

**Design & Support Tools**



## World's Best RF and Microwave Simulation Models

### Premium Model Libraries

Modelithics provides top quality simulation models for all types of RF & microwave components and semiconductor devices for use in popular Electronic Design Automation (EDA) tools. The library covers **70 component vendors**, more than 770 parts families with **more than 22,000 individual components**.

### Vendor Sponsored – Models, Data and Libraries

A multitude of Modelithics Vendor Partners (MVP's) are **actively working** with Modelithics to make available high-accuracy RF and microwave active and passive simulation models and data for free trial or long-term use in Electronic Design Automation (EDA).

### Custom Measurement and Modeling

High quality, rapid turn-around, RF/microwave characterization and modeling services of transistor, diode, passive and system block components. Our extensive array of test and measurement equipment, plus decades of experience, allow us to measure an extremely wide variety of component and system parameters.

### Premium Model Libraries

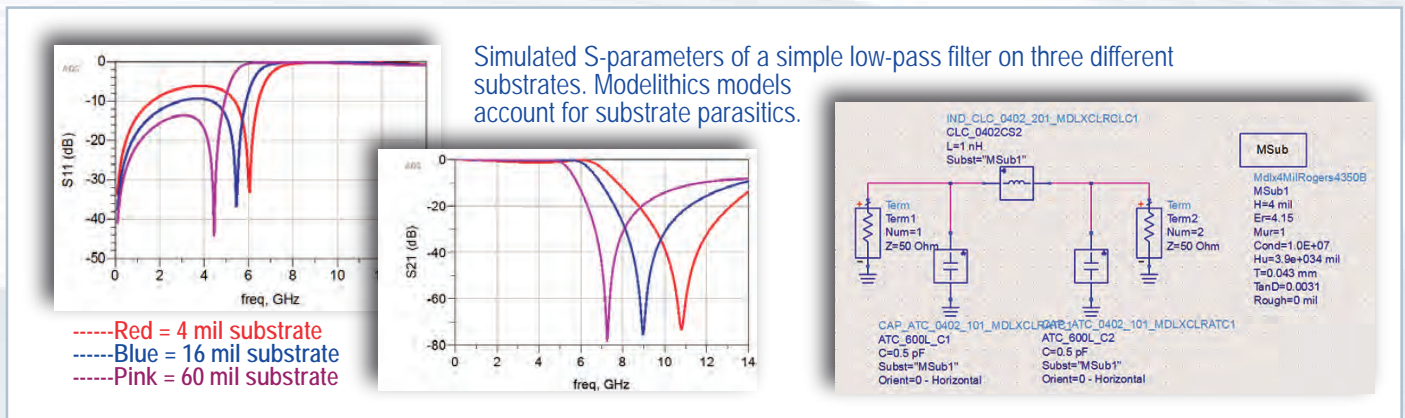
The Modelithics COMPLETE Library, available for Keysight ADS and Genesys, Cadence AWR, Sonnet, Ansys HFSS and Cadence Spectre RF, brings incredible flexibility and accuracy to electronic designs. Modelithics models are scalable, allowing design details, such as substrate and pad characteristics, to be specified and simulated. The Modelithics COMPLETE Library includes thousands of popular passive and active devices with modeling accuracy to deliver first-pass design success.

### Library Features

The Modelithics COMPLETE Library offers an extensive selection of models, representing thousands of components. The installed models are fully integrated with your EDA software. Modelithics COMPLETE also features a substrate library containing measurement-based substrate parameters for many of the most commonly used substrates.

- **Measurement-based** — Each model is developed using specialized measurements under device-specific test conditions.
- **Scalability** — Part-value, substrate, pad-size and temperature scalability are incorporated into many models.
- **Model documentation** — Each model contains a model datasheet that lists recommended model validity parameters, measurement and test fixture details, and model-to-measurement data comparisons.
- **X-Parameter\* models** — An alternative to compact non-linear equivalent circuit models for transistors that can speed up non-linear simulations and facilitate model portability between simulation platforms. They provide accurate non-linear model representations of complex integrated circuits for which equivalent circuit modeling is not practical.

(\* ) X-Parameters is a registered trademark of Keysight Technologies)





# Modelithics® Vendor Partners

Modelithics partners with leading suppliers in equipping designers with the exceptionally accurate models and measurement data. Many device and component vendors sponsor FREE use of models.

## MVP Partners

Anritsu	ANSYS	API Technologies	* AVX
* Barry	Cadence® AWRDE®	Cadence® Spectre RF® Option	CEL
Chilisin	* Coilcraft	Electro-Photonics	Exxelia
Gowanda	Guerrilla RF	* IMS - International Manufacturing Services	* Johanson
* KEMET	Keysight ADS	Keysight Genesys	Knowles
* MACOM	Maury Microwave	* Mini-Circuits	* Murata
Nuhertz	* Passive Plus, Inc.	* Piconics	* Presidio
* Qorvo	Rogers Corp	RJR Technologies	* Silicon Supplies
Sonnet	* TDK	Transline Technology	Vanguard
Virginia Diodes	* Vishay	* Würth Elektronik	

(\* ) indicates sponsoring partner, offering 30-90 days use of the vendors library

## Modelithics Licensing Options

Modelithics supports a variety of licensing schemes. Customers can opt for floating licenses (single-site, single-timezone, multiple timezones, cloud-based or roaming), node-locked, limited-term or most combinations of these.

Customers also can chose to use a sub-set of the COMPLETE library, like passive CLR only, small passives (0402 and smaller), mmWave&5G library (parts characterized at least up to 30GHz).

## Why Modelithics (or: Know your Return of Investment)

A high-frequency digital, RF, or hybrid design can require dozens of design iterations, as a variety of real-world interactions, resonances, and oscillations are first discovered and then painstakingly tuned out. But when the complex characteristics of each component are accurately modeled, the result is a far more accurate simulation that gets you close to your final design the very first time you simulate it. As a result, you'll complete designs faster and get new products to market sooner. Eliminating even one design turn can save your team the cost of a complete Modelithics library of 5 component models.

Modelithics has designed an ROI Calculator that is available for customers to use to enter their design costs to showcase the amount of savings with the Modelithics models. In just one or two design projects you will likely receive full return on your investment of the Modelithics COMPLETE Library. Try out the Modelithics ROI Calculator with your details:

[www.Modelithics.com/FreeTools/ROI](http://www.Modelithics.com/FreeTools/ROI)



## Advanced Model Features for More Accurate High Frequency Design

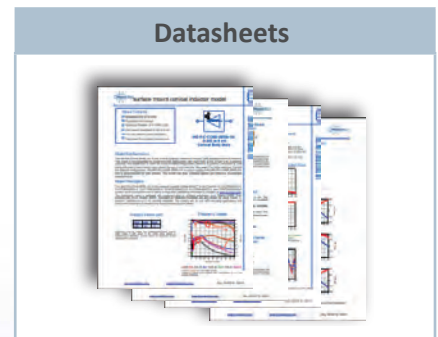
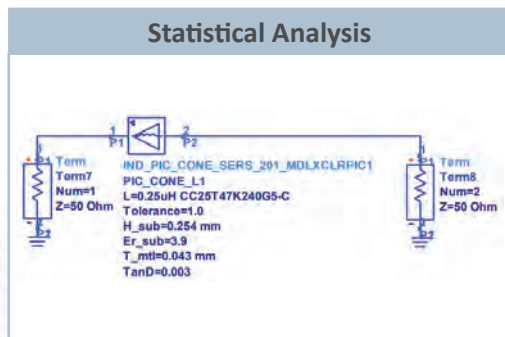
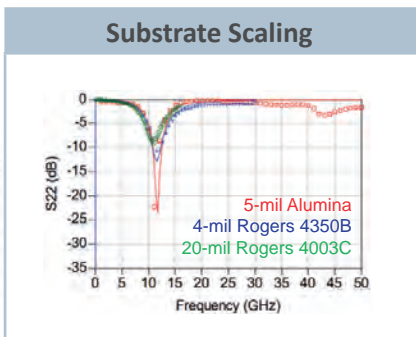
### Alternate Configurations Available

Shunt Model on a Substrate  
IND-PIC-CONE-SHNT-101

Shunt Model over a Metal Carrier  
IND-PIC-CONE-SHNT-001

Scalable Series Model  
IND-PIC-CONE-SERS-101

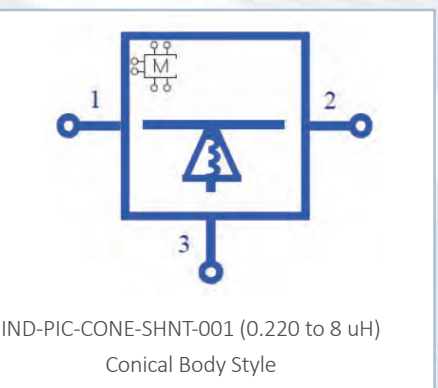
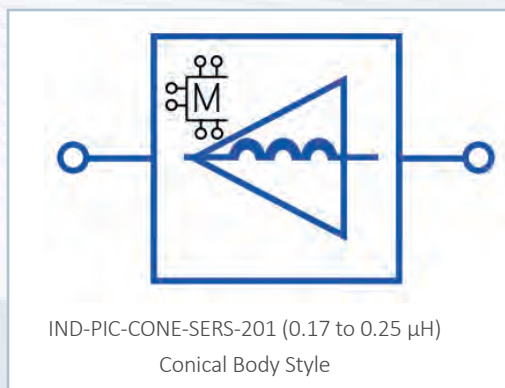
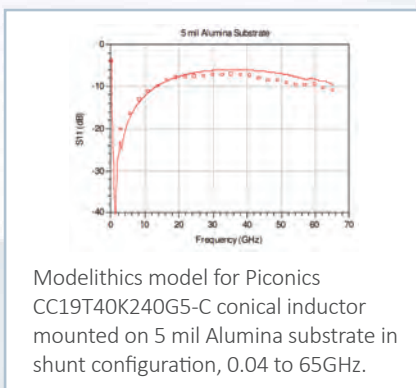
Alternate model versions exist in Modelithics CLR Library for similar Piconics conicals, 0.22 to 8  $\mu\text{H}$  SMT, but mounted in slightly different configuration (eg. Different substrates and with different reference planes).



