

RF EXPOSURE EVALUATION**1.1 Limit**

According to §1.1310 and §2.1091 RF exposure is calculated.

(B) Limits for General Population/Uncontrolled Exposures

Frequency range (MHz)	Electric field Strength	Magnetic field Strength	Power density	Averaging time
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

F = frequency in MHz

* = Plane-wave equivalent power density

1.2 MAXIMUM PERMISSIBLE EXPOSURE Prediction

Prediction of MPE limit at a given distance

Power density at the specific separation:

$S = PG/(4R^2 \pi)$	Where,
$S = (30.13 * 2.14) / (4 * 20^2 * \pi)$	S = Maximum power density (mW/cm ²)
$S = 0.0128 \text{ mW/cm}^2$	P = Power input to the antenna (mW)
	G = Numeric power gain of the antenna
	R = Distance to the center of the radiation of the antenna
	(20 cm = limit for MPE)

1.3 MAXIMUM PERMISSIBLE EXPOSURE Prediction**3-1. Sigfox Mode**

Max Peak output Power at antenna input terminal	23.639	dBm
Max Peak output Power at antenna input terminal	231.153	mW
Prediction distance	20.000	cm
Prediction frequency	920.138	MHz
Antenna Gain(typical)	2.010	dBi
Antenna Gain(numeric)	1.589	-
Power density at prediction frequency(S)	0.0731	mW/cm ²
MPE limit for uncontrolled exposure at prediction frequency	0.613	mW/cm ²

3-2. Bluetooth LE Mode

Max Peak output Power at antenna input terminal	7.480	dBm
Max Peak output Power at antenna input terminal	5.598	mW
Prediction distance	20.000	cm
Prediction frequency	2480.000	MHz
Antenna Gain(typical)	4.440	dBi
Antenna Gain(numeric)	2.780	-
Power density at prediction frequency(S)	0.0031	mW/cm ²
MPE limit for uncontrolled exposure at prediction frequency	1.000	mW/cm ²

3-3. WLAN Mode

Max Peak output Power at antenna input terminal	22.000	dBm
Max Peak output Power at antenna input terminal	158.489	mW
Prediction distance	20.000	cm
Prediction frequency	2437.000	MHz
Antenna Gain(typical)	4.440	dBi
Antenna Gain(numeric)	2.780	-
Power density at prediction frequency(S)	0.0876	mW/cm ²
MPE limit for uncontrolled exposure at prediction frequency	1.000	mW/cm ²

Simultaneous transmission operations

1. The power density level at 20 cm is 0.0731 mW/cm², which is below the uncontrolled exposure limit of 0.613 mW/cm² at Sigfox.
2. The power density level at 20 cm is 0.0031 mW/cm², which is below the uncontrolled exposure limit of 1.0 mW/cm² at Bluetooth LE.
3. The power density level at 20 cm is 0.0876 mW/cm², which is below the uncontrolled exposure limit of 1.0 mW/cm² at WLAN.

->Simultaneous MPE 20cm is Sigfox(0.0731/1.0) + BT LE(0.0031/1.0) = 0.0762 mW/cm² < 0.613 mW/cm²

->Simultaneous MPE 20cm is BT LE(0.0031/1.0) + WLAN(0.0876/1.0) = 0.0907 mW/cm² < 1.000 mW/cm²