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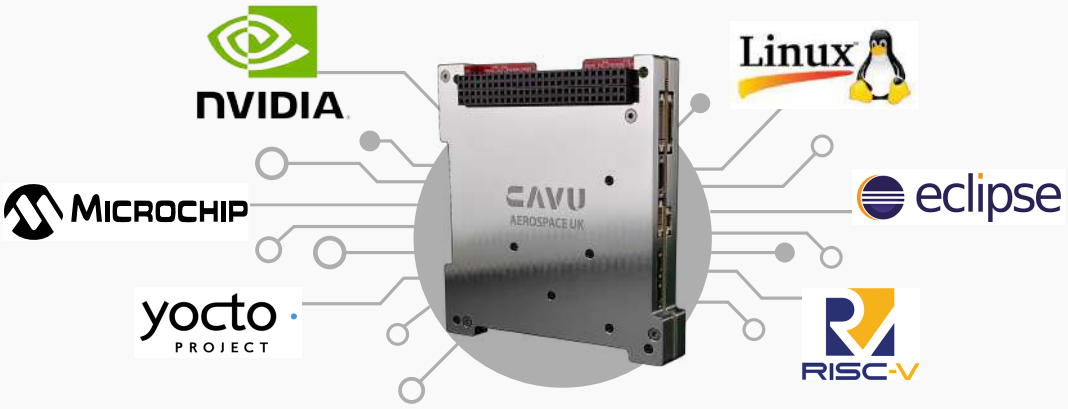
PolarEdge

PolarFire FPGA SoC paired with NVIDIA Jetson Orin NX Edge computing solutions

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.



Processor/Platform	Up to 275 TOPS	Power consumption
NVIDIA Jetson Orin NX	Up to 100 TOPS	10W – 25W
NVIDIA Jetson Xavier NX	Up to 21 TOPS	7.5W – 15W
NVIDIA Jetson Orin Nano	Up to 40 TOPS	5W – 15W
Google Coral Edge TPU	4 TOPS (per TPU)	2W per TPU (0.5W/TOPS)
Intel Movidius Myriad X	Up to 1 TOPS	<2W
Mythic M1076	Up to 25 TOPS	3W – 4W
Teledyne Qormino	Quad ARM Cortex A72, 1.8GHz	3W

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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

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

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

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

Environment

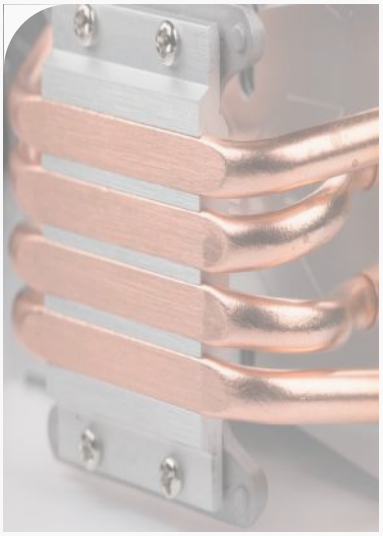
- **Radiation Tolerance:**
  - ZeroFIT SEU neutron-immune FPGA
  - Total Ionizing Dose: More than 30Krad
  - Internal Block RAM ECC Protected
  - Latch-up Immune
- **Temperature & Pressure:**
  -40°C to +85°C @ 10-8 bar
- **Shocks & Vibrations:**
  Compatible with ISS CubeSat Deployer
- **QML-V & QML-Q Options Available**

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

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**



Advanced Cooling Technology

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