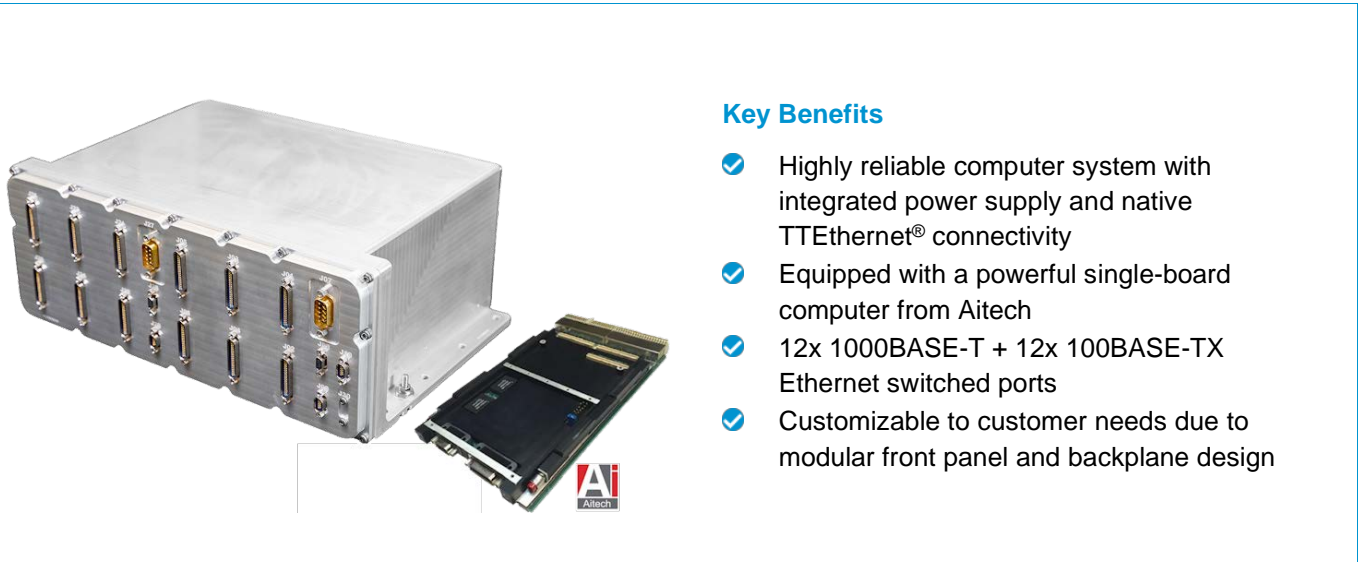




## TTE Avionics Core Unit

TTEthernet®-enabled computer platform



### Key Benefits

- ✓ Highly reliable computer system with integrated power supply and native TTEthernet® connectivity
- ✓ Equipped with a powerful single-board computer from Aitech
- ✓ 12x 1000BASE-T + 12x 100BASE-TX Ethernet switched ports
- ✓ Customizable to customer needs due to modular front panel and backplane design

The TTE Avionics Core Unit is a 3U cPCI chassis hosting two TTESwitch Space 3U cPCI cards, one TTEEnd System Space 3U cPCI card and one powerful Aitech Radiation Tolerant 3U CompactPCI Single Board Computer (SBC) SP0-S, specifically designed to meet the challenges of harsh space environments like Gateway's lunar orbit. It provides a modular platform for the design of complex distributed systems and applications as well as the processing of critical and non-critical Ethernet traffic (rate-constrained, time-triggered, best effort).

### TTE Avionics Core Unit

A powerful TTEthernet®-enabled computer platform integrating a single-board computer (SBC), a TTEEnd System 3U cPCI card and two TTESwitch Space 3U cPCI cards.

### Innovation meets Heritage

Based on TTTech's core technology, this product is manufactured and qualified by Beyond Gravity, leveraging on an extensive heritage of successful space products.

### Dual DC/DC Power Supply

The TTE Avionics Core Unit is equipped with a dual DC/DC PS (each PS supplies two slots) that safely transforms a spacecraft bus voltage of

96-136 V to the 3.3 V supply voltage (PICMG 2.0 R3.0) required on the cPCI backplane. Each power supply with its two slots forms an electrically independent power compartment confining failure propagation. A discrete power commanding interface is available for each compartment. Telemetry interfaces for hot spot temperature telemetry, and On/Off status telemetry are available.

