Abstracts

Monolithic Dual-Gate GaAs FET Digital Phase Shifter

J.L. Vorhaus, R.A. Pucel and Y. Tajima. "Monolithic Dual-Gate GaAs FET Digital Phase Shifter." 1982 Transactions on Microwave Theory and Techniques 30.7 (Jul. 1982 [T-MTT] (Joint Special Issue on GaAs IC's)): 982-992.

The design, fabrication, and characterization of a fully monolithic FET digital phase-shifter circuit is described. The circuit is designed around a unique dual-gate FET structure operating as a switchable single-pole, double-throw amplifier. Each 2.5 X 3.0-mm chip has one bit (e.g., 22.5°, 90°, etc.) of phase control. The circuit, which includes all dc bypass circuitry on-chip, features thin-film lumped element capacitors and inductors, air-bridge crossovers and interconnects, via-hole frontside grounding, and integral beam leads. The fabrication of these elements is described in some detail. The phase-shifter circuit gives a peak gain of 3 dB across a 10-percent bandwidth in X-band. A method of achieving continuous phase and amplitude control using a 90° bit chip is described. Finally, phase performance of a four-bit digital phase shifter realized by cascading four monolithic active phase-shifter chips is reported.

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