

AZ Displays, Inc.

1.MECHANICAL DATA

(1) Part Name	AGM2464D
(2) Module Size	180.0(W)mm X 65.0(H)mm X MAX10.5(D)mm (W/O,EL B/L) 180.0(W)mm X 65.0(H)mm X MAX15.5(D)mm (LED B/L) 190.0(W)mm X 65.0(H)mm X MAX13.8(D)mm (CCFL B/L)
(3) Dot Size	0.49 (W)mm x 0.49 (H)mm
(4) Dot Pitch	0.53 (W)mm x 0.53 (H)mm
(5) Number of Dots	240 (W) x 64 (H)Dots
(6) Duty	1/64
(7) LCD Display Mode	STN: ☐ Gray Mode ☐ Yellow Mode ☐ Blue Mode FSTN: ☐ Black and White(Normal White/Positive Image) ☐ Black and White(Normal Black/Negative Image) Rear Polarizer: ☐ Reflective ☐ Transflective ☐ Transmissive
(8) Viewing Direction	☐ 6 O'clock ☐ 12 O'clock ☐ ____ O'clock
(9) Backlight	☐ W/O ☐ EL B/L ☐ LED B/L ☐ CCFL B/L
(10) Weight	W/O B/L: 128.5 g EL B/L: 135.5 g LED B/L: 164.0 g CCFL B/L: 173.0 g

AZ Displays, Inc.

2.ABSOLUTE MAXIMUM RATINGS

(1) ELECTRICAL ABSOLUTE RATINGS

VSS=0V Standard

ITEM	SYMBOL	MIN	MAX	UNIT	COMMENT
Power Supply for Logic	VDD-VSS	-0.3	7.0	V	
Power Supply for LCM	VDD-VEE	0	20.0	V	
Input Voltage	VI	-0.3	VDD	V	
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
Humidity (Without Condensation)	Note 2,4		Note 3,5		Note 4,5		Note 4,6	

Note 2 Ta $\leq$ 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 < 48hrs, at 70°C will be < 120hrs

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

Note 5 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 6 Ta at -30°C will be < 48hrs, at 80°C will be < 120hrs

AZ Displays, Inc.

3.ELECTRICAL CHARACTERISTICS(VDD = 5V±10%)

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Input Voltage		VIH	H level	0.7VDD	—	VDD	V
		VIO	L level	0	—	0.3VDD	V
Recommended LC Driving Voltage (Normal Temp. LCM)		VDD–VEE	Duty= 1/64	0°C	13.1	13.5	13.9
			Bias= 1/9	25°C	11.9	12.5	13.1
				50°C	10.8	11.4	11.8
Recommended LC Driving Voltage (Wide Temp. LCM)		VDD–VEE	Duty= 1/64	–20°C	11.7	12.1	12.5
			Bias= 1/9	0°C	11.6	12.0	12.4
				25°C	11.5	11.9	12.3
				50°C	11.4	11.8	12.2
				70°C	11.3	11.7	12.1
Power Supply Current		IDD	FLM=72 Hz VDD=5.0 V VDD–VEE=11.6 V	6.5	7.2	10.6	mA
		IEE	PATTERN : □ ■ □ ■ □ ■ ■ □ ■ □ ■ □	1.6	1.8	2.4	
LED Power Supply Current		I LED	VAK = 5.0 V R18 = R19 =10Ω	—	220	—	mA
EL Power Supply Current		I EL	VAK = 110 Vrms 400HZ R18 = R19 =0Ω	—	—	10.0	mA rms
CCFL	Starting Voltage	VFLS	—	—	900	—	Vrms
	Driving Voltage	VFLD	—	—	450	—	Vrms
	Driving Current	I FLD	VFLD =450Vrms fFLD =30KHZ	—	5.0	—	mA rms
	Driving Voltage	f FL	—	15	30	50	KHZ

AZ Displays, Inc.

4.OPTICAL CHARACTERISTICS

4-1 Optical Char. of Normal Temp. Mode

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	3.5	4.5	50	75	20	30
	C, D	6.0	9.0	60	85	20	35
	J	4.5	7.5	55	80	20	35
S	A, B	3.0	4.2	50	75	20	30
	C, D	5.0	8.0	55	85	20	35
	J	4.0	7.0	50	75	20	35
T	A	2.0	2.5	40	60	18	25
	E, F	3.0	4.0	50	70	20	35
	J, K	3.0	4.0	50	70	20	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	—	600	1200	ms	NOTE 2
		25°C	—	110	220		
		50°C	—	50	100		
Response Time (fall)	Tf	0°C	—	900	1500	ms	NOTE 2
		25°C	—	250	360		
		50°C	—	100	150		

note:

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

AZ Displays, Inc.

