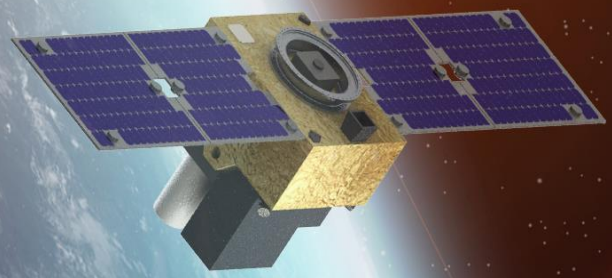
OHB LUXSPACE

TRITON-X

TRITON-X Heavy Specification and Description



Affordable

Scalable

Dependable

18/03/2021 TRIX-LXS-RP-0302 issue 2A

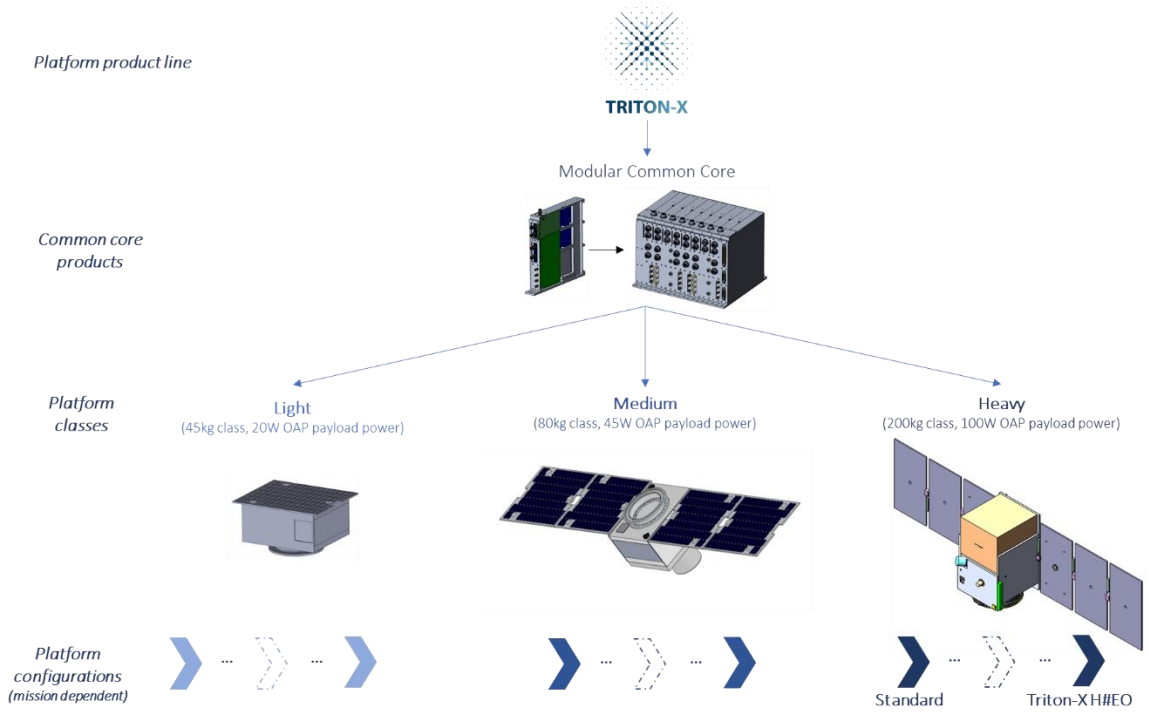
Triton-X Heavy

The high-performance microsatellite platform

1. Triton-X product line

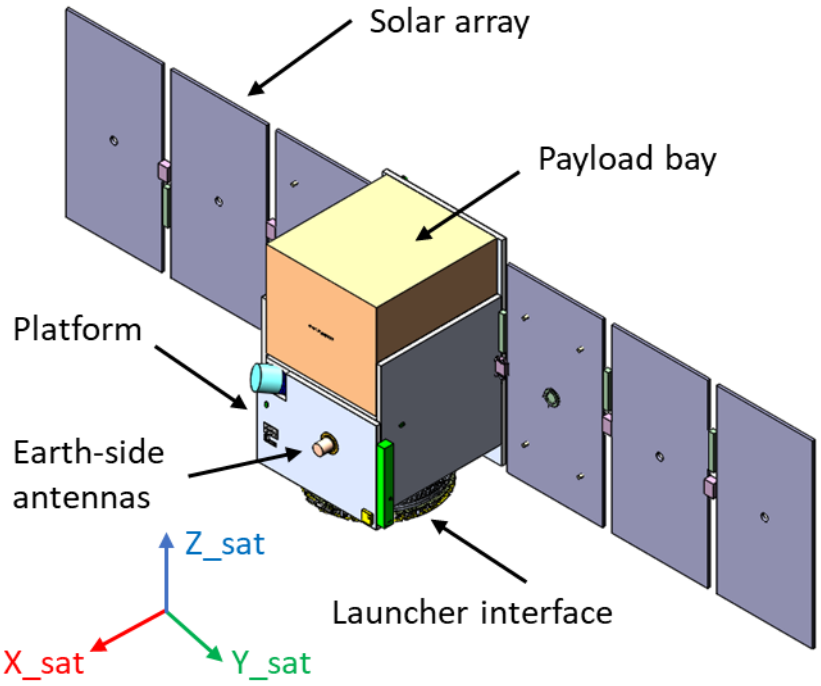
Triton-X is a product line of microsatellite platforms offered by LuxSpace. The platforms are designed with a high level of flexibility, which allows easy configuration to different payloads, launchers and mission profiles, minimizing the associated non-recurring engineering cost. Triton-X addresses a broad range of applications such as Earth observation, situational awareness, communications and condominium applications such as in-orbit demonstrations. Triton-X is optimised for low in orbit cost, i.e. also for the best fit to low cost launch opportunities being it on piggyback with heavy-lift launch vehicles or with dedicated small-lift launch vehicles.

