DATA SHEET

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

KEYSIGHT TECHNOLOGIES

KEYSIGHT TECHNOLOGIES

sales@prom-elec.com / ООО ПРОМЭЛЕКТРОНИКА

# 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 kΩ differential, 100 kΩ single-ended)
- Wide input dynamic range (10 Vpp)
- Wide offset range (± 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

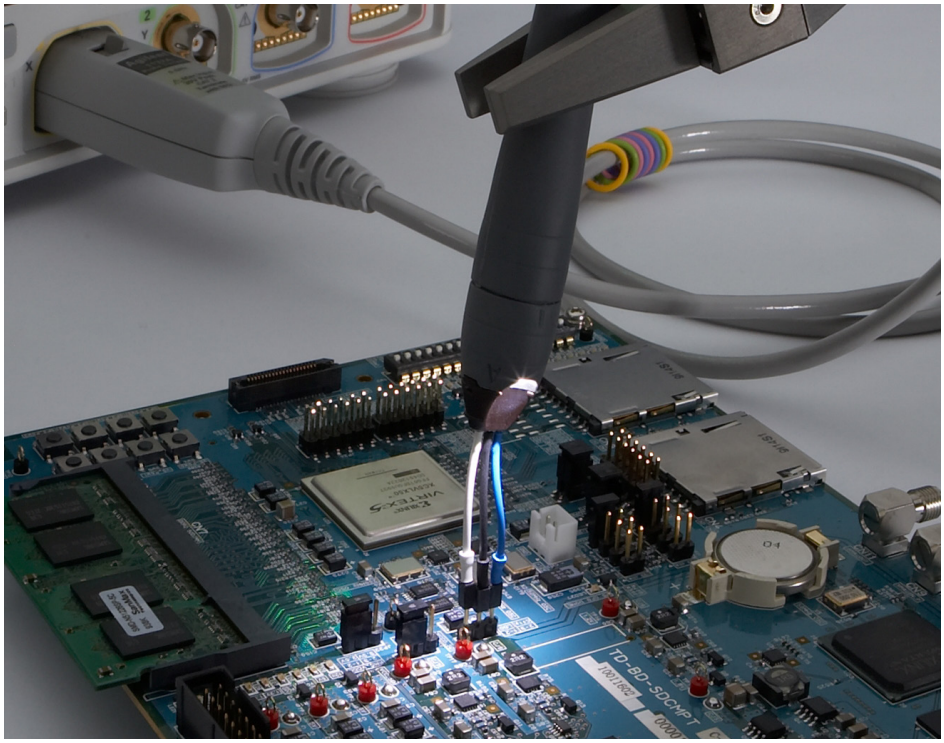
## At affordable prices

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 kΩ (differential) or 100 kΩ (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 (± 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)

