Keysight ENA Series Network Analyzers

Mixer Measurement Wizard
Operation Manual

Rev. 01.21

KEYSIGHT
TECHNOLOGIES

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Sample Program

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Overview

The ENA Mixer Measurement Wizard VBA macro assists in setting measurement conditions for mixer tests.   To obtain full benefits from this VBA macro, understanding of fundamental network analysis and scalar and vector mixer calibration are essential.   Keysight application notes 1408-1, 1408-2, and 1408-3 offer in-depth information regarding mixer measurements and calibration techniques.

Program Description

Program title	Mixer Measurement Wizard
File Name	EnaMixerWizard_0121.vba
Revision	Rev.01.21

Supported ENA models and firmware

Models	Firmware
E5071C 2-port/4-port with opt.008	Rev.8.00 or later

Required external instruments

- Power meter and power sensor
- Signal Generator

Measurements supported in the wizard

- Conversion Loss and Group delay
- Conversion Compression
- Return Loss

Calibration types Supported in the wizard

- Power meter calibration (PMC)
- Scalar mixer calibration (SMC)
- Vector Mixer calibration (VMC)

Starting the VBA macro

Step1.   Copy VBA file to local drive of ENA.

Step2.   Press Macro Setup on the front panel.

Step3.   Press **Load Project** and load VBA file.

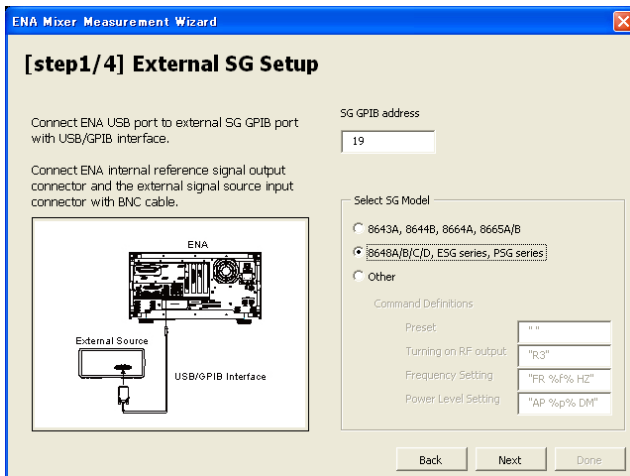**Step4.**   Press Macro Run on the front panel.
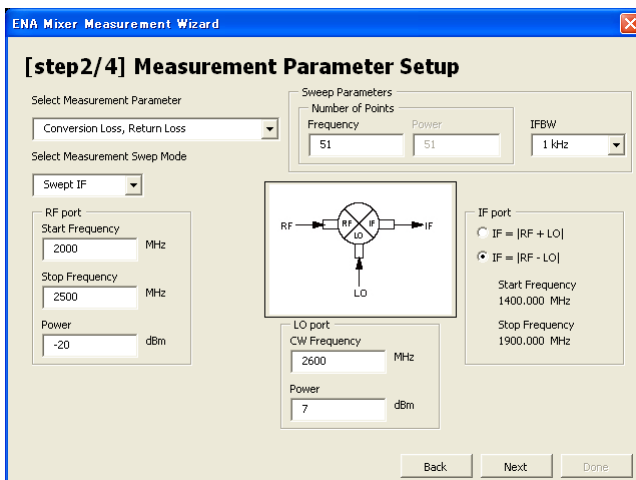
VBA macro Instruction

Startup Dialogue
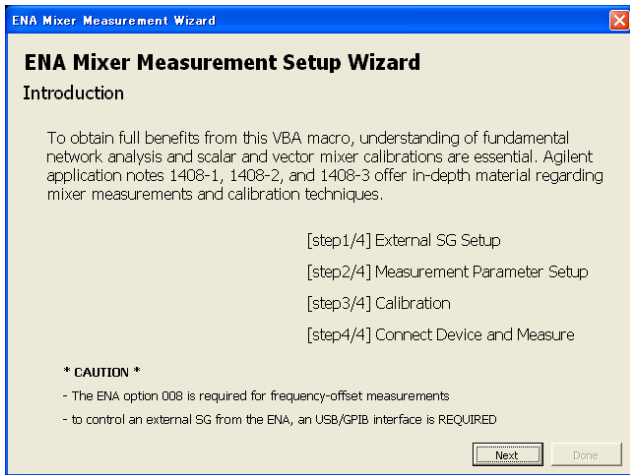
VBA program starts with Introduction Dialog. Press Next button to continue.
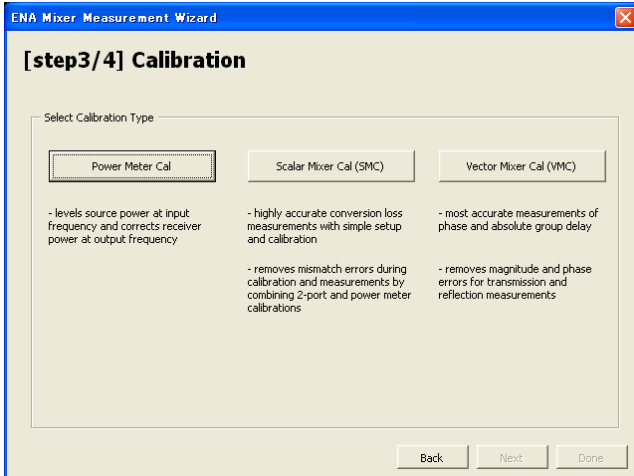
[Step1/4] External SG Setup

