

# AZ DISPLAYS, INC.

## 1. MECHANICAL DATA

(1) Product No.	<b>AGM3224W</b>
(2) Module Size	168.0 (W)mm x 111.0 (H)mm x 9.0(D)mm
(3) Dot Size	0.09 (W)mm x 0.33 (H)mm
(4) Dot Pitch	0.12 (W)mm x 0.36 (H)mm
(5) Number of Dots	320 xRGB(W) x 240 (H)Dots
(6) Duty	1/240
(7) LCD Display Mode	FSTN :Color STN module Rear Polarizer :Color Transmissive Type
(8) Viewing Direction	6 O'clock
(9) Backlight	CCFL
(10) Controller	Excluded
(11) DC/DC Converter	Excluded
(12) Weight	280 g(approx.)

Date: April 27, 2001

# AZ Displays, Inc.

## 2. ABSOLUTE MAXIMUM RATINGS

### (1) ELECTRICAL ABSOLUTE RATINGS

VSS=0V

ITEM	SYMBOL	MIN	MAX	UNIT	COMMENT
Power Supply for Logic	VDD-VSS	-0.3	7.0	V	
Power Supply for LCD Drive	VLCD-VSS	0	42.0	V	
Input Voltage	VI	-0.3	VDD+0.3	V	
Static Electricity	-	-	-	-	Note 1

### (2) ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	NORMAL TEMP.			
	OPERATING		STORAGE	
	MIN.	MAX.	MIN.	MAX.
Ambient Temperature	0	50	-20	60
Humidity (Without Condensation)	Note 2,4		Note 3,4	

Note 1 LCM should be grounded during handling

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

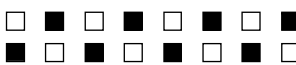

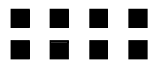
$T_a > 50^\circ\text{C}$  : Absolute humidity must be lower  
than the humidity of 85%RH at  $50^\circ\text{C}$

Note 3  $T_a$  at  $-20^\circ\text{C}$  will be  $< 48$  hrs, at  $60^\circ\text{C}$  will be  $< 120$  hrs

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

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## 3. ELECTRICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITION		MIN.	TYP.	MAX.	UNIT
Logic Circuit Power Supply	VDD-VSS	Ta= 25°C		4.5	5.0	5.5	V
Input Voltage	VIH	H level		0.8VDD	-	VDD	V
	VIL	L level		0	-	0.2VDD	V
Recommended LCD Driving Voltage	VLCD-VSS	Duty=1/240 Bias=1/13 VDD=5.0V	0°C	23.2	23.6	24.0	V
			25°C	22.2	22.6	23.0	
			50°C	21.0	21.4	21.8	
Supply Current for Logic	IDD	VDD-VSS = 5.0V VLCD-VSS = 22.6V Ta= 25°C		-	2.0	6.0	mA
Supply Current for LCD	ILCD	PATTERN: 		-	8.0	15.0	mA
LCM Surface Luminance	L	PATTERN: (Dots All On of White Color) 		-	75.0	-	cd/m <sup>2</sup>
		PATTERN: (Dots All Off) 		-	3.0	-	
CCFL Driving Current	IFLD	-		4.0	5.0	6.0	mArms

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## 4. OPTICAL CHARACTERISTICS

### 4-1 Optical Char. of Normal Temp. Mode

AT Vop

ITEM MODE		Cr(Contrast Ratio)						$\theta$ (Viewing Angle)		$\phi$ (Viewing Angle)	
		0°C		25°C		50°C		25°C		25°C	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
T	M	-	20	-	30	-	10	-	48	-	40~60
NOTE		NOTE 6						NOTE 5			

note:

T: TRANSMISSIVE  
M: 6 O'CLOCK STN MODULE

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

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	0°C	-	600	900	ms	NOTE 2
		25°C	-	240	360		
		50°C	-	150	230		
Response Time (fall)	Tf	0°C	-	350	530	ms	NOTE 2
		25°C	-	100	150		
		50°C	-	70	100		

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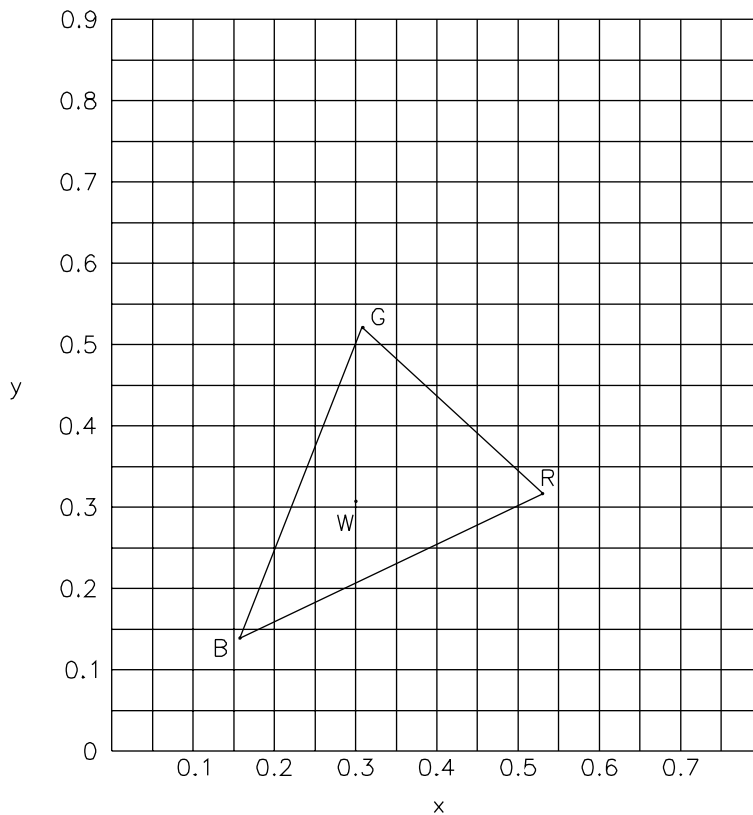
## 4-2 Color of CIE Coordinate

