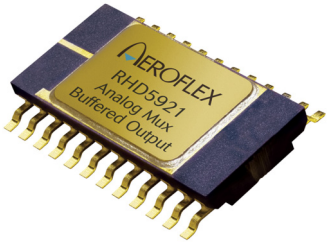
Standard Products

Datasheet

RadHard-by-Design
RHD5921 Analog Voltage Multiplexer
16-Channel, Buffered

www.aeroflex.com/RHDseries

March 4, 2015



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
- Low Power consumption when enabled
- CMOS analog switching allows rail to rail operation and low switch impedance
- Address bus (A0-3), and one enable line
- High input impedance
- Designed for aerospace and high reliability space applications
- Packaging – Hermetic ceramic
  - 24-pin, 0.614"L x 0.300"W x 0.105"Ht SOIC
  - Typical Weight 2 grams

- **Aeroflex Plainview's Radiation Hardness Assurance Plan is DLA Certified to MIL-PRF-38534, Appendix G.**

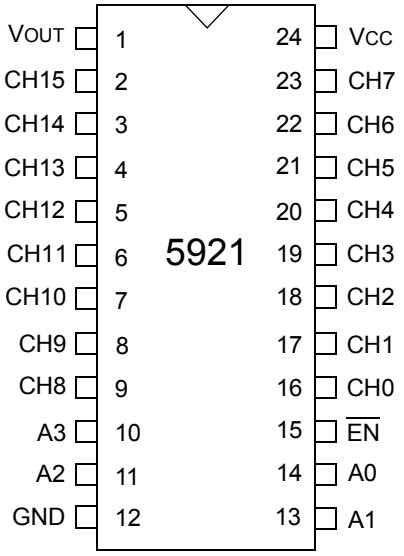
GENERAL DESCRIPTION

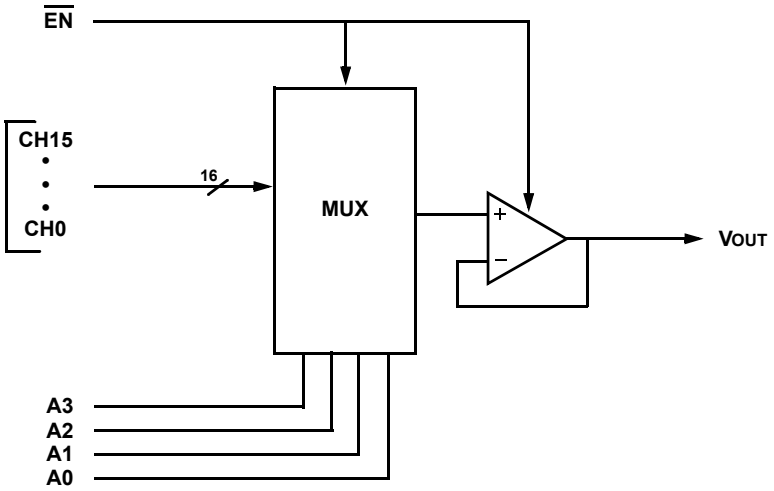
Aeroflex's RHD5921 is a radiation hardened, single supply, 16 channel buffered output multiplexer in a 24-pin SOIC package. The RHD5921 design uses specific circuit topology and layout methods to mitigate total ionizing dose effects and single event latchup. These characteristics make the RHD5921 especially 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 RHD5921 is ideal for demanding military and space applications.

ORGANIZATION AND APPLICATION

The RHD5921 is a 16 to 1 CMOS buffered output voltage multiplexer. Channel selection is controlled by 4 bit binary addressing and an active low enable. Multiplexed voltages are buffered by a unity gain CMOS Rail-to-Rail amplifier. When the RHD5921 is disabled, the chip is put into a power-down state and the output is tri-stated.

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 dependent.





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

RHD5921: 16 CHANNEL BUFFERED ANALOG MUX

ABSOLUTE MAXIMUM RATINGS

Parameter	Range	Units
Case Operating Temperature Range	-55 to +125	°C
Storage Temperature Range	-65 to +150	°C
Supply Voltage (+VCC)	+6.0	V
Digital Input Overvoltage (VEN, VA)	< VCC +0.4 > GND -0.4	V V
Analog Input Overvoltage (CH0-CH15)	< VCC +0.4 > GND -0.4	V
ESD Rating (MIL-STD-883, Method 3015, Class 2)	2,000 - 3,999	V

NOTICE: Stresses above those listed under "Absolute Maximum Ratings" 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
+VCC	Power Supply Voltage	3.3 to 5.0	V
VEN, VA	Logic Low Level	30% VCC	V
VEN, VA	Logic High Level	70% VCC	V

ELECTRICAL PERFORMANCE CHARACTERISTICS

(TC = -55°C TO +125°C, +VCC = +5V -- UNLESS OTHERWISE SPECIFIED)

