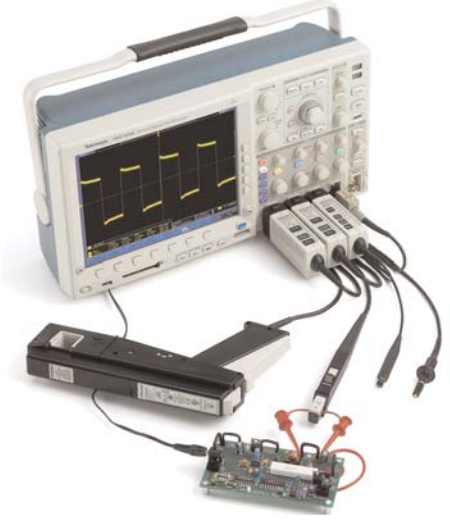
Oscilloscope Accessories

Selection Guide



Tektronix

Enabling Innovation

Table of Contents

Anytime, Anywhere Assistance

To help keep you up-to-date with the latest technology and help ensure you get the most out of your equipment, we offer a comprehensive, constantly expanding collection of technical literature, all available free of charge.

XYZs of Oscilloscopes and ABCs of Probes primers offer a better understanding of the basics of these solutions.

To select the right probe for your specific application, visit www.tektronix.com/accessories.

Choosing the Right Probe

Because of the wide range of oscilloscope measurement applications and needs, Tektronix offers a broad selection of oscilloscope probes.

Signal Characteristics

The first step to proper probe selection is to consider the signals you plan to measure. Do you need to measure voltage, current or both, what frequency is the signal, how large is the amplitude of the signal, does the device under test have low or high source impedance, and do you need to measure the signal differentially. Answers to these questions will allow you to pinpoint the best probing solution from the many probe types that Tektronix offers.

Bandwidth

Choose a probe with bandwidth that matches that of the Tektronix oscilloscope you will be using. A good rule of thumb is that the oscilloscope and probe bandwidth should be 3 to 5 times of the highest signal frequency of interest. It is equally important to consider the bandwidth of the risetime of the signal. At frequencies above 500 MHz, active probes will often provide better small signal performance.

Probe Loading

Ideally, you want to choose a probe that has as little effect as possible on the signal to be measured. The value of the device under test's source impedance can significantly influence the net effect of any probe loading. For example, with low source impedances, the loading effect of a typical high-impedance 10X passive probe would be hardly noticeable. This is because a high impedance added in parallel with a low impedance produces no significant change in total impedance. Passive probes are a good low cost general purpose solution. However, the story changes dramatically for higher bandwidth signals with high source impedances. For high source impedances, an active single ended or differential probe will be a better choice.

Probe to Scope Interfaces

Tektronix interfaces continue to evolve providing enhanced capability and performance. Many of these interfaces require additional adapters for use of existing probing solutions. The newer probing interface solutions add some rich features like AutoZero, On Screen Menu from Probe Menu Button, and more.

- ***Standard BNC Probes***
  Probes with a plain BNC connector will connect with virtually all Tektronix oscilloscopes. Low cost passive probes generally have a plain BNC connector.

- ***TEKPROBE Level 1 BNC Probes***
  Developed by Tektronix to provide greater ease of use, the TekProbe level 1 BNC connector equipped probes communicates scale information to the oscilloscope so that the oscilloscope correctly conveys accurate amplitude information.

- ***TEKPROBE Level 2 BNC Probes***
  The TEKPROBE level 2 BNC shares the scale information of the level 1 but also provides power for a whole host of active electronic probe designs.

- ***TekVPI Probes***
  TekVPI probe connection is our newest probe/scope interface. TekVPI equipped probes offer advances in power management and remote control. TekVPI probes are an ideal choice for applications where computer control is important.

- ***TekConnect Probes***
  Probes with our TekConnect interface support the highest bandwidth active probes offered by Tektronix. The TekConnect interface is designed to support probe requirements >20 GHz.

Voltage or Current Amplitude

Probe selection will vary widely depending on signal amplitude and type. Obviously a current probe is used for current measurements. However, you need to consider if an AC or AC/DC current probe is necessary. Also current probes come with solid toroid or split core designs. A split core design can offer important ease of use advantages in clamping around a conductor without having to unsolder and resolder as is the case for solid toroid current probes.

Voltage probes come in a variety of configurations ranging from small signal passive, active, differential, high voltage differential and high voltage passive types. Consider the amplitude and whether you need to make floating measurements when making your probe selection.

Probe Tip Connectivity

Most probes come with a package of standard accessories. These accessories often include a ground lead clip that attaches to the probe, a compensation adjustment tool, and one or more probe tip accessories to aid in attaching the probe to various test points. Probes that are designed for specific application areas, such as probing surface mount devices, may include additional probe tip adapters in their standard accessories package. Also, various special purpose accessories may be available as options for the probe.

ACCESSORY TYPE	TDS1000B/ TDS2000B Series (up to 200MHz) (BNC Input)	TPS2000B Series (up to 200MHz) (BNC Input)	TDS3000B Series (up to 500MHz) (TekProbe BNC Input)	DPO4000/ MSO4000 Series (up to 1GHz) (TekVPI Input)	DPO7000 Series (up to 3.5GHz) (TekVPI Input)	DPO70000/ DSA70000 Series (up to 20GHz) (TekConnect Input)	DSA8200 Series (up to 70GHz) (TekSMA Input)	RSA6100A RSA3408A/RSA3300A Series (up to 14GHz) (Type N Input)
PASSIVE PROBE (1 MEG OHM TERMINATION)	P2220 P6112 P6101B	P2220	P6139A P3010 P6101B	P6139A P6101B	P6139A P6101B	P6139A *1 P6101B *1		
PASSIVE PROBE (50 OHM TERMINATION)			P6158	P6158	P6158	P6158 *2 P6150 *3	P6158 *2 P6150 *3	P6150 *10 P6158 *10
TIME DOMAIN REFLECTOMETRY PROBES							P80318 *3A P8018 *3A	
HIGH VOLTAGE PROBE (1 MEG TERMINATION)	P5100 P6015A	P5120	P5100 P6015A	P5100 P6015A	P5100 P6015A	P5100 *1 P6015A *1		
HIGH VOLTAGE DIFFERENTIAL PROBES	P5200 P5205 *4, P5210 *4	P5205 *4 P5210 *4	P5205, P5210	TDP0500, TDP1000 P5205 *5, P5210 *5	TDP0500, TDP1000 P5205 *5, P5210 *5	P5205 *1, P5210 *1		
ACTIVE PROBES (50 OHM TERMINATION)			P6243 P6205	TAP1500	TAP3500, TAP2500 TAP1500	P7260, P7240 P7225	P7260 *6, P7240 *6 P7225 *6	P7260 *6, P7240 *6 P7225 *6
DIFFERENTIAL PROBES			P6246 *4	TDP0500, TDP1000 TDP1500 P6330 *5, P6248 *5 P6247 *5, P6246 *5	TDP3500, TDP1500 TDP1000, TDP0500 P6330 *5, P6248 *5 P6247 *5, P6246 *5	P7516, P7513 P7313, P7313SMA P7380A, P7380SMA P7360A, P7350 P7350SMA, P7340A P7330	P7516 *6, P7513 *6 P7313 *6, P7313SMA *6 P7380A *6, P7380SMA *6 P7360A *6, P7350 *6 P7350SMA*6, P7340A *6 P7330 *6	P7313, P7380A *6A P7380SMA *6A P7350 *6A P7350SMA *6A P7330 *6A
MICRO-VOLT DIFFERENTIAL PROBE			ADA400A *4	ADA400A *5	ADA400A *5	ADA400A *1		
AC/DC CURRENT PROBES	A622 TCP300 *8 TCP400 *8	A622 TCP300 *8 TCP400 *8	TCP202 *5 A622 TCP300 *8, TCP400 *8	TCP0030, TCP0150 TCP202 *5, A622 TCP300 *7 *8, TCP400 *7 *8	TCP0030, TCP0150 TCP202 *5, A622 TCP300 *7 *8, TCP400 *7 *8	TCP202 *5, A622 TCP300 *7 TCP400 *7		
AC ONLY CURRENT PROBES	A621 P6021, P6022 CT2	A621	A621 P6021, P6022 CT2	CT6, CT1 A621 P6021, P6022	CT6, CT1 A621 P6021, P6022	CT6 *2, CT1 *2 A621 *1 P6021 *2, P6022 *2		
ELECTRO-OPTICAL CONVERTER PROBES			P6701B P6703B	P6701B *5 P6703B *5	P6701B *5 P6703B *5	P6701B *2 P6703B *2		
POWER SOFTWARE		WSTRO, TPS2PWR1	WSTRO		DPOPWR *9			

