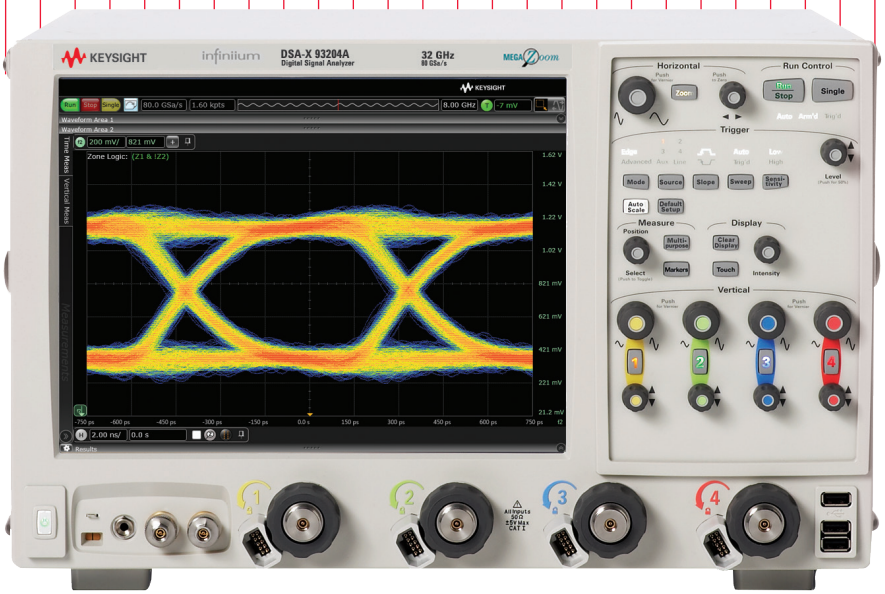
Keysight Technologies
U7245A GDDR5 Compliance Test Application for Infiniium 90000 Series Oscilloscope

Data Sheet



KEYSIGHT TECHNOLOGIES

Introduction

Test, Debug and Characterize Your GDDR5 Designs Quickly and Easily

The Keysight Technologies, Inc. U7245A GDDR5 compliance test application provides a fast and easy way to test, debug and characterize your GDDR5 designs. The tests performed by the GDDR5 compliance test software are based on the JEDEC1 JESD212 GDDR5 SGRAM Specification. In addition, the GDDR5 test application features Custom mode, which covers crucial measurements such as eye-diagram, mask testing, ringing and other tests that are not covered in the specifications but are critical for characterizing GDDR5 devices. The test application offers a user-friendly setup wizard and a comprehensive report that includes margin analysis.

GDDR5 represents an evolutionary upgrade to graphics memory systems. GDDR5 technology with higher data rates (up to 5x of GDDR3 and 4x of GDDR4) enables more bandwidth over a narrower memory interface for superior performance designs for applications requiring high bandwidth. Signal integrity is crucial for memory system interoperability. Reference clock jitter measurements help you ensure that jitter is well within the specifications, which is the key to reliable and interoperable memory systems. At the same time, electrical and timing characteristics of signals are critical as well, to ensure the memory system functions correctly and stays error free. The U7245A GDDR5 compliance test application is compatible with Keysight 90000 Series Infiniium oscilloscopes.

Features

The GDDR5 compliance test application offers several features to simplify the validation of your GDDR5 designs:

- Setup wizard for quick setup, configuration and test
- Execution speed and proven test algorithm for clock test, which minimizes your compliance test time
- User-selected tests and configurations based on JEDEC JESD212 GDDR5 SGRAM.
- Unique technique to provide read-write burst signal separation on the same bus in real-time mode, allowing powerful debug and analysis.
- Test framework provides powerful characterization through multiple trials that show a full array of statistics for each measurement and returns the worst measurement value

Comprehensive test coverage

With the GDDR5 compliance test application, you can use the same oscilloscope you use for everyday debugging to perform automated testing and margin analysis based on the JEDEC electrical and timing specifications. The application automatically configures the oscilloscope for each test and provides informative results. It includes margin analysis indicating how close your device comes to passing or failing the test for each specification. Some of the difficulties in performing the compliance tests are connecting to the target device, configuring the oscilloscope, performing the tests and analyzing the measured results. The GDDR5 compliance test application does most of this work for you. If you discover a problem with your device, the Custom mode feature in the test application and debug tools in the oscilloscope are available to aid in root-cause analysis.

