

# 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 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 < 48 hrs, at 60°C will be < 120 hrs

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

# AZ DISPLAYS, INC.

## 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

# AZ Displays, Inc.

## 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℃	—	600	900	ms	NOTE 2
		25℃	—	240	360		
		50℃	—	150	230		
Response Time (fall)	Tf	0℃	—	350	530	ms	NOTE 2
		25℃	—	100	150		
		50℃	—	70	100		

# AZ Displays, Inc.

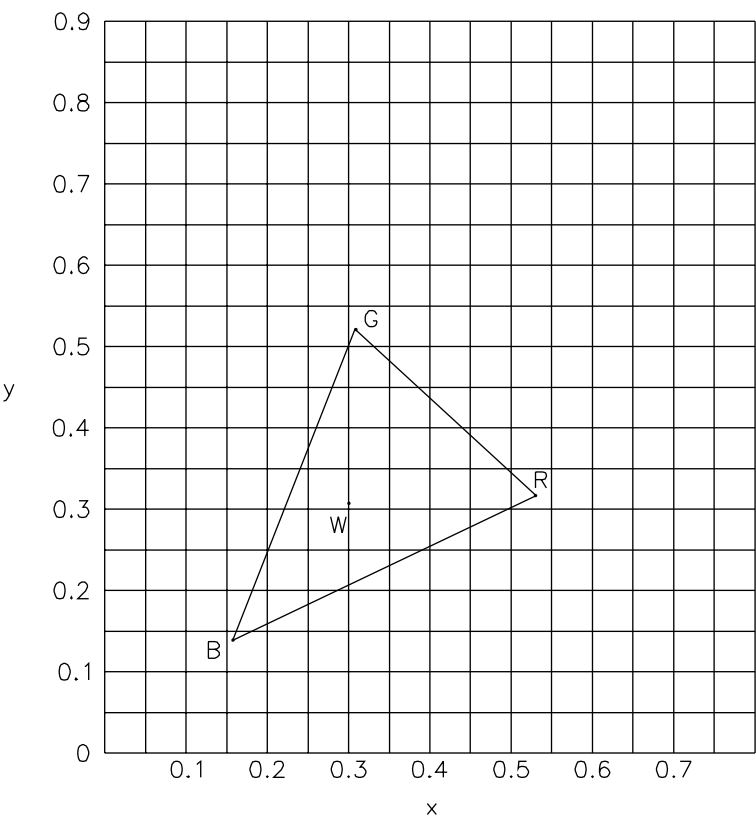
## 4-2 Color of CIE Coordinate

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 : ±0.05

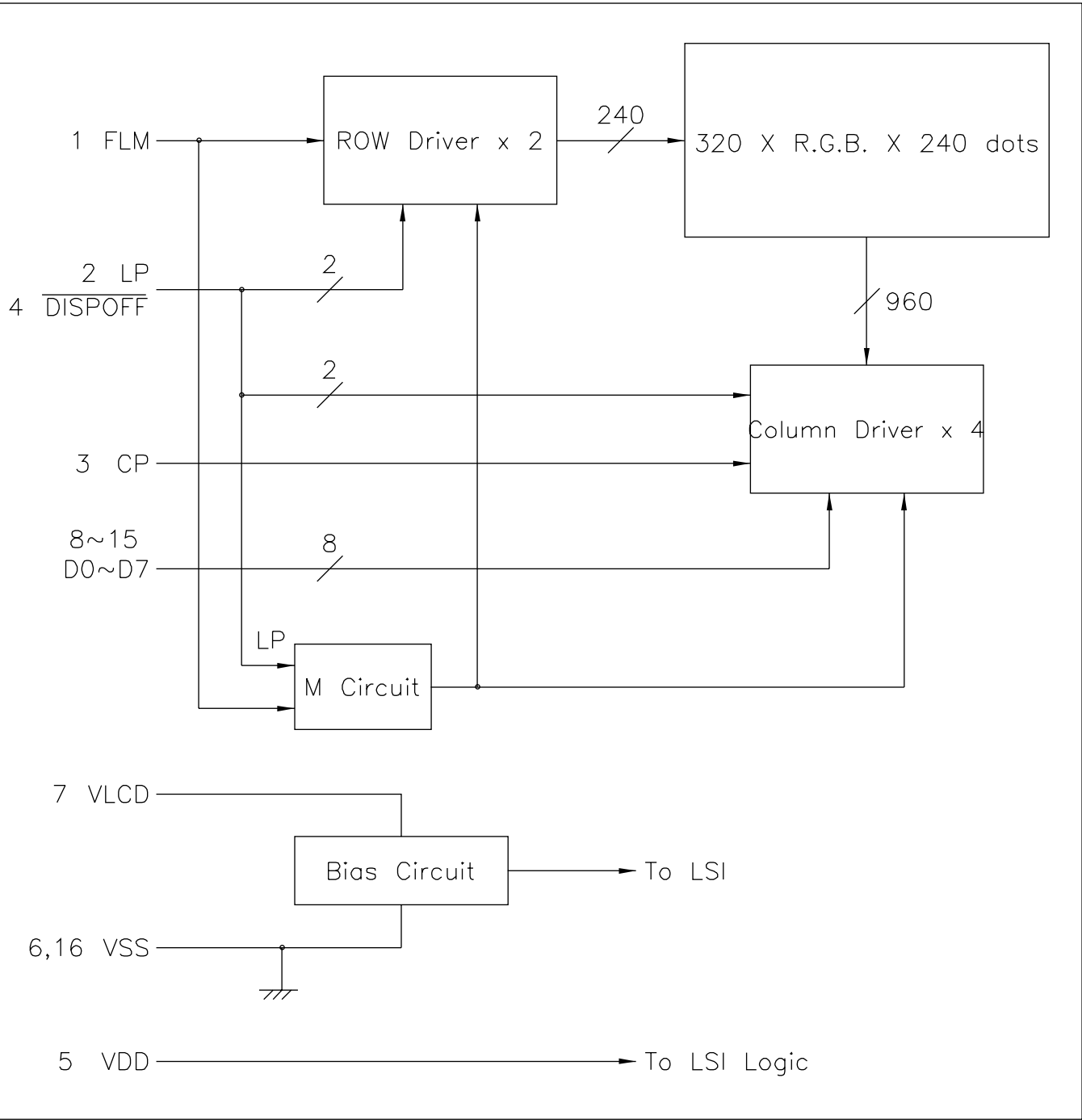
Fig.1



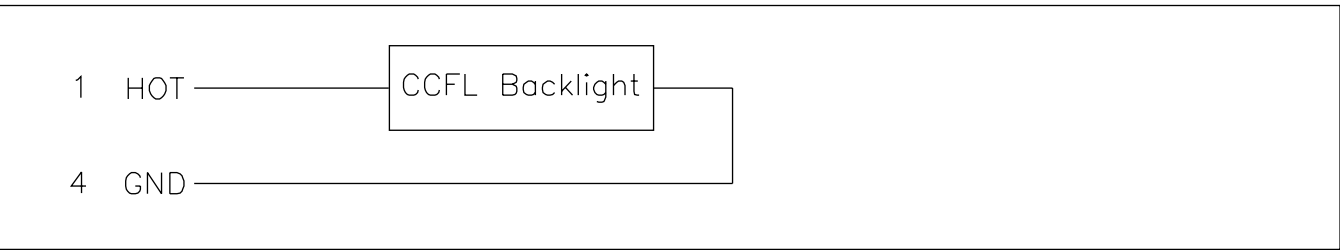
# AZ Displays, Inc.

