

E5061B ENA Series Network Analyzer, Option 1x5/2x5 RF NA Options

Procedure overview

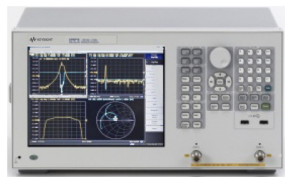
1. Procedure overview
2. Connect DUT to E5061B
3. Set measurement parameters
4. Perform calibration (optional)
5. Measure insertion loss
6. Measure bandwidth parameters

In this demo...

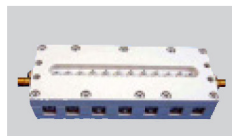
- Setting up typical measurement for band pass filter
- Performing calibration (mechanical or Ecal)
- Measuring insertion loss and bandwidth parameters

Required Instrument and fixture

E5061B-115/135/215/235 or E5061BEP-115/235
(also E5061B-117/137/217/237 available for 75 Ω DUT)



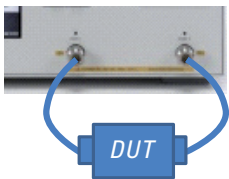
N-Type Cable



Band pass filter (BPF)

In this demo, we will use BPF (Center frequency = 1.09 GHz, BW = 15 MHz) but you can use another filter. Prepare appropriate cable and adapter to connect between ENA and DUT.

1. Connect DUT to E5061B



Legend: **[Key name]** = front panel hardware key
Key name = soft key
Number = front panel hardware numeric key

2. Set measurement parameters

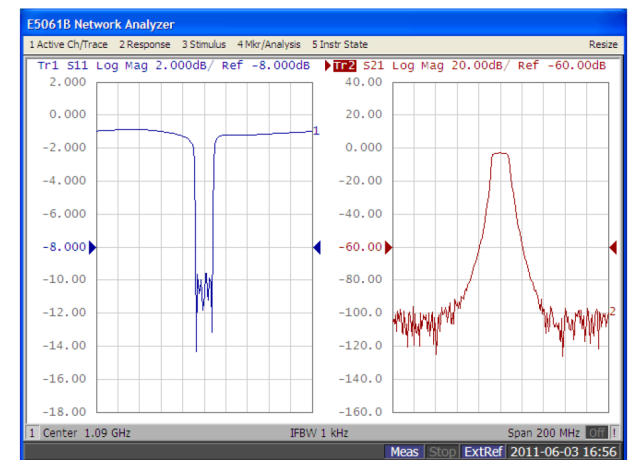
- a. Press **[Preset]** then press **OK**
- b. Set Frequency
Press **[Center]** then enter **1.09 GHz**
Press **[Span]** then enter **200 MHz**
- c. Set measurement traces
Press **[Display]** then press **Num of traces**, and **2**
Press **Allocate Traces** and **x2**
- d. Set measurement parameters for trace2
Activate trace2
Press **[Meas]** then press **S21**
Press **[Scale]** then press **Auto Scale All**
- e. Set IFBW
Press **[Avg]** then enter **1 kHz**

What is the active trace? How to activate the trace?

► to the right of the trace name indicates the active trace (the trace for which set up is being performed). To make a trace active, use **[Trace Next]** or **[Trace Prev.]**. Clicking the line where the trace name is placed also makes a trace active.

What happens by changing IFBW?

Narrowing the receiver IFBW enables you to reduce the effect of random noise on measurements. Narrowing the IFBW to 1/10 the original bandwidth causes the receiver noise floor to decrease by 10 dB. Lowering the noise floor of the receiver enables you to expand the dynamic range. In evaluating a characteristics accompanied by large change in the amplitude such as filter, it is important to expand dynamic range.



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To measure S-parameter accurately, recommend to perform calibration. However, if you don't have calibration kit, you can skip step 3. In this demo, we use 85032E economy mechanical calibration kit.

3. Perform calibration (Mechanical Cal)

- Select calibration kit and calibration type
Press **[Cal]** then press **Cal Kit**, and press **85032B/E**
Press **Calibrate**, then press **Enhanced Response**
- Measure calibration standard
Connect open std. to port1 then press **Open**
Connect short std. to port1 then press **Short**
Connect load std. to port1 then press **Load**
Connect thru std. between port1 and port2 then press **Thru**
- Activate calibration
Press **Done**

If you have Ecal (electric calibration) module, you can also perform calibration kit with Ecal.

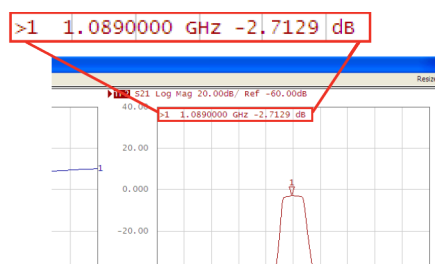
3. Perform calibration (Ecal)

- Connect Ecal to USB port
Need to allow the Ecal module to warm up for 20 min until the module indicator changes from WAIT to READY.
- Perform Calibration
Connect RF port of Ecal and ENA.
Press **[Cal]** then press **Ecal**
Press **Enhanced Response** then press **2-1 (S21 S11)**

In this demo, we performed "enhanced response" for the type of calibration method. For more detail on the calibration method, refer to help.

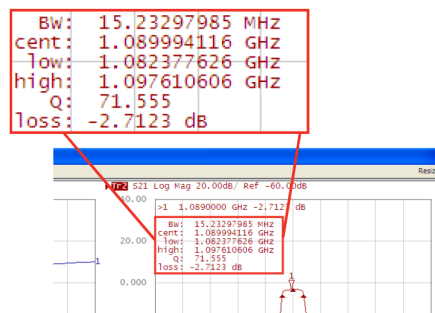
4. Measure the insertion loss

- Connect DUT to E5061B if you performed calibration
- Display marker on peak of the S21 measurement
Activate trace2, then press **[Marker]**
Press **[Marker Search]** then press **Max**
- Measure the marker value displayed as shown in the figure below. In this example, the response value denotes the insertion loss.



5. Measure the bandwidth parameters

- Perform bandwidths search
Press **[Marker Search]** then press **Bandwidth**
- The bandwidth data items (BW, cent, low, high, Q, loss) is displayed as shown in the figure below.



What are bandwidth parameters?

Using the bandwidth search functions, parameters below are read out.

BW (Bandwidth): Stimulus width between two cutoff frequency points (low and high)

Cent (Center Frequency): Center point between cutoff frequency points (low and high)

Low (Left-side Cutoff Frequency): The lower frequency of the two cutoff frequency points

High (Right-side Cutoff Frequency): The higher frequency of the two cutoff frequency points

Q (Q value): $Q = \text{cent}/\text{BW}$

Loss (Insertion Loss): The measured value of the active marker

Additional Demo: Bandwidth limit test

The test result of the trace can be indicated in the upper-right section of the graph.

- Bandwidth test setup
Press **[Analysis]** then press **Bandwidth Limit**
Press **[Min Bandwidth]** then enter smaller value than actual bandwidth
Press **[Max Bandwidth]** then enter greater value than actual bandwidth
- Turning on the bandwidth limit test function
Press **BW Test**

www.keysight.com/find/e5061b