

Summary slide for

**“Progress in High Power Test of R&D Source for ITER ICRF system”**

(Paper no. FIP/1-5)

As a part of in-kind contribution, India is responsible to deliver nine numbers (1 Prototype + 8 series production) of RF Sources to ITER system, each having power handling capability of 2.5 MW/CW at VSWR 2:1 in the frequency range 35 – 65 MHz or 3.0 MW/CW at VSWR 1.5:1 in the frequency range 40 – 55 MHz, along with other stringent requirement. As there is no unique amplifier chain able to meet the output power specifications as per ITER need, the layout consists of two parallel three-stage amplifier chains, with a combiner circuit on the output side. This kind of RF source is unique in terms of its stringent specifications. A voluntary R&D program by India has been initiated for establishing the technology prior to Prototype and series production. In this program, single chain experimentation at 1.5MW for 2000s is conducted for the frequency range 35-65 MHz up to VSWR 2:1.

To support the R&D program, a dedicated high power test facility has been developed to test RF amplifiers with matched as well as with mismatched load condition (simulating plasma load condition). Over the past two years, manufacturing, inspection, assembly and integration of R&D RF source using Diacrode technology is completed successfully.

This paper reports successful commissioning of R&D RF Source and the achievement of 1.5 MW of RF power for more than 2000s in the frequency range 35 – 65 MHz, confirming other extremely challenging specifications. Burn test was conducted for 6000s continuously to verify the ruggedness of the entire system and benchmark the technology for fusion application.

The next step is to proceed for achieving final specification (2.5 MW/CW at VSWR 2:1 in the frequency range 35 – 65 MHz) by combining two such RF amplifier chains using a wideband combiner and test for ITER-like scenarios. In this operational phase, the major challenge will be to stabilize the performance of the combiner during mismatch load condition.