CAN FD micro-controller for automotive system architectures

STMicroelectronics has introduced the Stellar automotive micro-controller (MCU) family. They support car architectures, which rely on broad "domain controllers" for areas such as drivetrain, chassis, and advanced driver assistance systems (ADAS).

Arm Cortex-R52 automotive micro-controllers with on-chip non-volatile memory for real-time multi-core performance (Photo: STMicroelectronics)

These domain controllers enable the transition toward software- and data-oriented architectures by providing data fusion from connected sensors while reducing harness complexity and electronic-component weight. Combining the advantages of 28-nM FD-SOI, on-chip Phase Change Memory (PCM), packaging, and multiple Arm Cortex-R52 cores, the Stellar family can operate at frequencies up to 600 MHz. They also integrate more than 40 Mbit/s of PCM while minimizing power consumption even in harsh, high-temperature environments, said the company. The MCUs are manufactured in-house in ST's 12-inch Crolles facility.

Major applications for the MCUs include smart control for hybrid powertrain, the broad electrification of car systems with on-board chargers, battery-management systems and DC-DC controllers, as well as smart gateways, ADAS, and enhanced vehicle stability controls.

The company is now sampling the first Stellar MCUs, which feature six Arm Cortex-R52 cores clocked at 400 MHz, 16 Mbit/s of PCM, and 8 Mbit/s of RAM, all in a BGA516 package. Stellar-based control units are currently undergoing road tests with lead customers.

Stellar satisfies the automotive industry's demanding ISO26262 Asil-D safety qualification by extending the Cortex-R52 cores with lockstep capabilities. They also feature a hypervisor for software separation and memory protection.

The MCU features a hardware security module (HSM) with Evita Full support and, by operating at more than 200 MHz, it is designed to maximize data throughput. The combination of HSMs with automotive interfaces, including CAN FD and LIN, provides the solution to the increasing requirement of OEMs for security and connectivity to their time-sensitive car networks, said the company.

"Stellar MCUs deliver the safe, real-time performance required by new domain controllers that support data-enabled services - an industry that will reach $1,4 trillion in 2030," said Marco Monti, President, Automotive and Discrete Group, STMicroelectronics. "Stellar MCUs are designed to support the new software-centric architectures that will enable this new revenue stream, where the functions of several control units are integrated in larger domains with the capability to remotely install new features without compromising automotive safety and security."

"Next-generation automotive platforms need to meet demanding real-time and safety requirements if we're going to make applications such as autonomous driving and smart powertrain control a reality," said Lakshmi Mandyam, Vice President of Automotive, Embedded and Automotive Line of Business, Arm. "The powerful combination of the Cortex-R52's energy-efficiency, functional safety features and high performance with ST's optimized multi-core SoC architecture delivers to the needs of these platforms."

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