

FCC RF Exposure Evaluation

Report Number:

F241578E3

Equipment under Test (EUT):

Accessory for Barryvox 2/S2 devices

Applicant:

Mammut Sports Group AG

Manufacturer:

Mammut Sports Group AG



Deutsche
Akkreditierungsstelle
D-PL-17186-01-00

References

- [1] **CFR 47 Rule part 1** Practice and Procedure
- [2] **CFR 47 Rule part 2** Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
- [3] **KDB 447498 D01 General RF Exposure Guidance v06**

Assessed and
written by:



Martin Eppinger
28.11.2025

Signature

Reviewed and
approved by:



Bernward ROHDE
28.11.2025

Signature

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1 Identification

1.1 Applicant

Name:	Mammut Sports Group AG
Address:	Birren 5, 5703 Seon
Country:	Switzerland
Name for contact purposes:	Fabian Moritz
Phone:	+41 62 769 64 66
eMail address:	fabian.moritz@mammut.com
Applicant represented during the test by the following person:	-

1.2 Manufacturer

Name:	Mammut Sports Group AG
Address:	Birren 5, 5703 Seon
Country:	Switzerland
Name for contact purposes:	Fabian Moritz
Phone:	+41 62 769 64 66
eMail address:	fabian.moritz@mammut.com
Applicant represented during the test by the following person:	-

1.3 Test Laboratory

The tests were carried out by: **PHOENIX TESTLAB GmbH**
Königswinkel 10
32825 Blomberg
Germany

accredited by Deutsche *Akkreditierungsstelle GmbH (DAkkS)* according to DIN EN ISO/IEC 17025:2018. The accreditation is only valid for the scope of accreditation listed in the annex of the certificate D-PL-17186-01-00. FCC Test Firm Designation Number DE0004, FCC Test Firm Registration Number 469623, CAB Identifier DE0003 and ISED# 3469A.

1.4 EUT (Equipment under Test)

Test object: *	USB-Stick
Model name: *	Accessory for Barryvox 2/S2 devices
Model number: *	7600.0061
Order number: *	N/A
FCC ID: *	ARN-USBBARRYVOX
IC certification number: *	8038A-USBBARRYVOX
PMN: *	USB-Stick for Barryvox 2/S2
HVIN: *	7600.0061
FVIN: *	V1.03

	EUT number		
	1	2	3
Serial number: *	2446800090	2446800107	-
PCB identifier: *	BLE-Stick	BLE-Stick	-
Hardware version: *	Rev. C01	Rev. C01	-
Software version: *	V1.002 (SVN: 971)	V1.002 (SVN: 971)	-

* Declared by the applicant

Note: PHOENIX TESTLAB GmbH does not take samples. The samples used for tests are provided exclusively by the applicant.

1.5 Technical Data of Equipment

General EUT data			
Power supply EUT: *	DC		
Supply voltage EUT: *	$U_{nom} = 5 \text{ V}_{DC}$	$U_{min} = 4.5 \text{ V}_{DC}$	$U_{max} = 5.5 \text{ V}_{DC}$
Temperature range: *	-25°C to +45°C		
Lowest / highest internal clock frequency: *	12 MHz / 2480 MHz		

Bluetooth® low energy frequencies			
Channel 00	2402 MHz	Channel 01	2404 MHz
Channel 02	2406 MHz	Channel 03	2408 MHz
...	...	...	...
...	...	...	...
Channel 18	2438 MHz	Channel 19	2440 MHz
...	...	...	...
...	...	...	...
Channel 36	2474 MHz	Channel 37	2476 MHz
Channel 38	2478 MHz	Channel 39	2480 MHz

