beyond gravity



Next Generation On Board Computer

On board computers are designed for space use and are flight proven with extensive heritage and excellent reliability. The Next Generation On Board Computer (OBC NG) is a fully redundant high reliable on board computer based on the radiation hardened CREOLE ASIC developed by Beyond Gravity. The CREOLE ASIC is a complete spacecraft on board computer on a chip including a fault tolerant SPARC[®] V8 processor, communication functions, reconfiguration function and mass memory controller.

The OBC NG is the latest in a family of on board computers that have successfully been powering various LEO, MEO, GEO and interplanetary spacecraft for decades.

Key features

Fully redundant unit with cross-strapping between vital functions Processing, Telecommand, Telemetry, On-Board Time, Reconfiguration and File/Data Storage functions in one unit Fixed or programmable reconfiguration sequences Low mass and volume Low power consumption Unit external mission and spacecraft configuration Qualified for space environment (LEO, MEO, GEO, interplanetary Expansion slots for additional functions such as GNSS receiver and additional mass memory

Options

- Non-redundant unit for small spacecraft applications
- Resizing from zero to eight expansion slot
- Payload mass memory
- Additional Application Software Processor several options
- TC AES Authentication and Decryption with 256-bit keys
- TM AES Encryption with 256-bit keys

Interfaces

- 2 x 7 SpaceWire interfaces
- 2 x 2 Control Area Network (CAN) buses
- 2 x 2 Redundant MIL-STD-1553B buses
- 2 x 2 Pulse Per Second (PPS) inputs
- 2 x 16 Synchronisation Pulse outputs
- 2 x 8 Alarm inputs
- 2 x 3 Separation Strap inputs
- 2 x 4 TM serial outputs up to 20 Mbps
- 2 x 2 TC serial inputs up to 2048 kbps
- 2 x 30 Essential TM status inputs
- 2 x 128 Pulse Command outputs
- External USO input (option)
- Primary power supply: 28V, 50V or 100V

Budgets

Unit Size	283 x 242 x 278 mm
Mass	9 kg
Power Consumption	< 38 W
Reliability	0.99
In-Orbit Life Time	up to 20 years
Processing memory	512 MiB w EDAC
File/Data storage	2 x 374 Gbit w EDAC

Processing function

- SPARC V8 LEON FT
- 93 DMIPS @ 75 MHz
- 32 Kbytes instruction cache
- 16 Kbytes data cache
- 512 MiB processing memory
- 32 KiB Boot PROM
- 8 MiB SW Image Storage
- Gigabit Ethernet Debug Link
- Real-Time Processor Trace Dump
- Hardware Driver Software

Block Diagram



Software and development environment

- Eclipse integrated software development environment
- GNU cross compiler (GCC) suite
- Boot Software and Hardware Driver Software
- RTEMS operating system Board Support Package
- LEON Tools utilizing the advanced on-chip Debug Support Unit
 - LEONmon allowing source code level debugging using gdb and eclipse
 - Loader for loading non-volatile SW image storage
 - BackTracker for software execution history analysis
 - Trace for real-time software execution trace dump
 - Inspector for real-time non-intrusive inspection of target
 - Shell for scripting of common tasks or tests
 - Broker management for LEON Tools and target management

Beyond Gravity equipment flight heritage

- > 3500 failure free equipment years in orbit
- > 300 Launcher On-Board Computers
- > 120 Satellite Data Handling Systems
- EDRS-C, MTG, ExoMars Rover, Hispasat 36W-1, SARah, Electra, Euclid, JUICE

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