Abstracts

Millimeter-wave-band amplifier and mixer MMICs using a broad-band 45/spl deg/ power divider/combiner

H. Hayashi, H. Okazaki, A. Kanda, T. Hirota and M. Muraguchi. "Millimeter-wave-band amplifier and mixer MMICs using a broad-band 45/spl deg/ power divider/combiner." 1998 Transactions on Microwave Theory and Techniques 46.6 (Jun. 1998 [T-MTT]): 811-819.

This paper demonstrates millimeter-wave-band amplifier and mixer monolithic microwave integrated circuits (MMIC's) using a broad-band 45/spl deg/ power divider/combiner. At first, we propose a broad-band 45/spl deg/ power divider/combiner, which combines a Wilkinson divider/combiner, 45/spl deg/ delay line, and 90/spl deg/ short stub. A coupling loss of 4.0/spl plusmn/0.2 dB and a return loss and an isolation of more than 19 dB with 45/spl plusmn/1/spl deg/ phase difference was obtained from 17 to 22 GHz for the fabricated K-band MMIC 45/spl deg/ power divider/combiner. Next, a parallel amplifier using the broad-band 45/spl deg/ power divider/combiner, which can be used in a power-combining circuit configuration requiring no isolator, is shown. Comparing the transmitter intermodulation generated in the parallel amplifier using the broad-band 45/spl deg/ power divider/combiner and that generated in the one using the conventional type, the broad-band suppression effect was confirmed. Finally, an application of the broad-band 45/spl deg/ power divider/combiner to a single-sideband (SSB) subharmonically pumped (SHP) mixer requiring no IF switch is shown. In an RF frequency range from 22.89 to 26.39 GHz, the fabricated K-band MMIC mixer achieved (for up-conversion) the good results of more than -13-dB conversion gain and more than 24-dB image-rejection ratio. These contribute significantly to the miniaturization of millimeter-wave communication equipment.

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