Agilent M9360A
PXI Attenuator/
Preselector

100 kHz to 26.5 GHz

Data Sheet
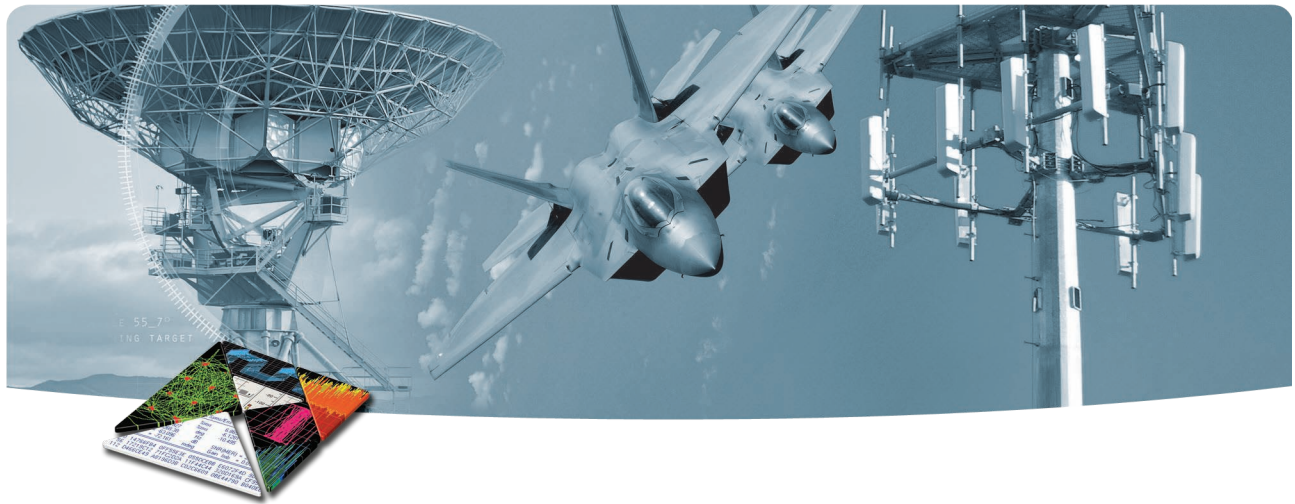

Challenge the Boundaries of Test
Agilent Modular Products

Agilent Technologies

OVERVIEW

Introduction

With attributes that provide enough performance to satisfy even the most demanding spectrum analysis applications, the Agilent M9360A PXI Attenuator/Preselector is a 3-slot, 3U, combination module providing attenuation and preselection signal conditioning for numerous system applications with an electronically tuneable, 4-stage, YIG-tuned filter (YTF) based RF-input pre-selector, and broadband switches for signal distribution.

Product Description

The M9360A provides the necessary input signal conditioning and routing for the Agilent M9351A and M9361A downconverters. It employs a 70 dB (10 dB/step) input step attenuator that enables a dynamic range of +30 dBm to −160 dBm, typical. The module uses broadband switches to distribute the incoming RF signal to other PXI modules for further processing with minimal signal degradation. In addition, the electronically tuneable YTF allows for greater than 80 dB input image rejection and greater than 40 MHz of instantaneous bandwidth. For additional bandwidth, the M9360A offers a bypass path that automatically routes signals around the band limited preselector. In addition to functioning as an analog front end for downconversion applications, the M9360A is also useful for providing RF and microwave attenuation or band-pass filtering.

When integrated in the Agilent M9392A PXI Vector Signal Analyzer, and combined with the 89600 VSA software, the M9360A provides a complete signal analyzer solution enabling analysis of communications, radar and avionics signals to 26.5 GHz in a modular open-system standard.

Applications

- Aerospace and defense
- Wireless communications
- Radar and wideband signal capture

Features

- Frequency range: 100 kHz to 26.5 GHz
- 35 MHz bandwidth (preselected, < 3 GHz)
- 40 MHz bandwidth (preselected, ≥ 3 GHz)
- Automatic signal routing for additional bandwidth with bypass path
- 2.75 GHz to 26.5 GHz (YIG tuned filter path)
- 70 dB step attenuator
- Chassis slot compatibility: cPCI (J1), PXI-1, PXIe Hybrid
- PXI form factor

Customer values

- Multiple programmatic interfaces enable easy integration into existing test environments and reduced development time
- Analyze large bandwidth signals
- Included drivers, soft front panels and programming examples in Visual Studio (VB.NET, C#, C/C++), VEE, LabVIEW, LabWindows/CVI, and MATLAB
- Conforms to Modular Open Systems Approach (MOSA)

EASY SETUP ... TEST ... AND MAINTENANCE

Hardware platform

Compliance

The M9360A is PXI compliant, using either a cPCI (J1), PXI-1, or PXIe Hybrid slot. Designed to benefit from fast data interfaces, the products can be integrated with other test and automation modules in cPCI(J1), PXI-1, or PXIe Hybrid chassis slots. The PXI format offers high perfor-mance in a small, rugged package. It is an ideal deploy-ment platform for many automated test systems.
A wide array of complementary PXI products are currently available. Products include multimeters, waveform genera-tors, local oscillators, digitizers, and switch multiplexers.

