









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

Use your generated GUI to:

- 1. Automate testing
- 2. Generate reports
- 3. Consistently test across your organization
- 4. Control switch matrix for automated multi-lane interface testing
- 5. Add analysis to your compliance and debug software

# Custom Automation for Your Keysight Infiniium 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.

Infiniium 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.

# Infiniium User Defined Application (UDA)

### UDA's environment was designed by Infiniium for Infiniium

There are two key differentiators for UDA from programs such as Keysight's VEE. The first is that UDA was designed specifically for an Infiniium oscilloscope. 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 Infiniium 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.

Combining UDA add-in capability with your Infiniium compliance applications.

User Defined Application (BETA VERSION 1.29.9032) - Project 1
Set Up       Tests       Configs       Connections       Subroutines       Events       Miscellaneous       Debug Run       Build         Application       Name:       Set       Set       Set         Versio       Provide Add-In Name       Set       Set         Filter       Please enter a name for this Addin       Name:       Name:       Miscellaneous         Exter       Name:       Miscellaneous       OK       Cancel       Set
Build Summary: ^Drag bar to resize ^ Description (Press F1 for more information) Build Find Reacts. Mode: Application

Figure 1. The need for UDA

User Defined Application (BETA VERSION 1.29.9032) - Project 1*								
File Edit Build Tools Help								
Set Up Te	ests Configs	Connections	Subroutines	Events	Miscellaneous	Debug Run	Build	
Applicatio	Application							
Name:	Example.MyU	DA						Change
Version:	0.01.0001							Change
Filters								
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Description	n (Press F1 for	more information	0					
Build Fin	d							
Ready Mode	: Application							

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.

File	Build Tools	Help				
			NIA			
Set Up	Tests Con	igs Connections Subroutines	Events Miscellaneous	Debug Run Build		
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	scop	e execute		:CH4	AN2:ISIM:DEC "%VAR:IsimPath2%", OFF	
	scop	e execute		:CH/	AN2:ISIM:CONV '%VAR:IsimPath2%', OFF	
	scop	e execute		XVA	R:IsimLoss2% '%VAR:IsimPath2%', OFF	
	scop	e execute		:CHA	AN1:ISIM:STAT %VAR:IsimState1%	
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0.34						* Dece have see in a
Build 3	summary:					Drag bar to resize
Descr	iption (Press F1	for more information)				
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Figure 3. Using InfiniiSim and user defined application



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.

Use	r-Defined Application - Project 1*	
File	Edit Build Tools Help	
Set Up	Test Definition <sup>1</sup>	R.M.
	Test Name: Frequency Constraints Select Step Type - Description: Measures signal for Reference: Internal document	
	Stess - E Specify Instrument Command	
	As Destination Value Griter SCPI command to sund to My81134A: So Thread 20000 © (ms) De More More Des A	L≩
Dand	Confree Previous Next	OK Cancel
Reduy	Limbs: (Min) 1 O Verify condition	2 (Max)
se Ur Usi	OK Cancel Cancel	

Figure 5. Controlling external instrument through SCPI commands



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

User	Defined App	lication - de	emo	(	
Eile	🛃 Test Defi	nition			
Set Up Free Spect	Test Name: Description: Reference: Steps Ify Scope Set Il path to a scop	Frequency Neasu Neasures signal fr Internal document tup File re setup (file will	rement equency Select Step Type Colout the twee of alone to odd	×	
OK Name Descript Referen	Cancel Move Up Move Down		Ulle Console Application Luurch Esternal Application Set Variable	jpasel   Br	
Ready	Configure Units:	Result yo = (s (Mn) 1 Nominal: Cancel	Run Control Display Message Pause Seep Verify condition Report	2	(Max)
e Unin User-	stall De	GL-usb	O Intermediate Value Cancel		the second second

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



Figure 8. Add your own command files

Define the be	havior for generating and displaying this value:	
Label:	Freq	
Value:	[scope] meas freq? %cfg:CHAN%	Set
Units:	Hz	
Precision:	Round Actual Value to nearest 10E 5 🔅 (100 kilo Hz)	
🗹 Include imag	10 📀 Scope Screen	
	O File (expected full path):	

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.

