AM27S21

1,024-Bit (256x4) Bipolar PROM

The AM27S21 (256 words by 4-bits) is a Schottky TTL Programmable Read-Only Memory (PROM).

This device is only available in a three-state (AM27S21) output version. These outputs are compatible with low-power Schottky bus standards capable of satisfying the requirements of a variety of microprogrammable controls, mapping functions, code version, or logic replacement. Easy word-depth expansion is facilitated by active LOW ($\overline{G_1}$ and $\overline{G_2}$) output enables.

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.

Am27S21/27S21A

1,024-Bit (256x4) Bipolar PROM

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 Am27S21 (256 words by 4-bits) is a Schottky TTL Programmable Read-Only Memory (PROM).

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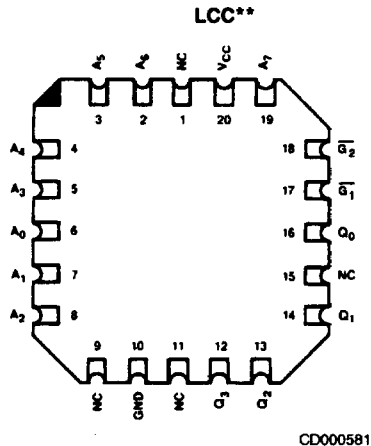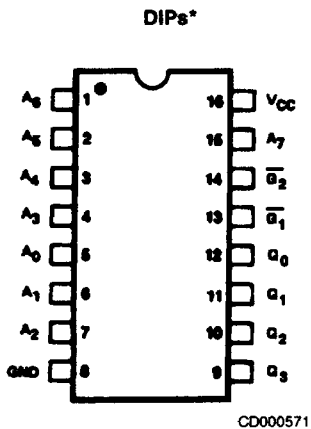
BLOCK DIAGRAM

BD006390
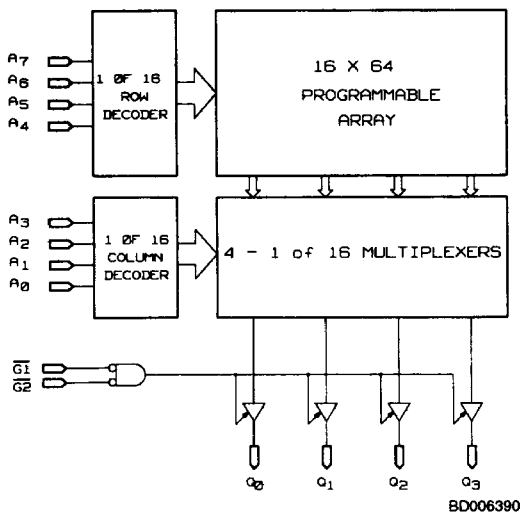
PRODUCT SELECTOR GUIDE

Three-State Part Number	Am27S21A		Am27S21	
Address Access Time	30 ns	40 ns	45 ns	60 ns
Operating Range	C	M	C	M

CONNECTION DIAGRAMS
Top View

DIPs*

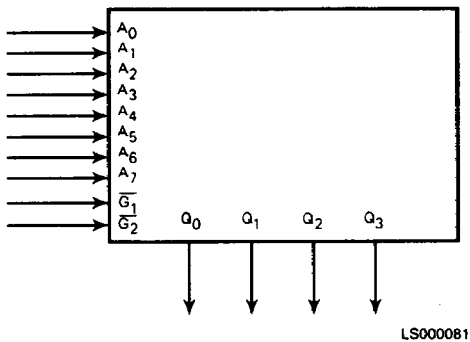|			
A₆	1	16	V_CC
A₅	2	15	A₇
A₄	3	14	G̅₂
A₃	4	13	G̅₁
A₀	5	12	Q₀
A₁	6	11	Q₁
A₂	7	10	Q₂
GND	8	9	Q₃

CD000571

LCC**

CD000581

*Also available in a 16-Pin Flatpack. Pinout identical to DIPs.
**Also available in a 20-Pin Square PLCC. Pinout identical to LCC.
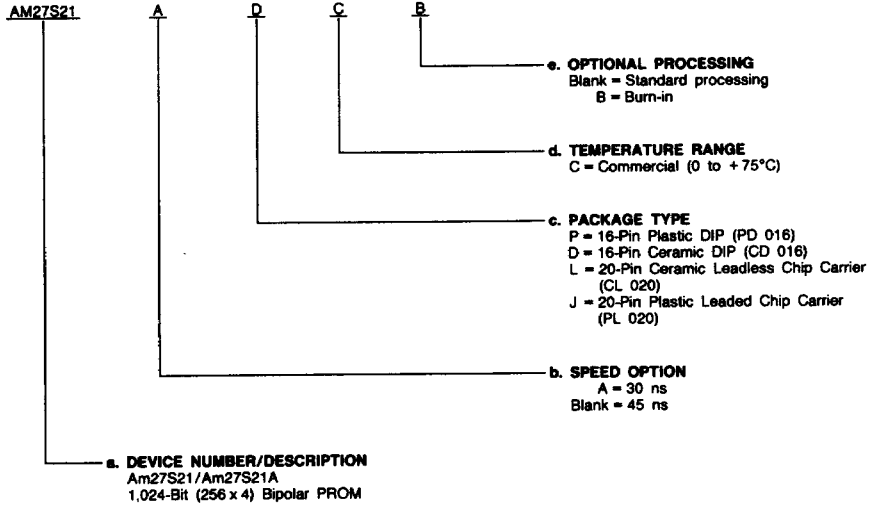
Note: Pin 1 is marked for orientation.

