

# AZ Displays, Inc.

## 1. MECHANICAL DATA

(1) Product No.	<b>AGM1232D</b>
(2) Module Size	84.0 (W)mm x 44.0 (H)mm x MAX13.0 (D)mm (LED B.L.) 84.0 (W)mm x 44.0 (H)mm x MAX9.0 (D)mm (W/O, EL B.L.)
(3) Dot Size	0.40 (W)mm x 0.45 (H)mm
(4) Dot Pitch	0.44 (W)mm x 0.49 (H)mm
(5) Number of Characters	122 (W) x 32 (H)Dots
(6) Duty	1/32
(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)
(8) Viewing Direction	Rear Polarizer: <input type="checkbox"/> Reflective <input type="checkbox"/> Transflective <input type="checkbox"/> Transmissive <input type="checkbox"/> 6 O'clock <input type="checkbox"/> 12 O'clock <input type="checkbox"/> ___O'clock
(9) Backlight	<input type="checkbox"/> W/O <input type="checkbox"/> LED B/L <input type="checkbox"/> EL B/L
(10) LCD Controller	SED1520
(11) Weight	W/O B/L: 26.5 g EL B/L: 28.0 g LED B L: 37.0 g

# AZ Displays, Inc.

## 2. ABSOLUTE MAXIMUM RATINGS

### (1) ELECTRICAL ABSOLUTE RATINGS

V<sub>SS</sub>=0V

	SYMBOL	MIN	MAX	UNIT	COMMENT
Power Supply for Logic	VDD-VSS	-0.3	6.5	V	
Input Voltage	V <sub>I</sub>	-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 Ta ≤ 50°C : 85%RH max

Ta > 50°C : Absolute humidity must be lower  
than the humidity of 85%RH at 50°C

Note 3 Ta 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 Ta ≤ 70°C : 75%RH max

Ta > 70°C : Absolute humidity must be lower  
than the humidity of 75%RH at 70°C

Note 6 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 (LOW VOLTAGE. LCM)	VDD-V0	DUTY= 1/32 Bias= 1/4	0°C	—	4.7	—	V
			25°C	4.2	4.5	5.0	
			50°C	—	4.3	—	
Recommended LC Driving Voltage (NORMAL TEMP. LCM)	VDD-V0		0°C	—	5.4	6.0	V
			25°C	4.4	4.9	5.3	
			50°C	3.9	4.3	—	
Recommended LC Driving Voltage (WIDE TEMP. LCM)	VDD-V0		-20°C	—	6.5	7.2	V
			0°C	—	—	—	
			25°C	5.8	6.3	6.8	
			50°C	—	—	—	
		70°C	5.4	5.7	—		
Power Supply Current	IDD	VDD = 5.0V	—	—	2.8	mA	
LED Power Supply Current	ILED	VBL = 5VDC (RBL = 5Ω) (RBL = 10Ω)	—	(143) (95)	—	mA	
EL Power Supply Current	IEL	VBL = 110VAC 400Hz	—	—	5.0	mA	

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## 4. OPTICAL CHARACTERISTICS

(FOR NORMAL TEMPERATURE MODE LCM)

AT Vop

MODE \ ITEM		Cr(Contrast Ratio)		$\theta$ (Viewing Angle)		$\phi$ (Viewing Angle)	
		25℃		25℃		25℃	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
R	A	3	4.6	40	80	25	34
	C	5	9	50	80	25	36
	J						
S	A	3	4	40	75	25	32
	C	4.5	9	40	70	25	30
	J						
T	E						
	G						
NOTE		FIG 6		FIG 5			

NOTE :

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

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

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	0℃	—	580	1200	ms	FIG 2
		25℃	—	220	450		
		50℃	—	140	280		
Response Time (fall)	Tf	0℃	—	760	1500	ms	FIG 2
		25℃	—	170	350		
		50℃	—	90	200		

