

AZ DISPLAYS, INC.

1. MECHANICAL DATA

(1) Product No.	AGM2432B-FE-FBH-T
(2) Module Size	75.1 (W)mm X 93.8 (H)mm X 7.5 (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 B/L (Blue-Green)
(10) Weight	60g(Included EL B/L and TOUCH PANEL)
(11) Controller	Excluded
(12) DC/DC Converter	Excluded
(13) EL B/L inverter Ckt	Included
(14) Touch Panel	Included

Revised: June 6, 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	OPERATING		STORAGE	
	MIN.	MAX.	MIN.	MAX.
Ambient Temperature	-20	70	-30	80
Humidity(Without Condensation)	Note 2,4		Note 3,4	

Note 1 LCM should be grounded during handling.

Note 2 $T_a \leq 70^\circ\text{C}$: 75%RH max

$T_a > 70^\circ\text{C}$: Absolute humidity must be lower

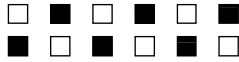
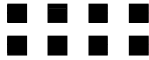
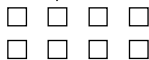
than the humidity of 75%RH at 70°C

Note 3 T_a at -30°C will be $< 48\text{hrs}$, at 80°C will be $< 120\text{hrs}$

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

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	VEE–VSS (Vop)	1/240 Duty 1/13 Bias	–20°C	24.2	24.6	25.0	V
			0°C	22.9	23.0	23.4	
			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 PATTERN :	–	0.2	0.5	mA	
	IEE		–	4.5	7.0		
EL Power Supply Current	IEL	VEL= 3.3V VELG= 0V BLE=3.3V	–	30	40	mA	
LCM	Surface Luminance	L	PATTERN: (Dots All On) 	–	2.0	–	cd/m ²
			PATTERN: (Dots All Off) 	–	9.29	–	

4. OPTICAL CHARACTERISTICS

AT V_{OP}

ITEM MODE		Cr(Contrast Ratio)						θ (Viewing Angle)		ϕ (Viewing Angle)	
		0°C		25°C		50°C		25°C		25°C	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
H	L	-	9.0	-	10.0	-	7.0	-	84	-	79
NOTE		NOTE 6						NOTE 5			

NOTE :

H: TRANSFLECTIVE(HIGH TRANSPARENCY)

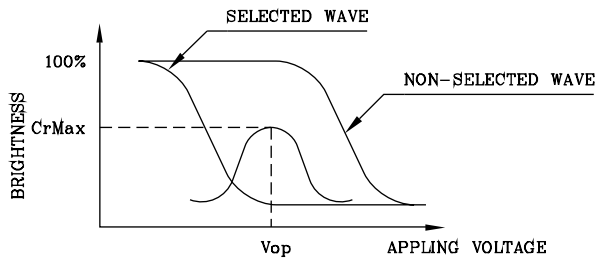
L: NORMALLY WHITE(PAPER WHITE)

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

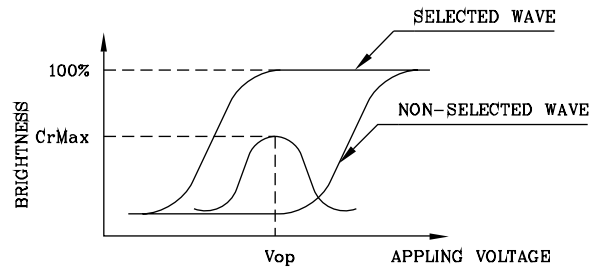
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	-20°C	-	3000	4500	ms	NOTE 2
		0°C	-	1100	1650		
		25°C	-	300	450		
		50°C	-	150	225		
		70°C	-	100	150		
Response Time (fall)	Tf	-20°C	-	2800	4200	ms	NOTE 2
		0°C	-	500	800		
		25°C	-	200	300		
		50°C	-	100	150		
		70°C	-	80	120		

(NOTE 1)

Definition of Operation Voltage(Vop)



(positive type)



