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SMALL SATELLITE PLATFORM WITH MMSI PAYLOAD

Earth observation @ ESA – Opportunities for Slovenia

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Agenda

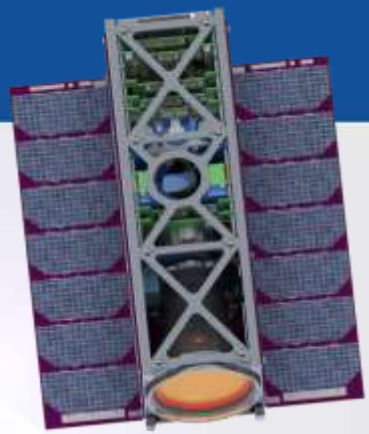
- Motivation and goals
- Platform NANOsky I
- Architectural configuration
- Applications
- Opportunities in and outside ESA

Motivation

What are the issues to use nano-sat‘s based multispectral imaging for actual operational or reliable science applications?

- Are the resources offered to the payload too scarce?
- Are there physical constrains that prevents adequate resolution and SNR
- Is the platform too unstable to guarantee good imaging quality?
- Is the way nano-sats are engineered not reliable for space operational scenarios?
- Is the communication bandwidth too limited?

Platform NANOsky I



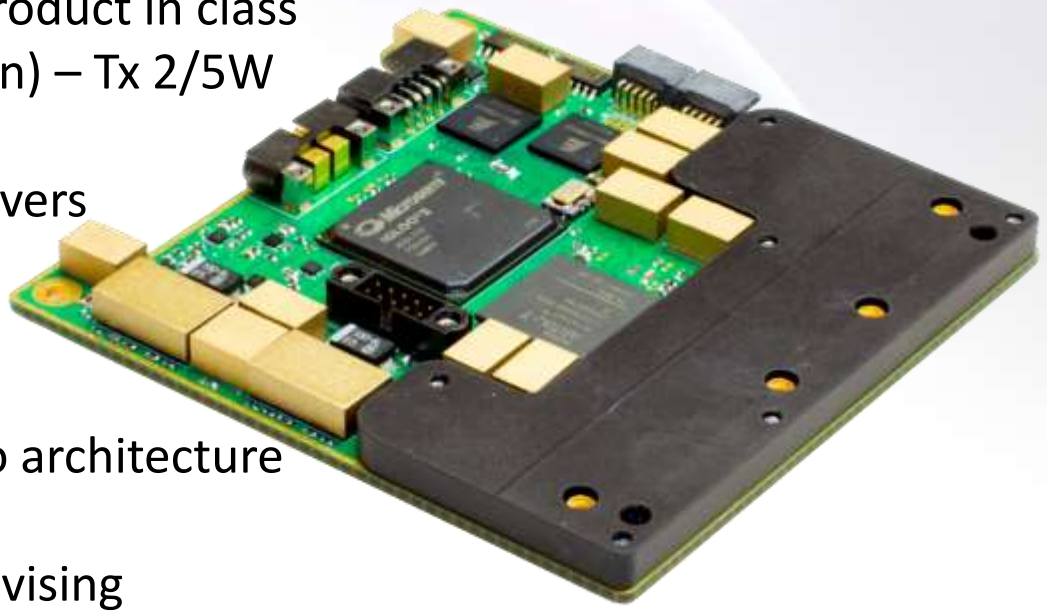
Highly miniaturized platform with fault tolerant features to acquire high reliability and availability

- SEE tolerant - RHBD
- Three level FDIR policy
- Modest harness and on-board communication
- Highly power efficent

NANOlink

S-Band transceiver is designed for receive and to transmit high data rates over large distances.

