

# RF Exposure Statement

## 1. LIMITS

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

(B) Limits for General Population/Uncontrolled Exposures

Frequency range (MHz)	Electric field Strength (V/m)	Magnetic field Strength (A/m)	Power density (mW/cm <sup>2</sup> )	Averaging time (minutes)
0.3 - 1.34.....	614	1.63	*(100)	30
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.....	.....	.....	1.0	30

F = frequency in MHz

\* = Plane-wave equivalent power density

## 2. MAXIMUM PERMISSIBLE EXPOSURE Prediction

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

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

S = Power density

P = power input to antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

### 3. RESULTS (DTS BAND)

#### 3-1. 2.4 GHz BAND

Max Peak output Power at antenna input terminal (dBm)	29.2500
Max Peak output Power at antenna input terminal (mW)	841.3951
Prediction distance (cm)	50.0000
Prediction frequency (MHz)	2437.0000
Antenna Gain(typical) (dBi)	5.9100
Antenna Gain(numeric)	3.8994
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.1044
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.0000

#### 3-2. 5.8 GHz BAND

Max Peak output Power at antenna input terminal (dBm)	27.4300
Max Peak output Power at antenna input terminal (mW)	553.3501
Prediction distance (cm)	50.0000
Prediction frequency (MHz)	5745.0000
Antenna Gain(typical) (dBi)	7.4600
Antenna Gain(numeric)	5.5719
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.0981
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.0000

**4.RESULTS (UNII 1 BAND)**

**4-1. 802.11a(5180 ~ 5240)**

Max Peak output Power at antenna input terminal (dBm)	10.4100
Max Peak output Power at antenna input terminal (mW)	10.9901
Prediction distance (cm)	50.0000
Prediction frequency (MHz)	5180.0000
Antenna Gain(typical) (dBi)	9.4000
Antenna Gain(numeric)	8.7096
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.0030
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.0000

**4-2.802.11n 20MHz BW(5180~5240)**

Max Peak output Power at antenna input terminal (dBm)	10.6200
Max Peak output Power at antenna input terminal (mW)	11.5345
Prediction distance (cm)	50.0000
Prediction frequency (MHz)	5240.0000
Antenna Gain(typical) (dBi)	9.4000
Antenna Gain(numeric)	8.7096
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.0032
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.0000

**4-3 802.11n 40MHz BW (5190 ~5230)**

Max Peak output Power at antenna input terminal (dBm)	13.3300
Max Peak output Power at antenna input terminal (mW)	21.5278
Prediction distance (cm)	50.0000
Prediction frequency (MHz)	5230.0000
Antenna Gain(typical) (dBi)	9.4000
Antenna Gain(numeric)	8.7096
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.0060
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.0000

**4-4 802.11ac 20MHz BW (5180~5240)**

Max Peak output Power at antenna input terminal (dBm)	10.8400
Max Peak output Power at antenna input terminal (mW)	12.1339
Prediction distance (cm)	50.0000
Prediction frequency (MHz)	5180.0000
Antenna Gain(typical) (dBi)	9.4000
Antenna Gain(numeric)	8.7096
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.0034
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.0000

4-5 802.11ac 40MHz BW(5190 ~ 5230)

Max Peak output Power at antenna input terminal (dBm)	12.4500
Max Peak output Power at antenna input terminal (mW)	17.5792
Prediction distance (cm)	50.0000
Prediction frequency (MHz)	5180.0000
Antenna Gain(typical) (dBi)	9.4000
Antenna Gain(numeric)	8.7096
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.0049
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.0000

4-5 802.11ac (5210)

Max Peak output Power at antenna input terminal (dBm)	9.6400
Max Peak output Power at antenna input terminal (mW)	9.2045
Prediction distance (cm)	50.0000
Prediction frequency (MHz)	5210.0000
Antenna Gain(typical) (dBi)	9.4000
Antenna Gain(numeric)	8.7096
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.0026
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.0000

**5. RESULTS (UNII 2A, 2C BAND)**

**5-1 802.11a (5260~5320) UNII 2A**

Max Peak output Power at antenna input terminal (dBm)	17.8100
Max Peak output Power at antenna input terminal (mW)	60.3949
Prediction distance (cm)	50.0000
Prediction frequency (MHz)	5260.0000
Antenna Gain(typical) (dBi)	9.4100
Antenna Gain(numeric)	8.7297
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.0168
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.0000

**5-2 802.11a (5500~5720) UNII 2C**

Max Peak output Power at antenna input terminal (dBm)	18.3300
Max Peak output Power at antenna input terminal (mW)	68.0769
Prediction distance (cm)	50.0000
Prediction frequency (MHz)	5720.0000
Antenna Gain(typical) (dBi)	8.5300
Antenna Gain(numeric)	7.1285
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.0154
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.0000

