ATmegaS128 Microcontroller

Summary
The AVR® ATmegaS128 microcontroller (MCU) brings the industry-leading AVR core to the aerospace industry. The ATmegaS128 MCU is designed for enhanced radiation performance and increased reliability in space applications. It takes advantage of mature Atmel AVR tools designed and used in the mass market worldwide for many years. The ATmegaS128 microcontroller targets many of the most common space applications, which typically require a small footprint, low power and analog control of motors and sensors.

Key Features
- High-performance, low-power 8-bit AVR MCU
  - Advanced RISC architecture / up to 8 MIPS
  - On-chip 2-cycle multiplier
  - 3–3.6V/0–8 MHz operating voltages and speed grades
- High-endurance non-volatile memory
  - 128 KB of Flash program memory
  - 4 KB EEPROM – 4 KB internal SRAM
  - Up to 64 KB optional external memory space
  - SPI interface for in-system programming
- Extended temperature range (−55 to +125°C)

Peripheral Features
- Two 8-bit and two 16-bit timers/counters
- 6 PWM channels
- 8-channel, 10-bit ADC
- TWI/USARTs/SPI serial interface
- Programmable watchdog timer
- On-chip analog comparator

Special Microcontroller Features
- Power-on reset and programmable brown-out detection
- Internal calibrated RC oscillator
- External and internal interrupt sources
- Six sleep modes: Idle, ADC Noise Reduction, Power-save, Power-down, Standby and Extended Standby

Key Highlights for Space Environments
- Full wafer lot traceability
- 64-lead ceramic package (CQFP)
- Space screening
- Space qualification
- Total ionizing dose: up to 30 Krad (Si)
- Single event latch-up LET > 62.5 MeV.cm²/mg
- Full characterization done @125°C for all functional blocks at different LET from 2 to 62.5 MeV.cm²/mg
- Estimated SER: 1 event every 1000 days (LEO)
ATmegaS128 Starter Kit
To ease your design process and reduce time-to-market, Microchip delivers a complete starter kit and development system for the ATmegaS128 AVR microcontroller. With its advanced features for prototyping and testing new designs, this kit gives you a head start for developing code on AVR devices. You can start with the industrial version using the ATmega128 MCU or the space version which uses the ATmegaS128 device, as both share the same pinout.

Atmel Studio
Atmel Studio is the Integrated Development Platform (IDP) for developing and debugging AVR and ARM® processor-based MCU applications. The Atmel Studio IDP gives you a seamless and easy-to-use environment to write, build and debug your applications written in C/C++ or assembly code. Atmel Studio supports all 8- and 32-bit AVR MCUs. It also connects seamlessly to debuggers and development kits.

Atmel Software Framework
The Atmel Software Framework (ASF) is an MCU software library providing 1,600 project examples of embedded software for Flash-based MCUs, including AVR and ARM-based devices. This library contains basic C code examples for all ATmegaS128 peripherals.

Application Notes
In addition to the Atmel Software framework, Microchip provides a broad range of application notes to implement different peripherals of the ATmegaS128 device. Most of those application notes are provided with source code in C language.

Additionally, Microchip provides, upon request, a full detailed radiation report for all peripherals of the device with Weibull curves and related SER. Together with this document a dedicated application note, “ATmegaS128-Safety Management for Space Applications” guides you through the main characteristics of the ATmegaS128 that require attention prior to development of a safe space application.

Hirel Plastic Flow for Volume Programs
- 64-pin QFP plastic package
- QMLN/AQEC/AEC-Q100 equivalent
- Ready for ECSS Class 3
- Extended temperature −55°C to 125°C
- Temperature cycling (optional)
- Unitary burnin (optional)
- Lot full traceability
- Neutron radiations assessment