

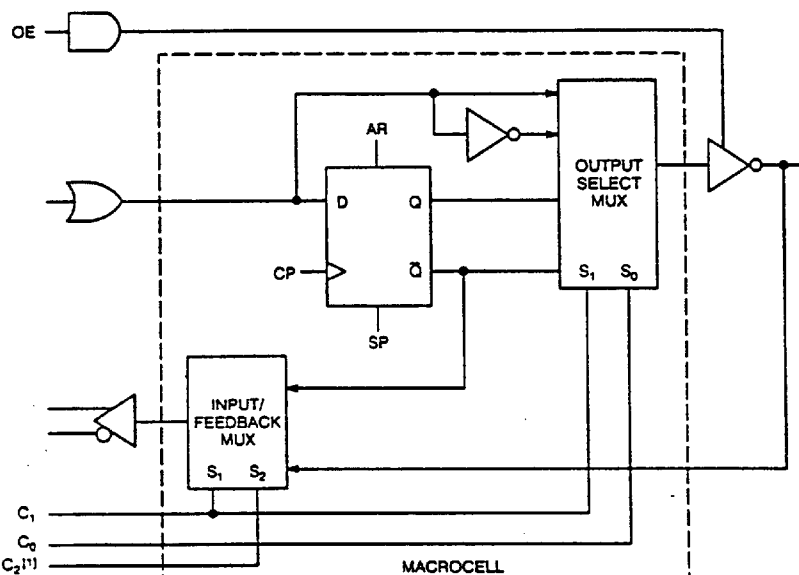
Programmable Logic - Radiation Hardened 22V10RP

Class S Screening
High Speed PLD

For Space Applications

SEI's 22V10RP (RP for RAD-PAK[®]) high speed PLD microcircuit features a minimum 100 kilorad (Si) total dose tolerance. Fully equivalent to the commercial 22V10, the 22V10RP combines

BiCMOS technology, Ti-W fuses and SEI's radiation hardened RAD-PAK[®] packaging. The 22V10RP provides 12 input pins and 10 I/O pins. By selecting each I/O pin as either permanent or temporary input, up to 22 inputs can be achieved. Applications requiring up to 21 inputs and a single output, down to 12 inputs and 10 outputs can be realized. The output enable product term available on each I/O allows this selection. It also features a variable product term architecture. Each output is provided with 8 to 16 product terms. This allows more applications to be implemented with this device than with other PLD devices that have fixed number of product terms for each output. This device also features common synchronous preset and asynchronous reset product terms. They eliminate the need to use standard product terms for initialization functions. The 22V10RP automatically resets on power-up. Moreover, the preload capability allows the output registers to be set to any desired state during testing. A security fuse is provided on the device to prevent copying of the device fuse pattern. It is available in Class S packaging and screening.

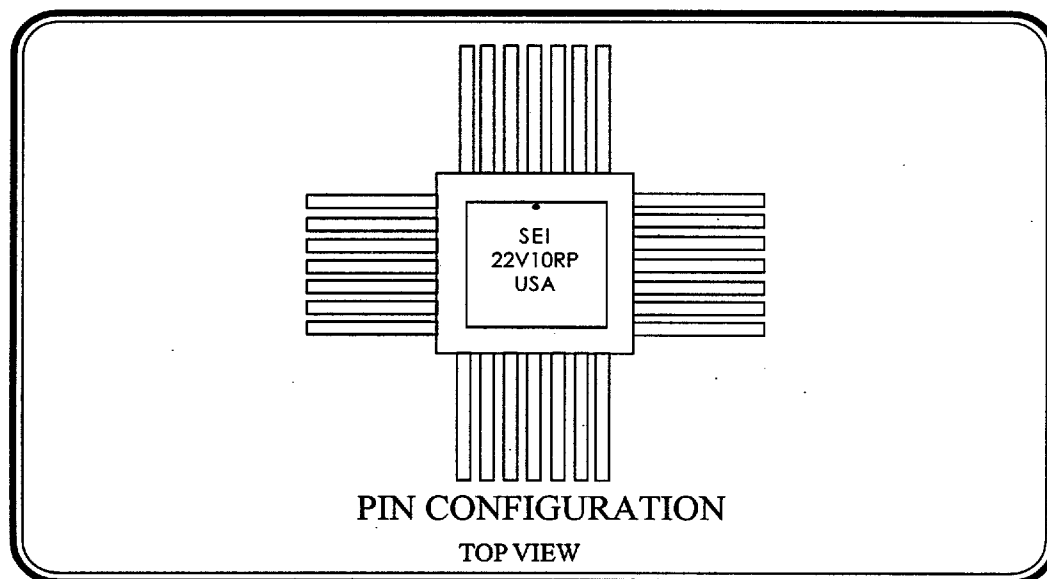


SPACE
ELECTRONICS
INCORPORATED

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

Radiation Hardened 22V10RP

Programmable Logic Device



Features:

- Second Generation PLD Architecture
- Pin Compatible with 22V10, PAL22V10
- RAD-PAK® Radiation Hardened Against Natural Space Radiation
- SEL: None
- SEU: None
- Total Dose Hardness >100 krad (Si)
- Package:
 - 28 Pin RAD-PAK® quad flat pack (1.15 in. x 1.15 in.)
 - Weight - 6.0 grams
 - 24 Pin RAD-PAK® flat pack (0.60 in. x 0.40 in.)
 - Weight - 4.8 grams
 - 24 Pin RAD-PAK® DIP (1.25 in. x 0.40 in.)
 - Weight - 5.0 grams
- Fast Propagation Time:
 - 15, 20, 25, 30 ns
- Each output user programmable for registered or combinatorial output
- High Speed BiCMOS Technology
 - Up to 22 inputs and 10 outputs
 - Increased product terms, average 12 per output
 - Extra terms provide logical synchronous PRESET and asynchronous RESET capability
- Screening per TM 5004
- QCI per TM5005
- 950 mW max @57MHz

Specifications and design are subject to change without notice.



February 1995

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

22V10RP ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MIN	MAX	UNITS
Positive Supply Voltage	V_{cc}	-0.5	7.0	V
DC Voltage to Outputs (Except during programming)		-0.5	$+V_{cc \text{ max}}$	V
DC Voltage to Outputs (During programming)			16	V
Output Current into Outputs (During programming, 1 sec)			200	mA
DC Input Voltage	V_{IN}	-0.5	5.5	V
DC Input Current	I_{IN}	-30	+5	mA
Power Dissipation	P_d		1200	mW
Storage Temperature Range	T_s	-65	+150	°C
Operating Temperature Range	T_A	-55	+125	°C

22V10RP RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	MIN	MAX	UNITS
Positive Supply Voltage	V_{dd}	4.75	5.25	V
High Level Input Voltage	V_{IH}	2.0		V
Low Level Input Voltage	V_{IL}		0.8	V



SPACE ELECTRONICS INC.

413

9011241 0000415 583

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

22V10RP DC ELECTRICAL CHARACTERISTICS¹

PARAMETER	SYMBOL	MIN	MAX	UNIT
Input Low Voltage	V_{IL}		0.8	V
Input High Voltage	V_{IH}	2.0		V
Output Low Voltage: $I_{OL} = 12 \text{ mA}$	V_{OL}		0.5	V
Output High Voltage: $I_{OH} = -2 \text{ mA}$	V_{OH}	2.4		V
Input Leakage Current: $V_{SS} \leq V_{IN} \leq 2.7 \text{ V}$, $V_{CC} = \text{Max}$	I_{IL}	-250	50	μA
Maximum Input Current: $V_{IN} = V_{CC}$, $V_{CC} = \text{Max}$	I_I		250	μA
Output Short Circuit Current: $V_{OUT} = 0.5 \text{ V}$, $V_{CC} = \text{Max}$	I_{OS}	-30	-120	mA
Power Supply Current: $V_{CC} = \text{Max}$	I_{CC}		190	mA
Output High Leakage Current: $V_{SS} \leq V_{OUT} \leq V_{IL}$, $V_{CC} = \text{Max}$	I_{OZH}		100	μA
Output Low Leakage Current: $V_{SS} \leq V_{OUT} \leq V_{CC}$, $V_{CC} = \text{Max}$	I_{OZL}		-100	μA
Input Capacitance ²	C_{IN}		8	pF
Output Capacitance ²	C_{OUT}		10	pF

Notes:

- $V_{CC} = 5 \pm 5\%$ volts; $T_A = -55$ to $+125^\circ\text{C}$.
- Guaranteed by design, $f = 1 \text{ MHz}$.



SPACE ELECTRONICS INC.

