



TAI33 500 MHz probe User's Manual

Information in this publication supersedes that in all previously published material.
Specifications are subject to change without notice.

Manufacturer

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Warranty

Pico Technology warrants this oscilloscope accessory for normal use and operation within specifications for a period of two years from date of shipment and will repair or replace any defective product which was not damaged by negligence, misuse, improper installation, accident or unauthorized repair or modification by the buyer. This warranty is applicable only to defects due to material or workmanship. Pico Technology disclaims any other implied warranties of merchantability or fitness for a particular purpose. Pico Technology will not be liable for any indirect, special, incidental, or consequential damages (including damages for loss of profits, loss of business, loss of use or data, interruption of business and the like), even if Pico Technology has been advised of the possibility of such damages arising from any defect or error in this manual or product.



(EC conformity marking)

The manufacturer declares the conformity of this product with the actual required safety standards in accordance with the Low Voltage Directive (LVD) 2006/95/EC:

CE/IEC 61010-031:2008

Safety requirements for electrical equipment
for measurement, control and laboratory use -

Part 031:
Safety requirements for hand-held probe
assemblies for electrical measurement and test

WEEE/ RoHS Directives



(EC conformity marking)

This electronic product is classified within the WEEE/ RoHS* category list as monitoring and control equipment (category 9). Category 9 products are exempted from the restrictions under the scope of the RoHS directive.

Your help and efforts are required to protect and keep clean our environment. Therefore return this electronic product at the end of its life either to the manufacturer or take care of separate WEEE collection and professional WEEE treatment yourself. Do not dispose as unsorted municipal waste!

- * EC Directives:
- | | | |
|---------------------------|---|---|
| WEEE Directive 2002/96/EC | - | Waste Electrical and Electronic Equipment |
| RoHS Directive 2002/95/EC | - | Restriction of the use of certain Hazardous Substances in Electrical and Electronic Equipment |

Definitions and Examples (Clause 6.5.2)

Measurement Category I Definition:	Measurement category I is for measurements performed on circuits not directly connected to a mains supply.
Examples:	Measurements in circuits not derived from a mains supply and specially protected (internal) circuits derived from a mains supply. In the latter case, transient stresses are variable; for that reason it is required that the transient withstand capability of the equipment is made known to the user.
Measurement Category II Definition: CAT II	Measurement category II is for measurements performed on circuits directly connected to the low voltage installation.
Examples:	Household appliances, portable tools and similar equipment.
Measurement Category III Definition: CAT III	Measurement category III is for measurements performed in the building installation.
Examples:	Measurements on distribution boards, circuit breakers, wiring including cables, bus-bars, junction boxes, switches, socket-outlets in the fixed installation and equipment for industrial use like for example stationary motors with permanent connection to the fixed installation.
Measurement Category IV Definition: CAT IV	Measurement category IV is for measurements performed at the source of the low-voltage installation.
Examples:	Electricity meters and measurements on primary over current protection devices and and ripple control units.

Definitions (Clause 3.5.6)

Pollution Degree 1	No POLLUTION or only dry, non conductive POLLUTION. NOTE:The POLLUTION has no influence.
Pollution Degree 2	Only- non conductive POLLUTION. Occasionally, however, a temporary conductivity caused by condensation must be accepted.
Pollution Degree 3	Conductive POLLUTION occurs or dry, non-conductive POLLUTION occurs which becomes conductive due to condensation which is to be expected.

IEC Safety Symbols

The following symbols may appear on the product or in this instruction manual:



Caution, risk of danger. Refer to manual.



Caution, risk of electric shock.



Earth (ground) TERMINAL.

To avoid personal injury and to prevent fire or damage to this product or products connected to it, review and comply with the following safety precautions. Be aware that if you use this probe assembly in a manner not specified the protection this product provides may be impaired.

Only qualified personnel should use this probe assembly.

Use only grounded instruments.

Do not connect the probe ground lead to a potential other than earth ground. Always make sure the probe and the measurement instrument are grounded properly.

Connect and disconnect properly.

Connect the probe output to the measurement instrument and connect the ground lead to earth ground before connecting the probe to the circuit under test. Disconnect the probe input and the probe ground lead from the circuit under test before disconnecting the probe from the measurement instrument.