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

Some of the Piconics component models have a "Tolerance" parameter which enables compatibility with statistical analysis tools in some EDA software. Powerful analyses, such as yield prediction and tolerance analysis, can be done to help optimize design performance and reduce production cost.

Each Modelithics model has a data-sheet 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.



Request a FREE 90 day trial of the Modelithics PICONICS model library

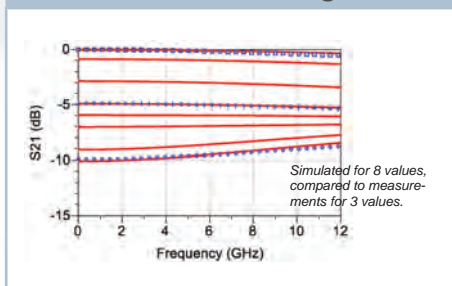
## List of Components in the Modelithics® PICONICS MVP Library

Inductor Model	Specifications	
CC110T47K240G5-C	Frequency: 10 MHz-40+ GHz Return Loss:-26dB typ. In/Out Insertion Loss:-.35dB typ. Idc(max): 100 mA L=8uH	
CC19T40K240G5-C	Frequency: 10 MHz-30 GHz Return Loss:-26dB typ. In/Out Insertion Loss:-.35dB typ. L=0.22uH	
CC21T36K250G5-C	Frequency: 10 MHz-36 GHz Return Loss:-26dB typ. In/Out Insertion Loss:-.35dB typ. L=0.425uH	
CC45T47K240G5C2	Frequency: 10 MHz-40+ GHz Return Loss:-26dB typ. In/Out Insertion Loss:-.35dB typ. L=0.84uH	
CC50T40K240G5-C	Frequency: 10 MHz-25 GHz Return Loss:-26dB typ. In/Out Insertion Loss:-.35dB typ. L=1.65uH	
CC82T44K240G5-C	Frequency: 10 MHz-15 GHz Return Loss:-26dB typ. In/Out Insertion Loss:-.35dB typ. L=6.7uH	
CC20T44K240G5-C Smallest SMT conical available	Frequency: 10 MHz-65+ GHz Return Loss:-20dB typ. In/Out Insertion Loss:-.35dB typ. L=0.17uH	
CC25T47K240G5-C Smallest SMT conical available	Frequency: 10 MHz-65+ GHz Return Loss:-26dB typ. In/Out Insertion Loss:-.35dB typ. L=0.17uH	

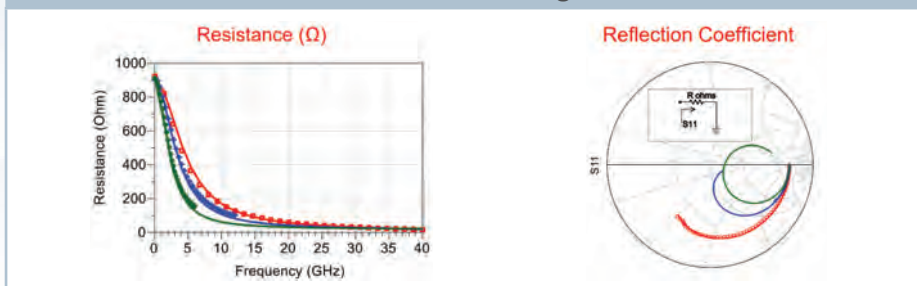


### Advanced Model Features for More Accurate High Frequency Design

#### Part Value Scaling



#### Part Value Scaling



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

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

#### Statistical Analysis

```

RES_IMS_1020_001_MDLXCLRIMS2
IMS_NDX-1020EZWR1
R=50.0 Ohm
Subst="MSub1"
Sim_mode=0 - Full Parasitic Model
Tolerance=1.0
Pad_Width=0.889 mm
Pad_Length=0.61 mm
Pad_Gap=0.483 mm
    
```

#### Datasheets

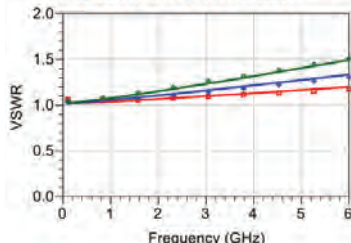


The IMS component models have a "Tolerance" parameter which enables compatibility with statistical analysis tools in some EDA software. Powerful analyses, such as yield prediction and tolerance analysis, can be done to help optimize design performance and reduce production cost.

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.

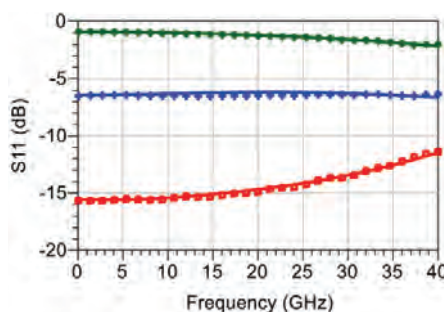
ATT-IMS-0402-001: Modelithics Model for IMS A-0402WA-C Attenuator Series

#### VSWR vs Substrate

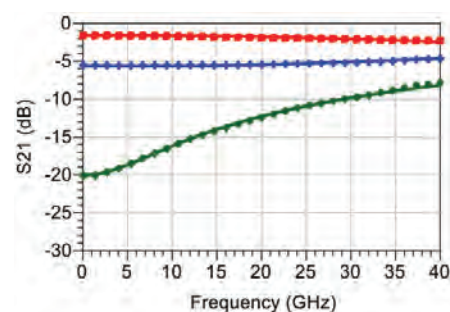


Legend: □ 6.6 mil Rogers 4350B, + 20 mil Rogers 4003C, ◇ 60 mil Rogers 4003C, Lines- Model, Symbols- Measured data. VSWR for a 10dB attenuator mounted on various substrates from 0.05 to 6 GHz.

#### S11



#### S21



RES-IMS-0302-001; Modelithics Model for IMS RC4-0302PW resistor series. Model vs. Measured Series 2-port S-parameter data. 6.6 mil Rogers 4350B (H/Er = 1.7 mil) S11 (left), S21 (right).



Request a FREE 90 day trial of the Modelithics ims model library

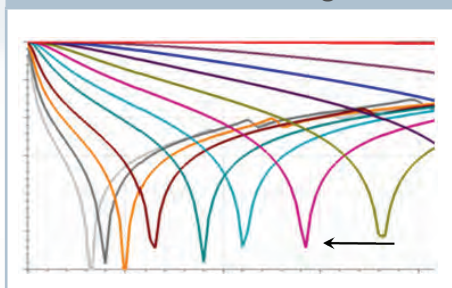
## List of Components in the Modelithics® ims MVP Library

Attenuators	Specifications	
A-0402WA-C	Frequency: model validated up to 50GHz VSWR 1.3:1 max. Attenuation: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10db Attenuation tolerance: $\pm 0.3$ dB (0- 3dB) $\pm 0.5$ dB (4- 7 dB) $\pm 1.0$ dB (8- 10 dB) Rated Power (70°C): 32mW Voltage: 1.26WVDC	
A-0603-C	Frequency: model validated up to 40GHz VSWR 1.3:1 max. Attenuation: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10db Attenuation tolerance: $\pm 0.3$ dB (0- 3dB) $\pm 0.5$ dB (4- 7 dB) $\pm 1.0$ dB (8- 10 dB) Rated Power (70°C): 63mW Voltage: 1.77WVDC	
IMS2533	Frequency: model validated up to 40GHz VSWR 1.3:1 max. Attenuation: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10db Attenuation tolerance: $\pm 0.3$ dB (0- 3dB) $\pm 0.5$ dB (4- 7 dB) $\pm 1.0$ dB (8- 10 dB) Rated Power (70°C): 63mW Voltage: 1.77WVDC	
IMS2652	Frequency: model validated up to 50GHz VSWR 1.3:1 max. Attenuation: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10db Attenuation tolerance: $\pm 0.3$ dB (0- 3dB) $\pm 0.5$ dB (4- 7 dB) $\pm 1.0$ dB (8- 10 dB) Rated Power (70°C): 32mW Voltage: 1.26WVDC	
VDR3725SG	Frequency: model validated up to 40GHz VSWR: 1.6:1 max. Attenuation: 0-30dB Rated Power: (depending dB-value)	
Attenuators	Specifications	
NDX-1020EZW	Frequency: model validated up to 40GHz Resistance: 50Ω Power rating: 50-160W (depending on thickness) Temperature: up to 150W ideal for thermal management	
RC3-0402PW	Frequency: model validated up to 40GHz Resistance range: 10Ω to 2KΩ TCR (ppm/°C): $\pm 100$ Rated Power (70°C): 80 mW Voltage: 50VDC	
RC4-0302PW	Frequency: model validated up to 40GHz Resistance range: 10Ω to 2KΩ TCR (ppm/°C): $\pm 100$ Rated Power (70°C): 63 mW Voltage: 50VDC	



