Atmel Battery Management

Atmel Li-Ion Battery Management Solution
for Automotive and Industrial Applications
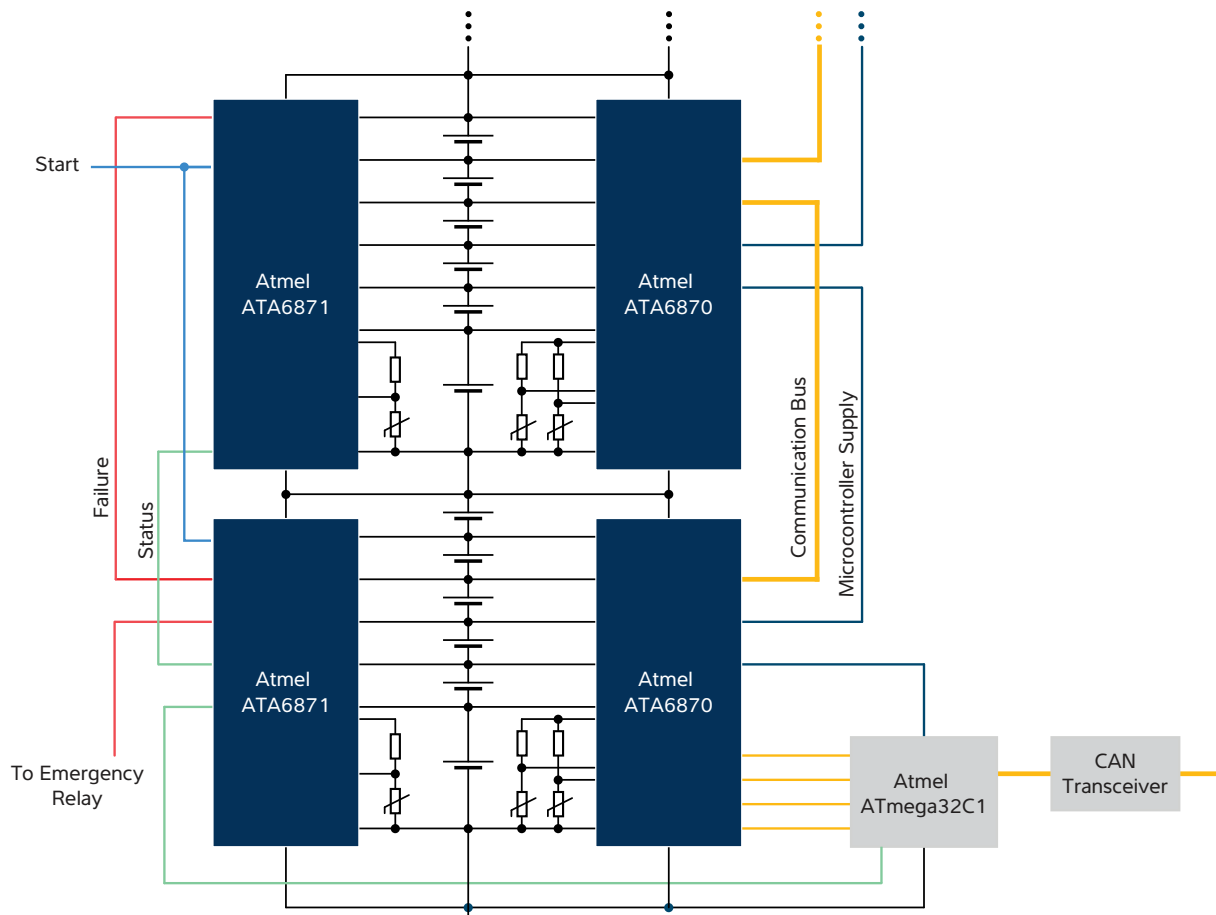
Atmel Li-Ion Battery Management

