M5150
SFRA Performance Verification Cell

Quick Start Guide

72A-3260-01   Rev. A   02/2013

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M5150

Description

The M5150 Performance Verification Cell allows field verification of test instruments and cables, assuring SFRA (Sweep Frequency Response Analyzer) test quality. It can be used either in the field or in the office.
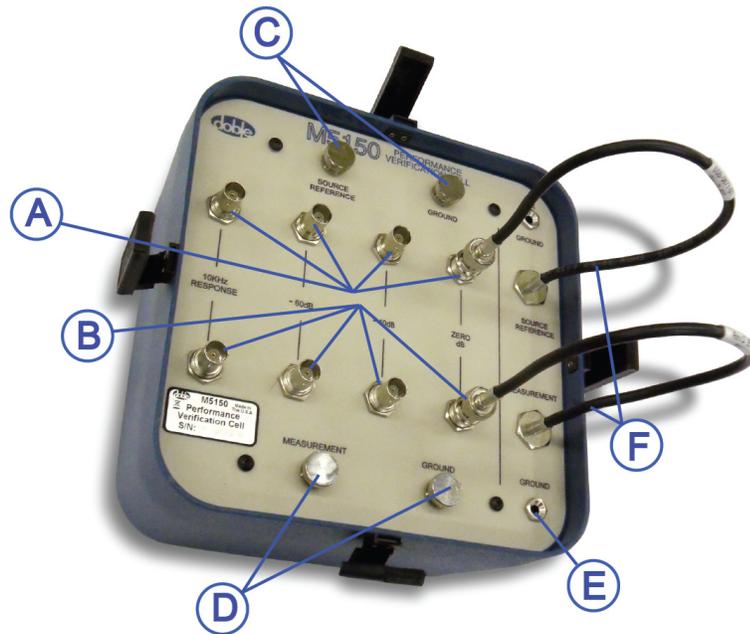
It can be used in either of two modes, with or without SFRA measurement leads.

Figure 1 M5150 Case

Top Panel

The top panel contains BNC connectors and connection points for connecting cables. See descriptions with Figure 2.

A	BNC connectors for instrument-only testing (Source/Reference side)	D	Connection points for connecting SFRA measurement cable clamps (Measurement side - Black)
B	BNC connectors for instrument-only testing (Measurement side)	E	Equipment grounding (earthing) jack
C	Connection points for connecting SFRA measurement cable clamps (Source/Reference side - Yellow/Red)	F	Jumpers for connecting desired response for testing with SFRA measurement cables

Figure 2 Top Panel

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Kit Contents

The following hardware is provided:

Part Number	Model/Instrument	Quantity
03D-1551-01	M5150 PERFORMANCE VERIFICATION CELL	1
181-0118	CABLE,BNC, m/m, RG58C/U, 120"	3
401-0160	BNC T-Adapter Female-Male-Female	1
181-0706	Cable, test lead, alligator clip, M5150	1

Assumptions

A working SFRA test system consists of:

- a Doble M5100, M5200, M5300, or M5400 (M5x00) instrument
- controlled by Doble SFRA software
- running on a PC that is ready to run a test (Note: The M5100 and the M5300 have an internal PC.)
- using default settings

Instructions for basic operation of the SFRA software are beyond the scope of this document. Refer to your instrument user guide.

Test Procedure

Hardware Test Setup

M5400

✋ **NOTE: Connection is shown for the M5400. All M5x00 instruments are similar. Just connect to the Source, Reference, and Measure, using either the color code or the connection labeling.**

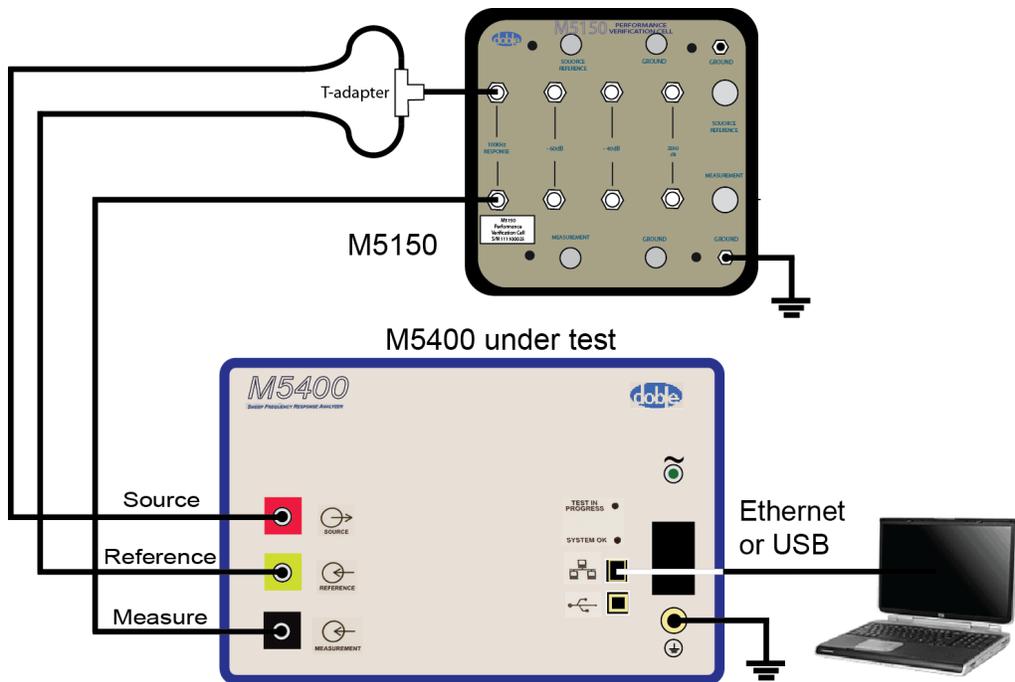Figure 3 shows a typical test setup for testing an M5400.

Figure 3 M5400 Typical Test Setup

Connection Procedure *Without* SFRA Measurement Leads

Testing M5x00 Instrument, Instrument-Only

Refer to Figure 3 on page 4, as needed.

1. Connect one of the coax cables from the M5x00 **"Source"** connector to the BNC T-adapter.

2. Connect one of the coax cables from the M5x00 **"Reference"** connector to the BNC T-adapter.

3. Connect the BNC T-Adapter to the top "**10 kHz Response**" connector on the M5150.

4. Connect a coax cable from M5x00 **"Measure"** connector to the bottom "**10 kHz Response**" connector on the M5150.

To continue testing for other response values, move the Source/Reference (T-adapter) and Measurement leads to a different set of connectors (-60 dB, -40 dB, or 0 dB), then run the test.

Connection Procedure *With* SFRA Measurement Leads

Testing M5x00 Instrument and Measurement Cables as a System

1. Connect the Source/Reference jumper to the top 10 kHz BNC connector (Figure 4).

2. Connect the Measurement jumper to the bottom 10 kHz BNC connector (Figure 4).

3. Attach the Source/Reference cable clamp (Red) to the Source/Reference connection point, and connect the Ground clamp to the Ground connection point (Figure 4).

Figure 4 Attaching Cable Clamps to Connection Point

4. Attach the Measurement cable clamp (Black) to the Measurement connection point, and connect the Ground clamp to the Ground connection point.

To continue testing for other response values, move the Source/Reference (T-adapter) and Measurement jumpers to a different set of connectors (-60 dB, -40 dB, or 0 dB), then run the test.

Running the Test

The M5x00 instrument must be powered up and communicating with the SFRA software.

Any apparatus template will work, but we recommend that you create new ones for M5150 testing. You also can download M5150 test templates from the Doble website, under *Support-->Download-->SFRA Accessories*.

Viewing Test Results

After performing a check, you will see magnitude traces similar to Figure 5 in the Data Display area.

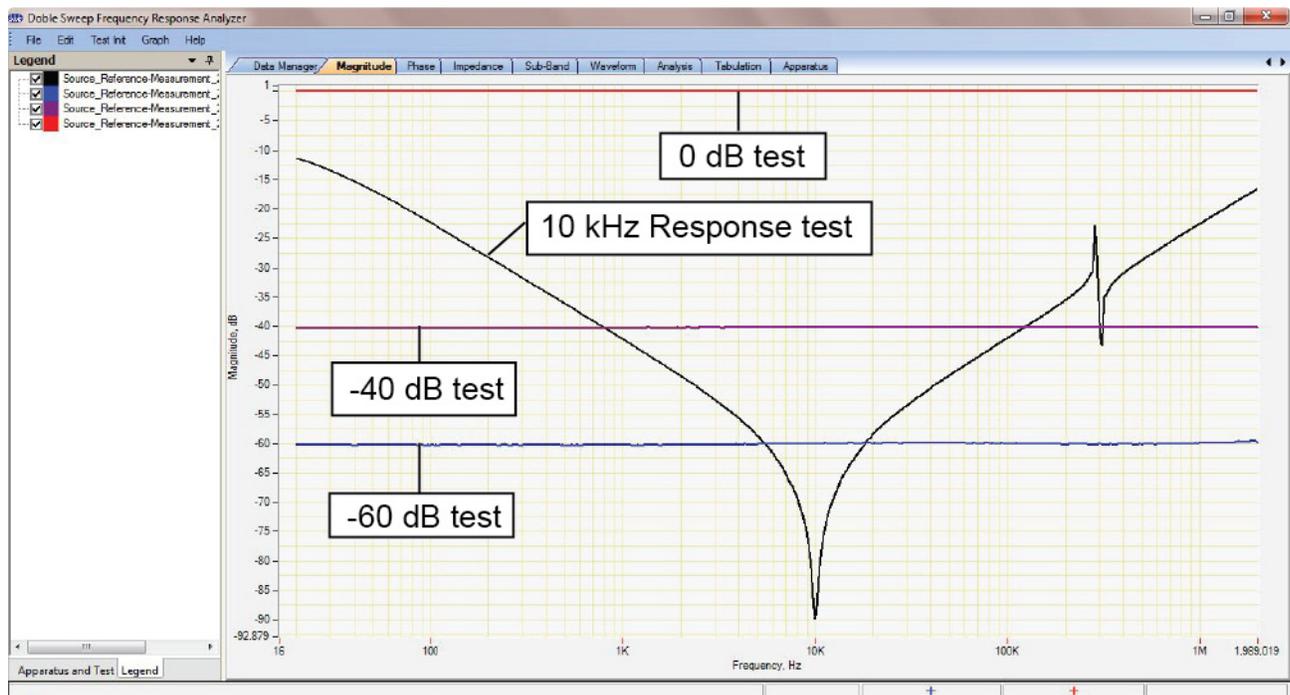*Figure 5 Magnitude Trace*

If your results closely match the traces shown in Figure 5, your test set (and cables, if used) are in proper working order.

Sample M5150 result files are available in the zip file download of this guide located on the Doble web site, under *Support-->Download-->SFRA Accessories*.

Comparison of Traces

A typical *10 kHz Response SFRA trace* will have the following characteristics:

- Minima[1] resonance of 10 kHz with a tolerance of +/- 100 Hz (9.90 to 10.10 kHz)
- A first notch depth of -80 to -90 dB minimum

Depending upon amount of background noise in the area when the M5x00 is under test with the M5150 Performance Verification Cell, you may experience variations in resonant amplitude (dB) but it should not affect the Frequency portion of the measurement sample.

If a questionable result is obtained please try the following suggestions:

- Re-check all measurement connections.
- Confirm that both the M5x00 and M5150 are bonded to a solid ground connection.
- Verify that all cables/leads away from any localized noise source.

Suspected noise sources include motors, SCRs, battery chargers, and transmission lines.

Typical 0, -40 and -60 dB SFRA traces should be in a +/- 1.0 dB tolerance.

See Figure 6 on page 9 for details.

It is recommended that a complete set of test traces are taken for each M5x00, by serial number, and saved for future comparison.

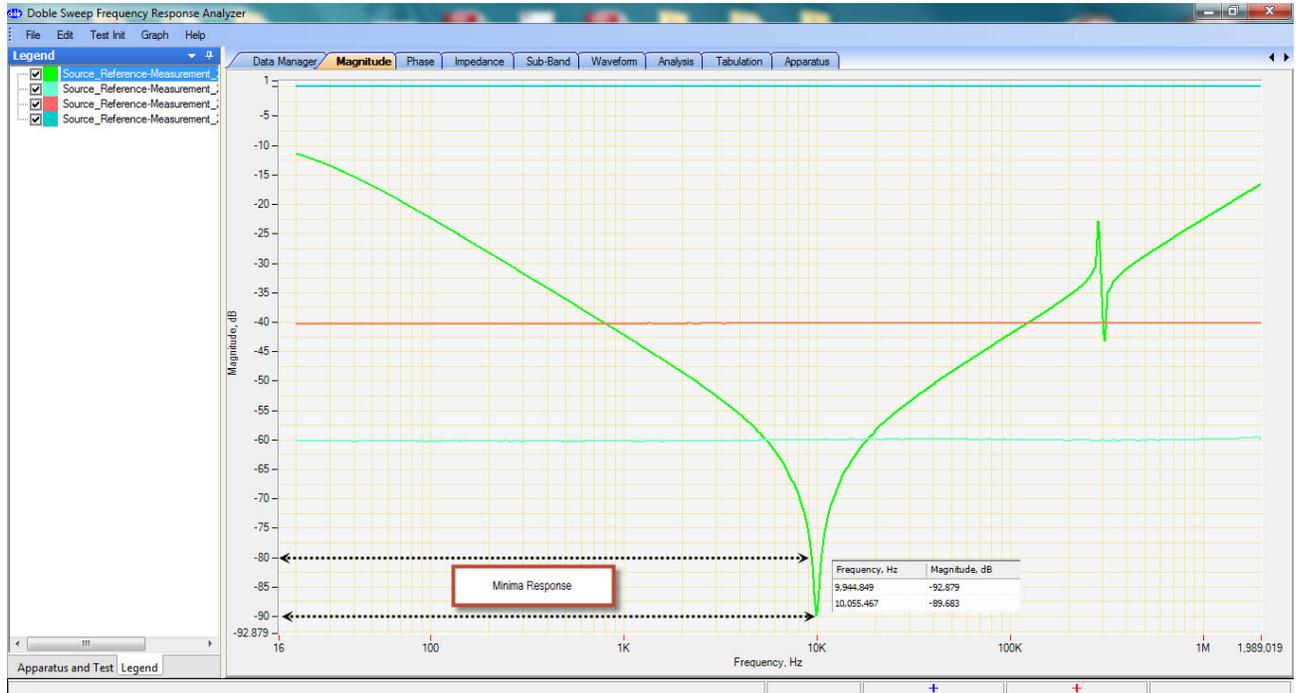1. Minima Response: The least or smallest quantity of measurement required

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Figure 6 Minima Response

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