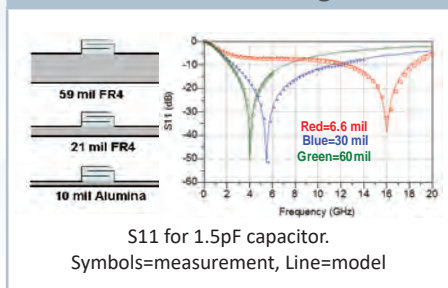
## Advanced Model Features for More Accurate High Frequency Design

### Part Value Scaling



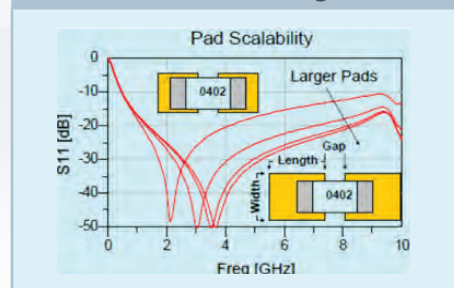
Modelithics Microwave Global Models™ for Presidio capacitors include all values from a part series within one model. This allows for tuning and optimization by capacitance and eliminates the need to manually substitute individual models during a design sequence.

### Substrate Scaling



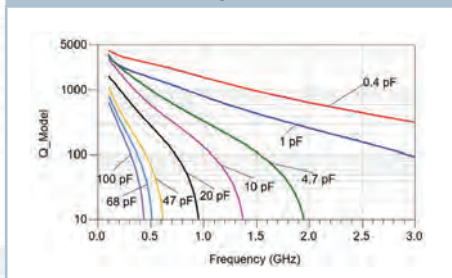
Variations in substrate properties have a significant effect on the response of surface mount components in high frequency designs. Modelithics models are substrate scalable, validated over a continuous range of substrate properties, based on board thickness and dielectric constant.

### Pad Size Scaling



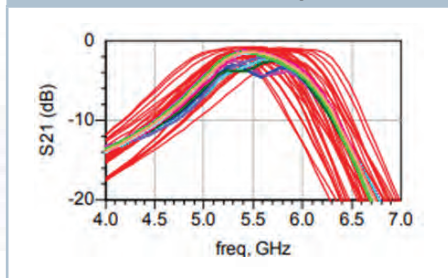
Modelithics models (in default mode) include the PCB pad with reference planes at the outer edges of the pads. The pad scaling feature lets designers adjust the dimensions to match their design, which is important for achieving maximum simulation-to-measurement agreement.

### Quality Factor



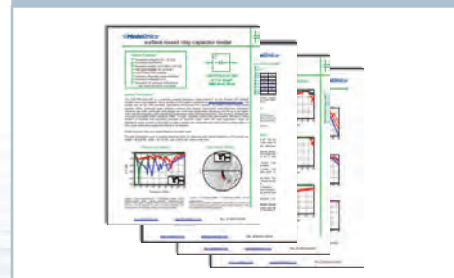
Capacitor models in the Presidio MVP library incorporate precise Effective Series Resistance (ESR) measurements. Accurate ESR is important in determining the loss factor or Q-factor of low loss circuits.

### Statistical Analysis



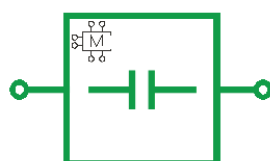
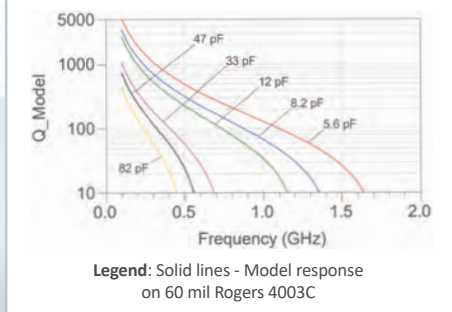
The Presidio capacitor models have a "Tolerance" parameter which enables compatibility with statistical analysis tools in some EDA software. Powerful analyses, such as yield prediction and tolerance analysis, can be done to help optimize design performance and reduce production cost.

### Datasheets

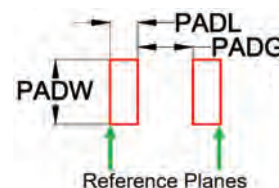


Each Modelithics model has a datasheet that provides detailed information about the model, such as the validation frequencies, reference planes, part value / pad scalability / substrate scalability ranges, model performance, and details about other features and model parameters.

Modelithics Model for Presidio 0603UP Capacitor Series  
**CAP-PRS-0603-001 Simulated Q-Factor**



Modelithics Model for Presidio P/N 0402UP Capacitor Series  
**CAP-PRS-0402-002 PC Board Footprint**



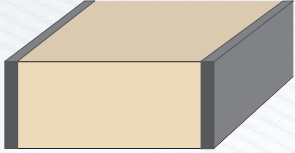
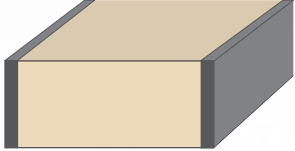
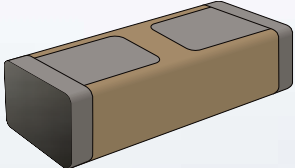
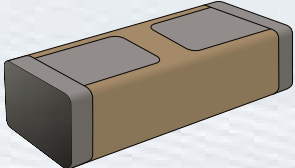
8.0 (0.20) ≤ PADL ≤ 29.5 (0.75)  
25.2 (0.64) ≤ PADW ≤ 29.1 (0.74)  
9.8 (0.25) ≤ PADG ≤ 30.0 (0.76)  
Units in mil (mm)








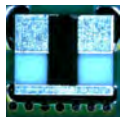


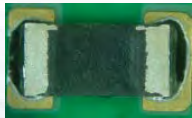



**Request a FREE 90 day trial of the Modelithics PRESIDIO model library**

## List of Components in the Modelithics® PRESIDIO MVP Library

Capacitors	Specifications	
<p>0402UP</p> <p>Ultra temperature stable dielectric. Extremely low ESR. For RF power and high Q applications.</p>	<p>Temperature Coefficient of Capacitance, 0 Volt: <math>0 \pm 30</math> ppm/°C            Typical Q: 20,000            Capacitance up to 1000pF: 1 MHz, 1.0 V AC RMS            Capacitance &gt;1000pF: 1 kHz, 1.0 V AC RMS            Dielectric Withstanding Voltage (DWV): 250% of WVDC <math>\leq</math> 300V            200% of WVDC = 500V</p>	
<p>0505UP</p> <p>Ultra temperature stable dielectric. Extremely low ESR. For Use Up to Ku-Band</p>	<p>Temperature Coefficient of Capacitance, 0 Volt: <math>0 \pm 30</math> ppm/°C            Typical Q: 10,000            Capacitance 0.05pf to 1000pF: 1 MHz, 1.0 V AC RMS            Working Voltage (DC): up to 250V</p>	
<p>0603UP</p> <p>Ultra temperature stable dielectric. Extremely low ESR. For rf and microwave</p>	<p>Temperature Coefficient of Capacitance, 0 Volt: <math>0 \pm 30</math> ppm/°C            Typical Q: 10,000            Capacitance 0.05pf to 27pF: 1 MHz, 1.0 V AC RMS            Working Voltage (DC): up to 200V</p>	
<p>BB0201X7R103M</p> <p>KEY APPLICATIONS            Broadband DC Blocking            OC192, OC768, Transponders and Transceivers, Broadband Microwave, Test Equipment</p>	<p>Capacitance: 10nF + 82pF            Working Voltage: 10V            Dielectric Withstanding: 25V (250% of WVDC)            Tolerance: 20%            Insulation Resistance: &gt;100MOhm</p>	
<p>BB0402X7R104M2</p> <p>Ultra temperature stable dielectric. Extremely low ESR. For RF power and high Q applications.</p>	<p>Capacitance: 100nF + 82pF            Working Voltage: 16V            Dielectric Withstanding: 40V (250% of WVDC)            Tolerance: 20%            Insulation Resistance: &gt;100MOhm</p>	
<p>BB0502X7R104M</p> <p>Ultra temperature stable dielectric. Extremely low ESR. For Use Up to Ku-Band</p>	<p>Capacitance: 100nF + 82pF            Working Voltage: 20V            Dielectric Withstanding: 50V (250% of WVDC)            Tolerance: 20%            Insulation Resistance: &gt;100MOhm</p>	