Software platform

IO Libraries

Agilent IO Libraries Suite offers FAST and EASY connec-tion to instruments and the newest version extends that capability to include modular instruments.

The Agilent IO Libraries Suite helps you display ALL of the modules in your system, whether they are PXI, PXIe, or PCIe. From here you can view information about the installed software or start the module's soft front panel. Launch the module's soft front panel directly from Agilent Connection Expert.

Find the right driver from Agilent Connection Expert.

Drivers

Agilent provides instrument drivers that work with your choice of software that saves time and preserves software and hardware investments. Agilent modular instruments come with IVI-COM, IVI-C, LabVIEW and MATLAB software drivers that work in the most popular T&M devel-opment environments including, Visual Studio (VB.NET, C#, C/C++), VEE, LabVIEW, LabWindows/CVI, and MATLAB.

With the multiple drivers included and minimum software adjustments, any Agilent PXI attenuator/preselector can be swapped out, replaced, or upgraded with the latest PXI attenuator/preselector.

Easy software integration

Included are application code examples for Visual Studio (VB.NET, C#, C/C++), VEE, LabVIEW, LabWindows/CVI, and MATLAB which provide attenuator/preselector set up and basic acquisition functionality. These application code examples are easily modified to quickly integrate the module into your measurement system.

Software applications

Agilent soft front panels provide easy to use instrument communications for diagnostics and basic hardware setup. The M9360A's graphical user interface guides developers through module setup. Users can quickly configure the instrument parameters. More sophisticated functions are available through the instrument's numerous program-matic interfaces. The M9360A supports interfaces for Visual Studio, MATLAB, and LabVIEW. The interfaces are implemented using the IVI standard supporting both IVI-COM and IVI-C.
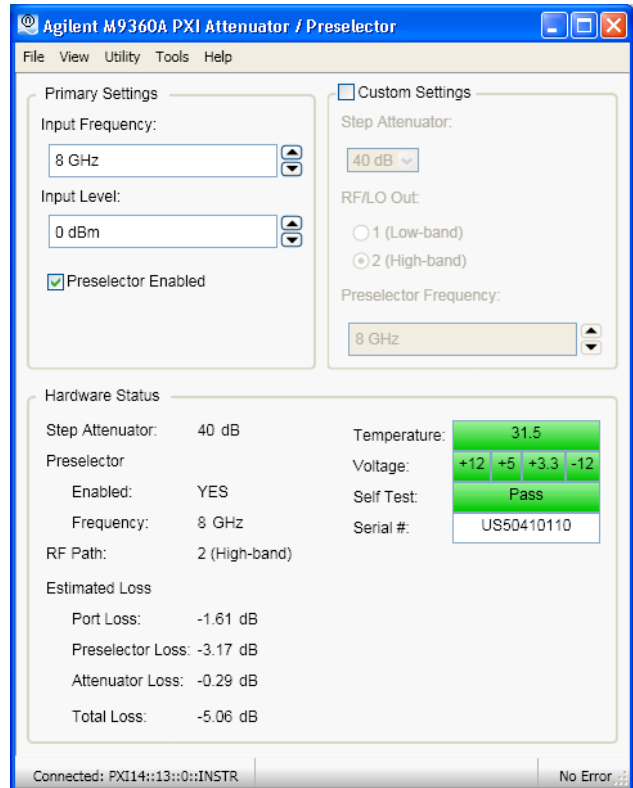

Figure 1. Agilent M9360A PXI Attenuator/Preselector, software interface

Calibration intervals

The M9360A is factory calibrated and shipped with an ISO-9002, NIST-traceable calibration certificate. A one year calibration cycle is recommended.

TECHNICAL SPECIFICATIONS AND CHARACTERISTICS

Input specifications		
Frequency range	RF IN to RF1 OUT	100 kHz to 26.5 GHz
	RF IN to RF 2 OUT (bypass path)	100 kHz to 26.5 GHz
	RF IN to RF 2 OUT (YTF path)	2.7 GHz to 26.5 GHz
	LO IN to LO 1 OUT	100 kHz to 26.5 GHz
	LO IN to LO 2 OUT	100 kHz to 26.5 GHz
Maximum power	RF IN	+30 dBm
	LO IN	+20 dBm
Return loss (50 Ω)	RF IN (100 kHz to 26.5 GHz)	−10 dB max, *(nominal)* [1]
	LO IN (100 kHz to 26.5 GHz)	−11 dB max, *(nominal)*

RF and LO output specifications		
Insertion loss from RF IN (minimum attenuation)	RF 2 OUT (bypass)	7 dB max
	RF 2 OUT (YTF path)	12 dB max
	RF 1 OUT	• 100 kHz to 2.9 GHz: 2 dB max
		• 2.9 GHz to 26.5 GHz: 6 dB max
Insertion loss from LO IN	LO 1 OUT or LO 2 OUT	1 dB max to 10 GHz
		1.5 dB max to 26.5 GHz
Switching time specifications	Step attenuator	20 ms max
	Switches	20 ms max
	Rated switch/attenuator life	5 million cycles min
Control specifications	Attenuator	0 dB to 70 dB in 10 dB steps
	Switches	SP2T mechanical type

