RIGOL

用户手册

RP5600A 无源探头

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RIGOL Technologies, Inc.

保证和声明

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文档编号

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高电压



请注意参阅手册



保护性接地端



壳体接地端



测量接地端

保养与清洁

保养

请勿将探头放置在长时间受到日照的地方。

清洁

请根据使用情况经常对探头进行清洁。方法如下：

1. 断开电源。
2. 用潮湿但不滴水的软布（可使用柔和的清洁剂或清水）擦试探头外部的浮尘。



注意

请勿使任何腐蚀性的液体沾到探头上，以免损坏探头。



警告

重新通电之前，请确认探头已经干透，避免因水分造成电气短路甚至人身伤害。

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RP5600A 探头简介

RIGOL公司的RP5600A无源示波器探头带宽达600 MHz，采用单元式结构，允许替换探头前端组件。探头设计紧凑，其卡入式BNC连接器可方便地连接到示波器。

特色：

- 高达600 MHz的模拟带宽；
- 精密、纤细的探头前端组件；
- 探头衰减比自动识别功能（需示波器支持）；
- 坚固、耐用的常规可伸缩探头钩；
- 配备多种接地引线，以连接不同的接地端。

一般性检查

当您得到一套新的 RP5600A 探头，建议您按以下步骤进行检查。

1. 检查是否存在因运输造成的损坏

如运输包装已损坏，请保留被损坏的包装或防震材料，直到货物经过完全检查且仪器通过电性和机械测试。

因运输造成探头损坏，由发货方和承运方联系赔偿事宜。**RIGOL** 公司恕不进行免费维修或更换。

2. 检查探头

若存在机械损坏或缺失，或者探头未通过电性和机械测试，请联系您的 **RIGOL** 经销商。

3. 检查附件

关于随探头提供的附件明细，请参考本手册中的“**附件**”一节。若包装中内容有缺失或损坏请告知您的 **RIGOL** 经销商。

附件

下面的图形和表格列出了 **RIGOL** RP5600A 探头的标准附件。所列附件可通过 **RIGOL** 公司订购。

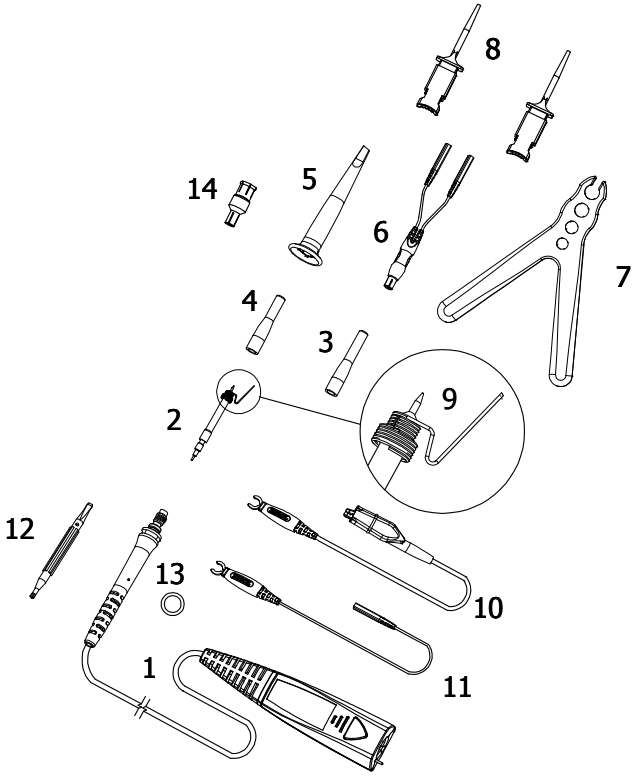


图 1 RP5600A 附件

