

## Re: RF Exposure for the FCC:

Calculation to show that the collocation of the RFID transmitter, transmitting at 134.2 KHz and the Bluetooth module, transmitting in the ISM 2.4GHz band, do not exceed the FCC RF exposure limit.

### Bluetooth Module

The power density (S) can be calculated with:  $S = (\text{Power} \times \text{gain}) / (4 \pi r^2)$

$$S = (11 \times 2.24) / (4 \pi 20^2)$$

$$S = 0.005 \text{ mW/cm}^2$$

The limit is  $1.0 \text{ mW/cm}^2$

Therefore, the Bluetooth ( $0.005 \text{ mW/cm}^2$ ) is 0.5% of the limit ( $1.0 \text{ mW/cm}^2$ ).

### RFID Transmitter

RFID transmitter measured  $97.7 \text{ dB}\mu\text{V/m}$  at 3m.

Using the FCC's basic calculation, extrapolating from 3m to 0.2m will add 47 dB to that value; so therefore:

$$144.7 \text{ dB}\mu\text{V/m at 20cm}$$

$$144.7 \text{ dB}\mu\text{V/m} = 17.2 \text{ V/m}$$

A limit of exposure for the general public at 134.2 kHz does not exist, so using the nearest limit, which is  $614 \text{ V/m}$  at 300 kHz.

$17.2 \text{ V/m}$  is 2.8% of  $614 \text{ V/m}$ .

### Combined

The Bluetooth is at 0.5% of the limit and the RFID is at 2.8% of the limit. Adding the two together, we have,  $0.5 + 2.8 = 3.3\%$ .

Therefore we can say that the combined powers for the whole device are only at 3.3% of the RF Exposure limits, and therefore comply.