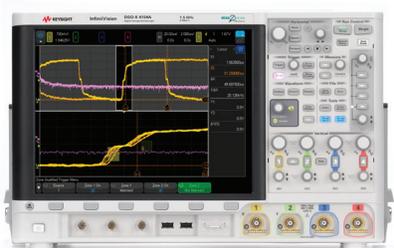# Keysight Technologies
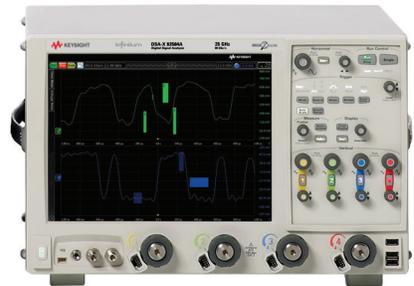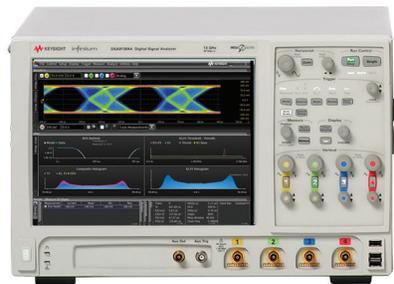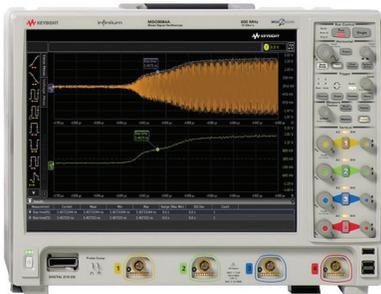# N5467B and N5467C
For Infiniium and InfiniiVision Oscilloscopes
User Defined Application (UDA)

Data Sheet

KEYSIGHT
TECHNOLOGIES

Easy-to-use tool, lets you generate custom GUIs with minimum programming

Use your generated GUI to:

– Automate testing
– Generate reports
– Consistently test across your organization
– Control switch matrix for automated multi-lane interface testing
– Add analysis to your compliance and debug software

Easy documentation of all tests in HTML, pdf, or csv formats.

# Custom Automation for Your Keysight Oscilloscope

Create the Applications that you need

Automated testing continues to be an extremely important part of today's engineering environment. Today's oscilloscope vendors provide compliance applications such as USB 3.0, PCIe, MIPI and DDR to provide specific automation for the technology that you need to ensure certification of your design.

However, compliance applications are created specifically to the technology that you purchase. These applications lacked the ability to be modified, which meant limited flexibility until the addition of UDA. Any custom automation had to be done on your own with more complicated programming environments.

Keysight oscilloscopes now solve this problem with the User Defined Application (UDA). UDA is the only fully customizable automated environment made for an oscilloscope by an oscilloscope designer. It provides full automation, including the ability to control other Keysight Technologies, Inc. instruments, external applications such as MATLAB, and your DUT software. UDA also provides the ability to add custom tests to your Infiniium compliance applications. In addition, UDA automates and customizes your multi-lane interface testing with available switch matrix (Keysight U3020AS26 and BitifEye BIT-2100 Series) or custom switch matrix. UDA switches the signal under test from a multi-lane interface automatically so you do not have to be in front of the test setup to do this manually. It also supports test plan feature, which iteratively runs through the different permutations of your device setup and tracks the results. It makes testing of multi-lane signals more efficient and saves you time.

When working with InfiniiVision oscilloscopes, the UDA application executes on a Windows PC and uses a network or USB connection to fully control and automate the test process. For Infiniium oscilloscopes, it is optional to run on a separate PC or directly on the oscilloscope, giving you the flexibility to optimize your test environment.
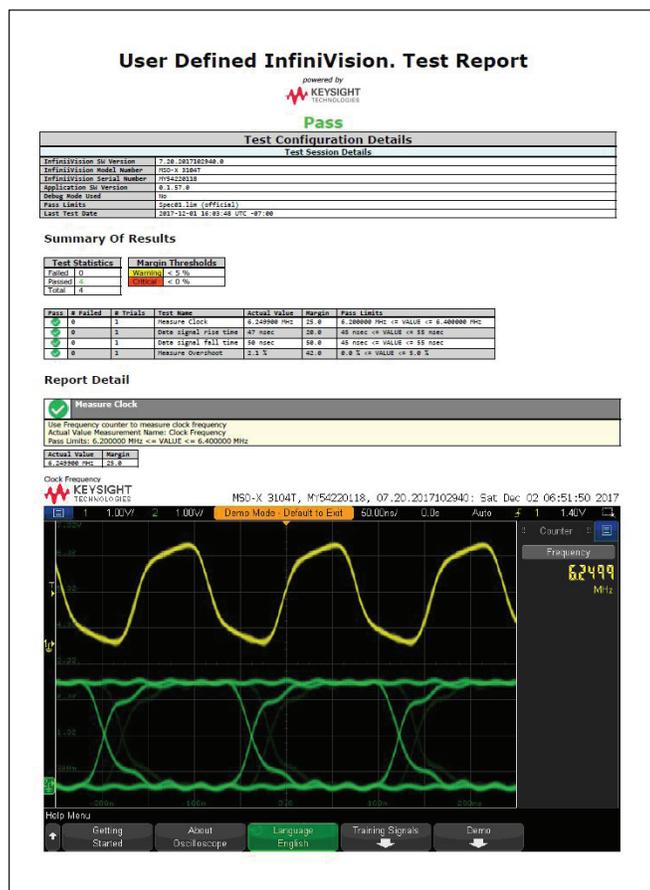
User Defined Application (UDA)

UDA's environment: developed for oscilloscope test

There are two key differentiators for UDA from programs such as Keysight's VEE. The first is that UDA was designed specifically for Keysight oscilloscopes. The UDA development environment is easier to use than other test and measurement automation packages, which allows you to spend less time programming and more time testing your application. The second key differentiator is that the environment built around the Infiniium proprietary compliance testing framework, which gives you features developed for Infiniium's compliance testing and the customization you wanted. Other oscilloscope vendors may have compliance applications or leverage development environments such as VEE; however, only Keysight oscilloscopes have the added advantage of the flexibility and ease of use of UDA.

UDA's development environment

Similar to other programming applications; UDA has its own development environment. The environment can be downloaded for free at www.keysight.com/find/uda.

The UDA environment includes all the tabs that you would see in a typical compliance application, however, you control the tests and automation that you need.

To make developing simple and easy, the development environment has two modes (Basic and Advanced). Basic mode allows you to quickly build an application. Tests written for basic mode will load a single setup file and execute a single script or command. You get variable set up, and can load your own company logo.

All the features that are included in basic mode are also included in advanced mode. In addition, advanced mode adds connection diagrams, external instrument control, external application value source (file based), test grouping, sequential test steps, and independent scripts running during testing.
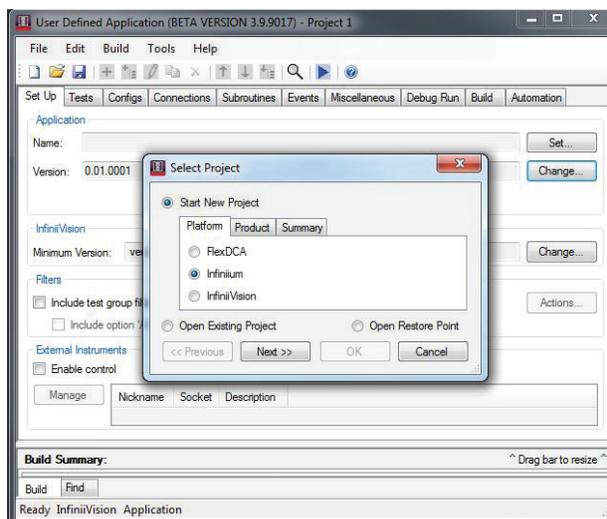

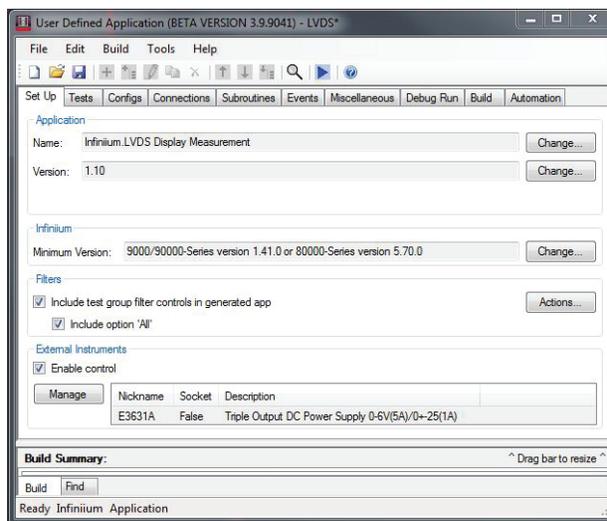Figure 1. Keysight's User Defined Application supports multiple oscilloscope types.

Figure 2. Basic UDA development environment

Infiniium User Defined Application (UDA)

Integrate other Infiniium analysis software into your UDA

UDA is fully compatible with all the Infiniium oscilloscope applications via SCPI commands. This compatibility includes Infiniium applications such as Serial Data Equalization, Serial Data Analysis, EZJIT Plus, InfiniiSim and InfiniiScan. By combining UDA with these Infiniium applications, you are able to get exactly the automated analysis that you need. For example, you can create a UDA to find which equalization algorithm will open your eye the best. Simply combine UDA with the Serial Data Equalization and the eye height measurement and you can quickly find the filter you need for the optimal filter design. Not only will you know which tap values to use, but you will also have your customized HTML report to show it.

In addition to working with all other Infiniium software, UDA is fully compatible with MATLAB and Infiniium's User-Defined Function, which allows you unprecedented flexibility in your measurement capability and in your automation software. UDA even allows you to import MATLAB graphics into your user-defined application report.

Use your add-in capability to create tests that unlock the power of de-embedding and your application. Compliance applications may allow you to de-embed a fixture, but UDA allows you to show the improvement in your design by removing the cable and the fixture.
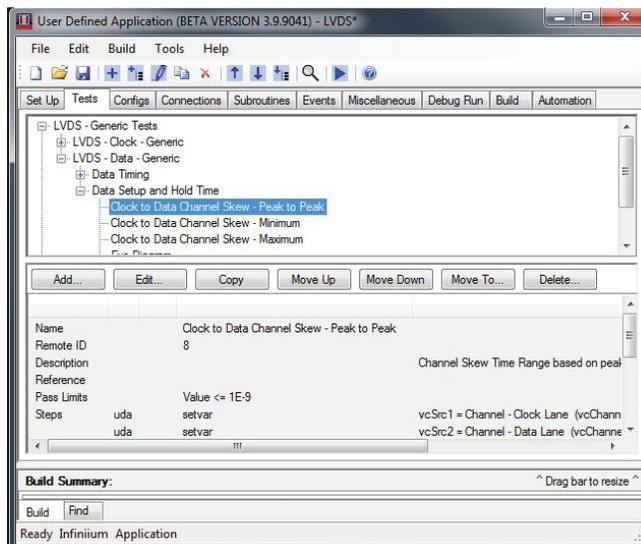

Figure 3. Simple process to create multiple test sequences with individual Pass/Fail results
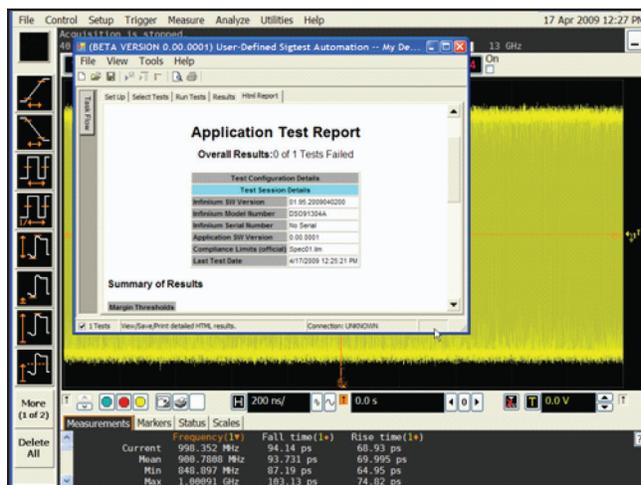

Figure 4. After the UDA has run, you get your own customized HTML report. You can import any image onto the report, allowing for customization of the application that you are running.
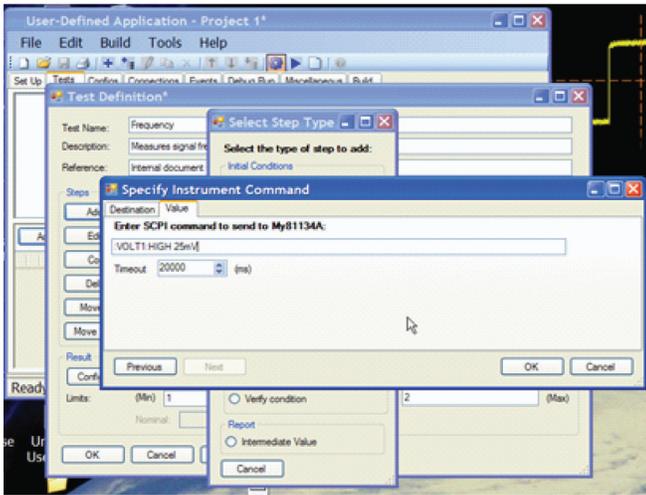
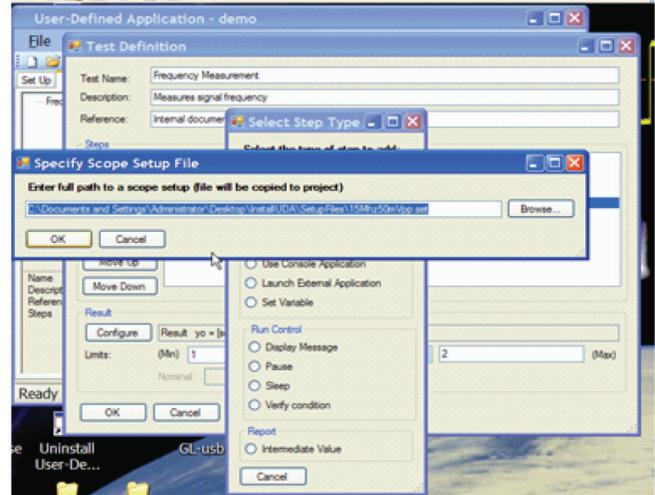Figure 5. Controlling external instrument through SCPI commands

