

# Keysight N8839A

## Hybrid Memory Cube (HMC) Compliance Test Software

For use with Infiniium Z-Series oscilloscopes

Data Sheet



## Introduction

The Keysight Technologies, Inc. N8839A hybrid memory cube (HMC) compliance test software provides a fast and easy way to test, debug, and characterize your HMC designs. The application's tests are based on the HMC Specification as defined by the HMC Consortium. N8839A also features a user-friendly setup wizard and a comprehensive report that includes margin analysis.

HMC is an evolutionary upgrade to DDR3 memory systems, offering significant bandwidth performance while using less power. HMC achieves these advances through a combination of high speed logic process technology and a stack of through-silicon-via (TSV) bonded memory die. It operates at up to 30 Gb/s.

Signal integrity is crucial for memory system interoperability. Reference clock jitter measurements help ensure that jitter is well within the specifications, which is vital for reliable and interoperable modular memory systems. Critical electrical and timing characteristics of other signals ensure the memory system functions correctly and stays error free.

The HMC compliance test application is compatible with the Keysight Infiniium Z-Series digital storage oscilloscopes.

## Comprehensive Test Coverage

With the HMC compliance test application, the same oscilloscope you use for everyday debugging can be used to perform automated testing and margin analysis based on the HMC specifications. N8839A automatically configures the oscilloscope for each test and provides informative results. It includes margin analysis indicating how close your device comes to passing each specification. Traditionally, some of the difficulties with testing have included connecting to the target device, configuring the oscilloscope, performing the tests, and analyzing the measured results. The HMC compliance test application does most of this work for you.

## Features

The N8839A compliance test application offers several features to simplify the validation of your designs:

- Complete test coverage on transmitter voltage, jitter, signaling rate, and return loss measurements
- Enhanced execution speed to minimize compliance test time
- User-selectable tests and configurations based on HMC Specification-defined data rates
- Test framework that provides powerful characterization through multiple trials, showing a full array of statistics for each measurement and returning the worst measurement value
- Offline setup for compliance testing on saved waveform files from the oscilloscope
- Switch matrix option to enable simultaneous connection of multiple data lanes



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## Easy Test Definition

N8839A enhances the usability of Keysight Infiniium oscilloscopes for testing HMC devices. The Keysight automated test framework quickly guides you through the steps required to define the setup, perform the tests, and view the test results. You can then select a category of tests or specify individual tests. The user interface is designed to minimize unnecessary reconnections, saving time and minimizing potential operator errors. Save the tests and configurations as project files and recall them later for quick testing and review of previous results. Clear menus make it easy to perform tests with minimal mouse clicks.