**List of Components in the Modelithics® api technologies > INMET MVP Library**

Attenuators	Specifications	
PCA	Attenuation: 1dB-20dB model validated DC-18GHZ Accuracy: 0.5dB-4dB Attenuation Stability: 0.0001 dB/dB/°C	
PCAA	Attenuation: 1dB-20dB model validated DC-20GHZ Accuracy: 0.5dB-1dB Attenuation Stability: 0.0001 dB/dB/°C	
PCAAF (flip-chip)	Attenuation: 1dB-20dB model validated DC-20GHZ Accuracy: 0.5dB-1dB Attenuation Stability: 0.0001 dB/dB/°C	
PCAF (flip-chip)	Attenuation: 1dB-20dB model validated DC-18GHZ Accuracy: 0.5dB-1dB Attenuation Stability: 0.0001 dB/dB/°C	
TCAF N-Serie negative Temperature coefficient	Attenuation: 2dB-6dB model validated DC-18GHZ Accuracy: 0.5dB-0.75dB Attenuation Stability: 0.005 dB/dB/°C	 
Resistors	Specifications	
ANC50-100W	Resistance: 50 Ohm Power: 10W CW Frequency: model validated DC-30GHz Capacitance: 1pF VSWR: 1.25:1	
ANC50-50W	Resistance: 50 Ohm Power: 10W CW Frequency: model validated DC-30GHz Capacitance: 0.5pF VSWR: 1.25:1	
NPC20-40S	Resistance: 50 Ohm, 100Ohm Power: 1W CW Frequency: model validated DC-30GHz VSWR: 1.25:1	
NPC50-100W	Resistance: 50 Ohm, 100 Ohm Power: 10W CW Frequency: model validated DC-20GHz Capacitance: 1pF	

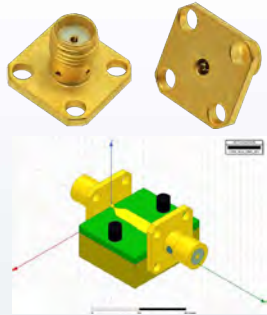


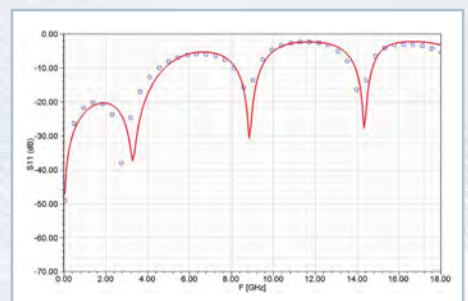
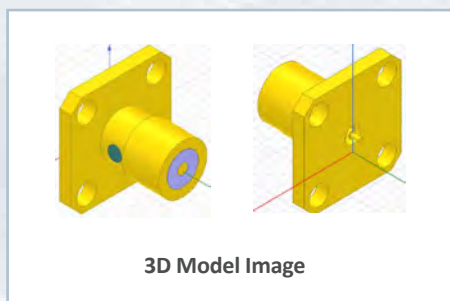
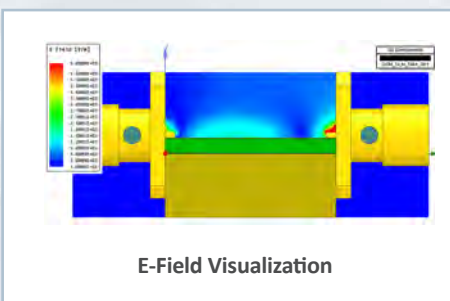
**List of Components in the Modelithics® api technologies > INMET MVP Library**

Resistors	Specifications	
NPC50-50W	Resistance: 50 Ohm, 100 Ohm Power: 5W CW Frequency: model validated DC-20GHz Capacitance: 0.5pF	
PPC100-200AW	Resistance: 50 Ohm, 100 Ohm Power: 20W CW Frequency: model validated DC-12GHz Capacitance: 0.8pF	

**Components in the Modelithics® Gigalane MVP Library**

GigaLane High Performance SMA Connectors are designed for applications up to 26.5 GHz in the common high frequency substrates and it is suitable for military and microwave frequencies.

Connector	Specifications	
PSF-S00-000	SMA 4-Hole Panel Mount Jack Frequency: DC- 26.5 GHz Insulation Resistance: 5 GΩ min. VSWR: 1.3:1 max.  This model is an encrypted 3D geometry model available in Ansys HFSS M for the GigaLane P/N PSF-S00-000 SMA 4-hole panel mount jack. The model is for use in 3D simulations with microstrip carrier-mounted applications. The model is validated with measured multi-substrate S-Parameters	




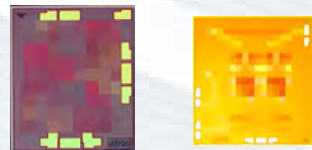
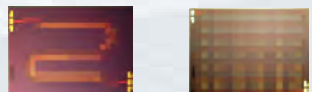

## Non-Linear Device Models

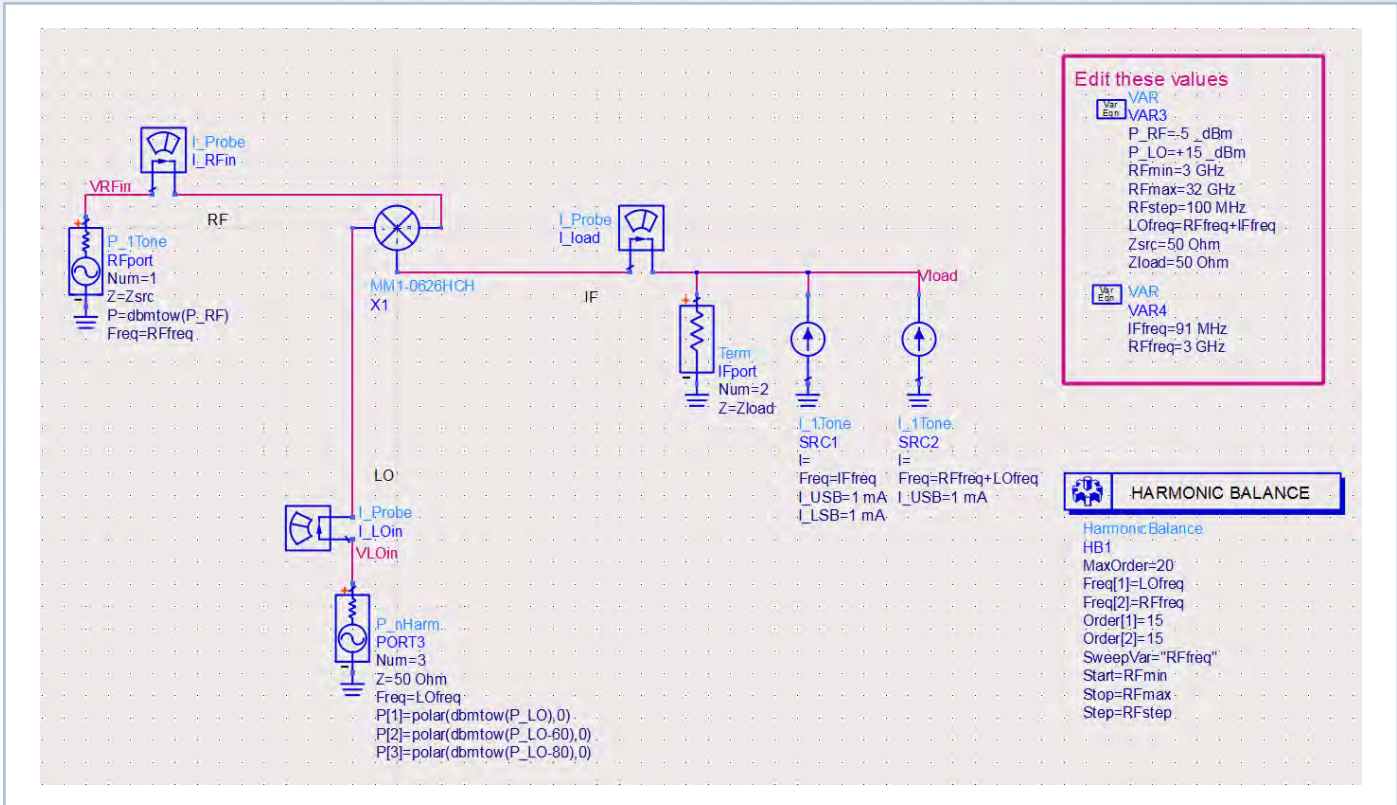
Marki Microwave is proud to publicly offer our non-linear simulation design kits for both Cadence® AWR® Microwave Office® (MWO) and Keysight's PathWave Advanced Design System (ADS). At Marki Microwave we strive to offer top tier engineering support with experts in all aspects of the RF & Microwave field. The best-in-class RF & Microwave components demand engineering support that is up to par. In keeping with this philosophy, both MWO and ADS design kits offer simulation models for our Microlithic and MMIC mixer and multiplier products. Support for both design kits is ongoing and verified through measurement. If you do not see the part you are interested in simulating, try looking for it as a bare die with the '-CH' suffix. We do not offer models including packaging effects so bare die performance will be closest to performance of the packaged mixer.

**You won't find mixer S-parameters on our website, for non-linear devices S-parameters are not meaningful.** S-parameters only shows small-signal behavior and don't allow for large-signal analysis. X-parameters, the superset of S-parameters, do allow for large-signal analysis; however, X-parameter models are both environmentally dependent and depend on the device under test's input condition. Both of these behavioral models do a good job for passive linear components like power dividers and couplers, and you'll find downloadable S-parameters on our website for all of our passive components.

