UNI-T

UT-PA2000/1000 Active single-ended probe

2GHz | 175ps | 10:1 | ± 4V | 1.3pF

User Manual REV.2.0

April 2025

Copyright Information

If the original purchaser sells or transfers the product to a third party within three years from the date of purchase, the warranty period shall be three years from the date the original purchaser purchased the product from UNI-T or an authorized Uni-T distributor. Probes and other accessories and fuses are not covered by this warranty. If a defect in the product is proven during the applicable warranty period, UNI-T may, at its sole discretion, either repair the defective product without charge for parts and labor or replace the defective product with an equivalent product (as determined by UNI-T). Parts, modules and replacement products used by Uni-T for warranty purposes may be new or repaired to have performance equivalent to new products. All replaced parts, modules and products shall become the property of UNI-T.

The "customer" referred to below means the individual or entity claiming the rights stipulated in this warranty. To obtain the services promised under this warranty, the "customer" must notify UNI-T of the defect within the applicable warranty period and make appropriate arrangements for the performance of the service. The customer is responsible for packing the defective product and shipping it to the repair center designated by UNI-T, and prepaying the shipping cost and providing a copy of the original purchaser's proof of purchase. If the product is to be returned to a location within the country where the UNI-T repair center is located, UNI-T shall bear the cost of returning the product to the customer. If the product is returned to any other location, the customer shall be responsible for all shipping costs, duties, taxes and any other expenses.

This warranty does not apply to any defect, malfunction or damage caused by accident, normal wear and tear of machine parts, use or improper use outside the scope specified in the product, or improper or inadequate maintenance. UNI-T is under no obligation under the terms of this warranty to provide the following services:

a) Repair damage caused by installation, repair or maintenance of the product by a person other than UNI-T service representative;
b) repair damage caused by improper use or connection with incompatible devices;
c) repair any damage or malfunction caused by the use of a power supply that does not meet the requirements of this manual;
d) Repair products that have been altered or integrated with other products (if this alteration or integration would increase the time or difficulty of repairing the product).

This warranty is made by UNI-T for this product and is used in lieu of any other express or implied warranties that UNI-T and its distributors disclaim Make any implied warranties of merchantability or fitness for a particular purpose. In the event of a breach of this warranty, NUI-T's responsibility to repair or replace the defective product is the sole and exclusive remedy available to the customer. In no event shall UNI-T and its distributors be liable for any indirect, special, incidental or consequential damages, whether or not they have been advised of the possibility of such damages.

Trademark Information

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Document version

UT-PA2000/1000-V2.0

Statement

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- Technical data are subject to change without notice.

Foreword

Thank you for choosing this UNI-T instrument. For safe and proper use this instrument, please read this manual carefully, especially the safety instructions section.

After reading this manual, it is recommended to keep the manual in a convenient location, preferably near the device, for future reference.

Safety Instructions

This chapter contains information and warnings that must be observed. Ensure that the instrument is operated under the safe conditions. In addition to the safety precautions indicated in this chapter, you must also follow accepted safety procedures.

Safety Precautions	
Warning	Please follow these guidelines to avoid possible electric shock and risk to personal safety.
	Users must adhere to the following conventional safety precautions in operation, service, and maintenance of this device. UNI-T will not

	be liable for any personal safety and property loss caused by the user's failure following the safety precautions. This device is designed for professional users and responsible organizations for measurement purposes. Do not use this device in any manner not specified by the manufacturer. This device is intended for indoor use only, unless otherwise stated in the product manual.
Safety Statements	
Warning	"Warning" indicates the presence of a hazard. It warns users to pay attention to a certain operation process, operation method or similar. Personal injury or death may occur if the rules in the "Warning" statement are not properly executed or observed. Do not proceed to the next step until you fully understand and meet the conditions stated in the "Warning" statement.
Caution	"Caution" indicates the presence of a hazard. It warns users to pay attention to a certain operation process, operation method or similar. Product damage or loss of important data may occur if the rules in the "Caution" statement are not properly executed or observed. Do not proceed to the next step until you fully understand and meet the conditions stated in the "Caution" statement.
Note	"Note" indicates important information. It reminds users to pay attention to procedures, methods, and conditions, etc. The contents of "Note" should be highlighted if necessary.