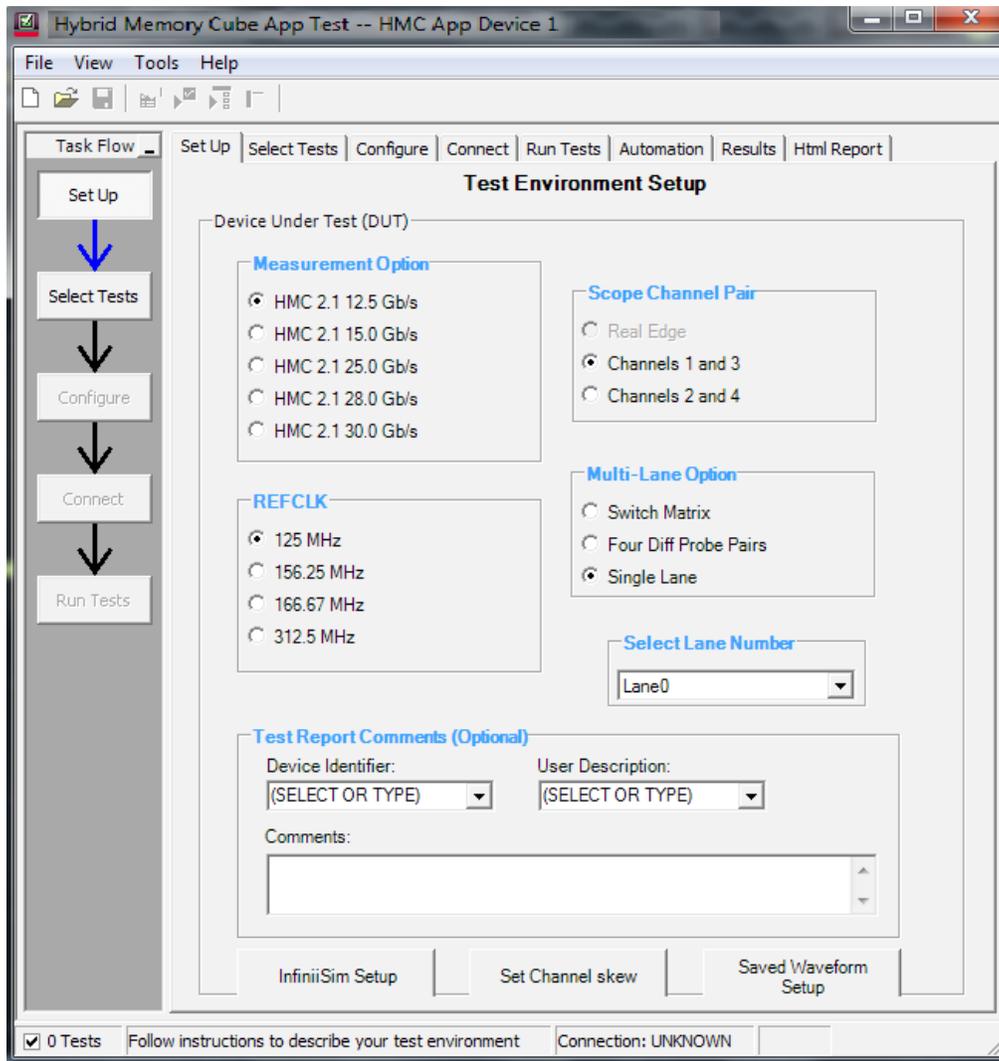


Figure 1. N8839A HMC application test setup screen.



## Configurability and Guided Connection

The HMC compliance test application provides test setup flexibility, including voltage, jitter, signaling rate, and vector network analyzer return loss measurements. Once tests are configured, the connection page displays the connection diagram for the selected tests. You can run the selected tests until the stop condition is met. The application then saves the worst-case conditions and helps you locate the anomalies in the signals.

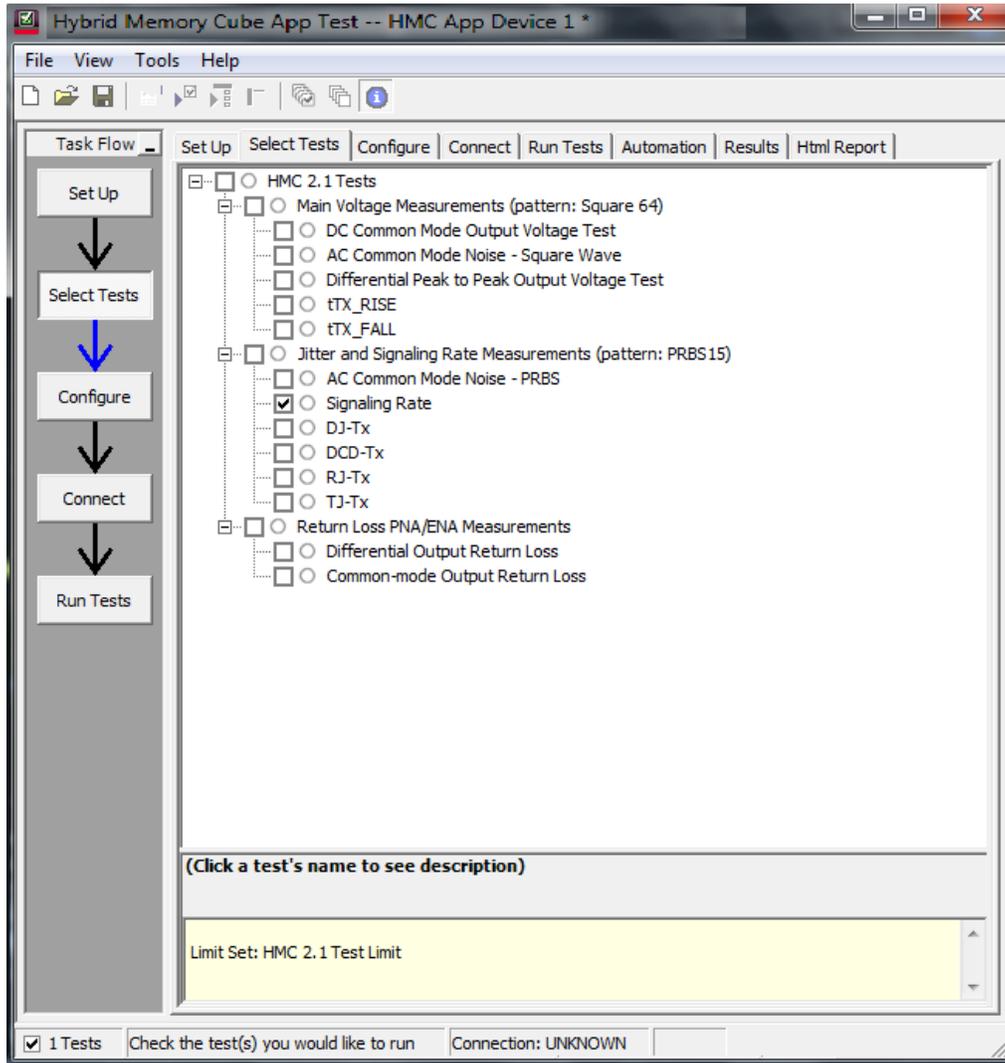


Figure 2. The Keysight automated test engine filters the test selection based on the test setup. Easily select individual tests or groups of tests with a mouse click.



## Comprehensive Results Analysis

In addition to providing measurement results, the HMC compliance test application reports how close your device is to the specified limit. The level at which warnings are to be issued can even be specified. A full array of statistics for each measurement is provided, and worst-case conditions to extensively test the performance of the device can be saved.

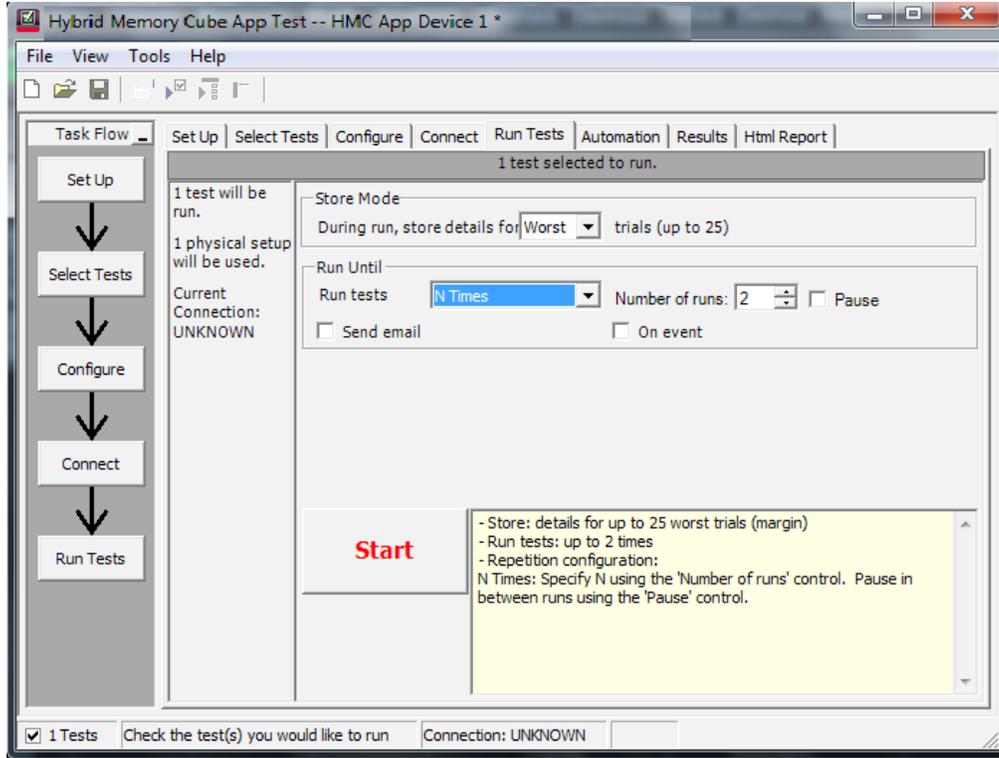


Figure 3. The Repetitive Run feature allows you to run the selected tests until the stop condition is met, enabling you to extensively test the performance of your device.

