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# A High Power 805 MHz RF Amplifier for LANSCE using GaN Devices

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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. Replacement klystrons have had mortality rates higher than tubes made over 25 years ago. This has caused us to embark on a new initiative to develop a replacement RF amplifier that fits in place of one klystron with HV modulator tank, that is also 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. Changing wireless infrastructure is causing leading manufacturers to introduce and discontinue products all within a decade, unlike the old klystron producers. Long term operation of LANSCE requires continuity of RF device 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 combining. GaN has inherent higher channel temperature and voltage breakdown ratings. We are testing devices for 3.6 kW of saturated power at 100 volts, and improvements are underway to increase this. Power supplies and combining technology are also under study as part of the overall system.

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