
Product Note 77

DataView, ContourViewer and WinPlot: Focus Microwaves Graphics Software

DataView, *ContourViewer* and *WinPlot* provide means for Focus customers to graphically represent and manipulate measurement files created using Focus Microwaves Load Pull and Noise measurement systems.

DataView is a graphics package that features: 1.) Graphical depiction of measured data in Cartesian and Contour plots, 2.) *DesignWindow* data processing. *DataView* can be operated independently of the measurement software for post-measurement data evaluation.

ContourViewer is a contour and 3D plot generation, and processing application for load pull data. It allows for multiple contour display, zooming, point elimination, JPG file export, Zo normalization, stability circle display, actual *tuning to an impedance* in the WinPower measurement program and more.

WinPlot allows Cartesian and Smith Chart plots of S-parameters (S1P and S2P), DC parameters (IV), Saturation and Harmonic sweeps. Various data manipulation and display operations are also provided [1].

DesignWindow is a data filtering and display application that allows simultaneous parameter requirements and dynamically displaying the remaining valid points either on the Smith Chart (Load Pull files) or on an IV plot (DC parameter files). It also allows tuning to a particular impedance on-line and measuring actual data.

DataView features:

- Opens measurement files via *ContourViewer* and *WinPlot*.
- Activates *DesignWindow*: Displays Load Pull (LPD) and IV Curve (IVP) files by filtering specified parameters and re-saves them for later processing in *ContourViewer* or *WinPlot* (Figure 1 & Figure 3).
- “Tune-to” impedance within *DesignWindow* plot, using Focus Microwaves’ WinPower software (Figure 2).

DesignWindow filters load pull data files and displays valid impedance points based on a multi-parameter mask. The range of each parameter is adjusted using scrollbars, as shown below.

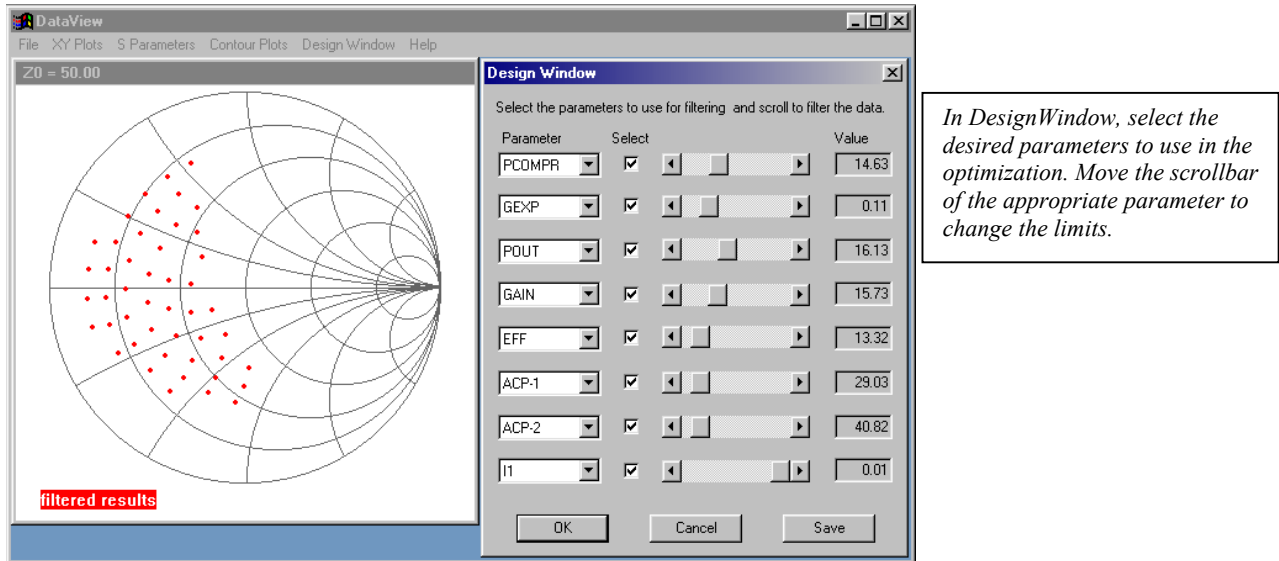


Figure 1: Load Pull *DesignWindow*

DesignWindow can tune to a specific impedance using WinPower. This feature can be used to compare interpolated values from *DesignWindow* display with measure data.

