

2008/10/17 Release

Power-efficient SiGe HBT for wireless communications at higher microwave frequency

Verified operating frequency of 30~150GHz and $1/3$ power consumption of current HBT

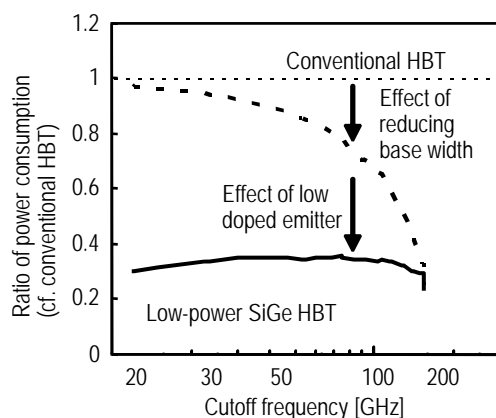


Figure 1. Performance of fabricated SiGe HBT

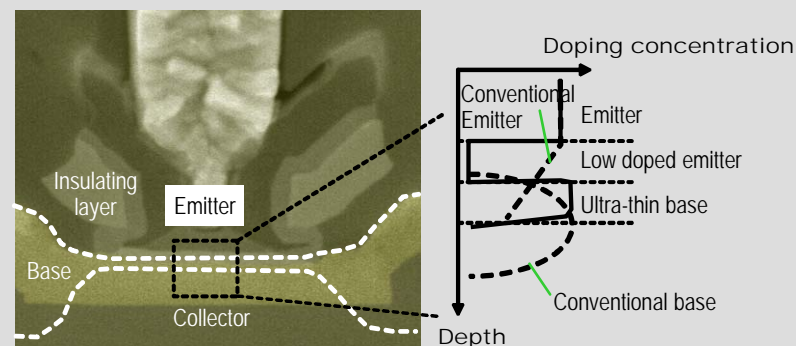


Figure 2. Cross-section of fabricated SiGe HBT & corresponding doping profile

Hitachi, Ltd. has developed low power consumption technology for silicon germanium heterojunction bipolar transistors (hereafter, SiGe HBT) which can be applied to next generation wireless communication systems which will operate at higher microwave frequencies (6-30 GHz). The technology developed enables the transistor to operate at a sufficient speed with a lower current than that required by conventional HBTs, thus conserving power.

A low-temperature epitaxial growth technique was established to form an ultra-thin base layer which improved high-speed performance. Further, to reduce operating current, a low doped emitter layer which can be formed with an extremely low thermal budget was successfully inserted between the base and emitter layers. As a result, both high-performance and low power consumption were simultaneously achieved. A prototype SiGe HBT fabricated with these techniques was found to operate at 30-150 GHz with $1/3$ power of conventional devices. This will be fundamental technology for operating power efficient systems in the high microwave frequency bandwidth of next generation wireless communication systems.

© 2008 Hitachi, Ltd., Research & Development Group. All rights reserved.

This research will be presented at the 2008 IEEE Bipolar / BiCMOS Circuits and Technology Meeting (BCTM2008) to be held from 13th - 16th October 2008 in Monterey, California, U.S.A.

This work was supported by Ministry of Internal Affairs and Communications of the Japanese Government.