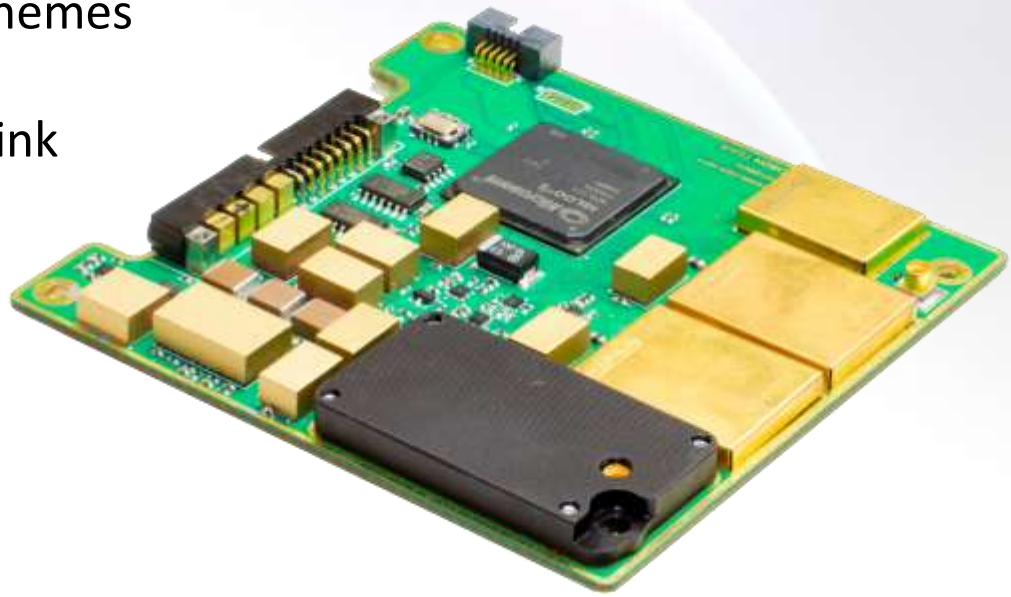
- Most power efficient product in class (mass/size/consumption) – Tx 2/5W
- Hot redundant transceivers
- ECSS CCSDS compliant
- Software Defined Radio architecture
- FDIR unit for SDR supervising
- 8Mbit/s



NANOcomm

CCSDS compliant full-duplex communication subsystem with SoC design approach

- Different modulation schemes
- UHF downlink / VHF uplink
- 32.8 kbps
- 2W
- Transceiver redundancy
- Direct command interface



NANOeps

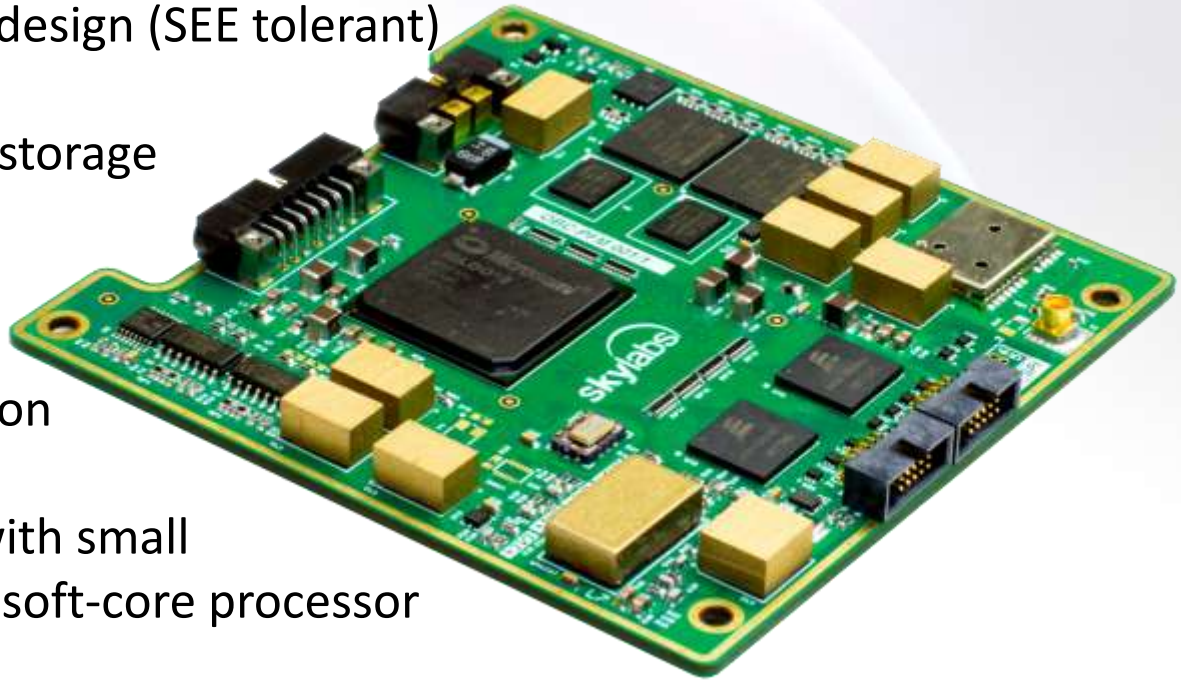
Electrical Power System is based on several innovative technologies for more efficient charging capabilities

- Analogue Maximum Power Point Tracking algorithm
- Passive load balancer
- Three level FDIR policy
- 30Wh