Due to its cutting-edge characteristics, Lithium-Ion (Li-Ion) is the preferred technology for modern high-performance batteries. Up to 30% smaller and 50% lighter than conventional NiMH batteries, Li-Ion batteries also store much more energy. However, while Li-Ion batteries offer important advantages in terms of size, weight, recharge speed, life span, and resistance to memory effects, they do have a tendency to overheat when overcharged or during deep discharging. This makes protection and safety functions paramount concerns in Li-Ion battery applications. The Atmel® ATA6870 Li-Ion Battery-Cell Measuring Circuit and Atmel ATA6871 Li-Ion Battery-Cell Monitoring Circuit, provide one of the safest solution on the market for monitoring Li-Ion batteries.
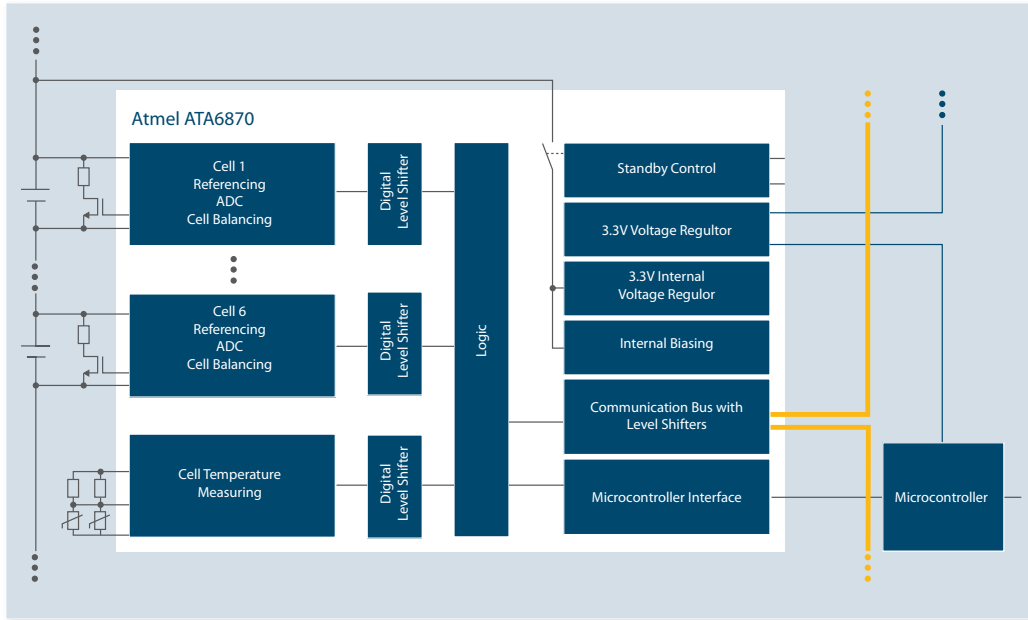
Applications

- Electric/hybrid vehicles
- Uninterruptible power supplies (UPS)
- Golf carts
- Power tools
- Motorcycle, eBikes
- Wheelchairs
- Forklifts
- Portable medical equipment

Atmel Battery Management

Atmel Li-Ion Battery Management Solution for Automotive and Industrial Applications

Atmel ATA6870

- Cell 1 Referencing ADC Cell Balancing
- Cell 6 Referencing ADC Cell Balancing
- Cell Temperature Measuring
- Digital Level Shifter
- Logic
- Standby Control
- 3.3V Voltage Regultor
- 3.3V Internal Voltage Regulor
- Internal Biasing
- Communication Bus with Level Shifters
- Microcontroller Interface
- Microcontroller

Atmel ATA6870 Li-Ion Battery-Cell Measuring Circuit

The Atmel® ATA6870 is a battery-cell measuring, power supply, and charge-balancing circuit for Li-Ion multi-cell battery stacks. It monitors the battery-cell voltage and battery-cell temperature with 12-bit ADCs. The circuit also provides charge-balancing capabilities for each battery cell. In addition, a linear regulator is integrated to supply a microcontroller or other external components. Reliable communication between stacked ICs is achieved by level shifters with current sources and checksum monitoring of data. The ATA6870 can also be connected to three, four, five, or six battery cells. Up to 16 circuits (96 cells) can be cascaded in one string, and the number of possible strings is unlimited.

Features

- 12-bit battery-cell voltage measurement
- Outstanding voltage reference without temperature drift
- Reliable measuring data due to high spike and noise suppression
- Simultaneous battery-cell measurement for the complete stack in parallel
- Cell temperature measurement
- Integrated power supply for microcontrollers
- Active and passive charge-balancing capability
- Reliable communication with checksum monitoring of data
- Less than 10µA standby current
- Hot plug-in capable

