Substrate Library Adds Accuracy and Convenience to Board-Based Designs

Modelithics' Substrate Library for AWR's Microwave Office provides access to accurate, scalable materials definitions

Modelithics Global Models™ are RLC component software models that enable rapid radio frequency and microwave circuit design and manufacturing success by incorporating scalability of multiple parameters within the model. Scalable input parameters include part-value and specific substrate characteristics, such as board thickness (H) and dielectric constant (ε_r) among others. Being able to quickly evaluate a model's performance as it is placed on different substrates in the design process, in addition to being able to perform statistical analyses involving tolerances of part-value as well as substrate parameters, ensures a higher probability of manufacturing success.

As a byproduct of the Global Model characterization process at Modelithics, certain substrate properties are also obtained through the measurements. Beginning with Version 8.0, Modelithics COMPLETE Library for AWR Corporation's Microwave Office includes a measurement-based substrate library for improved accuracy and convenience in simulating board-based designs. This note will provide an example of how to utilize the substrate library in generating S parameter plots for a passive model in Microwave Office using varying substrates.

Example use of Modelithics Substrate Library for AWR

In AWR Microwave Office, the substrate information is stored in the "Elements Browser" tab located on the left side of the design environment; in the "Element" window there is a pull down tab
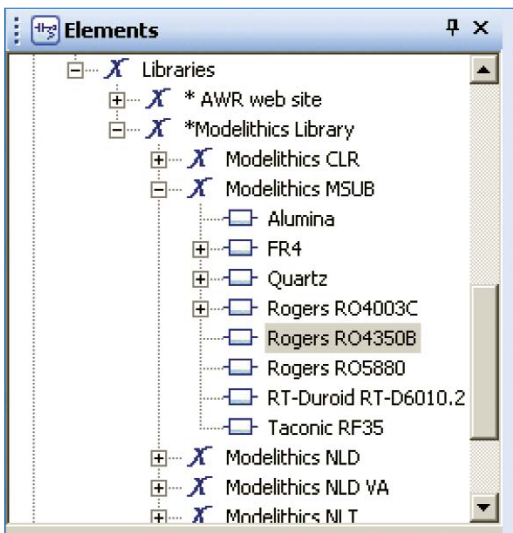

Figure 1
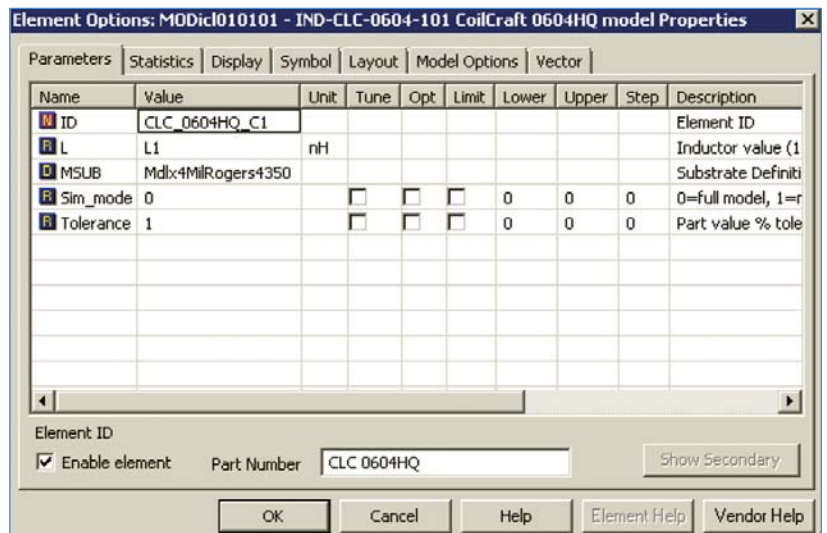**Substrate library located in the Elements Browser of an AWR MWO design environment.**

