

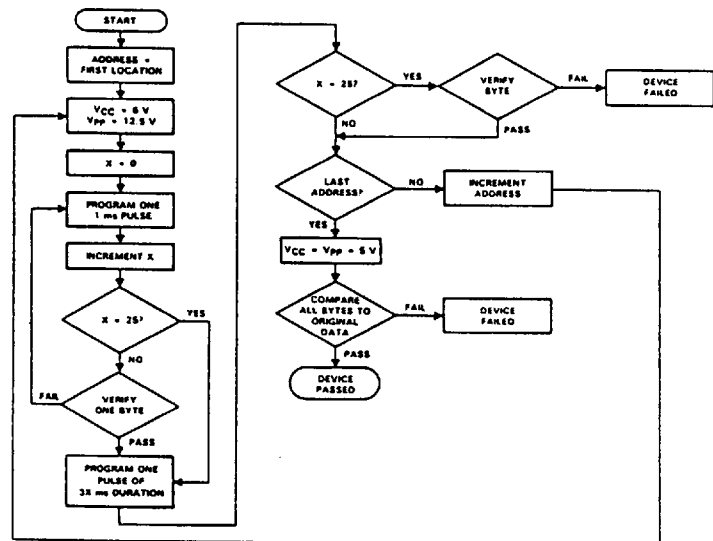
# 256kbit PROM - Radiation Hardened 27C256RP

32k x 8 PROM  
Memory Microcircuit

## For Space Applications

SEI's 27C256RP (RP for RAD-PAK®) memory microcircuit features a minimum 100 kilorad (Si) total dose tolerance. Using SEI's radiation hardened RAD-PAK® packaging technology, the 27C256RP is fully equivalent to the commercial SMJ27C256 from Texas Instruments and uses

HVCMOS technology for high speed and simple interface with MOS and bipolar circuits. This device operates from a single 5V supply in the read mode. As a result, it is ideal for use in microprocessor based systems. A 12.5V supply is needed for programming, but all programming signals are TTL level. For programming outside of the system, existing EPROM programmers may be used. Locations can be programmed singly, in blocks, or at random. Capable of surviving space environments, the 27C256RP is ideal for satellite, spacecraft, and space probe missions. The RAD-PAK® technology incorporates radiation shielding in the microcircuit package. It eliminates box shielding while providing lifetime in orbit. It has a 100 krad (Si) total dose survivability, mitigation of dose enhancement, and a high-rel die attachment. The 27C256RP features the same advanced 32k x 8 PROM architecture, high speed, and low power consumption as the military Texas Instruments counterpart. This device is offered as a one time programmable product.