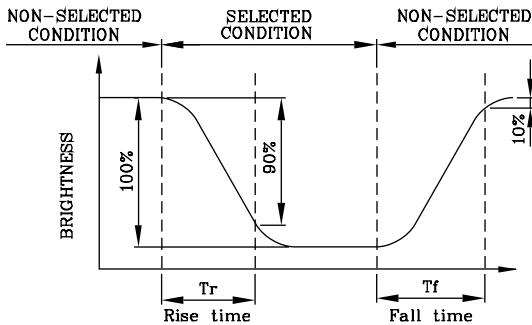
(negative type)

*Conditions

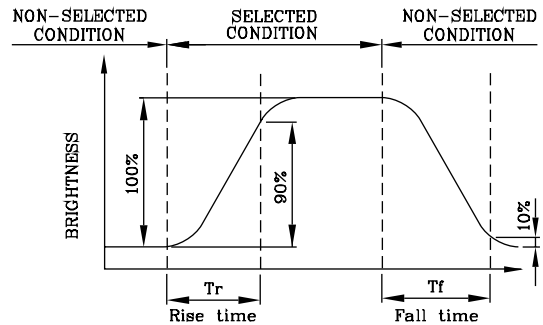
Viewing Angle : 0
 Frame Frequency : 70Hz
 Appling Waveform : 1/N duty 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)



(positive type)



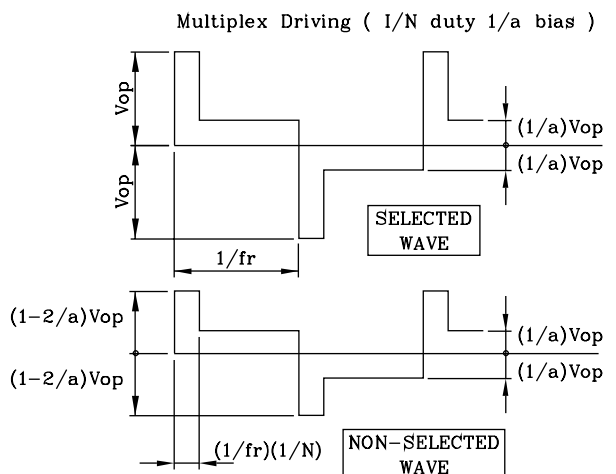
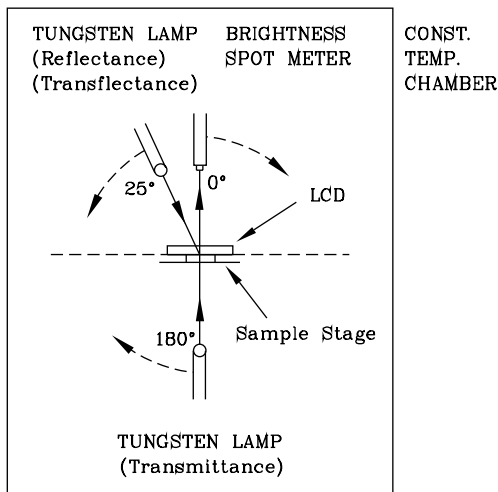
(negative type)

*Conditions

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

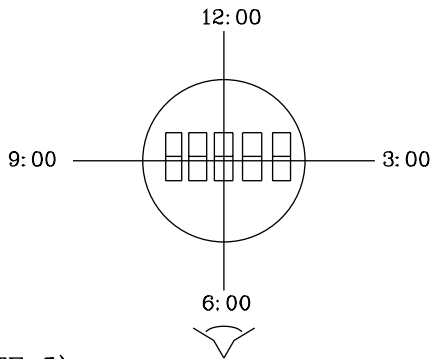
(NOTE 3)

Description of Measuring Equipment and Driving Waveforms



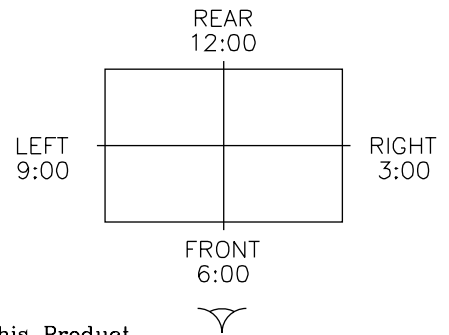
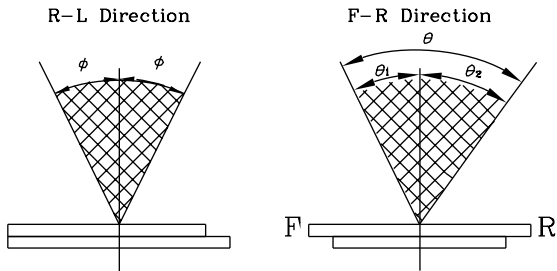
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle



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

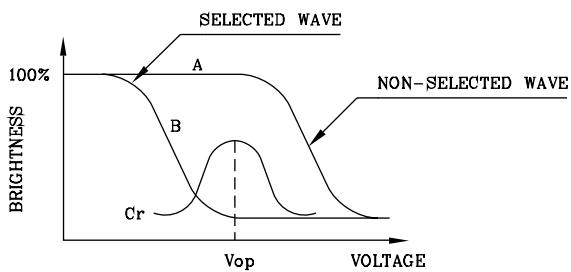
