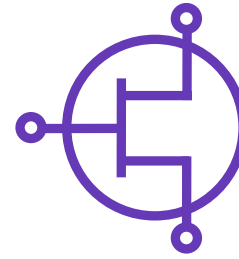


Model Features

- Broadband (DC to 30 GHz)
- Non-linear (EEHEMT model)
- Measurement Validations:
 - DC I-V (25°C)
 - Multi-bias S-parameters (1 - 30GHz, 25°C)
 - Noise parameters (5 - 18GHz, 25°C)
 - Single-Tone Tuned Power sweeps (8 GHz)
 - Third order IMD (8 GHz)



HMT-CEL-CE3512K2-101 Low – Noise PHEMT

Model Update

The HMT-CEL-CE3512K2-101 is an update and replacement model for the HMT-CEL-CE3512K2. This update adds the Sim_mode feature for improved pad-related simulation accuracy as well as a via removal option.

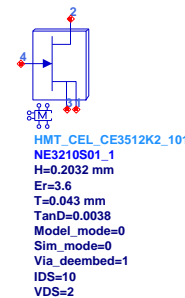
Model Description

The HMT-CEL-CE3512K2-101 is a non-linear model for the CEL CE3512K2 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.

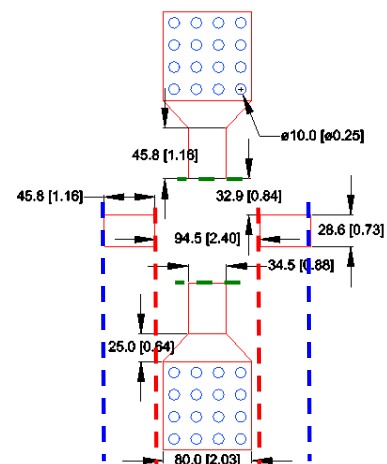
Technical Notes

- The non-linear model is extracted from DC I-V and S-parameter measurements at different bias conditions.
- Model optimized for 2V, 10 - 20 mA operation.
- Model Parameters:
 - **Model_mode:** model mode switch (0 or 1), 0 (default) = large signal mode, 1 = small signal model mode.
 - **Sim_mode:** removes effects of input (gate) and output (drain) mounting solder pads from model (0 or 2). The via pad effect is also removed from the model. 0 for full parasitic model, 2 for removing pad effects.
 - **Via_deembed:** remove the source vias from model (0 or 1). 0 = via effect included in model (see Test Layout image), 1 (default) = via effect removed from model.
 - **IDS:** drain current parameter for small signal model (default = 10mA)
 - **VDS:** drain voltage parameter for small signal model (default = 2V)
- The model has been validated with measurements over the frequency range DC to 30 GHz in a common source configuration.
- Model reference planes are 4.73mm apart. Test fixture has a ground paddle with 10mil vias for grounding the source.
- Board used is a 8 mil Rogers 4003C with a dielectric constant of 3.6.

