

## Differential Probes

### P6248·P6247·P6246 Datasheet



The P6248, P6247, and P6246 Differential Probes enable users to make time-domain or frequency-domain measurements on high-bandwidth signals commonly found in disk drive, digital IC design (RAMBUS), and communication applications (Gigabit Ethernet, IEEE-1394 Firewire, and Fibre Channel). The P6248 includes accessories that allow RAMBUS via probing and IEEE-1394 interconnect access. The small probe head geometry and assorted probe tip accessories allow these probes to easily accommodate manual probing of surface-mount devices while maintaining high CMRR.

#### P6248 key performance specifications

- $\geq 1.5$  GHz bandwidth (guaranteed)
- 1.7 GHz (typical,  $\leq 27$  °C) 1X mode
- 1.85 GHz (typical,  $\leq 27$  °C) 10X mode

#### P6247 key performance specifications

- $\geq 1.0$  GHz bandwidth (guaranteed)

#### P6246 key performance specifications

- $\geq 400$  MHz bandwidth (guaranteed)

#### Key features

- Low input capacitance:  $< 1$  pF differential

- Probe input connector: two standard 0.025 in./0.63 mm (0.1 in. center) square pin receptacle (female)
- Electrostatic discharge tolerant (IEC 801-2)
- For use with oscilloscopes, spectrum analyzers, or network analyzers
- $> 60$  dB (1000:1) Common Mode Rejection Ratio (CMRR)
- Small probe head allows easy probing of SMDs

#### Connectivity

- Connects to TekProbe® BNC interface on TDS Series oscilloscopes or other instruments using 1103 TekProbe® Power Supply

#### Applications

- Communications (Gigabit ethernet, IEEE-1394, fibre channel)
- Semiconductor characterization (RAMBUS)
- Disk drive read channel design
- Communication pulse shape compliance
- Jitter, crosstalk, and BERT measurements
- Location of ground bounce

#### P6248, P6247, and P6246 Differential Probes

The P6248, P6247, and P6246 Differential Probes are ideal for design verification of disk drive read, channel electronics, and timing analysis for troubleshooting ground-bounce problems associated with high-speed logic. They can also be used for pulse shape or crosstalk compliance testing of high-speed communication signals.

## Specifications

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

### Model overview

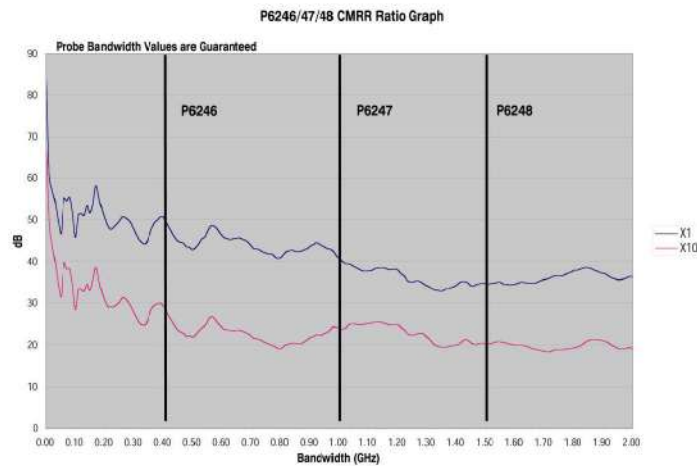
Characteristic	P6248	P6247	P6246
Bandwidth (guaranteed)	≥1.5 GHz	≥1.0 GHz	≥400 MHz
Rise time (specified)	<265 ps	<350 ps	<875 ps
Attenuation settings	X1, X10	X1, X10	X1, X10
DC attenuation accuracy	±2%	±2%	±2%
Common mode input voltage range	±7.0 V, 1X ±7.0 V, 10X	±7.0 V, 1X ±7.0 V, 10X	±7.0 V, 1X ±7.0 V, 10X
Differential mode input voltage range	±850 mV, 1X ±8.5 V, 10X	±850 mV, 1X ±8.5 V, 10X	±850 mV, 1X ±8.5 V, 10X
Maximum nondestructive input voltage	±25 V (DC + peak AC)	±25 V (DC + peak AC)	±25 V (DC + peak AC)
Electrostatic immunity	15 kV	15 kV	15 kV
Bandwidth limit	-	Switchable, 200 MHz	Switchable, 200 MHz
Lower frequency limit, DC reject mode	-	0.4 Hz, 1X 4.0 Hz, 10X	0.4 Hz, 1X 4.0 Hz, 10X
Probe interface	TekProbe® Level II <sup>1</sup>	TekProbe® Level II <sup>1</sup>	TekProbe® Level II <sup>1</sup>

<sup>1</sup> The TekProbe® Level II interface supports probe power, auto scaling, auto termination with TDS oscilloscopes.

## Warranted characteristics

### CMRR

Frequency	Attenuation setting	P6246	P6247	P6248
1 MHz	÷1	>60 dB	>60 dB	>60 dB
	÷10	>45 dB	>45 dB	>45 dB
100 MHz	÷1	>38 dB	>38 dB	>38 dB
	÷10	>25 dB	>25 dB	>25 dB
500 MHz	÷1	N/A	>35 dB	>35 dB
	÷10	N/A	>20 dB	>20 dB
1 GHz	÷1	N/A	>30 dB	>30 dB
	÷10	N/A	>18 dB	>18 dB
1.5 GHz	÷1	N/A	N/A	>25 dB (typical)
	÷10	N/A	N/A	>18 dB (typical)



## Typical characteristics

### Input capacitance

Differential mode	<1 pF
Common mode	<2 pF

### Input resistance

Differential mode	200 kΩ
Common mode	100 kΩ

Linearity ±2%

Noise <50 nV/squareroot Hz

Harmonic distortion  $\leq 1.5\%$

---

#### Passband ripple

<  $\pm 0.25$  dB

<b>P6248</b>	DC to 1.5 GHz
<b>P6247</b>	DC to 850 MHz
<b>P6246</b>	DC to 400 MHz

---

Output termination Terminate into 50  $\Omega$

### Physical characteristics

---

Weight (probe only) 160 g (0.36 lb.)

---

Probe head dimensions (H×W×D) 9.3 mm × 12 mm × 78 mm (0.36 in. × 0.47 in. × 3.0 in.)

---

Input connection dimensions 0.63 mm (0.025 in.) square pins on 2.54 mm (0.1 in.) centers

---

Cable length 1.2 m (47 in.)

### Environmental characteristics

---

#### Temperature

<b>Operating</b>	0 °C to +50 °C
<b>Nonoperating</b>	-55 °C to +75 °C

---

#### Humidity

(0 to 90% RH)

<b>Operating</b>	+30 °C to +50 °C
<b>Nonoperating</b>	+30 °C to +60 °C

## Ordering information

### Models

P6248	1.5 GHz Differential Probe
P6247	1.0 GHz Differential Probe
P6246	400 MHz Differential Probe

### P6248 standard accessories

Accessory	Quantity	Reorder part number <sup>2</sup>	
Certificate of traceable calibration	1	-	
Carrying case	1	016-1952-XX	
User manual (English)	1	071-0566-XX	
Service manual	1	071-0573-XX	
Tektronix probes care and handling reference	1	071-2870-XX	
Probe Tip Accessory kit	1	020-2702-XX	
	Accessory box	1	006-7164-XX
	Color coding bands, 2 each of 5 colors	1	016-1315-XX
	Probe tip connector saver	2	016-1781-XX (set of 2)
	Straight tip	8	016-1891-XX (set of 8)
	Y-lead adapter	2	196-3434-XX
	3 in. ground lead	2	196-3437-XX
	1 in. solder down	1	196-3504-XX
	3 in. solder down	1	196-3505-XX
	TwinTip™ adapter	2	206-0490-XX
	Micro CKT test tip	3	206-0569-XX

<sup>2</sup> Reorder quantities may differ from the original included quantities.

 <p><b>Tektronix</b> 016-1783-XX SHORT GROUND CONTACTS SET of 10</p>	 <p><b>Tektronix</b> 016-1782-XX SPRING LOADED GROUND PINS SET of 6</p>	 <p><b>Tektronix</b> 016-1786-XX TwinTip™ ADAPTER SET of 4</p>	 <p><b>Tektronix</b> 016-1780-XX LONGHORN VIA ADAPTER SET of 5</p>
 <p><b>Tektronix</b> 016-1785-XX TwinFoot™ ADAPTER SET of 4</p>	 <p><b>Tektronix</b> 016-1781-XX TIP SAVER SET of 2</p>	 <p>016-1315-XX Coding Color Clips</p>	 <p>679-4094-XX BNC to Probe Tip Adapter</p>
 <p>Straight Tip 016-1891-XX</p>	 <p>VariTip 016-1890-XX</p>	 <p>013-0309-XX</p>	 <p>206-0569-XX Micro CKT Test Tip</p>
 <p>Y Lead 196-3434-XX</p> <p>6" Ground Leads 196-3436-XX</p> <p>3" Ground Leads 196-3437-XX</p>			

**P6247 / P6246 standard accessories**

Accessory		Quantity	Reorder part number <sup>2</sup>	
Certificate of traceable calibration		1	-	
Carrying case		1	016-1952-XX	
User manual (English, German, French, Japanese)		1	070-9898-XX	
Service manual		1	070-9899-XX	
Tektronix probes care and handling reference		1	071-2870-XX	
BNC to probe tip adapter		1	679-4094-XX	
Accessory kit		1	020-2380-XX	
	Accessory box	1	006-7164-XX	
	Color coding bands, 2 each of 5 colors	1	016-1315-XX	
	Short ground contact (131-6247-XX)	2	016-1983-XX (set of 10)	
	Spring loaded ground (131-6271-XX)	2	016-1782-XX (set of 6)	
	Lead set	1	196-3435-XX	
		TwinFoot™ adapter (013-0306-XX)	2	016-1785-XX (set of 4)
		TwinTip™ adapter (013-0305-XX)	1	016-1786-XX (set of 4)
		Y-lead adapter	1	196-3434-XX
		6 in. ground lead	1	196-3436-XX
Micro CKT test tip	3	206-0569-XX		

**Optional accessories**

Accessory	Part number	P6248	P6247 / P6246
Longhorn Via adapter	016-1780-XX (set of 5)	■	
Spring loaded ground	016-1782-XX (set of 6)	■	
Short ground contact	016-1783-XX (set of 10)	■	
TwinFoot™ adapter	016-1785-XX (set of 4)	■	
TwinTip™ adapter	016-1786-XX (set of 4)	■	
VariTip™ adapter	016-1890-XX (set of 8)	■	
Micro Klipclip adapter	013-0309-XX (set of 2)	■	■
Adjustment tool	003-0675-XX	■	
Probe tip to BNC adapter	679-4094-XX	■	
P6046/HP1141A probe tip adapter	013-0304-XX	■	■
Table continued...			

Accessory	Part number	P6248	P6247 / P6246
IEEE 1394 adapter	679-5027-XX	■	■
TPA-BNC (connect the probe to TekVPI oscilloscopes)	TPA-BNC	■	■
TCA-BNC (connect the probe to TekConnect oscilloscopes)	TCA-BNC	■	■
50 $\Omega$ termination	011-0049-XX	■	■
50 $\Omega$ BNC cable, 20 in.	012-0076-XX	■	■
50 $\Omega$ SMA (F) to BNC (M) adapter	015-0572-XX	■	■
TekProbe® II Power Supply for interfacing with other BNC instruments; Power plug options for 1103:	1103	■	■
North America (115 V, 60 Hz)	Opt. A0	-	-
Universal Euro (220 V, 50 Hz)	Opt. A1	-	-
United Kingdom (240 V, 50 Hz)	Opt. A2	-	-
Australia (240 V, 50 Hz)	Opt. A3	-	-
Switzerland (220 V, 50 Hz)	Opt. A5	-	-
Japan (100 V, 110/120 V, 60 Hz)	Opt. A6	-	-
China (50 Hz)	Opt. A10	-	-
India (50 Hz)	Opt. A11	-	-
Brazil (60 Hz)	Opt. A12	-	-
No power cord (instrument set to 230 V)	Opt. A99	-	-

### Service options

<b>Opt. C3</b>	Calibration Service 3 Years
<b>Opt. C5</b>	Calibration Service 5 Years
<b>Opt. D3</b>	Calibration Data Report 3 Years (with Opt. C3)
<b>Opt. D5</b>	Calibration Data Report 5 Years (with Opt. C5)
<b>Opt. R3</b>	Repair Service 3 Years (including warranty)
<b>Opt. R5</b>	Repair Service 5 Years (including warranty)
<b>Opt. SILV600</b>	Standard warranty extended to 5 years



Opt. SILV900

Standard warranty extended to 5 years

CE Marking Not Applicable.

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



ASEAN / Australasia (65) 6356 3900  
 Belgium 00800 2255 4835\*  
 Central East Europe and the Baltics +41 52 675 3777  
 Finland +41 52 675 3777  
 Hong Kong 400 820 5835  
 Japan 81 (120) 441 046  
 Middle East, Asia, and North Africa +41 52 675 3777  
 People's Republic of China 400 820 5835  
 Republic of Korea +822 6917 5084, 822 6917 5080  
 Spain 00800 2255 4835\*  
 Taiwan 886 (2) 2656 6688

Austria 00800 2255 4835\*  
 Brazil +55 (11) 3759 7627  
 Central Europe & Greece +41 52 675 3777  
 France 00800 2255 4835\*  
 India 000 800 650 1835  
 Luxembourg +41 52 675 3777  
 The Netherlands 00800 2255 4835\*  
 Poland +41 52 675 3777  
 Russia & CIS +7 (495) 6647564  
 Sweden 00800 2255 4835\*  
 United Kingdom & Ireland 00800 2255 4835\*

Balkans, Israel, South Africa and other ISE Countries +41 52 675 3777  
 Canada 1 800 833 9200  
 Denmark +45 80 88 1401  
 Germany 00800 2255 4835\*  
 Italy 00800 2255 4835\*  
 Mexico, Central/South America & Caribbean 52 (55) 56 04 50 90  
 Norway 800 16098  
 Portugal 80 08 12370  
 South Africa +41 52 675 3777  
 Switzerland 00800 2255 4835\*  
 USA 1 800 833 9200

\* 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).

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.

4 Jan 2022 60W-13148-12  
[www.tek.com](http://www.tek.com)

**Tektronix**<sup>®</sup>