

FCC§15.247 (i), §1.1307 (b) (3) & §2.1093 – RF EXPOSURE

Applicable Standard

According to FCC §2.1093 and §1.1307(b) (3), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

According to KDB 447498 D04 Interim General RF Exposure Guidance

SAR-Based Exemption:

SAR-based thresholds are derived based on frequency, power, and separation distance of the RF source. The formula defines the thresholds in general for either available maximum timeaveraged power or maximum time-averaged ERP, whichever is greater.

Per § 1.1307(b)(3)(i)(B), for single RF sources (i.e., any single fixed RF source, mobile device, or portable device, as defined in paragraph (b)(2) of this section): A single RF source is exempt if:

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);

For worst case:

Consider face up (hand held):

Mode	Frequency	Maximum Tune-up Conducted Power	Antenna Gain		ERP	Distance	SAR-Based Exclusion Threshold		SAR-Based Exclusion
	(MHz)	(dBm)	(dBi)	(dBd)	(dBm)	(mm)	(mW)	(dBm)	
BLE	2402-2480	5.5	0	-2.15	3.35	5	6.79	8.32	Yes

Note 1: The tune-up power was declared by the applicant.

Note 2: 0dBd=2.15dBi.

Note 3: for hand held device, a factor of 2.5 was applied to the exemption threshold for extremity SAR evaluation

Consider Body worn:

Mode	Frequency	Maximum Tune-up Conducted Power	Antenna Gain		ERP	Distance	SAR-Based Exclusion Threshold		SAR-Based Exclusion
	(MHz)	(dBm)	(dBi)	(dBd)	(dBm)	(mm)	(mW)	(dBm)	
BLE	2402-2480	5.5	0	-2.15	3.35	24	53.92	17.32	Yes

Note 1: The tune-up power was declared by the applicant.

Note 2: 0dBd=2.15dBi.



So the stand-alone SAR test can be exempted.