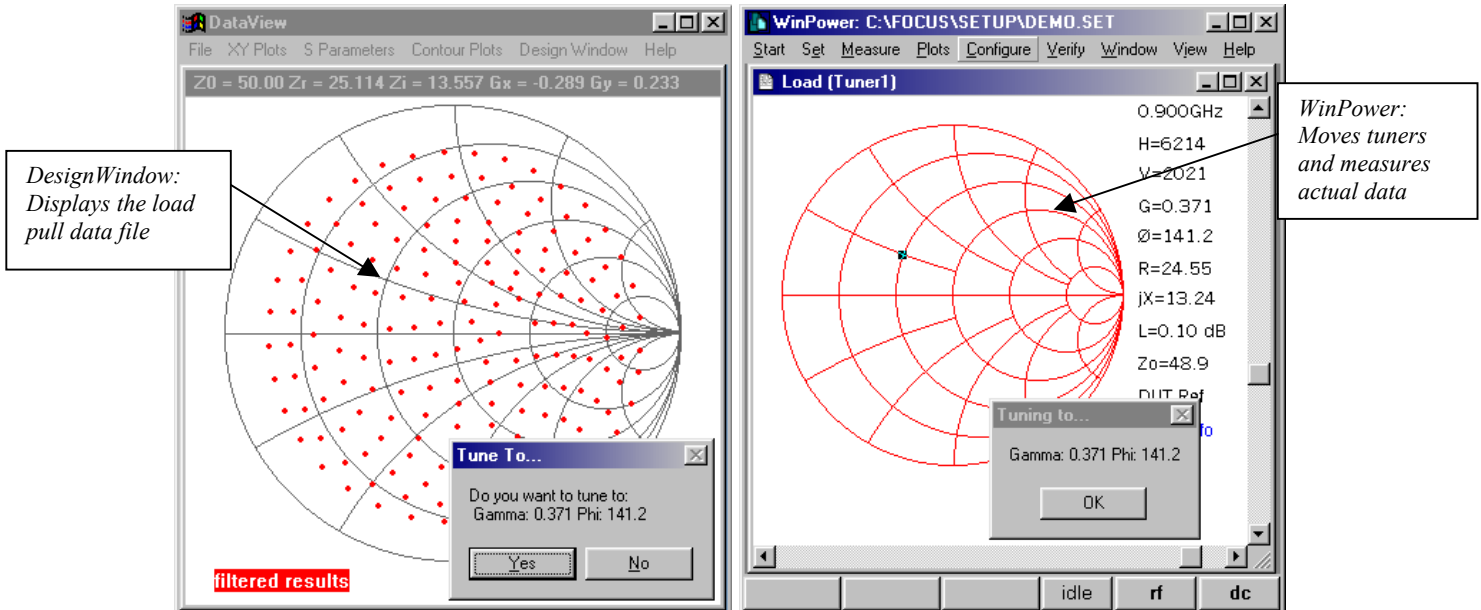


Figure 2: Right clicking in *DesignWindow* plot “Tunes-to” a Gamma value in *WinPower*

For IVP files, *DesignWindow* filters the DC bias conditions for valid points based on a multi-parameter mask. Similar to load pull files, the range of the parameters are determined using scrollbars.

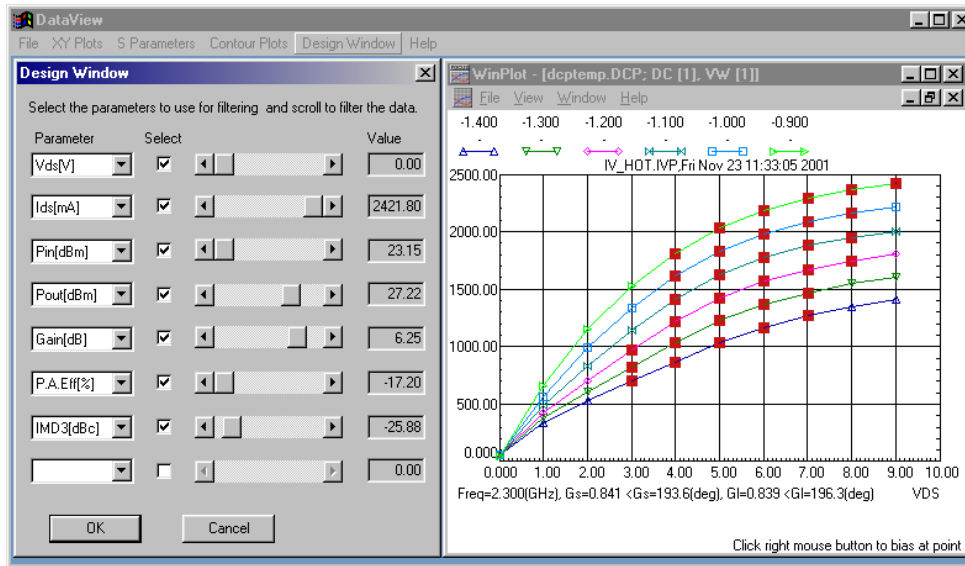


Figure 3: IV Curves DesignWindow

WinPlot generates Cartesian and polar (Smith Chart) displays of S-parameter and saturation files. Some of its features are:

- Display S2P (Figure 4), S1P, Saturation (SAT) (Figure 5) and IV Curve (DCP) files using Cartesian and Smith Chart plots.
- Display multiple parameters on same graph.

