



ELECTROMAGNETICS
SPECIALISTS

Benchmark Files
Sonnet V11
Sonnet V12 Desktop Solver
Sonnet V12 High Performance Solver

Revised: April 3, 2009

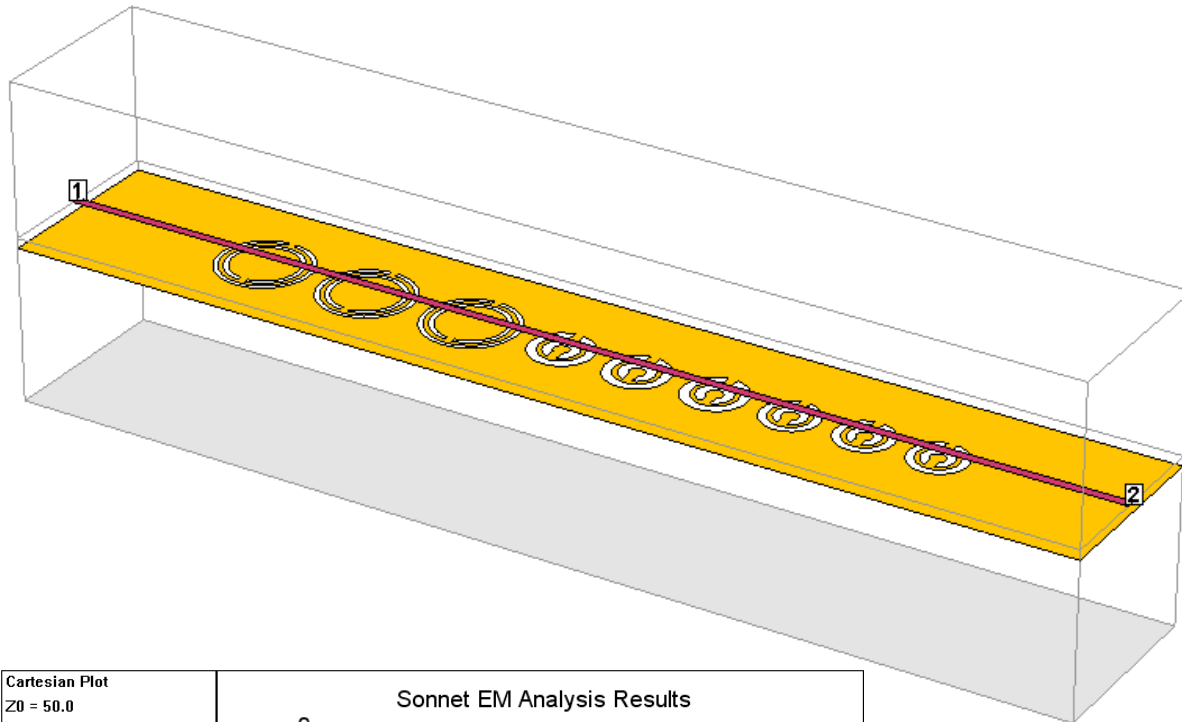


Circuit Analysis Runtime Benchmarks

- These benchmarks compare analysis run times for a selected cross-section of circuits
- Comparisons are made between Version 11 and Version 12 software on a per-frequency and overall run time basis
- Analysis performance improvements in Version 12 are due to two factors:
 - Parallel processing (new!) in Version 12 using multi-core utilization on a single computer
 - Enhanced meshing algorithm in Version 12 reduces subsection count (memory requirement) with no reduction in accuracy
- All benchmarks were conducted on the same computer
 - Dual processor, quad-core PC (2-year old technology)
 - Based on Intel Core2 Quad-core processor (E5345), 2.33 GHz, 1333 MHz FSB
 - Windows XP Pro x64
 - 32 GB of available RAM
- Version 12 Solvers:
 - Desktop Solver – 2 cores used
 - High Performance Solver – All 8 cores used on the PC



Defected Ground Structure (DGS) Filter 1



Version 11 Solver

Time/Freq.: 1,092 sec

Total Time: 11,820 sec

Version 12 **Desktop**
Solver

Time/Freq.: 289 sec

Total Time: 2,587 sec

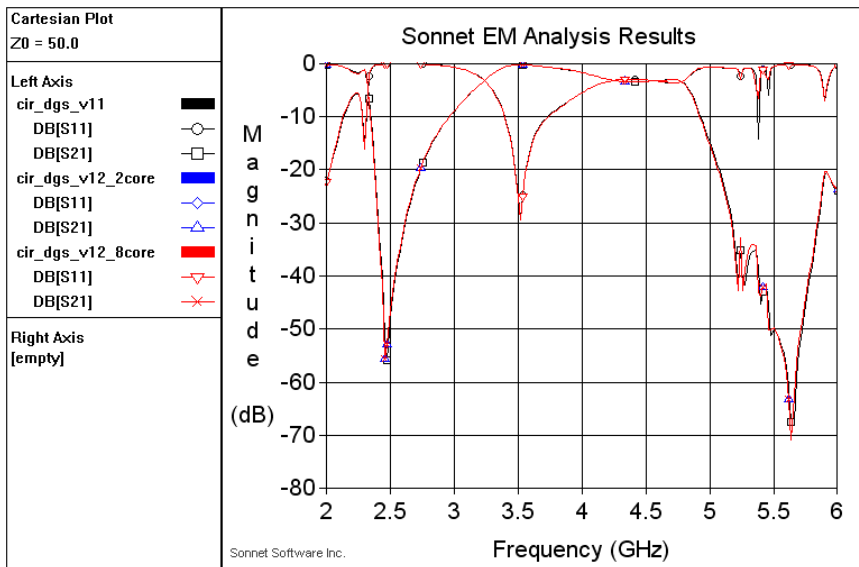
Improvement: 4.6x

Version 12 **High-Performance** Solver

Time/Freq.: 97 sec

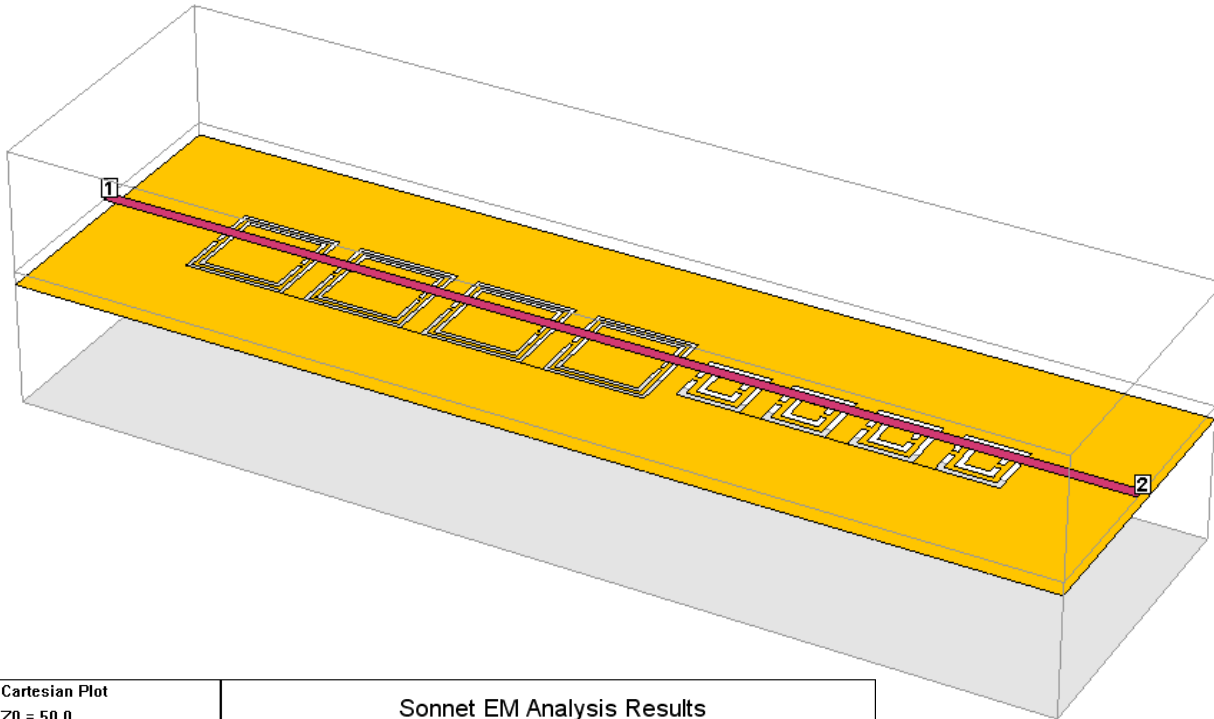
Total Time: 1,041 sec

Improvement: 11.4x





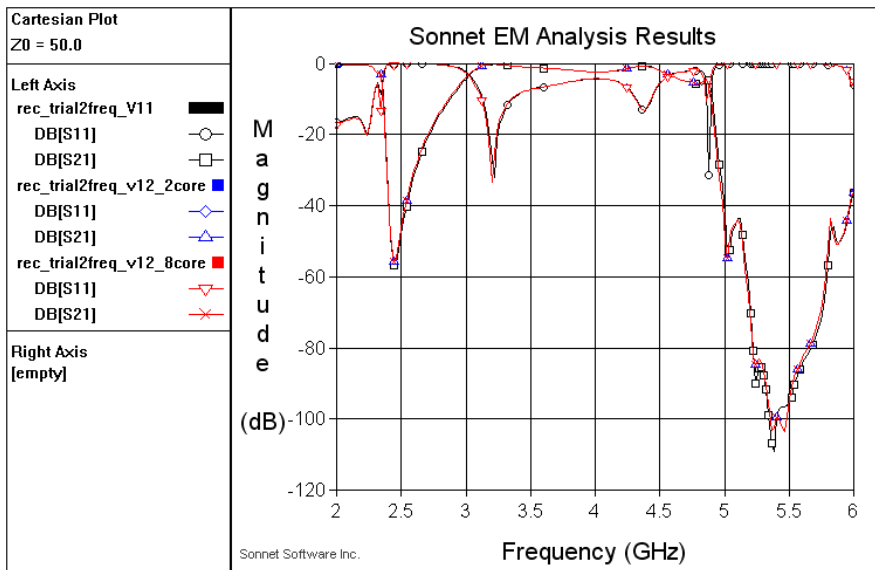
Defected Ground Structure (DGS) Filter 2



