

AZ DISPLAYS, INC.

COMPLETE LCD SOLUTIONS

SPECIFICATIONS FOR LIQUID CRYSTAL DISPLAY

PART NUMBER:

AGM3224D SERIES

DATE:

MARCH 30, 2007

1. MECHANICAL DATA

(1) Product No.	AGM3224D
(2) Module Size	160.0 (W)mm x 109.0 (H)mm x Max. 12.5 (D)mm
(3) Dot Size	0.33 (W)mm x 0.33 (H)mm
(4) Dot Pitch	0.36 (W)mm x 0.36 (H)mm
(5) Number of Dots	320 (W) x 240 (H)Dots
(6) Duty	1/240
(7) LCD Display Mode	FSTN: Black and White(Normally White/Positive Image)
Rear Polarizer:	Transflective(Normal)
(8) Viewing Direction	6 O'clock
(9) Backlight	LED B/L(White)
(10) Weight	245 g(Approx.)

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	
Input Voltage	VI	-0.3	VDD+0.3	V	
Static Electricity	-	-	-	-	Note 1

Note 1 LCM should be grounded during handling LCM.

(2) ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	WIDE TEMP.			
	OPERATING		STORAGE	
	MIN.	MAX.	MIN.	MAX.
Ambient Temperature	-20	70	-40	80
Humidity (Without Condensation)	Note 2,4		Note 3,4	

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

Note 3 T_a at -40°C will be < 120hrs, at 80°C will be < 120hrs

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

3. ELECTRICAL CHARACTERISTICS

3-1. ELECTRICAL CHARACTERISTICS

(VDD = 5.0V±5%)

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	
Power Supply for Logic	VDD-GND	—	4.75	5.0	5.25	V	
Input Voltage	VIH	H level	0.7VDD	—	VDD	V	
	VIL	L level	0	—	0.3VDD	V	
Recommended LC Driving Voltage	VDD-VO	Duty=1/240	-20°C	25.4	25.7	26.0	V
			0°C	23.8	24.1	24.4	
			25°C	22.9	23.2	23.5	
			50°C	21.5	21.8	22.1	
			70°C	20.5	20.8	21.1	
Power Supply Current	IDD	FLM = 70 Hz VDD = 5.0 V VEE = -24.0 V VDD-VO = 23.2 V PATTERN :	—	4.51	6.77	mA	
	IEE	<div style="display: flex; justify-content: space-around; font-family: monospace;"> □ ■ □ ■ □ ■ </div> <div style="display: flex; justify-content: space-around; font-family: monospace;"> ■ □ ■ □ ■ □ </div>	—	3.85	5.78	mA	
Surface Luminance of LCM	L	PATTERN: (Dots All On)	—	6.6	9.9	cd/m ²	
		PATTERN: (Dots All Off)	16.3	23.3	—		

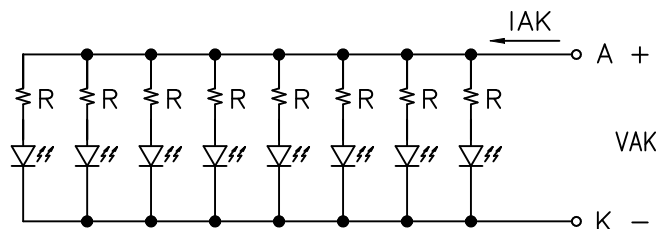
3-2.ELECTRICAL CHARACTERISTICS OF BACKLIGHT

Used LED Rating

Temp.=25°C

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
Peak forward current	I_P	-	-	240	mA	-
Maximum reverse voltage	V_R	-	-	5	V	-
Applied forward current	I_{AK}	-	150	160	mA	at $V_{AK} = 5.0$ V
Applied forward voltage	V_{AK}	-	5.0	-	V	at $I_{AK} = 150$ mA
LED power consumption	P_F	-	0.75	-	W	-
LED life time	L_L	-	10000	-	hrs	at $V_{AK} = 150$ mA (*1)

(*1) LED life time is defined as follows : The final brightness is at 50% of original brightness .



3-3.CHARACTERISTICS OF TOUCH SCREEN

Used Touch screen Rating

Temp.=25°C

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Applied Rating Voltage	V_R	—	—	—	7.0	V
Operating Temperature	T_{OPR}	20%~85% R.H. Max. Avoid Dew Condensation at Any Time	-5	—	60	°C
Storage Temperature	T_{STO}		-30	—	70	
Resistance of Terminal Electrodes	R_{ETD}	X Electrode	400	—	900	Ω
		Y Electrode	200	—	500	
Linearity	L	—	—	—	1.5	%
Insulation Resistance	R_{OFF}	$V_{DC} = 25V$	10	—	—	MΩ
Transparency	T	According to JIS-K7015	—	80	—	%
Surface Hardness	S_H	According to JIS-K5400	3	—	—	H

Test condition : Touch screen is placed horizontally in a vessel and no power is supplied to T/P.

