Keysight Active Current Probe

DS1202A Active Current Probe User Manual

Notices

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CAUTION

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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/DS1202A/active-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:

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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

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

Contents

What's in the Box?

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

Quantity	Description		Identifier[1]
1	Probe: — Active current probe		
1	Probe: — High precision EM probe base		Base unit
1	Power supply unit, 6 V DC input 100 V – 240 V AC, 50 – 60 Hz		PSU
-	Power cord (included with PSU)	Country specific	
1	Current probe input cable: — 3 wires (white, blue, transparent) to 2-pin input plug (female)		CPINP
1	Differential converter cable: From base unit to Active Current Probe		
1	Signal cable: BNC – BNC, 50 Ω, coax		

10	Jumper wires: male – male	

| -	This "DS1202A Active Current Probe – User Manual"

1. Identifier is referenced by this document only.

What It Does

The Active Current Probe is an active, 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   Active Current Probe. Power consumption signal measurement.
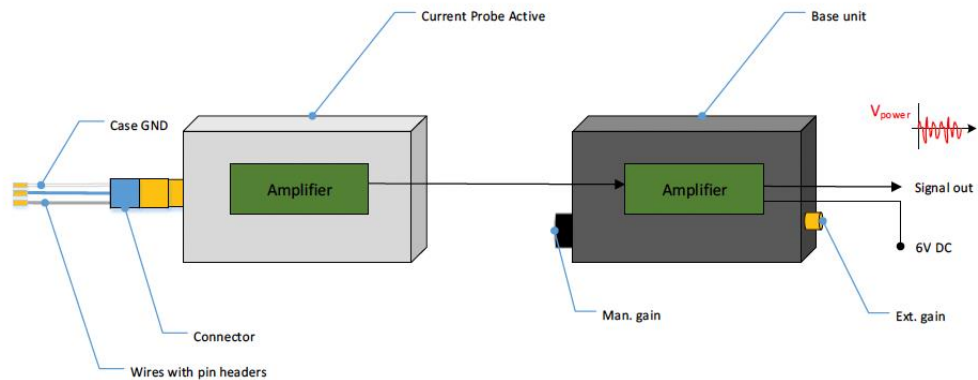

The Active Current Probe is inserted in the power supply line of a target and can transfer current variations up to 2 GHz.

The Active Current Probe is used in combination with the base unit, which can be used to amplify the measured signal.

How to Build a Setup

Overview of the typical setup

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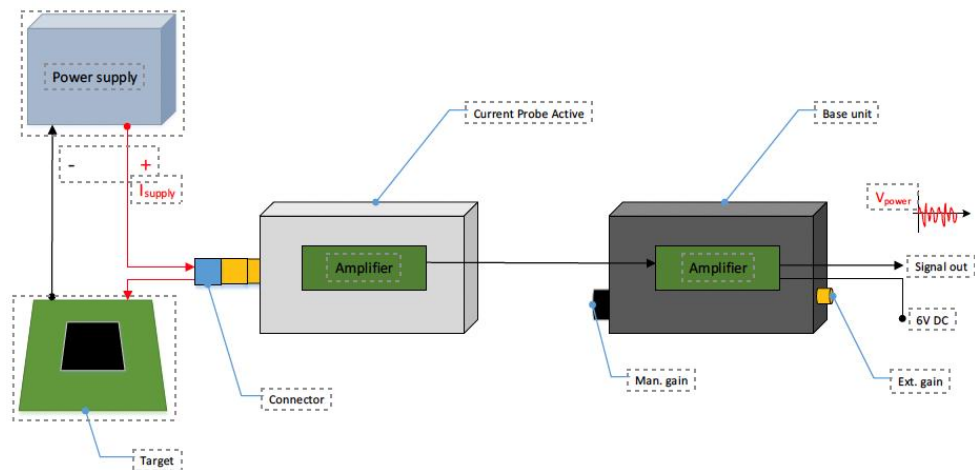

Connecting the setup

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 Active Current Probe.