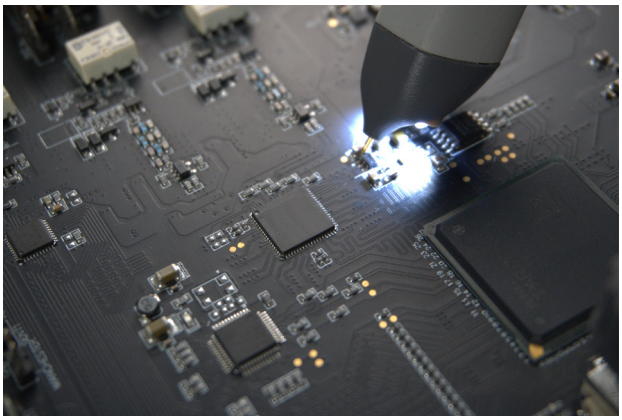
Safety Signs		
	**Danger**	It indicates danger of electric shock, which may cause personal injury or death.
	**Warning**	It indicates that there are factors you should be cautious of to prevent personal injury or product damage.
	**Caution**	It indicates danger, which may cause damage to this device or other equipment if you fail to follow a certain procedure or condition. If the "Caution" sign is present, all conditions must be met before you proceed to operation.
	**Note**	It indicates potential problems, which may cause failure of this device if you fail to follow a certain procedure or condition. If the "Note" sign is present,

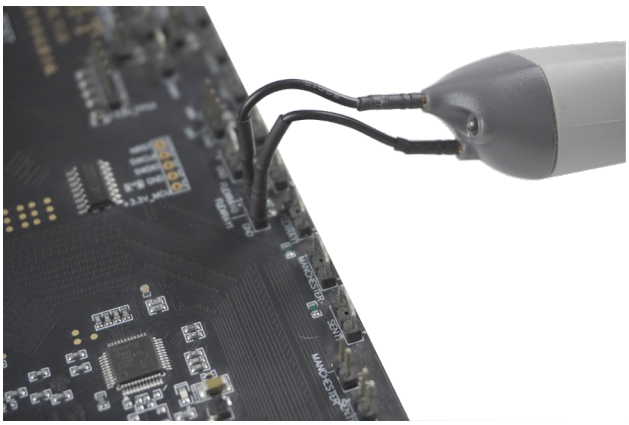
		all conditions must be met before this device will function properly.
CE	**Certification**	CE indicates a registered trademark of EU.
	**Waste**	Do not place equipment and accessories in the trash. Items must be properly disposed of in accordance with local regulations.
	**EEUP**	This environment-friendly use period (EFUP) mark indicates that dangerous or toxic substances will not leak or cause damage within this indicated time period. The environmentally friendly use period of this product is 40 years, during which it can be used safely. Upon expiration of this period, it should enter the recycling system.
Safety Requirements		
Warning		
Anti-static protection		Static electricity can cause damage to the instrument and should be tested in an anti-static zone whenever possible. Before connecting the cable to the instrument, its inner and outer conductors should be briefly grounded to release static electricity. This equipment has a protection level of 4kV in contact discharge and 8kV in air discharge.
Working environment		This device is intended for indoor use in a clean and dry environment with an ambient temperature range of 0°C - 40°C. The appliance must not be operated in explosive, dusty, or humid air.
Do not operate in a humid environment		Avoid the risk of short circuits or electric shock in the internal circuits of the instrument, and do not operate the instrument in a humid environment.
Do not operate in a flammable or explosive environment		To avoid damage to the instrument or personal injury, do not operate the instrument in a flammable or explosive environment.
Caution		
Abnormality		If this device may be faulty, please contact the authorized maintenance personnel of UNI-T for testing. Any maintenance, adjustment or parts replacement must be done by the relevant personnel of UNI-T.
handling safety		In order to avoid the instrument slipping down during handling, resulting in damage to the buttons, interfaces and other components on the instrument, please pay attention to the safety of handling.

Maintain proper ventilation	Poor ventilation can cause the temperature of the instrument to rise, which may further lead to damage to the instrument. Good ventilation should be maintained during use.
Keep clean and dry	Avoid dust or moisture in the air affecting the performance of the instrument, and keep the surface of the product clean and dry.
Note	
Calibration	The recommended calibration period is one year. Calibration should only be conducted by qualified personnel.

UT-PA2000 Overview

The UT-PA2000 and UT-PA1000 are active single-ended probes designed for high-frequency measurements, incorporating many of the features required for today's general-purpose high-speed probes. Active single-ended probes are widely used in high-speed digital circuits, bus analysis, signal integrity analysis and many other high-speed fields, which can obtain signal information in the circuit more accurately and quickly, which helps to improve the work efficiency and accuracy of engineers. Unless otherwise noted, the illustrations used in this manual are MSO7000X-series oscilloscopes and UT-PA2000 probes.





Excellent

Electrical properties:

- High bandwidth - Accurately measure high-speed serial signals
  UT-PA2000 bandwidth: 2GHz
  UT-PA1000 bandwidth: 1GHz
- Extremely high signal fidelity
  UT-PA2000 rise time: 175ps
  UT-PA1000 rise time: 350ps
- Low load: 1MΩ input impedance, ≤1.3pF input capacitance
- Dynamic range: ±4V
- Bias range: ±4V

Accessibility

Probe functions:

- Probe front light on/off button
- Control the oscilloscope to run/stop
- Clear the currently displayed waveforms and measurement values on the oscilloscope
- Control the oscilloscope to perform a forced trigger

Compatibility

- Oscilloscopes:
  MSO7000X、MSO8000HD、UPO7000L、
  MSO5000HD、MSO3000HD、MSO3000X

Outstanding

Machine design:

- A compact probe head used for testing small circuit components
- Various accessories for flexible connection to the DUT (Device Under Test)
- A special probe headlight design

Quick Start Guide

General Inspection

Before you use a new active single-ended probe, it is recommended that you check the probe as follows.

