

5 RSS-102 §4 – EXPOSURE LIMIT

5.1 Applicable Standard

According to RSS-102 §4:

For the purpose of this standard, Industry Canada has adopted the SAR and RF field strength limits established in Health Canada's RF exposure guideline, Safety Code 6.

Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)				
Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m ²)	Reference Period (minutes)
0.003-10 ²¹	83	90	-	Instantaneous*
0.1-10	-	0.73/ f	-	6**
1.1-10	87/ f ^{0.5}	-	-	6**
10-20	27.46	0.0728	2	6
20-48	58.07/ f ^{0.25}	0.1540/ f ^{0.25}	8.944/ f ^{0.5}	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 f ^{0.3417}	0.008335 f ^{0.3417}	0.02619 f ^{0.6834}	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/ f ^{1.2}
150000-300000	0.158 f ^{0.5}	4.21 x 10 ⁻⁴ f ^{0.5}	6.67 x 10 ⁻⁵ f	616000/ f ^{1.2}
Note: f is frequency in MHz. * Based on nerve stimulation (NS). ** Based on specific absorption rate (SAR).				

Calculated Formulary:

S = PG/4 π R² = power density (in appropriate units, e.g. W/m²);

P = power input to the antenna (in appropriate units, e.g., W);

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;

R = distance to the center of radiation of the antenna (appropriate units, e.g., m);

For simultaneously transmit system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

5.2 RF Exposure Evaluation Result

Beam-forming:

For the 2.4G Wi-Fi, as it can support the beam-forming function,

So Directional gain = GANT + $10 \cdot \log(2)$ · 2.4+3.01 = 5.41 dBi

Mode	Frequency Range (MHz)	Antenna Gain		Tune-up Average Power		Distances (mm)	Power Density (W/m ²)	RF Exp. Limit (W/m ²)
		(dBi)	(numeric)	(dBm)	(W)			
WIFI 2.4GHz	2412-2462	5.41	3.475	22.9	0.195	200	1.348	5.366
WIFI 5GHz	5180-5240	9.05	8.035	18.1	0.065	200	1.032	9.047
WIFI 5GHz	5745-5825	9.49	8.892	26	0.447	200	7.042	9.710

Non Beam-forming:

Mode	Frequency Range (MHz)	Antenna Gain		Tune-up Average Power		Distances (mm)	Power Density (W/m ²)	RF Exp. Limit (W/m ²)
		(dBi)	(numeric)	(dBm)	(W)			
WIFI 2.4GHz	2412-2462	2.4	1.738	26.1	0.407	200	1.408	5.366
WIFI 5GHz	5180-5240	4.8	3.020	18.2	0.066	200	0.396	9.047
WIFI 5GHz	5745-5825	5.8	3.802	29.6	0.912	200	6.898	9.710

The WIFI 2.4GHz and WIFI 5GHz cannot transmit simultaneously

Result: The device meets the exemption requirement.