注意

探头与（辅助测试的）附件组合的测量等级是它们组合的较低者。

表 1 RP5600A 附件

项	名称	零件编号	数量
1	探头	RP5600A-0200101	1
2	探头前端组件	RP5600A-0200201	2
3	前端护套（长）	RP5600A-0200301	1
4	前端护套（短）	RP5600A-0200401	1
5	探头钩	RP5600A-0200501	1
6	双引线转换插头	RP5600A-0200601	1
7	探头支架	RP5600A-0200701	1
8	测试夹	RP5600A-0200801	2
9	接地弹簧	RP5600A-0200901	2
10	接地鳄鱼夹	RP5600A-0201001	1
11	接地转换插头	RP5600A-0201101	1
12	调节棒	RP5600A-0201201	1
13	标识环	RP5600A-0201301	8
14	BNC 适配器	RP5600A-0201401	1

1. 探头

探头的主要组成部分。

2. 探头前端组件

组成探头前端的部件，用于与待测点相连。

3,4 前端护套（长、短）

安装短护套时，接地端外露，以便使用接地弹簧。安装长护套时，接地端被完全遮盖，以防止被测电路与探头短路。

5. 探头钩

可伸缩的挂钩，可直接将探头前端连接至待测电路而无需手握。

6. 双引线转换插头

从探头信号端和接地端分别引出一个插头。

7. 探头支架

测量时用于放置和固定探头。

8. 测试夹

将被测电路的针脚信号引出。

9. 接地弹簧

套在探头前端，用来接地，可改善高频响应。

10. 接地鳄鱼夹

将探头可靠接地，便于安全操作和正确读取信号。

11. 接地转换插头

用途同接地鳄鱼夹，但接头不同（参见标准附件图示）。

12. 调节棒

用于调节探头补偿。

13. 标识环

将不同颜色的标识环套在探头上，以区别不同通道使用的探头。

14. BNC 适配器

通过 BNC 适配器可将探头前端连接至 BNC 连接器上。

连接示波器

1. 将探头的 BNC 连接器连接到示波器通道或外部触发输入端，推到紧固的位置。

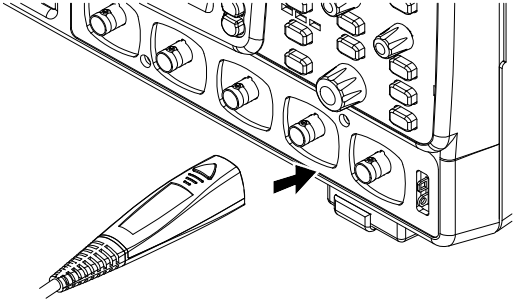


图 2 连接示波器

2. 将探头前端连接到待测电路中。

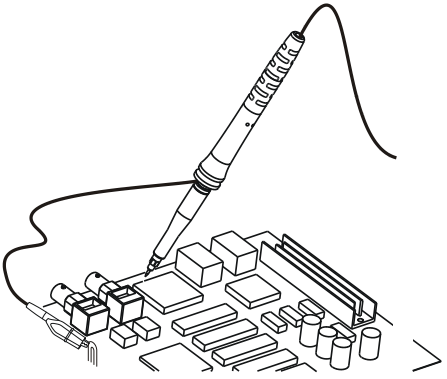
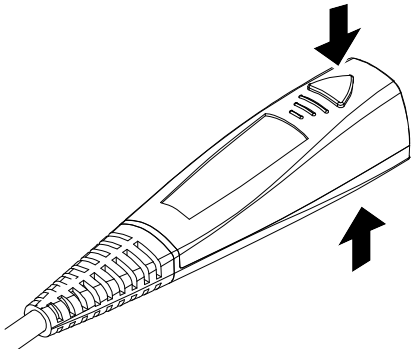
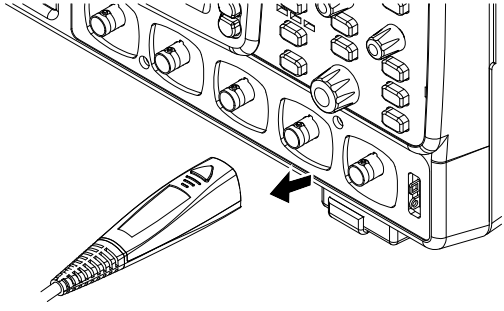


