Abstracts

New Technology Towards GaAs LSI/VLSI for Computer Applications

M. Abe, T. Mimura, N. Yokoyama and H. Ishikawa. "New Technology Towards GaAs LSI/VLSI for Computer Applications." 1982 Transactions on Microwave Theory and Techniques 30.7 (Jul. 1982 [T-MTT] (Joint Special Issue on GaAs IC's)): 992-998.

For future large-scale computer applications, new device technologies towards GaAs LSI/VLSI have been developed self-aligned fully implanted planar GaAs MESFET technology and high electron mobility transistor (HFMT) technology by molecular beam epitaxy (MBE). The self-aligned GaAs MESFET logic with 1.5-µm gate length exhibits a minimum switching time of 50 ps and the lowest power-delay product of 14.5 fJ at room temperature. The enhancement/depletion (E/D) type direct coupled HEMT logic has achieved a switching time of 17.1 ps with 1.7-µm gate length at liquid nitrogen temperature and more recently a switching time of 12.8 ps with 1.1-µm gate HEMT logic, which exceeds the top speed of Josephson Junction logic and shows the highest speed of any device logic ever reported. Optimized system performances are also projected to system delay of 200 ps at 10-kilogate integration with GaAs MESFET VLSI, and 100 ps at 100-kilogate with HEMT VLSI. These values of system delay correspond to the computer performance of over 100 million instructions per second (MIPS).

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