

差分探头

■ DP-220



INSTRUCTION MANUAL

使用说明书

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——一般安全概要

- 使用本产品前，请先查看以下安全预防措施，以避免受伤并防止损坏本产品或与其相连的设备。 为避免潜在危险，请仅按规定使用本产品。
- 只有合格的人员才能执行维修程序。



安全注意事项：避免火灾或人身伤害

使用合适的电源线。 仅使用为本产品指定并经使用国家/地区认证的电源线。

正确连接和断开连接。 当差分探头或测试线连接到电压源时，不要连接或断开它们。

正确连接和断开连接。

在将差分探头连接到被测电路之前，请先将差分探头输出端连接到测量仪器。在连接差分探头输入之前，请将差分探头引线连接到被测电路。在将差分探头与测量仪器断开连接之前，请将差分探头输入端和差分探头引线与被测电路断开。

将产品接地。

本产品通过主机电源线的接地导体间接接地。为避免触电，接地导体必须接地。 在连接产品的输入或输出端子之前，请确保产品正确接地。

遵守所有端子额定值。

为避免火灾或电击危险，请遵守产品上的所有额定值和标记。在连接到产品之前，请查阅产品手册以获取更多额定值信息。

请勿对任何端子（包括公共端子）施加超过该端子最大额定值的电位。

遵守最大输入电压：

1. 最大差分电压：± 260 V (DC + AC 峰值) 或 183 V_{rms}。
2. 输入端与接地端之间的最大差分电压：91.5 VRMS。

断开电源。不要阻塞或遮盖电源线，电源线必须随时能断开产品与电源的连接。

不要在没有盖子的情况下操作。请勿在移除盖板或面板的情况下操作本产品。

不要在疑似故障的情况下进行操作。

如果您怀疑本产品有损坏，请让合格的维修人员对其进行检查。

避免电路暴露。通电时请勿触摸有裸露电路的连接物和组件。

使用合适的适配器。 仅使用为本产品指定的 AC 适配器。

请勿在潮湿/潮湿的环境条件下操作。

请勿在易爆炸的环境中操作。

请保持产品表面清洁干燥。

符号说明

产品上可能会出现以下符号：



注意并参见操作说明。



接线端子上可能存在危险电压。



本仪器具有双重绝缘。

安规说明

本产品符合以下安全规定：

符合 IEC 61010-1 的电气安全：

- 双重绝缘
- 安装类目 III
- 污染等级 2（注：额定仅适用于室内使用）。
- 额定电压或最大接地电压： 91.5 VRMS



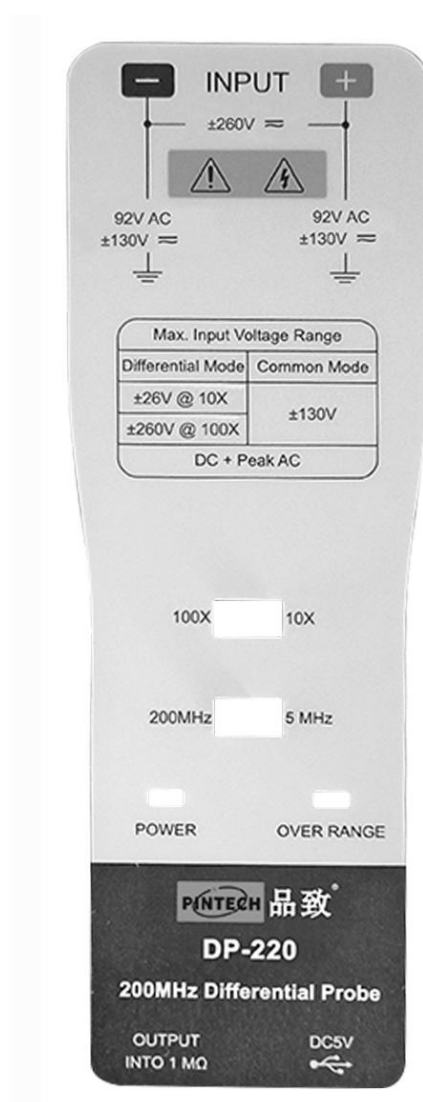
CE 标志：符合 EN 50081-1 和 50082-1 标准

产品介绍

DP-220 差分探头提供一个安全的绝缘仪器给示波器使用，它可以转换由高输入的差分电压($\cong \pm 260$ DC+AC peak) 进入一个低电压($\cong \pm 26$ V) 并且显示波形在示波器上，使用频率高达 200 MHz (DP-220) ，非常适合大电力测试、研发使用。