Parameter	Symbol	Conditions		Min	Max	Units
Supply Current (+VCC)	+ICC	$\overline{EN}$ = 30% VCC		0.5	5	mA
	+ISBY	$\overline{EN}$ = 70% VCC		10	500	µA
Address Input Current (A0-A3)	IAL	VA = 30% VCC	+25°C	-5	5	nA
			+125°C	-50	50	nA
	IAH	VA = 70% VCC	+25°C	-5	5	nA
			+125°C	-50	50	nA
Enable Input Current ($\overline{EN}$)	IENL	VEN = 30% VCC	+25°C	-5	5	nA
			+125°C	-50	50	nA
	IENH	VEN = 70% VCC	+25°C	-5	5	nA
			+125°C	-50	50	nA
Input Leakage Current (CH0-CH15)	+IINLK	VIN = +5V, VEN =70% VCC, Output and all unused MUX inputs under test = 0V	+25°C	-5	5	nA
			+125°C	-50	50	nA
Output Leakage Current (VOUT)	+IOUTLK	Tri-state, VEN > 70% VCC	+25°C	-5	5	nA
			+125°C	-50	50	nA

ELECTRICAL PERFORMANCE CHARACTERISTICS (continued)

(TC = -55°C TO +125°C, +VCC = +5V -- UNLESS OTHERWISE SPECIFIED)

Parameter	Symbol	Conditions	Min	Max	Units
Output ON Voltage	VON1	VIN = 5 Volts, RL = 10K	4.8	5.1	V
	VON2	VIN = 5 Volts, RL = 1K	4.35	4.65	V
	VON3	VIN = 3.3 Volts, RL = 10K	3.2	3.4	V

SWITCHING CHARACTERISTICS

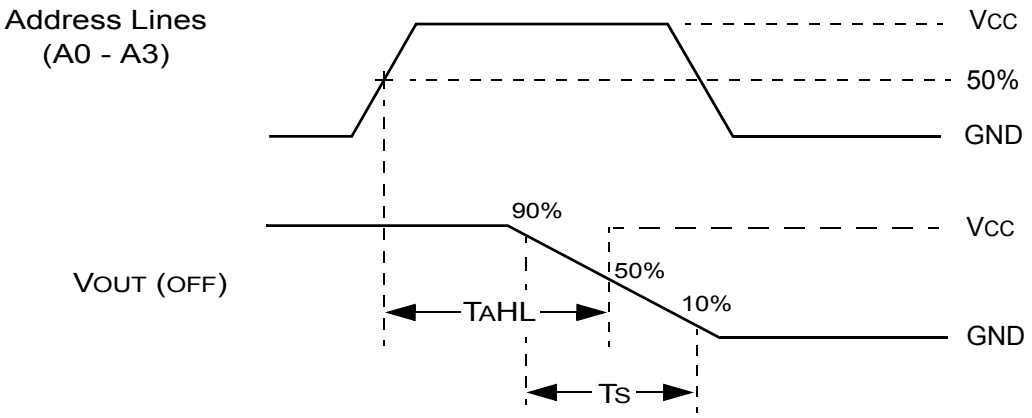
(TC = -55°C TO +125°C, +VCC = +5V -- UNLESS OTHERWISE SPECIFIED)

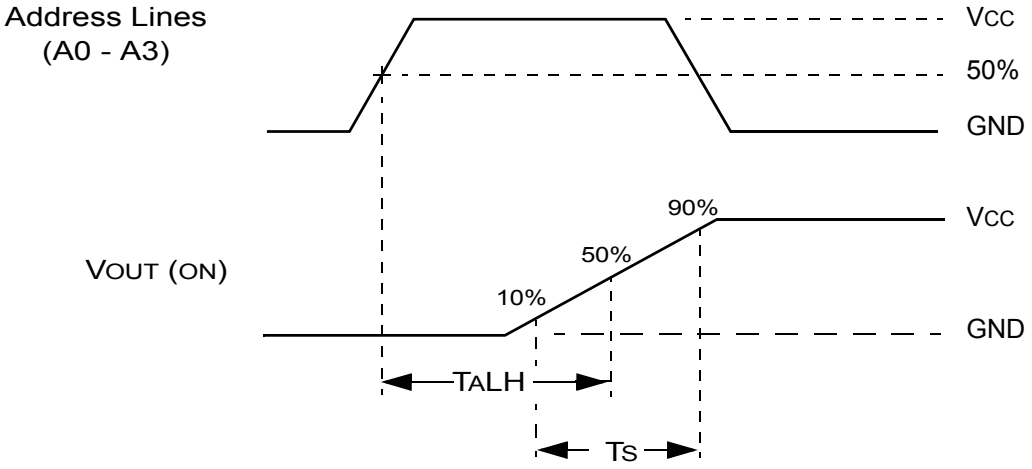
Parameter	Symbol	Conditions	Min	Max	Units
Address to Output Delay (ON, OFF)	TAHL	f = 10KHz, VIN = 5 Volts, RL = 10K	1	3	us
	TALH		1	3	us
Output Slew Rate	TS		1.8	4	V/us
Enable to Output Delay	TONEN	f = 10KHz, VIN = 5 Volts, RL = 1K	0.8	2.5	us
	TOFFEN		100	350	ns