## 5.BLOCK DIAGRAM

LCD



CCFL



# AZ Displays, Inc.

## 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)

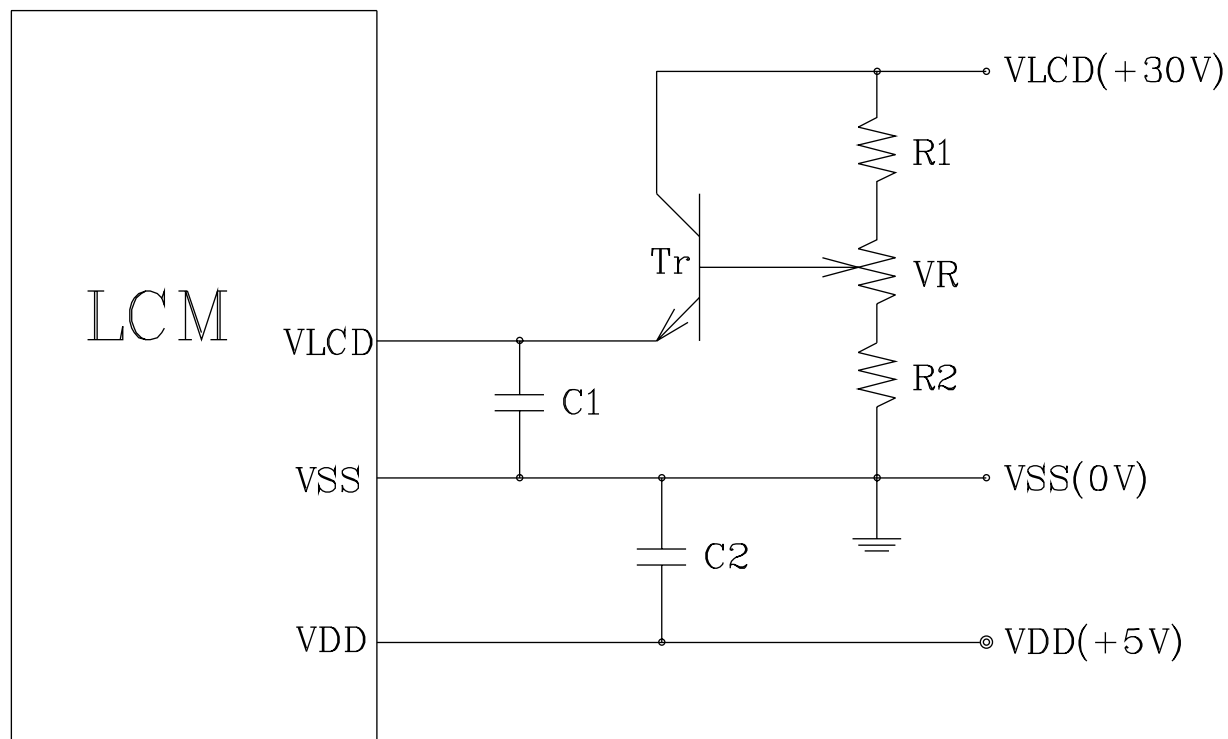
CCFL CONNECTOR : M63M83-04 (MITSUMI)

MATING CCFL CONNECTOR :

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

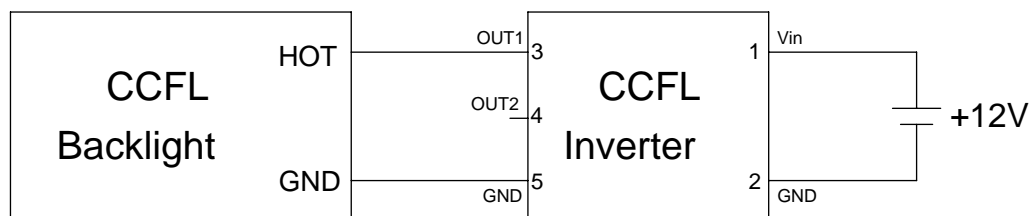
# AZ Displays, Inc.

