Abstracts

Monolithic MESFET distributed baluns based on the distributed amplifier gate-line termination technique

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The principles of the distributed amplifier are applied to realize wide-band monolithic distributed baluns. The technique reported here is based on using the gate-line "termination" of a distributed amplifier topology as the noninverting output and the inherent phase inversion property of the metal-semiconductor field-effect transistor (MESFET) to provide the antiphase output from the drain-line. Closed-form expressions are derived for the two output voltage signals and their respective power gains. The theoretical performance of the balun is then examined as a function of the important MESFET parameters and other circuit parameters. Some practical design considerations are given followed by the measured results of two monolithic prototypes. The first is a basic two-section balun, while the second employs a four-section balun with a three-stage positive gain slope preamplifier to compensate for the increase in gate-line loss with frequency. Balun operation over 0.5-20 GHz and 0.5-12 GHz has been demonstrated for the two-section and four-section balun, respectively.

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