图 3 连接被测电路

3. 需断开探头和示波器的连接时，按住探头连接器上下两侧的按钮，沿图 4（b）所示箭头所指方向将连接器从示波器的 BNC 连接器拔出即可。



（a）



（b）

图 4 断开示波器

注意

请勿试图从示波器 BNC 连接器上扭动探头，可能导致探头损坏。

探头的使用

注意

请您按照用户手册使用探头，以免造成不必要的损失。

注意

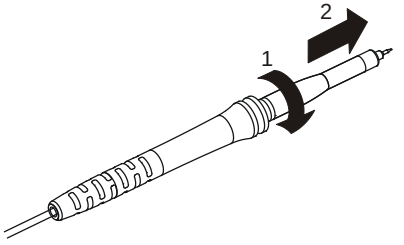
请勿将探头前端焊接到任何表面，以免损坏探头前端。

注意

若不使用任何附件，将探头连接到电路中时可能造成短路。

将探头连接到待测电路中

进行测量时，对于探头难以接触到的位置，可以不使用探头附件。



RP5600A 探头有长、短两种前端护套，上图使用的是长护套，该护套可沿图中箭头 1 方向旋转，沿箭头 2 方向可将护套从前端取出。

前端护套可旋转到多种位置：

- 适当的旋转前端护套，可以将附件提供的接地弹簧与探头前端组件相连，以便与地连接。
- 调节前端护套的位置可覆盖探头前端组件以实现与地绝缘。

使用接地附件

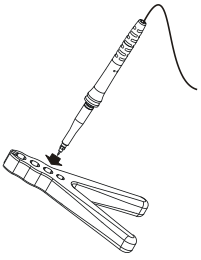
可通过连接接地鳄鱼夹、接地转换插头或接地弹簧将探头接地，这些接地附件均提供了一个接地点。为防止可能的短路，接地附件需与前端护套一起使用。

使用探头钩

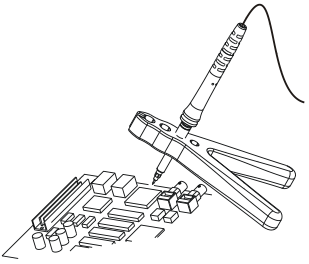
为了方便的使用，可将探头钩插入探头前端护套，使其与探头前端相连，按压探头钩将其与待测点相连。

使用探头支架

探头支架可以让您方便的进行电路测试。您可将探头放在支架上，无须一直手握。如下图所示，使用时选择合适的插孔将探头插入支架中，然后将探头接入待测点，将整个装置放在合适的位置即可。



使用方法



放置方法

警告

RP5600A 探头需用于带有通用地电势端的示波器（符合 OSHA 要求及美国国家电气规程）。探头及示波器裸露的金属部件必须接地。在某些应用中（如：要求使用外部电池为示波器供电的应用），如果地电势端未接地，可能对操作人员造成电击危害甚至造成死亡（取决于电压及电流）。

