

**P6910**  
**General Purpose Logic Analyzer Probe**  
**Instruction Manual**

[www.tektronix.com](http://www.tektronix.com)



077-0630-00

**Tektronix**

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- Worldwide, visit [www.tektronix.com](http://www.tektronix.com) to find contacts in your area.

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# 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 a larger system. Read the safety sections of the other component manuals for warnings and cautions related to operating the system.

## To Avoid Fire or Personal Injury

**Ground the product.** This product is indirectly grounded through the grounding conductor of the mainframe power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, ensure that the product is properly grounded.

**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.

The inputs are not rated for connection to mains or Category II, III, or IV circuits.

Connect the probe reference lead 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.

**Do not operate with suspected failures.** If you suspect that there is damage to this product, have it inspected by qualified service personnel.

**Avoid exposed circuitry.** Do not touch exposed connections and components when power is present.

**Do not operate in wet/damp conditions.**

**Do not operate in an explosive atmosphere.**

**Keep product surfaces clean and dry.**

**Terms in This Manual**

These terms may appear in this manual:



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

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

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**Symbols and 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.

The following symbol(s) may appear on the product:



CAUTION  
Refer to Manual



## Service Safety Summary

Only qualified personnel should perform service procedures. Read this *Service Safety Summary* and the *General Safety Summary* before performing any service procedures.

**Do Not Service Alone.** Do not perform internal service or adjustments of this product unless another person capable of rendering first aid and resuscitation is present.

**Disconnect Power.** To avoid electric shock, switch off the instrument power, then disconnect the power cord from the mains power.

**Use Care When Servicing With Power On.** Dangerous voltages or currents may exist in this product. Disconnect power, remove battery (if applicable), and disconnect test leads before removing protective panels, soldering, or replacing components.

To avoid electric shock, do not touch exposed connections.

# Compliance information

This section lists the safety and environmental standards with which the instrument complies.

## Safety compliance

**Equipment type** Test and measuring equipment.

**Safety class** Class 1 – grounded product.

**Pollution degree description**

A measure of the contaminants that could occur in the environment around and within a product. Typically the internal environment inside a product is considered to be the same as the external. Products should be used only in the environment for which they are rated.

- Pollution Degree 1. No pollution or only dry, nonconductive pollution occurs. Products in this category are generally encapsulated, hermetically sealed, or located in clean rooms.
- Pollution Degree 2. Normally only dry, nonconductive pollution occurs. Occasionally a temporary conductivity that is caused by condensation must be expected. This location is a typical office/home environment. Temporary condensation occurs only when the product is out of service.
- Pollution Degree 3. Conductive pollution, or dry, nonconductive pollution that becomes conductive due to condensation. These are sheltered locations where neither temperature nor humidity is controlled. The area is protected from direct sunshine, rain, or direct wind.
- Pollution Degree 4. Pollution that generates persistent conductivity through conductive dust, rain, or snow. Typical outdoor locations.

**Pollution degree** Pollution Degree 2 (as defined in IEC 61010-1). Note: Rated for indoor use only.

## Environmental considerations

This section provides information about the environmental impact of the product.

### Product End-of-Life handling

Observe the following guidelines when recycling an instrument or component:

**Equipment recycling.** Production of this equipment required the extraction and use of natural resources. The equipment may contain substances that could be harmful to the environment or human health if improperly handled at the product's end of life. To avoid release of such substances into the environment and to reduce the use of natural resources, we encourage you to recycle this product in an appropriate system that will ensure that most of the materials are reused or recycled appropriately.



This symbol indicates that this product complies with the applicable European Union requirements according to Directives 2002/96/EC and 2006/66/EC on waste electrical and electronic equipment (WEEE) and batteries. For information about recycling options, check the Support/Service section of the Tektronix Web site ([www.tektronix.com](http://www.tektronix.com)).

### Restriction of hazardous substances

This product is classified as Monitoring and Control equipment, and is outside the scope of the 2002/95/EC RoHS Directive.



# Preface

## Related documentation

The following list and table provide information on the related documentation available for your Tektronix product. For additional information, refer to the Tektronix Web site ([www.tektronix.com/manuals](http://www.tektronix.com/manuals)).

### Related documentation

Item	Purpose
TLA Quick Start User Manuals	High-level operational overview
Online Help	In-depth operation and UI help
Installation Reference Sheets	High-level installation information
Installation Manuals	Detailed first-time installation information
XYZs of Logic Analyzers	Logic analyzer basics
Declassification and Securities instructions	Data security concerns specific to sanitizing or removing memory devices from Tektronix products
Application notes	Collection of logic analyzer application specific notes
Product Specifications & Performance Verification Procedures	TLA Product specifications and performance verification procedures
TPI.NET Documentation	Detailed information for controlling the logic analyzer using .NET
Field upgrade kits	Upgrade information for your logic analyzer
Optional Service Manuals	Self-service documentation for modules and mainframes



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# Operating basics

This section provides a brief description of the Tektronix P6910 General Purpose Logic Analyzer Probe, probe accessories, probe labels, and probe accessory connection instructions.

## Product description

The P6910 probe is a 34-channel, general purpose probe that provides connections from a Tektronix logic analyzer to the SUT (system-under-test).

The following list details the capabilities and qualities of the P6910 probe:

- 34 individual active channel connections
- Differential and single-ended data, clock and qualification inputs
- Lead set support for both single-ended and differential applications
- Holder for 8-channel applications
- Color-coded signal connectors
- $-2.5\text{ V}$  to  $+5\text{ V}$  input operating range
- Minimal loading of  $<1\text{ pF}$  and  $20\text{ k}\Omega$  to ground
- Operation in normal or inverted polarity is acceptable
- Any common mode voltage is acceptable as long as the maximum positive voltage does not exceed  $+5\text{ V}$  and the maximum negative voltage does not exceed  $-2.5\text{ V}$

## P6910 probe accessory information

The P6910 probe includes accessories to connect the logic analyzer to the SUT.

The following accessories are available for the P6910 probe:

- Option 1K provides accessories for probing applications for less than 100 MHz. Tektronix recommends ordering two of each of the accessories for a 34-channel probe. Details on the accessories are provided later in this document. (See page 9, *Option 1K accessories*.)
- Option 2K provides a probe accessory kit (Tektronix part number, 020-2973-01 or higher) for high-performance probing applications; provides different means to connect the logic analyzer to the SUT. Tektronix recommends ordering two accessory kits for a 34-channel probe. Details on the accessory kit contents are provided later in this document. (See page 10, *Option 2K accessories*.)

- Probe labels, one sheet
- *P6910 General Purpose Logic Analyzer Probe Instruction Manual* (Tektronix part number, 077-0630-xx, available on the TLA Documentation CD or downloadable from the Tektronix Web site: [www.tektronix.com/manuals](http://www.tektronix.com/manuals))

## Probe label overview

The logic analyzer probe comes with a sheet of labels to apply to the probe before connecting the probe to the instrument and SUT.

Tektronix provides a sheet of color-coded labels to apply to the probe to help identify the connections to the logic analyzer and to the SUT. The label color is designed to match the color of the probe connections on the logic analyzer. A set of custom labels is also available for custom applications.

