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Channel Length Scaling Effects in Graphene Field-Effect Transistor INANC MERIC, Columbia University, JYOTSNA CHAUHAN, University of Florida, MELINDA HAN, PHILIP KIM, Columbia University, JING GUO, University of Florida, KENNETH L. SHEPARD, Columbia University — We present measurement and analysis of the current-voltage characteristics in the high-bias regime of graphene field-effect transistors of different channel lengths. The devices are fabricated with a gate dielectric process based on a polyvinyl alcohol adsorption layer, enabling reliable top-gates with the highest reported efficiency. Device characteristics are strongly determined by velocity saturation of the carriers, the zero-bandgap density-of states, contact doping, and tunneling. Contact doping strongly reduces the effective channel length in the absence of "spacer" between the gated channel region and the contacts. Surface polar optical phonon scattering determines saturation velocities down to short channel lengths. At the shortest channel lengths, band-to-band tunneling degrades device output conductance and transconductance.

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