

AZ Displays, Inc.

1. MECHANICAL DATA

(1) Product No.	AGM3224G
(2) Module Size	170.0(W)mm X 110.0(H)mm X MAX8.0(D)mm (CCFL B/L) (Excluded the mounting portions and connectors)
(3) Dot Size	0.33 (W)mm x 0.33 (H)mm
(4) Dot Pitch	0.36 (W)mm x 0.36 (H)mm
(5) Number of Dots	320 (W) x 240 (H)Dots
(6) Duty	1/240
(7) LCD Display Mode	STN: ☐ Gray Mode ☐ Yellow Mode ☐ Blue Mode FSTN: ☐ Black and White(Normally White/Positive Image) ☐ Black and White(Normally Black/Negative Image)
	Rear Polarizer: ☐ Reflective ☐ Transflective ☐ Transmissive ☐ Transflective(High Transmissive)
(8) Viewing Direction	☐ 6 O'clock ☐ 12 O'clock ☐ ____O'clock
(9) Backlight	CCFL B/L
(10) Weight	220g(approx.)
(11) Controller	Without
(12) DC/DC Converter	Without

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2.ABSOLUTE MAXIMUM RATINGS

(1) ELECTRICAL ABSOLUTE RATINGS

VSS=0V

ITEM	SYMBOL	MIN	MAX	UNIT	COMMENT
Power Supply for Logic	VDD-VSS	0	6.0	V	
Power Supply for LCM	VDD-VEE	0	30.0	V	
Input Voltage	VIN-VSS	0	VDD	V	
Supply Voltage for CCFL B/L	VL	0	1500	V	
Supply Current for CCFL B/L	IL	0	6.5	mA	
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
			Note 2,3				Note 3,5	
Humidity (Without Condensation)	Note 1				Note 4			

Note 1 Ta≦50℃ : 85%RH max
Ta>50℃ : Absolute humidity must be lower
than the humidity of 85%RH at 50℃

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

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

Note 4 Ta at -30℃ will be < 48hrs, at 70℃ will be < 120hrs

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3. ELECTRICAL CHARACTERISTICS

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Voltage for Logic		VDD-VSS	—	4.75	5.0	5.25	V
Supply Voltage for LCD		VEE-VSS	—	-25.2	-24.0	-22.8	V
Recommended LC Driving Voltage (Normal Temp. LCM)		VDD-V0	Duty= 1/240 0°C	—	22.1	22.9	V
			Bias= 1/12 25°C	20.6	21.4	22.2	
			50°C	19.7	20.5	—	
Input Signal Voltage		VIH	H level	0.8VDD	—	VDD	V
		VIO	L level	0	—	0.2VDD	V
Supply Current for Logic		IDD	VDD=5.0 V VDD-V0=21.4 V	—	6.5	—	mA
Supply Current for LCD		IEE	PATTERN : □ ■ □ ■ □ ■ ■ □ ■ □ ■ □	—	4.8	—	mA
CCFL LAMP	Supply Voltage	VFTL	FREQUENCY = 35 KHz	315	316.3	317	Vrms
	Supply Current	IFTL		4.9	5.0	5.1	Irms
	Brightness	B		34130	34360	34760	cd/m ²
	Color Degree	X		0.3285	0.3293	0.3305	—
		Y		0.3316	0.3325	0.3340	

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4.OPTICAL CHARACTERISTICS

(For Normal Temperature Mode LCM)

AT VoP

ITEM MODE		Cr(Contrast Ratio)		θ (Viewing Angle)		ϕ (Viewing Angle)	
		25°C		25°C		25°C	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
R	A,B						
	C,D						
	J						
S	A,B						
	C,D						
	J						
T	E	4.0	6.0	35	65	20	30
	G	5.0	7.0	40	70	25	35
note		NOTE6		NOTE5			

