Am10474

1024 x 4 IMOX™ ECL Bipolar RAM

PRELIMINARY

DISTINCTIVE CHARACTERISTICS

- Fast access time (10 ns) improves system cycle speeds.
- Fully compatible with standard voltage-compensated 10K series ECL — no board changes required.
- Enhanced output voltage level compensation providing 6X improvement in V_{OL} and V_{OH} stability over supply and temperature ranges.
- Internally voltage-compensated providing flat AC performance.
- Emitter follower outputs — easy wire-ORing
- Power dissipation decreases with increasing temperature.

GENERAL DESCRIPTION

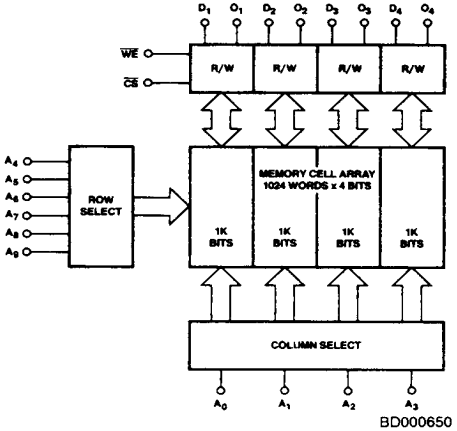
The Am10474-10, Am10474-15 and Am10474-25 are fully decoded 4096-bit ECL RAMs, organized 1024 words by 4 bits. Word selection is achieved by means of a 10-bit address, A_0 through A_9. Easy memory expansion is provided by an active LOW chip select ($\overline{CS}$) input and an unterminated OR-tieable emitter follower output.

An active LOW write enable ($\overline{WE}$) controls the write/read operation of the memory. When the chip select and write enable lines are LOW, the data inputs ($D_1 - D_4$) are written into the addressed memory word.

Reading is performed with the chip select line LOW and the write enable line HIGH. The information stored in the addressed word is read out on the noninverting outputs, $O_1 - O_4$.

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

BLOCK DIAGRAM



BD000650

MODE SELECT TABLE

Input			Output	
$\overline{CS}$	$\overline{WE}$	D_{IN}	D_{OUT}	Mode
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
L = LOW
X = Don't Care

PRODUCT SELECTOR GUIDE

Highlights of Key Performance Parameters (Commercial)

Part Number	Am10474-10	Am10474-15	Am10474-25
Address Access Time (t_{AA})	10 ns	15 ns	25 ns
Write Pulse Width (t_W)	12 ns	15 ns	25 ns
Write Recovery (t_{WR})	14 ns	17 ns	27 ns
Chip Select Access/ Recovery and Write Disable Times (t_{ACS}, t_{RCS}, t_{WS})	8 ns	8 ns	10 ns
Power Supply (I_{EE})	230 mA	200 mA	200 mA

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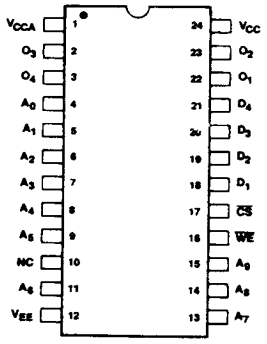
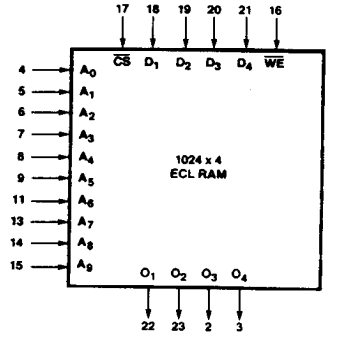
CONNECTION DIAGRAM
Top View



CD000931

LOGIC SYMBOL



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V_{CCA} = Pin 1
V_{CC} = Pin 24
V_{EE} = Pin 12
NC = Pin 10

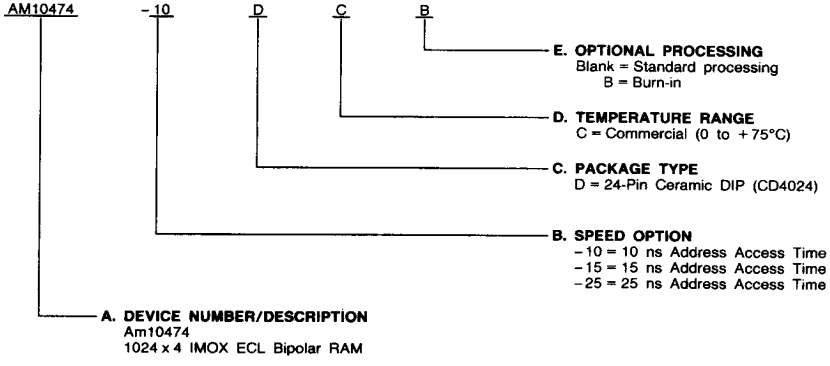
Note: Pin 1 is marked for orientation.