414

9011241 0000416 41T

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

22V10RP TIMING CHARACTERISTICS¹

PARAMETER	SYMBOL	MIN	MAX	UNITS
Input to Output Propagation Delay ² 22V10RP-10 22V10RP-15 22V10RP-20 22V10RP-25	t_{PD}		10 15 20 25	ns
Input to Output Enable Delay 22V10RP-10 22V10RP-15 22V10RP-20 22V10RP-25	t_{EA}		10 15 20 25	ns
Input to Output Disable Delay 22V10RP-10 22V10RP-15 22V10RP-20 22V10RP-25	t_{ER}		10 15 20 25	ns
Clock to Output Delay 22V10RP-10 22V10RP-15 22V10RP-20 22V10RP-25	t_{CO}		7.5 10 12.5 15	ns
Input to Feedback Setup Time 22V10RP-10 22V10RP-15 22V10RP-20 22V10RP-25	t_s	3.6 7.5 11.0 14.5		ns
Hold Time 22V10RP-10 22V10RP-15 22V10RP-20 22V10RP-25	t_H	0 0 0 0		ns
Clock Period ($t_s + t_{CO}$) 22V10RP-10 22V10RP-15 22V10RP-20 22V10RP-25	t_P	11.1 17.5 24.0 30.5		ns



SPACE ELECTRONICS INC.

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

9011241 0000417 356 415

PARAMETER	SYMBOL	MIN	MAX	UNITS
Clock Width 22V10RP-10 22V10RP-15 22V10RP-20 22V10RP-25	t_w	3 6 9 12		ns
Maximum Frequency 22V10RP-10 22V10RP-15 22V10RP-20 22V10RP-25	f_{MAX}	100 66 43 12		MHz
Asynchronous Reset Width 22V10RP-10 22V10RP-15 22V10RP-20 22V10RP-25	t_{AW}	10 15 20 25		ns
Asynchronous Reset Recovery Time 22V10RP-10 22V10RP-15 22V10RP-20 22V10RP-25	t_{AR}	6 10 14 20		ns
Asynchronous Reset to Registered Output Reset 22V10RP-10 22V10RP-15 22V10RP-20 22V10RP-25	t_{AP}	2 2 2 2	12 20 28 36	ns

Notes:

1. $V_{cc} = +5$ volts; $T_A = +25$ °C; use switching test circuit.
2. t_{PD} is tested with switch S_1 closed.
3. For three state outputs, output enable times are tested with $C_L = 50$ pF to the 1.5 volt level; S_1 is open for high impedance to HIGH tests and closed for high impedance to LOW tests. Output disable times are tested with $C_L = 5$ pF. HIGH to high impedance tests are made to an output voltage of $V_{OH} - 0.5$ volt with S_1 open; LOW to high impedance tests are made to the $V_{OL} + 0.5$ volt level with S_1 closed.



SPACE ELECTRONICS INC.

