1) ELECTRICAL ABSOLUTE RATINGS

Vss=0V

	SYMBOL	MIN	MAX	UNIT	COMMENT
Power Supply for Logic	VDD-VSS	-0.3	6.5	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 1,3		Note 2,3		Note 3,4		Note 3,5	

Note 1 Ta $\leq$ 50°C : 85%RH max
Ta>50°C : Absolute humidity must be lower
than the humidity of 85%RH at 50°C

Note 2 Ta at -20°C will be < 48hrs, at 70°C will be < 120hrs

Note 3 Background color changes slightly depending on ambient temperature.
This phenomenon is reversible.

Note 4 Ta $\leq$ 70°C : 75%RH max
Ta>70°C : Absolute humidity must be lower
than the humidity of 75%RH at 70°C

Note 5 Ta at -30°C will be < 48hrs, at 80°C will be < 120hrs

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3. ELECTRICAL CHARACTERISTICS

(VDD=5V±10%)

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Input Voltage	VIH	H level	0.8VDD	—	VDD	V
	VIO	L level	0	—	0.2VDD	V
Recommended LC Driving Voltage (NORMAL TEMP. LCM)	VDD-V0	0℃	—	7.5	8.0	V
		25℃	6.3	6.8	7.3	
		50℃	5.6	6.1	—	
Recommended LC Driving Voltage (WIDE TEMP. LCM)	VDD-V0	−20℃	8.1	8.5	8.9	V
		0℃	7.9	8.3	8.7	
		25℃	7.6	8.0	8.4	
		50℃	7.3	7.7	8.1	
		70℃	6.7	7.1	7.5	
Power Supply Current	IDD	VDD = 5.0V	—	—	5.0	mA
LED Power Supply Current	ILED	VBL = 5.0Vdc RLED = 5.0Ω	—	170	—	mA

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4.1 OPTICAL CHARACTERISTICS

(FOR NORMAL TEMPERATURE MODE LCM)

AT Vop

ITEM MODE		Cr(Contrast Ratio)		θ (Viewing Angle)		ϕ (Viewing Angle)	
		25℃		25℃		25℃	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
R	A	2.5	3.4	30	40	20	30
	C	4.0	8.0	40	60	25	40
	J						
S	A						
	C	4.0	7.0	40	60	25	35
	J						
T	E						
	C	3.0	6.0	40	50	20	35
NOTE		NOTE6		NOTE5			

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

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	0℃	—	470	940	ms	NOTE 2
		25℃	—	140	300		
		50℃	—	70	150		
Response Time (fall)	Tf	0℃	—	520	1000	ms	NOTE 2
		25℃	—	180	350		
		50℃	—	110	220		

NOTE :

- R: REFLECTIVE
- S: TRANSFLECTIVE
- T: TRANSMISSIVE
- A: GRAY
- C: YELLOW
- E: BLUE
- G: NORMALLY BLACK
- J: NORMALLY WHITE

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4.2 OPTICAL CHARACTERISTICS

(FOR WIDE NORMAL TEMPERATURE MODE LCM)

AT Vop

ITEM MODE		Cr(Contrast Ratio)		θ (Viewing Angle)		ϕ (Viewing Angle)	
		25℃		25℃		25℃	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
R	A						
	C						
	J						
S	A						
	C	—	6.5	—	60	—	90
	J						
T	E						
	C						
NOTE		NOTE6		NOTE5			

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

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	−20℃	—	1800	2700	ms	NOTE 2
		0℃	—	400	600		
		25℃	—	150	230		
		50℃	—	70	110		
		70℃	—	70	110		
Response Time (fall)	Tf	−20℃	—	1060	1590	ms	NOTE 2
		0℃	—	250	380		
		25℃	—	105	160		
		50℃	—	65	100		
		70℃	—	60	90		

