ARTICLE

EV10AS940 ADC Confirms Outstanding Radiation Robustness for Demanding Space Applications.

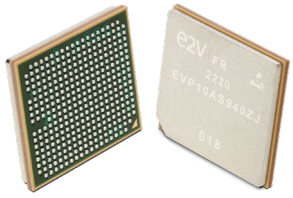
JUNE 2026

TELEDYNE | e2v Semiconductors

As space missions continue to push the boundaries of performance, bandwidth, and resilience, electronic components must operate flawlessly under increasingly harsh radiation environments. Teledyne e2v Semiconductors is pleased to announce the completion of a comprehensive heavy ion radiation test campaign on its **EV10AS940, a Ka band capable 12.8 GSps, 10 bit analog to digital converter (ADC)**, confirming its outstanding robustness and suitability for the most demanding space applications.

EV10AS940 is particularly well suited for both GEO applications and deep space missions, where reliability, radiation tolerance, and long-term stability are essential. It supports continuous high data rate operations over mission lifetimes exceeding 15 years, enabling applications such as telecommunications payloads, lunar missions, weather monitoring platforms and high-throughput broadcast systems.

A High Performance ADC Designed for Next Generation Space Systems



The EV10AS940 (Package FC-BGA350 (16x17.6mm, Pitch 0.8mm)) has been developed to address the growing need for ultra high speed data conversion in advanced spaceborne payloads. Designed to support high frequency, wide bandwidth signal chains, it is well suited for applications such as satellite communications, radar, electronic intelligence, and next generation space instrumentation where signal integrity and reliability are critical.

The EV10AS940 is a single-core 10-bit ADC designed to enable direct conversion up to 33 GHz, eliminating the need for complex RF front-end stages such as mixers. Its excellent high-frequency performance and low power consumption of just 2.5 W were achieved through a dual-chip architecture: an analog Track-and-Hold (T&H) circuit to ensure RF performance, and a digital quantizer to maintain low power operation.

To validate this performance under realistic space radiation conditions, Teledyne e2v conducted an extensive **Single Event Effects (SEE)** evaluation program, targeting the most severe radiation scenarios encountered in orbit. The results demonstrate a combination of **intrinsic robustness and ease of mitigation**, a key requirement for system designers seeking to balance performance, reliability, and system complexity.

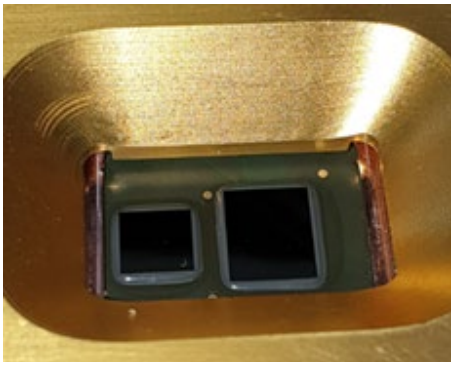


Fig 1: EV10AS940 dual-chip under measurement set up

Comprehensive Heavy Ion Test Campaign

The EV10AS940 was subjected to two independent heavy ion irradiation campaigns conducted in **December 2024** at leading radiation test facilities: RADEF (University of Jyväskylä, Finland) & Cyclotron Institute (TAMU, Texas, USA).

ION (RADEF)	Energy (MeV)	Range (µm(Si))	Effective LET (MeV.cm²/mg)
$^{17}O^{6}$	284	481	1.52
$^{20}Ne^{7}$	328	360	2.6
$^{40}Ar^{14}$	657	264	9.3
$^{57}Fe^{20}$	941	214	17.5
$^{83}Kr^{29}$	1358	185	33
$^{107}Ag^{37}$	1714	158	55
$^{126}Xe^{44}$	2059	157	66
ION (TAMU)	Energy (MeV)	Range (µm(Si))	Effective LET (MeV.cm²/mg)
^{197}Au	2954	155	94

Fig 1: EV10AS940 dual-chip under measurement set up

Across these campaigns, multiple samples were exposed to a wide range of heavy ions, from **oxygen to gold**, covering **Linear Energy Transfer (LET) values from 1.5 up to 94 MeV·cm²/mg**. This LET range is representative of — and exceeds — the harshest environments typically expected for space missions, providing a high level of confidence in real world operation.

The objective of the test program was clear: to characterize the ADC's susceptibility to radiation induced phenomena such as **Single Event Latch up (SEL), Single Event Functional Interrupts (SEFI), and Single Event Upsets (SEU)** under stringent conditions.

Zero Latch Up Events Up to Extremely High LET Levels

One of the most critical concerns for space electronics is **Single Event Latch up**, a potentially destructive condition that can lead to catastrophic device failure. The EV10AS940 demonstrated exceptional behavior in this regard.

