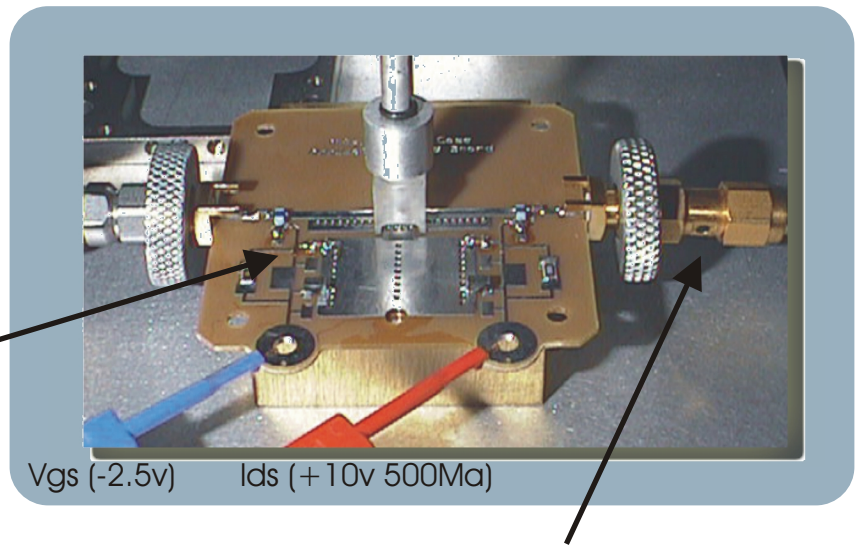


Using A Combination Of Measurement And Software Tools To Extract S-Parameters From An Imperfect World.

This note describes the S-Parameter measurement of the MGF0915A Power GaAs FET using the Mitsubishi D-Case Application Breadboard. A bias network is established which is "Transparent" to the RF input and output over the band of interest (See Mitsubishi Bias Application note). The device is measured using a VNA with opposite sex cable ends. An output SMA adaptor is used between the Application Circuit and the cable end. The measured S-Parameters are then mathematically corrected for Adaptor [S] matrix and the electrical model for the D-Case Application Circuit board using State Of The Art circuit simulation software.

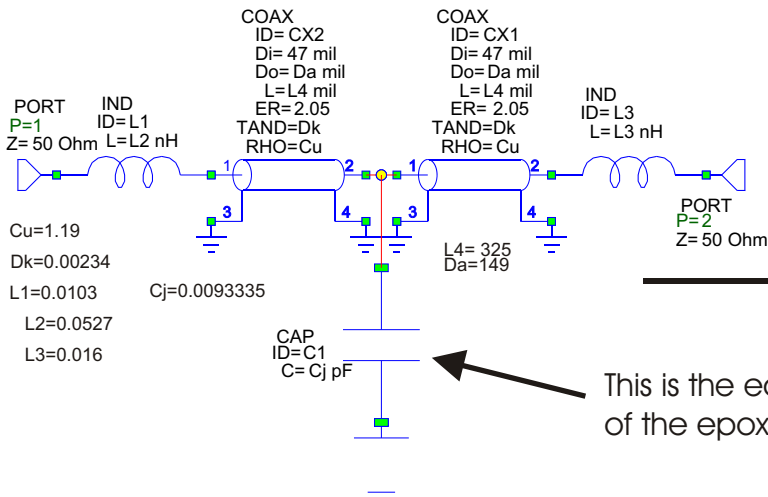
MGF0915A Measured Using The D-Case Application PCB

