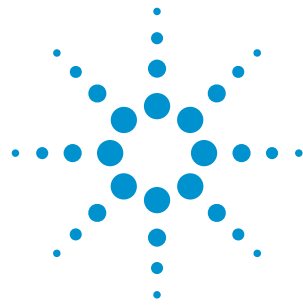


Agilent PXI Digital I/O Control Module

M9187A



Data Sheet

- Flexible configuration of 32 channels for independent input and output or configurable I/O
- Programmable input thresholds and flexible output drive capability
- Robust input and output protection
- Easier and faster PXI test system development
- Reliable measurements from robust, high-pin-count interconnects

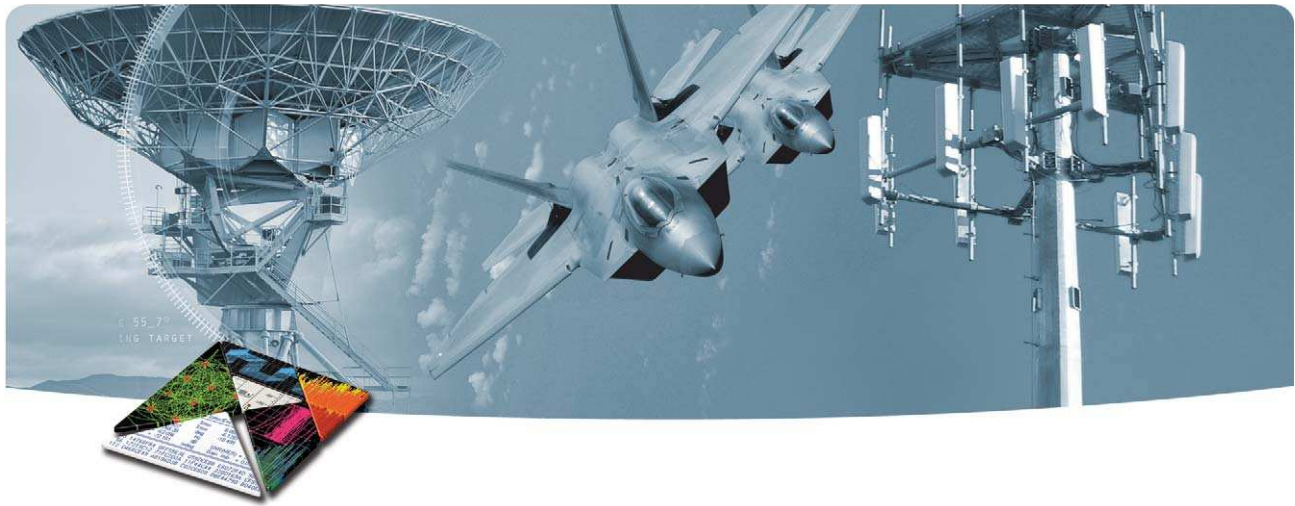


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... Agilent **MODULAR** Products



Agilent Technologies



OVERVIEW

Product description

The M9187A module can be configured as 32 channels of independent input and output or 32 channels of configurable I/O. The digital input is designed to accept a wide range of signal inputs by using a configurable signal input threshold. This allows you to read and compare input signals to specific logic high and low voltages, and then acquire the status of individual or all 32 channels with a single command. The digital outputs offer flexibility in configuration with active low- or high-side drive and support for open-collector/open-drain connections.

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

- 32 input channels and 32 output channels
- 100 V input protection and fully protected outputs
- Software drivers support the most common programming environments
- Optional connector block, soft front panels, and Agilent Connection Expert

Customer values

- Provides the flexibility to meet your testing needs
- Reliable performance
- 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 digital I/O module is PXI compliant with a J1 connector and can be used in PXI chassis with cPCI (J1), PXI-1 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 selection of complementary PXI products are currently available, such as multimeters, waveform generators, local oscillators, and digitizers.

Software platform

IO Libraries Suite

Agilent IO Libraries Suite offers fast and easy instrument connections and now extends to modular instruments. IO Libraries Suite 16.0 (or greater) 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 digital I/O module 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 setup 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 digital I/O graphical user interface guides developers through module setup so users can quickly configure the switch parameters. More sophisticated functions are also available through the wide selection of instrument program interfaces.

