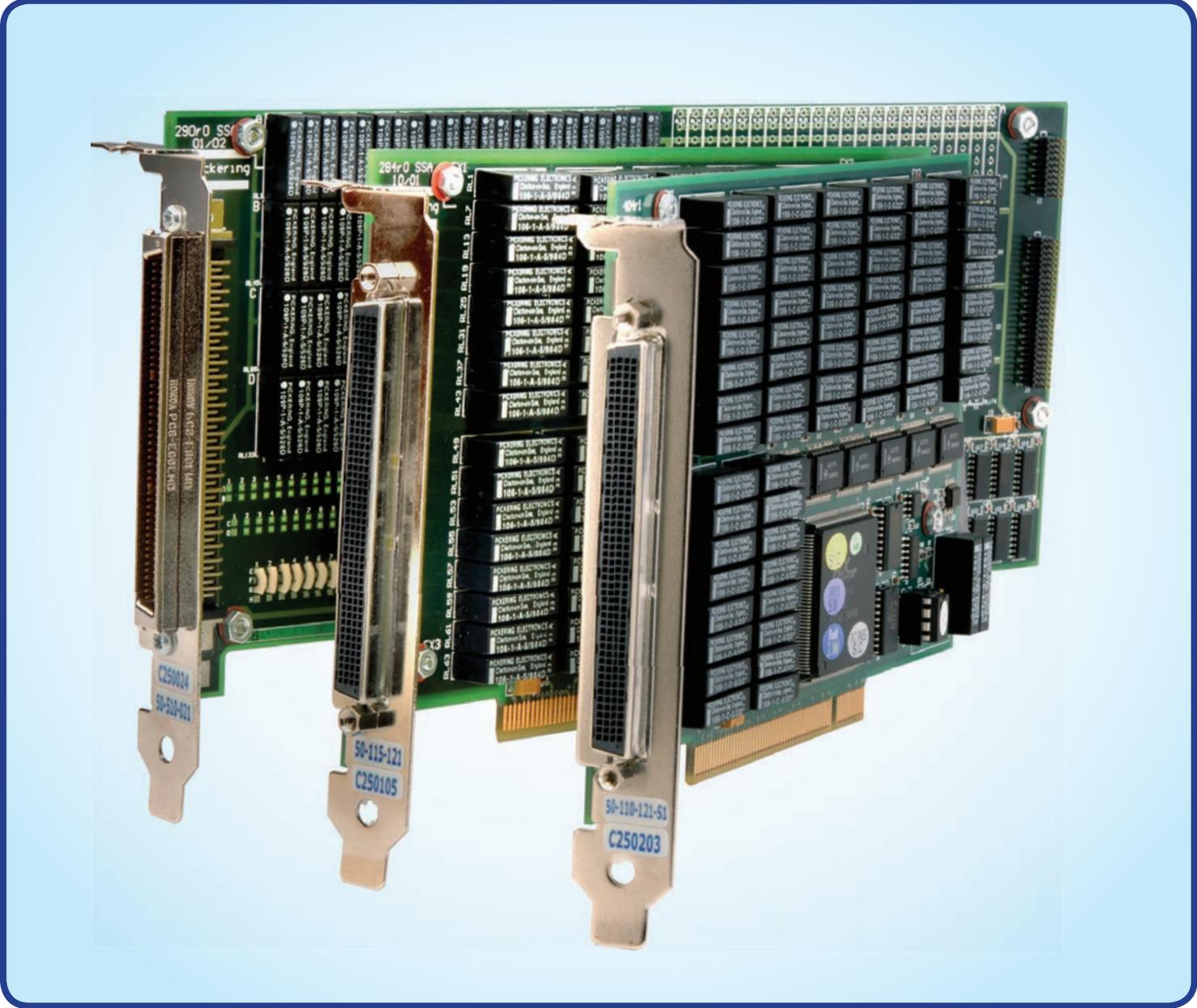


PCI Shortform



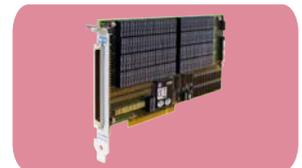
PCI PRODUCT GUIDE CONTENTS

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Overview - Peripheral Component Interconnect (PCI)

Also known as Conventional PCI, it is a computer bus for attaching hardware devices in a PC. Although integrated circuits (called planar devices) can be fitted onto the motherboard in the PCI specification, most people think of an expansion card that fits into a slot.

Intel's Architecture Development Lab (primarily ADL engineers) began work on PCI circa 1990, working with the companies Desktop PC and Core logic sections. It gained immediate use and had achieved significant market popularity by 1995. The PCI Local Bus replaced ISA and VESA Local Bus as the standard computer expansion bus.

The PCI specification covers:

- The physical size of the bus
- Electrical characteristics
- Bus timing
- Protocols.

The latest firmware specification is 3.1 obtainable from the PCI Special Interest Group (PCI-SIG).

Many types of PCI cards are used in PCs including:

Network cards, sound cards, modems, Serial and USB port and TV tuner cards. PCI video cards are suitable for lower bandwidth requirements, however many devices previously provided on expansion cards are either commonly integrated onto motherboards, or more commonly available in USB and PCI Express versions. Modern PCs may have no cards fitted at all when supplied, yet PCI is still used for certain specialized applications.

A standard PC with cover removed showing a Pickering PCI card fitted to the Motherboard.



PCI Express

The PCI Special Interest Group introduced the high speed serial PCI Express specification (PCIe) in 2004 with PCI being renamed as Conventional PCI at the same time. Motherboard manufacturers now include slots enabling PCIe devices to be fitted aswell as Conventional PCI.

The specification is again maintained and developed by the PCI Special Interest Group comprising more than 900 companies. PCIe 3.0 is the latest standard for expansion cards available for mainstream personal computers..

Pickering and PCI

A test system may not require a large number of switching or instrumentation modules or the need for a PXI or LXI chassis. In these cases a PCI plug-in card may provide a low cost solution that is perfectly adequate. In some cases full length PCI cards can be used that offer more capacity than their PXI equivalents, the complexity limitation usually being the connector space on the card's panel.

Pickering Interfaces offer a range of PCI cards including:

- General Purpose Relay
- Matrices (Including High Density and RF)
- Multiplexers (Including High Voltage)
- Programmable and Precision Resistor Cards
- Relay Drivers
- Function Generators.

Additionally an Adlink PCI PXI Interface card is available enabling a PXI chassis to be connected to a standard PC via a PCI slot. For further information on the 41-921 Interface kit containing this card please see the Pickering PXI Product Guide.

The range of Pickering Interfaces PCI cards is fully supported by an extensive range of breakouts, cables and connectors that Pickering offer in its Connection Solutions catalog. The availability minimizes the time users need to spend identifying and sourcing their connection requirements.

A common driver and software package ensures programs can be exchanged with minimal effort between the PCI and PXI platforms.

Pickering Interfaces can also quickly develop **custom solutions** for users of PCI cards. If you have requirements not covered by our standard range of cards please contact your local sales representative.

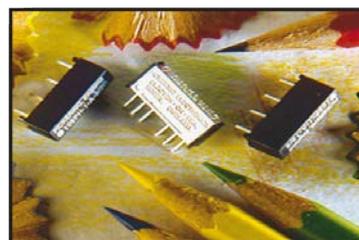
Reed Relays For Maximum Performance and Reliability

Pickering PCI matrix modules are constructed using Reed Relays manufactured by our sister company Pickering Electronics.

Sputtered Ruthenium Reed Relays offer maximum performance, are hermetically sealed and offer a very stable, long life relay contact (>10⁸ operations, typically 10⁹ operations) with very fast operation times.

Alternative types such as electro-mechanical armature relays or non-instrumentation grade reed relays are lower cost but do not offer the consistent contact resistance, long life, fast switching speed and low level switching capability of a reed relay.

