PXI-2722 Features

2025-03-20

Contents

PXI-2722 Overview

PXI-2722 Pinout

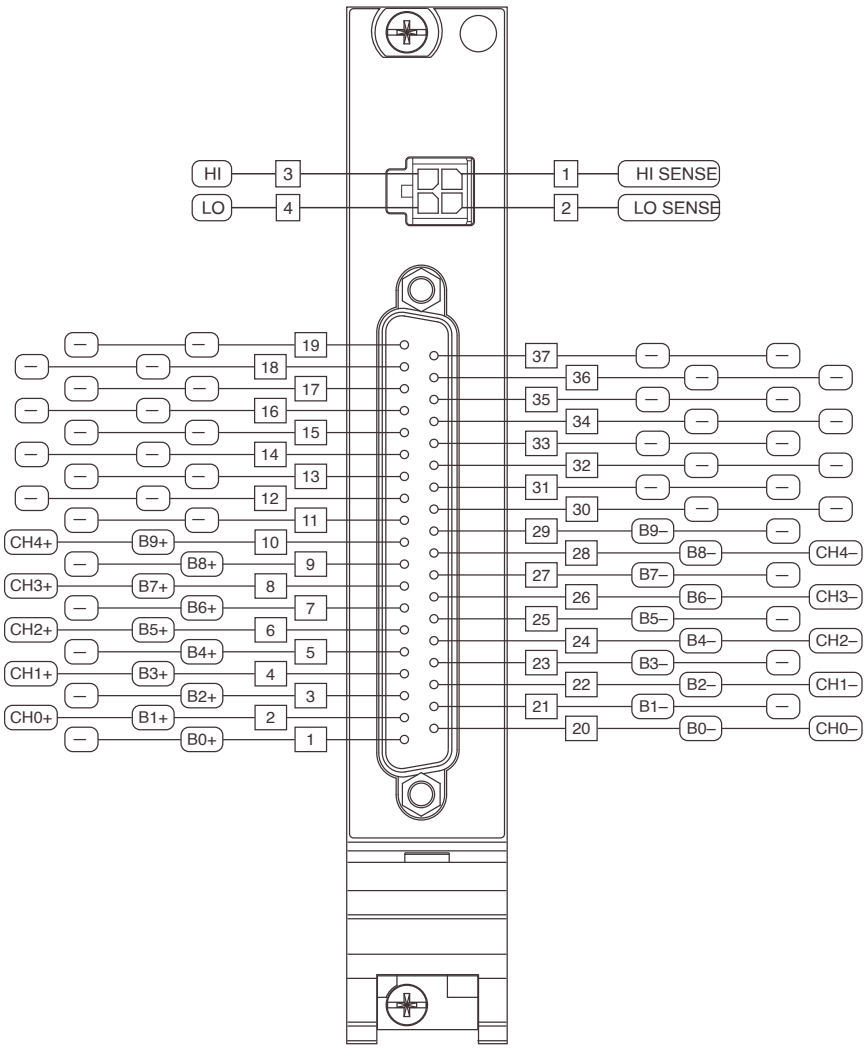


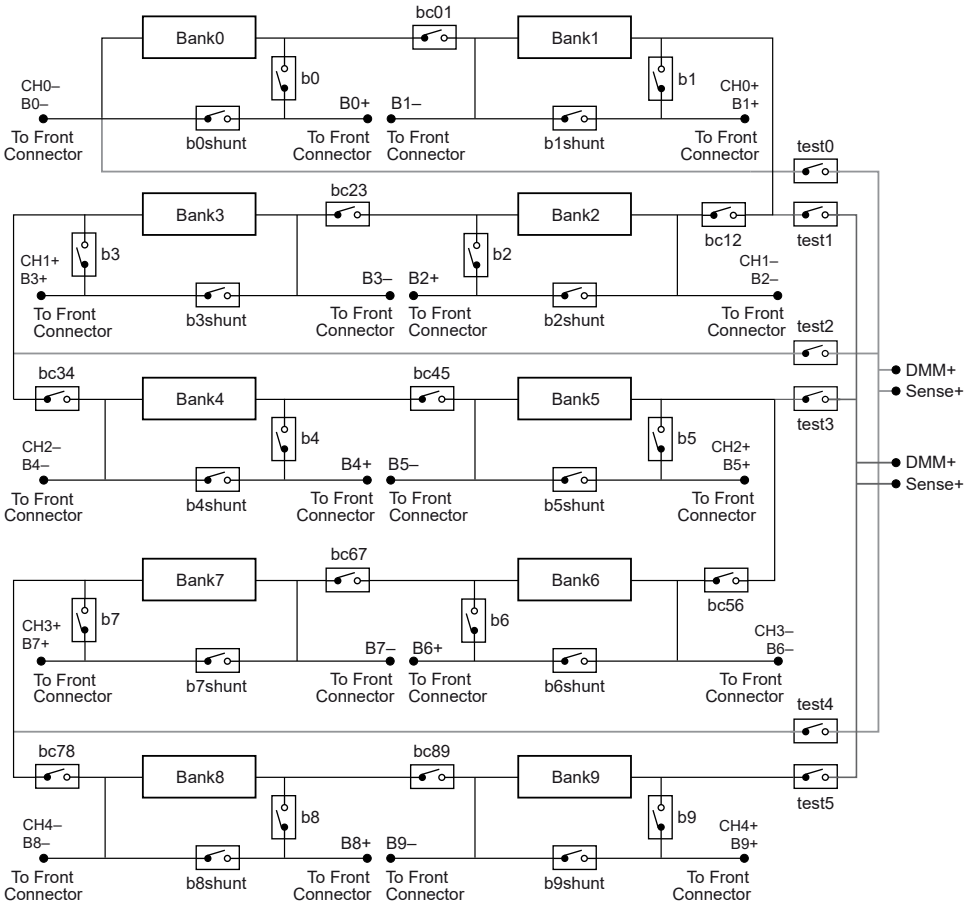
Table 1. Signal Descriptions

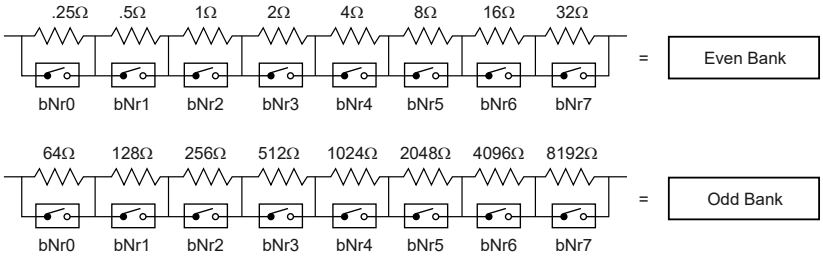
Signal	Description
B***X***+	Positive bank connection
B***X***-	Negative bank connection

Signal	Description
CH*x*+	Positive signal connection
CH*x*-	Negative signal connection
HI	HI input connection
HI SENSE	HI sense connection
LO	LO input connection
LO SENSE	LO sense connection
—	No connection

PXI-2722 Hardware Diagram

This figure shows the hardware diagram of the module.





Note Resistance values are nominal. Refer to the ***PXI-2722 Specifications*** for resistor values and accuracy information.

Refer to the following list for relay names on the module.

- kb0r0, kb0r1...kb0r7
- kb1r0, kb1r1...kb1r7
- kb2r0, kb2r1...kb2r7
- kb3r0, kb3r1...kb3r7
- kb4r0, kb4r1...kb4r7

- kb5r0, kb5r1...kb5r7
- kb6r0, kb6r1...kb6r7
- kb7r0, kb7r1...kb7r7
- kb8r0, kb8r1...kb8r7
- kb9r0, kb9r1...kb9r7
- kb0...kb9
- kb0shunt...kb9shunt
- kbc01, kbc12...kbc89
- ktest0, ktest1...ktest5

PXI-2722 Topology

This figure shows the topology for the module.

