SCOC3

your computer core on a single chip

The SCOC3 ASIC was designed to full 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 satellite - 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 Mgates 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

Main application fields

- Platform or payload computer
- LEO, MEO and GEO satellite

Budgets

• Op frequency	32, 48, 64, 80 MHz
• Memory gates	2.2 Mbits
• Logical gates	1.8 Mgates
• 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

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• Temperature	-55°C to +125°C
• Radiation	300 krad total dose
	SEU < 10-5 per day
	(LET < 30 MeV)
	Latchup free
	(LET level > 80 MeV)
• Failure occurrence	< 150 fit @ 50°C

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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.
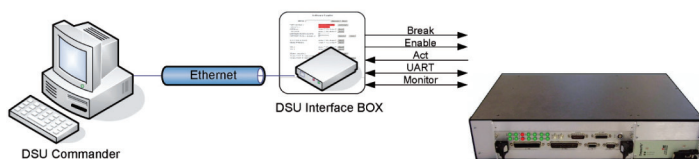
BSW - a basic SW, starting point for the flight SW
development
- BOOT and BIOS
- RTOS, relevant BSP and GNU tool list
- Applicative code samples
- Developed according to ECSS E40mand Q80 for
  compatibility with flight software development
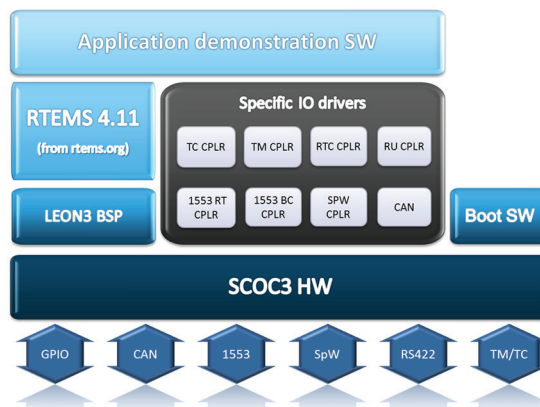
SIMSCOC - a SCOC3 simulator for SW development
- Adapted to flight software development
- Tailorable to any computer board based on
  SCOC3: processor speed, interfaces, memories
- JIT technology, calibrated with actual hardware
- Execution time fully controlled
- Integrated with non intrusive debug functions,
  with failure injection capabilities to exercise software
  error cases
- Compliant with SMP2 standard. Eclipse plug-in
  for Java
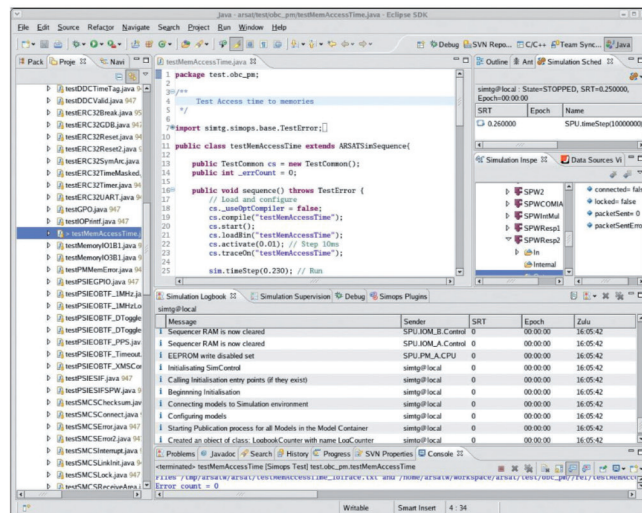
Document set

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