

N2792A and N2793A Differential Probes

User's Guide



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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.

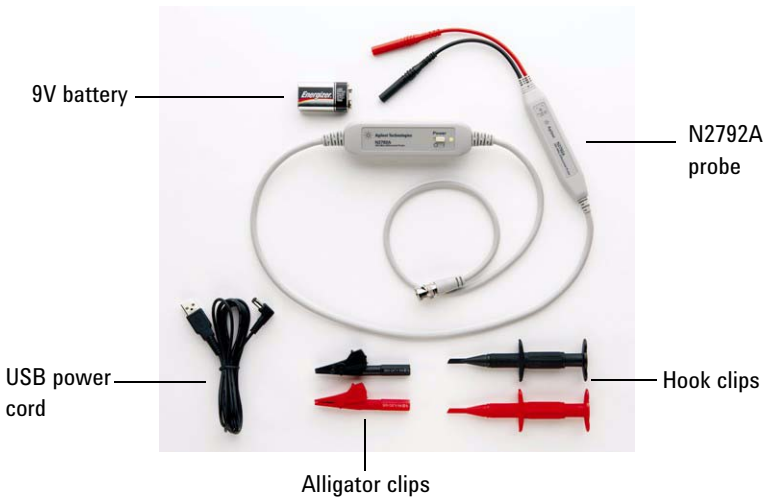
N2792A and N2793A Differential Probes

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 Ω (N2792A) and 200 k Ω (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 Ω 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.

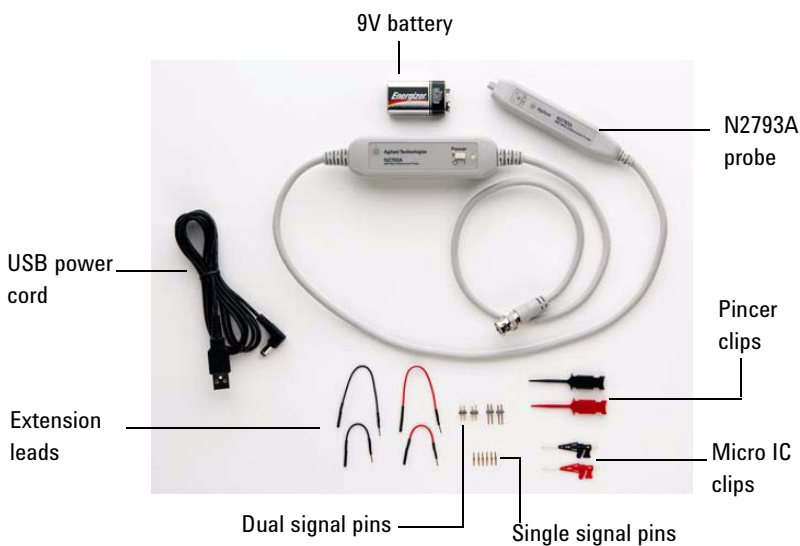
Part	Quantity
N2792A 200 MHz differential probe	1
Hook Clip, Red	1
Hook Clip, Black	1
Alligator Clip, Red	1
Alligator Clip, Black	1
USB Power Cord (2 m)	1
9V Battery	1
User's Guide	1



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:

Part	Quantity
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:

Part	Quantity
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 and Specifications

Characteristics and specifications 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

	N2792A	N2793A
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

	N2792A	N2793A
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 Ω 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).

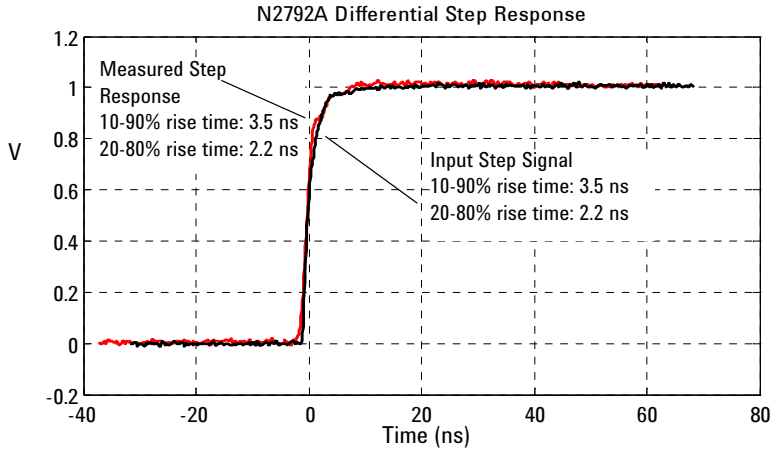


To protect against electrical shock, use only the accessories supplied with this probe or in the accessory kit.

