

RF Exposure evaluation

According to 447498 D01 General RF Exposure Guidance v06:

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$ for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

$f(\text{GHz})$ is the RF channel transmit frequency in GHz.

Power and distance are rounded to the nearest mW and mm before calculation.

The result is rounded to one decimal place for comparison.

$$\text{eirp} = p_t \times g_t = (E \times d)^2 / 30$$

where:

p_t = transmitter output power in watts,

g_t = numeric gain of the transmitting antenna (unitless),

E = electric field strength in V/m, --- $10^{((\text{dBuV/m})/20)}/10^6$,

d = measurement distance in meters (m)--- 3m.

$$\text{So } p_t = (E \times d)^2 / (30 \times g_t)$$

Worse case is as below:

BLE:

2440MHz -8.305 dBm (0.148 mW) output power

$$(0.148\text{mW} / 5\text{mm}) \cdot [\sqrt{2.440(\text{GHz})}] = \underline{0.046}$$

Antenna+(2457MHz):

Field strength = 88.30 dBuV/m @3m

Ant gain -0.62 dBi; so Ant numeric gain=0.87

$$\text{So } p_t = \{ [10^{(88.30/20)} / 10^6 \times 3]^2 / (30 \times 0.87) \} \times 1000\text{mW} = \underline{0.233\text{mW}}$$

$$\text{So } (0.233\text{mW} / 5\text{mm}) \times \sqrt{2.457\text{GHz}} = \underline{0.073}$$

$$0.046 + 0.073 = 0.119 < 3.0 \text{ for 1-g SAR}$$

Then SAR evaluation is not required.