# AZ Displays, Inc.

## 4-1.OPTICAL CHARACTERISTICS

(FOR WIDE TEMPERATURE MODE LCM)

AT Vop

MODE \ ITEM		Cr(Contrast Ratio)		$\theta$ (Viewing Angle)		$\phi$ (Viewing Angle)	
		25℃		25℃		25℃	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
R	A	4	4.4	30	35	20	25
	C						
	J						
S	A	3.5	4.2	25	32	20	25
	C						
	J						
T	E						
	G						
NOTE		FIG 6		FIG 5			

NOTE :

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

C: YELLOW  
E: BLUE  
G: NORMALLY BLACK  
J: NORMALLY WHITE

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

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	-20℃	-	1100	2200	ms	FIG 2
		0℃	-	-	-		
		25℃	-	90	200		
		50℃	-	-	-		
		70℃	-	40	80		
Response Time (fall)	Tf	-20℃	-	2400	4800	ms	FIG 2
		0℃	-	-	-		
		25℃	-	170	350		
		50℃	-	-	-		
		70℃	-	60	120		

# AZ Displays, Inc.

## 4-2.OPTICAL CHARACTERISTICS

(FOR LOW VOLTAGE MODE LCM)

AT Vop

MODE	ITEM	Cr(Contrast Ratio)		$\theta$ (Viewing Angle)		$\phi$ (Viewing Angle)	
		25℃		25℃		25℃	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
R	A		2.5		86		62
	C		3.0		93		50
	J		4.0		85		58
S	A						
	C						
	J						
T	E						
	G						
NOTE		FIG 6		FIG 5			

NOTE :

