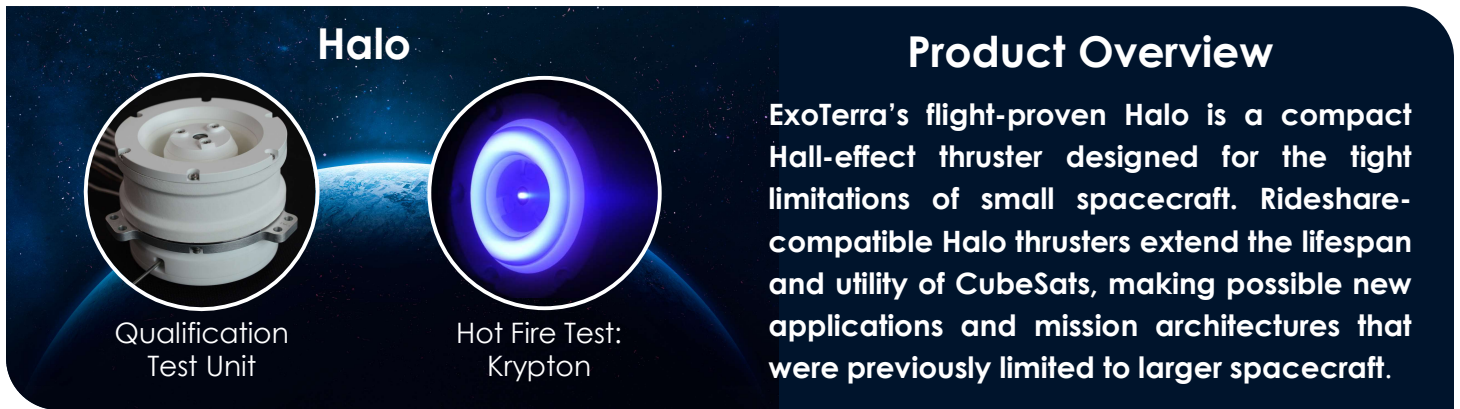


## Halo Hall-Effect Thruster - Krypton



### Product Overview

ExoTerra's flight-proven Halo is a compact Hall-effect thruster designed for the tight limitations of small spacecraft. Rideshare-compatible Halo thrusters extend the lifespan and utility of CubeSats, making possible new applications and mission architectures that were previously limited to larger spacecraft.

### Rideshare Orbit Optimization and Deorbit

ExoTerra's revolutionary Halo Hall-Effect Thruster allows CubeSats to escape their rideshare drop-off orbits to reach optimal orbits, maintain them for long durations, and deorbit on command. Halo meets the tight mass, volume, and thermal constraints of CubeSats and other rideshare spacecraft, and its high Isp and total impulse expand the mission potential of CubeSats by enabling them to attain and maintain targeted orbits. With Halo, CubeSats can perform better science, extend their useful lifetime, operate together in structured constellations, and even conduct low cost lunar and interplanetary missions.

**Mass:** 0.85 kg  
**Volume:** 0.375 U  
**Input Power:** 150 – 450 W  
**Total I<sub>SP</sub>:** 600 – 1000 s  
**Thrust Range:** 4 – 16 mN  
**Impulse:** ≥ 200 kN-s  
**Propellant:** Krypton

Halo is **flight-proven** with xenon, and the same design has demonstrated operation with lower-cost krypton propellant at power levels between 150 and 375 W. This makes it a perfect choice for satellites from 6U CubeSats up to ESPA class where mission cost is a concern.

### Big Propulsion for Small Satellites

Hall-effect thrusters provide superior total impulse performance compared to combustion, electrospray, or pulsed plasma propulsion options for CubeSat and small satellite applications. This enables a broader spectrum of missions and greater satellite lifetime.

Halo provides the flexibility to utilize krypton gas as an alternative to increasingly expensive xenon. Using krypton, Halo's thrust range of 4 to 16 mN with krypton reduces total transfer time compared to ion engine alternatives. Total specific impulse correspondingly ranges from 600-1000 s, allowing Halo to produce greater ΔV than other options. This high impulse package fits into a compact space: Halo weighs only 0.85 kg and fits within a 80 mm diameter by 75 mm long envelope.

**Halo performs best when paired with an ExoTerra Power Processing Unit (PPU) and Propellant Flow Controller (PFC). The PPU weighs just 1.88 kg and measures 218 x 145 x 121 mm and the PFC weighs an additional 0.8 kg and requires 120 x 113 x 90 mm volume.**

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.