Model Representation

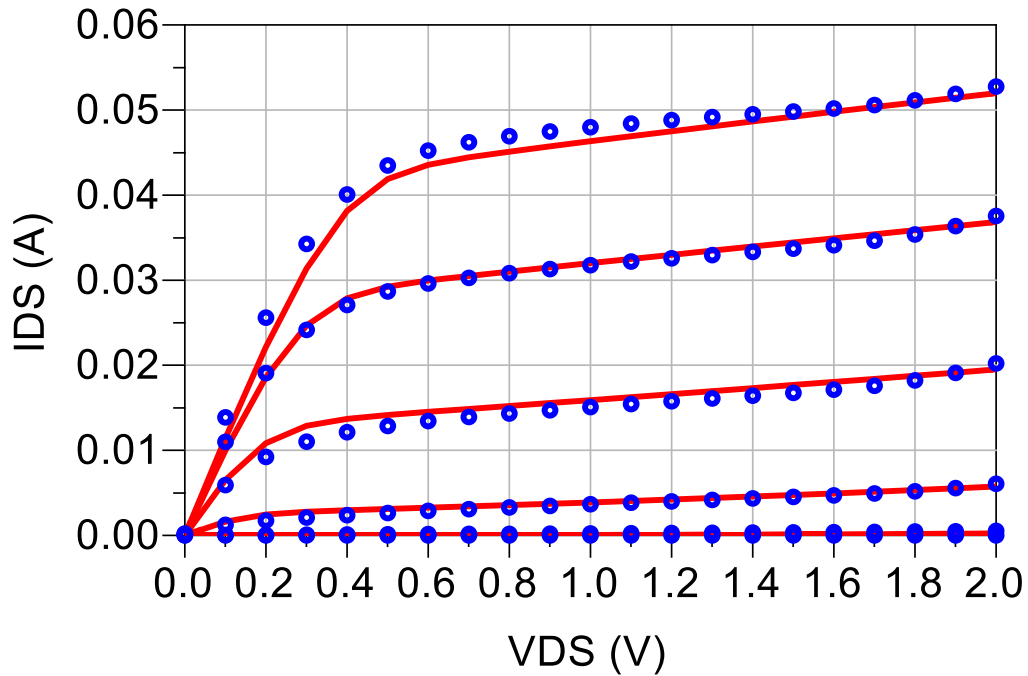


Test Layout



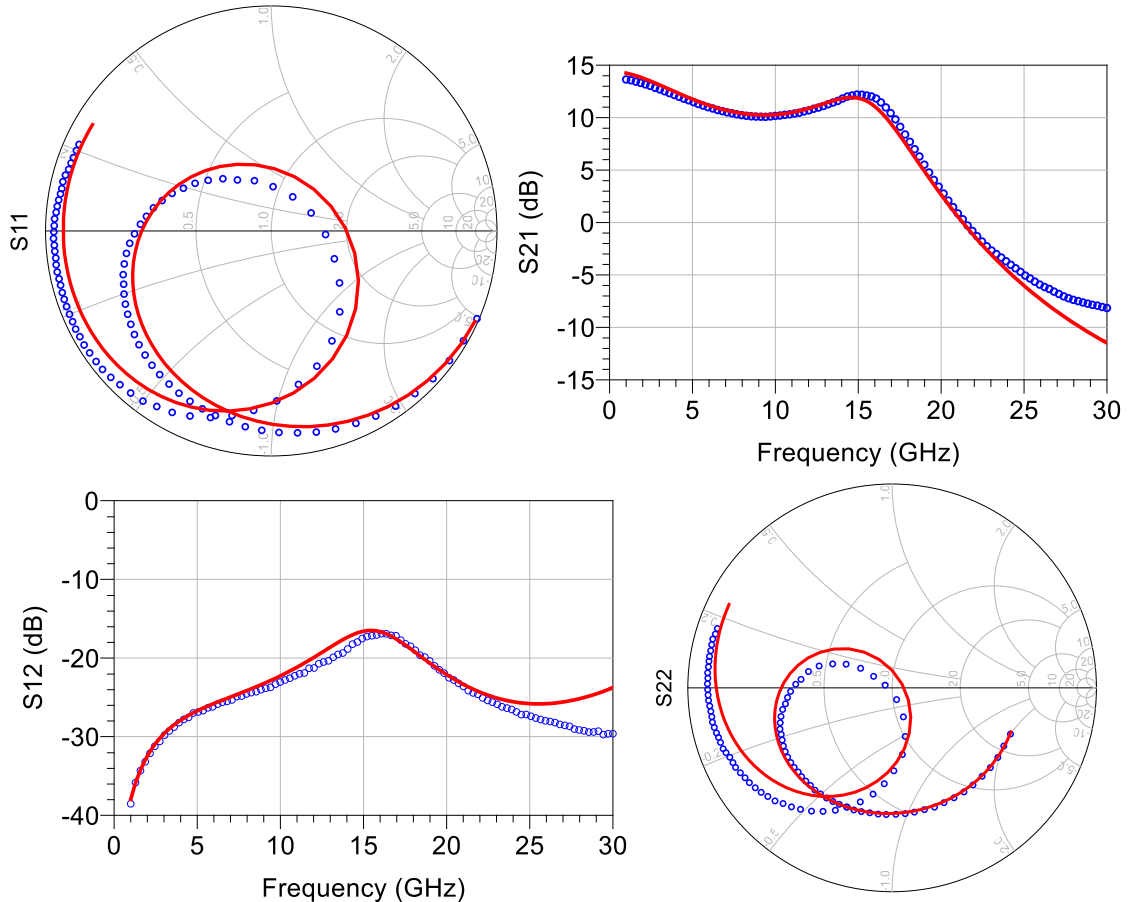
Model reference planes indicated for
Sim_mode=0 (blue), Sim_mode=2 (red), and
Via_deembed=1 (green)
Dimensions in mils