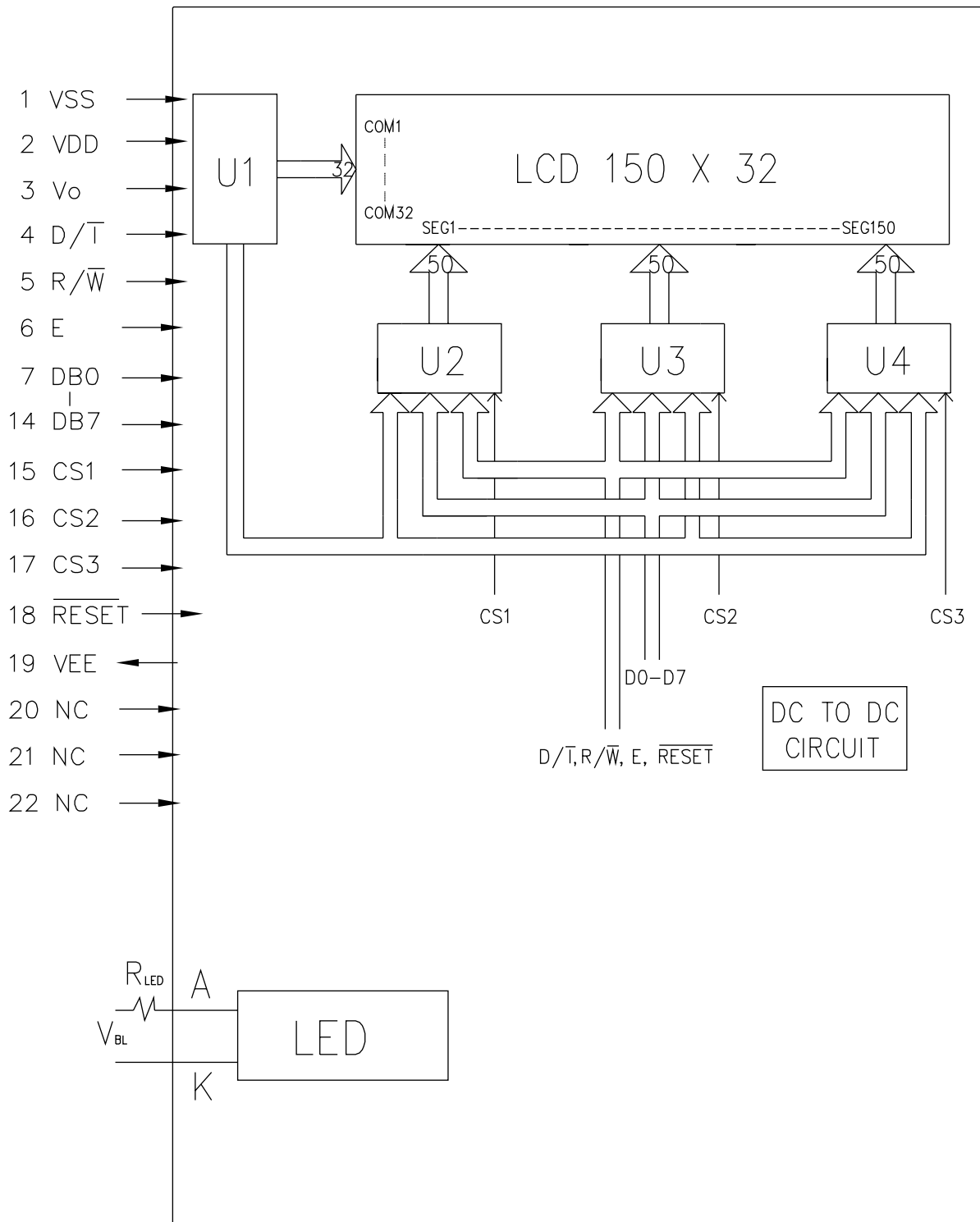
NOTE :

