What Is the Difference Between Average and Peak Power?

The amount of power a connector can handle can determine the long term (or even short term) reliability of your system. Using a connector that cannot adequately dissipate the power applied can cause serious problems and failure of your system. There are 2 types of power handling (expressed in watts) that must be considered: Average Power and Peak Power.

Average Power is the input power to a cable/connector, which will produce a maximum safe center conductor temperature under steady state conditions when terminated with a matched load. A safe center conductor temperature is one that will not melt the dielectric. When considering Average Power the following points should be noted:

- Average Power is inversely proportional to frequency and must be de-rated accordingly
- Average Power is equal to a Power Rating @ 1 Mhz/√ (Frequency in Mhz)
- Connectors generally have higher power ratings than the cable to which they are attached
- Connectors have metal shells whereas cables have braids covered by plastic jackets
- Connectors can be attached to bulkheads which help dissipate heat
- Connectors usually have lower attenuation per unit length due to air sections within the connector

Peak Power is limited by the voltage rating of the connector, and is determined by the equation V2/Z where V=the peak voltage rating and Z is the characteristic impedance. When considering Peak Power the following points should be noted:

- Peak power generally has a very short duty cycle, but you should calculate the average power of a peak pulse to be certain it does not exceed specifications
- Peak Power is not a function of frequency
- Peak Power is an inverse function of VSWR and modulation schemes and must be derated
- Peak and Average Power are functions of altitude and must be derated
- Maximum power ratings will always be the lesser of the cable/connector combination