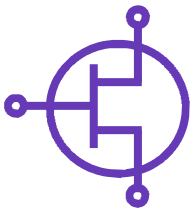
PHEMT MODEL

Model Features

- Broadband (DC-30GHz)
- Non-linear (EEHEMT model)
- Measurement validations:
  - DC-IV
  - Power sweep
  - Noise parameters
  - Third order IMD
  - Multi bias S-parameters on 8 mil Rogers 4003



NEC NE3210S01
Low-noise PHEMT
SO1 Package

Model Description

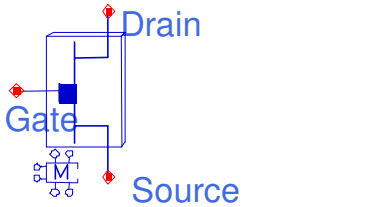
The HMT-NEC-NE3210S01 is a non-linear model for the NEC NE3210S01 PHEMT in a S01 package based on the extraction of EEHEMT model. The model is intended for use with microstrip applications operating from DC to 30 GHz. The model is designed for use in DBS and other commercial systems.

This model was enhanced in v8.0 to improve model performance.

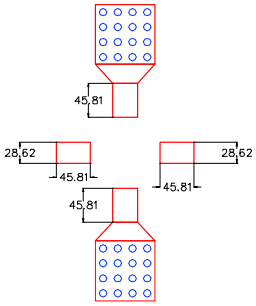
Technical Notes

- The non-linear model is extracted from DC and S-parameter measurements at different bias conditions.
- The model has been validated with measurements over the frequency range DC to 30 GHz in a common source configuration.
- The model optimal bias point is at Vds of 2V and Ids of 10 and 20 mA.
- Via effects are included in the model.
- The substrate used to extract the model: 8 mil Rogers 4003.