The product line consists of several microsatellite platform classes (Light, Medium and Heavy), all based on a common set of products, ensuring non-recurring engineering costs associated to adaptation to different missions are minimized. Within the same class, further customization and specific components selection is possible, to fine tune the platform design on the specific customer requirements.



2. Triton-X Heavy

The most capable Triton-X is the Triton-X Heavy. The following figure shows the external configuration of Triton-X Heavy with an indicative payload volume on top of the platform body. The Triton-X Heavy is compatible with a wide range of launch vehicles and launch slots.



Within the Heavy class, several mission-dependent configuration options are possible to match the satellite performance according to payload and mission requirements. The main options available are:

- Data Downlink
- Power generation
- Propulsion

Additional options include:

- Payload processing power and data storage
- AOCS performance (e.g. pointing accuracy, agility)
- Energy storage

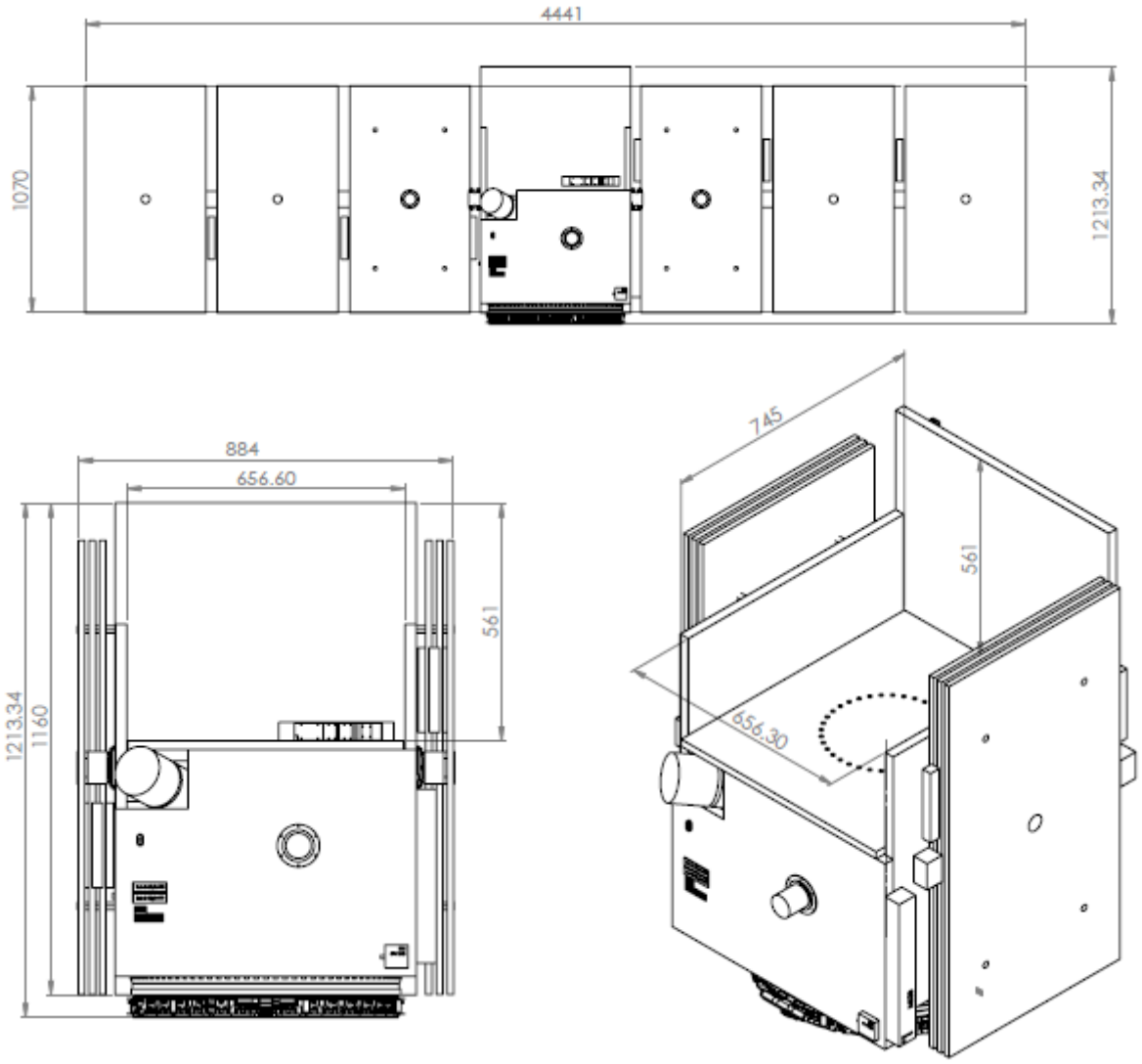
Out of many configurations possible, two reference configurations are highlighted:

- **Triton-X Heavy Standard** – a mid-performance platform.
- **Triton-X H#EO** – intended for high-performance optical Earth observation missions, including maximum power and agility.

The general characteristics of Triton-X Heavy are shown below, and the detailed datasheets of the two reference configurations are provided in the next section.

Mission characteristics	Triton-X Heavy	
Orbit altitudes	400 - 700	[km]
Orbit inclinations	60° - 100°	[°]
SSO LTAN/LTDN	any	
Satellite mass	200-class (mission dependent)	[kg]
Compatible launch vehicles	▪ Falcon 9 (rideshare) ▪ Soyuz (rideshare) ▪ PSLV (rideshare) ▪ Vega (rideshare) ▪ Rocket Factory Augsburg One ▪ Electron	

Triton-X H#EO example



3. Triton-X Heavy Standard

To meet most of your needs for a variety of missions.

Payload resources	Triton-X Heavy Standard	
Payload maximum mass	90	[kg]
Payload stowed envelope for compatibility with the launch vehicles	745 (X_sat) x 650 (Y_sat) x 560 (Z_sat) Height (Z_sat) may be increased depending on launch configuration selected	[mm]
Payload orbit average available power, nadir (OAP) at reference orbit of 500km SSO LTAN: 11:00, payload data handling avionics consumption shall be considered part of this OAP	56	[W]
Payload orbit average available power, with recharge (OAP) at reference orbit of 500km SSO LTAN: 11:00, Sun-pointing for recharge when payload not in use; payload duty cycle of 10% assumed	153	[W]
Payload avionics power consumption (OAP) depends on selected interface and services options, to be included in the payload power allocation (OAP)	34	[W]
Payload data interfaces	CAN, RS-485, LVDS, Ethernet, SpaceWire, SPI	
Payload thermal control provisions	▪ 4 heater lines with ON/OFF controller ▪ 1K measurement accuracy ▪ +/-3K control accuracy	

Platform	Triton-X Heavy Standard	
Platform mass Launch mass, including propellant	155	[kg]
Platform envelope Stowed solar arrays are included in the satellite envelope	867 (X_sat) x 888 (Y_sat) x 1195 (Z_sat)	[mm]
Attitude capabilities	▪ 3-axis stabilized ▪ Nadir pointing (along X_sat) ▪ Inertial pointing ▪ Ground target tracking ▪ Yaw steering (Earth motion compensation)	
Pointing accuracy (APE)	0.10	[deg]

