

RF Exposure Report

Report No.: SABCKS-WTW-P21061072

FCC ID: 2AWHPR201

Test Model: UTR-201

Received Date: June 29, 2021

Test Date: July 30, 2021

Issued Date: Aug. 20, 2021

Applicant: Space Exploration Technologies Corp.

Address: 1 Rocket Rd., Hawthorne, CA 90250 USA

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Hsin Chu Laboratory

Lab Address: E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,
Taiwan

Test Location: E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,
Taiwan

**FCC Registration /
Designation Number:** 723255 / TW2022



This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification.

Table of Contents


| | |
|--|----------|
| Release Control Record | 3 |
| 1 Certificate of Conformity | 4 |
| 2 RF Exposure | 5 |
| 2.1 Limits for Maximum Permissible Exposure (MPE)..... | 5 |
| 2.2 MPE Calculation Formula | 5 |
| 2.3 Classification | 5 |
| 2.4 Antenna Gain | 6 |
| 2.5 Calculation Result of Maximum Conducted Power..... | 7 |

Release Control Record

| Issue No. | Description | Date Issued |
|----------------------|-------------------|---------------|
| SABCKS-WTW-P21061072 | Original release. | Aug. 20, 2021 |

1 Certificate of Conformity

Product: Starlink Router

Brand: SPACEX, 

Test Model: UTR-201

Sample Status: ENGINEERING SAMPLE

Applicant: Space Exploration Technologies Corp.

Test Date: July 30, 2021

Standards: FCC Part 2 (Section 2.1091)
KDB 447498 D01 General RF Exposure Guidance v06

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by : Vivian Huang , **Date:** Aug. 20, 2021
Vivian Huang / Specialist

Approved by : Clark Lin , **Date:** Aug. 20, 2021
Clark Lin / Technical Manager

2 RF Exposure

2.1 Limits for Maximum Permissible Exposure (MPE)

| Frequency Range (MHz) | Electric Field Strength (V/m) | Magnetic Field Strength (A/m) | Power Density (mW/cm ²) | Average Time (minutes) |
|---|-------------------------------|-------------------------------|-------------------------------------|------------------------|
| Limits For General Population / Uncontrolled Exposure | | | | |
| 0.3-1.34 | 614 | 1.63 | (100)* | 30 |
| 1.34-30 | 824/f | 2.19/f | (180/f ²)* | 30 |
| 30-300 | 27.5 | 0.073 | 0.2 | 30 |
| 300-1500 | ... | ... | f/1500 | 30 |
| 1500-100,000 | ... | ... | 1.0 | 30 |

f = Frequency in MHz ; *Plane-wave equivalent power density

2.2 MPE Calculation Formula

$$Pd = (Pout * G) / (4 * \pi * r^2)$$

where

Pd = power density in mW/cm²

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

R = distance between observation point and center of the radiator in cm

2.3 Classification

The antenna of this product, under normal use condition, is at least 23cm away from the body of the user. So, this device is classified as **Mobile Device**.

2.4 Antenna Gain

| Antenna NO. | Antenna Net Gain(dBi) | Frequency range | Antenna Type | Connector Type | Cable Length (mm) |
|-------------|-----------------------|-----------------|--------------|----------------|-------------------|
| 1 | 1.4 | 2.4~2.4835GHz | PCB | None | NA |
| | 2.3 | 5.15~5.85GHz | | | |
| 2 | 2.3 | 2.4~2.4835GHz | PCB | None | NA |
| | 3.6 | 5.15~5.85GHz | | | |

Note: The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

2.5 Calculation Result of Maximum Conducted Power

| Operation Mode | Evaluation Frequency (MHz) | Max. Average Power (mW) | Antenna Gain (dBi) | Distance (cm) | Power Density (mW/cm ²) | Limit (mW/cm ²) |
|-----------------|----------------------------|-------------------------|--------------------|---------------|-------------------------------------|-----------------------------|
| WLAN (2.4GHz) | 2412~2462 | 882.202 | 4.87 | 23 | 0.40729 | 1 |
| WLAN (U-NII-1) | 5180~5240 | 744.049 | 5.98 | 23 | 0.44354 | 1 |
| WLAN (U-NII-2A) | 5260~5320 | 233.326 | 5.98 | 23 | 0.13909 | 1 |
| WLAN (U-NII-2C) | 5500~5720 | 238.065 | 5.98 | 23 | 0.14192 | 1 |
| WLAN (U-NII-3) | 5745~5825 | 726.102 | 5.98 | 23 | 0.43284 | 1 |

Note:

- Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
- 2.4GHz: The directional gain = $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2] = 4.87 \text{ dBi}$
- 5GHz: The directional gain = $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2] = 5.98 \text{ dBi}$

Conclusion:

The formula of calculated the MPE is:

$$CPD1 / LPD1 + CPD2 / LPD2 + \dots \text{etc.} < 1$$

CPD = Calculation power density

LPD = Limit of power density

$$\text{WLAN 2.4GHz} + \text{WLAN 5GHz} = 0.40729 / 1 + 0.44354 / 1 = 0.85083$$

Therefore the maximum calculations of above situations are less than the "1" limit.

--- END ---