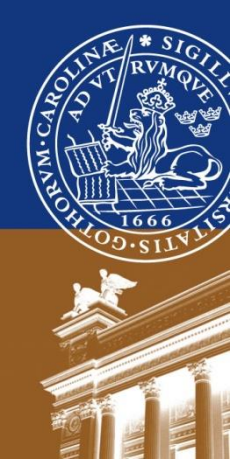


Progress in RF Circuit Design

Henrik Sjöland
Department of Electrical and Information Technology
Lund University, Sweden

RF Circuit Design Research Team

Henrik Sjöland

Markus Törmänen

Johan Wernehag

Jonas Lindstrand

Anders Nejdel

Mohammed Abdulaziz

Waqas Ahmad

Tobias Tired

Therese Forsberg

Outline

- Remote Antenna Units
- LTE Receiver Front-Ends
- mm-Wave Transmitters
- Questions

Remote Antenna Units

Part of SSF Distrant

Waqas Ahmad

To obtain low cost highly integrated remote antenna unit fed by optical fiber

Waqas Ahmad

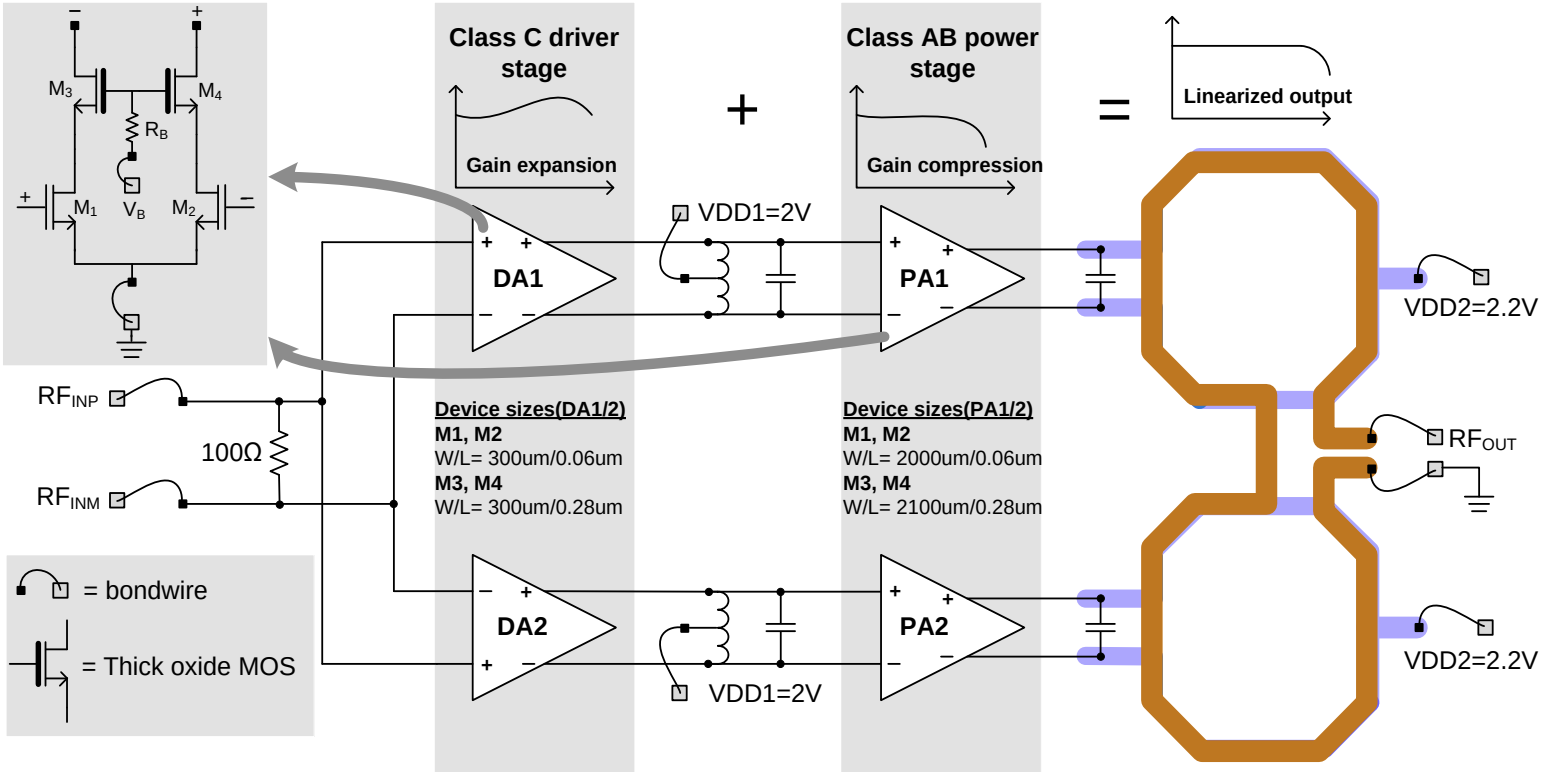
Remote Antenna Units

