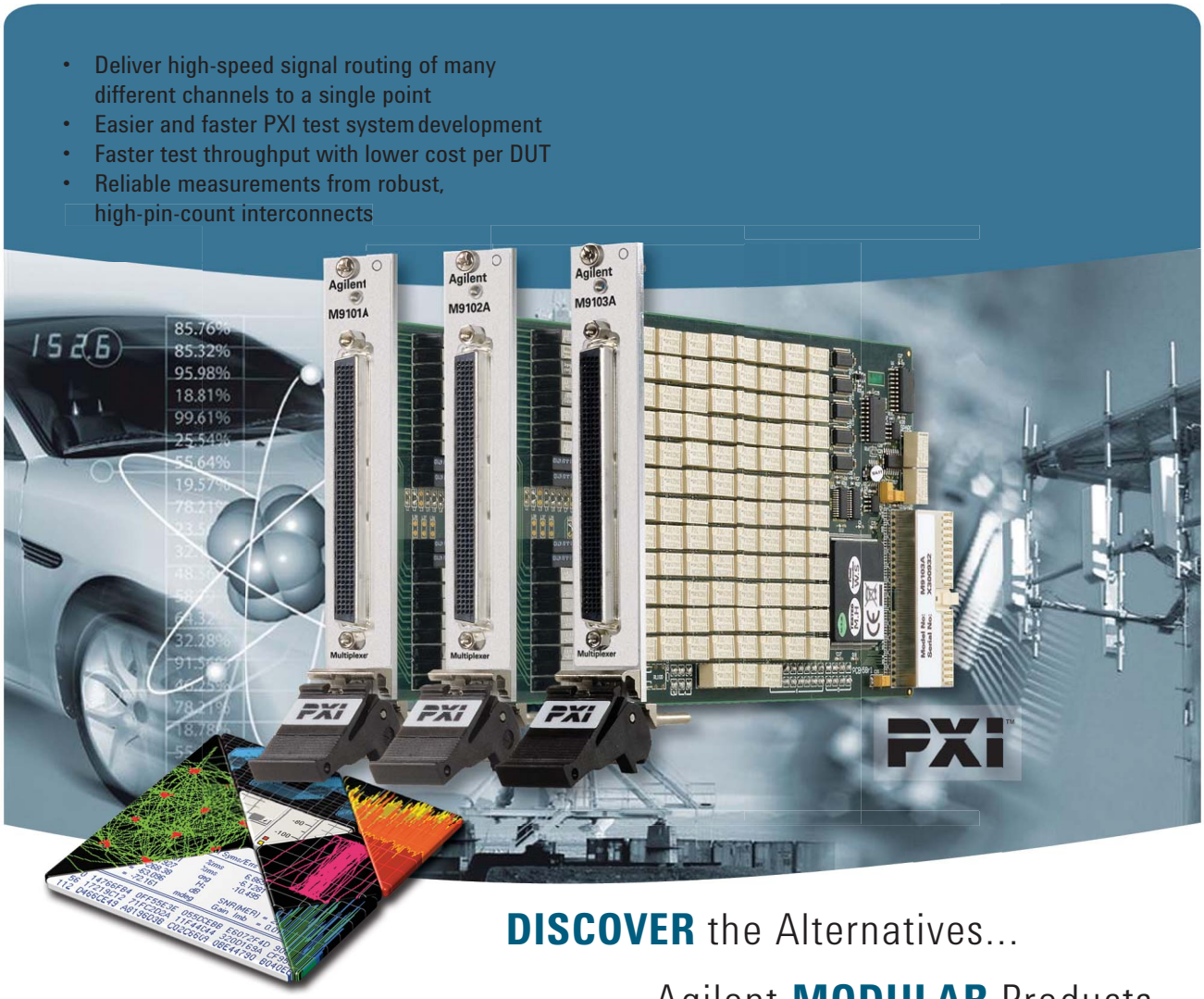
Agilent PXI Multiplexer Switch Modules

M9101A, M9102A, M9103A

Data Sheet

- Deliver high-speed signal routing of many different channels to a single point
- Easier and faster PXI test system development
- Faster test throughput with lower cost per DUT
- Reliable measurements from robust, high-pin-count interconnects



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OVERVIEW

Product description

The PXI multiplexer switch modules deliver high-speed signal routing of many different channels to a single point, and are ideal for routing multiple analog signals to a measurement device in automated test environments (ATE) or data acquisition systems.