Ta = 25°C

ITEM		SYMBOL	CONDITION	VALUE	BRIGHTNESS (cd/m <sup>2</sup> )
Color of CIE Coordinate	Red	X	$\phi = 0^\circ, \theta = 0^\circ$	0.542	18.4
		y		0.329	
	Green	X		0.302	42.5
		y		0.538	
	Blue	X		0.159	14.3
		y		0.138	
	White	X		0.295	65.0
		y		0.312	

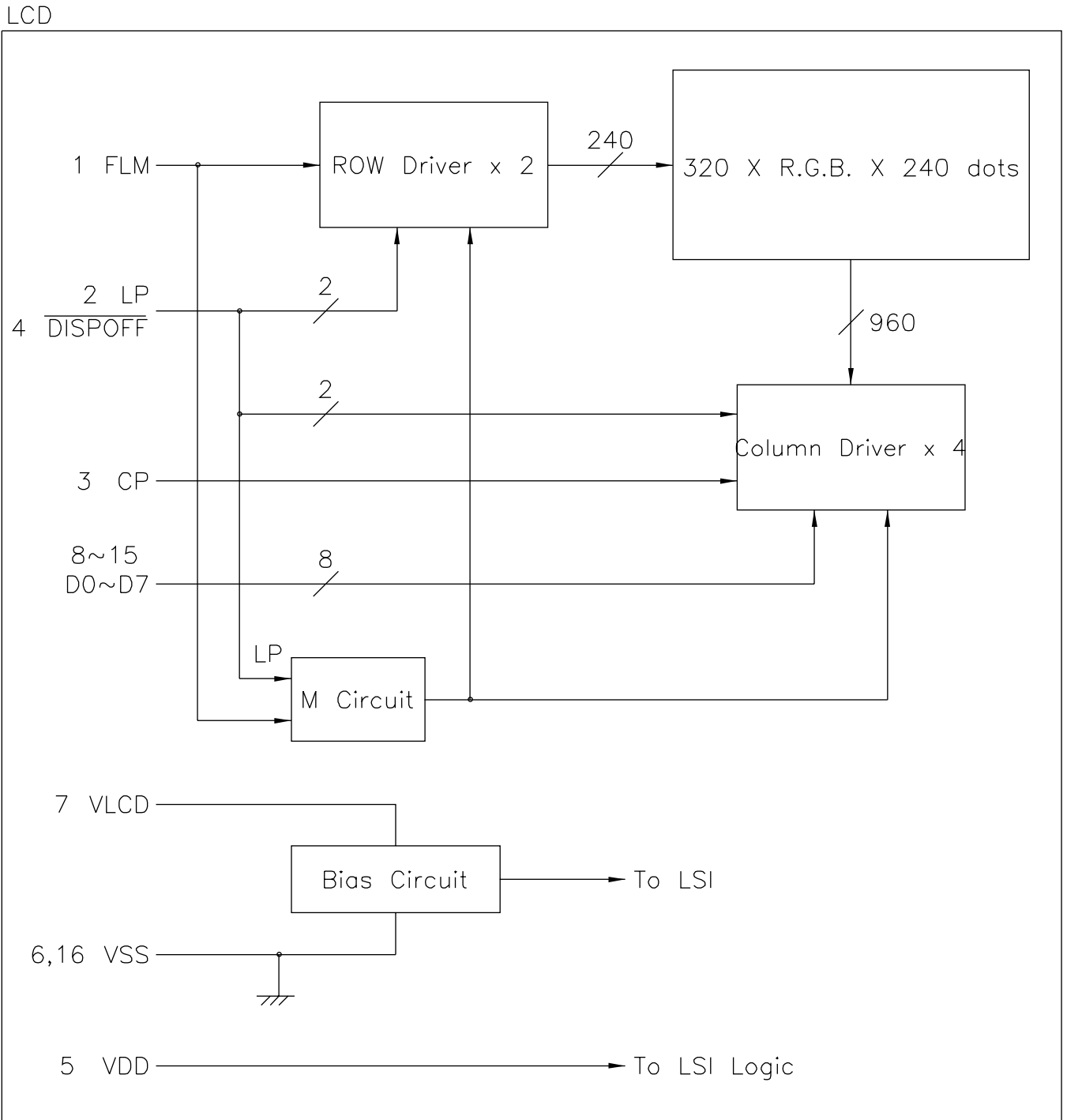
Tolerance :  $\pm 0.05$

Fig.1

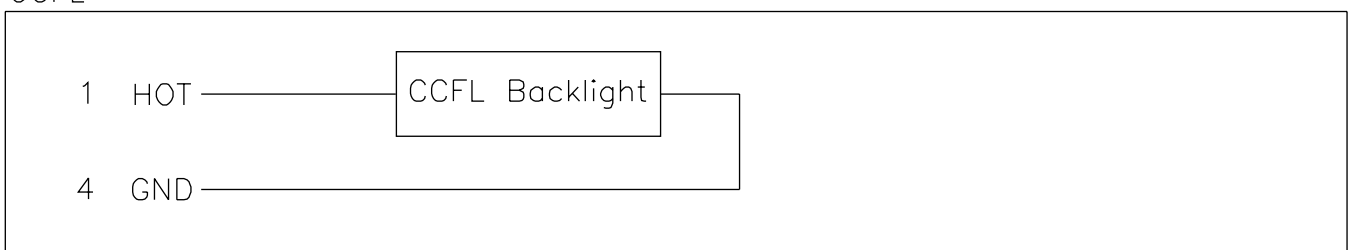


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## 5. BLOCK DIAGRAM



### CCFL



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## 6. INTERNAL PIN CONNECTION

### LCD

Pin No.	Symbol	Level	Function
1	FLM	H/L	First Line Marker
2	LP	H→L	Data Latch Signal
3	CP	H→L	Clock Signal for Shifting Data