## 7. POWER SUPPLY



$$R1 + R2 + VR = 10 \sim 20K\Omega$$

$$C1, C2 = 10\mu F$$



SUGGESTED INVERTER : CXA-L10L (TDK)



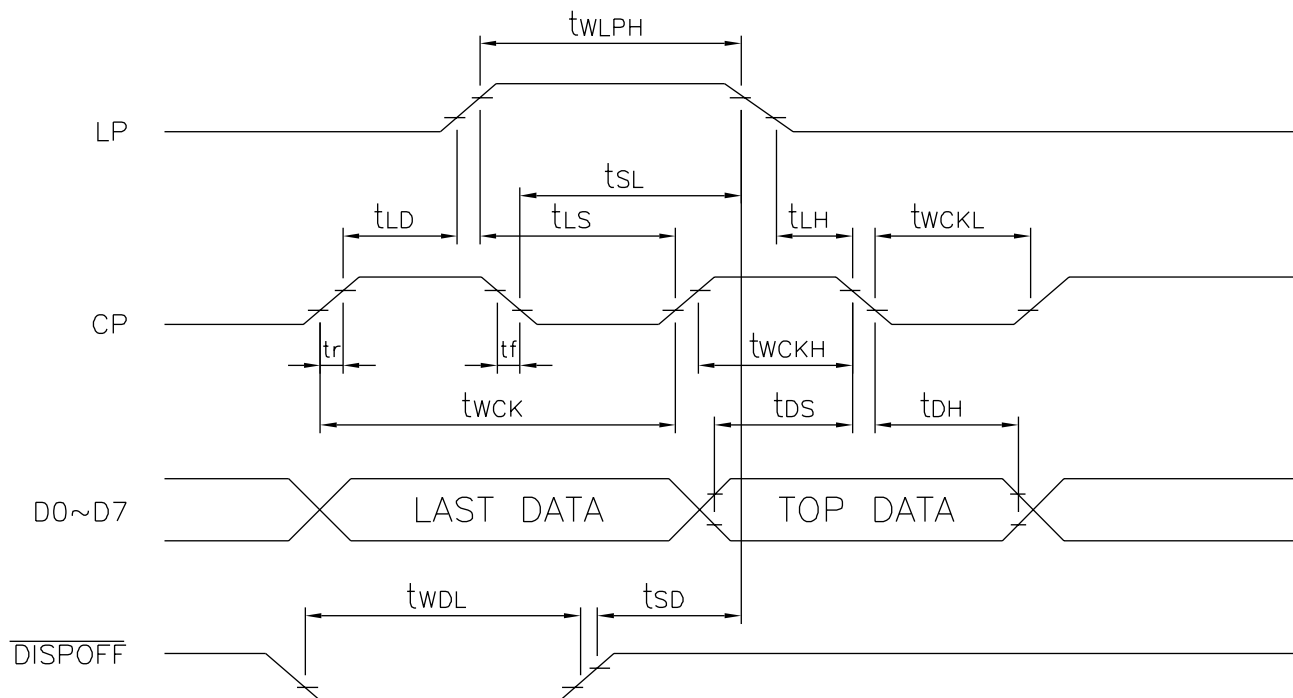
# AZ Displays, Inc.