差分探头输出标示是设计在操作示波器 $1M\Omega$ 的输入阻抗的相对衰减量，当使用 50Ω 匹配器时衰减量刚好为 2 倍量。

DP-220 为一高灵敏度设计，衰减器 X10, X100 皆为 10 进位以方便使用者计算，且不容易出错，其最高电压达到 $520V_{p-p}$ ，为一高电压设计的机种。



型号	频宽	衰减	示波器连接界面
DP-220	200 MHz	X10 / X100	BNC

仪器及附件说明



适用型号：DP-220

- ① 一体式输入引线
- ② 衰减量选择开关
- ③ 频宽选择开关
- ④ 电源开/关指示灯
- ⑤ 过载警示灯
- ⑥ 输出连接器/ BNC 电缆
- ⑦ 外部电源输入端 [DC5V]
- ⑧ USB 传输线 [L=100cm]
- ⑨ 延长线 [L=100cm]
- ⑩ 钩夹 (BP-256N)
- ⑪ 差分探钩 (BP-286N)
- ⑫ 鳄鱼夹 (BP-276N)
- ⑬ AC 转换器(适配器) [100~240V]
- ⑭ 插头转换器 [100~240V]

电气规格

功能/ 型号	DP-220
频宽(-3dB)	DC-200MHz
上升时间	1.75ns
衰 减	X10 / X100
精确度	$\cong \pm 2\%$
输入电压范围	$\cong \pm 26 \text{ V}$ (DC + AC peak) X10
	$\cong \pm 260 \text{ V}$ (DC + AC peak) X100
输入阻抗	各单端到接地端间的输入阻抗:1 M Ω // 1pF
输出电压	$\cong \pm 2.6 \text{ V}$
输出阻抗	50 Ω (在 1 M Ω 输入阻抗的示波器系统中)
5 MHz 限制频宽	可切换: Full / 5MHz
共模互斥比	60 Hz: >80 dB / 100 Hz: >60 dB / 1 MHz: >50 dB

一般规格

型 号	DP-220
电 源	指定外接 5 VDC 电源 (必须使用本公司指定品) 最大耗电量约 300 mA
尺 寸	175 x 68 x 28 mm
重 量	285 g
温 度	一般状态: +20 °C ~ +30 °C
	操作环境: 0 °C ~ +50 °C
	储存环境: -30 °C ~ +70 °C
湿 度	一般状态: $\cong 70$ %RH
	操作环境: 10 % ~ 85 %RH
	储存环境: 10 % ~ 90 %RH
附 件	延长线 x 红黑各 1, 钩夹 x 红黑各 1, 鳄鱼夹 x 红黑各 1, 差分探钩 x 红黑各 1, USB 连接线 x 1 条, 插头转换器 x 1 个, AC 转换器(适配器) x 1 个, 使用说明书

操作说明

连接到仪器

1. 将钩夹(或鳄鱼夹 BP-276N) 插入差分探头的输入端引线, 并将钩夹(或鳄鱼夹 BP-276N) 与测量电路接触。
2. 将差分探头的输出端接上 BNC 电缆后连接到示波器。

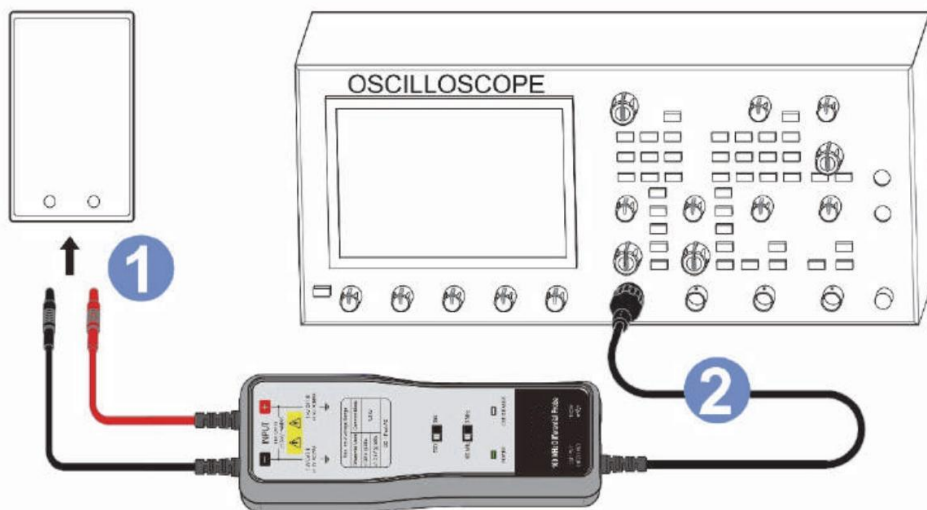


图 1.

