

AZ DISPLAYS, INC.

1.MECHANICAL DATA

(1) Product No.	AGM2412C
(2) Module Size	144.0 (W)mm x 104.0 (H)mm x MAX10.8 (D)mm (EL B.L., NO B.L.) 144.0 (W)mm x 104.0 (H)mm x MAX14.9 (D)mm (LED B.L.)
(3) Dot Size	0.42 (W)mm x 0.42 (H)mm
(4) Dot Pitch	0.45 (W)mm x 0.45 (H)mm
(5) Number of Dots	240 (W) x 128 (H)Dots
(6) Duty	1/128
(7) LCD Display Mode	STN: ☐ Gray Mode ☐ Yellow Mode FSTN: ☐ Black and White(Normal White/Positive Image) Rear Polarizer: ☐ Reflective ☐ Transflective ☐ Transmissive
(8) Viewing Direction	☐ 6 O'clock ☐ 12 O'clock ☐ ____O'clock
(9) Backlight	☐ W/O ☐ LED ☐ EL
(10) Weight	W/O B.L. : 137g EL B.L. : 142g LED B.L. : 175g

Revised: September 26, 2001

2.ABSOLUTE MAXIMUM RATINGS

(1) ELECTRICAL ABSOLUTE RATINGS

Vss=0V

ITEM	SYMBOL	MIN	MAX	UNIT	COMMENT
Power Supply for Logic	VDD-VSS	-0.3	5.5	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	WIDE TEMP.			
	OPERATING		STORAGE	
	MIN.	MAX.	MIN.	MAX.
Ambient Temperature	-20	70	-30	80
Humidity (Without Condensation)	Note 4,5		Note 4,6	

Note 2 Ta ≦ 50℃ : 85%RH max
Ta > 50℃ : Absolute humidity must be lower
than the humidity of 85%RH at 50℃

Note 3 Ta at -20℃ will be < 48hrs, at 70℃ will be < 120hrs

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

Note 5 Ta ≦ 70℃ : 75%RH max
Ta > 70℃ : Absolute humidity must be lower
than the humidity of 75%RH at 70℃

Note 6 Ta at -30℃ will be < 48hrs, at 80℃ will be < 120hrs

3. ELECTRICAL CHARACTERISTICS

(VDD=5V±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 LCM Driving Voltage (Wide Temp. LCM)	VCC—VO	Duty= 1/128	−20℃	19.9	20.3	20.7	V
			0℃	19.1	19.5	19.9	
		Bias= 1/13	25℃	18.5	18.9	19.3	
			50℃	17.7	18.1	18.5	
			70℃	16.9	17.3	17.7	
Power Supply Current	IDD	VDD = 5.0V PATTERN: 		—	48.5	—	mA
LED Power Supply Current	I LED	VBL = 5.0VDC (RBL = 0Ω)		—	650	—	mA
EL Power Supply Current	I EL	VEL = 72 Vrms 400Hz		—	6.5	—	mA

4.OPTICAL CHARACTERISTICS

4-1. WIDE TEMPERATURE MODE LCM

AT Vop

ITEM MODE		Cr(Contrast Ratio)		θ (Viewing Angle)		ϕ (Viewing Angle)	
		25℃		25℃		25℃	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
R	J	—	14.5	—	94	—	82
S	J	—	9.5	—	76	—	80
NOTE		NOTE6		NOTE5			

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

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	-20℃	—	2750	4125	ms	NOTE 2
		0℃	—	520	780		
		25℃	—	250	375		
		50℃	—	130	195		
		70℃	—	120	180		
Response Time (fall)	Tf	-20℃	—	2650	3975	ms	NOTE 2
		0℃	—	410	615		
		25℃	—	150	225		
		50℃	—	100	150		
		70℃	—	60	90		

