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Find the *National Instruments PXIe-2541* at our website: *Click HERE*

NI PXI/PXIe-2541 Specifications

300 MHz 8 × 12 50 Ω Matrix

This document lists specifications for the NI PXI/PXIe-2541 (NI 2541) matrix module. All specifications are subject to change without notice. Visit `ni.com/manuals` for the most current specifications.

Topology ..... 8 × 12 matrix

Refer to the *NI Switches Help* for detailed topology and pinout information.

Caution To ensure the specified EMC performance, operate this product only with shielded cables and accessories.

Caution Refer to the *Read Me First: Safety and Electromagnetic Compatibility* document at `ni.com/manuals` for important safety and compliance information.

About These Specifications

Specifications characterize the warranted performance of the instrument under the stated operating conditions.

Typical Specifications are specifications met by the majority of the instrument under the stated operating conditions and are tested at 23 °C. Typical specifications are not warranted.

Input Characteristics

All input characteristics are DC, AC_{rms}, or a combination unless otherwise specified.

Maximum switching voltage ..... 60 VDC (42.4 V_{pk})

Maximum switching or carry current ..... 0.5 A
(per channel)

Caution The switching power is limited by the maximum switching current and the maximum voltage, and must not exceed 10 W.

Maximum DC switching or carry power ..... 10 W
(per channel)

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Note Maximum RF power derates as frequency and number of simultaneous channels increase and must not exceed the values shown in Figures 1 and 2.

Maximum RF power.....10 W (refer to Figures 1 and 2)
(per channel, 50 ohm system)

Simultaneous channels at maximum RF power
(up to 300 MHz)

PXI 3

PXIe 5

Figure 1. NI PXI 2541 Maximum RF Input Power

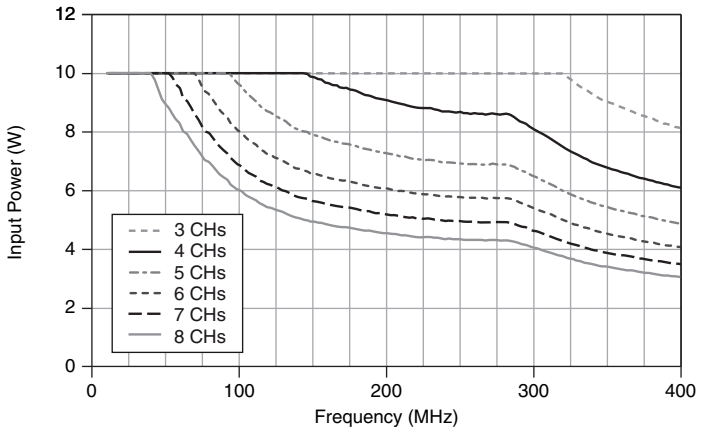
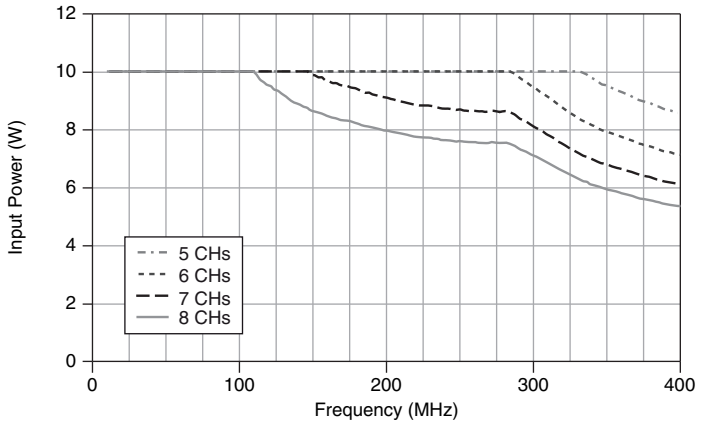


Figure 2. NI PXIe 2541 Maximum RF Input Power



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Note National Instruments recommends against switching active RF signals. As a relay actuates, the channel is momentarily unterminated. Some RF sources can be damaged by reflections if their outputs are not properly terminated. Consult your RF source documentation for more information.

