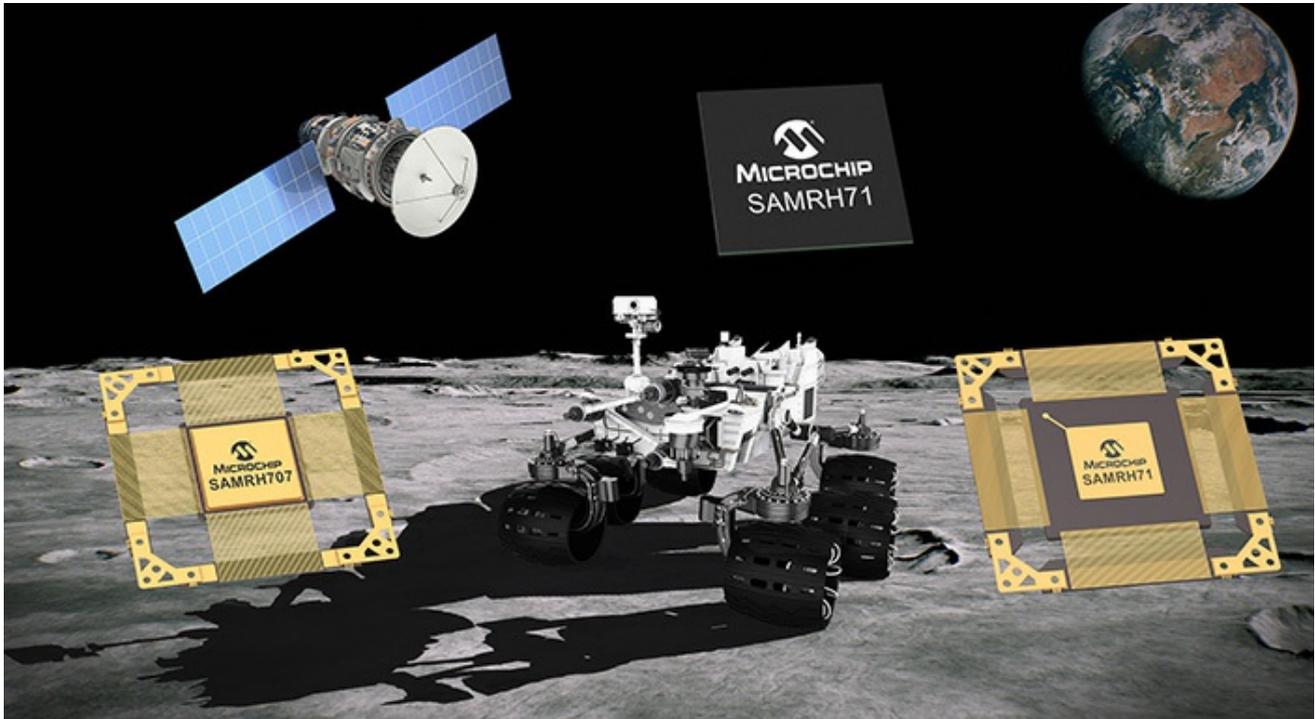


RADIATION-HARDENED MCUS

CAN FD micro-controllers for space systems

Microchip expanded its Arm Cortex-M7 MCU (micro-controller unit) family for space applications by the SAMRH707 MCU and the SAMRH71 MPU (micro-processor unit).



The units are dedicated for deep space initiatives including planetary exploration, orbiter missions, and space research (Source: Microchip)

Spacecraft and satellites are growing in complexity requiring expanding communication capabilities, reliability, and faster speeds, while the operators continuously seek to reduce cost, size, and weight. Scalable Cots (commercial off-the-shelf) solutions for space applications enable system designers a better integration and performance while reducing costs and time to market, explained the company.

SAMRH71 is a radiation-hardened variant of the company's Cots automotive SoC (system on chip) technology. It provides an architecture with more than 200 Dhrystone Mips (DMIPS, million instructions per second). Communication interfaces include CAN FD, Spacewire, MIL-STD-1553, and gPTP Ethernet (IEEE 1588). The MPU is [ESCC](#) qualified and compliant with MIL standard Class V and Q grades. The SAMRH707 MCU provides a more than 100-DMIPS processor unit, CAN FD, Spacewire, and MIL-STD-1553 interfaces as well as analog functions such as a 12-bit analog-to-digital converter (ADC) and a digital-to-analog converter (DAC).

Both chips provide two CAN FD interfaces according to the company's MCAN implementation. MCAN uses the non-ISO CAN FD frame format and therefore does not pass the CAN FD conformance test according to ISO 16845-1:2016. Additional transceiver hardware is required for connection to the physical layer. Each chip integrates up to 64 receive buffers and up to 32 transmit buffers.

The components were developed with support of the European Space Agency (ESA) and the Centre National D'Etudes Spatiales (CNES), the French space agency. "The SAMRH71 is the first Arm Cortex M7-based rad-hard micro-processor available today on the market. It offers developers the simplicity of a single-core processor and the performance of an advanced architecture without having to implement heavy mitigation techniques as is required for non-space components," said David Dangla, VLSI Components Expert at CNES. "Integration of digital-to-analog converters and analog-to-digital converters together with a powerful processor core is a key requirement for addressing new challenges in aerospace applications," said Kostas Marinis, Onboard Computers Engineer at ESA.

The SAMRH71 MPU is available in volume production quantities. Samples of the SAMRH707 in a CQFP164 ceramic package are offered. For system design, dedicated evaluation boards are available. The company's ecosystem including MPLAB Harmony tools suite and third-party software services for space applications are supported.

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