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Title:A self-mixing NMOS channel-detector optimized for mm-wave and THZ signals
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Abstract:A self-mixing terahertz signal detector combined with a low noise amplifier and a properly balanced - folded dipole or slot antenna for concentrating millimeter wave signals to NMOS detectors is described. The detector was optimized to 300 GHz signals. The noise equivalent power (NEP) was estimated to 320 pW/vHz while the total output referred noise of 2.1 μV/(Hz)1/2 was measured at amplifier gain of 46 dB. This was achieved by using NMOS mixer devices optimized for resistive mixing that operate in a linear region of operation where the channel voltage is set close to zero by means of regulating the virtual ground level. The NMOS device, which is positioned at the antenna connections, has a minimum channel length that permits a far more precise calculation of the coupling devices. A position like termination of the two symmetrical detector devices was distributed between an antenna area and the amplification stage. The detectors were fully integrated using the 250 nm CMOS technology. Good matching was found between mathematically analyzed and simulated noise performances and prototypes measurements, where comparable measurements were performed on a THz array which consists of four pixels with folded dipole antennas or those with slot type antennas. © Springer Science+Business Media, LLC 2012.
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