

**P5934  
Mass Termination Probe  
Instruction Manual**

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



077-0636-00

**Tektronix**

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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

**Connect and disconnect properly.** Do not connect or disconnect probes or test leads while they are connected to a voltage source.

**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.

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.

**Use proper AC adapter.** Use only the AC adapter specified for this product.

**Use proper fuse.** Use only the fuse type and rating specified for this product.

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

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

**Keep product surfaces clean and dry.**

**Provide proper ventilation.** Refer to the manual's installation instructions for details on installing the product so it has proper ventilation.



**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.*



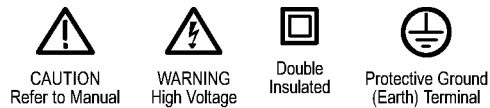
**CAUTION.** *Caution statements identify conditions or practices that could result in damage to this product or other property.*

**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:



## Environmental considerations

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

### 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 an industrial monitoring and control instrument accessory, and is not required to comply with the substance restrictions of the recast RoHS Directive 2011/65/EU until July 22, 2017.

# Preface

This document provides information on using the P5934 logic analyzer probe.

## 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                               |
| Field upgrade kits   | Upgrade information for your logic analyzer  |
| Optional Service Manuals                                     | Self-service documentation for modules and mainframes  |



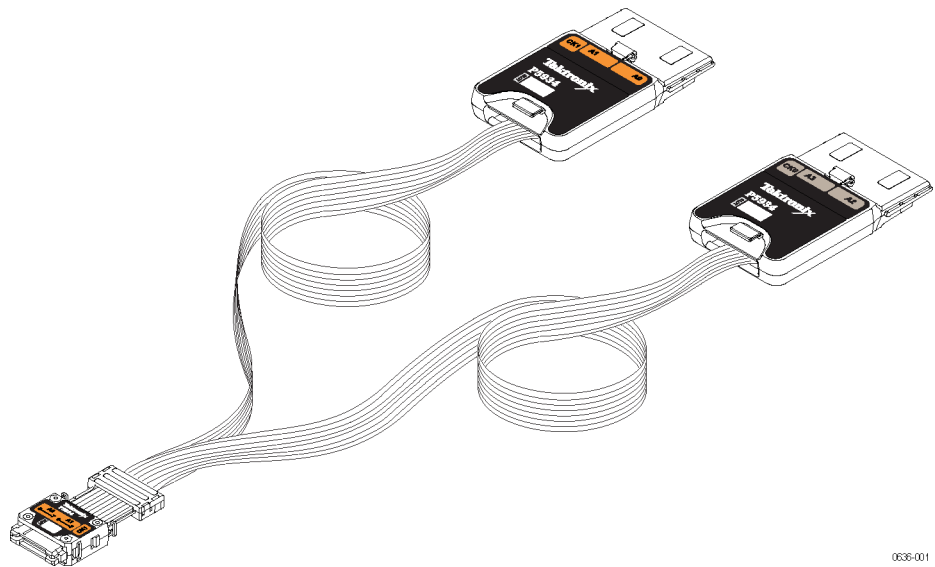
# Operating basics

This section provides a brief description of the Tektronix P5934 Mass Termination Logic Analyzer Probe, information on attaching color-coded probe labels, and instructions for connecting the probe and adapters from the logic analyzer to the SUT (system-under-test).

## Product description

The P5934 probe connects 34 logic analyzer channels directly to the SUT or to a microprocessor probe adapter on the SUT.

The probe acquires data from 32 input or output signals and two clocks, one clock and one qualifier, or two qualifier signals.



**Figure 1: P5934 Mass Termination Probe**

The following list describes the capabilities and qualities of the P5934 probe:

- Single-ended data and single-ended clock inputs
- Consists of one independent probe tip of 34 channels (32 data and 2 clock/qualifiers), and two 17-channel probe connectors
- Provides a means of connecting multiple channels to be quickly connected to a small footprint on the SUT

## Probe accessory information

The P5934 probe includes accessories to connect the logic analyzer to the SUT.

The following accessories are available:

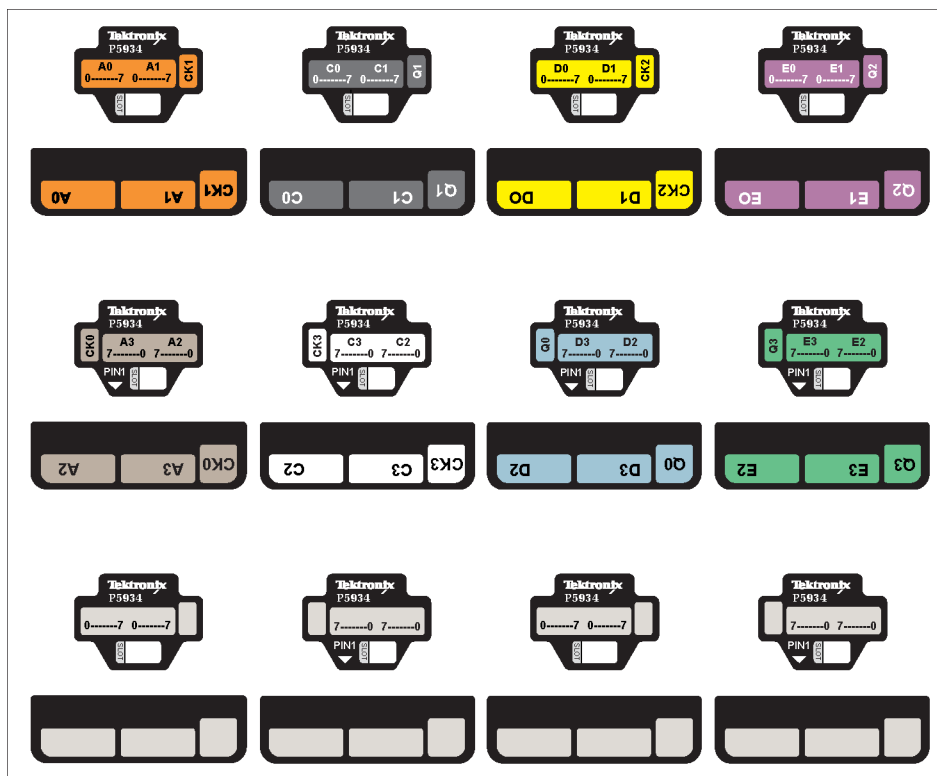
- Latch housing assembly, edge-mount
- Latch housing assembly, vertical
- Mictor connector (surface mount, vertical receptacle)
- Mictor connector kit (Tektronix part number, 020-2228-xx; kit of 21 surface mount vertical receptacle connectors)
- Probe labels
- *P5934 Logic Analyzer Probe Instructions* (Tektronix part number, 071-2976-xx)
- *P5934 High-Density Logic Analyzer Probe Instruction Manual* (Tektronix part number, 077-0636-xx, available on the TLA Documentation CD or downloadable from the Tektronix Web site: [www.tektronix.com/manuals](http://www.tektronix.com/manuals))

The following optional accessories are available for the probe:

- 17-Channel Compression-on-PCB to Mictor adapter (Tektronix part number, 020-2455-xx)
- 34-Channel Compression-on-PCB to Mictor adapter (Tektronix part number, 020-2456-xx)

## Probe label overview

The probe comes with color-coded labels to apply to the probe before connecting the probe to the logic analyzer and to the SUT.



0636-008

**Figure 2: P5934 probe labels**

The labeling scheme for the probe occurs on most microprocessor support packages and on the SUT for signal and channel assignments.

**NOTE.** Use one Pin 1 label for each probe connector. Do not use two labels with a pin 1 indicator or two labels without a pin 1 indicator on a single probe.

The following tables describe the color-coded label combinations for 136- and 102-channel logic analyzers and for 68- and 34-channel logic analyzers. Use the extra labels, as needed, from the label sheet.