Normal state is temperature : $25 \pm 10^\circ C$, relative humidity : $60 \pm 25\%$

4. OPTICAL CHARACTERISTICS

AT V_{OP}

ITEM MODE		Cr(Contrast Ratio)										θ(Viewing Angle)		φ(Viewing Angle)	
		-20℃		0℃		25℃		50℃		70℃		25℃		25℃	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
S	J	4.5	5.5	5.5	6.5	5.5	6.5	4.5	5.5	3.0	4.0	-	66	-	±34
NOTE		NOTE 6										NOTE 5			

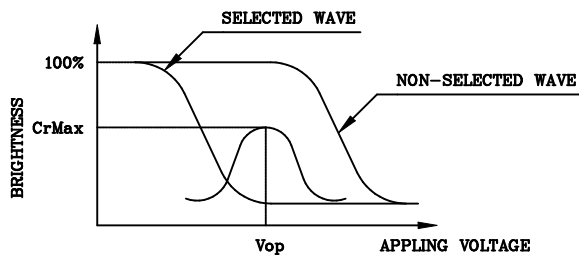
NOTE : S: Transflective(Normal)
 J: Normally White , 6 O'clock

AT φ=0° θ=0°

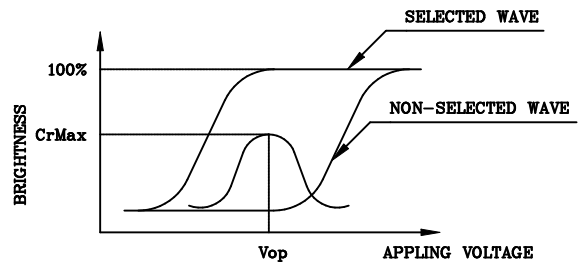
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	-20℃	2000	4000	6000	ms	NOTE 2
		0℃	400	750	1100		
		25℃	125	250	375		
		50℃	60	120	180		
		70℃	35	70	105		
Response Time (fall)	Tf	-20℃	1000	2000	3000	ms	NOTE 2
		0℃	210	420	630		
		25℃	60	120	180		
		50℃	30	60	90		
		70℃	20	40	60		

(NOTE 1)

Definition of Operation Voltage(Vop)



(positive type)



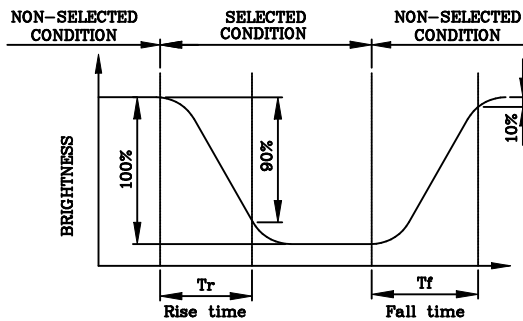
(negative type)

*Conditions

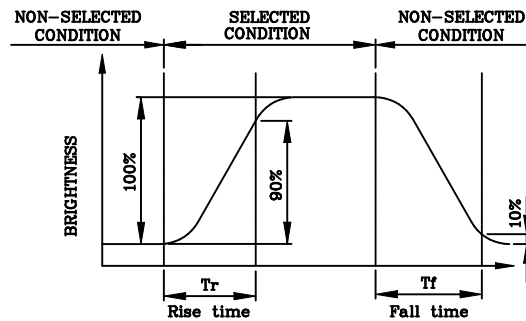
- Viewing Angle : 0
- Frame Frequency : 70Hz
- Applying Waveform : 1/N duty 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)



(positive type)



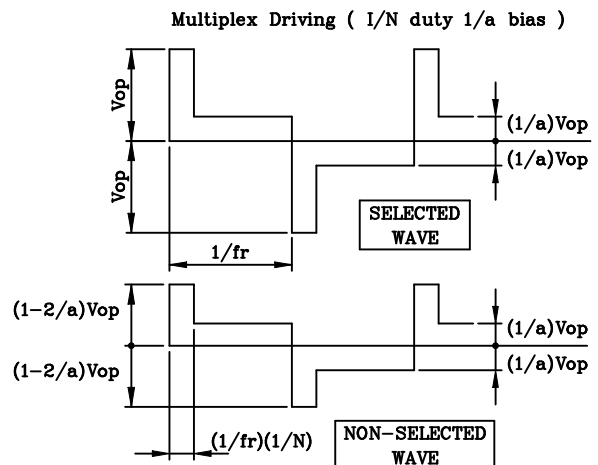
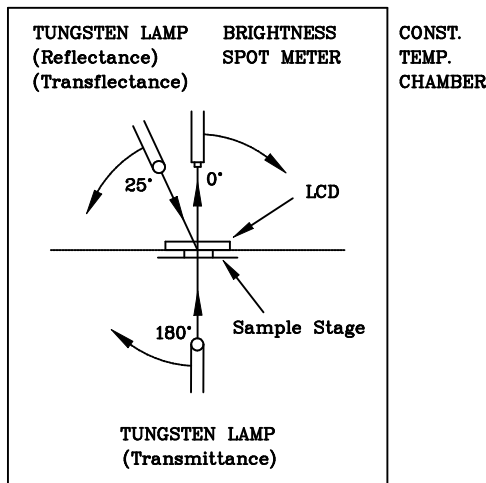
(negative type)

*Conditions

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

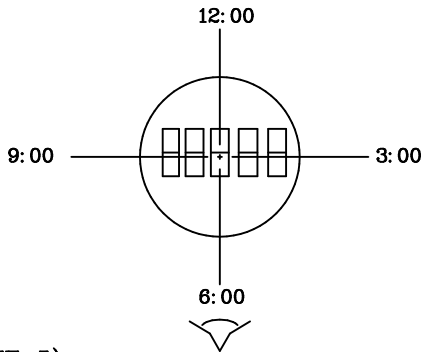
(NOTE 3)

