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Reference Designs Demonstrate Benefits Of 1700-V Switcher ICs In 800-V BEVs

Power Integrations' five reference designs based on the company's 1700-V InnoSwitch3-AQ flyback switcher ICs target 800-V automotive applications. Spanning power levels from 16 W to 120 W, the designs leverage both wound and low-profile planar transformers to implement power converters for dc-dc bus conversion, inverter emergency power, battery management and power supplies for auxiliary systems.

The designs feature Power Integrations' new wide-creepage InSOP-28G package, which supports 1000-Vdc on the primary side while providing appropriate creepage and clearance between pins in pollution degree 2 environments.

The following reference designs are all isolated flyback converters based on the 1700-V-rated CV/CC InnoSwitch3-AQ switcher ICs (see the figure). The three reference designs kits (RDKs) and two design example reports (DERs) are:

- RDK-994Q—a 35-W ultra-low-profile traction inverter gate-drive or emergency power supply with 40- to 1000-Vdc input and 24-V output
- RDK-1039Q—an 18-W power supply with planar transformer for traction inverter gate driver or emergency power supply
- RDK-1054Q—a 120-W power supply with planar transformer, designed to shrink or eliminate heavy, bulky 12-V batteries
- DER-1030Q—a 20-W four-output power supply—one emergency power supply (EPS) with 24.75-V output and three gate-drive power supplies with 25.5-V output
- DER-1045Q—a 16-W four-output power supply—one 14-V EPS output and three gate-drive outputs with split with +18-V/-5-V rails.

"The new InSOP-28G package, with its wide 5.1-mm drain-to-source pin creepage distance, addresses the critical need for enhanced safety and reliability in high-voltage applications," said Mike Stroka, product marketing engineer at Power Integrations. "It provides sufficient isolation that conformal coating can be eliminated, saving a manufacturing process step and associated qualification effort. The InnoSwitch3-AQ IC, featuring a 1700-V SiC switch, is an ideal solution for 800-V vehicles, simplifying manufacturing while enhancing overall system performance and reliability."

According to the vendor, Power Integrations' 1700-V-rated SiC-based CV/CC InnoSwitch3-AQ switching power supply ICs reduce power supply bill of materials (BOM) count by as much as 50%, saving space, enhancing system reliability and easing component sourcing challenges. Devices start up with as little as 30 V on the drain pin without external circuitry, which is often a critical requirement for functional safety.

Additional protection features include input undervoltage, output overvoltage and overcurrent limiting. Power consumption is less than 15 mW at no-load. The ICs also incorporate synchronous rectification and a valley switching, discontinuous/continuous conduction mode (DCM/CCM) flyback controller capable of delivering greater than 91% efficiency.

Available from www.power.com, the reference design kits range from $50 to $100 per kit. For further information, see the RDK-994Q, RDK-1039Q, RDK-1054Q, DER-1030Q, and DER-1045Q pages. Or contact a Power Integrations sales representative or one of the company's authorized worldwide distributors—DigiKey, Newark, Mouser and RS Components.

Figure. Spanning power levels from 16 W to 120 W, reference designs based on the 1700-V InnoSwitch3-AQ flyback switcher ICs implement power converters for dc-dc bus conversion, inverter emergency power, battery management and power supplies for auxiliary systems in 800-V battery electric vehicles.