



Negative Adjustable Regulator

DESCRIPTION

The RH137 negative adjustable regulator will deliver up to 1.5A output current over an output voltage range of -1.2V to -32V.

Every effort has been made to make these devices easy to use and difficult to damage. Internal current and power limiting coupled with true thermal limiting prevents device damage due to overloads or shorts, even if the regulator is not fastened to a heat sink.

Maximum reliability is attained with Linear Technology's advanced processing techniques combined with a 100% burn-in in the thermal limit mode. This assures that all device protection circuits are working and eliminates field failures experienced with other regulators that receive only standard electrical testing.

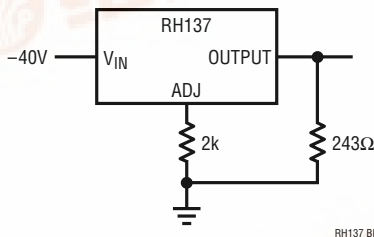
The wafer lots are processed to Linear Technology's in-house Class S flow to yield circuits usable in stringent military applications.

ABSOLUTE MAXIMUM RATINGS

Power Dissipation	Internally Limited
Input-to-Output Voltage Differential	40V
Operating Junction Temperature Range	-55°C to 150°C
Storage Temperature Range	-65°C to 150°C
Lead Temperature (Soldering, 10 sec)	300°C

LT, LTC and LT are registered trademarks of Linear Technology Corporation.

BURN-IN CIRCUIT



PACKAGE/ORDER INFORMATION

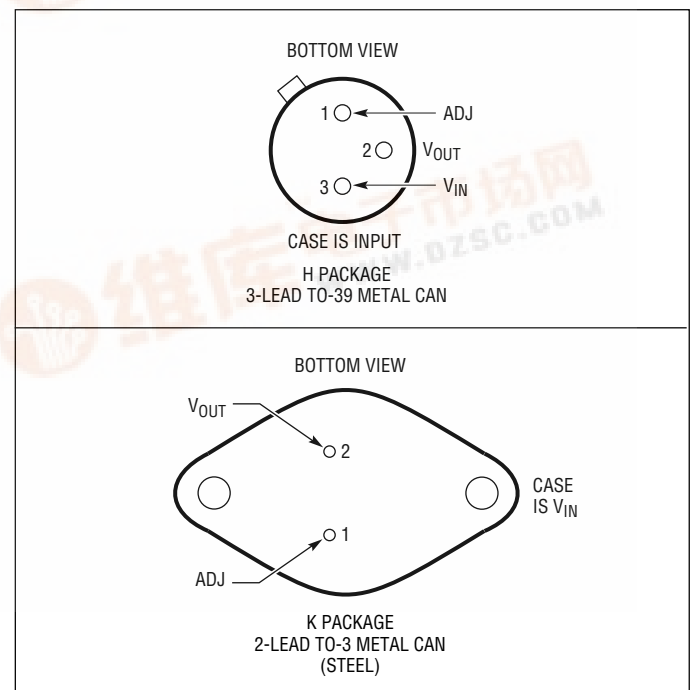


TABLE 1: ELECTRICAL CHARACTERISTICS (Preirradiation) (Note 1)

SYMBOL	PARAMETER	CONDITIONS	NOTES	$T_A = 25^\circ\text{C}$			SUB-GROUP	T_A			SUB-GROUP	UNITS
				MIN	TYP	MAX		-55°C	150°C	MIN		
V_{REF}	Reference Voltage	$ V_{IN} - V_{OUT} = 5\text{V}, I_{OUT} = 10\text{mA}$		-1.225	-1.275		1					V
		3V $ V_{IN} - V_{OUT} = 40\text{V}$, 10mA $I_{OUT} I_{MAX}, P P_{MAX}$		-1.200	-1.300		1	-1.200	-1.300	2,3		V
$\frac{V_{OUT}}{V_{IN}}$	Line Regulation	3V $ V_{IN} - V_{OUT} = 40\text{V}$	2		0.02		1		0.05	2,3		%/V
$\frac{V_{OUT}}{I_{OUT}}$	Load Regulation	10mA $I_{OUT} I_{MAX}, V_{OUT} = 5\text{V}$	2		25		1		50	2,3		mV
		10mA $I_{OUT} I_{MAX}, V_{OUT} = 5\text{V}$	2		0.5		1		1	2,3		%
	Thermal Regulation	10ms Pulse			0.02		1					%/W
	Ripple Rejection	$V_{OUT} = -10\text{V}, f = 120\text{Hz}, C_{ADJ} = 0$			60							dB
		$V_{OUT} = -10\text{V}, f = 120\text{Hz}, C_{ADJ} = 10\mu\text{F}$	3		66				66			dB
I_{ADJ}	Adjust Pin Current				100		1		100	2,3		μA
I_{ADJ}	Adjust Pin Current Change	10mA $I_{OUT} I_{MAX}$			5		1		5	2,3		μA
		3V $ V_{IN} - V_{OUT} = 40\text{V}$			5		1		5	2,3		μA
I_{MIN}	Minimum Load Current	$ V_{IN} - V_{OUT} = 40\text{V}$			5		1		5	2,3		mA
		$ V_{IN} - V_{OUT} = 10\text{V}$			3		1		3	2,3		mA
	Current Limit	$ V_{IN} - V_{OUT} = 15\text{V}$ H Package			0.5	1.5	1		0.5		2,3	A
		K Package			1.5	3.2	1		1.5		2,3	A
		$ V_{IN} - V_{OUT} = 40\text{V}$ H Package			0.15	0.5	1					A
		K Package			0.24	1.0	1					A
$\frac{V_{OUT}}{\text{Temp}}$	Temperature Stability	-55°C T_J 125°C	3						0.6			%
$\frac{V_{OUT}}{\text{Time}}$	Long Term Stability	$T_A = 125^\circ\text{C}$	3						1			%
e_n	RMS Output Noise	10Hz f 10kHz			0.003							%
θ_{JC}	Thermal Resistance (Junction to Case)	H Package	3		15							$^\circ\text{C}/\text{W}$
		K Package	3		3							$^\circ\text{C}/\text{W}$

