SIGNAL SENSING BY THE ARCHITECTURE OF EMBEDDED I/O PAD CIRCUITS

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Abstract- In this study, the detecting structures in an embedded CUP wafer, which are called sensors, are investigated through a contactless sensing analysis. These novel sensing structures, which were designed using the ADS 2009 platform and the design rules for the TSMC 0.18-μm CMOS process, were placed under bonding pads. However, signals would still pass through these I/O sensing structures (i.e., ESD devices or circuits) and become coupled up to the pads of the top-layer metal as square, sinusoidal, or ESD pulse waveforms are injected. Through the resulting sensing relationship, we could then judge whether or not the bottom circuit is a good candidate for EMI consideration. Eventually, it was found that during an ESD occurred situation, a strong signal coupling can be sensed by the ESD protection circuits, especially by gate-coupled ESD protection circuitry.

Index terms: Circuit under pad (CUP), electrostatic discharge (ESD), electromagnetic interference (EMI), gate-coupled circuit, gate-grounded nMOS (GGnMOS), human-body model (HBM).