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**NOTE.** *If you are labeling probes for either 34- or 68-channel logic analyzers, use a combination of two sets of probe labels for one of your probes. The labels for this probe are grouped within a dashed red line. (See Figure 1 on page 3.)*

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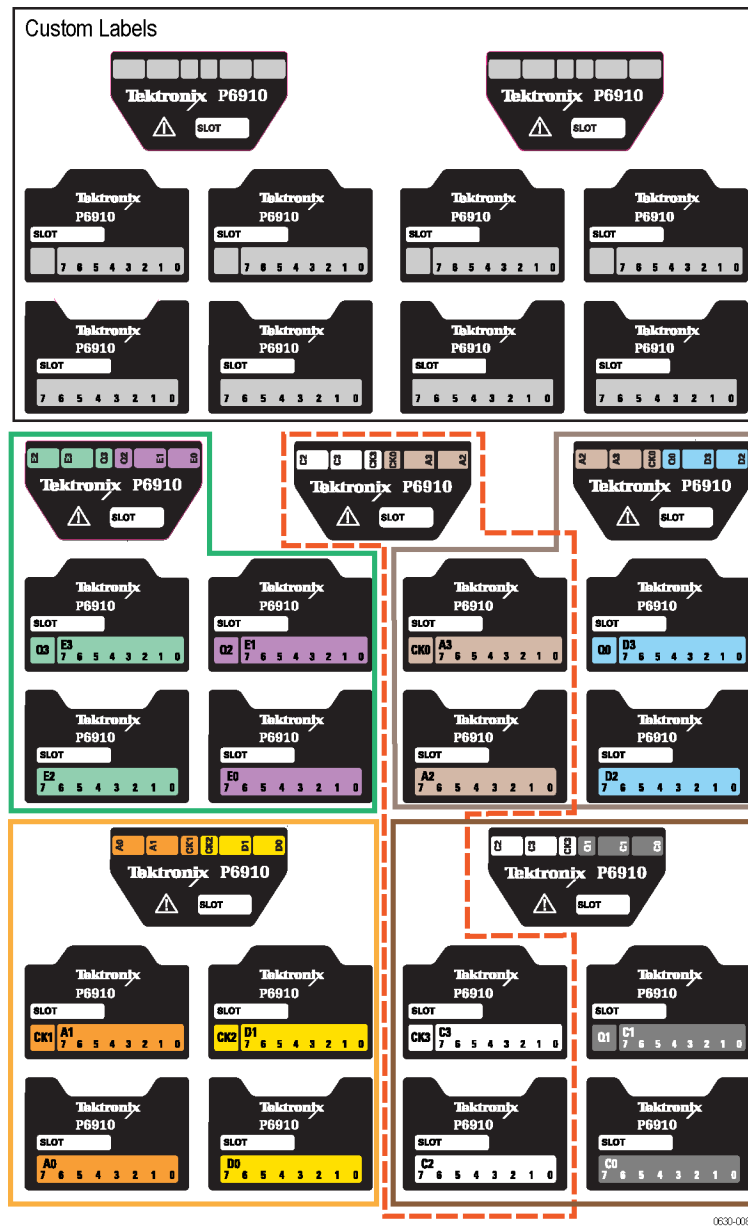


Figure 1: Example of a sheet of P6910 probe labels

## Apply the labels to the probe

Attach the labels to logic analyzer-end of the probe and to each of the four way stations.

Attach the color-coded labels to the probe to help you identify the logic analyzer and probe connections when connecting the probe to the SUT.

1. Determine the channel groups that you plan to use on your logic analyzer and identify the matching labels.

Refer to the logic analyzer to identify the number of probe connections (dependent on the number of channels on the instrument) and the channel color-coding that corresponds to the provided sheet of probe labels.

2. Identify the logic analyzer end of the probe. (See Figure 2 on page 5.)
3. Using a pair of flat-nosed tweezers, place the tip of the tweezers under the upper right corner of the logic analyzer-end label.

This will be the largest label of the five labels. Grasp the corner of the label and lift the label up and toward you.

4. Carefully align the label to the label indent located on the top of the logic analyzer-end and apply the label.
5. Identify the four way stations. (See Figure 2 on page 5.)

Note that the logic analyzer end label contains two colors. From the logic analyzer end follow one of the two colors down the length of the cable to the way station.

6. Using a pair of flat-nosed tweezers, place the tip of the tweezers under the upper right corner of the matching color-coded way station.

Grasp the corner of the label and lift the label up and toward you.

7. Carefully align the label to the label indent located on the top of the way station and apply the label.
8. Repeat step 7 for the second way station of the same color (but different label shape).
9. Repeat the above steps for the other logic analyzer-end label colors.

After applying the labels to the probes, you are ready to connect the probes to the logic analyzer.



Figure 2: Attaching the probe labels

## Connect the probe to the instrument

The P6910 probe connects a TLA6200 Series logic analyzer or TLA7000 Series logic analyzer with TLA7Axx or TLA7Bxx logic analyzer modules to the SUT.

Apply the labels to the probes before connecting the probes to the instrument and to the SUT.

Connect the probes to the logic analyzer using the following steps:

1. Match the color-coded labels of the probe to the same color-coded connector on the logic analyzer. (See Figure 3 on page 7.)
2. Identify the beveled edges of the connector inside the logic analyzer end of the probe.
3. Align the beveled edges of the connector to its mating connector on the logic analyzer and press into place.
4. Evenly tighten both screws on the logic analyzer end of the probe until they are snug.

Tighten each screw to 4 in-lbs (max).



**CAUTION.** *When attaching the probe to the logic analyzer, use care to evenly tighten probe screws until they are snug. Under-tightening the probe screws can result in intermittent operation. Over-tightening can result in stripped screws.*

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**NOTE.** *The P6910 probe can be connected to the logic analyzer when it is powered on. The probe head can also be connected to the SUT without turning the power off.*

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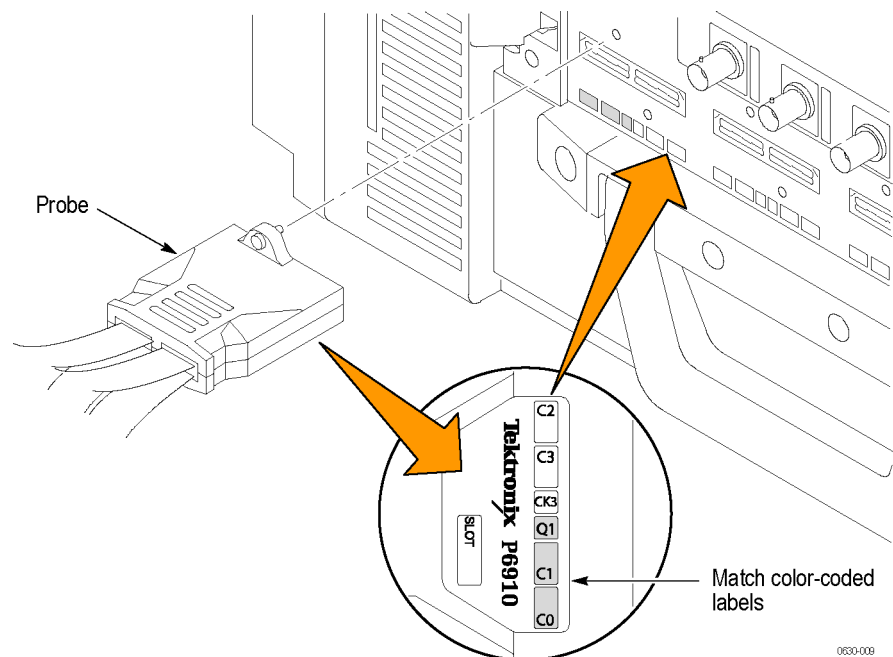


Figure 3: Connect the probe to the logic analyzer

## Connect the probe directly to the SUT

Connect the probe directly to square pin connectors on the SUT.