R: REFLECTIVE
S: TRANSFLECTIVE
T: TRANSMISSIVE
A: GRAY
C: YELLOW

E: BLUE
G: NORMALLY BLACK
J: NORMALLY WHITE

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5. BLOCK DIAGRAM



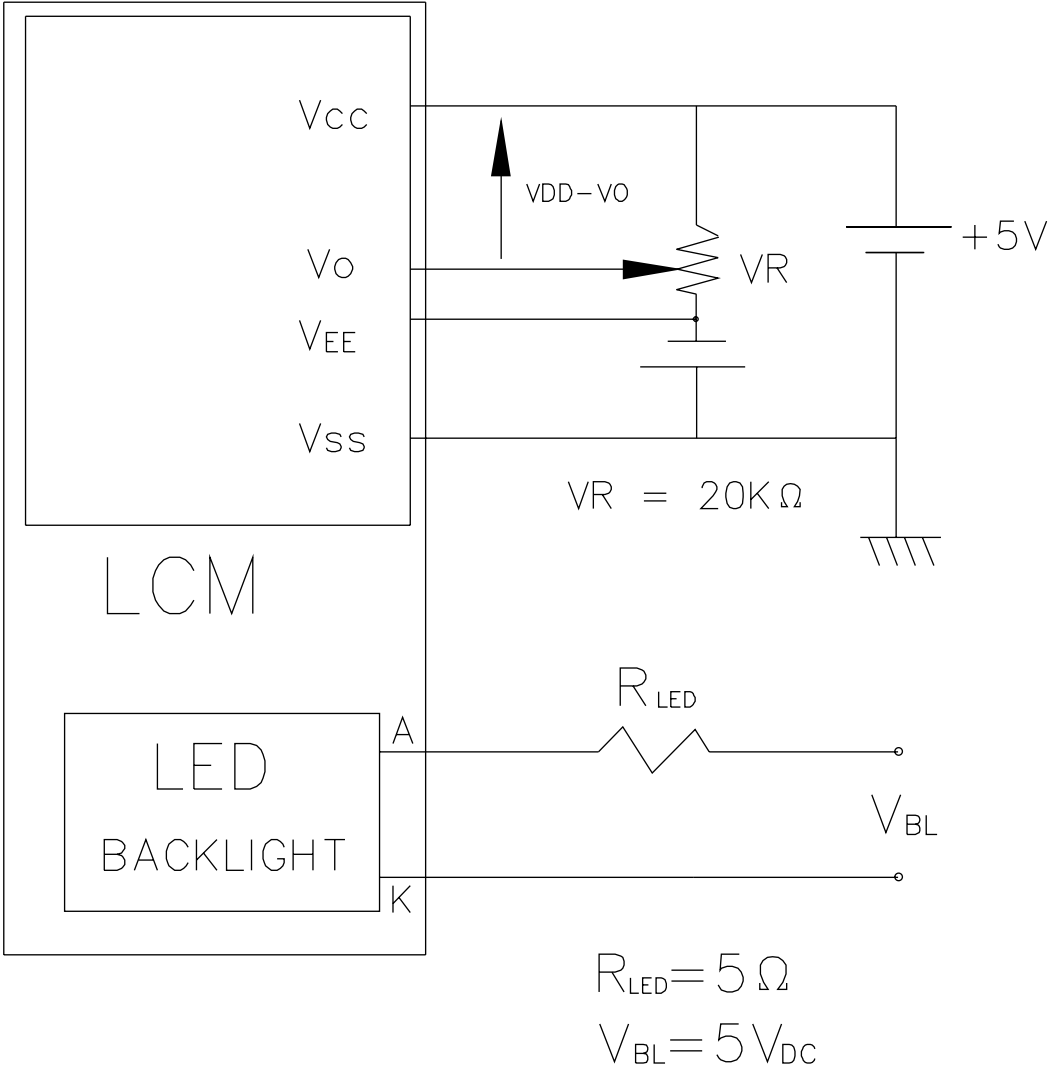
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6.INTERNAL PIN CONNECTION

Pin No.	Symbol	Level	Function	
1	V _{SS}	—	0V	POWER SUPPLY
2	V _{DD}	—	+5V	
3	V ₀	—	OPERATING VOLTAGE FOR LCD DRIVING	
4	D/ $\bar{T}$	H/L	H: DATA INPUT L: INSTRUCTION CODE INPUT	
5	R/ $\bar{W}$	H/L	H: DATA READ (FROM LCM TO MPU) L: DATA WRITE (FROM 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	CS3	H	CHIP SELECT FOR IC3	
18	$\overline{\text{RESET}}$	L	" L " ACTIVE	
19	VEE	—	POWER SUPPLY FOR LCD DRIVING	
20	NC	—	NONE CONNECTION	
21	NC	—	NONE CONNECTION	
22	NC	—	NONE CONNECTION	

