

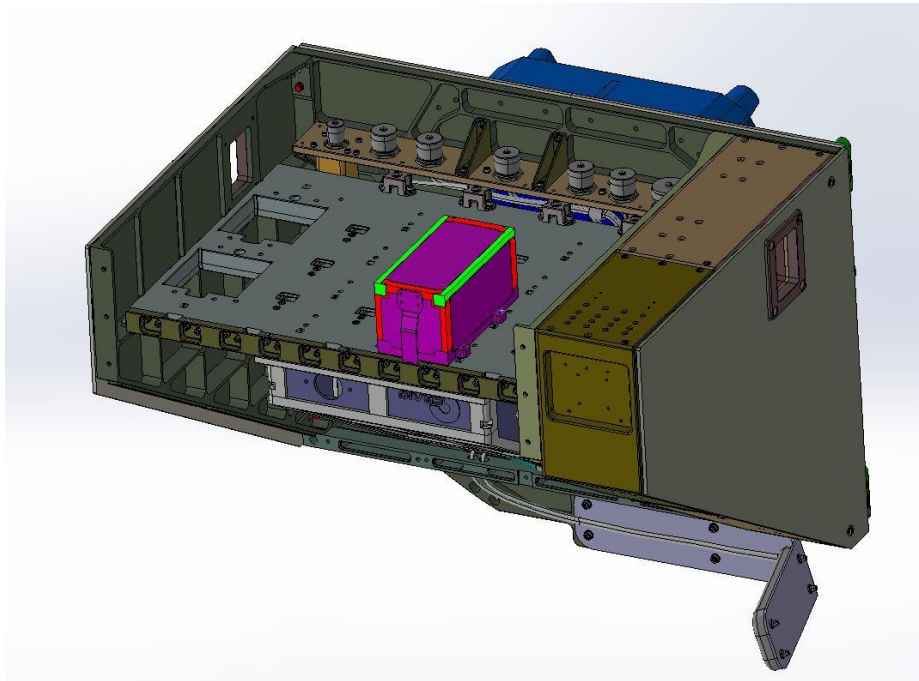
TotumSat-1N Experiment Technical Description

The overall goal of the TotumSat-1 mission, is to test and operate a prototype radio and antenna system in a space environment. Objectives include two testing way communications with Earth based end point transceivers, including location services, and validation of hardware in a space environment.

The experiment will be delivered to NanoRacks, Inc., second quarter 2020. It will be carried as cargo to the International Space Station (ISS) aboard a resupply mission and installed on the ISS NanoRacks External Platform (NREP). Operation will begin in mid 2020, and cease 24 months later. After that, TotumSat-1N will be dismantled from the NREP and returned to Earth.