Figure 7. Easily add any setup files to your UDA to guarantee testing repeatability.
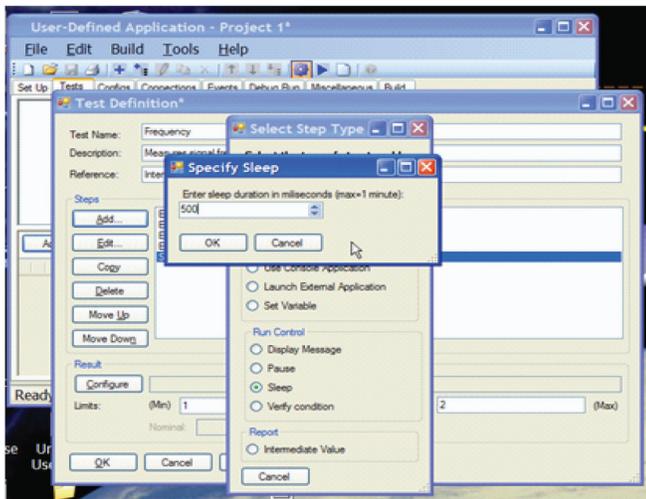

Figure 6. Manually enter a sleep command. Notice how the GUI allows for easy execution.
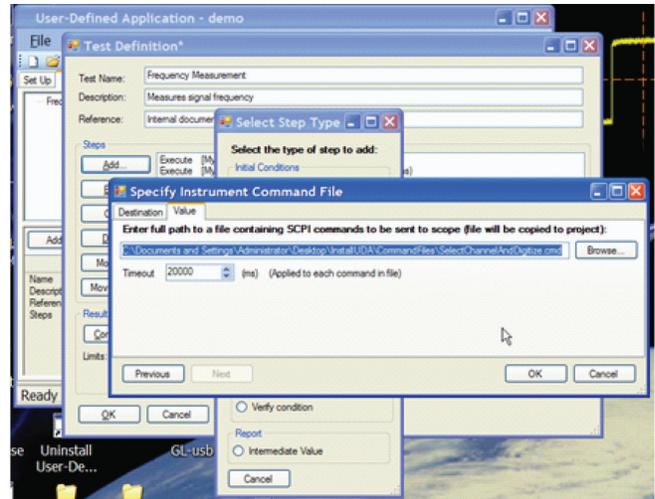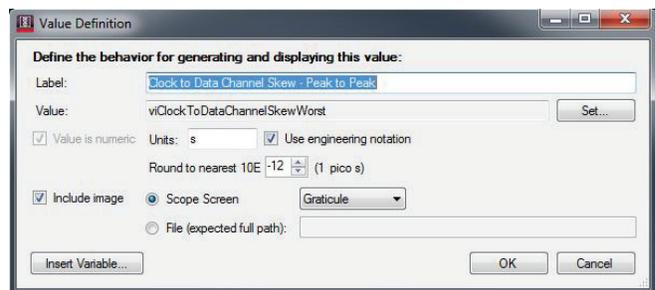

Figure 8. Add your own command files

Figure 9. Add scope screen shot after the test executes. This will be added to your HTML report

User-defined application provides features with ease of use in mind

Once you have created a test, you can copy it, delete it, move it to a group or edit it. The same is true about a group of tests, you can easily copy a group of tests and create a new group of tests and then edit each individual test. Because UDA allows you to do this, you don't need to type the same test multiple times. This saves you time and helps to eliminate errors.

Add your own external applications

One of the most advanced features of UDA is the ability to run any external application to your UDA. You can create a script from VBA or C# and then execute it into the UDA application. This allows you to add customizable consoles.

