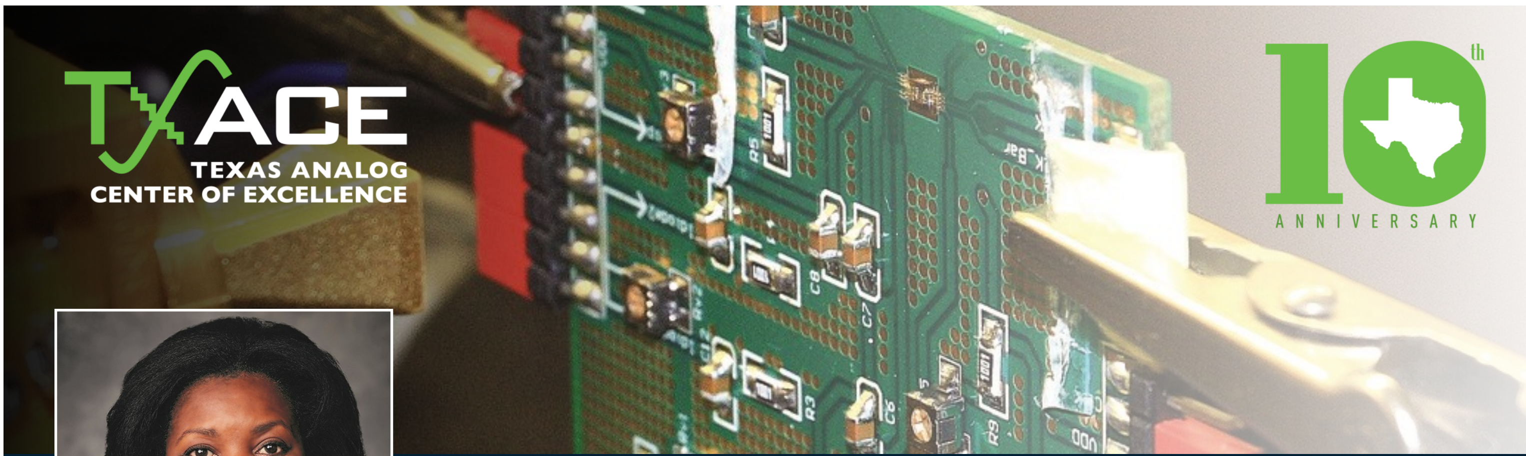

Transition Design for High Data Rate Links at Submillimeter Wave Frequencies

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BIO

Rashaunda Henderson received the B.S.E.E. degree from Tuskegee University, Tuskegee, AL, in 1992, and the M.S. and Ph.D. degrees in electrical engineering from The University of Michigan, Ann Arbor, MI, in 1994 and 1999, respectively. From 1999 to 2007, she worked as a R&D device engineer at Freescale Semiconductor, formerly known as Motorola Semiconductor Product Sector. Since Fall 2007, she has been researching novel passive components and integration techniques for millimeter -wave circuits and systems. She advises a team of students in the design, fabrication and characterization of high performance passive components, antennas and packages for frequencies operating through 325 GHz. Dr. Henderson is a senior member of the IEEE and an elected member of the MTT-S Administrative Committee.

ABSTRACT

High data rate communication systems using electronic circuits have been demonstrated with carrier frequencies up to 100 GHz using flip-chip technology and plastic waveguides. Extending to higher frequencies from 100 to 350 GHz will benefit in higher bandwidths while requiring novel techniques to launch the signals using on-chip antennas. If standard dielectric waveguides are used, they will require multiple structures due to their band-limited nature. In addition, these waveguides do not include IC packaging, which is required for commercial system deployment. Providing a low cost transition realized in printed circuit board technology can reduce the overall costs.

This presentation highlights the design and characterization of vertical transitions to support a high data rate communication system operating at 180 and 315 GHz. Transmitter and receiver circuits have been designed in 65 nm CMOS technology and a dielectric waveguide study has been conducted using holey fiber technology. A vertical transition is used to guide the RF signal from the chip to the dielectric waveguide. Substrate integrated waveguide concepts are utilized to implement the transition with an on-chip cross dipole and holey fiber waveguide in cyclic olefin copolymer. Designs at 3 and 30 GHz have been used to understand performance and then scale up for the system configuration. To support the bandwidth and dual polarization scheme, quadruple ridge waveguide structures with air dielectric are being designed with advanced printed circuit board techniques.

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Osborne Conference Room (ECSS 3.503)

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