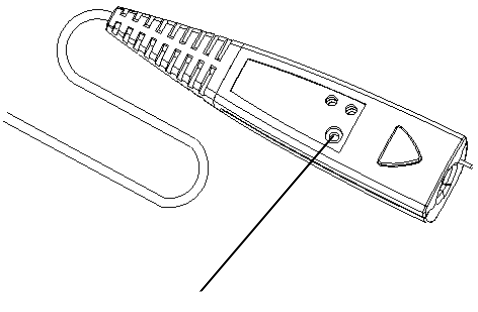
补偿调整

您需对探头进行补偿使其特性和示波器匹配。探头可进行低频补偿和高频补偿。探头首次与示波器相连时需进行低频补偿（也可以随时调整），而高频补偿可以定期调整。

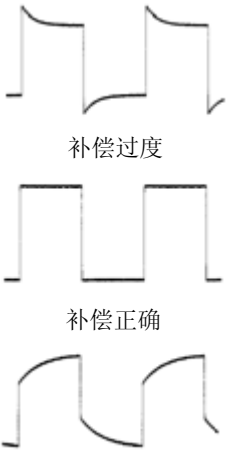
低频补偿

请按下面的步骤进行低频补偿：

1. 将探头连接到示波器前面板的通道 BNC 连接器和探头补偿信号输出端，将接地鳄鱼夹与探头补偿信号输出端下面的“接地端”相连。
2. 按下示波器前面板的 **Auto** 键；
3. 使用附件提供的调节棒调节探头上面的低频补偿调节孔，以获得最平坦的脉冲（见下图）。



低频补偿调节孔



补偿过度

补偿正确

补偿不足

表 2 选件（用于高频补偿调节）

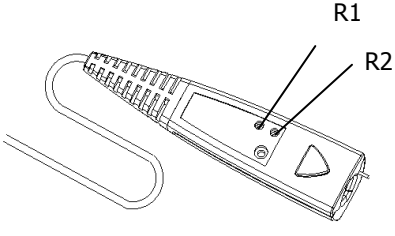
项	名称	零件编号
1	50 Ω 馈通适配器	RP5600A-0300101

高频补偿

执行高频补偿之前必须进行如前面所述的低频补偿。

请按下面的步骤进行高频补偿：

1. 将 50 Ω 馈通适配器连接到一个快沿信号发生器；
2. 将 BNC 适配器连接到 50 Ω 馈通适配器；
3. 移除探头前端的探头附件（接地弹簧或探头钩）和前端护套；
4. 将探头前端连接到 BNC 适配器（以便与快沿信号发生器相连），并将探头连接到示波器；
5. 从快沿信号发生器输出小于 500 ps 的快沿信号；
6. 按下示波器前面板上的 **Auto** 键，观测示波器上的波形；
7. 使用调节棒调节高频补偿电阻 R1 和 R2；
8. 以微小增量交替调节电阻 R1 和 R2 直到显示的波形呈现出平坦的顶部和陡峭的上升沿。



注意

高频补偿调节具有一定的难度，建议由专业人士操作。

性能规格

性能指标	
带宽	DC~600 MHz
衰减比	固定 10:1
输入阻抗	10 MΩ±2%
输入电容	12 pF±1 pF
最大输入	CAT II 300 VAC[1]
补偿范围	6 pF~26 pF

一般规格	
操作环境	温度 0 °C ~50 °C，湿度 0 RH~80% RH
存放环境	温度-20 °C ~60 °C，湿度 0 RH~90% RH
探头尺寸	142±2 cm
探头重量	约 48±2 g

注：

[1] CAT I 和 CAT II 的定义

装置种类（超压种类）I：信号电平，特殊设备或部分设备，无线电通讯和电子等，相对装置种类（超压种类）II 有更小的瞬态电压。

装置种类（超压种类）II：局部电平，器具，可携带设备等，相对装置种类（超压种类）III 有更小的瞬态电压。

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Fax：(86-10) 8070 5070

服务与支持热线：800 810 0002
化学分析仪器服务专线：400 618 6776

地址：北京市昌平区沙河镇踩河村 156 号
邮编：102206

电子邮件：service@rigol.com

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RIGOL

User's Guide

RP5600A Passive Probe

Dec. 2011
RIGOL Technologies, Inc.

Guaranty and Declaration

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RIGOL guarantees this product conforms to the national and industrial standards in China. International standard conformance certification is in progress, e.g. ISO.

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Terms in This Guide. These terms may appear in this manual:



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



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

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

DANGER	indicates an injury or hazard may immediately happen.
WARNING	indicates an injury or hazard may be accessible potentially.
CAUTION	indicates a potential damage to the instrument or other property might occur.

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



Hazardous Voltage



Refer to Instructions



Protective Earth Terminal



Chassis Ground



Test Ground

General Care and Cleaning

General Care:

Do not store or leave the probe in places where it will be exposed to direct sunlight for long period of time.

Cleaning:

Clean the probe regularly according to its operating conditions. To clean the exterior surface, perform the following steps:

1. Disconnect the probe from all power sources.
2. Clean the loose dust on the outside of the probe with a lint-free cloth (with mild detergent or water).



CAUTION

To avoid damages to the probe, do not expose it to corrosive liquids.



WARNING

To avoid injury resulting from short circuit, make sure the probe is completely dry before reconnecting into a power source.

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RP5600A Probe at a Glance

The **RIGOL** RP5600A passive probe provides up to 600 MHz bandwidth and uses modular structure allowing users to replace the probe tips. The probe has compact structure and uses snap-on BNC connector for easy connection with the oscilloscope.

Features:

- Up to 600 MHz analog bandwidth.
- Precise and tenuous probe tip.
- Auto identification of the probe attenuation ratio (when supported by the oscilloscope).
- Firm, durable and retractable normal probe hook.
- Equipped with many kinds of ground lines to connect to different earth terminals.

General Inspection

When you get a new RP5600A probe, you are suggested to take the following steps to inspect the probe.

1. **Inspect the shipping container for damage.**
   Keep the damaged shipping container or cushioning material until the contents of the shipment have been checked for completeness and the instrument has passed both electrical and mechanical tests.

   The consigner or carrier shall be liable for the damage to the probe resulting from shipment. **RIGOL** would not be responsible for free maintenance/rework or replacement of the unit.

2. **Inspect the probe.**
   In case of any damage, or defect, or failure, notify your **RIGOL** sales representative.

3. **Check the accessories.**
   Accessories supplied with the probe are listed in the "**Accessories**" section. If the contents are incomplete or damaged, please contact the local sales representative of **RIGOL**.

Accessories

The figure and table below list the standard accessories for RP5600A. All the accessories can be ordered and purchased from **RIGOL**.

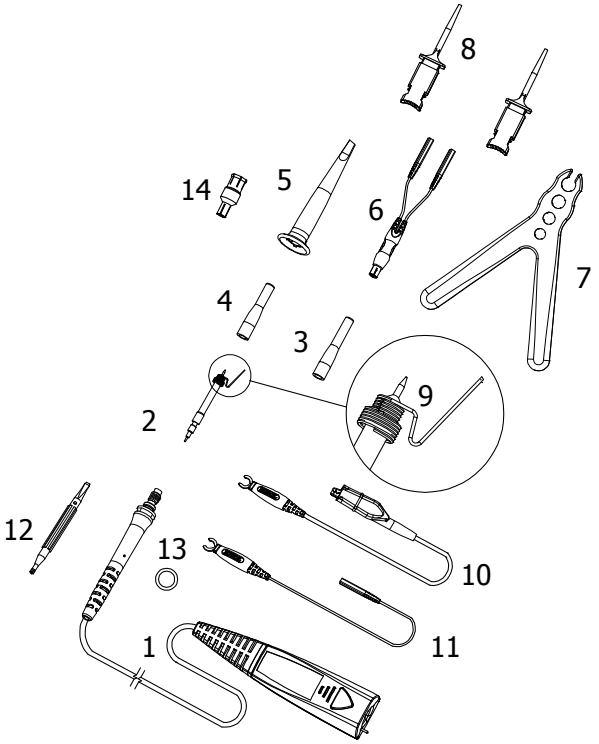


Figure 1 RP5600A Accessories

CAUTION

The measurement category of the combination of the probe and the accessories (used to assist the measurement) is the lower one in the combination.

