

## AM27S02, AM27S03

### 64-Bit Inverting-Output Bipolar RAM

The AM27S02 and AM27S03 are 64-bit RAMs built using Schottky diode clamped transistors in conjunction with internal ECL circuitry and are 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 (AM27S02) or three-state outputs (AM27S03). Chip selection for large memory systems can be controlled by active-LOW output decoders such as the AM74S138.

#### Rochester Electronics Manufactured Components

Rochester branded components are manufactured using either die/wafers purchased from the original suppliers or Rochester wafers recreated from the original IP. All recreations are done with the approval of the OCM.

Parts are tested using original factory test programs or Rochester developed test solutions to guarantee product meets or exceeds the OCM data sheet.

#### Quality Overview

- ISO-9001
- AS9120 certification
- Qualified Manufacturers List (QML) MIL-PRF-38535
  - Class Q Military
  - Class V Space Level
- Qualified Suppliers List of Distributors (QSLD)
  - Rochester is a critical supplier to DLA and meets all industry and DLA standards.

Rochester Electronics, LLC is committed to supplying products that satisfy customer expectations for quality and are equal to those originally supplied by industry manufacturers.

*The original manufacturer's datasheet accompanying this document reflects the performance and specifications of the Rochester manufactured version of this device. Rochester Electronics guarantees the performance of its semiconductor products to the original OEM specifications. 'Typical' values are for reference purposes only. Certain minimum or maximum ratings may be based on product characterization, design, simulation, or sample testing.*

# Am27S02/Am27S03

64-Bit Inverting-Output Bipolar RAM



Am27S02/Am27S03

Advanced Micro Devices

## DISTINCTIVE CHARACTERISTICS

- Fully decoded 16 word x 4-bit low-power Schottky RAMS
- Ultra-Fast Version: Address access time 25 ns
- Internal ECL circuitry for optimum speed/power performance over voltage and temperature
- Output preconditioned during write to eliminate write recovery glitch
- Available with open-collector outputs (Am27S02) or with three-state outputs (Am27S03)
- Pin-compatible replacements for 3101A, 74S289, (use Am27S02); for 74S189, (use Am27S03)

## GENERAL DESCRIPTION

The Am27S02 and Am27S03 are 64-bit RAMs built using Schottky diode clamped transistors in conjunction with internal ECL circuitry and are 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 (CS) input and open-collector OR-tieable outputs (Am27S02) or three-state outputs (Am27S03). Chip selection for large memory systems can be controlled by active-LOW output decoders such as the Am74S138.

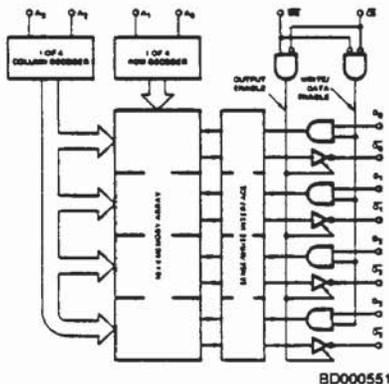
An active-LOW Write line ( $\overline{WE}$ ) controls the writing/reading operation of the memory. When the chip select and write

lines are LOW the information on the four data inputs  $D_0$  to  $D_3$  is written into the addressed memory word and preconditions the output circuitry so that correct data is present at the outputs when the write cycle is complete. This preconditioning operation ensures 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 four inverting outputs  $\overline{O}_0$  to  $\overline{O}_3$ .

During the writing operation or when the chip select line is HIGH the four outputs of the memory go to an inactive high impedance state.

