Abstracts

Wide-Band Varactor-Tuned Coaxial Oscillators

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An experimental investigation into the effects of package and circuit reactances on wide-band varactor-tuned oscillators is described. The results are used to design an X-band Gunn coaxial oscillator with a tuning range in excess of 3 GHz. It is shown that the stray reactance, junction capacitance, and bond-wire inductance affect the varactor tuning characteristics. The characteristics are conveniently displayed by the reflection phase variation with tuning voltage and frequency. A general theory for wide-band varactor-tuned oscillators is presented which is related to the impedance characteristics. These results are used to design three coaxial varactor-tuned oscillators. The first two oscillators are series arrangements while the third oscillator is a parallel arrangement. A simple circuit technique is used to improve the tuning range of each arrangement. This technique is shown to increase the coupling to the varactor diode and decrease the oscillator Q by reactance compensation.

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