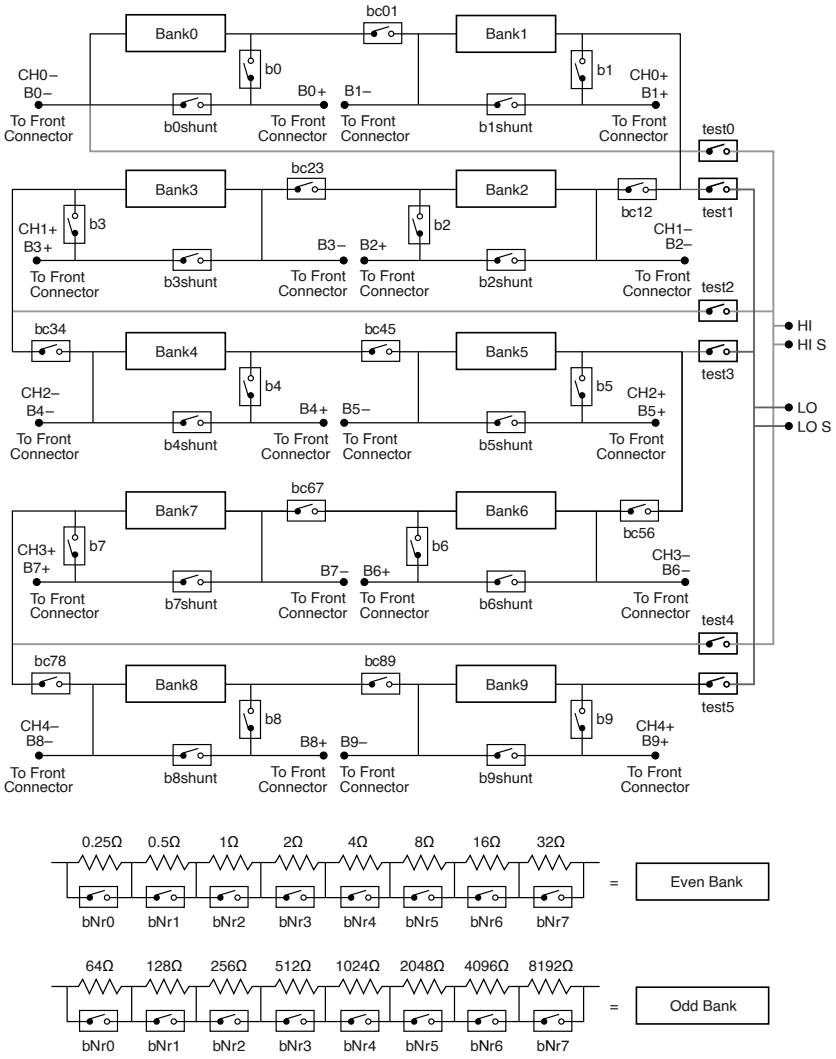
Module software name: 2722/Independent
(NISWITCH_TOPOLOGY_2722_INDEPENDENT)

The module is composed of reed relays in parallel with discrete resistors. The module has five channels that can nominally switch from 0 Ω to 16,383 Ω in 0.25 Ω steps.

Note NI has created a set of reference VIs that you can use to specify a desired resistance value to output or RTD temperature to simulate. Using the reference VIs is the simplest way to interact with the programmable resistor module. It is also possible to program using direct calls in NI-SWITCH, NI-DAQmx, NI Switch Executive, or an IVI switch driver. For more information, including a detailed overview of the module architecture, visit ni.com/r/272xoverview.

Note Switching inductive loads, such as motors and solenoids, can produce high-voltage transients in excess of the module's rated voltage. Without additional protection, these transients can interfere with module operation and impact relay life.

Independent Topology



Note Bank connect relays allow adjacent banks or channels to connect together internally. For example, you can connect two or more adjacent channels together to create a potentiometer, a voltage divider, or a multi-segment resistor chain.

Making a Connection

Each 16-bit channel is composed of two adjacent 8-bit banks on the module. For example, ch0 is composed of banks 0 and 1 and ch1 is composed of banks 2 and 3. NI has created a set of reference VIs that will programmatically open and close relays based on a user-specified resistance value or RTD temperature to simulate. To access these reference VIs, visit ni.com/r/272xoverview.. NI recommends using this set of reference VIs for the easiest programming experience. If not using these reference VIs,

NI recommends using the low-level relay control VIs or functions instead of the connect channel VIs or functions. The DAQmx Relay API supports closing multiple relays in a single driver call, which is faster than the channel API.

When a bank relay is closed, the corresponding resistor is placed in parallel with the low resistance of the relay, which nominally equates to a zero Ω shunt. Closing any of the 8 bank relays in a given bank decreases the resistance of that bank.

For example, the following procedure uses the NI-SWITCH Relay API to short across the largest resistor in bank 0 and join bank 0 and bank 1 in series.

1. Close `b0r7` by calling the niSwitch Relay Control VI with the inputs of `b0r7` and `close`.
2. Close `bc01` by calling the niSwitch Relay Control VI with the inputs of `bc01` and `close`.

You can perform the same operation using the NI-SWITCH Channel API, as shown below.

1. Connect `b0->b0r7` by calling niSwitch Connect Channels VI with the inputs of `b0` and `b0r7`.
2. Connect `b0->b1` by calling niSwitch Connect Channels VI with the inputs of `b0` and `b1`.

Each bank is initially in a high impedance (open) state across the bank terminals. To enable the desired output channel you must first connect the bank relay, `bN`.

Each bank includes a shunt relay that completely bypasses the bank's string of 8 series relays. Closing the shunt relay `bN->bNshunt`, for example, `b0->b0shunt` or low-level `kb0shunt`, results in a low resistance across the bank, 0 Ω nominally. This allows the module to pass signals with minimal attenuation. On 16-bit modules, such as this module, closing the upper bank's shunt relay reduces the resistance when outputting values less than 64 Ω.

Note It is not necessary to close all 8 bank relays and the shunt relay. Configuring multiple banks this way can exceed the power budget of the module.

The 4-pin front panel test connector can connect to any adjacent pair of even-odd banks, allowing resistance measurements, or voltage measurements, across those two banks, for example `b0` to `b1`, `b2` to `b3`, `b4` to `b5`. On 16-bit modules, such as this module, this allows channel resistance measurements using a DMM with Offset Compensated Ohms (such as the PXI-4070, PXI-4071, or PXI-4072). To connect a pair of banks to the test leads, close the appropriate test relays using the command `testN->testout`. For example, to measure the resistance across banks 0 and 1, call `test0->testout` and `test1->testout`. For banks 2 and 3, call `test1->testout` and `test2->testout`. Refer to the device's hardware diagram for valid test relay connections.

Note Closing multiple pairs of test relays introduces low impedance paths between banks. NI recommends disconnecting the 37-pin DSUB connector if these low impedance paths would damage your device under test or cause the current specifications of the module to be exceeded.

Note Each channel on the module exhibits an "open" when initialized, reset, and first powered on. The niSwitch Reset and niSwitch Disconnect All Channels VIs or niSwitch_reset and niSwitch_DisconnectAll functions will disconnect all relays, resulting in an open circuit on each channel.

PXI-2722 Relay Replacement

The module uses reed relays.

Note The module uses a custom lead length to meet safety standards. Trim leads per rework instructions or use one of the custom relays from the relay kit.

