Welcome!
Texas Instruments New Product Update

- This webinar will be recorded and available at www.ti.com/npu
- Phone lines will be muted
- Please post questions in the chat or contact your sales person or field applications engineer

New Product Update:
Small-size digital power monitors

Ben Damkroger

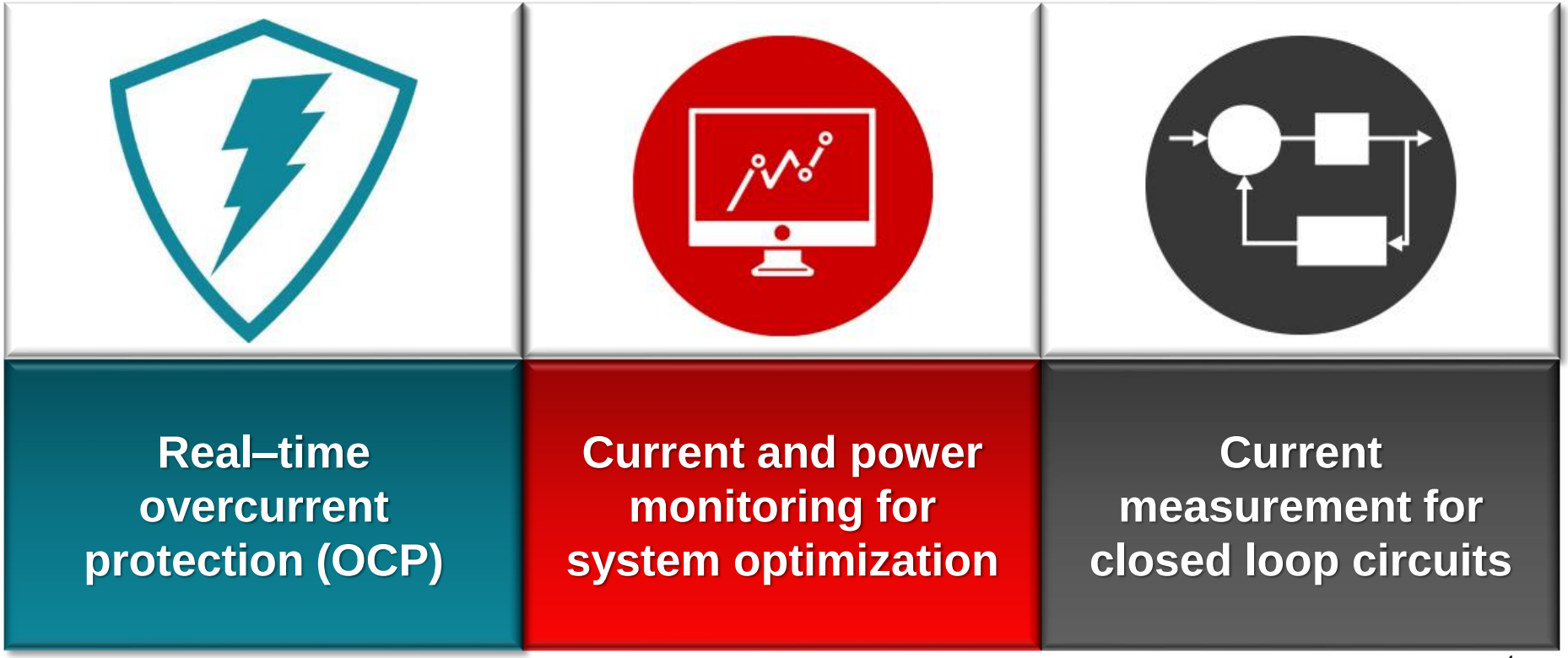
10/21/2021

Texas Instruments

Agenda

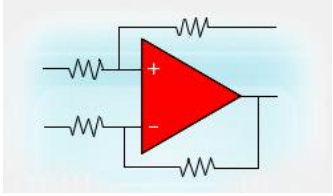
- TI’s Current Sensing portfolio
- TI’s new small-size digital power monitors
  - New devices: INA234 and INA236
  - Relevant applications
- SYSCONFIG tool
- Additional resources

Current & power measurement use cases



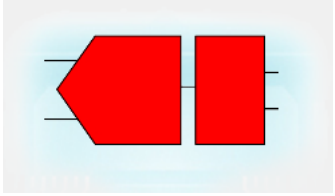
Current measurement portfolio

Analog sense amplifiers



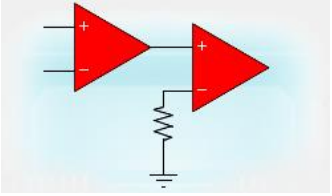
Integrate the full analog signal processing and provide a voltage or current output

