

# 5A Low Dropout Positive Adjustable Regulator

**OBSOLETE:**  
**FOR INFORMATION PURPOSES ONLY**  
 Contact Linear Technology for Potential Replacement

## DESCRIPTION

The RH1084 positive adjustable regulator is designed to provide 5A with higher efficiency than currently available devices. All internal circuitry is designed to operate down to 1V input-to-output differential and the dropout voltage is fully specified as a function of load current. Dropout is guaranteed at a maximum of 1.5V at maximum output current, decreasing at lower load currents. On-chip trimming adjusts the output voltage to 1%. Current limit is also trimmed, minimizing the stress on both the regulator and power source circuitry under overload conditions.

The RH1084 is pin compatible with older 3-terminal regulators. A 10 $\mu$ F output capacitor is required on these new device. However, this is usually included in most regulator designs.

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

## ABSOLUTE MAXIMUM RATINGS

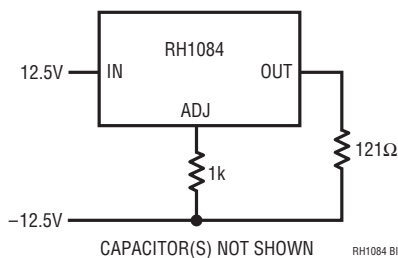
Power Dissipation .....	Internally Limited
Input-to-Output Voltage Differential .....	25V
Operating Junction Temperature Range	
Control Section .....	-55°C to 150°C
Power Transistor .....	-55°C to 200°C
Storage Temperature Range.....	-65°C to 150°C
Lead Temperature (Soldering, 10 sec) .....	300°C

## PRECONDITIONING

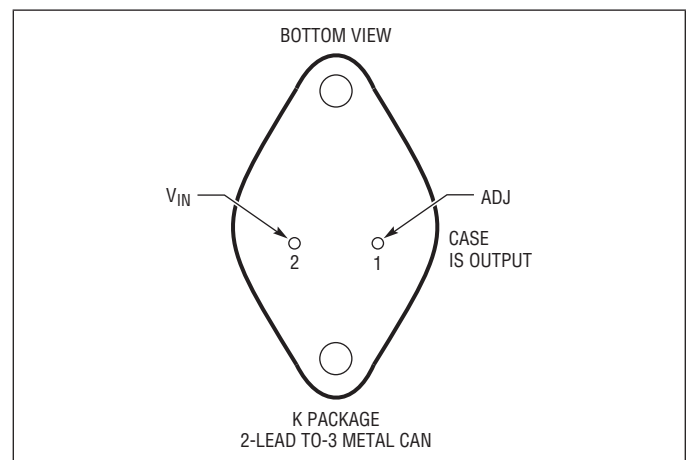
100% Thermal Limit Burn-In

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## BURN-IN CIRCUIT



## PACKAGE INFORMATION

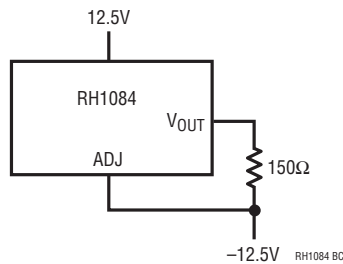


Note: For ordering information contact LTC.

## TABLE 1: ELECTRICAL CHARACTERISTICS (Preirradiation)

PARAMETER	CONDITIONS	NOTES	$T_A = 25^\circ\text{C}$			SUB-GROUP	$-55^\circ\text{C} \leq T_A \leq 125^\circ\text{C}$			SUB-GROUP	UNITS
			MIN	TYP	MAX		MIN	TYP	MAX		
Reference Voltage	$I_{OUT} = 10\text{mA}$ , $(V_{IN} - V_{OUT}) = 3\text{V}$		1.238	1.250	1.262	1					V
	$10\text{mA} \leq I_{OUT} \leq I_{FULL\ LOAD}$ , $1.5\text{V} \leq (V_{IN} - V_{OUT}) \leq 25\text{V}$	5	1.225		1.270		1.225	1.250	1.270	2,3	V
Line Regulation	$I_{LOAD} = 10\text{mA}$ , $1.5\text{V} \leq (V_{IN} - V_{OUT}) \leq 15\text{V}$ $15\text{V} \leq (V_{IN} - V_{OUT}) \leq 25\text{V}$	1, 2		0.015	0.2	1		0.035	0.2	2,3	%
					0.5	1		0.050	0.5	2,3	%
Load Regulation	$(V_{IN} - V_{OUT}) = 3\text{V}$ , $10\text{mA} \leq I_{OUT} \leq I_{FULL\ LOAD}$	1,2,5		0.3	0.6	1		0.5	0.8	2,3	%
Dropout Voltage	$\Delta V_{REF} = 1\%$ , $I_{OUT} = I_{FULL\ LOAD}$	3,5			1.5	1		1.3	1.5	2,3	V
Current Limit	$(V_{IN} - V_{OUT}) = 5\text{V}$ $(V_{IN} - V_{OUT}) = 25\text{V}$		5.5			1	5.5	6.5		2,3	A
			0.3			1	0.3	0.6		2,3	A
Minimum Load Current	$(V_{IN} - V_{OUT}) = 25\text{V}$				10	1		5.0	10	2,3	mA
Thermal Regulation	$T_A = 25^\circ\text{C}$ , 30ms Pulse			0.003	0.015	4					%/W
Ripple Rejection	$f = 120\text{Hz}$ , $C_{ADJ} = 25\mu\text{F}$ , $C_{OUT} = 25\mu\text{F}$ Tantalum, $I_{OUT} = I_{FULL\ LOAD}$ , $(V_{IN} - V_{OUT}) = 3\text{V}$	5	60	75		4	60	75		5,6	dB
Adjust Pin Current	$T_J = 25^\circ\text{C}$			55	120	1			120	2,3	$\mu\text{A}$
Adjust Pin Current Change	$10\text{mA} \leq I_{OUT} \leq I_{FULL\ LOAD}$ , $1.5\text{V} \leq (V_{IN} - V_{OUT}) \leq 25\text{V}$	5			5	1		0.2	5	2,3	$\mu\text{A}$
Temperature Stability								0.5			%
Long Term Stability	$T_A = 125^\circ\text{C}$ , 1000 Hrs	4						0.3			%
RMS Output Noise (% of $V_{OUT}$ )	$T_A = 25^\circ\text{C}$ , $10\text{Hz} \leq f \leq 10\text{kHz}$			0.003							%
Thermal Resistance	Control Circuitry	4		0.75							$^\circ\text{C/W}$
	Power Transistor	4		2.3							$^\circ\text{C/W}$

