

Fabrication and Characterization of Novel Low Inductance Micro-Coaxial Cables

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Abstract

We have developed low inductance micro-coaxial cables to supply power to microchips. Our uniquely-low inductance cables are enabled by very thin dielectric compared to a conventional 50 Ω cable. These cables will be used in a novel packaging platform in which traditional interconnects are replaced by micro-scale coaxial cables. This method saves time, cost, and labor for small production volume, custom electronics, compared to conventional multi-layered packaging techniques. These micro-coaxial cables are designed to have minimal inductance in order to meet the stringent power supply requirements of today's most power hungry chips, e.g. a Kintex 7 FPGA. One cable fabricated by Draper, and one fabricated by Sandvik Palm Coast are the focus of this presentation. The Draper cable consists of a 5 mil Copper core, 12 μm polyester-imide dielectric layer, and 55 μm Gold shield. The measured capacitance and inductance of the Draper cable is 0.93 pF/mm and 40 pH/mm respectively. The Sandvik cable consists of a 6 Mil Copper Core, 4 μm polyurethane dielectric layer, and 44 μm of Silver. The Sandvik cable has a measured capacitance of 2.38 pF/mm and measured inductance of 22.1 pH/mm. For comparison, a 50 Ω cable of similar diameter has 202 pH/mm and typical bond wire has 1000pH/mm. The coax inductance is so low that inductance from the cable attachment points completely dominates and new attachment methods are under investigation.