**CAUTION.** *The probe can be damaged by incorrectly connecting the probe to the SUT. Incorrect handling of the probe while connecting it to the SUT can damage the probe or the mating connector on the SUT. Always position the probe perpendicularly to the mating connector and then connect the probe.*

1. Connect the probe to the square pins on the SUT.

The probe is compatible with differential and single-ended signals. The (-) lead can be connected to the (-) side of a differential signal or to ground.

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**NOTE.** *Connect lead sets in groups or to individual locations on the SUT. If necessary, use the grouper from the accessories kit to hold the lead set together.*

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2. Connect the way station ground connector to a ground on the SUT.

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**NOTE.** *The lead sets have true differential inputs. For single-ended use, the negative input of the lead set can be connected to ground. However, the ground lead from each way station is provided to connect the probe ground to the SUT ground.*

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## Option 1K accessories

Option 1K provides probe accessories to connect the P6910 probe to the SUT for applications for less than 100 MHz. The following table and illustration show the probe accessories.

Ref number	Item	Quantity	Tektronix part number
1	8-channel lead set	2 ea	196-3470-01
2	1-channel lead set	1 ea	196-3471-01
3	Probe Grouper kit Header, 2 X 8 pin	2 ea 1 ea	020-3042-00
4	Probe grabber tips	2 ea 1 package of 10 tips	020-2896-00

<sup>1</sup> Instructions for installing the probe grouper are provided later in this manual. (See page 15, *Install the probe grouper (Option 1K and 2K).*)

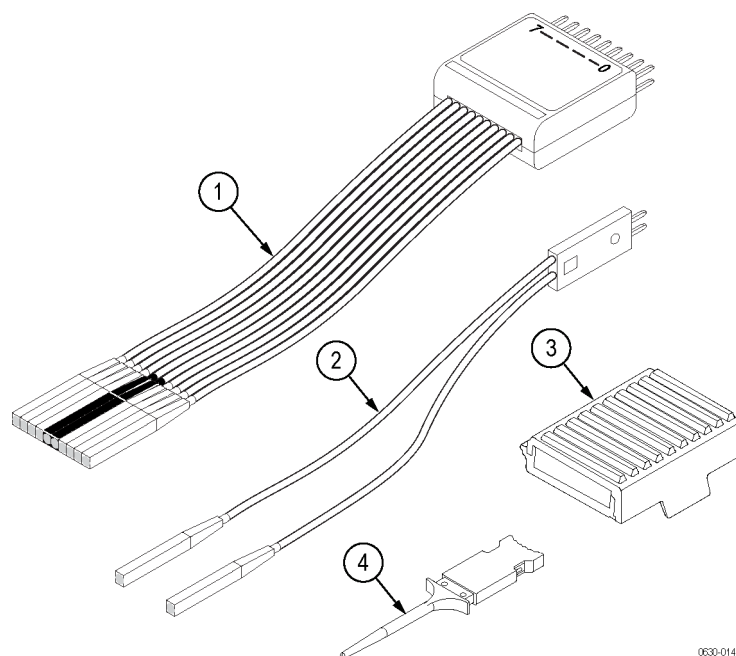


Figure 4: Option 1K accessories

## Option 2K accessories

Option 2K provides probe accessories with different means to connect the P6910 probe to the SUT.

Determine which method meets your particular needs. For some cases, you may need to either glue or solder the adapters to the SUT before connecting the probe. Not all of the accessories in the kit are needed for use with this probe.

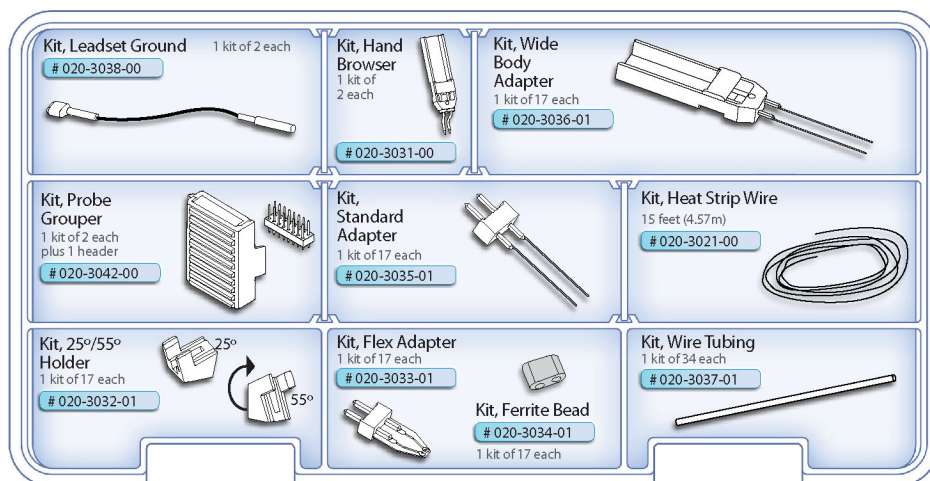
The accessory kit is identical to the one used with the P6780 MSO probe. Either the P6780 or P6910 probes can connect to any of the accessories in the kit. The accessories enable users to share accessories between either probe as well as switching between logic analyzer and oscilloscope probing applications.

The following table describes the contents of the accessory kit.

Item	Quantity	Tektronix part number
Standard Adapter	Kit of 17 ea	020-3035-01
Wire Tubing	Kit of 34 ea	020-3037-01
Ferrite Bead	Kit of 17 ea	020-3034-01
Wide Body Adapter	Kit of 17 ea	020-3036-01
Flex Adapter	Kit of 17 ea	020-3033-01
Insulated Wire	15 ft. (4.57 m)	020-3021-00
25°/55° Holder	Kit of 17 ea	020-3032-01
Lead set Ground	Kit of 2 ea	020-3038-00
Hand Browser	Kit of 2 ea	020-3031-00
Probe Grouper	2 ea	020-3042-00
Header, 2 X 8 pin	1 ea	



The following figure shows the individual contents of the accessory kit.