Bluetooth® low energy radio mode	
Fulfils radio specification: * ¹	Bluetooth® low energy (BLE) 5.1
Radio chip: * ¹	Texas Instruments CC2642R
Antenna type: * ¹	Meandered printed inverted-F PCB antenna
Antenna name: * ¹	NA
Antenna gain: * ²	2.5 dBi
Antenna connector: * ¹	-
Supply voltage BLE module: * ¹	$U_{nom} = 3.3 \text{ V}_{DC}$ $U_{min} = 1.8 \text{ V}_{DC}$ $U_{max} = 3.8 \text{ V}_{DC}$
Type of modulation: * ¹	BLE (1 Mbps PHY) GFSK
Operating frequency range: * ¹	BLE (1 Mbps PHY) 2402 – 2480 MHz
Number of channels: * ¹	BLE (1 Mbps PHY) 40 (2 MHz channel spacing)

*¹ Declared by the applicant

*² based on the antenna test report F241578E4 issued by Phoenix Testlab GmbH

1.6 Dates

Date of receipt of test sample:	23.12.2024
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2 Evaluation Method

2.1 RF exposure test exemptions for single sources

2.1.1 General Exemption CFR 47 §1.1307(b)(3)(i)(A)

The available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption may not be used in conjunction with other exemption criteria other than those in paragraph (b)(3)(ii)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(ii)(A);

2.1.2 SAR Based Exemption CFR 47 §1.1307(b)(3)(i)(B)

The available maximum time-averaged power of effective radiated power (ERP), whichever is greater, is less than or equal to the threshold P_{th} (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 cm to 40 cm and at frequencies from 0.3 GHz to 6 GHz inclusive.

For the following separation distances [d] and frequency ranges P_{th} is given by the following formulas

	0.5 cm ≤ d ≤ 20cm	20 cm < d ≤ 40 cm
0.2 GHz ≤ f < 1.5 GHz	$P_{th}(mW) = ERP_{20cm} \left(\frac{d}{20} \right)^x$ $ERP_{20cm} (mW) = 2040f$ $x = -\log_{10} \left(\frac{60}{ERP_{20cm} \sqrt{f}} \right)$	$P_{th}(mW) = ERP_{20cm}$ $ERP_{20cm} (mW) = 2040f$
1.5 GHz ≤ f ≤ 6 GHz	$P_{th}(mW) = ERP_{20cm} \left(\frac{d}{20} \right)^x$ $ERP_{20cm} (mW) = 3060$ $x = -\log_{10} \left(\frac{60}{ERP_{20cm} \sqrt{f}} \right)$	$P_{th}(mW) = ERP_{20cm}$ $ERP_{20cm} (mW) = 3060$

Relaxation for extremities according to Appendix A [3]

Finally, when 10-g extremity SAR applies, SAR test exemption may be considered by applying a factor of 2.5 to the SAR-based exemption thresholds.

2.1.3 MPE Based Exemption CFR 47 §1.1307(b)(3)(i)(C)

By using Table 1 and the minimum separation distance (d in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. For the exemption in Table 1 to apply, d must be at least $\lambda/2\pi$, where λ is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical dimensions of the radiating structure(s) do not exceed the electrical length of $\lambda/4$ or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

RF Source frequency [MHz]	Threshold ERP [W]
0.3 - 1.34	$1920 d^2$
1.34 - 30	$3450 d^2/f^2$
30 - 300	$3.83 d^2$
300 - 1500	$0.0128 d^2/f$
1500 - 100000	$19.2 d^2$

d : Minimal separation distance from antenna to the user

2.1.4 Stand alone MPE evaluation limits

The human exposure to RF emissions from such devices could be evaluated based on the MPE limits adopted by the FCC for electric and magnetic field strength and / or power density. The limits for General Population / Uncontrolled Exposure are given in the following table from CFR 47 §1.1310(e)1:

Frequency range [MHz]	Electric field strength (E) [V/m]	Magnetic field strength (H) [A/m]	Power density (S) [mW/cm ²]	Averaging time [min]
(i) Limits for Occupational/Controlled Exposure				
0.3 - 3.0	614	1.63	*(100)	≤6
3.0 - 30	$1842/f$	$4.89/f$	*($900/f^2$)	<6
30 - 300	61.4	0.163	1.0	<6
300 - 1,500			$f/300$	<6
1,500 - 100,000			5	<6
(ii) 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

