EXOTERRA

Halo12 Hall-Effect Thruster **EP Subsystem**

Product Overview

ExoTerra's Halo12 is a compact Hall-effect thruster designed for the micro and small satellite market. The rideshare-compatible family of Halo thrusters extends the lifespan and utility of SmallSats, making possible new mission applications and architectures that were previously limited to larger spacecraft.

Electric Propulsion Optimized for High Impulse Missions

ExoTerra's revolutionary Halo12 Hall-Effect Thruster allows small satellites to perform high impulse missions. Halo12 is a magnetically shielded Hall-Effect thruster optimized for complex near-earth and interplanetary missions. The thruster has a projected impulse capability of 7 MN-s (approx. 30 kh), corresponding to a throughput of over 400 Kg Xe, and has demonstrated >25,000 cathode ignitions. This high impulse and cycle capability enables SmallSats to perform a wide variety of missions, including LEO-GEO transit, rendezvous, inclination change, interplanetary missions, and non-traditional orbits. This enables affordable interplanetary and deep space science, lunar activities, or robust long life LEO & GEO missions.

Mass: 3.4 kg
Volume: ~1.5 U
PPU Input Power: 200 - 1800 W
Total I_{SP} Range: 900 – 2000+ s
Thrust Range: 11 – 100+ mN
Impulse: Up to 7 MN-s
Propellant: Xe or Kr

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

The TRL 6 thruster has completed a robust flight qualification program, including a 7200 h long-duration wear test, vibration, shock, and thermal vacuum testing.

Big Propulsion for Small Satellites

Halo12's demonstrated thrust range of 11 to 100 mN decreases total transfer time over ion engine alternatives. Specific impulse correspondingly ranges from 900 s to >2000 s, allowing Halo12 to produce greater ΔV from a given propellant mass than chemical, water, or many other electric propulsion options. All of this while operating at a peak total efficiency of >60%, which is virtually unheard of for a low-power electric propulsion device.

This high thrust, specific impulse, efficiency fits into a compact space. Halo12 weighs a mere 3.4 kg and fits within a 12 cm diameter by 15 cm long envelope (excluding mission-unique gas fittings). Halo12 nominally uses Xenon as a propellant, but Krypton is an alternative.

The accompanying PPU is just 2 kg and occupies 20 x 10 x 11 cm. With over 100 kRad TID capacity, it matches Halo12's GEO and interplanetary capabilities.

For more information contact:
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Halo12 EP Subsystem Performance

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.

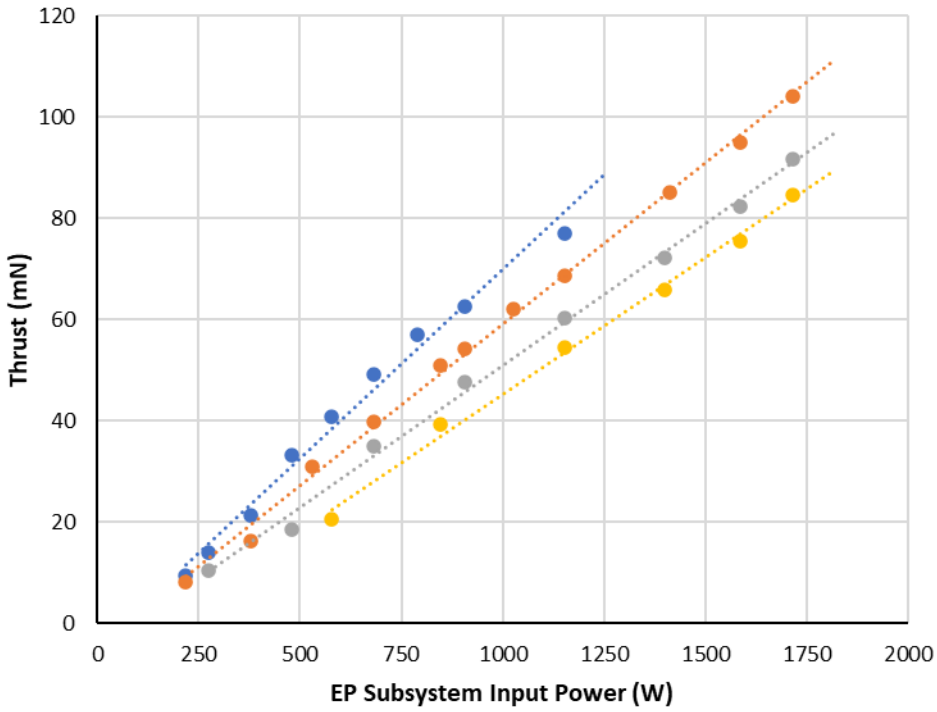
Halo12 Development

The Halo12 Thruster assembly has completed environmental testing to levels encompassing a wide range of launch vehicles and spacecraft architectures. A long duration wear test wherein >7200 h (1.55 MN-s) was demonstrated, corresponding to a projected >7MN-s lifetime capability. Halo12 is scheduled for a first flight in the 2023 or 2024 timeframe.

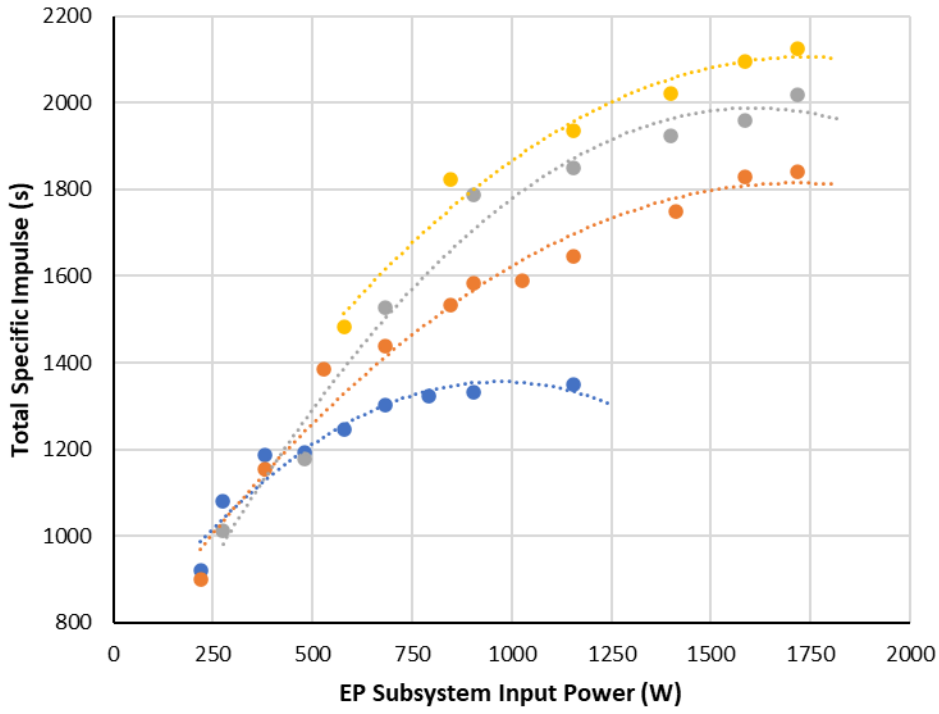
Part of an Integrated Propulsion System

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, and power processing unit. 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, component, tube & harness mounting and routing, thermomechanical analysis, tooling, assembly onto the customer's satellite, weld, and testing prior to delivery.

Thrust vs. Subsystem Input Power



Total Specific Impulse vs. Subsystem Input Power



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