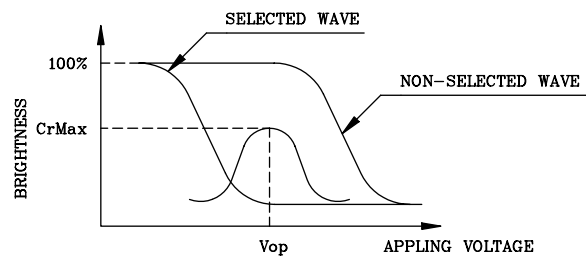
NOTE :

R: REFLECTIVE
S: TRANSFLECTIVE
T: TRANSMISSIVE
A: GRAY

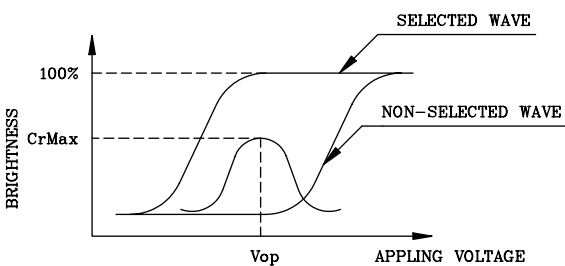
C: YELLOW
E: BLUE
G: NORMALLY BLACK
J: NORMALLY WHITE

(NOTE 1)

Definition of Operation Voltage(Vop)



(positive type)



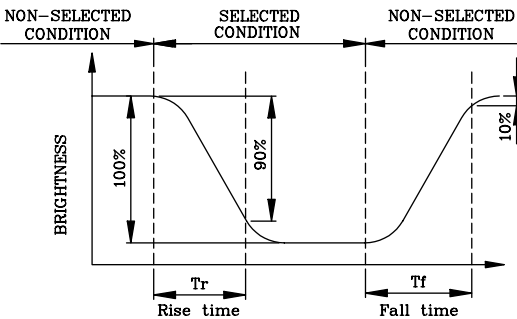
(negative type)

*Conditions

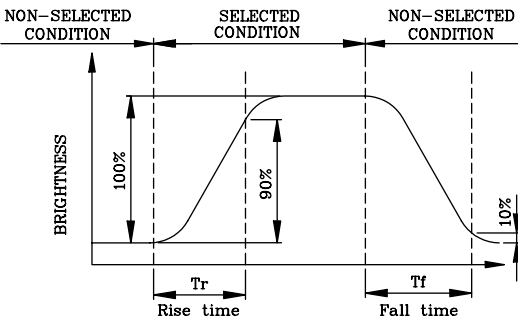
Viewing Angle : 0
Frame Frequency : 70Hz
Applying Waveform : I/N duty 1/a bias

(NOTE 2)

Definition of Response Time(T_r, T_f)



(positive type)



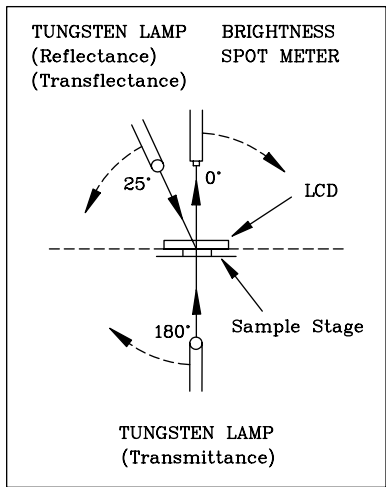
(negative type)

*Conditions

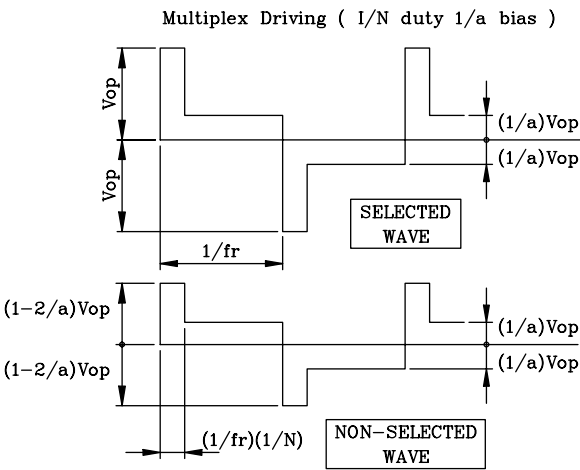
Operating Voltage : V_{op}
Viewing Angle (θ, ϕ) : (0,0)
Frame Frequency : 70Hz
Applying Waveform : I/N duty 1/a bias