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7. POWER SUPPLY



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8.TIMING CHARACTERISTICS

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Enable cycle time	t_{cyc}	Fig a, Fig.b	500	—	—	ns
E high level width	P_{WEH}	Fig a, Fig.b	220	—	—	ns
E low level width	P_{WEL}	Fig a, Fig.b	220	—	—	ns
E rise/fall time	t_r, t_f	Fig a, Fig.b	—	—	20	ns
Address set up time	t_{AS}	Fig a, Fig.b	40	—	—	ns
Address hold time	t_{AH}	Fig a, Fig.b	10	—	—	ns
Data delay time	t_{DDR}	Fig.b	—	—	140	ns
Data set up time	t_{DSW}	Fig.a	60	—	—	ns
Data hold time (WR)	t_{DHW}	Fig.a	10	—	—	ns
Data hold time (RD)	t_{DHR}	Fig.b	20	—	—	ns

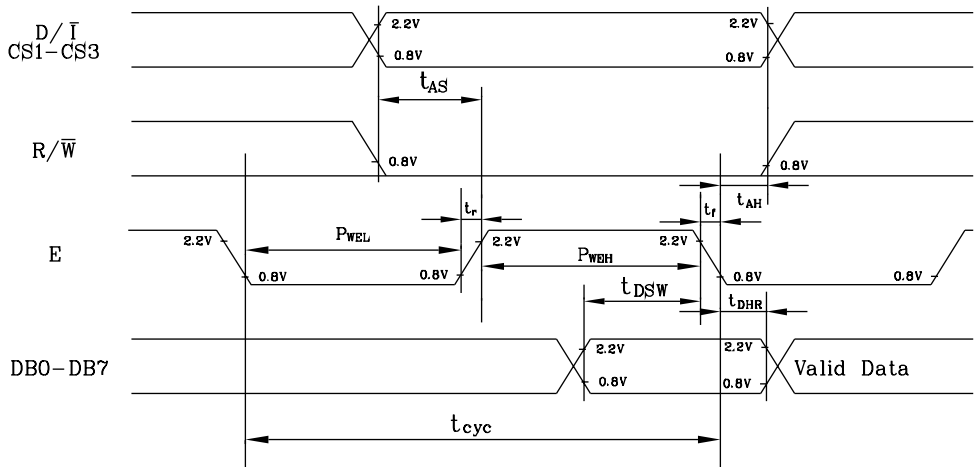


Fig. a Interface timing (data write)

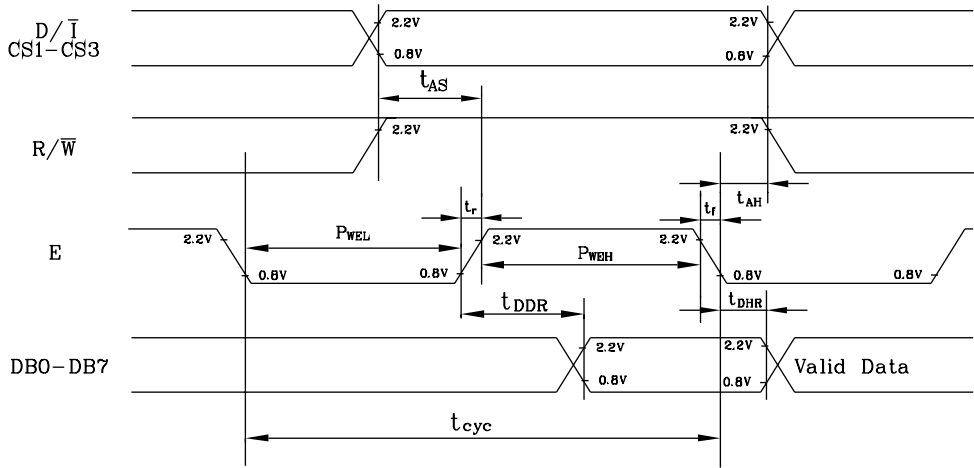
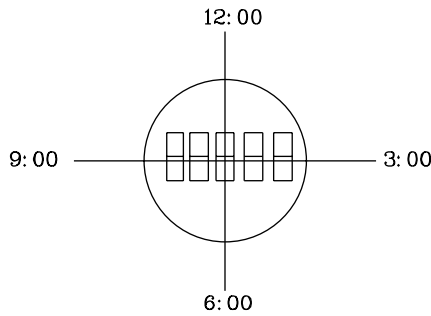


