Certus Semiconductor I/O Library Characterization Printed Circuit Board Design

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Abstract

The Certus student hardware team (Team 14) collaborated with Certus Semiconductor to develop a printed circuit board (PCB) that supports characterization of their 90nm input/output (I/O) library.

Team 14 created a schematic and PCB layout in KiCAD design software, designing testing circuitry and choosing appropriate components. They worked with various companies to secure packaging, socketing, and a PCB manufacturer.

The PCB serves as a physical interface to perform tests on a proprietary application-specific integrated circuit (ASIC) designed by Certus. The response of the ASIC's silicon to various signals (i.e. signal rise/ fall times, hysteresis, etc.) was measured and recorded by Team 17, an ASU Capstone team who was tasked with device testing. The resulting data will be used in future silicon reports which will be made available to customers like TSMC and Samsung.

Motivation and Objectives

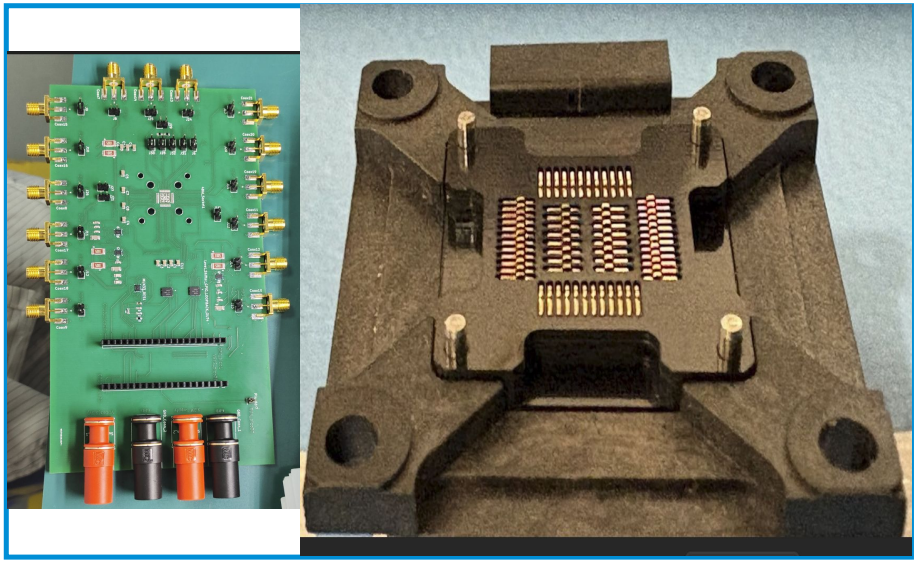
Modern embedded depend on reliable I/O interfaces to ensure effective communication between digital controllers and external devices. Team 14 was tasked with creating a hardware platform capable of evaluating delay response, rise and fall times, and other performance metrics.

The objective is to design and deliver a fully assembled PCB that serves as a precise interface between the ASIC's I/O structures and the measurement equipment used by the testing team (Team 17). The system integrates packaging, socketing digital control, and analog paths into a single reliable platform that enables repeatable characterization results for Certus and its customers.

Design and Implementation

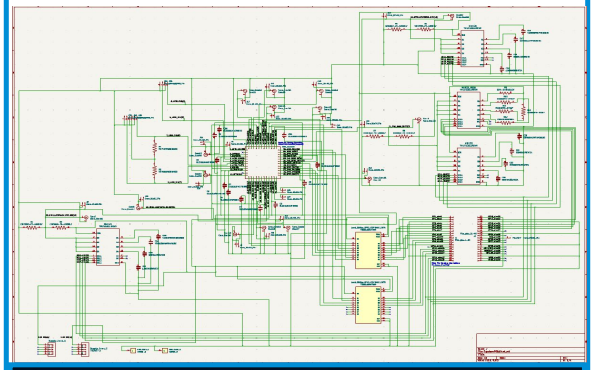
The design process began with securing a QFN package and compatible socket to house the Certus ASIC. Each die pad was mapped through the package to the socket pins, ensuring accurate signal, power, and ground routing. Using KiCAD design software, the team built the schematic, which includes digital control circuitry, pull-down networks for stable measurement conditions, analog test paths, and a Raspberry Pi Pico interface for automated I/O toggling during characterization.

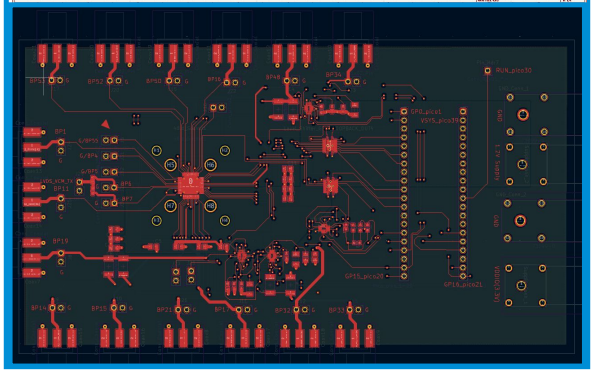
Once the schematic was finalized, the team completed the PCB layout by organizing components for clean routing, maintaining consistent ground references, and protecting sensitive high speed signals. Several review sessions with Certus engineers helped refine the design. After final revisions, the team generated manufacturing files and worked with a PCB vendor to have the boards assembled. The final product is a fully operational hardware test platform which the testing team used for characterization.



PCB Layout & Final Hardware

The completed PCB integrates all required digital, analog, and control interfaces into a single testing platform. Clear labeling and logically arranged routing make the board easy to navigate and operate during characterization. The board connects directly to the testing team's equipment, streamlining the measurement process.





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