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

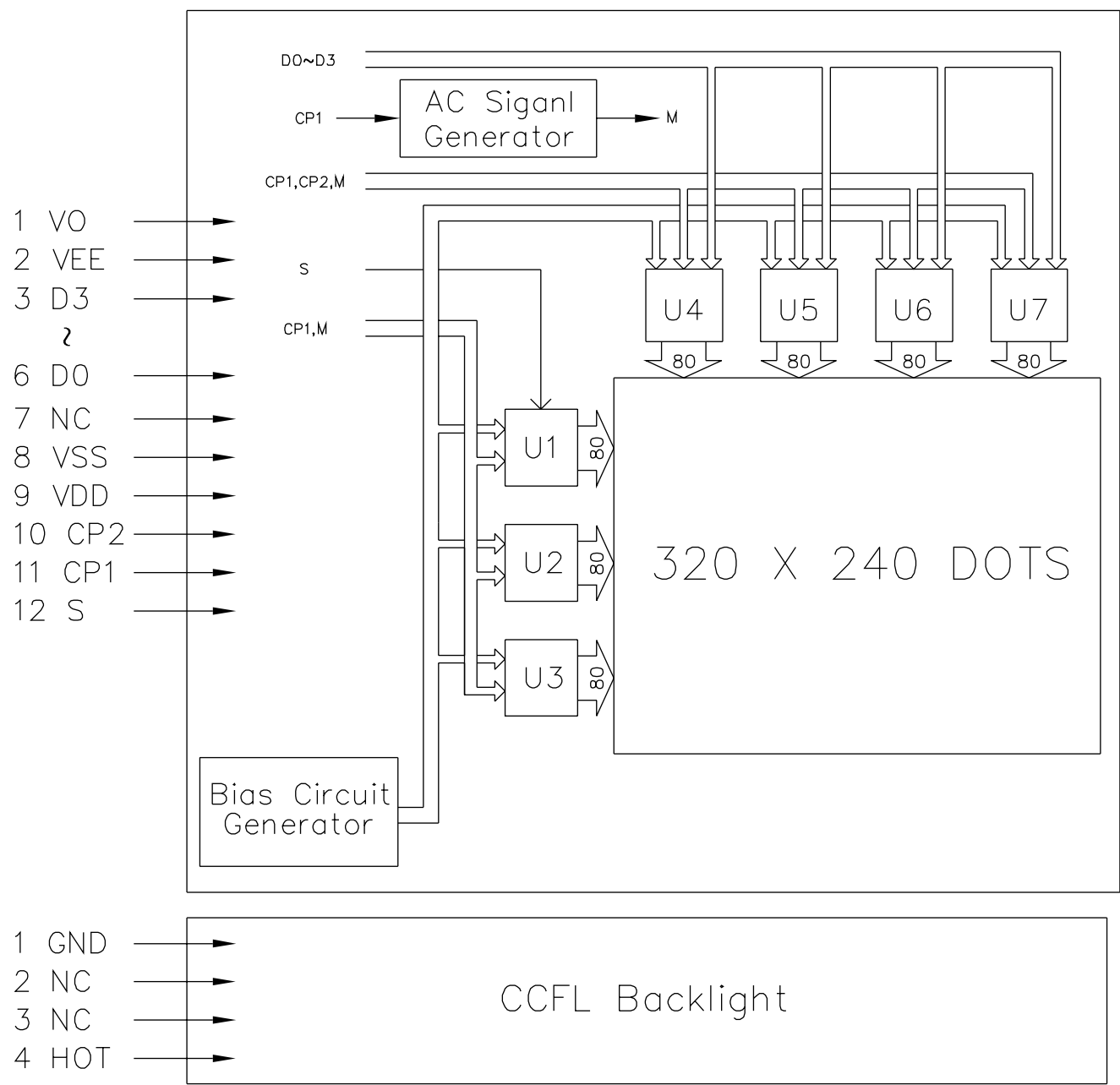
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	0°C	—	500	1000	ms	NOTE 2
		25°C	—	200	400		
		50°C	—	70	140		
Response Time (fall)	Tf	0°C	—	800	1300	ms	NOTE 2
		25°C	—	220	420		
		50°C	—	120	190		

note:

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

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5. BLOCK DIAGRAM



* AC Signal Setting

J1	J2	J3	J4	J5	J6	J7	J8
L	L	L	H	L	H	H	H

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6.INTERNAL PIN CONNECTION

CN1(LCD)

