

RHD5920

Features

- Single power supply operation at 5V
- Radiation performance
 - Total dose: >1 Mrad(Si); Dose rate = 50-300 rad(Si)/s
 - ELDRS Immune
 - SEL Immune >100 MeV-cm²/mg
 - Neutron Displacement Damage >10¹⁴ neutrons/cm²
- Full military temperature range
- Rail to Rail operation
- Low power consumption < 4.0mW
- One address bus (A0-3), and one enable line
- Designed for aerospace and high reliability space applications
- Packaging – Hermetic ceramic
 - 24-pin, 0.614"L x 0.300"W x 0.120"Ht SOIC
 - Typical Weight 2 grams
- **Radiation Hardness Assurance Plan: DLA Certified to MIL-PRF-38534, Appendix G.**

General Description

The 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-cm²/mg. Total dose degradation is minimal to above 1 Mrad(Si). Displacement damage environments to neutron fluence equivalents in the mid 10¹⁴ neutrons per cm² range are readily tolerated. There is no sensitivity to low-dose rate (ELDRS) effects. SEU effects are application dependent.

16-Channel Analog Multiplexer

RHD5920

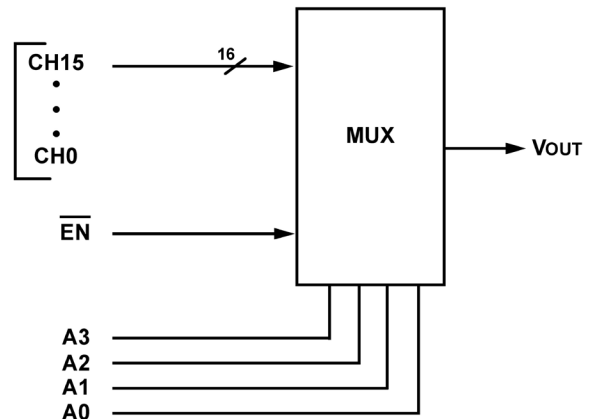
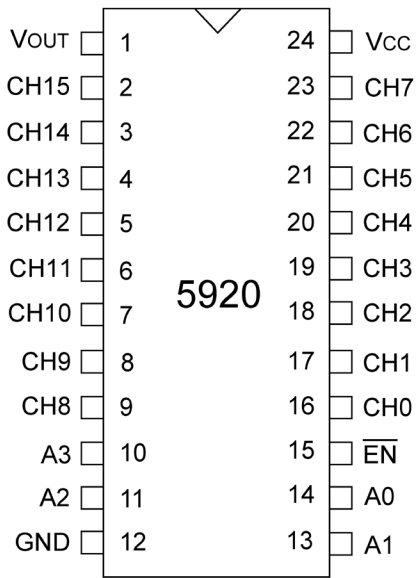


Figure 1: 16 Channel Analog Mux

Note:

- 1) Package and lid are electrically isolated from signal pads.

Absolute Maximum Ratings

Parameter	Range	Units
Case Operating Temperature Range	-55 to +125	°C
Storage Temperature Range	-65 to +150	°C
Supply Voltage (+V _{CC})	+7.0	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
Input Current	±10	mA
Thermal resistance, junction-to-case	5	°C/W

Notice:

- 1) 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
+V _{CC}	Power Supply Voltage	+5.0	V
V _{IL}	Low Level Input Voltage	30% V _{CC}	V
V _{IH}	High Level Input Voltage	70% V _{CC}	V

RHD5920

Electrical Performance Characteristics

(T_C = -55°C To +125°C, +V_{CC} = +5V -- Unless Otherwise Specified)

Parameter	Symbol	Conditions	MIN	MAX	Units	
Supply Current (+V _{CC}) <u>1/</u>	+I _{CC}	V _{EN} = 30% V _{CC}	-	800	μA	
	+I _{SBY}	V _{EN} = 70% V _{CC}	-	200	μA	
Address Input Current (A0-A3) <u>1/</u>	I _{AL}	V _A = 30% V _{CC}	+25°C	-5	5	nA
			+125°C	-50	50	nA
	I _{AH}	V _A = 70% V _{CC}	+25°C	-5	5	nA
			+125°C	-50	50	nA
Enable Input Current (EN) <u>1/</u>	I _{ENL}	V _{EN} = 30% V _{CC}	+25°C	-5	5	nA
			+125°C	-50	50	nA
	I _{ENH}	V _{EN} = 70%V _{CC}	+25°C	-5	5	nA
			+125°C	-50	50	nA
High Input Leakage Current (CH0-CH15) <u>1/</u>	I _{INLK5}	V _{IN} = +5V, V _{EN} = 70% V _{CC} , Output and all unused MUX inputs under test = 0V	+25°C	-5	5	nA
			+125°C	-50	50	nA
Low Input Leakage Current (CH0-CH15) <u>1/</u>	I _{INLK0}	V _{IN} = 0V, V _{EN} = 70% V _{CC} Output and all unused MUX inputs under test = +5V	+25°C	-5	5	nA
			+125°C	-50	50	nA
Output Leakage Current (V _{OUT}) <u>1/</u>	I _{OUTLK}	V _{OUT} = +5V, V _{EN} = 70% V _{CC} , All inputs grounded except channel being tested	+25°C	-5	5	nA
			+125°C	-50	50	nA
Switch ON Resistance <u>1/</u>	R _{DS ON}	V _{IN} = 0V, V _{EN} = 30% V _{CC} , I _{OUT} = +1mA V _{IN} = +2.5V, V _{EN} = 30% V _{CC} , I _{OUT} = -0.6mA V _{IN} = +5V, V _{EN} = 30% V _{CC} , I _{OUT} = -1mA	-55°C	-	500	Ω
			+25°C	-	750	Ω
			+125°C	-	1000	Ω

