RF Exposure Analysis – SAR Test Exemption – HPR50

FCC ID: 2ANFF-Q102

The HPR50 equipment operates using 2.4GHz BT LE and ANT+ transmitters

The 2.4GHz BT LE and ANT+ transmitters do NOT transmit simultaneously

The following FCC Rule Parts are applicable:

Part 2.1093 – Radiofrequency radiation exposure evaluation: portable devices

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

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

For the HPR50

BT Operating Frequency: 2402 – 2480MHz

ANT+ Operating Frequency: 2457 – 2457MHz

Tx Power$_{max}$: +4.0dBm
Antenna gain 0dBi

EIRP = + 4.0dBm

ERP = 4.0-2.15dBm = 1.85dBm (1.53mW)

Consider minimum separation distance (R) = 5mm (0.005m)

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)   Less than 1 mw Blanket exemption. P_{TH} = 0.001 W – (The HPR50 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 $\lambda/2\pi$

For the HPR50:

2.4GHz operation - $\lambda/2\pi$ = 0.02m

The HPR50 separation distance equals 0.005m therefore this clause is not applicable.

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

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

Where

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

and

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

d = the separation distance (cm);

For the EPR50 @ 2.4GHz Operation:

From §1.1307(b)(3)(B) :

$ERP_{20\ cm}$ = 3060 mW

$x = -\log_{10}(60/(3060 * \sqrt{2.4}))$
$= -\log_{10}(0.0127) = 1.898$

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

$= 3060\ (0.5/20)^{1.898}$

= 2.79mW (4.45dBm)

= 6.98mW (8.43dBm) - includes x2.5 10gm extremity exemption limit

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

The EPR50 max. transmitter power @ 2.4GHz = 1.85dBm ERP (< 8.43dBm P_{th}) so the ERP50 is therefore exempt from evaluation for the individual BT and ANT+ transmitters.