LX8117-xx

800mA Low Dropout Positive Regulators

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PRODUCTION DATA SHEET

DESCRIPTION

The LX8117 is a positive Low Dropout (LDO) regulator. At its designed maximum load current of 800mA, the LX8117 dropout voltage is guaranteed to be 1.2V or lower. The dropout voltage decreases with load current. An adjustable output voltage version of the LX8117 is available, as well as versions with fixed outputs of 2.85V, 3.3V and 5V. The 2.85V version is specifically designed for use as a component of active termination networks for the SCSI bus. On-chip trimming of the internal voltage reference allows specification of the output voltage to within ±1% of its nominal value. The output current-limit point is also trimmed, which helps to minimize stress on both the regulator and the system power source when they are operated under short-circuit conditions. The regulator's internal circuitry will operate at input-to-output differential voltages down to 1V.

Most regulator circuit designs include output capacitors with values in the range of tens to hundreds of microfarads or more. The LX8117 requires at lease 10µF of output capacitance for stable operation.

PNP-type regulators can waste current equal to as much as 10 percent of their output as a quiescent current, which flows directly to ground, bypassing the load. Quiescent current from the LX8117 flows through the load, increasing power-use efficiency and allowing cooler operation.

The LX8117 is available in a low-profile plastic SOT-223 package for applications where space is at a premium. The LX8117 is also available in a plastic TO-263 package for instances when the thermal resistance from the circuit die to the environment must be minimized.

KEY FEATURES

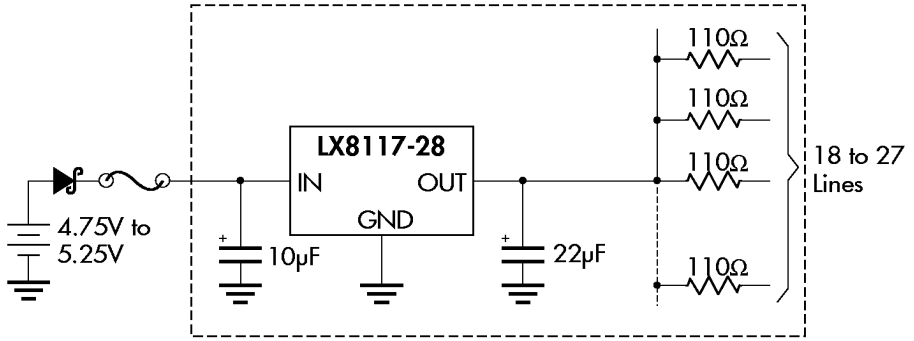
- 0.2% LINE REGULATION MAX.
- 0.4% LOAD REGULATION MAX.
- OUTPUT CURRENT OF 800mA
- OPERATES DOWN TO 1V DROPOUT
- SPACE SAVING SOT-223 SURFACE MOUNT PACKAGE
- GUARANTEED DROPOUT VOLTAGE AT MULTIPLE CURRENT LEVELS
- THREE-TERMINAL ADJUSTABLE OR FIXED 2.85V, 3.3V, 5V

APPLICATIONS

- BATTERY CHARGERS
- ACTIVE SCSI TERMINATORS
- 5V TO 3.3V LINEAR REGULATORS
- HIGH-EFFICIENCY LINEAR REGULATORS
- POST REGULATORS FOR SWITCHING SUPPLIES

PRODUCT HIGHLIGHT

ACTIVE TERMINATOR FOR SCSI-2 BUS



AVAILABLE OPTIONS PER PART #

Part #	Output Voltage
LX8117-28	2.85V
LX8117-33	3.3V
LX8117-05	5V
LX8117-00	Adjustable

PACKAGE ORDER INFORMATION

T_A (°C)	ST Plastic SOT-223 3-pin	DD Plastic TO-263 3-pin
0 to 125	LX8117-xxCST	LX8117-xxCDD

Note: All surface-mount packages are available in Tape & Reel. Append the letter "T" to part number. (i.e. LX8117-28CSTT)
"xx" refers to output voltage, please see table above.

FOR FURTHER INFORMATION CALL (714) 898-8121

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ABSOLUTE MAXIMUM RATINGS (Note 1)

Power Dissipation ..... Internally Limited
Input Voltage
LX8117-00 (Adj.) / -33 (3.3V) / -05 (5.0V) 15V
LX8117-28 (2.85V) 12V
Surge Voltage 15V
Operating Junction Temperature
Plastic (ST, DD Packages) ..... 150°C
Storage Temperature Range ..... -65°C to 150°C
Lead Temperature (Soldering, 10 seconds) ..... 300°C
Short-Circuit Protection ..... Indefinite

Note 1. Exceeding these ratings could cause damage to the device. All voltages are with respect to Ground. Currents are positive into, negative out of the specified terminal.

