

Infineon battery management offerings



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가상부스에 오신 걸 환영합니다!



Control your batteries with TLE9012AQU

Products

System approach

The **TLE9012AQU** is a multi-channel battery monitoring and balancing system IC designed for Li-ion battery packs used in automotive, industrial and consumer applications. **TLE9012AQU** fulfills four main functions: cell voltage measurement, temperature measurement, cell balancing and isolated communication to the main battery controller. It provides the necessary diagnosis tools to ensure proper functioning of the controlled battery.

An AURIX™ microcontroller ensures safe charging and discharging of the battery, and that the state of charge and state of health of the cells packed are correctly calculated. In order to ensure safe and reliable communication between the monitoring ICs and the main controller, an isolated transceiver **TLE9015QU** can be used. **TLE9015QU** provides additional features such as error communication and ring mode topology for additional fail-safe operation.

The demo shows a complete system combining all products above:

- › TLE9012AQU for sensing the voltage and temperature of the cells
- › TLE9015QU to enable isolated communication
- › AURIX™ microcontroller TC397 for enabling secured communication with an external PC for development purposes

These evaluation kits are available on Infineon's website.

Success stories

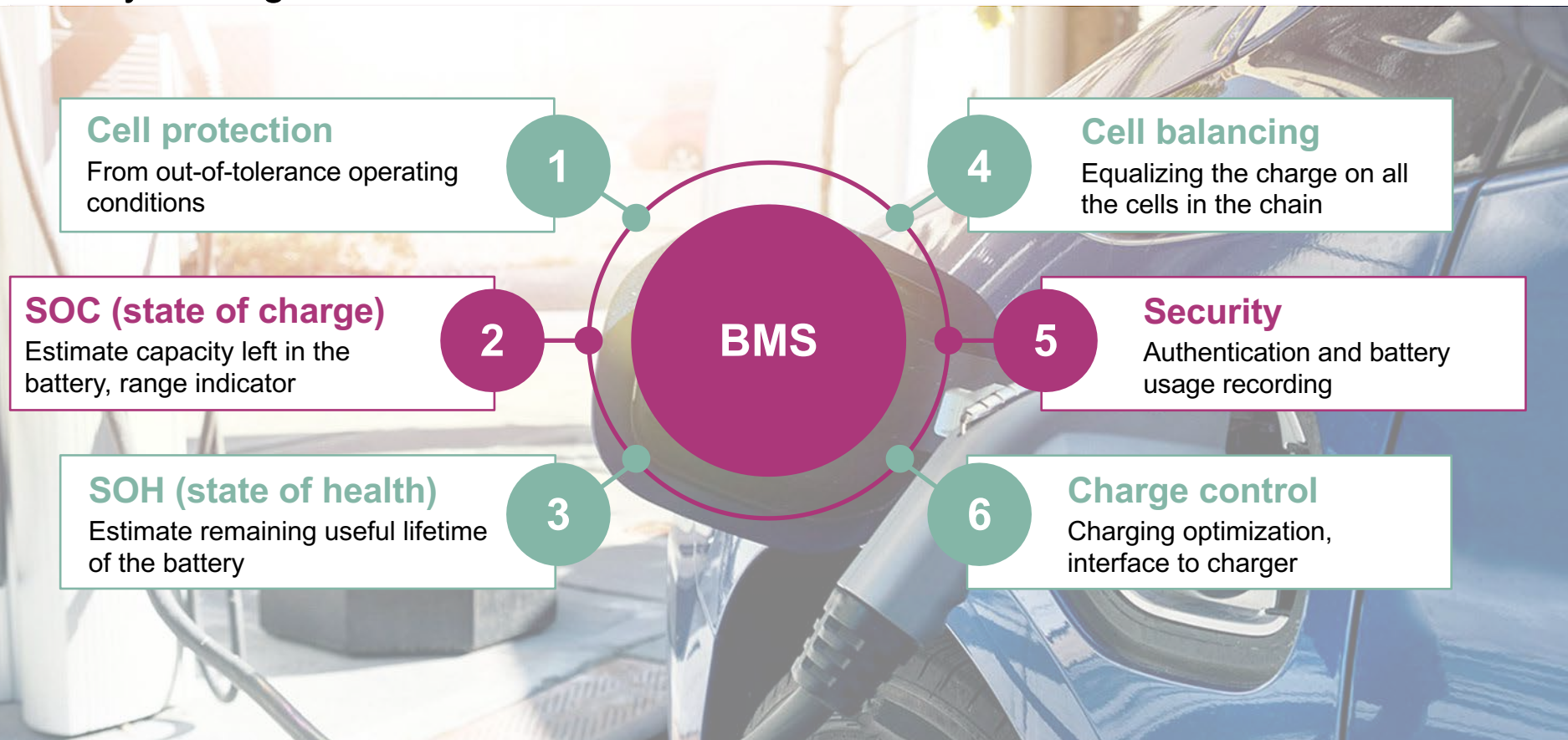
Key benefits

- › Robust communication without need for transformers or common mode chokes
- › Best-in-class voltage measurement accuracy even after soldering thanks to stress sensor technology
- › Integrated diagnosis easing functional safety design
- › Integrated UART communication for systems with a microcontroller on local ground

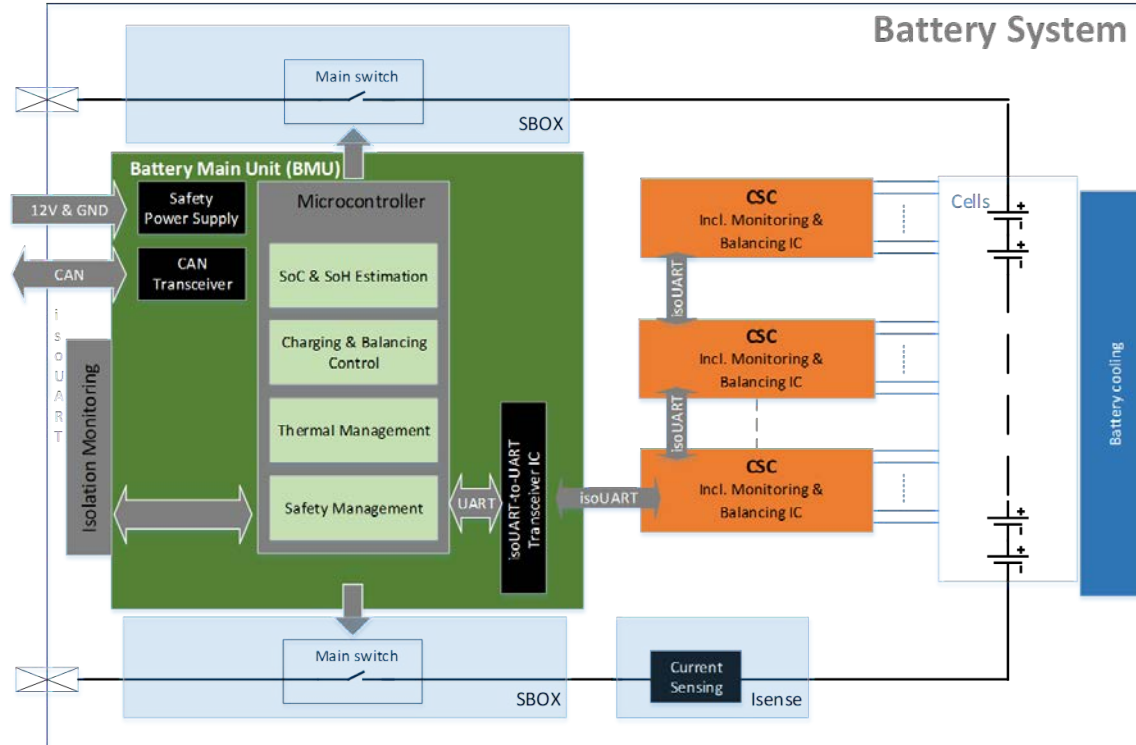
Target applications

- › Mild hybrid electric vehicles (MHEV)
- › Hybrid electric vehicles (HEV)
- › Plug-in hybrid electric vehicles (PHEV)
- › Battery electric vehicles (BEV)
- › 12 V Li-ion battery systems
- › Energy storage systems (ESS)
- › Home energy storage systems (HESS)
- › eBike battery management systems
- › Commercial, construction and agricultural vehicles (electric buses, trucks, forklifts, ...)