Application PCB included in measurement



The electrical Equivalent Circuit For The SMA VNA Adaptor

Barrel Adaptor included in measurement



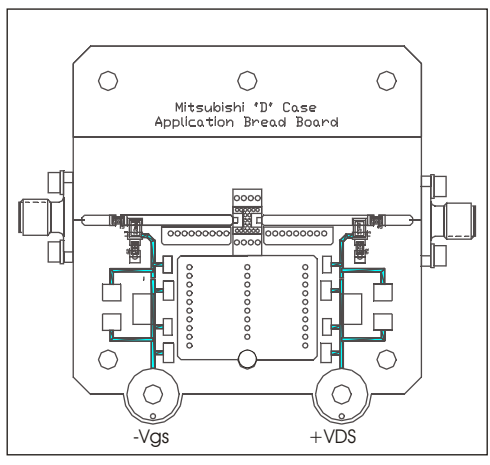
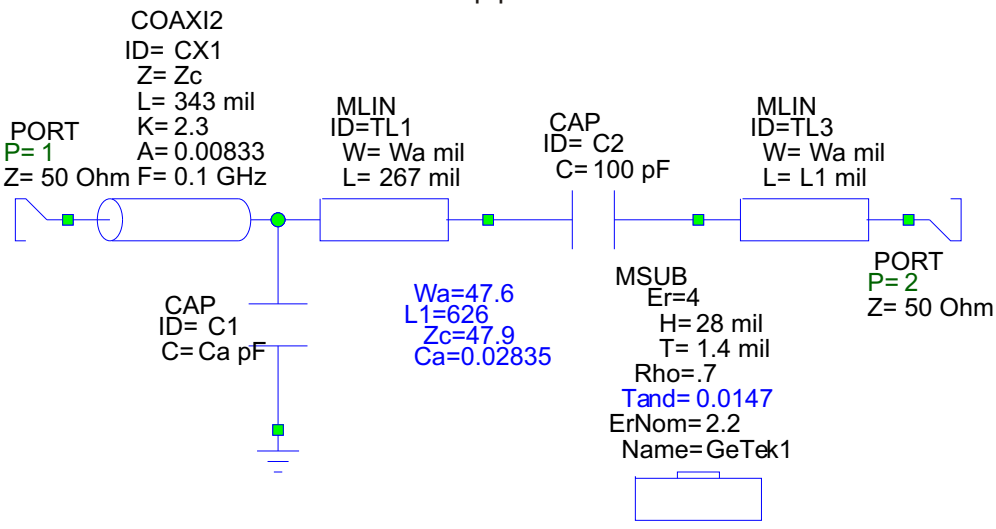
This is the equivalent of the epoxy capture

Note: Most VNA's provide for Delay settings to establish reference measurement planes. This does not negate the reactive and loss effects of the either the Adaptor or the Application Circuit

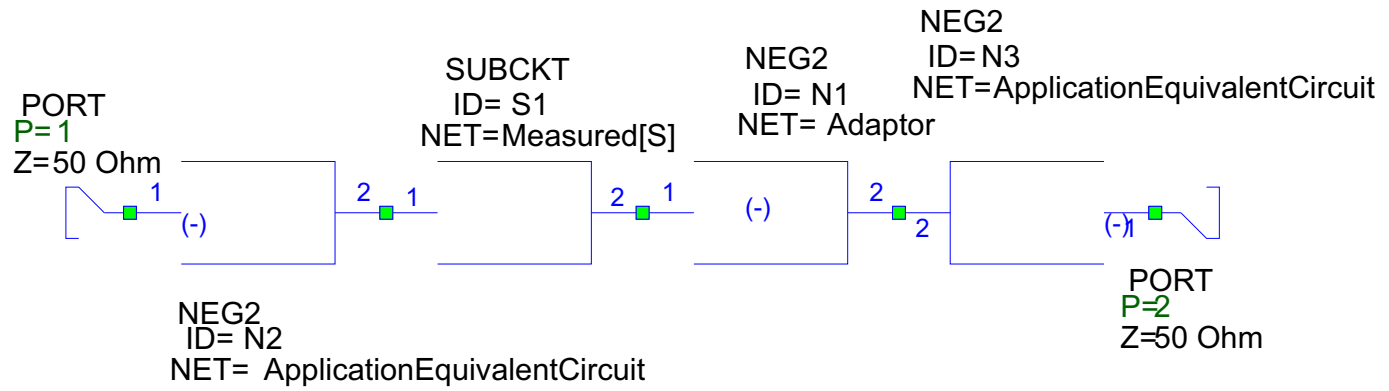
Using A Combination Of Measurement And Software Tools To Extract S-Parameters From An Imperfect World.



