ACTIVE DIFFERENTIAL PROBES
INSTRUCTION MANUAL
TT-SI 8000 SERIES



TESTEC

Safety Summary

To avoid personal injury and/or product damage, review and comply with the following safety precautions. These precautions apply to both operating and maintenance personnel and must be followed during all phases of operation, service, and repair of this probe.



A **WARNING** statement calls attention to an operating procedure, practice, or condition, which, if not followed correctly, could result in injury or death to personnel.



A **CAUTION** statement calls attention to an operating procedure, practice, or condition, which, if not followed correctly, could result in damage to or destruction of parts or the entire product.

Do Not Work Alone

Do not work alone when working with high voltages.

Inspect the Probe

Inspect the probe and accessories for cracks and frayed or broken leads before each use. If defects or damages are noted, DO NOT USE the probe.

Dry Conditions

Hands, shoes, floor, and work bench must be dry. Avoid making measurements under humidity, dampness, or other environmental conditions that might affect safety.

Do Not Remove the Probe's Casing

Removal of the probe's casing may expose you to electric shock. If necessary, disconnect the inputs and outputs of the probe before opening the case.

Hazardous Contact

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

Unexpected Charges

Hazardous voltages may be present in unexpected locations in circuitry being tested when a fault condition in the circuit exists.

Capacitors inside the instrument may retain a charge even if the instrument is disconnected from its source of supply.

Use Only in Office-Type Indoor Setting

The probe is designed to be used in office-type indoor environments.

Do not operate the probe:

- In the presence of noxious, corrosive, flammable fumes, gases, vapors, chemicals, or finely-divided particulates.
- In environments where there is a danger of any liquid spilled on the probe.
- In air temperatures exceeding the specified operating temperatures.
- In atmospheric pressures outside the specified altitude limits or where the surrounding gas is not air.

Not for Critical Applications
This probe is not authorized for use in contact with the human body or for use as a component in a life-support device or system.

Do Not Substitute Parts
Do not install substitute parts or perform any unauthorized modification to the instrument.

Only Qualified Personnel
Only qualified personnel should use this probe. This differential voltage probe is designed to be used by personnel who are trained, experienced, or otherwise qualified to recognize hazardous situations and who are trained in the safety precautions necessary to avoid possible injury when using such a device.

Observe Maximum Working Voltage
Do not use any probe above its maximum working voltage ranges. See specifications on page 7.

Use Proper Power Source
Do not operate this probe from a power source that applies more than the voltage specified.

Must be Grounded
This probe is grounded by the shell of the BNC connector 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 that the measurement instrument is properly grounded. Whenever it is likely that the ground protection is impaired, you must make the instrument inoperative and secure it against any unintended operation.

Terms and Symbols

The following symbols appear on the product or in its documentation:

Direct voltage


Both direct and alternating voltage


Caution, possibility of electric shock


Caution, see documentation for details


Earth Ground

Definitions

Measurement Category II (CAT II)
refers to local-level electrical distribution, such as that provided by a standard wall outlet or plug-connected equipment. Examples of CAT II measurements would be household appliances, portable tools, and similar modules.

Measurement Category III (CAT III)
refers to measurements on hard-wired equipment in fixed installations, distribution boards, and circuit breakers that form part of a building wiring installation. Other examples are wiring, including cables, bus bars, junction boxes, switches, socket outlets in the fixed installation, and stationary motors with permanent connections to fixed installations

Pollution Degree 2
refers to an operation environment where normally only dry, non-conductive pollution occurs. Temporary conductivity caused by condensation can be expected.

Working CAT rating is equal to that of the lowest rated element within the test set-up.

Compliance Statements

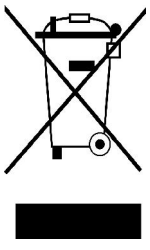
EC Declaration of Conformity

CE The product conforms to the applicable European Union requirements per IEC 61010-031:2015 Safety requirements
for electrical equipment for measurement, control and laboratory use.
Part 31: Safety requirements for hand-held probe assemblies for electrical measurement and test.

EU RoHS Compliance

The probe and accessories conform to the 2011/65/EU RoHS2 Directive.