1. Check whether there is any damage caused by transportation

   If you notice that the carton or styrofoam protector is severely damaged, please contact your UNI-T distributor.

2. Check the attachments

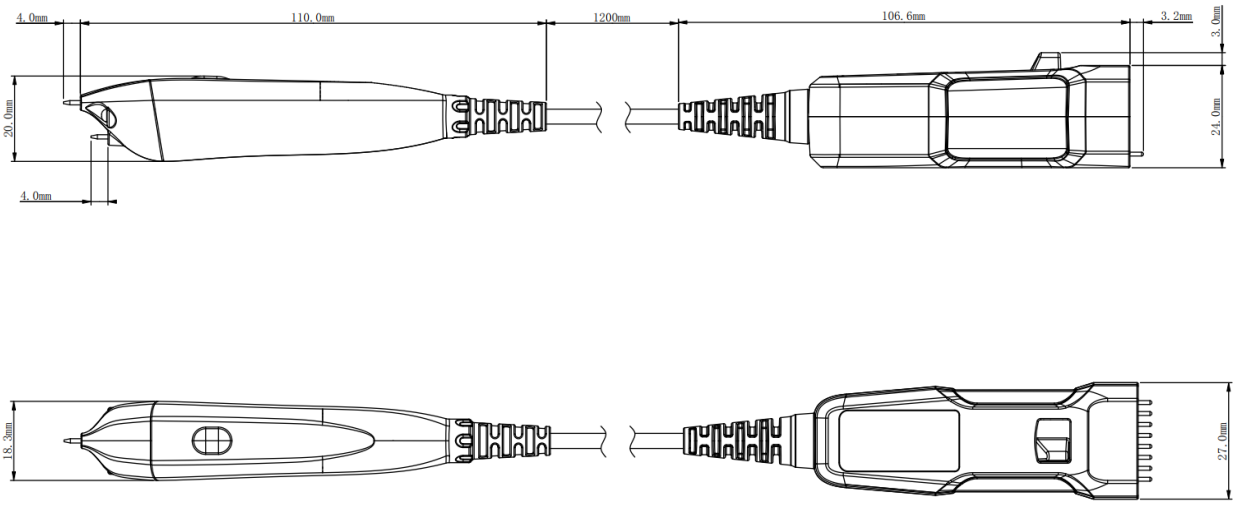
   Please check the random accessories according to the packing list, if there is damage or missing, if the accessories are missing or damaged, please contact your UNI-T dealership.

3. Check the whole machine

   If you notice that the probe is cosmetially damaged, not working properly, or failing performance testing, please contact your UNI-T dealer.

   If the instrument is damaged due to shipping, please keep the packaging and notify the shipping department and contact your UNI-T distributor.

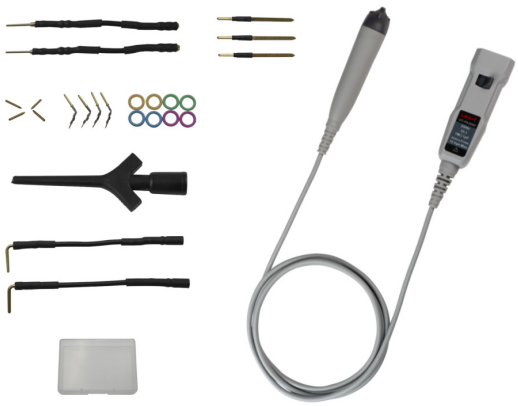
Probe Dimensions



Supplied Accessories

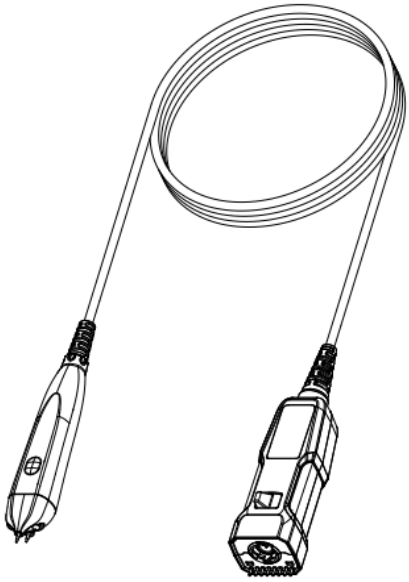
This section lists the UT-PA2000 and UT-PA1000 probe kits and standard accessories. Parts listed can be ordered through consultation with UNI-T and distributors.

