



SAR Exclusion Calculation

Test Type: SAR Exclusion Calculation

Product Type: Wireless Headphone

Product Name/Number: Model Number: 423376
FCC ID: A94423376
IC: 3232A-423376

Prepared For: Design Assurance Engineering Department,
Bose Corporation

Test Results: Pass [X]

Applicable Standards: FCC 47 CFR 2.1093 SAR
As per FCC KDB 447498 D01 General RF Exposure Guidance
DR03-41372

RSS-102 Section 2.51
Report Number: EMC.423376.18.88.1

General Comments/Special Test Conditions:

This report relates only to the items tested. This report covers EMC marking requirements for
Enter product and any special modifications or test conditions.

	Print Name	Signature	Date
Prepared By:	Brent DeWitt		March 29, 2018

* Since every test result is separately reviewed after its completion, the electrical engineer review indicated above represents a higher level review to ensure this report lists and contains all applicable and appropriate requirements.

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Certificate # 1514.1

SAR Exclusion Calculation



FCC 47 CFR 2.1093 SAR Exclusion Calculation

As per FCC KDB 447498 D01 General RF Exposure Guidance DR03-41372

All power readings below reflect 1dB addition to account for radio tolerance.

Maximum conducted output power measured plus tolerance of 1dB (dBm)	Maximum conducted output power, tolerance included (mW)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	Worst Possible Duty Cycle (%)	EIRP Duty Cycle Corrected (mW)	d Separation Distance (cm)	d Separation Distance (mm)	S Power Density (mW/cm ²)	S Power Density (W/m ²)	Frequency (GHz)	(100 MHz to 6 GHz) 1-g SAR Exclusion Threshold Applies only if: d <= 50mm <= 3.0	SAR Testing Exclusion
8.8	7.6	3.8	12.6	18.20	78	14.194	3.175	31.75	0.112	1.12	2.45	0.374	No SAR

RSS-102 SAR exemption calculation

Summary:

Minimum typical separation distance between the antenna and the user when worn as an around-the-ear headset is 1.25 inches or 31.75 mm.



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Exemption limit from RSS-102 for routine evaluation based on frequency and separation distance for 2450 MHz @ 25mm = **48 mW** (see Appendix A: Table 1)

EUT's EIRP = 14.45mW or 18.2 mW if tolerance is added (see EIRP calculation below)

Both 18.2 mW and 14.45 mW are less than 48 mW, therefore the EUT is exempt from routine SAR evaluation.

EIRP calculation:

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SAR Exclusion Calculation

7.8 dBm peak conducted RF output power as measured using a method compliant with RSS-210

3.8 dBi dBi peak antenna gain

EIRP = peak conducted RF power + peak antenna gain = 7.8 dBm + 3.8 dBi = 11.6 dBm = **14.45mW**

Conclusion:

For our EUT transmitting at 2450 MHz, if evaluate the EUT against the exemption limits at a distance of 25mm (minimum distance from antenna to outside of enclosure), the power at this distance must be below 48 mW. $48 \text{ mW} - 14.45 \text{ mW} = 33.55 \text{ mW}$ of margin (pass).



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From RSS-102: 2.5.1 Exemption Limits for Routine Evaluation — SAR Evaluation

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 1.

Table 1: SAR evaluation — Exemption limits for routine evaluation based on frequency and separation distance^{4,5}

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of ≤5 mm	At separation distance of 10 mm	At separation distance of 15 mm	At separation distance of 20 mm	At separation distance of 25 mm
≤300	71 mW	101 mW	132 mW	162 mW	193 mW
450	52 mW	70 mW	88 mW	106 mW	123 mW
835	17 mW	30 mW	42 mW	55 mW	67 mW
1900	7 mW	10 mW	18 mW	34 mW	60 mW
2450	4 mW	7 mW	15 mW	30 mW	52 mW
3500	2 mW	6 mW	16 mW	32 mW	55 mW
5800	1 mW	6 mW	15 mW	27 mW	41 mW

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of 30 mm	At separation distance of 35 mm	At separation distance of 40 mm	At separation distance of 45 mm	At separation distance of ≥50 mm
≤300	223 mW	254 mW	284 mW	315 mW	345 mW
450	141 mW	159 mW	177 mW	195 mW	213 mW
835	80 mW	92 mW	105 mW	117 mW	130 mW
1900	99 mW	153 mW	225 mW	316 mW	431 mW
2450	83 mW	123 mW	173 mW	235 mW	309 mW
3500	86 mW	124 mW	170 mW	225 mW	290 mW
5800	56 mW	71 mW	85 mW	97 mW	106 mW

Output power level shall be the higher of the maximum conducted or equivalent isotropically radiated power (e.i.r.p.) source-based, time-averaged output power. For controlled use devices where the 8 W/kg for 1 gram of tissue applies, the exemption limits for routine evaluation in [Table 1](#) are multiplied by a factor of 5. For limb-worn devices where the 10 gram value applies, the exemption limits for routine evaluation in Table 1 are multiplied by a factor of 2.5. If the operating frequency of the device is between two frequencies located in Table 1, linear interpolation shall be applied for the applicable separation distance. For test separation distance, less than 5 mm, the exemption limits for a separation distance of 5 mm can be applied to determine if a routine evaluation is required.