6.7 Effective Radiated Power (ERP)

As described in Exhibit 7.1, the radiated power received at a spectrum analyzer was measured from the radio product specimen with integral antenna at 2 degrees increments as the specimen was rotated. These recorded power readings are un-calibrated ERP measurements. To convert these readings to ERP values a reference reading was obtained from a calibrated (to an ideal dipole) antenna to which was applied the same power level as the measured output power of the radio specimen. The reading at the spectrum analyzer from this calibrated reference antenna served to calibrate the spectrum analyzer readings for ERP measurements. By comparing the readings between the reference antenna and the radio product specimen, and with a measurement of the output power of the radio product specimen, this measurement also serves to determine the radio specimen antenna gain.

6.7.1 ERP in 806 MHz - 825 MHz band

The following calculation shows how ERP was determined, at a test frequency of 813.5125. For this example the location of the highest level observed was used. This occurred at the angular position of 105 degrees as noted in the Figure 6-37.

a.) Analyzer reading for radio specimen, as tested at 28.609 dBm (726 mW) output power: -23.0 dBm
b.) Analyzer reading for a substitution antenna, at 28.5 dBm applied power: -22.6 dBm
c.) Antenna gain (logarithmic) compared to an ideal dipole: (-23.0) - (-22.6) + 0.36 = -0.04 dBd
d.) Measured ERP: (28.609) + (-0.04) = 28.56 dBm
e.) Measured ERP: 719 milliwatts

However, the measured ERP value above was not determined at the production controlled maximum output power of the radio product so it is necessary to scale this number. The antenna gain permits the ERP to be calculated for any output power value in a manner similar to steps c and d above. The following calculations were used to determine the maximum ERP based upon the maximum output power rating (700 milliwatts) stated in Exhibit 6.1.1.

f.) Maximum output power rated: 700 milliwatts
g.) Output Power measured: 726 milliwatts
h.) Scaled ERP: 719 x (700/726) = 694 milliwatts

The method above was used to process all rotational measurement data and, for brevity, the following graph (Figure 6-37) summarizes in a visual fashion the radio ERP at the 105 degree location and other rotational positions.

6.7.2 896 MHz - 901 MHz band

The above calculations were repeated at a test frequency of 896.01875 MHz. For this example the greatest level observed was used. This occurred at 49 degrees as noted in the Figure 6-37.

a.) Analyzer reading for radio specimen, as tested at 28.549 dBm (716 milliwatts) output power: -21.3 dBm
b.) Analyzer reading for a substitution ideal dipole antenna, at 28.549 dBm applied power: -23.7 dBm
c.) Antenna gain (logarithmic) compared to an ideal dipole: (-21.3) – (-22.1) –0.54 = 0.26 dBd
d.) Measured ERP: (28.549) + (0.26) = 28.809 dBm
e.) Measured ERP: 760 milliwatts
f.) Maximum output power rated: 700 milliwatts
g.) Output Power measured: 716 milliwatts
h.) Maximum calculated ERP: 760 x (700/716) = 743 milliwatts

The following graph of item h is provided to serve as a simplified summary of that measured data and to visualize the maximum calculated ERP at the azimuthal positions of 49 and 105 degrees.

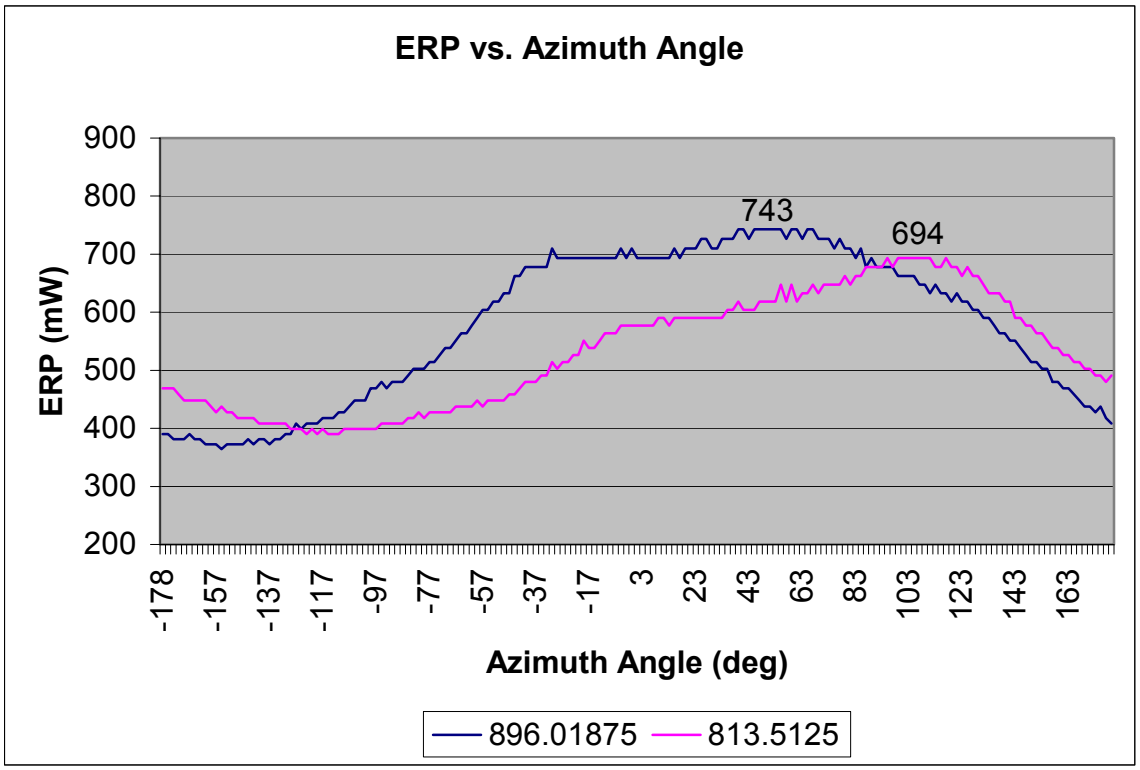

Figure 6-37: Scaled ERP vs. Azimuth Angle