**Table 1: Color-coded label combinations (136- and 102-channel logic analyzers)**

| Address              |                               |
|----------------------|-------------------------------|
| Color on Pin 1 side  | Tan (CK:0, A3:7-0, A2:7-0)    |
| Color on Pin 38 side | Orange (CK:1, A1:7-0, A0:7-0) |

**Table 1: Color-coded label combinations (136- and 102-channel logic analyzers) (cont.)**

| <b>Address</b>                         |                                 |
|--|---------------------------------|
| <b>Data</b>                            |                                 |
| Color on Pin 1 side                    | Blue (QUAL:0, D3:7-0, D2:7-0)   |
| Color on Pin 38 side                   | Yellow (CK:2, D1:7-0, D0:7-0)   |
| <b>Control</b>                         |                                 |
| Color on Pin 1 side                    | White (CK:3, C3:7-0, C2:7-0)    |
| Color on Pin 38 side                   | Gray (QUAL:1, C1:7-0, C0:7-0)   |
| <b>Extended (136 instruments only)</b> |                                 |
| Color on Pin 1 side                    | Green (QUAL:3, E3:7-0, E2:7-0)  |
| Color on Pin 38 side                   | Violet (QUAL:2, E1:7-0, E0:7-0) |

**Table 2: Color-coded label combinations (68- and 34-channel logic analyzers)**

|                                    |  |
|------------------------------------|--|
| Color on Pin 1 side (Control)      | White<br>(CK:3, C3:7-0, C2:7-0)        |
| Color on Pin 38 side (Address)     | Blank (write in, CK:0, A3:7-0, A2:7-0) |
| <b>For a 68 channel instrument</b> |  |
| Color on Pin 1 side (Address)      | Tan (CK:0, A3:7-0, A2:7-0)             |
| Color on Pin 38 side (Address)     | Orange (CK:1, A1:7-0, A0:7-0)          |
| Color on Pin 1 side (Control)      | White (CK:3, C3:7-0, C2:7-0)           |
| Color on Pin 38 side (Data)        | Yellow (CK:2, D1:7-0, D0:7-0)          |

## Apply the labels to the probe

Attach the labels to the probe connector and to both sides of the probe tip.

---

**NOTE.** Use flat-nosed tweezers to remove the labels from the sheet of labels. Never peel labels with your fingers. The labels are made of soft vinyl and can stretch and distort easily. To avoid stretching the label, always hold it from the top right corner while removing it from the sheet of labels.

*The adhesive on the vinyl labels is extremely strong. Carefully align each label to the intended outline on the probe connector and probe tip before attaching it to the probe. Once labels are placed on the probe, they become very difficult to remove.*

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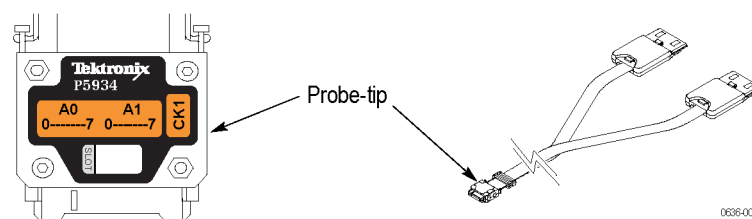
To apply labels to the probe, complete the following steps:

1. Locate the labels that you need for the probe from the provided label sheets, but do not peel them off yet.

If you need help determining which labels to use, see the following steps:

- a. Determine which channel group on the logic analyzer that you want to connect the probe; note the color-coded labels on the logic analyzer.
- b. Look at the label sheets and locate the labels that match the logic analyzer channel group that you need to use. Notice that there are two different sizes of labels for each channel group:
  - Probe-tip labels (smaller)
  - Probe connector labels (larger)
  - Blank labels (custom channel combinations not recommended)

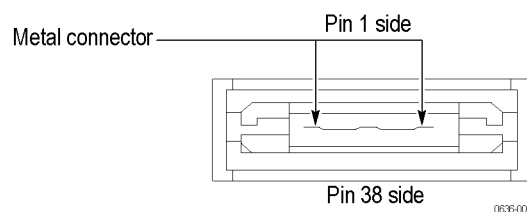
2. Locate the probe-tip connector on the probe.



**Figure 3: Locating the probe-tip connector**

3. Locate the pin 1 side of the probe-tip connector by using the end view of the probe-tip connector.

The position of the bent waves, the angled ends, are on the pin 1 side.

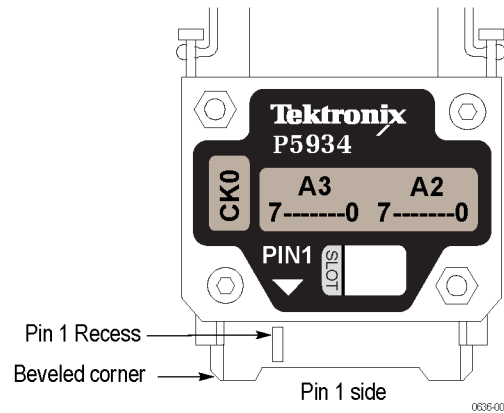


**Figure 4: End view of the probe-tip connector**

4. Remove the pin 1 side label that you need from the sheet of labels.

5. Apply the pin 1 side label to the pin 1 side of the probe-tip connector.

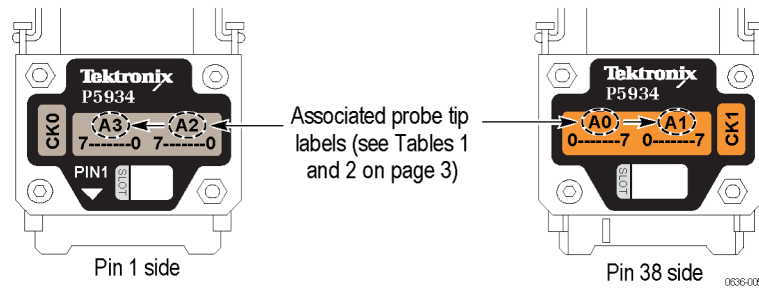
**NOTE.** You can also use the small pin 1 recess or the beveled corners on the probe tip end of the connector, but both are difficult to find. (See Figure 5 on page 6.)



**Figure 5: Other indicators for pin 1 side**

6. Apply the associated pin 38 side label to the probe tip. (See Figure 6.)

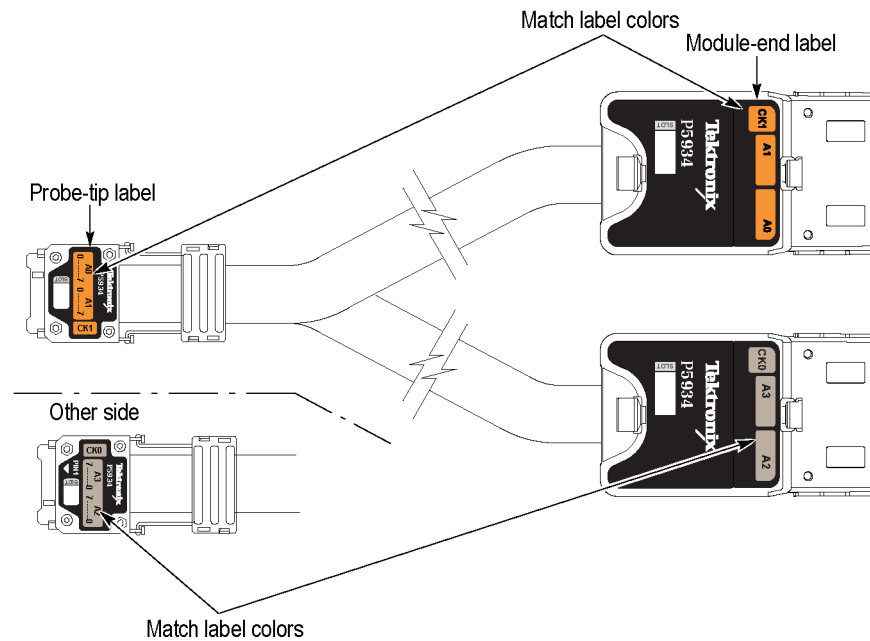
If necessary, see the color-coded combination tables on the previous pages for label information.



