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DEVICE SPECIFICATIONS

100-Channel SPST Relay Module

This document lists specifications for the NI PXI/PXIe-2569 (PXI/PXIe-2569) generalpurpose 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	5
Shock and Vibration	5
Compliance and Certifications	6
Diagrams	7
Accessories10	0

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

0	
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.¹



Caution When hazardous voltages (>42.4 Vpk/60 V DC) are present on any channel, safety low-voltage (\leq 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.

¹ 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.

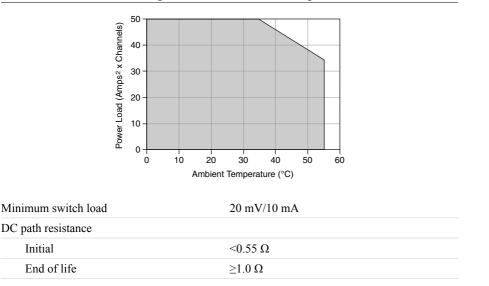


Figure 1. Module Load Derating



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-channel)					
10 kHz	≤-85 dB, typical				
100 kHz	≤-65 dB, typical				
1 MHz	≤-45 dB, typical				
10 MHz	≤-25 dB, typical				
Isolation (50 Ω 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.

Expected relay life					
Mechanical	1×10^8 cycles				
Electrical					
10 VDC, 100 mADC resistive	2.5×10^6 cycles				
10 VDC, 1 ADC resistive	1×10^{6} cycles				
30 VDC, 1 ADC resistive	5×10^5 cycles				
60 VDC, 1 ADC resistive	1×10^5 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

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 μ s to 62 μ s)

Physical Characteristics

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

Power requirement

i owei requitement					
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 cm \times 2.0 cm \times 13.0 cm				
	$(8.5 \text{ in.} \times 0.8 \text{ in.} \times 5.1 \text{ in.})$				
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.)				

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 _{rms} (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 $C \in$

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)

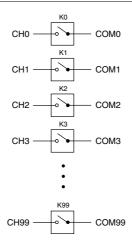
EU Customers At the end of the product life cycle, all NI products must be disposed of according to local laws and regulations. For more information about how to recycle NI products in your region, visit *ni.com/environment/weee*.

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	o <u>150</u> 151	Ĺ			51	∘ CH1	
CH0 ⊶	COM2	o 149 152	•	35	<u>~</u>	50 52	• CH3	→ COM1
CH2 ⊶		o 148	~	٦Ľ	~	49 53	• CH5	—∘ COM3
CH4 ⊶		0 153 0 147	•	36	~	48 54	• CH7	— COM5
CH6 ⊶		o 154 o 146	•	36	<u>~</u>	47 55	• CH9	— COM7
CH8 ⊶		145	•][~	46 56	• CH11	— COM9
CH10 ⊶		0 156 144	•	זנ	<u>~</u>	45 57 44	• CH13	> COM11
CH12 ⊶		0 157 143	~	1	<u>~</u>	58	• CH15	> COM13
CH14 ⊶		142	•][~	43	• CH17	> COM15
CH16 ⊶		- 159	~	1	<u>~</u>	42 60	• CH19	— COM17
CH18 ⊶		160	-0	99	~	41 61	• CH21	COM19
CH20 ⊶		. 139	-0	7	~	40 62	• CH23	COM21
CH22 ⊶		162	-0	99	<u>~</u>	39 63	• CH25	COM23
CH24 ⊶		163	-0	7	<u>~</u>	38	• CH25	→ COM25
CH26 ⊶	0011120	164	-0	٦Ľ	~	37 65		— COM27
CH28 ⊶	0011120	165	-0][<u>~</u>	36 66	01123	→ COM29
CH30 ⊶	0011100	124	-0][~	35	• CH31	> COM31
CH32 ⊶		o 167 133	-0	7	~	60	• CH33	— COM33
CH34 ⊶	0011101	o 133 168	-0	72	~	33	• CH35	— COM35
CH36 ⊶		• <u>169</u>	-0	٦Ľ	~	32	• CH37	
CH38 ~	0011100	• <u>131</u> 170	-0	٦Ľ	~	70 31 71	• CH39	→ COM39
CH40 ⊶	COM40	 130 171 129 172 	-0	٦Ľ	~	71 30 72	• CH41	→ COM41
CH42 ⊶	COM42	o <u>129</u> 172	-0	ĴĹ	-	72 29 73	• CH43	→ COM43
CH44 ⊶	COM44	• 128 173	-0	ĴΓ	~	73 28 74	• CH45	 COM45 → COM45
CH46 ⊶	COM46	o <u>127</u> 174	Ē	ĴΓ	~		• CH47	→ COM45
CH46 ⊶ CH48 ⊶	COM48	o <u>126</u> 175	-0	Ĵ	~	27 75 26 76	• CH49	
	COM50	o <u>125</u>		Ĵ	~	76 25	• CH51	001110
01100	COM52	170 124 177 123 178 178 122	÷	ĴĹ	-	25 77 24	• CH53	-→ COM51
CH52 ⊶	COM54	o 123 178	~	ĴĹ	ہ ہ		• CH55	→ COM53
CH54 ⊶	COM56	 122 179 121 	-0 -0	Ĵ	-		• CH57	→ COM55
CH56 ⊶	COM58	o 121 180	-	Ĵ	<u>~</u>	80	• CH59	→ COM57
CH58 ⊶	COM60	<u>120</u> <u>181</u>	~		<u>~</u>	21 81 20	• CH61	→ COM59
CH60 ⊶	COM62	 119 182 	•][~	00	• CH63	→ COM61
CH62 ⊶		, 118	•	35	~		• CH65	─ COM63
CH64 ⊶		183 117 184	•	36	~	84	• CH67	— COM65
CH66 ⊶		184 116 185	•	٦Ľ	<u>~</u>		• CH69	— COM67
CH68 ⊶		115	~	31	<u>~</u>	16 86	• CH71	— COM69
CH70 ⊶		186 114 10	~	٦Ľ	<u>~</u>	15 87	• CH73	> COM71
CH72 ⊶		187	-0	Ĵ٢	~	14	• CH75	— COM73
CH74 ⊶		0 188 112	-0][~	13 89	• CH77	— COM75
CH76 ⊶		0 189 0 111	-0	7	~	12	0	— COM77
CH78 ⊶	00.0.0	<u>190</u> 110	•	٦Ľ	ò	11	011/0	— COM79
CH80 ⊶	0011100	191	-0	7	~	00	01101	> COM81
CH82 ⊶	0011102	192	-0	٦Ľ	~	9	• CH83	— COM83
CH84 ⊶	001004	 108 193 107 	-0][0	8	• CH85	— COM85
CH86 ⊶	0011100	194	-0][~	7	• CH87	
CH88 ⊶	0011100	195	-0	7	~	6	• CH89	-→ COM89
CH90 ⊶	0011100	196	-0	٦٢	~	5	• CH91	→ COM91
CH92 ⊶	0011102	104 197 100	-0	٦Ľ	~	4	• CH93	
CH94 ⊶	0010104	o <u>103</u> 198	-0	ĴΓ	-	98 3 99	• CH95	→ COM95
CH96 ↔	COM96	o <u>102</u> 199	-0	ĴĹ	~	99 2 100	• CH97	→ COM97
CH98 ↔	COM98	<u>101</u> 200	-0	ĴΓ	0	100	• CH99	→ COM99
0			Ċ	_	Ĵ)		0.011100



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

Accessories

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

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

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



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.

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 ² (one required per module)	Virginia Panel	510108131
Mating ITA PC ² (198 required per module)	Virginia Panel	720101101
DAK assembly NI PCB, 200 Pin LFH, male	MAC Panel	561036

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

² 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

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