

# **Impact of self-heating and substrate effects on small-signal output conductance in UTBB SOI MOSFETs**

## **Abstract**

The frequency variation of the output conductance in ultra-thin body with ultra-thin BOX (UTBB) SOI MOSFETs without a ground plane is studied through measurements and two-dimensional simulations. Two effects causing the output conductance variation with frequency, namely self-heating and source-to-drain coupling through the substrate, are discussed and qualitatively compared. Notwithstanding the use of ultra-thin BOX, which allows for improved heat evacuation from the channel to the Si substrate underneath BOX, a self-heating-related transition clearly appears in the output conductance frequency response. Furthermore, the use of an ultrathin BOX results in an increase of the substrate-related output conductance variation in frequency. As a result, the change in output conductance of UTBB MOSFETs caused by the substrate effect appears to be comparable and even stronger than the change due to self-heating.