1. MECHANICAL DATA

(1) Product No.		AGM4832D
(2) Module Size		156.0 (H)mm x 94.9 (W)mm x MAX11.5 (D)mm
(3) Dot Size		0.228 (H)mm x 0.228 (W)mm
(4) Dot Pitch		0.24 (H)mm x 0.24 (W)mm
(5) Number of Dots		480 (H) x 320 (W)Dots
(7) Duty		1/320
(8) LCD Display Mode	FSTN:	Black and White(Normally White/Positive Image)
		(DISPLAY DATA "H" ; DOTS ON → BLACK)
		(DISPLAY DATA "L" ; DOTS OFF → WHITE)
	Rear Polarizer:	Transflective(Normal)
(9) Viewing Direction		6 O'clock
(10) Backlight		LED
(11) Weight		132g

Revised: May 23, 2001

2. ABSOLUTE MAXIMUM RATINGS

(1) ELECTRICAL ABSOLUTE RATINGS of LCD MODULE

VSS=0 V Standard

ITEM	SYMBOL	MIN	MAX	UNIT	COMMENT
Power Supply for Logic	VDD−VSS	−0.3	6.5	V	
Input Voltage	VEE−VSS	0	27	V	
Static Electricity	−	−	−	−	Note 1

(2) ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS of LCD MODULE

ITEM	TEMPERATURE RANGE			
	OPERATING		STORAGE	
	MIN.	MAX.	MIN.	MAX.
Ambient Temperature(°C)	−20	70	−30	80
	Note 3, 4		Note 4, 6	
Humidity (Without Condensation)	Note 2		Note 5	

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 70°C will be < 120 hrs

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

Note 5 Ta ≦ 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 < 48 hrs, at 80°C will be < 120 hrs

3. ELECTRICAL CHARACTERISTICS

ITEM		SYMBOL	CONDITION		MIN.	TYP.	MAX.	UNIT
Power Supply for Logic		VDD−VSS	Ta=25°C		2.7	3.3	5.5	V
Input Voltage		VIL	L level		VSS	0.2VDD	−	V
		VIH	H level		−	0.8VDD	VDD	V
Input Leakage Current		IL	Ta=25°C		−	−	100	μA
LCM Recommand LCD Module Driving Voltage		VEE−VSS	1/320 Duty 1/11.7 Bias	Ta=−20°C	26.3	26.6	26.9	V
				Ta=0°C	24.5	24.8	25.1	
				Ta=25°C	23.5	23.8	24.1	
				Ta=50°C	22.2	22.5	22.8	
				Ta=70°C	21.3	21.6	21.9	
Power Supply Current for LCM		IDD	Ta=25°C VDD=3.3V VEE−VSS=23.8V FLM=70Hz PATTERN : ■□■□ □■□■ ■□■□		−	0.2	−	mA
		IEE			−	6.9	−	
Power Supply Current for LED B/L		ILED	(3.6V 0Ω)		−	140	160	mA
LCM	Surface Luminance	L	I_{LED} = 140mA	PATTERN: (Dots All On) ■■■■ ■■■■	−	−	−	cd/m²
				PATTERN: (Dots All Off) □□□□ □□□□	−	15	−	

4.OPTICAL CHARACTERISTICS

(For Wide Temperature Mode LCM)

AT VOP

ITEM / MODE		Cr(Contrast Ratio)										θ(Viewing Angle)		φ(Viewing Angle)	
		−20°C		0°C		25°C		50°C		70°C		25°C		25°C	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
S	J	–	4.0	–	5.0	–	5.5	–	4.0	–	4.0	–	96	–	±38
H	L	–	7.5	–	10	–	11	–	8	–	6	–	96	–	±38
NOTE		NOTE 6										NOTE 5			

NOTE :

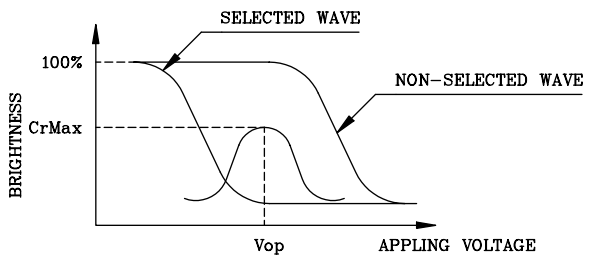
S : TRANSFLECTIVE(NORML)
H : TRANSFLECTIVE(HIGH TRANSPARENCY)
J : NORMALLY WHITE, 6 O'CLOCK
L : NORMALLY WHITE, 6 O'CLOCK, SPECIAL LIGHTER BACKGROUND COLOR

AT φ=0° θ=0°

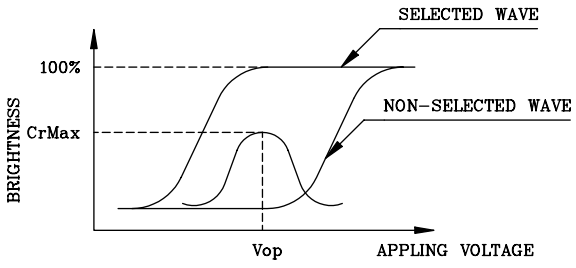
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	−20℃	–	8600	13000	ms	NOTE 2
		0℃	–	1200	1800		
		25℃	–	410	610		
		50℃	–	160	240		
		70℃	–	100	150		
Response Time (fall)	Tf	−20℃	–	3700	5500	ms	NOTE 2
		0℃	–	600	900		
		25℃	–	150	230		
		50℃	–	80	120		
		70℃	–	60	90		

(NOTE 1)

Definition of Operation Voltage(Vop)



(positive type)



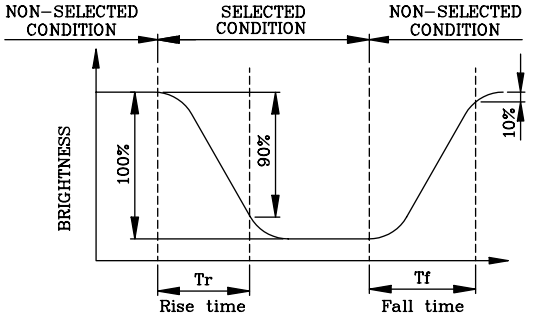
(negative type)

*Conditions

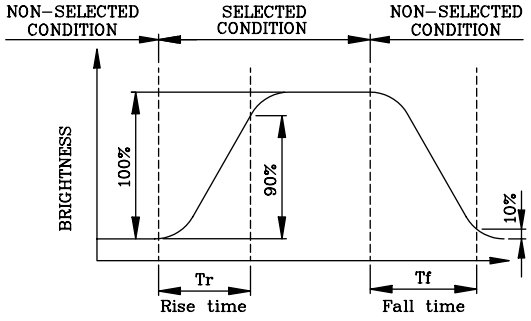
Viewing Angle : 0
Frame Frequency : 70Hz
Appling Waveform : I/N duty 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)



(positive type)



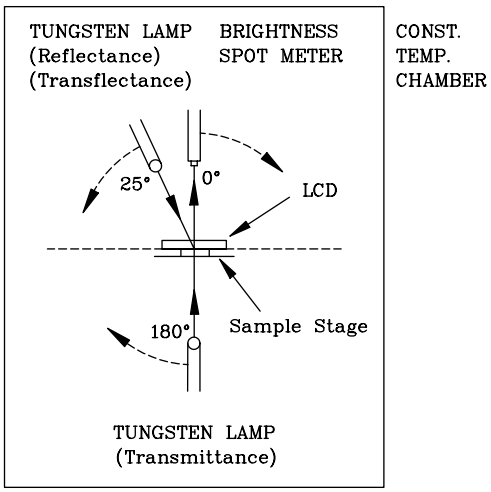
(negative type)

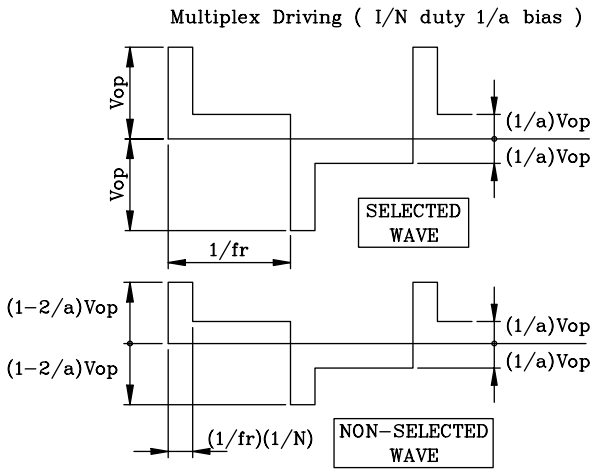
*Conditions

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

(NOTE 3)

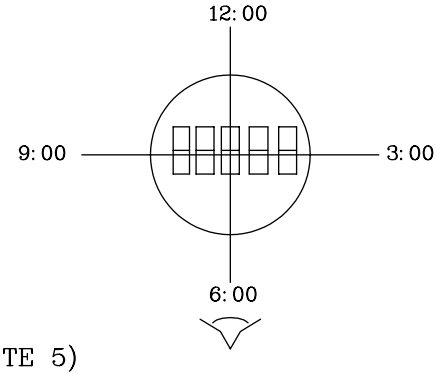
Description of Measuring Equipment and Driving Waveforms





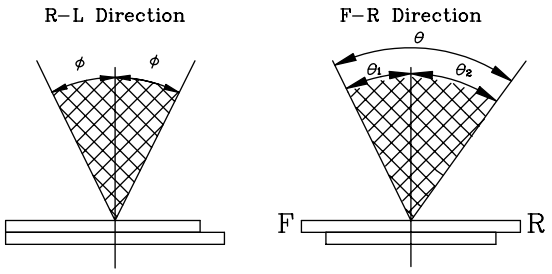
(NOTE 4)

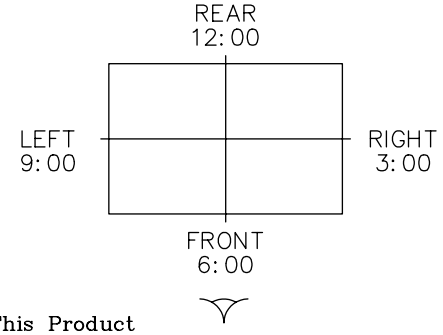
Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle





*For This Product

The Viewing Direction Is 6 O'clock

So $\theta 1 > \theta 2$

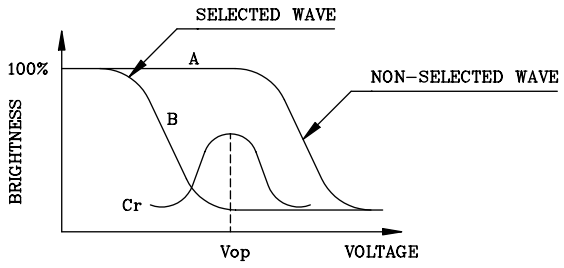
$\theta = \theta_1 + \theta_2$

*Conditions

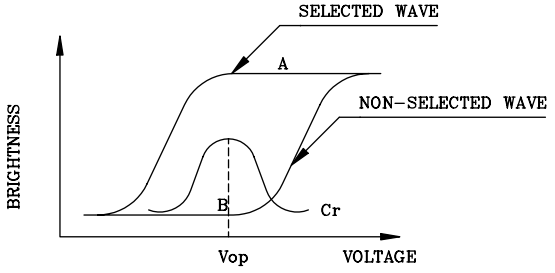
Operating Voltage : Vop
Frame Frequency : 70Hz
Appling Waveform : 1/N duty 1/a bias
Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type)



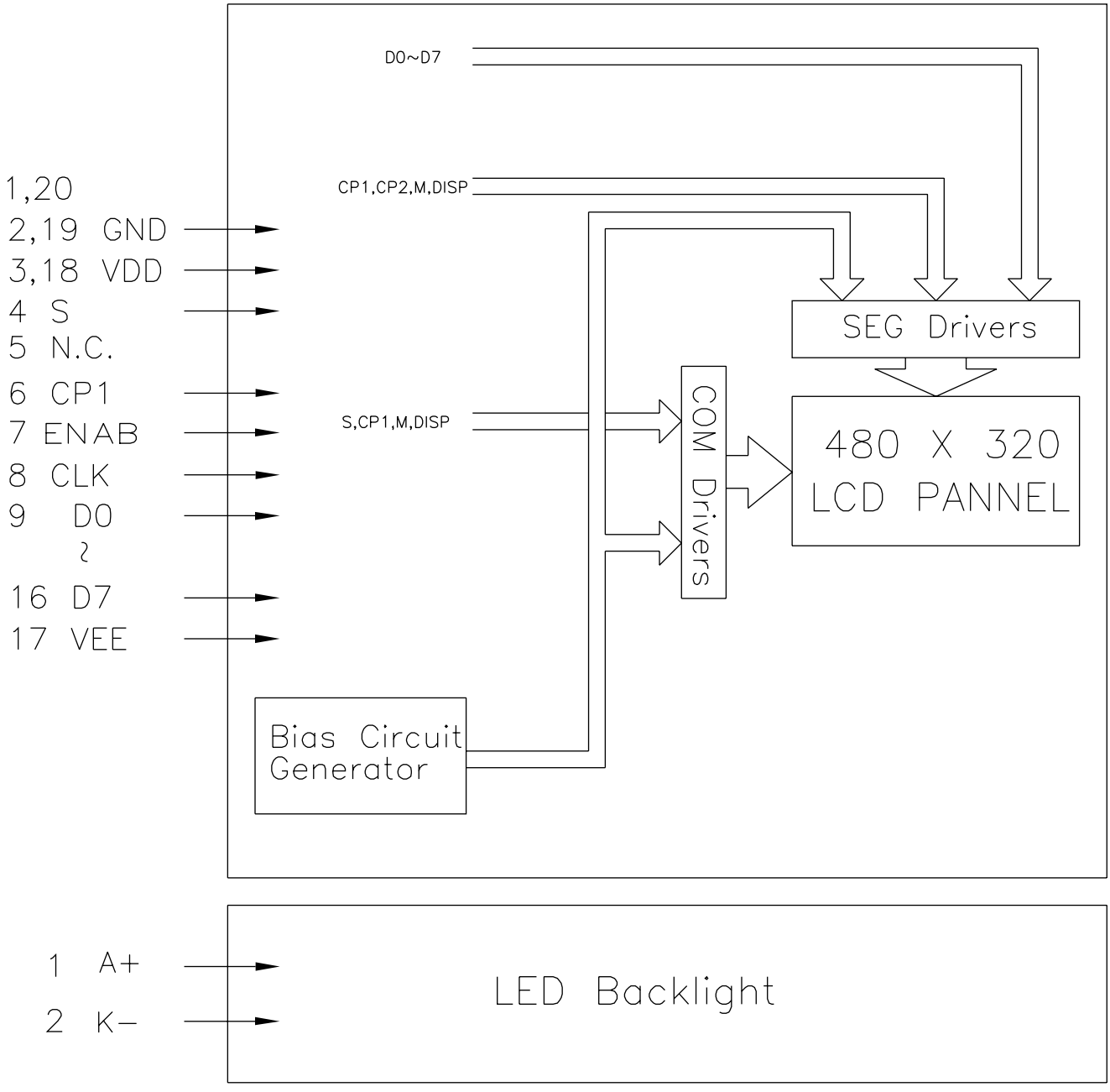
(negative type)