This result was confirmed across multiple test configurations, including elevated temperature and increased supply voltage conditions, which further stress the device beyond nominal operating limits: SEL tests were performed at Vmax with Tj = 125°C. An additional test was conducted at Vmax +10% with Tj = 135°C. During these tests, carried out at a LET of 94 MeV·cm²/mg and up to a fluence of 1E7 particles/cm², without the use of tilt, **no destructive SEL events were detected.**

This absence of latch up events highlights the intrinsic robustness of the EV10AS940 design and significantly simplifies system level protection strategies. For spacecraft architects, this translates into reduced risk, increased mission reliability, and greater design flexibility.

Predictable and Easily Mitigated Functional Behavior

In addition to latch up testing, the campaigns investigated non destructive SEE phenomena. **Single Event Functional Interrupts** were observed only in their most benign form **(SEFI1)**, starting at low LET values. Importantly, these events were **fully recoverable using a simple synchronization command**, without requiring complex recovery sequences or power cycling.

No more severe SEFI types were detected throughout the test matrix, even under extreme radiation exposure. This predictable and easily manageable behavior allows system designers to implement straightforward mitigation at firmware or FPGA level, without compromising overall system availability.

Single Event Upsets (SEU), as expected for very high speed digital devices, were also observed at low LET levels. These events did not lead to permanent malfunction and are well understood at system level. The measured behavior confirms that standard error detection and correction techniques can be effectively applied in mission environments.

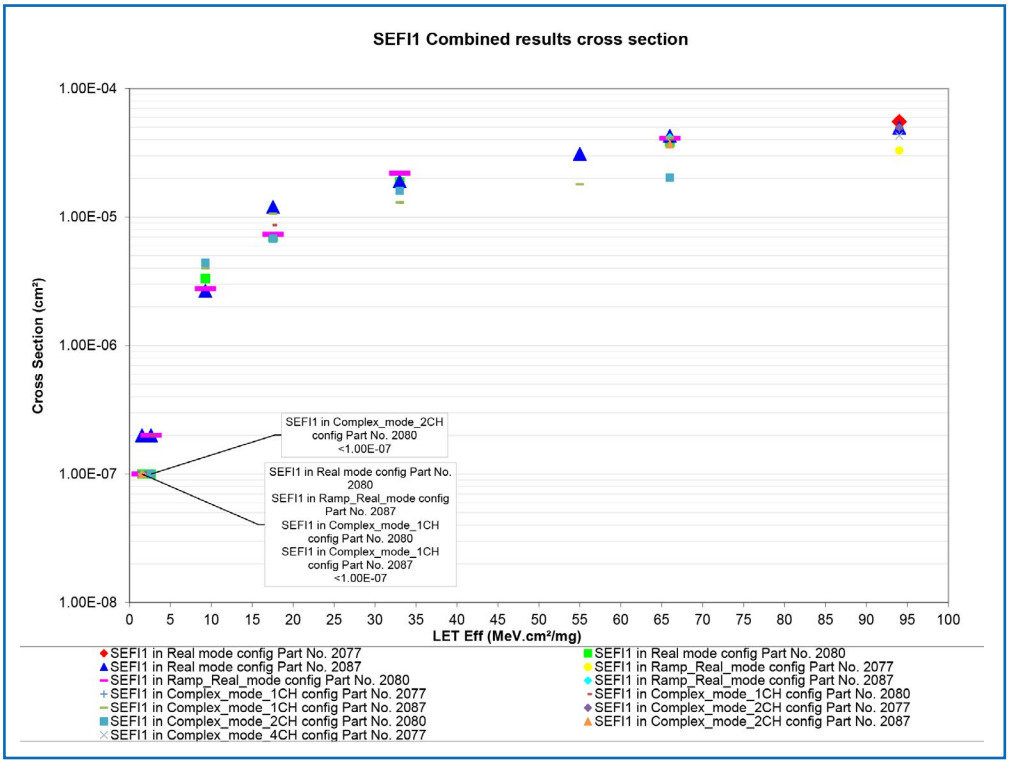


Fig 2: SEFI1 combined cross section.

