Standard Products

Preliminary

RadHard-by-Design RHD5920 Analog Multiplexer 16-Channel

www.aeroflex.com/RHDseries

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FEATURES

- Single power supply operation at 3.3V to 5V
- Radiation performance
  - Total dose: >1Mrad(Si); Dose rate = 50 - 300 rads(Si)/s
  - ELDRS Immune
  - SEL Immune >100 MeV-cm^2/mg
  - Neutron Displacement Damage >10^{14} neutrons/cm^2
- Full military temperature range
- Rail to Rail operation
- Low power consumption < 1.0mW
- One address bus (A0-3), and one enable line
- Designed for aerospace and high reliability space applications
- Packaging – Hermetic ceramic
  - 24-pin, 0.3"W x 0.6"L x 0.12"Ht SOIC
  - Typical Weight 2 grams
- DSCC SMD 5962-10243 pending

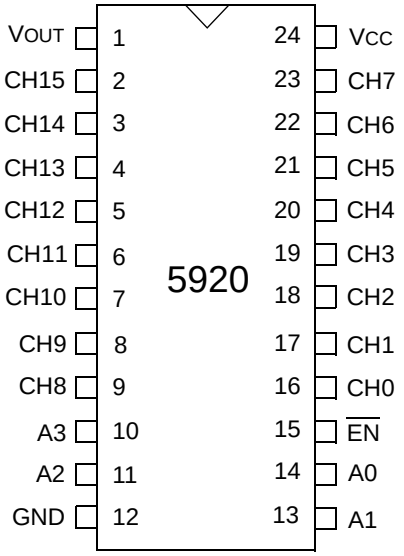
GENERAL DESCRIPTION

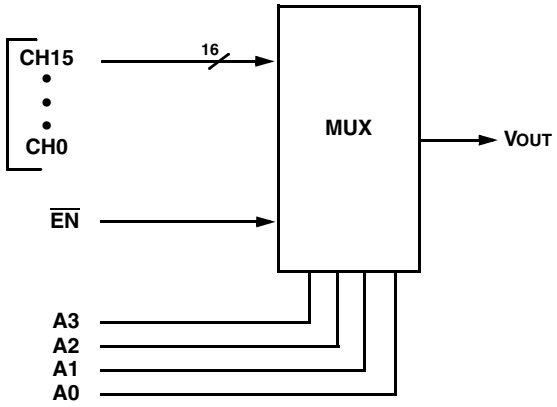
Aeroflex's RHD5920 is a radiation hardened, single supply, 16 Channel Multiplexer in a 24-pin SOIC package. The RHD5920 design uses specific circuit topology and layout methods to mitigate total ionizing dose effects and single event latchup. These characteristics make the RHD5920 especially suited for the harsh environment encountered in Deep Space missions. It is guaranteed operational from -55°C to +125°C. Available screened in accordance with MIL-PRF-38534 Class K, the RHD5920 is ideal for demanding military and space applications.

ORGANIZATION AND APPLICATION

The RHD5920 is a 16 to 1 CMOS multiplexer. Channel selection is controlled by 4 bit binary addressing and an active low enable. All inputs and outputs are diode protected.

The devices will not latch with SEU events to above 100 MeV-cm^2/mg. Total dose degradation is minimal to above 1Mrad(Si). Displacement damage environments to neutron fluence equivalents in the mid 10^{14} neutrons per cm^2 range are readily tolerated. There is no sensitivity to low-dose rate (ELDRS) effects. SEU effects are application dependant.





Notes:
1. Package and lid are electrically isolated from signal pads.

RHD5920: 16 CHANNEL ANALOG MUX

ABSOLUTE MAXIMUM RATINGS

Parameter	Range	Units
Case Operating Temperature Range	-55 to +125	℃
Storage Temperature Range	-65 to +150	℃
Supply Voltage ($+V_{CC}$)	+6.0	V
Digital Input Overvoltage (V_{EN}, V_A)	< V_{CC} +0.4 > GND -0.4	V V
Analog Input Over Voltage (CH0-CH15)	< V_{CC} +0.4 > GND -0.4	V

NOTICE: Stresses above those listed under "Absolute Maximums Rating" may cause permanent damage to the device. These are stress rating only; functional operation beyond the "Operation Conditions" is not recommended and extended exposure beyond the "Operation Conditions" may affect device reliability.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Typical	Units
$+V_{CC}$	Power Supply Voltage	3.3 to 5.0	V
V_{EN}, V_A	Logic Low Level	30% V_{CC}	V
V_{EN}, V_A	Logic High Level	70% V_{CC}	V

ELECTRICAL PERFORMANCE CHARACTERISTICS

(T_C = -55℃ TO +125℃, $+V_{CC}$ = +5V -- UNLESS OTHERWISE SPECIFIED)

