



Nuhertz®

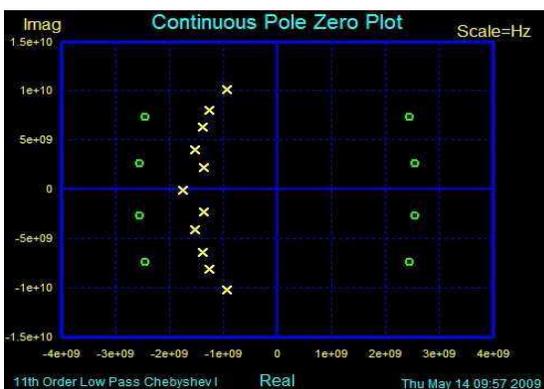
Best in Filter Designs

Nuhertz Technologies is the creator of *FilterSolutions*,[®] the most comprehensive software suite for the synthesis of filter structures. The software comprises six individual sub-modules: Distributed Element; Lumped Element; Active Element; Digital Circuit; Impedance Matching, or Switched Capacitor Resonator filters. These modules can each be purchased separately.

The core features of *FilterSolutions* are echoed in *FilterQuick*, a simplified program interface included within *FilterSolutions*. Nuhertz also provides a lower cost, reduced feature version, *FilterLight*. The company website details the feature comparisons.

Filter Synthesis

Using *FilterSolutions*, the designer can choose from numerous filter topologies, or can arbitrarily customize filter designs by adding or moving poles and zeros.



Filter Solutions Pole-Zero Plot

Users are able to synthesize Cross-Coupled resonator structures of 10th, or greater, order with the minimum possible number of cross-couplings. Space-saving “folded”, cross-coupled filters can be designed and optimized to minimize PC board space.

Using the programs’ “Automated General Parameter Synthesis” (AGPS) feature, users can directly manipulate the pole/zero characteristics of the filter’s transfer function to tune and restore maximally flat equiripple bandpass response. The resultant recalculation will directly move stopband zeros while creating a design that minimizes the number of inductors and capacitors in the circuit.

In the distributed element mode, Designers can instantly compute Microstrip or Stripline geometries in Order to build networks from user-defined S or G-transfer functions.

Filter Analyses

FilterSolutions provides a variety of analysis tools to account for custom modifications and real world parasitic effects such as:

- | | |
|---|---------------------|
| Conductor resistivity | Dielectric losses |
| Element value error | Finite Inductor Q |
| Geometry Errors | User selected parts |
| Op-Amp Gain & BW | Element Parasitics |
| Vendor S-parameters | Element Sensitivity |
| EM Optimization (with 3 rd party tools) | |
| Use of measurement based scalable models and vendor S-parameters, using 3 rd party tools | |

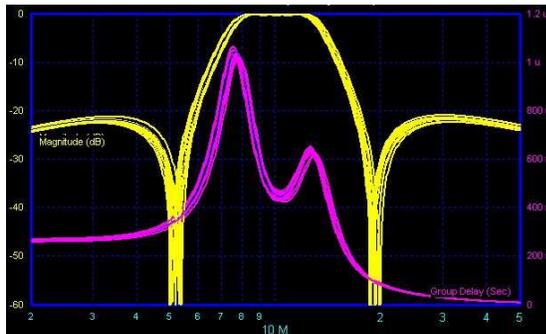


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Monte Carlo Analysis

Analysis for random errors in element values is easy. Just select the elements to be varied, then the size and nature of the distributions. *FilterSolutions* does the rest with easy-to-study analysis traces for each simulation run.



FilterSolutions Monte Carlo Analysis

Distributed Line Designs

FilterSolutions supports a variety of distributed element filter geometries including combline, hairpin and interdigital, in microstrip, stripline or suspended substrate media.

The programs support integration of lumped elements and parallel edge-coupled and shunt stub resonators.

FilterSolutions can be used to place radial, delta or butterfly stubs.

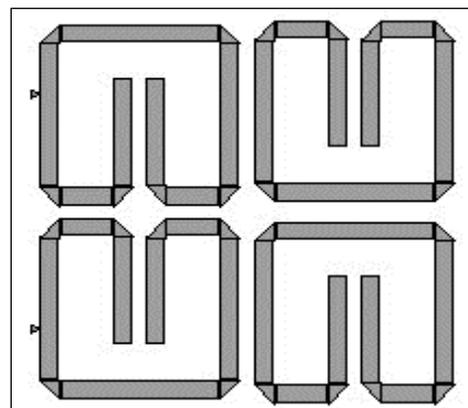
Output Data

Output functions vs. time or frequency; Rectilinear, Polar or Smith Chart formats; CSV data; Spice network lists; DXF format; Touchstone data; Importation into Sonnet em simulation tools and AWR circuit simulators.

Filter Topologies

Among the filter topologies supported by *FilterSolutions* are:

- Bessel
- Butterworth
- Chebyshev
- Delay
- Elliptic
- Gaussian
- Hourglass
- Legendre
- Matched
- Raised Cosine
- Tubular
- ZigZag
- Coupled Resonator and Cross-Coupled
- Folded Resonator (pictured below)



FilterSolutions Folded Hairpin Design



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Integration with 3rd Party Tools



Nuhertz is a Sonnet Software EDA Partner. Nuhertz synthesis provides filter geometries in Sonnet Project Format, enabling high frequency EM analyses in Sonnet Lite and other Sonnet suites. *FilterSolutionsLite+* includes Sonnet LitePlus™ as an integral program.

Using the Co-calibrated™ port feature available in Sonnet Software, *FilterSolutions* provides a co-simulated electromagnetic tuning technique with exportable results for circuit analysis.

www.sonnetsoftware.com



FilterSolutions can be integrated into Microwave Office® software created by AWR Corporation. The power of Nuhertz synthesis and AWR analysis provides unparalleled capabilities for filter design.

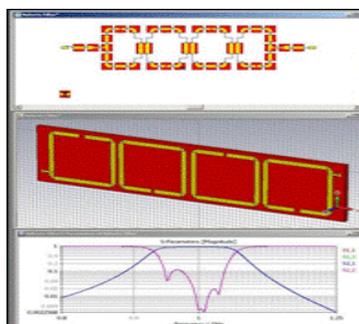
Using co-simulation tuning techniques, electromagnetically tuned filters can be imported into AWR's simulation tools for analysis, electromagnetic optimization, circuit integration and layout.

www.awrcorp.com



In partnership with CST Microwave, Nuhertz provides the ability to integrate filter synthesis in a new CST product called Filter Designer 2D, a synthesis and electromagnetic analysis tool; part of CST's STUDIO SUITE® a new capability in analytic tool integration is now available.

www.cst.com



CST Exportable Tapped Ring Resonator



Nuhertz Technologies provides the ability to optimize filter circuits with the use of Modelithics models or other S-parameter models. Modelithics CLR models are scalable, measurement-based models in a huge library with proven accuracy. For further information, contact Nuhertz or Modelithics directly at their website:

www.modelithics.com



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