3. 如有需要先调整示波器上的垂直开关。
4. 将示波器上的衰减率及垂直开关调整到一致的位置, 如表格 1. 所示。
5. **注意! 电源必须打开。**

表格 1. 垂直偏差换算表

衰减	X100	X10
最大输入电压(DC+AC Peak)	±260V	26V
DC 最大输入值	±260V	26V
AC 最大输入有效值	183 Vrms	18 Vrms

示波器上的垂直偏向 V/div	换算实际偏向 V/div	
	X100	X10
1	100	10
0.5	50	5
0.2	20	2
0.1	10	1
50 m	5	0.5
20 m	2	0.2
10 m	1	0.1
5 m	0.5	50 m
2 m	0.2	50 m



注意！实际的垂直偏向是等于衰减乘上示波器上所选择的垂直偏向，如果另外使用 50 Ω 负载端子时，实际电压值刚好是 2 倍量。

例如：

差分探头是 X100，示波器的垂直偏向在 0.5 V/div，
 其实际的垂直偏向为 $100 \times 0.5 = 50 \text{ V/div}$
 示波器输入的负载是 50 Ω，偏向就为 25 V/div

断开与仪器连接



警告！为避免电击，在将差分探头与仪器断开连接之前，请先将差分探头与电路断开。

1. 逆时针转动 BNC 接头。
2. 直接拔出 BNC 接头。

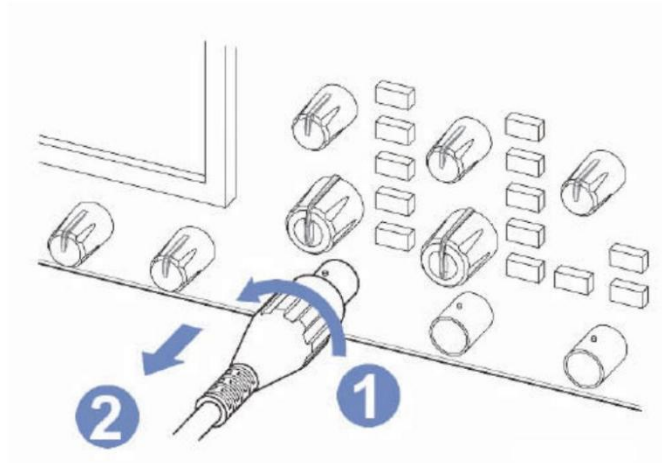


图 2.

频宽限制

切换 Bandwidth Limit 开关，可以将输出频宽限制在 5 MHz。启用频宽过滤器后，可以有效去除所有的高频内容、谐振、噪声、简化输出波形。

输入引线绞线

测量时将输入线绞线，可以有效避免环境电磁干扰与噪声。

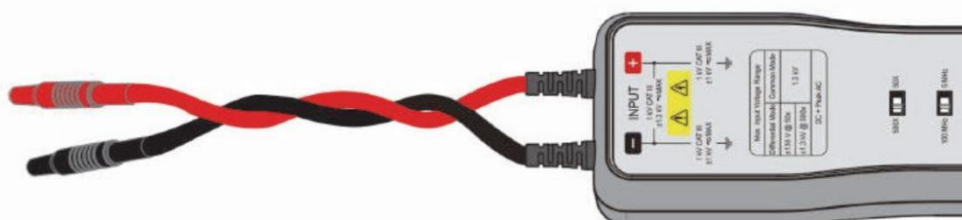


图 3.