Accessory	Quantity	Description
Gold-plated aircraft hook (Red)	×2	Optional UT-PA-F01, bandwidth of 1GHz
Gold-plated aircraft hook (Black)	×2	Standard UT-PA-F01, bandwidth of 1GHz
Offset blade	×1	Optional UT-PA-F02, bandwidth of 1GHz
Ground blade	×5	Standard UT-PA-F03, bandwidth of 1GHz
Ground flexible tip	×2	Standard UT-PA-F04, bandwidth of 1GHz
Rigid tip	×20	Standard UT-PA-F05, bandwidth of 2GHz
Flexible tip	×2	Optional UT-PA-F06, bandwidth of 1GHz
Two-wire socket adapter (9cm)	×1	Optional UT-PA-F07, bandwidth of 1GHz
Straight-through grounding wire (5cm)	×2	Standard UT-PA-F08, bandwidth of 1GHz
Straight-through grounding wire (5cm)	×2	Standard UT-PA-F09, bandwidth of 1GHz
Single-conductor copper foil sheet (with adhesive backing), 2*2cm	×10	Optional UT-PA-F10, bandwidth of 1GHz
Tip box	×1	Standard UT-PF01
Accessory box	×1	Standard UT-PF02
Ceramic tweezers	×1	Standard PT05-003
Identification ring	×8	Standard UT-PF03



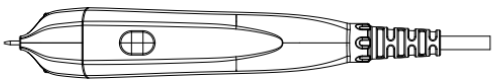
Probe

The rear end of the probe can be connected to MSO7000X, MSO8000HD, UPO7000L and other series of oscilloscopes, and the probe can be powered through the oscilloscope channel. The front end can be flexibly inserted into the measured point according to the user's needs.



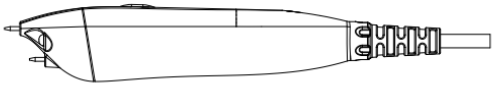
Probe Front-end

The front end of the probe adopts a fixed pitch single-ended grounding pin, the front probe lamp design, and the front oscilloscope control button design makes it easy to control the oscilloscope during measurement.



Front View

Side View 1



Side View 2

Using Probe

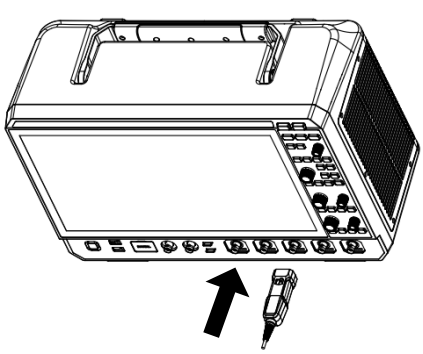
When using a probe, the correct use of the probe can ensure probe performance, extend the life of the probe and guarantee the validity of the signal measurement results.

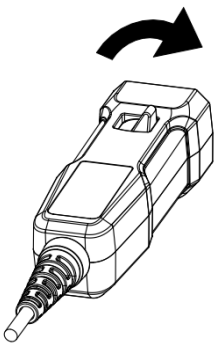
- Connect the oscilloscope
- Use of the front end of the hand-held single-ended probe
- Replace the probe accessory
- Use the probe button
- Calibrate the probe

Connecting the oscilloscope

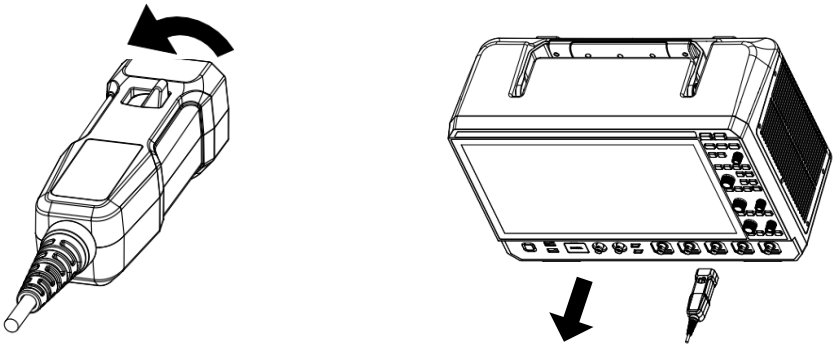
After the probe is properly connected to the UNI-T MSO7000X, UPO7000L, MSO8000HD, etc., the oscilloscope automatically recognizes the probe and provides power to the probe through the oscilloscope channel. In this case, you can adjust the offset voltage and calibrate the probe through the oscilloscope front panel menu (the MSO7000X-series oscilloscope is used as an example below).

(1) Connect one end of the active probe to the oscilloscope channel input connector and push to the closed position.





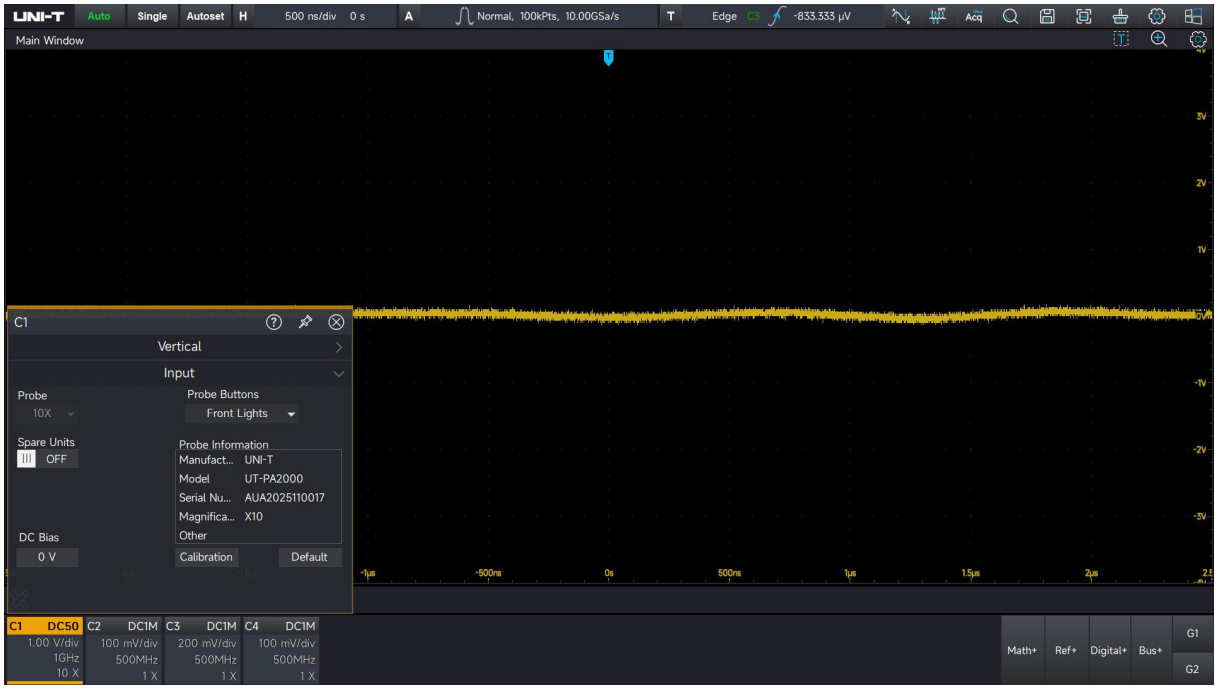
(2) When you need to disconnect the probe from the oscilloscope, first push the probe's locking knuckle in reverse to the slack position, unplug the connector from the oscilloscope, and release the latch



Note: Do not rotate the probe on oscilloscope's BNC connector; otherwise, the probe may be damaged.

(3) Probe recognition

Once the probe is inserted, the oscilloscope will automatically recognize the probe information, including the manufacturer, model, serial number, probe magnification, and more. You can click on the oscilloscope vertical channel and click input in the vertical channel control menu to view it.



(4) Automatically adjust probe multiple

The probe is fixed at 10X, and when the probe is connected to an oscilloscope, the oscilloscope's probe magnification will be fixed at 10X and cannot be changed.

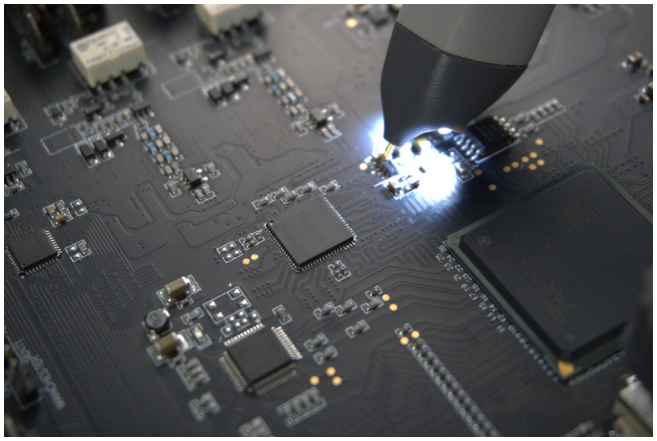
(5) Automatically set impedance

The probe has a fixed output impedance of 50Ω, and when the probe is connected to an oscilloscope, the oscilloscope's impedance setting is fixed at 50Ω and cannot be changed.

Using the front-end of the handheld single-ended probe

The UT-PA2000 probe has an effective bandwidth of up to 2GHz on the front end and the UT-PA1000 probe has an effective bandwidth of up to 1GHz on the front end, and the probe tip and ground pin can be replaced and can be used with a variety of flexible accessories to extend probe life.