(NOTE 3)

Description of Measuring Equipment and Driving Waveforms

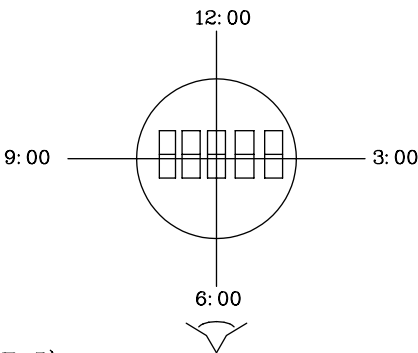


CONST.
TEMP.
CHAMBER



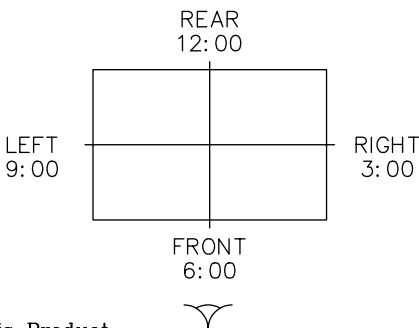
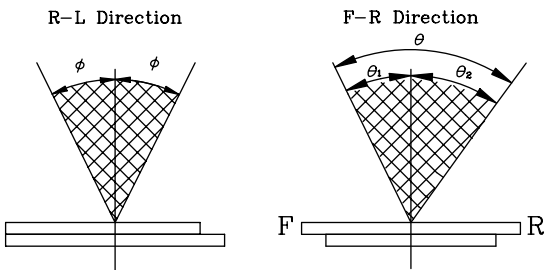
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle



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

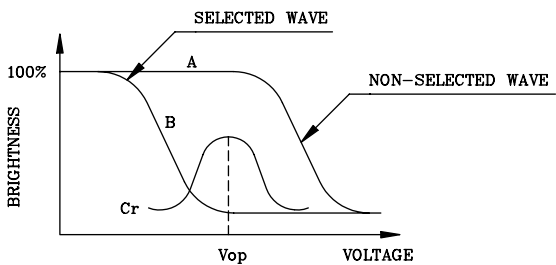
$$\theta = \theta_1 + \theta_2$$

*Conditions

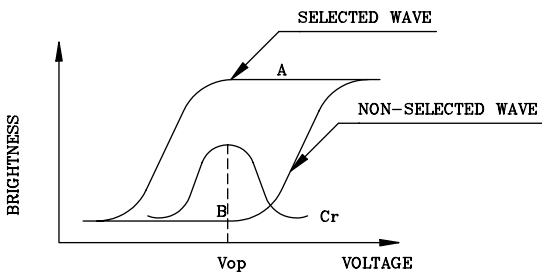
Operating Voltage : V_{op}
Frame Frequency : 70Hz
Applying Waveform : 1/N duty 1/a bias
Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type)