**Figure 6: Location of the pin 38 side label on the probe-tip**

7. Apply the probe connector labels to the probe connectors. (See Figure 7 on page 7.)

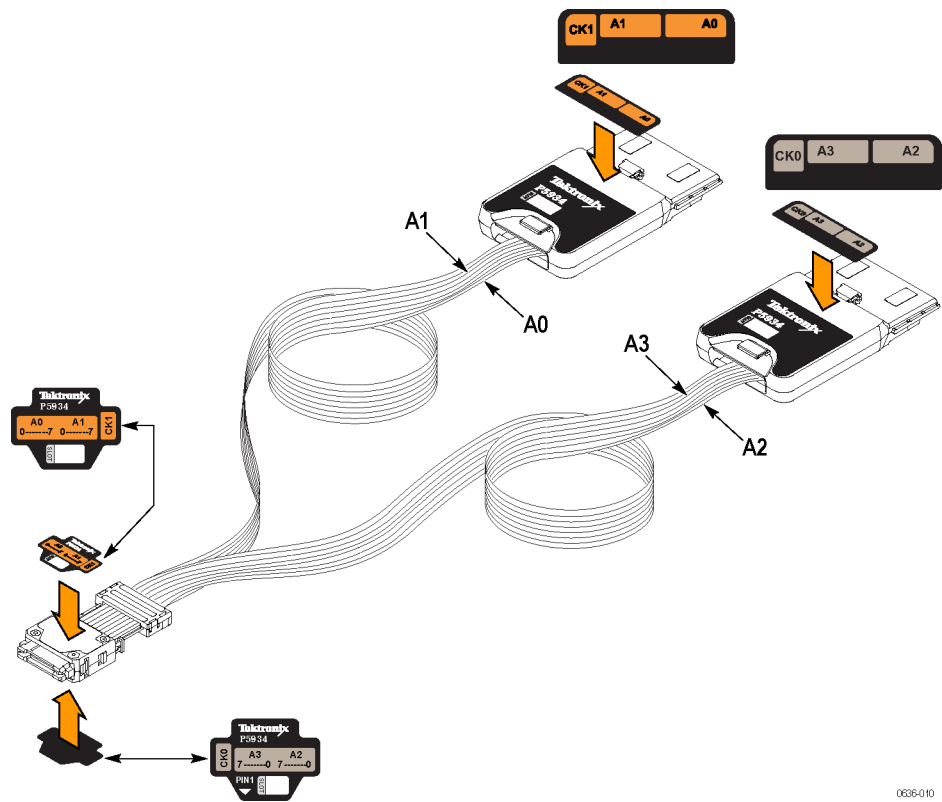
To avoid mislabelling, hold the probe-tip in your hand and follow the cable to the probe connector. Match the color of the probe connector label to the probe-tip label.



0036-006

**Figure 7: Applying labels to the probe connectors**

The following figure summarizes the label placement for the probe.



0636-010

Figure 8: Probe label placement summary

## Connect the probe to the logic analyzer

The probe connects a TLA6400 Series logic analyzer to the SUT. You can connect the probe to the SUT without turning off the power to the SUT.

Apply the labels to the probes before connecting the probes to the logic analyzer and to the SUT.

1. Match the color-coded labels of the probe to the same color-coded connector on the logic analyzer.
2. Connect the logic analyzer probe as shown.

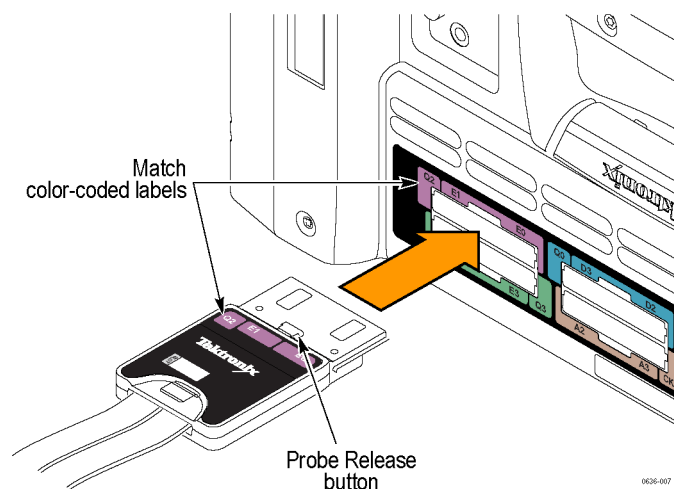


Figure 9: Connecting the logic analyzer probe

## SUT probe connection overview

The probe connects to surface-mounted or edge-mounted Mictor connectors on the SUT.

Determine how you intend to connect the probes to the SUT. Then install the Mictor connectors on the SUT before connecting the probes.

Use one of the following methods to connect the probe to the SUT:

- Connect to the SUT directly to a Mictor connector on the SUT.
- Connect to the SUT through a Mictor adapter.

In the following procedures, a surface-mounted Mictor connector is shown in the illustrations. The procedures are the same for the edge-mounted connector.

## Connect the probe directly to the SUT

Connect to the SUT directly to a Mictor connector (either surface-mounted or edge-mounted connector) on the SUT.

To connect the probe directly to a Mictor connector on the SUT, complete the following steps:

1. Line up the pin 1 indicator on the probe tip with pin 1 on the connector on the PCB on the SUT. The Mictor connector is keyed to prevent incorrect connections.



**CAUTION.** *To avoid damaging the probe and SUT, always position the probe perpendicular to the mating connector and gently connect the probe. Incorrect handling of the probe while connecting it to the SUT can result in damage to the probe or to the mating connector on the SUT.*

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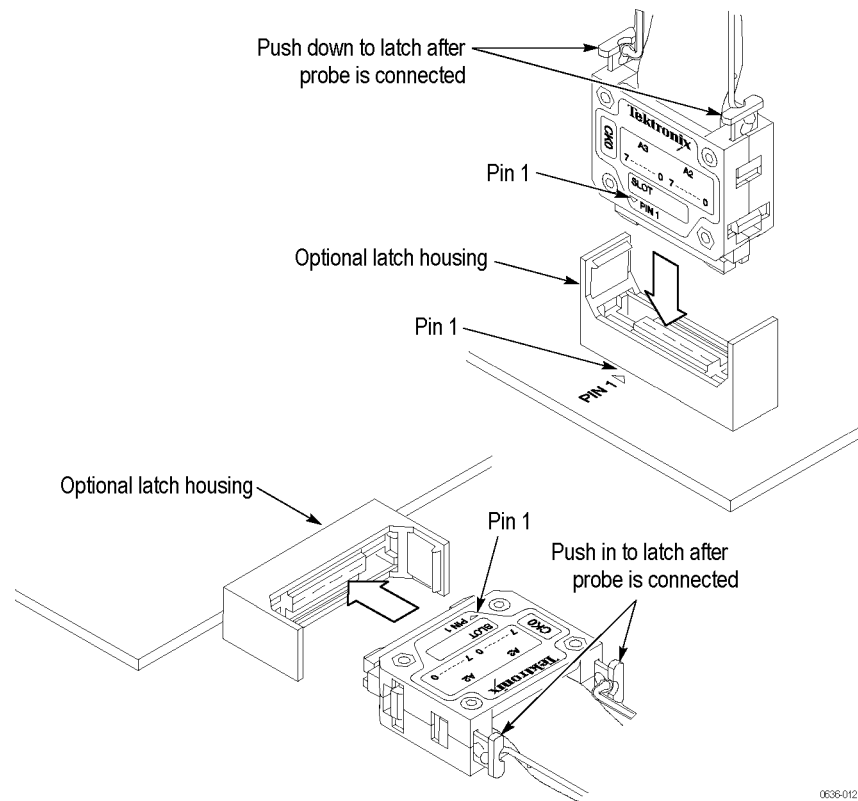
**NOTE.** *If you have custom channel combinations for the mictor connector on your SUT, use the blank sheet of labels to create your own pin 1 and pin 38 side labels.*

*Use one Pin 1 label for each probe connector. Do not use two labels with a pin 1 indicator or two labels without a pin 1 indicator on a single probe.*

*Custom labeling is an option, though not recommended.*

---

2. Position the probe tip perpendicular to the connector, and gently connect the probe as shown in the following figure. (See Figure 10 on page 11.)
3. When connected, push the latch releases on the probe to set the latch.



0636-012

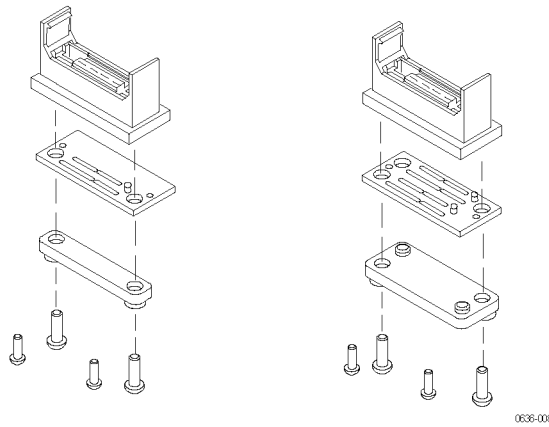
**Figure 10: Connecting to a surface- or edge-mounted connector**

## Connect the probes using the Mictor adapter

The Compression-on-PCB to Mictor adapters provide a means of connecting the probe to take advantage of the new compression footprint and eliminate the need for Mictor connectors in your SUT.

Two different adapters are available:

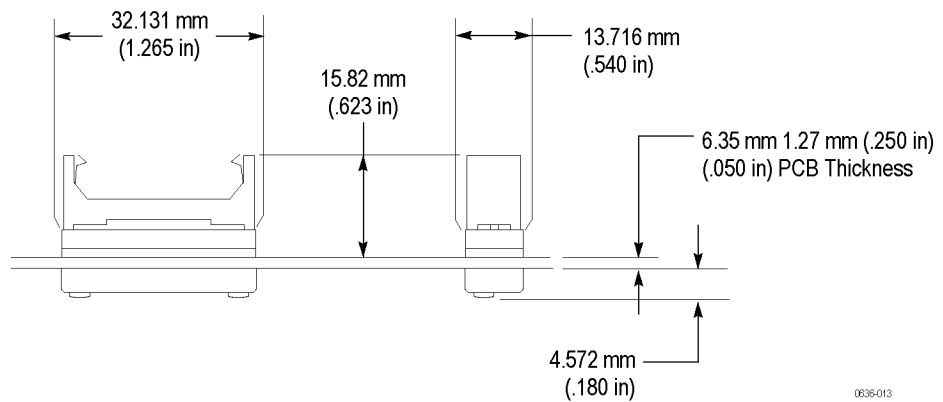
- 17-Channel Mictor adapter
- 34-Channel Mictor adapter



**Figure 11: Mictor adapters**

Two different screw lengths are required to accommodate the 0.050-inch - 0.250-inch (1.27 mm - 6.35 mm) PCB thickness range.

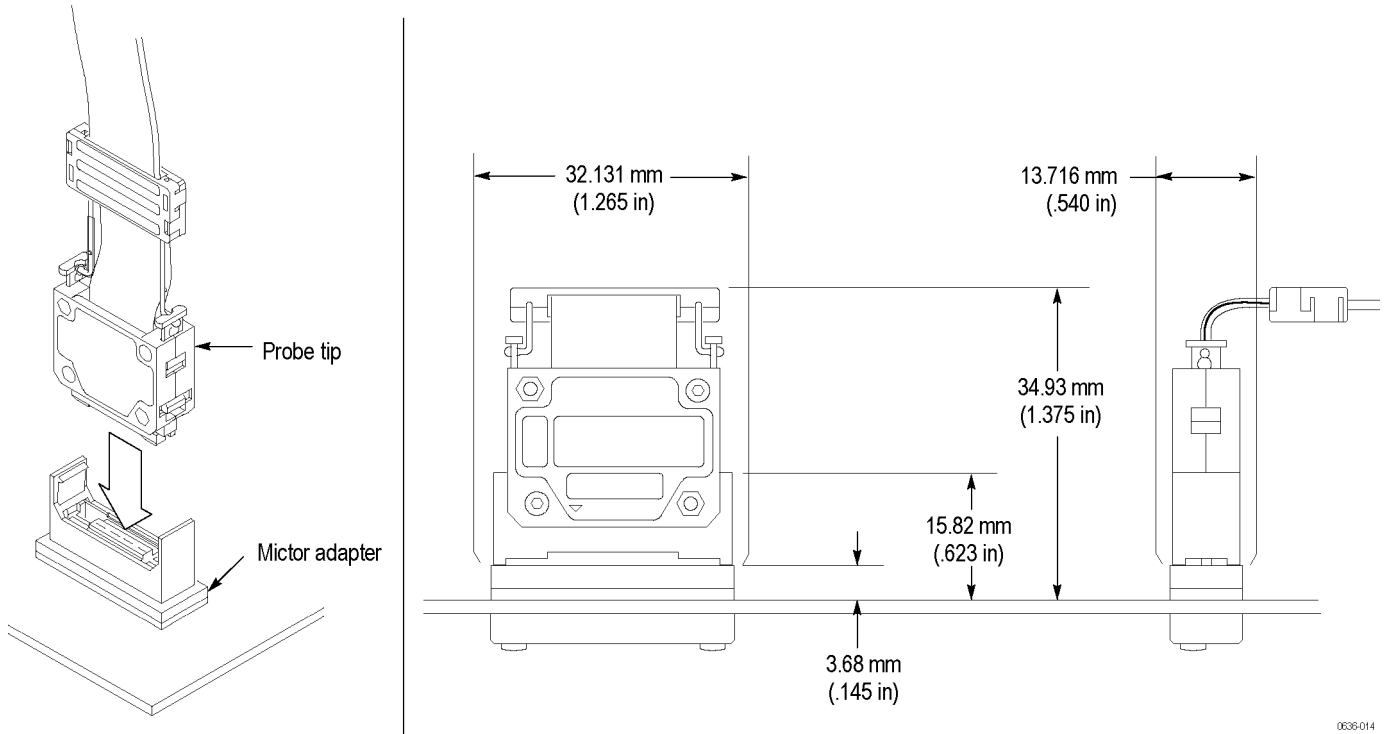
This adapters require the use of the Compression-on-PCB to Mictor adapter land footprint. The following figure provides dimensional information; the dimensions are the same for both adapters.



**Figure 12: Dimensions of the Mictor adapters**



Compare the clearance between the probe connection and the connection via the Mictor adapter. (See Figure 13.) Note that the difference in clearance between the probe connection and the connection using the Mictor adapter is 3.68 mm (0.145-in.).



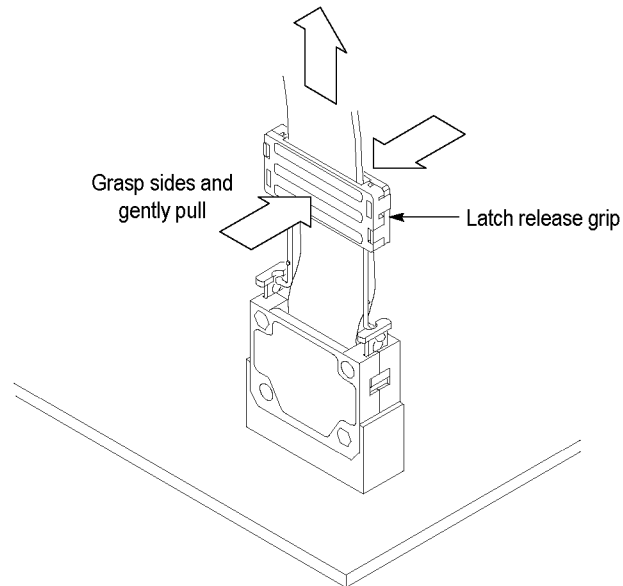
0636-014

Figure 13: Clearance for probe connection using the Mictor adapter

## Disconnect the probe from the SUT

To disconnect the probe, complete the following steps:

1. Gently pull the latch release grip to release the probe tip from the latch housing as shown in the following figure. (See Figure 14.)



**Figure 14: Releasing the probe tip from the latch housing**



**CAUTION.** To avoid damage to the probe and mating connector, hold on to the latch release grip and gently pull the probe straight out of the connector. Do not tilt the probe in any direction when disconnecting it. Tilting the probe can damage the probe and mating connector.

---

2. Continue to pull the probe tip straight out of the mating connector using the latch release grip.

If you use an extender, grip the corners of the circuit board-end attached to the SUT, and gently pull it straight out of the connector.

---

# Reference

This section provides guidelines for designing a P5934 probe interface on the SUT.

## Mictor connectors and latch housings

The probe contains 34 sets of signal connections (32 data channels and two clock or qualifier channels).

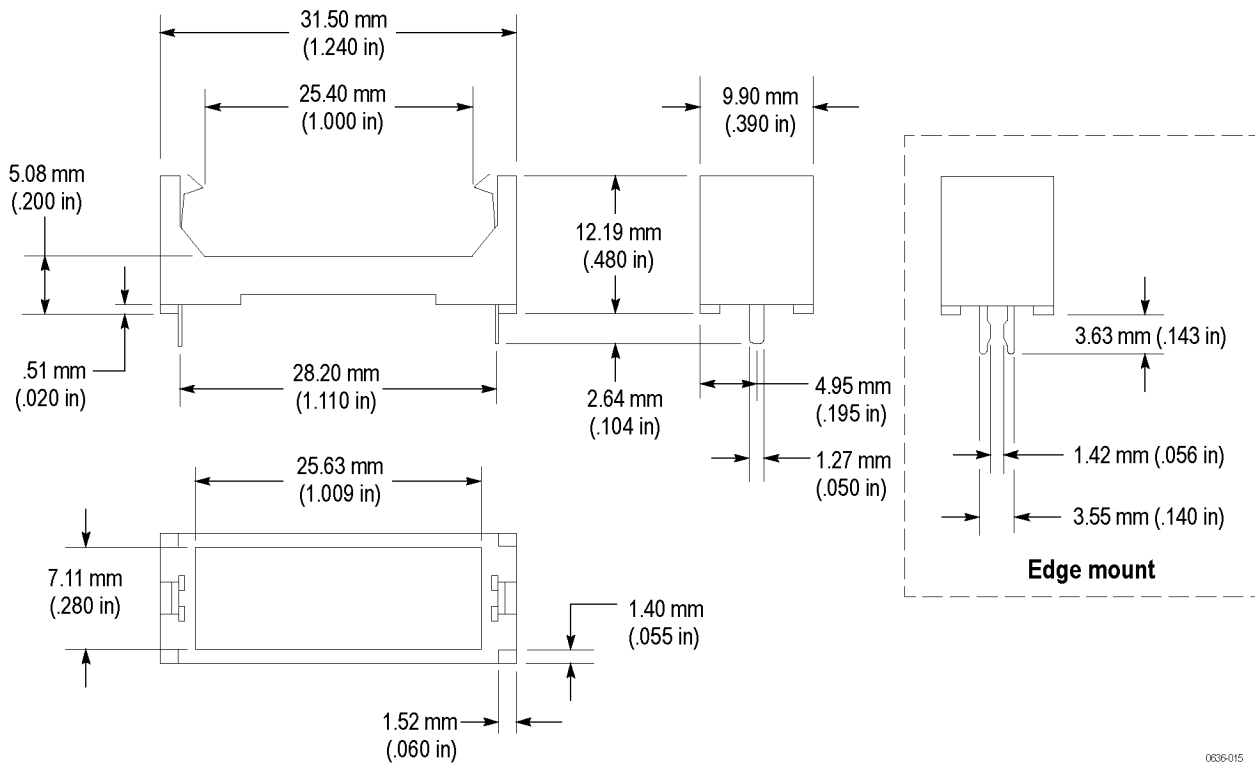
The probe tip connection is a 38-pin Mictor connector. The following table lists Mictor connectors you can purchase that are compatible with the probe and compatible latch housings and connectors.

**Table 3: Compatible Mictor connectors**

| <b>Tektronix part number</b> | <b>Description</b>   |
|------------------------------|--|
| 131-6134-01                  | Probe,tip; terminal ,calibrator 0.250 Hex C36000 gold plated, calgrator terminal                             |
| 131-6520-00                  | Connector receptical; edge mount, Mictor; female, right-angle, 38 POS, 0.025 center, PD NI matched impedance |
| 105-1088-xx                  | Latch housing; edge mount (0.062 inch circuit board thickness)   |
| 105-1089-xx                  | Latch housing; surface mount   |

Latch housing mechanisms to use with the Mictor connectors are available for purchase. The latch housing surrounds the Mictor connector on your SUT and provides positive retention of the probe.

The following figure shows the dimensions of the optional latch housings.



0036-015

Figure 15: Latch housing dimensions

## P5934 probe dimensions

The following figure shows the dimensions of the P5934 probe,

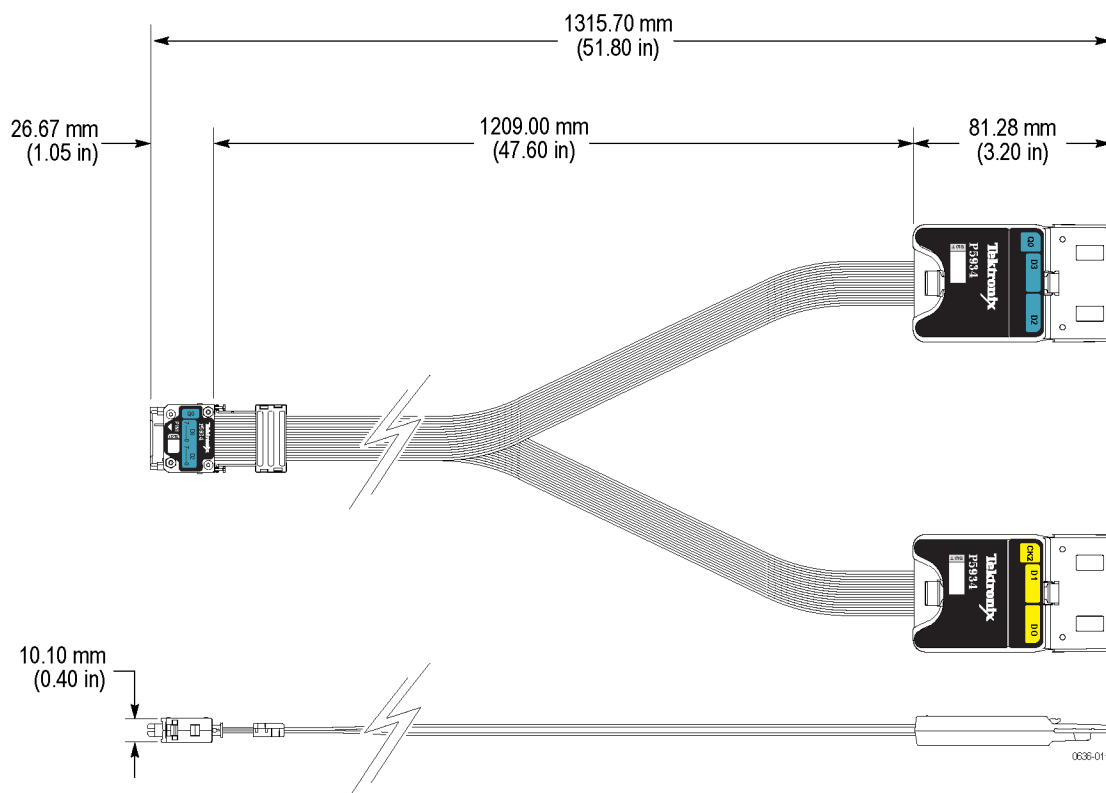
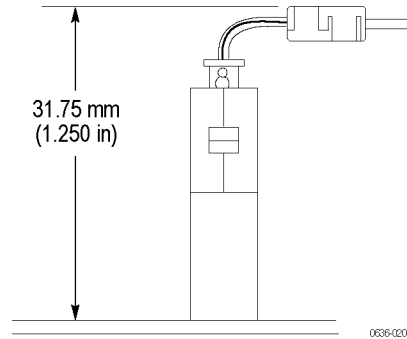


Figure 16: P5934 probe dimensions

## Dimensions and placement of Mictor connectors

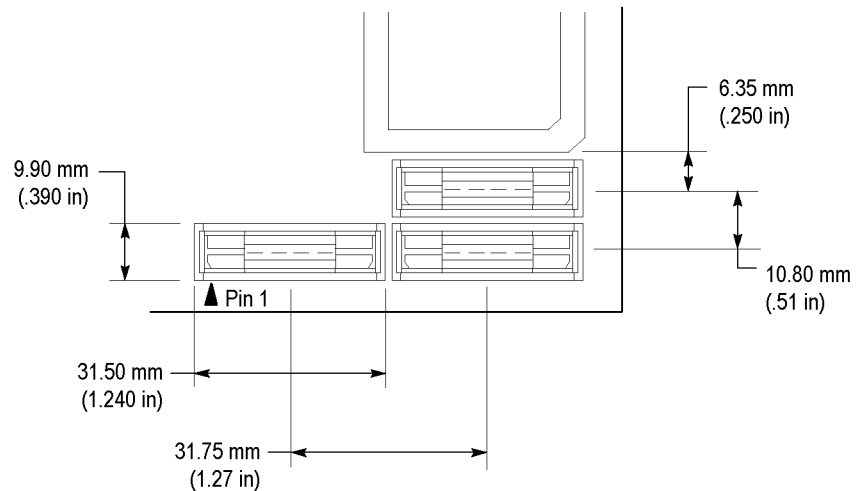
Use compatible surface-mounted or edge-mounted Mictor connectors in your circuit board design. Place the connector as close as possible to the device under test.

The following figure shows the vertical dimensions of the probe.



**Figure 17: Vertical dimensions of the probe**

The following figure shows the dimensions and minimum placement of surface-mounted connectors on a SUT. The side-to-side dimension between connectors also applies to the edge-mounted connector.



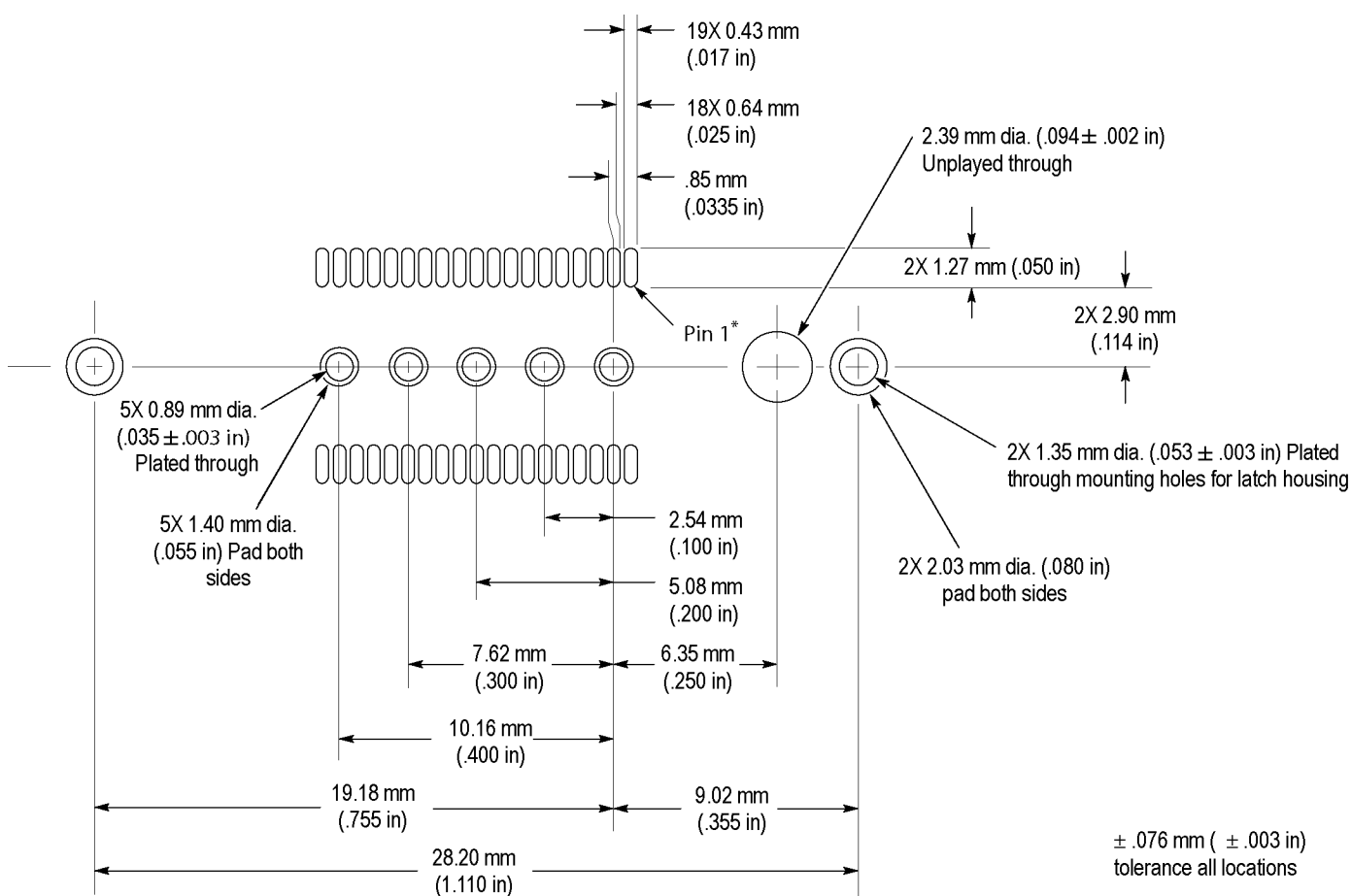
**Figure 18: Dimensions and placement of a surface-mounted Mictor connector with latch housing**

## Mechanical layout and pin numbering sequence

Use the correct mechanical layout and pin numbering sequence for your design.

Compatible Mictor connectors have 43 pins; pins 39 through 43 are grounded. Pins 1, 2, 37, and 38 are open. The following figure shows the positions and spacing between the pins, the keyhole, and the latch housing mounting holes of a surface-mounted connector. Refer to the pin assignment table for the recommended pin assignments. (See Table 4 on page 21.)

If you include the latch housing in your design, place a pin 1 indicator on your circuit board during design because the latch housing obscures the pin 1 indicator on the Mictor connector. Even though the Mictor connector is keyed, you still need to know the location of pin 1 when connecting the probe.



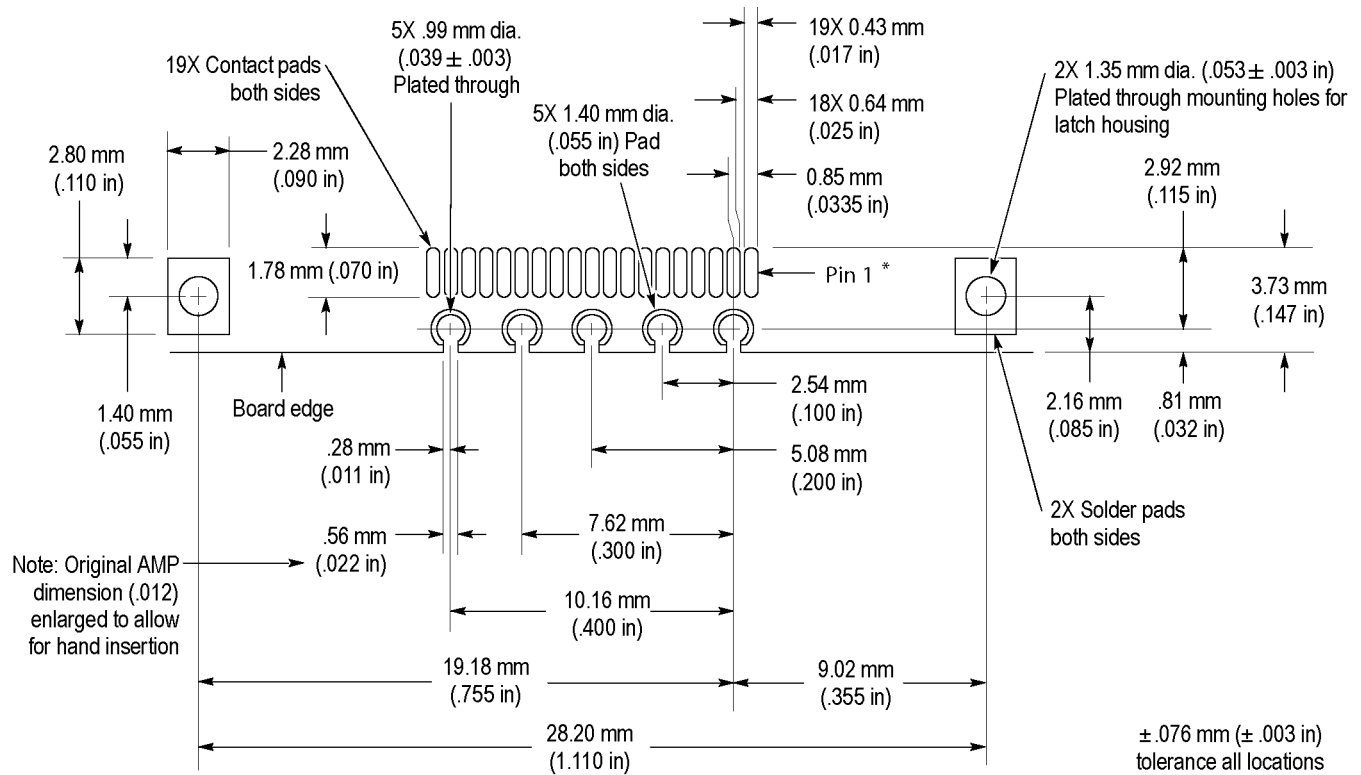
Notes: \* The AMP pin assignment, an industry standard, is what we recommend for your circuit board layout.

0636-016

Figure 19: Surface-mounted connector layout (component side)

The following figure shows the positions and spacing between the pins and latch housing mounting holes of an edge-mounted connector.

**NOTE.** *The edge-mounted connector does not have a keyhole. Be sure to position pin 1 correctly when building the SUT to maintain the correct mapping of signals from your SUT to the logic analyzer probe sections and channels.*



Note: \* The AMP pin assignment, an industry standard, is what we recommend for your circuit board layouts .

0636-017

**Figure 20: Edge-mounted connector layout (component side)**



## Standard probe channel assignments

Tektronix recommends using the standard Probe channel assignments for your design.

The 17 channels to which the probe connects on the logic analyzer cannot be changed. When mapping signals from your SUT to channels on the logic analyzer, keep the probe section, clock, and/or qualifier channels together as shown in the tables. (See Table 1 on page 3.) (See Table 2 on page 4.)

Each probe connector has 43 pins; pins 39 through 43 are the five ground pins. Pins 1, 2, 3, and 4 are unused.

The preferred pin assignment is the pin assignment because other commercial CAD packages use the numbering scheme as the industry standard. (See Table 4 on page 21.) The table shows the pin assignments for the surface-mounted connector. Pin assignments are the same for the edge-mounted connector.

The standard probe channel assignment uses an odd-side even-side pin assignment. Pin 1 is located at the top left, and pin 3 is located directly below it. Pin 2 is located on the top right, and pin 4 is located directly below it. Refer to the table for the pin assignments. (See Table 5.)

---

**NOTE.** When designing Mictor connectors into your SUT, always verify which pin-numbering sequence your CAD system uses.

---

**Table 4: Pin assignments () for Mictor connector (component side)**

| Type of pin assignment   | Comments  |
|--|---|
| <p style="text-align: center;"><b>Preferred</b></p> <p style="text-align: center;"><b>AMP Pin Assignment</b></p> | <p>Preferred. This pin assignment is the industry standard and is what Tektronix recommends that you use.</p> |

The following tables show the sections and channels and the probe pins to which they connect. (See Table 5.) (See Table 6 on page 22.) The tables also comply with the labeling schemes in the previous tables except for the 34-channel instrument on the Pin 38 side of the probe. The Mictor pin numbers are shown for reference only.

**NOTE.** The labeling scheme for a 34 or 68 channel instrument is listed in a previous table. (See Table 2 on page 4.)

**Table 5: Pin 1 side probe channel assignments**

| pin number | Section and channel |         |         |         |
|------------|---------------------|---------|---------|---------|
|            | A probe             | C probe | D probe | E probe |
| 5          | CLK:0               | CLK:3   | Q0      | Q3      |
| 7          | A3:7                | C3:7    | D3:7    | E3:7    |
| 9          | A3:6                | C3:6    | D3:6    | E3:6    |
| 11         | A3:5                | C3:5    | D3:5    | E3:5    |
| 13         | A3:4                | C3:4    | D3:4    | E3:4    |
| 15         | A3:3                | C3:3    | D3:3    | E3:3    |
| 17         | A3:2                | C3:2    | D3:2    | E3:2    |
| 19         | A3:1                | C3:1    | D3:1    | E3:1    |
| 21         | A3:0                | C3:0    | D3:0    | E3:0    |
| 23         | A2:7                | C2:7    | D2:7    | E2:7    |
| 25         | A2:6                | C2:6    | D2:6    | E2:6    |
| 27         | A2:5                | C2:5    | D2:5    | E2:5    |
| 29         | A2:4                | C2:4    | D2:4    | E2:4    |
| 31         | A2:3                | C2:3    | D2:3    | E2:3    |
| 33         | A2:2                | C2:2    | D2:2    | E2:2    |
| 35         | A2:1                | C2:1    | D2:1    | E2:1    |
| 37         | A2:0                | C2:0    | D2:0    | E2:0    |

**Table 6: Pin 38 side probe channel assignments**

| pin number | Section and channel |         |         |         |
|------------|---------------------|---------|---------|---------|
|            | A probe             | C probe | D probe | E probe |
| 6          | CLK:1               | Q1      | CLK:2   | Q2      |
| 8          | A1:7                | C1:7    | D1:7    | E1:7    |
| 10         | A1:6                | C1:6    | D1:6    | E1:6    |
| 12         | A1:5                | C1:5    | D1:5    | E1:5    |
| 14         | A1:4                | C1:4    | D1:4    | E1:4    |
| 16         | A1:3                | C1:3    | D1:3    | E1:3    |
| 18         | A1:2                | C1:2    | D1:2    | E1:2    |
| 20         | A1:1                | C1:1    | D1:1    | E1:1    |
| 22         | A1:0                | C1:0    | D1:0    | E1:0    |
| 24         | A0:7                | C0:7    | D0:7    | E0:7    |
| 26         | A0:6                | C0:6    | D0:6    | E0:6    |

**Table 6: Pin 38 side probe channel assignments (cont.)**

| pin number | Section and channel |         |         |         |
|------------|---------------------|---------|---------|---------|
|            | A probe             | C probe | D probe | E probe |
| 28         | A0:5                | C0:5    | D0:5    | E0:5    |
| 30         | A0:4                | C0:4    | D0:4    | E0:4    |
| 32         | A0:3                | C0:3    | D0:3    | E0:3    |
| 34         | A0:2                | C0:2    | D0:2    | E0:2    |
| 36         | A0:1                | C0:1    | D0:1    | E0:1    |
| 38         | A0:0                | C0:0    | D0:0    | E0:0    |

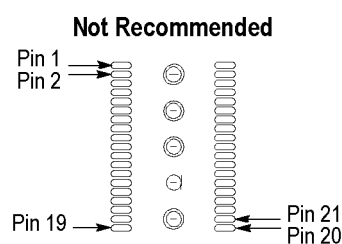
## Alternate probe channel assignments

An alternate probe channel assignment is available. However, it is not recommended due to incompatibility with commercial CAD packages.

The 17 channels to which the end connects on the logic analyzer cannot be changed. When mapping signals from your target system to channels on the logic analyzer, you must keep the probe section, clock, and/or qualifier channels together. Each probe connector has 43 pins; pins 39 through 43 are the five ground pins. Pins 1, 2, 37, and 38 are unused, and it is recommended that they be connected to ground.

The pin assignment is counterclockwise with Pin 1 located at the top left, and pin 2 located directly below it. Pin 20 is located on the bottom right, and pin 21 is located directly above it.

**Table 7: Nonstandard pin assignment for Mictor connector (component side)**

| Type of pin assignment   | Comments   |
|--|--|
| <p><b>Not Recommended</b></p>  <p><b>Nonstandard Pin Assignment</b></p> | <p>This pin assignment is no longer recommended due to incompatibility with other commercial CAD packages.</p> |

The following tables show the sections and channels and the probe pins to which they connect. The tables comply with the labeling schemes in the previous tables except for the 34-channel instrument on the Pin 38 side of the probe. The Mictor pin numbers are shown for reference only.

**Table 8: Pin 1 side probe channel assignments (nonstandard)**

| Nonstandard probe pin number | Section and channel |         |         |         |
|------------------------------|---------------------|---------|---------|---------|
|                              | A probe             | C probe | D probe | E probe |
| 3                            | CLK:0               | CLK:3   | Q0      | Q3      |
| 4                            | A3:7                | C3:7    | D3:7    | E3:7    |
| 5                            | A3:6                | C3:6    | D3:6    | E3:6    |
| 6                            | A3:5                | C3:5    | D3:5    | E3:5    |
| 7                            | A3:4                | C3:4    | D3:4    | E3:4    |
| 8                            | A3:3                | C3:3    | D3:3    | E3:3    |
| 9                            | A3:2                | C3:2    | D3:2    | E3:2    |
| 10                           | A3:1                | C3:1    | D3:1    | E3:1    |
| 11                           | A3:0                | C3:0    | D3:0    | E3:0    |
| 12                           | A2:7                | C2:7    | D2:7    | E2:7    |
| 13                           | A2:6                | C2:6    | D2:6    | E2:6    |
| 14                           | A2:5                | C2:5    | D2:5    | E2:5    |
| 15                           | A2:4                | C2:4    | D2:4    | E2:4    |
| 16                           | A2:3                | C2:3    | D2:3    | E2:3    |
| 17                           | A2:2                | C2:2    | D2:2    | E2:2    |
| 18                           | A2:1                | C2:1    | D2:1    | E2:1    |
| 19                           | A2:0                | C2:0    | D2:0    | E2:0    |

**Table 9: Pin 38 side probe channel assignments (nonstandard)**

| Nonstandard probe pin number | Section and channel |         |         |         |
|------------------------------|---------------------|---------|---------|---------|
|                              | A probe             | C probe | D probe | E probe |
| 36                           | CLK:1               | Q1      | CLK:2   | Q2      |
| 35                           | A1:7                | C1:7    | D1:7    | E1:7    |
| 34                           | A1:6                | C1:6    | D1:6    | E1:6    |
| 33                           | A1:5                | C1:5    | D1:5    | E1:5    |
| 32                           | A1:4                | C1:4    | D1:4    | E1:4    |
| 31                           | A1:3                | C1:3    | D1:3    | E1:3    |
| 30                           | A1:2                | C1:2    | D1:2    | E1:2    |
| 29                           | A1:1                | C1:1    | D1:1    | E1:1    |
| 28                           | A1:0                | C1:0    | D1:0    | E1:0    |
| 27                           | A0:7                | C0:7    | D0:7    | E0:7    |
| 26                           | A0:6                | C0:6    | D0:6    | E0:6    |
| 25                           | A0:5                | C0:5    | D0:5    | E0:5    |
| 24                           | A0:4                | C0:4    | D0:4    | E0:4    |
| 23                           | A0:3                | C0:3    | D0:3    | E0:3    |

Table 9: Pin 38 side probe channel assignments (nonstandard) (cont.)

| Nonstandard probe pin number | Section and channel |         |         |         |
|------------------------------|---------------------|---------|---------|---------|
|                              | A probe             | C probe | D probe | E probe |
| 22                           | A0:2                | C0:2    | D0:2    | E0:2    |
| 21                           | A0:1                | C0:1    | D0:1    | E0:1    |
| 20                           | A0:0                | C0:0    | D0:0    | E0:0    |

## Loading and equivalent circuits

Use the loading and equivalent circuits for the best design for your application.

Each signal line has a  $20\text{ k}\Omega \pm 1\%$  resistor (shunted by a  $0.23\text{ pF}$  capacitor) in series with an approximately five foot long section of  $75\text{ }\Omega$  coaxial cable. The load presented to the SUT by the probe is low. The load is equivalent to a  $2\text{ pF}$  capacitance with  $20\text{ k}\Omega$  resistance returned to a  $2.2\text{ V}$  supply. The following approximation of the probe loading is sufficient for most circuit simulation calculations.

The following figure shows the equivalent circuit of the probe.

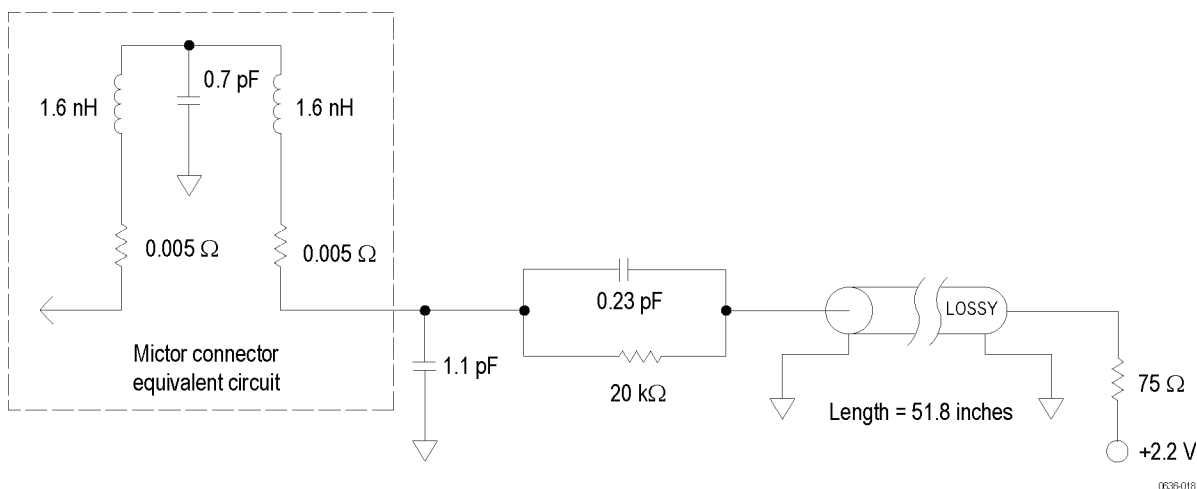


Figure 21: Equivalent circuit for the probe

The following table shows the values to calculate characteristics of the lossy delay lines shown in the next two figures.

**Table 10: Lossy delay line values**

| Characteristic    | Value                   |
|-------------------|-------------------------|
| C (capacitance)   | 1.58 pF per inch        |
| L (inductance)    | 8.9 nH per inch         |
| R (resistance)    | 0.067 $\Omega$ per inch |
| $Z_0$ (impedance) | 75 $\Omega$             |

## Specifications

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

These specifications are for a P5934 probe connected between a logic analyzer and a SUT. Refer to the *TLA6400 Series Logic Analyzer 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 specifications. The probes are designed to meet Tektronix standard 062-2847-00 class 5.

**Table 11: Electrical and mechanical specifications**

| Characteristic  | Description  |
|---|--|
| Number of input channels  | 34 (32 data and 2 clock/qualifier channels)                                    |
| Input impedance   | 20 k $\Omega$ $\pm$ 0.5% in parallel with 2 pF                                 |
| Analog bandwidth  | 1.5 GHz  |
| Channel-to-channel skew   |  |
| ( <i>Maximum</i> )  | Instrument channel-to-channel skew plus $\pm$ 500 ps                           |
| ( <i>Typical</i> )  | Instrument channel-to-channel skew plus $\pm$ 250 ps                           |
| Delay time from probe tip input connector to probe output connector | 6.33 ns $\pm$ 100 ps   |
| Maximum operating swing time  | 2 $V_{P-P}$ for rise times below 1 ns<br>6 $V_{P-P}$ for rise times above 1 ns |
| Maximum nondestructive input signal to probe                        | -4.5 V to +15 V  |
| Probe overdrive   | $\pm$ 150 mV or $\pm$ 25% of signal swing, whichever is greater                |
| Probe length (including probe tip and connectors)                   | 1.3157 m (51.8 in)   |

The following table shows the environmental specifications.

**Table 12: Environmental specifications**

| <b>Characteristic</b> | <b>Description</b>  |
|-----------------------|---|
| <b>Temperature</b>    |   |
| Operating             | -10 °C to +55 °C (14 °F to +131 ° F) with 15 °C/hour (59 °F/hour) maximum gradient, non-condensing, derated 1 °C (33.8 °F per 300 m (984 ft.) above 1500 m (4921 ft.) |
| Non-operating         | -51° C to +71 ° C (-60 ° F to +160 ° F) with 15 °C/hour (59 °F/hour) maximum gradient   |
| <b>Humidity</b>       |   |
| Operating             | 5% to 95% relative humidity up to 30 °C (86 °F)<br>5% to 45% relative humidity above 30 °C (86 °F) up to 55 °C (131 °F); non-condensing                               |
| Non-operating         | 5% to 95% relative humidity up to 30 °C (86 °F)<br>5% to 45% relative humidity above 30 °C (86 °F) up to 71 °C (160 °F); non-condensing                               |
| <b>Altitude</b>       |   |
| Operating             | up to 3000 m (9843 ft.)   |
| Non-operating         | up to 12,000 m (39370 ft.)  |





# Maintenance

## Probe calibration information

The probe does not require calibration; however, the probe can be returned to Tektronix for functional verification. If a probe failure occurs, return the entire probe to Tektronix for repair.

## Probe service strategy information

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

**Table 13: Service options**

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

## Inspect or clean the probe

The probe does not require scheduled or periodic maintenance. To maintain good electrical contact, keep the probe free of dirt, dust, and contaminants. Also, ensure that any electrically conductive contaminants are removed.

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.

4. If you connect and disconnect the probe frequently, occasionally use a magnifying glass to examine the contact points on both the probe tip and on the mating connector.

If contacts have been dislocated from their proper position, use a pair of small tweezers (such as a #3 to #5), to carefully move the contacts back into place.

## Perform the functional check

Perform the functional check to verify basic functionality. Tektronix recommends that you perform the functional check after replacing any of the probe parts.

1. Connect the probe to the logic analyzer and to an active signal source.
2. Open the Setup window on the logic analyzer.
3. Check for signal activity in the Setup window for the attached probe.

## 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.

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, it is important to 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 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.

## **Keep out area**

An area on a printed circuit board in which component, trace, and/or via placement may be restricted.

## **PCB**

An acronym for Printed Circuit Board.

## **Probe connector**

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

## **Probe tip**

The end of the probe that connects to the SUT. It is also known as the probe head.

## **SUT**

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



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