Digital power monitors



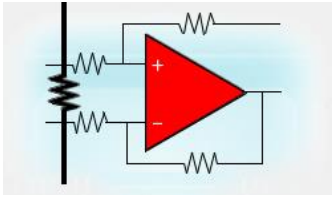
Integrate the full signal conditioning path and utilize a standard digital interface

Analog output with integrated comparators



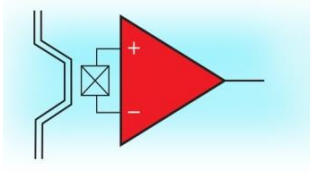
Provides an ALERT signal(s) when the load current exceeds a threshold along with the analog voltage output

In-package shunt solutions



Offers a low-drift, precision shunt resistor element in-package with either analog or digital out

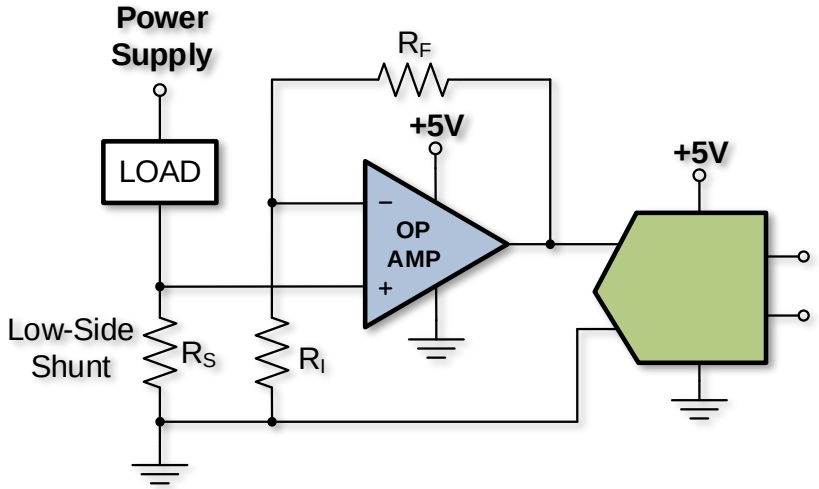
In-package Hall-effect current sensors



Offers precision isolated Hall through-package current measurement

Benefits of designing with a dedicated current sense device

Discrete current sense circuit

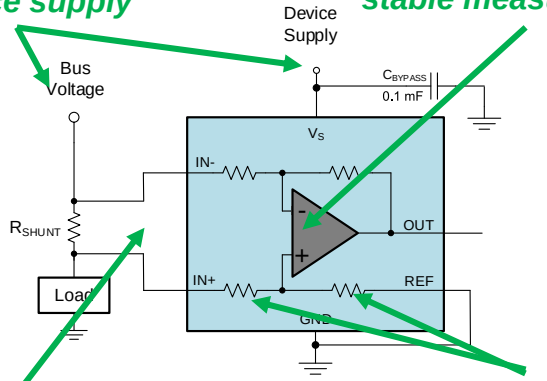


- External gain resistors are primary error and temperature drift contributors
- Input range limited by supply voltage

Dedicated current sense device

Wide input range independent of device supply

Zero-drift enables high precision, temperature stable measurements



Very low amplifier offset voltage allows for lower ohmic shunt

Precision matched gain network increases accuracy & reduces drift

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TI's new small-size digital power monitors

Features

- -0.3-V to *48-V common mode voltage *(28 V for INA234)
- ADC specifications
  - Full scale range (±20 mV or ±80 mV)
  - 16-bit and 12-bit options
- High accuracy
  - Low offset and drift
  - Low gain error and drift
  - Low bias current
- Telemetry capabilities
  - 16-bit/12-bit: voltage, current, and power
- Additional features
  - Low supply and I2C/SMBus compatible voltage
  - Low shutdown current
  - Wafer chip scale package

Benefits

- Wide common mode range supports low-side, and high-side applications for 12-V, 24-V, 36-V systems.
- High accuracy enables:
  - Low ohmic shunts (mΩ) to minimize measurement power dissipation
  - Minimize/eliminate calibration
- Measure more variables than with standard current sense amplifiers
- Optimized to lessen the power draw and size of portable, battery-powered devices

