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Transition from high to low $1/f$ noise regimes in Field Oxide Field Effect Transistors (FOXFETs) XING ZHOU, DANIEL FLEETWOOD, RONALD SCHRIMPF, Vanderbilt University, LAURA GONELLA, FEDERICO FACCIO, CERN, PH Department, VANDERBILT COLLABORATION, CERN COLLABORATION — The excess low frequency ($1/f$) noise of parasitic field oxide FETs from a 130 nm technology has been found to vary by more than ~6 orders of magnitude with gate voltage, above the nominally measured device threshold. We find that this variation is due to a transition from noisy subthreshold conduction to full conduction in strong inversion at a point that is more than 5 V above the standard extrapolated threshold voltage. This field oxide structure has a length of ~ 1 micron and a width of ~ 200 micron. We attribute the conduction below to a noisy, subthreshold (perhaps even percolative) path at lower voltages, with a significant contribution from the high density of defects at the Si/SiO_2 interface in this parasitic FOXFET structure. The noise above the ?true? threshold (as determined with assistance from the noise measurements) follows a standard number fluctuation model, when the subthreshold conduction regime is separated out in the analysis. This work was supported in part by the US Navy.

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