NANOobc

On-board computer represents the newcomer in the emerging space market

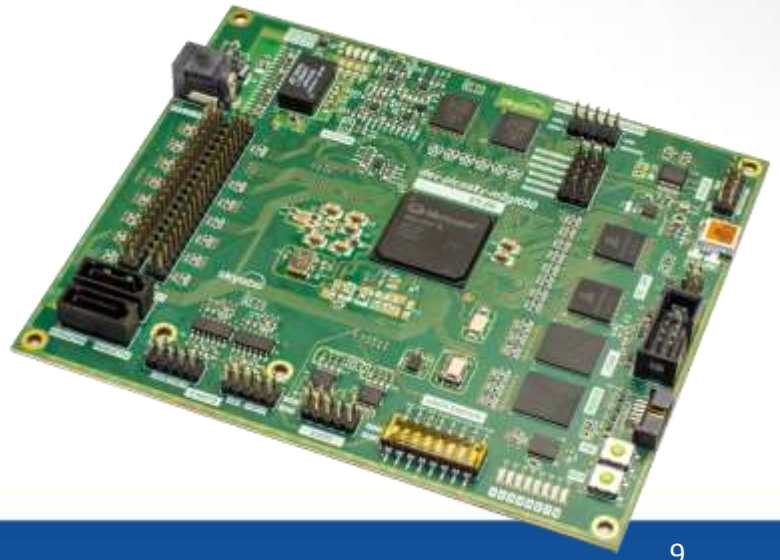
- Fault tolerant by design (SEE tolerant)
- Redundant mass storage
- GNSS module
- Latch-up protection
- Fully compliant with small foot-print PicoSkyFT soft-core processor



PicoSky Fault Tolerant Processor

Designed for embedded processing functions within SoC

- Small footprint fault tolerant
- Rad hardened by design approach
- SEE Tolerant
- FDIR mitigation techniques
- Cycle accurate simulator rapidly increases development
- Versatile development boards available



NANOimager (MMSI)

Miniaturized multispectral optical payload

- 2 PCB‘s design – highly versatile solution
- 8 multispectral channels (from red into SWIR)
- InGaAs highly sensitive SWIR sensor
- Focal length 100mm
- GSD 100m @500km
- SNR on each channel > 100
- Power consumption < 6.7W (with TEC)

MMSI Applications & markets

- **Modus operandi**
  - Target regions for selected applications

- **Applications**
  - Monitoring of vegetation condition (NDVI, crop water requirement – moisture stress, crop health)
  - Fire Hazard (fire focus through smoke)
  - Sea pollution (turbid waters, oil pollution)

- **Markets**
  - Reliable platform with ultra miniaturized SWIR imager is ideally suitable for emerging space market.
    - Especially for upcoming near real time earth observation applications based on small satellite constellations.

SkyLabs customers & partners

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SkyLabs & ESA activities

Finished Projects:

- MMSI - Phase A

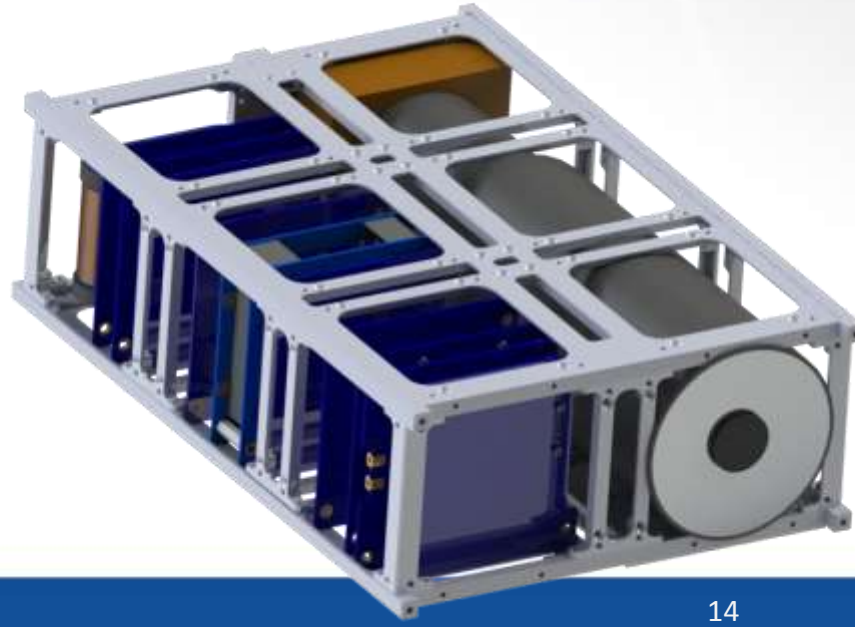
Ongoing projects:

- MMSI – Phase B
- PicoSkyFT processor – Validation & Verification plan

SkyLabs & ESA activities

Goal for Future projects when Slovenia become full ESA member state:

- GSTP activity - Microcontroller Softcore for Space Applications (SkyLabs has already working relevant products to acquire activity through DN)
- GSTP activity - MMSI (Phase C,D)
- GSTP/EO activity – 6/12U NANOplatform



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THANK YOU