

NMTsat Satellite Technical Description

The overall goal of the NMTsat mission is to further educate undergraduate and graduate students regarding space technologies at the New Mexico Institute of Mining and Technology, in Socorro, New Mexico (also known as New Mexico Tech, or NMT).

The satellite will be launched as a secondary payload aboard a Rocket Lab's Electron, from New Zealand, November 1, 2017. It will be inserted into an orbit at 500km at 85 degree inclination. Transmission will begin 5 days after launch and cease 6 months thereafter. Atmospheric friction will slow the satellite and reduce the altitude of the orbit until it deorbits about 3.9 years after launch. See the Orbital Debris Assessment Report for details.

The spacecraft is a 3U+ cubesat (3 units with “tuna can”) 103.2mm X 103.2mm X 340.5mm. The total mass is about 1.58 kg.

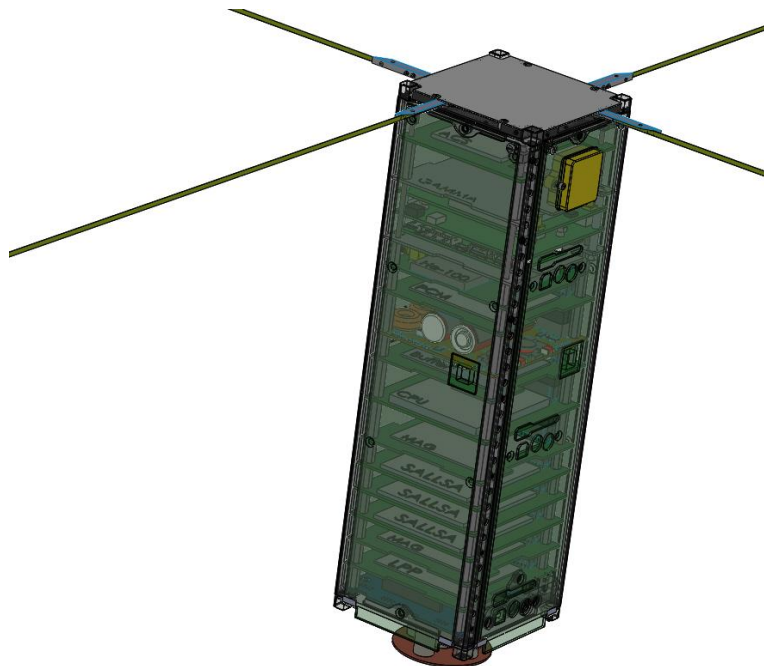


Figure 1: NMTsat Transparent View

NMTSat contains the following instruments, experiments and systems:

LPP (Langmuir Plasma Probe) instrument will measure plasma density in the vicinity of the satellite. It consists of a copper probe extending from the satellite body and of a variable power supply and current measurement system.

MAG instruments is a pair of two magnetometers that will be used to determine the orientation of the satellite as it orbits around the Earth.

ELROI (Extremely Low Resource Optical Identifier) is an optical identifying system that produces a narrow-band laser light in all directions. It consists of two 0.25mW lasers, two glass diffusers, an aluminum housing, and a self-contained data processor and power system to allow for independent diagnostics and operation.

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GAMMA (GPS Autonomous Micro Monitor by ASTRA) Made up of a GPS antenna and a receiver and data processor that will measure ionospheric scintillation.

CPU Subsystems NMTsat uses a BeagleBoard embedded computer, with Linux operation system, as its Command and Data Handling Processor (C&DH). The C&DH includes a redundant experimental Field Programmable Gate Array whose space worthiness will be evaluated.

PCM (Power Control Module) instrument consists of two parts. One part is a power control subsystem, and another is a power monitoring subsystem. The power control subsystem controls power to the other instruments on the satellite. The power monitoring subsystem monitors the power consumption of the other instruments, and measures electronic noise on bus power lines.

Power Subsystems solar panels will deliver on average 2W of power to a P31u power-management unit made by GomSpace in Denmark. The P31u includes batteries for storing power as well as power conditioning circuits.

Communication Subsystems Communications is provided by an AstroDev He-100 radio, VHF down, UHF up, and a deploying antenna system by Innovative Solutions in Space. NMTSat will be controlled by the ground station located at New Mexico Tech.

Attitude control Magnetic hysteresis rods passively control the orientation of the satellite.

Structure: The structure is fabricated of 6061 aluminum, and the standoff for the plasma probe instrument is made from a high performance engineering thermoplastic.

Propulsion Subsystem: No propulsion subsystem is included.