Please visit the Reed Relay web site at www.pickeringrelay.com for further information.

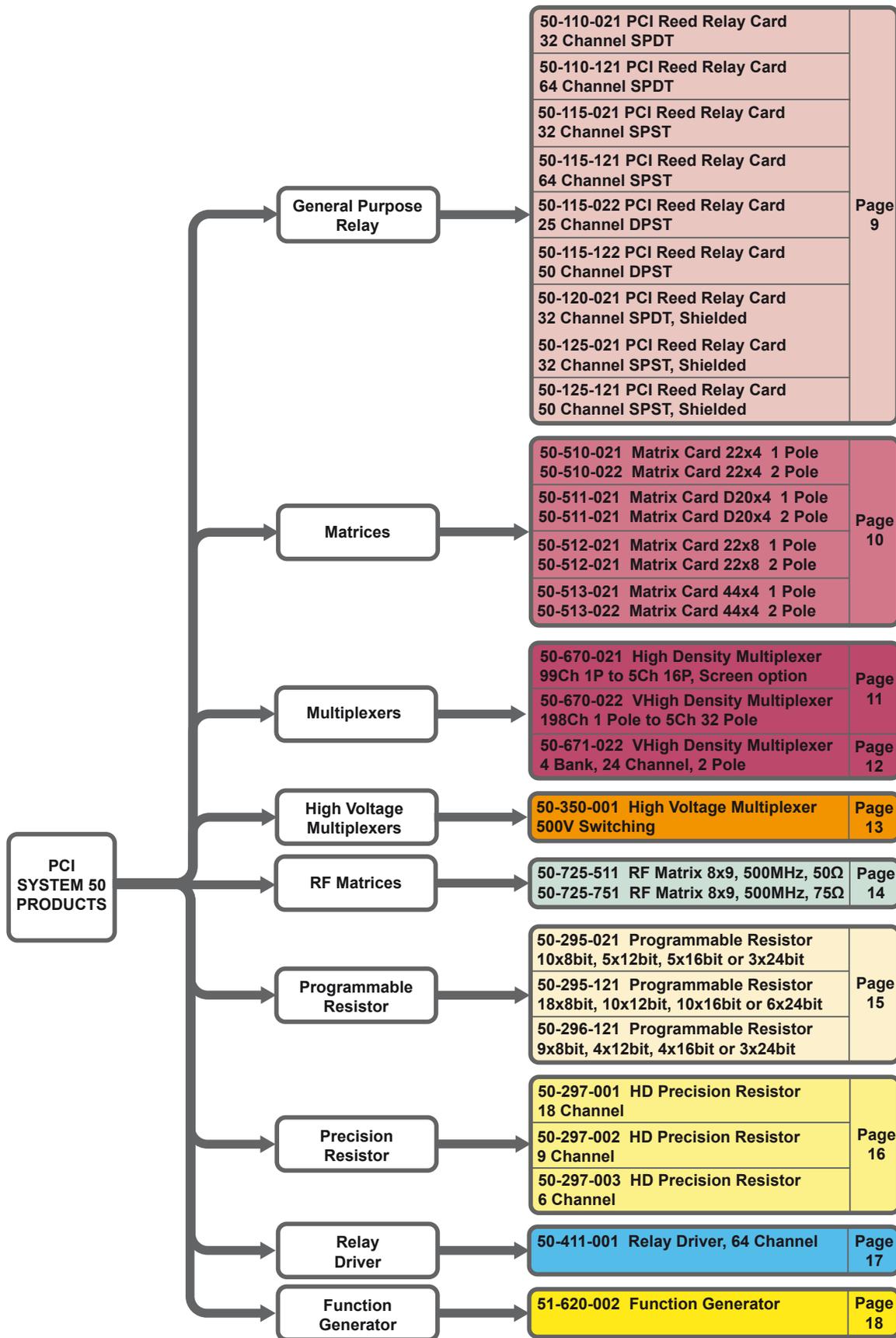


PCI Switch Systems - Numerical Index

Product Code	Description	Page Number
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50-512-022	Matrix Card, Single 22x8, 2 Pole	10
50-513-021	Matrix Card, Single 44x4, 1 Pole, Screen option	10
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50-670-021	High Density Multiplexer (99Ch1P to 5Ch16P), Screen option	11
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51-620-002	Function Generator	18

PCI FAMILY TREE

Pickering PCI Products Selection Guide



GENERAL INFORMATION

PCI Compliance

The modules comply with the PCI Specification 2.0 (issued Aug 2000) or later.

Physical Parameters

Physical characteristics: Single slot PCI format
 Signalling Environment: +5V only

Safety & CE Compliance

All cards are fully CE compliant and meet applicable EU directives: Low-voltage safety EN61010-1:2001, EMC Immunity EN61000-6-1:2001, Emissions EN55011:1998.

Programming

Pickering provide kernel, IVI and VISA (NI and Agilent) drivers which are compatible with Windows 2000/XP/Vista operating systems. The VISA driver is also compatible with Real-Time Operating Systems such as LabVIEW RT. Additionally, QNX is fully supported.

These drivers may be used with a variety of programming environments and applications including:

- National Instruments** products (LabVIEW/LabWindows/CVI/MAX/TestStand etc.)
- Microsoft Visual Studio** products (Visual Basic/Visual C+)
- Agilent VEE**
- Mathworks Matlab**

Drivers for popular Linux distributions are available, other environments are also supported, please contact Pickering with specific enquiries.



Operating/Storage Conditions

Operating Conditions

Operating Temperature: 0°C to 55°C
 Humidity: Up to 90% non-condensing
 Altitude: 5000m

Storage and Transport Conditions

Storage Temperature: -20°C to +75°C
 Humidity: Up to 90% non-condensing
 Altitude: 15000m

Data Sheets:

Please see the Product data sheet for specific details regarding products of interest. These can be found on the companies website at www.pickeringtest.com Partially populated versions are also available. Please contact the factory for information.

Support Products

Connectors and Cabling

For connection accessories for the PCI products please refer to the module appropriate Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time

For further assistance, please contact your local Pickering sales office.

GENERAL PURPOSE RELAY

50-110/115/120/125 PCI Reed Relay Card

- 25, 32, 50 or 64 Reed Relays Per Card
- SPST, DPST, SPDT and Shielded Configurations
- Ruthenium Reed Relays Suitable For Low Level Signals
- Uses High Reliability Pickering Reed Relays For Maximum Performance
- Fast Operating Speed 250µs Typical
- Switch up to 150Vdc/100Vac, 1.25A with 20W Max Power
- VISA, IVI & Kernel Drivers Supplied for Windows 2000/XP/Vista
- Shares Similar Architecture To PXI 40-110 Card
- 2 Year Warranty

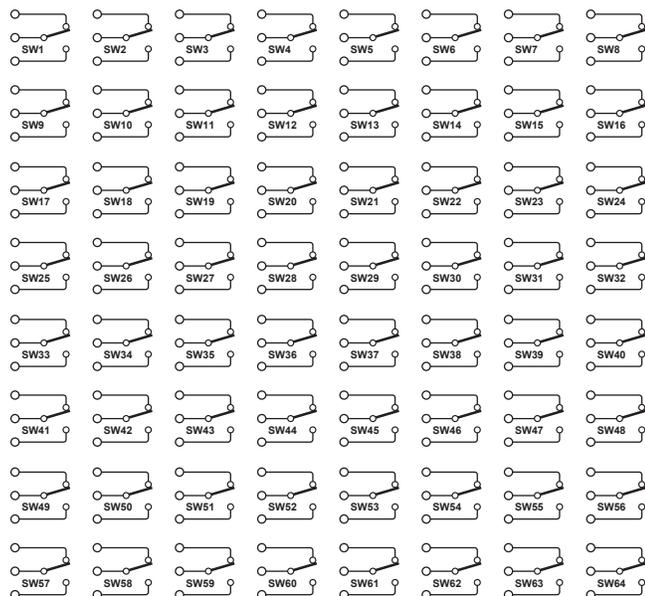


The 50-110/115 range of switching cards are available in both Changeover (SPDT) and Normally Open (SPST & DPST) configurations. Connections are made via a front panel 200 pin female connector.

For applications requiring improved bandwidth and crosstalk performance please look at our 50-120/125 range of shielded reed relay cards.

General purpose reed relays are suitable for the construction of small switching networks, for slaving up to larger switches or for operating external devices (e.g. lamps, solenoids etc.).

All of the reed relays used in our PCI cards are manufactured by our sister company Pickering Electronics. Pickering reed relays offer very high reliability (over 10^8 operations) with maximum switching performance, especially for low level signals.



**Schematic of the 50-110-121 Relay Card
– 64 x SPDT Reed Relays**

Switching Specification

Switch Type:	Ruthenium Reed
Max Switching Voltage:	150Vdc/100Vac
Max Power:	20W (3W for SPDT)
Max Switch Current:	1A (0.25A for SPDT)
Max Carry Current:	1.25A
On Path Resistance:	<800mΩ (400mΩ typical)
Off Path Resistance:	>10 ⁹ Ω
Differential Thermal Offset:	<10µV
Crosstalk (100Ω balanced):	80dB (1MHz), 72dB (10MHz) 62dB (25MHz)
Isolation (100Ω balanced):	75dB (1MHz), 60dB (10MHz) 55dB (25MHz)
Operate Time:	<0.5ms, 0.25ms typ.
Release Time:	<0.5ms, 0.25ms typ.
Expected Life, low power:	>1x10 ⁸ operations
Expected Life, full power:	>1x10 ⁶ operations

Product Order Codes

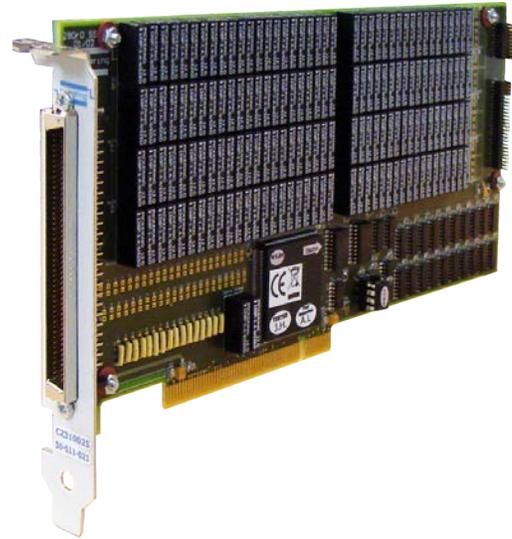
32 x SPDT, Ruthenium Reed Relays	50-110-021
64 x SPDT, Ruthenium Reed Relays	50-110-121
32 x SPST, Ruthenium Reed Relays	50-115-021
64 x SPST, Ruthenium Reed Relays	50-115-121
25 x DPST, Ruthenium Reed Relays	50-115-022
50 x DPST, Ruthenium Reed Relays	50-115-122
32 x Shielded SPDT Reed Relays	50-120-021
32 x Shielded SPST Reed Relays	50-125-021
50 x Shielded SPST Reed Relays	50-125-121

Mating Connectors & Cabling

For connection accessories for the 50-110 series please refer to the [90-002D](#) 200 way LFH Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog

50-510/511/512/513 PCI Matrix Card

- High Density Reed Relay Matrix Card
- 1 Short Slot PCI
- 22x4, Dual 20x4, 22x8 or 44x4
- 1-Pole, 2-Pole or 1-Pole Screened Versions
- Large Matrices Built Using Multiple Cards
- Screened 50Ω Option
- Uses High Reliability Pickering Reed Relays For Maximum Performance
- Fast Operating Speed <500μs
- Switch up to 100Volts, 1.2A with 20W Max Power
- VISA, IVI & Kernel Drivers Supplied for Windows 2000/XP/Vista
- 2 Year Warranty



The 50-510 series of matrix cards feature a wide range of selectable switching configurations (22x4, dual 20x4, 22x8 and 44x4).

Larger matrices may be constructed by Daisy Chaining the common signals from multiple PCI cards. For example four 44x4 Cards will form a 176x4 Matrix, a total of 1704 crosspoints.

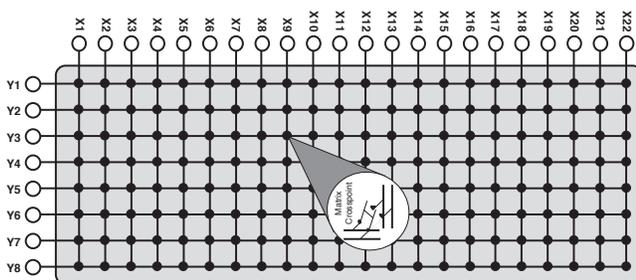
Typical applications include signal routing in Functional ATE and data acquisition systems. These PCI matrix cards are constructed using high reliability Ruthenium Electro-Plated Reed Relays, offering >10⁸ operations to give maximum switching confidence with long life and stable contact resistance. Available reed relay formats are 1-pole, 2-pole and 1-Pole screened.

Relay Type

All 50-510 series cards are fitted with Reed Relays (Ruthenium electroplated type), these offer very long life with good low level switching performance and excellent contact resistance stability.

Spare Reed Relays are built onto the circuit board to facilitate easy maintenance with minimum downtime.

All reed relays are manufactured by our sister company Pickering Electronics, www.pickeringrelay.com.



50-512 22x8 2-Pole Matrix

Switching Specification

Switch Type:	Ruthenium Reed
Max Switching Voltage:	100V
Max Power:	20W
Max Switch Current:	0.5A
Max Carry Current:	1.2A
On Path Resistance:	<1500mΩ
Off Path Resistance:	>10 ⁹ Ω
Differential Thermal Offset:	<5μV
Bandwidth:	25MHz (50-510 & 50-511) 10MHz (50-512 & 50-513)
Operate Time:	<1ms, 0.5ms typ.
Release Time:	<1ms, 0.5ms typ.
Expected Life	
Low power load:	>1x10 ⁸ operations
Full power load:	>5x10 ⁶ operations

Product Order Codes

Single 22x4 Matrix, 1-Pole	50-510-021
Single 22x4 Matrix, Screened 1-Pole	50-510-021-S
Single 22x4 Matrix, 2-Pole	50-510-022
Dual 20x4 Matrix, 1-Pole	50-511-021
Dual 20x4 Matrix, Screened 1-Pole	50-511-021-S
Dual 20x4 Matrix, 2-Pole	50-511-022
Single 22x8 Matrix, 1-Pole	50-512-021
Single 22x8 Matrix, Screened 1-Pole	50-512-021-S
Single 22x8 Matrix, 2-Pole	50-512-022
Single 44x4 Matrix, 1-Pole	50-513-021
Single 44x4 Matrix, Screened 1-Pole	50-513-021-S
Single 44x4 Matrix, 2-Pole	50-513-022

Expansion Cables:

50-512 Expansion to 44x8	50-976-020-0.1M
50-512 Expansion to 22x16	50-976-050-0.1M
50-513 Expansion to 88x4	50-976-020-0.1M
50-513 Expansion to 44x8	50-976-050-0.1M

50-670 PCI Very High Density Multiplexer

- Very High Density Multiplexer
- Up to 198 Switch Pins Available with 1, 2, 4, 8, 16 or 32-Pole Switching Formats
- Screened Option For Improved Noise Performance
- All Versions Use High Reliability Pickering Reed Relays
- Fast Operating Speed <500µs
- Switch up to 150Vdc/100Vac, 1.2A with 20W Max Power
- Automatic Isolation Switches Reduce Capacitive Loading in Large Systems
- VISA, IVI & Kernel Drivers Supplied for Windows 2000/XP/Vista
- Shares Same Architecture As PXI 40-670 Card
- 2 Year Warranty

The 50-670 series of very high density multiplexer cards feature a wide range of switching configurations. Typical applications include signal routing in ATE and data acquisition systems.