4	DISPOFF	H/L	Display Control Signal, H :Display on L :Display off
5	VDD	–	Power Supply for Logic
6	VSS	–	Power Supply (0V,GND)
7	VLCD	–	Power Supply for LCD Drive
8	D0	H/L	Display Data
9	D1	H/L	Display Data
10	D2	H/L	Display Data
11	D3	H/L	Display Data
12	D4	H/L	Display Data
13	D5	H/L	Display Data
14	D6	H/L	Display Data
15	D7	H/L	Display Data
16	VSS	–	Power Supply (0V,GND)

LCD INTERFACE CABLE :

FFC,N16,Pitch 1.0 mm (Thickness = 0.3 mm)

MATING CONNECTOR :

MOLEX 52207-1690 or COMPATIBLE

### CCFL

Pin No.	Symbol	Level	Function
1	HOT	–	Power Supply for CCFL(HOT)
2	NC	–	Non-connection
3	NC	–	Non-connection
4	GND	–	Power Supply for CCFL(GND)

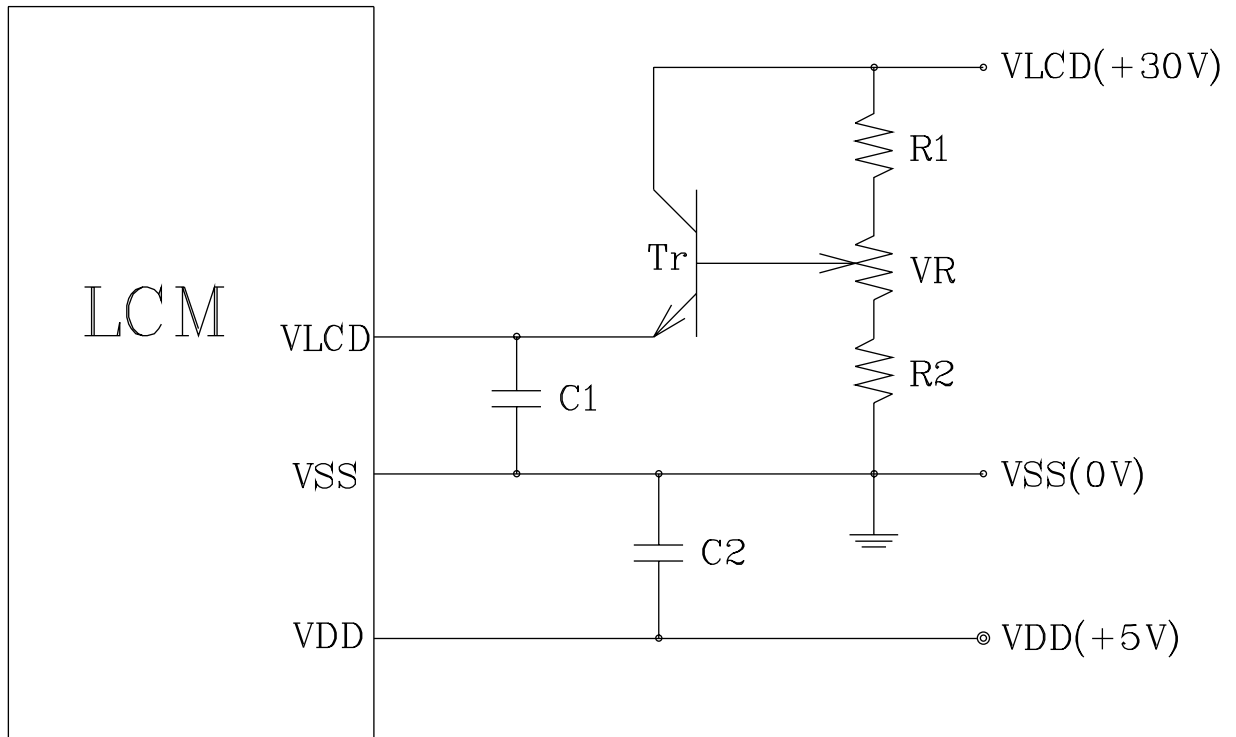
CCFL CONNECTOR : M63M83-04 (MITSUMI)

