SI-9002
Differential Probe

User's manual

Rev. 1.00

TiePie engineering

Safety

This probe is in compliance with IEC-61010-031 CAT III, Pollution Degree 2.

Safety Terms and Symbols

Terms appearing in this manual

Warning Warning statements identify conditions or practice that could result in injury or loss life.

Caution Caution statements identify conditions or practice 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

General Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this probe or any product that is connected to it.

- **Observe Maximum Working Voltage**
  To avoid any injury, do not use the probe under the condition that the voltage between either input lead or earth is above 1000Vrms CAT III. This voltage rating applies to both of 1/20 & 1/200 settings.

- **Must be Grounded**
  This probe is grounded with the shell of BNC connector and an auxiliary grounding terminal, through the grounding conductor of the power cord of the measurement instrument. Before making connections to the input leads of this probe, ensure that the output BNC connector is attached to the BNC connector of the measurement instrument and the auxiliary grounding terminal is connected to a proper ground, while the measurement instrument is properly grounded.
- **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 covers removed.
- **Do Not Operate in Wet/Damp Conditions**
  To avoid electric shock, do not operate this probe in wet of 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 Circuit**
  To avoid injury, remove jewelry such as rings, watches, and other metallic objects. Do not touch exposed connections and components when power is present.
- **Use Proper Power Source**
  To ensure this probe functions well, use four AA cells or 6VDC/60mA or a regulated 9VDC/40mA mains adaptor or power lead. Do not operate this probe from a power source that applies more than the voltage specified.
- **Do Not Operate With Suspected Failures**
  If you suspect there is damage to this probe, have it inspected by qualified service personnel.

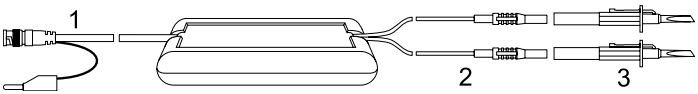
Using the SI-9002

Description

The SI-9002 enables conventional oscilloscopes with ground referenced inputs to display and measure in-circuit waveforms that are referenced to high common mode voltages. The differential probe extends the measurement capability of oscilloscopes in electronic power converters, inverters, motor speed controls, switch mode power supplies, and many applications.

Appearance

The differential probe looks as follows.



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

Installation

- 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 referenced.

- Connect an appropriate power source to this probe and then turn it on.
- Select the proper attenuation ratio. When measuring signals below 140V, switch the attenuation ratio to 1/20 in order to get higher resolution and less noise ratio. Otherwise, set the attenuation ratio to 1/200 when measuring signals up to 1400V.

Warning To protect against electric shock, use only the accessories supplied with this probe.

- Using the appropriate probe accessories, connect the inputs to the circuit under measurement.

Caution This probe is to carry out differential measurement between two points on the circuit under measurement. This probe is not for electrically insulating the circuit under measurement and the measuring instrument.

Inspection Procedure

- Connect the BNC output connector to the vertical input of a general purpose oscilloscope.
- Install four AA cells or connect an appropriate mains adaptor or power lead to the correct line voltage.
- Set the oscilloscope input coupling to DC and the input range to 1V/div. Center the trace on the display.
- Connect the inputs of the probe to power lines.
- Set the range of the probe to 1/200.
- Then, a 50Hz/60Hz sine-wave of proper amplitude will be displayed on the screen of the oscilloscope and this means the probe is working properly.

Cleaning

Use a soft cloth to clean the dirt. Prevent damage to probe.

- Avoid immersing the probe.
- Avoid using abrasive cleaners.
- Avoid using chemicals contains benzene or similar solvents.

Specifications

Bandwidth	DC to 25MHz (-3dB)
Attenuation Ratio	1:20 / 1:200
Accuracy	±2%
Rise Time	14 ns
Input Impedance	4MΩ//5.5pF each side to ground
Input Voltage	
- Differential Range	1:20 : ±140V(DC+Peak AC) or 140Vrms 1:200 : ±1400V(DC+Peak AC) or 1000Vrms
- Common Mode Range	±1400V(DC+Peak AC) or 1000Vrms
- Absolute Max. Voltage (Differential or Common Mode)	±1400V(DC+Peak AC) or 1000Vrms CAT III
Output Voltage	
- Swing	±7V (into 50kΩ load)
- Offset (typical)	<±5mV
- Noise (typical)	0.7mVrms
- Source Impedance (typical)	50Ω (for using 1MΩ input system oscilloscope)
CMRR (typical)	-80dB @50Hz, -60dB @20kHz
Ambient Operating Temperature	−10°C to +40°C
Ambient Storage Temperature	−30°C to +70°C
Ambient Operating Humidity	25 to 85% RH
Ambient Storage Humidity	25 to 85% RH
Power Requirements [1]	
- Standard	4xAA cells
- Optional	Mains adaptor (6 - 9 VDC / 60mA)
Length of BNC Cable	95cm
Length of Input Leads	45 cm
Weight	400gms (probe and PVC jacket)
Dimensions (LxWxH)	170mm x 63mm x 21mm

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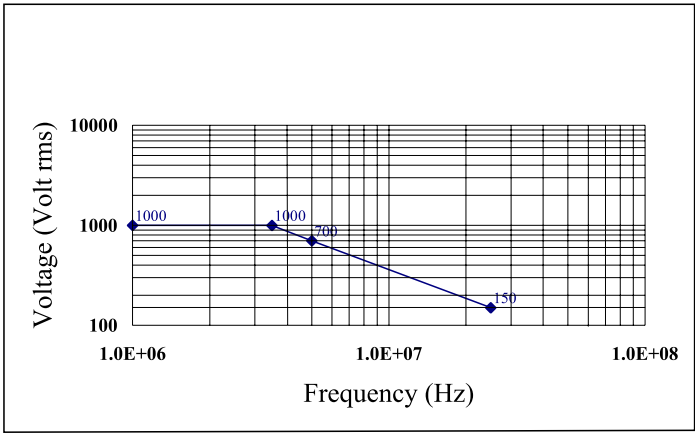
- The supplied voltage must be <12V and >4.4V, otherwise the probe could be damaged or can't be operated properly.
- polarity is + inside and - outside. For wrong polarity, built-in circuit protects the probe, no danger or damage will occur.
- When the voltage of the cells become too low, the power indicator on the panel will flicker.

Derating Curve

The derating curve of the maximum absolute input voltage in common mode is shown in the following graph:



If you have any suggestions and/or remarks regarding this application or the manual, please contact:

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