

Contact Physics of Capacitive Interconnects

by

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Abstract

The resistance and capacitance of typical multi-point contact interfaces have been used to assess the impact on high frequency signal integrity. Previous work has reported that the impedance of degraded contact interfaces can affect high frequency signals. These papers have also included research into the relationship of wave propagation relative to contact interface physics at high frequencies in the frequency and time domains.

In these works it was shown how fully degraded interfaces can still provide acceptable performance for high frequency and high data rate signal transfers. In the case of a fully degraded contact, signals were transferred by capacitive signal coupling and wave propagation.

This paper changes the focus to defining the critical parameters of a capacitively coupled interface. Moreover, the physics of the contact interface is related to contacts that rely on capacitive (as opposed to metallic) coupling.

The results of this paper are aimed at defining the physics and design requirements for capacitively coupled contacts. The paper will define critical performance parameters for high frequency signal propagation. In addition, contact reliability and contact design will be considered as well. These parameters will be compared and contrasted to traditional metallic interconnect parameters. Moreover, contact reliability test sequences will be considered in the discussion. The general thrust of this paper will be to contrast the requirements for high frequency signal contacts using capacitive coupling versus the more traditional metallic contact interface.

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