

## RF Exposure Report

**Report No.:** SABCKS-WTW-P21070524

**FCC ID:** 2AWHPR211

**Test Model:** UTR-211

**Received Date:** 2021/7/15

**Test Date:** 2021/9/14

**Issued Date:** 2021/10/6

**Applicant:** Space Exploration Technologies Corp. (SPACEX)

**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,  
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**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 specifically mentioned, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification.

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### Release Control Record

Issue No.	Description	Date Issued
SABCKS-WTW-P21070524	Original release.	2021/10/6

## 1 Certificate of Conformity

**Product:** Starlink Router

**Brand:**

SPACEX



**Test Model:** UTR-211

**Sample Status:** Engineering sample

**Applicant:** Space Exploration Technologies Corp. (SPACEX)

**Test Date:** 2021/9/14

**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:** 2021/10/6  
Vivian Hunag / Specialist

**Approved by :** Clark Lin , **Date:** 2021/10/6  
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 <sup>2</sup> )	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 <sup>2</sup> )*	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

$$P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot r^2)$$

where

$P_d$  = power density in mW/cm<sup>2</sup>

$P_{out}$  = 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 28 cm away from the body of the user. So, this device is classified as **Mobile Device**.

## 2.4 Antenna Gain

1. The antennas provided to the EUT, please refer to the following table:

Antenna No.	RF Chain No.	Antenna Net Gain (dBi)	Frequency Range	Antenna Type	Connector Type
1	0	4.2	2.4~2.4835 GHz	PCB	none (like solder)
		7.8	5.15~5.85 GHz		
2	1	3.4	2.4~2.4835 GHz	PCB	none (like solder)
		7.3	5.15~5.85 GHz		
3	2	3.9	2.4~2.4835 GHz	PCB	none (like solder)
		8.4	5.15~5.85 GHz		

Note: Max. gain was selected for the final test.

2. The directional antenna gain, please refer to the following table:

Frequency Range (GHz)	Directional Antenna Gain (dBi)
2.4~2.4835	7.53
5.15~5.25	9.27
5.725~5.85	9.06

## 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 <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
WLAN (2.4GHz)	2412~2462	848.182	7.53	28	0.48749	1
WLAN (U-NII-1)	5180~5240	336.763	9.27	28	0.28893	1
WLAN (U-NII-3)	5745~5825	439.396	9.06	28	0.35919	1

Note:

1. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

### 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

$$\text{WLAN 2.4GHz} + \text{WLAN 5GHz} = 0.48749 / 1 + 0.35919 / 1 = 0.84668$$

**Therefore the maximum calculations of above situations are less than the “1” limit.**

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