



The Future of Analog IC Technology™

MP8100 Precision High-Side Current-Sense Amplifier

INITIAL RELEASE – SPECIFICATIONS SUBJECT TO CHANGE

DESCRIPTION

The MP8100 is a low-cost, precision, high-side current-sense amplifier. This device operates from a single 2.5V to 18V supply and typically consumes 17µA. It is ideal for today's notebook computers, cell phones and other systems where battery/DC current monitoring is critical.

High-side current monitoring is especially useful in battery-powered systems since it does not interfere with the ground path of the battery charger. The input common-mode range of 1.5V to 18V is independent of the supply voltage and ensures that the current-sense feedback remains viable even when connected to a 2-cell battery pack in deep discharge.

FEATURES

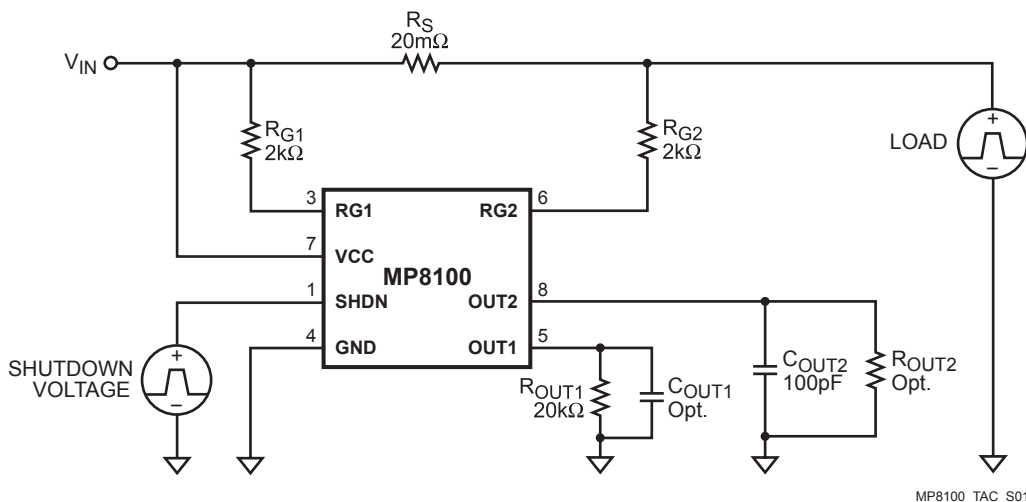
- Low-Cost, Compact Current-Sense Solution
- 17µA Typical Supply Current
- 2.5V to 18V Operating Supply Voltage
- 1.5V to 18V Input Common Mode Range
- 1µA Typical Shutdown Current
- 250µV Input Offset Voltage
- High Current Sensing Capability
- Low 100mΩ Output Impedance (Optional)
- Available in an 8-Pin SOIC Package

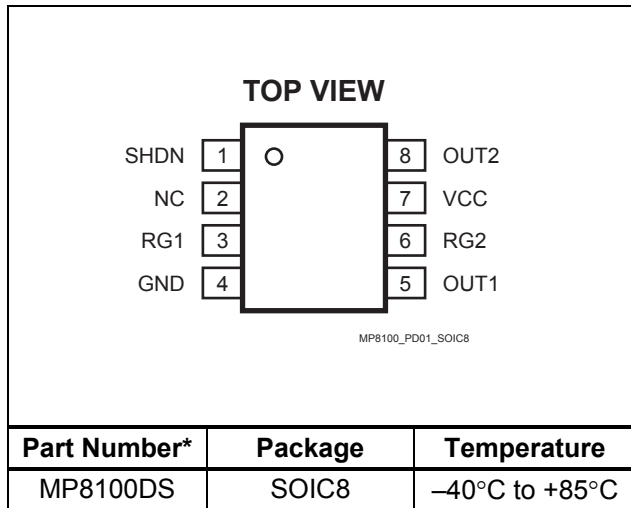
APPLICATIONS

- Portable PCs
- PDA's
- Smart Battery Packs
- Cell Phones
- Portable Test/Measurement Systems
- Battery-Operated Systems
- Energy Management Systems

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TYPICAL APPLICATION



PACKAGE REFERENCE


* For Tape & Reel, add suffix -Z (eg. MP8100DS-Z)
 For Lead Free, add suffix -LF (eg. MP8100DS-LF-Z)

ABSOLUTE MAXIMUM RATINGS ⁽¹⁾

V_{CC}, RG1, RG2 to GND -0.3V to +20V
 Maximum Differential Input Voltage, RG1 to RG2 5V
 Storage Temperature -65°C to +150°C

Recommended Operating Conditions ⁽²⁾

V_{CC}, RG1, RG2 to GND 2.5V to 18V
 Operating Temperature -40°C to +85°C

Thermal Resistance ⁽³⁾

	θ_{JA}	θ_{JC}
SOIC8.....	90.....	42... °C/W
Continuous Power Dissipation (T _A =70°C)	800mW	

Notes:

- 1) Exceeding these ratings may damage the device.
- 2) The device is not guaranteed to function outside of its operating conditions.
- 3) Measured on approximately 1" square of 1 oz copper.

