skylabs

TURN-KEY SATELLITE AVIONICS

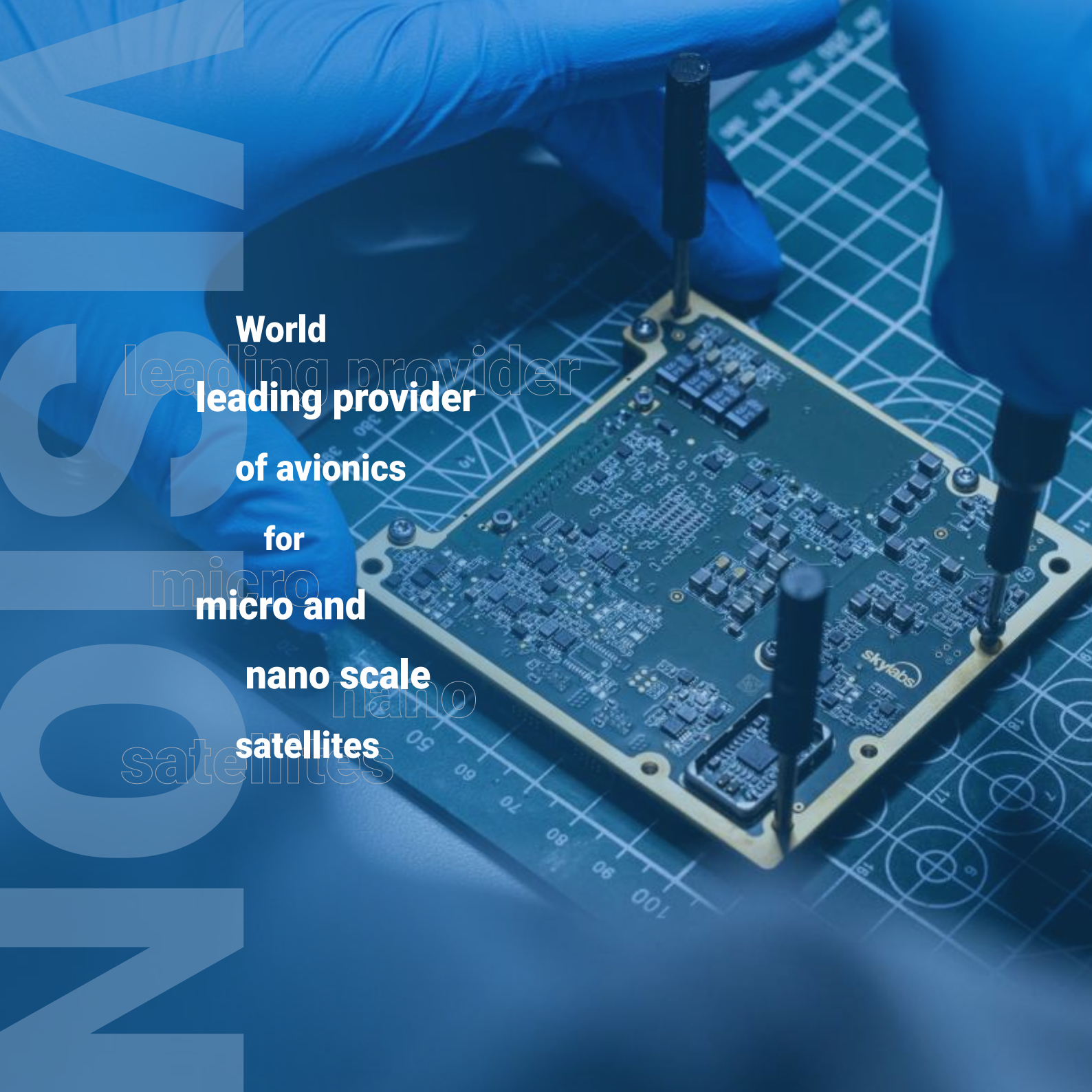

Reliable
Highly miniaturized
Radiation tolerant
Flight Proven
High Quality
Fault Tolerant
Innovative
In-House testing
skylabs
NANO

Together, we are shaping the future of space technology!

At SkyLabs, we specialize in cutting-edge miniaturized on-board data handling solutions and pioneering space engineering. Our focus lies in high-tech solutions, including fault-tolerant hardware and software, powered by internally developed radiation-hardened IP cores for space avionics.

Our dynamic team of experts is dedicated to delivering advanced technology solutions for the most demanding space applications. Embracing the latest technology trends, we prioritize innovation with a proactive and creative design approach.

Located in Maribor, Slovenia, SkyLabs is strategically positioned in Central Europe, fostering strong business connections across the region.


