



**TDP3500 and TDP4000**  
**3.5 GHz and 4 GHz Differential Probes**  
**Technical Reference**



071-2297-01





**TDP3500 and TDP4000**  
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**Technical Reference**

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- In North America, call 1-800-833-9200.
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# Table of Contents

Important safety information .....	iii
General safety summary .....	iii
Service safety summary .....	iv
Terms in this manual .....	v
Symbols and terms on the product .....	v
Preface .....	vi
Specifications .....	1
Warranted characteristics .....	1
Typical characteristics .....	2
Nominal characteristics .....	5
Probe tip adapter specifications .....	6
Performance verification .....	10
Required equipment .....	10
Special adapters .....	11
Preparation .....	13
DC Attenuation Accuracy .....	14
Differential Signal Range .....	16
Rise Time .....	17
Maintenance .....	22
Inspection and cleaning .....	22
Replacement parts .....	22
Preparation for shipment .....	22





# Important safety information

This manual contains information and warnings that must be followed by the user for safe operation and to keep the product in a safe condition.

To safely perform service on this product, additional information is provided at the end of this section. (See page iv, *Service safety summary*.)

## General safety summary

Use the product only as specified. Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. Carefully read all instructions. Retain these instructions for future reference.

This product shall be used in accordance with local and national codes.

For correct and safe operation of the product, it is essential that you follow generally accepted safety procedures in addition to the safety precautions specified in this manual.

The product is designed to be used by trained personnel only.

Only qualified personnel who are aware of the hazards involved should remove the cover for repair, maintenance, or adjustment.

Before use, always check the product with a known source to be sure it is operating correctly.

This product is not intended for detection of hazardous voltages.

Use personal protective equipment to prevent shock and arc blast injury where hazardous live conductors are exposed.

While using this product, you may need to access other parts of a larger system. Read the safety sections of the other component manuals for warnings and cautions related to operating the system.

When incorporating this equipment into a system, the safety of that system is the responsibility of the assembler of the system.

### To avoid fire or personal injury

**Observe all terminal ratings.** To avoid fire or shock hazard, observe all ratings and markings on the product. Consult the product manual for further ratings information before making connections to the product. Do not exceed the Measurement Category (CAT) rating and voltage or current rating of the lowest rated individual component of a product, probe, or accessory if applicable. Use caution when using 1:1 test leads because the probe tip voltage is directly transmitted to the product.

Do not apply a potential to any terminal, including the common terminal, that exceeds the maximum rating of that terminal.

The measuring terminals on this product are not rated for connection to mains or Category II, III, or IV circuits.

**Do not operate without covers.** Do not operate this product with covers or panels removed, or with the case open. Hazardous voltage exposure is possible.

**Avoid exposed circuitry.** Do not touch exposed connections and components when power is present.

**Do not operate with suspected failures.** If you suspect that there is damage to this product, have it inspected by qualified service personnel.

Disable the product if it is damaged. Do not use the product if it is damaged or operates incorrectly. If in doubt about safety of the product, turn it off and disconnect the power cord. Clearly mark the product to prevent its further operation.

Before use, inspect voltage probes, test leads, and accessories for mechanical damage and replace when damaged. Do not use probes or test leads if they are damaged, if there is exposed metal, or if a wear indicator shows.

Examine the exterior of the product before you use it. Look for cracks or missing pieces.

Use only specified replacement parts.

**Do not operate in wet/damp conditions.** Be aware that condensation may occur if a unit is moved from a cold to a warm environment.

**Do not operate in an explosive atmosphere.**

**Keep product surfaces clean and dry.** Remove the input signals before you clean the product.

### Probes and test leads

Remove all probes, test leads and accessories that are not in use.

Use only correct Measurement Category (CAT), voltage, temperature, altitude, and amperage rated probes, test leads, and adapters (if applicable) for any measurement.

**Inspect the probe and accessories.** Before each use, inspect probe and accessories for damage (cuts, tears, or defects in the probe body, accessories, or cable jacket). Do not use if damaged.

## Service safety summary

The *Service safety summary* section contains additional information required to safely perform service on the product. Only qualified personnel should perform service procedures. Read this *Service safety summary* and the *General safety summary* before performing any service procedures.

**To avoid electric shock.** Do not touch exposed connections.

**Do not service alone.** Do not perform internal service or adjustments of this product unless another person capable of rendering first aid and resuscitation is present.

## Terms in this manual

These terms may appear in this manual:



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**WARNING.** *Warning statements identify conditions or practices that could result in injury or loss of life.*

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**CAUTION.** *Caution statements identify conditions or practices that could result in damage to this product or other property.*

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## Symbols and terms on the product

These terms may appear on the product:

- WARNING indicates an injury hazard not immediately accessible as you read the marking.
- CAUTION indicates a hazard to property including the product.

The following symbol(s) may appear on the product:



## Preface

This is the Technical Reference Manual for the TDP3500 and TDP4000 differential probes. This manual provides specifications and performance verification procedures for the probe.

# Specifications

The specifications in Tables 1 through 4 apply to a TDP3500 and TDP4000 differential probes installed on a Tektronix oscilloscope. The probe must have a warm-up period of at least 20 minutes and be in an environment that does not exceed the limits described. (See Table 2.) The probe calibration and Autozero routines should be run on the host instrument before verifying the warranted probe specifications. Specifications for the TDP3500 and TDP4000 differential probes fall into three categories: warranted, typical, and nominal characteristics.

## Warranted characteristics

Warranted characteristics describe guaranteed performance within tolerance limits or certain type-tested requirements. (See Table 2.) Warranted characteristics that have *Performance Verification* checks are marked with the ✓ symbol. Performance verification procedures are contained in the *TDP3500 and TDP4000 Technical Reference*, which is Tektronix part number 071-2297-XX.

**Table 1: Warranted electrical characteristics**

Specification	TDP3500	TDP4000
✓ Differential signal range (DC coupled)	$\pm 2.0 V_{(DC + \text{peak AC})}$	$\pm 2.0 V_{(DC + \text{peak AC})}$
Common-mode signal range (DC coupled)	+5 V to $-4 V_{(DC + \text{peak AC})}$	+5 V to $-4 V_{(DC + \text{peak AC})}$
Maximum nondestructive input voltage between signal and common of the same channel	$\pm 15 V_{(DC + \text{peak AC})}$	$\pm 15 V_{(DC + \text{peak AC})}$
✓ DC attenuation accuracy	$\pm 2\%$ of input	$\pm 2\%$ of input
✓ Rise time, probe only (10–90%, + 20 °C to + 30 °C)	$\leq 140$ ps	
Common-mode rejection ratio	>60 dB at DC >55 dB at 1 MHz >45 dB at 30 MHz >25 dB at 1 GHz	>60 dB at DC >55 dB at 1 MHz >45 dB at 30 MHz >25 dB at 1 GHz
Temperature	Operating: 0 to +40 °C (32 °F to +104 °F) Nonoperating: –40 to +71 °C (–40 °F to +159 °F) <sup>1</sup>	
Humidity	Operating: 0-90% RH, tested at + 30 to +40 °C (+86 °F to +104 °F) Nonoperating: 0-90% RH, tested at +30 to +60 °C (+86 °F to +140 °F)	

<sup>1</sup> See warning that follows.