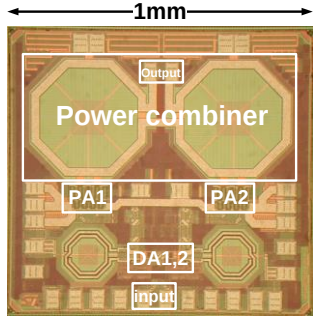
Fully Integrated CMOS RAU

Unpublished Material

Remote Antenna Units

Linearized CMOS PA

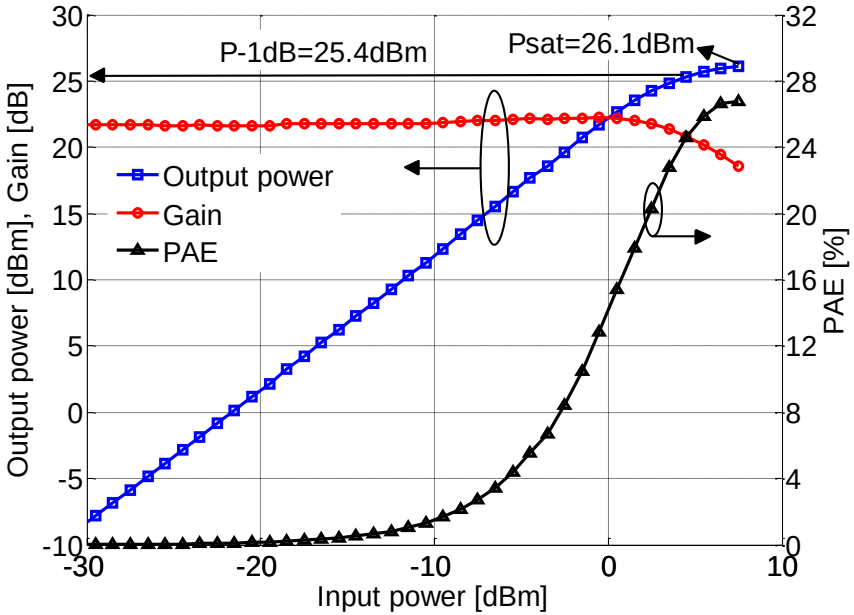


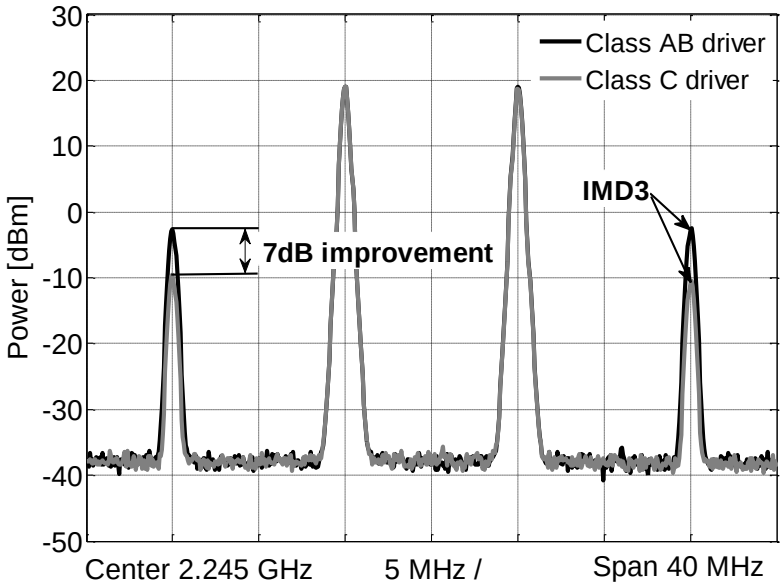


ISCAS 2015

Remote Antenna Units

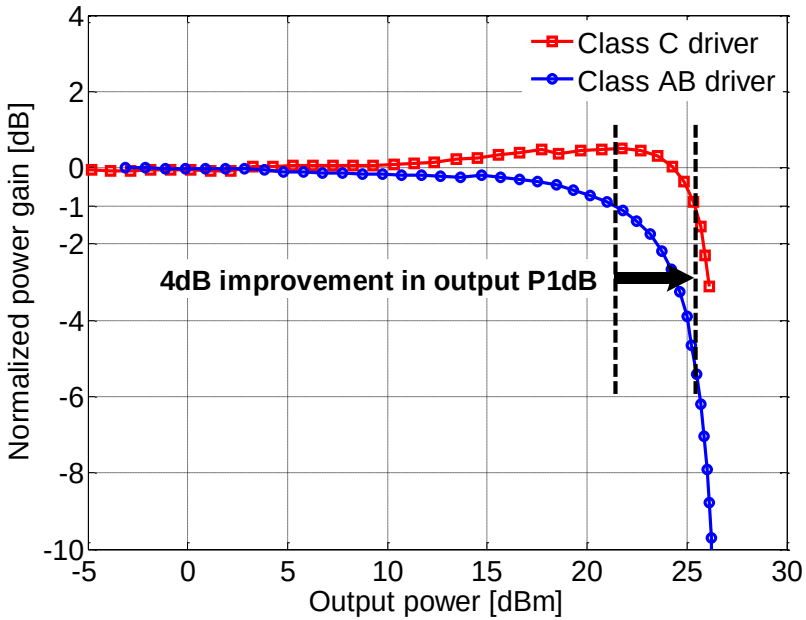
Measurement Results

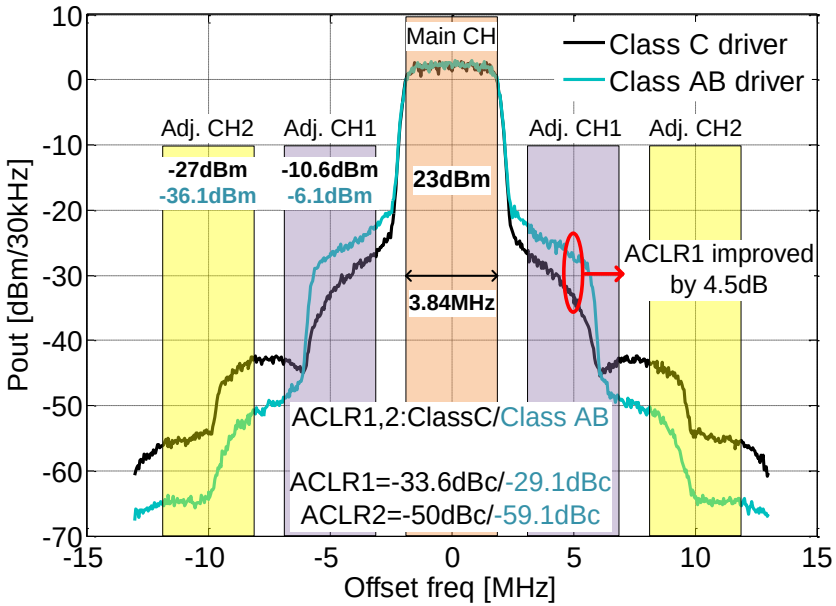




Remote Antenna Units

Measurement Results

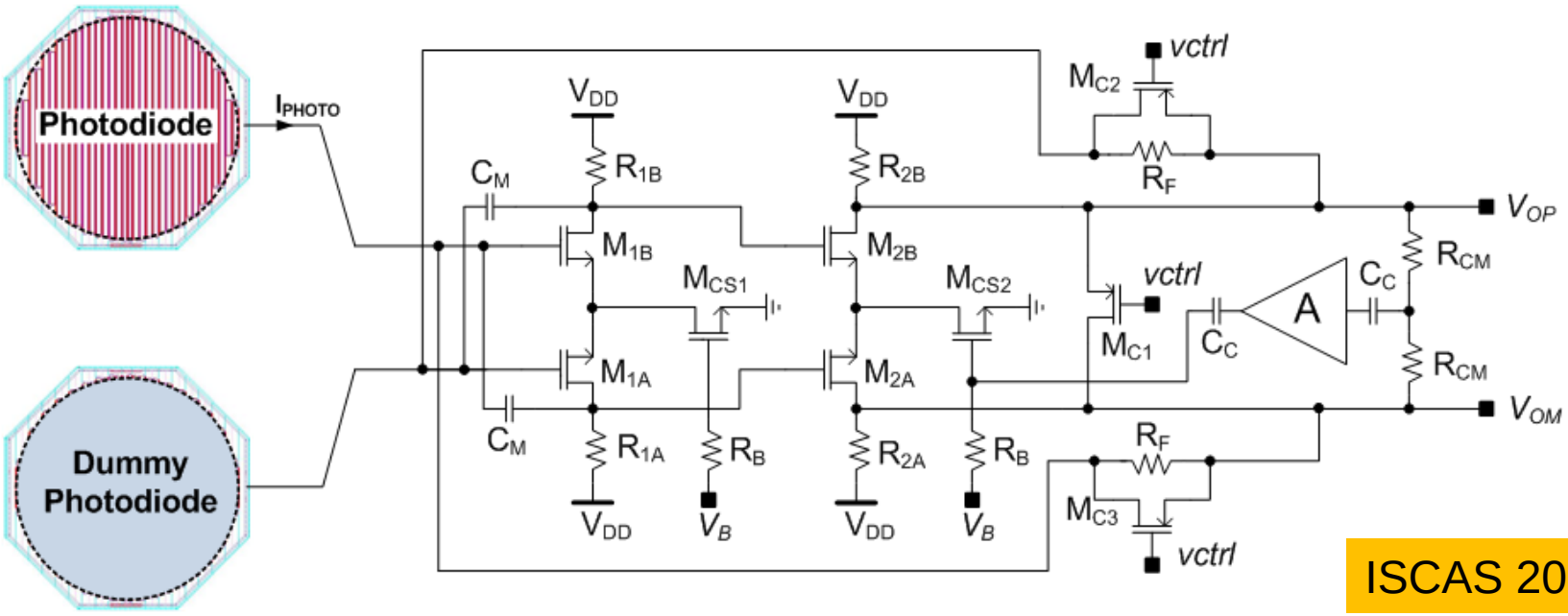




Remote Antenna Units

CMOS TIA with SE to Diff. Conversion

- Single-ended to differential conversion
- Photodiode capacitance neutralization
- Variable gain while maintaining stability



