

# Differential Probes

## TDP1500 • TDP3500 Data Sheet



### Features & Benefits

- Outstanding Electrical Performance
  - 3.5 GHz and 1.5 GHz Bandwidth Models – Accurate Measurements for Serial and Digital Applications
  - Excellent Common Mode Rejection – Reduces Measurement Errors in Higher Common Environments
  - Low Capacitive and Resistive Loading – Maintains Signal Fidelity and Reduces DC Biasing Interactions
- Versatile Mechanical Performance
  - Compact Probe Head Size for Probing Small Geometry Circuit Elements
  - DUT Attachment Accessories Enable Connection to Fine-spaced SMDs
  - Robust Design for Reliability

- Easy to Use
  - Connects Directly to DPO7000, DPO4000, and MSO4000 Series Oscilloscopes Using TekVPI Probe Interface
  - Provides Automatic Units Scaling and Readout on the Oscilloscope Display
  - Easy Access to Probe Comp Box Controls or Oscilloscope Probe Menu Display for Probe Status, Setup Control, and Diagnostic Information
- Integrated Scope/Probe System
  - Direct Connection to and Powered from TekVPI™ Oscilloscope Interface (Connects directly to TekVPI scopes without the need of an external power supply, like many competitors require)
  - Single-button Oscilloscope Probe Menu Access
  - Setup and Control from Probe Comp Box or Oscilloscope User Interface
  - AutoZero - Zeros Out Output Offset
  - Remote GPIB/USB Probe Control Through the Oscilloscope (Requires TEK-USB-488 Adapter for GPIB control on DPO4000 and MSO4000)

### Applications

- Design, Validation, Debugging, and Characterization of Common High-speed Serial Bus Designs:
  - I<sup>2</sup>C
  - CAN/LIN
  - SPI
  - Serial ATA
  - Ethernet (GbE)
  - USB 2.0
  - FireWire (1394b)
- Signal Integrity, Jitter, and Timing Analysis
- Manufacturing Engineering and Test

## Differential Probes - A Better Measurement Tool

Differential active probes provide truer signal reproduction and fidelity for high-frequency measurements. With ultra-low input capacitance and versatile device-under-test connection capabilities, the TDP1500 and TDP3500 Differential-ended Active probes provide excellent high-speed electrical and mechanical performance required for today's digital system designs.

Specifically designed for use and direct connection to the TekVPI™ probe interface used on the DPO7000, DPO4000, and MSO4000 Series oscilloscopes, the TDP1500 and TDP3500 Differential probes achieve high-speed signal acquisition and measurement fidelity by solving three traditional problems:

- DUT loading effects - Are reduced by lower input capacitance and high input resistance
- DUT connectivity - A variety of accessories exist for attaching to small SMDs, some come standard or recommended
- Maximizing of system (oscilloscope and probe) bandwidth - probing solutions for all measurements for TekVPI interface oscilloscope models up to 3.5 GHz

## Characteristics

Characteristic	Description
Bandwidth (Probe only)	≥1.5 GHz warranted (TDP1500) ≥3.5 GHz warranted (TDP3500)
Attenuation (Probe only)	1x/10x (TDP1500) 5x (TDP3500)
Rise Time (Probe only)	≤265 ps typical (TDP1500) ≤110 ps typical (TDP3500)
Differential Input Capacitance	≤1 pF (TDP1500) ≤0.3 pF (TDP3500)
Differential Input Resistance	200 kΩ (TDP1500) 100 kΩ (TDP3500)
Differential Input Dynamic Range	±8.5 V (10x) (TDP1500) ±850 mV (1x) (TDP1500) ±2 V (TDP3500)
CMRR	>60 dB at 1 MHz (TDP1500, TDP3500) >25 dB at 1 GHz (TDP1500, TDP3500)
Input Offset Range	±7 V (10x or 1x) (TDP1500) ±1 V displayed (TDP3500)
Operation Voltage Input Range (Common Mode Input Range)	±7 V (1x) (TDP1500) ±7 V (10x) (TDP1500) +5 V to -4V (TDP3500)
Noise	<50 nV/root Hz (TDP1500) ≈35 nV/root Hz (TDP3500)
Max Input Voltage (Nondestruct)	±25 V (DC + pk AC) (TDP1500) ±25 V (DC + pk AC) (TDP3500)
Propagation Delay	5.3 ns typical (TDP3500) 5.4 ns typical (TDP1500)

## Physical Characteristics

Dimensions	mm	in.
Cable Length*1	1200	48
Weight	g	oz.
Probe Only*1	160	5.4

\*1 Typical for TDP1500.

## Power Requirements

TDP1500 and TDP3500 are powered directly by the DPO7000, DPO4000, and MSO4000 Series Oscilloscopes with TekVPI probe interface.

## Recommended Oscilloscopes

DPO7000, DPO4000, MSO4000 Series Oscilloscopes with TekVPI probe interface.

## Minimum System Requirements / Instrument

### Compatibility

The TDP3500 is fully supported on DPO7000, DPO4000, and MSO4000. The TDP1500 is fully supported on the DPO4000 and MSO4000. TDP1500 functions properly with DPO7000 Series firmware version 4.0.0 and above, but does not provide range control on the oscilloscope menu.

## Ordering Information

### TDP1500

1.5 GHz Differential Probe with TekVPI Interface, Certificate of Traceable Calibration Standard.

### TDP3500

3.5 GHz Differential Probe with TekVPI Interface, Certificate of Traceable Calibration Standard.

### TDP1500 – Standard Accessories Included

Description	QTY Shipped	Reorder Part No.	Reorder QTY
Pouch, Nylon Carrying Case with Inserts	1 each	016-1952-xx	1 each
Documentation Kit TDP1500, Includes: Printed User Manual (English 071-2209-xx; Japanese 071-2210-xx; Simplified Chinese 071-2211-xx) and a CD containing (Technical Reference Manual PDF English 071-2296-xx)	1 each Kit	020-2866-xx (English w/ Standard)	1 each
		020-2891-xx (Japanese w/ Opt L5)	1 each
		020-2892-xx (Simplified Chinese w/ Opt L7)	1 each
Certificate of Traceability	1 each	Standard w/ Probe	1 each
Accessory Kit TDP1500 (see contents listed below, 0 through 10)	1 each	020-2702-xx	1 each
0) Plastic Accessory Box	1 each	006-7164-xx	
1) Straight Pins	8 each	016-1891-xx	Pkg of 8 each
2) Longhorn VIA Adapter	Pkg of 5 each	016-1780-xx	Pkg of 5 each
3) 1-inch Solder Down	1 each	196-3504-xx	1 each
4) 3-inch Solder Down	1 each	196-3505-xx	1 each
5) Y-Lead Adapter	2 each	196-3434-xx	1 each
6) Micro CKT Test Tip	3 each	206-0569-xx	1 each
7) Tip Saver	2 each	016-1781-xx	2 each
8) 3-inch Ground Lead	2 each	196-3437-xx	Pkg of 2 each
9) Marker Band Set (2 each of 5 colors)	1 each	016-1315-xx	1 each
10) Accessory Performance Summary and Reorder Sheet	1 each	001-1412-xx	1 each

**TDP3500 – Standard Accessories Included**

<b>Description</b>	<b>QTY Shipped</b>	<b>Reorder Part No.</b>	<b>Reorder QTY</b>
Pouch, Nylon Carrying Case with Inserts	1 each	016-1952-xx	1 each
Documentation Kit TDP3500, Includes: Printed User Manual (English 071-2212-xx; Japanese 071-2213-xx; Simplified Chinese 071-2214-xx) and a CD containing (Technical Reference Manual PDF English 071-2297-xx)	1 each Kit	020-2867-xx (English w/ Standard)	1 each
		020-2893-xx (Japanese w/ Opt L5)	1 each
		020-2894-xx (Simplified Chinese w/ Opt L7)	1 each
Anti-static Wrist Strap	1 each	006-3415-xx	1 each
Certificate of Traceability	1 each	Standard w/ Probe	1 each
Accessory Kit TDP3500 (see contents listed below, 1 through 7)	1 each	020-2883-xx	1 each
0) Plastic Accessory Box	1 each	006-7164-xx	1 each
1) Variable Spacing Tip Adapter	Pkg of 4 each	016-1885-xx	Pkg of 4 each
2) Square Pin Adapter	Pkg of 4 each	016-1884-xx	Pkg of 4 each
3) Y-Lead Adapter	2 each	196-3434-xx	1 each
4) Micro CKT Test Tip	3 each	206-0569-xx	1 each
5) 3-inch Ground Lead	2 each	196-3469-xx	Pkg of 2 each
6) Marker Band Set (2 each of 5 colors)	1 each	016-1315-xx	1 each
7) Accessory Performance Summary and Reorder Sheet	1 each	001-1435-xx	1 each
Accessory Kit; Solder-In Differential Probes TDP3500, P6330, P7330, P7350	1 each	020-2505-xx	1 each
1) Adapter, Resistor / Wire	Pkg of 2 each	016-1926-xx	Pkg of 2 each
2) Wire Assembly w/ 0.02 dia	Pkg of 10 each	016-1930-xx	Pkg of 10 each
3) Wire Assembly w/ 0.008 dia	Pkg of 10 each	016-1931-xx	Pkg of 10 each
4) 10 $\Omega$ Resistor w/ 0.02 dia Wire	Pkg of 10 each	016-1927-xx	Pkg of 10 each
5) 10 $\Omega$ Resistor w/ 0.008 dia Wire	Pkg of 10 each	016-1933-xx	Pkg of 10 each
6) 20 $\Omega$ Resistor w/ 0.02 dia Wire	Pkg of 10 each	016-1928-xx	Pkg of 10 each
7) 20 $\Omega$ Resistor w/ 0.008 dia Wire	Pkg of 10 each	016-1934-xx	Pkg of 10 each

**Optional Accessories**

Description	TDP1500	TDP3500	Ordering Part Number (Qty)
BNC to Probe Tip Adapter	X	–	679-4094-xx (set of 1)
TwinFoot™ Adapter	X	X	016-1785-xx (set of 4)
TwinTip™ Adapter	X	–	016-1786-xx (set of 4)
VariTip™ Adapter	X	–	016-1890-xx (set of 8)
IC Micro Grabber	X	X	013-0309-xx (set of 2)
Micro KlipChip™ Adapter	X	–	SMK-4 (set of 4)
IEEE 1394 Adapter	X	–	679-5027-xx (set of 1)
Short Ground Contact	X	–	016-1783-xx (set of 10)
Spring-loaded Ground	X	–	016-1782-xx (set of 6)

**Manual Options**

Option	Description
Opt. L0	English user instruction manual (Standard).
Opt. L5	Japanese user instruction manual.
Opt. L7	Simplified Chinese instruction manual.



Product(s) are manufactured in ISO registered facilities.



Product(s) complies with IEEE Standard 488.1-1987, RS-232-C, and with Tektronix Standard Codes and Formats.

**Service Options**

Option	Description
Opt. C3	Calibration Service 3 years
Opt. C5	Calibration Service 5 years
Opt. D1	Calibration Data Report
Opt. D3	Calibration Data Report 3 years (with Opt. C3)
Opt. D5	Calibration Data Report 5 years (with Opt. C5)
Opt. R3	Repair Service 3 years
Opt. R5	Repair Service 5 years
Opt. CA1	Single calibration event, or coverage for the designated calibration interval, whichever comes first

**Contact Tektronix:**

**ASEAN / Australasia** (65) 6356 3900  
**Austria** +41 52 675 3777  
**Balkans, Israel, South Africa and other ISE Countries** +41 52 675 3777  
**Belgium** 07 81 60166  
**Brazil** +55 (11) 40669400  
**Canada** 1 (800) 661-5625  
**Central East Europe, Ukraine, and the Baltics** +41 52 675 3777  
**Central Europe & Greece** +41 52 675 3777  
**Denmark** +45 80 88 1401  
**Finland** +41 52 675 3777  
**France** +33 (0) 1 69 86 81 81  
**Germany** +49 (221) 94 77 400  
**Hong Kong** (852) 2585-6688  
**India** (91) 80-42922600  
**Italy** +39 (02) 25086 1  
**Japan** 81 (3) 6714-3010  
**Luxembourg** +44 (0) 1344 392400  
**Mexico, Central/South America & Caribbean** 52 (55) 54247900  
**Middle East, Asia, and North Africa** +41 52 675 3777  
**The Netherlands** 090 02 021797  
**Norway** 800 16098  
**People's Republic of China** 86 (10) 6235 1230  
**Poland** +41 52 675 3777  
**Portugal** 80 08 12370  
**Republic of Korea** 82 (2) 6917-5000  
**Russia & CIS** +7 (495) 7484900  
**South Africa** +27 11 206 8360  
**Spain** (+34) 901 988 054  
**Sweden** 020 08 80371  
**Switzerland** +41 52 675 3777  
**Taiwan** 886 (2) 2722-9622  
**United Kingdom & Ireland** +44 (0) 1344 392400  
**USA** 1 (800) 426-2200

For other areas contact Tektronix, Inc at: 1 (503) 627-7111

Updated 30 October 2008

**For Further Information.** Tektronix maintains a comprehensive, constantly expanding collection of application notes, technical briefs and other resources to help engineers working on the cutting edge of technology. Please visit [www.tektronix.com](http://www.tektronix.com)



Copyright © Tektronix, Inc. All rights reserved. Tektronix products are covered by U.S. and foreign patents, issued and pending. Information in this publication supersedes that in all previously published material. Specification and price change privileges reserved. TEKTRONIX and TEK are registered trademarks of Tektronix, Inc. All other trade names referenced are the service marks, trademarks, or registered trademarks of their respective companies.

21 Jul 2009

51W-20565-1