3

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	
AM10474-10	DC, DCB
AM10474-15	
AM10474-25	

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
Case 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 (Note 2)
Temperature ..... 0 to +75°C
Supply Voltage ..... −5.46 V to −4.94 V

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

DC CHARACTERISTICS (Commercial) $V_{EE} = -5.2$ V, V_{CC} = GND (Note 2)

Parameter Symbol	Parameter Description	Test Conditions (Note 2)			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	T = 0°C	−1000		−840	mV
				T = +25°C	−960		−810	
				T = +75°C	−900		−720	
V_{OL}	Output Voltage LOW			T = 0°C	−1870		−1665	mV
				T = +25°C	−1850		−1650	
				T = +75°C	−1830		−1625	
V_{OHC}	Output Voltage HIGH	$V_{IN} = V_{IHB}$ or V_{ILA}		T = 0°C	−1020			mV
				T = +25°C	−980			
				T = +75°C	−920			
V_{OLC}	Output Voltage LOW			T = 0°C			−1645	mV
				T = +25°C			−1630	
				T = +75°C			−1605	
V_{IH}	Input Voltage HIGH	Guaranteed Input Voltage HIGH for All Inputs (Note 4)		T = 0°C	−1145		−840	mV
				T = +25°C	−1105		−810	
				T = +75°C	−1045		−720	
V_{IL}	Input Voltage LOW	Guaranteed Input Voltage LOW for All Inputs (Note 4)		T = 0°C	−1870		−1490	mV
				T = +25°C	−1850		−1475	
				T = +75°C	−1830		−1450	
I_{IH}	Input Current HIGH	$V_{IN} = V_{IHA}$		T = 0 to +75°C			220	µA
I_{IL}	Input Current LOW Chip Select ($\overline{CS}$)	$V_{IN} = V_{ILB}$		T = 0 to +75°C	0.5		170	µA
	All Other Inputs				−50			
I_{EE}	Power Supply Current (Pin 12)	All Inputs and Outputs Open	Am10474-10	T = 0 to +75°C	−230			mA
			Am10474-15/-25		−200			

Notes:
1. Typical values are:
   $V_{EE} = -5.2$ V, $V_{CC} = V_{CCA}$ = GND, T_A = 25°C
2. Output Load = 50 Ω and 30 pF to −2.0 V, T = T_A = 0 to +75°C for DIPs. Guaranteed with transverse air flow exceeding 400 linear F.P.M. and 2-minute warm-up period. Approximate thermal 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 +75°C for Flatpak and LCC packages
   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.
5. Operating specification with adequate time for temperature stabilization and transverse air flow exceeding 400 linear feet per minute. Conformance testing performed θ = 25°C/w (approximately)

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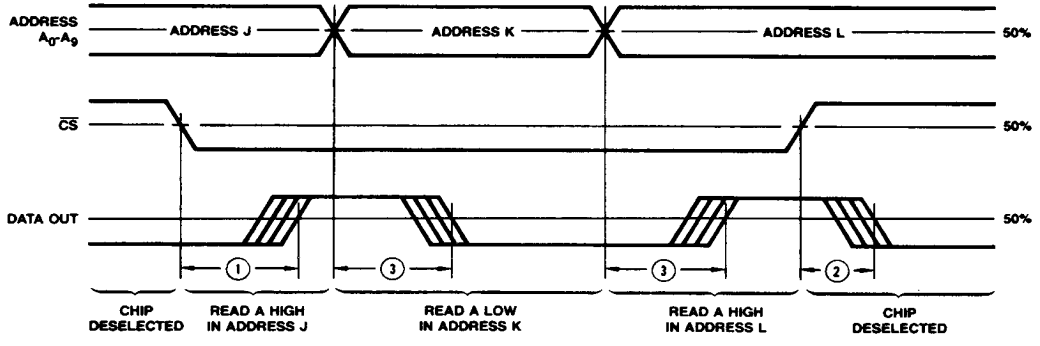
SWITCHING CHARACTERISTICS (Commercial) $V_{EE} = -5.46$ V to -4.94 V, V_{CC} = GND (Note 2)