R: REFLECTIVE

S: TRANSFLECTIVE

T: TRANSMISSIVE

A: GRAY

C: YELLOW

E: BLUE

G: NORMALLY BLACK

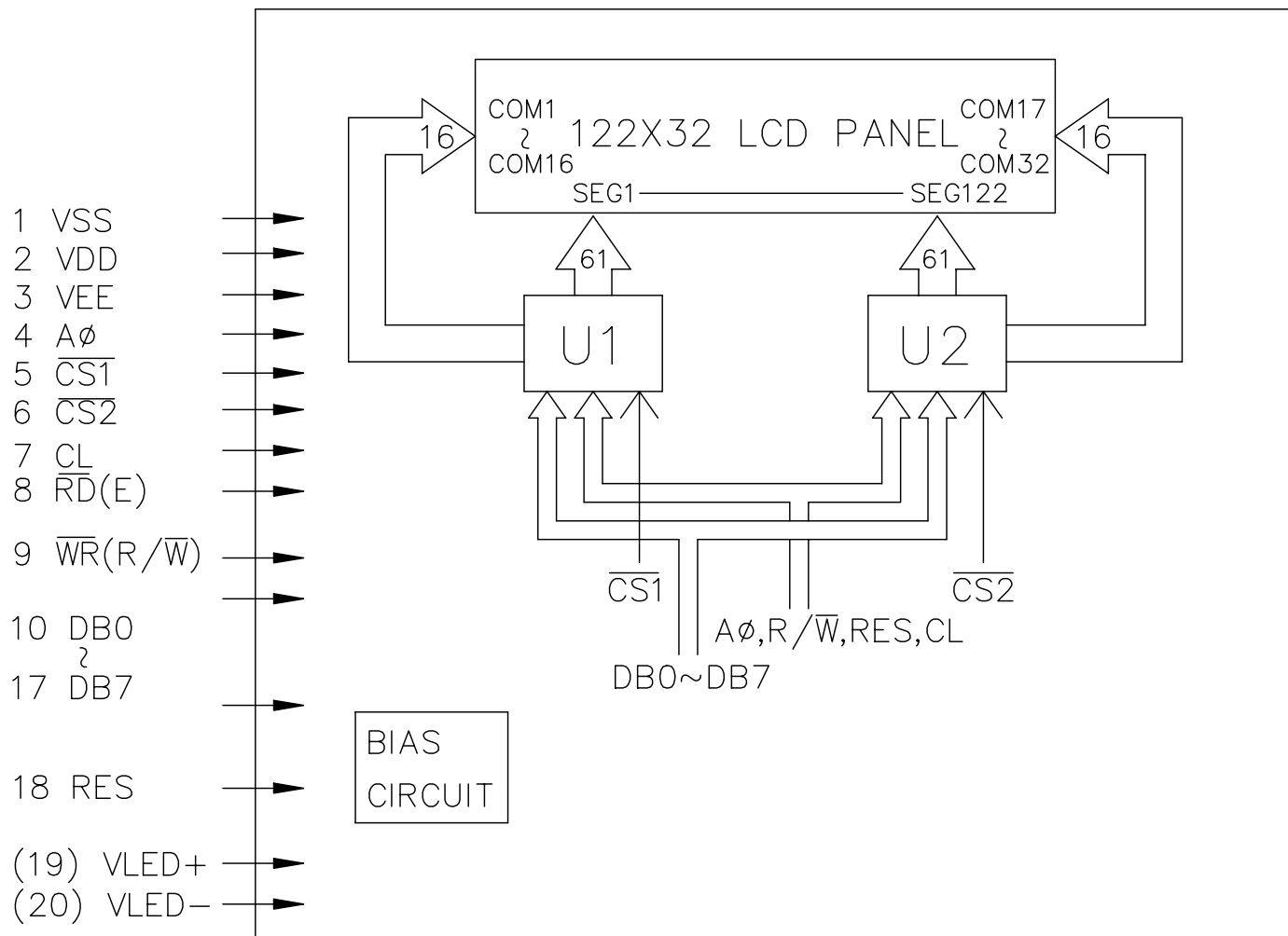
J: NORMALLY WHITE

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

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	-20℃	-	-	-	ms	FIG 2
		0℃	-	-	-		
		25℃	-	250	375		
		50℃	-	-	-		
		70℃	-	-	-		
Response Time (fall)	Tf	-20℃	-	-	-	ms	FIG 2
		0℃	-	-	-		
		25℃	-	150	225		
		50℃	-	-	-		
		70℃	-	-	-		

