

Agilent PXI Matrix Switch Modules

M9120A, M9121A, M9122A



Data Sheet



Challenge the Boundaries of Test

Agilent Modular Products

Anticipate — Accelerate — Achieve



Agilent Technologies



OVERVIEW

Product description

The PXI matrix switch modules activate multiple channels in a single instance. Select a switch row to connect to any column and create routing for multiple signals between instruments and the device under test. Choose from high-speed, long-life reed relays capable of switching up to 100 Vrms with up to 20 W of power, or the higher power armature relays capable of switching up to 60W of power. Multiple switch matrices offer a variety of power and switch density options.

Installation and configuration is fast and easy with standard cable connections or an optional connector block, soft front panels, and Agilent Connection Expert. In addition, software drivers support the most common programming environments such as Visual Studio®, C, C++, Visual Basic, MATLAB, and LabVIEW.

Applications

- Aerospace and defense
- Automotive
- Electronic test
- Medical
- Semiconductor

Features

- Quickly connect multiple high-voltage points
- High-density modules provide more connections in a smaller area
- Up to 256 2-wire crosspoints
- High-speed, long-life reed relays or higher power armature relays
- Software drivers support the most common programming environment
- Optional connector blocks offer reliable measurements from robust, high-pincount interconnects
- Easy programming and control with soft front panels and Agilent Command Expert

Customer values

- Connect multiple points for high-pin-count applications
- Get the performance you need with high-speed 1000 μ s reed relay switches or up to 60 W per channel
- Work in your programming environment of choice and reduce development time
- Fast and easy module installation and configuration

EASY SETUP ... TEST ... AND MAINTENANCE

Hardware platform

Compliance

The matrix switch modules are PXI compliant with a J1 connector and can be used in PXI chassis with cPCI (J1), PXI-1 (J1 only), or PXIe hybrid slot connectors.

The PXI format offers high performance in a small, rugged package. It is an ideal deployment platform for many automated test systems. In addition, a wide array of complementary PXI products are currently available, such as multimeters, waveform generators, local oscillators, digitizers, and RF switch modules.

Software platform

IO Libraries

Agilent IO Libraries Suite offers fast and easy instrument connections and now extends to modular instruments. IO Libraries Suite 16 adds support for PXI, helping you display all of the modules in your system, whether they are PXI, PXIe, or AXIe, as well as view information about installed software. In addition, the new version allows you to more easily find the right driver and start module soft front panels directly with Agilent Connection Expert.

Drivers

Agilent provides instrument drivers that work with your choice of software, saving time and preserving software and hardware investments. Agilent modular instruments come with IVI-COM, IVI-C, and LabVIEW software drivers that work in the most popular test and measurement development environments including LabVIEW, MATLAB, LabWindows/CVI, Visual Studio® C, C++, C#, VEE, and Visual Basic®.

With a broad selection of drivers already included, any Agilent PXI matrix switch can be swapped out, replaced, or upgraded with the latest version, requiring only minimal software adjustments.

Easy software integration

In addition, application code examples are included for LabVIEW, LabWindows/CVI, Visual Studio C, C++, C#, Visual Basic, and MATLAB, providing switch set-up and basic functionality. These application code examples are easily modified to quickly integrate the switch module into your measurement system.

Software applications

Agilent soft front panels provide easy-to-use instrument communications. The PXI matrix switch graphical user interface guides developers through module setup so users can quickly configure the switch states. Switch control is also possible through the wide selection of instrument program interfaces.

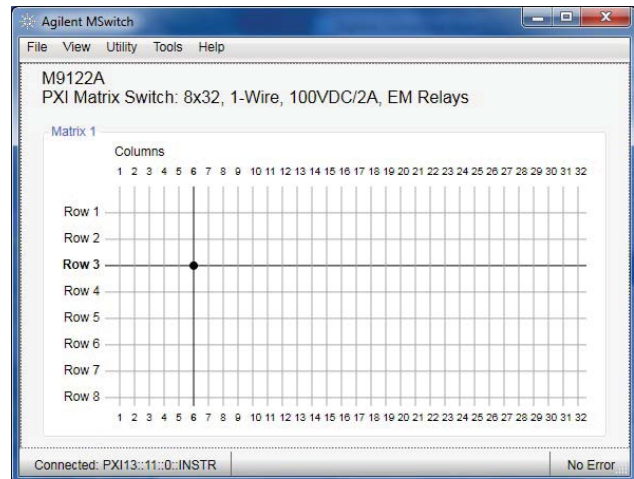


Figure 1. Matrix switch soft front panel

SPECIFICATIONS AND CHARACTERISTICS



Specification and characteristic summary

Following is a summary of specifications and characteristics for the Agilent PXI matrix switches. More detailed specifications and characteristics for each module are featured later in this document.

