

RF_Budget_Frequency_Sweep

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 below.

Or in Version 14 or higher you can open the project directly from this page using this button. Make sure to select the **Enable Guided Help** before clicking this button.

Open Install Example

Design Notes

RF Budget and Tone Analysis Example

This example makes use of spectrum and RF cascade budget measurements. To only update cascaded measurements click Analyze. To update the spectrum plots as well as cascaded measurements click Run/Stop System Simulators.

Under Options -> Default System Options -> RF Settings you will note that impedance mismatch modeling is enabled. The link must be terminated with a load which is defined by Z parameter of the PORT element or use LOAD element when impedance mismatch modeling is enabled, otherwise the end of the link will be treated as an open circuit. The VSS Modeling Guides provides more information on impedance mismatch modeling in VSS.

Under the Frequency Analysis tab in Default System Options you will see that a frequency range relative to the center frequency of the system has been defined. The RF budget analysis measurements will be performed 0 to 0.2GHz offset from the center frequency in increments of 0.001GHz.

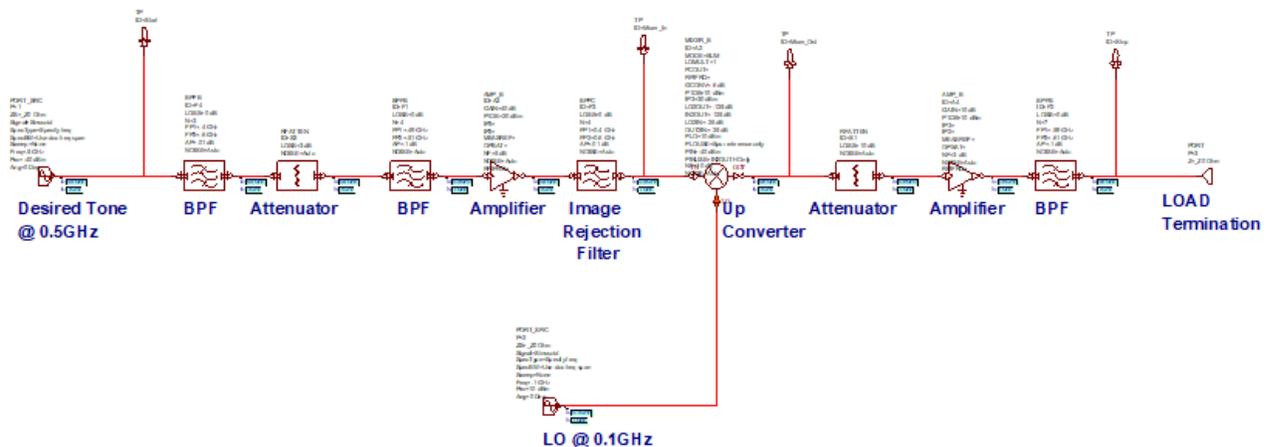
The graph "Cascaded NF over Frequency" shows the cascaded NF at the output of the RF link versus frequency. The NF is calculated within the bandwidth of the last bandpass filter. The frequencies displayed on the x-axis are absolute values as opposed to relative to center frequency. The NF rises outside the bandwidth of the filter. Please read the online VSS Modeling Guide for further information on RF budget measurements as well as noise modeling.

The graph "Cascaded available gain" displays the gain at the center frequency and also at a possible image frequency of 0.7GHz, which is at a 0.2GHz offset from the desired signal of 0.5GHz.

