Quick Start Guide

ShockLine™ Series SmartCal™

MN25208A, 300 kHz to 8.5 GHz, 2-Port Auto Calibration Module
MN25218A, 300 kHz to 20 GHz, 2-Port Auto Calibration Module
MN25408A, 300 kHz to 8.5 GHz, 4-Port Auto Calibration Module
MN25418A, 300 kHz to 20 GHz, 4-Port Auto Calibration Module

Anritsu

Anritsu Company
490 Jarvis Drive
Morgan Hill, CA 95037-2809
USA

Part Number: 10410-00741
Revision: E
Published: June 2018
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QSG-1 Introduction

This document provides a brief overview of the minimum installation requirements, calibration procedures, and general information regarding the use of the MN25208A, MN25408A, MN25218A and MN25418A SmartCal Modules with ShockLine VNAs. The SmartCal is a USB controlled auto calibration module for ShockLine VNAs. The SmartCal is available in four frequency models. See Table QSG-1.

Table QSG-1. ShockLine SmartCal Calibration Modules

SmartCal Module	Frequency Range, Port Count
MN25208A	300 kHz to 8.5 GHz, 2-port – available with connector Options -001 N(f), -002 K(f), -003 3.5 mm(f)
MN25218A[a]	300 kHz to 20.0 GHz, 2-port – available with K(f) connectors: Option -002 K(f)
MN25408A	300 kHz to 8.5 GHz, 4-port – available with connector Options: -001 N(f), -002 K(f), -003 3.5 mm(f)
MN25418A	300 kHz to 20.0 GHz, 4-port – available with K(f) connectors: Option -002 K(f)

a. Applies to Rev 2 SmartCal Modules. MN25218A with serial numbers <1817999 operates 1 MHz to 20 GHz.

SmartCal can be connected directly to a USB port of the MS46322A/B, MS4652xB or to a USB port of a PC when used with the MS46121A/B, MS46122A/B.

The SmartCal module is a plug and play device that automatically powers on and loads calibration coefficients from its on-board memory into ShockLine software. SmartCal has auto sense and port mapping features, allowing it to auto sense the VNA port number to which it is connected. In addition, port mapping allows the user to assign any SmartCal port to any of the VNA ports.

QSG-2 PC Requirements for MS46121A/B, MS46122A/B Only

The ShockLine MS46322A/322B/522B/524B internal computer meets the requirements for using SmartCal. The minimum PC requirements when using SmartCal with the ShockLine MS46121A/B, MS46122A/B are listed below:

- Operating System Windows® 7, Windows 8, or Windows 10: 64 bit
- CPU 3 GHz
- RAM 4 GB
- Disk 120 GB
- DirectX Version 9 with Windows Display Driver Model (WDDM) installed
- Available USB 2.0 port

QSG-3 Installation

- To achieve the maximum performance of the SmartCal calibrator, Anritsu recommends operating the SmartCal with the latest ShockLine software installed in your MS46322A/B, MS4652xB or the PC controller for the MS46121A/B or MS46122A/B. The latest ShockLine software download is available at: https://www.anritsu.com/en-us/test-measurement/support/downloads/software/dwl18844
- Calibration kit coefficients are stored internally to SmartCal and are automatically loaded into the ShockLine software.
- Connect the SmartCal to the VNA or control computer with the included USB A/Micro-B latch cable (Anritsu part number 2000-1606-R)
- SmartCal automatically powers up and is ready for use.

QSG-4 Anritsu VNA Related Manuals

Product Information, Compliance, and Safety

- ShockLine™ Vector Network Analyzers, SmartCal™ and Site Master™ Cable and Antenna Analyzers – 10100-00067

ShockLine Vector Network Analyzers

Refer to the following documents for detailed operating instructions when using the MS46122A/B, MS46322A/B, or MS4652xB, ShockLine VNA with the ShockLine Series SmartCal.

