



RadICS Platform

Diversity Strategy

RadIy is proud to present the RadICS Digital Instrumentation and Control (I&C) Platform that was approved by the U.S. Nuclear Regulatory Commission (NRC) in 2019. The RadICS Platform is robust, flexible, and scalable. It provides state-of-the-art functions, services, and safeguards for both safety and non-safety applications in the nuclear industry. The RadICS Platform consists of a Logic Module, basic input/output modules, and specialty modules all housed in a seismically qualified chassis.

The RadICS Platform creates a new paradigm for addressing common cause failure (CCF) vulnerabilities. The old paradigm relies on the addition of a separate diverse actuation system to address the CCF vulnerabilities associated with microprocessor-based systems. The old paradigm adds system complexity along with increased costs and longer schedules for protection system modernization projects.

The RadICS Platform is based on field programmable gate array (FPGA) technology that incorporates a unique diversity strategy based on internal features of the RadICS Modules to address the CCF vulnerabilities. No separate diverse actuation system is needed to

address the CCF vulnerabilities, which eliminates system complexity along with the associated cost and schedule impacts.

The RadICS diversity strategy flows directly from the design strategy used to achieve IEC 61508:2010 SIL 3 certification, which incorporated extensive and robust self-monitoring features to achieve the SIL 3 rating in a single channel configuration. Fault insertion tests were used to validate the self-monitoring features. The characteristics of the SIL certification are a high degree of coverage for self-monitoring using robust measures (including independence and diversity attributes) that put the Modules in the safe state when critical failures are detected.

The RadICS Platform design was evaluated using the methodology described in the NRC document NUREG/CR-7007, "Diversity Strategies for Nuclear Power Plant Instrumentation and Control Systems." The evaluation credits important functional and technology diversity features and demonstrates the internal diversity of the RadICS Platform which allows for implementation without the use of a Diverse Actuation System (DAS).



Research & Production
Corporation RadIy
29 Akademika Tamma Street,
Kropyvnytskyi 25009, Ukraine
inter.project@radiy.com
www.radiy.com

20 Years of Innovation for the Global Nuclear Industry

For more than 20 years RadIy has provided advanced instrumentation and control (I&C) solutions for nuclear power plant modernization and new build projects in the global market. RadIy's main I&C product, the RadICS I&C Platform, was developed specifically for use in nuclear power plants. It is the only FPGA-based I&C platform with a SIL 3 certification in a single channel configuration. Radics, a wholly owned LLC, provides delivery services for the RadICS I&C Platform for international markets to meet local regulatory requirements. RadIy also offers industrial control systems, electrical equipment, and reverse engineering services.



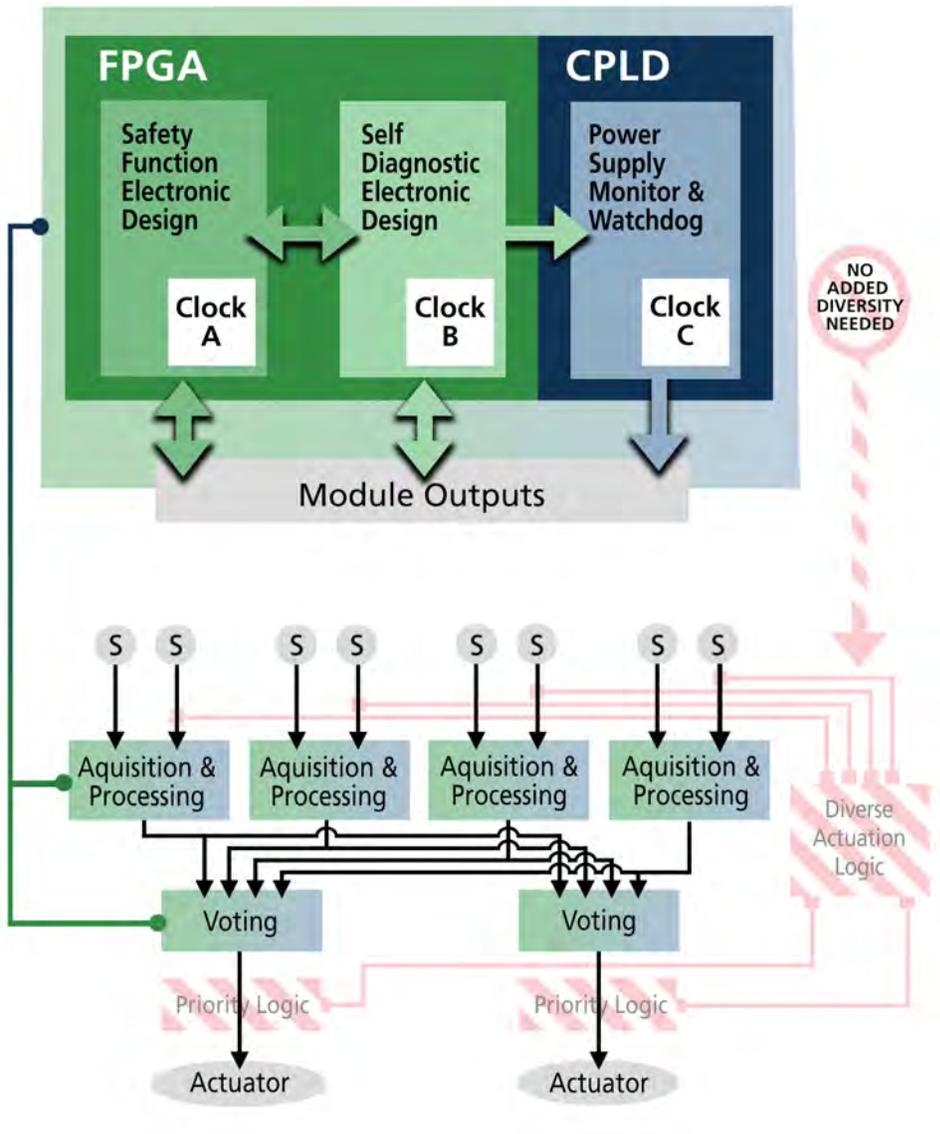
RadICS Platform

Diversity Strategy

The RadICS Platform employs several internal-diversity features to provide sufficient protection to address CCF vulnerabilities that may be introduced by the FPGA technology:

- ◆ **Functionally Independent and Diverse Self-Testing and Diagnostics:** Provides physically separate FPGA logic circuits for self-monitoring features that are independent and functionally diverse from the FPGA logic circuits executing control functions. The self-monitoring features put the Modules in the safe state when critical failures are detected.
- ◆ **Functionally Independent and Diverse Power Supply and Watchdog (PSWD) Monitoring:** Provides a functionally diverse method of monitoring the FPGA logics and power supplies. The PSWD Unit provides an independent method of placing a RadICS Module in a safe state when critical failures are detected.
- ◆ **Separate Clocks for Diverse Functional Domains:** Physically separate clocks are used for safety functions, self-testing, and PSWD monitoring to ensure different timing or order of execution based on the parallel processing of the FPGA and CPLD circuits.
- ◆ **Diverse Chip Technologies:** The CPLD-based PSWD Unit is separate and inherently diverse from the Module FPGAs.

RadICS Streamlines Your System



The RadICS Platform diversity strategy represents a stronger diversity case than other platforms previously accepted by the NRC. The RadICS Platform diversity approach provides other benefits by simplifying the overall I&C systems designs, since a separate DAS is not required to mitigate digital CCF vulnerabilities.