Keysight Passive Current Probe

DS1201A Passive Current Probe

KEYSIGHT

USER MANUAL

Notices

Trademark Acknowledgments

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Safety Notices

CAUTION

A CAUTION notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a CAUTION notice until the indicated conditions are fully understood and met.

WARNING

A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

Safety Summary

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Keysight Technologies assumes no liability for the customer's failure to comply with these requirements. Before operation, you should review the instrument and manual for safety markings and instructions. You must follow these to ensure safe operation and to maintain the instrument in safe condition.

General

WARNING

This product has been manufactured and tested according to international safety standards. The protective features of this product may be impaired if it is used in a manner not specified in the operation instructions.

WARNING

Use only the Keysight supplied power cord or cords with the same or better electrical rating.

Using other power cords may present a fire hazard or cause serious to deadly injury.

WARNING

Use only the Keysight supplied power supply.

Using other power supplies may present a fire hazard or cause serious to deadly injury.

Cleaning the instrument

WARNING

To prevent electrical shock, disconnect the instrument from mains before cleaning.

Use a dry cloth slightly dampened with water to clean the external case parts. Do not attempt to clean internally.

For information regarding Connections to External Circuits refer to page 15.

For information regarding device specific Safety Instructions refer to page 22.

Before Applying Power

Verify that all safety precautions are taken. The power cable inlet of the instrument serves as a device to disconnect from the mains in case of hazard. The instrument must be positioned so that the operator can easily access the power cable inlet. When the instrument is rack mounted the rack must be provided with an easily accessible mains switch.

Do not Operate in Explosive Atmosphere

Do not operate the instrument in the presence of flammable gases or fumes.

Do not Remove the Instrument Cover

Operating personnel must not remove instrument covers. Component replacement and internal adjustments must be made only by qualified personnel.

Instruments that appear damaged or defective should be made inoperative and secured against unintended operation until they can be repaired by qualified service personnel.

Instrument Markings

Instrument Marking	Description
	The instruction manual symbol. The product is marked with this warning symbol when it is necessary for the user to refer to the instructions in the manual.
	Direct Current.
	Alternate Current.
	The CE mark is a registered trademark of the European Community.
	The UK mark is a registered trademark of the United Kingdom.
	The RCM mark is a registered trademark of the Australian Communications and Media Authority.
	The KC mark is the Korean certification mark. This equipment is Class A suitable for professional use and is for use in electromagnetic environments outside of the home.

	Product tested and certified by CSA Group to meet safety and performance standards for both Canada and US
	Electro Static Discharge. Attach ESD protective wrist strap to avoid damage by direct contact with the equipment.
	China Restricted Substance Product Label. The EPUP (environmental protection use period) number in the center indicates the time period during which no hazardous or toxic substances or elements are expected to leak or deteriorate during normal use and generally reflects the expected useful life of the product.
ccr.keysight@keysight.com	This is the Keysight email address required by EU directives applicable to our product.
	The crossed out wheeled bin symbol indicates that separate collection for waste electric and electronic equipment (WEEE) is required, as obligated by the EU DIRECTIVE and other National legislation. Please refer to keysight.com/go/takeback to understand your Trade in options with Keysight in addition to product takeback instructions.

South Korean Class A EMC Declaration

Information to the user: This equipment has been conformity assessed for used in business environments. In a residential environment this equipment may caused radio interference. (*) This EMC statement applies to the equipment only for use in business environment.

사용자안내문
이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다.

(*) 사용자 안내문은 "업무용 방송통신기자재"에만 적용한다.

http://www.rra.go.kr/selform/Kst-RU24980

Declaration of Conformity

Declarations of Conformity for this product and for the Keysight products may be downloaded from the Web. Go to https://www.keysight.com/go/conformity. You can then search by product number to find the latest Declaration of Conformity.

Specification

Environmental Specifications

Parameter	Description	Comment
Ambient operating temperature	10 – 30 °C	
Ambient non-operating temperature	-10 – 50 °C	
Humidity	< 90 %	Non-condensing
Operating altitude	Up to 2000 m	
Overvoltage category	II	
Pollution degree	2	For indoor use only

Electrical Specifications

For detailed power input ratings of this product the rating label placed on the product can be also referred.

AC Adaptors

Parameter	Description
Line Voltage	100 – 240 V~
Line Frequency	50 – 60 Hz
Input Current	1.0 A max.
Line Voltage Fluctuations	± 10 %
Output Voltage	15 V⎓
Output power	36 W max.

Where to Find the Latest Information

Documentation is updated periodically. For the latest information about these products, including instrument software upgrades, application information, and product information, browse to one of the following URLs, according to the name of your product:

https://www.keysight.com/us/en/product/DS1201A/passive-current-probe.html

To receive the latest updates by email, subscribe to Keysight Email Updates at the following URL:

https://support.keysight.com

Information on preventing instrument damage can be found at:

https://www.keysight.com/find/PreventingInstrumentDamage

Is your product software up-to-date?

Periodically, Keysight releases software updates to fix known defects and incorporate product enhancements. To search for software updates for your product, go to the Keysight Technical Support website at:

https://www.keysight.com/find/techsupport

Product and Solution Cybersecurity

Keysight complies with multinational regulations for the cybersecurity of its own products and is committed to providing information to assist you in protecting your products and solutions from external cyber threats. For more information, see:

https://www.keysight.com/us/en/about/quality-and-security/security/product-and-solution-cyber-security.html

Keysight also recommends that you secure your IT environments using appropriate third-party tools. For instruments that run the Microsoft Windows operating system, Keysight concurs with Microsoft's recommendations for ensuring that the instrument is protected:

— Get the latest critical Windows updates

— For network-connected instruments, use an Internet firewall (in Keysight instruments, Windows Firewalls enabled by default)

— For network-connected instruments, use up-to-date antivirus and anti-spyware software

Responsible Disclosure Program

Keysight recommends that security researchers share the details of any suspected vulnerabilities across any asset owned, controlled, or operated by Keysight (or that would reasonably impact the security of Keysight and our users) using this form:

https://www.keysight.com/us/en/contact/responsible-disclosure-program.html

Report a Product Cybersecurity Issue

If you discover a cybersecurity issue that you suspect may involve Keysight's proprietary software, or third-party software supplied by Keysight as part of a product, or that may affect the operation of Keysight products, we encourage you to report it to us using this form:

https://www.keysight.com/us/en/about/quality-and-security/security/product-and-solution-cyber-security.html

Contents

Manufacturer’s Address

Keysight Technologies Netherlands Riscure B.V.

Delftechpark 49

2628 XJ Delft, The Netherlands

What's in the Box?

In the box you will find the Passive Current Probe and all accessories to connect it to an oscilloscope.

Quantity	Description	Photo	Identifier[1]
1	Passive Current Probe 1		
1	Amplifier: — low-noise amplifier, HD24248 Power jack female, BNC signal jacks		
1	Power Supply Unit, 12V DC input 100 – 240 V AC, 50 .. 60 Hz		PSU
-	Power cord (included with PSU)	 Country specific	
1	Passive Current Probe input cable: — 3 wires (white, blue, shielding) to 3-pin shielded input plug (female)		CPINP
1	Passive Current Probe output cable: — BNC to SMB, 50 Ω, coaxial		CPOUT

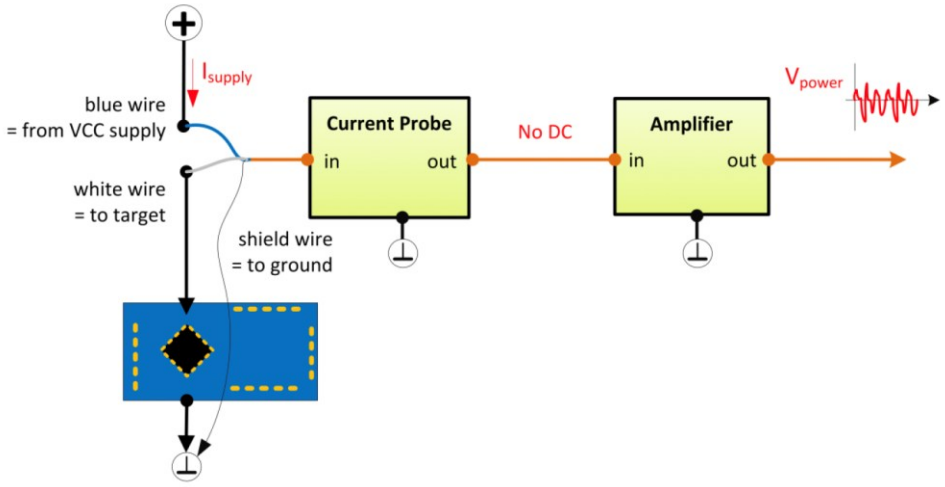
1	This " DS1201A Passive Current Probe User Manual"

1. Identifier is referenced by this document only.

What It Does

The Passive Current Probe is a passive, high frequency pick-up device for electric currents. It is used in Side Channel Analysis (SCA) to measure the power consumption of a target with great sensitivity.

Figure 1 The Passive Current Probe used to pick up a power consumption signal



The Passive Current Probe is inserted in the power supply line of a target and can transfer current variations up to 1000 MHz.

When used in combination with the Amplifier, the Passive Current Probe is capable of measuring pA variations.

Connections to External Circuits

All external I/O connections are supplied by non-hazardous voltages supplied by circuits of limited energy.

WARNING

All external inputs connected to ports shall provide reinforced or double insulation against hazardous voltages for protection against electric shock and shall have voltage below 30 Vrms and 42.4 Vpeak or 60 VDC.

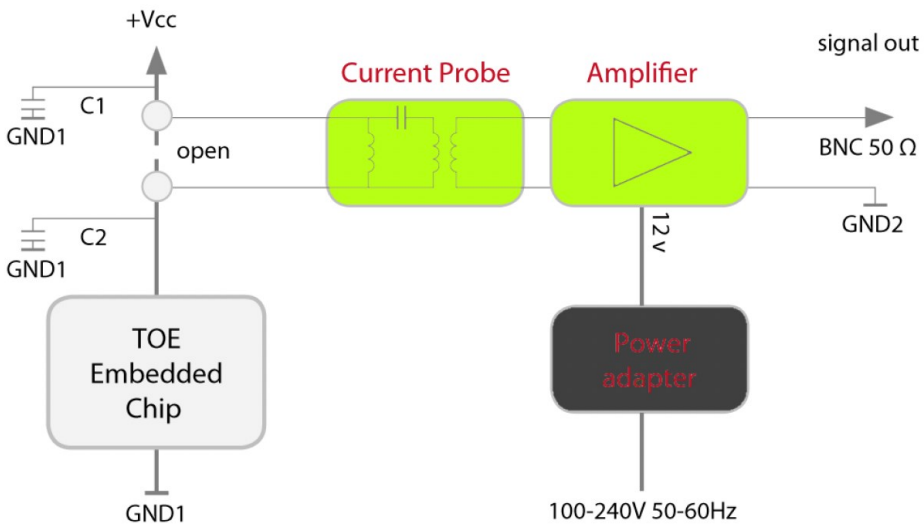
CAUTION

Connecting an instrument to voltages other than rated may introduce excessive voltage and damage the device. Excessive voltage can lead to thermal stress, breakdown of insulating materials, or direct electrical failure, necessitating repairs or replacements. Always refer to product model specifications to avoid such damage.

How to Build a Setup

Overview of the typical setup

Figure 2 Inserting the Passive Current Probe into the supply line of a target of evaluation



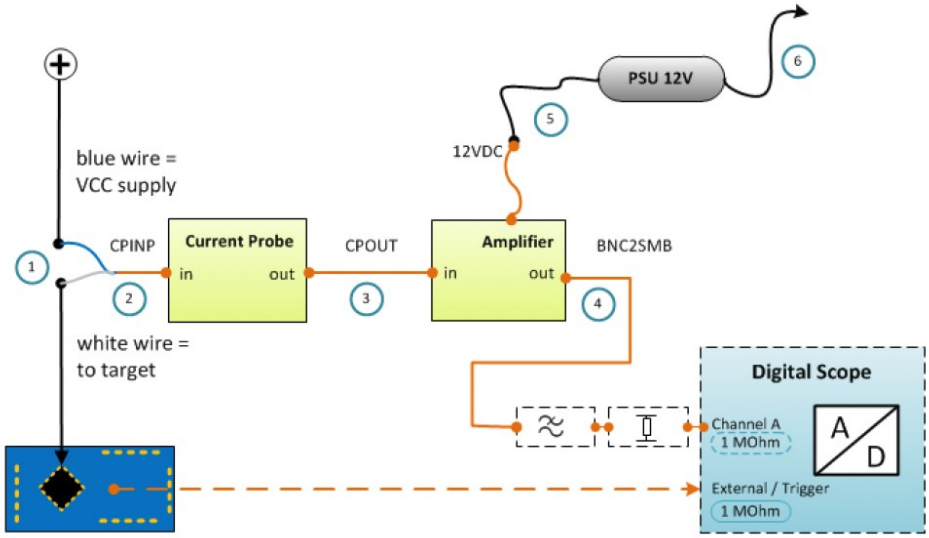
Connecting the setup

Preparation:

Create a tap point in the VCC supply line to the target chip.

NOTE The printed circuit board of the target may have a dedicated jumper block labelled VCC. Remove the jumper and apply jumper headers to the wires of the input cable of the Passive Current Probe.

Figure 3 Order of connecting a typical setup using the Passive Current Probe



Steps to follow:

1. Connect the **blue and white wires** of the CPINP cable to the tap point.
2. Connect the **CPINP** cable plug to the **In** port of the Passive Current Probe.
3. Connect port **Out** of the Passive Current Probe with cable **CPOUT** to port **In** of the Amplifier.
4. Connect the **Out** port of the Amplifier with cable **BNC2SMB** to input **Channel A** of the oscilloscope.

— If your scope channel has a 1 MΩ impedance, you need to insert a 50 Ω impedance adapter (not supplied).

— Depending on your application you may need to insert a certain low-pass filter (not supplied).

5. Connect the **12V plug** from the PSU with the **power supply jack** in the cable of the Amplifier.
6. Plug the PSU into the mains power.

Your setup is ready to start measuring.

Help and Troubleshooting

Still have questions?

Visit the Keysight Support Portal: https://support.keysight.com.

Technical Specifications

Operational conditions

— Room temperature 20 – 30 °C, (68 – 86 °F).

NOTE Maintain stable environmental conditions (temperature, humidity, airflow etc.) to reliably repeat tests and compare test results.

Power supply input

— Passive Current Probe, passive.

— Amplifier, 12 V DC, load typical 20 mA.

— Center-positive plug, inner-Ø 2.5 mm, outer-Ø 5.5 mm.

WARNING Use of a PSU other than supplied by Keysight is not supported. Power spikes may cause internal damage and loss of accuracy.

Passive Current Probe

— Bandwidth 1 MHz - 1000 MHz @ 3 dB.

— Transfer function output/input: 25 mV/mA (5 internal windings) @ output load 50 Ω.

— Max. continuous current 90 mA (RMS) AC.

— Max. pulse current 2.4 A, max. pulse energy 0.2 *10-6 As (Ampere x second).

— For low frequencies DC . 200 kHz, the input acts as short circuit (60 mΩ + 10 µH).

— For high frequencies > 200 kHz, current fluctuations are picked-up and transferred.

— Output must work into 50 Ω load.

— Output signal ≤ 2.5 V (RMS) @ 90 mA (RMS).

Amplifier

- Bandwidth 0.1 MHz . 2500 MHz @ 3 dB.
- Gain 25 dB @ 500 MHz, amplification ≥ 250 x.
- Low noise 2.4 dB @ 500 MHz.
- Output must work into 50 Ω load.

Product case Passive Current Probe

- Dimensions L x W x H: 80 x 54 x 23 [mm], 3.15 x 2.13 x 0.91 [inch].

Port	Label	Description
A1	In	Current pick-up circuit, ≤ 60 mΩ
A2	Out	Voltage output, 50 Ω

Product case Amplifier

— Dimensions L x W x H: 32 x 32 x 14 [mm], 1.25 x 1.25 x 0.56 [inch].

Port	Label	Description
B1	In	Measurement signal input
B2	GND	PSU 12 V DC, negative potential wire, common shielding ground
B3	12V	PSU 12 V DC, positive potential wire
B4	Out	Magnified signal output

Safety Instructions

WARNING Only the power adapter which was delivered with the device can be used.

CAUTION The device cannot be serviced, it needs to be returned to Keysight to be repaired.

CAUTION The device does not contain any serviceable parts. If something is broken or malfunctioning, it needs to be returned to Keysight for repair.

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www.keysight.com