Connections are made via a front panel 200 pin connector. Available reed relay formats are: The 50-670 multiplexer may be operated as a conventional multiplexer with break-before-make action when a new channel is selected. In addition multiple channels may be simultaneously selected (*not available for 50-670-022-198/1 version*).

Product Order Codes

HD MUX, 99-Channel, 1-Pole	50-670-021-99/1
HD MUX, 49-Channel, 2-Pole	50-670-021-49/2
HD MUX, 24-Channel, 4-Pole	50-670-021-24/4
HD MUX, 10-Channel, 8-Pole	50-670-021-10/8
HD MUX, 5-Channel, 16-Pole	50-670-021-5/16
VHD MUX, 198-Channel, 1-Pole	50-670-022-198/1
VHD MUX, 99-Channel, 2-Pole	50-670-022-99/2
VHD MUX, 49-Channel, 4-Pole	50-670-022-49/4
VHD MUX, 24-Channel, 8-Pole	50-670-022-24/8
VHD MUX, 10-Channel, 16-Pole	50-670-022-10/16
VHD MUX, 5-Channel, 32-Pole	50-670-022-5/32
HD Screened, 99-Channel, 1-Pole	50-670-021-S-99/1
HD Screened, 49-Channel, 2-Pole	50-670-021-S-49/2
HD Screened, 24-Channel, 4-Pole	50-670-021-S-24/4
HD Screened, 10-Channel, 8-Pole	50-670-021-S-10/8
HD Screened, 5-Channel, 16-Pole	50-670-021-S-5/16



**POSSIBLY THE WORLDS
HIGHEST DENSITY PCI MULTIPLEXER
WITH 198 CHANNELS**

Switching Specification

Switch Type:	Ruthenium Reed
Max Switching Voltage:	150Vdc/100Vac
Max Power:	20W
Max Switch Current:	1A
Max Carry Current:	1.2A
Initial Path Resistance On (Single Card):	<800mΩ (600mΩ typical)
Initial Path Resistance Off (Single Card):	>10 ⁹ Ω
Differential Thermal Offset:	<10µV
Bandwidth (3dB, 1 card):	>5MHz †
Operate Time:	<0.5ms
Release Time:	<0.5ms
Expected Life (operations)	
Low power load:	>1x10 ⁹
Full power load:	>1x10 ⁶

† Bandwidth is configuration dependent (please consult sales office for further information).

Built in Automatic Isolation Switching (*available in 1, 2 and 4-pole mode*), connects only the currently active multiplexer bank onto the analogue common, thereby keeping capacitive loading and leakage currents in large multiplexer systems to a minimum. Larger multiplexers may be constructed by Daisy Chaining the common signals from multiple PCI/PXI cards.

The screened version (50-670-022-S) is suitable where improved noise performance is required.

50-671

PCI Very High Density Multiplexer

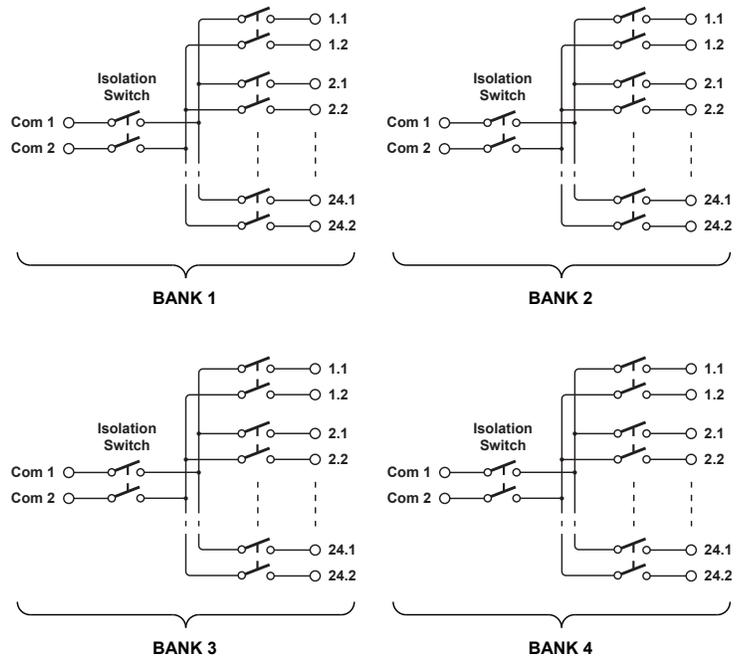
- Very High Density Multiplexer
- 4 Banks, 24-Channel, 2-Pole
- Uses High Reliability Pickering Reed Relays
- Fast Operating Speed <500µs
- Switch up to 100Volts, 1.2A with 20W Max Power
- Automatic Isolation Switches Reduce Capacitive Loading in Large Systems
- VISA, IVI & Kernel Drivers Supplied for Windows 2000/XP/Vista
- 2 Year Warranty



The 50-671 very high density multiplexer is available in 24-channel 2-pole format with 4 separate banks. Typical applications include signal routing in ATE and data acquisition systems.

The 50-671 multiplexer may be operated as a conventional multiplexer with break-before-make action when a new channel is selected. In addition multiple channels may be simultaneously selected

Built in Automatic Isolation Switching connects only the currently active multiplexer bank on to the analogue common, thereby keeping capacitive loading and leakage currents in large multiplexer systems to a minimum. Larger multiplexers may be constructed by Daisy Chaining the common signals from multiple cards.



Functional Diagram for the 50-671-021
4-Bank, 24-Channel 2-Pole Multiplexer Card

Switching Specification

Switch Type:	Ruthenium Reed
Max Switching Voltage:	100V
Max Power:	20W
Max Switch Current:	1A
Max Carry Current:	1.2A
Path Resistance On (Single Card):	<800mΩ (600mΩ typical)
Path Resistance Off (Single Card):	>10 ⁹ Ω
Differential Thermal Offset:	<10µV
Bandwidth (3dB, 1 card):	>5MHz
Noise Level (0 to 1MHz in 50Ω system):	<-80dBm
Operate Time:	<0.5ms
Release Time:	<0.5ms
Expected Life (operations)	
Low power load:	>1x10 ⁹
Full power load:	>1x10 ⁶

Product Order Codes

4-Bank, 24-Channel, 2-Pole MUX

50-671-022

Latest Details

Please refer to our Web Site for Latest Product Details.

www.pickeringtest.com

50-350

PCI High Voltage Multiplexer

- Multiplexer Designed Specifically For Cable Test With TDR Port For Cable Impedance and Fault Finding Measurements
- Standard Short PCI Card
- Coaxial 50Ω Section with >500MHz Bandwidth
- Use High Reliability Pickering High Voltage Reed Relays
- Fast Operating Speed 0.5ms
- Switch up to 500Volts, 1A with 10W Max Power
- VISA & Kernel Drivers Supplied for Windows 2000/XP and LabView
- 2 Year Warranty



The 50-350 is a Short PCI Card designed as a high voltage multiplexer for use in a Submarine Cable Testing Application.

It is designed to allow the dynamic connection of various test instruments to 1 of 16 test points. The multiplexer may be operated as a conventional multiplexer with break-before-make action when a new channel is selected. In addition multiple channels may be simultaneously selected.

The coaxial ports are suitable for switching frequencies to 500MHz (measured from Test Lead to TDR port). It may also be used with low frequency signals where very good isolation and crosstalk performance is required.