Matrix switch specification and characteristic summary								
Multiplexer switches	Description	Type # slots	Channels	Switch speed (typical)	Max voltage	Current switch and carry	Relay type	Connectors
M9120A	Matrix switch	PXI 1-slot	4x32, 2-wire	3 msec	100 Vrms ¹	2 A/2 A	Armature	78 Dsub connector block or cable
M9121A	High-density matrix switch	PXI 1-slot	4x64, 2-wire	< 1 msec ²	100 Vrms ¹	0.5 A/0.5 A	Reed	200 LFH connector block or cable
M9122A	Matrix switch	PXI 1-slot	8x32, 1-wire	3 msec	100 Vrms ¹	2 A/2 A	Armature	50 Dsub connector block or cable

1. Not for connection to mains.

SPECIFICATIONS AND CHARACTERISTICS

M9120A 4x32, 2-wire PXI matrix switch

The M9120A high-density matrix is designed to switch medium voltage/power signals. The 128, 2-wire armature relays offer higher voltage switching and up to 60W per channel. This module is ideal for telecom applications that need to simultaneously send and return signals.

The matrix module includes a 4-wire-wide bus to route signals between test instruments and your device under test. To create larger matrices, multiple modules can be linked together, for example, four rows of two M9120A modules can be joined to create a 4x64 matrix. Easily connect to the matrix with a 78-pin Dsub female connector or cable.

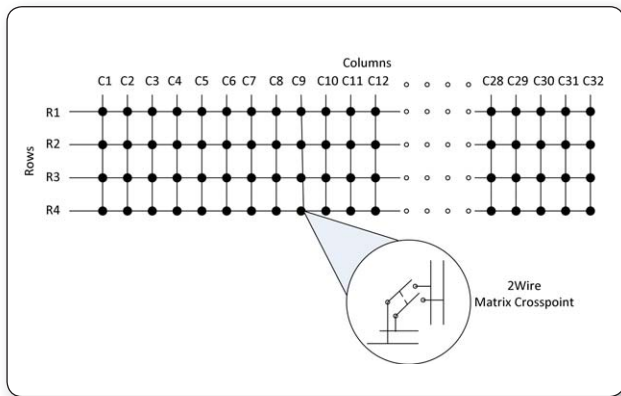


Figure 2. M9120A 4x32, 2-wire, armature relays

M9120A specifications and characteristics

General specifications	
Channels	4x32
Switch type	Medium power, 2-wire armature
Max volts ¹	100 Vrms
Max switch rating/carry rating	2.0 A
Switching characteristics (nominal)	
Max power	60 W
Switch speed (typical)	3 msec
Initial path resistance, differential (typical)	500 mΩ
Connectors	78 Dsub connector block or cable
Bandwidth	7.5 MHz
DC isolation, Ch-Ch, Ch-Gnd	
25C / 40%RH (typical)	1x10 ¹⁰ Ω
25C / 80%RH (typical)	1x10 ⁸ Ω
40C / 80%RH (typical)	1x10 ⁷ Ω
Thermal offset, differential (typical)	8 μV
Relay life, operations ²	
Low power load (typical)	> 1x10 ⁷
Rated power load (typical)	> 1x10 ⁵

1. Not for connection to mains.
2. Relay life is defined as path resistance <1.4 Ω

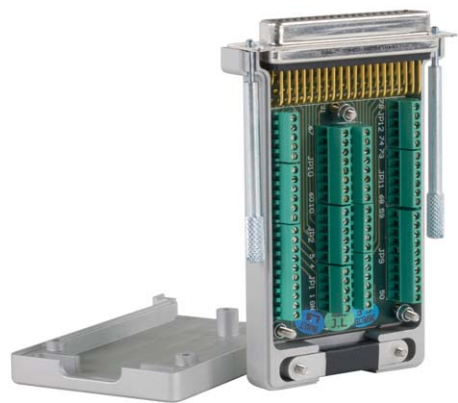


Figure 3. 78-pin Dsub connector block

SPECIFICATIONS AND CHARACTERISTICS

M9121A 4x64, 2-wire PXI high-density matrix switch

The M9121A ultra-high-density 4x64, full-crosspoint switch matrix, offers high-speed reed relay signal switching in a single PXI module. The crosspoints of the high-speed, 2-wire, long-life reed switches can be rapidly activated to route signals in your test system. The matrix relays support signal switching up to 100 Vrms with 10 W maximum power. The module includes a 4-wire-wide bus to route signals between test instruments and your device under test. To create larger matrices, multiple modules can be linked together. For example, four rows of two M9121A modules can be joined to create a 4x128 matrix. Easily connect to the matrix with a high-density, 200-pin low force helix (LFH) connector or cable.