5-3 802.11n 20MHz BW(5500~5270) UNII 2C

Max Peak output Power at antenna input terminal (dBm)	20.3200
Max Peak output Power at antenna input terminal (mW)	107.6465
Prediction distance (cm)	50.0000
Prediction frequency (MHz)	5720.0000
Antenna Gain(typical) (dBi)	8.5300
Antenna Gain(numeric)	7.1285
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.0244
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.0000

5-4 802.11ac 20MHz BW(5260~5320) UNII 2A

Max Peak output Power at antenna input terminal (dBm)	17.7300
Max Peak output Power at antenna input terminal (mW)	59.2925
Prediction distance (cm)	50.0000
Prediction frequency (MHz)	5260.0000
Antenna Gain(typical) (dBi)	9.4100
Antenna Gain(numeric)	8.7297
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.0165
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.0000

5-5 802.11ac 20MHz BW(5500~5720) UNII 2C

Max Peak output Power at antenna input terminal (dBm)	20.3100
Max Peak output Power at antenna input terminal (mW)	107.3989
Prediction distance (cm)	50.0000
Prediction frequency (MHz)	5720.0000
Antenna Gain(typical) (dBi)	8.5300
Antenna Gain(numeric)	7.1285
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.0244
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.0000

5-6 802.11n 40MHz BW(5270~5310) UNII 2A

Max Peak output Power at antenna input terminal (dBm)	13.0500
Max Peak output Power at antenna input terminal (mW)	20.1837
Prediction distance (cm)	50.0000
Prediction frequency (MHz)	5310.0000
Antenna Gain(typical) (dBi)	9.4100
Antenna Gain(numeric)	8.7297
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.0056
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.0000

5-7 802.11n 40MHz BW(5510~5710) UNII 2C

Max Peak output Power at antenna input terminal (dBm)	19.6300
Max Peak output Power at antenna input terminal (mW)	91.8333
Prediction distance (cm)	50.0000
Prediction frequency (MHz)	5710.0000
Antenna Gain(typical) (dBi)	8.5300
Antenna Gain(numeric)	7.1285
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.0208
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.0000

5-8 802.11ac 40MHz BW(5270~5310) UNII 2A

Max Peak output Power at antenna input terminal (dBm)	12.1800
Max Peak output Power at antenna input terminal (mW)	16.5196
Prediction distance (cm)	50.0000
Prediction frequency (MHz)	5310.0000
Antenna Gain(typical) (dBi)	9.4100
Antenna Gain(numeric)	8.7297
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.0046
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.0000

5-9 802.11ac 40MHz BW(5510~5710) UNII 2C

Max Peak output Power at antenna input terminal (dBm)	19.7600
Max Peak output Power at antenna input terminal (mW)	94.6237
Prediction distance (cm)	50.0000
Prediction frequency (MHz)	5710.0000
Antenna Gain(typical) (dBi)	8.5300
Antenna Gain(numeric)	7.1285
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.0215
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.0000

5-10 802.11ac 80MHz BW(5290) UNII 2A

Max Peak output Power at antenna input terminal (dBm)	11.5800
Max Peak output Power at antenna input terminal (mW)	14.3880
Prediction distance (cm)	50.0000
Prediction frequency (MHz)	5290.0000
Antenna Gain(typical) (dBi)	9.4100
Antenna Gain(numeric)	8.7297
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.0040
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.0000

5-11 802.11ac 80MHz BW(5530~5690) UNII 2C

Max Peak output Power at antenna input terminal (dBm)	19.8600
Max Peak output Power at antenna input terminal (mW)	96.8278
Prediction distance (cm)	50.0000
Prediction frequency (MHz)	5690.0000
Antenna Gain(typical) (dBi)	8.5300
Antenna Gain(numeric)	7.1285
Power density at prediction frequency (mW/cm <sup>2</sup> )	0.0220
MPE limit for uncontrolled exposure at prediction frequency (mW/cm <sup>2</sup> )	1.0000

### 3. RESULTS

#### DTS BAND

1. The power density level at 50 cm is **0.1044 mW/cm<sup>2</sup>**, which is below the uncontrolled exposure limit of **1.0 mW/cm<sup>2</sup> at 2.4GHz BAND**
2. The power density level at 50 cm is **0.0981 mW/cm<sup>2</sup>**, which is below the uncontrolled exposure limit of **1.0 mW/cm<sup>2</sup> at 5.8GHz BAND**