No.	Parameter Symbol	Parameter Description	Test Conditions	Am10474-10 Min.	Am10474-10 Typ. (Note 1)	Am10474-10 Max.	Am10474-15 Min.	Am10474-15 Typ. (Note 1)	Am10474-15 Max.	Am10474-25 Min.	Am10474-25 Typ. (Note 1)	Am10474-25 Max.	Units
READ MODE													
1	t_{ACS}	Chip Select Access Time	Measured at 50% of input to 50% of output			8			8			10	ns
2	t_{RCS}	Chip Select Recovery Time				8			8			10	ns
3	t_{AA}	Address Access Time				10			15			25	ns
WRITE MODE													
4	t_W	Write Pulse Width (to Guarantee Writing)	$t_{WSA} = t_{WSA}$ (Min.)	12			15			25			ns
5	t_{WSD}	Data Setup Time Prior to Write		2			2			2			ns
6	t_{WHD}	Data Hold Time After Write		2			2			2			ns
7	t_{WSA}	Address Setup Time Prior to Write	$t_W = t_W$ (Min.)	2			2			2			ns
8	t_{WHA}	Address Hold Time After Write		2			2			2			ns
9	t_{WSCS}	Chip Select Setup Time Prior to Write	Measured at 50% of input to 50% of output	2			2			2			ns
10	t_{WHCS}	Chip Select Hold Time After Write		2			2			2			ns
11	t_{WS}	Write Disable Time				8			8			10	ns
12	t_{WR}	Write Recovery Time				14			17			27	ns
RISE TIME AND FALL TIME													
13	t_r	Output Rise Time	Measured between 20% and 80% points		2.5			2.5			2.5		ns
14	t_f	Output Fall Time			2.5			2.5			2.5		
CAPACITANCE													
15	C_{IN}	Input Pin Capacitance	Measured with a pulse technique on sample basis		4			4			4		pF
16	C_{OUT}	Output Pin Capacitance			7			7			7		

SWITCHING WAVEFORMS (Cont'd.)



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Read Mode

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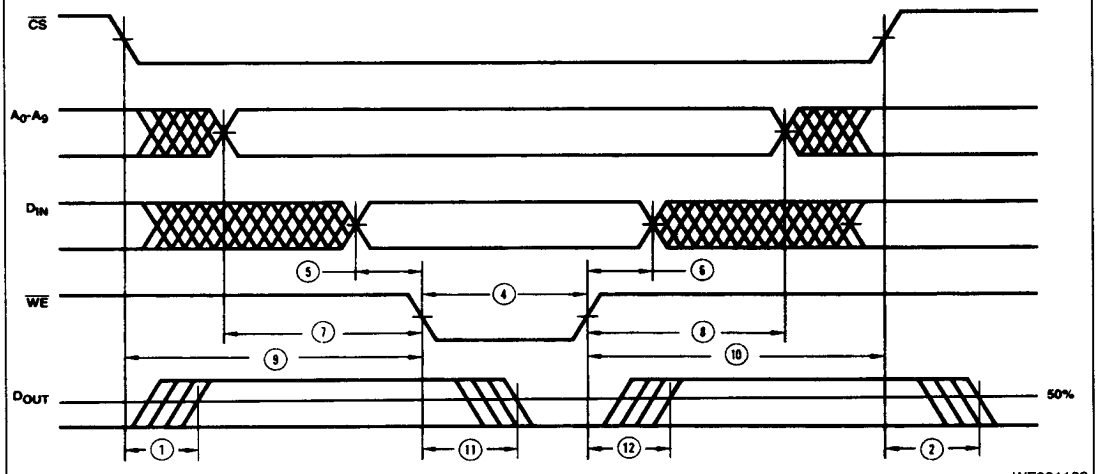
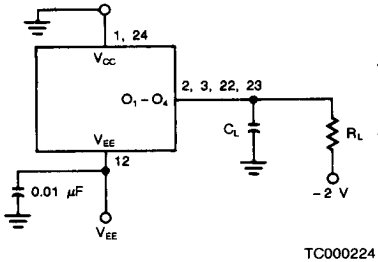
SWITCHING WAVEFORMS

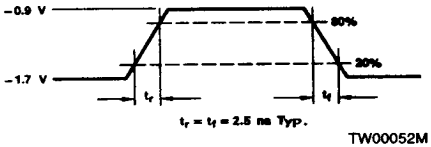


Write Mode

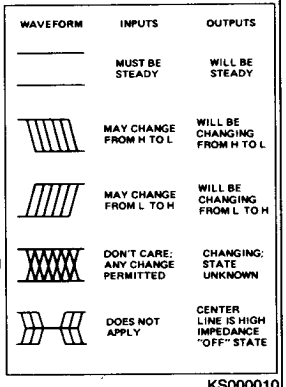
SWITCHING TEST CIRCUIT



SWITCHING TEST WAVEFORM



KEY TO SWITCHING WAVEFORM



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

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