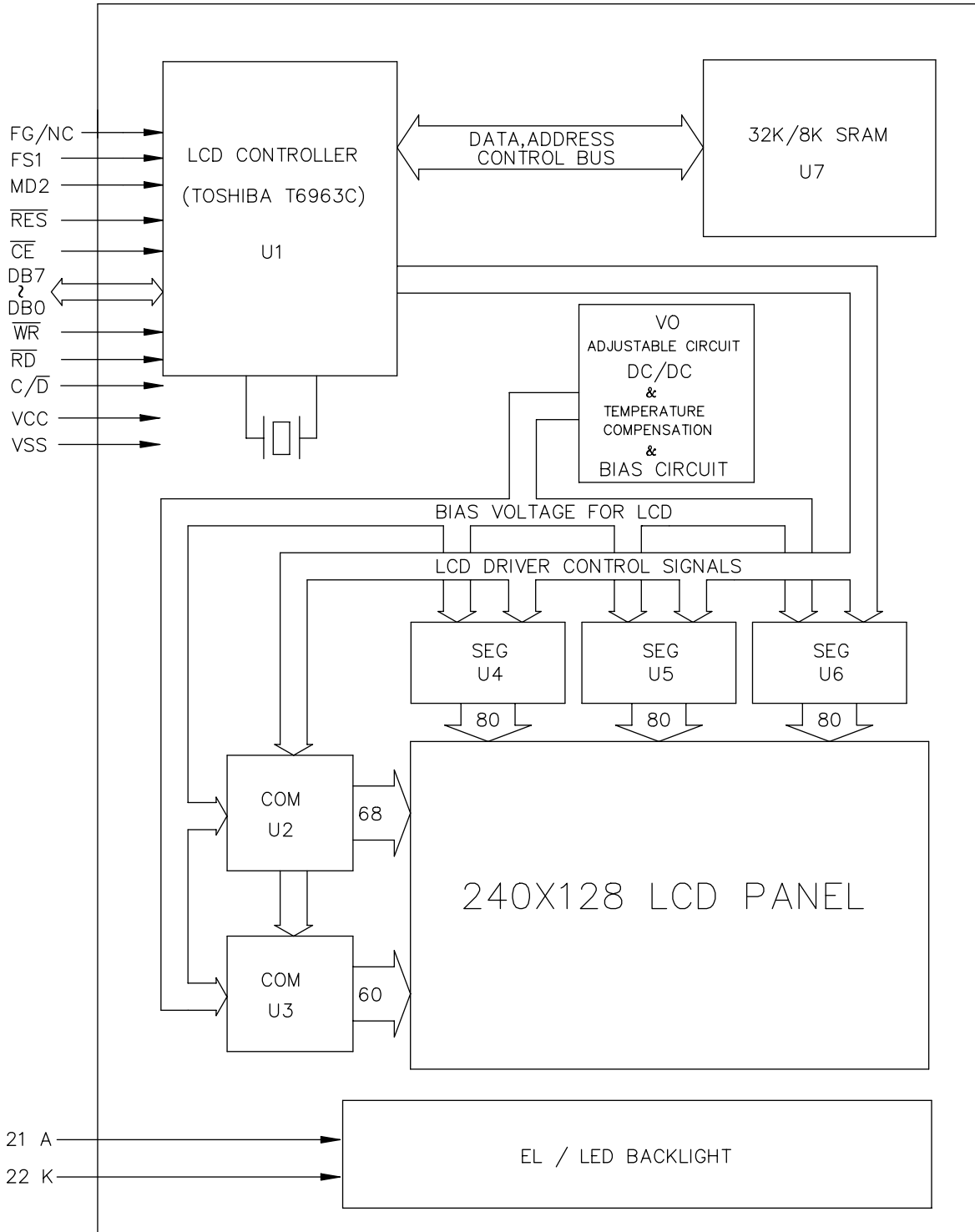
(negative type)

