

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

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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)

Module	Frequency (GHz)				
	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)

Module	Frequency (GHz)				
	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)

Module	Frequency (GHz)				
	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)

Module	Frequency (GHz)				
	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
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(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

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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

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.