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USER GUIDE

NI SMB-2145/2146/2147/2148

Shielded Signal Accessories for NI 5751/5752 Adapter Modules

The NI SMB-2145/2146/2147/2148 (NI SMB-214x) devices are shielded signal accessories for NI FlexRIO™ digitizer adapter modules (NI 5751 and NI 5752). NI SMB-214x accessories provide easy connections to other devices for testing and debugging. The following table describes each of the accessories.

Table 1. NI 214x Signal Accessories

Accessory	Description
NI SMB-2145	NI 5752 analog input accessory
NI SMB-2146	NI 5752 digital I/O accessory
NI SMB-2147	NI 5751 analog input accessory
NI SMB-2148	NI 5751 digital I/O accessory

This guide explains how to set up and use NI SMB-214x signal accessories with NI 5751/5752 adapter modules.

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Conventions

The following conventions are used in this manual:



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 *Specifications* section for information about precautions to take.

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.

What You Need to Get Started

To set up and use the NI SMB-214x, you need the following items:

- ❑ NI 5751R or NI 5752R, installed in a PXI/PXI Express or CompactPCI chassis



Note The NI 5751R and NI 5752R are comprised of an NI FlexRIO FPGA module and an NI FlexRIO adapter module (NI 5751 or NI 5752).

❑ The appropriate cable assembly for your adapter module:

Table 2. NI SMB-214x Cables

Adapter Module/Signal	Cable Description	Part Number
NI 5751 Analog	SHC68-C68-D4	196275A-01
NI 5751 Digital	SHC68-C68-D4	196275A-01
NI 5752 Analog	SHC68-C68-D3	188143B-01
NI 5752 Digital	SHC68-C68-D4	196275A-01

❑ At least one 50 Ω cable with SMB connectors

Related Documentation

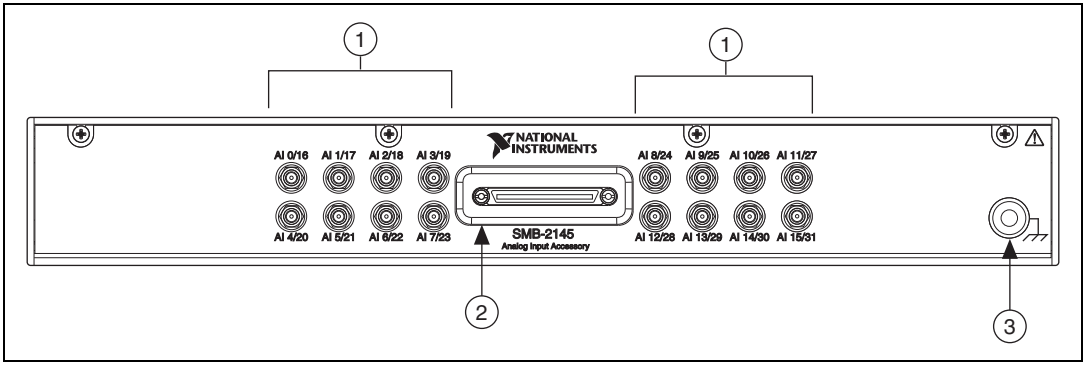
You may find the following documents helpful as you use the NI SMB-214x.

- *NI 5751R User Guide and Specifications*
- *NI 5752R User Guide and Specifications*
- *NI FlexRIO FPGA Module Installation Guide and Specifications*

These printed documents provide the specifications for your adapter module and your FPGA module. These documents are also available at `ni.com/manuals`.

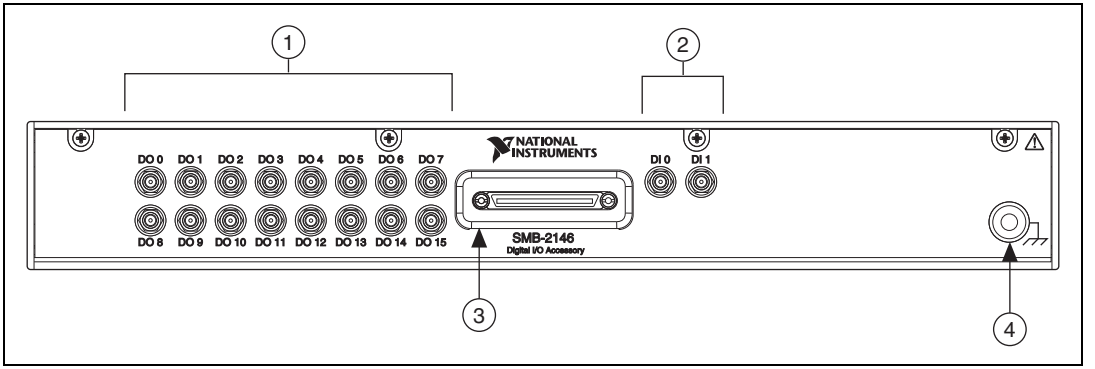
Parts Locator

Figures 1-4 show the connectors on each of the NI SMB-214x accessories.



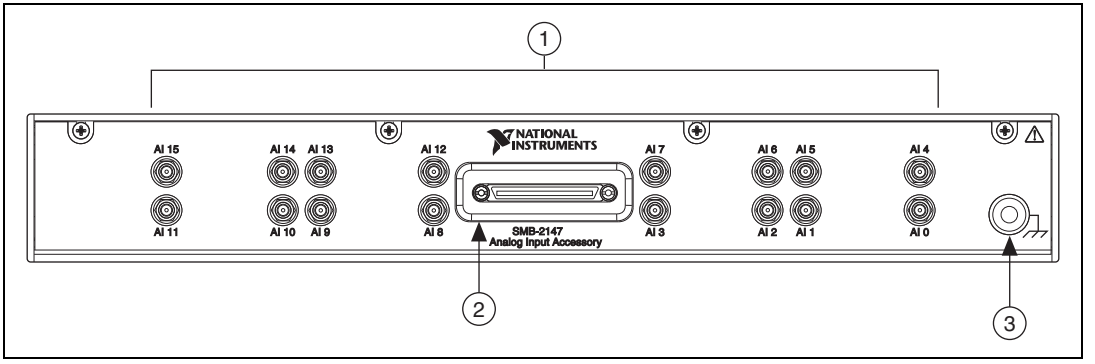
1 Analog Inputs <0..31> 2 VHDCI Connector 3 Shield Ground Lug

Figure 1. NI SMB-2145 Parts Locator Diagram



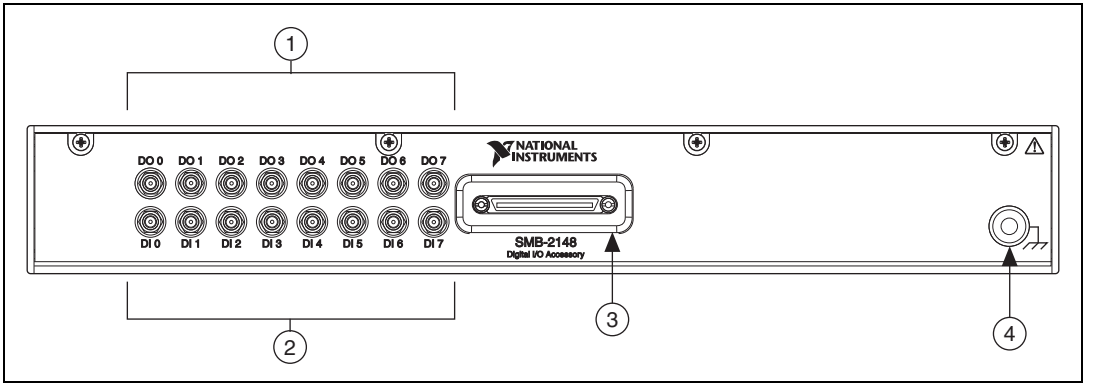
1	Digital Outputs <0..15>	3	VHDCI Connector
2	Digital Inputs <0..1>	4	Shield Ground Lug

Figure 2. NI SMB-2146 Parts Locator Diagram



1	Analog Inputs <0..15>	2	VHDCI Connector	3	Shield Ground Lug

Figure 3. NI SMB-2147 Parts Locator Diagram



1	Digital Outputs <0..7>	3	VHDCI Connector
2	Digital Inputs <0..7>	4	Shield Ground Lug

Figure 4. NI SMB-2148 Parts Locator Diagram

Installing Cables

Caution Disconnect power from the adapter module, accessory, and any other connected hardware before connecting the cable to prevent personal injury or damage to the hardware. NI is *not* liable for damage resulting from improper connections.