Figure 11 shows a UDA that was created for setting up testing of SDI (serial data interface). The VBA example occurs at run time and allows the user to test to the exact conditions the user wishes for testing.
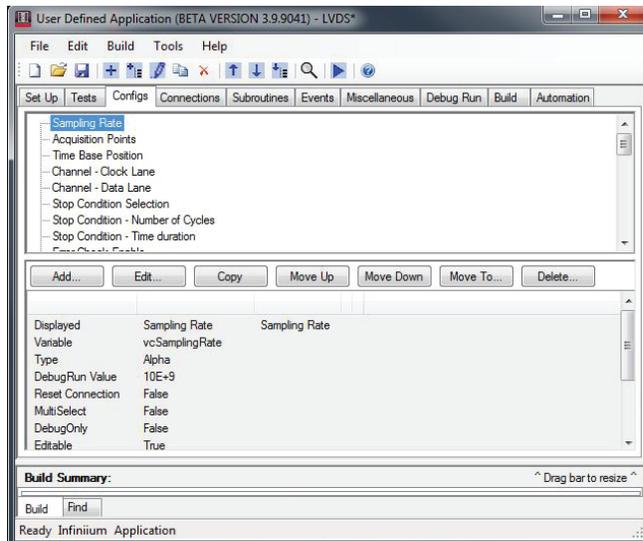

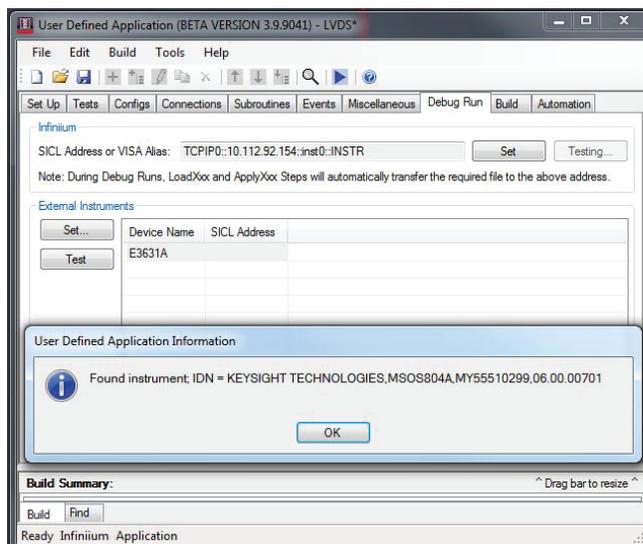Figure 10. Create, copy, edit your tests and groups of tests

Figure 11. Easily debug as you create custom applications

Complete variable control

UDA also allows you to set up and use variables. This simplifies your programs. For instance if you are using CHAN as the variable for my oscilloscopes' four channels, you can set channel 1 as the default. Create variables that are input by the user at run-time on the scope.

Building your program

Once you have completed your UDA you can "generate" the application that you have developed. There are four different options for building your applications that include the following:

- Build application
- Launch application (Works when you are developing the UDA on your oscilloscope. This will launch the application on the oscilloscope).
- Generate installer (Generates the application and generates a zipfile to be downloaded and installed on your oscilloscopes desktop).
- Install application (Works when you are developing the UDA on your oscilloscope. This will install everything you need to run the UDA. When you use this option, the application is permanently installed on your oscilloscope).

At any time during the development of your application you can do a "debug" run, which allows you to check for any errors, such as a file not existing or a path being incorrect. Debug runs also can check to see if any external instruments you are controlling can be found.
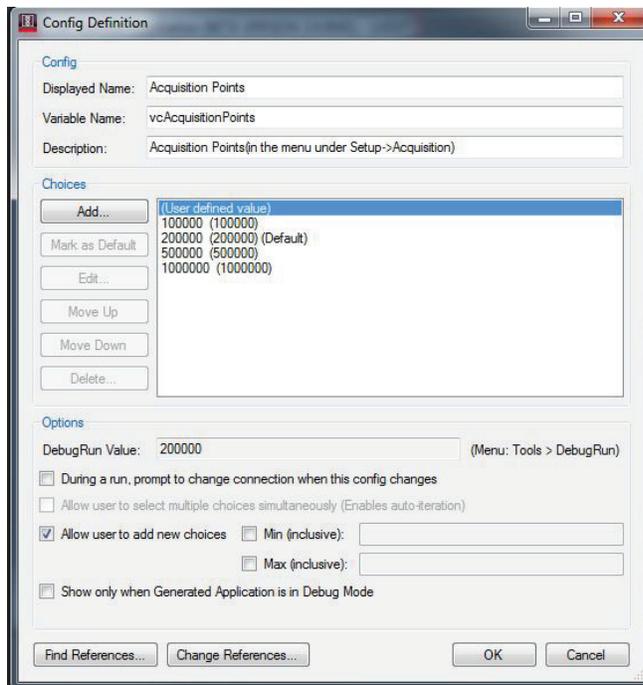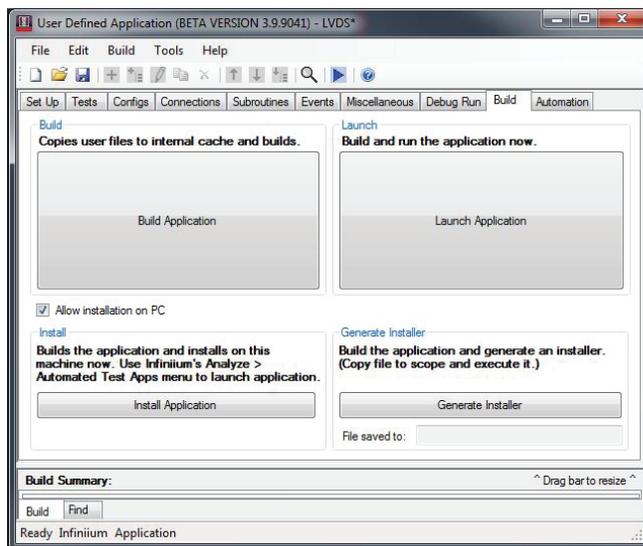

Figure 12. Setting up variables

Figure 13. Four different options to build your program

After the application is installed

Once you have developed your UDA and installed it on your oscilloscope. The application is fully integrated into the Infiniium GUI. You run your UDA like any of Infiniium's best-in-class compliance applications. The application can be found in the Analyze menu under the automated test apps.
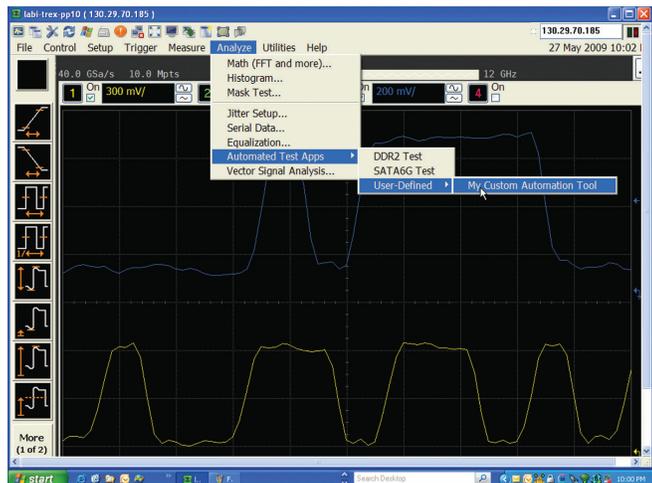

Figure 14. Full Integration of UDA in Infiniium baseline software

Combining UDA add-in capability with your Infiniium compliance applications

Available in UDA version 2.50 and later, you can now create test add-ins. A test add-in can be added to your Infiniium compliance application, such as SAS-3 or PCIe Gen3. This capability now allows you to test to the exact compliance specification and then create additional customized automation tests through UDA and test them all in the same report. This now gives you the unmatched combination of the ease of use of compliance applications and the flexibility customized technologies. There is no other tool in the oscilloscope industry that allows this combination.

Using add-in capability

User defined application can be combined with any Infiniium compliance application, making it possible to get the ease-of-use of Keysight's compliance applications with the flexibility of UDA.

UDA add-in capability adds a completely unique experience when using Keysight's software. Create a test you need in UDA, then add it to your compliance application.
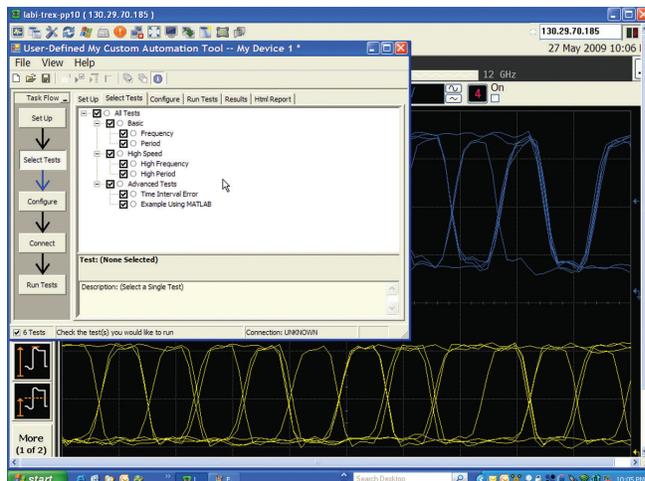

