2nd Floor, 63-66 Hatton Garden, London - EC1N 8LE
Tel: +44 (0) 203 745 5201

RF Exposure Analysis - SAR Test Exemption

FCC ID: 2AEHI-ER01

The device ER01 operates in the 2.4 GHz band (Bluetooth LE).

The following FCC Rule Parts are applicable:

Part 2.1093 – Radiofrequency radiation exposure evaluation: portable devices (i)

Part 1.1307(b)(3)(i)(C) - MPE test exemption (ii)

Part 1.1307(b)(3)(i)(B) - SAR test exemption (iii)

For the ER01, FCC ID: 2AEHI-ER01

Operating Frequency: 2402 - 2480 MHz

Tx Power: 5.0 dBm max. conducted (3.16 mW)

Maximum Duty Cycle: 50%

Tx max. conducted Power (corrected for Duty Cycle) = 1.58 mW (2.0 dBm)

Antenna gain = 3.3 dBi

Source-based time averaged EIRP = 2.0 + 3.3 = 5.3 dBm (3.4 mW)

Source-based time averaged ERP = EIRP - 2.15 dBm = 3.15 dBm (2.1 mW)

Minimum separation distance (R) = 6.4 cm (0.064 m)

Evaluation

From Part 2.1093(c)(1). RF exemption applies if the maximum transmitted power is less than the maximum of the following three criteria:

i) No more than 1 mw Blanket exemption. P_{TH} = 1.0mW – (the module is not compliant)
ii) determination of exemption under the MPE-based §1.1307(b)(3)(i)(C), if i) not met
iii) determination of exemption under the SAR-based §1.1307(b)(3)(i)(B) if both i) and ii) are not met;

Determination of threshold power (P_{TH}) under the MPE-based §1.1307(b)(3)(i)(C) :

This is only applicable at a separation distance greater than λ/2π

For the ER01, FCC ID: 2AEHI-ER01

2.4 GHz operation - λ/2π = 0.02 m

Separation distance equals 0.064 m therefore this clause is not applicable.

Determination of threshold power (P_{th}) under §1.1307(b)(3)(i)(B) as the transmitter power threshold for SAR test exemption:

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

Where

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

and

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

d = the separation distance (cm);

For 2.4GHz Operation:

For SAR test exemption (iii):

§1.1307(b)(3)(B) :

$ERP_{20\ cm}$ = 3060 mW

x = $-\log_{10}$ (60/(3060 $\sqrt{2.402}$))
= $-\log_{10}$ (0.0127) = 1.899

Continued\....

Threshold Power $P_{th} = ERP_{20\,cm}(d/20\ cm)^{x}$

$= 3060\ (6.4/20)^{1.899}$

$= 351.6$ mW (25.5 dBm)

(P_{th} = device transmitter power ERP or conducted time averaged, whichever is greater)

The ER01 maximum ERP (3.15 dBm) is greater than the maximum conducted transmitter power (2.0 dBm)

Conclusion:

The maximum ERP is below the applicable 351.6 mW threshold for operation at 2.4 GHz, and therefore RF Exposure Evaluation is not required for the ER01 which is exempt from evaluation in accordance with §1.1307(b)(3).

03 Dec 2024

Amelia Ortiz Rios

Regulatory Affairs Manager