Modelithics®
Accelerating Your Design Success!

Modelithics Knowles MVP Library
for High Accuracy Electronic Simulation

Modelithics® Vendor Partner

knowles

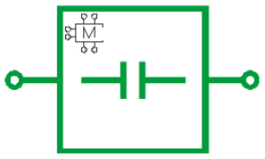
OVERVIEW

The **Modelithics Knowles MVP Library** is a collection of highly accurate measurement-based models that can be simulated in popular Electronic Design Automation (EDA) software tools. These models offer broadband parasitic prediction from DC up to 50 GHz and offer scalable design parameters such as part value, pad value, and substrate properties (select models also include orientation selectability). These high-performance models integrate seamlessly with the EDA software, providing highly accurate modeling capabilities that help drive first-pass design success.

LIBRARY FEATURES

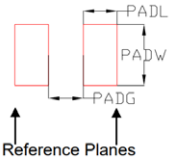
The Modelithics Knowles MVP Library offers a collection of **Microwave Global Models™** that provide many advantages over ideal and S-parameter file-based models. Valuable features of the models include:

- **MEASUREMENT-BASED** — Each global model is developed using highly accurate measurements across multiple conditions including different substrates and pad dimensions. By developing models using measurements, designers can have confidence that their simulations will represent real-world conditions.
- **SCALABLE** — The models can be scaled for part value, pad value, and substrate properties, allowing designers to simulate based on their specific conditions.
- **OPTIMIZATION AND STATISTICAL ANALYSIS** — Model parameters can be tuned and optimized in the EDA software to provide best case parameter selection rapid achievement of design goals. Model parameters can also be set up for statistical analysis.
- **AVAILABLE FOR POPULAR EDA TOOLS** — Keysight Advanced Design System (ADS), Keysight Technologies' RF Synthesis (Genesys), Cadence® AWR Design Environment®, Ansys® HFSS™, Sonnet® Suites™, Cadence Spectre RF® Option, and SIMULIA® CST Studio Suite®.
- **COMPLETE DOCUMENTATION** — Each model contains a comprehensive model datasheet that lists recommended model validity parameters, measurement and test fixture details, and model-to-measurement data comparisons.



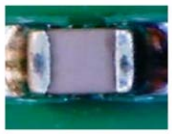
CAP-SYF-0603-001
High Q Ultra Low ESR
Surface Mount Chip Capacitor Family

Reference Planes



29.53 (0.75) ≤ PADL ≤ 45.28 (1.15)
35.43 (0.9) ≤ PADW ≤ 43.31 (1.1)
25.59 (0.65) ≤ PADG ≤ 27.56 (0.7)
Valid for both Horizontal
and Vertical Orientations
Units in mils (mm)

Device in Horizontal Orientation

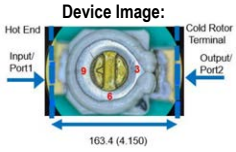


Device in Vertical Orientation



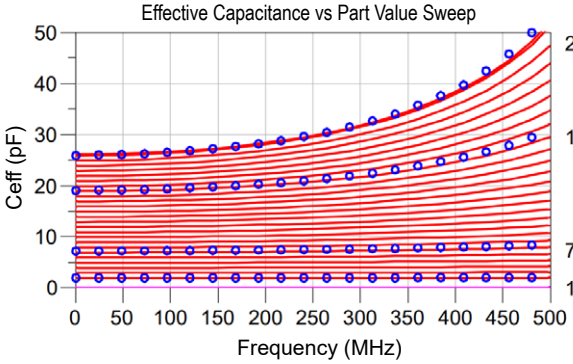
CAP-VLT-JR150-001:
Modelithics Model for 3-15 pF JR150 Trimmer Capacitor 1412 Body Style

Device Image:



163.4 (4.150) distance between default model reference planes with sim_mode=0. Units in mil (mm). Reference Planes at outer pad edges

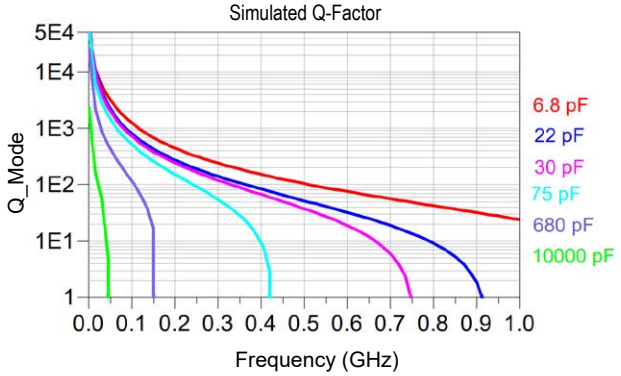
Effective Capacitance vs Part Value Sweep



Red solid lines - Model response on 60 mil Rogers 4003C
Blue symbols - Measurement on 60 mil Rogers 4003C
Note: Plot shows model swept with capacitor value 1.8 to 26.0 pF, 1 pF step. Measurements shown for 1.8, 7.2, 19.1 and 26.0 pF values.

CAP-SYF-2225-001:
Modelithics Model for 22252 Capacitor (1 to 10000 pF) 2225 Body Style

Simulated Q-Factor



Solid lines - Model response on 60 mil Rogers 4003C
Note: Plot shows selected values within the model range.

