P5910
General Purpose Logic Analyzer Probe

Instruction Manual

www.tektronix.com

077-0635-01

Tektronix

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For product information, sales, service, and technical support:

- In North America, call 1-800-833-9200.
- Worldwide, visit www.tektronix.com to find contacts in your area.

Warranty

Tektronix warrants that this product will be free from defects in materials and workmanship for a period of one (1) year from the date of shipment. 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. Parts, modules and replacement products used by Tektronix for warranty work may be new or reconditioned to like new performance. All replaced parts, modules and products become the property of Tektronix.

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, with shipping charges prepaid. 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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[W2 – 15AUG04]

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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:

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.*

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:

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).

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).

Related documentation

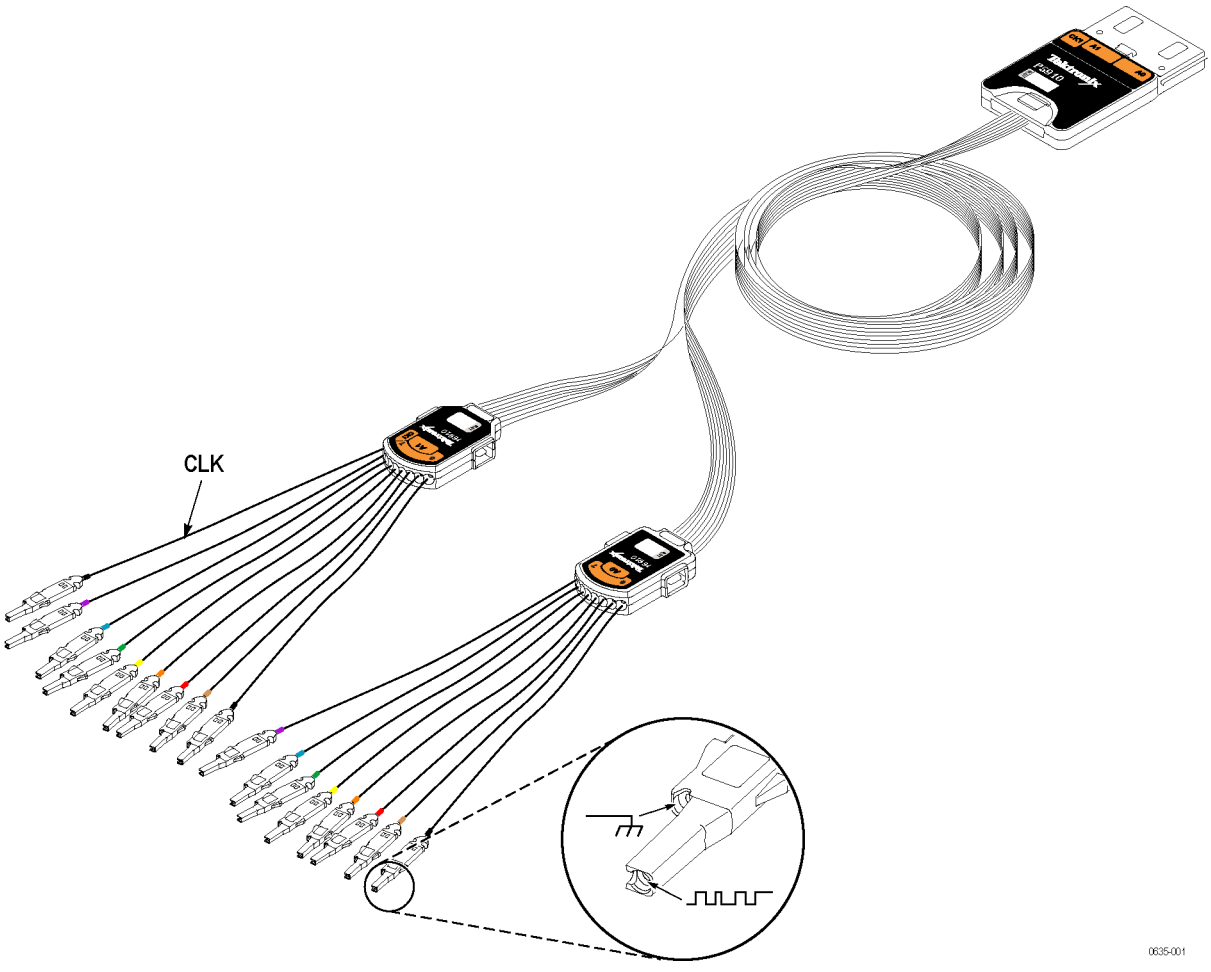
Item	Purpose
TLA Quick Start User Manuals	High-level operational overview
Online Help	In-depth operation and UI help
Installation Reference Sheets	High-level installation information
Installation Manuals	Detailed first-time installation information
XYZs of Logic Analyzers	Logic analyzer basics
Declassification 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
Field upgrade kits	Upgrade information for your logic analyzer
Optional Service Manuals	Self-service documentation for modules and mainframes

