Am31L01/31L01A

64-Bit Low Power Write Transparent, Inverting Output, Bipolar RAM

DISTINCTIVE CHARACTERISTICS

- Standard version: Address access time 50 ns
- Low power: I_{CC} typically 75 mA
- Internal ECL circuitry for optimum speed/power performance over voltage and temperature
- High speed
- Fully decoded 16-word x 4-bit Schottky RAMs

GENERAL DESCRIPTION

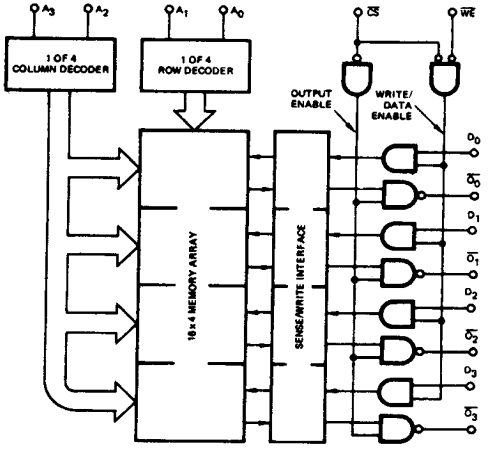
The Am31L01/31L01A is comprised of 64-bit RAMs built using Schottky diode clamped transistors in conjunction with internal ECL circuitry and is ideal for use in scratch pad and high-speed buffer memory applications. Each memory is organized as a fully decoded 16-word memory of 4 bits per word. Easy memory expansion is provided by an active-LOW chip select ($\overline{CS}$) input and open-collector OR tieable outputs.

An active-LOW Write line ($\overline{WE}$) controls the writing/reading operation of the memory. When the chip select and write lines are LOW, the information on the four data inputs, D_0 to D_3, is written into the addressed memory word. During the write cycle, the outputs are active and invert the four data inputs, D_0 to D_3.

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 four inverting outputs $\overline{O_0}$ to $\overline{O_3}$.

When the chip select line is HIGH, the four outputs of the memory go to an inactive high-impedance state.

BLOCK DIAGRAM



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MODE SELECT TABLE

Input		Data Output Status $\overline{O_0} - \overline{O_3}$	Mode
$\overline{CS}$	$\overline{WE}$		
L	L	Data In (Inverted)	Write
L	H	Selected Word (Inverted)	Read
H	X	Output Disabled	Deselect

H = HIGH L = LOW X = Don't Care

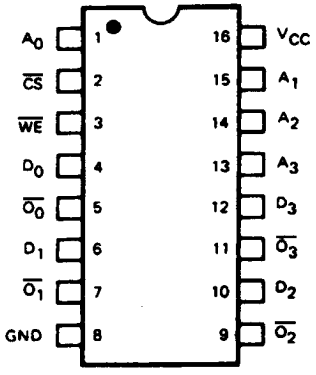
PRODUCT SELECTOR GUIDE

Open Collector (Write Transparent)	Am31L01A	Am31L01A	Am31L01	Am31L01
Access Time	55 ns	65 ns	80 ns	90 ns
I_{CC}	35 mA	38 mA	35 mA	38 mA
Temperature Range	C	M	C	M

Publication # 08063 Rev. A Amendment /0
Issue Date: May 1986

CONNECTION DIAGRAMS
Top View

DIPs*



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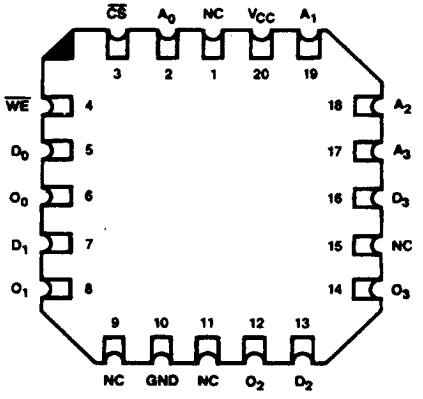

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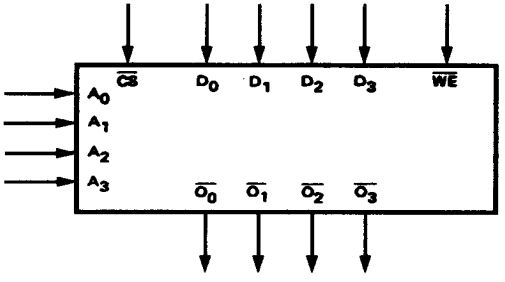
*Also available in 16-Pin Flatpack. Connections identical to DIPs.