Using the front end of the handheld single-ended probe, the users can conveniently measure single-ended signals. When performing signal measurement, the single-ended ground pin needs to be grounded.



Probe Tip and Ground Tip Connect to DUT

Note: Due to the fixed spacing of the probe tip, ensure the ground connection is made as close as possible to the probe tip.

Use probe accessories

The probe is available with a variety of test accessories for different scenarios, and when using these accessories, it is necessary to replace the standard probe pin or the ground pin.

1. Replace the probe tip

   Carefully replace the probe tip, handle the replacement process cautiously to avoid damaging the connection and compromising the probe's performance.

   Replacement Method

   - Disconnect the active probe from the oscilloscope.
   - Insert the new probe tip vertically into the active probe.

2. Replace single-ended ground sheet

   When replacing the single-ended ground sheet, ensure that it is securely connected to the copper pipe to maintain the probe's performance.

(a)Grounding knives

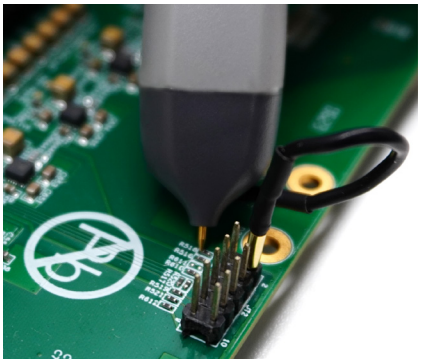
(b)Grounding elastic probes

(d)Right angle grounding wire(5cm)

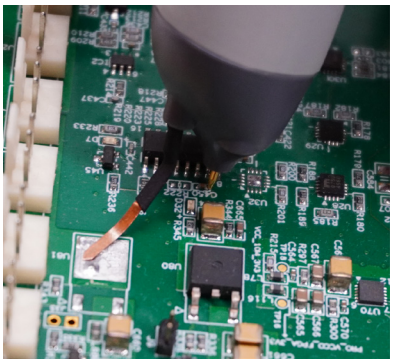
(e)Dual-wire receptacle adapter

The accessories for the test are as follows:

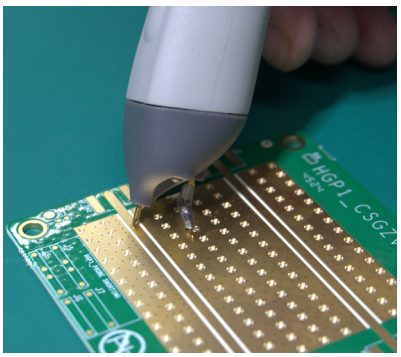
The test connection diagrams illustrate the configurations of specific probe accessories and the probe's front end.



Right-angle Ground Wire



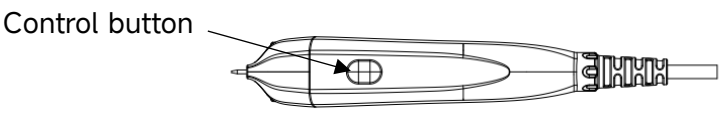
Ground Spring Tip



Grounding knife

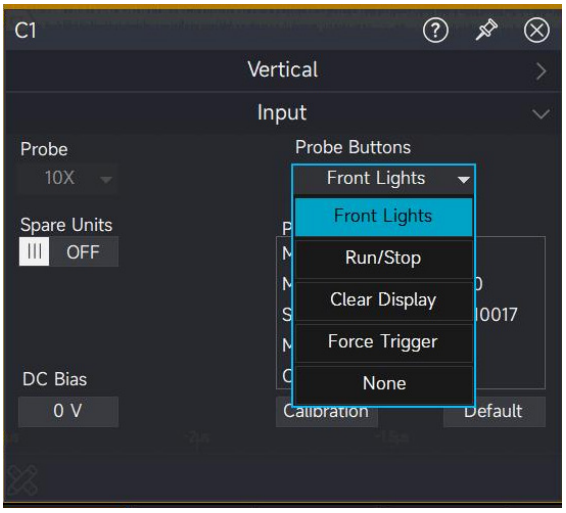
Using probe buttons

The front end of the probe is designed with buttons for the control of the oscilloscope and the probe headlamp, and the use of the probe button during the test can effectively improve the testing efficiency of the tester. The probe control buttons contain functions such as probe headlight control, oscilloscope run/stop, clear display, forced trigger, no operation, etc., and can be used when the UT-PA2000 and UT-PA1000 are used with MSO7000X, UPO7000L, MSO8000HD, and other series of oscilloscopes.