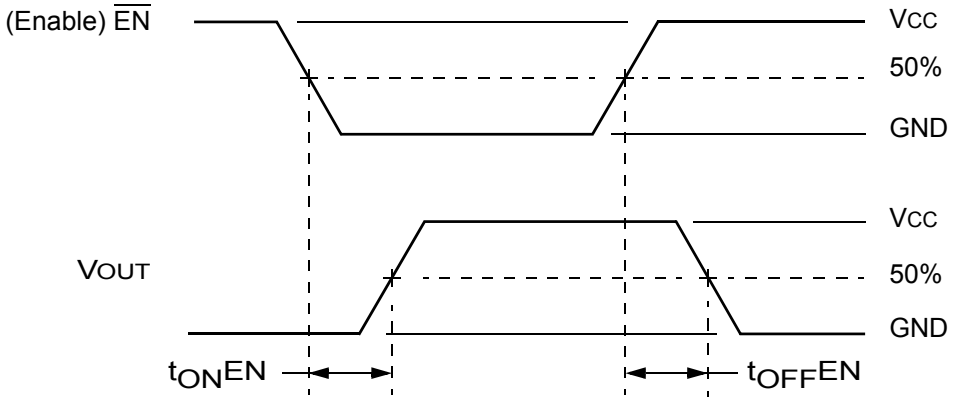
TRUTH TABLE (CH0 – CH15)

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



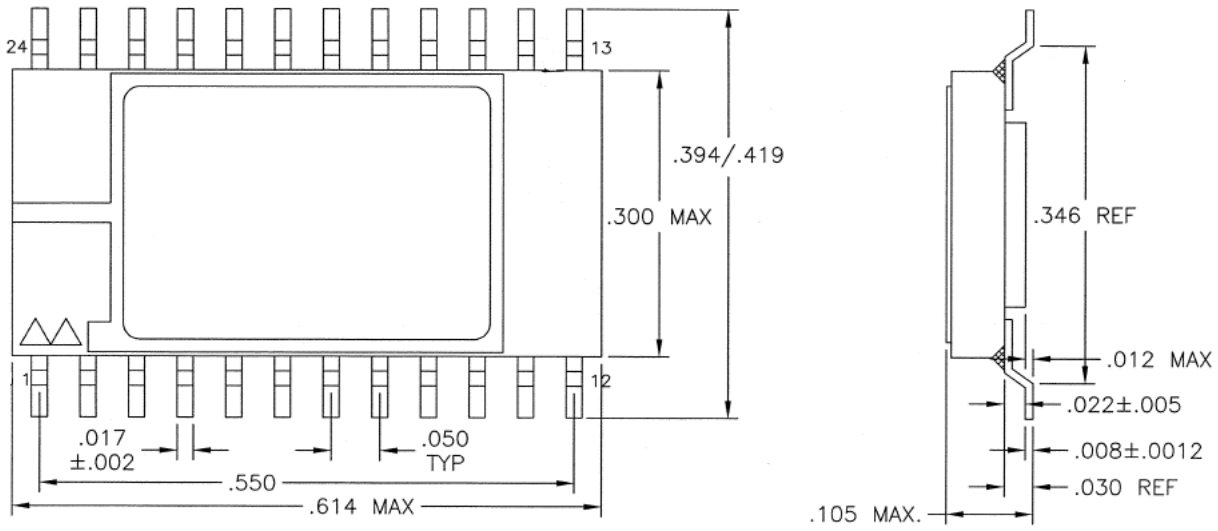




RHD5921 SWITCHING DIAGRAMS

ORDERING INFORMATION

Model	DLA SMD #	Screening	Package
RHD5921-7	-	Commercial Flow, +25°C testing only	24-pin SOIC
RHD5921-S	-	Military Temperature, -55°C to +125°C Screened in accordance with the individual Test Methods of MIL-STD-883 for Space Applications	
RHD5921-201-1S	5962-1024302KXC	In accordance with DLA SMD	
RHD5921-201-2S	5962-1024302KXA		
RHD5921-901-1S	5962H1024302KXC	In accordance with DLA Certified RHA Program Plan to RHA Level "H", 1Mrad(Si)	
RHD5921-901-2S	5962H1024302KXA		



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

PACKAGE OUTLINE

EXPORT CONTROL:

This product is controlled for export under the U.S. Department of Commerce (DoC). A license may be required prior to the export of this product from the United States.

www.aeroflex.com/HiRel info-ams@aeroflex.com

Datasheet Definitions:

Advanced	*Product in Development*
Preliminary	*Shipping Non-Flight Prototypes*
Datasheet	*Shipping QML and Reduced HiRel*

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