

Abstract Submitted  
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**Low-power Loss Measurements for ITER Gyrotron ECH Transmission Line Components**<sup>1</sup> ELIZABETH KOWALSKI, MICHAEL SHAPIRO, RICHARD TEMKIN, MIT PSFC, TIMOTHY BIGELOW, DAVID RASMUSSEN, US ITER Project, ORNL — The ITER transmission line system will transport 20 MW of power from 24 1-MW gyrotrons at 170GHz using overmoded metallic cylindrical waveguides that are 63.5 mm in diameter with quarter wavelength corrugations. Each line must have less than 83% loss, requiring precise loss measurements of waveguide components. An accurate measurement of the loss in these waveguide components was obtained using a low-power S-Parameter analysis technique which reduces the error and increases the accuracy of the loss measurement. The loss in a miter bend was measured to be 0.022 +/- 0.008 dB, in good agreement with theory. In addition, the loss due to a gap in the waveguide was measured for various gap lengths and found to be in good agreement with theory. This measurement shows the accuracy of the technique. To characterize the modes present in corrugated waveguide, a linearly polarized (LP) basis set of modes was derived which accounts for the polarization of the modes present since most high-power applications have linearly polarized Gaussian beam inputs.

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