Contrast Ratio : Cr=A/B

*Conditions

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

5. BLOCK DIAGRAM



6.INTERNAL PIN CONNECTION

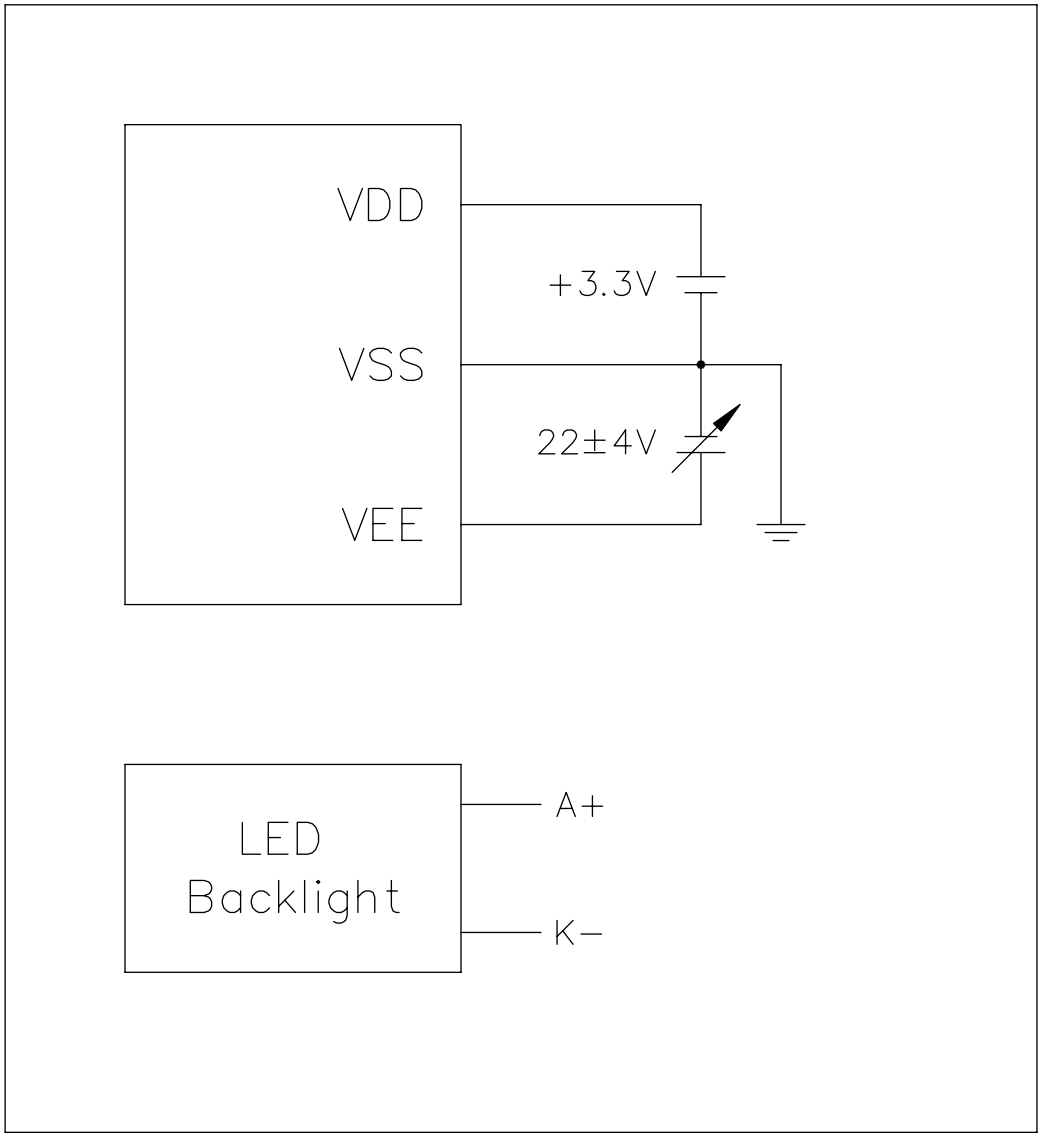
LCD

Pin No.	Symbol	Function
1	GND	Signal GND
2	GND	Signal GND
3	VDD	Logic Supply Voltage
4	S	Scan Start-up Signal, "H"=Start
5	N.C.	No Connect
6	CP1	Data Latch Clock, "H"→"L"
7	ENAB	"H" Display On, "L" Display Off
8	CLK	Clock signal
9	D0	Display Data Signal
10	D1	
11	D2	
12	D3	
13	D4	
14	D5	
15	D6	
16	D7	
17	VEE	LCD Supply Voltage
18	VDD	Logic Supply Voltage
19	GND	Signal GND
20	GND	Signal GND