Disposal of Old Electrical & Electronic Equipment



(Applicable in the European Union and other European countries with separate collection systems). This product is subject to Directive 2012/19/EU of the European Parliament and the Council of the European Union on waste electrical and electronic equipment (WEEE), and in jurisdictions adopting that Directive, is marked as being put on the market after August 13, 2005, and should not be disposed of as unsorted municipal waste. Please utilize your local WEEE collection facilities in the disposition of this product and
otherwise observe all applicable requirements.

This probe is in compliance with IEC 61010-031:2015 CAT III, Pollution Degree 2.

1 Introduction

Overview

The TT-SI 8000 differential probe series allows safe, accurate measurement between two voltage points where neither point is referenced to ground. The probes are designed for high sensitivity measurements up to 200 MHz bandwidth and up to 7000V differential voltage. The probes are compatible with oscilloscopes from all major manufacturers.

Features

- Meets IEC 61010-1:2015 safety standard
- Selectable attenuation settings
- Offset setting function
- 5 MHz bandwidth limit function to remove noise and interferences.
- Overrange sound & light alarm
- High accuracy (±2%)
- Powered through USB or USB to mains adapter
- Over range indicator LED

Initial Inspection

This unit is tested prior to shipment. It is therefore ready for immediate use upon receipt. An initial physical inspection should be made to ensure that no damage has been sustained during shipment. After the inspection, verify the contents of the shipment.

Delivery Content

- 1 x differential probe - TT-SI 8000 series
- 2 x pincer clips, black & red – TT-SI GR82
- 2 x hook clips, black & red – TT-SI GR81
- 2 x alligator clips, black & red – TT-SI CR81 (not TT-SI 8010A & B)
- 2 x alligator clips, black & red – TT-SI CR82 (TT-SI 8010A & B only)
- 2 x 4mm test leads, black & red – TT-SI TL8
- 1 x insulated BNC cable, 100 cm – TT-SI BN8
- 1 x USB power cable, 150cm – TT-SI USB8
- 1 x USB power adapter 5V/1A – EU version – TT-SI NT8
- 1 x User manual

Model Overview

Model	Max. Input Differential Voltage	Bandwidth	Attenuation
TT-SI 8071	700V	70MHz	x10/x100
TT-SI 8050	1500V	70MHz	x50/x500
TT-SI 8051	1500V	100MHz	x50/x500
TT-SI 8052	1500V	200MHz	x50/x500
TT-SI 8110	2800V	100MHz	x100/x1000
TT-SI 8010A	7000V	70MHz	x100/x1000
TT-SI 8010B	7000V	100MHz	x100/x1000

2 Using the Probe

WARNING

At the time of powering on the probe, the input leads must not be connected to an item to be tested. Never operate the probe with the case open.

CAUTION

This probe is used to carry out differential measurements between two points on the circuit under test. This probe is not designed for electrically insulating the circuit under test or the measuring instrument.