4-2 Optical Char. of Wide Temp. Mode

AT V_{OP}

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	3.5	4.2	50	68	20	30
	C	5.0	—	50	—	30	35
	J	6.0	8.0	50	70	20	38
S	A	3.5	4.0	50	65	20	30
	C	5.0	—	50	—	25	35
	J	5.0	7.0	50	—	25	35
T	E						
	G						
note		NOTE6		NOTE5			

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

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	−20°C	—	2100	3200	ms	NOTE 2
		0°C	—	450	680		
		25°C	—	150	250		
		50°C	—	110	170		
		70°C	—	70	90		
Response Time (fall)	Tf	−20°C	—	2100	3200	ms	NOTE 2
		0°C	—	400	600		
		25°C	—	120	180		
		50°C	—	60	100		
		70°C	—	30	50		

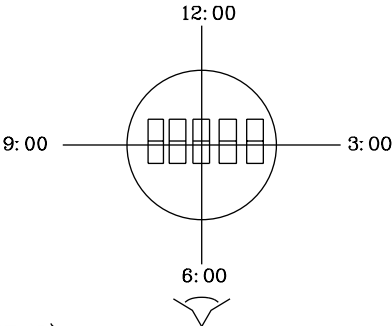
note:

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

AZ Displays, Inc.

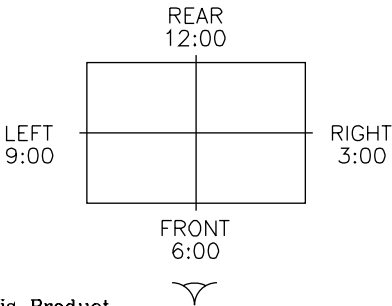
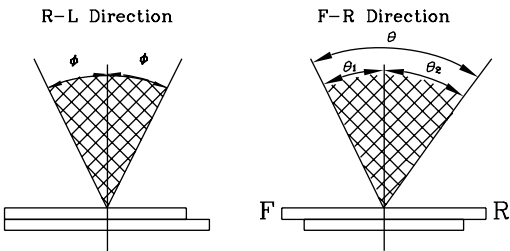
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle



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

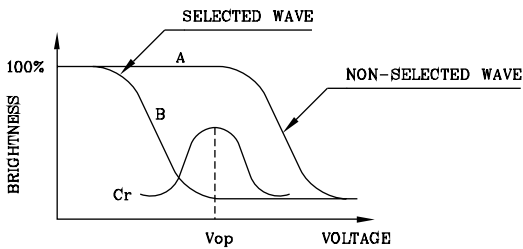
$$\theta = \theta_1 + \theta_2$$

*Conditions

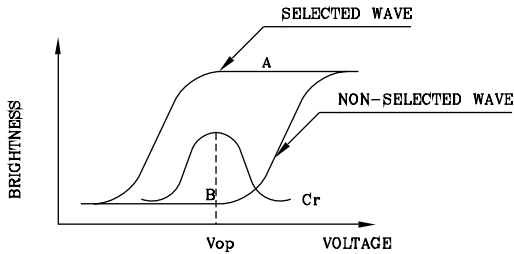
Operating Voltage : V_{op}
Frame Frequency : 70Hz
Applying Waveform : 1/N duty 1/a bias
Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type)



(negative type)

