Abstracts

Thermal and package performance limitations in LDMOSFET's for RFIC applications

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This paper presents a systematic study of the limitations imposed by thermal and packaging considerations on radio-frequency (RF) performance of Si bulk and silicon-on-insulator (SOI) lateral DMOSFET's (LDMOSFET's). Several bulk and SOI devices are studied with the help of measurements as well as two-dimensional device simulations incorporating electrothermal models. Model parameters are extracted and used in circuit simulators to perform RF characterization of these devices. Further, a new three-region theory for the LDMOSFET is discussed and used to evaluate the static and RF performance of the devices in a nonisothermal environment. This paper shows that the package plays an important role in RF performance of SOI and bulk devices due to self-heating effects within the device. A detailed DC and RF performance evaluation is presented. Significant drift is observed in RF performance of bulk and SOI devices due to self-heating considerations. The physical understanding of these thermal effects within the device can facilitate the design of better packages for bulk and SOI devices.

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