DESCRIPTION

The RH1021-5 is a precision 5V reference with ultralow drift and noise, extremely good long term stability and almost total immunity to input voltage variations. The reference output will source and sink up to 10mA. Unique circuit design makes the RH1021-5 the first IC reference to offer ultralow drift without the use of high power on-chip heaters.

The wafer lots are processed to Linear Technology's in-house Class S flow to yield circuits usable in stringent military applications.

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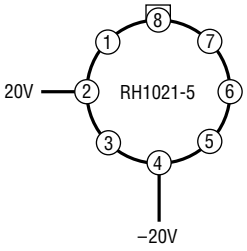
All other trademarks are the property of their respective owners.

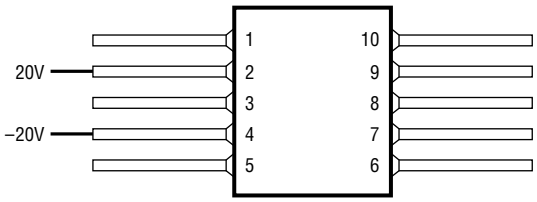
ABSOLUTE MAXIMUM RATINGS

(Note 9)

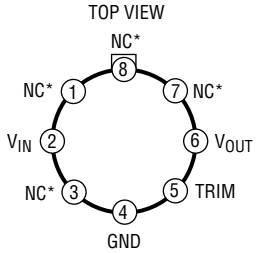
Input Voltage 40V
Input/Output Voltage Differential 35V
Output to Ground Voltage
(Sink Mode Current Limit) 10V
Trim Pin-to-Ground Voltage
  Positive ..... Equal to V_{OUT}
  Negative ..... –20V
Output Short-Circuit Duration
  V_{IN} = 35V ..... 10 sec
  $V_{IN} \leq$ 20V ..... Indefinite
Operating Temperature Range ..... –55°C to 125°C
Storage Temperature Range ..... –65°C to 150°C
Lead Temperature (Soldering, 10 sec) ..... 300°C

BURN-IN CIRCUITS





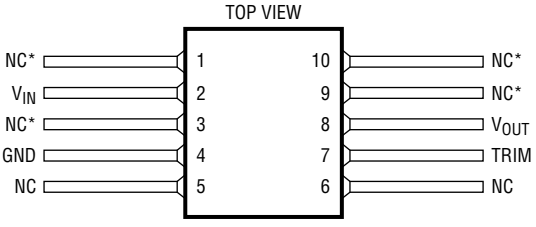
PACKAGE/ORDER INFORMATION



H PACKAGE
8-LEAD TO-5 METAL CAN

* CONNECTED INTERNALLY.
DO NOT CONNECT EXTERNAL
CIRCUITRY TO THESE PINS.

ORDER PART NUMBER
RH1021BMH-5
RH1021CMH-5
RH1021DMH-5



W PACKAGE
10-LEAD CERPAC

* CONNECTED INTERNALLY.
DO NOT CONNECT EXTERNAL
CIRCUITRY TO THESE PINS.

ORDER PART NUMBER
RH1021CMW-5

TABLE 1: ELECTRICAL CHARACTERISTICS (Preirradiation) (Note 8)

SYMBOL	PARAMETER	CONDITIONS	NOTES	T_A = 25°C MIN	TYP	MAX	SUB-GROUP	−55°C ≤ T_A ≤ 125°C MIN	TYP	MAX	SUB-GROUP	UNITS
V_{OUT}	Output Voltage	RH1021CM-5	1	4.9975		5.0025	1					V
		RH1021BM-5, DM-5	1	4.95		5.05	1					V
TCV_{OUT}	Output Voltage Temperature Coefficient	RH1021BM-5	2							5	2,3	ppm/°C
		RH1021CM-5, DM-5	2							20	2,3	ppm/°C
$\frac{\Delta V_{OUT}}{\Delta V_{IN}}$	Line Regulation	7.2V ≤ V_{IN} ≤ 10V	3			12	1			20	2,3	ppm/V
		10V ≤ V_{IN} ≤ 40V	3			6	1			10	2,3	ppm/V
$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	Load Regulation (Sourcing Current)	0 ≤ I_{OUT} ≤ 10mA	3			20	1			35	2,3	ppm/mA
	Load Regulation (Sinking Current)	0 ≤ I_{OUT} ≤ 10mA	3			100	1			150	2,3	ppm/mA
I_S	Supply Current					1.2	1			1.5	2,3	mA
	Output Voltage Noise	0.1Hz ≤ f ≤ 10Hz	4		3							μV_{P-P}
		10Hz ≤ f ≤ 1kHz	4			3.5	4					μV_{RMS}
	Long Term Stability of V_{OUT}	ΔT = 1000 Hrs Noncumulative	5		15							ppm
	Temperature Hysteresis of V_{OUT}	ΔT = ±25°C			10							ppm