Table 1 RP5600A Accessories

Item#	Name	Part No.	Qty
1	Probe	RP5600A-0200101	1
2	Probe tip	RP5600A-0200201	2
3	Barrel insulator (long)	RP5600A-0200301	1
4	Barrel insulator (short)	RP5600A-0200401	1
5	General purpose retractable hook tip	RP5600A-0200501	1
6	Dual-lead adapter	RP5600A-0200601	1
7	Probe bracket	RP5600A-0200701	1
8	SMD clip	RP5600A-0200801	2
9	Spring ground	RP5600A-0200901	2
10	Alligator ground lead	RP5600A-0201001	1
11	Socketed ground lead	RP5600A-0201101	1
12	Screwdriver	RP5600A-0201201	1
13	Sign loop	RP5600A-0201301	8
14	BNC adapter	RP5600A-0201401	1

1. Probe

Main body of the probe.

2. Probe Tip

Front Component of the probe.

3,4 Barrel Insulator (long, short)

When using the short one, the ground terminal is exposed in favor of using the ground spring. When using the long one, the ground terminal is covered completely to avoid short circuit between the probe and the circuit under test.

5. General Purpose Retractable Hook Tip

Directly connect the probe head to the circuit under test to spare your hands.

6. **Dual-lead Adapter**
   Lead out a plug from the signal terminal and the ground terminal of the probe respectively.
7. **Probe Bracket**
   Lay and fix the probe during the measurement.
8. **SMD Clip**
   Lead out the pin signal of the circuit under test.
9. **Spring Ground**
   Connect to the probe tip for grounding to improve the high-frequency response.
10. **Alligator Ground Lead**
    Ground the probe reliably for safe operation and accurate signal reading.
11. **Socketed Ground Lead**
    The usage is the same as the alligator ground lead but it uses different joint (refer to the figure of standard accessories).
12. **Screwdriver**
    Used in probe compensation adjustment.
13. **Sign Loop**
    Fix sign loops of different colors on the probes to distinguish the probes connected to different channels.
14. **BNC Adapter**
    Use this adapter to connect the probe to a BNC connector.

To Connect to the Oscilloscope

1. Connect the BNC connector of probe to the desired channel or the external trigger input terminal of the oscilloscope. Push it straight on until it latches into place.

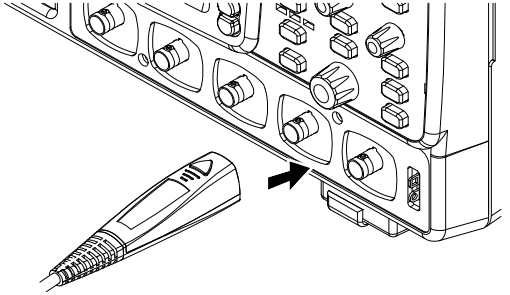


Figure 2 To Connect the Oscilloscope

2. Connect the probe to the circuit under test.

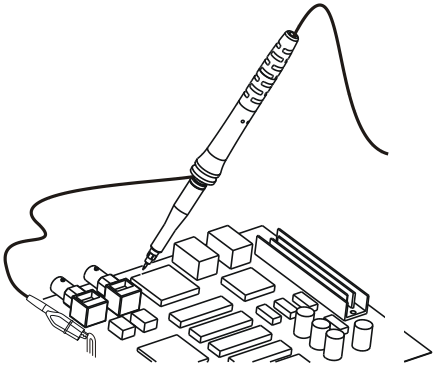
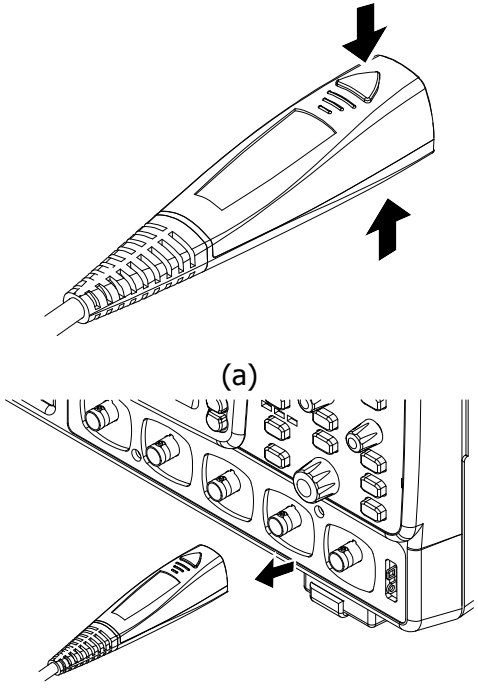


Figure 3 To Connect the Circuit under Test

3. To disconnect the probe from the oscilloscope, push the small buttons on the top and bottom of the probe connector, and then pull the probe connector out from the BNC connector of the oscilloscope in the arrow direction as shown in the Figure 4 (b).



(a)

(b)

Figure 4 To Disconnect the Oscilloscope

CAUTION

Do not attempt to twist the probes on or off the oscilloscope's BNC connector, otherwise the probe might be damaged.

To Use the Probe

CAUTION

To avoid any damage or loss, please use the probe according to the User's Guide.

CAUTION

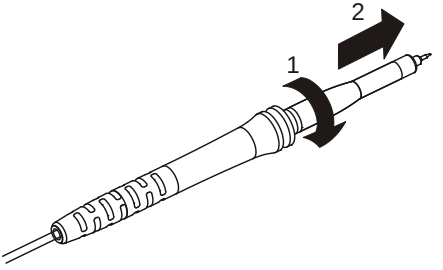
Do not solder the probe tip to any surface, or else the probe tip would be damaged.

CAUTION

If using the probe without any accessories, short circuit might occur when the probe is connected to the circuit.

To connect the probe to the circuit under test

When using the probe to measure some hard-to-reach positions, you can spare the probe accessories.



RP5600A has two kinds of barrel insulators: long and short. The insulator shown in the figure above is the long one. You can screw the barrel insulator in the direction of arrow 1 and take it off in the

direction of arrow 2.

The barrel insulator can be screwed to various positions:

- With the barrel insulator screwed all the way on, a spring ground may be added to the probe tip to provide ground contact.
- With the barrel insulator screwed most of the way out, the barrel insulator covers the front component of the probe.

To use the ground accessories

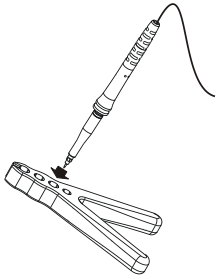
Ground the probe by connecting the alligator ground, the socketed ground lead or the spring ground which all provide reference for a ground point. It is necessary to use the barrel insulator in conjunction with any of the ground accessories so as to avoid possible short circuit.

To use the general purpose retractable hook tip

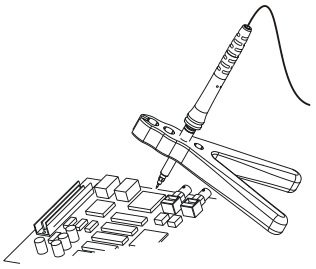
Insert the probe hook tip into the barrel insulator to connect it to the probe tip. Then, connect the hook tip to the point to be tested by pressing the retractable hook tip body towards the probe body.

To use the probe bracket

The probe bracket can facilitate your circuit testing. Users can place the probe on the bracket to spare their hands. As shown in the figures on the next page, insert the probe into the proper hole on the bracket and connect the probe tip to the point to be tested, then place the whole equipment to a proper position.



Using Method



Placement Method

WARNING

RP5600A must be used with oscilloscopes that have a common terminal at ground potential (complying with OSHA requirements and the National Electric Code). Exposed metal surfaces of the probe and the oscilloscope must be grounded. Failure to ground the common terminal during certain applications, such as those requiring the oscilloscope to be powered from external battery, might expose the operator to an electrical shock hazard that could be lethal (depending on the voltage and current conditions).

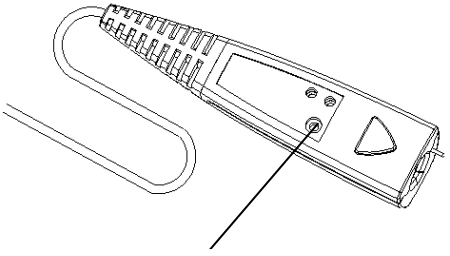
Compensation Adjustments

You are suggested to compensate the probe to match with the oscilloscope. The probes can be adjusted for both low-frequency compensation and high-frequency compensation. You should make low-frequency compensation of the probe when it is connected to the oscilloscope for the first time (or adjust it at any time), while high-frequency compensation can be made regularly.

