playbrush

RF Exposure Analysis – SAR Test Exemption – A122

FCC ID: 2AF47A122

The device operates in the 2.4GHz band (2402-2480MHz).

The following FCC Rule Parts are applicable:

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

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

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

For the A122

Operating Frequency: 2402 – 2480MHz

Specified Tx Power: +4.0dBm max. conducted (2.5mW)

Antenna gain = 0dBi

EIRP = 4.0dBm

ERP = EIRP-2.15dBm = +1.85dBm (1.53mW)

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)   No more than 1 mw Blanket exemption. P_{TH} = 1.0mW – (the A122 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 A122:

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

Separation distance equals 0.005m 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:

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

Where

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

and

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

d = the separation distance (cm);

For 2.4GHz Operation:

For SAR test exemption (iii):

§1.1307(b)(3)(B) :

$$ERP_{20\ cm} = 3060 \text{ mW}$$

$$x = -\log_{10}(60/(3060\ \sqrt{2.402}))$$
$$= -\log_{10}(0.0127) = 1.898$$

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

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

$$= 2.79\text{mW} \ (4.5\text{dBm})$$
(P_{th} = device transmitter power ERP or conducted time averaged, whichever is greater)

The max. A122 conducted transmitter power (4.0dBm) is greater than the A122 ERP (1.85dBm).

The max. A122 conducted transmitter power (4.0dBm) does not exceed P_{th} (4.5dBm), so the A122 is therefore exempt from SAR evaluation in accordance with §1.1307(b)(3).

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