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Launch of New Generation Battery Monitoring ICs for Automotive

Kyoto, Japan – Nuvoton Technology Corporation Japan (NTCJ) today announced 3rd generation enhanced functional safety battery monitoring ICs (BM-ICs) for automotive battery management system (BMS).

Accelerate the electrification of automobiles toward carbon neutrality.

Benefit

1. Enhanced redundancy measurement system and communication function to facilitate development and design of BMS compliant with ASIL-D of in-vehicle functional safety standard (ISO26262).
2. Achieved high-precision measurement with a voltage measurement error of 1.5 mV (our conventional product is at 2.5 mV) and realized BMS compatible with various types of battery cells and applications.
3. Simplify in-vehicle battery system connecting 100 to 200 battery cells in series by measuring up to 20 series-connected battery cells with one IC, which is the highest level in the industry.

/ Please check here for details:

<https://www.nuvoton.com/products/battery-management/battery-monitoring-ics/automotive-qualified>

Battery electric vehicles (BEVs) and hybrid electric vehicles (HEVs) are becoming more and more popular to achieve carbon neutrality worldwide. Automakers are encouraged to ensure safety against hazardous events such as lithium-ion batteries catching fire and emitting fumes. The cruising range per charge of BEVs must be extended equivalent to a single fueling of internal combustion engine vehicle. Lithium-ion batteries have various battery chemistries such as NMC[1], LiFePO4[2], and LTO[3], depending on the materials used for the positive electrode and negative electrode. A battery monitoring IC can measure a wider voltage in wide temperatures is required to select the optimum battery according to the application for considering of energy efficiency, safety and cost.

Automakers are required to install a large-capacity, high-output lithium-ion battery in a small space of BEVs and HEVs.

Our new BM-ICs can detect a wide range of battery cell abnormalities and BMS failures with a redundant measurement system consisting duplicates of the battery cell input terminal, multiplexer, and AD converter in a single IC. It is equipped with a daisy communication function that is more robust than conventional products. This will enable automakers and battery module manufacturers to easily develop and design battery systems that comply with ISO26262 ASIL-D requirements. The new devices with a high precision voltage measurement error of 1.5 mV, help to extend the cruising range of BEVs, and support wide input voltage range thereby maximizes the performance of lithium-ion batteries; and enable to deploy a common platform for various vehicle models and applications. In addition, the new products measure up to 20 connected battery cells in series, which have been well-established from the previous generation. As a result, BMS can be configured with smaller number of components for a high-voltage battery system with many battery cells connected in series, contributing to the miniaturization of the battery module.

Technological Features:

1. The elements and functional blocks are electrically separated by utilizing the characteristics of the well-established proprietary SOI process. This separates the measurement terminals of the battery cell into two systems. The enhanced measurement system enables failure detection of the input filter composed of external parts. The bidirectional daisy communication enables the configuration of a robust communication topology with higher redundancy.
2. The new ICs have the industry's highest level of absolute voltage measurement accuracy due to implementing a high-precision reference circuit and adjusting the temperature fluctuation characteristics at the time of shipping inspection. The new products achieve high measurement over wide voltage ranges and temperatures by circuit technology that suppresses leakage current and corrects minute deviations in voltage accuracy at high temperatures.
3. The new devices have high withstand voltage at a maximum rated voltage 144V with integrated functions by fine process, and a highly safe redundant design that are advantage of SOI process technologies.

Applications

Battery electric vehicles (BEVs), hybrid electric vehicles (HEV), large-capacity energy storage systems (ESS), etc.

Part Number

3rd generation battery monitoring ICs (KA84933 series) for automotive
KA84933UA / KA84923UA / KA84939UA

Definition of Terms

[1] NMC (Lithium nickel manganese cobalt oxide):

Batteries that use NMC (a compound that consists of Nickel, Manganese, and Cobalt) for the positive electrode with a low calorific value, excellent discharge characteristics at low temperatures, and a high energy density, used in medical equipment and electric vehicles.

[2] LiFePO₄ (lithium iron phosphate):

Batteries that use phosphoric acid for the positive electrode. It is highly safe because thermal runaway rarely happens, and the raw material cost is relatively low. It is used in electric tools and electric vehicles.

[3] LTO (lithium-titanate-oxide):

Batteries that use LTO instead of graphite for the negative electrode material. The voltage is low and the capacity is small, but the thermal stability is high and the cycle characteristics are appropriate.

[4] SOI (Silicon on Insulator) process:

The elements are separated by an insulator (SiO₂ layer). The electrical separation between the elements is separated by a PN junction in conventional process.

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About Nuvoton Technology Corporation Japan (NTCJ)

Nuvoton Technology Corporation Japan (NTCJ) joined Nuvoton Group in 2020. As a dedicated global semiconductor manufacturer, NTCJ provides technology and various products cultivated over 60 years since its establishment, as well as spatial sensing solutions and battery application solutions that optimally combine them. We value relationships with our customers and partners, and by providing added value that exceeds expectations, we are working as a global solution company that solves various issues in society, industry, and people's lives. For more information, please visit <https://www.nuvoton.co.jp/en/>.