ZAITRA

SIMERA SENSE

Intelligent On-Board Compression

The Simera Sense MultiScape100 imager, paired with ZAITRA's SKAIDOCK on-board processor, forms an autonomous, flight-proven Earth Observation system. Combining Simera's high-performance camera with ZAITRA's FPGA IP cores and AI software enables real-time processing, intelligent compression, and in-orbit analysis. Its plug-and-play design accelerates integration, reduces bandwidth needs, and speeds up access to critical insights.

ZAITRA On-Board Processing

- SKAIDOCK On-Board DPU: CubeSat PC104 form factor (90 x 94 x 29 mm, 320g) powered by AMD Zynq UltraScale+ MPSoC.
- High-Speed Data Readout IP: Dedicated FPGA IP Core capable of handling data streams up to 400 Mbps with less than 110 ns latency.
- Plug & Play Integration: Full compatibility with Simera Sense imagers.
- SKAISEN AI On-Board Analytics: Enables real-time cloud filtering and object detection for autonomous decision-making and data prioritization.
- SKAIPACK ROI Compression: Advanced compression using JPEG2000 ROI or CCSDS-123.0-B-2, prioritizing high-value areas identified by AI.

MultiScape100

- Resolution I 4096 pixels across track
- Spectral Range I 7 bands visible and near-infrared (VNIR)
- GSD I 4.75 m at 500 km orbit height
- Focal lenght I 580 mm
- Power consumption I 7.75 W
- Mass I 1.26 kg
- Volume I 98 x 98 x 176 mm (1.5 U)
- Storage I 128 GB
- Interfaces
  - Control - I2C, SPI, RS-422, SpaceWire
  - Data- LVDS, SpaceWire

Plug & Play Compatibility

Combine the Simera Sense MultiScape100 with ZAITRA's SKAIDOCK to obtain a compact, high-performance Earth observation payload. The full setup fits within roughly 2U volume and operates below 12 W.

SKAIDOCK delivers true plug-and-play integration with xScape imagers, minimizing mission integration time. Its dedicated camera connector provides I²C, SPI, PPS, LVDS, and 5 V power interfaces fully aligned with Simera Sense standards, enabling immediate use of the standard harness. The ZAITRA Data Readout FPGA IP Core supports data rates up to 400 Mbps, allowing direct retrieval of uncompressed TIFF imagery, with no additional development effort.

Advanced RoI Compression

SKAIPACK Region-of-Interest (RoI) Compression dramatically reduces downlink bandwidth while preserving mission-critical content. Depending on your application, data volume can be reduced by up to 98.6 %.

Integrated SKAISEN AI models automatically detect high-value regions and maintain them in lossless quality, while less relevant background (such as clouds or ocean) is aggressively compressed to optimize transmission efficiency.

Actionable Insights

With SKAISEN AI, your satellite moves beyond image capture to on-board understanding. Immediately after acquisition, deployed models perform real-time analysis, including cloudiness prediction and object detection, enabling autonomous decision-making directly in orbit.

By processing data on-board, SKAISEN ensures faster access to priority information. Results are provided as structured JSON metadata, delivering ready-to-use insights without waiting for ground-based analysis.

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