Abstracts

Monolithic Image-Rejection Optoelectronic Up-Converters that Employ the MMIC Process (Dec. 1993 [T-MTT])

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This paper presents very small 30-GHz-band monolithic image-rejection optoelectronic up-converters that employ the HEMT-MMIC process for the first time. MMIC HEMT optoelectronic mixers are characterized by their direct photodetection and nonlinear characteristics. It is shown that common-source configurations have higher response than common-drain configurations, and up-converter applications are preferable to down-converter applications based on the HEMT direct photodetection characteristics. These characteristics are used to realize 30-GHz-band monolithic image-rejection optoelectronic up-converters. An in-phase divider and a branch-line hybrid with two HEMT optoelectronic mixers are successfully integrated into an MMIC chip with an area of 1.5 mm x 1.1 mm. Fundamental performance is demonstrated and excellent wideband performance, which comes from the well-balanced operation of monolithic integrated circuits, is confirmed. These monolithic optoelectronic mixers promise to realize compact and cost-effective 1-chip optical receivers for fiber optic links which support millimeter-waves.

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