

SAR test exclusion considerations

FCC Regulation(s): Part 1.1307

Guidance Applied: KDB 447498 D04v01

Part 1.1307(b)(3) Determination of exemption.

(i) 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:

(A) The available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption may not be used in conjunction with other exemption criteria other than those in paragraph (b)(3)(ii)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(ii)(A);

(B) Or 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);

(C) Or using Table 1 and the minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. For the exemption in Table 1 to apply, R must be at least $\lambda/2\pi$, where λ is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical dimensions of the radiating structure(s) do not exceed the electrical length of $\lambda/4$ or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

Table 1 to § 1.1307(b)(3)(i)(C)—Single RF Sources Subject to Routine Environmental Evaluation

RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	$1,920 R^2$.
1.34-30	$3,450 R^2/f^2$.
30-300	$3.83 R^2$.
300-1,500	$0.0128 R^2 f$.
1,500-100,000	$19.2 R^2$.

Determination of exemption

Part 1.1307(b)(3)(i)(b)

RF feature	Mode	Transmitting Frequency(MHz)	Separation distance (Cm)	Measured average power (dBm)	Max. power with tune-up tolerance (dBm)	Ant. Gain (dBi)	Max. power with tune-up tolerance (mW)	ERP (mW)	SAR test exclusion thresholds (mW)
BLE	1Mbps	2480.0	1.50	4.01	5.0	3.85	3.16	4.68	22.03

Part 1.1307(b)(3)(i)(c)

RF feature	Mode	Transmitting Frequency(MHz)	Separation distance (Cm)	Measured average power (dBm)	Max. power with tune-up tolerance (dBm)	Ant. Gain (dBi)	Max. power with tune-up tolerance (mW)	ERP (mW)	SAR test exclusion thresholds (mW)
UWB	UWB Ant 0	7897.2	1.50	-15.45	-15.0	5.49	0.03	0.07	4.32

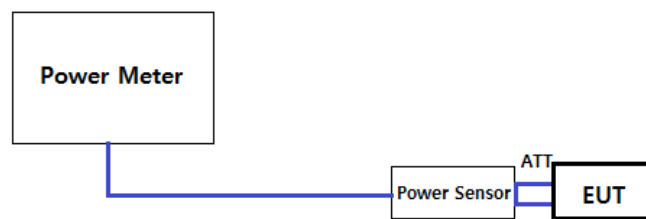
ERP: Max. power with tune-up tolerance + Antenna gain (dBi) – 2.15 dB

Note 1: The device must be installed with a minimum separation distance of 15 mm from user for RF exposure compliance.

Note 2: Please refer to the operation description for max tune-up power.

Note 3: UWB and BLE do not transmit simultaneously.

Test Set-up



The conducted average power was measured using a wideband gated RF power meter and gate parameters was adjusted such that the power is measured only when the EUT is transmitting at its maximum power.

Test Equipment List

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
Power Meter & Wide Bandwidth Sensor	Anritsu	ML2496A	25/11/26	26/11/26	1338004
		MA2411B	25/11/26	26/11/26	1911481

Conclusion: SAR evaluation for general population exposure conditions by measurement or numerical simulation is not required