Product brief

Battery monitoring and balancing IC
TLE9012AQU

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 main battery controller. Additionally, TLE9012AQU provides the necessary diagnosis tools to ensure proper function of the controlled battery.

Features

› General
  – Monitors up to 12 series connected cells
  – Supports communication of more than 20 devices
  – Supports hot plugging

› Voltage measurement
  – 16 bit high resolution ADC measurement for each cell
  – High accuracy measurement for SoC (State-of-Charge) and SoH (State-of-Health) calculation
  – Temperature compensated measurements
  – Built in noise filtering
  – Selectable measurement bit length

› Temperature measurement
  – 5 temperature measurement channels for connection to external NTC
  – On-chip temperature measurement and monitoring

› Balancing
  – Integrated balancing switch allowing up to 150 mA balancing current

› Communication Interface (iso UART)
  – Differential robust serial interface for communication between battery blocks
  – High-speed communication up to 2 Mbps
  – Power balanced communication scheme

› Green product (RoHS-compliant)

› AEC-Q100 qualified

› ISO 26262 ready, supporting ASIL-C BMS safety applications

› Safety features
  – Two independent internal voltage references
  – Block voltage measurement based on different ADC
  – Configurable analog OV/UV comparators
  – End-to-end CRC secured communication
  – CRC secured configuration registers
  – Internal open load detection
  – Emergency mode for communication

Benefits

› Robust communication without need of 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 Vehicle (MHEV)
› Hybrid Electric Vehicle (HEV)
› Plug-in Hybrid Electric Vehicle (PHEV)
› Battery Electric Vehicle (BEV)
› 12 V Li-Ion battery systems
› Energy Storage System (ESS)
› Home Energy Storage System (HESS)
› eBike battery management system
› Commercial, construction and agricultural vehicles (electric bus, truck, forklift, …)

www.infineon.com/battery-management-ics
Battery monitoring and balancing IC

**TLE9012AQU**

**Orderable Part Number OPN:** TLE9012AQUXUMA1

**Parametrics TLE9012AQU**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of voltage measurement channels</td>
<td>12</td>
</tr>
<tr>
<td>Number of temperature measurement channels</td>
<td>5</td>
</tr>
<tr>
<td>Maximum balancing current with internal switch</td>
<td>150 mA</td>
</tr>
<tr>
<td>Voltage class</td>
<td>75 V</td>
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<tr>
<td>Maximum cell voltage</td>
<td>5.5 V</td>
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<tr>
<td>Isolated communication interface</td>
<td>Iso UART</td>
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<tr>
<td>Non-isolated communication interface</td>
<td>UART</td>
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<tr>
<td>Communication maximum bandwidth</td>
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<td>Stand-by current</td>
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<tr>
<td>ESD protection</td>
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<td>(T_{j\text{ max}})</td>
<td>150ºC</td>
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<td>Package</td>
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</tbody>
</table>

**Block diagram**

**Diagnosis unit incl. round robin**

**Temperature measurement unit**

**Power supply unit**

**Cell management unit**

**Digital control & registers**

**UART interface high-side**

**UART/GPIO**

**Power management diagnosis**

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