Abstracts

An E-Beam Fabricated GaAs D-Type Flip-Flop IC

M. Gloanec, G. Nuzillat, C. Arnodo and M. Peltier. "An E-Beam Fabricated GaAs D-Type Flip-Flop IC." 1980 Transactions on Microwave Theory and Techniques 28.5 (May 1980 [T-MTT] (Special Issue on Gigabit Logic for Microwave Systems)): 472-478.

A first generation of monolithic digital IC's using normally-on type GaAs MESFET's with 1.2-µm gate length was initially developed. This technology leads to logic gates with propagation delays in the range 130-170 ps. It was applied to the fabrication of an edge-triggered D-type flip-flop IC whose perfomance is presented: minimum data pulsewidth (350 ps), maximum toggle frequency (up to 1.6 GHz), data input sensitivity. An improved technology intended for higher speeds is now under development. It utilizes direct-writing E-beam lithography to delineate 0.75-µm gate length devices with extremely high alignment accuracy. This fabrication process leads to 61 ps (4 pJ) or 68 ps (2 pJ) propagation delays measured on a dual-ring oscillator test circuit. Recent advances in N/N/sup -/ epitaxial deposition techniques make these performances very uniform and satisfactorily reproducible. D-type flip-flop IC's have been fabricated with this new technology using a reduced (-1 to -1.5 V) pinchoff voltage value. Stable D-type operation up to 3-GHz clocking frequencies has been experimentally observed with a corresponding speed-power product of 2.6 pJ/gate.

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