# NI PXIe-5698 Getting Started Guide

2025-03-20

# Contents

# NI 5698

**Note** Before you begin, install and configure your chassis and controller.

This document explains how to install, configure, and test the NI PXIe-5698 (NI 5698). The NI 5698 is an RF preamplifier module designed to work with the NI 5668R vector signal analyzer. The NI 5698 also functions as a stand-alone preamplifier. The NI 5698 ships with the NI-RFSA instrument driver, which you use to program the device.

To access NI 5698 documentation, navigate to **Start** » **All Programs** » **National Instruments** » **NI-RFSA** » **Documentation**.

**Caution** The protection provided by this product may be impaired if it is used in a manner not described in this document.

**Hot Surface** If the NI 5698 has been in use, it may exceed safe handling temperatures and cause burns. Allow the NI 5698 to cool before removing it from the chassis.

## Electromagnetic Compatibility Guidelines

This product was tested and complies with the regulatory requirements and limits for electromagnetic compatibility (EMC) stated in the product specifications. These requirements and limits are designed to provide reasonable protection against harmful interference when the product is operated in the intended operational electromagnetic environment.

This product is intended for use in industrial locations. However, harmful interference may occur in some installations, when the product is connected to a peripheral device or test object, or if the product is used in residential or commercial areas. To minimize interference with radio and television reception and prevent unacceptable

performance degradation, install and use this product in strict accordance with the instructions in the product documentation.

Furthermore, any modifications to the product not expressly approved by NI could void your authority to operate it under your local regulatory rules.

**Caution** To ensure the specified EMC performance, operate this product only with shielded cables and accessories.

**Caution** To ensure the specified EMC performance, the length of all I/O cables must be no longer than 3 m (10 ft).

## Verifying the System Requirements

To use the NI 5698, your system must meet certain requirements. For more information about minimum system requirements, recommended system, and supported application development environments (ADEs), refer to the readme, which is installed or available at ni.com/manuals.

## Unpacking the Kit

**Notice** To prevent electrostatic discharge (ESD) from damaging the device, ground yourself using a grounding strap or by holding a grounded object, such as your computer chassis.

1. Touch the antistatic package to a metal part of the computer chassis.
2. Remove the device from the package and inspect the device for loose components or any other sign of damage.

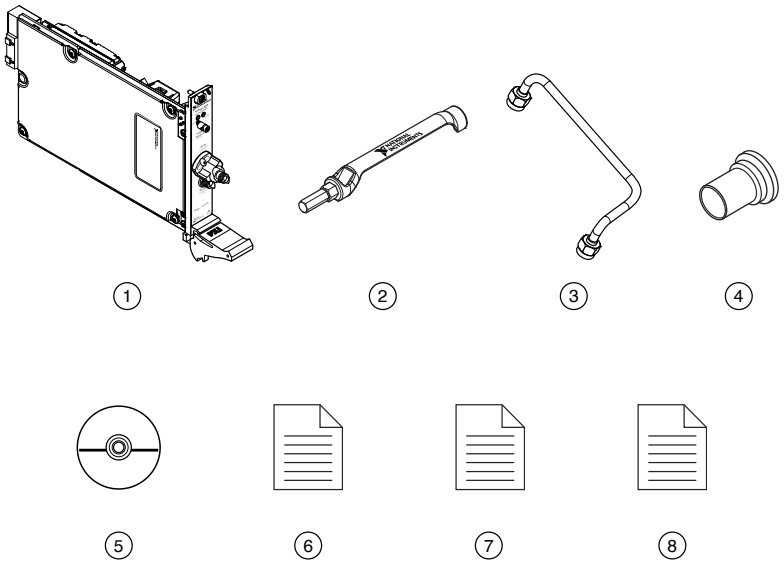
   **Notice** Never touch the exposed pins of connectors.

   **Note** Do not install a device if it appears damaged in any way.

3. Unpack any other items and documentation from the kit.

**Note** Store the device in the antistatic package when the device is not in use.

## Verifying the Kit Contents




1. NI 5698 RF Preamplifier Module
2. SMA Driver Bit, Part Number 190487B-01
3. Semi-Rigid 2.92 mm-to-2.92 mm Cable, Part Number 159289A-01
4. Plastic Cap (x2), Part Number 775067-01
5. Driver Software DVD
6. NI PXIe-5698 Getting Started Guide (This Document)
7. Read Me First: Safety and Electromagnetic Compatibility
8. Maintain Forced-Air Cooling Note to Users

# Preparing the Environment

Ensure that the environment you are using the NI 5698 in meets the following specifications.

| | |
|---|---|
| Operating ambient temperature (IEC 60068-2-1, IEC 60068-2-2) | 0 °C to 55 °C |
| Operating relative humidity (IEC 60068-2-56) | 10% to 90%, noncondensing |
| Maximum altitude | 2,000 m (800 mbar) (at 25 °C ambient temperature) |
| Pollution Degree | 2 |

Indoor use only.

**Notice** Clean the hardware with a soft, nonmetallic brush or lint free cloth. Make sure that the hardware is completely dry and free from contaminants before returning it to service.

**Note** Refer to the ***NI PXIe-5698 Specifications*** at ni.com/manuals for complete specifications.

## Installing the Software

You must be an Administrator to install NI software on your computer.

1. Install an ADE, such as LabVIEW or LabWindows™/CVI™.
2. Download the driver software installer from ni.com/downloads.
   Package Manager downloads with the driver software to handle the installation. Refer to the Package Manager Manual for more information about installing, removing, and upgrading NI software using Package Manager.
3. Follow the instructions in the installation prompts.

**Note** Windows users may see access and security messages during installation. Accept the prompts to complete the installation.

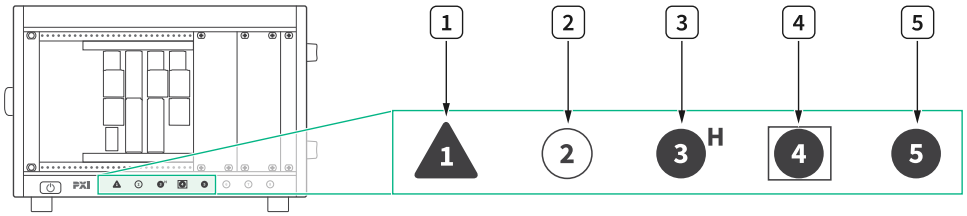
4. When the installer completes, select **Restart** in the dialog box that prompts you to restart, shut down, or restart later.

## Installing the NI 5698

**Notice** To prevent damage to the NI 5698 caused by ESD or contamination, handle the module using the edges or the metal bracket.

1. Ensure the AC power source is connected to the chassis before installing the module.
   The AC power cord grounds the chassis and protects it from electrical damage while you install the module.
2. Power off the chassis.
3. Inspect the slot pins on the chassis backplane for any bends or damage prior to installation. Do not install a module if the backplane is damaged.
4. Remove the black plastic covers from all the captive screws on the module front panel.
5. Identify a supported slot in the chassis. The following figure shows the symbols that indicate the slot types.