INA236

48 V, 16-bit, Ultra-Precise I²C/SMBus, Current, Voltage and Power Monitor w/ ALERT

Features

- -0.3-V to 48-V common mode voltage with 1.7-V to 5.5-V supply voltage range
- High accuracy
  - 16-bit ADC with selectable 20-mV/80-mV full-scale input range
  - Offset: 5 µV (Max) with 0.1 µV/°C (Max) drift
  - Gain error: 0.1% (Max)
- Application configurable
  - Reports current in amperes
  - Programmable sample averaging
  - Independent programmable conversion times
  - Alert/ ADC conversion ready flag
  - General call addressing allows simultaneous conversion among devices
  - 1.2 V I²C/SMBus compatible interface (1.2 V, 1.8 V, 3.3 V, 5 V compatible)
  - 3 µA max sleep/shutdown mode
- 0.745 mm x 1.508 mm wafer-chip-scale package (WCSP), SOT23-8 (DDF)

Applications

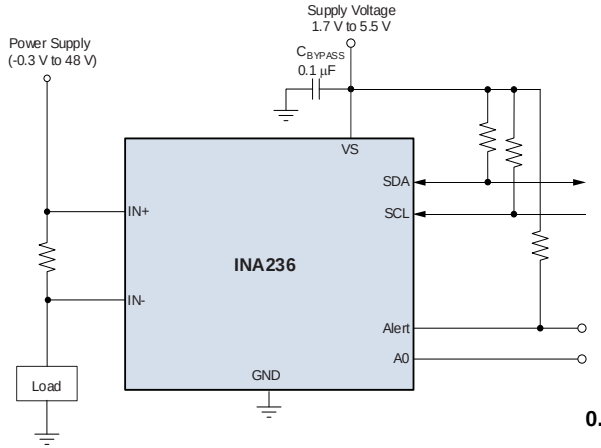
- Smartphones
- Wearables
- Portable medical devices
- Notebook PCs
- Tablets

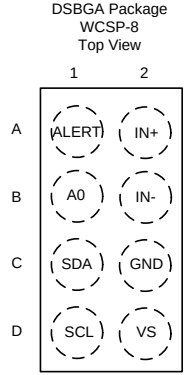
Tools & Resources

- INA236EVM
- INA236GUI

Benefits

- Adaptable configuration to optimize performance under multiple operating conditions
- Accurate power monitoring at low currents with wide dynamic range for high peak currents. Reduces IR loss through smaller shunt resistors
- Easy interface to advanced MCUs and processors saving 75% footprint compared to standard packages





0.745 mm x 1.508 mm x 0.35 mm

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INA234

28 V, 12-bit, I²C/SMBus Current, Voltage and Power Monitor w/ ALERT

Features

- -0.3-V to 28-V common mode voltage with 1.7-V to 5.5-V supply voltage range
- High accuracy
  - 12-bit ADC with selectable 20-mV/80-mV full-scale input range
  - Offset: 100 µV (Max) with 0.2 µV/°C (Max) drift
  - Gain error: 0.5% (Max)
- Application configurable
  - Reports current in amperes
  - Programmable sample averaging
  - Independent programmable conversion times
  - Alert/ ADC conversion ready flag
  - General call addressing allows simultaneous conversion among devices
  - 1.2 V I²C/SMBus compatible interface (1.2 V, 1.8 V, 3.3 V, 5 V compatible)
  - 3µA max sleep/shutdown mode
- 0.745 mm x 1.508 mm wafer-chip-scale package (WCSP)

Applications

- Smartphones
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- Portable medical devices
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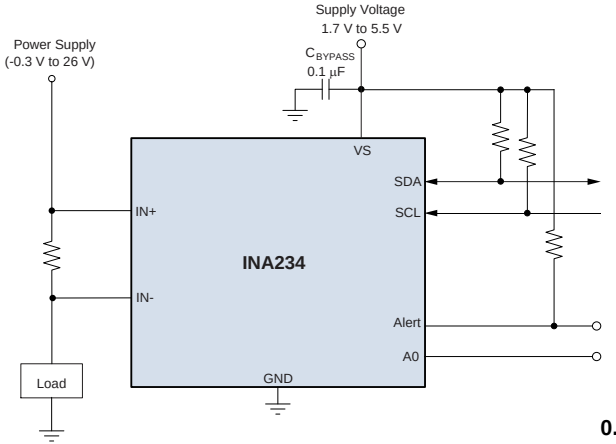

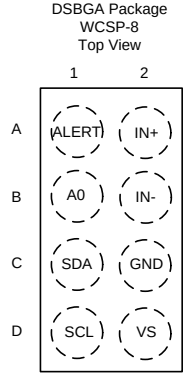

0.745 mm x 1.508 mm x 0.35 mm

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Small-size digital power monitor applications

