

THE ELECTRON CYCLOTRON RESONANT HEATING SYSTEM ON THE DIII-D TOKAMAK

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Abstract. In the DIII-D electron heating and current drive installation, up to six gyrotron microwave generators in the 1 MW class at pulse lengths up to 5 s have been operated simultaneously. The frequency for all the gyrotrons is 110 GHz, corresponding to the second harmonic of the electron gyrofrequency at 2 T. The peak generated power has been over 4 MW with peak injected power slightly greater than 3 MW. The rf generators are located remotely and are connected to the tokamak by up to 100 m of evacuated circular corrugated waveguide carrying the HE_{1,1} mode, with overall transmission efficiency including, coupling to the waveguide, of up to 75%. Ancillary equipment for polarization control, beam switching, power monitoring, control of launch direction and system protection has been developed.

The system has been used to support a wide variety of physics experiments including control of MHD modes, current density profile modifications, basic plasma heating and

current drive, transport studies and rf-assisted startup. The gyrotron complex is being upgraded by the acquisition of additional tubes with 5–10 s pulse length capability.