K252EL 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 0.18 kW.

The antenna system consists of a circularly polarized Scala CA2-CP antenna. The antenna has a power gain of 1.3 at 98.3 mHz. Therefore, an antenna input power of 138.5 watts is required to achieve 0.18 kW.

The transmission line used to get from the transmitter to the antenna input is Andrew LDF4.5-50 (5/8 inch) low density foam heliax. With 126 feet of length, the transmission line attenuation is 0.64dB yielding an efficiency of 86.27%. Therefore, a power of 160.49 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 0.160 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 LDF4.5-50 Heliax (126 feet)
Insertion Loss = 0.64 dB (at 98.3 mHz)

Antenna Gain:

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

Scala CA2-CP
Power Gain: 1.3 dB

TPO Calculations:

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

$$\frac{0.18\text{ kW}}{(1.3 * 86.27\%)} = \mathbf{0.16049\text{ kW} = 0.16\text{ kW TPO}}$$