

Radiation Tolerant/Hardened IC Solutions



Radiation Tolerant/Hardened ICs

At Triad Semiconductor, we specialize in complex analog and mixed-signal Integrated Circuits (ICs) delivered as Application Specific Integrated Circuits (ASICs) and Application Specific Standard Products (ASSPs). With a firm foundation built over two decades of delivering trusted solutions in aerospace, defense, industrial, and medical markets, we are uniquely equipped to handle your most demanding applications.

Radiation Tolerant/Hardened Applications

- Satellite Space-Borne Electronics (LEO, MEO, GEO Orbits)
- Smart Munitions, Drones
- Missiles and Weapon Systems
- High-Altitude Aviation Electronics
- Defense-Industry Equipment in need of Prompt Dose Protection
- Chiplet Mixed-Signal Sensor AFEs and Mixed-Voltage Domain Interfacing



Unparalleled Technology Advantage

Harness the power of our ASICs and ASSPs that are uniquely designed for demanding radiation assurance applications. Our patented ViArray technology provides accelerated time-to-market with maximum flexibility and effective risk mitigation. We provide robust solutions that can manage change swiftly, ensuring projects are delivered on time, on budget, and with excellent radiation assurance levels.

Proven Track Record

Triad Semiconductor has been delivering complex mixed-signal IC solutions for over twenty years. Our longstanding partnerships with Air Force Research Labs (AFRL), the Missile Defense Agency (MDA), NASA, and Sandia National Labs, has resulted in the development of mixed-signal configurable IC solutions optimized for aerospace and defense applications.

Aerospace and Defense Capabilities



ViArray Technology

Triad's Rad-Hard ViArray technology accelerates IC design and qualification times by utilizing a unique configurable array approach to mixed-signal radiation-hardened IC development.

Radiation Effects Assurance

Silicon ICs are subject to the transient and long-term effects of radiation. Some common transient effects or single event effects (SEE) are single-event upsets (SEU), single-event transients (SET), and single-event latch-up (SEL). Long-term effects generally result from exposure to ionizing energy or total ionizing dose (TID) and typically cause threshold voltage shifts and mobility degradation.

The two most common approaches used to minimize radiation effects in ICs are:

RHBP

Radiation Hardening
by Process

RHBP requires a semiconductor process with an insulating substrate such as silicon-on-insulator (SOI). These processes are generally more costly and not widely available. RHBD is a series of electrical and layout techniques that can be applied to bulk CMOS.

Triad Semiconductor has evolved RHBD techniques to achieve TID, SEE and Prompt Dose radiation hardness suitable for space applications using commercial bulk CMOS.

Consequently, Triad Semiconductor radiation hardened ICs have robust radiation hardness with minimal variation in electrical parameters from lot-to-lot, with excellent long-term reliability, at the lowest cost.

RHBD

Radiation Hardening
by Design

Rad-Hard ViArray Technology

Triad's patented mixed-signal ViArray technology, in conjunction with RHBD techniques, results in an optimal solution for RH ICs. Radiation hardened mixed-signal ViArrays have a rich mixture of analog and digital resources.

One of the most significant advantages of using Triad's ViArrays is only a single via-layer is used to design or modify an IC. Hence, the need for radiation requalification can be eliminated - Qualification by Similarity. In addition, design changes or new designs can be done quickly and cost effectively.

Mixed-Signal IP Examples

Analog to Digital Converters $\Delta\Sigma$, SAR, Pipelined, Flash	DC to 50MSPS 4 to 20 bits
Digital to Analog Converters $\Delta\Sigma$, R2R, Segmented, Current Steering, Switched Cap, PWM	Up to 100MSPS 6 to 20 bits
V _{REF} /Power Management Bandgap/DTMOS References, Buck, Boost, LDO	Up to 60V Up to 2A
Analog/Digital Signal Processing TIAs, LNAs, Switched Cap, PLL/DLLs, One-Bit Signal Processing, MCUs	AFEs with mod/demod

Please contact Triad to discuss your specific IP needs as the above examples are only a snapshot of our capabilities.

Getting Started

If you have a need for radiation hardened/tolerant analog or mixed-signal integration, we encourage you to explore the possibility of converting your idea into a reality as a Triad ASIC or ASSP. To schedule an initial discovery meeting, please contact us:

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Detailed radiation
qualification
reports available
upon request.