The electrical equivalent for input and output of the Mitsubishi D-Case Application Test PCB



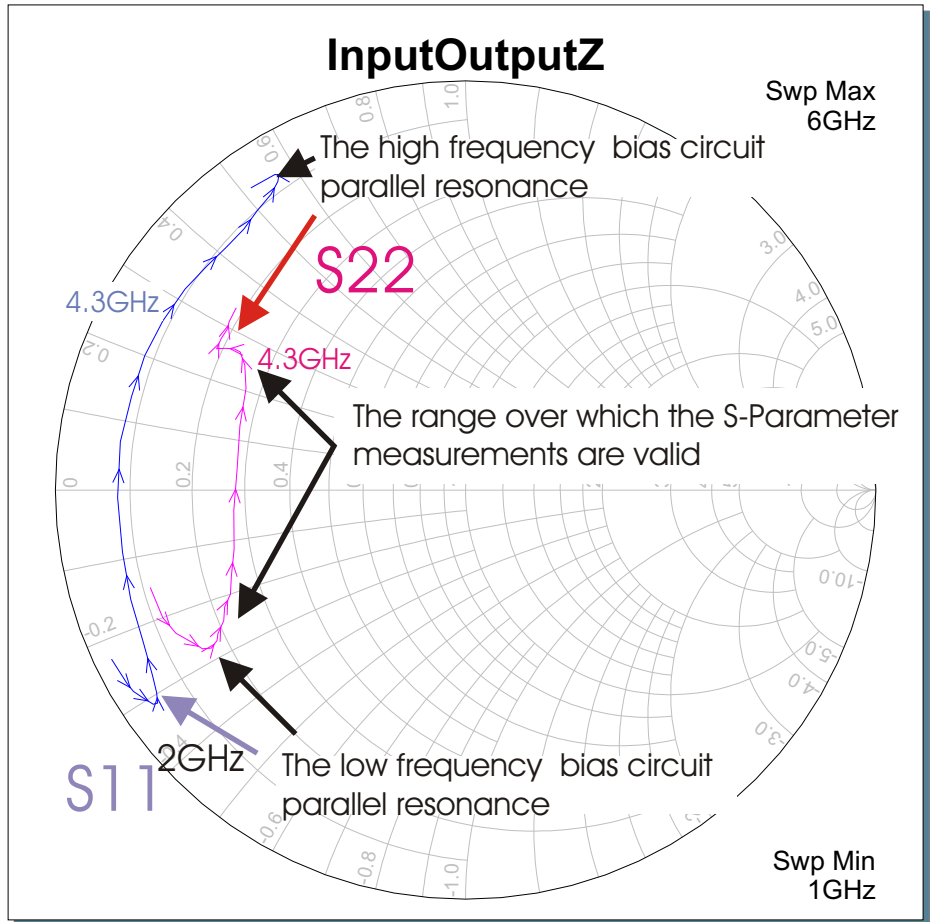
The [S] Parameter measurement correction for adaptor and Application Circuit PCB



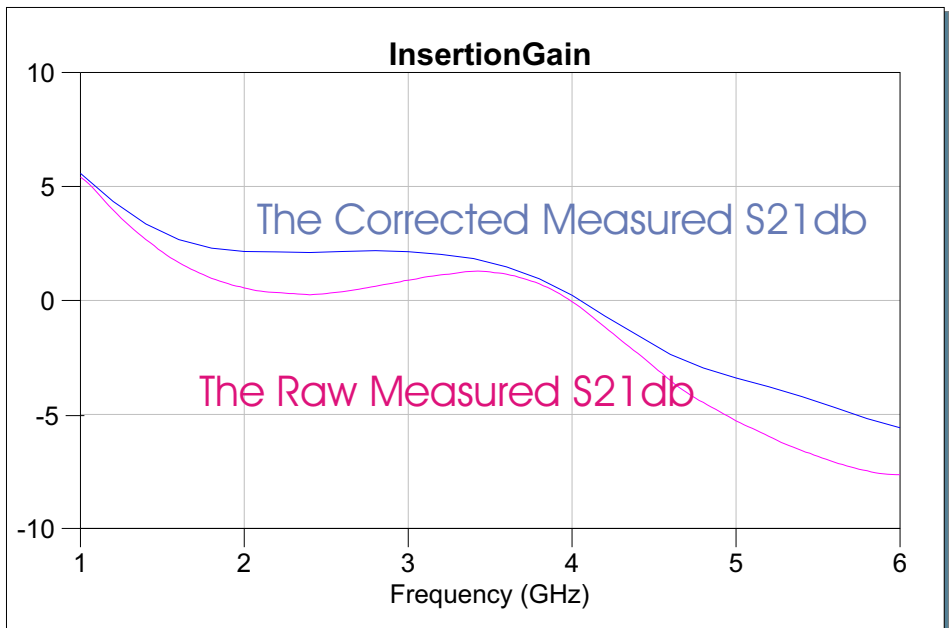
Note: Simulation and correction software provided by Applied Research Microwave Office. www.appwave.com