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## 5. BLOCK DIAGRAM



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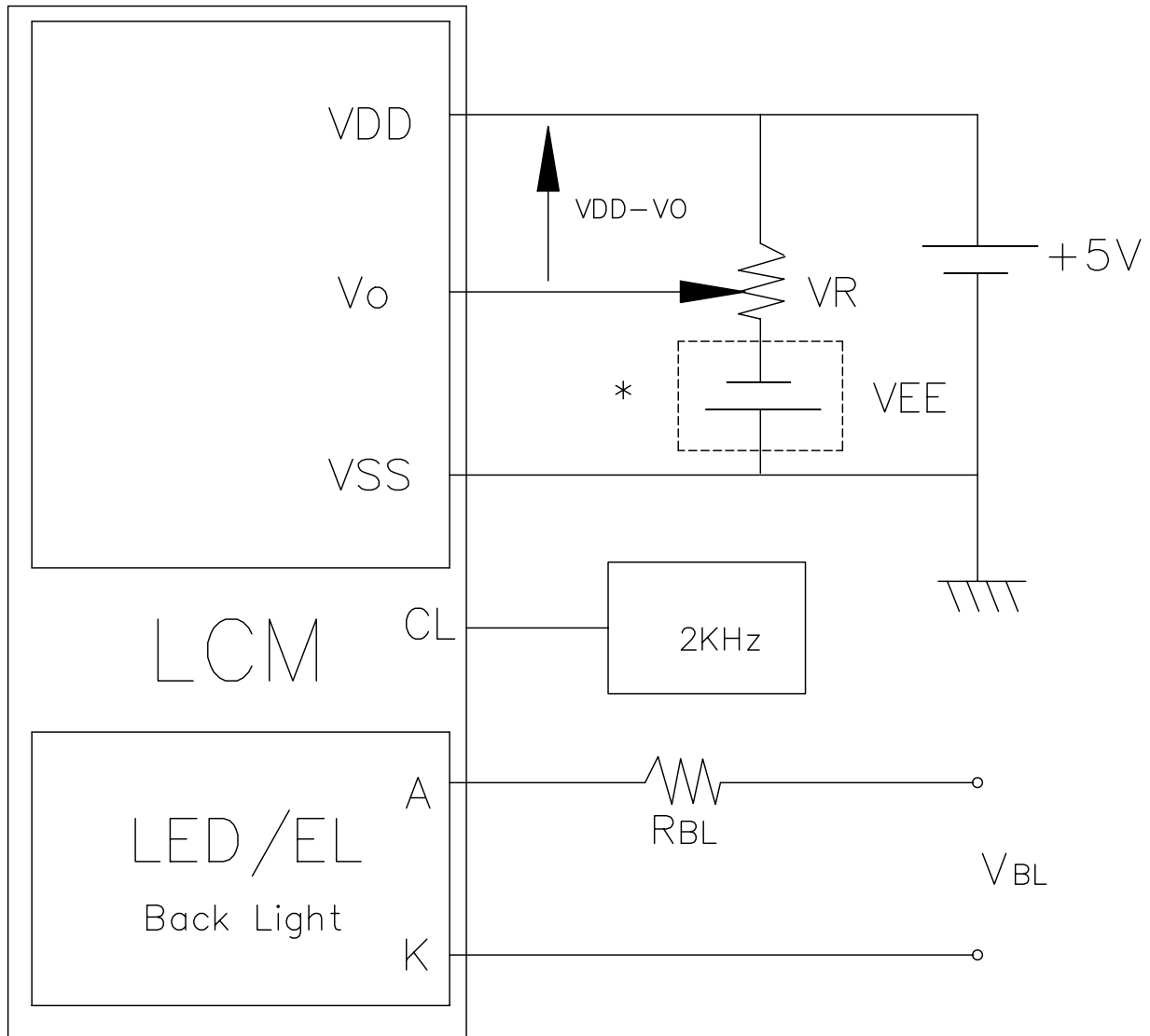
## 6. INTERNAL PIN CONNECTION

PinNo.	Symbol	Level	Function
1	VSS	—	GROUND
2	VDD	—	POWER SUPPLY FOR LOGIC CIRCUIT
3	VEE	—	POWER SUPPLY FOR LCD
4	A $\phi$	H/L	L→INSTRUCTION H→DATA
5	$\overline{CS2}$	L	CHIP ENABLE ACTIVE "L"
6	$\overline{CS1}$	L	CHIP ENABLE ACTIVE "L"
7	CL	H/L	EXTERNAL CLOCK(2KHZ)
8	$\overline{RD}(E)$	—	$\overline{RD}$ FOR 80 SERIES, E FOR 68 SERIES
9	$\overline{WR}(R/\overline{W})$	—	$\overline{WR}$ FOR 80 SERIES, R/ $\overline{W}$ FOR 68 SERIES
10	DB0	H/L	DATA BUS LINE
11	DB1	H/L	
12	DB2	H/L	
13	DB3	H/L	
14	DB4	H/L	
15	DB5	H/L	
16	DB6	H/L	
17	DB7	H/L	
18	RES	H/L	L→80 SERIES, H→68 SERIES
(19)	VLED+	—	POWER SUPPLY FOR LED BACK LIGHT
(20)	VLED-	—	



# AZ Displays, Inc.

## 7. POWER SUPPLY



$VR = 20K\Omega$  (Variable)

$VEE = 3\sim 5V$

$VEE = 0V$  (FOR LOW VOLTAGE LCM)