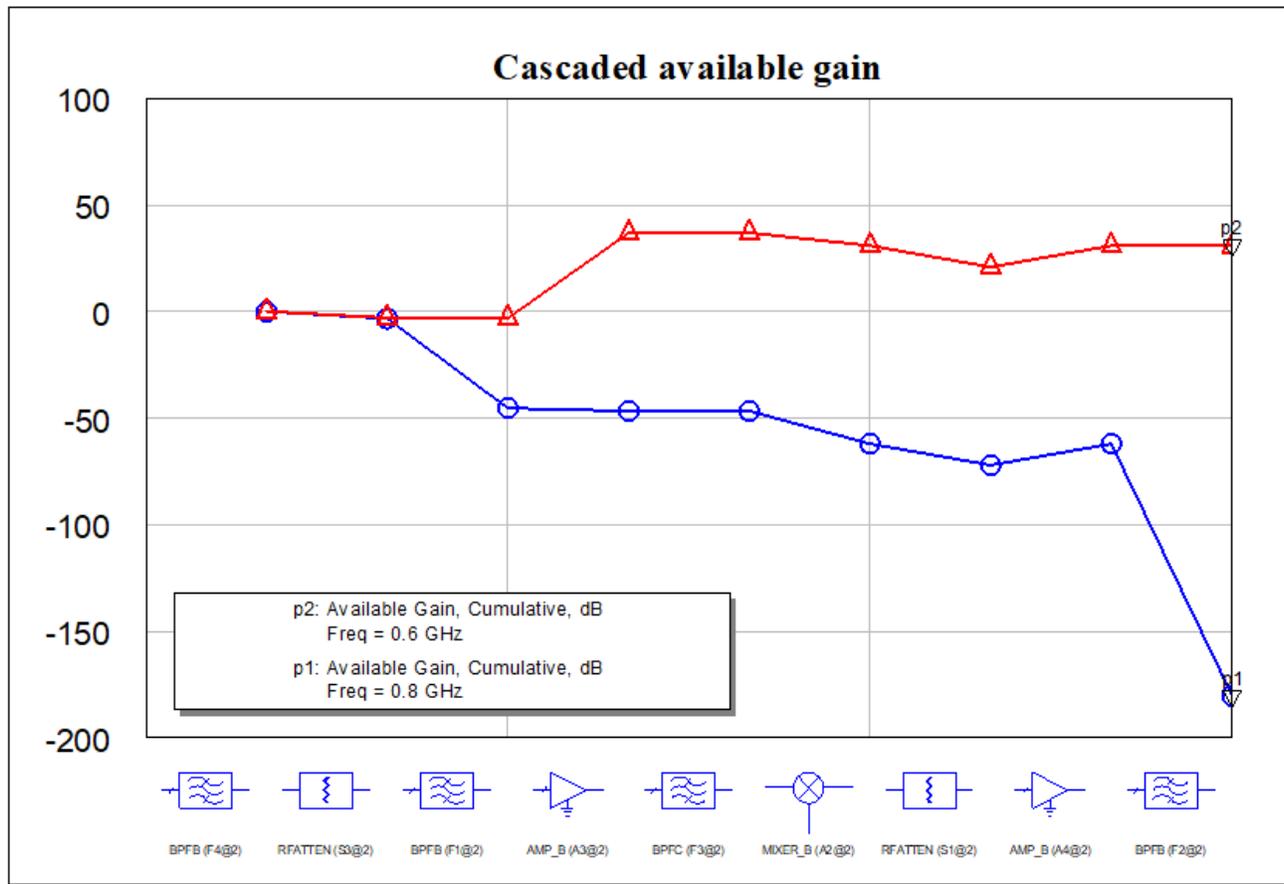
If the bandwidth of the image rejection filter is made narrower or its order is increased, from 4 to 7 for example, the available gain at the image frequency will be reduced and the cascaded NF after the mixer will decrease.

Spectrum plots are shown at several points in the link.

System Diagram - RF System

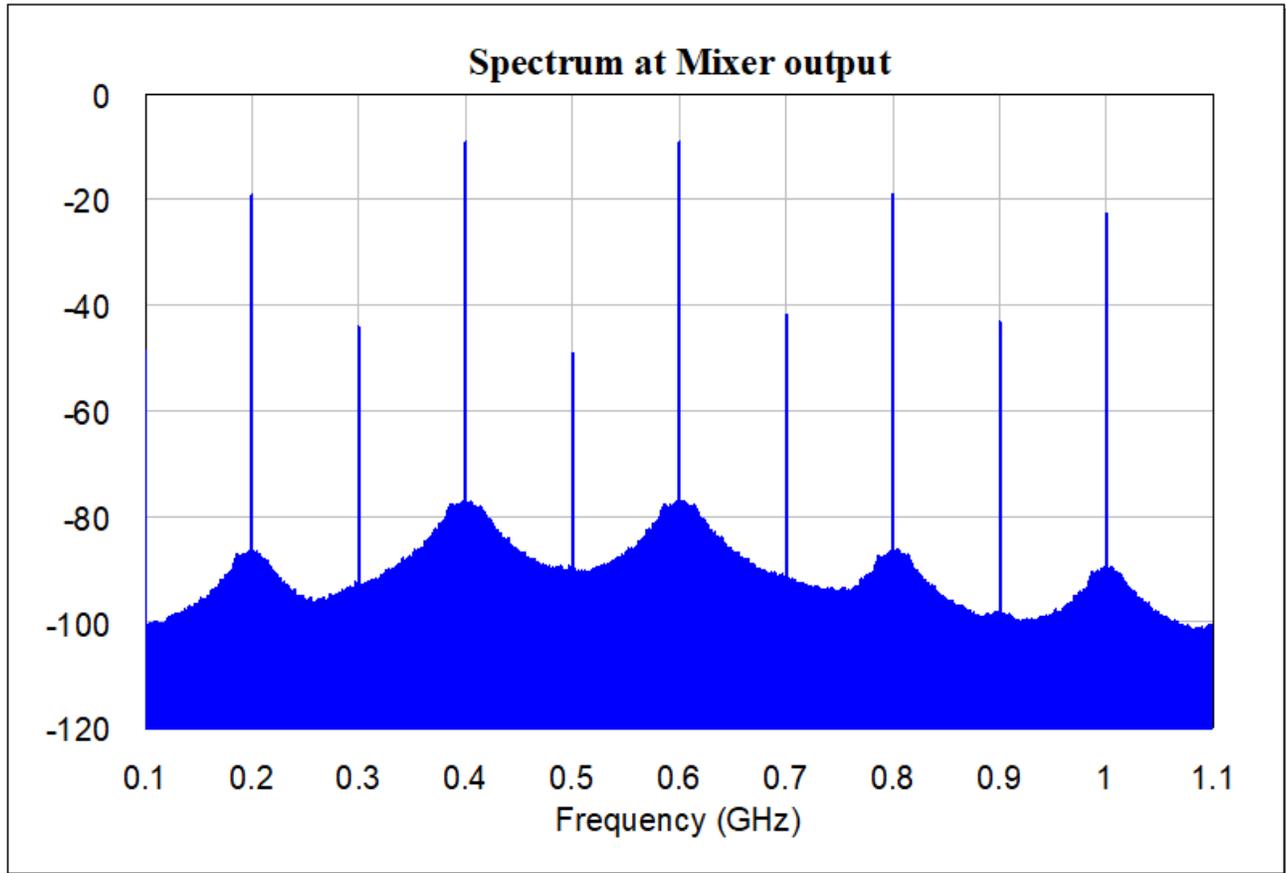


Graph - Cascaded available gain

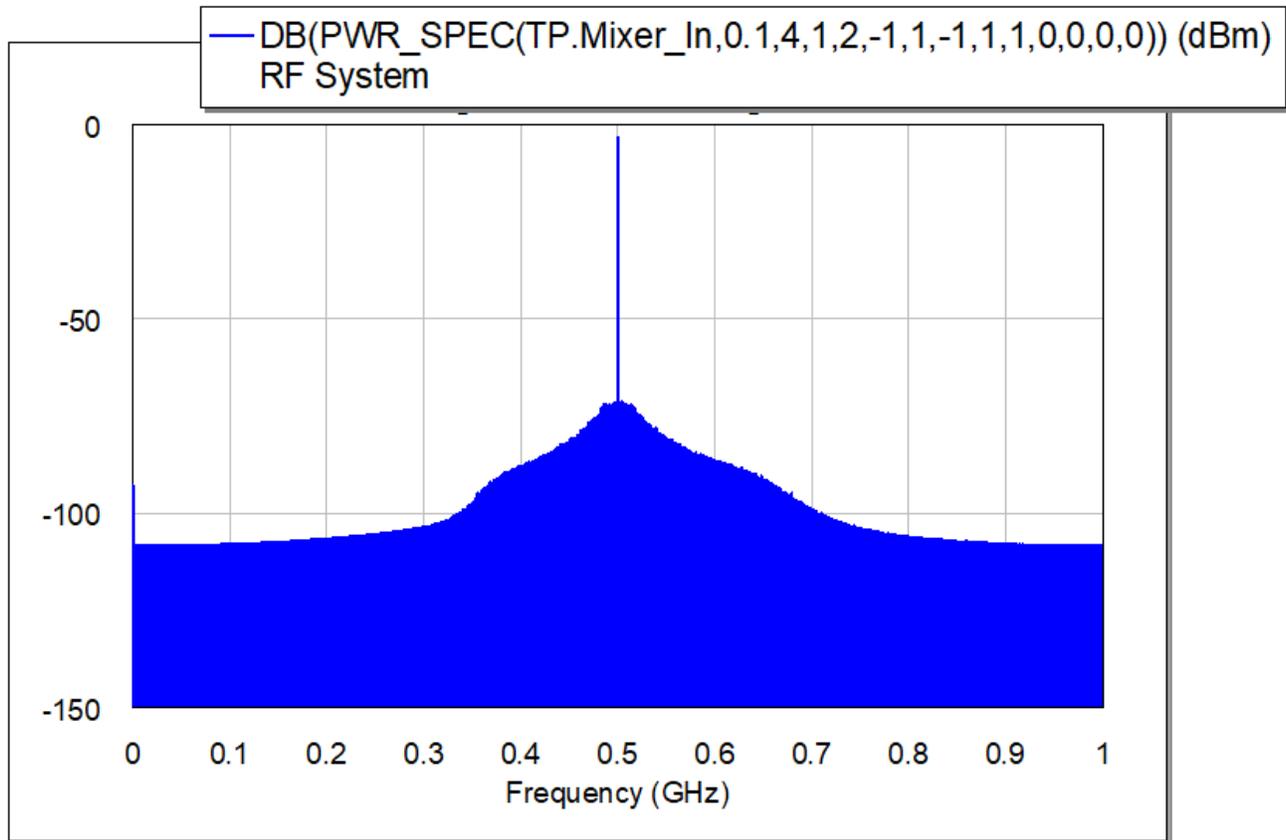


