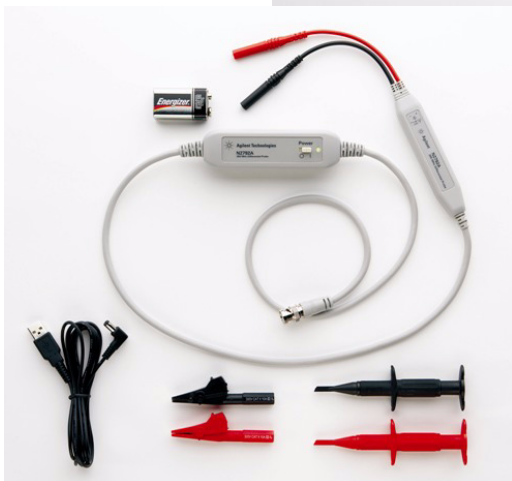
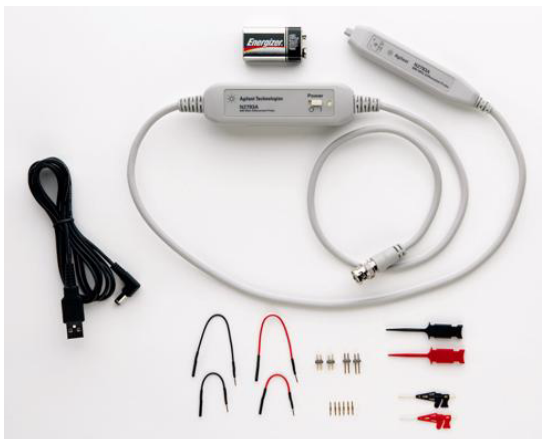




# N2792A and N2793A Differential Probes

## User's Guide



© Copyright Agilent Technologies 2009  
All Rights Reserved.



**Agilent Technologies**

---

# Contents

Inspecting the Probe	3
Cleaning the Probe	3
Handling the Probe	3
N2792A and N2793A Differential Probes	4
Contents and Accessories	5
Characteristics	8
Safety Information	10
Using the N2792A or N2793A Differential Probes	11
N2792A Probe - Plots	12
N2793A Probe - Plots	15
Using the Accessories	18
N2792A Performance Verification Procedures	20
N2792A Performance Verification Test Record	22
N2793A Performance Verification Procedures	23
N2793A Performance Verification Test Record	25

---

## Inspecting the Probe

- ❑ Inspect the shipping container for damage.

Keep the damaged shipping container or cushioning material until the contents of the shipment have been checked for completeness and the probe has been checked mechanically and electrically.

- ❑ Check the accessories.

- If the contents are incomplete or damaged, notify your Agilent Technologies Sales Office.

- ❑ Inspect the instrument.

- If there is mechanical damage or defect, or if the probe does not operate properly or pass calibration tests, notify your Agilent Technologies Sales Office.
- If the shipping container is damaged, or the cushioning materials show signs of stress, notify the carrier as well as your Agilent Technologies Sales Office. Keep the shipping materials for the carrier's inspection. The Agilent Technologies office will arrange for repair or replacement at Agilent Technologies' option without waiting for claim settlement.

---

## Cleaning the Probe

Disconnect the probe and clean it with a soft cloth. Make sure the probe is completely dry before reconnecting it to an oscilloscope. Avoid using abrasive cleaners and chemicals containing benzene or similar solvents.



## Handling the Probe

Handle the probe with care and refer to the safety notices in this manual. Note that the probe cable is a sensitive part of the probe and, therefore, you should be careful not to damage it through excessive bending or pulling. You should also avoid any mechanical shocks to this product in order to guarantee accurate performance and protection.

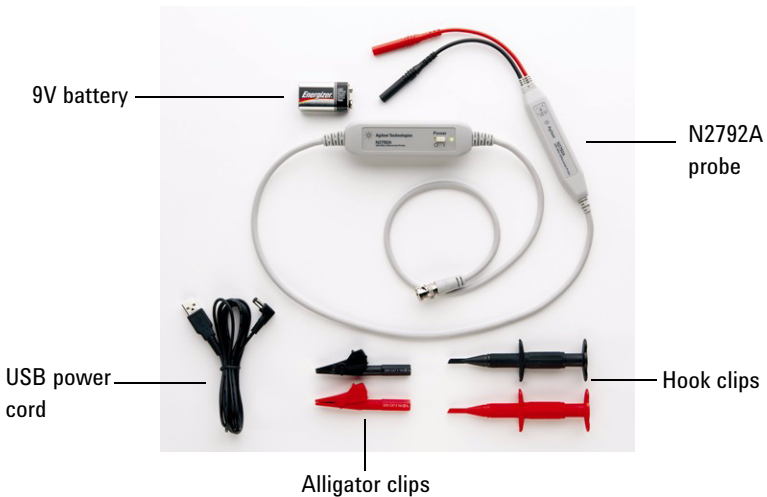
### N2792A and N2793A Differential Probes

The N2792A 200 MHz and N2793A 800 MHz differential probes provide the superior high-speed differential signal probing required by today's high-speed power measurements, automotive bus measurements, and high-speed digital system designs. The N2792A and N2793A probes offer a 10:1 attenuation ratio, allowing them to be used for a broad range of applications. These differential probes have an input resistance of 1 M $\Omega$  (N2792A) and 200 k $\Omega$  (N2793A) and both feature low input capacitance to minimize circuit loading (7 pF for N2792A and 2 pF for N2793A). The N2792A and N2793A probes are compatible with any oscilloscope equipped with 50  $\Omega$  BNC inputs. They can be powered by any USB port on your oscilloscope or computer, or by an internal battery (one 9V battery included with each probe).

## Contents and Accessories

The following table lists the parts included with the N2792A 200 MHz differential probe.