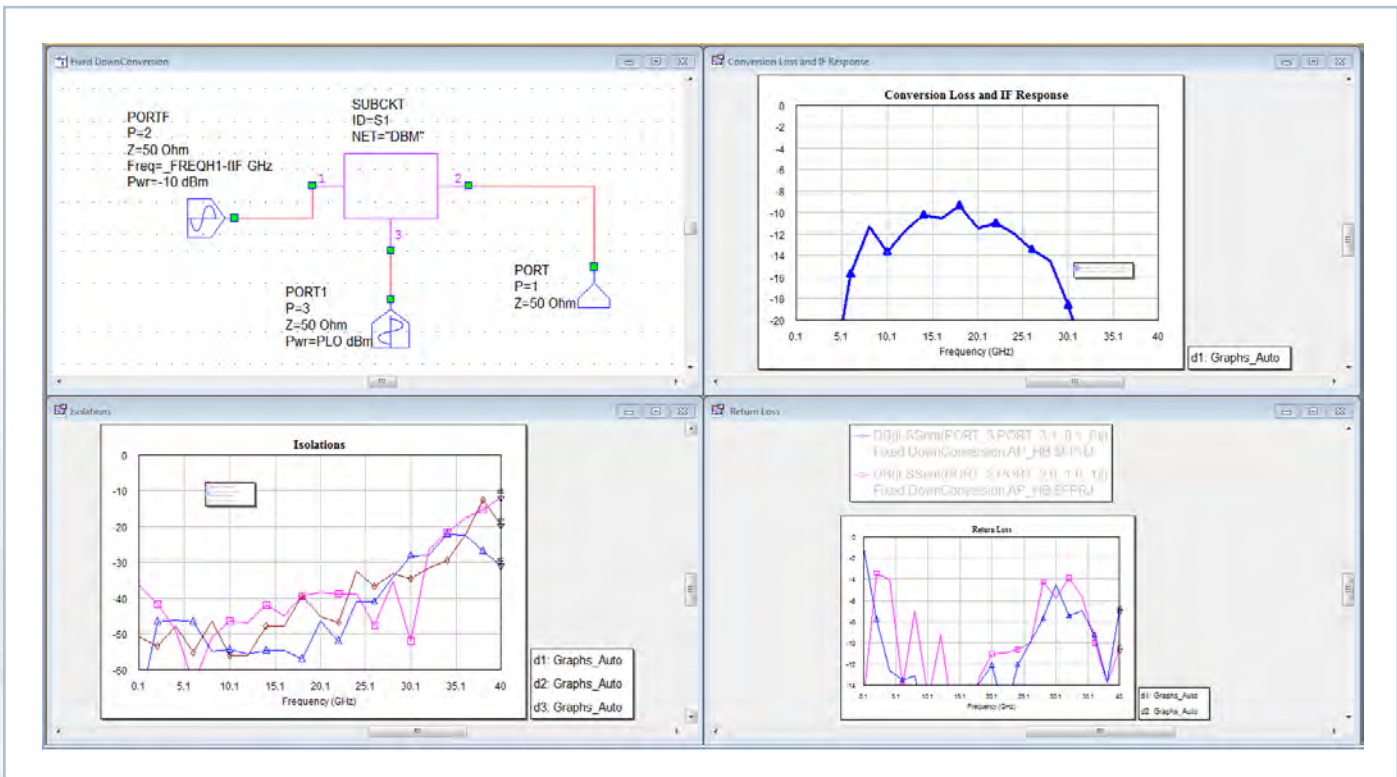
Heavily non-linear devices such as mixers, doublers, and NLTs demand physics-based models capable of accurately simulating non-linear effects of the diodes within the circuits. This is precisely what our design kits do. Numerical solutions through harmonic balance simulations are the time efficient way of performing non-linear analysis such as IP3 and spurious output prediction early in the design cycle. Days and weeks of careful characterization can be reduced to a few hours with the design and debug support offered by our simulation design kits. For an overview of the design kits, examples of its accuracy, and a complete list of products supported please visit our website [www.markimicrowave.com/engineering/resources/non-linear-device-models/](http://www.markimicrowave.com/engineering/resources/non-linear-device-models/)

### List of supported devices (excerpt):

<b>Multipliers</b> MLD-0416LSM, MLD-0632LCH, MLD-1640LCH, MMD-1030HCH, MMD-1640HCH, MMD-1648HCH, MMD-1648LCH, MMD-2060HCH, MMD-2060LCH, MMD-3580HCH, MMD-3580LCH	
<b>Mixers, IQ-Mixers</b> MLIQ-0416ICH, MLIQ-0416LCH, MLIQ-1845ICH, MLIQ-1845LCH, ML1-1040ICH, ML1-1040LCH, ML1-1050ICH, ML1-1050LCH, ML1-1644ICH, ML1-1644LCH, ML1-1850ICH, ML1-1850LCH,, MM1-0424SCH, MM1-0626HCH, MM1-0626SCH, MM1-0726HSM, MM1-0832HCH, MM1-0832LCH, MM1-1140HCH, MM1-1044HCH, MM1-1044LCH, MM1-1850HCH, MM1-1850SCH, MM1-1857HCH, MMIQ-0412LCH, MMIQ-0520HCH, MMIQ-0520LCH, MMIQ-1037HCH, MMIQ-1037SCH, MMIQ-1040LCH, MMIQ-1860HCH, MMIQ-1860LCH	
<b>Comb Generators</b> NLTL-6273CH, NLTL-6275CH, NLTL-6794CH, NLTL-6796CH	
<b>Hybrids</b> MQH-0517, MQH-2R58R5	



ADS representation of Marki Mixer MM1-0626HCH with RF/LO sources and probes.



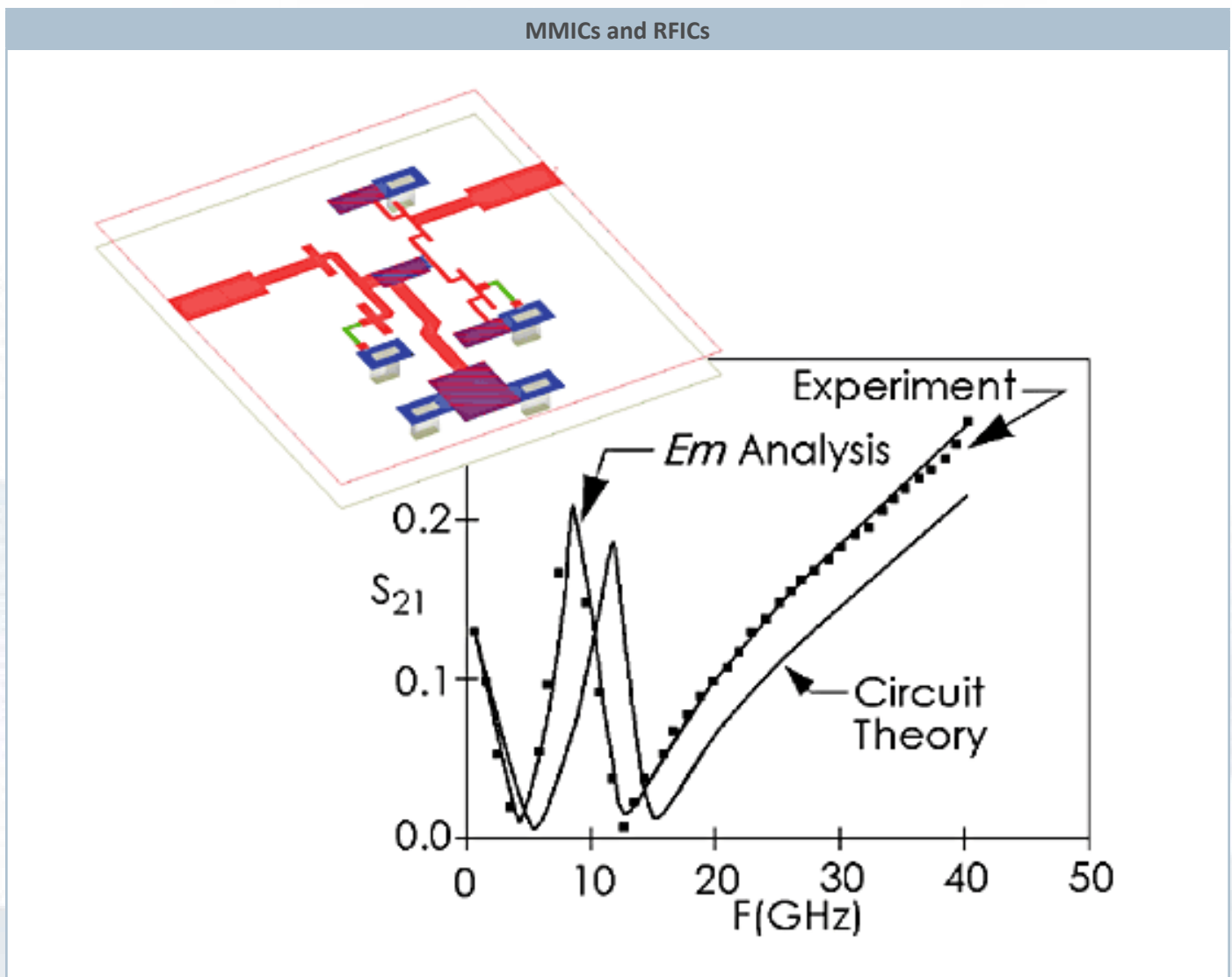
Cadence Microwave Office representation of a Mixer with simulation results

### 3D-Planar Electro-Magnetic Simulation Tools

At Sonnet, we've been developing 3D planar EM software since 1983, and our software has earned a solid reputation as the world's most accurate commercial high frequency planar electromagnetic (EM) analysis tool suite for single and multi-layer planar circuits and antennas. Our software provides very precise layout-based electrical model extraction of passive circuits and planar transmission lines from kHz through THz frequencies.