The 50-350 also provides 3 digital output lines to control external devices

Switching Specification

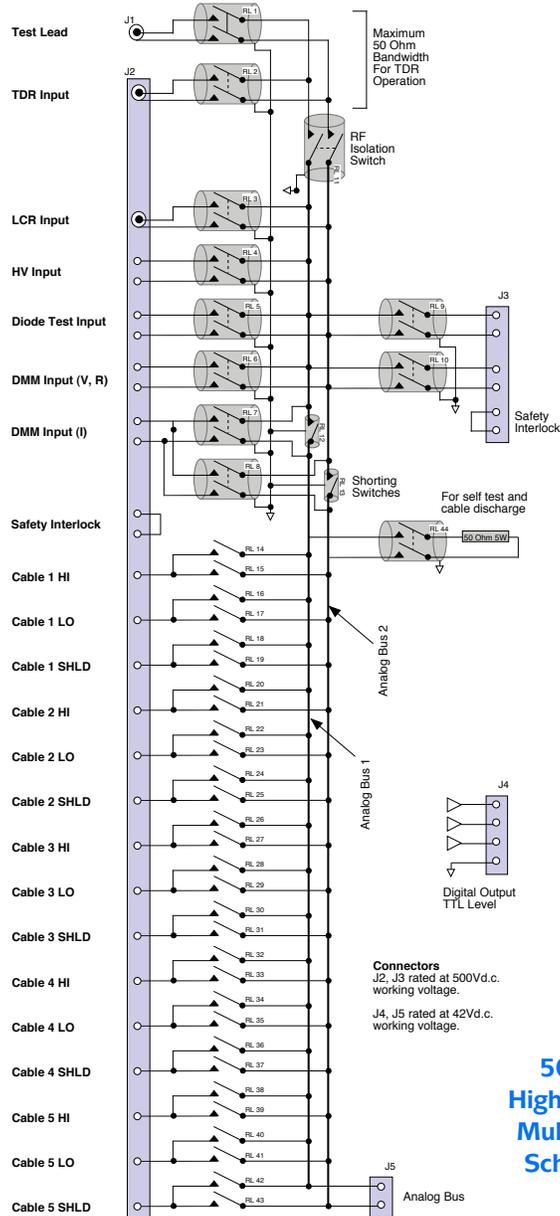
Switch Type:	Rhodium Reed
Max Standoff Voltage:	500V DC
Max Switching Voltage:	500V DC
Max Power:	10W
Max Switch Current:	0.5A
Max Carry Current:	1.2A
Path Resistance (passing thru 3 relays)	
On (Single Card):	<250mΩ
Off (Single Card):	>10 ⁹ Ω
Differential Thermal Offset:	<10μV
Operate Time:	0.5ms
Release Time:	0.5ms
Expected Life	
Low power load:	>1x10 ⁸ operations
Full power load:	>1x10 ⁶ operations

TTL Digital Output Specification

Max Voltage:	7V DC
Max Current Drive:	10mA
Nominal True Voltage:	>2.0V
Nominal False Voltage:	<0.8V
Operate Time:	<0.5ms
Release Time:	<0.5ms

Product Order Code

High Voltage PCI Multiplexer
500V Switching and 500V Withstand **50-350-001**



**50-530
High Voltage
Multiplexer
Schematic**

50-725

PCI 8 x 9 RF Coaxial Matrix Card

- 8x9 RF Coaxial Matrix
- 500MHz Bandwidth
- 50Ω and 75Ω Versions Available
- High Quality Ruthenium Reed Relays
- High Density Coaxial Connectors: SMB, or mini-SMB
- 75Ω Version Suitable for Telecoms and High Quality Video Switching
- VISA, IVI & Kernel Drivers Supplied for Windows 2000/XP/Vista
- 2 Year Warranty

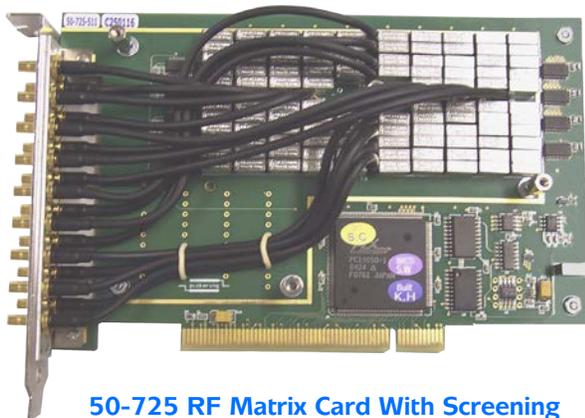
The 50-725 is an 8x9 RF Matrix Card suitable for switching frequencies to beyond 500MHz. The 50-725 is available in either 50Ω or 75Ω versions with a choice of coaxial connectors. It is intended for the easy construction of high performance bidirectional matrix switching systems.

Automatic Isolation Switches are located on all coaxial connectors (refer to drawing), these disconnect the matrix from the external test fixture. This maximises isolation and RF performance.

Relay Type

The 50-725 matrix uses Sputtered Ruthenium Reed Relays, these offer very stable switch contact resistance with expected life of 10^9 operations when switching typical RF signals.

Spare RF Relays are built onto the circuit board to facilitate easy maintenance with minimum downtime.



50-725 RF Matrix Card With Screening Cover Removed

Product Order Codes

PCI 8x9 500MHz Coax Matrix, 50Ω SMB	50-725-511
PCI 8x9 500MHz Coax Matrix, 75Ω Mini SMB	50-725-751



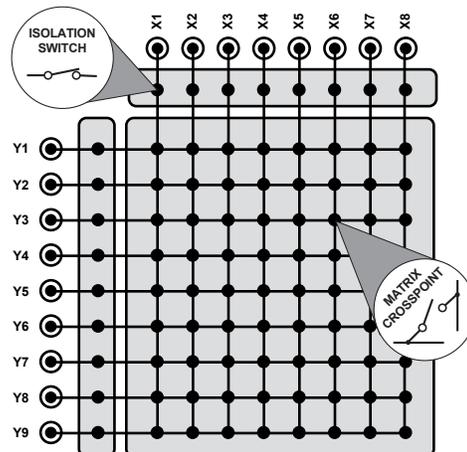
General Switching Specification

Max Switching Voltage:	100V
Max Power:	3W
Max Switch Current:	0.25A
Max Carry Current:	0.5A
Characteristic Impedance:	50Ω or 75Ω
On Path Resistance:	<750mΩ
Off Path Resistance:	> $1 \times 10^8 \Omega$
Differential Thermal Offset:	<35μV
Operate Time:	<1.0ms, 0.5ms typical.
Release Time:	<1.0ms, 0.5ms typical.
Expected Life	
Low power load:	> 1×10^9 operations
Full power load:	> 5×10^6 operations

RF Specification

Maximum Frequency:	500MHz
Typical Rise Time:	800ps †
Insertion Loss (<500MHz):	<3dB †
VSWR (<500MHz):	<1:1.8 †
Isolation (<500MHz):	>70dB
Crosstalk (<500MHz):	>60dB

† Matrix RF Performance is entirely dependant upon the combination of crosspoints currently selected, these figures are for **one** selected crosspoint on any X or Y channel only, refer to graphs.



8-x9 Coaxial Matrix Schematic Diagram

50-295/296

PCI Programmable Resistor Card

- High Density Resistor Card
- Configurable to 8, 12, 16, or 24-Bit Resolution
- Up to 18 Channels of 8-Bit Resolution
- Up to 10 Channels of 16-Bit Resolution
- Provides Fully Isolated Variable Resistors
- Configurable as Adjustable Resistor or Potentiometer
- Built-in Non-Volatile Parametric Memory for Calibration Data
- Uses High Reliability Pickering Reed Relays for Maximum Performance
- Up to 2000 Value Changes Per Second
- Special Versions With Non-Standard Resistors Built to Order
- VISA & Kernel Drivers Supplied for Windows 2000/XP/Vista Plus Soft Front Panel
- 2 Year Warranty

The 50-295 is a Programmable Resistor card with up to 18-channels of 8-bit resolution resistor chains in a single PCI slot. The flexible architecture allows the card to also be supplied as 12-bit, 16-bit or 24-bit resolution versions for applications requiring finer resolution, greater resistance range or higher channel count. The card is ideal for simulating the sensors for control and management systems under test, allowing the user to verify system response in design verification or manufacturing test applications.