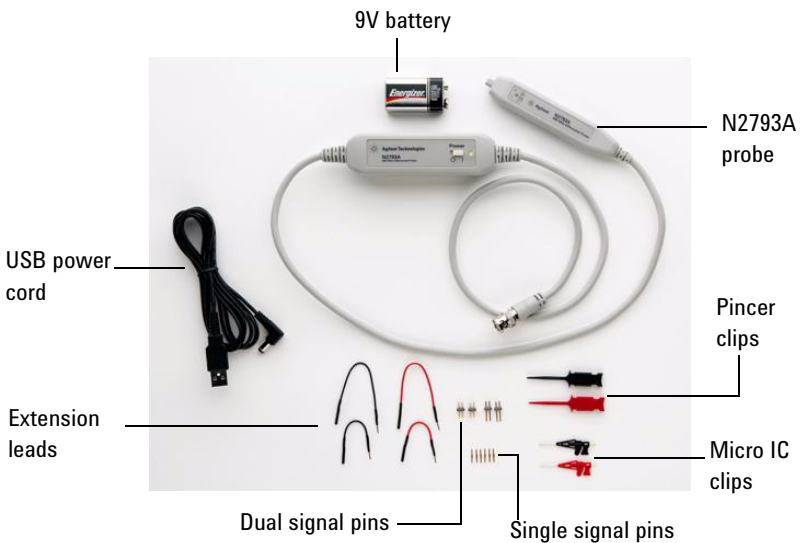
Part	Quantity
N2792A 200 MHz differential probe	1
Hook Clip, Red	1
Hook Clip, Black	1
Alligator Clip, Red	1
Alligator Clip, Black	1
USB Power Cord (2 m)	1
9V Battery	1
User's Guide	1



## Contents and Accessories

The following table lists the parts included with the N2793A 800 MHz differential probe.

Part	Quantity
N2793A 800 MHz differential probe	1
Pincer Clip, Red	1
Pincer Clip, Black	1
Micro IC Clip, Red	1
Micro IC Clip, Black	1
Extension Lead, 0.8 mm J-P, 5 cm, Black	1
Extension Lead, 0.8 mm J-P, 5 cm, Red	1
Extension Lead, 0.8 mm J-P, 10 cm, Black	1
Extension Lead, 0.8 mm J-P, 10 cm, Red	1
Dual Signal Pin, 16.8 mm	2
Dual Signal Pin, 12.8 mm	2
Single Signal Pin, 0.8 mm	6
USB Power Cord (2 m)	1
9V Battery	1
User's Guide	1



For replacement accessories for the N2792A probe, you can order the N2792-68700 Differential Probe Accessory Kit. It includes:

<b>Part</b>	<b>Quantity</b>
Clip Hook, Red	1
Hook Clip, Black	1
Alligator Clip, Red	1
Alligator Clip, Black	1
USB Power Cord (2 m)	1

For replacement accessories for the N2793A probe, you can order the N2793-68700 Differential Probe Accessory Kit. It includes:

<b>Part</b>	<b>Quantity</b>
Pincer Clip, Red	1
Pincer Clip, Black	1
Micro IC Clip, Red	1
Micro IC Clip, Black	1
Extension Lead, 0.8 mm J-P, 5 cm, Black	1
Extension Lead, 0.8 mm J-P, 5 cm, Red	1
Extension Lead, 0.8 mm J-P, 10 cm, Black	1
Extension Lead, 0.8 mm J-P, 10 cm, Red	1
Dual Signal Pin, 16.8 mm	2
Dual Signal Pin, 12.8 mm	2
Single Signal Pin, 0.8 mm	6
USB Power Cord (2 m)	1

## Characteristics

Characteristics for the N2792A and N2793A differential probes are shown below. The probe / oscilloscope should be warmed up for at least 20 minutes before any testing and the environmental conditions should not exceed the probe's specified limits.

### Electrical Characteristics

	<b>N2792A</b>	<b>N2793A</b>
Bandwidth (-3 dB)	200 MHz	800 MHz
Attenuation Ratio	10:1	10:1
Probe Risetime (10%-90%)	1.75 ns	437 ps
Gain Accuracy	±1%	±2%
Absolute Maximum Rated Input Voltage (each side to ground)	±60 V	±40 V
Maximum Differential Input Voltage (DC + AC Peak)	±20 V	±15 V
Maximum Common Mode Input Voltage	±60 V	±30 V
Input Resistance	500 kΩ, 7 pF (each side to ground) 1 MΩ, 3.5 pF (between inputs)	100 kΩ, 2 pF (each side to ground) 200 kΩ, 1 pF (between inputs)
Output Voltage Swing	±2 V (driving 50 Ω scope input)	±1.5 V (driving 50 Ω scope input)
Offset (typical)	±2 mV	±5 mV
CMRR (typical)	-80 dB at 60 Hz, -50 dB at 10 MHz	-60 dB at 60 Hz, -15 dB at 500 MHz
Power Requirements	one 9V battery or USB power adapter (5 V to 9 V, 200 mA)	one 9V battery or USB power adapter (5 V to 9 V, 300 mA)
Approximate Battery Life	7.5 hours (alkaline battery)	4.5 hours (alkaline battery)
Battery/Power Cord	The supplied voltage must be less than 12 V and greater than 4.5 V or else the probe could be damaged	

- all are typical
- Adhere to the characteristics and specifications listed in this table to prevent damage to the probe and to keep it functioning properly



---

**Mechanical Characteristics**

	<b>N2792A</b>	<b>N2793A</b>
Approximate Weight (not including battery and accessories)	170 g (6 oz)	170 g (6 oz)
BNC Cable Length	120 cm (47 inches)	120 cm (47 inches)
Length of Input Leads	15 cm (5.9 inches)	n/a
Housing Dimensions (L x W x H)	111 mm x 22 mm x 14 mm (4.4 in x 0.9 in x 0.6 in)	111 mm x 22 mm x 14 mm (4.4 in x 0.9 in x 0.6 in)

---

**Environmental Specifications**

Temperature	Operating: -10 °C to +40 °C Nonoperating: -30 °C to +70 °C
Altitude	Operating: 3,000 m (9,842 feet) Nonoperating: 15,300 m (50,196 feet)
Humidity	Operating: 25 - 85% room humidity Nonoperating: 25 - 85% room humidity
Pollution Degree	Pollution Degree 2

-Adhere to the characteristics and specifications listed in this table to prevent damage to the probe and to keep it functioning properly

---

**Safety Specifications**

CEI/IEC 61010-031 CAT II

---

### Safety Information

---

#### Warning



To avoid personal injury and to prevent fire or damage to this product or products connected to it, review and comply with the following safety precautions. Be aware that if you use this probe assembly in a manner not specified, the protection this product provides may be impaired.

#### Observe Maximum Working Voltage

To avoid injury, do not use the N2792A probe above 60 V between each input lead and earth or between the two input leads and do not use the N2793A probe above 40 V between each input lead and earth or between the two input leads.

#### Must be Grounded

Before making connections to the input leads of this probe, ensure that the output BNC connector is attached to the BNC channel input of the oscilloscope and the oscilloscope is properly grounded.

#### Do Not Operate Without Covers

To avoid electrical shock or fire hazard, do not operate this probe with the covers removed.

#### Do Not Operate in Wet / Damp Conditions

To avoid electrical shock, do not operate this probe in wet or damp conditions.

#### Do Not Operate in an Explosive Atmosphere

To avoid injury or fire hazard, do not operate this probe in an explosive atmosphere.

#### Avoid Exposed Circuit

To avoid injury, remove jewelry such as rings, watches, and other metallic objects. Do not touch exposed connections and components when power is present.

#### Use Proper Power Source

To ensure this probe functions well, use one 9V battery or the supplied USB power cord.

#### For Indoor Use Only

Only use this probe indoors.

#### Do Not Operate With Suspected Failures

If you suspect there is damage to this probe, have it inspected by a qualified service personnel.



---

## Using the N2792A or N2793A Differential Probes

- To use these probes, first slide open the battery compartment on the rear of the probe housing and insert the 9V battery. You can also use the USB power cord that ships with the probe to supply power instead of the battery. Simply connect the USB power cord to the probe and a USB port (on a computer or oscilloscope).



Input for USB power cord

### Battery Use

- Insert one 9V battery in the back of the unit as indicated within the chassis (see picture above for the battery location)
- When battery life has expired, remove the battery

Note the WEEE label on the battery and dispose of properly

- Then connect the BNC output connector to the channel input of the oscilloscope. The oscilloscope must have a 50  $\Omega$  input and be ground referenced.
- Using the appropriate probe accessories, connect the inputs to the circuit under test (refer to the *Using the Accessories* section starting on page 18 for information on how to connect the accessories to the probes).

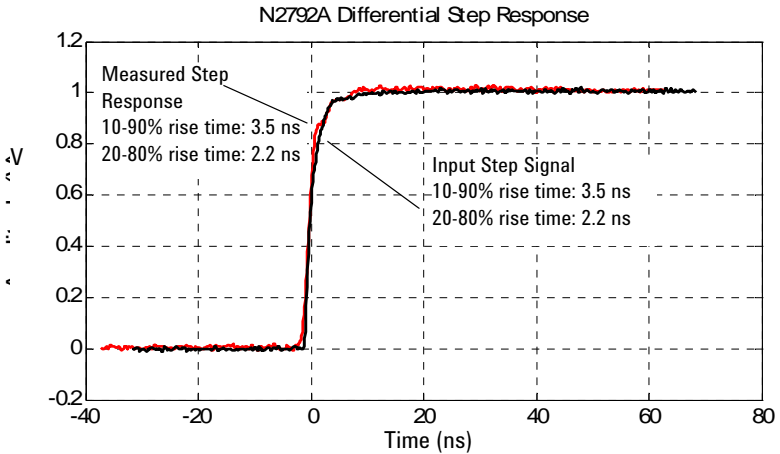


To protect against electrical shock, use only the accessories supplied with this probe or in the accessory kit.

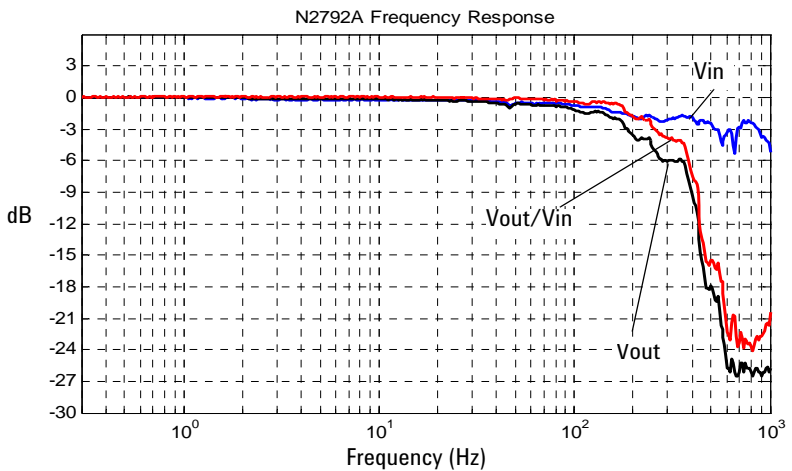


This probe is to carry out differential measurements between two points on the circuit under test. This probe is not for electrically insulating the circuit under test and the measuring instrument.

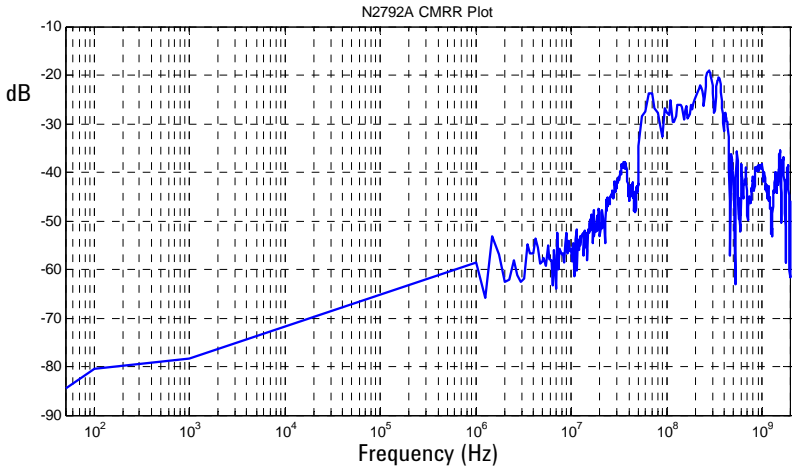
## N2792A Probe - Plots



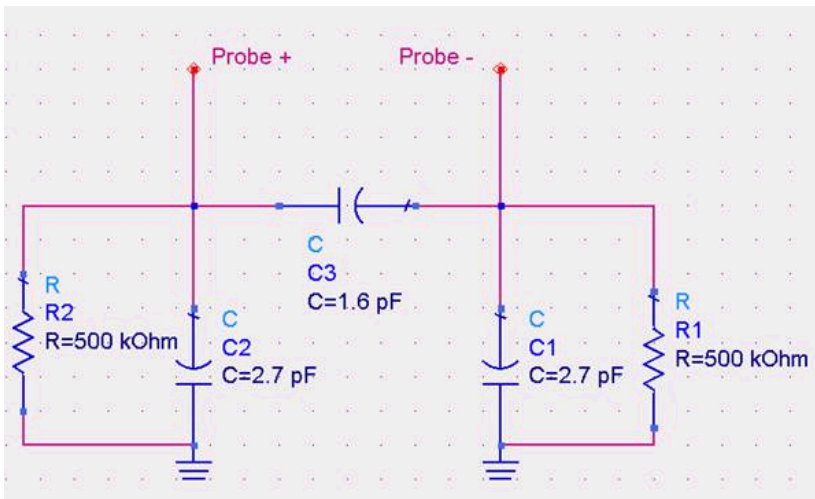
Graph of normalized differential step response (50Ω, 3.5 ns 10-90% rising edge step generator), 3.5 ns normalized rising edge (10-90%), 2.2 ns normalized rising edge (20-80%)



Graph of dB(Vin), dB(Vout) + 20dB, and dB(Vout/Vin) + 20dB frequency response

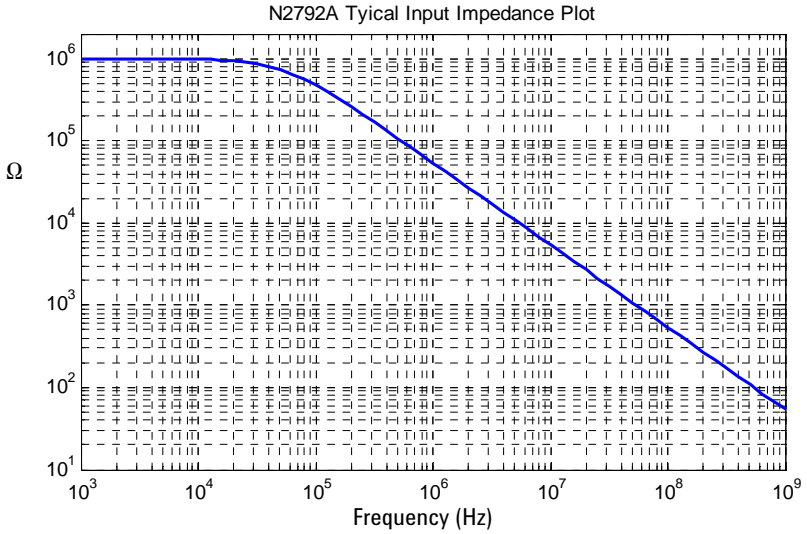


Graph of  $\text{dB}(V_{\text{out}}/V_{\text{in}}) + 20\text{dB}$  frequency response when inputs driven in common mode (common mode rejection)

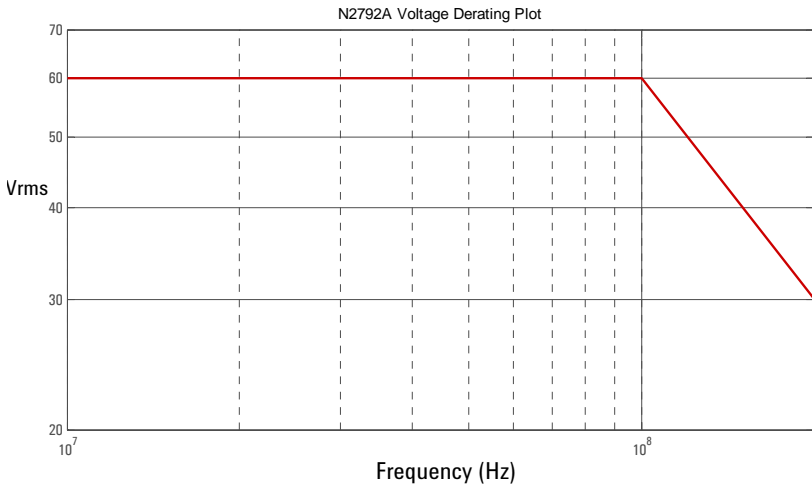


Input impedance equivalent model showing measured input capacitance values

## N2792A Probe - Plots

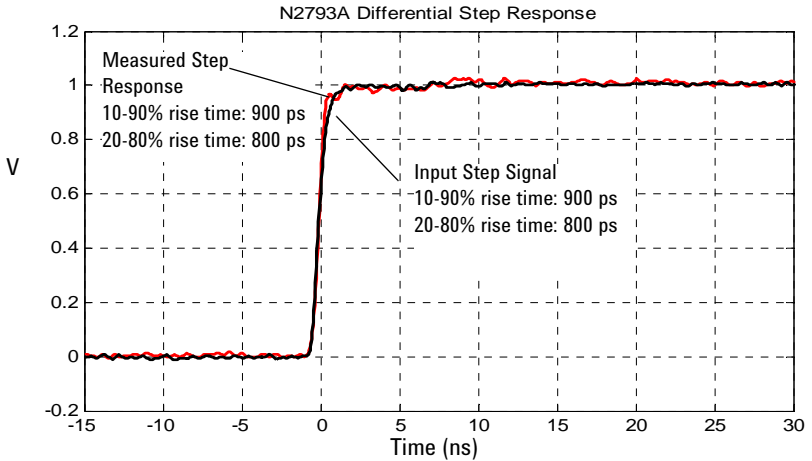


Typical input impedance plot

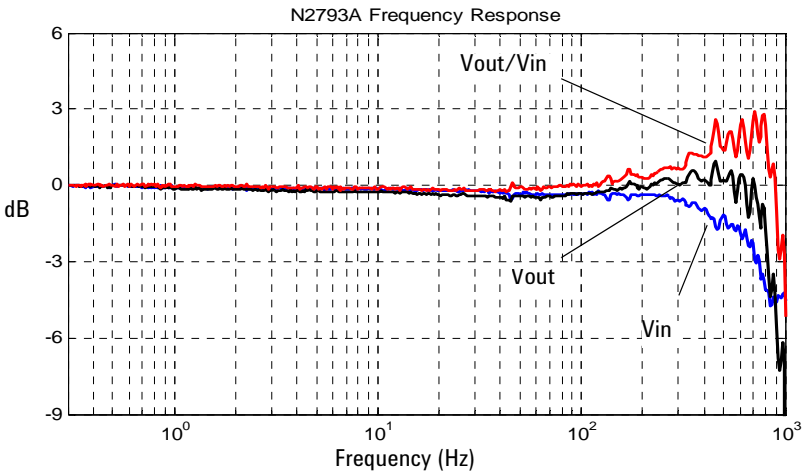


Typical derating curve of the absolute maximum input voltage (either input to ground)

N2793A Probe - Plots

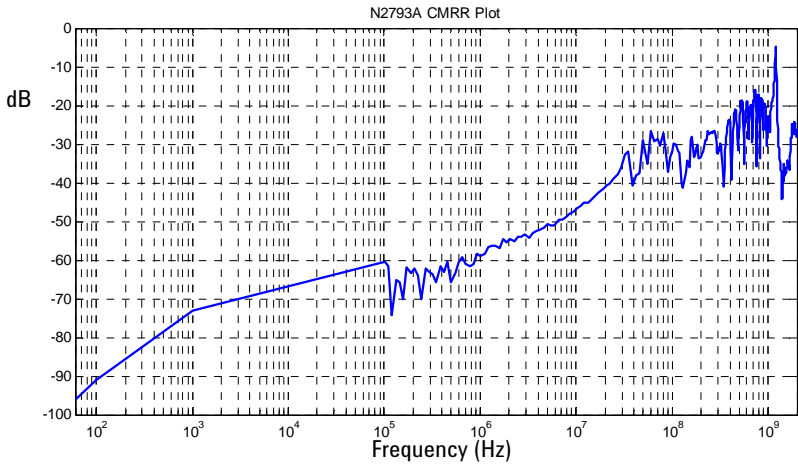


Graph of normalized differential step response (50Ω, 900 ps 10-90% rising edge step generator) 900 ps normalized rising edge (10-90%), 800 ps normalized rising edge (20-80%)

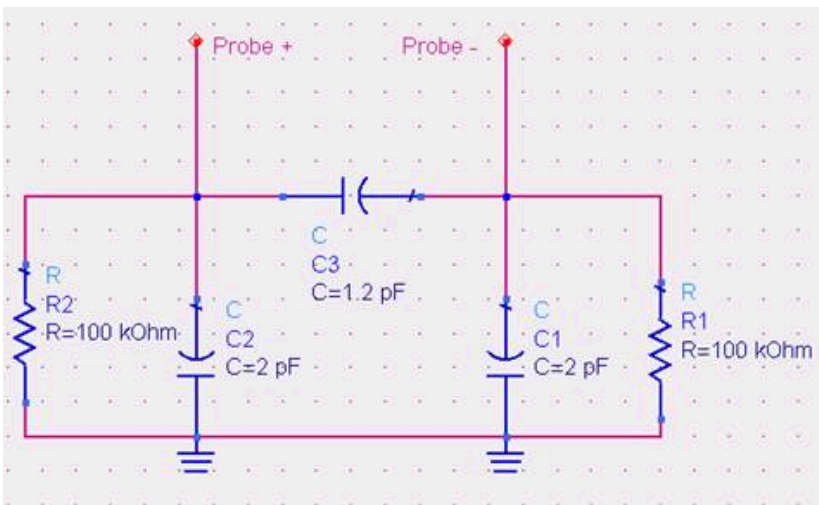


Graph of dB(Vin), dB(Vout) + 20dB, and dB(Vout/Vin) + 20dB frequency response

## N2793A Probe - Plots

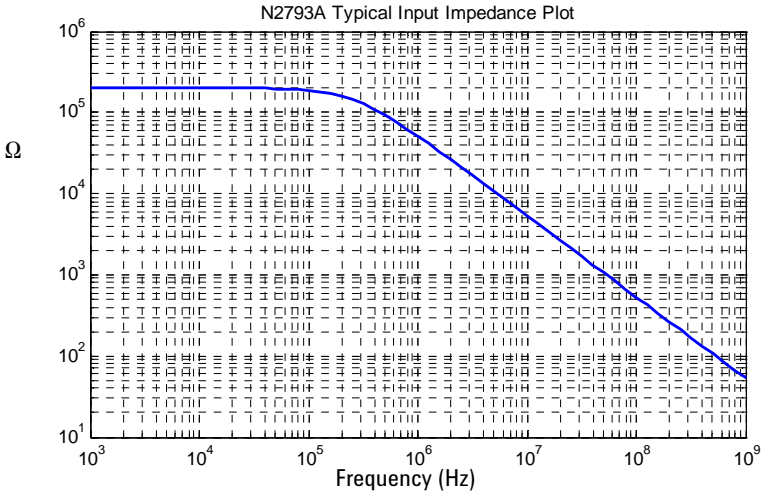


Graph of  $\text{dB}(V_{\text{out}}/V_{\text{in}}) + 20\text{dB}$  frequency response when inputs driven in common mode (common mode rejection)

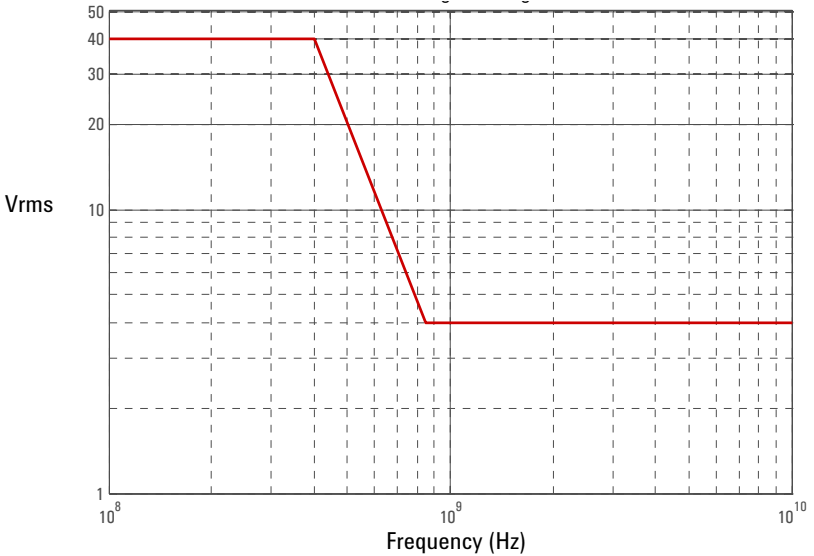


Input impedance equivalent model showing measured input capacitance values





Typical input impedance plot



Typical derating curve of the absolute maximum input voltage (either input to ground)

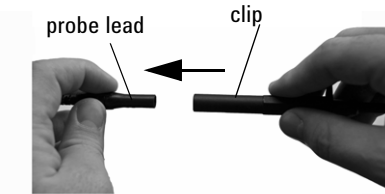
## Using the Accessories

### N2792A Accessories

The following section describes how to use the main accessories supplied with the N2792A probe and with the N2792-68700 Accessory Kit.

#### Hook and Alligator Clips

These accessories can be pushed onto the probe leads as shown below.



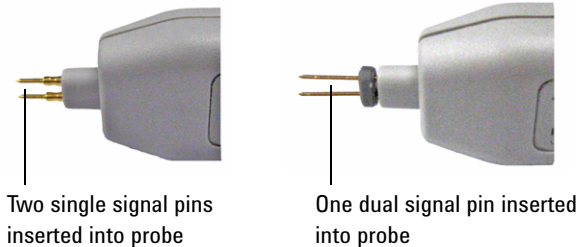
Use the hook clips to clamp onto smaller components and use the alligator clips to clamp onto thicker gauge devices. For pictures of each of these clips, refer to the picture on page 5.

### N2793A Accessories

The following section describes how to use the main accessories supplied with the N2793A probe and with the N2793-68700 Accessory Kit.

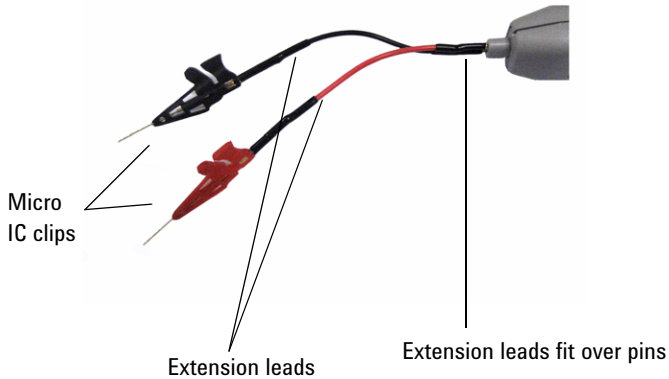
#### Single and Dual Signal Pins

These pins are inserted into the probe tip inputs located on the probe (see below). Using either one of these probe tips will result in the best possible signal integrity when compared to the other accessories available with the N2793A probe.



### Extension Leads

If the length of the pins is not adequate for your measurement setup or if you need to use the pincer or micro IC clips, the extension leads can be placed over the pins as shown below. There are two lengths of extensions leads available: 5 cm and 10 cm.



### Micro IC Clips and Pincer Clips

With today's miniature IC- and component-packaging techniques, these clips can make probing challenging devices much easier. They attach to the extension leads as shown in the picture above. Squeeze the lever on the micro IC clips to extend the grasping jaws. Push the back of the pincer clips to extend their connectors.

## N2792A Performance Verification Procedures

The following procedure can be used to test the DC differential gain accuracy and bandwidth of the N2792A differential probe. Please note that these procedures do not indicate that these characteristics are warranted. Instead, these procedures are meant to give you an idea of how your probe performs.

### Required Test Equipment

<b>Description</b>	<b>Critical Specifications</b>	<b>Recommended Model Part Number</b>	<b>Functions</b>
Digitizing Oscilloscope	Bandwidth: >200 MHz 1 M $\Omega$ /50 $\Omega$ selectable input	Agilent MS09254A	Display probe output
Signal Generator Precision DC voltage source	Amplitude accuracy: less than or equal to 0.25% 1 M $\Omega$ /50 $\Omega$ selectable load Sine wave greater than or equal to 200 MHz	Fluke 9500B Or Agilent E8257D+1EU option	Signal source for DC gain and bandwidth
BNC Adapter	BNC (f) to Dual Banana (m) Adapter	Agilent 1251-2277	Interconnection between probe and generator
50 $\Omega$ BNC Feed Through Adapter	50 $\Omega$ precision feed through	HP 11048C	Termination between probe and calibrator for bandwidth verification

### DC Differential Gain Accuracy

- 1** Set the volts/division on channel 1 of the oscilloscope to 20 mV/div. Set the seconds/div to 200  $\mu$ s and the acquisition mode to average 32. Set the input impedance to 50 $\Omega$ .
- 2** Set the volts/division on channel 2 of the oscilloscope to 500 mV/div. Trigger on channel 2, select 50  $\Omega$  impedance.
- 3** Set the calibrator 9500B's channel 2 as the trigger channel (50  $\Omega$  load). Connect the calibrator's channel 2 active head to channel 2 of the oscilloscope.
- 4** Connect the active head channel 1 from the Fluke 9500B to channel 1 of the oscilloscope. Set the calibrator channel 1 to 0.1V peak-to-peak amplitude and 1 KHz (square wave, 1 M $\Omega$  load), enable the output.
- 5** Select the amplitude measurement on the oscilloscope and record the DC amplitude (approximately 100 mV) of the square wave. This measurement is only the oscilloscope.
- 6** Disable the Fluke calibrator output, disconnect the channel 1 active head from channel 1 of the oscilloscope.
- 7** Connect the output of the N2792A probe to channel 1 of the oscilloscope.
- 8** Attach the BNC adapter to the Fluke channel 1 active head.

- 9 Attach the differential probe input leads by clipping the alligator clamp to the BNC adapter banana post.
- 10 Set the Fluke calibrator to 1V and 1 KHz standard amplitude output (channel 1, square wave, 1 M $\Omega$  load).
- 11 Enable the output of the calibrator.
- 12 Record the DC amplitude of the square wave and divide 10 into just the amplitude of the oscilloscope. Verify that the probe gain accuracy is  $\pm 2\%$  + scope gain accuracy.
- 13 Disable the calibrator output and leave the setup connected for the next procedure.

### **Bandwidth**

- 1 Connect the 50  $\Omega$  BNC feed through adapter to the calibrator's active head channel 1.
- 2 Attach the BNC (f)-to-banana post adapter to the BNC feed through adapter.
- 3 Attach the differential probe input leads by clipping the alligator clamp to the BNC adapter banana post.
- 4 Set the volts/division on channel 1 of the oscilloscope to 50 mV/div and seconds/division to 2 ns/div. Set the trace to the center of the oscilloscope. Input impedance should be set to 50  $\Omega$ . Disable the average mode. Set the acquisition mode to Peak Detect mode.
- 5 Set the calibrator to sine wave, 3 V peak-to-peak amplitude. Set the frequency to 200 MHz, 50  $\Omega$  load.
- 6 Write down the peak-to-peak amplitude measured by the oscilloscope. It should be greater than or equal to 210 mV - scope vertical accuracy.
- 7 Disable the generator output and disconnect the probe input.

## N2792A Performance Verification Test Record

<p><b>Agilent Technologies</b></p> <p>Recommended Test Interval: 1 Year                  Recommended Date of Next Certification: _____                  Certification Temperature: _____</p>		<p>N2792A 200 MHz Differential Probe                  Serial No.: _____                  Certification Date: _____                  Tested By: _____                  _____                  _____</p>	
Test	Probe Settings	Limits	Results
Gain	10:1	98 mV to 102 mV	
Bandwidth	10:1	Greater than or equal to 210 mV - scope vertical accuracy	

## N2793A Performance Verification Procedures

The following procedure can be used to test and verify the DC differential gain accuracy and bandwidth of the N2793A high voltage differential probe. Please note that these procedures do not indicate that these characteristics are warranted. Instead, these procedures are meant to give you an idea of how your probe performs.

### Required Test Equipment

Description	Critical Specifications	Recommended Model Part Number	Functions
Digitizing Oscilloscope	Bandwidth: >1 GHz 1 M $\Omega$ /50 $\Omega$ selectable input	Agilent MS09254A	Display probe output
Signal Generator Precision DC voltage source	Amplitude accuracy: less than or equal to 0.25% 1 M $\Omega$ /50 $\Omega$ selectable load Sine wave greater than or equal to 800 MHz	Fluke 9500B Or Agilent E8257D+1EU option	Signal source for DC gain and bandwidth
Performance Check Fixture	50 $\Omega$ impedance controlled microstrip trace	Agilent E2655B	Probing trace for bandwidth test
Terminator	50 $\Omega$ matched load		Termination for the PV fixture
BNC Adapter	BNC (f) to SMA (m)		Interconnection between calibrator and PV fixture
BNC Adapter	BNC(f) to Dual Banana (m) adapter	Agilent 1251-2277	Termination between probe and calibrator

### DC Differential Gain Accuracy

- 1 Set the volts/division on channel 1 of the oscilloscope to 20 mV/div. Set the seconds/div to 200  $\mu$ s and the acquisition mode to average 32. Set the impedance to 50 $\Omega$ .
- 2 Set the volts/division on channel 2 of the oscilloscope to 500 mV/div. Trigger on channel 2, select 50  $\Omega$  impedance.
- 3 Set the calibrator 9500B's channel 2 as the trigger channel (50  $\Omega$  load). Connect the calibrator's channel 2 active head to channel 2 of the oscilloscope.
- 4 Connect the active head channel 1 from the Fluke 9500B to channel 1 of the oscilloscope. Set the calibrator channel 1 to 0.1V peak-to-peak amplitude and 1 KHz (square wave, 1 M $\Omega$  load), enable the output.
- 5 Select the amplitude measurement on the oscilloscope and record the DC amplitude (approximately 100 mV) of the square wave. This measurement is only the oscilloscope.
- 6 Disable the Fluke calibrator output, disconnect the channel 1 active head from channel 1 of the oscilloscope.

## N2793A Performance Verification Procedures

- 7 Connect the output of the N2793A probe to channel 1 of the oscilloscope.
- 8 Attach the BNC adapter to the Fluke channel 1 active head.
- 9 Attach the differential probe input leads by clipping the alligator clamp to the BNC adapter banana post.
- 10 Set the Fluke calibrator to 1 V and 1 KHz standard amplitude output (channel 1, square wave, 1 M $\Omega$  load).
- 11 Enable the output of the calibrator.
- 12 Record the DC amplitude of the square wave and divide 10 into just the amplitude of the oscilloscope. Verify that the probe gain accuracy is +/-2% + scope gain accuracy..
- 13 Disable the calibrator output and leave the setup connected for the next procedure.

### Bandwidth

- 1 Connect the PV fixture trace to the calibrator active head channel 1.
- 2 Set the volts/division on channel 2 of the oscilloscope to 500 mV. Trigger on channel 2. Select 50  $\Omega$  impedance.
- 3 Set the calibrator channel 2 as the trigger channel (50  $\Omega$  load). Connect calibrator channel 2 active head to the channel 2 of the oscilloscope.
- 4 Terminate the 50  $\Omega$  trace on the E2655B with the matched 50  $\Omega$  terminator.
- 5 Use a probe positioner to place the probe pgog pin tips onto the center of the signal trace and ground via.
- 6 Set the volts/division on channel 1 of the oscilloscope to 50 mV and ns/division to 2 ns/division. Set the trace to the center of the oscilloscope and set the impedance to 50  $\Omega$ . Disable average mode and set the acquisition mode to Peak Detect mode.
- 7 Set the calibrator to sine wave, 3 V peak-to-peak and set the frequency to 800 MHz, 50  $\Omega$  load.
- 8 Write down the peak-to-peak amplitude measured by the oscilloscope. It should be greater than or equal to 210 mV - scope vertical accuracy.
- 9 Disable the generator output and disconnect the probe input.



## N2793A Performance Verification Test Record

<p><b>Agilent Technologies</b></p> <p>Recommended Test Interval: 1 Year                  Recommended Date of Next Certification: _____                  Certification Temperature: _____</p>	<p>N2793A 800 MHz Differential Probe                  Serial No.: _____                  Certification Date: _____                  Tested By: _____                  _____                  _____</p>
--	--

Test	Probe Settings	Limits	Results
Gain	10:1	98 mV to 102 mV	
Bandwidth	10:1	Greater than or equal to 210 mV - scope vertical accuracy	



---

# Safety Notices

## Safety Symbols



**Instruction manual symbol:** the product is marked with this symbol when it is necessary for you to refer to the instruction manual in order to protect against damage to the product or personal injury.



**Hazardous voltage symbol.**

This apparatus has been designed and tested in accordance with IEC Publication 61010, Safety Requirements for Measuring Apparatus, and has been supplied in a safe condition. This is a Safety Class I instrument (provided with terminal for protective earthing). Before applying power, verify that the correct safety precautions are taken (see the following warnings). In addition, note the external markings on the instrument that are described under "Safety Symbols."

### Warnings

- Whenever it is likely that the ground protection is impaired, you must make the instrument inoperative and secure it against any unintended operation.
- Service instructions are for trained service personnel. To avoid dangerous electric shock, do not perform any service unless qualified to do so. Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.
- Do not install substitute parts or perform any unauthorized modification to the instrument.
- Capacitors inside the instrument may retain a charge even if the instrument is disconnected from its source of supply.
- Do not operate the instrument in the presence of flammable gasses or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.
- Do not use the instrument in a manner not specified by the manufacturer.

# Notices

© Agilent Technologies, Inc.  
2009-2011

No part of this manual may be reproduced in any form or by any means (including electronic storage and retrieval or translation into a foreign language) without prior agreement and written consent from Agilent Technologies, Inc. as governed by United States and international copyright laws.

Manual Part Number  
N2791-97001, Feb 2011

Print History  
N2791-97001, Feb 2011  
N2791-97000, May 2009

Agilent Technologies, Inc.  
1900 Garden of the Gods Road  
Colorado Springs, CO 80907  
USA

## Restricted Rights Legend

If software is for use in the performance of a U.S. Government prime contract or subcontract, Software is delivered and licensed as "Commercial computer software" as defined in DFAR 252.227-7014 (June 1995), or as a "commercial item" as defined in FAR 2.101(a) or as "Restricted computer software" as defined in FAR 52.227-19 (June 1987) or any equivalent agency regulation or contract clause. Use, duplication or disclosure of Software is subject to Agilent Technologies' standard commercial license terms, and non-DOD Departments and Agencies of the U.S. Government will receive no greater than Restricted Rights as defined in FAR 52.227-19(c)(1-2) (June 1987). U.S. Government users will receive no greater than Limited Rights as defined in FAR 52.227-14 (June 1987) or DFAR 252.227-7015 (b)(2) (November 1995), as applicable in any technical data.

## Document Warranty

The material contained in this document is provided "as is," and is subject to being changed, without notice, in future editions. Further, to the maximum extent permitted by applicable law, Agilent dis-

claims all warranties, either express or implied, with regard to this manual and any information contained herein, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. Agilent shall not be liable for errors or for incidental or consequential damages in connection with the furnishing, use, or performance of this document or of any information contained herein. Should Agilent and the user have a separate written agreement with warranty terms covering the material in this document that conflict with these terms, the warranty terms in the separate agreement shall control.

## Technology Licenses

The hardware and/or software described in this document are furnished under a license and may be used or copied only in accordance with the terms of such license.

## WARNING

A **WARNING** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a **WARNING** notice until the indicated conditions are fully understood and met.

## CAUTION

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.





**Agilent Technologies**

Agilent Technologies, Printed in the Philippines February 2011  
Manual Part Number: N2792-97001

