Temperature_Dependent_Parameters

Where To Find This Example

Select **Help > Open Examples...** from the menus and type either the example name listed above or one of the keywords at the bottom of this page.

You can also open the project directly from this page using this button. Make sure to select the **Help > Enable Guided Help** from the menus before clicking this button.

Open Install Example

Design Notes

Frequency and Temperature Dependent Devices in VSS

This example demonstrates performance of a device with varying frequency and temperature. This is accomplished by setting a range of frequencies for analysis in the Options/Default System Options..., under the RF Frequencies tab, and sweeping the environment variable for temperature, _TAMB. The Gain, P1dB, IP3, and NF in the AMP_B2 model are defined for a range of frequencies and temperatures. The graphs in this project show the gain, third order intermodulation product, and noise figure over the RF link.

Simulation Details

The simulated frequencies are defined in the Options/Default System Options..., under the RF Frequencies tab. The block SWPVAR is used to sweep the variable _TAMB. For each combination of frequency and temperature, the simulation selects the gain, P1dB, IP3, and NF of the device. Looking at the parameters for AMP_B2, we see that for frequency 1 GHz, the gain at 100K is 10 dB, 14 dB at 230K, and 21 dB at 290K.

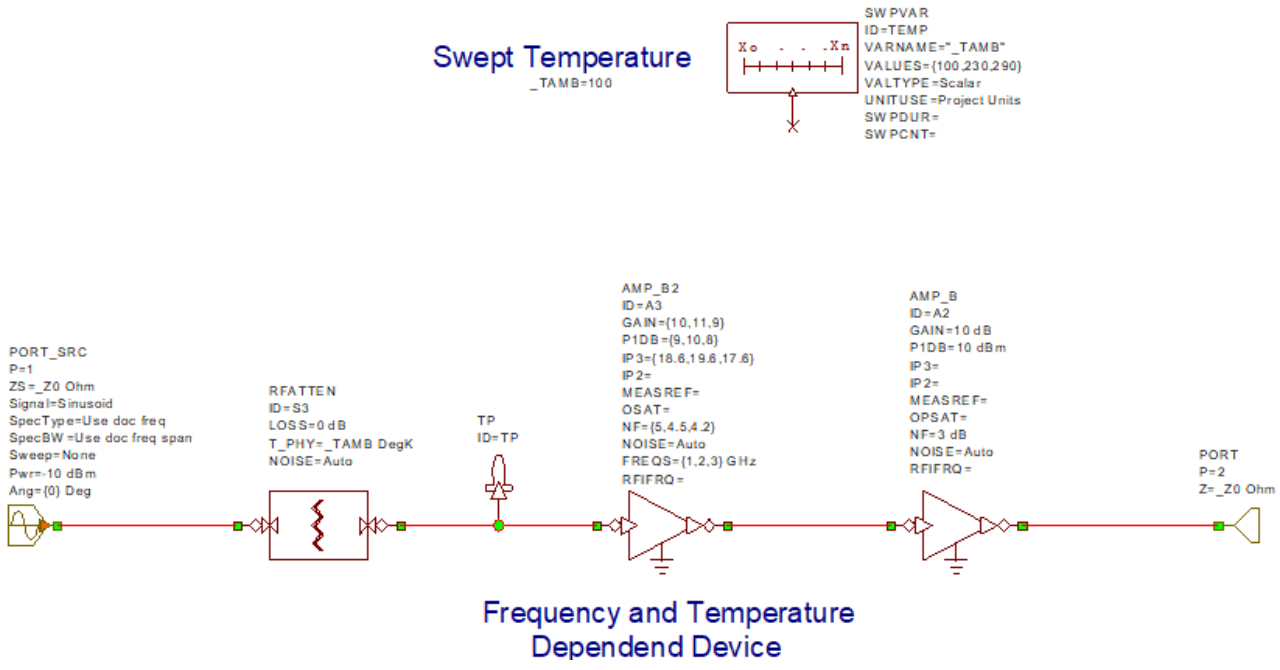
Graphs

The Gain and NF graphs plot the cumulative gain and cumulative noise figure of the RF link, respectively. They each contain 9 traces, each of them corresponding to each combination of frequency and temperature selection. The IP3 graph shows the power of the third order intermodulation products as a function of frequency and temperature.