### Total Dose Bias Circuit



**TABLE 1A: ELECTRICAL CHARACTERISTICS** (Postirradiation)  $T_A = 25^\circ\text{C}$  unless otherwise noted.

PARAMETER	CONDITIONS	10KRAD(Si)		20KRAD(Si)		50KRAD(Si)		100KRAD(Si)		200KRAD(Si)		UNITS
		MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
Reference Voltage (Note 5)	$I_{OUT} = 10\text{mA}$ ( $V_{IN} - V_{OUT} = 3\text{V}$ )	1.234	1.258	1.23	1.257	1.225	1.253	1.22	1.247	1.205	1.241	V
	$10\text{mA} \leq I_{OUT} \leq I_{FULL\ LOAD}$ , $1.5\text{V} \leq (V_{IN} - V_{OUT}) \leq 15\text{V}$	1.22	1.275	1.219	1.275	1.215	1.275	1.210	1.275	1.203	1.275	V
Line Regulation (Notes 1, 2)	$I_{LOAD} = 10\text{mA}$											
	$1.5\text{V} \leq (V_{IN} - V_{OUT}) \leq 15\text{V}$		0.2		0.21		0.23		0.25		0.3	%
	$15\text{V} \leq (V_{IN} - V_{OUT}) \leq 25\text{V}$		0.5		0.5		0.5		0.5		0.5	%
Load Regulation (Notes 1, 2, 5)	$(V_{IN} - V_{OUT}) = 3\text{V}$ $10\text{mA} \leq I_{OUT} \leq I_{FULL\ LOAD}$		0.6		0.6		0.6		0.7		0.8	%
Dropout Voltage (Note 3)	$\Delta V_{REF} = 1\%$ , $I_{OUT} = \text{FULL LOAD}$		1.5		1.55		1.65		1.8		2.0	V
Current Limit	$(V_{IN} - V_{OUT}) = 5\text{V}$	5.5		5.5		5.4		5.25		5.0		A
	$(V_{IN} - V_{OUT}) = 25\text{V}$	0.3		0.3		0.3		0.3		0.3		A
Minimum Load Current	$(V_{IN} - V_{OUT}) = 25\text{V}$		10		10		10		10		10	mA
Adjust Pin Current			120		120		120		120		120	$\mu\text{A}$
Adjust Pin Current Change (Note 5)	$10\text{mA} \leq I_{OUT} \leq I_{FULL\ LOAD}$ $1.5\text{V} \leq (V_{IN} - V_{OUT}) \leq 15\text{V}$		5		5		5		5		5	$\mu\text{A}$

**Note 1:** See thermal regulation specifications for changes in output voltage due to heating effects. Line and load regulation are measured at a constant junction temperature by low duty cycle pulse testing.

**Note 2:** Line and load regulation are guaranteed up to the maximum power dissipation of 45W for RH1084. Power dissipation is determined by the input/output differential voltage and the output current. Guaranteed maximum power dissipation will not be available over the full input/output voltage range.

**Note 3:** Dropout voltage is specified over the full output current range of the device. Test points and limits are shown on the Dropout Voltage curve in the LT<sup>®</sup>1084 data sheet.

**Note 4:** Guaranteed by design, characterization, or correlation to other tested parameters.

**Note 5:**  $I_{FULL\ LOAD}$  is defined in the Current Limit curves in the standard data sheet. For compliance with 883 revision C current density specifications, the RH1084 is rated to 3A.

**TABLE 1A: ELECTRICAL CHARACTERISTICS**

MIL-STD-883 TEST REQUIREMENTS	SUBGROUP
Final Electrical Test Requirements (Method 5004)	1*,2,3,4,5,6
Group A Test Requirements (Method 5005)	1,2,3,4,5,6
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 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 defective for the lot.

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

## TYPICAL PERFORMANCE CHARACTERISTICS

