

May 14, 2020

FCC Office of Engineering and Technology
445 12th Street SW
Washington, DC 20554

SUBJECT: CTIM-FD (Compact Total Irradiance Monitor Flight Demonstration) cubesat mission (FCC application #0419-EX-CN-2020)

Ms. Leann Nguyen,

Please find details on the CTIM-FD cubesat mission included below.

Date license is required: August 1st, 2020

LV integration date: November 1st, 2020

Launch date: February 2021

Date for initiation of on-orbit operations: NET 1-month post launch

Expected mission duration: 24 months

Principle Investigator for the mission.

Point of Contact Name: Dave Harber

Organization Name: Laboratory for Atmospheric and Space Physics

Address: 1234 Innovation Drive, Boulder, CO 80303

E-Mail: Dave.Harber@lasp.colorado.edu

Telephone Number: 303-492-1387

Technical point of contact for the mission.

Point of Contact Name: Dave Harber

Organization Name: Laboratory for Atmospheric and Space Physics

Address: 1234 Innovation Drive, Boulder, CO 80303

E-Mail: Dave.Harber@lasp.colorado.edu

Telephone Number: 303-492-1387

*please also include Steve Reising on any relevant communications.

Point of contact who can terminate ALL satellite transmissions if interference is detected.

Point of Contact Name: Wengang Zheng

Organization Name: Laboratory for Atmospheric and Space Physics

Address: 1234 Innovation Drive, Boulder, CO 80303

E-Mail: Wengang.Zheng@lasp.colorado.edu

Telephone Number: 303-492-9447

*please also include Dave Harber on any relevant communications.

Point of contact who can terminate ALL Boulder CO ground station transmissions if interference is detected.

Point of Contact Name: Wengang Zheng

Organization Name: Laboratory for Atmospheric and Space Physics
Address: 1234 Innovation Drive, Boulder, CO 80303
E-Mail: Wengang.Zheng@lasp.colorado.edu
Telephone Number: 303-492-9447
*please also include Dave Harber on any relevant communications.

Point of contact who can terminate ALL Alaska ground station transmissions if interference is detected.

Point of Contact Name: Wengang Zheng
Organization Name: Laboratory for Atmospheric and Space Physics
Address: 1234 Innovation Drive, Boulder, CO 80303
E-Mail: Wengang.Zheng@lasp.colorado.edu
Telephone Number: 303-492-9447
*please also include Dave Harber on any relevant communications.

Project Description

The CTIM-FD (Compact Total Irradiance Monitor Flight Demonstration) is a 6U CubeSat mission to better measurement of the total solar irradiance. These observations are important to understand the solar physics and the energy balance of the earth ecosystem. The payload consists of an Electric Substitution Radiometer (ESR) based on an innovative absorptive material, the vertically aligned carbon nanotube (VACNT), prepared in cooperation with the National Institute of Standard and Technology (NIST). It is mounted in a special housing to isolate it from external vibration and thermal effects. Each instrument package has redundant channels, and the spacecraft mounts two of these instrument packages, leading to quadrupled redundancy. The mission is to demonstrate its measurement capabilities and long-term stabilities.

CTIM-FD is a science mission lead by Dr. Dave Harber at the Laboratory for Atmospheric and Space Physics (LASP), University of Colorado. The CubeSat bus is built in house and operated by LASP.

License Details

The CTIM mission will utilize a SpaceQuest TRXU UHF radio operating a half-duplex uplink and downlink at 437.325MHz. CTIM will also include a SpaceQuest S-band radio that will be used as a data transmitter nominally operating at 1Mbps. We are requesting a 47 CFR Part 97 - AMATEUR RADIO SERVICE license for our uplink at 437.325MHz per the frequency coordination letter from IARU: "In response to your coordination request I confirm the IARU frequency coordination for your satellite CTIM Coordinated frequency for up- and downlink 437.325 MHz, emission designator 15K0G1DCN, eirp 2.3 dBW." For the telemetry downlink, we are requesting operation between at 437.325MHz as well. We are requesting to operate our data downlink at 2402MHz in the ISM band.

Additional data required for applications requesting use of federal or shared government frequencies.

Spacecraft: CTIM-FD

Inclination: 52°
Apogee: 500 km
Perigee: 500 km
Orbital period: 1h 36m
Number of satellites in the system: 1
Number of transmitting satellites: 1
Number of transmitting satellites: 1

Transmitter #1 (UHF)

Center Frequency: 437.325MHz
Bandwidth: 15kHz
3dB beamwidth: 300°
Maximum Antenna Gain: 1dBi
Polarization: Linear
Maximum transmit power: 5W
Modulation: GFSK
ITU emission designator: 15K0G1DCN

Transmitter #1 (S-band)

Center Frequency: 2402 MHz
Bandwidth: 2MHz
3dB beamwidth: 80°
Maximum Antenna Gain: 6dBi
Polarization: RCP
Maximum transmit power: 3.2W
Modulation: GFSK
ITU emission designator: 2M00G2DAX

Receiver #1 (UHF)

Center Frequency: 437.325MHz
Bandwidth: 15kHz
3dB beamwidth: 300°
Maximum Antenna Gain: 1dBi
Polarization: Linear
Receiver Sensitivity: -110dBm

Modulation: GFSK

ITU emission designator: 15K0G1DCN

Ground Station #1:

Boulder, CO 80309

40°00'31.6"N, 105°14'51.0"W

Altitude above MSL [m]: 1588

Antenna height above ground [m] : 3

Elevation: 5-90°

Azimuth: 0-360°

Transmitter #1 (UHF)

Center Frequency: 437.325MHz

Bandwidth: 15kHz

3dB beamwidth: 21°

Maximum Antenna Gain: 21dBi

Polarization: RCP

Maximum transmit power: 500W

Modulation: GFSK

ITU emission designator: 15K0G1DCN

Receiver #1 (UHF)

Center Frequency: 437.325MHz

Bandwidth: 15kHz

3dB beamwidth: 21°

Maximum Antenna Gain: 21dBi

Polarization: RCP

Receiver Sensitivity: -110 dBm

Modulation: GMSK

ITU emission designator: 15K0G1DCN

Receiver #2 (S-band)

Center Frequency: 2402MHz

Bandwidth: 2MHz

3dB beamwidth: 2.1°

Maximum Antenna Gain: 38dBi

Polarization: RCP

Receiver Sensitivity: -110dBm

Modulation: GFSK

ITU emission designator: 2M00G2DAX

Ground Station #2:

Fairbanks, AK 99709

64°47'39.14"N 147°43'10.91"W

Altitude above MSL [m]: 142

Antenna height above ground [m] : 5.5m

Elevation: 5-90°

Azimuth: 0-360°

Transmitter #1 (UHF)

Center Frequency: 437.325MHz

Bandwidth: 15kHz

3dB beamwidth: 21°

Maximum Antenna Gain: 18dBi

Polarization: RCP

Maximum transmit power: 500W

Modulation: GMSK

ITU emission designator: 15K0G1DCN

Receiver #1 (UHF)

Center Frequency: 437.325MHz

Bandwidth: 15kHz

3dB beamwidth: 21°

Maximum Antenna Gain: 18dBi

Polarization: RCP

Receiver Sensitivity: -110 dBm

Modulation: GMSK

ITU emission designator: 15K0G1DCN