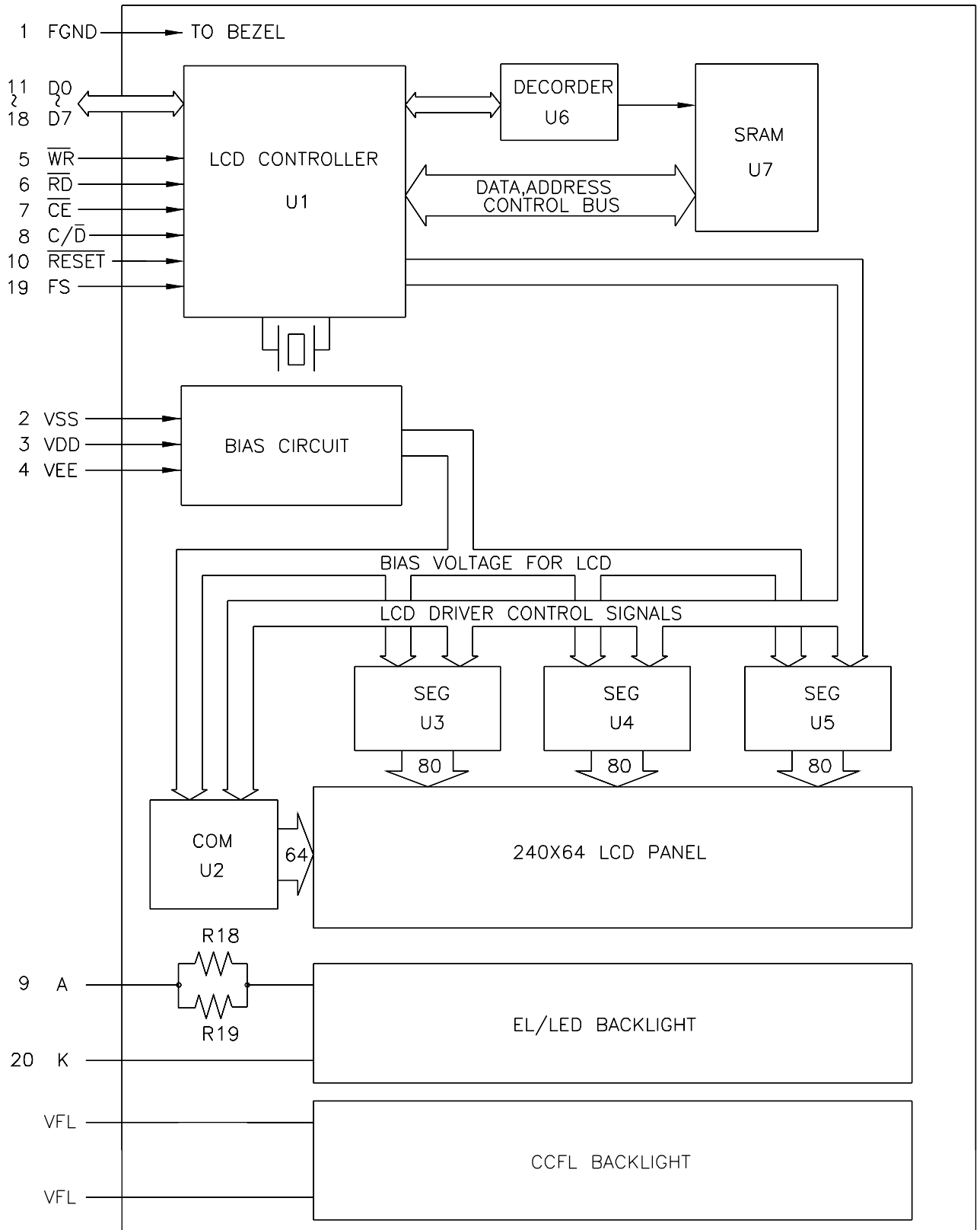
$$\text{Contrast Ratio : } Cr = A/B$$

*Conditions

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

AZ Displays, Inc.

5. BLOCK DIAGRAM



AZ Displays, Inc.