Refer to the following table for information about ordering replacement relays.

Replacement Relay	Part Number
Coto (all relays)	9117-0001
NI relay kit (10 relays)	781451-10

The module uses lead-free assemblies. Ensure you have the following:

- Temperature-regulated soldering iron set to 371 °C (700 °F) for lead-free solder rework
- 96.5/3.0/0.5 Tin/Silver/Copper solder (flux core) for lead-free solder rework
- Solder wick
- Fine pick
- Isopropyl alcohol
- Cotton swabs

Note The module uses lead-free assemblies. NI recommends using lead-free solder for relay replacement on lead-free assemblies.

Notice Do not rework lead assemblies using a lead-free work station. Lead solder from the unit could contaminate the station.

Notice If a lead-free assembly is reworked with lead solder, label the assembly to indicate this. This can prevent the same unit from being reworked later on a lead-free solder station, which could contaminate the station.

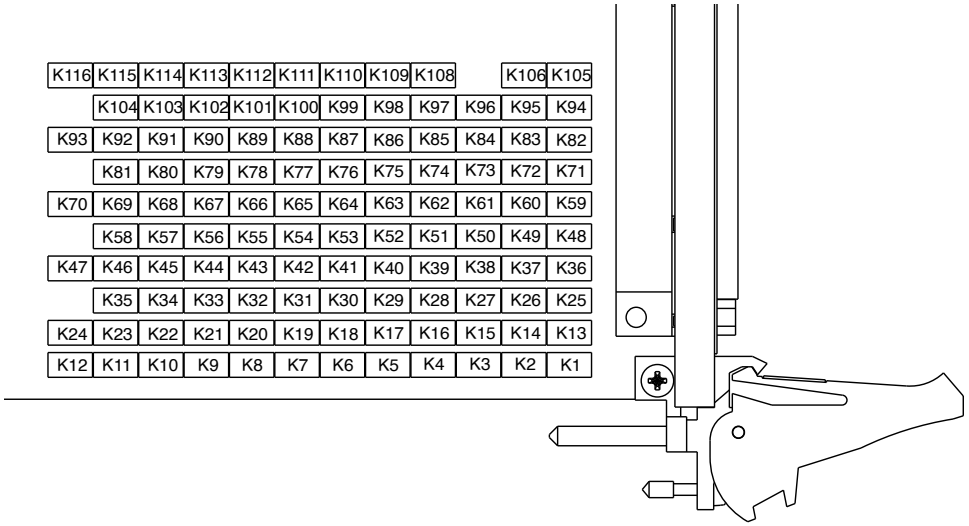
Complete the following steps to disassemble your module and replace a failed relay.

1. Ground yourself using a grounding strap or a ground connected to your PXI chassis.

   Note Properly grounding yourself prevents damage to your module from electrostatic discharge.