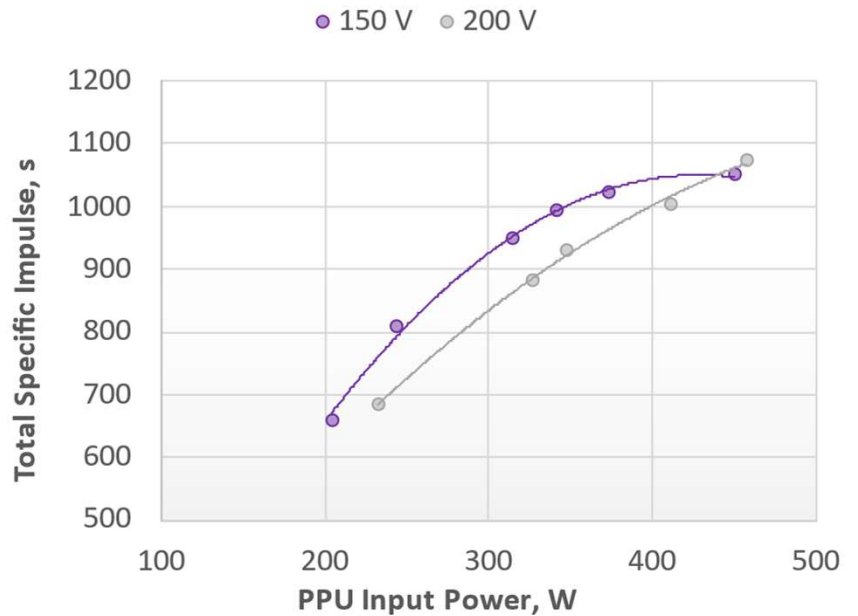
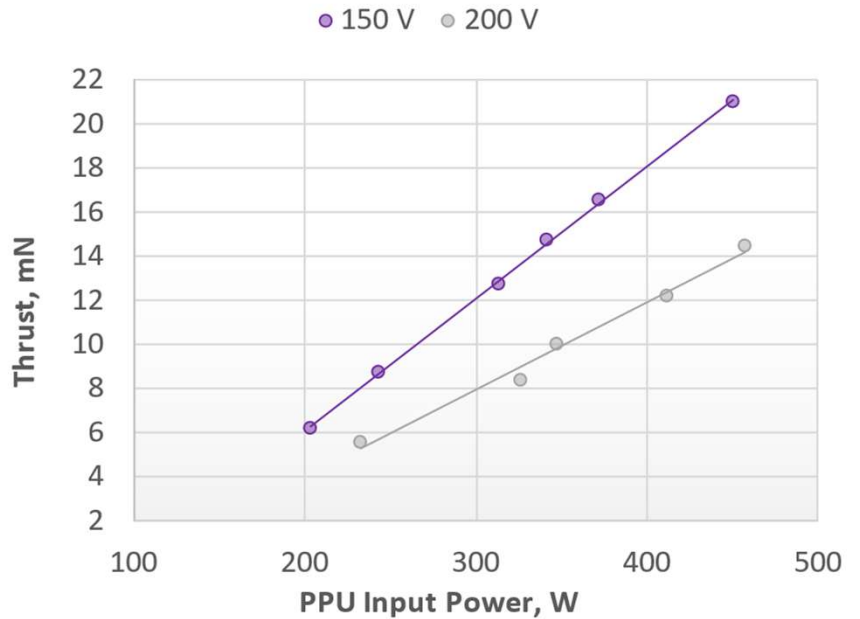
## Flight Heritage

The Halo Thruster, PPU & XFC is a flight proven electric propulsion system. First flight hardware was delivered in 2022 and launched June 2023. Multiple Halo systems are currently in orbit.

## Part of an Integrated Propulsion System

ExoTerra has the expertise, tools and processes to offer satellite makers a full electric propulsion system solution for micro and small satellites. The Halo EP module includes the thruster, a propellant storage (tank) and distribution system, and a power processing unit. ExoTerra offers the module as a kit to be assembled by the customer, or 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.

## Thrust and Total Specific Impulse with Krypton Propellant



**Note: Performance mapping and optimization of Halo with krypton propellant is still in progress.**

For more information contact: