Abstracts

Compact DC-60-GHz HJFET MMIC switches using ohmic electrode-sharing technology

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Compact DC-60-GHz heterojunction field-effect transistor (HJFET) monolithic-microwave integrated-circuit (MMIC) switches have been demonstrated for millimeter-wave communications and radar systems. To reduce the MMIC chip size, a novel ohmic electrode-sharing technology (OEST) has been developed for MMIC switches with series-shunt FET configuration. Four FET's of the series-shunt single-pole double-throw (SPDT) MMIC switch were integrated into an area of approximately 0.018 mm/sup 2/. The developed MMIC switches have a high power-handling capability with low insertion loss (IL) and high isolation (Iso) at millimeter-wave frequencies. From DC to 60 GHz, the single-pole single-throw (SPST) MMIC switch achieved the IL and Iso of better than 1.64 and 20.6 dB, respectively. At 40 GHz, the IL increases by 1 dB at the input power of 21 dBm. A novel large-signal FET model for the switch circuit is presented. The simulated power-transfer performance shows the excellent agreement with the measured one. The developed MMIC switches will contribute to the low-cost and high-performance millimeter-wave communications and radar systems.

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