*1 Requires TCA-1MEG Adapter for TDS7000, DPO/DSA70000 series.

*2 Requires TCA-BNC Adapter for TDS7000, DPO/DSA70000 series.

*3A Use of w/80A03 is suggested to reduce EOS/ESD static discharge damage to sampling equipment.

*3 Requires TCA-292MM or TCA-SMA Adapter for TDS7000, DPO/DSA70000 series.

*4 Requires 1103 Power Supply for DPO7000, DPO4000 or MSO4000 series.

*5 Requires TPA-BNC Adapter for DPO7000, DPO4000 or MSO4000 series.

*6 Requires 80A03 Adapter for use with DSA8200 Digital Signal Analysis Sampling Oscilloscope.

*6A Requires RTPA2A Adapter for use with the RSA2200A, RSA3300A, WCA200AA, RSA3408A series Real Time Spectrum Analyzers.

*7 TCP300 (TCPA300 Amplifier used with TCP305 or TCP312 or TCP303), TCP400 (TCPA400 Amplifier used with TCP404XL).

*8 May be used with TPA-BNC Adapter for proper readout or direct BNC connection without readout.

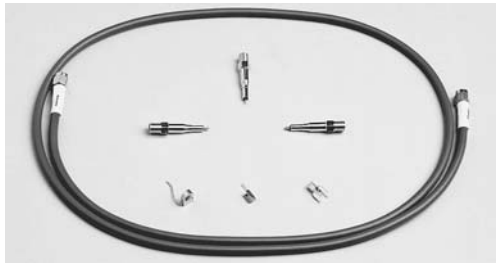
*9 The DPOPWR for DPO7000 TEKVPI series oscilloscopes requires purchase of the DPO7XXX OPT PWR or DPO7UP OPT PWR.

*10 Requires N type to SMA Female Adapter or N type to BNC.

▶ *P6139A Passive Probe.*

Passive Probes

Passive voltage probes are the most commonly used oscilloscope probe. Other speciality probes expand the range and functionality of an oscilloscope as a measurement system, but a general purpose, passive voltage probe is the working end of the oscilloscope, a tool used every day by engineers and technicians. The probe's utility is often taken for granted, but without it, even the simplest measurement cannot be performed. Tektronix passive probes are carefully designed to match the input characteristics of the oscilloscopes they complement, preserving maximum signal integrity. Special purpose high bandwidth passive probes are available at 3, 9, and 20 GHz.



▶ *P6150 Passive Probe.*

▶ *P2220 Passive Probe.*

Characteristics

Type	Cable Length	Attenuation	Bandwidth at –3 dB	Compensation Range	Read Out	Oscilloscope Compatibility
1X Passive Probe						
P6101B	2 m	1X	15 MHz	NA		All 1 MEG BNC Inputs
10X Passive Probes						
P3010	2 m	10X	100 MHz	15 to 30 pF	Yes	TDS3012/3014
P5050	1.3 m	10X	500 MHz	16 to 22 pF	Yes	TDS5000 Series
P6109B	2 m	10X	100 MHz	15 to 35 pF	Yes	TDS320/340
P6112	2 m	10X	100 MHz	15 to 35 pF		TDS200 Series
P6114B	2 m	10X	400 MHz	10 to 35 pF	Yes	TDS380
P6117	2 m	10X	200 MHz	15 to 35 pF		THS700 Series
P6131	1.3 m	10X	300 MHz	14 to 18 pF	Yes	2400 Series
P6138A	1.3 m	10X	400 MHz	12 to 18 pF	Yes	TDS400 Series
P6139A	1.3 m	10X	500 MHz	8 to 12 pF	Yes	TDS3000/500/600/7000 Series
P6150	1.0 m	1/10X	3/9 GHz	50 Ω Inputs		All 50 Ω SMA Inputs (BNC w/ Adapter)
P6158	1.2 m	20X	3 GHz	50 Ω Inputs	Yes	All 50 Ω BNC Inputs (SMA Inputs w/ Adapter)
P8018	1.0 m	1X	>20 GHz	50 Ohm inputs	No	SMA inputs, DSA8200
P80318	1.0 m	1X	>20 GHz	50 ohm inputs	No	Differential SMA inputs, DSA8200
1X/10X Switchable						
P2220	1.5 m	1X/10X	6/200 MHz	15 to 25 pF		TDS200, TDS1000, TDS2000 TPS2000 Series

▶ *TAP3500 Active Probe.*

Active Single-ended Probes

Active voltage probes provide Tektronix oscilloscopes the ability to faithfully acquire real time signal information from today's high-speed designs. Active probes provide a wide signal acquisition bandwidth and ensure reduced device under test (DUT) loading. An active probe is the best choice when your application involves high-impedance, high-frequency circuit elements that demand minimal loading. DC offset capability allows you to use the probe's full dynamic range when measuring AC signals in the presence of DC offset voltage.

Active Probes with the TekVPI interface connect directly to DPO/MSO4000 and DPO7000 Series oscilloscopes. Tektronix' TekConnect® interface takes active probe intelligence to the next level, providing probe power, automated signaling of probe parameters and probe controls including scale factor and offset voltage levels.

