26.5 GHz Multiplexers, SPDT Relays, and Transfer Switches

NI PXI-2596, NI PXI-2597, NI PXI-2598, NI PXI-2599

- 26.5 GHz bandwidth electromechanical relays
- 50 Ω characteristic impedance
- Onboard relay counting
- Fully software programmable
- Configurations
  - PXI-2596 – dual 6x1 unterminated multiplexer (SP6T)
  - PXI-2597 – 6x1 terminated multiplexer (SP6T)
  - PXI-2598 – dual transfer switch
  - PXI-2599 – dual SPDT (Form C) relays
- Modules designed using microwave relays from Radiall

Operating Systems
- Windows 2000/NT/XP

Recommended Software
- NI Switch Executive
- LabVIEW
- LabWindows/CVI
- Measurement Studio

Other Compatible Software
- Visual Basic
- C/C++

Driver/Services Software (included)
- NI-SWITCH
- NI-DAQmx

Overview and Applications

The National Instruments PXI-2596, PXI-2597, PXI-2598, and PXI-2599 multiplexers, SPDT relays, and transfer switch modules route RF or microwave signals in automated test applications. While designed to operate with less than 1 dB insertion loss up to 26.5 GHz, they appear almost invisible to signals at much lower frequencies as well. Use the NI PXI-2597 terminated multiplexer when high-power signal reflections are a concern and 50 Ω terminations are required. The PXI-2596 offers a higher-density, unterminated option with dual 6x1 multiplexer banks in the same module. The PXI-2598 and PXI-2599 operate as transfer switches and SPDT relays, respectively, for basic signal routing or inserting and removing components in a signal path. These modules are also well-suited for passing high-order harmonics from RF upconverters such as the NI PXI-5670 2.7 GHz RF vector signal generator or routing multiple sources to RF downconverters such as the NI PXI-5660 2.7 GHz RF vector signal analyzer.

Relay Count Tracking

The switches count relay closures on each of their individual relays. Relay counts are incremented each time a relay is actuated. You can programmatically retrieve the counts, stored on board the modules, and use them for predictive maintenance to reduce unexpected system downtime.

Signal Connectivity Options

The PXI-2596, PXI-2597, PXI-2598, and PXI-2599 all use standard SMA connectors for signal connections. National Instruments offers two semirigid SMA cables (0.15 and 0.45 cm) that are acceptable for many RF/microwave signals. There are also many custom cable vendors on the market that can meet your exact cable length, performance, and connector requirements. Please visit **ni.com/switches** for a list of third-party cable vendors.

Software

All National Instruments PXI switch modules are shipped with NI-SWITCH, an IVI-compliant driver offering complete functionality for all switch modules. For additional assistance in configuring, programming, and managing higher-channel-count switching systems, NI Switch Executive software offers an easy-to-use, intelligent switch management and visual routing environment. With the latest version of NI Switch Executive, you can store calibration information for your RF/microwave switch routes on a per-path basis. Use the NI-SWITCH Soft Front Panel for simple relay operations or debugging switch code/execution.

Ordering Information

NI PXI-2596	778572-96
NI PXI-2597	778572-97
NI PXI-2598	778572-98
NI PXI-2599	778572-99

Includes NI-SWITCH and NI-DAQmx driver software.

Accessories

SMA male-male cable (semirigid)	
0.15 cm	763443-01
0.45 cm	763444-01
NI Switch Executive	
Development system	778546-01
Deployment engine	778548-00

BUY NOW!

For complete product specifications, pricing, and accessory information, call (800) 813 3693 (U.S.) or go to **ni.com/switches.**

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Specifications

Input Characteristics

Frequency range ..... 0 to 26.5 GHz
Characteristic Impedance ..... 50 Ω
Maximum RF carry power (50 Ω load)
PXI-2596, PXI-2597, PXI-2599 ..... 150 W
  PXI-2598 ..... 75 W
Maximum voltage (cold-switching only)
PXI-2596, PXI-2597, PXI-2599 ..... 90 V_{rms}
  PXI-2598 ..... 65 V_{rms}
Maximum carry current (per channel)
PXI-2596, PXI-2597, PXI-2599 ..... 1.73 A_{rms}
  PXI-2598 ..... 1.25 A_{rms}

Insertion Loss (dB)

	Frequency (GHz)				
Module	**0 to 3**	**3 to 8**	**8 to 12.4**	**12.4 to 18**	**18 to 26.5**
PXI-2596	0.2	0.3	0.4	0.5	0.6
PXI-2597	0.2	0.3	0.4	0.5	0.7
PXI-2598	0.2	0.3	0.4	0.5	0.7
PXI-2599	0.2	0.3	0.4	0.5	0.7

Voltage Standing Wave Ratio (VSWR)