Typical DC path resistance

Initial ..... <2.1 Ω

End-of-life ..... ≥3.1 Ω

Path resistance is a combination of relay contact resistance and trace resistance. Contact resistance typically remains low for the life of a relay. At the end of relay life, the contact resistance rises rapidly above 3.1 Ω.

RF Performance Characteristics

Values in parentheses are typical.

Characteristic impedance (Z_0) ..... 50 Ω nominal

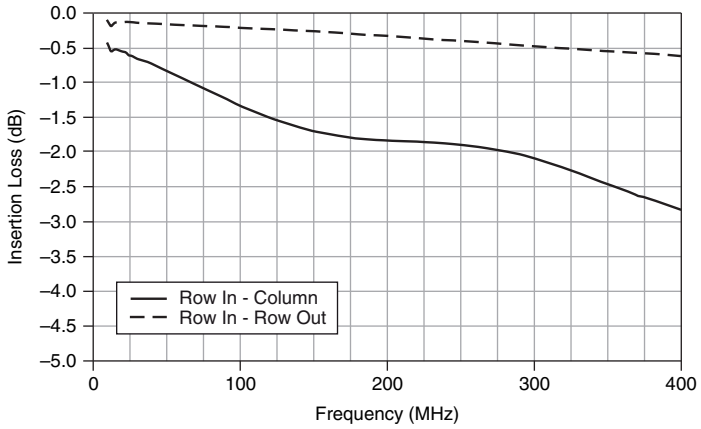
Insertion loss (≤300 MHz)

Row In - Column ..... <3 dB (<2.1 dB)

Row In - Row Out ..... <1 dB (<0.5 dB)

Refer to Figure 3 for the insertion loss of the NI 2541.

Figure 3. Typical Insertion Loss



VSWR (≤300 MHz)

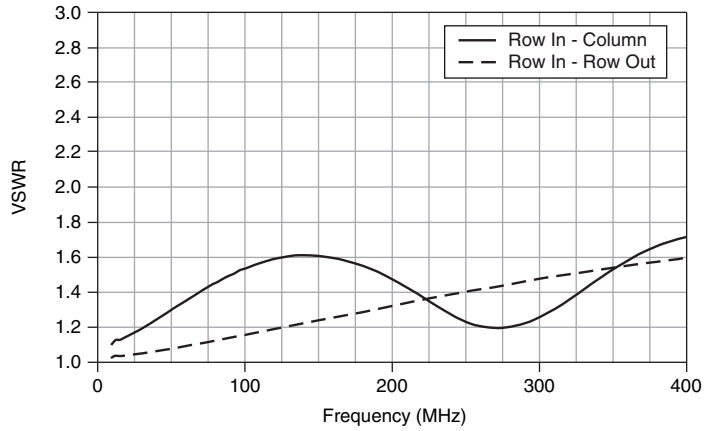
Row In - Column ..... <2.2 (<1.6)

Row In - Row Out ..... <1.8 (<1.5)

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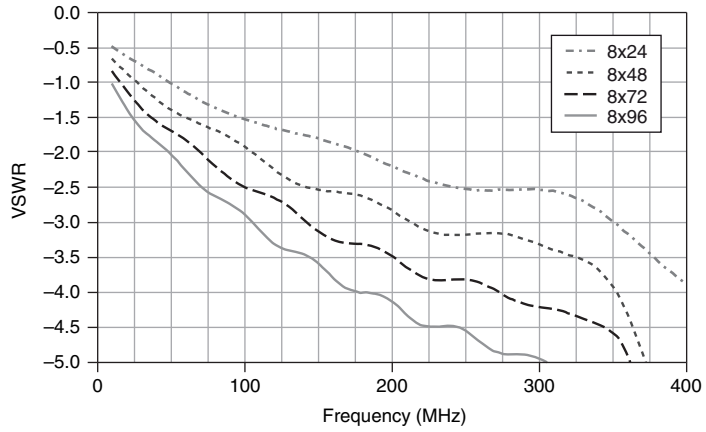
Refer to Figure 4 for the VSWR of the NI 2541.