SEI 27C256RP RADHARD 32K X 8 PROM MICROCIRCUIT



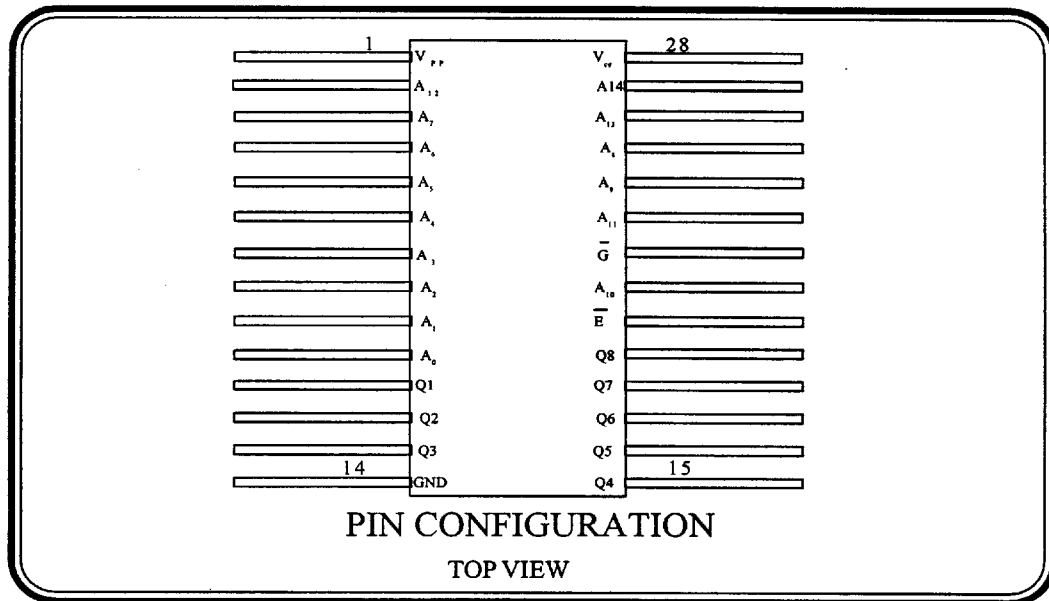
SPACE  
ELECTRONICS  
INCORPORATED

Tel: (619) 452-4167 Fax: (619) 452-5499  
INTERNET: 102005.1635@COMPUSERVE.COM

9011241 0000107 764

# Radiation Hardened 27C256RP

CMOS 32kx8 OTP PROM  
Memory Microcircuit



## Features:

- 32k x 8 Bit PROM Organization
  - One time programmable (OTP)
- Pin Compatible with Texas Instruments SMJ27C256
- RAD-PAK® Radiation Hardened Against Natural Space Radiation
  - Total Dose Hardness >100 krad (Si)
- Package:
  - 28 Pin RAD-PAK® flat pack (410 mils x 720 mils)
  - Weight - 5.2 grams
  - 28 Pin RAD-PAK® DIP (410 mils x 720 mils)
  - Weight - 5.2 grams
- Operating Temperature Range:
  - 55°C to 125°C
- JEDEC Approved Byte Wide Pinout
- High Speed:
  - 150, 170, 200, 250, 300 ns Maximum Access Times Available
- Advanced HVC MOS Technology
  - Single 5V Power Supply
  - 3-State Output Buffers
  - 400mV Guaranteed DC Noise Immunity with Standard TTL Loads
- Low Operating Power
  - 220 mW max Active
  - 1.7 mW max Standby

Specifications and design are subject to change without notice.



Sept. 1994

*For Further Information Contact:*

**Space Electronics Inc.**

4031 Sorrento Valley Blvd., San Diego, CA 92121

(619) 452-4167 Fax (619) 452-5499

INTERNET: 102005.1635@COMPUSERVE.COM

### 27C256RP Absolute Maximum Ratings

PARAMETER	SYMBOL	MIN	MAX	UNITS
Supply voltage range	$V_{CC}$	-0.6	7	V
Supply voltage range	$V_{PP}$	-0.6	14	V
Input voltage range All inputs except A9 A9		-0.6 -0.6	6.5 13.5	V V
Output voltage range		-0.6	$V_{CC}+1$	V
Normal operating temperature range		-55	+125	°C
Storage temperature range		-65	150	°C

### 27C256RP Recommended Operating Conditions

PARAMETER	SYMBOL	MIN	MAX	UNITS
Supply voltage	$V_{CC}$	4.5	5.5	V
Supply voltage <sup>1</sup>	$V_{PP}$	$V_{CC}-0.7$	$V_{CC}$	V
High-level input voltage TTL CMOS	$V_{IH}$	2 $V_{CC}-0.2$	$V_{CC}+1$ $V_{CC}+0.2$	V V
Low-level input voltage TTL CMOS	$V_{IL}$	-0.5 GND-0.2	0.8 GND+0.2	V V
Operating temperature range	$T_A$	-55	125	°C

**Note:**

1.  $V_{CC} = 6V$ ,  $V_{PP} = 12.5V$



**SPACE ELECTRONICS INC.**

4031 SORRENTO VALLEY BLVD.  
SAN DIEGO, CA 92121  
PHONE: (619) 452-4167  
FAX: (619) 452-5499  
INTERNET: 102005.1635@COMPUSERVE.COM

108

■ 9011241 0000109 537 ■

27C256RP DC Electrical Characteristics

PARAMETER	SYMBOL	MIN	MAX	UNITS
High-level output voltage $I_{OH} = -400 \mu A$	$V_{OH}$	2.4		V
Low-level output voltage $I_{OL} = 2.1 mA$	$V_{OL}$		0.4	V
Input current (leakage) $V_I = 0 V$ to $5.5 V$	$I_I$		$\pm 1$	$\mu A$
Output current (leakage) $V_O = 0 V$ to $V_{CC}$	$I_O$		$\pm 1$	$\mu A$
$V_{PP}$ supply current $V_{PP} = V_{CC} = 5.5 V$	$I_{PP1}$		100	$\mu A$
$V_{PP}$ supply current (during program pulse) $V_{PP} = 13 V$	$I_{PP2}$		50	mA
$V_{CC}$ supply current (standby) TTL-input level $V_{CC} = 5.5 V, E = V_{IH}$ CMOS-input level $V_{CC} = 5.5 V, E = V_{CC}$	$I_{CC1}$		500 300	$\mu A$
$V_{CC}$ supply current (active) $V_{CC} = 5.5 V, E = V_{IL}$ $t_{cycle}$ = minimum cycle time, outputs open	$I_{CC2}$		25	mA
Open short circuit	$I_{OS}$		100	mA



