URSI Austria Commission Meeting

Institute of Microwave and Photonic Engineering

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IHF – Research Areas

Radar and Wave Propagation
RF and mmW Technologies & Measurements
Optoelectronic and Photonics
RFID Technologies
MIMO & OTA Systems

Radar Targets
Adaptive Antennas and Filters

Research Partners:
- Infineon
- AVL
- NXP
- AT&S
- Rohde & Schwarz
- Rosenberger
- DWD
- Joanneum Research
- Viper RF

Current Research Projects:
- **SeCos**
  - RFID at mmW
  - RFID reader & tag for localisation
- **MARG**
  - FMCW weather radar
  - HW & SW development
- **GAZELE**
  - Automotive radar stimulator
  - Real-time & multiple targets
- **K@Home**
  - Potassium sensor
  - CMOS clock

Institute of Microwave and Photonic Engineering
IHF – Infrastructure

MW and mmW Laboratory
- Complex MW measurements 10MHz to 110 GHz
- Automated on-wafer measurements (-40degC to 170degC)
- 80 m² clean room

Anechoic Chamber
- Emission Measurements
- Antenna Patterns
- MIMO & OTA measurements

Research Radar
- C-Band weather radar
- X-Band mono-pulse system

RFID
- RFID Reader
- Simulink modelling
- Localisation
Three Papers at the

1. (URSI) FRP-UB.3A.7: A MM-WAVE RFID SYSTEM BASED ON THE EPC-GEN2 PROTOCOL
2. (URSI) TU-UC.1A.4: A SOLID-STATE C-BAND FMCW SENSOR SYSTEM FOR PRECIPITATION MEASUREMENT
3. (URSI) MO-UE.1A.4: ESD PROTECTION FOR MOBILE HANDSET ANTENNA APPLICATIONS
A Solid-State C-Band FMCW Sensor System for Precipitation Measurements

Helmut Paulitsch, Graz University of Technology (Austria)
Ferenc Dombai, MET-ENV, Budapest (Hungary)
Jim Mayock, VIPER RF (UK)
Wolfgang Bösch, Graz University of Technology (Austria)

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MARG weather radar concept provides

- High range resolution 50m
- Measurement range 30km
- Radar scanning time 30sec
- Highly integrated radar electronic
- Sophisticated FMCW signal processing
- State of the art MW hardware (GaN)
- Low cost implementation
ESD Protection for Mobile Handset Antenna Applications

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Wolfgang Bösch \(^{(2)}\)
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A mm-Wave RFID System based on the EPC-Gen2 Protocol

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MMID Basestation
1. mm-wave transceiver chipset
2. standard gain horn antennas
3. arbitrary signal generator for IQ signals
4. sampling card for IQ signals
5. 2-channel variable baseband amplifier

Diagram:
- Computer MATLAB® / AWR
- 3 Baseband Generator
- 4 2-channel ADC
- 5 Baseband Amplifier
- 1 mm-wave transceiver
- 2 TX Antenna
- 2 RX Antenna

Diagram Legend:
- Commands
- Digital Baseband Signals
- Baseband Signals
- RF Signals
A mm-Wave RFID System based on the EPC-Gen2 Protocol

MMID Transponder
1. antenna(-array)
2. matching network
3. mm-wave diode
4. microstrip low-pass filter
5. lumped elements low-pass filter with a bias-tee
6. adapter circuitry between the mm-wave frontend and the digital baseband chip
7. EPC Gen2 digital baseband chip