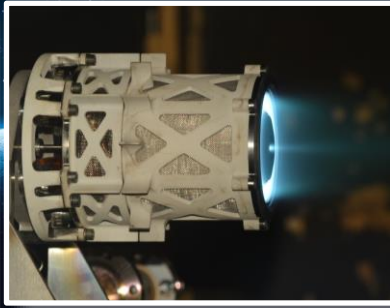


## Halo12 Electric Propulsion Subsystem - Xenon



Halo12 Hall Thruster



### Product Overview

ExoTerra's Halo12 electric propulsion subsystem is a high-performance high- $\Delta V$  integrated Hall thruster, PPU, and XFC. The subsystem is designed for the micro and small satellite market and enables mission architectures that were previously limited to larger spacecraft.

### Electric Propulsion Optimized for High Impulse Missions

ExoTerra's revolutionary Halo12 Hall-effect thruster-based EP subsystem provides industry-leading performance and enables small satellites to perform extremely high- $\Delta V$  missions.

The subsystem uses the JPL-developed and ExoTerra-commercialized Halo12 magnetically-shielded Hall-effect thruster, which has a projected total impulse capability of up to 7 MN-s (equivalent to >20,000 h of operation and >500 kg xenon throughput, depending on operating condition).

This EP subsystem enables small satellites to perform interplanetary and deep space science, lunar activities, or robust long life LEO & GEO missions, including LEO-GEO transfers, inclination changes, and establishing non-traditional orbits.

The TRL-5 subsystem thruster is undergoing a robust flight qualification program with a minimum of TRL-7, including flight heritage, expected in Q3-4 2023.

**Propellant:** Xenon

**Input Power:** 250 – 1650 W

**Total  $I_{sp}$ :** 900 – 2200 s

**Thrust Range:** 10 – 110 mN

**Total Impulse:** 7 MN-s

**TRL:** 5

### Big Propulsion for Small Satellites

The Halo12 electric propulsion subsystem provides superior performance versus existing commercial small satellite propulsion technologies. Along with its high-thrust, high-efficiency capabilities, the subsystem is exceptionally compact and lightweight.

With a  $\geq 100$  kRad TID capability, wide throttling envelope, on-orbit update capability, and options for single or multiple simultaneous string operations, the subsystem is ideal for near-Earth and interplanetary missions.

#### Overall Dimensions:

<b>Thruster</b>	3.4 kg
	12 cm OD x 15 cm L
<b>PPU</b>	3.8 kg
	25 cm x 15 cm x 15 cm
<b>XFC</b>	0.8 kg
	16 cm x 10 cm x 8 cm

For more information contact:

## About ExoTerra

ExoTerra was founded in 2011 with a vision of reducing the cost of space exploration. We pursue this goal by developing affordable technologies that minimize spacecraft mass and volume while enhancing their performance and offering unique capabilities.