6.INTERNAL PIN CONNECTION

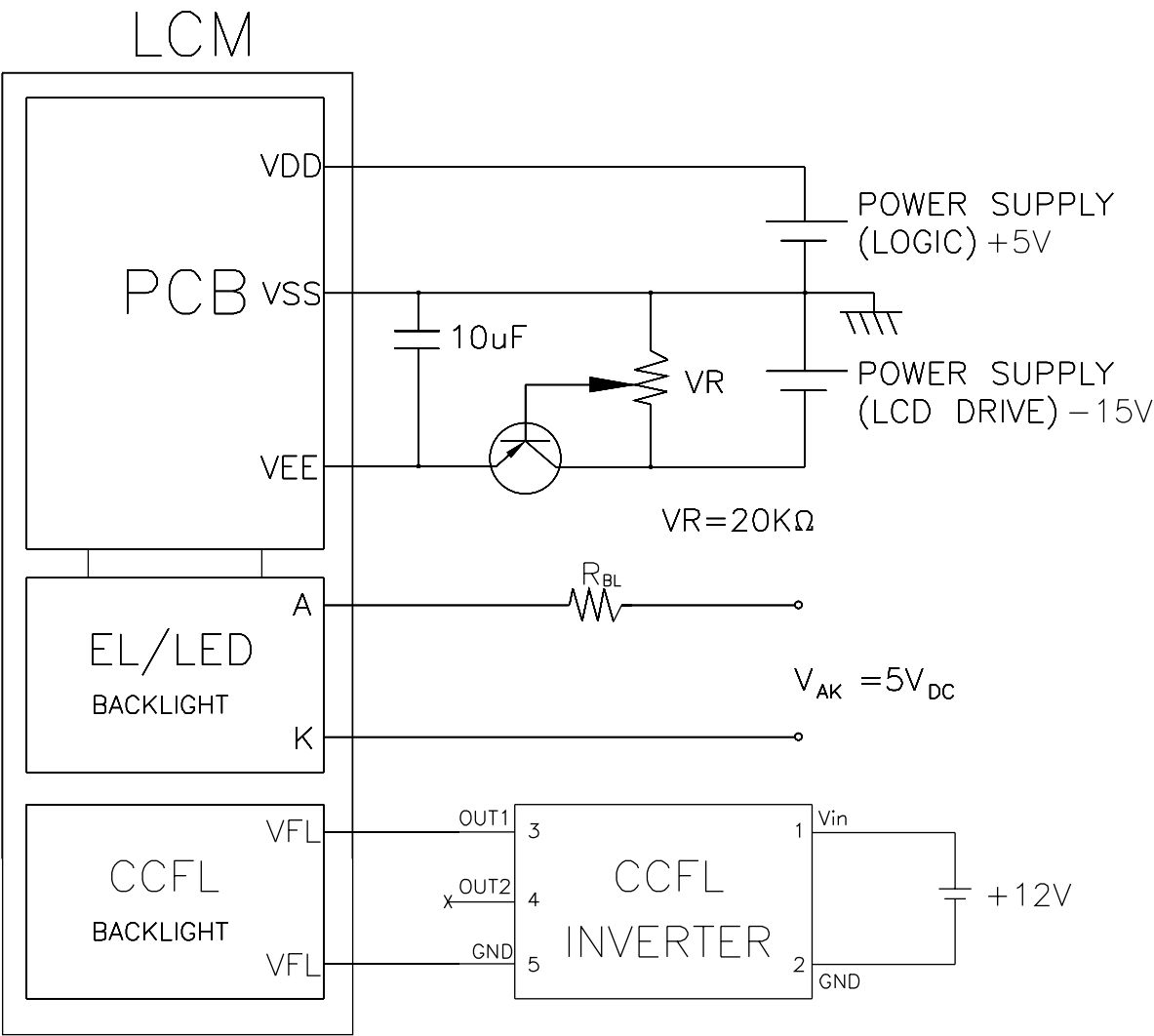
PIN NO.	SYMBOL	FUNCTION
1	FGND	FRAME GROUND (0V)
2	VSS	GROUND
3	VDD	POWER SUPPLY FOR LOGIC (+5V)
4	VEE	POWER SUPPLY FOR LC DRIVING
5	$\overline{WR}$	DATA WRITE
6	$\overline{RD}$	DATA READ
7	$\overline{CE}$	CHIP ENABLE
8	C/ $\overline{D}$	$\overline{WR}$ ="L",C/ $\overline{D}$ ="H" :COMMAND WRITE $\overline{WR}$ ="L",C/ $\overline{D}$ ="L" :DATA WRITE $\overline{RD}$ ="L",C/ $\overline{D}$ ="H" :STATUS READ $\overline{RD}$ ="L".C/ $\overline{D}$ ="L" :DATA READ
9	A	Anode of LED B/L and EL B/L
10	$\overline{RESET}$	CONTROLLER RESET
11	D0	DATA INPUT/OUTPUT
12	D1	DATA INPUT/OUTPUT
13	D2	DATA INPUT/OUTPUT
14	D3	DATA INPUT/OUTPUT
15	D4	DATA INPUT/OUTPUT
16	D5	DATA INPUT/OUTPUT
17	D6	DATA INPUT/OUTPUT
18	D7	DATA INPUT/OUTPUT
19	FS	FONT SELECT CONNECT TO VDD :6X8 PIXELS/CHARACTER CONNECT TO GND :8X8 PIXELS/CHARACTER
20	K	Cathode of LED B/L and EL B/L

CCFL Connector : J.A.E/IL-G-4S-S3C2

PIN NO	SYMBOL	FUNCTION
1	VFL	POWER SUUPLY FOR CCFL DRIVE
2	NC	—
3	NC	—
4	VFL	POWER SUUPLY FOR CCFL DRIVE

AZ Displays, Inc.

7. POWER SUPPLY



Recommended Inverter : CXA-L10L (TDK)

Recommended Value for R_{BL} and V_{BL}

item Back Light interface	R_{BL}		V_{BL}	
	EL	LED	EL	LED
A,K PIN	0Ω	5Ω	110V _{AC} 400HZ	5V _{DC}

AZ Displays, Inc.