PinNo.	Symbol	Level	Function	
1	VO	—	LCD CONTRAST ADJUST VOLTAGE	
2	VEE	—	POWER SUPPLY FOR LCD DRIVE	
3	D3	H/L	DISPLAY DATA SIGNAL	
4	D2	H/L		
5	D1	H/L		
6	D0	H/L		
7	NC	—	NO CONNECTION	
8	VSS	—	0V	GROUND
9	VDD	—	5V	DC POWER SUPPLY
10	CP2	H/L	DATA INPUT CLOCK SIGNAL	
11	CP1	H/L	INPUT DATA LATCH SIGNAL	
12	S	H/L	SCAN START-UP SIGNAL	

CN2(CCFL)

PinNo.	Symbol	Level	Function	
1	VFT1	—	POWER SUPPLY FOR CCFL(GND)	
2	NC	—	NO CONNECTION	
3	NC	—	NO CONNECTION	
4	VFT2	—	POWER SUPPLY FOR CCFL(HOT)	

Used connector :

CN1 : 12 PIN, FFC(PITCH 1.25mm)

CN2 : M63M83-04 (MITSUMI)

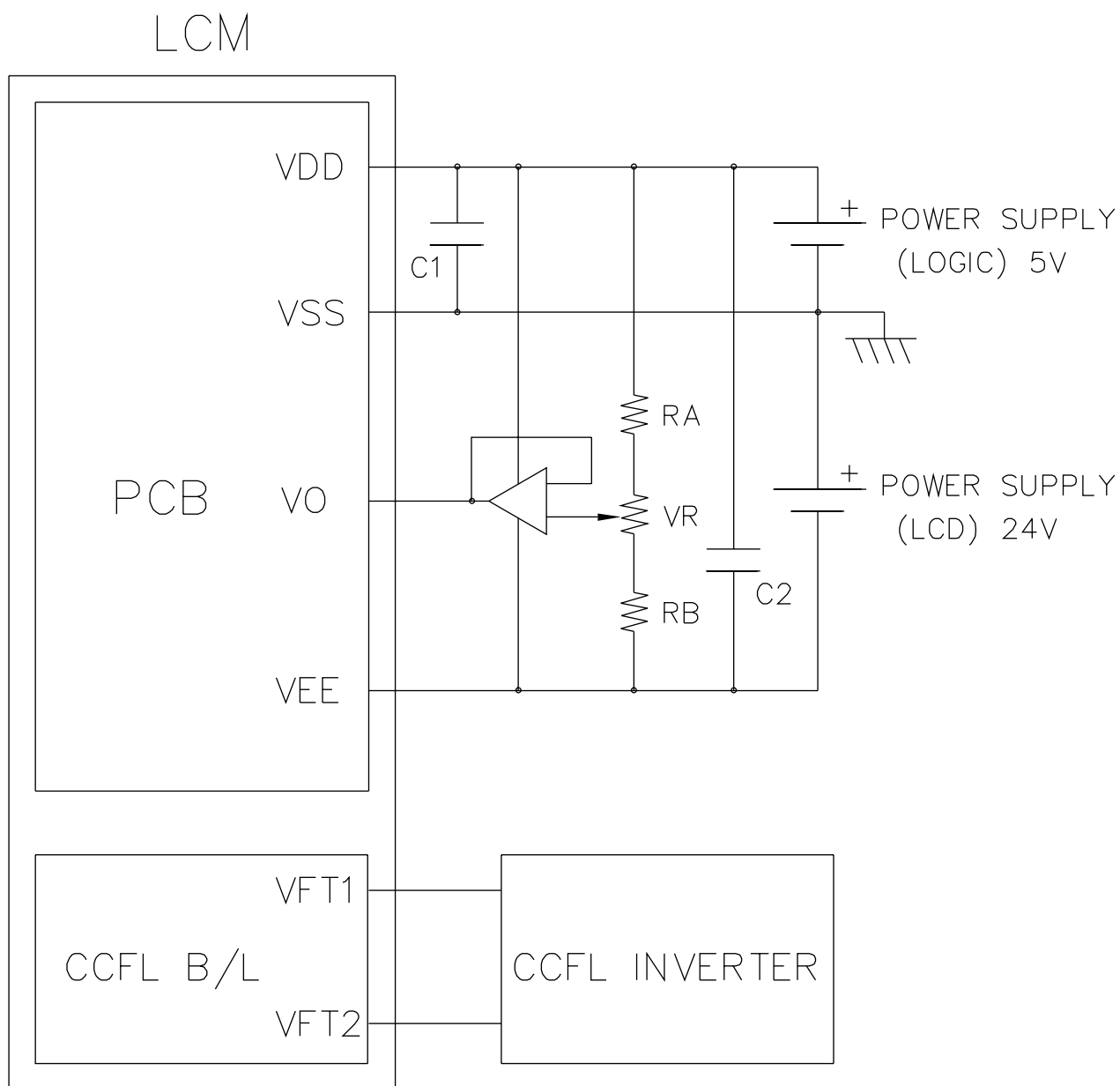
Mating connector :