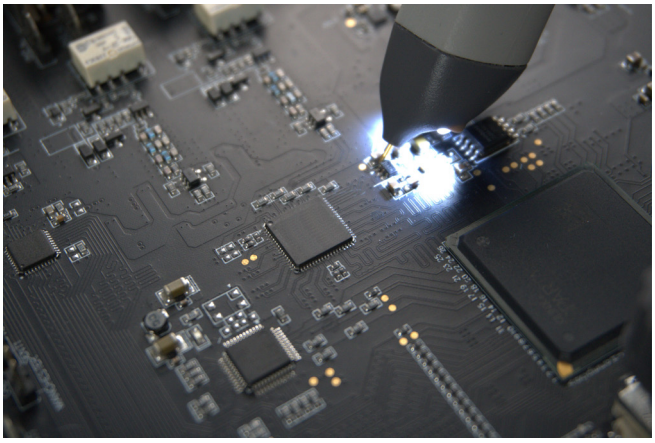


Probe Headlight Control

When the probe is connected to the oscilloscope, click the oscilloscope vertical channel setting, and select the headlight in the input settings - > probe button option, then the probe button can be set to turn on/off the headlight function, in the test scene of low light, the probe headlamp can provide you with a light source to ensure an effective connection between your probe and the test specimen



The following is the test chart of the probe headlight control, when the headlight is on, press the probe button to turn the headlight off. When the headlight is off, press the probe button to turn the headlight on



Run/Stop

When the probe is connected to the oscilloscope, click the oscilloscope vertical channel settings, and select Run/Stop in the Input Settings - > Probe button options, you can set the probe button to control the oscilloscope run/stop function, during the test, you can free one hand to stop and start the oscilloscope in time when the key signal is captured.

When the oscilloscope is running, press the probe button to stop it.

When the oscilloscope is stopped, press the probe button to run it.

Clear Display

When the probe is connected to the oscilloscope, click the oscilloscope vertical channel setting, and select Clear Display in the Input Settings - > Probe button option, you can set the probe button to control the oscilloscope clear display function, during the test, you can control the oscilloscope to clear the measured value, refresh the acquisition trace, etc.

Forced Trigger

When the probe is connected to the oscilloscope, click the oscilloscope vertical channel setting, and select the forced trigger in the input settings-> probe button option, you can set the probe button to control the oscilloscope forced trigger function

No operation

When the probe is connected to the oscilloscope, click the oscilloscope vertical channel settings, and select No operation in the Input Settings -> Probe button option, you can set the probe button to no operation, and the probe button will have no effect.

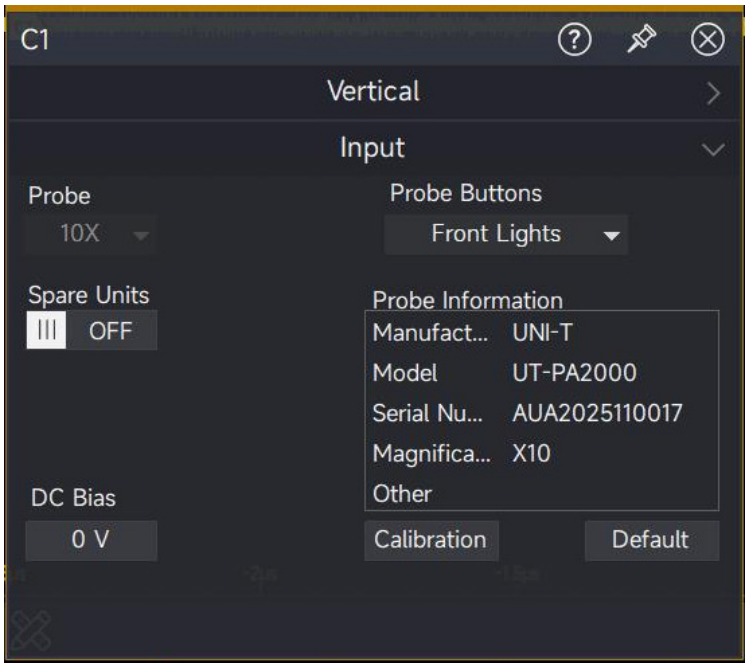
Calibrating the probe

Before using the probe, you need to calibrate the probe, and the probe calibration will effectively adjust the zero offset of the probe, which will ensure the integrity of the measured signal.