LED

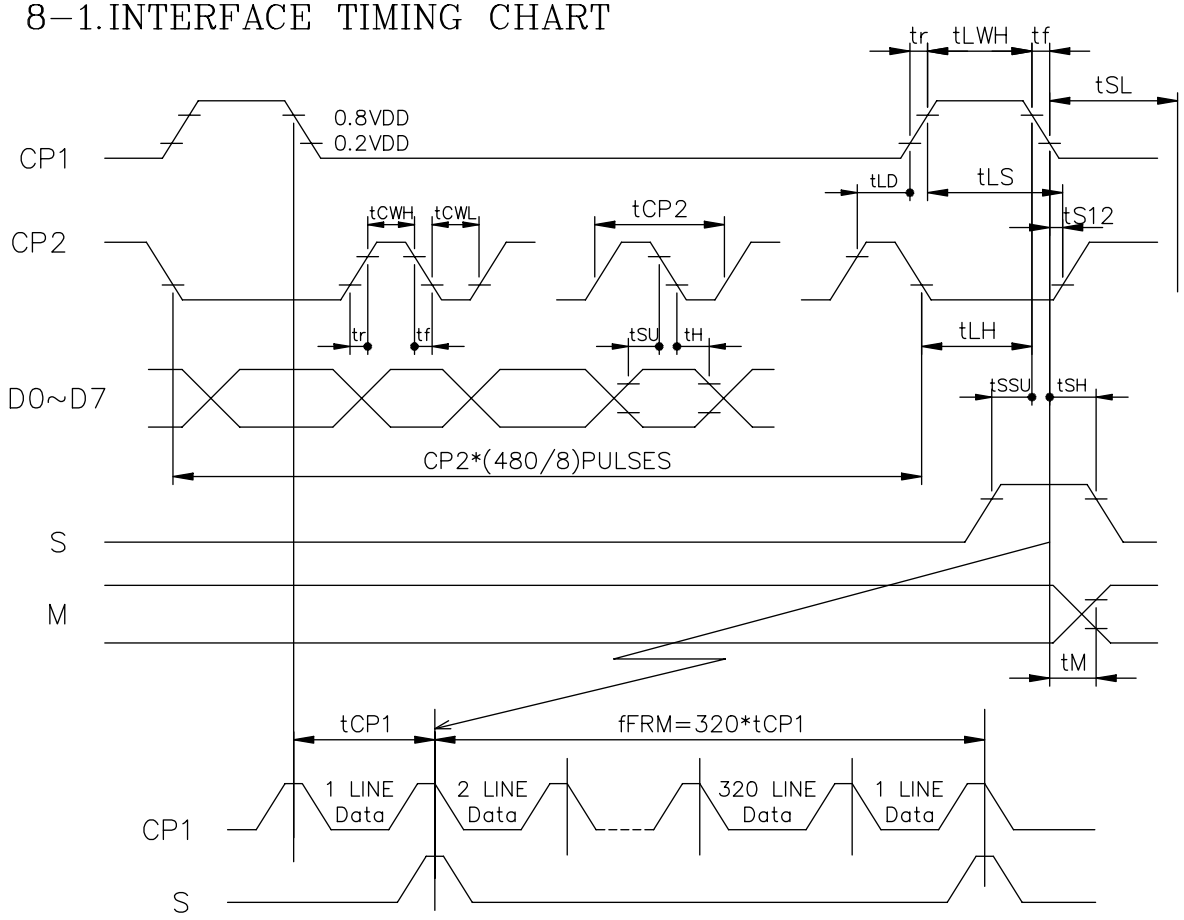
Pin No.	Symbol	Function
1	A+	Power Supply for LED Backlight
2	K-	