**SPACE ELECTRONICS INC.**

109

■ 9011241 0000110 259 ■

4031 SORRENTO VALLEY BLVD.  
SAN DIEGO, CA 92121  
PHONE: (619) 452-4167  
FAX: (619) 452-5499  
INTERNET: 102005.1635@COMPUSERVE.COM

**27C256RP Timing Requirements<sup>1</sup>**

PARAMETER	SYMBOL	MIN	MAX	UNITS
Initial program pulse duration	$t_{W(PGM)}$	0.95	1.05	ms
Final pulse duration	$t_{W(FPGM)}$	2.85	78.75	ms
Address setup time	$t_{su(A)}$	2		us
G <sub>A</sub> setup time	$t_{su(G)}$	2		us
Output disable time from G <sub>A</sub>	$t_{off}$	0	130	ns
Output enable time from G <sub>A</sub>	$t_{on(G)}$		150	ns
Data setup time	$t_{su(D)}$	2		us
V <sub>PP</sub> setup time	$t_{su(VPP)}$	2		us
V <sub>CC</sub> setup time	$t_{su(VCC)}$	2		us
Address hold time	$t_{h(A)}$	0		us
Data hold time	$t_{h(D)}$	2		us
E <sub>A</sub> setup time	$t_{su(E)}$	2		us

**NOTES:** 1.  $T_A = 25^\circ\text{C}$ ,  $V_{CC} = 6\text{V}$ ,  $V_{PP} = 12.5\text{V}$



**SPACE ELECTRONICS INC.**

4031 SORRENTO VALLEY BLVD.  
 SAN DIEGO, CA 92121  
 PHONE: (619) 452-4167  
 FAX: (619) 452-5499  
 INTERNET: 102005.1635@COMPUSERVE.COM

**27C256RP AC Electrical Performance**

PARAMETER	SYMBOL	MIN	MAX	UNITS
Access time from address 27C256-15 27C256-17 27C256-20 27C256-25 27C256-30	$t_{m(A)}$		150 170 200 250 300	ns
Access time from chip enable 27C256-15 27C256-17 27C256-20 27C256-25 27C256-30	$t_{m(E)}$		150 170 200 250 300	ns
Output enable time from $G\bar{A}$ 27C256-15 27C256-17 27C256-20 27C256-25 27C256-30	$t_{en(G)}$		70 70 75 100 120	ns
Output disable time from $G\bar{A}$ or $E\bar{A}$ , whichever occurs first 27C256-15 27C256-17 27C256-20 27C256-25 27C256-30	$t_{dis}$	0 0 0 0 0	55 55 60 60 105	ns
Output data valid time after change of address, $E\bar{A}$ , or $G\bar{A}$ , whichever occurs first 27C256-15 27C256-17 27C256-20 27C256-25 27C256-30	$t_{v(A)}$	0 0 0 0 0		ns
Input capacitance; $V_i = 0\text{ V}$ , $f = 1\text{ MHz}$	$C_i$		10	pF
Output capacitance; $V_o = 0\text{ V}$ , $f = 1\text{ MHz}$	$C_o$		14	pF

**27C256RP Package Ordering Guide**

Package Style	Case Outline	1/	Description
F	F-28		28 Pin Flat Package

Note:

1/ For outline information, see Appendix A (Package Information - Outline Dimension)