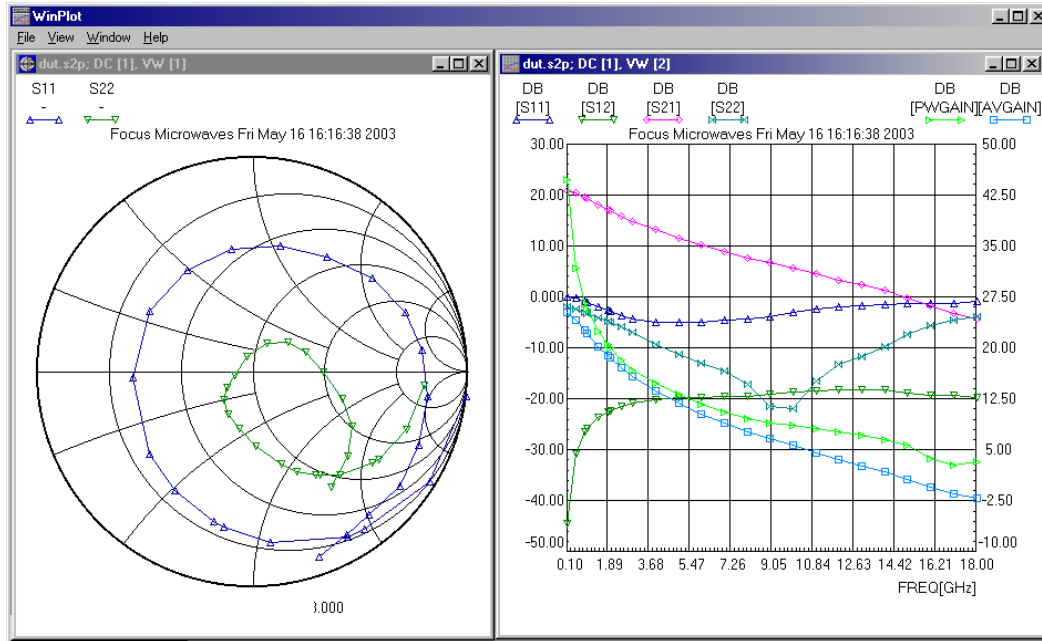


Figure 4: WinPlot S2P file

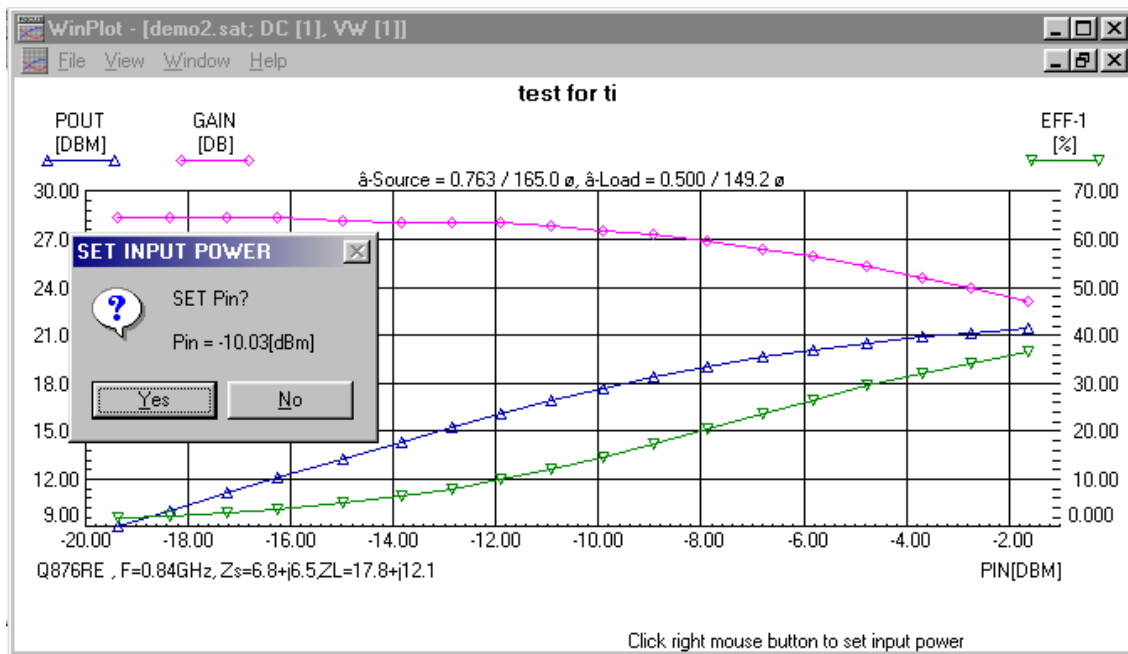


Figure 5: Saturation file

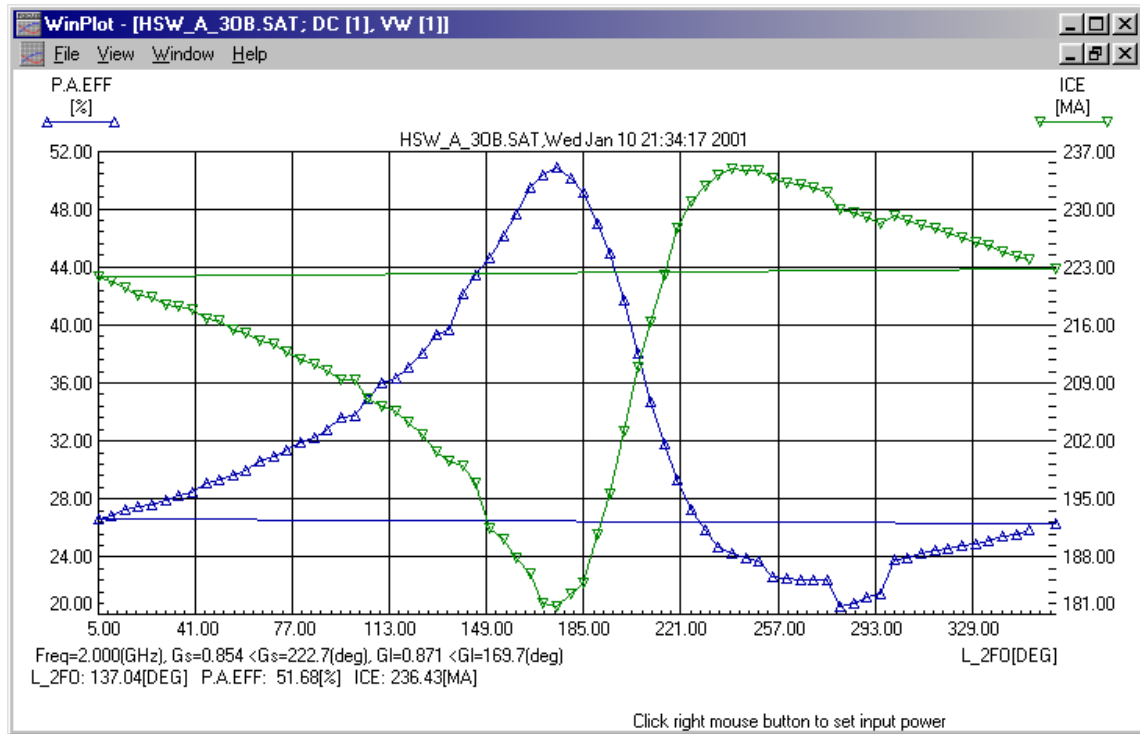


Figure 6: Harmonic Sweep Saturation Plot

WinPlot offers curve fitting, automatic or manual scaling, the ability to plot multiple parameter sets on separate graphs and more.

An important feature of *WinPlot* is “Automatic Setting” of input power to the load pull setup when displaying a saturation file (figure 5) or DC bias conditions when displaying IV curves.

A right click on a position within the plot will retrieve the actual parameter data, and adjust the source RF power (figure 5) or adjust the bias conditions via instrument control within *WinPower*.

ContourViewer features:

- Open Load Pull Data (LPD), Load Pull Compression (LPC) or Noise Measurement Record files (MRF) for display as (Figure 7 & Figure 8):
 - A two dimensional Smith Chart display with line contours
 - A two dimensional Smith Chart display with shaded color contours
 - A three dimensional Smith Chart display with contours rendered in coloured polygons.
- Modify (and save) files in a text editor then easily reload them to display changes.
- Display multiple contours on the same plot when in line contour mode (Figure 9).
- Filter the data contained in the load pull file for display. Option to remove specific points from the plot (Figure 10 & Figure 11).
- “Tune-to” impedance within the ContourViewer plot, with Focus Microwaves’ WinPower software (Figure 12).
- Display the measured data points used to create the graphic plot on the Smith Chart.
- Export displayed contour plots as JPEG image files with labels.
- Normalize Smith Chart plots to some real impedance value or perform an automatic normalization (Figure 13).
- Zoom-in on any of the 2D or 3D Smith Chart plots (Figure 14).
- Floating Data display: showing the position, in either gamma or impedance, and the interpolated value of the currently viewed parameter.
- Display the source and load stability circles of a loaded S2P file (Figure 15).
- Display the Load Pull Smith Chart plots as an OpenGL 3D Plot (Figure 16).

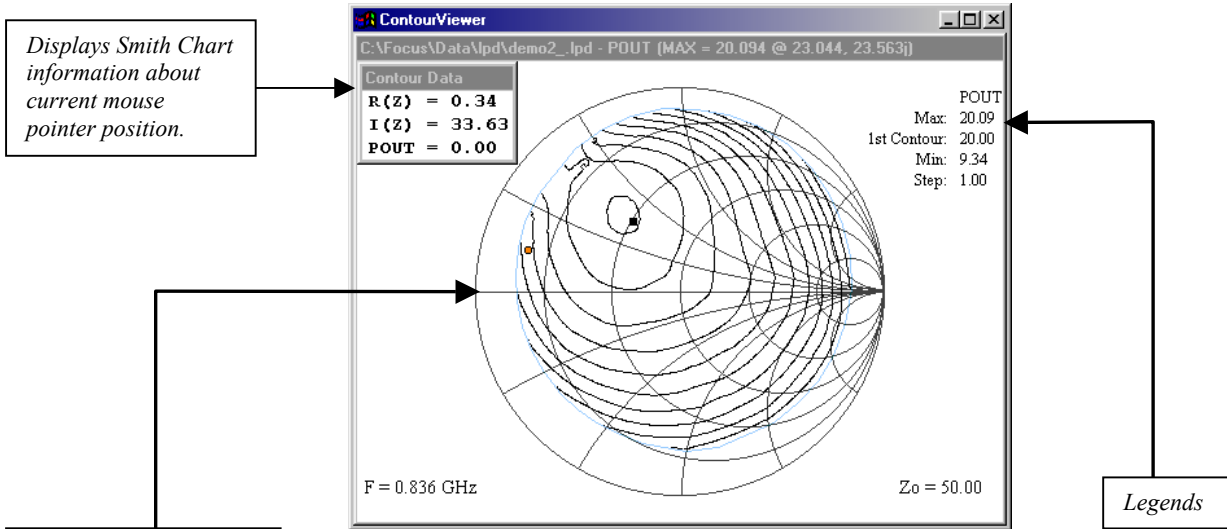


Figure 7: Contour Plot

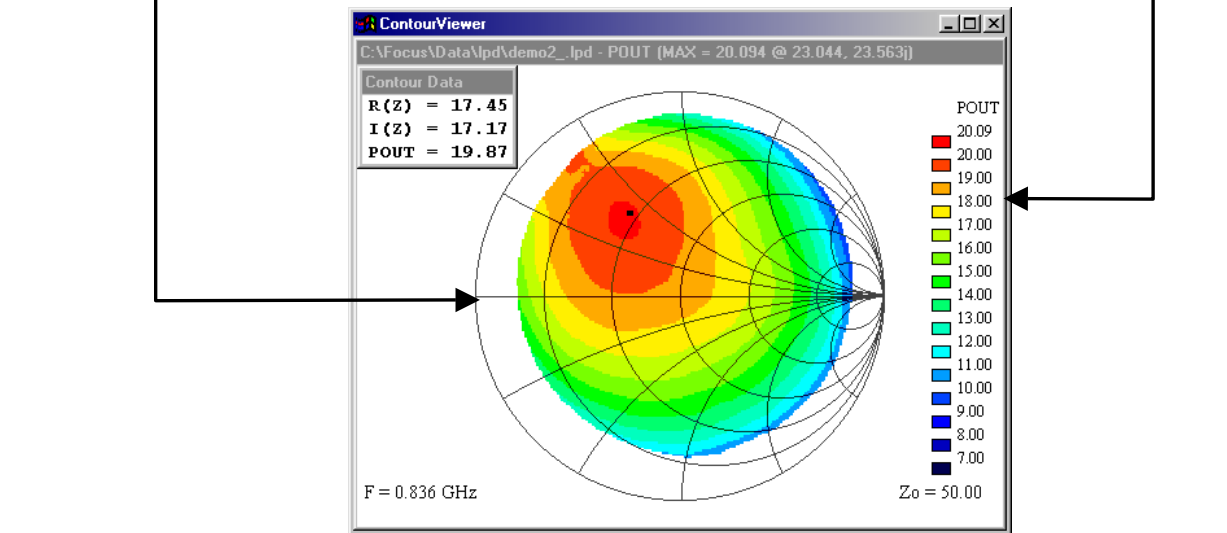


Figure 8: Colour Plot

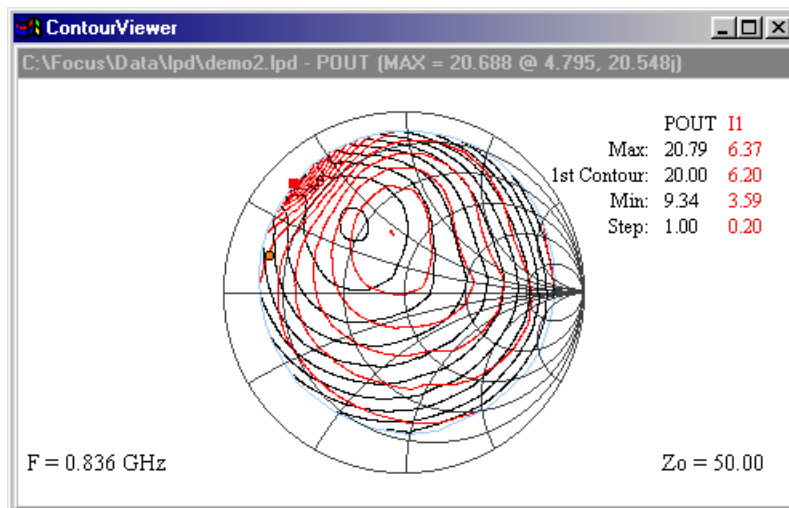


Figure 9: Displaying Multiple Contours

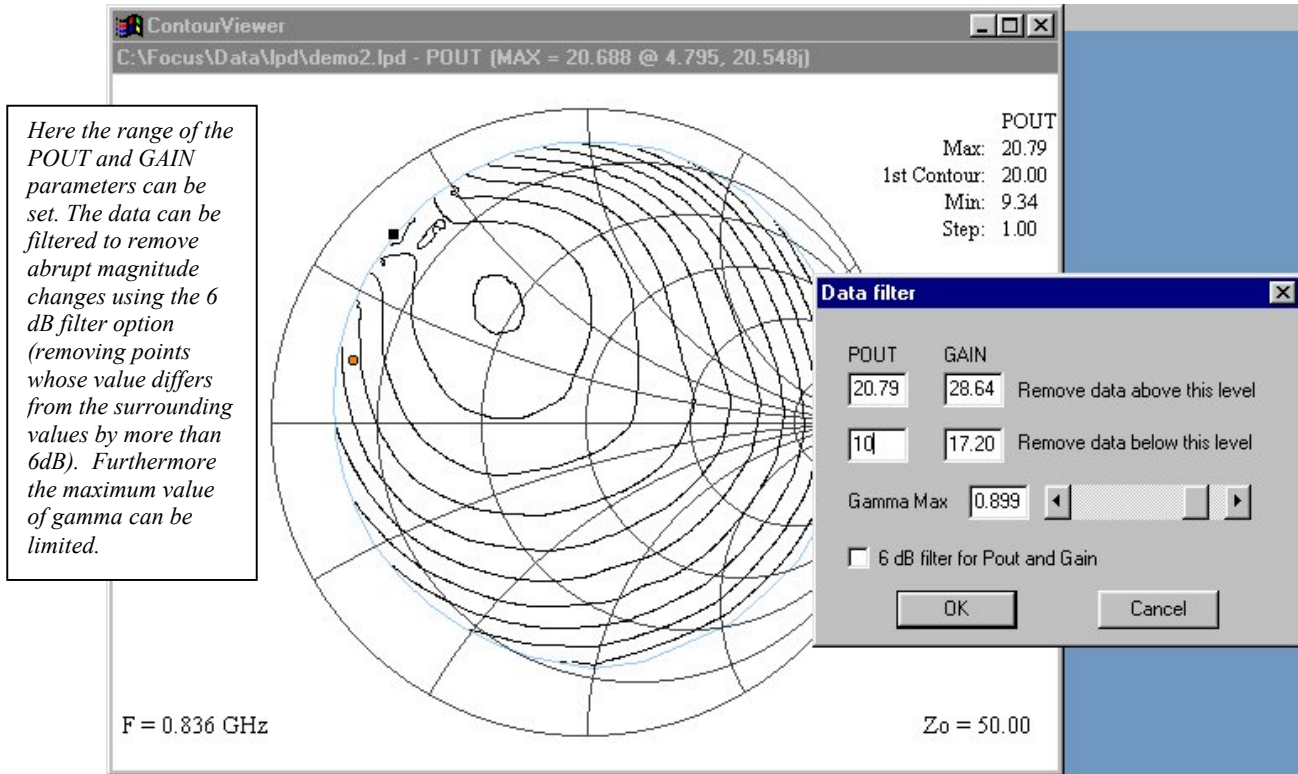


Figure 10: Filtering data of a Load Pull file

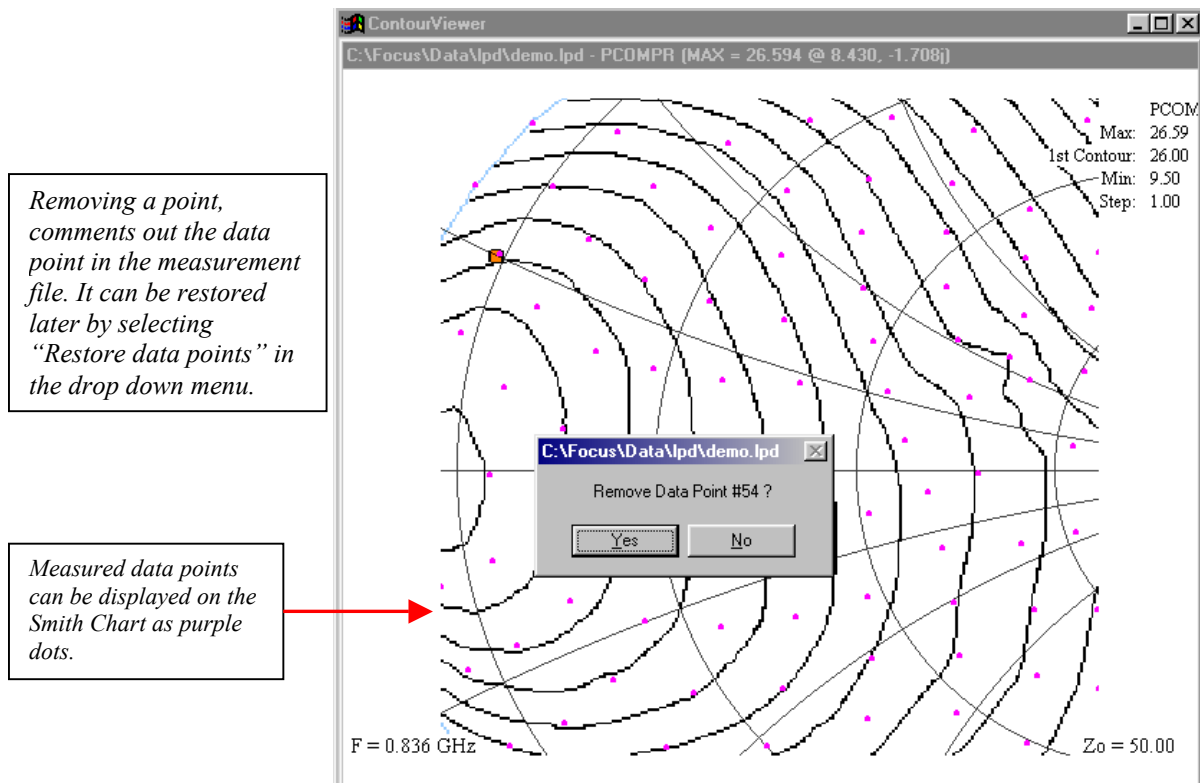


Figure 11: Removing a specific point from the plot

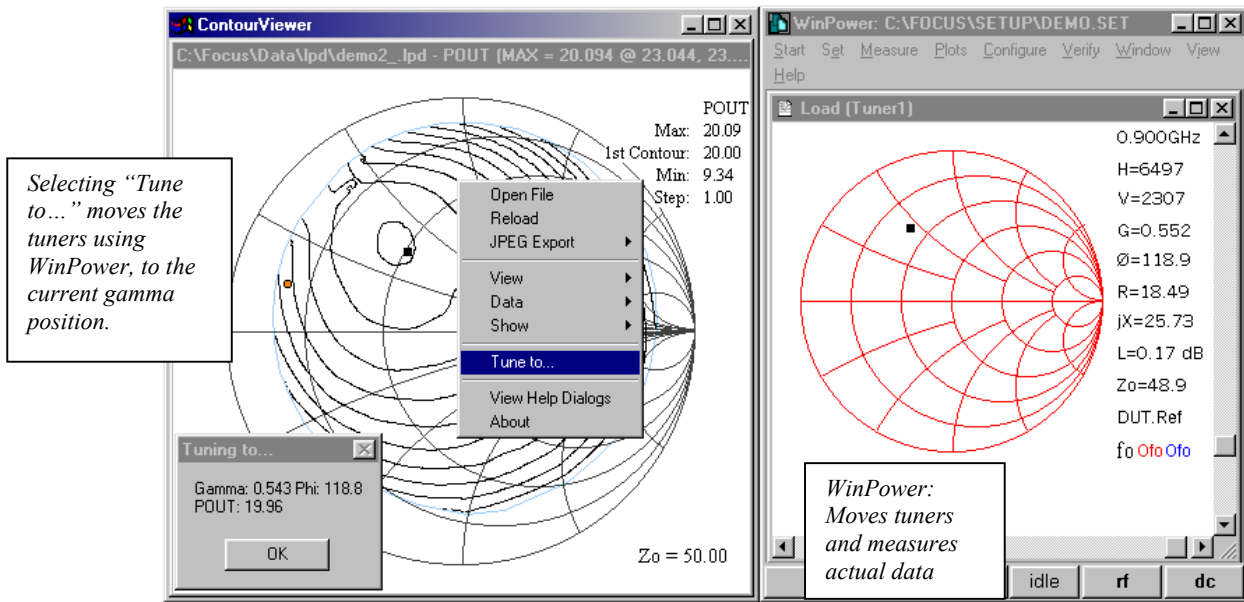


Figure 12: Tuning to a specific Gamma in WinPower using ContourViewer plot

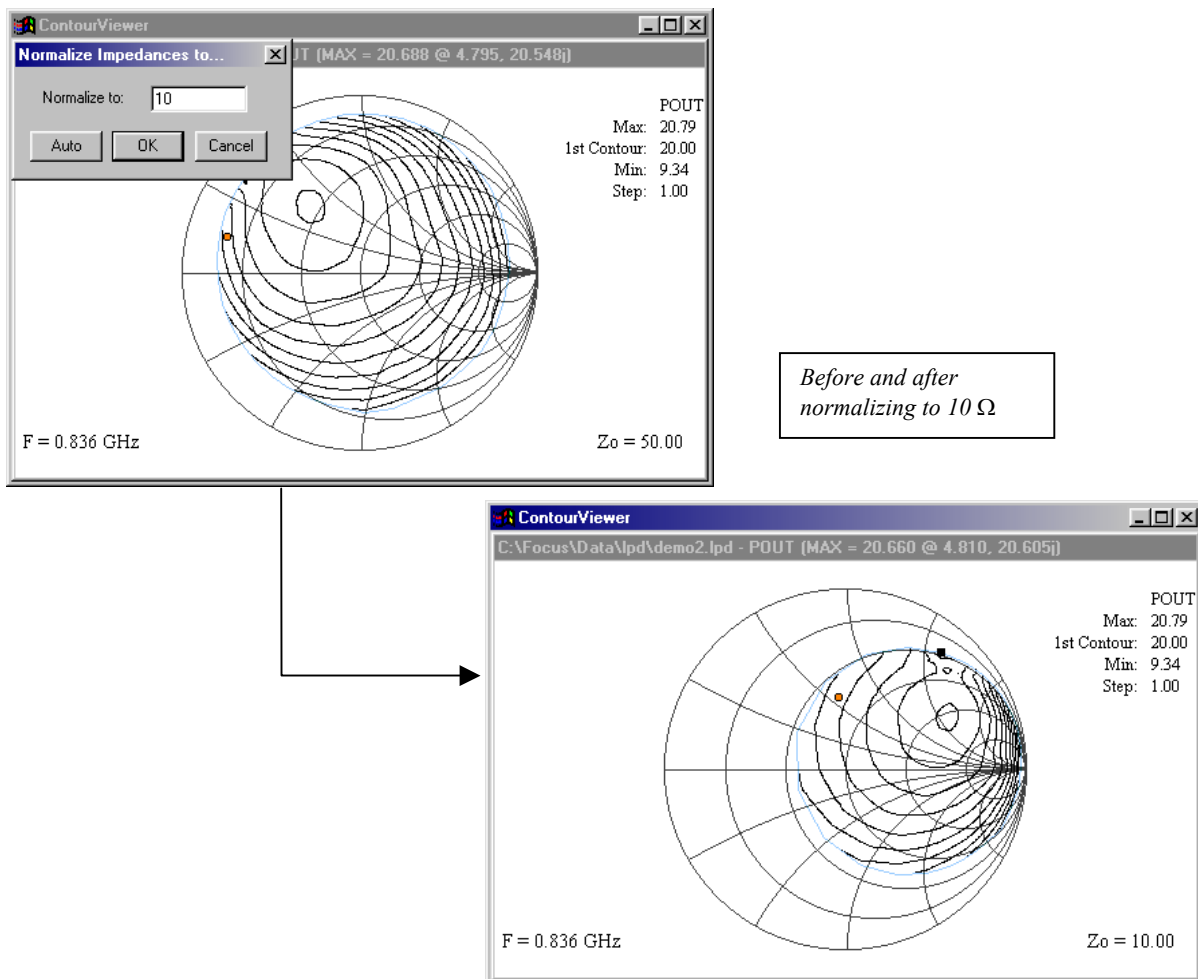


Figure 13: Normalizing the Smith Chart Plot

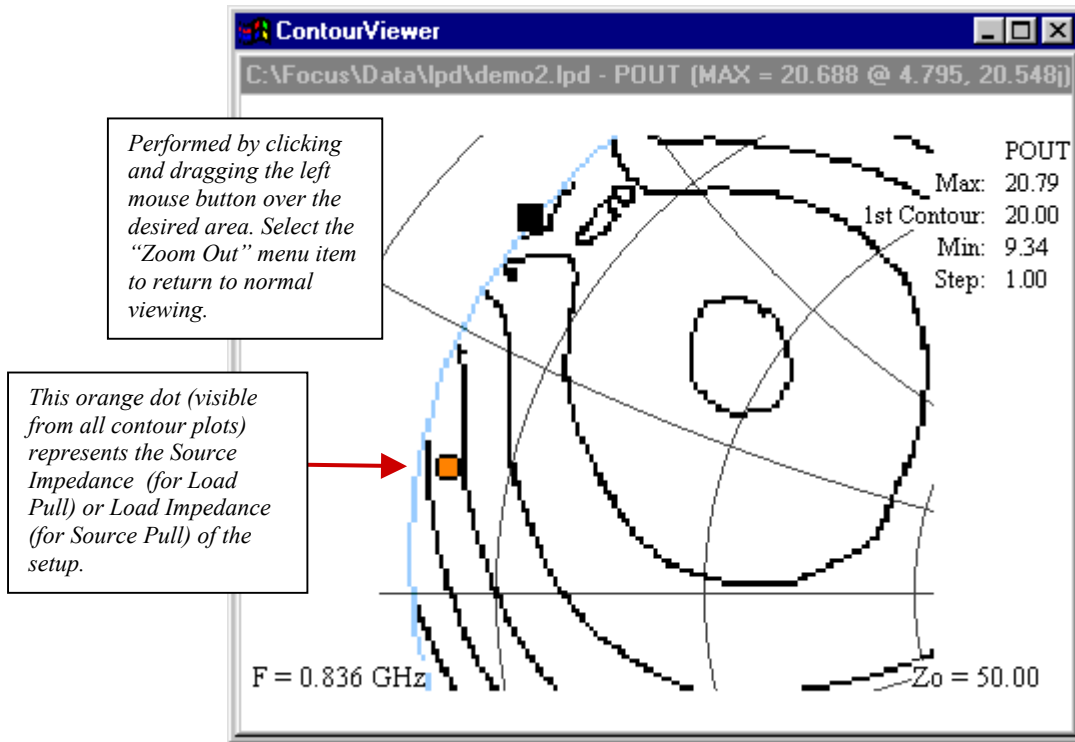


Figure 14: Zoomed-in on a Load Pull Smith Chart Plot

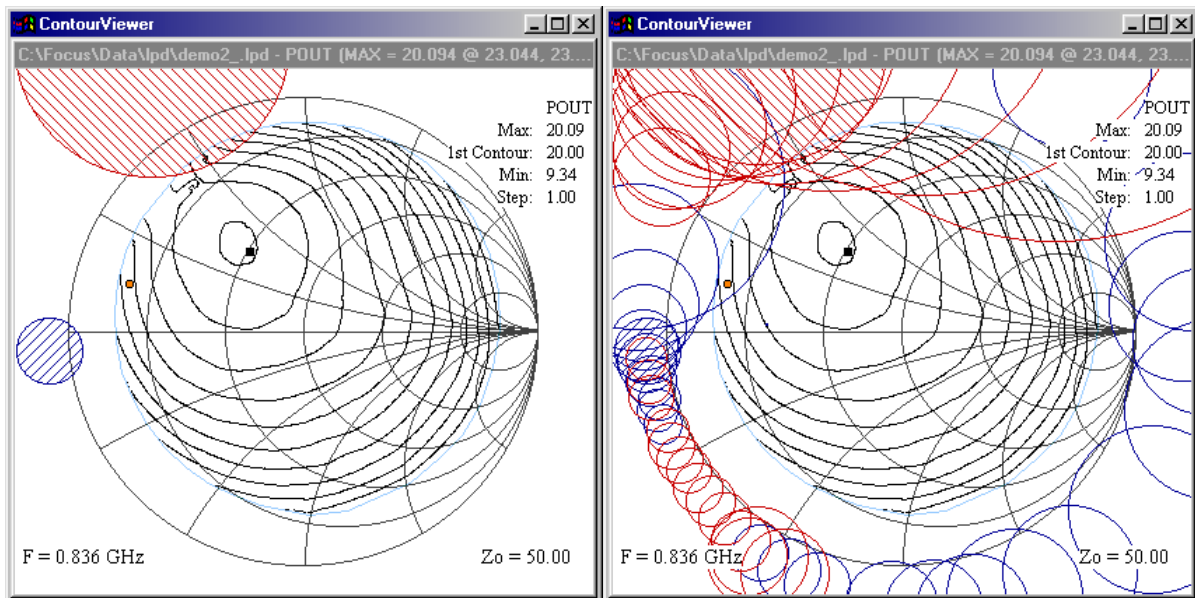


Figure 15: Source (blue) and Load (red) Stability Circles; left: only actual frequency shown; right: all frequencies included in the DUT S2P file are shown; circles at the current frequency are shaded

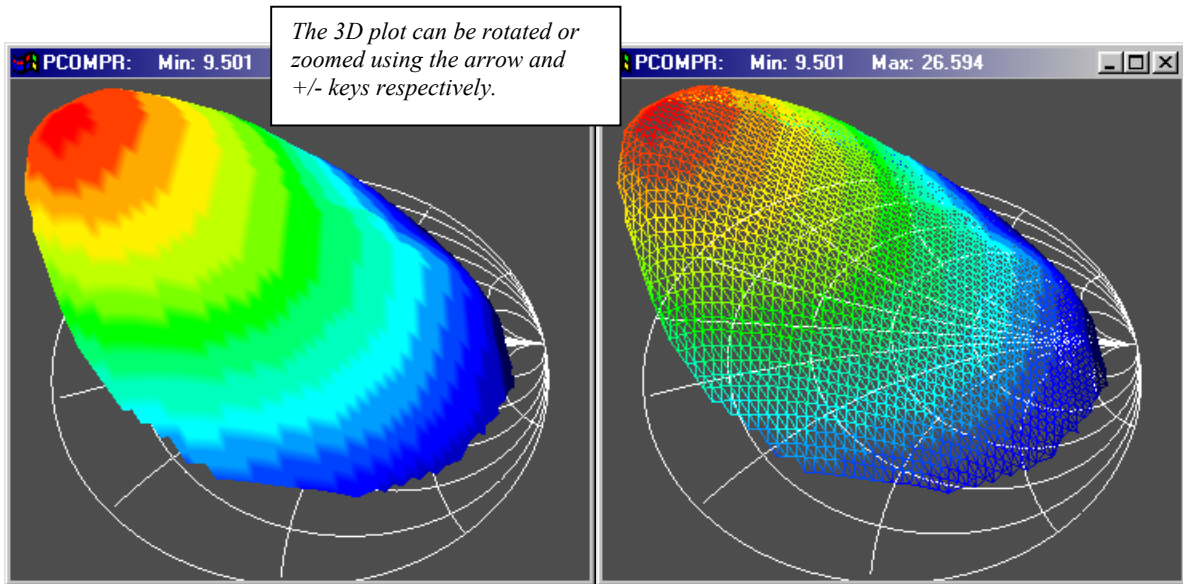