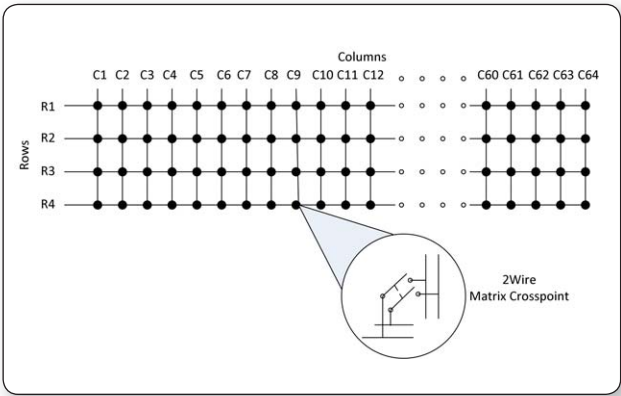


Figure 4. M9121A 4x64, 2-wire, reed relays

M9121A specifications and characteristics

General specifications	
Channels	4x64
Switch type	Ultra-high-density, 2-wire reed
Max volts ¹	100 Vrms
Max switch rating/carry rating	0.5 A
Switching characteristics (nominal)	
Max power	10 W
Switch speed (typical)	< 1 ms
Initial path resistance, differential (typical)	900 mΩ
Connectors	200 LFH connector block or cable
Bandwidth	10 MHz
DC isolation, Ch-Ch, Ch-Gnd, typical per channel	
25C / 40%RH	1x10 ¹⁰ Ω
25C / 80%RH	1x10 ⁷ Ω
40C / 80%RH	1x10 ⁶ Ω
Thermal offset, differential (typical)	6 μV
Relay life, operations ²	
Low power (< 10 V) load (typical)	1x10 ⁹
Up to 100 V (typical)	1x10 ⁶

1. Not for connection to mains, 150 V peak.
2. Relay life is defined as path resistance <2.7 Ω



Figure 5. 200-pin LFH connector block

SPECIFICATIONS AND CHARACTERISTICS

M9122A 8x32, 1-wire, PXI matrix switch

The M9122A high-density, full 8x32 crosspoint switch matrix offers high-voltage switching in a PXI module. The matrix is designed with durable electromechanical switches that are capable of switching up to 100 Vrms, with up to 60 W of power.

Choose from crosspoints arranged in eight rows and 32 columns that can be activated instantaneously to route signals in your test system. The module includes an 8-wire-wide bus to easily route signals between test instruments and the device under test. To create larger matrices, multiple modules can be linked together. For example, create a larger matrix by joining eight rows of two M9122A modules to create a 16x32 matrix. Easily connect to the matrix with a 50-pin Dsub connector or cable.

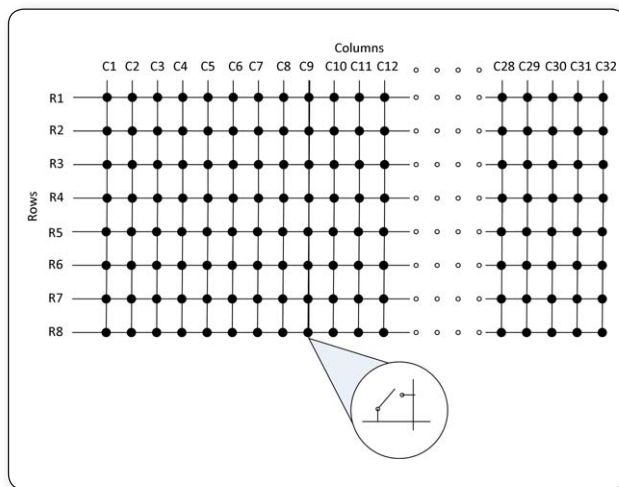


Figure 6. M9122A 8x32, 1-wire, armature relays

M9122A specifications and characteristics

General specifications

Channels	8x32
Switch type	1-wire, armature
Max volts ¹	100 Vrms
Max switch rating/carry rating	2.0 A

Switching characteristics (nominal)

