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Wafer-scalable high-performance CVD graphene devices and analog circuits LI TAO, JONGHO LEE, HUIFENG LI, RICHARD PINER, RODNEY RUOFF, DEJI AKINWANDE, The University of Texas at Austin — Graphene field effect transistors (GFETs) will serve as an essential component for functional modules like amplifier and frequency doublers in analog circuits. The performance of these modules is directly related to the mobility of charge carriers in GFETs, which per this study has been greatly improved. Low-field electrostatic measurements show field mobility values up to 12k cm^2/Vs at ambient conditions with our newly developed scalable CVD graphene. For both hole and electron transport, fabricated GFETs offer substantial amplification for small and large signals at quasi-static frequencies limited only by external capacitances at high-frequencies. GFETs biased at the peak transconductance point featured high small-signal gain with eventual output power compression similar to conventional transistor amplifiers. GFETs operating around the Dirac voltage afforded positive conversion gain for the first time, to our knowledge, in experimental graphene frequency doublers. This work suggests a realistic prospect for high performance linear and non-linear analog circuits based on the unique electron-hole symmetry and fast transport now accessible in wafer-scalable CVD graphene. *Support from NSF CAREER award (ECCS-1150034) and the W. M. Keck Foundation are appreicated.

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