

Development of wideband amplifier in ITER ICRF range

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ITER-India is responsible for delivery of 8+1(prototype) RF sources to ITER project. Each RF source will provide 2.5MW of RF power at VSWR 2:1 in the frequency range of 35 to 65MHz. Eight such RF sources will generate total 20MW of RF power. Two RF chains containing three high power amplifiers (HPA1, HPA2 and HPA3) need to be combined to build an RF source. HPA2 and HPP3 are RF tube based amplifiers while HPA1 is a solid state power amplifier. A development work is ongoing for a tetrode tube based wide band HPA1. Aim is to achieve a -1dB bandwidth over any 5MHz band in frequency range 35-65MHz. To achieve this specification the design of output cavity is based on wideband impedance matching circuit. Two L-C circuits connected in series are tuned to achieve a wideband response over desired frequency band. Input circuit design is based on tunable wide band impedance transformer. The amplifier is designed to operate in Grounded Grid configuration with CPI 4CW25000B tube. The rated output power is 10kW/CW. A detailed calculation is performed to find operating parameters of tetrode tube at rated power. A LabVIEW based code Tetrode Tube Calculator (TTC) is developed to perform load line calculation for tetrode tube. The code requires as input, parameters like DC anode bias, input DC power, anode voltage swing etc. and calculates the parameters like output power, efficiency, output impedance, input impedance etc. The calculated parameters are used as input for cavity design.

This paper discusses the tube parametric calculation using TTC code in detail. The detailed design of HPA1 cavity using CST Microwave studio software is discussed.

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