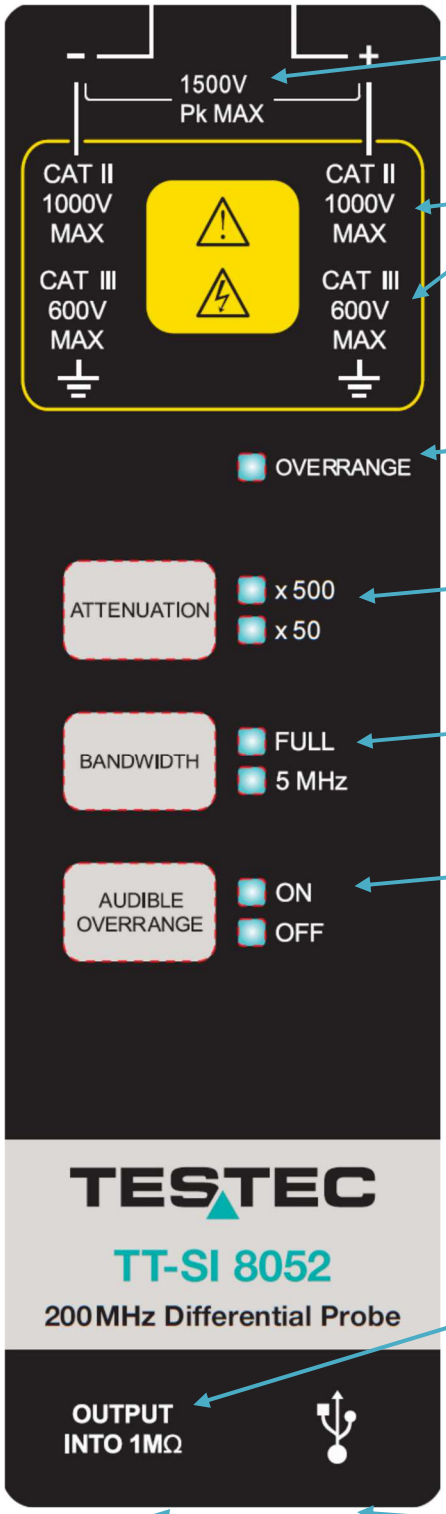
Getting Started

1. Connect the BNC output connector to the vertical input of a general purposed oscilloscope. The oscilloscope must have a ground referenced.
2. Connect power through USB or USB-adapter.
3. LED's will turn on.
4. The default factory setting is high attenuation ratio, FULL bandwidth and audible alarm is on. The probe has an automatic memory function, so it saves the state before power off.

Test Procedure

1. Connect the BNC output connector to the vertical input of the oscilloscope.
2. Set the attenuation setting on the oscilloscope to match the probe setting.
3. Connect the input of probe to a function generator. Then select a square-wave output of 10 V amplitude and 100 kHz frequency.
4. The square-wave will be displayed on the screen of the oscilloscope. The oscilloscope should show the same voltage and frequency as the function generator. This indicates the probe is working properly.

