LX8580

7A Very Low Dropout Positive Adjustable Regulator

Production Data Sheet

DESCRIPTION

The LX8580 is a high-performance, very low dropout voltage regulator, designed for use with advanced microprocessors. This product can be used with separate voltage supplies for the control and power sections, allowing a power section dropout voltage as low as 100mV. The LX8580 can also be used in a single voltage supply configuration, with a dropout performance similar to that of the LX8584 (1.3V at 7A).

The LX8580 is supplied in a five terminal TO-220 package, which allows the implementation of remote (Kelvin) voltage sensing. This sensing compensates for output voltage variations due to load changes and resistive voltage drops in connectors and board traces. Typical load regulation measured at the sense pin is less than 1mV for a load current step of 7mA to 7A.

The LX8580 is ideal for generating a secondary 2 - 2.5V low voltage supply on a motherboard where a 3.3V supply is already available.

IMPORTANT: For the most current data, consult *MICROSEMI*'s website: **http://www.microsemi.com**

KEY FEATURES

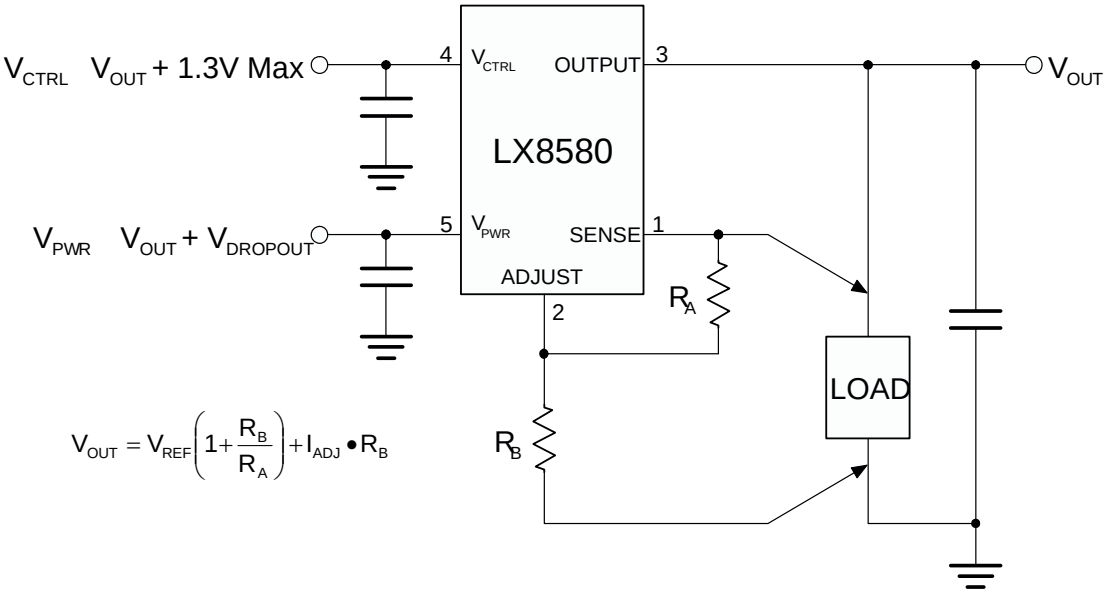
- Low Dropout, 800mV Max. at 7A Output Current in Dual Supply Mode
- Fast Transient Response
- Remote Sensing
- 1mV Load Regulation
- Adjustable Output
- No Supply Sequencing Problems in Dual Supply Mode

KEY FEATURES

- Microprocessor Supplies
- 3.3V to 2.5V Processor Power Supplies
- High-Current Regulators
- Post Regulators for Switching Supplies

PRODUCT HIGHLIGHT

Special Capabilities of the LX8580 To Allow
44% Smaller LDO Thermal Dissipation



PACKAGE ORDER INFO

T_A (°C)	Dropout Voltage	**P** Plastic TO-220 5-Pin RoHS Compliant Transition DC: 0543	**DD** Plastic To-263 5-Pin RoHS Compliant Transition DC: 0535
0 to 125	0.1V – 0.8V	**LX8580-00CP**	**LX8580-00CDD**

Note: Available in Tape & Reel. Append the letters "TR" to the part number. (i.e. LX8580-00CDD-TR)

