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RF Exposure Analysis

Product: Headphones

FCC ID: IERRF-H588LTI

Analysis for FCC portable use

Standalone SAR test exclusion considerations are defined in KDB 447498D01 (v05r01) Chapter 4.3.1 where the 1-g head or body and 10-g extremity SAR exclusion threshold is defined by the following formula:

$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] * [\sqrt{f(\text{GHz})}] \leq 3.0 \text{ for 1-g SAR and } \leq 7.5 \text{ for 10-g extremity SAR}$$

- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison

For the Headphone set, the maximum conducted output power, including tune-up tolerance, is defined in the Operational Description (based on 2.1 V regulated operation) as 9 dBm (7.94 mW). Appendix A (below) shows the PCB trace antenna location which is positioned 13 mm from the outer surface of the enclosure on the face nearest to the user. The enclosure is covered by a fabric ear pad which provides a further 14 mm separation (total 27 mm) between the antenna and the user. However, considering that the ear pad is compressible when worn, and to ensure the most conservative separation distance is used, a distance of 5 mm has been chosen for the calculation as this is stated as the minimum separation distance in KDB 447498 4.3.1 (1). Furthermore, Appendix B is included to show the distance from the antenna at which a value of 3 for 1-g Head SAR is reached.

When the above data is applied using the given formula, the following result for assessment against the ≤ 3.0 limit for 1-g head SAR is achieved:

$$(8 \text{ mW} / 5 \text{ mm}) \times \sqrt{2.406 \text{ GHz}} \leq 3.0$$

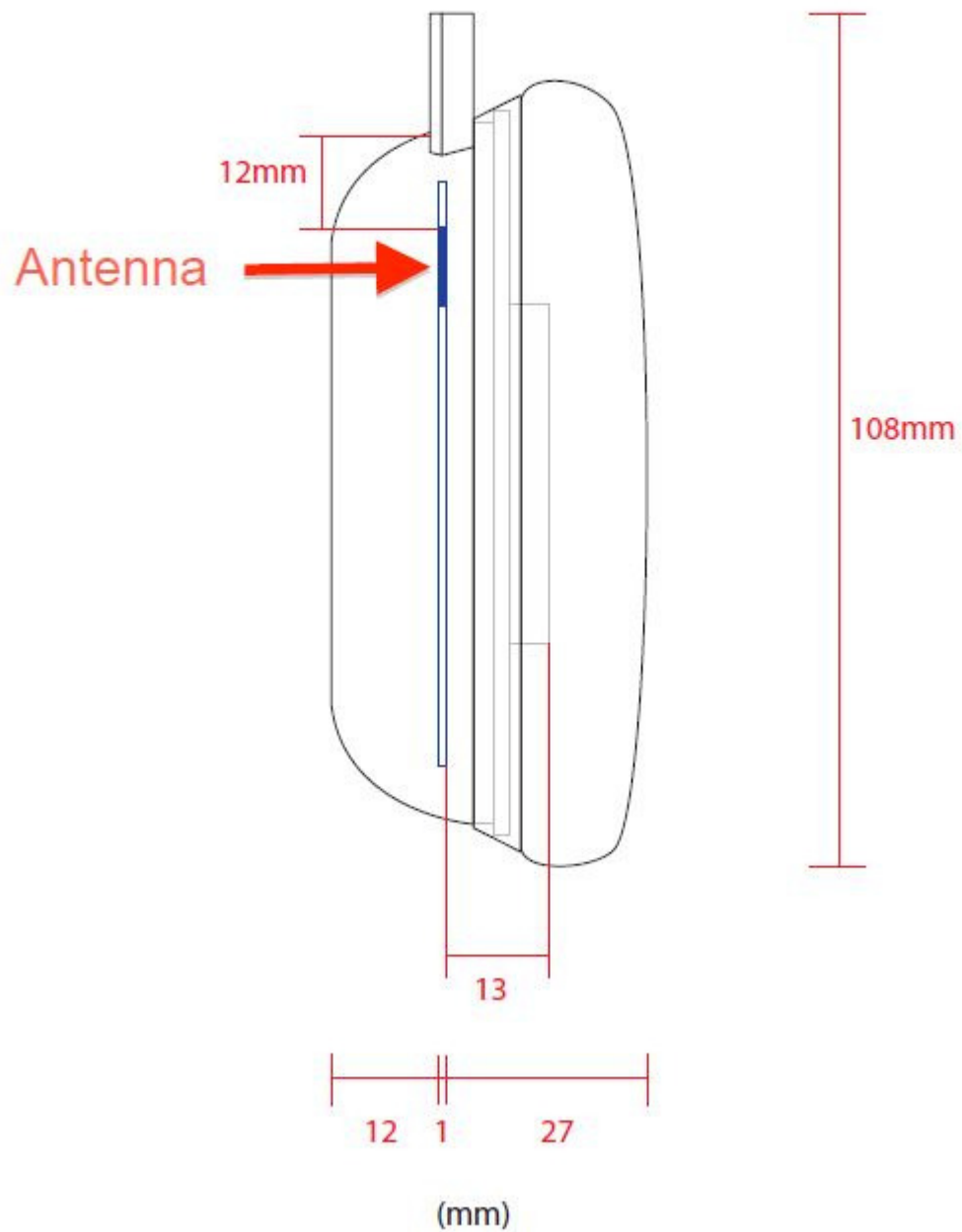
$$1.6 \times 1.5511 = 2.5$$

2.5 is <3.0 limit for 1-g head SAR

Thus for portable use, the SAR exclusion condition is fulfilled and SAR evaluation is not required for a separation distance of 5 mm or more.

Signature: _____ Date: 11/15/2013

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Appendix A: Antenna location in Headphone Earpiece

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Appendix B: Distance from Antenna at which a value of 3 for 1-g Head SAR is reached

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] * [\sqrt{f(\text{GHz})}] \leq 3.0$ for 1-g SAR

The above equation is re-arranged for distance, giving:

$(\text{Max. power of channel, mW} * \sqrt{f_{\text{GHz}}}) / 3 = \text{min. test separation distance, mm}$

Substituting the values in:

$\text{Min. test separation distance} = (8 * \sqrt{2.406}) / 3$

$= 4.14 \text{ mm}$