Figure 15. The appearance of the application software is very close to Infiniium's industry leading compliance applications.
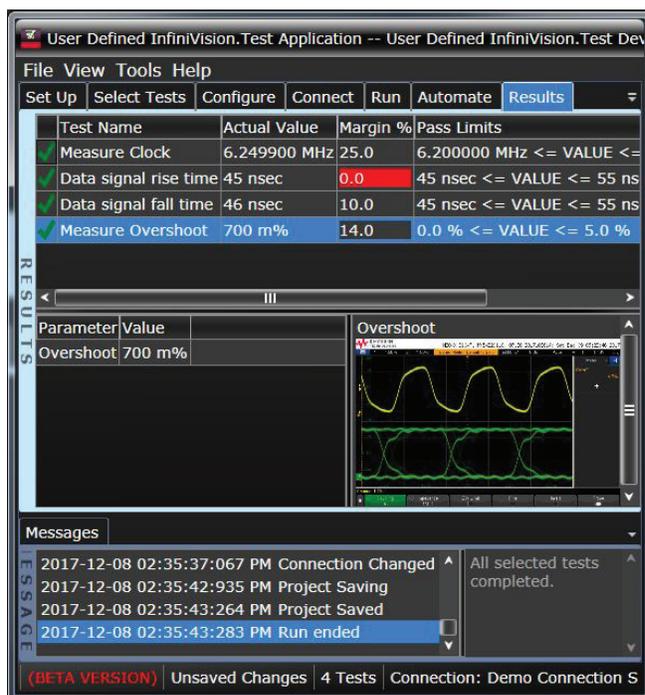

Figure 16. Test results are can easily be reviewed, re-run, or executed multiple times before creating a test report

Switch matrix

The custom switch matrix software option for UDA used together with switch matrix hardware provides automated and customizable testing for multi-lane digital bus interfaces. The benefits of the automated switching solution include:

– Eliminate reconnections—which saves time and reduces errors through automating test for each lane of a multi-lane bus.
– Maintain accuracy—with the use of unique PrecisionProbe or InfiniiSim to compensate switch path losses and skew.
– Customize testing—with the use of remote programming interface and UDA for device control, instrument control and test customization.

More information of the switching solution and configuration, visit www.keysight.com/find/switching and *Using Microwave Switches When Testing High Speed Digital Interfaces* application note (Keysight publication number 5991-2375EN).
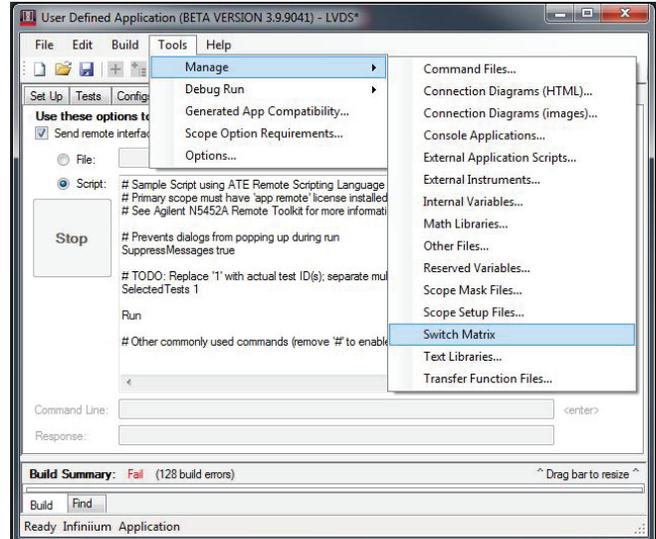

Figure 17. Switch matrix software feature enabled in the UDA.

Figure 18. Automated testing for multi-lane digital bus interface through switching solution.

Share, modify and transfer user-defined applications and add-ins

UDA development environment is free to download at www.keysight.com/find/uda. You can create your UDA and shares your application both on site or trans-regionally. You can run as many UDAs on your oscilloscope as you would like with one license.

You can find examples of UDA at:
www.keysight.com/find/share_uda

You can also share the UDAs that you have developed. You can download an example and then modify the application to be the exact application that you need with one license.

Figure 19. Share your applications at www.keysight.com/find/share_uda
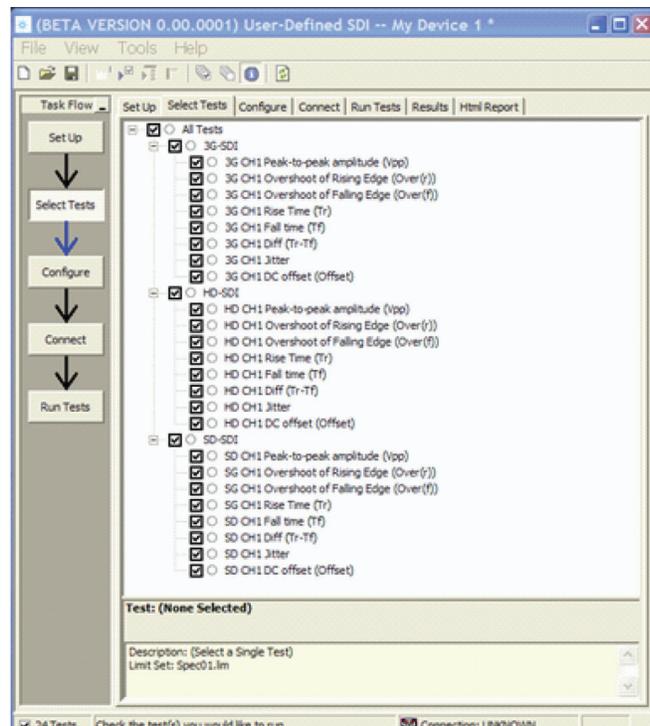