Figure 2
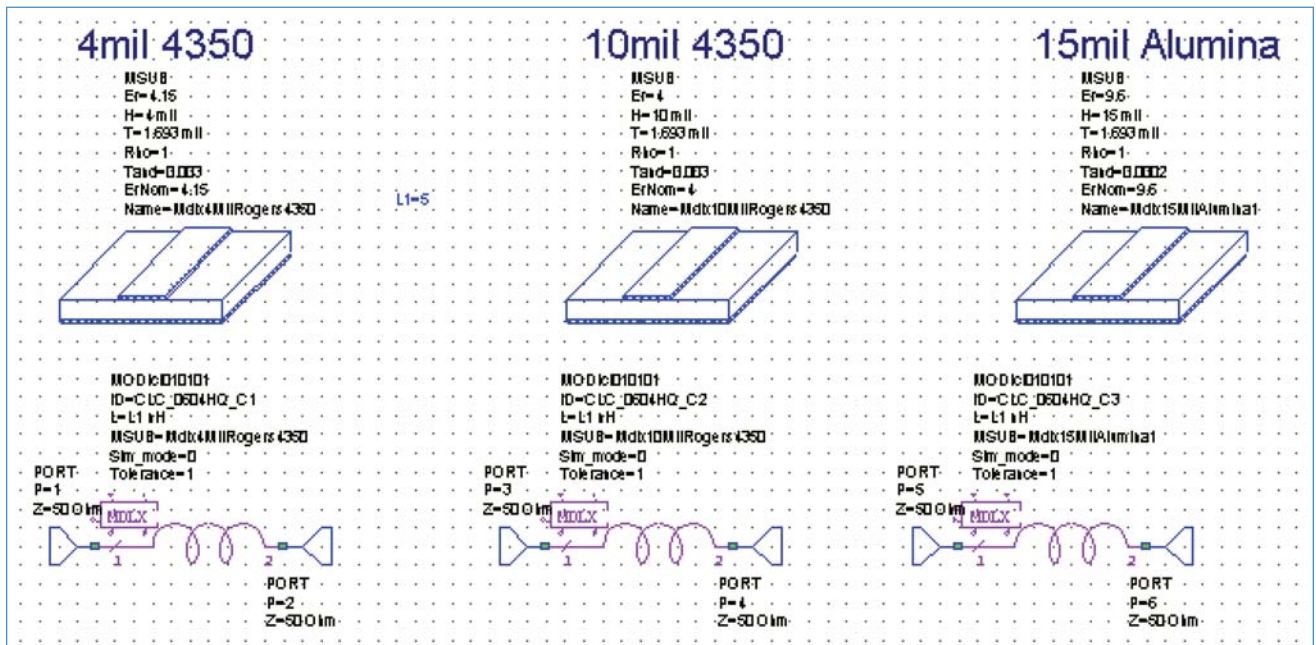**Element Options: This model shown is set to have 4 mil Rogers 4350 as the substrate.**

Figure 3
S parameter schematic showing a model being simulated using three different substrates.

that gives you the option of choosing a substrate that has been placed in the schematic window. Figures 1 and 2 provide examples of this.

Figure 3 gives an example of the Modelithics inductor model IND-CLC-0604-101 being simulated using three different substrates: 4 and 10 mil Rogers 4350,

15 mil Alumina. Figure 4 shows the S_{11} and S_{12} responses of the model.

About This Note

This note (Modelithics Application Note 042) was developed by University of South Florida student intern Scott Muir. The AWR MWO input files associated with the example shown here are available upon request.
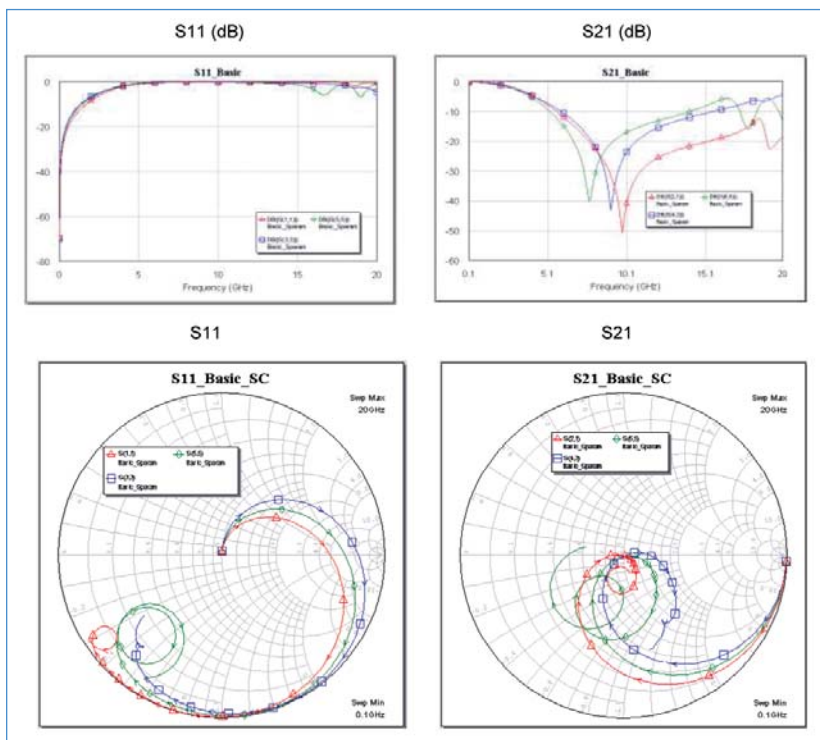
References

1. "Comprehensive Models for RLC Components to Accelerate PCB Designs," *Microwave Journal*, May 2004.

2. L. Dunleavy and L. van der Klooster, "Improved MW Circuit Design Flow Through Passive Model Yield and Sensitivity Analysis," IEEE IMS2012 MicroApps Presentation, June 2012.

Contact Information

For information about Modelithics products and services, please contact:

Modelithics, Inc.
3650 Spectrum Blvd., Suite 170
Tampa, FL 33612
Tel: +1 888-359-6539
E-mail: sales@modelithics.com
www.modelithics.com

Figure 4
L = 5.0 nH; Frequency Sweep: DC to 20 GHz; red trace – 4 mil, blue trace – 10 mil, green trace – 15 mil.