Observe probe ratings.

Do not apply any electrical potential to the probe input which exceeds the maximum ratings of the probe. Make sure to comply with the voltage versus frequency derating curve on page 8.

Keep away from live circuits.

Avoid open circuitry. Do not touch connections or components when power is present.

Do not operate with suspected failures.

Refer to qualified service personnel.

Indoor use only.

Do not operate in wet/damp environment. Keep product surfaces dry and clean.

Do not operate the product in an explosive atmosphere.

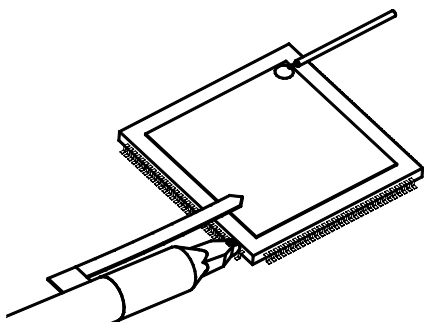
The TA133 passive probe sets new standards in high-performance probing.

The compact design with only 2.5 mm housing diameter at the probe tip is ideal for measurements of SMT components. It provides a much better visibility of the device under test than conventional 5 mm probe housing designs.

A true Pico Technology feature is the exchangeable probe tip. The gold-plated spring contact and the rigid tip are only 0.5 mm in diameter. Tip replacement is easy and gives the engineer a convenient choice.

The shortest possible ground connection is recommended, particularly for HF measurements on ICs. Due to long ground leads, most conventional adaptors bring additional inductance and resonances into the measurement which result in false or inaccurate readings. The innovative IC contacting system of the TA133 with 5 different IC adapters from 0.5 to 1.27 mm pitch, in combination with the ground blade and IC ground copper pad, is the ideal solution for short-circuit-safe, reproducible, and authentic measurements.

These great advantages and over 30 accessories for the new TA133 offers a variety of configurations to solve most adaptation needs.



IC contacting system with IC adapter, ground blade and IC ground copper pad.

Specifications not defined as "guaranteed" are typical and are published as general information for the user. The instrument should have warmed up for at least 20 minutes and the environmental conditions should not exceed the probe's specified limits.

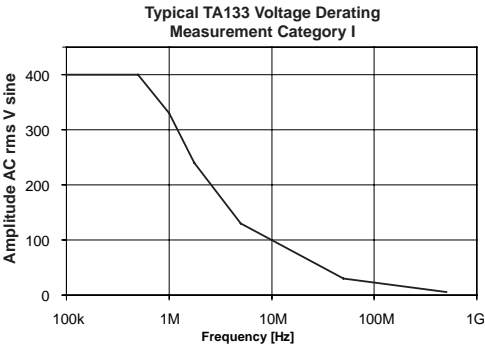
Electrical Specifications

Attenuation Ratio ⁽¹⁾	10:1	± 2 % at DC
Voltage Coefficient	0.0025 %/V	(typical)
Probe Bandwidth	500 MHz	(-3 dB)
Probe Risetime	700 ps	(10 % - 90 %) (typical)
Maximum Rated Input Voltage ⁽²⁾	400 V rms	
Measurement category I:	1000 V transient overvoltage	
Measurement category II:	300 V rms CAT II	
Pollution Degree ⁽²⁾	2	

Voltage Derating



Note that the max. input voltage rating of the probe decreases as the frequency of the applied signal increases.



(1) Connect to oscilloscope with an input impedance of 1 MΩ ± 1 %.
(2) As defined in IEC 61010-031. See definitions explained on page 4 and 5.

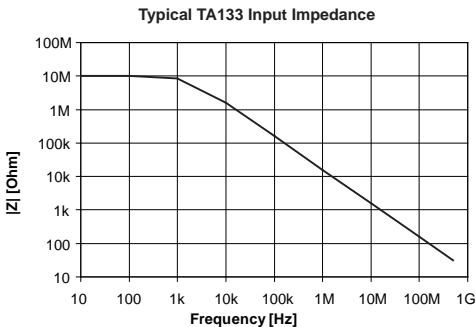
Electrical Characteristics

Input Resistance (System)	10 MΩ	± 1 %
Input Capacitance (System)	9.5 pF	(typical)
Compensation Range	10 pF - 25 pF	(typical)
Input Coupling of the Measuring Instrument	1 MΩ AC / DC	

Input Impedance



Note that the input impedance of the probe decreases as the frequency of the applied signal increases.