Graph - Spectrum at Mixer output

DB(PWR_SPEC(TP.Mixer_Out0.1,4,1,2,-1,-1,-1,1,1,0,0,0,0)) (dBm)
RF System

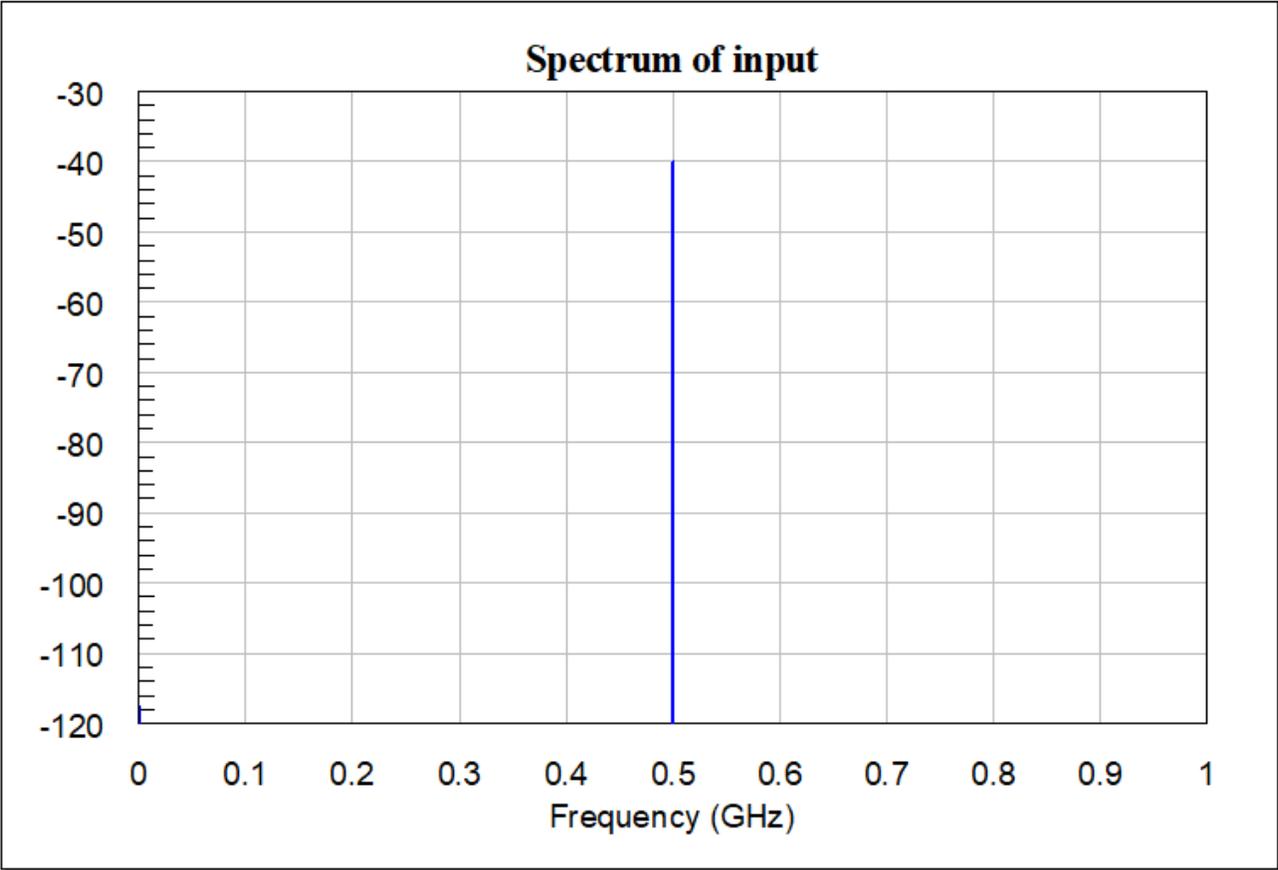


