

# **RIGOL**

## User's Guide

### RP1000D Series High Voltage Differential Probe

Apr. 2015  
RIGOL Technologies, Inc



# Guaranty and Declaration

## Copyright

© 2012 RIGOL Technologies, Inc. All Rights Reserved.

## Trademark Information

**RIGOL** is a registered trademark of RIGOL Technologies, Inc.

## Publication Number

UGE18106-1110

## Notices

- **RIGOL** products are covered by P.R.C. and foreign patents, issued and pending.
- **RIGOL** reserves the right to modify or change parts of or all the specifications and pricing policies at company's sole decision.
- Information in this publication replaces all previously corresponding material.
- Information in this publication is subject to change without notice.
- **RIGOL** shall not be liable for either incidental or consequential losses in connection with the furnishing, use or performance of this manual as well as any information contained.
- Any part of this document is forbidden to be copied, photocopied or rearranged without prior written approval of **RIGOL**.

## Product Certification

**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](mailto:service@rigol.com)

Website: [www.rigol.com](http://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

# Contents

|                                 |    |
|---------------------------------|----|
| Guaranty and Declaration.....   | I  |
| General Safety Summary.....     | II |
| Safety Terms and Symbols .....  | IV |
| RP1000D Overview .....          | 1  |
| Basic Operations .....          | 5  |
| Cleaning and General Care ..... | 7  |
| Warranty .....                  | 7  |
| Specifications .....            | 8  |
| Technical Specifications .....  | 8  |
| Operation Environment .....     | 11 |
| General Specifications .....    | 11 |
| Accessories.....                | 12 |





## 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  $50\Omega$ .



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  $50\Omega$ , 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)<br>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<br>X50 attenuation ratio: ≤ 350Vpp, about 125Vrms or DC<br>X200 attenuation ratio: ≤ 1400Vpp, about 500Vrms or DC |
| Maximum Input Voltage                         | Maximum differential voltage: 1400V (DC+AC peak-peak value) or 500Vrms<br>Voltage to ground at the input terminal: 600Vrms  |
| Input Impedance                               | Differential: 4MΩ/1.2pF<br>Single-ended and to ground: 2MΩ/2.3pF  |
| Output Voltage                                | ≤ ±6.5V   |
| Output Impedance                              | 50Ω   |
| Rise Time                                     | X50 or X200 attenuation ratio: 14ns<br>X20 attenuation ratio: 23.4ns  |
| Common-mode Rejection                         | 60Hz: > 80dB<br>100Hz: > 60dB<br>1MHz: > 50dB   |
| Power Supply                                  | Specified external 9V DC power supply (must be specified products acknowledged by <b>RIGOL</b> )  |
| Power Consumption                             | 0.4 watt  |



## RP1050D:

|   |  |
|---|--|
| Bandwidth                                     | X200, X500 or X1000 attenuation ratio: DC - 50MHz (-3dB)<br>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<br>X200 attenuation ratio: ≤ 1400Vpp, about 460Vrms or DC<br>X500 attenuation ratio: ≤ 3500Vpp, about 1140Vrms or DC<br>X1000 attenuation ratio: ≤ 7000Vpp, 2300Vrms or DC |
| Maximum Input Voltage                         | Maximum differential voltage: 7000V (DC+AC peak-peak value) or 2300Vrms<br>Voltage to ground at the input terminal: 6500Vrms   |
| Input Impedance                               | Differential: 100MΩ/1.2pF<br>Single-ended and to ground: 50MΩ/2.3pF  |
| Output Voltage                                | ≤ ±7.0V  |
| Output Impedance                              | 50Ω  |
| Rise Time                                     | X200, X500 or X1000 attenuation ratio: 7ns<br>X100 attenuation ratio: 14ns   |
| Common-mode Rejection                         | 60Hz: > 80dB<br>100Hz: > 60dB<br>1MHz: > 50dB  |
| Power Supply                                  | Specified external 9V DC power supply (must be specified products acknowledged by <b>RIGOL</b> )   |
| Power Consumption                             | 0.4 watt   |

**RIGOL**

## RP1100D:

|   |  |
|---|--|
| Bandwidth                                     | X200, X500 or X1000 attenuation ratio: DC - 100MHz (-3dB)<br>X100 attenuation ratio: DC - 50MHz  |
| Attenuation Ratio                             | X100, X200, X500, X1000  |
| Accuracy                                      | ±2%  |
| Input Voltage Range (DC + AC peak-peak value) | X100 attenuation ratio: ≤ 700Vpp, about 230Vrms or DC<br>X200 attenuation ratio: ≤ 1400Vpp, about 460Vrms or DC<br>X500 attenuation ratio: ≤ 3500Vpp, about 1140Vrms or DC<br>X1000 attenuation ratio: ≤ 7000Vpp, about 2300Vrms or DC |
| Maximum Input Voltage                         | Maximum differential voltage: 7000V (DC+AC peak-peak value) or 2300Vrms<br>Voltage to ground at the input terminal: 6500Vrms   |
| Input Impedance                               | Differential: 100MΩ/1.2pF<br>Single-ended and to ground: 50MΩ/2.3pF  |
| Output Voltage                                | ≤ ±8.0V  |
| Output Impedance                              | 50Ω  |
| Rise Time                                     | X200, X500 or X1000 attenuation ratio: 3.5ns<br>X100 attenuation ratio: 7ns  |
| Common-mode Rejection                         | 60Hz: > 80dB<br>100Hz: > 60dB<br>1MHz: > 50dB  |
| Power Supply                                  | Specified external 9V DC power supply (must be specified products acknowledged by <b>RIGOL</b> )   |
| Power Consumption                             | 0.4 watt   |

## Operation Environment

|             | General        | Operation    | Storage        |
|-------------|----------------|--------------|----------------|
| Temperature | +20°C to +30°C | 0°C to +50°C | -30°C to +70°C |
| 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   | 50Ω impedance<br>RG58C UL<br>100cm length | 1                |
| 4. | Dual-banana plug silicon cable   | UL 6KV<br>18AWG<br>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   | 50 $\Omega$ impedance<br>RG58C UL<br>100cm length | 1                |
| 4. | High voltage dedicated dual-banana plug silicon cable                      | UL 20KV<br>16AWG<br>60cm length                   | Red: 1; Black: 1 |
| 5. | High voltage dedicated IC clip   | maximum 6500V<br>(DC+AC p-p)                      | Red: 1; Black: 1 |
| 6. | Safety alligator clip  | UL 1000V CAT II, 10A                              | Red: 1; Black: 1 |

# RIGOL

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<br>RG58C UL<br>100cm length | 1                |
| 4. | High voltage dedicated dual-banana plug silicon cable                      | UL 20KV<br>16AWG<br>60cm length           | Red: 1; Black: 1 |
| 5. | High voltage dedicated IC clip   | maximum 6500V<br>(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 |