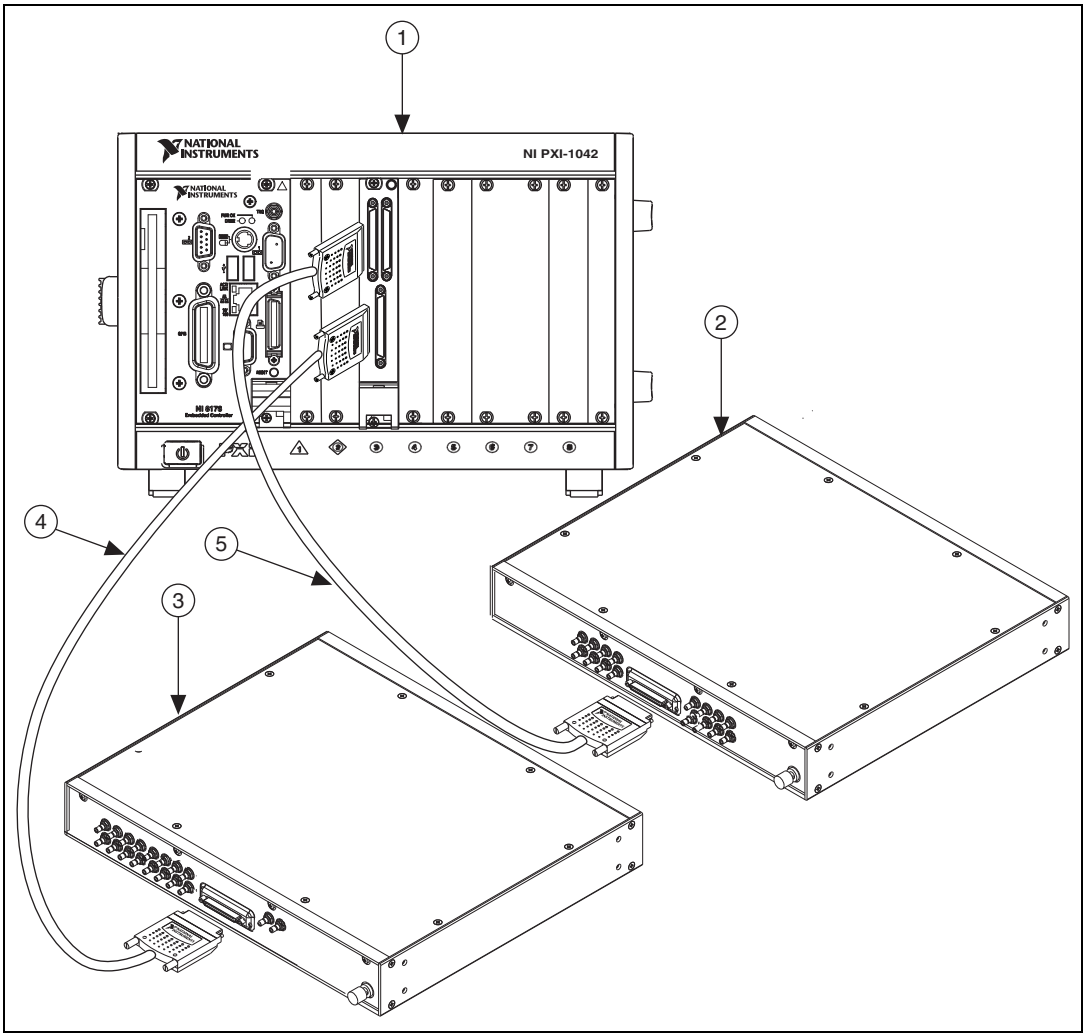
Complete the following steps to install the cable and any 50 Ω SMB cables.

1. Install the NI 5751R or NI 5752R by following the installation procedure described in the *NI FlexRIO FPGA Module Installation Guide and Specifications*.
2. Remove power from the adapter module by powering down the PXI/PXI Express or CompactPCI chassis or by programmatically removing power from the adapter module. Power down any external hardware intended for connection to this system.
3. Attach either end of the cable assembly to the VHDCI connector on the front panel of the adapter module and secure the cable with the captive screws on the cable connector.

Note Do *not* use cables other than the cables listed in Table 2 with these accessories.