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7A VERY LOW DROPOUT POSITIVE ADJUSTABLE REGULATOR

PRODUCTION DATA SHEET

ABSOLUTE MAXIMUM RATINGS (Note 1)

Power Dissipation ..... Internally Limited
V_{PWR} Input Voltage 7V
V_{CTRL} Input Voltage 13V
Operating Junction Temperature
Plastic (P Package) ..... 150°C
Storage Temperature Range ..... -65°C to 150°C
Lead Temperature (Soldering, 10 seconds) ..... 300°C
RoHS Peak Package Solder Reflow Temp. (40 seconds max. exposure)..... 260°C (+0, -5)

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

P PACKAGE:

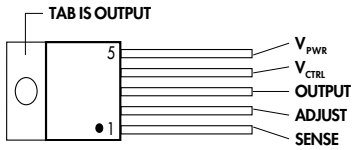
THERMAL RESISTANCE-JUNCTION TO TAB, θ_{JT}	3.0°C/W
THERMAL RESISTANCE-JUNCTION TO AMBIENT, θ_{JA}	60°C/W

DD PACKAGE:

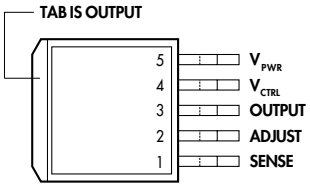
THERMAL RESISTANCE-JUNCTION TO TAB, θ_{JT}	3.0°C/W
THERMAL RESISTANCE-JUNCTION TO AMBIENT, θ_{JA}	60°C/W

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.

PACKAGE PIN OUTS



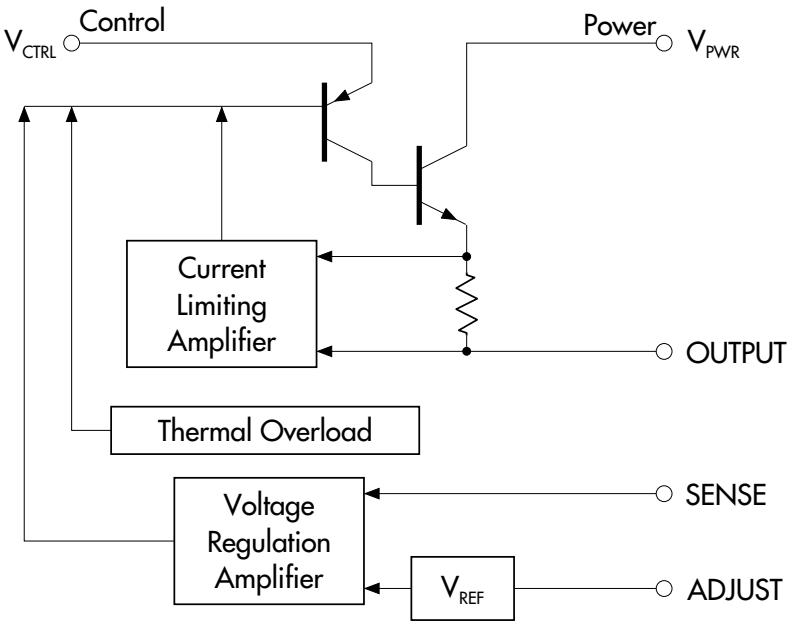
P PACKAGE
(Top View)



DD PACKAGE
(Top View)

RoHS 100% Matte Tin Lead Finish

BLOCK DIAGRAM



LINFINITY MICROELECTRONICS

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, these specifications apply over the operating ambient temperatures $0°C \le T_A \le 125°C$. Low duty cycle pulse testing techniques are used which maintains junction and case temperatures equal to the ambient temperature.)