MATING CCFL CONNECTOR :

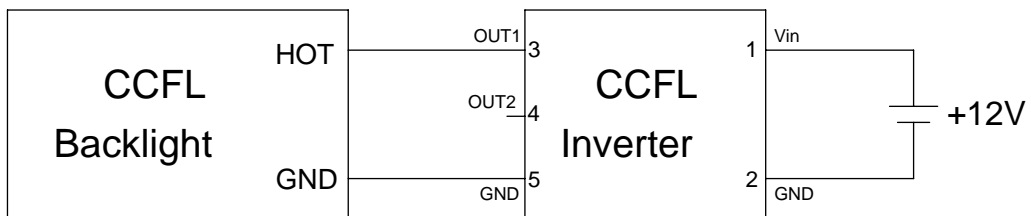
M60-04-30-134P or M60-04-30-114P or M61M73-04 (MITSUMI)

# AZ Displays, Inc.

## 7. POWER SUPPLY



$$R1 + R2 + VR = 10 \sim 20K\Omega$$
$$C1, C2 = 10\mu F$$



SUGGESTED INVERTER : CXA-L10L (TDK)



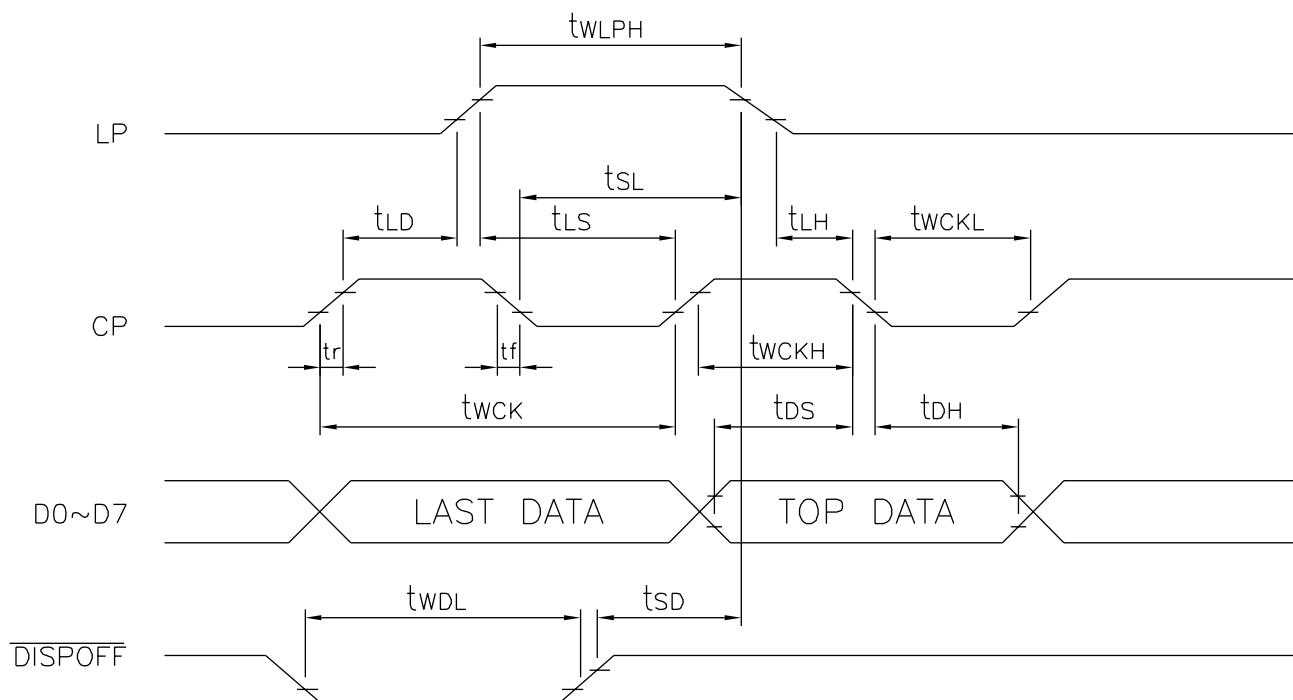
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## 8. TIMING CHARACTERISTICS