TABLE 1A: ELECTRICAL CHARACTERISTICS (Postirradiation) (Note 6)

SYMBOL	PARAMETER	CONDITIONS	NOTES	10Krad(Si) MIN	MAX	20Krad(Si) MIN	MAX	50Krad(Si) MIN	MAX	100Krad(Si) MIN	MAX	200Krad(Si) MIN	MAX	UNITS
V_{OUT}	Output Voltage	RH1021CM-5	1	4.9945	5.0055	4.993	5.007	4.991	5.009	4.9875	5.0125	4.984	5.016	V
		RH1021BM-5, DM-5	1	4.95	5.05	4.945	5.055	4.942	5.058	4.94	5.06	4.935	5.065	V
TCV_{OUT}	Output Voltage Temperature Coefficient	RH1021BM-5	2		5		5		5		7		10	ppm/°C
		RH1021CM-5, DM-5	2		20		20		20		22		25	ppm/°C
$\frac{\Delta V_{OUT}}{\Delta V_{IN}}$	Line Regulation	7.2V ≤ V_{IN} ≤ 10V	3		12		12		13.5		15		18	ppm/V
		10V ≤ V_{IN} ≤ 40V	3		6		6		6		7		9	ppm/V
$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	Load Regulation (Sourcing Current)	0 ≤ I_{OUT} ≤ 10mA	3,7		20		20		20		20		20	ppm/mA
	Load Regulation (Sinking Current)	0 ≤ I_{OUT} ≤ 10mA	3		100		100		100		100		150	ppm/mA
I_S	Supply Current				1.2		1.2		1.2		1.2		1.2	mA

TABLE 1A: ELECTRICAL CHARACTERISTICS (Postirradiation) (Note 6)

Note 1: Output voltage is measured immediately after turn-on. Changes due to chip warm-up are typically less than 0.005%.

Note 2: Temperature coefficient is measured by dividing the change in output voltage over the temperature range by the change in temperature. Separate tests are done for hot and cold; T_{MIN} to 25°C and 25°C to T_{MAX}. Incremental slope is also measured at 25°C.

Note 3: Line and load regulation are measured on a pulse basis. Output changes due to die temperature change must be taken into account separately. Package thermal resistance is 150°C/W for the TO-5 (H) package and 170°C/W for the 10-lead flatpack (W) package.

Note 4: RMS noise is measured with a 2-pole highpass filter at 10Hz and a 2-pole lowpass filter at 1kHz. The resulting output is full wave rectified and then integrated for a fixed period, making the final reading an average as opposed to RMS. Correction factors are used to convert from average to RMS and to correct for the nonideal bandpass of the filters. Peak-to-peak noise is measured with a single highpass filter at 0.1Hz and a 2-pole lowpass filter at 10Hz. The unit is enclosed in a still-air environment to eliminate thermocouple effects on the leads. Test time is 10 seconds.

Note 5: Consult factory for units with long term stability data.

Note 6: V_{IN} = 10V, I_{OUT} = 0, T_A = 25°C, unless otherwise noted.

Note 7: $I_{OUT(MAX)}$ (Sourcing) is 5mA for exposures greater than 100Krad (Si).

Note 8: V_{IN} = 10V, I_{OUT} = 0, unless otherwise noted.

Note 9: Absolute Maximum Ratings are those values beyond which the life of a device may be impaired.

TABLE 2: ELECTRICAL TEST REQUIREMENTS

MIL-STD-883 TEST REQUIREMENTS	SUBGROUP
Final Electrical Test Requirements (Method 5004)	1*,2,3,4
Group A Test Requirements (Method 5005)	1,2,3,4
Group B and D for Class S, and Group C and D for Class B End Point Electrical Parameters (Method 5005)	1,2,3

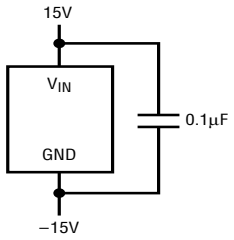
* PDA Applies to subgroup 1. See PDA Test Notes.