ISCAS 2015

LTE Receiver Front-Ends

Part of SSF DARE

Anders Nejdel

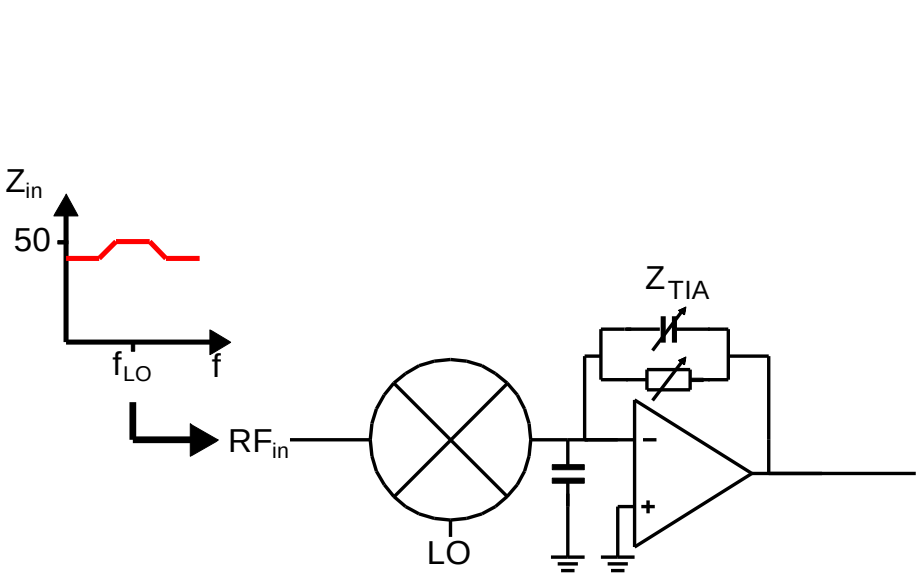
Mohammed Abdulaziz

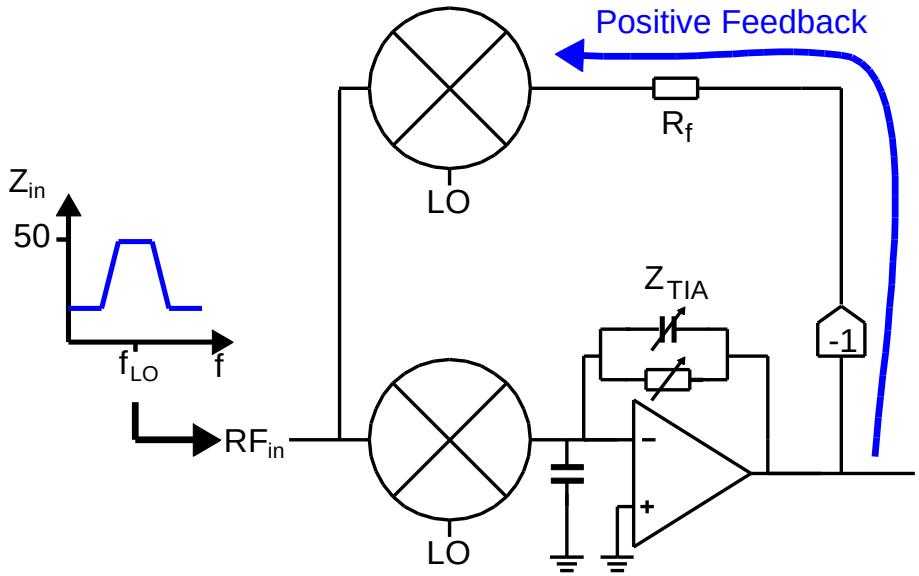
To obtain high analog performance using digital calibration.

Anders Nejdel

LTE Receiver Front-Ends

Mixer-first receiver front-end with positive feedback



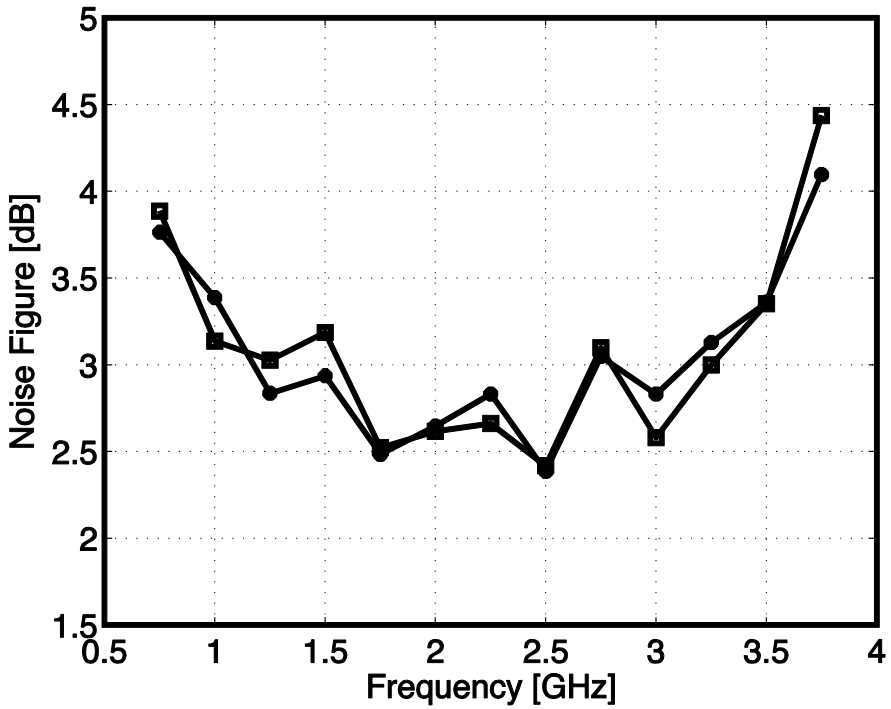


RFIC 2015

- Increase input impedance at f_{LO}
- R_f used to control loop gain to match input

