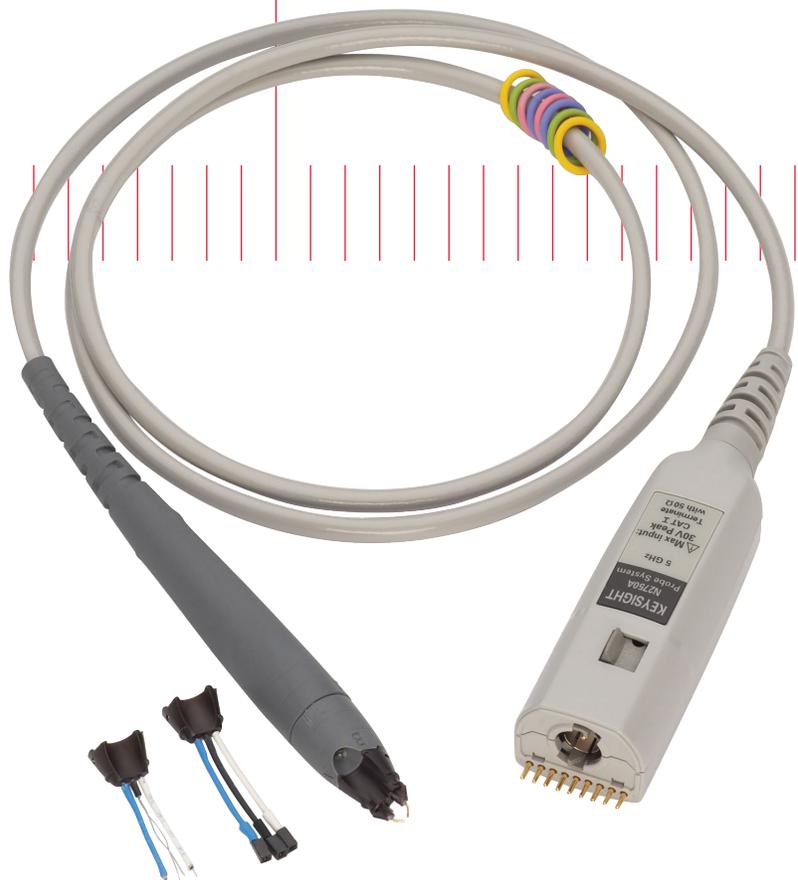


# Keysight Technologies

## N2750A/51A/52A InfiniiMode Differential Active Probes

Data Sheet



## Key Features

### Measurement versatility

- 1.5 GHz, 3.5 GHz, and 6 GHz probe bandwidth models
- Dual attenuation ratio (2:1/10:1)
- High input resistance (200 k $\Omega$  differential, 100 k $\Omega$  single-ended)
- Wide input dynamic range (10 Vpp)
- Wide offset range ( $\pm 15$  V)
- High CMRR (>60 dB at 1 MHz)

### Superb usability

- InfiniiMode probing for making differential, single-ended and common mode measurements with a single probe
- Built-in multi-function scope control for quick access to a variety of scope functions
- Built-in “Headlight” to see where you are probing
- Includes solder-in, browser, and socketed tips standard
- AutoProbe interface for auto configuration and probe power

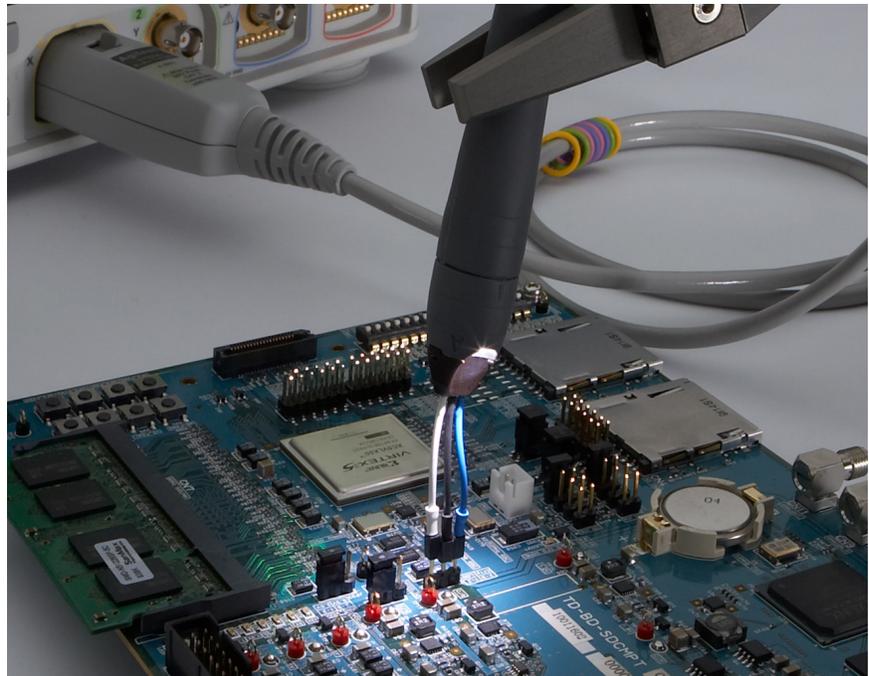
### At affordable prices

The N2750A Series InfiniiMode differential probes are a new generation of low-cost, 1.5 GHz, 3.5 GHz, and 6 GHz differential active probes compatible with the Keysight Technologies, Inc. InfiniiVision and Infiniium oscilloscopes’ AutoProbe interface.

## Measurement Versatility

These probes integrate many of the features and characteristics needed for today’s general-purpose, high-speed differential probing - especially in digital system design, component design/characterization, and differential serial bus measurements. The N2750A Series differential probes offer 2:1 and 10:1 dual attenuation settings, allowing them to be used for a broad range of applications. Dual attenuation range is automatically configured depending on the size of the input signal.

The new differential probes have an input resistance of 200 k $\Omega$  (differential) or 100 k $\Omega$  (each input to ground) and an extremely low input capacitance of 700 fF to minimize circuit loading. This, accompanied with superior signal fidelity, makes these probes useful for most digital design and debug applications. And with their wide dynamic range (10 Vpp) and offset range ( $\pm 15$  V), these probes can be used in a wide variety of analog signal measurements as well.



## Superb Usability

### InfiniiMode

The N2750A Series probes come with new InfiniiMode operation modes. The InfiniiMode allows convenient measurements of differential, single-ended, and common mode signals with a single probe tip without reconnecting the probe to change the connection. The N2750A probe's InfiniiMode provides the following modes of operation.

- A – B (differential)
- A – ground (single-ended A)
- B – ground (single-ended B)
- $(A+B)/2$  – ground (common mode)

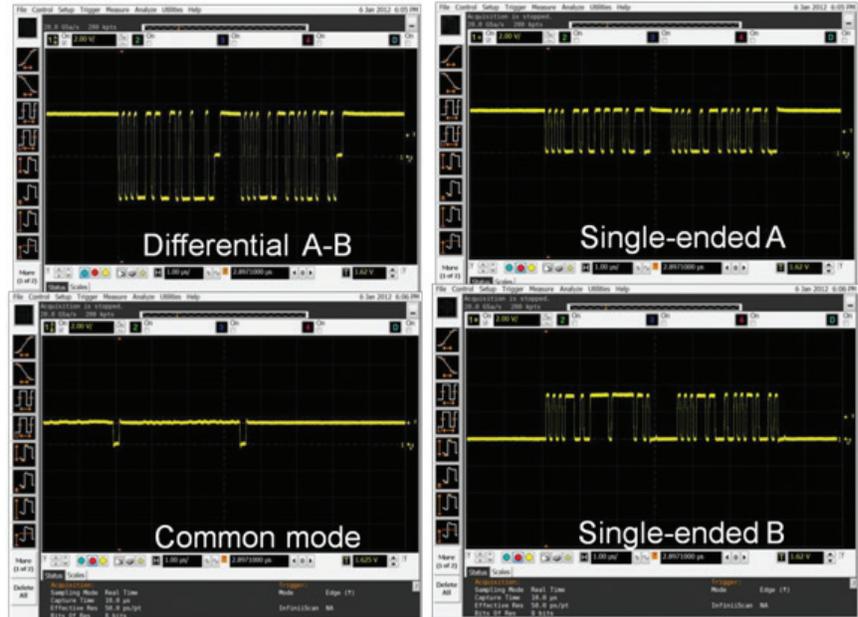


Figure 1. The InfiniiMode allows convenient measurements of differential, single-ended (A, B), and common mode signals with a single probe tip without reconnecting the probe to change the connection.