Max power	60 W
Switch speed (typical)	3 msec
Initial path resistance, single ended (typical)	250 mΩ
Connectors	50 Dsub connector block or cable
Bandwidth	5 MHz

DC isolation, Ch-Ch, Ch-Gnd	
25C / 40%RH (typical)	$1 \times 10^{10} \Omega$
25C / 80%RH (typical)	$1 \times 10^8 \Omega$
40C / 80%RH (typical)	$1 \times 10^7 \Omega$
Thermal offset, single-ended (typical)	6 μ V
Relay life, operations ²	
Low power load (typical)	$> 1 \times 10^7$
Rated power load (typical)	$> 1 \times 10^5$

1. Not for connection to mains.

2. Relay life is defined as path resistance $< 1.4 \Omega$

SPECIFICATIONS AND CHARACTERISTICS

General specifications

Slot type	PXI 1-slot		
Connector type	<i>M9120A</i>	<i>M9121A</i>	<i>M9122A</i>
	78 Dsub connector block or cable	200 LFH connector block or cable	50 Dsub connector block or cable

Environmental characteristics^{1, 2}

Temperature	Operating: 0° to 55°C Non-operating: -40° to +70°C
Relative humidity	Relative humidity: Up to 95% R.H. at 40° C, non-condensing, pollution degree 1
EMC	European EMC Directive 2004/108/EC - IEC/EN 61326-1 - CISPR Pub 11 Group 1, Class A - AS/NZS CISPR 11 - ICES/NMB-001 Canadian ISM device ICS-001
Safety	European Low Voltage Directive 2006/95/EC - ETL, UL/IEC/EN 61010-1, 2nd Edition
Altitude under relative humidity	Altitude: up to 4.6 km (15,000 ft)
Warm-up time	15 minutes, max

1. Samples of this product have been type tested in accordance with the Agilent Environmental Test Manual and verified to be robust against the environmental stresses of storage, transportation, and end-use; those stresses include, but are not limited to temperature, humidity, shock, vibration, altitude, and power line conditions.

2. Test methods are aligned with IEC 60068-2 and levels are similar to MIL-PRF-28800F class 3.

Physical characteristics

Dimensions	3U/1-slot PXI/CompactPCI standard - Connector slot compatibility: cPCI (J1), PXI-1, PXIe hybrid slot - Front panel complies with IEEE1101.10 certification and compliance		
Weight	<i>M9120A</i>	<i>M9121A</i>	<i>M9122A</i>
	260 g (.57 lbs)	400 g (.88 lbs)	380 g (.87 lbs)

Power requirements

	<i>M9120A</i>	<i>M9121A</i>	<i>M9122A</i>
+3.3V	0	0	100 mA (typ)
+5V	400 mA (typ)	400 mA (280 mA) (typ)	400 mA (typ), 1.3 A max
+12V	0	0	50 mA (typ)

SPECIFICATIONS AND CHARACTERISTICS

System requirements		
Topic	Windows® 7 and Vista Requirements	Windows® XP Requirements
Operating systems	Windows 7 (32-bit and 64-bit) Windows Vista, SP1 and SP2 (32-bit and 64-bit)	Windows XP, Service Pack 3
Processor speed	1 GHz 32-bit (x86), 1 GHz 64-bit (x64) (no support for Itanium 64)	600 MHz or higher required 800 MHz recommended
Available memory	4 GB minimum 8 GB or greater recommended	3 GB minimum
Available disk space ²⁷	1.5 GB available hard disk space, includes: • 1 GB available for Microsoft .NET Framework 3.5 SP1 ²⁸ • 100 MB for Agilent IO Libraries Suite	1.5 GB available hard disk space, includes: • 1 GB available for Microsoft .NET Framework 3.5 SP1 ²⁸ • 100 MB for Agilent IO Libraries Suite
Video	Support for DirectX 9 graphics with 128 MB graphics memory recommended (Super VGA graphics is supported)	Super VGA (800 x 600) 256 colors or more
Browser	Microsoft® Internet Explorer 7.0 or greater	Microsoft® Internet Explorer 6.0 or greater

1. Because of the installation procedure, less memory may required for operation than is required for installation.

2. NET Framework Runtime Components are installed by default with Windows Vista and Windows 7. Therefore, you may not need this amount of available disk space.

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2. NET Framework Runtime Components are installed by default with Windows Vista and Windows 7. Therefore, you may not need this amount of available disk space.