## 8. TIMING CHARACTERISTICS

### 8-1 INTERFACE TIMING

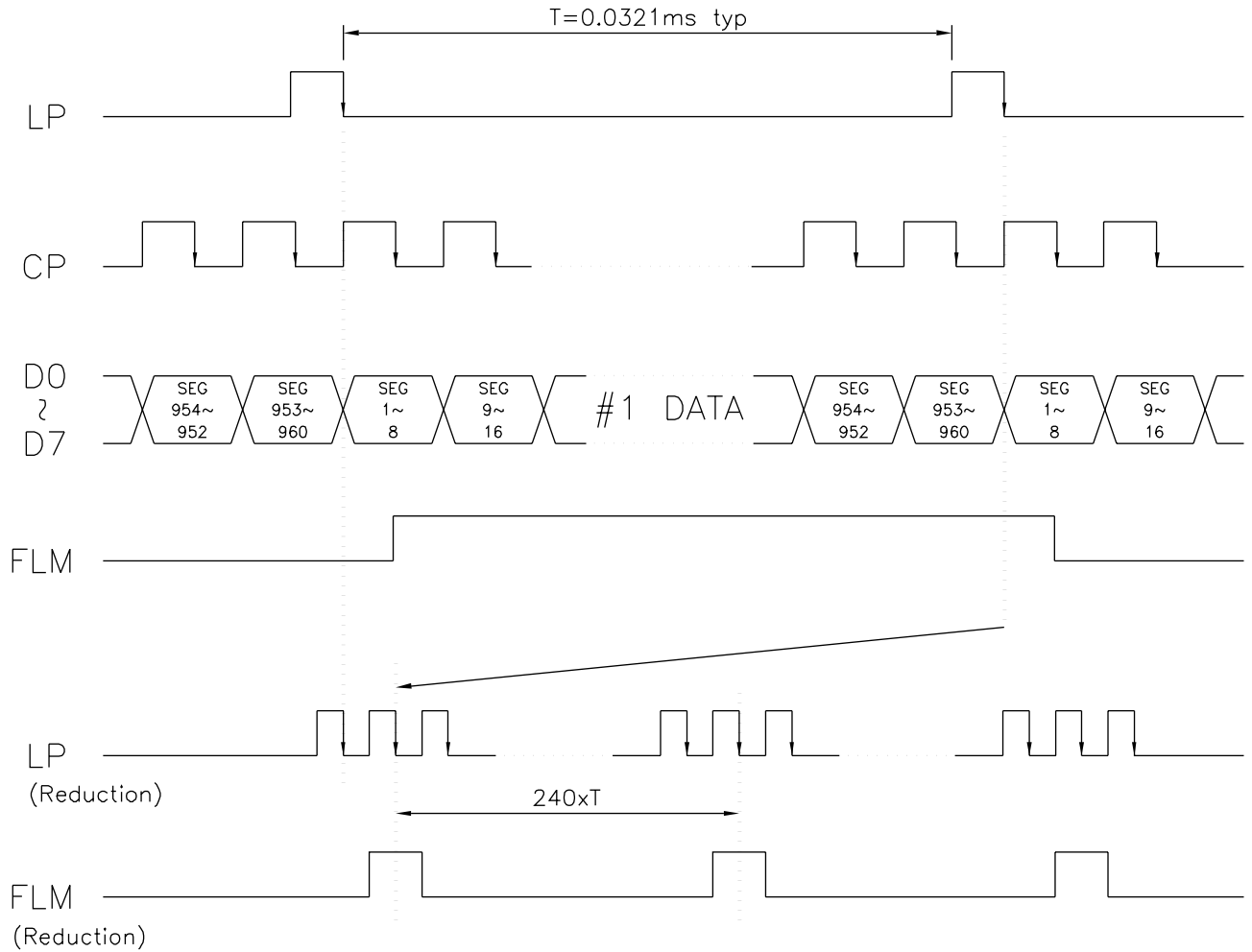
VDD=5.0V  $\pm$  10%

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



