#### DEVICE SPECIFICATIONS

# NI PXI/PXIe-2569

#### 100-Channel SPST Relay Module

This document lists specifications for the NI PXI/PXIe-2569 (PXI/PXIe-2569) general-purpose relay module. All specifications are subject to change without notice. Visit *ni.com/manuals* for the most current specifications.

#### Contents

About These Specifications	. 1
Input Characteristics.	
Dynamic Characteristics	. 4
Trigger Characteristics	. 4
Physical Characteristics	
Environment	
Shock and Vibration	.5
Compliance and Certifications	.6
Diagrams	
Accessories.	

# **About These Specifications**

*Specifications* characterize the warranted performance of the instrument under the stated operating conditions. Data in this document are *Specifications* unless otherwise noted.

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

All voltages are specified in DC,  $AC_{pk}$ , or a combination unless otherwise specified.

Topology

100-SPST (latching), 50-DPST

Refer to the NI Switches Help at ni.com/manuals for detailed topology information.



**Caution** The protection provided by the PXI/PXIe-2569 can be impaired if it is used in a manner not described in this document.



## Input Characteristics

Maximum switching voltage				
Channel-to-channel	100 V			
Channel-to-ground	100 V, CAT I			



**Caution** This module is rated for Measurement Category I. It is intended to carry signal voltages no greater than 100 Vrms, 150 Vpk, or 150 VDC. This module can withstand up to 800 V impulse voltage. Do not use this module for connection to signals or for measurements within Categories II, III, or IV. Do not connect to MAINS supply circuits (for example, wall outlets) of 115 VAC or 230 VAC.<sup>1</sup>



**Caution** When hazardous voltages (>42.4 Vpk/60 V DC) are present on any channel, safety low-voltage (≤42.4 Vpk/60 V DC) cannot be connected to any other channel.



**Caution** The switching power is limited by the maximum switching current and the maximum voltage and must not exceed 60 W, 62.5 VA.

Maximum switching power (per channel)	60 W, 62.5 VA (DC to 60 Hz)
Maximum current (switching or carry, per channel)	1 A
Simultaneous channels at maximum current (≤35 °C)	50



**Note** Switching inductive loads (for example, 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. For more information about transient suppression, visit *ni.com/info* and enter the Info Code relayflyback.

#### Module Load Derating at >35 °C

Load derating is dependent on the ambient temperature and the sum of the current squared of each channel simultaneously carrying a signal. The result must fall within the shaded region of the following figure. The following examples represent this calculation.

Example 1: Fifty channels carry 0.75 A while 10 channels carry 0.5 A.

$$(50 \times 0.75^2) + (10 \times 0.5^2) = 30.6 \text{ A}^2 \times \text{channels}$$

Example 1 can be used at ambient temperatures between 0 °C and 55 °C.

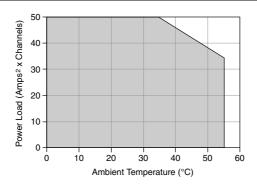
Measurement Categories CAT I and CAT O are equivalent. These test and measurement circuits are not intended for direct connection to the MAINS building installations of Measurement Categories CAT II, CAT III, or CAT IV.

Example 2: Sixty channels carry 0.75 A while 35 channels carry 0.5 A.

$$(60 \times 0.75^2) + (35 \times 0.5^2) = 42.5 \text{ A}^2 \times \text{channels}$$

Example 2 can be used at ambient temperatures between 0 °C and 45 °C.

Figure 1. Module Load Derating



Minimum switch load	20 mV/10 mA				
DC path resistance					
Initial	<0.55 Ω				
End of life	≥1.0 Ω				



**Note** DC path resistance typically remains low for the life of the relay. At the end of relay life, the path resistance rises rapidly above the specified value. Load ratings apply to relays used within the specification before the end of relay life.

Thermal EMF	<12 μV, typical					
Bandwidth (-3 dB, 50 Ω termination)	≥20 MHz, typical					
Crosstalk (50 Ω termination, channel-to-c	hannel)					
10 kHz	≤-85 dB, typical					
100 kHz	≤-65 dB, typical					
1 MHz	≤-45 dB, typical					
10 MHz	≤-25 dB, typical					
Isolation (50 $\Omega$ termination, open channel	)					
10 kHz	≥85 dB, typical					
100 kHz	≥65 dB, typical					
1 MHz	≥45 dB, typical					
10 MHz	≥25 dB, typical					

## **Dynamic Characteristics**

Relay operate time 1 ms, typical 3.4 ms maximum



**Note** Certain applications may require additional time for proper settling. Refer to the NI Switches Help at ni.com/manuals for more information about including additional settling time.

pected relay life	
Mechanical	$1 \times 10^8$ cycles
Electrical	
10 VDC, 100 mADC resistive	$2.5 \times 10^6$ cycles
10 VDC, 1 ADC resistive	$1 \times 10^6$ cycles
30 VDC, 1 ADC resistive	$5 \times 10^5$ cycles
60 VDC, 1 ADC resistive	$1 \times 10^5$ cycles



**Note** Relays are field replaceable. Refer to the NI Switches Help at ni.com/manuals for more information about replacing a failed relay.