SOFTWARE

Instrument Connection Software



Agilent IO Library

Agilent IO Libraries Suite offers a single entry point for a connection to modular and traditional instruments. It automatically discovers interfaces, chassis, instruments, and identifies updates to IVI instrument drivers. IO Libraries Suite safely installs in side-by-side mode with NI I/O software.

Free software
Download from A.com
(www.agilent.com/find/iosuite)

Module Management



Agilent Connection Expert

The Agilent Connection Expert is the Graphical User interface included in the IO Libraries Suite that allows you to search for, verify and update IVI instrument and soft front panel drivers for modular and traditional instruments.

Free software
Included in the IO Libraries (www.agilent.com/find/iosuite)

Module Setup and Usage



Agilent Soft Front Panel

The PXI module includes a Soft Front Panel (SFP), a software-based Graphical User Interface (GUI) which enables the instrument's capabilities from your PC.

Included on CD-Rom with module

Programming

	Driver	Development environments	
Drivers	IVI-COM IVI-C LabVIEW	Visual Basic Visual Studio® (VB.NET, C#, C/C++) VEE LabVIEW, LabWindows/CVI, MATLAB	Included on CD-Rom with module or Download from A.com

Programming Assistance



Command Expert

Assists in finding the right instrument commands and setting correct parameters. A simple interface includes documentation, examples, syntax checking, command execution and debug tools to build sequences for integration in Excel, MATLAB, Visual Studio, LabVIEW, VEE, SystemVue.

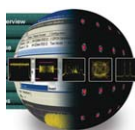
Free software
Download from A.com
(www.agilent.com/find/commandexpert)

Programming examples

Each module includes programming Program examples available for LabVIEW, LabWindows/CVI, Visual Studio C, C++, C#, Visual Basic, and MATLAB

Download from A.com

Signal Generation Software



Signal Studio

Suite of signal-creation tools which provides performance-optimized reference signals for: W-CDMA/HSPA+, cdma2000/1xEV-DO, GSM/EDGE/Evo, LTE/LTE-Advanced FDD, LTE/LTE-Advanced TDD, TD-SCDMA/HSDPA, WLAN 802.11a/b/g/n/ac, and Bluetooth.

Licensed software
(www.agilent.com/find/signalstudio)



System View

A system-level EDA that accelerates design and verification at the physical layer where advanced digital signal processing meets RF.

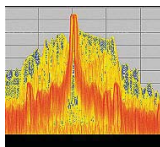
Licensed software
(www.agilent.com/find/eesof-systemvue)

MATLAB

Interactive tools and command-line functions for instrument control and data analysis tasks such as signal processing, signal modulation, digital filtering, and curve fitting.

Licensed software

Signal Analysis Software



Vector Signal Analysis

89600 VSA software sees through the complexity of emerging and existing industry standards serving as your window into complex signal interactions.

Licensed software
(www.agilent.com/find/vsa)

SETUP AND CALIBRATION SERVICES

Assistance		
On day startup assistance	An Agilent Technologies applications engineer will help you get started and install the modules in a chassis, configure the controller, load software and make first measurements.	Included in base configuration
Calibration and Traceability		
Factory Calibration	Agilent's modular products M9120A, M9121A, M9122A are factory calibrated and shipped with an ISO-9002, NIST-traceable calibration certificate.	Included in base configuration
Calibration Cycle	A one year calibration cycle is recommended.	
Calibration Sites	• At Agilent Worldwide Service Centers • On-site by Agilent • By self-maintainers	More information on www.agilent.com/find/infoline
R1282A Annual Calibration Service	• Agilent Calibration • Agilent Calibration + Uncertainties • Agilent Calibration + Uncertainties + Guardbanding • Standards Compliance • ANSI Z540.3-2006, ISO 17025:2005, ANSI Z540-1-1994, ISO 9001:2008	Additional service, not included in the warranty

CONFIGURATION AND ORDERING

Hardware

Model	Description
Each switch includes:	Getting started guide, software drivers, and Agilent I/O libraries
M9120A	PXI matrix switch: 4x32, 2-wire, 100V/2A, EM relays
M9121A	PXI high-density matrix switch: 4x64, 2-wire, 100V/0.5A, reed relays
M9122A	PXI matrix switch: 8x32, 1-wire, 100V/2A, armature relays

Accessories

M9120A	Description
Y1181A	PXI connector block: 78-pin, shielded, female DSub
Y1187A	PXI connector cable: 78-pin, male-to-female, 1 meter
Y1188A	PXI connector cable: 78-pin, male-to-female, 2 meter

