

Alpha Satellite Mission Technical Description

The overall goal of the Alpha mission is to serve as a technical demonstration of a light sail in orbit, verifying the mechanical properties of the polycarbonate material. Also, the sail architecture will demonstrate key functions of next-generation ChipSats.

Alpha comprises a 1U CubeSat capable of deploying a free-flying 1m x 1m light sail in response to ground commands. The sail has a sensor-equipped ChipSat attached to each of the 4 corners. These will transmit GPS data to the Cornell University ground station, enabling tracking of the sail to about 10 m accuracy.

The satellite will be launched on SpaceX-23, currently scheduled for August, 2021. It will be inserted into orbit from the ISS via the NanoRacks CubeSat Deployer (NRCSD). Apogee and perigee will be approximately 400km, on an inclination of 51.6° from the equator.

Ground communication via Iridium will begin 2 to 3 hours after deployment of the CubeSat from the ISS. Atmospheric drag will lower the CubeSat's altitude until it de-orbits about 3 months after release from the deployer. Payload deployment will occur on command ~3 weeks after CubeSat deployment; exact timing dependent on TLE and verification that the spacecraft is over Region 2. The sail's orbit lifespan will be on the order of a few days after it is deployed from the CubeSat. The Orbital Debris Assessment Report provides more detail.

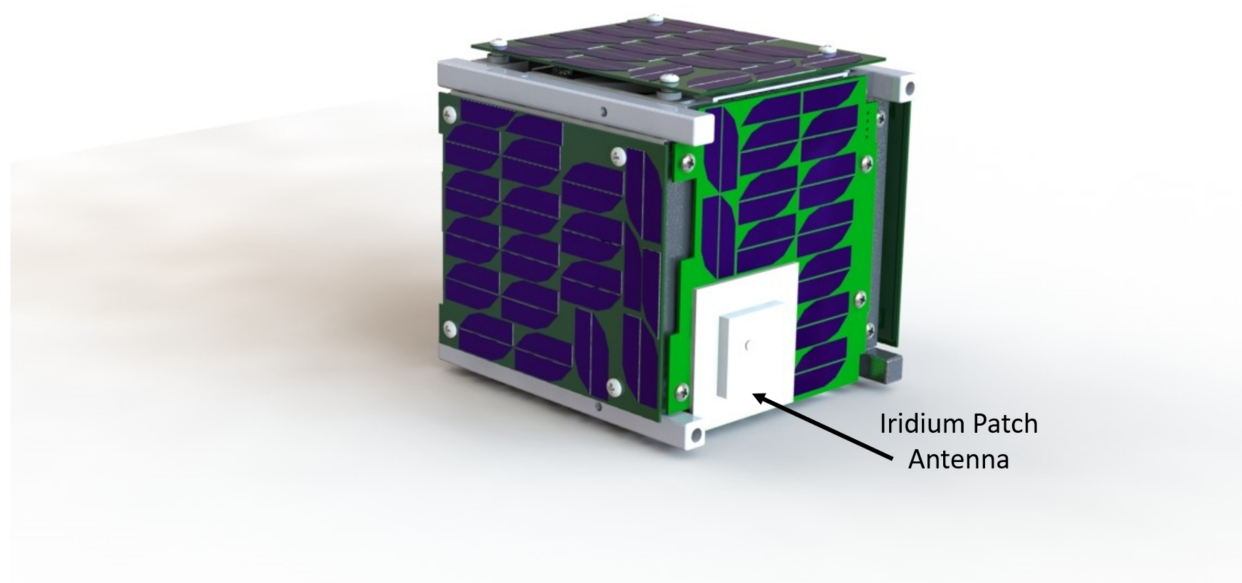


Figure 1: Alpha Spacecraft (View of Antenna)