UPDATE ON CW 8 KW 1.5 GHZ KLYSTRON REPLACEMENT

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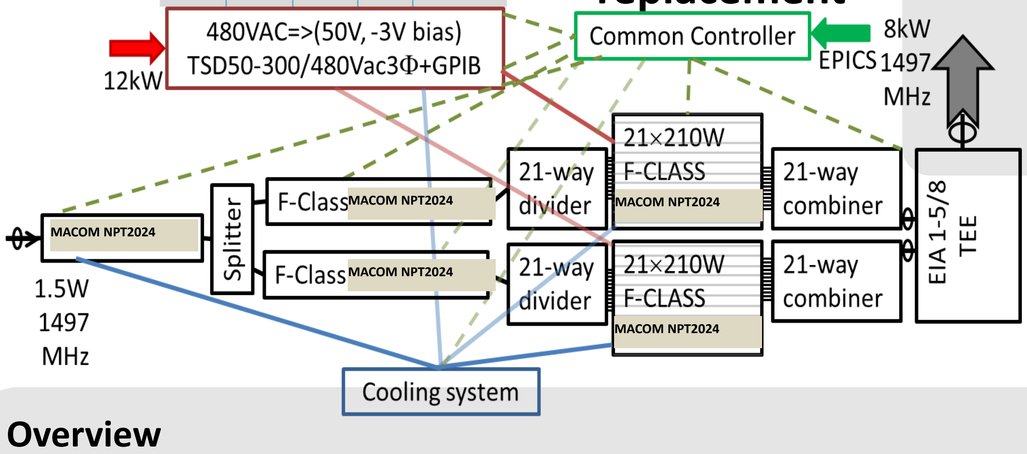
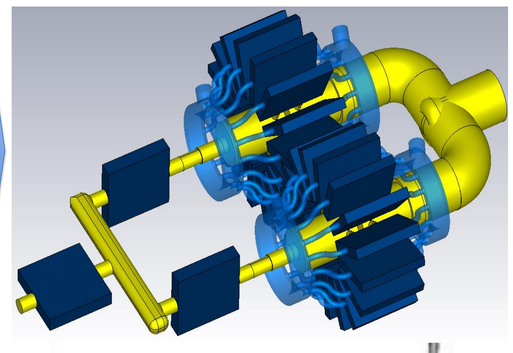
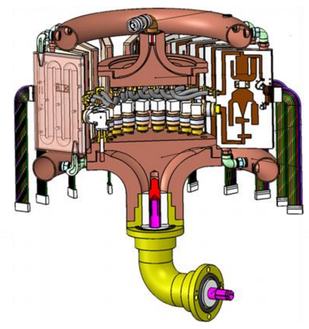
Block diagram of proposed replacement

