Abstracts

Recent Developments in Millimeter Wave Components

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Several noteworthy improvements in the state-of-the-art of millimeter wave receiver components have been obtained which are to be reported in this paper. Planar, passivated, GaAs Schottky barrier diodes with very high frequency cut-off characteristics have been developed, and regularly reproduced. These diodes, having f/sub co/ /spl ap/ 1000 GHz at zero bias, have been tailored for use in a line of mixers that covers the 26.5 GHz to 110 GHz range with a typical conversion loss of 5.5 dB at 35 GHz and 8.0 dB at 94 GHz. Mixer noise ratio typically is 1.2 or better for all units. Currently available designs have IF passbands of 100 - 500 MHz, 0.5 - 1.0 GHz, and 1.0 - 2.0 GHZ. The very high f/sub co/ of the diodes has allowed the development of an uncooled degenerate parametric amplifier which has attained a noise figure of 1.7 dB while operating with a gain of 15 dB and an instantaneous signal bandwidth of greater than 800 MHz. The center frequency of the amplifiers is in the 30 - 35 GHz range. The pump power required for full band operation is 10 - 20 mw. The GaAs Schottky barrier diodes have also been designed into several baseband detectors. When biased optimally, an improvement of some 20 - 30 dB in tangential signal sensitivity (TSS) can be obtained in the 70 - 90 GHz range over the TSS available from a biased bolometer and narrow band detector amplifier. Typically the TSS = -51 dBm at 35 GHz and -40 dBm at 94 GHz with a video bandwidth of 10 MHz.

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