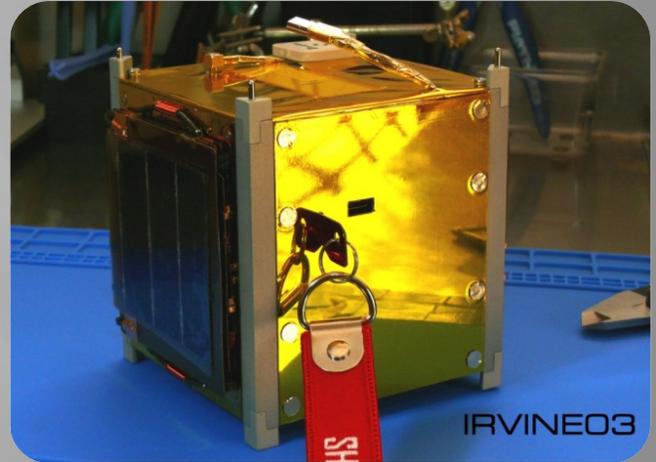
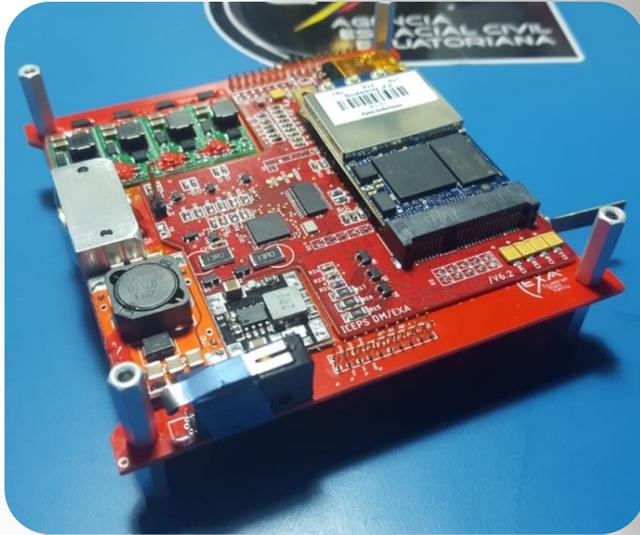




ICEPS: COMPACT, ALL-PURPOSE, USB 2.0 BASED SATELLITE SYSTEM CORE



IRVINE03



IRVINE03

FLIGHT HERITAGE

ICEPS will fly onboard IRVINE03 on NASA's ELaNa slot in Q3/2020, IRVINE04 on NASA's ELaNa slot in Q2/2022 and on-board QB-ROVER to land on the moon on Astrobotic's Peregrine Lander in Q3/2021.

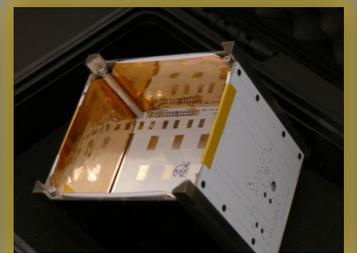
EMBEDDED HIGH SPEED LASER COMMUNICATIONS

The embedded 450nm LASER emitter on board ICEPS allows the download of information at a minimum speed of 2Mbps to a maximum of 10Mbps, user selectable, integrated passive cooling keeps the high powered laser operating in a wide beam that does not need a high pointing accuracy.



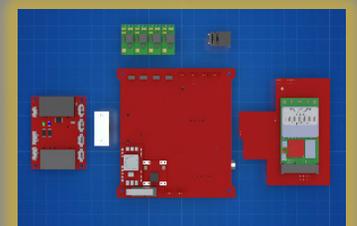
USB RESILIENCE AGAINST RADIATION

To mitigate the impact of SLEs and SUEs in the OBC, the ICEPS board is encased between 2 BADI/S battery packs and the SEAM/NEMEA shielding MLI, which blocks X, Gamma, Beta and Alpha rays, regulates internal temperatures and also blocks EMI and plasma discharge. It has even shown to withstand hypervelocity impacts up to 2km/s.



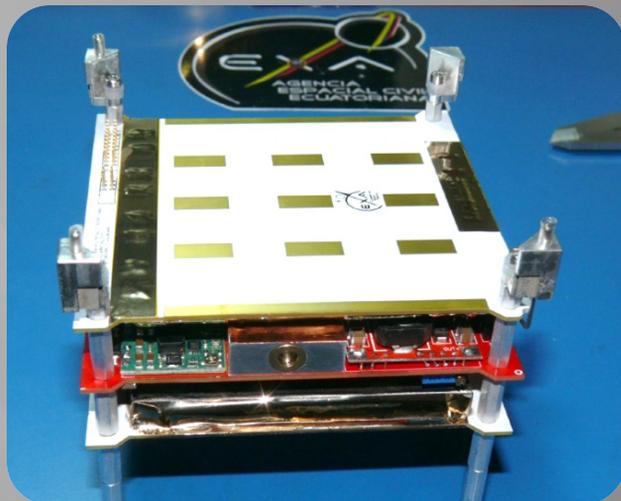
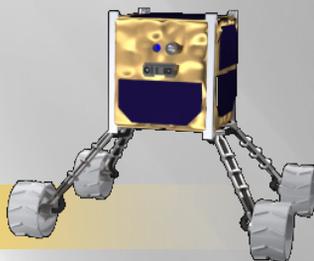
MODULARITY