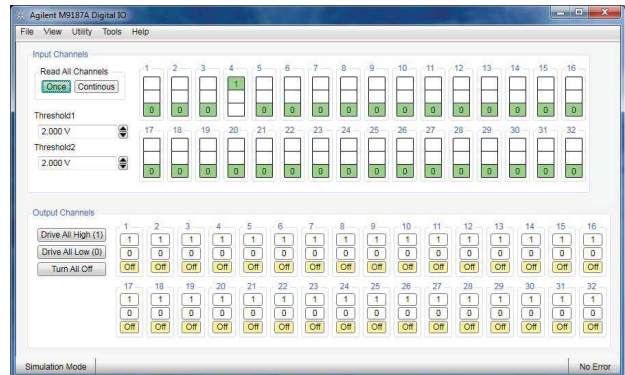


Figure 1. Digital I/O soft front panel

SPECIFICATIONS AND CHARACTERISTICS

M9187A PXI 32-ch digital I/O

The 32 input channels are attenuated, then multiplexed to a programmable variable threshold detector (configurable between 0.3 and 50 V) that converts input analog signals to digital signals by comparing the input voltages to the user-selected logic high and low voltages. The digital inputs are designed for input signals that are static, or have less frequently changing inputs (< 10 KHz).

The digital outputs are capable of driving relay coils, alarms, and visual indicators. Each of the 32 output channels can either drive the output high and source up to 0.4 A, or drive the output low and sink up to 0.5 A to the GND terminal. An external voltage supply (+5 V to +50 V) is required for the high-side voltage source, enabling the module to drive high-capacity loads. The low-side does not require an external voltage source allowing use in open collector or open drain driver applications.

The digital I/O module is designed for use in tough test environments and includes protection from over-voltage, over-current, and thermal overload. Connect an input channel to an output channel using external wiring to allow the input channel to verify that the output connection is being driven as expected, or to create software-configurable I/O.

