

# AZ DISPLAYS, INC.

## 1. MECHANICAL DATA

(1) Product No.	<b>AGM2432B</b>
(2) Module Size	73.28 (W)mm X 92.18 (H)mm X 6.5 (D)mm
(3) Dot Size	0.225 (W)mm X 0.225 (H)mm
(4) Dot Pitch	0.24 (W)mm X 0.24 (H)mm
(5) Number of Dots	240 (W) X 320 (H) Dots
(6) Duty	1/240
(7) LCD Display Mode	FSTN: Black and White (Positive Image) Rear Polarizer: Transflective
(8) Viewing Direction	6 O'clock
(9) Backlight	EL (Blue-Green)
(10) Weight	52g(Included the EL B/L)
(11) Controller	Excluded
(12) DC/DC Converter	Excluded
(13) EL B/L inverter Ckt	Built-in

Revised: May 1, 2000

## 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 LC Drive	VEE-VSS	-0.3	30.0	V	
Input Voltage	VI	-0.3	VDD	V	
Static Electricity	-	-	-	-	Note 1

### (2) ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	WIDE TEMP.			
	OPERATING		STORAGE	
	MIN.	MAX.	MIN.	MAX.
Ambient Temperature	-20	70	-30	80
Humidity (Without Condensation)	Note 2,3		Note 3,4	

Note 1 LCM should be grounded during handling.

Note 2 Background color changes slightly depending on ambient temperature.

This phenomenon is reversible.

Note 3 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 4 Ta at -30°C will be < 48hrs, at 80°C will be < 120hrs

## 3. ELECTRICAL CHARACTERISTICS

( VDD= 3.3V ± 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 (WIDE TEMP. LCM)	VEE–VSS (Vop)	1/240 Duty	–20°C	24.2	24.6	25.0	V
			0°C	22.9	23.0	23.4	
		1/13 Bias	25°C	22.3	22.7	23.1	
			50°C	21.1	21.5	21.9	
			70°C	20.3	20.7	21.1	
Power Supply Current	IDD	VDD= 3.3V VSS= 0V VEE–VSS=22.7V FLM= 70Hz	–	0.2	0.5	mA	
	IEE	PATTERN : □ ■ □ ■ □ ■ ■ □ ■ □ ■ □	–	6.3	10.0		
EL Power Supply Current	IEL	VEL= 3.3V VELG= 0V BLE=3.3V	–	30	40	mA	

## 4. OPTICAL CHARACTERISTICS

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.
S	J	-	9.0	-	9.0	-	6.0	-	66	-	83
NOTE		NOTE 6						NOTE 5			

NOTE :

S: TRANSFLECTIVE (NORMAL)

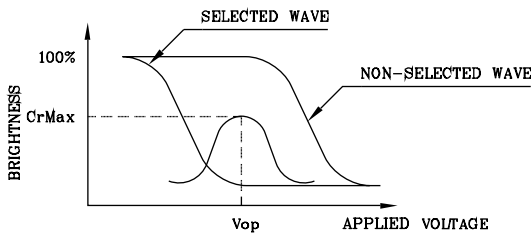
J: NORMALLY WHITE (FSTN)

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

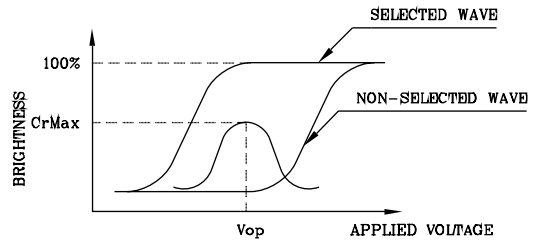
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	-20°C	-	3000	4500	ms	NOTE 2
		0°C	-	1100	1650		
		25°C	-	300	450		
		50°C	-	150	225		
		70°C	-	100	150		
Response Time (fall)	Tf	-20°C	-	2800	4200	ms	NOTE 2
		0°C	-	500	800		
		25°C	-	200	300		
		50°C	-	100	150		
		70°C	-	80	120		

(NOTE 1)

Definition of Operation Voltage(Vop)



(positive type)



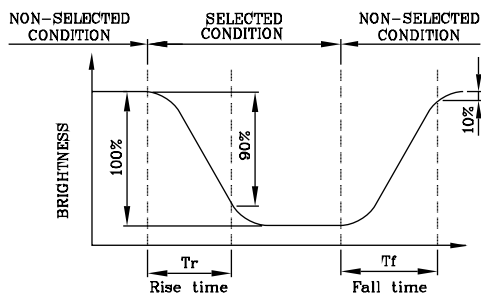
(negative type)

\*Conditions

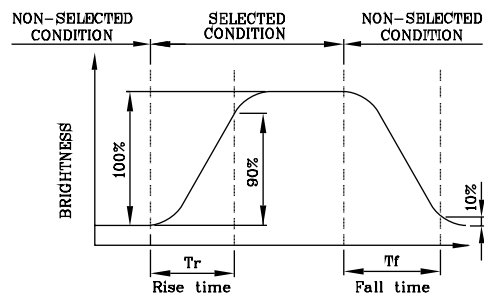
- Viewing Angle : 0
- Frame Frequency : 70Hz
- Applied Waveform : 1/N duty 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)



(positive type)



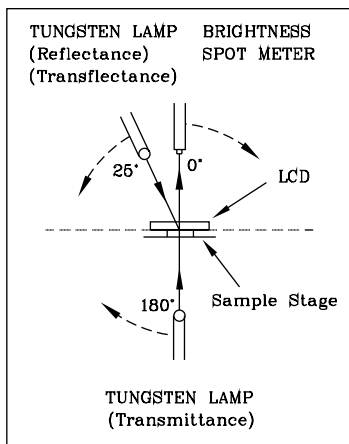
(negative type)

\*Conditions

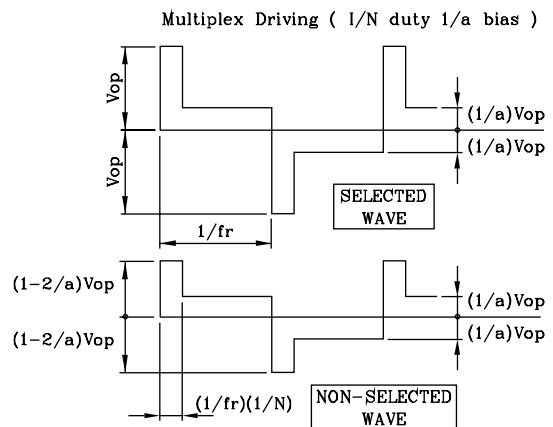
- Operating Voltage : Vop
- Viewing Angle (θ,φ) : (0,0)
- Frame Frequency : 70Hz
- Applied Waveform : 1/N duty 1/a bias

(NOTE 3)

Description of Measuring Equipment and Driving Waveforms

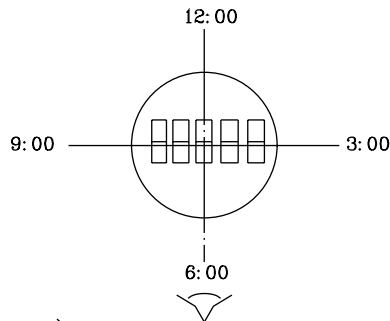


CONST.  
TEMP.  
CHAMBER



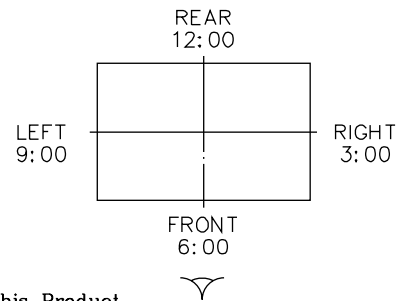
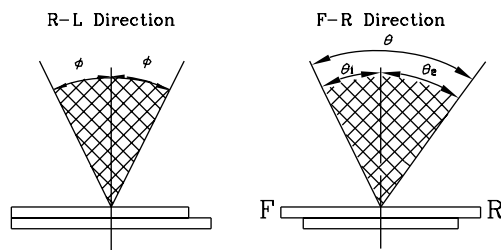
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle



\*For This Product  
The Viewing Direction Is 6 O'clock  
So  $\theta_1 > \theta_2$

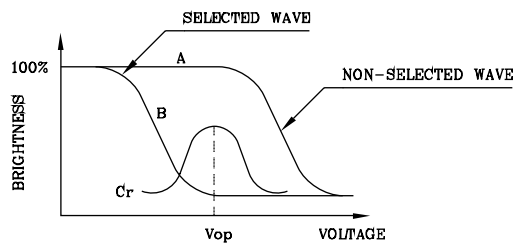
$$\theta = \theta_1 + \theta_2$$

\*Conditions

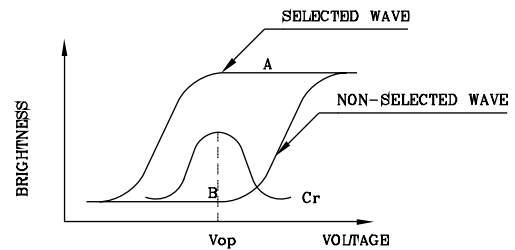
Operating Voltage :  $V_{op}$   
Frame Frequency : 70Hz  
Applied Waveform : 1/N duty 1/a bias  
Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type)



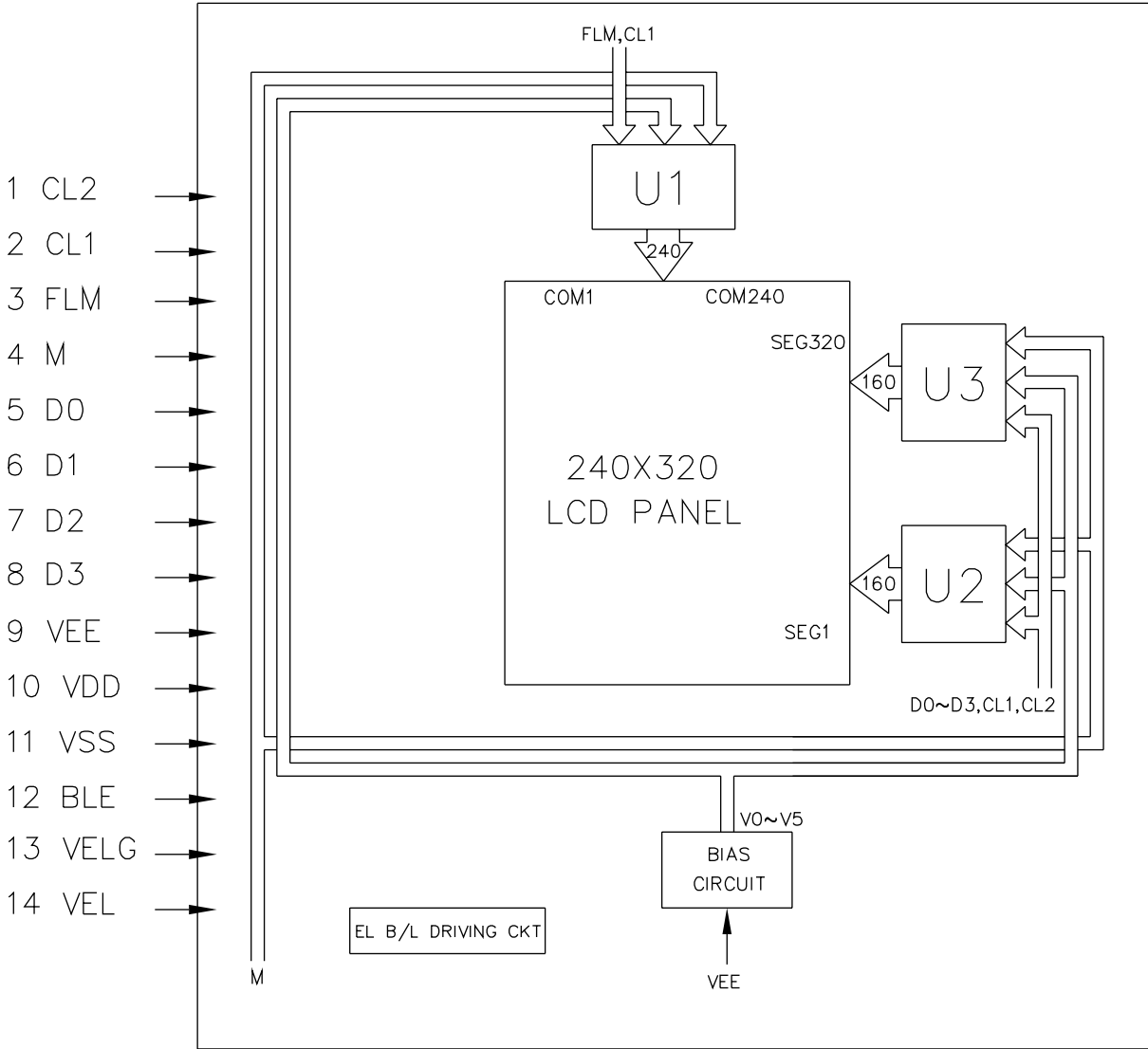
(negative type)

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

\*Conditions

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

## 5. BLOCK DIAGRAM

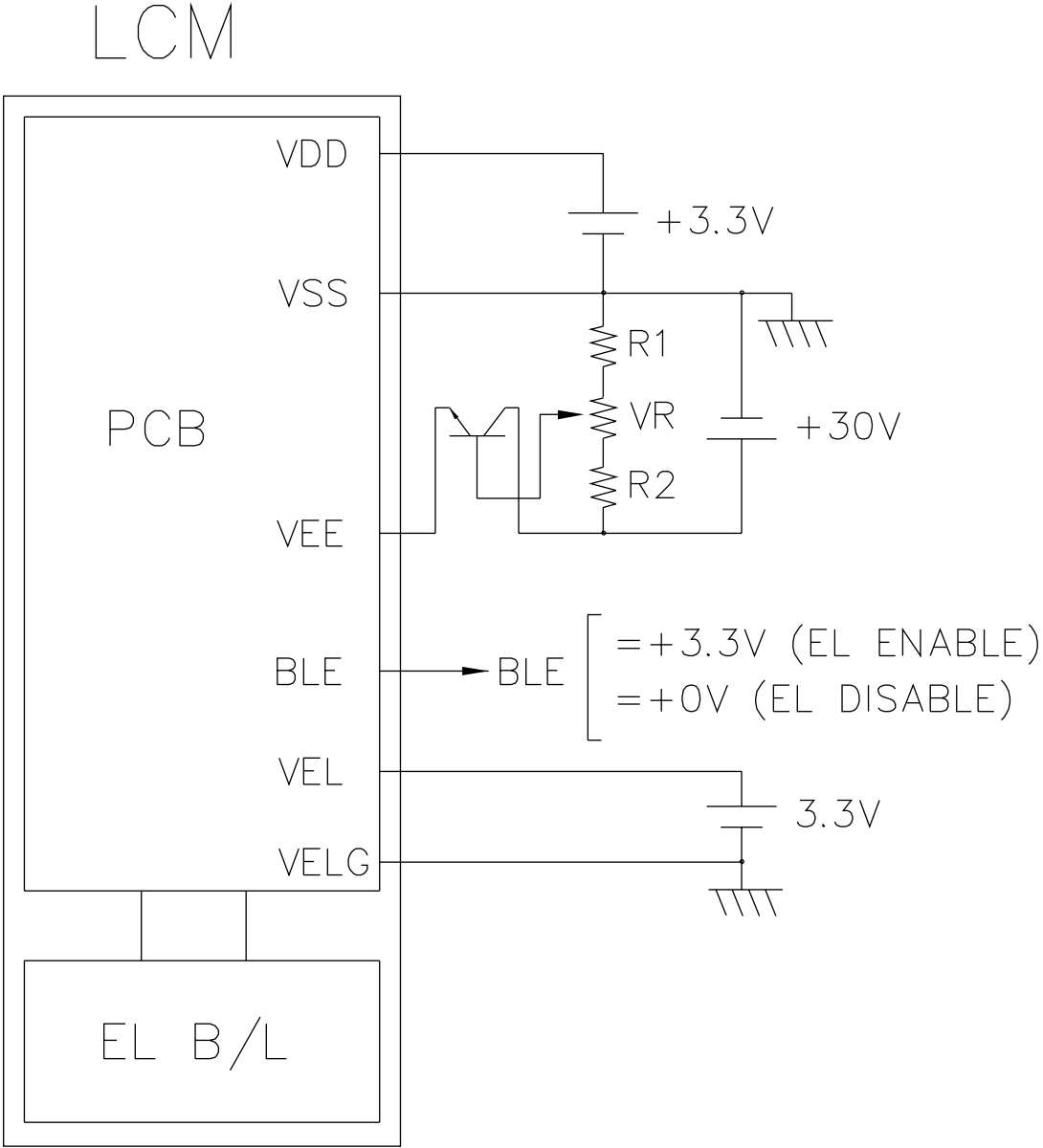


## 6. INTERNAL PIN CONNECTION

PinNo.	Symbol	Level	Function
1	CL2	H/L	Data Shift Clock Signal
2	CL1	H/L	Data Latch Clock Signal
3	FLM	H/L	Frame Signal
4	M	H/L	Alternate Signal
5	D0	H/L	Display Data
6	D1	H/L	
7	D2	H/L	
8	D3	H/L	
9	VEE	—	Power Supply for LCD (+V)
10	VDD	—	Power Supply for Logic
11	VSS	—	Power Supply (0V)
12	BLE	H/L	H: EL Enable ; L: EL Disable
13	VELG	—	Power Supply for EL (GND,0V)
14	VEL	—	Power Supply for EL (+)
15	NC	—	No Connection
16	NC	—	
17	NC	—	
18	NC	—	



## 7. POWER SUPPLY



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

## 8. TIMING CHARACTERISTICS

### 8-1 INTERFACE TIMING

@ VDD=3.3V±10%, Ta=-20~70°C

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Clock Cycle	tC	Fig.a	500	-	-	ns
SCP Pulse Width	tSWH,tSWL	Fig.a	240	-	-	ns
Data Set Up Time	tDSU	Fig.a , Fig.b	240	-	-	ns
Data Hold Time	tDHD	Fig.a , Fig.b	240	-	-	ns
SCP Rise/Fall Time	tr,tf	Fig.a , Fig.b	-	-	50	ns
LP Rise Time	tLRP	Fig.a	240	-	-	ns
LP Fall Time	tLFP	Fig.a	240	-	-	ns
LP Pulse Width	tLW	Fig.a	240	-	-	ns
SCP To LP Delay Time	tSL	Fig.a	50	-	-	ns
LP To SCP Delay Time	tLS	Fig.a	100	-	-	ns
LP "H" Pluse Width	tCWH	Fig.b	40	-	-	ns
LP "L" Pluse Width	tCWL	Fig.b	170	-	-	ns