Mechanical Characteristics

Weight (probe only)	48 g
Cable Length	1.2 m
Probe Tip Diameter	2.5 mm

Environmental specifications

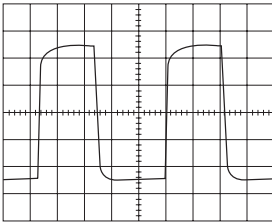
Altitude	operating	up to 2000 m
	non-operating	up to 15000 m
Temperature Range	operating	0° C to +50° C
	non-operating	-40° C to +71° C
Maximum Relative Humidity	operating	80 % relative humidity for temperatures up to +31° C, decreasing linearly to 40 % at +50° C

The probe can be adjusted for low frequency (LF) compensation and for high frequency (HF) compensation.

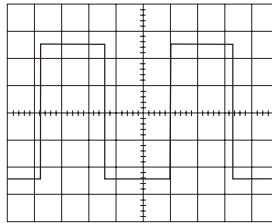
LF Compensation

LF needs to be adjusted when the probe is connected to the oscilloscope input the first time. LF compensation matches the probes cable capacitance to the oscilloscope input capacitance. This matching assures good amplitude accuracy from DC to upper bandwidth limit frequencies. A poorly compensated probe clearly influences the overall system performance (probe + scope) and introduces measurement errors resulting in inaccurate readings and distorted waveforms.

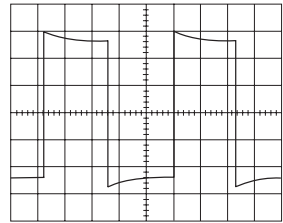
LF compensation is performed by connecting the probe to the CAL – output on the oscilloscope front panel and adjusting the LF compensation trimmer to optimum square wave response. For clarification see below figures.



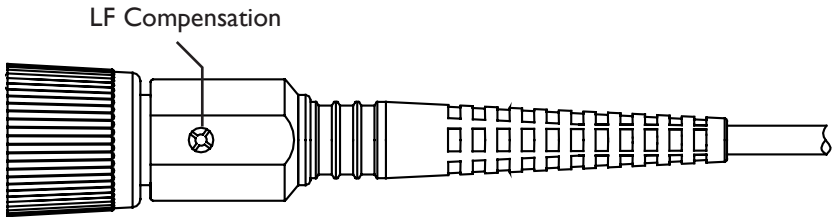
undercompensated



optimum



overcompensated



HF Compensation

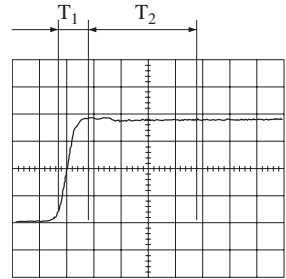
It is typically not necessary to adjust HF compensation unless the probe is being used with an oscilloscope having large differences in input characteristics from the oscilloscope that was used for factory adjustment. If you intend to use this probe with an instrument other than the PicoScope 6400, you should check the probe's high frequency response and adjust it if necessary. We recommend using the following equipment for proper HF compensation:

Rectangular wave generator with a rise time faster than 700 ps, 50 ohm feed-through and probe BNC adapter.

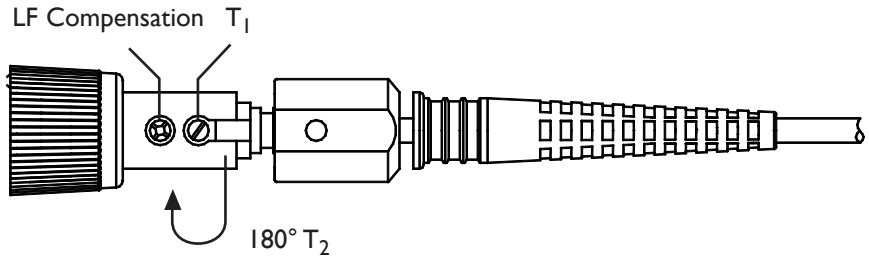
HF adjustment is performed by connecting the probe to the rectangular wave generator. Adjust trimmers (T_1 and T_2) for optimum square wave response.