### 8-1 INTERFACE TIMING

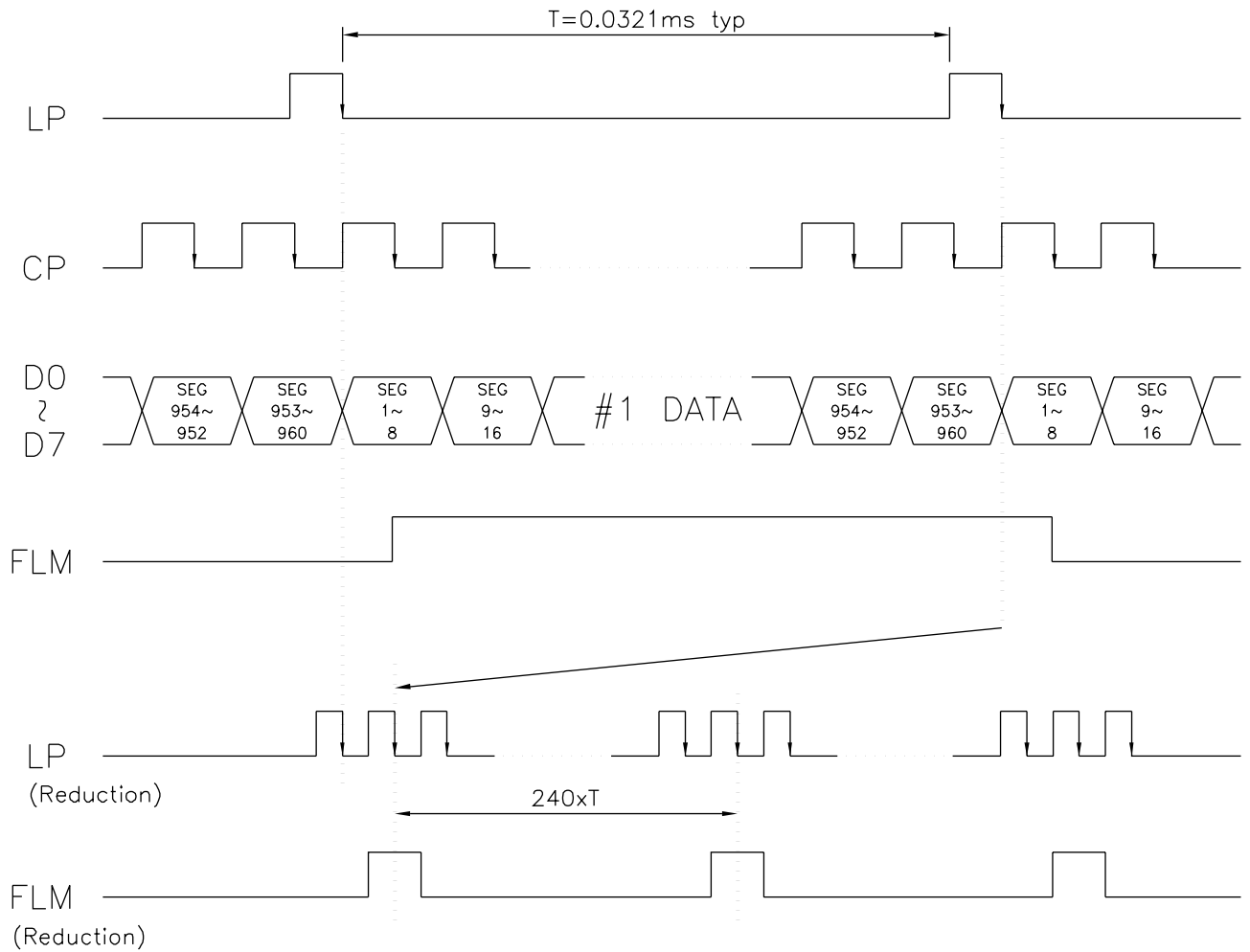
VDD=5.0V ± 10%

Parameter	SYMBOL	MIN.	MAX.	UNIT
CLOCK PULSE CYCLE TIME	$t_{wck}$	40	—	ns
CLOCK PULSE HIGH LEVEL WIDTH	$t_{wckH}$	12	—	ns
CLOCK PULSE LOW LEVEL WIDTH	$t_{wckL}$	14	—	ns
LATCH PULSE HIGH LEVEL WIDTH	$t_{wLPH}$	15	—	ns
CP→LP RISE TIME	$t_{LD}$	5	—	ns
CP→LP FALL TIME	$t_{SL}$	25	—	ns
LP→CP RISE TIME	$t_{LS}$	25	—	ns
LP→CP FALL TIME	$t_{LH}$	25	—	ns
CLOCK PULSE RISE/FALL TIME	$t_r, t_f$	—	50	ns
DATA SETUP TIME	$t_{DS}$	5	—	ns
DATA HOLD TIME	$t_{DH}$	15	—	ns
$\overline{\text{DISPOFF}}$ LOW LEVEL WIDTH	$t_{WDL}$	1.2	—	$\mu\text{s}$
$\overline{\text{DISPOFF}}$ CANCELLATION TIME	$t_{SD}$	100	—	ns