Battery management functions



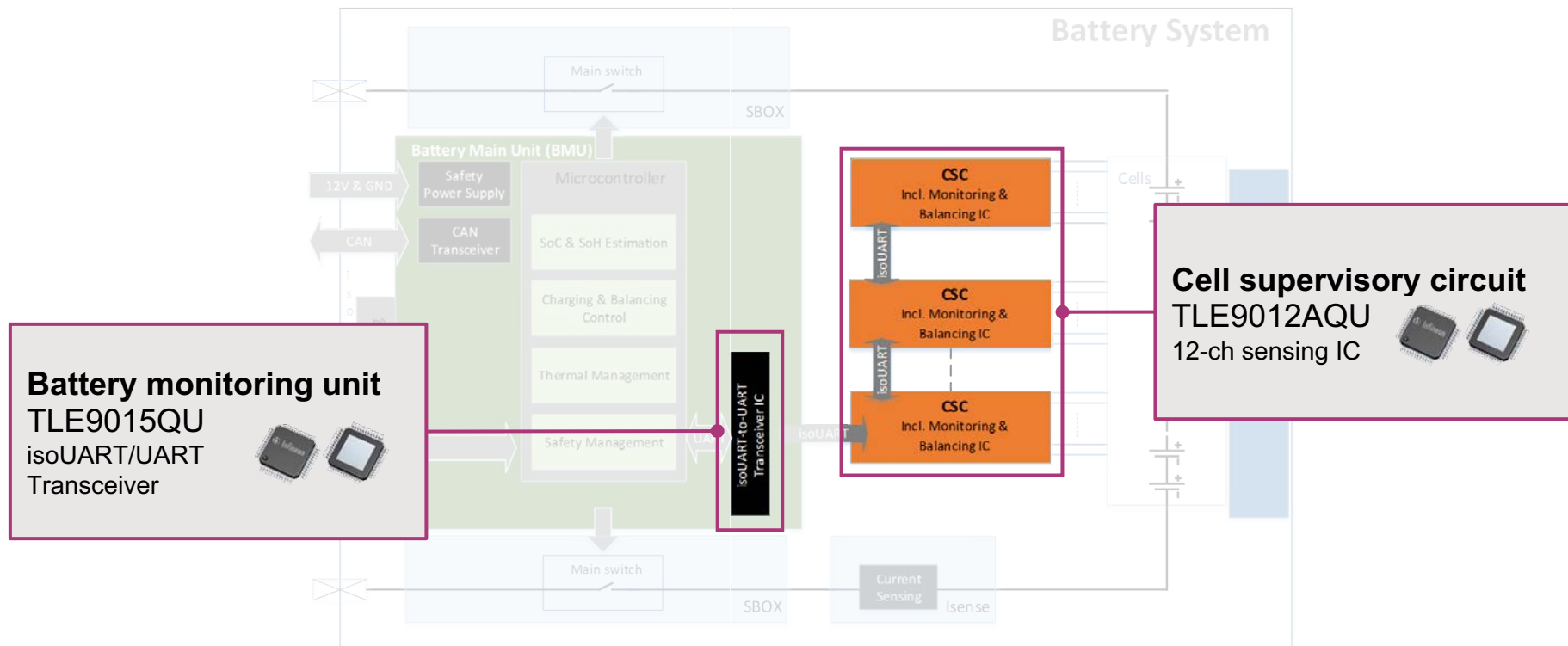
Battery management functions



CSC: Cell supervisory circuit

BMU: Battery main unit

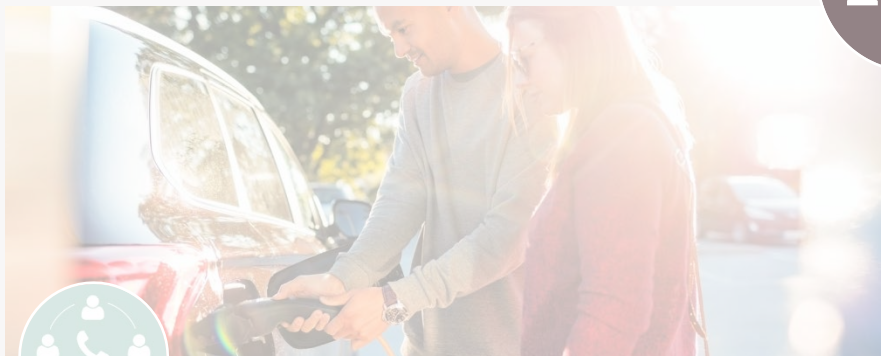
Battery management functions



Cell balancing



Accurate voltage measurement



Host communication



Temperature measurement

Accurate voltage measurement



Cell supervisory circuit

TLE9012AQU

12-ch sensing IC



Battery monitoring unit

TLE9015QU

Transceiver



Synchronicity

12x delta sigma ADCs ensure that voltage of all cells is measured synchronously

Filtering

Several filtering modes ensure that desired noise can be eliminated from measured signal without influencing system cost

Voltage measurement diagnosis

Additional block voltage measurement and comparator ensure that possible errors on the voltage measurement HW are detected

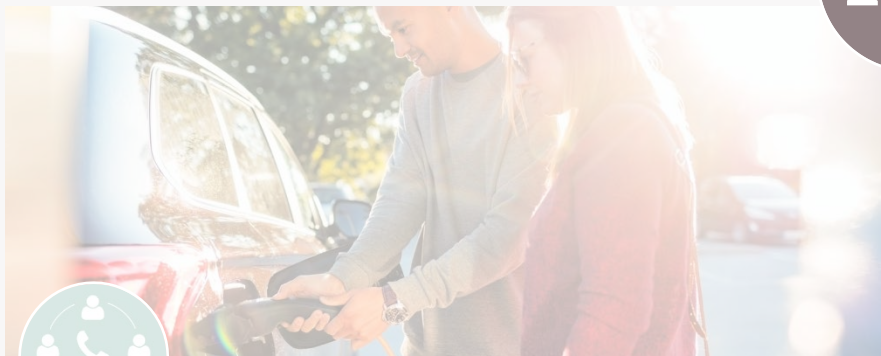
Accuracy

± 5.8 mV end-of-life accuracy guaranteed by using a stress sensor and advance temperature compensation

Cell balancing



Accurate voltage measurement



Host communication



Temperature measurement

Temperature measurement



Cell supervisory circuit

TLE9012AQU

12-ch sensing IC



Battery monitoring unit

TLE9015QU

Transceiver



Adaptive current selection

NTC current is provided and automatically selected by device depending on temperature value to maximize accuracy over full range

Automatic measurement

Temperature will be measured automatically by IC without further triggering from microcontroller, minimizing traffic on bus

Cell balancing



Accurate voltage measurement



Host communication



Cell supervisory circuit

TLE9012AQU

12-ch sensing IC



Battery monitoring unit

TLE9015QU

Transceiver



UART-based communication

isoUART is based on UART frames that are transferred including an 8-bit CRC to ensure data integrity until microcontroller register