Platform	Triton-X Heavy Standard	
half-cone from payload reference axis, 3σ		
Pointing knowledge (AKE) half-cone from payload reference axis, 3σ	60	[arcsec]
Pointing stability, jitter (RPE) around payload reference axis, 3σ	40 1.0	[arcsec], [s]
Slew performance 60° slew around any axis, incl. tranquilization	82	[s]
Maximum satellite rate around any axi	2.3	[°/s]
Orbit position knowledge accuracy 1σ, GPS and on-board propagator	10	[m]
Orbit velocity knowledge accuracy 1σ, GPS and on-board propagator	0.5	[m/s]
On-board time-stamp accuracy Time-stamp accuracy depends on payload avionics configuration and interfaces	1 [ms] (1 [µs] TBC)	[ms]
Power generation, nadir (OAP) at reference orbit of 500km SSO LTAN: 11:00, continous nadir pointing	156	[W]
Power generation, with recharge (OAP) at reference orbit of 500km SSO LTAN: 11:00, Sun-pointing for recharge when payload not in use; duty cycle 10%	254	[W]
Power consumption (OAP) during nominal payload operations	101	[W]
Bus voltage	28V +/-4V unregulated	
Low-speed downlink data rate (telemetry) S-band; Ground Station with G/T ≥ 15 dB/K	1	[Mbps]
Low-speed uplink data rate (telecommand) S-band; Ground Station EIRP ≥ 74 dBm	56	[kbps]
High-speed downlink average data rate (payload data) X-band; Ground Station with G/T ≥ 26.5 dB/K	80	[Mbps]
Delta-V electric propulsion	197	[m/s]
Thrust level electric propulsion	7	[mN]
Design lifetime	5 years	
Compatible standards	CCSDS, AES, PUS-C (ECSS-E-ST-70-41C)	

4. Triton-X H#EO

High performance and high power intended for Earth observation missions.

Payload resources	Triton-X H#EO	
Payload maximum mass	90	[kg]
Payload stowed envelope for compatibility with the launch vehicles	695 (X_sat) x 656 (Y_sat) x 581 (Z_sat)	[mm]
Payload orbit average available power, nadir (OAP) at reference orbit of 500km SSO LTAN: 11:00, payload data handling avionics consumption shall be considered part of this OAP	112	[W]
Payload orbit average available power, with recharge (OAP) at reference orbit of 500km SSO LTAN: 11:00, Sun-pointing for recharge when payload not in use; payload duty cycle of 10% assumed	260	[W]
Payload avionics power consumption (OAP) depends on selected interface and services options, to be included in the payload power allocation (OAP)	62	[W]
Payload data interfaces	CAN, RS-485, LVDS, Ethernet, SpaceWire, SPI	
Payload thermal control provisions	▪ 4 heater lines with ON/OFF controller ▪ 1K measurement accuracy ▪ +/-3K control accuracy	

Platform	Triton-X H#EO	
Platform mass Launch mass, including propellant	126	[kg]
Satellite envelope Stowed solar arrays are included in the satellite envelope	867 (X_sat) x 888 (Y_sat) x 1195 (Z_sat)	[mm]
Attitude capabilities	▪ 3-axis stabilized ▪ Nadir pointing (along X_sat) ▪ Inertial pointing ▪ Ground target tracking ▪ Yaw steering (Earth motion compensation)	
Pointing accuracy (APE)	25	[arcsec]

Platform	Triton-X H#EO	
half-cone from payload reference axis, 3σ		
Pointing knowledge (AKE) half-cone from payload reference axis, 3σ	23	[arcsec]
Pointing stability, jitter (RPE) around payload reference axis, 3σ	0.9 2.5	[arcsec], [s]
Slew performance 60° slew around any axis, incl. tranquilization	63	[s]
Maximum satellite rate around any axis	2.0	[°/s]
Orbit position knowledge accuracy 1σ, GPS and on-board propagator	10	[m]
Orbit velocity knowledge accuracy 1σ, GPS and on-board propagator	0.5	[m/s]
On-board time-stamp accuracy Time-stamp accuracy depends on payload avionics configuration and interfaces	30	[µs]
Power generation, nadir (OAP) at reference orbit of 500km SSO LTAN: 11:00, continous nadir pointing	235	[W]
Power generation, with recharge (OAP) at reference orbit of 500km SSO LTAN: 11:00, Sun-pointing for recharge when payload not in use; duty cycle 10%	381	[W]
Power consumption (OAP) during nominal payload operations	122	[W]
Bus voltage	28V +/-4V unregulated	
Low-speed downlink data rate (telemetry) S-band; Ground Station with G/T ≥ 15 dB/K	1	[Mbps]
Low-speed uplink data rate (telecommand) S-band; Ground Station EIRP ≥ 74 dBm	56	[kbps]
High-speed downlink average data rate (payload data) X-band; Ground Station with G/T ≥ 26.5 dB/K	800	[Mbps]
Delta-V electric propulsion	200	[m/s]
Thrust level electric propulsion	7	[mN]
Design lifetime	5 years	
Compatible standards	CCSDS, AES, PUS-C (ECSS-E-ST-70-41C)	

OHB LUXSPACE

9, rue Pierre Werner
6832 Betzdorf
Luxembourg
www.luxspace.lu