# AZ Displays, Inc.

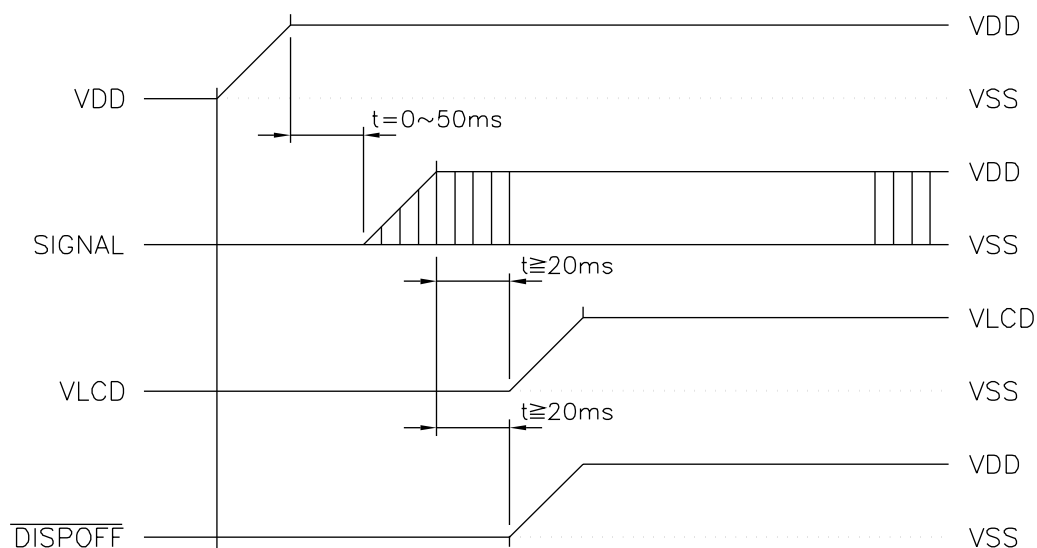
## 8-2 TIMING CHART OF INPUT SIGNAL



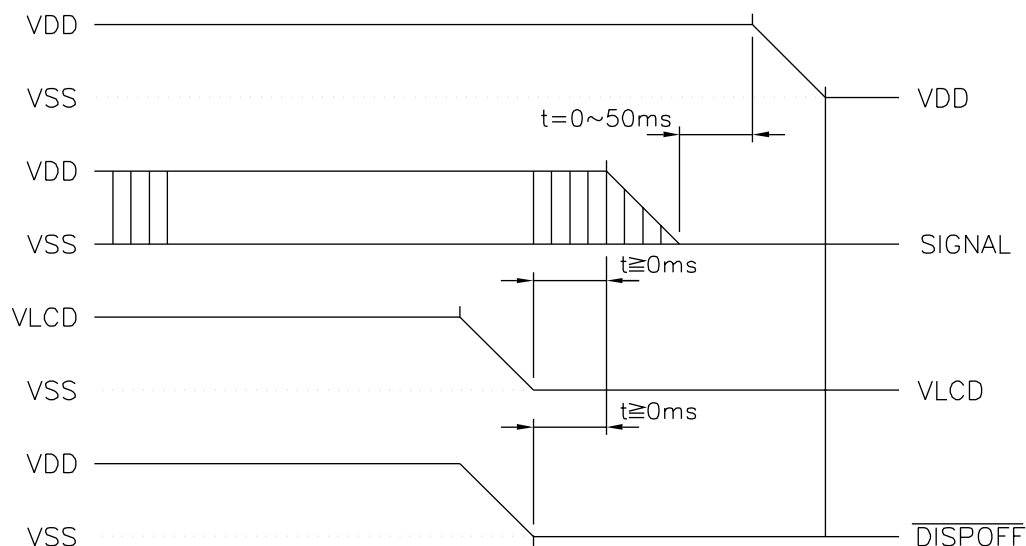
# AZ Displays, Inc.