2. Locate the relay you want to replace. Refer to the following figure and table for relay locations.

Figure 1. Module Relay Map

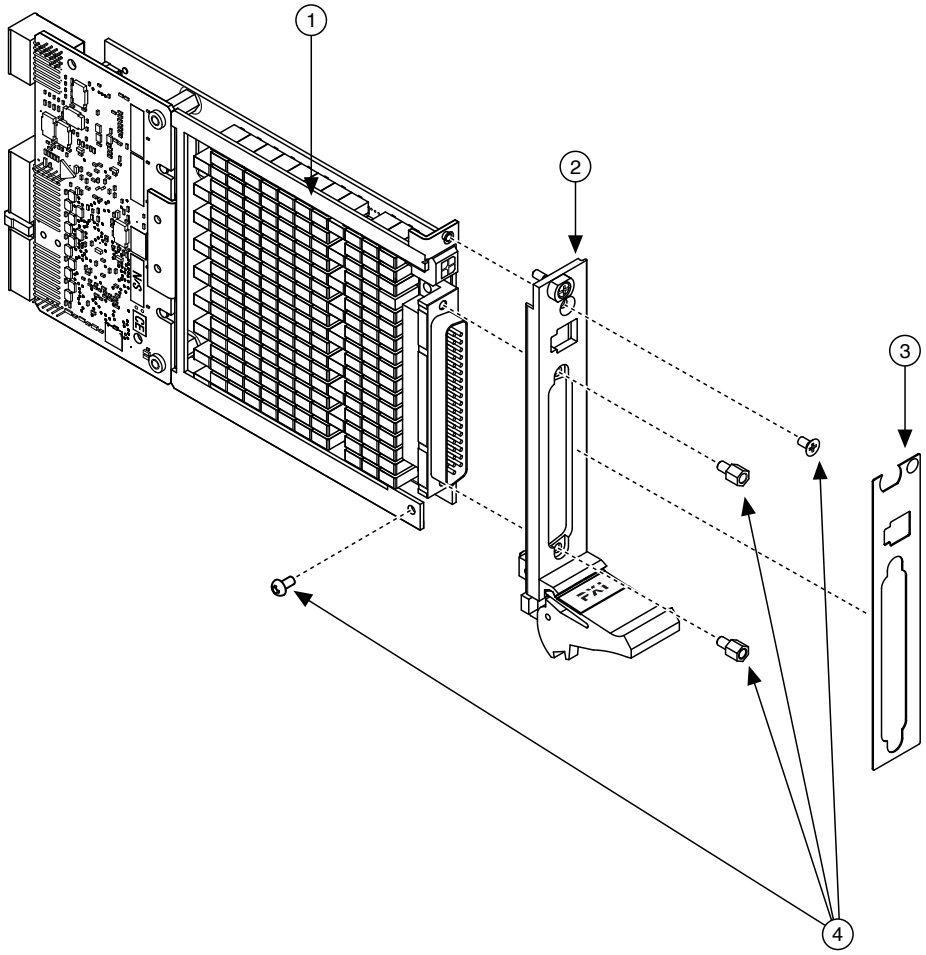


Relay Name	Reference Designator	Relay Name	Reference Designator	Relay Name	Reference Designator	Relay Name	Reference Designator
kb0shunt	K1	kb2r2	K30	kb5shunt	K59	kb7r2	K88
kb0	K2	kb2r3	K31	kb5	K60	kb7r3	K89
kbc01	K3	kb2r4	K32	kbc56	K61	kb7r4	K90
ktest0	K4	kb2r5	K33	ktest3	K62	kb7r5	K91
kb0r0	K5	kb2r6	K34	kb5r0	K63	kb7r6	K92
kb0r1	K6	kb2r7	K35	kb5r1	K64	kb7r7	K93
kb0r2	K7	kb3shunt	K36	kb5r2	K65	kb8shunt	K94
kb0r3	K8	kb3	K37	kb5r3	K66	kb8	K95
kb0r4	K9	kbc34	K38	kb5r4	K67	kbc89	K96
kb0r5	K10	ktest2	K39	kb5r5	K68	kb8r0	K97
kb0r6	K11	kb3r0	K40	kb5r6	K69	kb8r1	K98
kb0r7	K12	kb3r1	K41	kb5r7	K70	kb8r2	K99
kb1shunt	K13	kb3r2	K42	kb6shunt	K71	kb8r3	K100
kb1	K14	kb3r3	K43	kb6	K72	kb8r4	K101
kbc12	K15	kb3r4	K44	kbc67	K73	kb8r5	K102
test1	K16	kb3r5	K45	kb6r0	K74	kb8r6	K103
kb1r0	K17	kb3r6	K46	kb6r1	K75	kb8r7	K104

