# Agilent M9351A
PXI Downconverter

50 MHz to 2.9 GHz

Data Sheet

*Challenge the Boundaries of Test*

*Agilent Modular Products*

***Anticipate ___Accelerate ___Achieve***

**Agilent Technologies**

# OVERVIEW

## Intoduction

The Agilent Technologies M9351A PXI Downconverter is optimized for use with Agilent's newest generation of PXI digitizers for use in Aerospace and Defense applications such as radar and wideband signal capture and in wireless communications applications.

## Product description

The M9351A is a one-slot 3U PXI downconverter that converts RF signals from 50 MHz to 2.9 GHz into baseband frequency signals centered at an IF frequency of 500 MHz. The built-in pre-amp enables very low-level signal measurements, down to -160 dBm, and the built-in calibration simplifies system power budget calculations.

When integrated in the Agilent M9392A PXI Vector Signal Analyzer, and combined with the VSA software, the M9351A 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: 50 MHz to 2.9 GHz
  50 MHz to 625 MHz (bypass mode), (useable to 1 MHz)
- 500 MHz IF center frequency
- 40 MHz bandwidth (3 dB)
- Built-in pre-amp for low-level measurements
- Image protected conversion—no need for a preselector
- Bypass path so you can pass your signal straight to digitizer
- Fast IF power control with 40 dB solid state IF attenuator with 0.5 dB steps
- 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
- Included drivers, soft front panels and programming examples in VisualStudio® (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 M9351A 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 performance in a small, rugged package. It is an ideal deployment platform for many automated test systems. A wide array of complementary PXI products are currently available. Products include multimeters, waveform generators, local oscillators, digitizers, and switch multiplexers.

## Software platform

### IO Libraries

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

***NEW*** support for PXI -- 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.

***NEW*** easy way to 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 development environments including, VisualStudio (VB.NET, C#, C/C++), VEE, LabVIEW, LabWindows/CVI, and MATLAB.

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

### Easy software integration

Included are application code examples for VisualStudio (VB.NET, C#, C/C++), VEE, LabVIEW, LabWindows/CVI, and MATLAB which provide downconverter 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 M9351A'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 programmatic interfaces. The M9351A supports interfaces for Visual Studio, MATLAB, and LabVIEW. The interfaces are implemented using the IVI standard supporting both IVI-COM and IVI-C.

