



SpaceCloud® iX5-106 Radiation Tolerant Edge Computing, Storage, and Analytics Ecosystem in Space with a NASA TRL 9

SpaceCloud® iX5-106

SpaceCloud

Unibap is at the forefront of providing on-orbit cloud computing, intelligent data processing, sensor management, and storage for data analytics and distribution of timely, relevant and actionable information. Unibap's radiation tolerant SpaceCloud computing hardware and SpaceCloud framework provide a powerful and flexible infrastructure for mesh networks, containerized app deployment, artificial intelligence, and IOT frameworks on space systems.

SpaceCloud OS (SCOS) supply a rich environment derived from Ubuntu Server distribution optimized for on-orbit intelligent data processing and optimized computing data libraries. It also offers many tested and optional third party libraries such as geospatial information package ENVI®/IDL®, communication and compression packages CCSDS/ECCS PUS, CCSDS 123.B2, and CCSDS 124. SCOS also natively support TensorFlow, TensorFlow lite, containerization, many standard compute libraries and SpaceCloud framework.

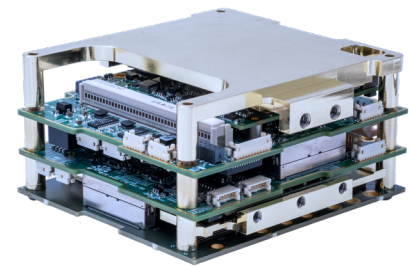
SpaceCloud framework offers a standard API for creating deployable applications quickly and validating them against the Unibap SpaceCloud container registry. Just download the container SDK and runtime to begin creating advanced portable data processing applications.

Spaceflight heritage

The SpaceCloud iX5 maiden commercial spaceflight was on D-Orbit Wild Ride ION Mission in Q2 2021. In addition, Hawaii Spaceflight Laboratory (HFSL) has taken delivery of the iX5 for NASA's Hyperspectral Thermal Imager (HYTI) mission. The iX5 has a Technology Readiness Level of 9.

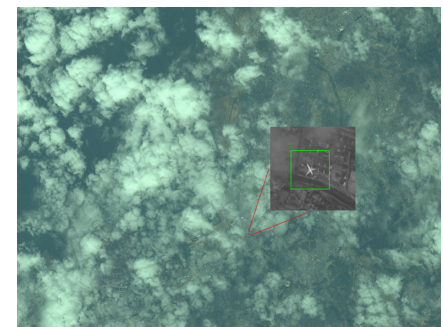
On-orbit Data processing

Whether you have a Space Domain Awareness (SDA) payload, an Earth Observation (EO) payload, a synthetic aperture radar (SAR) payload, robotics, or any other situation where intelligent data processing is needed, the iX5 provides unique value through its massively parallel architecture and machine learning support.



Unibap SpaceCloud iX5 Flight Model photographs for the D-Orbit Wild RIDE ION mission in Q2 2021.

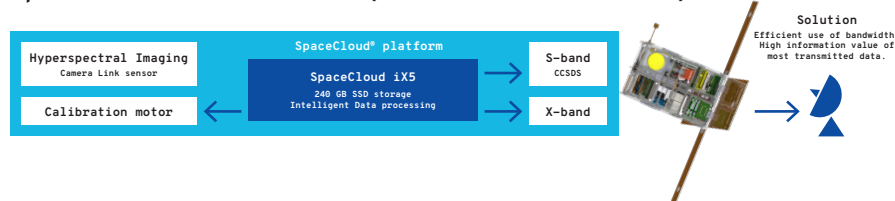
Quad core x86-64 CPU and AMD Radeon GPU paired with SATA SSD storage, Microsemi SmartFusion2 FPGA and Intel Movidius Myriad X Vision Processing Unit.



SpaceCloud Application Example

Mid-air airplane detection SpaceCloud Application developed by SaraniaSat Inc for US Space Force leveraging the onboard ENVI/IDL L3 Harris Geospatial software suite. The app scans 100 sq. kvm of World View-3 MSI spectral data and produces geolocated coordinates for detected aircrafts under 1 minute on the iX5.

SpaceCloud iX5 use case (NASA HYTI 6U Cubesat)



SPACECLOUD iX5-106	COMPUTE PERFORMANCE
CoreMark v1.0 per cpu core	5500+
CPU [GFLOPS]	40
OpenCL GPU [GFLOPS]	87
FPGA DSP cores	72 (18x18)
Additional AI acceleration	4 TOPS Intel Movidius Myriad X Vision Processing Unit

USE CASES EXAMPLES

- Edge cloud computing
- Earth observation/Disaster monitoring
- Cloud detection and sensor data preparation
- Space domain awareness
- Synthetic aperture radar
- Interplanetary exploration
- Autonomous vehicles operation



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Model Name **SpaceCloud® iX5-106**

PROCESSING & MEMORY	
Intelligent Processing Core	Unibap Qseven e2160 compute module
RAM	2 GB DDR3 ECC (CPU/GPU)
Heterogeneous interconnect	PCIexpress® x2 lanes v2.0, 10 GT/s (AMD SOC <-> FPGA) mini-PCIe slot
Storage	2 x 120 GB SATA SSD
Display output for development	HDMI output, max 4K HD
H.264 video encoding acceleration	1080p @ 60Hz hardware accelerated
Unibap SafetyChip/SafetyBoot feature	Enabled on Flight Model version
AI acceleration	Intel Movidius Myriad X VPU
I/O INTERFACE	
Termistor inputs	8 x AD590
I2C	2 (Isolated)
SPI	1
CAN v2.0b	1 (Isolated)
Ethernet, GigaLAN	1 GbE (1000BASE-T)
USB	2 x USB 2.0 1 x USB 3.0
Serial Communication	5x RS232/422 (Isolated)
SpaceWire	2
MECHANICAL	
Dimensions	100 (W) x 100 (H) x 50 (D) [mm] Request ICD for details
Enclosure	On request
ENVIRONMENTAL & ELECTRICAL	
Power Consumption	10-30 W (Depending on processing and storage selection and use)
Input power voltage	12 V DC
Non operating temperature	-40 °C to 85 °C
Operating temperature	-20 °C to 50 °C (7W TDP SOC)
Vibration	Qualified for launch, details upon request
Certification	IPC 610-E Class III (RoHS)
SOFTWARE SUPPORT	
Operating System	SpaceCloud OS (Linux)
SpaceCloud Framework	Supported
Containerized development flow	Supported

Information may change at any time. Doc. reference: 1004027 ver 2.8