Abstracts

A single-chip GaAs MMIC image-rejection front-end for digital European cordless telecommunications

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An active image-rejection filter is presented in this paper, which applies actively coupled passive resonators. The filter has very low noise and high insertion gain, which may eliminate the use of a low-noise amplifier (LNA) in front-end applications. The GaAs monolithic-microwave integrated-circuit (MMIC) chip area is 3.3 mm/sup 2/. The filter has 12-dB insertion gain, 45-dB image rejection, 6.2-dB noise figure, and dissipates 4.3 mA from a 3-V supply. An MMIC mixer is also presented. The mixer applies two single-gate MESFETs on a 2.2-mm/sup 2/ GaAs substrate. The mixer has 2.5-dB conversion gain and better than 8-dB single-sideband (SSB) noise figure with a current dissipation of 3.5 mA applying a single 5-V supply. The mixer exhibits very good local oscillator (LO)/RF and LO/IF isolation of better than 30 and 17 dB, respectively, Finally, the entire front-end, including the LNA, image rejection filter, and mixer functions is realized on a 5.7-mm/sup 2/ GaAs substrate. The front-end has a conversion gain of 15 dB and an image rejection of more than 53 dB with 0-dBm LO power. The SSB noise figure is better than 6.4 dB, The total power dissipation of the front-end is 33 mW. The MMIC's are applicable as a single-block LNA and image-rejection filter, mixer, and single-block front-end in digital European cordless telecommunications. With minor modifications, the MMIC's can be applied in other wireless communication systems working around 2 GHz, e.g., GSM-1800 and GSM-1900.

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