



Experimental Investigation of New Ultra Wide band In-Phase and Quadrature-Phase Power Splitters

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Abstract:

The design and realization of a new in-phase and quadrature-phase power splitters for ultra wideband (UWB) applications are described in this paper. The in-phase power splitter is first designed and then the quadrature-phase power splitter (QPS) is developed using the designed in-phase power splitter, a conventional microstrip transmission line (MS) TL, and a well-synthesized metamaterial (MM) TL. The phase response of the MM TL is synthesized to achieve the desired 90° phase difference over an UWB frequency range. Two splitters were designed, implemented for UWB operation and experimentally demonstrated. To examine the performances of the proposed splitters, even-odd mode analysis, numerical simulations and experimental measurements were carried out. The comparison between simulated and experimental results shows a good agreement. Results show that the proposed in-phase power splitter has good insertion loss with equal power split, acceptable return loss at all ports and satisfactory isolation performances within the whole UWB frequency range. The proposed QPS has an output amplitude imbalance of less than 2.4 dB and a phase error of less than $\pm 15^\circ$ from 3.0–9.0 GHz (100% FBW).

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