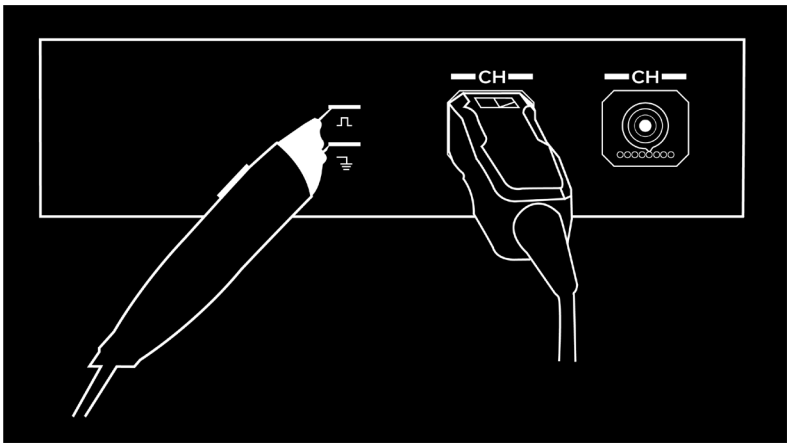
1. Connecting the oscilloscope

   Refer to the first section *Connecting the oscilloscope* . After completing the connection, the probe needs to be warmed up for 15 minutes to ensure that the probe enters a stable working state.

2. Access the oscilloscope's channel menu and click Input Settings > Auto Calibration to perform the probe calibration.



3. Before calibration, you need to make sure that the probe is not connected to any DUT, insert the probe into the oscilloscope channel, connect the probe to the square wave terminal, and then click Auto-Calibration.



4. Wait for the calibration to be completed. The calibration time depends on the degree of zero offset of the probe, approximately 40 seconds. If this is the first time calibrating the probe, the process may take longer.

   When calibration is complete, the oscilloscope will display either "Probe Calibration Completed" or "Probe Calibration Failed" based on the results. If the prompt displays "Probe Calibration Failed," please retry the calibration steps. If calibration fails multiple times, contact UNI-T distributor for assistance.

Appendix A Maintenance and Cleaning

(1) General Maintenance

Keep the probe and its accessories away from the direct sunlight.

Caution: Avoid contact with sprays, liquids, or solvents to prevent probe damage.

(2) Cleaning

Check the probe frequently according to the operating condition. Follow these steps to clean the external surface of the probe:

Use a soft cloth to remove dust from the probe.

Disconnect the power supply and clean the probe with mild detergent or water.

Do not use abrasive or chemical cleaners, as they may damage the probe.

Warning: Please confirm that the instrument is completely dry before use, to avoid electrical shorts or even personal injury caused by moisture.

Appendix B Technical Specifications

Technical Specifications	UT-PA2000	UT-PA1000
Bandwidth (-3dB)	2GHz	1GHz
Rise Time	≤175ps	≤350ps
DC Attenuation Ratio	10:1±5%	
Input Dynamic Range	±4V（DC or peak AC）	
Maximum Input Voltage	±12V（Non-working voltage）	
Input Offset Range	±4V	
DC Offset Error（Output is 0）	±2mV	
Input Capacitance	≤1.3pF	
Input Resistance	1MΩ ±1%	
Transmission Delay	≤7ns	
Flatness (25°C)	Typical 0.5dB(100kHz - 500MHz) Typical 1dB(500MHz - 1GHz)	
Probe Noise (Equivalent to input end)	<7mV ACrms	
Output Impedance	50Ω	
ESD (Electrostatic Discharge)	8kV HBM	
Power Loss	0.5W	
General Specifications		
Weight	<100g	
Wire Length	1.2m	
Probe Dimension	front ： 110mmx18.3mmx20mm back end ： 106.6mmx24mmx27mm	
Compatible Oscilloscopes	MSO7000X,MSO8000HD,UPO7000L,MSO3000HD, MSO3000X, MSO5000HD	
Environmental characteristics		
Operating temperature	0°C～40°C	
Non-operating temperature	-40°C～70°C	
Operating humidity	95% RH @40°C	
Non-operating humidity	95% RH @65°C	
Working altitude	4600m	
Non-operating altitude	15300m	

Appendix C Limited Warranty and Liability

UNI-T guarantees that the Instrument product is free from any defect in material and workmanship within three years from the purchase date. This warranty does not apply to damages caused by accident, negligence, misuse, modification, contamination, or improper handling. If you need a warranty service within the warranty period, please contact your seller directly. UNI-T will not be responsible for any special, indirect, incidental, or subsequent damage or loss caused by using this device. For the probes and accessories, the warranty period is one year. Visit instrument.uni-trend.com for full warranty information.

Learn more at: www.uni-trend.com

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https://instruments.uni-trend.com/ContactForm/

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说明书菲林做货要求：

序号	项目	内容
1	尺寸	外尺寸:（148x210）±1mm.
2	材质	封面封底 128G 双铜 内页 60g 书纸
3	颜色	黑色，双面印刷
4	外观要求	印刷完整清晰,版面整洁.无分层.残损.毛边等缺陷
5	装订方式	骑马订装
6	表面处理	无
7	其它	
版本		REV.0

DWH 设计		MODEL 机 型 ： UT-PA2000/1000 系列	Part NO. 110401113361X
CHK 审核		UNI-T®	优利德科技(中国)股份有限公司 UNI-TREND TECHNOLOGY (CHINA) CO.,LTD
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