

SAR Exemption Assessment Report

REP107834-1R1ARFWL

Manufacturer:

HeartBeam, Inc.

Model:

2002A

Product Marketing Name (PMN):

HeartBeam ECG Device

HVIN/Model variant(s):

2002A

FCC ID:

2BQ5Z-HBM2002A

Specification:

- ◆ FCC 47 CFR Part 1 Subpart I, §§1.1307, 1.1310
- ◆ FCC 47 CFR Part 2 Subpart J, §2.1091
- ◆ FCC KDB 447498 D01 General RF Exposure Guidance v06

Lab and test locations

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Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contain in this report are within Nemko USA's ISO/IEC 17025 accreditation.

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Section 1 Evaluation summary

1.1 SAR exemption for stand-alone transmission

1.1.1 References, definition, and limits

FCC §2.1093

- (2) The SAR limits for general population/uncontrolled exposure are 0.08 W/kg, as averaged over the whole body, and a peak spatial-average SAR of 1.6 W/kg, averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the parts of the human body treated as extremities, such as hands, wrists, feet, ankles, and pinnae, where the peak spatial-average SAR limit is 4 W/kg, averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube). Exposure may be averaged over a time period not to exceed 30 minutes to determine compliance with general population/uncontrolled SAR limits.

FCC KDB 447498 D01

4.3.1 Standalone SAR test exclusion considerations

The SAR-based exemption formula of §1.1307(b)(3)(i)(B), repeated here, applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power or effective radiated power (ERP), whichever is greater, of less than or equal to the threshold P_{th} (mW).

This method shall only be used at separation distances from 0.5 cm to 40 cm and at frequencies from 0.3 GHz to 6 GHz (inclusive). P_{th} is given by formula

$$P_{th}(mW) = \begin{cases} ERP_{20\text{ cm}} \left(\frac{d}{20\text{ cm}} \right)^x & d \leq 20\text{ cm} \\ ERP_{20\text{ cm}} & 20\text{ cm} < d \leq 40\text{ cm} \end{cases}$$

where

$$x = -\log_{10} \left(\frac{60}{ERP_{20\text{ cm}} \sqrt{f}} \right)$$

Table 1.1-1: Example Power Thresholds (mW)

Separation:	5 mm	10 mm	15 mm	20 mm	25 mm	30 mm	35 mm	40 mm	45 mm	50 mm
300 MHz	39	65	88	110	129	148	166	184	201	217
450 MHz	22	44	67	89	112	135	158	180	203	226
835 MHz	9	25	44	66	90	116	145	175	207	240
1900 MHz	3	12	26	44	66	92	122	157	195	236
2450 MHz	3	10	22	38	59	83	111	143	179	219
3600 MHz	2	8	18	32	49	71	96	125	158	195
5800 MHz	1	6	14	25	40	58	80	106	136	169

Notes: Values in the table are in mW

For mobile devices that are not exempt per Table 1 [of §1.1307(b)(1)(i)(C)] at distances from 20 cm to 40 cm and in 0.3 GHz to 6 GHz, evaluation of compliance with the exposure limits in §1.1310 is necessary if the ERP of the device is greater than ERP 20 cm in Formula below [repeated from §2.1091(c)(1); also in §1.1307(b)(1)(i)(B)].

$$P_{th}(mW) = ERP_{20\text{ cm}}(mW) = \begin{cases} 2040f & 0.3\text{ GHz} \leq f < 1.5\text{ GHz} \\ 3060 & 1.5\text{ GHz} \leq f \leq 6\text{ GHz} \end{cases}$$

Table 1.1-2: Thresholds for single RF sources subject to routine environmental evaluation

RF Source Frequency			Minimum Distance			Threshold ERP
f_L (MHz)		f_H (MHz)	$\lambda_L / 2\pi$		$\lambda_H / 2\pi$	(W)
0.3	–	1.34	159 m	–	35.6 m	1,920 R ²
1.34	–	30	35.6 m	–	1.6 m	3,450 R ² /f ²
30	–	300	1.6 m	–	159 mm	3.83 R ²
300	–	1,500	159 mm	–	31.8 mm	0.0128 R ² /f
1,500	–	100,000	31.8 mm	–	0.5 mm	19.2 R ²

Table 1

1.1.2 EUT technical information

Type of EUT use	Body
Minimum separation distance	5 mm
Highest operating frequency	2480 MHz
Antenna type	Integrated monopole
Antenna gain	3.8 dBi
Maximum transmitter conducted power	-0.81 dBm (0.83 mW)
Maximum system EIRP	2.99 dBm (1.99 mW)
Maximum system ERP	0.84 dBm (1.21 mW)
Duty cycle	100 % (worst-case)

Data source: Conducted power and EIRP taken from measurement data in Nemko test report REP107834-1TRFWL.

1.1.3 Justification for Standalone SAR test exclusion

SAR exemption verification for FCC:

Nominal RF power (mW):	1.21	INPUTS
Duty cycle (%):	100	
Frequency (GHz):	2.48	
Distance (cm):	0.5	
Time averaged power (mW):	1.21	Calculated

Frequency (GHz)	λ (cm)	Power (mW)	Distance (cm)	Exemption ERP _{20cm} (mW)	x	P _{threshold} (mW)	Result	Ratio
2.48	12.1	1.21	0.5	3060	1.90	2.72	EXEMPT	0.45

1.1.4 Verdict

The calculation is below the threshold, therefore, the product exempt from the SAR test requirements.

End of test report