TELEDYNE TEST TOOLS
Everywhereyoulook™

T3CP100-2 Current Probe Manual

100 Amp, 2 MHz Current Probe

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Contents

Safety Instructions

Follow these instructions to keep the probe operating in a correct and safe condition. Observe generally accepted safety procedures in addition to the precautions specified here. **The overall safety of any system incorporating this product is the responsibility of the assembler of the system.**

Symbols

These symbols appear on the probe body or in documentation to alert you to important safety considerations.

	**CAUTION**, possibility of electric shock.
	**CAUTION** of damage to probe or instrument, or **WARNING** of hazard to health. Attend to the accompanying information to protect against personal injury or damage. Do not proceed until conditions are fully understood and met.
	Do not apply around or remove from **UNINSULATED HAZARDOUS LIVE** conductors which may render electric shock, electric burn, or arc flash.
	Equipment protected by double insulation or reinforced insulation.
	**CAUTION**, hot surface.

Precautions

Comply with the following safety precautions to avoid personal injury or damage to your equipment:

Use only as specified. Using the probe and/or the equipment it is connected to in a manner other than specified may impair the protection mechanisms.

Do not use the probe for measurements on Mains circuits. The probe should only be applied around or removed from insulated, limited-energy circuit conductors that are not directly connected to the mains.

Do not overload; observe all ratings. To avoid electric shock or fire, do not connect the current probe to any wire that carries voltages or currents that exceed the ratings of the probe.

Connect and disconnect properly. Connect the probe to the test instrument before connecting to the circuit/conductor being measured.

Avoid damaging the cable through excessive bending.

Never install or remove the probe on bare conductors which are energized. The transformer core and shield are grounded but not insulated and may contact the conductor when the locking lever is open.

Be careful not to damage the insulation surface when making measurements. Before clamping to the conductor being measured, check that the insulation on the conductor is undamaged, and take care not to damage the insulation when clamping the conductor. Any damage to the insulation could cause an electric shock.

Use only indoors within the operational environment listed. Do not use in wet or explosive atmospheres.

Do not remove the probe's casing. Touching exposed connections may result in electric shock.

Keep product surfaces clean and dry.

Comply with the maximum input current vs. frequency derating when measuring current that includes a high frequency component. Using the probe at high frequencies or in strong magnetic fields may cause the device to become abnormally hot, resulting in fire, equipment damage or burns.

Do not operate with suspected failures. Before each use, inspect the probe and accessories for any damage such as tears or other defects in the probe body, cable jacket, accessories, etc. If any part is damaged, cease operation immediately and sequester the probe from inadvertent use.

NOTE: Depending on the amplitude and frequency of the current being measured, the sensor head may emit a resonant sound. This sound may also occur during demagnetizing operation, but it does not represent a malfunction (device failure).

PRODUCT OVERVIEW

T3CP100-2: DC/AC 100 A Peak, 70 A rms, 2 MHz Bandwidth

Teledyne Test Tools new T3CP100-2 current probe is a 2MHz bandwidth active AC/DC coupled probe, featuring 2 ranges of 100 A Peak, 70 A rms / 10A Peak, 7 A rms, fast and accurate waveform capture, risetime of ≤ 175 ns and low test circuit loading.

This probe can be used with any oscilloscope having a 1MΩ BNC input.

Key Features

- Accurate and easy current measurements.
- Wide 2 MHz bandwidth.
- Maximum AC Peak to Peak current of 200 A.
- Dual range 10 A Peak, 7 A rms / 100 A Peak, 70 A rms.
- Maximum conductor voltage of ± 600 V.
- Measurement jaw size 12 mm.
- Auto Zero button and indicator.
- Use with any scope with a 1MΩ input and BNC connector.
- Powered by 9 V battery or wall plug power supply (included).

Applications

- Power design and power component measurements.
- Consumer electronics and household appliances.
- Domestic and industrial photo-voltaic (PV) system design and maintenance.
- Automotive and vehicle electronics.
- Industrial and military electronics.
- Service technicians.
- Research and development.
- Universities, general electronics and education.

T3CP100-2 Product Description

Power On / Off Switch

Turns the probe power on or off. The power indicator will be alight if the power is on and off if the power is off.

Power Indicator

The power indicator will be alight when the power is turned on, and off when the power is off.