These switches can operate in a break-before-make mode, ensuring no two points are connected at the same time, or, when needed, allowing multiple channels to be connected simultaneously. The modules include an isolation switch that connects the closed channels to a module common, which minimizes the capacitive loading and leakage currents in larger multiplexer systems. Expand multiplexers by linking the common connections of multiple PXI cards.

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

- High-speed, long-life reed relays or higher power armature relays
- Modules operate in break-before-make mode ensuring only one channel is connected at a time
- Durable connection options
- Software drivers support the most common programming environments
- Optional connector block, soft front panels and Agilent Connection Expert
- PXI Chassis connector compatibility: cPCI (J1), PXI-1 (J1 only), PXIe hybrid slot

Customer values

- Get the performance you need with 500 µsec switches or up to 60W per channel
- Ensure no two points are connected at the same time
- Scan many points in a compact space
- Work in your programming environment of choice and reduce development time
- Fast and easy installation and configuration

EASY SETUP ... TEST ... AND MAINTENANCE

Hardware platform

Compliance

The multiplexer 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 16.0 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 Multiplexer 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 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.

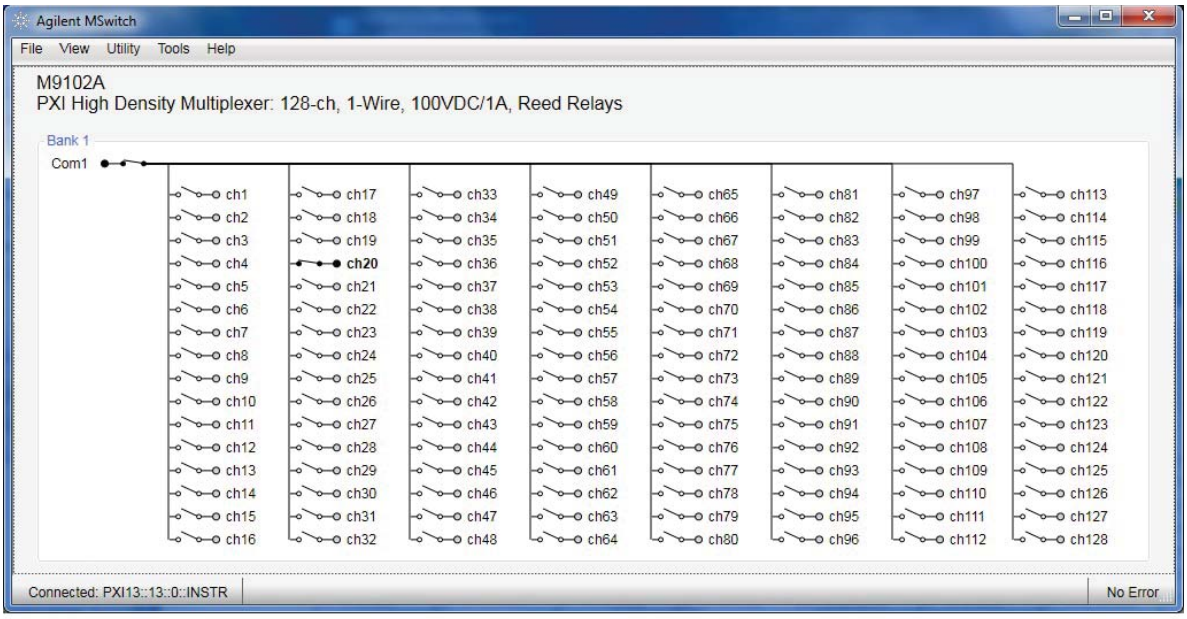


Figure 1. Multiplexer switch soft front panel

SPECIFICATIONS AND CHARACTERISTICS

Specification and characteristic summary

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

Multiplexer switch specification and characteristic summary

Multiplexer switches	Description	Type # slots	Channels	Switch speed *(typical)*	Max voltage	Current switch and carry	Relay type	Connectors
M9101A	High-density multiplexer	PXI 1 slot	64 channels 2-wire	1000 µsec[1]	100 Vrms[2]	0.5A/1.0A	Reed	200 LFH connector block or cable
M9102A	High-density multiplexer	PXI 1 slot	128 channels 1-wire	1000 µsec[1]	100 Vrms[2]	0.5A/1.0A	Reed	200 LFH connector block or cable
M9103A	High-density multiplexer	PXI 1 slot	99 channels 1-wire	4.5 µsec[1]	100 Vrms[2]	1.0A/1.0A	Armature	200 LFH connector block or cable

1. Contact factory for more information.
2. Not for connection to mains.

M9101A PXI high-density multiplexer

The M9101A high-density, 64-channel multiplexer has been designed to route many different channels to a single point. The relays are capable of switching up to 100 Vrms, with up to 20 W of power, and are ideal for routing analog signals to test instruments in automated test environments (ATE) or data acquisition systems. Each channel has a high and a low connection for 2-wire switching, while an isolation switch connects all closed channels to the module common to minimize capacitive loading and leakage currents in large multiplexer configurations. Easily connect the multiplexer with a high-density, 200-pin low force helix (LFH) connector or cable.

