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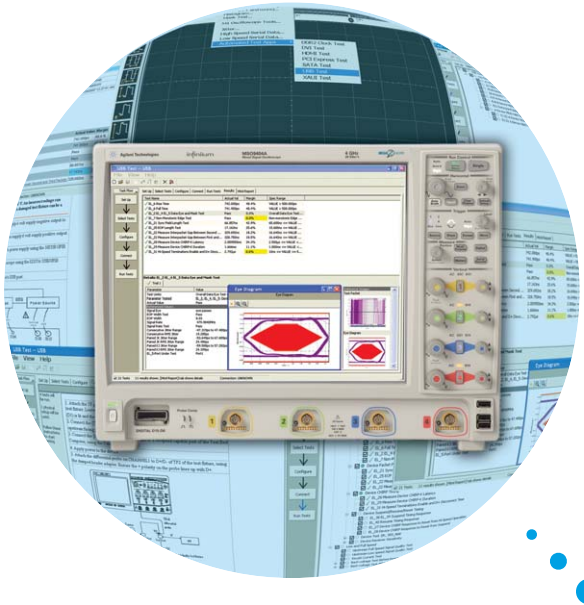
N5416A and N5417A USB Compliance Test Software for Infiniium Oscilloscopes

Data Sheet



The N5416A USB compliance test software for Infiniium oscilloscopes gives you a fast and reliable way to verify USB electrical specification compliance for your USB 2.0 devices, hosts and hubs. The software executes the official USB-IF MATLAB scripts with MATLAB's runtime engine embedded in the oscilloscope.

- **Easy-to-use interface for fast setup, configuration and automated test**
- **Recognized by the USB-IF for USB compliance testing**
- **Additional features: support for USB OTG (on-the-go) and multi-trial testing**
- **USB-IF MATLAB® script execution inside the Infiniium oscilloscope**
- **Award-winning Infiniium ease of use**
- **Test fixtures for USB 1.1 (low and full speed), USB 2.0 (high speed) and USB OTG compliance**

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Easily verify USB electrical parameters

With USB compliance test software, you can take the Infiniium oscilloscope you use for everyday debugging and use it to verify USB electrical parameters with the same testing scripts the USB-IF created for official compliance testing at designated workshops. The USB compliance test software has a new setup wizard that allows you to quickly and easily test all facets of electrical compliance of your device, host or hub. The setup wizard menu structure of the N5416A USB test option provides a level of simplicity not found with other vendors multi-tiered menu structures for executing tests and documenting results.

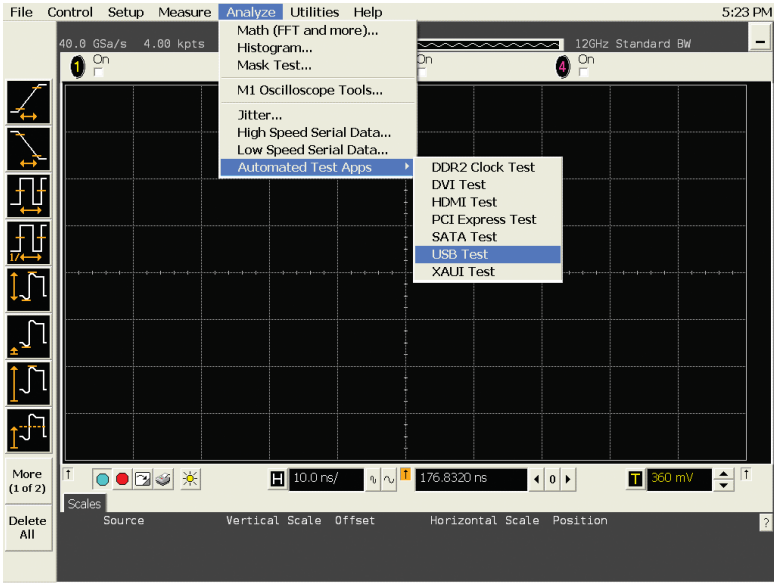


Figure 1. The Infiniium USB compliance tests are incorporated directly into the oscilloscopeís menu structure as a submenu under the Analyze menu.

