

RadHard-by-Design RHD5964 Precision Voltage Reference

www.aeroflex.com/RHDseries

December 8, 2014



FEATURES

- Operating voltage range: 3 volts to 6 volts.
- Radiation performance
 - Total dose: > 1 Mrad(Si); Dose rate = 50 - 300 rads(Si)/s
 - ELDRS Immune
 - SEL Immune > 100 MeV-cm²/mg
 - Neutron Displacement Damage > 10¹⁴ neutrons/cm²
- 2.50V Precision Voltage Reference
- Power at 5 volts: 5mW
- 2000V Input/Output ESD protection
- Full military temperature range
- Designed for aerospace and high reliability space applications
- Packaging – Hermetic Ceramic Surface Mount
 - Weight - 2.0 gm max
- Aeroflex Plainview's Radiation Hardness Assurance Plan is DLA Certified to MIL-PRF-38534, Appendix G.

GENERAL DESCRIPTION

Aeroflex's RHD5964 is a radiation hardened, single supply, Voltage Reference in a 3-pad SMD-0.5 Packages. The RHD5964 design uses specific circuit topology and layout methods to mitigate total ionizing dose effects and single event latchup. These characteristics make the RHD5964 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 RHD5964 is ideal for demanding military and space applications.

The RHD5964 integrated circuit die is mounted directly to the metal signal pad providing optimum thermal conduction to the printed circuit board bond sites.

TABLE 1: 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
Input Voltage VIN - GND	+6.0	V
Enable (EN)	VIN +0.4, GND -0.4	V
Lead Temperature (soldering, 10 seconds)	300	°C
Thermal Resistance, Junction to Case, @jc	3.5	°C/W
ESD Rating (per 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.

TABLE 2: RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Typical	Units
+VIN	Input Supply Voltage	3.0 to 5.0	V
EN - High	Output Enabled	70% VIN	V
EN - Low	Output Disabled	30% VIN	V

TABLE 3: ELECTRICAL PERFORMANCE CHARACTERISTICS

(TC = -55°C TO +125°C, +VIN = +5.0V, unless stated otherwise)

RHD5964: 2.50V Precision Voltage Reference							
Parameter	Symbol	Conditions	Min	Typ	Max	Units	
Quiescent Supply Current	IINQ	No Load	-	.625	1	mA	
Reference Output Voltage	VREF	No Load	+25°C	2.45	2.5	2.55	V
Reference Temperature Co <u>3/</u>	REF TC		-	25	35	ppm/°C	
Reference Change with Temperature <u>4/</u>	ΔREFT		-	0.45	0.63	%	
Long Term Stability <u>5/</u>	ΔVREF/TIME		-	-	100	ppm	
Power Supply Rejection Ratio	PSRR		45	-	-	dB	
Reference Load Regulation	REFIL	IOUT = 0 -to- 1 mA	-	-	0.12	%/mA	
Reference Short Circuit Current	IO(SINK)	Reference to VCC	-25	-50	-75	mA	
	IO(SOURCE)	Reference to GND	25	50	75	mA	
Switching Characteristics							
Turn on Time	TON	5% Settling, No Load	-	-	30	us	

Notes:

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/ Reference temperature coefficient is defined as the absolute value of the difference from the maximum and minimum voltage over the specified temperature range, divided by the change in temperature and converted into ppm/°C.

$$\text{RefTc} = \frac{\left| \frac{V_{\text{max}} - V_{\text{min}}}{2.5\text{V}} \right| * 100}{(125 - (-55))} * 10000$$

4/ Reference change with temperature is defined as the absolute value of the difference from the maximum and minimum voltage over the specified temperature range represented as a percentage.

$$\Delta \text{RefT} = \left| \frac{V_{\text{max}} - V_{\text{min}}}{2.5\text{V}} \right| * 100$$