DC I-V Characteristics: 25C



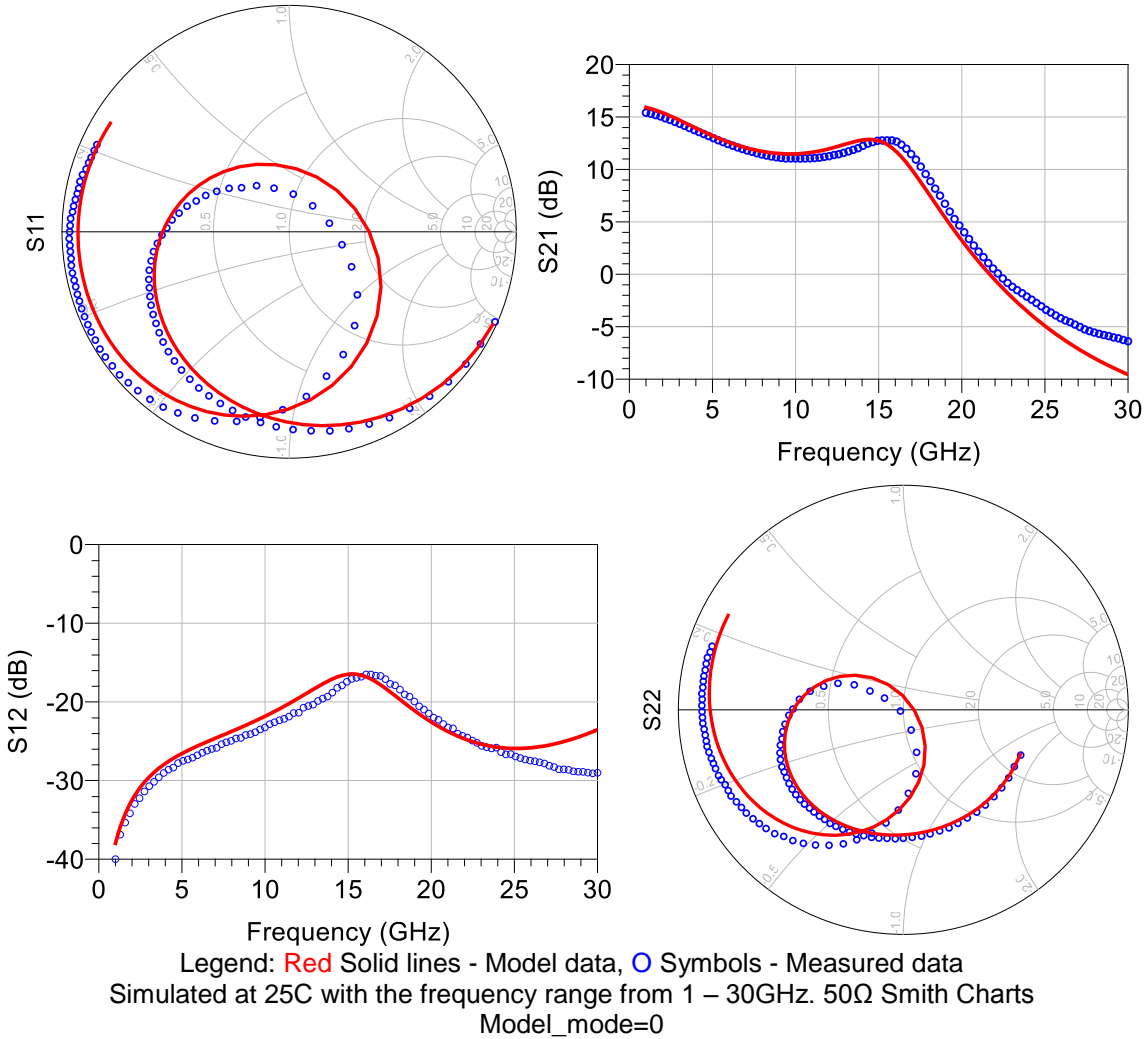
Legend: Red Solid lines - Model data, O Symbols - Measured data
 Simulated at 25C with VGS varying from -1 to 0V in steps of 0.2V,
 VDS varying from 0 to 2V in steps of 0.1V.
 Model_mode=0

