

Solution Brief

IoT Edge Technology
SMARC Modules
Intel Atom® x6000E Series Processors

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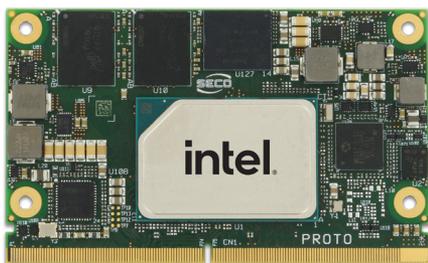
Edge-optimized SECO SMARC modules help reduce cost and time to market¹

Introducing SMARC modules powered by Intel Atom® x6427FE and x6200FE processors—designed and optimized for functional safety (FuSa) applications



“Being able to provide functional safety on small form factors is a great benefit that SECO’s solution is bringing to the market.”

—Davide Catani, chief technology officer,
SECO



SECO SM-C93 SMARC module

Keeping workers and the environment safe is a key priority when designing automated equipment and processes. Functional Safety (FuSa), a technology to remove unacceptable risks in the presence of a fault, is critical to applications in the industrial automation, agricultural, transportation, and healthcare industries, among others.

As FuSa has gained importance, Smart Mobility ARChitecture (SMARC) modules—low-power, high-performance modules that provide power, DRAM, and compute—have become a standard for many IoT edge applications. Now, SECO has created a new solution that simplifies the adoption of the latest available FuSa technologies by combining the power of SMARC modules with a feature set focused on FuSa applications. With the new SECO SM-C93 SMARC module, powered by Intel Atom® x6427FE and x6200FE processors, OEMs can quickly add FuSa capabilities and features in a small form factor to help meet strict safety requirements and bring solutions to market up to six months faster.¹

Challenges

Functional safety has become a critical challenge for solutions in many industries. In healthcare, dialysis machines and high-end ICU ventilators allow real-time monitoring and management of patient care, necessitating reliable electronic systems. In the industrial world, applying FuSa standards can help prevent dangerous situations for workers—and enable robots and machinery to detect failures and anomalies that can help prevent injury to users. For transportation engineers, integrating FuSa into onboard equipment, such as braking control systems, can reduce the need for human security checks.

In environments where machines and people are increasingly mixed, embedded applications must have a high level of safety to prevent harmful situations. Designing for FuSa and adhering to related standards, including IEC 61508 and ISO 13849, is a time-consuming process, requiring considerable effort and increasing production costs.

Solution: A flexible, modular approach to achieve FuSa certification

The SECO SM-C93 SMARC module brings together a range of features related to FuSa, allowing customers to integrate the module into solutions while tailoring it to their business needs. Using a modular approach, SECO has made it possible for customers to build their own customized boards or to use the SM-C93 module on their existing boards.

Optimized for flexibility, reliability, and safety, the SM-C93 was designed to fully comply with IEC 61508 and ISO 13849 FuSa standards. By including qualified FuSa components directly in the SMARC module, alongside complete documentation, SECO aims to make it easier for OEMs and others to pass the IEC 61508 and ISO 13849 certification process quickly, with reduced development costs and time to market.¹



“We’ve been working with Intel for over 40 years and had early access to this new processor that has been enhanced for IoT. We received all the technical support we needed while on our solution development journey, which has been very valuable.” —Davide Catani, chief technology officer, SECO

Benefits of the SECO SM-C93 SMARC module include:

- **Faster development time¹:** By incorporating qualified FuSa components directly into the module, development time can be significantly reduced.¹
- **Reduced implementation complexity:** The SM-C93 enables simpler implementations and software development compared to creating custom code and hardware that must be individually certified to meet standards.
- **Improved flexibility:** The SM-C93 is designed to work across a wide range of applications including robotics, automated ground vehicles, and industrial automation, allowing it to be used even as use cases adapt and change.

How it works

Creating the SM-C93 module required an approach that took FuSa all the way to the silicon. Using Intel’s first enhanced-for-IoT processor platform, SECO integrated multiple safety-enhancing capabilities onto the new SMARC module:

- **Functional safety features:** FuSa interface signals for IEC 61508 and ISO 13849 (SIL2/Cat.3 PL d certified², SIL3/Cat.4 PL e capable).
- **Integrated Intel® Safety Island:** Intel Safety Island, an integrated functional safety IP included on these processors, works with the CPU to check for errors, flag and report faults, and orchestrate diagnostic tests.
- **Intel® Time Coordinated Computing (Intel® TCC):** With Intel TCC and Time-Sensitive Networking (TSN), the SM-C93 enables highly deterministic performance that standardizes time-sensitive data transmission.
- **In-band error-correcting code (IBECC):** This error-correcting architecture works to detect and correct single-bit memory errors to enhance safety and reliability.
- **Wired connectivity:** 2x integrated Ethernet controllers with TSN capabilities.
- **Industrial grade:** Support for extended temperature operations at ambient temperatures of -40°C to 85°C.

The new processor platform also offers outstanding CPU and GPU performance to support IoT application requirements, including up to four cores and a high performance/watt ratio (4.5W–12W TDP). These features are complemented by a small form factor (50 x 82 mm) that can be easily implemented in any generic carrier, then customized.

SECO chose Intel Atom x6427FE and x6200FE processors due to their existing safety certification features, high performance, and low power usage. These features help the SM-C93 SMARC module to stay flexible and easy to use for a wide range of applications across multiple industries.

Conclusion: Integrated functional safety to power a new generation of IoT applications

Functional safety certification is an important step for developing new IoT applications in a wide range of industries, from healthcare to manufacturing. To make qualified functional safety capabilities available quickly to its customers in a small form factor, SECO developed the SM-C93 SMARC module. Based on Intel Atom x6427FE and x6200FE processors offering Intel’s first platform enhanced for IoT with integrated FuSa capabilities, the SM-C93 is designed to help OEMs develop new IEC 61508 and ISO 13849 certified² solutions quickly.

Offering flexibility, reliability, and safety in a single small package, the SM-C93 brings innovative FuSa technology to SMARC implementations. Using this modular, flexible solution that addresses multiple use cases, engineers can meet safety certification requirements in a straightforward, simplified way. A full range of integrated safety features help ensure that development can take place quickly while meeting full FuSa requirements to help keep workers and end users safe.

Learn more

To discover how the SECO SM-C93 SMARC module can accelerate development and time to market for applications with functional safety requirements, visit the [product page](#) today.

To learn more about Intel® processors with new IoT-optimized capabilities and onboard FuSa functionality, visit the [processor family](#) page.

About SECO

The SECO Group represents excellence in the field of high-tech and PC miniaturization, offering customizable microcomputers, integrated systems, and IoT solutions for a variety of fields and applications, including healthcare, industrial automation, transportation, and digital signage. With a portfolio of cutting-edge hardware solutions and software platforms, SECO makes sure its customers are always at the forefront of new digital technology.

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1. Based on internal SECO data.
2. Certification in process.

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