Parameter	Symbol	Conditions		Min	Max	Units
Supply Current ($+V_{CC}$)	$+I_{CC}$	$\overline{EN}$ = 30% V_{CC}		-	10	µA
	$+I_{SBY}$	$\overline{EN}$ = 70% V_{CC}		-	10	µA
Address Input Current (A0-A3)	I_{AL}	V_A = 30% V_{CC}	+25℃	-5	5	nA
			+125℃	-50	50	nA
	I_{AH}	V_A = 70% V_{CC}	+25℃	-5	5	nA
			+125℃	-50	50	nA
Enable Input Current ($\overline{EN}$)	I_{ENL}	V_{EN} = 30% V_{CC}	+25℃	-5	5	nA
			+125℃	-50	50	nA
	I_{ENH}	V_{EN} = 70%V_{CC}	+25℃	-5	5	nA
			+125℃	-50	50	nA
High Input Leakage Current (CH0-CH15)	I_{INLK_5}	V_{IN} = +5V, V_{EN} =70% V_{CC}, Output and all unused MUX inputs under test = 0V	+25℃	-5	5	nA
			+125℃	-50	50	nA
Low Input Leakage Current (CH0-CH15)	I_{INLK_0}	V_{IN} = 0V, V_{EN} =70% V_{CC} Output and all unused MUX inputs under test = +5V	+25℃	-5	5	nA
			+125℃	-50	50	nA
Output Leakage Current (V_{OUT})	I_{OUTLK}	V_{OUT} = +5V, V_{EN} = 70% V_{CC} , All inputs grounded except channel being tested	+25℃	-5	5	nA
			+125℃	-50	50	nA
Switch ON Resistance	R_{DSON}	V_{IN} = 0V, V_{IN} = +2.5V, V_{IN} = +5V V_{EN} = 30% V_{CC} I_{OUT} = -1mA	-55℃	-	500	Ω
			+25℃	-	750	Ω
			+125℃	-	1000	Ω

SWITCHING CHARACTERISTICS

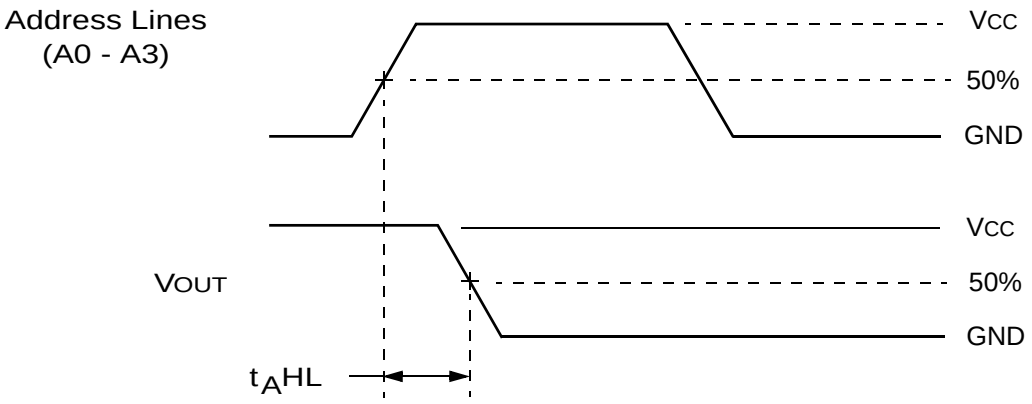
(TC = -55℃ TO +125℃, +V CC = +5V -- UNLESS OTHERWISE SPECIFIED)

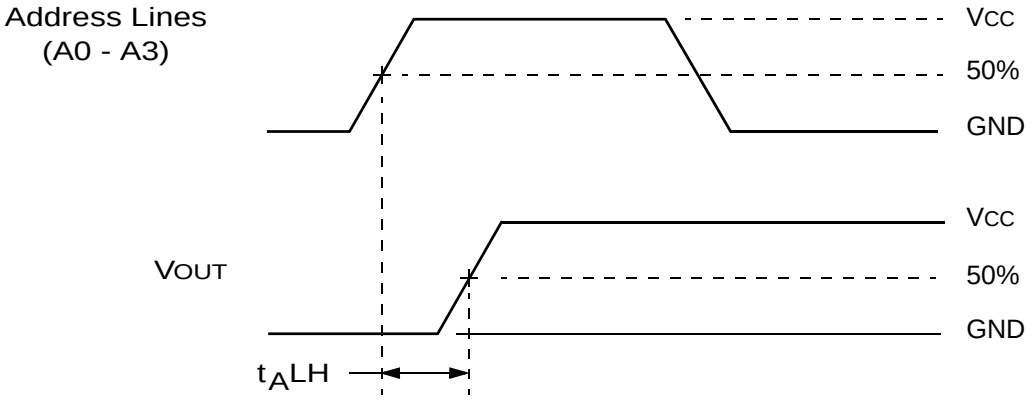
Parameter	Symbol	Conditions	Temp	Min	Max	Units
Address to Output Delay	t_AHL	VOUT High to Low Transition	-55℃	10	150	ns
			+25℃	10	150	ns
			+125℃	10	200	ns
	t_ALH	VOUT Low to High Transition	-55℃	10	150	ns
			+25℃	10	150	ns
			+125℃	10	200	ns
Enable to Output Delay	$t_{ON}EN$	(Enabled)	-55℃	10	150	ns
			+25℃	10	150	ns
			+125℃	10	200	ns
	$t_{OFF}EN$	(Disabled)	ALL	10	200	ns

