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Find the *National Instruments USB-5681* at our website: ***Click HERE***

GETTING STARTED GUIDE

NI RF Power Meters

This document explains how to install, configure, and set up the NI USB-5680/5681 RF power meters. NI RF power meters make true RMS power measurements. The NI RF power meters ship with the NI-568x instrument driver, which you can use to program the device.

For more information about the NI 5680/5681, refer to the *NI RF Power Meters Help*, which is located at **Start»All Programs»National Instruments»NI-568x»Documentation**. Refer to the specifications document that ships with the device for detailed specifications.

For the most current versions of specifications and other documentation, visit `ni.com/manuals`. For the latest version of NI-568x, visit `ni.com/updates`.

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Conventions

The following conventions are used in this guide:

» The » symbol leads you through nested menu items and dialog box options to a final action. The sequence **File»Page Setup»Options** directs you to pull down the **File** menu, select the **Page Setup** item, and select **Options** from the last dialog box.



This icon denotes a tip, which alerts you to advisory information.



This icon denotes a note, which alerts you to important information.



This icon denotes a caution, which advises you of precautions to take to avoid injury, data loss, or a system crash. When this symbol is marked on a product, refer to the *Read Me First: Safety and Electromagnetic Compatibility* for information about precautions to take.

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NATIONAL INSTRUMENTS

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bold	Bold text denotes items that you must select or click in the software, such as menu items and dialog box options. Bold text also denotes parameter names.
italic	Italic text denotes variables, emphasis, a cross-reference, or an introduction to a key concept. Italic text also denotes text that is a placeholder for a word or value that you must supply.
`monospace`	Text in this font denotes text or characters that you should enter from the keyboard, sections of code, programming examples, and syntax examples. This font is also used for the proper names of disk drives, paths, directories, programs, subprograms, subroutines, device names, functions, operations, variables, filenames, and extensions.
NI 5680	Refers to the NI USB-5680 RF power meter.
NI 5681	Refers to the NI USB-5681 RF power meter.
Platform	Text in this font denotes a specific platform and indicates the text following it applies only to that platform.

1. Verifying the System Requirements

To use the NI-568x instrument driver, the system must meet certain requirements. For more information about minimum system requirements, recommended system, and supported application development environments (ADEs), refer to the *NI-568x Readme*. Before installing NI-568x, you can access this file on the NI-568x software CD. After you install NI-568x, you can access this file at **Start»All Programs»National Instruments»NI-568x»Documentation**.

2. Unpacking

Remove the NI RF power meter from the package and inspect it for loose components or any sign of damage. Notify NI if the device appears damaged in any way. Do *not* install a damaged device.

Caution The NI RF power meter is a static-sensitive device. Always properly ground yourself and the equipment when handling the NI RF power meter or connecting to it.

3. Verifying the Kit Contents

Verify that the kit contains the following items required to set up and use the NI RF power meter:

- ❑ NI RF power meter with dust cap

Note The NI 5681 ships from the factory with a protective silicone cover already installed on the device.

- ❑ One of the following cables:
  - NI 5680: USB 2.0 A to Mini-B cable
  - NI 5681: USB 2.0 A to Latching Micro-AB cable
- ❑ A precision Type-N to SMA adapter
- ❑ NI-568x instrument driver software CD. The NI-568x CD also includes the *NI RF Power Meters Help* and the *NI-568x Readme*. After you install the NI-568x driver, you can find these documents at **Start»All Programs»National Instruments»NI-568x»Documentation**.

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- ❑ Other included documents:
  - *NI RF Power Meters Getting Started Guide* (this document)
  - Specifications document for your device
  - Calibration certificate for your device. Contact your local NI sales representative if you need a PDF copy of this document.
  - *Read Me First: Safety and Electromagnetic Compatibility*

Other Required Items

In addition to the kit contents, you need the following items:

- ❑ 1 N · m torque wrench
- ❑ Desktop or laptop computer with its documentation and one available USB 2.0 or 1.1 compliant slot

4. Installing the Software

You must install the NI-568x software before installing the NI RF power meter. Complete the following steps to install the software:

1. (Optional) If you are developing an NI-568x application, install an ADE, such as LabVIEW or LabWindows™/CVI™.
2. Install the latest service packs for your operating system.
3. Insert the NI-568x CD into the CD drive. The NI-568x installer should open automatically. If the installation window does *not* appear, navigate to the CD drive, double-click the drive, and double-click `setup.exe`.
4. Follow the instructions in the installation prompts. For troubleshooting information, contact NI technical support or visit `ni.com/support`.

   (Windows 7/Vista) Users may see access and security messages during installation. Accept the prompts to complete the installation.
5. When the installer completes, a dialog box asks if you want to restart, shut down, or restart later. Select **Restart**.

5. Installing the Hardware

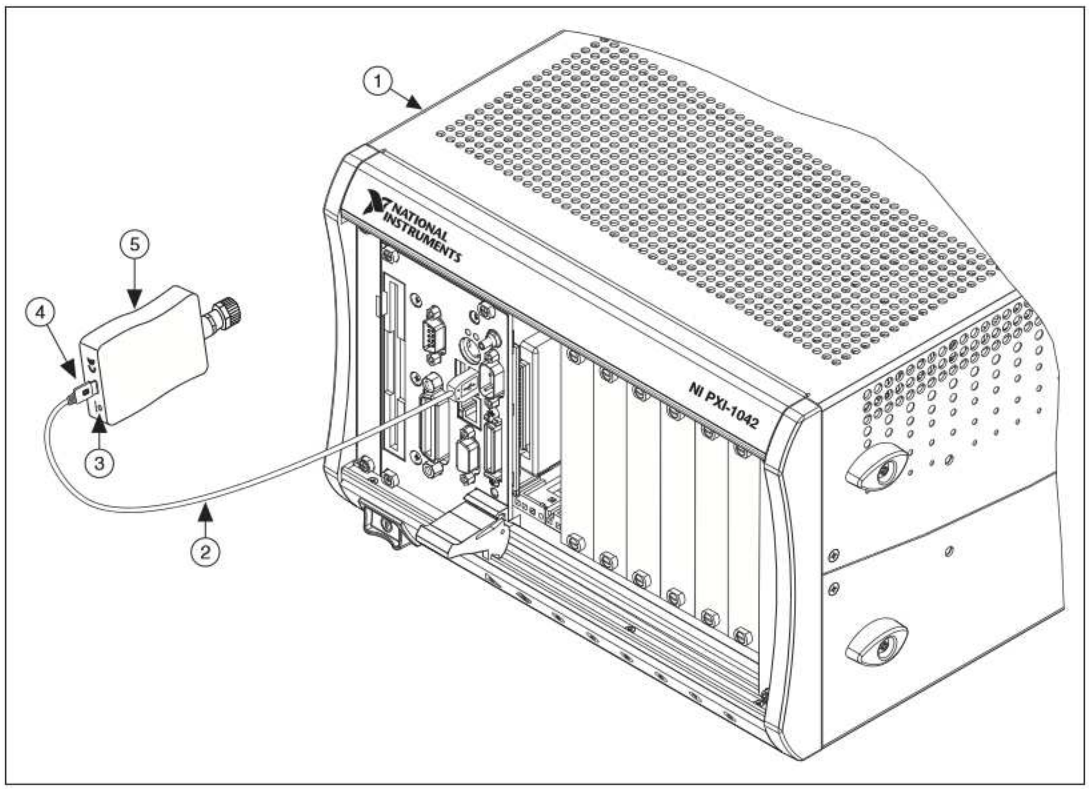
Install the NI-568x software before installing the hardware.

Note If you connect the NI RF power meter to a PC or chassis before installing the software, the PC or chassis will not recognize the NI RF power meter.

To install the NI RF power meter, connect the USB cable between the device and the PC. Refer to Figure 1 for an example of a completed installation.

Note The STATUS LED next to the device USB connector lights green after the NI-568x software is installed.

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1	PXI Chassis	3	STATUS LED	5	NI RF Power Meter
2	USB Cable	4	USB Connector		

Figure 1. NI USB Power Meter Installation

6. Windows Device Recognition

After you install the NI RF power meter, Windows automatically recognizes a new device. You will see a Windows message appear in the Windows task bar that notifies you that a new device has been installed. You do not need to take any further action for Windows to recognize your device.

Note During the Windows device recognition process, Windows assigns a COM number to your device. You can see the COM number that was assigned to your device in Measurement & Automation Explorer (MAX), under **Devices and Interfaces**.

7. Connecting Signals

Connect signals to the NI RF power meter hardware front panel Type-N connector to perform common power measurements. You can also use the Type N-to-SMA adapter to make the signal connection.

Note You must zero the NI RF power meter before you take power measurements, particularly when the device operates within the lower 20 dB dynamic range of the device. Zero the NI RF power meter every time you connect it to a USB port. If you make frequent low-power measurements, check the sensor zeroing often, and repeat as necessary.

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The back panel LED indicates the status of the NI RF power meter. Refer to Table 1 for LED information.