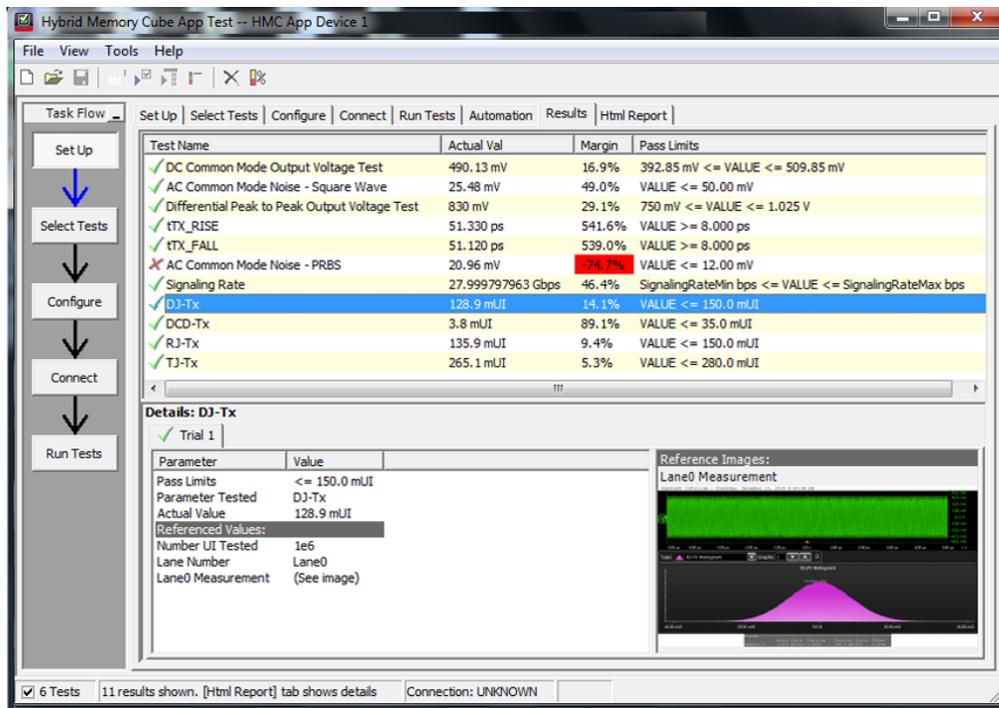


Figure 4. The HMC test application documents your test parameters, pass or fail status, test specification range, measured values, and the pass/fail margin.



## Thorough Performance Reporting

The HMC compliance test application generates thorough HTML reports that capture the performance, status, and margins of your device. Details are available for each test, such as the test limits, test description and test results – including saved waveforms. In addition, the pass/fail margin is indicated to provide further insight. N8839A also captures screen shots of critical measurements for your reference and documentation, in a report that is suitable for printing and sharing with your vendors, customers, and colleagues.

