

Test report No:
NIE: 71728RAN.002

Assessment report

RF EXPOSURE REPORT ACCORDING TO FCC 47 CFR Part 2.1091; FCC 47 CFR Part 2.1093 FCC 47 CFR Part 1.1307; FCC 47 CFR Part 1.1310

(*) Identification of item under evaluation	Accessory to wireless hearing instrument
(*) Trademark	GN Hearing
(*) Model and /or type reference	SAS-4
(*) Other identification of the product	HW version: PCBA, SAS-4 MAIN BOARD,V2 SW version: Farlander5 FCC ID: X26SAS-4 IC: 6941C-SAS4
(*) Features	Bluetooth LE
(*) Manufacturer	GN Hearing A/S Lautrupbjerg 7, 2750 Ballerup, Denmark
Test method requested, standard	FCC 47 CFR Part 2.1091 Radiofrequency radiation exposure evaluation: mobile devices. FCC 47 CFR Part 2.1093 Radiofrequency radiation exposure evaluation: portable devices. FCC 47 CFR Part 1.1307: Actions that may have a significant environmental effect, for which Environmental Assessments (EAs) must be prepared. FCC 47 CFR Part 1.1310: Radiofrequency radiation exposure limits.
Summary	IN COMPLIANCE
Approved by (name / position & signature)	Rafael López Regulatory Lab.Technical Office Manager  2023.08.11 09:51:02 +02'00'
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Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item under evaluation", "Trademark", "Model and/or type reference", "General description of the device", "Other identification of the product").
2. Antenna gain and use distance information.
3. The device under evaluation consists of an accessory to wireless hearing instrument, which is capable of streaming Audio from a Television or other audio device, to multiple hearing instrument.

DEKRA Testing and Certification S.A.U. declines any responsibility with respect to the information provided by the client and that may affect the validity of results.

Identification of the client

GN Hearing A/S

Lautrupbjerg 7, 2750 Ballerup, Denmark

Document history

Report number	Date	Description
71728RAN.002	2023-08-11	First release

Appendix A: FCC RF Exposure assessment result

General description of the device under evaluation

Table 1 shows information used for the RF Evaluation, taking into account the following declared specifications for the device:

Description and technologies: the device under evaluation consists of an accessory to wireless hearing instrument, which is capable of streaming Audio from a Television or other audio device, to multiple hearing instrument.

Antennas: the device supports one antenna for the Bluetooth Low energy transmitting technology.

Evaluation Distance: according to the manufacturer, during its normal use, the separation distance between the radiating structures of the device and nearby users will be greater than 20 cm. In order to perform the assessment a conservative evaluation distance of 20 cm has been used.

Although the device under evaluation will be installed close to the television or other audio device, the hearing instrument must be paired with the device under evaluation for the first time of use. During this process the user must press the pairing button of the device during a pairing sequence of 39 seconds, being the user at distance less than 20 cm from the device.

In order to perform the assessment for this pairing process, a conservative assessment distance of 0 cm (0.5 cm applied for the evaluation) and a maximum time of exposure of 50 seconds have been used for the assessment.

Maximum output power and antenna gain values:

- Values corresponding to conducted output power have been measured and stated into DEKRA Testing and Certification, S.A.U. test report num. 71728RRF.001.
- Values corresponding to antenna gain have been declared by the device manufacturer (maximum peak gain stated in antenna manufacturer's datasheet).

Technology / Mode	Operating Band	Frequency under evaluation (MHz)	Maximum Conducted Output Power (dBm)	Antenna peak gain (dBi)	Maximum E.R.P. (dBm)	Maximum E.R.P. (mW)	Maximum E.I.R.P. (dBm)	Maximum E.I.R.P. (mW)
Bluetooth 1Mb	ISM	2400 - 2483.5	7.47	2.00	7.32	5.39	9.47	8.84
Bluetooth 2Mb	ISM	2400 - 2483.5	7.57	2.00	7.42	5.52	9.57	9.06

Table 1: Equipment specifications

Evaluation Results

Determination of Exemption according to FCC 47 CFR Part 1.1307:

Technology / Mode	Operating Band	Frequency under evaluation (MHz)	Distance (cm)	Maximum E,R,P, (mW)	§1,1307(b)(3),i,(C) Exposure Limit (mW)	Verdict for exemption § 1,1307(b)(3),i
Bluetooth 1Mb	ISM	2400 - 2483.5	20.00	5.39	768.00	Pass
Bluetooth 2Mb	ISM	2400 - 2483.5	20.00	5.52	768.00	Pass

Table 2: FCC Exemption Evaluation Results

The computed value(s) are below the exemption limit(s), so these modes meet the requirements stated in FCC 47 CFR Part 1.1307.

