

KDB 447498

General SAR test reduction and exclusion guidance

Section 4.3 General SAR test reduction and exclusion guidance

For Standalone SAR exclusion consideration, when SAR Exclusion Threshold requirement in KDB 447498 is satisfied, standalone SAR evaluation for general population exposure conditions by measurement or numerical simulation is not required.

In the frequency range below 100 MHz to 6 GHz and test separation distance of <5mm, the SAR Test Exclusion Threshold for operation in the 2400 – 2483.5 MHz band will be determined as follows

SAR Exclusion Threshold (SARET)

$$NT = [(MP/TSD^A) * \sqrt{f_{GHz}}]$$

NT = Numeric Threshold (3.0 for 1-g SAR and 7.5 for 10-g SAR)
 MP = Max Power of channel (mW) (inc tune up)
 TSD = When the minimum *test separation distance* is < 5 mm, a distance of 5 mm

We can transpose this formula to allow us to find the maximum power of a channel allowed and compare this to the measured maximum power.

$$= [(NT \times TSD) / \sqrt{f_{GHz}}]$$

Wi-Fi Operating Frequency 2.412 GHz

SARET = $[(3.0 \times 5) / \sqrt{2.412}]$
 SARET = $[15 / 1.55]$
 SARET = 9.677mW

Wi-Fi Operating Frequency 2.437 GHz

SARET = $[(3.0 \times 5) / \sqrt{2.437}]$
 SARET = $[15 / 1.56]$
 SARET = 9.615mW

Wi-Fi Operating Frequency 2.462 GHz

SARET = $[(3.0 \times 50) / \sqrt{2.462}]$
 SARET = $[15 / 1.57]$
 SARET = 9.554mW

BTLE Operating Frequency 2.402 GHz

$$\begin{aligned}
 \text{SARET} &= [(3.0 \times 5) / \sqrt{2.402}] \\
 \text{SARET} &= [15 / 1.55] \\
 \text{SARET} &= 9.677 \text{mW}
 \end{aligned}$$

BTLE Operating Frequency 2.440 GHz

$$\begin{aligned}
 \text{SARET} &= [(3.0 \times 5) / \sqrt{2.442}] \\
 \text{SARET} &= [15 / 1.56] \\
 \text{SARET} &= 9.615 \text{mW}
 \end{aligned}$$

BTLE Operating Frequency 2.480 GHz

$$\begin{aligned}
 \text{SARET} &= [(3.0 \times 5) / \sqrt{2.48}] \\
 \text{SARET} &= [15 / 1.57] \\
 \text{SARET} &= 9.554 \text{mW}
 \end{aligned}$$

Section 7.2 Transmitters used in mobile device exposure conditions for simultaneous transmission operations

Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneously transmitting antennas incorporated in a host device is ≤ 1.0 , according to calculated/estimated, numerically modelled, or measured field strengths or power density. The MPE ratio of each antenna is determined at the minimum *test separation distance* required by the operating configurations and exposure conditions of the host device, according to the ratio of field strengths or power density to the MPE limit at the test frequency. Worst case figures are recorded for each radio for simultaneous operation.

Band	EIRP (mW)	Antenna Gain (dBi)	Duty Cycle (%)	Time Averaged EIRP (mW)	SAR Exclusion Threshold (mW)	Ratio
Bluetooth LE	1.93	1.7	100.00	2.8576	9.62	0.2972
Wi-Fi	80.91	0	1.00	0.8091	9.55	0.0847
Sum of Ratios of simultaneously operating radios						0.38
Ratio Limit						< 1.0