

Am100470

4096 x 1 IMOX™ ECL Bipolar RAM

Am100470

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DISTINCTIVE CHARACTERISTICS

- Fast access time (12 ns typ.) — improves system cycle speeds
 - Enhanced output voltage level compensation providing 6X (improvement in) V_{OL} and V_{OH} stability over supply and temperature ranges
 - Internally voltage and temperature compensated providing flat AC performance
- Outputs preconditioned during write cycle eliminating write recovery glitch
 - Emitter follower outputs — easy wire-ORing
 - Power dissipation decreases with increasing temperature

GENERAL DESCRIPTION

The Am100470 is a fully decoded 4096-bit ECL RAM organized 4096 words by one bit. Bit selection is achieved by means of a 12-bit address, A_0 through A_{11} . Easy memory expansion is provided by an active-LOW chip select (\overline{CS}) input and an unterminated OR-tieable emitter follower output.

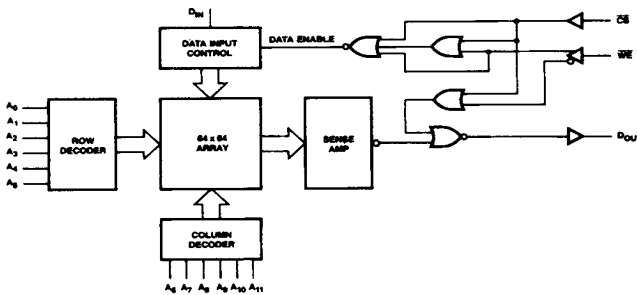
An active-LOW write line (\overline{WE}) controls the write/read operation of the memory. When the chip select and write lines are LOW, the data input (D_{IN}) is written into the addressed memory word simultaneously preconditioning

the output so true data is present when the write cycle is complete. This preconditioning operation insures minimum write recovery times by eliminating the 'write recovery glitch.'

Reading is performed with the chip select line LOW and the write line HIGH. The information stored in the addressed word is read out on the noninverting output (D_{OUT}).

During the writing operation or when the chip select line is HIGH, the output of the memory goes to a LOW state.

BLOCK DIAGRAM



MODE SELECT TABLE

Input			Output		Mode
\overline{CS}	\overline{WE}	D_{IN}	D_{OUT}		
H	X	X	L		Not Selected
L	L	L	L		Write "0"
L	L	H	L		Write "1"
L	H	X	D_{OUT}		Read

H = HIGH = -0.9 V
 L = LOW = -1.7 V
 X = Don't Care

BD000660

PRODUCT SELECTOR GUIDE

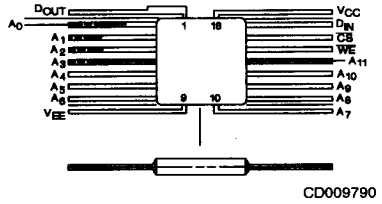
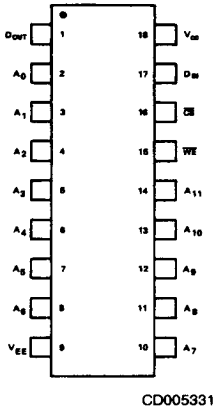
Highlights of Key Performance Parameters (Commercial)

Part Number	Am100470SA	Am100470A
Address Access Time (t_{AA})	15 ns	25 ns
Write Pulse Width (t_W)	15 ns	20 ns
Write Recovery (t_{WR})	8 ns	10 ns
Chip Select Access/ Recovery and Write Disable Times (t_{ACS} , t_{RCS} , t_{WS})	8 ns	10 ns
Power Supply (I_{EE})	230 mA	200 mA

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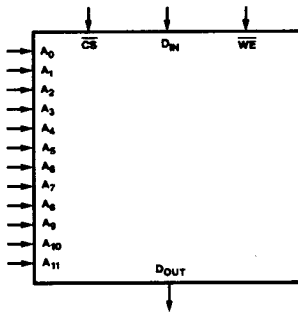
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CONNECTION DIAGRAMS Top View



Note: Pin 1 is marked for orientation.

LOGIC SYMBOL



LS002550

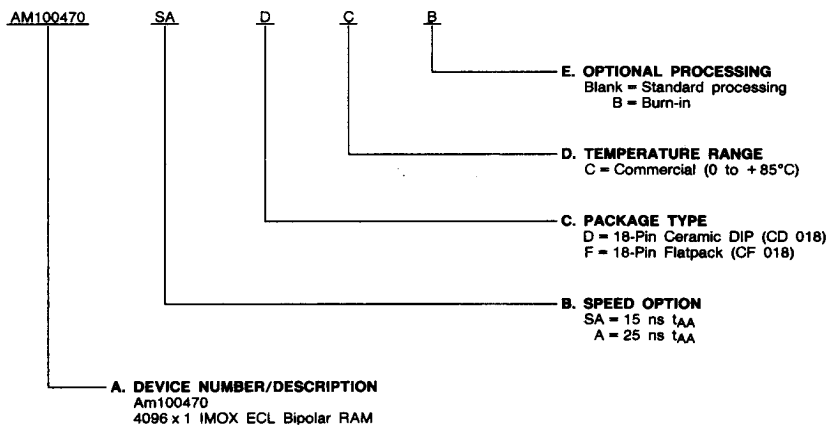
VCC = Pin 18
VEE = Pin 9

ORDERING INFORMATION

Standard Products

AMD standard products are available in several packages and operating ranges. The order number (Valid Combination) is formed by a combination of:

- A. Device Number**
- B. Speed Option** (if applicable)
- C. Package Type**
- D. Temperature Range**
- E. Optional Processing**



Valid Combinations	
AM100470SA	DC, DCB,
AM100470A	FC, FCB

Valid Combinations

Valid Combinations list configurations planned to be supported in volume for this device. Consult the local AMD sales office to confirm availability of specific valid combinations, to check on newly released combinations, and to obtain additional data on AMD's standard military grade products.

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ABSOLUTE MAXIMUM RATINGS

Storage Temperature -65 to +150°C
 Ambient Temperature with
 Power Applied -55 to +125°C
 V_{EE} Pin Potential to GND Pin -7.0 V to +0.5 V
 Input Voltage (DC) V_{EE} to +0.5 V
 Output Current (DC Output HIGH) -30 mA to +0.1 mA

Stresses above those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent device failure. Functionality at or above these limits is not implied. Exposure to absolute maximum ratings for extended periods may affect device reliability.

OPERATING RANGES

Commercial (C) Devices
 Temperature 0 to +85°C
 Supply Voltage -5.7 V to -4.2 V

Operating ranges define those limits between which the functionality of the device is guaranteed.

DC CHARACTERISTICS V_{EE} = -4.5 V, V_{CC} = GND (Note 2)

Parameter Symbol	Parameter Description	Test Conditions		B (Note 3)	Typ. (Note 1)	A (Note 3)	Units
V _{OH}	Output Voltage HIGH	V _{IN} = V _{IHA} or V _{ILB}	Loading is 50 Ω to -2.0 V	-1025	-955	-880	mV
V _{OL}	Output Voltage LOW			-1810	-1715	-1620	mV
V _{OHc}	Output Voltage HIGH	V _{IN} = V _{IHB} or V _{ILA}		-1035			mV
V _{OLc}	Output Voltage LOW					-1610	mV
V _{IH}	Input Voltage HIGH	Guaranteed Input Voltage HIGH for all inputs (Note 4)		-1165		-880	mV
V _{IL}	Input Voltage LOW	Guaranteed Input Voltage LOW for all inputs (Note 4)		-1810		-1475	mV
I _{IH}	Input Current HIGH	V _{IN} = V _{IHA}				220	μA
I _{IL}	Input Current LOW Chip Select(\overline{CS}) All Other Inputs	V _{IN} = V _{ILB}		0.5 -50		170	μA
I _{EE}	Power Supply Current (Pin 9)	All Inputs and Outputs Open	Am100470A	-200	-160		mA
			Am100470SA	-230	-180		

Notes: 1. Typical values are at V_{EE} = -4.5V, T = 25°C and maximum loading.

2. Output Load = 50 Ω and 30 pF to -2.0 V

T = T_A = 0 to +85°C for DIPs.

Guaranteed with transverse air flow exceeding 400 linear F.P.M. and 2-minute warm-up period. Typical resistance values of the package are:

θ_{JA} (Junction to Ambient) = 90°C/Watt (still air)

θ_{JA} (Junction to Ambient) = 50°C/Watt (at 400 F.P.M. air flow)

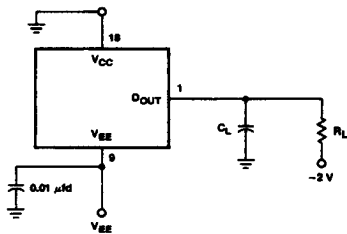
T = T_C = 0 to +85°C for Flatpacks and Leadless Chip Carriers.

θ_{JC} (Junction to Case) = 25°C/Watt

3. Definition of symbols and terms used in this product specification: The relative values of the specified conditions and limits will be referenced to an algebraic scale. The extremities of the scale are: "A" the value closest to positive infinity, "B" the value closest to negative infinity.

4. These are absolute voltages with respect to device ground pin and include all overshoots due to system and/or tester noise. Do not attempt to test these values without suitable equipment.