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List of Components in the Modelithics® Knowles MVP Library

Capacitors					Inductors
22252	C06CF	HighQUltraLowESR	JR150	JR500	CL1008
4040J	C08BL	JR030	JR200	Milli-cap	
40402	C08BL	JR060	JR300	MIN02	
C04BL	H-Range	JR100	JR400	Opti-cap	
C06BL					

Visit our website for an updated complete list of the Modelithics Knowles models:
www.Modelithics.com/MVP/Knowles

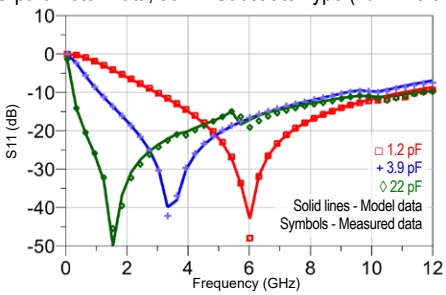
3D Models Available for Use with Supported Simulators:

Capacitors	
C04BL	H-Range
C04UL	CL1008
Milli-cap	

Advanced Model Features for More Accurate High Frequency Design

Part Value Scaling

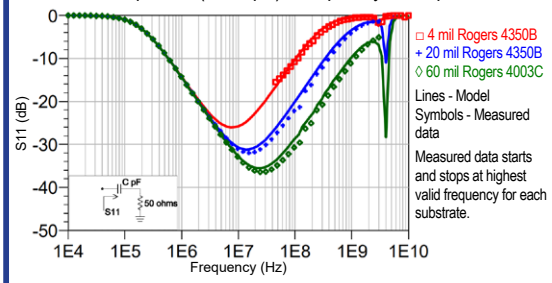
CAP-DLI-0603-003: Modelithics Model for C06CF Capacitor; Model vs. Measured Series 2-port S-parameter Data; 30 mil Substrate Type (H/Er = 8.0 mil):



Modelithics Microwave Global Models™ for Knowles components have all values within a part series within one model. This allows for tuning and optimization by inductance and eliminates the need to manually substitute individual models during a design sequence.

Substrate Scaling

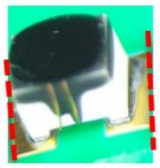
CAP-SYF-4040-002: Modelithics Model for 40402 Capacitor (8200 pF); Frequency Sweep

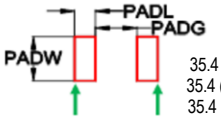


Variations in substrate properties have a significant effect on the response of surface mount components in high frequency designs. Modelithics models are substrate scalable and validated over a continuous range of substrate properties based on board thickness and dielectric constant.

Pad Size Scaling

CL1008 Inductor Device Image
Reference Planes at pad edge





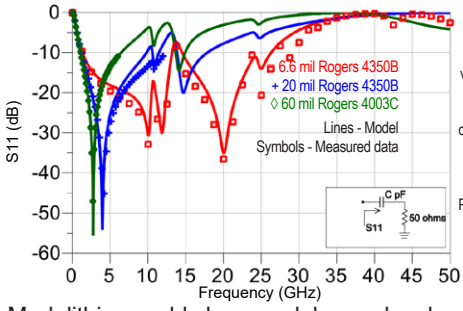
35.4 (0.900) <= PADL <= 43.3 (1.100)
35.4 (0.900) <= PADW <= 47.2 (1.200)
35.4 (0.900) <= PADG <= 43.3 (1.100)
Units in mils (mm)

Reference Planes

Modelithics models (in default mode) include the PCB pad with reference planes at the outer edges of the pads. The pad scaling feature lets designers adjust the dimensions to match their design, which is important for achieving maximum simulation-to-measurement agreement.

Broadband Validation

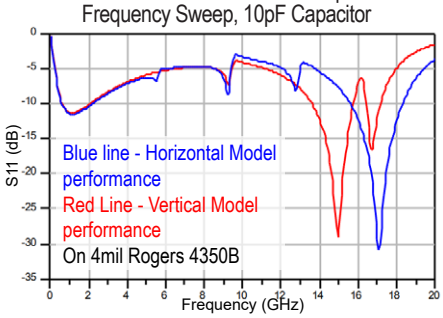
CAP-SYF-0402-001: Model for 0402 Capacitor: Frequency Sweep



Modelithics world class models are developed by performing accurate lab measurements with techniques that have been refined over 20 years. Models are validated against broadband measurements made possible by Modelithics wide array of test capabilities.

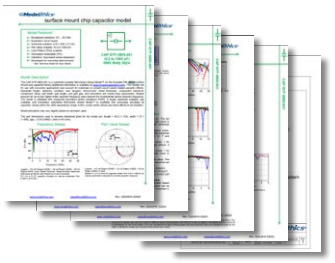
Orientation Selectability

CAP-SYF-0603-001: Model for High Q Ultra Low ESR Capacitor Horizontal vs. Vertical Model Comparison Frequency Sweep, 10pF Capacitor



Some Knowles capacitor have the orientation selectability feature. This represents the physical orientation in which the surface mount component is attached to the pads. Capacitors show different frequency response depending on the mounting orientation.

Datasheets



Each Modelithics model has a datasheet that provides detailed information about the model, such as the validation frequencies, reference planes, part value / pad scalability / substrate scalability ranges, model performance, and details about other features and model parameters.

What's in YOUR DREAM LIBRARY?

Help us build ***YOUR*** dream library! Pre-Release models are added based on customer demand. Share your desired models with **sales@modelithics.com**!

Visit the Knowles MVP Page on the Modelithics website to:

- Explore the current list of available Knowles component models
- View model datasheets
- Browse literature collection for application notes, presentations, etc.
- Request a FREE* 90 day trial of the Modelithics Knowles model library: **www.Modelithics.com/MVP/Knowles**

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**with approval and/or valid registration*

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