Version 11 Solver
Time/Freq.: 290 sec
Total Time: 8400 sec

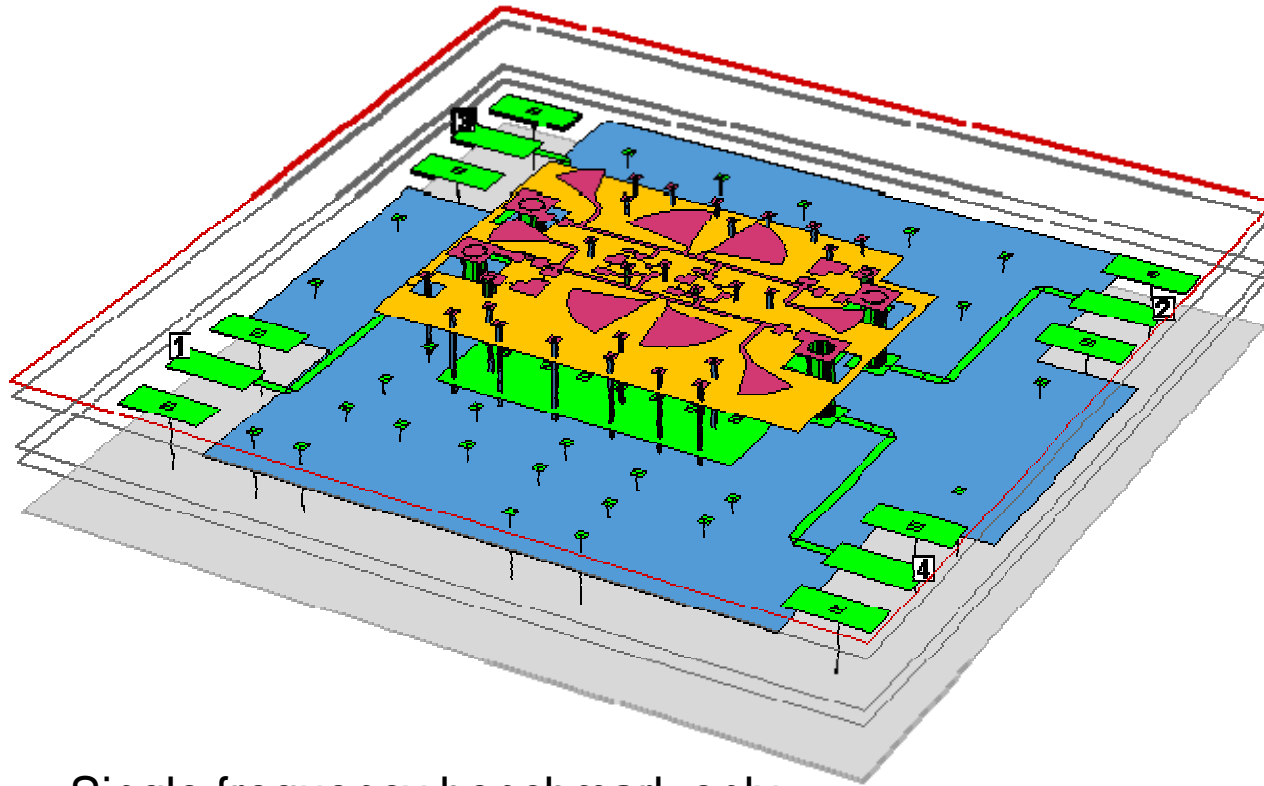
Version 12 **Desktop** Solver
Time/Freq.: 94 sec
Total Time: 1,419 sec
Improvement: 5.9x

Version 12 **High-Performance** Solver
Time/Freq.: 62 sec
Total Time: 702 sec
Improvement: 12.0x





Multi-Layer Package with SMD Components



Single frequency benchmark only

Version 11 Solver
Time/Freq.: 158,400 sec (est.)

Version 12 **Desktop**
Solver

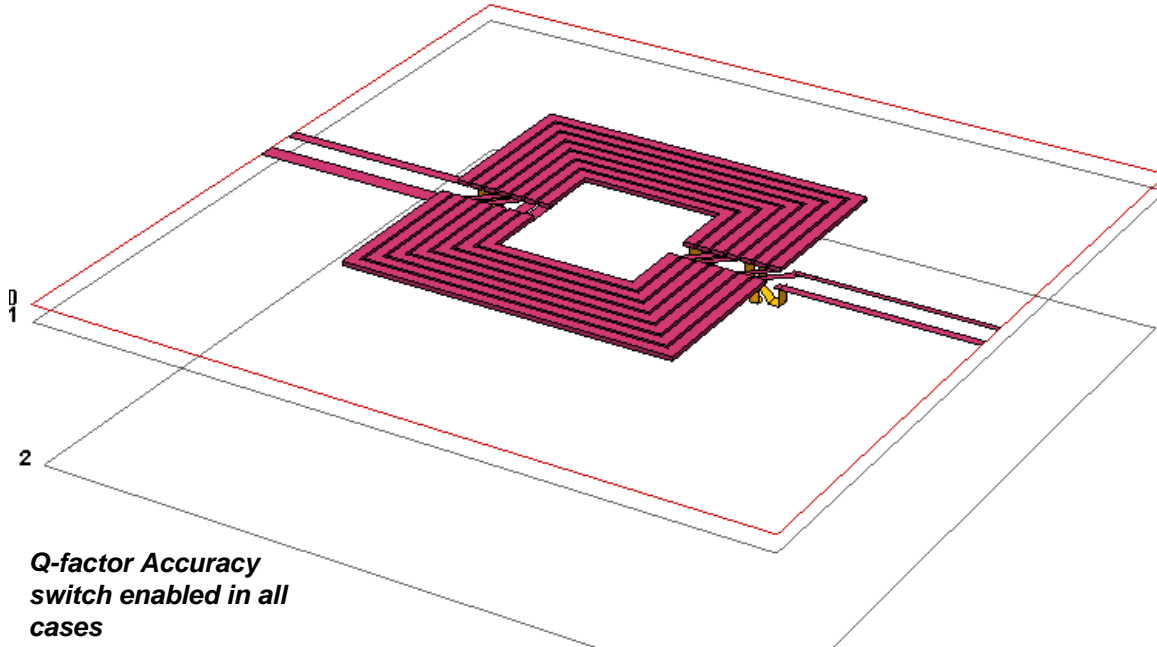
Time/Freq.: 25,580 sec
Improvement: 6.2x

Version 12 **High-Performance** Solver

Time/Freq.: 11,880 sec
Improvement: 13.3x



Spiral Balun on Silicon w/Thick Metal



Version 11 Solver
Time/Freq.: 250 sec
Total Time: 1,502 sec

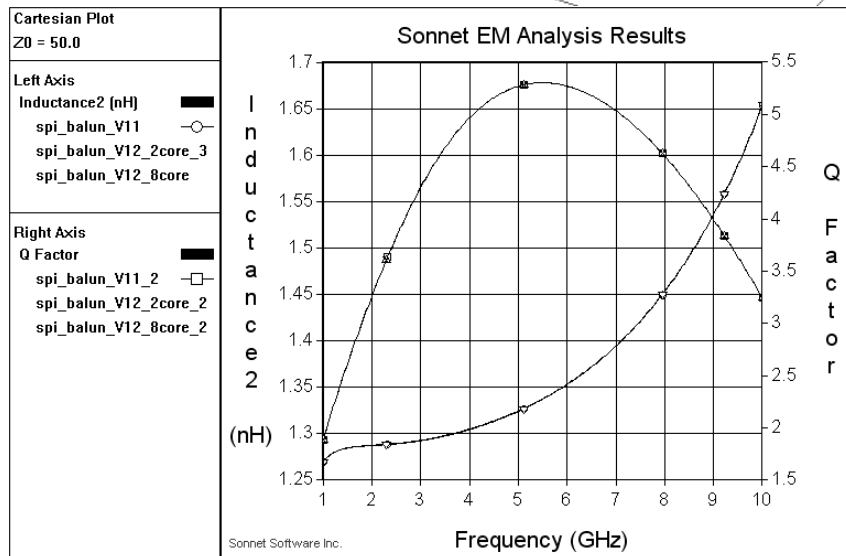
Version 12 **Desktop**
Solver

Time/Freq.: 115 sec
Total Time: 690 sec
Improvement: 2.2x

Version 12 **High-Performance** Solver

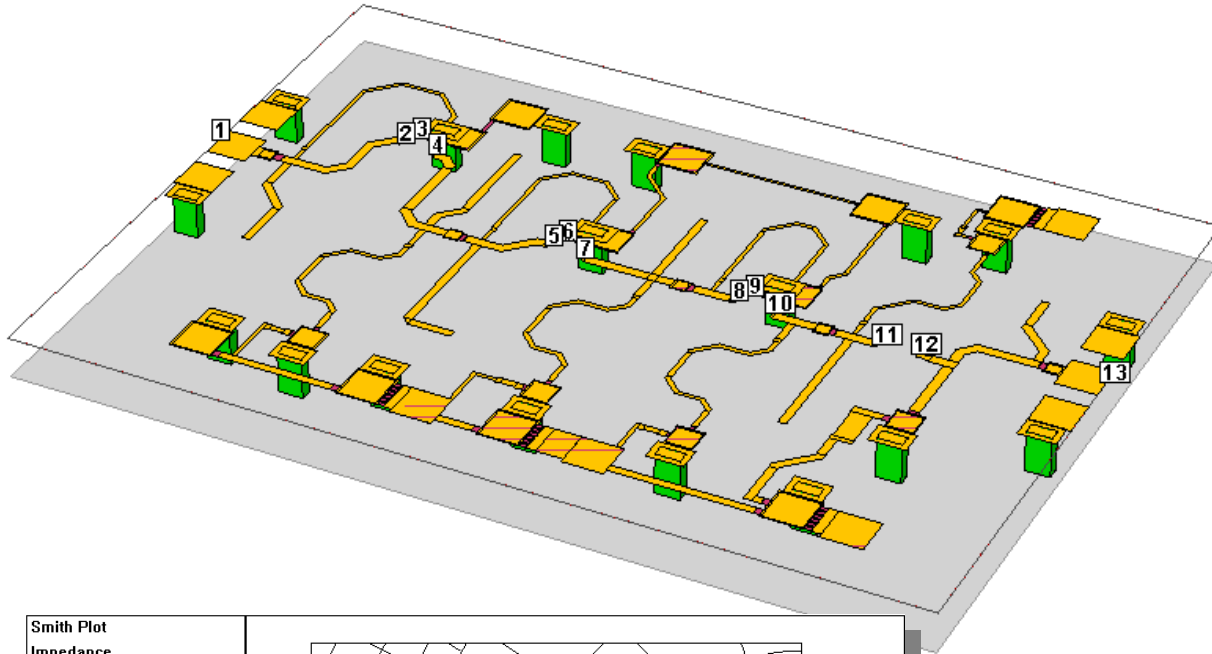
Time/Freq.: 46 sec
Total Time: 274 sec
Improvement: 5.5x

**Q-factor Accuracy
switch enabled in all
cases**





Q-Band 4-Stage LNA MMIC with Co-Calibrated Internal Ports



Version 11 Solver

Time/Freq.: 8,700 sec

Total Time: 52,200 sec

Version 12 **Desktop** Solver

Time/Freq.: 1,980 sec

Total Time: 9,180 sec

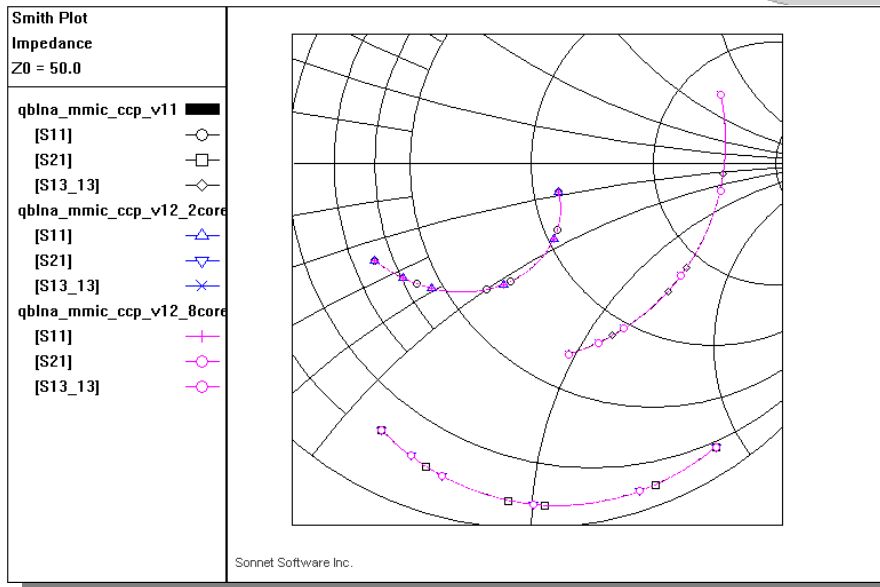
Improvement: 4.4x

Version 12 **High-Performance** Solver

Time/Freq.: 605 sec

Total Time: 3,660 sec

Improvement: 14.3x





LTCC Multi-Layer Bandpass Filter

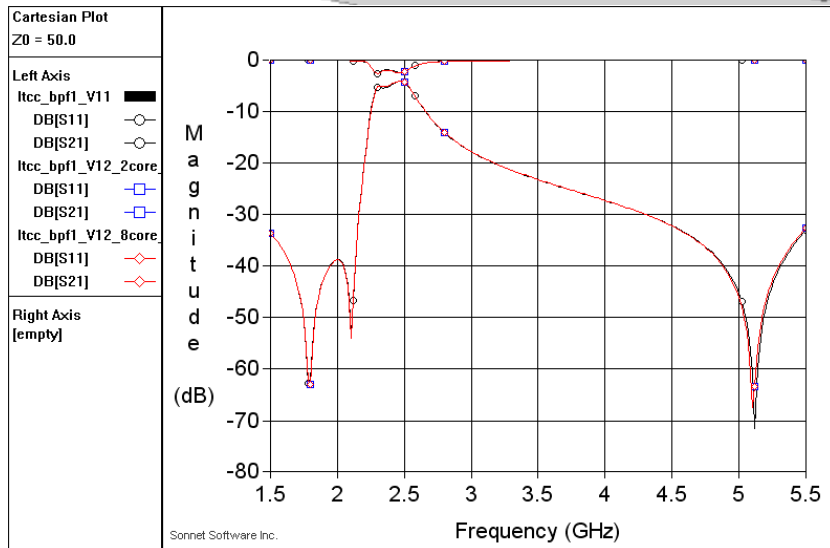
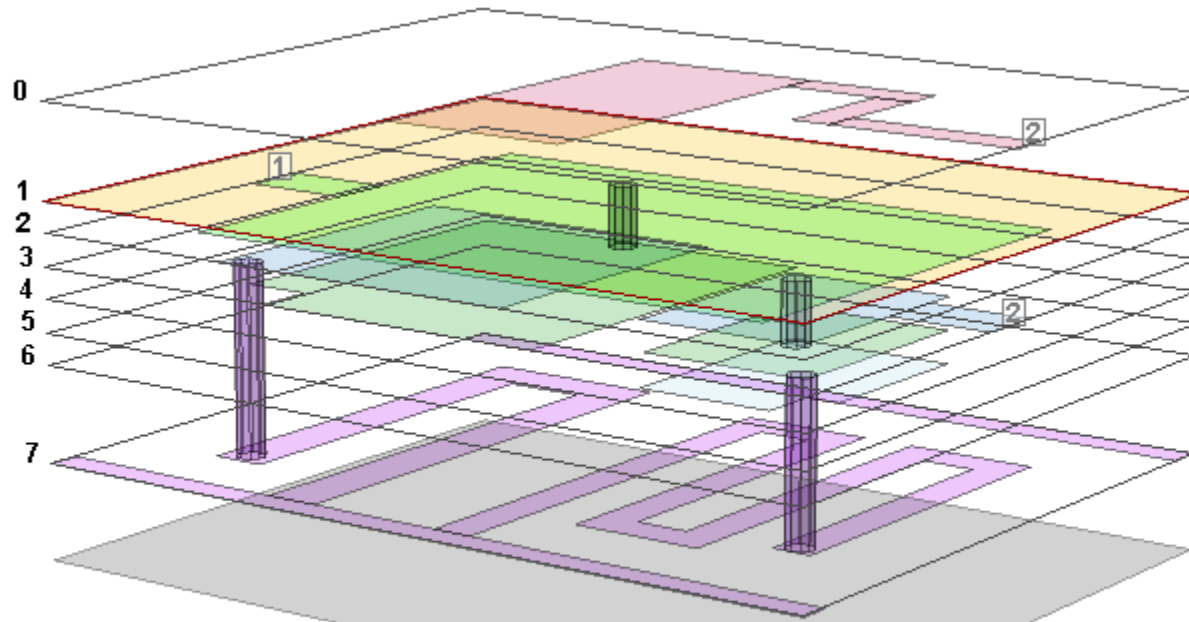