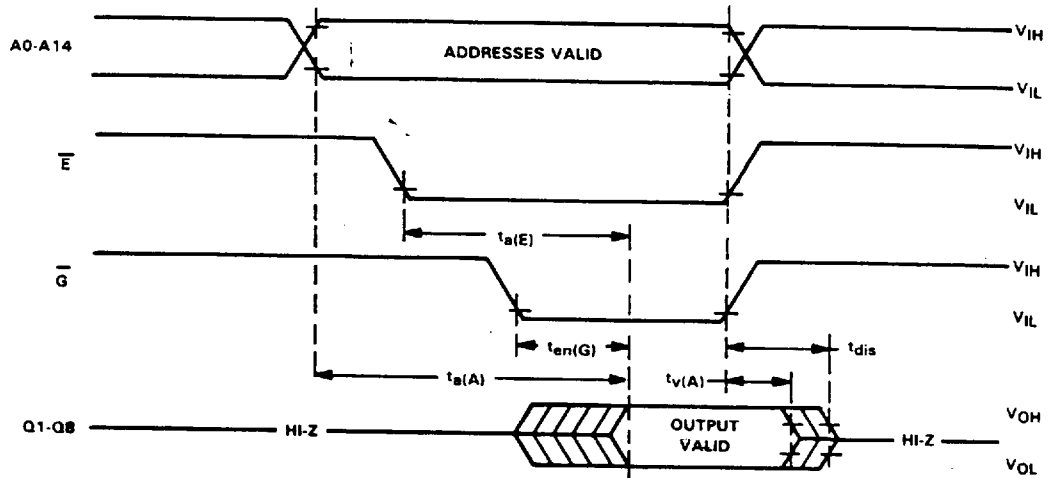
**SPACE ELECTRONICS INC.**

4031 SORRENTO VALLEY BLVD.  
SAN DIEGO, CA 92121  
PHONE: (619) 452-4167  
FAX: (619) 452-5499  
INTERNET: 102005.1635@COMPUSERVE.COM

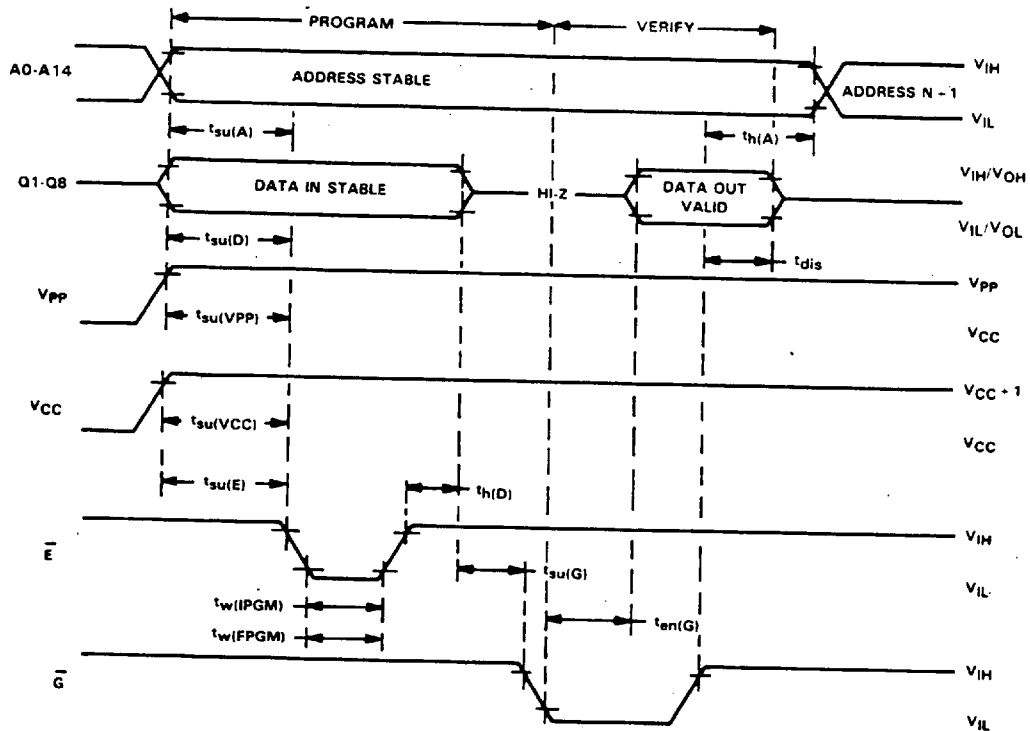
111

■ 9011241 0000112 021 ■

### Read Cycle Timing



### Program Cycle Timing



**SPACE ELECTRONICS INC.**

112

9011241 0000113 T68

4031 SORRENTO VALLEY BLVD.  
 SAN DIEGO, CA 92121  
 PHONE: (619) 452-4167  
 FAX: (619) 452-5499  
 INTERNET: 102005.1635@COMPUSERVE.COM