Propagation Layers for Intra-Chip Wireless Interconnection Compatible with Packaging and Heat Removal

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Inserting an Aluminum Nitride (AlN) layer which acts as a dielectric propagating medium between a silicon wafer containing integrated antennas and a metal chuck emulating the role of a heat sink improves the antenna power transmission gain by ~ 8dB at 15GHz. AlN, with its high thermal conductivity also addresses the heat removal problem. With a 760-µm AlN layer, an on-chip wireless connection is demonstrated over a 2.2-cm distance between a transmitting antenna and a receiver, which is 3X the previously reported separation. This should be sufficient for clock distribution in an IC with the maximum size projected in ITRS.