7. POWER SUPPLY



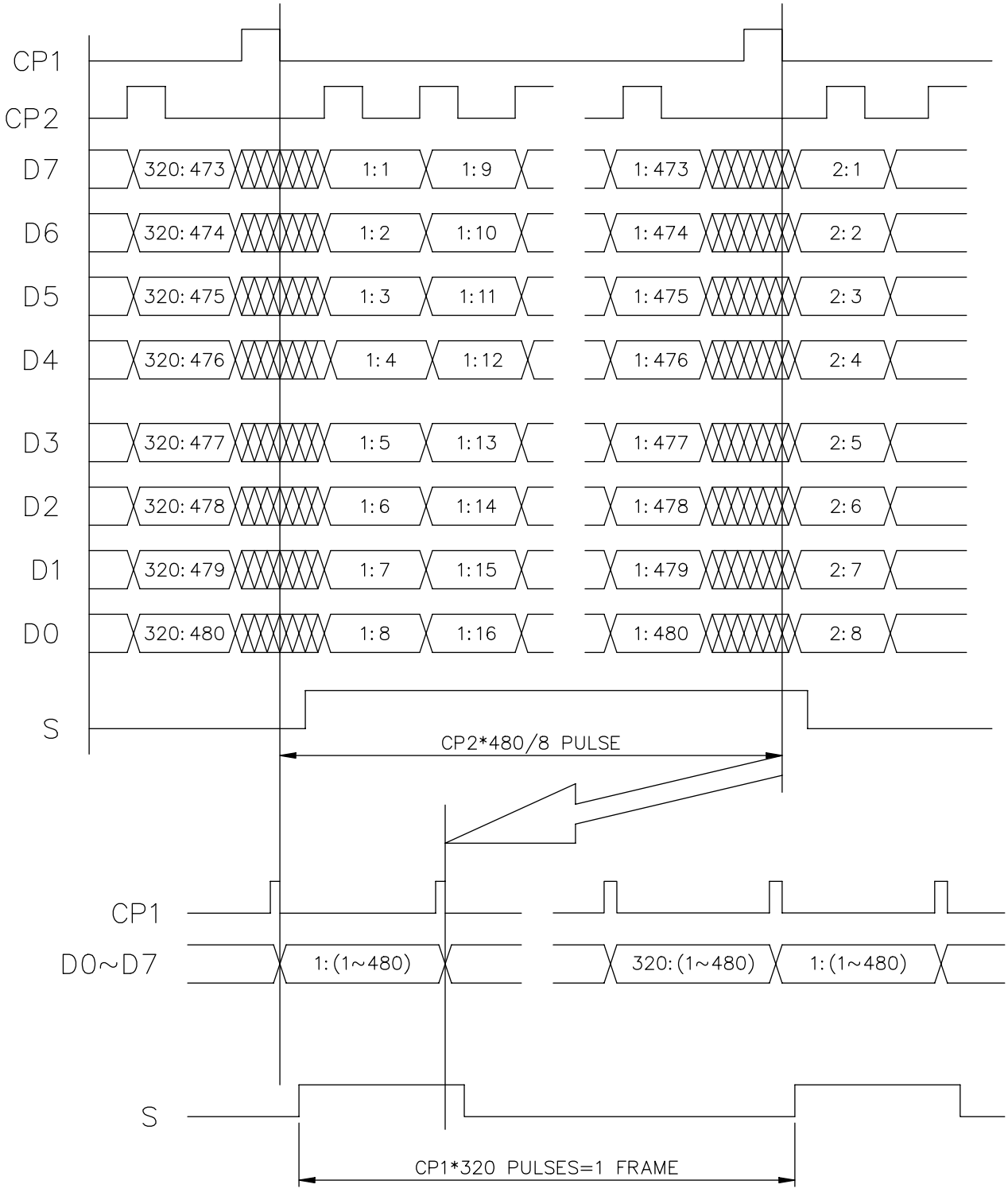
8. TIMING CHARACTERISTICS

8-1. INTERFACE TIMING CHART

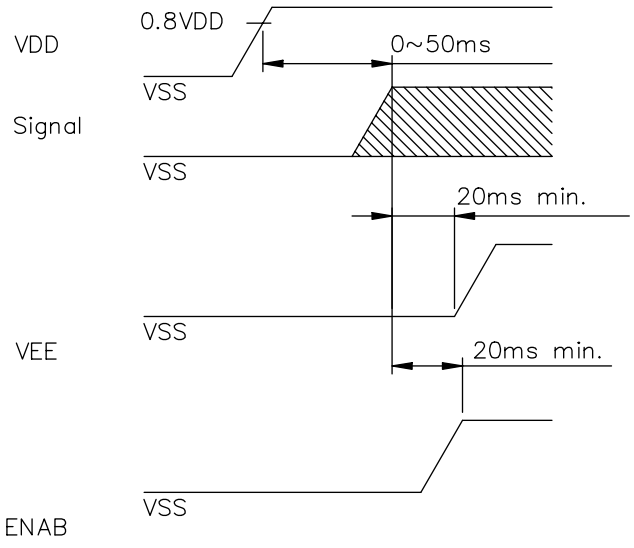


ITEM	Symbol	RATING			Unit
		MIN	NORMAL	MAX	
Frame cycle	tFRM	8.0	–	16.9	msec
CP2 clock cycle	tCP2	120	–	–	nsec
"H" level clock width	tCWH	30	–	–	nsec
"L" level clock width	tCWL	30	–	–	nsec
"H" level latch clock width	tLWH	60	–	–	nsec
Data setup time	tSU	30	–	–	nsec
Data hold time	tH	30	–	–	nsec
CP1↑clock allowance time from CP2↑	tLS	45	–	–	nsec
CP1↓clock alowance time from CP2↓	tSL	45	–	–	nsec
CP2↑clock allowance time from CP1↑	tLD	0	–	–	nsec
CP2↓clock alowance time from CP1↓	tLH	45	–	–	nsec
Input signal data rise/fall time	tr,tf	–	–	50	nsec
S signal data setup time	tSSU	100	–	–	nsec
S signal data hold time	tSH	30	–	–	nsec
M delay time	tM	–	–	70	nsec