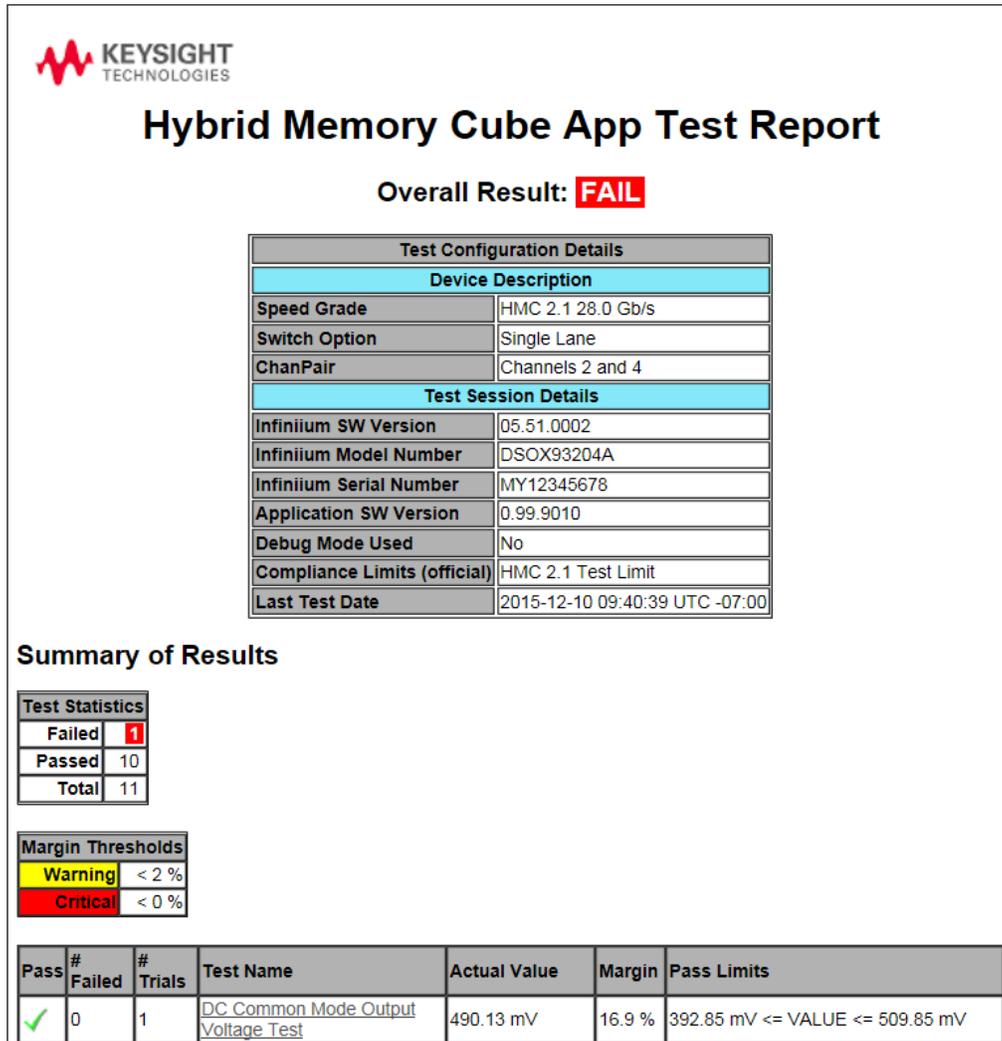


Figure 5. The HMC test application generates a summary report where your device's test results can be seen quickly and clearly.



## Extensibility

It is easy to add additional custom tests or steps to the test application using the User Defined Application (UDA) development tool ([www.keysight.com/find/uda](http://www.keysight.com/find/uda)). UDA simplifies the development of functional Add-Ins that can be plugged into the HMC software application.

Add-Ins may be designed as:

- Complete custom tests (with configuration variables and connection prompts)
- Custom steps such as pre- or post-processing scripts, external instrument control, and your own device control

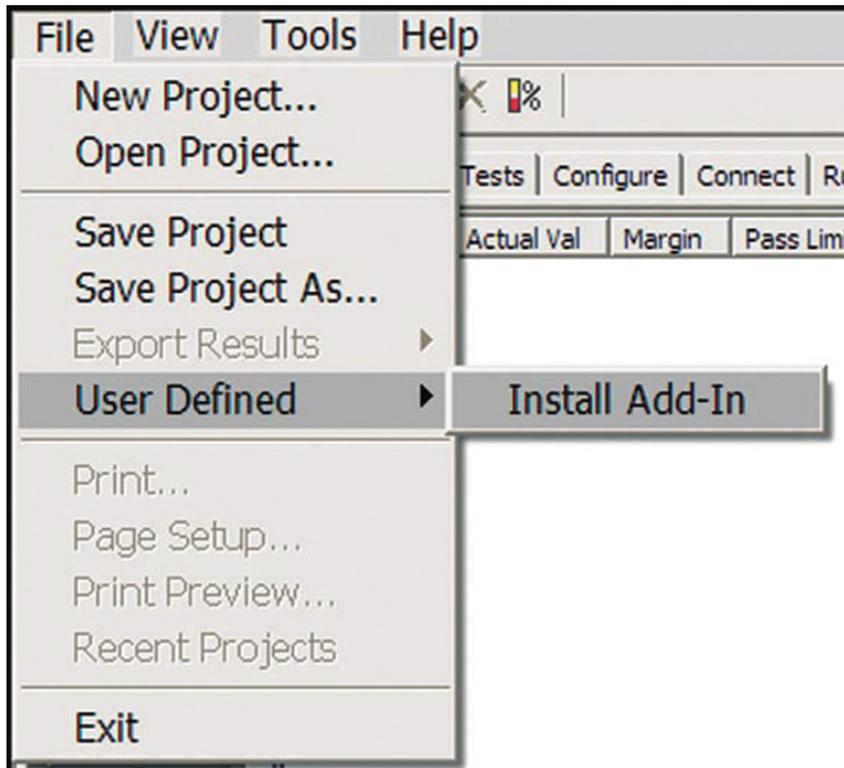


Figure 6. Importing a UDA Add-In into your test application.

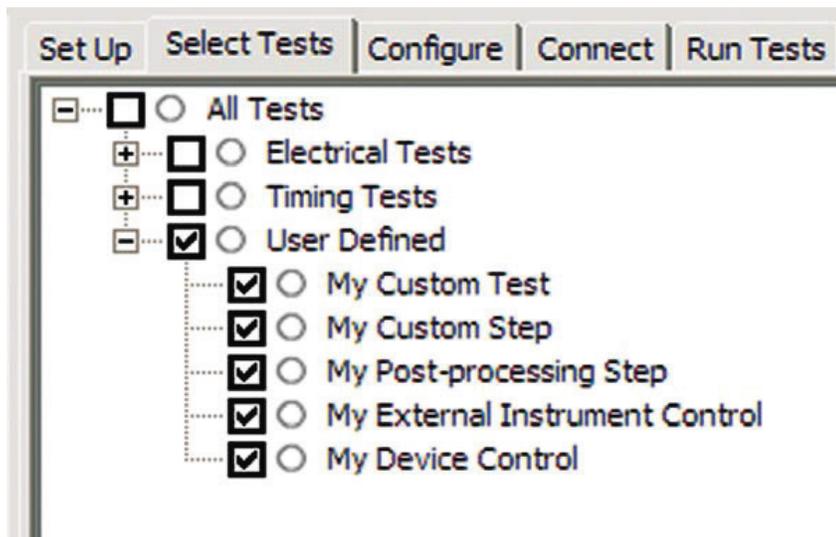


Figure 7. UDA Add-In tests and utilities in your test application.



## Automation

Completely automate the execution of your application's tests and Add-Ins from a separate PC using the included N5452A Remote Interface feature. (Download the free toolkit from: [www.keysight.com/find/scope-apps-sw](http://www.keysight.com/find/scope-apps-sw)). Create and execute automation scripts inside the application using a convenient built-in client. The commands required for each task may be created using a command wizard or obtained from the Remote Hints accessible throughout the user interface. Using automation, accelerate complex testing scenarios and automate manual tasks such as:

- Opening projects, executing tests, and saving results
- Executing tests repeatedly while changing configurations
- Sending commands to external instruments
- Executing tests out of order

Combine the power of built-in automation and extensibility to transform your application into a complete test suite executive.

- Interact with your device controller to place it into desired states or test modes before test execution
- Configure additional instruments used in your test suite, such as a pattern generator and probe switch matrix
- Export data generated by your tests for post-processing using your favorite environment, such as MATLAB, Python, LabVIEW, C, C++, or Visual Basic
- Sequence or repeat the tests and Add-In custom steps execution in any order for complete test coverage of the test plan

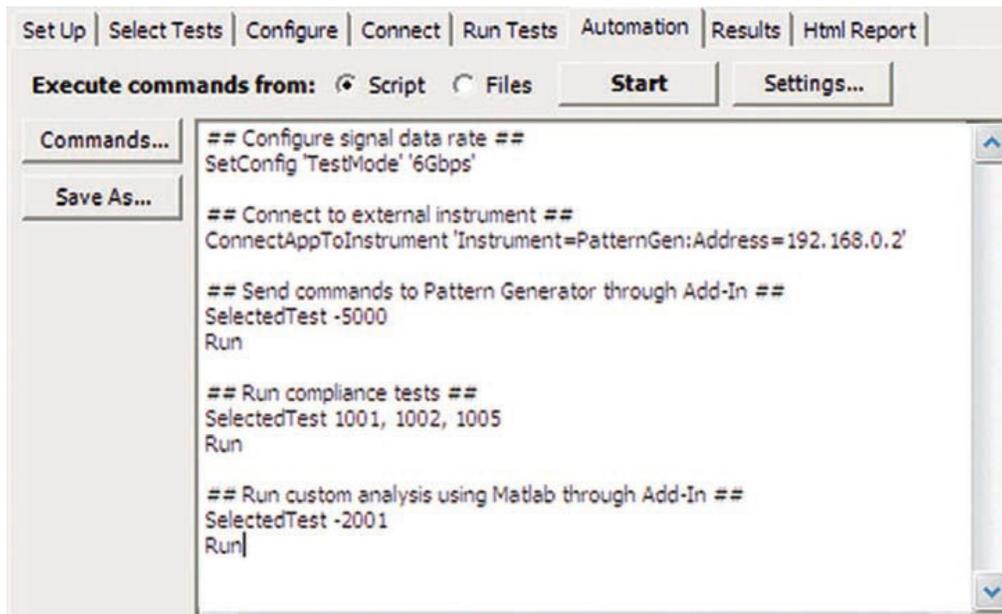


Figure 8. Remote programming script in the Automation tab.



## Automation (Continued)

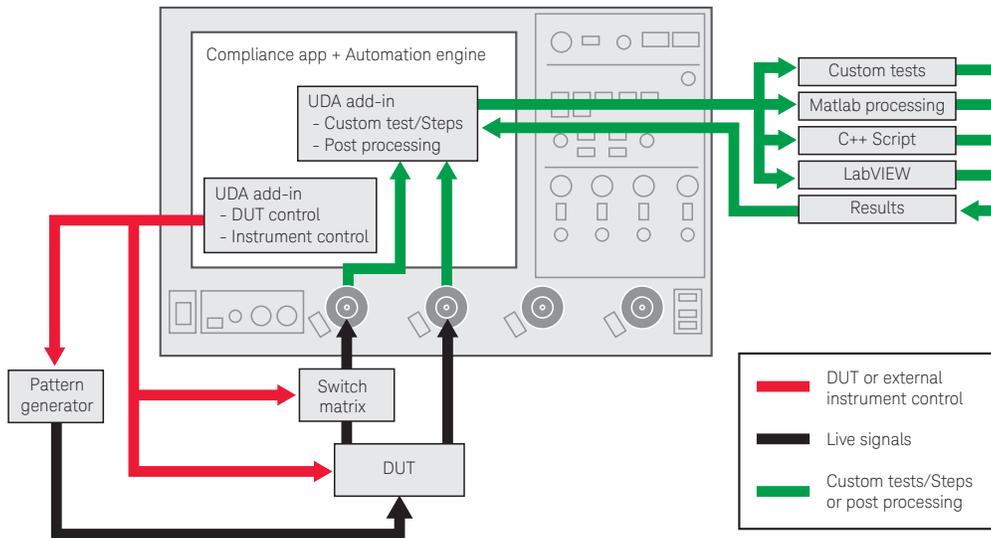


Figure 9. Combine the power of built-in automation and extensibility to transform your application into a complete test suite executive.



## Switch Matrix

The Keysight Switch Matrix software option for the conformance application, used together with Switch Matrix hardware, enables fully-automated testing for multi-lane digital bus interfaces. The benefits of this automated switching solution include:

- Eliminating reconnection, saving time and reducing errors by automating test setup for each lane of a multi-lane bus
- Maintaining accuracy with the use of unique PrecisionProbe or InfiniiSim to compensate for switch path losses and skew
- Customizing tests using a remote programming interface and the UDA tool for device control, instrument control, and test customization. For more information about the switching solution and configuration, visit [www.keysight.com/find/switching](http://www.keysight.com/find/switching) and see the Keysight application note, *Using Microwave Switches When Testing High Speed Serial Digital Interfaces*, publication number 5991-2375EN.