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

*Conditions

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

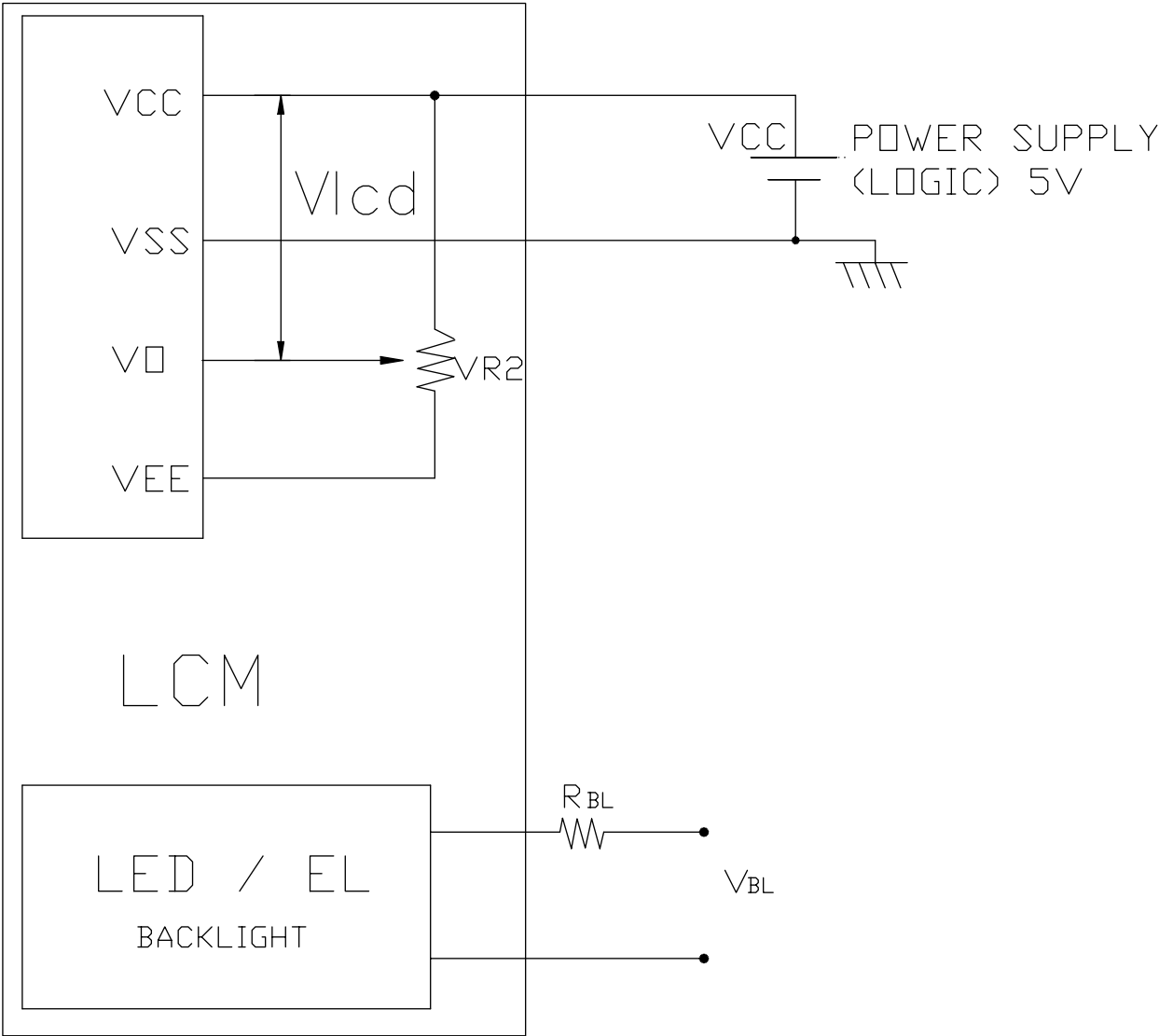
5. BLOCK DIAGRAM



6.INTERNAL PIN CONNECTION

PIN NO.	SYMBOL	FUNCTION
1	VSS	GROUND (0V)
2	VCC	Logic Supply Voltage (+5V)
3	NC	—
4	C/ $\overline{D}$	"H" : Command "L" : DATA
5	$\overline{RD}$	DATA READ
6	$\overline{WR}$	DATA WRITE
7	DB0	Data bit 0
8	DB1	Data bit 1
9	DB2	Data bit 2
10	DB3	Data bit 3
11	DB4	Data bit 4
12	DB5	Data bit 5
13	DB6	Data bit 6
14	DB7	Data bit 7
15	$\overline{CE}$	Chip Enable
16	$\overline{RES}$	Reset
17	N.C.	—
18	MD2	Font Size Selection
19	FS1	Font Size Selection
20	FG/NC	Frame Ground or NC
21	A+	Power Supply for LED / EL B.L.
22	K—	

