

**Tektronix Logic Analyzer Family
Product Safety & Compliance
Instructions**

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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

Use Proper Power Cord. Use only the power cord specified for this product and certified for the country of use.

Use Proper Voltage Setting. Before applying power, ensure that the line selector is in the proper position for the source being used.

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

Ground the Product. This product is grounded through the grounding conductor of the 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.

Power Disconnect. The power cord disconnects the product from the power source. Do not block the power cord; it must remain accessible to the user at all times.

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.

Replace Batteries Properly. Replace batteries only with the specified type and rating.

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:



CAUTION
Refer to Manual



WARNING
High Voltage



Protective Ground
(Earth) Terminal



Earth Terminal



Chassis Ground



Mains Disconnected
OFF (Power)



Mains Connected
ON (Power)



Standby

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.

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. In order 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 European Union's requirements according to Directive 2002/96/EC on waste electrical and electronic equipment (WEEE). For information about recycling options, check the Support/Service section of the Tektronix Web site (www.tektronix.com).

Mercury Notification. This product uses an LCD backlight lamp that contains mercury. Disposal may be regulated due to environmental considerations. Please contact your local authorities or, within the United States, the Electronics Industries Alliance (www.eiae.org) for disposal or recycling information.

Perchlorate Materials. This product contains one or more type CR lithium coin cell batteries. According to the state of California, CR lithium coin cells are classified as perchlorate materials and require special handling. See www.dtsc.ca.gov/hazardouswaste/perchlorate for additional information.

Restriction of Hazardous Substances

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

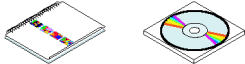

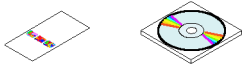
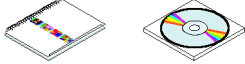





Preface

This document contains safety, environmental, and compliance information for your Tektronix TLA7000 Series and TLA5000 Series Logic Analyzer products.

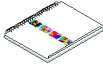

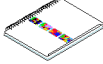

To prevent personal injury or damage, consider the following requirements before starting service:

- The procedures in this manual should be performed only by qualified service personnel.
- Read the General Safety Summary and Service Safety Summary found at the beginning of this manual.
- For detailed installation information, refer to the *TLA7000 Series Logic Analyzer Installation Manual* or to the *TLA5000B Series Logic Analyzer Installation Manual* available on the TLA Documentation CD or on the Tektronix Web site (www.tektronix.com/manuals).

Related Documentation

Item	Purpose	Location
TLA Quick Start User Manuals	High-level operational overview	
Online Help	In-depth operation and UI help	
Installation Quick Reference Cards	High-level installation information	
Installation Manuals	Detailed first-time installation information	
XYZs of Logic Analyzers	Logic analyzer basics	 www.Tektronix.com
Declassification and Security instructions	Data security concerns specific to sanitizing or removing memory devices from Tektronix products	 www.Tektronix.com
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	

Related Documentation (cont.)

Item	Purpose	Location
Field upgrade kits	Upgrade information for your logic analyzer	 
Optional Service Manuals	Self-service documentation for modules and mainframes	 

Getting Started

Read this section before installing the instrument. This section describes environmental considerations and power requirements for your instrument.

TLA7000 Series Logic Analyzer Environmental Considerations

The following table describes the environmental considerations for the TLA7000 Series Logic Analyzer.



CAUTION. For the TLA7012 Portable Mainframe, allow a 15.3 cm (6-in) clearance at the top, back, and sides of the instrument to ensure proper cooling. Keep the bottom of the instrument clear.

For the TLA7016 Benchtop Mainframe and the TLA7PCI Benchtop Controller PC, allow a 5.1 cm (2-in) clearance at the top, back, and sides of the instrument to ensure proper cooling.

For the TL708EX TekLink 8-Port Hub allow a 15.3 cm (6-in) clearance at the back of the instrument to ensure proper cooling.

Inadequate clearances can cause the instrument to overheat and shut down.

Table 1: TLA7000 Series Logic Analyzer environmental considerations

Feature	Description
Temperature	Operating +5 °C to +45 °C ¹
	Nonoperating -20 °C to +60 °C
Humidity 20% to 80%	Operating ≤30 °C; 80% relative humidity (29 °C maximum wet bulb temperature) ²
	Nonoperating 8% to 80% (29 °C maximum wet bulb temperature)
Altitude	Operating and nonoperating To 3000 m (9843 ft.)

¹ The operating temperature for the TL708EX TekLink 8-Port Hub is 0 °C to +50 °C

² The operating humidity for the TL708EX TekLink 8-Port Hub is 5% to 95% relative humidity at an altitude up to 3000 m (9843 ft.)

TLA5000B Series Logic Analyzer Environmental Considerations

The following table describes the environmental considerations for the TLA5000B Series Logic Analyzer.



CAUTION. Allow a 5.1 cm (2 in) clearance around the top, back, and sides of the instrument to ensure proper cooling. Inadequate clearances can cause the instrument to overheat and shut down.

Table 2: TLA5000B Series Logic Analyzer environmental considerations

Feature	Description	
Temperature	Operating	+5 °C to +50 °C
	Nonoperating	-20 °C to +60 °C
Humidity 20% to 80%	Operating	20% to 80% relative humidity, noncondensing (29 °C maximum wet bulb temperature)
	Nonoperating	8% to 80% (29 °C maximum wet bulb temperature)
Altitude	Operating	To 3000 m (9843 ft.)
	Nonoperating	12,190 m (40,000 ft)

TLA7012 Portable Mainframe Site Considerations

You can use the portable mainframe on a bench or on a cart in the normal position (on the bottom feet). The front feet extend to give a better view of the instrument display. You can also mount the mainframe in an instrument rack.