World
leading provider
of avionics
for
micro and
nano scale
satellites

CULTURE

Innovation-driven environment

Everyone is empowered to bring new ideas. Creativity and out-of-the-box thinking are strongly encouraged.

Collaboration and teamwork

Our diverse team of engineers works closely across departments, sharing knowledge and supporting each other to achieve collective success.

Continuous learning

We support and encourage our team members to stay ahead of industry trends through ongoing education and research.

Respectful communication

We prioritize open, respectful communication, fostering a positive, inclusive environment where everyone feels valued and heard.

Work-life balance

We encourage healthy lifestyle, good work-life balance and a variety of sports activities, ensuring our team stays motivated and energized.


To innovate
the space market
with SkyLabs
disruptive technologies,
products and
solutions
that will change
the layout of space.

CORE VALUES

Innovation

We constantly push the boundaries of technology, creating cutting-edge solutions that revolutionize space engineering and satellite systems.

Reliability

Our products are built with precision and resilience, ensuring they perform in the most challenging conditions, from space missions to commercial applications.

Customer focus

We listen closely to our customers' needs and deliver tailored, high-quality solutions that exceed expectations and create lasting value.

Excellence

We strive for excellence in everything we do, from the design of our technologies to the way we serve our customers and stakeholders.

Adaptability

In the rapidly evolving space industry, we stay agile, adapting to new challenges and opportunities to maintain our leadership in the market.


QUALITY

COMMITMENT TO QUALITY

At SkyLabs, our comprehensive MAIT processes are meticulously managed by seasoned and certified operators, ensuring rigorous quality control at every stage. Our commitment to delivering superior products is upheld through the use of AOI, followed by exhaustive visual inspections conducted by our team of IPC-A-610 Class 3 certified experts.

The assembly process is undertaken in our ISO 7 and ISO 8 class cleanroom facilities to assure the cleanliness of our products at the highest level. The final step of our process involves in-depth environmental testing and qualification of our complex products in strict adherence to the stringent requirements of ISO 19683 standards.

Our QMS is crafted in alignment with the rigorous ECSS and has consistently exceeded ISO 9001 audit expectations over the years.

IPC®

ESD

International Organization for Standardization ISO 9001

PRODUCTS

PRODUCTS PORTFOLIO

Main CPU cluster

4x RISC-V 64-bit processors @ 600 MHz

Supervisor

RISC-V monitoring core @ 600 MHz

Memory subsystem

64kB L1 and 2MB L2 memory (SECDED protected)

NANOstack

Optionally available with NANOstack enclosure

- ISO 19683
- IPC Class 3+
- TRL 7
- In-house MAIT

NANOhpc-obc

High performance fault tolerant OBC

The NANOhpc-obc is a 64-bit high-performance multicore RISC-V on-board computer specifically designed for demanding LEO applications that require exceptional performance. It targets key market opportunities, including AI@Edge, situational awareness, and cybersecurity.

With a best-in-class performance-to-power ratio, the NANOhpc-obc delivers 6,500 CoreMarks at just 1.3 W, and achieving 3.125 CoreMarks per MHz / 1.714 DMIPS per MHz. This product pushes on-board intelligence to its limits, addressing the most challenging computational needs.

Equipped with a rich set of embedded peripherals and a coherent multicore cluster, the NANOhpc-obc supports a versatile mix of deterministic real-time systems and Linux, making it ideally suited for power-efficient embedded computing across a wide range of applications.

Main memory
2 GB LPDDR4

TM storage
256 kB MRAM with SECDED

Mass storage
128 GB NAND Flash

Interfaces
Redundant CAN, LVDS, RS422/485, UART, GPIO, 1 Gb ETH

Memory Management
MMU with Physical memory protection

Software
Linux (Yocto)

Processor

NOEL-V 32-bit core (RV32IMAFD) with FPU

Memory

256 MB DDR3 (ECC protected)

NANOstack

Optionally available with NANOstack enclosure

- ISO 19683
- IPC Class 3+
- TRL 9
- In-house MAIT

NANOhpm-obc

High performance MCU fault tolerant OBC

The NANOhpm-obc is a high-performance RISC-V on-board computer, designed for most demanding LEO applications. NANOhpm-obc provides a versatile design in terms of variety of resources and available interfaces. The NANOhpm-obc is built on a robust NANOobc architecture, enhanced with significantly greater processing power, delivering 100 DMIPS at 50 MHz. It delivers Fault Tolerant NOEL-V processor (Cobham Gaisler - CAES) in peripheral rich SoC design. The NANOhpm-obc is delivered with flight proven NANOsky CMM Firmware framework, on top which application layer functions can be developed to suit any mission needs.