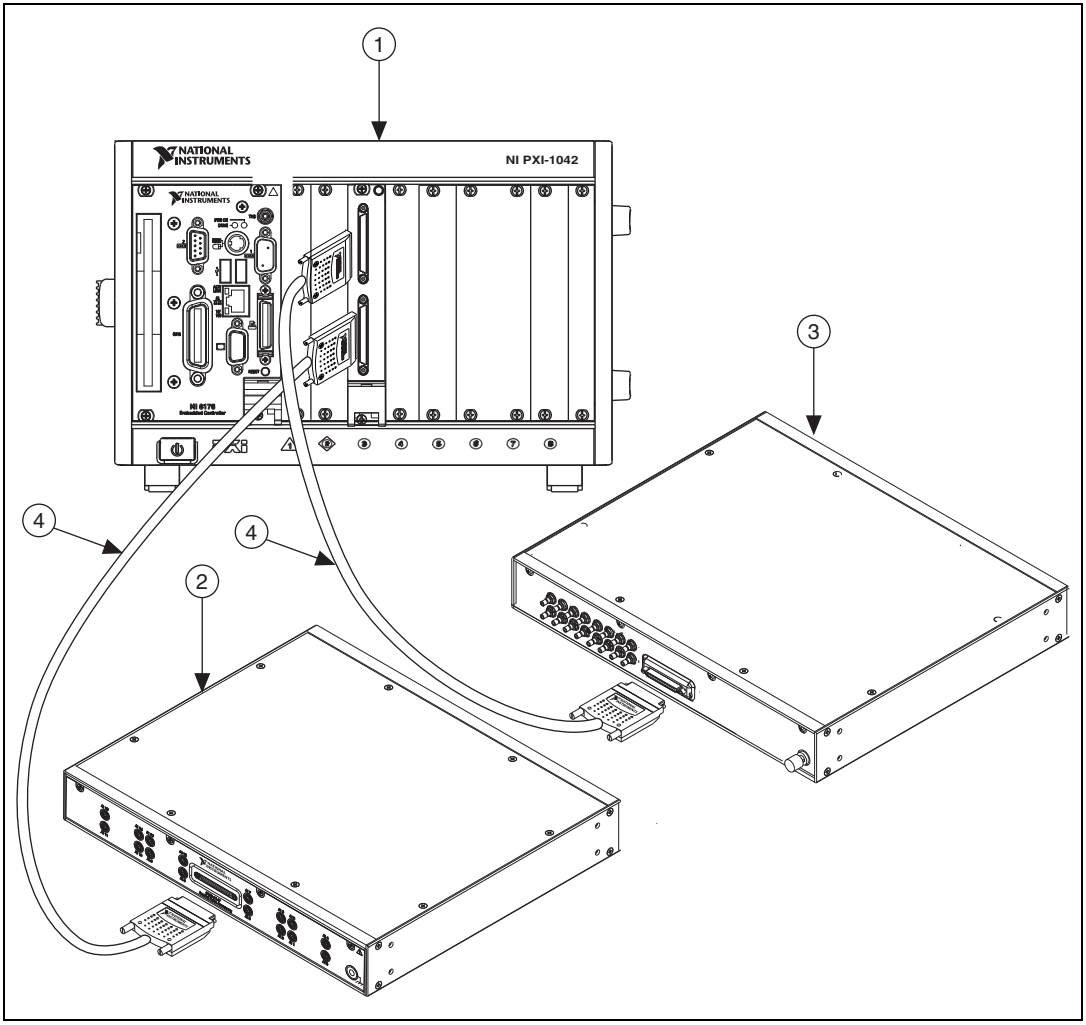
4. Attach and secure the other end of the cable assembly to the VHDCI connector of the NI SMB-214x and secure them together with the captive screws on the cable connector.

Figures 5 and 6 show how to connect your NI SMB-214x accessory to your NI FlexRIO system.



1 PXI Chassis with NI 5752R	4 SHC68-C68-D4 Cable Assembly
2 NI SMB-2145	5 SHC68-C68-D3 Cable Assembly
3 NI SMB-2146	

Figure 5. Connecting the NI 5752R to the NI SMB-2145 and NI SMB-2146



1 PXI Chassis with NI 5751R	3 NI SMB-2148
2 NI SMB-2147	4 SHC68-C68-D4 Cable Assemblies

Figure 6. Connecting the NI 5751R to the NI SMB-2147 and NI SMB-2148

5. Make signal connections by connecting SMB cables to NI SMB-214x signal terminals. Refer to the *Connecting Signals* section for more information.