Connect ENA USB port to external SG GPIB port with USB/GPIB interface.

Select the SG model to select appropriate command.
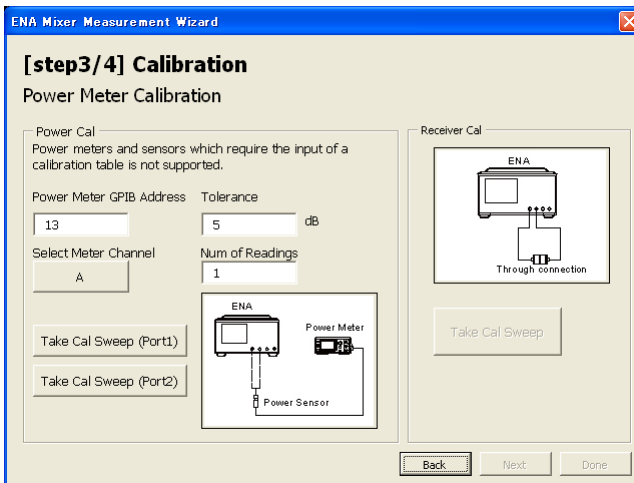
[Step2/4 Measurement Parameter Setup

Select Measurement Type. Refer to "table 1-1 for available measurement and calibration.

[Step3/4] Calibration type selection

Select calibration type. Refer to table1 for available measurement and calibration.
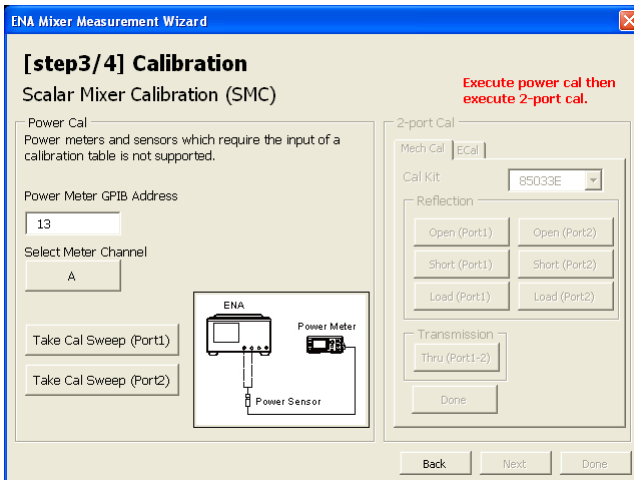
[Step3/4] (1) Power Meter Calibration

Power meter calibration technique is perfromed with this form.
Press "Take Cal Sweep" button under "Power cal" box to calibrate power level of the ENA.
Then, execute receiver calibration with "Take Cal Sweep" button in the "Receiver Cal" box.
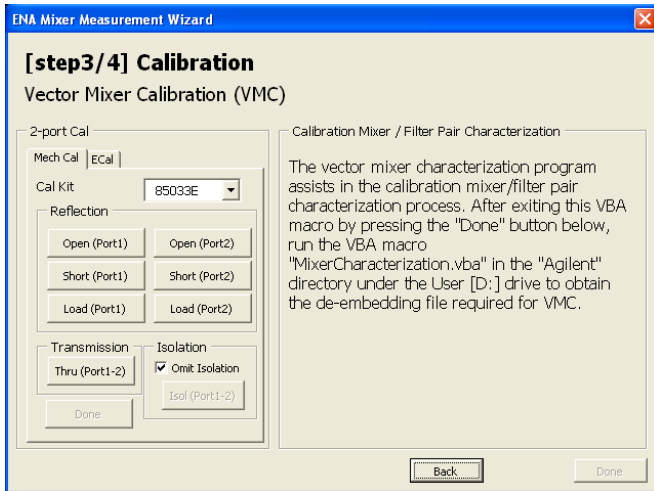
[Step3/4] (2) Scalar Mixer Calibration

Scalar mixer calibration technique is performed with this form.
Press "Take Cal Sweep" button under "Power cal" box to calibrate power level of the ENA.
Then, execute full-2 port calibration

[step3/4] (3) Vector Mixer Calibration

Full 2 port calibration, which is required for the Vector Mixer Calibration, will be executed with this form.

Perform full 2 port calibration and press "Done" button.

Then load the VBA macro "MixerCharactarization.vba" in the "keysight" directory under the User [D:] drive to obtain the de-embedding file required for VMC.

[step4/4] Connect Device and Measurement
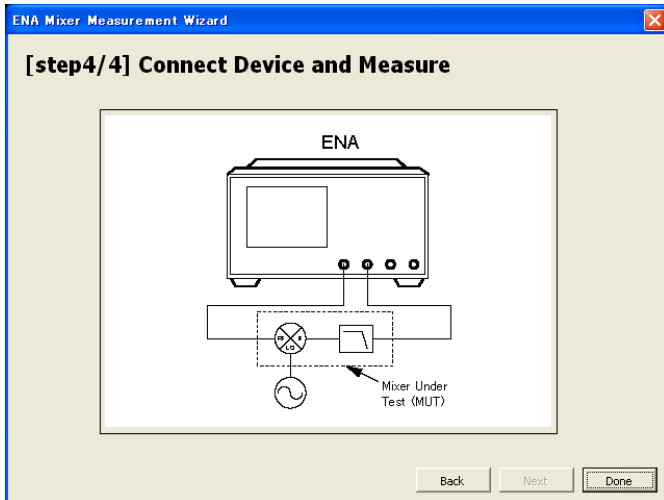
Connect DUT, then press "Done" button to finish the VBA macro.

Available measurement types, calibration method and measurement results

Following table describes available measurement types and calibration techniques with the VBA wizard. Also, measurement result with each measurement type and calibration type is described below.
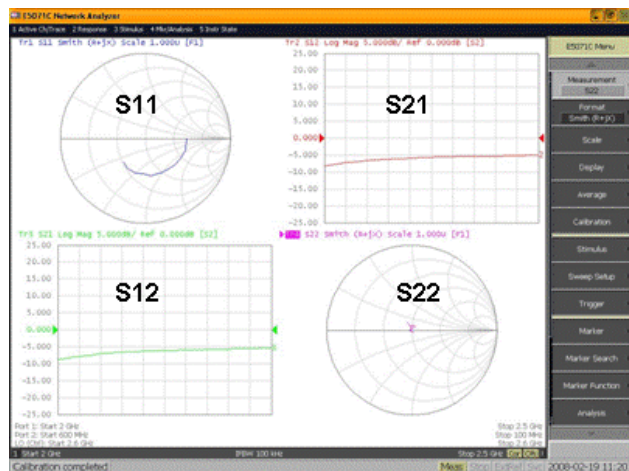
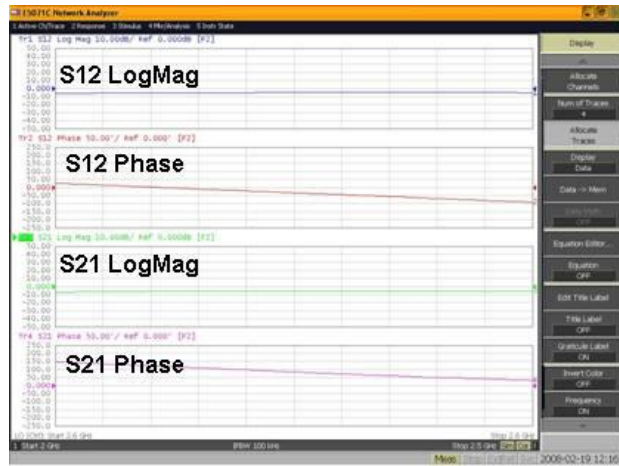| Measurement Type (Step2)		Calibration Type (Step3)		
Measurement	Sweep	Power Meter Cal	Scalar Mixer Cal	Vector Mixer Cal
Conversion Loss	Swept IF	(a) ○	(b) ○	(c) ○
	Fixed IF	○	○	×
	Fixed RF	○	○	×
Conversion Loss, Group Delay	Swept IF	×	×	(d) ○
Conversion Compression	CW	×	(e) ○	×
	Swept	×	(f) ○	×