**Figure 1.** Chassis Compatibility Symbols



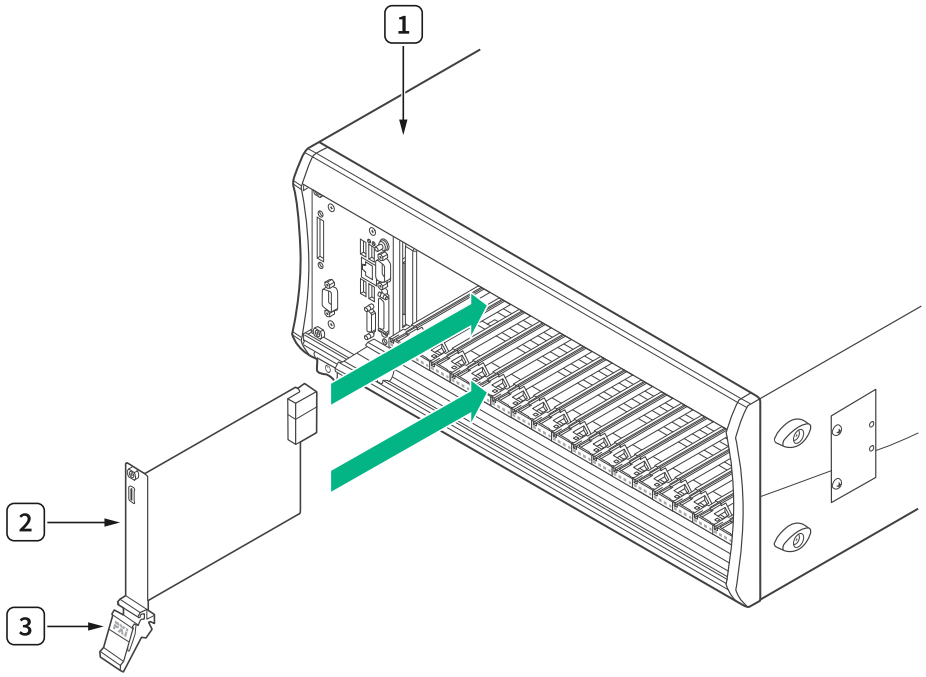

1. PXI Express System Controller Slot
2. PXI Peripheral Slot
3. PXI Express Hybrid Peripheral Slot
4. PXI Express System Timing Slot
5. PXI Express Peripheral Slot

The NI 5698 module can be placed in PXI Express peripheral slots or PXI Express

Hybrid peripheral slots.

6. Touch any metal part of the chassis to discharge static electricity.
7. Ensure that the ejector handle is in the downward (unlatched) position.
8. Place the module edges into the module guides at the top and bottom of the chassis. Slide the module into the slot until it is fully inserted.

**Figure 2.** Module Installation




1. Chassis
2. Hardware Module
3. Ejector Handle in Downward (Unlatched) Position

9. Latch the module in place by pulling up on the ejector handle.
10. Secure the module front panel to the chassis using the front-panel mounting screws.

> **Note** Tightening the top and bottom mounting screws increases mechanical stability and also electrically connects the front panel to the chassis, which can improve the signal quality and electromagnetic performance.

11. Cover all empty slots using either filler panels (standard or EMC) or slot blockers with filler panels, depending on your application.

> **Note** For more information about installing slot blockers and filler

> panels, go to ni.com/r/pxiblocker.

12. Power on the chassis.

**Related tasks:**

- Installing the Software

## Direct Connections to the NI 5698

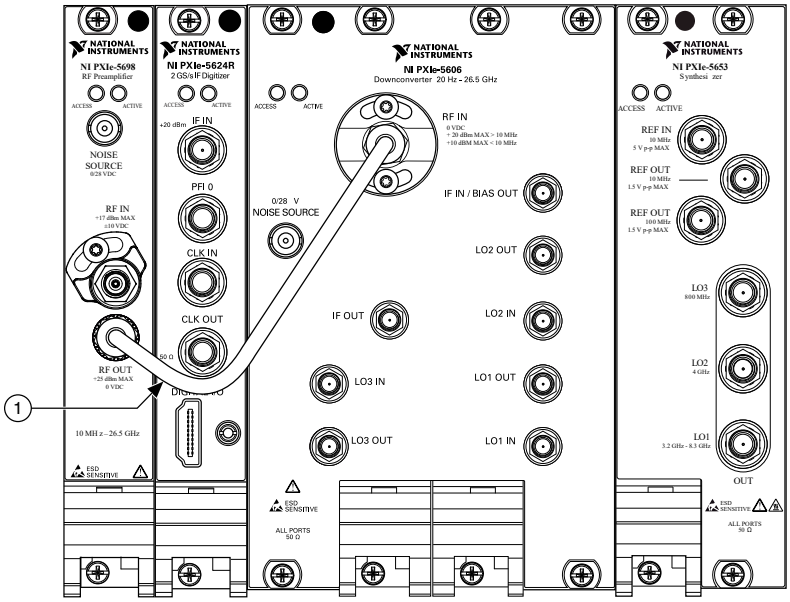
The NI 5698 is a precision RF instrument that is sensitive to ESD and transients. Ensure you take the following precautions when making direct connections to the NI 5698 to avoid damaging the device.

