

## Technical Memo

To: Ray Vergati  
From: Scott Heffernan - Radio Frequency Engineer  
cc: Jason Overbey  
Subject: Power Density Report for CTFF310D  
Date: January 6, 2010

### 1. Introduction:

This report is the result of an Electromagnetic Field Intensities (EMF - Power Densities) study for the T-Mobile PCS/UMTS antenna installation on a Monopole at 23 Stonybrook Road, Stratford, CT. This study incorporates the most conservative consideration for determining the practical combined worst case power density levels that would be theoretically encountered from locations surrounding the transmitting location.

### 2. Discussion:

The following assumptions were used in the calculations:

- 1) The emissions from T-Mobile transmitters are in the (1940-1950),(2140-2145) & (2110-2120) MHz frequency Bands.
- 2) The antenna array consists of three sectors, with 2 antennas per sector.
- 3) The model number for GSM antenna is APX16DWV-16DWV.
- 3) The model number for UMTS antenna is APX16DWV-16DWV.
- 4) GSM antenna center line height is 97 ft.
- 4) UMTS antenna center line height is 87 ft.
- 5) The maximum transmit power from any GSM sector is 2097.1 Watts Effective Radiated Power (EIRP) assuming 8 channels per sector.
- 5) The maximum transmit power from any UMTS sector is 2628.39 Watts Effective Radiated Power (EIRP) assuming 2 channels per sector.
- 6) All the antennas are simultaneously transmitting and receiving, 24 hours a day.
- 7) Power levels emitting from the antennas are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.
- 8) The average ground level of the studied area does not change significantly with respect to the transmitting location

Equations given in "FCC OET Bulletin 65, Edition 97-01" were then used with the above information to perform the calculations.

### 3. Conclusion:

Based on the above worst case assumptions, the power density calculation from the T-Mobile PCS antenna installation on a Monopole at 23 Stonybrook Road, Stratford, CT, is 0.14345 mW/cm<sup>2</sup>. This value represents 14.345% of the Maximum Permissible Exposure (MPE) standard of 1 milliwatt per square centimeter (mW/cm<sup>2</sup>) set forth in the FCC/ANSI/IEEE C95.1-1991. Furthermore, the proposed antenna location for T-Mobile will not interfere with existing public safety communications, AM or FM radio broadcasts, TV, Police Communications, HAM Radio communications or any other signals in the area.

**Worst Case Assumptions:** is defined as assuming that the main lobe of the transmitting antenna is always focused at the sample point of interest. This assumes that the maximum gain is realized at this point and will yield the highest possible MPE% value possible for that given point / distance. In reality, due to the highly focused nature of the proposed antennas, most of the available energy transmitting from the proposed facility will be directed toward the horizon to best enhance the desired coverage footprint area. The net result is that a very small percentage of the available energy is directed toward the ground area in close proximity to the facility. Values seen in the immediate area of the facility will be on the order of 10 to 20 dB lower in actual value than the worst case assumption since the gain of the antenna pattern is dramatically reduced at these angles. A 10 to 20 dB reduction in power output potential equates to a value that is between 10 and 100 times lower than expected calculated values. This can be seen in the attached antenna specification sheet with associated vertical and horizontal antenna patterns.