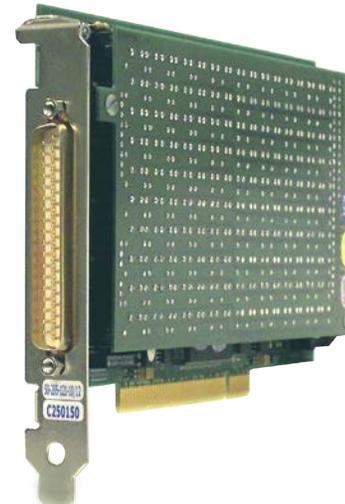
The programmable resistors can be configured as potentiometers with a wiper connection, model 50-296, simulating the response to external adjustable components.

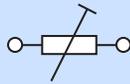
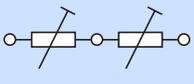
High Density Resistor Card Order Codes

10 x 8-Bit (0Ω to 255Ω)	50-295-021-10/8
18 x 8-Bit (0Ω to 255Ω)	50-295-121-18/8
5 x 12-Bit (0Ω to 4kΩ)	50-295-021-5/12
10 x 12-Bit (0Ω to 4kΩ)	50-295-121-10/12
5 x 16-Bit (0Ω to 65kΩ)	50-295-021-5/16
10 x 16-Bit (0Ω to 65kΩ)	50-295-121-10/16
3 x 24-Bit (0Ω to 16MΩ)	50-295-021-3/24
6 x 24-Bit (0Ω to 16MΩ)	50-295-121-6/24

High Density Potentiometer Card Order Codes

5 x 8-Bit Pot (0Ω to 255Ω Wiper)	50-296-021-5/8
9 x 8-Bit Pot (0Ω to 255Ω Wiper)	50-296-121-9/8
2 x 12-Bit Pot (0Ω to 4kΩ Wiper)	50-296-021-2/12
4 x 12-Bit Pot (0Ω to 4kΩ Wiper)	50-296-121-4/12
2 x 16-Bit Pot (0Ω to 65kΩ Wiper)	50-296-021-2/16
4 x 16-Bit Pot (0Ω to 65kΩ Wiper)	50-296-121-4/16
1 x 24-Bit Pot (0Ω to 16MΩ Wiper)	50-296-021-1/24
3 x 24-Bit Pot (0Ω to 16MΩ Wiper)	50-296-121-3/24



Resolution	Resistance Range	Configuration	Number Per Card
8-Bit	0Ω to 255Ω	 Resistor	10 or 18
12-Bit	0Ω to 4kΩ		5 or 10
16-Bit	0Ω to 65kΩ		5 or 10
24-Bit	0Ω to 16MΩ		3 or 6
8-Bit	0Ω to 255Ω Wiper	 Potentiometer	5 or 9
12-Bit	0Ω to 4kΩ Wiper		2 or 4
16-Bit	0Ω to 65kΩ Wiper		2 or 4
24-Bit	0Ω to 16MΩ Wiper		1 or 3

Programmable Resistor Card Options Overview

Programmable Resistor Specification

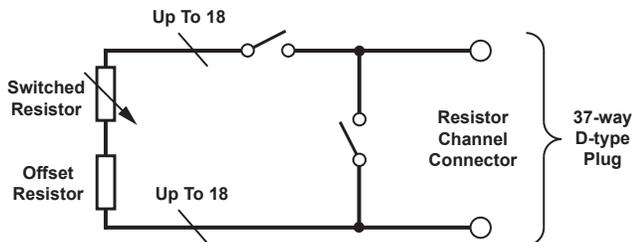
Max Switching Voltage:	100V
Resolution	1Ω
Accuracy:	±0.5% (0 to 1MΩ) ±5% (>1MΩ)
Residual Resistance, typical: (when chain resistance is set to 0Ω)	1Ω (8-bit) 1.5Ω (12-bit) 2Ω (16-bit) 3Ω (24-bit)
Max Power:	0.5W
Max Switch Current:	0.5A
Max Carry Current:	1.0A
Differential Thermal Offset:	<35uV (8-bit) <45uV (12-bit) <50uV (16-bit) <60uV (24-bit)
Operate Time:	<0.5ms
Release Time:	<0.5ms
Expected Life	
Low power load:	>1x10 ⁸ operations
Full power load:	>1x10 ⁶ operations

50-297 High Density Precision Resistor Card

- High Density Resistor Simulation
- Up To 18 Channels in a Single PCI Slot
- Short and Open Simulation
- Simple Software Control Through Resistance Calls
- VISA & Kernel Drivers Supplied for Windows 2000/XP/Vista Plus Soft Front Panel
- 2 Year Warranty

The 50-297 provides a simple solution for applications requiring accurate simulation of resistive sensors. The 50-297 is available in a variety of resistance ranges and resolution capabilities that meet the needs of most functional test systems. It is particularly well suited to applications such as the testing of engine controllers where resistive sensors provide information on parameters such as temperature.

Each channel of the 50-297 card is able to simulate the common short circuit and open circuit conditions that can be experienced in a system due to faulty wiring or sensors.



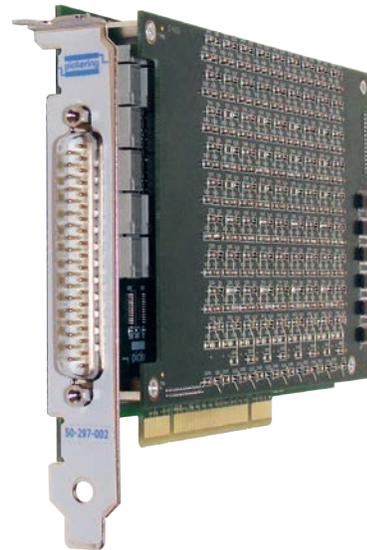
**Functional Diagram for the 50-297
High Density Precision Resistor Card**

Product Order Codes

18 Channel Precision Resistor Card	50-297-001
9 Channel Precision Resistor Card	50-297-002
6 Channel Precision Resistor Card	50-297-003

Accessories:

Calibration lead for 4-wire resistance measurement using DMM - 37-way D-type socket to shrouded 4mm bayonet plugs, 1Meter length **40-975-037-1M**



Specification

Accuracy:	Resolution $\pm 0.2\%$ @ $\pm 10^\circ\text{C}$ from calibration temperature. (factory calibration @ 21°C)
Fault Simulation:	Open and short circuit (typically $< 0.3\Omega$)
Power:	0.5W maximum
Temperature Stability:	$< 50\text{ppm}$
Number of Operations:	100 million (10mA)
Maximum Voltage:	100V or as limited by power
Settling time:	2ms typical
Software Control:	By resistance calls to card for selected channel.
Calibration:	4-wire resistance measurement of selected channel for calibration purposes with UUT removed and a special cable assembly attached. Calibration data stored on the card as a factory calibration (read only access) or user calibration data (user read or write).