外部电源

差分探头的功耗约为 500 mA，因此不适合使用电池，请仅使用附件转换器(适配器)连接电源。

如果电源转换器(适配器)有任何损坏，请与我们联系并仅使用我们提供的转换器(适配器)。

注意！ 如果输入电源超过 6 VDC 会导致差分探头造成硬损坏。

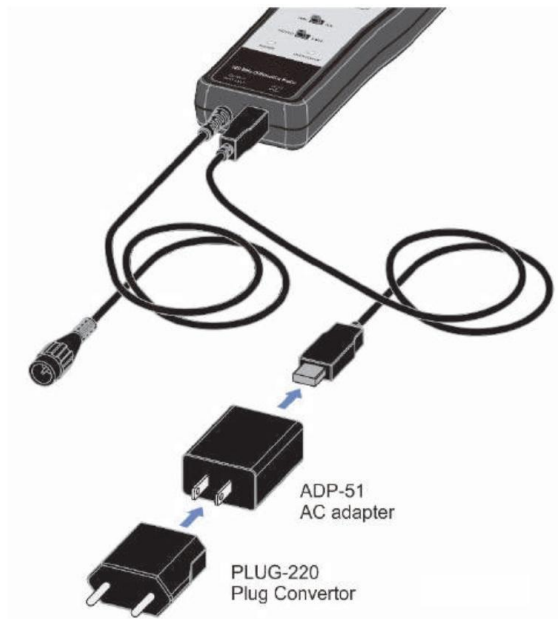
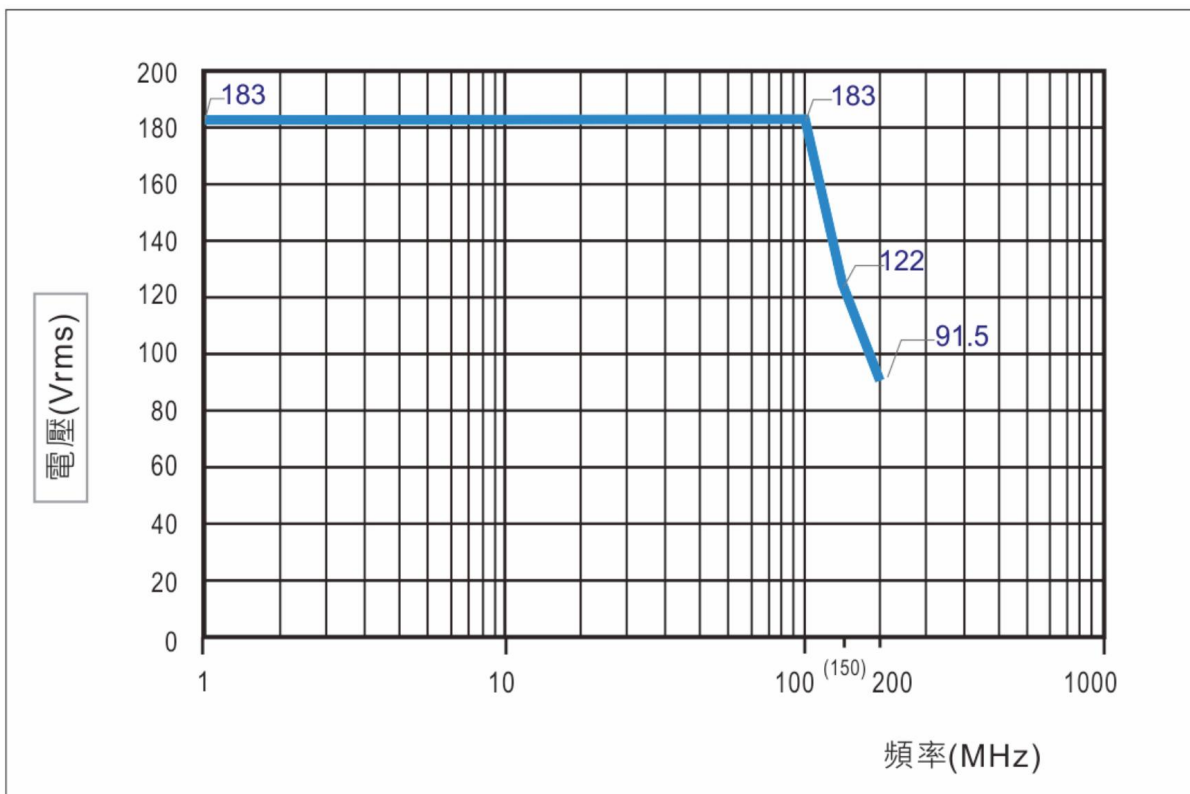


图 4.

降额曲线

高频耐压曲线是以最大共模输入电压为例：



产品维护

保养此产品时请使用原厂指定的工具，由其他不被认可的维修人员所做的维修，原厂将不负任何责任。

清洁

此产品不需要任何特定的清洁，如有需要，请用轻软干净的棉布沾上微量的清洁液轻轻的在产品外观擦拭。

保固

- 除了人为的特意损坏，本产品受保固并可以回原厂维修，但并不包含在安全规范的责任。
- 保固是以不超出发票上的金额，零件的更换及运送的费用。
- 保固是仅在正常操作下所造成的损坏，并不包含任何刻意的损坏、操作上的错误、机械上的操作不当、保养不当、负载或过压等问题。
- 原厂的保固仅包含有限的单纯更换损坏的零件，使用者将不可归据直接或间接的责任在原厂。
- 原厂的保固是售出后的 12 个月内，如有任意的非原厂的维修或更换零件，原厂保固将自然取消。

维修

有任何的维修，保养或更换零件是在保固以外，请将产品退回原厂维修。

GENERAL SAFETY SUMMARY

- Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. To avoid potential hazards, use this product only as specified.
- Only qualified personnel should perform service procedures.



Safety Precautions: to avoid fire or personal injury

Use proper power cord. Use only the power cord specified for this product and certified for the country of use.

Connect and disconnect properly. Do not connect or disconnect probes or test leads while they are connected to a voltage source.

Connect and disconnect properly. Connect the probe output to the measurement instrument before connecting the probe to the circuit under test. Connect the probe reference lead to the circuit under test before connecting the probe input. Disconnect the probe input and the probe reference lead from the circuit under test before disconnecting the probe from the measurement instrument.

Ground the product. This product is indirectly grounded through the grounding conductor of the mainframe power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, ensure that the product is properly grounded.

Observe all terminal ratings. To avoid fire or shock hazard, observe all ratings and markings on the product.

Consult the product manual for further ratings information before making connections to the product.

Do not apply a potential to any terminal, including the common terminal, that exceeds the maximum rating of that terminal.

Respect the max input voltages:

1. Max differential voltage: 260 V (DC+ACpeak) or 183Vrms .
2. Max voltage between each input terminal and ground: 91.5VRMS.

Power disconnects. The power cord disconnects the product from the power source. Do not block the power cord; it must remain accessible to the user at all times.

Do not operate without covers. Do not operate this product with covers or panels removed.

Do not operate with suspected failures. If you suspect that there is damage to this product, have it inspected by qualified service personnel.

Avoid exposed circuitry. Do not touch exposed connections and components when power is present.

Use proper AC adapter. Use only the AC adapter specified for this product.

Do not operate in wet/damp conditions.

Do not operate in an explosive atmosphere. Keep product surfaces clean and dry.

Explanation Symbols

The following symbol(s) may appear on the product:



Attention refers to operation Instructions.



Dangerous voltage may be present at terminals.



This instrument has double insulation.

Compliance Information

This product complies with the following safety regulations:

Electrical Safety to IEC 61010-1:

- Dual Insulation
- Installation Category III
- Pollution Degree 2. (Note: Rated for indoor use only)
- Rated Voltage or Max Live-Earth: 91.5 VRMS



CE Mark: conforms to EN 50081-1 and 50082-1 standards.

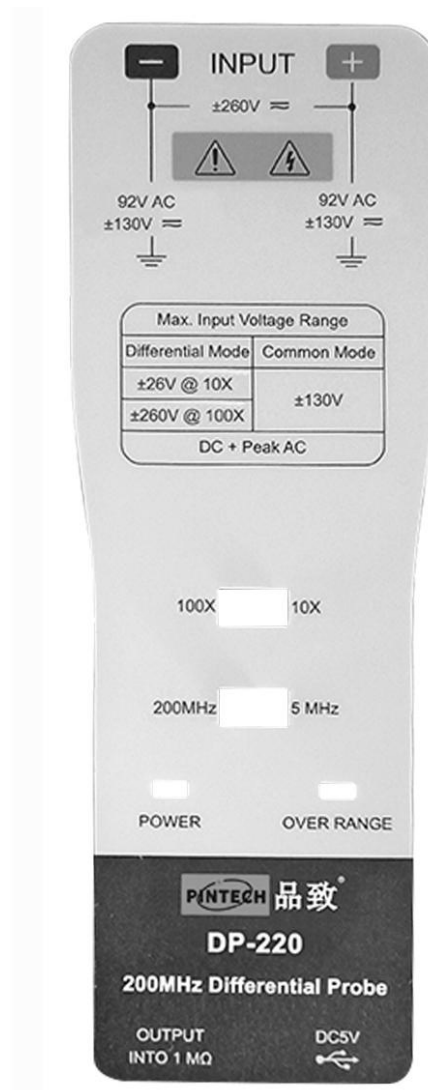
PRODUCT INTRODUCTION

The DP-220 differential voltage probes provide a safety means of measuring floating potentials for all models of oscilloscopes incomplete safety.