Processor
NOEL-V 32-bit core (RV32IMAFD) with FPU

Memory
256 MB DDR3 (ECC protected)

TM storage
Redundant 8 Mbit MRAM (EDAC protected)

Mass storage
2 GB NAND Flash (EDAC protected)

Interfaces
Redundant CAN for TM/TC, dual LVDS/RS422/485

On-board
Integrated GNSS receiver

Processor

PicoSkyFT 8/16-bit core with single precision FPU

Code Memory

4 MB MRAM (EDAC protected)

NANOstack

Optionally available with NANOstack enclosure

- ISO 19683
- IPC Class 3+
- TRL 9
- In-house MAIT

NANOobc-2

Fault tolerant OBC for a mission critical operation

The NANOobc-2 on-board computer represents the second generation of SkyLabs's flight proven OBC for the emerging space market. Its fault tolerance by design provides remarkable reliability and robustness against SEE. The NANOobc-2 is powered by PicoSkyFT processor, which furthermore increases operational reliability and delivers nearly 16 MIPS. NANOobc-2 features a redundant mass storage and sufficient capacity of non-volatile and volatile program and data memories to assure functionality for the most demanding space applications. The NANOobc-2 is delivered with flight proven NANOsky CMM Firmware framework, on top which application layer functions can be developed to suit any mission needs.

Data Memory
2 MB
(EDAC protected)

TM storage
4 MB MRAM
(EDAC protected)

Mass storage
2 GB NAND Flash
(EDAC protected)

Interfaces
Redundant CAN for TM/TC,
dual LVDS/RS422/485

On-board
Integrated GNSS
receiver

Software
FreeRTOS OS with
NANOsky CMM Framework

coming soon

Output power
up to 37 dBm (5W)

Security (optional)
Encryption: AES-GCM-256
CCSDS 355.0-B-2: SDLP

NANOstack
Optionally available with NANOstack enclosure

- ISO 19683
- IPC Class 3+
- TRL 3
- In-house MAIT

NANOcast

Secure high-speed link with highly efficient integrated amplifier

NANOcast is a 100 Mbps X-Band satellite transmission communication subsystem with an additional highly efficient integrated amplifier and built-in encryption system, which provides a high level of security between satellite and ground station communication. Several intelligent built-in functions enable the use of the NANOcast as an advanced communication system, making the acquisition of satellite payload data practically autonomous. The security functions of the NANOcast subsystems are based on the use of the CCSDS SDLS protocol and supports the symmetric AES-GCM-256 authenticated encryption algorithm with support for encryption key. Advanced encryption functions are supported in combination with a NANOlink subsystem.

Data rate
up to 100 Mbps
@ 50 MHz (OQPSK)

Interfaces
Redundant CAN for TM/TC,
dual LVDS, dual ETH

Protocol
CCSDS compliant

Frequency band
8025 MHz to 8500 MHz

Output power

Adj. up to 31.5 dBm (1.4W) per antenna port

Power consumption

< 17 W at 31.5 dBm for two antenna ports

Security (optional)

Encryption: AES-GCM-256
CCSDS 355.0-B-2: SDLP
CCSDS 355.1-B-1: SDLP-EP

NANOstack

Optionally available with NANOstack enclosure

- ISO 19683
- IPC Class 3+
- TRL 7
- In-house MAIT

NANOlink(-S)-boost-dp

S-Band communication subsystem with highly sophisticated signal splitter/combiner

The NANOlink(-S)-boost-dp is a highly miniaturized full-duplex TM/TC satellite communication subsystem, equipped with an additional efficient integrated amplifier, a sophisticated two antenna port splitter/combiner, and an optional built-in encryption system that provides a high level of security between the satellite and the ground station (GS).

Several intelligent built-in functions enable the NANOlink(-S)-boost-dp to operate as a fully autonomous system, facilitating the streamlined acquisition of satellite diagnostic data. The optional security features (-S) utilize the CCSDS Space Data Link Security protocol.

Additionally, the NANOlink(-S)-boost-dp supports the symmetric AES-GCM-256 authenticated encryption algorithm and accommodates multiple encryption keys, making it a key subsystem in NANOsky avionics.

Input sensitivity
-86 dBm @ 4 Mbps OQPSK

Data rate
Up to 4 Mbps
Full duplex

Frequency band
Tx: 2.200 - 2.300 GHz
Rx: 2.025 - 2.110 GHz

Protocol
CCSDS compliant

TM storage
Up to 24k log entries

Interfaces
Redundant CAN for TM/TC, dual LVDS

Output power
Adj. up to 37 dBm (5W)

Power consumption
< 17 W at 37 dBm

Security (optional)
Encryption: AES-GCM-256
CCSDS 355.0-B-2: SDLP
CCSDS 355.1-B-1: SDLP-EP

NANOstack
Optionally available with NANOstack enclosure

- ISO 19683
- IPC Class 3+
- TRL 9
- In-house MAIT

NANOlink(-S)-boost

S-Band communication subsystem with additional highly efficient amplifier

The NANOlink(-S)-boost is a highly miniaturized full-duplex TM/TC satellite communication subsystem, equipped with an additional efficient integrated amplifier, and an optional built-in encryption system that provides a high level of security between the satellite and the ground station (GS).