Figure 4. Typical VSWR



The NI 2541 supports column expansion. Row Out connectors of one module can be connected to the Row In connectors of another module to create larger matrices. Figure 5 shows the effect of matrix expansion on R0C0 insertion loss when cable part number 188374-0R15 is used to cascade 2, 4, 6, and 8 modules. VSWR for these cases remains below 1.8 past 300 MHz. Refer to the *NI Switches Help* for more information about matrix expansion.

Figure 5. Expansion Insertion Loss



Typical Open CH Isolation (≤300 MHz)

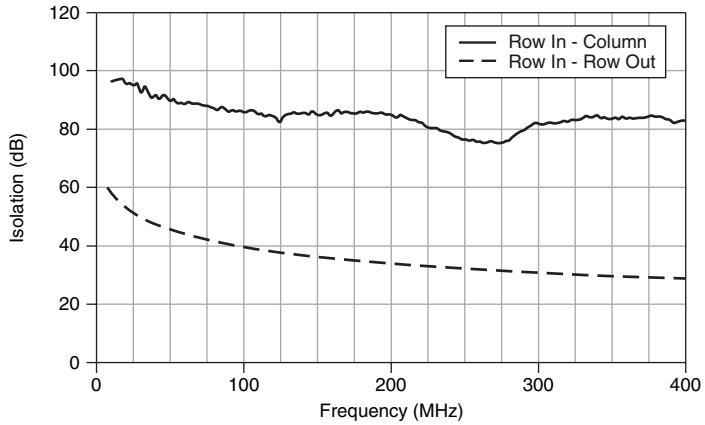
Row In - Column .....>75 dB

Row In - Row Out.....>30 dB

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Refer to Figure 6 for the channel-to-channel isolation of the NI 2541.

Figure 6. Typical Open Channel Isolation

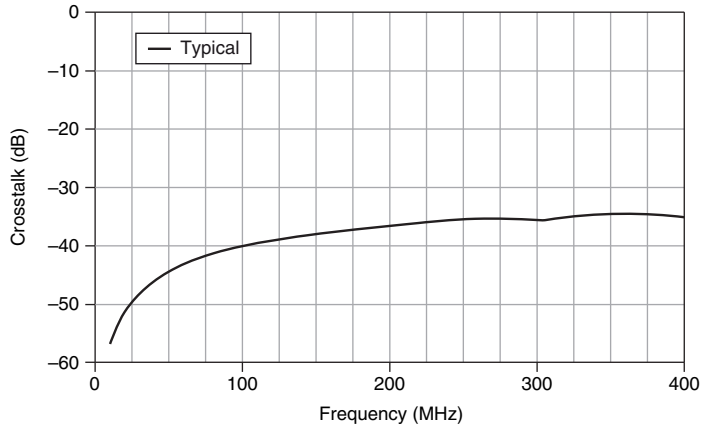


Typical Crosstalk

≤300 MHz..... < -35 dB

Refer to Figure 7 for the crosstalk of the NI 2541.

Figure 7. Typical Crosstalk



Typical propagation delay

Row In - Column ..... <6 ns

Row In - Row Out ..... <1 ns

Typical CH-CH skew

Row In - Column ..... <2.0 ns

Row In - Row Out ..... <0.1 ns

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Dynamic Characteristics

Simultaneous relay drive limit.....40 relays

Maximum operate time.....0.25 ms

Maximum release time.....0.25 ms

Note Certain applications may require additional time for proper settling. Refer to the *NI Switches Help* for information about including additional settling time.

Typical relay life

Mechanical.....1×10^7 cycles

Electrical (resistive, <10 pF load, DC or 50 Ω RF systems)

10 V, 100 mA.....1×10^7 cycles

20 V, 500 mA.....5×10^6 cycles

Note Reed relays are highly susceptible to damage caused by switching capacitive and inductive loads. Capacitive loads can cause high inrush currents while inductive loads can cause high flyback voltages. The addition of appropriate protection can greatly improve contact lifetime. For more information about adding protection circuitry to a capacitive load, visit `ni.com/info` and enter the Info Code `relaylifetime`. For information about inductive loads, enter the Info Code `relayflyback`. To estimate reed relay lifetime, refer to the *Compliance and Certifications* section of this document.

