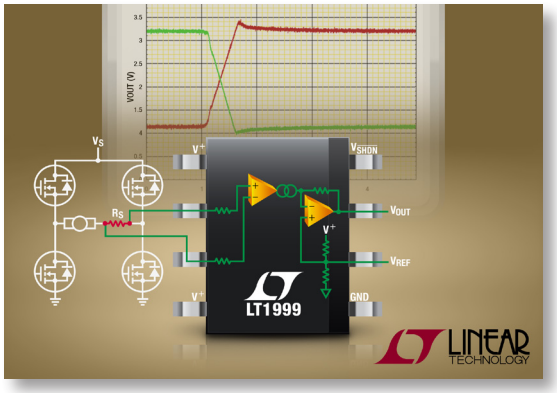
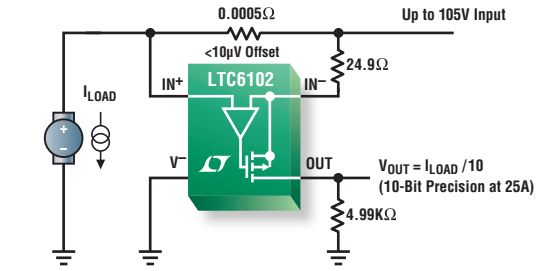
Precision High Side Current Sense Amplifiers

LT1999: High Voltage Bidirectional Current Sense Amplifier

- Buffered Output with 3 Gain Options:
  10V/V, 20V/V, 50V/V
- AC CMRR > 80dB at 100kHz
- Gain Accuracy: 0.5% Max
- Input Common Mode Voltage Range: –5V to 80V
- Smooth Continuous Operation Over Entire Common Mode Range
- Low Power Shutdown <10µA
- –55°C to 150°C Operating Temperature Range
- 8-Lead MSOP and 8-Lead SO (Narrow) Packages



The LT1999 accurately measures fast switching currents in H-bridge motor controls, switching power supplies, solenoids and battery chargers. It features a –5V to 80V input common mode voltage range, 2MHz bandwidth, less than 1.5mV offset voltage and 0.5% gain error over temperature. With more than 80dB common mode rejection at 100kHz, the LT1999 maintains outstanding accuracy even in the presence of large square wave input voltages.



Resolve µAmps from Amps **Reduce R_{SENSE} by 99%**

LTC6102: Zero-Drift High Side Current Sense Amplifier

- Supply Range:
  4V to 60V, 70V Maximum (LTC6102)
  5V to 100V, 105V Maximum (LTC6102HV)
- ±10µV Input Offset Maximum
- ±50nV/°C Input Offset Drift Maximum
- Fast Response: 1µs Step Response
- PSRR 130dB Minimum
- Operating Temperature Range: –40°C to 125°C
- 8-Lead MSOP and 3mm x 3mm DFN Package

The LTC®6102 zero-drift high side current sense amplifier has the precision to resolve microamps from amps of load current. Its outstanding accuracy can be used to attain high precision with a lower value sense resistor, resulting in less power loss and heat dissipation in the sense element.

Part	LT1999	LTC6102 LTC6102HV	LTC6101 LTC6101HV	LT6106	LT6107	LT6105	LTC6103	LTC6104	LT1787 LT1787HV	LT6100
Key Features	High Speed AC	Zero-Drift	V_{CM} to 105V	Lowest Cost	–55°C to 150°C	V_{CM} Incl. GND	Dual	Gain Set Each Direction	Bidirectional	Pin-Set Gain
Current Direction	Bidirectional	Unidirectional	Unidirectional	Unidirectional	Unidirectional	Unidirectional	Unidirectional	Bidirectional	Bidirectional	Unidirectional
Common Mode Voltage	–5V to 80V	4V to 70V 5V to 105V	4V to 70V 5V to 105V	2.7V to 44V	2.7V to 44V	–0.3V to 44V	4V to 70V	4V to 70V	2.5V to 40V 2.5V to 65V	4.1V to 48V
Response Time	1µs	1µs	1µs	3.5µs	3.5µs	3µs	1µs	1µs	10µs	40µs
V_{OS} Maximum	750µV	10µV	300µV	250µV	250µV	300µV	450µV	450µV	100µV	300µV
V_{OS} Drift	5µV/°C	25nV/°C	1µV/°C	1µV/°C	1µV/°C	0.5µV/°C	1.5µV/°C	1.5µV/°C	0.5µV/°C	0.5µV/°C
I_{BIAS} Maximum	175µA	3nA	170nA	40nA	40nA	25µA	170nA	170nA	20nA	10µA
Gain	10, 20, 50V/V	R-Set	R-Set	R-Set	R-Set	R-Set	R-Set	R-Set	8V/V	Pin-Set
PSRR Minimum	80dB @ 100kHz	120dB	118dB	106dB	106dB	100dB	110dB	110dB	120dB	105dB

