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Instructions

Tektronix

P5050
10X Passive Probe

071-1018-01

www.tektronix.com

071101801

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WARRANTY

Tektronix warrants that the products that it manufactures and sells will be free from defects in materials and workmanship for a period of one (1) year from the date of purchase from an authorized Tektronix distributor. If any such product proves defective during this warranty period, Tektronix, at its option, either will repair the defective product without charge for parts and labor, or will provide a replacement in exchange for the defective product. Batteries are excluded from this warranty.

In order to obtain service under this warranty, Customer must notify Tektronix of the defect before the expiration of the warranty period and make suitable arrangements for the performance of service. Customer shall be responsible for packaging and shipping the defective product to the service center designated by Tektronix, shipping charges prepaid, and with a copy of customer proof of purchase. Tektronix shall pay for the return of the product to Customer if the shipment is to a location within the country in which the Tektronix service center is located. Customer shall be responsible for paying all shipping charges, duties, taxes, and any other charges for products returned to any other locations.

This warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate maintenance and care. Tektronix shall not be obligated to furnish service under this warranty a) to repair damage resulting from attempts by personnel other than Tektronix representatives to install, repair or service the product; b) to repair damage resulting from improper use or connection to incompatible equipment; c) to repair any damage or malfunction caused by the use of non-Tektronix supplies; or d) to service a product that has been modified or integrated with other products when the effect of such modification or integration increases the time or difficulty of servicing the product.

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Address	Tektronix, Inc. 14200 SW Karl Braun Drive P.O. Box 500 Beaverton, OR 97077 USA
Web site	www.tektronix.com
Sales support	1-800-833-9200, select option 1*
Service support	1-800-833-9200, select option 2*
Technical support	Email: techsupport@tektronix.com 1-800-833-9200, select option 3* 6:00 a.m. – 5:00 p.m. Pacific time

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* **This phone number is toll free in North America. After office hours, please leave a voice mail message.**
Outside North America, contact a Tektronix sales office or distributor; see the Tektronix web site for a list of offices.

General Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. To avoid potential hazards, use this product only as specified.

Only qualified personnel should perform service procedures.

While using this product, you may need to access other parts of the system. Read the *General Safety Summary* in other system manuals for warnings and cautions related to operating the system.

To Avoid Fire or Personal Injury

Connect and Disconnect Properly. Connect the probe output to the measurement instrument before connecting the probe to the circuit under test. Disconnect the probe input and the probe ground from the circuit under test before disconnecting the probe from the measurement instrument.

Observe All Terminal Ratings. To avoid fire or shock hazard, observe all ratings and markings on the product. Consult the product manual for further ratings information before making connections to the product.

Connect the ground lead of the probe to earth ground only.

Do not apply a potential to any terminal, including the common terminal, that exceeds the maximum rating of that terminal.

Do Not Operate Without Covers. Do not operate this product with covers or panels removed.

Avoid Exposed Circuitry. Do not touch exposed connections and components when power is present.

Do Not Operate With Suspected Failures. If you suspect there is damage to this product, have it inspected by qualified service personnel.

Do Not Operate in Wet/Damp Conditions.

Do Not Operate in an Explosive Atmosphere.

Keep Product Surfaces Clean and Dry.

Symbols and Terms

Terms in this Manual. These terms may appear in this manual:



WARNING. *Warning statements identify conditions or practices that could result in injury or loss of life.*

CAUTION. *Caution statements identify conditions or practices that could result in damage to this product or other property.*

Terms on the Product. These terms may appear on the product:

DANGER indicates an injury hazard immediately accessible as you read the marking.

WARNING indicates an injury hazard not immediately accessible as you read the marking.

CAUTION indicates a hazard to property including the product.

Symbols on the Product. The following symbols may appear on the product:



CAUTION
Refer to Manual



Double
Insulated



Protective Ground
(Earth) Terminal

Operating Basics

The P5050 is a compact, high impedance, passive probe designed for use with Tektronix TDS5000 Series Digital Phosphor Oscilloscopes. The P5050 has a 1.3 meter cable and is fully compatible with the Tektronix family of compact size (3.5 millimeter) probe accessories. The *Replaceable Parts* list beginning on page 10 identifies the standard and optional accessories for the P5050 probe.

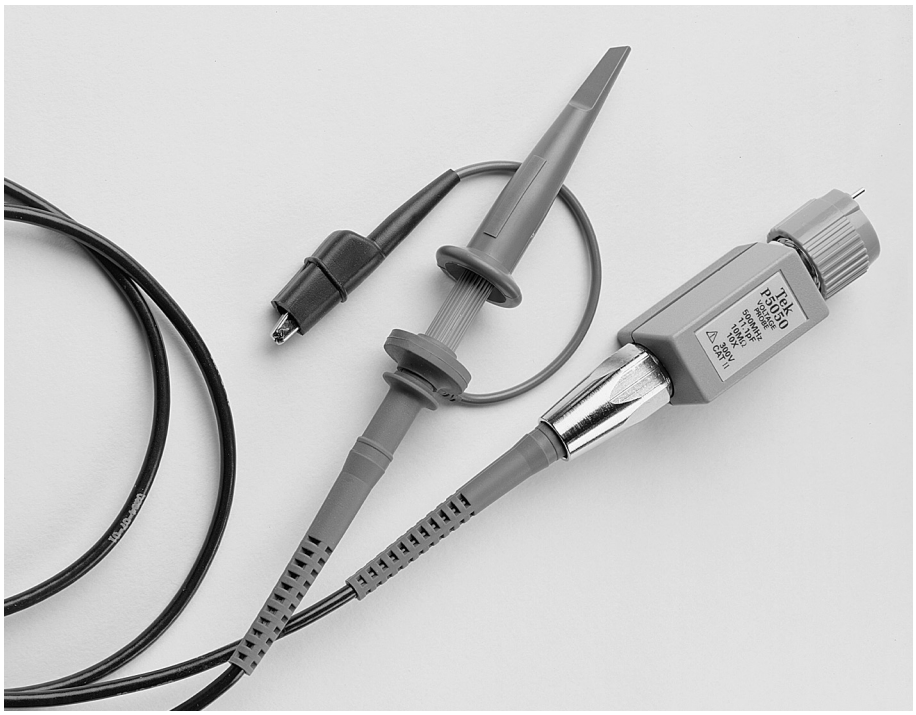


Figure 1: P5050 10X Passive Probe

Probe Compensation

Due to variations in oscilloscope input characteristics, you may need to adjust the low-frequency compensation of the probe when you move it from one oscilloscope to another. If a 1 kHz calibrated square wave displayed at 1 ms/division shows significant differences between the leading and trailing edges, perform the following steps to optimize low-frequency compensation:

1. Connect the probe to the calibration signal on the oscilloscope front panel.
2. Press **AUTOSET** or otherwise adjust your oscilloscope to display a meaningful waveform.
3. Adjust the trimmer in the probe (accessible through the compensation box) until you see a square wave with perfectly flat top on the display. See Figure 3 on page 3.



WARNING. *To avoid damaging the trimmer, use the Philips head adjustment tool supplied with your P5050 probe. Adjustment tools from some probe models may not be compatible with the P5050 probe. See Figure 2 below.*

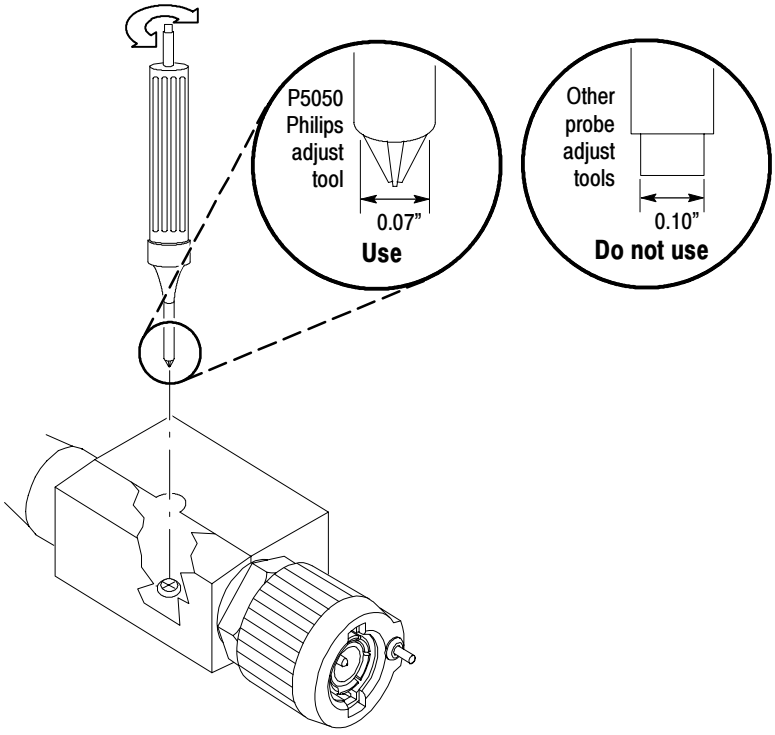


Figure 2: Adjusting the trimmer with the P5050 Philips head adjustment tool

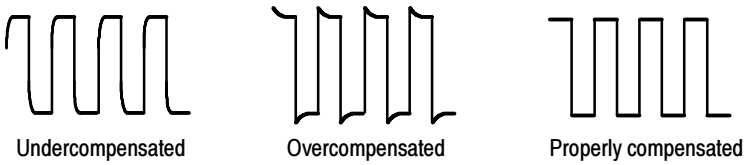


Figure 3: Probe compensation waveforms

Ground Lead Length

When you are probing a circuit, you should always use as short a ground lead as possible between the probe head and circuit ground.

The series inductance added by the probe tip and ground lead can result in a resonant circuit; this circuit may cause parasitic ringing within the bandwidth of your oscilloscope. Refer to Figure 4.

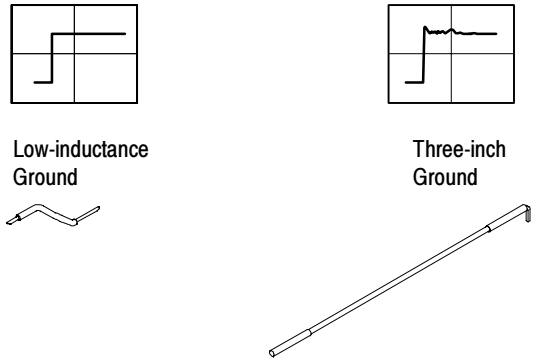


Figure 4: Waveform distortion from ground lead length

Maximum Working Voltage

Observe Maximum Working Voltage. Do not use the P5050 probe above 300 V_{RMS} CAT II. Refer to the operating chart in Figure 5 on page 7.



WARNING. *To avoid electric shock when using the probe, do not touch the metallic portions of the probe head while connected to a voltage source.*

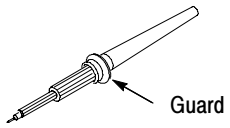
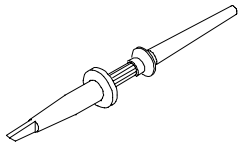
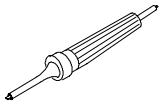
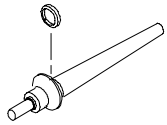
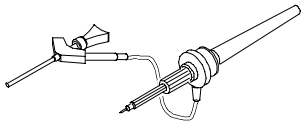
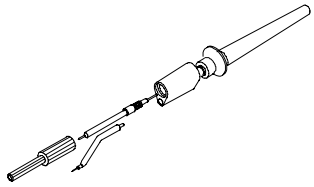
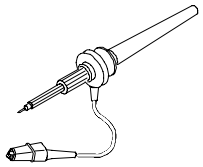
Cleaning

To remove accumulated dirt from the probe exterior, use a soft cloth dampened with a mild detergent and water solution, or use isopropyl alcohol. Do not use solvents such as benzene, toluene, xylene, or acetone. Avoid abrasive cleaners.

Features and Accessories

Table 1 illustrates the features and standard accessories of the P5050 probe.

Table 1: Features and Accessories

Feature/Accessory	Description	Applications/Notes
	Guard	This feature keeps fingers away from the probe tip for protection against electric shock.
	Retractable hook tip	Connects the probe tip to wires and component leads for hands-free measurement. ***NOTE.*** *For a solid connection, firmly push and twist the hook tip onto the probe tip before using.*
	Adjustment tool	This Philips head tool is used to adjust probe compensation. Access the adjustment through the opening in the compensation box. ***CAUTION.*** *To avoid damage to the trimmer, use only this adjustment tool for adjusting probe compensation.*
	Color marker bands	Color codes the probe to the oscilloscope input when more than one probe is in use. Clip one band around the strain relief of the probe head and the matching band on the strain relief of probe output.
	SMT KlipChip™ and ground lead	Connects the probe ground to small or hard to reach ground reference points. Refer to Figure 4 on page 3 for ground lead length guidelines.
	Low-inductance ground	The ground collar and short lead connect the probe ground to a ground reference close to the signal source. The short lead minimizes aberrations on high-frequency signals caused by the inductance of the ground lead. Refer to Figure 4 on page 3 for ground lead length guidelines.
	Ground lead with insulated alligator clip	Connects the probe ground to ground reference. Refer to Figure 4 on page 3 for length guidelines for the ground lead. ***NOTE.*** *To remove the ground lead from the probe, first unscrew the collar, and then gently pull off the ground lead.*



WARNING. *To avoid electric shock when using the probe, keep fingers behind the guard on the probe body.*

Specifications

The characteristics listed in Table 2 apply to a P5050 probe installed on a Tektronix TDS5000 Series oscilloscope unless otherwise noted.

Specifications apply when the instrument warms up for a period of at least 20 minutes in an environment that does not exceed the limits described in Table 3 on page 7.

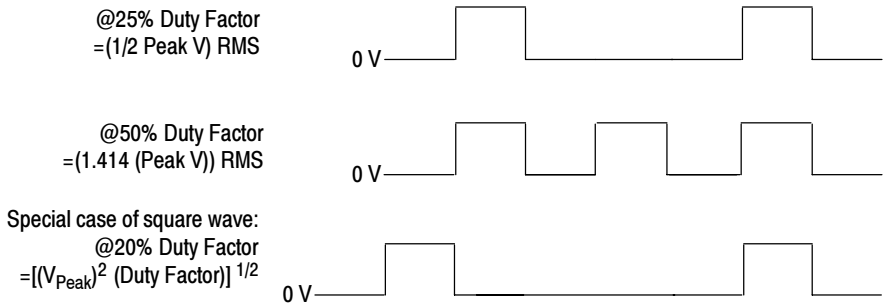
Table 2: Electrical characteristics

Characteristic	Description
Attenuation[1] (System)	10X ± 0.5% at DC
Input Resistance[1] (System)	10 MΩ ± 0.5% at DC
Input Capacitance	11.1 pF ± 0.3 pF at probe tip (at 1 KHz, 1 V p-p)
Compensation Range	16 pF to 22 pF
Rise Time, Typical	0.8 nsec, 10% to 90% with TDS5000 series, ≥ 50 mV / div
System Bandwidth (–3 dB)	DC to 500 MHz with TDS5000 series
Propagation Delay (Probe), Typical	5.5 ns
Probe Coding	10X
Maximum Input Voltage[2,3]	400 V RMS CAT I or 400 V DC CAT I 300 V RMS CAT II or 300 V DC CAT II 150 V RMS CAT III or 150 V DC CAT III 565 V peak, <50% DF, <1 sec PW 895 V peak, <20% DF, <1 sec PW 1250 V peak, <10% DF, <50 μsec PW See Figure 7 on page 8 for voltage derating curve.

1 System characteristic.

2 As defined in EN61010-1. See Certifications and compliances in Table 4 on page 9.

3 RMS=Root Mean Square=rms=The square root of the average of the sum of the squares of the instantaneous voltage in one cycle = $\sqrt{\sum (fx_i)^2 / n}$ **.**
300 VDC=300V RMS, 420 V Peak (sinewave)=300 V RMS. See Figure 5 on page 7.



Example: Maximum Input Voltage
$=[(895\ V\ Pk)^2\ (.20)]^{1/2}= 400\ V\ RMS$

Figure 5: Maximum input voltage calculation example

Table 3: Physical and environmental characteristics

Characteristic	Description
Net Weight (Including Accessories)	<0.24 lb (110 g)
Temperature Range	
Operating	+5° F to +149° F (–15° C to +55° C)
Nonoperating	–80° F to +185° F (–62° C to +85° C)
Humidity[1]	Five cycles (120 hr) at 95% to 97% relative humidity
Altitude	< 9842.5 feet (< 3000 meters), operating < 50,000 feet (< 15,240 meters), nonoperating

[1] **Tektronix standard 062-2847-00, class 3. Refer to MIL-E-16400F, paragraph 4.5.9 through 4.5.9.5.1, class 4.**

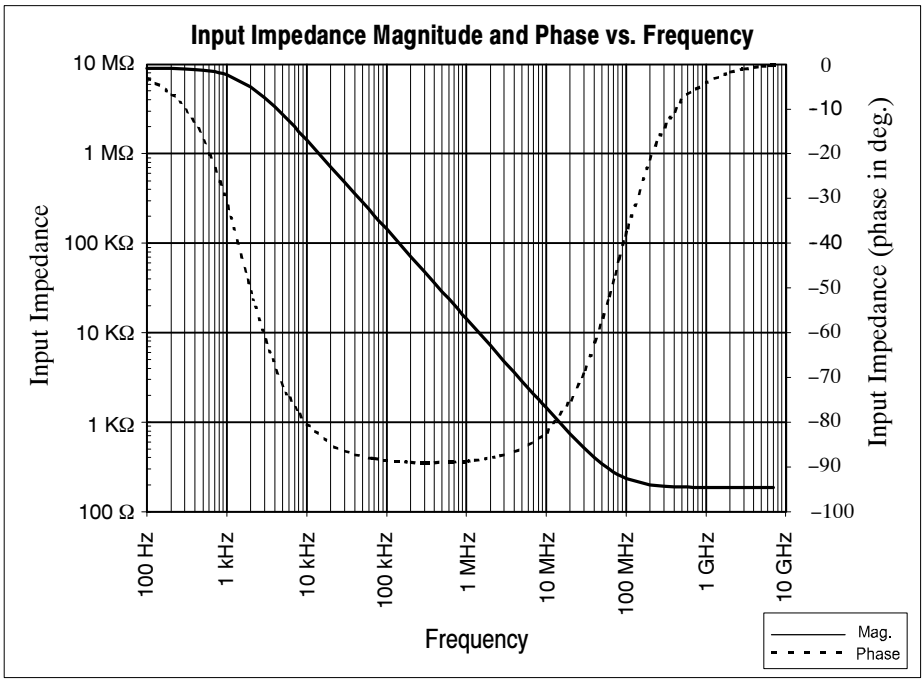


Figure 6: Typical P5050 input impedance

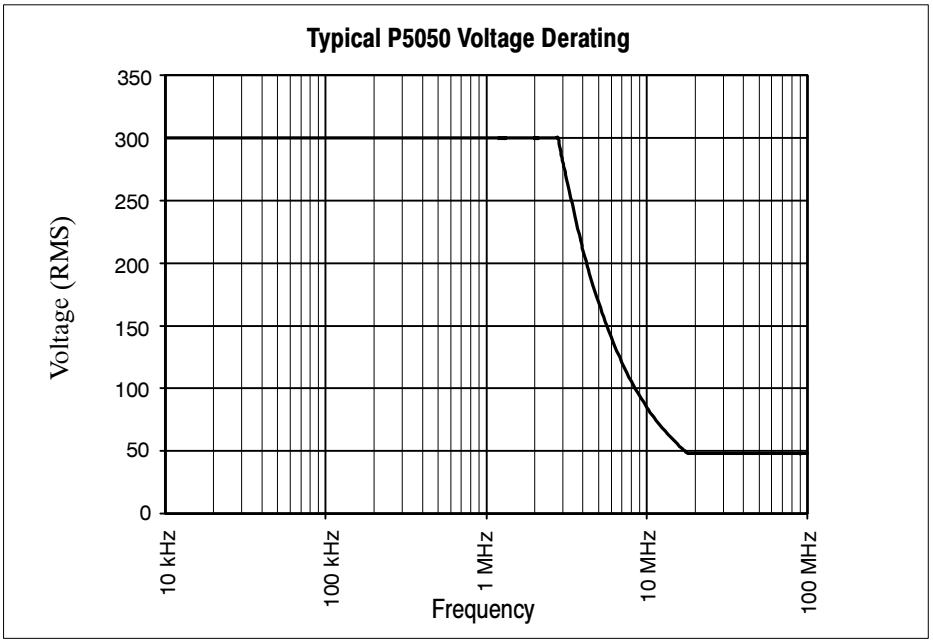


Figure 7: Typical P5050 voltage derating curve

Table 4: Certifications and compliances

EC Declaration of Conformity	Compliance was demonstrated to the following specification as listed in the Official Journal of the European Communities: Low Voltage Directive 73/23/EEC as amended by 93/68/EEC:	
	EN 61010-1/A2	Safety requirements for electrical equipment for measurement, control, and laboratory use
	EN 61010-2-031:1994	Particular requirements for hand-held probe assemblies for electrical measurement and test
Overvoltage Category	Category:	Examples of Products in this Category:
	CAT III	Distribution-level mains, fixed installation
	CAT II	Local-level mains, appliances, portable equipment
	CAT I	Signal levels in special equipment or parts of equipment, telecommunications, electronics
Pollution Degree 2	Do not operate in environments where conductive pollutants may be present.	
Safety	UL3111-1, First Edition & UL3111-2-031, First Edition CSA C22.2 No. 1010.1-92 & CAN/CSA C22.2 No. 1010.2.031-94 EN61010-1/A2 EN61010-2-031 Pollution Degree 2	

Replaceable Parts

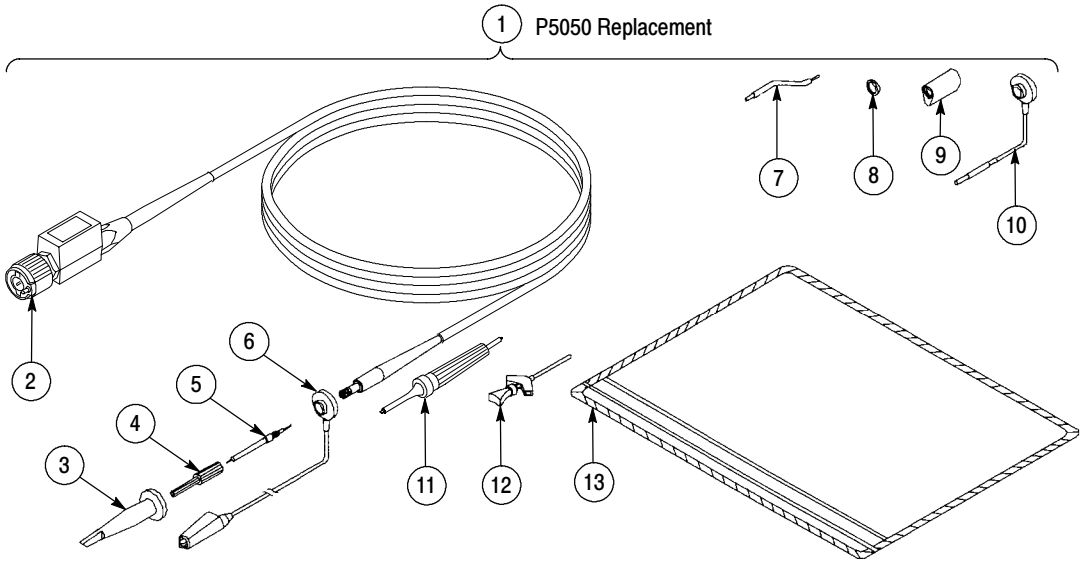


Figure 8: P5050 probe with standard accessories

Replaceable parts: P5050 probe and standard accessories

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description	Mfr. code	Mfr. part number
8 -1	P5050			1	P5050 10X PASSIVE PROBE, REPLACEMENT		
					STANDARD ACCESSORIES		
-2	131-3219-00			1	CONN,RF PLUG:BNC,MALE	24931	28P266-3
-3	013-0107-07			1	TIP,PROBE:MINIATURE/COMPACT SIZE, RETRACTABLE HOOK ASSY	80009	013-0107-07
-4	204-1049-00			1	BODY SHELL:TIP COVER	TK2565	204-1049-00
-5	206-0378-00			1	PROBE TIP ASSY:10X,8.0PF,10M OHM	80009	206-0441-00
-6	196-3305-00			1	LEAD,ELECTRICAL:22 AWG,6.0 L,W/CLIP	TK2469	196-3305-00
-7	195-4240-00			1	LEAD,ELECTRICAL:0.025 DIA,COPPER,2.3 L	TK2469	195-4240-00
-8	016-0633-00			1	MARKER SET,CA:2 EA VARIOUS COLORS	80009	016-0633-00
-9	343-1003-01			1	COLLAR,GND:P5050	TK2565	343-1003-01
-10	196-3113-02			1	LEAD,ELECTRICAL:STRD,22 AWG,6.0 L,8-N	TK2469	196-3113-02
-11	003-1433-02			1	SCREWDRIVER:ADJUSTMENT TOOL	TK2565	003-1433-02
-12	206-0364-00			1	TIP,PROBE:MICROCKT TEST,0.05 CTR	80009	206-0364-00
-13	----------			1	POUCH,ACCESSORY		
	071-1018-XX			1	MANUAL,TECH:INSTRUCTIONS,P5050	TK2548	071-1018-XX

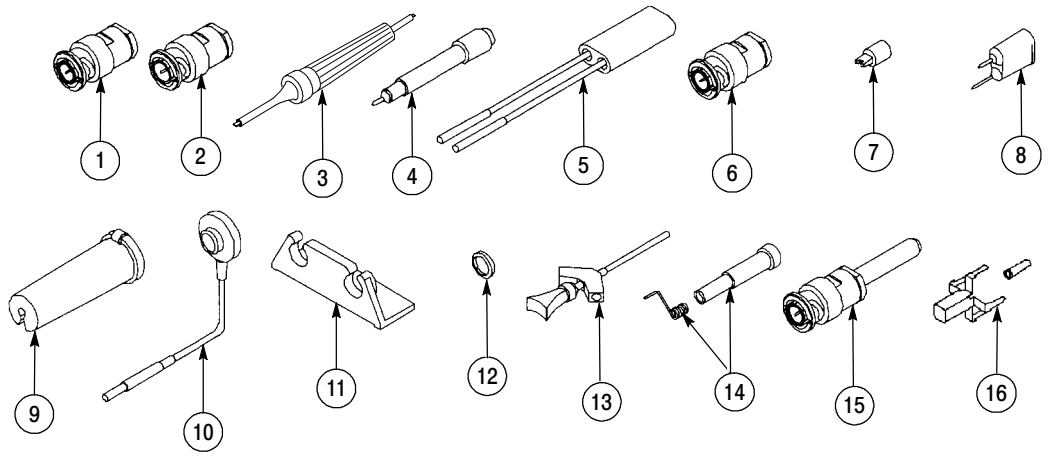


Figure 9: P5050 probe optional accessories

Replaceable parts: P5050 probe optional accessories

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description	Mfr. code	Mfr. part number
					OPTIONAL ACCESSORIES		
9 -1	013-0226-00			1	CONNECTOR,BNC:BNC TO PROBE TIP ADAPTER	24931	28P264-2
-2	013-0227-00			1	CONNECTOR,BNC:50 OHM,BNC TO P TIP ADAPTER	24931	28P312-1
-3	003-1433-02			1	SCREWDRIVER:ADJUSTMENT TOOL	80009	003-1433-02
-4	013-0202-03			1	ADAPTER,PROBE:SUBMINIATURE/COMPACT TO MIN	TK2565	013-0202-03
					NOTE: ITEMS 5 THROUGH 9 ARE USABLE WHEN THE SUBMINIATURE/COMPACT TO MINIATURE PROBE TIP ADAPTER IS USED. (ITEM 4)		
-5	015-0325-01			1	ADAPTER,PROBE:PROBE TO CONNECTOR PINS	TK2565	015-0325-01
-6	013-0084-04			1	ADAPTER,CONN:BNC TO PROBE	80009	013-0084-04
-7	015-0201-07			1	TIP,PROBE:IC TEST,PKG OF 10	80009	015-0201-07
	015-0201-08			1	TIP,PROBE:IC TEST,PKG OF 100	80009	015-0201-08
-8	013-0085-00			1	TIP,PROBE:GROUNDING	80009	013-0085-00
-9	352-0670-00			1	HOLDER,PROBE:ATTENUATOR TIPS (3)	TK2565	352-0670-00
-10	196-3113-03			1	LEAD,ELECTRICAL:STRD,22 AWG,3.0 L,8-N	TK2469	196-3113-03
-11	352-0351-00			1	HOLDER,PROBE:BLACK ABS P6000 SERIES	7X318	1127
-12	016-0633-00			1	MARKER SET,CA:2 EA VARIOUS COLORS	80009	016-0633-00
-13	SMG50			1	SMT KLIPCHIP:20 ADAPTERS	80009	SMG-50
-14	016-1077-00			1	ACCESSORY KIT:GND TIP CONTACT,PKG OF 2 EA OF 5 LENGTHS W/COVER SHELL	80009	016-1077-00
-15	013-0254-00	9307		1	ADAPTER,CONN:BNC TO PROBE TIP,MALE	24931	28P-302-2
-16	131-5031-00	8926		1	CONNECTOR,PROBE:PKG OF 25,COMPACT	8009	131-5031-00

Manufacturers cross index

Mfr. code	Manufacturer	Address	City, state, zip code
24931	BERG ELECTRONICS INC	BERG ELECTRONICS RF/COAXIAL DIV 2100 EARLYWOOD DR PO BOX 547	FRANKLIN, IN 46131
7X318	KASO PLASTICS INC	11013 A NE 39TH	VANCOUVER, WA 98662
80009	TEKTRONIX INC	14150 SW KARL BRAUN DR PO BOX 500	BEAVERTON, OR 97077-0001
TK2469	TENSOLITE CORPORATION	3000 LEWIS & CLARK HWY SUITE 2	VANCOUVER, WA 98661
TK2548	XEROX CORPORATION	14181 SW MILLIKAN WAY	BEAVERTON, OR 97005
TK2565	VISION PLASTICS INC	26000 SW PARKWAY CENTER DRIVE	WILSONVILLE, OR 97070

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