THERMAL DATA

ST PACKAGE:

THERMAL RESISTANCE-JUNCTION TO TAB, θ_{JT}	15°C/W
THERMAL RESISTANCE-JUNCTION TO AMBIENT, θ_{JA}	150°C/W*

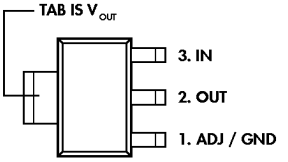
DD PACKAGE:

THERMAL RESISTANCE-JUNCTION TO TAB, θ_{JT}	10°C/W
THERMAL RESISTANCE-JUNCTION TO AMBIENT, θ_{JA}	60°C/W*

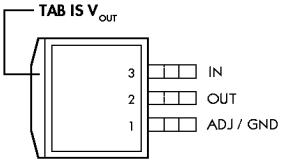
Junction Temperature Calculation: $T_J = T_A + (P_D \times \theta_{JA})$. The θ_{JA} numbers are guidelines for the thermal performance of the device/pc-board system. All of the above assume no ambient airflow.

* θ_{JA} can be improved with package soldered to 0.5IN^2 copper area over backside ground plane or internal power plane. θ_{JA} can vary from 20°C/W to > 40°C/W depending on mounting technique.

PACKAGE PIN OUTS

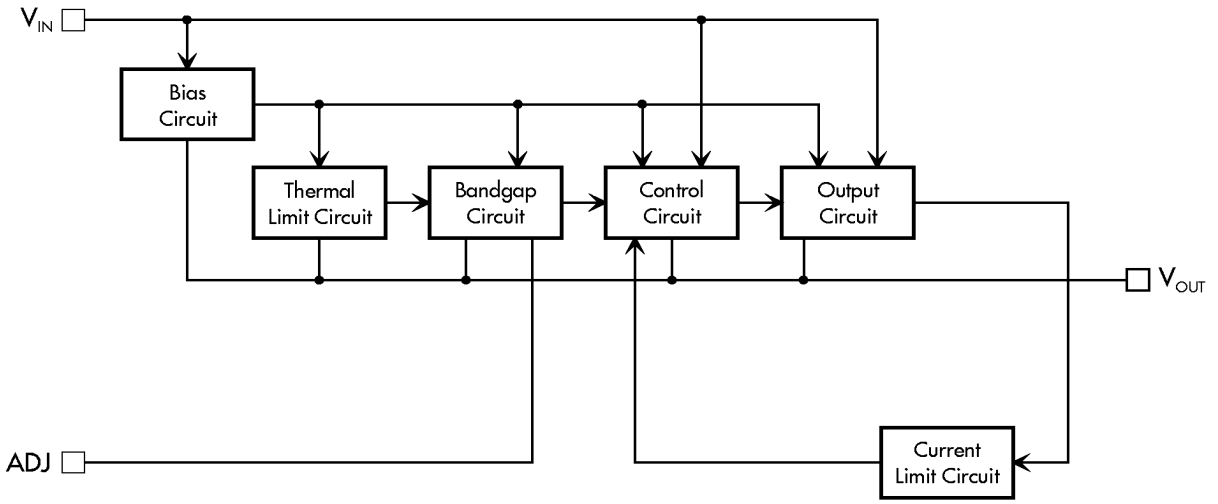


ST PACKAGE
(Top View)



DD PACKAGE
(Top View)

BLOCK DIAGRAM



LINFINITY MICROELECTRONICS

RECOMMENDED OPERATING CONDITIONS (Note 2)

Parameter		Symbol	Recommended Operating Conditions			Units
			Min.	Typ.	Max.	
Input Voltage						
Operating Voltage	LX 8117-00 / 8117-05				15	V
	LX8117-28 / 8117-33				12	V
Input-Output Differential	LX8117-00				10	V
Operating Ambient Temperature Range			0		125	°C

Note 2. Range over which the device is functional.

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, $0°C \le T_J \le 125°C$.)

