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ELECTRICAL & COMPUTER ENGINEERING
TEXAS A&M UNIVERSITY

# S E M I N A R

**Room 1003 ETB**

January 28, 2016 3:55-5:10 P.M.

## A 28GHz Efficient Linear Power Amplifier for 5G Phased Arrays in 28nm Bulk CMOS

by

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**Abstract:** This work is the first CMOS power amplifier (PA) targeting 28GHz fifth generation (5G) mobile user equipment phased array transceivers. The two-stage PA is optimized for power added efficiency (PAE) at desired error vector magnitude (EVM) as the objective function, and inductive source degeneration is used in the output stage to broaden inter-stage matching bandwidth, as well as to reduce distortion. Fabricated in 28nm bulk CMOS, the PA achieves 9% measured PAE at $P_{out}$ of +4.2dBm for a 64-QAM orthogonal frequency division multiplexing (OFDM) signal with a peak-to-average power ratio (PAPR) of 9.6dB at −25dBc EVM using a 1V supply. The PA also achieves 35.5%/10% PAE at saturation/9.6dB back-off from saturation. To the best of the authors' knowledge, these are the highest measured PAE values among published K- and Ka-band CMOS PAs.

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**Sherif Shakib** received the BSc and MSc degrees in electronics engineering from Cairo University in 2009 and 2011, respectively, and is currently working toward the PhD degree in electrical engineering at the Analog and Mixed Signal Center, Texas A&M University, College Station, TX. He was a teaching and research assistant at Cairo University, Cairo, Egypt from 2009 to 2011, an RF/AMS Intern at SysDSoft, Inc. in 2008, and an RFIC design intern at Qualcomm Research, San Diego, CA in 2012 and 2014. His research interests are in analog and RF/microwave integrated circuit design, and numerical methods in electromagnetics.