Am27S29/Am27S29A/Am27S29SA

4,096-Bit (512x8) Bipolar PROM

Advanced Micro Devices

DISTINCTIVE CHARACTERISTICS

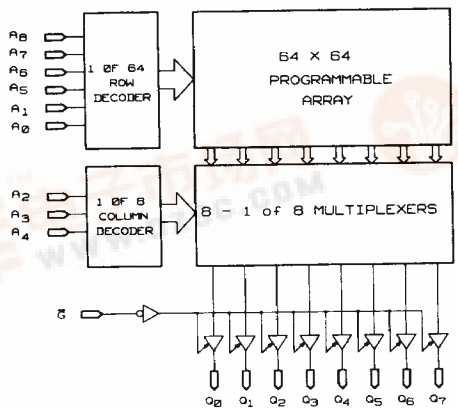
- High Speed
- Highly reliable, ultra-fast programming Platinum-Silicide fuses
- High programming yield
- Low-current PNP inputs
- High-current open-collector and three-state outputs
- Fast chip select

GENERAL DESCRIPTION

The Am27S29 (512-words by 8-bits) is a Schottky TTL Programmable Read-Only Memory (PROM).

This device has three-state outputs, compatible with low-power Schottky bus standards capable of satisfying the requirements of a variety of microprogrammable controls, mapping functions, code conversion, or logic replacement. Easy word depth expansion is facilitated by an active LOW ($\overline{G}$) output enable.

FUNCTIONAL BLOCK DIAGRAM



BD006182

PRODUCT SELECTOR GUIDE

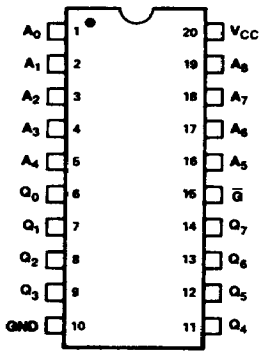
Three-State Part Number	Am27S29SA		Am27S29A		Am27S29	
Address Access Time	30 ns	40 ns	35 ns	45 ns	55 ns	70 ns
Operating Range	C	M	C	M	C	M

Publication # 03328 Rev. D Amendment /0
Issue Date: January 1989

CONNECTION DIAGRAMS

Top View

DIPs*



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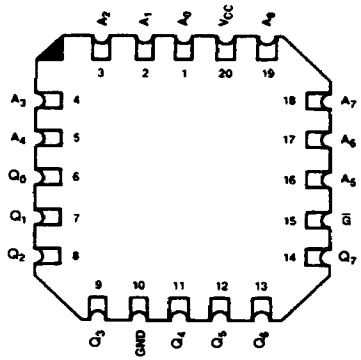
LCC**



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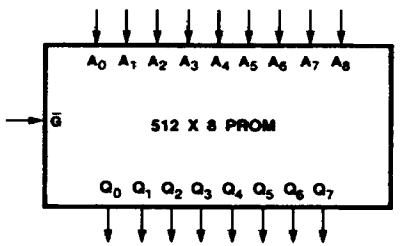
*Also available in a 20-pin Flatpack. Pinout identical to DIPs.
**Also available in a 20-pin PLCC. Pinout identical to LCC.

Note: Pin 1 is marked for orientation.

LOGIC SYMBOL



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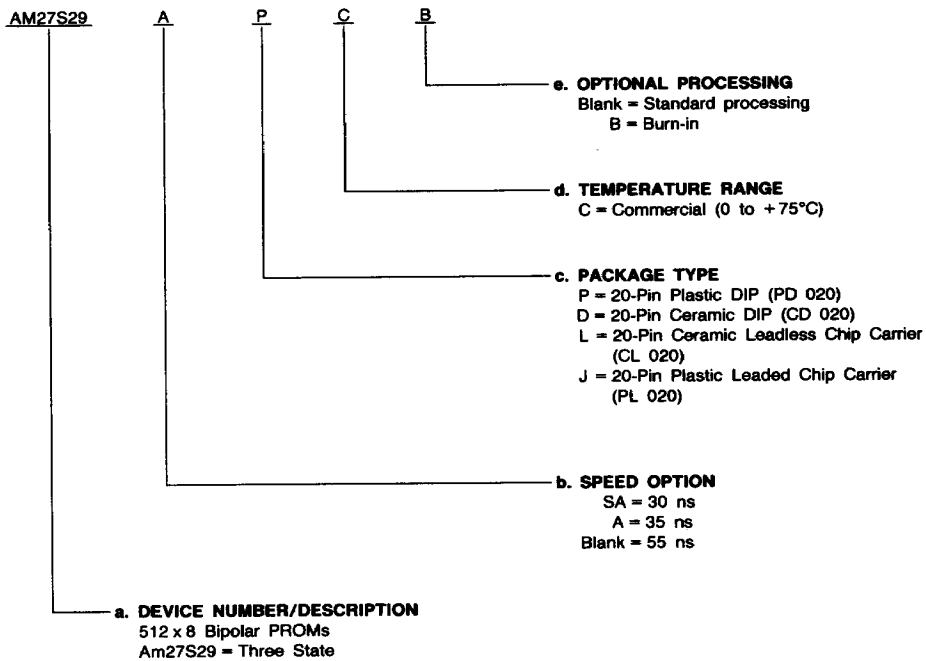
ORDERING INFORMATION

