HEWLETT PACKARD

Microwave Measurement Uncertainty Training

Technical Data

HP Education Services: Your Key to Higher Productivity

Course Overview

The Microwave Measurement Uncertainty course (50792X opt. 23) provides training on the process of performing uncertainty analysis of microwave measurements. The course will cover the contemporary terms and definitions employed in the CIPM method of uncertainty calculations; the identification and quantification of errors in the microwave parameters; and the mathematical summation of total measurement uncertainty.

Because the new CIPM (International Committee for Weights and Measures) recommendation for expressing uncertainty in measurment is the only recommendation endorsed by an intergovernmental organization* this course provides a solid foundation for building an understanding of measurement uncertainty and a wise long-term investment.

Upon completion, the student will have individually performed the measurement uncertainty calculations of several basic through complex test configurations and measurements; actual HP performance test procedures will be used in these analyses.

* members include: ISO International Organization for Standarization, IOML (International Organization of legal Metrology) and BIPM (International Bureau of Weights and Measures)

Course Features

- CIPM terms and definitions
- Identification and quantification of microwave measurement errors
- Mathematical deviation of combined standard measurement uncertainty
- Application of BIPM method to actual HP test and calibration procedures
- Optional tour of NIST

Specifications

Course Length
3 days

Audience
Metrologists responsible for complying with ISO metrology standards and technicians and engineers who take these measurements and perform the calculations.

Prerequisites
Student must have successfully completed Microwave Measurement Fundamentals (50740B), or have equivalent experience. This course is a hands-on Student should also bring a scientific calculator capable of doing statistics.

Delivery Method
Dedicated

Format
Course content is 60% lecture and 40% lab.

Classroom Training Benefits

Experienced HP Instructors
Learn from an experienced HP instructor who is an expert in using and applying instrument systems to meet your measurement needs.

Available at HP Classrooms or Your Site
Take advantage of HP's learning facilities, equipment, and interactive learning environment by attending class at an HP facility. Or, save travel expenses and time by organizing a dedicated class at your location.

Optional Tour of NIST
Students attending this course at HP's Englewood facility will also have the option of participating in an additional 1/2 day tour of NIST (National Institute of Standards and Technology). Students are responsible for providing their own transportation to NIST.

Regularly Scheduled Classes
Plan training months in advance.

Extensive Hands-on Practice
HP classroom training is characterized by extensive hands-on experience and interactive class discussion. HP classroom training pays off immediately because it is geared to real-world solutions.

Comprehensive Student Materials
Copies of course materials are provided for future reference on the job.

Course Number: 50792X opt. 023 (Dedicated)

Microwave Measurement Uncertainty Training (50792X opt. 023)

Course Agenda

- Introduction
  - The global picture
- Metrology setting
  - Quotes
  - Graphical Illustration of Value
  - Error
  - Uncertainty
  - Calibration
  - Standards
  - Traceability
- Disturbance
  - Lack of Conformity and Agreement in the Worldwide Measurement Community
  - Meeting Compliance of New Standards
- Basic Terms, concepts and Definitions (BIPM method)
- Error
  - Source
  - Random
  - Systematic
  - Total Measurement Error
- Review of Statistical Analysis
- Mathematical Methodology of BIPM
- Basic Power Measurement Test Ensemble
  - Identify and Classify Error Sources
  - How to find and quantify the Assigned Values
  - Calculate the Uncertainty
- Introduce Additional Examples of Test Ensembles and Types of Measurements to Reveal all Error Contributing Factors and Explore the Four Basic Microwave Measurements: Frequency, VSWR, Power and Attenuation
- Work on complex measurement and test ensembles as group and individual projects

Ordering Information

To order Microwave Measurement Uncertainty Training (50792X opt. 023) in the U.S. call 1-800-HPCLASS or (800-472-5277).

HP's Customer Registration Center can provide you with price, scheduling, and enrollment information.

Outside the U.S., contact your nearest local HP sales office.

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