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TA042

100 MHz x100/x1000 Differential Probe

User's Manual

This probe complies with IEC-1010.1, IEC-1010.2–031 CAT III, Pollution Degree 2.

1. Safety terms and symbols

Terms appearing in this manual:

WARNING	Warning statements identify conditions or practices that could result in injury or death.
CAUTION	Caution statements identify conditions or practices that could result in damage to this product or other property.

Symbols appearing on the product:

Danger
High Voltage

Protective
(Earth) Terminal

Attention
Refer to Manual

2. General safety summary

Please review the following safety precautions to avoid injury and prevent damage to this probe or any products that are connected to it.

Observe maximum working voltage

To avoid any injury, do not use the probe above 1000 V rms CAT III between each input lead and earth or between the two input leads. This voltage rating applies to both the 1/100 and the 1/1000 settings.

Must be grounded

This probe is grounded with the shell of the BNC connector and an auxiliary grounding terminal.

WARNING	Before making connections to the input leads of this probe, ensure that its output lead is grounded. You may do this either by connecting the BNC shell to a grounded measurement instrument, or by connecting the auxiliary grounding terminal to a reliable ground point. Read the next paragraph for further advice.

You must verify that the probe is securely grounded before connecting the probe input leads. Some types of measuring instrument, such as a USB oscilloscope connected to a laptop, are unlikely to be grounded even if the laptop is powered from the mains. Bench-top oscilloscopes are usually grounded, but in some cases may have been isolated from ground. A USB oscilloscope connected to a desktop computer is usually grounded. In any case, do not assume that the measurement instrument is grounded. **Always verify the ground connection for yourself before connecting the probe input leads.**

Use fused test prods if necessary

If this probe is intended to use for measurements in circuits of INSTALLATION CATEGORY III, it should incorporate with fused test prods.

Do not operate without covers

To avoid electric shock or fire hazard, do not operate this probe with the covers removed.

Do not operate in wet or damp conditions

To avoid electric shock, do not operate this probe in wet or damp conditions.

Do not operate in explosive atmosphere

To avoid injury or fire hazard, do not operate this probe in an explosive atmosphere.

Avoid exposed circuitry

To avoid injury, remove jewelry such as rings, watches and other metallic objects. Do not touch exposed connections and components when power is present.

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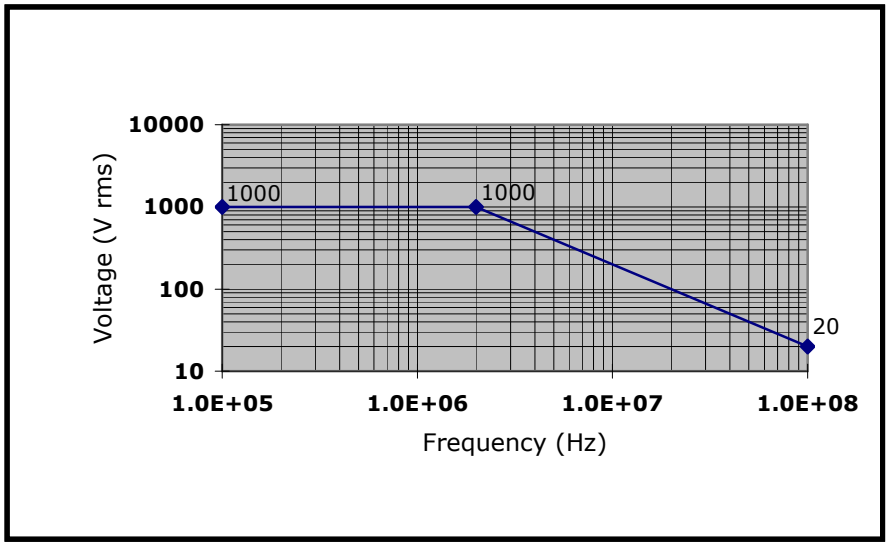
8. Derating curve

The derating curve for absolute maximum input voltage is as follows:



9. Overrange indicator

The overrange indicator lights up red if the voltage of the input signal exceeds the linear operating range of the probe. When this happens, the signal on the probe output may not accurately represent the signal on the probe input.

10. Test procedure

a. Connect the BNC output connector to the vertical input of a general-purpose oscilloscope.
b. Install four AA cells or connect an appropriate mains adaptor to this probe.
c. Set the oscilloscope input coupling to DC and 1 V/div. Center the trace on the display.
d. Connect the sprung hooks of the probe to power lines.
e. Set the range of the probe to 1/1000.
f. A 50 Hz / 60 Hz sine-wave of proper amplitude will be displayed on the screen of the oscilloscope. This means the probe is working properly.

11. Cleaning

Use a soft cloth to clean the probe, taking care not to cause damage.

a. Do not immerse the probe.
b. Do not use abrasive cleaners.
c. Do not use chemicals contains benzene or similar solvents.

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7. Specifications

Bandwidth	DC to 100 MHz (-3 dB)
Attenuation ratio	1:100/1000
Accuracy	±2%
Rise Time	3.5 ns
Input Impedance	4 MΩ // 7 pF each side to ground
Input Voltage	
Max. Differential* (1/100) Max. Differential* (1/1000)	±140 V (DC + Peak AC) or 140 V rms ±1400 V (DC + Peak AC) or 1000 V rms
Common Mode Range*	±1400V (DC + Peak AC) or 1000 V rms (1/100 and 1/1000)
Absolute Max. Voltage* (Differential or Common Mode)	±1400 V (DC + Peak AC) or 1000 V rms CAT III (1/100 & 1/1000)
Output Voltage	
Swing (into 50 kΩ load)	±7V
Offset (typical)	<±5 mV
Noise (typical)	0.9 mV rms
Source Impedance (typical)	50 Ω
CMRR (typical)	-80 dB @ 60 Hz; -50 dB @ 1 MHz
Ambient Operating Temperature	-10 to 40 ℃
Ambient Storage Temperature	-30 to 70 ℃
Ambient Operating Humidity	25 to 85% RH
Ambient Storage Humidity	25 to 85% RH
Power Requirements	
Standard	4xAA cells or 6 V DC / 200 mA mains adaptor** or regulated 9 V DC / 120 mA mains adaptor**
Option	Power leads
Length of Input Leads	30 cm
Length of BNC Lead	90 cm
Weight	500 g
Dimension (LxWxH)	207 mm x 83 mm x 38 mm

* Voltage limit is the lesser of the DC+Peak AC and RMS values.
**

a. The supplied voltage must be less than 12 V and greater than 4.4 V, otherwise the probe could be damaged or might not operate properly.
b. Polarity is "+" inside and "–" outside. If the polarity is wrong, a built-in circuit protects the probe so that no danger or damage will occur.
c. When the voltage of the cells becomes too low, the power indicator on the panel will flicker.

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Use proper power source

To ensure proper functioning of this probe, use four AA cells or a 6 VDC / 200 mA mains adaptor or regulated 9 VDC / 120 mA mains adaptor or power leads.

Do not operate the probe if it is damaged

If you suspect there is damage to this probe, have it inspected by qualified service personnel.

3. Description

By enabling conventional oscilloscopes to display and measure in-circuit waveforms that are referenced to high common-mode voltages, this differential probe extends the measurement capability of oscilloscopes in electronic power converters, inverters, motor speed controls, switch-mode power supplies and many applications.

4. Installation

a. Simply plug in the BNC output connector to the vertical input of a general-purpose oscilloscope or other measurement instrument, and connect the auxiliary grounding terminal to a proper ground. The measurement instrument must have a ground reference.
b. Install four AA cells or connect an appropriate power source to this probe.
c. Select the proper attenuation ratio. When measuring signals below 140 V, switch the attenuation ratio to 1/100 in order to get higher resolution and less noise. Otherwise, set the attenuation to 1/1000.

WARNING To protect against electric shock, use only the accessories designed for use with this differential probe.

d. Using the appropriate probe accessories, connect the input to the circuits under measurement.

CAUTION This probe is designed for carrying out differential measurements between two points on the circuit under test. It is not intended for electrically insulating the circuit under test and the measuring instrument.

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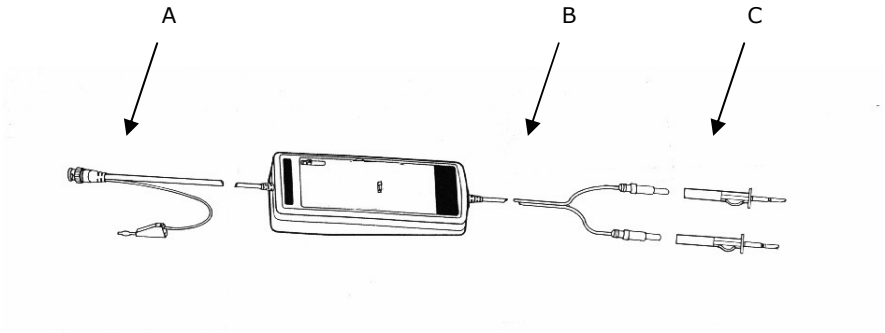
5. Appearance

The differential probe looks like this:



A. Output Lead	The BNC output connector and an auxiliary grounding terminal are connected to the oscilloscope.
B. Input Leads	The input leads of the differential probe connect to sprung hooks that come with the probe.
C. Sprung Hooks	The sprung hooks are connected safely to test points in the circuits under test.

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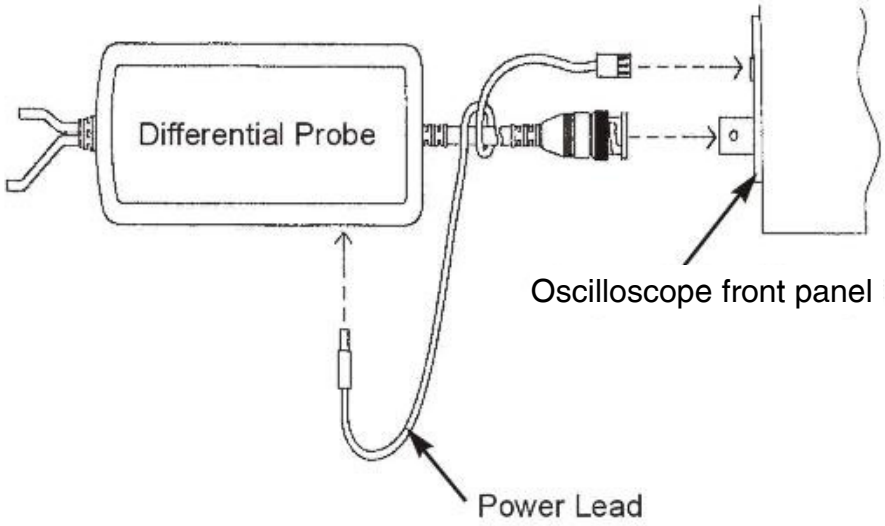
6. Power leads

Two types of power leads are available for use with this instrument:

a. Lemo® Lead: For oscilloscopes with Lemo® power connectors.
b. Probus® Lead: For oscilloscopes with Probus® power connectors.



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