Several intelligent built-in functions enable the NANOlink(-S)-boost to operate as a fully autonomous system, facilitating the streamlined acquisition of satellite diagnostic data. The optional security features (-S) utilize the CCSDS Space Data Link Security protocol.

Additionally, the NANOlink(-S)-boost supports the symmetric AES-GCM-256 authenticated encryption algorithm and accommodates multiple encryption keys, making it a key subsystem in NANOsky avionics.

Input sensitivity
-97 dBm @ 4 Mbps OQPSK

Data rate
Up to 4 Mbps @ Full duplex

Frequency band
Tx: 2.200 - 2.300 GHz
Rx: 2.025 - 2.110 GHz

Protocol
CCSDS compliant

TM storage
Up to 24k log entries

Interfaces
Redundant CAN for TM/TC, dual LVDS

Output power
Adj. up to 30 dBm (1W)

Power consumption
< 7 W at 30 dBm

Security (optional)
Encryption: AES-GCM-256
CCSDS 355.0-B-2: SDLP
CCSDS 355.1-B-1: SDLP-EP

NANOstack
Optionally available with
NANOstack enclosure

- ISO 19683
- IPC Class 3+
- TRL 9
- In-house MAIT

NANOlink(-S)-base

S-Band full-duplex communication subsystem with highly efficient amplifier

The NANOlink(-S)-base is a highly miniaturized full-duplex TM/TC satellite communication subsystem, equipped with an efficient integrated amplifier, and an optional built-in encryption system that provides a high level of security between the satellite and the ground station (GS).

Several intelligent built-in functions enable the NANOlink(-S)-base to operate as a fully autonomous system, facilitating the streamlined acquisition of satellite diagnostic data. The optional security features (-S) utilize the CCSDS Space Data Link Security protocol.

Additionally, the NANOlink(-S)-base supports the symmetric AES-GCM-256 authenticated encryption algorithm and accommodates multiple encryption keys, making it a key subsystem in NANOsky avionics.

Input sensitivity
-97 dBm @ 4 Mbps OQPSK

Data rate
Up to 4 Mbps
Full duplex

Frequency band
Tx: 2.200 - 2.300 GHz
Rx: 2.025 - 2.110 GHz

Protocol
CCSDS compliant

TM storage
Up to 24k log entries

Interfaces
Redundant CAN for TM/TC, dual LVDS

Output power
Adj. up to 30 dBm (1W)

Power consumption
< 4.5 W at 31 dBm

NANOstack
Optionally available with NANOstack enclosure

- ISO 19683
- IPC Class 3+
- TRL 9
- In-house MAIT

NANOcomm-2

UHF/VHF full-duplex communication subsystem with highly efficient amplifier

NANOcomm-2 is a highly miniaturised full-duplex TM/TC satellite communication subsystem. Its best-in-class SWaP characteristics assure the NANOcomm-2 outstanding performance for the emerging space market. Powered by PicoSkyFT, the NANOcomm-2 features embedded intelligence that directly enhances the overall functionality of the satellite system. Several intelligent built-in functions enable the NANOcomm-2 to operate as a fully autonomous system, facilitating the streamlined acquisition of satellite diagnostic data.

Input sensitivity
-111dBm @ 25 kbps GFSK

Data rate
Up to 25 kbps @ Full duplex

Frequency band
Tx/Rx: 420 - 450 MHz
Tx/Rx: 130 - 200 MHz

Protocol
CCSDS compliant

TM storage
Up to 24k log entries

Interfaces
Redundant CAN for TM/TC

Scalable distributed system

picoRTU-base
picoRTU-analog
picoRTU-digital
picoRTU-high-power

Various user interfaces

HV/HC/LV-HPC (ECSS-compliant)
Analog inputs
RS422/485, CAN, GPIOs,…

NANOstack

Modular distributed system

- ISO 19683
- IPC Class 3+
- TRL 7
- In-house MAIT

picoRTU system

Highly modular RTU system for LEO small & micro satellite platforms

The robust picoRTU modular system is designed to meet the space industry's demands for faster time to market while reducing non-recurrent costs and simplifying the integration and verification processes. The picoRTU system can function either as a standalone base unit or, through a stacked modular approach, as a collection of interconnected add-on units.