S-Parameters Model vs. Measured:
 VDS = 2V, VGS = -0.52V, IDS = 10mA, 25C

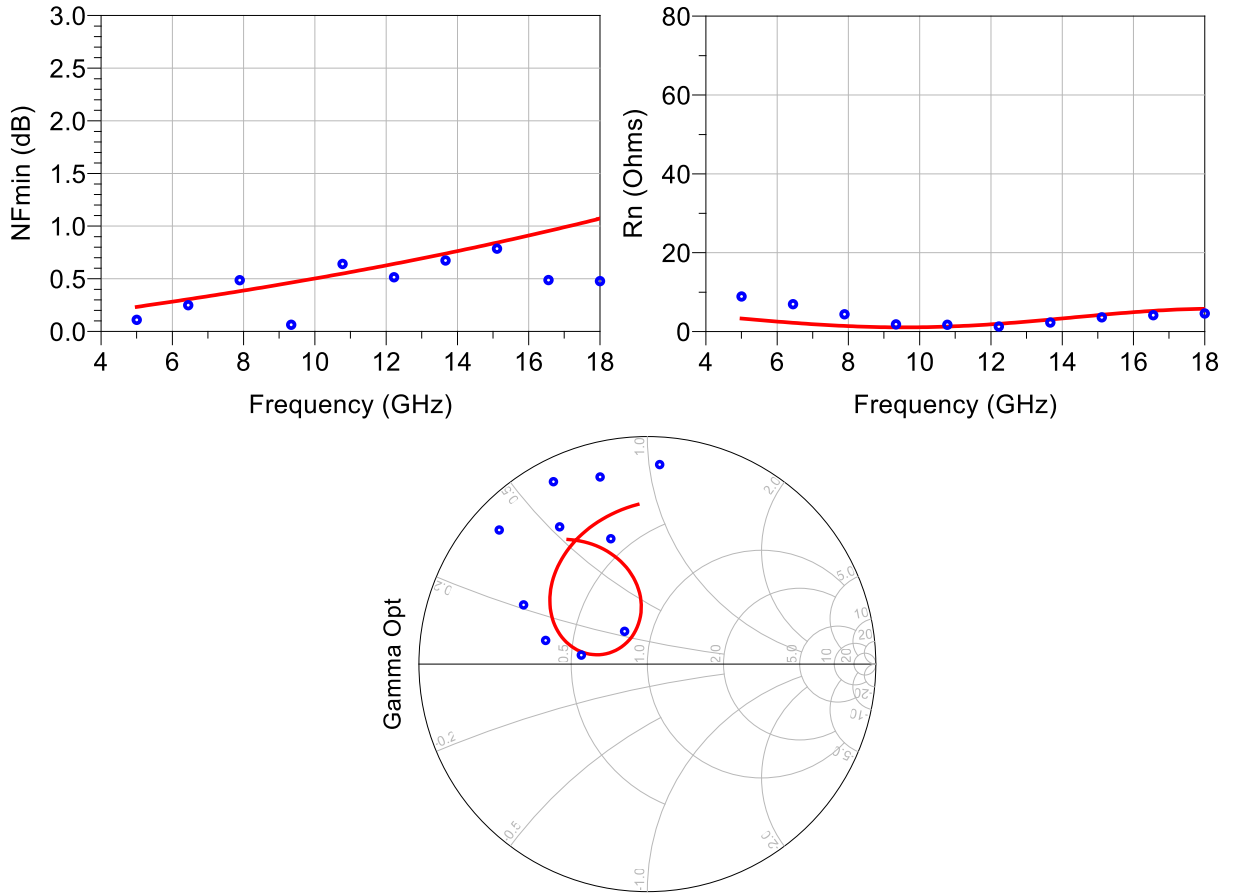


Legend: Red Solid lines - Model data, O Symbols - Measured data
 Simulated at 25C with the frequency range from 1 – 30GHz. 50Ω Smith Charts
 Model_mode=0

S-Parameters Model vs. Measured:
 VDS = 2V, VGS = -0.39V, IDS = 20mA, 25C



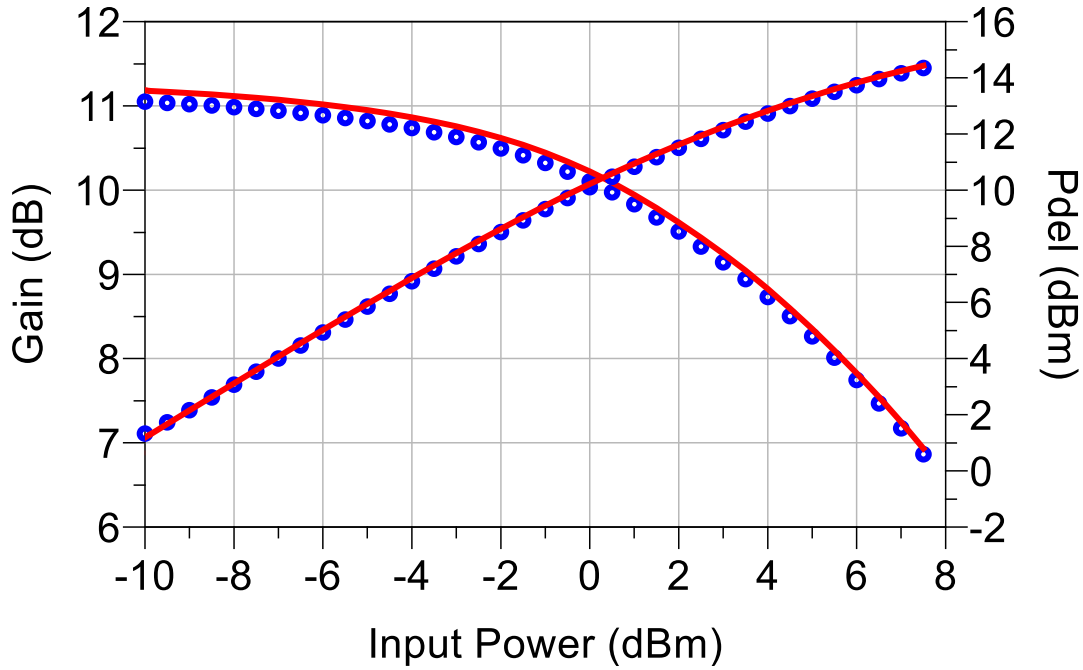
Noise Performance Model vs. Measured:
 VDS = 2V, VGS = -0.52V, IDS = 10mA, 25C



