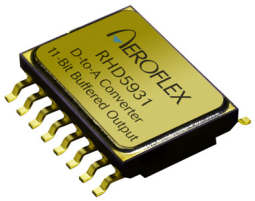
Standard Products

Datasheet

RadHard-by-Design
RHD5931 Digital-to-Analog Converter
11-Bit Buffered Output

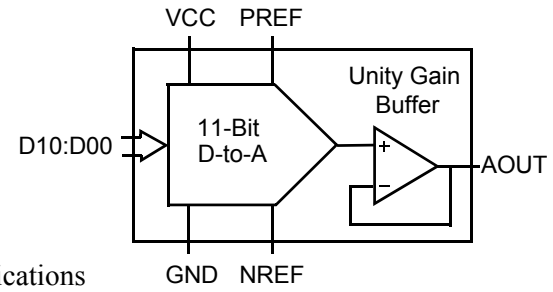
www.aeroflex.com/RHDseries

March 17, 2014



FEATURES

- Radiation performance
  - Total dose: >1 Mrad(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
- 11-Bit DAC
- Buffered Output
- Single power supply operation at +3.3V to +5V
- Low Power
- Full 4-quadrant multiplying DAC
- CMOS/TTL inputs
- Full military temperature range
- Designed for aerospace and high reliability space applications
- Packaging – Hermetic ceramic SOIC
  - 16 leads, 0.411"L x 0.293"W x 0.090"Ht
  - Typical Weight 0.8 grams



SCHEMATIC SYMBOL

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

GENERAL DESCRIPTION

The Aeroflex 11-Bit DAC is a standard CMOS R/2R Kelvin resistor network with a buffered output. The digital inputs, D10(MSB) through D00(LSB), are buffered to drive single-pole double-throw CMOS switches to apply either the PREF or NREF signals to the 2R legs of the resistor network.

PREF and NREF inputs can be any static or dynamic voltage within the power supply range. The nominal values for R and 2R are 5K and 10K respectively. The characteristic impedance of the resistor network is approximately 5K.

The voltage-output configuration of the integrated circuit can be thought of as a digitally controlled voltage with a value of PREF-NREF with a high output impedance. The output will swing rail-to-rail if unloaded.

Applications include digital potentiometers, programmable voltage sources and a large variety of other circuits that can be found in many industry references.

ABSOLUTE MAXIMUM RATINGS

Parameter	Range	Units
Case Operating Temperature Range	-55 to +125	°C
Storage Temperature Range	-65 to +150	°C
Junction Temperature	+150	°C
Lead Temperature (soldering, 10 seconds)	300	°C
Thermal Resistance, Junction to Case, Θjc	10	°C/W
Supply Voltage +Vcc	+6.0	V
PREF relative to NREF	+6.0	V
Digital Input Voltage	Vcc +0.4 GND -0.4	V
ESD Rating (MIL-STD-883, Method 3015, Class 2)	2,000 - 3,999	V
Power @25°C	200	mW

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

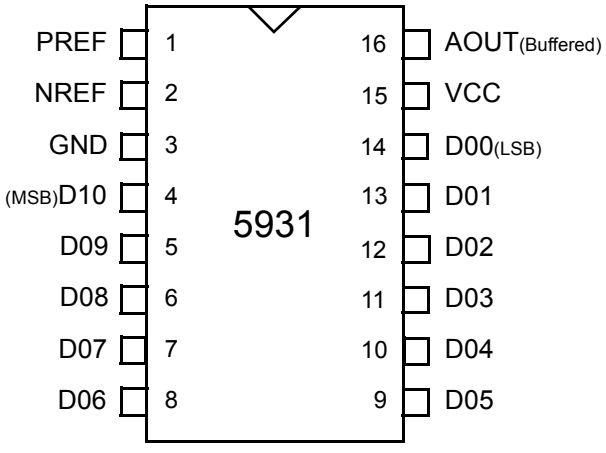
ELECTRICAL PERFORMANCE CHARACTERISTICS 1/
(Tc = -55°C to +125°C, +Vcc = +5.0V -- Unless otherwise specified)

