

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.

Worse case is as below:

BLE:

2480MHz -2.071dBm (0.621mW) output power

$(0.621\text{mW} / 5\text{mm}) \cdot [\sqrt{2.480(\text{GHz})}] = 0.2 < 3.0$ for 1-g SAR

ANT+:

Field strength = 91.28 dBuV/m @3m

Ant gain 0.22 dBi; so Ant numeric gain=1.05

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

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.

So $p_t = (E \times d)^2 / (30 \times g_t) = \{ [10^{(91.28/20)/10^6} \times 3]^2 / (30 \times 1.05) \} \times 1000\text{mW} = 0.384 \text{ mW}$

So $(0.384\text{mW} / 5\text{mm}) \times \sqrt{2.457 \text{ GHz}} = 0.12 < 3.0$ for 1-g SAR

BLE and ANT+ transmit at the same time:

$0.2 + 0.12 = 0.32 < 3.0$ for 1-g SAR

Then SAR evaluation is not required.