Recommended Value for RBL and VBL

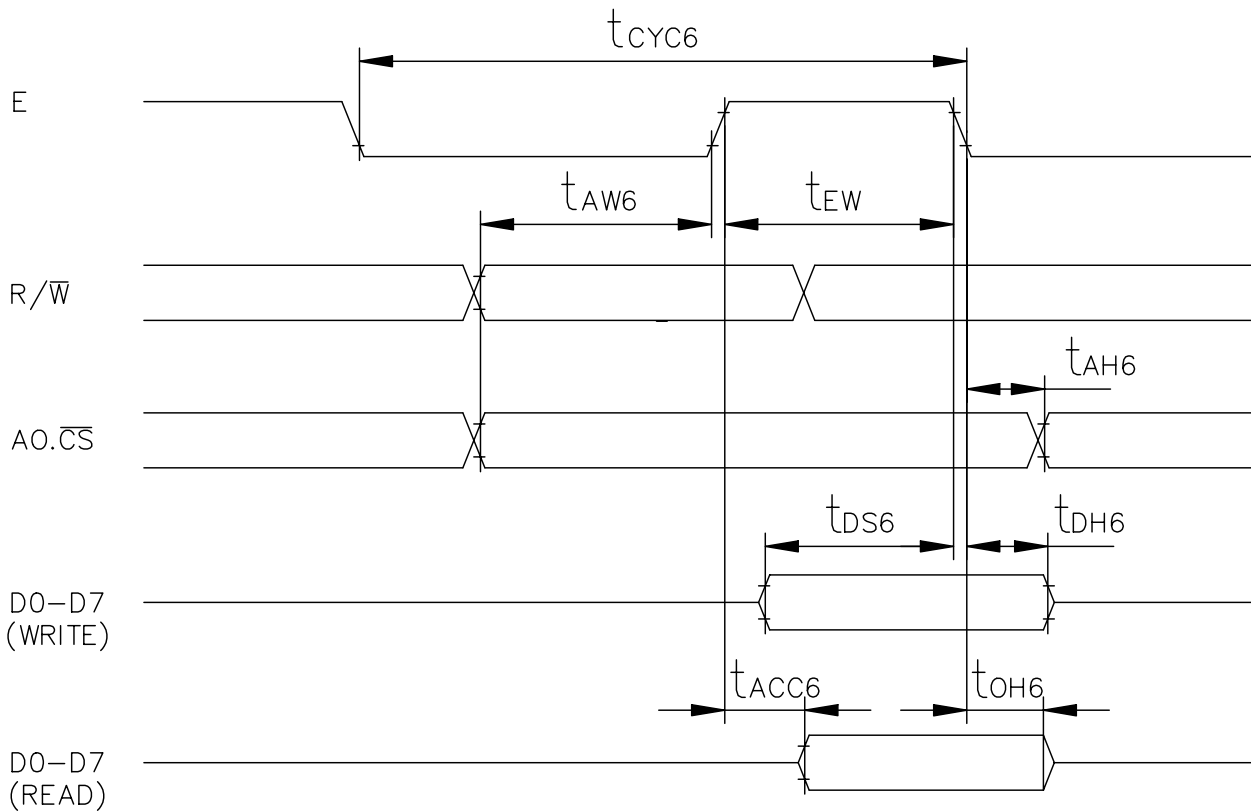
ITEM	RBL		VBL	
	LED	EL	LED	EL
Back Light	LED	EL	LED	EL
Interface	LED	EL	LED	EL
20 PIN	$0\Omega$	$0\Omega$	5V	110V <sub>Ac</sub> 400Hz

