

**EXTENDED INTERACTION KLYSTRONS FOR  
TERAHERTZ POWER AMPLIFIERS\***

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Extended Interaction Klystrons have been demonstrated at frequencies up to 218 GHz CW and 229 GHz pulsed. Modern design, fabrication, and measurement technologies show promise of extending their operation into the THz regime. This paper describes the challenges and some novel approaches to the development of EIKs operating terahertz frequencies, while simultaneously meeting demanding requirements for output power, gain, bandwidth, and efficiency.

The main challenges in design include focus and transport of an emittance dominated beam, development of a broadband, high gain circuit, and the minimization of the sensitivity of design to the effects of fabrication and alignment tolerances. The main challenges in fabrication and integration include achieving required component dimensions and alignment within specified tolerances and achieving high quality surface finishes using materials with satisfactory mechanical and thermal properties.

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