> **Notice** Apply external signals only while the NI 5698 is powered on. Applying external signals while the device is powered off may cause damage.

- Ensure you are properly grounded when manipulating cables or antennas connected to the NI 5698RF IN connector.
- If you are using nonisolated devices, such as a nonisolated RF antenna, ensure the devices are maintained in a static-free environment.
- If you are using an active device, such as a preamplifier or switch routed to the NI 5698RF IN connector, ensure that the device cannot generate signal transients greater than the RF and DC specifications of the NI 5698RF IN connector.

## Connecting to the PXIe-5668

**Figure 3.** PXIe-5668 with PXIe-5698 Front Panel Interconnection




1. Semi-rigid 2.92 mm-to-2.92 mm Coaxial Cable

1. Use the 2.92 mm-to-2.92 mm cable to connect the RF OUT connector on the PXIe-5698 front panel to the RF IN connector on the PXIe-5606 front panel.
2. Hand-tighten all 2.92 mm cable ends on the 2.92 mm cable connectors. The cable connectors should tighten without much torque or effort.
3. Carefully complete tightening all 2.92 mm connectors to 1 N · m using an appropriate torque wrench or torque screwdriver and driver bit.

> **Notice** Incorrect torque at 2.92 mm connections can degrade signal fidelity and phase-locked loop (PLL) performance and may cause insertion loss. Use an appropriate torque wrench or torque screwdriver and 2.92 mm driver bit to ensure all 2.92 mm connections are properly torqued. 2.92 mm connectors for connections to external equipment may require torque different from 1 N · m, depending on the connector type, material, and manufacturer.

4. Power on your PXI Express chassis and controller system.
5. Verify that the ACCESS LED is illuminated on all modules.

**Related concepts:**

- Troubleshooting

**Related tasks:**

- Configuring the NI 5698 in MAX

## NI 5698 Front Panel

The NI 5698 front panel contains three connectors and two LEDs.

**Figure 1.** NI 5698 RF Preamplifier Module Front Panel

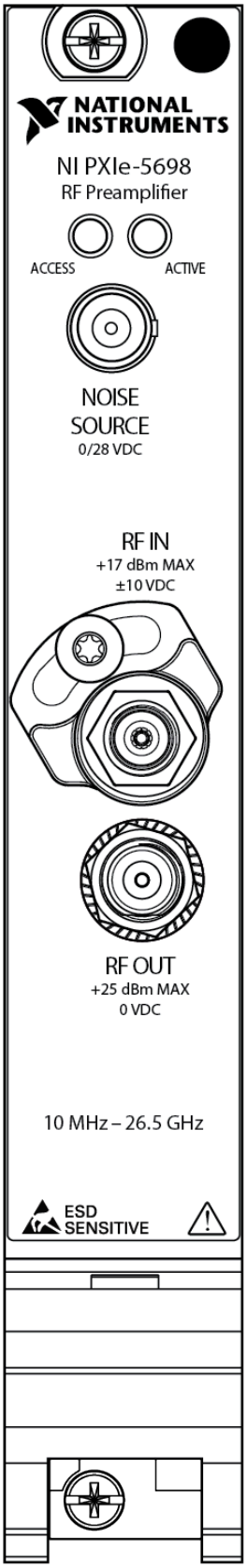


**Table 3.** Device Front Panel Icon Definitions

| | |
|---|---|
|  | Refer to the user documentation for required maintenance measures to ensure user safety and/or preserve the specified EMC performance. |
|  | The signal pins of this product's input/output ports can be damaged if subjected to ESD. To prevent damage, turn off power to the product before connecting cables and employ industry-standard ESD prevention measures during installation, maintenance, and operation. |

**Table 2.** NI 5698 RF Preamplifier Module Front Panel Connectors

| Connector | Use |
|---|---|
| NOISE SOURCE | HD BNC connector for enabling noise source on or off to facilitate noise figure measurements. |
| RF IN | Connects the analog RF input signal to the NI 5698 RF preamplifier. The maximum RF input is +17 dBm. |
| RF OUT | Outputs the bypassed or preamplified RF signal. The maximum RF output is +25 dBm. |

**Table 3.** NI 5698 RF Preamplifier Module Front Panel LEDs

| LED | Indications |
|---|---|
| ACCESS | Indicates the basic hardware status of the module.<br><br>OFF—The module is not yet functional, or the module has detected a problem with a PXI Express power supply rail.<br><br>AMBER—The module is being accessed. ***Accessed*** means that the device setup registers are being written to in order to control the device.<br><br>GREEN—The module is ready to be programmed |

| LED | Indications |
|---|---|
| | by NI-RFSA. |
| ACTIVE | Indicates the module state.<br><br>OFF— The module is in a quiescent state.<br><br>AMBER—The module is waiting for a Reconfiguration Trigger from the configuration list.<br><br>GREEN—The module is triggered and is running a step from the configuration list.<br><br>RED—The module has detected an error state. An error state may indicate the module has exceeded approved operating temperature and thermal shutdown has occurred or that the module has detected a power supply failure. If the power supply fails, contact NI technical support. |

## Configuring the NI 5698 in MAX

Use Measurement & Automation Explorer (MAX) to configure your NI hardware. MAX informs other programs about which NI hardware products are in the system and how they are configured. MAX is automatically installed with NI-RFSA.

1. Launch MAX.
2. In the configuration tree, expand **Devices and Interfaces** to see the list of installed NI hardware.
   Installed modules appear under the name of their associated chassis.
3. Expand your **Chassis** tree item.
   MAX lists all modules installed in the chassis. Your default names may vary.

**Note** If you do not see your module listed, press <F5> to refresh the list

of installed modules. If the module is still not listed, power off the system, ensure the module is correctly installed, and restart.

4. Record the identifier MAX assigns to the hardware. Use this identifier when programming the NI 5698.
5. To use the NI 5698 with the NI 5668R vector signal analyzer, you must associate the NI 5698 with the NI 5606 RF downconverter in MAX.

**Note** This step is not required if you are using the NI 5698 as a stand-alone device.

   a. Select the system device with the appropriate downconverter in the configuration tree.
   b. In the Associated Devices section, use the **RF Conditioning** drop-down listbox to select the NI 5698.
   c. Click **Save** in the MAX toolbar.

**Note** Module associations may be lost when you move the modules to different chassis slots.

6. Self-test the hardware by selecting the item in the configuration tree and clicking **Self-Test** in the MAX toolbar.
   The MAX self-test performs a basic verification of hardware resources.

**Related concepts:**

- Troubleshooting

**Related information:**

- Refer to the NI RF Vector Signal Analyzers Help for more information about renaming devices.

# Troubleshooting

If an issue persists after you complete a troubleshooting procedure, search our KnowledgeBase for additional information our technical support engineers create as

they answer common user questions and resolve unexpected issues.

**Related tasks:**

- Connecting to the PXIe-5668

## Why Is the ACCESS LED Off When the Chassis Is On?

The LEDs may not light until the device has been configured in MAX. Before proceeding, verify that the NI 5698 appears in MAX.

If the ACCESS LED fails to light after you power on the chassis, a problem may exist with the chassis power rails, a hardware module, or the LED.

> **Notice** Apply external signals only while the NI 5698 is powered on. Applying external signals while the device is powered off may cause damage.