Model Representation

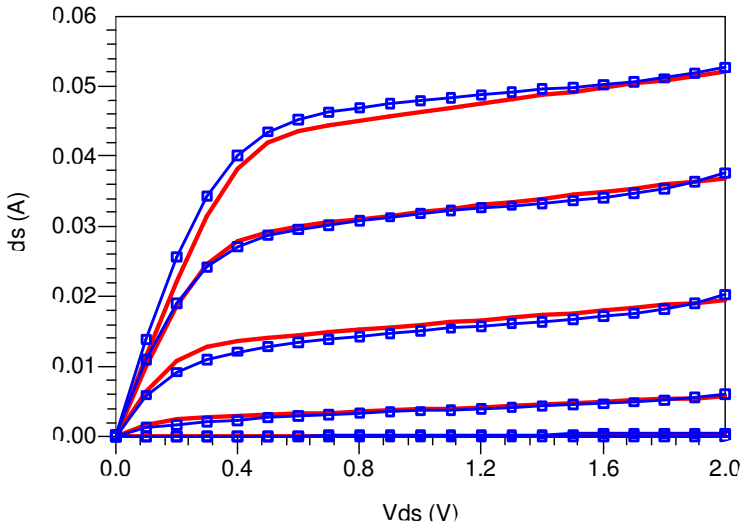


Test Layout



Dimensions in mils

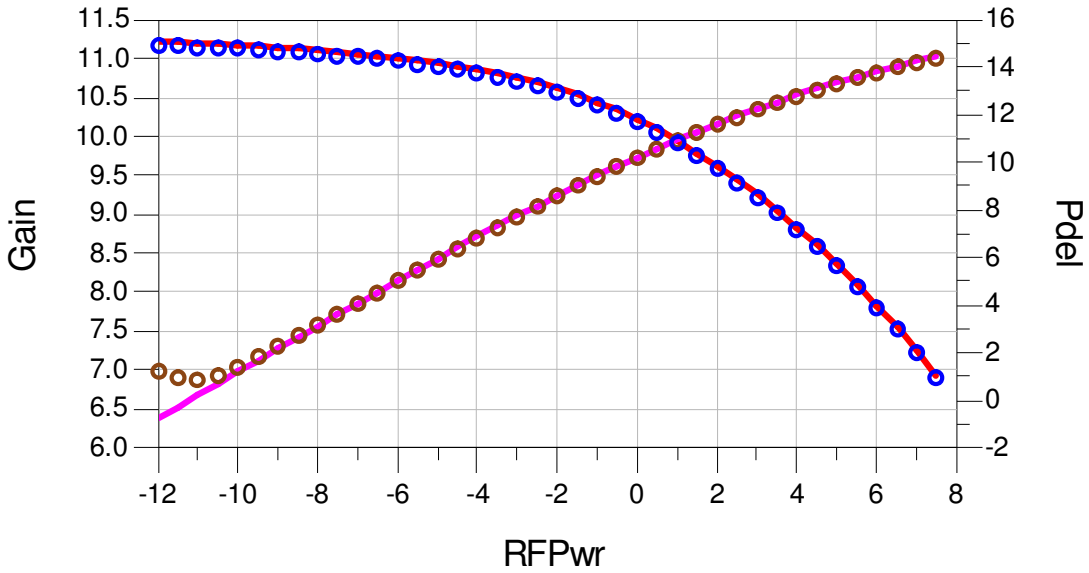
DC IV Characteristics



Legend: Solid Red lines-Model, dashed lines with Blue ▫ markers-Measured data

Simulated at T=25C with VGS varying from –1 to 0V in steps of 0.2V

Gain Compression

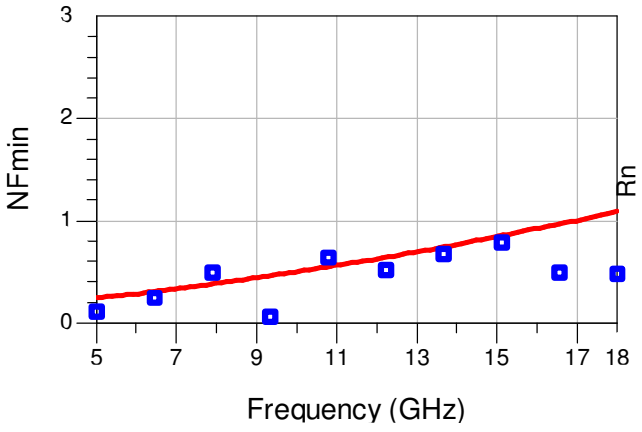


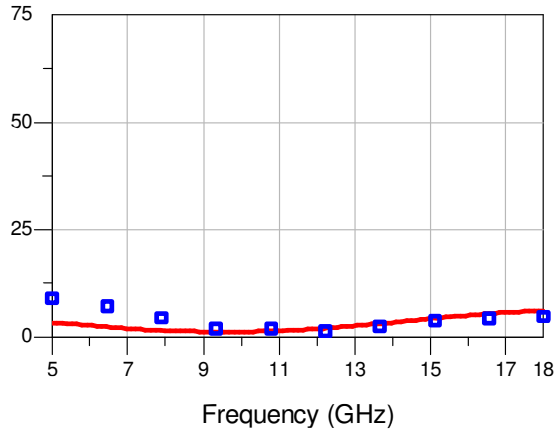
Legend: Solid lines-Model, markers-Measured data

● -Gain Compression, ■ -Output power

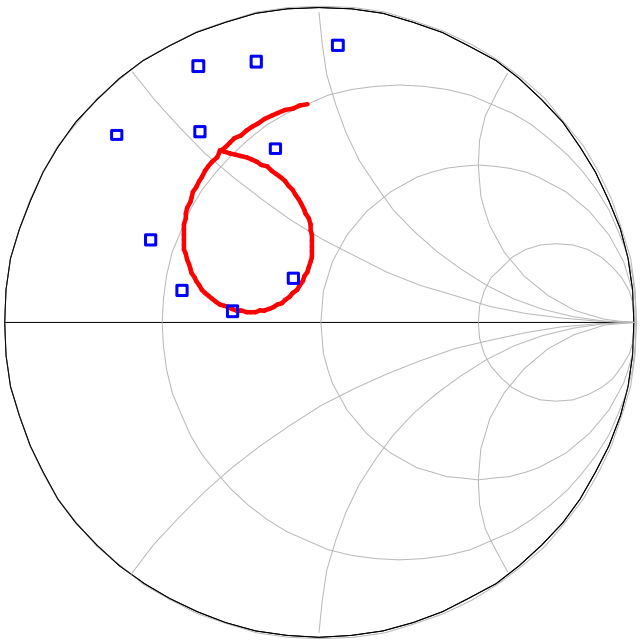
Simulated at 50 ohms at an input frequency of 8 GHz.
Bias conditions: VDS=2V and IDS=20mA

NOISE PERFORMANCE





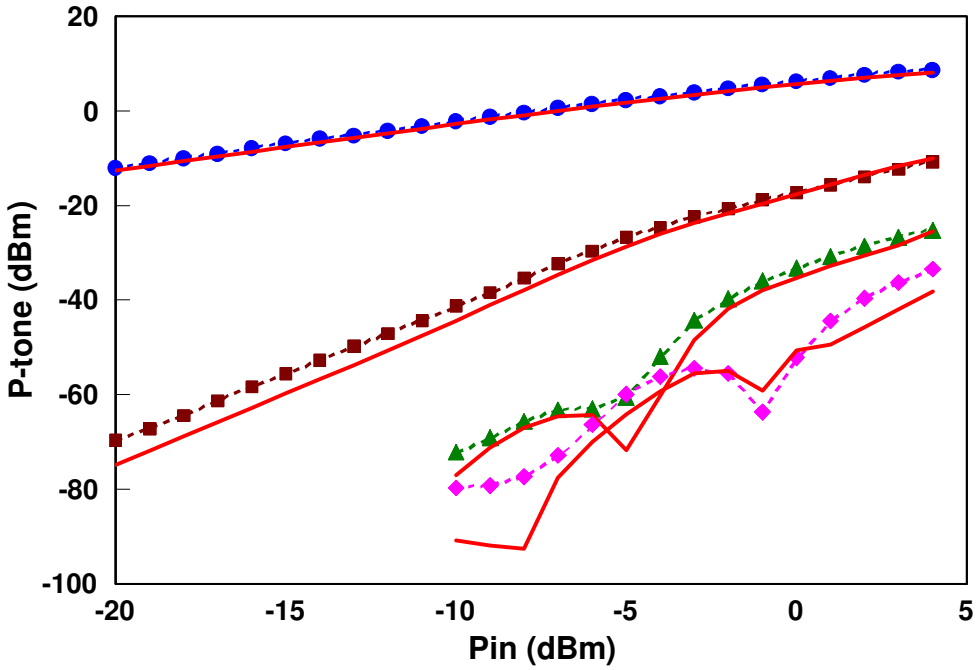
Gamma opt



Legend: Solid Red lines-Model , Blue ☐ Markers– Measured data

Simulated at VDS=2V and IDS=10mA on 8 mil Rogers 4003 substrate
Frequency range: 5 to 18 GHz

Third order Intermodulation

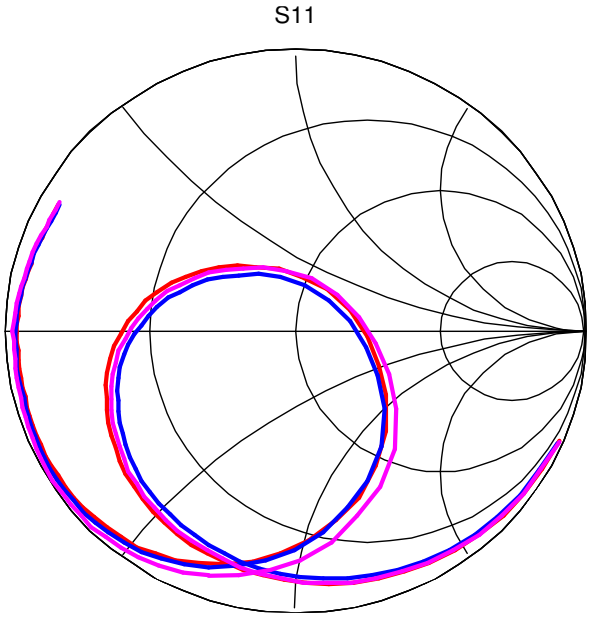


Legend: Solid lines– model, Dashed lines with markers– Measured data
● - carrier, ■ - third order, ▲– fifth order, ◇ - seventh order products

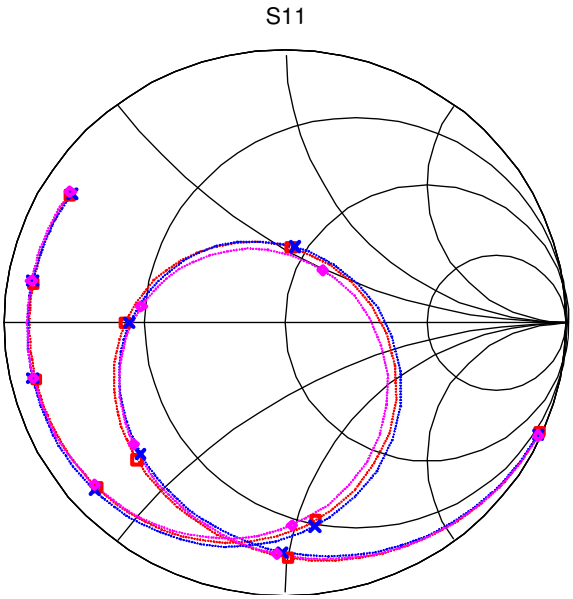
Simulated on 8 mil Rogers 4003 substrate with a two-tone spacing of 1 MHz.
Bias is VDS=2V and IDS=10 mA.

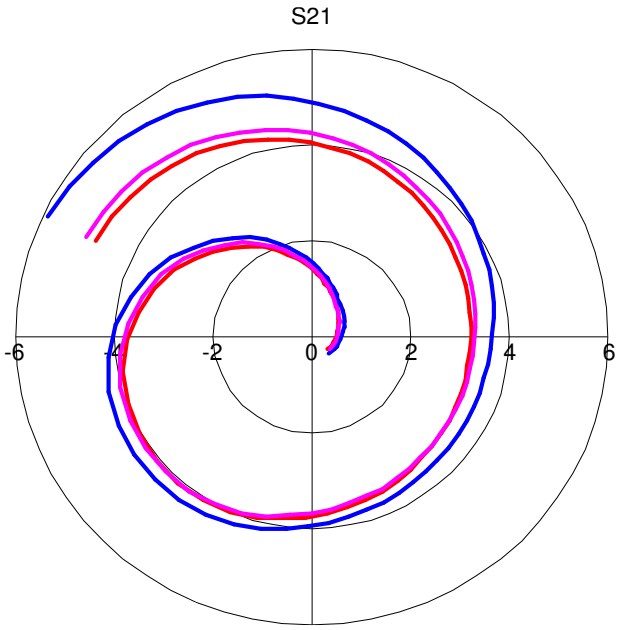
Bias Dependence

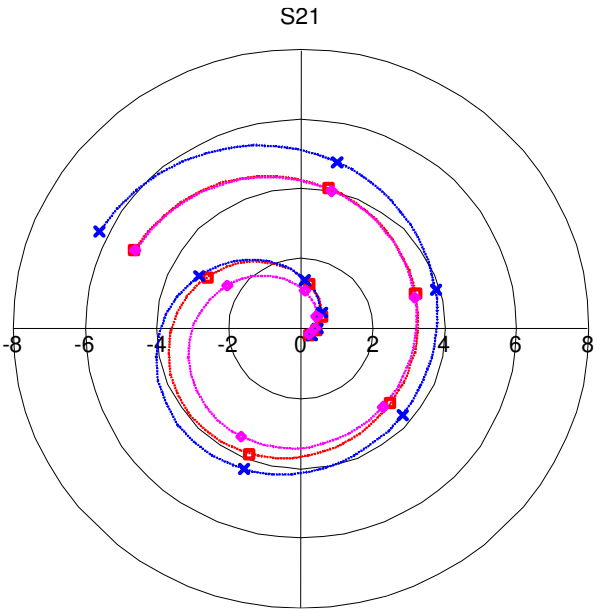
Modeled



Measured







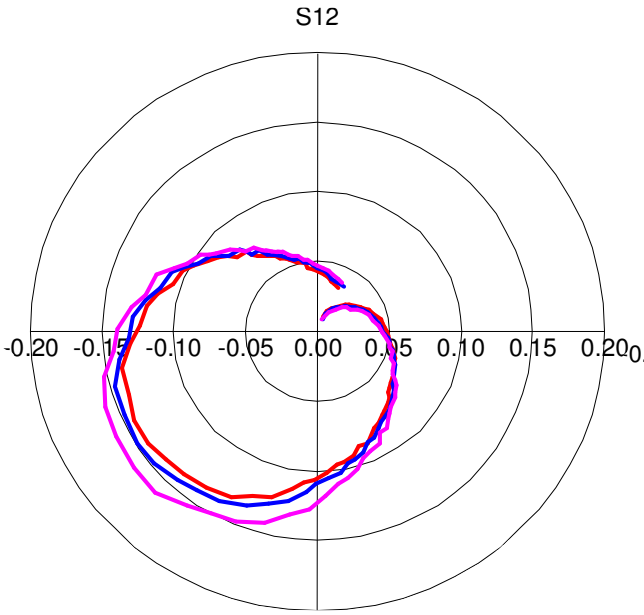
Legend: Solid lines– model, Dashed lines with markers– Measured data

