

AZ DISPLAYS, INC.

COMPLETE LCD SOLUTIONS

**SPECIFICATIONS FOR
LIQUID CRYSTAL DISPLAY**

PART NUMBER: AGM3224N SERIES

DATE: APRIL 06, 2007

1. FEATURES

- (1) Display format : 320 240 dot-matrix ; 1/ 240 duty.
- (2) Construction : LCD, Bezel, Heat Seal, Zebra ,LED back-light, Touch Panel and PCB.
- (3) Display type : STN , Negative, 6 o'clock.
- (4) Controller : E3305F or S1D13700 or RA8835.
- (5) 5V single power input. Built-in DC/DC converter for LCD driving.
- (6) Normal temperature type.

2. MECHANICAL DATA

Para meter	Standard Value	Unit
Dot size	0.345(W) 0.345(H)	mm
Dot pitch	0.36(W) 0.36(H)	mm
Viewing area	122.0(W) 92.0(H)	mm
Module size	196.85(W) 109.0(H) 14.5 max (T)	mm

3. ABSOLUTE MAXIMUM RATINGS

Para meter S		ymbol	Min	Max	Unit
Logic Circuit Supply Voltage		VDD-VSS	-0.3	7.0	V
LCD Driving Voltage		VDD-VO	-0.3	26.0	V
Input Voltage		VI	-0.3	VDD+0.3	V
Normal temp. type	Operating Temp.	TOP	0	50	C
	Storage Temp.	TSTG	-20	70	C