Note To ensure a solid ground connection, tighten the SMB connectors by gently snapping them into place.

6. Apply power to the adapter module by powering on the PXI/PXIe or Compact PCI chassis or by programmatically applying power to the adapter module.
7. Power on any external hardware intended for use with this system.

Connecting Signals

The NI SMB-214x provides signal connectivity to the NI 5751/5752 adapter module. You can connect to these signals from the labeled SMB connectors on the NI SMB-214x.

Caution Connections that exceed any of the maximum ratings for the NI SMB-214x or the NI 5751/5752 adapter module can damage the device and the computer. Maximum input ratings are provided in the specifications document that shipped with the adapter module. NI is *not* liable for any damages resulting from such signal connections.

Figures 7 through 10 show the pinouts of the VHDCI connectors of NI SMB-214x accessories. The analog inputs, digital inputs, and digital outputs are connected to corresponding pins on the NI SMB-214x. Refer to Table 3 for the pin descriptions.

Table 3. VHDCI Connector Pinout Descriptions

Pin	Signal Description
AI <0..31>	Analog input channels 0 through 31
DI <0..15>	Digital input channels 0 through 15
DO <0..15>	Digital output channels 0 through 15
GND	Ground reference for signals
RSVD	Reserved for system use. Do not connect signals to these channels.

