Abstracts

60-GHz monolithic down- and up-converters utilizing a source-injection concept

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This paper deals with the design considerations, fabrication process, and performance of coplanar waveguide (CPW) heterojunction FET (HJFET) down- and up-converter monolithic microwave integrated circuits (MMIC's) for V-band wireless system applications. To realize a mixer featuring a simple structure with inherently isolated ports, and yet permitting independent port matching and low local oscillator (LO) power operation, a "source-injection" concept is utilized by treating the HJFET as a three-port device in which the LO signal is injected through the source terminal, the RF (or IF) signal through the gate terminal, and the IF (or RF) signal is extracted from the drain terminal. The down-converter chip incorporates an image-rejection filter and a source-injection mixer. The up-converter chip incorporates a source-injection mixer and an output RF filter. With an LO power and frequency of 7 dBm and 60.4 GHz, both converters can operate at any IF frequency within 0.5-2 GHz, with a corresponding conversion gain within -7 to -12 dB, primarily dominated by the related filter's insertion loss. Chip size is 3.3 mm/spl times/2 mm for the down-converter, and 3.5 mm/spl times/1.8 mm for the up-converter.

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