## Thruster Development

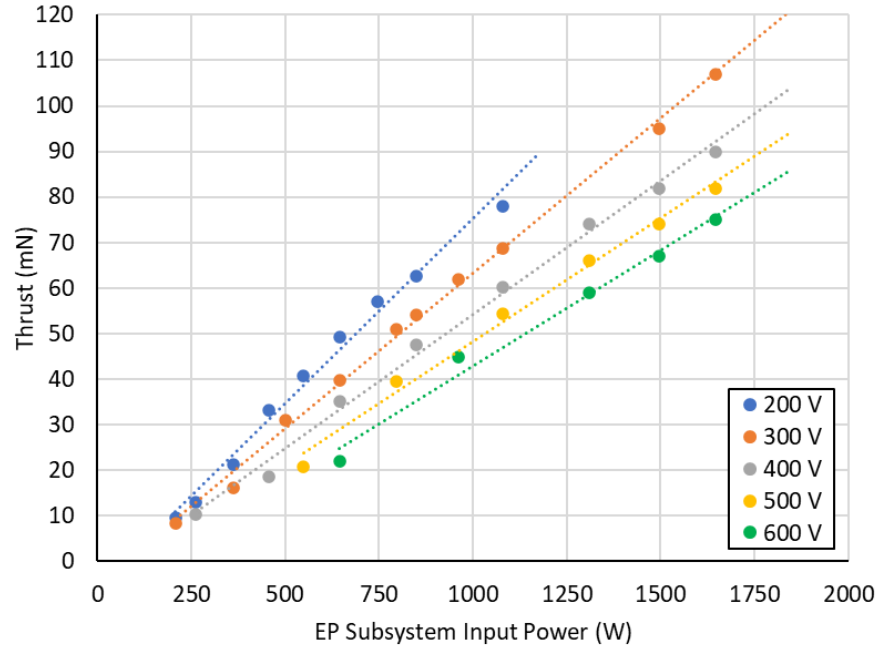
The Halo12 thruster completed component-level environmental testing to envelope a wide range of launch vehicles and spacecraft architectures. Long-duration testing demonstrated 7200 h (1.55 MN-s) of operation, corresponding to a 7MN-s total delivered impulse capability. Independent cathode testing demonstrated 25,000 ignitions and 13,000 h of operation.

## Integrated Systems

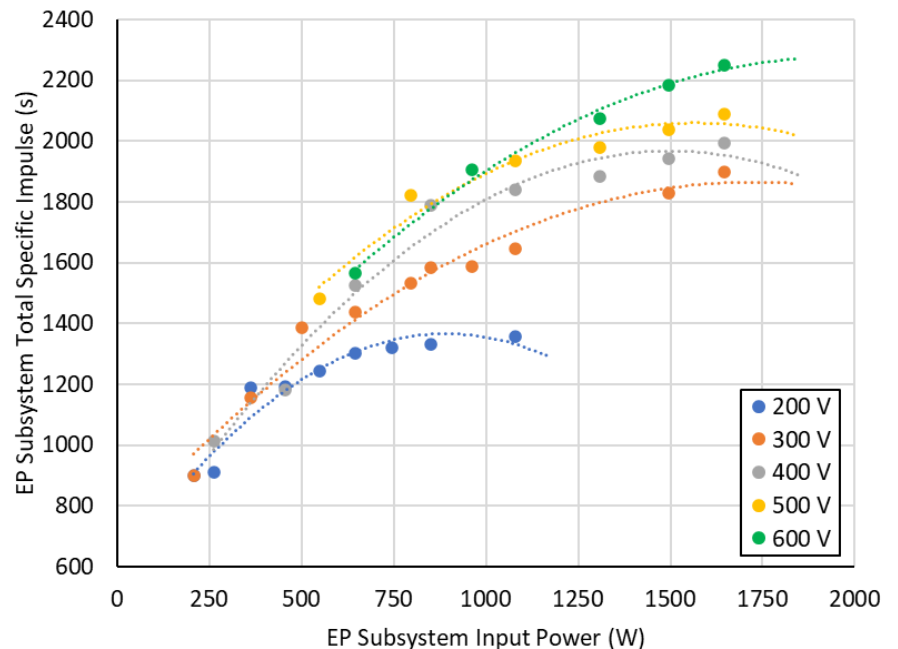
ExoTerra offers satellite makers a full electric propulsion system solution for small satellites. The Halo12 EP module includes the thruster, a propellant storage and distribution system (tank + XFC), and power processing unit (PPU). ExoTerra offers the module as a kit that can be assembled by the customer, or we can provide custom solutions to integrate the system into the customer's satellite. This service includes components, precision welding, tube and harness design and mounting, complete thermal & mechanical analysis, tooling, assembly onto the customer's satellite, and testing prior to delivery.

## Performance with Xenon Propellant

*Thrust vs. Subsystem Input Power*



*Total I<sub>sp</sub> vs. Subsystem Input Power*



For more information contact: