Tektronix®

A622
100 Amp AC/DC Current Probe
Instructions

070-8883-05

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www.tek.com
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Contacting Tektronix

Tektronix, Inc.
14150 SW Karl Braun Drive
P.O. Box 500
Beaverton, OR 97077
USA

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

- In North America, call 1-800-833-9200.
- Worldwide, visit *www.tek.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.

THIS WARRANTY IS GIVEN BY TEKTRONIX WITH RESPECT TO THE PRODUCT IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED. TEKTRONIX AND ITS VENDORS DISCLAIM ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. TEKTRONIX' RESPONSIBILITY TO REPAIR OR REPLACE DEFECTIVE PRODUCTS IS THE SOLE AND EXCLUSIVE REMEDY PROVIDED TO THE CUSTOMER FOR BREACH OF THIS WARRANTY. TEKTRONIX AND ITS VENDORS WILL NOT BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES IRRESPECTIVE OF WHETHER TEKTRONIX OR THE VENDOR HAS ADVANCE NOTICE OF THE POSSIBILITY OF SUCH DAMAGES.

[W2 – 15AUG04]

Important safety information

This manual contains information and warnings that must be followed by the user for safe operation and to keep the product in a safe condition.

To safely perform service on this product, see the *Service safety summary* that follows the *General safety summary*.

General safety summary

Use the product only as specified. Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. Carefully read all instructions. Retain these instructions for future reference.

Comply with local and national safety codes.

For correct and safe operation of the product, it is essential that you follow generally accepted safety procedures in addition to the safety precautions specified in this manual.

The product is designed to be used by trained personnel only.

Only qualified personnel who are aware of the hazards involved should remove the cover for repair, maintenance, or adjustment.

Before use, always check the product with a known source to be sure it is operating correctly.

This product is not intended for detection of hazardous voltages.

Use personal protective equipment to prevent shock and arc blast injury where hazardous live conductors are exposed.

To avoid fire or personal injury

Observe all terminal ratings. To avoid fire or shock hazard, observe all ratings and markings on the product. Before using the product, consult the product manual for further ratings. Do not exceed the Measurement Category (CAT) ratings and voltage or current rating.

Do not apply a potential to any terminal, including the common terminal, that exceeds the maximum rating of that terminal. Do not use the probe anywhere beyond the tactile barrier.

Do not operate without covers. Do not operate this product with covers or panels removed, or with the case open. Hazardous voltage exposure is possible.

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

Use only specified replacement parts.

Replace batteries properly. Replace batteries only with the specified type and rating.

Recharge batteries properly. Recharge batteries for the recommended charge cycle only.

Do not operate in wet/damp conditions. Be aware that condensation may occur if a unit is moved from a cold to a warm environment.

Do not operate in an explosive atmosphere.

Keep product surfaces clean and dry. Remove the input signals before you clean the product.

Probes and test leads

Connect and disconnect properly. Connect the probe output to the measurement product before connecting the probe to the circuit under test. Disconnect the probe from the circuit under test before disconnecting the probe from the measurement product.

Do not connect a current probe to any wire that carries voltages, currents, and frequencies above the current probe rating.

Inspect the probe and accessories. Before each use, inspect probe and accessories for damage (cuts, tears, or defects in the probe body, accessories, or cable jacket). Do not use if damaged.

Service safety summary

The *Service safety summary* section contains additional information required to safely perform service on the product. Only qualified personnel should perform service procedures. Read this *Service safety summary* and the *General safety summary* before performing any service procedures.

To avoid electric shock. Do not touch exposed connections.

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, remove the current probe from the circuit before removing any covers or panels, or opening the case for servicing.

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.

Verify safety after repair. Always recheck operation after performing a repair.

Terms in the manual

These terms may appear in this manual:

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

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

Terms on the product

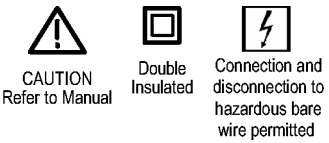
These terms may appear on the product:

- DANGER indicates an injury hazard immediately accessible as you read the marking.
- WARNING indicates an injury hazard not immediately accessible as you read the marking.
- CAUTION indicates a hazard to property including the product.

Symbols on the product

When this symbol is marked on the product, be sure to consult the manual to find out the nature of the potential hazards and any actions which have to be taken to avoid them. (This symbol may also be used to refer the user to ratings in the manual.)

The following symbols may appear on the product:



Compliance information

This section lists European contact information, safety, and environmental standards with which the instrument complies.

European contact:

Tektronix UK, LTD

Western Peninsula

Western Road

Bracknell, RG12 1RF

United Kingdom

Safety compliance

This section lists the safety standards with which the product complies and other safety compliance information.

EU declaration of conformity – low voltage

Compliance was demonstrated to the following specification as listed in the Official Journal of the European Union:

Low Voltage Directive 2014/35/EU

- EN 61010-1. Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 1: General Requirements.
- EN 61010-2-032. Particular requirements for handheld current clamps for electrical measurement and test equipment.

U.S. nationally recognized testing laboratory listing

- UL 61010-1. Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 1: General Requirements.

Canadian certification

- CAN/CSA-C22.2 No. 61010-1. Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 1: General Requirements.

Additional compliances

- IEC 61010-1. Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 1: General Requirements.
- IEC 61010-2-032. Particular requirements for handheld current clamps for electrical measurement and test equipment.

Equipment type

Test and measuring equipment.

Safety class

Class 2

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, dry location use only.

IP rating

IP20 (as defined in IEC 60529).

Measurement and overvoltage category descriptions

Measurement terminals on this product may be rated for measuring mains voltages from one or more of the following categories (see specific ratings marked on the product and in the manual).

- Measurement Category II. For measurements performed on circuits directly connected to the low-voltage installation.
- Measurement Category III. For measurements performed in the building installation.
- Measurement Category IV. For measurements performed at the source of low-voltage installation.

NOTE. *Only mains power supply circuits have an overvoltage category rating. Only measurement circuits have a measurement category rating. Other circuits within the product do not have either rating.*

Environmental compliance

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 2012/19/EU and 2006/66/EC on waste electrical and electronic equipment (WEEE) and batteries. For information about recycling options, check the Tektronix Web site (*www.tek.com/productrecycling*).

Getting started

The A622 current probe enables a general purpose oscilloscope to display AC and DC current signals up to 100 amps Peak (70 A RMS). The A622 current probe can also make AC and DC measurements with a multimeter by using the BNC-to-banana plug adapter available as a recommended accessory (see *Replaceable Parts* on page 13).

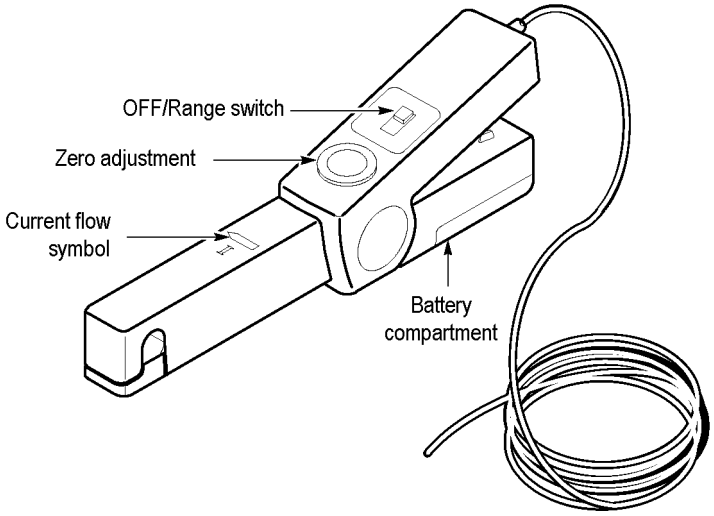
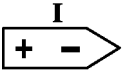
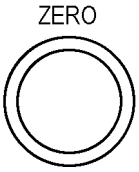
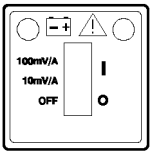
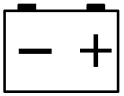


Figure 1: A622 AC/DC Current Probe

The following table highlights the controls and indicators on the A622 current probe.

Table 1: A622 controls and indicators

Control/Indicator	Description
	**Current flow symbol.** The arrow shows the polarity convention of the probefor measuring current flowing from positive to negative.
	**Zero adjustment.** Rotate to adjust the probe output to zero when there is no current present. It can also be used to offset a DC signal component. Zeroing is not needed for AC measurements unless your instrument cannot isolate a DC component (if present).
	**OFF/Range switch.** Slide the switch from OFF to either the 10 mV/A or 100 mV/A range. When either range is selected, the probe is turned on, and the green battery indicator lights. If the indicator does not light, see *Battery Notes* on page 7.
	**Battery indicator.** The green battery indicator lights when the probe is turned on. For more information, see *Battery Notes* on page 7.
	**Overload indicator.** The red overload indicator lights if the measured signal is greater that the selected range capacity. Switch the probe to 10 mV/A if possible, or remove the probe from the circuit.

Operating Basics

Before using the probe, the batteries must be installed; see *Battery Installation* on page 7.

WARNING. *Personal injury or damage to the probe can result if you clamp the probe onto circuits with voltages greater than 600 VAC. Do not clamp the probe onto circuits with higher voltages. Always connect the probe to the instrument before clamping onto the circuit under test.*

1. Connect the probe BNC connector to the oscilloscope input. Start by setting the oscilloscope channel vertical coupling to DC volts and the vertical deflection to 0.1 V/div.
2. Move the **OFF/Range** switch to the **10 mV/A** or **100 mV/A** position to power on the probe.

   The A622 current probe has a green LED power/battery indicator. If the LED does not light, replace the battery.
3. Use the **ZERO** adjustment to zero or offset the probe output.

4. Connect the probe to the circuit by opening the jaws and clamping around the conductor. See *Figure 2: Connecting the A622 current probe* on page 4.

NOTE. *Clamping around both the "hot" and neutral wires may give you a zero reading.*

(Remember to unclamp the probe from the conductor before disconnecting it from your meter or instrument.)

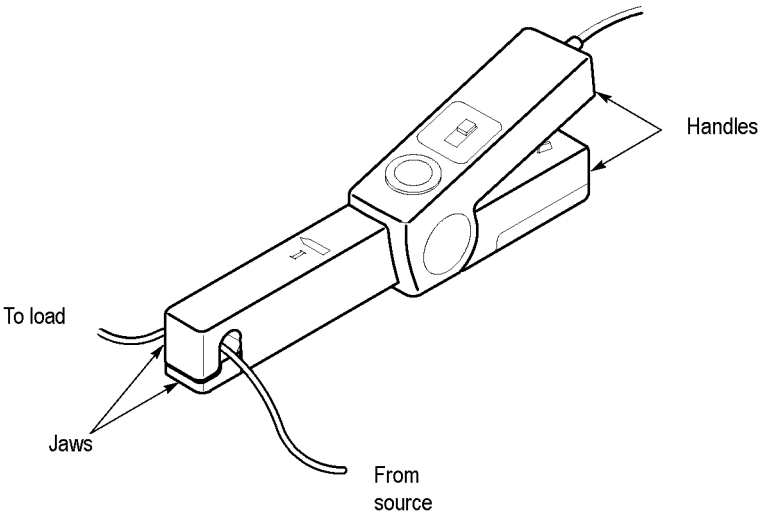


Figure 2: Connecting the A622 current probe

5. Adjust the probe and channel as necessary to get a clear view of the signal. Set the channel to DC volts to see both the AC and DC currents; set the channel to AC to see the AC current only.

The current drawn by some devices looks much different than that of others. While the RMS current may be low, the momentary peaks can be quite high. The following figures shows the difference between the line current drawn by a resistive load and a motor controller.

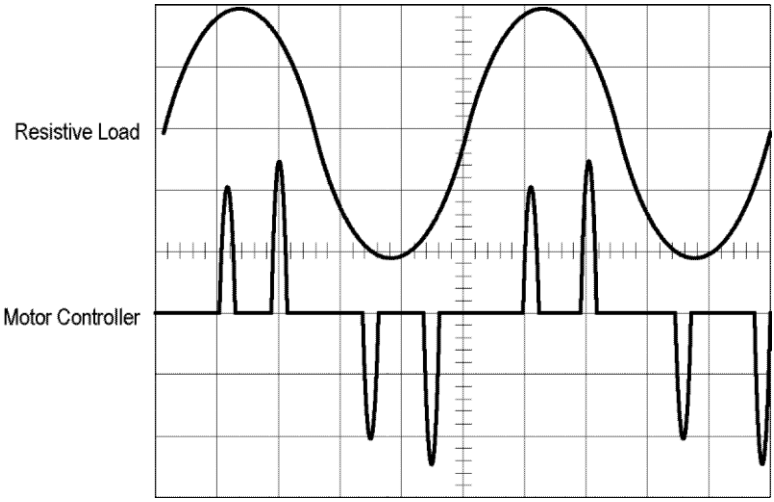


Figure 3: Typical current waveforms

If you are using the A622 current probe with a multimeter, connect the probe with the recommended BNC-to-banana adapter. Connect the black lead to the meter **COM**, and the red lead to the **VΩ** input.

To measure only AC current, set the meter to measure AC volts.

To measure DC current, set the meter to measure DC volts. Note the current convention arrow on the probe to get the proper polarity reading.

To increase the measurement sensitivity of the A622 current probe, loop additional turns of the wire under test through the jaws. See *Figure 4: Increasing the sensitivity* on page 6. The sensitivity of the A622 current probe is multiplied times the number of loops in the jaws. For example: 10 mV/A × 4 turns = 40 mV/A.

CAUTION. *To prevent damage to the probes, do not force the jaw closed. If you cannot close the jaw around the conductor(s), either reduce the number of conductors you are measuring, or, if possible, take your measurement on a smaller conductor.*

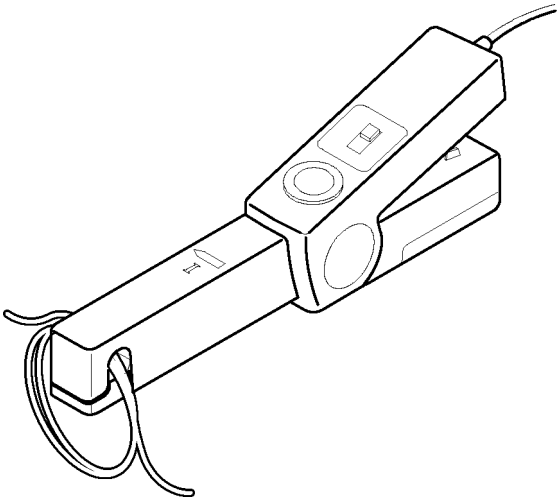


Figure 4: Increasing the sensitivity

Maintenance

Use the information in this section to properly maintain the operation of your A622 AC/DC Current Probe.

Cleaning

To clean the probe body, use a soft cloth dampened in a solution of mild detergent and water. To clean the core, open the jaw and clean the exposed core surfaces with a cotton swap dampened with isopropyl alcohol (isopropanol). Lubricate the jaws mating surfaces with a light oil.

Do not clean with solvents or abrasives. Do not immerse the probe.

Battery Notes

The A622 current probe uses a single 9 V battery. Refer to *Table 2: Electrical Characteristics* on page 8.

As the battery in the A622 current probe is drained, significant gain errors can occur. The green LED will continue to light until a low battery voltage of 6.5 V is reached.

If probe gain errors are detected, replace the battery with a fresh one.

Battery Installation

1. Remove the probe from the circuit.
2. Open the battery compartment by loosening the captive screw and sliding the cover off (see *Figure 5: A622 battery compartment* on page 8).
3. While observing polarity, attach the battery to the battery connector.
4. Replace the cover and lightly tighten the screw to hold the cover in place.

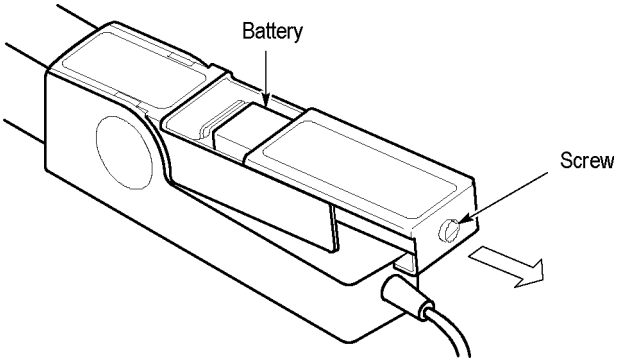


Figure 5: A622 battery compartment

Specifications

These characteristics apply to an A622 AC/DC Current Probe installed on a Tektronix TDS 220 oscilloscope. The oscilloscope must be warmed up for at least 20 minutes and be in an environment within the specified limits in *Table 5: Environmental Characteristics* on page 10.

Table 2: Electrical Characteristics

Current Ranges	10/100 mV/A
DC Accuracy, typical	±3% ± 50 mA at 100 mV/A (50 mA to 10 A peak range) ±4% ± 50 mA at 10 mV/A (500 mA to 40 A peak range) ±15% max at 100 mV/A (40 A peak to 100 A peak range)
Gain versus frequency, typical	*Figure 6: Gain versus frequency at 1 A peak, typical* on page 10
Maximum Working Current	*Table 3: Voltage and current ratings* on page 9

Current Ranges	10/100 mV/A
Maximum Working Voltage [1]	*Table 3: Voltage and current ratings* on page 9 30 Vms,42 Vpk, 60 VDC, for voltages above these limits, use insulated conductors only.
Maximum Float Voltage	*Table 3: Voltage and current ratings* on page 9
Frequency Range	DC to 100 kHz (-3 dB)
Battery Type and Life, typical	9V NEDA 1604A, IEC 6LR61 40 hours minimum (1 each)
DC signal linearity, typical	*Figure 8: DC signal linearity in the 10 mV/A range, typical* on page 11
Phase shift, typical	*Figure 9: Phase versus frequency at 1 A peak, typical* on page 12

Table 3: Voltage and current ratings

Rating	Maximum working current (A)		Maximum working voltage (V)	Maximum floating
	Range 10 mV/A	Range 100 mV/A		
DC	100 [2]	10	600	600
DC + peak AC	100 [2]	10	600	600
AC peak	100	10	600	600
AC peak-peak	200	20	1200	-
RMS CAT III	70.7	7.07	600	600
RMS CAT II	70.7	7.07	600	600
RMS CAT I	70.7	7.07	600	600

[1] An insulated conductor is any conductor that is surrounded by an insulating material that is capable of isolating the voltage present on the conductor. Lacquer coatings like those typically found on transformer windings do not provide sufficient, reliable insulation for use with current probes. The lacquer coating can be easily nicked or damaged, which compromises the insulating capabilities of the lacquer coating.

[2] See frequency derating information in *Figure 7: Maximum current versus frequency* on page 11.

Table 4: Physical Characteristics

Characteristic	Description
Dimensions	231 mm x 36 mm x 67 mm (9.09 x 1.42 x 2.64 inches)
Maximum Conductor Size	11.8 mm (0.46 inches)
Cable Length	2 m (6.6 feet)
Weight	330 g (12 oz) with battery

Table 5: Environmental Characteristics

Characteristic	Description
Temperature	
Working	0 °C to +50 °C (+32 °F to +122°F)
Storage	-20 °C to +80°C (-4 °F to +176°F)
Humidity	0 °C to 40 °C, 95% humidity 40 °C to 50 °C, 45% humidity
Pollution Degree	2

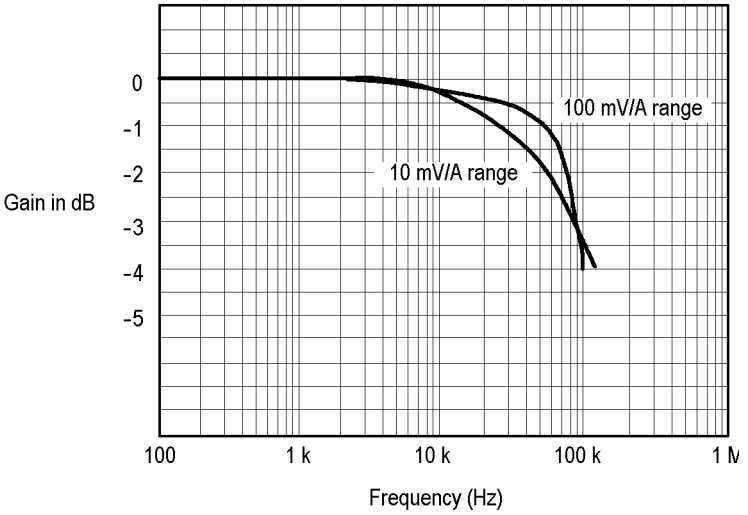


Figure 6: Gain versus frequency at 1 A peak, typical

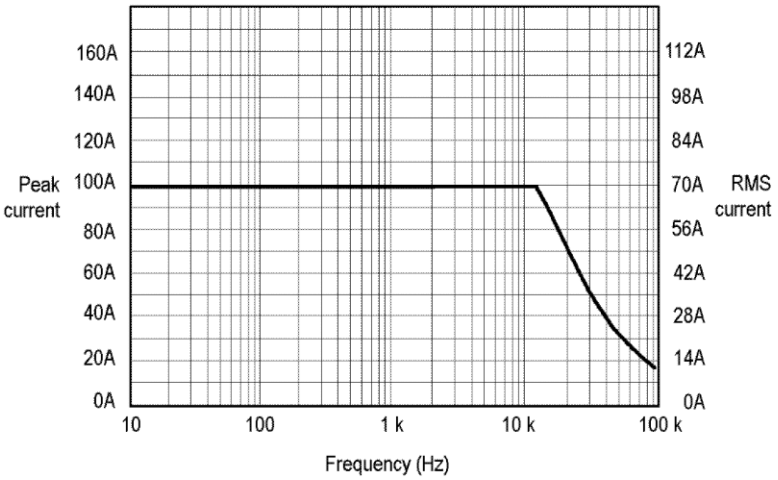


Figure 7: Maximum current versus frequency

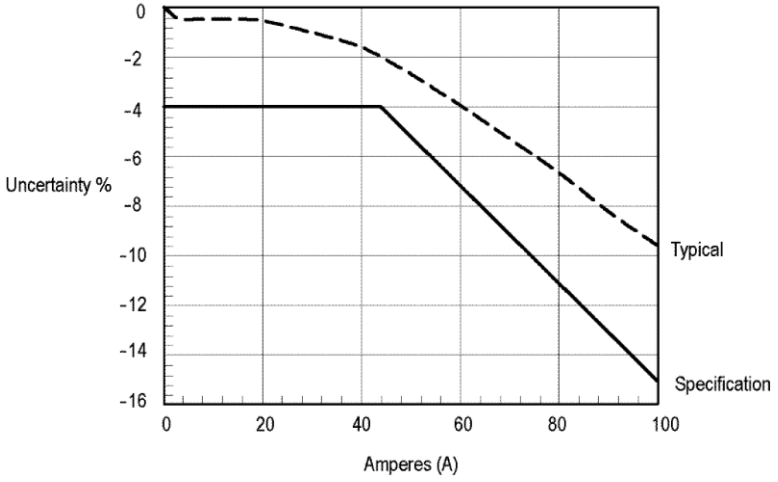


Figure 8: DC signal linearity in the 10 mV/A range, typical

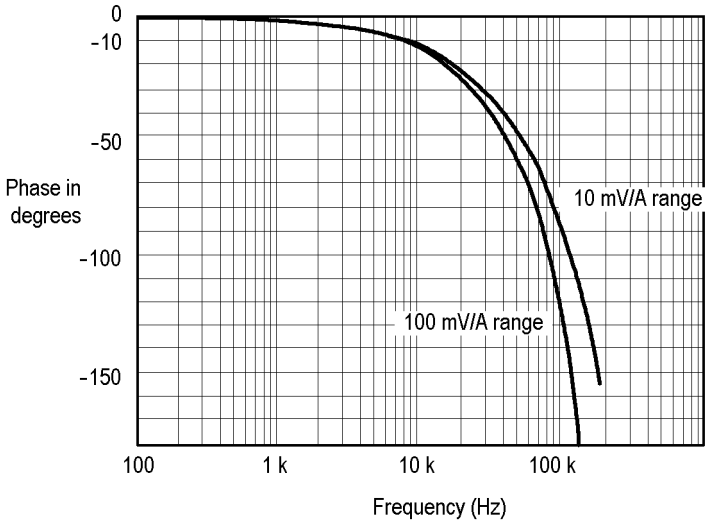


Figure 9: Phase versus frequency at 1 A peak, typical

Preparation for Shipment

If the original packaging is unfit for use or not available, use the following packaging guidelines:

1. Use a sturdy shipping carton having inside dimensions at least one inch greater than the probe dimensions.
2. Put the probe into a plastic bag or wrap to protect it from dampness.
3. Place the probe into the box and stabilize it with light packing material.
4. Seal the carton with shipping tape.

Replaceable Parts

The A622 AC/DC Current Probe is shipped with the following items:

- These instructions Tektronix part number 070-8883-XX
- One 9V battery Tektronix part number 146-0017-XX ANSI/ NEDA number 1604A IEC number 6LR61

Recommended accessory for use with DMMs:

- One BNC to banana plug adapter Tektronix part number 012-1450-XX

The A622 does not have any user repairable assemblies. If you should have trouble with your probe, contact your local Tektronix Service Center or representative for help.