8. TIMING CHARACTERISTICS

8-1 INTERFACE TIMING

ITEM	ITEM	CONDITION	MIN.	MAX.	UNIT
C/ $\overline{\text{D}}$ SET UP TIME	t_{CDS}	Fig.	100	—	ns
C/ $\overline{\text{D}}$ HOLD TIME	t_{CDH}	Fig.	10	—	ns
$\overline{\text{CE}}$, $\overline{\text{RD}}$, $\overline{\text{WR}}$ CLOCK WIDTH	t_{CP} , t_{RP} , t_{WP}	Fig.	80	—	ns
DATA SET UP TIME	t_{DS}	Fig.	80	—	ns
DATA HOLD TIME	t_{DH}	Fig.	40	—	ns
ACCESS TIME	t_{ACC}	Fig.	—	150	ns
DATA OUTPUT HOLD TIME	t_{OH}	Fig.	10	50	ns

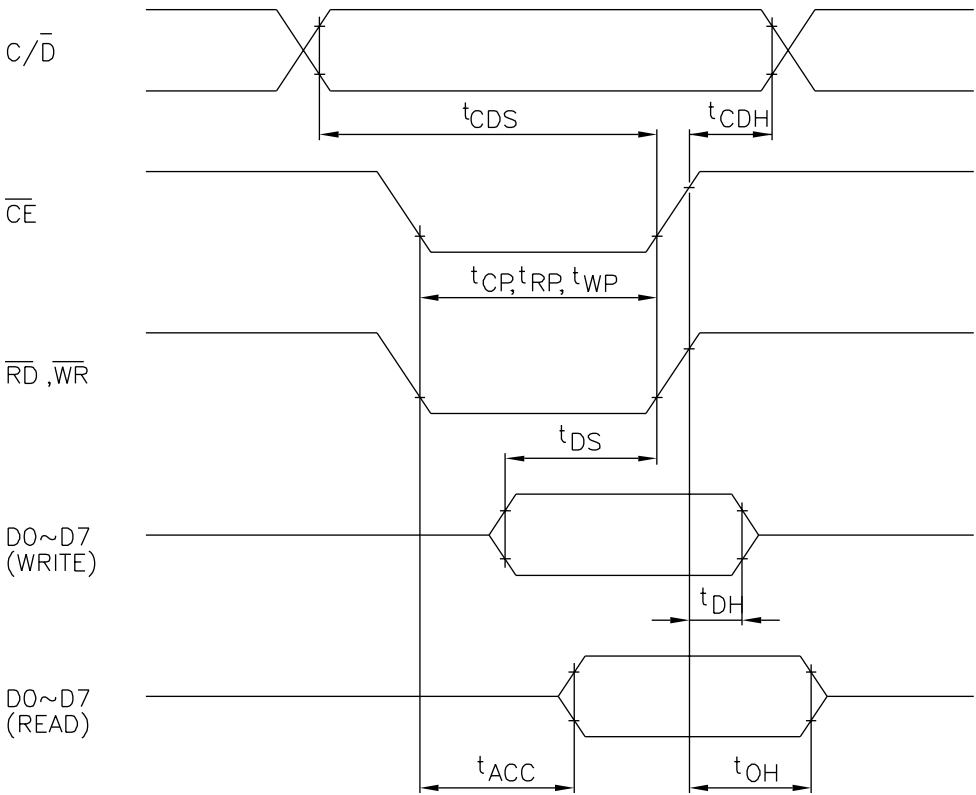
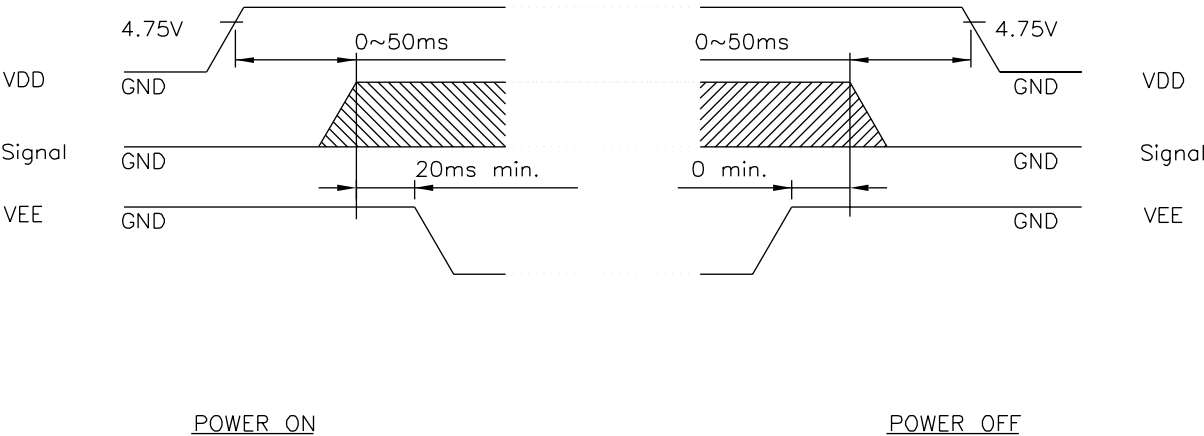


Fig. INTERFACE TIMING CHART

AZ Displays, Inc.