Relay Name	Reference Designator	Relay Name	Reference Designator	Relay Name	Reference Designator	Relay Name	Reference Designator
kb1r1	K18	kb3r7	K47	kb6r2	K76	kb9shunt	K105
kb1r2	K19	kb4shunt	K48	kb6r3	K77	kb9	K106
kb1r3	K20	kb4	K49	kb6r4	K78	—	—
kb1r4	K21	kbc45	K50	kb6r5	K79	test5	K108
kb1r5	K22	kb4r0	K51	kb6r7	K80	kb9r0	K109
kb1r6	K23	kb4r1	K52	kb6r6	K81	kb9r1	K110
kb1r7	K24	kb4r2	K53	kb7shunt	K82	kb9r2	K111
kb2shunt	K25	kb4r3	K54	kb7	K83	kb9r3	K112
kb2	K26	kb4r4	K55	kbc78	K84	kb9r4	K113
kbc23	K27	kb4r5	K56	test4	K85	kb9r5	K114
kb2r0	K28	kb4r6	K57	kb7r0	K86	kb9r6	K115
kb2r1	K29	kb4r7	K58	kb7r1	K87	kb9r7	K116

3. Remove the front panel, as shown in the following image.

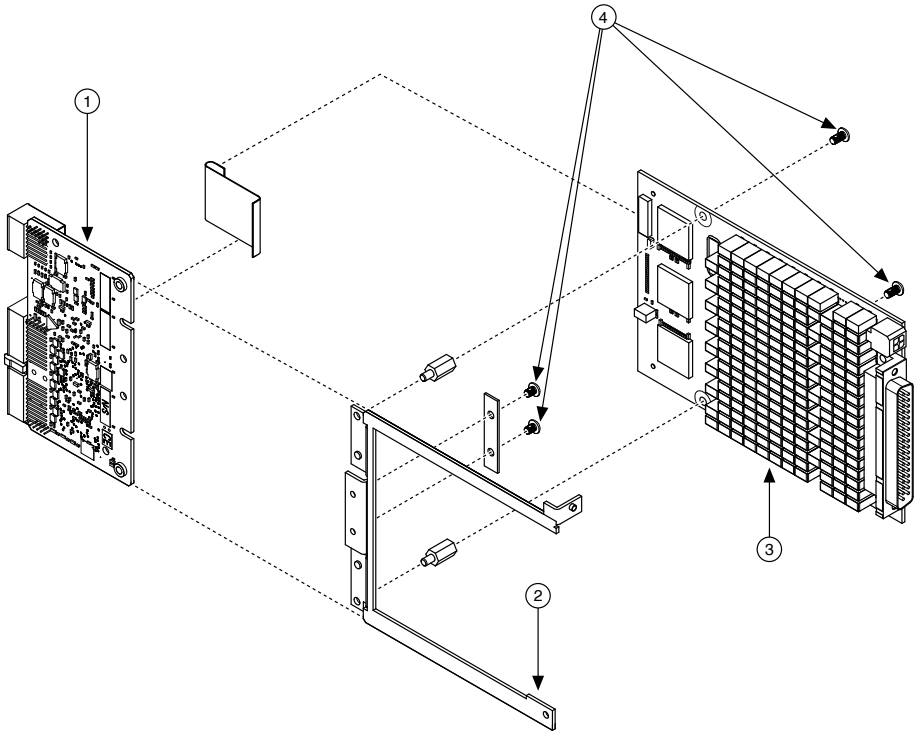
Figure 2. Removing the Front Panel



1. Bracket
2. Front Panel
3. Front Panel Overlay
4. Screws

4. Remove the bracket, as shown in the following image.

Figure 3. Removing the Bracket



1. CA3 Digital Back End
2. Bracket
3. Daughter Card
4. Screws

5. Replace the relay as you would any other through-hole part. Trim the replaced relay leads to no more than 1 mm (0.04 in.) from the PCB.

Tip Use the NI-SWITCH Switch Soft Front Panel to reset the relay count after you have replaced a failed relay. Refer to the ***Switch Soft Front Panel Help*** for more information.