# CAVU
AEROSPACE UK

OBC-Cube-Polar

Advanced Cubesat Onboard Computer leveraging PolarFire SoC Technology

The OBC-Cube-Polar Cubesat Onboard Computer utilizes Microchip's PolarFire SoC FPGA, offering reliable and efficient computing for Cubesat missions. With PolarFire SEU immunity, high-speed processing, programming flexibility, and low power consumption, it provides robust error correction and radiation tolerance. Equipped with advanced RISC-V cores, a large choice of memories, and extensive connectivity options, it is ideal for scientific research and commercial satellite deployment, ensuring consistent performance in challenging space conditions.
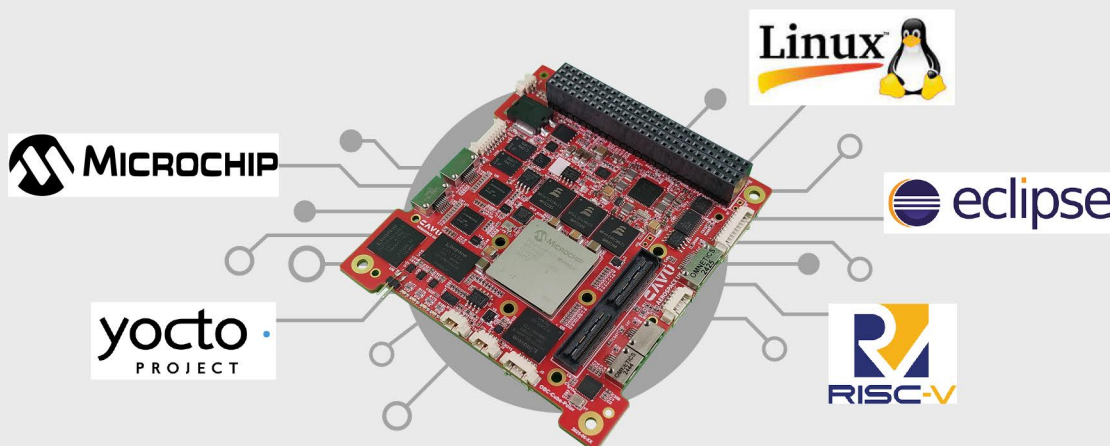
Key Features

— SEU Immune PolarFire SoC FPGA Platform
— More Than 4000DMIPS Processing Power
— Low Power FPGA Design
— Large RAM with ECC Protection
— Radiation-Immune MRAM/FRAM Memories
— Extensive OS Support: e.g. Linux, INTEGRIRTY, FreeBSD
— Complete Connectivity Solutions

Special Features

— Expected Lifetime: 3 to 5 years in LEO
— On-Board Current & Temperature Monitoring
— On-Board Watchdog
— Double Redundant DC-DC
— TMR and Double Redundant Storage Options
— Custom Daughter Card Connection for SerDes
— NRE-Free Customization

MEMORY

— **RAM:** 2GB or 4GB with ECC Protection
— **ROM:** Tripple 16Mb or 32Mb MRAM (Total 48Mb or 96Mb)
— **Nonvolatile Storage:** 64GB Flash via Dual 32GB eMMC
— **QSPI Flash:** Double 512Mb (Total 1Gb)
— **EEPROM:** I2C/SPI FRAM & MRAM
— **MicroSD Card Slot:** For Development and Debug

PROCESSOR

— **Microchip PolarFire SoC Flash Based FPGA SoC**
— **Quad 64-bit RISC-V on FPGA + 1 RISC-V Monitoring Core**
— **660MHz per Core, More Than Total 4000DMIPS**
— **Optional 32-bit RISC-V Soft Cores**

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Cubesat Onboard Computer

Specifications

Interfaces

DIGITAL/ANALOG:

Digital I/O:	20~60
ADC:	8/16CH with 12-bit or 16-bit resolution

High Speed Interfaces:

Space Wire:	1 or 2
1G Ethernet:	1 or 2
SerDes:	Via QSH Connector for PCIe, JESD, etc.

Serial Interfaces:

CAN2.0:	4
RS422 and RS485:	2 to 8
RS232:	2 to 4
I2C:	2 to 4
SPI:	2 to 4
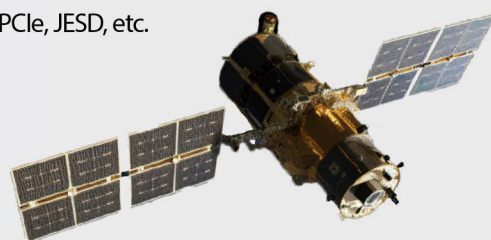
Environment

Radiation Tolerance:
- ZeroFIT SEU neutron-immune FPGA
- Total Ionizing Dose: More than 30Krad
- Internal Block RAM ECC Protected
- Latch-up Immune

Temperature & Pressure: -40℃ to +85℃ @ 10-8 bar

Shocks & Vibrations: Compatible with ISS CubeSat Deployer

QML-V & QML-Q Options Available

MICROCHIP
PolarFire FPGA

Software Support

Design Tools:
- Free Eclipse-based SoftConsole Programming IDE and Debug via JTAG for the rapid development of bare metal- and RTOS-based C/C++ software.
- IAR Embedded Workbench
- MATLAB Embedded Coder Support

Multiple Operating Systems: Linux, FreeRTOS, GNOME, INTEGRITY, FreeBSD, Azure, Ubuntu, VxWorks, SAFWRTOS, etc.

Extensive Community and Mi-V Ecosystem Support

Implementing Custom FPGA Processing Design

Budget

Dimensions:	Cubesat Standard: 90.17x95.89mm
Mass:	80gr
Power Supply:	5V ±5% or 8V~36V
Power Consumption:	3W ~ 5W

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