### Quick action scope control

The N2750A Series differential probes provide convenient and quick access to various functions on the scope. You often have a need to control the scope while you hold a probe in your hand. With the quick action scope control feature built into the probe, you can turn the built-in headlight of the probe on and off, or control some frequently used scope functions such as RUN/STOP, auto scale, quick print, quick save, etc. with only a button press on the probe. Get control of your most needed function with a push of the quick action control button on the probe. The following scope functions can be controlled with the quick action control button.

### For Infiniium oscilloscopes:

- Headlight on-off/intensity control
- InfiniiMode
- Run/stop toggle
- Single
- Clear display
- Autoscale
- No action
- Multipurpose (mapped to quick action button)
  - Quick Measure
  - Quick Print
  - Quick Screen
  - Quick Setup
  - Quick Waveform
  - Quick Email
  - Quick Execute
  - Quick Control

### For InfiniiVision oscilloscopes:

- Headlight on-off/intensity control
- InfiniiMode
- Run/stop toggle
- Single
- Clear display
- Autoscale
- Force trigger
- Quick action (mapped to quick action button)
  - Quick measure all
  - Quick measure statistics reset
  - Quick mask statistics reset
  - Quick print
  - Quick save
  - Quick e-mail
  - Quick recall
  - Quick freeze display
  - Quick trigger mode
  - Quick clear display

Flexibility in probe use models is also a vital necessity. The probes come standard with three different types of exchangeable probe tips that allow for easy connections to the circuit under test. These probe tips enable you to access multiple signals on anything from header connectors to hard-to-reach, high-density circuitry. The probes are equipped with a white LED headlight to illuminate the circuit under test which will help you see where you are probing.

The probes are powered directly by the AutoProbe interface, eliminating the need for an additional power supply. The AutoProbe interface also automatically identifies the probe type for auto configuration of the probe.

	<b>Browser tip</b>	<b>Solder-in tip</b>	<b>Socketed tip</b>
Maximum bandwidth	Up to 6 GHz warranted, 7 GHz typical (with N2752A) Up to 3.5 GHz (with N2751A) Up to 1.5 GHz (with N2750A)	Up to 2.5 GHz (with N2751A/52A) Up to 1.5 GHz (with N2750A)	Up to 3 GHz (with N2751A/52A) Up to 1.5 GHz (with N2750A)
InfiniiMode	No	Yes	Yes
Key features	Adjustable pitch spacing (0.5 mm – 7.5 mm), full bandwidth, differential mode only, head light, damping R tip	Damping R tip	Damping R tip
Applications	Highest performance (7 GHz), quick and simple hand browsing	For soldering tips directly to test devices, semi-permanent DUT signals, differential signals where SE and common modes need to be investigated	For directly connecting to 0.1" header pins
Replacement part number	N2776A (qty 3)	N2777A (qty 3)	N2778A (qty 3)



Figure 2. N2750A Series differential probe with browser tip

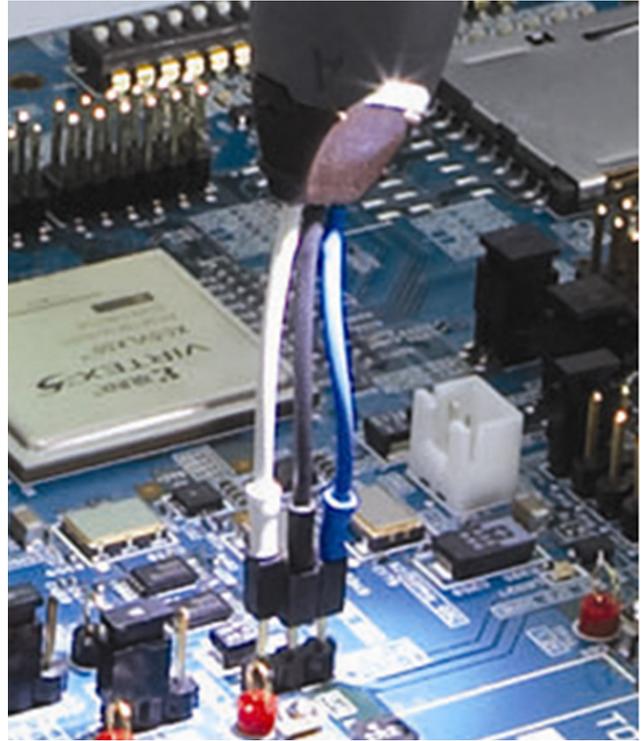


Figure 3. With InfiniiMode socketed tip

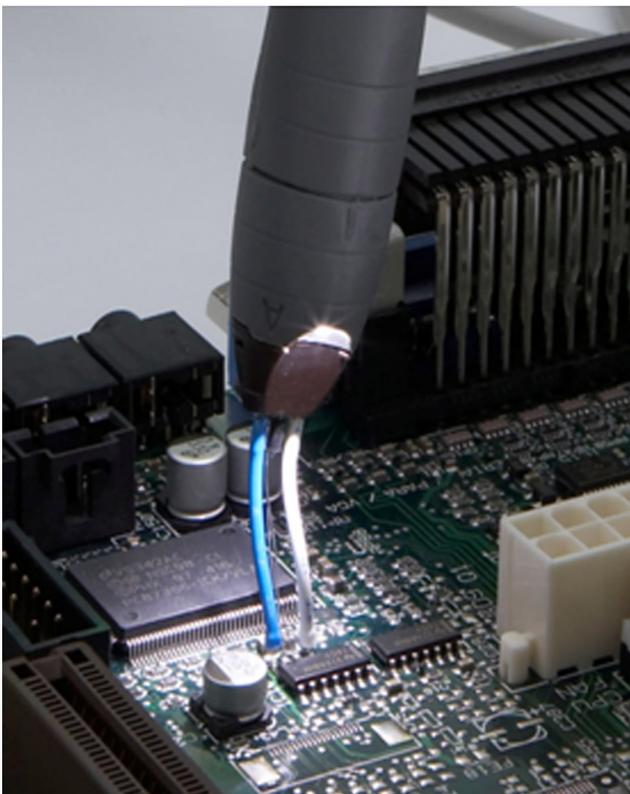


Figure 4. With InfiniiMode solder-in tip

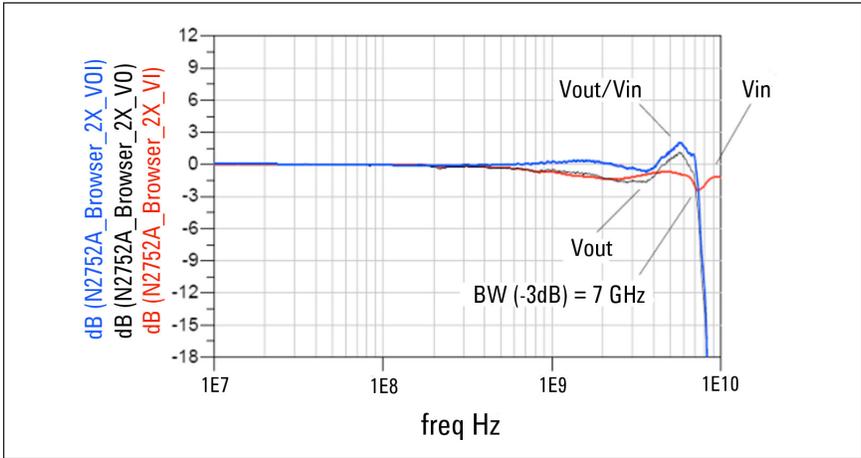


Figure 5. Vout/Vin frequency response of N2752A (at 2:1) with browser tip

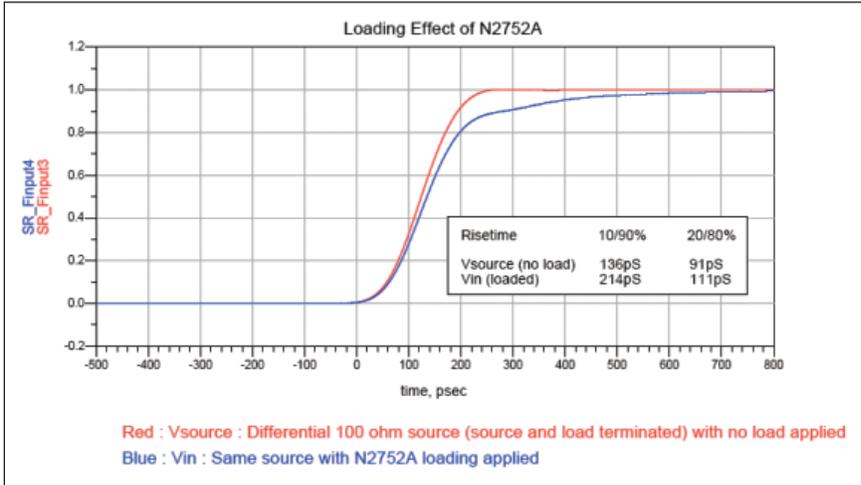


Figure 6. Loading effect of N2752A (at 2:1) with browser tip

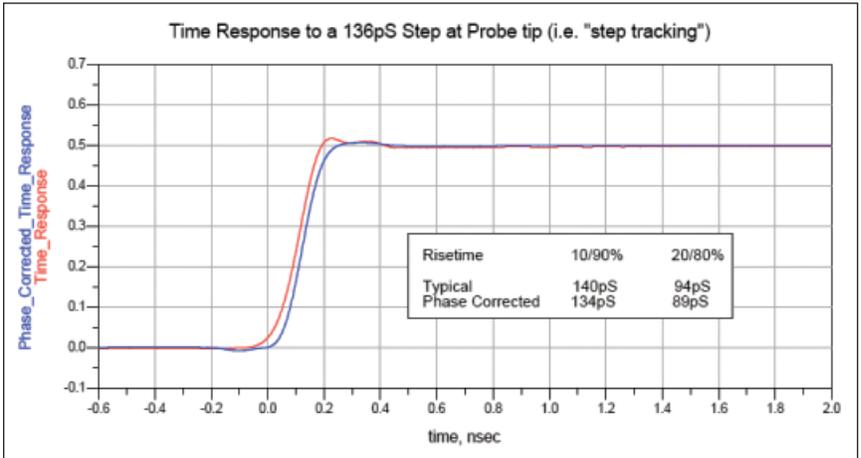


Figure 7. Time domain response to a 136 psec step of N2752A (at 2:1) with browser tip

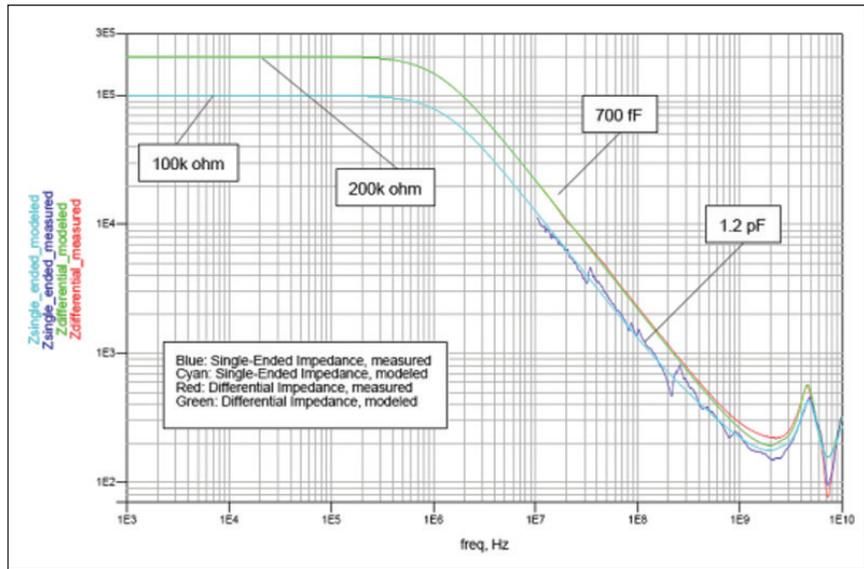


Figure 8. Input impedance over frequency of N2752A

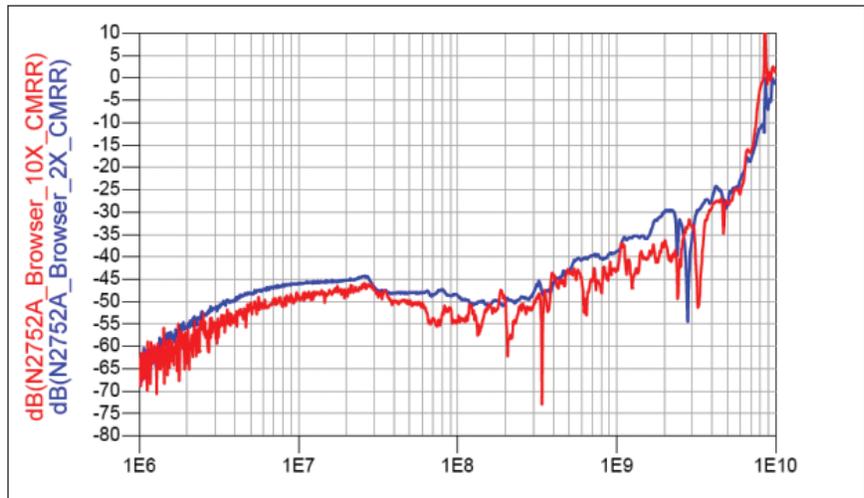


Figure 9. Common mode rejection ratio of N2752A (red: 2:1, blue: 10:1)

Characteristics and specifications			
Model number	N2750A	N2751A	N2752A
Probe bandwidth* (-3 dB)	1.5 GHz	3.5 GHz	6 GHz (warranted), 7 GHz (typical)
Rise time, probe only (10-90%)	233 psec	100 psec	58.3 psec
System bandwidth (with Keysight oscilloscope)	1 GHz (with Keysight's 1 GHz Infiniium/InfiniiVision oscilloscope)	2.5 GHz (with Keysight's 2.5 GHz Infiniium oscilloscope)	4/6 GHz (with Keysight's 4/6 GHz Infiniium oscilloscope)
Input resistance (@DC)*	200 k $\Omega$ $\pm$ 2% (differential mode) 100 k $\Omega$ $\pm$ 2% (single-ended mode) 50 k $\Omega$ $\pm$ 2% (common mode)		
Input capacitance	700 fF (with browser)		
Attenuation ratio (@DC)	2:1/10:1		
Input dynamic range	$\pm$ 1 V, 2 V <sub>pp</sub> (@2:1)/ $\pm$ V, 10 V <sub>pp</sub> (@10:1)		
Input common mode range	$\pm$ 15 V (from DC to 100 Hz), $\pm$ 2.5 V (for >100 Hz)****		
Offset range	$\pm$ 15 V		
Offset accuracy**	< 3%		
Maximum non-destructive input voltage	$\pm$ 30 V (DC + peak AC)		

\* Denotes warranted electrical specifications at 2:1 attenuation mode after 20 minute warm-up. All others are typical.

\*\* When calibrated on the oscilloscope, these characteristics are determined by the oscilloscope characteristics.

\*\*\* The N2750A Series differential probes can be used with the Infiniium 9000X/Q Series scope and the N5442A precision BNC adapter.

\*\*\*\* Assumes symmetric differential signals.

Characteristics and specifications			
Model number	N2750A	N2751A	N2752A
Differential mode rejection ratio		40 dB at 1 MHz 40 dB at 30 MHz 30 dB at 1 GHz	
Channel isolation, at single-ended mode		60 dB at 1 MHz 45 dB at 30 MHz 20 dB at 1 GHz	
Offset gain accuracy		< 3 % before calibration < 1 % after calibration	
Noise referred to input		2.5 mVrms (@2:1), 7 mVrms (@10:1)	
Maximum signal slew rate		30 V/ns (differential, 10x), 15 V/ns (single-ended, 10x)	
Zero offset error referred to Input		< 30 mV before calibration scope, < 5 mV after calibration scope	
Propagation delay		6.85 nsec	
ESD tolerance		> 8 kV from 100pF, 300 Ω, HBM	
Output impedance		50 Ω	
Cable length		1.3 m	
Probe weight		100 g	
Ambient operating temperature		0 to +40 °C	
Ambient non-operating temperature		-40 to +70 °C	
Operating humidity		Up to 95% RH @ +40 °C	
Non-operating humidity		Up to 90% RH @ +65 °C	
Operating altitude		4,600 m	
Non-operating altitude		15,300 m	
EMC/EMI		Radiated Emission: CISPR 11 Group 1, Class A. ESD: IEC61000-4-2 4KV Contact discharge, 8KV Air discharge	
Standard accessories		<ul style="list-style-type: none"> <li>- 2x InfiniiMode solder-in tips</li> <li>- 1x InfiniiMode socketed tip</li> <li>- 1x Differential browser tip</li> </ul>	
Others (included)		<ul style="list-style-type: none"> <li>- 1x calibration certificate</li> <li>- 1x accessory configuration card</li> </ul>	
Standard warranty		1 year (extended warranty available at cost)	
Recommended Keysight oscilloscopes***	InfiniiVision 3000 X-Series with software ver 2.2 or higher, 4000 X-Series with 3.01 or higher, 6000 X-Series with 6.0 or higher, Infiniium 9000 Series with 3.5 or higher, S-Series with 5.0 or higher	Infiniium 9000 and 90000A Series with software ver 3.5 or higher, S-Series with 5.0 or higher	Infiniium 9000 and 90000A Series with software ver 3.5 or higher, S-Series with 5.0 or higher

\* Denotes warranted electrical specifications at 2:1 attenuation mode after 20 minute warm-up. All others are typical.

\*\* When calibrated on the oscilloscope, these characteristics are determined by the oscilloscope characteristics.

\*\*\* The N2750A Series differential probes can be used with the Infiniium 9000X/Q Series scope and the N5442A precision BNC adapter.

\*\*\*\* Assumes symmetric differential signals.

Ordering information	
Model number	Description
N2750A	1.5 GHz InfiniiMode differential probe
N2751A	3.5 GHz InfiniiMode differential probe
N2752A	6 GHz InfiniiMode differential probe
N2776A	Differential browser tips (qty 3)
N2777A	InfiniiMode solder-in tips (qty 3)
N2778A	InfiniiMode socketed tips (qty 3)
N4822A	Socketed tip for USB/Ethernet application fixtures (not included in the standard probe kit)

Other recommended accessories	
Model number	Description
N2787A	3D probe positioner
E2655C	Performance verification and deskew fixture
N5442A	Precision BNC adapter for 90000X/Q Series oscilloscopes

Publication title	Publication type	Publication number
<i>Keysight Oscilloscope Probes and Accessories</i>	Selection Guide	5989-6162EN
<i>Infiniium Oscilloscope Probes and Accessories</i>	Data Sheet	5968-7141EN
<i>8 Hints for Better Scope Probing</i>	Application Note	5989-7894EN
<i>Oscilloscope Probing for High-Speed Signals</i>	Application Note	5989-9177EN
<i>Performance Comparison of Differential and Single-ended Active Voltage Probes</i>	Application Note	5988-8006EN
<i>Improving Usability and Performance in High-Bandwidth Active Oscilloscope Probes</i>	Application Note	5988-8005EN
<i>Optimizing Oscilloscope Measurement Accuracy on High-Performance Systems with Keysight Active Probes</i>	Application Note	5988-5021EN
<i>Restoring Confidence in Your High-Bandwidth Probe Measurements</i>	Application Note	5988-7951EN
<i>The Truth About the Fidelity of High-Bandwidth Voltage Probes</i>	Application Note	5988-6515EN
<i>Extending the Range of Keysight InfiniiMax Probes</i>	Application Note	5989-7587EN
<i>Understanding and Using Offset in InfiniiMax Active Probes</i>	Application Note	5988-9264EN
<i>Tips for Making Low Current Measurements with an Oscilloscope and Current Probe</i>	Application Note	5989-7529EN
<i>Using Keysight InfiniiMax Probes with Test Equipment Other Than Oscilloscopes</i>	Application Note	5989-1869EN
<i>Why Oscilloscope Measurements may Require Extreme Probing</i>	Application Note	5990-4721EN
<i>Side by Side Comparison of Keysight and Tektronix Probing</i>	Application Note	5989-0553EN
<i>Tips and Techniques for Making Power Supply Noise Measurements with an Oscilloscope</i>	Application Note	5989-6755EN
<i>Time-Domain Response of Keysight InfiniiMax Probes</i>	Application Note	5988-9608EN
<i>How Offset, Dynamic Range and Compression Affect Measurements</i>	Application Note	5990-8255EN
<i>Keysight InfiniiMax Probes Impact on Lead-Free (ROHS) Compliance</i>	Application Note	5989-5179EN



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