Parameter	Symbol	Conditions	Min	Max	Units
Resolution 2/	N			11	Bits
Supply Current	Icc	Toggle inputs, Vcc, GND		5	mA
Quiescent current	Iccq	All inputs = Vcc		1	mA
Relative Accuracy	RA	PREF = Vcc, NREF = GND		0.25	% of FSR
Gain Error	AE	PREF = Vcc, NREF = GND		0.55	% of FSR
Offset Error	OFF_2	PREF = 4.9 V, NREF = 0.1 V		0.25	% of FSR
Output Settling Time	TD	All inputs = Gnd to Vcc, PREF = 4.9 V, NREF = 0.1 V, Output = 1/2 LSB of Nominal		5	us
PREF Input Z 2/	ZP			5K	Ω
NREF Input Z 2/	ZR			5K	Ω
Input Hi Voltage	VIH	PREF = 4.9 V, NREF = 0.1 V	3.5		V
Input Lo Voltage	VIL	PREF = 4.9 V, NREF = 0.1 V		1.5	V
Input High Leakage 3/	IIH	Input under test = GND		1	nA
Input Low Leakage 3/	IIL	Input under test = Vcc		1	nA

Note: 1/ Specification derated to reflect Total Dose exposure to 1 Mrad(Si) @ +25°C.
2/ Not Tested. Shall be guaranteed by design, characterization, or correlation to other test parameters.
3/ These parameters for Tc = -55°C are guaranteed by design, characterization, or correlation to other test parameters.

Package Pin #s	Signal	Definitions
1	PREF	Positive Analog Voltage Reference.
2	NREF	Negative Analog Voltage Reference
3	GND	- Voltage Supply
4	D10	Digital Bit 10 (MSB)
5	D09	Digital Bit 09
6	D08	Digital Bit 08
7	D07	Digital Bit 07
8	D06	Digital Bit 06
9	D05	Digital Bit 05
10	D04	Digital Bit 04
11	D03	Digital Bit 03
12	D02	Digital Bit 02
13	D01	Digital Bit 01
14	D00	Digital Bit 00 (LSB)
15	VCC	+ Voltage Supply
16	AOUT	Analog Output (Buffered)

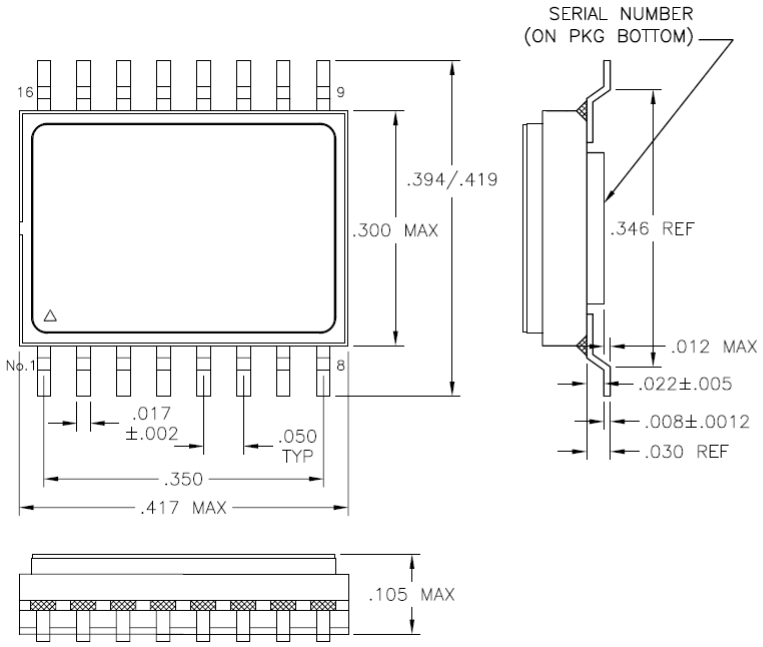
PINOUT DESCRIPTIONS



PACKAGE PINOUT

ORDERING INFORMATION

Model	DLA SMD #	Screening	Package
RHD5931-7	-	Commercial Flow, +25°C testing only	16-pin SOIC Package
RHD5931-S	-	Military Temperature, -55°C to +125°C Screened in accordance with the individual Test Methods of MIL-STD-883 for Space Applications	
RHD5931-201-1S	5962-1120802KXC	In accordance with DLA SMD	
RHD5931-201-2S	5962-1120802KXA		
RHD5931-901-1S	5962H1120802KXC	DLA SMD and Radiation Certification Pending	
RHD5931-901-2S	5962H1120802KXA		



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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