Parameter		Symbol	Test Conditions	LX8117-xx			Units
				Min.	Typ.	Max.	
Reference Voltage	LX8117-00		I_{OUT} = 10mA, $(V_{IN} - V_{OUT})$ = 2V, T_J = 25°C	1.238	1.250	1.262	V
			10mA ≤ I_{OUT} ≤ 800mA, 1.4V ≤ $(V_{IN} - V_{OUT})$ ≤ 10V	1.225	1.250	1.270	V
Output Voltage			I_{OUT} = 10mA, V_{IN} = 4.85V, T_J = 25°C	2.820	2.850	2.880	V
	LX8117-28		0mA ≤ I_{OUT} ≤ 800mA, 4.25V ≤ V_{IN} ≤ 10V	2.790	2.850	2.910	V
			0mA ≤ I_{OUT} ≤ 500mA, V_{IN} = 3.95V	2.790	2.850	2.910	V
	LX8117-33		I_{OUT} = 10mA, V_{IN} = 5V, T_J = 25°C	3.267	3.300	3.333	V
			0mA ≤ I_{OUT} ≤ 800mA, 4.75V ≤ V_{IN} ≤ 10V	3.235	3.300	3.365	V
	LX8117-05		I_{OUT} = 10mA, V_{IN} = 7V, T_J = 25°C	4.950	5.000	5.050	V
			0mA ≤ I_{OUT} ≤ 800mA, 6.50V ≤ V_{IN} ≤ 10V	4.900	5.000	5.100	V
Line Regulation (Note 3)	LX8117-00		I_{OUT} = 10mA, 1.5V ≤ $V_{IN} - V_{OUT}$ ≤ 7V		.05	0.2	%
	LX8117-28		I_{OUT} = 0mA, 4.25V ≤ V_{IN} ≤ 10V		1	6	mV
	LX8117-33		I_{OUT} = 0mA, 4.75V ≤ V_{IN} ≤ 10V		1	6	mV
	LX8117-05		I_{OUT} = 0mA, 6.5V ≤ V_{IN} ≤ 10V		1	10	mV
Load Regulation (Note 3)	LX8117-00		$(V_{IN} - V_{OUT})$ = 3V, 10mA ≤ I_{OUT} ≤ 800mA		0.15	0.4	%
	LX8117-28		V_{IN} = 4.25V, 0mA ≤ I_{OUT} ≤ 800mA		2	10	mV
	LX8117-33		V_{IN} = 4.75V, 0mA ≤ I_{OUT} ≤ 800mA		2	10	mV
	LX8117-05		V_{IN} = 6.5V, 0mA ≤ I_{OUT} ≤ 800mA		2.5	15	mV
Dropout Voltage (Note 4)			I_{OUT} = 100mA		0.97	1.10	V
			I_{OUT} = 500mA		1.00	1.15	V
			I_{OUT} = 800mA		1.05	1.20	V
Current Limit			$(V_{IN} - V_{OUT})$ = 5V, T_J = 25°C	800	950		mA
Minimum Load Current (Note 5)			V_{IN} ≤ 10V, (LX8117)		0.5	5	mA
Quiescent Current	LX8117-28		V_{IN} ≤ 10V		4.5	10	mA
	LX8117-33		V_{IN} ≤ 10V		4.5	10	mA
	LX8117-05		V_{IN} ≤ 10V		4.5	10	mA
Thermal Rejection			T_A = 25°C, 30ms Pulse		0.08	0.2	%/W
Ripple Rejection			f_{RIPPLE} = 120Hz, $(V_{IN} - V_{OUT})$ = 3V, V_{RIPPLE} = 1Vp - p	60	75		dB
Adjust Pin Current	LX8117-00				45	100	µA
Adjust Pin Current Change	LX8117-00		10mA ≤ I_{OUT} ≤ 800mA, 1.4V ≤ $(V_{IN} - V_{OUT})$ ≤ 10V		0.2	5	µA
Temperature Stability					0.5		%
Long Term Stability			T_A = 125°C, 1000Hrs		0.3		%
RMS Output Noise			(% of V_{OUT}), 10Hz ≤ f ≤ 10kHz		0.003		%
Thermal Resistance	SOT-223		(Junction to Case, at Tab)		15		°C/W
	TO-263		(Junction to Case, at Tab)		10		°C/W

Notes: 3. See thermal regulation specification for changes in output voltage due to heating effects. Load regulation and line regulation are measured at a constant junction temperature by low duty cycle pulse testing.

4. Dropout voltage is specified over the full output current range of the device. Dropout voltage is defined as the minimum input/output differential measured at the specified output current. Test points and limits are also shown on the Dropout Voltage Curve.

5. Minimum load current is defined as the minimum output current required to maintain regulation.

APPLICATION NOTES

OUTPUT VOLTAGE

The LX8117 develops a 1.25V reference voltage between the output and the adjust terminal (See Figure 1). By placing a resistor, R1, between these two terminals, a constant current is caused to flow through R1 and down through R2 to set the overall output voltage. Normally this current is the specified minimum load current of 10mA. Because I_{ADJ} is very small and constant when compared with the current through R1, it represents a small error and can usually be ignored.

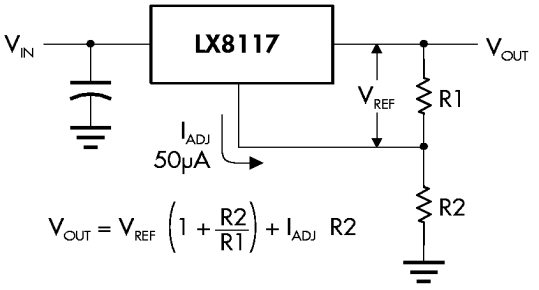


FIGURE 1 — BASIC ADJUSTABLE REGULATOR