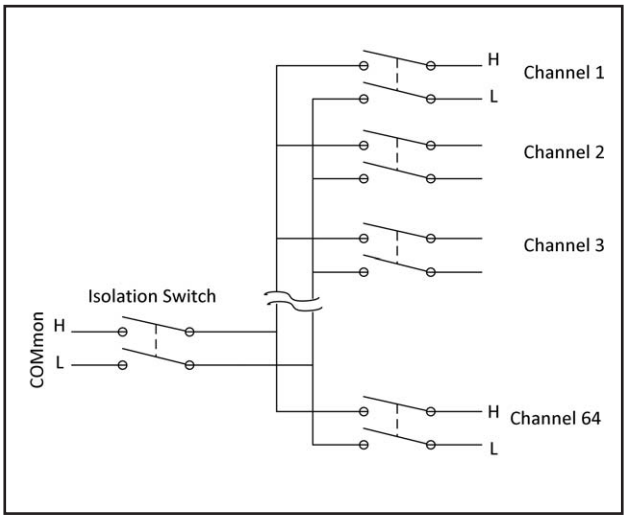


Figure 2. M9101A 64-ch, 2-wire, reed relays

M9101A specifications and characteristics

General specifications	
Channels	64
Switch type	High-density, 2-wire reed
Max volts[1]	100 Vrms
Max switch rating/carry rating	0.5A/1.0A
Switching characteristics, nominal	
Max power	10 W
Switch speed *(typical)*[2]	< 1000 usec[2]
Initial path resistance, differential *(typical)*	800 mΩ
Connectors	200 LFH connector block or cable
Bandwidth	5 MHz
DC isolation, Ch-Ch, Ch-Gnd	
25C / 40%RH *(typical)*	$1x10^9\Omega$
25C / 80%RH *(typical)*	$1x10^8\Omega$
40C / 80%RH *(typical)*	$1x10^6\Omega$
Thermal offset	Contact factory
Relay life, operations[2,3]	
Low power load *(typical)*	$1x10^9$
Rated power load *(typical)*	$> 5x10^6$

1. Not for connection to mains.
2. Preliminary. Contact factory for latest data.
3. Switch modules are considered a "wear-out" item, and it is normal for relay performance to degrade over time; life expectancy and performance depends on the specific application and use model.

Figure 2. 200 LFH connector block

M9102A PXI high-density multiplexer

The M9102A high-density, 128-channel multiplexer features 1-wire, high-speed, long-life reed relays capable of switching up to 100 Vrms, with up to 20 W of power. The modules' isolation switch connects the closed channels to the module common. Create a larger multiplexer by linking the common connections on multiple PXI cards. Easily connect the multiplexer with a high-density, 200-pin low force helix (LFH) connector or cable.

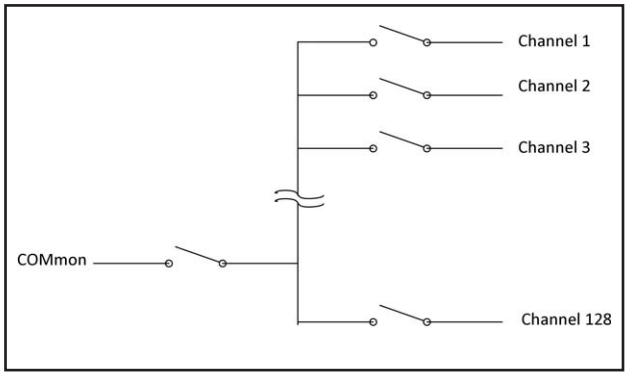


Figure 4. M9102A 128-ch, 1-wire, reed relays

M9101A specifications and characteristics

General specifications	
Channels	128
Switch type	High-density, 1-wire reed
Max volts[1]	100 Vrms
Max switch rating/carry rating	0.5A/1.0A
Switching characteristics, nominal	
Max power	10W
Switch speed *(typical)*[2]	< 1000 usec[2]
Initial path resistance, single ended *(typical)*	400 mΩ
Connectors	200 LFH connector block or cable
Bandwidth	5 MHz
DC isolation, Ch-Ch, Ch-Gnd	
25C / 40%RH *(typical)*	$1x10^9\Omega$
25C / 80%RH *(typical)*	$1x10^8\Omega$
40C / 80%RH *(typical)*	$1x10^6\Omega$
Thermal offset	Contact factory
Relay life, operations[2,3]	
Low power load *(typical)*	$1x10^9$
Rated power load *(typical)*	$> 5x10^6$

1. Not for connection to mains.
2. Preliminary. Contact factory for latest data.
3. Switch modules are considered a "wear-out" item, and it is normal for relay performance to degrade over time; life expectancy and performance depends on the specific application and use model.