3 Product Overview



Probe Inputs

Maximum Differential Voltage

Common Mode Voltage and
Maximum Input Voltage to Earth

Overrange Indicator

Attenuation Selection Button and Indicators

Bandwidth Limit Button and Indicators

Audible Overrange On/Off Button and Indicators

Load Requirement

USB Power Lead Input

BNC Output

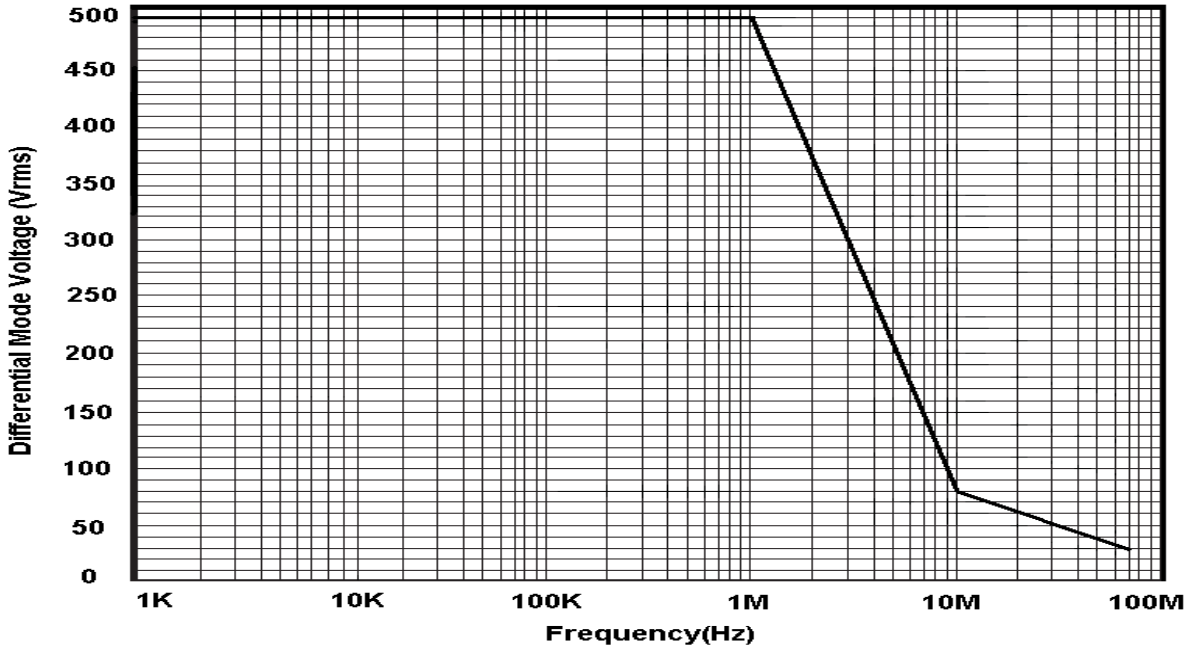
4 Specifications

		TT-SI 8071				TT-SI 8110			
Bandwidth (-3dB)		70MHz		**TT-SI 8050**	70MHz	100MHz		**TT-SI 8010A**	70MHz
				TT-SI 8051	100MHz			**TT-SI 8010B**	100MHz
				TT-SI 8052	200MHz				
Rise Time		≤5ns		**TT-SI 8050**	≤5ns	≤3.5ns		**TT-SI 8010A**	≤5ns
				TT-SI-8051	≤3,5ns			**TT-SI 8010B**	≤3,5ns
				TT-SI 8052	≤1,75ns				
DC-Accuracy		±2%		±2%		±2%		±2%	
Attenuation Ratio		x10/x100		x50/x500		x100/x1000		x100/x1000	
Maximum Input Voltage Differential Mode (DC+Peak AC)		x10	±70V	x50	±150V	x100	±280V	x100	±700V
		x100	±700V	x500	±1500V	x1000	±2800V	x1000	±7000V
Maximum Input Voltage Common Mode (DC+Peak AC)		±700V		±1500V		±2800V		±7000V	
Maximum Input Voltage each Side to Ground (Vrms)		450V CAT II 600V		600V CAT III 1000V CAT II		600V CAT III 1000V CAT II		1000V CAT III 2300V	
Input Impedance	Single-Ended to Ground	2.5MΩ		5MΩ		5MΩ		20MΩ	
	Between Inputs	5MΩ		10MΩ		10MΩ		40MΩ	
Input Capacitance	Single-Ended to Ground	＜4pF		＜4pF		＜4pF		＜5pF	
	Between Inputs	＜2pF		＜2pF		＜2pF		＜2.5pF	
CMRR	DC	＞80dB		＞80dB		＞80dB		＞80dB	
	100kHz	＞60dB		＞60dB		＞60dB		＞60dB	
	1MHz	＞50dB		＞50dB		＞50dB		＞50dB	
Input referred Noise		70V	＜20mV	150V	＜50mV	280V	＜100mV	700V	＜200mV
		700V	＜120mV	1500V	＜300mV	2800V	＜600mV	7000V	＜1.2V
Differential Overvoltage Detection Level		x10	≥70V	x50	≥150V	x100	≥280V	x100	≥700V
		x100	≥700V	x500	≥1500V	x1000	≥2800V	x1000	≥7000V
Propagation Delay	Probe	approx. 9ns							
	BNC Cable	approx. 5ns							
Bandwidth Limit Filters		≥-3dB@5MHz							
Weight		230g							
Input Lead Length		28cm (17cm for TT—SI 8052)							
Automatic Save		Yes							
Offset Setting Function		Yes（when set in test mode)							
Termination Load		≥100kΩ							
Power Supply		USB 5V/1A and 220V Adapter							
Safety standard		EN61010-031: 2015							

