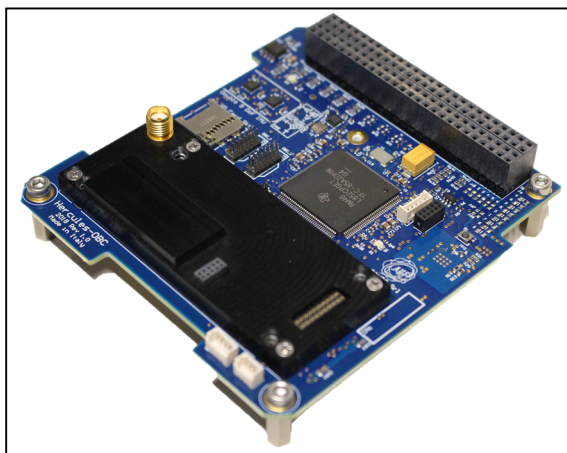




OBC Hercules



Description

Hercules is an OBC unit designed to have redundancy without losing powerfulness. It features an ARM Cortex R4F 32-Bit RISC CPU with dual core CPUs working in lockstep up to 220MHz. The output signals of each core are compared for redundancy. Both cores and memories have a different physical orientation to make them less susceptible to common mode faults.

The CPU uses ECC on both the flash and the data SRAM, being able to recover from bit flips from SEUs. It also implements parity checks on peripheral memories.

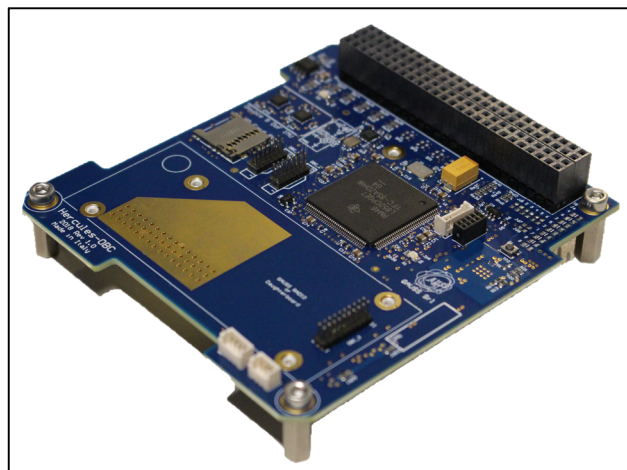
The OBC integrates also two 9DoF IMUs for redundancy, a FRAM memory for critical data storage, a NOR Flash and an SDCard for high density less critical data storage.

The top half of the PCB has a daughterboard adapter that is compatible with GAUSS UHF radio and with a PWM motor and coils driver daughterboard.

The OBC allows for multiple pinout configurations in order to make it compatible with most of the subsystems on the microsatellite market.

Primary Features

- **ARM Cortex R4F** (RM46) 32-Bit RISC CPU with dual core CPUs **working in lockstep** up to 220MHz designed for **Safety Critical Applications**;
- Up to 16 **Analog** Input and more than 20 possible Digital **GPIO** channels (depending on ports configurations);
- 2 x **CAN 2.0B** ports, **I²C** (plus an external voltage shiftable connector), **SPI** bus and 2 x **UART** interfaces;
- **RS422/485** Half & Full Duplex adapter for a UART interface;
- Up to 3 **Motors** & 3 **Coils** dedicated connector with 6 PWMs, 6 ADCs and 12 GPIOs signals;
- Two **N2HET** with up to 32 channels that can be programmed and executed in parallel and independently from the CPU;
- **Dual (for noise reduction) Embedded IMU** with 3 axis magnetometer, accelerometer and gyroscope;
- **4Mbit FRAM** memory for critical information storage;
- **1Gbit Nor Flash** memory and **SDCard** socket for high density data storage;





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- Embedded sensors: 3 x temperature sensors;
- Embedded RTC with 10ths of milliseconds of resolution and with a TCXO for maximum accuracy;
- Daughterboard's connection compatible with the GAUSS radio and usable for GAUSS' and customers' expansion boards.

Other Features

- Weight about 65 grams;
- PC/104 CubeSat form factor compatible;
- Several modalities for low power consumption;
- It can be powered using 5V or 3.3V and from different hardware configurable pins;
- Off the shelf industrial grade / automotive components;
- Operating temperature range -40°C to +85°C.

Flight Heritage

It will be one of the OBCs in the next UniSat-7 mission (microsatellite 33kg). The board is currently under testing but it can be ordered.

Support

User friendly software libraries are included: for the IMU, temperature sensors, RTC, flash memory, I2C, COM, SPI bus control and GPIO.

A **test example code** for using the libraries is included.