## 8-3 POWER ON/OFF TIMING

### ON SEQUENCE



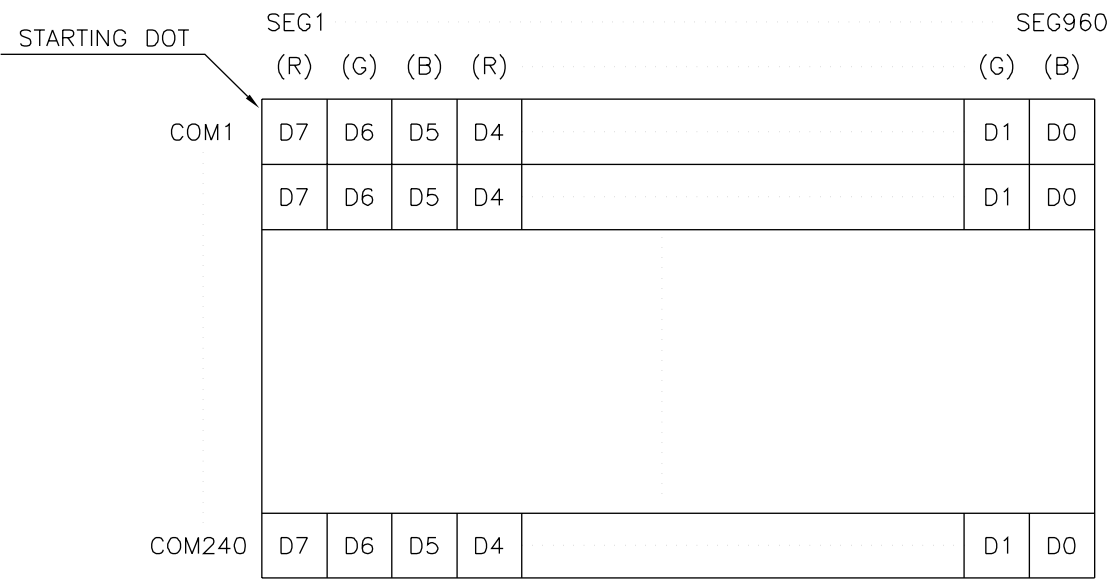
### OFF SEQUENCE



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.

# AZ Displays, Inc.

## 8-4 DISPLAY PATTERN

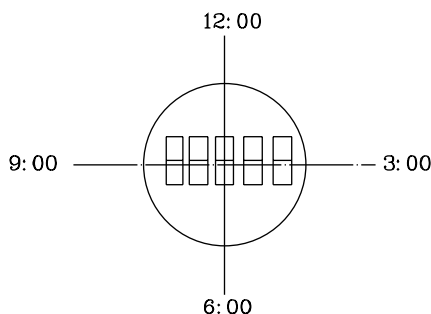


D0~D7 are 8 bits transmitted data, where D0 is LSB and D7 is MSB.

# AZ Displays, Inc.

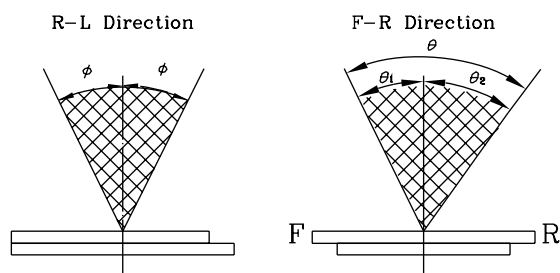
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle



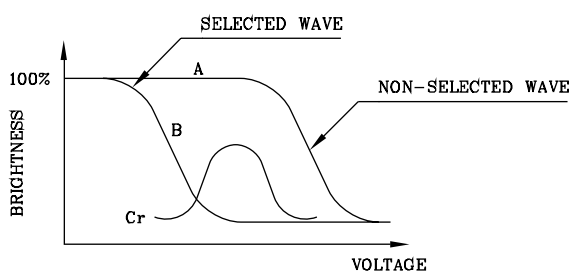
$\theta = \theta_1 + \theta_2$

\*Conditions

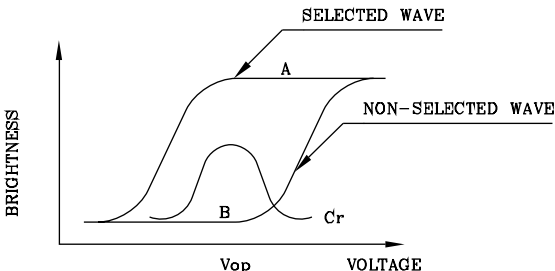
- Operating Voltage : Vop
- Frame Frequency : 70Hz
- Applying Waveform : 1/N duty 1/a bias
- Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type)