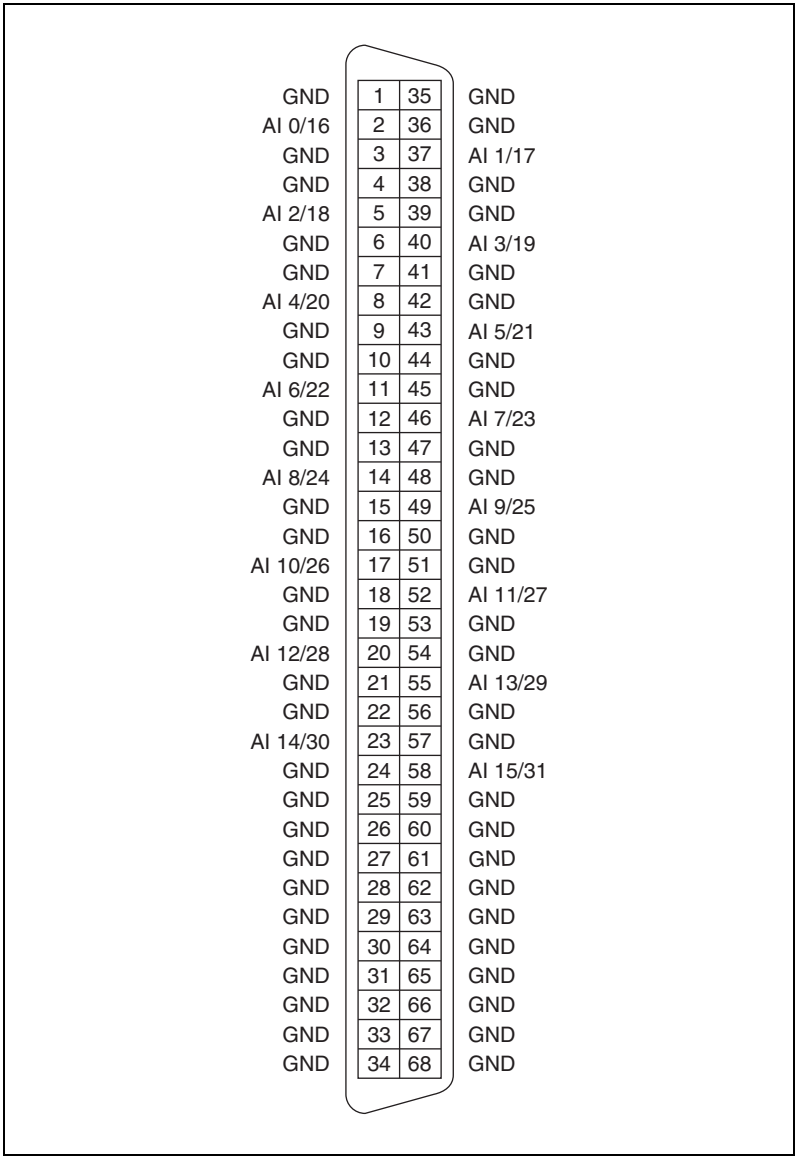


Figure 7. NI SMB-2145 VHDCI Connector Pinout

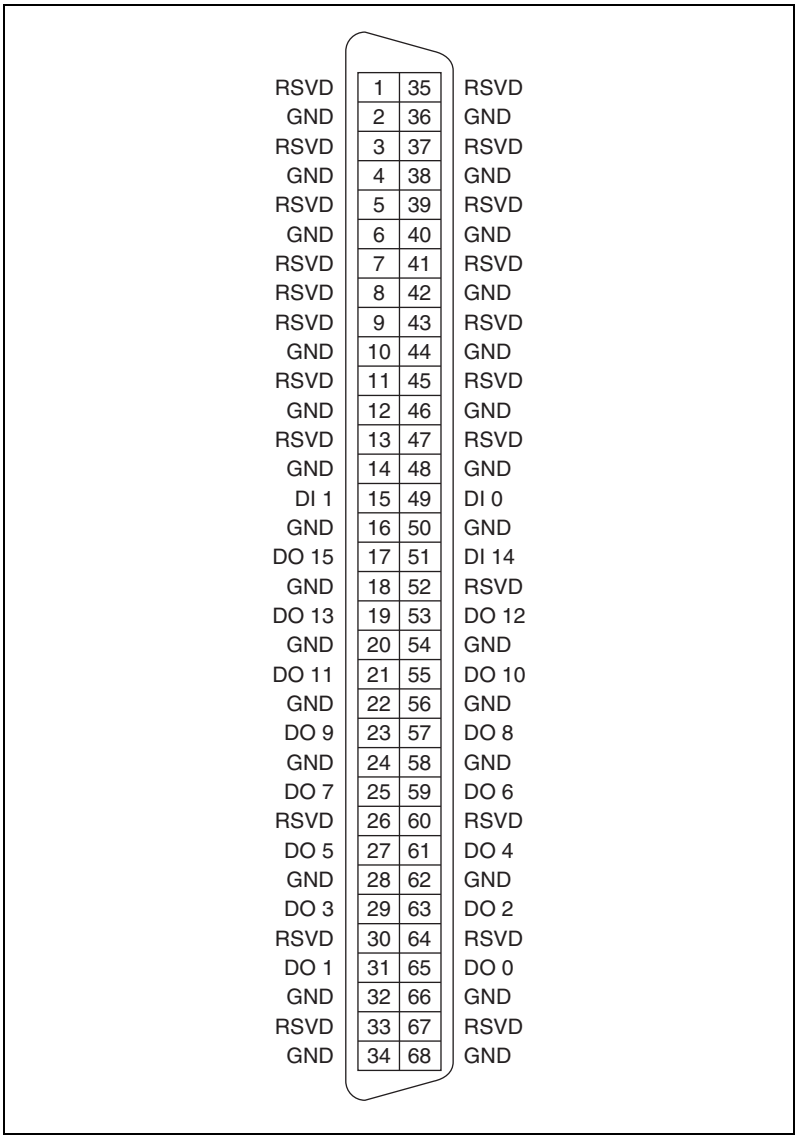


Figure 8. NI SMB-2146 VHDCI Connector Pinout

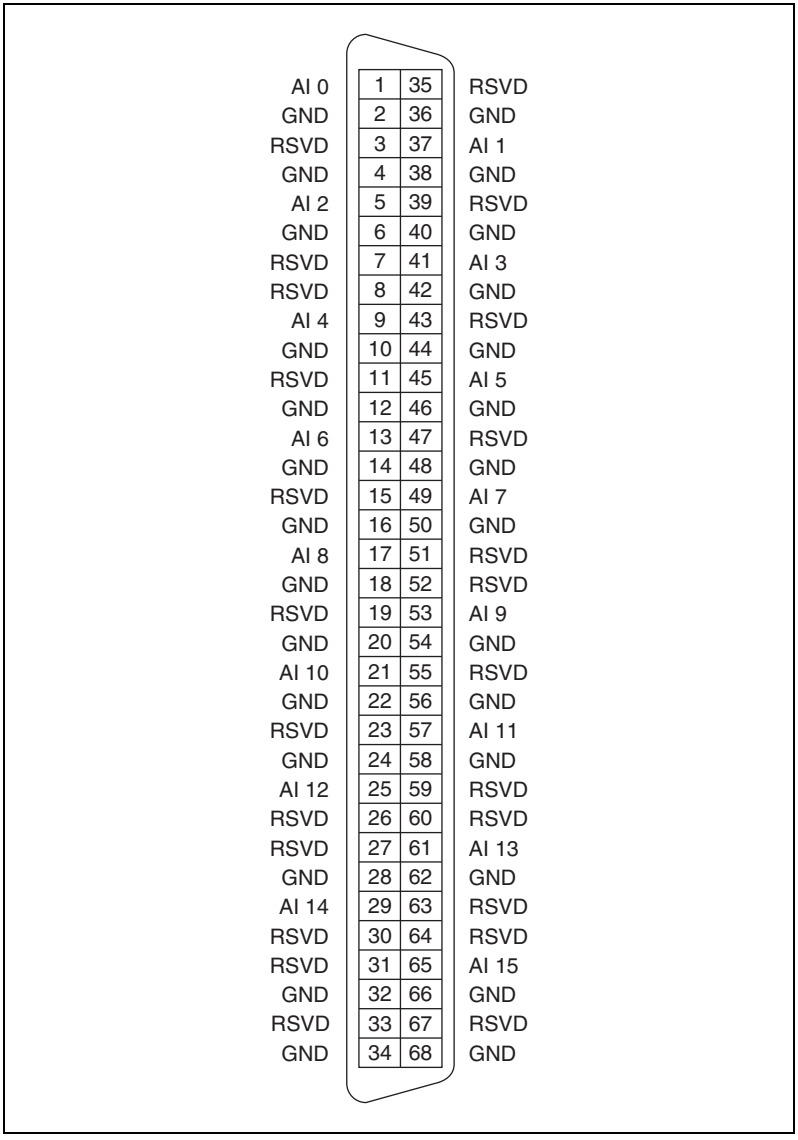


Figure 9. NI SMB-2147 VHDCI Connector Pinout

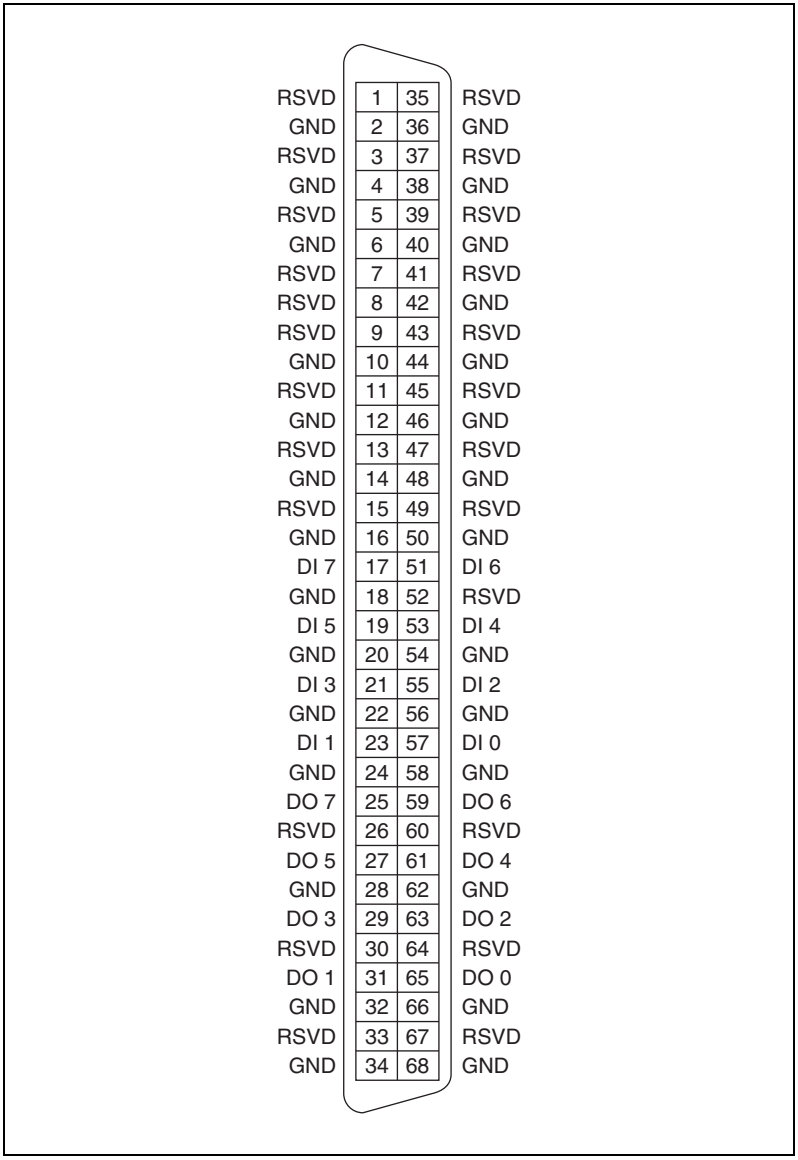


Figure 10. NI SMB-2148 VHDCI Connector Pinout

Note For additional shielding, you can connect the shield ground connector on the NI SMB-214x to earth/hard ground. This terminal is connected to the shielded enclosure ground. The shield ground lug is shown in Figures 1 through 4.

Cleaning the Accessory

Disconnect all cables to the NI SMB-214x before cleaning. To remove light dust, use a soft, nonmetallic brush. To remove other contaminants, use alcohol wipes. The unit must be completely dry and free from contaminants before returning to service.

Specifications

These specifications are characteristic at 25 °C unless otherwise noted.

NI SMB-2145

Analog Input

Analog input channels ..... 16, single-ended

Typical propagation delay through NI SMB-2145 ..... 1.2 ns

Typical channel-to-channel skew ..... ±35 ps

