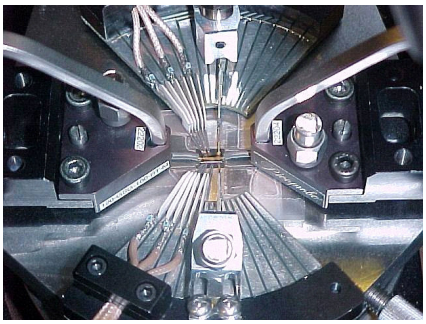
Characterization Services

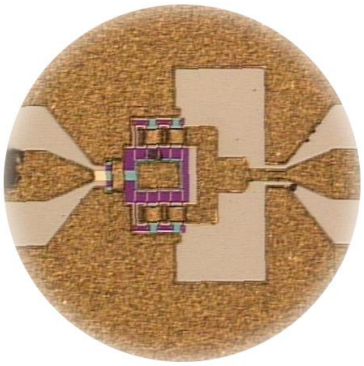
Modelithics™ Inc. provides a broad array of highest quality, RF/microwave/mm-wave characterization services. We also specialize in utilizing precision characterization data to develop equivalent circuit and black-box models for linear and non-linear devices. The models can be inserted into most microwave computer-aided-engineering (CAE) software tools currently on the market. Our mission is to help customers achieve rapid RF/MW design and manufacturing success, by providing superior long-term service and quick turn-around.



Modelithics' in-house resources are supplemented, through sub-contract, with facilities at The University of South Florida's Center for Wireless and Microwave Information Systems (the WAMI Center). The combined facilities cover measurements of S-parameters, noise parameters, load and source pull, as well as DC and pulsed IV. Other measurements include 1/f noise, phase noise, intermodulation distortion, and power compression.

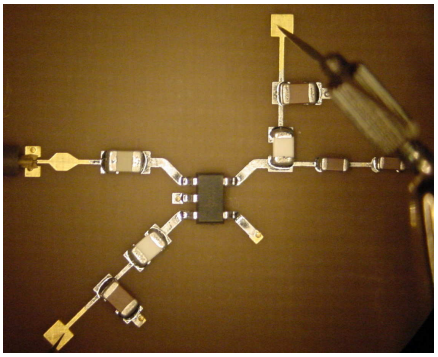
Wafer-Probe Emphasis – Flexibility Available

Modelithics emphasizes wafer probe measurements of semiconductor wafer and chip, as well as surface mount components assembled on hybrid boards. Other measurement configurations involving microstrip or coplanar test fixtures, and measurements to coaxial or waveguide reference planes are available.



S-Parameter Measurements

Multiple vector network analyzer test platforms cover the frequency range from 30 kHz to 110 GHz. True 4-port S-parameter measurements through 26 GHz are available to support mixed-mode circuit design applications.



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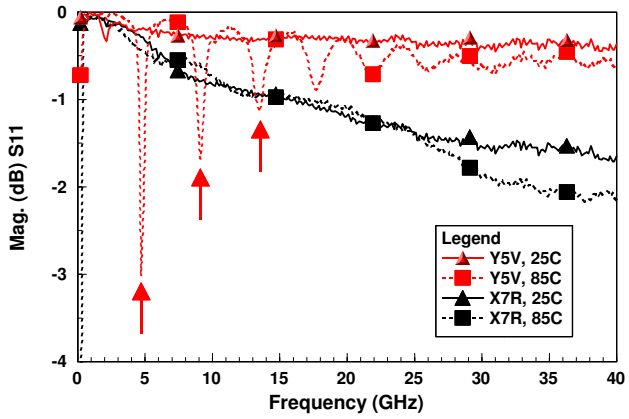
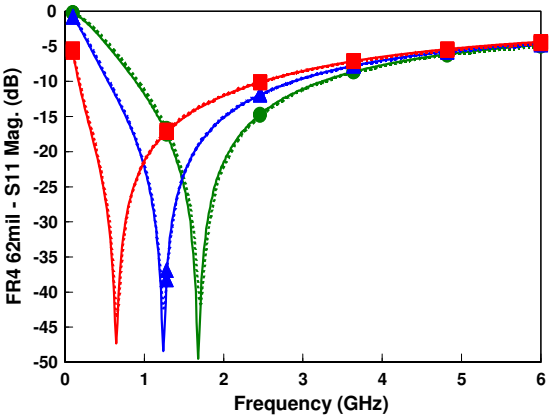
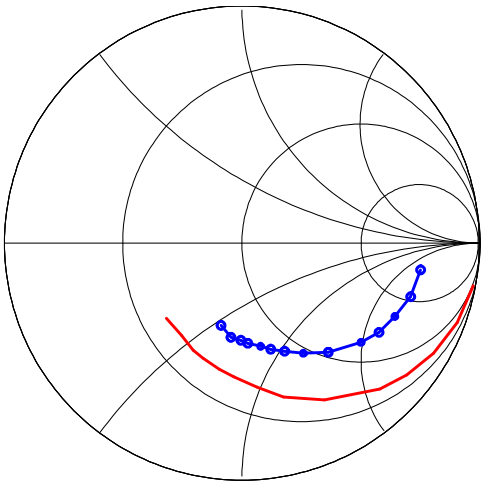


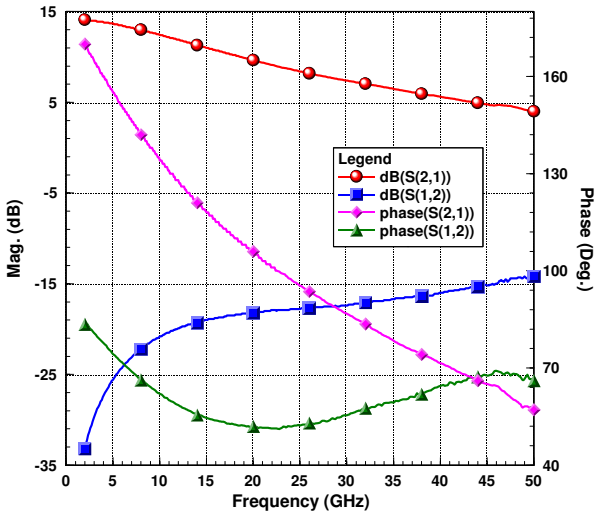
S11 for a shunt-mounted 0.9 nF capacitor (Y5V material) and a 1 nF capacitor (X7R material) at 25ºC and 85ºC.



Measured S11 for a series varactor diode at 3 voltages 0, 5 and 10 Volts compared to a Modelithics™ model.



Legend: Solid line -S11, Line + Circle- S22



Measured 2-50 GHz S-parameters of a HEMT.

Noise-Parameter Measurements

Noise parameter measurements are performed in a screen room to minimize local electromagnetic interface.

- 2 to 26 GHz — Agilent ATN NP5
- 0.8 to 50 GHz — Maury ATS (in development)
- 92 to 96 GHz — Maury ATS (in development)

Measurements include: minimum noise figure (Fmin), optimum source reflection coefficient for minimum noise (Γopt), and noise resistance Rn.

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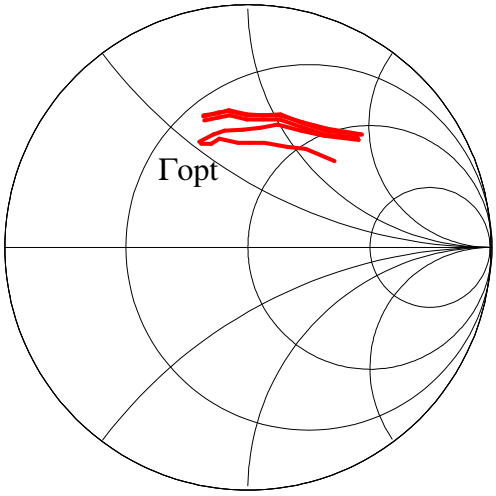
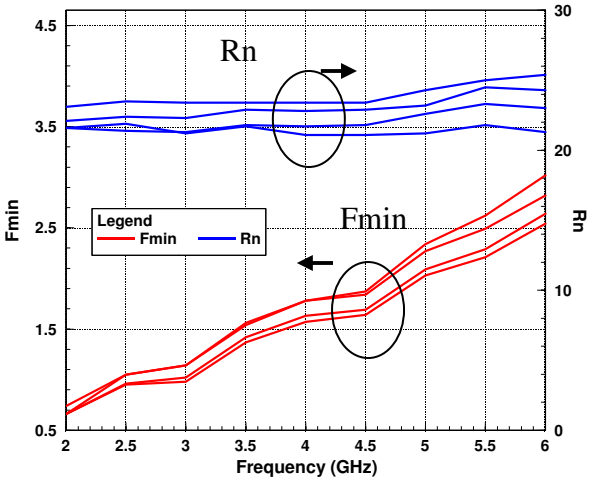


Optimum source reflection coefficient for minimum noise for 5 BJT device samples, 2~ 6GHz.

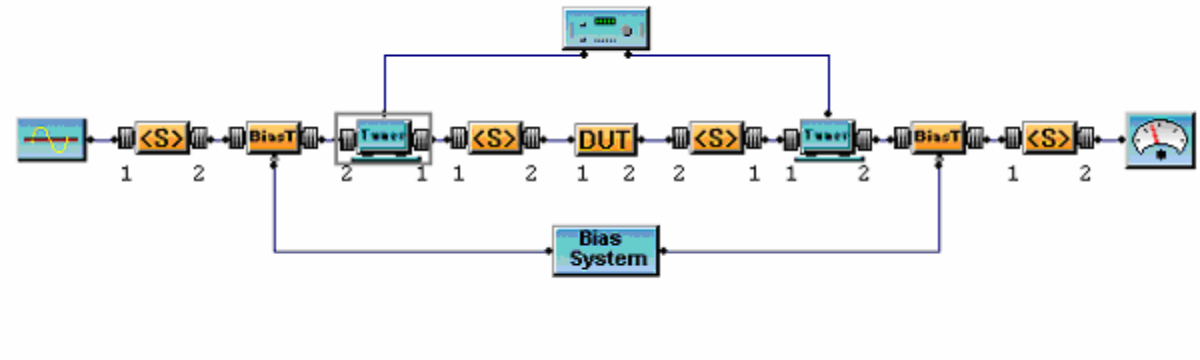


Minimum noise figure and noise resistance for 5 BJT device samples.

Load and Source Pull Measurements

Load and source pull measurements can be performed to generate impedance contours for optimizing the tradeoff between various amplifier performance parameters, such as output power and 1 dB compression, power-added-efficiency (PAE), transducer gain, and third-order-intermodulation distortion (IM3 or TOI).

- Fundamental tuning 0.8 to 8 GHz Maury ATS
- Fundamental tuning 1.8 to 18 GHz Maury ATS
- Fundamental tuning 75 to 110 GHz Maury ATS
- Harmonic tuning 2.45 GHz & 5.25 GHz (2nd and 3rd harmonic can be tuned)



Maury Automatic Tuner System (ATS) block diagram for source and load pull power measurements.

