5A Low Dropout Positive Adjustable Regulator

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 10µF 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.

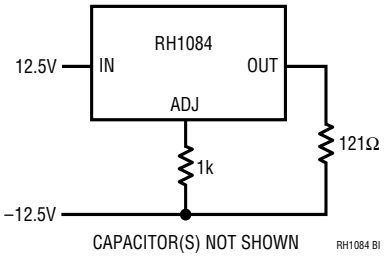
ABSOLUTE MAXIMUM RATINGS

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

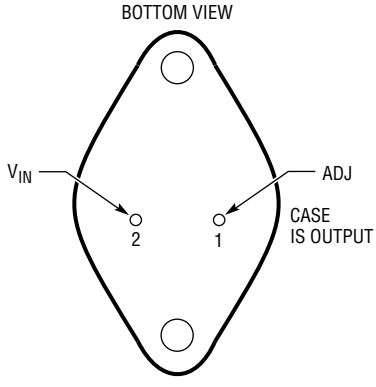
PRECONDITIONING

100% Thermal Limit Burn-In

BURN-IN CIRCUIT



PACKAGE INFORMATION



K PACKAGE
2-LEAD TO-3 METAL CAN

Note: For ordering information contact LTC.

TABLE 1: ELECTRICAL CHARACTERISTICS (Preirradiation)

PARAMETER	CONDITIONS	NOTES	$T_J = 25°C$ MIN	TYP	MAX	SUB-GROUP	$-55°C \le T_J \le 150°C$ MIN	TYP	MAX	SUB-GROUP	UNITS
Reference Voltage	I_{OUT} = 10mA, $(V_{IN} - V_{OUT})$ = 3V		1.238	1.250	1.262	1					V
	10mA ≤ I_{OUT} ≤ $I_{FULL\ LOAD}$, 1.5V ≤ $(V_{IN} - V_{OUT})$ ≤ 25V	5	1.225		1.270		1.225	1.250	1.270	2,3	V
Line Regulation	I_{LOAD} = 10mA, 1.5V ≤ $(V_{IN} - V_{OUT})$ ≤ 15V 15V ≤ $(V_{IN} - V_{OUT})$ ≤ 25V	1,2		0.015	0.2 0.5	1 1		0.035 0.050	0.2 0.5	2,3 2,3	% %
Load Regulation	$(V_{IN} - V_{OUT})$ = 3V, 10mA ≤ I_{OUT} ≤ $I_{FULL\ LOAD}$	1,2,5		0.1	0.3	1		0.2	0.4	2,3	%
Dropout Voltage	ΔV_{REF} = 1%, I_{OUT} = $I_{FULL\ LOAD}$	3,5			1.5	1		1.3	1.5	2,3	V
Current Limit	$(V_{IN} - V_{OUT})$ = 5V $(V_{IN} - V_{OUT})$ = 25V		5.5 0.3			1 1	5.5 0.3	6.5 0.6		2,3 2,3	A A
Minimum Load Current	$(V_{IN} - V_{OUT})$ = 25V				10	1		5.0	10	2,3	mA
Thermal Regulation	T_A = 25°C, 30ms Pulse			0.003	0.015	4					%/W
Ripple Rejection	f = 120Hz, C_{ADJ} = 25µF, C_{OUT} = 25µF Tantalum, I_{OUT} = $I_{FULL\ LOAD}$, $(V_{IN} - V_{OUT})$ = 3V	5	60	75		4	60	75		5,6	dB
Adjust Pin Current	T_J = 25°C			55	120	1			120	2,3	µA
Adjust Pin Current Change	10mA ≤ I_{OUT} ≤ $I_{FULL\ LOAD}$, 1.5V ≤ $(V_{IN} - V_{OUT})$ ≤ 25V	5			5	1		0.2	5	2,3	µA
Temperature Stability								0.5			%
Long Term Stability	T_A = 125°C, 1000 Hrs	4						0.3			%
RMS Output Noise (% of V_{OUT})	T_A = 25°C, 10Hz ≤ f ≤ 10kHz			0.003							%
Thermal Resistance	Control Circuitry Power Transistor	4 4		0.75 2.3							°C/W °C/W

Total Dose Bias Circuit

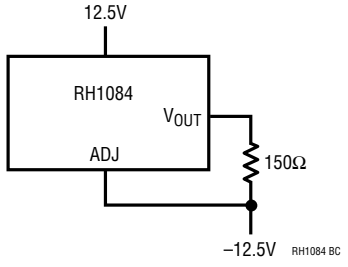


TABLE 1A: ELECTRICAL CHARACTERISTICS (Postirradiation) T_A = 25°C unless otherwise noted.

