TELEDYNE LECROY
Everywhereyoulook™

PP009-1	
PP009-2	



Operator's Manual

PP009 Passive Probe

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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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July, 2017

Safety Instructions

Follow generally accepted safety procedures in addition to the precautions specified in this section. **The overall safety of any system incorporating this accessory is the responsibility of the assembler of the system.**

Symbols

These terms and symbols may appear on the probe body or in this manual to alert you to important safety considerations.



High Voltage WARNING, risk of electric shock or burn.



CAUTION of potential damage to equipment, or **WARNING** of potential injury. Attend to the accompanying information to protect against personal injury or damage. Do not proceed until conditions are fully understood and met.



DOUBLE INSULATION



PROTECTIVE (EARTH) TERMINAL

Precautions

To avoid personal injury or damage to property, review and comply with the following safety precautions. **Use product only as specified.**

Connect only to grounded instruments. Use only with compatible Teledyne LeCroy oscilloscopes that have their BNC input connected to an earth ground. Do not connect the probe reference lead to any point which is at a potential other than earth ground.

Connect and disconnect properly. Connect probe to the oscilloscope before connecting the probe to the test circuit. Disconnect the probe input and reference lead from the test circuit before disconnecting the probe from the oscilloscope. To avoid injury or death due to electric shock, do not connect or disconnect probes or probe accessories while they are connected to a voltage source.

Do not overload. To avoid electric shock or fire, do not apply any potential to the probe leads that exceeds the maximum rating of the probe.

Comply with voltage derating curve. When measuring higher frequency signals, comply with the Voltage vs. Frequency Derating Curve.

Observe all terminal ratings. To avoid electric shock or fire, observe all markings on the oscilloscope before connecting. Consult the respective oscilloscope product manual for further ratings information.

Do not remove probe casing. Removing the probe's case or touching exposed connections may result in electric shock.

Use only within operational environment listed. Use indoors only. Do not use in wet or explosive atmospheres. Keep product surfaces clean and dry.

Use only accessories compatible with the probe.

Handle with care. The probe tip is extremely sharp and may puncture skin or cause other bodily injury if not handled properly.

Keep fingers behind the finger guard of probe body and accessories.

Do not operate with suspected failures. Before each use, inspect the probe and accessories for any potential 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.

Introduction

The PP009 is a miniature high impedance passive probe designed for use with ≤ 600 MHz Teledyne LeCroy oscilloscopes. Its high input resistance and low capacitance make it ideal for general purpose probing of signals with frequency content from DC through several hundred MHz.



Keep fingers behind the probe's finger guard during use.



Rated for indoor use only. Do not operate where conductive pollutants may be present.



Maximum input voltage derates when frequency response is approximately 30 kHz or higher. See voltage derating curve p.4.

Specifications

Electrical Characteristics

Attenuation	÷10 ±1%
Input Resistance	10 MΩ ±1%
Input Capacitance	9.5 pF
Input Impedance	(see plot on p.5)
Compensation Range	10 – 20 pF
Bandwidth	500 MHz (-3 dB)

Electrical Ratings*

Max. Input Voltage	Circuits not directly connected to Mains, 400 Vrms, 1250 V transient overvoltage CAT II, 300 Vrms
Pollution Degree	2

* See Certifications for an explanation of rating categories.

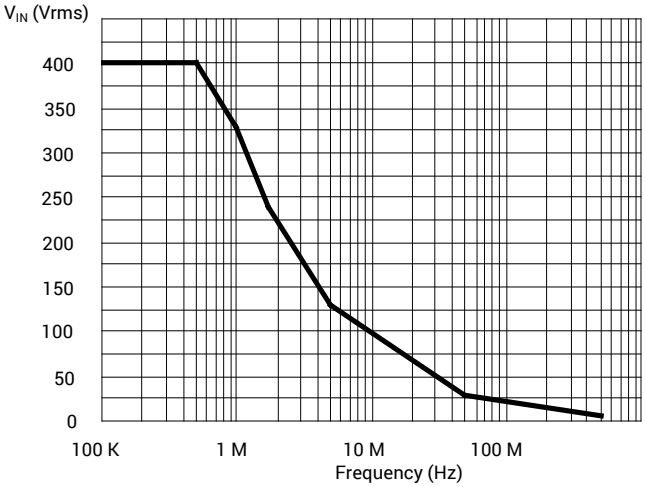
Operating Environment

Temperature, Operating	0º to 50º C
Temperature, Storage	-40º to 71º C
Altitude, Operating	Up to 2000 m (6560 ft)
Humidity, Operating	5% to 85% RH to 30° C 5% to 65% RH 30° C to 40° C 5% to 45% RH above 40° C