Benefits

- Together with the Atmel ATA6871, provides highest safety level for Li-Ion batteries
- Cost-saving due to cost-optimized 30V CMOS technology
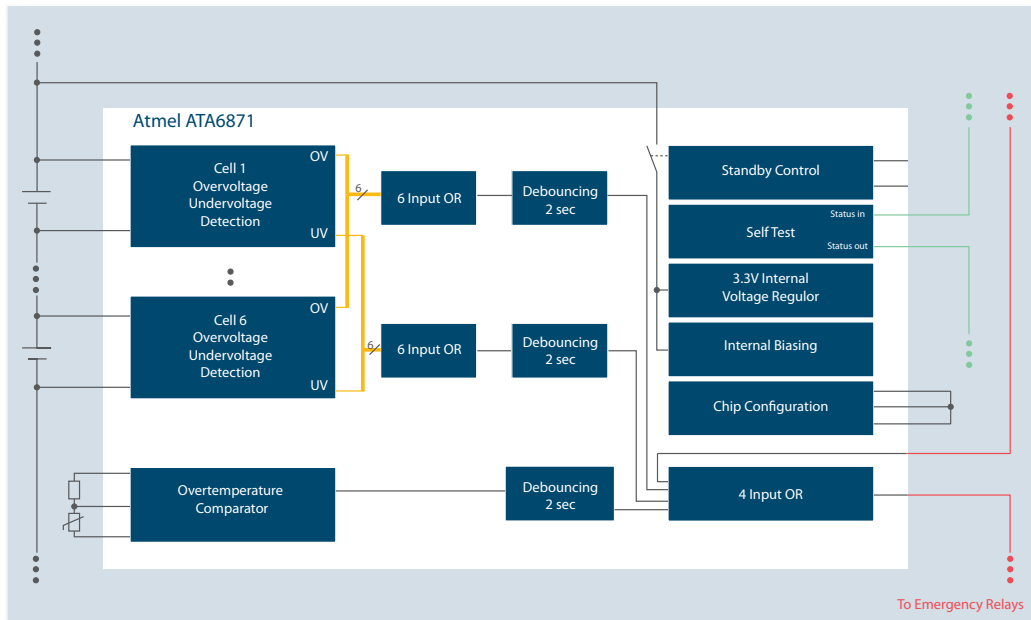
Atmel ATA6871 Li-Ion Battery-Cell Monitoring Circuit

The Atmel® ATA6871 is a battery-cell monitoring circuit that acts as an emergency, safety, and backup circuit in Li-Ion battery systems. It monitors overvoltage, undervoltage, and battery-cell temperature without requiring a microcontroller. The ATA6871 offers an advanced self-test function to check the monitoring comparators, open and shorted measuring lines, as well as communication lines. The ATA6871 can monitor four, five, or six battery cells, and can be stacked up to 16 times in one string. The number of possible strings is unlimited.

Features

- Overvoltage, undervoltage, and cell temperature monitoring
- Self-diagnosis, including:
  - Comparator functions
  - Communication lines
  - Short and open measuring lines
- Hot plug-in capable
- Less than 10µA standby current

Benefits

- Highest safety levels for Li-ion batteries due to:
  - Hardware-implemented monitoring thresholds
  - Works without software or microcontroller – extended self-test capability
- High flexibility due to customizable overvoltage and undervoltage thresholds*
- Cost-effective solution due to cost-optimized 30V CMOS Technology

  * Available with adequate volumes

Tools and Support

Atmel® provides evaluation boards for both the Atmel ATA6870 and Atmel ATA6871 battery monitoring circuits. These boards enable the simplest and fastest testing of circuits. Three stacked ATA6870 or ATA6871 circuits are available on the boards to enable the monitoring of 18 Li-Ion battery cells. The evaluation boards are easily stackable, making it possible to build and evaluate a complex monitoring system for high performance Li-Ion batteries with little effort. A detailed description of the boards can be downloaded from http://www.atmel.com.