M9103A PXI high-density multiplexer

The M9103A is a high-density, 99-channel, high-powered armature relay multiplexer. Each channel has a high and low for 2-wire switching and can switch up to 100 Vrms, with up to 60 W of power. The modules' isolation switch connects the closed channels to the module common. Easily connect to the multiplexer with a high-density, 200-pin low force helix (LFH) connector or cable.

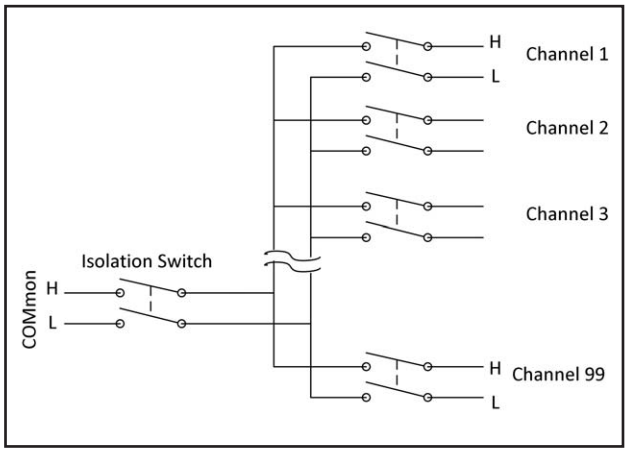


Figure 5. M9103A 99-ch, 2-wire, EM relays

M9101A specifications and characteristics

General specifications	
Channels	99
Switch type	2-wire armature
Max volts[1]	100 Vrms
Max switch rating/carry rating	1A
Switching characteristics, nominal	
Max power	60 W
Switch speed *(typical)*	4.5 msec[2]
Initial path resistance, differential *(typical)*	470 mΩ
Connectors	200 LFH connector block or cable
Bandwidth	1 MHz
DC isolation, Ch-Ch, Ch-Gnd	
25C / 40%RH *(typical)*	$1x10^{9}\Omega$
25C / 80%RH *(typical)*	$1x10^{7}\Omega$
40C / 80%RH *(typical)*	$1x10^{5}\Omega$
Thermal offset, differential *(typical)*	5 µV
Relay life, operations	
Low power load *(typical)*	$> 1x10^{7}$
Rated power load *(typical)*	$> 1x10^{5}$

1. Not for connection to mains.

2. Preliminary. Contact factory for latest data.

SPECIFICATIONS AND CHARACTERISTICS, CONTINUED

General specifications	
Slot type	PXI 1 slot
Connector type	200 LFH connector block or cable

Environmental specifications	
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, IEC 60664-1 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

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			
	M9101A	*M9102A*	*M9103A*
	220 g (.49 lbs)	220 g (.49 lbs)	230 g (.51 lbs)

Power requirements			
	M9101A	*M9102A*	*M9103A*
+3.3V	0	0	0
+5V	134 mA (280 mA) *(typ)*	134 mA (280 mA) *(typ)*	300 mA *(typ)*
+12V	0	0	0

SPECIFICATIONS AND CHARACTERISTICS, CONTINUED

System requirements			
Operating systems	Windows® XP, Service Pack 3 or later (32-bit)	Windows® Vista, SP1 and SP2 (32-bit and 64-bit), Business, Ultimate, Enterprise, Home Basic, and Home Premium	Windows® 7 (32-bit and 64-bit) Starter, Home Basic, Home Premium, Professional, Ultimate, Enterprise
Processor speed	600MHz or higher required 800MHz recommended	1Ghz 32-bit (x86), 1GHz 64-bit (x64),no support for Itanium64	1GHz 32-bit (x86), 1GHz 64-bit (x64), no support for Itanium 64
Available memory	256 MB minimum (1 GB or greater recommended)	1 GB minimum	1 GB minimum
Available disk space[1]	1.5 GB available hard disk space, includes: · 1GB available for Microsoft .NET Framework 3.5 SP1[2] · 100MB for Agilent IO Libraries Suite	1.5 GB available hard disk space, includes: · 1GB available for Microsoft .NET Framework 3.5 SP1[2] · 100MB for Agilent IO Libraries Suite	1.5 GB available hard disk space, includes: · 1GB available for Microsoft .NET Framework 3.5 SP1[2] · 100MB for Agilent IO Libraries Suite
Video	Super VGA (800x600) 256 colors or more	Support for DirectX 9 graphics with 128MB graphics memory recommended (Super VGA graphics is supported)	Support for DirectX 9 graphics with 128MB graphics memory recommended (Super VGA graphics is supported)
Browser	Microsoft® Internet Explorer 6.0 or greater	Microsoft® Internet Explorer 7 or greater	Microsoft® Internet Explorer 7 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.

