PXI Signal Insertion Switch Modules

PXI-2510, PXI-2512, PXIe-2512, PXI-2514, PXIe-2514, PXI-2515, and PXIe-2515

- **Software:** Includes interactive soft front panel, API support for LabVIEW and text-based languages, shipping examples, and detailed help files
- Electromechanical, Reed, and FET relay options
- Two analog buses for fault and signal insertion
- Up to 68 channels
- Up to 150 V or 40 A
- Onboard relay count tracking

Built for Automated Test and Measurement

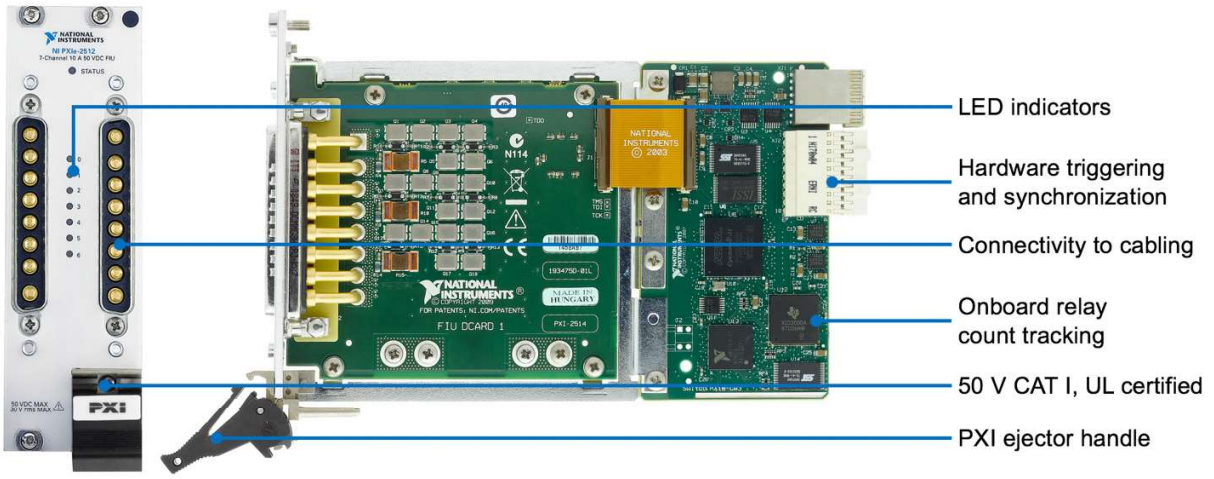
PXI Signal Insertion Switch Modules, also known as fault insertion units (FIUs), provide a set of feedthrough channels, which make the switch transparent to the system when closed. You can open or short these channels to two fault buses, allowing you to simulate open or interrupted connections as well as shorts between pins, shorts to battery voltages, and shorts to ground on a per-channel basis. When controlled with the LabVIEW Real-Time Module, the PXI Signal Insertion Switch Module can validate the integrity of control systems including engine control units (ECUs) and full authority digital engine controls (FADECs). You can also use the FIU models for hardware-in-the-loop (HIL) applications and electronic reliability tests.

Additionally, NI switch modules offer advanced features, such as hardware triggering and onboard relay count tracking, providing a smarter way to tackle difficult applications in industries ranging from consumer electronics to aerospace and defense.

Table 9. NI offers a variety of PXI Signal Insertion Switch Modules, varying in channel density, relay type, and voltage/current rating, allowing you to pick the model that best fits your needs.

	Number of Channels	Maximum Voltage	Maximum Current	Maximum Bandwidth	Relay Type
PXI-2510	68	150 V	2 A	6.5 MHz	EMR
PXI-2512 and PXIe-2512	7	50 VDC 30 VAC	10 A	800 kHz	FET
PXI-2514 and PXIe-2514	7	28 VDC 19.8 VAC	40 A	800 kHz	FET
PXI-2515 and PXIe-2515	32	150 V	2 A	10 MHz	EMR

Detailed View of PXIe-2512 Signal Insertion Switch Module



Key Features

Hardware Fault Insertion

In many hardware-in-the-loop (HIL) test systems, hardware fault insertion or signal insertion is used to create signal faults between the electronic control unit (ECU) and the rest of the system to test, characterize, or validate ECU behavior under specific failure conditions. Fault insertion is most commonly used when it is imperative for a specific ECU to have both a known and an acceptable response to fault conditions – examples include ECUs for vehicles, aircraft, spacecraft, and machinery. To accomplish this, fault insertion units (FIUs) are inserted between the I/O interfaces of a test system and the ECU so the test system can switch between normal operation and fault conditions such as a short to battery, short to ground, or open circuit.