Easy test definition

The test application enhances the usability of Keysight Infiniium oscilloscopes for testing GDDR5 devices. The Keysight automated test framework guides you quickly through the steps required to define the setup, perform the tests and view the test results. You can select a category of tests or specify individual tests. The user interface is designed to minimize unnecessary reconnections, which saves time and minimizes potential operator error. You can save the tests and configurations as project files and recall them later for quick testing and review of previous results. Clear menus let you perform tests with minimum mouse clicks.

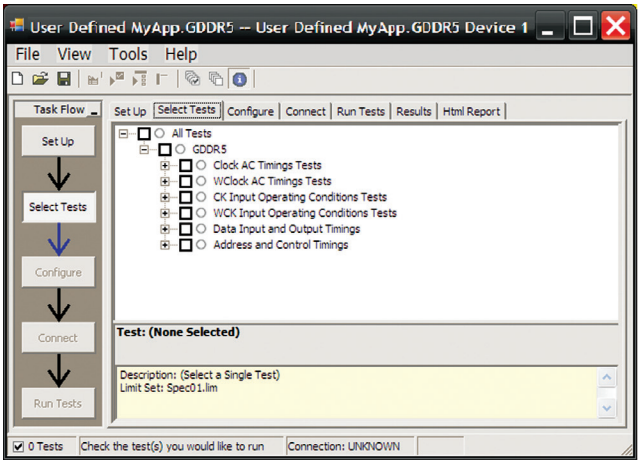


Figure 1. The Keysight automated test engine filters the test selection based on your test setup. You can easily select individual tests or groups of tests with a mouse-click.

1 The JEDEC (Joint Electronic Device Engineering Council) Solid State Technology Association is a semiconductor engineering standardization body of the Electronic Industries Alliance (EIA), a trade association that represents all areas of the electronic industry.

Configurability and guided connection

The GDDR5 compliance test application provides flexibility in your test setup. The GDDR5 compliance test application provides you with user-defined controls for critical test parameters such as voltage threshold values, number of waveforms used for analysis and customizable violation settings. Once you have configured the tests, the connection page will display the connection diagram for the test you have selected. With the multiple test trial capability, you can extensively characterize the performance of your GDDR5 devices. You can run the selected tests until the stop condition is met. The application will then save the worst-case conditions and help you track down the anomalies in your signals

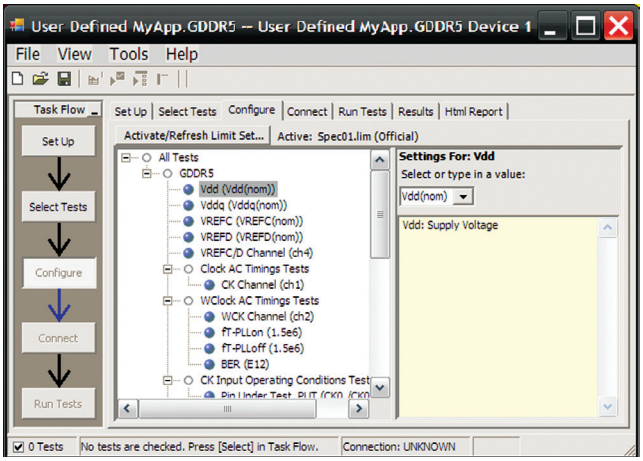


Figure 2. The software provides user-defined controls for test parameters such as voltage threshold values.

In addition to providing you with measurement results, the U7245A GDDR5 compliance test application reports how close you are to the specified limit. You can specify the level at which warnings are to be issued. You are provided with a full array of statistics for each measurement, and you can save worst-case conditions to extensively test the performance of your device.