CONFIGURATION AND ORDERING

Hardware

Model	Description
Each switch includes:	Getting started guide, software drivers, and Agilent I/O libraries
M9101A	PXI high-density multiplexer: 64-ch, 2-wire, 100 Vrms/1A, reed relays
M9102A	PXI high-density multiplexer: 128-ch, 1-wire, 100 Vrms/1A, reed relays
M9103A	PXI high-density multiplexer: 99-ch, 2-wire, 100 Vrms/1A, armature relays

Related products

Model	Description
M9018A	18-slot PXIe chassis: 18-slot, 3U, 8GB/s
M9021A	PCIe® cable interface: Gen 2, x8
M9045A	PCIe ExpressCard adaptor: Gen 1
Y1200A	PCIe cable: x4 to x8, 2.0m (used with M9045A)
M9047A	PCIe desktop PC adapter: Gen 2, x8
Y1202A	PCIe cable: x8, 2.0m (used with M9047A)

Accessories

Model	Description
Y1182A	PXI connector block: 200-pin, shielded, male
Y1189A	PXI connector cable: 200-pin, male-to-female, 1 meter
Y1190A	PXI connector cable: 200-pin, male-to-female, 2 meter

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 recom mended)
- If an external computer is being used, select an appro priate PC interface card (the Agilent M9047A is recom mended 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 other wise 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 perfor mance is not warranted.*

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

WARRANTY AND CALIBRATION

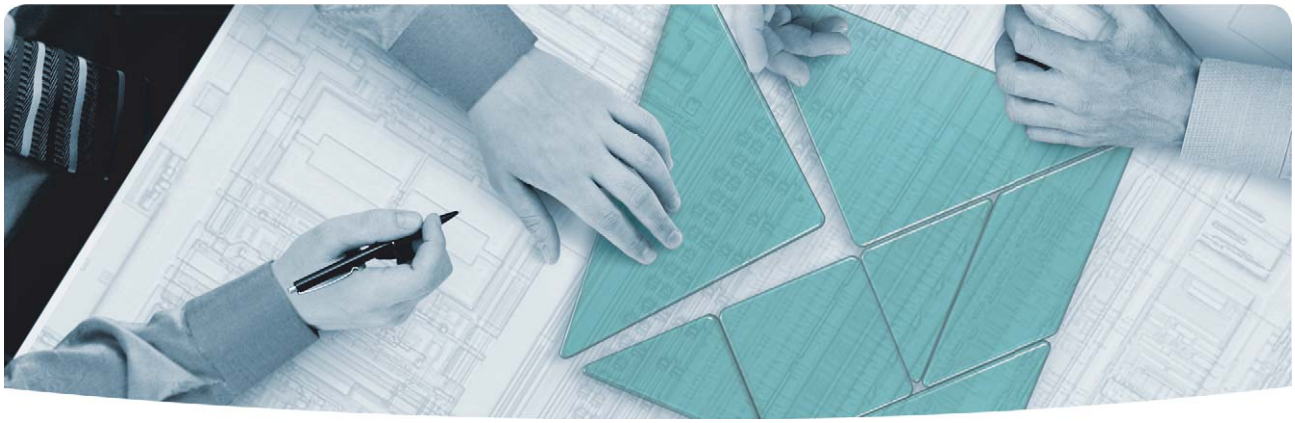
Advantage Services: Calibration and Warranty

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 throughout this document is called a tangram. This seven-piece puzzle originated in China a few centuries ago. The goal is to create shapes—from simple to complex—that form an identifiable silhouette. 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—architecture, hardware, software—Agilent can help you create the system you need, from simple to complex.

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Agilent Advantage Services is committed to your success throughout your equipment's lifetime. We share measurement and service expertise to help you create the products that change our world. To keep you competitive, we continually invest in tools and processes that speed up calibration and repair, reduce your cost of ownership, and move us ahead of your development curve.

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