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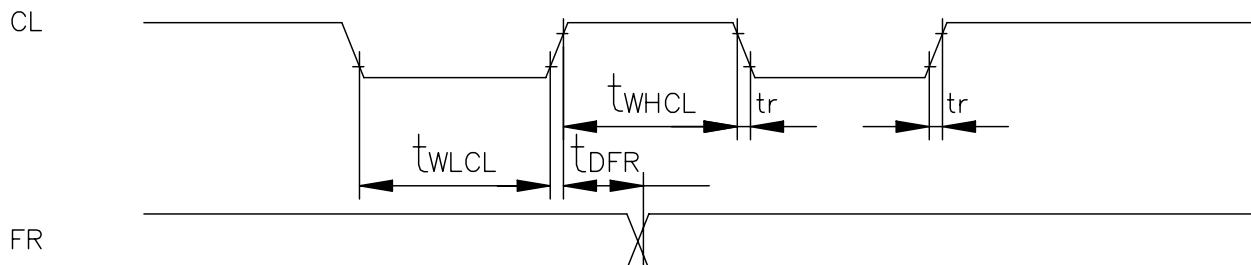
## 8. TIMING CHART

Item	Signal	Symbol	Condition	Min	Typ	Max	Unit
LOW pulse width	CL	$t_{WLCL}$		35	—	—	$\mu s$
HIGH pulse width		$t_{WHCL}$		35	—	—	$\mu s$
Rising time		$t_r$		—	30	150	ns
Falling time		$t_f$		—	30	150	ns
FR delay time	FR	$t_{DFR}$	(Input timing)	-2.0	0.2	2.0	$\mu s$
			(Output timing), $C_L=100pF$		0.2	0.4	

○ Read/write timing for the 68-port MPU



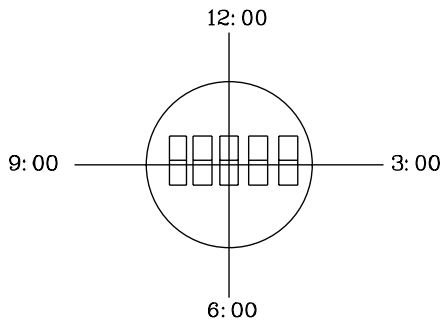
○ Control timing for 80-port/68-port display



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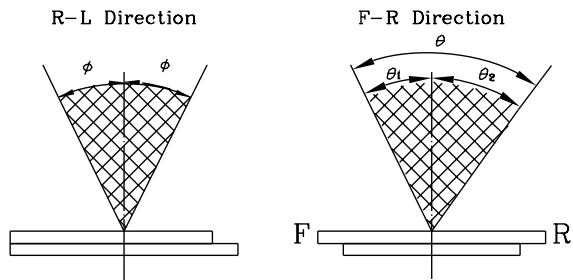
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle



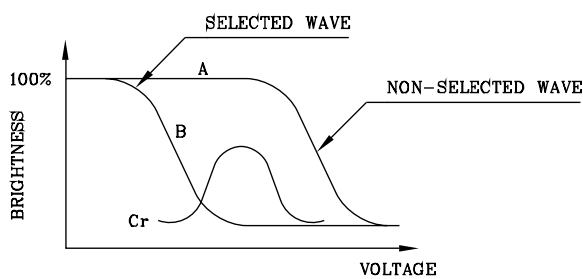
$$\theta = \theta_1 + \theta_2$$

\*Conditions

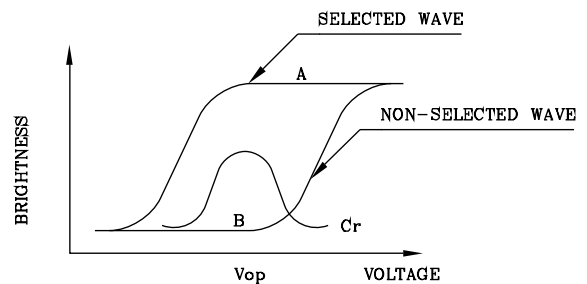
- Operating Voltage :  $V_{op}$
- Frame Frequency : 70Hz
- Applying Waveform : 1/N duty 1/a bias
- Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type)