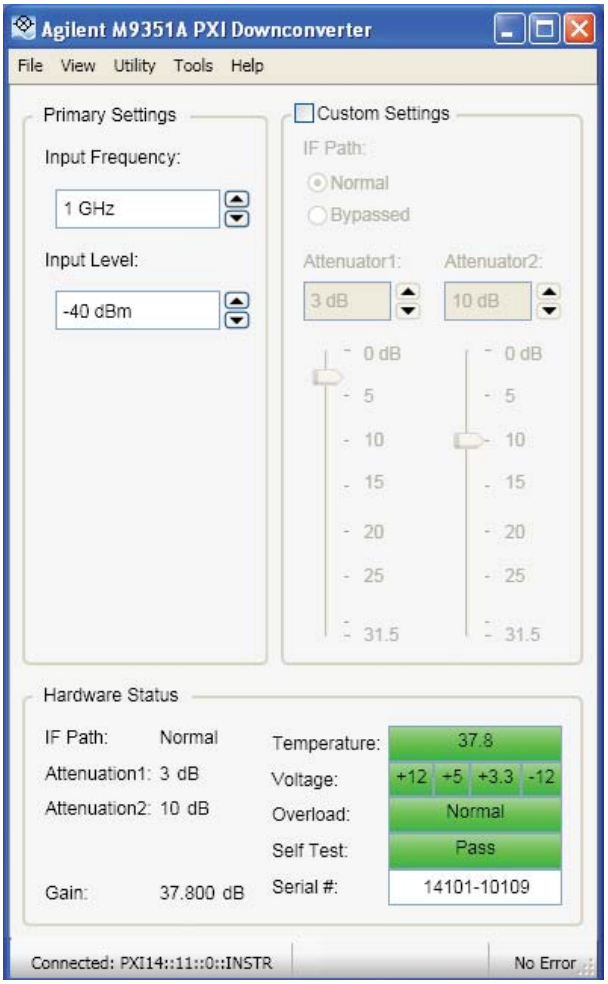



*Figure 1. Agilent M9351A PXI Downconverter, software interface*

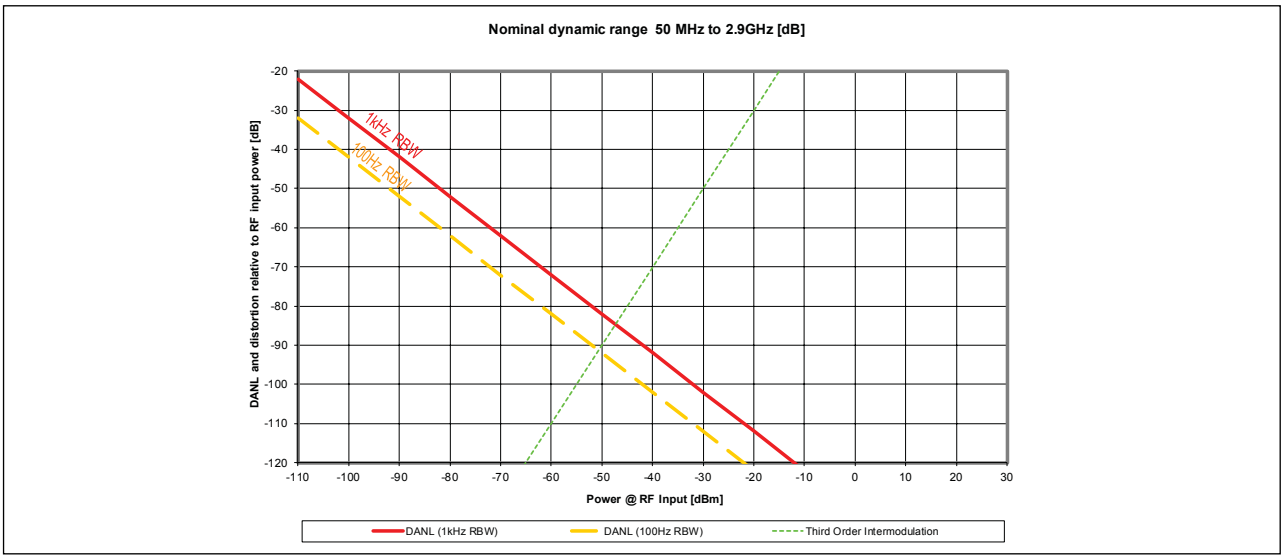
### Calibration intervals

The M9351A is factory calibrated and shipped with an ISO-9002, NIST-traceable calibration certificate. A one year calibration cycle is recommended.

# TECHNICAL SPECIFICATIONS AND CHARACTERISTICS

## RF input specifications

| | |
|---|---|
| Frequency range | 50 MHz to 2.9 GHz<br>50 MHz to 625 MHz (usable to 1 MHz) (bypass mode) |
| Operating level range | -160 dBm to -30 dBm, *(nominal)* |
| Compression point | -25 dBm min |
| Maximum power | +10 dBm (continuous without damage), *(nominal)* |
| Return loss (50 Ω) | -10 dB, max, *(nominal)* |
| IP3 (two -40 dBm RF input tones, 1 MHz apart, referenced to module input) | -10 dBm, min |
| LO leakage at RF input | -50 dBm, max [2], *(nominal)* |




## IF output specifications

| | |
|---|---|
| Gain (RF to IF) | 38 dB, *(nominal)* |
| Gain control resolution | 37 dB to 68.5 dB, in 0.5 dB steps |
| Level (user adjustable via IF gain control) | -2 dBm (500 mVp-p), *(nominal)* |
| Overload warning | +3 dBm ± 2 dB, *(nominal)* |
| Center frequency (user adjustable via LO IN frequency) | 500 MHz, *(nominal)* |
| Bandwidth (3 dB) | 40 MHz, min |
| LO leakage at IF output | -60 dBm, max [2, 3] |
| Residuals, RF and LO input terminated | -75 dBm |
| Bypass mode loss | 2.5 dB max, *(nominal)* |

## IF video specifications [1]

| | |
|---|---|
| Output rise time | 15 ns at 500 MHz IF out [3] |
| Output fall time | 35 ns at 500 MHz IF out [3] |
| DC output level (with -2 dBm IF out) | +1 V, min (polarity positive) [3] |

1 *IF video is not available in bypass mode.*
2 *3 GHz to 10 GHz.*
3 *At room temperature (25 °C ± 5 °C).*

## Internal LO phase noise

## LO input specifications

| | |
|---|---|
| Frequency range | 3.5 GHz to 6.4 GHz |
| Power | +15 dBm ± 2 dB |
| Return loss | -10 dB, max, *(nominal)* |
| Impedance | 50 Ω *(nominal)* |

## Reference oscillator input specifications

| | |
|---|---|
| Frequency range | 100 MHz ± 1 ppm |
| Power | 0 dBm ± 3 dB |
| Impedance | 50 Ω, *(nominal)* |

