

## PCS-50 Calibration System

### Key Features

- 9kHz - 50 GHz
- Calibrate RF Power Sensors  
Attenuators  
Power Splitters  
Directional Couplers
- Cost Effective
- Update the EPROMs
- Windows Based
- Point and Click
- Support More Power Sensors:  
Agilent  
Technologies  
Anritsu  
Giga-tronics

The **PCS-50 Power Calibration System** is a complete turn-key solution for calibrating **Power Sensors, Attenuators, Power Splitters and Directional Couplers**. Engineered as a complete replacement for the HP 11760S Power Sensor Calibration system, the PCS-50 Calibration System has an increased frequency range of 9 kHz to 50 GHz.

The PCS-50 also dramatically decreases the cost of ownership by decreasing the amount of standards required to perform 17025 and Z540 accredited calibrations. The total system was designed to maximize measurement capabilities and minimize the required technician interaction.

The accompanying software package was designed with flexibility in mind. Not only does it support flexibility in standards, it also supports flexibility in measurement methodologies. This gives quality managers the ability to weigh the cost of calibration against the required uncertainties and determine the appropriate calibration methodology and corresponding uncertainties for a given calibration.

The PCS-50 Power Calibration System is revolutionary in its design. It is the first ever Power Sensor Calibration Solution that has removed the expensive 50 GHz signal generator. Instead we utilize Port-2 of the network analyzer to provide a clean, stable CW signal. This allows us to drop thousands of dollars off the total cost of the system.

Figure 1 illustrates the configuration of the PCS-50 System for Power Sensor Calibration. CW signals are produced by one of the two network analyzers and fed into the PCS-K150 Amplifier system. Then the signal is fed into the power splitter where the power is equally divided between the reference sensor and the standard/UUT sensor connected to Port-2 of the power splitter.

The PCS-K150 amplifier is a switchable amplifier providing 3 modes of operation. Mode one is a pass through mode with no amplification. Mode two is an Amplified mode providing up to +27 dBm of amplification from 9 kHz to 50 GHz. Mode three is a linearity test mode.

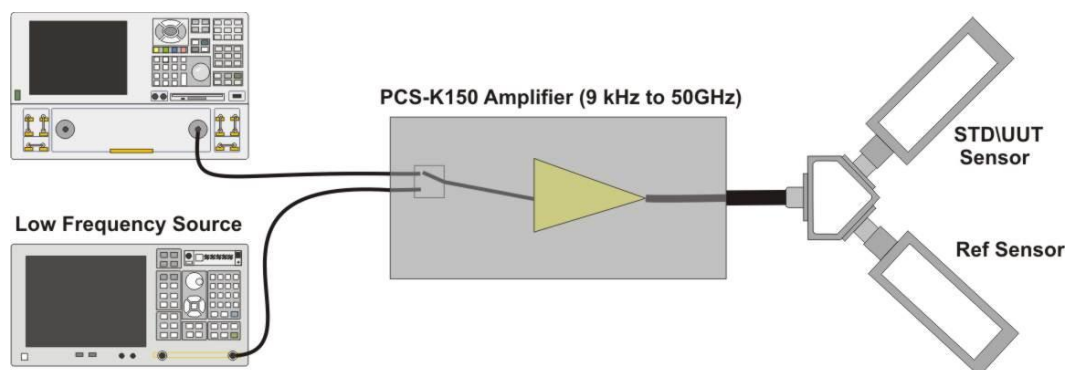
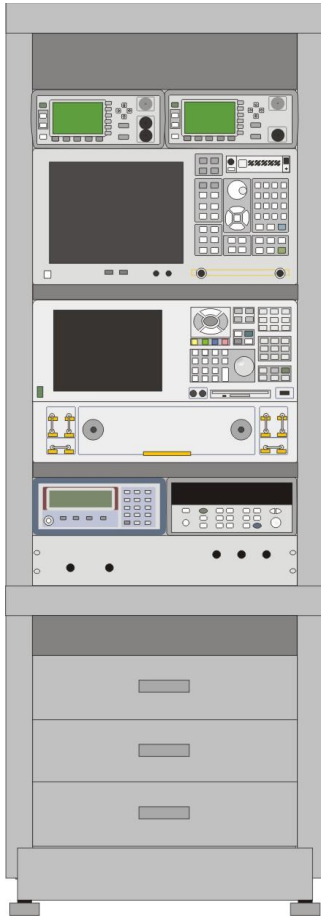


Figure 1: System Block Diagram



## Turnkey System

The PCS-50, 9 kHz to 50 GHz Power Calibration System, is a turnkey package complete with everything you need to start calibrating from day one. The system comes with all the standards, cables, connectors and software required to perform NIST traceable, Z540\17025 accredited calibrations.

The most common configuration shown on the right comes complete with a workstation computer, label printer, color laser printer and the following standards:

- Agilent E4419A Power Meter
- Agilent E4418A Power Meter
- Agilent E5071C ENA
- Agilent N5230C PNA
- R&S URE3 Voltmeter
- CLS PCS-K150 Amplifier
- Work Shelf & Storage Drawers

Additional configurations and hardware options are available to support additional power sensors from other manufacturers, such as Anritsu, Boonton and Giga-tronics.

### Lower Cost of Ownership

The system was designed to calibrate more items with less hardware. This decrease in the total number of required standards dramatically decreases the total cost of ownership. Because the system has less hardware, it also has less to calibrate. Calibration labs not only see the savings on their initial investment, they also see the annual cost of maintenance is noticeably lower.

### Signal Generator Removed

This is the industry's first power sensor calibration solution that does not have a traditional signal generator. Instead it utilizes the CW signals source in the network analyzers. We selected the Agilent PNA and ENA Network Analyzers because of their ability to provide clean RF signals with low harmonic and sideband distortion.

The CW signals are provided on Port-2 of the network analyzer then sent into the PCS-K150 switch/amplifier where it can be amplified up to as much as +33

dBm.

### Reflection (VSWR / rho)

The PCS-50 Power Calibration System comes complete with two network analyzers capable of measuring VSWR and rho with full S-parameters for increased accuracy. The combined frequency range of these two analyzers is 9 kHz to 50 GHz.

### Cal Factor Measurements

With the PCS-K150 switch/amplifier, the PCS-50 Power Calibration System is able to provide stable and flat CW signals at power levels from -40 dBm to +10 across its entire frequency range.

### Linearity

The PCS-50 is able to test the linearity of the Agilent's newer E-Series power sensors and upload the cal values, if required.

### Full S-Parameters

The two vector network analyzers in the PCS-50 add greater accuracy and increased measurement capabilities by providing full S-Parameters for S11, S12, S21 & S22 measurements.

## Key Specifications

### Frequency Range

9 kHz to 50 GHz

### K1 RF Power Output

- >+33 dBm @ 50 MHz
- >+20 dBm from 9 kHz to 18 GHz
- >+20 dBm from 9 kHz to 26.5 GHz
- >+16 dBm from 9 kHz to 50 GHz

### Cal Factor Uncertainties

- < 2.5%\* from 9 kHz to 99 kHz
- < 2%\* from 100 kHz to 18 GHz
- < 2.5%\* from 18 GHz to 26.5 GHz
- < 3% from 25.6 GHz to 40 GHz
- < 4.5% from 40 GHz to 50 GHz

\* Uncertainties may vary depending on measurement technique and standards.

### Linearity Uncertainties

- < 1% from -36 to +33 dBm @ 50 MHz

### SWR (rho) Uncertainties

- < 0.01 from 100 kHz to 18 GHz
- < 0.015 from 18 GHz to 26.5 GHz
- < 0.020 from 25.6 GHz to 40 GHz
- < 0.030 from 40 GHz to 50 GHz

## The Software is Key

The PCS-50 Power Calibration System comes complete with two software packages required to perform the automated calibrations on power sensors, attenuators, power splitters and directional couplers.

### PS-Cal

PS-Cal software was designed to perform all of the required tests on power sensors including rho, cal factor and linearity. Currently, it is the only third party solution on the market capable of completely testing the new Agilent E-Series Power Sensors.

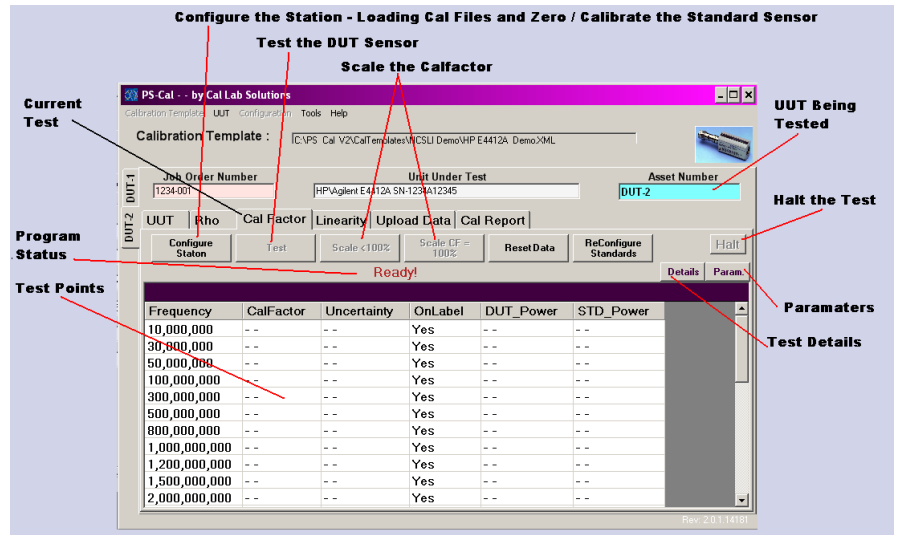
**Windows Based** - PS-Cal is the industry's first, truly Windows based power sensor calibration solution capable of testing multiple sensors in batch mode, saving time and money. It is by far the easiest to use, most customizable and state-of-the-art solution on the market

**Easy to Use** - PS-Cal's user interface is very user friendly and easy to navigate. Technicians have the ability to execute the tests in the order they choose and can rerun any test without losing data.

**Customizable** - PS-Cal was designed with expandability and flexibility in mind. It ships with several standard test routines and allows additional customized test routines with uncertainty calculations to be easily integrated.

**State-of-the-Art** - PS-Cal was built in Microsoft's Visual Studio.NET® and Agilent's Test and Measurement Tool Kit. PS-Cal is compatible with National Instruments' and Agilent's GPIB cards. PS-Cal is also able to communicate with instruments via Serial, TCP/IP or USB.

**Attractive Reports** - PS-Cal has integrated Active Reports®, a powerful reporting tool that generates full color, customizable reports.



**Template Based** - The user is able to configure test points, test methods and standards in a template and then save the template for later use

**Uploads EPROM Data** - After calibrating an EPROM enabled power sensor, you can easily upload the calibration data to the DUT Sensor.

**Batch Mode Operation**- PS-Cal allows the user to calibrate power sensors in batch mode. This allows the user to calibrate more sensors in less time.

**Threaded Application**- Because PS-Cal is a truly Windows® based solution, it allows us to thread the application. What that means is the user can be more productive--while the software is collecting calibration data on one sensor, the user can be updating information and printing the calibration data at the same time.

### SAM

SAM (Specialized Applications for Metrology) software is used to calibrate the RF components (attenuators, power splitters, & directional couplers) 9 kHz to 50 GHz.

Just like PS-Cal, this software was built on Windows® technologies. SAM is an easy to use, template based, threaded application, specifically written to calibrate the most common RF components.

## Most Commonly Supported Power Sensors

### N5530 Power Modules

Agilent N5532A-504  
 Agilent N5532A-518  
 Agilent N5532A-526  
 Agilent N5532A-550

### 8902 Power Modules

HP\Agilent 11722A  
 HP\Agilent 11792A

### 848x Series

HP\Agilent 8481A  
 HP\Agilent 8481B  
 HP\Agilent 8481D  
 HP\Agilent 8481D-039  
 HP\Agilent 8481H  
 HP\Agilent 8482A  
 HP\Agilent 8482B  
 HP\Agilent 8482H  
 HP\Agilent 8483A  
 HP\Agilent 8484A  
 HP\Agilent 8485A  
 HP\Agilent 8485A-033  
 HP\Agilent 8485D  
 HP\Agilent 8487A  
 HP\Agilent 8487D

### E-Series (EPROM)

HP\Agilent EPC-E18  
 HP\Agilent EPC-E26  
 HP\Agilent E4412A  
 HP\Agilent E4413A  
 HP\Agilent E9300A  
 HP\Agilent E9300B  
 HP\Agilent E9300H  
 HP\Agilent E9301A  
 HP\Agilent E9301B  
 HP\Agilent E9301H  
 HP\Agilent E9304A  
 HP\Agilent E9304A-H18

### Peak Average

Agilent E9325A  
 Agilent E9326A  
 Agilent E9321A  
 Agilent E9322A  
 Agilent E9323A  
 Agilent E9327A

### Thermister Mounts

HP\Agilent 478A

### Giga-tronics

Giga-tronics 80310A  
 Giga-tronics 80313A  
 Giga-tronics 80314A  
 Giga-tronics 80350A  
 Giga-tronics 80353A  
 Giga-tronics 80354A  
 Giga-tronics 80351A  
 Giga-tronics 80352A  
 Giga-tronics 80355A  
 Giga-tronics 80330A  
 Giga-tronics 80333A  
 Giga-tronics 80334A  
 Giga-tronics 80401A  
 Giga-tronics 80402A  
 Giga-tronics 80410A  
 Giga-tronics 80420A  
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 Giga-tronics 80501A  
 Giga-tronics 80502A  
 Giga-tronics 80503A  
 Giga-tronics 80504A  
 Giga-tronics 80601A  
 Giga-tronics 80621A  
 Giga-tronics 80701A

## Additional Capabilities

### RF Attenuators

- 3dB Fixed
- 6dB Fixed
- 10dB Fixed
- 20dB Fixed
- 30dB Fixed
- 40dB Fixed
- 50dB Fixed
- 60dB Fixed
- .1dB Step
- 1dB Step
- 10dB Step

### Power Splitters

- 2 Way
- 3 Way

### Directional Couplers

- Single Directional
- Dual Directional

### Filters

- High Pass
- Band Pass
- Low Pass
- Notch

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