## BLOCK DIAGRAM



## MODE SELECT TABLE

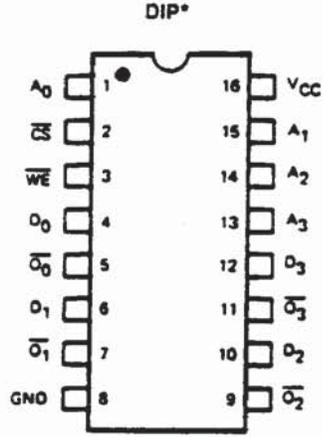
Input		Data Output Status $\overline{O}_0 - \overline{O}_3$	Mode
CS	WE		
L	L	Output Disabled	Write
L	H	Selected Word (Inverted)	Read
H	X	Output Disabled	Deselect

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

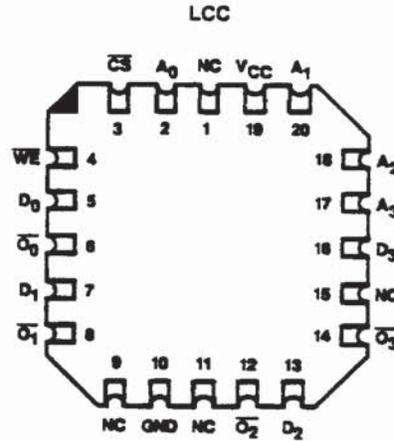
## PRODUCT SELECTOR GUIDE

Access Time	25 ns	30 ns	35 ns	50 ns
I <sub>CC</sub>	70 mA	70 mA	70 mA	70 mA
Temperature Range	C	M	C	M
Open Collector	Am27S02A	Am27S02A	Am27S02	Am27S02
Three State	Am27S03A	Am27S03A	Am27S03	Am27S03

**CONNECTION DIAGRAMS**  
Top View



CD000831

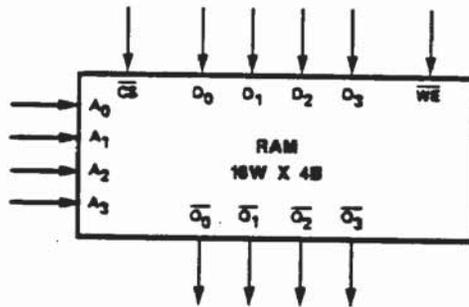


CD000891

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

Note: Pin 1 is marked for orientation.