Graph - Spectrum at mixer input



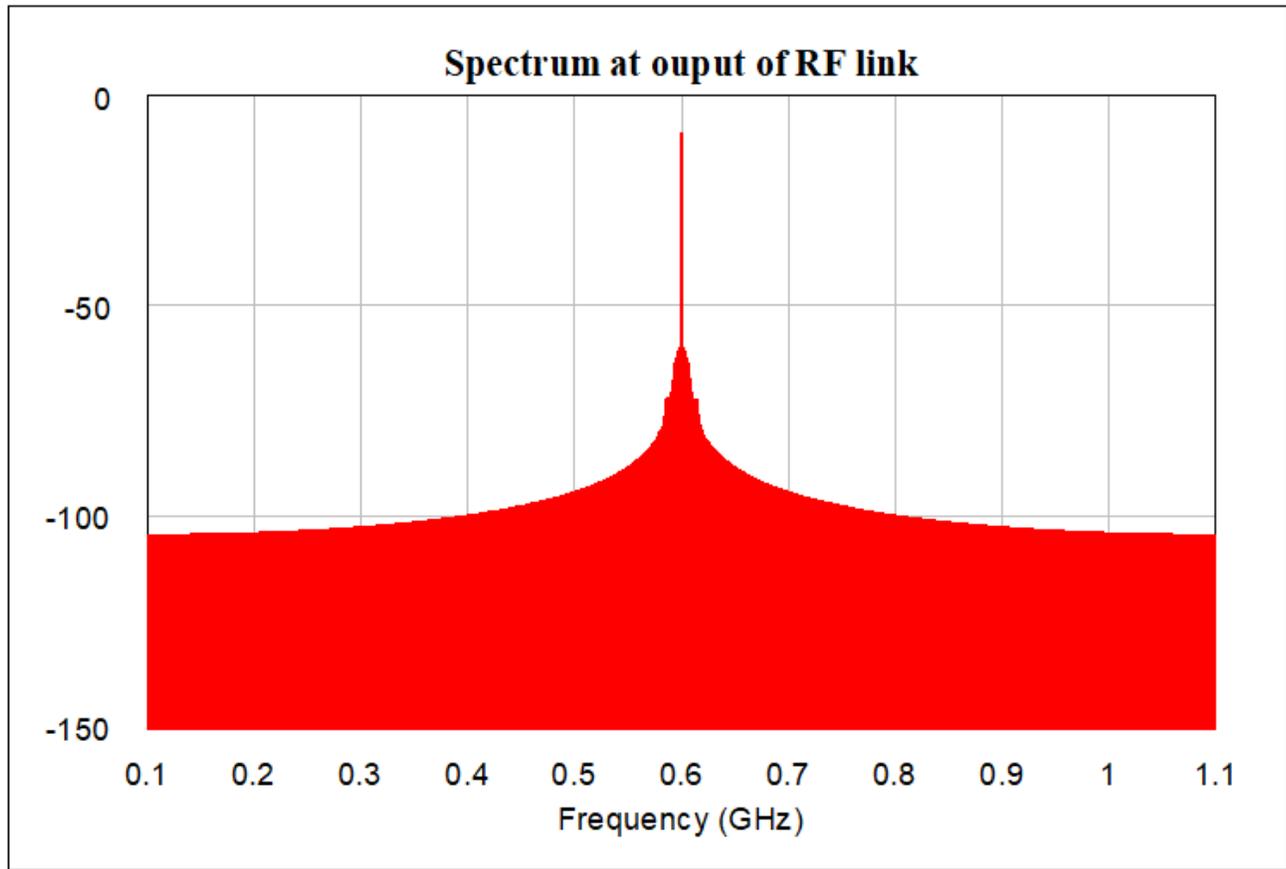
Graph - Spectrum of input