Low Battery Indicator

When the voltage of the battery is 6.5V or lower the low battery indicator will be lit red indicating that the battery should be changed or external power applied to the probe.

External DC Power Socket

This is the point where the external power supply (supplied) is connected to the T3CP100-2 current probe.

High / Low Range Indicators

During use of the probe one of the high / low indicators will always be lit indicating the current measurement range selected. The range can be changed by using the High / Low Range Selector.

High / Low Range Selector

This button allows the high or low range of the probe to be selected.

High / Low Range Selection Table

This table indictes to the user the ranges of the high and low settings as well as the output voltage level.

Auto Zero Indicator

The Auto Zero indicator will be alight when the probe is running it's auto zero process.

Auto Zero Button

Pressing the Auto Zero Button starts the degaussing and auto zero process. The auto zero indicator will alight during this process. The probe measurement clamp jaw should be disconnected from any DUT before using the auto zero button. It is recommended to use the auto zero button before making any measurements.

Control Unit

The control unit houses the probe control as well as having a 9V battery compartment. A standard 9V alkaline battery needs to be installed within the battery compartment if using the probe without the external power supply.

1m Interconnect Cable

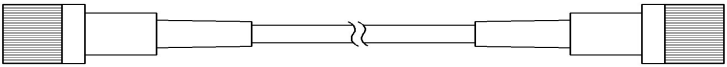
The 1m current probe head / control unit interconnect cable is permanently attached between the probe head and the control unit.

Probe Head

The current probe measurement head uses a spring loaded lever to open and close the jaw. The jaw can clamp around cables up to 12mm in diameter. The measurement cable / DUT should always be insulated. Do not clamp around uninsulated wires and cables.

BNC Output Connector

The BNC output connector can be connected to any instrument with a 1 MΩ input impedance including an Oscilloscope, DVM / DMM, etc. The supplied BNC to BNC cable can be used for this connection if the measuring instrument has a BNC input, such as an Oscilloscope. If connecting to a DVM / DMM then a BNC to banana plug cable may be required (not supplied), see your DVM / DMM manual.



1m BNC to BNC Output Cable

Power Supply

The supplied wall socket power supply (not illustrated) can be used to power the T3CP100-2 current probe in place of batteries if required.

Making Measurements

- Ensure that the probe is being used within its input operating range. Use of the probe outside of its operating range may result in damage to the probe.
- Connect the power supply to the probe, or install a 9V battery in the probe and turn the probe on, the power indicator light should glow.
- Connect the output BNC connector of the probe to the input BNC connector on the oscilloscope using the supplied BNC to BNC cable.
- Set the oscilloscope input impedance to 1MΩ.
- Set the oscilloscope's input coupling to DC and channel attenuation ratio to 10:1 or 100:1 for correct scaling depending on the T3CP100-2 range being used. For the L range set the oscilloscope attenuation ratio to 10:1, for the H range set the oscilloscope attenuation ratio to 100:1.
- With the probe measurement jaw closed, use the Auto Zero button to degauss and auto zero the probe. The auto zero light will glow during the auto zero process and a buzzer will sound two beeps. If only a single beep is heard then the auto zero process has failed. Note that a 30 minute warm up time is required before using Auto Zero and making measurements. This is the probe's measurement warm up time and improves measurement accuracy.
- Connect the probe to the circuit under test to make measurements. Note that the probe is directional as indicated on the current probe head. The probe should be kept away from high voltage pulse circuits and stray magnetic fields to minimize interference.
- After the test remove the probe measurement jaw from the circuit under test.
- Since the probe has a 2 MHz bandwidth it is recommended to turn on a bandwidth limit filter on the Oscilloscope if it has one.

Safe Probing

This device is designed to comply with Safety Standards and has been thoroughly tested for safety prior to shipment. However, mishandling during use could result in injury or death, as well as damage to the device. Be certain that you understand the instructions and precautions in the manual before use. We disclaim any responsibility for accidents or injuries not resulting directly from device defects.

To avoid short circuits and potentially life-threatening hazards, follow these warnings and precautions:

- Never attach the probe to a circuit that operates over the maximum rated current or voltage to earth.
- While connected to, and measuring, a live circuit do not touch the current probe clamp jaw or the conductor being measured.
- Be careful to avoid damaging the DUT conductor insulation while taking measurements.
- Make sure that the oscilloscope connected to this device's output BNC connector is equipped with protective earthing with double-insulation construction.
- Do not allow the T3CP probe to get wet, and do not take measurements with wet hands. This may cause an electric shock.
- Read and observe all warnings and precautions relating to electrical safety for the measuring instrument (typically an oscilloscope) being connected to the probe.
- Do not store or use the probe where it could be exposed to direct sunlight, high temperature, humidity, or condensation. Under such conditions, the probe may be damaged and insulation may deteriorate so that it no longer meets specifications.

- Before using the probe for the first time, verify that it operates normally to ensure that no damage has occurred during storage or shipping. If you find any damage, contact your dealer or a Teledyne LeCroy representative.
- This device is not designed to be water or dust proof. To avoid damage, do not use it in a wet or dusty environment.
- To avoid damaging the probe cable and power supply cable, do not excessively bend or pull the cables.
- When performing continuous measurements, it is necessary to be aware that the offset voltage may drift, depending on factors such as the ambient temperature and probe temperature. If this happens remove the probe from the DUT and peform a Auto Zero.
- Accurate measurements may be impossible in locations subject to strong external magnetic fields, such as transformers and high-current conductors, or in locations subject to strong external electric or magnetic fields, such as radio transmission equipment.

Accessories

- 1m BNC to BNC probe output connecting cable, to connect the T3CP100-2 BNC output to an Oscilloscope input.
- Wall socket PSU. The wall socket PSU can power the probe in place of the batteries.

Maintenance

- Keep the probe dry and clean.
- Clean the probe with a dry cloth, do not use liquid cleaning agents.
- After use put the probe back in its case and store in a clean and dry place out of the sun.
- To maintain the working life of the probe do not pull on, over twist or knot the connecting cable.

Specifications

T3CP100-2 Specifications	Low Range	High Range
Current Range	50mA - 10A Peak	1A - 100A Peak
	35.35mA - 7.07A rms	0.707A - 70.7A rms
Range Output	0.1V/A	0.01V/A
Oscilloscope Attenuation Ratio	10:1	100:1
Typical DC Precision	3% ± 50mA	500mA - 40A Peak: 4% ± 50mA 40A - 100A Peak: ± 15% Max
Bandwidth (-3dB)	DC - 2MHz Refer to Figure 1	
Maximum Current Verses Frequency	Refer to Figure 2	
Typical DC Linearity (High Range)	Refer to Figure 3	
Rise Time	≤ 175ns	
Phase Shift	DC - 65Hz <1.5°	DC - 65Hz <1°
Maximum Operating Current	Refer to Voltage And Current Rating Table	
Maximum Operating Voltage	Refer to Voltage And Current Rating Table	
Maximum Floating Voltage	Refer to Voltage And Current Rating Table	

T3CP100-2 Specifications (continued)	Low Range	High Range
Maximum Insulated Wire Voltage	CAT II 600V, CAT III 300V	
Typical Battery Life	9V Alkaline: 15 Hours	
Low Power Indication	At <6.5V the battery indicator will turn red	
Overload Indicator	When the measurement current exceeds the probe range the buzzer will buzz	
Calibration Interval	Annually	
Warranty	1 Year	

Voltage And Current Rating Table

Parameter	Maximum Operating Current		Maximum Operating Voltage	Maximum Floating Voltage
	Low Range	High Range		
DC	10A	100A	600V	600V
DC + Peak AC	10A	100A	600V	600V
AC Peak	10A	100A	600V	600V
AC Peak to Peak	20A	200A	1200V	0V
RMS CAT I	7.07A	70.7A	600V	600V
RMS CAT II	7.07A	70.7A	600V	600V
RMS CAT III	7.07A	70.7A	300V	300V

Safety Ratings

Probe Designation[1] Type D
Measurement Category [2] O (Other)
Safe Voltage Rating [3] Use only on fully insulated conductors
Pollution Degree [4] 2

Definitions (per IEC/EN 61010-2-032:2019)

1. Type D current probe is intended to be applied around or removed from insulated conductors.
2. O refers to other circuits not intended to be directly connected to the Mains supply. Not rated for measurements within Measurement Categories II, III, or IV.
3. Not rated for measurements on uninsulated conductors.
4. Pollution Degree 2 refers to operating environment where normally only dry, non-conductive pollution occurs. Temporary conductivity caused by condensation must be expected.

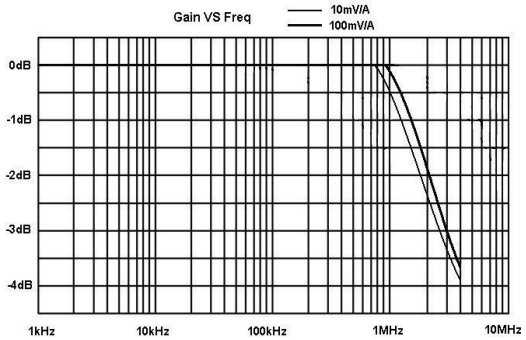


Figure 1: Bandwidth

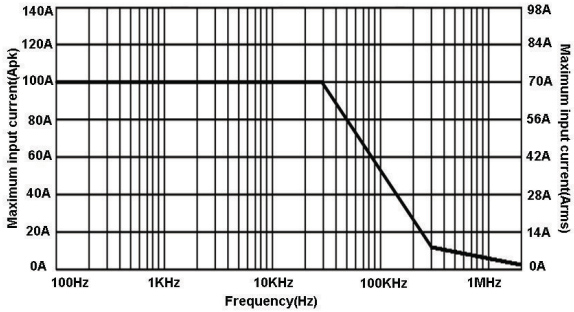


Figure 2: Maximum Current Versus Frequency

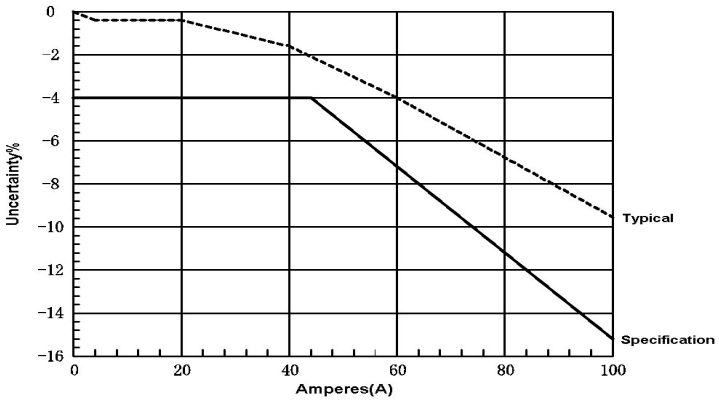


Figure 3: Typical DC Linearity (High Range)

Mechanical And Environmental Characteristics	Probe Characteristic
Current Clamp Dimensions	100mm x 20mm x 60mm
Current Clamp Control Unit Dimensions	137mm x 33mm x 35mm
Operating Altitude	0 - 2000 meters
Maximum Measurement Conductor Diameter	12mm
Current Clamp To Control Unit Cable Length	1 meter
Output BNC to BNC Cable Length	1 meter
Weight	223 grams excluding 9V Battery
Operating Temperature	0^0C - 50^0C
Storage Temperature	-20^0C - 80^0C
Operating Relative Humidity	0^0C - 40^0C $\leq$ 95% RH $+40^0$C - 50^0C $\leq$ 45% RH
Pollution Degree	Level 2

Certifications

Teledyne LeCroy certifies compliance to the following standards as of the date of publication. As standards evolve, these may no longer be current. See the Declaration of Conformity shipped with your product for current certifications.

EMC Compliance

EC Declaration of Conformity - EMC

The current probes meet the intent of EC Directive 2014/30/EU for Electromagnetic Compatibility. Compliance was demonstrated to the following specifications as listed in the Official Journal of the European Communities:

EN 61326-1:2013 EMC requirements for electrical equipment for measurement, control, and laboratory use.[1]

ELECTROMAGNETIC EMISSIONS:

EN 55011/A1:2010 Radiated and Conducted Emissions Group 1 Class A [2, 3]

ELECTROMAGNETIC IMMUNITY:

EN 61000-4-2:2009 Electrostatic Discharge, 4 kV contact, 8 kV air, 4 kV vertical/horizontal coupling planes [4]

EN 61000-4-3/A2:2010 RF Radiated Electromagnetic Field, 3 V/m, 80-1000 MHz; 3 V/m, 1400 MHz - 2 GHz; 1 V/m, 2 GHz - 2.7 GHz

EN 61000-4-8:2010 Power Frequency Magnetic Field, 3 A/m, 50 Hz; 3 A/m, 60 Hz

1 To ensure compliance with the applicable EMC standards, use high quality shielded interface cables.

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

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

4 Meets Performance Criteria "B" limits of the respective standard: during the disturbance, product undergoes a temporary degradation or loss of function or performance which is self-recoverable.

EUROPEAN CONTACT:*

Teledyne GmbH – LeCroy Division

Im Breitspiel 11c

D-69126 Heidelberg

Germany

Tel: (49) 6221 82700

Australia & New Zealand Declaration of Conformity - EMC

The probe complies with the EMC provision of the Radio Communications Act per the following standards, in accordance with requirements imposed by the Australian Communication and Media Authority (ACMA):

AS/NZS CISPR 11:2009/A1:2010, EN 55011:2009/A1:2010 Radiated and Conducted Emissions, Group 1, Class A.

AUSTRALIA / NEW ZEALAND CONTACTS:*

RS Components Pty Ltd.

Suite 326 The Parade West

Kent Town, South Australia 5067

RS Components Ltd.

Unit 30 & 31 Warehouse World

761 Great South Road

Penrose, Auckland, New Zealand

* Visit teledynelecroy.com/support/contact for the latest contact information.

Safety Compliance

EC Declaration of Conformity – Low Voltage

The probe meets the intent of EC Directive 2014/35/EU for Product Safety.

Compliance was demonstrated to the following specifications as listed in the Official Journal of the European Communities:

IEC/EN 61010-1:2010 + A1:2019 Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements

IEC/EN 61010-2-032:2019 Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 2-032: Particular Requirements for Hand-Held and Hand Manipulated Current Sensors for Electrical Test and Measurement.

Environmental Compliance

End-Of-Life Handling

The probe is marked with this symbol to indicate that it complies with the applicable European Union requirements to Directives 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE).

The probe is subject to disposal and recycling regulations that vary by country and region. Many countries prohibit the disposal of waste electronic equipment in standard waste receptacles. For more information about proper disposal and recycling of your Teledyne LeCroy product, visit teledynelecroy.com/recycle.

EC DECLARATION OF CONFORMITY - RoHS

Unless otherwise specified, all the materials and processes are compliant with RoHS Directive 2011/65/EU in its entirety, inclusive of any further amendments or modifications of said Directive.

CHINA RoHS 2

Unless otherwise specified, all the materials and processes are compliant with the latest requirements of China RoHS 2. The hazardous substances contained in the instrument are disclosed in accordance with the standards SJ/T 11364-2014 (Marking for the restricted use of hazardous substances in electronic and electrical products) and GB/T 26572-2011 (Requirements on concentration limits for certain restricted substances in electrical and electronic products). The instrument is marked with an appropriate Environmental Friendly Use Period (EFUP) symbol. The packaging materials include the appropriate recycling labels. The below substance disclosure tables (in Chinese and English languages) provide the required compliance information.

部件名称	有毒有害物质和元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr6+)	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
PCBAs	X	O	O	O	O	O
机械硬件	O	O	O	O	O	O
金属片	O	O	O	O	O	O
塑料部件	O	O	O	O	O	O
电缆组件	X	O	O	O	O	O
显示器	O	O	O	O	O	O
电源	O	O	O	O	O	O
风扇	O	O	O	O	O	O
电池	O	O	O	O	O	O
电源线	O	O	O	O	O	O
外部电源(如有)	X	O	O	O	O	O
探头(如有)	X	O	O	O	O	O
熔丝(如有)	O	O	O	O	O	O
产品外壳(如有)	O	O	O	O	O	O
适配器/模块(如有)	O	O	O	O	O	O
鼠标(如有)	O	O	O	O	O	O
O: 表明该有毒有害物质在该部件所有均质材料中的含量均在SJ/T11364-2014标准规定的限量要求之下。						
X: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出SJ/T11364-2014标准规定的限量要求。						

EFUP（对环境友好的使用时间）：30年。

使用条件：参阅用户手册“环境条件”部分的规定。

探头EFUP：10年。

Part Name	Toxic or Hazardous Substances and Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr6+)	Polybrominated Biphenyls (PBB)	Polybrominated Diphenyl Ethers (PBDE)
PCBAs	X	O	O	O	O	O
Mechanical Hardware	O	O	O	O	O	O
Sheet Metal	O	O	O	O	O	O
Plastic Parts	O	O	O	O	O	O
Cable Assemblies	X	O	O	O	O	O
Display	O	O	O	O	O	O
Power Supply	O	O	O	O	O	O
Fans	O	O	O	O	O	O
Batteries	O	O	O	O	O	O
Power Cord	O	O	O	O	O	O
Ext Power Supply (if present)	X	O	O	O	O	O
Probes (if present)	X	O	O	O	O	O
Fuse (if present)	O	O	O	O	O	O
Product Case (if present)	O	O	O	O	O	O
Adapters/Modules (if present)	O	O	O	O	O	O
Mouse (if present)	O	O	O	O	O	O
O: Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement specified in SJ/T11364-2014.						
X: Indicates that this toxic or hazardous substance contained in at least one of the homogenous materials used for this part is above the limit requirement specified in SJ/T11364-2014.						

EFUP (Environmental Friendly Use Period): 30 years.

Use Conditions: Refer to the environmental conditions stated in the User Manual.

EFUP for Probes: 10 years.

Warranty

Teledyne LeCroy warrants this oscilloscope accessory for normal use and operation within specification for a period of one year from the date of shipment. Spare parts, replacement parts and repairs are warranted for 90 days. In exercising its warranty, Teledyne LeCroy, at its option, will either repair or replace any assembly returned within its warranty period to the Customer Service Department or an authorized service center. However, this will be done only if the product is determined by Teledyne LeCroy's examination to be defective due to workmanship or materials, and the defect is not caused by misuse, neglect, accident, abnormal conditions of operation, or damage resulting from attempted repair or modifications by a non-authorized service facility.

The customer will be responsible for the transportation and insurance charges for the return of products to the service facility. Teledyne LeCroy will return all products under warranty with transportation charges prepaid.

This warranty replaces all other warranties, expressed or implied, including but not limited to any implied warranty of merchantability, fitness or adequacy for any particular purposes or use. Teledyne LeCroy shall not be liable for any special, incidental, or consequential damages, whether in contract or otherwise.

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ABOUT TELEDYNE TEST TOOLS

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Company Profile

Teledyne LeCroy is a leading provider of oscilloscopes, protocol analyzers and related test and measurement solutions that enable companies across a wide range of industries to design and test electronic devices of all types. Since our founding in 1964, we have focused on creating products that improve productivity by helping engineers resolve design issues faster and more effectively. Oscilloscopes are tools used by designers and engineers to measure and analyze complex electronic signals in order to develop high-performance systems and to validate electronic designs in order to improve time to market.

The Teledyne Test Tools brand extends the Teledyne LeCroy product portfolio with a comprehensive range of test equipment solutions. This new range of products delivers a broad range of quality test solutions that enable engineers to rapidly validate product and design and reduce time-to-market. Designers, engineers and educators rely on Teledyne Test Tools solutions to meet their most challenging needs for testing, education and electronics validation.

Location and Facilities

Headquartered in Chestnut Ridge, New York, Teledyne Test Tools and Teledyne LeCroy has sales, service and development subsidiaries in the US and throughout Europe and Asia. Teledyne Test Tools and Teledyne LeCroy products are employed across a wide variety of industries, including semiconductor, computer, consumer electronics, education, military/aerospace, automotive/industrial, and telecommunications.

Distributed by:

Teledyne LeCroy (US Headquarters)

700 Chestnut Ridge Road
Chestnut Ridge, NY. USA 10977-6499

Phone:	800-553-2769 or 845-425-2000
Fax Sales:	845-578-5985
Phone Support:	1-800-553-2769
Email Sales:	contact.corp@teledynelecroy.com
Email Support:	support@teledynelecroy.com
Web Site:	http://teledynelecroy.com/

Teledyne LeCroy (European Headquarters)

Teledyne LeCroy GmbH
Im Breitspiel 11c
D-69126 Heidelberg, Germany

Phone:	+49 6221 82700
Fax:	+49 6221 834655
Phone Service:	+49 6221 8270 85
Phone Support:	+49 6221 8270 28
Email Sales:	contact.gmbh@teledynelecroy.com
Email Service:	service.gmbh@teledynelecroy.com
Email Support:	tlc.t3.appsupport.eu@teledyne.com
Web Site:	http://teledynelecroy.com/germany

World wide support contacts can be found at:
https://teledynelecroy.com/support/contact/#

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