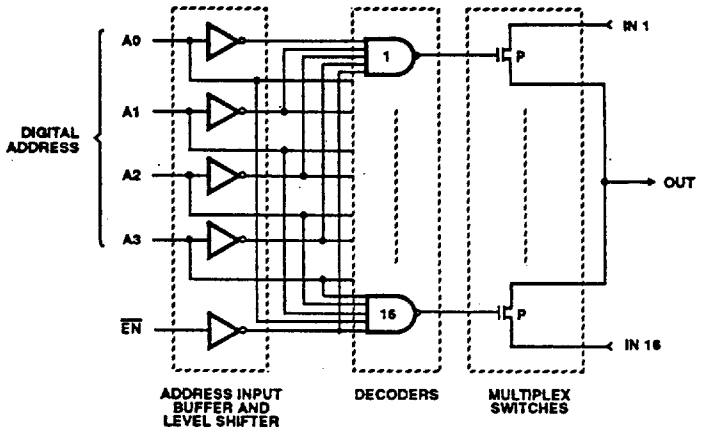
Radiation Hardened 1840RP

16 Channel CMOS Analog Multiplexer

For Space Applications



1840RP 16-Channel Multiplexer Functional Diagram

SEI's 1840RP (RP for RAD-PAK®) high speed 16 Channel CMOS Analog Multiplexer features a minimum 100 kilorad (Si) total dose tolerance. Using SEI's radiation hardened RAD-PAK® packaging technology, the 1840RP is fully equivalent to the industry standard 1840RH. The 1840RP precision, monolithic, CMOS analog multiplexer provides high input impedance to the analog source if device power fails or the analog signal voltage inadvertently exceeds the supply rails during powered operation. Each of the sixteen channel selection is controlled by a 4-bit binary address plus an Enable-Inhibit input which conveniently controlls the ON/OFF operation of several mutliplexers in a system. All digital inputs have electrostatic discharge protection. The 1840RP has been specifically designed to meet exposure to radiation environments, it has a total dose survivability of greater than 100krad (Si) and single event latchup and upset thresholds greater than 100 MeV/mg/cm^2. It is guaranteed operational from -55°C to +125°C. The 1840RP is available in Class B or S packaging and screening.

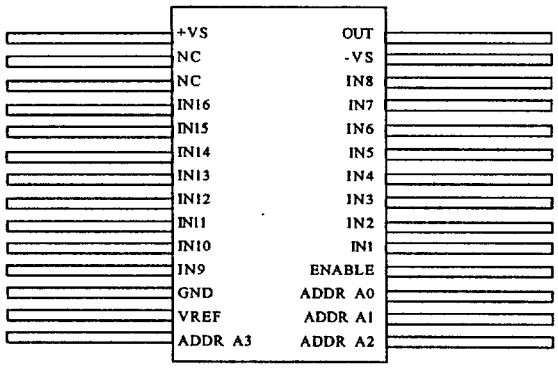
SPACE ELECTRONICS INCORPORATED

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

INTERNET:102005.1635@COMPUSERVE.COM

PAGE(S) INTENTIONALLY BLANK

Radiation Hardened
1840RP 16 Channel CMOS Analog Multiplexer



1840RP PIN CONFIGURATION
Top View

Features:

- 16 Channel CMOS Analog Multiplexer
- Pin Compatible with Industry Standard 1840RH
- RAD-PAK® Radiation Hardened Against Natural Space Radiation
- Total Dose Hardness >100 krad (Si)
  - No Single Event Latchup > 100MeV/mg/cm²
  - No Single Event Upset > 100MeV/mg/cm²
- Package
  - 28 Pin RAD-PAK® Flat Pack
  - 28 Pin RAD-PAK® DIP
- Low Power Consumption
- Break-Before-Make Switching
- Fast Access Time <400 ns
- Guaranteed Flat ON-Resistance over Specified Signal Range, 7Ω Max
- Guaranteed ON-Resistance Match Between Channels, < 5Ω Max
- Guaranteed Charge Injection, <10pC
- $I_{NO(OFF)}$ Leakage <2.5nA at +85°C
- $I_{COM(OFF)}$ Leakage <20nA at +85°C
- ESD Protection >2000V
- Single-Supply Operation (+4.5V to +30V) Bipolar-Supply Operation (±4.5V to ±20V)
- Rail-to-Rail Signal Handling
- TTL/CMOS-Logic Compatible