Description of Measuring Equipment and Driving Waveforms



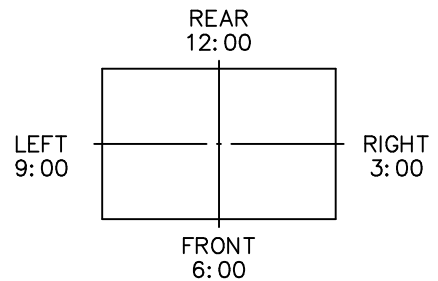
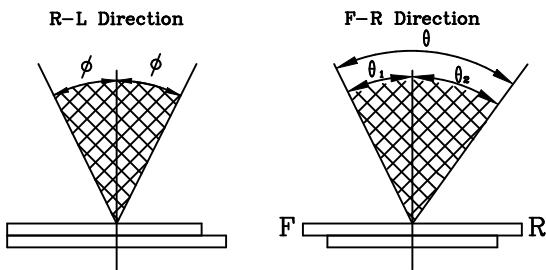
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle



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

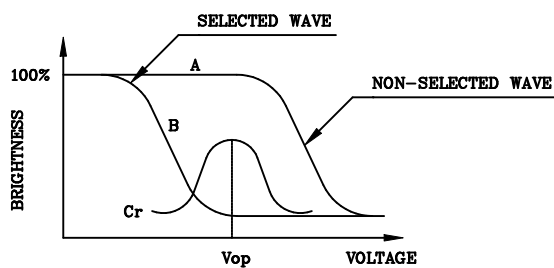
$$\theta = \theta_1 + \theta_2$$

*Conditions

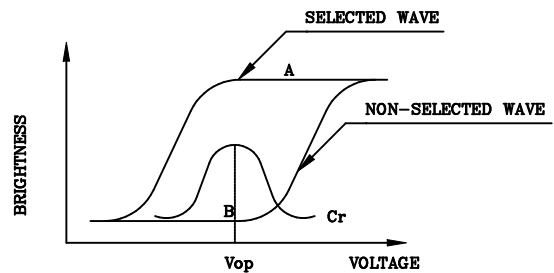
Operating Voltage : Vop
Frame Frequency : 70Hz
Applying Waveform : 1/N duty 1/a bias
Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type)



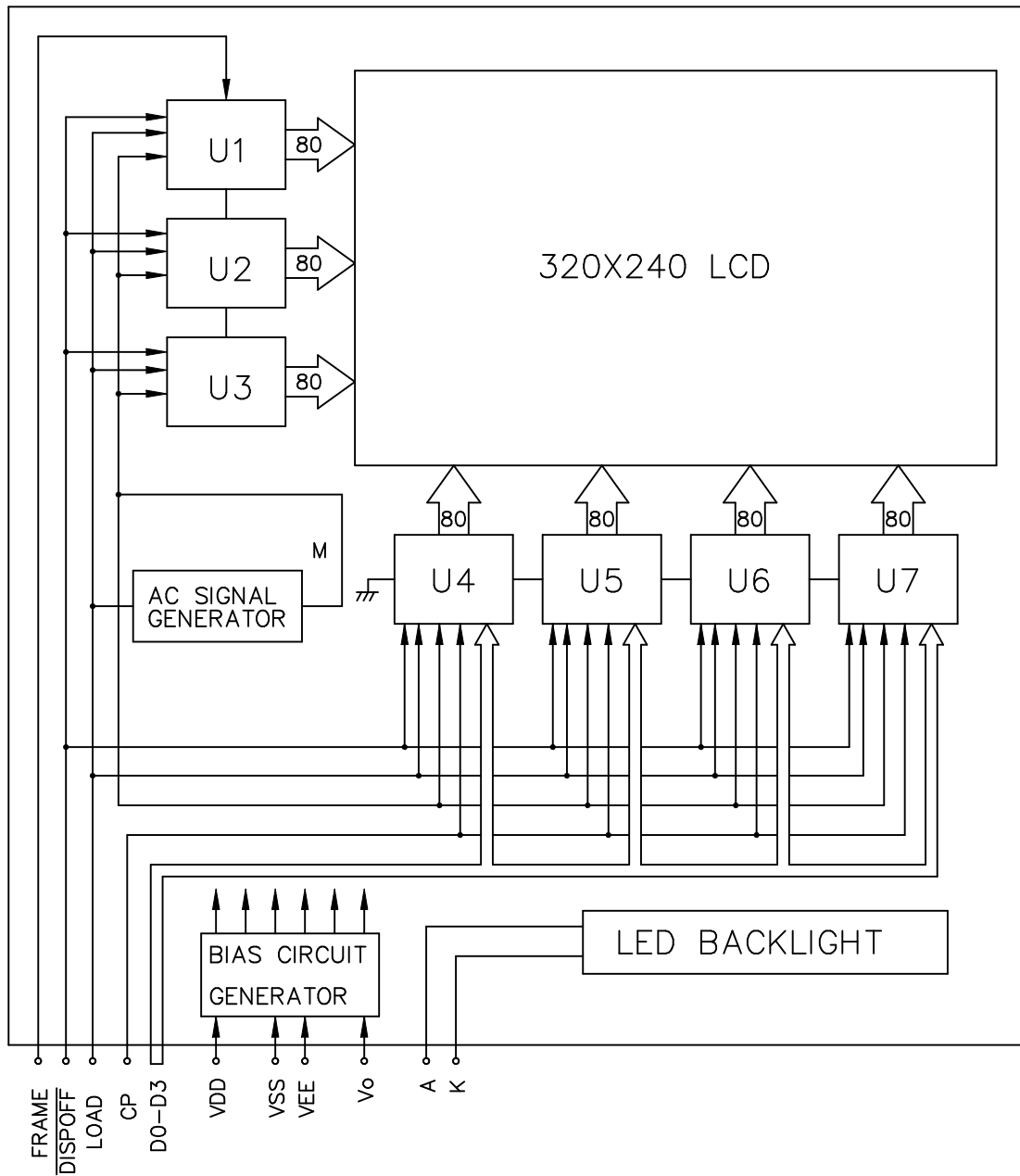
(negative type)