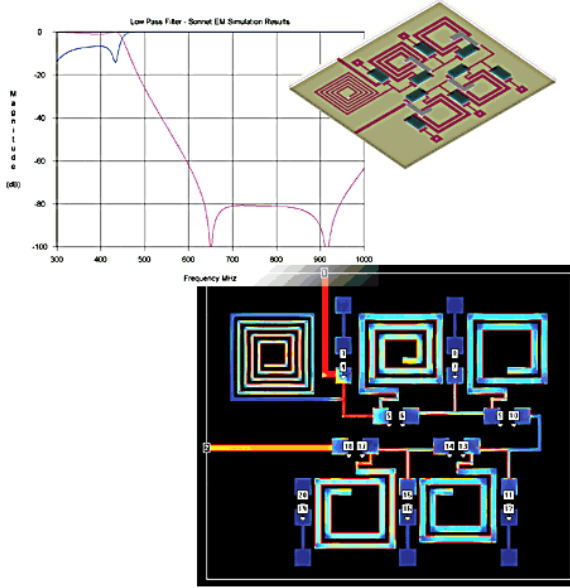
#### Application Examples:

Sonnet uses the Method of Moments (MoM) applied directly to Maxwell's Equations to solve planar problems. Using 2D-FFT and proprietary mathematical formulations, Sonnet is able to solve pre-dominantly planar problems extremely fast.



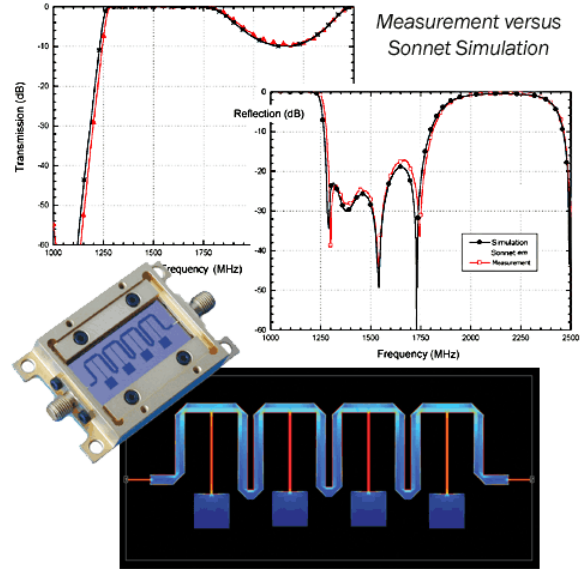
Sonnet computes response and current density of the featured interstage matching network from 10-30 GHz. Current density is shown at 19 GHz. Sonnet's new ABS technique provides a fine resolution response over a 3X bandwidth. Sonnet excels in thin dielectric and short via simulation requirements often found in MMIC and RFIC applications.

### PCB Filters and matching networks



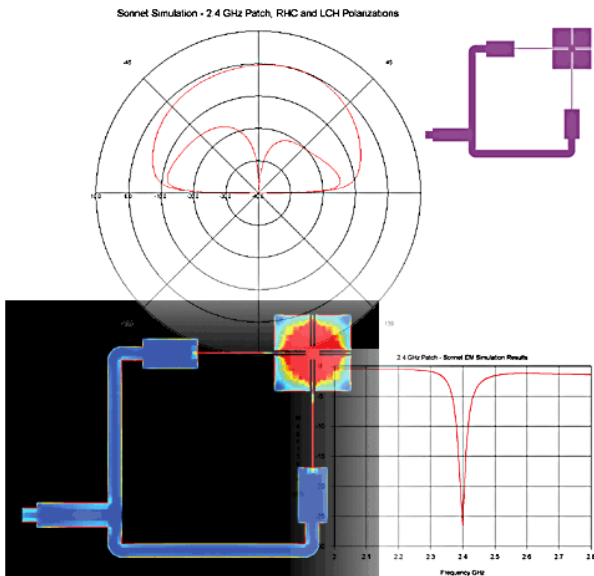
Sonnet provides EM modeling of all layout details, including parasitics and cross coupling. Using Sonnet's unique calibrated internal ports and a netlist interpreter, S-parameter or lumped element models (e.g. Modelithics CLR) for surface mount devices can be easily incorporated into the EM simulation

### Superconductors



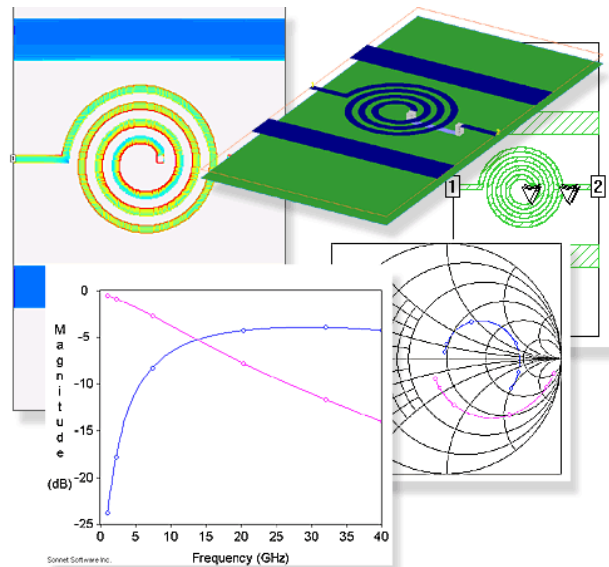
Superconducting filter design modeled in Sonnet for a radio astronomy application. Sonnet simulations demonstrate excellent agreement with measurements on the part; Sonnet enabled a first-pass success for the filter. Current density is shown at 1.5 GHz.

### Antennas



Sonnet provides precise S-parameters, current density and far-field radiation

### Lossy Silicon



All EM effects, including eddy current effects in the silicon, and frequency-dependant metal loss are included in the analysis.



## Data Capture and Processing Tools

Introducing the premier version of SoftPlot- Test automation and documentation for RF Engineers, in one easy-to-use package

**Network Analyzer**

**Spectrum Analyzer**

**Modulation Analyzer**

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GPIB, RS-232 or LAN Connectivity

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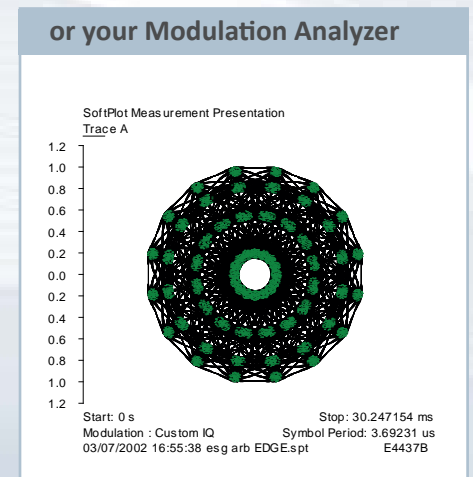
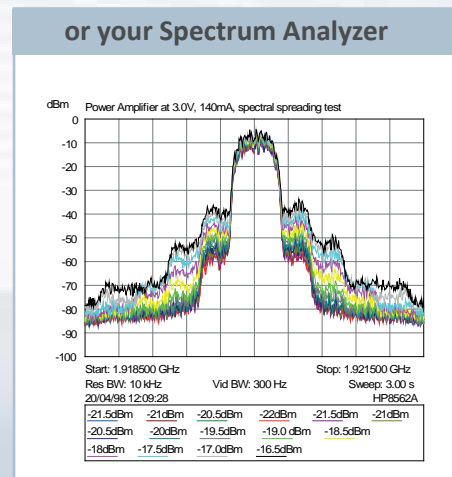
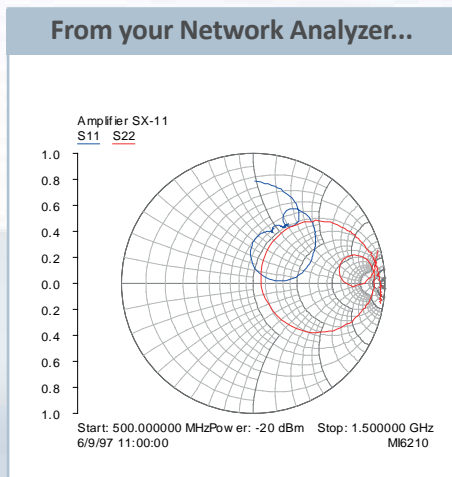
**Spreadsheets and Maths software**