LOGIC SYMBOL

LS000081

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**

```
AM27S21     A     D     C     B
```

e. OPTIONAL PROCESSING
Blank = Standard processing
B = Burn-in

d. TEMPERATURE RANGE
C = Commercial (0 to +75°C)

c. PACKAGE TYPE
P = 16-Pin Plastic DIP (PD 016)
D = 16-Pin Ceramic DIP (CD 016)
L = 20-Pin Ceramic Leadless Chip Carrier (CL 020)
J = 20-Pin Plastic Leaded Chip Carrier (PL 020)

b. SPEED OPTION
A = 30 ns
Blank = 45 ns

a. DEVICE NUMBER/DESCRIPTION
Am27S21/Am27S21A
1,024-Bit (256 x 4) Bipolar PROM

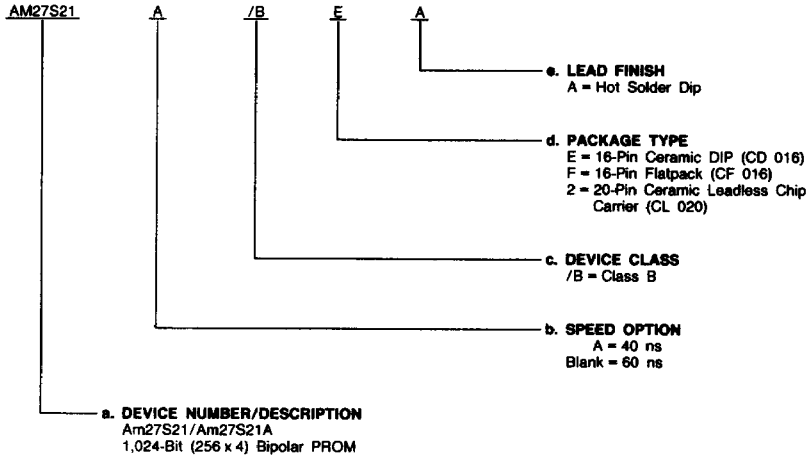| Valid Combinations	
AM27S21	DC, DCB, PC, PCB,
AM27S21A	LC, LCB, JC, JCB

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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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**

```
AM27S21        A        /B        E        A
```

e. LEAD FINISH
A = Hot Solder Dip

d. PACKAGE TYPE
E = 16-Pin Ceramic DIP (CD 016)
F = 16-Pin Flatpack (CF 016)
2 = 20-Pin Ceramic Leadless Chip Carrier (CL 020)

c. DEVICE CLASS
/B = Class B

b. SPEED OPTION
A = 40 ns
Blank = 60 ns

a. DEVICE NUMBER/DESCRIPTION
Am27S21/Am27S21A
1,024-Bit (256 x 4) Bipolar PROM

Valid Combinations	
AM27S21	/BEA, /BFA, /B2A
AM27S21A	

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.

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

A₀ – A₇   Address inputs (Inputs)

The 8-bit field presented at the address inputs selects one of 256 memory locations to be read from.

Q₀ – Q₃   Data Output Port (Outputs)

The output whose state represents the data read from the selected memory locations.

$\overline{G_1}$, $\overline{G_2}$ Output Enable

Provides direct control of the Q output buffers. Outputs disabled force all open-collector outputs to an OFF state and all three-state outputs to a floating or high-impedance state.

$$\text{Enable} = \overline{G_1} \cdot \overline{G_2}$$
$$\text{Disable} = \overline{\overline{G_1} \cdot \overline{G_2}}$$
$$= G_1 + G_2$$

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.

