

HIGH POWER CORRUGATED WAVEGUIDE COMPONENTS

Miter bends and polarizers



- General Atomics (GA) produces plain miter bends, miter bends with arc detectors, power monitor miter bends and polarizer miter bends
- Frequency range 28 to 300 GHz
- For use in waveguide transmission lines with waveguide inner diameters of 1.25", 2.375", 2.5" and 3.5"
- Transmitted powers up to 2 MW cw and higher

Precision-machined for accurate alignment, low ohmic loss transmission and typically 90° change in direction

MITER BENDS AND POLARIZERS

GA has the scientific, engineering and fabrication expertise to design and deliver standard and specialized miter bend.

PLAIN AND ARC DETECTOR MITER BENDS:

- Mirrors are water-cooled so the miter bends are suitable for 1-2 MW cw operation at 170 GHz in 2.5" (63.5 mm) versions
- For 170 GHz operation, ohmic losses on copper mirror have been measured to be 0.17% at room temperature for E-plane orientation
- Typically designed to allow broadband transmission, e.g., 110-170 GHz in 2.5" waveguide
- Arc detector version can detect arcs in either direction



2.5" plain miter bend showing water cooling lines to copper mirror



Arc detector version in 2.5" waveguide showing optical fiber connections

POWER MONITOR MITER BENDS:

- Couples small fraction of mm-wave beam using a linear array of coupling holes
- Both forward and reverse power can be monitored
- Version shown is suitable for 1 MW cw for H-plane polarization
- Prototype using a new design is being fabricated for use at up to 2 MW cw H-plane operation



2.5" power monitor miter bend showing pickup horns for monitoring forward and reverse power

POLARIZER POWER MONITOR MITER BENDS:

- Water-cooled mirror can be rotated through 90° as fast as ~ 0.1 s
- Uses servomotor with computer-controlled controller/driver
- Magnetic fluid vacuum feedthrough avoids dynamic O-rings
- A pair of polarizer miter bends can achieve any output polarization for a given input polarization



2.5" polarizer miter bend showing water connection for mirror cooling

LOW DIFFRACTION MITER BENDS:

- Prototype low diffraction miter bends were fabricated and tested at high power long pulse operation. The black tape enabled IR measurements of taper surface temperature
- 170 GHz HE_{11} mode in 2.5" waveguide is converted to a Gaussian mode in an up-taper to an expanded housing with a slightly curved mirror
- Calculated mode conversion ~ 0.08% vs. 0.25% for a standard miter bend



Pair of low diffraction miter bends