PARAMETER	CONDITIONS	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
Reference Voltage (Note 5)	I_{OUT} = 10mA ($V_{IN} - V_{OUT}$) = 3V	1.234	1.258	1.23	1.257	1.225	1.253	1.22	1.247	1.205	1.241	V
	10mA ≤ I_{OUT} ≤ $I_{FULL\ LOAD}$ 1.5V ≤ ($V_{IN} - V_{OUT}$) ≤ 15V	1.210	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_{OUT} = 10mA 1.5V ≤ ($V_{IN} - V_{OUT}$) ≤ 15V 15V ≤ ($V_{IN} - V_{OUT}$) ≤ 25V		 0.2 0.5		 0.21 0.5		 0.23 0.5		 0.25 0.5		 0.3 0.5	 % %
Load Regulation (Notes 1, 2, 5)	($V_{IN} - V_{OUT}$) = 3V 10mA ≤ I_{OUT} ≤ $I_{FULL\ LOAD}$		0.3		0.3		0.3		0.35		0.4	%
Dropout Voltage (Note 3)	ΔV_{REF} = 1%, I_{OUT} = FULLLOAD		1.5		1.55		1.65		1.8		2.0	V
Current Limit	($V_{IN} - V_{OUT}$) = 5V ($V_{IN} - V_{OUT}$) = 25V	5.5 0.3		5.5 0.3		5.4 0.3		5.25 0.3		5.0 0.3		A A
Minimum Load Current	($V_{IN} - V_{OUT}$) = 25V		10		10		10		10		10	mA
Adjust Pin Current			120		120		120		120		120	µA
Adjust Pin Current Change (Note 5)	10mA ≤ I_{OUT} ≤ $I_{FULL\ LOAD}$ 1.5V ≤ ($V_{IN} - V_{OUT}$) ≤ 15V		5		5		5		5		5	µA

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®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 2: ELECTRICAL TEST REQUIREMENTS

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.

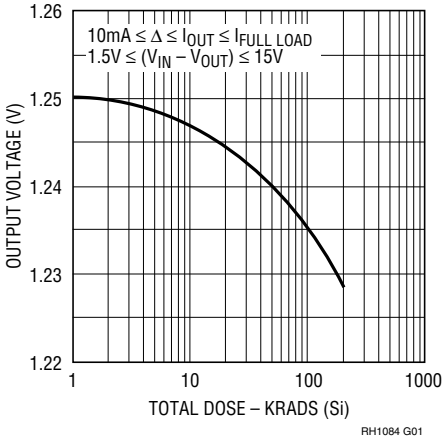
PDA Test Notes

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.

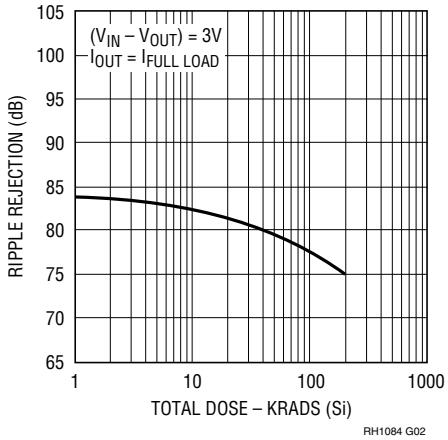
Linear Technology Corporation reserves the right to test to tighter limits than those given.