TQM
Total Quality Management

Aug 1996

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

1840RP ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MIN	MAX	UNITS
Supply Voltage Between Pins 1 and 27			+40	V
+VSUPPLY to Ground			+20	V
-VSUPPLY to Ground			-20	V
VREF to Ground		-0.5	+7.0	V
Analog Input Overvoltage	+VS (Power On/Off) -VS (Power On)		+25V -25V	V
Digital Input Overvoltage	+VA -VA		VREF + 4 GND - 4	V
Digital Input Overvoltage	+VEN -VEN		VREF + 0.5 -0.5	V
Storage Temperature Range		-65	+150	°C
Total Power Dissipation		1400	1600	mW

1840RP OPERATING CONDITIONS

PARAMETER	SYMBOL	MIN	MAX	UNITS
Operating Supply Voltage	VSUPPLY	-15	+15	V
Operating Temperature Range		-55	+125	°C
VREF		4.5	5.5	V
Logic Low Level	VAL		0.8	V
Logic High Level	VAH		4.0	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

1840RP DC ELECTRICAL CHARACTERISTICS

(V+ = +15V, V- = -15V, GND = 0V, VAH = +4.0V, VAL = +2.4V, T_A = -55 °C to +125 °C, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	TEMPERATURE	MIN	MAX	UNITS
Analog Signal Range	VS		-55°C to +125°C	-5	+15	V
Input Leakage Current, Address, or Enable Pins	IAH IAL	Measure Inputs Sequentially Ground All Unused Pins VAL = 0.8V, VAH = 4.0V	-55°C to +125°C	-1000	1000	nA
Leakage Current Into the Source Terminal of an "Off" Switch	+IS(OFF)	VS = +10V, All Unused Input and Output = -10V, VEN = 4V	+25°C	-10	10	nA
			+125°C, -55°C	-100	100	nA
	-IS(OFF)	VS = +10V, All Unused Input and Output = +10V, VEN = 4V	+25°C	-10	10	nA
			+125°C, -55°C	-100	100	nA
Leakage Current Into the Source Teminal of an "Off" Switch with Power "Off"	+IS(OFF) Power Off	V+, V-, VREF, A0, A1, A2, A3, A4, EN= GND, Unused Inputs Tied to GND, VS = +25V	+25°C	-50	50	nA
			+125°C, -55°C	-100	100	nA
Leakage Current Into the Source Teminal of an "Off" Switch with Overvoltage Applied	+IS(OFF) Overvoltage	VS = +25V, VD = 0V, VEN = 4V, All Unused Inputs Tied to GND	-55°C to +125°C	-1000	1000	nA
	-IS(OFF) Overvoltage	VS = -25V, VD = 0V, VEN = 4V, All Unused Inputs Tied to GND	-55°C to +125°C	-1000	1000	nA
Leakage Current Into the Drain Terminal of an "Off" Switch	+ID(OFF)	VD = +10V, VEN= 4V, All Unused Inputs = -10V	+25°C	-10	10	nA
			+125°C, -55°C	-100	100	nA
	-ID(OFF)	VD = -10V, VEN= 4V, All Unused Inputs = +10V	+25°C	-10	10	nA
			+125°C, -55°C	-100	100	nA
Leakage Current Into the Drain Terminal of an "Off" Switch with Overvoltage Applied	+ID(OFF) Overvoltage	VS = +25V, Measure VD, VEN = 4V, All Unused Inputs to GND	-55°C to +125°C	-1000	1000	nA
	-ID(OFF) Overvoltage	VS = -25V, Measure VD, VEN = 4V, All Unused Inputs to GND	-55°C to +125°C	-1000	1000	nA