### TTESwitch Space 3U cPCI

The onboard TTESwitch Space 3U cPCI cards form the core of a TTEthernet® network. The cards are built in a compact cPCI 3U form factor as an off-the-shelf product. TTEthernet® permits the use of synchronized and non-synchronized functions of distributed systems in the same Ethernet network.



### Application Fields

- Human space flight
- Telecommunication
- Earth observation
- Reconnaissance

System-critical hard real-time functions enjoy reserved bandwidth, full determinism and a jitter below 1  $\mu$ s. Thanks to a combination of SAE AS6802 time-triggered Ethernet, ARINC 664-part 7 compatible rate-constrained Ethernet and IEEE 802.3 Ethernet, high transfer rates for non-critical data can be achieved at the same time, without impacting critical traffic. Each switch has an internal frame memory of 512 kB, supporting the storage of lower priority traffic while higher priority traffic is processed.

### TTEnd System Space 3U cPCI

The TTEnd System Space 3U cPCI interface card connects user data processing hardware to the TTEthernet<sup>®</sup> network. The card is built in a compact cPCI 3U form factor as an off-the-shelf product. TTEthernet<sup>®</sup> permits the use of synchronized and non-synchronized functions of distributed systems in the same Ethernet network. The end system has an internal frame memory of 512 kb to buffer traffic.

### Aitech Radiation Tolerant 3U cPCI SBC

The 3U CompactPCI SP0-S is a space-rated single-board computer (SBC), based on NXP's PowerQUICC<sup>®</sup>III MPC8548E system on chip with an e500 processing core. The SP0-S includes several performance enhancing improvements over previous designs, including an SDRAM memory upgrade to the DDR2 with 20% higher bandwidth at lower power dissipation. Also added are three rad-hard, on-board temperature sensors as well as six microcontroller-based A/Ds that monitor the board's 3.3 VDC input voltage and five of the internally generated CPU core and I/O voltages. Fully tested and characterized to over 100 krad (Si) and latch-up immune to >65 MeV-cm<sup>2</sup>/mg, the SP0-S is ideal for high performance high altitude, NEO, LEO and GEO missions.

### Available Models

**EDU:** Functionally-representative with commercial parts for laboratory use only.

**FLIGHT:** Qualified according to ECSS and acceptance-tested. Flight-grade model for safety-critical space applications. Built with level-1 grade ceramic parts.

### Ordering Codes

13700	TTE-ACU (SP0, ES, SW, SW - FLIGHT)
13733	TTE-ACU (SP0, ES - FLIGHT)

13733/13700 – TTEAvionics Core Unit (FLIGHT)	Lifetime	15 years
	Environmental	<p><b>Vibration (random, all axes, qualification test levels):</b> 20 – 60 Hz; +3 db/oct, 60 – 1000 Hz; 0.273 g<sup>2</sup>/Hz, 1000 – 2000 Hz; -6 db/oct</p> <p><b>Shock, all axes (qualification test levels):</b> 20 Hz: 20 g, 1000 Hz: 2000 g, 2000 Hz: 3000 g, 10000 Hz: 3000 g</p> <p><b>Temperatures (qualification test levels):</b> Operational range: -35 °C to +66 °C, storage range: -40 °C to +85 °C</p> <p><b>Radiation:</b> TID for 15 years GEO missions, all components SEL free up to 60 MeV/cm<sup>2</sup>/mg &amp; SEE tested up to 60 MeV/cm<sup>2</sup>/mg</p> <p><b>EMC:</b> Compliance to MIL-STD-461F CS101, CS114 (Space), CE101-4, CE102 (for 115 V)</p>
	Power supply	<p>Supply voltage: 96 – 136 V</p> <p>Provides internally: 3.3 V (according to PICMG 2.0 R3)</p> <p>Power consumption EoL 13700: 49.3 W average, 63.8 W peak</p> <p>Power consumption EoL 13733: 22.4 W average, 29.1 W peak</p>
	Dimensions	291.1 x 200.7 x 115.1 mm
	Mass	ACU configuration: 6.6 kg



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