

RIGOL

User's Guide

RP1000D Series High Voltage Differential Probe

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RIGOL TECHNOLOGIES, INC.

Guaranty and Declaration

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RIGOL guarantees this product conforms to the national and industrial standards in China as well as the ISO9001:2008 standard and the ISO14001:2004 standard. Other international standard conformance certification is in progress.

Contact Us

If you have any problem or requirement when using our products or this manual, please contact **RIGOL**.

E-mail: service@rigol.com

Website: www.rigol.com

General Safety Summary

Please review the following safety precautions carefully before putting the instrument into operation so as to avoid any personal injuries or damages to the instrument and any product connected to it. To prevent potential hazards, please use the instrument only specified by this manual.

Ground The Instrument.

The instrument is grounded through the Protective Earth lead of the power cord. To avoid electric shock, it is essential to connect the earth terminal of power cord to the Protective Earth terminal before any inputs or outputs.

Observe All Terminal Ratings.

To avoid fire or shock hazard, observe all ratings and markers on the instrument and check your manual for more information about ratings before connecting.

Do Not Operate Without Covers.

Do not operate the instrument with covers or panels removed.

Avoid Circuit or Wire Exposure.

Do not touch exposed junctions and components when the unit is powered.

Do Not Operate With Suspected Failures.

If you suspect damage occurs to the instrument, have it inspected by qualified service personnel before further operations. Any maintenance, adjustment or replacement especially to circuits or

accessories must be performed by **RIGOL** authorized personnel.

Keep Well Ventilation.

Inadequate ventilation may cause increasing of temperature or damages to the device. So please keep well ventilated and inspect the intake and fan regularly.

Do Not Operate in Wet Conditions.

In order to avoid short circuiting to the interior of the device or electric shock, please do not operate in a humid environment.

Do Not Operate in an Explosive Atmosphere.

In order to avoid damages to the device or personal injuries, it is important to operate the device away from an explosive atmosphere.

Keep Product Surfaces Clean and Dry.

To avoid the influence of dust and/or moisture in air, please keep the surface of device clean and dry.

Electrostatic Prevention.

Operate in an electrostatic discharge protective area environment to avoid damages induced by static discharges. Always ground both the internal and external conductors of the cable to release static before connecting.

Safety Terms and Symbols

Terms Used in this Manual. These terms may appear in this manual:

**WARNING**

Warning statements indicate conditions or practices that could result in injury or loss of life.

**CAUTION**

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

Terms Used on the Product. These terms may appear on the product:

DANGER

It calls attention to an operation, if not correctly performed, could result in injury or hazard immediately.

WARNING

It calls attention to an operation, if not correctly performed, could result in potential injury or hazard.

CAUTION

It calls attention to an operation, if not correctly performed, could result in damage to the product or other devices connected to the product.

Symbols Used on the Product. These symbols may appear on the product:



**Double
Insulation**



**Hazardous
Voltage**



**Safety
Warning**



**Protective
Earth
Terminal**



**Chassis
Ground**



**Test
Ground**

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RP1000D Overview

RP1000D series high voltage differential probe can convert high differential input voltage to low voltage and display the waveform on oscilloscope. Its working frequency is up to 25MHz (RP1025D), 50MHz (RP1050D) and 100MHz (RP1100D) and it is rather suitable for large electricity test and R&D.

RP1000D series high voltage differential probe is applicable to general purpose oscilloscope and the labeled attenuation ratios are those when the input impedance of the oscilloscope is $1M\Omega$. The attenuation ratios will double when the input impedance of the oscilloscope is 50Ω .



Figure 1 RP1025D High Voltage Differential Probe



Figure 2 RP1050D High Voltage Differential Probe



Figure 3 RP1100D High Voltage Differential Probe

Basic Operations

1. Connect the red safety IC clip with one end of the red dual-banana plug silicon cable and the black safety IC clip with one end of the black dual-banana plug silicon cable provided in the accessories. Then, connect the red dual-banana plug silicon cable with the red (+) input terminal of the high voltage probe and the black dual-banana plug silicon cable with the black (-) input terminal of the high voltage probe.

Note:

- a) The safety IC clip can be replaced by the high voltage dedicated IC clip, safety alligator clip or safety contact probe prod;
 - b) The dual-banana plug silicon cable can be replaced by high voltage dedicated dual-banana plug silicon cable.
2. Connect one end of the dual-BNC coaxial cable to the BNC interface of the high voltage differential probe and the other end to input terminal of the oscilloscope.
 3. Turn on the channel switch on the oscilloscope and adjust the high voltage probe and oscilloscope to make the attenuation ratios of the two match. If the attenuation ratio of the oscilloscope does not match that of the high voltage probe, the actual vertical scale equals the attenuation ratio of the high voltage probe divided by the attenuation ratio of the oscilloscope and then times the vertical scale of the oscilloscope.

For example, when the attenuation ratio of the oscilloscope is set to 1X, the attenuation ratio of the high voltage probe is set to X200 and the vertical scale of the oscilloscope is 0.5V/div, the actual vertical scale is $200 \times 0.5\text{V/div} = 100\text{V/div}$. When the input impedance of the oscilloscope is 50Ω , the actual vertical scale is $2 \times 200 \times 0.5\text{V/div} = 200\text{V/div}$.

Note: When the attenuation ratio of the oscilloscope matches the attenuation ratio of the high voltage probe, the vertical scale displayed on the oscilloscope is the actual scale.

Cleaning and General Care

Cleaning:

This product has no particular requirement for cleaning. To clean the probe, please wipe the probe surface using soft and clean cloth dampened with detergent.

General Care:

Please store this product in anti-humidity case if the product will not be used for more than 60 days.

Warranty

RIGOL warrants that its products mainframe and accessories will be free from defects in materials and workmanship within the warranty period.

If a product is proven to be defective within the respective period, **RIGOL** guarantees the free replacement or repair of products which are approved defective. To get repair service, please contact with your nearest **RIGOL** sales or service office.

RIGOL does not provide other warranty items except the one being provided by this warranty statement. The warranty items include but not being subjected to the hint guarantee items related to tradable characteristic and any particular purpose. **RIGOL** will not take any responsibility in cases regarding to indirect, particular and ensuing damage.

Specifications

Technical Specifications

RP1025D:

Bandwidth	X50 or X200 attenuation ratio: DC - 25MHz (-3dB) X20 attenuation ratio: DC - 15MHz
Attenuation Ratio	X20, X50, X200
Accuracy	±2%
Input Voltage Range (DC + AC peak-peak value)	X20 attenuation ratio: ≤ 140Vpp, about 50Vrms or DC X50 attenuation ratio: ≤ 350Vpp, about 125Vrms or DC X200 attenuation ratio: ≤ 1400Vpp, about 500Vrms or DC
Maximum Input Voltage	Maximum differential voltage: 1400V (DC+AC peak-peak value) or 500Vrms Voltage to ground at the input terminal: 600Vrms
Input Impedance	Differential: 4MΩ/1.2pF Single-ended and to ground: 2MΩ/2.3pF
Output Voltage	≤ ±6.5V
Output Impedance	50Ω
Rise Time	X50 or X200 attenuation ratio: 14ns X20 attenuation ratio: 23.4ns
Common-mode Rejection	60Hz: > 50dB 100Hz: > 50dB 1MHz: > 50dB
Power Supply	Specified external 9V DC power supply (must be specified products acknowledged by RIGOL)
Power Consumption	0.4 watt

RP1050D:

Bandwidth	X200, X500 or X1000 attenuation ratio: DC - 50MHz (-3dB) X100 attenuation ratio: DC - 25MHz
Attenuation Ratio	X100, X200, X500, X1000
Accuracy	±2%
Input Voltage Range (DC + AC peak-peak value)	X100 attenuation ratio: ≤ 700Vpp, about 230Vrms or DC X200 attenuation ratio: ≤ 1400Vpp, about 460Vrms or DC X500 attenuation ratio: ≤ 3500Vpp, about 1140Vrms or DC X1000 attenuation ratio: ≤ 7000Vpp, 2300Vrms or DC
Maximum Input Voltage	Maximum differential voltage: 7000V (DC+AC peak-peak value) or 2300Vrms Voltage to ground at the input terminal: 6500Vrms
Input Impedance	Differential: 100MΩ/1.2pF Single-ended and to ground: 50MΩ/2.3pF
Output Voltage	≤ ±7.0V
Output Impedance	50Ω
Rise Time	X200, X500 or X1000 attenuation ratio: 7ns X100 attenuation ratio: 14ns
Common-mode Rejection	60Hz: > 50dB 100Hz: > 50dB 1MHz: > 50dB
Power Supply	Specified external 9V DC power supply (must be specified products acknowledged by RIGOL)
Power Consumption	0.4 watt

RP1100D:

Bandwidth	X200, X500 or X1000 attenuation ratio: DC - 100MHz (-3dB) X100 attenuation ratio: DC - 50MHz
Attenuation Ratio	X100, X200, X500, X1000
Accuracy	$\pm 2\%$
Input Voltage Range (DC + AC peak-peak value)	X100 attenuation ratio: $\leq 700V_{pp}$, about 230Vrms or DC X200 attenuation ratio: $\leq 1400V_{pp}$, about 460Vrms or DC X500 attenuation ratio: $\leq 3500V_{pp}$, about 1140Vrms or DC X1000 attenuation ratio: $\leq 7000V_{pp}$, about 2300Vrms or DC
Maximum Input Voltage	Maximum differential voltage: 7000V (DC+AC peak-peak value) or 2300Vrms Voltage to ground at the input terminal: 6500Vrms
Input Impedance	Differential: 100M Ω /1.2pF Single-ended and to ground: 50M Ω /2.3pF
Output Voltage	$\leq \pm 8.0V$
Output Impedance	50 Ω
Rise Time	X200, X500 or X1000 attenuation ratio: 3.5ns X100 attenuation ratio: 7ns
Common-mode Rejection	60Hz: > 50dB 100Hz: > 50dB 1MHz: > 50dB
Power Supply	Specified external 9V DC power supply (must be specified products acknowledged by RIGOL)
Power Consumption	0.4 watt

Operation Environment

	General	Operation	Storage
Temperature	+20℃ to +30℃	0℃ to +50℃	-30℃ to +70℃
Humidity	≤ 70%RH	10% to 85%RH	10% to 90%RH

General Specifications

Probe Dimensions	RP1025D: about 214mm x 60mm x 35mm
	RP1050D: about 240mm x 85mm x 36mm
	RP1100D: about 240mm x 85mm x 36mm
Weight	RP1025D: 280g
	RP1050D: 280g
	RP1100D: 280g
Safety	IEC 1010-1, CAT III, pollution degree 2
Electromagnetic Compatibility	Conform to EN50081-1 and 50082-1 standards
Maximum Voltage to Ground	RP1025D: 600Vrms
	RP1050D: 6500Vrms
	RP1100D: 6500Vrms
Using Environment	Indoor environment
Insulation Category	Double insulation

Accessories

RP1025D:

	Accessories	Explanation	Quantity
1.	User's Guide	Chinese & English	1
2.	AC power adaptor that accords with the standard of the destination country	--	1
3.	Dual-BNC coaxial cable	50 Ω impedance RG58C UL 100cm length	1
4.	Dual-banana plug silicon cable	UL 6KV 18AWG 60cm length	Red: 1; Black: 1
5.	Safety IC clip	UL 1000V CAT III	Red: 1; Black: 1
6.	Safety alligator clip	UL 1000V CAT II, 10A	Red: 1; Black: 1

RP1050D:

	Accessories	Explanation	Quantity
1.	User's Guide	Chinese & English	1
2.	AC power adaptor that accords with the standard of the destination country	--	1
3.	Dual-BNC coaxial cable	50Ω impedance RG58C UL 100cm length	1
4.	High voltage dedicated dual-banana plug silicon cable	UL 20KV 16AWG 60cm length	Red: 1; Black: 1
5.	High voltage dedicated IC clip	maximum 6500V (DC+AC p-p)	Red: 1; Black: 1
6.	Safety alligator clip	UL 1000V CAT II, 10A	Red: 1; Black: 1

RP1100D:

	Accessories	Explanation	Quantity
1.	User's Guide	Chinese & English	1
2.	AC power adaptor that accords with the standard of the destination country	--	1
3.	Dual-BNC coaxial cable	50Ω impedance RG58C UL 100cm length	1
4.	High voltage dedicated dual-banana plug silicon cable	UL 20KV 16AWG 60cm length	Red: 1; Black: 1
5.	High voltage dedicated IC clip	maximum 6500V (DC+AC p-p)	Red: 1; Black: 1
6.	Safety alligator clip	UL 1000V CAT II, 10A	Red: 1; Black: 1
7.	Safety contact probe prod	UL 1000V, CAT III	Red: 1; Black: 1