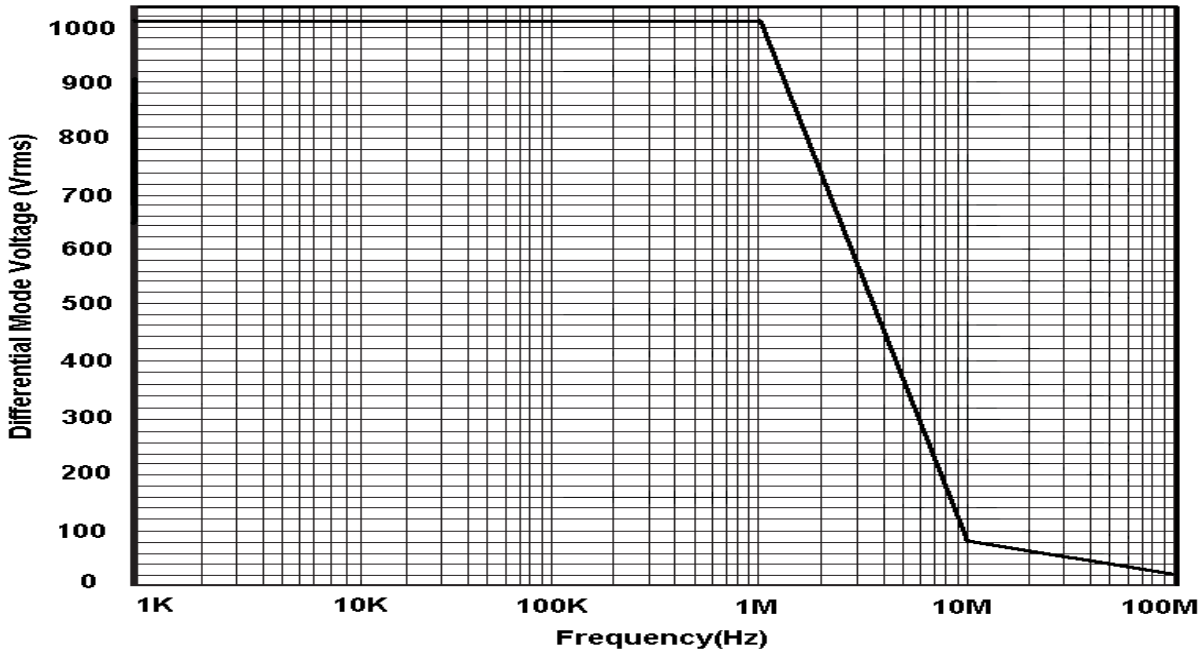
Specifications are subject to change without notice. All specifications apply to the unit after a temperature stabilization time of 20 minutes over an ambient range of 25°C ± 5°C.