Preselector YTF specifications		
YIG frequency range		2.7 GHz to 26.5 GHz
3 dB bandwidth	< 3 GHz	35 MHz min, 120 MHz max
	≥ 3 GHz	40 MHz min, 120 MHz max
Tuning speed		< 5 ms at 50 MHz step, *(nominal)*
Tuning accuracy		± 50 MHz (corrected), *(nominal)*
Topology		4 pole, 24 dB/oct, *(nominal)*

Environmental and physical specifications		
Temperature range	Operating	0 °C to 55 °C
	Non-operating	−40 °C to +70 °C
Connectors	RF IN	APC 3.5 (precision type)
	RF 1 OUT	SMA (f)
	RF 2 OUT	SMA (f)
	LO IN	SMA (f)
	LO 1 OUT	SMA (f)
	LO 2 OUT	SMA (f)
EMC		Complies with European EMC Directive 2004/108/EC
		• IEC/EN 61326-2-1
		• CISPR Pub 11 Group 1, class A
		• AS/NZS CISPR 11
		• ICES/NMB-001
		This ISM device complies with Canadian ICES-001. Cet appareil ISM est conforme a la norme NMB-001 du Canada.
Warm-up time		15 minutes, minimum

[1] *Attenuator set to 10 dB.*

Power dissipation				
+3.3 V	+5 V	+12 V	−12 V	Total power
0.1 A	0.6 A	1.3 A	0.1 A	21 W max

Dimensions	• 3U/3-slot PXI/CompactPCI standard • Chassis slot compatibility: cPCI (J1), PXI-1, PXIe Hybrid • Front panel complies with IEEE1101.10 certification and compliance
Weight	3.5 lb/1.6 kg

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 [1]	1.5 GB available hard disk space, includes: • 1 GB available for Microsoft .NET Framework 3.5 SP1 [2] • 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 [2] • 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 be 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 INFORMATION

Ordering [1]

Model [1]	Description
M9360A	PXI Attenuator/Preselector: 100 kHz to 26.5 GHz
Includes	Software and product information on CD and cables

Accessories

Software, example programs, and product information on CD (included)	
Cables (included)	

M9360A PXI Attenuator/Preselector

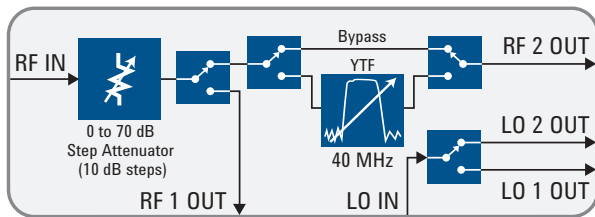*Figure 2. Simplifed block diagram of the M9360A PXI Attenuator/ Preselector.*

Related products

Model	Description
M9202A	PXIe IF Digitizer: 12-bit, 2 GS/s
M9302A	PXI Local Oscillator: 3 GHz to 10 GHz
M9361A	PXI Downconverter: 2.75 MHz to 26.5 GHz
M9351A	PXI Downconverter: 50 MHz to 2.9 GHz
M9392A	PXI Vector Signal Analyzer: 50 MHz to 26.5 GHz
M9018A	PXIe 18-slot Chassis
M9036A	PXIe Embedded Controller [2]

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)	Visual Studio (VB.NET, C#, C/C++), VEE, LabVIEW, LabWindows/CVI, MATLAB
Agilent IO Libraries	Includes: VISA Libraries, Agilent Connection Expert, IO Monitor

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[1] For the M9360A to work properly, at least one PXI chassis and one PXI controller type must be available.

[2] PC desktop and PC laptop controllers are also available. Please see the M9392A Configuration Guide (literature no. 5990-8254EN) for more information.

WARRANTY AND CALIBRATION

Express Warranty

Reduce downtime with the fastest repair service in the industry. The express warranty upgrades the global warranty to provide:

- 5 day typical turnaround repair service in the US, Japan, China and many EU countries or up to a 10 day improve ment in turnaround time in the rest of the world.
- Priority return shipment

Advantage Services: Calibration and warranty

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

Calibration	
R1282A	Annual calibration
M9360-A-UK6	Commercial calibration certificate with test data [1]
R-50C-011-3	3-year calibration assurance plan (return to Agilent)
R-50C-011-5	5-year calibration assurance plan (return to Agilent)
Warranty	
Included	3-year warranty (return to Agilent), standard
R-51B-001-5Z	5-year warranty assurance plan (return to Agilent)
Express warranty	
R-51B-001-3X	Express warranty – 3 years [1]
R-51B-001-5X	Express warranty – 5 years [1]

[1] *Options not available in all countries.*

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 °C 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 instruments will meet when operated over a 20 °C 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 °C 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.

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

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