

## **Self-Heating Process in Microwave Transistors**

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### **Abstract**

The temperature of microwave FETs is found to vary significantly at extremely high frequencies even though the fundamental thermal time constant is only a few kHz. This affects third-order intermodulation through a process involving temperature rise due to power dissipation at the fundamental and second harmonic frequencies of signal, which is mixed with the fundamental and second-order products of the device's inherent nonlinearity. The process is strongly influenced by the spacing between the frequencies of signal components, which is exploited in a proposed method for characterizing the frequency dependence of self-heating. The impact on circuit performance is that distortion and intermodulation, which vary with bias and load conditions, additionally vary with self-heating. This additional dependence is overlooked in present circuit models and analysis techniques.