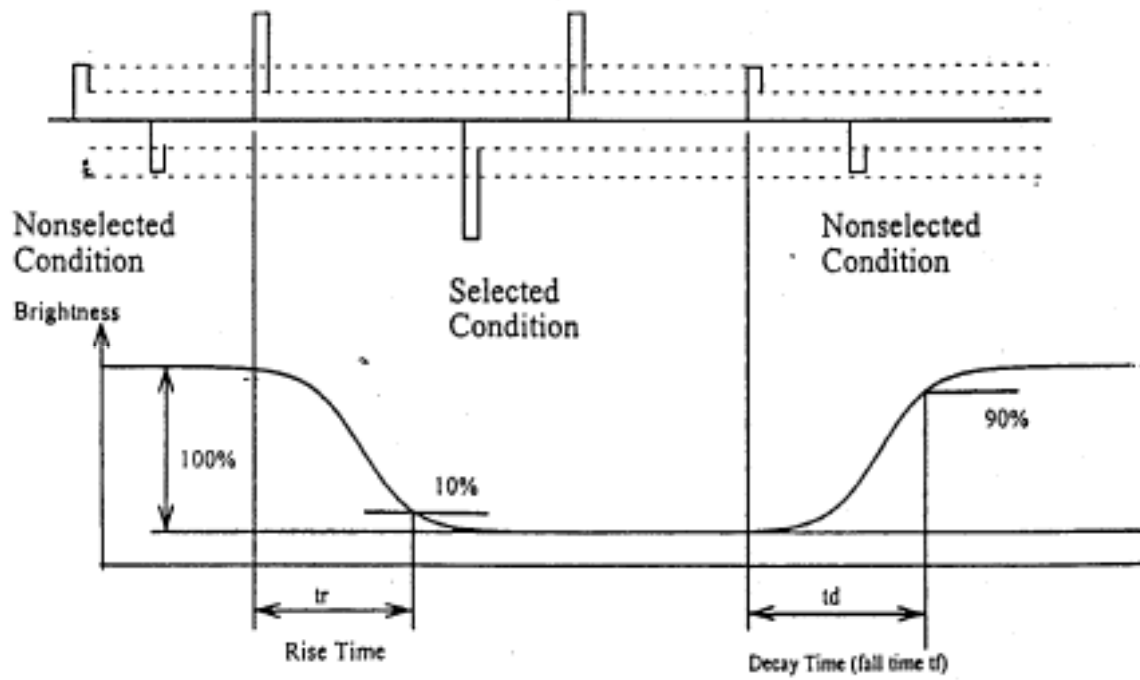
4. ELECTRO-OPTICAL CHARACTERISTICS

Parameter	Sym bol	Condition	Min	Typ	Max	Unit	Note
----- E lectronic Ch aract eristics -----							
Logic Circuit Supply Voltage	VDD-VSS	--	4.5	5.0	5.5	V	
LCD Driving Voltage	VDD-VO	0 C	20.7	21.8	22.9	V	0 ~ 50 C for Normal Temp. type
		25 C	20.2	21.2	22.2		
		50 C	19.0	20.0	21.0		
Input Voltage	VIH	--	0.7 VDD	--	VDD	V	
	VIL	--	VSS	--	0.3 VDD	V	
Logic Supply Current	IDD	VDD = 5V	--	50	--	mA	
----- Optical Ch aract eristics -----							
Contrast	CR	STN type	--	5	--		Note 1
Rise Time	tr	25 C	--	1 10	170	ms	Note 2
Fall Time	tf	25 C	--	1 10	170	ms	
Viewing Angle Range	f	25 C & CR 2	--	40	--	Deg.	Note 3
	b		--	35	--		
	l		--	35	--		
	r		--	35	--		
Frame Frequency	fF	25 C	--	64	--	Hz	

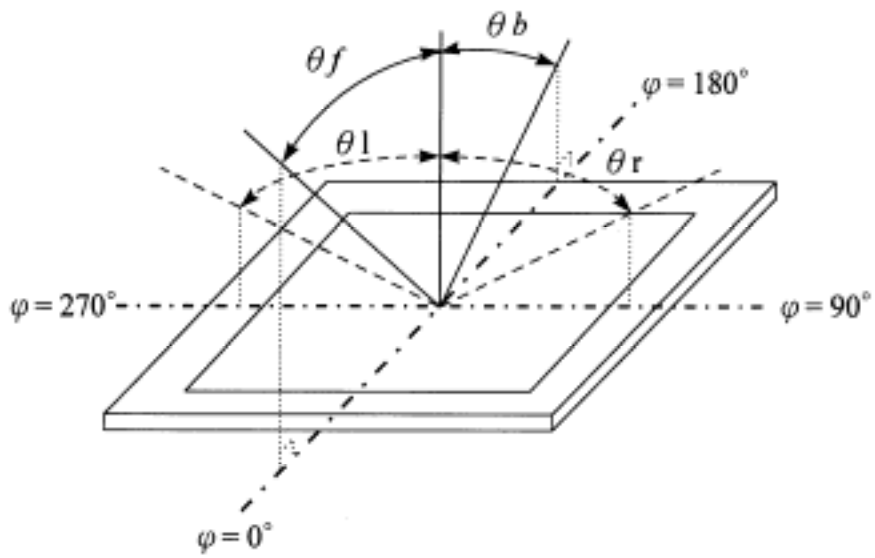
(NOTE 1) Contrast ratio :

CR = (Brightness in OFF state) / (Brightness in ON state)

(NOTE 2) Response time :



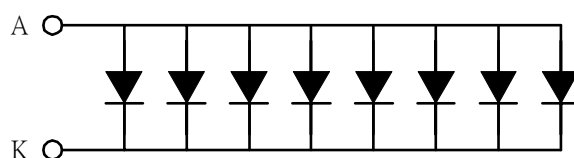
(NOTE 3) Viewing angle



4.1. LED Back-light Electrical Specification

----- White LED Back-light Characteristics -----							
Parameter	Sym bol	Condition	Min	Typ	Max	Unit	Note
Forward Voltage	VF	--	--	3.2	3.5	V	Supply Voltage between A&K
Forward Current	IF	VF=3.2V	--	120	--	mA	
Bare LED Luminous intensity		VF=3.2V	--	60	--	cd/m ²	
LCM Luminous intensity		VF=3.2V	--	12	--	cd/m ²	