5 Voltage Derating Curve

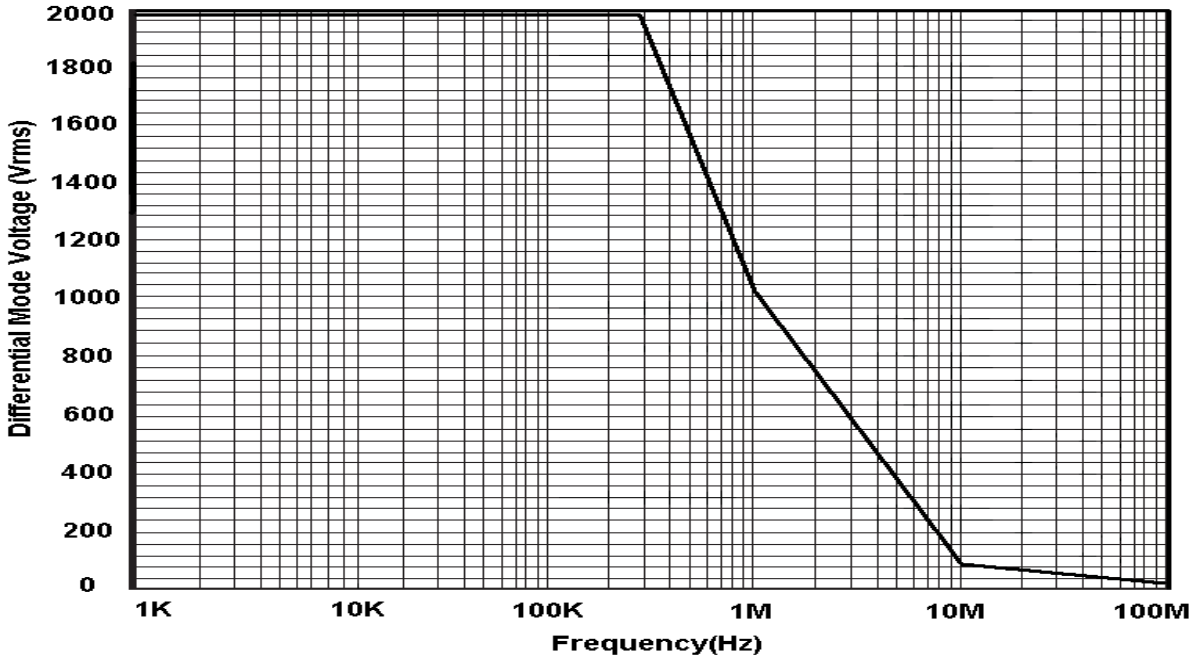
Derating Curve TT-SI 8071



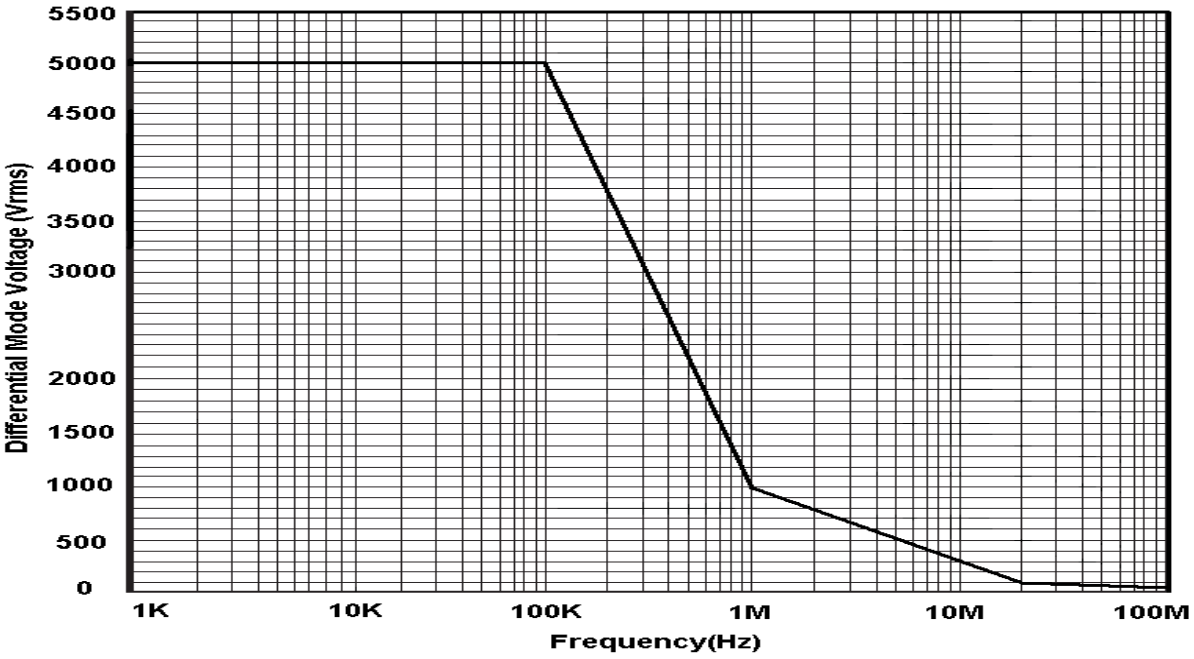
Derating Curve TT-SI 8050, 8051, 8052



Derating Curve TT-SI 8110



Derating Curve TT-SI 8010A, 8010B



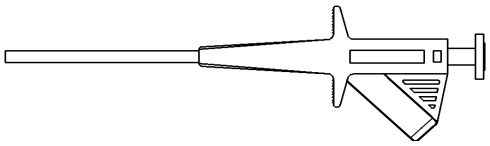
6 Accessories Description



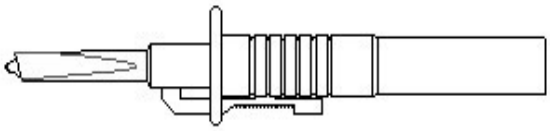
TT-SI CR81 - Alligator Clips
one pair black and red
1000V CAT III / 600V CAT IV



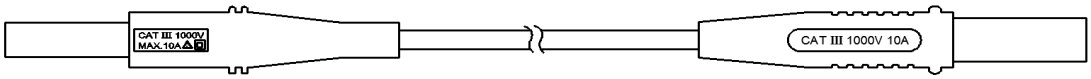
TT-SI CR82 - Alligator Clips
one pair black and red
1000V CAT III / 600V CAT IV



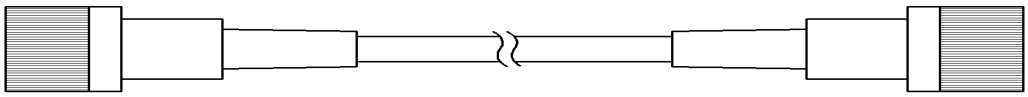
TT-SI GR82 - Pincer Clips
one pair black and red
1000V CAT III



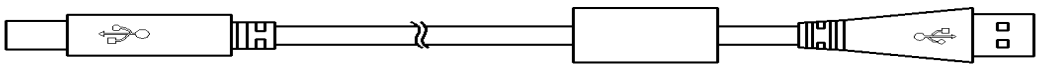
TT-SI GR81 - Hook Clips
one pair black and red
1000V CAT III



