IEEE MTT Chapter Presentation

Current Status of Millimeter-Wave Transistor Technology

Professor: Bumman Kim

Abstract

The current status of millimeter transistors is reviewed. It includes HBT InP & SiGe), PHEMT, and CMOS. But the emphases are given to the HBT technology because it has the best potential for the highest speed operation. And Postech efforts in this area are introduced. We describe, in depth, the process development for the high speed devices. We have reviewed the current status of device performances and have pin-pointed their limitations for the speed. The scaling laws for HBT are introduced. And it will show that by further reducing parasitics of the HBT, it will reach to the THz domain.

Biography

Dr. Bumman Kim is working in the field of microwave and millimeter-wave circuits and devices. He has developed linear power amplifiers for base-station applications such as LPA based on feed-forwarding or base-band correction architectures, HPA on pre-distortion or feedback techniques, and for HBT or FET based handset power amplifiers. He has also developed microwave Doherty amplifier for the applications. His interests include RF circuit design based on SiGe HBTand CMOS and millimeter wave circuits using BCB based 3D structures. His research on large signal models of RF devices such HBT, CMOS and LDMOS have been applied to various circuit designs. His research in HBT for RF applications have resulted in the optimized HBT structures for a low 1/f noise, high speed application with Fmax around 700GHz and linear power generation.

He had worked for the GTE Labs and the Central Research Labs of Texas Instruments. At the GTE Labs, he was involved in fiber-optic network components

such as laser-to-fiber coupling, optical modulators, optical switch and fast diode modulators. His bead coupling design was adopted for GTE's fiber optic network. At TI, his research was in developing monolithic microwave integrated circuits and devices. He pioneered the development of power MESFETs at millimeter wave frequencies. He built the first MMIC at mm-wave frequency and the first transistor based oscillator operating at frequencies over 100GHz. His contributions include developments of a distributed power amplifier with 0.5W across 2- 20 GHz band, the dual-gate FET variable gain power amplifiers and large signal simulator.

Dr. Kim is a fellow of IEE and senior member of IEEE. He is a lifetime member of Korean academy of science and technology and also a member of national academy of engineering of Korea. He served as a dep't head of EE and dean of academic affairs at Postech. He was a visiting professor at Caltech on sabbatical in 2001. He is an associate editor of IEEE Trans. on MTT and a distinguished microwave lecture of IEEE MTT society

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TIME: **5:00 pm**

LOCATION: **DC 1304, University of Waterloo**

Invited by Professor S. Chaudhuri