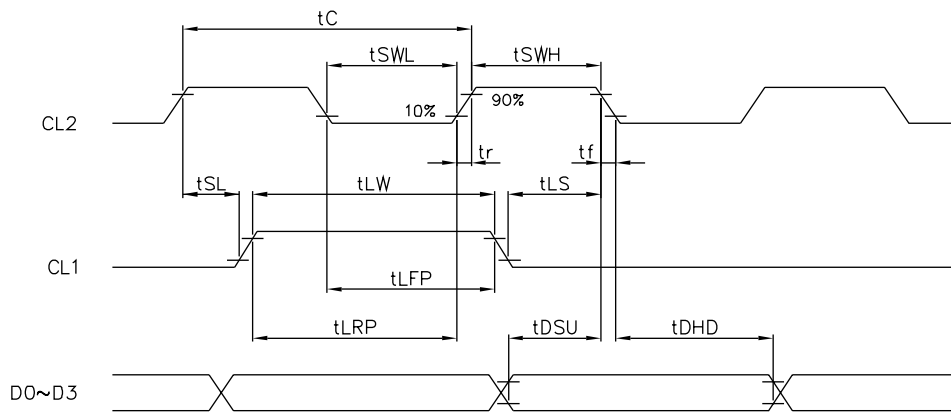


Fig . a Interface timing (SEGMENT)

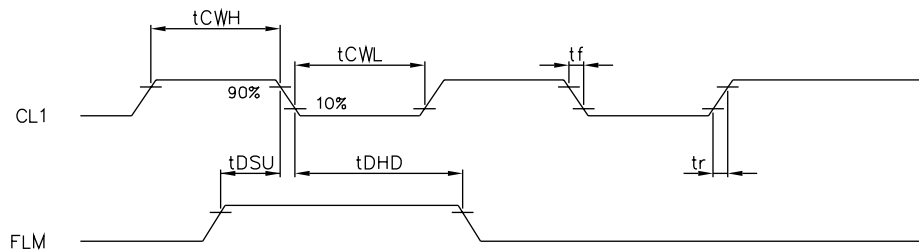
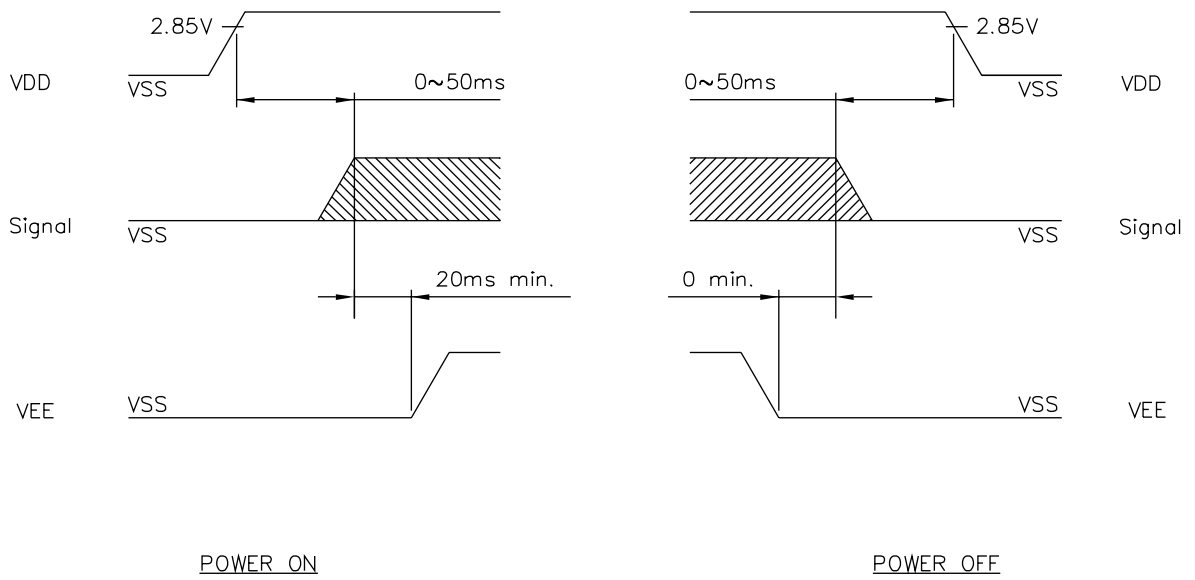