A variety of unit models are available, each offering different types of ECSS-compliant user interfaces. This flexibility allows the system to be efficiently tailored on a mission-by-mission basis, with minimal non-recurrent charges.

Interfaces
Redundant CAN for TM/TC, redundant LVDS

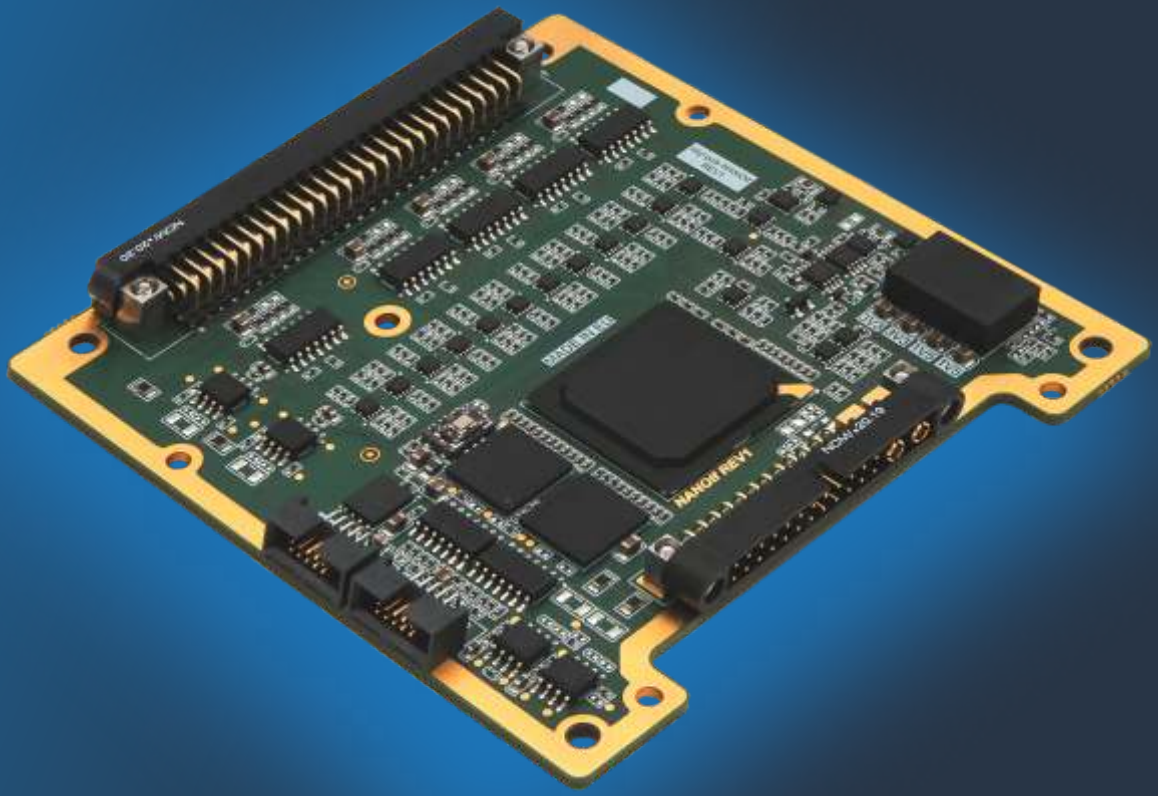
Synchronisation
GNSS 1PPS synchronisation input

ECSS user interfaces
HV/HC/LV-HPC
Differential ASM, ASM, TSM, BDM, BSM

Other user interfaces
RS422/485, CAN, GPIOs,...

User interfaces

CAN, RS422/485, GPIOs,...



Comprehensive subsystem TM

Currents, voltages, temperatures...

NANOstack

Optionally available with NANOstack enclosure

- ISO 19683
- IPC Class 3+
- TRL 9
- In-house MAIT

NANOif-2

Intelligent remote terminal unit with unified TM/TC interface

The NANOif-2 represents an intelligent remote terminal unit for interconnection of satellite's on-board sensors, instruments, or payloads into a seamless and unified on-board data handling architecture. NANOif-2 support several highly configurable user interfaces, as discrete ADC channels, Digital Input/Output, or communication links as UARTs, RS422/485, SPIs, I2Cs, and auxiliary CAN. All the interfaces are seamlessly transformed into a standard NANOsky I TM/TC redundant CAN bus interface. The translation of user interfaces is performed in a way to provide maximal RTU independence to the user's higher protocols. Several intelligent built-in functions enable the use of the NANOif-2 RTU as a fully autonomous system, making the acquisition and conditioning of satellite sensors data practically autonomous.