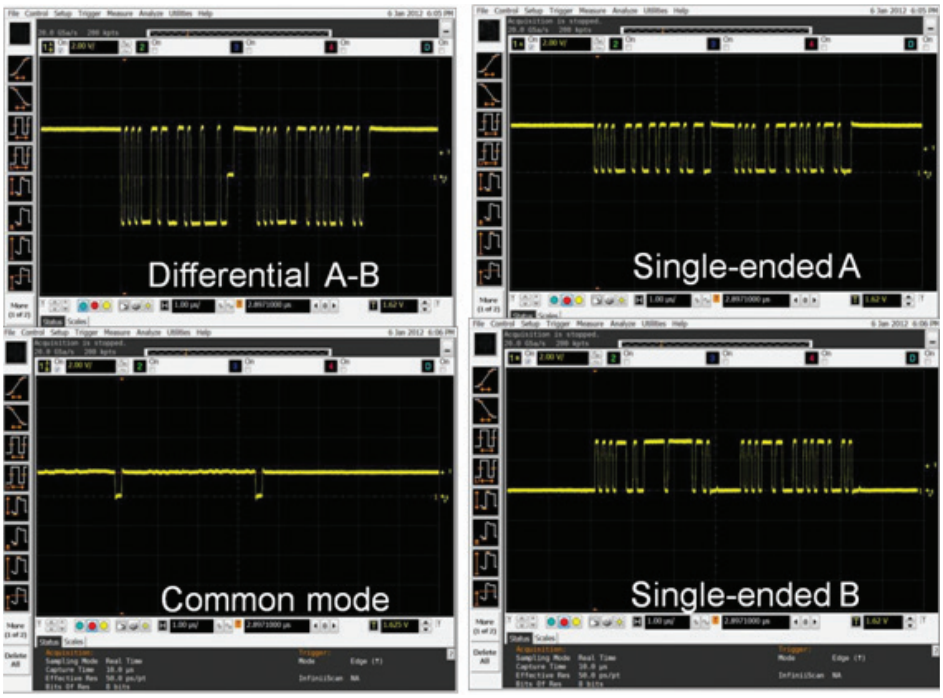



Figure 1. The InfiniiMode allows convenient measurements of differential, single-ended (A, B), and common mode signals with a single probe tip without reconnecting the probe to change the connection.

## 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.

| | **Browser tip** | **Solder-in tip** | **Socketed tip** |
|---|---|---|---|
| Maximum bandwidth | Up to 6 GHz warranted,<br>7 GHz typical (with N2752A)<br>Up to 3.5 GHz (with N2751A)<br>Up to 1.5 GHz (with N2750A) | Up to 2.5 GHz<br>(with N2751A/52A)<br>Up to 1.5 GHz (with N2750A) | Up to 3 GHz<br>(with N2751A/52A)<br>Up to 1.5 GHz (with N2750A) |
| InfiniiMode | No | Yes | Yes |
| Key features | Adjustable pitch spacing<br>(0.5 mm – 7.5 mm),<br>full bandwidth, differential mode only,<br>head light, damping R tip | Damping R tip | Damping R tip |
| Applications | Highest performance (7 GHz),<br>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)* |

* Comes with two each solder-in, socketed and browser tips per each probe.