ICEPS can be configured from an EPS configuration only to a full System Core configuration at user request, it can be used as a satellite or as a rover





ICEPS: TECHNICAL INFORMATION (1)



FEATURES

- A satellite in one card, 25mm thin.
- USB 2.0 Internal Bus, I2C slave network
- EPIQ Z2 On-Board Computer running Linux IIOS.
- OBC-Integrated SDR from 70MHz to 6GHz, 2RX and 1 Transceiver.
- OBC-Integrated 6-axis IMU (3-axis gyroscope, 3-axis accelerometer).
- 32GB to 512GB Samsung rad-hard internal storage.
- 8 external USB ports for device usage and programming.
- 10Mbps solid state laser emitter with variable beam aperture, user selectable data rate.
- 12V, 5V, 3v3 and adjustable power rails.
- 4 UMPPT channels for maximum solar energy harnessing.
- 20 internal sensors capacity.
- Integrated automatic management of release/deploy mechanisms, integrated automatic LNB/PA switching.
- Manufactured according to space standards and custom mission design.
- Functional, performance, thermal bake out and vibration tests provided with documentation.
- Compatible with EXA KRATOS Structures.
- Ready to run your mission, just add your payload

TESTING and QUALITY

All boards are provided with tests reports regarding:

- **Thermal Bake out (10E-7 mbar @ 50C for 24 hours)**
- **Full vibration test available for Dnepr, LM2D, Falcon-9, Electron and PSLV**

TEST	QT	AT
Functional	✓	✓
Vibration	✗	✓
Thermal Cycling	✗	✓
Thermal Vacuum	✗	✓
LASER data rate & power	✓	✓
USB signal integrity	✓	✓
Power rail integrity	✓	✓
Performance	✓	✓

QT and AT are performed on the unit to be shipped

CUSTOMIZATION

Each ICEPS is tailored to the mission needs with customer's choice of connectors, components, subsystems, shielding and power rail configuration. Detailed blueprints, 3D PDFs, STEP and SolidWorks files can be provided on demand.

CONTACT US:

Email: info@exa.ec

Web: <http://exa.ec>

Twitter: https://twitter.com/EXA_ec

Facebook: <https://www.facebook.com/AgenciaEspacialEcuatoriana/>

LinkedIn: <https://www.linkedin.com/company/ecuadorian-space-agency>

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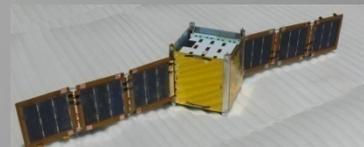
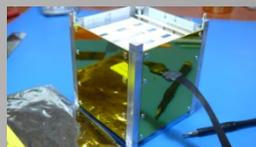
Guayaquil - Ecuador

Phone: +593-999-429106

Fax: +593-42-836098



ICEPS: TECHNICAL INFORMATION (2)



FULL LIST OF FEATURES

Bus Type	USB 2.0 and I2C
OBC	<p>Xilinx Zynq XC7Z010-21 System-on-Chip: Programmable Logic (PL) Specification:</p> <ul style="list-style-type: none"> ▪ 28K Logic Cells ▪ 2.1Mbits BlockRAM ▪ 80 DSP slices <p>Processor System (PS) Specification:</p> <ul style="list-style-type: none"> ▪ Dual-core ARM Cortex A9 CPU running up to 733 MHz ▪ Linux 4.11 ▪ 512 MB of DDR3L RAM ▪ 32 MB of QSPI flash storage for uboot bootloader, Linux kernel, and root file system <p>Temperature Sensor: TMP103AYFFR Accuracy: -40 deg C to +125 deg C (+/- 1 deg C typ), Resolution: 1 deg C</p>
OBC/OS	Linux computer running IIOS
Radio:	SDR from 70MHz to 6GHz
EIRP:	+28.5dBm integrated USB
Sensitivity:	-110dBm
Antenna Ports:	2RX and 1 Transceiver (TX/RX)
System Storage:	32 to 512 Gigabytes
Number of Ports:	15 total: 6 external, 8 internal USB2.0 60MB/s r/w and one I2C slave network
High Speed Laser Communications:	405nm or 450 nm solid state LASER, temperature stabilized , 10 Mbps, variable beam aperture, variable focus. Integrated temperature sensor range -50C to +125C
Power Rails:	5V@3A; 12V@3A(adjustable), 3v3@3.6A(2 redundant); 4.2 ~ 3.6 (unregulated) @ 12A ; 1 auxiliary APU port
Battery packs:	One or two at 3.7@6A, 50W max nominal
Power Delivery:	50W Nominal (continuously) , 65W Maximum, 100W peak for 2.5 sec.
Solar management:	4 UMPPT channels 16V@2A max each
Solar charger:	Based on TP5100 2A continuously, 1S, 2S,3S
Internal sensors:	20 internal sensors; integrated IMU
Actuators:	Integrated automatic management of Release/deploy mechanisms; integrated automatic LNB/PA switching
Built in protection:	RBL; 10A Activation switch w/ MTBF>1000, 2A and 7A resettable fuses
Inertial Measurement Unit:	6-axis MotionTracking Device: (3-axis gyroscope, 3-axis accelerometer) TDK / InvenSense ICM-20602
Unit:	- Gyroscope sensitivity error: ±1% - Gyroscope noise: ±4 mdps/√Hz - Accelerometer noise: 100 µg/g/√Hz
Mass:	100 grams