It converts the high differential voltage ($\cong \pm 260$ DC+AC peak) into a low voltage ($\cong \pm 26$ V) with reference to the earth for display on the oscilloscopes.

The BNC output is designed to operate on an input with an impedance of 1 M Ω . It is 2 times of the 50 Ω .

DP-220 are designed for high sensitivity modules and high dynamic range. Attenuation x10, x100 , which is easy for calculation without mistake. Maximum voltage is 520 Vp-p. These are designed for high voltage.



Model	Bandwidth	Attenuation	Oscilloscope interface
DP-220	200 MHz	X10 / X100	BNC

Description of the Instrument and Accessories



Model: DP-220

- | | |
|--------------------------------|-------------------------------|
| ① Integral Input Leads | ② Attenuation Function Switch |
| ③ Bandwidth Function Switch | ④ Power On/Off Indication |
| ⑤ Overrange Indication | ⑥ Output Connector/ BNC Cable |
| ⑦ External Power Source [DC5V] | ⑧ USB Cable [L=100cm] |
| ⑨ Extender Leads [L=100cm] | ⑩ Hook Clips |
| ⑪ Test Probes (BP-286N) | ⑫ Alligator Clips (BP-276N) |
| ⑬ AC adapter [100~240V] | ⑭ Plug Converter [100~240V] |

Electrical Specifications

Function/ Model	DP-220
Bandwidth (-3dB)	DC - 200 MHz
Rise Time	1.75ns
Attenuation	X10 / X100
Accuracy	$\cong \pm 2\%$
Input Voltage Ranges	$\cong \pm 26$ V (DC + AC peak) for X10, (i.e about 18 Vrms)
	$\cong \pm 260$ V (DC + AC peak) for X100, (i.e about 183 Vrms)
Input Impedance	1 M Ω // 1 pF each side to ground
Output Voltage	$\cong \pm 2.6$ V
Output Impedance	50 Ω (for 1 M Ω input oscilloscope)
5 MHz Limit Bandwidth	Switchable: Full / 5MHz
Rejection Rate on Common Mode	60 Hz: >80 dB / 100 Hz: >60 dB / 1 MHz: >50 dB

General Specifications

Model	DP-220
Power Supply	External 5 V DC (USB Input), consumption about 300 mA
Dimensions	175 x 68 x 28 mm
Weight	285 g
Temperature	Reference: +20 °C ~ +30 °C
	Use: 0 °C ~ +50 °C
	Storage: -30 °C ~ +70 °C
Relative Humidity	Reference: $\cong 70$ %RH
	Use: 10 % ~ 85 %RH
	Storage: 10 % ~ 90 %RH
Accessories	Extender leads x 2pcs, Hook clips x 2pcs, Alligator clips x 2pcs, Test probes x 2pcs, USB cable x 1pc, Plug convertor x 1pc, AC adapter x 1pc, Instruction manual

OPERATING INFORMATION

Connecting to the Instrument

1. Connect to leads to the input and place the wire-grip on the circuit to be tested.
2. Connect the probe to the oscilloscope with the insulated BNC cable.

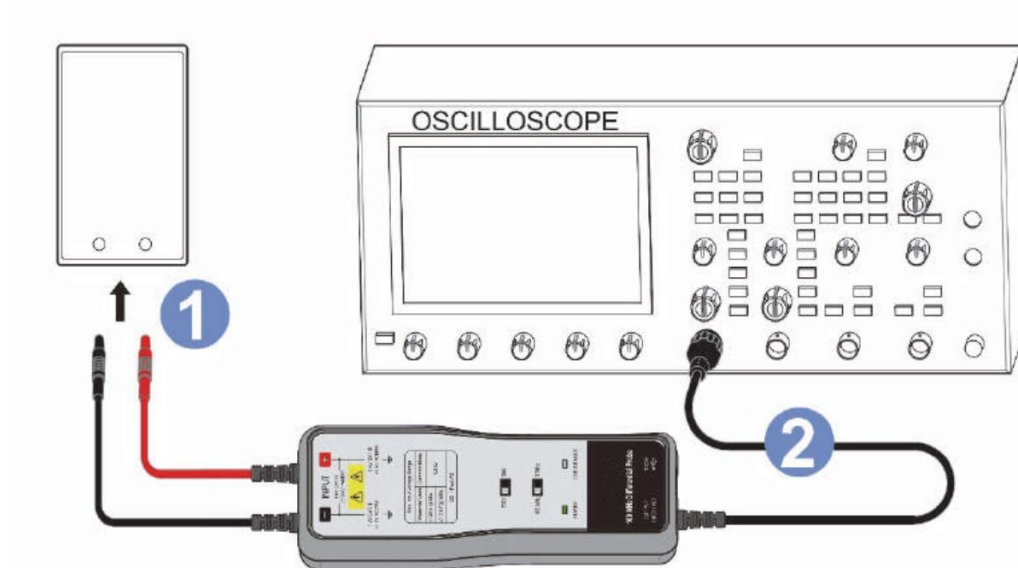


Figure1.