CN1 : 5597-12APB.5597-12CPB(MOLEX)

CN2 : M60-04-30-134P (MITSUMI)

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7. POWER SUPPLY



$$R_A = 20 \text{ K}\Omega$$

$$R_B = 0.1 \text{ K}\Omega$$

$$R_V = 10 \text{ K}\Omega (\text{VARIABLE})$$

$$C_1, C_2 = 10 \text{ }\mu\text{F}$$

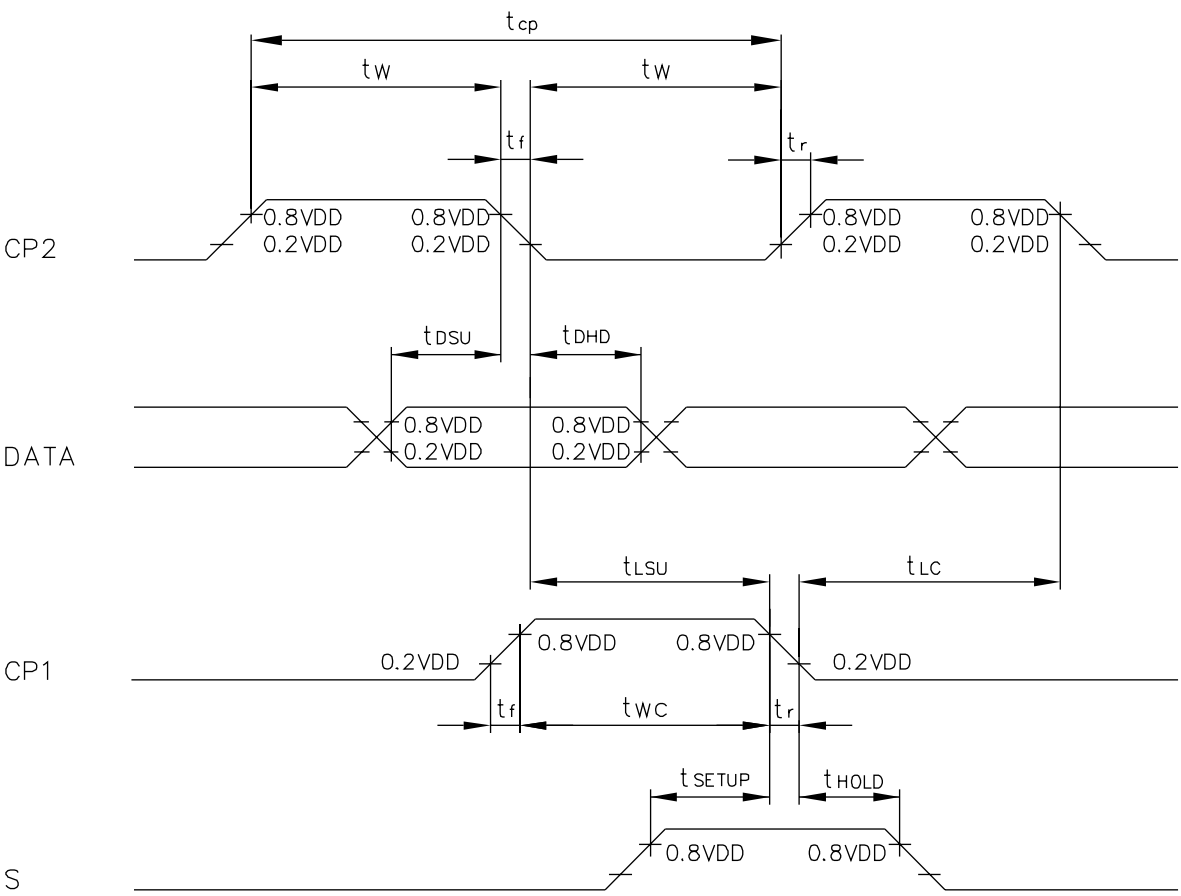
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8.TIMING CHARACTERISTICS