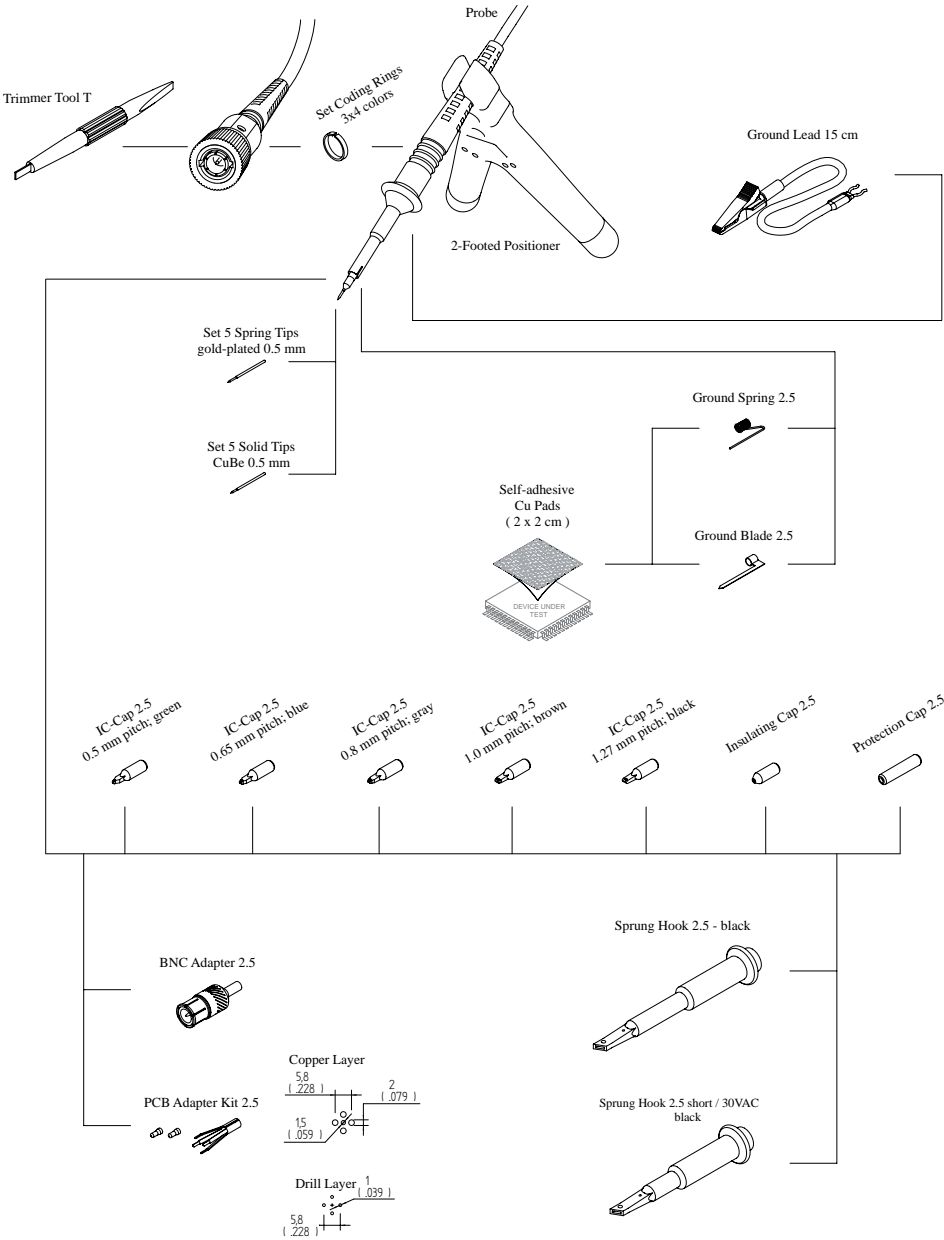
T_1 is used for rise time adjustment.

T_2 influences probe response time.



optimum





You can buy a range of kits containing accessories and spare parts for the TA133 probe. Contents of the available kits are listed below.

