

RF Exposure Letter

For frequencies below 100 MHz, the following may be considered for SAR test exclusion

MPE Assessment Limit

Mobile device exposure for standalone operations:

According to §1.1310, the limit for general population/uncontrolled exposures

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

Note: f = frequency in MHz. * = Plane-wave equivalent power density.

Mobile device exposure for simultaneous transmission operations: **the sum of the MPE ratios for all simultaneously transmitting antennas incorporated in a host device is ≤ 1.0**

RF exposure Calculations

RF Exposure Calculations:

The following information provides the minimum separation distance for the highest gain antenna provided. This calculation is based on the conducted power, considering maximum power and antenna gain. The formula shown in KDB 447498 D01 is used in the calculation.

Equation from KDB 447498 D01 General RF Exposure Guidance v06 (10/23/2015) is:

$$S = PG / 4\pi R^2$$

Where: S = power density (in appropriate units, e.g. mW/cm²)

P = Time-average maximum tune up procedure (in appropriate units, e.g., mW)

G = the numeric gain of the antenna

R = distance to the center of radiation of the antenna (20 cm = limit for MPE)

Signal 1:13.56MHz

d=3m

$$\text{EIRP(dBm)} = E(\text{dB } \mu \text{ V/m}) - 95.3 \text{mW} = 10[\text{dBm}/10]$$

$$pt = 46.17 \text{ dBuV/m} = -49.059 \text{ dBm} = 0.000012 \text{ mW}$$

$$\text{Power Density} = (1 * 0.000012) / (4 * 3.1416 * 20^2) = 0.000000002387 \text{ (mW/cm}^2\text{)}$$

So $(0.000000002387 \text{ mW/cm}^2 < 13.3 \text{ mW/cm}^2$ Then SAR evaluation is not required)

Signal 2:13.56MHz

d=3m

$$\text{EIRP(dBm)} = E(\text{dB } \mu \text{ V/m}) - 95.3 \text{mW} = 10[\text{dBm}/10]$$

$$pt = 45.74 \text{ dBuV/m} = -49.489 \text{ dBm} = 0.000011 \text{ mW}$$

$$\text{Power Density} = (1 * 0.000011) / (4 * 3.1416 * 20^2) = 0.000000002188 \text{ (mW/cm}^2\text{)}$$

So $(0.000000002188 \text{ mW/cm}^2 < 13.3 \text{ mW/cm}^2$ Then SAR evaluation is not required)

Synchronous launch:

$$\text{Power Density} = 4G: 0.1221/0.5303 + 4G: 0.1221/0.5303 + \text{BT\&Wi-Fi: } 0.1734/1 + \text{NFC: } 0.000000002387/13.3 + \text{NFC: } 0.000000002188/13.3 = 0.6339$$

So $0.6339 < 1$

Then SAR evaluation is not required