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High-K MISFET channel mobility from magnetoresistance R.T. BATE, W.W. CHANCE, P. KUMAR, W.P. KIRK, NanoFAB Center, University of Texas at Arlington — Carrier trapping in the gate insulator or at the interface with the silicon can depress the effective channel mobility of high-K MISFETs below the drift mobility. This reduction in effective mobility can be distinguished from true mobility reduction due to carrier scattering by using the Hall effect to measure the channel carrier density [1]. However, channel Hall measurements have traditionally required nonstandard multidrain devices, which must be included in the test chip design. We propose measuring the reduction in drain current of conventional transistors by a magnetic field to determine the Hall coefficient. This method, which requires no multidrain devices, could become a routine diagnostic procedure. It is based on a theorem concerning the magnetoresistance of a rectangular plate with perfectly conducting end contacts [2], which has apparently not been tested experimentally, at least on MOSFET's. The validity of the method can be determined by comparison with channel carrier density determined in other ways, including split capacitance on MOSFETS, conventional Hall effect, and Corbino magnetoresistance on MISFETs. Progress toward these goals is described. [1] N.S Saks and A.K Agarwal, *Appl. Phys. Letters* **77** (20), 3281 – 3283 (2000); R. T. Bate and W. P. Kirk, *Bull. Am. Phys. Soc.* March, 2004, Abstract S6.011 [2] H. H. Jenson and H. Smith, *J. Phys. C: Solid State*, **5**, 2867-2880, (1972)

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