Abstracts

Characterization and modeling of small-signal substrate resistance effect in RF CMOS (2002 Vol. I [MWSYM])

Yo-Sheng Lin, Shey-Shi Lu, Tai-Hsing Lee and Hsiao-Bin Liang. "Characterization and modeling of small-signal substrate resistance effect in RF CMOS (2002 Vol. I [MWSYM])." 2002 MTT-S International Microwave Symposium Digest 02.1 (2002 Vol. I [MWSYM]): 161-164 vol.1.

A novel theory based on dual-feedback circuit methodology is proposed to explain the kink phenomenon of the scattering parameter S/sub 22/ in deep submicrometer MOSFETs. Our results show that the output impedance of MOSFETs intrinsically shows a series RC circuit (for low substrate resistance) or a "shifted" series RC circuit (for very high substrate resistance) at low frequencies, and a parallel RC circuit at high frequencies. It is this inherent triple characteristic of the output impedance that causes the appearance of the double kinks phenomenon of S/sub 22/ in a Smith chart. Our model can not only predict the behavior of S/sub 22/, but also calculate all S-parameters accurately. Experimental data of 0.25 /spl mu/m-gate MOSFETs are used to verify our theory. Excellent agreement between theoretical values and experimental data was found.

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