

# 1/f Noise Measurements and SPICE Model Extraction For Bipolar Transistors

Noise in semiconductor devices has a significant impact on circuits performances.

This is even more important in today's low-voltage, high-performance, mixed-signal and RF designs.

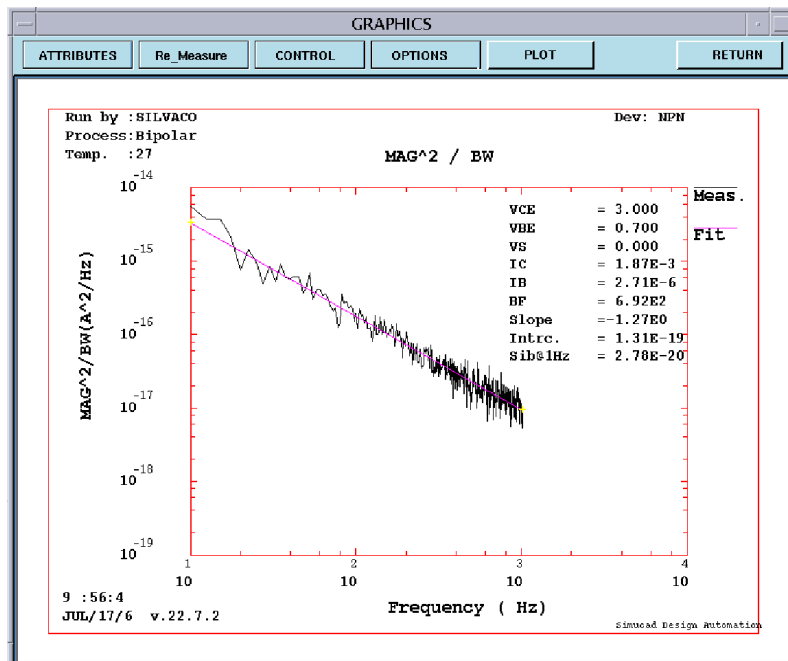
The capability to measure and characterize semiconductor device noise is a fundamental requirement for design.

Noise characterization is also important to monitor semiconductor processes quality.

Silvaco has been offering 1/f noise measurement and SPICE model noise parameters extraction solutions to its customers for several years.



Simucad noise amplifier.



Single bias point noise measurements data.

Silvaco now announces the enlargement of this offer with the addition of the following features:

- A new version of the S3245A noise amplifier specifically designed for high-performance/high-accuracy BJT (bipolar junction transistor) 1/f noise measurements.
- A new version of the UTMOST III software, which includes an improved version of 1/f noise measurement and SPICE, models extraction.

Automatic I-V and 1/f noise measurements can be performed on wafer level or on packaged devices. Multiple DC bias points can be specified.

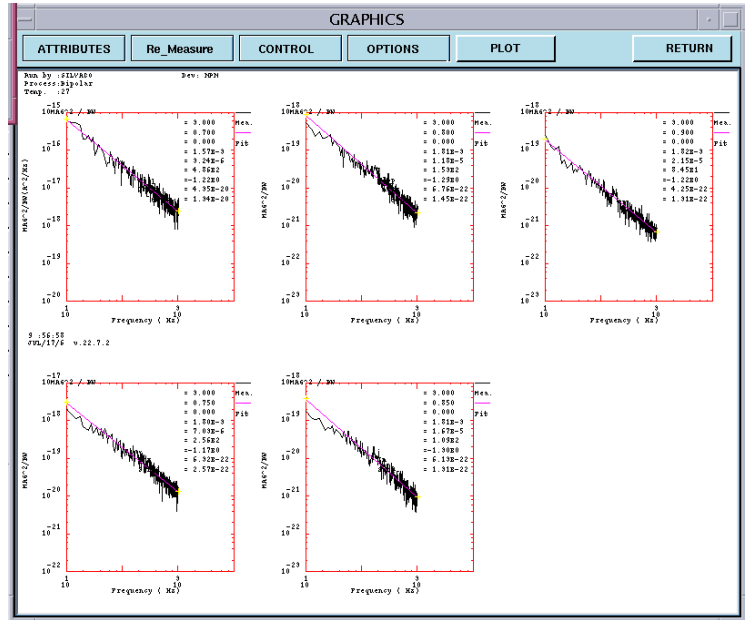
It is possible to setup the bias conditions, measurement frequency range, number of averages and other measurements conditions. These setups can be saved as a file to be used in the future.

Measurement at multiple bias points within a single measurement session is possible as well.

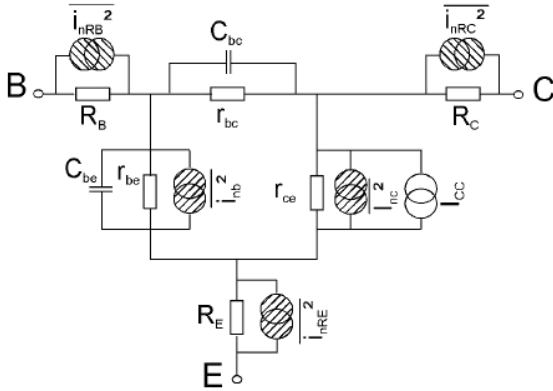
SPICE parameter extraction is performed by UTMOST by specifying the model type. UTMOST supports all available standard noise models.

The extracted noise parameters are fed back into special NOISE verification circuits and simulated. This final step completes the verification of the extracted noise parameters.

Existing SPICE models accuracy can be verified as well by simulating noise characteristics.



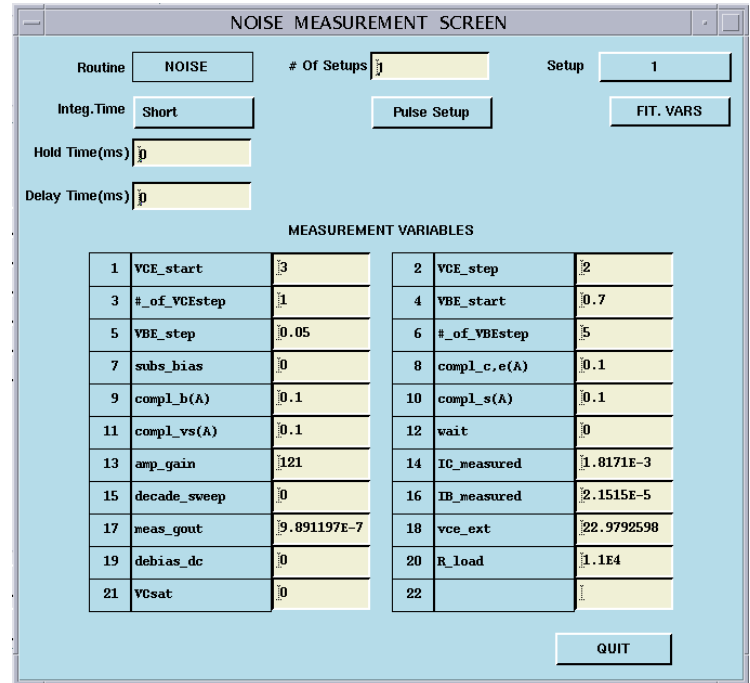
Multiple bias point noise measurement data.



BJT equivalent circuit for noise simulations.

$$S_{i_B} = \frac{\overline{i_{nB}^2}}{1\text{HZ}} = KF \frac{I_B^{AF}}{f} \left[ \frac{A^2}{\text{HZ}} \right]$$

Base current noise equation implemented in SPICE (AF, KF are the SPICE parameters).



UTMOST III measurements setup window.

# SILVACO

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