

Rad Hard Current Sources For Sensing Subsystems In Satellites

[Renesas Electronics'](#) ISL70591SEH and ISL70592SEH radiation-hardened precision current sources are designed to provide current excitation to the more than 300 resistive sensors that monitor the health of a satellite's subsystems. The ISL70591SEH and ISL70592SEH are the first current source ICs in the company's line of space products, and are well suited for telemetry, tracking & command, attitude & orbital control, and electrical power subsystem applications. These devices boast "ultra-high" spaceflight performance in a small package.

The ISL70591SEH and ISL70592SEH come in 4-lead ceramic flatpack packages and provide 100 μ A and 1 mA of output current, respectively. They offer a smaller footprint than competitive devices, and replace the discrete solutions that typically require three to five components (see the figure).

The smaller package size boosts reliability by placing the excitation source closer to the sensor. According to Renesas, the current source ICs also reduce system errors by delivering ultra-low noise for higher accuracy over temperature and radiation. Their high output impedance rejects voltage variations on the supply line, and lets designers parallel multiple current sources if they need higher current.

These devices leverage Renesas' proprietary silicon-on-insulator process, which provides single-event latch-up (SEL) and single-event burn-out (SEB) robustness in heavy ion environments. Both devices are radiation assurance tested to 100 krad(Si) at high dose rate and 75 krad(Si) at low dose rate. In addition, Renesas' innovative floating design lets users create a current source or sink with no ground connection.

"Our new precision current source devices give satellite customers the high performance, ease of use, and small footprint they need for their designs," said Philip Chesley, vice president of Industrial Analog and Power Business Division, Renesas Electronics.

Other key features of the ISL70591SEH and ISL70592SEH include:

- Wide operating range of 3 V to 40 V, allowing operation off unregulated 28-V power rails
- High initial accuracy (+V = 20 V at 25°C) of $\pm 0.34\%$ (ISL70591SEH) or $\pm 0.30\%$ (ISL70592SEH)
- Low temperature coefficient of 2.25 nA/°C
- Radiation hardness wafer-by-wafer assurance: High dose rate (50 to 300 rad(Si)/s): 100 krad(Si); Low dose rate (0.01 rad(Si)/s): 75 krad(Si)
- SEE hardness assurance with no SEB/SEL to LET_{TH} , +V = 35 V, 86 MeV \cdot cm²/mg
- Temperature operating range of -55°C to +125°C
- Availability in 4-lead CDFP packages or in die form.

For more information, see the ISL70591SEH [page](#) and the ISL70592SEH [page](#).

For more news about rad hard power components, see How2Power's [Space Power](#) section.



Figure. Offered in 4-lead ceramic flatpack packages or in die form, the ISL70591SEH and ISL70592SEH are rad hard, precision 100- μ A and 1-mA current sources that offer a smaller footprint than competing current source ICs and discrete current source solutions. Targeting sensing subsystems in satellites, these current sources are well suited for telemetry, tracking & command, attitude and orbital control, and electrical power subsystem applications.