**LOGIC SYMBOL**



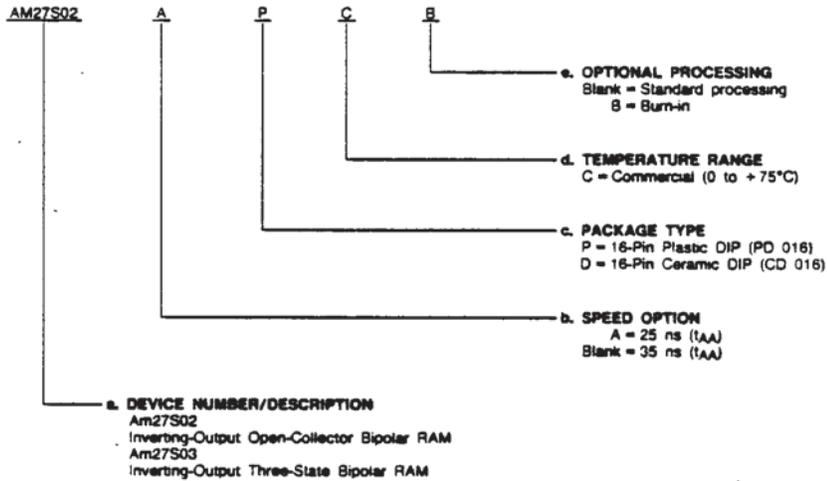
LS000212

**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	
AM27S02	
AM27S02A	PC, PCB.
AM27S03	DC, DCB
AM27S0A	

**Valid Combinations**

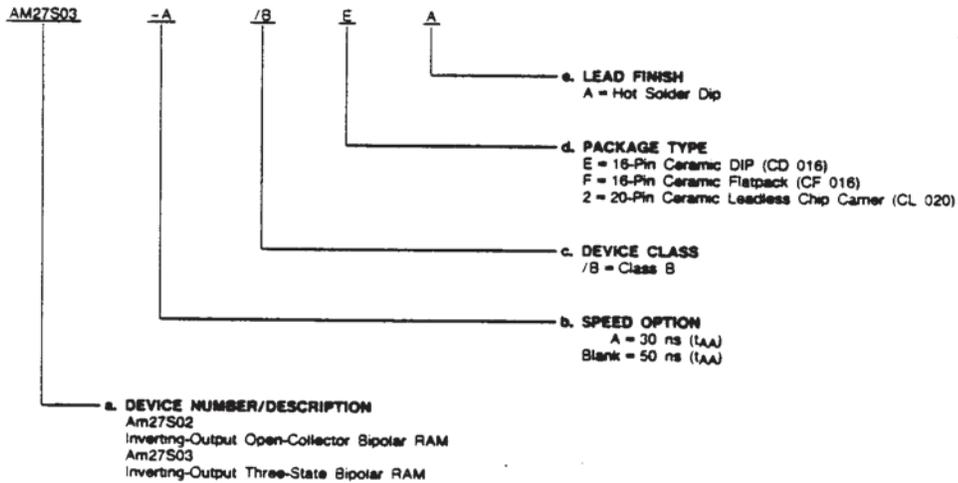
Valid Combinations list configurations planned to be supported in volume for this device. Consult the local AMD sales office to confirm availability of specific valid combinations, to check on newly released combinations, and