Operating basics

This section provides a brief description of the Tektronix P5910 General Purpose Logic Analyzer Probe, probe accessories, probe labels, and probe accessory connection instructions.

Product description

The P5910 probe is a 17-channel, general purpose probe that provides connections from a Tektronix TLA6400 series logic analyzer to the SUT (system-under-test).



The following list details the capabilities and qualities of the P5910 probe:

- 16 data channels and one clock/qualifier channel
- Holder for 8-channel applications
- Color-coded signal connectors
- 300 mV minimum single-ended signal amplitude
- -2.5 V to 5.5 V input operating range
- Minimum loading of 20 KΩ, 1.25 pF to ground

P5910 probe accessory information

The P5910 probe includes accessories to connect the logic analyzer to the SUT.

The following accessories are available for the P5910 probe:

- Logic probe accessory kit (Tektronix part number, 020-2662-xx); provides different means to connect the logic analyzer probe to the SUT.
- Probe labels (Tektronix part number 335-2736-xx)
- *P5910 General Purpose Logic Analyzer Probe Instruction Manual* (Tektronix part number, 077-0635-xx, available on the TLA Documentation CD or downloadable from the Tektronix Web site: www.tektronix.com/manuals)

Probe label overview

Tektronix provides 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.

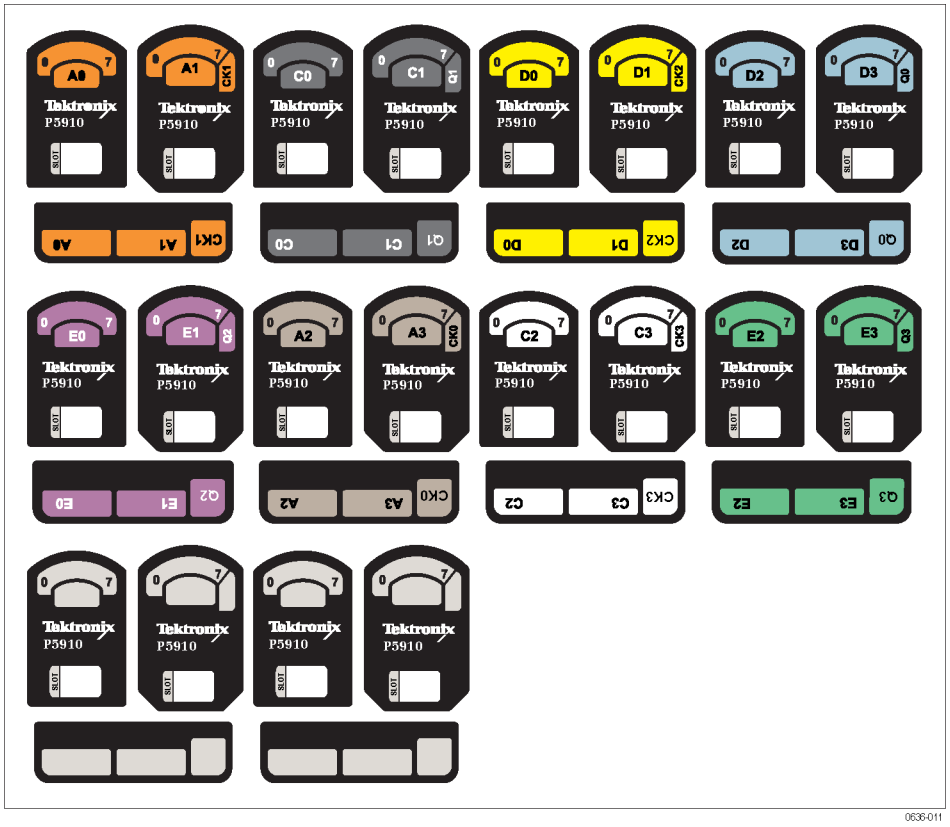


Figure 1: Example of a sheet of P5910 probe labels

Apply the labels to the probe

Attach the labels to the probe connector and to the probe heads.

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 group/color that you plan to use for your probe and select the appropriate label group from the label sheet.

   Refer to the logic analyzer to identify the channel color-coding that corresponds to the provided sheet of probe labels.

2. Locate the probe connector label for your probe and carefully apply it to the probe.

3. Apply the remaining two labels to the probe heads (SUT end of the probe).

   Match the corners of each label to the label detents on the probe heads.

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

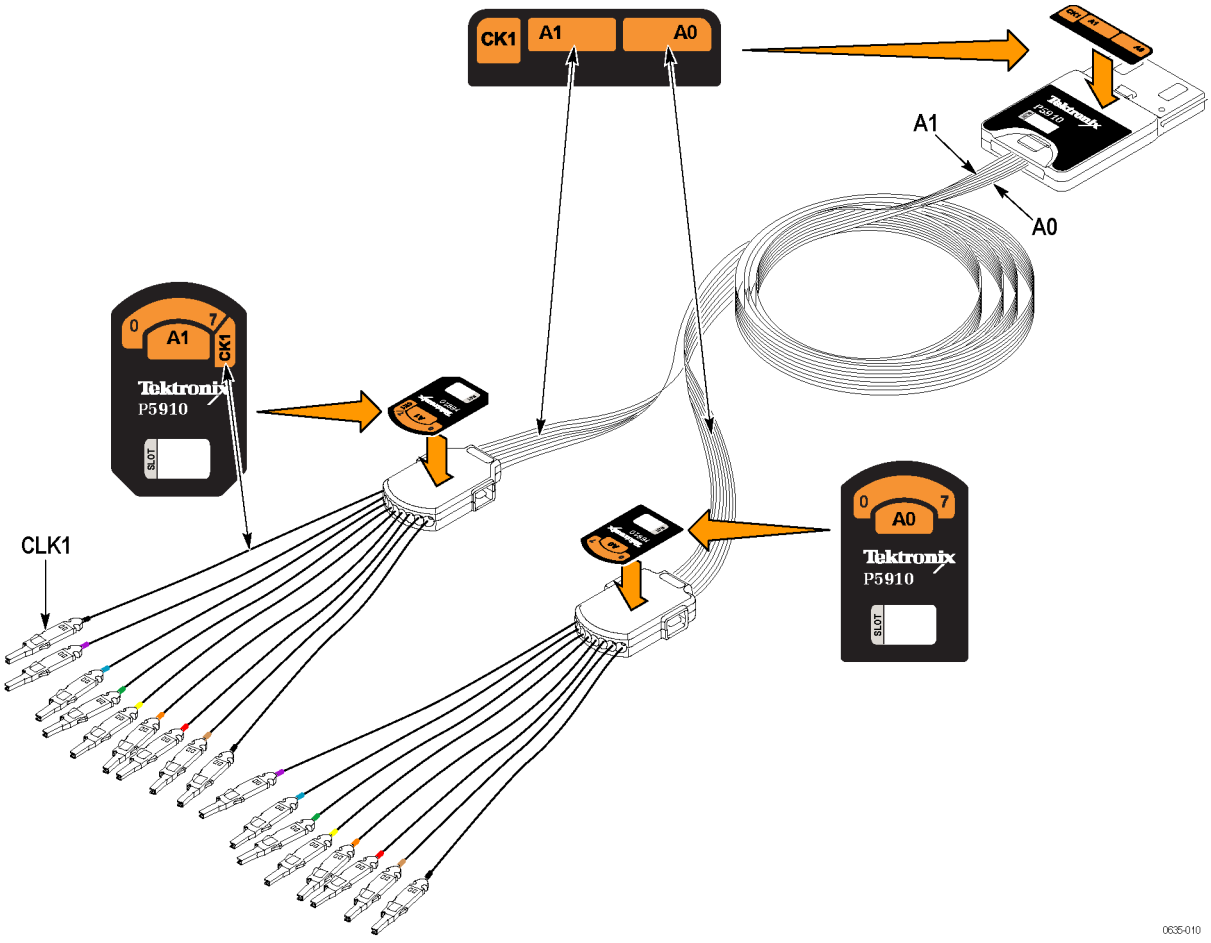


Figure 2: Attaching the probe labels

Accessory kit information

The probe accessory kit provides accessories to use when connecting the P5910 probe to the SUT.

The accessory kit provides different ways to connect the P5910 probe to the SUT. Determine which method meets your particular needs. The following table lists the contents of the accessory kit.

Table 1: Accessory kit contents

Item	Quantity	Tektronix part number
Extension ground tips	20	020-2711-xx
Probe tips	10	131-5638-11
IC grabber	20	020-2733-xx
3-inch ground lead set	8	020-2712-xx
8-inch ground lead set	2	020-2713-xx
Probe grouper	2	352-1115-xx

The following illustration shows the accessory kit and the contents with information on using the kit accessories.

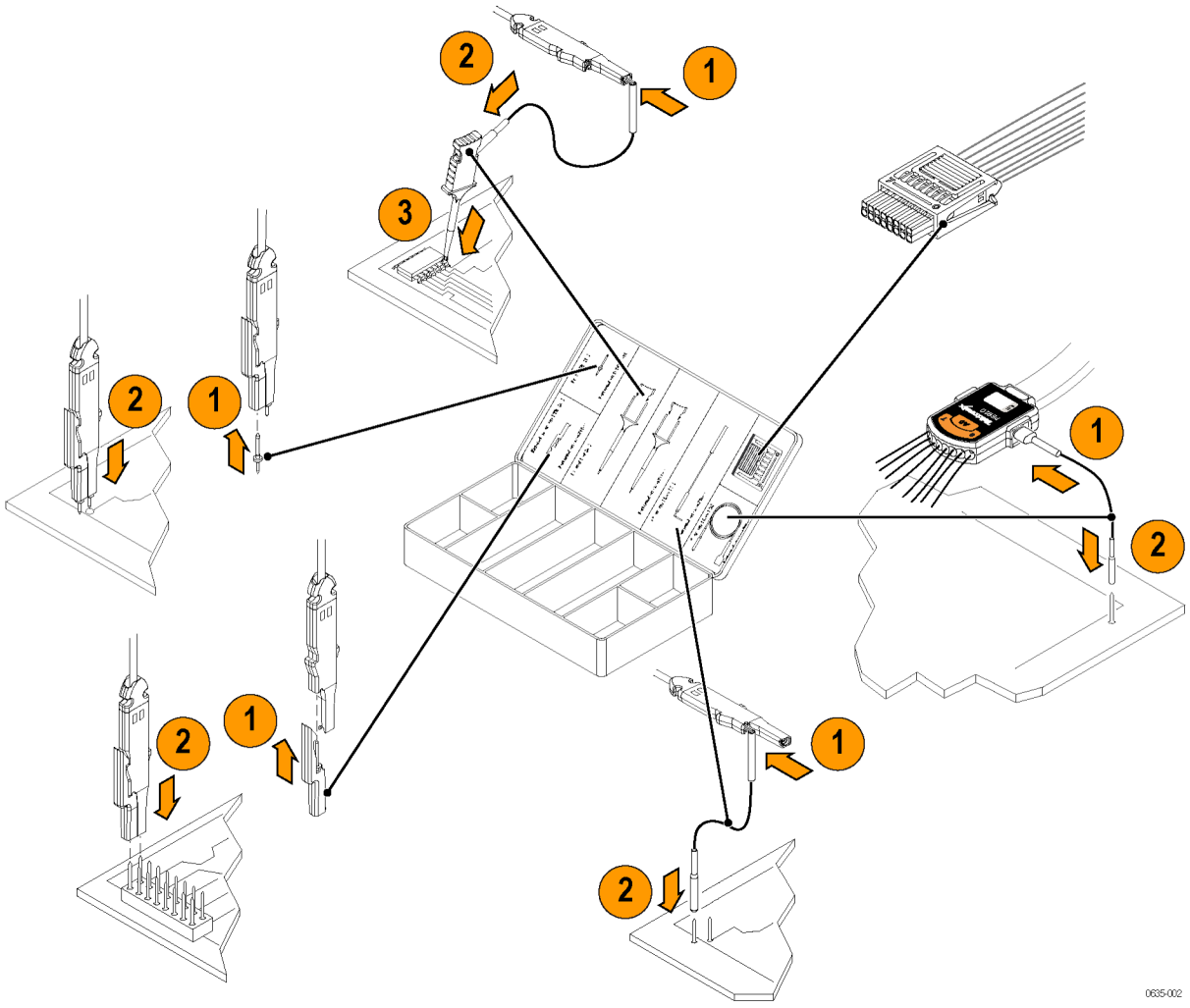


Figure 3: Accessory kit contents

Install the probe grouper

Use the probe grouper to easily connect the lead sets to 2 x 8 rows of 0.025-inch square pins. The clock lead is separate.

Complete the following steps if you need to install the leads in the probe grouper:

1. Install the leads individually through the probe grouper as shown. You may need to rotate some of the leads 90° to install them in the probe grouper.

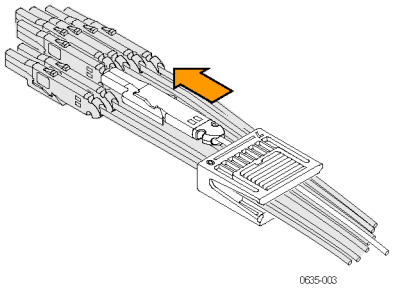


Figure 4: Install the probe leads through the probe grouper

2. Align the leads as shown.

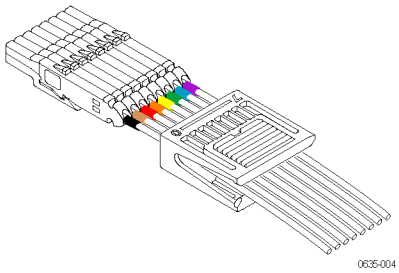


Figure 5: Align the probe leads

3. Slide the probe grouper over the leads to engage the retention tangs into the notches.

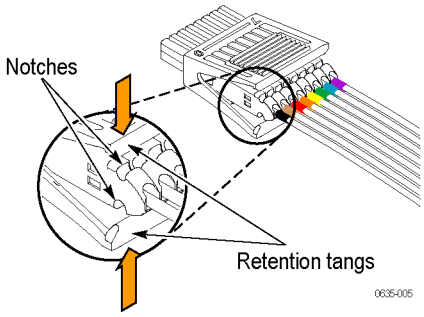


Figure 6: Slide the probe grouper over the leads and engage the retention tangs into the notches

To disassemble the leads from the probe grouper, reverse the above steps.

Connect the probe to the instrument

The P5910 probe connects a TLA6400 Series logic analyzer 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 7 on page 8.)
2. Insert the probe connector to the respective connector on the logic analyzer until it snaps into place.

NOTE. *The P5910 probe can be connected to the logic analyzer when it is powered on. The probe heads can also be connected to the SUT without turning the power off.*

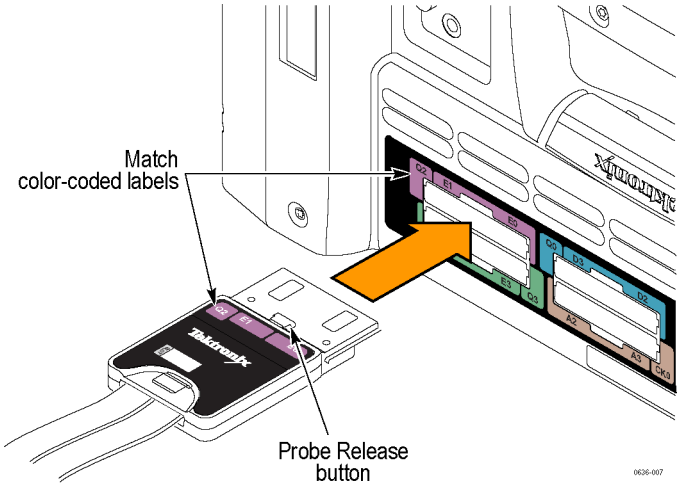


Figure 7: Connect the probe to the logic analyzer

To remove the probe from the instrument: push the probe in, press the Probe Release button, and then pull out the probe.

Connect the probe to the SUT

Connect the probe to the SUT using one of the following methods.

- Connect the probe to the square pins on the SUT.
- Connect the probe to rows of pins on the SUT using the probe grouper to hold the lead sets together.
- Use other items from the accessories kit as needed to connect the lead sets to the SUT.

Reference

Probe footprints

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

Refer to the following figures for footprint information.

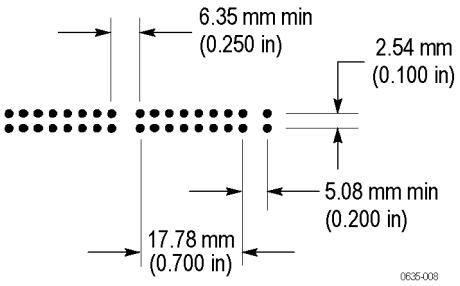


Figure 8: Pin spacing between 8-channel groups and clock/qualifier leads

The following figure shows the 8-channel footprint with an 8-channel probe grouper attached.

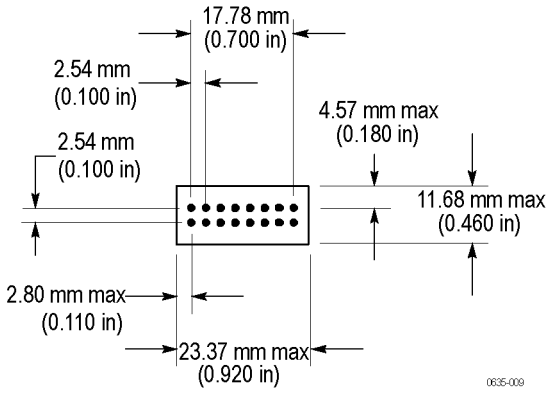


Figure 9: Dimensions of 8-channel probe footprint with probe grouper attached

The following illustration shows the relationship of the probe sections and clock/qualifier channels when the probe is connected to a specific group on the logic analyzer. For example if a probe is connected to the orange channel group on the logic analyzer, it will use the Address 0 and Address 1 probe sections and the clock/qualifier channel is connected to CK1.

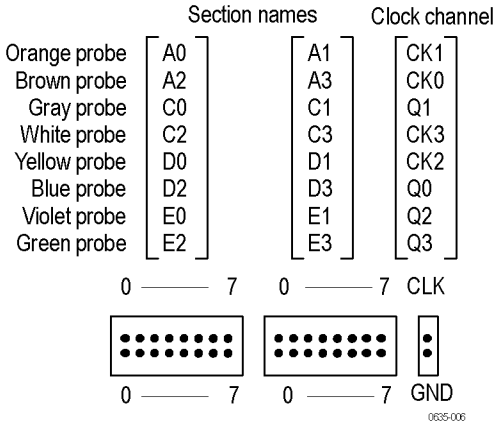


Figure 10: P5910 grouping footprint (16-data channels plus one clock)

Load model

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

The following figure shows the load model and equivalent circuit for the probe.

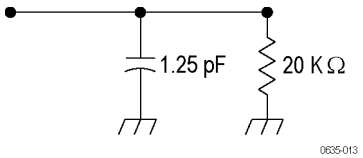


Figure 11: P5910 probe loading and equivalent circuit

Probe dimensions

The following figure shows the dimensions of the P5910 probe.

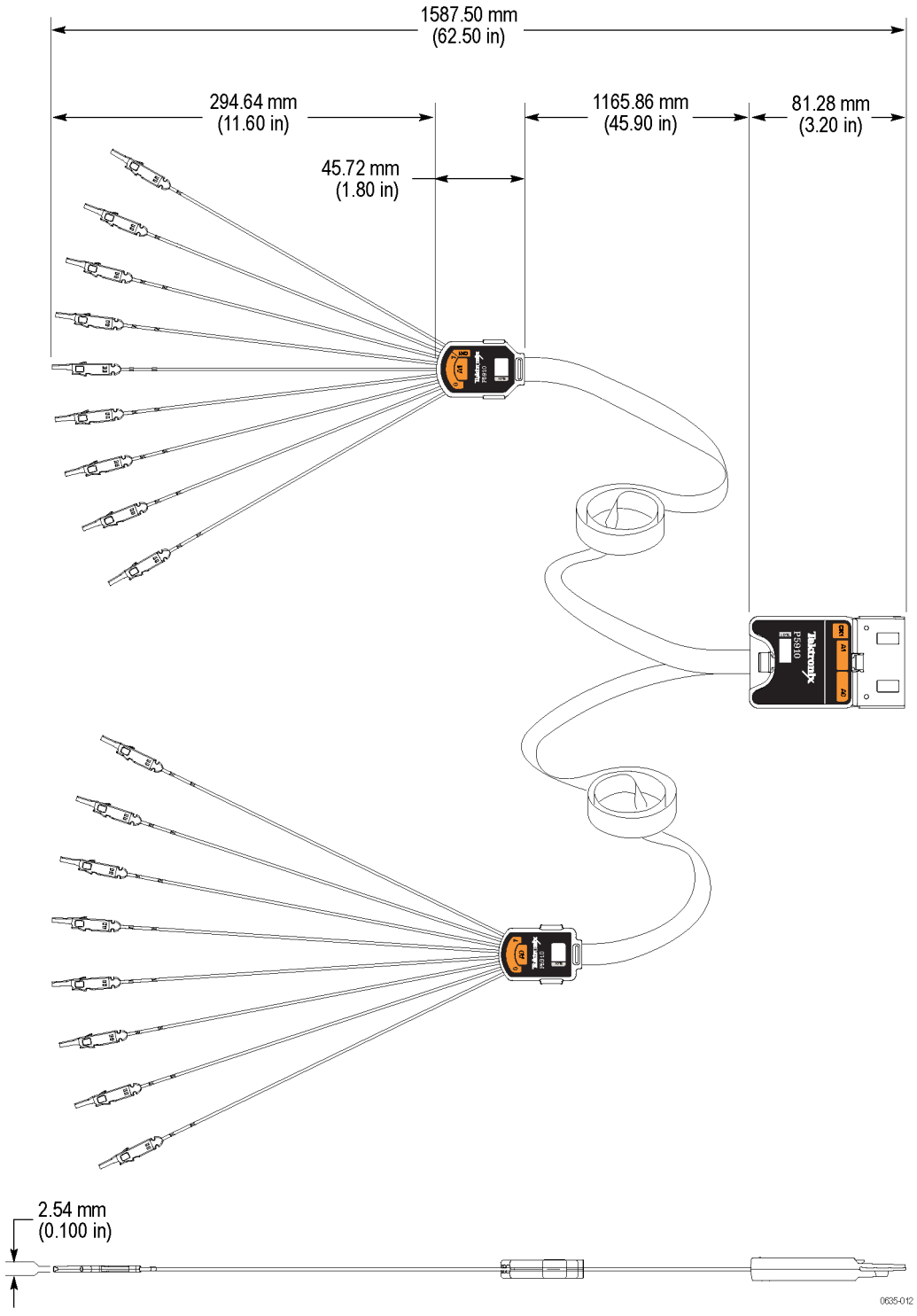


Figure 12: P5910 probe dimensions

Specifications

The following tables list the electrical, mechanical, and environmental specifications for the P5910 probe.

The electrical specifications apply when the probe is connected between a compatible logic analyzer and a SUT. Refer to the *TLA6400 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 specifications. The probes are designed to meet Tektronix standard 062-2847-00.

Table 2: Mechanical and electrical specifications

Characteristic	Description
Number of input channels	17 (16 data channels, 1 clock/qualifier channel)
Input impedance	20 kΩ, 1.25 pF to ground
Analog bandwidth	2 GHz
Minimum input signal	300 mV_{p-p}
Operating signal range	-2.5 V to +5 V
Channel to channel skew	±60 ps, within a single probe ±125 ps, between probes
Delay from probe tip to input connector	6.39 ns
Maximum nondestructive input signal to probe	-4.5 V to +13 V
Probe length (including probe tips and connectors)	1.5875 m (62.50 in)

Table 3: Environmental specifications

Characteristic	Description
Temperature	
Operating	-10 °C to 55 °C (14 °F to 131 °F) with 15 °C/hour (59 °F/hour) maximum gradient, noncondensing, derated 1 °C (34 °F) per 300 m above 1500 m (984 ft. above 4921 ft.)
Nonoperating	-51 °C to 71 °C (-60 ° to 160 °F) with 15 °C/hour (59 °F/hour) maximum gradient
Humidity	
Operating	5% to 95% relative humidity ≤ 30 °C (86 °F) 5% to 45% relative humidity 30 °C to 55 °C (86 °F to 131 °F) Non condensing
Nonoperating	5% to 95% relative humidity ≤ 30 °C (86 °F) 5% to 45% relative humidity 30 °C to 71 °C (86 °F to 160 °F) Non condensing
Altitude	
Operating	Up to 3000 m (9,843 ft)
Nonoperating	Up to 12,000 m (39,370 ft)

Maintenance

P5910 probe calibration information

The P5910 probe does not require calibration. If a probe failure occurs, return the entire probe to your Tektronix representative for repair.

P5910 probe service strategy information

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

Table 4: 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.
3. Set the threshold voltage to the appropriate value for the active signal source.
4. Check for signal activity in the Setup window for the attached probe.

Inspect or clean the probe

Inspect and clean the instrument as often as operating conditions require. Collection of dirt on internal components can cause them to overheat and break-down. 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 P5910 probe contains no user-replaceable parts. However, probe accessories can be replaced. (See page 2, *P5910 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.

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.

Probe connector

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

Probe grouper

A removable clip that groups eight individual podlets into a single 8-wide P5910 probe assembly. This provides ease when connecting to a row of 2 x 8 2.54 mm (0.100 in) square pins.

Probe head

The end of the probe that connects to the SUT.

SUT

System-under-test. Also known as the target system or DUT (device-under-test). The logic analyzer connects to the SUT through the probe.

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