

X-Band Low-Noise GaAs Monolithic Frequency Converter (Short Papers)

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An X-band, low-noise GaAs monolithic frequency converter has been developed. Multicircuit functions, such as amplification, filtering, and mixing, were integrated on to a single GaAs frequency converter chip. The frequency converter consists of an X-band three-stage low-noise amplifier, an image rejection filter, an X-band dual-gate FET mixer, and an IF-band buffer amplifier. To minimize circuit size without degrading performances, an RC-coupled buffer amplifier was connected directly after a dual-gate FET mixer IF port, and one-section parallel and series microstrip lines were adopted for the amplifier. One-half-micron ($1/2\ \mu\text{m}$) single-gate FET's and a one-micron ($1\ \mu\text{m}$) dual-gate FET, which have an ion-implanted closely-spaced electrode structure, were used. Either via hole grounds or bonding wire grounds are selectable for the frequency converter. Chip size is $3.4 \times 1.5\ \text{mm}$. The frequency converter provides less than 3-dB noise figure and more than 34-dB conversion gain.

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