Model Number	50-297-001	50-297-002	50-297-003
Resistance Range	1 Ω to 230 Ω	2 Ω to 13.5k Ω	3 Ω to 1.5M Ω
Setting Resolution	1 Ω	0.25 Ω	0.125 Ω
Number of Channels per Module	18	9	6

50-411 PCI Relay Driver Card

- 64 Channel Relay Driver
- 60V Drive Capability, Up to 1A Per Channel
- Short Circuit and Thermal Protection
- Over Voltage Clamp
- High Current Capacity
- Switch With External Relay Power
- VISA & Kernel Drivers Supplied for Windows 2000/XP/Vista
- 2 Year Warranty

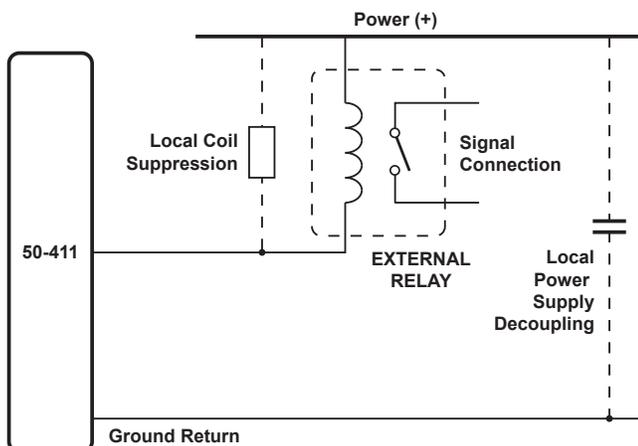


The 50-411 is the perfect solution for driving external relays from a PCI slot.

Each card provides 64 channels of low side switching for external relays. Users need to simply connect a positive voltage source to one side of the relay coil and the other side to the 50-411 output. Each output is capable of sinking up to 1A of continuous current.

Each output is protected by current, thermal and overvoltage circuits. The thermal and current limit circuits protect the output from failure even when directly connected to voltages up to 30V. When switching relays inductive spikes from the load are clamped at 80V to dump relay coil energy of up to 550m Joule without the use of additional diode clamps.

Relay coil current is prevented from flowing back into the PCI slot by the use of an isolation barrier.



Using the 50-411 to drive an external relay. Local power supply decoupling for the relay and coil suppression circuits are recommended for best EMC characteristics with high current relays, but are not essential for safe operation due to the built in protection system.

Specification

Number of Output Channels:	64
Typical Output Resistance:	0.6Ω (on state)
Off State Leakage Current:	3μA maximum at 12V (start up condition is open circuit).
Maximum Output Current:	1A on any channel, up to 12 channels (Please refer to de-rating curve for lower channel currents). Note: for full load conditions, adequate cooling is assumed.
Maximum Output Voltage:	60V (recommended maximum continuous voltage).
Output Protection:	Limits at 1.3A nominal Thermal limit activates at typically 1.5W in output device. Overvoltage clamp operates at 80V.
Output Connector:	78-way male D-type
Physical Characteristics:	Single slot short PCI format

Product Order Codes

64-Channel Relay Driver Card

50-411-001

51-620 PCI Function Generator

- DC to 10MHz
- Two Channels in One PCI Slot
- 48-bit Frequency Resolution
- Simple Generation of Repetitive Arbitrary Waveforms
- DC Offset Capability
- Flexible Sweep Capability
- Amplitude Modulation Capability
- Uses 10MHz Internal Clock or External Clock Reference
- External Trigger Support
- VISA Driver Supplied

The 51-620 is a compact 2 channel function generator provided in short PCI card format. It is capable of generating sine waves to 10MHz with 48-bit frequency resolution referenced to an onboard 10MHz clock or to an external standard. The 51-620 can generate arbitrary waveforms loaded into the internal 256k memory, allowing the function generator to emulate many waveform types, including the typical waveforms of automotive and aerospace sensors.

The function generator provides a very simple method of providing variable output frequencies through the use of Direct Digital Synthesis (DDS), making it far easier to use than an ARB for repetitive waveform generation.

The 51-620 supports trigger functions to allow triggered events from other instruments to initiate waveform generation or sweeps.

The supplied soft front panel demonstrates the ability of the 51-620 to quickly generate common waveforms and the ability to import external waveforms. The soft front panel also supports swept modes of operation.

Product Order Codes

Dual Channel PCI Function Generator **51-620-002**



Specification (each channel)

Frequency

Frequency range:	DC to 10MHz (sine wave).
Frequency resolution:	48-bit
Frequency accuracy:	As onboard 10MHz clock.
Frequency sweep:	Frequency sweeps can be single or continuous (ramp up and/or down) phase continuous through use of DDS sweep facility.

Output

Maximum Output:	±10V, open circuit load.
Waveform Signal:	10V pk to pk, open circuit load
Output Offset Voltage:	Settable from -5V to +5V in 10mV steps.
Output DAC resolution:	10-bit
Signal Level Control:	0 to -40dB, <0.1dB steps.
Output Impedance:	50Ω
Output Loading:	Capable of driving 600Ω with 10V peak e.m.f. Typically capable of driving a 50Ω load with 6V peak e.m.f. output (DC and signal).



Triangular Waveform at Frequency of 5MHz

Pickering Interfaces understands that just providing the switching and instrumentation modules is not enough, users need to be provided with fast and effective ways of connecting their investment to the device under test.

The modules in the Pickering Interfaces PXI, PCI and LXI system are fully supported by a comprehensive range of connector and cable accessories. The accessories are detailed in the Connection Solutions Catalog available in paper or downloadable format. The catalog is cross referenced to all Pickering system 40 PXI modules and PCI modules as well as PXI modules supported by the 60-100 series LXI chassis, making it easy for the user to find the perfect accessories to compliment their chosen module.

- **Connectors & Prototyping Cables**

Pickering can supply mating multi-way connectors for any PXI module in the range from 4-way power connectors up to 200-way high density types. This allows the user to construct their own prototype cable assemblies to suit specific applications. Alternatively, cableforms can be supplied with a multi-way connector on one end and un-terminated wires on the other. This removes a large amount of the work required by the user when prototype cabling is required

- **Cable Assemblies**

Pickering Interfaces offers a wide range of standard and custom cable assemblies that support all our switching and instrumentation products. Every module we manufacture is fully supported by cables and accessories, allowing users to procure their cables and modules from one source to ensure connector compatibility. Our manufacturing plant in the Czech Republic can manufacture high quality cable assemblies in small or medium volumes on fast turn around times. We support both simple and complex connectors (200 way).



- **Connector Blocks & Breakouts**

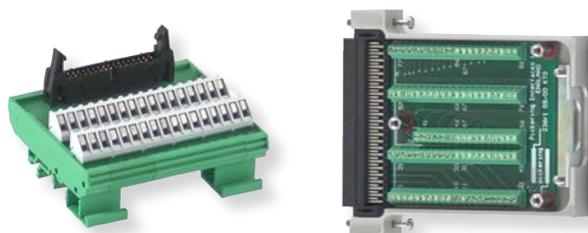
Breakout Boxes provides an electrical connection between a module's multi-way connector and a set of screw terminals. They are mounted on the front panel of the module and allow the user to easily attach discrete wires to what would otherwise be a difficult to terminate connector. Most Pickering PXI modules have a good selection of Connector Blocks and Breakouts available.

- **Fuse Holders and Terminals**

We also offer a range of DIN rail mounted Terminals and accessories. These provide an easy means of building your test system as they enable discrete wires from cableforms to be interconnected between PXI modules and the devices under test. The range also includes DIN rail mounted fuse holders to provide overload protection for your test system.

- **Custom Connectors & Cabling**

If a particular connector and cable configuration cannot be found in the Connection Solutions Catalog, Pickering can make custom cableforms to special order. This service further reduces the work that the user requires to build a test system that exactly meets their requirements. Please contact Pickering sales office to discuss your application.





Addressing and Configuration

Pickering PCI Modules have the configuration set under software control with modules supplied preconfigured. PCI cards do not have to be addressed in the same way as GPIB or VXI cards in that the computer system defines slot positions and identifies a card in a particular slot.



A standard PC with Pickering PCI card fitted to the Motherboard. Outputs unconnected.

Programming using a standard PC

Pickering provide kernel, I/O and VISA (NI and Agilent) drivers which are compatible with Windows 2000/XP/Vista operating systems. The VISA driver is also compatible with Real-Time Operating Systems such as LabVIEW RT. Additionally, QNX is fully supported. For other RTOS support and possible drivers for Windows 7 please contact the factory.

