

# Differential Probes

## P6248·P6247·P6246 Datasheet



P6248

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 apply to all models unless noted otherwise.

### Model overview

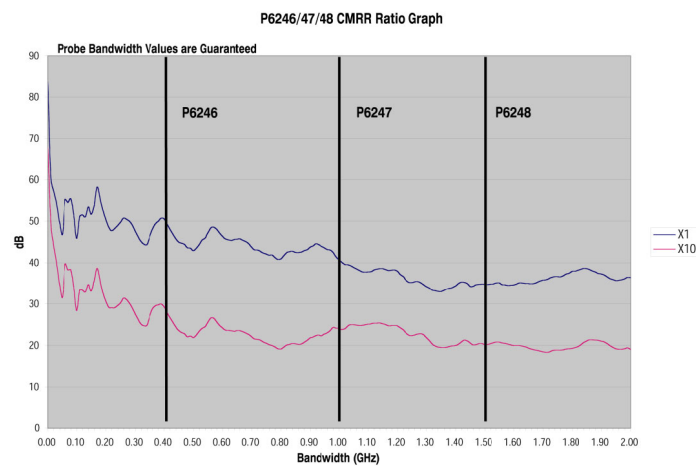
Characteristic	P6248	P6247	P6246
Bandwidth (guaranteed)	≥1.5 GHz	≥1.0 GHz	≥400 MHz
Rise time (specified)	<265 ps	<350 ps	<875 ps
Attenuation settings	X1, X10	X1, X10	X1, X10
DC attenuation accuracy	±2%	±2%	±2%
Common mode input voltage range	±7.0 V, 1X ±7.0 V, 10X	±7.0 V, 1X ±7.0 V, 10X	±7.0 V, 1X ±7.0 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 k $\Omega$

Common mode 100 k $\Omega$

### Linearity

±2%

### Noise

<50 nV/squareroot Hz

### Harmonic distortion

≤1.5%

### Passband ripple

< ±0.25 dB

P6248 DC to 1.5 GHz

P6247 DC to 850 MHz

P6246 DC to 400 MHz

### Output termination

Terminate into 50  $\Omega$

## Datasheet

### Physical characteristics

<b>Weight (probe only)</b>	160 g (0.36 lb.)
<b>Probe head dimensions (H×W×D)</b>	9.3 mm × 12 mm × 78 mm (0.36 in. × 0.47 in. × 3.0 in.)
<b>Input connection dimensions</b>	0.63 mm (0.025 in.) square pins on 2.54 mm (0.1 in.) centers
<b>Cable length</b>	1.2 m (47 in.)

### Environmental characteristics

<b>Temperature</b>	
<b>Operating</b>	0 °C to +50 °C
<b>Nonoperating</b>	-55 °C to +75 °C
<b>Humidity</b>	(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 196-3436-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>3</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	■	■
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 Ω termination	011-0049-XX	■	■
50 Ω BNC cable, 20 in.	012-0076-XX	■	■

<sup>3</sup> Reorder quantities may differ from the original included quantities.

Accessory	Part number	P6248	P6247 / P6246
50 Ω 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
<b>Opt. SILV900</b>	Standard warranty extended to 5 years

CE Marking Not Applicable.



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





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