Weather Radar Average Power And Peak Power Versus Sensitivity

The radar's sensitivity is much more related to the *average* power than to the *peak* power. The TDR Klystron radar has the highest average power, and by far the best sensitivity of any commercially available weather radar system.

The formula for calculating average power is:

$$P_{avg} = \frac{(PulseWidth)\,x\,(PRF)\,x\,(PeakPower)}{1,000,000}$$

Where:

Pulse Width = pulse width in microseconds
PRF = *pulse* repetition frequency in pulses per second
Peak Power = peak transmitter power output in Watts

Example: (typical magnetron radar in reflectivity mode)
Pulse Width = 2.0 microseconds
PRF = 250 pulses/second
Peak Power = 250,000 Watts

P_{avg} = (2.0 x 250 x 250,000) / 1,000,000 = 125 Watts

Example: (TDR Klystron radar in reflectivity mode)
Pulse Width = 10.0 microseconds
PRF = 500 pulses/second
Peak power = 250,000 Watts

P_{avg} = (10.0 x 500 x 250,000) / 1,000,000 = 1,250 Watts