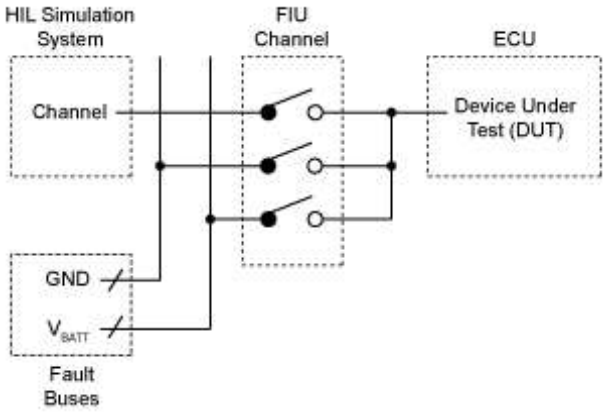
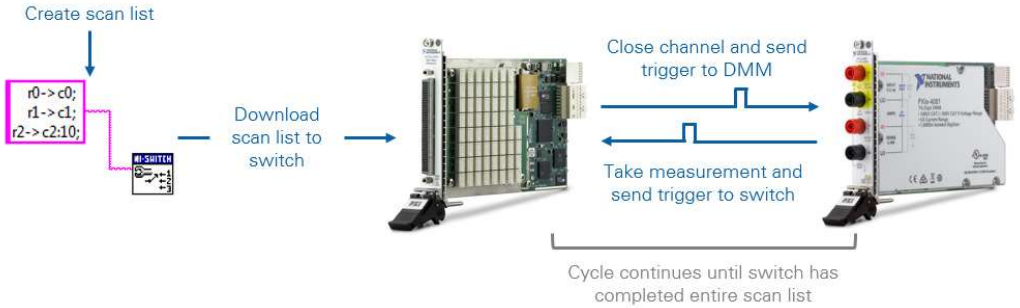


Figure 13. An FIU can insert fault conditions between automated test equipment, such as hardware-in-the-loop simulation systems, and devices under test. This FIU schematic is capable of numerous example faults, including open circuit fault, short to ground, short to power, and pin-to-pin short.

Synchronization and Integration

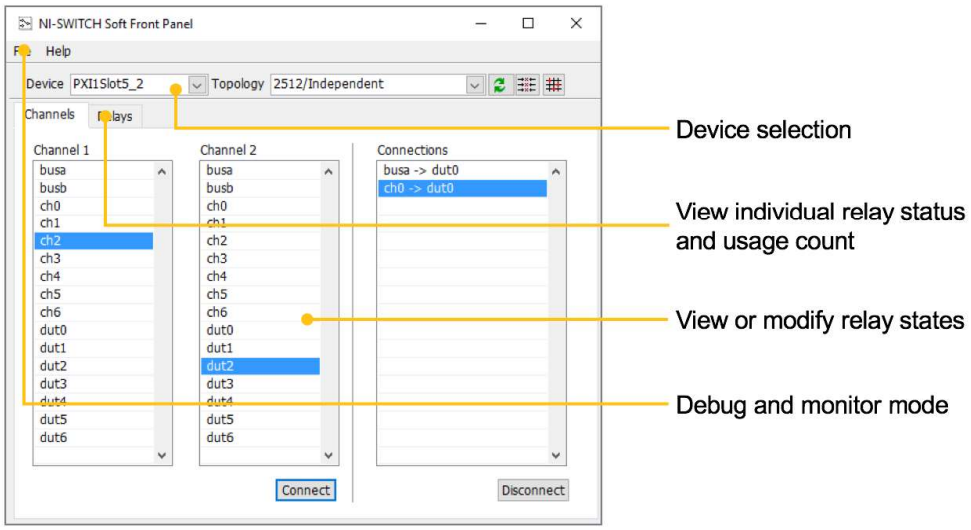
NI switches use the inherent timing and synchronization capabilities of the PXI platform to communicate with other instruments within the PXI chassis[1]. You can store a list of switch connections in memory onboard the switch module and then use the integrated hardware scanning and triggering engine to advance the switch sequence and rapidly communicate with any PXI instrument that can send and receive digital triggers, such as DMM or oscilloscope. This advanced switching method removes the software overhead and reduces the bus latency associated with traditional software-controlled switching operations for faster test execution with more repeatable timing.



[1]Triggering is available on most NI switches. To check if this feature is supported by a switch module, reference the “Trigger Characteristics” section of the product specification document.

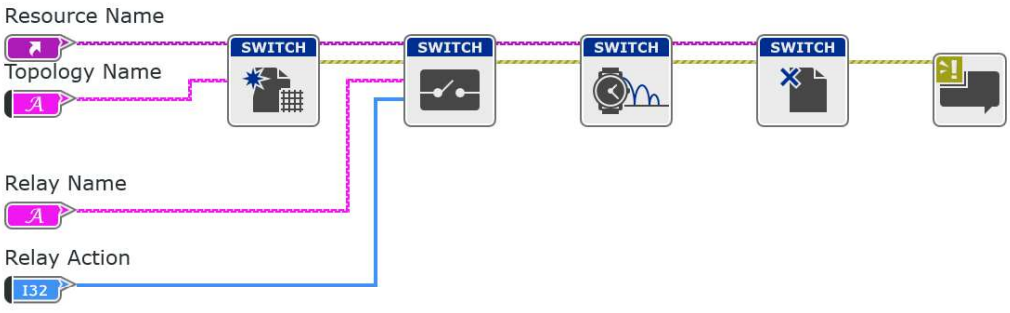
NI-SWITCH Soft Front Panel

The NI-SWITCH driver software includes an interactive soft front panel for full out-of-the-box functionality. This interactive soft front panel allows you to configure the switch topology and change switch connections with a simple click. In addition, you can use the **Debug Driver Session** mode to monitor and debug the switch during automated measurement. For example, you can monitor which signal paths are active, which individual relays are open/closed, and how many times each relay has been used.