	Frequency (GHz)				
Module	**0 to 3**	**3 to 8**	**8 to 12.4**	**12.4 to 18**	**18 to 26.5**
PXI-2596	1.2	1.3	1.4	1.5	1.6
PXI-2597	1.2	1.3	1.4	1.5	1.7
PXI-2598	1.2	1.3	1.4	1.5	1.7
PXI-2599	1.2	1.3	1.4	1.5	1.7

Open Channel Isolation (dB)

	Frequency (GHz)				
Module	**0 to 3**	**3 to 8**	**8 to 12.4**	**12.4 to 18**	**18 to 26.5**
PXI-2596	80	70	60	60	55
PXI-2597	80	70	60	60	55
PXI-2598	80	70	65	60	50
PXI-2599	80	70	60	60	55

RF Carry Power (W)

	Frequency (GHz)				
Module	**0 to 3**	**3 to 8**	**8 to 12.4**	**12.4 to 18**	**18 to 26.5**
PXI-2596	150	95	75	65	25
PXI-2597	150	95	75	65	25
PXI-2598	75	50	35	30	25
PXI-2599	150	95	75	65	25

PXI-2597 termination power, average (at 25 °C)
  Per termination ..... 1 W
  Total ..... 3 W

Dynamic Characteristics

Expected relay life (mechanical)
  PXI-2596 ..... 10^7 cycles
  PXI-2597 ..... 2 x 10^6 cycles
  PXI-2598 ..... 2.5 x 10^6 cycles
  PXI-2599 ..... 10^7 cycles
Recommended cycle speed ..... 5 cycles/s

Physical

Relay manufacturer/PN
  PXI-2596 ..... Radiall R591 series
  PXI-2597 ..... Radiall R574 series
  PXI-2598 ..... Radiall R577 series
  PXI-2599 ..... Radiall R570 series
Relay types ..... Electromechanical
Contact material ..... Beryllium copper, gold-plated
I/O connectors ..... SMA jacks
Dimensions
  PXI-2596 ..... 2-slot, 3U, PXI/cPCI module
  PXI-2597 ..... 3-slot, 3U, PXI/cPCI module
  PXI-2598 ..... 2-slot, 3U, PXI/cPCI module
  PXI-2599 ..... 1-slot, 3U, PXI/cPCI module

Environment

Operating temperature ..... 0 to 55 °C
Storage temperature ..... -20 to 70 °C
Relative humidity ..... 5 to 85%, noncondensing
Pollution degree 2
Approved altitude ..... up to 2,000 m
Indoor use only.

Shock and Vibration

Operational shock ..... 30 g peak, half-sine, 11 ms pulse

(Tested in accordance with IEC-60068-2-27. Test profile developed in accordance with MIL-PRF-28800F.)

Random vibration
  Operating ..... 5 to 500 Hz, 0.3 g_{rms}
  Nonoperating ..... 5 to 500 Hz, 2.4 g_{rms}

(Tested in accordance with IEC-60068-2-64. Nonoperating test profile exceeds the requirements of MIL-PRF-28800F, Class 3.)

Safety

This product is designed to meet the requirements of the following standards of safety for electrical equipment for measurement, control, and laboratory use:

IEC 61010-1, EN 61010-1
UL 61010-1
CAN/CSA-C22.2 No. 61010-1

Electromagnetic Compatibility

Emissions	EN 55011 Class A at 10 m FCC Part 15A above 1 GHz
Immunity	EN 61326:1997 + A2:2001, Table 1
EMC/EMI	CE, C-Tick, and FCC Part 15 (Class A) Compliant

Note: *For EMC compliance, operate these devices with shielded cabling.*

CE Compliance CE

This product meets the essential requirements of applicable European Directives, as amended for CE marking, as follows:

Low-Voltage Directive (safety)	73/23/EEC
Electromagnetic Compatibility Directive (EMC)	89/336/EEC

Note: *Refer to the Declaration of Conformity (DoC) for this product for any additional regulatory compliance information. To obtain the DoC for this product, visit* **ni.com/certification**, *search by model number or product line, and click the appropriate link in the Certification column.*

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Hardware Services

NI Factory Installation Services

NI Factory Installation Services (FIS) is the fastest and easiest way to use your PXI or PXI/SCXI combination systems right out of the box. Trained NI technicians install the software and hardware and configure the system to your specifications. NI extends the standard warranty by one year on hardware components (controllers, chassis, modules) purchased with FIS. To use FIS, simply configure your system online with **ni.com/pxiadvisor**.

Calibration Services

NI recognizes the need to maintain properly calibrated devices for high-accuracy measurements. We provide manual calibration procedures, services to recalibrate your products, and automated calibration software specifically designed for use by metrology laboratories. Visit **ni.com/calibration**.

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NI provides complete repair services for our products. Express repair and advance replacement services are also available. We offer extended warranties to help you meet project life-cycle requirements. Visit **ni.com/services**.

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