

## High-Performance $\text{In}_{0.53}\text{Ga}_{0.47}\text{As}/\text{InP}$ Hall Sensors with Doped and 2DEG Channels and Screening Front and Back Gate Layers

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High-performance doped- and 2DEG-channel InP/InGaAs Hall sensors appropriate for applications requiring high sensitivity at low power dissipation, high stability, weak temperature dependence and high resolution are reported. For both device types, high bias-current-related sensitivities up to 1350 V/AT at sheet resistances below 1 k $\Omega$  have been obtained. Neither drift effects nor reproducibility errors were observed within the reproducibility of the measurement setup of 0.1%. This advance is achieved by a design which incorporates a buried active layer, where influences of substrate traps and surface states are screened out by highly p-doped front and back gate layers. Also high absolute magnetic sensitivities up to 1.0 V/T for supply voltages below 4 V are obtained. For optimized bias conditions of both device types, a temperature dependence of the sensitivity below -20 ppm/K is achieved without external compensation. For the 2DEG devices the channel sheet charge density remains fairly constant even down to 20 K, which makes these sensors especially useful for cryogenic applications. High signal-to-noise ratios corresponding to minimal detectable fields of 40 nT/Hz<sup>1/2</sup> at 1 kHz and 100 nT/Hz<sup>1/2</sup> at 100 Hz were measured for both device types.