Procedure overview
- Connect fixture to Gain-Phase test port
- Set measurement parameters
- Perform calibration
- Connect DUT then scale measurement trace
- Perform equivalent circuit analysis

In this demo...
- Impedance measurement (Series-thru method, GP port)
- Calibration at the fixture
- Equivalent Circuit Analysis

Required Instrument and fixture
Instrument
E5061B-3L5/005/720 or E5061BEP-NZA (E5061BEP-NZA is the package solution which has all required option for impedance analysis)

In this demo, a 0.1 μF leaded capacitor is measured. You can evaluate other components as well. Also, you can even evaluate SMD(chip) components if you have a test fixture for SMD components (16034E or 16034G).

1. Connect fixture to Gain-Phase test port

2. Set measurement parameters
   a. Press [Preset] then press OK
      Set measurement traces
   b. Press [Display] then press Num of traces, and 2
      Press Allocate Traces and x2
   c. Set measurement parameters
      Press [Meas] then press Impedance analysis menu
      Press Method then press GP Series (T 50 ohm, R 1 Mohm)
      Press |Z|
      Press [Trace Next] to select trace2 then press Cs
   d. Set Y-axis to log scale for trace1
      Press [Trace Next] to select trace1
      Press [Scale] then Y-Axis and Log
   e. Set log sweep parameters
      Press [Sweep Setup] then press Sweep type, and Log Freq
      Press [Start] then enter 100 Hz
      Press [Stop] then enter 30 MHz
   f. Set IF bandwidth
      Press [Avg] then press IFBW AUTO
      Press IFBW Auto Limit and enter 100 Hz

What is the method under impedance analysis menu?
There are several topologies (or methods) to measure impedance depending on the DUT’s impedance range.
With the GP Series (T 50 ohm, R 1 Mohm), Series-thru method at GP (Gain-Phase) port of the E5061B (port impedance: T: 50 ohm, R: 1 Mohm) is used.

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3. Perform calibration
   a. Select calibration kit
      Press [Cal] then press Cal Kit, and Leaded 50 ohm
   b. Measure calibration standard
      Press [Cal] then press Calibrate
      Press Impedance calibration
      Make open state then press Open
      Make short state then press Short
      Make load state then press Load
   c. Activate calibration
      Press Done

   Refer to following figure to make each state for the standard measurement.

   Open
   Short
   Load
   Nothing
   Insert short bar (equipped with fixture)
   Insert 50 ohm resister

   For load state, use leaded 50 ohm standard (5012-8846) equipped with E5061B-720

4. Connect DUT then scale measurement trace
   a. Connect DUT to the fixture
   b. Press [Scale] then press Auto Scale All

5. Perform equivalent circuit analysis
   a. Select equivalent circuit
      Press [Analysis] then press Equivalent Circuit
      Press Select circuit then press D
      Press Display to turn on analysis
      Press Calculate

      Equivalent circuit is calculated with the specified circuit model and measured impedance value.

      Measured trace and simulated trace can be compared by changing each component’s value. Simulated trace is stored in the Memory trace.

      Which is the right circuit model for my DUT?
      Models for equivalent circuit should be selected depending on the type of the DUT:
      A. Inductors with high core loss
      B. Inductors with high winding resistance or resistors with low resistance value
      C. Resistors with high resistance value
      D. Capacitors
      E. Resistors