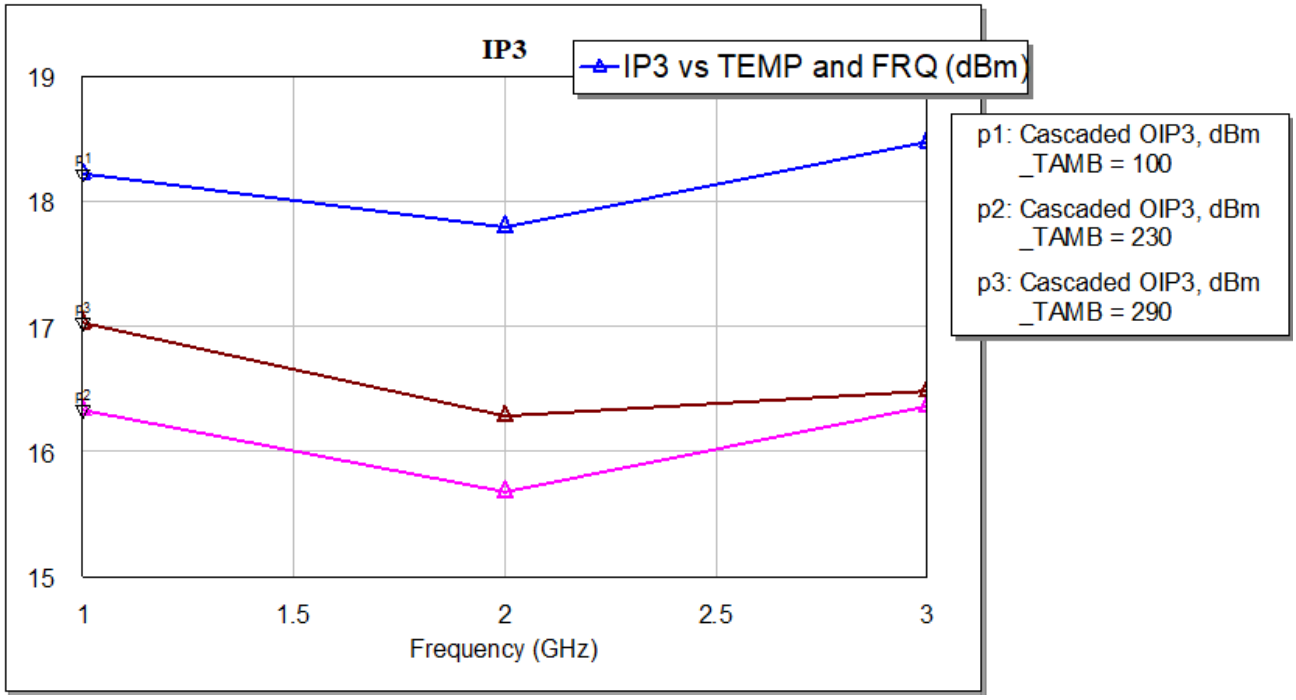
For a detailed description of how to configure AMP_B2, please refer to section 2.6.3 of VSS Modeling Guide.

You may also consider using the block AMP_F to model frequency-dependent devices.