ELECTRICAL CHARACTERISTICS

V_{CC} = 10V, V_{SHDN} = 0V, T_A = +25°C, unless otherwise noted.

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Supply Voltage	V _{CC}		2.5		18	V
Supply Current	I _{CC}	I _{LOAD} = 0A; V _{CC} = 18V		17	30	µA
OUT1 Input Offset Voltage	V _{OS1}			0.25	1.20	mV
OUT2 Input Offset Voltage	V _{OS2}			0.25	1.20	mV
Input Bias Current	I _{RG1} , I _{RG2}			4		nA
OUT1 Current Accuracy	I _{RG1} /I _{OUT1}	V _{SENSE} = 100mV		±1		%
No-Load OUT1 Error		V _{SENSE} = 0V		1		µA
Low-Level OUT1 Error		V _{SENSE} = 5mV		2		µA
No-Load OUT2 Error		V _{SENSE} = 0V		1		µA
Low-Level OUT2 Error		V _{SENSE} = 5mV		2		µA
Power Supply Rejection Ratio	PSRR	2.5V < V _{CC} < 18V, V _{SENSE} = 100mV		0.05		%/V
Shutdown Supply Current	I _{CC(SHDN)}	V _{SHDN} = Float; V _{CC} = 18V		1	5	µA
SHDN Threshold Voltage	V _{TH_SHUTDOWN}		0.7	1.0	1.8	V
SHDN Input Low Current	I _{IL}			-300		nA
SHDN Input High Current	I _{IH}	V _{SHDN} = 3V		+500		nA
OUT1 Output Voltage Range	V _{OUT1}			V _{CC} - 0.15		V
OUT2 Output Voltage Range	V _{OUT2}			V _{CC} - 1		V

ELECTRICAL CHARACTERISTICS (continued)
 $V_{CC} = 10V$, $V_{SHDN} = 0V$, $T_A = +25^{\circ}C$, unless otherwise noted.

Parameter	Symbol	Conditions	Min	Typ	Max	Units
OUT1 Rise, Fall Time ⁽⁴⁾	t_R, t_F	$V_{SENSE} = 10mV$ to $150mV$, $R_{OUT1} = 10k\Omega$, $R_{G1} = R_{G2} = 2k\Omega$, $C_{OUT1} = 50pF$, 10% to 90%		TBD		μs
OUT2 Rise, Fall Time ⁽⁴⁾	t_R, t_F	$V_{SENSE} = 10mV$ to $150mV$, $R_{OUT2} = 100k\Omega$, $R_{G1} = R_{G2} = 2k\Omega$, $C_{OUT2} = 100pF$, 10% to 90%		TBD		μs
Maximum OUT1 Current ⁽⁴⁾	I_{OUT1}			500		μA
Maximum OUT2 Current ⁽⁴⁾	I_{OUT2}			5		mA

Notes:

4) Guaranteed by design.

5) Input common mode range cannot exceed the supply voltage.

PIN FUNCTIONS

Pin #	Name	Description
1	SHDN	Shutdown. Connect to ground for normal operation. When high, supply current is less than $5\mu A$.
2	NC	Not Connected.
3	RG1	Gain Resistor. Connect to battery side of current-sense resistor through the gain resistor.
4	GND	Ground or Battery Negative Terminal.
5	OUT1	Output For Driving Resistive Loads.
6	RG2	Gain Resistor. Connect to load side of current-sense resistor through the gain resistor.
7	VCC	Power Input. Connect to Battery Input.
8	OUT2	Output For Driving Capacitive Loads.

OPERATION

The MP8100 is a current-sense amplifier with a wide operating input voltage range of 2.5V to 18V.