Figure 10. Automated testing for multi-lane digital bus interface through a switching solution.

## Requirements and Compatibility

### Test performed

The Keysight HMC compliance test application covers voltage, jitter, signaling rate, and return loss measurements defined in the HMC Specifications. The application helps you test all HMC devices for compliance while using a Keysight V- or Z-Series Infiniium oscilloscope. These tests help you perform extensive validation beyond the test specification.

### System device requirements

Voltage measurements require a Square 64 test pattern. Jitter and signaling rate measurement require a PRBS 15 test pattern. A vector network analyzer is required to complete return loss measurements.



## Recommended Oscilloscopes

The HMC compliance software is compatible with Infiniium Series oscilloscopes with Windows 7 and operating software revision 5.52 or higher. For oscilloscopes with earlier revisions, free upgrade software is available at [www.keysight.com/find/scope-apps-sw](http://www.keysight.com/find/scope-apps-sw).

Data rate	Minimum bandwidth	Minimum scope channels	Description
Up to 30 Gb/s	45 GHz	1	Z-Series oscilloscope

Note: Infiniium 90000A and V-Series oscilloscope can be used for lower than 30 Gb/s data rate operation.

## Ordering Information

### Software options

Application	License type		Infiniium V-, Z-Series	Infiniium 90000 Series
Hybrid memory cube (HMC) compliance	Fixed	Factory-installed	N8839A-1FP	DS090000-089
		User-installed	N8839A-1FP	N8839A-1FP
	Floating	Transportable	N8839A-1TP	N8839A-1TP
		Server based		N5435A-101
EZJIT+ jitter analysis software (included in DSA model)	Fixed	Factory-installed	N5400A-1FP	DS090000A-004
		User-installed	N5400A-1FP	N5400A-1FP
	Floating	Transportable	N5400A-1TP	N5400A-1TP
		Server based		N5435A-001
Serial data analysis software (included in DSA model)	Fixed	Factory-installed	E2688A-1FP	DS090000A-003
		User-installed	E2688A-1FP	E2688A-1FP
	Floating	Transportable	E2688A-1TP	E2688A-1TP
		Server based		N5435A-003
InfiniiSim advanced (optional)	Fixed	Factory-installed	N5465A-1FP	DS090000A-014
		User-installed	N5465A-1FP	N5465A-1FP
	Floating	Transportable	N5465A-1TP	N5465A-1TP
		Server based		N5435A-027
Switch matrix (optional)	Fixed	Factory-installed	N8890A-1FP	DS90000-097
		User-installed	N8890A-1FP	N8890A-1FP
	Floating	Transportable	N8890A-1TP	N8890A-1TP
		Server based		N5435A-124

## Related Literature

Publication title	Publication number
<i>E2688A, N5384A High-Speed Serial Data Analysis and Clock Recovery Software For Infiniium Oscilloscopes - Data Sheet</i>	5989-0108EN
<i>EZJIT Plus Jitter Analysis Software for Infiniium Oscilloscopes - Data Sheet</i>	5989-0109EN
<i>N5465A InfiniiSim Waveform Transformation Toolset for Infiniium Oscilloscopes - Data Sheet</i>	5990-4059EN
<i>Infiniium Z-Series Oscilloscopes - Data Sheet</i>	5991-3868EN





[www.axistandard.org](http://www.axistandard.org)

AdvancedTCA® Extensions for Instrumentation and Test (AXIe) is an open standard that extends the AdvancedTCA for general purpose and semiconductor test. The business that became Keysight was a founding member of the AXIe consortium. ATCA®, AdvancedTCA®, and the ATCA logo are registered US trademarks of the PCI Industrial Computer Manufacturers Group.



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LAN eXtensions for Instruments puts the power of Ethernet and the Web inside your test systems. The business that became Keysight was a founding member of the LXI consortium.



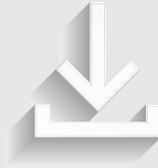
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