3. Adjust the vertical zero adjustment of the oscilloscope if necessary.
4. Select the attenuation ratio and the vertical deviation of the oscilloscope in accordance with the conversion table1.
5. NB. The POWER light must come on.

table1. The conversion table gives the real vertical deviation:

Attenuation	X100	X10
MAX Voltage Input Range (DC+AC Peak)	±260V	±26V
DC MAX INPUT	±260V	±26V
AC RMS MAX INPUT	183 Vrms	18 Vrms

Vertical deviation on the oscilloscope in V/div	Real Deviation In V/div	
	X100	X10
1	100	10
0.5	50	5
0.2	20	2
0.1	10	1
50 m	5	0.5
20 m	2	0.2
10 m	1	0.1
5 m	0.5	50m
2 m	0.2	20m



NOTE. The real vertical deviation in V/div is equal to the attenuation factor multiplied by the range of vertical deviation selected on the oscilloscope. It will be doubled in the case of use of a 50 Ω load.

Example:

With the probe on factor X100, the oscilloscope on 0.5 V/div, the real vertical deviation is $100 \times 0.5 = 50$ V/div.

With a 50 Ω load on the input of the oscilloscope the deviation becomes 50 V/div

Disconnecting from the Instrument



WARNING. To avoid electrical shock, disconnect the probe inputs from the circuit before disconnecting the probe from the instrument.

1. Turn the probe connector counterclockwise.
2. Pull straight out.

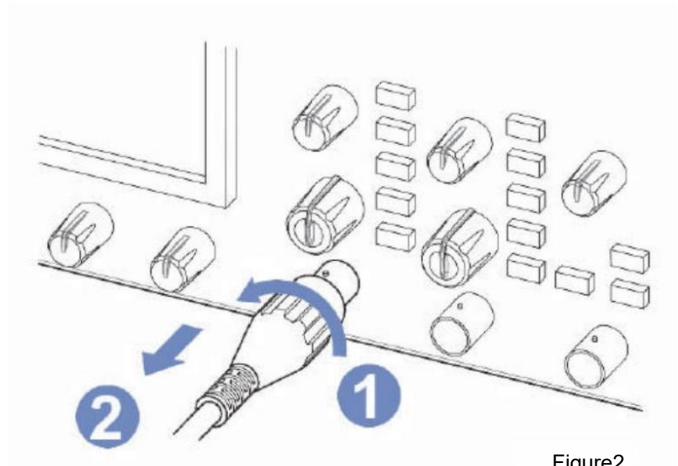


Figure2.

Bandwidth Limit

Slide the Bandwidth limit switch to limit the probe bandwidth to 5 MHz. The 5 MHz filter assists in the characterization and testing of power supplies in switch mode by removing all high frequency content, noise and harmonics from the measurement.

Twisting the input leads

Twisting the input leads helps to cancel noise from high-EMI environments that is induced into the input leads.



Figure3.

External Power Source

Power consumption of the probe is about 500 mA, thus it no suit for battery, please use the accessory adapter only. (Refer Figure4.)

If there are any damage on the adaptor, please contact us and use the adaptor supply by us only. If the input power over 6 VDC will caused to the probe hard damage.