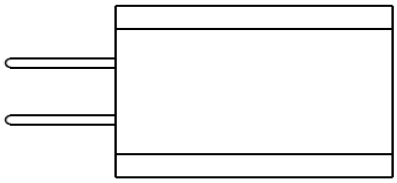
TT-SI TL8 - Extension Test Leads Leads 4mm, one pair black and red
1000V CAT III, 100cm



TT-SI BN8 - BNC Output Lead, 100cm



TT-SI USB8 - USB Power Lead, 150cm



TT-SI NT8 – USB Mains Adapter 5V/1A

7 Cleaning

This probe does not require any particular cleaning. If necessary, clean the case with a soft cloth.



WARNING

Dry the probe thoroughly before attempting to make voltage measurements.



CAUTION

Avoid immersing or using abrasive cleaners or solvents containing Benzene (or similar solvents) on the probe as these can cause deterioration of the probe body and cables.

8 Service & Warranty Information

Limited One-Year Warranty

Testec Elektronik GmbH warrants these products to be free from defective material or workmanship for a period of 1 year from the date of original purchase. Under this warranty, Testec Elektronik GmbH is limited to repairing the defective device when returned to the factory, shipping charges prepaid, within the warranty period.

Units returned to Testec Elektronik GmbH that have been subject to abuse, misuse, damage, or accident, or have been connected, installed, or adjusted contrary to the instructions furnished by Testec Elektronik GmbH, or that have been repaired by unauthorized persons, will not be covered by this warranty.

Testec Elektronik GmbH reserves the right to discontinue models, change specifications, price, or design of this device at any time without notice and without incurring any obligation whatsoever.

The purchaser agrees to assume all liabilities for any damages and/or bodily injury which may result from the use or misuse of this device by the purchaser, his employees, or agents.

This warranty is in lieu of all other representations or warranties expressed or implied and no agent or representative of Testec Elektronik GmbH is authorized to assume any other obligation in connection with the sale and purchase of this device.

Service

If you have a need for repair services, technical, or sales support, please contact us:

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E-Mail: service@testec.de
www.testec.de

Aktive Differential-Tastköpfe Übersicht | Active Differential Probes Overview

Typ	Attenuation Ratio	Bandwidth	DC-Accuracy	max. Input Voltage Differential Range (DC + Peak AC)
Series 50				
TT-SI 50	x10	50 MHz	1 %	±70 V
TT-SI 51	x100	50 MHz	1 %	±700 V
Series 7000				
TT-SI 7002	x20/x50/x200	25 MHz	2 %	±70 V/±175 V/±700 V
TT-SI 7005	x1/x5/x10	60 MHz	2 %	±3,5 V/±18 V/±35 V
Series 8000				
TT-SI 8071	x10/x100	70 MHz	2 %	±70 V/±700 V
TT-SI 8050	x50/x500	70 MHz	2 %	±150 V/±1500 V
TT-SI 8051	x50/x500	100 MHz	2 %	±150 V/±1500 V
TT-SI 8052	x50/x500	200 MHz	2 %	±150 V/±1500 V
TT-SI 8110	x100/x1000	100 MHz	2 %	±280 V/±2800 V
TT-SI 8010A	x100/x1000	70 MHz	2 %	±700 V/±7000 V
TT-SI 8010B	x100/x1000	100 MHz	2 %	±700 V/±7000 V
Series 9000				
TT-SI 9001	x10/x100	25 MHz	2 %	±70 V/±700 V
TT-SI 9002	x20/x200	25 MHz	2 %	±140 V/±1400 V
TT-SI 9071	x10/x100	70 MHz	1 %	±70 V/±700 V
TT-SI 9101	x10/x100	100 MHz	2 %	±70 V/±700 V
TT-SI 9110	x100/x1000	100 MHz	2 %	±140 V/±1400 V
TT-SI 9010	x100/x1000	70 MHz	2 %	±700 V/±7000 V (2500 V_{rms})
TT-SI 9010A	x100/x1000	70 MHZ	2 %	±700 V/±7000 V (5000 V_{rms})

Technische Änderungen vorbehalten | All specifications and characteristics are subject to change without notice

TT-SI 8XXX Differential Probe User's Manual

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