Abstract

A Single Electron 2 bit multiplier is presented in this paper. Modern techniques of lithography make it possible to confine electrons to sufficiently small dimensions that the quantization of both their charge and their energy are easily observable. When such confined electrons are allowed to tunnel to metallic leads a single electron transistor (SET) is created. This transistor turns on and off again every time one electron is added to the isolated region. A 2 bit multiplier performs multiplication through a series of additions. For example, suppose we want to multiply 2 * 1. Instead of building a multiplier circuit, we can instead use an adder and perform 2 * 1 by adding 1 + 1. The first number indicates how many times the second number is added to itself. The adder which is used to build the 2 bit multiplier circuit is designed using single electron transistor. The logic operation of 2 bit multiplier is verified using simulation software "SIMON2. 0".

References

- Ass. Prof. Sameh Ebrahim Rehan, "A Novel XOR Gate Using Single Electron Tunneling Technology".
Index Terms

Computer Science  Electronics

Keywords

Single Electron Transistor; Half Adder; Quantum Dot; Tunnel Junction; Coulomb Blockade