# **Trigger Characteristics**

Input trigger	
Sources	PXI trigger lines <07>
Minimum pulse width	150 ns



**Note** The PXI/PXIe-2569 can recognize trigger pulse widths less than 150 ns if you disable digital filtering. Refer to the NI Switches Help at ni.com/manuals for information about disabling digital filtering.

Output trigger	
Destinations	PXI trigger lines <07>
Pulse width	Programmable (1 μs to 62 μs)

### **Physical Characteristics**

Relay type	Electromechanical, latching			
Relay contact material	Palladium-ruthenium, gold covered			
I/O connector	200 POS LFH Matrix 50, receptacle			

Power requirement	
PXI	6 W at 5 V 2.5 W at 3.3 V
PXI Express	7.5 W at 12 V 2.5 W at 3.3 V
Dimensions (L $\times$ W $\times$ H)	3U, one slot, PXI/cPCI module, PXIe compatible, $21.6 \text{ cm} \times 2.0 \text{ cm} \times 13.0 \text{ cm}$ (8.5 in. $\times$ 0.8 in. $\times$ 5.1 in.)
Weight	289 g (10.2 oz)
Environment	
Maximum altitude	2,000 m (at 25 °C ambient temperature)
Pollution Degree	2
Indoor use only.	
Operating Environment	
Ambient temperature range	0 °C to 55 °C (Tested in accordance with IEC 60068-2-1 and IEC 60068-2-2.)
Relative humidity range	10% to 90%, noncondensing (Tested in accordance with IEC 60068-2-56.)
Storage Environment	
Ambient temperature range	-20 °C to 70 °C (Tested in accordance with IEC 60068-2-1 and IEC 60068-2-2.)
Relative humidity range	5% to 95%, noncondensing (Tested in accordance with IEC 60068-2-56.)

## 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 Hz to 500 Hz, 0.31 $g_{rms}$ (Tested in accordance with IEC 60068-2-64.)
Nonoperating	5 Hz to 500 Hz, 2.46 g <sub>rms</sub> (Tested in accordance with IEC 60068-2-64. Test profile exceeds the requirements of MIL-PRF-28800F, Class 3.)

#### Compliance and Certifications

#### Safety

This product is designed to meet the requirements of the following electrical equipment safety standards 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 61326-1 (IEC 61326-1): 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 EMC declarations and certifications, refer to the *Online Product* Certification section.

# CE Compliance $\zeta$

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

- 2014/35/EU; Low-Voltage Directive (safety)
- 2014/30/EU; Electromagnetic Compatibility Directive (EMC)

#### 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 Minimize Our Environmental Impact 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)

X

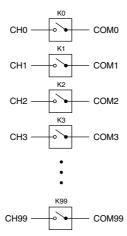
**EU Customers** At the end of the product life cycle, all NI products must be disposed of according to local laws and regulations. For more information about how to recycle NI products in your region, visit ni.com/environment/weee.

#### 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.)

# Diagrams

The following figure shows the PXI/PXIe-2569 power-on state diagram.



The following figure shows the PXI/PXIe-2569 connector pinout.

