

# Positive Adjustable Regulator


## DESCRIPTION

The RH117 is a 3-terminal positive adjustable regulator capable of supplying up to 0.5A (H package) or 1.5A (K package). The output is adjusted using two external resistors for a range of 1.2V to 37V. The devices have full current limit thermal overload safe area protection, all of which remain functional even if the adjustment terminal is disconnected.

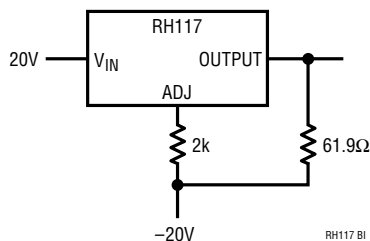
The wafer lots are processed to LTC's in-house Class S flow to yield circuits usable in stringent military applications. In addition to 883 processing, the RH117 is subjected to 100% burn-in in thermal limit.

## ABSOLUTE MAXIMUM RATINGS

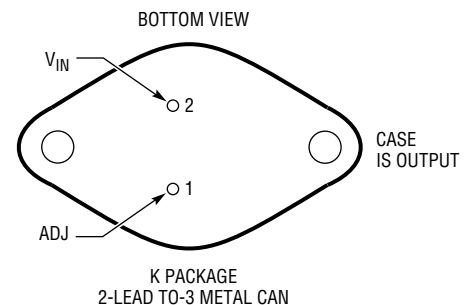
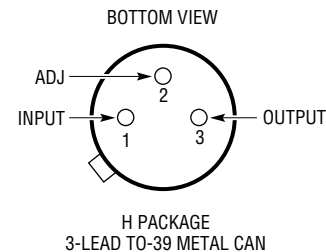
Power Dissipation .....	Internally Limited
Input-to-Output Voltage Differential .....	40V
Operating Junction	
Temperature Range .....	-55°C to 150°C
Storage Temperature Range .....	-65°C to 150°C
Lead Temperature (Soldering, 10 sec) .....	300°C

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## BURN-IN CIRCUIT



## PACKAGE/ORDER INFORMATION



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

SYMBOL	PARAMETER	CONDITIONS	NOTES	T <sub>J</sub> = 25°C			SUB-GROUP	-55°C T <sub>J</sub> 150°C			SUB-GROUP	UNITS
				MIN	TYP	MAX		MIN	TYP	MAX		
V <sub>REF</sub>	Reference Voltage	3V (V <sub>IN</sub> - V <sub>OUT</sub> ) 40V, 10mA I <sub>OUT</sub> I <sub>MAX</sub> , P P <sub>MAX</sub>		1.20		1.30	1	1.20		1.30	2,3	V
$\frac{V_{OUT}}{V_{IN}}$	Line Regulation	3V (V <sub>IN</sub> - V <sub>OUT</sub> ) 40V, I <sub>OUT</sub> = 10mA	2			0.02	1			0.05	2,3	%/V
$\frac{V_{OUT}}{I_{OUT}}$	Load Regulation	10mA I <sub>OUT</sub> I <sub>MAX</sub> , V <sub>OUT</sub> 5V	2			15	1			50	2,3	mV
		10mA I <sub>OUT</sub> I <sub>MAX</sub> , V <sub>OUT</sub> 5V	2			0.3	1			1	2,3	%
	Thermal Regulation	20ms Pulse				0.07	1					%/W
	Ripple Rejection	V <sub>OUT</sub> = 10V, f = 120Hz, C <sub>ADJ</sub> = 0				65				65		dB
		V <sub>OUT</sub> = 10V, f = 120Hz, C <sub>ADJ</sub> = 10μF	3			66				66		dB
I <sub>ADJ</sub>	Adjust Pin Current					100	1			100	2,3	μA
I <sub>ADJ</sub>	Adjust Pin Current Change	10mA I <sub>OUT</sub> I <sub>MAX</sub>				5	1			5	2,3	μA
		2.5V (V <sub>IN</sub> - V <sub>OUT</sub> ) 40V, I <sub>OUT</sub> = 10mA				5	1			5	2,3	μA
I <sub>MIN</sub>	Minimum Load Current	(V <sub>IN</sub> - V <sub>OUT</sub> ) = 40V				5	1			5	2,3	mA
	Current Limit	(V <sub>IN</sub> - V <sub>OUT</sub> ) 15V H Package		0.5			1	0.5			2,3	A
		K Package		1.5			1	1.5			2,3	A
		(V <sub>IN</sub> - V <sub>OUT</sub> ) = 40V H Package		0.15			1					A
		K Package		0.30			1					A
$\frac{V_{OUT}}{\text{Temp}}$	Temperature Stability	-55°C T <sub>J</sub> 150°C							1			%
$\frac{V_{OUT}}{\text{Time}}$	Long Term Stability	T <sub>A</sub> = 125°C	3							1		%
e <sub>n</sub>	RMS Output Noise	10Hz f 10kHz				0.001						%
θ <sub>JC</sub>	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)		20KRAD(Si)		50KRAD(Si)		100KRAD(Si)		UNITS
				MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
V <sub>REF</sub>	Reference Voltage	3V (V <sub>IN</sub> - V <sub>OUT</sub> ) 40V, 10mA I <sub>OUT</sub> I <sub>MAX</sub> , P P <sub>MAX</sub>		1.20	1.30	1.20	1.30	1.20	1.30	1.20	1.30	V
$\frac{V_{OUT}}{V_{IN}}$	Line Regulation	3V (V <sub>IN</sub> - V <sub>OUT</sub> ) 40V, I <sub>OUT</sub> = 10mA	2		0.02		0.02		0.02		0.03	%/V
$\frac{V_{OUT}}{I_{OUT}}$	Load Regulation	10mA I <sub>OUT</sub> I <sub>MAX</sub> , V <sub>OUT</sub> 5V	2		36		42		48		60	mV
		10mA I <sub>OUT</sub> I <sub>MAX</sub> , V <sub>OUT</sub> 5V	2		0.72		0.84		0.96		1.20	%

