Abstract Submitted
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Commissioning a Megawatt-class Gyrotron with Collector Potential Depression[1] J. LOHR, M. CENGHER, Y.A. GORELOV, D. PONCE, R. PRATER, GA — A 110 GHz depressed collector gyrotron has been installed on the DIII-D tokamak. The commissioning process rapidly achieved operation at full parameters, 45 A and 94 kV total voltage, with 29 kV depression. Although short pulse, 2 ms, factory testing demonstrated 1.2 MW at 41% electrical efficiency, long pulse testing at DIII-D achieved only 33% efficiency at full power parameters, for pulse lengths up to 10 s. Maximum generated power was ∼950 kW, considerably below the 1.2 MW target. During attempts to increase the power at 5 s pulse length, it was noted that the collector cooling water was boiling. This led to the discovery that 14 of the 160 cooling channels in the collector had been blocked by braze material during manufacture of the tube. The locations of blocked channels were identified using infrared imaging of the outside of the collector during rapid changes in the cooling water temperature. Despite these difficulties, the rf beam itself was of very high quality and the stray rf found calorimetrically in the Matching Optics Unit, which couples the Gaussian rf beam to the waveguide, was only 2% of the generated power, about half that of our previous best quality high power beam. Details of the power measurements and collector observations will be presented.

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