## Environmental and physical specifications

| | | |
|---|---|---|
| Temperature range | Operating<br>Non-operating | 0 °C to 55 °C<br>-40 °C to +70 °C |
| Connectors | RF IN<br>LO IN<br>VIDEO OUT<br>IF OUT<br>REF IN | SMA (f)<br>SMA (f)<br>SMB (m)<br>SMB (m)<br>SMB (m) |
| EMC | | Complies with European EMC Directive 2004/108/EC<br>• IEC/EN 61326-2-1<br>• CISPR Pub 11 Group 1, class A<br>• AS/NZS CISPR 11<br>• ICES/NMB-001<br>This ISM device complies with Canadian ICES-001.<br>Cet appareil ISM est conforme a la norme NMB-001 du Canada. |
| Warm-up time | | 15 minutes, max |

| Power dissipation: | | | | |
|---|---|---|---|---|
| +3.3 V | +5 V | +12 V | -12 V | Total power |
| 0.1 A | 0.5 A | 1.1 A | 0.0 A | 16 W max |

| | |
|---|---|
| Dimensions | • 3U/1-slot PXI/CompactPCI standard<br>• Chassis slot compatibility: cPCI (J1), PXI-1, PXIe Hybrid<br>• Front panel complies with IEEE1101.10 certification and compliance |
| Weight | 1.1 lb/0.5 kg |

# CONFIGURATION AND ORDERING INFORMATION

## Ordering

| Model | Description |
|---|---|
| M9351A | PXI Downconverter:<br>50 MHz to 2.9 GHz |
| Includes | Software, example programs, and product information on a CD.<br>Cables. |

## Accessories

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

**M9351A Downconverter** (50 MHz to 2.9 GHz)

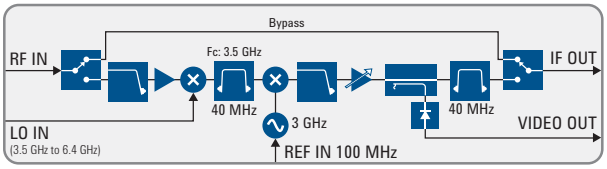



*Figure 2. Simplifed block diagram of the M9351A PXI Downconverter.*

## Related products

| Model | Description |
|---|---|
| M9302A | PXI Local Oscillator: 3 GHz to 10 GHz |
| M9202A | PXIe IF digitizer: 12-bit, 2 GS/s |
| M9360A | PXI Attenuator/Preselector:<br>100 kHz to 26.5 GHz |
| M9361A | PXI Downconverter: 2.75 MHz to 26.5 GHz |
| M9392A | PXI Vector Signal Analyzer:<br>50 MHz to 26.5 GHz |
| M9018A | 18-slot PXIe Chassis |
| M9036A | PXIe Embedded Controller [3] |

## Software

| Model | Description |
|---|---|
| Supported operating systems | Microsoft Windows® XP (32-bit),<br>Microsoft Windows® Vista (32/64-bit)<br>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++), VEE, LabVIEW, LabWindows/CVI, MATLAB |
| Agilent IO Libraries | Includes: VISA Libraries, Agilent Connection Expert, IO Monitor |

| System requirements | | |
|---|---|---|
| Topic | Windows® 7 and Vista Requirements | Windows® XP Requirements |
| Operating systems | Windows 7 (32-bit and 64-bit)<br>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)<br>(no support for Itanium 64) | 600 MHz or higher required<br>800 MHz recommended |
| Available memory | 4 GB minimum<br>8 GB or greater recommended | 3 GB minimum |
| Available disk space [1] | 1.5 GB available hard disk space, includes:<br>• 1 GB available for Microsoft .NET Framework 3.5 SP1 [2]<br>• 100 MB for Agilent IO Libraries Suite | 1.5 GB available hard disk space, includes:<br>• 1 GB available for Microsoft .NET Framework 3.5 SP1 [2]<br>• 100 MB for Agilent IO Libraries Suite |
| Video | Support for DirectX 9 graphics with 128 MB graphics memory recommended<br>(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.*

[3] *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] |
| **Warranty** | |
| | Standard warranty is 1 year |
| R-51B-001-3C | 1 year return-to-Agilent warranty extended to 3 years |
| R-51B-001-5C | 1 year return-to-Agilent warranty extended to 5 years |
| **Express Warranty** | |
| R1280X | Express Warranty - 5 day turnaround [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 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.

*Challenge the Boundaries of Test*

*Agilent Modular Products*

PXI **www.pxisa.org**

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Product specifications and descriptions in this document subject to change without notice.

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