OSCAR

compact, powerful and versatile On Board Computer based on LEON3 core

OSCAR takes benefits from the latest technological development to offer a versatile, compact and cost attractive Platform On Board Computer to any satellite mission. The mass and volume gain is mainly achieved thanks to the use of a new SCOC3 ASIC. All the following functionalities are now merged onto a sole new 0.18µm ATMEL technology ASIC (ATC18RHA)

- LEON3-FT processor, GRFPU and 2x64 Kbytes caches

- MIL_STD 1553B   • Space-Wire Links   • CAN

- CCSDS TM/TC   • UART

- CCSDS Time synchronisation and distribution

OSCAR On Board Computer provides the satellite flight segment with the following features:

- Processing resources for the flight mission software

- TM/TC services and interfaces with the RF communication chain

- General communication services with the Avionics and payload equipment through an on-board communication bus based on the MIL-1553B standard or CAN and SpW

- Platform commands: HPC, LLC, BLD and relay status

- Time synchronisation and distribution

- Failure tolerance architecture based on the use of redunded reconfiguration units and redundancy implementation principle.

Key Features

- 26 MIPS @ 32 MHz or 40 MIPS @ 48 MHz
- 128 Kbytes EEPROM for boot software and 256 Mbytes RAM memory
- 512 Mbytes of exchange memory
- 2 redundant MIL-STD 1553B, or optionally 2 CAN, for platform and payload management
- 2 Space Wire links
- CCSDS Telemetry and Telecommand compliant with ESA standard
- Lukewarm redundancy, custom reconfiguration capabilities: up to 8 programmable scenarii are available for HW reconfiguration
- High reliability thanks to full redundant architecture
    - 2 Processor boards and 2 DC/DC converter boards, with 1500 fits per channel
    - Complete functional cross strap between Processor board functionalities
- Architecture proposes a separate box for the I/O's, controlled via the 1553, CAN or Space Wire
- UARTs and Space Wire links for software development and debugging

Budgets

- Mass   5 kg
- Volume   230 x 160 x 200 mm3
- Power   15 W max on master lane @ 26 MIPS with Mil-Bus

Interfaces

- Power bus Input Voltage in 22 V and 37 V
- Functional SpaceWire, CAN, 1553, UART
- CCSDS TM/TC
- Debug IP monitor and DSU

Environments / Reliability

- Temperature -30 °C to +60 °C
- Vibration 20 g sine, 20 grms
- Shock 1500 g @ 2000 Hz
- Radiation   compliant with 10 years LEO ; 15 years GEO
                     SEU tolerant
                     Latchup immune
- EMI/EMC: MIL-STD-461
- Failure occurrence 1500 fits per channel
- EEE Quality available in Class1 or Class2

Heritage

- OSCAR unit is flight proven on SPOT6 satellite since september 2012
- OSCAR unit is already selected for more than 15 LEO satellites

AIRBUS
DEFENCE & SPACE

OSCAR Hardware design

Hardware

OSCAR is made of 2 processor boards and 2 DC/DC converter boards .

Equipment without redundancy can be proposed with a single processor board and a single DC/DC board.

Technical details of the processor board

- 256 Mbytes memory CPU proposed with SDRAM 64 Mbytes
- 512 Mbytes memory I/O proposed with SDRAM 64 Mbytes, with opportunity to extend to 2.5 Gbytes mass memory with SDRAM stacked on cubes
- ASIC SCOC3, 180 nm hardened based technology
- FPGA RTSX72SU companion chip for customised reconfiguration mode

Technical details of the DC/DC board

- CV board: power voltage generation with High power commands (relays interfaces) and low level commands.
- Capability to implement TM/TC ciphering and deciphering functionalities.

OSCAR development tool kit

STARKIT - a starter kit for SCOC3 evaluation

- FPGA-based development platform
- 100% representative of SCOC3 and its Interfaces
- 6U board, cPCI format, rackable
- Delivered with DSU Commander for communication with SCOC3
- Option: DSU interface box to connect STARKIT on an ethernet network

Kit SW - a simple and easy way to use SW tool for developments on SCOC3

- BIOS and Drivers for SCOC3 specific I/O's: SpW, 1553, UART, CAN, TM/TC...
- RTEMS 4.11 (operating system) and its LEON3 support package (BSP)
- Application / Demonstration SW
- Airbus Defence & Space quality standards (source code available)
- Based on the GNU tool chain: gcc compiler, RTEMS tools, using a linux machine
- Similar RTOS (e.g. VxWorks) could be easily ported
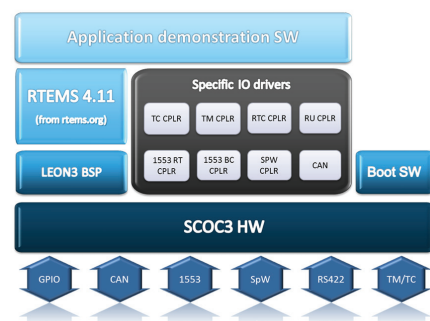
SIMSCOC - a Complete OSCAR/SCOC3 simulator for SW development

- 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
- Failure injection capabilities to exercise software error cases
- Compliant with SMP2 standard. Eclipse plug-in for Java