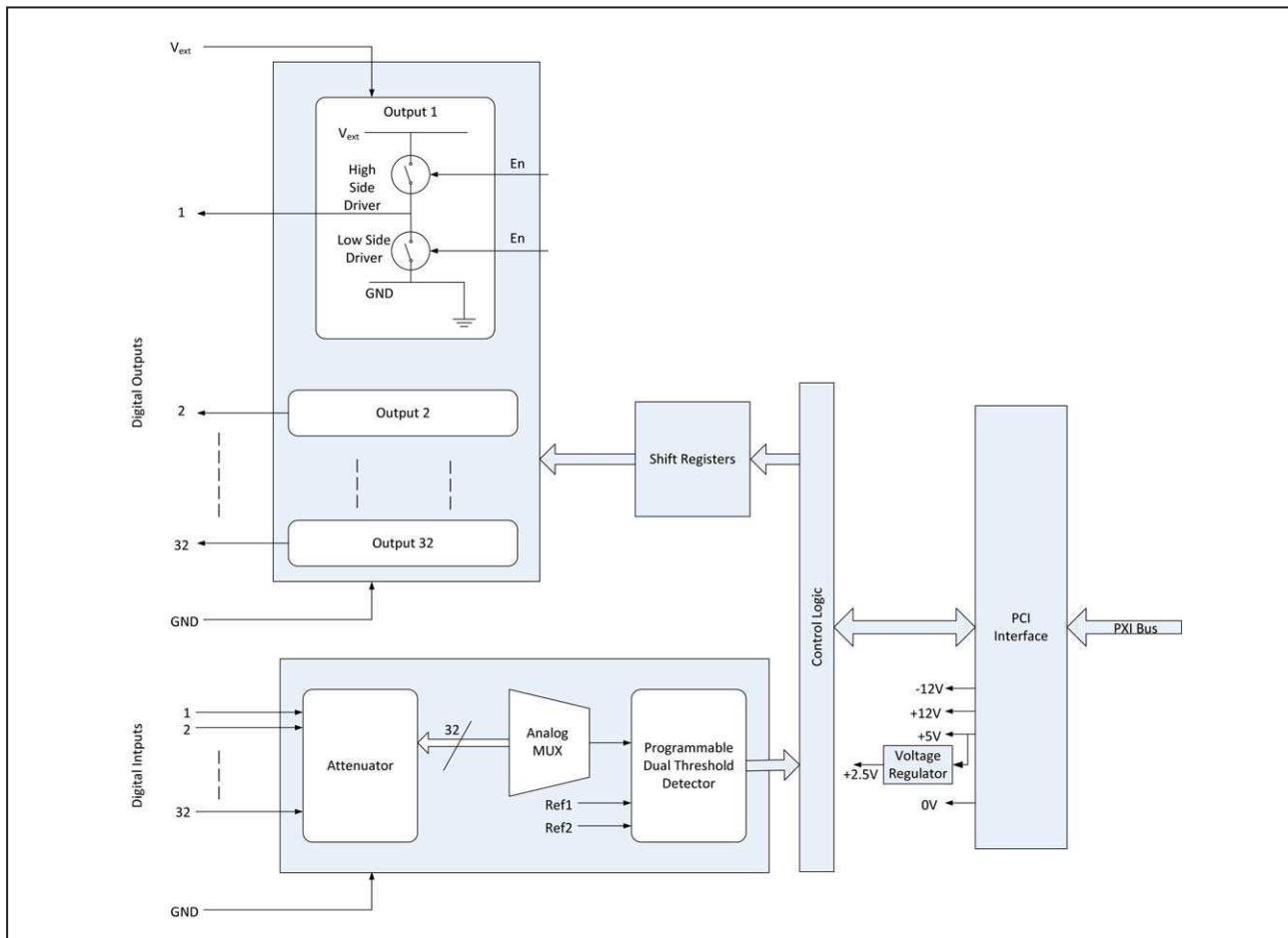


Figure 2. M9187A 32 inputs, 32 outputs, 0.3V to 50V

SPECIFICATIONS AND CHARACTERISTICS

General specifications	
Channels	32 input and 32 output or 32 bit I/O
Input/output specifications	
Input specifications ¹	
Channels	32 inputs
Impedance (<i>typical</i>)	$1 \times 10^6 \Omega$, $\pm 5\%$
Max voltage ⁷	+50 V
Logic threshold (common to all inputs)	Dual levels
Voltage range (for each level)	+0.3 V to +50 V
Voltage accuracy (<i>typical</i>)	$\pm 200 \text{ mV}^2$
Readback settling time ³	50 μs
Output specifications ¹	
Channels	32 outputs
Max voltage	+50 V
Output states, individually controlled per channel	Driven high, driven low, off
Low-side driver ⁴	
Max current	500 mA per channel, 10 A total per module
Resistance (at max current) (<i>typical</i>)	<700 m Ω
High-side driver	
V ^{ext} (user supplied, common to all outputs) ⁵	+5 to +50 V
Min drive voltage (at max current)	V ^{ext} - 1.5 V
Max current	400 mA per channel, 10A total per module
Output protection ⁶	Current limited, over voltage, thermal

1. Input and output channels may be wired together by the user for software configurable I/O.

2. Preliminary. Contact factory for latest data.

3. Read back settling time required after threshold change, input change, or channel selection.

4. V^{ext} connection not required for open collector/open drain low-side drive.

5. Relative to front panel ground connections.

6. Overvoltage limit allows direct drive of inductive loads such as relay coils.

7. Inputs are overvoltage protected to 100V.

SPECIFICATIONS AND CHARACTERISTICS

General specifications

Slot type	PXI 1 slot
Connector type	78-pin 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	<ul style="list-style-type: none">• 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	0.16 kg (0.35 lbs)

Power requirements (max), (nominal)

5 V	100 mA
3.3 V	0 mA
+12 V	50 mA
-12 V	50 mA

SPECIFICATIONS AND CHARACTERISTICS

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
Digital I/O includes:	Getting started guide, software drivers, and Agilent I/O libraries
M9187A	PXI digital I/O: 32 inputs, 32 outputs, 0.3V to 50V

Accessories

Model	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

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:

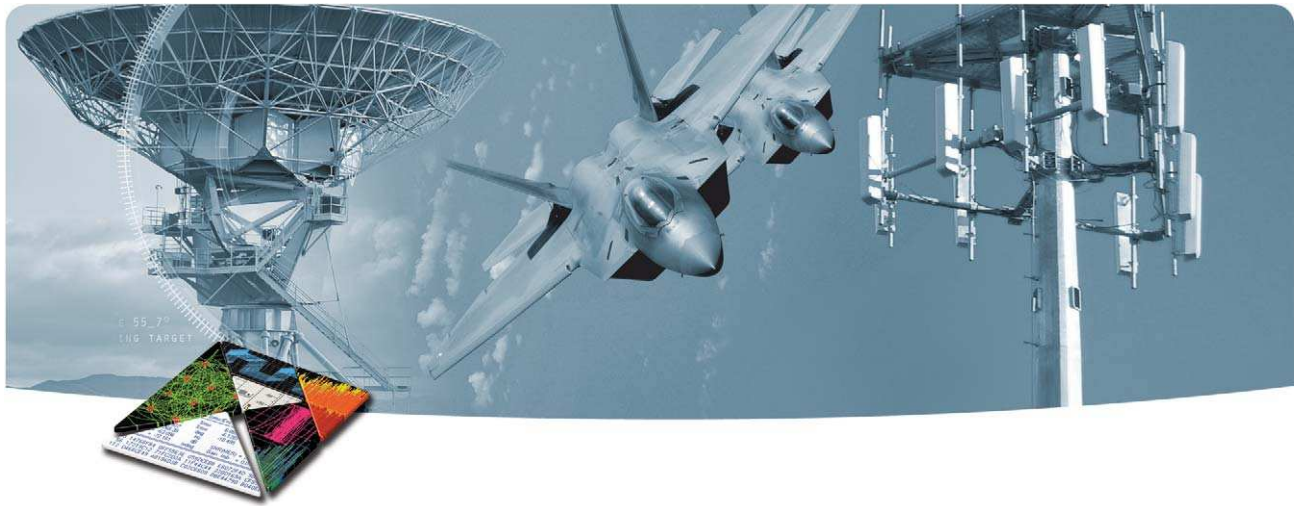
- Select a PXIe system module, PCIe cable interface, or embedded controller (the Agilent M9021A is recommended)
- If an external computer is being used, select an appropriate PC interface card (the Agilent M9047A is recommended with an external PC)
- Select an appropriate cable to connect the computer 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

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)

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



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.

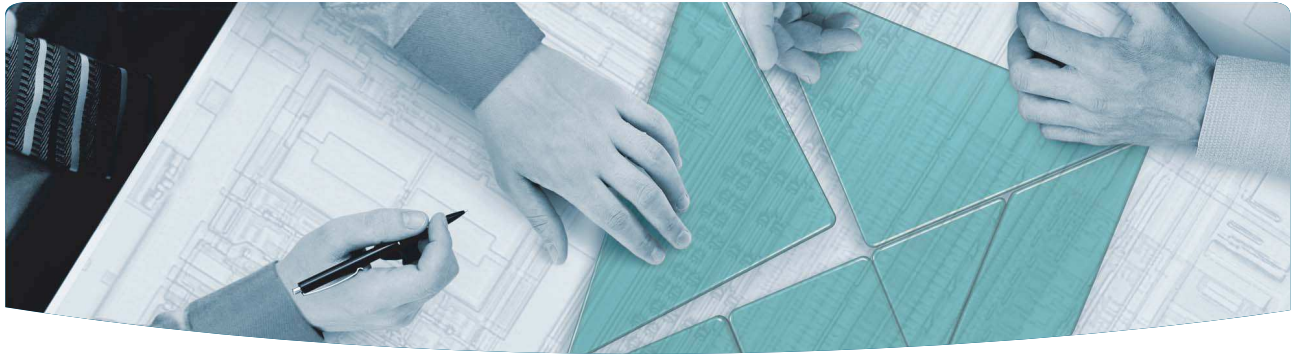
WARRANTY AND CALIBRATION

Advantage Services: Calibration and Warranty

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

Warranty

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



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.



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