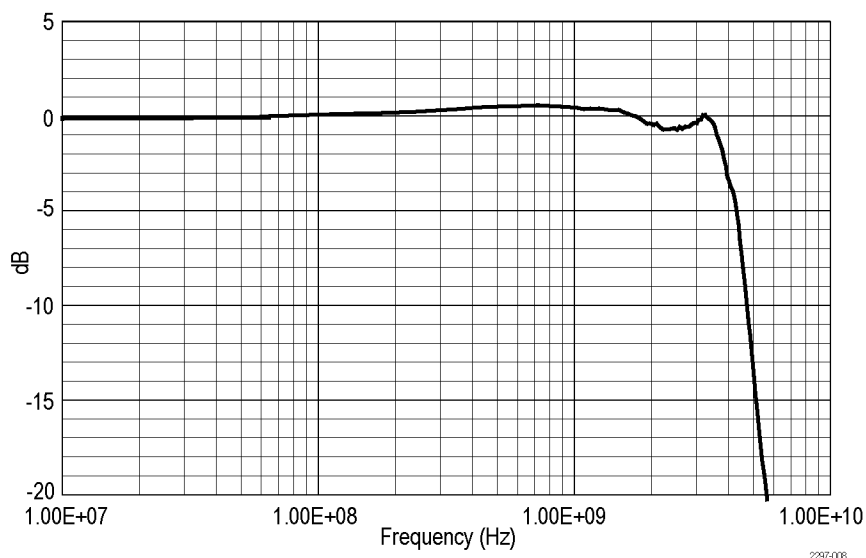
**WARNING.** To avoid a burn hazard at high ambient temperatures, do not touch the probe with bare hands at nonoperating temperatures above +50 °C.

## Typical characteristics

Typical characteristics describe typical but not guaranteed performance.

**Table 2: Typical electrical characteristics**

Specification	TDP3500	TDP4000
Bandwidth (probe only)	DC to $\geq 3.5$ GHz	DC to $\geq 4$ GHz
Rise time, probe only (10–90%, + 20 °C to + 30 °C)		$\leq 115$ ps
Differential input resistance, DC coupled	100 k $\Omega$	100 k $\Omega$
Common mode input resistance	50 k $\Omega$	50 k $\Omega$
Differential input capacitance	<0.3 pF at 10 MHz	<0.3 pF at 10 MHz
Common-mode input capacitance	<0.45 pF per side at 100 MHz	<0.45 pF per side at 100 MHz
Offset accuracy	$\pm 10$ mV	$\pm 10$ mV
Differential offset range	$\pm 1$ V	$\pm 1$ V
Common mode rejection ratio	(See Figure 4 on page 4.)	
System noise Referred to probe input	<35 nV/ $\sqrt{\text{Hz}}$ @ 100 MHz	<35 nV/ $\sqrt{\text{Hz}}$ @ 100 MHz
Input impedance	(See Figure 5 on page 4.)	
Propagation delay	5.4 ns $\pm$ 2 ns from probe tip to output	5.4 ns $\pm$ 2 ns from probe tip to output



**Figure 1: TDP3500 typical bandwidth**

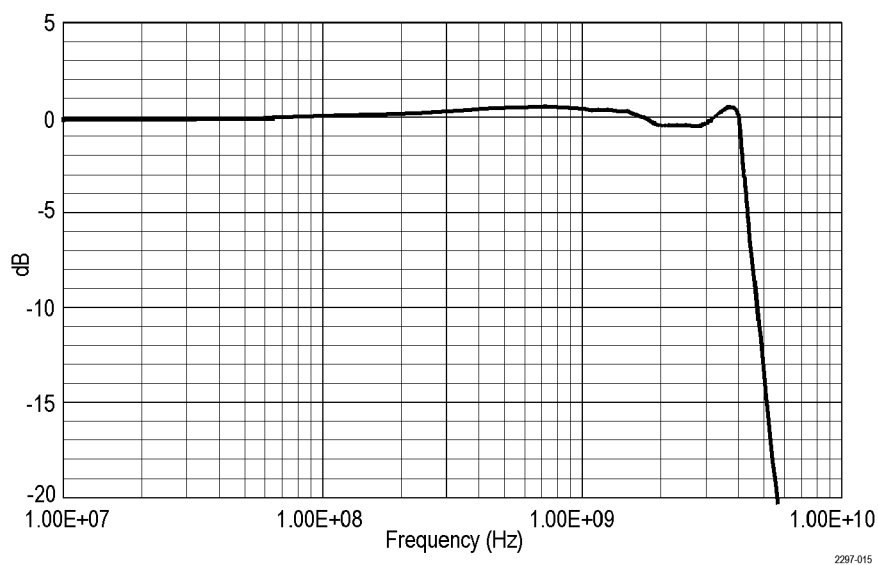


Figure 2: TDP4000 typical bandwidth

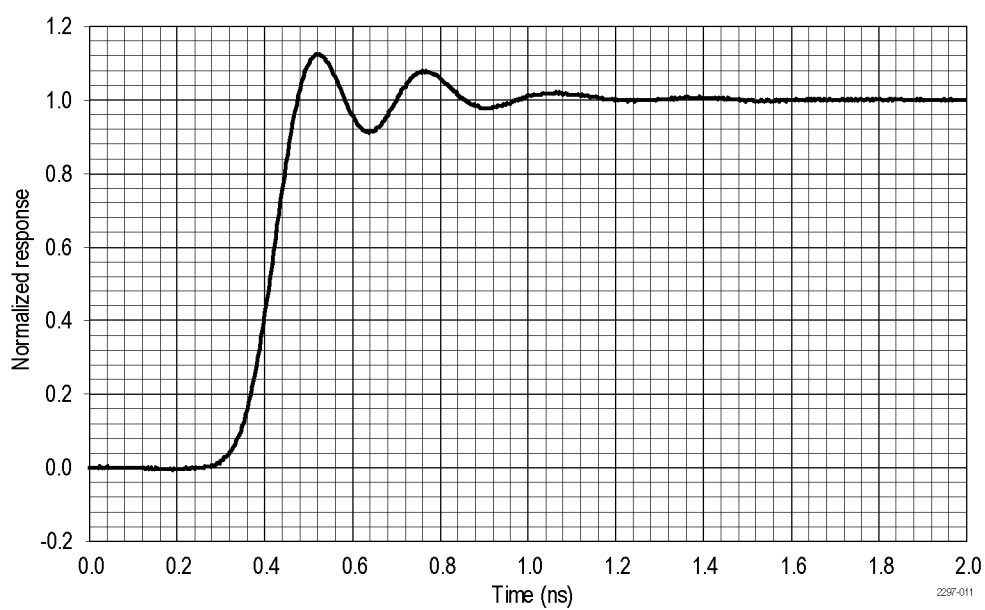


Figure 3: TDP3500 Typical rise time

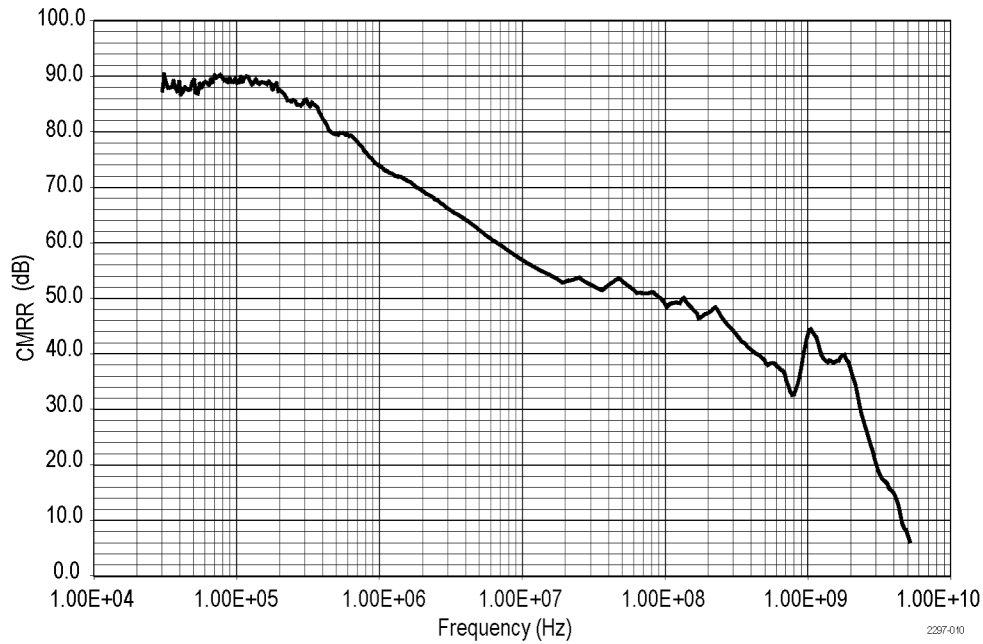


Figure 4: TDP3500 and TDP4000 Typical Common-Mode Rejection Ratio

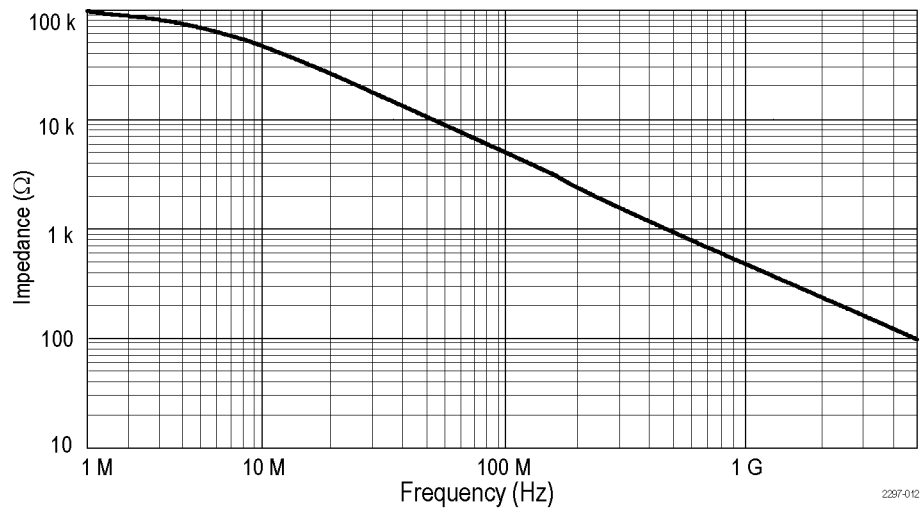
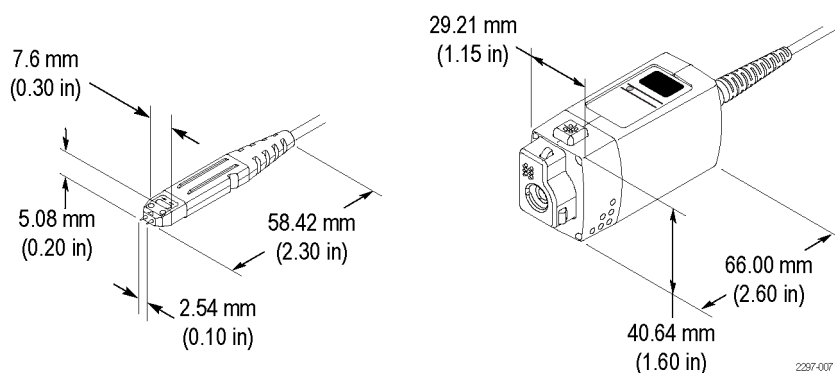


Figure 5: TDP3500 and TDP4000 Typical input impedance versus frequency



**Table 3: Typical mechanical characteristics**

Dimensions, input connection	0.63 mm (0.025 in) square pin sockets on 2.54 mm (0.100 in) centers
Dimensions, control box	117 mm × 41 mm × 29 mm (4.6 in × 1.6 in × 1.15 in)
Dimensions, probe head	86 mm × 11 mm × 8.9 mm (3.4 in × 0.45 in × 0.35 in)
Dimensions, output cable	1.22 m (48 in)
Unit weight (probe only)	144.5 g (5.1 oz)

**Figure 6: Probe dimensions**

## Nominal characteristics

Nominal characteristics describe guaranteed traits, but the traits do not have tolerance limits.

**Table 4: Nominal electrical characteristics**

Input configuration	Differential (two inputs, + and - ), with case ground
Output coupling	DC coupling
Voltage range	+/-2 V
Termination	Terminate output into 50 $\Omega$

## Probe tip adapter specifications

This section describes the characteristics of the adapters that are included in your accessory kit. The adapters are listed in order of performance, beginning with the fastest. You will get the best probe performance by connecting the probe directly to square pins on your circuit. However, as test points are not always as convenient, these adapters make taking measurements easier while maintaining the best signal fidelity.

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**NOTE.** All adapter specifications are typical unless otherwise indicated.

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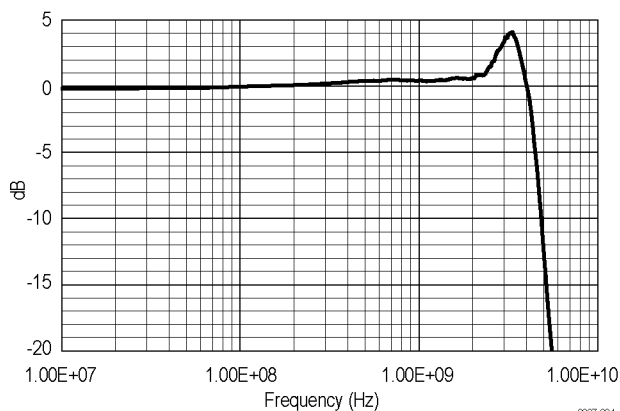
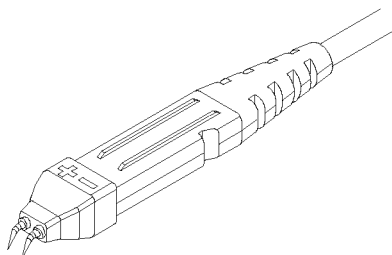
### Variable Spacing Adapter

Tektronix part number: 016-1885-xx

Bandwidth: <3.5 GHz (TDP3500), <4 GHz (TDP4000),

10/90 Rise time: <120 ps (TDP3500), <110 ps (TDP4000)

This adapter has adjustable pins that can span from 0.020 to 0.180 inch apart.



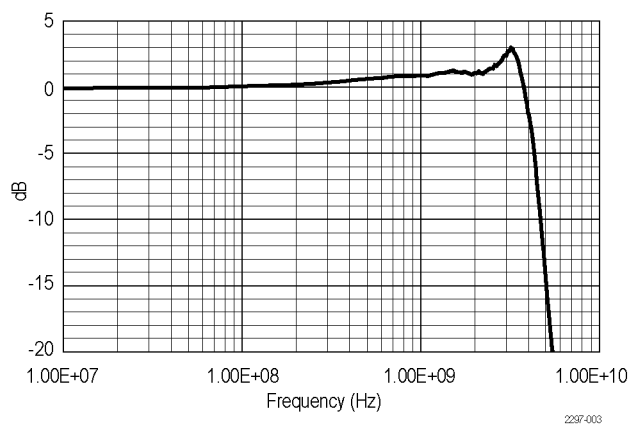
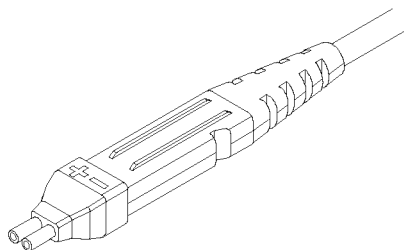
## Square Pin Adapter

Tektronix part number: 016-1884-xx

Bandwidth: <3.5 GHz

10/90 Rise time: <120 ps

Use this adapter to provide easy access to square-pin test points that you frequently check, or to other probe accessories.



## Solder-in Adapter Kit

Tektronix part number: 020-2505-xx Solder-In Adapter Kit

(Includes two adapters, Tektronix part number 016-1926-xx, and a Resistor/Wire Kit, Tektronix part number 020-2506-xx)

You can reorder the kit. The Resistor/Wire Kit includes ten each resistors (10  $\Omega$  and 20  $\Omega$  bonded to 0.020 in wire), and ten lengths of 0.020 in solder wire. The kit also includes ten each resistors (10  $\Omega$  and 20  $\Omega$  bonded to 0.008 in wire), and ten lengths of 0.008 in solder wire.

Bandwidth: <4.3 GHz (Solder wire), <3.8 GHz (10  $\Omega$  resistor), <3.7 GHz (20  $\Omega$  resistor)

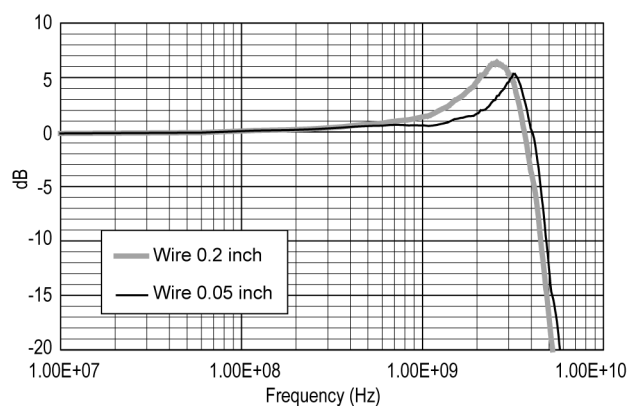
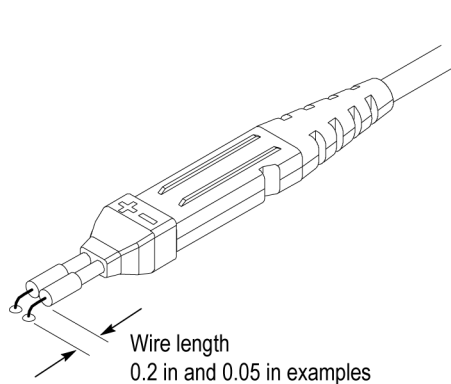
10/90 Rise time: <124 ps (Solder wire), <131 ps (10  $\Omega$  resistor), <140 ps (20  $\Omega$  resistor)

Use this adapter on test points that you frequently check that do not have square pins or other convenient connections. Solder the wire or resistor leads that come with the kit to your test points.

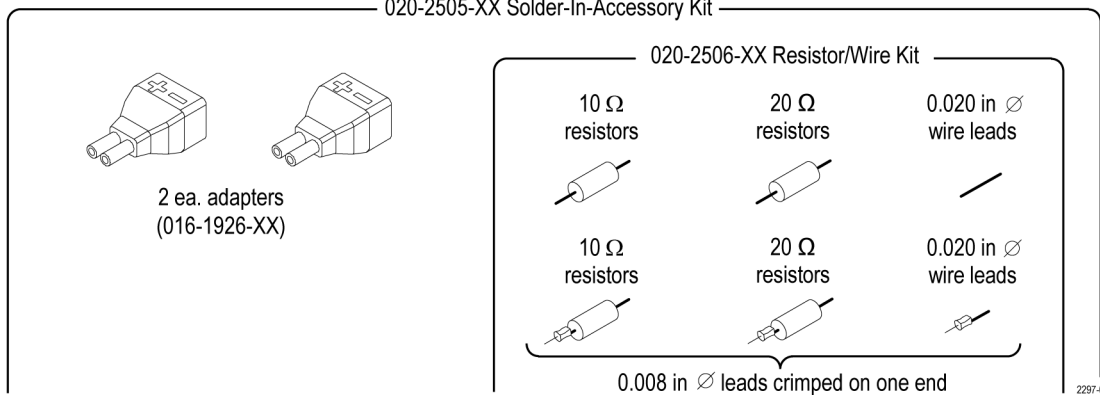


**CAUTION.** To prevent short circuits, solder and dress the adapter leads carefully, and make sure that the leads do not touch other conductors when the adapter is not connected to the probe.

To prevent damaging this adapter, do not connect it to 0.025" square pins. Instead, use the square-pin adapter included in the probe accessory kit.



020-2505-XX Solder-In-Accessory Kit



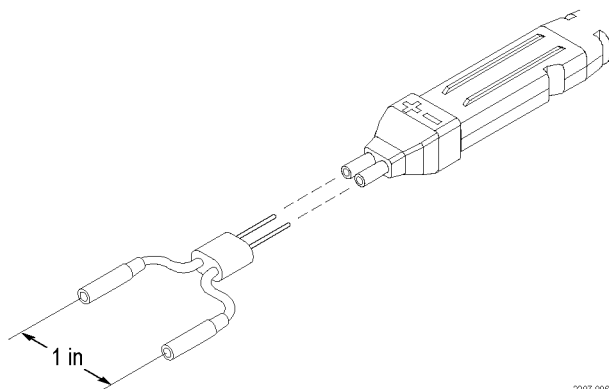
## Y-Lead Adapter

Tektronix part number: 196-3434-xx

Usable Bandwidth: <100 MHz

Calculated rise time: 1.4 ns

Use this adapter for DC and low-frequency measurements. The socket ends plug onto square pins, component leads, and the MicroCKT Test Tip adapters included with the probe.



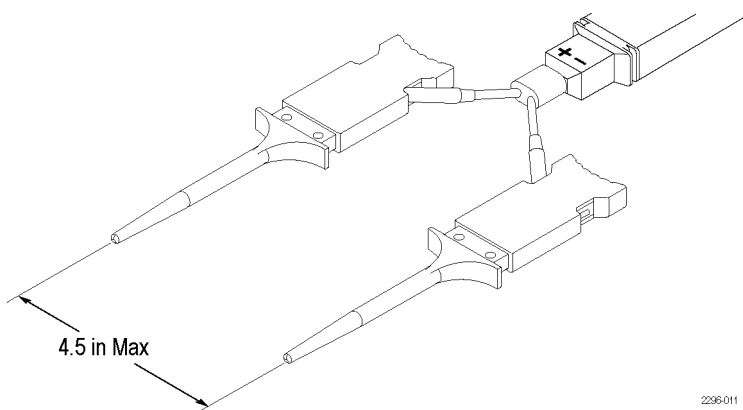
## MicroCKT Test Tips

Tektronix part number: 206-0569-xx

Usable Bandwidth: <100 MHz

Calculated rise time: 3.5 ns

Use the MicroCKT Test Tips with the Y-lead adapters. Due to the length of these adapters, they are recommended only for DC and low-frequency measurements.



## Performance verification

Use the following procedures to verify the warranted specifications of the TDP3500 and TDP4000 Differential Probe. Before beginning these procedures, photocopy the test record and use it to record the performance test results. (See Table 6 on page 21.) The recommended calibration interval is one year.

These procedures test the following specifications:

- DC attenuation accuracy
- Differential signal range
- Rise time

## Required equipment

Table 5 lists the equipment required to perform the performance verification procedures. The types and quantities of connectors may vary depending on the specific equipment you use.

**Table 5: Test equipment**

Description	Minimum requirements	Example product
Digitizing oscilloscope with TekVPI interface	Fully compatible with TekVPI interface	Tektronix DPO7000 series oscilloscope (w/V3.02 or higher firmware)
Sampling oscilloscope		Tektronix TDS8000 series oscilloscope
Sampling module		Tektronix 80E0x
Sampling module	TDR output; 250 mV step, <100 ps rise time	Tektronix 80E04
TekVPI calibration fixture	Optional probe accessory	Tektronix part number 067-1701-xx
Probe calibration fixture	Optional probe accessory	Tektronix part number 067-0419-xx
BNC-to-probe tip adapter	Optional probe accessory	Tektronix part number 067-1734-xx
BNC Male-to-SMA Female adapter	As per description	Tektronix part number 015-0572-xx
Calibrated DC voltage source	Adjustable from 0 V to $\geq 10$ V. Outputs must be isolated from earth ground.	Keithley 2400
DMM (2 required)	DC Accuracy $\geq 0.5\%$ on range to measure 10 V, averaging mode.	Fluke 187
BNC cables (2)	50 $\Omega$ , 42 inch	Tektronix part number 012-0057-xx
SMA cables (2)	50 $\Omega$ , 28 inch	Tektronix part number 012-0649-xx
Banana-to-banana patch cords (2)	1 red 1 black	Tektronix part number 012-0031-xx Tektronix part number 012-0039-xx
Dual-male-banana-to-female BNC adapter	As per description	Tektronix part number 103-0090-xx
Precision inline BNC terminator	50 $\Omega \pm 0.1\%$	Tektronix part number 011-0129-xx
Y-lead adapter	Standard accessory included w/probe	Tektronix part number 196-3434-xx
MicroCKT test tips (2)	Standard accessory included w/probe	Tektronix part number 206-0569-xx

## Special adapters

Some of the adapters used in these procedures are available only from Tektronix. These adapters are described on the following pages.

### TekVPI Calibration Fixture

The TekVPI calibration fixture, Tektronix part number 067-1701-xx, connects between the host instrument and the probe under test. (See Figure 7.) An SMA connector on the rear of the fixture provides access to the probe output signal for performance verification measurements.

1. SMA connector for probe output measurements
2. TekVPI socket for probe under test
3. BNC connection used for some tests

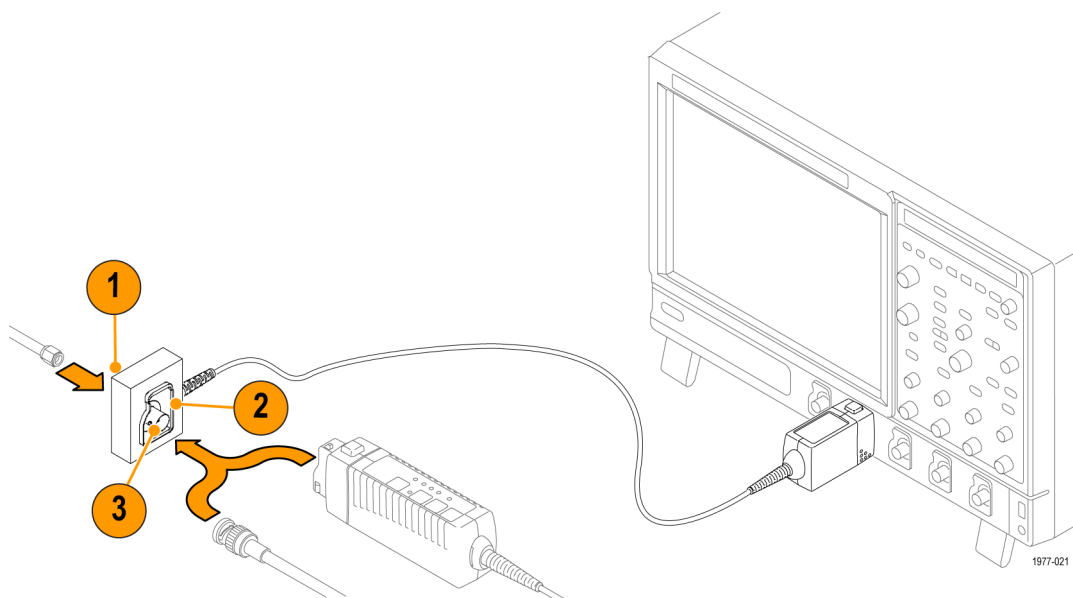


Figure 7: TekVPI calibration fixture

## Probe Calibration Fixture

The Probe calibration fixture, Tektronix part number 067-0419-xx, provides a means to check the rise time specification of the probe. (See Figure 8.) A probe positioner can be helpful to keep the probe in contact with the fixture.

1. SMA connectors for input/output signals and terminations
2. Common Mode (CM) test points
3. Differential Mode (DM) test points

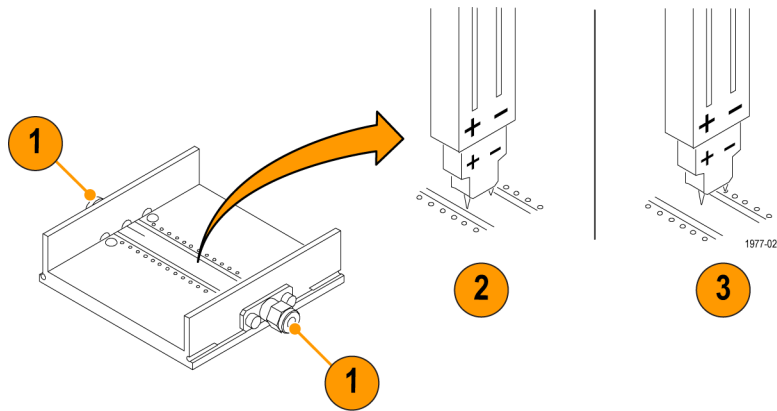


Figure 8: Probe calibration fixture connections



## Preparation

Prepare the equipment as follows:

1. Turn on the TekVPI oscilloscope.
2. Connect the TekVPI Calibration Fixture to the oscilloscope.
3. Connect the SMA M-to-BNC F adapter to the SMA output of the TekVPI Calibration Fixture.
4. Connect the precision termination to the BNC end of the SMA M-to-BNC F adapter.
5. Connect one end of the BNC cable to the precision termination.
6. Connect the other end of the BNC cable to the BNC-to-dual banana adapter.
7. Connect the BNC-to-dual banana adapter to the DMM input.
8. Connect the probe to the TekVPI Calibration Fixture.
9. Connect the Square Pin adapter and Y-lead adapter to the probe. Observe proper polarity: red to (+), black to (-).
10. Connect the MicroCKT test tips to the Y-lead adapter.
11. Set the vertical offset to 0 V. (Check that the offset is set to zero before performing each test unless instructed otherwise.)

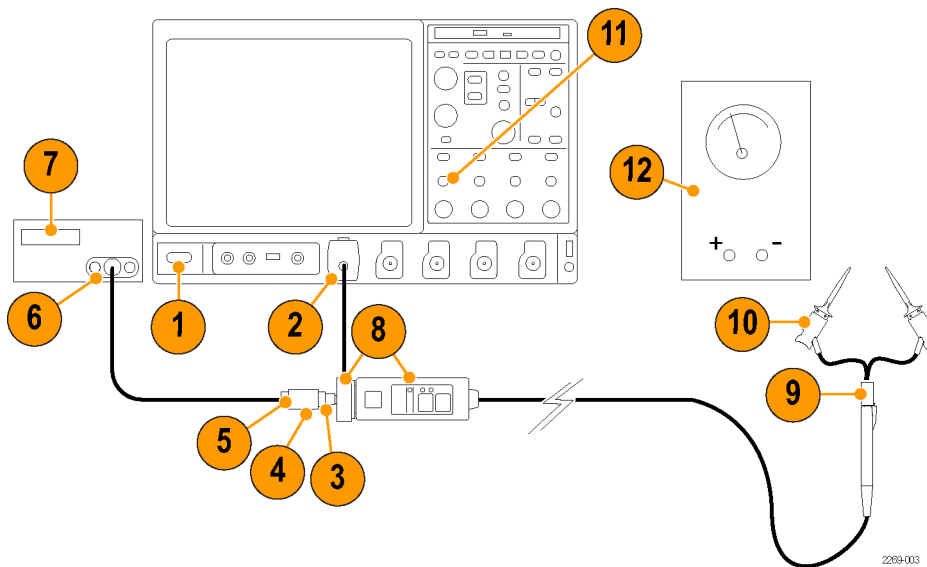


Figure 9: Preliminary test setup

12. Turn on the remaining test equipment listed in the table.
13. Allow the probe and test equipment to warm up for 20 minutes at an ambient temperature of 20 °C to 30 °C.
14. Photocopy the test record and use it to record the test results. (See Table 6 on page 21.)

Perform the verification procedures in order.

## DC Attenuation Accuracy

This test checks the probe gain by measuring known voltages with a multimeter. The probe is then used to measure the same voltages, and then a comparison calculation is made.

### Preparation

1. Set the vertical offset to 0 V.
2. Connect the MicroCKT test tips to the DC source. Observe proper polarity: red to (+), black to (-).
3. Connect a second DMM to the DC source.

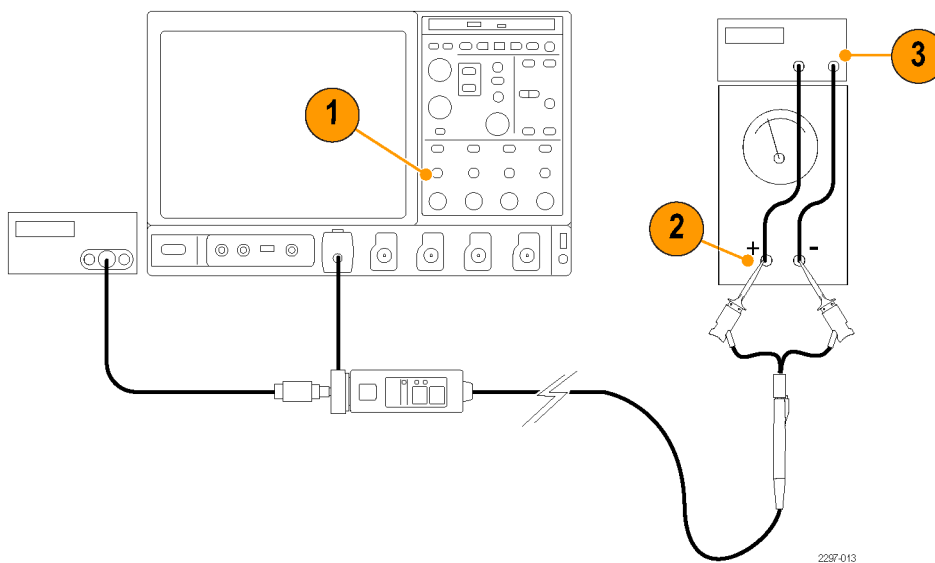


Figure 10: Setup for differential-mode tests

## Verification

4. Set the input voltage on the DC source to approximately 1.4 V. Record the actual voltage as  $V_{in1}$ .
5. Record the output voltage as  $V_{out1}$ .
6. Reverse the polarity of the input voltage on the DC source. (Swap the MicroCKT test tips or the Y-lead adapter.) Record the actual voltage as  $V_{in2}$ .
7. Record the output voltage as  $V_{out2}$ .
8. Calculate the attenuation using the values from the measurements as follows:

$$\text{Attenuation} = (V_{in1} - V_{in2}) \div (V_{out1} - V_{out2})$$

Example:

$$\begin{aligned} &= [1.4 \text{ V} - (-1.4 \text{ V})] \div [0.28 \text{ V} - (-0.28 \text{ V})] \\ &= 2.8 \text{ V} \div 0.56 \text{ V} \\ &= 5.0 \end{aligned}$$

9. Verify that the attenuation is in the range of 4.9 to 5.1. Record the results in the test record.

Leave the probe connected for the next test.

## Differential Signal Range

This procedure verifies the differential signal range of the probe. This procedure uses the setup from the previous test.

### Verification

1. Set the vertical offset to 0 V.
2. Set the input voltage on the DC source to 0 V, and verify that it is 0 V with the multimeter. (See Figure 11.)
3. Measure the probe output voltage as  $V_{\text{offset}}$ . You will use this offset voltage to get more accurate results in the calculations below.

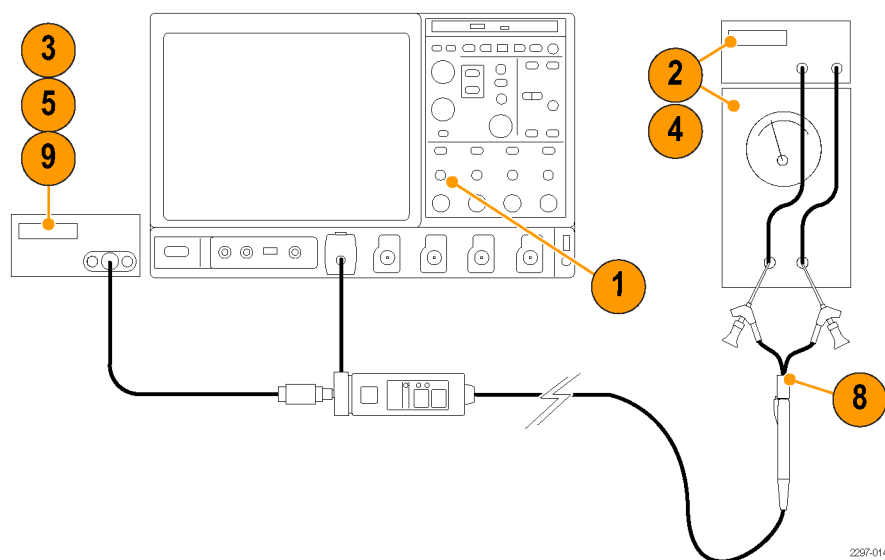


Figure 11: Differential signal range test

4. Set the input voltage on the DC source to  $2\text{ V} \pm 100\text{ mV}$ , and record the actual voltage as  $V_{\text{in}}$ .
5. Measure and record the output voltage as  $V_{\text{out}}$ .
6. Calculate attenuation as  $|V_{\text{in}} \div (V_{\text{out}} - V_{\text{offset}})|$ .
7. Verify that the attenuation is in the range of 4.75 to 5.25. Record the results in the test record.
8. Reverse the polarity of the input voltage for the following measurements. (Swap the MicroCKT test tips or the Y-lead adapter.)
9. Measure and record the output voltage as  $V_{\text{out}}$ .
10. Calculate attenuation using the formula in step 6.
11. Verify that the attenuation is in the range of 4.75 to 5.25. Record the results in the test record.

Disconnect the probe from the test setup and connect it to any oscilloscope channel to keep the probe at operating temperature.

## Rise Time

This procedure verifies that the probe meets the warranted rise time specification. Two rise times are measured; the test system alone, and then the test system with the probe included. The probe rise time is calculated using the two measurements.

This test uses the TDR function of the 80E04 sampling head as a fast rise time signal source. A second 80E0X sampling head is used to take the measurements. Although the following procedure assigns the TDR and measurement functions to specific oscilloscope channels, any channels can be used. However, the TDR function is only available on 80E04 sampling heads.



**CAUTION.** To prevent damage, use care when working with SMA connectors: support equipment to avoid mechanical strain on the connectors, and when tightening connections, use a torque wrench to 7.5 in-lbs.

### Test System Rise Time

1. Connect the 80E04 sampling head to Channel 1 of the sampling oscilloscope. (See Figure 12.)
2. Connect the 80E0X sampling head to Channel 8 of the sampling oscilloscope.
3. Connect SMA cables to Channels 1 and 8 on the sampling heads.
4. Connect the SMA cable from Channel 1 to an SMA-to-BNC adapter, and then to the BNC connector on the TekVPI adapter.
5. Connect the SMA cable from Channel 8 to the SMA connector on the TekVPI adapter.
6. Turn on Channel 8 and set the vertical scale to 50 mV/div.

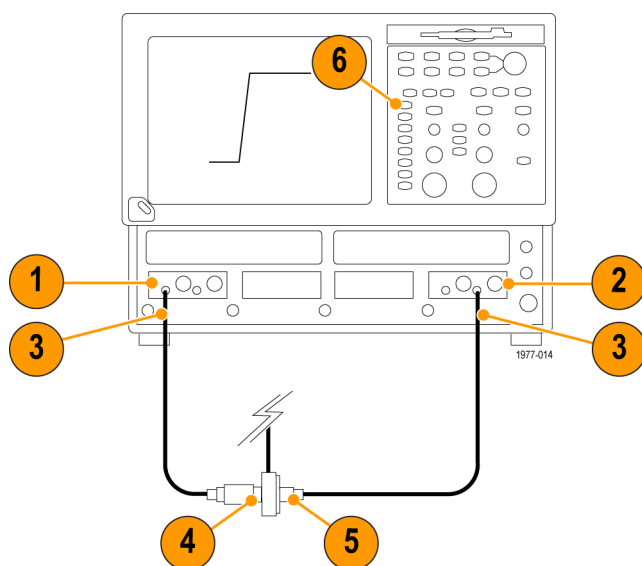


Figure 12: Test system rise time setup

7. Set the Channel 1 sampling head to TDR mode: press the **SETUP DIALOGS** button and select the TDR tab. (See Figure 13 on page 18.)
8. Set the Channel 1 (**C1**) **Polarity** to positive (rising).
9. Set the **Preset** of Channel 1 on. TDR Preset sets Internal Clock in the Trigger menu, turns on the TDR Step in the TDR Setups menu, turns on the channel and selects the acquisition Units in the TDR Setups menu, and sets the horizontal scale, position, and reference. The sampling module will turn on a red light next to the SELECT channel button, indicating that TDR is activated for that channel.

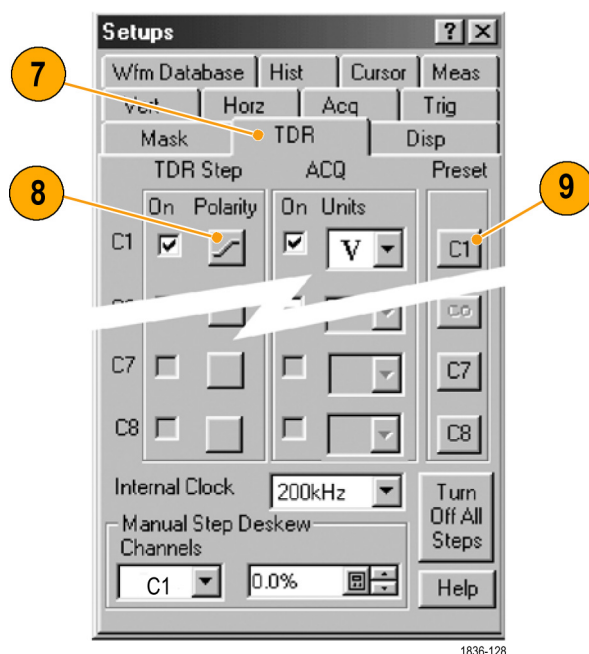


Figure 13: TDR parameter setup

10. Turn off the display for Channel 1 so that only Channel 8 is shown on screen.
11. Adjust the oscilloscope horizontal and vertical position controls to display a signal similar to that shown. (See Figure 12.)
12. Set the oscilloscope horizontal scale to 50 ps/div and center the waveform.
13. Use the oscilloscope measurement capability to display rise time. Increase the stability of the pulse edge measurement by using averaging, if available. Rise time is determined from the 10% and 90% amplitude points on the waveform. Record the rise time as  $t_s$ .

## Test System and Probe Rise Time

14. Disconnect the SMA cable and BNC adapter from the Channel-1 side of the TekVPI Calibration fixture. (See Figure 14.)
15. Connect the SMA cable from Channel 1 of the sampling oscilloscope to the SMA connector on the Probe Calibration Fixture. Leave the 50  $\Omega$  termination on the other SMA connector.
16. Plug the probe into the TekVPI Calibration fixture.
17. Probe the DM pins on the Probe Calibration Fixture. A probe positioner may be helpful. (See Figure 8 on page 12.)
18. Set the TekVPI oscilloscope offset to 0.0 V.

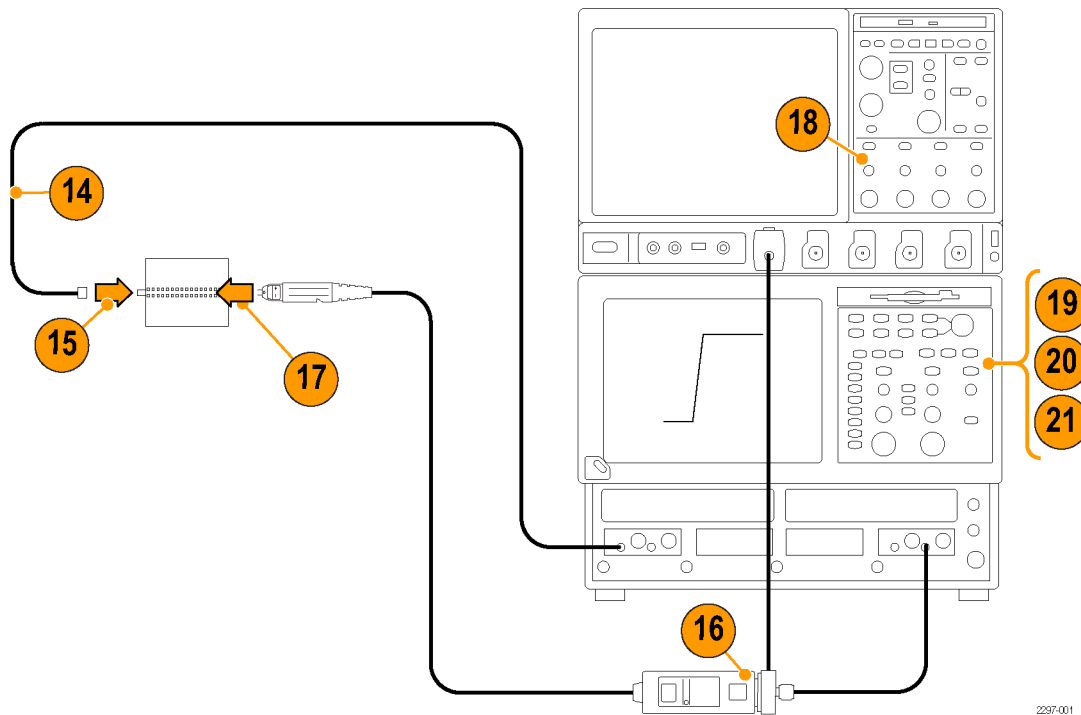


Figure 14: Probe rise time setup

**NOTE.** The following measurements are taken with the sampling oscilloscope. The TekVPI oscilloscope only provides power and offset to the probe.

19. On the sampling oscilloscope, expand the horizontal scale to locate the step edge: set the vertical scale to 10 mV/div, and adjust horizontal range to 200 ps/div while maintaining the edge view. For a more stable measurement display, turn on averaging.
20. Adjust the position controls on the sampling oscilloscope to display the entire leading edge waveform.
21. Use the measurement capability of the sampling oscilloscope to display rise time. Increase the stability of the pulse edge measurement by using averaging, if available. Rise time is determined from the 10% and 90% amplitude points on the waveform. Record the rise time as  $t_{s+p}$ .
22. Using the test system rise time ( $t_s$ ) that you measured in step 13, and the test system and probe rise time ( $t_{s+p}$ ) that you measured in step 21, calculate the probe-only rise time using the formula shown.

$$t_p = \sqrt{t_{(s+p)}^2 - t_s^2}$$

*Example:*

$$t_p = \sqrt{(147^2 - 50^2)}$$

$$t_p = \sqrt{21600 - 2500}$$

$$t_p = \sqrt{19100}$$

$$t_p = 137.8 \text{ ps}$$

This completes the performance verification.



**Table 6: Test Record**

Probe Model/Serial Number: \_\_\_\_\_ Certificate Number: \_\_\_\_\_

Temperature: \_\_\_\_\_ RH % : \_\_\_\_\_

Date of Calibration: \_\_\_\_\_ Technician: \_\_\_\_\_

Performance test	Minimum	Measured/Calculated	Maximum
<b>DC attenuation accuracy</b>			
	4.9	_____	5.1
<b>Differential signal range</b>			
standard polarity	4.75	_____	5.25
with connections reversed	4.75	_____	5.25
<b>Rise time</b>			
TDP3500 at 3.5 GHz	≤140 ps	_____	N/A

## Maintenance

This section contains maintenance information for the TDP3500 and TDP4000 Differential Probes.

### Inspection and cleaning

Protect the probe from adverse weather conditions. The probe is not waterproof.



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**CAUTION.** To prevent damage to the probe, do not expose it to sprays, liquids, or solvents. Do not use chemical cleaning agents; they may damage the probe. Avoid using chemicals that contain benzine, benzene, toluene, xylene, acetone, or similar solvents.

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Clean the exterior surfaces of the probe with a dry, lint-free cloth or a soft-bristle brush. If dirt remains, use a soft cloth or swab dampened with a 75% isopropyl alcohol solution. A swab is useful for cleaning narrow spaces on the probe. Do not use abrasive compounds on any part of the probe.



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**CAUTION.** To prevent damage to the probe, avoid getting moisture inside the probe during exterior cleaning, and use only enough solution to dampen the swab or cloth. Use a 75% isopropyl alcohol solution as a cleanser, and rinse with deionized water.

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### Replacement parts

Due to the sophisticated design of these differential probes, there are no user replaceable parts within the probes. Refer to the *Quick Start User Manual* for a list of replaceable accessories for your probe.

If your probe does not meet the specifications tested in the Performance Verification, you can send the probe to Tektronix for repair. Follow the procedure below to prevent damage to the probe during shipping.

### Preparation for shipment

If the original packaging is unfit for use or not available, use the following packaging guidelines:

1. Use a corrugated cardboard shipping carton having inside dimensions at least one inch greater than the probe dimensions. The box should have a carton test strength of at least 200 pounds.
2. Put the probe into an antistatic bag or wrap to protect it from dampness.
3. Place the probe into the box and stabilize it with light packing material.
4. Seal the carton with shipping tape.
5. Refer to *Contacting Tektronix* on the copyright page for the shipping address.