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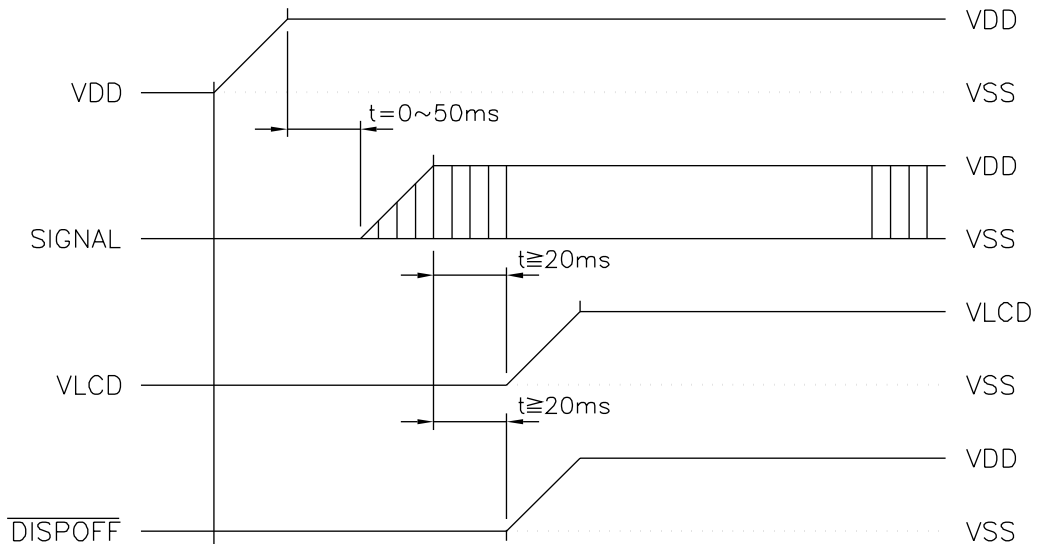
## 8-2 TIMING CHART OF INPUT SIGNAL



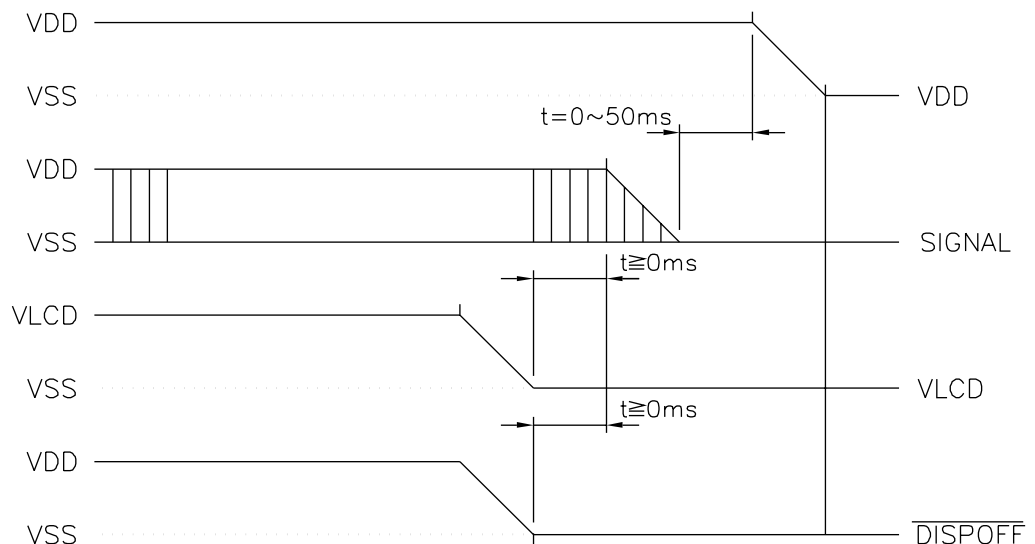
# AZ Displays, Inc.