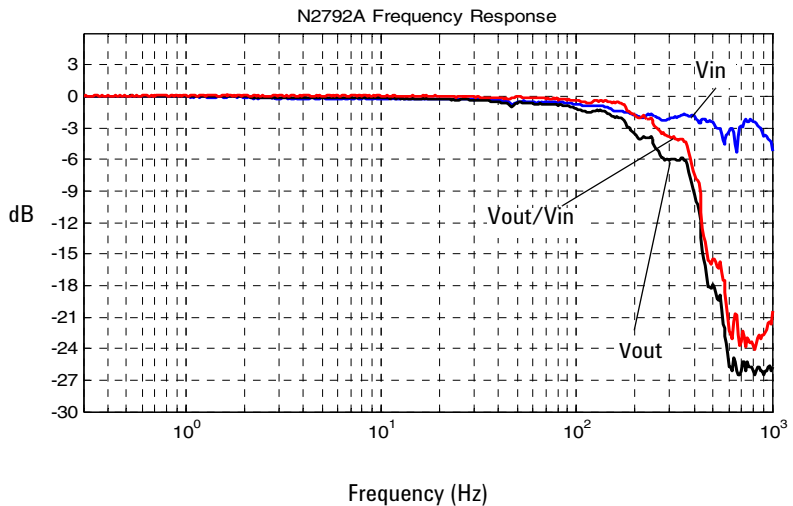


This probe is to carry out differential measurements between two points on the circuit under test. This probe is not for electrically insulating the circuit under test and the measuring instrument.

