K297AP Transmission System

Transmitter Power Output Calculations

This exhibit has been included to explain the basis for the transmitter power output utilized to achieve the authorized effective radiated power of 0.235 kW.

The antenna system consists of a vertically polarized Scala CLFM-VRM antenna. The antenna has a power gain of 5.0 at 107.3 mHz. Therefore, an antenna input power of 47 watts is required to achieve 0.235 kW.

The transmission line used to get from the transmitter to the antenna input is Andrew LDF5-50 (7/8 inch) low density foam heliax. With 116 feet of length, the transmission line attenuation is 0.46 dB yielding an efficiency of 90.03%. Therefore, a power of 52.20 watts is required at the input of the transmission line, which is also the transmitter output, to achieve the authorized effective radiated power. After rounding, a transmitter power output of 0.052 kW is needed to achieve the permitted ERP.

Feed System Efficiency:

In calculating the Feed System Efficiency, the following values were used based on the insertion loss data provided by each manufacturer.

Andrew LDF5-50 Heliax (116 feet)
Insertion Loss = 0.46 dB (at 107.3 mHz)

Antenna Gain:

In calculating the Antenna Gain, the following value was used based on data provided by the manufacturer:

Scala CLFM-VRM
Power Gain: 5.0 dB

TPO Calculations:

$$\frac{\text{Effective Radiated Power}}{(\text{Antenna Power Gain} * \text{Feed System Efficiency})} = \text{TPO}$$

$$\frac{0.235\text{ kW}}{(5.0 * 90.03\%)} = \textbf{0.052 kW TPO}$$