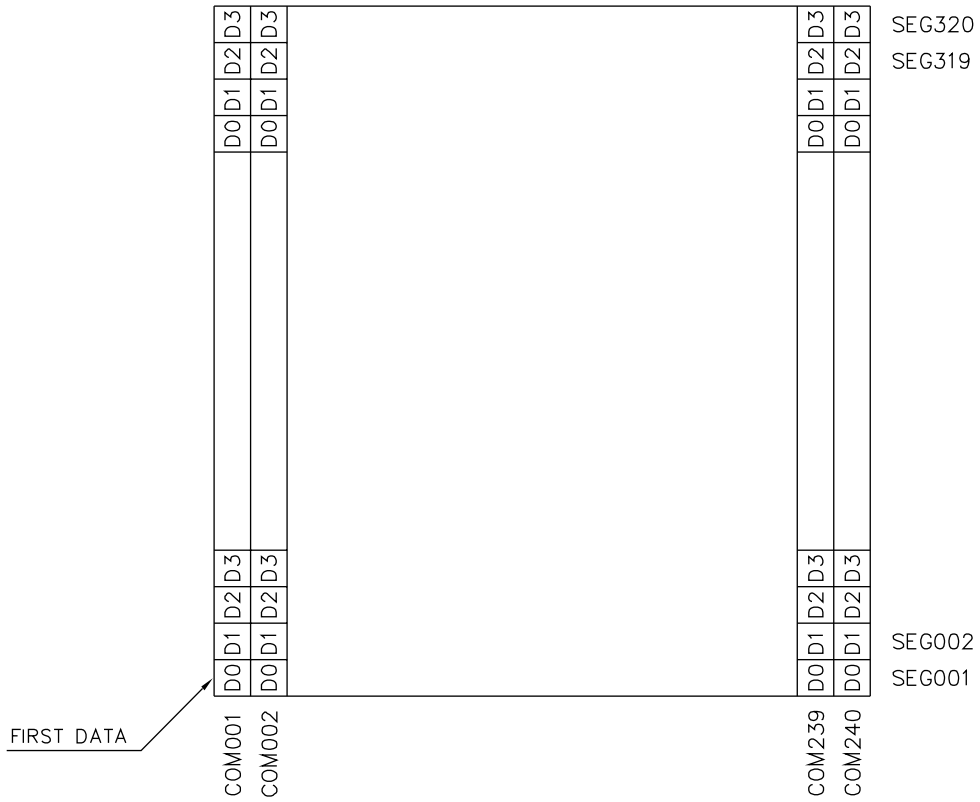
Fig . b Interface timing (COMMON)