8-1 INTERFACE TIMING

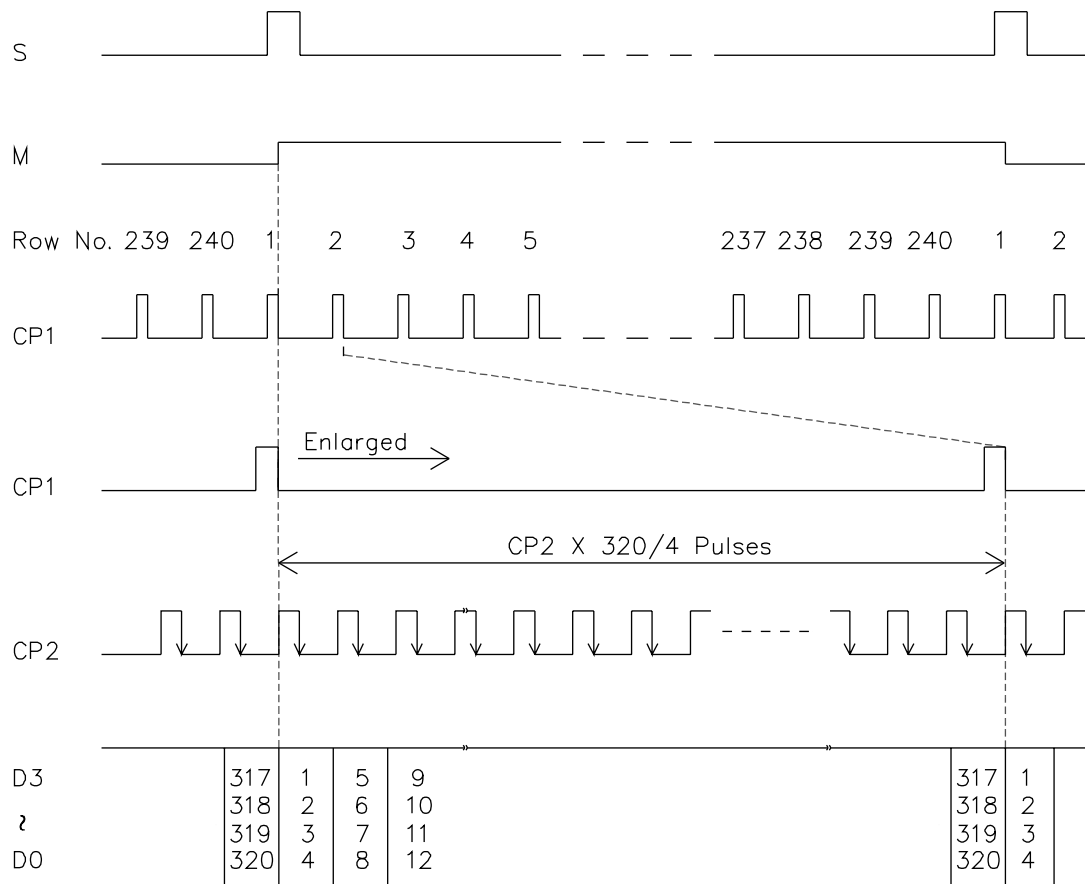
@VDD=2.5~5.5V

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
"CP2" CLOCK CYCLE	t_{CP}	152	—	—	ns
"CP2" PULSE WIDTH	t_w	65	—	—	ns
CLOCK RISE, FALL TIME	t_r, t_f	—	—	50	ns
DATA SETUP TIME	t_{DSU}	50	—	—	ns
DATA HOLD TIME	t_{DHD}	40	—	—	ns
"CP2"→ "CP1" FALL TIME	t_{LSU}	65	—	—	ns
"CP1"→ "CP2" FALL TIME	t_{LC}	65	—	—	ns
"S" SETUP TIME	t_{SETUP}	100	—	—	ns
"S" HOLD TIME	t_{HOLD}	100	—	—	ns
"CP1" PULSE WIDTH	t_{WC}	65	—	—	ns