7. POWER SUPPLY



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

ITEM B.L. VALUE	V _{BL}	R _{BL}
LED	5V	0Ω
EL	110V _{AC} 400HZ	0Ω

8–1.INTERFACE TIMING CHARACTERISTICS

(VCC=5.0V±10%,VSS=0V,Ta=−20 To 70°C)

ITEM	SYMBOL	CONDITION	MIN.	MAX.	UNIT
C/D SET UP TIME	t_{CDS}	Fig.	100	—	ns
C/D HOLD TIME	t_{CDH}	Fig.	10	—	ns
$\overline{CE}, \overline{RD}, \overline{WR}$ CLOCK WIDTH	t_{CE}, t_{RD}, t_{WR}	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

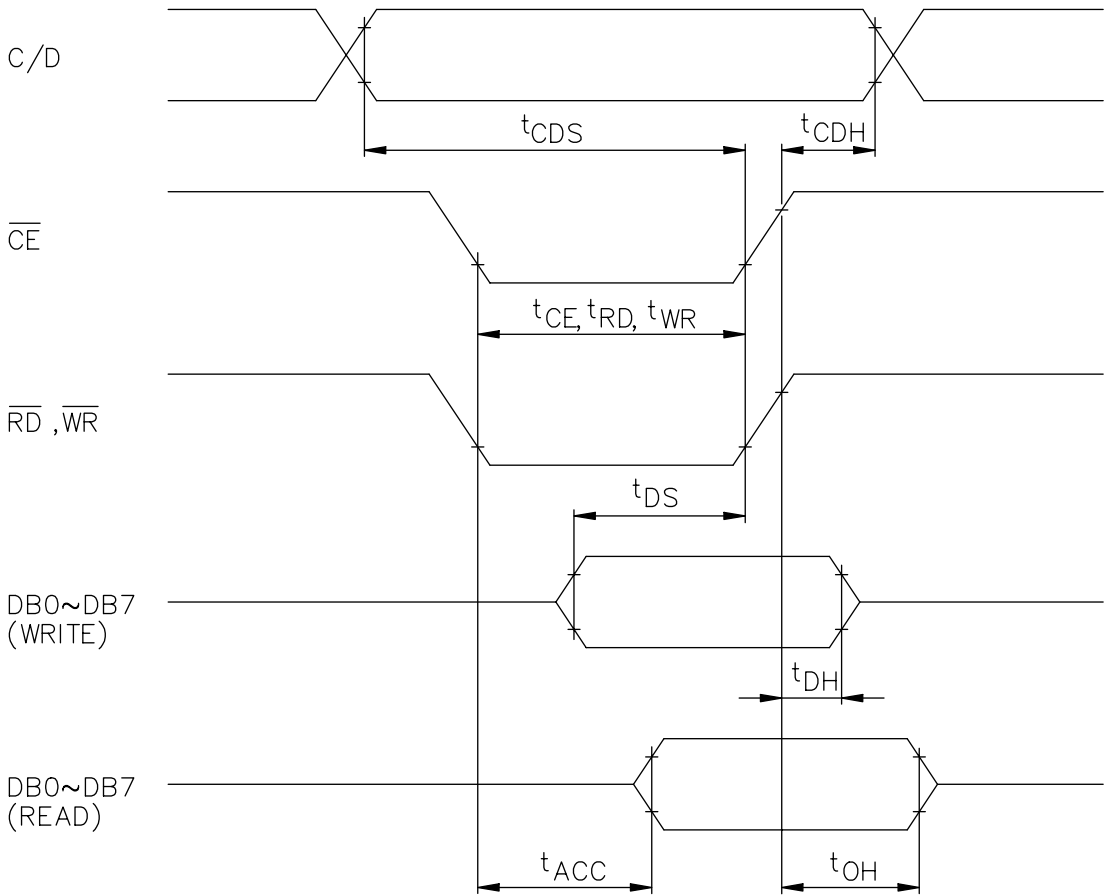
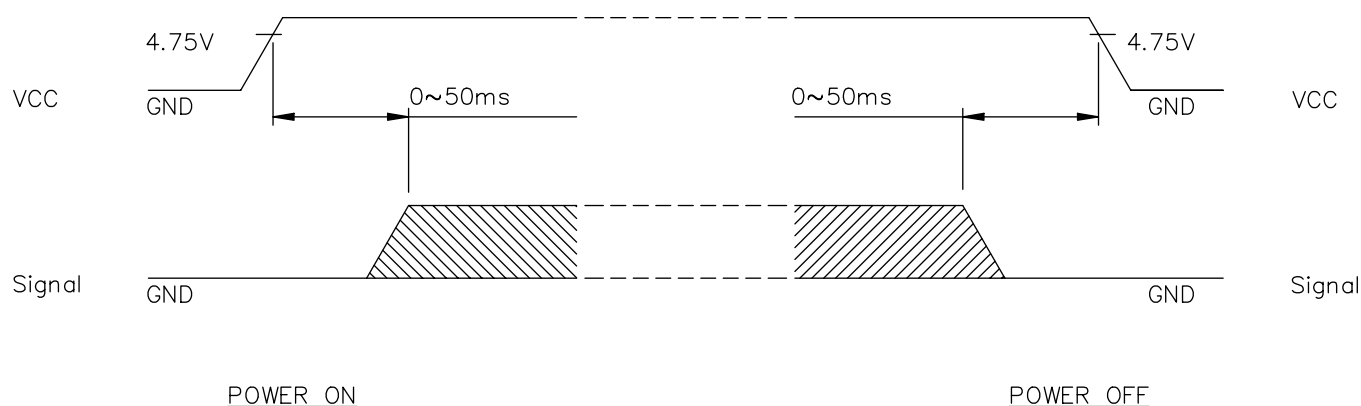