User interfaces
2x CAN (with CSP bridge), 5x RS422
24x ADC, 20x GPIO

Interfaces
Redundant CAN for TM/TC

TM storage
Up to 24k log entries

Battery pack capacity
up to 172 Wh

Battery pack life time
> 30000 re-charge cycles @ 20% DoD
(80% EOL capacity)

23 power output channels
3.3V, 5V (3x redundant), 12V and unregulated ch.
Current and voltage monitoring
Over-current and over/under-voltage protection

NANOstack
Optionally available with
NANOstack enclosure

- ISO 19683
- IPC Class 3+
- TRL 9
- In-house MAIT

NANOeps

Highly integrated EPS with battery management and power control/distribution module

The NANOeps subsystem consists of a power control & distribution module coupled with a battery management module, featuring a scalable integrated battery pack (up to 172 Wh). This makes it one of the most advanced EPS available for nano and microsatellites platforms. The NANOeps includes active balancing to ensure exceptional lifespan and heating system for optimal protection of each battery cell. It is capable of supplying power through 23 independent channels, three of which are redundant. Additionally, the system features five dedicated deployment actuator interfaces, separation and remove before flight switches, and many other functionalities.

The comprehensive subsystem's TM (currents, voltages, temperatures, etc.) and TC is provided over cold redundant CAN interface. The NANOeps is fully complaint with up to two NANOeps-AMPPT subsystems.

Charge rate
Continuous up to 18A

Discharge rate
Continuous up to 18 A / Peak up to 54 A

Deployment Interfaces
5x deployment outputs, 10x deployment TLM inputs

Separation/RBF Switches
Two separation switches and RBF

Battery balancer
Active battery balancing per cell string

Interfaces
Redundant CAN for TM/TC

Solar array performance

8 channels
(each with dedicated AMPPT)

Solar array performance

Input power up to 9W per ch.

NANOstack

Optionally available with NANOstack enclosure

- ISO 19683
- IPC Class 3+
- TRL 9
- In-house MAIT

NANOeps-AMPPT

The safest and most accurate solar array energy conversion subsystem

NANOeps-AMPPT subsystem supports the safest and most accurate solar array energy conversion method using well proven analog maximum power point tracking feature. NANOeps-AMPPT is fully autonomous unit and compliant with NANOeps subsystem. Several intelligent built-in functions enable NANOeps-AMPPT to provide a rich set of TM for its autonomous analog MPPT conversion loop.

Number of NTC inputs
10

AMPPT efficiency
> 80 % (at 25°C)

Interfaces
Redundant CAN bus for TM/TC

Solar array parameters
12.1V to 23.3V input voltage
Up to 678 mA input current

Charge output parameters
Output voltage range 7.5V – 11V
Output power up to 8W per ch.

Protocol
CCSDS compliant

Security
Encryption: AES-GCM-256
CCSDS 355.0-B-2: SDLP
CCSDS 355.1-B-1: SDLP-EP

TRL 9

skyEGSE-comm

Ground Station Equipment for communication over S-band RF link or over UHF/VHF RF link

skyEGSE-comm is a CCSDS compliant SDR equipment, that enables full duplex communication link with SkyLabs's on-board RF communication subsystems. skyEGSE-comm exposes all communication capabilities over a MQTT, allowing seamless integration over an Ethernet connection with customer's AIT or MOSW. Moreover, the skyEGSE-comm can be interconnected with existing ground station networks, including providers such as Leaf-Space and KSATlite.

