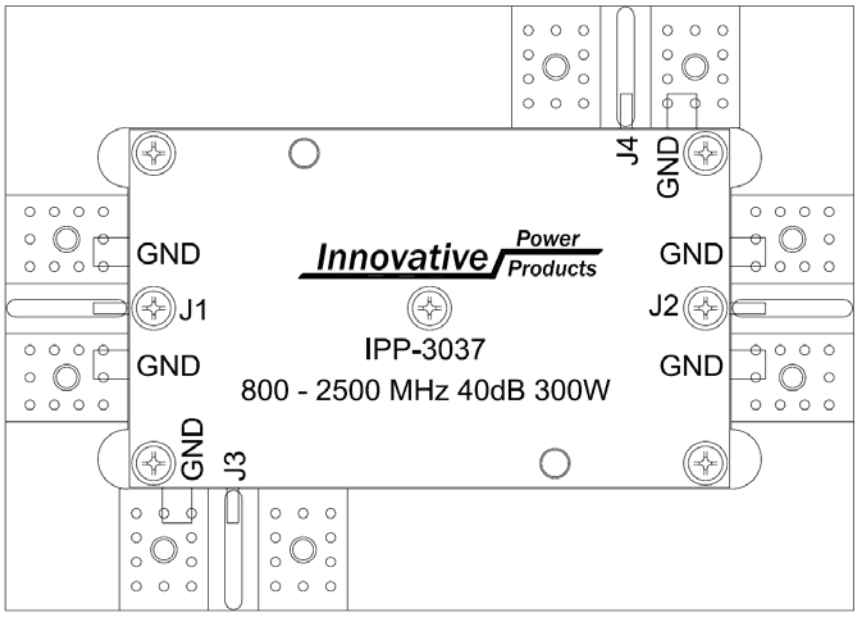
IPP Drop-In, Directional Coupler Application Note

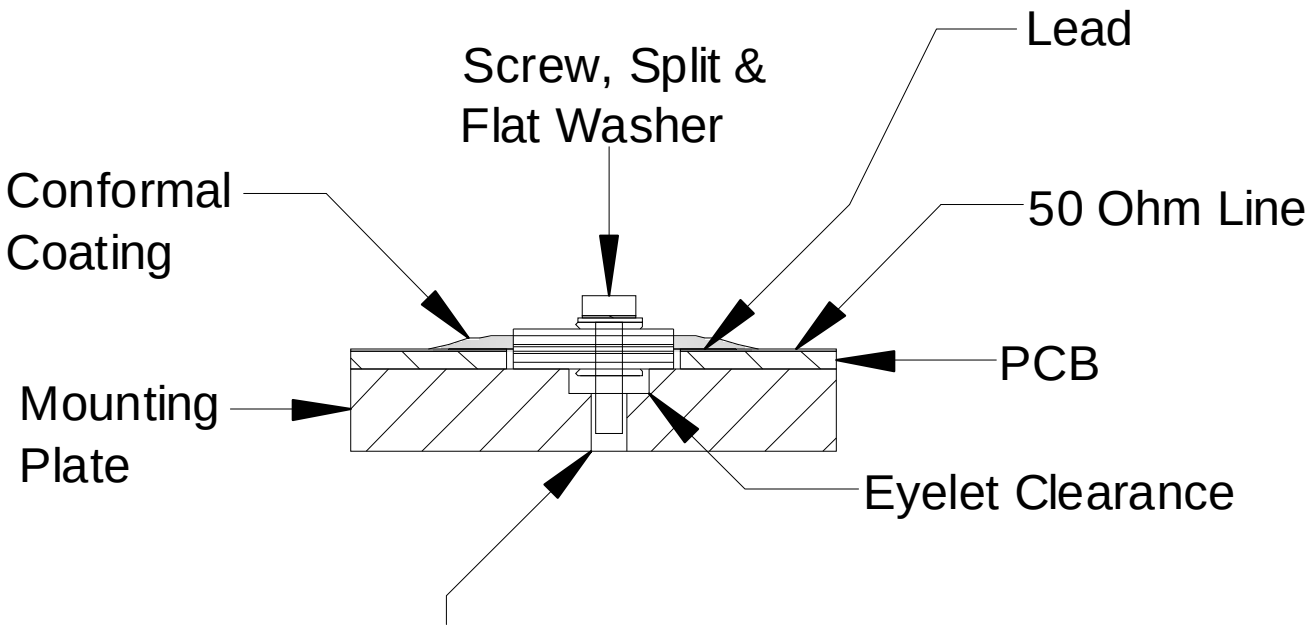
- General Notes:
  - Data and specifications apply when part is mounted in IPP test fixture and terminated with a good 50 Ohm load.
  - Conformal coating is recommended at the lead/50Ω line interface for high power applications to prevent voltage arcing.
  - To insure proper grounding and heat sinking the bottom plate of coupler must lay flat on mounting surface. As required on some models please allow clearance for all eyelet projections in base plate.
  - Solder signal, and on some models ground leads to 50 ohm lines and ground plane using lead free or Sn63 alloy.
  - Torque stainless steel screws, split and flat washers to proper value per size screw.
  - Operating temperature is -55°C to +85°C base plate, non-condensing.

Input Output Relationships for Directional Couplers

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



Eyelet Clearance for Directional Couplers with Eyelets



Mounting, Side View

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.
    - $Cpl(f)(dB)=10\log(Pin(f)/Pcpl(f))$
    - $Cpl\ (dB)= \left[\sum_{n=1}^{N} Cpl(f)\right]/N$

- **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.
    - $Ptotal\ Max= Pin + Pout + Pcoupled + Preflected$