

## Environmental assessment (EA)

The device is designed to carry 2 transmitters which can be operated simultaneously:

- Proprietary data transmitter in the 902 MHz to 928 MHz ISM band
- GSM/WCDMA module (Only worst case stated; it is only possible to operate in one transmission mode at once)

This device is to be used only for fixed and mobile applications.

The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all the persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

The table below is excerpted from Table 1B of 47 CFR 1.1310 titled Limits for Maximum Permissible Exposure (MPE) and Health Canada Safety Code 6, Limits for General Population/Uncontrolled Exposure:

Frequency Range (MHz)	Power density (mW/cm <sup>2</sup> )	Averaging time (minutes)
300 – 1500	f (MHz) /1500	30
1500 – 100.000	1.0	30

Based on the above table the Limits for Maximum Permissible Exposure (MPE) are:

For 902 - 928 MHz frequency band device: **0.60 mW/cm<sup>2</sup>** (worst case)

For GSM/WCDMA module: **0.57 mW/cm<sup>2</sup>** (worst case)

For this consideration the max measured source based time averaged powers are:  
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Using the equation from page 19 of OET Bulletin 65, Edition 97-01:

$$S = \frac{PG}{4\pi R^2}$$

where: S = power density (in appropriate units, e.g. mW/cm<sup>2</sup>)

P = power input to the antenna (in appropriate units, e.g., 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 (appropriate units, e.g., cm)

At a distance of 20 cm the calculated power density of the individual transmitter are:

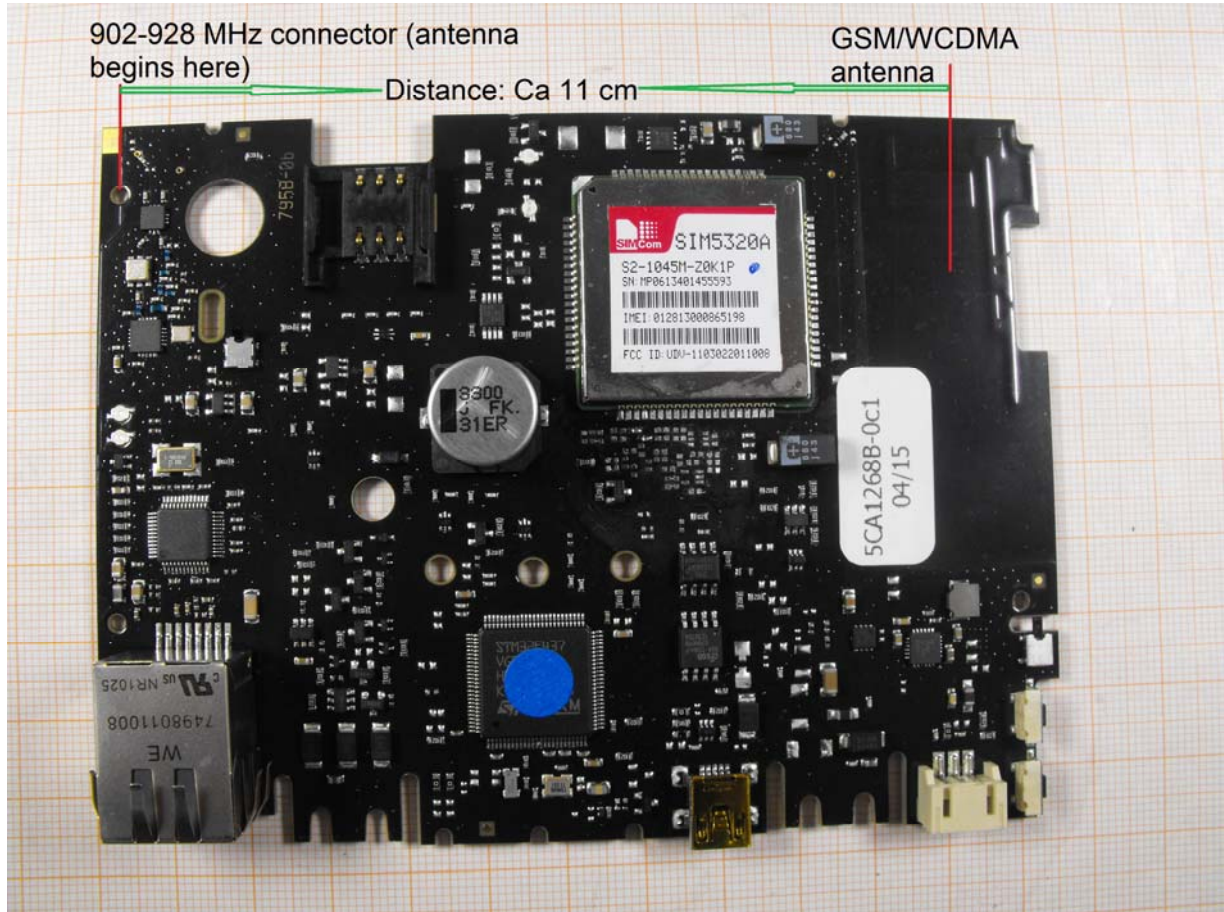
902-928 MHz transmitter: **0.00732 mW/cm<sup>2</sup>**

