Abstracts

Coplanar Waveguides and Microwave Inductors on Silicon Substrates

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Silicon has many advantages as a microwave substrate material including low cost and a mature technology. The aim of this paper is to evaluate the potential of using high-resistivity silicon as a low-cost low-loss microwave substrate through an experimental comparative study. Coplanar waveguides fabricated on Si, GaAs, and quartz substrates are tested and their characteristics are compared. Microwave spiral inductors and meander lines are also fabricated on various substrates, and their performance is also analyzed. The results demonstrate that the losses of a coplanar transmission line (CPW) realized on high-resistivity (3 k to 7 k Omega-cm) silicon substrates are comparable to the losses of a CPW realized on a GaAs substrate covered with insulators. Furthermore, measured unloaded Q's of microwave inductive structures on high-resistivity silicon substrates are comparable to the measured unloaded Q's of the same structures on GaAs and on quartz. This paper demonstrates that hlgh-resistivity Si can be used as a microwave substrate.

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