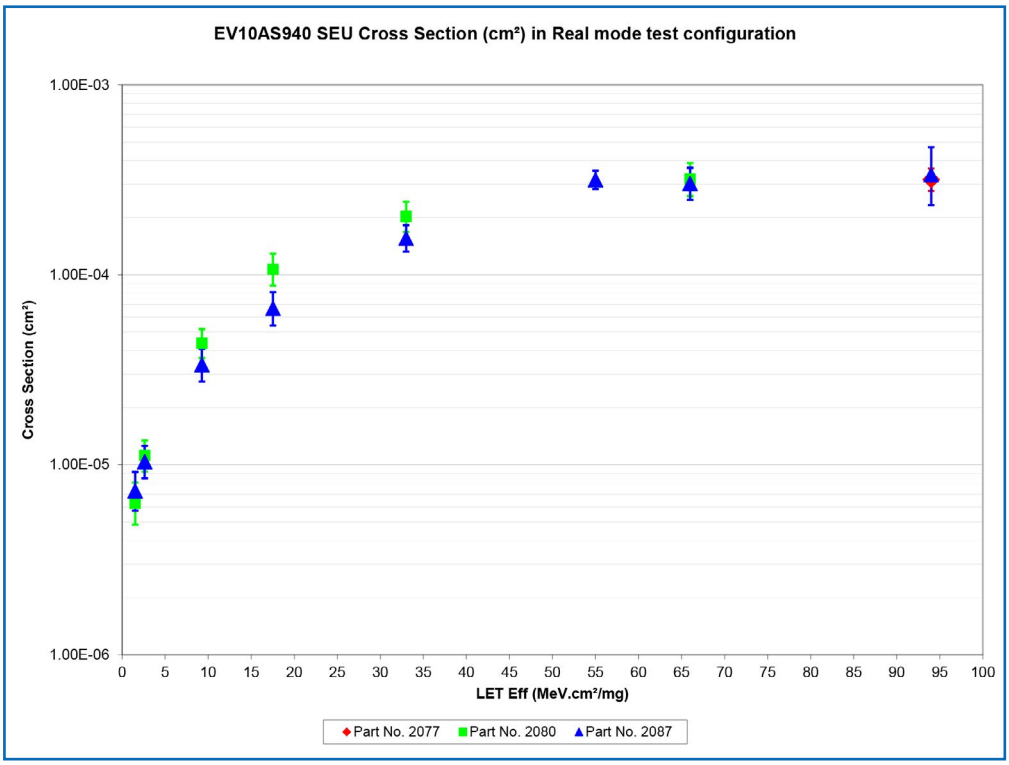


Fig 3: SEU results, REAL mode.

Robust Operation in Extreme Conditions

The scope and depth of the qualification campaigns provided a high confidence characterization of the EV10AS940 under **extremely stringent conditions**. Devices were tested across multiple operating modes, temperature points, and supply voltage configurations, ensuring that performance remains stable across realistic mission scenarios.

Crucially, at the end of the full test program, **all devices remained fully operational**, with no degradation observed following irradiation. This resilience reinforces the suitability of the EV10AS940 for long duration missions and high reliability space platforms.

Enabling Next Generation Space Architectures

The combination of **no observed latch up up to very high LET**, predictable functional behavior, and straightforward mitigation strategy makes the EV10AS940 a compelling choice for system designers targeting advanced space payloads.

By delivering both **exceptional speed** and **radiation robustness**, the EV10AS940 enables:

- Simplified system architectures
- Reduced reliance on heavy protection circuitry
- Improved payload performance and efficiency

These attributes are particularly valuable as satellite payloads move toward higher frequencies and wider bandwidths to support increasing data demands.

Enabling Next Generation Space Architectures

The results of this SEE campaign confirm that the EV10AS940 is not only a high performance ADC, but also a **reliable and resilient solution for operation in the harshest space radiation environments.** Its demonstrated robustness and ease of integration support Teledyne e2v's long standing commitment to providing trusted, mission critical semiconductor solutions for space applications.

With this successful qualification, the EV10AS940 stands ready to support the next generation of space missions delivering speed, reliability, and confidence where it matters most.

The Total Ionizing Dose (TID) characterization of the EV10AS940 has already been performed, complementing the demonstrated robustness against Single Event Effects. The results confirm the device's strong capability to sustain long-term operation in radiation environments. More TID tests are currently in progress, and the complete TID test reports including detailed analysis and mission profile recommendations will be made available by the end of 2026. This further reinforces Teledyne e2v's commitment to delivering fully qualified, radiation-tolerant solutions for GEO applications, deep space missions, and extremely critical instruments.

For more information on the EV10AS940 and the extensive radiation test campaign highlighted in this article, or to access the full detailed SEE report, **please do not hesitate to contact the Teledyne e2v Semiconductors team.** Our experts will be pleased to provide comprehensive technical insights, detailed data, and tailored support to help address your specific application requirements.

TELEDYNE | e2v Semiconductors

For further information, please contact:
Victoria Nasserddine,
Product Marketing Manager
Signal and Data Processing Solutions
victoria.nasserddine@teledyne.com