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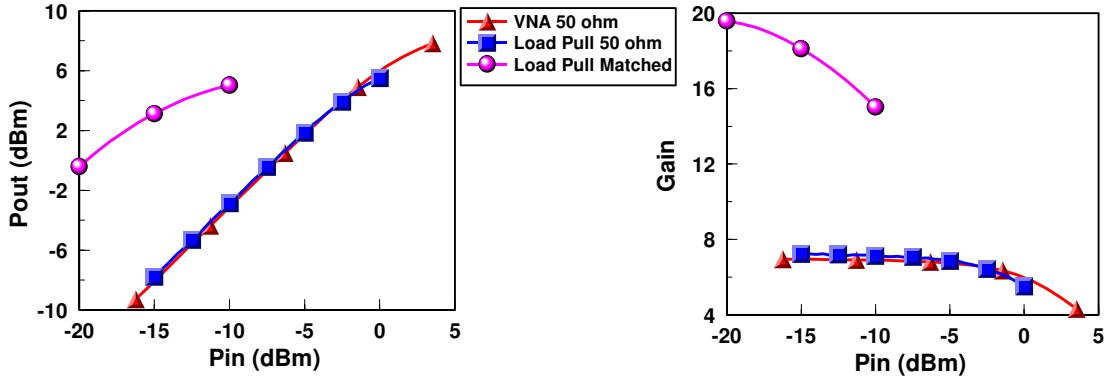
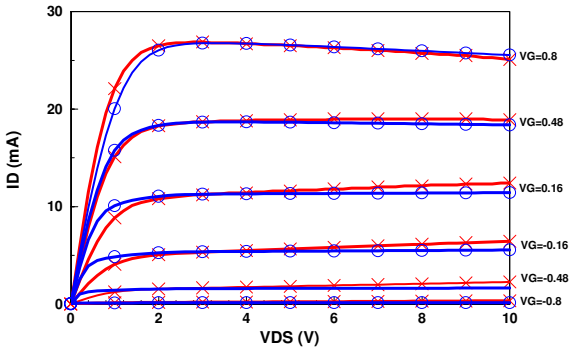


5.25 GHz on-wafer measurements of output power vs. input power (left) and gain vs. input power (right) for a 10µm x 5µm MOSFET device. 50 Ohm power swept data is compared between Maury ATS load-pull system and a vector network analyzer (VNA).

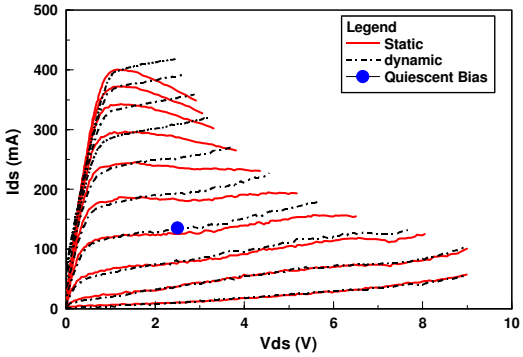
DC and Pulsed IV

For transistor and diode characterization, dc and pulsed measurements are made using the following:

- DC IV characterization - HP4142 DC Parameter Analyzer
- Pulsed IV Measurements - Accent DIVA



DC I-V curves from HP4142 DC Parameter analyzer compared to a non-linear model for a MOSFET, obtained via IC-CAP

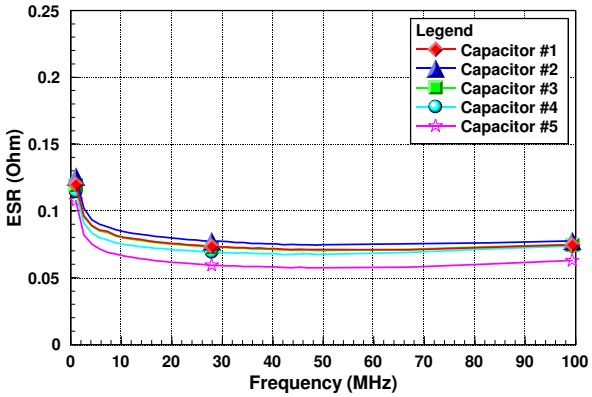


Dynamic versus static DC-IV data of a 600um pHEMT using the DIVA Dynamic IV Analyzer.

Other Instrumentation

Many other measurements and tools are available to support model development, including:

- Q-factor measurements of discrete passives
- Impedance measurements to 3 GHz
- 1/f noise and phase noise measurements
- 50 Ohm intermodulation distortion and power compression testing



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