Trigger Characteristics

Input trigger

Sources.....PXI trigger lines 0–7

Minimum pulse width.....150 ns

Note The NI 2541 can recognize trigger pulse widths less than 150 ns by disabling digital filtering. For information about disabling digital filtering, refer to the *NI Switches Help*.

Output trigger

Destinations.....PXI trigger lines 0–7

Pulse width.....Programmable (1 µs to 62 µs)

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Physical Characteristics

Relay type ..... Reed, non-latching

Relay contact material ..... Rhodium

I/O connectors..... 28 MCX jacks

Power requirement

- PXI ..... 10 W at 5 V, 2 W at 3.3 V
- PXI Express ..... 10 W at 12 V, 2.5 W at 3.3 V

Dimensions (L × W × H) ..... 3U, one slot, PXI/cPCI module, PXIe compatible 21.6 × 2.0 × 13.0 cm (8.5 × 0.8 × 5.1 in.)

Weight..... 410 g (14.46 oz)

Environment

Operating temperature ..... 0 °C to 55 °C

Storage temperature..... -20 °C to 70 °C

Relative humidity ..... 5% to 85%, noncondensing

Pollution Degree 2

Maximum altitude..... 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.)

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Accessories

Visit ni.com for more information about the following accessories.

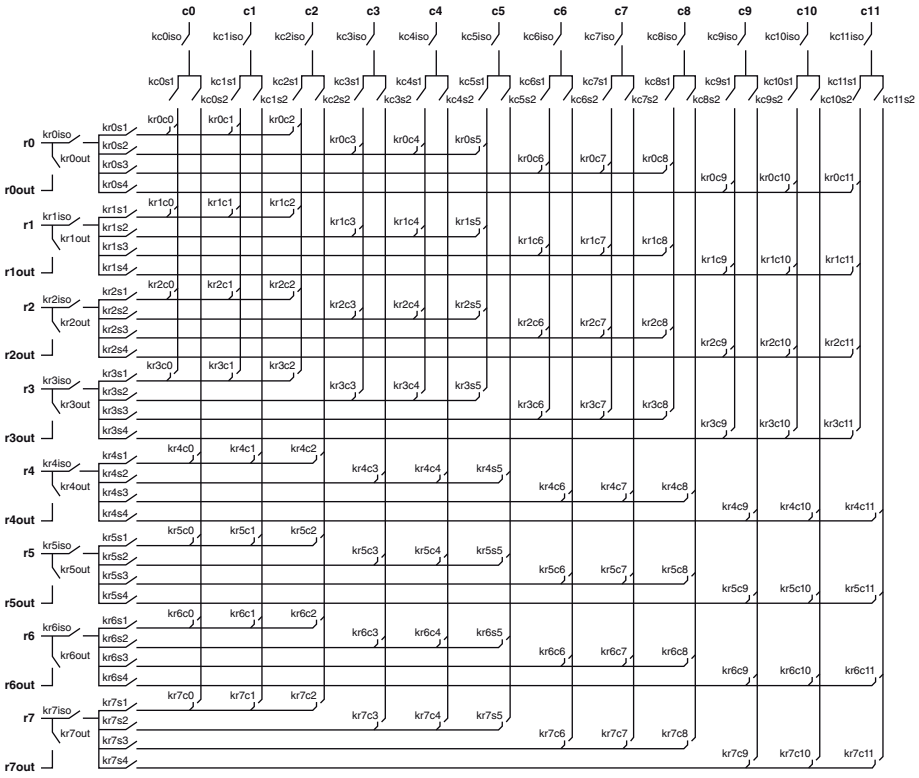
Table 1. Cabling Available for the NI 2541

Connectors	Length	Part Number
MCX-MCX	0.15 m	188374-0R15
	0.3 m	188374-0R3
	1.0 m	188374-01
MCX-BNC	0.3 m	188375-0R3
	1.0 m	188375-01
MCX-SMB	0.3 m	188376-0R3
	1.0 m	188376-01
MCX-SMA	0.3 m	188377-0R3
	1.0 m	188377-01
50 Ω MCX terminator (1 GHz maximum)	—	778831-01

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Figure 8 shows the NI 2541 power-on-state diagram. Refer to the *NI Switches Help* for a larger view of this diagram.