Version 11 Solver
Time/Freq.: 1,045 sec
Total Time: 7,320 sec

Version 12 **Desktop** Solver

Time/Freq.: 89 sec
Total Time: 509 sec
Improvement: 14.4x

Version 12 **High-Performance** Solver

Time/Freq.: 33 sec
Total Time: 200 sec
Improvement: 36.6x





4-Way Wideband Wilkinson Power Divider

Version 11 Solver

Time/Freq.: 379 sec

Total Time: 5,820 sec

Version 12 **Desktop** Solver

Time/Freq.: 205 sec

Total Time: 3,360 sec

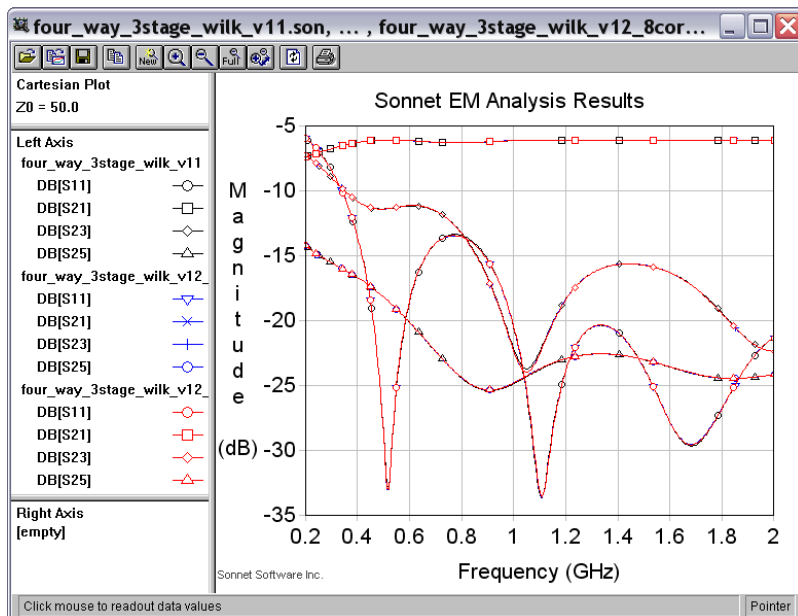
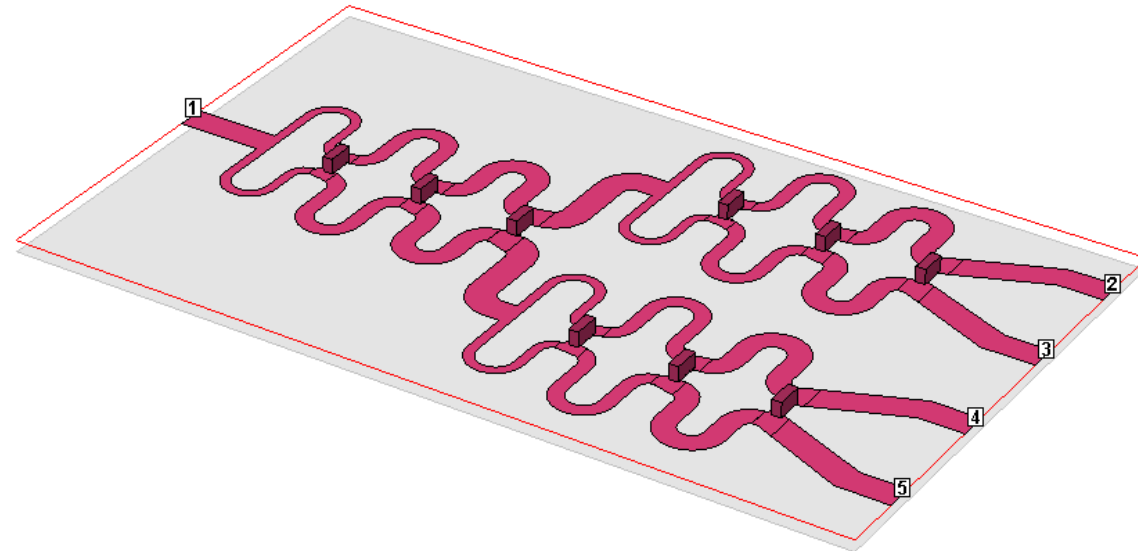
Improvement: 1.7x