COM0 0 150 0 50 0 50 0 CM3  CH2 COM2 0 130 0 0 5 50 0 CM3  CH3 COM4 0 148 0 0 5 50 0 CM5  CH6 COM6 0 147 0 5 50 0 CM7  CH8 COM8 0 155 0 0 0 55 0 CH7  COM8 0 155 0 0 0 55 0 CM7  CM8 0 155 0 0 0 5 50 0 CM7  CM8 0 155 0 0 0 5 50 0 CM7  CM10 0 145 0 0 0 5 50 0 CM7  CM10 0 155 0 0 0 0 50 0 CM7  CM11 0 CM11 0 155 0 0 0 0 0 0 0 CM1  CM11 0 CM11 0 155 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0					_	$\overline{}$			
CH2		00140	150	$\overline{}$			51 .	CLIA	
CH2	CH0	·	1/10	ŀ	ĴĹ	<u>~</u>	50 52		→ COM1
CH6	CH2	·	152	-		0-	49 53		→ COM3
CH8	CH4	<u> </u>	117	·	ĴĹ	0	48 54		→ COM5
COM10	CH6	•	154	•	ĴĹ	0-	47		→ COM7
COM12	CH8	0	155 145	-		٥	46 56	00	→ COM9
COM16	CH10	·		P		<u>~</u>	45 57	<u> </u>	→ COM11
COM16   185	CH12	•	157 143	·		0-	44 58		→ COM13
COM18	CH14	·		•		<u>~</u>	59 _		→ COM15
COM20	CH16	•	141	•		<u>-</u>	60		→ COM17
COM22	CH18	0	160 140	•		٥	61		→ COM19
COM24	CH20	·	139	•		<u>-</u>	40		→ COM21
CH26	CH22	•	162	·	ĴĹ	<u>~</u>	39		→ COM23
CH26         COM28         -184         o 16         o 37         c CM29         c CM29           CH30         COM28         -185         o 16         o 66         C CH31         c COM29           CH30         COM30         -185         o 16         o 66         o CH31         c COM31           CH34         COM32         -184         o 16         o 38         o CH33         c COM35           CH36         COM36         -183         o 16         o 38         o CH37         c COM36           CH36         COM36         -183         o 16         o 38         o CH37         c COM37           CH36         COM36         -183         o 16         o 38         o CH37         c COM37           CH37         COM36         -183         o 16         o 38         o CH37         c COM37           CH40         COM40         -173         o 16         o 39         o CH43         c COM31           CH41         COM40         -173         o 16         o 22         o CH43         c COM41           CH44         COM46         -173         o 16         o 22         o CH47         c COM47           CH44         COM46         -173	CH24	0	163 137	·		<u>۰</u>	38		→ COM25
CH28         COM20         165         o 16         o 12         o COM29           CH30         COM30         184         o 16         o 85         o CH31         c COM31           CH32         COM30         184         o 16         o 84         o CH33         c COM36           CH34         COM36         183         o 16         o 33         o CH37         c COM37           CH36         COM36         180         o 16         o 33         o CH39         c COM39           CH40         COM40         170         o 16         o 30         c CH43         c COM41           CH42         COM42         172         o 16         o 22         c CH43         c COM46           CH44         COM46         172         o 16         o 23         c CH47         c COM46           CH44         COM46         172         o 16         o 22         c CH43         c COM46           CH44         COM46         172         o 16         o 23         c CH47         c COM47           CH44         COM46         172         o 16         o 24         c CH47         c COM47           CH44         COM46         172         o 16	CH26	·	164 136	·	ĴĹ	0-	37		→ COM27
CH30	CH28	·	165 135	-		0	36 66		→ COM29
COM36   133   134   135	CH30	·	166 134	-	ĴĹ	<u>-</u>	35		→ COM31
COM36	CH32	·	167 133	-	ĴĹ	<u>~</u>	34		→ COM33
COM36	CH34	•	132	·		0	60		→ COM35
CH410         COM40         0 171         0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1	CH36	•	109	ŀ	ĴĹ	0	32 70		→ COM37
CH410         COM40         0 171         0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1	CH38	•	170	·	ĴĹ	0-	31		→ COM39
COM44   128   0   173   0   0   0   24   0   0   0   0   0   0   0   0   0	CH40	0	171	-	ĴĹ	0-	30		⊸ COM41
CH44         COM46         173         o 16         28         CH49         COM45           CH48         COM48         125         o 16         27         CH49         COM40           CH48         COM50         125         o 16         25         CH49         COM40           CH50         COM50         125         o 16         25         CH51         COM50           CH52         COM52         177         o 16         23         CH53         COM53           CH54         COM54         173         o 16         23         CH55         COM55           CH56         COM54         173         o 16         23         CH55         COM55           CH56         COM54         173         o 16         23         CH57         COM55           CH58         COM56         173         o 16         23         CH59         COM55           CH68         COM60         120         o 16         21         CH59         COM50           CH60         COM64         183         o 16         21         CH61         COM60           CH61         COM64         183         o 16         CH67         COM66	CH42	·	172	·	ĴĹ	<u>-</u>	29		COM43
COM48   COM48   COM49   COM50   COM51   COM5	CH44	0	173	·	ĴĹ	<u>~</u>	28		→ COM45
