

## **PSDC and FILPAL capabilities and training courses**

### **1. Basic Course:**

**Common Issues: Impedance Matching Techniques and Applications**

**Training Objectives: Design Matching networks for different applications and industry**

- a. Smith chart applications
- b. Lumped element matching
- c. Distributed matching
- d. Active circuit matching

**Hands-on FILPAL EDS Electronics Design Simulation EDS software**

**CASE studies with application/ product testing with Test & Measurement equipment**

Equipment required: Vector Network Analyzer R&S ZVL (our own) or Keysight ENA and FILPAL and Mini-Circuit devices

### **2. Basic to Intermediate Course:**

**Common Issues: Filtering (noise, harmonics, interference)**

**Training Objectives: Improve Signal to Noise ratio SNR, Total Harmonics Distortion THD**

- a. Lumped element filter design
- b. Distributed filter design using Richard's transforms.
- c. Microstrip filter design
- d. Cavity filter design
- e. FILSAT filter for 5G and FSS mitigation

**Hands-on FILPAL EDS Electronics Design Simulation EDS software**

**CASE studies with application/ product testing with Test & Measurement equipment**

Equipment required: Vector Signal Generator R&S SMBV, Spectrum Analyzer R&S FSQ Vector Network Analyzer R&S ZVL (our own) or Keysight ENA and FILPAL devices

### **3. Intermediate Course:**

**Common Issues: Machine to Machine communication via wireless connection**

**Training Objectives: Wireless communication setup and implementation**

**Software Tools for Wireless Access and Remote Handling**

- a. Point-To-Points (P2X) Open Platform for Industrial Revolution 4.0 / IOT
  - i. Integrated solution platform for test & measurement instruments with networking capabilities / remote access and handling
  - ii. Network configuration – Wired or Wireless
  - iii. Master Control over 2-in-1 Vector Network and Spectrum Analyzer mode
  - iv. Real-Time Plotting block with Real-Time data capture
  - v. Integration with off-the-shelf wireless Sensors and Actuators
- b. Data-Post-Processing (DPP) custom date Post Process platform
  - i. Material Under Test (MUT) property block for Magnetic Characterization
  - ii. Convert S-parameters to Dielectric properties
  - iii. Allow definitions of sample and holder parameters (length, thickness, cut-off frequencies, sample to holder distance, etc.)
  - iv. Perform calculations using various mathematical models
  - v. (Nicolson-Ross-Weir NRW, Non-Iterative model, etc.)
  - vi. Plot various measurements (Permeability, Permittivity, Loss tangent)

**Hands-on FILPAL Point to multiple Points P2X software and Data Post Processing DPP software**

**CASE studies with application/ product testing with Test & Measurement equipment**

Equipment required: Vector Network Analyzer R&S ZVL (our own) & Keysight ENA, Vector Signal Generator R&S SMBV, Spectrum Analyzer R&S FSQ, other equipment may be considered.

#### 4. Intermediate to Advance Course:

**Common Issues: Unable to source for off the shelves devices for engineering purpose**

**Training Objectives: Design, Simulation and Testing of RF and microwave components and devices**

- a. Basic theories and design principles
- b. Calibration and measurement

**Hands-on FILPAL EDS Electronics Design Simulation EDS software**

**CASE studies with application/ product testing with Test & Measurement equipment**

Equipment required: Vector Network Analyzer R&S ZVL (our own) & Keysight ENA for device testing;  
Vector Signal Generator R&S SMBV, Spectrum Analyzer R&S FSQ for system testing

#### 5. Advanced Course

**Common Issues: Unable to source for non-linear devices for engineering purpose**

**Training Objectives: Design, Simulation and Testing of RF and microwave components and devices**

**Small-signal and Low noise amplifier (LNA) designs**

- a. Stability consideration
- b. Noise performance
- c. Gains
- d. Designing biasing circuits
- e. Layout generation, fabrication and measurements

**Hands-on FILPAL EDS Electronics Design Simulation EDS software**

**CASE studies with application/ product testing with Test & Measurement equipment**

Equipment required: Vector Network Analyzer R&S ZVL (our own) & Keysight ENA for device testing;  
Vector Signal Generator R&S SMBV, Spectrum Analyzer R&S FSQ for system testing  
Additionally: Phase Noise Analyzer R&S FSUP

#### 6. Advanced Course

**Common Issues: Unable to define the electrical especially High Frequency signal specification for datasheet documentation**

**Training Objectives: To provide Custom Component Modeling CCM techniques**

- a. Defining RF electrical specifications
  - i. Modeling and performing 3D simulation using HFSS (S-parameters)
  - ii. Performing small signal circuit modelling based on high order polynomial curve fitting
- b. Developing custom PDK/Toolbox
  - i. Developing GE custom toolbox
  - ii. Enabling automatic parameters extraction through built-in model using FILPAL EDS simulator

**Hands-on FILPAL EDS Electronics Design Simulation EDS software, not available for HFSS**

**Equipment required: FILPAL Electronics Design Simulation EDS, and HFSS demonstration**

#### Other Courses

Fundamental RF & Microwave Passive components for Wireless communications

Fundamental RF & Microwave Active components for Wireless communications

Advanced RF Microwave Filter Design



Everyone Engineers, Anytime Anywhere

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