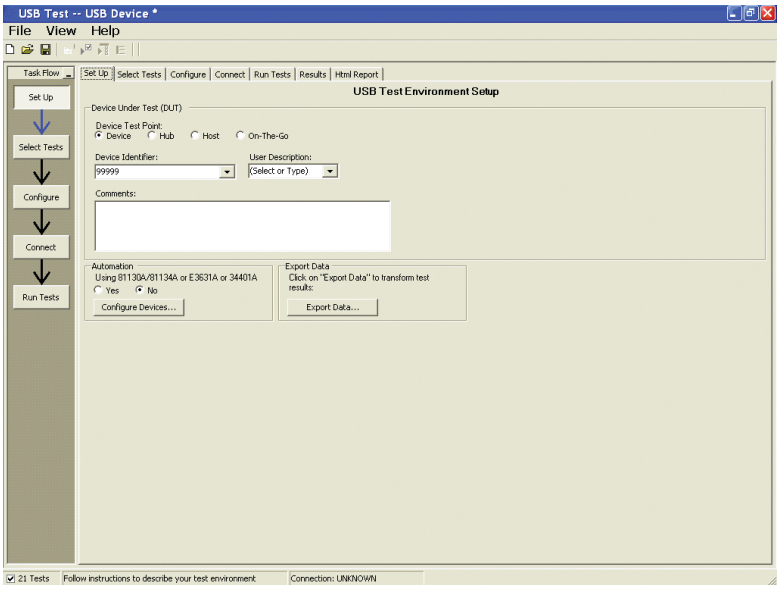


Figure 2. You can configure and launch the Infiniium USB compliance tests through a single window

Easily verify USB electrical parameters

Low-, full- and high-speed tests require compliance with signal quality, inrush current, droop, drop, and backdrive voltage tests. Hi-speed USB requires compliance with an additional suite of tests. These tests are provided by the USB compliance test software, along with USB OTG (on-the-go) test capability (with the automated USB OTG electrical test fixture). Tests can be executed directly from the scope interface under the Analyze menu.

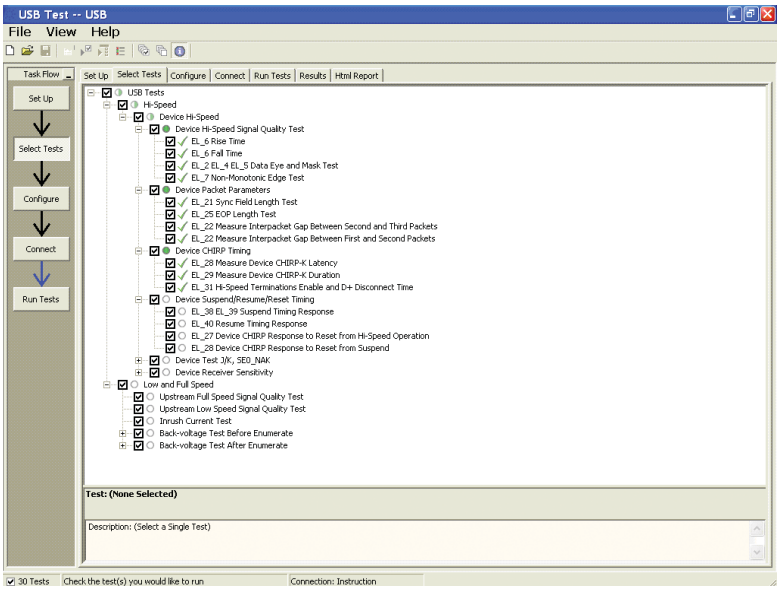


Figure 3. You can select individual tests or the entire list of compliance tests from a single window page.