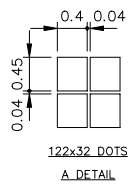
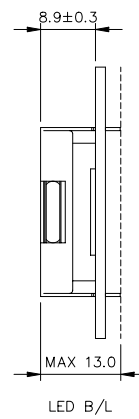
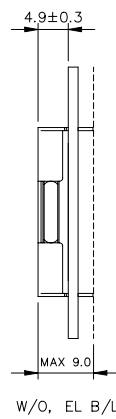
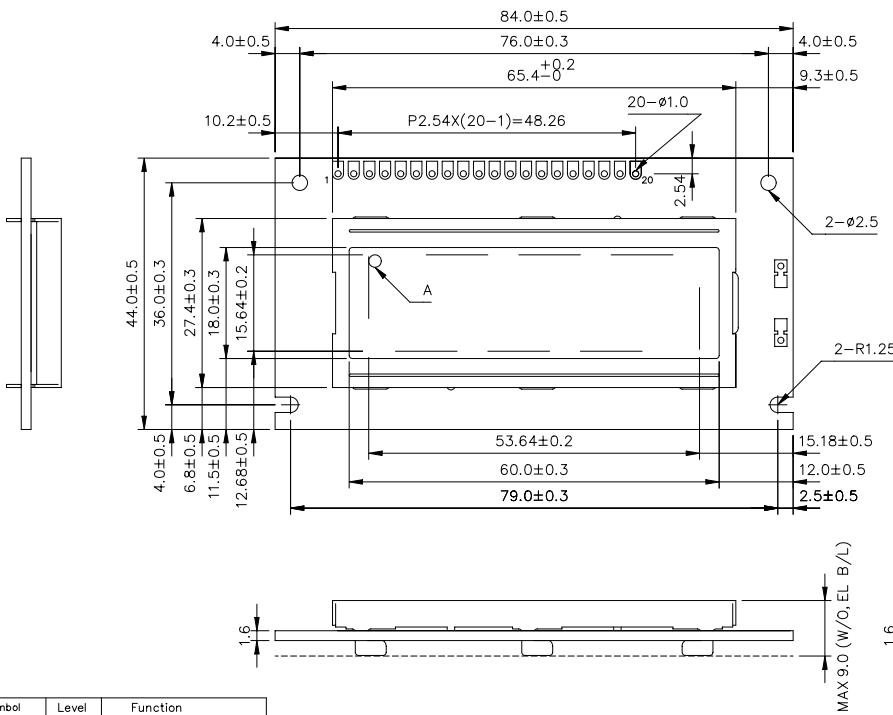


(negative type)

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

\*Conditions

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



PinNo.	Symbol	Level	Function
1	VSS	-	GROUND
2	VDD	-	POWER SUPPLY FOR LOGIC CIRCUIT
3	VEE	-	POWER SUPPLY FOR LCD
4	A $\phi$	H/L	L-INSTRUCTION H-DATA
5	CS1	L	CHP ENABLE ACTIVE "L"
6	CS2	L	CHP ENABLE ACTIVE "L"
7	CL	H/L	EXTERNAL CLOCK(20KHZ)
8	RD(E)	-	RD FOR 80 SERIES, E FOR 68 SERIES
9	WR(R/W)	-	WR FOR 80 SERIES, R/W FOR 68 SERIES
10	DB0	H/L	DATA BUS LINE
11	DB1	H/L	
12	DB2	H/L	
13	DB3	H/L	
14	DB4	H/L	
15	DB5	H/L	
16	DB6	H/L	
17	DB7	H/L	
18	RES	H/L	L=80 SERIES H=68 SERIES
19	VLED+	-	POWER SUPPLY FOR LED BACK LIGHT
20	VLED-	-	

Resolution : 122X32 Dots

AGM1232D		AZ DISPLAYS, INC.	
APPROVE	NAME	DATE	TITLE
CHECK			DWG-NO
DESIGN			MXAX042X
DRAW	MAY PING	87.07.22	Rev.A
		THIRD ANGLE PROJECT	
		UNIT :	mm
		SCALE :	1/1