Interface
Dual RS422

Interface
Dual high-speed LVDS

Interface
Dual CAN buses

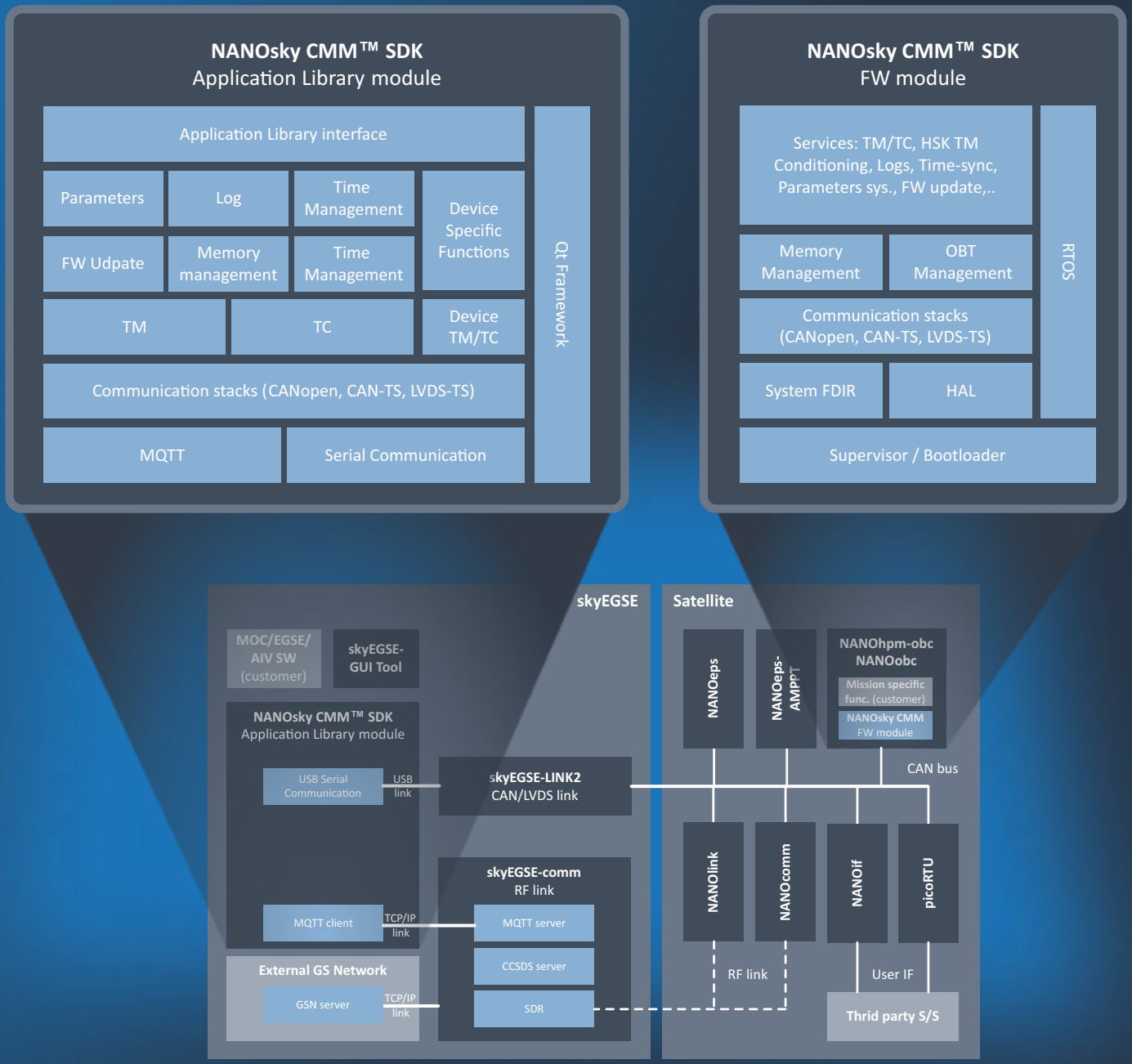
IPC Class 3+

In-house MAIT

skyEGSE-LINK2

An USB Interface dongle for communication over CAN/LVDS/RS422 interfaces

skyEGSE-LINK2 advance interface dongle enables high speed and low latency communication between SkyLabs subsystems and advanced skyEGSE-GUI software or NANOsky CMM™ SDK. “Plug-n-Play” USB interface provides required data throughput to feed all dongle’s interfaces at the maximal data rates.


NANOsky CMM™ SDK
Application Library module
Application Library interface
Parameters
Log
Time Management
Device Specific Functions
FW Udpate
Memory management
Time Management
TM
TC
Device TM/TC
Communication stacks (CANopen, CAN-TS, LVDS-TS)
MQTT
Serial Communication
Qt Framework
NANOsky CMM™ SDK
FW module
Services: TM/TC, HSK TM Conditioning, Logs, Time-sync, Parameters sys., FW update,..
Memory Management
OBT Management
Communication stacks (CANopen, CAN-TS, LVDS-TS)
System FDIR
HAL
Supervisor / Bootloader
RTOS
skyEGSE
Satellite
MOC/EGSE/ AIV SW (customer)
skyEGSE-GUI Tool
NANOsky CMM™ SDK
Application Library module
USB Serial Communication
USB link
skyEGSE-LINK2
CAN/LVDS link
skyEGSE-comm
RF link
MQTT client
TCP/IP link
MQTT server
CCSDS server
SDR
External GS Network
GSN server
TCP/IP link
NANOeps
NANOeps-AMPPT
NANOhpm-obc
NANOobc
Mission specific func. (customer)
NANOsky CMM FW module
CAN bus
NANOlink
NANOcomm
NANOif
picoRTU
RF link
User IF
Thrid party S/S

TRL 9

NANOsky CMM™ SDK

Software development kit for Control, Monitor and Management (CMM™) of NANOsky platform subsystems

The NANOsky CMM™ SDK implements all functions to support controlling, monitoring and management of any SkyLabs subsystems. All functions are provided in a comprehensive C++ library, with application-level examples for fast prototyping or functionality integration to a third-party software. This enables users a drastic savings in the development time for integration of SkyLabs subsystems functions into customer specific EGSE, AIV/T or even MOC software.