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

1840RP DC ELECTRICAL CHARACTERISTICS (continued)

(V+ = +15V, V- = -15V, GND = 0V, VAH = +4.0V, VAL = +2.4V, T_A = -55 °C to +125 °C, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	TEMPERATURE	MIN	MAX	UNITS
Leakage Current from an "On" Driver Into the Switch (Drain & Source)	+ID(ON)	VS = +10V, VD = +10V, VEN = 0.8V, All Unused Inputs = -10V	+25°C	-10	10	nA
			+125°C, -55°C	-100	100	nA
	-ID(ON)	VS = -10V, VD = -10V, VEN = 0.8V, All Unused Inputs = +10V	+25°C	-10	10	nA
			+125°C, -55°C	-100	100	nA
Switch On Resistance	+15V R(ON)	VS = +15V, ID = -1mA, VEN = 0.8V	-55°C to +125°C		1000	Ω
	-5V R(ON)	VS = -5V, ID = +1mA, VEN = 0.8V	-55°C to +125°C		4000	Ω
	+5V R(ON)	VS = +5V, ID = -1mA, VEN = 0.8V	-55°C to +125°C		2500	Ω
Positive Standby Supply Current	+ISBY	VEN = 4.0V	-55°C to +125°C		0.5	mA
Negative Standby Supply Current	-ISBY	VEN = 4.0V	-55°C to +125°C	-0.5		mA
Positive Supply Current	I(+)	VEN = 0.8V VEN = 0V	-55°C to +125°C		1.0	mA
Negative Supply Current	I(-)	VEN = 0.8V VEN = 0V	-55°C to +125°C	-0.5		mA

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

1840RP Truth Table

A3	A2	A1	A0	EN	"ON" CHANNEL
X	X	X	X	L	NONE
L	L	L	L	H	1
L	L	L	H	H	2
L	L	H	L	H	3
L	L	H	H	H	4
L	H	L	L	H	5
L	H	L	H	H	6
L	H	H	L	H	7
L	H	H	H	H	8
H	L	L	L	H	9
H	L	L	H	H	10
H	L	H	L	H	11
H	L	H	H	H	12
H	H	L	L	H	13
H	H	L	H	H	14
H	H	H	L	H	15
H	H	H	H	H	16

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

1840RP AC ELECTRICAL CHARACTERISTICS

(V+ = +15V, V- = -15V, GND = 0V, VAH = +4.0V, VAL = +2.4V, T_A = -55 °C to +125 °C, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	TEMPERATURE	MIN	MAX	UNITS
Break-Before-Make Time Delay	TD	RL = 1kΩ, CL = 50pF	+25°C		40	ns
Propagation Delay Times: Address Inputs to I/O Channels	TON(A) TOFF(A)	RL = 10kΩ, CL = 50pF	+25°C		300	ns
			+125°C, -55°C		400	ns
Enable to I/O	TON(EN) TOFF(EN)	RL = 1kΩ, CL = 50pF	+25°C		200	ns
			+125°C, -55°C		400	ns

1840RP ELECTRICAL PERFORMANCE CHARACTERISTICS

(V+ = +15V, V- = -15V, GND = 0V, VAH = +4.0V, VAL = +2.4V, T_A = -55 °C to +125 °C, unless otherwise noted.)

PARAMETER 1/	SYMBOL	CONDITIONS	TEMPERATURE	MIN	MAX	UNITS
Capacitance Address Input	CA	+VS = -VS = 0V, f = 1MHz	+25°C		7	pF
Capacitance Channel Input	CS(OFF)	+VS = -VS = 0V, f = 1MHz	+25°C		5	pF
Capacitance Channel Output	CD(OFF) TOFF(EN)	+VS = -VS = 0V, f = 1MHz	+25°C		50	pF
Off Isolation	VISO	VEN = 4.0V, f = 200kHz, CL = 7pF, RL = 1kΩ, VS = 3.0VRMS	+25°C	45		dB

Note:
1/ The parameters are controlled via design or process parameters and not directly tested. These parameters are characterized upon initial design and after major process and/or design changes.

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