5/ Not tested. Shall be guaranteed to specified limits after 1000hr life test

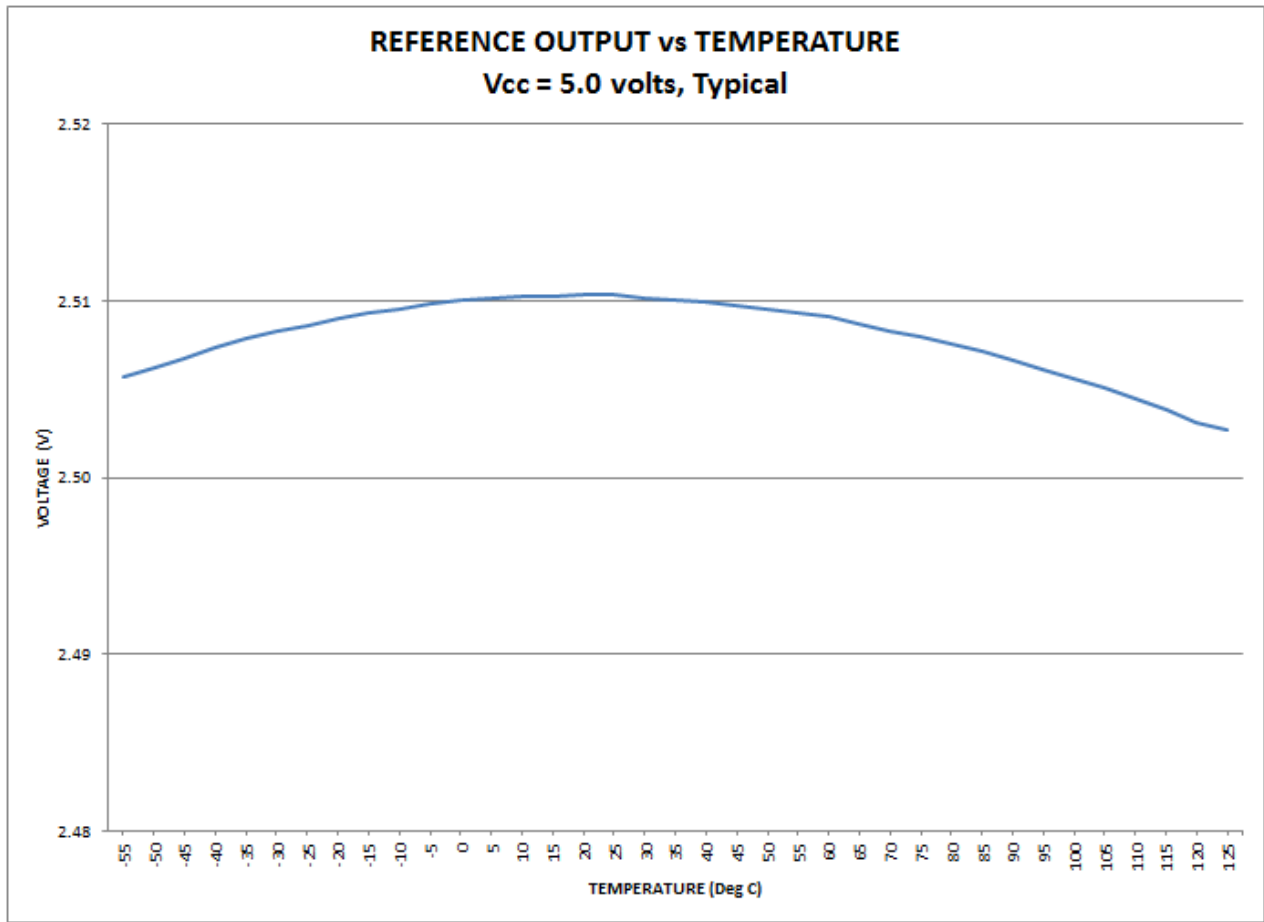
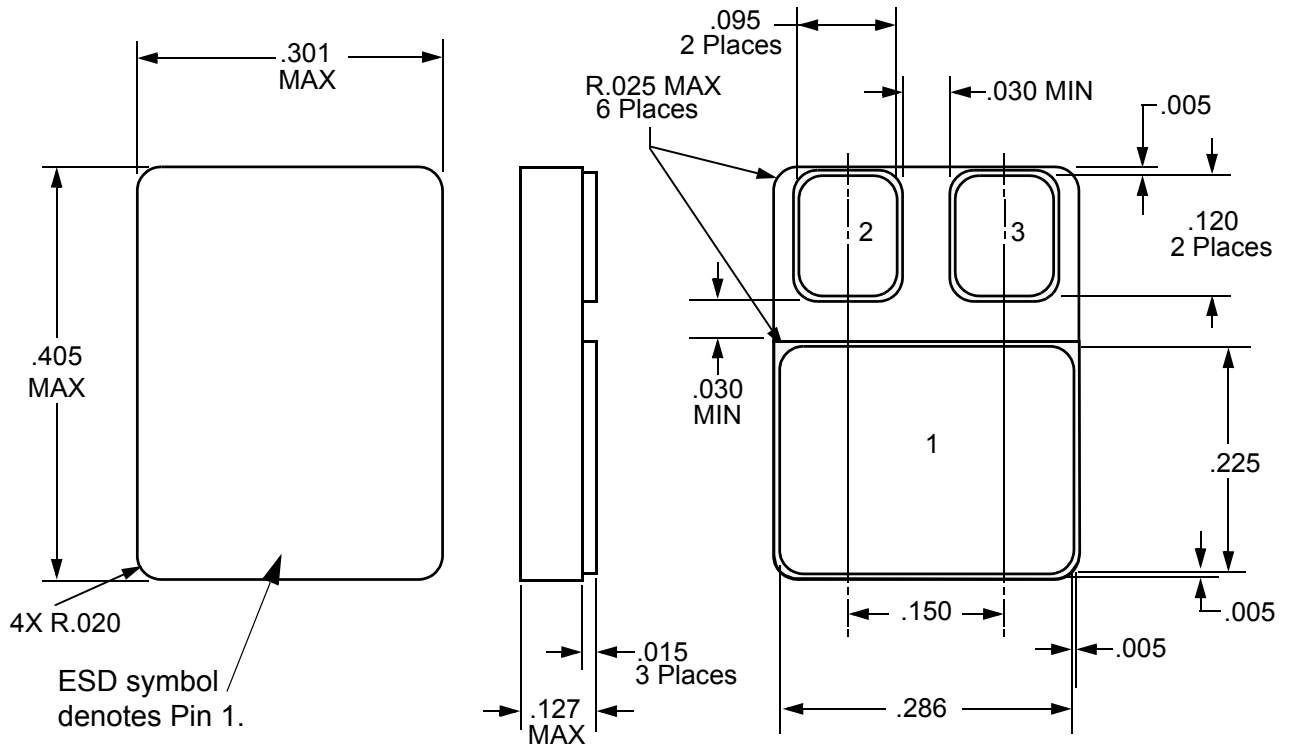