**Export to ...**

**Automation links to external Software**

**Test automation scripts:**

- Simplify equipment configuration
- Replay test sequences
- Interactive graphing of measurements

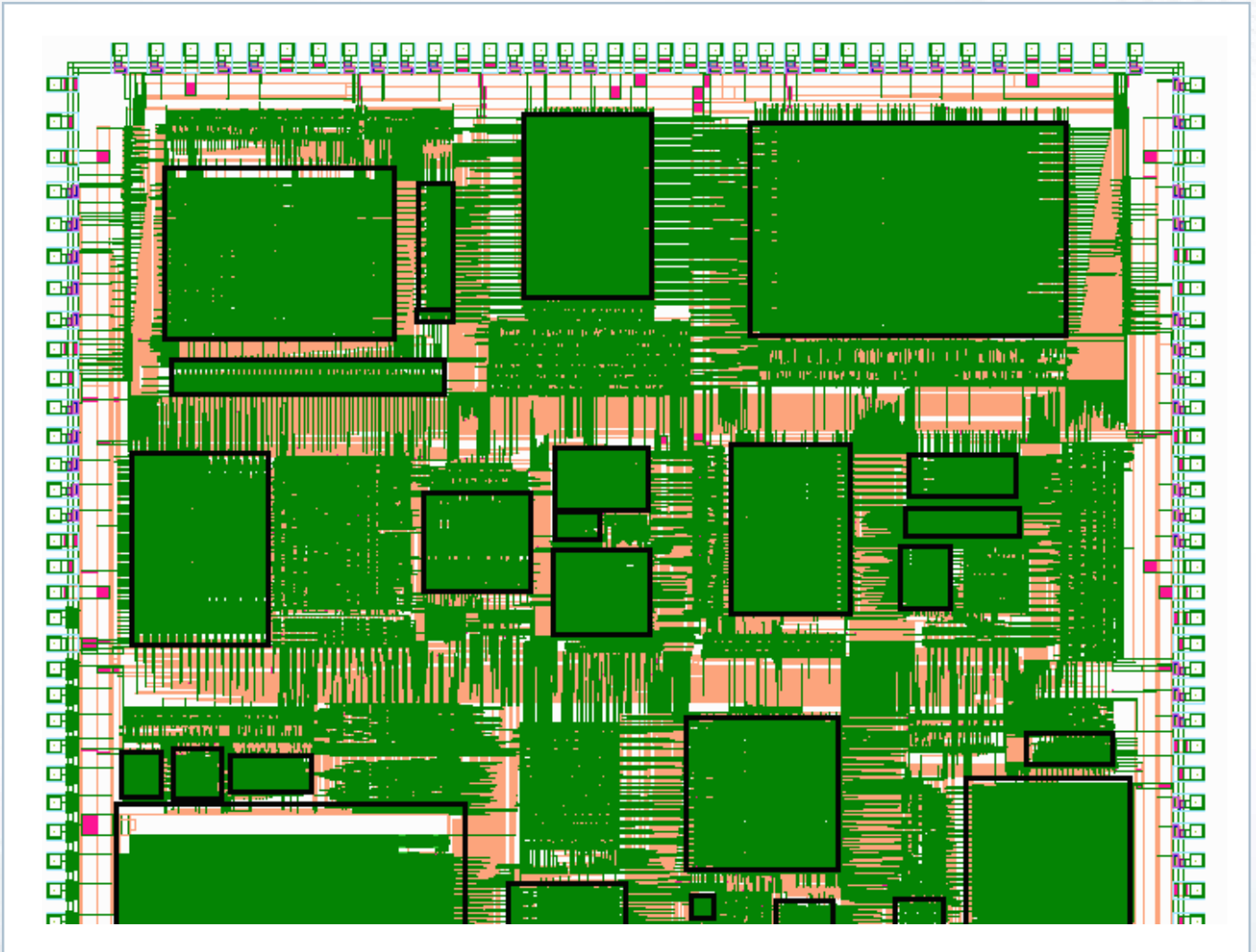






## Translators, Viewers, Plotting, Geometry Engines

Artwork Conversion Software develops bi-directional CAD translators, high speed viewers and high resolution rasterizers (vector to bitmap) for CAD data bases such as GDSII, Gerber, DXF, MEBES, OASIS, ODB++ as well as proprietary formats...

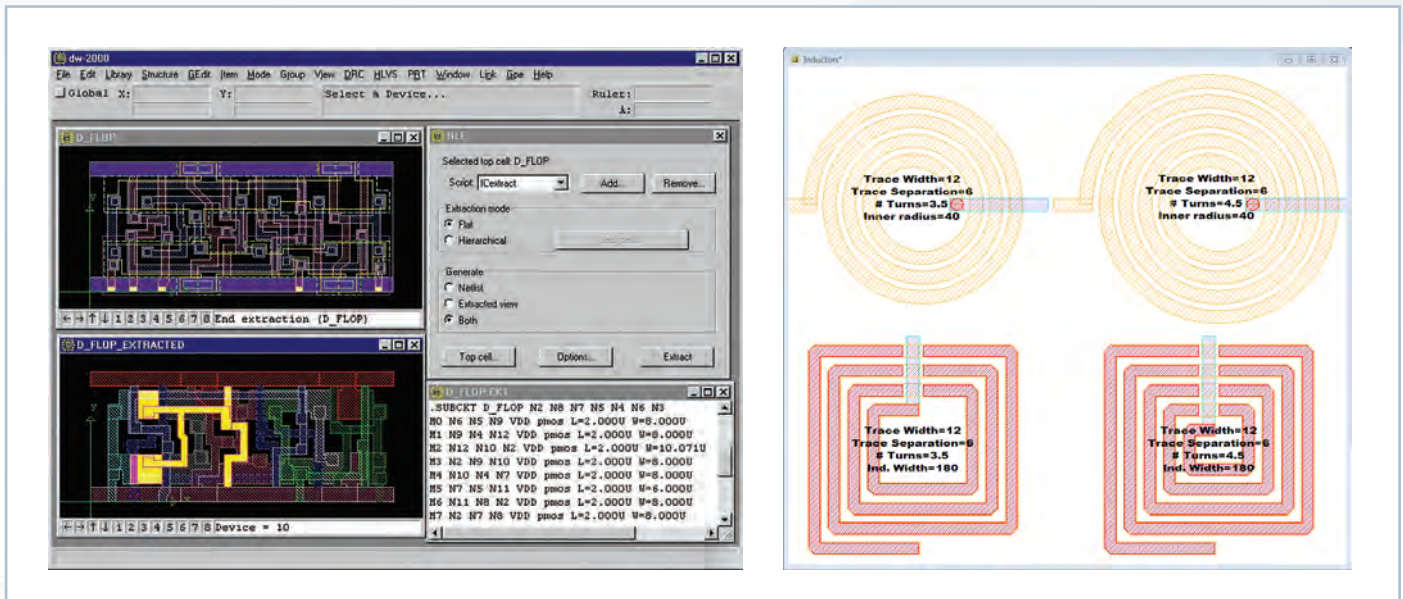


Artwork Conversion Tools are used by major EDA manufacturers as built-in or stand-alone import and export modules to offer a hassle-free connectivity to and from PCB and mechanical CAE products as well as semiconductor foundries.

Also, many EMS and contract manufacturers rely on the tool sets offered by Artwork Conversion. Give us a try, we will not disappoint you.



Design Workshop Technologies creates high-quality computer aided design software for the microelectronics, MEMS, and photonics industries and for other microfabrication applications. With over 30 years of software innovation, our products are flexible and cost-effective; we aim to bring maximum capability and maximum value.



**dw-2000** is Design Workshop Technologies' flagship suite of products, used by customers worldwide to deliver winning designs for over twenty years.