Item	TA064 spring contact tips	TA065 advanced accessory kit	TA066 basic accessory kit	TA067 standard accessory kit	TA068 solid probe tips
Coding rings (set) 3x4 colors		1			
Ground blade 2.5		1			
Ground lead 15 cm		1	1	1	
Ground spring 2.5		1			
IC-Cap 2.5 0.5 mm pitch; green		1			
IC-Cap 2.5 0.65 mm pitch; blue		1			
IC Cap 2.5 0.8 mm pitch; grey		1			
IC Cap 2.5 1.0 mm pitch; brown		1			
IC Cap 2.5 1.27 mm pitch; black		1			
Insulating cap 2.5		1		1	
PCB adapter kit 2.5		1			
Self-adhesive Cu pad 2 x 2 cm		2			
Solid tip CuBe 0.5 mm		1	1	1	5
Spring tip gold plated 0.5 mm	5	1	1	1	
Sprung hook 2.5 short / 30 VAC		1	1	1	
Sprung hook 2.5		1	1	1	
Trimmer Tool T		1		1	

The following items are included in the scope of delivery. Please check the delivery for completeness. If any item is missing, send a message to our service department and we will send you this item immediately.

Item	Qty
Adjustment Tool T	1
Coding Rings (set) 3x4 Colors	1
Ground Blade 2.5	1
Ground Lead 11 cm	1
Ground Spring 2.5	1
IC-Cap 2.5 0.5 mm pitch; green	1
IC-Cap 2.5 0.65 mm pitch; blue	1
IC-Cap 2.5 0.8 mm pitch; grey	1
IC-Cap 2.5 1.0 mm pitch; brown	1
IC-Cap 2.5 1.27 mm pitch; black	1
Instruction Manual	1
Insulating Cap 2.5	1
PCB Adapter Kit 2.5	1
Probe	1
Protection Cap 2.5	1 (1)
self adhesive Cu Pad (2 x 2 cm)	2
Solid Tip CuBe 0.5 mm	1
Spring Tip gold plated 0.5 mm	1 (2)
Sprung Hook 2.5	1

(1) plugged on probe

(2) installed in probe



Use ground lead only for connections to earth ground.



The BNC Adapter is rated: 42 V pk AC + DC



The accessories provided with the probe have been safety tested. Do not use any other accessories than those originally provided.



Handle with care especially when fitted with the extra thin and sharp spring contact tip to avoid any injury. Note that the probe cable is a sensitive part of the probe. Do not damage through excessive bending or pulling. Avoid mechanical shock to this product in general to guarantee accurate performance and protection.

Maintenance

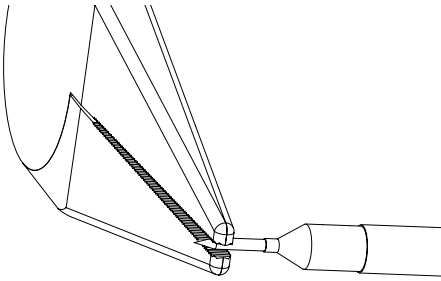
Cleaning

To clean the exterior of the probe use a soft cloth moistened with either distilled water or isopropyl alcohol. Before use allow the probe to dry completely.

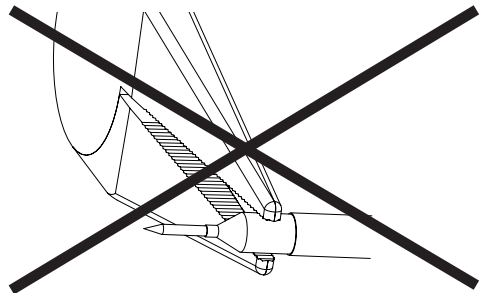
Changing the Probe Tip

To change the probe tip use pliers to grip and pull it carefully straight out of its contact socket, along the axis of the probe. Do not grip the white plastic insulator or the housing with pliers, because the tip could be squeezed and made impossible to remove. The probe could be damaged.

If the probe tip is removed, the new tip can be inserted with pliers into the contact socket, along the axis of the probe. In order to insert the probe tip completely into the housing, press the probe tip carefully against a hard surface.



Use pliers to grip and pull the probe tip carefully out of its contact socket.



Do not grip the white plastic insulator or the probe housing with pliers.