Version 12 **High-Performance** Solver

Time/Freq.: 122 sec

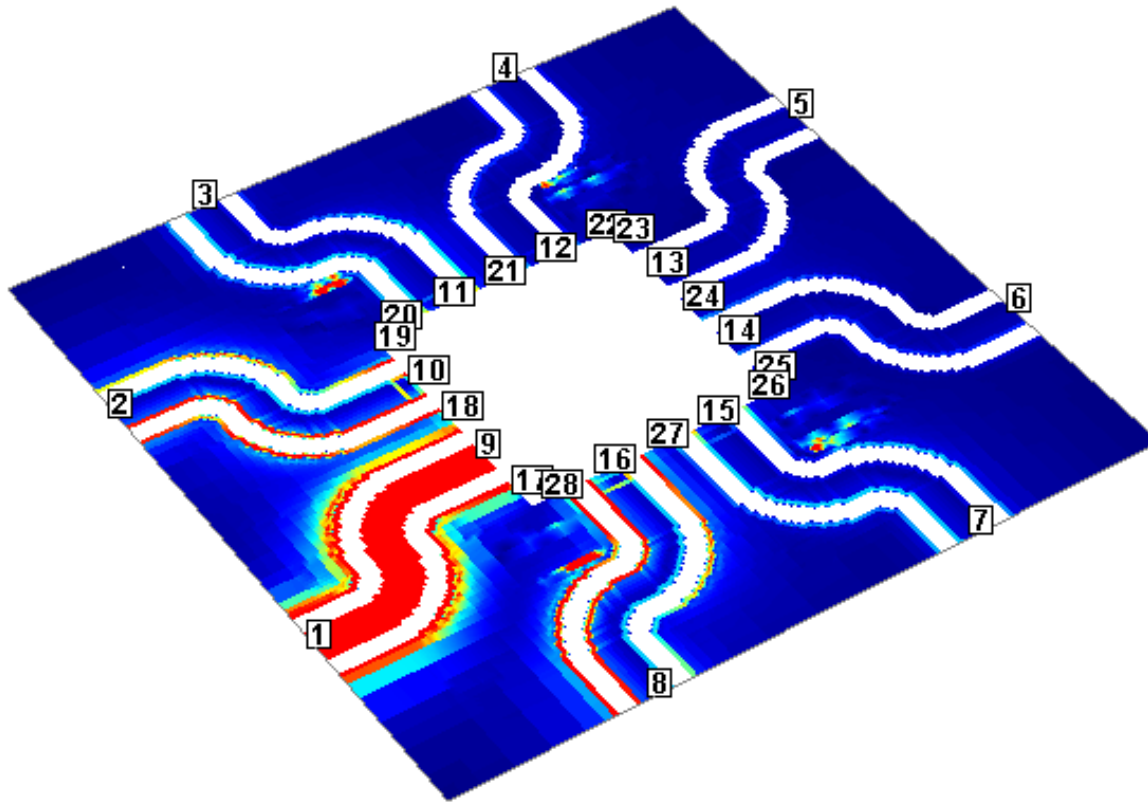
Total Time: 2,350 sec

Improvement: 2.5x





Coplanar Waveguide Test Fixture



Version 11 Solver

Time/Freq.: 1,361 sec

Total Time: 6,600 sec

Version 12 **Desktop**
Solver

Time/Freq.: 210 sec

Total Time: 1,278sec

Improvement: 5.2x

Version 12 **High-
Performance** Solver

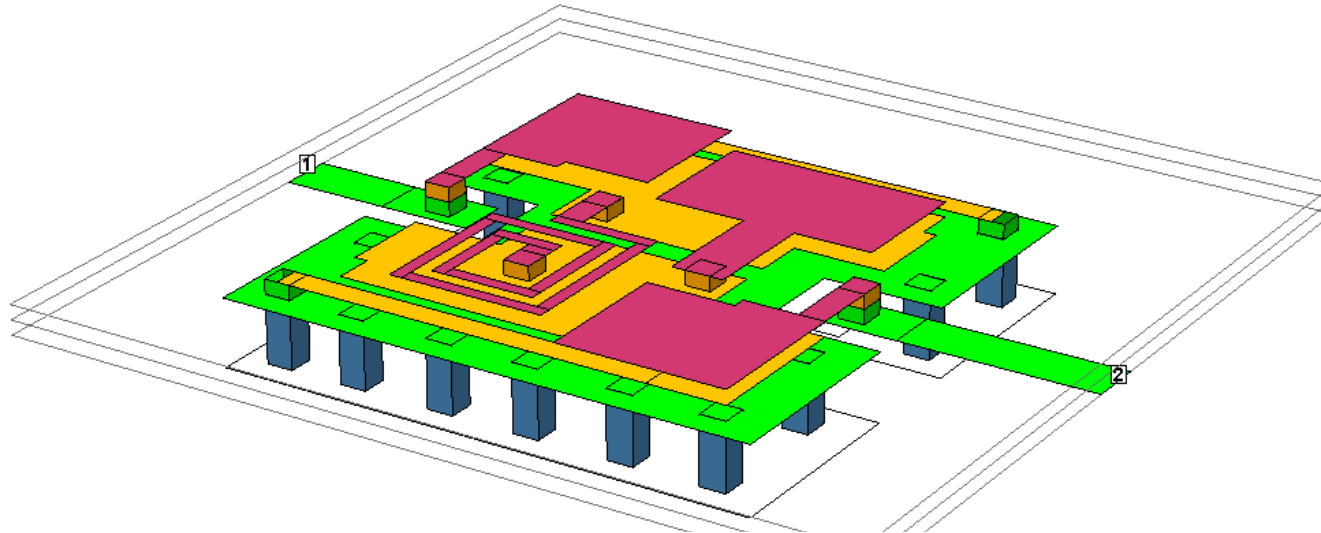
Time/Freq.: 83 sec

Total Time: 520 sec

Improvement: 12.7x



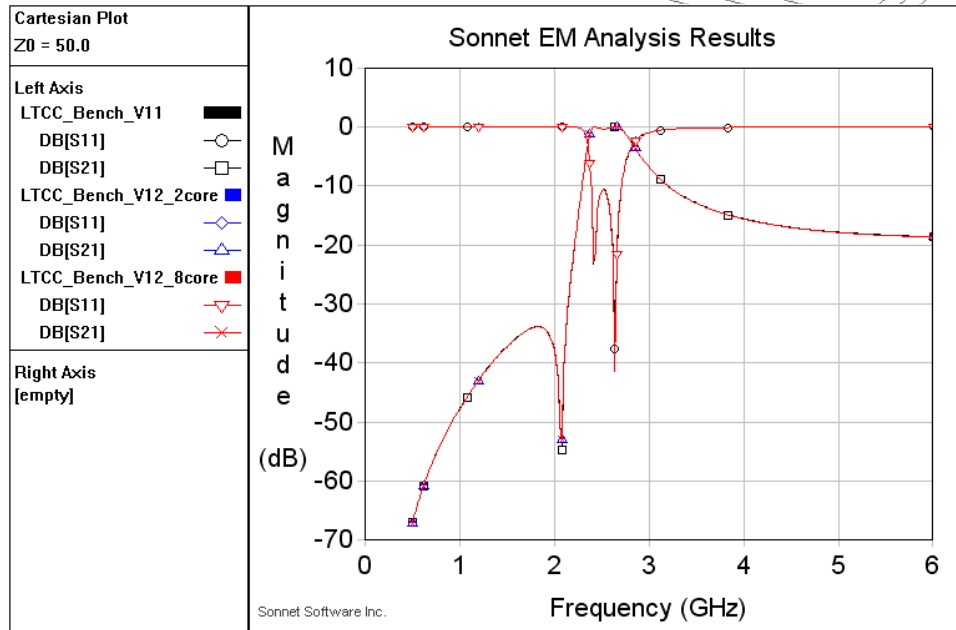
Bandpass Filter in Multi-Layer Package



Version 11 Solver
Time/Freq.: 4,560 sec
Total Time: 36,600 sec

Version 12 **Desktop** Solver
Time/Freq.: 536 sec
Total Time: 4,260 sec
Improvement: 8.6x

Version 12 **High-Performance** Solver
Time/Freq.: 185 sec
Total Time: 1,489 sec
Improvement: 24.6x





PCB Hybrid PA with SMD Components

Version 11 Solver
Time/Freq.: 5820 sec
Total Time: 23,520 sec

Version 12 **Desktop** Solver
Time/Freq.: 877 sec
Total Time: 3,520 sec
Improvement: 6.7x

Version 12 **High-Performance** Solver
Time/Freq.: 375 sec
Total Time: 1,508 sec
Improvement: 15.6x