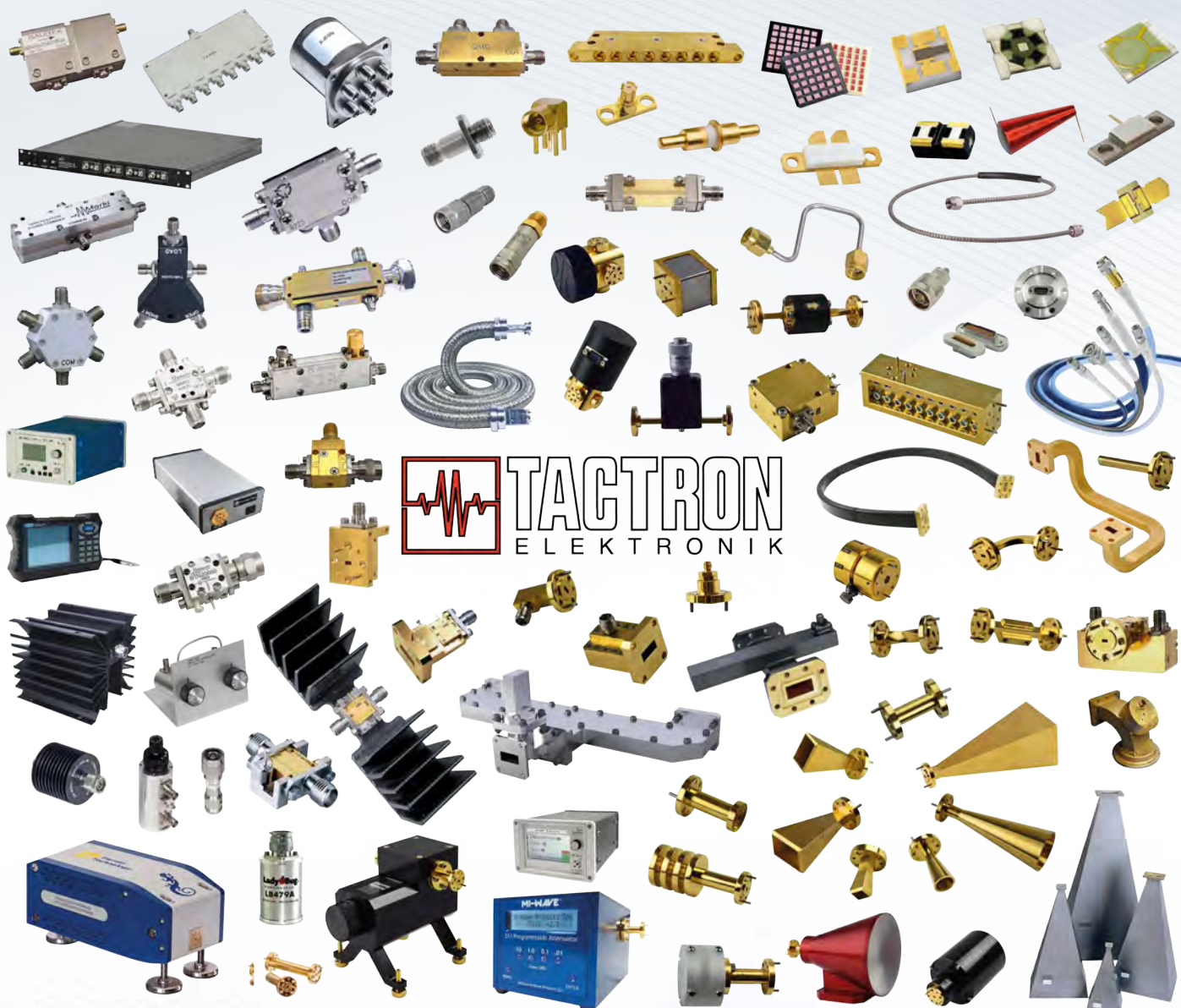
**dw-2000** addresses the design requirements of physical layout and verification of analog and mixed-signal integrated circuits. Although available as separate modules, dw-2000 is an integrated environment consisting of a full-featured Layout Editor, a comprehensive Design Rule Checker, a reliable LVS and a Data Conversion Module. All these modules share a common powerful Programming Environment allowing almost unlimited extensibility.

#### dw-2000 Highlights

- Integrated LVS and DRC
- Native 64bit editions for increased speed and performance
- Hierarchical layout
- All-angle Boolean and resize
- Fully customizable
- Programming language environment
- Automatic layout generation
- Fully-featured
- Unlimited undo/redo
- View at different aspect ratios
- Snapping using Gravity
- Conversion to/from other formats
- Parametric Cells (P-Cells)

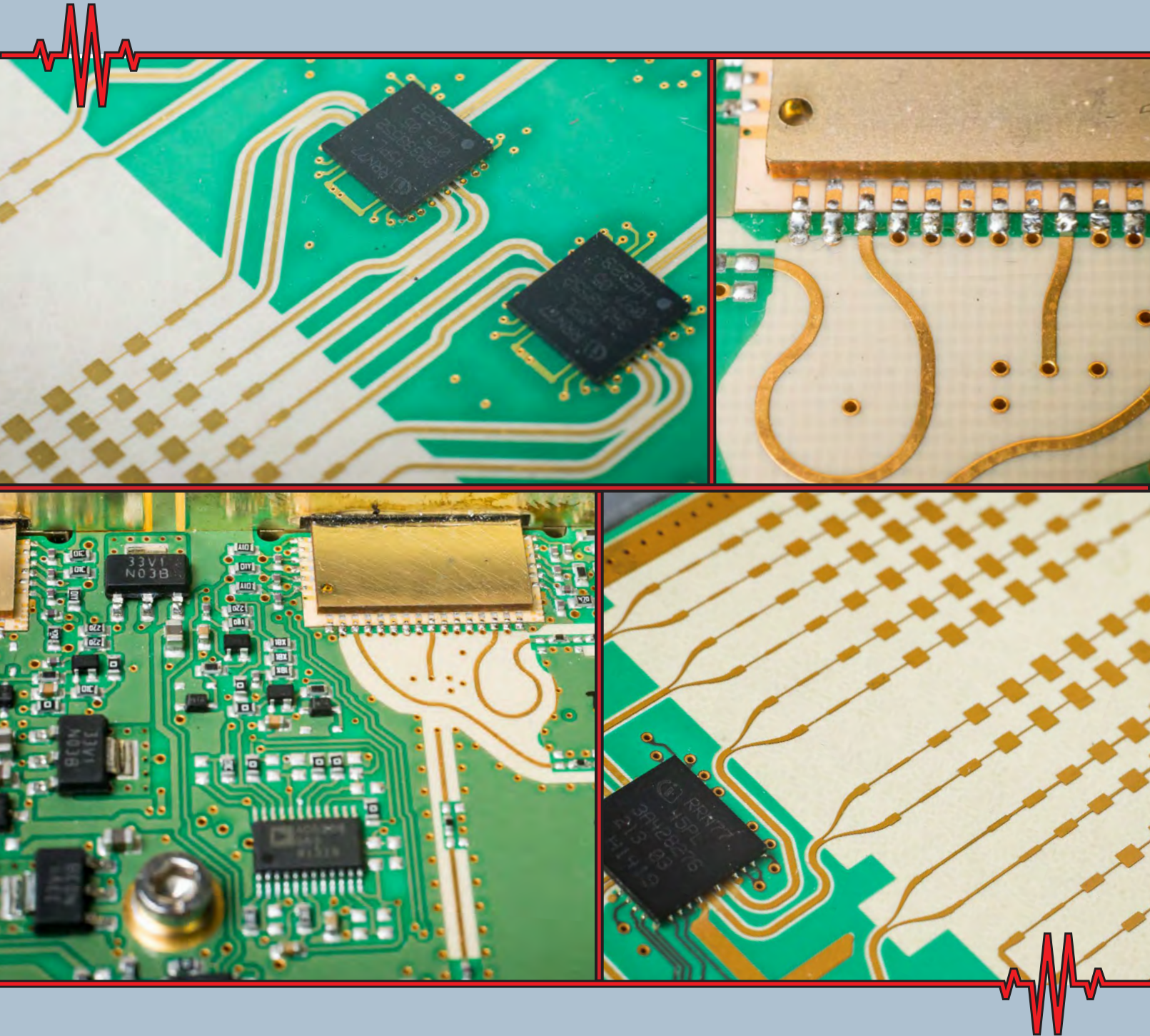
#### Microwave Highlights

- Fully integrated environment
- Support for all-angle geometries
- Design flow optimization guaranteeing excellent ROI
- Automatic layout generation
- Customizable Inductor P-Cells
- Microwave device extraction such as inductors
- Recommended Microwave modules XDRC
- HLVS
- P-Cell Development Kit
- PDK development services available



**RF- and Microwave Components • Coaxial DC to 110GHz** • Terminations • Adapters • Antennas • Bias Tees • Attenuators • DC-Blocks • Detectors • Equalizers • Filters • Cables and Cable Assemblies • Dividers • Combiners • Mixers • Multipliers • Noise Sources • Phase Shifters • Couplers • Hybrid Couplers • Switches • Connectors • Amplifiers • Circulators • Isolators • **RF- and Microwave Components • Waveguides DC to 500GHz** • Terminations • Adapters • Antennas • Attenuators • Detectors • Filters • flexible Waveguides • flexible dielectric Waveguides • Multipliers • Waveguide Structures • Couplers • Noise Sources • Mixers • Oscillators • Phase Shifters • Switches • Amplifiers • Circulators • Isolators • **SMDs DC to 110 GHz** • Terminations • Attenuators • Diodes • Filters • Inductors • Capacitors • Dividers • Transistors • Resistors • **Chips / MMICs to 125 GHz** • **Modules** • ASICs and ICs • Up / Downconverters • Frequency Standards • Frequency Extenders • Filters • customized Modules • Synthesizers • Amplifiers • **Systems** • Radar Evaluation Boards • Radar Target Simulators (active/passive) • System Development • Satellite Hardware • Quasi-Optical Network Analyzers • Material • **Software** • CAD / CAE • Test&Measurement • **Measurement Technology** • Spectrum & Network Analyzing • Frequency Extenders • Handheld Synthesizers • Power Sensors • Test and Measurement Equipment • Cable/Antenna Testers • Power Monitoring • Delay Lines • Radar Target Simulators • **Security** • Radar Testsimulators • Signal Logging and Analyzing • Cellular Radio Jammers • **SatCom** • LNBS • Block Converters • 70/140 IF Converters • Transmitters/Receivers • Oscillators • Frequency Sources • Redundant Switching Systems • Amplifier Systems • Low Noise Amplifiers • Test Translators • Amplitude / Slope Equalizers • Power Supply Systems • Waveguides • Rotary Joints





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