Figure 3   Order for connecting a typical setup using the Active Current Probe.
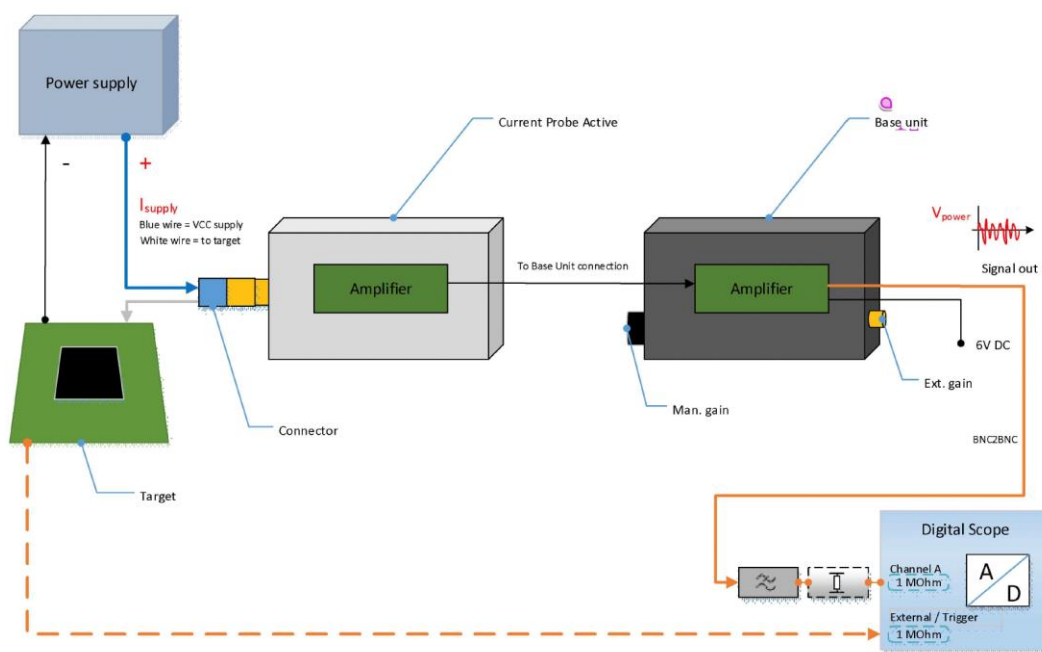
Steps to follow:

1. Connect the blue and white wires of the CPINP cable to the tap point.

2. In some situations, it may be beneficial to connect the ground (GND) wire of the CPINP cable to the GND of the target.

3. Connect the CPINP cable plug to the In port of the Active Current Probe.

4. Connect Active Current Probe port to base unit with cable to base unit port In.

5. Connect the Out port of the base unit with cable BNC2BNC 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).

6. Plug the 6V PSU into the power mains.

7. Connect the 6V plug from the PSU with the power supply jack in the base unit.

Your setup is ready to start measuring.
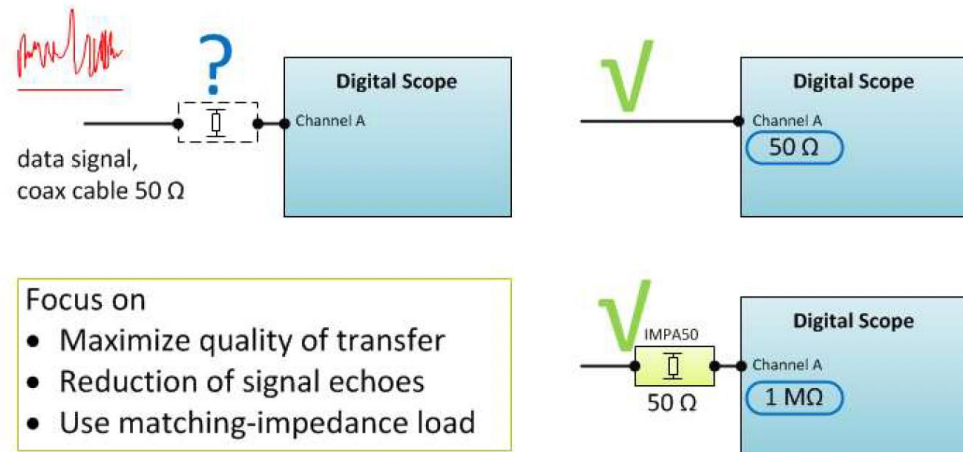
Figure 4   Active current probe connected to base unit.

Using the Base Unit

Connecting the base unit

Connect the base unit with cable BNC2BNC to a measurement channel with 50 Ω impedance (or through a 50 Ω impedance adapter [not supplied]).

Figure 5   Reading the base unit signal with a matching impedance.

Adjusting the gain

There are two methods of adjusting the probe sensitivity. The first method is using the manual gain knob.

— Make sure the "man. gain on" LED indicator is lit up. If not, push the gain knob to switch to manual gain.

— Rotate the "man. gain" knob clockwise until the desired gain setting has been met.

Figure 6   Manual gain

NOTE	Use the engraved markers around the "man. gain" knob for easy reproducibility of the gain setting.

The second method is control gain through an external device that can put an accurate voltage for amplification of the signal by the internal amplifiers of the base unit.

— Make sure to pull the "man. gain" knob. The "ext. gain on" LED indicator will light up.

— Use a device (for example Keysight Spider) to provide an accurate voltage from 0 V (low gain) to 3.3 V (high gain) to the "ext. gain" SMB input to set the desired gain.

Figure 7.   The "man. gain" knob is pulled out to enable external gain.

WARNING   Do not use a control voltage greater than 3.3 V.
This will damage the base unit.

Connecting the converter cable

The differential converter cable connects the Active Current Probe to the base unit.

Connect the differential converter cable to the base unit by placing the notch against the pin of the connector.

If the connector does not slide in fully, rotate the end of the connector until it does.

Figure 8.   Differential converter cable

WARNING   Do not use force.
The connector may be damaged.

Help and Troubleshooting

Still have questions?

— The Inspector Help menu has detailed information on the Active Current Probe.

— Visit the Keysight internet support portal: http://support.keysight.com. The support portal allows you to submit questions.

Technical Specifications

Operational conditions

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

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

CAUTION	The housing of the Active Current Probe will get hot when in use ~40 °C (104 °F).

CAUTION	The housing of the Active Current Probe is electrically conductive. And is ground (GND) of Active Current Probe.

Power supply input

— Active current probe

— Base unit (amplifier), 6 V DC, load typical 820 mA Max.

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

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

Active current probe

— Bandwidth 1 MHz – 2000 MHz

— Max. continuous current 100 mA (RMS) AC.

— Max. pulse current 5 A, max.

— Current measurement circuit $\leq 0.082\ \Omega$, $\leq 0.042\ \mu H$

— 40dB of gain with Base Unit Max.

Product case

    — Dimensions L x W x H: 59.90 x 35.30 x 29.30 [mm], 2.35 x 1.38 x 1.15 [in].

Port	Label	Description
A1	in	Current measurement circuit, ≤ 0.082 Ω
A2	To Base Unit	Differential signal to base unit

Port	Label	Description
1	out	BNC, Analog output -2.5 V ~ +2.5V (50 Ω)
2	ext. gain	Control voltage input 0 V ~ +3.3 V (2.3k Ω)
3	ext gain LED	When ON amplification is controlled with external voltage (2)
4	Power in	Connector for the 6 V DC 2 A PSU
5	Power on	When lit power is OK
6	man gain	Knob to control the gain
7	Man. gain LED	When ON amplification is controlled with potentiometer.
8	in	Connection to the "To Base Unit" connector on Active Current Probe

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