

General SAR test reduction and exclusion guidance

KDB 447498

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 50mm, the SAR Test Exclusion Threshold for operation in the 2400 – 2483.5 MHz band will be determined as follows

SAR Exclusion Threshold (SARET)

$$\text{SAR Exclusion Threshold} = \text{Step 1} + \text{Step 2}$$

Step 1

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

$$\begin{aligned} NT &= \text{Numeric Threshold (3.0 for 1-g SAR and 7.5 for 10-g SAR)} \\ MP &= \text{Max Power of channel (mW) (inc tune up)} \\ TSD^A &= \text{Min Test separation Distance or 50mm (whichever is lower) = 50} \end{aligned}$$

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.

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

For Distances Greater than 50 mm Step 2 applies

Step 2

$$(TSD^B - 50mm) * 10\}$$

Where:

$$TSD^B = \text{Min Test separation Distance (mm)} = 50$$

Operating Frequency 2.402 GHz

$$\begin{aligned}\text{SARET} &= [(3.0 \times 50) / \sqrt{2.402}] + \{(50 - 50) * 10\} \\ \text{SARET} &= [150 / 1.55] + (0 * 10) \\ \text{SARET} &= 96.77 \text{mW}\end{aligned}$$

Operating Frequency 2.440 GHz

$$\begin{aligned}\text{SARET} &= [(3.0 \times 50) / \sqrt{2.44}] + \{(50 - 50) * 10\} \\ \text{SARET} &= [150 / 1.56] + (0 * 10) \\ \text{SARET} &= 96.15 \text{mW}\end{aligned}$$

Operating Frequency 2.480 GHz

$$\begin{aligned}\text{SARET} &= [(3.0 \times 50) / \sqrt{0.92760}] + \{(50 - 50) * 10\} \\ \text{SARET} &= [150 / 1.57] + (0 * 10) \\ \text{SARET} &= 95.54 \text{mW}\end{aligned}$$

Channel Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	EIRP (mW)	SAR Exclusion Threshold	SAR Evaluation
2402	6.41	1.95	6.85	96.77	Not Required
2440	6.42	1.95	6.87	96.15	Not Required
2480	6.43	1.95	6.89	95.54	Not Required

Therefore standalone SAR evaluation for general population exposure conditions by measurement or numerical simulation is not required.

Appendix G Continued**MPE Calculation****47 CFR §§1.1310****Prediction of MPE limit at a given distance**

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = \frac{EIRP}{4\pi R^2} \text{ re - arranged } R = \sqrt{\frac{EIRP}{S 4\pi}}$$

where:

S = power density

R = distance to the centre of radiation of the antenna

EIRP = EUT Maximum power

Note:

The EIRP was calculated by addition on the maximum conducted carrier power 7.95 dBm (6.24 mW) and the maximum antenna gain (2dBi).

Result

Prediction Frequency (MHz)	Maximum EIRP (mW)	Power density limit (S) (mW/cm ²)	Distance (R) cm Required to be less than 1 mW/cm ²
2402		1	
2440		1	
2480		1	