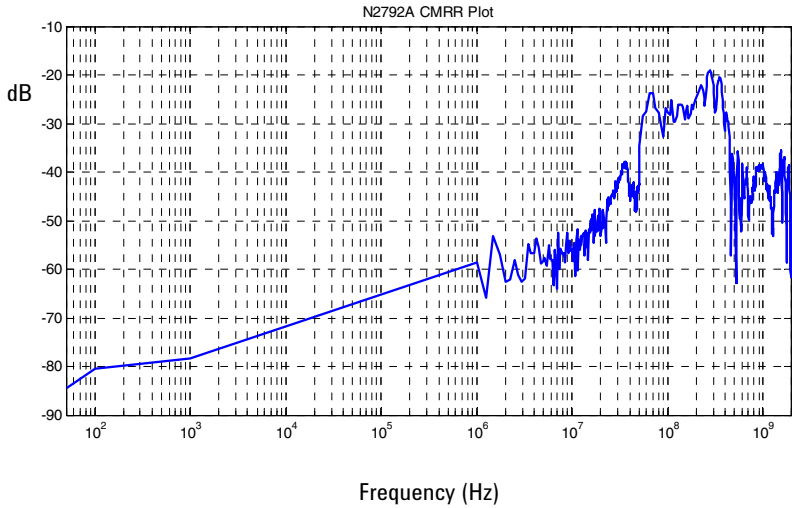
N2792A Probe - Plots



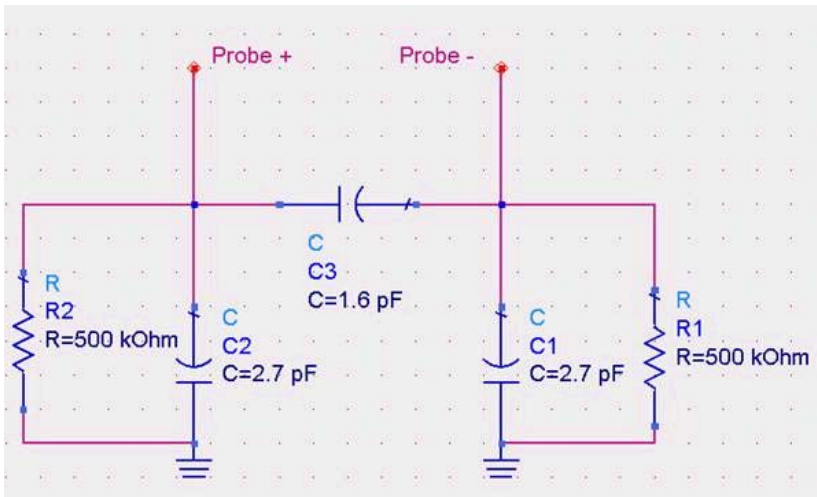
Graph of normalized differential step response (50Ω, 3.5 ns 10-90% rising edge step generator), 3.5 ns normalized rising edge (10-90%), 2.2 ns normalized rising edge (20-80%)



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

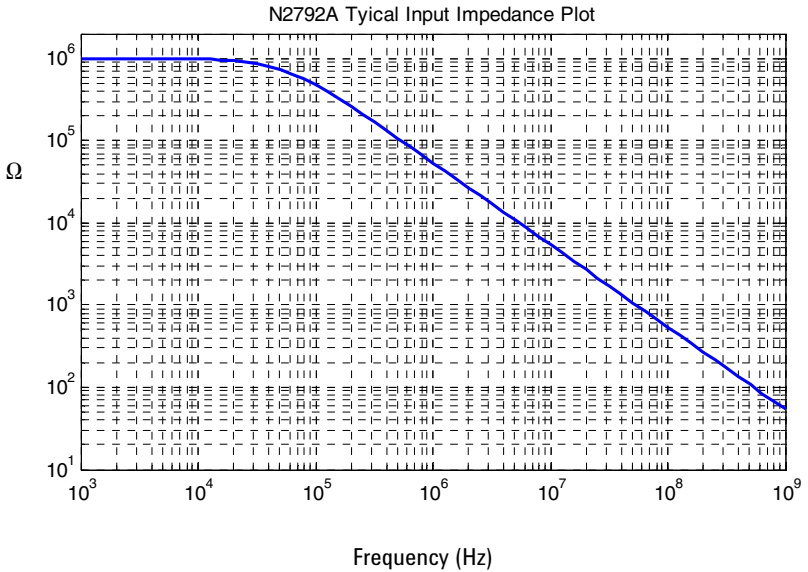


Graph of $\text{dB}(V_{\text{out}}/V_{\text{in}}) + 20\text{dB}$ frequency response when inputs driven in common mode (common mode rejection)

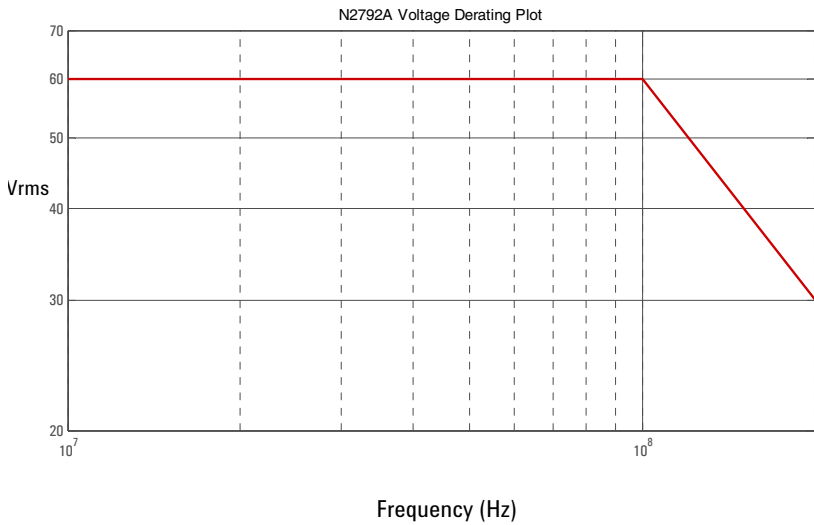


Input impedance equivalent model showing measured input capacitance values

N2792A Probe - Plots

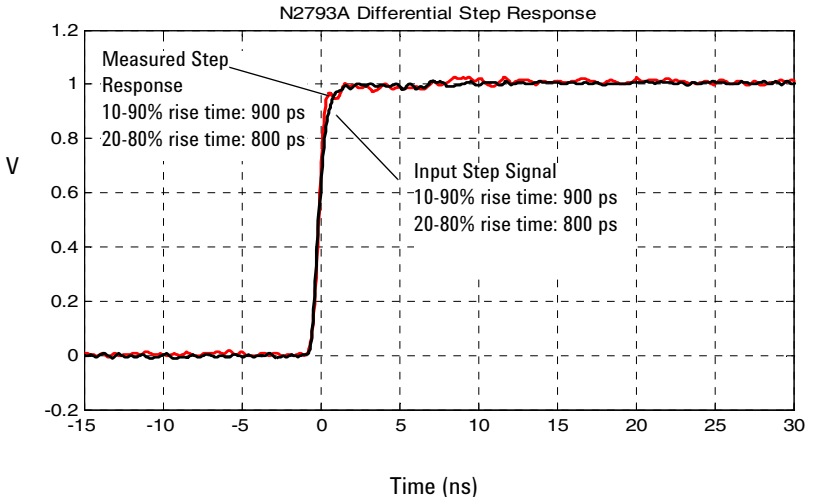


Typical input impedance plot

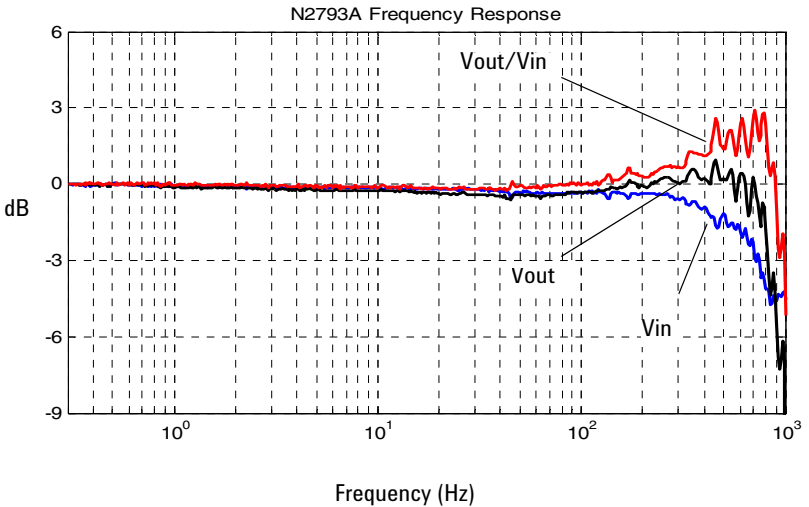


Typical derating curve of the absolute maximum input voltage (either input to ground)

N2793A Probe - Plots

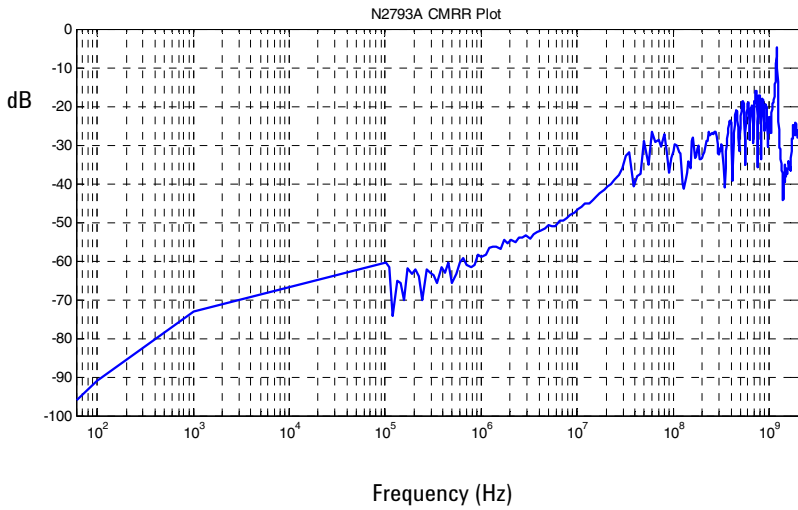


Graph of normalized differential step response (50Ω , 900 ps 10-90% rising edge step generator) 900 ps normalized rising edge (10-90%), 800 ps normalized rising edge (20-80%)

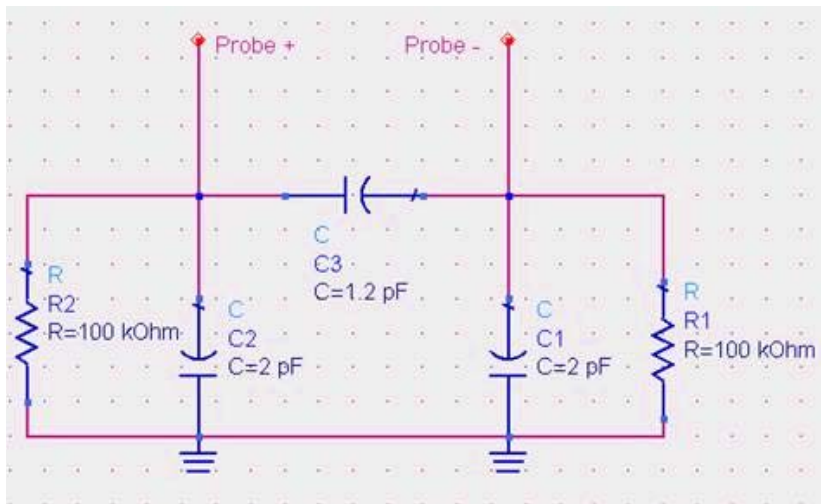


Graph of $dB(V_{in})$, $dB(V_{out}) + 20dB$, and $dB(V_{out}/V_{in}) + 20dB$ frequency response

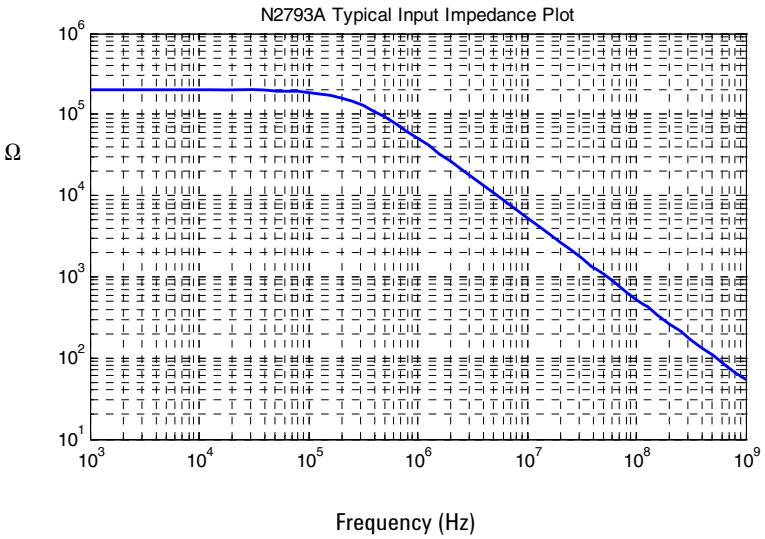
N2793A Probe - Plots



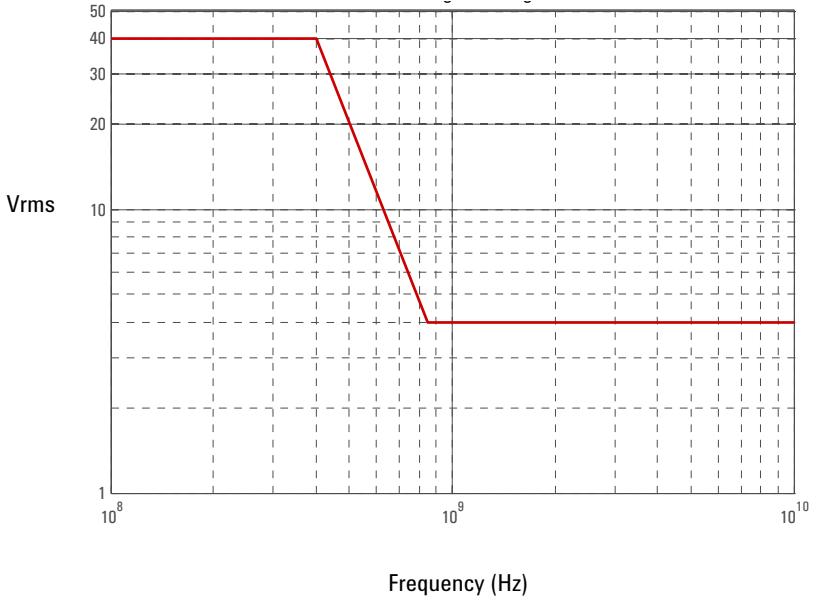
Graph of $\text{dB}(V_{\text{out}}/V_{\text{in}}) + 20\text{dB}$ frequency response when inputs driven in common mode (common mode rejection)



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)

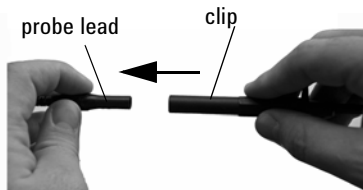
Using the Accessories

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.



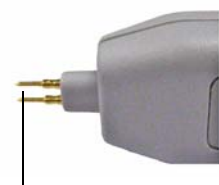
Use the hook clips to clamp onto smaller components and use the alligator clips to clamp onto thicker gauge devices. For pictures of each of these clips, refer to the picture on page 5.

N2793A Accessories

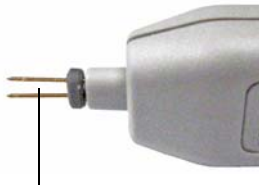
The following section describes how to use the main accessories supplied with the N2793A probe and with the N2793-68700 Accessory Kit.

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.



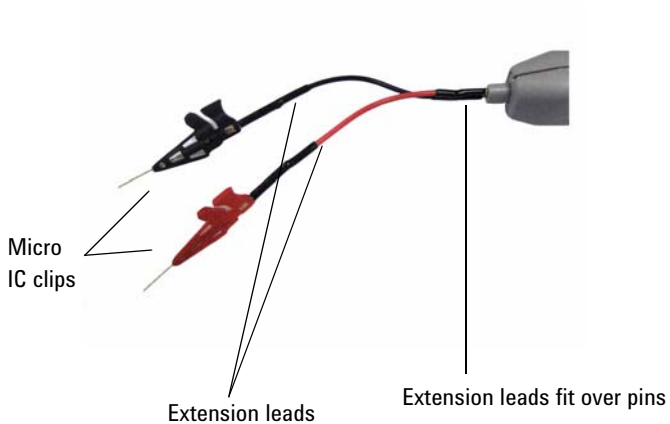
Two single signal pins inserted into probe



One dual signal pin inserted into 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.



夹层转换板分析仪示波器探头		INTERPOSER/ANALYZER/OSCILLOSCOPE PROBE					
部件名称		有毒有害物质或元素					
Part Name		Toxic or Hazardous Substances and Elements					
		铅	汞	镉	六价铬	多溴联苯	多溴二苯醚
		Pb	Hg	Cd	CrVI	PBB	PBDE
金属扣件	Metal fasteners	○	○	○	×	○	○
连接器	Connectors	×	○	○	×	○	○
印制电路板	Printed circuit assemblies	×	○	×	○	○	○
电缆	Cables	×	○	○	○	○	○
机械部件	Machined parts	×	○	○	○	○	○
其它部件	Other parts	○	○	○	○	○	○

O: 表示该有毒有害物质在该部件所有均质材料中的含量均在 SJ/T11363-2006 标准规定的限量要求以下。

X: 表示该有毒有害物质至少在该部件某一均质材料中的含量超出SJ/T11363-2006 标准规定的限量要求。

O: Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006.

X: Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in SJ/T11363-2006.

如果上述表单多于一个，请参考您的订单或者装箱单从上述表格中找到适合您的产品的列表。

If more than one table is shown above, reference your order or packing list to determine which is applicable to your product.

若您需要了解有关本产品的生产日期信息，请联系您的安捷伦销售代表。

If you have a question about the manufacturing date for your product, ask your Agilent representative

有关如何与安捷伦联系的信息，请参考产品使用手册。

For Agilent contact information, please reference your product manual.

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