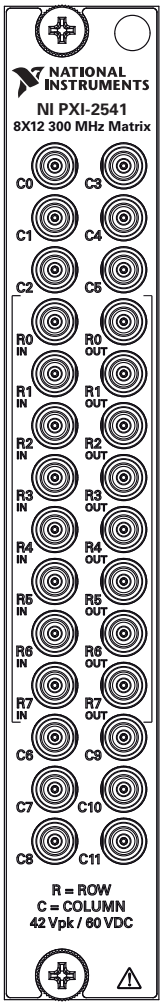
Figure 8. NI 2541 Power-On State



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The following figure shows the NI PXI 2541 front panel diagram.

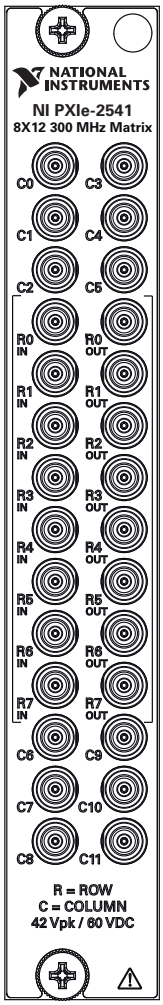
Figure 9. NI PXI 2541 Front Panel



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The following figure shows the NI PXIe 2541 front panel diagram.

Figure 10. NI PXIe 2541 Front Panel



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Compliance and Certifications

Safety

This product meets 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, CSA 61010-1

Note For UL and other safety certifications, refer to the product label or the *Online Product Certification* section.

Electromagnetic Compatibility

This product meets the requirements of the following EMC standards for electrical equipment for measurement, control, and laboratory use:

- EN 61326 (IEC 61326): Class A emissions; Basic immunity
- EN 55011 (CISPR 11): Group 1, Class A emissions
- AS/NZS CISPR 11: Group 1, Class A emissions
- FCC 47 CFR Part 15B: Class A emissions
- ICES-001: Class A emissions

Note In the United States (per FCC 47 CFR), Class A equipment is intended for use in commercial, light-industrial, and heavy-industrial locations. In Europe, Canada, Australia and New Zealand (per CISPR 11) Class A equipment is intended for use only in heavy-industrial locations.

Note Group 1 equipment (per CISPR 11) is any industrial, scientific, or medical equipment that does not intentionally generate radio frequency energy for the treatment of material or inspection/analysis purposes.

Note For the standards applied to assess the EMC of this product, refer to the *Online Product Certification* section.

CE Compliance CE

This product meets the essential requirements of applicable European Directives as follows:

- 2006/95/EC; Low-Voltage Directive (safety)
- 2004/108/EC; Electromagnetic Compatibility Directive (EMC)

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Online Product Certification

Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information. To obtain product certifications and 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.

Environmental Management

NI is committed to designing and manufacturing products in an environmentally responsible manner. NI recognizes that eliminating certain hazardous substances from our products is beneficial to the environment and to NI customers.

For additional environmental information, refer to the *NI and the Environment* Web page at `ni.com/environment`. This page contains the environmental regulations and directives with which NI complies, as well as other environmental information not included in this document.

Waste Electrical and Electronic Equipment (WEEE)



EU Customers At the end of the life cycle, all products *must* be sent to a WEEE recycling center. For more information about WEEE recycling centers and National Instruments WEEE initiatives, visit `ni.com/environment/weee`.

电子信息产品污染控制管理办法 （中国 RoHS）



中国客户 National Instruments 符合中国电子信息产品中限制使用某些有害物质指令 (RoHS)。关于 National Instruments 中国 RoHS 合规性信息，请登录 `ni.com/environment/rohs_china`。 (For information about China RoHS compliance, go to `ni.com/environment/rohs_china`.)

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