TITLE
Hitoshi Aoki and Masanori Shimasue, “Self-Heating characterization of Multi-Finger MOSFETs used for RF-CMOS applications” IET 2012.

ABSTRACT
The purpose of this research is to characterize and model the self-heating effect of multi-finger n-channel MOSFETs. Self-heating effect does not need to be analyzed for single-finger bulk CMOS devices. However, it should be considered for multi-finger n-channel MOSFETs that are mainly used for RFCMOS applications. We have measured and characterized multi-finger (16, 64, and 128 fins) n-channel MOSFETs, extensively, with instruments, and process and device simulators. A DC drain current measurement method without self-heating is developed and performed by using a vector network analyzer. Lastly, a compact model, which is a BSIM4 model with customized equations and additional sub-circuit, was developed and implemented in our SPICE simulator. As the results, using the proposed model and extracted parameters excellent agreements have been obtained between measurements and simulations in DC and S-parameter domain whereas the original BSIM4 shows inconsistency between static DC and small signal ac simulations because of the rack of self-heating effect. The proposed model and measurement method can be applied for any RF-CMOS circuit design applications.