Using A Combination Of Measurement And Software Tools To Extract S-Parameters From An Imperfect World.

The corrected S_{11} and S_{22} are plotted for the MGF0915A biased at a level of 10v 500Ma. The range over which the measurements are valid are set by the biasing circuit. The low frequency and high frequency resonances for the bias circuit are visible at both the high and low end of both input and output locus.



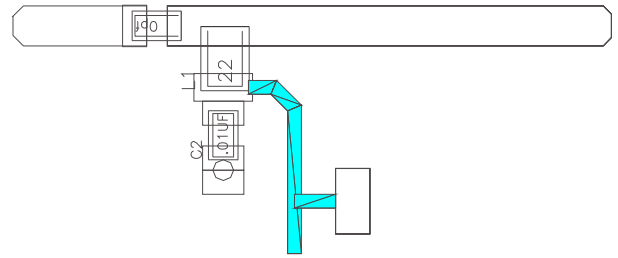
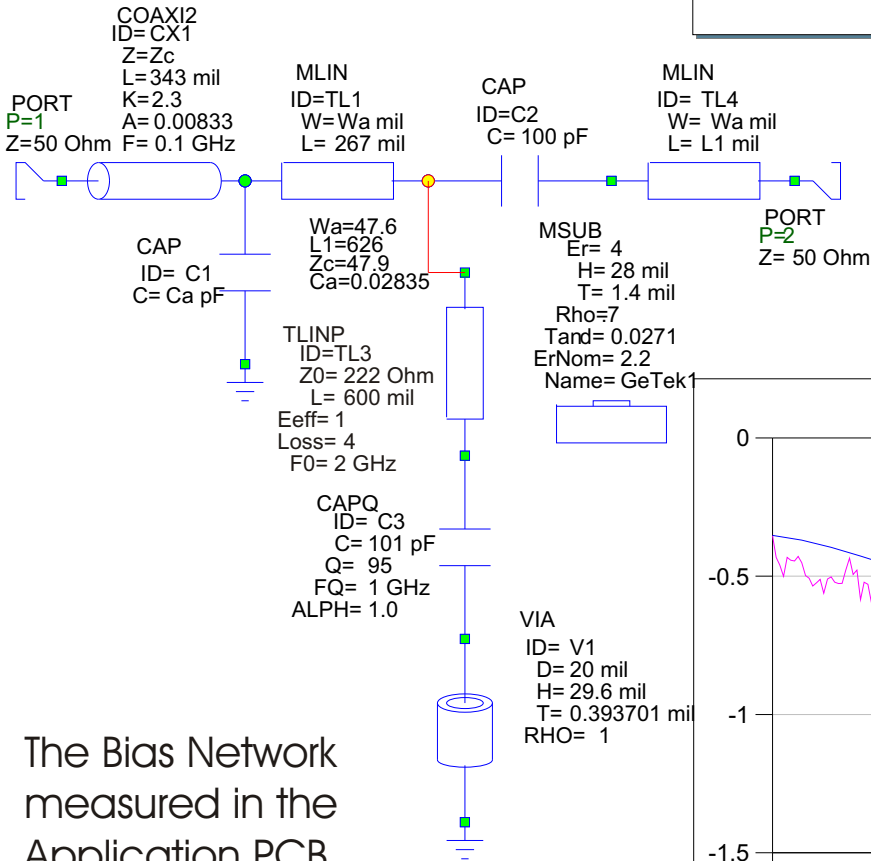
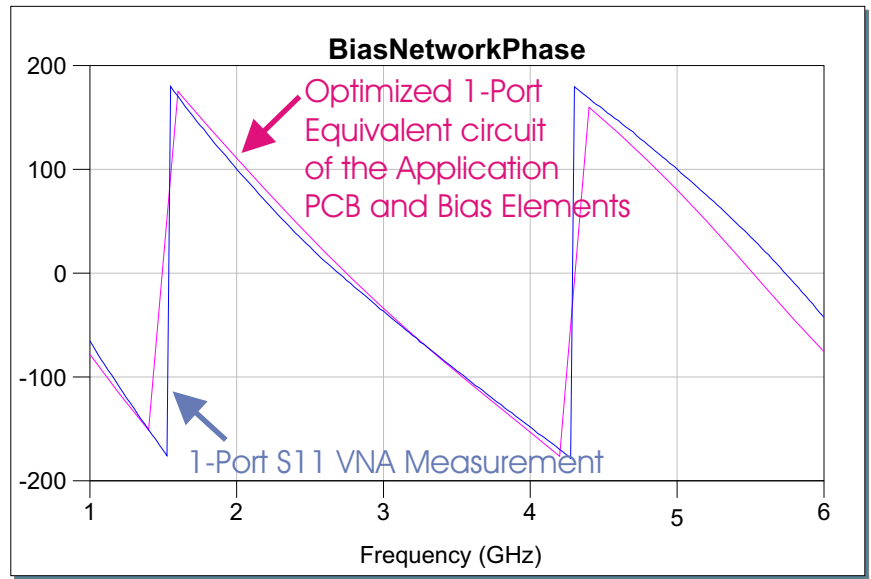
The measured and corrected S_{21} db are plotted for the MGF0915A biased at a level of 10v 500Ma. The bias elements are seen to be only semi transparent over a very narrow bandwidth. Further correction to include the actual bias circuits will result in greater accuracy.



