# Abstracts

## Enhanced Performance in GaAs TUNNETT Diode Oscillators Above 100 GHz Through Diamond Heat Sinking and Power Combining (Dec. 1994 [T-MTT])

*H. Eisele and G.I. Haddad. "Enhanced Performance in GaAs TUNNETT Diode Oscillators Above 100 GHz Through Diamond Heat Sinking and Power Combining (Dec. 1994 [T-MTT])." 1994 Transactions on Microwave Theory and Techniques 42.12 (Dec. 1994, Part II [T-MTT] (1994 Symposium Issue)): 2498-2503.*

Single-drift GaAs TUNNETT diodes on integral heat sinks with RF power levels up to 40 mW at 102.33 GHz exhibit no sign of saturation in RF output power or efficiency and are thought to be thermally limited. Therefore, diodes from the same MBE grown material were fabricated using a different selective etching technology and mounted on diamond heat sinks for improved heat dissipation. RF output power levels of up to 95 mW with corresponding dc-to-RF conversion efficiencies of 5.85% were measured at 104.16 GHz. To further increase the available RF output power, two TUNNETT diodes at a time were power combined using two radial line full-height waveguide cavities. The combined RF output power was 46 mW at 102.3 GHz from two diodes on integral heat sinks and 142 mW at 103.87 GHz from two diodes on diamond heat sinks with corresponding combining efficiencies of 80% and more. This is the first successful demonstration of power combining with TUNNETT diodes and the power levels and efficiencies from either single or combined diodes are the highest reported to date from any devices made of III-V materials (eg., GaAs and InP). Single diodes in second-harmonic mode yielded RF power levels of 0.57 mW at 219.7 GHz and 0.19 mW at 235.7 GHz.

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