## 8-3 POWER ON/OFF TIMING

### ON SEQUENCE



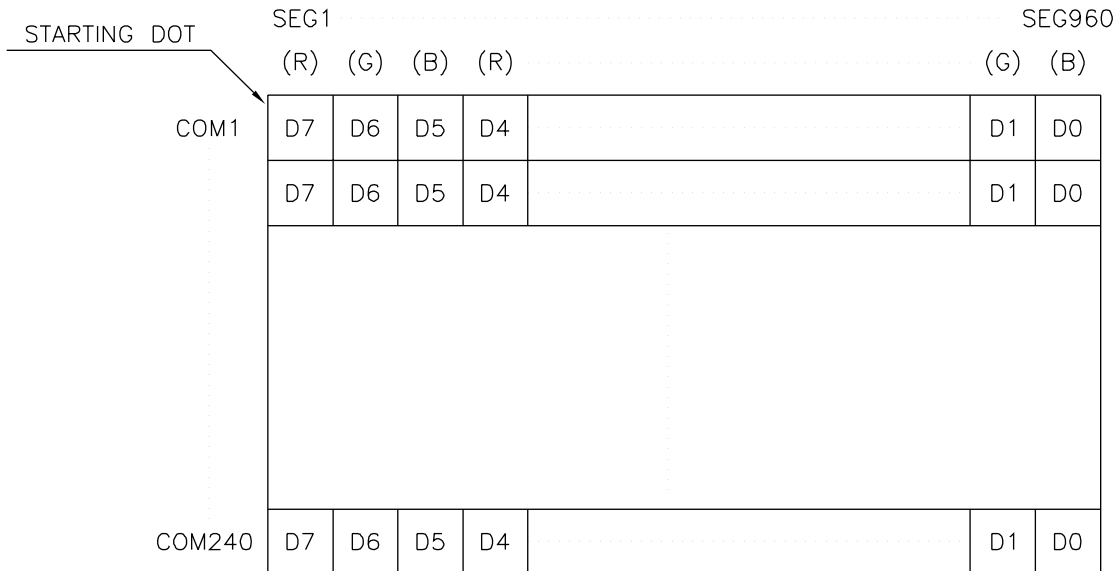
### OFF SEQUENCE



Please maintain the above sequence when turning on and off the power supply of the module. If  $\overline{\text{DISPOFF}}$  is supplied to the module while internal alternate signal for LCD driving(M) is unstable, DC component will be supplied to the LCD panel. This may damage the LCD module.

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## 8-4 DISPLAY PATTERN

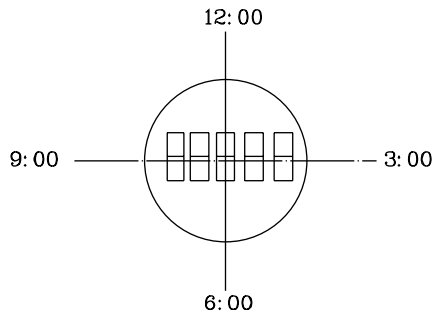


D0~D7 are 8 bits transmitted data, where D0 is LSB and D7 is MSB.

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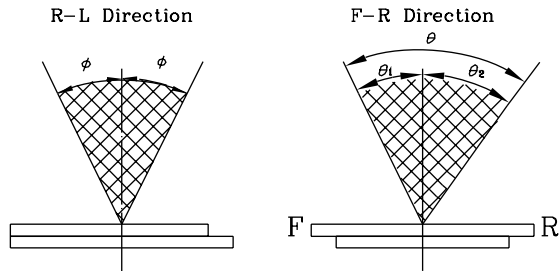
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle



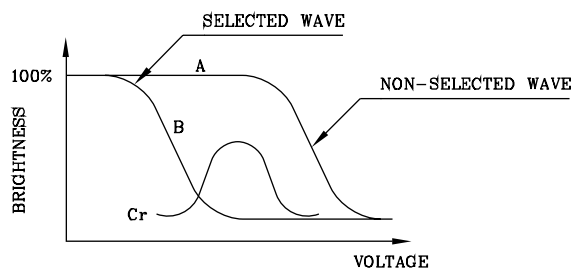
$$\theta = \theta_1 + \theta_2$$

\*Conditions

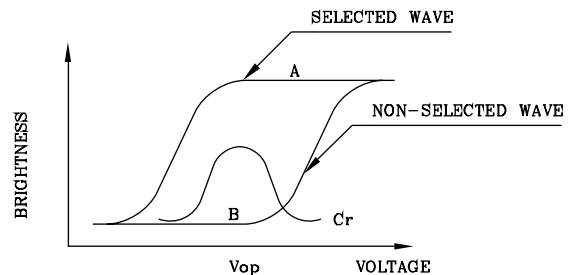
- Operating Voltage : Vop
- Frame Frequency : 70Hz
- Applying Waveform : 1/N duty 1/a bias
- Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type)