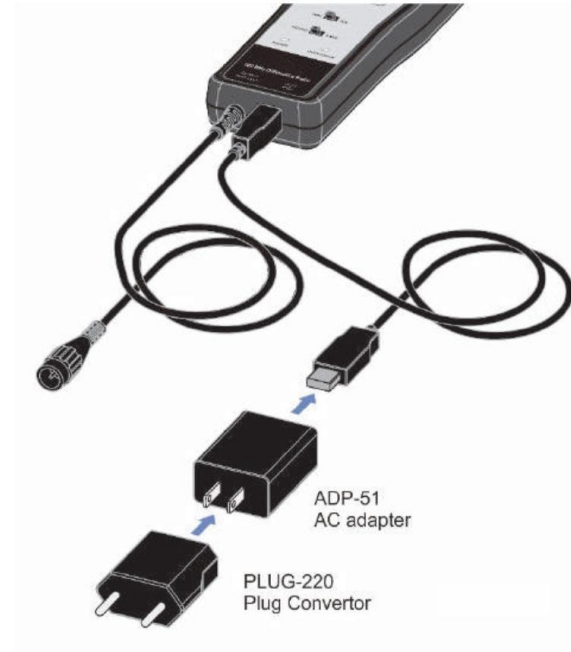
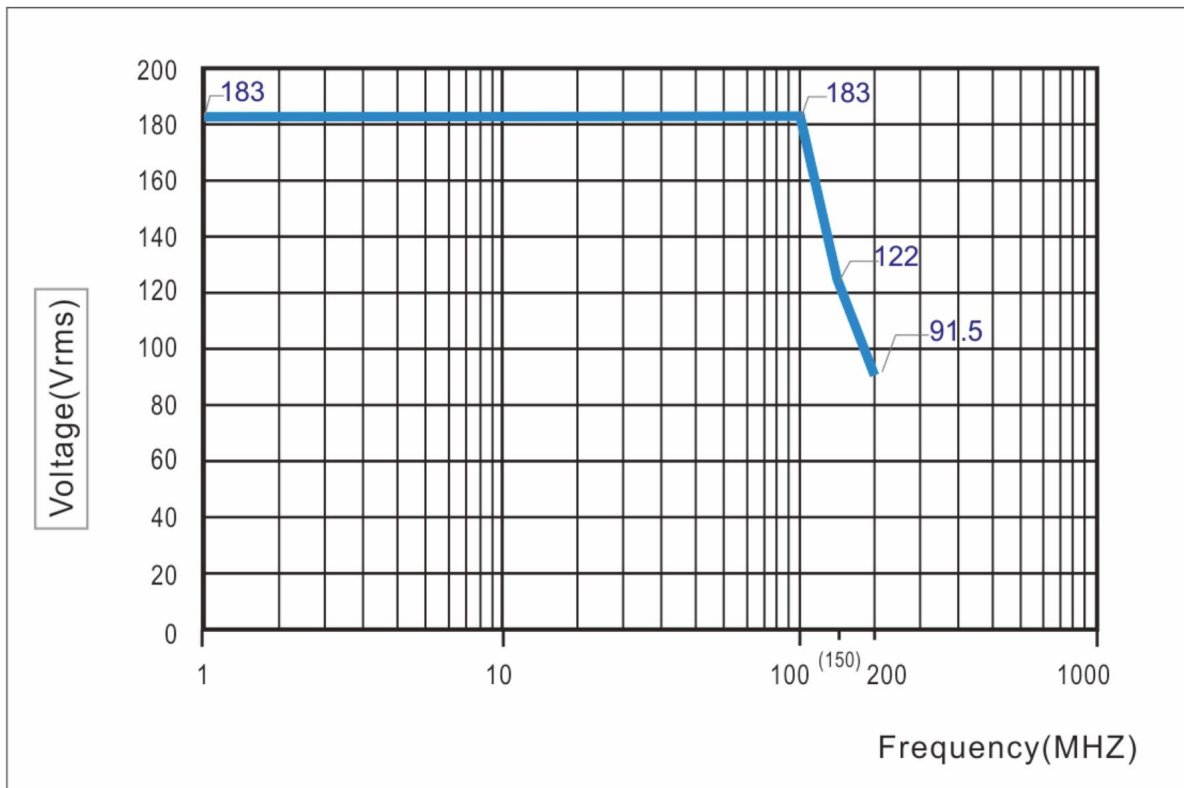


Figure 4.

Derating Curve

The derating curve of the absolute maximum input voltage in common mode is shown as below.



MAINTENANCE

For maintenance, only use specified spare parts.

The manufacturer can't be held responsible for any accident arising following a repair made other than its after sales service or approved repairers.

Cleaning

This probe does not require any particular cleaning. If necessary, clean the case with a cloth slightly moistened with soapy water.

Warranty

Unless notified to the contrary, our instruments are guaranteed against any manufacturing defect or material defect. They do not bear the specification known as the safety specification. Our guarantee, which may not under any circumstances exceed the amount of the invoiced price, goes no further than the repair of our faulty equipment, carriage paid to our workshops.

Repair

Maintenance, repairs under or out of guarantee. Please return to product to your distributor.