# N2870A Series Passive Probes and Accessories

## Data Sheet

### Introduction

The N2870A Series passive probe family sets new standards in high performance probing of up to 1.5 GHz bandwidth. These general purpose probes and accessories offer high quality measurements at a very reasonable price.

### Faithful reproduction of signals

The N2870A Series passive probes offer DC to 35 MHz, 200 MHz, 350 MHz, 500 MHz and 1.5 GHz bandwidths and various attenuation factors to address a wide range of measurement needs. For general purpose probing, you can use the N2873A 500 MHz model, which provides superior 10 MΩ input resistance, 9.5 pF of low input capacitance and low-inductance ground connection. This keeps probe loading low enough to achieve high signal integrity measurements. The 1.5 GHz passive probe offers even lower input capacitance for measuring faster edges more accurately, making it a low-cost alternative to an active probe.

All N2870A Series probes come with the probe ID readout feature, allowing the probe to be automatically recognized when connected to most Agilent oscilloscopes.



***Figure 1. N2873A 500 MHz passive probe with standard accessories***

### Family of 7 mini passive probes spanning from 35 MHz to 1.5 GHz

- Small 2.5 mm probe tip
- Replaceable spring-loaded probe tip for reliable contact
- 1:1, 10:1, 20:1 and 100:1 attenuation ratios with auto probe ID readout
- Wide compensation range for a variety of scope inputs
- Comes with various probe tip accessories
- Optional probe accessory kits
- N2873A, 500 MHz, 10:1 probe ships with the 9000 Series Infiniium oscilloscope

## Easy access to signals

The compact design with a 2.5 mm probe tip diameter provides better visibility to the circuit under test than conventional 5 mm or 3.5 mm probe tips. This makes it easier to probe today's fine pitched space ICs and components. In addition, the replaceable probe tip is spring loaded, keeping it from slipping off the device you are probing. All N2870A Series probes come installed with one spring-loaded probe tip and four spare probe tips (2 spring-loaded tips, and 2 rigid tips).



*Figure 2. Sharp probe tip makes it easy to probe today's fine pitched components.*

To minimize the inductive effects that cause ringing of high speed signals, use the innovative ground blade or spring ground connection. Adhesive copper pads provided with the probe can be attached on top of an IC and connected to its ground pins to create a convenient ground plane for the probe to connect to. When used with the ground blade this method provides an ideal ground connection for probing signals with high frequency contents.

The IC caps fits over the probe tip, providing a convenient self-aligning connection to fine-pitch IC pins. Every N2870A Series probe comes with 5 different IC caps for IC lead pitches from 0.5 mm through 1.27 mm.

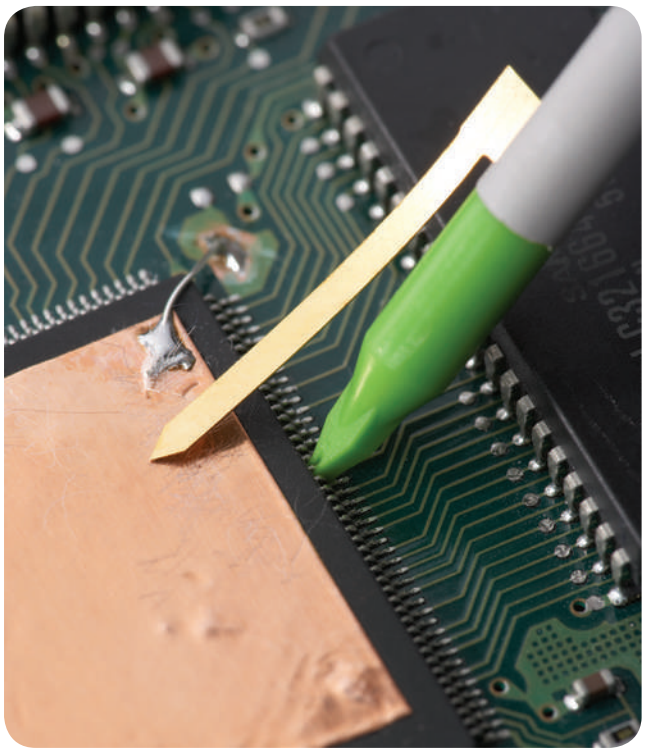

*Figure 3. Short ground blade with copper ground plane pad provides an ideal ground connection for probing signals with high frequency contents. The green 0.5 mm pitch IC cap fits over the probe tip providing a convenient self-aligning connection to IC pins.*

## Variety of connections

Use the optional accessory kits to provide access to signals and components that are difficult to probe.

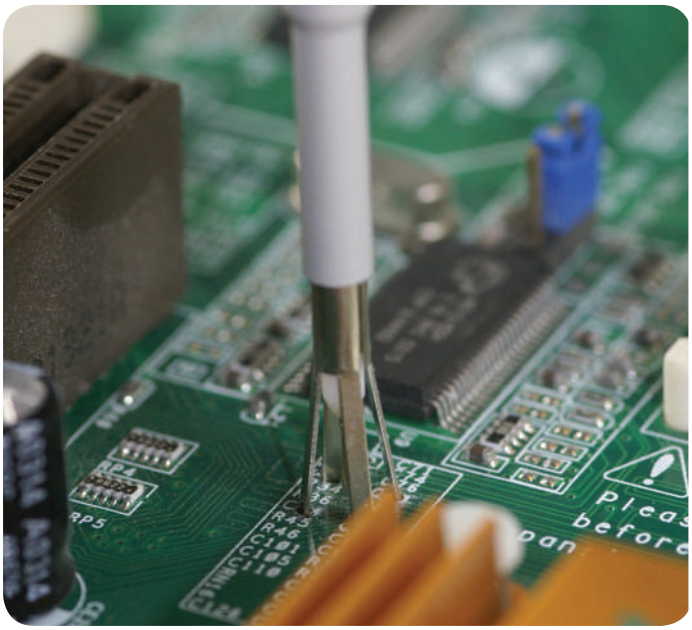

*Figure 4. The Agilent N2885A PCB adapter sockets are designed to solder into a printed circuit board (PCB) as test points to minimize ground inductance and maximize signal fidelity. This package contains 25 sockets.*

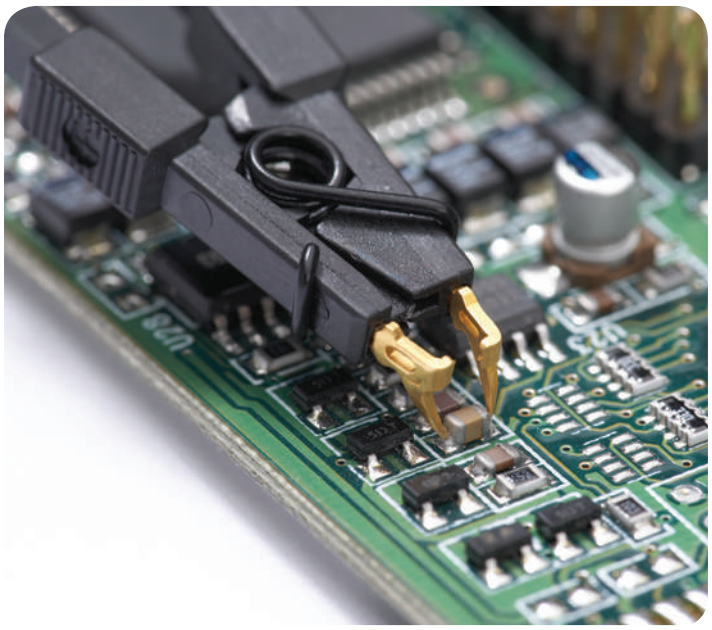

*Figure 5. Micro SMD clips were specially designed to provide fast and convenient hands-free probing of surface mount chip resistors or capacitors. This part is included in the N2877A and N2879A accessory kits.*

# Variety of connections (continued)

Use the optional accessory kits to provide access to signals and components that are difficult to probe.

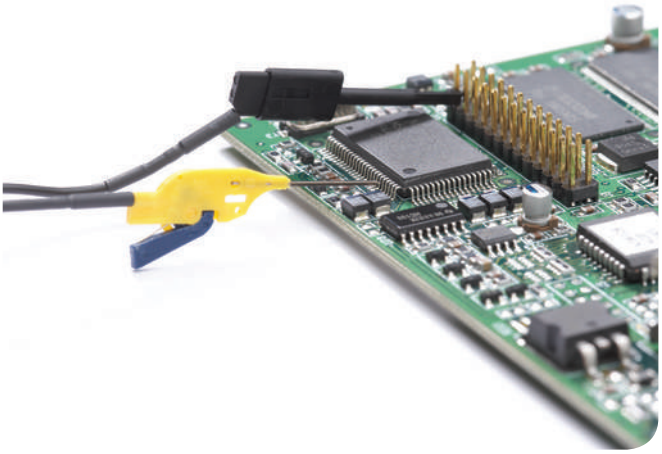

*Figure 6. With today's miniature IC- and component-packaging techniques, probing can be a considerable challenge. Use 0.5 mm QFP IC clips with TQFP/PQFP packages with 0.5 mm lead pitch or greater, or use pico-hook clips made for connections over components or wires with leads up to 0.04" diameter or smaller.*

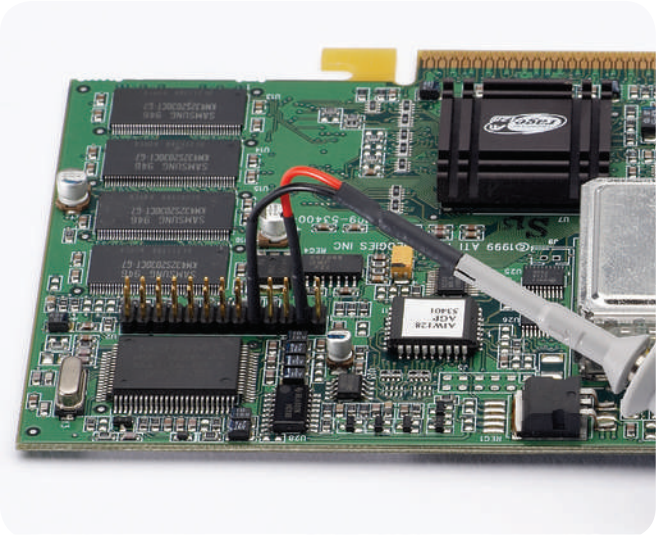

*Figure 7. The dual lead adapter allows you to easily connect the N2870A Series probe to a popular 0.1" pin header with 0.025" square pins. This dual lead adapter has no shorting hazards since all external metal surfaces are insulated.*

## Variety of connections (continued)



*Figure 8. An IC cap adapter and ground blade with optional N2786A two-leg probe positioner offers an ideal hands-free solution for short circuit-proof probing of a fine-pitch IC. The N2877A deluxe accessory kit and N2878A fine-pitch accessory kit contain one N2786A two-leg probe positioner.*

## Electrical characteristics

| Model number | Bandwidth (-3dB) | Attenuation ratio | Input C | Input R (Scope and probe) | Max input voltage (AC RMS) | Scope input coupling | Scope comp range |
|---|---|---|---|---|---|---|---|
| N2870A | 35 MHz | 1:1 | 39 pF (+oscilloscope) | 1 MΩ | 55V CAT II | 1 MΩ | — |
| N2871A | 200 MHz | 10:1 | 9.5 pF | 10 MΩ | 400 V CAT I<br>300 V CAT II | 1 MΩ | 10-25 pF |
| N2872A | 350 MHz | 10:1 | 9.5 pF | 10 MΩ | 400 V CAT I<br>300 V CAT II | 1 MΩ | 10-25 pF |
| N2873A | 500 MHz | 10:1 | 9.5 pF | 10 MΩ | 400 V CAT I<br>300 V CAT II | 1 MΩ | 10-25 pF |
| N2874A | 1.5 GHz | 10:1 | 1.8 pF | 500 Ω | 8.5 V CAT I | 50 Ω | — |
| N2875A | 500 MHz | 20:1 | 5.6 pF | 20 MΩ | 400 V CAT I<br>300 V CAT II | 1 MΩ | 7-20 pF |
| N2876A | 1.5 GHz | 100:1 | 2.2 pF | 5 kΩ | 21 V CAT I | 50 Ω | — |

**Common to all**

Probe ID readout: Compatible with Agilent's InfiniiVision and Infiniium Series oscilloscopes

## Mechanical characteristics

- Weight (probe only): 48 g
- Cable length: 1.3 m
- Ground sleeve diameter: 2.5 mm

**Environmental characteristics**

**Temperature**

- Operating: 0 °C to +50 °C
- Non-operating: -40 °C to +70 °C

**Altitude**

- Operating: 2,000 m (6,561 ft)
- Non-operating: 15,000 (49,212 ft)

**Humidity**

- Operating: 80% room humidity for temperatures up to 31 °C, decreasing linearly to 40% at 50 °C

**Pollution degree:** 2

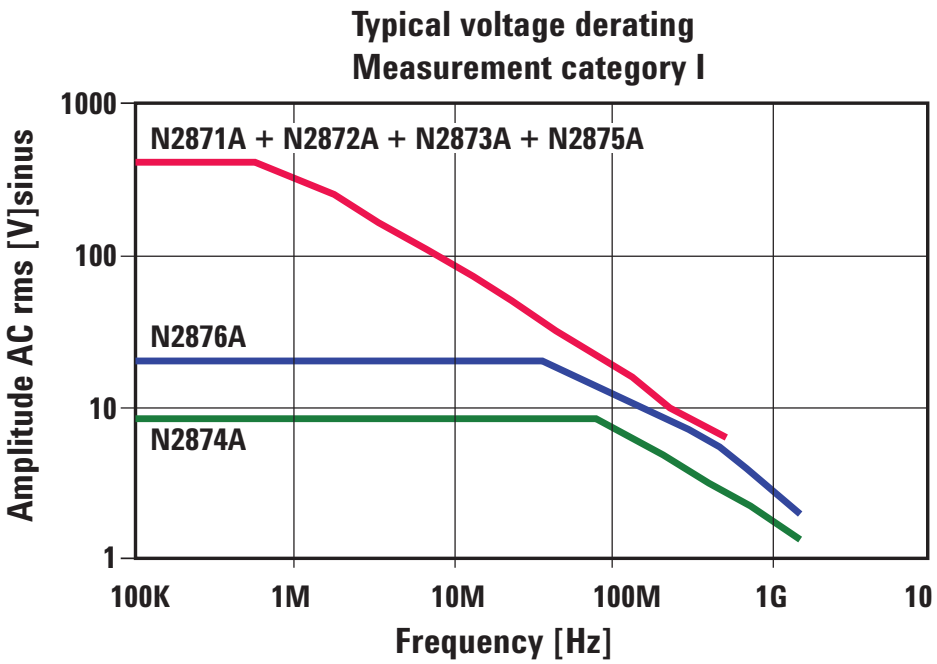


*Figure 9. N2870A Series amplitude vs. frequency characteristics*

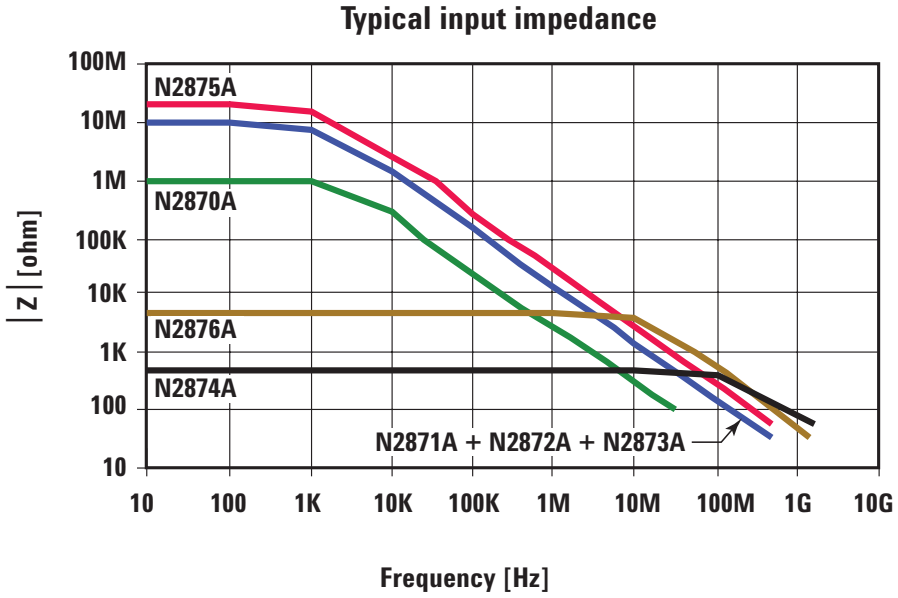


*Figure 10. N2870A Series input impedance vs. frequency characteristics*

## Standard accessories

| | N2871A, N2872A, N2873A, N2875A | N2870A | N2874A, N2876A |
|---|---|---|---|
| Rigid probe tips, qty 2 | ● | ● | ● |
| Spring-loaded probe tips, qty 2 | ● | ● | ● |
| Sprung hook 2.5 mm | ● | ● | |
| Short sprung hook 2.5 mm | | | ● |
| Ground blade 2.5 mm with 2 copper pads | ● | ● | ● |
| IC cap 2.5-0.5 mm green | ● | ● | ● |
| IC cap 2.5-0.65 mm blue | ● | ● | ● |
| IC cap 2.5-0.8 mm grey | ● | ● | ● |
| IC cap 2.5-1.0 mm brown | ● | ● | ● |
| IC cap 2.5-1.27 mm black | ● | ● | ● |
| Insulating cap 2.5 mm | ● | ● | ● |
| Protection cap 2.5 mm | ● | ● | ● |
| BNC adapter 2.5 mm | ● | ● | ● |
| Ground spring 2.5 mm | ● | ● | ● |
| Ground lead 15 cm | ● | ● | ● |
| Trimmer tool | ● | | |
| Color coded rings 3x4 | ● | ● | ● |
| User's guide manual | ● | ● | ● |

## Optional accessories

| | N2877A Deluxe accessory kit | N2878A General purpose accessory kit | N2879A Fine pitch accessory kit | N2885A PCB socket adapter kit |
|---|---|---|---|---|
| IC Cap 2.5-0.5 green | ● | ● | ● | |
| IC Cap 2.5-0.65 blue | ● | ● | ● | |
| IC Cap 2.5-0.8 grey | ● | ● | ● | |
| IC Cap 2.5-1.0 brown | ● | ● | ● | |
| IC Cap 2.5-1.27 black | ● | ● | ● | |
| Insulating cap 2.5 mm | ● | ● | ● | |
| Protection cap 2.5 mm | ● | ● | ● | |
| Bernstein adjustment tool | ● | | | |
| HF compensated ground lead 22 cm | ● | | | |
| Ground lead 22 cm to 4 mm banana plug | ● | | | |
| Ground lead 22 cm to 2 mm banana plug | ● | | | |
| Ground lead 11 cm to miniclip | ● | | | |
| Ground lead 11 cm to 0.8 mm socket | ● | | | |

## Optional accessories (continued)

| | N2877A Deluxe accessory kit | N2878A General purpose accessory kit | N2879A Fine pitch accessory kit | N2885A PCB socket adapter kit |
|---|---|---|---|---|
| Ground spring 2.5 | ● | | ● | |
| 10 Self-adhesive Cu-pads (2x2cm) | ● | ● | ● | |
| Ground blade 2.5 | ● | ● | ● | |
| Ground lead 2.5 to mini alligator clip | ● | | | |
| Set of 5 spring tips gold plated 0.5mm | ● | ● | ● | |
| Set of 5 solid tips cuBe 0.5mm | ● | ● | ● | |
| Adapter 2.5 to 2 mm banana plug | ● | | | |
| Adapter 2.5 to 0.8 mm socket | ● | | | |
| Dual adapter 2.5 to 0.8 mm sockets | ● | | ● | |
| Sprung hook 2.5 mm | ● | ● | | |
| Short sprung hook 2.5 mm | ● | | | |
| Adapter 2.5 to 4 mm banana plug | ● | | | |
| Pico hook black | ● | | ● | |
| Pico hook red | ● | | ● | |
| BNC adapter 2.5 mm | ● | ● | | |
| PCB adapter kit 2.5 mm | ● | | ● | ●(Qty 25) |
| QFP IC-Clips 13 mm long down to 0.5 mm pitch (1 pair yellow/ green) | ● | | ● | |
| QFP IC-Clips short down to 0.5mm pitch (1 pair yellow/green) | ● | | ● | |
| Ground lead 15 cm | ● | ● | | |
| Color coded rings 3x4 color | ● | ● | | |
| 2-leg probe positioner (N2786A) | ● | | ● | |
| Micro SMD clip | ● | | ● | |

Note: For the exact number of accessories that come with each of the accessory kits, refer to the N2870A Series probes and accessories user's guide with Agilent literature number N2876-97000.

## Replacement parts

| Part number | Description |
|---|---|
| N4831A | Sprung Hook Adapter 2.5mm for N2870A,71A,72A,73A,75A (qty 2) |
| N4837A | Ground Lead 15cm for N2870A Series probes (qty 2) |
| 0960-2907 | Short Spring Hook 2.5mm for N2874A and N2876A 1.5 GHz passive probe |
| 0960-2908 | 10 Self-adhesive Copper-pads 2X2cm for N2870A Series probes |
| N4836A | Dual Lead-Adapter for N2870A Series probes (qty 2) |
| N4829A | Probe tip kit (10 each rigid and spring loaded tip) |
| N4838A | 2.5 mm ground spring (qty 2) |
| N4863A | 2.5 mm probe tip-to-PCB adapter, horizontal (qty 2) |
| N4864A | 2.5 mm probe tip-to-PCB adapter, vertical (qty 2) |

## Related literature

| Publication | Description | Publication number |
|---|---|---|
| *Agilent Oscilloscope Probes and Accessories* | Selection Guide | 5989-6162EN |
| *Agilent InfiniiVision Oscilloscope Probes and Accessories* | Data Sheet | 5968-8153EN |
| *Agilent Infiniium Oscilloscope Probes and Accessories* | Data Sheet | 5968-7141EN |



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