FUNCTIONAL DESCRIPTION

Applying The Am27S21

Typical application of the Am27S21 is shown below. The Am27S21 is employed as mapping ROMs in a microprogram computer control unit. The eight-bit macroinstruction from main memory is brought into the A₀ – A₇ inputs of the mapping ROM array. The instruction is mapped into a 12-bit address space with each PROM output supplying 4 bits. The 12 bits of address are then supplied to the "D" inputs of the Am2910 as a possible next address source for microprogram memory. The $\overline{MAP}$ output of the Am2910 is connected to the $\overline{G_1}$ input of the Am27S21 such that when the $\overline{G_1}$ input is HIGH, the outputs of the PROMs are in the three-state mode in the case of the Am27S21. The $\overline{G_2}$ input is grounded; thus data from other sources are free to drive the D inputs of the Am2910 when $\overline{MAP}$ is HIGH.
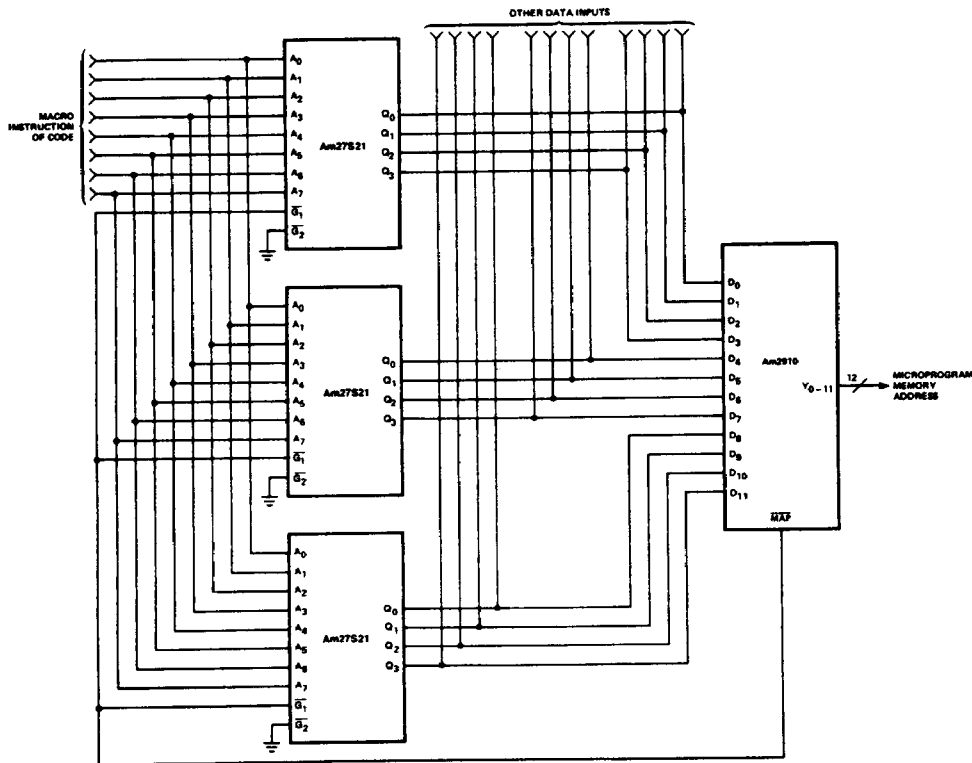
AF000232

Figure 1. Microprogramming Instruction Mapping

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}				0.45	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} = 0.0V (Note 3)		−20		−90	mA
I_{CC}	Power Supply Current	All inputs = GND, V_{CC} = Max.				130	mA
V_I	Input Clamp Voltage	V_{CC} = Min., I_{IN} = −18 mA				−1.2	V
I_{CEX}	Output Leakage Current	V_{CC} = Max., V_{G1} = 2.4 V	(Note 1)	V_O = V_{CC}			40	µA
				V_O = 0.4 V			−40	
C_{IN}	Input Capacitance	V_{CC} = 5.00 V., T_A = 25°C V_{IN}/V_{OUT} = 2.0 V. @ f = 1 MHz (Note 4)			4		pF
C_{OUT}	Output Capacitance				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 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	Am27S21A COM'L Min.	Am27S21A COM'L Max.	Am27S21A MIL Min.	Am27S21A MIL Max.	Am27S21 COM'L Min.	Am27S21 COM'L Max.	Am27S21 MIL Min.	Am27S21 MIL Max.	Unit
1	TAVQV	Address Valid to Output Valid Access Time		30		40		45		60	ns
2	TGVQZ	Delay from Output Enable Valid to Output Hi-Z		20		25		20		30	ns
3	TGVQV	Delay from Output Enable Valid to Output Valid		20		25		20		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 A under Switching Test Circuits.
2. TGVQZ is measured at steady state HIGH output voltage −0.5 V and steady state LOW output voltage + 0.5 V output levels using the test load in B under Switching Test Circuits.

*Subgroups 7 and 8 apply to functional tests.

## SWITCHING TEST CIRCUITS

TC003460
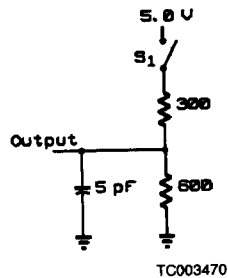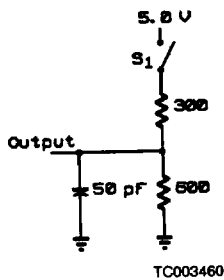
A. Output Load for all tests except TGVQZ

TC003470

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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