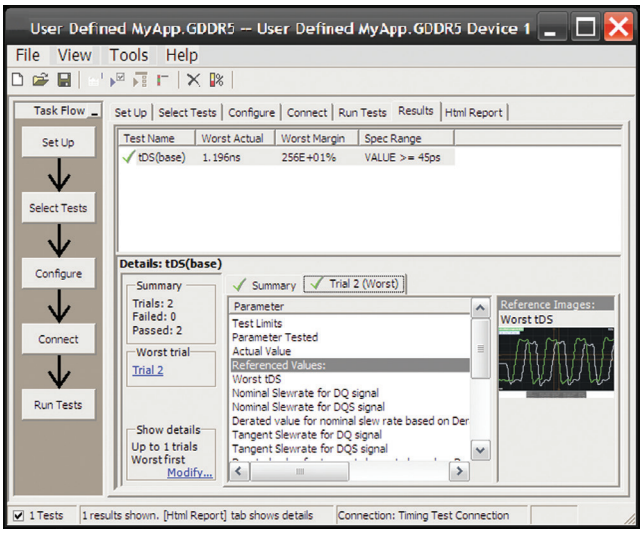


Figure 3. The GDDR5 test application documents your test parameters, pass or fail status, test specification range, measured values and pass/fail margin.

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Thorough performance reporting

The U7245A GDDR5 compliance test application generates thorough HTML reports that capture the performance, status and margins of your device. It also captures screen shots of critical measurements for your reference and documentation. This report is suitable for printing and sharing with your vendors, customers or colleagues.

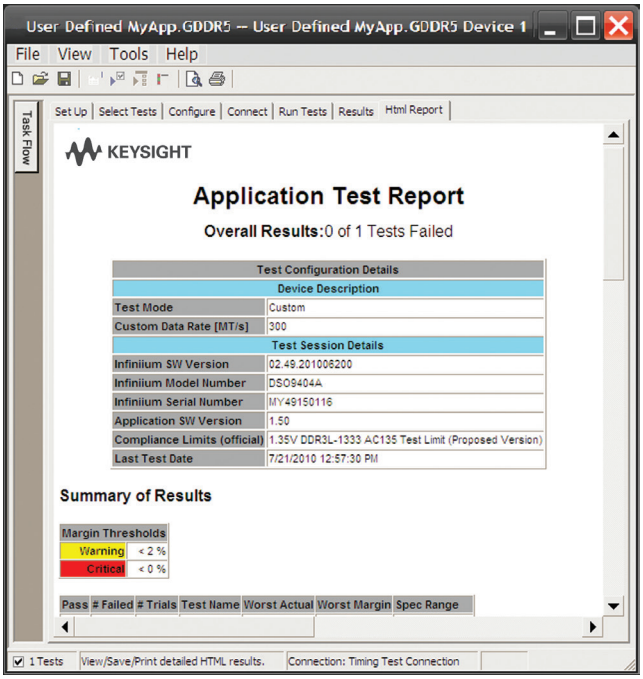


Figure 4. The test application generates a summary report where you can see your device's test results quickly and clearly. Details are available for each test including the test limits, test description and test results, including saved waveforms. In addition, the pass/fail margin is indicated to give you further insight.

Extensibility

You may add additional custom tests or steps to your application using the N5467A User Defined Application (UDA) development tool (www.keysight.com/find/uda). Use UDA to develop functional "Add-Ins" that you can plug into your application.

Add-ins may be designed as:

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

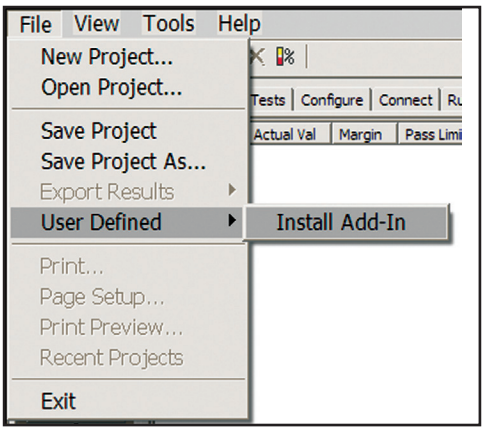


Figure 5. Importing a UDA Add-In into your test application.