Parameter	Symbol	Test Conditions	LX8580			Units
			Min.	Typ.	Max.	
Reference Voltage	V_{REF}	V_{CTRL} = 2.75V, V_{PWR} = 2V, I_{LOAD} = 10mA, T_J = 25°C	1.243	1.250	1.257	V
		V_{CTRL} = 2.7V to 6V, V_{PWR} = 1.75V to 5.5V, I_{OUT} = 10mA to 4A	1.237	1.250	1.263	V
		V_{CTRL} = 2.7V to 6V, V_{PWR} = 2.05V to 5.5V, I_{OUT} = 10mA to 7A	1.237	1.250	1.263	V
Line Regulation	ΔV_{REF} (V_{IN})	V_{CTRL} = 2.5V to 12V, V_{PWR} = 1.75V to 5.5V, I_{LOAD} = 10mA, T_J = 25°C		1	3	mV
		V_{CTRL} = 2.5V to 12V, V_{PWR} = 1.75V to 5.5V, I_{LOAD} = 10mA		2	6	mV
Load Regulation	ΔV_{REF} (I_{OUT})	V_{CTRL} = 2.75V, V_{PWR} = 2.1V, I_{LOAD} = 10mA to 7A (V_{ADJ} = 0)		2	7	mV
Thermal Regulation	ΔV_{OUT} (Pwr)	30ms Pulse		0.002	0.020	%/W
Thermal Resistance	$R_{\theta JT}$	Control Circuitry/Power Transistor		0.65	2.70	°C/W
Ripple Rejection		V_{CTRL} = V_{PWR} = 3.75V Avg, V_{RIPPLE} = $1V_{P-P}$, V_{ADJ} = 0V, I_{OUT} = 4A	60	80		dB
Control Pin Current (Note 3)	I_{CTRL}	V_{CTRL} = 2.75V, V_{PWR} = 2.05V, I_{LOAD} = 100mA		3	10	mA
		V_{CTRL} = 2.75V, V_{PWR} = 2.05V, I_{LOAD} = 4A		30	60	mA
		V_{CTRL} = 2.75V, V_{PWR} = 1.75V, I_{LOAD} = 4A		33	70	mA
		V_{CTRL} = 2.75V, V_{PWR} = 2.05V, I_{LOAD} = 7A		60	120	mA
Adjust Pin Current	I_{ADJ}	V_{CTRL} = 2.75V, V_{PWR} = 2.05V, I_{LOAD} = 0mA (V_{ADJ} = 0)		60	120	µA
Current Limit	$I_{\theta(MAX)}$	V_{CTRL} = 2.75V, V_{PWR} = 2.05V, ΔV_{OUT} = 100mV (V_{ADJ} = 0)	7.1	9		A
Dropout Voltage (Control Section) Minimum V_{CTRL} (Note 2) (V_{PWR} - V_{OUT})	V_{CTRL} - V_{OUT}	V_{PWR} = 2.05V, I_{LOAD} = 100mA		0.90	1.15	V
		V_{PWR} = 2.05V, I_{LOAD} = 1A		1.00	1.15	V
		V_{PWR} = 2.05V, I_{LOAD} = 2.75A		1.05	1.18	V
		V_{PWR} = 2.05V, I_{LOAD} = 4A		1.06	1.20	V
		V_{PWR} = 2.05V, I_{LOAD} = 7A		1.10	1.30	V
Dropout Voltage (Power Section) Minimum V_{PWR} (Note 2) (V_{PWR} - V_{OUT}) (V_{ADJ} = 0)	V_{PWR} - V_{OUT}	V_{CTRL} = 2.75V, I_{LOAD} = 100mA		0.05	0.17	V
		V_{CTRL} = 2.75V, I_{LOAD} = 1A		0.10	0.22	V
		V_{CTRL} = 2.75V, I_{LOAD} = 2.75A		0.20	0.38	V
		V_{CTRL} = 2.75V, I_{LOAD} = 4A, T_J = 25°C		0.30	0.40	V
		V_{CTRL} = 2.75V, I_{LOAD} = 4A		0.30	0.50	V
		V_{CTRL} = 2.75V, I_{LOAD} = 7A, T_J = 25°C		0.52	0.62	V
		V_{CTRL} = 2.75V, I_{LOAD} = 7A		0.56	0.80	V
Minimum Load Current		V_{CTRL} = 5V, V_{PWR} = 3.3V, V_{ADJ} = 0V		5	10	mA