TABLE 1A: ELECTRICAL CHARACTERISTICS (Postirradiation) (Note 4)

SYMBOL	PARAMETER	CONDITIONS	NOTES	10KRAD(Si)		20KRAD(Si)		50KRAD(Si)		100KRAD(Si)		200KRAD(Si)		UNITS
				MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
V_{REF}	Reference Voltage	$ V_{IN} - V_{OUT} = 5\text{V}, I_{OUT} = 10\text{mA}$		-1.225	-1.275	-1.225	-1.275	-1.225	-1.275	-1.225	-1.275	-1.22	-1.28	V
		3V $ V_{IN} - V_{OUT} = 40\text{V}$, 10mA $I_{OUT} I_{MAX}, P P_{MAX}$		-1.2	-1.3	-1.2	-1.3	-1.2	-1.3	-1.2	-1.3	-1.2	-1.3	V
$\frac{V_{OUT}}{V_{IN}}$	Line Regulation	3V $ V_{IN} - V_{OUT} = 40\text{V}$,	2		0.02		0.02		0.02		0.02		%/V	
$\frac{V_{OUT}}{I_{OUT}}$	Load Regulation	10mA $I_{OUT} I_{MAX}, V_{OUT} = 5\text{V}$	2		25		25		25		25		mV	
		10mA $I_{OUT} I_{MAX}, V_{OUT} = 5\text{V}$	2		0.5		0.5		0.5		0.5		%	

TABLE 1A: ELECTRICAL CHARACTERISTICS (Postirradiation) (Note 4)

SYMBOL	PARAMETER	CONDITIONS	NOTES	10KRAD(Si)		20KRAD(Si)		50KRAD(Si)		100KRAD(Si)		200KRAD(Si)		UNITS	
				MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX		
I_{ADJ}	Adjust Pin Current				100		100		100		100		100	μ A	
I_{ADJ}	Adjust Pin Current Change	10mA I_{OUT} I_{MAX} 3V $ V_{IN} - V_{OUT} = 40V$			5		5		5		5		5	μ A	
I_{MIN}	Minimum Load Current	$ V_{IN} - V_{OUT} = 40V$ $ V_{IN} - V_{OUT} = 10V$			5		5		5		5		5	mA	
	Current Limit	H Package $ V_{IN} - V_{OUT} = 15V$ $ V_{IN} - V_{OUT} = 40V$			0.5	1.5	0.5	1.5	0.5	1.5	0.5	1.5	0.5	1.5	A
		K Package $ V_{IN} - V_{OUT} = 15V$ $ V_{IN} - V_{OUT} = 40V$			0.15	0.5	0.15	0.5	0.15	0.5	0.15	0.5	0.15	0.5	A
					1.5	3.2	1.5	3.2	1.5	3.2	1.5	3.2	1.5	3.2	A
					0.24	1	0.24	1	0.24	1	0.24	1	0.24	1	A

Note 1: Unless otherwise specified, these specifications apply for $|V_{IN} - V_{OUT}| = 5V$; and $I_{OUT} = 0.1A$ for the H package (TO-39) and $I_{OUT} = 0.5A$ for the K package (TO-3) package. Although power dissipation is internally limited, these specifications are applicable for power dissipations of 2W for the TO-39 and 20W for the TO-3. I_{MAX} is 0.2A for the TO-39 and 1.5A for the TO-3 package.

Note 2: Regulation is measured at a constant junction temperature using pulse testing with a low duty cycle. Changes in output voltage due to heating effects are covered under the specification for thermal regulation.

Note 3: Guaranteed by design, characterization or correlation to other tested parameters.

Note 4: $T_J = 25^\circ C$ unless otherwise noted.