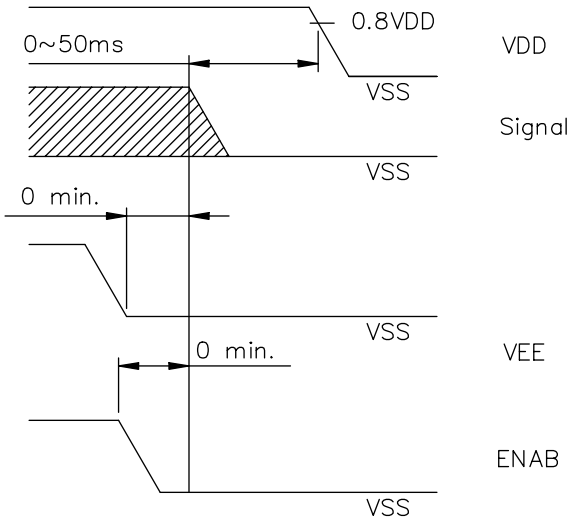
8-2.DATA INPUT TIMING



8-3.POWER ON/OFF TIMING



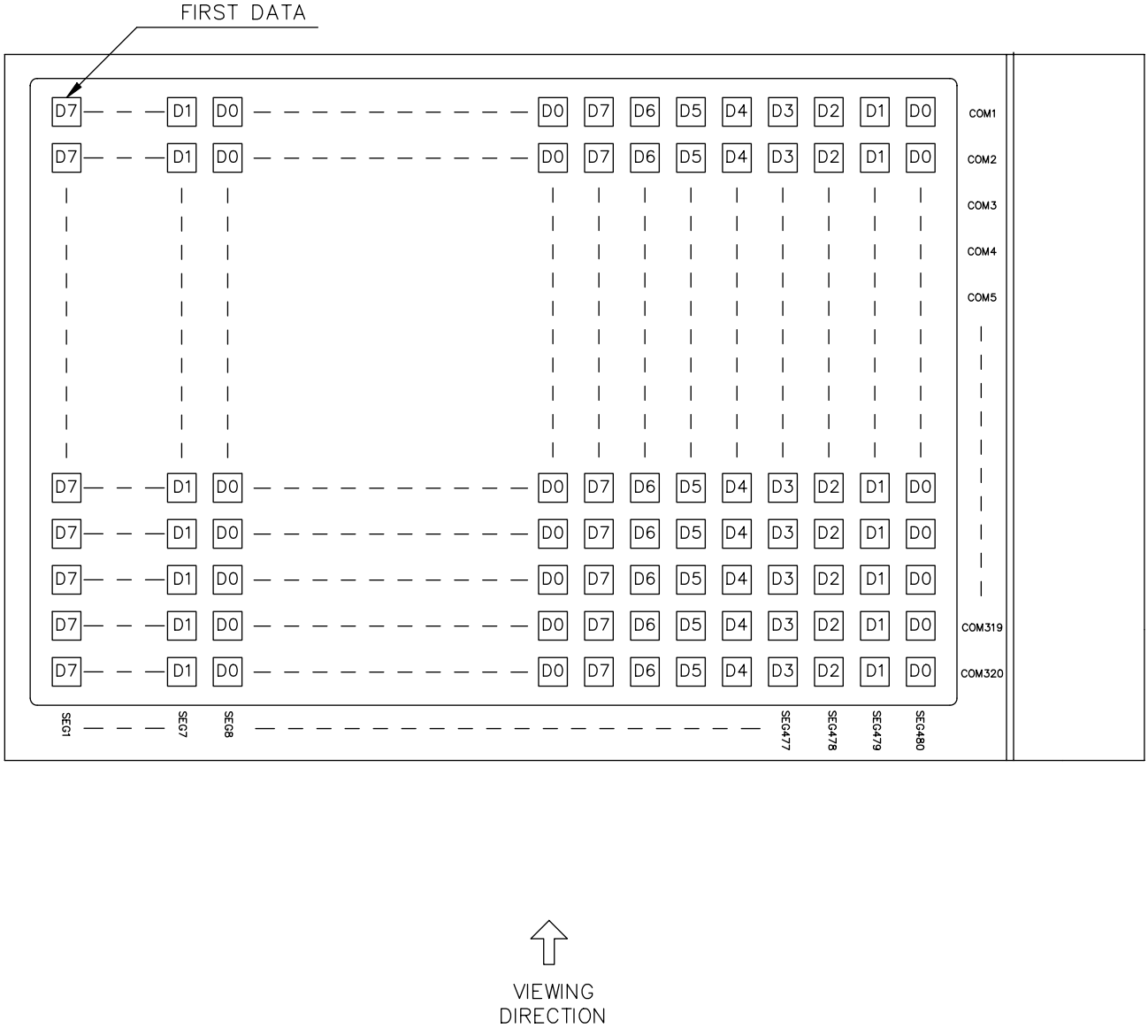
POWER ON

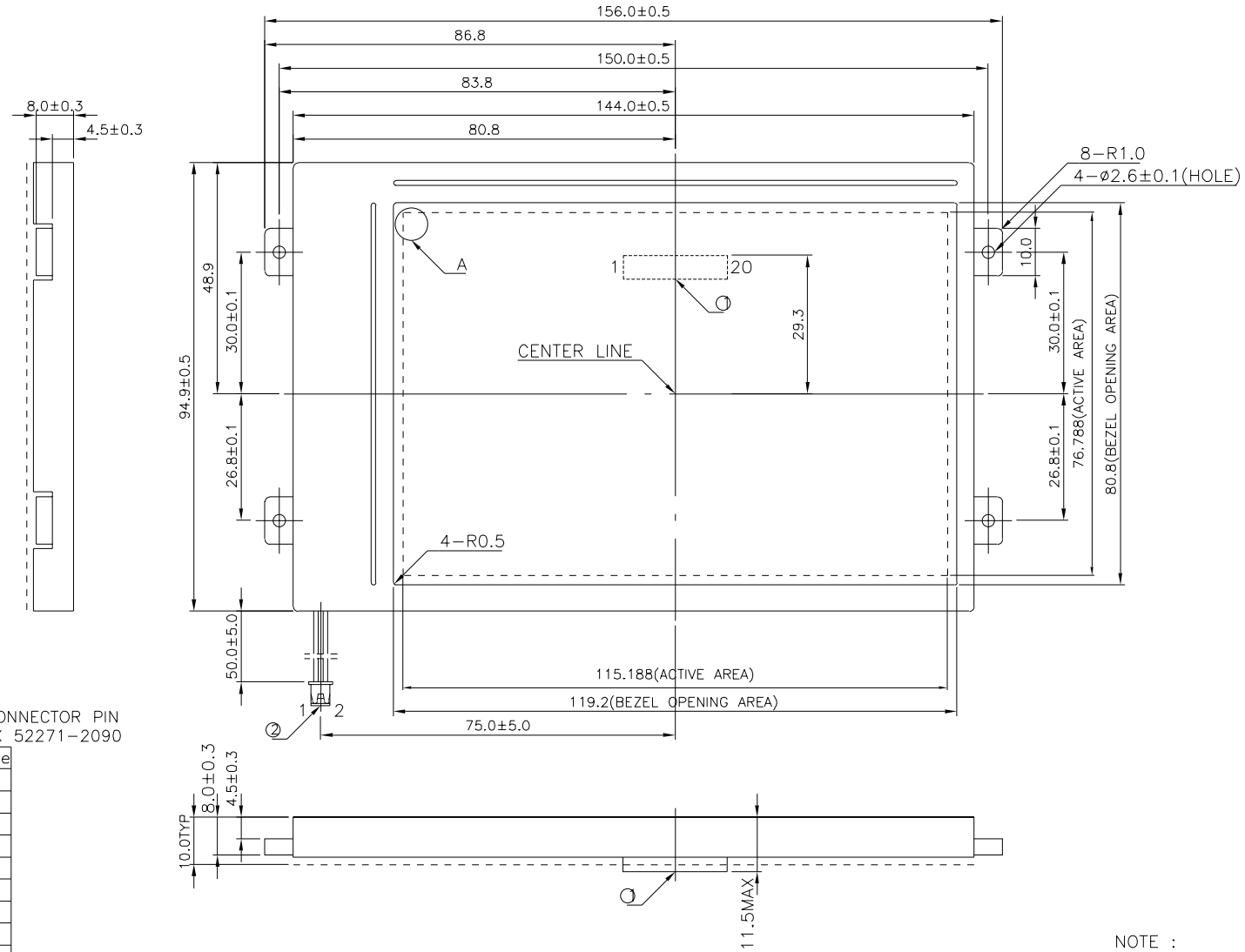


POWER OFF

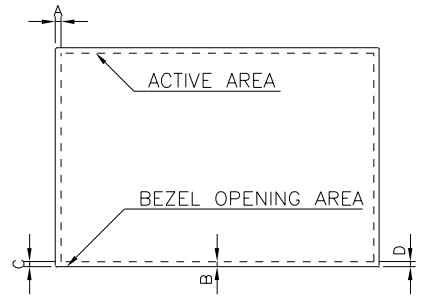
Missing pixels may occur when the LCM is driven beyond above power interface timing sequence.

8-4. DISPLAY PATTERN

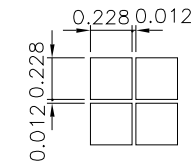




BEZEL/DISPLAY POSITION



1) TOLERANCE X-DIRECTION A = 2.0±0.8
2) TOLERANCE Y-DIRECTION B = 2.0±0.8
3) OBLIQUITY OF DISPLAY AREA (C-D)<0.8



A DETAIL

① INTERFACE CONNECTOR PIN LAYOUT,MOLEX 52271-2090

Pin No.	Pin Name
1	GND
2	GND
3	VDD
4	S
5	(N.C.)
6	CP1
7	ENAB
8	CLK
9	D0
10	D1
11	D2
12	D3
13	D4
14	D5
15	D6
16	D7
17	VEE
18	VDD
19	GND
20	GND

② LED CONNECTOR PIN LAYOUT,PHR-2(JST)

Pin No.	1	2
	HOT	GND

NOTE :
1. RESOLUTION : 480 X 320 DOTS
2. BACKLIGHT COLOR : LED(WHITE)
3. TOLERANCE NO SPECIFIED : ±0.5mm

LTCF9S294JGK			AZ DISPLAYS, INC.		
	NAME	DATE			
APPROVE			TITLE	AGM4832D	
CHECK			DWG-NO	TC-S294JGK	Rev.A
DESIGN			THIRD ANGLE PROJECT	UNIT : mm	
DRAW	MAY PING	88.03.03		SCALE : 1/1	