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Title:A Low Noise 2.7 THz Waveguide-Based Superconducting Mixer
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Abstract:We report on a low noise waveguide-based heterodyne mixer utilizing a superconductiang NbN hot electron bolometer (HEB) operating near 2.7 THz. The mixer is an NbN nano-bridge integrated with a gold bowtie planar antenna on an ultra-thin silicon substrate of ~ 2-3 μm thickness. To produce the waveguide embedding circuit for use at such a high frequency, we adopted a novel approach combining UV-lithography and micro-plating techniques. The mixer response agreed precisely with model predictions, and we measured a minimum uncorrected DSB receiver noise temperature of 965 K at an LO frequency of 2.74 THz.
Number of references:23
Inspec controlled terms:bolometers - hot carriers - niobium compounds - planar antennas - superconducting microbridges - superconducting mixers - ultraviolet lithography
Uncontrolled terms:waveguide-based superconducting mixer - low noise heterodyne mixer - superconductiang NbN hot electron bolometer - nanobridge - gold bowtie planar antenna - ultrathin silicon substrate - waveguide embedding circuit - UV lithography - microplating techniques - mixer response - model predictions - DSB receiver noise temperature - LO frequency - frequency 2.7 THz - size 2 mum to 3 mum - temperature 965 K - NbN - Si
Inspec classification codes:B3240C Superconducting junction devices - B5270 Antennas - B7230C Photodetectors - B2550G Lithography (semiconductor technology)
Numerical data indexing:frequency 2.7E+12 Hz;size 2.0E-06 3.0E-06 m;temperature 9.65E+02 K
Chemical indexing:NbN/bin Nb/bin N/bin;Si/sur Si/el
Treatment:Practical (PRA); Experimental (EXP)
Discipline:Electrical/Electronic engineering (B)
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