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.

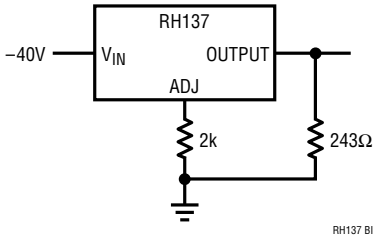
Maximum reliability is attained with Linear Technology's advanced processing techniques combined with a 100% burn-in in the thermal limit mode. This assures that all device protection circuits are working and eliminates field failures experienced with other regulators that receive only standard electrical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

BURN-IN CIRCUIT



PACKAGE/ORDER INFORMATION

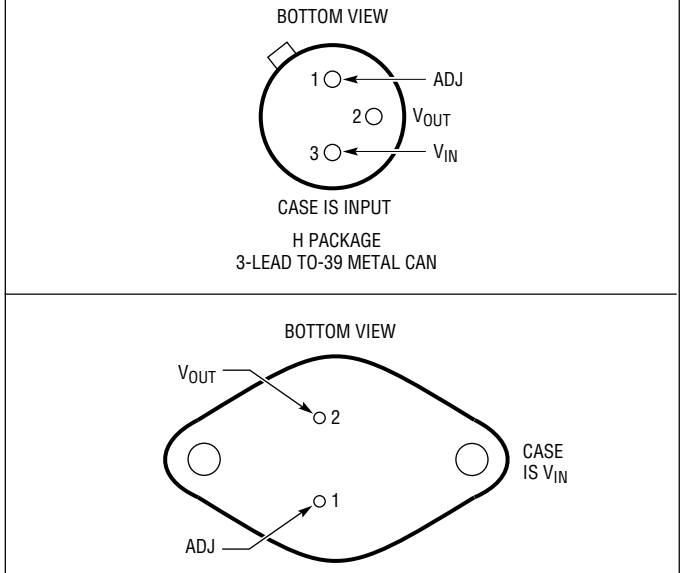


TABLE 1: ELECTRICAL CHARACTERISTICS (Preirradiation) (Note 1)

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

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

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_{REF}	Reference Voltage	$\|V_{IN} - V_{OUT}\|$ 5V, I_{OUT} = 10mA		–1.225	–1.275	–1.225	–1.275	–1.225	–1.275	–1.225	–1.275	–1.22	–1.28	V
		3V $\|V_{IN} - V_{OUT}\|$ 40V, 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 $\|V_{IN} - V_{OUT}\|$ 40V,	2		0.02		0.02		0.02		0.02		0.02	%/V
$\frac{V_{OUT}}{I_{OUT}}$	Load Regulation	10mA I_{OUT} I_{MAX}, $\|V_{OUT}\|$ 5V	2		25		25		25		25		25	mV
		10mA I_{OUT} I_{MAX}, $\|V_{OUT}\|$ 5V	2		0.5		0.5		0.5		0.5		0.5	%

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

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

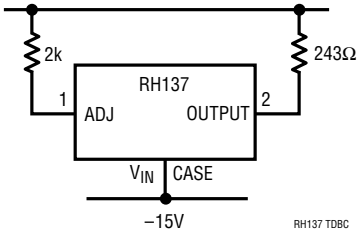
* PDA Applies to subgroup 1. See PDA Test Notes.

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.

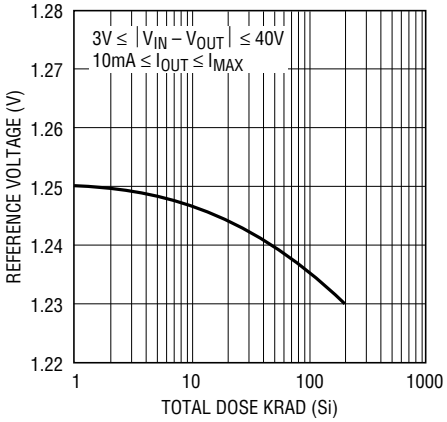
Linear Technology Corporation reserves the right to test to tighter limits than those given.

TOTAL DOSE BIAS CIRCUIT

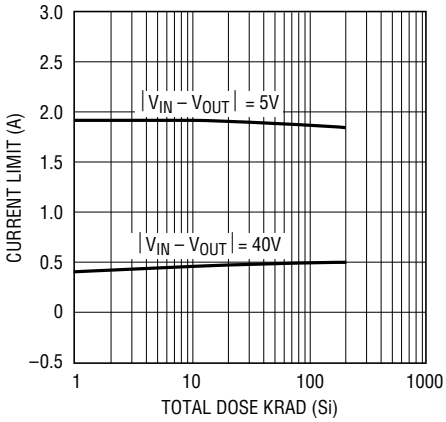


TYPICAL PERFORMANCE CHARACTERISTICS

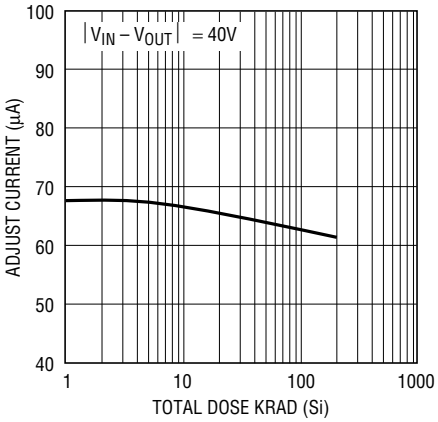
Reference Voltage



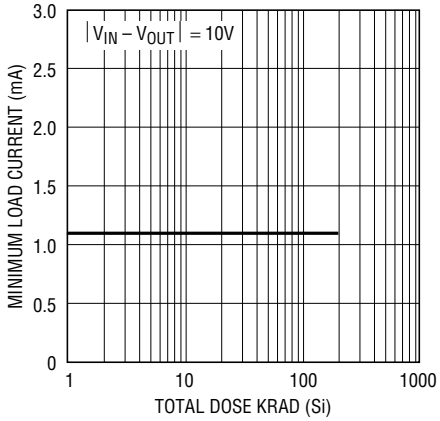
Current Limit



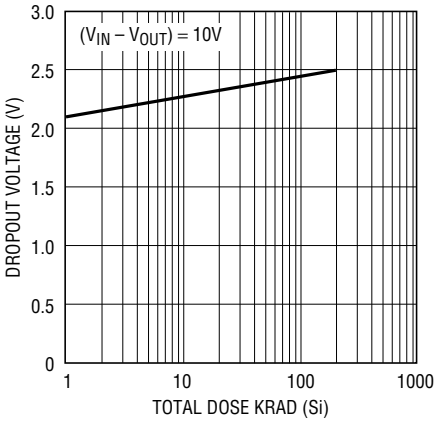
Adjust Current



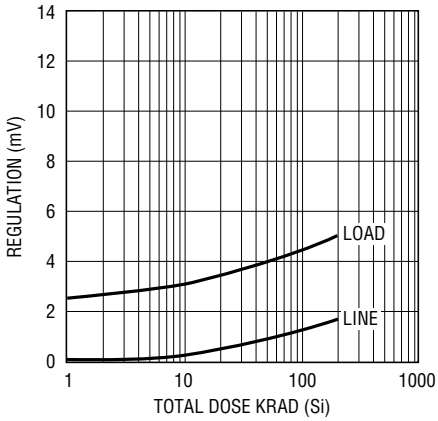
Minimum Load Current



Dropout Voltage



Regulation



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