

RF EXPOSURE EVULATION

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:

$S = PG / (4R^2 \pi)$ $S = (9.33 * 2.79) / (4 * 5^2 * \pi)$ $S = 0.083 \text{ mW/cm}^2$	<p>Where,</p> <p>S = Maximum power density (mW/cm²)</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 9.70 dBm \pm 0.5dB)****3-1. 2.4 GHz WLAN Mode**

Max Peak output Power at antenna input terminal	5.10	dBm
Max Peak output Power at antenna input terminal	3.24	mW
Prediction distance	5	cm
Prediction frequency	2,412	MHz
Antenna Gain(typical)	4.451	dBi
Antenna Gain(numeric)	2.79	-
Power density at prediction frequency(S)	0.13	mW/cm ²
MPE limit for uncontrolled exposure at prediction frequency	0.05	mW/cm ²

3-2. 5 GHz WLAN Mode

Max Peak output Power at antenna input terminal	-8.65	dBm
Max Peak output Power at antenna input terminal	0.14	mW
Prediction distance	5	cm
Prediction frequency	5,805	MHz
Antenna Gain(typical)	-2.41	dBi
Antenna Gain(numeric)	0.57	-
Power density at prediction frequency(S)	0.010	mW/cm ²
MPE limit for uncontrolled exposure at prediction frequency	0.004	mW/cm ²

3-3. BT Mode

Max Peak output Power at antenna input terminal	9.70	dBm
Max Peak output Power at antenna input terminal	9.33	mW
Prediction distance	5	cm
Prediction frequency	2,442	MHz
Antenna Gain(typical)	4.451	dBi
Antenna Gain(numeric)	2.79	-
Power density at prediction frequency(S)	0.23	mW/cm ²
MPE limit for uncontrolled exposure at prediction frequency	0.08	mW/cm ²

Simultaneous transmission operations

Since this product is operated by SISO and is used in RFID Handy-type products, consideration of the limb type SAR is given to 7.5.

WLAN

SAR Test exclusion thresholds for 100MHz to 6GHz at test separation distance ≤ 50 mm = **Used**
[(max.power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] * $[\sqrt{f(\text{GHz})}]$
= $[3.24 / 5] * [\sqrt{2.412}] = 1.006 \leq 7.5$, for 10g SAR

Thus, SAR for this device is not required.

BT

SAR Test exclusion thresholds for 100MHz to 6GHz at test separation distance ≤ 50 mm = **Used**
[(max.power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] * $[\sqrt{f(\text{GHz})}]$
= $[9.33 / 5] * [\sqrt{2.442}] = 2.478 \leq 7.5$, for 10g SAR

Thus, SAR for this device is not required.

Simultaneous transmission SAR test exclusion considerations

$1.006 + 2.478 = 3.484 \leq 7.5$ for 10g SAR

Thus, SAR for this device is not required.