RF Exposure Report
FCC Part 2.1091

EUT Name: BLUrepeater

EUT Model: BLUrepeater V1

Prepared for:

Satellite Tracking of People, LLC
5253 W Sam Houston Parkway N, Suite 190
Houston, TX, 77041
USA

Prepared by:

TUV Rheinland of North America, Inc.
5015 Brandin Ct.
Fremont, CA 94538
Tel: (925) 249-9123
Fax: (925) 249-9124
http://www.tuv.com/

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Statement of Compliance

Manufacturer:	Satellite Tracking of People, LLC 5253 W Sam Houston Parkway N, Suite 190 Houston, TX, 77041 USA
Name of Equipment:	BLUrepeater
Model Name	BLUrepeater V1
Application of Regulations:	FCC Part 2.1091

Guidance Documents:

FCC Part 2.1091

Test Methods:

FCC Part 1.1310, KDB 447498 D01

The electromagnetic compatibility test and documented data described in this report has been performed and recorded by TUV Rheinland, in accordance with the standards and procedures listed herein. As the responsible authorized agent of the EMC laboratory, I hereby declare that the equipment described above has been shown to be compliant with the EMC requirements of the stated regulations and standards based on these results. If any special accessories and/or modifications were required for compliance, they are listed in this report.

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Alexander Sowinski	December 8, 2021	Richard Decker	December 8, 2021
Test Engineer	Date	Laboratory Signatory	Date

Test Cert. # 3331.02

1 Product Specifications

1.1 *Product Description*

BLUrepeater is a small, lightweight RF signal range extender. Designed to work with accessories to extend the LoRa/FSK signal.

1.2 *Product Specifications*

EUT Specifications	
Exposure Type	☒ General Population / Uncontrolled ☐ Occupational / Controlled
Multiple Antenna Feeds:	☐ Yes, and how many ☒ No
Hardware Version	1.0
Software Version	1.0
Antenna Type	Stamped Metal SMT
Antenna Gain	1.0 dBi
Note:	

1.3 *Air Interfaces*

Air Interface	Supported Capabilities	Modulation	Maximum Duty Cycle	Band	Frequency Range (MHz)	Maximum Output Power (dBm)
Proprietary Radio	LoRa, FSK	CSS, FSK	0.095%	N/A	902 - 927	14.37

2 RF Exposure Evaluation

2.1 *Purpose*

This report will demonstrate the compliance of RF exposure to the human body of the BLUrepeater according to FCC rule part 2.1091. All transmitters, regardless if it is categorically excluded, are assessed to ensure the product can operate in manners that meet or exceed the minimum test separation distance as required by KDB 447498.

2.2 *Categorical Exclusion Assessment*

Air Interface	Band	Frequency Range (MHz)	FCC Rule Part	Categorically Excluded according to FCC 1.1307 (b)(1)
Proprietary Radio	N/A	902 - 927	15.247	Yes

2.3 *Maximum Permissible Exposure Limit*

The Maximum Permissible Exposure (MPE) limits according to FCC rule part 1.1310 for general population/uncontrolled exposure is as follows:

Frequency Range (MHz)	E-field strength (V/m)	H-field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
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
300-1,500	-	-	f/1500	30
1,500-100,000	-	-	1.0	30

* = Plane-wave equivalent power density

2.4 *Assessment Methods*

The power density is calculated according to the following equation

$$S = \frac{EIRP}{4\pi R^2}$$

Where

S = Power Density (mW/cm^2)
EIRP = Effective Isotropic Radiated Power (mW)
R = Minimum distance between the human body and antenna (cm)

When the calculated power density exceeds the MPE limits, the power density is measured.

Duty Cycle

Per the client, the minimum TX interval is 20 seconds for both LoRa and FSK modes.
For LoRa, the maximum TX duration is 19 ms.
For FSK, the maximum TX duration is 16 ms.

LoRa Duty Cycle: (0.019 / 20) * 100 = 0.095%
FSK Duty Cycle: (0.016 / 20) * 100 = 0.080%

Assessment Calculation

The maximum output power and antenna gain is declared by the manufacturer and used in this assessment. The minimum RF exposure distance during normal operation is 20cm.

Stand Alone Analysis

Frequency Band (MHz)	Operating Mode	Max. Conducted Power (dBm)	Numeric Antenna Gain (dBi)	DC Correction (dB)	EIRP (dBm)	Power Density (mW/cm^2)	Operating Frequency (MHz)	Power Density Limit (mW/cm^2)	Result
902 – 927	LoRa	14.37	+1.0	-60.45	-45.08	0.000000006	903	0.602	Pass
902 - 927	FSK	14.30	+1.0	-61.94	-46.64	0.000000004	903	0.602	Pass

2.5 *Conclusion*

The EUT was found to be compliant to the requirements of FCC part 1.1310 and part 2.1091 with a minimum distance of 20 cm.