

MET/CAL® Procedures for RF Power Sensor Calibration

Automate RF calibration and
manage RF calibration assets

Technical Data

Fluke Calibration has developed RF reference sources that reduce the amount of equipment and simplify the processes required to calibrate power sensors, spectrum analyzers, and other RF test equipment. But hardware is only part of the RF calibration story. Another important part of the story is the software used to automate the calibration process.

Calibrating RF power sensors requires numerous complicated calculations, mismatch correction and uncertainty analysis; tasks normally performed by highly skilled metrologists. Automating the calibration process with MET/CAL® Calibration Management Software makes it a simple task to provide traceable RF power sensor calibrations. Now TEGAM has partnered with Fluke Calibration to make it easy to add MET/CAL automation to your RF power sensor calibration system, with a series of 29 MET/CAL procedures for RF power sensors from Agilent (Keysight), Anritsu, Rohde & Schwartz, and TEGAM.

Using these MET/CAL procedures as part of your RF calibration system provides these valuable benefits:

- Perform RF power sensor calibrations in your own laboratory instead of sending them to another laboratory or manufacturer. The cost of one MET/CAL RF power sensor procedure pays for itself after one or two calibrations.



- If you currently use MET/CAL in other parts of your lab, you can add RF power sensor calibration capabilities easily and quickly. Using MET/CAL for both RF calibration and your other calibrations allows you to use one user interface and database, improving the productivity of your calibration laboratory.
- You will find it easier and more efficient to manage your calibration assets and reports across more of your workload using the MET/TEAM® or MET/BASE® databases.
- MET/CAL procedures simplify the complex RF power sensor calibration process, performing calculations of calibration factor, mismatch correction and uncertainty analysis all within an automated procedure.
- Perform power sensor calibrations four to eight times faster than by manual calibration, freeing up your most skilled metrologists to focus on other tasks.
- You gain confidence that your results are traceable and auditable.
- You avoid the task of writing complex automated procedures.

Each of the RF power sensor MET/CAL procedures performs calibration of the sensor per the manufacturer's requirements for calibration factor, including mismatch correction and uncertainty analysis. Many of the procedures have both verification and adjustment capability.

The MET/CAL *Plus* application suite includes browser-based MET/TEAM Test Equipment and Asset Management Software for asset management and data storage. You can now manage all of your test equipment and other measurement assets in a single database.

Fluke Calibration 96270A RF Reference Source

RF calibration just became a lot less complicated

The 27 GHz Fluke Calibration 96270A RF Reference Source is the simplest, most accurate and cost-effective single instrument for calibrating spectrum analyzers, RF power sensors and more. Unlike many RF calibration solutions, the 96270A is designed specifically for RF calibration, with a calibration oriented user interface that makes it easy to learn and operate. Automated with MET/CAL software, the 96270A dramatically reduces calibration times, improving efficiency and increasing calibration system capacity by 25 percent or more.



TEGAM PMX Series Microwave Power Calibration System

Flexible suite of microwave calibration tools in a complete automated system

The TEGAM PMX system includes TEGAM microwave power standards, a network analyzer and the Fluke Calibration 96270A selected to provide the lowest total uncertainty calibration. It is designed to realize consistent, cost-effective and traceable calibrations. The system can be automated with MET/CAL software and the MET/CAL procedures developed by TEGAM, for efficient RF power sensor calibration. The 96270A has the performance to easily handle RF power sensor linearity calibration, and the versatility to calibrate other workload like spectrum analyzers.



MET/CAL procedures for RF power sensor calibration

Sensor manufacturer	Model number	Type	Bandwidth	Formal name
Agilent 848x Sensors	8481A	VER/ADJ	18 GHz	Power Sensor
	8482A	VER/ADJ	4.2 GHz	Power Sensor
	8485A	VER/ADJ	26.5 GHz	Power Sensor
	8487A	VER/ADJ	50 GHz	Power Sensor
Agilent E441x Sensors	E4412A	VER/ADJ*	18 GHz	Wide Dynamic Range Power Sensor, E-Series
	E4413A	VER/ADJ*	26.5 GHz	Wide Dynamic Range Power Sensor, E-Series
Anritsu MA244x Sensors	MA2442A	VER/ADJ	18 GHz	High Accuracy Sensor
	MA2442D	VER/ADJ	18 GHz	High Accuracy Diode Sensor
	MA2445A	VER/ADJ	50 GHz	High Accuracy Sensor
	MA2445D	VER/ADJ	50 GHz	High Accuracy Diode Sensor
Agilent N1920 Sensors	N1921A	VER	18 GHz	P-Series Wideband Power Sensor
	N1922A	VER	40 GHz	P-Series Wideband Power Sensor
Agilent U2000x USB Sensors	U2000A	VER	18 GHz	USB Power Sensor
	U2001A	VER	6 GHz	USB Power Sensor
	U2002A	VER	24 GHz	USB Power Sensor
R&S NRP-Zxx USB Sensors	NRP-Z51	VER/ADJ	18 GHz	Thermal Power Sensor
	NRP-Z52	VER/ADJ	33 GHz	Thermal Power Sensor
	NRP-Z56	VER/ADJ	50 GHz	Thermal Power Sensor
Agilent E93xx Sensors	E9300A	VER/ADJ*	18 GHz	E-Series Average Power Sensor
	E9301A	VER/ADJ*	6 GHz	E-Series Average Power Sensor
Anritsu MA247x Sensors	MA2472A	VER/ADJ	18 GHz	Power Sensor
	MA2472D	VER/ADJ	18 GHz	Standard Diode Sensor
	MA2475A	VER/ADJ	50 GHz	Power Sensor
	MA2475D	VER/ADJ	50 GHz	Standard Diode Sensor
Anritsu MA2400xA Sensors	MA24002A	VER/ADJ	18 GHz	Thermal Power Sensor
	MA24005A	VER/ADJ	50 GHz	Thermal Power Sensor
TEGAM F11XX, 25XX	F1130B	VER/ADJ	18 GHz	Feedthrough Power Standard
	F1135B	VER/ADJ	26.5 GHz	Feedthrough Power Standard
	2510A	VER/ADJ	50 GHz	Microwave Calibration Standard

* Requires Agilent N1913A/14A meter to write EEPROM data.