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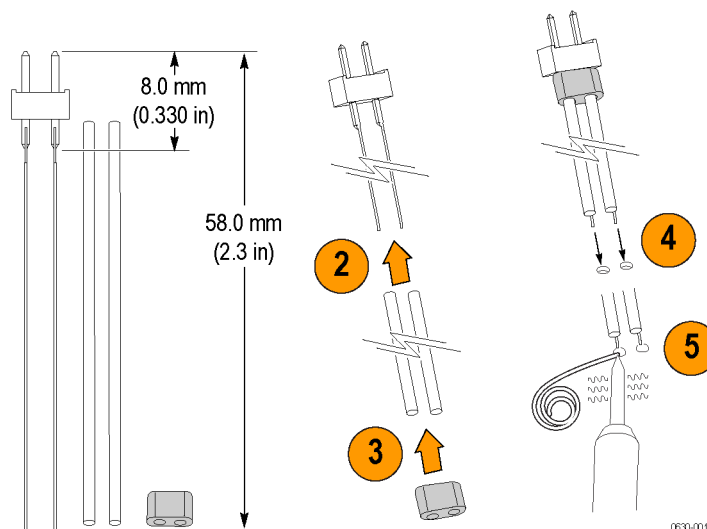
Figure 5: Option 2K accessory kit contents

### Install the standard adapter

Use the general purpose standard adapters for soldering to the component pins or vias on the SUT.

Install adapters on the PCB as needed to connect the probe to the SUT.

1. Locate the standard adapter in the accessory kit and trim the length according to your needs.
2. Trim the wire tubing to the desired length and slide it over the adapter leads. (See Figure 6 on page 11.)



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Figure 6: Installing the standard adapter on the PCB

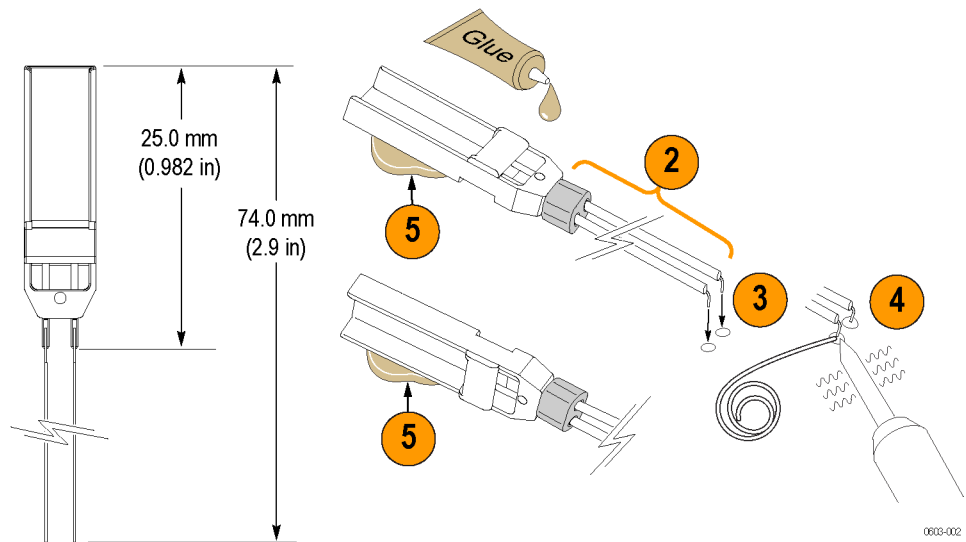
3. Attach the ferrite bead as needed to improve the signal quality. (See Figure 6.)
4. Insert the ends of the adapter onto the PCB.
5. Solder the adapter to the PCB.
6. Connect the probe lead set to the adapter.

### Install the wide body adapter

Use the wide body adapter to firmly hold the probe lead set in place on the PCB. The adapters can be stacked or grouped together depending on the connection needs.

Install the wide body adapter on the PCB after installing the wire tubing and ferrite bead:

1. Locate the wide body adapter in the accessory kit and trim the length according to your needs.
2. Trim the wire tubing to the desired length, attach the ferrite bead (if needed to improve the signal quality), and slide the ferrite bead and tubing over the adapter leads.
3. Insert the ends of the adapter onto the PCB.
4. Solder the adapter to the PCB.
5. Identify where to place the wide body adapter on the PCB and glue it into place. (See Figure 7 on page 12.)



**Figure 7: Install the wide body adapter on the PCB**

6. Connect the probe lead set to the adapter.

**Install the flex adapter**

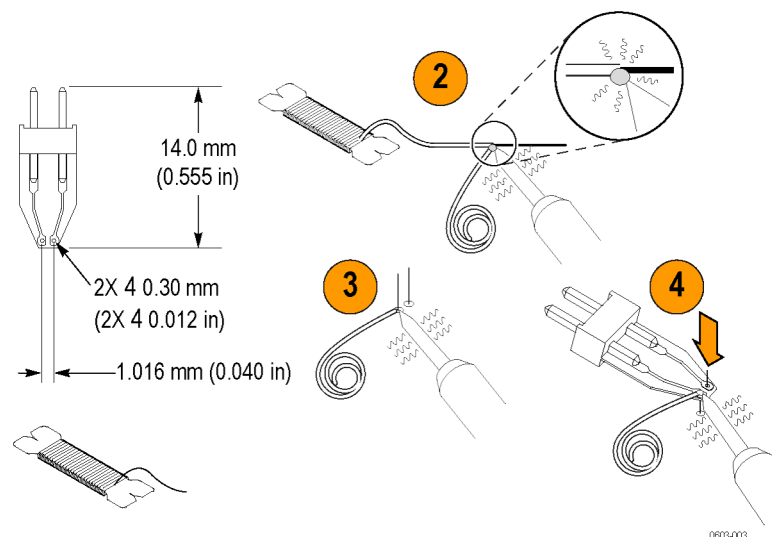
Use the flexible tip to connect to circuit board vias on the SUT.

1. Determine the location for the flex adapter on the circuit board.

The adapter connects to the SUT through the insulated wire provided with the accessory kit.

2. Use a soldering iron to melt the insulation on the wire to connect the adapter to the SUT. (See Figure 8 on page 13.)

Use two wires to connect differential signals from the probe to the SUT.



**Figure 8: Install the adapter to the SUT with the insulated wire**

3. Solder one end of the wire to the circuit board as shown. (See Figure 8.)

Install the second wire in the same manner.

4. Install the flex adapter over the two wires and solder it in place.
5. Connect the probe lead set to the adapter.

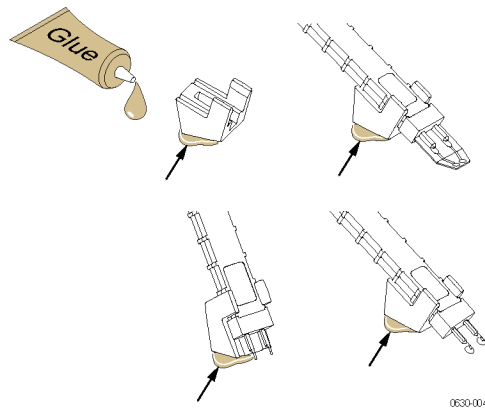
**Install the 25° /55° holder**

Use the holders to provide strain relief for the flex adapter and standard adapter at a 25° or 55° angle.

1. Determine if you want to use the holder with the adapters at a 25° or 55° angle on the circuit board.

Rotate the holder to work at either angle.

2. Position the holder so that the leads of the flex adapter or standard adapter align to the connections on the circuit board and glue the holder into place. (See Figure 9.)



