

**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 <sup>2</sup> )	30
30 - 300.....	27.5	0.073	0.2	30
300 - 1500.....	.....	.....	f/1500	30
1500 - 100.000.....	.....	.....	<b>1.0</b>	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:**

$S = PG/(4R^2 \pi)$ $S = (5.236 * 1.66) / (4 * 5^2 * \pi)$ $S = 2.77 \text{ mW/cm}^2$	<p>Where,</p> <p>S = Maximum power density (mW/cm<sup>2</sup>)</p> <p>P = Power input to the antenna (mW)</p> <p>G = Numeric power gain of the antenna</p> <p>R = Distance to the center of the radiation of the antenna (20 cm = limit for MPE)</p>
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**1.3 MAXIMUM PERMISSIBLE EXPOSURE Prediction**

- Calculated under the worst-case conditions of each mode.

(Measured power 7 dBm ± 0.5dB)

**3-1. 2.4 GHz Mode**

Max Peak output Power at antenna input terminal	7.19	dBm
Max Peak output Power at antenna input terminal	5.236	mW
Prediction distance	5	mm
Prediction frequency	2462	MHz
Antenna Gain(typical)	2.2	dBi
Antenna Gain(numeric)	1.66	-
Power density at prediction frequency( S)	2.77	mW/cm <sup>2</sup>
MPE limit for uncontrolled exposure at prediction frequency	0.045	mW/cm <sup>2</sup>

SAR Test exclusion thresholds for 100MHz to 6GHz at test separation distance ≤ 50 mm = **Used**

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] * [\sqrt{f(\text{GHz})}]$

$= [5.236 / 5] * [\sqrt{2.462}] = 1.64 \leq 3.0$ , for 1g SAR

**Thus, SAR for this device is not required.**

**3-2. 900 MHz RFID Mode**

Max Peak output Power at antenna input terminal	29.95	dBm
Max Peak output Power at antenna input terminal	998.78	mW
Prediction distance	50	mm
Prediction frequency	902.75	MHz
Antenna Gain(typical)	1.071	dBi
Antenna Gain(numeric)	1.28	-
Power density at prediction frequency( S)	402.96	mW/cm <sup>2</sup>
MPE limit for uncontrolled exposure at prediction frequency	201.48	mW/cm <sup>2</sup>

SAR Test exclusion thresholds for 100MHz to 6GHz at test separation distance ≤ 50 mm = **Used**

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] * [\sqrt{f(\text{GHz})}]$

$= [998.78 / 50] * [\sqrt{902.75}] = 18.79 \leq 3.0$ , for 1g SAR

**This product measured the SAR test for RFID.**

**3-2. 900 MHz RFID Mode**

Max Peak output Power at antenna input terminal	21.90	dBm
Max Peak output Power at antenna input terminal	154.88	mW
Prediction distance	5	mm
Prediction frequency	1880	MHz
Antenna Gain(typical)	0.94	dBi
Antenna Gain(numeric)	1.24	-
Power density at prediction frequency( S)	154.88	mW/cm <sup>2</sup>
MPE limit for uncontrolled exposure at prediction frequency	77.44	mW/cm <sup>2</sup>

SAR Test exclusion thresholds for 100MHz to 6GHz at test separation distance  $\leq 50$  mm = **Used**

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] * [\sqrt{f}(\text{GHz})]$

$= [154.88 / 5] * [\sqrt{1.880}] = 42.472 \leq 3.0$ , for 1g SAR

**This product measured the SAR test for LTE Band 2.**