COM49 CH50 COM50 COM60 C	CH46	•	174	·	JĹ	<u>~</u>	27 75		→ COM47
CH58         COM50         180         0         21         CH3         C CM59           CH60         COM60         181         0         0         29         CH63         COM61           CH62         COM60         181         0         0         29         CH63         COM63           CH64         COM64         118         0         0         183         0         183         0         184         CH65         COM66         COM76         COM77 <td>CH48</td> <td>•</td> <td>175</td> <td>·</td> <td>JĹ</td> <td>0</td> <td>26</td> <td></td> <td>COM49</td>	CH48	•	175	·	JĹ	0	26		COM49
CH58         COM50         180         0         21         CH3         C CM59           CH60         COM60         181         0         0         29         CH63         COM61           CH62         COM60         181         0         0         29         CH63         COM63           CH64         COM64         118         0         0         183         0         183         0         184         CH65         COM66         COM76         COM77 <td>CH50</td> <td>0</td> <td>176</td> <td>-</td> <td>JĹ</td> <td>0</td> <td>25</td> <td>01101</td> <td>COM51</td>	CH50	0	176	-	JĹ	0	25	01101	COM51
CH58         COM50         180         0         21         CH3         C CM59           CH60         COM60         181         0         0         29         CH63         COM61           CH62         COM60         181         0         0         29         CH63         COM63           CH64         COM64         118         0         0         183         0         183         0         184         CH65         COM66         COM76         COM77 <td>CH52</td> <td><u> </u></td> <td>177</td> <td>-</td> <td>Jſ</td> <td>0-</td> <td>24</td> <td>000</td> <td>→ COM53</td>	CH52	<u> </u>	177	-	Jſ	0-	24	000	→ COM53
CH58         COM50         180         0         21         CH3         C CM59           CH60         COM60         181         0         0         29         CH63         COM61           CH62         COM60         181         0         0         29         CH63         COM63           CH64         COM64         118         0         0         183         0         183         0         184         CH65         COM66         COM76         COM77 <td>CH54</td> <td><u> </u></td> <td>178</td> <td>-</td> <td>Ĵ٢</td> <td><u>-</u></td> <td>23</td> <td></td> <td>→ COM55</td>	CH54	<u> </u>	178	-	Ĵ٢	<u>-</u>	23		→ COM55
CH58         COM50         180         0         21         CH3         C CM59           CH60         COM60         181         0         0         29         CH63         COM61           CH62         COM60         181         0         0         29         CH63         COM63           CH64         COM64         118         0         0         183         0         183         0         184         CH65         COM66         COM76         COM77 <td>CH56</td> <td>·</td> <td>179</td> <td>-</td> <td>ĴĹ</td> <td><u>-</u></td> <td>22</td> <td></td> <td>→ COM57</td>	CH56	·	179	-	ĴĹ	<u>-</u>	22		→ COM57
COM60	CH58	·	180	·	JĹ	0-	21		→ COM59
COM62 0 COM64 0 182 0 18 0 18 0 18 0 CM65 0 CM66 0 CM66 0 187 0 18 0 18 0 18 0 CM65 0 CM66 0 CM66 0 CM66 0 187 0 18 0 18 0 CM65 0 CM66	CH60	0	181	-	Jſ	0	20	0	⊸ COM61
CH64         COM66         CH63         CH66         COM66         COM66         CH66         COM66         CH66         COM66         CH66         COM66         CH66         COM66         CH66         COM66         CM66         COM66         CM66         COM66         CM66         COM66         CM66         COM66         CM66         COM66         CM66         COM60         COM60         COM60         COM60         CM60         COM70         CM76         CM76         CM76         CM77         CM76         CM76         CM76         CM76         CM76         CM76         CM77         CM	CH62	·	182		٦ſ	0	19		⊸ COM63
COM68 - 116	CH64	·	183	l	٦ſ	<u>-</u>	18		→ COM65
COM68		•		l	Jſ	<u>-</u>	17		
COM70		·	185	l	٦ſ	-	16		
CH72	CH70	0	186	l	٦ŗ	-	15		
COM76 0-112 0 10 0 10 0 10 0 10 0 10 0 10 0 1	CH72	0		l	٦ŗ	-	14	00	COM73
CH76		•	188	l	٦ŗ	0	13	01170	
CH78		·	189	l	٦ŗ	<u>-</u>	12	CH77	
CH80		·	190	l	٦ŗ	<u>-</u>	11	CH79	
COM82		COM80	191	l	٦ſ	-	10	CH81	
COM86 0 106 0 107 0 100		COM82	192	l	٦ſ	-	92	CH83	
COM86		·	193	l	٦ŗ	0	8	01100	
COM90 - 106 - 0 86 - CH91		COM86	194	l	٦ŗ	-	7 .	CH87	
CH90		·	195	l		-		000	
COM92 - 103 - 104 - CH93 - CH93 - CM93 - CM94 - 103 - 104 - CM94 - 103 - 104 - CM95 - CM95 - CM96 - 109 - 109 - CM97 - CM97 - CM98 - 101 - 100 - CM99 - CM97 - CM98 - 101 - 100 - CM99 - CM97 - CM98 - 101 - 100 - CM99 - CM97 - CM98 - 101 - 100 - CM99 - CM98 - 101 - 100 - CM99 - CM98 - 101 - 100 - CM99 - CM99 - CM97 - CM97 - CM97 - CM97 - CM98 - 101 - 100 - CM99 - CM99 - CM99 - CM97 - CM		·	196	i.		_	5		
CH94			197	i.		_			
CH96 COM98 101 2 2 CH97 COM97		COM94	198	_		_	3	CH95	
COM98 • 101   100 CH99		COM96	199			_	2	01107	
555 CONVISE			200	<u> </u>			100	CH99	
				_	_				



