

Digital isolator with CAN-capability

Renesas Electronics launched digital isolators with superior radiation performance for small satellites in low earth orbit. The ISL71610M and ISL71710M provide isolation protection for power supply stages and serial communications interfaces such as CAN.

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(Photo: Renesas)

Renesas Electronics introduced two plastic packaged, radiation-tolerant digital isolators that provide isolation protection (2500 V_{RMS}) from voltage spikes in power supply stages and serial communications interfaces used in low Earth orbit (LEO) small satellites (Smallsats). Private “new space” companies plan to launch thousands of Smallsats forming large constellations that operate in multiple LEO planes. Smallsat mega-constellations provide ubiquitous broadband Internet of Things communications anywhere across the globe, and Earth observation imaging for sea, air, and land asset tracking.

The passive input ISL71610M and active input ISL71710M offer performance across key electrical specifications, including isolation voltage, data rate, common mode transient immunity, propagation delay, quiescent current, and dynamic current. Renesas’ Giant Magneto Resistive (GMR) digital isolators are ideal replacements for optocouplers that are susceptible to cloudy optics from total ionizing dose radiation. Both GMR isolators also outperform transformer-based digital isolators that experience electromagnetic interference due to radiated emissions from edge and dipole radiation.

In isolation partitioned power supply designs, the two products provide an instantaneous 2,5 kV_{RMS} of isolation and 600 V_{RMS} continuous working voltage at 85 °C. In serial communications subsystems that need the transmitter and receiver electrically isolated from each other, the ISL71610M operates up to 100 Mbit/s, and the ISL71710M up to 150 Mbit/s. Both are suitable for serial communications links, such as CAN.

Isolated CAN application

The ISL71710M can be used with a single-ended CAN input signal to provide fault tolerant serial communications isolation between the CAN controller and ISL71026M rad-tolerant CAN transceiver, or the ISL72026SEH rad-hard CAN transceiver.

“The ISL71610M and ISL71710M use a GMR inductive structure that is inherently immune to radiation effects, and build on Renesas’ six decades of spaceflight experience,” said Philip Chesley, Vice President, Industrial Analog and Power Business Division, Renesas Electronics Corporation. “GMR makes our space-grade digital isolators more desirable than optical-based designs, and Renesas’ radiation-tolerant plastic flow provides the optimal cost versus radiation performance in comparison to Class V isolators.”

Isolated 100-V half-bridge power supply reference design

The passive input digital isolator is used in the company’s radiation-hardened half-bridge power stage reference design. The reference design’s ISL73040SEH4Z evaluation board demonstrates a half-bridge power stage design capable of taking 100-V input from a satellite’s solar panels and generating step-down power rail voltages - 28 V, 12 V, 5 V, and 3,3 V - with a power efficiency of up to 94 percent.

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