

INTERFACING TO SENSORS WITH VIA-CONFIGURABLE ANALOG ARRAYS

A sensor measures a physical quantity and converts it to a signal which can be read by an observer or by an instrument. In the case where the sensor output signal is a voltage, it is generally not useful until it is properly conditioned and in some cases digitized. This presentation will cover some of the types of circuits used to convert sensor outputs to useable form and how these circuits can be implemented in via-configurable analog arrays (VCAAs). VCAA technology will be introduced as new approach to develop semi-custom sensor interface application specific integrated circuits (ASICs) at a fraction of the cost and time associated with typical full-custom ASICs.

VCAAs, like digital-structured ASICs and FPGAs, have their origin in digital gate arrays. Gate arrays were first used in production in the late 1970s. The advantage of structured arrays or gate arrays comes from requiring fewer mask layers than a full-custom chip for configuration. A VCAA is a structured analog array requiring only a single via layer for customization. VCAAs can be applied to almost any analog sensor interface circuit from basic programmable gain stages to high resolution analog-to-digital-converters (ADCs). In this presentation Delta Sigma and Successive Approximation ADCs implemented in VCAAs will be described in detail.

In conclusion, VCAA manufacturing and semiconductor processing flows will be presented. Specifically, the staging of wafers during fabrication to allow for rapid turnaround time will be covered in detail. Finally, the trade-offs associated with VCAA technology versus off-the-shelf components versus full-custom ASICs will be discussed.

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