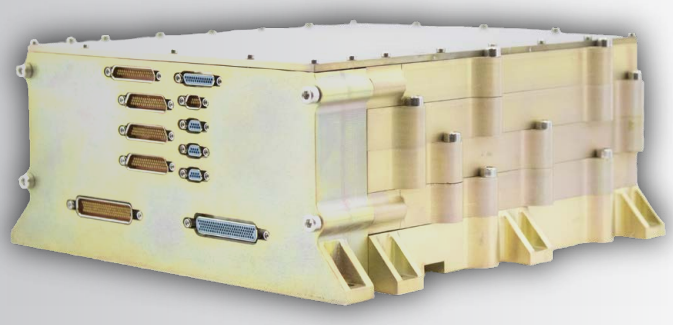
CAVU
AEROSPACE UK

Spacecraft Onboard Computers

CDH-FS

Satellite On-Board Command & Data Handling Subsystem with Redundancy



PIONEERING SPACECRAFT COMPUTING

The CAVU CDH-FS is a state-of-the-art, fully redundant FPGA-based satellite onboard computer system. It's designed with a backup processor board that seamlessly takes over in case of a primary processor failure, ensuring uninterrupted operation. This redundancy significantly enhances the system's reliability and safety, a critical feature for space missions.

The onboard computer (OBC) is engineered to withstand various space hazards, including radiation, cosmic rays, and solar flares. It utilizes a Microchip/Microsemi SmartFusion2 and ProASIC3 Flash Based FPGAs, which are not only SEU immune but also more power-efficient than conventional SRAM-based FPGA architectures.

KEY FEATURES

- Two Cold/Hot Redundant OBC Modules
- Two Cold/Hot Redundant ADC/DAC Modules
  - Double Hot Redundant ADC Converters
- Intelligent Supervisor & Health Monitoring Module
- Smart Data Sync Algorithm Between OBC Modules
- Up to 3 Selectable Boot Regions from Bootloader
- Fully Customizable

INTELLIGENT REDUNDANCY

The subsystem comprises two CAVU CDH-1 modules and an intelligent supervisor board. These components are interconnected through an interface board that doubles all input and output signals, routing them through the main and redundant boards.

The transition to the redundant board is automatic, triggered by a sophisticated monitoring system housed in the supervisor module. This module continuously oversees the health and performance of the system, promptly detecting any failures or malfunctions and initiating corrective action.

ADVANCED SATELLITE COMMAND CONTROL

The CDH-FS is designed to cater to the complex needs of the satellite industry. It supports over 15 different serial interfaces and boasts an impressive 200 GPIOs & 128CH ADC. This makes it compatible with a wide array of sensors and actuators, enabling precision control over satellite systems.

In summary, the CAVU CDH-FS embodies cutting-edge technology in satellite computing. Its high level of reliability, redundancy, and flexibility make it an ideal solution for various satellite missions.

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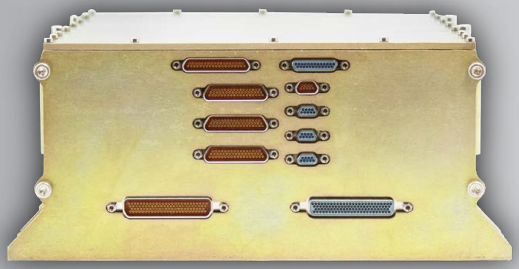
CDH-FS



SPECIFICATIONS

SPECIAL FEATURES

Expected Life-time:
3-5 years in LEO
On-Board Current & Temperature Monitoring
External On-Board Watchdog Monitor via Supervisor
Power Consumption Monitoring via Supervisor
Triple Real Time Clock
Hot Redundant On-Board Voltage Converters
Intelligent Fail-Safe Switch-Over Algorithm

PROCESSOR

ARM Cortex-M3 on FPGA
Microchip/Microsemi SmartFuion2 Flash Based FPGA
Microsemi ProASIC3 Flash Based FPGA for Interaface
FPU on FPGA Upon Request
150 DMIPS @ 128MHz
SoftConsole/Keil Programming and Debug via JTAG

MEMORY

RAM:
160Mbits MRAM 40 bits width (128Mbits+32Mbits ECC)
ROM:
96Mbits MRAM (Configurable as Triple 32Mbits)
Nonvolatile Flash Memory:
Total 24Gbit SLC NAND Flash (Triple 8G)
256K Serial FRAM
256M Serial NOR

INTERFACES

DIGITAL/ANALOG

Digital Outputs (5V/3.3V)	100
Digital Inputs (5V/3.3V)	90
PWM/Pulse Outputs (5V/3.3V)	10
16bits Analog To Digital Converter (-10V~+10V)	128
Digital To Analog Converter (0V~5V)	2

SERIAL

CAN2.0 Up to 1Mbps	5
Full-Duplex RS422	8
Half-Duplex RS485	8
RS232	1
I2C	1
SPI	1

ENVIRONMENT

Radiation Hardness:
Total Ionizing Dose: 30Krad (Si)/yr
Latch-up Immune
SEE @ 60MeV
Temperature & Pressure:
-40℃ to +85℃ @ 10^{-8} bar
Shocks:
2000g, 2000-10000Hz
Random Vibrations:
14g(RMS) 3-Axis , 20~2000Hz

BUDGET

Dimensions:
205x203x87mm
Mass:
4250gr
Power Supply:
5V ±5%
Power Consumption:
3W ~ 5W

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