

# Differential Probes

## TDP1500, TDP3500 and TDP4000 Datasheet



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, TDP3500 and TDP4000 Differential-ended Active probes provide excellent high-speed electrical and mechanical performance required for today's digital system designs.

### Key performance specifications

- 4 GHz (TDP4000), 3.5 GHz (TDP3500) and 1.5 GHz (TDP1500) probe bandwidth
- $\leq 1$  pF (TDP1500) and  $\leq 0.3$  pF (TDP3500/TDP4000) differential input capacitance
- 200 k $\Omega$  (TDP1500) and 100 k $\Omega$  (TDP3500/TDP4000) differential input resistance
- $\pm 25$  V (TDP1500) and  $\pm 15$  V (TDP3500/TDP4000) DC + pk AC input voltage (non-destruct)
- $>60$  dB at 1 MHz and  $>25$  dB at 1 GHz CMRR

### Key features

- Outstanding electrical performance
  - 4 GHz, 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 oscilloscopes with the 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 the 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

## 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



## A better measurement tool

Specifically designed for use and direct connection to oscilloscopes with the TekVPI™ probe interface, the TDP1500, TDP3500 and TDP4000 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 4 GHz

For the best probe support, download and install the latest version of the oscilloscope software from [www.tek.com/software/downloads](http://www.tek.com/software/downloads).

## Specifications

All specifications are guaranteed unless noted otherwise. All specifications apply to all models unless noted otherwise.

### Warranted characteristics

<b>Bandwidth (probe only)</b>	
TDP1500	≥1.5 GHz warranted
<b>Rise time (probe only)</b>	
TDP3500	≤140 ps
<b>Attenuation</b>	
TDP1500	1X, 10X
TDP3500	5X
<b>CMRR</b>	
	>60 dB at 1 MHz, >25 dB at 1 GHz
<b>Maximum input voltage (nondestruct)</b>	
TDP1500	±25 V (DC + pk AC)
TDP3500	±15 V (DC + pk AC)
TDP4000	±15 V (DC + pk AC)

### Typical characteristics

<b>Bandwidth (probe only)</b>	
TDP3500	≥3.5 GHz
TDP4000	≥4 GHz
<b>Rise time (probe only)</b>	
TDP1500	≤265 ps
TDP4000	≤125 ps
<b>Differential input capacitance</b>	
TDP1500	≤1 pF
TDP3500	≤0.3 pF
TDP4000	≤0.3 pF
<b>Differential input resistance</b>	
TDP1500	200 kΩ
TDP3500	100 kΩ
TDP4000	100 kΩ
<b>Noise level</b>	
TDP1500	$< 50 \frac{\text{nV}}{\sqrt{\text{Hz}}}$
TDP3500	$\approx 35 \frac{\text{nV}}{\sqrt{\text{Hz}}}$
TDP4000	$\approx 35 \frac{\text{nV}}{\sqrt{\text{Hz}}}$

## Typical characteristics

Propagation delay 5.4 ns

### Common mode input range

TDP1500	±7 V (1X)
	±7 V (10X)
TDP3500	+5 V to -4 V
TDP4000	+5 V to -4 V

### Input offset range

TDP1500	±7 V (10X or 1X)
TDP3500	±1 V displayed
TDP4000	±1 V displayed

### Differential input dynamic range

TDP1500	±8.5 V (10X)
	±850 mV (1X)
TDP3500	±2 V
TDP4000	±2 V

## Nominal characteristics

Recommended oscilloscope interface TekVPI™ Probe

## Power requirements

Power requirements Powered directly by oscilloscopes with the TekVPI probe interface.

## Physical characteristics

Dimensions	Dimension	millimeters (mm)	inches (in)
	Cable length <sup>1</sup>		1200

  

Weight	Model (probe only)	grams (g)	ounces (oz)
	TDP1500, TDP3500, TDP4000 <sup>2</sup>		160

<sup>1</sup> Typical for TDP1500.

<sup>2</sup> Typical for TDP1500.

## Ordering information

### Models

TDP1500	1.5 GHz Differential Probe with TekVPI™ Probe Interface, Certificate of Traceable Calibration Standard.
TDP3500	3.5 GHz Differential Probe with TekVPI™ Probe Interface, Certificate of Traceable Calibration Standard.
TDP4000	4 GHz Differential Probe with TekVPI™ Probe Interface, Certificate of Traceable Calibration Standard.

### Options

#### Language options

Opt. L0	English manual
Opt. L5	Japanese manual
Opt. L7	Simplified Chinese manual

#### Service options

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 (including warranty)
Opt. R5	Repair Service 5 Years (including warranty)
Opt. SILV900	Standard warranty extended to 5 years

### Accessories

#### TDP1500 standard accessories

Description	Quantity shipped	Reorder part number	Reorder quantity
Pouch, nylon carrying case with inserts	1 each	016-1952-xx	1 each
Certificate of traceability	1 each	Standard with probe	1 each
Accessory kit TDP1500 (see contents listed below, 0 through 10)	1 each	020-2702-xx	1 each

Description	Quantity shipped	Reorder part number	Reorder quantity
Plastic accessory box	1 each	006-7164-xx	--
Straight pins	8 each	016-1891-xx	8 each
Longhorn VIA adapter	2 each	016-1780-xx	5 each
1-inch solder down	1 each	196-3504-xx	1 each
3-inch solder down	1 each	196-3505-xx	1 each
Y-lead adapter	2 each	196-3434-xx	1 each
Micro CKT test tip	3 each	206-0569-xx	1 each
Tip saver	2 each	016-1781-xx	2 each
3-inch ground lead	2 each	196-3437-10	2 each
Marker band set (2 each of 5 colors)	1 each	016-1315-xx	1 each

### TDP3500 and TDP4000 standard accessories

Description	Quantity shipped	Reorder part number	Reorder quantity
Pouch, nylon carrying case with inserts	1 each	016-1952-xx	1 each
Certificate of traceability	1 each	Standard with probe	1 each
Probe tip cover	1 each	200-4236-xx	1 each
Antistatic wrist strap	1 each	006-3415-xx	1 each
Accessory kit TDP3500/TDP4000 containing:	1 each	020-2883-xx	1 each
Plastic accessory box	1 each	006-7164-xx	--
Square pin adapter	4 each	016-1884-xx	4 each
Variable spacing tip adapter	4 each	016-1885-xx	4 each
Y-lead adapter	2 each	196-3434-xx	1 each
Micro CKT test tip	3 each	206-0569-xx	1 each
3-inch ground lead	2 each	196-3469-xx	2 each
Marker band set (2 each of 5 colors)	1 each	016-1315-xx	1 each
Accessory kit (solder-in differential probes TDP3500/TDP4000, P6330, P7330, P7350) containing:	1 each	020-2505-xx	1 each
Adapter, resistor/wire	2 each	016-1926-xx	2 each
Wire assembly w/ 0.02 diameter	10 each	016-1930-xx	10 each
Wire assembly w/ 0.008 diameter	10 each	016-1931-xx	10 each
10 Ω resistor w/ 0.02 diameter wire	10 each	016-1927-xx	10 each
10 Ω resistor w/ 0.008 diameter wire	10 each	016-1933-xx	10 each
20 Ω resistor w/ 0.02 diameter wire	10 each	016-1928-xx	10 each
20 Ω resistor w/ 0.008 diameter wire	10 each	016-1934-xx	10 each

## Recommended accessories

Description	Part number	Quantity		
		TDP1500	TDP3500	TDP4000
BNC to probe tip adapter	067-1734-xx	1 each	--	--
Spring loaded grounds	016-1782-xx	1 package of 6	--	--
TwinFoot™ adapter	016-1785-xx	1 package of 4	1 package of 4	1 package of 4
TwinTip™ adapter	016-1786-xx	1 package of 4	--	--
VanTip™ adapter	016-1890-xx	1 package of 8	--	--
IC micro grabber	SMK-4	1 package of 4	1 package of 4	1 package of 4
IEEE 1394 adapter	679-5027-xx	1 each	1 each	1 each
TekVPI™ cal fixture	067-1701-xx	1 each	1 each	1 each
Short ground contacts	016-1783-xx	1 package of 10	--	--



Tektronix is registered to ISO 9001 and ISO 14001 by SRI Quality System Registrar.



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

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\* European toll-free number. If not accessible, call: +41 52 675 3777

**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.tek.com](http://www.tek.com).

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