User-Defined Application - demo*	
File <u>E</u> dit Build <u>T</u> ools <u>H</u> elp	
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Reference         No. Literature: currently available           Steps         Execute         (M)411344, FREG 3014; temeot.+20000ms)           Execute         (M)411344, (VIC)111404 /1V (temeot.+20000ms)           Load         Sife2/lips art(::::::::::::::::::::::::::::::::::::	pp.set) JDA\CommandF 1E+09)
۲	>
Ready	.:

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

User-Defined Application - Example Project
File Edit Build Tools Help
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Set Up Tests Configs Connections Events Debug Run Miscellaneous Build
Basic
Frequency
⊟- High Speed
High Frequency
E - Advanced Tests
Time Interval Error
Example Using INATEAD
Add Edit Copy Delete Move Up Move Down Move To
Name High Frequency Description Measures Signal Frequency
Reference Internal Document Chapter 1 Paragraph 2
Execute [My81134A] :PREU 3GH2 (timeout=20000ms)
Execute [My81134A] :VOLT1:LOW -1V (timeout=20000ms) Execute [My81134A] :OUTP1 ON filmeout=20000ms)
Load 3GHz2Vpp.set (E:\UDA\Example\SetupFiles\3GHz2Vpp.set)
Steep 3UUU ms Execute [scope] SelectChannelAndDigitize.cmd (E:\UDA\Example\CommandFiles\SelectChannelAndD
Result Frequency = Iscope1 meas freq?%cfq:CHAN% (Nearest 100 kilo GHz) (Image = Screen) (1 <= 1
Ready

Figure 11. Easily set up a UDA for testing

### 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.

🔡 Config	Definition
Label:	Scope Channel
Variable:	CHAN
Description:	The Channel Receiving the Signal
Choices: Add Edit Delete Mark as Default Select For Debug Run	Channel 1 (CHAN1) (Default) (DebugRun) Channel 2 (CHAN2)
Allow use	r to add new choices
ОК	Cancel

Figure 12. Setting up variables

User-Defined Application - Example Pro	oject*				
<u>F</u> ile <u>E</u> dit Build <u>T</u> ools Help					
i 🗅 😂 🔲 🔿   + 🏗 📝 🖬 🗙   T 🔍 🐂 🧕	▶ 🗋   @				
Set Up Tests Configs Connections Events Debug Run	Miscellaneous Build				
Build	Launch				
Build Application	Launch Application				
<u> </u>	Traver, Abiotravi				
Generate Installer Build the application and generate a .zip installation file. Copy file to scope, unzip and run setup.exe. Generate Installer					
_					
File saved to:					
Install Build the application and install on this machine nor	w. Use scope menu to launch application.				
Install Application					
Ready					

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-ofuse 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. You can choose to run all tests or run each test individually.

### 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).

File View Too	ls Help				
🗅 🚔 🖬	Compliance limits				
Task Flor	Infiniium				
	Switch Matrix				
Set Up	resultante   Actual val   Màrgin   Pass L				
Configure Sw	itch Matrix Settings*				
⊂ Off  ● On					
Controller Signal Paths					
Configuration Mode					
<ul> <li>Automatically select drivers and paths (limited models)</li> </ul>					
C Manually perform these tasks (any supported model)					

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.