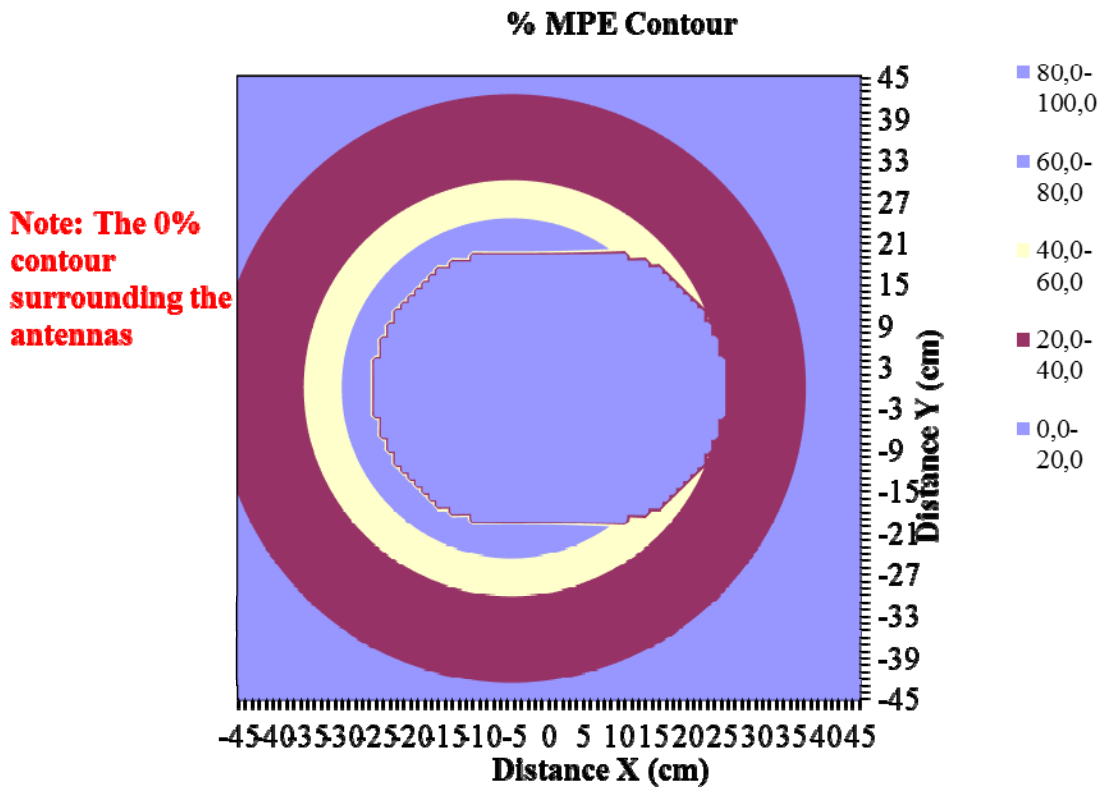
GSM/WCDMA transmitter: **0.50331 mW/cm<sup>2</sup>** (GSM 850; Value taken from Tune up SIM5320ASIM5320A)

902-928 MHz transmitter: **1.50 %** of Maximum Permissible Exposure

GSM/WCDMA transmitter: **88.30 %** of Maximum Permissible Exposure

For the simulation of the simultaneous transmission condition the following antenna separation distances were estimated. (see picture)





**Result:** The sum percentage for location that are at least 20 cm from any active antenna is **89.5%** and below the Limits for Maximum Permissible Exposure.