$$\theta = \theta_1 + \theta_2$$

*Conditions

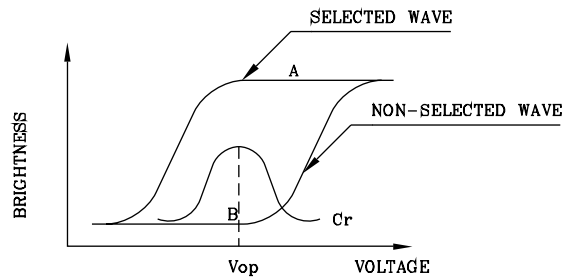
Operating Voltage : V_{op}
Frame Frequency : 70Hz
Applying Waveform : 1/N duty 1/a bias
Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type)



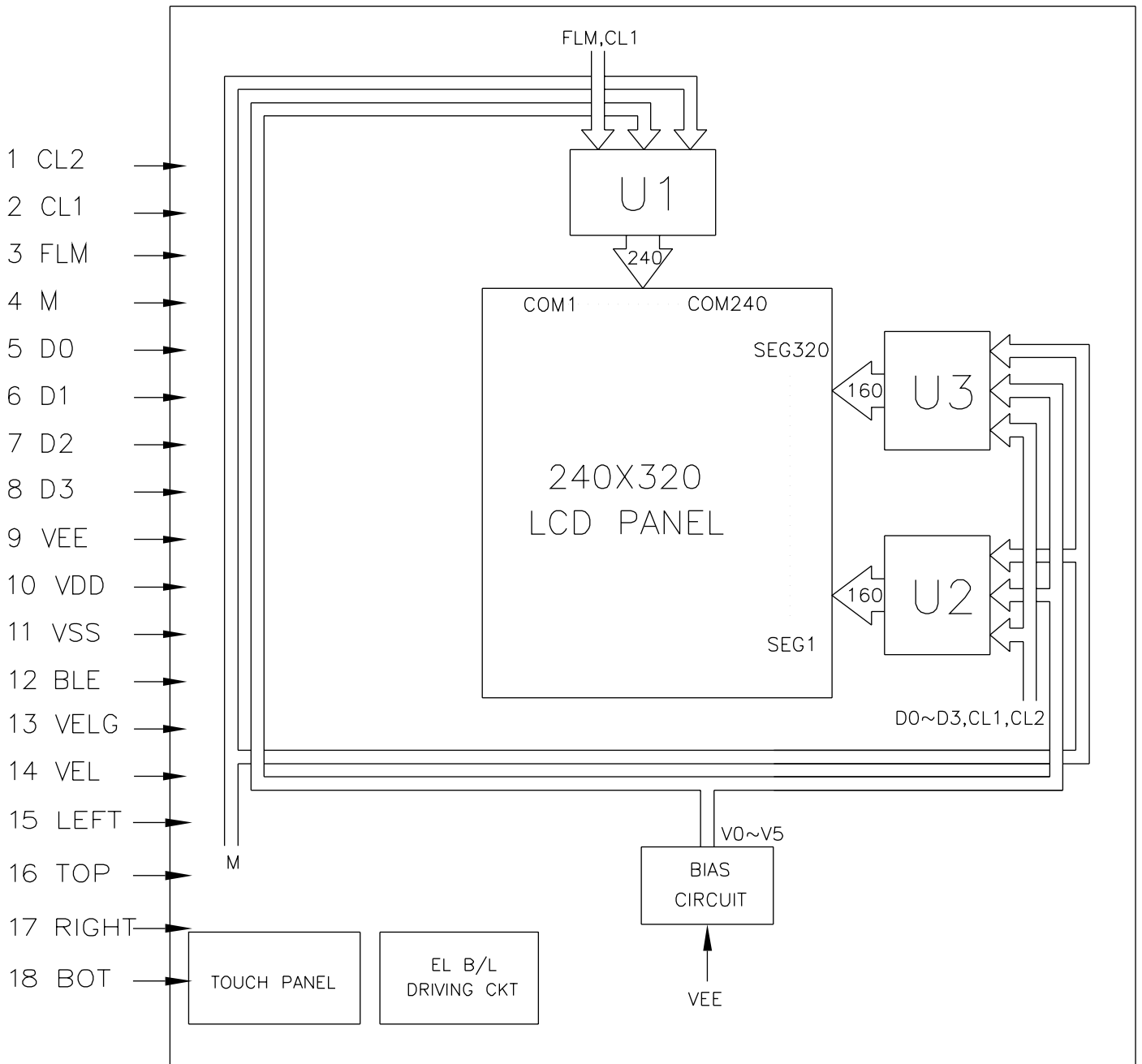
(negative type)

