

RF Exposure evaluation

According to KDB 447498 D01 General RF Exposure Guidance v05
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:
[(max. power of channel, including tune-up tolerance, mW) / (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

$$\text{eirp} = \text{pt} \times \text{gt} = (\text{Exd})^2 / 30$$

where:

pt = transmitter output power in watts,

gt = 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

$$\text{So pt} = (\text{Exd})^2 / 30 \times \text{gt}$$

The worst case is below:

For Bluetooth:

Field strength = 96.65dBuV/m @3m

Ant gain 0.85dBi; so Ant numeric gain=1.22

$$\text{So pt} = \{ [10^{(96.65/20)} / 10^6 \times 3]^2 / (30 \times 1.22) \} \times 1000 \text{mW} = 1.137 \text{mW}$$

$$\text{So } (1.137 \text{mW} / 5 \text{mm}) \times \sqrt{2.441 \text{GHz}} = 0.355$$

For 2.4G wireless:

Field strength = 89.66dBuV/m @3m

Ant gain 0dBi; so Ant numeric gain=1

$$\text{So pt} = \{ [10^{(89.66/20)} / 10^6 \times 3]^2 / 30 \} \times 1000 \text{mW} = 0.277 \text{mW}$$

$$\text{So } (0.277 \text{mW} / 5 \text{mm}) \times \sqrt{2.402 \text{GHz}} = 0.086$$

Bluetooth and 2.4G wireless can transmit at the same time:

So the worst case is $0.355 + 0.086 = 0.441 < 3.0$ for 1-g SAR

Then SAR evaluation is not required