

FINAL DESIGN AND TEST RESULTS OF A HIGH VOLTAGE AMPLIFIER FOR A GYROTRON BODY POWER SUPPLY

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The design of a high voltage amplifier was being developed that uses series-connected transistors to control the output [1]. Although having many potential applications, this amplifier is designed to meet at a minimum the requirements of a body power supply for depressed collector gyrotrons that are used in electron cyclotron systems on the DIII-D tokamak and other devices worldwide. Therefore, the output voltage needs to be adjustable up to 35 kVDC and be capable of square-wave modulation at frequencies up to 5 kHz. Continuous operating body currents for a gyrotron are on the order of a few tens of milliamps. However, to attain the required speed for modulation with load capacitances as high as 2.5 nF, the ability to both source and sink peak currents as high as 5 to 10 A is required.

The design of a 40 kV, 250 mA high voltage amplifier has now been completed and the amplifier was fabricated. The transistors are configured into modules and the modules are mounted in four card cages within an enclosure that has a size equivalent to a standard electronics rack. The high voltage DC power supply, that provides the input voltage to the amplifier section, and the controls for the amplifier are housed within a separate electronics rack. An 800 k Ω , 2.5 nF dummy load for testing the amplifier was also fabricated, and the amplifier was been tested into this load up to its full 40 kV output.

The description of the recently completed amplifier and the test results will be presented.

[1] J. Tooker, P. Huynh., J. Fusion Eng. Des., 88 (2013), 521