Abstracts

Asymmetric ring-hybrid phase shifters and attenuators

Hee-Ran Ahn and I. Wolff. "Asymmetric ring-hybrid phase shifters and attenuators." 2002 Transactions on Microwave Theory and Techniques 50.4 (Apr. 2002 [T-MTT]): 1146-1155.

A new structure of asymmetric ring-hybrid phase shifters and attenuators is presented. Each consists of an asymmetric ring hybrid and reflecting terminations, and it does not have any additional 90/spl deg/ phase delay line for utilizing symmetric reflecting terminations that conventional phase shifters use. To analyze these asymmetric ring-hybrid phase shifters, normalized impedance ratios NI/sub b/ and NI/sub d/ are introduced, and the possibilities to reduce the size of the reflecting terminations are presented. Using the new structure of the asymmetric ring-hybrid phase shifters, asymmetric ring-hybrid attenuators are synthesized. To analyze the attenuators, normalized resistance ratios NR/sub Lb/ and NR/sub Ld/ are introduced, so that the resistances in the reflection terminations can arbitrarily be determined. On the basis of the derived new structures, a uniplanar asymmetric ring-hybrid -135/spl deg/ phase shifter and a microstrip asymmetric 4-dB attenuator with 45/spl deg/ phase shift have been fabricated and measured. They show good agreement between measured and simulated results and they may be used for impedance transformers besides their original functions.

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