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	
AM27S29	PC, PCB, DC, DCB, LC, LCB, JC, JCB
AM27S29A	
AM27S29SA	

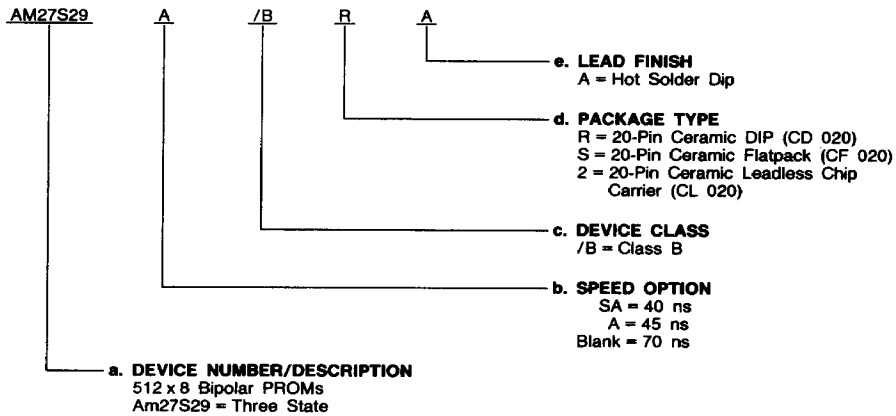
Valid Combinations

Valid Combinations list configurations planned to be supported in volume for this device. Consult the local AMD sales office to confirm availability of specific combinations, to check on newly released valid 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	
AM27S29	/BRA, /BSA, /B2A
AM27S29A	
AM27S29SA	

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.

Group A Tests

Group A Tests consist of Subgroups 1, 2, 3, 7, 8, 9, 10, 11.

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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.

PIN DESCRIPTION

$A_0 - A_8$ Address (Inputs)
The 9-bit field presented at the address inputs selects one of 512 memory locations to be read from.

$Q_0 - Q_7$ Data Output Port
The outputs whose state represents the data read from the selected memory locations.

$\overline{G}$ Output Enable (Input)
Provides direct control of the Q-output buffers. Outputs disabled forces all three-state outputs to a floating or high-impedance state.

Enable = $\overline{G}$

Disable = G

V_{CC} Device Power Supply Pin
The most positive of the logic power supply pins.

GND Device Power Supply Pin
The most negative of the logic power supply pins.

ABSOLUTE MAXIMUM RATINGS

Storage Temperature ..... −65 to +150°C
Ambient Temperature with
Power Applied ..... −55 to +125°C
Supply Voltage ..... −0.5 V to +7.0 V
DC Voltage Applied to Outputs
(Except During Programming) ..... −0.5 V to +V_{CC} Max.
DC Voltage Applied to Outputs
During Programming ..... 21 V
Output Current into Outputs During
Programming (Max. Duration of 1 sec) ..... 250 mA
DC Input Voltage ..... −0.5 V to +5.5 V
DC Input Current ..... −30 mA to +5 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
Ambient Temperature (T_A) ..... 0 to +75°C
Supply Voltage (V_{CC}) ..... +4.75 V to +5.25 V

Military (M) Devices*
Case Temperature (T_C) ..... −55 to +125°C
Supply Voltage (V_{CC}) ..... +4.5 V to +5.5 V

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

*Military product 100% tested at T_C = +25°C, +125°C, and −55°C.