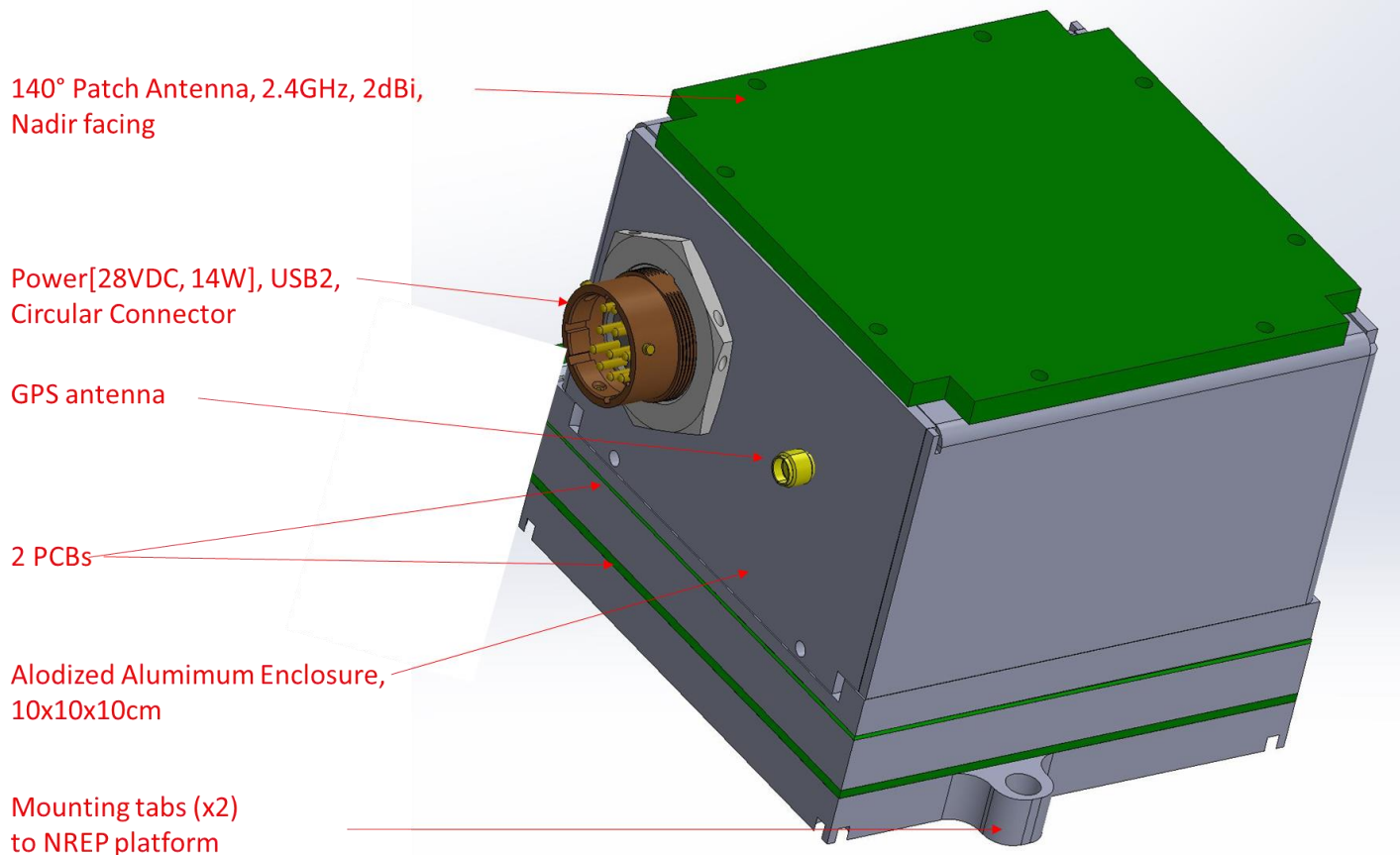
The experiment is a standard CubeSat 1U format (10x10x10cm, alodized aluminum, 0.8kg).

**Figure 1 TotumSat-1N Installation Overview
Example of NREP Mounting of Experiment**



TotumSat-1N Experiment Technical Description

Figure 2 TotumSat-1 Detail



Command and Data Handling (CDH) Subsystem: The CDH board contains a Xilinx Zynq ARM A9 processor running Linux, for all command and data handling functions. It connects to the NREP platform via a USB 2.0 bus.

Communications Subsystem: The experiment will communicate with Totum Labs Mission Operations via the NREP to the ISS TDRS network; Totum Labs Mission Operations will interface to NanoRacks Operations in Houston. The TDRS backhaul will be used for bi-directional Data handling, Commands (On/Off, Power control, etc), performance metrics monitoring, data logging/status, Firmware and parameter updates. See also Payload Subsystem.

Electrical Power Subsystem (EPS): Electrical power is supplied from the NREP platform (electrically isolated and fused 28VDC, 0.5Amp).

Thermal Control Subsystem (TCS): Temperature control is accomplished via thermal conduction to the NREP aluminum mounting plate.

Structure Subsystem: The structure is fabricated of milled and alodized aluminum.

Payload Subsystem: The TotumSat-1N payload is the combined CPU/FPGA digital system, 2.4GHz 1Watt radio transceiver and associated antenna that communicates with the terrestrial-based Endpoint transceivers (“Endpoints”). The Endpoints are low powered radio transceivers, located at Totum’s Mission Control center in San Diego, and potentially elsewhere; they are licensed separately from the spacecraft. See the Communications Plan document for details.