- MS46122A/B-MS46322A/B Series VNA Measurement Guide – 10410-00336
- MS4652xB Series VNA Measurement Guide – 10410-00753
- MS46121A/B-MS46122A/B-MS46322A/B Series VNA User Interface Reference Manual – 10410-00337
- MS4652xB Series VNA User Interface Reference Manual – 10410-00744

Connecting the SmartCal™

- SmartCal works with all models of the ShockLine VNA family.
- The VNA calibration setups are shown below:

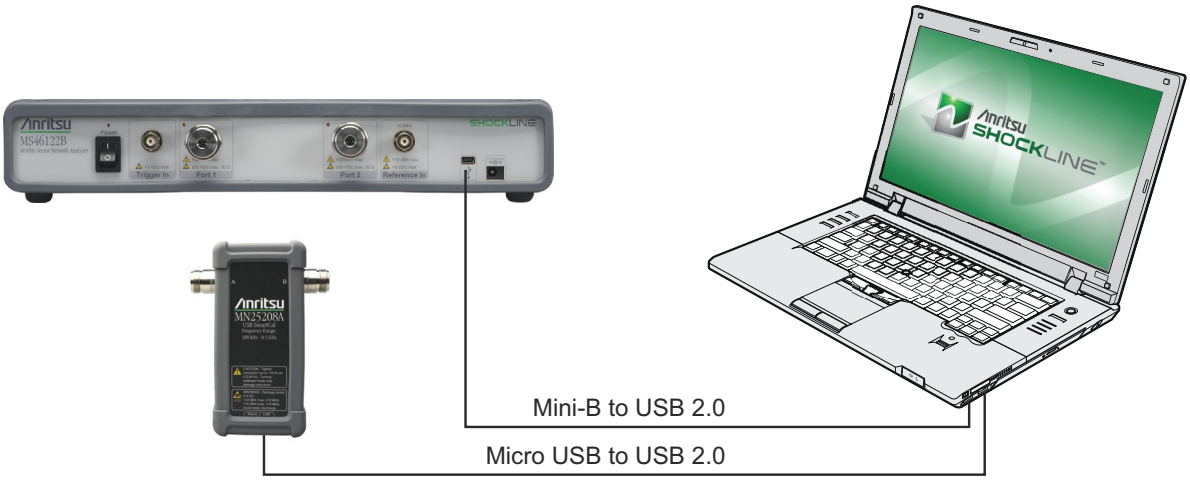


Figure QSG-1. SmartCal Setup for the MS46121A/B, MS46122A/B

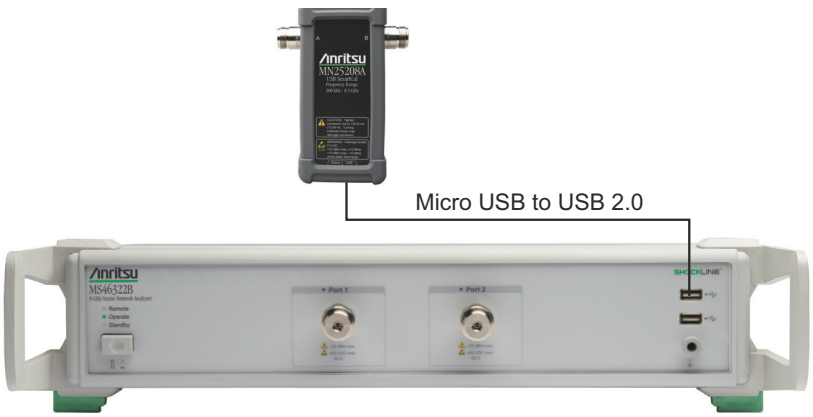


Figure QSG-2. SmartCal Setup for the MS46322A/B

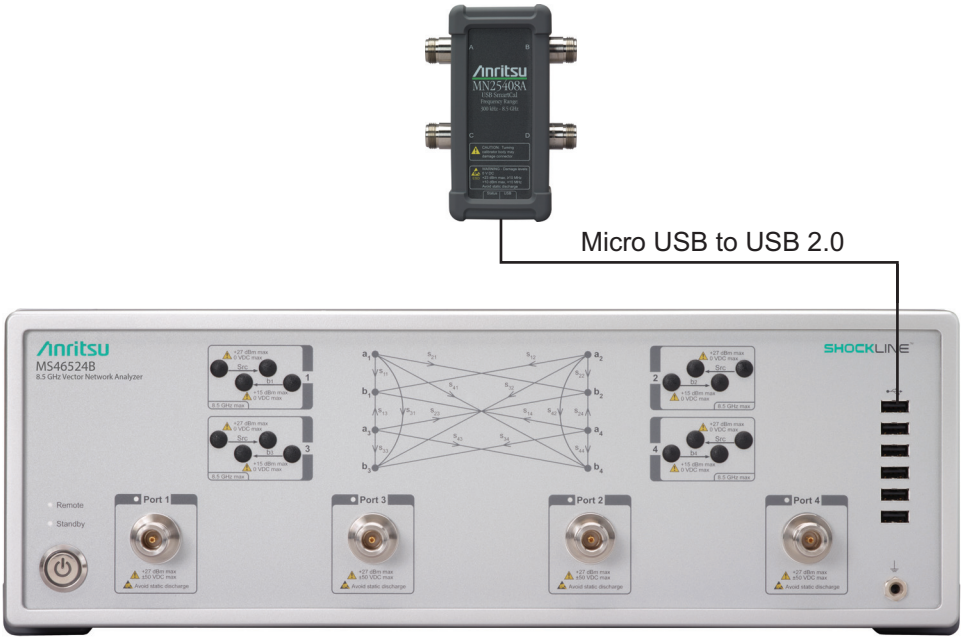


Figure QSG-3. SmartCal Setup for the MS4652xB (MS46524B shown)

Once the SmartCal is connected, the LED indicator light on the SmartCal becomes active. The LED color changes orange to indicate that the SmartCal has been powered on. The orange LED stays on until the first calibration is initiated and then turns off, but the SmartCal module is still active and ready for use.

Figure QSG-4. Orange Indicator L.E.D. for SmartCal Detection

If the L.E.D. does not come on, check the micro USB connection of the SmartCal or the terminating end of the USB 2.0 cable.

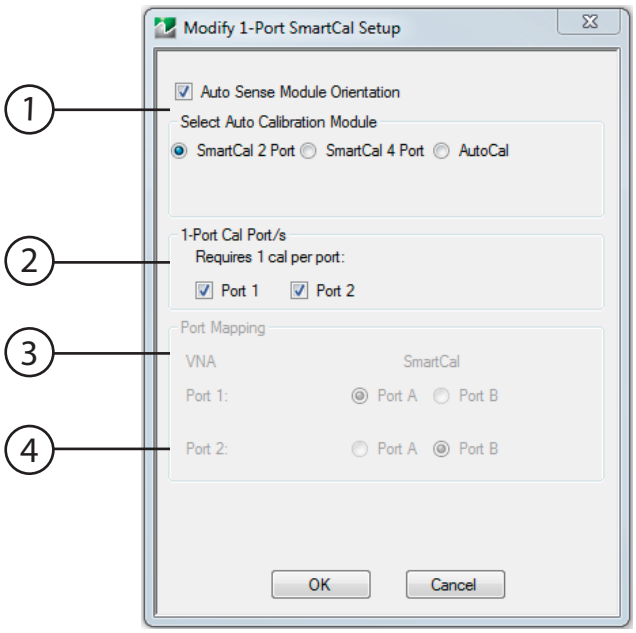
QSG-5 1-Port Calibration Procedure

The 1-Port Cal is an Open, Short, and Load measurement.

Note	For the MS46121A/B, there can only be one calibration file present per channel. Each MS46121A/B operates in a different channel, so a calibration for each unit per channel is required.

All the setup options for this type of Cal are in the Modify Cal Setup.

Navigation: Calibration | Calibrate | AutoCal | 1-Port Cal | Modify Cal Setup



1. Auto Sense Module Orientation – For automatically detecting which VNA ports are connected.
2. Select Calibration Kit – Indicates SmartCal or AutoCal calibration.
3. 1-Port Cal Port/s – Indicates which port(s) and how many 1-port calibrations to execute.
4. Port Mapping – Indicates which VNA ports are connected to the SmartCal module.