— DB(PWR_SPEC(TP.Start,0.1,4,10,2,-1,1,-1,1,1,0,0,0,0)) (dBm)
RF System

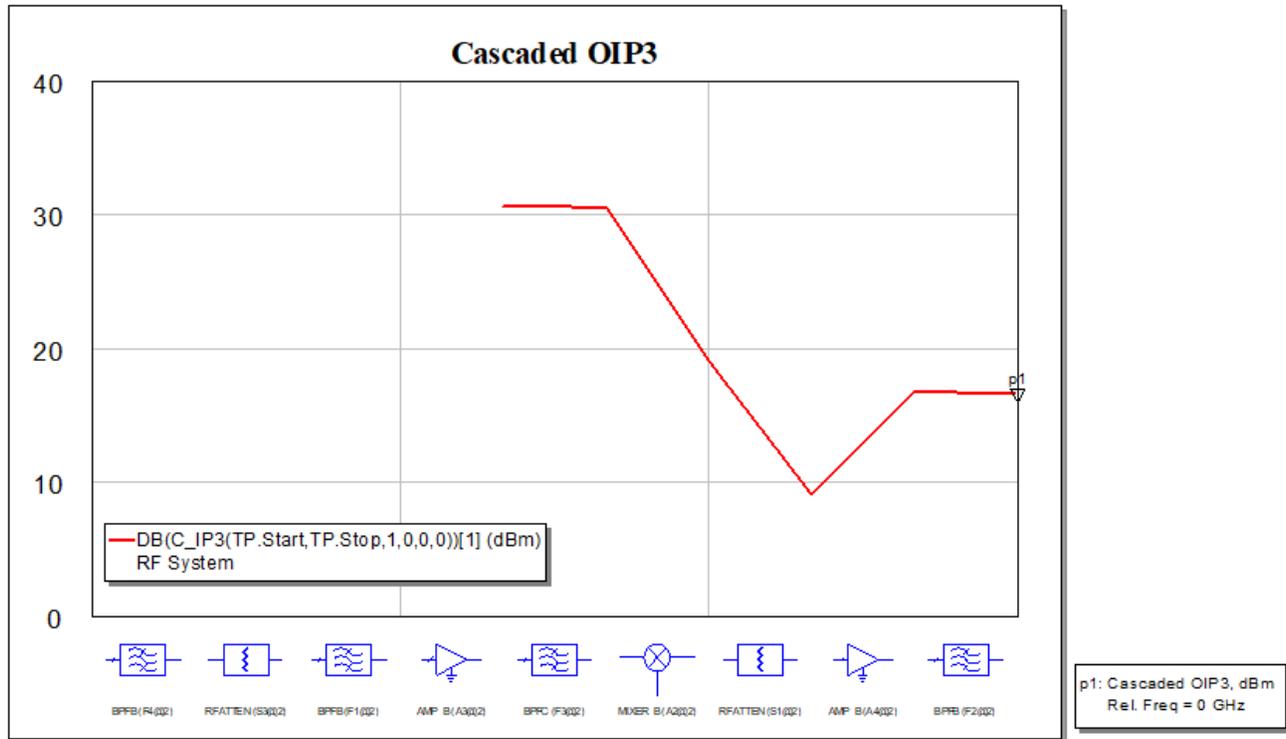


Graph - Spectrum at ouput of RF link

