Development and Implementation of an Integrated Sense Structure for Pulse Measurements of Steep Current and Voltage Transitions in Power Electronic Applications

Background

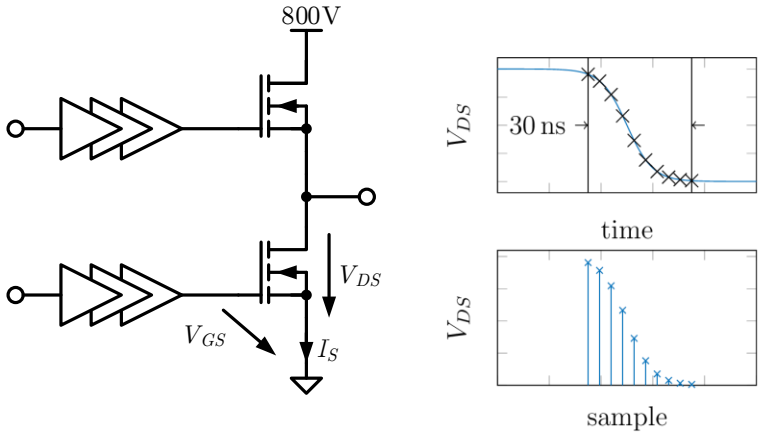
Modern power converters pose high demands onto the power semiconductors. Adaptive gate drivers for IGBTs or SiC transistors can be used to increase efficiency and to reduce device stress and electromagnetic interference.

In order to form a control loop which adjusts the current gate driving waveform to meet the demanded specifications, measurements of the switching transitions are needed to assess the current performance. Thus, the drain and gate potential as well as the drain current have to be sampled and quantized for analysis in the digital domain.

Task

The aim of this thesis is the development of an analog-to-digital converter (ADC) able to sample the fast voltage and current transitions of the switching transistor with a peak sample rate in the order of a few gigasamples per second.

Additionally, external circuitry has to be implemented that converts the high voltage and high current singals to levels which can be handled by the ADC integrated in 180 nm.



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