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

*Conditions

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

5. BLOCK DIAGRAM



6. INTERNAL PIN CONNECTION

CN1

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	LEFT	—	Touch Panel Connection
16	TOP	—	
17	RIGHT	—	
18	BOT	—	

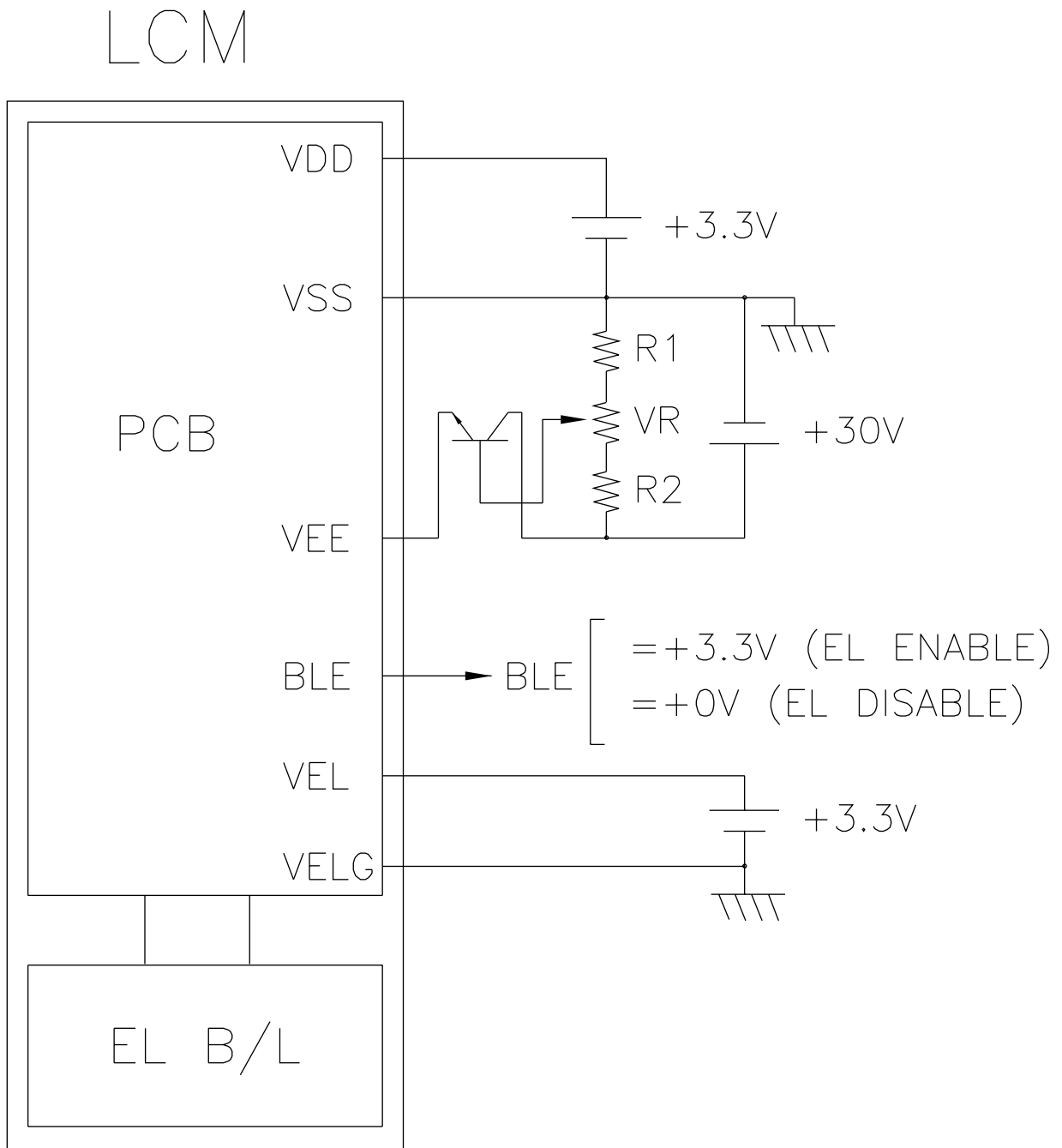
CABLE(CN1) :

FFC,N18,PITCH=1.0mm,THICKNESS=0.3mm

MATING CONNECTOR :

MOLEX 52207-1890 or COMPATIBLE

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
CL2 Cycle Time	tC	Fig.a	125	-	-	ns
CL2 Pulse Width	tSWH,tSWL	Fig.a	51	-	-	ns
CL2 Rise/Fall Time	tr,tf	Fig.a	-	-	50	ns
CL1 Pulse Width	tCWH,tCWL	Fig.a , Fig.b	30	-	-	ns
CL1 Rise/Fall Time	tLRP,tLFP	Fig.b	-	-	50	ns
CL2 To CL1 Delay Time	tSL	Fig.a	50	-	-	ns
CL1 To CL2 Delay Time	tLS	Fig.a	100	-	-	ns
Data Set Up Time	tDSU	Fig.a , Fig.b	30	-	-	ns
Data Hold Time	tDHD	Fig.a , Fig.b	50	-	-	ns