Docking stations

Current monitoring to maximize power to USB load devices

Smart watches

Input current monitoring for OCP

True wireless stereo

Discrete small cell battery fuel gauging

Notebook PCs

Subsystem power monitoring to increase battery life

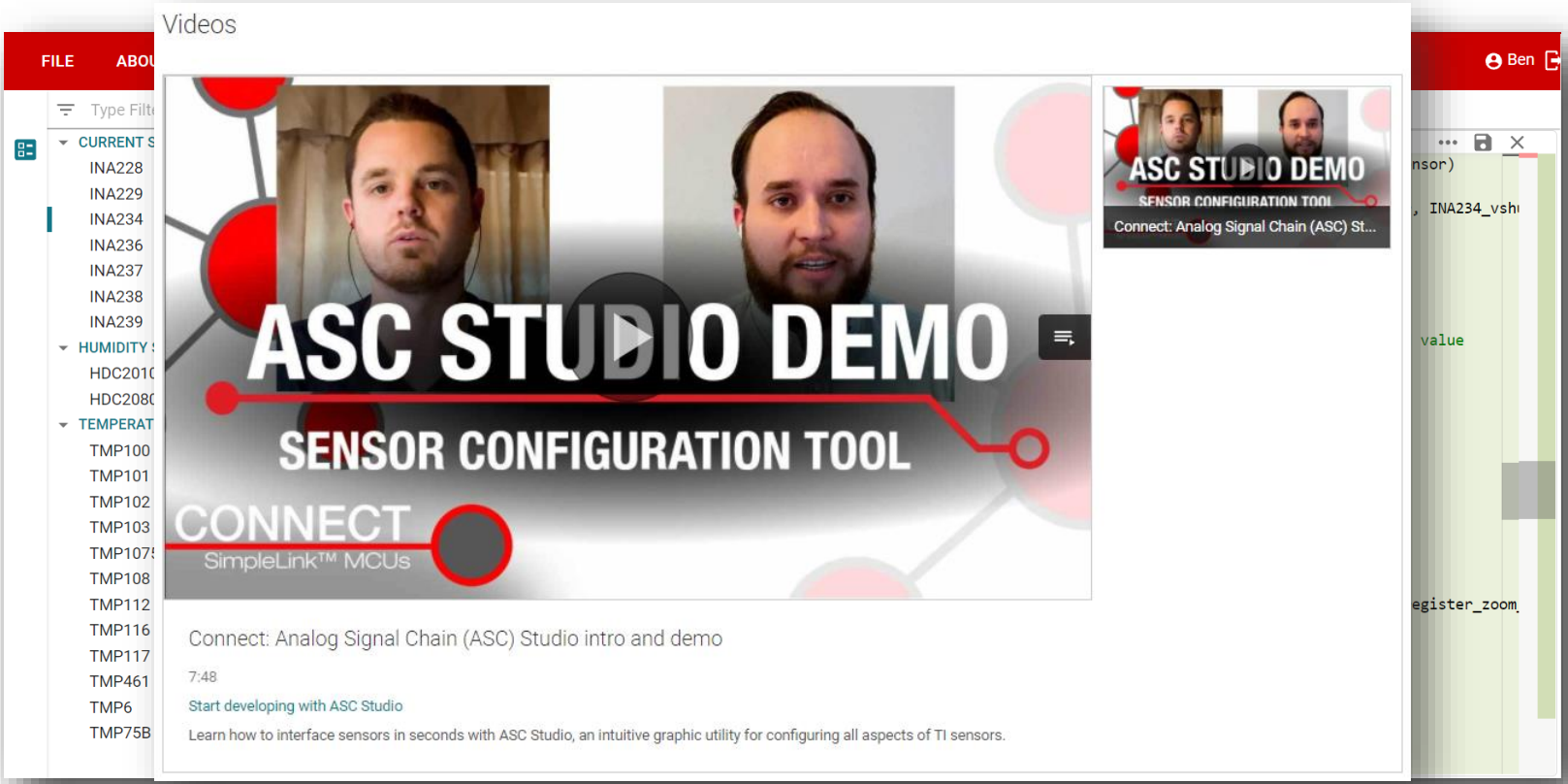
Server/computer fans

Monitor fan health to maximize air flow safely

Smart displays

Power monitoring as a leading indicator of temperature

TI SYSCONFIG tool



Additional resources

Step 1

- TI Precision Labs video series
- Current sense amplifier comparison and error tool

Step 2

- Integrated, current sensing analog-to-digital converter application brief
- Getting started with digital power monitors application report

Step 3

- INA234 and INA236 evaluation module
- TI SYSCONFIG (system configuration tool)
- E2E support forums

Visit www.ti.com/npu

For more information on the New Product Update series, calendar and archived recordings

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