Figure 2. N2750A Series differential probe with browser tip

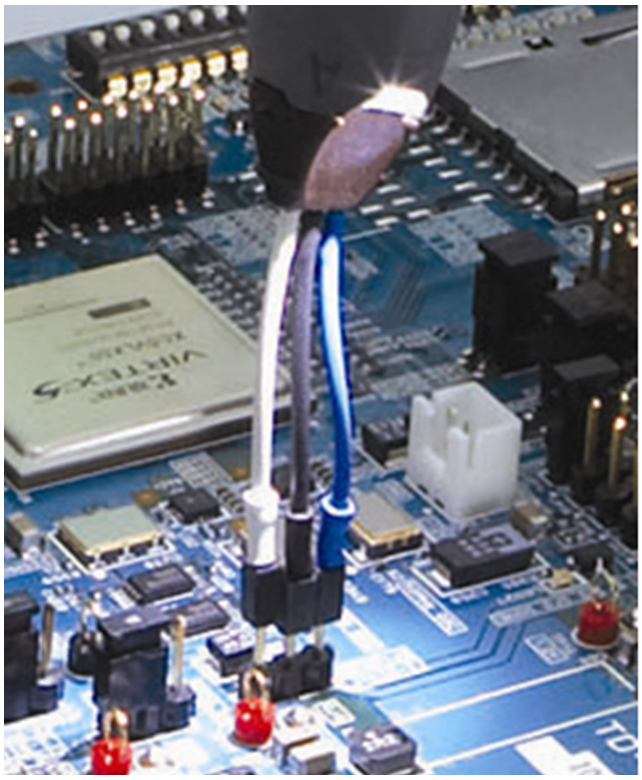


Figure 3. With InfiniiMode socketed tip

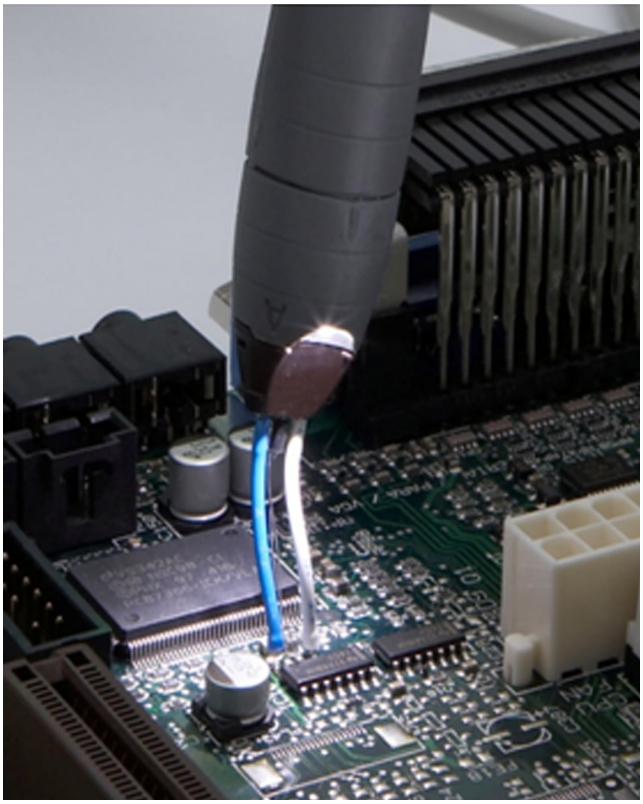


Figure 4. With InfiniiMode solder-in tip

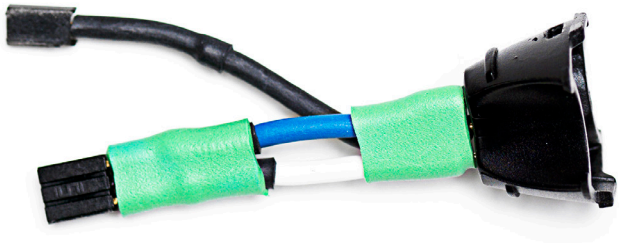


Figure 5. N4822A Socketed tip for USB/ethernet application fixtures (not included in the standard probe kit).

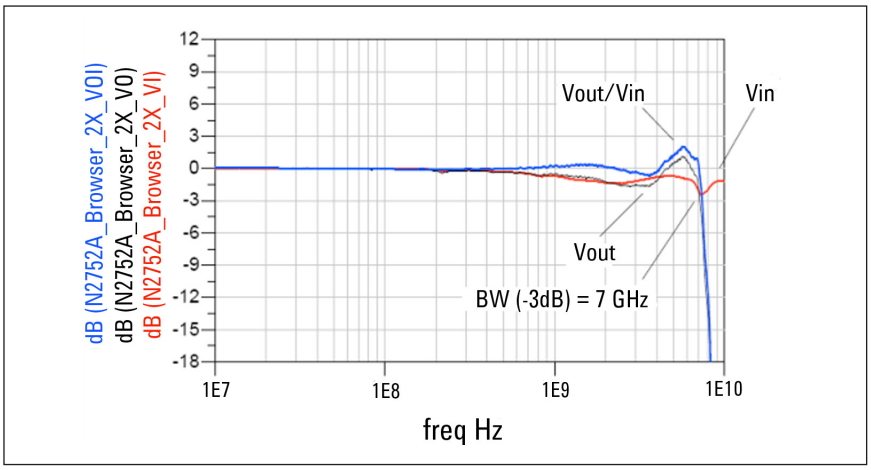



Figure 6. Vout/Vin frequency response of N2752A (at 2:1) with browser tip

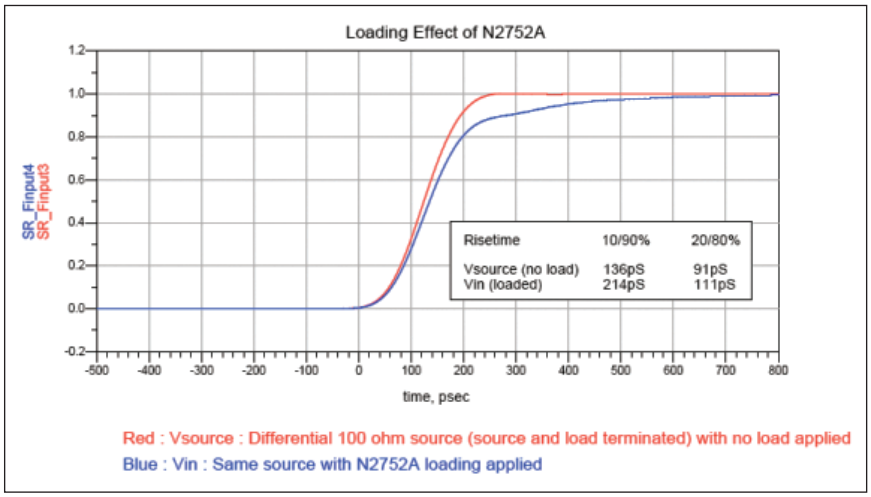



Figure 7. Loading effect of N2752A (at 2:1) with browser tip

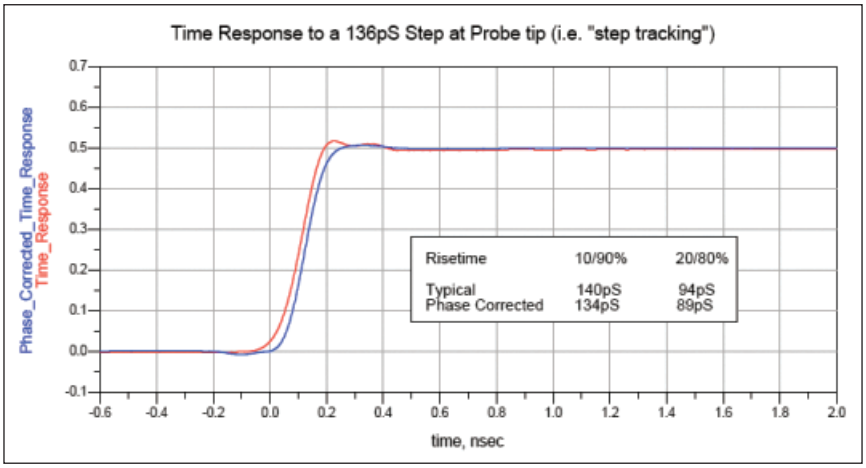



Figure 8. Time domain response to a 136 psec step of N2752A (at 2:1) with browser tip

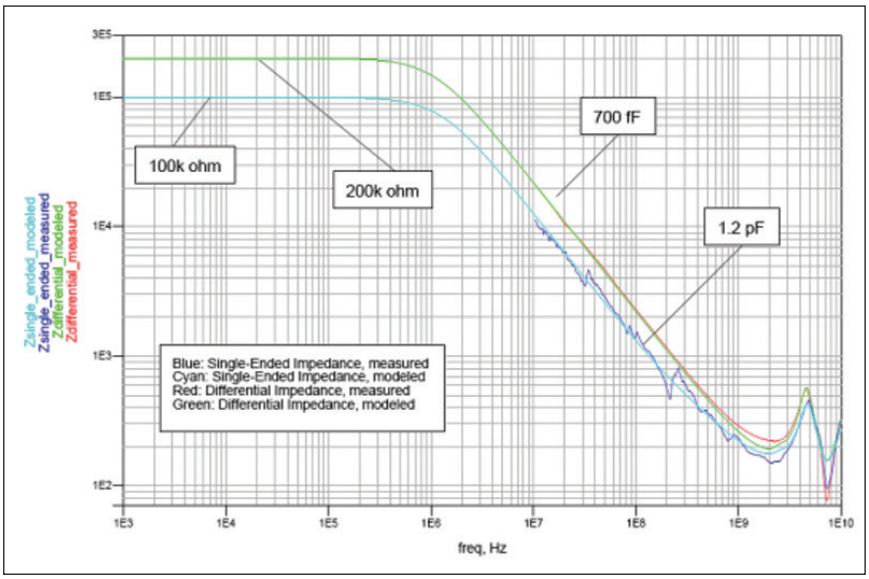



Figure 9. Input impedance over frequency of N2752A

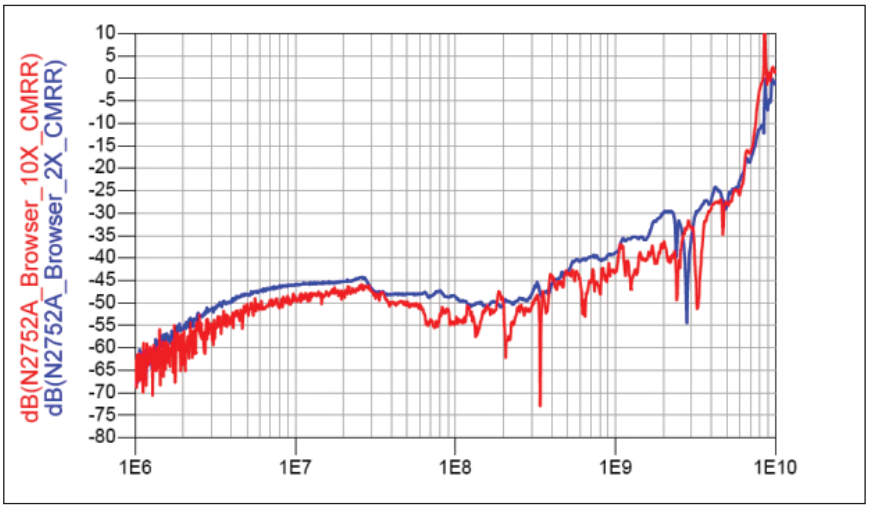



Figure 10. Common mode rejection ratio of N2752A (red: 2:1, blue: 10:1)

| Characteristics and specifications | | | |
|---|---|---|---|
| **Model number** | **N2750A** | **N2751A** | **N2752A** |
| Probe bandwidth* (–3 dB) | 1.5 GHz | 3.5 GHz | 6 GHz (warranted),<br>7 GHz (typical) |
| Rise time, probe only (10-90%) | 233 psec | 100 psec | 58.3 psec |
| System bandwidth<br>(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 kΩ ± 2 % (differential mode)<br>100 kΩ ± 2 % (single-ended mode)<br>50 kΩ ± 2 % (common mode) | | |
| Input capacitance | 700 fF (with browser) | | |
| Attenuation ratio (@DC) | 2:1/10:1 | | |
| Input dynamic range | ± 1 V, 2 Vpp (@2:1)/± V, 10 Vpp (@10:1), mains isolated | | |
| Input common mode range | ± 15 V (from DC to 100 Hz), ± 2.5 V (for >100 Hz)**** | | |
| Offset range | ± 15 V | | |
| Offset accuracy** | < 3 % | | |
| Maximum non-destructive input voltage | ± 30 V (DC + peak AC), mains isolated | | |

* 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 90000X/Q Series scope and the N5442A precision BNC adapter.
**** Assumes symmetric differential signals.

| Characteristics, non-condensing and specifications | | | |
|---|---|---|---|
| **Model number** | **N2750A** | **N2751A** | **N2752A** |
| Differential mode rejection ratio | | 40 dB at 1 MHz<br>40 dB at 30 MHz<br>30 dB at 1 GHz | |
| Channel isolation, at single-ended mode | | 60 dB at 1 MHz<br>45 dB at 30 MHz<br>20 dB at 1 GHz | |
| Offset gain accuracy | | < 3 % before calibration<br>< 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),<br>15 V/ns (single-ended, 10x) | |
| Zero offset error referred to input | | < 30 mV before calibration scope,<br>< 5 mV after calibration scope | |
| Propagation delay | | 6.85 nsec | |
| ESD tolerance | | > 8 kV from 100 pF, 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-condensing | |
| Non-operating humidity | | Up to 90 % RH @ +65 °C, non-condensing | |
| Operating altitude | | 4,600 m | |
| Non-operating altitude | | 15,300 m | |
| EMC/EMI | | Radiated Emission: CISPER 11 Group 1, Class A.<br>ESD: IEC61000-4-2 4KV contact discharge, 8KV air discharge | |
| Standard accessories | | 2x InfiniiMode solder-in tips<br>2x InfiniiMode socketed tip<br>2x Differential browser tip | |
| Others (included) | | 1x calibration certificate<br>1x accessory configuration card | |
| 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 |

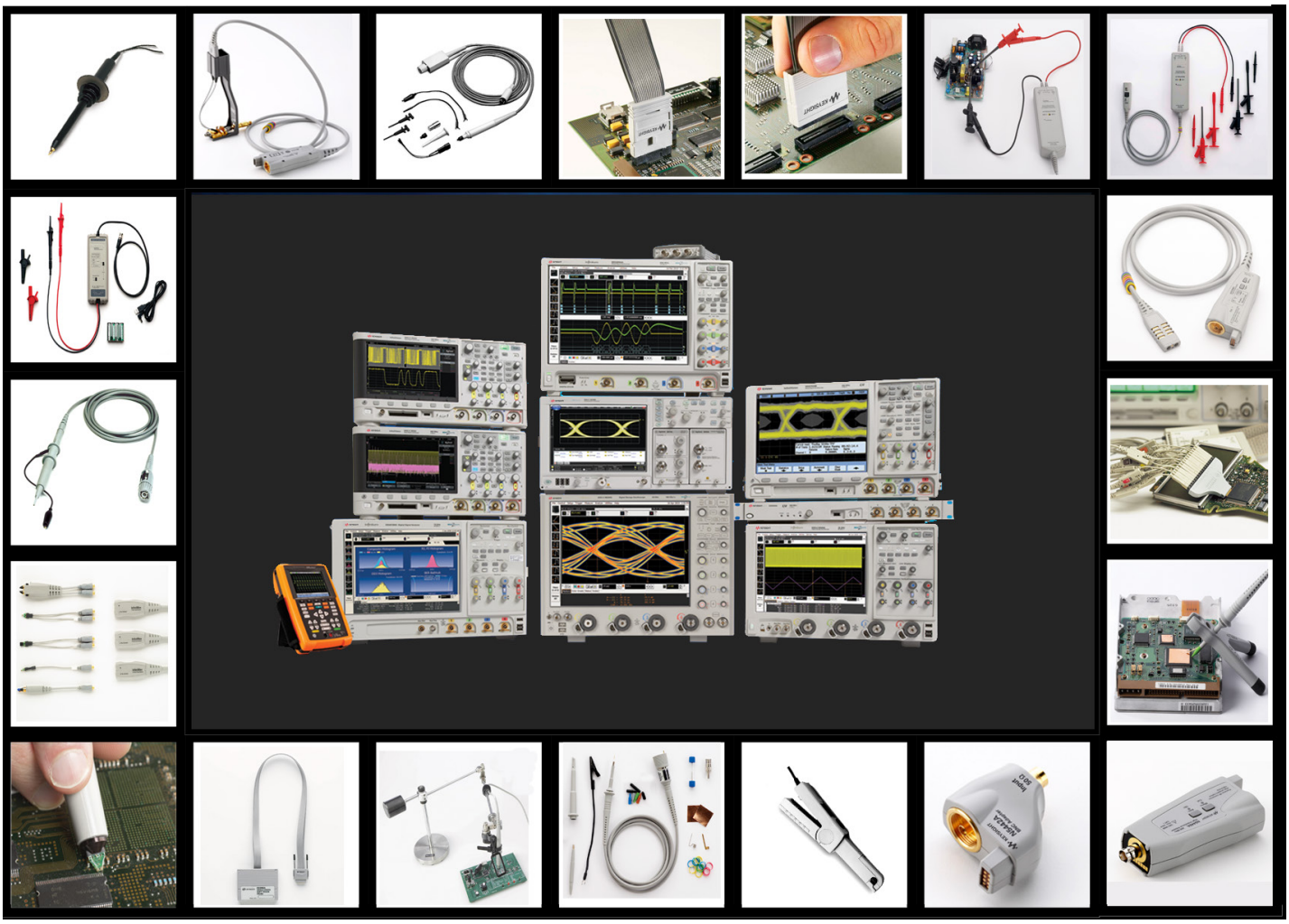
* Denotes warranted electrical specifications at 2:1 attenuation mode after 20 minute warm-up, All others are typical.
** When calibrated on the oscilloscope, these characteristics are determined by the oscilloscope characteristics.
*** The N2750A Series differential probes can be used with the Infiniium 90000X/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) |

* Standard probe comes standard with solder-in, socketed and browser tips (two each)..

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

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



## Keysight Oscilloscopes

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

## Learn more at: www.keysight.com

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

KEYSIGHT TECHNOLOGIES



This information is subject to change without notice. © Keysight Technologies, 2019, Published in USA, October 2, 2019, 5991-0560EN