

# **KDUT FM5 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 99 W.

The antenna system consists of a circularly polarized Scala 2xCA2-FM/CP/CV antenna. The antenna has a power gain of 0.95 at 102.3 MHz. Therefore, an antenna input power of 104.2 watts is required to achieve 99 W.

The transmission line used to get from the bandpass filter to the antenna input is Andrew LDF4-50 (1/2 inch) foam dielectric heliax. With 24.3 meters of length, the transmission line attenuation is 0.57 dB yielding an efficiency of 87.80%. Therefore, a power of 118.7 watts is required at the input of the transmission line.

A Nicom FBP800 bandpass filter is located in front of the transmission line. The filter has an insertion loss of 0.6 dB yielding an efficiency of 87.05%. Therefore, a power of 136.3 watts is required at the input of the filter.

Finally, a jumper is used to get from the transmitter to the bandpass filter. The jumper is Andrew LDF4-50 (1/2 inch) foam dielectric heliax. With 6.0 meters of length, the transmission line attenuation is 0.16 dB yielding an efficiency of 96.3%. Therefore, a power of 141.6 watts is required at the input of the jumper, which is also the transmitter output, to achieve the authorized effective radiated power. After rounding, a transmitter power output of 142 watts is needed to achieve the permitted ERP.

### **Antenna Gain:**

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

Scala 2xCA2-FM/CP/CV  
Power Gain: .95x

### **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 LDF4-50 Heliax (24.3 meters)  
Insertion Loss = 0.57 dB (at 102.3 MHz)

Nicom BFP 800 bandpass filter  
Insertion Loss = 0.6 dB

Andrew LDF4-50 (6 meters)

Insertion Loss = 0.16 dB

Overall Feed System Efficiency = 1.33 dB (73.57%)

**TPO Calculations:**

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

$$\frac{99 \text{ W}}{(0.95 * 73.57\%)} = \underline{\underline{141.6 \text{ W} = 142 \text{ W TPO}}}$$