FIGURE 1– VREF OUTPUT vs TEMPERATURE

RHD5964 SIGNAL DEFINITIONS

Pad #	Signal	Definition
1	GND	Ground
2	VREF	2.50V Precision Voltage Reference
3	VIN	Input Voltage



NOTE: Package & Lid are electrically isolated from signal pads.

FIGURE 2 – PACKAGE OUTLINE — SURFACE MOUNT : SMD-0.5

ORDERING INFORMATION

Model	DLA SMD #	Screening	Package
RHD5964-7	-	Commercial Flow, +25°C testing only	3-Pad SMD-0.5 Power Pkg
RHD5964-901-1S	5962H1422104KXC	DLA SMD and Radiation Certification Pending	
RHD5964-901-2S	5962H1422104KXA		

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@eroflex.com

Datasheet Definitions:

<i>Advanced</i>	<i>Product in Development</i>
<i>Preliminary</i>	<i>Shipping Non-Flight Prototypes</i>
<i>Datasheet</i>	<i>Shipping QML and Reduced HiRel</i>



Aeroflex Plainview, Inc. reserves the right to make changes to any products and services described herein at any time without notice. Consult Aeroflex or an authorized sales representative to verify that the information in this data sheet is current before using this product. Aeroflex does not assume any responsibility or liability arising out of the application or use of any product or service described herein, except as expressly agreed to in writing by Aeroflex; nor does the purchase, lease, or use of a product or service from Aeroflex convey a license under any patent rights, copyrights, trademark rights, or any other of the intellectual rights of Aeroflex or of third parties.

Our passion for performance is defined by three attributes.



Solution-Minded



Performance-Driven



Customer-Focused