Abstracts

Wide-Bandwidth Electron Bolometric Mixers: A 2DEG Prototype and Potential for Low-Noise THz Receivers

J.-X. Yang, F. Agahi, D. Dai, C.F. Musante, W. Grammer, K.M. Lau and K.S. Yngvesson. "Wide-Bandwidth Electron Bolometric Mixers: A 2DEG Prototype and Potential for Low-Noise THz Receivers." 1993 Transactions on Microwave Theory and Techniques 41.4 (Apr. 1993 [T-MTT]): 581-589.

This paper presents a new type of electron bolometric ("hot electron") mixer. We have demonstrated a three order of magnitude improvement in the bandwidth compared with previously known types of electron bolometric mixers, by using the two-dimensional electron gas (2DEG) medium at the hetero-interface between AlGaAs and GaAs. We have tested both in-house MOCVD-grown material, and MBE material, with similar results. The conversion loss (L/sub c/) at 94 GHz is presently 18 dB for a mixer operating at 20 K, and calculations indicate that L/sub c/ can be decreased to about 10 dB in future devices. Calculated and measured curves of L/sub c/ versus P/sub LO/, and I/sub DC/, respectively, agree well. We argue that there are several different configurations of electron bolometric mixers, which will all show wide bandwidth, and that these devices are likely to become important as low-noise THz receivers in the future.

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