

THE DESIGN AND PERFORMANCE OF WAVEGUIDE TRANSMISSION LINE COMPONENTS FOR PLASMA ELECTRON CYCLOTRON HEATING (ECH) SYSTEMS*

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Over the past three years, General Atomics (GA) has developed and fabricated a variety of corrugated waveguide transmission line components for the U.S., European and Japanese fusion programs. Each of these programs has required ECH transmission line systems that efficiently transmit high power microwaves from newly developed gyrotrons to fusion plasmas for heating and current drive. These systems required low loss transmission of microwave power. To meet this requirement, GA has developed a variety of vacuum compatible transmission line components which consists of straight corrugated waveguides, calorimetric loads, switches, miter bends, polarizers, corrugated bellows, power monitors and DC breaks. Designed to operate at specific frequencies ranging from 82 GHz to 170 GHz with waveguide diameters of 32, 64, and 89 mm, the components have been fabricated to transmit as much as 1 MW of microwave power for a pulse length of 5 s. This paper presents the design criteria of selected components, and the calculated and measured performances of those components.

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