Benefits

In the past, pre-compliance testing in a lab environment involved capturing data with an oscilloscope, transferring it to a PC and post-processing it with a software program. Agilent has simplified the process by installing a run-time version of MATLAB software in the scope and integrating the USB test option into the Infiniium oscilloscope's menu structure.

Once the test is executed, the test results appear on the Infiniium display in an HTML-formatted window.

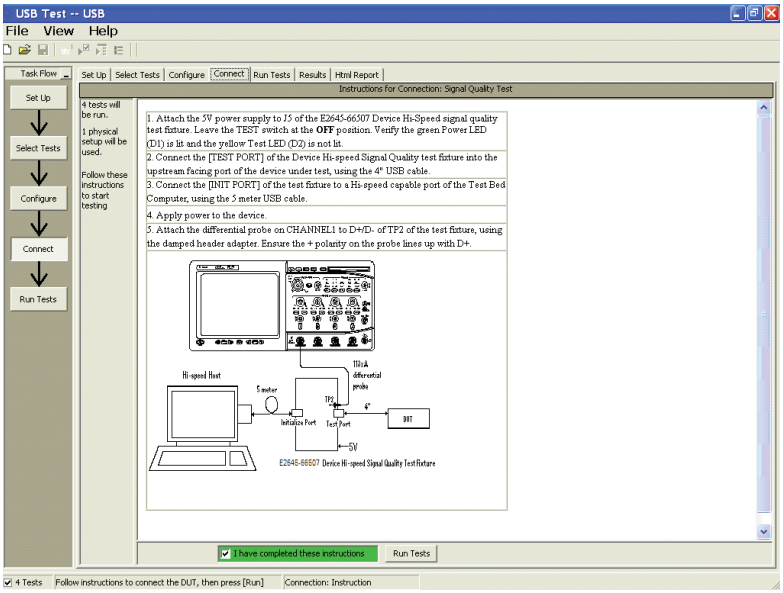


Figure 4. Test instructions and diagrams are included to help you configure your equipment.

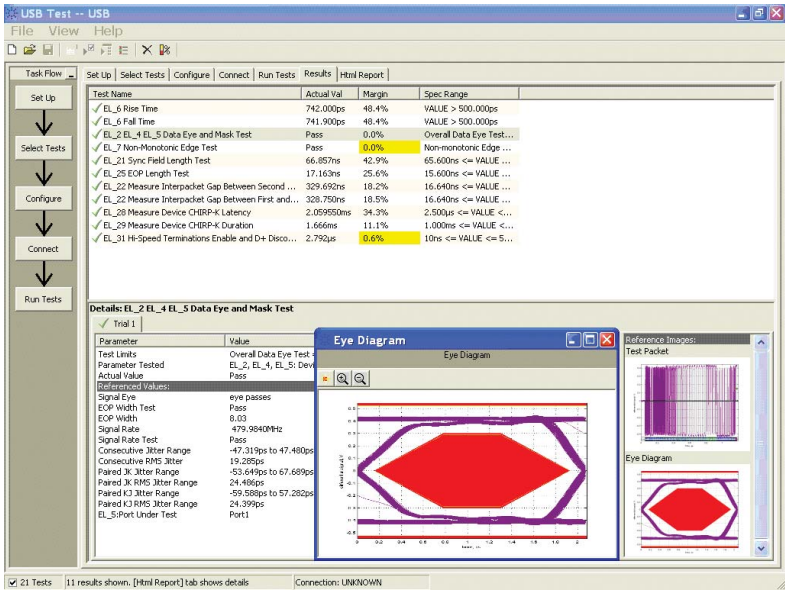


Figure 5. Infiniium scopes automatically display test results in an html window immediately after test execution.

Benefits

Each test also automatically saves the PNG, HTML, and TSV files required by the USB-IF. The higher data rates associated with hi-speed USB 2.0 demand a measurement system that will not interfere with your device/host/hub operation by loading the system. The award-winning InfiniiMax probing system, which is compatible with Infiniium oscilloscopes, provides unmatched signal fidelity – ensuring your measurement system does not load the signals under test – so it does not compromise the specification margins for passing the electrical signal quality tests. The InfiniiMax probing system has been approved by the USB-IF for compliance testing. The set of six high-speed test fixtures are highly manageable in a test environment due to their small size. The six fixtures allow you the flexibility to run different tests concurrently when you have more than one host, hub, or device to verify for compliance. The OTG fixture available is the only automated OTG test fixture for USB OTG compliance testing.