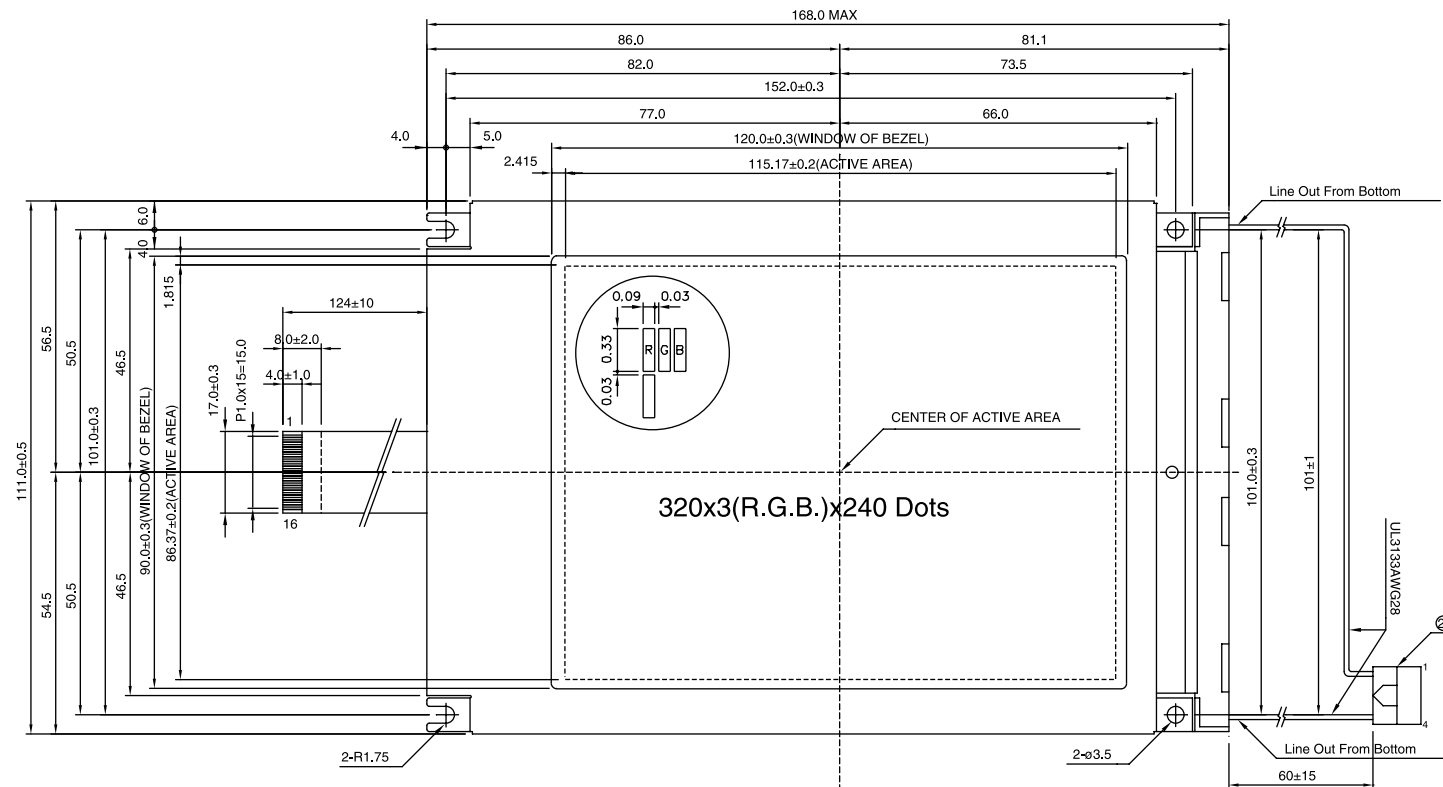


(negative type)

Contrast Ratio :  $Cr=A/B$

\*Conditions

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

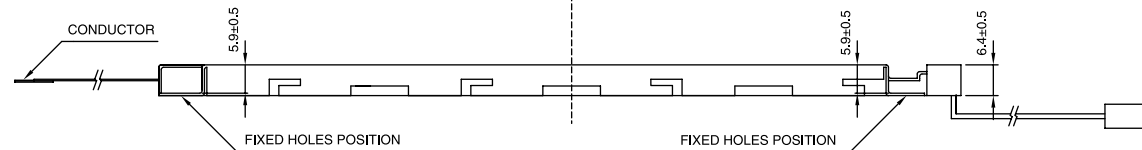


PIN ASSIGNMENT OF I/O CONNECTION

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 CCFL(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	CB-T161G	Rev.A
CHECK					
DESIGN					
DRAW	MAY PING	87.05.20			

THIRD ANGLE PROJECT

UNIT : mm  
SCALE : 2/3