* LED Dice number = 8



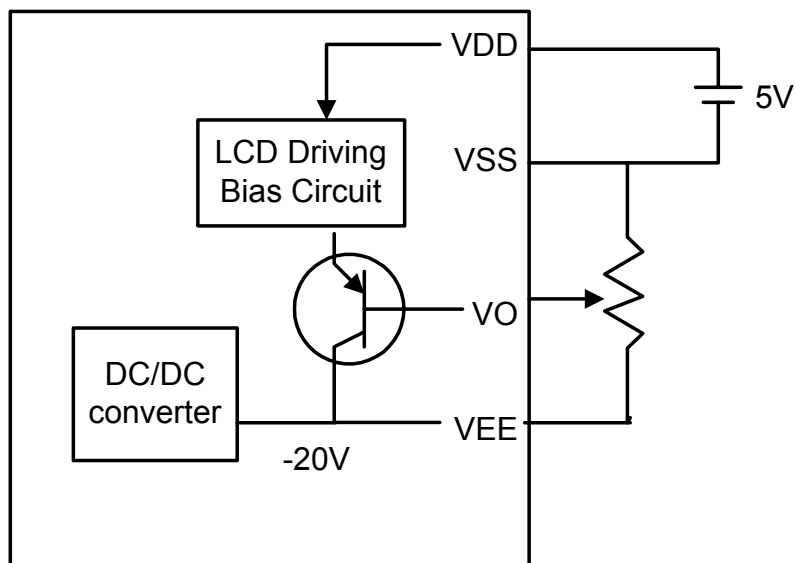
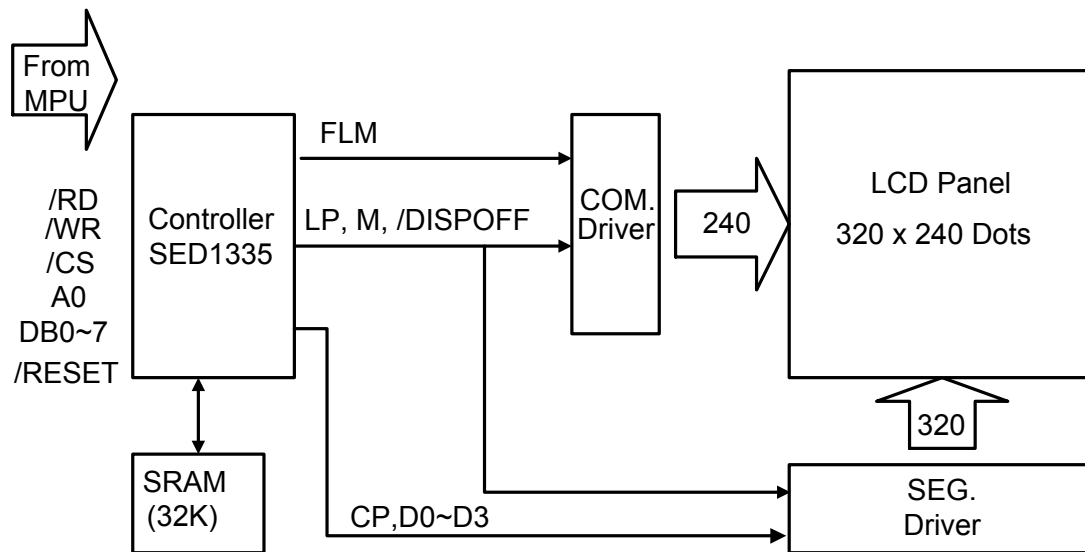
4.2. Touch Panel Electrical Specification

Parameter	Condition	Standard Value
Terminal Resistance	X Axis	250 ~ 700
	Y Axis	250 ~ 850
Insulating Resistance	DC 25 V	More than 10M
Linearity	--	1.0 %

Interface

No.	Sym bol	Function
1	XR	Touch Panel Right Signal in X Axis
2	YT	Touch Panel Top Signal in Y Axis
3	XL	Touch Panel Left Signal in X Axis
4	YB	Touch Panel Bottom Signal in Y Axis

5. BLOCK DIAGRAM & POWER SUPPLY



6. PIN CONNECTIONS

PIN NO.	SIGNAL	LEVEL	FUNCTION
1	/RESET	H/L	Reset Signal
2	/RD	H/L	80 Series: Read Signal 68 Series: Enable Signal(E)
3	/WR	H/L	80 Series: Write Signal 68 Series: R/W Signal
4	/CS	H/L	Chip Select Signal
5	A0	H/L	Data Type Selection
6 ~ 13	DB0~DB7	H/L	Data Input(8 bits)
14	VDD	-	Power Supply for Logic(+5.0V)
15	VSS	-	Power Supply(Ground : 0V)
16	VEE	-	Negative voltage output (-20V)
17	VO	-	Contrast Adjustment Input (VDD-VO = LCD driving voltage)
18-24	NC	-	No Connection