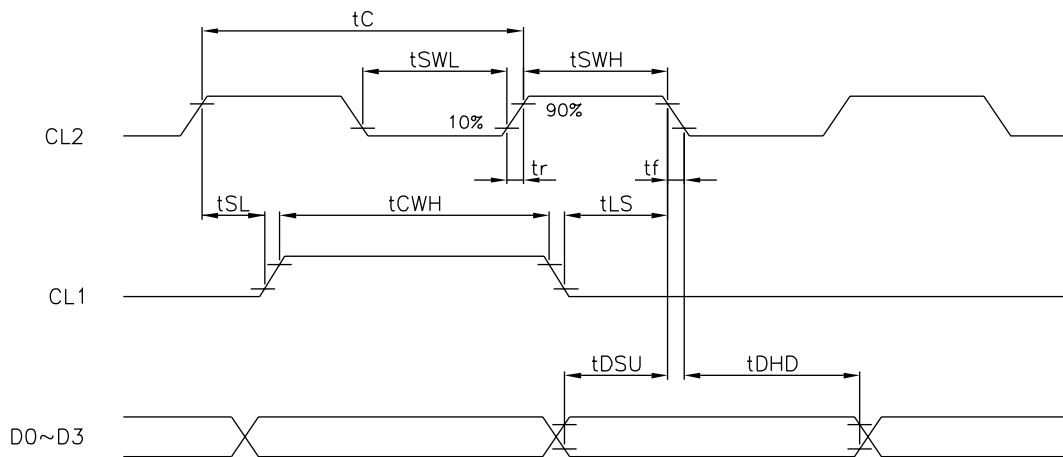


Fig . a Interface timing (SEGMENT)

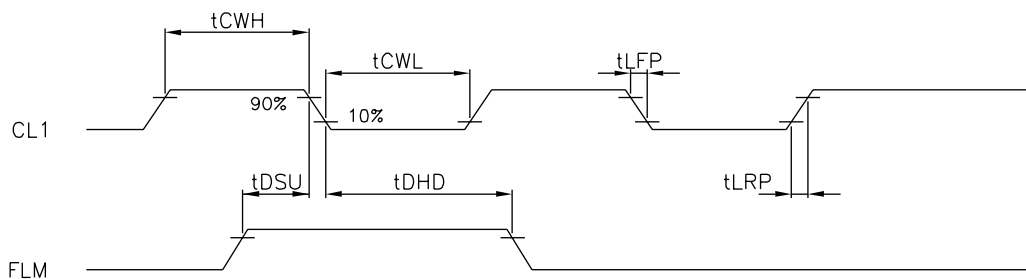
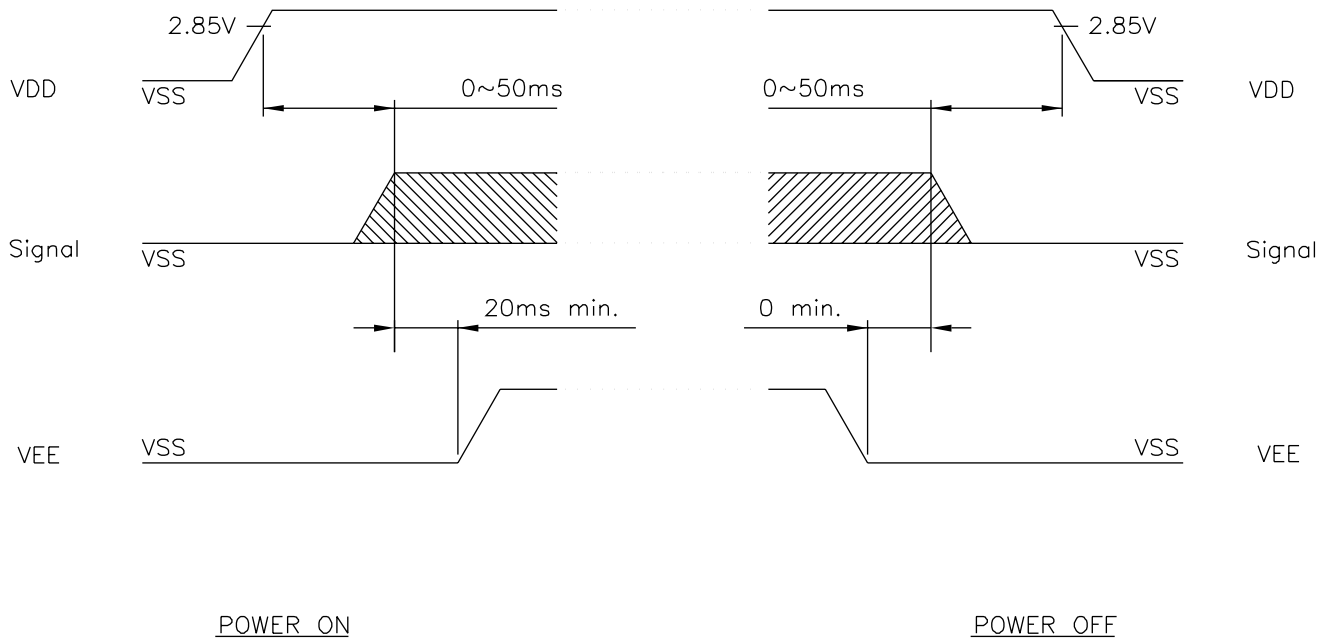


