

DEFENCE AND SPACE Space Products

OSCAR

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



A v i o n i c s



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 2x64Kbytes caches
- MIL STD 1553 Bus
- 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 STD 1553 Bus or CAN and SpW

- Platform commands: HPC, LLC, BLD and relay status
- Time synchronization and distribution
- Failure tolerance architecture based on the use of reduded reconfiguration units and redundancy implementation principle

KEY FEATURES

- 62 DMIPS and 17 MFLOPS @ 72MHz
- 256Kbytes EEPROM for boot software, 6 Mbytes for Application software and 256Mbytes program RAM memory
- 2Gbytes of exchange memory
- 2 redundant MIL STD 1553 Bus or optionally 2 CAN, for platform and payload management
- 2 SpaceWire links
- CCSDS Telemetry and Telecommand compliant with ESA standard
- Security function compliant with SDLS 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
- Architecture proposes a separate box for the I/O's, controlled via the 1553, CAN or SpaceWire
- UARTs and Space Wire links for software development and debugging

BUDGETS

- Mass: 5kg
- Volume: 230 x 184 x 206mm
- Power: 25W max

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

- 256Mbytes memory CPU proposed with SDRAM 64Mbytes
- 2Gbytes memory I/O proposed with 2 Gbytes mass memory with 512Mbytes SDRAM stacked on cubes
- ASIC SCOC3, 180nm hardened based technology
- FPGA RTSX72SU companion chip for customised reconfiguration mode

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 etc.
- 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

INTERFACES

- Power bus: 22-37V
- Dialog: SpaceWire, CAN, RS-422 UART, MIL STD 1553 Bus
- CCSDS TM/TC
- Debug IP monitor and DSU

HERITAGE

- OSCAR unit is flight proven on SPOT6 satellite since september 2012
- OSCAR unit is already selected for more than 21 LEO satellites

ENVIRONMENTS / RELIABILITY

- Thermal: -30°C to +60°C
- Vibration: 20g sine, 20g rms
- Shock: 1500g @ 2000Hz
- 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 class 1 or class 2



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

