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Title:Terahertz detectors based on superconducting hot electron bolometers
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Abstract:Low noise terahertz (THz) heterodyne detectors based on superconducting niobium nitride (NbN) hot electron bolometers (HEBs) have been studied. The HEB consists of a planar antenna and an NbN bridge connecting across the antenna's inner terminals on a high-resistivity Si substrate. The double sideband noise temperatures at 4.2 K without corrections have been characterized from 0.65 to 3.1 THz. The excess quantum noise factor of about 4 has been obtained, which agrees well with the calculated value. Allan variance of the HEB has been measured, and Allan time up to 20 s is obtained using a microwave feedback method. Also, the intermediate frequency gain bandwidth (GBW) was measured using two different methods, resulting in same GBW value of about 3.5 GHz.
Number of references:15
Inspec controlled terms:bolometers - electron detection - heterodyne detection - hot carriers - niobium compounds - quantum noise - submillimetre wave detectors - superconducting device noise - superconducting photodetectors - terahertz wave detectors
Uncontrolled terms:superconducting hot electron bolometer - low noise terahertz heterodyne detector - low noise THz heterodyne detector - superconducting HEB - planar antenna - bridge - high-resistivity Si substrate - double sideband noise temperature - quantum noise factor - Allan variance - intermediate frequency gain bandwidth - GBW - temperature 4.2 K - frequency 0.65 THz to 3.1 THz - NbN
Inspec classification codes:B7230C Photodetectors - B7420 Particle and radiation detection and measurement - B7320R Thermal variables measurement - B7310N Microwave measurement techniques - B1350 Microwave circuits and devices - B3240R Superconducting receivers and detectors
Numerical data indexing:temperature 4.2E+00 K;frequency 6.5E+11 3.1E+12 Hz
Chemical indexing:NbN/int Nb/int N/int NbN/bin Nb/bin N/bin
Treatment:Practical (PRA); Experimental (EXP)
Discipline:Electrical/Electronic engineering (B)

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