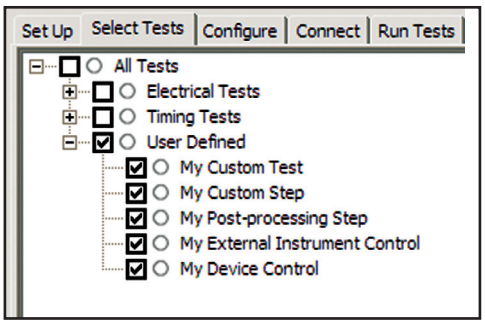


Figure 6. UDA Add-In tests and utilities in your test application.

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Automation

You can completely automate execution of your application's tests and Add-Ins from a separate PC using the included N5452A Remote Interface feature (download free toolkit from www.keysight.com/find/scope-apps-sw). You can even create and execute automation scripts right inside the application using a convenient built-in client.

The commands required for each task may be created using a command wizard or from "remote hints" accessible throughout the user interface. Using automation, you can accelerate complex testing scenarios and even 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 and post-process it using your favorite environment, such as MATLAB, Python, LabVIEW, C, C++, Visual Basic etc.
- Sequence or repeat the tests and "Add-In" custom steps execution in any order for complete test coverage of the test plan.

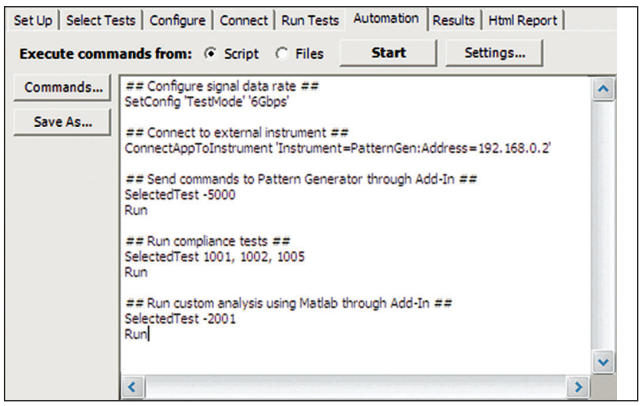


Figure 7. Remote Programming script in the Automation tab.

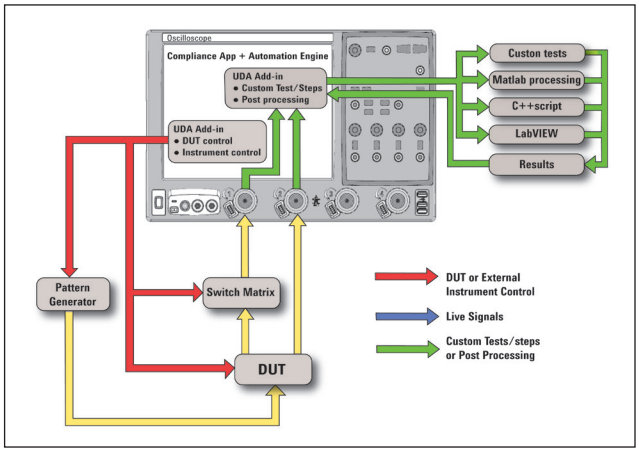


Figure 8. Combine the power of built-in automation and extensibility to transform your application into a complete test suite executive.

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Recommended oscilloscopes

The GDDR5 compliance software is compatible with Keysight Infiniium Series oscilloscops with operating software revision 4.20 or higher. For oscilloscopes with earlier revisions, free upgrade software is available here: www.keysight.com/find/scope-apps-sw.

Data rate	Minimum bandwidth	Minimum channels	Compatible oscilloscopes
Up to 5 GT/s	20 GHz	4	Infiniium 90000 and Z-Series

