

New concepts for a high power 805 MHz RF amplifier for LANSCE using Gallium Nitride semiconductors

Monday 26 August 2024 16:00 (2 hours)

Los Alamos Neutron Science Center uses a coupled-cavity linac (CCL) to accelerate H- beam from 100 to 800 MeV. This was the first CCL put into operation (1972) and is powered by forty-four 1.25 MW 805 MHz klystrons developed in the same era. A new initiative is underway to develop a replacement RF amplifier that fits in place of one klystron with HV modulator tank, and is functionally equivalent or better in RF performance. Conventional LDMOS transistors based on silicon have reduced power above 500 MHz, and are also limited in peak power by the maximum drain voltage (50-65 volts). Changing wireless infrastructure is causing leading manufacturers to introduce and discontinue products within a decade. Long term operation of LANSCE requires continuity of product availability. We have chosen leading-edge high voltage Gallium Nitride (GaN) on Silicon Carbide transistors to be able to reduce the number of active devices and the complexity of power combing. GaN has inherent higher temperature and voltage capability. We are testing devices for 3.6 kW of saturated power at 100 volts, and improvements are underway. Combining technology is also under study as part of the overall system.

Footnotes

Funding Agency

US Department of Energy by Triad National Security, LLC, under contract 89233218CNA000001

Primary author: LYLES, John (Los Alamos National Laboratory)

Co-authors: WAGHMARE, Aditya (Los Alamos National Laboratory); COMISKEY, Brandon (Los Alamos National Laboratory); BROWN, Eric (Los Alamos National Laboratory); VALLADARES, Jesus (Los Alamos National Laboratory); CASTELLANO, Jose (Los Alamos National Laboratory); BRADLEY III, Joseph (Los Alamos National Laboratory); ALVAREZ PRIETO, Juan (Los Alamos National Laboratory); RODRIGUEZ, Manuelita (Los Alamos National Laboratory); SANCHEZ BARRUETA, Maria (Los Alamos National Laboratory); PROKOP, Mark (Los Alamos National Laboratory); BROWN, Michael (Los Alamos National Laboratory); VAN ROOY, Paula (Los Alamos National Laboratory); BAILY, Scott (Los Alamos National Laboratory); ROCHA, Stephanie (Los Alamos National Laboratory); RUSSELL, Steven (Los Alamos National Laboratory); KWON, Sungil (Los Alamos National Laboratory); HALL, Wesley (Los Alamos National Laboratory)

Presenter: LYLES, John (Los Alamos National Laboratory)

Session Classification: Monday Poster Session

Track Classification: MC4: Technology: MC4.6 RF power sources and power couplers