to obtain additional data on AMD's standard military grade products.

**MILITARY 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. 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**

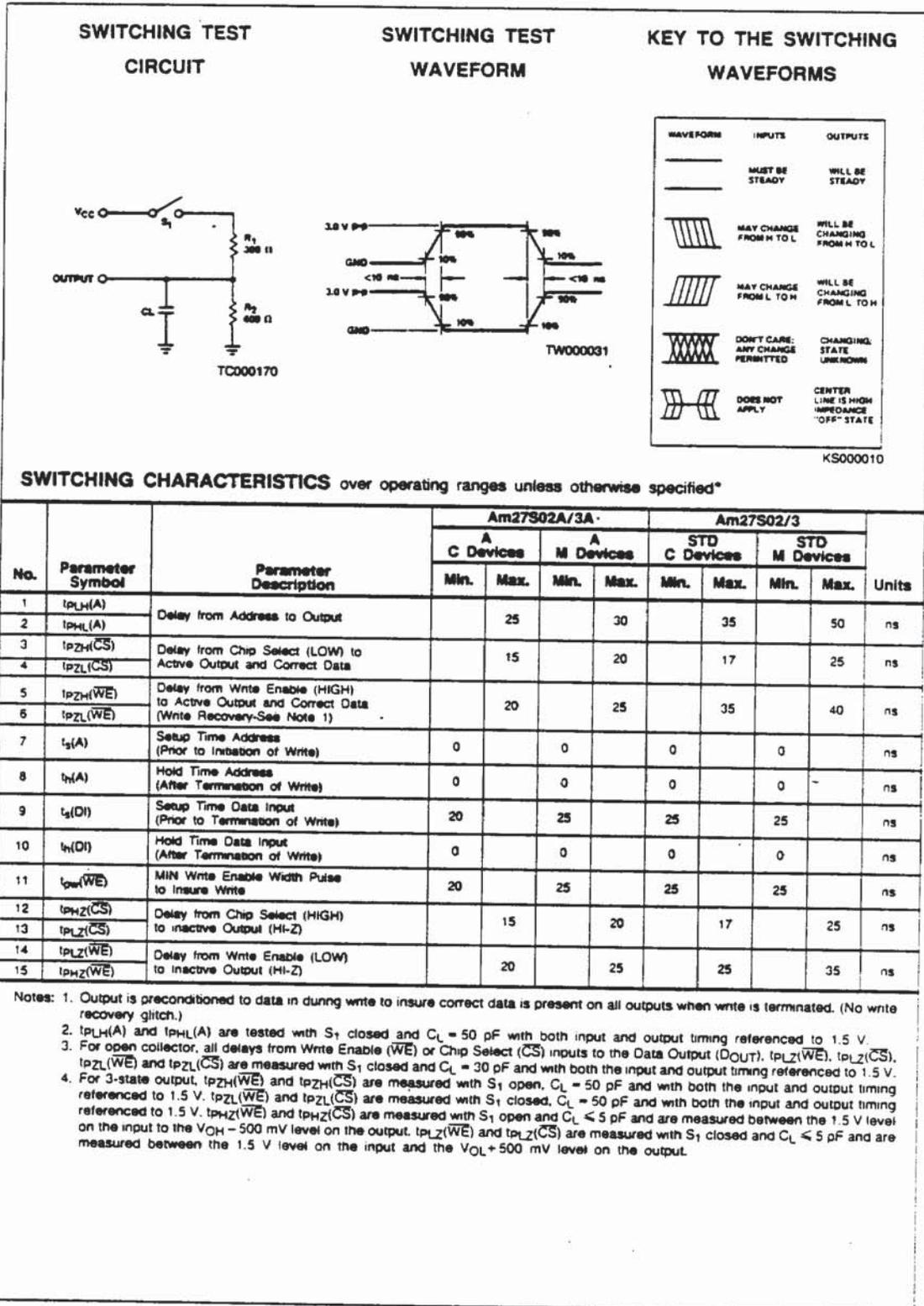
Valid Combinations list configurations planned to be supported in volume for this device. Consult the local AMD sales office to confirm availability of specific valid combinations or to check for newly released valid combinations.