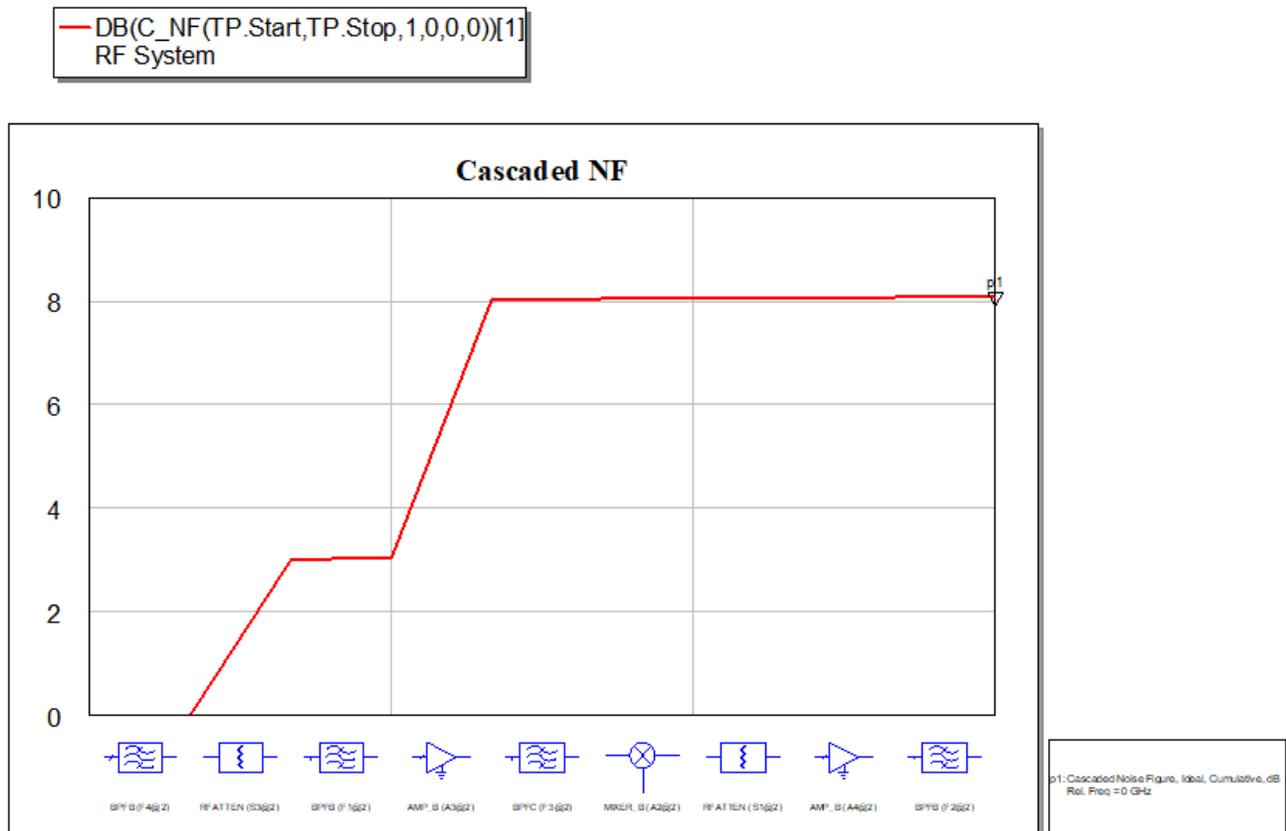
— DB(PWR_SPEC(TP.Stop,1,4,1,2,-1,1,-1,1,1,0,0,0,0)) (dBm)
RF System



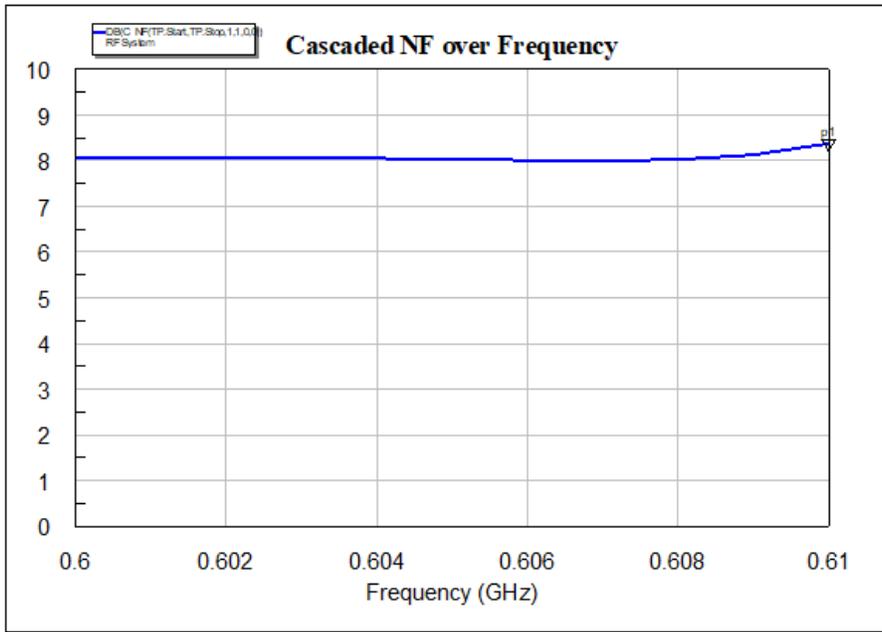
Graph - Cascaded OIP3



Graph - Cascaded NF



Graph - Cascaded NF over Frequency



p1: Cascaded Noise Figure, Ideal, Cumulative, dB