| | | | | | | |
|---|---|---|---|---|---|---|
| 塑料和聚合物部件 | ○ | ○ | ○ | ○ | ○ | × |
| ○： 表示该有毒有害物质在该部件所有均质材料中的含量均在SJ/T11363-2006 标准规定的限量要求以下。 | | | | | | |
| ×： 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出SJ/T11363-2006 标准规定的限量要求。 | | | | | | |

## 10.3 RF EXPOSURE SEPARATION DISTANCES

To protect from overexposure to RF energy, install Canopy radios so as to provide and maintain the minimum separation distances from all persons shown in Table 13.

**Table 13: Exposure separation distances**

| Module Type | Separation Distance from Persons |
|---|---|
| Canopy Module (FSK or OFDM) | At least 20 cm (approx 8 in) |
| Canopy Module with Reflector Dish | At least 1.5 m (approx 5 ft) |
| Canopy Module with LENS | At least 50 cm (approx 20 in) |
| 900 MHz, integrated or connectorized antenna | At least 80 cm (32 in) |
| Indoor 900 MHz SM | At least 10 cm (4 in) |

The following section and its Table 14 provide details and discussion of the associated calculations.

### 10.3.1 Details of Exposure Separation Distances Calculations and Power Compliance Margins

Limits and guidelines for RF exposure come from:

- US FCC limits for the general population. See the FCC web site at http://www.fcc.gov, and the policies, guidelines, and requirements in Part 1 of Title 47 of the Code of Federal Regulations, as well as the guidelines and suggestions for evaluating compliance in FCC OET Bulletin 65.
- Health Canada limits for the general population. See the Health Canada web site at http://www.hc-sc.gc.ca/rpb and Safety Code 6.
- ICNIRP (International Commission on Non-Ionizing Radiation Protection) guidelines for the general public. See the ICNIRP web site at http://www.icnirp.de/ and *Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields*.

The applicable power density exposure limits from the documents referenced above are

- 10 $W/m^2$ for RF energy in the 5.7/5.8-GHz frequency bands.

Peak power density in the far field of a radio frequency point source is calculated as follows:

$$S = \frac{P \cdot G}{4 \pi d^2}$$

where
$S$ = power density in W/m$^2$
$P$ = RMS transmit power capability of the radio, in W
$G$ = total Tx gain as a factor, converted from dB
$d$ = distance from point source, in m

Rearranging terms to solve for distance yields $$d = \sqrt{\frac{P \cdot G}{4 \pi S}}$$

Table 14 shows calculated minimum separation distances $d$, recommended distances and resulting power compliance margins for each frequency band and antenna combination.

**Table 14: Calculated exposure distances and power compliance margins**

| Band | Antenna | Variable | | | d (calculated) | Recommended Separation Distance | Power Compliance Margin |
|---|---|---|---|---|---|---|---|
| | | P | G | S | | | |
| 900 MHz FSK | integrated | 0.25 W (24 dBm) | 15.8 (12 dB) | 6 W/m$^2$ | 23 cm | 80 cm (32 in) | 12 |
| | external Yagi | 0.063 W (18 dBm) | 50.1 (17 dB) | 6 W/m$^2$ | 20 cm | 80 cm (32 in) | 15 |
| | external flat panel | 0.39 W (26 dBm) | 10.0 (10 dB) | 6 W/m$^2$ | 23 cm | 80 cm (32 in) | 12 |
| | indoor, integrated | Simulation model used to estimate Specific Absorption Rate (SAR) levels | | | | 10 cm (4 in) | 2 |
| 2.4 GHz FSK | integrated | 0.34 W (25 dBm) | 6.3 (8 dB) | 10 W/m$^2$ | 13 cm | 20 cm (8 in) | 2.3 |
| | integrated plus reflector | 0.34 W (25 dBm) | 79.4 (19 dB) | 10 W/m$^2$ | 46 cm | 1.5 m (5 ft) | 10 |
| 5.2 GHz FSK | integrated | 0.2 W (23 dBm) | 5.0 (7 dB) | 10 W/m$^2$ | 9 cm | 20 cm (8 in) | 5 |
| | integrated plus reflector | 0.0032 W (5 dBm) | 316 (25 dB) | 10 W/m$^2$ | 9 cm | 1.5 m (5 ft) | 279 |
| | integrated plus LENS | 0.025 W (14 dBm) | 40 (16 dB) | 10 W/m$^2$ | 9 cm | 50 cm (12 in) | 31 |
| 5.4 GHz FSK | integrated | 0.2 W (23 dBm) | 5.0 (7 dB) | 10 W/m$^2$ | 9 cm | 20 cm (8 in) | 5 |
| | integrated plus reflector | 0.0032 W (5 dBm) | 316 (25 dB) | 10 W/m$^2$ | 9 cm | 1.5 m (5 ft) | 279 |
| | integrated plus LENS | 0.020 W (13 dBm) | 50 (17 dB) | 10 W/m$^2$ | 9 cm | 50 cm (12 in) | 31 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 5.7 GHz FSK | Integrated | 0.2 W (23 dBm) | 5.0 (7 dB) | 10 $W/m^2$ | 9 cm | 20 cm (8 in) | 5 |
| | integrated plus reflector | 0.2 W (23 dBm) | 316 (25 dB) | 10 $W/m^2$ | 71 cm | 1.5 m (5 ft) | 4.5 |
| | integrated plus LENS | 0.2 W (23 dBm) | 50 (17 dB) | 1 $W/m^2$ | 28 cm | 50 cm (20 in) | 3.13 |
| 5.4 GHz OFDM | integrated SM, PMP 400, PTP 200 | 0.01 W (10 dBm) | 50 (17 dB) | 10 $W/m^2$ | 6 cm | 20 cm (8 in) | 10 |
| | Integrated SM, PMP 430 | 0.079 W (19 dBm) | 10 (10 dB) | 10 $W/m^2$ | 8 cm | 20 cm (8 in) | 6.4 |
| | connectorized AP, 18 dBi | 0.02 W (13 dBm) | 50 (17 dB) | 10 $W/m^2$ | 9 cm | 20 cm (8 in) | 5 |
| 5.8 GHz OFDM | integrated SM | 0.079 W (19 dBm) | 10 (10 dB) | 10 $W/m^2$ | 8 cm | 20 cm (8 in) | 6.4 |
| | connectorized AP, 17 dBi | 0.079 W (19 dBm) | 40 (16 dB) | 10 $W/m^2$ | 16 cm | 80 cm (32 in) | 25.6 |
| 4.9 GHz OFDM | Integrated, 17 dBi | 0.063 W (18 dBm) | 40 (16 dB) | 10 $W/m^2$ | 14 cm | 20 cm (8 in) | 2 |
| | connectorized, 18 dBi | 0.063 W (18 dBm) | 40 (16 dB) | 10 $W/m^2$ | 14 cm | 20 cm (8 in) | 2 |

The Recommended Separation Distance is chosen to give significant compliance margin in all cases. It is also chosen so that a given item (bare module, reflector, or LENS) always has the same distance, regardless of frequency band, to simplify remembering and following exposure distances in the field.

These are conservative distances:

- They are along the beam direction (the direction of greatest energy). Exposure to the sides and back of the module is significantly less.
- They meet sustained exposure limits for the general population (not just short-term occupational exposure limits), with considerable margin.
- In the reflector cases, the calculated compliance distance *d* is greatly overestimated because the far-field equation models the reflector as a point source and neglects the physical dimension of the reflector.