

Development of LDMOS-based Solid-State Power Amplifiers for the heavy ion accelerator

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Construction of a heavy ion accelerator facility is currently underway to support various scientific studies in fields such as nuclear physics, materials science, and medicine. The heavy ion accelerator is primarily composed of the SCL3 section for low-energy acceleration and the SCL2 section for high-energy acceleration. Currently, beam extraction and application experiments have been conducted in the low-energy acceleration section, and the construction of the high-energy acceleration device is in progress. SCL3 consists of 22 quarter wave resonators (QWR) with a superconducting acceleration cavity frequency of 81.25 MHz and 102 half wave resonators (HWR) operating at 162.5 MHz. SCL2 comprises 213 single spoke resonators (SSR) with a frequency of 325 MHz.

The SCL3 superconducting acceleration cavity can deliver up to 4 kW of RF power to the acceleration cavity using a high-power solid-state power amplifier (SSPA) based on LDMOS (Lateral Double-Diffused Metal Oxide Semiconductor) technology. The key components of the SSPA include the main transistor, a bidirectional coupler for RF input power monitoring, attenuator, limiter to prevent over-input, ultra-short MMIC, driving amplifier, 4-way input power divider, 4-way output power combiner, circulator, and dummy load. The basic principle of the high-power amplifier applied to the 81.25 MHz and 162.5 MHz acceleration cavities is the same, but there are differences in components such as the circulator and RF combiner.

Paper submission Plan

Best Presentation

Contribution track

ICABU WG1. Accelerator Systems

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