Figure 20. SDI application that is available for your download today

Oscilloscope Compatibility

InfiniiVision Oscilloscopes	Software Version Supported
3000T series	7.10 or greater
4000A series	7.10 or greater
6000A series	7.10 or greater
Infiniium Oscilloscopes	
S-series	all
V-series	all
Z-series	all
9000A series	all
9000H series	all
90000A series	1.41 or greater
90000 Q series	all
8000A series	5.5 or greater
80000B series	5.5 or greater
90008A series digitizers	all

Ordering Information

N5467B - UDA	Fixed perpertual	Transportable	Server-based
InfiniiVision	N5467B-4FP	N5467B-4TP	-
Infiniium	N5467B-1FP	N5467B-1TP	N5435A-058
Switch Matrix	N5467B-7FP	N5467B-7TP	N5435A-708

1. N5467B and N5467C are equivalent products and utilize the same license options.
2. Infiniium license (1FP and 1TP) includes support for InfiniiVision oscilloscopes.
3. Software system requirements:
    - Software 4.30 or above requires Windows 7.
    - .NET 4.5.2 https://www.microsoft.com/en-us/download/details.aspx?id=42643
    - Keysight IO Libs version18.0 or greater http://www.keysight.com/find/iosuite
    - Keysight License Manger version 5.1 or greater http://www.keysight.com/find/licensing
4. Infiniium oscilloscope requirements:
    - 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
5. UDA software license is required to run generated UDA program on the oscilloscope.
6. UDA software license is a pre-requisite to use custom switch matrix.
7. For full switch configuration, please refer to www.keysight.com/find/switching or the Automated Switching Solution for Oscilloscopes brochure, publication number 5991-2413EN.
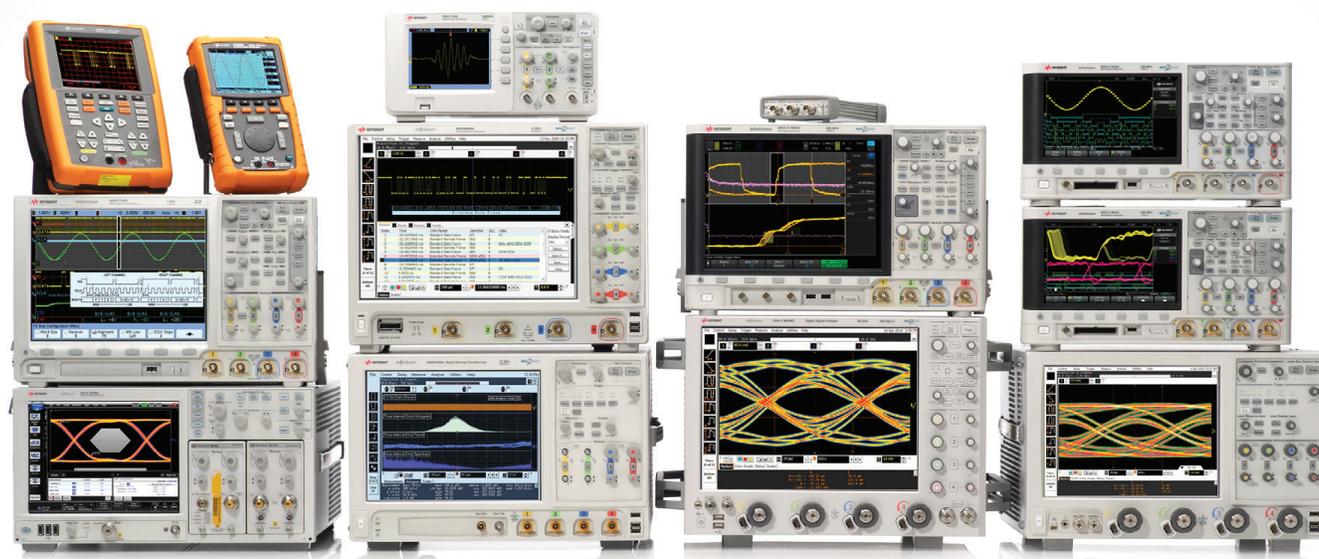
Keysight Oscilloscopes

Multiple form factors from 20 MHz to > 90 GHz | Industry leading specs | Powerful applications

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