High number of slaves

Communication allows up to 62 slaves without loss of signal

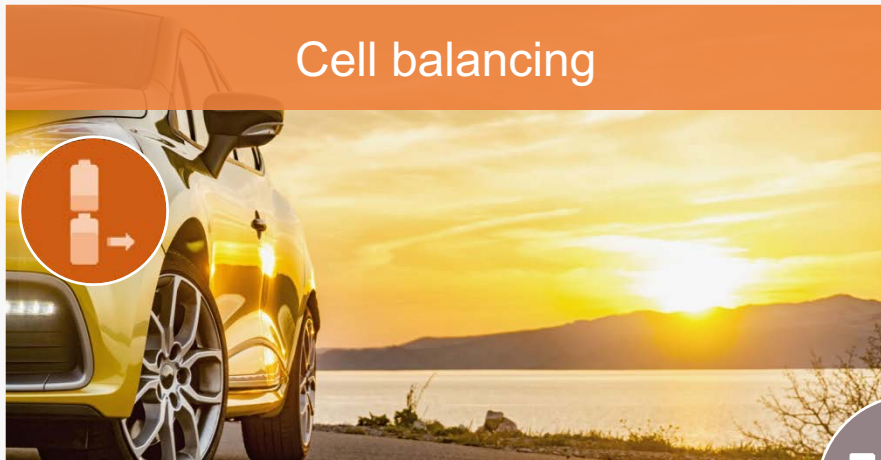
Ring mode topology

Supports ring topology to ensure fail operational state in case 1 slave/wire is failing

Power balanced

Each message will be sent over the full chain independent of the position of the receiver slave. Answers are also sent in both directions

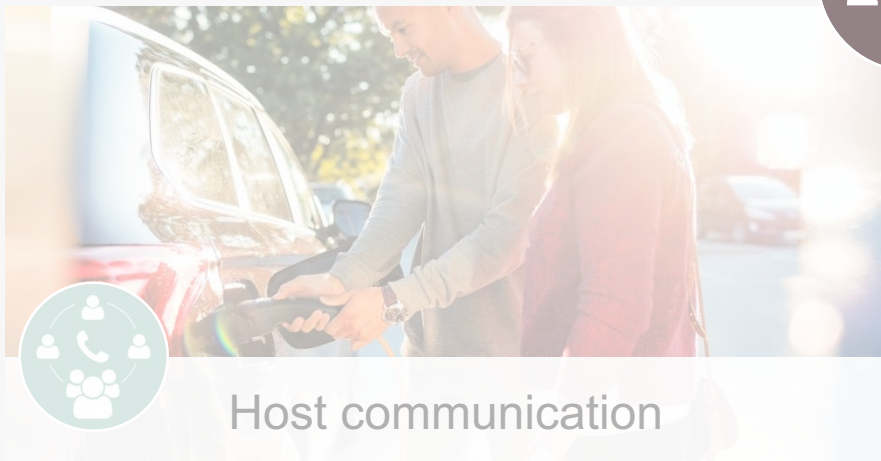
Cell balancing



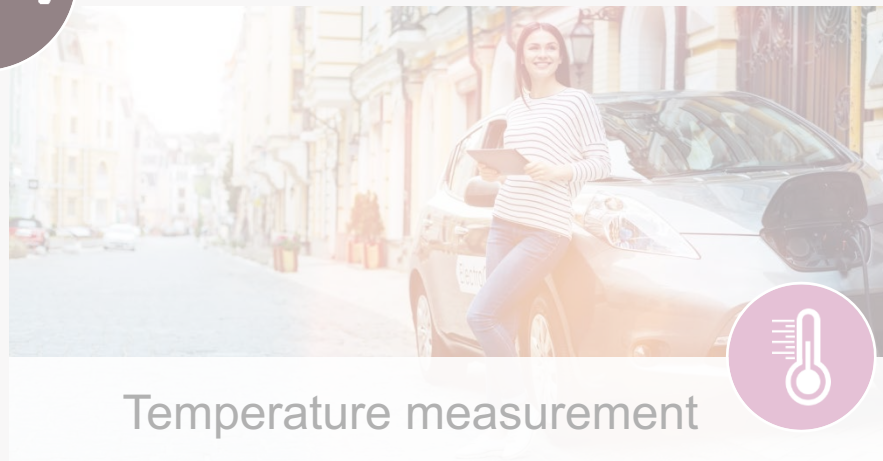
Accurate voltage measurement



Host communication



Temperature measurement



Cell balancing



Cell supervisory circuit

TLE9012AQU

12-ch sensing IC



Battery monitoring unit

TLE9015QU

Transceiver



Integrated balancing switch

Integrated switches with up to 150 mA using external resistors to reduce chip power consumption

Balancing diagnosis

Overcurrent, undercurrent and open load diagnosis available

Balancing time targets

Balancing can be programmed to stop after a given time set at up to 32 hours and does not need microcontroller interaction

External balancing switches

Supports external PMOS switches for increased balancing current



Part of your life. Part of tomorrow.