LEOStar™-2 Bus
A Small, Yet High Performance Spacecraft Bus Designed for 1 - 5 Year Low Earth Orbit Missions; Suitable for Space and Earth Scientific, Remote Sensing and Other Applications.

FACT SHEET

Design
Our LEOStar-2 spacecraft is a compact, flexible, high performance platform for space and Earth scientific, remote sensing, and other applications. LEOStar-2 spacecraft have flown on Pegasus®, Minotaur and Delta II launch vehicles, are compatible with other U.S. and foreign launch vehicles including Falcon 9, Dnepr and Vega, and can be configured as an ESPA ride share. The platform is optimized for Low Earth Orbit missions and can be adapted to other missions (MEO, Lunar or Lagrange Points).

The avionics architecture supports single-string or selective redundancy configurations. Using EEE-INST-002 level 2, level 3 or screened commercial parts LEOStar-2 is able to support 1 to 5 year on-orbit lifetimes with high reliability.

Payload Accommodations
Standard LEOStar-2 configurations accommodate payload masses up to 150 kg and a Payload Orbit Average Power (OAP) of 150 W. LEOStar-2 can support higher payload masses on larger launch vehicles. LEOStar-2’s solar arrays are configured to deliver 1,500 Watt peak and are capable of supporting an enhanced payload power of 400 Watts OAP. The on-orbit verified pointing knowledge is 28 arcsec with control at 35 arcsec. Higher accuracies are achievable using enhanced performance attitude control sensors.

FACTS AT A GLANCE

- Compact spacecraft.
- Compatible with a wide variety of domestic and foreign launch vehicles.
- Available in single string and selectively redundant configurations.
- Seven missions launched to date, two in production.
- Payload Support:
  - 150 kg with greater ability subject to launch capability and orbit requirements.
  - 150 Watts OAP with capability to support up to 400 Watts OAP.
  - 28 arcsec pointing knowledge and 35 arcsec pointing accuracy.
  - Higher accuracies achievable with enhanced attitude control sensors.
LEOStar-2 Bus

Mission Services
We can deliver LEOStar-2 spacecraft alone or as part of a “turn-key” service including mission design, instrument/payload integration, instrument provision, satellite environmental test, launch services, early orbit checkout, and mission operations, including delivery of instrument data. We have the end-to-end capability to build, integrate, test, launch and operate missions.

Production Approach
Using mature designs, proven assembly and test procedures, and established vendor sources, we can deliver a LEOStar-2 spacecraft ready for instrument integration in 24 to 30 months after receipt of order.

Heritage
Currently, Orbital ATK has four LEOStar-2 based satellites on-orbit and two in production. First developed for GeoEye, OrbView-4 commercial high-resolution imagery system, the LEOStar-2 spacecraft has flown in a redundant configuration for NASA's SORCE mission, in a selectively redundant configuration for NASA's GALEX and OCO-2 missions, and in a single-string configuration for NASA's AIM and NuSTAR missions. Current LEOStar-2 programs in production at our Dulles, Virginia satellite manufacturing facility include the TESS and ICON spacecraft.

Options
• Upgraded Avionics components, actuators, or sensors to improve system capability and increase mission lifetime.
• Expanded on-board solid state memory and X-band downlink for increased payload data storage and high rate data transfer.
• Hydrazine propulsion capability to enable orbit maneuvers and increase mission lifetime.
• Long-term on-orbit satellite operations and data delivery.

Additional Features
• Modular design – flexibility in design ACS sensor and actuator selection, payload unique data services and proven, assembly, integration and testing enables rapid adaptation to each mission.
• Low cost with high experience – our extensive experience in developing and manufacturing affordable mission solutions enables us to deliver highly capable flight systems under tight cost and schedule constraints.

LEOStar-2 Spacecraft Longevity

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LEOStar-2 spacecraft have an excellent on-orbit performance record.
LEOSTar-2 Missions

ICON - Ionospheric Connection Explorer
Mission: Explore Space/Earth weather connection
Launch: June 2017; Pegasus XL
Status: In development

TESS - Transiting Exoplanet Survey Satellite
Mission: Exoplanet Exploration
Launch: August 2017; Falcon 9
Status: In development

OCO-2 - Orbiting Carbon Observatory-2
Mission: Atmospheric Monitoring
Launch: July 2, 2014; Delta II
Status: Operational, currently performing baseline mission

NuSTAR - Nuclear Spectroscopic Telescope Array
Mission: X-ray detection of black holes
Launch: June 13, 2012; Pegasus XL
Status: Baseline mission complete, currently in extended operations

OCO - Orbiting Carbon Observatory
Mission: Atmospheric monitoring
Launch: February 24, 2009; Taurus XL
Status: Lost due to Launch Vehicle failure

AIM - Aeronomy of Ice in the Mesosphere
Mission: Atmospheric monitoring
Launch: April 25, 2007; Pegasus XL
Status: Baseline mission complete, currently in extended operations

GALEX - Galaxy Evolution Explorer
Mission: Astronomical exploration
Launch: April 28, 2003; Pegasus XL
Status: Mission complete, decommissioned on June 28, 2013

SORCE - Solar Radiation and Climate Experiment
Mission: Solar irradiance measurement and monitoring
Launch: January 25, 2003; Pegasus XL
Status: Baseline mission complete, currently in extended operations

OrbView-4
Mission: Commercial Remote
Launch: September 21, 2001; Taurus 2110
Status: Lost due to Launch Vehicle failure
## LEOStar-2 Bus

### Spacecraft Features

**Spacecraft Mass:** Typically 200 to 450 kg (incl. payload)

**Redundancy:** Single string or selective redundancy

**Orbit Options:** Low Earth Orbit, typically 450-1,000 km altitude, any inclination. MEO, HEO, Lunar or Lagrange Point missions

**Design Life:** 1 to 5 years

**Delivery:** Ready for payload integration in 24 to 30 months

**Launch Vehicle and Compatibility:** Pegasus, Minotaur, Antares, Delta, Falcon 9, Dnepr, Vega and ESPA ride share

### Payload Accommodation

**Payload Mass:** 150 kg or greater depending on mission

**Payload Power:** 150 Watts OAP standard; up to 400 Watts OAP (optional)

**Stability Mode:** 3-axis Zero Momentum Bias (ZMB). Pitch momentum bias and spin stabilized configurations also available

**Pointing:** Standard Knowledge: 28 arcsec Control: 35 arcsec Stability: < 1 arcsec/sec Higher performance available with upgraded attitude control sensors

**Propulsive Capability:** Mono-propellant blow-down system. Delta-V: ~300 m/sec for a 350 kg satellite carrying 50 kg propellant. Compatible with Solid Rocket Motor for energetic orbit insertion

**Data Storage:** 14 Gbit standard. >1 Tbit (optional)

**Payload Interfaces:** RS/422, RS-485, LVDS standard MIL-STD-1553 and SpaceWire (optional)

**Data Downlink:** 4 Mbps S-band 300 Mbps X-Band (optional)

**Command Uplink:** 2 Kbps S-Band Up to 128 Kbps (optional)

### For more information, please contact:

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