In addition, the evaluation kit for the ATA6870 also includes control software with an intuitive graphical user interface. The software enables easy control of the board from a desktop or laptop PC. In addition to the measurement and graphic representation of the cells' voltages, the software also enables the monitoring of individual cells, overvoltage and undervoltage, as well as simple controlling of the cell-balancing function. The kit also enables advanced users to write programming sequences to verify the complete monitoring process for a Li-Ion battery. For debugging purposes, the programming sequence can be run as a step-by-step procedure.
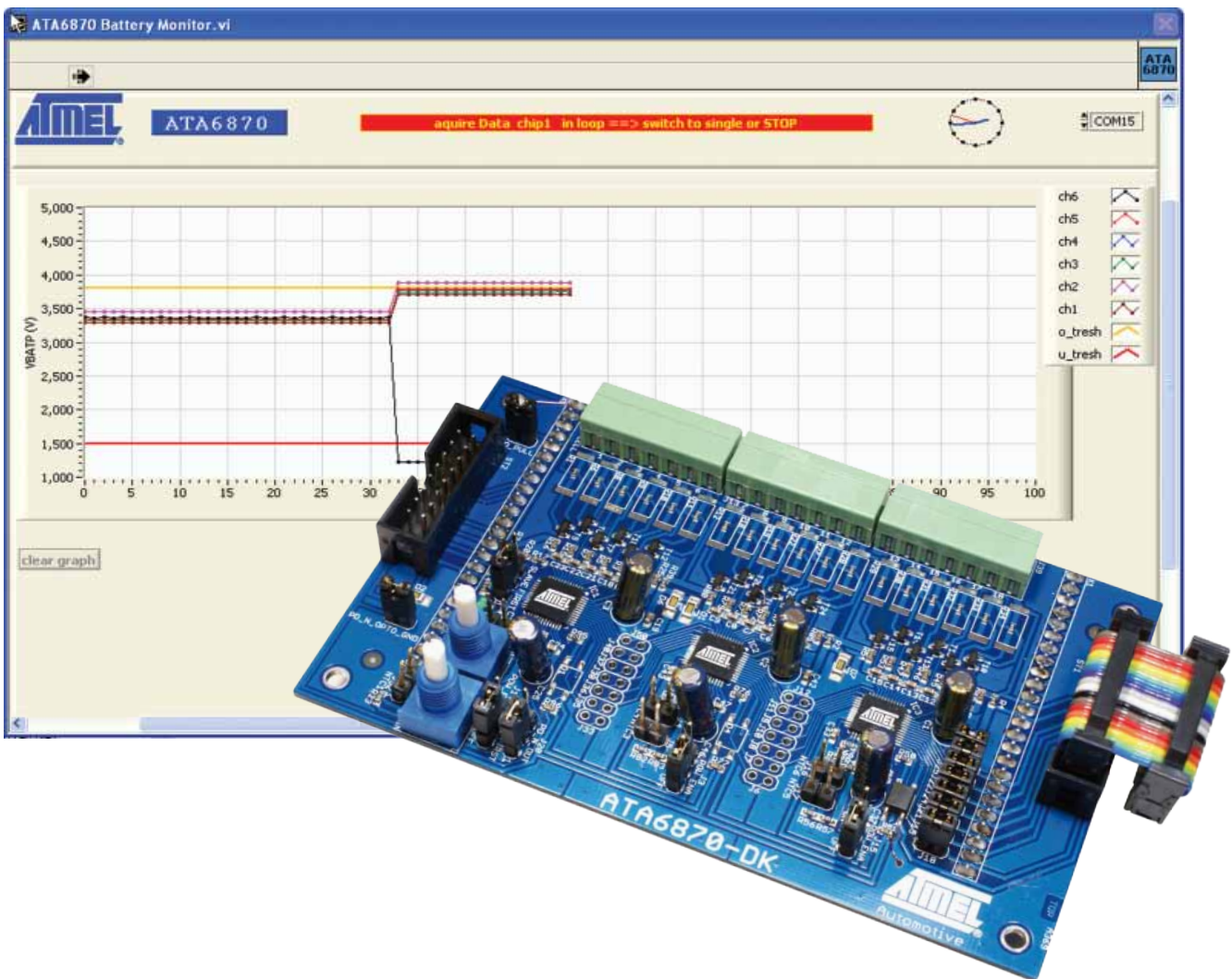
Atmel Battery Management

Atmel Li-Ion Battery Management Solution for Automotive and Industrial Applications

Ordering Information

Atmel Part Number	Package	Remarks
ATA6870-PLPW	QFN48, 7mm x 7mm	1k Tape and Reel
ATA6870-PLQW	QFN48, 7mm x 7mm	4k Tape and Reel
ATA6871-TLPW	SSO28	1k Tape and Reel
ATA6871-TLQW	SSO28	4k Tape and Reel
ATA6870-DK	Development Kit	
ATA6871-DK	Development Kit	

Atmel Corporation
2325 Orchard Parkway
San Jose, CA 95131
USA
Tel: (+1)(408) 441-0311
Fax: (+1)(408) 487-2600
www.atmel.com

Atmel Asia Limited
Unit 01-5 & 16, 19F
BEA Tower, Millennium City 5
418 Kwun Tong Road
Kwun Tong, Kowloon
HONG KONG
Tel: (+852) 2245-6100
Fax: (+852) 2722-1369

Atmel Munich GmbH
Business Campus
Parkring 4
D-85748 Garching b. Munich
GERMANY
Tel: (+49) 89-31970-0
Fax: (+49) 89-3194621

Atmel Japan
9F, Tonetsu Shinkawa Bldg.
1-24-8 Shinkawa
Chuo-ku, Tokyo 104-0033
JAPAN
Tel: (+81)(3) 3523-3551
Fax: (+81)(3) 3523-7581