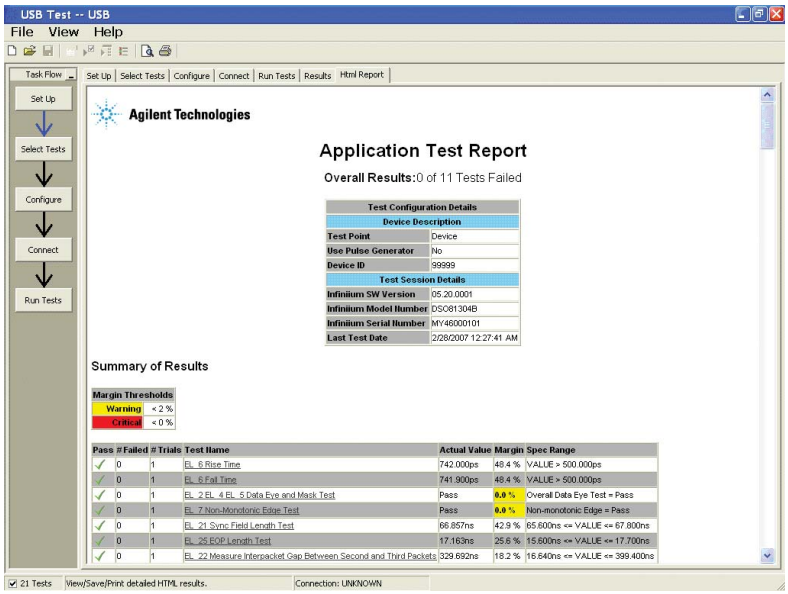


Figure 6. The results are stored in a printable HTML report.

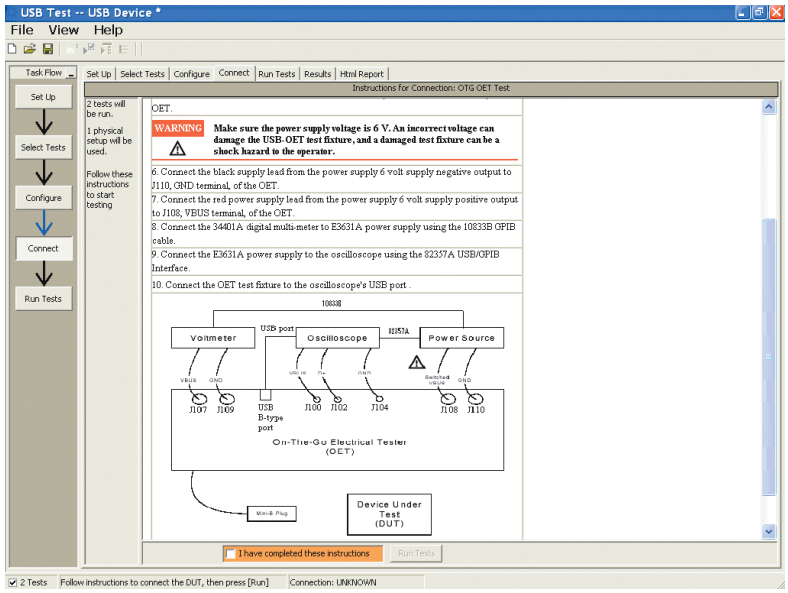


Figure 7. USB OTG test instructions

Recommended Test Equipment

The N5416A USB test option requires an Infiniium 4-channel or 4+16 channel oscilloscope. To run hi-speed USB compliance tests, you will need E2649A/E2649B fixtures. For low/full-speed tests, you will need a E2646A SQuIDD test fixture. For USB OTG tests, in addition to the Infiniium oscilloscope, you will need an N5417A USB OTG test fixture and an E3631A power supply and 34401A digital multimeter.

