

Silicon-micromachined THz systems - enabling the large-scale exploitation of the THz frequency spectrum?

Talk by Prof. Dr. Joachim Oberhammer, KTH Royal Institute of Technology in Stockholm
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The sub-THz frequency spectrum, though already exploited primarily for scientific applications for several decades, is still lacking technology solutions in particular for system integration, high-performance passive components and interfaces including antennas. Furthermore, for a large-scale exploitation of these sub-THz frequency bands, different fabrication technologies are needed which also are volume-manufacturable. This talk shows the state of the art in micromachining fabrication techniques, which offer outstanding performance, proven high-volume manufacturability and system integration capability. Several technology demonstrators based on very low loss micromachined waveguides will be presented, including filters (telecommunication diplexers from D-band frequencies up to 750 GHz with Q-factors of 900 to 1600), steerable and corporate-fed antenna arrays with 39-DBi gain in different bands up to 400 GHz, phase shifters with best phase-shift to loss performance in any technology, micro-electromechanical waveguide switches in several bands up to 750 GHz, and also some system level solutions including a D-band communication link, and a beam-steering/beam-shape switched micromachined car-radar front-end.



Joachim Oberhammer is a professor in Microwave and THz Microsystems at the School of Electrical Engineering and Computer Science, Dept. of Micro and Nanosystems, KTH Royal Institute of Technology in Stockholm, Sweden, since 2015. He has lead radio-frequency/microwave/terahertz micro-electromechanical systems research at KTH for over 15 years. He is author and co-author of more than 150 reviewed research papers and holds 4 patents. His career includes positions as guest professor "Chair of Excellence" at Universidad Carlos III de Madrid, Spain, and guest researcher at both Nanyang Technological University, Singapore, and at the NASA-Jet Propulsion Laboratory, USA. He is recipient of an European Research Council (ERC) Consolidator Grant, is an Associate Editor of IEEE Transactions on Terahertz Science and Technology since 2018, and a Steering Group member of the IEEE MTT-S and AP-S Chapters Sweden since 2009.