->Simultaneous MPE 50cm is  $(0.1044/1.0) + (0.0981/1.0) < 1$

\*The Worst case Adapter 2.4GHz 2Tx MiMo:29.25dBi, 5GHz 2Tx MiMO 27.43dBi

is Highest power

#### UNII 1 BAND

1. The power density level at 50 cm is **0.00030 mW/cm<sup>2</sup>**, which is below the uncontrolled exposure limit of **1.0 mW/cm<sup>2</sup> at 802.11a(5180~5240) BAND**
2. The power density level at 50 cm is **0.0032 mW/cm<sup>2</sup>**, which is below the uncontrolled exposure limit of **1.0 mW/cm<sup>2</sup> at 802.11n\_20MHz BW(5180~5240) BAND**
3. The power density level at 50 cm is **0.0060 mW/cm<sup>2</sup>**, which is below the uncontrolled exposure limit of **1.0 mW/cm<sup>2</sup> at at 802.11n\_40MHz BW(5190~5230) BAND**
4. The power density level at 50 cm is **0.0034 mW/cm<sup>2</sup>**, which is below the uncontrolled exposure limit of **1.0 mW/cm<sup>2</sup> at at 802.11ac\_20MHz BW(5180~5240) BAND**
5. The power density level at 50 cm is **0.0049 mW/cm<sup>2</sup>**, which is below the uncontrolled exposure limit of **1.0 mW/cm<sup>2</sup> at at 802.11ac\_40MHz BW(5190~5230) BAND**
6. The power density level at 50 cm is **0.0026 mW/cm<sup>2</sup>**, which is below the uncontrolled exposure limit of **1.0 mW/cm<sup>2</sup> at at 802.11ac(5210) BAND.**

## UNII 2A,UNII 2C BAND

1. The power density level at 50 cm is **0.0168mW/cm<sup>2</sup>**, which is below the uncontrolled exposure limit of **1.0 mW/cm<sup>2</sup> at 802.11a(5260~5320) UNII 2A BAND**
2. The power density level at 50 cm is **0.0154mW/cm<sup>2</sup>**, which is below the uncontrolled exposure limit of **1.0 mW/cm<sup>2</sup> at 802.11a(5500~5720) UNII 2C BAND**
3. The power density level at 50 cm is **0.0244 mW/cm<sup>2</sup>**, which is below the uncontrolled exposure limit of **1.0 mW/cm<sup>2</sup> at at 802.11n\_20MHz BW(5500~5720) UNII 2C BAND**
4. The power density level at 50 cm is **0.0165mW/cm<sup>2</sup>**, which is below the uncontrolled exposure limit of **1.0 mW/cm<sup>2</sup> at at 802.11ac\_20MHz BW(5260~5320) UNII 2A BAND**
5. The power density level at 50 cm is **0.0244 mW/cm<sup>2</sup>**, which is below the uncontrolled exposure limit of **1.0 mW/cm<sup>2</sup> at at 802.11ac\_20MHz BW(5500 5720) UNII 2C BAND**
6. The power density level at 50 cm is **0.0056 mW/cm<sup>2</sup>**, which is below the uncontrolled exposure limit of **1.0 mW/cm<sup>2</sup> at at 802.11n\_40MHz BW (5270~5310) UNII 2A BAND.**
7. The power density level at 50 cm is **0.0208mW/cm<sup>2</sup>**, which is below the uncontrolled exposure limit of **1.0 mW/cm<sup>2</sup> at at 802.11n\_40MHz BW (5510~5710) UNII 2C BAND.**
8. The power density level at 50 cm is **0.0046 mW/cm<sup>2</sup>**, which is below the uncontrolled exposure limit of **1.0 mW/cm<sup>2</sup> at at 802.11ac\_40MHz BW (5270~5310) UNII 2A BAND.**
9. The power density level at 50 cm is **0.0215mW/cm<sup>2</sup>**, which is below the uncontrolled exposure limit of **1.0 mW/cm<sup>2</sup> at at 802.11ac\_40MHz BW (5510~5710) UNII 2C BAND.**
10. The power density level at 50 cm is **0.0040 mW/cm<sup>2</sup>**, which is below the uncontrolled exposure limit of **1.0 mW/cm<sup>2</sup> at at 802.11ac\_80MHz BW (5290) UNII 2A BAND.**
11. The power density level at 50 cm is **0.0220 mW/cm<sup>2</sup>**, which is below the uncontrolled exposure limit of **1.0 mW/cm<sup>2</sup> at at 802.11ac\_80MHz BW (5530~5690) UNII 2C BAND.**