No fixtures are supplied with the N5416A software. One SQiDD test fixture must be ordered separately as part number E2646A (for low- and full-speed testing). A set of six high-speed test fixtures for signal quality, receiver sensitivity, TDR, and host disconnect must be ordered separately as part number E2649B. For USB OTG (on-the-go) test, USB OTG electrical fixture must be ordered separately as part number N5417A.

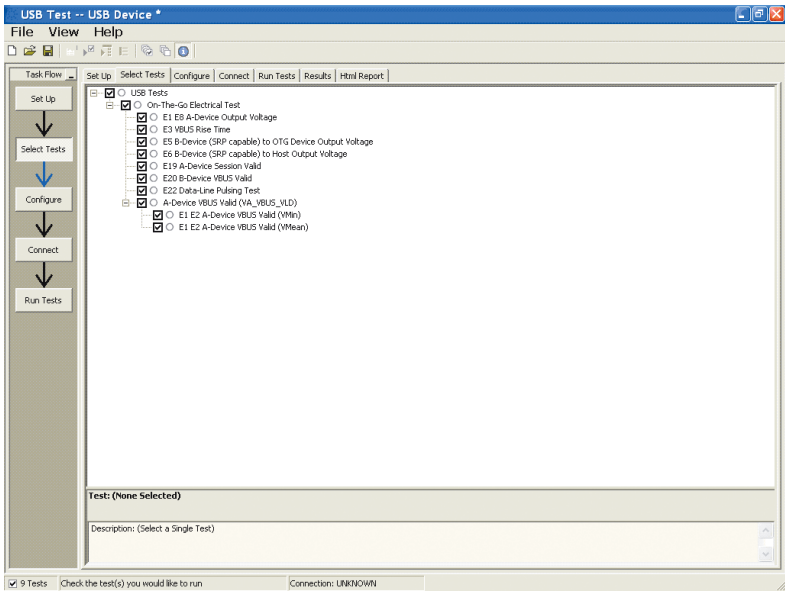


Figure 8. USB OTG test selections

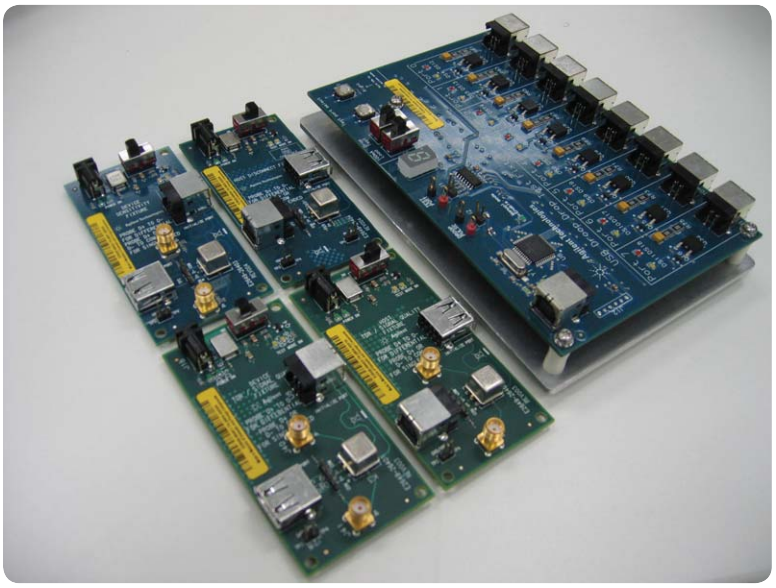


Figure 9. E2649B test fixture

Recommended Test Equipment (continued)

Recommended high-speed test equipment[1]

With Agilent Infiniium Series and 54850 Series oscilloscopes (recommended bandwidth: 2 GHz or higher)