DC CHARACTERISTICS 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			Min.	Typ.	Max.	Unit
V_{OH} (Note 1)	Output HIGH Voltage	V_{CC} = Min., I_{OH} = −2.0 mA V_{IN} = V_{IH} or V_{IL}			2.4			V
V_{OL}	Output LOW Voltage	V_{CC} = Min., I_{OL} = 16 mA V_{IN} = V_{IH} or V_{IL}					0.50	V
V_{IH}	Input HIGH Level	Guaranteed input logical HIGH voltage for all inputs (Note 2)			2.0			V
V_{IL}	Input LOW Level	Guaranteed input logical LOW voltage for all inputs (Note 2)					0.8	V
I_{IL}	Input LOW Current	V_{CC} = Max., V_{IN} = 0.45 V					−0.250	mA
I_{IH}	Input HIGH Current	V_{CC} = Max., V_{IN} = 2.7 V					25	μA
I_{SC} (Note 1)	Output Short-Circuit Current	V_{CC} = Max., V_{OUT} = 0.0 V (Note 3)			−20		−90	mA
I_{CC}	Power Supply Current	All inputs = GND V_{CC} = Max.					160	mA
V_I	Input Clamp Voltage	V_{CC} = Min., I_{IN} = −18 mA					−1.2	V
I_{CEX}	Output Leakage Current	V_{CC} = Max. $\overline{V_G}$ = 2.4 V	(Note 1)	V_O = V_{CC}			40	μA
				V_{OUT} = 0.4 V			−40	
C_{IN}	Input Capacitance	V_{IN} = 2.0 V @ f = 1 MHz (Note 4) V_{CC} = 5 V; T_A = 25°C				4		pF
C_{OUT}	Output Capacitance	V_{OUT} = 2.0 V @ f = 1 MHz (Note 4)V_{CC} = 5 V; T_A = 25°C				8		

Notes:
1. This applies to three-state devices only.
2. V_{IL} and V_{IH} are input conditions of output tests and are not themselves directly tested. V_{IL} and V_{IH} are absolute voltages with respect to device ground and include all overshoots due to system and/or tester noise. Do not attempt to test these values without suitable equipment.
3. Not more than one output should be shorted at a time. Duration of the short circuit should not be more than one second.
4. These parameters are not 100% tested, but are periodically evaluated at initial characterization and at any time the design is modified where capacitance may be affected.

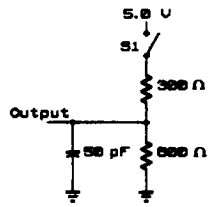
SWITCHING CHARACTERISTICS over operating ranges unless otherwise specified (for APL Products, Group A, Subgroups 9, 10, 11 are tested unless otherwise noted*)

No.	Parameter Symbol	Parameter Description	"SA" Version				"A" Version				Standard Version				Units
			COM'L		MIL		COM'L		MIL		COM'L		MIL		
			Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
1	TAVQV	Address Valid to Output Valid Access Time		30		40		35		45		55		70	ns
2	TGVQZ	Delay from Output Enable Valid to Output Hi-Z		20		25		20		25		25		30	ns
3	TGVQV	Delay from Output Enable Valid to Output Valid		20		25		20		25		25		30	ns

See also Switching Test Circuits.
Notes:
1. Tests are performed with input transition time of 5 ns or less, timing reference levels of 1.5 V, and input pulse levels of 0 to 3.0 V using test load in Figure A.
2. TGVQZ is measured at steady state HIGH output voltage −0.5 V and steady state LOW output voltage +0.5 V ouput levels using the test load in Figure B.

*Subgroups 7 and 8 apply to functional tests.

SWITCHING TEST CIRCUITS



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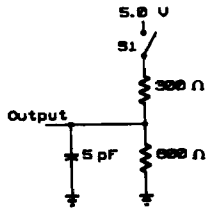
A. Output Load for all A–C tests except TGVQZ



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B. Output Load for TGVQZ

Notes: 1. All device test loads should be located within 2" of device output pin.
2. S_1 is open for Output Data HIGH to Hi-Z and Hi-Z to Output Data HIGH tests. S_1 is closed for all other AC tests.
3. Load capacitance includes all stray and fixture capacitance.

SWITCHING 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

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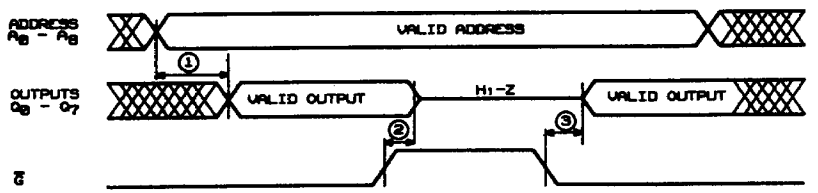

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