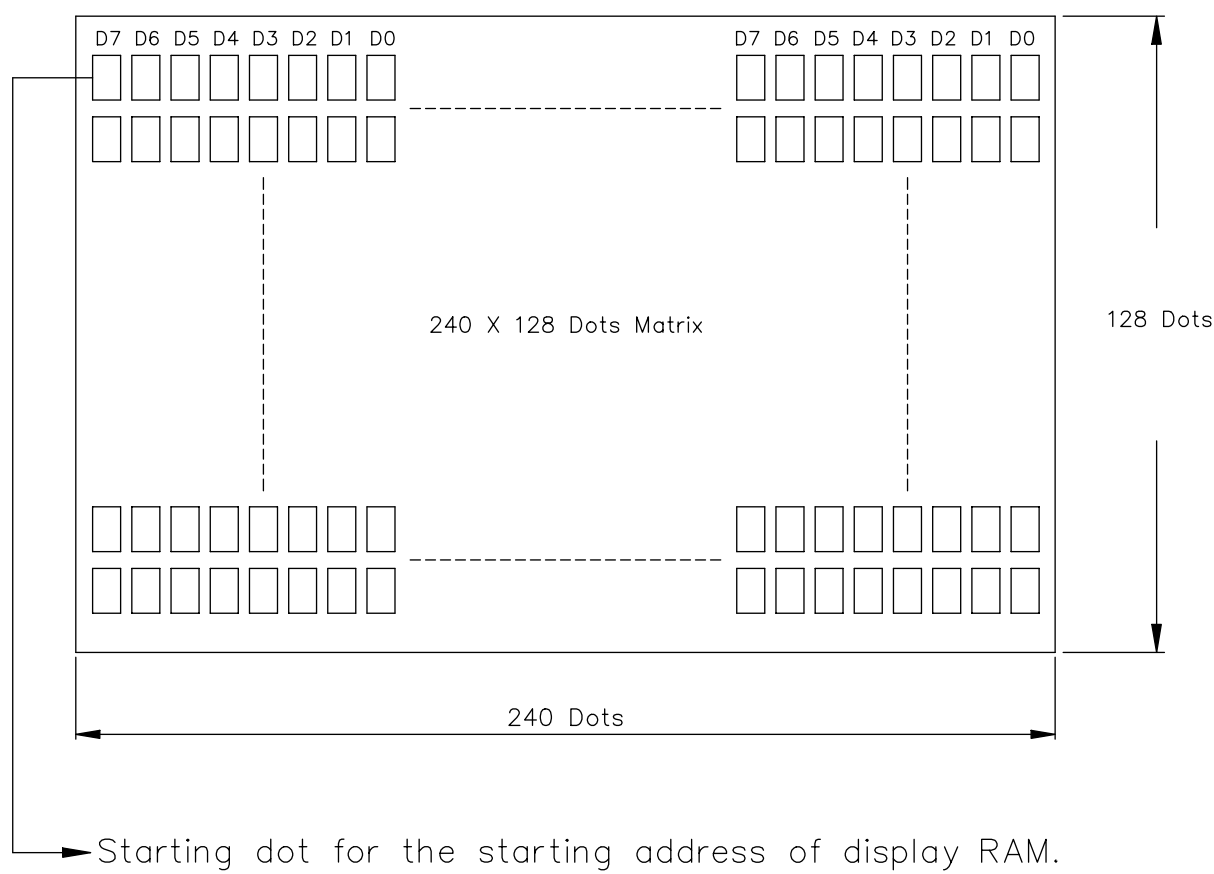
Fig. INTERFACE TIMING CHART

8-2. POWER ON/OFF TIMING CHARACTERISTICS



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

8-3.DISPLAY PATTERN



DB0~DB7 are 8 bits transmitted data ,where DB0 is LSB and DB7 is MSB.

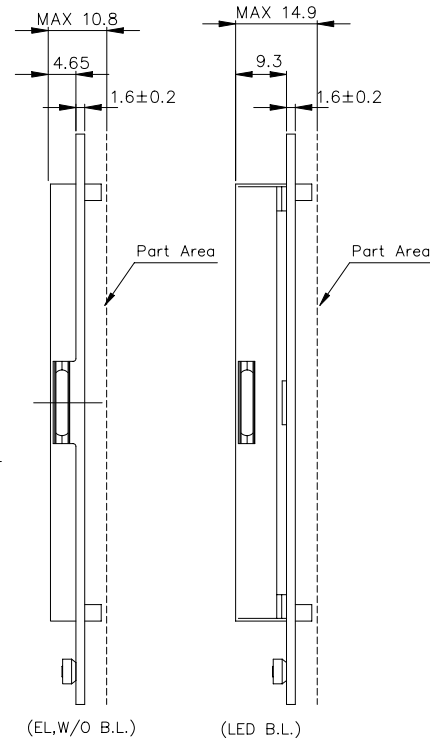


Figure 1: Dimensions of the LED Module. The diagram shows three views of the module: a top view, a side view (EL, W/O B.L.), and a bottom view (LED B.L.). The top view includes dimensions for the LED array (22-ø2.0 PAD, 22-ø1.0 PTH), a variable resistor for contrast adjustment, and various mounting dimensions. The side views show the module's profile and the 'Part Area'.

Top View Dimensions:

- LED Array: 22-ø2.0 PAD, 22-ø1.0 PTH
- Variable Resistor for Contrast Adjustment (For Dim. see B Detail)
- Dimensions: 11.2, 69.5, 27.5, 2.5, 6.0, 12.1, 22
- Formula: $P2.54 \times (22 - 1) = 53.34$

Side View Dimensions:

- EL, W/O B.L. (Electroluminescence, Without Back Layer)
- LED B.L. (LED Back Layer)
- Part Area



	LM_EA_184_1_		AZ DISPLAYS, INC.		
	NAME	DATE	TITLE	AGM2412C	
APPROVE	TONY CHOU	87.10.02			
CHECK	J.S.SHEU	87.10.02	DWG-NO	MXAX184X1	Rev.A
DESIGN	JACK LEE	87.10.02	 UNIT : mm SCALE : 1/1		
DRAW	MAY PING	87.10.02			