Model or part number	Description	Quantity
N5416A	USB 2.0 low/full/high speed test option for Infiniium oscilloscopes[2]	1
E2649B	Hi-speed USB 2.0 test fixture set consists of: E2649-66401 Device TDR/signal quality test fixture E2649-66402 Host TDR/signal quality test fixture E2649-66403 Device receiver sensitivity fixture E2649-66404 Host disconnect test fixture E2649-66405 Droop and drop test fixture	1
1131A/32A/34A	InfiniiMax probe amplifier (qty 2 required for hub testing)	1
N5442A	InfiniiMax III 3.5mm to precision BNC adapter (required for the 90000 X-Series)	3
E2678A	Differential socketed probe head for InfiniiMax probe amplifiers (qty 2 required for hub testing)	1
Digital signal generator[3]	81130A Pulse data generator with options: 11-MB SRAM memory card (UFJ) 81132A 660-MHz option 8493C 006 6-dB attenuator Male SMA cable Or 81134A pulse generator 15433B 500 ps transition time converter (for use with the 81134A) Male SMA cable	 1 2 2 2 2 2
82357B*	USB-to-GPIB interface converter	1
TDR[4]	86100A/B/C 54754A Male SMA cable	1 1 2
34401A	Digital multimeter	1
Hi-speed USB	Hardware configuration: 815EEA2 motherboard, Pentium® III 700 MHz	1
Test bed computer	256 MB RAM, 40-GB HD, CD (CD-RW), FD, IOGear (or ATEN) USB 2.0 PCI card (5-port) Software configuration: Windows® 2000 or Windows XP	
USB cable	1.5-meter cable[5] 1-meter cable	1 1
USB-IF tool on host system	HS electrical test tool available from www.usb.org (USBHSET.exe)	1

[1] High-speed devices must support the full-speed mode. Consult the "Recommended low/full-speed test equipment" table for the required test equipment.
[2] Option 8, enhanced bandwidth, is recommended for the 54855A. Option 5, noise reduction, is recommend for the 80000, 90000 and 90000X Series oscilloscopes.
[3] A digital signal generator is required when testing receiver sensitivity for devices/hubs.
* 82357A (USB1.1) is obsolete and replaced by 82357B (USB 2.0)
[4] The TDR test was deleted from the Hi-speed Test Procedure (Rev. 1.0), but it is still recommended during development.
[5] Not available from Agilent. Refer to www.usb.org for lists of qualified vendors.

(Note that four damped adapters are included with the E2649A)
(The damped adapter part number is 01130-63201)

Recommended Test Equipment (continued)

Recommended low/full-speed test equipment[1]

With Agilent Infiniium Series or 54830B/D, 54832A/D oscilloscopes

Model or part number	Description	Quantity
N5416A	USB 2.0 low/full/high speed test option for Infiniium oscilloscopes	1
E2646A	One SQiDD (signal quality inrush, drop/droop) test fixture for low/full-speed USB 2.0 testing	1
1165A	Miniature passive probe for the 5483x Series oscilloscopes	3
10073C	Passive probe for the 8000 Series oscilloscopes	3
E2697A	High-impedance adapter with one 10073C passive probe (for the 5485x, 80000 and 90000 Series oscilloscopes)	3
10075A	Clip adapter (for each E2697A)	3
8710-2063	Dual lead adapters	3
1147A	50-MHz current probe (for 8000, 54831B/D or 32B/D only)	1
N2782A and N2779A*	50-MHz 30 A current probe and 3-channel power supply	1
USB host system	Refer to http://compliance.usb.org/Interoperability	1
USB cable	5-meter cable 1-meter cable	6 1
USB-IF tool on	HS electrical test tool available from **www.usb.org** (USBHSET.exe)	1

* N2774A and N2775A are obsolete and replaced with N2779A and N2782A.

