Abstracts

Integration of air-gap transmission lines on doped silicon substrates using glass microbump bonding techniques

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Air-gap transmission-line structures have been fabricated and integrated on doped silicon substrates using glass microbump bonding (GMBB) techniques. The air-gap transmission lines have the advantages of low losses and low dispersion compared to conventional uniplanar transmission lines on semiconductor substrate. This bonding technique provides an alternative approach for both monolithic microwave integrated circuits (MMICs) and optoelectronic integrated circuits (OEICs) on silicon substrates. To demonstrate the potential of air-gap structures, several transmission-line configurations are fabricated and tested. The measured data are compared with simulation results. The results confirm the air-gap structures low-loss capabilities. To further explore the advantage of this bonding technique, several spiral inductors are fabricated in air-gap configurations. Their measured characteristics demonstrate the low dispersion potential of this technology. Finally, the integration of air-gap interconnects for OEICs on silicon CMOS circuitry is also proposed.

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