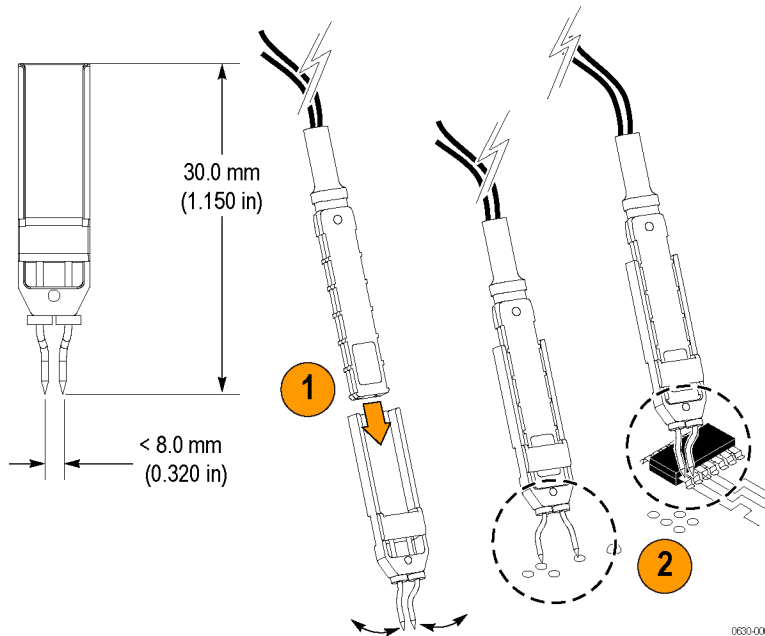
**Figure 9: Install the adapter holder by gluing it to the circuit board**

3. Install the lead set and the adapter in the holder.

### Install the hand browser

Use the hand browser to temporarily connect to signals of interest on the SUT.

1. Insert the lead set into the hand browser. (See Figure 10.)



**Figure 10: Insert the lead set into the hand browser**

2. Position the probe tips as needed to connect to the signal of interest on the SUT.

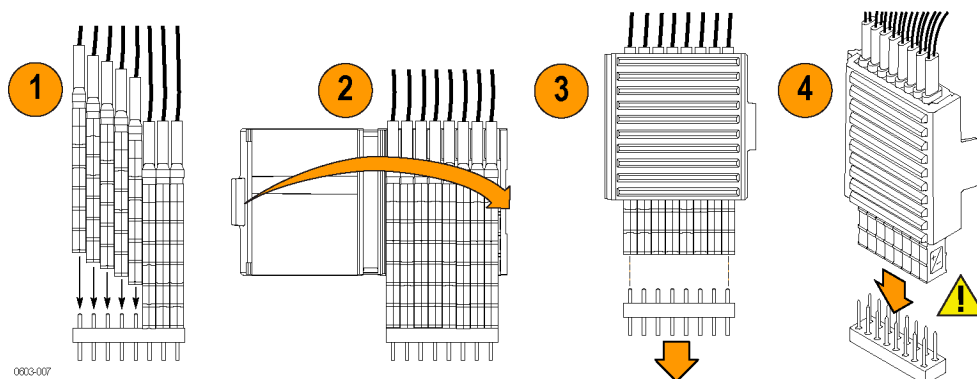
The probe tips swivel 360°.

### Install the probe grouper (Option 1K and 2K)

Use the probe grouper to group lead sets together for connections to adjacent pins on the SUT.

1. Connect the lead sets to the header. (See Figure 11.)

The header temporarily holds the lead sets in place while you install the grouper.



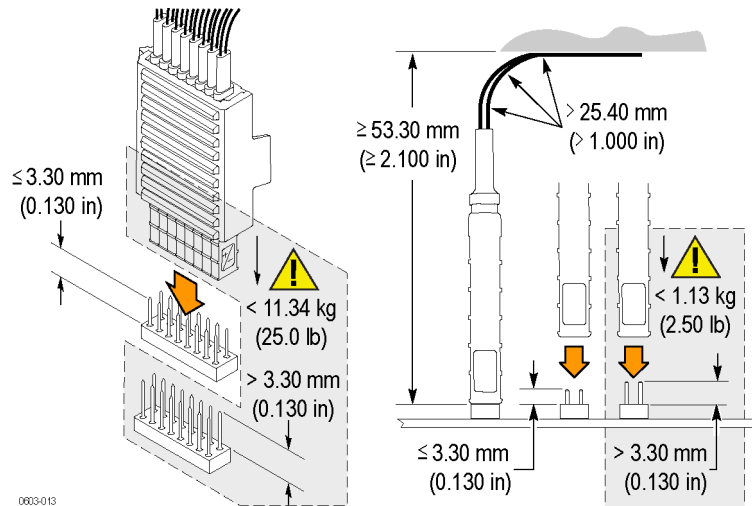
**Figure 11: Use the grouper to hold the lead sets together**

2. Place the grouper around the lead sets and close it in place.
3. Remove the header from the lead sets.
4. Connect the assembly to the SUT.

Note the insertion force and clearance guidelines when connecting the probe to the SUT. (See Figure 12 on page 16.)



**WARNING.** To avoid damaging the lead sets, do not exceed the clearances or insertion force for the lead sets and square pins. Refer to the following illustration for clearance and insertion force information.



**Figure 12: Clearance and insertion force information for the lead sets**

# Reference

## Clock and qualifiers

Use the clock and qualifier probe connections from the SUT to define how the logic analyzer stores data.

Every logic analyzer has some-special purpose input channels. Inputs designated as clocks can cause the logic analyzer to store data. Qualifier channels can be logically AND'ed and OR'ed with clocks to further define when to latch data from the SUT. Routing the appropriate signals from the design to these inputs ensures that the logic analyzer can acquire data correctly. Unused clocks can be used as qualifier signals.

Depending on the channel width, each logic analyzer will have a different set of clock and qualifier channels. The following table shows the availability of the clock and qualifier channels.

**Table 1: Logic analyzer clock and qualifier availability**

Logic analyzer width	Clock inputs				Qualifier inputs			
	CLK:0	CLK:1	CLK:2	CLK:3	QUAL:0	QUAL:1	QUAL:2	QUAL:3
34-channel	✓			✓				
68-channel	✓	✓	✓	✓				
102-channel	✓	✓	✓	✓	✓	✓		
136-channel	✓	✓	✓	✓	✓	✓	✓	✓

All clock and qualifier channels are stored. The logic analyzer always stores the logic state of these channels every time it latches data.

Since clock and qualifier channels are stored in memory there is no need to double-probe these signals for timing analysis. When switching from state to timing analysis modes, all of the clock and qualifier signals will be visible. This also allows you to route regular signals, those not needed for clocking, to these channels when they are not being used for their special purpose.

It is a good practice to take advantage of these channels to increase your options for when you will latch data. Routing several of your design's clocks and strobes to the logic analyzer clock inputs will provide you with a greater flexibility in the logic analyzer clocking setup menus.

As an example, look at a processor with a master clock, a data strobe, and an address strobe. Routing all three of these signals to the logic analyzer clock inputs will enable you to latch data on the processor master clock, only when data is strobed, or only when address is strobed. Some forethought in signal routing can greatly expand the ways to latch and analyze data.

A processor also provides a good example of signals that can be useful as qualifiers. There are often signals that indicate data reads versus data writes (R/W), signals that show when alternate bus masters have control of the processor buses (DMA), and signals that show when various memory devices are being used (ChipSel). All of these signals are good candidates for assignment to qualifier channels.

By logically AND'ing the clock with one of these qualifiers you can program the logic analyzer to store only data reads or data writes. Using the DMA signal as a qualifier provides a means of filtering out alternate bus master cycles. Chip selects can limit data latching to specific memory banks, I/O ports, or peripheral devices.

## Multiplexed buses

The logic analyzer can demultiplex data from multiplexed buses.

Each signal on a dual- or quad-multiplexed bus can be demultiplexed into its own logic analyzer channel. Refer to the following tables to determine which channel groups to connect to feed the test data to channels on the SUT.

**Table 2: 2X demultiplexing source-to channel assignments**

Base connecting channel groups	Prime channels receiving SUT test data			
	136-channel logic analyzer	102-channel logic analyzer	68-channel logic analyzer	34-channel logic analyzer
A3:7-0	D3:7-0	D3:7-0	C3:7-0	C3:7-0
A2:7-0	D2:7-0	D2:7-0	C2:7-0	C2:7-0
A1:7-0	D1:7-0	D1:7-0	D1:7-0	—
A0:7-0	D0:7-0	D0:7-0	D0:7-0	—
C3:7-0	C1:7-0	C1:7-0	—	—
C2:7-0	C0:7-0	C0:7-0	—	—
E3:7-0	E1:7-0	—	—	—
E2:7-0	E0:7-0	—	—	—
CLK:0	QUAL:1	QUAL:1	—	—
CLK:1	QUAL:0	QUAL:0	—	—
CLK:2	QUAL:3	—	—	—
CLK:3	QUAL:2	—	—	—



Table 3: 4X demultiplexing source-to channel assignments

Base connecting channel groups	Prime channels receiving SUT test data			
	136-channel logic analyzer	102-channel logic analyzer	68-channel logic analyzer	34-channel logic analyzer
C3:7-0	C2:7-0 C1:7-0 C0:7-0	C2:7-0 C1:7-0 C0:7-0	A3:7-0 A2:7-0 C2:7-0	A3:7-0 A2:7-0 C2:7-0
A1:7-0	A0:7-0 D1:7-0 D0:7-0	A0:7-0 D1:7-0 D0:7-0	A0:7-0 D1:7-0 D0:7-0	—
A3:7-0	A2:7-0 D3:7-0 D2:7-0	A2:7-0 D3:7-0 D2:7-0	—	—
E3:7-0	E2:7-0 E1:7-0 E0:7-0	—	—	—
CLK:3	CLK:2 QUAL:3 QUAL:2	—	—	—
CLK:1	CLK:0 QUAL:1 QUAL:0	CLK:0 QUAL:1 QUAL:0	—	—

When demultiplexing data there is no need to connect the destination channels to the multiplexed bus. Data from the source channels are routed to the destination channels internal to the logic analyzer.

Demultiplexing affects only the main memory for the destination channels. This means that the MagniVu memory is filled with data from whatever is connected to the demultiplexing destination channel probe inputs. This provides an opportunity to acquire high resolution MagniVu data on a few extra channels. Connecting the demultiplexing destination channels to other signals will allow viewing of their activity in the MagniVu memory but not the main memory.

## Range recognizers

When using range recognizers, probe groups and probe channels must be in hardware order.

Probe groups must be used from the most-significant probe group to the least-significant probe group based on the following order:

C3 C2 C1 C0 E3 E2 E1 E0 A3 A2 D3 D2 A1 A0 D1 D0 Q3 Q2 Q1 Q0  
CK3 CK2 CK1 CK0

Probe channels must be from the most-significant channel to the least-significant channel based on the following order:

7 6 5 4 3 2 1 0

The above example assumes a 136-channel logic analyzer. The missing channels in instruments with fewer than 136 channels are ignored. With merged modules, range recognition extends across the first three modules: the master module contains the most-significant channels.

## Probe signal names

Use signal names to simplify probe connections to the logic analyzer.

Refer to the following tables for information on signal connections. Match the alpha character that precedes the channel identifier (for example, E3:7) to the probe head label.

All differential data and clock/qualifiers on the probe may have the negative input pin grounded and be used as a single-ended input.

You can find more information on 2X and 4X demultiplexing channel assignments in the *Demultiplexing Information* section. (See Table 2 on page 18.) (See Table 3 on page 19.)

**Table 4: Signal connections on 136- and 102-channel instruments for probe 4 and probe 3**

Signal name	Podlet	Probe 4 way station for 136-channel instrument only				Probe 3 way station for 136- and 102-channel instruments			
Clk/Qual	Clk/Qual	Q3-	Q2-	Q1-	Q0-	CK0-	CK1-	Q0-	Q1-
Clk/Qual+	Clk/Qual	Q3+	Q2+	Q1+	Q0+	CK0+	CK1+	Q0+	Q1+
Data 7-	7	E3:7-	E2:7-	E1:7-	E0:7-	A3:7-	A2:7-	D3:7-	D2:7-
Data 7+	7	E3:7+	E2:7+	E1:7+	E0:7+	A3:7+	A2:7+	D3:7+	D2:7+
Data 6-	6	E3:6-	E2:6-	E1:6-	E0:6-	A3:6-	A2:6-	D3:6-	D2:6-
Data 6+	6	E3:6+	E2:6+	E1:6+	E0:6+	A3:6+	A2:6+	D3:6+	D2:6+
Data 5-	5	E3:5-	E2:5-	E1:5-	E0:5-	A3:5-	A2:5-	D3:5-	D2:5-
Data 5+	5	E3:5+	E2:5+	E1:5+	E0:5+	A3:5+	A2:5+	D3:5+	D2:5+
Data 4-	4	E3:4-	E2:4-	E1:4-	E0:4-	A3:4-	A2:4-	D3:4-	D2:4-
Data 4+	4	E3:4+	E2:4+	E1:4+	E0:4+	A3:4+	A2:4+	D3:4+	D2:4+
Data 3-	3	E3:3-	E2:3-	E1:3-	E0:3-	A3:3-	A2:3-	D3:3-	D2:3-
Data 3+	3	E3:3+	E2:3+	E1:3+	E0:3+	A3:3+	A2:3+	D3:3+	D2:3+
Data 2-	2	E3:2-	E2:2-	E1:2-	E0:2-	A3:2-	A2:2-	D3:2-	D2:2-
Data 2+	2	E3:2+	E2:2+	E1:2+	E0:2+	A3:2+	A2:2+	D3:2+	D2:2+
Data 1-	1	E3:1-	E2:1-	E1:1-	E0:1-	A3:1-	A2:1-	D3:1-	D2:1-
Data 1+	1	E3:1+	E2:1+	E1:1+	E0:1+	A3:1+	A2:1+	D3:1+	D2:1+
Data 0-	0	E3:0-	E2:0-	E1:0-	E0:0-	A3:0-	A2:0-	D3:0-	D2:0-
Data 0+	0	E3:0+	E2:0+	E1:0+	E0:0+	A3:0+	A2:0+	D3:0+	D2:0+

Table 5: Signal connections on 102- and 136-channel instruments for probe 2 and probe 1

Signal name	Podlet	Probe 2 way station for 136- and 102-channel instruments				Probe 1 way station for 136- and 102-channel instruments			
Clk/Qual-	Clk/Qual-	CK1-		CK2-		CK3-		Q1-	
Clk/Qual+	Clk/Qual+	CK1+		CK2+		CK3+		Q1+	
Data 7-	7	A1:7-	A0:7-	D1:7-	D0:7-	C3:7-	C2:7-	C1:7-	C0:7-
Data 7+	7	A1:7+	A0:7+	D1:7+	D0:7+	C3:7+	C2:7+	C1:7+	C0:7+
Data 6-	6	A1:6-	A0:6-	D1:6-	D0:6-	C3:6-	C2:6-	C1:6-	C0:6-
Data 6+	6	A1:6+	A0:6+	D1:6+	D0:6+	C3:6+	C2:6+	C1:6+	C0:6+
Data 5-	5	A1:5-	A0:5-	D1:5-	D0:5-	C3:5-	C2:5-	C1:5-	C0:5-
Data 5+	5	A1:5+	A0:5+	D1:5+	D0:5+	C3:5+	C2:5+	C1:5+	C0:5+
Data 4-	4	A1:4-	A0:4-	D1:4-	D0:4-	C3:4-	C2:4-	C1:4-	C0:4-
Data 4+	4	A1:4+	A0:4+	D1:4+	D0:4+	C3:4+	C2:4+	C1:4+	C0:4+
Data 2+	2	A1:2+	A0:2+	D1:2+	D0:2+	C3:2+	C2:2+	C1:2+	C0:2+
Data 3-	3	A1:3-	A0:3-	D1:3-	D0:3-	C3:3-	C2:3-	C1:3-	C0:3-
Data 3+	3	A1:3+	A0:3+	D1:3+	D0:3+	C3:3+	C2:3+	C1:3+	C0:3+
Data 2-	2	A1:2-	A0:2-	D1:2-	D0:2-	C3:2-	C2:2-	C1:2-	C0:2-
Data 1-	1	A1:1-	A0:1-	D1:1-	D0:1-	C3:1-	C2:1-	C1:1-	C0:1-
Data 1+	1	A1:1+	A0:1+	D1:1+	D0:1+	C3:1+	C2:1+	C1:1+	C0:1+
Data 0-	0	A1:0-	A0:0-	D1:0-	D0:0-	C3:0-	C2:0-	C1:0-	C0:0-
Data 0+	0	A1:0+	A0:0+	D1:0+	D0:0+	C3:0+	C2:0+	C1:0+	C0:0+

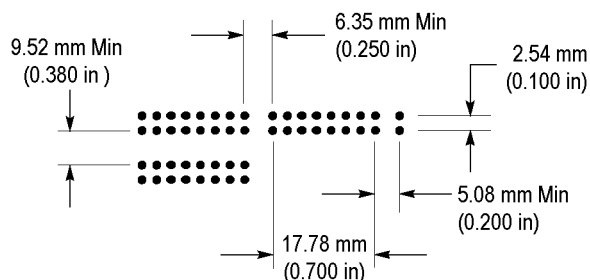
**Table 6: Signal connections on 68- and 34-channel instruments**

<b>Signal name</b>	<b>Podlet</b>	<b>Probe 2 way station for 68-channel instrument only</b>				<b>Probe 1 way station for 34-channel instrument only</b>		
Clk/Qual	Clk/Qual	CK1-		CK2-		CK3-		
Clk/Qual+	Clk/Qual	CK1+		CK2+		CK3+		
Data 7-	7	A1:7-	A0:7-	D1:7-	D0:7-	C3:7-	C2:7-	A2:7-
Data 7+	7	A1:7+	A0:7+	D1:7+	D0:7+	C3:7+	C2:7+	A2:7+
Data 6-	6	A1:6-	A0:6-	D1:6-	D0:6-	C3:6-	C2:6-	A2:6-
Data 6+	6	A1:6+	A0:6+	D1:6+	D0:6+	C3:6+	C2:6+	A2:6+
Data 5-	5	A1:5-	A0:5-	D1:5-	D0:5-	C3:5-	C2:5-	A2:5-
Data 5+	5	A1:5+	A0:5+	D1:5+	D0:5+	C3:5+	C2:5+	A2:5+
Data 4-	4	A1:4-	A0:4-	D1:4-	D0:4-	C3:4-	C2:4-	A2:4-
Data 4+	4	A1:4+	A0:4+	D1:4+	D0:4+	C3:4+	C2:4+	A2:4+
Data 3-	3	A1:3-	A0:3-	D1:3-	D0:3-	C3:3-	C2:3-	A2:3-
Data 3+	3	A1:3+	A0:3+	D1:3+	D0:3+	C3:3+	C2:3+	A2:3+
Data 2-	2	A1:2-	A0:2-	D1:2-	D0:2-	C3:2-	C2:2-	A2:2-
Data 2+	2	A1:2+	A0:2+	D1:2+	D0:2+	C3:2+	C2:2+	A2:2+
Data 1-	1	A1:1-	A0:1-	D1:1-	D0:1-	C3:1-	C2:1-	A2:1-
Data 1+	1	A1:1+	A0:1+	D1:1+	D0:1+	C3:1+	C2:1+	A2:1+
Data 0-	0	A1:0-	A0:0-	D1:0-	D0:0-	C3:0-	C2:0-	A2:0-
Data 0+	0	A1:0+	A0:0+	D1:0+	D0:0+	C3:0+	C2:0+	A2:0+

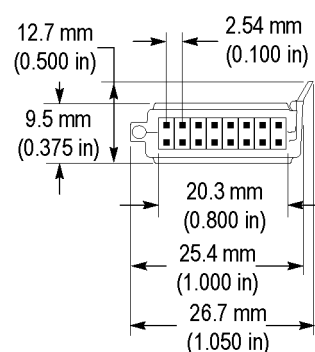
## Probe footprints

Pin spacing allows for space tolerances between the podlet holder and the clock/qualifier configurations.

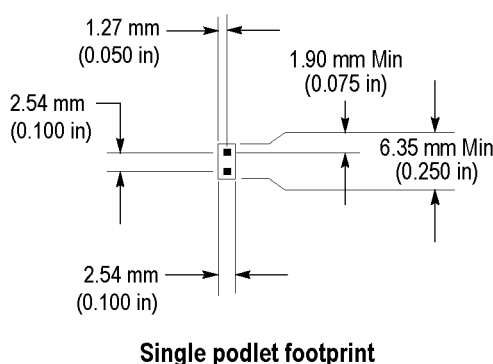
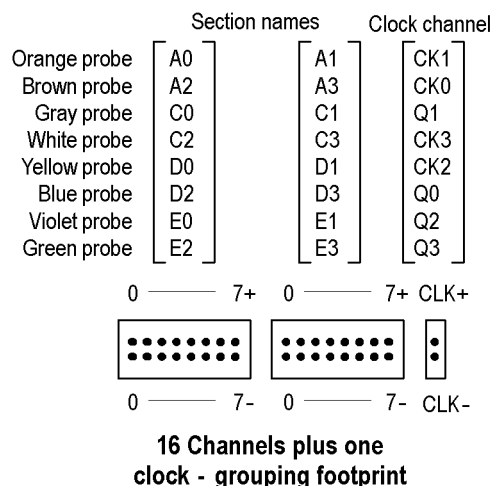
Refer to the following figure for footprint information. (See Figure 13.) Negative inputs of differential signals can be grounded to support single-ended signal inputs.



**Pin spacing between 8-channel podlet groups and clock/qual podlets**



**8-Channel probe footprint with 8-channel podlet grouper attached**



**Single podlet footprint**

All dimensions are per standard IPC tolerance, which is 0.004 inches

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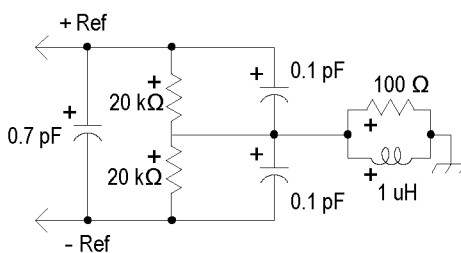
**Figure 13: P6910 General-Purpose probe land footprint**

## Load models

Load models are important electrical considerations when working with the P6910 probe.

The low frequency model is typically adequate for rise and fall times of 1 ns or greater in a typical  $25\ \Omega$  source impedance environment ( $50\ \Omega$  runs with a pass-through connection). For source impedance outside this range, and/or rise and fall times less than 1 ns, use the high frequency model to determine if a significant difference is obtained in the modeling result.

The following electrical model displays a single podlet load model of the probe. (See Figure 14.)



**Figure 14: Single podlet load model**

## Specifications

The following tables list the electrical and environmental specifications for the P6910 probe.

The electrical specifications apply when the probe is connected between a compatible logic analyzer and a SUT. Refer to the *Tektronix Logic Analyzer Series Product Specifications & Performance Verification Technical Reference Manual* (available on the TLA Documentation CD or downloadable from the Tektronix Web site) for a complete list of system and module specifications. The probes are designed to meet Tektronix standard 062-2847-00 class 5.

**Table 7: Mechanical and electrical specifications**

Characteristic	Description
Threshold accuracy	$\pm(35\ \text{mV} \pm 1\% \text{ of setting})$
Input resistance	$20\ \text{k}\Omega \pm 1\%$
Input capacitance	$<1.0\ \text{pF}^1$
Minimum digital signal swing	300 mV single-ended
Maximum nondestructive input signal to probe	$\pm 15\ \text{V}$
Delay from probe tip to input connector	$7.70\ \text{ns} \pm 80\ \text{ps}$

**Table 7: Mechanical and electrical specifications (cont.)**

Characteristic	Description
Probe length	1.8 m (6 ft)
Operating range	+5 V to -2.5 V

<sup>1</sup> P6910 single podlet input capacitance is 0.7 pF, but podlets in a group will have <1 pF input capacitance.

**Table 8: Environmental specifications**

Characteristic	Description
Temperature	
Operating	0 °C to 50 °C (32 °F to 122 °F) with 5 °C/hour maximum gradient, noncondensing
Nonoperating	-55 °C to 75 °C (-67 ° to 167°F) with 5 °C/hour maximum gradient, no media in instrument drive
Humidity	
Operating	5% to 95% relative humidity ≤ 30 °C (86 °F) 5% to 75% relative humidity 30 °C to 60 °C (86 °F to 140 °F) Non condensing
Nonoperating	5% to 95% relative humidity ≤ 30 °C (86 °F) 5% to 75% relative humidity 30 °C to 50 °C (86 °F to 122 °F) Non condensing
Altitude	
Operating	Up to 4600 m (15,092 ft)
Nonoperating	Up to 4600 m (15,092 ft)





# Maintenance

## Probe calibration information

The probe does not require calibration. If a probe failure occurs, return the entire probe to your Tektronix representative for repair.

## Probe service strategy information

The following service options are available when you order your Tektronix product:

**Table 9: Service options**

Option	Description
C3	Calibration Service 3 Years Includes initial certifications plus two annual calibrations
C5	Calibration Service 5 Years Includes initial certifications plus four annual calibrations
R3	Repair Service 3 Years Return product to Tektronix for servicing
R5	Repair Service 5 Years Return product to Tektronix for servicing
R3DW	Repair Service Coverage 3 Years (includes product warranty period). 3-year period starts at time of instrument purchase
R5DW	Repair Service Coverage 5 Years (includes product warranty period). 5-year period starts at time of instrument purchase

## Perform the functional check

A functional check verifies basic functionality of the probe.

1. Connect the probe to the logic analyzer and to an active signal source.
2. Open the Setup window where the probes are attached to the logic analyzer.  
If your logic analyzer is a TLA7000 Series mainframe with multiple modules, open the Setup window for the module where the probes are attached.
3. Check for signal activity in the Setup window for the attached probe.

## Inspect or clean the probe

Inspect and clean the probe as often as operating conditions require. Dirt acts as an insulating blanket, preventing efficient heat dissipation. Dirt also provides an electrical conduction path that can cause failures, especially under high-humidity conditions.

Perform the following steps to clean the probe:

1. Keep the probes free of dirt, dust, and contaminants to maintain a reliable electrical probe connection.
2. Remove dirt and dust with a soft brush.
3. Use only a damp cloth for more extensive cleaning.

Never use abrasive cleaners or organic solvents.

## Repackage the probe

The following information describes how to repackage the probe, to store the probe, or to return the probes to the factory.

1. Use the original packaging, if possible.

If the original packaging is not available, use a corrugated cardboard shipping carton.

2. Add cushioning material to prevent the probes from moving inside the shipping container.
3. Enclose the following information when shipping the probe to a Tektronix Center:
  - Owner's address
  - Name and phone number of a contact person
  - Type of probe
  - Reason for return
  - Full description of the service required

# Replaceable parts

## Parts ordering information

Replacement parts are available through your local Tektronix field office or representative.

The P6910 probe contains no user-replaceable parts. However, probe accessories can be replaced. (See page 1, *P6910 probe accessory information*.) Contact your local Tektronix representative for replacement information.

Changes to Tektronix products are sometimes made to accommodate improved components as they become available and to give you the benefit of the latest improvements. When ordering parts, include the following information in your order:

- Part number
- Instrument type or model number
- Instrument serial number
- Instrument modification number, if applicable

If you order a part that has been replaced with a different or improved part, your local Tektronix field office or representative will contact you concerning any change in the part number.



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# Glossary

## **Functional check procedure**

Functional check procedures verify the basic functionality of the probes by confirming that the probes recognize signal activity at the probe tips.

## **Keep out area**

The area of the printed circuit board in which only probe components may be mounted.

## **Logic analyzer-end**

The end of the probe which connects to the logic analyzer.

## **Module**

The unit that plugs into a TLA7000 series mainframe which provides instrument capabilities such as logic analysis.

## **Podlet**

A circuit contained in a flex lead and attached to a probe which provides square-pin connections to the circuit under test for one data acquisition channel and a reference pin.

## **Podlet holder**

A removable clip that groups eight individual podlets into a single 8-wide P6910 probe assembly. This provides ease when connecting to a row of 2 x 8 2.54 mm (0.100 in) square pins.

## **PCB**

An acronym for Printed Circuit Board.

## **Probe head**

The end of the probe that connects to the SUT.

## **SUT**

System-Under-Test. Also known as the target system. The logic analyzer connects to the SUT through the probe.

## **Way station**

An intermediate probe part is used to connect the heads of the P6910 probes to a single ribbon cable.



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