Figure QSG-5. SmartCal Setup for 1-Port Calibration

1. Set all parameters in the Modify 1-Port SmartCal Setup.
2. Continue back to the SmartCal setup menu after setting all parameters.
3. Press "Begin Cal" to start the calibration.
4. The LED on the SmartCal becomes green during the calibration as data is transferred.
5. The calibration software guides the user through the rest of the calibration procedure.
6. When the calibration is complete, "Calibration Completed" appears. Press "Close" to apply the calibration.

Note	The process after this point is the same for all ShockLine VNAs

The LED on SmartCal should become green during the calibration as data is transferred. The green LED may not stay active during the course of an entire calibration. SmartCal remains active despite the LED turning off.

Figure QSG-6. Green Indicator L.E.D. for SmartCal Data Transfer

The calibration proceeds with the message displayed on the ShockLine GUI as shown below.

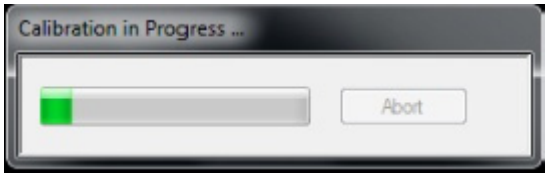


Figure QSG-7. Calibration in Progress Bar

If SmartCal is not plugged in correctly or not detected, the following message appears.

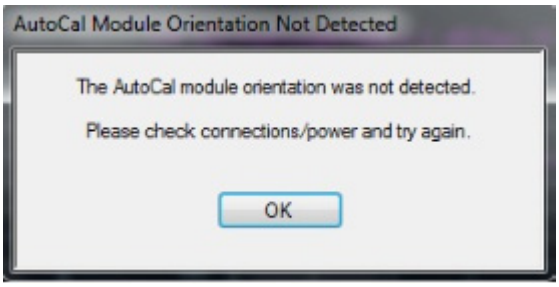
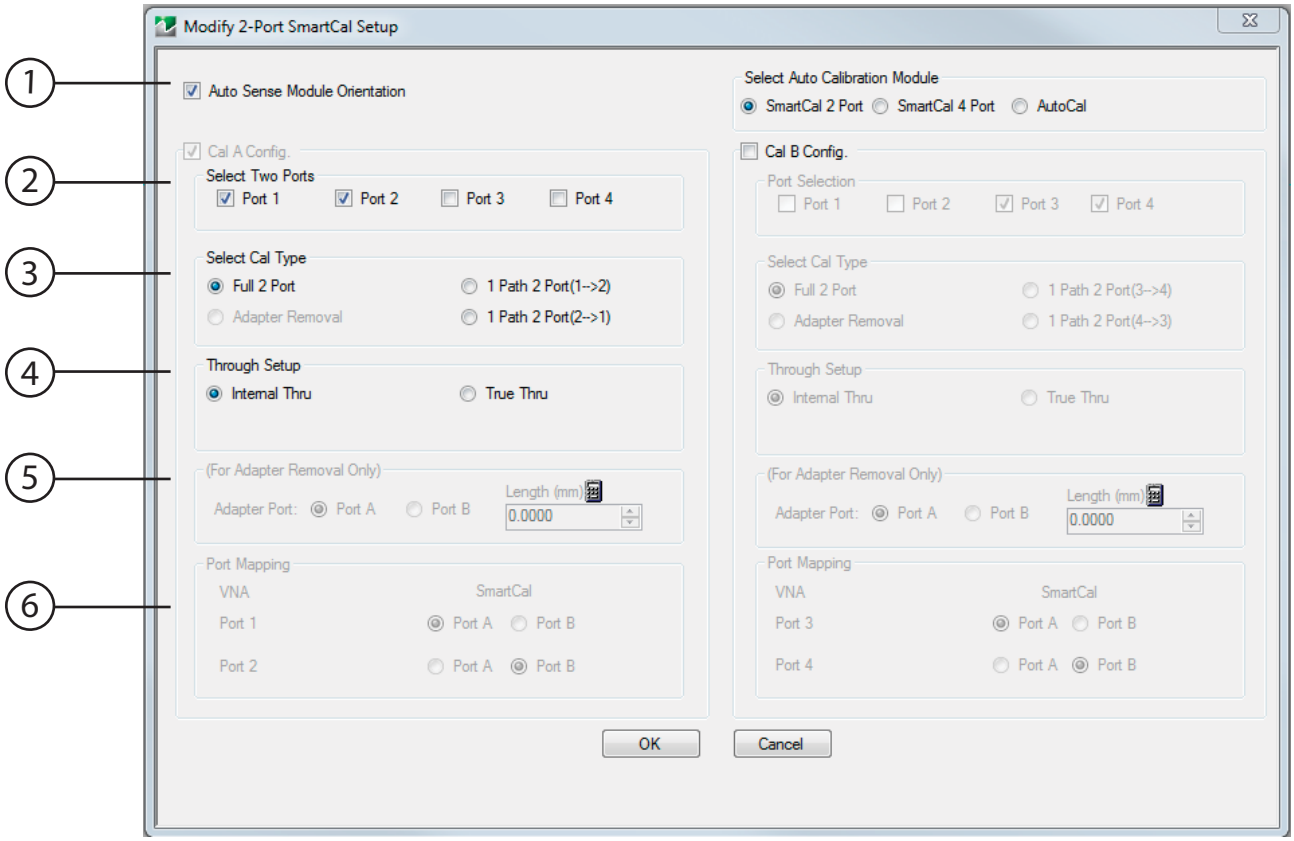


