Abstracts

Integration of High-Q GaAs Varactor Diodes and 0.25 µm GaAs MESFET's for Multifunction Millimeter-Wave Monolithic Circuit Applications

M.G. McDermott, C.N. Sweeney, M. Benedek, J.J. Borelli, G. Dawe and L. Raffaelli. "Integration of High-Q GaAs Varactor Diodes and 0.25 µm GaAs MESFET's for Multifunction Millimeter-Wave Monolithic Circuit Applications." 1990 Transactions on Microwave Theory and Techniques 38.9 (Sep. 1990 [T-MTT] (Special Issue on Multifunction MMIC's and their System Applications)): 1183-1190.

Two technologies have been demonstrated whereby high-Q, vertical-structure, abrupt-junction varactor diodes have been monolithically integrated with 0.25 µm GaAs MESFET's on semi-insulating GaAs substrates for multifunction millimeter-wave monolithic circuit applications. A range of diodes with various anode sizes have been realized with measured capacitance swings of >2.1:1 from 0 V to -4 V and series resistances of approximately 1 Omega. Diodes having a zero bias capacitance of 0.35 pF have Q's of >19 000 (50 MHz) with -4 V applied to the anode. Under power bias conditions, the MESFET's have a measured gain of >6 dB at 35 GHz with extrapolated values for f/sub t/, and f/sub max/, of 32 GHz and 78 GHz, respectively. Using these technologies, a monolithic Ku-band VCO containing a varactor diode, a 0.25 µm GaAs MESFET, and the usual MMIC passive components has been built and tested. At around 31 GHz, the circuit has demonstrated 60 mW power output with 300 MHz of tuning bandwidth. The technologies can be extended to integrate other types of diodes and 0.25 µm FET devices on the same GaAs wafer, such as p-i-n's and MESFET's/HEMT's or Schottky mixer diodes and MESFET's/HEMT's.

❑ Return to main document.