## 8-2 POWER ON/OFF TIMING

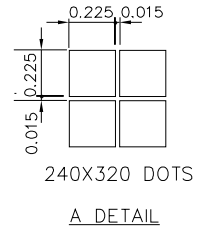
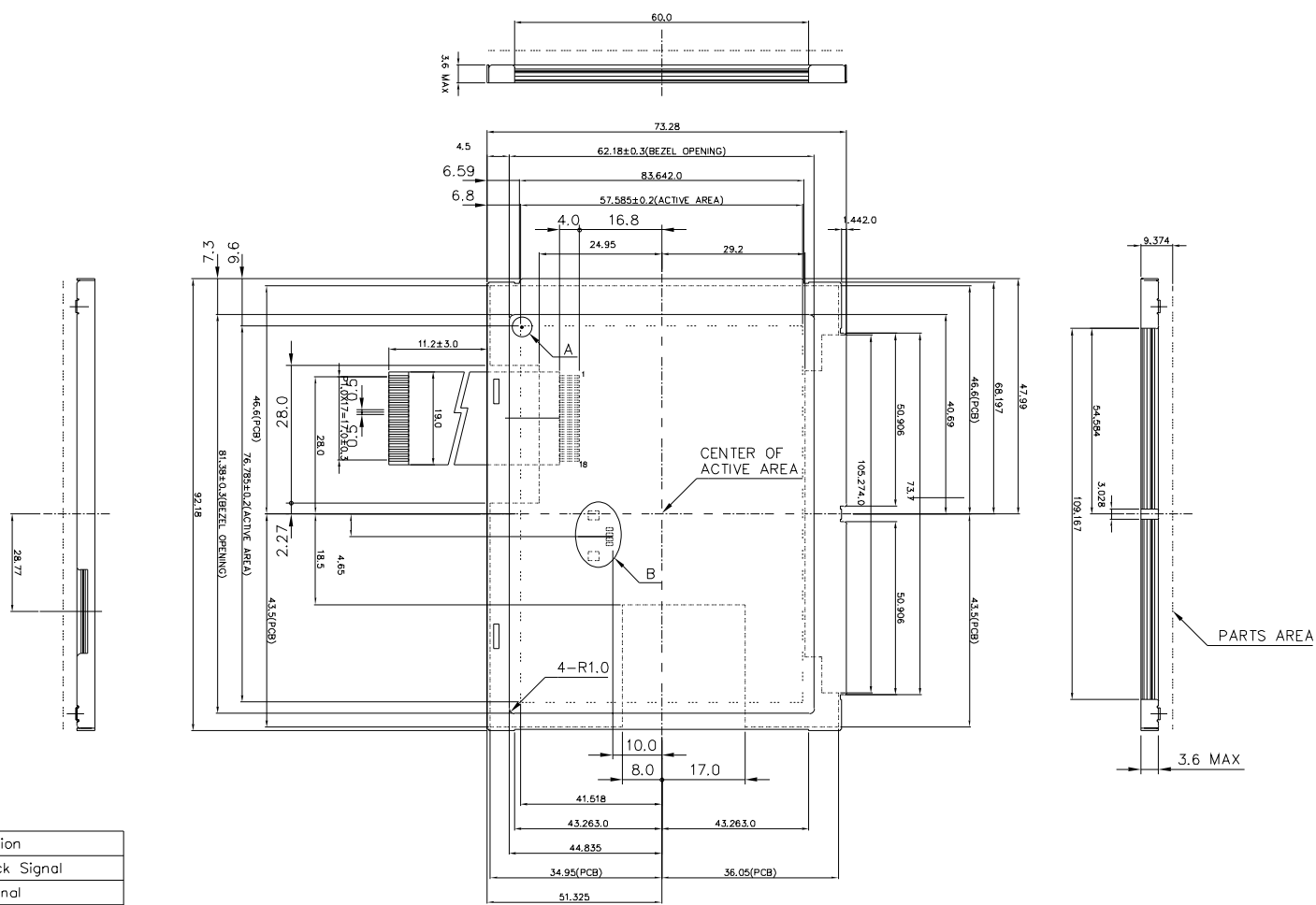


Missing pixels may occur when the LCM is driven beyond the power interface timing sequence.

## 8-3 DISPLAY PATTERN



240 X 320 Dots Matrix



INTERFACE		
Pin No.	Symbol	Function
1	CL2	Data Shift Clock Signal
2	CL1	Data Latch Signal
3	FLM	First Line Marker
4	M	Alternate Signal
5	D0	Display Data
6	D1	
7	D2	
8	D3	
9	VEE	Power Supply for LCD(+V)
10	VDD	Power Supply for Logic(+)
11	VSS	Power Supply for Logic(GND,0V)
12	BLE	H:EL Enable, L:EL Disable
13	VELG	Power Supply for EL(GND,0V)
14	VEL	Power Supply for EL(+)
15	NC	No Connection
16	NC	
17	NC	
18	NC	

- NOTE :
1. RESOLUTION : 240 X 320 DOTS
  2. BACKLIGHT : EL Backlight, Blue-Green
  3. TOLERANCE NOT SPECIFIED : ±0.5 mm

LTD79X202XGK		AZ DISPLAYS, INC.	
APPROVE	NAME	TITLE	Part No : AGM 2432B-FE
CHECK	DATE	DWG-NO	TD-X202XGK Rev.A
DESIGN		UNIT	: mm
DRAW	MAY PING 87.11.25	SCALE	: 2/3