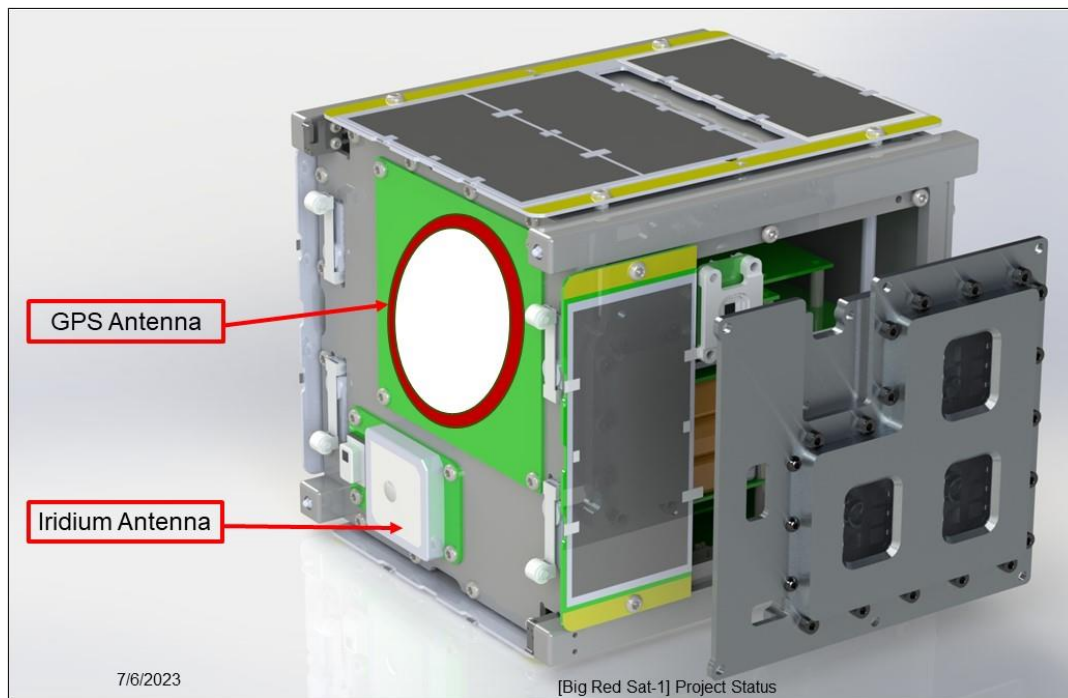


# Big Red Sat-1 Satellite Technical Description

The overall goal of the Big Red Sat-1 mission is to collect initial data on perovskite solar cells. This preliminary data will show the initial feasibility of using perovskite solar cells in orbital payloads.

The satellite will be launched as a secondary payload aboard SpaceX 30, from Kennedy Space Center Launch Complex 39, No Earlier Than March 4, 2024. It will be deployed from the ISS into an orbit at 420 km circular, on an inclination from the equator of 51.6 degrees. Transmission will begin 60 minutes after deploying and cease 18 months from deployment or upon demise. Atmospheric friction will slow the satellite and reduce the altitude of the orbit, until de-orbiting occurs about 1 year after launch. See the Orbital Debris Assessment Report for details.

The spacecraft is a 1U Cubesat unit with the dimensions 10 cm X 10 cm X 10 cm.) The total mass is about 1.25 Kg.



**Figure 1 Big Red Sat-1 Overview**

The satellite contains the following systems:

### **Attitude Determination and Control System (ADCS)**

The ADCS being used consists of a permanent magnet used to stabilize rotation to one axis. A NovAtel GPS receiver and star tracker are included, but not required for flight control.

### **Flight Computer**

A custom flight computer is used to controls data collection, storage, transfer, and power saving systems.

# Big Red Sat-1 Satellite Technical Description

## **Curve Tracer**

Takes passive JV (current voltage) curves to characterize the material properties of Perovskite and GaAs solar cells within the presence of the LEO light spectrum.

## **Perovskite Enclosure**

Low pressure enclosure filled with Argon gas to shield perovskite solar cells from moisture and oxygen. Three slides containing six perovskite cells are located within the enclosure.

## **Communications**

Communications is via an Eyestar-S4 Iridium 9603 transceiver modem, which provides 2 way communications with mission operations via the Iridium satellite constellation. A Tallysman TW1600 patch antenna supports the S4 unit.

In conformance with § 5.107 Transmitter Control Requirements, all transmission from the satellite can be terminated by a kill-command sent from mission operations via the Iridium constellation.

## **Electrical Power System (EPS)**

COTS system purchased through Near Space Launch. The system directly charges an 18 Whr 2s LiPo with approximately 6W of orbital average power.

**Structure Subsystem:** The structure is fabricated of type 3 anodized aluminum.

**Propulsion Subsystem:** No propulsion subsystem is included.