EM Field exposure calculation calculation

RF Exposure – USA and Canada

FCC Maximum Permissible Exposure (MPE) limits for equipment operating in the frequency range 1500 – 100,000 MHz is 1.0 mW/cm^2 which equates to 10 W/m^2.

Industry Canada Maximum Permissible Exposure (MPE) limits for equipment operating in the frequency range 300 – 6000 MHz range is $0.02619f^{0.6834}$ W/m^2 which equates to 4.90 W/m^2 at 2110 MHz.

For the purpose of calculating a safe distance, the lower permitted exposure level for Canada will be used

The equation $S = \frac{\sqrt{EIRP}}{4\pi S}$ can be written to find safe distance, r:

$r = \sqrt{(PG/4\pi S)}$

P: power input to antenna(s) in mW

G: numeric gain of antenna relative to isotropic radiator

S: power density in = 4.9 W/m2

The safe distance from the smartlink antenna shall be the greater of:

20 cm or $\sqrt{(PG/4\pi S)}$

Which gives

20 cm or $\sqrt{(1.9*3.2 / 4 * \pi * 4.9)}$ cm.

Smartlink is designed to be used with one of two standard antennas

- External 2 dBi omni-directional antenna
- External 5 dBi omni-directional antenna

These give the following safe distances from the unit:

Antenna gain	Safe distance (cm)
2 dBi (1.6 dBd)	21.12
5 dBi (3.2 dBd)	31.25

The recommended safe distance is 0.32 m