75 Word Abstract

Single-Electron Pass-Transistor Logic and its Application to a Binary Adder

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Abstract

A new type of logic for constructing single-electron transistor (SET) circuits is proposed. The logic uses multigate SETs as pass transistors. Since the multigate configuration enables us to implement XOR function using just one device, the logic can express sum- and carry-bits of an adder in a compact way. We have fabricated an elemental circuit of the logic and tested the basic operation of the SETs in the circuit. We also describe a multibit binary adder based on the logic, and discuss the circuit size and speed.