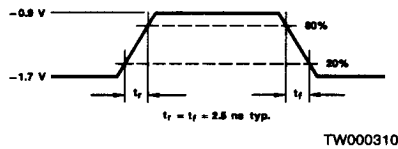
SWITCHING TEST CIRCUIT



TC000231

$R_L = 50 \Omega$ termination of measurement system
 $C_L = 30$ pF (including stray jig capacitance)

SWITCHING TEST WAVEFORMS



KEY TO SWITCHING WAVEFORMS

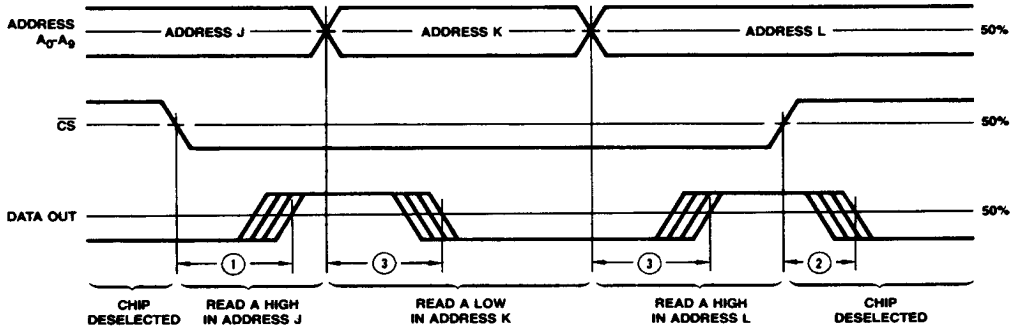
WAVEFORM	INPUTS	OUTPUTS
	MUST BE STEADY	WILL BE STEADY
	MAY CHANGE FROM H TO L	WILL BE CHANGING FROM H TO L
	MAY CHANGE FROM L TO H	WILL BE CHANGING FROM L TO H
	DON'T CARE; ANY CHANGE PERMITTED	CHANGING STATE UNKNOWN
	DOES NOT APPLY	CENTER LINE IS HIGH IMPEDANCE "OFF" STATE

KS000010

SWITCHING CHARACTERISTICS $V_{EE} = -4.73$ to -4.72 V (Note 2)

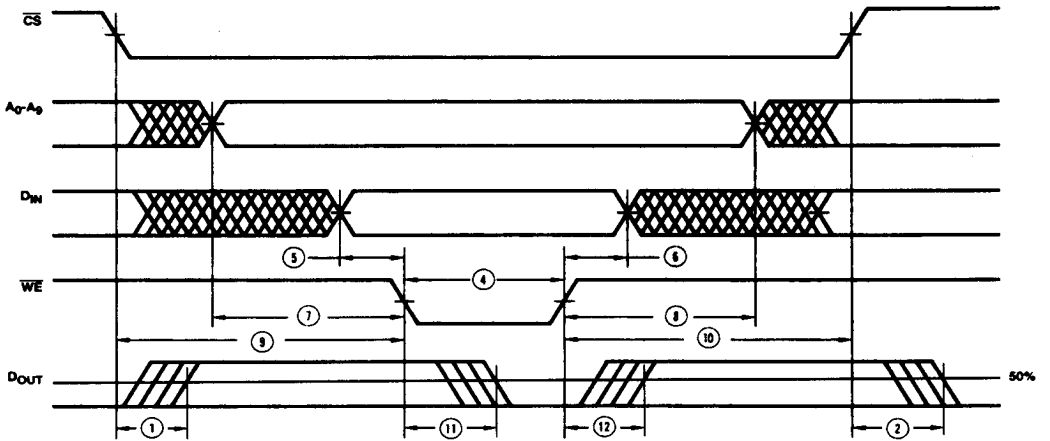
No.	Parameter Symbol	Parameter Description	Test Conditions	Am100470SA			Am100470A			Units
				Min.	Typ. (Note 1)	Max.	Min.	Typ. (Note 1)	Max.	
READ MODE										
1	tACS	Chip Select Access Time	Measured at 50% of input to 50% of output		6	8		8	10	ns
2	tRCS	Chip Select Recovery Time			6	8		8	10	ns
3	tAA	Address Access Time			12	15		18	25	ns
WRITE MODE										
4	tW	Write Pulse Width (to Guarantee Writing)	tWSA = tWSA(Min.)	15			20			ns
5	tWSD	Data Setup Time Prior to Write		2			2			ns
6	tWHD	Data Hold Time After Write		2			2			ns
7	tWSA	Address Setup Time Prior to Write	tW = tW(Min.)	3			3			ns
8	tWHA	Address Hold Time After Write		2			2			ns
9	tWSCS	Chip Select Setup Time Prior to Write	Measured at 50% of input to 50% of output	2			2			ns
10	tWHCS	Chip Select Hold Time After Write		2			2			ns
11	tWS	Write Disable Time			6	8		8	10	ns
12	tWR	Write Recovery Time		6	8		8	10	ns	
RISE TIME AND FALL TIME										
	t _r	Output Rise Time	Measured between 20% and 80% points		2.5			2.5		ns
	t _f	Output Fall Time			2.5			2.5		
CAPACITANCE										
	C _{IN}	Input Pin Capacitance	Measure with a Pulse Technique on a Sample Basis.		4	5		4	5	pF
	C _{OUT}	Output Pin Capacitance			7	8		7	8	

SWITCHING WAVEFORMS



WF001173

Read Mode



WF001163

Write Mode