Typical trace characteristic impedance ..... 50 Ω

Maximum voltage rating ..... 5.5 V or the maximum input voltage of the NI 5752 analog inputs, whichever is less

Physical

Dimensions ..... 30.5 cm × 4.5 cm × 26.5 cm (12.0 in. × 1.77 in. × 10.43 in.)

Weight ..... 1,380 g (48.7 oz.)

I/O connectors ..... One 68-pin VHDCI connector, 16 SMB jack connectors, one banana-style connector

NI SMB-2146

Digital I/O

Digital output channels.....16, single-ended

Digital input channels.....2, single-ended

Typical propagation delay
through NI SMB-2146.....1.2 ns

Typical channel-to-channel skew .....±35 ps

Typical trace
characteristic impedance.....50 Ω

Maximum voltage rating .....5.5 V or the maximum input voltage of the NI 5752 digital inputs, whichever is less

Physical

Dimensions .....30.5 cm × 4.5 cm × 26.5 cm (12.0 in. × 1.77 in. × 10.43 in.)

Weight .....1,380 g (48.7 oz.)

I/O connectors.....One 68-pin VHDCI connector, 18 SMB jack connectors, one banana-style connector

NI SMB-2147

Analog Input

Analog input channels .....16, single-ended

Typical propagation delay
through NI SMB-2147.....1.2 ns