Ordering information

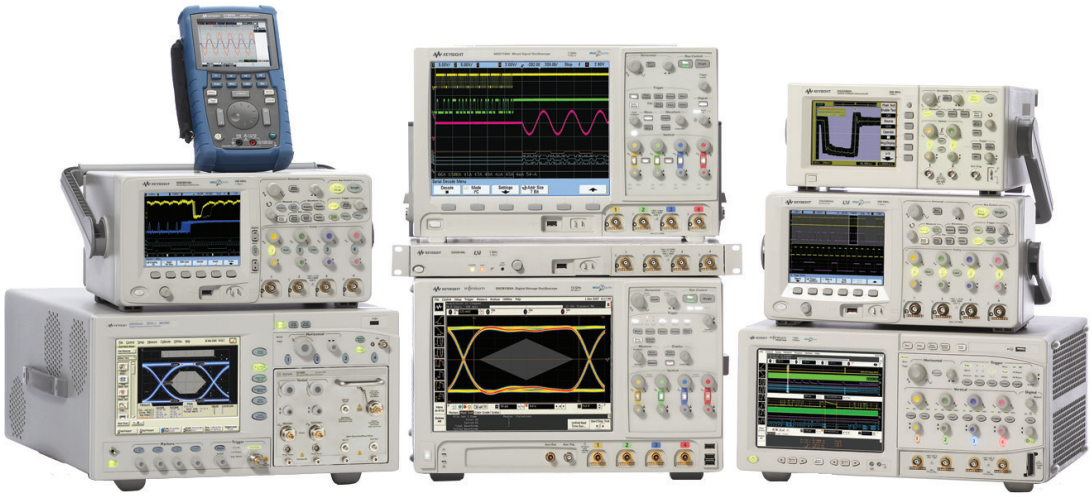
Software options

Application	License type		Infiniium Z-Series	Infiniium S-Series	Infiniium 90000 Series	Infiniium 9000 Series
GDDR5 compliance	Fixed	Factory-installed	U7245A-1FP	-	-	-
		User-installed	U7245A-1FP	-	U7245A-1NL	-
	Floating	Transportable	U7245A-1TP	-	U7245A-1TP[1,2]	-
		Server-based			-	
Serial data analysis sofware (included in DSA model)	Fixed	Factory-installed	E2688A-1FP	N5384A-1FP	Option 003	Option 003
		User-installed	E2688A-1FP	N5384A-1FP	E2688A-1NL	N5384A-1NL
	Floating	Transportable	E2688A-1TP	N5384A-1TP	E2688A-1TP [1,2]	N5384A-1TP [1,2]
		Server-based			N5435A-003	
InfiniiScan+	Fixed	Factory-installed	N5414B-1FP	N5415B-1FP	Option 009	Option 009
		User-installed	N5414B-1FP	N5415B-1FP	N5414B-1FP	N5415B-1NL
	Floating	Transportable	N5414B-1TP	N5415B-1TP	N5414B-1TP [1,2]	N5415B-1TP [1,2]
		Server-based			N5435A-004	
InfiniiSim Advanced (optional)	Fixed	Factory-installed	N5465A-1FP	N5465B-1FP	Option 014	Option 014
		User-installed	N5465A-1FP	N5465B-1FP	N5465A-1NL	N5465B-1NL
	Floating	Transportable	N5465A-1TP	N5465B-1TP	N5465A-1TP[1,2]	N5465B-1TP [1,2]
		Server-based			N5435A-027	

1. Requires software 5.00 and above.
2. Software 4.30 or above requires Windows 7. N2753A Infiniium Windows XP to 7 OS upgrade kit (oscilloscope already has M890 motherboard). N2754A Infiniium Windows XP to 7 OS and M890 motherboard upgrade kit (oscilloscope without M890 motherboard). Verify the M890 motherboard using the procedure found in the Windows 7 upgrade kit data sheet, publication number 5990-8569EN.

Related literature

Publication title	Publication type	Publication number
Keysight Infiniium DSO/DSA 90000A Series Oscilloscopes and InfiniiMax Series Probes	Data sheet	5989-7819EN
Keysight Infiniium 90000 X-Series Oscilloscopes	Data sheet	5990-5271EN
Keysight InfiniiScan Event Identification Software for Infiniium Series Oscilloscopes (N5414B and N5415B)	Data sheet	5989-4605EN
Keysight Technologies E2688A, N5384A High-Speed Serial Data Analysis and Clock Recovery Software	Data sheet	5989-0108EN
Keysight InfiniiMax III probing system	Data sheet	5990-5653EN



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