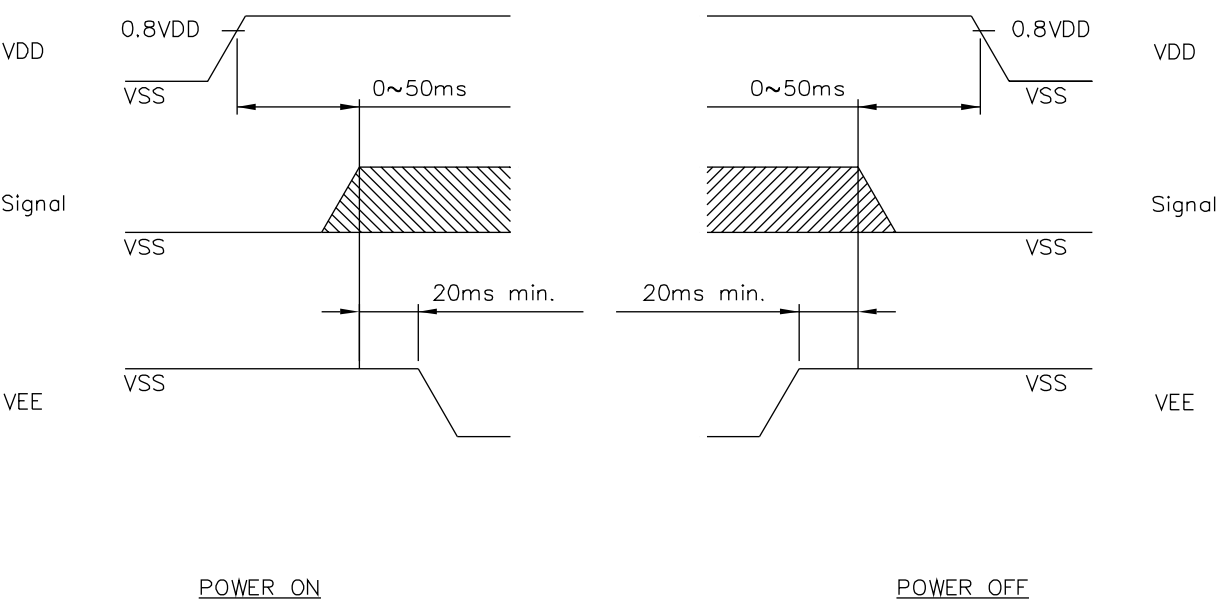
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8-2 TIMING CHART OF INPUT SIGNALS



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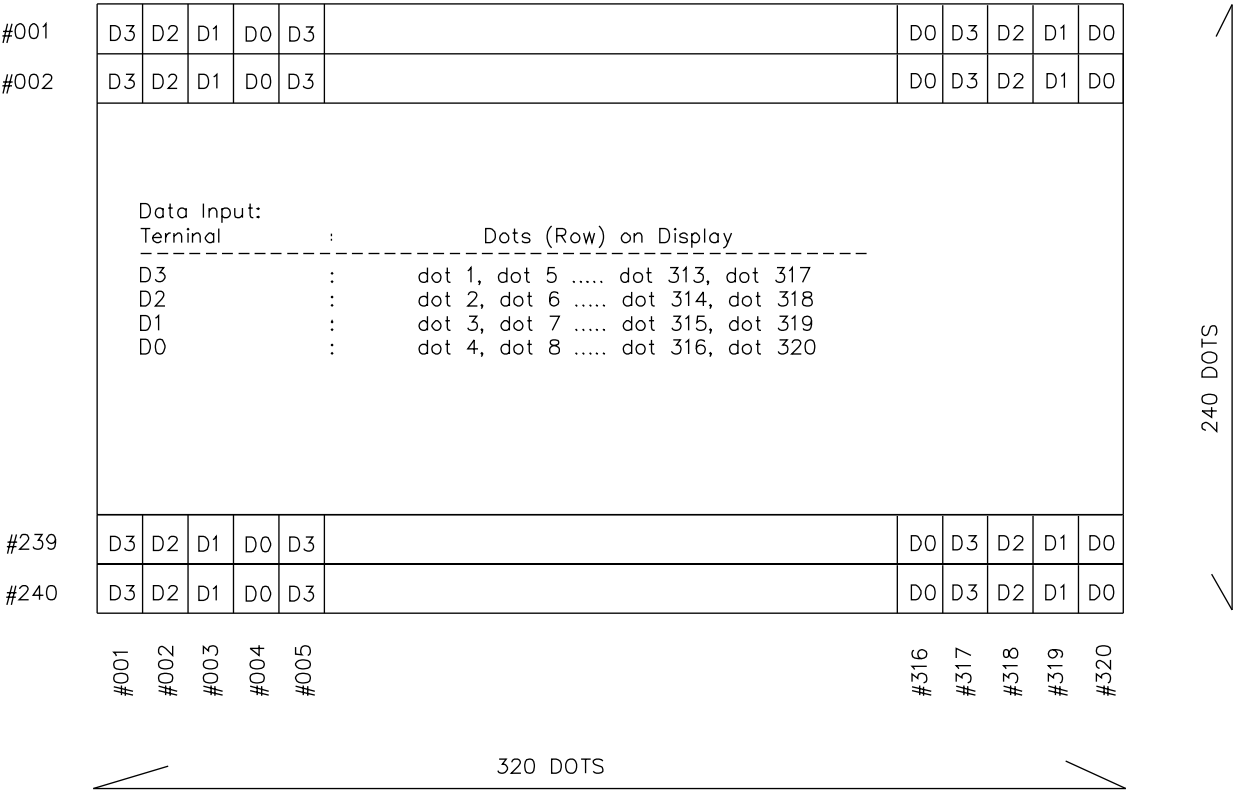
8-3 POWER ON/OFF TIMING