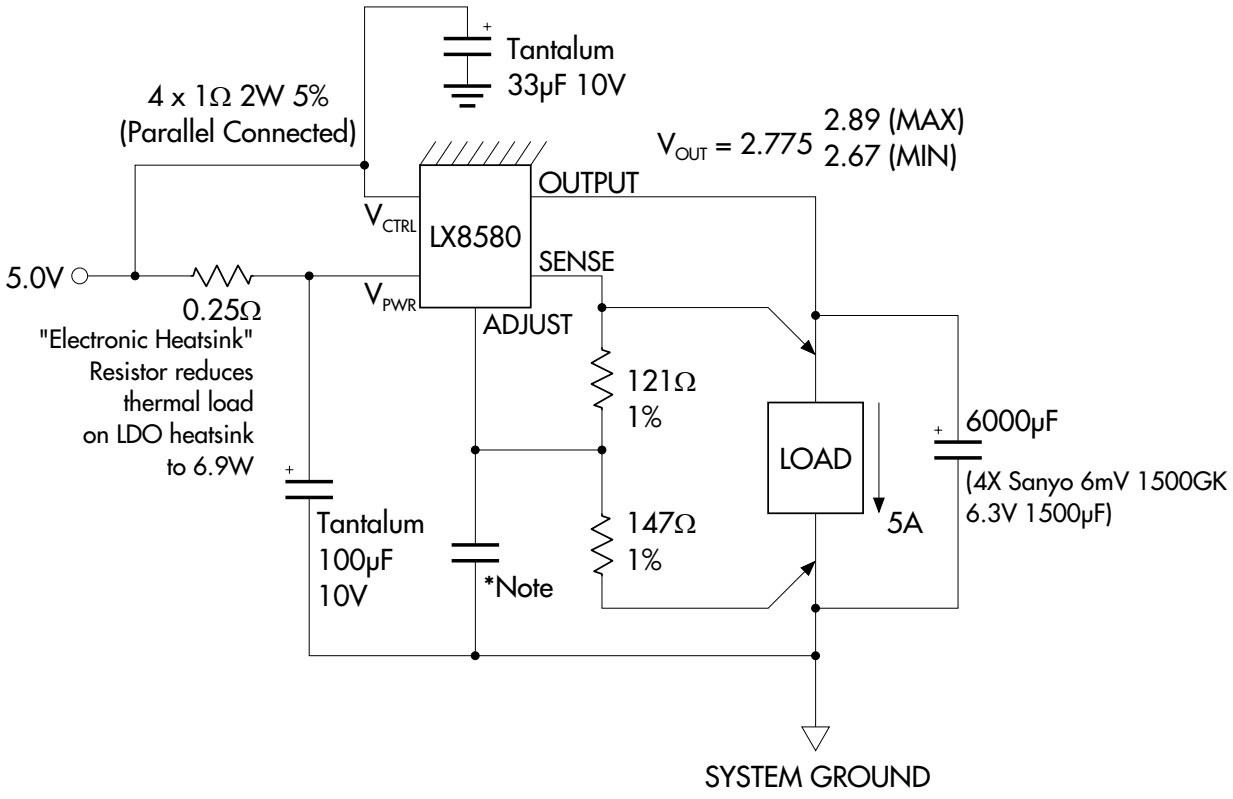
Note 2. Dropout is caused by either minimum control voltage (V_{CTRL}) or minimum power voltage (V_{PWR}). Both parameters are specified with respect to the output voltage. The specifications represent the minimum input/output voltage required to maintain 1% regulation.

Note 3. The control pin current is the drive current required for the output transistor. This current will track output current with roughly a 1:100 ratio. The minimum value is equal to the quiescent current of the device.

FUNCTIONAL PIN DESCRIPTION

Pin	#	Description
SENSE	1	This pin is the positive side of the reference voltage for the device. With this pin it is possible to Kelvin-sense the output voltage at load.
ADJUST	2	This pin is the negative side of the reference voltage for the device. Ripple rejection can be improved by adding a small bypass capacitor from the Adjust pin to ground. The capacitor value should be selected so that $C_R \leq 1 / 2\pi F_R R_A$, where F_R is the ripple frequency and R_A is the value of the resistor between the output and sense leads of the LX8580.
OUTPUT	3	This is the power output of the device.
V_{CTRL}	4	This pin is the voltage supply pin for the control circuitry of the device. The current flow into this pin will be about 1% of the output current. For the device to regulate, the voltage at this pin must be between 1.0V and 1.3V greater than the output voltage.
V_{PWR}	5	This is the collector of the power section of the LX8580. The output load current is supplied through this pin. For the device to regulate, the voltage at this pin must be between 0.1V and 0.8V greater than the output voltage (higher output currents require higher voltages between V_{PWR} and OUTPUT).

BASIC APPLICATION CIRCUIT



*Note: For improved transient response, add capacitor as shown (typical 15µF).