Measurement Result

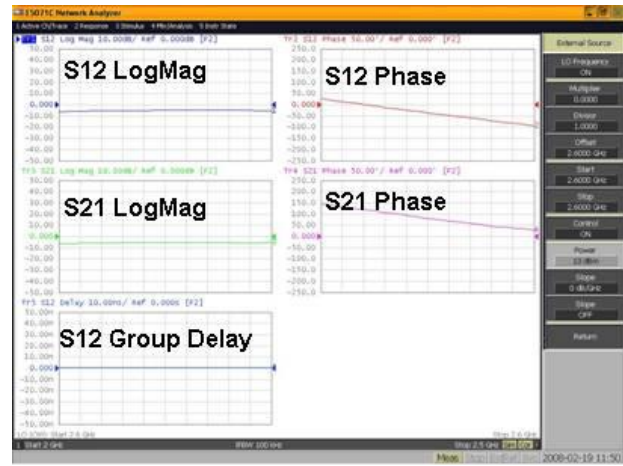(a) Conversion loss with PMC
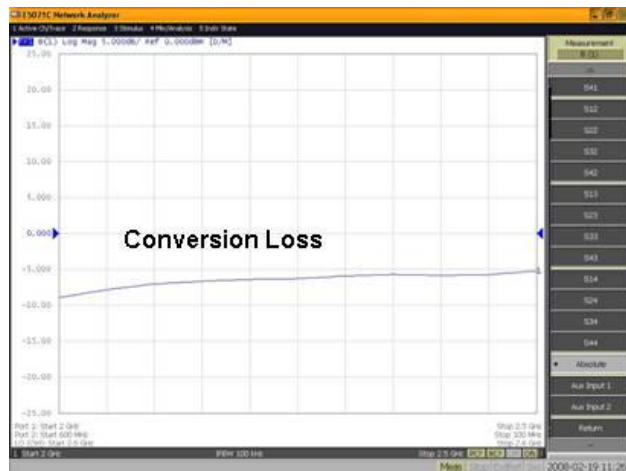
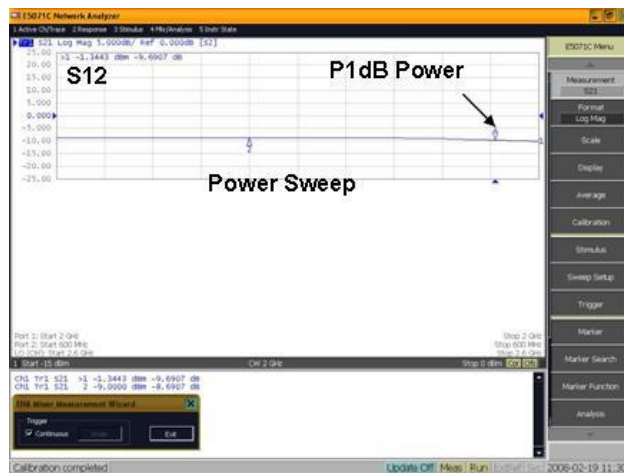(b) Conversion loss with SMC
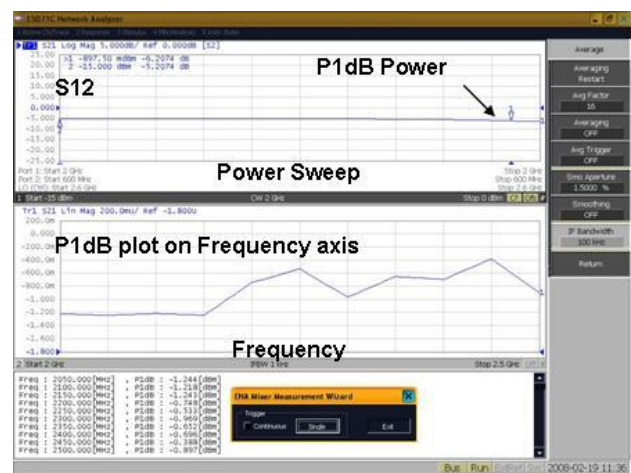
(c) Conversion loss with VMC

(d) Conversion Loss and Group Delay with VMC

(e) Conversion Compression(CW) with SMC

(f) Conversion Compression (Swept) with SMC

Revision History

Revision	Date	Description
01.00	Mar 2008	Initial Revision
01.01	Apr 2008	Modified Power Meter Trigger Bug Modified Frequency Range Check
01.10	Oct 2008	Supported 20GHz Option Modified Scalar Mixer Calibration (Step 3/4 (2)) Modified Vector Mixer Calibration (Step 3/4 (3))
01.20	July 2010	Added option TDR support
01.21	Oct 2014	Minor bug fix to support Windows 7