Table 3: TLA7012 Portable Mainframe power considerations

Feature	Description
Voltage range and frequency	100 V _{RMS} to 240 V _{RMS} ±10%, 50 Hz to 60 Hz
	115 V _{RMS} ±10%, 400 Hz
Input current	6 A _{RMS} maximum at 90 V _{RMS} , 60 Hz or 100 _{RMS} , 400 Hz (70 A surge)
Power consumption	750 W maximum

TLA7016 Benchtop Mainframe Site Considerations

The TLA7016 Benchtop Mainframe is designed to operate on a bench, on a cart, or in a rackmount environment. If you need to stack more than two benchtop mainframes, install the mainframes in a rack.



WARNING. *To avoid personal injury, never lift or move a benchtop mainframe by yourself. The size and weight of the mainframe requires two people to lift or move it.*

Do not stack more than one benchtop mainframe on top of another benchtop mainframe. Always use a rackmount kit to ensure that the mainframes are secure and will not fall.

Table 4: TLA7016 Benchtop mainframe power considerations

Feature	Description
Voltage range, frequency, and power consumption	100 V _{RMS} to 120 V _{RMS} , 50 Hz to 60 Hz, 1450 W maximum
	120 V _{RMS} to 240 V _{RMS} , 50 Hz to 60 Hz, 1900 W maximum
	115 _{RMS} , 400 Hz, 1450 W maximum
Input current	16.5 A maximum at 90 VAC (70 A surge)

Support Hardware Site Considerations

The TLA7PC1 Benchtop PC Controller, TL708EX Hub, and GbE switch units can operate separately on your workbench, equipment rack, or cart. You can also mount them to your benchtop mainframe using the brackets provided with the benchtop mainframe.

Table 5: TLA7PC1 and TL708EX power considerations

Product		Description
TLA7PC1	Voltage range and frequency	100 V _{RMS} to 240 V _{RMS} ±10%, 50 Hz to 60 Hz
	Input current	8 A _{RMS} maximum at 100 V _{RMS} , 5 A _{RMS} maximum, at 240 V _{RMS}
	Power consumption	350 W maximum
TL708EX	Voltage range and frequency	100 V _{RMS} to 240 V _{RMS} ±10%, 47 Hz to 63 Hz
	Input current	0.9 A _{RMS} maximum at 120 V _{RMS} at 80 W
	Power consumption	110 W maximum

TLA5000B Series Logic Analyzer Site Considerations

You can use the TLA5000B Series Logic Analyzer on a bench or on a cart in the normal position (on the bottom feet). You can also mount the mainframe in an instrument rack.

Table 6: TLA5000B Series Logic Analyzer Power considerations

Feature	Description
Voltage range and frequency	100 V _{RMS} to 240 V _{RMS} ±10%, 47 Hz to 63 Hz
Maximum power consumption	220 Watts line power maximum
Steady-State input current	4 A _{RMS} maximum

TLA7000 Series Basic Installation

The TLA7000 Series products are normally used in a network environment and the installation instructions for instruments in a network environment are beyond the scope of this document.

For detailed network installation information, refer to the *TLA7000 Series Logic Analyzer Installation Manual* available on the TLA Documentation CD or on the Tektronix Web site (www.tektronix.com/manuals).

Chassis Ground Connections

Use the chassis ground connections to connect the grounds of the target system to the logic analyzer to ensure a common ground connection between instruments. (See Figure 1 on page 5.)



CAUTION. To reduce the risk of ground-loop noise, ground all of the instruments in the system to the logic analyzer mainframe using the ground connections shown.

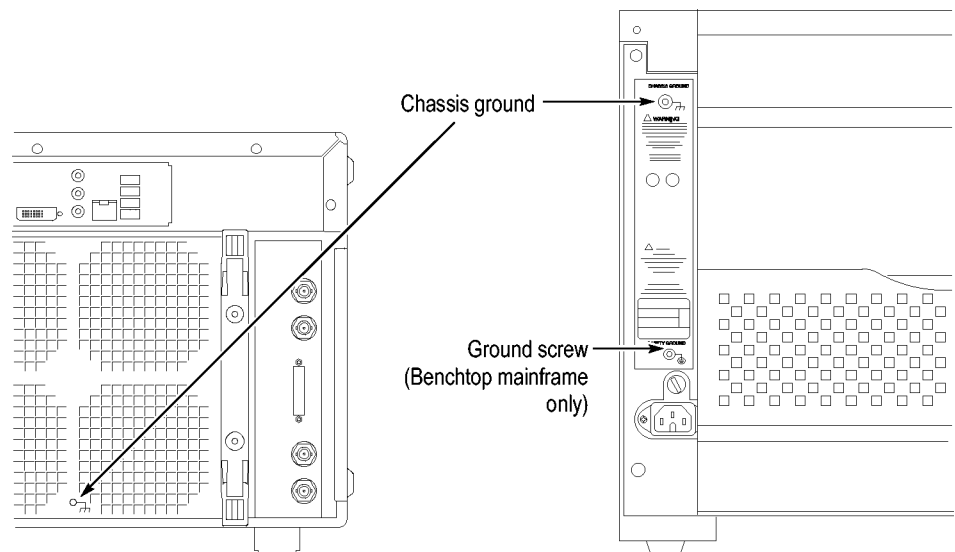


Figure 1: Location of the ground connection on the TLA7000 logic analyzers

Installing Modules in TLA7000 Series Mainframes

TLA700 Modules or TLA7000 Modules are fully compatible with the TLA7000 Series mainframes.



CAUTION. To avoid damaging the instrument, do not install or remove any modules while the instrument is powered on. Always power down the instrument before installing or removing modules.

You can merge modules together to create wider modules. If your application requires you to merge modules, do so before installing the modules in the mainframe.

Use a screwdriver to tighten the retaining screws to 2.5 in-lbs after seating the modules in place. (See Figure 2 on page 6.)

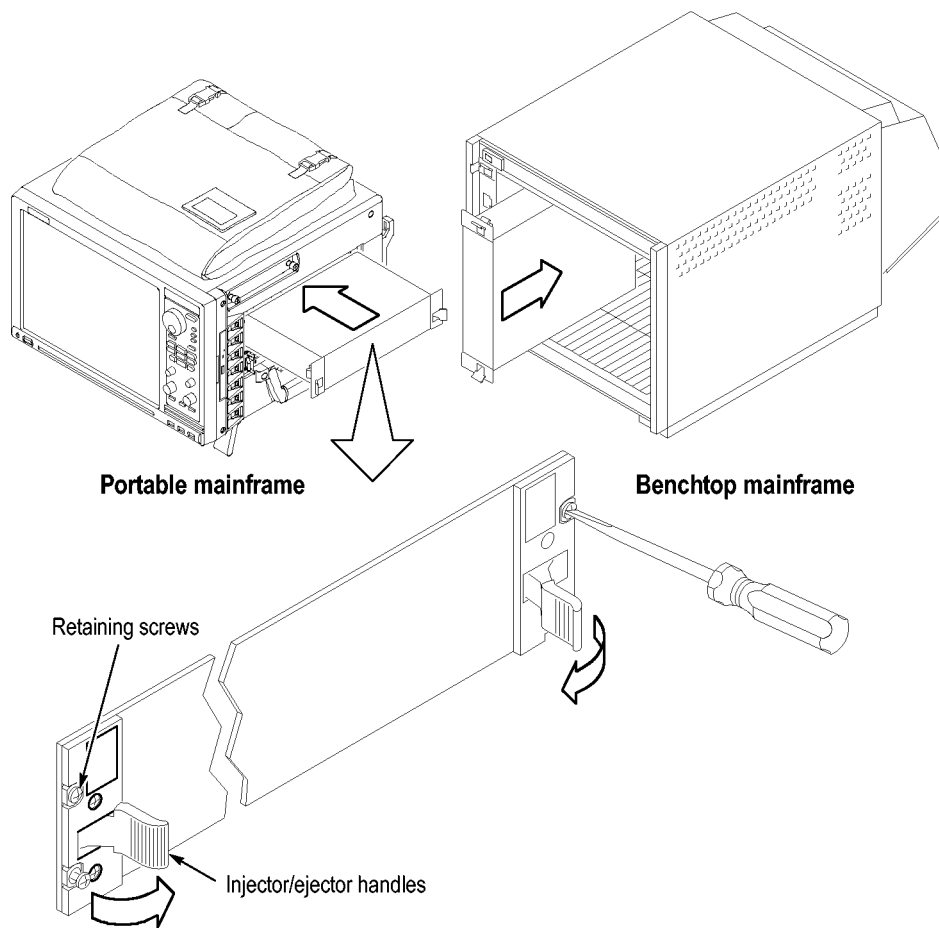


Figure 2: Installing modules

If you have any unused (empty) slots in your mainframe, install blank-slot panel covers to meet EMC and cooling specifications. Install a blank-slot panel cover for the empty slot in the portable mainframe. (See Figure 3.) Install the blank slot-panels on the benchtop mainframe. (See Figure 4.) Install the blank-slot panel covers before you install any modules. Use only Tektronix TLA covers; otherwise the mainframe may not meet EMC and cooling requirements.

Make sure that the EMI shielding is in contact with the adjacent panel or module cover, and that the airflow shutter activation arms protrude through the holes in the blank-slot panel.

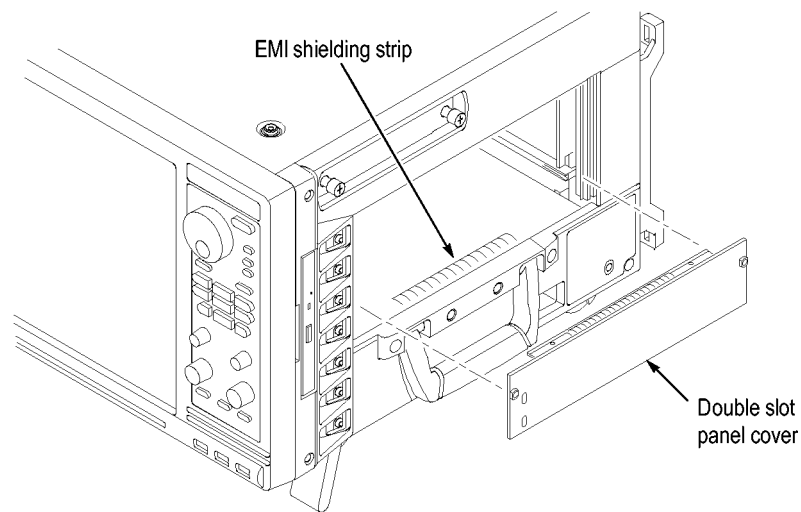


Figure 3: Installing panel covers on the portable mainframe

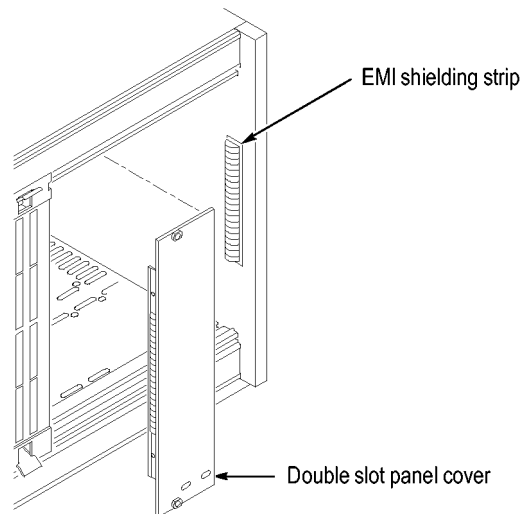


Figure 4: Installing panel covers on the benchtop mainframe

Connecting Accessories

After installing the mainframes and modules, you can connect the accessories such as external monitors, keyboard, and printer.

Connect the accessories to the TLA7012 Portable Mainframe. (See Figure 5.)
 If you have a TLA7016 Benchtop Mainframe, connect the accessories to the external PC; connect other cables and connectors to the mainframe. (See Figure 6 on page 9.)

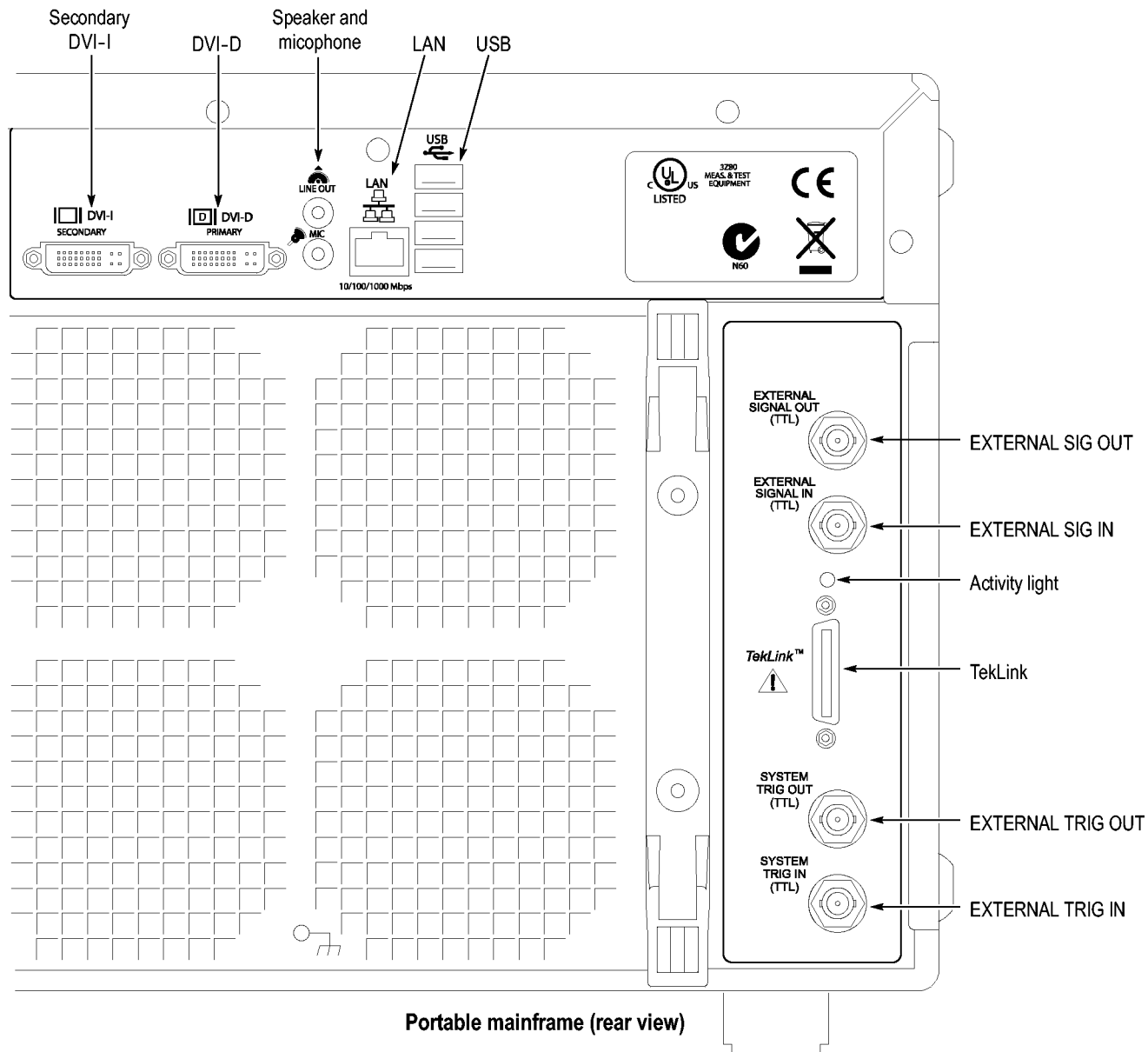


Figure 5: TLA7012 accessories connections

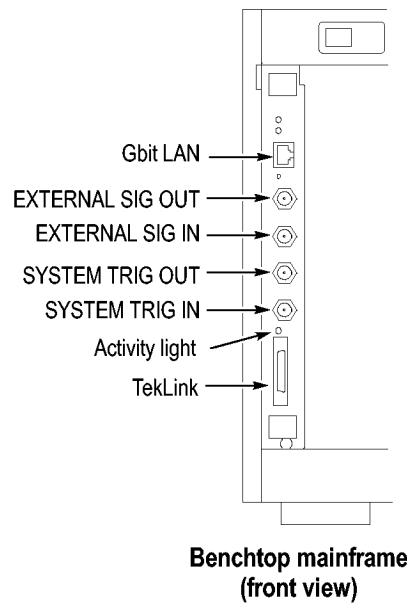


Figure 6: TLA7016 accessories connections

Connect additional accessories as needed. (See Table 7.)

Table 7: Additional accessory connection information

Item	Description
Monitor	<p>There are two display ports on the TLA7012: Primary (DVI-D, digital output only), and Secondary (DVI-I, digital/analog out). Simulscan mode displays the same information on the internal display and the external monitor connected to either Primary or Secondary.</p> <p>To change the display settings, right-click the mouse on the desktop, select Properties, and go to the Settings tab. Select the settings for your monitor. Note that some of the display settings may not function until you connect an external monitor.</p> <p>Use the VGA-to-DVI display adapter to connect a VGA monitor to the Secondary DVI-D output. If you use a nonstandard monitor, you may need to change the Windows display settings to achieve the proper resolution.</p>
LAN	<p>Connect the mainframes to your network through the Gbit LAN connectors. You can remotely control the mainframes through a LAN switch using your PC (loaded with the TLA application software), or the dedicated PC controller (TLA7PC1).</p>
Printer	<p>The instruments send printer information to the USB ports. Use any of the four USB ports for your printer.</p>

TLA5000B Series Basic Installation

For detailed installation information, refer to the *TLA5000B Series Logic Analyzer Installation Manual* available on the TLA Documentation CD or on the Tektronix Web site (www.tektronix.com/manuals).

Chassis Ground Connections

Use the chassis ground connections to connect the grounds of the target system to the logic analyzer to ensure a common ground connection between instruments. (See Figure 7.)

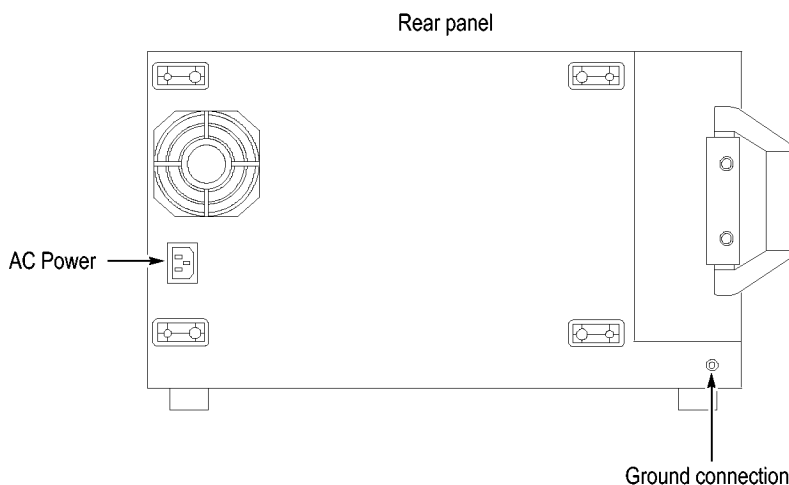


Figure 7: Location of the ground connection on the TLA5000B logic analyzers

Connecting Accessories

Connect the accessories to the side of the instrument; depending on your model, the number of connectors and locations may differ. (See Figure 8.)

Table 8: Accessory connection information

Item	Description
Monitor	If you use a non-plug & play monitor, you may need to change the Windows display settings to achieve the proper resolution.
Printer	Connect the printer to the LPT (parallel) port.
Rackmount	The logic analyzer can be installed in rackmount kits. Refer to the respective rackmount kit instructions for installation information.

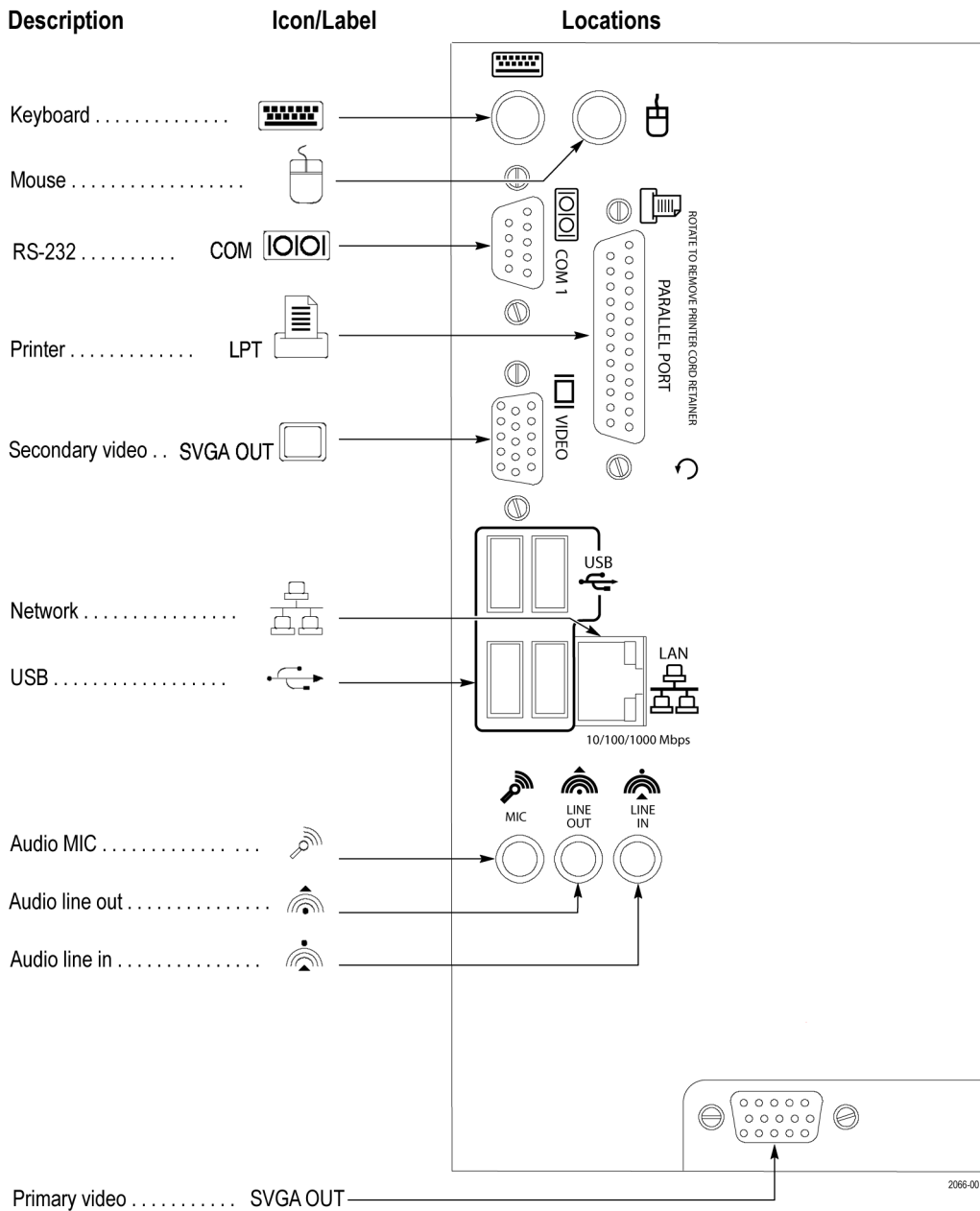


Figure 8: TLA5000B accessory connections

Controls and Connectors

This section describes basic controls and connectors on your instrument.

TLA7012 Logic Analyzer Front Panel Controls

Use the front-panel controls to operate the TLA7012 Portable Mainframe logic analyzer. (See Figure 9.) You can also attach an external keyboard, monitor, and mouse to operate the logic analyzers. The TLA7016 Benchtop mainframes do not have front-panel controls and require an external controller with a keyboard, monitor, and mouse.

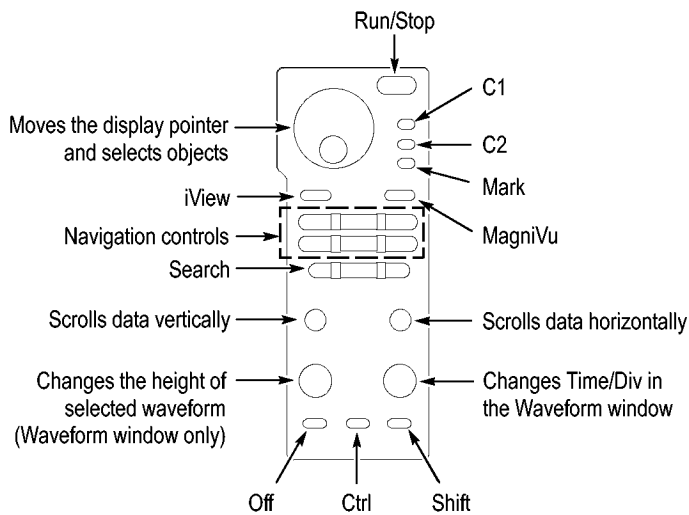


Figure 9: TLA7012 Portable Mainframe front panel

TLA5000B Series Logic Analyzer Front Panel Controls

Use the front panel controls on the TLA5000B instrument to operate the logic analyzer. You can also attach an external keyboard, monitor, and mouse to operate the logic analyzer.

You can use the front panel keys as an alternative to an external keyboard. Most keys and key combinations are available using the front panel. (See Figure 10.)

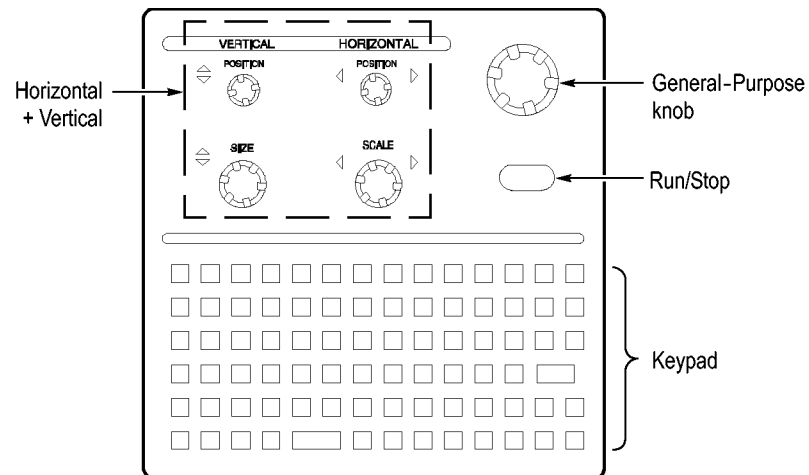


Figure 10: TLA5000B front panel

TLA7000 Series External Connectors

The following mainframe external connections are available. (See Figure 11.)

- System Trigger In and System Trigger Out, used to receive or send a trigger from/to an external source
- External Signal In and External Signal Out, used to receive or send a signal from/to an external source
- TekLink, used to coordinate trigger signals, input/output signals, and time references between mainframes
- Accessory connections, such as USB, LAN, and audio/video outputs

Connecting an External Display

There are two display ports on the TLA7012: Primary (DVI-D, digital output only), and Secondary (DVI-I, digital/analog out). Simulscan mode displays the same information on the internal display and the external monitor connected to either Primary or Secondary.

To enable Simulscan mode, or to enable/disable external monitors or make other display changes, right click on your desktop and select Properties > Graphics > Intel Graphics Technology.

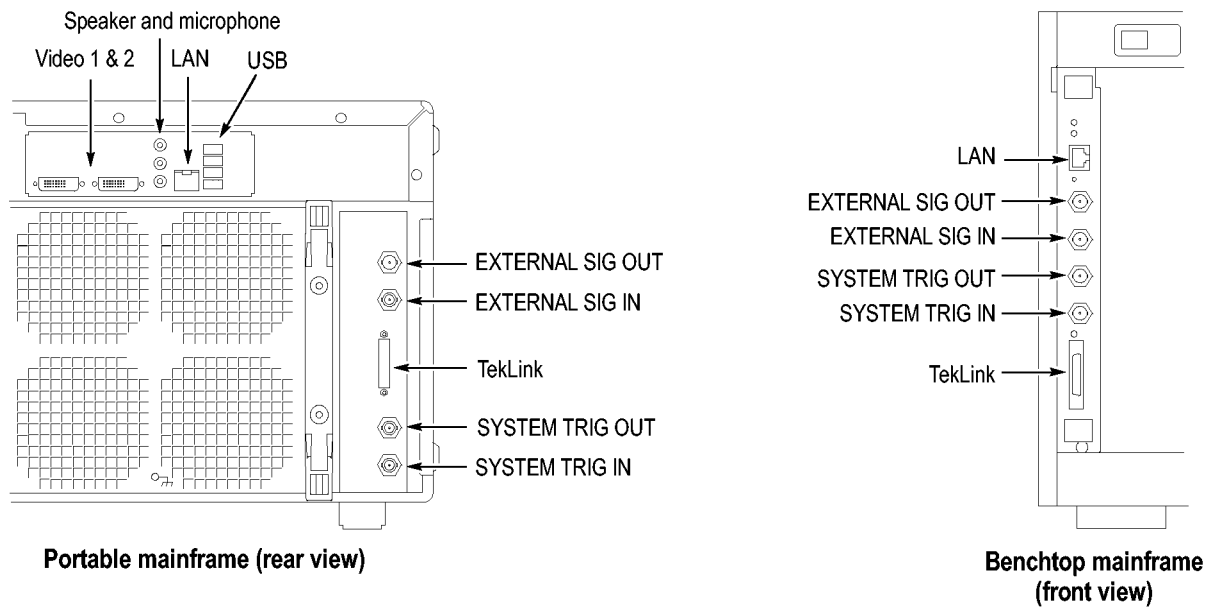


Figure 11: TLA7000 Series external connectors

TLA5000B Series Logic Analyzer External Connectors

Use the external connectors on the rear panel of the logic analyzer to connect external accessories. (See Figure 8 on page 11.)

Use the four front-panel BNC connectors to send signals between the logic analyzer and other instruments. For example, use the iView cable to connect the logic analyzer to an oscilloscope.

First Time Operation

Make sure that you connect the keyboard, mouse, and other accessories before applying power to the logic analyzer. Complete the following steps to turn on the logic analyzer for the first time:

1. Connect the power cord to your instrument.
2. If you have an external monitor, connect the power cord and turn on the monitor.

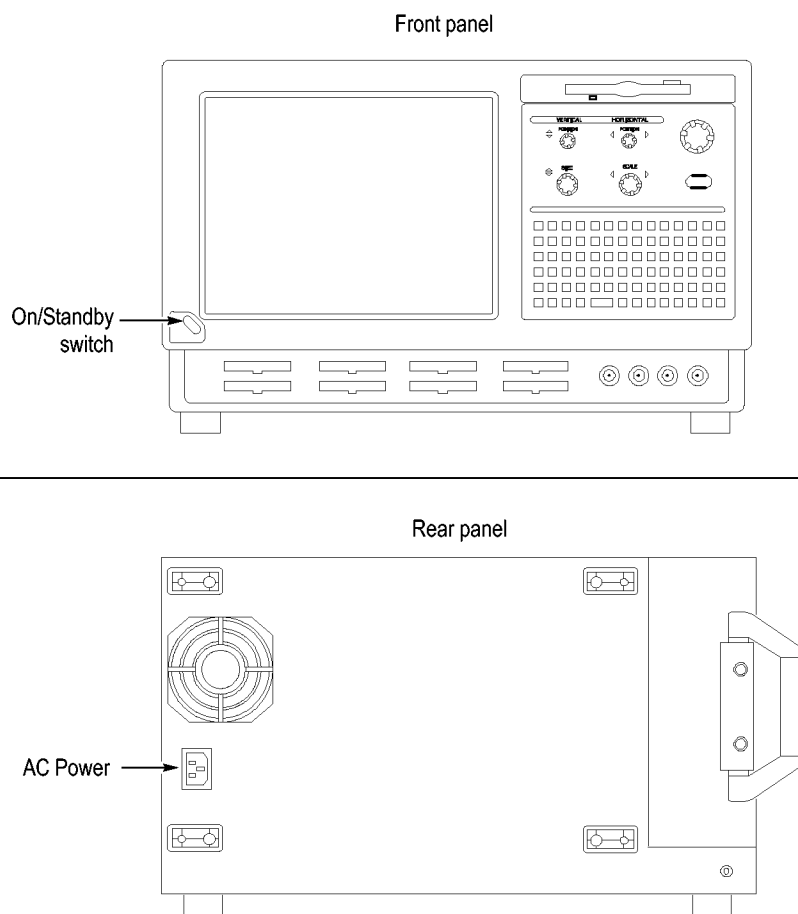


Figure 12: TLA5000B On/Standby switch location

3. Turn on the logic analyzer as follows:
 - a. Press the On/Standby switch on the front of the instrument to turn on the logic analyzer.
 - b. Wait for the logic analyzer to complete power-on self-tests and start Windows.

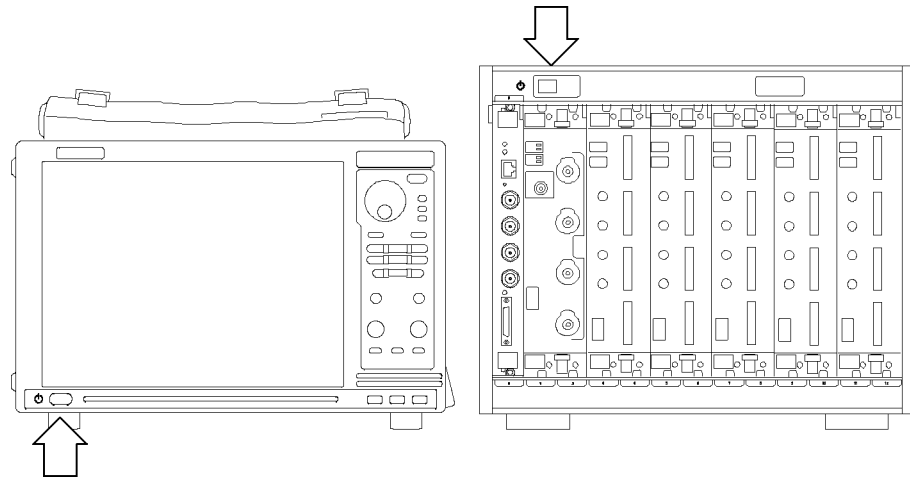


Figure 13: TLA7000 On/Standby switch locations

Appendix A: Certifications and Compliances

Certifications and Compliances

EC Declaration of Conformity – EMC

Meets intent of Directive 2004/108/EEC for Electromagnetic Compatibility. Compliance was demonstrated to the following specifications as listed in the Official Journal of the European Communities:

EN 61326:1997. EMC requirements for Class A electrical equipment for measurement, control, and laboratory use. Annex D. ^{1 2}

- IEC 61000-4-2:1999. Electrostatic discharge immunity
- IEC 61000-4-3:2002. RF electromagnetic field immunity
- IEC 61000-4-4:2004. Electrical fast transient/burst immunity
- IEC 61000-4-5:2005. Power line surge immunity
- IEC 61000-4-6:2003. Conducted RF immunity
- IEC 61000-4-11:2004. Voltage dips and interruptions immunity

EN 61000-3-2:2000. AC power line harmonic emissions

EN 61000-3-3:1995. Voltage changes, fluctuations, and flicker

European Contact.

Tektronix UK, Ltd.
Western Peninsula
Western Road
Bracknell, RG12 1RF
United Kingdom

¹ This product is intended for use in nonresidential areas only. Use in residential areas may cause electromagnetic interference.

² Emissions which exceed the levels required by this standard may occur when this equipment is connected to a test object.

Australia / New Zealand Declaration of Conformity – EMC

Complies with the EMC provision of the Radiocommunications Act per the following standard, in accordance with ACMA:

- EN 61326:1997. EMC requirements for electrical equipment for measurement, control, and laboratory use.

EC Declaration of Conformity – Low Voltage	<p>Compliance was demonstrated to the following specification as listed in the Official Journal of the European Communities:</p> <p>Low Voltage Directive 2006/95/EC.</p> <ul style="list-style-type: none">■ EN 61010-1: 2001. Safety requirements for electrical equipment for measurement control and laboratory use. Part 1
U.S. Nationally Recognized Testing Laboratory Listing	<ul style="list-style-type: none">■ UL 61010-1: 2004, Second Edition. Safety requirements for electrical equipment for measurement control and laboratory use. Part 1 ¹ <p>¹ TLA7016 Benchtop Mainframes and TLA5000B Logic Analyzers comply with UL 61010B-1:2003, 1st edition, Standard for electrical measuring and test equipment.</p>
Canadian Certification	<ul style="list-style-type: none">■ CAN/CSA C22.2 No. 61010-1-04. Second Edition. Safety requirements for electrical equipment for measurement, control, and laboratory use. Part 1. ¹ <p>¹ TLA7016 Benchtop Mainframes and TLA5000B Logic Analyzers comply with CAN/CSA C22.2 No. 61010.1-97. 1st edition, Second Amendment. Safety requirements for measurement, control, and laboratory use. Part 1.</p>
Additional Compliances	<ul style="list-style-type: none">■ IEC 61010-1: 2001. Safety requirements for electrical equipment for measurement, control, and laboratory use. Part 1
Equipment Type	Test and measuring equipment.
Safety Class	Class 1 – grounded product.
Safety Certification of Plug-in or VXI Modules	The safety certification is valid only when installed in an appropriately approved (by a USA NRTL or a Canada Certified Organization) mainframe.

Pollution Degree Description	<p>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.</p> <ul style="list-style-type: none"> ■ 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.
Installation (Overvoltage) Category Descriptions	<p>Terminals on this product may have different installation (overvoltage) category designations. The installation categories are:</p> <ul style="list-style-type: none"> ■ Measurement Category IV. For measurements performed at the source of low-voltage installation. ■ Measurement Category III. For measurements performed in the building installation. ■ Measurement Category II. For measurements performed on circuits directly connected to the low-voltage installation. ■ Measurement Category I. For measurements performed on circuits not directly connected to MAINS.
Overvoltage Category	Overvoltage Category II (as defined in IEC 61010-1)