**TABLE 1A: ELECTRICAL CHARACTERISTICS** (Postirradiation) (Note 5)

SYMBOL	PARAMETER	CONDITIONS	NOTES	10KRAD(Si)		20KRAD(Si)		50KRAD(Si)		100KRAD(Si)		UNITS
				MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
$I_{ADJ}$	Adjust Pin Current				100		100		100		100	$\mu A$
$I_{ADJ}$	Adjust Pin Current Change	10mA $I_{OUT}$ $I_{MAX}$			5		5		5		5	$\mu A$
		2.5V ( $V_{IN} - V_{OUT}$ ) 40V, $I_{OUT} = 10mA$			5		5		5		5	$\mu A$
$I_{MIN}$	Minimum Load Current	$(V_{IN} - V_{OUT}) = 40V$			5		5		5		5	mA
	Current Limit	$(V_{IN} - V_{OUT}) = 15V$	H Package		0.5		0.5		0.5		0.5	A
			K Package		1.5		1.5		1.5		1.5	A
		$(V_{IN} - V_{OUT}) = 40V$	H Package		0.15		0.15		0.15		0.15	A
			K Package		0.30		0.30		0.30		0.30	A

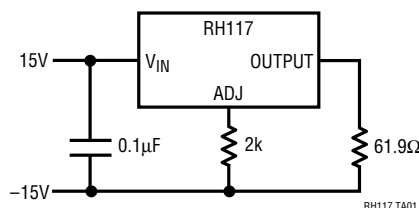
**Note 1:** Unless otherwise specified, these specifications apply for  $V_{IN} - V_{OUT} = 5V$ ; and  $I_{OUT} = 0.1A$  for the H package (TO-39) and  $I_{OUT} = 0.5A$  for the K package (TO-3) package. Although power dissipation is internally limited, these specifications are applicable for power dissipations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

**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.

## TOTAL DOSE BIAS CIRCUIT

**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.

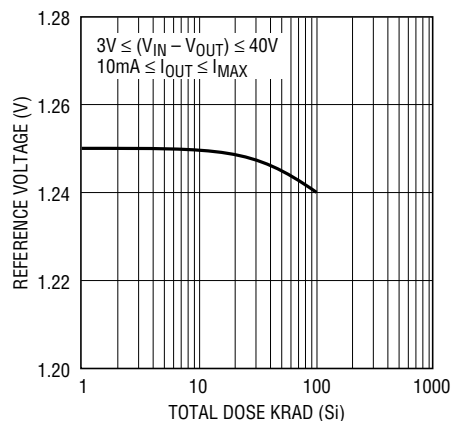
### PDA Test Notes

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.

