



RF Exposure Calculations

As per OET Bulliten 65 – Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields – Edition 97-01 together with Supplement C (Ed. 01-01, June 2001) and Industry Canada RSS-102 (Issue 2, Nov. 2005), the maximum power density allowed for general population/uncontrolled exposure is $f/1500 \text{ mW/cm}^2 = f/150 \text{ W/m}^2$, where f is the frequency of operation in MHz. Calculating for the lowest frequency of operation (905MHz), the maximum power density allowed is $0.603 \text{ mW/cm}^2 = 6.03 \text{ W/m}^2$. The power density is calculated as follows:

$$S = (P \cdot G) / (4 \cdot \pi \cdot R^2) = \text{EIRP} / (4 \cdot \pi \cdot R^2)$$

where:

S = power density in mW/cm^2

P = power at the antenna connector in mW

G = linear system gain of the antenna

R = separation from antenna (cm)

EIRP = Effective Isotropic Radiated Power (mW).

By convention, a minimum separation distance of 20 cm has been used for indoor antennas. Applying this distance to the radiation exposure limits, the EIRP is limited to 3.03 W or 34.8 dBm. The min. separation distance required for an EIRP of 36 dBm or 4 W is 22.9 cm.

The 915A Radio can use an indoor, fix mounted antenna that must be located at least 20 cm away for people. The outdoor antennas must be fix mounted outdoors with a min. distance from people of 30 cm. For the EUM3005 Product, our product manual recommends a separation of 2 m. which exceeds the min. required.

The WaveRider Indoor Diversity antenna can meet power density requirements of FCC 1.1310 and RSS-102 for a 20 cm separation between people and the antenna. In the worst case, the EIRP is 27.3 dBm at the antenna port (peak power) plus 4.4 dBi antenna gain for a total possible EIRP of less than 32 dBm, not taking into account any time averaging (duty cycle) or peak to average factors.

The YAGI antenna is an outdoor antenna intended to be mounted in a permanent, fixed location. With a maximum gain of 13 dBi, the YAGI antenna requires 4.3 dB in installation losses to keep peak power at 36.0 dBm, so we are requiring a minimum of 43 feet of LMR200 cable to be used when installing this antenna. YAGIs with less gain will require proportionally less cable to maintain the 36 dBm limit.

Therefore the FCC requirements for human exposure to RF radiation are met.

Antenna Type	Max. Gain (dBi)	Min. Attenuation Req'd @ Max Gain (dB)	Separation Requirement (cm)
WaveRider Indoor Diversity	4.4	0	20
YAGI	13	4.3	30

The Industry Canada RF Technical Brief Cover Sheet follows with the information for the WaveRider Indoor Diversity Antenna, since it is the only user-installable antenna. The YAGI is professionally installed outdoors.

Annex A - RF Technical Brief Cover Sheet

All Fields must be completed with the requested information or the following codes:
N/A for Not Applicable, N/P for Not Performed or N/V for Not Available.
Where applicable, check appropriate box.

1. COMPANY NUMBER: WaveRider Communications (Canada) Inc.
2. MODEL NUMBER: 915A Radio
3. MANUFACTURER: Solelectron EMS Canada - Kanata
4. TYPE OF EVALUATION: Complete the applicable sections: (a) SAR Evaluation: Device Used in the Vicinity of the Human Head; (b) SAR Evaluation: Body-worn Device; (c) RF Evaluation

Note: The worst-case scenario (i.e. highest measured value obtained) should be reported.

(a) SAR Evaluation: Device used in the Vicinity of the Human Head

- Multiple transmitters: Yes No
- Evaluated against exposure limits: General Public Use Controlled Use
- Duty cycle used in evaluation: _____ %
- Standard used for evaluation: _____
- SAR value: _____ W/kg. Measured Computed Calculated

(b) SAR Evaluation: Body-worn Device

- Multiple transmitters: Yes No
- Evaluated against exposure limits: General Public Use Controlled Use
- Duty cycle used in evaluation: _____ %
- Standard used for evaluation: _____
- SAR value: _____ W/kg. Measured Computed Calculated

(c) RF Evaluation

- Evaluated against exposure limits: General Public Use Controlled Use
- Duty cycle used in evaluation: 100 %
- Standard used for evaluation: RF Exposure Evaluation
- Measurement distance: 0.20 m
- RF value: 6.03 V/m A/m W/m²
Measured Computed Calculated