19468			
Disclaimer by Tim Chemacki = Tue Aug 12, 2008 9:46 am	0	707	by <b>Tim Chemacki</b> G Tue Aug 12, 2000 9:46 am
Back Builder for the 90000A Series escilloscope     B by beasay > Thu Jan 00, 2009 11:35 pm	0	241	by Beassay G The Jan 08, 2009 11:35 pm
Lab/New drivers available for the 90000A Series oscilloscope by basing + Sun Dec 14, 2008 12:42 am	0	359	by beasay G Sun Dec 14, 2008 12:42 am
Caliting Vee modules with Perl     by wangedet > Mon Dec 08, 2008 1:58 pm	1	46.7	by jborges) G Hon Dec 08, 2008 4:35 pm
LIBUX and UNIX SRL drivers for 900008 Series     B by beasay = Set Nov 01, 2000 S:02 pm	0	679	by baseay G Sat Nov 01, 2008 5:32 pm
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BATEAB driver for the 90000 Series 8 by beausy > Sat Nov 01, 2000 S:27 pm	0	640	by baasay 12 Sat Nov 01, 2008 5:27 pm
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State Analyzer Bit Decoder     B by bassay > Wed Oct 15, 2008 4:46 pm	0	705	by beasay G Wed Oct 15, 2008 4:46 pm
Controlling two scopes with Mylafinitian     B by bassay = Thu Aug 28, 2008 9:07 am	0	821	by bassay G Thu Aug 28, 2008 9:07 am
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Waveform to ASCE converter     B by basing > Wed Aug 13, 2008 2:52 pm	0	914	by beasary G Wed Aug 10, 2008 2:02 pm
Downland Large Waveform Files from your Scope to PC     B by bassay > Wed Aug 13, 2000 9:30 am	0	896	by beasay G Wed Aug 13, 2008 9:38 am

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

Oscilloscope	Software version
90000 X-Series	All
Z-Series	All
90000 Q-Series	All
90000A Series	1.41 or later
90008A Series digitizers	All
9000A Series	All
S-Series	All
9000 H-Series	All
8000A Series	5.5 or later
80000B Series	5.5 or later

# Ordering information

Application	License type		Infiniium Z-Series	Infiniium S-Series	Infiniium 90000 Series	Infiniium 9000 Series
UDA software <sup>3</sup>	Fixed	Factory-installed	N5467B-1FP	N5467C-1FP	—	_
		User-installed	N5467B-1FP	N5467C-1FP	N5467B-1NL	N5467C-1NL
	Floating	Transportable	N5467B-1TP	N5467C-1TP	N5467B-1TP <sup>1,2</sup>	N5467C-1TP <sup>1,2</sup>
		Server-based	N5435A-058	N5435A-058	N5435A-058	N5435A-058
UDA custom switch matrix <sup>4,5</sup>	Fixed	Factory-installed	N5467B-7FP	N5467C-7FP	—	—
		User-installed	N5467B-7FP	N5467C-7FP	N5467B-7NL	N5467C-7NL
	Floating	Transportable	N5467B-7TP	N5467C-7TP	N5467B-7TP <sup>1,2</sup>	N5467C-7TP <sup>1,2</sup>
		Server-based	N5435A-708	N5435A-708	N5435A-708	N5435A-708

1. Requires software 5.00 and above.

 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.

3. UDA software license is required to run generated UDA program on the oscilloscope.

4. UDA software license is a pre-requisite to use custom switch matrix.

 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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**myKeysight** 

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### www.axiestandard.org

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#### www.lxistandard.org

LAN eXtensions for Instruments puts the power of Ethernet and the Web inside your test systems. Keysight is a founding member of the LXI consortium.



#### www.pxisa.org

PCI eXtensions for Instrumentation (PXI) modular instrumentation delivers a rugged, PC-based high-performance measurement and automation system.



## Three-Year Warranty

www.keysight.com/find/ThreeYearWarranty

Keysight's commitment to superior product quality and lower total cost of ownership. The only test and measurement company with three-year warranty standard on all instruments, worldwide.



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### www.keysight.com/go/quality

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#### www.keysight.com/find/channelpartners

Get the best of both worlds: Keysight's measurement expertise and product breadth, combined with channel partner convenience.

www.keysight.com/find/UDA

For more information on Keysight Technologies' products, applications or services, please contact your local Keysight office. The complete list is available at: www.keysight.com/find/contactus

#### Americas

Canada	(877) 894 4414
Brazil	55 11 3351 7010
Mexico	001 800 254 2440
United States	(800) 829 4444

### Asia Pacific

Australia	1 800 629 485
China	800 810 0189
Hong Kong	800 938 693
India	1 800 112 929
Japan	0120 (421) 345
Korea	080 769 0800
Malaysia	1 800 888 848
Singapore	1 800 375 8100
Taiwan	0800 047 866
Other AP Countries	(65) 6375 8100

#### Europe & Middle East

United Kingdom

For other unlisted countries: www.keysight.com/find/contactus (BP-09-23-14)



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