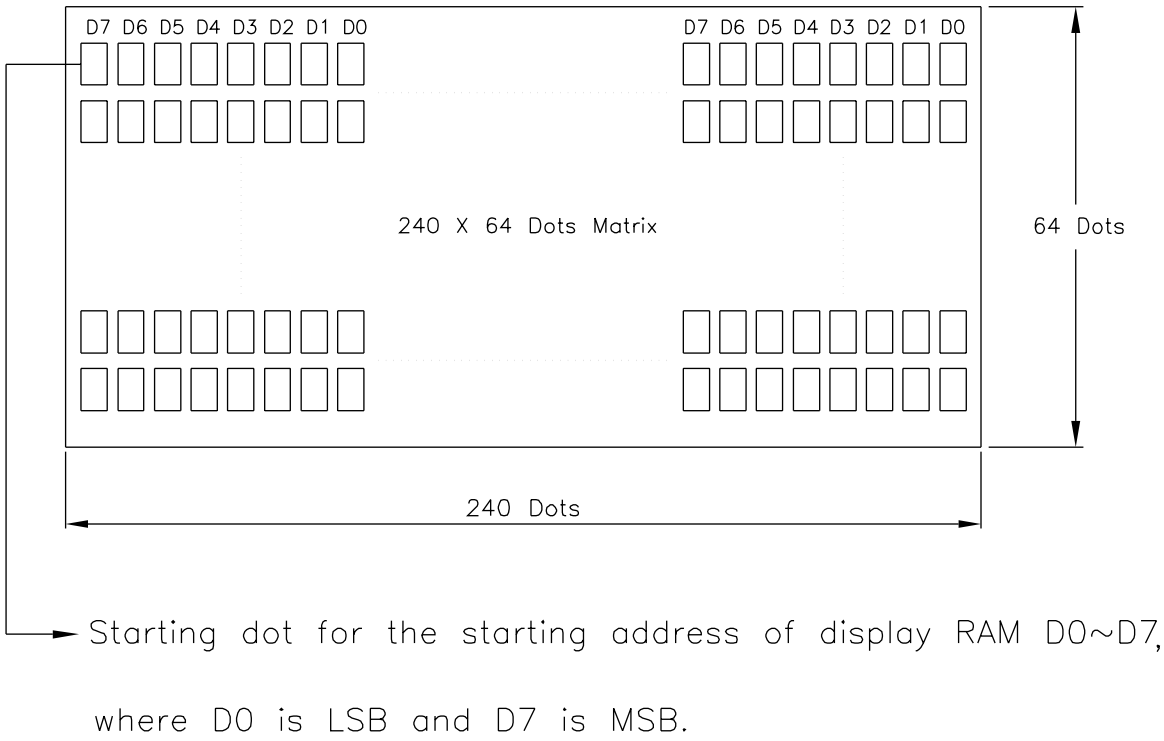
8-2 POWER ON/OFF TIMING

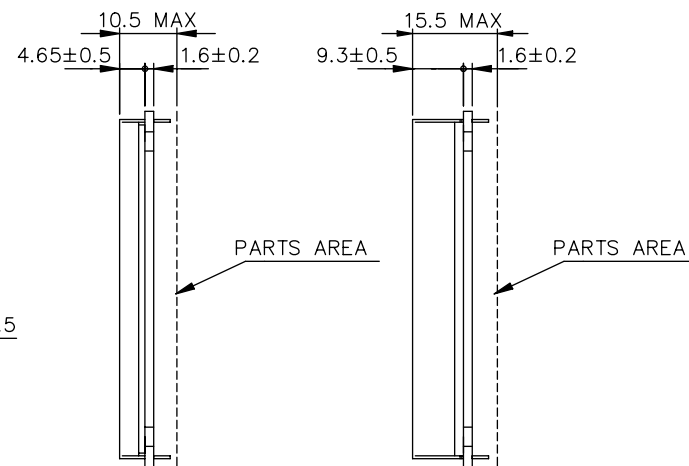
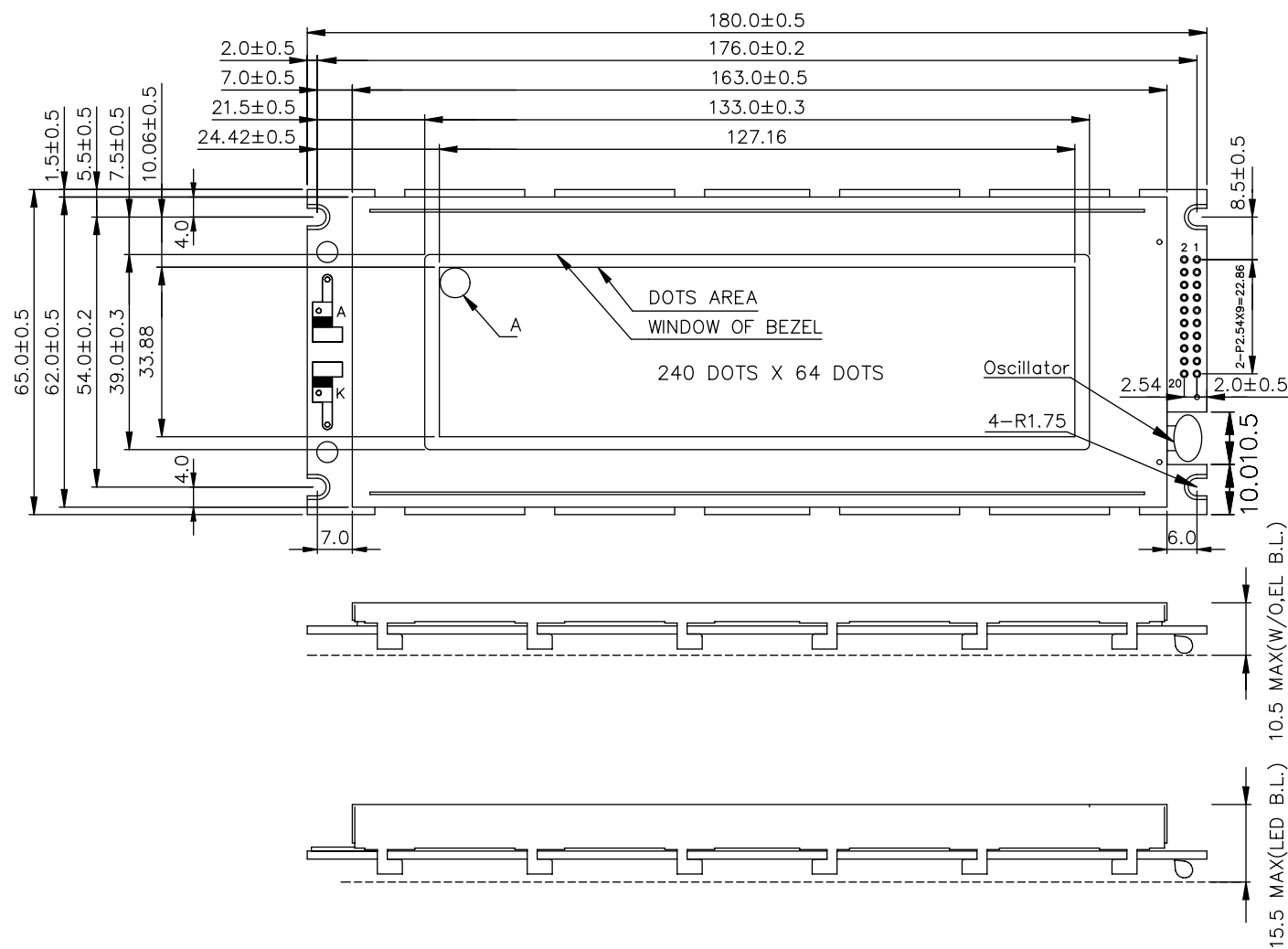


The missing pixels may occur when the LCM is driven beyond above power interface timing sequence.

AZ Displays, Inc.

8-3 DISPLAY PATTERN





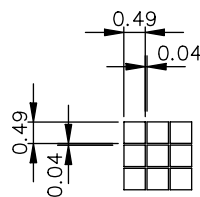
W/O, EL B/L

LED B/L

NOTES:

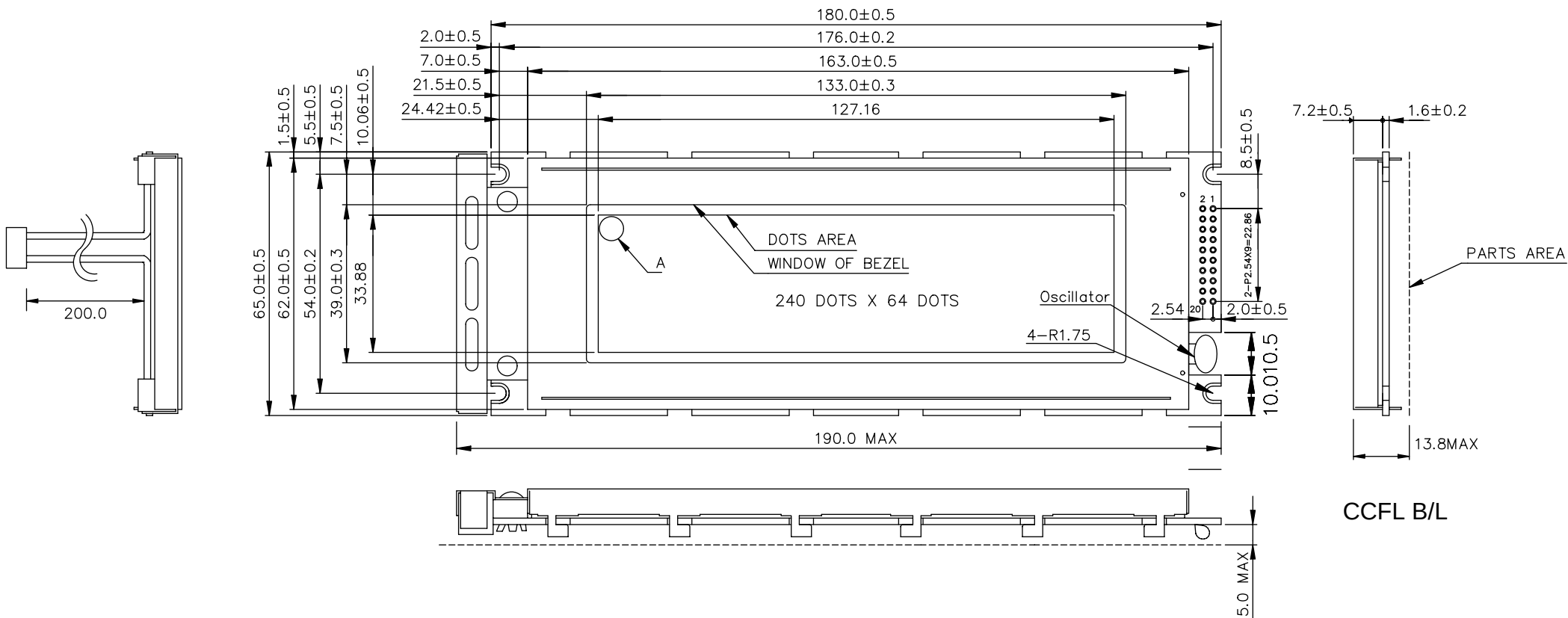
1. Resolution : 240 x 64 Dots
2. Controller : T6963C
3. DC/DC Converter : Without
4. General Tolerance : ± 0.5 mm

PIN NO.	1	2	3	4	5	6	7	8	9	10
SYMBOL	FGND	VSS	VDD	VEE	WR	RD	CE	C/D	A	RESET
PIN NO.	11	12	13	14	15	16	17	18	19	20
SYMBOL	D0	D1	D2	D3	D4	D5	D6	D7	FS	K



A DETAIL

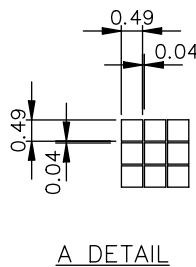
AGM2464D			AZ DISPLAYS, INC.		
APPROVE	NAME	DATE	TITLE		
CHECK			DWG-NO	MX-X003XP	Rev.B
DESIGN	M.Y. Lin	88.10.8	THIRD ANGLE PROJECT	UNIT	: mm
DRAW	MAY PING	88.10.8		SCALE	: NTS



NOTES:

- Resolution : 240 x 64 Dots
- Controller : T6963C
- DC/DC Converter : Without
- General Tolerance : ±0.5 mm

PIN NO.	1	2	3	4	5	6	7	8	9	10
SYMBOL	FGND	VSS	VDD	VEE	WR	RD	CE	C/D	A	RESET
PIN NO.	11	12	13	14	15	16	17	18	19	20
SYMBOL	D0	D1	D2	D3	D4	D5	D6	D7	FS	K



AGM2464D		AZ DISPLAYS, INC.		
APPROVE	NAME	DATE	TITLE	
CHECK			DWG-NO	MB-X003X1P
DESIGN	M.Y. Lin	88.10.8	UNIT	: mm
DRAW	MAY PING	88.10.8	SCALE	: NTS
THIRD ANGLE PROJECT				