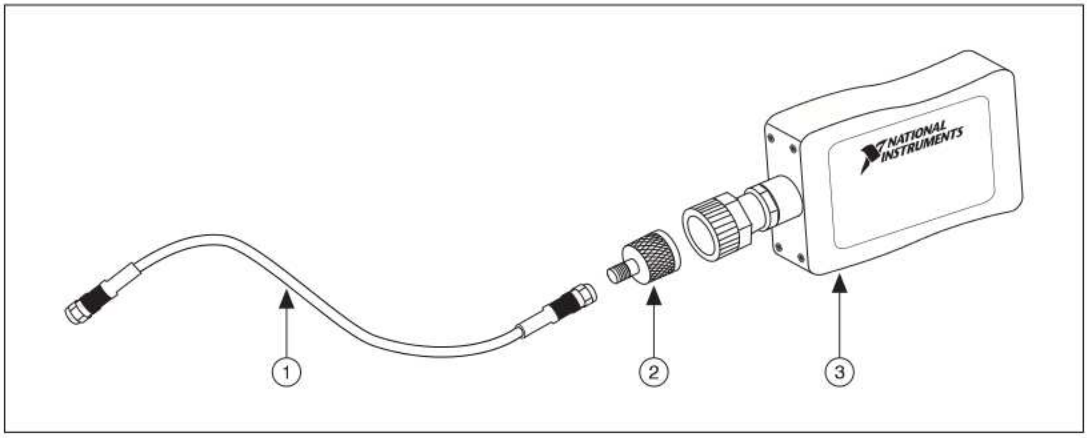
Table 1. Status LED Indication

LED Color	Meaning
Green	The NI RF power meter is connected to a computer or a chassis and is functioning properly.
Yellow	An error has occurred or the firmware is being updated.
Off	The NI RF power meter is not initialized.

For more information about these common measurements, refer to the *NI RF Power Meters Help*.

Caution Always refer to the specifications document included with the NI RF power meter device *before* connecting signals. Failure to observe the specified maximum signal ratings can cause shock, a fire hazard, or damage to the devices connected to the NI RF power meter. NI is *not* liable for any damage or injuries resulting from incorrect signal connections.

Caution Do not overtorque the connectors. Always use the specified torque wrench.



1 TSMA-to-SMA Coaxial Cable 2 Precision Type-N to SMA Adapter 3 NI USB Power Meter

Figure 2. Connecting the NI RF Power Meter to an SMA Cable

Connector Care and Handling

The NI RF power meter is a high-quality precision laboratory device and should be carefully handled. Follow the precautions listed in this section when handling or connecting these devices. Complying with these precautions guarantees longer component life and lower equipment downtime due to connector or device failure.

Avoid Touching Connectors with Bare Hands

Avoid touching connector mating planes with bare hands. Natural skin oils and microscopic dirt particles are difficult to remove.

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Observe Pin Depth of Mating Connectors

Make sure to use the proper connectors to mate with the NI RF power meter. NI recommends that you use precision or industrial grade Type-N connectors or that you use SMA connectors when using the Type N-to-SMA adapter. Always check the pin depth of a connector before use to determine if they are out of the specified range.

Avoid Lateral Pressure

Never put lateral pressure on the center pin of the connector.

Avoid Overtorquing Connectors

Do not overtorque connectors; doing so may damage the connector center pin. Always use a 1 N · m torque wrench when tightening connectors. Never use pliers. Never tighten the connectors, adapters, or cables such that the center pin rotates.

Avoid Mechanical Shock

Precision connectors are designed to withstand years of normal bench handling. Handle the connectors carefully and avoid dropping them. Mechanical shock significantly reduces their service life.

Avoid Applying Excessive Power

The NI RF power meter is rated for a specific maximum continuous input power. Exceeding the maximum input power level permanently damages the internal components.

Clean Connectors Carefully

Dirt and other contamination on the connector interfaces can affect the performance of the RF components. To clean the connector interfaces, use only denatured alcohol as a cleaning solvent. Do not use excessive amounts of alcohol, as this prolongs drying time. Use low-pressure compressed air to remove foreign particles and to dry the connector. After cleaning, verify that the center pin has not been bent or damaged.



Tip Most cotton swabs are too large to fit in the smaller connector types. In these cases, remove most of the cotton and then twist the remaining cotton tightly. Ensure that the remaining cotton does not become lodged in the connector, and verify that no cotton or other foreign material remains in the connector after cleaning. Cotton swabs of the appropriate size can be purchased through a medical or laboratory supply center.

Store Connectors Properly

When not in use, keep the connectors covered with the dust cap included in the NI RF power meter shipping kit.

8. Programming the NI RF Power Meter

You can acquire data with the NI RF power meter by using the NI-568x soft front panel (SFP), or you can control the NI RF power meter programmatically with an ADE using the NI-568x instrument driver. In addition, you can run the NI-568x examples to demonstrate the functionality of the device.

NI-568x SFP

The NI-568x SFP is a software representation of a traditional benchtop power meter. Launch the NI-568x SFP to use the NI RF power meter interactively. You can launch the NI-568x SFP from **Start»All Programs»National Instruments»NI-568x»NI-568x Soft Front Panel**.

