

# Processor Board

RUAG Space processor boards are designed for space use and are flight proven.

## Key Features

- COLE 32-bit Fault-Tolerant LEON2-FT SPARC v8 Processor
- IEEE-754 floating point unit
- Optional companion RTAX 2000 FPGA
- State-of-the-art Eclipse software development environment
- Enhanced Debug Support Unit (E-DSU)

## Processing Performance

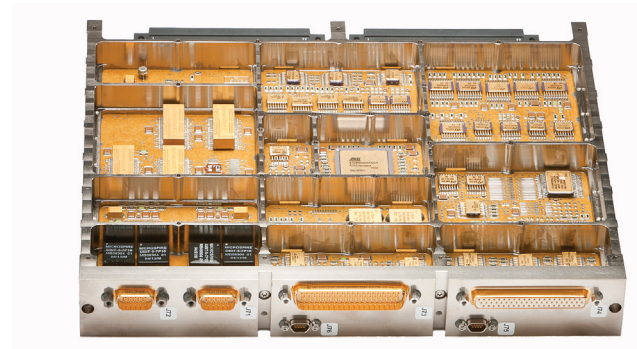
- 70 MIPS 22 MFLOPS@80 MHz
- 32 KiB instruction cache
- 16 kiB data cache

## Interfaces

- 3 dual-redundant MIL-STD-1553B buses with Bus Controller and Bus Monitor capabilities. One of the bus interfaces can also function as Remote Terminal.
- 2 Controller Area Network (CAN) buses.
- 8 SpaceWire (ECSS-E-50-12A) up to 200 Mbps.
- 5 Universal Asynchronous Receiver/Transmitter (UART) interfaces.
- 2 Transmit and 2 Receive Packet Wire links (synchronous serial links with clock, data, strobe and ready).
- 1 OBDH Central Terminal..
- 12 general-purpose inputs or outputs.
- 8 synchronization pulse outputs.
- Test interfaces (RS-422 VART and SpaceWire, LICE)

## Memory

- 8 MiB SBAM or 512 MiB SDRAM, EDAC protected
- MMU
- 64 KiB boot PROM
- 8 MiB EEPROM



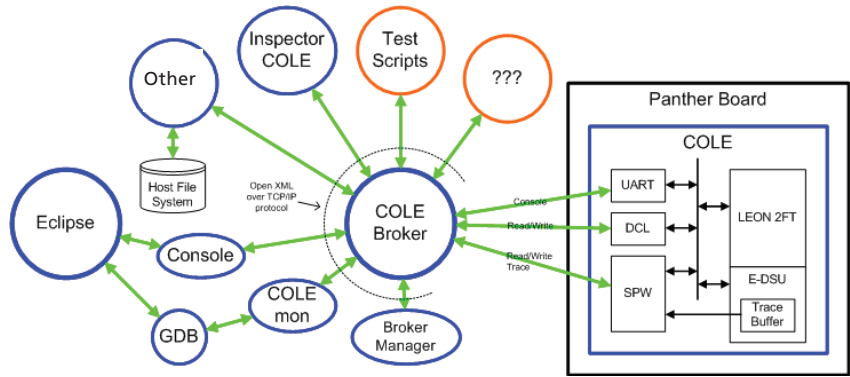
An example of a Flight Model Processor Board.

## Budgets

Printed Circuit Board size	257 x 185 mm
Module size	261 x 205 mm x 36 mm
Power consumption	6 W
Reliability (QML-Q,)	900 FITS
Design life time	15 years in Geostationary or Low Earth Orbit

# Software Development Environment

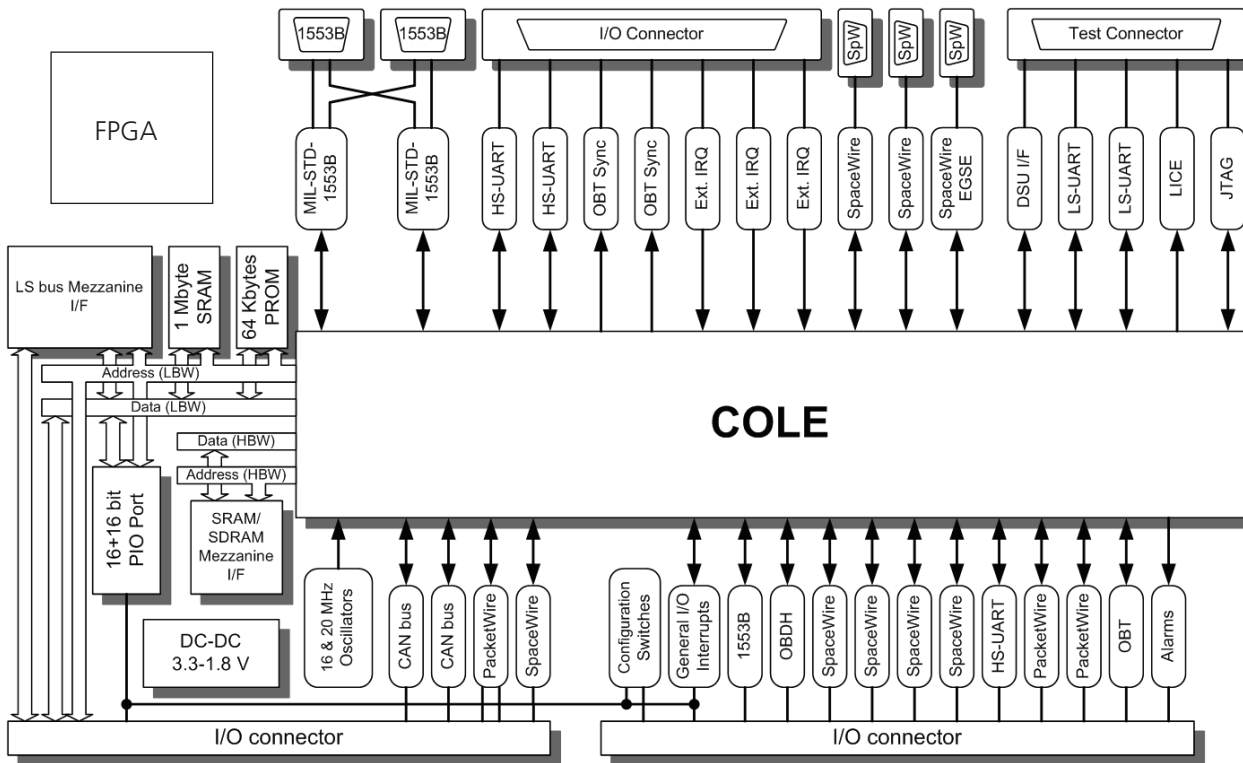
- The board is provided with a Boot Software as well as Hardware Driver Software for supported interfaces.
- The GNU cross compiler (GCC) suite can be used for development in C and C++ for the COLE target.
- Support for the RTEMS operating system is available in terms of a COLE Board Support Package.
- A host platform independent COLE specific development tool suite, COLE Tools, that utilises the enhanced Debug Support Unit is available.



The core of the COLE Tools is the COLE Broker, which allows multiple clients, connected via TCP/IP sockets, to share the same links (SpaceWire and UART:s) towards COLE. The main clients are:

- COLEmon: GDB remote target monitor proxy for source level debugging
- Console: COLE UART debugging I/O
- Inspector COLE: Non-intrusive browsing, monitoring and midification of internal COLE registers and memory

## Block diagram



## Heritage

## Applications