Valid Combinations	
AM27S02	/BEA, /BFA, /B2A
AM27S02A	
AM27S03	
AM27S03A	

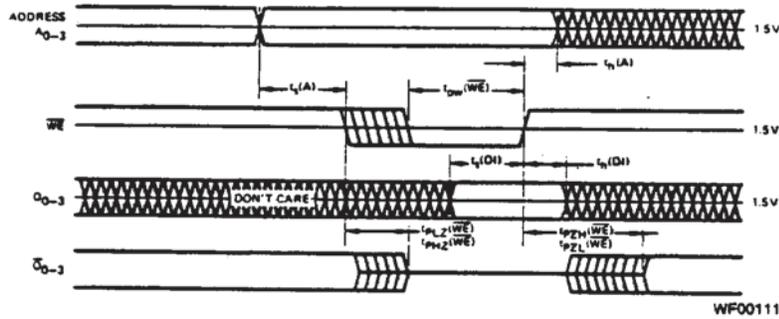
**Group A Tests**

Group A tests consist of Subgroups 1, 2, 3, 9, 10, 11.

ABSOLUTE MAXIMUM RATINGS				OPERATING RANGES				
Storage Temperature .....	-65 to +150°C	Commercial (C) Devices						
Ambient Temperature with		Temperature .....	0 to +75°C					
Power Applied .....	-55 to +125°C	Supply Voltage .....	+4.75 V to +5.25 V					
Supply Voltage .....	-0.5 V to +7.0 V	Military* (M) Devices						
DC Voltage Applied to Outputs .....	-0.5 V to +V <sub>CC</sub> Max.	Temperature .....	-55 to +125°C					
DC Input Voltage .....	-0.5 V to +5.5 V	Supply Voltage .....	+4.5 V to +5.5 V					
Output Current into Outputs .....	20 mA	<i>Operating ranges define those limits between which the functionality of the device is guaranteed.</i>						
DC Input Current .....	-30 mA to +5 mA	*Military products 100% tested at T <sub>C</sub> = +25°C, +125°C, and -55°C.						
<i>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.</i>				(see note 5)				
<b>DC CHARACTERISTICS</b> over operating ranges unless otherwise specified (for APL Products, Group A, Subgroups 1, 2, 3 are tested unless otherwise noted)								
Parameter Symbol	Parameter Description	Test Conditions	Am27S02/Am27S03			Unit		
			Min.	Typ.	Max.			
V <sub>OH</sub> (Note 2)	Output HIGH Voltage	V <sub>CC</sub> = Min., V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OH</sub> = -5.2 mA I <sub>OH</sub> = -2.0 mA	COM'L MIL	2.4	3.0		V
V <sub>OL</sub>	Output LOW Voltage	V <sub>CC</sub> = Min., V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OL</sub> = 18 mA I <sub>OL</sub> = 20 mA			350 -390	450 500	mV
V <sub>IH</sub>	Input HIGH Level	Guaranteed Input Logical HIGH Voltage for All Inputs (Note 3)			2.0			V
V <sub>IL</sub>	Input LOW Level	Guaranteed Input Logical LOW Voltage for All Inputs (Note 3)					0.8	V
I <sub>IL</sub>	Input LOW Current	V <sub>CC</sub> = Max., V <sub>IN</sub> = 0.40 V	WE, D <sub>0</sub> -D <sub>3</sub> , A <sub>0</sub> -A <sub>3</sub> CS			-15 -30	-250 -250	μA
I <sub>IH</sub>	Input HIGH Current	V <sub>CC</sub> = Max., V <sub>IN</sub> = 2.7 V				0	10	μA
I <sub>SC</sub> (Note 2)	Output Short Circuit Current	V <sub>CC</sub> = Max., V <sub>OUT</sub> = 0.0 V (Note 4)			-20	-45	-90	mA
I <sub>CC</sub>	Power Supply Current	All Inputs = GND Outputs = Open V <sub>CC</sub> = Max.				50	70	mA
V <sub>CL</sub>	Input Clamp Voltage	V <sub>CC</sub> = Min., I <sub>IN</sub> = -18 mA				-0.85	-1.2	V
I <sub>CEX</sub>	Output Leakage Current	V <sub>CS</sub> = V <sub>IH</sub> or V <sub>WE</sub> = V <sub>IL</sub> V <sub>OUT</sub> = 2.4 V, V <sub>CC</sub> = Max.				0	40	μA
		V <sub>CS</sub> = V <sub>IH</sub> or V <sub>WE</sub> = V <sub>IL</sub> V <sub>OUT</sub> = 0.4 V, V <sub>CC</sub> = Max.	(Note 2)		-40	0		μA
Notes: 1. Typical limits are at V <sub>CC</sub> = 5.0 V and T <sub>A</sub> = 25°C. 2. This applies to three-state devices only. 3. 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. 4. Not more than one output should be shorted at a time. Duration of the short circuit should not be more than one second. 5. Operating specifications with adequate time for temperature stabilization and transverse air flow exceeding 400 linear feet per minute. Conformance testing performance instantaneously where T <sub>A</sub> = T <sub>C</sub> = T <sub>J</sub> . θ <sub>JA</sub> ≈ 50 °C/W (with moving air) for Ceramic DIP. θ <sub>JA</sub> ≈ 10-17°C/W for flatpack and leadless chip carrier.								

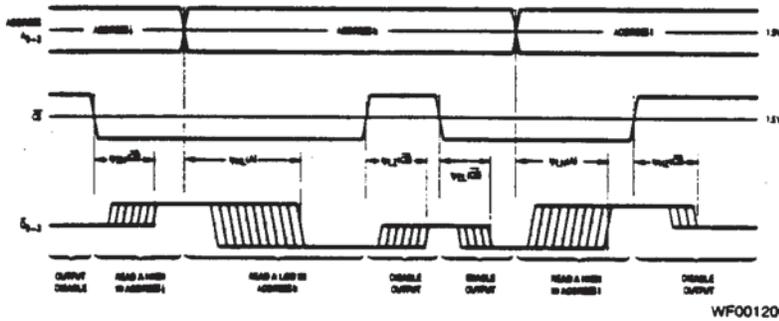


**SWITCHING WAVEFORMS**



**Write Mode**

Write Cycle Timing. The cycle is initiated by an address change. After  $t_1(A)$ min, the write enable may begin. The chip select must also be LOW for writing. Following the write pulse,  $t_1(A)$ min must be allowed before the address may be changed again. The output will be inactive (floating for the Am27S03) while the write enable is (WE) LOW.



**Read Mode**

Switching delays from address and chip select inputs to the data output. For the Am27S03 disabled output is "OFF", represented by a single center line. For the Am27S02, a disabled output is HIGH.