Note: Pin 1 is marked for orientation.

LOGIC SYMBOL



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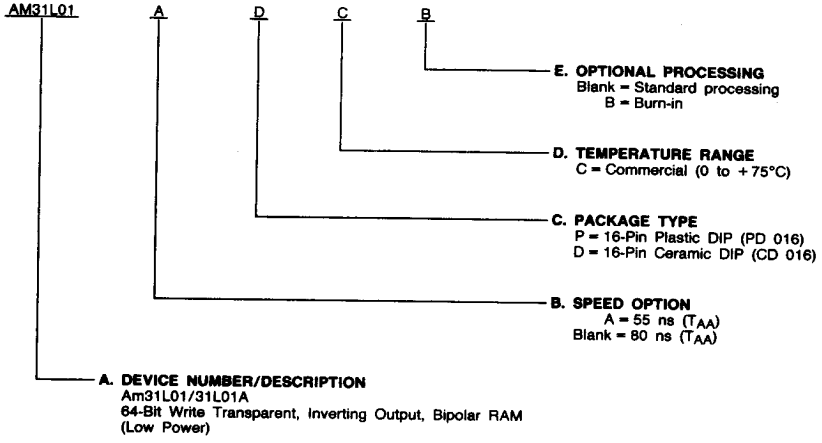
ORDERING INFORMATION

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	
AM31L01	PC, PCB, DC, DCB
AM31L01A	

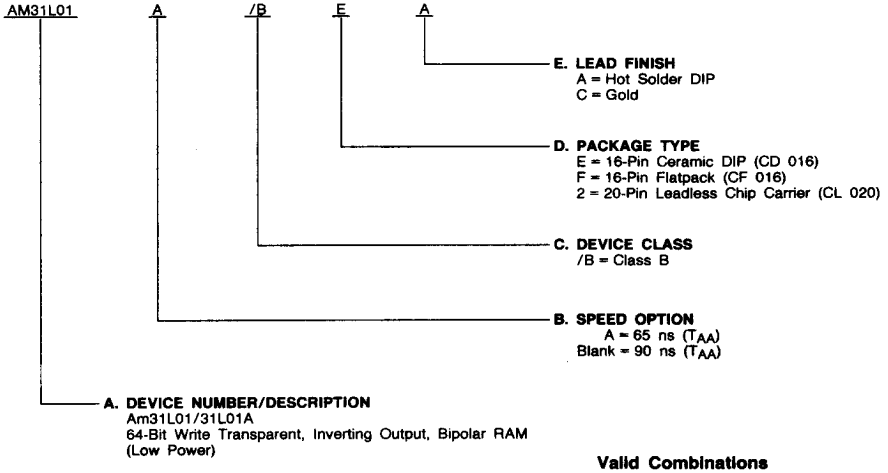
Valid Combinations

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.

ORDERING INFORMATION

APL Products

AMD products for Aerospace and Defense applications are available in several packages and operating ranges. APL (Approved Products List) products are fully compliant with MIL-STD-883C requirements. CPL (Controlled Products List) products are processed in accordance with MIL-STD-883C, but are inherently non-compliant because of package, solderability, or surface treatment exceptions to those specifications. The order number (Valid Combination) for APL products is formed by a combination of: **A. Device Number**
B. Speed Option (if applicable)
C. Device Class
D. Package Type
E. Lead Finish



Valid Combinations	
AM31L01	/BEA, /BFA, /B2C
AM31L01A	

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 or to check for newly released valid combinations.

ABSOLUTE MAXIMUM RATINGS

Storage Temperature ..... −65 to +150°C
Ambient Temperature with
Power Applied ..... −55 to +125°C
Supply Voltage to Ground Potential
(Pin 18 to Pin 8) ..... −0.5 V to +7.0 V
DC Voltage Applied to Outputs
for High Output State ..... −0.5 V to V_{CC} Max.
DC Input Voltage ..... −0.5 V to +5.5 V
Output Current, into Outputs ..... 20 mA
DC Input Current ..... −30 mA to +5.0 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 (Note 3)

Commercial (C) Devices
Temperature ..... 0 to +75°C
Supply Voltage ..... +4.75 V to +5.25 V

Military (M) Devices
Temperature ..... −55 to +125°C
Supply Voltage ..... +4.5 V to +5.5 V

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

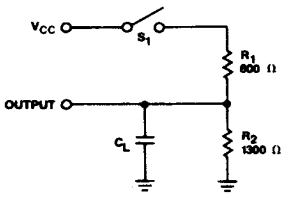
DC CHARACTERISTICS over operating range unless otherwise specified*

