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Ta-Shun Chu received the B.S. degree in civil engineering and M.S. degree in applied mechanics from National Taiwan University, Taipei, Taiwan, in 2000 and 2002, respectively, and the Master and Ph.D. in electrical engineering from the University of Southern California, Los Angeles, CA, USA, in 2004 and 2010, respectively. In 2010, he joined the Department of Electrical Engineering, National Tsing Hua University, Hsinchu, Taiwan, as an Assistant Professor. The focus of his research is the development and implementation of radio frequency and mm-wave circuits, wideband multi-antenna systems, and wireless active and passive sensors.

RF, Mm-Wave, and THz Clocking Techniques and Applications

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Abstract

With the aggressive scaling of CMOS technology, the ft (transition frequency) and fmax (maximum oscillation frequency) of MOS transistors are increasing dramatically. Therefore, very large scale integrated circuits and systems are able to operate at high speed and high frequency. There have been immense efforts devoted to the development of synchronous signal distribution networks, which is essential in numerous high-speed and high-frequency applications, such as multi-gigahertz digital clock distribution and millimeter-wave spatial power combining. The most notable feature of a synchronous digital system is that the circuits only react in response to a global clock. At multi-gigahertz frequency digital global clock distribution requires low skew and low jitter to prevent synchronous timing failures. Spatial power combining, which requires many devices to provide coherent radiation, can achieve extremely high power level transmission. At millimeter-wave frequencies, spatial power combining can be utilized to radiate huge power instead of individual devices, which have a limitation of power production.

This talk will focus on clocking technique in RF, mm-wave, and THz region. First, on-chip phase noise measurement technique will be presented. Then THz transceiver will be discussed. And then precise timing circuitry for Impulse Radar applications will be discussed.