PDA Test Notes

The PDA is specified as 5% based on failures from group A, subgroup 1, tests after cooldown as the final electrical test in accordance with method 5004 of MIL-STD-883. The verified failures of group A, subgroup 1, after burn-in divided by the total number of devices submitted for burn-in in that lot shall be used to determine the percent for the lot.

Linear Technology Corporation reserves the right to test to tighter limits than those given.

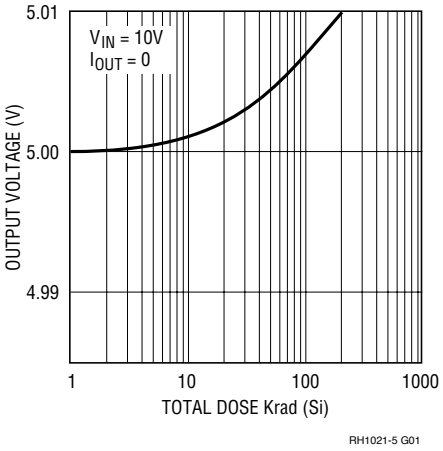
TOTAL DOSE BIAS CIRCUIT



Information furnished by Linear Technology Corporation is believed to be accurate and reliable. However, no responsibility is assumed for its use. Linear Technology Corporation makes no representation that the interconnection of its circuits as described herein will not infringe on existing patent rights.

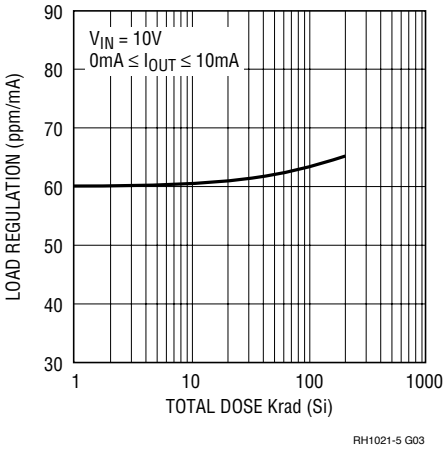
TYPICAL PERFORMANCE CHARACTERISTICS

Output Voltage



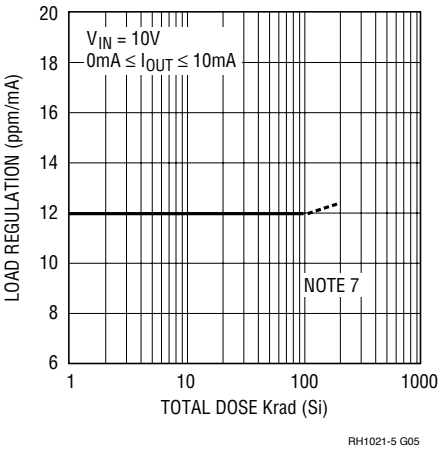
RH1021-5 G01

Load Regulation (Sinking)



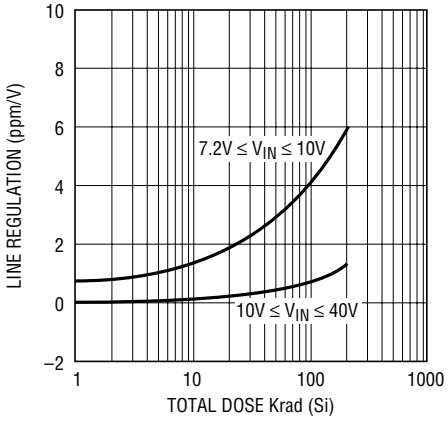
RH1021-5 G03

Load Regulation (Sourcing)



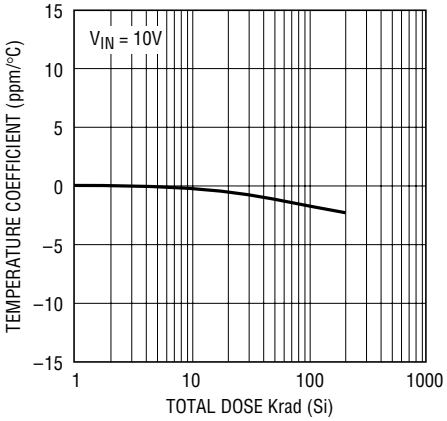
RH1021-5 G05

Line Regulation



RH1021-5 G02

Temperature Coefficient



RH1021-5 G04

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