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

*Conditions

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

5. BLOCK DIAGRAM



* AC SIGNAL SETTING

J1	J2	J3	J4	J5	J6	J7	J8
L	H	H	L	L	L	L	L

6. INTERNAL PIN CONNECTION

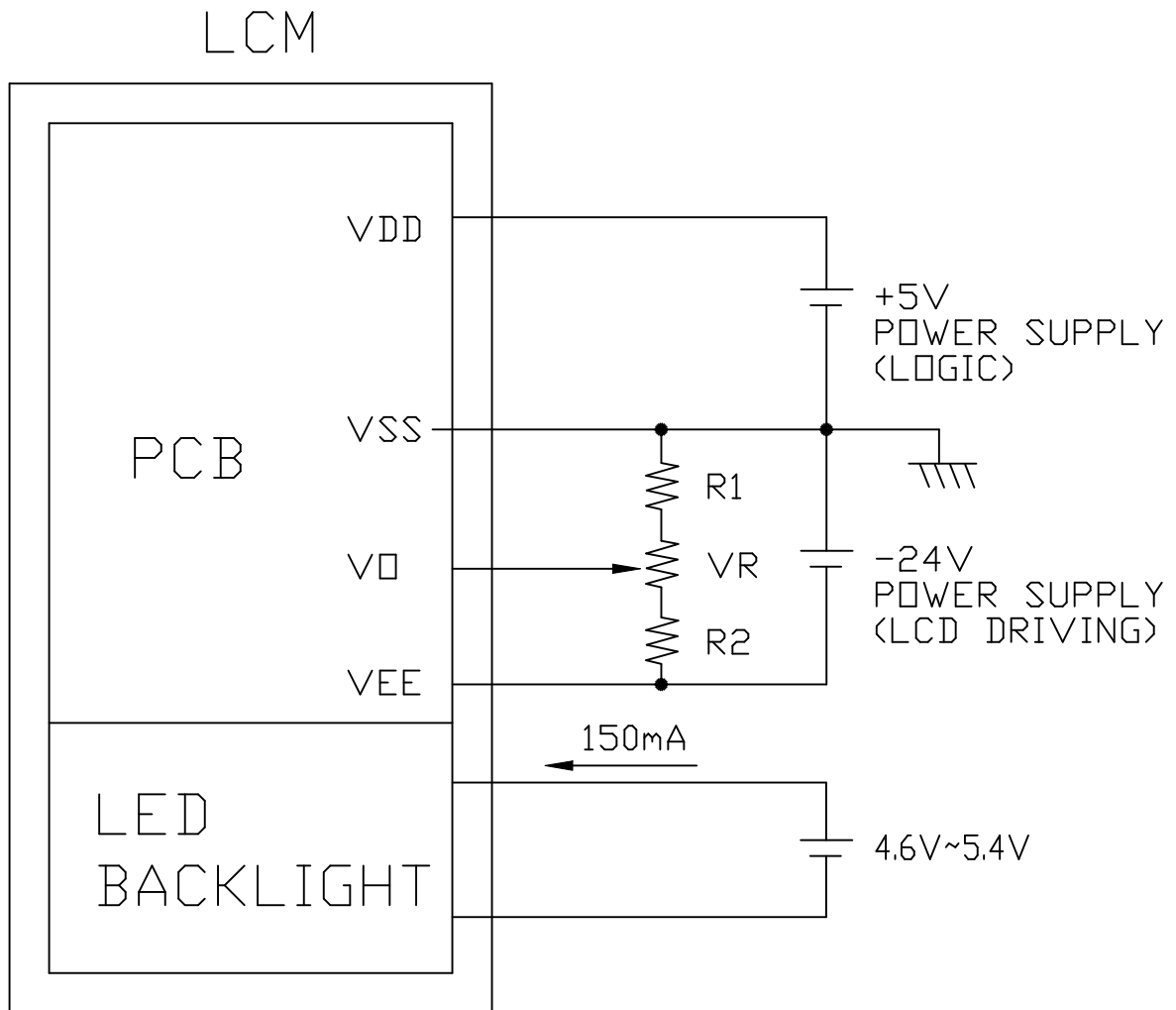
CN1: PITCH 1.25mm WIDTH 18.75mm

PIN NO.	SYMBOL	LEVEL	FUNCTION
1	D0	H/L	DISPLAY DATA SIGNAL
2	D1		
3	D2		
4	D3		
5	$\overline{\text{DISPOFF}}$	H/L	H: ON/L: OFF
6	FRAME	H	SCAN START-UP SIGNAL
7	NC	-	NO CONNECTION
8	LOAD	H \rightarrow L	INPUT DATA LATCH SIGNAL
9	CP	H \rightarrow L	DATA INPUT CLOCK SIGNAL
10	VDD	-	POWER SUPPLY FOR LOGIC(+5V)
11	VSS	-	SIGNAL GROUND(0V)
12	VEE	-	POWER SUPPLY FOR LCD
13	VO	-	LCD CONTRAST ADJUST VOLTAGE
14	FGND	-	FRONT PANNEL GROUND