7. TIMING CHARACTERISTICS

7.1. 8080 Family Interface Timing

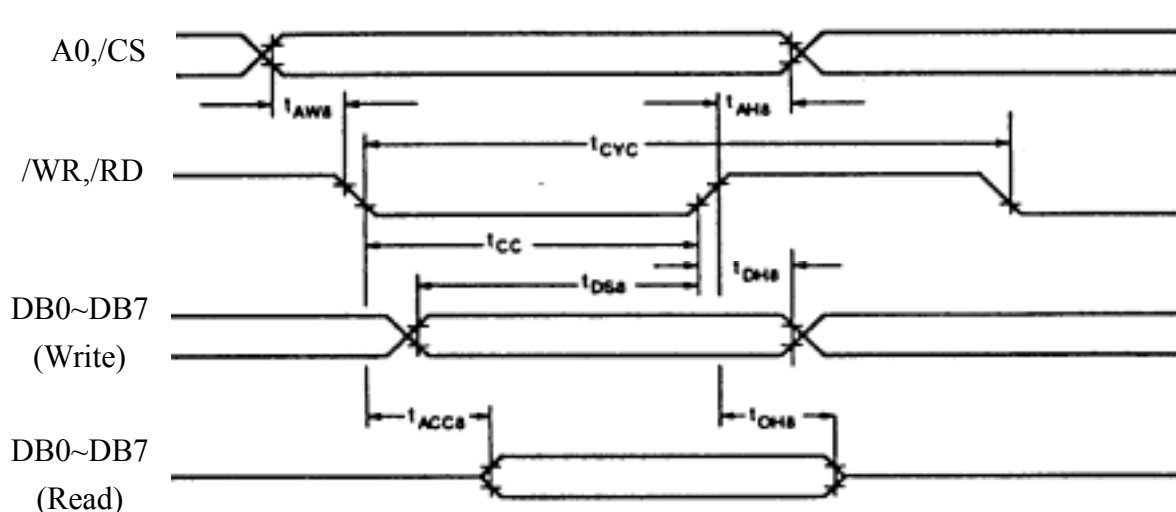
Parameter	Condition	Symbol	Min	Max	Unit	Remark
Address Hold Time	CL=100 pF VDD=2.7~4.5	tAH8	10		ns	A0,/CS
Address Setup Time		tAW8	0		ns	
System Cycle Time		tCYC	Note		ns	/WR,/RD
Strobe Pulse Width		tOC	150		ns	
Data Setup Time		tDS8	120		ns	DB0~DB7
Data Hold Time		tDH8	5		ns	
/RD Access Time		tACC8	-	80	ns	
Output Disable Time		tOH8	10	55	ns	

Note: For memory control and system control commands:

$$t_{CYC8} = 2t_C + t_{OC} + t_{CEA} + 75 > t_{ACV} + 245$$

For all other commands:

$$t_{CYC8} = 4t_C + t_{OC} + 30$$



7.2. 6800 Family Interface Timing

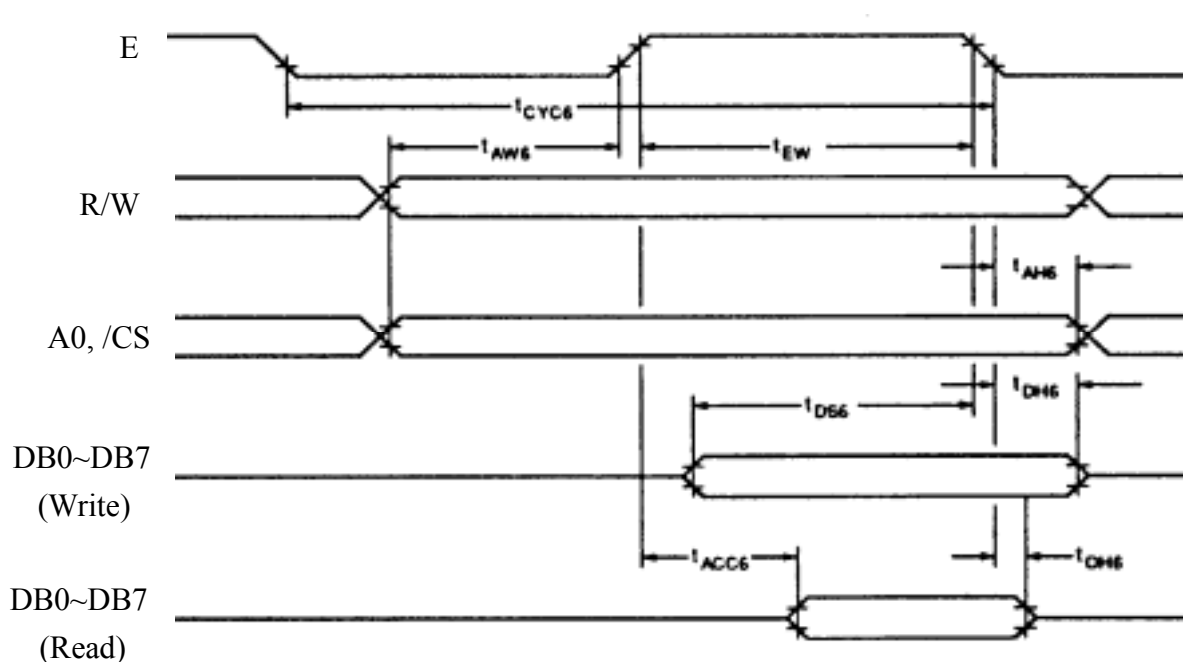
Parameter	Condition	Symbol	Min	Max	Unit	Remark
System Cycle Time	CL=100 pF VDD=2.7~4.5	tCYC6	Note		ns	A0,/CS, R/W
Address Setup Time		tAW6	10		ns	
Address Hold Time		tAH6	0		ns	
Data Setup Time		tDS6	120		ns	DB0~DB7
Data Hold Time		tDH6	0		ns	
Output Disable Time		tOH6	10	75	ns	
Access Time		tACC6	-	130	ns	
Enable Pulsewidth		tEW	150	-	ns	E

