

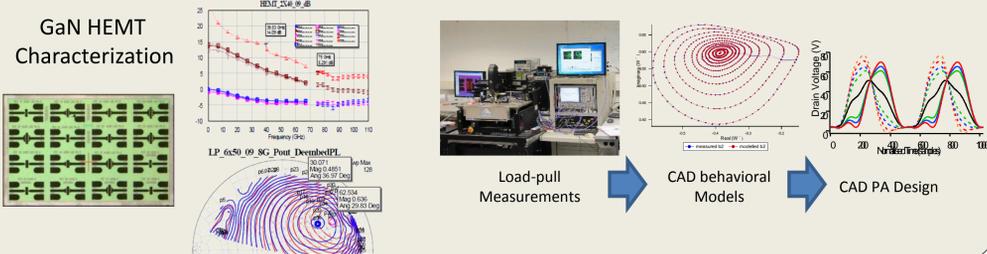
S&T Campaign: Materials Research Electronics RF Active & Passive / Energy Efficient

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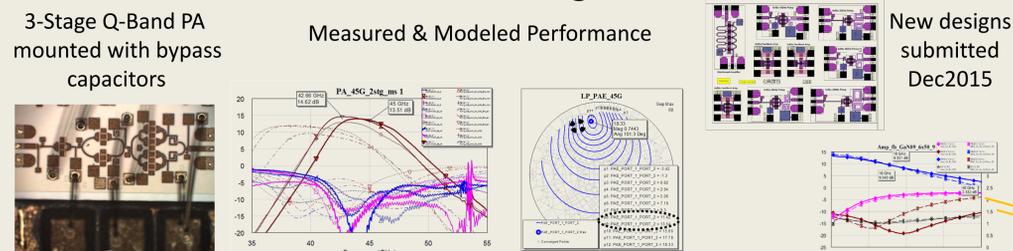
Research Objective

- Develop innovative microwave/mmW circuits, integration and component technologies providing higher performance, improved reliability, and/or reduced size, weight, prime power, cost over existing technology
- Explore reconfigurable and adaptive RF front end circuits including power amplifiers

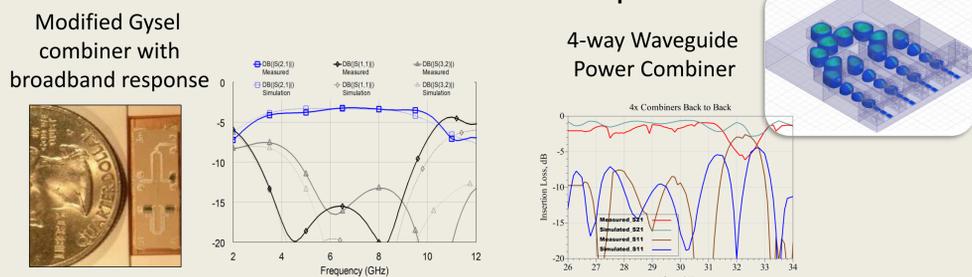
Device Characterization and Modeling



MMIC Design

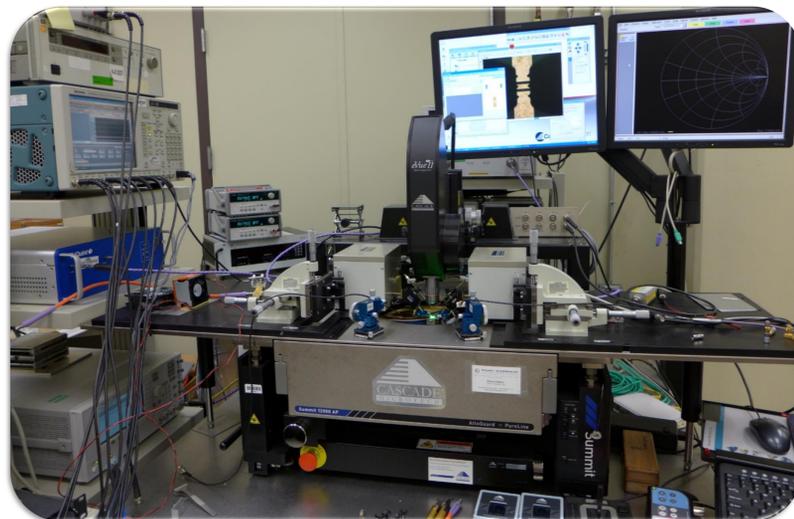


Power Combiner Development



ARL Facilities and Capabilities Available to Support Collaborative Research

- Modeling/simulation tools including AWR Microwave Office, ADS, HFSS, Sonnet
- On-wafer and packaged s-parameter, noise, and power test to 110 GHz, limited test to 220 GHz
- Die packaging design & integration to 110 GHz
- Scalar/power measurements to 230 GHz
- Leverage existing collaborations with industry/academia/DARPA on advanced technologies



On-wafer load pull with advanced modulated signals up to 50 GHz

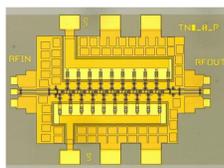


Novel 216 GHz InP Transmitter Architecture

Challenges

- Congested and contested spectrum environment
- Availability and accuracy of models for new device processes
- Simultaneously achieving power, efficiency, linearity, and size limitation

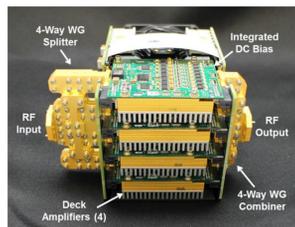
1 THz InP HEMT TMIC amplifier



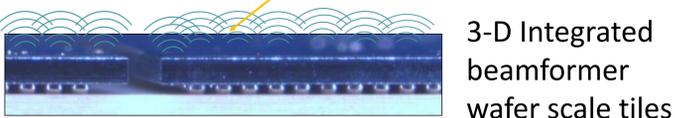
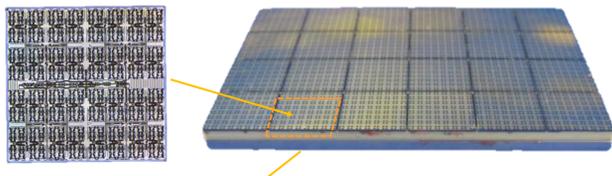
850 GHz InP HEMT TMIC Receiver



233 GHz InP HBT 0.75 W PA



mmW T/R Sub-array



Complementary Expertise / Facilities / Capabilities Sought in Collaboration

- Advanced device characterization and modeling including high frequency circuit and thermal co-design
- Expanded high frequency and nonlinear measurement capabilities
- Mm-wave system integration technologies
- 5G Systems expertise