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NI-568x Instrument Driver

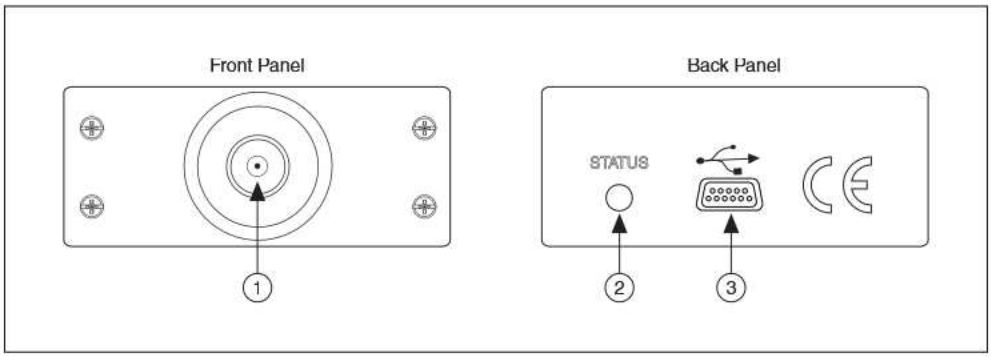
NI-568x features a set of operations and attributes that exercise all the functionality of the NI RF power meter, including configuration, control, and other device-specific functions. Refer to the *NI RF Power Meters Help* for information about using NI-568x in your applications.

NI-568x Examples

The NI-568x examples are instructional tools that demonstrate some of the functionality of the NI RF power meter. You can use these examples separately or integrate them into your systems. NI-568x includes examples for getting started and other power meter functionality. You can access NI-568x examples at **Start»All Programs»National Instruments»NI-568x»Examples**.

Appendix A: Front and Back Panel

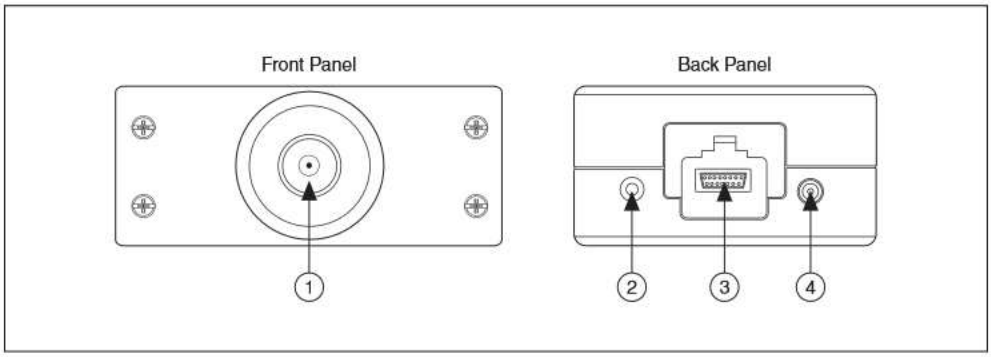
The NI 5680 front panel has one connector. The NI 5680 back panel has one USB port and the STATUS LED. Refer to Figure 3 for an illustration of both panels of the device.



1	Type-N Connector	2	STATUS LED	3	Mini-B USB Port

Figure 3. NI USB-5680 Front and Back Panel

The NI 5681 front panel has one connector. The NI 5681 back panel has one USB port, an external trigger terminal, and the STATUS LED. Refer to Figure 4 for an illustration both panels of the device.



1	Type-N Connector	3	Mircro-AB USB 2.0 Port
2	STATUS LED	4	External Trigger Terminal

Figure 4. NI USB-5681 Front and Back Panel

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Appendix B: Where to Go for Support

The National Instruments Web site is your complete resource for technical support. At ni com/support you have access to everything from troubleshooting and application development self-help resources to email and phone assistance from NI Application Engineers.

A Declaration of Conformity (DoC) is our claim of compliance with the Council of the European Communities using the manufacturer's declaration of conformity. This system affords the user protection for electromagnetic compatibility (EMC) and product safety. You can obtain the DoC for your product by visiting ni com/certification. If your product supports calibration, you can obtain the calibration certificate for your product at ni com/calibration.

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France 01 57 66 24 24, Germany 49 89 7413130, India 91 80 41190000, Israel 972 3 6393737,
Italy 39 02 41309277, Japan 0120-527196, Korea 82 02 3451 3400, Lebanon 961 (0) 1 33 28 28,
Malaysia 1800 887710, Mexico 01 800 010 0793, Netherlands 31 (0) 348 433 466,
New Zealand 0800 553 322, Norway 47 (0) 66 90 76 60, Poland 48 22 328 90 10,
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Slovenia 386 3 425 42 00, South Africa 27 0 11 805 8197, Spain 34 91 640 0085,
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