Determination of Exemption according to FCC 47 CFR Part 1.1307 for the pairing process:

For an exposure time of 50 seconds, equipment specifications will be as follow:

Technology / Mode	Operating Band	Frequency under evaluation (MHz)	Maximum Conducted Output Power (dBm)	TX time for a 30 min period (s)	Time Averaged Conducted Power (dBm)	Ant. peak gain (dBi)	Maximum Averaged E.R.P (dBm)	Maximum Averaged E.R.P (mW)	Maximum Averaged E.I.R.P (dBm)	Maximum Averaged E.I.R.P (mW)
Bluetooth 1Mb	ISM	2400 - 2483.5	7.47	50.00	-8.10	2.00	-8.25	0.15	-6.10	0.25
Bluetooth 2Mb	ISM	2400 - 2483.5	7.57	50.00	-7.99	2.00	-8.14	0.15	-5.99	0.25

Table 3: Equipment specifications for the pairing process

The evaluation according to the minimum intended use distance of 0 mm, 5mm applied for the evaluation, will be as follow:

Technology / Mode	Operating Band	Frequency under evaluation (MHz)	Distance (cm)	Time Averaged Conducted Power (mW)	§1.1307(b)(3).i.(A) Exposure Limit (mW)	Verdict
Bluetooth 1Mb	ISM	2400 - 2483.5	0.50	0.15	1.00	Pass
Bluetooth 2Mb	ISM	2400 - 2483.5	0.50	0.16	1.00	Pass

Table 4: FCC Exemption Evaluation Results for pairing process

The computed value(s) are below the exemption limit(s), so these modes meet the requirements stated in FCC 47 CFR Part 1.1307.

Appendix B: FCC RF Exposure information

RF Exposure determination of exemption

According to FCC 47 CFR §1.1307 (b)(3) Determination of exemption:

(i) For single RF sources (i.e., any single fixed RF source, mobile device, or portable device, as defined in paragraph (b)(2), a single RF source is exempt if:

(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);

(B) Or the available maximum time-averaged power or 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 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). P_{th} is given by:

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

Where

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

and

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

d = the separation distance (cm);

(C) Or using Table 1 and the minimum separation distance (R 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, R 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).

TABLE 1 TO §1.1307(b)(3)(i)(C)—SINGLE RF SOURCES SUBJECT TO ROUTINE ENVIRONMENTAL EVALUATION

RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	$1,920 R^2$.
1.34-30	$3,450 R^2/f^2$.
30-300	$3.83 R^2$.
300-1,500	$0.0128 R^2 f$.
1,500-100,000	$19.2 R^2$.

(ii) For multiple RF sources: Multiple RF sources are exempt if:

(A) The available maximum time-averaged power of each source is no more than 1 mW and there is a separation distance of two centimeters between any portion of a radiating structure operating and the nearest portion of any other radiating structure in the same device, except if the sum of multiple sources is less than 1 mW during the time-averaging period, in which case they may be treated as a single source (separation is not required). This exemption may not be used in conjunction with other exemption criteria other than those in paragraph (b)(3)(i)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(i)(A).

(B) in the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure Limit_k} \leq 1$$

Where:

a = number of fixed, mobile, or portable RF sources claiming exemption using paragraph (b)(3)(i)(B) of this section for Pth, including existing exempt transmitters and those being added.

b = number of fixed, mobile, or portable RF sources claiming exemption using paragraph (b)(3)(i)(C) of this section for Threshold ERP, including existing exempt transmitters and those being added.

c = number of existing fixed, mobile, or portable RF sources with known evaluation for the specified minimum distance including existing evaluated transmitters.

Pi = the available maximum time-averaged power or the ERP, whichever is greater, for fixed, mobile, or portable RF source i at a distance between 0.5 cm and 40 cm (inclusive).

Pth,i = the exemption threshold power (Pth) according to paragraph (b)(3)(i)(B) of this section for fixed, mobile, or portable RF source i.

ERPj = the ERP of fixed, mobile, or portable RF source j.

ERPth,j = exemption threshold ERP for fixed, mobile, or portable RF source j, at a distance of at least $\lambda/2\pi$ according to the applicable formula of paragraph (b)(3)(i)(C) of this section.

Evaluated,k = the maximum reported SAR or MPE of fixed, mobile, or portable RF source k either in the device or at the transmitter site from an existing evaluation at the location of exposure.

Exposure Limit,k = either the general population/uncontrolled maximum permissible exposure (MPE) or specific absorption rate (SAR) limit for each fixed, mobile, or portable RF source k, as applicable from §1.1310 of this chapter.

The available maximum time-averaged power or effective radiated power (ERP), can be calculated using the following formula to assess compliance with the Exemption Limits:

$$P_{E.I.R.P.} = P_T + G_T - L_C$$

Where:

P_T= transmitter time-averaged output power (including Duty Cycle and tune-up tolerance, if applicable)

G_T= gain of the transmitting antenna

L_C = signal attenuation in the connecting cable between the transmitter and the antenna if applicable

$$P_{E.R.P.} = P_{E.I.R.P.} - 2.15 \text{ dB}$$