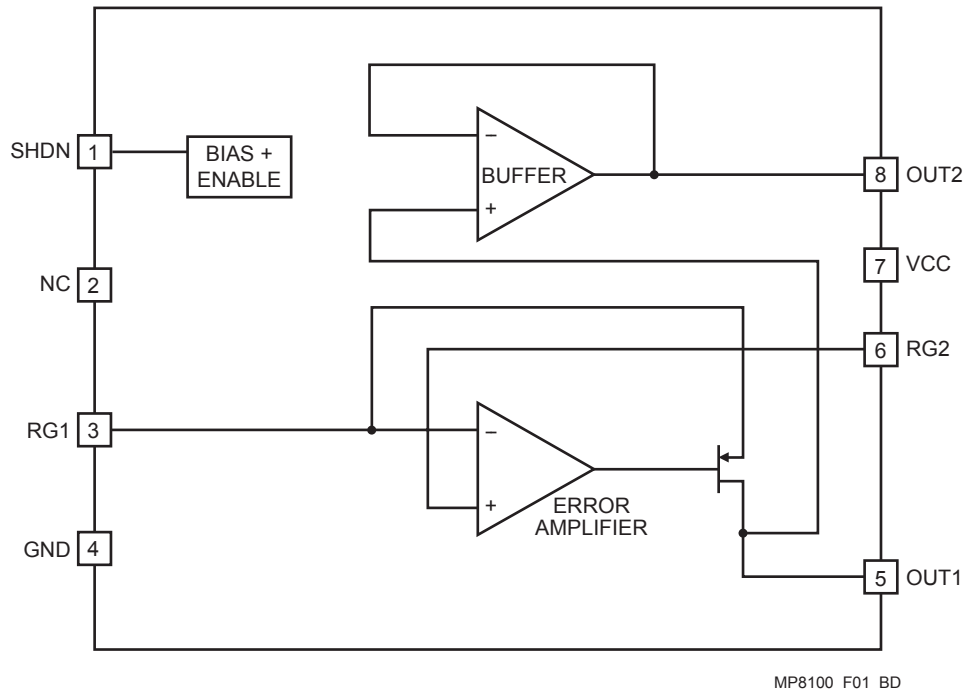


Figure 1—Functional Block Diagram

APPLICATION INFORMATION

COMPONENT SELECTION

Table 1—Suggested Component Values

Full-Scale Load Current, I_{SENSE} (A)	Current Sense Resistor (m Ω)	Gain Setting Resistor (k Ω) ($R_{G1} = R_{G2}$)	R_{OUT1} (k Ω)	Gain
0.1	500	2	20	10
1	50	2	20	10
5	10	2	20	10
10	5	2	20	10

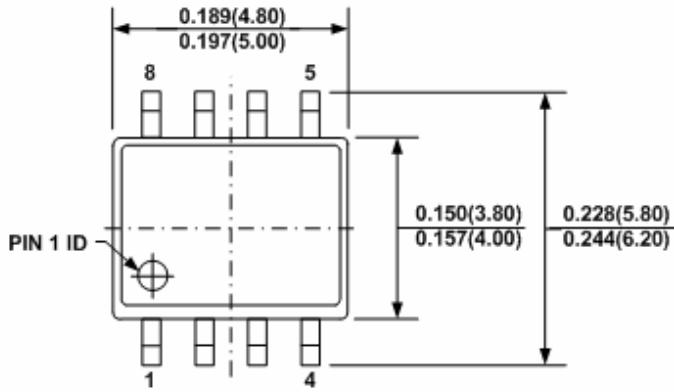
The value of V_{OUT1} can be obtained with the equation:

$$V_{OUT} = \frac{I_L \times R_S \times R_{OUT1}}{R_{G1}} = I_L \times R_S \times \text{Gain}$$

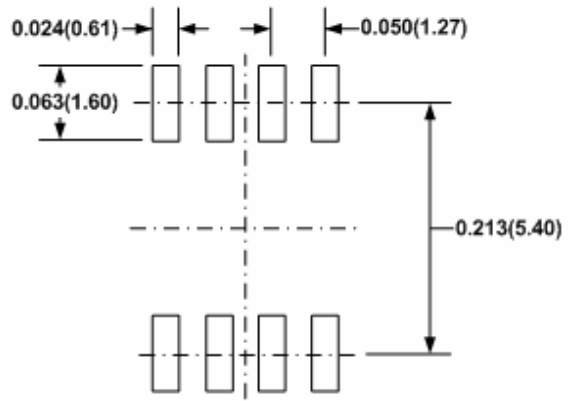
Where R_{G1} is the sense resistor and I_L is the load current.

PACKAGE INFORMATION

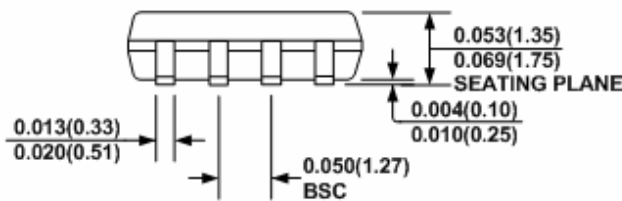
SOIC8



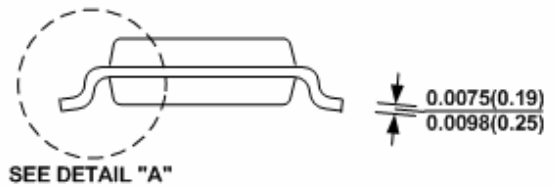
TOP VIEW



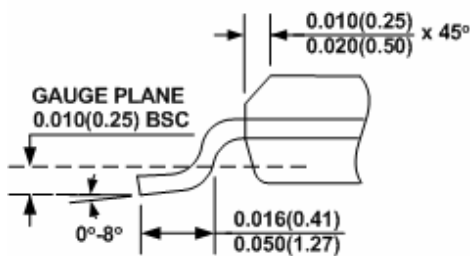
RECOMMENDED LAND PATTERN



FRONT VIEW



SIDE VIEW



DETAIL "A"

NOTE:

- 1) CONTROL DIMENSION IS IN INCHES. DIMENSION IN BRACKET IS IN MILLIMETERS.
- 2) PACKAGE LENGTH DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.
- 3) PACKAGE WIDTH DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSIONS.
- 4) LEAD COPLANARITY (BOTTOM OF LEADS AFTER FORMING) SHALL BE 0.004" INCHES MAX.
- 5) DRAWING CONFORMS TO JEDEC MS-012, VARIATION AA.
- 6) DRAWING IS NOT TO SCALE.

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