



TÜVRheinland®
Precisely Right.

RF Exposure Report

FCC Part 2.1091

EUT Name: BLUbase

EUT Model: BLUbase V1

Prepared for:

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

Prepared by:

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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: BLUbase
Model Name BLUbase 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.

This report must not be used to claim product endorsement by A2LA or any agency of the U.S. Government. This report shall not be reproduced except in full, without the written authorization of TUV Rheinland of North America.



Alexander Sowinski December 9, 2021

Test Engineer Date



Richard Decker December 9, 2021

Laboratory Signatory Date



Test Cert. # 3331.02

1 Product Specifications

1.1 Product Description

BLUbase is our small, lightweight (RF) transceiver. Working in tandem with BLUband, BLUbase receives, enters, and leaves records from BLUband.

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	LoRa/ FSK: +1.0 dBi WiFi (2.4 GHz): +3.4 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	903 - 927	14.98
WiFi	802.11 b/g/n20	64-QAM	100%	2.4 GHz	2412 - 2462.0	18.86

* WiFi worst case was noted to be 802.11g, CH1 @ 2412 MHz.

2 RF Exposure Evaluation

2.1 Purpose

This report will demonstrate the compliance of RF exposure to the human body of the BLUbase 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	903 - 927	15.247	Yes
WiFi	2.4 GHz	2412 – 2462.0	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/cm²)

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: $(0.016 / 20) * 100 = 0.080\%$

The WiFi operates at 100% duty cycle; no correction factor is required.

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
903 – 927	LoRa	14.98	+1.0	-60.45	-44.47	0.000000007	903	0.602	Pass
903 - 927	FSK	14.83	+1.0	-61.94	-46.11	0.000000005	903	0.602	Pass
2412 – 2462.0	WiFi 802.11g	18.86	+3.4	+0.0	22.26	0.000033475	2412	1.0	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.