Fig. b Interface timing (data read)

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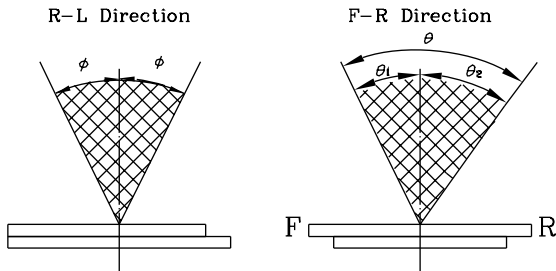
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle



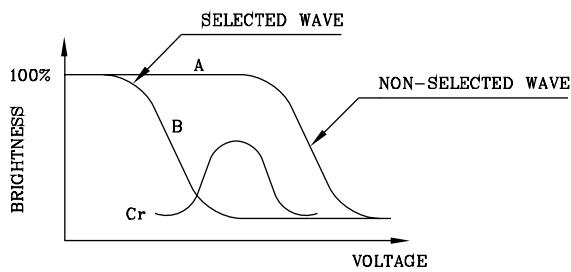
$$\theta = \theta_1 + \theta_2$$

*Conditions

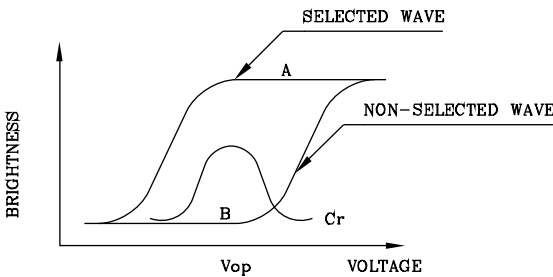
Operating Voltage : V_{op}
Frame Frequency : 70Hz
Applying Waveform : 1/N duty 1/a bias
Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type)

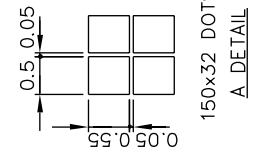
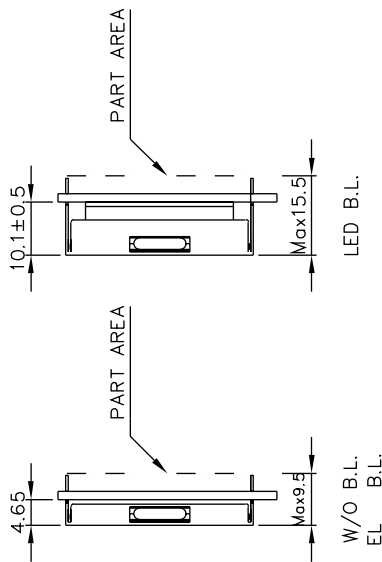


(negative type)

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

*Conditions

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



PinNo.	Symbol	Level	Function	
			OV	Power supply
1	V _{SS}	—		
2	V _{DD}	—		
3	V ₀	—		OPERATING VOLTAGE FOR LCD
4	D ₁	H/L		DATA INPUT L: INSTRUCTION CODE INPUT
5	R/W	H/L		H: DATA READ (FROM LCD TO MPU) L: DATA WRITE (FROM MPU TO LCD)
6	E	H ₁ H ₂ →L		ENABLE SIGNAL
7	DB0	H/L		
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	CS3	H		CHIP SELECT FOR IC3
18	R _{ES}	L		RESET
19	V _{EE}	—		POWER SUPPLY FOR LCD DRIVING
20	NC	—		NO CONNECTION
21	NC	—		NO CONNECTION
22	NC	—		NO CONNECTION

Note :

- 1.Resolution : 150X32 Dots
- 2.General Tolerance : $\pm 0.5\text{mm}$

	AGM1532A		AZ DISPLAYS, INC.	
	NAME	DATE		
APPROVE			TITLE	
CHECK			DWG-NO	MXB031X Rev. A
DESIGN			 UNIT : mm THIRD ANGLE PROJECT	
DRAW	MAY PING	87.03.02	SCALE : 2/3	