# PS-Cal® Release Notes

## PS-Cal v4.8.2, December 2023 Release

### Features and Enhancements

Added support for Agilent N524xB Low Frequency Extension
Added R&S NRX driver with support for R&S USB sensors
Added multi-path R&S and HP 848xB sensor support to 2818A

### Bug Fixes, Corrections, and Incidental Changes

Corrected EEPROM process for Agilent 9300B
Corrected EEPROM process for R&S NRPxS sensors

## PS-Cal v4.8, September 2023 Release

### Features and Enhancements

Added templates for Keysight U2020XA family of power sensors
Added Keysight P9374B and P5005A drivers
Added support for Keysight N9640D E-Cal module
Added driver and calibration template for TEGAM 2818A feedthrough standard
Added support for PMX18-CS calibration system
Implemented ability to detect if HP 478 Series sensors cause a "Power Underload" condition
- If condition is detected, PS-Cal will attempt to re-zero the meters
- If condition persists, PS-Cal will halt test

Added capability for "CalResults" files to be imported as Standard files (TEGAM Thermistor Mounts)
Included statement on reports indicating k=2 confidence factor
Enhanced N522xB driver to act as signal generator at low frequencies

### Bug Fixes, Corrections, and Incidental Changes

Corrected Boonton sensor templates that use 1 GHz as calibration frequency.
Renamed HP 83600 Series from "8360Series"
Notated E4412A/E4413A upload process
Clarified attenuator file dialog
Ladybug LB59xx driver reconfigured for cal factor tests
Corrected "unhandled exception" charting error if invalid CalResults file is loaded
Changed Ref CF on printed sensor labels from 0 to value of 50 MHz reference
Fixed inconsistencies between rho and cal factor tables on some sensors.

## PS-Cal v4.7, August 2022 Release

### Features and Enhancements

Added custom VSWR/Gamma parameter for NoMismatch templates (Input 0 or 1 for v4.6 behavior)
Improved Boonton driver compatibility
Added import capability for splitter and bolometer .DAT files from MET/CAL
1830/478A changes:
- 432 Comp/Bias mode parameter added
- Added 478-H75 Template

Added Anritsu ML2495 driver
Added PASS/FAIL limits in live charting for Performance Verification and Power Accuracy templates/techniques
Added Uncertainty check to Ladybug sensors
Templates added for N8481A-CFT, N8482A-CFT, N8485A, N8485A-033-CFT, N8487A-CFT

### Bug Fixes, Corrections, and Incidental Changes

Corrected Halt button behavior during test
E9327A template updated
Feedthrough calibration factor resolution changed to 4 digits in related reports
Updated limits on Ladybug sensors
Ladybug LB59xx driver reconfigured for cal factor tests
Corrected "unhandled exception" charting error if invalid CalResults file is loaded
Changed Ref CF on printed sensor labels from 0 to value of 50 MHz reference
Fixed inconsistencies between rho and cal factor tables on some sensors.

## PS-Cal v4.6, December 2020 Release

### Features and Enhancements

Chart Device Under Test (DUT) cal factors in real-time during calibration

Compared cal factors in real-time against a user-selected historical calibration data file (historical data must be another PS-Cal calibration results file)
Compared two historical calibration data files (both files must be PS-Cal calibration results files)
Added view modes for comparison charts:

- Single calibration results data file
- Cal factor comparison of two data files
- Cal factor difference between two data files
- Combination chart with cal factor comparison plotted against the left y-axis, and cal factor difference plotted against the right y-axis

Implemented limited calibration process log file capability
Added calibration frequencies to the TEGAM 1505A RF and 2505A RF Power Standards calibration templates

### Bug Fixes, Corrections, and Incidental Changes

Corrected numerous typographical errors
Removed 10 MHz and 30 MHz frequencies from the Keysight E9327A template
Corrected rho limits for Anritsu MA2473A, MA2472A, MA2473D, MA2474D templates
Implemented sequential program build numbers
Fixed minor bugs in various workflows
Improved error handling in various workflows that resulted in fatal program errors or other unexpected behavior
Corrected upper and lower limits for all Ladybug series sensors
Removed Ceyear AV1464 driver
Updated PS-Cal to Microsoft .Net Framework 4.6.2
Upgraded Grape City ActiveReports library from version 8.x to 13.x