The missing pixels may occur when the LCM is driven beyond above power interface timing sequence.

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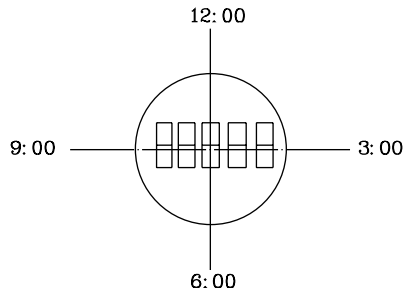
8-4 DISPLAY PATTERN



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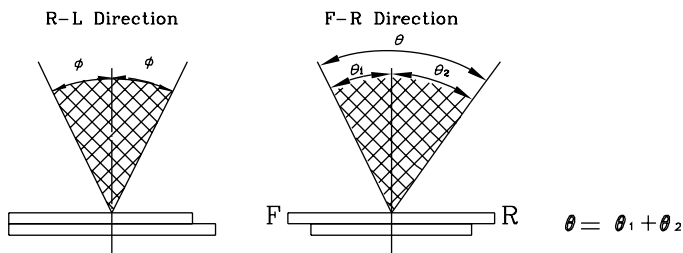
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle

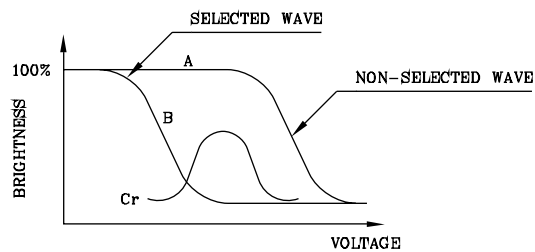


*Conditions

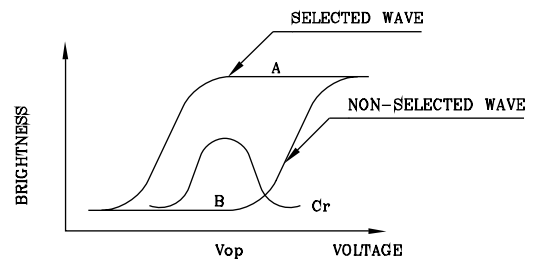
Operating Voltage : Vop
Frame Frequency : 70Hz
Applying Waveform : 1/N duty 1/a bias
Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type)