TYPICAL PERFORMANCE CHARACTERISTICS

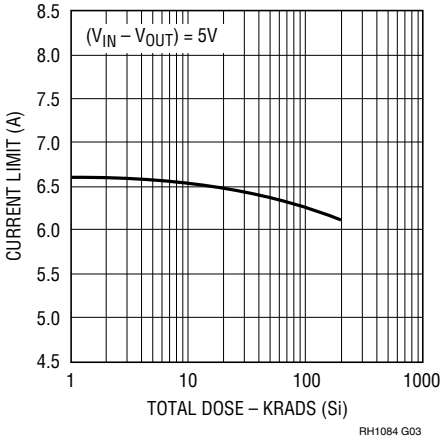
Reference Voltage



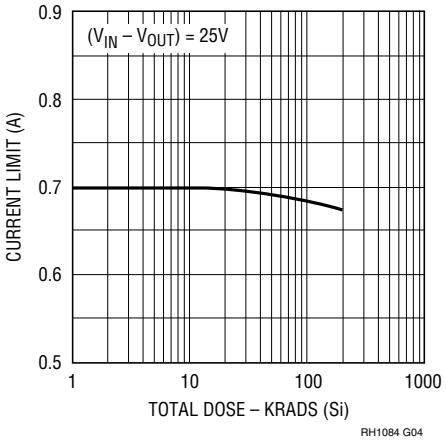
Ripple Rejection



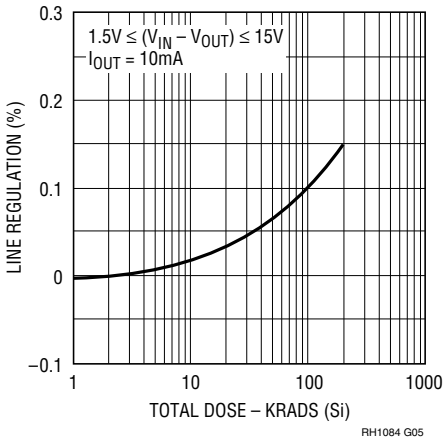
Current Limit



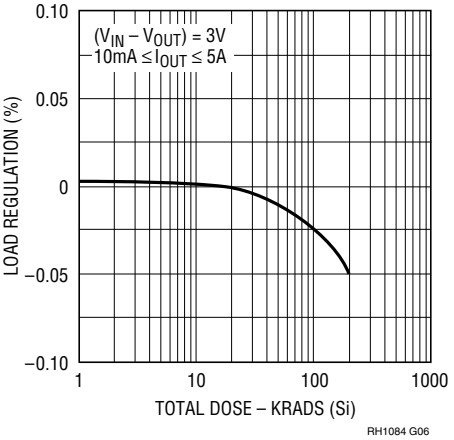
Current Limit



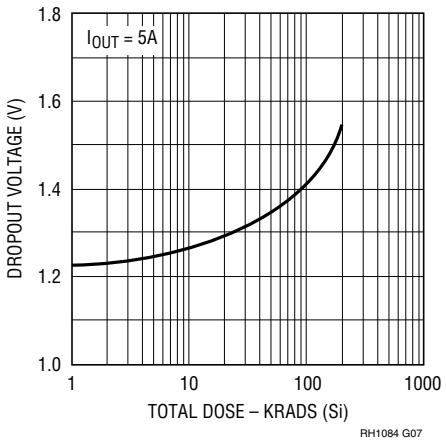
Line Regulation



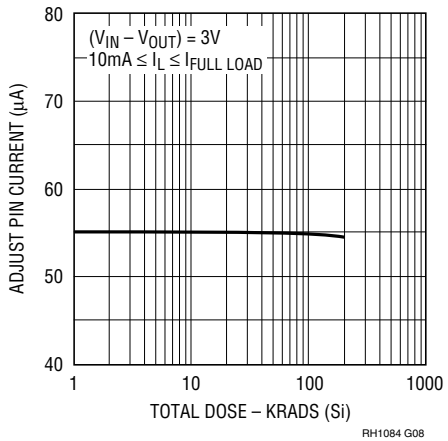
Load Regulation



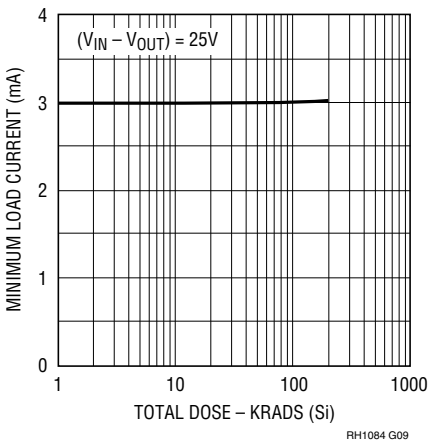
Dropout Voltage



Adjust Pin Current



Minimum Load Current



I.D. No. 66-11-1084

Linear Technology Corporation
1630 McCarthy Blvd., Milpitas, CA 95035-7417
(408) 432-1900 • FAX: (408) 434-0507 • www.linear.com

LT/LT 0705 REV C PRINTED IN USA