

15 General SAR test reduction & exclusion guidance / RF Exposure

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.

The SAR Test Exclusion Threshold for 100 MHz to 6 GHz will be determined as follows.

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

Step 1

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

NT	=	Numeric Threshold (3.0 for 1-g SAR and 7.5 for 10-g SAR)
MP	=	Max Power of channel (mW) (including tune-up tolerance)
TSD ^A	=	Min Test separation Distance or 50mm (whichever is lower)
	=	5mm (in this case)

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.

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

For Distances Greater than 50 mm Step 2 applies

Step 2

$$(TSD^B - 50\text{mm}) * 1$$

Where:

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

Note: Step 2 doesn't apply here as the TSD^A is less than 50 mm

Operating Frequency 2.402 GHz

$$\text{SARET} = [(3.0 \times 5) / \sqrt{2.402}]$$

$$\text{SARET} = 9.68\text{mW}$$

Operating Frequency 2.426 GHz

$$\text{SARET} = [(3.0 \times 5) / \sqrt{2.426}]$$

$$\text{SARET} = 9.63\text{mW}$$

Operating Frequency 2.480 GHz

$$\text{SARET} = [(3.0 \times 5) / \sqrt{2.480}]$$

$$\text{SARET} = 9.53\text{mW}$$

Channel Frequency (MHz)	EIRP (mW)	SAR Exclusion Threshold (mW)	SAR Evaluation
2402	0.027	9.68	Not Required
2426	0.020	9.63	Not Required
2480	0.018	9.53	Not Required

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

Prediction of MPE limit at a given distance

Equation from IEEE C95.1

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

Where:

S = power density

R = distance to the centre of radiation of the antenna

EIRP = EUT Maximum power

FCC Result

Prediction Frequency (MHz)	Maximum EIRP (mW)	Power density limit (S) (mW/cm ²)	Distance required to be less than the power density limit (R) (cm)
2402	0.027	1	0.047

IC Result

Prediction Frequency (MHz)	Maximum EIRP (W)	Exemption limit (W)	RF Exposure
2402	0.000027	5	Not Required