

**United States of America  
FEDERAL COMMUNICATIONS COMMISSION  
EXPERIMENTAL  
RADIO STATION CONSTRUCTION PERMIT  
AND LICENSE**

EXPERIMENTAL

(Nature of Service)

WL2XCN

(Call Sign)

XC    FX MO

(Class of Station)

0399-EX-CR-2021

(File Number)

NAME Space Exploration Technologies Corp.

Subject to the provisions of the Communications Act of 1934, subsequent acts, and treaties, and all regulations heretofore or hereafter made by this Commission, and further subject to the conditions and requirements set forth in this license, the licensee hereof is hereby authorized to use and operate the radio transmitting facilities hereinafter described for radio communications in accordance with the program of experimentation described by the licensee in its application for license.

Operation: In accordance with Sec. 5.3(c) of the Commission's Rules

Station Locations

- (1) Redmond (KING), WA - NL 47-41-39; WL 122-01-58
- (2) MOBILE: Edwards AFB, CA: Airborne max alt 40,000 ft AGL, within 1000 km, centered around NL 34-55-11; WL 117-53-16
- (3) Edwards AFB (KERN), CA - NL 34-55-11; WL 117-53-16
- (4) MOBILE: Redmond, WA: 8 ft elevation, within 300 km, centered around NL 47-41-39; WL 122-01-58

Frequency Information

Redmond (KING), WA - NL 47-41-39; WL 122-01-58

Frequency	Station Class	Emission Designator	Authorized Power	Frequency Tolerance (+/-)
14-14.5 GHz	FX	240MD7W	5.1 kW (ERP)	0.001 %

This authorization effective August 01, 2021 and will expire 3:00 A.M. EST August 01, 2022

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Special Conditions:

- (1) The station identification requirements of Section 5.115 of the Commission's Rules are waived.
- (2) Licensee should be aware that other stations may be licensed on these frequencies and if any interference occurs, the licensee of this authorization will be subject to immediate shut down.
- (3) This authorization is issued for the express purpose of conducting experimental operations described in the related application and required by US Air Force contract no. FA8650-19-9-9320. The use of this radio station in any other manner or for any other purpose will constitute a violation of the privileges herein authorized. Except as subsequently authorized by the Commission, this radio station shall not be operated after the expiration date of the contract designated in the related application and enumerated above.
- (4) Stop buzzer: Kristi Key  
 Phone Number: 3109708116  
 E-Mail Address: kristina.key@spacex.com

**Special Conditions:**

- (5) Licensee is authorized to conduct tests on 18 units of SpaceX 01319991-501 earth stations for user and gateway uplink operations:  
For user uplink operations: Licensee is authorized to conduct fixed on ground tests at SpaceX's Redmond, WA, and Edwards AFB, CA facilities, and conduct limited testing from a moving vehicle on the ground - vehicle-mounted earth station (VMES) at Redmond, WA, in the 14.0-14.5 GHz frequency band via SpaceX's NGSO satellites.  
For gateway uplink operations: Licensee is authorized to conduct fixed on ground tests at SpaceX's Redmond, WA facility in the 28.35-29.1 GHz and 29.5-30 GHz frequency bands and Panaca (LINCOLN), NV facility in the 27.5 -29.1 GHz and 29.5-30 GHz frequency bands via SpaceX's NGSO satellites.
- (6) Licensee is also authorized to conduct tests on the ground and from a moving aircraft on two units of Ball Aerospace earth station aboard aircraft (ESAA) at Edwards AFB, CA, in the 14.0-14.5 GHz frequency band via SpaceX's NGSO satellites.
- (7) POINT OF COMMUNICATION: Space Exploration Technologies Corp. ("SpaceX")'s Ku-band non-geostationary- orbit (NGSO) satellites (S2983/S3018).
- (8) Operations in the 14.0-14.5 GHz frequency band must be compliance with the equivalent power flux-density limit (-160 dBW/m<sup>2</sup>/40 kHz) of Article 22.5D of the ITU Radio Regulations.
- (9) Operations in the 27.5 -28.6 GHz and 29.5-30 GHz frequency band must be compliance with the equivalent power flux-density limit (-162 dBW/m<sup>2</sup>/40 kHz) of Article 22.5D of the ITU Radio Regulations.
- (10) The authorized SpaceX's user and gateway earth station, VMES, and ESAA must not transmit signals until SpaceX's NGSO satellites in view at an elevation angle of at least 25 degrees.
- (11) The direction of the authorized SpaceX's user, gateway, VMES or ESAA earth station transmit beam and the GSO arc is separated by less than 18°. Operations in the Ku-band (14-14.5 GHz) and Ka-band (28.35-28.6 GHz and 29.5-30 GHz) must always maintain +&- 18° of avoidance angle (exclusion zone) with the GSO arc. As the earth station is tracking SpaceX's NGSO satellites, it must not radiate within +&-18° of the GSO arc.
- (12) ESAA in aircraft on the ground must not transmit at elevation angles less than three degrees. There is no minimum angle of antenna elevation for ESAA while airborne.
- (13) ESAA's operations authorized pursuant to this license are operations by U.S.-registered aircraft.
- (14) ESAA authorized herein must not be used to provide air traffic control communications.
- (15) The VMES and ESAA (ESIMs) must be self-monitoring and, should a condition occur that causes it to exceed EIRP, EIRP density or EIRP mask limits, the ESIMs will automatically cease transmissions within 100 milliseconds and not resume transmissions until the condition that caused the experimental ESIMs to exceed those limits is corrected.
- (16) Operations of the authorized ESIMs are subject to the footnote NG527A(c) of Section 2.106 of the Commission rules. In the band 14.0-14.5 GHz (Earth-to-space), ESIMs authorized to communicate with SpaceX's non-geostationary satellites must not cause unacceptable interference to, or claim protection from, geostationary-satellite networks.

**Special Conditions:**

- (17) Operations of the authorized ESIMs operating in the 14 -14.5 GHz frequency band must be compliance with the following additional conditions:
- a. Licensee's ESIMs must employ a tracking algorithm that is resistant to capturing and tracking adjacent satellite signals, and each station must be capable of inhibiting its own transmission in the event it detects unintended satellite tracking.
  - b. Licensee's ESIMs must be monitored and controlled by a ground-based network control and monitoring center. Such stations must be able to receive "enable transmission" and "disable transmission" commands from the network control center and must cease transmission immediately after receiving a "parameter change" command until receiving an "enable transmission" command from the network control center. The network control center must monitor operation of each earth station to determine if it is malfunctioning, and each earth station must self-monitor and automatically cease transmission on detecting an operational fault that could cause harmful interference to a fixed satellite service network.
  - c. Licensee must maintain a point of contact available 24 hours per day, seven days per week, with the authority and ability to terminate operations authorized herein, for discussing interference concerns with other licensees, and must submit a letter to be included in its license file with the name and telephone number of the point of contact prior to commencing operation.