Note: For memory control and system control commands:

$$tCYC6 = 2tC + tEW + tCEA + 75 > tACV + 245$$

For all other commands:

$$tCYC6 = 4tC + tEW + 30$$



AC Electrical Characteristics

8. INSTRUCTION SET

Class	Command	Code											Hex	Command Description	Command read parameters	
		/RD	/WR	A0	D7	D6	D5	D4	D3	D2	D1	D0			Number of bytes	Section
System Control	SYSTEM SET	1	0	1	0	1	0	0	0	0	0	0	40	Initialized Device and display	8	8.2.1
	SLEEP IN	1	0	1	0	1	0	1	0	0	1	1	53	Enter Standby mode	0	8.2.2
Display Control	DISP ON/OFF	1	0	1	0	1	0	1	1	0	0	D	58, 59	Enable and disable display and display flashing	1	8.3.1
	SCROLL	1	0	1	0	1	0	0	0	1	0	0	44	set Display start address and display regions	10	8.3.2
	CSRFORM	1	0	1	0	1	0	1	1	1	0	1	5D	Set cursor byte	2	8.3.3
	CGRAM ADDR.	1	0	1	0	1	0	1	1	1	0	0	5C	Set start address of character generator RAM	2	8.3.6
	CSRDIR	1	0	1	0	1	0	0	1	1	CD 1	CD 0	4C to 4F	Set direction of cursor movement	0	8.3.4
	HDOT SCR	1	0	1	0	1	0	1	1		1	0	5A	set horizontal scroll position	1	8.3.7
	OVLAY	1	0	1	0	1	0	1	1	0	1	1	5B	set display overlay format	1	8.3.5
Drawing Control	CSRW	1	0	1	0	1	0	0	0	1	1	0	46	set cursor address	2	8.4.1
	CSRR	1	0	1	0	1	0	0	0	1	1	1	47	read cursor address	2	8.4.2
Memory Control	MWRITE	1	0	1	0	1	0	0	0	0	1	0	42	write to display memory	-	8.5.1
	MREAD	1	0	1	0	1	0	0	0	0	1	1	43	read from display memory	-	8.5.2

Note:

- In general, the internal registers of the SED1335F are modified as each command parameter is input. However, the microprocessor does not have to set all the parameters of a command and may send a new command before all parameters have been input. The internal registers for the parameters that have been input will have been changed but the remaining parameter registers are unchanged.
- 2 bytes parameters(where two bytes are treated as 1 data item) are handled as following:
 - CSRW, CSRR: Each byte is processed individually. The microprocessor may read or write just the low byte of the cursor address.
 - SYSTEM SET, SCROLL, CGRAM ADR. : Both parameter bytes are processed together. If the command is changed after half of the parameter has been input, the single byte is ignored.
- APL and APH are 2-byte parameters, but are treated as two 1-byte parameters.
- Please refer to SED1335F LCD Controller Data Book for detail.

11. OUTLINE DIMENSION