**Note** For topology-specific connection information, refer to your device in the MSwitches Help at ni.com/manuals and associated cable or terminal block installation instructions.

## **Accessories**

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

Table 1. NI Accessories for the PXI/PXIe-2569

Accessory	Part Number
LFH200 to 50-pin DSUB switch cable (CH-Com twisted), 1 m	779038-02
LFH200 connector to bare-wire switch cable, 2 m	779038-01
NI TBX-50B, 50-pin DSUB screw terminal block	782866-01



**Caution** You must install mating connectors according to local safety codes and standards and according to the specifications provided by the connector manufacturer. You are responsible for verifying safety compliance of third-party connectors and their usage according to the relevant standard(s), including UL and CSA in North America and IEC and VDE in Europe.

Table 2. Third-Party Accessories for the PXI/PXIe-2569

Accessory	Manufacturer	Part Number
Terminal sticks (four required per module)	Molex	71715-4002
Plug connector subassembly	Molex	71719-3000
Backshell only	Jevons	JDC200B-832
Mass interconnect cable assembly, 20 in.	Virginia Panel	540105010105
Mass interconnect cable assembly, 36 in.	Virginia Panel	540105010205
Mating ITA module <sup>2</sup> (one required per module)	Virginia Panel	510108131
Mating ITA PC <sup>2</sup> (198 required per module)	Virginia Panel	720101101
DAK assembly NI PCB, 200 Pin LFH, male	MAC Panel	561036

<sup>&</sup>lt;sup>2</sup> PCB mount, additional cover, or enclosure required.

Table 3. Third-Party Accessories for the LFH200 to 50-pin D-SUB Switch Cable

Accessory	Manufacturer	Part Number
VARIOFACE module, with screw connection and 50 position D-SUB pin strip	Phoenix Contact	FLK-D50 SUB/S
VARIOFACE module, with screw connection and 50 position D-SUB pin strip	Phoenix Contact	FLKM-D50 SUB/S
VARIOFACE module, with screw connection and 50 position D-SUB pin strip	Phoenix Contact	FLKMS-D50 SUB/S
VARIOFACE module, with screw connection and 50 position D-SUB pin strip, with LED indicators	Phoenix Contact	FLKM-D50 SUB/S/LA

Refer to the *NI Trademarks and Logo Guidelines* at ni.com/trademarks for information on NI trademarks. Other product and company names mentioned herein are trademarks or trade names of their respective companies. For patents covering NI products/technology, refer to the appropriate location: Help»Patents in your software, the patents.txt file on your media, or the *National Instruments Patent Notice* at ni.com/patents. You can find information about end-user license agreements (EULAs) and third-party legal notices in the readme file for your NI product. Refer to the *Export Compliance Information* at ni.com/legal/export-compliance for the NI global trade compliance policy and how to obtain relevant HTS codes, ECCNs, and other import/export data. NI MAKES NO EXPRESS OR IMPLIED WARRANTIES AS TO THE ACCURACY OF THE INFORMATION CONTAINED HEREIN AND SHALL NOT BE LIABLE FOR ANY ERRORS. U.S. Government Customers: The data contained in this manual was developed at private expense and is subject to the applicable limited rights and restricted data rights as set forth in FAR 52.227-14, DFAR 252.227-7014, and DFAR 252.227-7015.