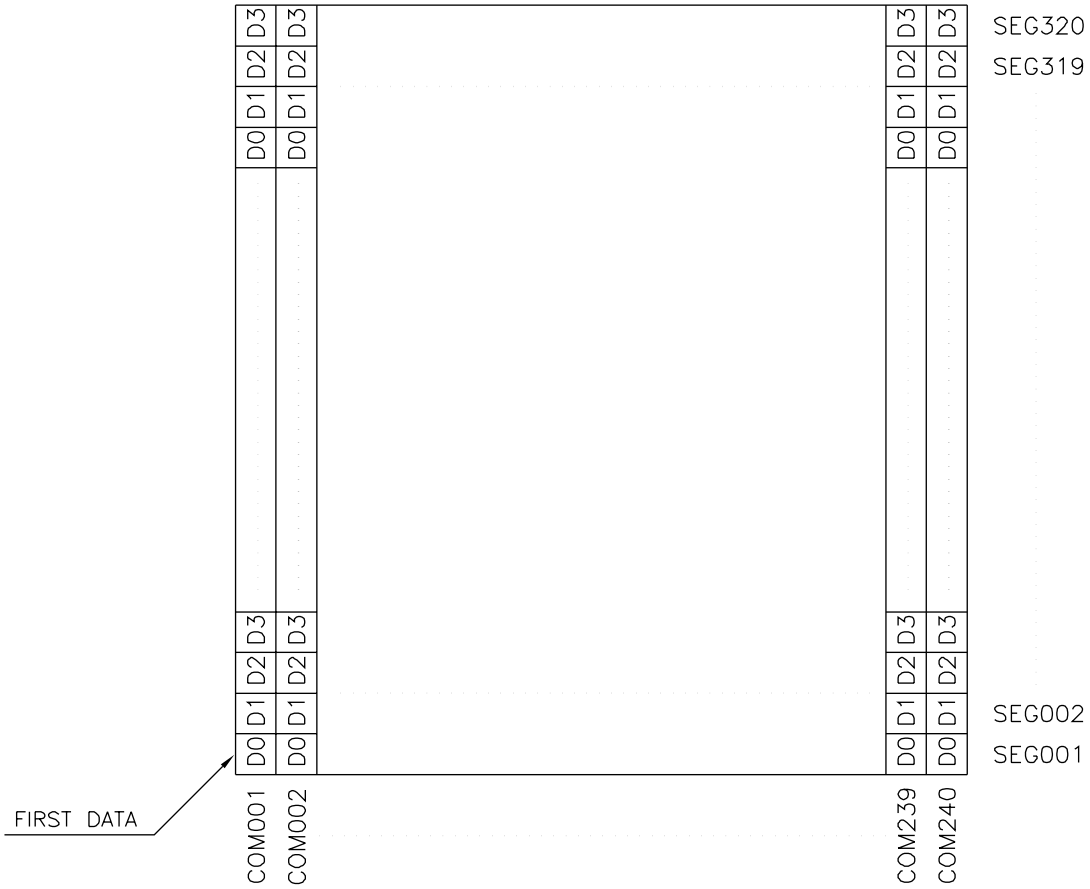
Fig . b Interface timing (COMMON)