Minimum system requirements for MET/CAL Software with MET/TEAM*

MET/TEAM server (minimum requirements)	MET/CAL client	MET/TEAM client
Microsoft® Windows® 7 64-bit	Microsoft Windows XP SP3 or later	Browser support for any of the following browsers:
Microsoft Windows Server 2008 64-bit	Microsoft Windows XP SP3 or later	Google Chrome™ version 18 or newer
Microsoft Windows Server 2008 R2 64-bit	Microsoft Windows Server 2003	Microsoft Internet Explorer® version 7 or newer
2.0 GHz Intel® Pentium® IV processor or equivalent	Microsoft Windows Vista (32 and 64-bit)	Apple Safari® 5.1 or newer
2 GB of RAM	Microsoft Windows 7 (32 and 64-bit)	Mozilla Firefox® version 12 or newer
4 GB of available hard drive space on the server	Microsoft Windows Server 2008 (32 and 64-bit)	Hardware requirements are those required to run the browser, at a minimum this should be:
	Microsoft Windows Server 2008 R2 (64-bit)	1.5 GHz Intel Pentium 4 processor or equivalent
	1 G Hz Intel Pentium 4 processor or equivalent	512 MB of RAM
	1 GB of RAM	Supported network protocols: TCP/IP
	2 GB of available hard drive space	Backup device: Strongly recommended

*1. Minimum MET/CAL software requirements for RF power sensor procedures: MET/CAL version 8.3 or newer, with MET/TEAM or MET/BASE.

*2. System requirements may change as software environments evolve, please refer to flukecal.com/metcal for the latest system requirements.

Minimum hardware requirements to use these procedures

One of the following vector network analyzers, with an open/short/lowband/sliding load calibration kit for the UUT connector type and/or frequency range	UUT power meter (indicator), as appropriate for the UUT power sensor
Agilent 8510C	Agilent N1913A (USB option required for U2000A Series)
Agilent PNA Series	Agilent N1911A (P-Series)
N5221A - 13.5 GHz	Rohde & Schwarz NRP2
N5222A - 26.5 GHz	Anritsu ML2437A
N5224A - 43.5 GHz	TEGAM 1830A power meter (reference), with one of these power standards as appropriate for the UUT connector type and/or frequency range
N5225A - 50.0 GHz	TEGAM F1130B - Type N, 18 GHz
N5227A - 67.0 GHz	TEGAM F1135B - APC-3.5, 26.5 GHz
Agilent PNA-L Series	TEGAM 2510A - 2.4 mm, 50 GHz
N5232A - 20.0 GHz	Signal source(s) to cover the frequency range of the UUT
N5234A - 43.5 GHz	Must be a supported flexible generator in MET/CAL software.
N5235A - 50.0 GHz	This list is updated regularly by Fluke Calibration; refer to MET/CAL's user_config_instr.ini for the current list.
Agilent PNA-X Series	Customers can also add support for many of their own generators by modifying user_config_instr.ini with commands, if desired.
N5241A - 13.5 GHz	Can be a single generator if it covers the full frequency range, or two generators (crossover frequency will be requested in the procedure).
N5242A - 26.5 GHz	Must be capable of providing 1 mW of incident power to the UUT at all frequencies. The procedures test for this capability at maximum UUT frequency only.
N5244A - 43.5 GHz	The Fluke 96270A is recommended for calibrations up to 27 GHz, since it offers the performance to handle RF sensor linearity calibrations, and functionality to add additional workload like spectrum analyzers.
N5245A - 50.0 GHz	
N5247A - 67.0 GHz	
Anritsu VectorStar Series	
MS4642A - 20 GHz	
MS4644A - 40 GHz	
MS4645A - 50 GHz	
MS4647A - 70 GHz	
Rohde & Schwarz ZVA Series	
ZVA8 - 8 GHz	
ZVA24 - 24 GHz	
ZVA40 - 40 GHz	
ZVA50 - 50 GHz	
ZVA67 - 67 GHz	

Electrical	RF	Temperature	Pressure	Flow	Software
------------	----	-------------	----------	------	----------

Fluke Calibration.
Precision, performance, confidence.™

Fluke Corporation
PO Box 9090, Everett, WA 98206 U.S.A.
Fluke Europe B.V.
PO Box 1186, 5602 BD
Eindhoven, The Netherlands

For more information call:
In the U.S.A. (800) 443-5853 or
Fax (425) 446-5116
In Europe/M-East/Africa +31 (0) 40 2675 200 or
Fax +31 (0) 40 2675 222
In Canada (800)-36-FLUKE or
Fax (905) 890-6866
From other countries +1 (425) 446-5500 or
Fax +1 (425) 446-5116
Web access: <http://www.fluke.com>

Modification of this document is not permitted without written permission from Fluke Corporation.

©2014 Fluke Corporation.
Specifications subject to change without notice.
11/2014 6003301a-en