Parameter Symbol	Parameter Description	Test Conditions			Am31L01/31L01A Min.	Typ.	Max.	Units
V_{OL}	Output LOW Voltage	V_{CC} = Min., V_{IN} = V_{IH} or V_{IL}	I_{OL} = 8 mA			280	450	mV
			I_{OL} = mA			310	500	
V_{IH}	Input HIGH Level	Guaranteed Input Logical HIGH Voltage for all Inputs (Note 2)		COM'L	2.0			Volts
				MIL.	2.1			
V_{IL}	Input LOW Level	Guaranteed Input Logical LOW Voltage for all Inputs (Note 2)		COM'L.			0.8	
				MIL.			0.8	
I_{IL}	Input LOW Current	V_{CC} = Max., V_{IN} = 0.40 V	$\overline{WE}$, $D_0 - D_3$, $A_0 - A_3$			−30	−250	μA
			$\overline{CS}$			−30	−250	
I_{IH}	Input HIGH Current	V_{CC} = Max., V_{IN} = 2.7 V				0	10	μA
I_{CC}	Power Supply Current	All inputs = GND V_{CC} = Max.		COM'L		25	35	mA
				MIL.		25	38	
V_{CL}	Input Clamp Voltage	V_{CC} = Min., I_{IN} = −18 mA				−0.85	−1.2	Volts
I_{CEX}	Output Leakage Current	$\overline{CS}$ = V_{IH} or $\overline{WE}$ = V_{IL} V_{OUT} = 2.4 V, V_{CC} = Max.				0	40	μA

Notes: 1. Typical limits are at V_{CC} = 5.0 V and T_A = 25°C.
2. 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.
3. Operating specification with adequate time for temperature stabilization and transverse air flow exceeding 400 linear feet per minute. Conformance testing performed instantaneously where T_A = T_C = T_J.
$\theta_{JA} \approx 50$ °/w (with moving air) for Ceramic DIP.
$\theta_{JC} \approx 10–17$ °/w for Flatpack and Leadless Chip Carrier.

*See the last page of this spec for Group A Subgroup Testing information.

SWITCHING TEST CIRCUIT



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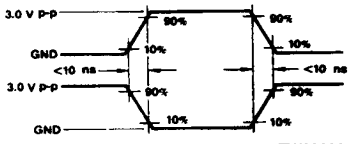
SWITCHING TEST WAVEFORM



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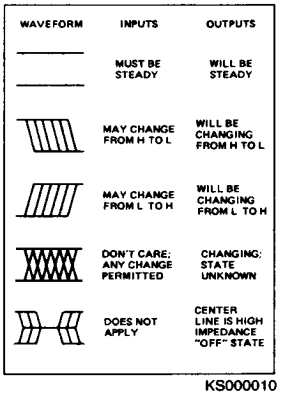
KEY TO SWITCHING WAVEFORMS



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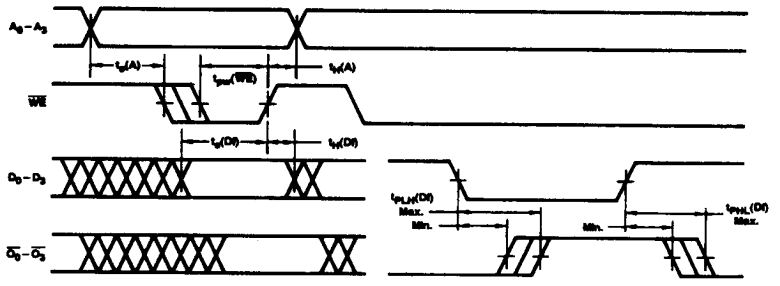
SWITCHING CHARACTERISTICS over operating range unless otherwise specified*

