SCOC3
your computer core on a single chip

The SCOC3 ASIC was designed to fulfill 2 major objectives:
• To take benefit of the latest electronic integration and miniaturisation technologies to reduce mass and cost of space computers
• To propose a European universal computer core as a building block for any satellite platform, extendable to payload computers.

The LEON3FT Sparc V8 32 bits processor IP has been integrated with standard interface IP used on satellites - Spacewire, 1553, CAN, UART - and with state of the art utilities for processor such as floating point unit, Memory Management Unit, large caches, debug function, memory controller.

CCSDS standard TM/TC control is included in the ASIC. This allows one board to be eliminated with respect to the former platform computer generation.

The ASIC is implemented using the largest matrices of the ATMEL ATC18RHA technology: 3.6 M gates at 180 nm on a 170 mm² Si chip. The packaging is a MCGA 472, offering 342 IO for users over a small surface.

### Key Features
- All the core functions of a platform computer gathered within a single component:
  - LEON 3 FT with GRFPU-FT runs at up to 80 MHz, offering up to 68 MIPS
  - CCSDS TM/TC interface offering a MAP interface for cross-strapping of 2 SCOC3
  - 7 Space Wire, 2x 1553, 2 CAN, 4 UART
- Dual AMBA-AHB bus architecture, with CPU bus and IO bus able to operate at different frequencies
- CCSDS time management, housekeeping telemetry packetiser
- Compatibility with both SDRAM and SRAM memories
- Power management
- Security module as an option (authentication, ciphering / deciphering)
- SCOC3 software simulator for users
- Integrated Development Environment based on Eclipse and RTEMS
- Debug facilities: IP monitor and LEON DSU

### Budgets
- Op frequency 32, 48, 64, 80 MHz
- Memory gates 2.2 Mbits
- Logical gates 1.8 M gates
- Packaging MCGA 472, 342 users IO
- Size 30 x 30 x 6 mm³
- Mass 12 g
- Power 1 W @ 32 MHz
  - 1.9 W @ 80 MHz

### Interfaces
- Voltage in 1.8 V and 3.3 V
- Functional Spacewire, CAN, 1553, UART
- TM/TC CCSDS TM/TC
- Reconf ATF280 interface
- Debug IP monitor and DSU

### Environments
- Temperature -55°C to +125°C
- Radiation 300 krad total dose
  - SEU < 10⁻⁶ per day (LET < 30 MeV)
  - Latchup free (LET level > 80 MeV)
- Failure occurrence < 150 ft @ 50°C

Main application fields
- Platform or payload computer
- LEO, MEO and GEO satellite
Software tool kit

**STARKIT** - a starter kit for SCOC3 evaluation
- 100% representative of SCOC3 and its interfaces
- 6U board, cPCI format, rackable
- Delivered with DSU Commander for communication with SCOC3

As an option, a DSU interface box is available to connect STARKIT on an ethernet network.

**BSW** - a basic SW, starting point for the flight SW development
- BOOT and BIOS
- RTOS, relevant BSP and GNU tool list
- Applicative code samples
- Developed according to ECSS E40mand Q80 for compatibility with flight software development

**SIMSCOC** - a SCOC3 simulator for SW development
- Adapted to flight software development
- Tailorable to any computer board based on SCOC3: processor speed, interfaces, memories
- JIT technology, calibrated with actual hardware
- Execution time fully controlled
- Integrated with non intrusive debug functions, with failure injection capabilities to exercise software error cases
- Compliant with SMP2 standard. Eclipse plug-in for Java

Document set

**All awaited documents for SCOC3 user**
- SCOC3 datasheet
  - Presents SCOC3 features, modes, modules and architecture.
  - Also gives the electrical characteristics, the environment limits and the interface timings
- SCOC3 user manual
  - Gives a detailed description of the HW/SW interface and of the functionality of the modules.
  - Contains programming and detailed information
- SCOC3 application notes
  - Give some examples to ease the use of SCOC3
- AIRBUS Defence and Space also proposes help services for the first step on SCOC3, for hardware and software