Figure 16: Load Pull 3D plot in solid and grid view

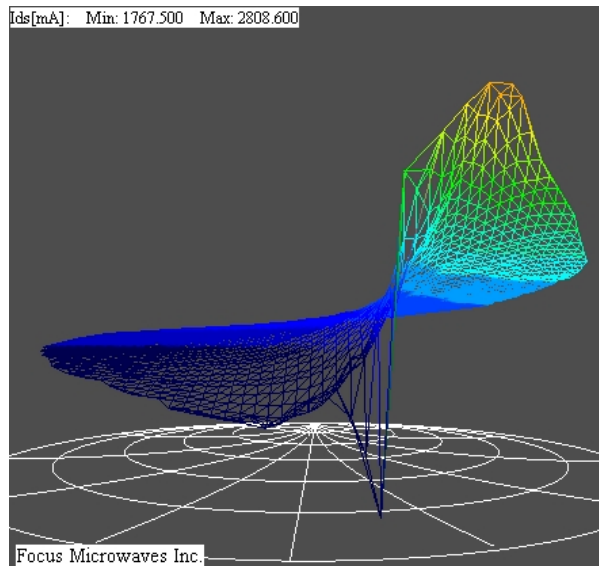


Figure 17: 3D plot of Drain Current of a push-pull FET showing a possible oscillation at $\Gamma \approx 0.9 / 200^\circ$

References

[1] Product Note 36, “WinPlot, Cartesian and Polar Plot generation Software for Windows”, Focus Microwaves, October 1996.