1/ Specification derated to reflect Total Dose exposure to 1 Mrad(Si) @ +25°C

Switching Characteristics

(T_C = -55°C To +125°C, +V_{CC} = +5V -- Unless Otherwise Specified)

Parameter	Symbol	Conditions	TEMP	MIN	MAX	Units
Address to Output Delay	t _{AHL}	V _{OUT} High to Low Transition	-55°C	10	150	ns
			+25°C	10	150	ns
			+125°C	10	200	ns
	t _{ALH}	V _{OUT} Low to High Transition	-55°C	10	150	ns
			+25°C	10	150	ns
			+125°C	10	200	ns
Enable to Output Delay	t _{ONEN}	(Enabled)	-55°C	10	150	ns
			+25°C	10	150	ns
			+125°C	10	200	ns
	t _{OFFEN}	(Disabled)	ALL	10	200	ns

RHD5920

Truth Table (CH0 – CH15)

A3	A2	A1	A0	$\overline{\text{EN}}$	"ON" Channel <u>1</u> /
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 V_{OUT}

RHD5920

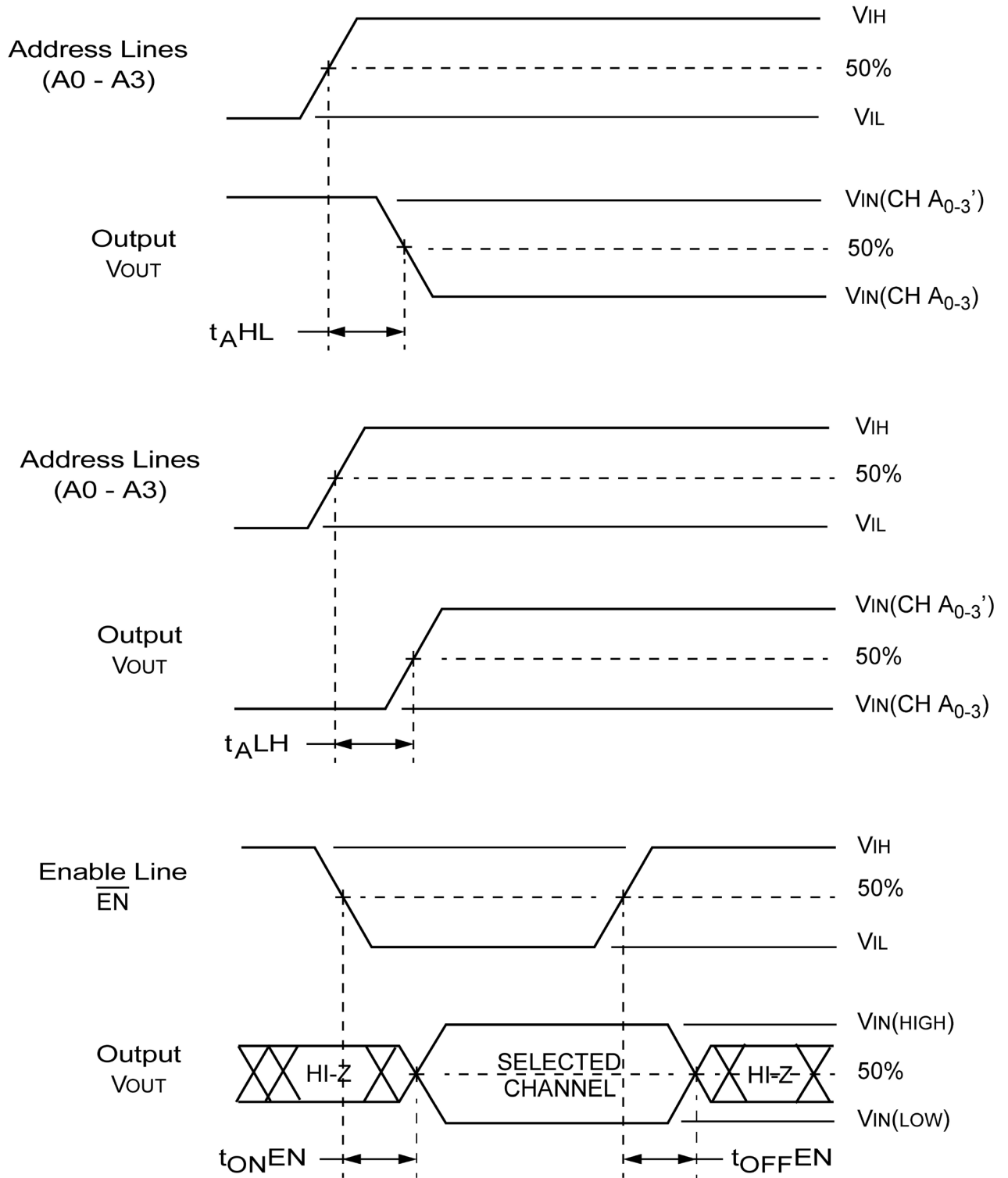


Figure 2: RHD5920 Switching Diagrams

Note:

1) $f = 10\text{KHz}$, Duty cycle = 50%.

RHD5920

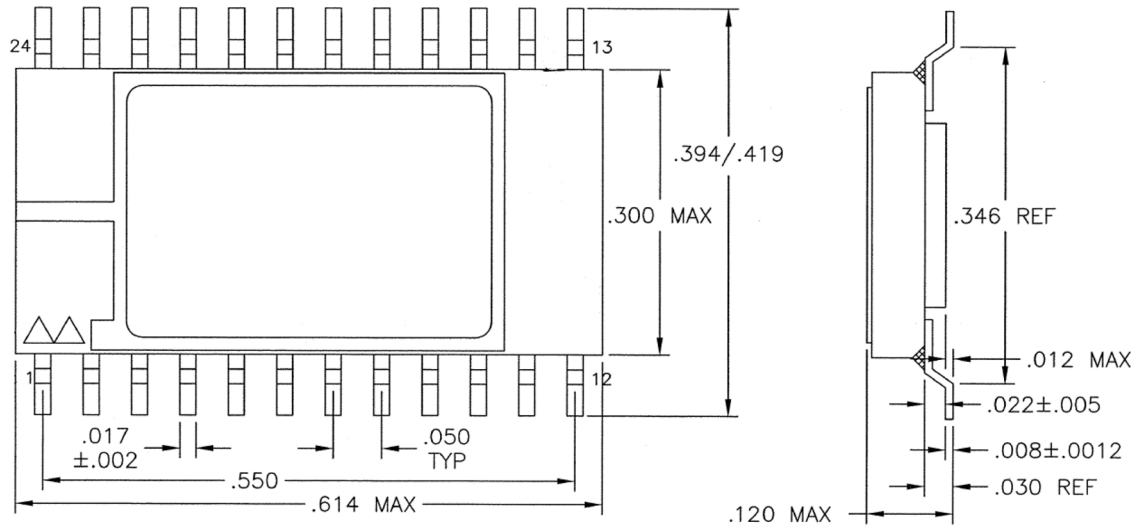


Figure 3: Package Outline

Note:

- 1) Package and lid are electrically isolated from signal pads.

Ordering Information

Model	DLA SMD #	Screening	Package
RHD5920-7	-	Commercial Flow, +25°C testing only	24-pin SOIC
RHD5920-201-1S	5962-1024301KXC	In accordance with DLA SMD	
RHD5920-201-2S	5962-1024301KXA		
RHD5920-901-1S	5962H1024301KXC	In accordance with DLA Certified RHA Program Plan to RHA Level "H", 1 Mrad(Si)	
RHD5920-901-2S	5962H1024301KXA		

Revision History

Date	Revision	Change Description
03/28/2016	E	Import into CAES format
06/21/2017	F	Remove 3.3 volt references, Add to the Absolute Max table: Input Current and Thermal Resistance.



RHD5920

Datasheet Definitions

	DEFINITION
Advanced Datasheet	CAES reserves the right to make changes to any products and services described herein at any time without notice. The product is still in the development stage and the datasheet is subject to change . Specifications can be TBD and the part package and pinout are not final .
Preliminary Datasheet	CAES reserves the right to make changes to any products and services described herein at any time without notice. The product is in the characterization stage and prototypes are available.
Datasheet	Product is in production and any changes to the product and services described herein will follow a formal customer notification process for form, fit or function changes.

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