NANOsky CMM™ SDK is composed out of Application Library and FW module.

Application Library module

serves as a framework developed in Qt/C++ for Windows and Linux environments. It supports all functionalities of NANOsky and picoRTU subsystems, making it easier to integrate with third-party AIV/T or EGSE software, or to build a solution from scratch.

FW module

is a standard set of on-board computer functions integrated into a RTOS. This C-based FW module is verified and flight-proven, including essential features, FDIR mechanism, communication stacks with redundancy management, housekeeping TM acquisition and logging, and more.

Interface

CMM with multiple subsystems

Analyse

Realtime TM monitoring and data export

skyEGSE-GUI

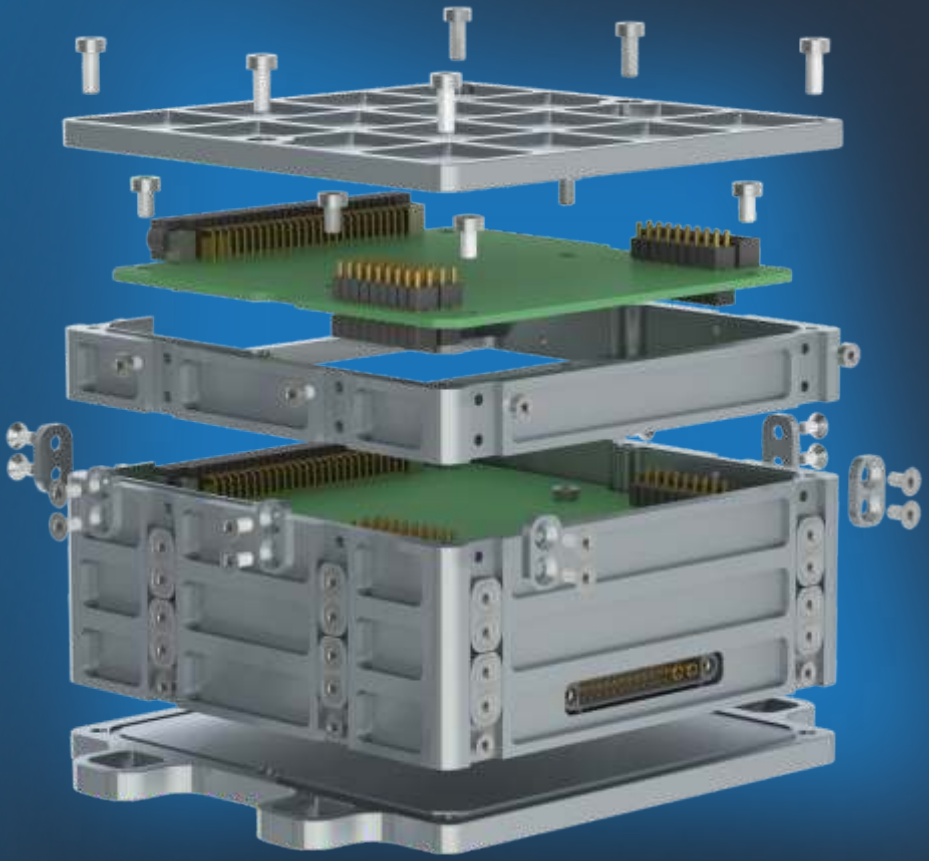
Intuitive App for out-of-the-box operation

skyEGSE-GUI application enables user immediate out of the box control, monitor and management of any SkyLabs NANOsky avionics equipment. skyEGSE-GUI application is a graphical user interface developed on top of powerful NANOsky CMM SDK Application Library module. Application establish connection with target equipment via skyEGSE-LINK2 or skyEGSE-comm.

- **Provides TC for controlling all equipment functions**
- **Downloading equipment logs**
- **Equipment parameterisation**
- **Equipment FW upgrade function**
- **Execution of customised TM/TC**

Redundancy support

Single module and physically separated
Two modules physically separated



Mounting options

Easy adaptable mounting position
Vertical or horizontal mounting

Extendable

Easy to extend with new module
Up to 16 modules in single stack

NANOstack

is innovative mechanical approach of assembling satellite platform in highly modular, scalable and ruggedised enclosure, while preserving best in class SWaP without sacrificing reliability or performance.

SCAN THE QR CODE
TO VIEW OUR CATALOG

skylabs

SkyLabs d.o.o.

Zagrebška cesta 104
SI-2000 Maribor
Slovenia

+386 (0) 59 338 890
info@skylabs.si
www.skylabs.si