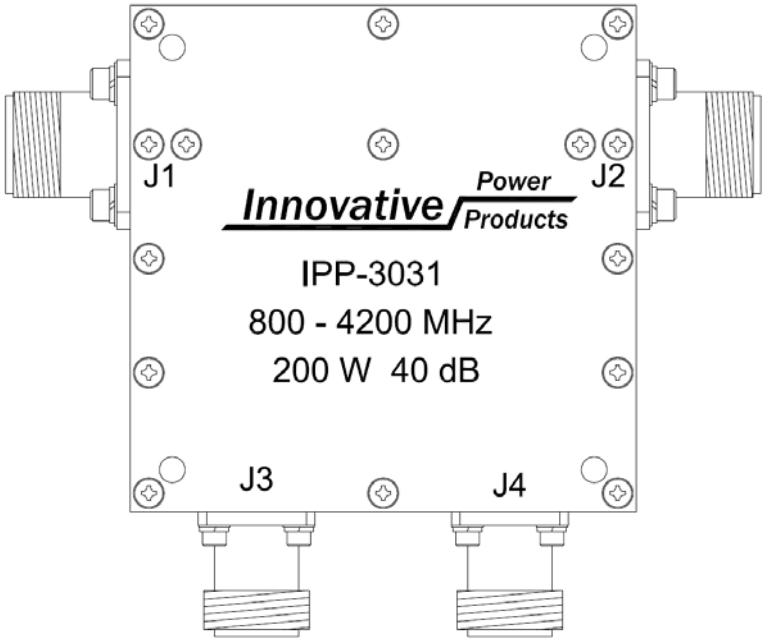
IPP Coaxial Directional Coupler Application Note

❖ **General Notes:**

- Data and specifications apply when ports is terminated with a good 50 Ohm load.
- Mating connectors should be tight.
- To insure proper heat sinking the bottom plate of coupler must lay flat on mounting surface.
- Torque stainless steel mounting screws, split and flat washers to proper value per size screw.
- Operating temperature is -55°C to +85°C base plate, non-condensing humidity
- Unless otherwise noted on outline drawing the VSWR specification refers to the J1, J2 input and output ports. The coupled ports VSWR are tuned to meet the coupled flatness specification when terminated with a 50 Ohm load impedance.

Input Output Relationships for Directional Couplers

INPUT	OUTPUTS			
	J1	J2	J3	J4
J1	N/A	Output	Forward Coupled	Reflected Coupled
J2	Output	N/A	Reflected Coupled	Forward Coupled



Electrical Specifications

- **VSWR (Voltage Standing Wave Ratio)**
  - The voltage standing wave ratio is a measure of how well a load is impedance-matched to a source. The value of VSWR is always expressed as a ratio with 1 in the denominator (2:1, 3:1, 10:1, etc.) It is a scalar measurement only (no angle). A perfect impedance match corresponds to a VSWR 1:1 meaning you will get all the power from source to load.
    - VSWR (σ) = Vmax/Vmin

- **Insertion Loss (IL)**
  - The insertion loss is the amount of power (P) lost when transmitted through the coupler from the input port to the output port.
  - The power loss from input to output includes power transferred to the coupled port which can be significant for lower coupling values.
    - IS(dB)=10Log(Pin/Pout)

- **Isolation (ISO)**
  - The isolation is the amount of power at the input port divided by the amount of power at the reflected (isolated) port when the other ports are terminated into 50 Ohms.
    - ISO(dB)=10Log(Pin/Piso)

- **Directivity (Dir)**
  - Directivity is a measure of the quality of the directional coupler?
    - Dir(dB)=Coupling-Isolation

- **Coupling (Cpl)**
  - At any given frequency (f) the coupling value is the ratio of the power levels from the input port to the coupled port. The coupling specification refers to the average of the coupling values (N) at each (f) in the band. Were N is the number of frequencies in the band.
    - Cpl(f)(dB)=10log(Pin(f)/Pcpl(f))
    - $\text{Cpl (dB)} = \left[\sum_{n=1}^{N} \text{Cpl(f)}\right]/N$

Electrical Specifications

- **Coupled Flatness (CF)**
  - The coupling specification refers to the difference in coupling (dB) between the maximum coupling (MaxCpl) value at (f1) and the minimum coupling (MinCpl) value at (f2) for the specified frequency band.
    - $CF(\pm dB) = (MaxCpl(f1) - MinCpl(f2))/2$

- **Power (P)**
  - The maximum power allowed into the coupler is the sum of the input power at each port.
    - $P_{total\ Max} = P_{in} + P_{out} + P_{coupled} + P_{reflected}$