Figure QSG-8. Module Not Detected Error

QSG-6 2-Port Calibration Procedure

- The 2-Port calibration is an Open, Short, Load, and Thru measurement on both ports.
- For the most accurate measurement, a Full 2-Port calibration should be used.
- All of the setup options for this type of calibration are in the Modify Cal Setup dialog.

Navigation: Calibration | Calibrate | AutoCal | 2-Port Cal | Modify Cal Setup



1.	Auto Sense Module Orientation – For automatically detecting which VNA ports are connected.
2.	Cal A Config – Selection button for ports, two must be chosen as a 4-port calibration is two 2-port calibrations.
3.	Select Cal Type – Provides options for adapter removal or calibration type.
4.	Through Setup – Allows for external thru or SmartCal internal thru Standard.
5.	Adapter Removal – Menu to input adapter electrical length for error removal. Not currently available.
6.	Port Mapping – Indicates which VNA ports are connected to the SmartCal module. Manual port mapping enabled when auto sense is disabled.

Figure QSG-9. SmartCal Setup for 2-Port Calibration (MS46524B 2-port dialog box shown)

1. Set all parameters in the Modify 2-Port SmartCal Setup dialog.

2. Continue back to the SmartCal setup menu.

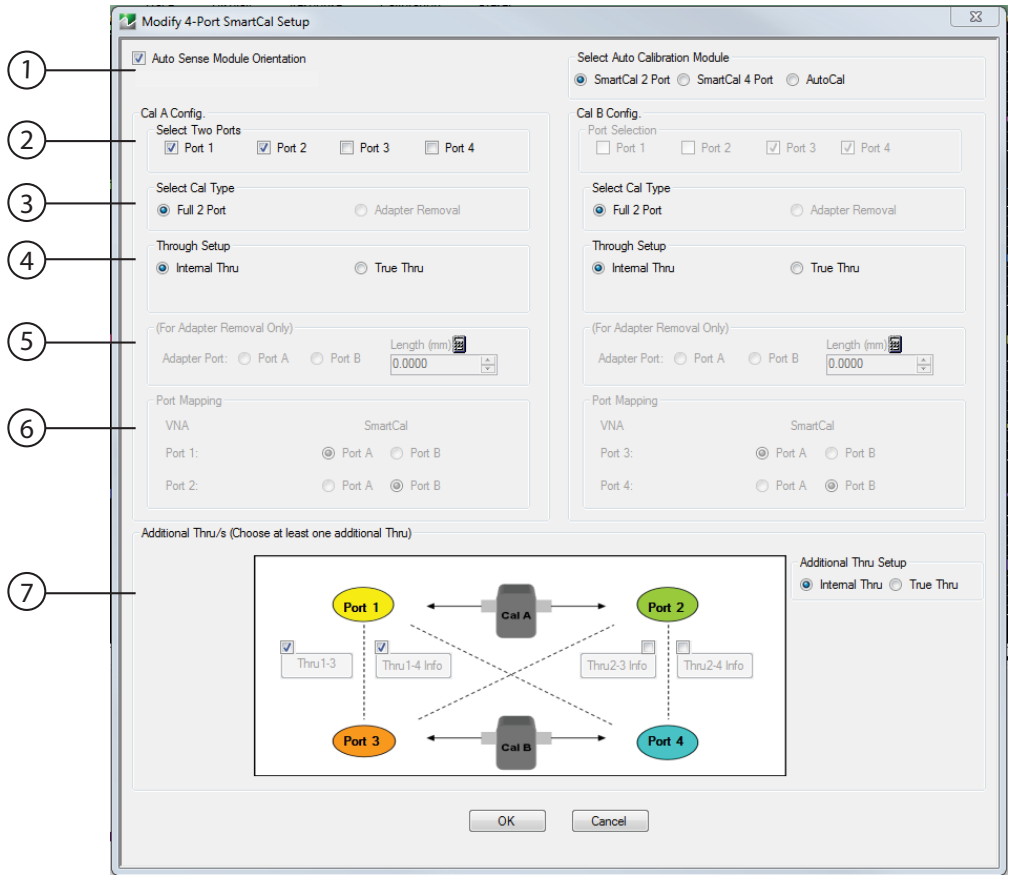
3. Press "Begin Cal".

4. The calibration software will guide the user through the rest of the calibration procedure.

QSG-7 4-Port Calibration Procedure

The 4-Port calibration is an Open, Short, Load, and Thru measurement.

Navigation: Calibration | Calibrate | AutoCal | 4-Port Cal | Modify Cal Setup



1.	Auto Sense Module Orientation – For automatically detecting which VNA ports are connected.
