EU project targets 0.5-THz SiGe bipolar transistor

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PARIS — A European consortium from industry and academia has been formed to develop advanced silicon-based bipolar transistors with a maximum operating frequency of 0.5 Terahertz targeting millimeter wave and terahertz communication, radar, imaging and sensing applications.

Dubbed Dotfive, the 36-month project has a total budget of €14.75 million ($21.8 million) with a contribution of €9.7 million ($14.3 million) from the European Commission, making it the largest ‘More than Moore’ nanoelectronics project under the EC’s Seventh Framework Program.

The project’s aim is to establish a firm position in Europe for silicon-germanium heterojunction bipolar transistors (SiGe HBTs) for millimeter wave applications “We are trying to bring microwave applications into silicon in contrast to other types of semiconductor that have been used, that are more expensive and do not allow large device integration,” said Michael Schröter, chair for electron devices and integrated circuits at the Technical University of Dresden (Germany).

Gilles Thomas, ST’s research and development co-operative projects manager, who has been nominated Dotfive project coordinator said, “In the first year, we will try to get 300-GHz frequency which means it translates into a delay time of typically 3.5 picoseconds. In the second year, we intend to achieve 400 GHz and 3 picoseconds and, in the third year, we target 500 GHz and 2.5 picoseconds.”

Ultimately, project partners would start encroaching into the terahertz region, which ranges from frequencies of about 300
GHz to 10 THz. This would open a lot of applications that are now taken by other technologies like imaging systems with applications in the security, medical and scientific areas.

Initially, the project aims to devise a proof of concept and demonstrate the potential of the silicon-based technology. "We are preparing the next technology node, and this technology takes us beyond 2012. We could then go to a project closer to the industrialization phase like Catene," said Thomas. Catene is the follow-up program to Medea and Medea+. It is the follow-up program to Medea and Medea+.

Led by STMicroelectronics NV, the Dotfive project brings together academic partners, the Johannes Kepler University of Linz (Austria), the Bordeaux National School of Electronics, IT and Radiocommunications, the Paris-Sud University (France), the Technical University of Dresden, the Bundeswehr University in Munich, the University of Siegen (Germany) and the University of Naples (Italy); research institutes IMEC (Leuven, Belgium) and IHP (Germany); and industrial partners XMOD Technologies (Talence, France), GWT-TUD GmbH (Dresden, Germany) and Infineon Technologies (Munich, Germany).

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