

## **R280 RF EXPOSURE INFORMATION**

### **GENERAL**

This exhibit addresses sections 2.1091 and 2.1093 of the FCC CFR for control of RF exposure.

Since the repeater is permanently installed in buildings and radiates through antennas installed in the ceiling, they are never operated within 20 centimeters of an individual user and hence they are classified as "mobile" devices rather than "portable" devices. Our interpretation of 2.1091 (c) suggests that only mobile devices over 1.5 Watts are subject to evaluation. However, for completeness, the RF exposure analysis is provided below.

### **RF EXPOSURE ANALYSIS**

The analysis will use the following conditions.

1. The test subject will be a 50 kg body with a cross-sectional area of 1 square meter.
2. The subject is assumed to be totally absorptive. Note that in reality, the subject will reflect some of the incident power and thus the exposure of the subject will actually be less than calculated.
3. The subject will be considered to be 2 meters from the antenna. At this distance, far-field calculations will be appropriate. Note that in most operating conditions, the subject will be much further from the antenna. Typical distances are in the range of 5 to 50 meters. Thus, the typical exposure will be substantially lower than that calculated.
4. The unit will be operated into a half-wave dipole antenna (gain = 1.64). Further antenna configurations will be considered after the calculations.
5. Calculations will be based on the maximum unit saturated output power of +28 dBm (0.64 W). In practice, the unit will be operated at or below the rated output power which is substantially lower than the saturated output power.

Calculations are as follows:

$$PD = (P \times G) / (4 \pi r^2)$$

$$TE = PD \times A$$

$$AR = TE / M$$

Where PD is the power density in Watts per square meter  
P is the output power at the antenna in Watts  
G is the antenna gain factor  
r is the distance from the antenna to the test subject in meters  
TE is the total exposure of the subject in Watts  
A is the cross-sectional area of the subject in square meters  
AR is the absorption rate in Watts per kg  
M is the mass of the subject in kg

Applying the above equations to the analysis it follows that:

$$PD = (0.64W \times 1.64) / (4 \pi (2m)^2) = 0.0208 W/m^2$$

$$TE = 0.0208W/m^2 \times 1m^2 = 0.0208 W$$

$$AR = 0.0208W / 50kg = 0.000416 W/kg$$

This demonstrates that even under worst case considerations, the exposure will be significantly less than the General Population/Uncontrolled Exposure limit of 0.08 W/kg as specified in Section 2.1093 of the FCC CFR and is clearly insignificant compared to that radiated by a handheld portable phone close to the head.

Under normal operating conditions and antenna distances, the exposure will be typically in the range of approximately 0.0001 W/kg or less. Even if a more directional antenna with a higher gain is used, the exposure will remain well below the required limits.

## **CONCLUSIONS**

The above analysis has demonstrated that RF exposure from the R280 is compliant with exposure limits by a substantial margin.