

## ams introduces cost-saving system management reference design for lithium pedelec/e-bike batteries

### Blueprint for controllerless balancing and voltage monitoring shows how to reduce component count and BoM cost while providing essential safety functions

Unterpremstaetten, Austria (March 17, 2014), ams AG (SIX: AMS), a leading provider of high performance analog ICs and sensors, today introduced an example design for lithium pedelec/e-bike batteries which implements accurate cell monitoring and balancing without the need for a microcontroller in the Battery Management System (BMS).

Battery pack and pedelec manufacturers which use the design will benefit from valuable bill-of-materials (BoM) cost savings and a simpler circuit design, compared to batteries in production today.

The ams design is for a 48V pedelec battery consisting of up to 14 lithium-ion cells. It uses two AS8506 smart cell monitoring ICs, with few supporting components, to monitor the temperature and voltage of up to seven cells each and to implement passive balancing of the cells when charging.

By contrast, conventional BMS designs in pedelecs use dumb voltage monitoring ICs to measure the voltage and temperature of cells, reporting the values to a dedicated battery management microcontroller via a serial communications link. The MCU is required to control safety and protection functions (over- and under-voltage and over-temperature shut-down) and cell balancing.

The AS8506 from ams, however, includes built-in logic functions for controlling cell safety, protection and balancing. These functions can easily be configured by the user, with the settings saved in an on-board OTP memory. The device also features integrated MOSFETs for use in passive cell balancing operations. During charging, each cell's voltage is compared to a user-programmable reference voltage threshold. Up to 100mA may be discharged through the MOSFET from any cell exceeding the threshold, until all cells have reached the threshold and the battery module is fully charged.

This architecture, in which battery monitoring and cell balancing operations are implemented inside the AS8506 voltage-monitoring device, dispenses with the dedicated MCU required in conventional pedelec battery designs. When an AS8506 detects an over- or under-voltage or over-temperature condition, an interrupt signal is transmitted to the pedelec's motor controller IC to complete the required safety shut-down operations.

'Battery lifetime, safety and run-time strongly affect consumers' choice of pedelec, but so does cost,' said Bernd Gessner, Vice President and General Manager of the automotive business unit of ams. 'The controllerless reference design from ams helps pedelec manufacturers meet consumer demand by



providing outstanding safety and battery performance, but in a simpler and lower-cost architecture than has previously been available.'

The reference design can be used in any pedelec or e-bike battery containing up to 14 lithium-ion cells. It can also be extended to supervise more than 14 cells by daisy-chaining additional AS8506 ICs as required.

The reference design files are available on request from ams.

### Price & Availability

The AS8506 cell monitoring IC is in volume production now. It is priced at \$9.10 for 1,000 pieces.

### Technical Support

Demo kits for the AS8506 are available online from ams. For further information on the AS8506 demo kit or to request samples, please visit [www.ams.com/battery-stack-monitor/AS8506-demokit](http://www.ams.com/battery-stack-monitor/AS8506-demokit).

### about ams

ams develops and manufactures high performance analog semiconductors that solve its customers' most challenging problems with innovative solutions. ams' products are aimed at applications which require extreme precision, accuracy, dynamic range, sensitivity, and ultra-low power consumption. ams' product range includes sensors, sensor interfaces, power management ICs and wireless ICs for customers in the consumer, industrial, medical, mobile communications and automotive markets.

With headquarters in Austria and 9 design centers world wide ams employs over 1,400 people globally and serves more than 7,800 customers around the globe. ams is listed on the SIX Swiss stock exchange (ticker symbol: AMS). More information about ams can be found at [www.ams.com](http://www.ams.com).

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