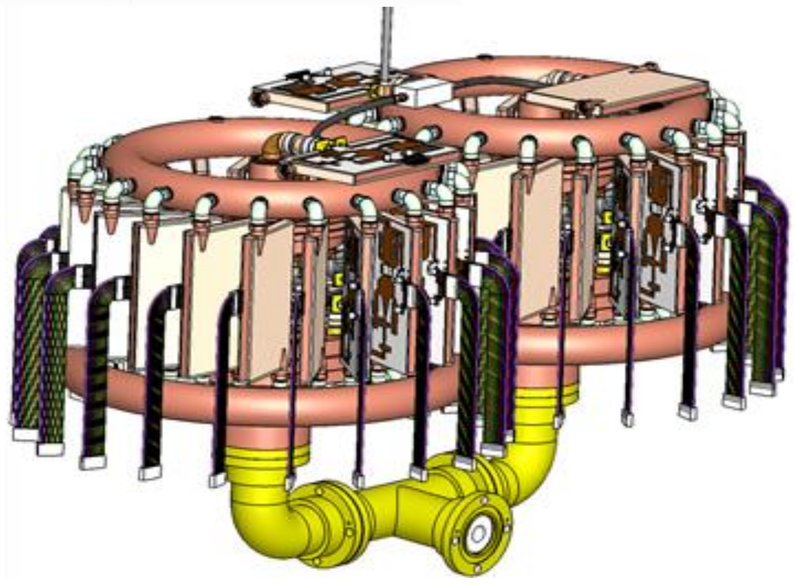


Overview

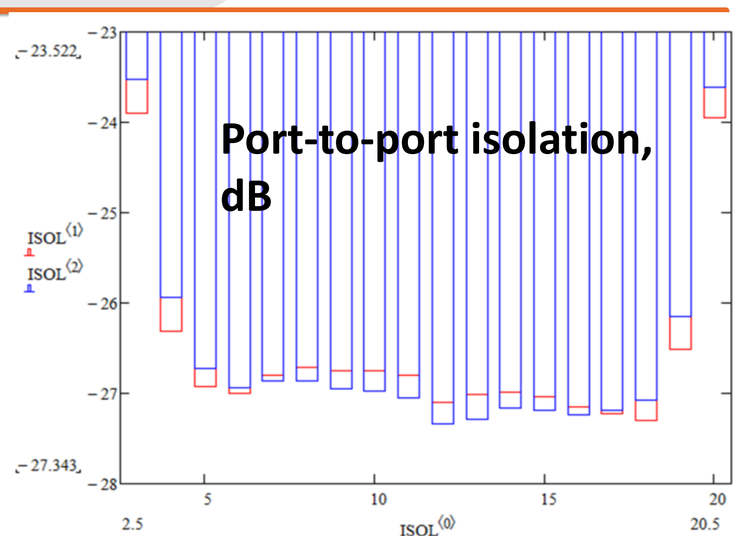
JLAB upgrade program requires a ~8 kW, 1497 MHz amplifier operating at more than 55-60% efficiency, and 8 kW CW power to replace up to 340 klystrons. One of possibilities for the klystron replacement is usage of high electron mobility packaged GaN transistors applied in array of highly efficient amplifiers using precise in-phase, low-loss combiners-dividers. Design features and challenges related to amplifier modules and radial multi-way dividers/combiners are discussed including HFSS simulations and measurements.



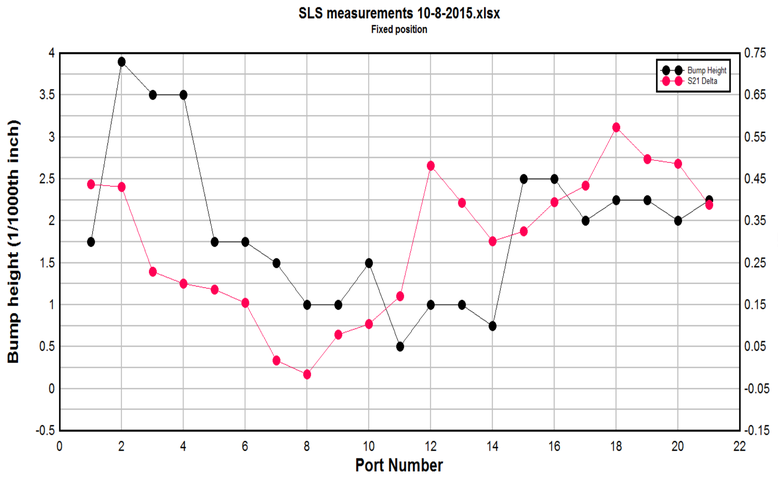




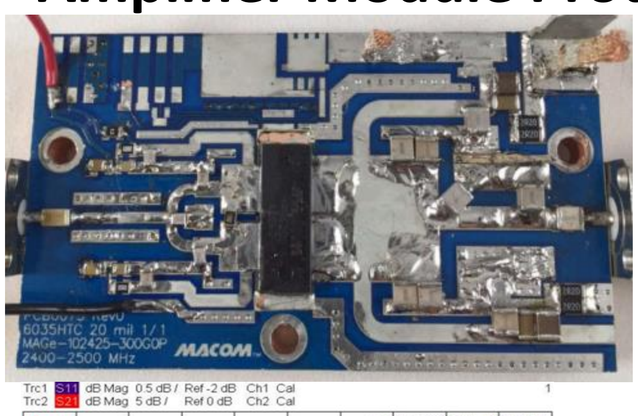
Multiway combiner prototype

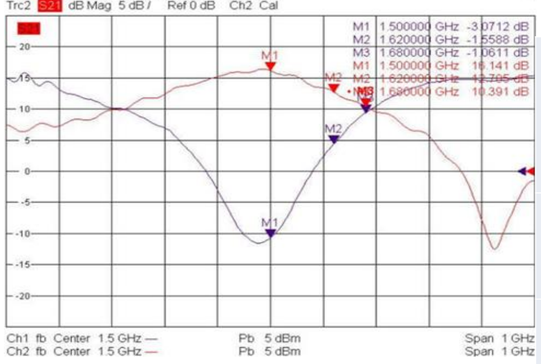


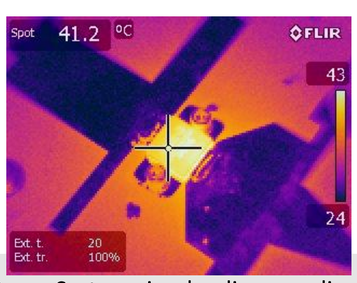
Port-to-port mechanical imperfections & insertion losses