TABLE 2: ELECTRICAL TEST REQUIREMENTS

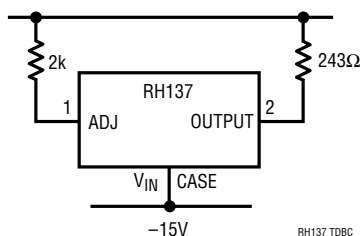
MIL-STD-883 TEST REQUIREMENTS	SUBGROUP
Final Electrical Test Requirements (Method 5004)	1*,2,3
Group A Test Requirements (Method 5005)	1,2,3
Group C and D End Point Electrical Parameters (Method 5005)	1

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

PDA Test Notes

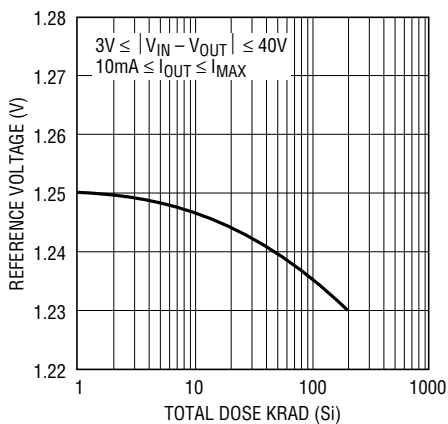
The PDA is specified as 5% based on failures from group A, subgroup 1, tests after cooldown as the final electrical test in accordance with method 5004 of MIL-STD-883 Class B. The verified failures of group A, subgroup 1, after burn-in divided by the total number of devices submitted for burn-in in that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

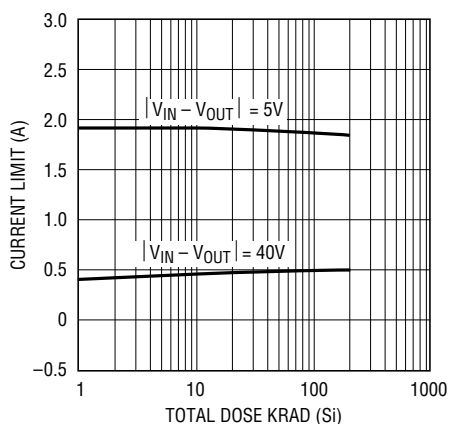
TYPICAL PERFORMANCE CHARACTERISTICS

Reference Voltage



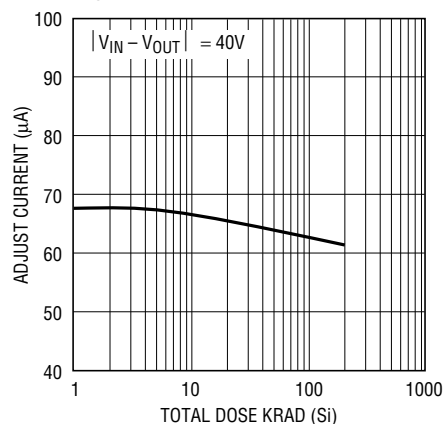
RH137 G01

Current Limit



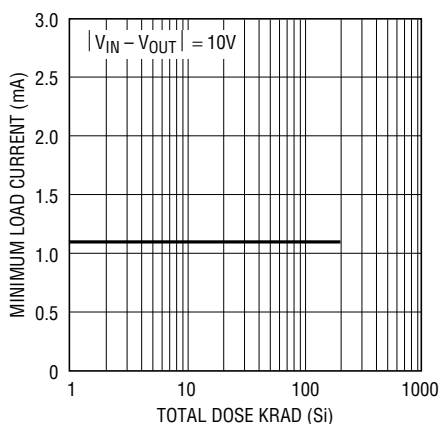
RH137 G02

Adjust Current



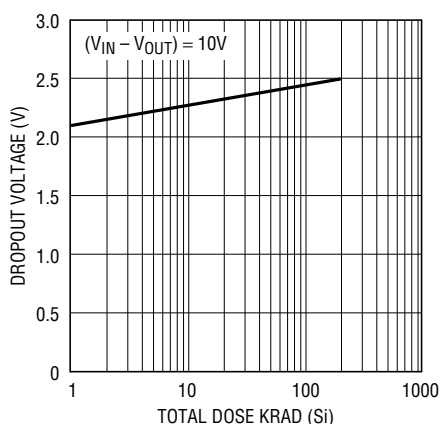
RH137 G03

Minimum Load Current



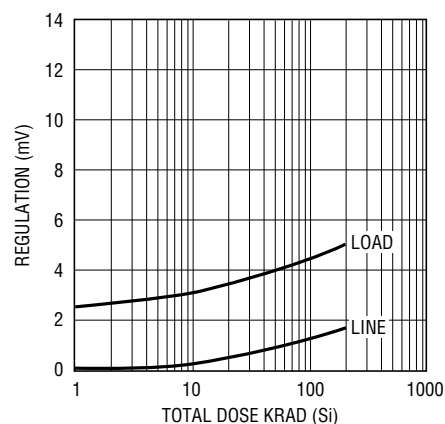
RH137 G04

Dropout Voltage



RH137 G05

Regulation



RH137 G06