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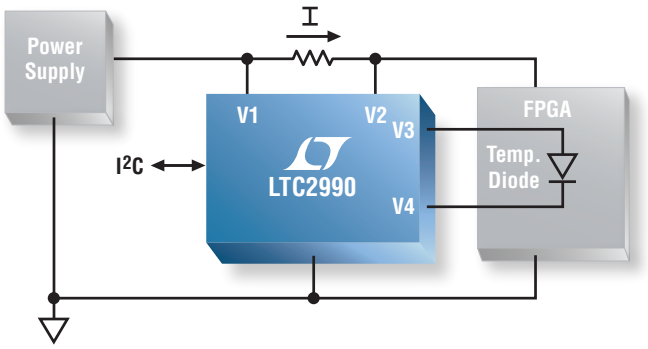
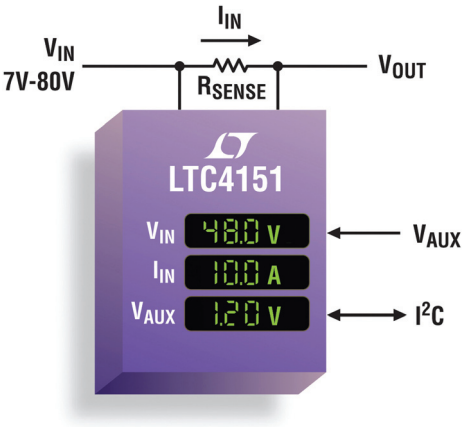
I²C Temperature, Voltage and Current Monitor

The LTC®2990, a temperature, voltage and current monitor for 3V to 5.5V systems, integrates a 14-bit ADC, 10ppm/°C reference and I²C interface to provide submillivolt voltage resolution, as well as accuracy of ±1°C internally and ±0.5°C remotely when making temperature measurements.





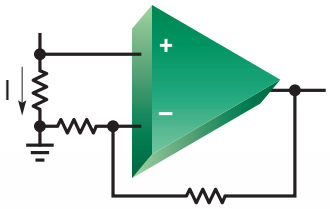
I²C Current and Voltage Monitor

The LTC4151 is a high side power monitor that operates over a wide voltage range of 7V to 80V. In default operation mode, the onboard 12-bit ADC continuously measures high side current, input voltage and an external voltage. Data is reported through the I²C interface when polled by a host.

More Amplifiers for Current Sense Applications

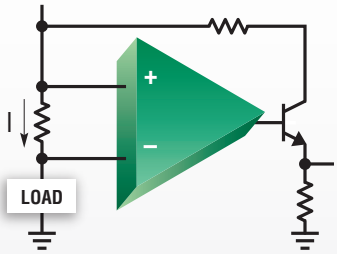
With over 300 amplifiers in our portfolio, we have the tools to solve the most difficult current sense challenges. Visit our website for a comprehensive application note and circuit collection covering low side, high side, unidirectional, bidirectional, negative supply, motor and inductive loads, and many other applications.

Precision Op Amps for Low Side Current Sense



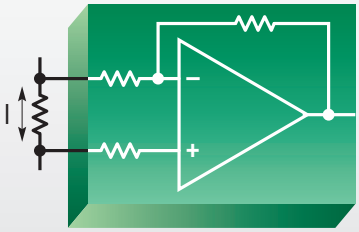
Part Number	V_{OS}	I_{BIAS}	V_S Range	V_{IN} Range (V_{CM})
LTC2050HV	0.5µV	75pA	2.7V to 12V	0V to (V_S – 1.3V)
LTC2054HV	0.5µV	0.6pA	2.7V to 12V	0V to (V_S – 0.7V)
LT1677	20µV	2nA	2.5V to 44V	0V to V_S
LTC6078	7µV	0.2pA	2.7V to 6V	0V to V_S
LTC6081	70µV	0.2pA	2.7V to 6V	0V to V_S
LT1218	25µV	30nA	2V to 36V	0V to V_S
LT1800	75µV	25nA	2V to 12.6V	0V to V_S
LT1806	100µV	1µA	1.8V to 12.6V	0V to V_S
LT6220	70µV	15nA	2.2V to 12.6V	0V to V_S
LTC6240	50µV	0.2pA	2.8V to 12V	0V to V_S

Over-The-Top® Op Amps for High Side Current Sense



Part Number	V_{OS}	I_{BIAS}	V_S Range	V_{IN} Range (V_{CM})
LT1494	150µV	250pA	2.1V to 36V	0V to 36V
LT1636	50µV	5nA	2.6V to 44V	0V to 44V
LT1637	100µV	20nA	1.8V to 44V	0V to 44V
LT1672	150µV	250pA	2.1V to 36V	0V to 36V
LT1782	400µV	8nA	2.2V to 18V	0V to 18V

Difference Amps for High or Low Side Current Sense



Part Number	V_{OS}	I_{BIAS}	V_S Range	V_{IN} Range (V_{CM})
LT1990	900µV		2.4V to 36V	–250V to 250V
LT1991	15µV	2.5nA	2.7V to 36V	–60V to 60V
LT1995	1000µV		5V to 36V	0V to 36V
LT1996	15µV	2.5nA	2.7V to 36V	–60V to 60V

Download our current sense circuit collection and application note at www.linear.com/currentsense

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