M9121A	Description
Y1182A	PXI connector block: 200-pin, shielded, male
Y1189A	PXI connector cable: 200-pin, LFH male to four 50 pin Dtype female connectors, 1 meter
Y1190A	PXI connector cable: 200-pin, LFH male to four 50 pin Dtype female connectors, 2 meter

M9122A	Description
Y1180A	PXI connector block: 50-pin, female DSub
Y1185A	PXI connector cable: 50-pin, male-to-female, 1 meter
Y1186A	PXI connector cable: 50 pin, male-to-female, 2 meter

Related products

Model	Description
M9018A	18-slot PXIe chassis: 18-slot, 3U, 8GB/s
M9021A	PCIe® cable interface: Gen 2, x8
M9045B	PCIe ExpressCard adaptor: Gen 1
Y1200B	PCIe cable: x4 to x8, 2.0m (used with M9045B)
M9048A	PCIe PC adapter
Y1202A	PCIe cable: x8, 2.0m (used with M9047B)

Software

Model	Description
Supported operating systems	Microsoft Windows® XP (32-bit), Microsoft Windows® Vista (32/64-bit) Microsoft Windows® 7 (32/64-bit)
Standard compliant drivers	IVI-COM, IVI-C, LabVIEW, MATLAB
Supported application development environments (ADE)	VisualStudio® (VB.NET, C#, C/C++), LabVIEW, LabWindows/CVI, MATLAB
Agilent IO Libraries	Includes: VISA Libraries, Agilent Connection Expert, IO Monitor

Recommended chassis configuration

For the ultimate in speed and flexibility, combine your switches with other PXI modules in the Agilent M9018A PXIe chassis as follows:

- Select a PXIe system module, PCIe cable interface, or embedded controller (the Agilent M9021A is recommended)
- If an external computer is being used, select an appropriate PC interface card (the Agilent M9047A is recommended with an external PC)
- Select an appropriate cable to connect the computer interface board to the system module (the Y1202A is recommended to connect the M9047A and M9021A)
- Select rack mount and EMC filler panel kits as required



Definitions for specifications

Specifications describe the warranted performance of calibrated instruments that have been stored for a minimum of 2 hours within the operating temperature range of 0 to 55°C, unless otherwise stated, and after a 45 minute warm-up period. Data represented in this document are specifications unless otherwise noted.

Characteristics describe product performance that is useful in the application of the product, but that is not covered by the product warranty. Characteristics are often referred to as Typical or Nominal values.

- *Typical describes characteristic performance, which 80% of the instruments will meet when operated over a 20 to 30°C temperature range. Typical performance is not warranted.*
- *Nominal describes representative performance that is useful in the application of the product when operated over a 20 to 30°C temperature range. Nominal performance is not warranted.*

Note: All graphs contain measured data from several units at room temperature unless otherwise noted.

WARRANTY AND CALIBRATION

Advantage Services: Calibration and Warranty

Agilent Advantage Services is committed to your success throughout your equipment’s lifetime.

Warranty

	Standard warranty is 1 year ¹
R-51B-001-3C	1 year return-to-Agilent warranty extended to 3 years

1. Excludes relay wear-out.



The Modular Tangram

The four-sided geometric symbol that appears in this document is called a tangram. The goal of this seven-piece puzzle is to create identifiable shapes—from simple to complex. As with a tangram, the possibilities may seem infinite as you begin to create a new test system. With a set of clearly defined elements—hardware, software—Agilent can help you create the system you need, from simple to complex.



Challenge the Boundaries of Test Agilent Modular Products

PXI www.pxisa.org

AXIe www.axiestandard.org

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www.agilent.com
www.agilent.com/find/modular
www.agilent.com/find/pxi-switch

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China	800 810 0189
Hong Kong	800 938 693
India	1 800 112 929
Japan	0120 (421) 345
Korea	080 769 0800
Malaysia	1 800 888 848
Singapore	1 800 375 8100
Taiwan	0800 047 866
Other AP Countries	(65) 375 8100

Europe & Middle East

Belgium	32 (0) 2 404 93 40
Denmark	45 70 13 15 15
Finland	358 (0) 10 855 2100
France	0825 010 700*
	*0.125 €/minute
Germany	49 (0) 7031 464 6333
Ireland	1890 924 204
Israel	972-3-9288-504/544
Italy	39 02 92 60 8484
Netherlands	31 (0) 20 547 2111
Spain	34 (91) 631 3300
Sweden	0200-88 22 55
United Kingdom	44 (0) 118 9276201

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