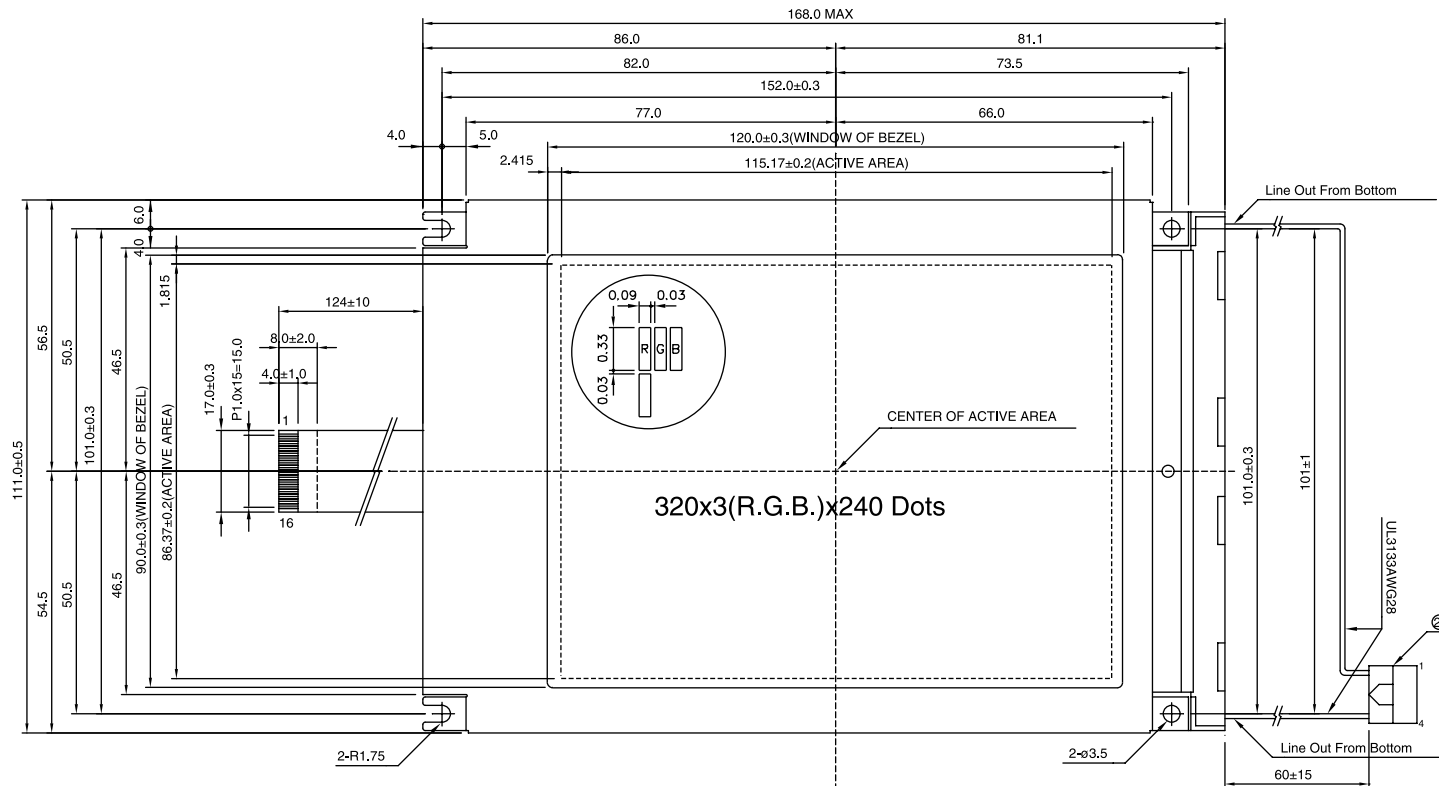


(negative type)

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

\*Conditions

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

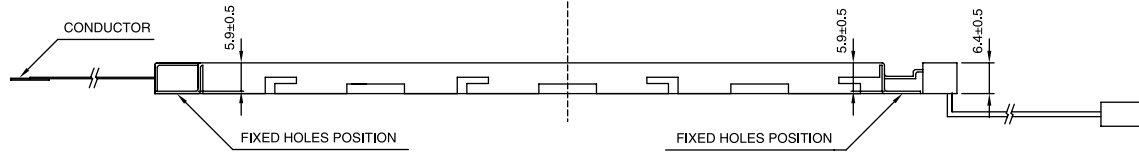


**PIN ASSIGNMENT OF I/O CONNECTION**

Pin No.	SYMBOL	LEVEL	FUNCTION
1	FLM	H/L	First Line Marker
2	LP	H→L	Data Latch Signal
3	CP	H→L	Data Shift Clock Signal
4	DISPOFF	H/L	H : Display On L : Display Off
5	V <sub>DD</sub>	-	Power Supply for Logic
6	V <sub>SS</sub>	-	Power Supply(0V,GND)
7	V <sub>LCD</sub>	-	Power Supply for LCD Drive
8	D0	H/L	Display Data
9	D1	H/L	Display Data
10	D2	H/L	Display Data
11	D3	H/L	Display Data
12	D4	H/L	Display Data
13	D5	H/L	Display Data
14	D6	H/L	Display Data
15	D7	H/L	Display Data
16	V <sub>SS</sub>	-	Power Supply(0V,GND)

**PIN ASSIGNMENT OF CCFL CONNECTION**

Pin No.	SYMBOL	LEVEL	FUNCTION
1	HOT	-	Power Supply for CCFL(HOT)
2	NC	-	No Connection
3	NC	-	No Connection
4	GND	-	Power Supply for CFL(GND)



**NOTE :**

1. RESOLUTION : 320 X 3(R.G.B.) X 240 DOTS
2. CONTROLLER : WITHOUT
3. DC/DC CONVERTER : WITHOUT
4. ① INTERFACE CONNECTOR  
FFC, N16 P1.0mm  
② CCFT CONNECTOR  
M63M83-04(MITSUMI)
5. NO TOLERANCE SPECIFIED : ±0.5mm

		AGM3224W		AZ DISPLAYS, INC.		
		NAME	DATE	TITLE		
APPROVE				DWG-NO		
CHECK				CB-T161G		Rev.A
DESIGN				THIRD ANGLE PROJECT		
DRAW	MAY PING	87.05.20		UNIT : mm		
				SCALE : 2/3		