Typical channel-to-channel skew .....±35 ps

Typical trace
characteristic impedance.....50 Ω

Maximum voltage rating .....5.5 V or the maximum input voltage of the NI 5751 analog inputs, whichever is less

Physical

Dimensions ..... 30.5 cm × 4.5 cm × 26.5 cm (12.0 in. × 1.77 in. × 10.43 in.)

Weight ..... 1,380 g (48.7 oz.)

I/O connectors ..... One 68-pin VHDCI connector, 16 SMB jack connectors, one banana-style connector

NI SMB-2148

Digital I/O

Digital input channels ..... 8, single-ended

Digital output channels ..... 8, single-ended

Typical propagation delay through NI SMB-2148 ..... 1.2 ns

Typical channel-to-channel skew ..... ±35 ps

Typical trace characteristic impedance ..... 50 Ω

Maximum voltage rating ..... 5.5 V or the maximum input voltage of the NI 5751 digital inputs, whichever is less

Physical

Dimensions ..... 30.5 cm × 4.5 cm × 26.5 cm (12.0 in. × 1.77 in. × 10.43 in.)

Weight ..... 1,380 g (48.7 oz.)

I/O connectors ..... One 68-pin VHDCI connector, 16 SMB jack connectors, one banana-style connector

Compliance and Certifications

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