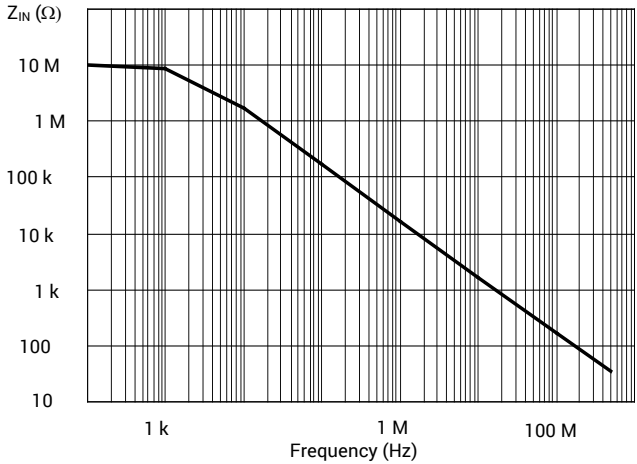
General Characteristics

Cable Length	1.3 m (4.3 ft)
Weight (probe only)	46 g

Max. V_{IN} vs. Frequency



Typical Input Impedance



Connectivity Accessories

Teledyne LeCroy provides 24 individual accessories for the PP009 probe, which enable reliable connections to any physical configuration. In addition to those provided with the standard probe, several optional varieties are available either individually, or grouped in sets related to specific application needs.

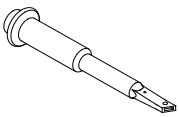
The PK005A series of connectivity accessories is compatible with any Teledyne LeCroy 5 mm PP009 series probe. Accessories are shown with the Teledyne LeCroy part number followed by the description.

The following kits containing an assortment of probe connectivity accessories can be ordered directly from Teledyne Lecroy.

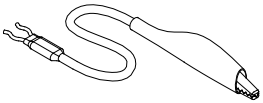
PKIT1-5MM-102 Basic Adapter Kit replaces the standard accessories with Qty. 1 each of PK1-5MM-110, PK1-5MM-104, PK1-5MM-103, PK1-5MM-108, PK1-5MM-117, PK1-5MM-101, PK1-5MM-102, PK1-5MM-118 and PK1-5MM-123; Qty. 6 each of PK1-5MM-109; and Qty. 5 of PK1-5MM-124.

PKIT1-5MM-101 Micro Clip Kit adapts the probe for use with 0.5 mm IC lead clips. It contains Qty. 1 each of PK1-5MM-115Y, PK1-5MM-115G, PK1-5MM-114Y, PK1-5MM-114G and PK1-5MM-111.

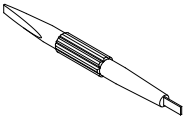
Standard Accessories



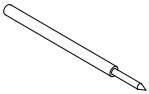
PK1-5MM-101
Sprung Hook



PK1-5MM-102
Standard Ground Lead



PK1-5MM-103
Adjustment Tool



PK1-5MM-104
Rigid Tip, 0.8 mm



PK1-5MM-105
Insulating Cap



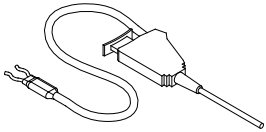
PK1-5MM-106
Color Coding Rings (set)



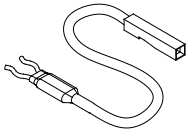
Protective Cap

Optional Accessories

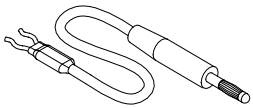
GROUND LEADS



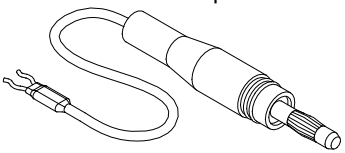
PK1-5MM-119
Ground Lead with mini clip



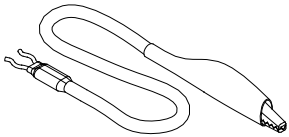
PK1-5MM-120
Ground Lead, 8 mm socket



PK1-5MM-121
Ground Lead, 2 mm plug



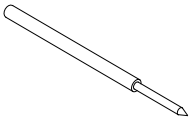
PK1-5MM-122
Ground Lead, 4 mm plug



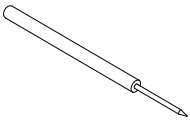
PK1-5MM-123*
High Frequency Compensated
Ground Lead

*The PK1-5MM-123 High Frequency compensated ground lead allows operation with long ground lead with minimum signal distortion.

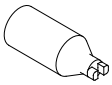
Tips and Springs



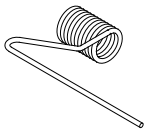
PK1-5MM-109
Spring Tip, 0.8 mm



PK1-5MM-124
Spring Tip, 0.38 mm

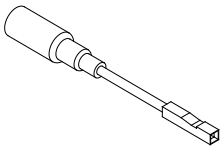


PK1-5MM-108
IC Cap, 2.54 mm pitch

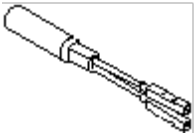


PK1-5MM-118
Ground Spring

Input Adapters and Clips



PK1-5MM-111
Single Lead Adapter



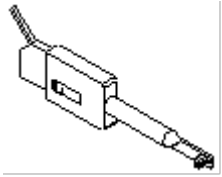
PK1-5MM-112
Dual Lead Adapter



PK1-5MM-116
Adapter, 2 mm plug

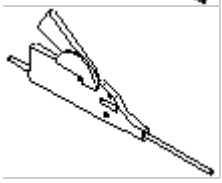


PK1-5MM-117
Adapter, 4 mm plug

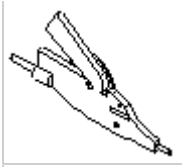


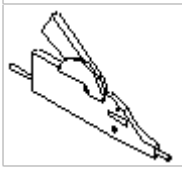
PK1-5MM-113
Pico Hook™



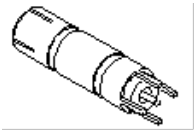


PK1-5MM-114Y
PK1-5MM-114G
Micro Clip, Long

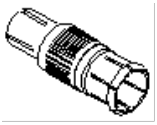




PK1-5MM-115Y
PK1-5MM-115G
Micro Clip, Short



PK1-5MM-107
PCB Adapter



PK1-5MM-110
BNC Adapter
(For low voltage use only
≤ 42 V_{pk} AC + DC)

Use and Maintenance

This probe is a high quality, precision instrument. To maintain accuracy and signal fidelity, mechanical shock should be avoided, as well as damage to the cable through excessive bending.

To achieve the small 5 mm tip size, the input tip diameter is narrower than those in larger probes. Avoid placing excessive force sideways on the tip.

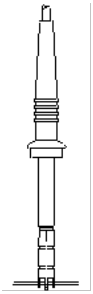
Should the tip become damaged, it may be replaced by the user using the procedure listed on the last page. Other maintenance and component replacement should be referred to qualified personnel.

Cleaning

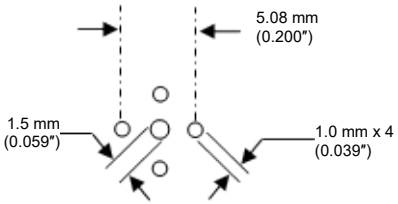
The outside of the probe should cleaned with a soft cloth dampened with either deionized / distilled water or isopropyl alcohol. Allow the surface to dry completely before returning the probe to service. Never immerse the probe in any liquid.

Use of PCB Adapter

The PCB adapter (Teledyne Lecroy P/N PK1-5MM-107) is intended to be designed into and permanently installed in circuit boards to provide a reliable, high frequency test point which eliminates the need to hand hold the probe.



Probe connected using PCB Adapter

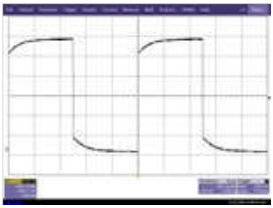


PC Board hole size and pattern

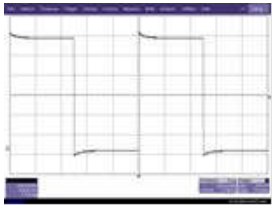
Probe Compensation

Proper compensation of the probe is required to assure good amplitude accuracy in the dynamic portions of the waveform being measured. LF compensation matches the probe to differences in oscilloscope input capacitance. The LF compensation should always be checked and adjusted as needed when first connecting a passive probe to the oscilloscope input. HF compensation matches time constants within the probe to compensate for normal component tolerances. It is typically not necessary to adjust HF compensation unless the probe is being used with an oscilloscope with large differences in input characteristics than the oscilloscope model it was designed for.

LF compensation is performed by connecting the input of the probe to a low frequency square wave, such as the oscilloscope calibrator signal set to 1 kHz. The compensation is adjusted by rotating the adjustment accessible through the small hole in the center of the housing near the BNC connector. Use the tool supplied with the probe for this adjustment.



Undershoot



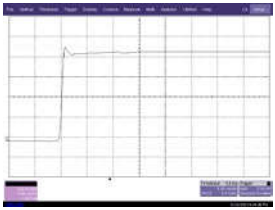
Overshoot



Correct adjustment

Should HF compensation be required, access the adjustments by sliding the black plastic cover off the compensation housing near the BNC con-nector. A pulse generator with low overshoot and a 300 ps risetime is the required signal source, along with a set of attenuators. The probe must be connected to a terminated probe tip to BNC adapter.

Some overshoot and ring will be present at some settings of V/Div. Adjust both trimmers for the overall best response on all ranges.

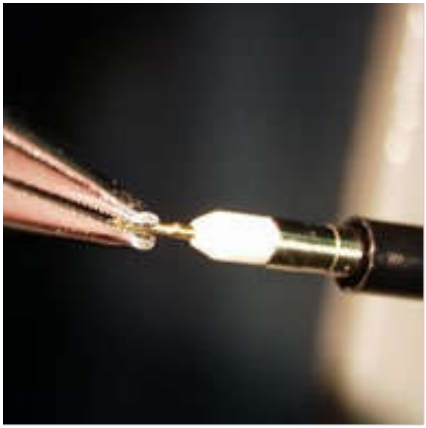


Typical optimum HF adjustment

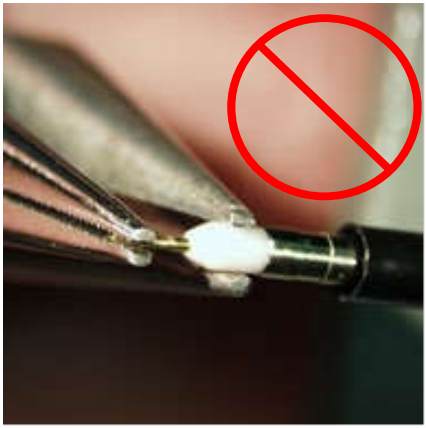
Tip Selection and Replacement

The PP009 probe is supplied a rigid tip. The spring-loaded tips PK1-5MM-109 (0.8 mm) and PK1-5MM-124 (0.38 mm), which can be ordered from Teledyne LeCroy as optional accessories, have sharp points and an on-axis requirement. All tips provide reliable connections under a wide range of physical interconnect situtations. While lacking the on-axis requirement of the spring tip, the rigid tip has a larger diameter and is more robust when exposed to physical stress at the tip. Select the proper tip for your application needs.

To replace the spring-loaded tips, carefully grip the outermost portion of tip and pull straight out along the axis of the probe, using needle nose pliers. Do not grip the plastic insulator with pliers; this will squeeze the tip, making it difficult or impossible to remove. Do not grip the outer gold plated tube that the tip slides into. With the tip removed, align the replacement tip with the hole and begin the insertion with the pliers. The tip can be fully seated by placing the probe against a hard surface and gently applying downward pressure.



To remove tip, grip the spring-loaded portion beyond the outer sleeve and pull straight out.



Do not apply pliers to the plastic insulator.

Certifications

Teledyne LeCroy certifies compliance to the following standards as of the date of publication. See the EC Declaration of Conformity shipped with the product for current certifications.

EC Declaration of Conformity - Safety

The probe meets 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 61010-031:2015 Safety requirements for electrical equipment for measurement, control and laboratory use – Part 031: Safety requirements for handheld probe assemblies for electrical measurement and test.

- Measurement Category II (CAT II) refers to measurements performed on circuits directly connected to utilization points (socket outlets and similar) of the low-voltage mains installation.
- Pollution Degree 2, operating environment where normally only dry non-conductive pollution occurs. Conductivity caused by temporary condensation should be expected.

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 and 2013/56/EU on Waste Electrical and Electronic Equipment (WEEE) and Batteries.

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, please visit teledynelecroy.com/recycle.

Restriction of Hazardous Substances (RoHS)

The probe and accessories conform to the 2011/65/EU RoHS2 Directive.

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