Legend: Red Solid lines - Model data, O Symbols - Measured data
 Simulated at 25C with the frequency range from 5 – 18GHz. 50Ω Smith Charts.
 Model_mode=1, IDS=10mA, VDS=2V.

Single Tone Power Sweep: Frequency = 8GHz
 VDS = 2V, VGS = -0.52V, IDS = 10mA, 25C
Load Condition: 50Ohm

Transducer Gain and Delivered Power



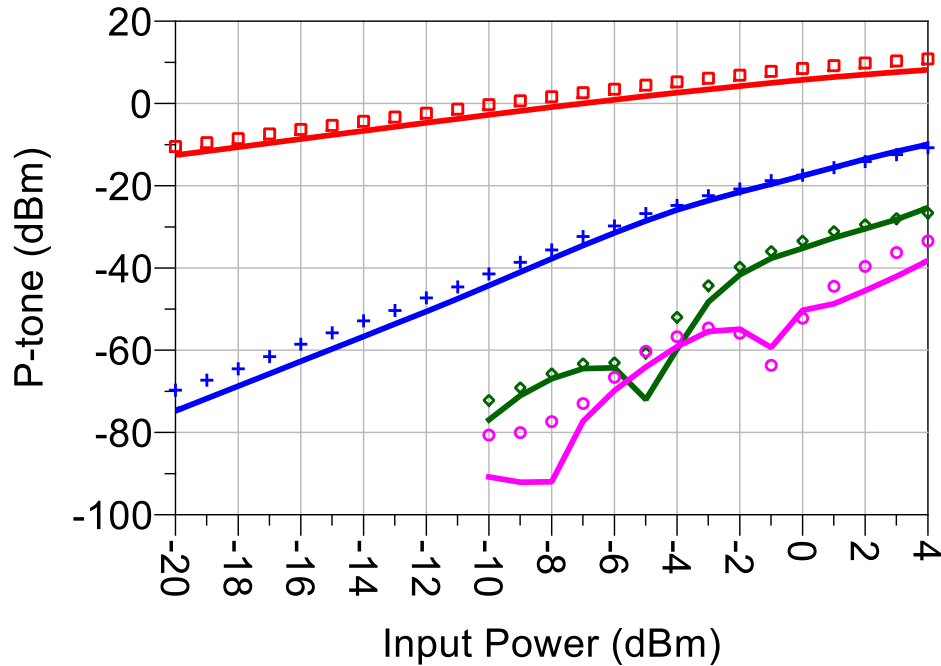
Legend: Red Solid lines - Model data, ○ Symbols - Measured data.
 Model_mode=0

Load Condition:
 Test Bench Impedances
 (Ohms):

 ZS = 50
 ZLoad = 50

Third Order Intermodulation: Frequency = 8GHz, 1MHz Tone Spacing
 VDS = 2V, VGS = -0.52V, IDS = 10mA, 25C
Load Condition: 50Ohm

Transducer Gain and Delivered Power



Legend: Solid lines - Model data, Symbols - Measured data.

Red – carrier, blue – third order, green – fifth order, magenta – seventh order products
 Simulated on 8mil Rogers 4003C substrate with a two-tone spacing of 1 MHz.
 Model_mode=0

Load Condition:
 Test Bench Impedances
 (Ohms):

ZS = 50
 ZLoad = 50

Model and Datasheet Revision Notes

02/08/2018	Original model and datasheet development
02/20/2018	Updated Test Layout
03/08/2018	Updated datasheet plots