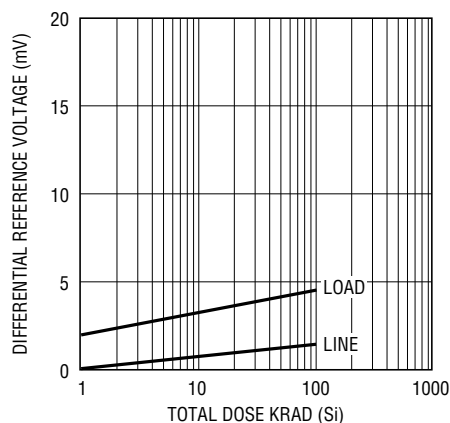
## TYPICAL PERFORMANCE CHARACTERISTICS

### Reference Voltage



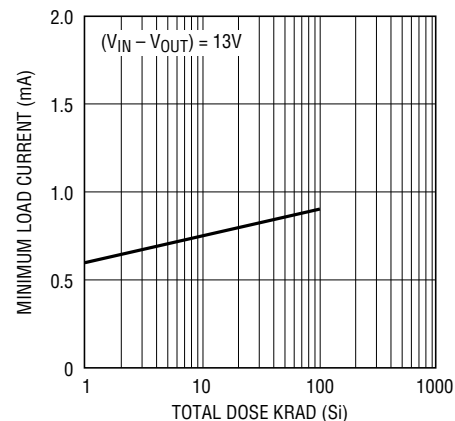
RH117 G01

### Regulation



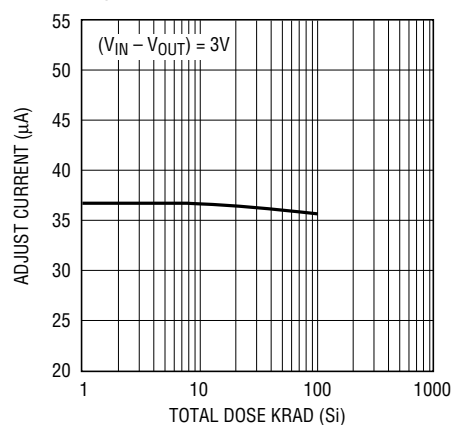
RH117 G02

### Minimum Load Current



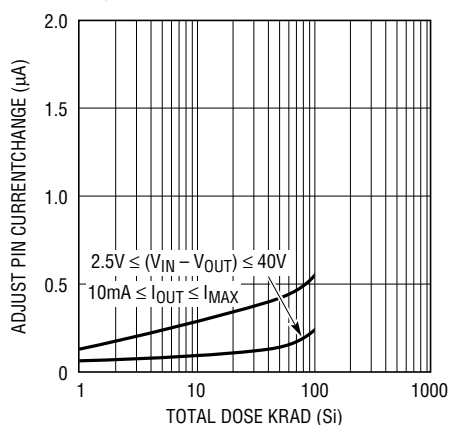
RH117 G03

### Adjust Pin Current



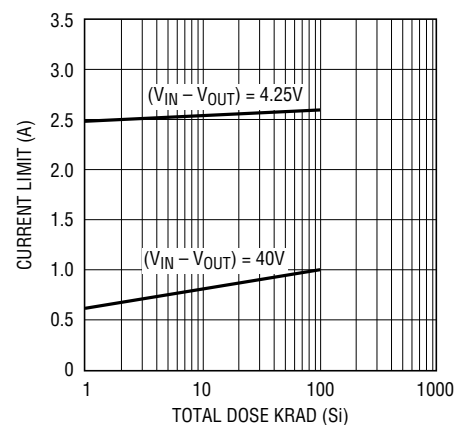
RH117 G04

### Adjust Pin Current Change



RH117 G05

### Current Limit



RH117 G06