□ - 10 mA , X– 20 mA , ◇- IDSS

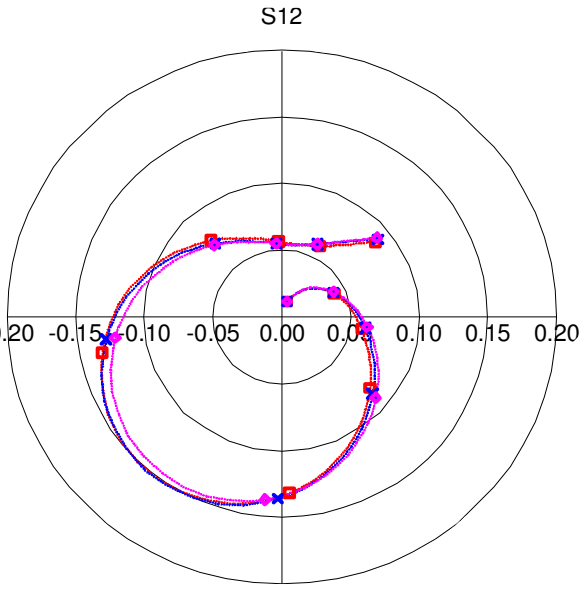
Model and measured S11 and S21 at VDS=2V on the 8 mil Rogers 4003 substrate. Frequency range is 1 to 30 GHz.

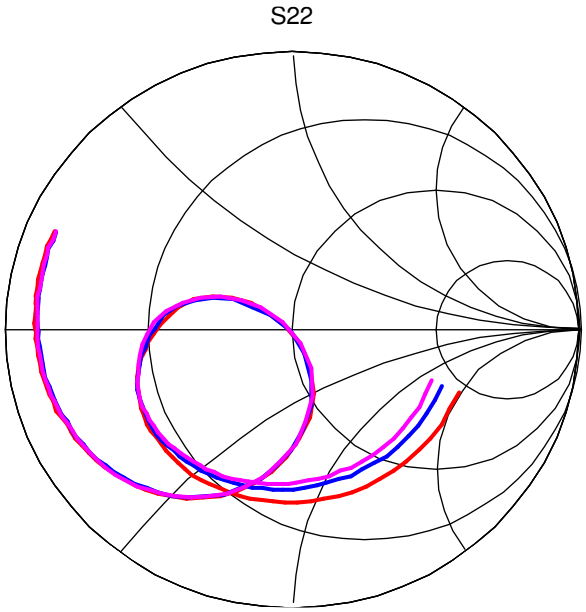
Bias Dependence

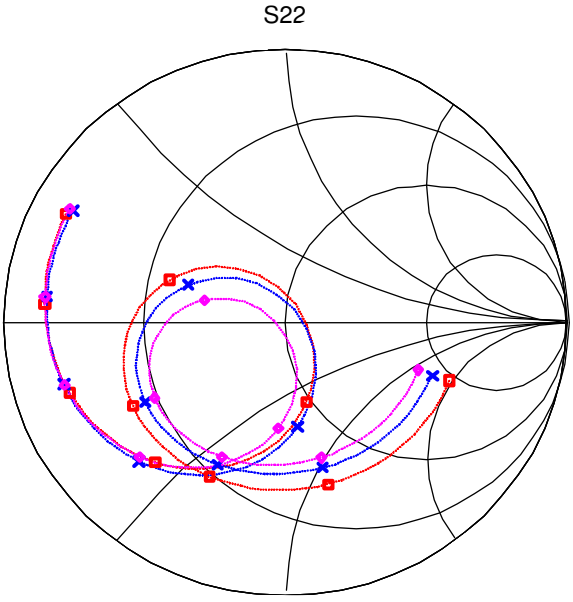
Modeled



Measured







Legend: Solid lines– model, Dashed lines with markers– Measured data
□ - 10 mA , X– 20 mA , ◇- IDSS

Model and measured S12 and S22 at VDS=2V on the 8 mil Rogers 4003 substrate. Frequency range is 1 to 30 GHz.

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