2.	Cal A Config – Selection button for ports, two must be chosen as a 4-port calibration is two 2-port calibrations.
3.	Select Cal Type – Provides options for adapter removal or calibration type.
4.	Thru Setup – Allows for external thru or SmartCal internal thru Standard.
5.	Adapter Removal – Menu to input adapter electrical length for error removal. Not currently available.
6.	Port Mapping – Indicates which VNA ports are connected to the SmartCal module. Manual port mapping is enabled when auto sense is disabled.
7.	Additional Thru/s – Option menu for selecting Thru/s for calibration. Manual port mapping enabled when auto sense is disabled.

Figure QSG-10. SmartCal Setup for 4-Port Calibration

1. Set all parameters in the Modify 4-Port SmartCal Setup dialog. Two additional Thru connections must be made for a 2-port SmartCal unit to complete a full 4-port calibration. By default, ShockLine software selects the additional connections between ports 1 and 3 and ports 1 and 4. Select all Thru connections for complete calibration coverage.

2. Continue back to the SmartCal setup menu.

3. Press "Begin Cal".

4. The calibration software guides the user through the rest of the calibration procedure.

5. The following prompt is displayed after the first of two sets of ports is calibrated. Connect the remaining two ports to continue calibration. For example, if Ports 1 and 2 are calibrated first, then the prompt asks the user to connect Ports 3 and 4 (Figure QSG-11). Each additional Thru measurement that is selected produces a similar connection prompt.

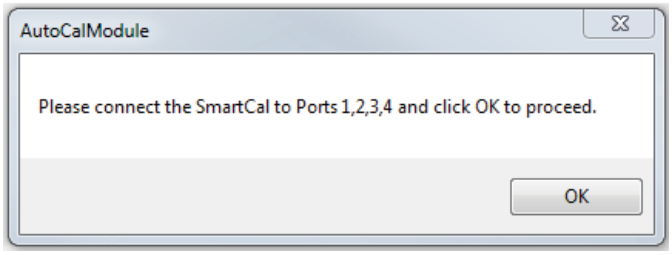


Figure QSG-11. SmartCal Dialog

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Anritsu Company
490 Jarvis Drive
Morgan Hill, CA 95037-2809
USA
http://www.anritsu.com