

# Filter\_S21\_vs\_f\_fo

## Where To Find This Example

### AWR Version 14

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### AWR Version 13

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## Design Notes

### Filter s21 vs f-fo script.emp

Whereas Microwave Office plots frequency  $f$  as the x-axis, in some applications, like filters, it may be required to plot a response as a function of  $f/fo$  on the x-axis. This project plots S21 as a function of normalized frequency  $f/fo$  by using output equations for a simple behavioral filter.

#### Overview

In order to plot S21 with a modified x-axis of  $f/fo$ , this project calculates  $f/fo$  x-axis points with output equations. Output equation pulls out the S21 data from the graph, pulls the simulation frequencies using the swpvals variable, sets  $fo=7\text{GHz}$ , and calculates  $f/fo$ . The graph "S21 vs norm f" uses an output equation to plot the S21 against the new x-axis.

#### Output Equations

The variable `_FREQ` makes the simulation frequency available as a variable withing Microwave Office. In the output equations `_FREQ` is divided by the chosen center frequency for the example,  $fo$ , in order to generate the normalized frequency "fnew" for the new x-axis. The S-parameter data is captured into a variable by the equation statement `S21 = Schematic 1: DB(|S[2,1]|)`.

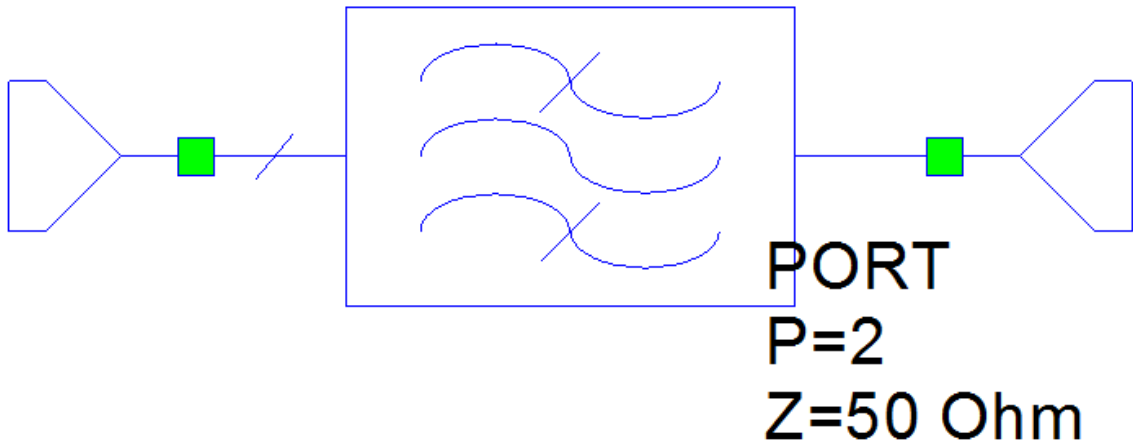
#### Graph on New X-Axis

The graph "S21 vs norm f" plots S21 on the "fnew" axis of  $f/fo$ . The measurement uses an output equation result

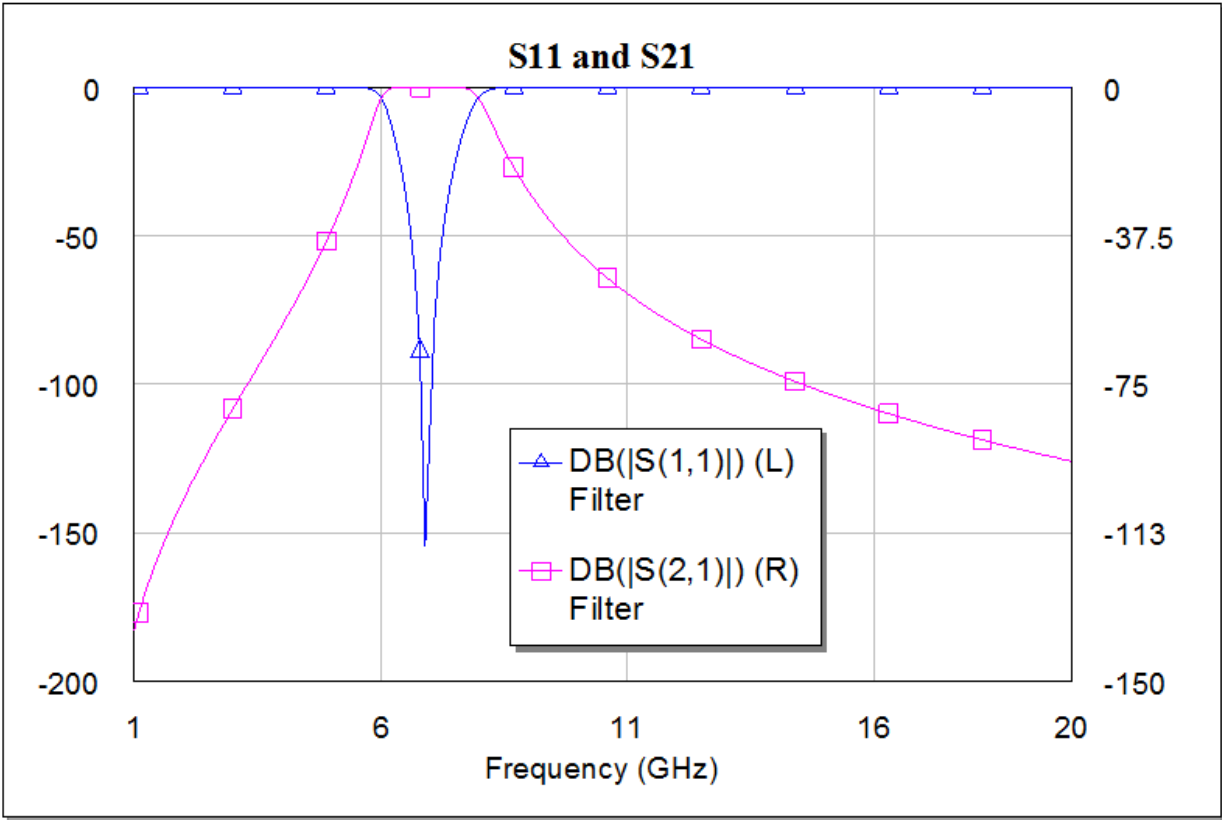
## Schematic - Filter

PORT  
P=1  
Z=50 Ohm

BPFB  
ID=BPFB1  
N=5  
FP1=6 GHz  
FP2=8 GHz



Graph - S11 and S21



Graph - S21 vs norm f