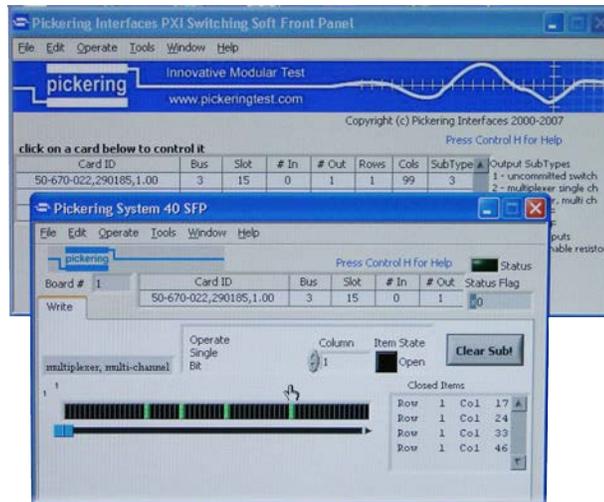
These drivers may be used with a variety of programming environments and applications including:

- National Instruments** products (LabVIEW/LabWindows/CVI/MAX/TestStand etc.)
- Microsoft Visual Studio** products (Visual Basic/Visual C+)
- Agilent VEE**
- Mathworks Matlab**

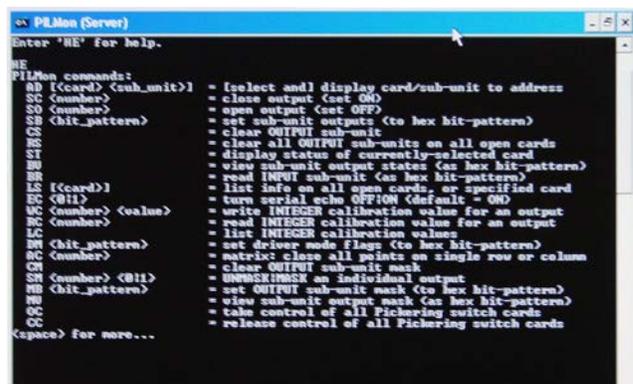
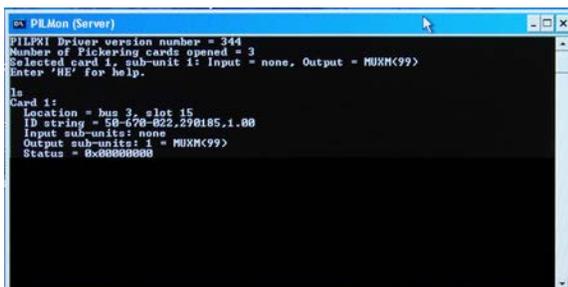
Drivers for popular Linux distributions are available and other environments are also supported.

Testing

- Using the **Test Panels** application under 'Drivers' from the Product DVD or Pickering website:
 If you are a LabVIEW user, run "Test Panels (LabVIEW VI)"; if not, run Test Panels (EXE).
 A selector panel will appear, listing all installed Pickering PCI switch cards.
 Click on the card you wish to control, and a graphical control panel is presented allowing operation of the card.
 Panels can be opened simultaneously for all the installed cards.



- As an alternative to the Test Panels, the simple Terminal Monitor program **PILMon** can be used:
 This can also be found on the product DVD or Pickering website.
 It allows access to all functions of Pickering switch cards through a command-line interface.
 In PILMon, enter "HE" for help on it's commands.



OTHER PRODUCTS FROM PICKERING

Pickering have been manufacturing Modular Switching & Instrumentation systems since 1988. Our sister company Pickering Electronics have manufactured instrumentation quality reed relays since the late 1960's. Pickering Interfaces design & manufacture solutions for all major modular Test platforms including PXI, GPIB, PCI, VXI and now LXI, we also manufacture many customer solutions and have a wide range of connector/cabling designed for the demanding Functional Test Developer.

LXI Instruments (LAN eXtensions for Instrumentation), LXI – SYSTEM 60

Pickering Interfaces are Strategic members of the LXI Consortium, www.lxistandard.org.

LXI is the next generation of test instrumentation combining state-of-the-art measurements in a small package at a cost-effective price using enhanced Ethernet connectivity and built in Triggering. Pickering are constantly adding to their range of LXI products, currently the range includes; High Density Matrices, High Power Matrices, Microwave Multiplexers, Microwave Matrices, Fiber Optic Multiplexers, Low Thermal EMF Matrices, High Voltage Matrices, RF & Video Matrices, a Power Management Switch, and a 7 or 18 slot Modular Switching Chassis that supports PXI switching modules in an LXI environment.



60-103 LXI 18-Slot Modular Switching Chassis



60-102 LXI 7-Slot Modular Switching Chassis



60-800/820 LXI Microwave Multiplexer



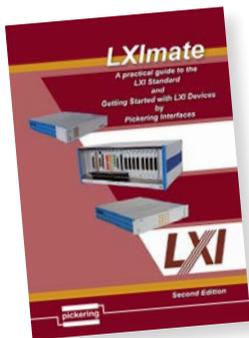
60-711 LXI Dual 24x8 Video Matrix



60-552 LXI High Density 64x64 Matrix



60-310 LXI High Voltage 2-Pole 300x2 Matrix



LXImate

Want to know more about LXI?

The LXImate is an easy to read overview of the LXI Standard and some of the products available that conform to this standard. Get your free copy of the LXImate by registering at www.pickeringtest.com/lximate

OTHER PRODUCTS FROM PICKERING

PXI Switch, Instrument & Systems – SYSTEM 40

Pickering have a full range of competitively priced 3U & 6U PXI (CompactPCI) Switch Modules, including Relay, Digital I/O, Matrix, Multiplexer, RF, Microwave, Optical and Telecom, our 3U PXI matrix modules offer up to 4400 crosspoints per module.

Pickering PXI Instruments include Arbs, Amplifiers, Digitizers, Automotive Serial Protocol Communications, 5½, 6½ & 7½ DMMs, Power Supplies, RF Power Meters, RF Attenuators, Programmable Resistor/Potentiometers, Avionics Bus Analyzers, Breadboards & Digital I/O. We are continually adding to our PXI range (over 500 models), so if the product you require is not listed please ask.



PCI Switch Modules – SYSTEM 50

Pickering Interfaces have a range of competitively priced PCI switch Modules, including General Purpose Reed Relay, Matrix, Multiplexer, RF & Programmable Resistor. Pickering Interfaces PCI Modules share the same software environment as our extensive PXI range.



VXI Switching System Modules – SYSTEM 30

Pickering Interfaces have a range of high density VXI switching modules, System 30, containing up to 2340 relays per module. These are C sized modules with a SCPI message based interface, VXI Plug/Play & IVI Drivers, offering up to 10 times density advantage over competing VXI switching products.



SIM Relay Cards – SYSTEM 1000

Pickering Interfaces also offer range of uncommitted relays, matrices and multiplexers based on 72-pin SIM modules. These enable the user build custom switching systems that can be located inside test fixtures and close to the unit under test. Control is via an RS232 or I²C interface.



IEEE-488.2 & RS-232 Controlled Switching Systems – SYSTEM 10/20

Pickering Interfaces' System 10 and System 20 Programmable Relay Switching Systems now offer the most comprehensive range of switching modules currently available. Our switching systems will switch from nano Volts to 7.5 kilo Volts, DC to 26.5GHz and pico Amps to 30 Amps. Models are programmable using a wide range of interfaces: IEEE 488, Ethernet or RS-232.



Custom Switching Solutions

Pickering Interfaces are able to meet your exact custom switching needs. With extensive experience in PXI, PCI, VXI, IEEE-488, and Ethernet architectures, we can develop a switching solution that matches your exact needs. For further information please visit the Custom Design area of the "Sales" section of our web site or call your local Pickering Sales office.

详细资料？请通过sales@hkaco.com联系我们。

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February 2012

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