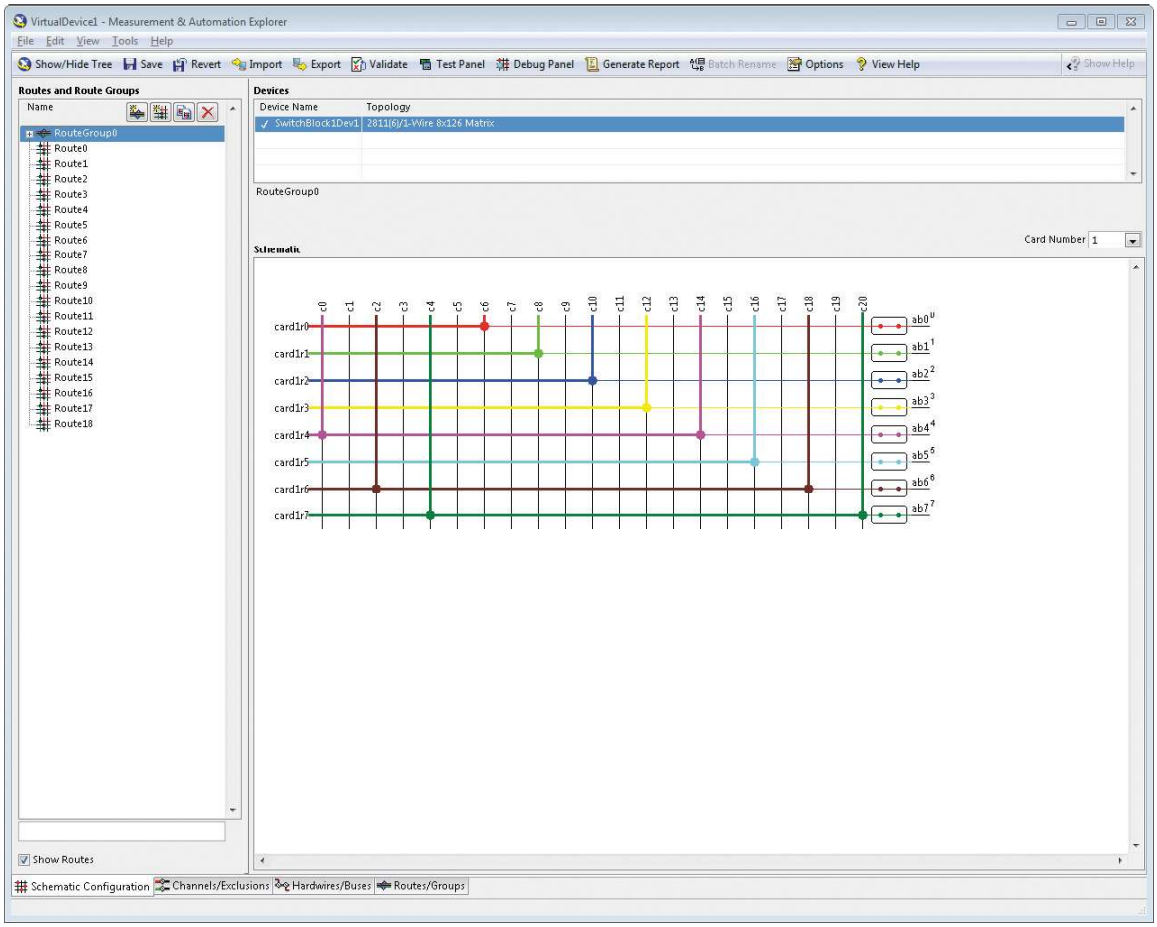
NI-SWITCH Application Programming Interface (API)

In addition to the soft front panel, the NI-SWITCH driver includes a best-in-class API that works with a variety of development options such as LabVIEW, C, C#, and others. The driver also provides access to help files, documentation, and dozens of ready-to-run shipping examples you can use as a starting point for your application.



Switch Executive Application Software

While the NI-SWITCH driver provides all the low-level functionality required to program switch actions, Switch Executive is application software for intelligent switch management and routing that accelerates development and simplifies maintenance of complex switch systems. The point-and-click graphical configuration and automatic routing capabilities make it easy to design your switch system. Using intuitive channel aliases and route names keeps your system documented for future modifications. Save time and increase test code reuse by integrating your system with TestStand, LabVIEW, LabWindows™ /CVI, and Measurement Studio.



- Graphically configure routes and route groups
- Develop reusable switching code and integrate it into NI TestStand or NI LabVIEW
- Automatically route signals between switch endpoints
- Scale switch configuration using Microsoft Excel
- Maintain switch configuration using route validation, reporting and debugging features