Note: f = frequency in MHz; * Plane – wave equivalent power density

The power density is calculated as follows:

$$S = \frac{P \cdot G \cdot D}{4 \cdot \pi \cdot d^2}$$

Where:

P: conducted power

G: Antenna gain (linear)

D: Duty Cycle

d: Minimal separation distance from antenna to the user

3 Results of evaluation

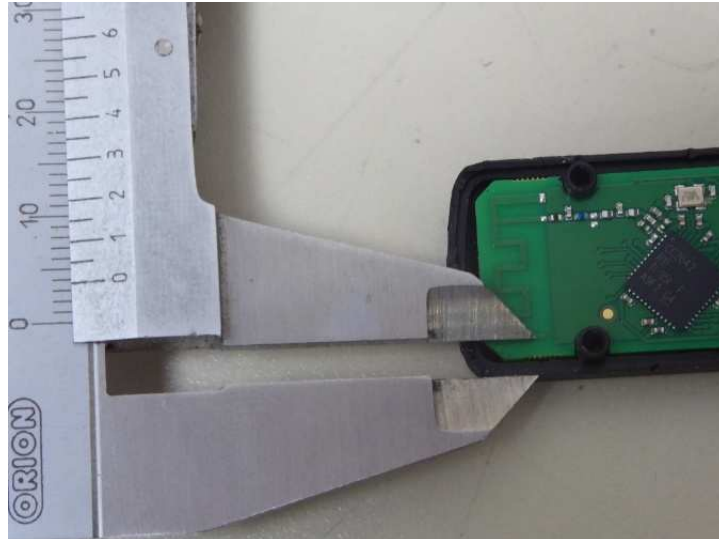
3.1 Used evaluation methods

RF Exposure test exemptions for single sources			
Used	Method	See sub-clause	Comment
☐	General Exemption acc. CFR 47 §1.1307(b)(3)(i)(A)	2.1.1	-
☒	SAR Based Exemption acc. CFR 47 §1.1307(b)(3)(i)(B)	2.1.2	-
☐	MPE Based Exemption acc. CFR 47 §1.1307(b)(3)(i)(C)	2.1.3	-
☐	MPE Calculation	2.1.4	-

RF Exposure test exemptions for simultaneous transmission sources			
Used	Method	See sub-clause	Comment
☒	Not applicable		No simultaneous TX possible

3.2 Evaluation Distance

The minimum separation distance between the radiating antenna and the user is about 3mm as seen in the image below.



Antenna	Min separation distance as declared by the applicant
Antenna 0	0.3 cm

3.3 BLE 2.4 GHz Emissions

The following information are based on test report F241578E2 issued by PHOENIX TESTLAB GmbH.

According to the chapter 4.3.1 in [3] the device is excluded from SAR Evaluation when the following condition is fulfilled:

$$3 \geq \frac{P_{e.i.r.p}}{d} \cdot \sqrt{f}$$

With d being the minimum separation distance from the radiating to the user in mm, $P_{e.i.r.p}$ the maximum EIRP of the EUT in mW and f being the corresponding frequency in GHz.

According to [3] for separation distances < 5mm the limit for 5mm has to be applied. Using the maximum EIRP, including a tune up range of 2dB, of 7.2 dBm (5.25 mW) and the corresponding frequency of 2.48 GHz the calculated value is 1.6527. This value is lower than 3 and therefore the condition is fulfilled.

4 Conclusion

The EUT complies in all operational modes to the limits given in [3] in chapter 4.3.1 at a separation distance of 0.3 cm for antenna 0 and is there excluded from SAR evaluation.

5 Report History

Report Number	Date	Comment
F241578E4	28.11.2025	Initial Evaluation Report
-	-	-
-	-	-

----- end of evaluation report -----