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SAR Exclusion Calculation

Project: C8445

Report number: C15489TR1

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Customer Details

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Equipment Under Test: OMED Breath Analyzer

Operating frequency bands: BLE: 2400MHz to 24835MHz

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Registered in England and Wales
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SAR Exclusion Calculation - FCC

The calculation is according to the FCC Knowledge Database (KDB) document KDB 447498 D01 General RF Exposure Guidance V06.

Section 4.3.1 General SAR Test Exclusion Bands was applied. Section 4.3.1 a) for 100MHz to 6GHz and test separation distances ≤50mm was specifically applied. According to this section the SAR test exclusion thresholds are determined by the following:

$$\text{Threshold} = \left[\frac{P(mW)}{d(mm)}\right] \cdot \sqrt{f(GHz)}$$

Where

P is the maximum power of the channel including tune-up tolerance in mW

d is the minimum test separation distance in mm

f is the RF channel frequency in GHz

The minimum test separation distance was considered to be 2.82mm in consultation with Section 4.2.2 *Body-worn accessory exposure conditions.*

This evaluation of the threshold is compared to the threshold limit.

a. Limit for 1-g head or body worn devices: threshold limit ≤3

b. Limit for 10-g extremity worn devices: threshold limit ≤7.5

Since the device can be body worn the limit a applies.

Bluetooth Low Energy

For this apparatus, the calculated threshold was evaluated using a distance of 2.82mm, and the results are tabulated in the table below.

The power level values are taken from the Eurofins E&E Ltd test report C15488TR1

Frequency (GHz)	Power (mW)	Dist (mm)	Calculated Threshold	Threshold Limit
2.402	0.97	2.82	0.53	3.00
2.440	1.01	2.82	0.56	3.00
2.480	0.98	2.82	0.55	3.00

Table 1 Calculation of threshold BLE

SAR Exclusion Calculation - ISED

Standard:

RSS-102 Radio Frequency (RF) ~Exposure Compliance of Radio communication Apparatus (All Frequency Bands)

Issue 6 December 2023

From RSS-102: 6.3 SAR exemption limits

SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in Table 11.

Table 11: Power limits for exemption from routine SAR evaluation based on the separation distance

Frequency (MHz)	≤ 5 mm(mW)	10 mm (mW)	15 mm(mW)	20 mm(mW)	25 mm(mW)	30 mm(mW)	35 mm(mW)	40 mm(mW)	45 mm(mW)	> 50 mm(mW)
≤ 300	45	116	139	163	189	216	246	280	319	362
450	32	71	87	104	124	147	175	208	248	296
835	21	32	41	54	72	96	129	172	228	298
1900	6	10	18	33	57	92	138	194	257	323
2450	3	7	16	32	56	89	128	170	209	245
3500	2	6	15	29	50	72	94	114	134	158
5800	1	5	13	23	32	41	54	74	102	128

For limb-worn devices where the 10 gram of tissue applies, the exemption limits for routine evaluation in table 11 are multiplied by a factor of 2.5.

For controlled-use devices where the 8 W/kg for 1 gram of tissue applies, the exemption limits for routine evaluation in table 11 Table 11 are multiplied by a factor of 5.

When the operating frequency of the device is between two frequencies located in table 11, linear interpolation shall be applied for the applicable separation distance. If the separation distance of the device is between two distances located in table 11, linear interpolation may be applied for the applicable frequency. Alternatively, the limit corresponding to the smaller distance may be employed.

Bluetooth Low Energy

The power level values are taken from the Eurofins E&E Ltd test report C15488TR1

Frequency (GHz)	Measured power (mW)	Dist (mm)	Exemption Limit (mW)*	SAR Test required
2.402	0.97	2.82	3.26	No
2.440	1.01	2.82	3.05	No
2.480	0.98	2.82	2.97	No

Table 2 SAR exemption limit BLE

*Note: Linear interpolation applied from the frequencies and limits given in RSS-102: 6.3 SAR exemption limits, Table 11.

Conclusion

For the required stated distances, the apparatus met the exclusion requirements for SAR testing (ISED).

Prepared by:

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