

RF Exposure Compliance Requirement

$$E \text{ (V/m)} = (30 \cdot P \cdot G)^{0.5} / d$$

E=Electric Field (V/m)

Remark: $E \text{ (V/m)} = 10 \times (\text{dBuV/m}) / 20 \times 10^{-6}$

P=Peak RF output Power (W)

G=EUT Antenna numeric gain (numeric)

d= Separation distance between radiator and human body (m)

in the formula above:

d=3m, E =50.9dBuV/m (max. value provided by client), antenna gain=0dBi

P=0.0000369mW

In KDB 447498 D01 v06: 4.3.1 Standalone SAR test exclusion considerations:

- a) For 100 MHz to 6 GHz and *test separation distances* ≤ 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following:

$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f_{\text{(GHz)}}}] \leq 3.0 \text{ for 1-g SAR, and } \leq 7.5 \text{ for 10-g extremity SAR,}^{30} \text{ where}$$

- $f_{\text{(GHz)}}$ is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation³¹
- The result is rounded to one decimal place for comparison
- The values 3.0 and 7.5 are referred to as *numeric thresholds* in step b) below

The test exclusions are applicable only when the minimum *test separation distance* is ≤ 50 mm, and for transmission frequencies between 100 MHz and 6 GHz. When the minimum *test separation distance* is < 5 mm, a distance of 5 mm according to 4.1 f) is applied to determine SAR test exclusion.

- b) For 100 MHz to 6 GHz and *test separation distances* > 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following (also illustrated in Appendix B):³²
- $\{[\text{Power allowed at numeric threshold for 50 mm in step a)}] + [(\text{test separation distance} - 50 \text{ mm}) \cdot (f_{\text{(MHz)}}/150)]\}$ mW, for 100 MHz to 1500 MHz
 - $\{[\text{Power allowed at numeric threshold for 50 mm in step a)}] + [(\text{test separation distance} - 50 \text{ mm}) \cdot 10]\}$ mW, for > 1500 MHz and ≤ 6 GHz
- c) For frequencies below 100 MHz, the following may be considered for SAR test exclusion (also illustrated in Appendix C):³³
- For *test separation distances* > 50 mm and < 200 mm, the power threshold at the corresponding test separation distance at 100 MHz in step b) is multiplied by $[1 + \log(100/f_{\text{(MHz)}})]$
 - For *test separation distances* ≤ 50 mm, the power threshold determined by the equation in c) 1) for 50 mm and 100 MHz is multiplied by $\frac{1}{2}$
 - SAR measurement procedures are not established below 100 MHz.

Formulas as below:

$$P \leq (3 \times m) / \sqrt{f_{\text{(GHz)}}} \quad \text{a)}$$

P is the max. power of channel, including tune-up tolerance, mW

m is min.test separation distance, mm

$f_{(GHz)}$ is the RF channel transmit frequency in GHz

$$P \leq (3 \times 50) / \sqrt{f_{(GHz)} + (m-50) \times f_{(MHz)} / 150} \quad b)1)$$

$$P \leq [(3 \times 50) / \sqrt{0.1 + (m-50) \times 100 / 150}] \times [1 + \lg(100 / f_{(MHz)})] \quad c)1)$$

$$P \leq \{[(3 \times 50) / \sqrt{0.1 + (50-50) \times 100 / 150}] \times (1 + \lg 100 / 100)\} \times 1/2 \quad c)2)$$

$$P \leq 237.19 \text{ mW}$$

The SAR Test Exclusion Threshold is calculated from:

$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0 \text{ for 1-g SAR.}$$

The worst case test separation distance is **5mm**.

The transmission frequencies of the device are below 100 MHz.

The SAR Test Exclusion Threshold (mW) are listed below:

Transmit frequency (MHz)	ERP (mW)	SAR Test Exclusion Threshold (mW)
13.56	0.0000369	237.19