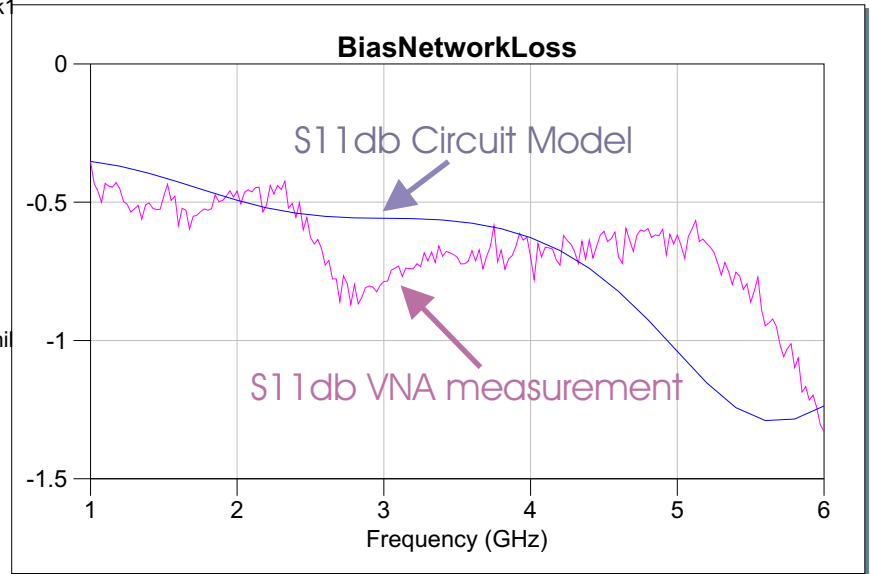
Using A Combination Of Measurement And Software Tools To Extract S-Parameters From An Imperfect World.



The correction process can be extended an additional step to include the bias circuit "Transparency Error". Reference Mitsubishi Bias Note. The 0805 size bias coil is modeled as a high impedance line with slow axial phase velocity. The circuit is measured on the VNA with the MGF0915A device removed. The model parameters are then optimized to match the S11 measurements data. The circuit includes the long open line to the DUT. The S11 phase and amplitude error are minimized over the band of interest (2GHz to 4GHz)



The Bias Network measured in the Application PCB with the DUT removed



The Full S-Parameter correction measurement for the MGF0915A measured in the D-Case Application Circuit.