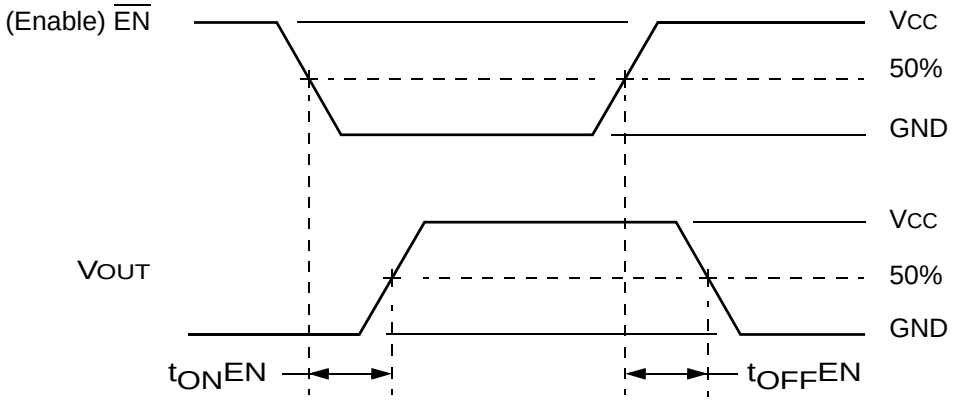
TRUTH TABLE (CH0 – CH15)

A3	A2	A1	A0	$\overline{EN}$	"ON" CHANNEL 1/
X	X	X	X	H	NONE
L	L	L	L	L	CH0
L	L	L	H	L	CH1
L	L	H	L	L	CH2
L	L	H	H	L	CH3
L	H	L	L	L	CH4
L	H	L	H	L	CH5
L	H	H	L	L	CH6
L	H	H	H	L	CH7
H	L	L	L	L	CH8
H	L	L	H	L	CH9
H	L	H	L	L	CH10
H	L	H	H	L	CH11
H	H	L	L	L	CH12
H	H	L	H	L	CH13
H	H	H	L	L	CH14
H	H	H	H	L	CH15

1/ Between (CH0-CH15) and VOUT





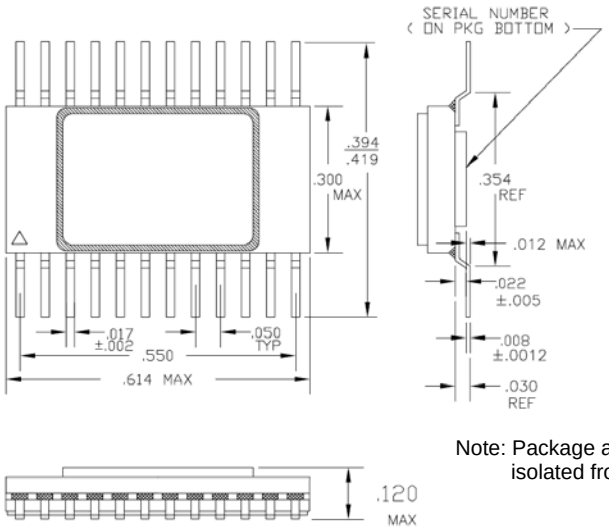


NOTE: f = 10KHz, Duty cycle = 50%.

RHD5920 SWITCHING DIAGRAMS

ORDERING INFORMATION

Model	DSCC SMD #	Screening	Package
RHD5920-7	-	Commercial Flow, +25℃ testing only	24-pin SOIC
RHD5920-S	-	Military Temperature, -55℃ to +125℃ Screened in accordance with MIL-PRF-38534, Class K	
RHD5920-201-1S	5962-1024301KXC (Pending)	In accordance with DSCC SMD (Pending)	
RHD5920-201-2S	5962-1024301KXA (Pending)		
RHD5920-901-1S	5962H1024301KXC (Pending)		
RHD5920-901-2S	5962H1024301KXA (Pending)		



Note: Package and lid are electrically isolated from signal pads.

PACKAGE OUTLINE

EXPORT CONTROL:

This product is controlled for export under the International Traffic in Arms Regulations (ITAR). A license from the U.S. Department of State is required prior to the export of this product from the United States.

EXPORT WARNING:

Aeroflex's military and space products are controlled for export under the International Traffic in Arms Regulations (ITAR) and may not be sold or proposed or offered for sale to certain countries. (See ITAR 126.1 for complete information.)

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