

14 Radio Frequency Radiation Exposure

14.1 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 50mm, the SAR Test Exclusion Threshold for operation in the 1920 MHz – 1930 MHz band will be determined as follows

SAR Exclusion Threshold (SARET)

SAR Exclusion Threshold = Step 1 + Step 2

Step 1

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

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^A = Min Test separation Distance or 50mm (whichever is lower) = 50

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.

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

For Distances Greater than 50 mm Step 2 applies

Step 2

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

Where:

TSD^B = Min Test separation Distance (mm) = 50

Operating Frequency 1.921536 GHz

SARET = $[(3.0 * 50) / \sqrt{1.921536}] + \{(50 - 50) * 10\}$
 SARET = $[150 / 1.38] + (0 * 10)$
 SARET = 108.21mW

Operating Frequency 1.928448 GHz

SARET = $[(3.0 * 50) / \sqrt{1.928448}] + \{(50 - 50) * 10\}$
 SARET = $[150 / 1.39] + (0 * 10)$
 SARET = 108.02mW

Channel Frequency (MHz)	EIRP (mW)	Exclusion Threshold	Evaluation
1921.536	100.9	108.21	Exempt
1928.448	100.2	107.02	Exempt

Therefore evaluation for general population exposure conditions by measurement or numerical simulation is required.

14.2 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

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

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 dBm (Base, Left antenna 1) and the maximum antenna gain.

Result

Prediction Frequency (MHz)	Conducted Carrier power (dBm)	Antenna Gain (dBi)	Maximum EIRP (mW)	Power density limit (S) (mW/cm ²)	Distance (R) cm Required to be less than 1 mW/cm ²
1921.536	18.04	2	100.9	1	1.3
1924.992	18.02	2	100.5	1	1.3
1928.448	18.01	2	100.2	1	1.3