CN2: J.A.E./IL-G-4S-S3C2

PIN NO.	SYMBOL	LEVEL	FUNCTION
1	A	-	POWER SUPPLY VOLTAGE FOR LED
2	NC	-	-
3	NC	-	-
4	K	-	GROUND

7. POWER SUPPLY



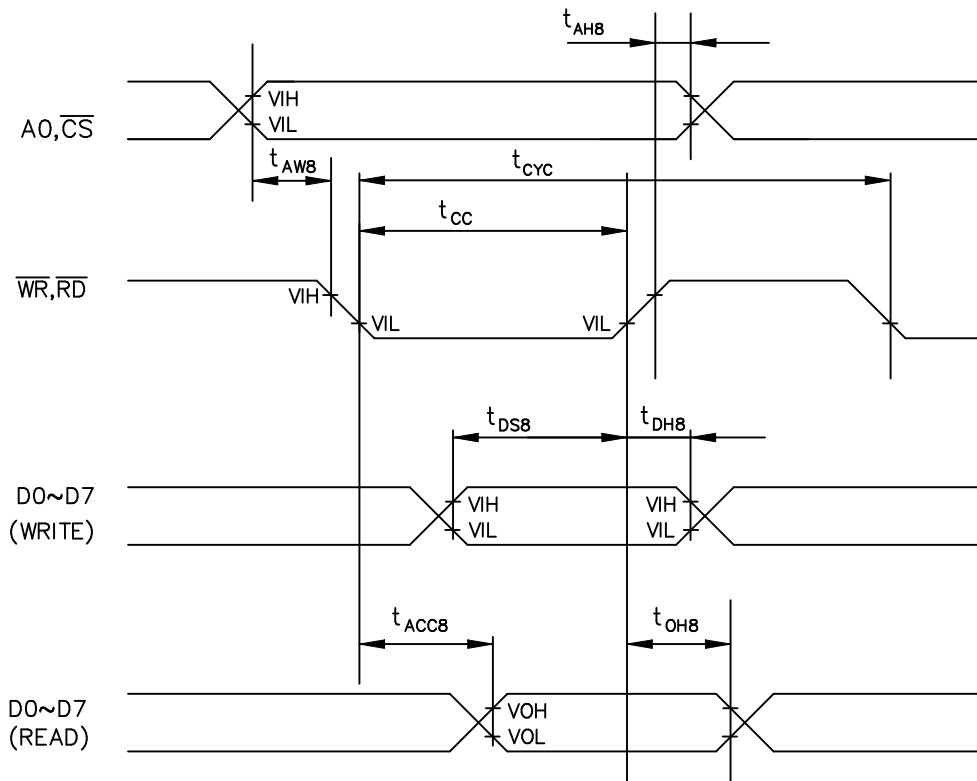
$$1. R1 + VR + R2 = 10K \sim 20K \Omega$$

8. TIMING CHARACTERISTICS

8-1. READ/WRITE CHARACTERISTICS(8080 FAMILY MPU)

VDD=5.0V±5%

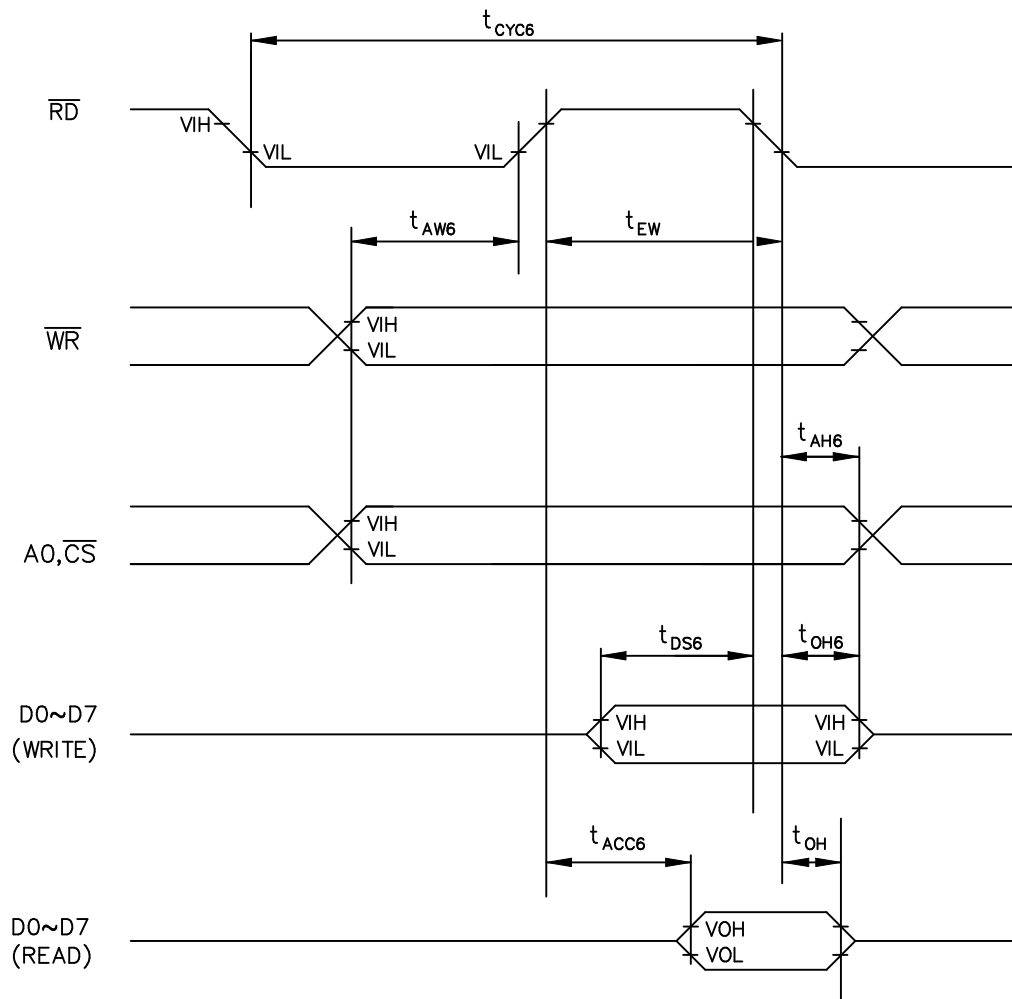
ITEM	ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
A0, \overline{CS}	ADDRESS HOLD TIME	t_{AH8}	10	—	—	ns
	ADDRESS SETUP TIME	t_{AW8}	0	—	—	ns
$\overline{WR}, \overline{RD}$	SYSTEM CYCLE TIME	t_{cyc8}	1	—	—	ns
	STROBE PULSE WIDTH	t_{cc}	120	—	—	ns
D0 to D7	DATA HOLD TIME	t_{DH8}	5	—	—	ns
	DATA SETUP TIME	t_{DS8}	120	—	—	ns
	\overline{RD} ACCESS TIME	t_{ACC8}	—	—	50	ns
	OUTPUT DISABLE TIME	t_{OH8}	10	—	50	ns



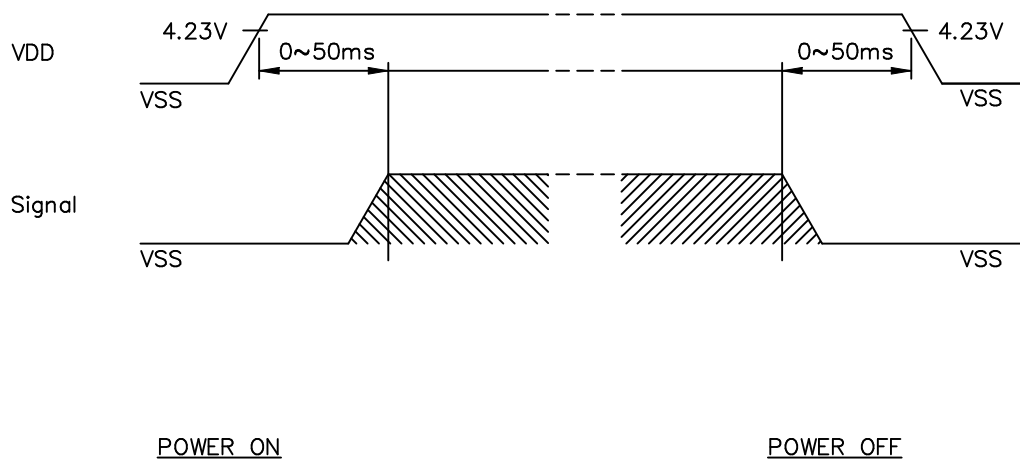
8-2.READ/WRITE CHARACTERISTICS(6800 FAMILY MPU)

VDD=5.0V±5%

ITEM	ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
A0, $\overline{\text{CS}}$, $\overline{\text{WR}}$	ADDRESS HOLD TIME	t_{AH6}	0	—	—	ns
	ADDRESS SETUP TIME	t_{AW6}	0	—	—	ns
	SYSTEM CYCLE TIME	t_{CYC6}	1	—	—	ns
D0 to D7	DATA HOLD TIME	t_{DH6}	0	—	—	ns
	DATA SETUP TIME	t_{DS6}	100	—	—	ns
	ACCESS TIME	t_{ACC6}	—	—	85	ns
	OUTPUT DISABLE TIME	t_{OH6}	10	—	50	ns
$\overline{\text{RD}}$	ENABLE PULSE WIDTH	t_{RDW}	120	—	50	ns

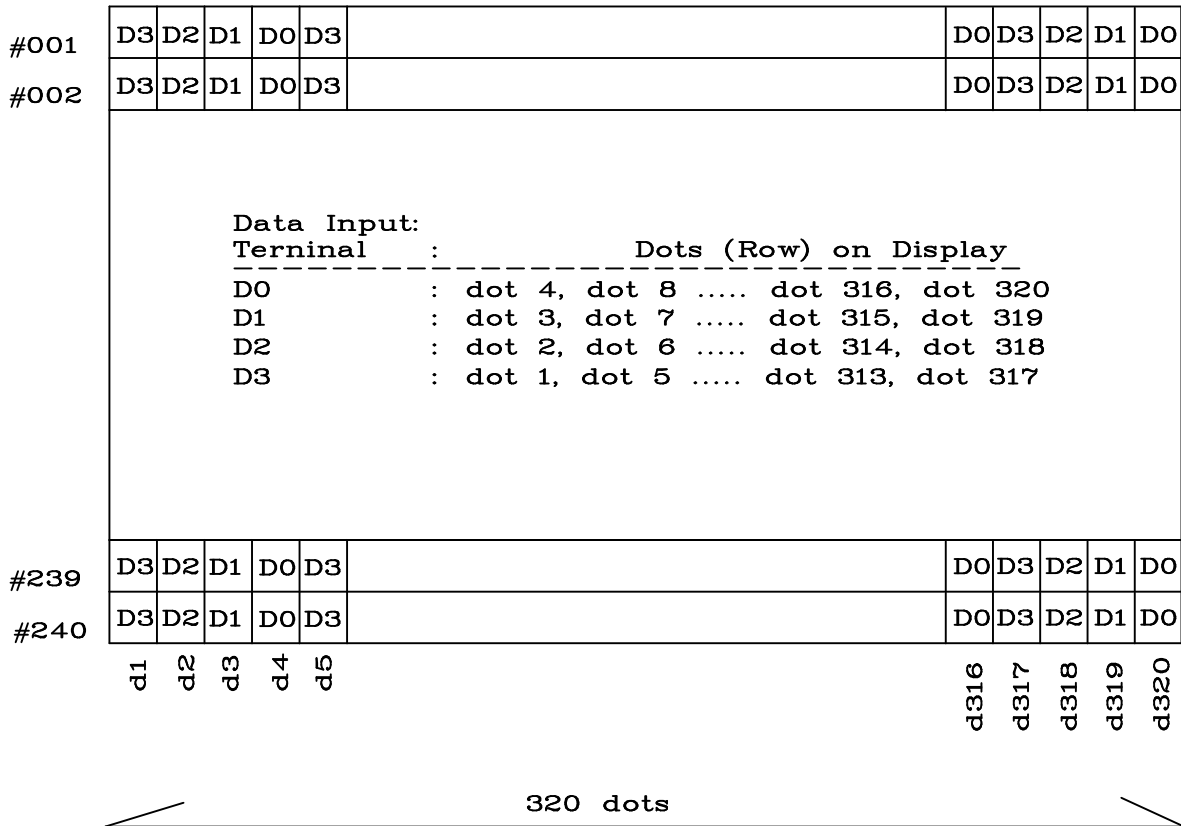


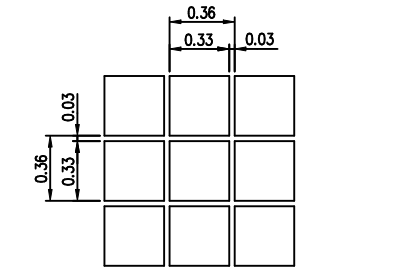
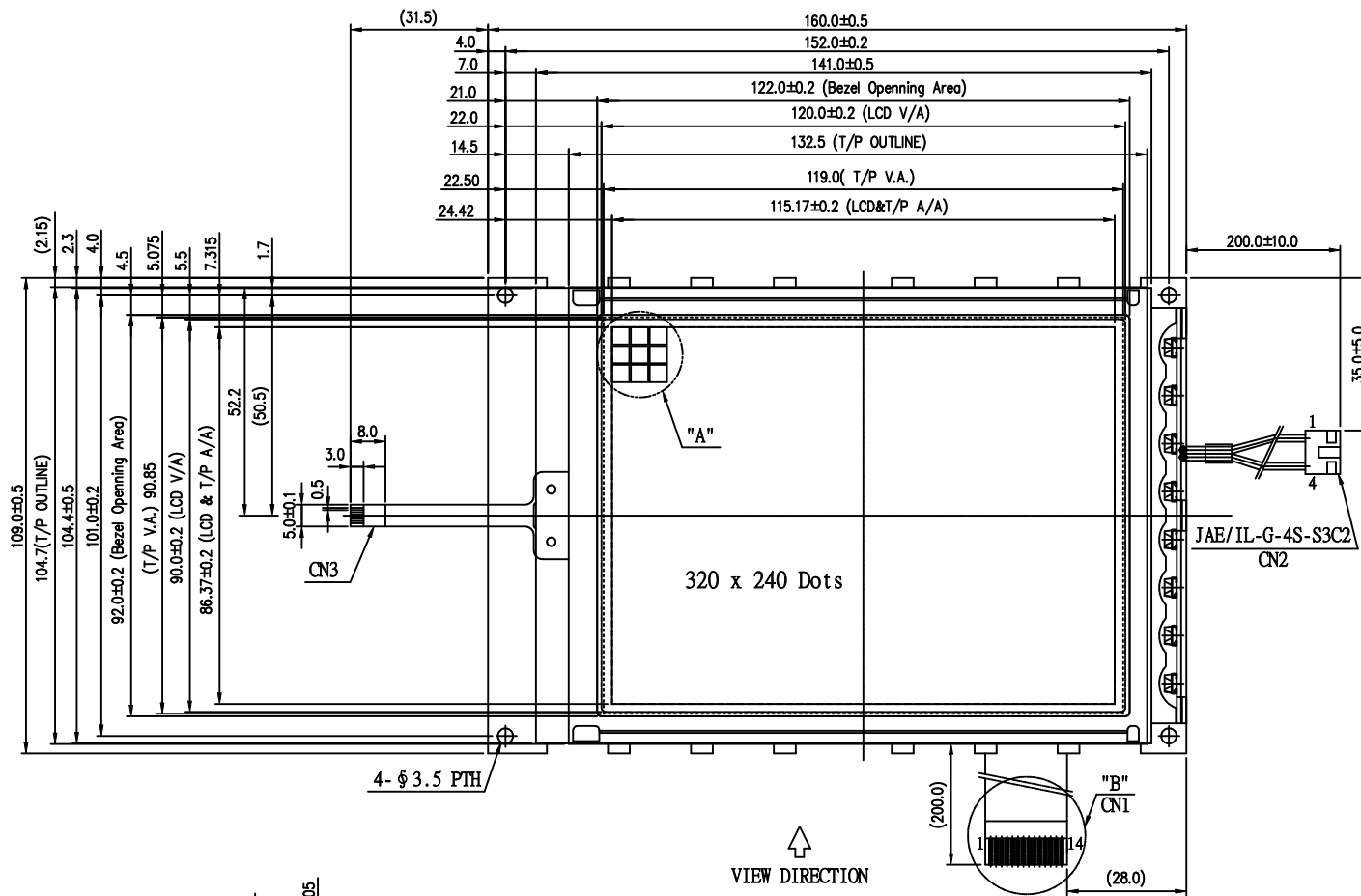
8-3. POWER ON/OFF TIMING



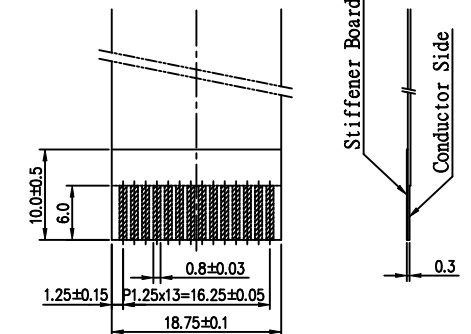
The missing pixels may occur when the LCM is driven beyond above power interface timing sequence.

8-4.DISPLAY PATTERN

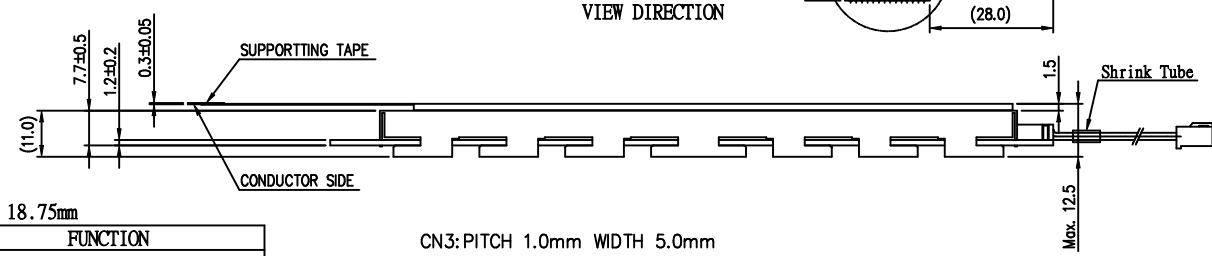




Detail "A"
S = 40:1



Detail "B"
S = 2:1



- NOTES :
- 1.RESOLUTION : 320 X 240 DOTS
 - 2.DRIVER IC: NT7086Q or Compatible
 - 3.BACKLIGHT: LED (WHITE)
 - 4.FRAME: SECC (0.5mm t)
 - 5.TOUCH PANEL: (1.4mmt) Anti-Glare
Light Transmissivity : 80%

CN1:PITCH 1.25mm WIDTH 18.75mm

CN3:PITCH 1.0mm WIDTH 5.0mm

PIN NO.	SYMBOL	LEVEL	FUNCTION
1	DO	H/L	DISPLAY DATA SIGNAL
2	D1		
3	D2		
4	D3		
5	DISPOFF	H/L	H:ON/L:OFF
6	FRAME	H	SCAN START-UP SIGNAL
7	NC	-	NO CONNECTION
8	LOAD	H-L	INPUT DATA LATCH SIGNAL
9	CP	H-L	DATA INPUT CLOCK SIGNAL
10	VDD	-	POWER SUPPLY FOR LOGIC(+5V)
11	VSS	-	SIGNAL GROUND(OV)
12	VEE	-	POWER SUPPLY FOR LCD
13	VO	-	LCD CONTRAST ADJUST VOLTAGE
14	FGND	-	FRONT PANNEL GROUND

PIN NO.	SYMBOL	FUNCTION
1	UP	UP DIRECTION
2	RIGHT	RIGHT DIRECTION
3	DOWN	DOWN DIRECTION
4	LEFT	LEFT DIRECTION

CN2:J.A.E./IL-G-4S-S3C2

PIN NO.	SYMBOL	LEVEL	FUNCTION
1	A	-	POWER SUPPLY VOLTAGE FOR LED
2	NC	-	-
3	NC	-	-
4	K	-	GROUND

GENERAL TOLERANCE LIST

DIMENSION	TOLERANCE
$L \leq 6$	± 0.25 (mm)
$6 < L \leq 18$	± 0.3 (mm)
$18 < L \leq 50$	± 0.4 (mm)
$50 < L \leq 125$	± 0.5 (mm)
$125 < L$	± 0.6 (mm)

AZ Displays, Inc.

	P/N: AGM3224D-FLW-FBH-T				APPROVE	NAME	DATE	THIRD ANGLE P
					CHECK			
					DESIGN		92.11.20	SCALE UNIT
					DRAWN		92.11.20	1/1 mm
REV. NO.	DESCRIPTION	DATE	DESIGN	CHECK	APPROVE	DWG. NO.	M 0 3 2 A D 34 A	