## PS-Cal v4.5, October 2019 Release

### Features and Enhancements

Added LadyBug power sensor support and required files
Added EEPROM Table 0 read/write for Anritsu power sensors
Added support for Keysight N5222B Opt 205 (Low Frequency Extension)
Added measurement uncertainty lookup tables and verification against Statement of Accreditation
Added support for the Fluke 96000 high frequency signal generator
Added / Updated mismatch uncertainty calculations for 1805 & 1806 calibrator
Added U2002A-Option H26 power sensor calibration template
Added Gigatronics 80350A power sensor
Added Agilent U2002A Option H26 power sensor
Added verification only support for R&S NRVS power meters and sensors
Added Marconi 6960 power meter driver and support for Marconi power sensors
Added bridge support for the HP thermistors
Updated 478 and 8478 thermistor features
Added PCS-K150-II switched amplifier support
Updated the PNA-X network analyzers to support external amplifiers
Added calibration support for E4P41xA power sensors templated at <+ 16 dBm
Updated leveling loop to support power sensor calibrations at +18 dBm
Added support for the Keysight E5080A PNA
Added command to default Agilent power meter settings
Added E441x high power verification templates
Added power standard Cal-Factor calibration with thermistor or bridge
Added Agilent_PNA_E836xA to equivalent port match
Changed amplifier safety levels
Updated linearity measurements with the PCS-K150
Added frequency limits button to high power calibration with directional coupler
Added error handling for uncertainty lookup and fixed naming errors
Added equivalent port match and power standard reports
Added measurement method for high power calibrations using high power VNA
Update voltmeter drivers for to improve calibration times
Updated power standard calibration & 3458A ratio voltage measurements
Added high power measurement capabilities to the VNA cal factor measurement

### Bug Fixes, Corrections, and Incidental Changes

Resolved 100 kHz minimum frequency error
Resolved maximum level error for Keysight H-series sensors
Changed install requirements to .NET 4.0
Added 50 MHz to 80701A template
Updated 1830A driver to support thermistors in the correct mode
Resolved 1830A error when calibrating Tegam bolometers
Resolved issue with start over crashing
Resolved issue using 1830A as the UUT in bridge mode

Resolved issue with 1830 averaging unlimited zero values
Resolved issue with Bridge-Averaging tool not removing zero measurement
Resolved localization issue setting the application to US English
Resolved issue of setting the power level on the 8757 network analyzer
Resolved I/O errors with 8757D
Resolved connection message issue with Fluke 5790A
Resolved EEPROM upload issue for Giga-tronics power sensors
Modified station verification method from +/- 0.05 dB to < RSS of instruments
Resolved issue with E9302A_H18 having two frequency lists
Updated test process selection to scale
Resolved error calculating mismatch uncertainties scaled to %
Corrected typo in the Anritsu upload tool
Added CRLF to the end of all calls to the CETC AV1464x signal generator
Updated station calibration for Type-F and Type-G Cal-Factor
Minor updates to the UI and application version

## PS-Cal v4.4, August 2018 Release

Add EEPROM programming support for the N1913A and N1914A power meters
Add templates for TEGAM RF standards 1505A, 2505A, 1510A, 2510A, and 1807A
Add support for Keysight U8481A, U8485A, and U8487A power sensors
Add uncertainty data for E5071C at frequencies above 8.5 GHz
Add user-definable reference frequency parameter to Giga-tronics 80701
Update HP 8340A driver to set RF to OFF after preset command
Update the Boonton power sensor calibration upload routine
Update Boonton 4232 power meter driver
Split Boonton power sensors into peak and CW groups
Set calibration frequency to 1 GHz for select Boonton models
Resolve type issue with Agilent PNA N5230C driver
Correct attenuator math error
Correct error in E9304A H18/H19/H20/H24/H25 sensor templates
Update Keysight 34401A drivers
Update Test Report user interface
Improve EEPROM upload routines
Add user prompt to restart PS-Cal after removing instrument(s) from Station
Change E930xA cal level from -10 to -11 dBm
Add EEPROM upload to the Anritsu MA248x power sensors
Add extended frequency points to TEGAM bolometer templates
Rename power splitter files
Correct 1830A Measurement Error when Calibrating Power Sensors at -30 dBm
Update Giga-tronics upload tool

## PS-Cal v4.3, February 2018 Release

Changed bridge measurement methodology to reduce measurement time per frequency
Added amplifier support
Added samples / measurement parameter
Added dwell time parameter and set default to 13 s
Updated install package
Updated Bridge Method verification process to set frequency on DUT power meter
Fixed 13s delay setting in verification tests
Changed order of inheritance for Direct Comparison
Updated TEGAM 2510 lower frequency limit
Updated and tested TEGAM 1806 bridge measurement methods
Split E9304A into two templates to allow use of TEGAM 2505A
Resolved calculation issues with 1806A bridge
Added temperature in degrees Celsius to linearity test
Added zero and power averaging tool
Updated main form error handling
Resolved issue with template for 2002A
Updated I/O for Keysight meters writing data to EEPROMS
Added Rohde &Schwarz .NET header to files to interact with DLL files
Added notification stating that Boonton 4500B can only read EEPROM
Resolved Z51 upload issue
Updated leveling loops to 0.05db
Changed voltmeter drivers to 6.5 Digits
Added new driver for CETC_AV1464x series signal generator
Resolved timeout settling errors with Rohde &Schwarz EEPROM upload and HP 3458A
Resolved problem with 9640A setting signal source to +6 dbm

Resolved 1830A Com Port setting errors when VISA resource is not available
Resolved issue with Boonton 4500A programming EEPROM
Modified DMM drivers for a 10V range and 2.5V measurement default for TEGAM hardware
Updated power sensor template e932xa
Increased scroll bars on selection UI for Select Test Method screen
Updated drivers so all have static creation classes
Updated Boonton 4500B driver to support watts
Added better error messages for exporting n553xx data