LTE Receiver Front-Ends

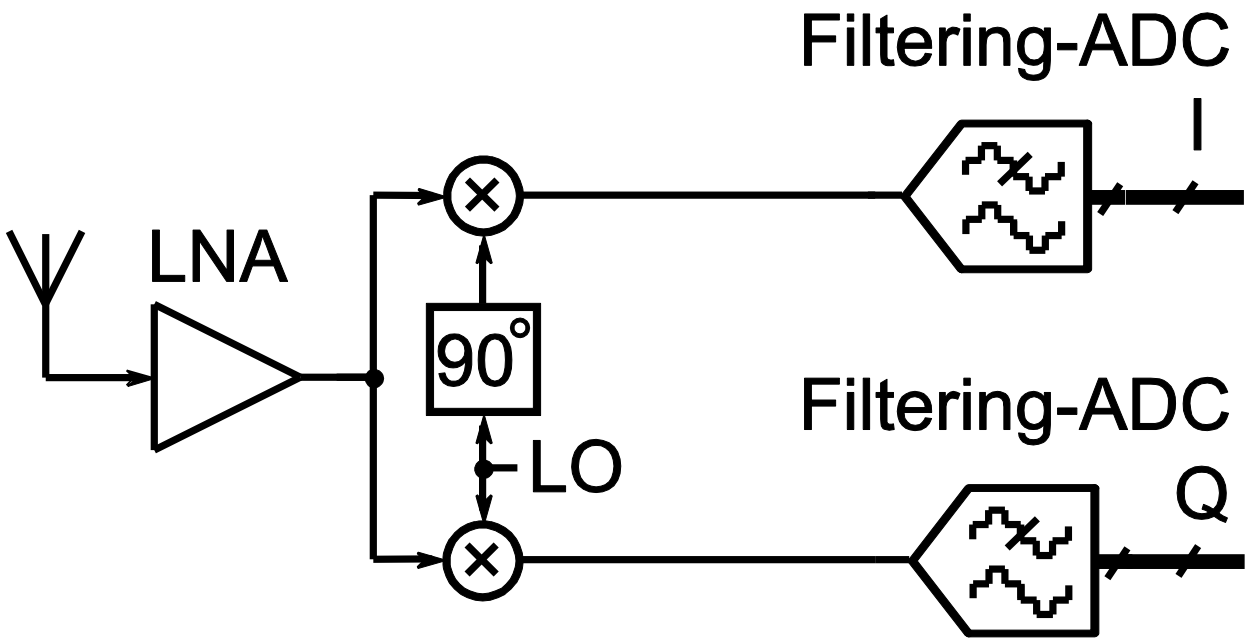
Measurements



Noise figure below 3 dB

LTE Receiver Front-Ends

Receiver front end with ADC-CSF (presented yesterday)



Power for receiver (from RF input to digital output):
36-53 mW

ESSCIRC 2015

Mohammed Abdulaziz

LTE Receiver Front-Ends

Swedish Foundation for Strategic Research

A Receiver Front-End with Blocker Sensing

Unpublished Material

mm wave transmitters

Tobias Tired
Therese Forsberg

To obtain cost and power efficient beam-steering transmitters for V-band and E-band.

Therese Forsberg

Vetenskapsrådet

mm wave transmitters

A two-stage mm-Wave PA in 65 nm CMOS

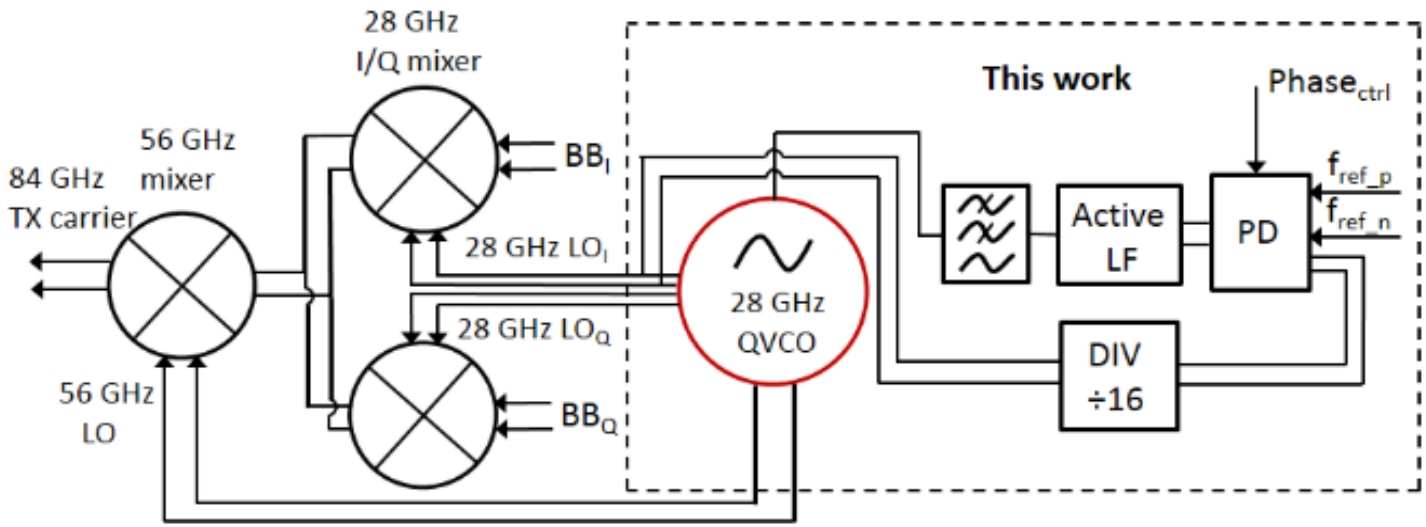
Unpublished Material

APMC 2015

Tobias Tired

mm wave transmitters

28 GHz beam steering SiGe PLL for E-band transmitter (presented yesterday)



Thanks!

To all sponsors and co-operation partners

For your attention

Questions