8-2 POWER ON/OFF TIMING

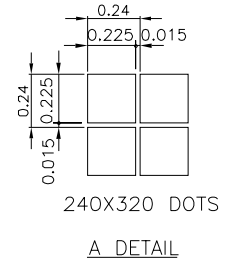
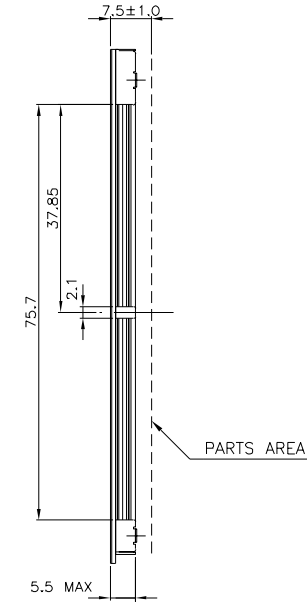
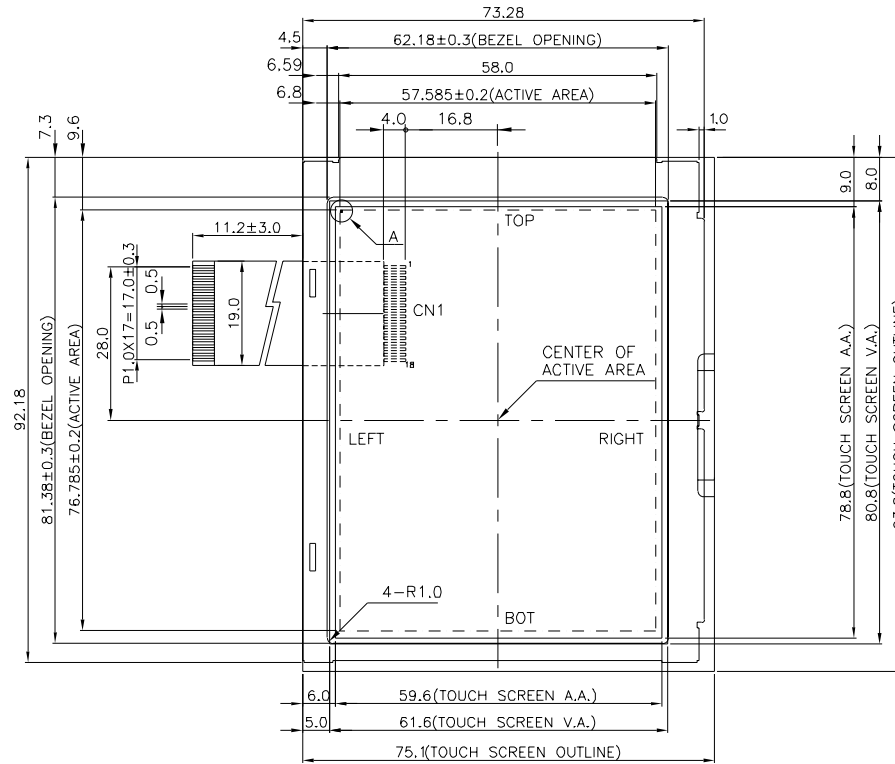
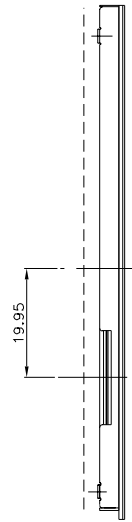


Missing pixels may occur when the LCM is driven beyond above power interface timing sequence.

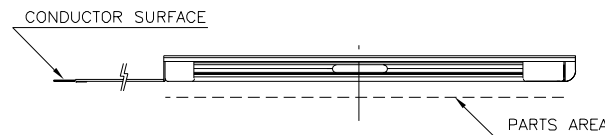
8-3 DISPLAY PATTERN



240 X 320 Dots Matrix



↑
VIEWING DIRECTION



NOTE :

1. RESOLUTION : 240 X 320 DOTS
2. BACKLIGHT : EL Backlight, Blue-Green
3. TOLERANCE NO SPECIFIED : ±0.5 mm

INTERFACE CONNECTION(CN1)

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	LEFT	Touch Panel Connection
16	TOP	
17	RIGHT	
18	BOT	

		LTD79H202L5GK		AZ DISPLAYS, INC.	
		NAME	DATE		
APPROVE				TITLE	AGM2432B-FE-FBH-T
CHECK				DWG-NO	TDBH202L5GK Rev.A
DESIGN					
DRAW	MAY PING	87.12.03		THIRD ANGLE PROJECT	UNIT : mm SCALE : 2/3