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Preliminary measurements of eight solid-state modules of the 10 kW pulsed power amplifier at 352 MHz under development at FREIA

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Solid-state high power amplifiers are increasingly used in particle accelerators as drivers and as high power stages themselves. In this context, at FREIA, we are developing a 10 kW pulsed power amplifier at 352 MHz. The frequency and pulsed operation (3.5 ms pulse at 14 Hz repetition) correspond to the specifications of the European Spallation Source (ESS), which we assist in its development and testing. The 10 kW amplifier is composed of eight modules, each module is built around a single package including two Si LDMOS transistors, operated in class B. The r.f. design implements matching networks in a single-ended architecture and avoids the use of baluns, required for a push-pull configuration. The operation in pulsed mode allows using a capacitor bank (eight 68 mF capacitors) releasing the extent of the DC power supply. Preliminary measurements demonstrate an output pulsed power around 1250 W per module, a power-added efficiency of 70% and a gain of 20 dB. A small variation ($< 5^\circ$) within the phase and gain (< 0.5 dB) distribution among the modules is obtained. Analogue circuits monitoring the operational currents, voltages and temperature for each module are also under development in addition of high power combiners.

Summary

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