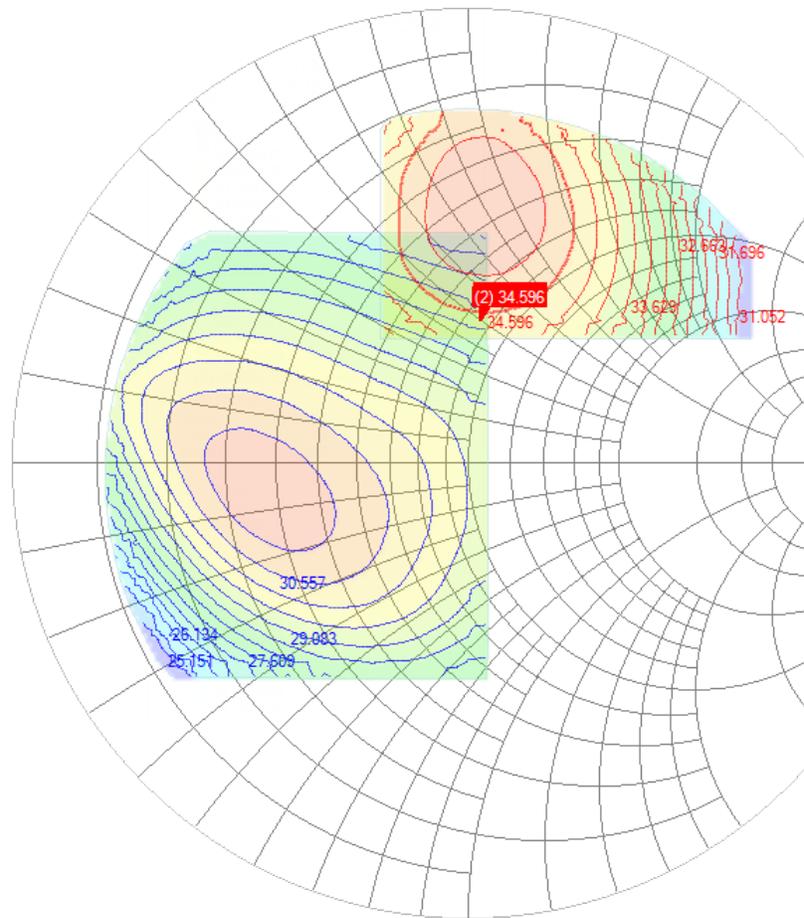# Focus Device Characterization Suite

Everything a test engineer needs to fully characterize transistors from 10MHz to 110GHz in power and noise

FDCS

The Focus Device Characterization Suite (FDCS) includes several software products aimed at characterizing transistor devices. These comprise load pull and noise measurements as well as data plotting and API functionalities.

Load Pull *LPEx*

The Load Pull Explorer (LPEx) is a load pull characterization and test software. Advanced software routines are used for tuner control/calibration, driver based instrument communication, and reference plane de-embedding. Standard frequency based, time domain based (vector-receiver based) measurements are supported. Additionally, hybrid active injection load pull allows the combination of active injection and passive tuning.
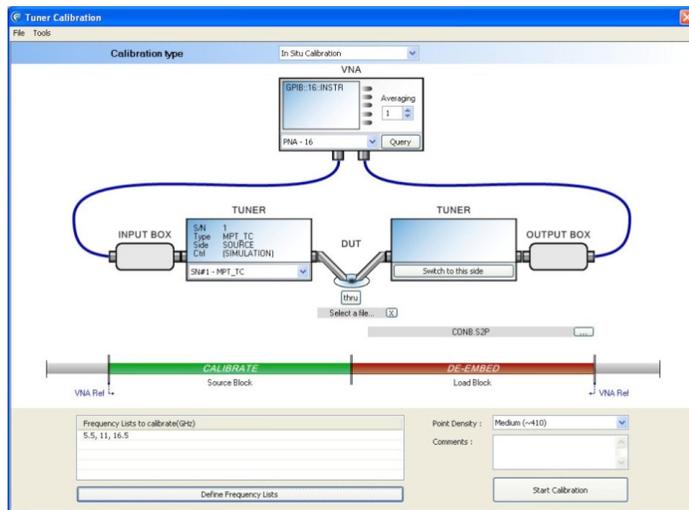
Tuner Calibration Dialog
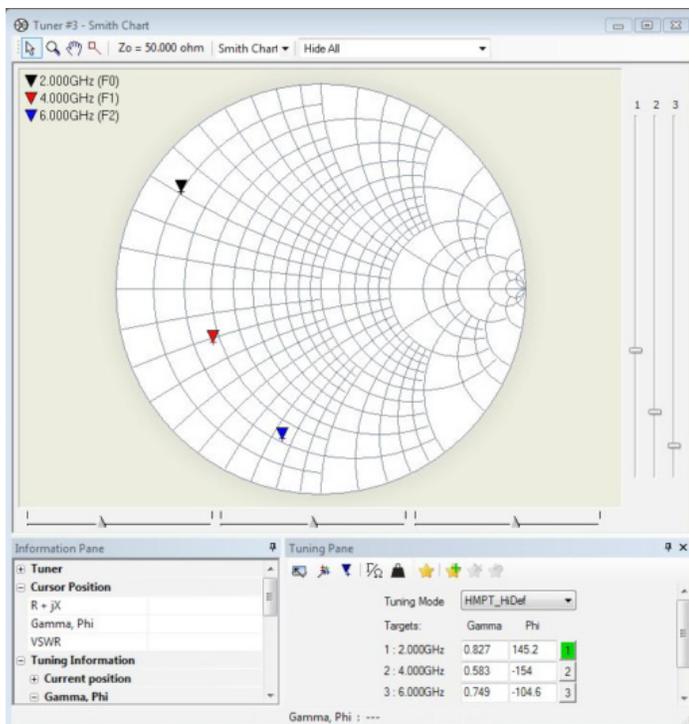
LP Harmonic Functionality

Calibration
The software uses a vector network analyzer and proprietary software algorithms to perform a variety of calibration operations.

Instrument Drivers
The software provides an open structure for instrument driver support and implementation. This structure is based on industry standard VISA instrument communication. Additionally, standardized IVI drivers can be imported by the user for many instrument types.

LP-Basics
This software option provides automated load pull measurements for basic power, gain, efficiency and DC measurements.

LP-Harmonic (LP-2H, LP-3H, LP-4H)
The harmonic options provide tuning functionality for our multi-harmonic tuners using our proprietary impedance synthesis algorithms.

LP-Spectrum
Provides automated spectrum analyzer measurements including IMD, ACPR and EVM.

LP-User
Provides the capability to create custom measurements that allows the user to operate any test and measurement instrument.

LP-Wave
Provides automated vector-receiver measurements using Focus' 8 term method. Mesuro Phase Reference, Keysight NVNA and X-Parameters compatible.

LP-Active
• Hybrid Active impedance synthesis using the combination of passive and active impedance synthesis techniques.
• Hybrid Active injection load pull (F0 & harmonics) and source pull (harmonics only) supported.
• Active injection impedance synthesis with fixed passive tuner as prematch.

LP-Pulse
• Pulsed DC-IV curve measurement support using Focus MPIV, or Auriga pulsed systems (4750, 4850, or 5 series).

LP-Differential
• Load pull measurements.
• For differential impedance synthesis in the device reference.
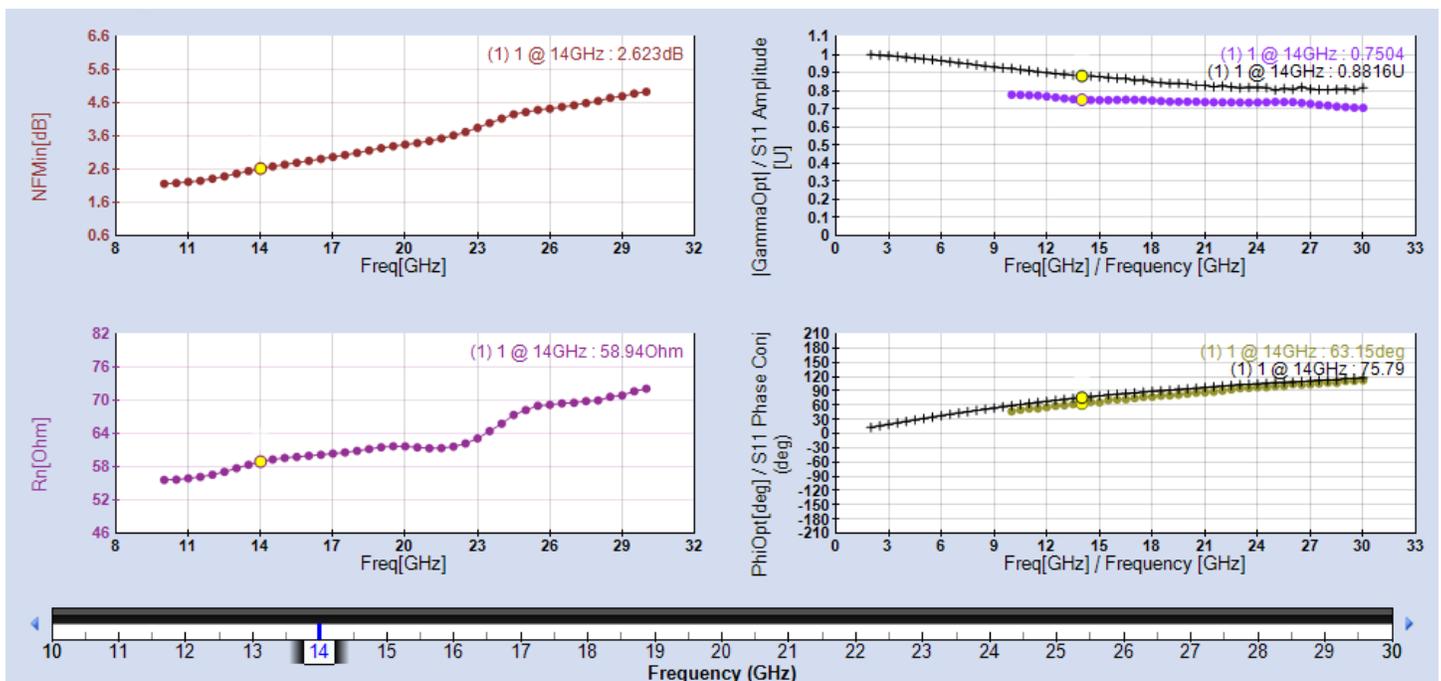
Noise Measurements *NPEx*

The Noise Parameter Explorer (NPEx) which is used to perform noise characterization of transistors. This option permits the user to perform wideband noise figure measurements and extract noise parameters. Additionally, noise measurements can be measured directly or be down-converted to suit bandwidth considerations with support for fixed LO or swept LO down-conversion.

Additional features include:
• Stability circle, available gain circle display.
• Software controlled DC biasing.
• Multi-Bias S-parameter and noise measurements, extraction and display.
• Graphical wizard for setup calibrations.
• Noise measurements are de-embedded to the device reference plane.
• The noise setup can be created using cold noise (cold in or cold out) or hot/cold measurement method.
• Advanced, proprietary methods are used to improve extracted noise parameter results.
• Automated noise testing at single or multi-bias DC settings.
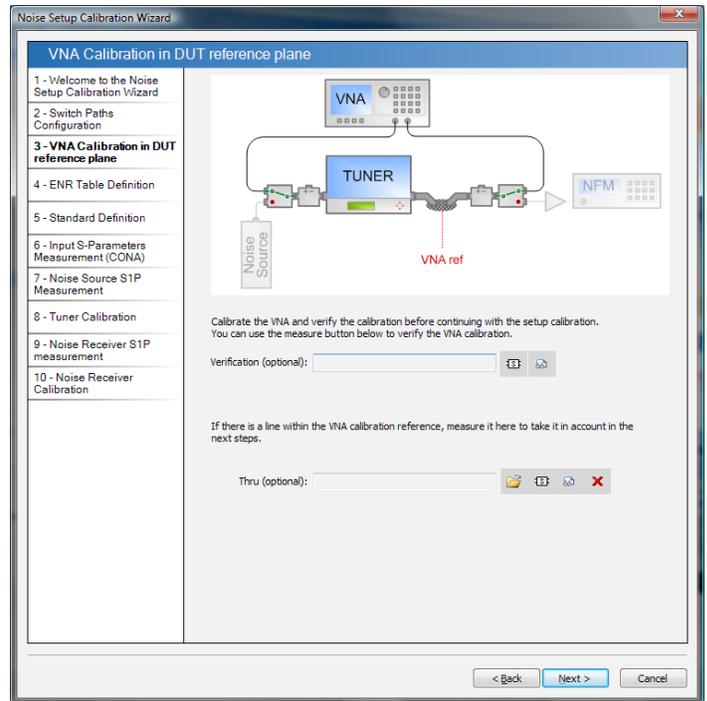
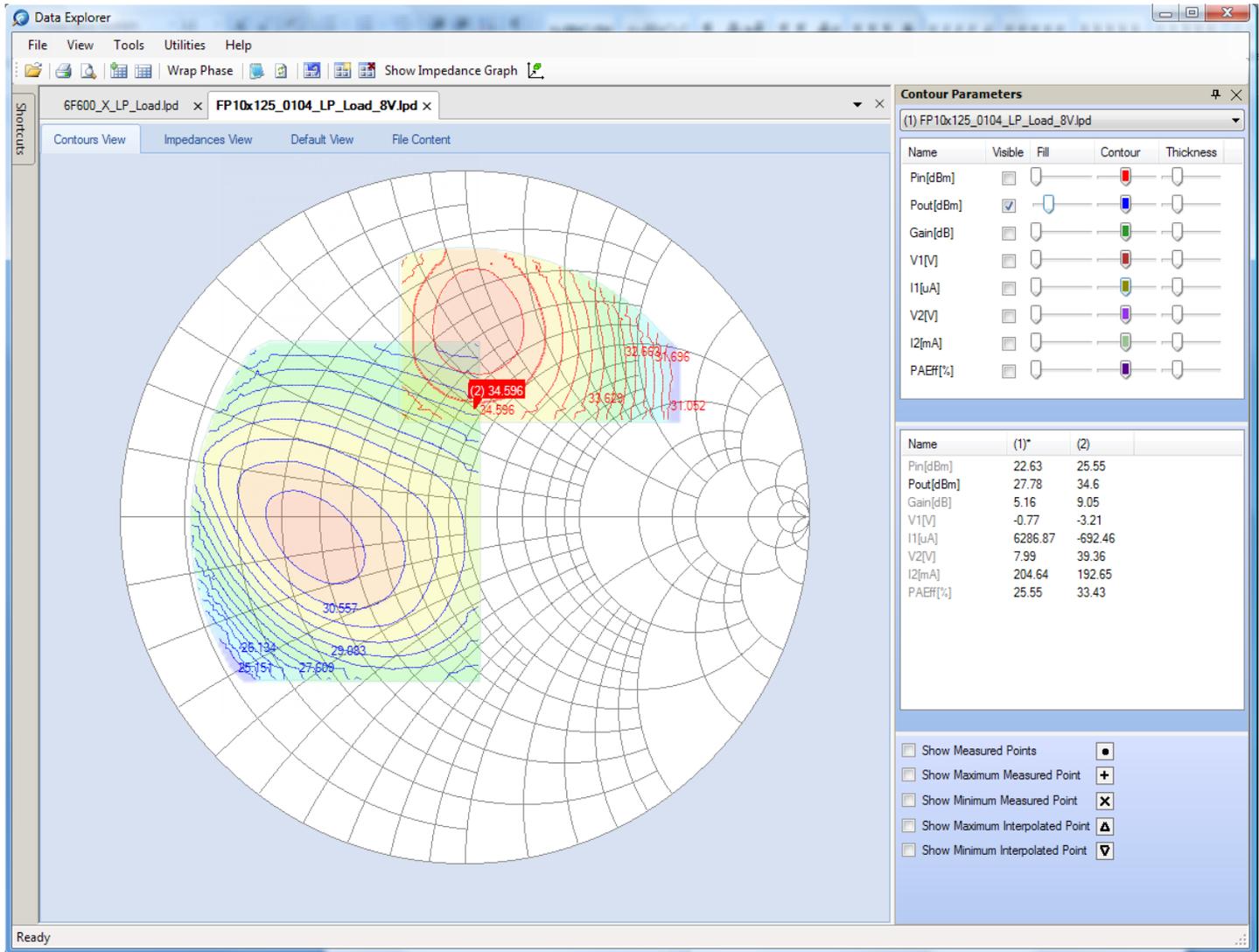*Noise Calibration Wizard – VNA Calibration in DUT reference plane*

4 Noise Parameters

Data Plotting

Graph Ex

Data Explorer is included in FDCS for graphical display of any data produced for Load Pull, Noise or I/V measurements.

Contour plot Comparing Multiple Files

Programming Interfaces (API)

LP Macro / NP Macro

FDCS offers several programming interfaces (APIs) that allow the user to automate measurements for tuner and probe station for load pull and noise in their ActiveX programming platform of choice. Such platforms include LabView, Agilent Vee, C++, C#, Visual Basic, and Matlab.

Standalone Tuner Control

• **iTunerActiveX:** Used for tuner movement and impedance control with CCMT tuners in any ActiveX compatible programming platform.

• **iTunerActiveXPlus:** Provides the same functionality as iTunerActiveX without the limitations of on tuner processing (more accurate, unlimited density, no limit on number of calibrations).

• **MPTActiveX:** Used for tuner movement and impedance control with MPT tuners in any ActiveX compatible programming platform.

• **LFTActiveX:** Used for tuner movement and impedance control with LFT tuners in any ActiveX compatible programming platform.

• **DMTActiveX:** used for tuning and controlling differential tuners in any ActiveX compatible programming platform.