

## Battery Pack Monitors

### FEATURES

- ▶ Battery pack current measurement
  - ▶ Buffered analog inputs
  - ▶ Continuous operation option
  - ▶ Lossless measurement for coulomb counting
  - ▶ 1 ms update rate
  - ▶  $\pm 0.1\%$  maximum gain error
  - ▶  $\pm 1 \mu\text{V}$  maximum offset
  - ▶ Redundant implementation
- ▶ Battery pack voltage measurement
  - ▶ Buffered analog inputs
  - ▶ Synchronous with current measurement
  - ▶ Differential and single-ended mode
  - ▶ Redundant implementation
- ▶ 10 additional voltage measurement channels
  - ▶ Buffered analog inputs
  - ▶ On-demand operation
  - ▶ Differential and single-ended mode
  - ▶ Redundant implementation
- ▶ Overcurrent detection
  - ▶ Triple redundancy with majority voting
  - ▶ PWM output options
- ▶ Built-in *isoSPI*
  - ▶ 2 Mbps isolated serial communications
  - ▶ Capacitor or transformer coupled
  - ▶ Daisy-chaining option
  - ▶ 4-wire SPI option
- ▶ General-purpose digital IO
  - ▶ Six general-purpose outputs
  - ▶ Dual threshold read-back of GPOs
  - ▶ Four GPIOs configurable as an I<sup>2</sup>C or SPI controller
- ▶ 48-Lead side-solderable QFN package
- ▶ AEC-Q100 qualified
- ▶ ADBMS295xWFS models developed for use in ISO 26262 applications for ASIL D

### APPLICATIONS

- ▶ Electric and hybrid electric vehicles
- ▶ Backup battery systems
- ▶ Grid energy storage

I<sup>2</sup>C refers to a communications protocol originally developed by Philips Semiconductors (now NXP Semiconductors).

### GENERAL DESCRIPTION

The ADBMS2950 and ADBMS2952 are battery pack monitors, and the ADBMS2951 is a link monitor for electrical and hybrid vehicles, and other current or voltage sense applications. The ADBMS2950 and ADBMS2952 measure the current flowing in and out of a battery pack by sensing the voltage drop over a shunt resistor with a very low offset.

The ADBMS2950 and ADBMS2952 also detect overcurrent conditions using fast overcurrent ADCs with digital threshold comparators and communicate their results through dedicated overcurrent alert lines with minimum delay.

The ADBMS2950/ADBMS2951/ADBMS2952 feature a total of 12 internally buffered high impedance inputs for measuring voltages from external sensors or resistor dividers, enabling measurement of pack voltages, temperatures, HV-Link voltages, chassis isolation, and the supervision of the state of contactors and fuses.

Six digital outputs (GPOs) supporting open-drain or push-pull can be used to control high voltage transistors to disconnect external resistor dividers. Four digital GPIOs also allow operation as an I<sup>2</sup>C or SPI controller interface to address an external EEPROM or other serial peripherals.

The built-in serial interface of the ADBMS2950 and ADBMS2951 can be configured for SPI or isolated *isoSPI* communication to the host. An additional *isoSPI* port allows to connect a daisy-chain of the ADBMS2950 and ADBMS2951 devices; optionally extended with the ADBMS683x cell monitors. The ADBMS2952 supports SPI communication only.

### TYPICAL APPLICATION CIRCUIT

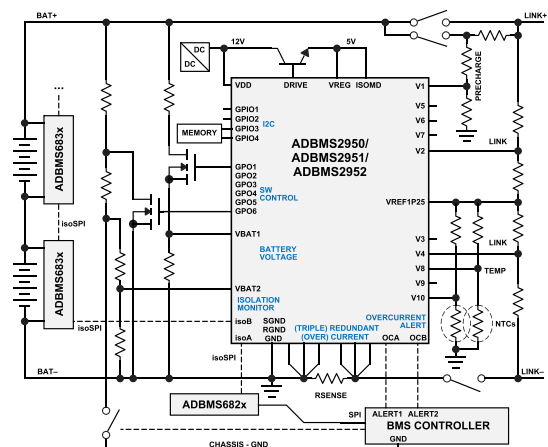


Figure 1. Typical ADBMS2950 Application

**NOTES**