No.	Parameter Symbol	Parameter Description	Am31L01A C Devices Min.	Am31L01A C Devices Max.	Am31L01A M Devices Min.	Am31L01A M Devices Max.	AM31L01 C Devices Min.	AM31L01 C Devices Max.	AM31L01 M Devices Min.	AM31L01 M Devices Max.	Units
1	$t_{PLH}(A)$	Delay from Address to Output		55		65		80		90	ns
2	$t_{PHL}(A)$										
3	$t_{PZL}(\overline{CS})$	Delay from Chip Select (LOW) to Active Output and Correct Data		30		35		60		70	ns
4	$t_{PZL}(\overline{WE})$	Delay from Write Enable (HIGH) to Active Output and Correct Data (Write Recovery - See Note 1)		30		35		80		100	ns
5	$t_s(A)$	Setup Time Address (Prior to Initiation of Write)	0		0		0		0		ns
6	$t_h(A)$	Hold Time Address (After Termination of Write)	0		0		0		0		ns
7	$t_s(DI)$	Setup Time Data Input (Prior to Termination of Write)	45		55		60		80		ns
8	$t_h(DI)$	Hold Time Data Input (After Termination of Write)	0		0		0		0		ns
9	$t_{pw}(\overline{WE})$	Min. Write Enable Pulse Width to Insure Write	45		55		60		80		ns
10	$t_{PLZ}(\overline{CS})$	Delay from Chip Select (HIGH) to Inactive Output (Hi-Z)		30		35		50		60	ns
11	$t_{PLH}(DI)$	Delay from Data Input to Correct Data Output ($\overline{WE} = \overline{CS} = V_{IL}$)		55		65		80		90	ns
12	$t_{PHL}(DI)$										

Notes: 1. Output is preconditioned to data in (inverted) during write to insure correct data is present on all outputs during write and after write is terminated. (No write recovery glitch).
2. $t_{PLH}(A)$ and $t_{PHL}(A)$ are tested with S_1 closed and $C_L = 30$ pF with both input and output timing referenced to 1.5 V.
3. All delays from Write Enable ($\overline{WE}$) or Chip Select ($\overline{CS}$) inputs to the Data Output (D_{OUT}), t_{PLZ} ($\overline{WE}$), t_{PLZ} ($\overline{CS}$), t_{PZL} ($\overline{WE}$) and $t_{PZL}(\overline{CS})$ are measured with S_1 closed and $C_L = 30$ pF and with both the input and output timing referenced to 1.5 V.

*See the last page of this spec for Group A Subgroup Testing information.

SWITCHING WAVEFORMS



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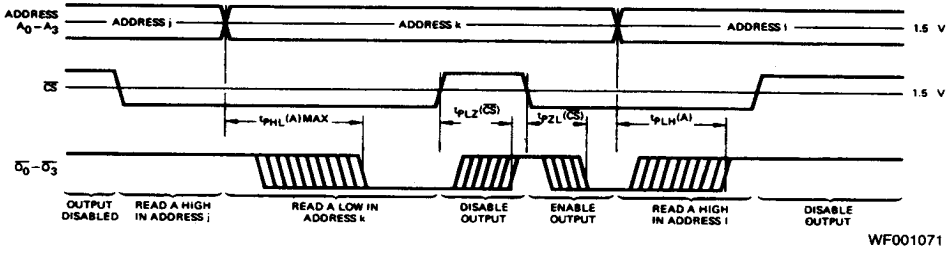
Write Mode

Write Cycle Timing. The cycle is initiated by an address change. After $t_s(A)$ Min., the write enable may begin. The chip select must also be LOW for writing. Following the write pulse, $t_h(A)$ Min. must be allowed before the address may be changed again. The output will be the complement of the data input while the write enable ($\overline{WE}$) is LOW.



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Read Mode

Switching delays from address and chip select inputs to the data output.

GROUP A SUBGROUP TESTING

DC CHARACTERISTICS

Parameter Symbol	Subgroups
V_{OL}	1, 2, 3
V_{IH}	1, 2, 3
V_{IL}	1, 2, 3
I_{IL}	1, 2, 3
I_{IH}	1, 2, 3
I_{CC}	1, 2, 3
V_{CL}	1, 2, 3
I_{CEX}	1, 2, 3

SWITCHING CHARACTERISTICS

No.	Parameter Symbol	Subgroups
1	t_{PLH}(A)	9, 10, 11
2	t_{PHL}(A)	9, 10, 11
3	$t_{PZL}(\overline{CS})$	9, 10, 11
4	$t_{PZL}(\overline{WE})$	9, 10, 11
5	t_s(A)	9, 10, 11
6	t_h(A)	9, 10, 11
7	t_s(DI)	9, 10, 11
8	t_h(DI)	9, 10, 11
9	$t_{pw}(\overline{WE})$	9, 10, 11
10	$t_{PLZ}(\overline{CS})$	9, 10, 11
11	t_{PLH}(DI)	9, 10, 11
12	t_{PHL}(DI)	9, 10, 11

MILITARY BURN-IN

Military burn-in is in accordance with the current revision of MIL-STD-883, Test Method 1015, Conditions A through E. Test conditions are selected at AMD's option.