

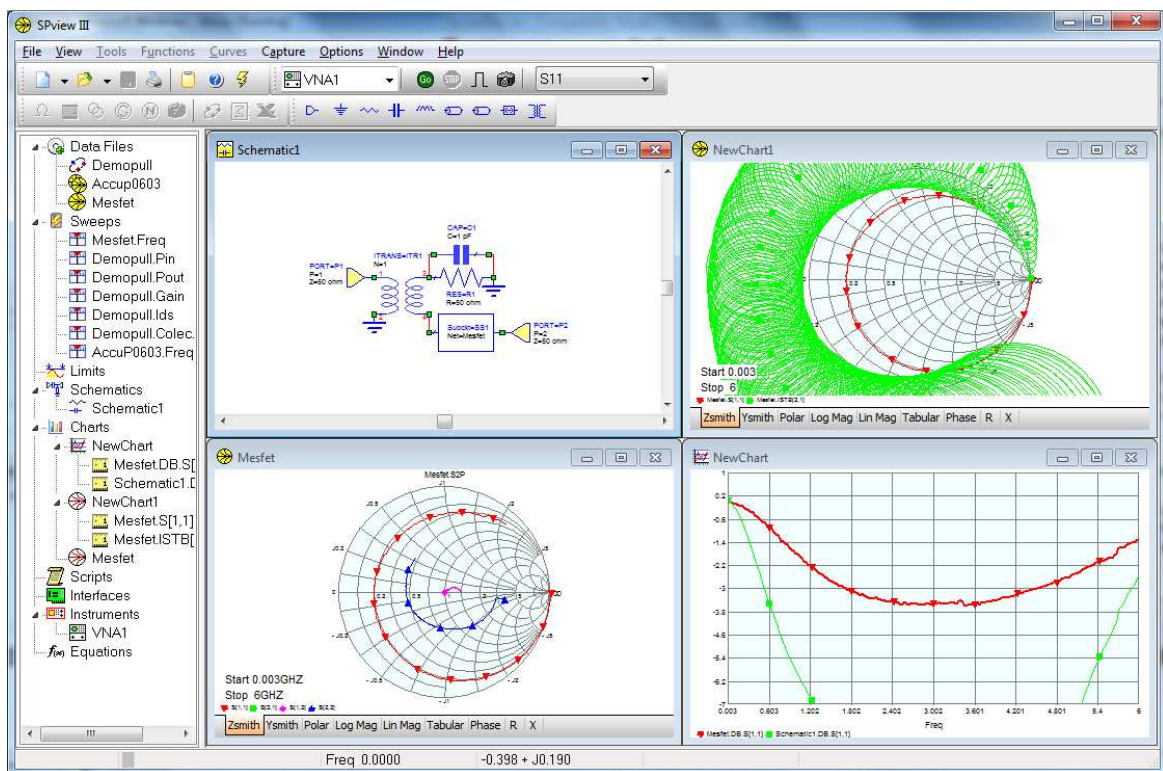
SPview III S-Parameter/Data Extraction and Analysis

Overview

SPview is an S-Parameter and measurement data toolkit for RF and Microwave engineering. With built in remote control capabilities, it can capture data directly from Vector Network Analysers, Spectrum Analysers, Scalar Analysers and Oscilloscopes. It can produce S-parameter data files compatible with all major simulators. Built in charting and data manipulation features enable faster circuit design, the 2-port functions charts are particularly useful for amplifier designers often removing several measure/simulate cycles.

The S-parameter transforms provide an almost complete measurement data back end post-processing engine equivalent to that found in expensive simulation programs.

Special tools for specific applications such as load-pull and mixed-mode S-parameters transforms provide additional functionality that would normally require additional expensive software.



SPview Main Screen

What's New

Version 3 is a major upgrade to the feature set.

The interface is now more automated with all features controlled by a project manager, features are enhanced in all areas.

Major functional additions include a multiport linear simulator complete with visual schematic editor, Equation plotter, Statistical functions, sweeps, limit lines, SPsim style measurements, multi instrument support, VISA remote control library support, USB instrument interface support plus lots more.

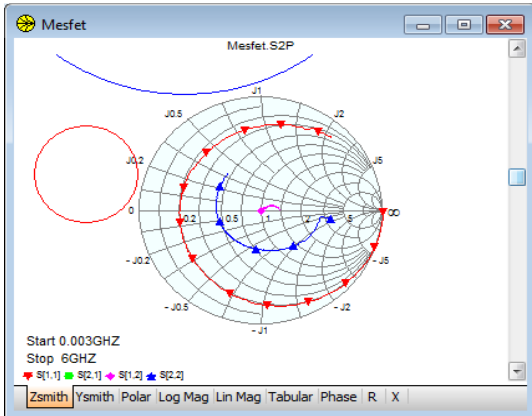
Key Features

- Data capture from Vector, Spectrum, Scalar Analysers and Oscilloscopes.
- Real-time, single shot and screen copy modes.
- Connect and control Instrumentation via GPIB,RS232 or LAN or USB.
- Supports NI488, Agilent SICL, R&S smart instruments and multi-vendor VISA remote control libraries.
- No third party libraries/drivers required to control Ethernet connected instruments.
- Displays data using several chart types including Zsmith, Ysmith, Polar and Log magnitude.
- Visual data editing, merging and analysis.
- Comprehensive S-parameter function analysis chart set.
- Post processing modes including ref-plane adjustments, stability, noise and gain circles.
- Load-Pull data import and contour mapping.
- Mixed mode differential/common mode S-parameter transforms.
- Schematic system with multi port linear simulator.
- Comprehensive range of measurements applied to schematics.
- De-embedding using 2 port NEG2 negation element.
- Mathematical complex equation plotting.
- Statistical and trend analysis functions.
- Support for MDIF file import and use as schematic elements.
- COM connectivity to other COM enabled software and simulators.
- Built in programmability with VBscript and JAVA script languages.
- Syntax highlighted Script editor
- Multi level Undo/Redo for charts, schematics and script editor.
- Saves captured data as '.SNP' S-parameter files for input into simulators.
- Create new files using data from data books with numeric or graphical entry.
- Real-time panning and zooming of all chart types using mouse.
- Status readout with precise data-point values in both U+JV and R+JX.
- 2-Port function charts including Stability(K-factor,Det,b1) and Power gain (Gmsg, Gmax, Gu).
- 1-port transform charts including group delay, VSWR and TDR (Time domain reflectometry)
- Stability circles mode with continuously variable frequency sweep control.
- Load, save and convert 2-port Y,Z and H parameter files in MA, DB or RI format.
- Re-normalise data to any impedance.
- Edit all trace data onscreen by simply grabbing data points and dragging across the screen.
- Insert and delete data points onscreen with auto interpolation. Grab and drag whole curves.

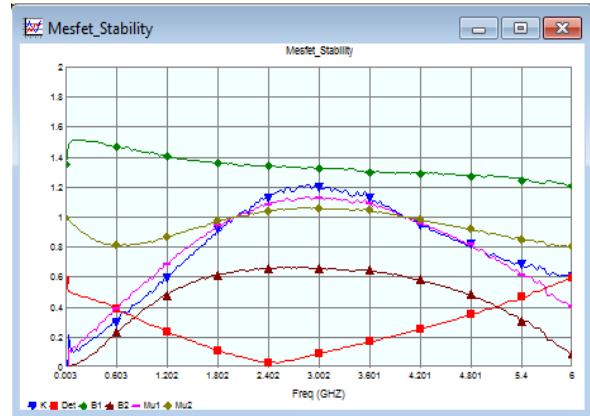
S-Parameter facilities

SPview can capture S-Parameter data from virtually all commercially available Vector network analysers both new and old. Once captured, data can be manipulated by SPviews internal mathematical transforms. Functions available include Stability circles, Noise circles, Gain circles, K-factor stability analysis, Power Gain, Group delay, VSWR and Time domain.

SPview gives older VNA's the facilities available in newer and more expensive models and additionally it can capture N-port data, that is, 3, 4..99 port data can be captured and saved as S-parameter files. Flexible capture modes include the ability to capture individual traces directly into any chart and to cut and copy traces between charts.



Smith chart with stability circles



Example Stability function analysis

SPview provides many functions to post process S-parameter data such as reference plane adjustments, re-normalisation, smoothing and FFT transforms. Live captured data can also be directly fed into other programs such as Simulators.

Data Capture

Multiport S parameter data can be captured directly into a chart or into a data file stored in the project manager (ready for use in a schematic). SPview automatically prompts the user to change ports and load unconnected ports when the DUT has more ports than the VNA supports.

SPview also supports single function data capture, screen snap, S11,..S22 and for newer analysers, the catalogue traces function allows any displayed trace to be downloaded.

Circles

For 2 port data sets displayed in a vector chart, interactive circles can be applied. SPview provides...

- Stability circles
- Noise circles
- Constant gain circles

The circles can be pulled along the data set with sliders, gain and noise circles can also have their respective parameter dynamically altered.

Function charts

A selection of common S-parameter transforms is available which are directly plotted onto scalar charts, transforms include...

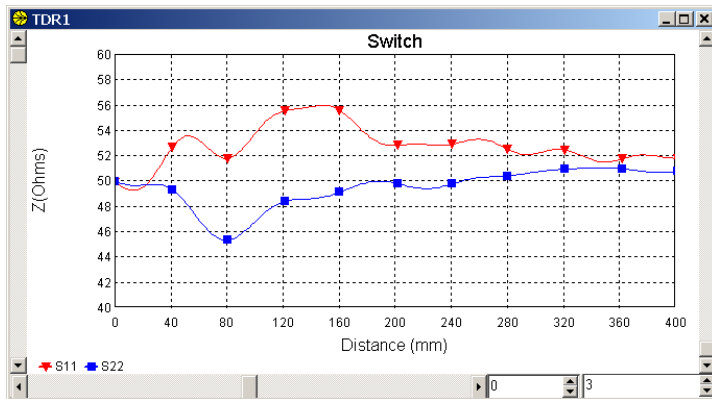
- Stability
- Power gain
- Time domain
- UV grid
- De-normalised RX grid
- Logarithmic Magnitude
- Phase

A further comprehensive set of transforms are available via the schematics measurement system.

Note: Data capture is not available on light versions. All transforms are available for imported data.

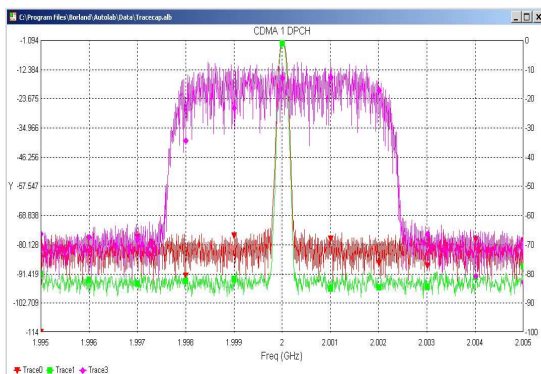
Live TDR

The Live TDR mode captures S-parameter reflection data from VNA's and performs a time transform to produce a distance to discontinuity trace. This facility is also available for offline data, the real-time mode allows circuits to be hand optimised.



Trace Capture

Full trace captures of Oscilloscopes, Scalar and Spectrum Analysers. Snapshot single shot and live trace update modes. Multiple trace overlays, cut and paste curves between charts, Load save and merge trace data. Export data to MS excel. Trace math and curve editing facilities.



Trace Capture

Visual Data manipulation facilities

SPview's graphical interface allows on screen editing. Data points can be grabbed using the mouse and dragged over the screen to a new point. Whole curves can be grabbed and moved on screen.

Individual data point can be added deleted or edited. Trace math can be applied to curves such as subtraction, multiplication etc.

Charts can be dynamically panned and zoomed simply by dragging the mouse.

Markers

SPview uses several different marker types, Trace Markers, Data Markers and Delta Markers.

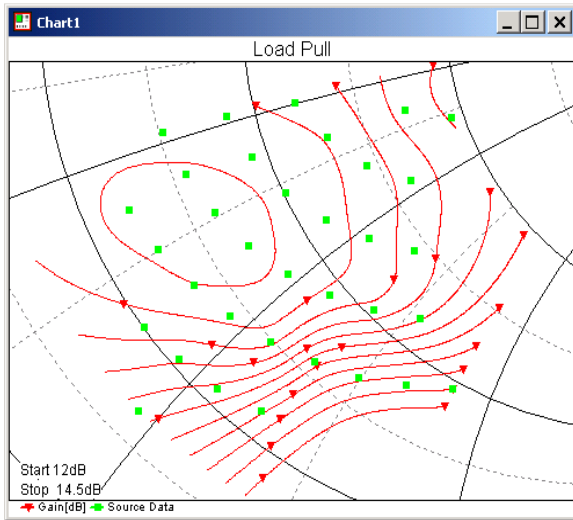
Multiple data markers can be placed on any data point(s). Markers can be dragged using the mouse.

Version 3 now adds vertical markers which display the Y values of all curves on a chart for a specified X value.

Multiple vertical markers can be placed on a chart.

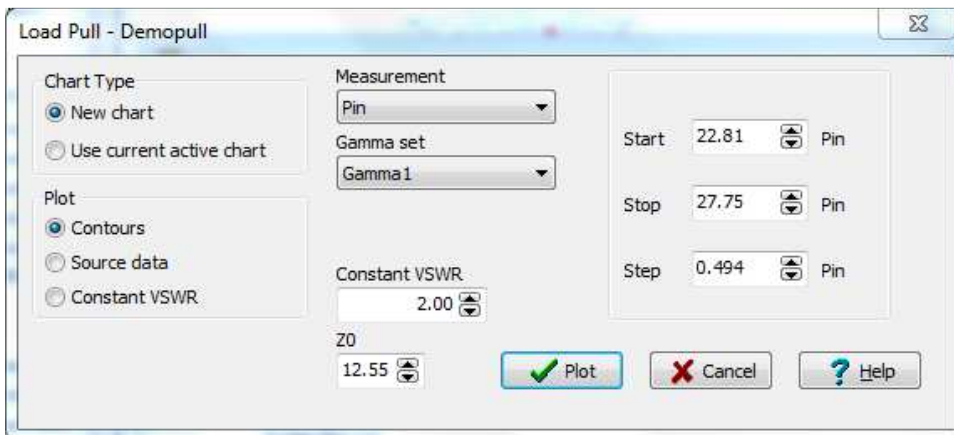
Load Pull Features

Import Data files produced from Focus and Maury Load pull test systems. SPview utilises 3D spline interpolation algorithms and then a mapping algorithm to produce contour maps of any measurement data within the files. Multiple measurements can be overlaid on the same chart



Contour mapping

The load pull control panel provides easy access to all the measurements contained in the data file and gives user control on how data is presented on the chart.



Load Pull Control Panel

The load pull system can also import and plot **Sweep Plan Files** (*.spl). These files contain multiple data sets usually one for each frequency.

The load pull math engine can plot several functions including...

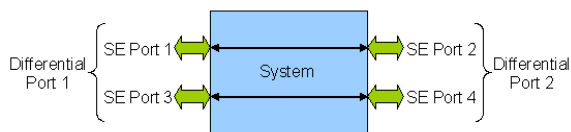
- Source data points
- Contour map
- Constant VSWR

The plots for any measurement contained in the file can be made and overlaid on the same chart, in addition the plots can be made with reference to any gamma set held in the file.

Constant VSWR plots are made on a scalar grid chart and plotted from -180 to +180 degrees. These are made with reference to a user selectable VSWR.

Mixed mode S-Parameters

Mixed mode S-parameters are commonly used in signal integrity applications especially in the latest high speed digital systems and microprocessor-PCB interfaces. This analysis mode can be used to highlight such problems as crosstalk between interconnects.



4-port Single ended to Differential port mapping

Specialist VNA's are employed to measure differential S-parameters.

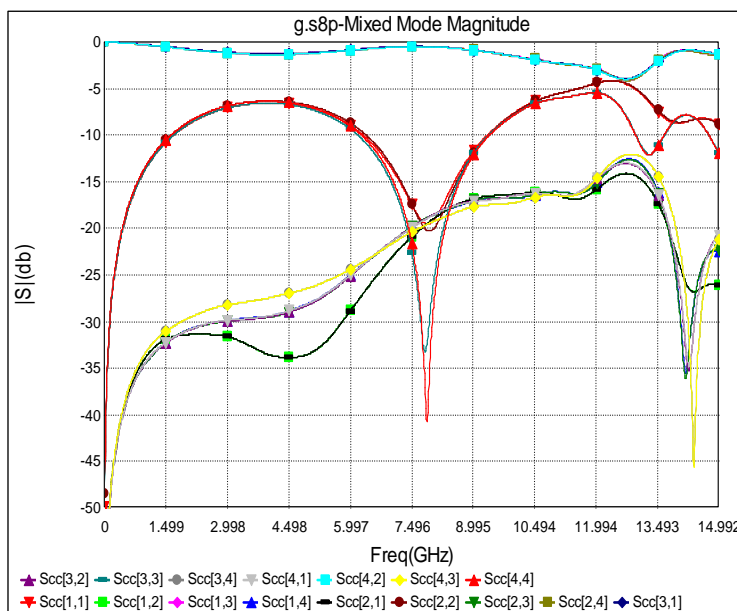
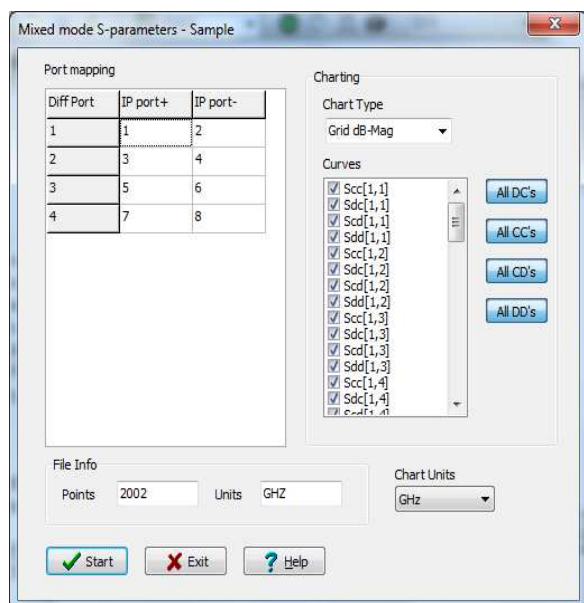
SPview mixed mode S-parameter facility allows multi-port differential and common mode excited networks to be measured and analysed using only a 2-port single ended VNA a software transform algorithm is then applied to calculate the mixed-mode network responses.

SPview transforms work with 4-98 port network data stored as touchstone compatible files.

Single ended to mixed mode port assignments are automatically made by the tool but the port mapping display on the tool control panel allows these assignments to be manually changed.

Output data can be transformed and plotted in 4 modes

- Common mode input and output.
- Differential input to Common mode output.
- Common mode input to Differential output.
- Differential input and output.



Mixed mode transform control panel and sample output

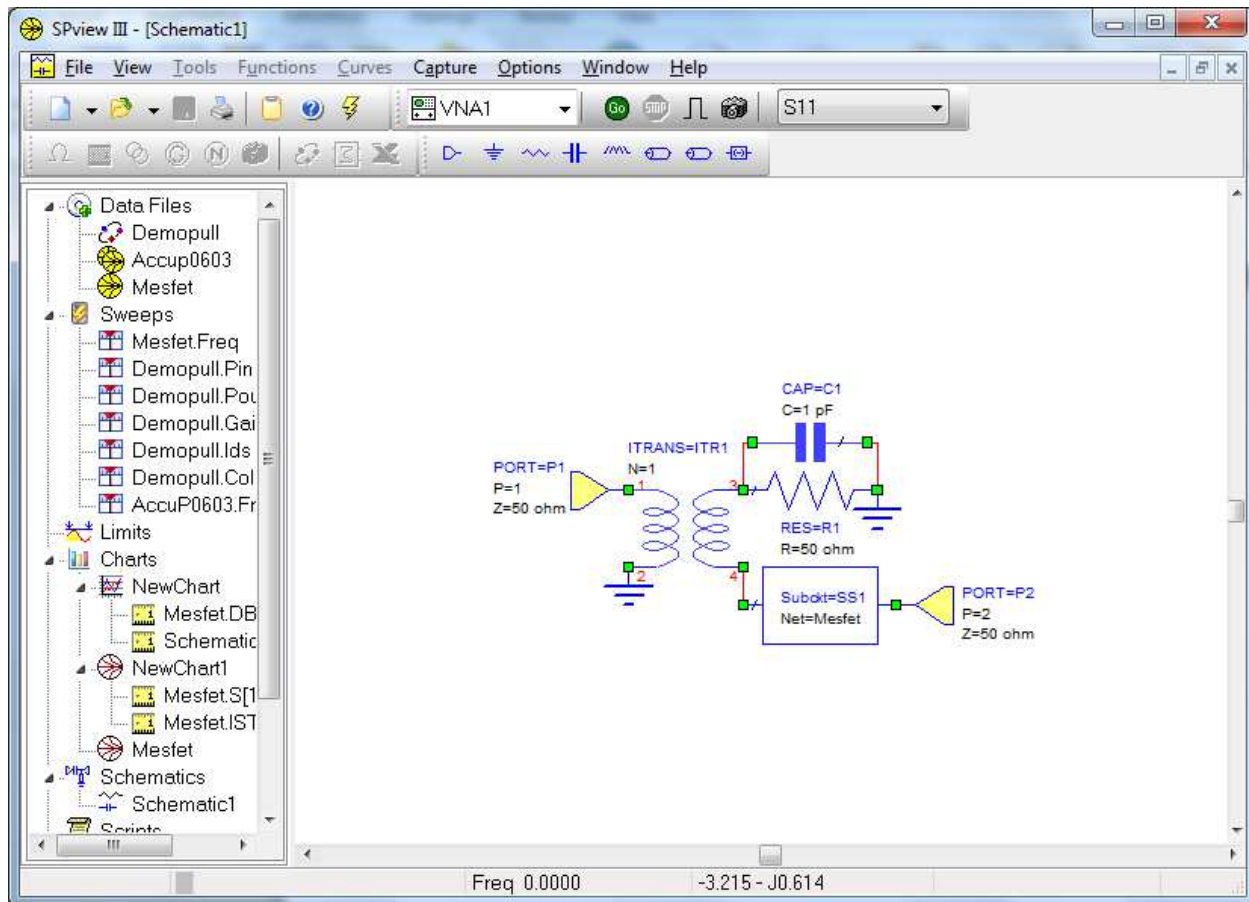
Outputs can be plotted on vector or a scalar chart, vector plots allow further mathematical transforms to be applied to the mixed mode data.

Schematics

New in version 3, the schematic feature allows data files (either captured or loaded from disk) to be dragged and dropped onto a schematic and combined with other data files, components and transmission lines.

The schematics allow the ports to be set to any impedance which allows data files to be renormalized to arbitrary impedances.

Additionally the NEG2 2 port negation element can be included in schematics and used to de-embed parasitic elements from a data set.



Schematic Features

- Autowire and/or manual wiring tool
- Schematic sub circuits
- Up to 8 ports per schematic
- Drag and drop data files onto schematic
- Drag and drop sub circuits onto schematic
- Multi-level Undo/Redo
- Rotate elements
- Enable/disable individual elements
- Copy/Paste single/multi items
- Copy schematic to clipboard as graphic
- Equations
- Schematic input parameters
- Component property editor

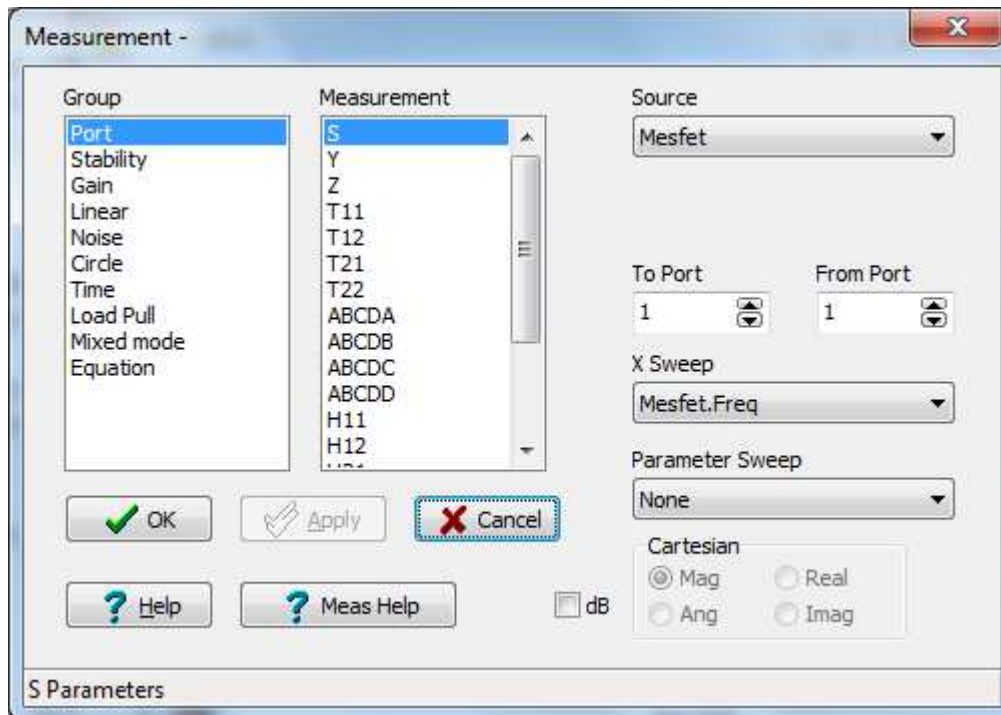
Simulation

The schematics/measurement/simulation system is fully automated and synchronised, measurements added to charts provide immediate results traces. All changes/edits to schematics produce immediate updates to chart traces.

No special simulation properties need to be set, all simulations are determined by the source data provided in the measurement.

Measurements

A host of measurements can be applied to schematics and data files, these measurements are more versatile than the older SPview2 style transforms.



Measurements control panel

The measurements system is controlled via the control panel, the measurement source can be selected along with the sweep source. A secondary sweep can be defined for certain measurements to allow a family of curves to be generated. Various input options are displayed in accordance with the measurement selected.

Sweeps

Sweeps are defined in the project manager sweeps section, sweeps can be user generated or automatically generated from imported data files. Sweeps can be linear, list or log, a list sweep allows each data point to be specified explicitly and not related to the other points around it.

Sweeps can have a “units type” attached which allows the displayed units to be multiplier related to the fundamental units used by the linear simulator. In other words if the sweep is defined as “Frequency” then the display units can be specified as GHz, MHz, KHz etc.

A sweep editor is provided to manage sweeps.

Measurements

All measurements are attached to a chart on which the output traces will be generated. Measurements include..

- S, Y, Z, G, H, T and ABCD parameters.
- K, D, B1, B2, nMu1 and Mu2 stability parameters.
- Gu, Gtm, Gmax and Gmsg gain parameters.
- VSWR, GD (group delay), Zodd, Zeven and Zin.
- NF, Ntemp, Gopt, Fmin and Rn noise parameters.
- Istb, Ostb, Ncir and Gcir circle parameters.
- Timp, Tstp and TDR time domain transform parameters.
- Load pull measurements.
- Mixed mode measurements.

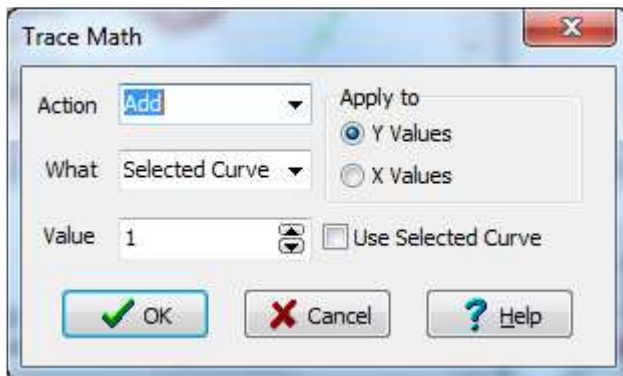
In addition a number of Cartesian modifiers can be applied to the measurement result data which control how the complex result data is transformed for scalar XY plotting.

Math

SPview provides a number of mathematical features ranging from simple math applied to existing trace data to full blown complex equation plotting, statistical and trend analysis.

Trace Math

Trace math is used to apply a simple shift or multiplication of existing trace data. Trace math can be applied to either the X or Y value set of a curve.

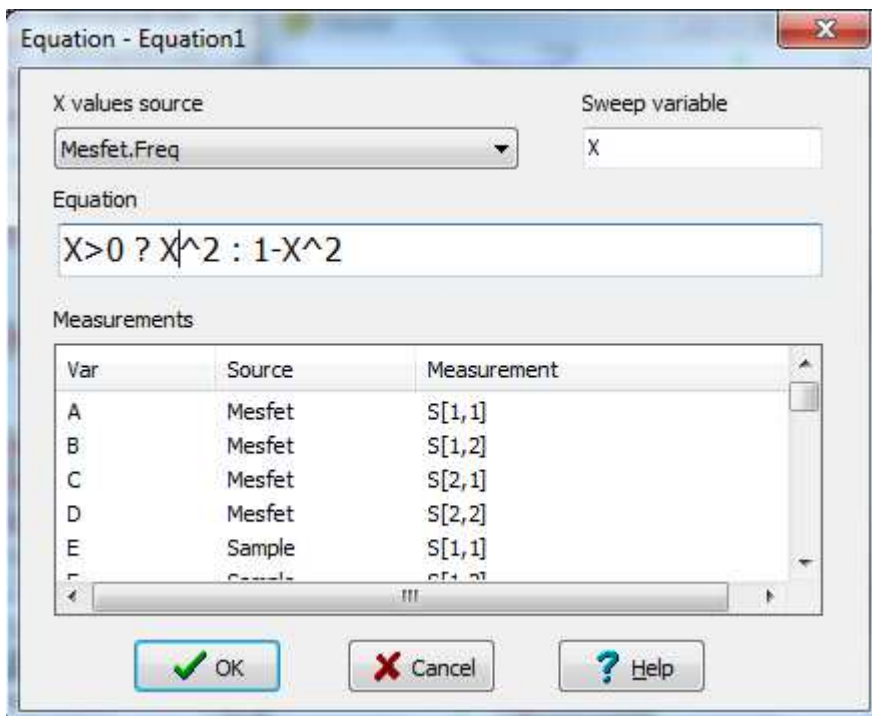


Actions are Add, Subtract, Multiply and divide. The action can be applied to a single or all curves in a chart. In addition the action can either use a fixed value or the selected curve can be used as the value to be used against all other curves.

Thus a normalisation can be performed by subtracting the selected curve to all other curves.

Equation plotter

Equation plotter is used to plot free form equations either as a function of existing trace data and/or as a function of a completely independent variable (controlled by a sweep).

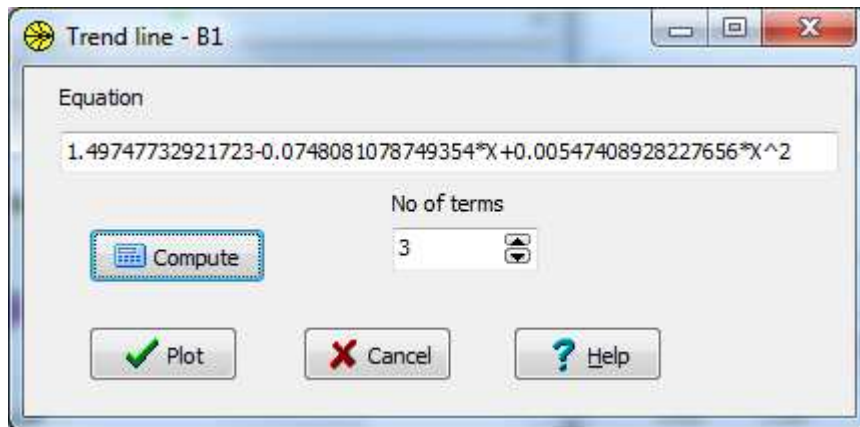


Equation plotter control panel

The equation evaluator is an infix expression evaluator which also seamlessly integrates complex numbers as a data type. The evaluator includes a library of real and complex functions. The syntax also includes an *if-then-else* structure (shown in the diagram above) which allows for conditional evaluation.

Trend Analysis

The trend analysis tool is used to extract a trend equation from measured curve data. It can generate a polynomial equation to approximate the curve and it can also plot the equation using the same X sweep data as the curve analysed.

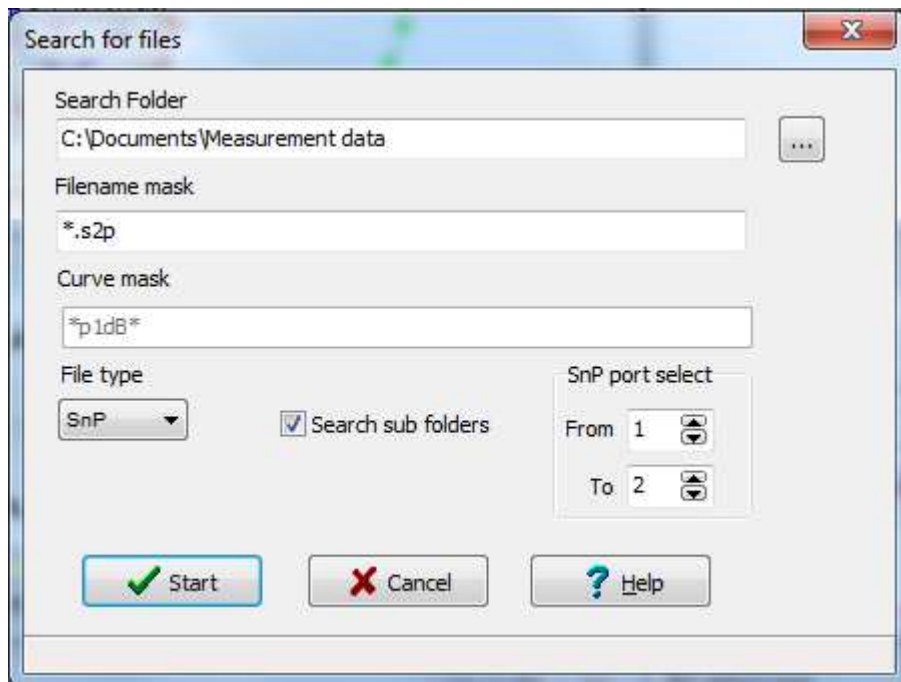


Trend analysis tool.

The tool allows up to 9 terms to be used in the approximation, a 2 term equation produces a straight line linear regressive result.

Statistics

The statistical analysis functions analyses all lines in a chart and produces statistical lines. These functions are coupled with the file search utility which is used to extract related data from multiple files.



File search utility

The search tool uses wildcard searches to import alike single curve data from multi curve files data into a single chart, i.e. in the above case all the S21 curves from any 2 port touchstone file found in the selected folder or sub-folders.

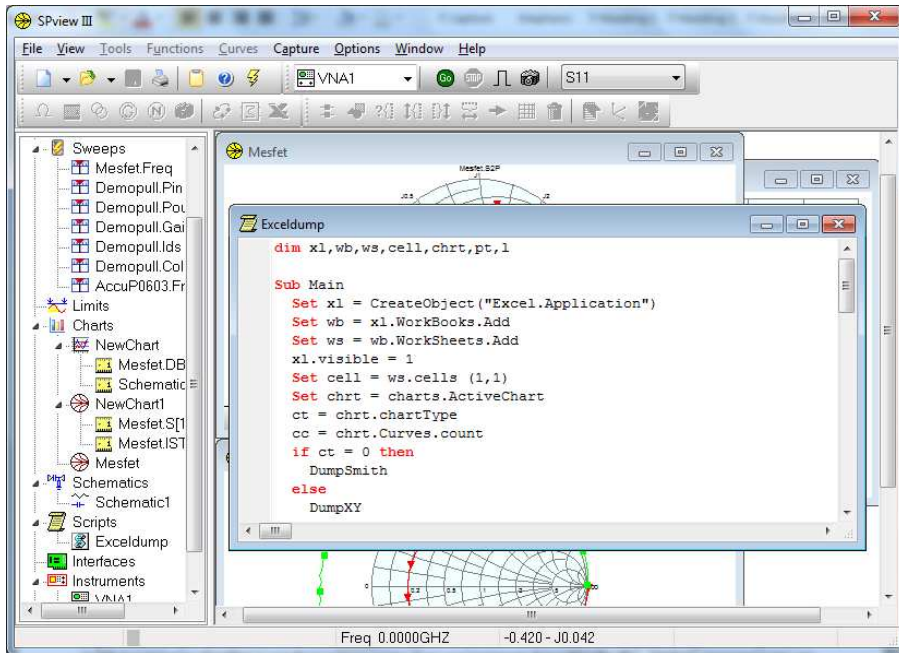
Once imported, the SPview statistical functions can plot the Min,Max, Mean, standard deviation and NxSD of the data.

Scripting

The internal scripting environment provides a full syntax highlighted editor for Visual Basic and Jscript. Useful scripts can be appended to the main screen Script menu for integration into SPview's environment. SPview exposes a full programming API to the script language.

Scripts allow users to write their own program code to add functionality to SPview's standard features. The scripting interface uses the windows scripting engine, this allows any programming language supported by windows scripting host to be used. Standard languages supported are VBScript (Visual Basic) and Jscript (Java)..

Script programming environment



SPview provides full access to the charts and instruments/remote control system.

All instruments can be programmed without knowledge of the individual instructions sets. The internal drivers convert a generic instruction set into the device specific functions.

Write through *facilities*, allows direct remote control reading and writing of any instrument. GPIB/LAN/RS232 direct control allows any instrument fitted with these interfaces to be controlled via SPview using its native command set.

Any number of scripts can be created or imported, they are managed in the project manager and can be run directly from there.

Note: The scripting features is not included in the light version.

Supported Equipment

The following table lists the currently supported equipment, this list is for equipment that is fully supported for automatic extraction. The Script system can access and control any piece of equipment using its native command set.

The internal drivers usually support significantly more models than listed as vendors tend to make their instruction sets compatible.

Vector Network Analysers	Spectrum Analysers	Scalar Analysers	Oscilloscopes
HP/Agilent			
HP8752/3 A,B,C,D,E	8560/1/2/3E	8757	54xxx (series)
HP8510 A,B,C,D	8590/1/2/3/4		
HP-PNA	ESA		
HP8719/20	PSA		
HP8711/12	8566/7/8B		
HP4395/6	4395/6		
	70000		
IFR/Marconi/Aeroflex			
	2309/10	6501	
	2382/3/6	6200	
	6800	6800	
	2390		
	2399		
Rohde and Schwarz			
ZVx (series)	FSP		
	FSE		
	FS300/315		
Anritsu			
360 (series)	MS/MSA26xx		
R37xxx (series)			
MS642x			
Advantest			
R3762/3			
R3751/2/3/4			
R3860	R3267/73		
Tektronix			
			TDS220
			TDS400
			TDS600
Lecroy			
			Waverunner (series)

License options

SPview can be supplied in 3 license options,

Software Nodelock	Low cost single user	single installation
Hardware Dongle	More versatile single user	multi-installation.
Networked	Multi-user	multi-installation

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