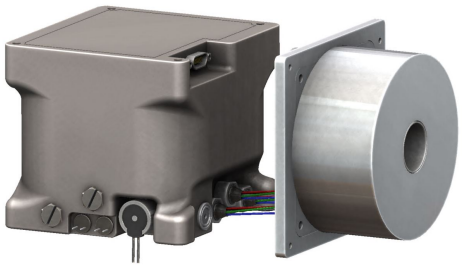
# PHASE FOUR

## RIDER

Rider is an off-the-shelf plasma engine for low-power small satellites. Rider does not require anodes, cathodes, or high voltage electronics since it uses radio frequency waves to ionize and heat xenon plasma. Magnetic fields direct the plasma out of the engine nozzle to produce thrust.

## Specifications

| | |
|---|---|
| Thruster Volume | 0.5 U |
| Support Module Volume | 1 U |
| System Wet Mass | 3 kg |
| Propellant | 500 grams of xenon |
| Mounting | Modular, PC/104 |
| Communication | UART: 3.3 V or RS-422/485 |
| Voltage | 12 - 36 V |
| Command | Tunable Performance |
| Standby Orb. Avg. Power | <2 W |
| Operational Power | 40 - 160 W |



Rider includes a thruster and a support module.

The integrated support module contains power processing, propellant storage and management, and thruster control.

The thruster and support module are connected by an umbilical and do not need to be co-located in the satellite.

## Performance

Rider thrust and specific impulse results vary with power input.

This performance was measured at The Aerospace Corporation[1] and results were summarized at the AIAA Propulsion and Energy Forum in July 2018 (Siddiqui and Cretel, AIAA 2018).

| Power (W) | Thrust (mN) | Isp (s) | Total Impulse (Ns) |
|---|---|---|---|
| 40 | 0.4 | 80 | 390 |
| 60 | 0.7 | 140 | 710 |
| 80 | 1.0 | 210 | 1030 |
| 100 | 1.3 | 270 | 1340 |
| 120 | 1.7 | 340 | 1660 |
| 140 | 2.0 | 400 | 1980 |
| 160 | 2.3 | 470 | 2300 |

1 A. G. Hsu Schouten et al, "Commercial Customer Deliverable Report: Phase Four Thruster Testing March 2018," Aerospace Report No. VTR-2018-1614