Low-frequency compensation

Follow the steps below to make low-frequency compensation:

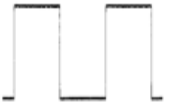
1. Connect the probe to a channel BNC connector and the probe compensation signal output terminal at the front-panel of the oscilloscope. Connect the ground alligator lead of the probe to the "Ground Terminal" under the probe compensation signal output terminal.
2. Press **Auto** at the front panel of the oscilloscope.
3. Set the low-frequency compensation adjustment on the probe using screwdriver provided via the low-frequency compensation adjustment hole on the probe to get the flattest pulse possible (as shown in figures on the next page).



Low-frequency
Compensation Adjustment



Over compensated



Perfectly compensated



Under compensated

Table 2 Option (for high-frequency compensation adjustment)

Item#	Name	Part No.
1	50 Ω feedthrough adaptor	RP5600A-0300101

High-frequency compensation

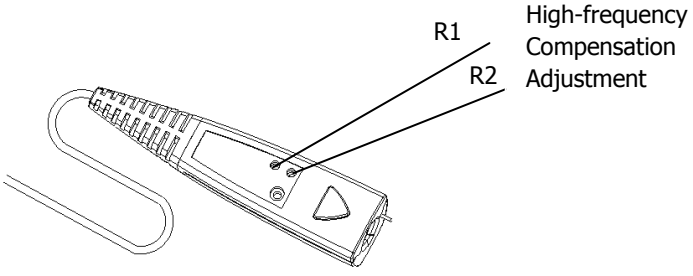
Low-frequency compensation must be performed before executing High-frequency compensation.

Follow the steps below to make high-frequency compensation:

1. Connect the 50 Ω feedthrough adaptor (option) to a generator with fast edge signal.
2. Connect the BNC adapter to the 50 Ω feedthrough adaptor.
3. Remove the accessories (the spring ground or the hook tip) at the probe head and the barrel insulator.
4. Connect the probe head to the BNC adapter (so as to connect it to the generator with fast edge signal) and connect the probe to

the oscilloscope.

5. Output a fast edge signal lower than 500 ps from the generator.
6. Press **Auto** at the front panel of the oscilloscope to view the waveform.
7. Use the screwdriver to adjust the resistors R1 and R2 of the high-frequency compensation.
8. Adjust the high frequency adjustment hole in small increments until the displayed waveform has flat tops and steep rising edges.



CAUTION

It is recommended that the high-frequency compensation should be done by professionals.

Characteristics

Performance Specification	
Bandwidth	DC to 600 MHz
Attenuation Ratio	Fixed at 10:1
Input Impedance	10 MΩ±2%
Input Capacitance	12 pF±1 pF
Maximum Input	CAT II 300VAC[1]
Compensation Range	6 pF to 26 pF

General Specification	
Operation Environment	Temperature: 0 °C to 50 °C Humidity: 0 RH to 80% RH
Storage Environment	Temperature: -20 °C to 60 °C Humidity: 0 RH to 90% RH
Size	142±2 cm
Weight	Approximately 48±2 g

Note:

[1] CAT I and CAT II Definitions

Installation Category (Overvoltage Category) I: signal level, special equipment or parts of equipment, telecommunication, electronic, etc., with smaller transient voltages than installation category (Overvoltage Category) II.

Installation Category (Overvoltage Category) II: local level, appliance, portable equipment etc., with smaller transient voltages than installation category (Overvoltage Category) III.

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 and service office.

RIGOL does not provide any other warranty items except the one being provided by this summary and the 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.

Contact Us

If you have any problem or requirement when using our products, please contact RIGOL Technologies, Inc. or your local distributors.

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