USB OTG recommended test equipment

Using Agilent Infiniium Series or 54830B/D, 54832A/D

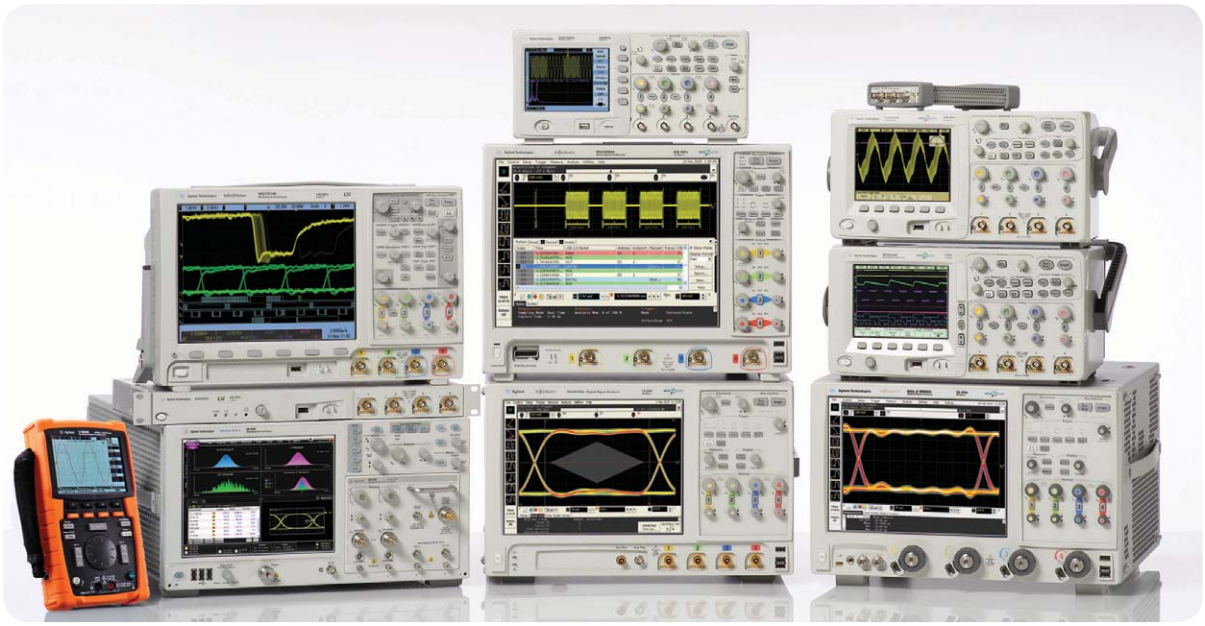
Model or part number	Description	Quantity
N5417A	USB OTG (on-the-go) electrical test fixture	1
10073C	Passive probe for the 8000 Series oscilloscopes	2
E2697A	High-impedance adapter with one 10073C passive probe (for the 5485x, 80000 and 90000 Series oscilloscopes)	2
E3631	Power supply unit	1
34401	Digital multimeter (DMM)	1
82357B*	USB/GPIB interface cable	1
10833A	GPIB cable	1

* 82357A is obsolete and replaced by 82357B

Ordering Information

Infiniium oscilloscope	Operating system	Software revision	USB test option	Tests
8000 Series	Windows XP Pro	A.04.90 or higher	N5416A	Low/full speed
90000A Series	Windows XP Pro	A.02.10 or higher	N5416A	Low/full/high speed
9000 Series	Windows XP Pro	A.02.00 or higher	N5416A	Low/full/high speed
80000B Series	Windows XP Pro	A.05.20 or higher	N5416A	Low/full/high speed
5483xB/D	Windows XP Pro	A.04.21 or higher	N5416A	Low/full speed
5485xA	Windows XP Pro	A.04.21 or higher	N5416A	Low/full/high speed
80000A Series	Windows XP Pro	A.04.21 or higher	N5416A	Low/full/high speed
90000 X-Series	Windows XP Pro	A.03.00 or higher	N5416A	Low/full/high speed

Note that free upgrade media for Infiniium oscilloscopes is available for order online at http://www.agilent.com/find/infiniium_software.



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