1. Disconnect any signals from the module front panels.
2. Power off the chassis.
3. Remove the module from the chassis and inspect it for damage. Do not reinstall a damaged device.
4. Reinstall the module in a different chassis slot.
5. Power on the chassis.
6. Verify that the device appears in MAX.
7. Reset the device in MAX and perform a self-test.

## What Should I Do if the NI 5698 Does Not Appear in MAX?

1. In the MAX configuration tree, expand **Devices and Interfaces**.
2. Expand the **Chassis** tree to see the list of installed hardware, and press <F5> to refresh the list.
3. If the module is still not listed, power off the system, ensure that all hardware is correctly installed, and restart the system.
4. Navigate to the Device Manager by right-clicking the Start button, and selecting **Device Manager**.
5. Verify the NI 5698 appears in the Device Manager.

a. Under an NI entry, confirm that a NI 5698 entry appears.

> **Note** If you are using a PC with a device for PXI remote control system, under **System Devices**, also confirm that no error conditions appear for the **PCI-to-PCI Bridge**.

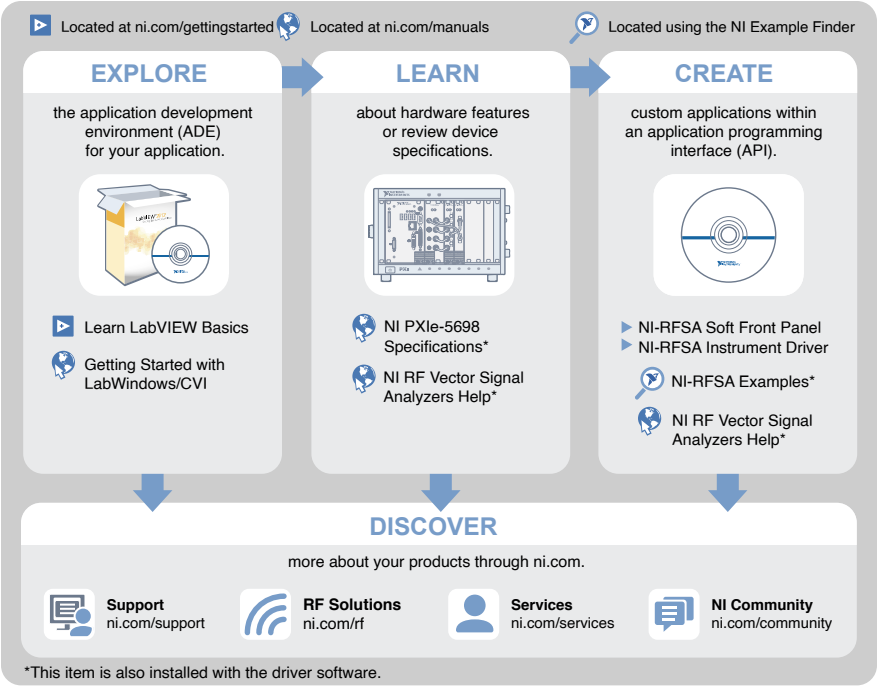
b. If error conditions appear, reinstall NI-RFSA.

## What Should I Do if the NI 5698 Fails the Self-Test?

1. Restart the system.
2. Launch MAX, and perform the self-test again.
3. Power off the chassis.
4. Reinstall the failed module in a different slot.
5. Power on the chassis.
6. Perform the self-test again.

## Where to Go Next

Refer to the following figure for information about other product tasks and associated resources for those tasks.




**Tip** The ***NI RF Vector Signal Analyzers Help*** is an HTML version of a traditional user manual that includes detailed information about RF fundamentals, device features, and programming with NI-RFSA.

## NI Services

Visit ni.com/support to find support resources including documentation, downloads, and troubleshooting and application development self-help such as tutorials and examples.

Visit ni.com/services to learn about NI service offerings such as calibration options, repair, and replacement.

Visit ni.com/register to register your NI product. Product registration facilitates technical support and ensures that you receive important information updates from NI.

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