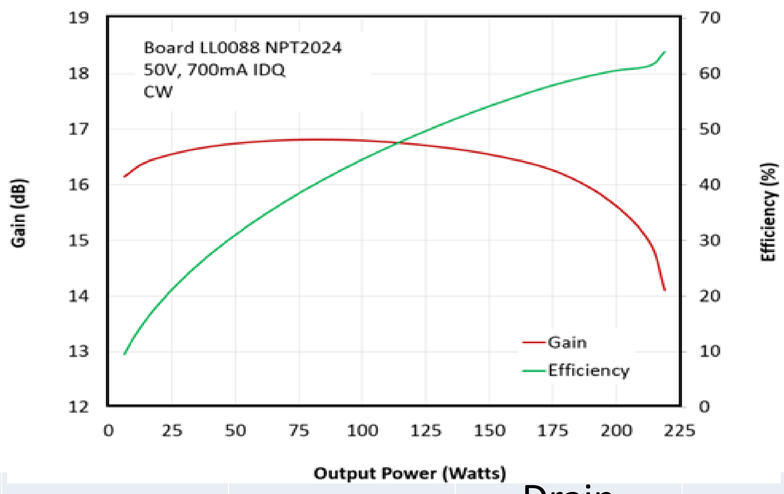


Amplifier Module Prototype



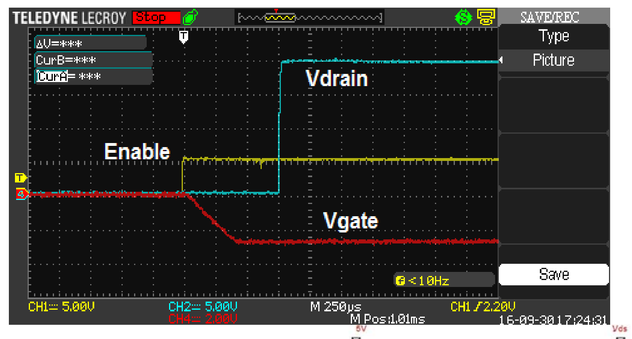


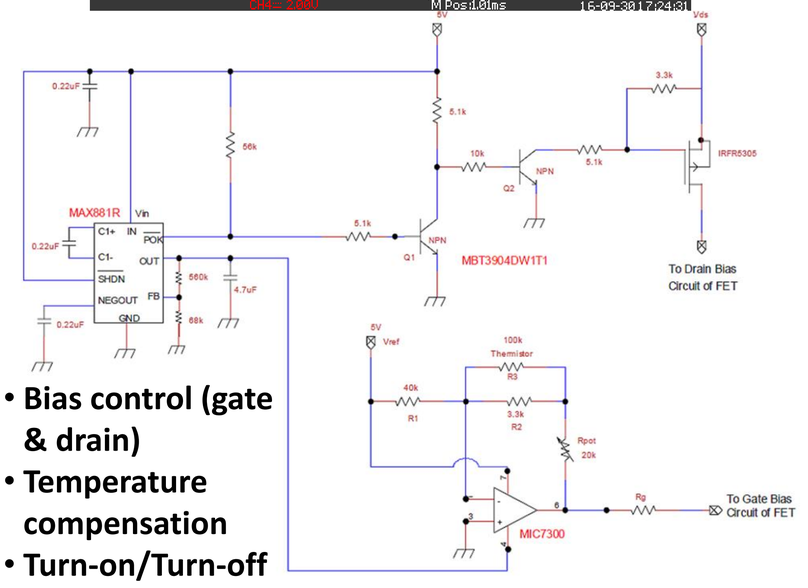




MOSFET setup	Pout, W	PAE, %	Drain efficiency, %	Gain, dB
CGHV14500	100	43	45	10.2
	132	47	49	9.6
CGHV14250	117	58	60	11.7
	158	50	53	9
QPD1823 at 1880 MHz	126	57	58	19.8
	170	63	64	16.3
NPT2024 at 50 V drain	200	58.4	60	15.7
	218	60.7	63	14

Low-level control





- Bias control (gate & drain)
- Temperature compensation
- Turn-on/Turn-off sequencing
- Emergency shut down

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