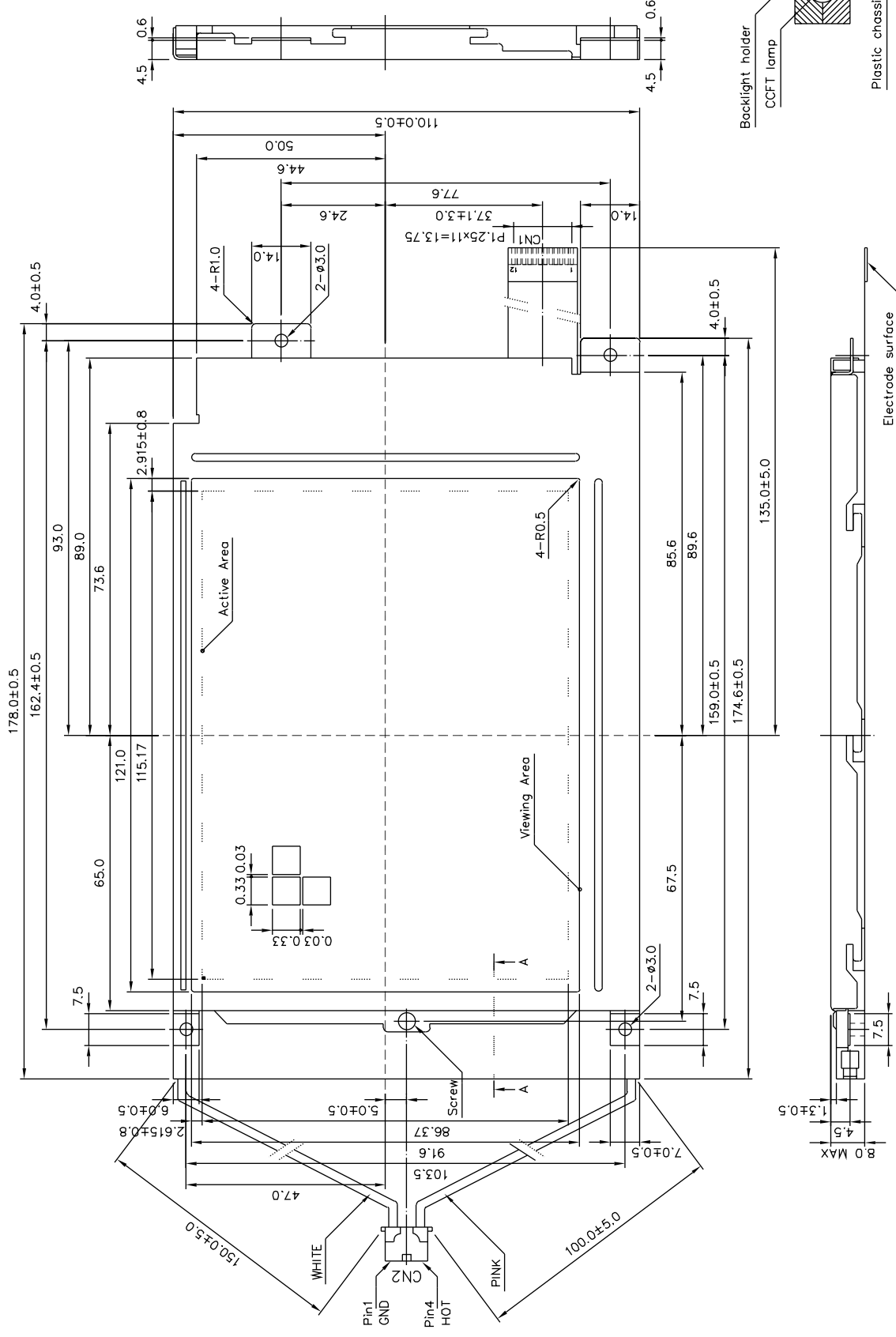
(negative type)

Contrast Ratio : Cr=A/B

*Conditions

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

INTERFACE	SYMBOL
1.1	
1.2	
1.3	
1.4	
1.5	
1.6	
1.7	
1.8	
1.9	
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1.98	
1.99	
1.100	



Note ::

1. RESOLUTION : 320 X 240 DOTS
2. CONTROLLER : WITHOUT
3. DC/DC CONVERTER : WITHOUT

	AGM3224G		AZ DISPLAYS, INC.	
	NAME	DATE		
APPROVE			TITLE	
CHECK			DWG-NO	TB-x134x
DESIGN			Rev. A	
DRAW			 UNIT : mm SCALE : 1/1 THIRD ANGLE PROJECT	
	MAY PING	86.09.13		

A-A' Section(Scale : 2/1)