

* RF Exposure

1. Regulation

According to §15.247(i), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See § 1.1307(b)(1) of this Chapter.

Limits for Maximum Permissive Exposure: RF exposure is calculated.

| Frequency Range | Electric Field Strength [V/m] | Magnetic Field Strength [A/m] | Power Density [mW/cm ²] | Averaging Time [minute] |
|---|-------------------------------|-------------------------------|-------------------------------------|-------------------------|
| Limits for General Population / Uncontrolled Exposure | | | | |
| 0.3 ~ 1.34 | 614 | 1.63 | *(100) | 30 |
| 1.34 ~ 30 | 824/f | 2.19/f | *(180/f ²) | 30 |
| 30 ~ 300 | 27.5 | 0.073 | 0.2 | 30 |
| 300 ~ 1 500 | / | / | f/1 500 | 30 |
| 1 500 ~ 15 000 | / | / | 1.0 | 30 |

f=frequency in MHz, * = plane-wave equivalent power density

MPE (Maximum Permissive Exposure) Prediction

Predication of MPE limit at a given distance: Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2 \quad (\Rightarrow R = \sqrt{PG/4\pi S})$$

S = power density [mW/cm²]

P = Power input to antenna [mW]

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 [cm]

2. RF Exposure Compliance Issue

The information should be included in the user's manual:

This appliance and its antenna must not be co-located or operation in conjunction with any other antenna or transmitter. A minimum separation distance of 20 cm must be maintained between the antenna and the person for this appliance to satisfy the RF exposure requirements.

3. Calculation Result of RF Exposure

| | Target power [dBm] | Tune up tolerance [dB] | Max tune up power [dBm] | Max tune up power [mW] | Ant Gain [dBi] | Ant Gain [mW] | Power Density at 20 cm [mW/cm ²] | Limit [mW/cm ²] |
|---|-----------------------|---------------------------|----------------------------|---------------------------|-------------------|------------------|---|--------------------------------|
| Bluetooth GFSK | 1.0 | ±2.0 | 3.0 | 2.00 | 2.29 | 1.69 | 0.000 67 | 1.000 00 |
| Bluetooth [1]/4DQPSK | -1.0 | ±2.0 | 1.0 | 1.26 | 2.29 | 1.69 | 0.000 42 | 1.000 00 |
| Bluetooth 8DPSK | -1.0 | ±2.0 | 1.0 | 1.26 | 2.29 | 1.69 | 0.000 42 | 1.000 00 |
| WiFi 2.4G 802.11b | 14.0 | ±2.0 | 16.0 | 39.81 | 4.11 | 2.58 | 0.020 40 | 1.000 00 |
| WiFi 2.4G 802.11g | 10.0 | ±2.0 | 12.0 | 15.85 | 4.11 | 2.58 | 0.008 12 | 1.000 00 |
| WiFi 2.4G 802.11n_HT20 | 10.0 | ±2.0 | 12.0 | 15.85 | 4.11 | 2.58 | 0.008 12 | 1.000 00 |
| WiFi 5G 802.11a/n20/n40 /ac20/ac40/ac80 _5 150 BW | 12.0 | ±2.0 | 14.0 | 25.12 | 2.89 | 1.95 | 0.009 72 | 1.000 00 |
| WiFi 5G 802.11a/n20/n40 /ac20/ac40/ac80 _5 250 BW | 12.0 | ±2.0 | 14.0 | 25.12 | 2.89 | 1.95 | 0.009 72 | 1.000 00 |
| WiFi 5G 802.11a/n20/n40 /ac20/ac40/ac80 _5 470 BW | 9.6 | ±2.0 | 11.6 | 14.45 | 2.51 | 1.78 | 0.005 13 | 1.000 00 |
| WiFi 5G 802.11a/n20/n40 /ac20/ac40/ac80 _5 750 BW | 11.0 | ±2.0 | 13.0 | 19.95 | 5.78 | 3.78 | 0.011 93 | 1.000 00 |

4. Target power and tolerance, Max tuneup power

| Mode | Target power [dBm] | Tolerance [dB] | Max tuneup power [dBm] | Average Power [dBm] |
|---|--------------------|----------------|------------------------|---------------------|
| Bluetooth GFSK | 1.0 | ±2.0 | 3.0 | 1.66 |
| Bluetooth [F]/4DQPSK | -1.0 | ±2.0 | 1.0 | 0.14 |
| Bluetooth 8DPSK | -1.0 | ±2.0 | 1.0 | 0.14 |
| WiFi 2.4G 802.11b | 14.0 | ±2.0 | 16.0 | 15.54 |
| WiFi 2.4G 802.11g | 10.0 | ±2.0 | 12.0 | 11.87 |
| WiFi 2.4G 802.11n_HT20 | 10.0 | ±2.0 | 12.0 | 11.69 |
| WiFi 5G 802.11a/n20/n40 /ac20/ac40/ac80 _5 150 BW | 12.0 | ±2.0 | 14.0 | 13.10 |
| WiFi 5G 802.11a/n20/n40 /ac20/ac40/ac80 _5 250 BW | 12.0 | ±2.0 | 14.0 | 12.89 |
| WiFi 5G 802.11a/n20/n40 /ac20/ac40/ac80 _5 470 BW | 9.6 | ±2.0 | 11.6 | 10.70 |
| WiFi 5G 802.11a/n20/n40 /ac20/ac40/ac80 _5 750 BW | 11.0 | ±2.0 | 13.0 | 11.98 |