## RF Exposure – USA and Canada

The 305-0007 remote unit is installed in a fixed location and designed to be used > 20cm from the body.

The device is designed to be used with a variety of antennas and EMF calculations have been done using 8dBi antenna which is higher gain than any of the recommended options so represents worst case for all of them.

| Requirement | Frequency range (MHz) | Power Density Limit (W/m²) | IC Exemption from Routine evaluation (W EIRP) |
|---|---|---|---|
| FCC OET 65 | 30 - 300 | 2.0[1] | N/A |
| | 300 – 1500 | F / 150[1] | |
| | 1500 – 100000 | 10 | |
| RSS-102 Issue 5 | 48 – 300 | 1.281 | 0.600 |
| | 300 – 6000 | $0.02619f^{0.6834}$ | $0.0131\ f^{0.6834}$ |

Table 1: Permitted Exposure levels and IC exemption levels

Notes:

- For any given Frequency over the whole band of operation, the IC limits are the most stringent
- The routine exemption limit is approximately 50% of the more stringent limit, so emissions complying with that automatically comply with both FCC and IC limits.
- The worst case calculation is for the lowest frequency of operation in each band

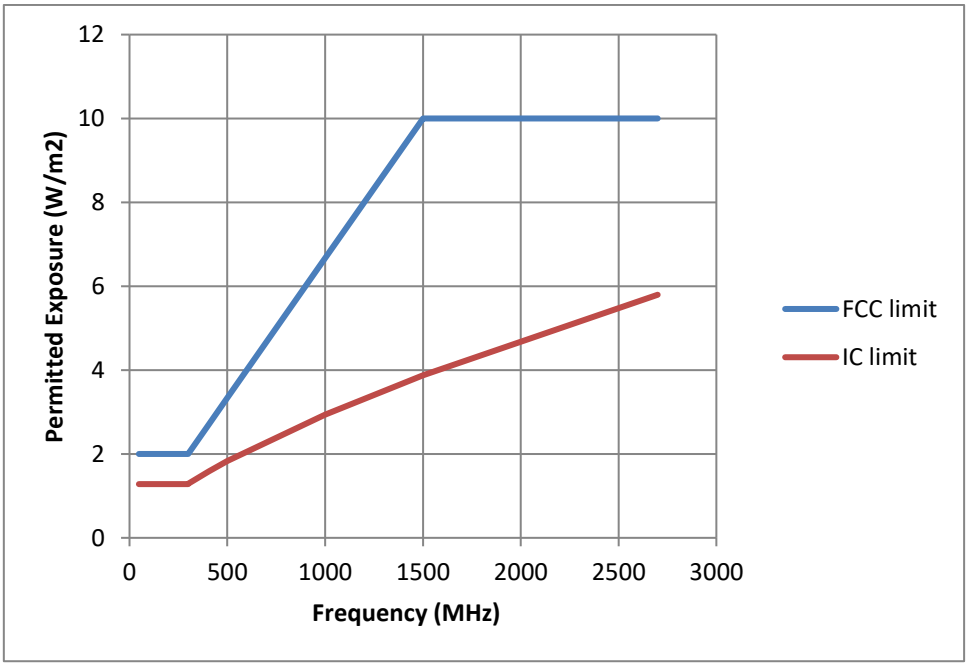


Figure 1: FCC vs IC permitted exposure levels for general population

[1] FCC limits are specified in mW/cm², which have been multiplied by 10 to convert into W/m².

## Demonstration of compliance

- As the product is installed in a fixed location, the power density can be calculated at 20cm and compared to the permitted exposure limits and IC routine exemption limit.
- The product operates over a wide frequency range:
    - Worst case for 30-300 MHz band is operation at 150 MHz
    - Worst case for 300-6000 MHz region is operation at 406.1 MHz

## FCC

Using the equation $S=\frac{PG}{4\pi R^2}$ , the exposure level at 20 cm can be calculated and compared against the limit

P: power input to antenna in W

G: numeric gain of antenna relative to isotropic radiator

S: power density limit in W/m2

R: distance for evaluation in m, which is 0.2

| Freq band | Freq (MHz) | Antenna port power (dBm) | EIRP (W) | S (W/m²) | FCC limit (W/m²) |
|---|---|---|---|---|---|
| < 300 MHz | 174.0 | 15.85 | 0.243 | 0.48 | 2.00 |
| > 300 MHz | various | 20.0 | 0.631 | 1.26 | ≥ 2.71[2] |

Table 2: Calculated Exposure levels at 20 cm

## Industry Canada

The radiated power is compared against the exemption limit in section 2.5.2 of RSS-102:

| Freq band | Freq (MHz) | Antenna port power (dBm) | EIRP (W) | IC Exemption from Routine evaluation (W EIRP) | Radiated power below exclusion limit |
|---|---|---|---|---|---|
| < 300 MHz | 150.0 | 15.85 | 0.243 | 0.600 | Yes |
| > 300 MHz | 406.1 | 20.0 | 0.631 | 0.794 | Yes |

Table 3: EIRP calculations for Industry Canada routine evaluation

[2] Limit at 406 MHz which increases with frequency until it reaches 10.00 at 1500 MHz.