▶ *P7240 Active Probe.*

▶ *P7225 Active Probe.*

▶ *TAP1500 Active Probe.*

▶ *P6243 Active Probe.*

Characteristics

Type	Cable Length	Attenuation	Bandwidth at –3 dB	Linear Dynamic Range	Interface[*2]	Oscilloscope Compatibility[*3]
P6205	1.5 m	10X	750 MHz	±10 V	TEKPROBE BNC	TDS400-700/3000/7000
P6241	1.3 m	10X	4.0 GHz	+/-4V	TEKPROBE BNC	TDS500-700/7000
P6243	1.3 m	10X	1.0 GHz	±8 V	TEKPROBE BNC	TDS400-700/3000/5000/7000
P6245	1.3 m	10X	1.5 GHz[*1]	±8 V	TEKPROBE BNC	TDS400-700/5000/7000
P6249	1.4 m	5X	4.0 GHz[*1]	±2 V	TEKPROBE BNC	TDS500-700/7000
P7225	1.3 m	10X	2.5 GHz	+/-4V	TekConnect	TDS/CSA7000B, TDS6000 TekConnect® Series
P7240	1.4 m	5X	4.0 GHz[*1]	±2 V	TekConnect	TDS/CSA7000B, TDS6000 TekConnect® Series
P7260	1.12 m	5X/25X	6.0 GHz	+/-0.75 V / +/-3.0 V	TekConnect	TDS/CSA7000B, TDS6000 TekConnect® Series
TAP1500	1.3 m	10X	1.5 GHz	+/-8 V	TekVPI	DPO/MSO4000/DPO7000
TAP2500	1.3 m	10X	2.5 GHz	+/-4 V	TekVPI	DPO/MSO4000/DPO7000
TAP3500	1.3 m	10X	3.5 GHz	+/-4 V	TekVPI	DPO/MSO4000/DPO7000

[*1] P6245/P6249/P6209 and P7240 is typical.

[*2] Any probe with TEKPROBE BNC may be used on TekConnect Series Oscilloscopes using the TCA-BNC Adapter.

[*3] Probes with bandwidths >1 GHz or attenuation of 5X may not function with "Probe Cal" on older Tektronix oscilloscopes. Check www.tektronix.com for more complete information on compatibility.

The TekConnect interface extends useful bandwidth and signal fidelity out thru 18 GHz.

TEKPROBE BNC active probes can also be used with any oscilloscope that has a BNC-type connector such as the TDS1000B/2000B oscilloscopes, if the 1103 TEKPROBE power supply is used.

▶ *P7500 TriMode™ Differential Probes shown with optional P75PDPM.*

P7513, P7516 TriMode Differential Probes

The P7500 Series probes feature TriMode™ probing to streamline the task of measuring differential signals. TriMode probing enables one probe to make differential, single-ended, and common mode measurements, all with a single probe setup.

Differential Probes/ Differential Pre-amplifier

To achieve faster data rates, high speed serial data standards use differential signals. Differential probes are ideal for measuring differential signals due to their broad frequency ranges, high common mode rejection ratio (CMRR), and skew matched inputs. Tektronix offers a full range of differential probes from 400MHz up to >16GHz with a wide variety of connection options for handheld, solder-in, or fixtured probing.

▶ *P7313SMA, P7380SMA Differential Probes.*

P7313SMA, P7350SMA, P7380SMA

Tektronix also offers a line of SMA probes up to 13GHz for measuring high speed differential signals in a 50Ω environment. These SMA probes enable differential signal acquisition on each channel of a multiple channel oscilloscope. This is the ideal system for compliance testing of the many new multi-lane high speed serial data standards. The SMA probes also offer termination voltage control for signals that are not AC coupled or DC referenced. Input signals are attached through a pair of precision matched SMA cables.

▶ *ADA400A Pre-amplifier.*

ADA400A Differential Pre-amplifier

The ADA400A differential pre-amplifier allows direct oscilloscope measurements of very low-amplitude voltages and signals that are not grounded. Although the ADA400A is designed for TEKPROBE BNC interface oscilloscopes, it can be used with any oscilloscope by using the 1103 TEKPROBE power supply.

Characteristics

Model - ADA400A

Gain - X100, X10, X1, X0.1

Bandwidth - DC to 1 MHz

Bandwidth Filters - 100 Hz, 3 kHz, 100 kHz

Differential Voltage - 100 mV @ X100, 1 V @ X10, 10 V @ X1, 80 V @ X0.1

Max. Input Voltage to Ground - ±10 V @ X100, X10; ±40 V @ X1, X0.1

Input R - Input impedance of 1 MΩ in all settings and selectable impedance of infinite Ω (>10^{12} Ω) in X100 and X10 gain settings

Input Current - 55 pF (each input)

Common Mode Rejection Ratio - >100,000:1 DC to 10 kHz

Z-Active™ Differential Probes (P7313, P7380A, P7360A, P7340A)

Tektronix has created a revolutionary Z-Active probe architecture that is a hybrid approach composed of a distributed attenuator topology feeding an active probe amplifier. They use a tiny passive probe tip element that is separate from the amplifier, extending the usable reach of the probe. In traditional active probes, adding this much length can introduce signal fidelity problems. However this architecture maintains high DC input resistance and presents a higher AC impedance than previous probe architectures.

It accomplishes this while providing significant length between the probe body and the probe attachment point to the DUT. This architecture provides the best of both worlds: high DC impedance like existing active probes and the stable high frequency loading of Z0 probes.

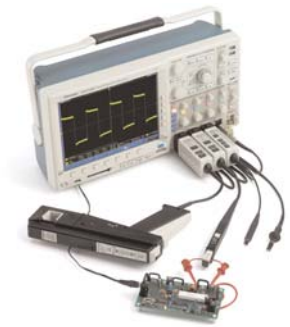
▶ *P7313, 7380A, P7360A, P7340A Probes.*

Characteristics – Differential Probes

Model	Bandwidth (typical)	Attenuation	Rise Time (10-90%)	Diff. Input V Range	Comm. Input V Range	Input R Range (typical)	CMRR (typical)	Oscilloscope Compatibility
P6246	DC to 400 MHz	1X/10X	<875 ps	±0.85 V (1X) ±8.5 V (10X)	±7.0 V (1X) ±7.0 V (10X)	200 kΩ (differential mode)	>30 dB (≤1 GHz) >38 dB (≤100 MHz) >60 dB (≤1 MHz)	DPO/CSA70000 w/TCA-BNC, DPO7000/DPO/MSO4000 w/TPA-BNC, TDS500/600/700/5000/7000, TDS3000(B) w/1103 PS
P6247	DC to 1 GHz	1X/10X	<350 ps	±0.85 V (1X) ±8.5 V (10X)	±7.0 V (1X) ±7.0 V (10X)	200 kΩ (differential mode)	>30 dB (≤1 GHz) >38 dB (≤100 MHz) >60 dB (≤1 MHz)	DPO/CSA70000 w/TCA-BNC, DPO7000/DPO/MSO4000 w/TPA-BNC, TDS500/600/700/5000/7000, TDS3000(B) w/1103 PS
P6248	DC to 1.5 GHz	1X/10X	<265 ps	±0.85 V (1X) ±8.5 V (10X)	±7.0 V (1X) ±7.0 V (10X)	200 kΩ (differential mode)	>30 dB (≤1 GHz) >38 dB (≤100 MHz) >60 dB (≤1 MHz)	DPO/CSA70000 w/TCA-BNC, DPO7000/DPO/MSO4000 w/TPA-BNC, TDS500/600/700/5000/7000, TDS3000(B) w/1103 PS
P7330	3.5 GHz	5X	<140 ps	±2 V	+5 V to –4 V	100 kΩ (differential mode)	>25 dB (≤1 GHz) >60 dB (≤1 MHz)	TDS/CSA7000B, TDS6000
P6330	3.5 GHz	5X	<140 ps	±2 V	+5 V to –4 V	100 kΩ (differential mode)	>25 dB (≤1 GHz) >60 dB (≤1 MHz)	TekConnect® Series

Characteristics – Differential Probes

Model	Bandwidth (typical)	Attenuation	Rise Time (10-90%)	Diff. Input V Range	Comm. Input V Range	Input R Range (typical)	CMRR (typical)	Oscilloscope Compatibility
P7313	> 12.5 GHz	5X/25X	< 40 ps	±0.625 V (5X) ±2.0 V (25X)	+4 V to –3 V	100 kΩ (differential mode)	>15 dB (12.5 GHz) >20 dB (8 GHz) >35 dB (1 GHz) >50 dB (1 MHz)	DPO/DSA70000 TDS/CSA7000(B) TDS6000(B/C)
P7313SMA	> 13 GHz	5X/12.5X	< 40 ps	±4 V (2.5X) ±3.6 V (12.5X)	+3.6 V to -2.5 V	50 Ω (differential mode)	>15 dB (12.5 GHz) >20 dB (8 GHz)	DPO/DSA70000 TDS/CSA7000(B) TDS6000(B/C)
P7340A	> 4 GHz	5X/25X	< 100 ps	±1 V (5X) ±2.5 V (25X)	+5 V to -3 V	100 k Ω (differential mode)	>20 dB (8 GHz) >35 dB (1 GHz) >50 dB (1 MHz)	DPO/DSA70000 TDS/CSA7000(B) TDS6000(B/C)
P7350	5.0 GHz	6.25X	<100 ps	±2 V	+6.25 V to –5 V	100 kΩ (differential mode)	>45 dB (≤1 MHz)	DPO/DSA70000 TDS/CSA7000(B) TDS6000(B/C)
P7350SMA	5.0 GHz	6.25X	<100 ps	±2 V	+6.25 V to -5 V	100 k Ω (differential mode)	>55 dB (≤1 MHz)	DPO/DSA70000 TDS/CSA7000(B) TDS6000(B/C)
P7360A	6.0 GHz	5X/25X	<70 ps	±1 V (5X) ±2.5 V (25X)	+5 V to -3 V	100 k Ω (differential mode)	>55 dB (≤1 MHz)	DPO/DSA70000 TDS/CSA7000(B) TDS6000(B/C)
P7380SMA	> 8 GHz	2.5X/12.5X	< 55 ps	625 mVp-p (2.5X) 3.0 Vp-p (12.5X)	+/- 2.5 V	50 Ω per side	>15 dB (8 GHz) >20 dB (5 GHz) >35 dB (1 GHz) >50 dB (100 MHz) >60 dB (DC)	DPO/DSA70000 TDS/CSA7000(B) TDS6000(B/C)
P7380A	> 8 GHz	5X/25X	< 55 ps	±1 V (5X) ±2.5 V (25X)	+4 V to –3 V	100 kΩ (differential mode)	>20 dB (8 GHz) >35 dB (1 GHz) >50 dB (1 MHz)	DPO/DSA70000 TDS/CSA7000(B) TDS6000(B/C)
P7513	> 13 GHz	5X/12.5X	< 40 ps	±.75 V (5X) ±175 V (12.5X)	+4 V to -2 V	100 k Ω (differential mode)	>15 dB (12.5 GHz) >20 dB (8 GHz)	DPO/DSA70000 TDS/CSA7000(B) TDS6000(B/C)
P7516	> 16 GHz	5X/12.5X	< 32 ps	±.75 V (5X) ±175 V (12.5X)	+4 V to -2 V	100 k Ω (differential mode)	>15 dB (12.5 GHz) >20 dB (8 GHz)	DPO/DSA70000 TDS/CSA7000(B) TDS6000(B/C)
TDP1500	DC to 1.5 GHz	1X/10X	<265 ps	±0.85 V (1X) ±8.5 V (10X)	±7.0 V (1X) ±7.0 V (10X)	200 k Ω (differential mode)	>30 dB (≤1 GHz) >38 dB (≤100 MHz) >60 dB (≤1 MHz)	DPO7000 DPO/MSO4000
TDP3500	3.5 GHz	5X	<140 ps	±2 V	+5 V to -4 V	100 k Ω (differential mode)	>25 dB (≤1 GHz) >60 dB (≤1 MHz)	DPO7000 DPO/MSO4000



Current Probes

Tektronix offers the widest selection of high performance current probes available. Tektronix current measurement systems provide simultaneous AC/DC measurements, bandwidth coverage from DC to 2 GHz and amplitude measurements from mA's to 20,000 A. Tektronix AC only probes are available in fixed and split core configurations. The AC/DC current measurement probes are split core providing easier access to the device-under-test in most situations.

Current measurements are used to understand power loss, phase shift, and are used as a low impedance loading alternative to voltage probe measurements. Current probes measure the flux field generated by the movement of electrons through a conductor. Within the range specifications of the current probe, the flux field surrounding a conductor is converted to a linear voltage output that can be displayed and analyzed on an oscilloscope or other measurement instrument.

▶ *TCP202 current probe.*

▶ *CT6 In-circuit current probe.*

▶ *TCP300 and TCP400 Series Current Measurement System.*

Oscilloscope Series Current Measurement Solutions

Tektronix offers current probing solutions for a variety of applications and each of its oscilloscope series. Some current probes make direct connection to the oscilloscope while others require an external amplifier system.

The TDS1000, TDS2000 and TPS2000 series use the A621 (AC) and A622 (AC/DC) for general purpose measurements.

TCP202 provides the TDS3000, TDS5000, TDS7000, DPO70K, and DSA70K series with a high speed AC/DC measurement solution at common amperage levels (≤15A).

The DPO4000, MSO4000, and DPO7000 series with TekVPI interface utilize the TCP0030 and TCP0150 direct connect current probe solutions to meet applications requiring 1mA up 150A at frequencies up to 120 MHz.

Need Higher Current Capatibility

The TCPA300 and TCPA400 Current Probe Amplifiers provide current measurement capability of up to 750A (dc+pkac). These products may be used on BNC and TEKPROBE interface products to provide the current measurement capability needed to meet those higher current levels.

The CT4 AC only current probe provides 2kA measurements when used with any of the 3.8 mm jaw size current probes (TCP202, TCP0030, TCP305, TCP312, P6021, A6302, and A6312)

The Power Connection

Current measurements are but one half of the equation for making and understanding power measurements (P = I x E). Voltage measurements are the second part. The combination allows power measurements such as: inrush / outrush currents; line power harmonics; power quality; power loss measurement at switching device; magnetic components characterization; characterization of power semiconductor devices and analysis of ripple and noise.

Characteristics – Current Probes

	Bandwidth Hz to MHz	Peak Pulse	Max ACp-p	Derate Above	Max DC	Amp-S Product	Rise Time	Insertion Impedance @ 1 MHz	Max Barewire Voltage	Max Conductor Diameter	Cable Length
TCP300 and TCP400 Series Products For TEKPROBE, TekConnect and Standard 50 Ohm / 1MegOhm BNC Oscilloscope Systems											
TCP312 w/TCPA300	DC to 100	50A	60A	50 kHz	5A–1A/V 30A – 10A/V	50A*5µS – 1A/V 500A*5µS – 10A/V	≤3.5 ns	0.08 Ω	Insulated Wire Only	3.8 mm (0.15 in.)	1.5 m
TCP312 using CT4	0.5 to 20	20 kA*5*2	2 kA*5*3	1.2 kHz	20A	0.5A*1S	<17.5 ns	2.5 M Ω	3 kV	38 mm (1.5 in.)	1.5 m
TCP305 w/TCPA300	DC to 50	50A	100A	2 kHz	25A – 5A/V 50A – 10A/V	500A*5µS – 5A/V NA – 10A/V	≤7 ns	0.035 Ω	Insulated Wire Only	3.8 mm (0.15 in.)	1.5 m
TCP305 using CT4	0.5 to 20	20 kA*5*2	2 kA*5*3	1.2 kHz	20A	5A*5S typ	<17.5 ns	1.1 M Ω	3 kV	38 mm (1.5 in.)	1.5 m
TCP303 w/TCPA300	DC to 15	150A	424A	1 kHz	25 – 5A/V 150 – 50A/V	3,000A*5µS – 5A/V 15,000A*5µS – 50A/V	≤23 ns	0.01 Ω	600V RMS*6*7 300V RMS*6*7	21 x 25 mm (0.83 x 1.0 in.)	2 m
TCP404XL w/TCPA400	DC to 2	750A	1414A	1.8 kHz	750A*5 – 1A/mV 500A – 1A/mV	NA – 1A/mV	≤175 ns	0.1 M Ω	600V RMS*6*7 300V RMS*8	21 x 25 mm (0.83 x 1.0 in.)	8 m
Direct Connect Current Probes											
TCP202	DC to 50	50 A	40 A	20 kHz	15 A	500x10-6	≤ 7.0 ns	0.07 Ω	300 V*6	0.15 in.	2.2 m
TCP202 w/CT4	0.5 to 20	20 kA*2	2 kA*3	1.2 kHz	15 A	0.1	≤ 17.5 ns	30 M Ω	3 kV	1.5 in.	2.2 m
TCP0030 (TekVPI)	DC to 120	50A	84A	5 kHz	5A 30A	50AµS - 1A/V 500AµS - 10A/V*5	≤2.9 ns	0.08 Ω	Insulated Wire Only	3.8 mm (0.15 in)	2 m
TCP0150 (TekVPI)	DC to 20	150A	424A	2 kHz	25A 5A 150A 50A/V	300AµS - 5A/V 500AµS - 10A/V 1500AµS - 5A/V 50A/V	≤17.5 ns	0.03 Ω	600V RMS*6*7 300V RMS*8	21m 0.83	2 m 2 m
Other Current Probe Solutions											
P6021	120 to 60	250 A	15 A	0.5 MHz	0.5 A	500x10-6	≤5.8 ns	0.03 Ω	Insulated Wire Only	0.15 in.	1.5 m
P6021 w/CT4	120 to 20	20 kA*2	2 kA*3	1.2 MHz	20 A	0.5	≤17.5 ns	0.03 Ω	3 kV	1.5 in.	1.5 m
P6022	935 to 120	100 A	6 A	10 MHz	0.2 A	9x10-6	≤2.2 ns	0.03 Ω	600 V	0.10 in.	2.75 m
CT1	25 K to 1000	12 A	1.4 A		0.3 A	1x10-6	≤0.35 ns	1 Ω	175 VRMS*6	0.070 in.	1.07 m
CT2	1.2 K to 200	36 A	7 A		0.3 A	50x10-6	≤0.5 ns	0.1 Ω	175 VRMS*6	0.052 in.	1.07 m
CT6	250 K to 2000	6 A	0.7 A		0.2 A	0.25x10-6	≤200 ps	1.1Ω	30 VRMS	0.032 in.	1 m
A621	5 Hz to 50 kHz	2000A	4000A	N/A	N/A	1A-S	≤7µS	N/A	600V*8	2.13 in	1.5 m
A622	DC to 100 kHz	100A	200 A	10 kHz	100A	N/A	≤3.5µS	N/A	600V*8	0.46 in	2 m

*1 Scope set at 10 mV/Div. *2 Based on voltage breakdown. *3 Based on thermal heating limits in CT4. *4 Depends on instrument used. *5 Derated w/ duty cycle and frequency. *6 CAT I *7 CAT II *8 CAT III

▶ *P5210 High-voltage Differential Probe.*

High-voltage Differential Probes

Solve Your Floating Voltage Measurement Problems

The P5200, P5205 and P5210 are high-voltage differential probes that eliminate the need to operate your ground referenced oscilloscope without the proper ground connection, ensuring safe operation. The P5200 probe is designed for use with any ground referenced oscilloscope from any manufacturer, while the P5205 and P5210 probes are specific to Tektronix oscilloscopes that have a TEKPROBE BNC interface.

High-voltage Probes

The P5100 and P6015A single-ended probes let users make ground-referenced, high-voltage measurements accurately and safely.

Characteristics – High-voltage Differential Probes

Model	Switchable Attenuation	Differential Voltage RMS/CAT II	Common Voltage RMS/CAT II	DC Gain Accuracy	Bandwidth	Power Source
P5200[*1]	500X/50X	1300 V	1000 V	3%	DC to 25 MHz	AC
P5205	500X/50X	1300 V	1000 V	3%	DC to 100 MHz	TEKPROBE
P5210	1000X/100X	4400 V	2200 V	3%	DC to 50 MHz	TEKPROBE

[*1] WARNING: For safe operation, do not use the P5200 High Voltage Differential Probe with oscilloscopes that have floating inputs (isolated inputs), such as the Tektronix TPS2000 Series oscilloscopes and THS700 Series oscilloscopes. The P5200 High Voltage Differential Probe requires an oscilloscope or other measurement instrument with grounded inputs.

Characteristics – High-voltage Single-ended Probes

Model	Attenuation	Bandwidth	Loading (MΩ/pF)	Maximum Input Voltage	Length (Standard)	Compensation Range	Readout
P6015A	1000X	75 MHz	100/3.0	20 kV_{RMS}	10 ft/3 m[*2]	7–49 pF	Optional
P5100	100X	250 MHz[*3]	10/2.7	2.5 kV DC+pk AC 1,000 V CAT II	10 ft/3 m	7–30 pF	Yes
P5102[*4]	10X	100 MHz	5/11.2	1,000 V_{RMS} CAT II	3.1m	24-28 pF	No
P5120[*5]	20X	200 MHz	5/11.2	1,000 V_{RMS} CAT II	3 m	15-25 pF	No
TDP0500	5X, 50 X	500 MHz	1 Mohm	+/-42 V (DC + PK AC)	1.2 m	<1 pf	TekVPI
TDP1000	5X, 50 X	1000 MHz	1 Mohm	+/-42 V (DC + PK AC)	1.2 m	<1 pf	TekVPI

[*2] 25 ft./7.6 m option. [*3] Typical. [*4] For use with THS700 Series only. [*5] For use with TPS2000 Series only.

P5102, P5120 IsolatedChannel™ Applications

In many applications, it is important to be able to isolate the measurement from earth ground and also to isolate the common voltage between channels. The P5120, coupled with the TPS2000 Series digital storage oscilloscopes and the P5102, paired with the THS700 Series handheld digital storage oscilloscopes, deliver both the isolation for the measurement from earth ground and full isolation between the channels.

▶ *P6701B and P6703B*

▶ *AMT75 Communication Adapter.*

Characteristics - P6700 Series Optical-to-electrical Converters

	Wavelength Response	Bandwidth	Rise Time	Conversion Gain	Max. Input Optical Power	Noise Equivalent Power	Max. Input Fiber Core Diameter
P6701B	500 to 950 nm	DC to 1.0 GHz	≤500 ps	1 V/mW	1 mW (0 dBm)	≤0.75 µW (RMS)	62.5 µm
P6703B	1100 to 1700 nm	DC to 1.2 GHz	≤395 ps	1 V/mW	1 mW (0 dBm)	≤0.35 µW (RMS)	62.5 µm

Optical-to-electrical Converters

P6700 Series

The Tektronix P6701B/P6703B convert optical signals into electrical signals for convenient analysis. They work with Tektronix oscilloscopes featuring the TEKPROBE BNC interface, or with oscilloscopes from other manufacturers equipped with the 1103 TEKPROBE power supply. The P6700 Series products are ideal for optical signal characterization in the development, manufacturing or service of optical communication systems or sources, such as eye pattern testing for communication signals (SONET/ SDH or Fibre Channel).

Electrical Communication Adapter

The AMT75 (75 Ohm to 50 Ohm) adapter provides an efficient and effective solution for 50 Ohm terminated instruments to analyze high speed signals in the 75 ohm Video environment.

The adapter connects directly to TDS series oscilloscopes with the TEKPROBE BNC interface and other oscilloscope systems with an appropriate adapter.

Characteristics – AMT75

Model	Bandwidth (return loss)	VSWR Compliance	Standards
AMT75	DC to 1.0 GHz	<1.1:1 (>26 dB) ITU G.957, ITU G.703, Bellcore GR-253-CORE	ANSI TI.102,

Listed below are a few of our most popular accesssories. Please visit www.Tektronix.com /accessories to view a complete selection.

Miscellaneous Adapters

TEK-USB-488

Enables GPIB Control of Tektronix Instruments through the USB Port of Tektronix Instruments such as DPO/MSO4000, TDS1000B/2000B compliant with USBTMC-USB488 Standards.

Adapters and Connection Accessories

Tektronix provides a complete line of coaxial adapters and connectors. Make connections quickly without soldering or crimping.

TekConnect® Signal Interconnect

The TekConnect® signal connection system ensures the best signal fidelity for high-bandwidth oscilloscopes when probing signal bandwidths above 1 GHz.

This interface provides a convenient locking mechanism that makes it easy to preserve a reliable, robust electrical connection and ensures signal fidelity at speeds beyond the capabilities of the traditional BNC connector. All Tektronix high-bandwidth oscilloscopes feature Tekconnect, and the P7000 Series probes are directly compatible with this signal connection system. Adapters are available to provide connection to SMA–, BNC– and N–type connectors.

▶ *TCA-BNC (TekConnect)*

▶ *TCA-SMA (TekConnect)*

▶ *TCA-292MM (TekConnect)*

▶ *TCA75 (TekConnect)*

▶ *TCA-N (TekConnect)*

▶ *TCA-1MEG (TekConnect)*

▶ *80A03 (TekConnect)*

TekVPI Interface

The DPO4000, MSO4000 and DPO7000 Series oscilloscope families feature TekVPI (Tektronix Versatile Probe Interface). Versatility and ease-of-use are the hallmarks of TekVPI probe design, enabled by intelligent bi-directional oscilloscope/probe communications with the TekVPI oscilloscope host instrument. TekVPI architecture facilitates probe designs that are microprocessor based with EEROM memory and bidirectional serial interface communications capability to improve the users' ease-of-use in probe setup, easy selection of displayed probe status and setup information, as well as accurate probe measurement results all intended to simplify and improve the user's test and measurement experience.

All Tektronix mid-range performance oscilloscopes feature the TekVPI. A series of passive probes, active probes, differential probes, and current probes have been developed to ensure the customer has the performance tool set required for a variety of In addition the TPA-BNC adapter is available to provide backward compatibility to probes with the TEKPROBE interface.

Model	Connector	Termination	Bandwidth
TCA–BNC	BNC	50 Ω	DC to 4 GHz
TCA–SMA	SMA	50 Ω	DC to 18 GHz
TCA–N	N	50 Ω	DC to 11 GHz
TCA75	BNC	75 Ω	DC to 4 GHz
TCA–1MEG	BNC	1 M Ω	DC to 500 MHz
80A03	SMA	50 Ω	DC to 12 GHz
TCA-292MM	SMA	50 Ω	DC to 20 GHz
RTPA2A	SMA	50 Ω	DC to 8 GHz
TPA-BNC	BNC	50 Ω 1 M Ω	DC to 4 GHz

Connectors

Connector Type	Part Number
BNC Connectors	
BNC Female to BNC Female	103-0028-00
BNC Male to BNC Male	103-0029-00
BNC "T"	103-0030-00
BNC Elbow Male to Female	103-0031-00
SMA Connectors	
SMA Male to SMA Male	015-1011-00
SMA Female to SMA Female	015-1012-00
SMA "T"	015-1016-00
SMA Male to BNC Female	015-1018-00

▶ *TPA-BNC (TekVPI)*

Adapters

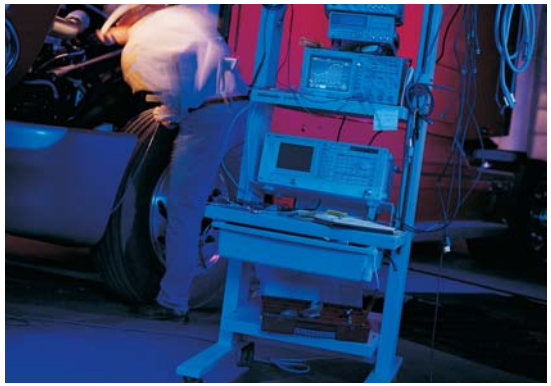
Adapter Configuration	Part Number
BNC Adapters	
BNC Male to GR	017-0064-00
BNC Male to Dual Binding Post	103-0035-00
BNC Female to Dual Banana Plug	103-0090-00
BNC Female 75 to 50 Ω Type N Min. Loss	131-4199-00
SMA Adapters	
SMA Male to BNC Female	015-0554-00
SMA Male to SMA Female	015-0549-00
SMA Kit	020-1693-00
SMA Female to BNC Male	015-0572-00
SMA Female to SMA Slide On Male	015-0553-00
SMA Male to SMA Male	015-0551-00
N Style Adapters	
N Female to BNC Male	103-0058-00
N Male to BNC Female	103-0045-00

Attenuators, Terminators and Cables

A full range of attenuators, terminators and cables allows you to take full advantage of your test instrument.

Part Number	Impedance Ohms	Avg Power Watts	Maximum VSWR	Attenuation	Attenuation dB	Tolerance dB	Type
Attenuators w/ BNC Connectors							
011-0069-03	50 ± 2%	2	1.2 DC to 2 GHz	2X	6	± 0.5	Attenuator
011-0060-03	50 ± 2%	2	1.2 DC to 2 GHz	5X	14	± 0.6	Attenuator
011-0059-03	50 ± 2%	2	1.2 DC to 2 GHz	10X	20	± 0.6	Attenuator
011-0057-01	50 to 75	2	1.1 DC to 100 MHz	2.3X	7.2	± 0.5	Min. Loss Attenuator
Terminators w/ BNC Connectors							
011-0049-02	50 ± 2%	2	1.2 DC to 1 GHz	NA	NA	NA	Feed-through Termination
011-0129-00	50 ± 0.1%	2	–	NA	NA	NA	Feed-through Termination
011-0055-02	75 ± 1.33%	1	1.1 DC to 100 MHz	NA	NA	NA	Feed-through Termination
011-0102-03	75 ± 0. 07%	0.5	–	NA	NA	NA	Coax. Termination
011-0103-02	75 ± 0.5%	0.125	–	NA	NA	NA	Return Loss Bridge
011-0155-00	50 ± 2%	0.5	1.09 DC to 26.5 MHz	NA	NA	NA	Coax. Termination
Attenuators w/ SMA Connectors							
015-1001-01	50 ± 2%	1	1.35 DC to 18 GHz	2X	6	± 0.3	Attenuator
015-1002-01	50 ± 2%	1	1.35 DC to 18 GHz	5X	14	± 0.5	Attenuator
015-1003-00	50 ± 2%	2	1.35 DC to 18 GHz	10X	20	± 0.5	Attenuator
Terminators w/ SMA Connectors							
015-1020-00	–	–	–	NA	NA	NA	Short Circuit Termination (M)
015-1021-00	–	–	–	NA	NA	NA	Short Circuit Termination (F)
015-1022-01	50 ± 1%	0.5	–	NA	NA	NA	Termination (M)
Coaxial, Delay, Interface Cables							
Tektronix offers a wide array of coaxial, delay, and interface cables. Please contact your local Tektronix representative or visit www.tektronix.com/accessories for more details.							

(M) Male (F) Female



► *K4000.*

Mobility Accessories for Oscilloscopes

Tektronix provides a wide variety of accessories to make your instrument more useable in a variety of applications such as Test Systems and Station to Station.

Instrumentation Carts/Workstation

Tektronix can free up your valuable work space, make sharing and moving instrumentation easy and get you closer to the device under test. Tektronix instrument carts and workstations bring you a high level of functionality while safe-guarding your instrument investment. Carts are shipped ready to assemble, allowing maximum configuration flexibility.

► *TDS3 BATC Battery*

► *Soft Case*

Rackmount Kits

Tektronix Rackmount Kits are designed specifically for Tektronix Instrumentation. They provide access to rear panel connections and maximize the space used in your rackmount applications.

Instrumentation Travel Cases

Designed for travel, Tektronix hard sided or convenient soft-sided travel cases protect your instrument investment. Tektronix travel cases are specifically designed for each instrument for maximum protection and storage space for your probes, battery packs, and manuals. The HCTEK4321 along with the oscilloscope associated soft case provides maximum protection for your valuable instrumentation. (TDS1000, TDS2000, TPS2000, TDS3000, DPO4000 series)

Battery Powered Instrumentation

Tektronix offers maximum mobility with portable oscilloscopes using battery power. The battery packs are generally rated for 2 to 3 hours of use, then require recharging. Two to three packs will provide enough power to last the entire day. Make your measurements in remote locations quickly and easily.

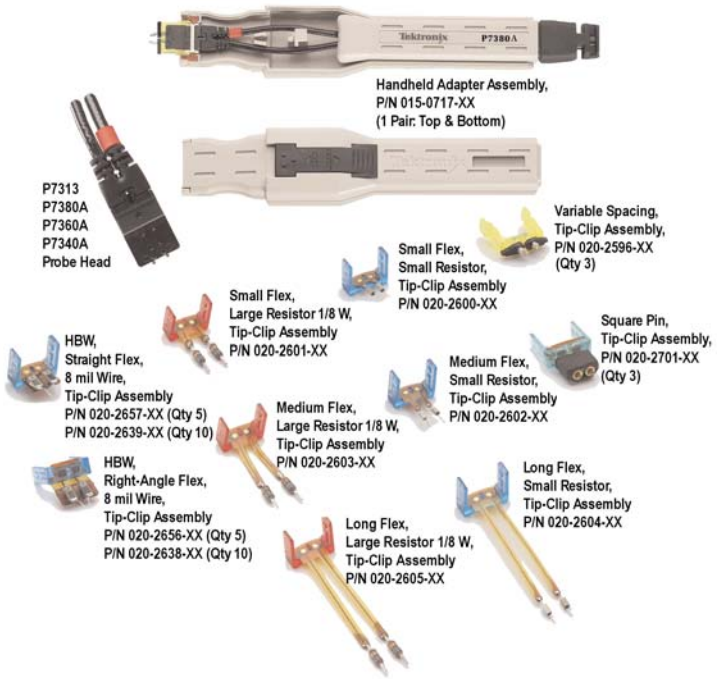
Accessory Type	TDS1000/ TDS2000 Series (≤200 MHz) (BNC)	TPS2000 Series (≤200 MHz) (BNC	TDS3000 Series (≤500 MHz) (TEKPROBE BNC)	DPO/MSO4000 Series (≤1 GHz) (TekVPI)	DPO7000 Series (≤3.5 GHz) (TekVPI)	DPO/DSA70000 Series (≤20 GHz) (TekConnect)	DSA8200 Series (≤70 GHz) (TekSMA)	RSA6100A/ RSA3408A/ RSA3300A/ Series (≤14 GHz) (Type N)
Carts			K420	K420	K420 (requires 407-5192-00 bracket set)	K4000 w/brackets 407-5187-00 407-5188-00	K4000	K420
Rackmount Kit	RM2000B		RM3000	RM4000	016-1985-00	016-1985-00	016-1791-01	016-1962-00*1
Case, Hard	HCTEK4321*2	HCTEK4321*2	HCTEK4321*3	HCTEK4321*4	016-1942-00 (016-1522-00 w/wheels)	016-1977-00		016-1963-00*1
Case, Soft	AC2100	AC2100	AC3000	AC4000				
Battery Pack		TPSBAT	TDS3BATC					
Battery Charger		TPSCHG	TDS3CHG					

*1 RSA6100A Series *2 Requires AC2100 Soft Case for maximum protection *3 Requires AC3000 Soft Case for maximum protection *4 Requires AC4000 Soft Case for maximum protection

P6246, P6247, P6248 Probe Tip Accessories

P6249, P7240, P7225 Probe Tip Accessories

P7300 Probe Tip Accessories



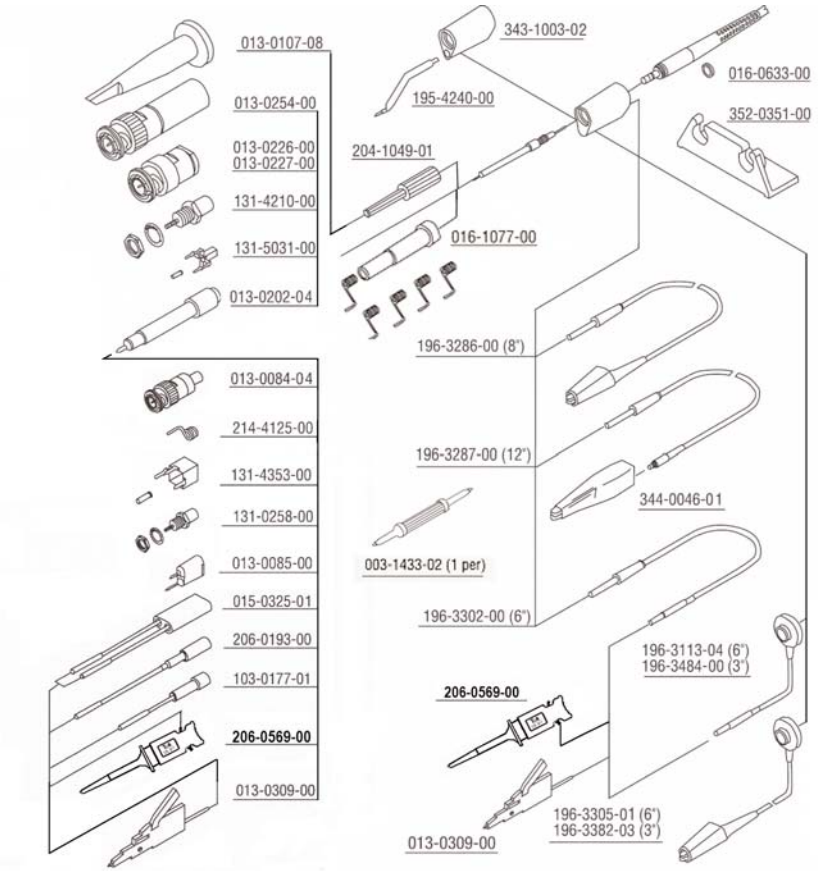
TDP0500, TDP1000, TDP1500 Probe Tip Accessories

TDP3500 Probe Tip Accessories

Probe Accessories & Replacement Parts

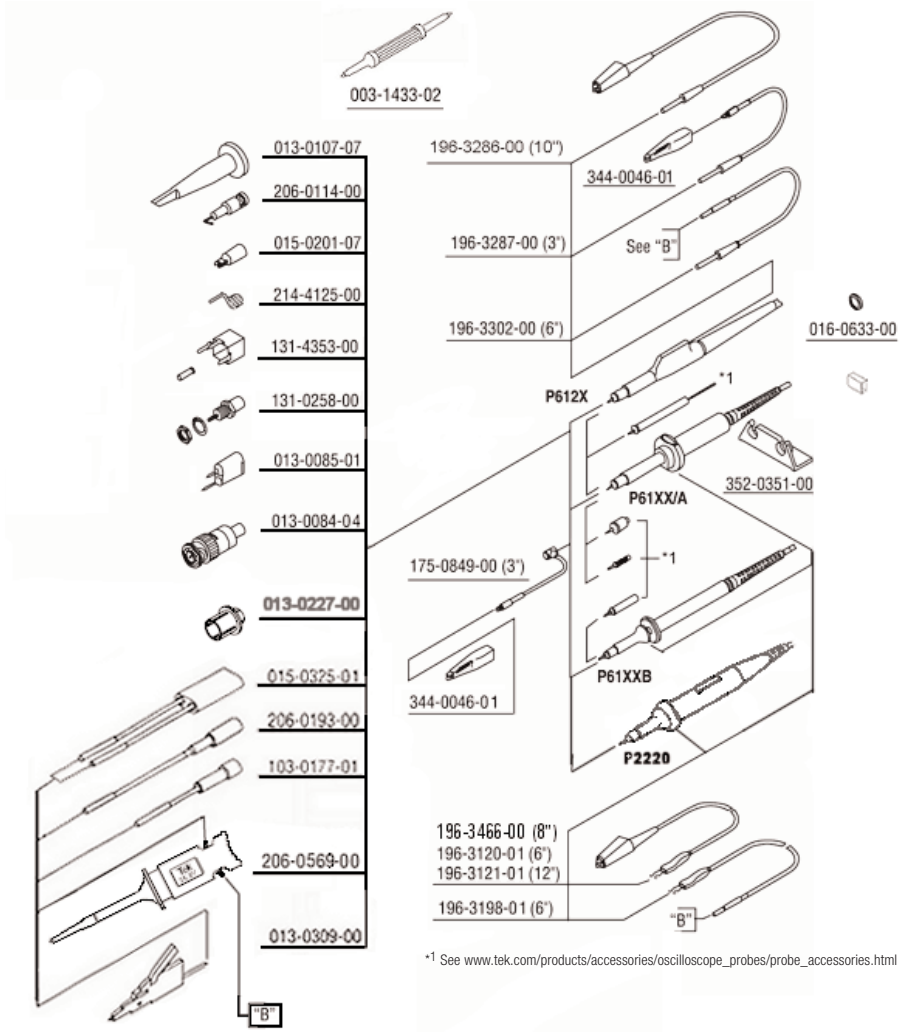
Tektronix offers a complete set of high performance probing solutions and a wide range of other accessories.

P6137, P6138A, P6139A Probe Tip Accessories



▶ *3.5 mm (Compact) Probe System*

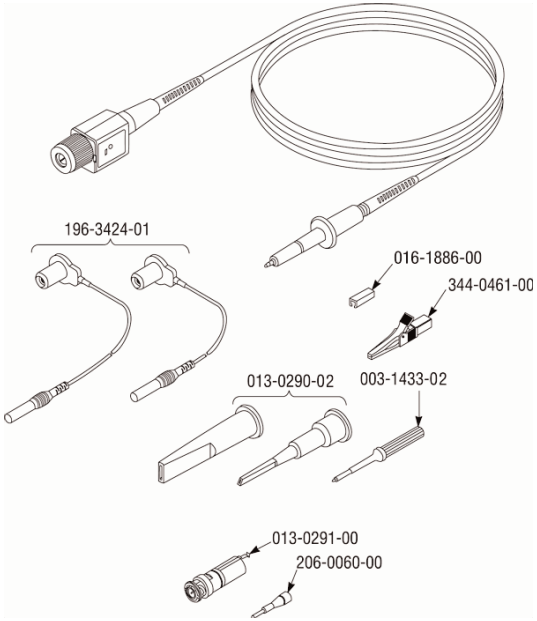
P61XX/A, P61XXB, P612X, P620X, P22XX Probe Tip Accessories



*1 See www.tek.com/products/accessories/oscilloscope_probes/probe_accessories.html

▶ *5 mm (Miniature) Probe System*

P5100, P5102, P5120 Probe Tip Accessories



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**

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