9011241 0000418 292

416

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

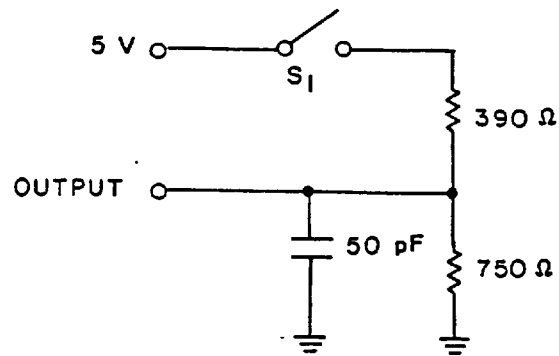


Figure 1. SWITCHING TEST CIRCUIT

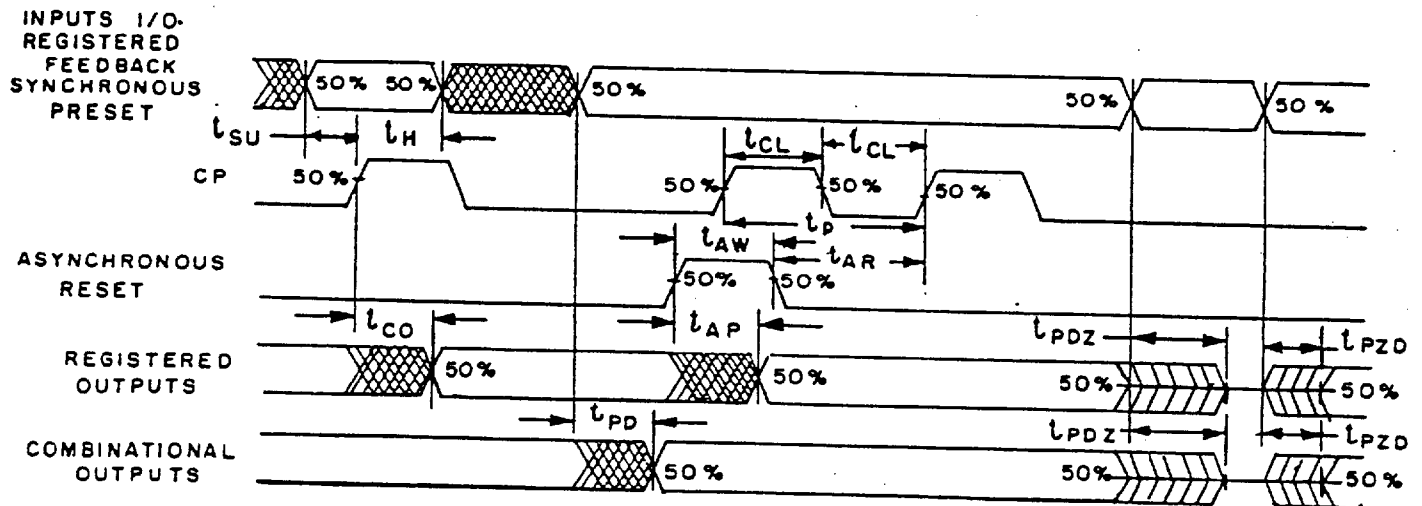


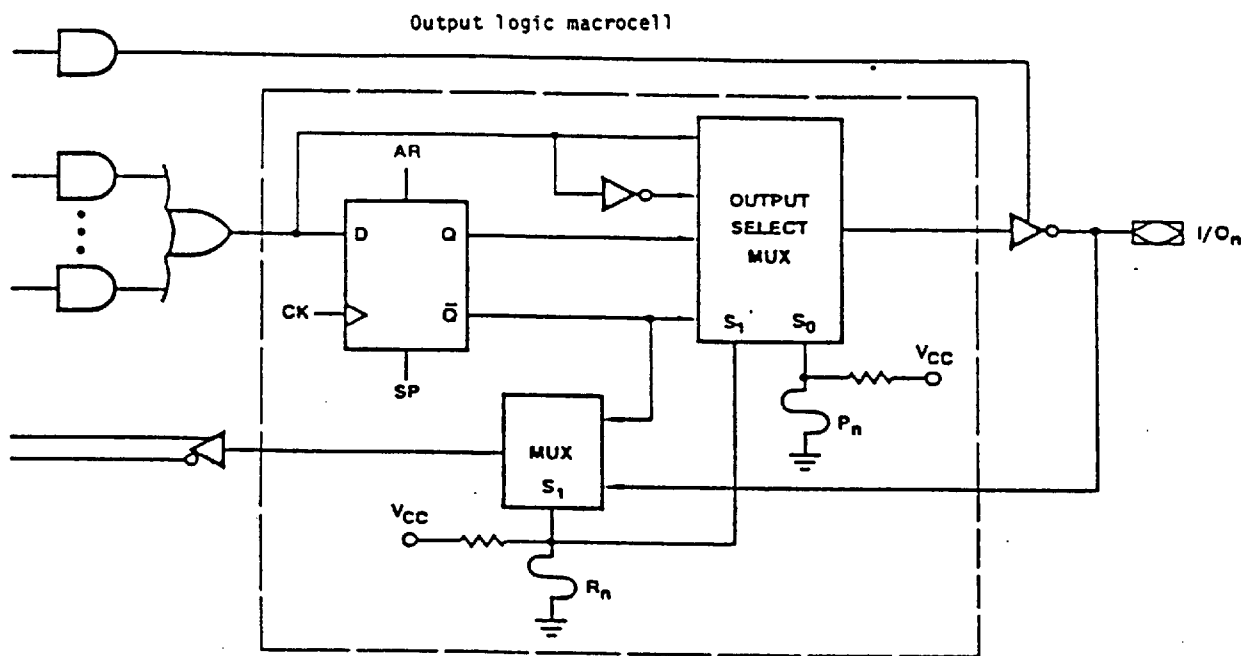
Figure 2. SWITCHING WAVEFORMS



SPACE ELECTRONICS INC.

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

9011241 0000419 129 417



S ₁	S ₀	Output configuration
0	0	Registered/active low
0	1	Registered/active high
1	0	Combinatorial/active low
1	1	Combinatorial/active high

0 = Unblown fuse
1 = Blown fuse

Figure 3. LOGIC DIAGRAM (UNPROGRAMMED) - Continued

22V10RP Package Ordering Guide

Package Style	Case Outline	1/	Description
D	D-24		24 Pin Dual In Line Package
F	F-24		24 Pin Flat Package
Q	Q-28		28 Pin Quad 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

9011241 0000421 887 419