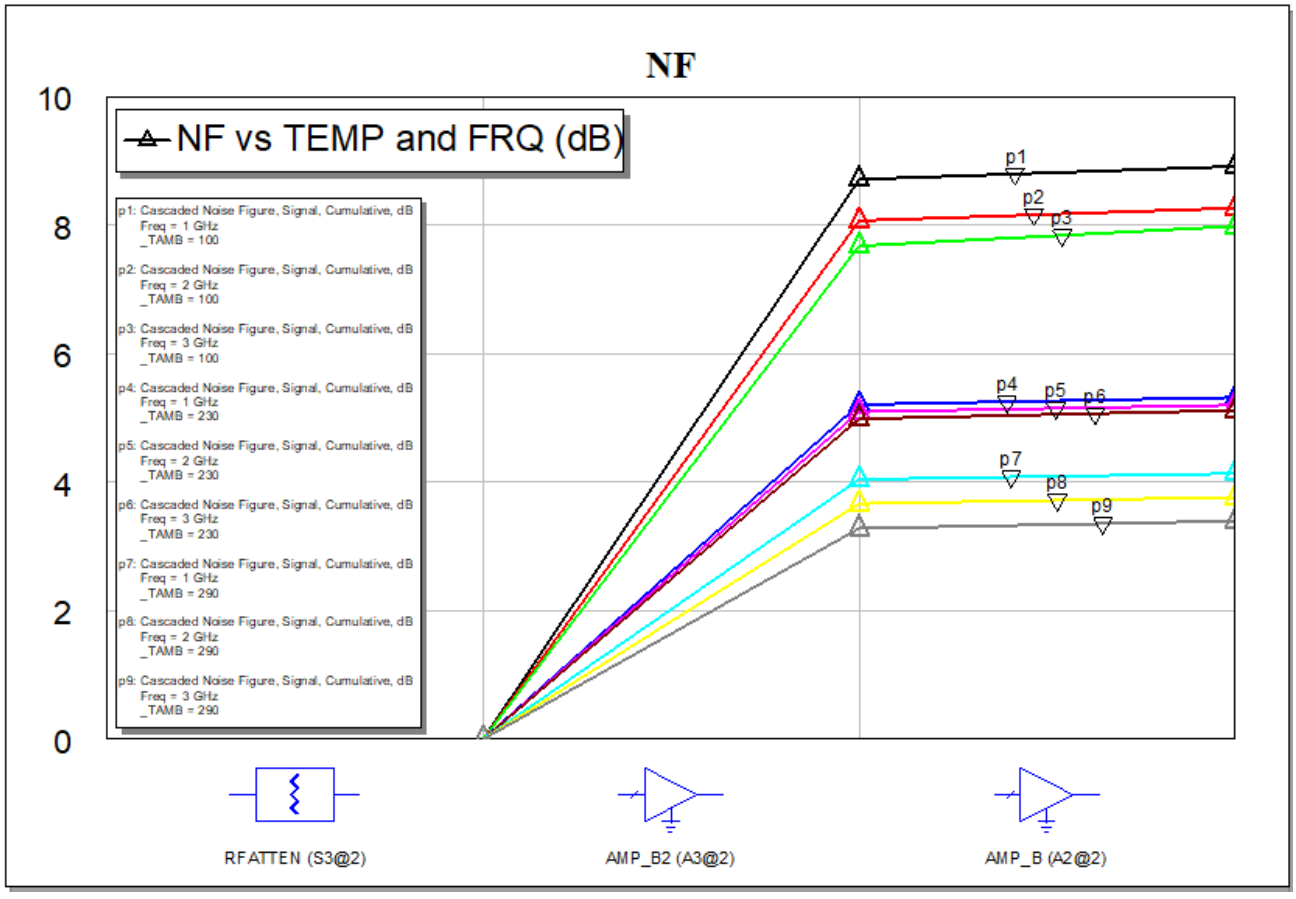
System Diagram - RF Link



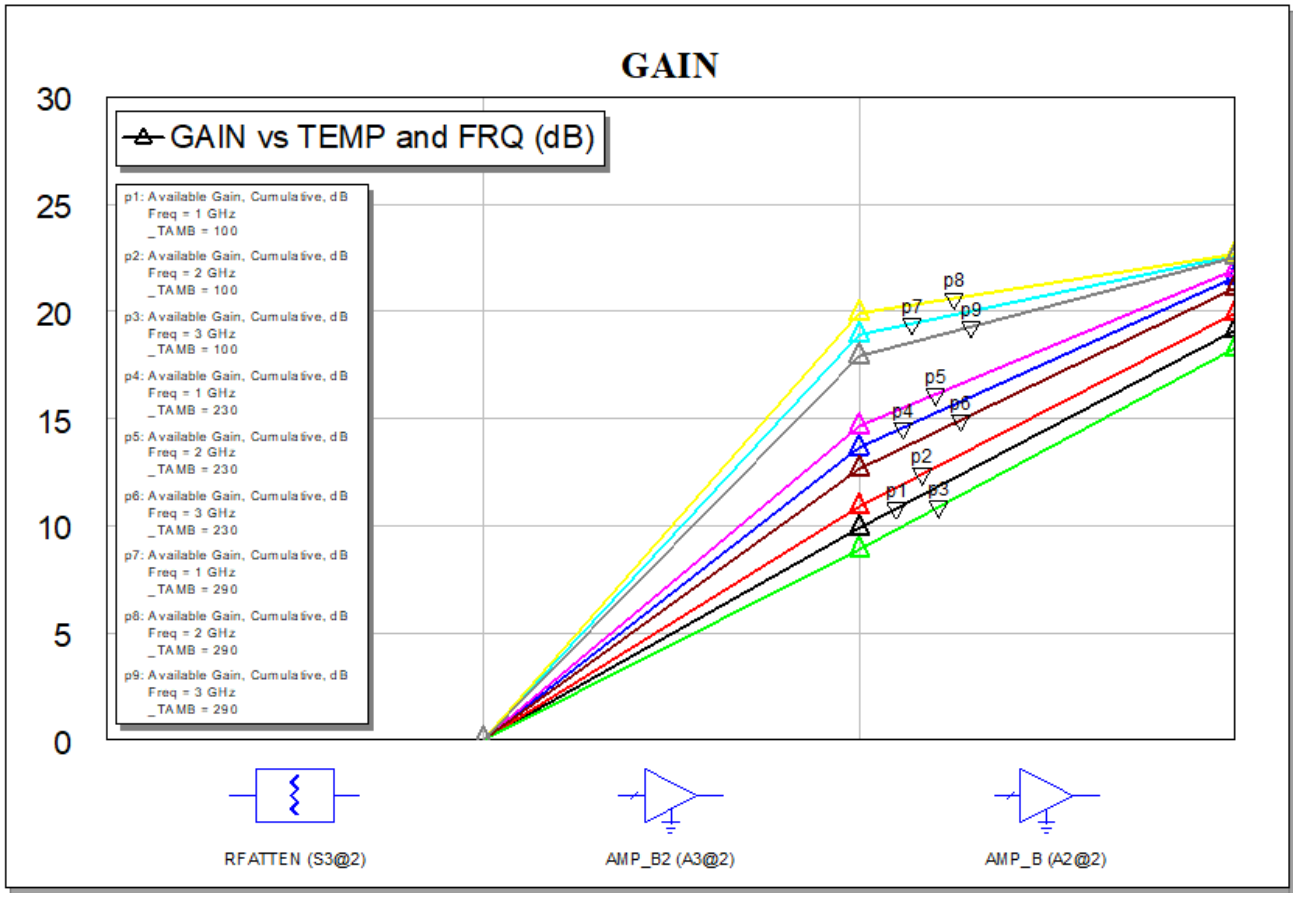
Graph - IP3



Graph - NF



Graph - GAIN


GAIN
GAIN vs TEMP and FRQ (dB)
p1: Available Gain, Cumulative, dB
Freq = 1 GHz
_TAMB = 100
p2: Available Gain, Cumulative, dB
Freq = 2 GHz
_TAMB = 100
p3: Available Gain, Cumulative, dB
Freq = 3 GHz
_TAMB = 100
p4: Available Gain, Cumulative, dB
Freq = 1 GHz
_TAMB = 230
p5: Available Gain, Cumulative, dB
Freq = 2 GHz
_TAMB = 230
p6: Available Gain, Cumulative, dB
Freq = 3 GHz
_TAMB = 230
p7: Available Gain, Cumulative, dB
Freq = 1 GHz
_TAMB = 290
p8: Available Gain, Cumulative, dB
Freq = 2 GHz
_TAMB = 290
p9: Available Gain, Cumulative, dB
Freq = 3 GHz
_TAMB = 290
30
25
20
15
10
5
0
p8
p7
p9
p5
p4
p6
p2
p1
p3
RFATTEN (S3@2)
AMP_B2 (A3@2)
AMP_B (A2@2)