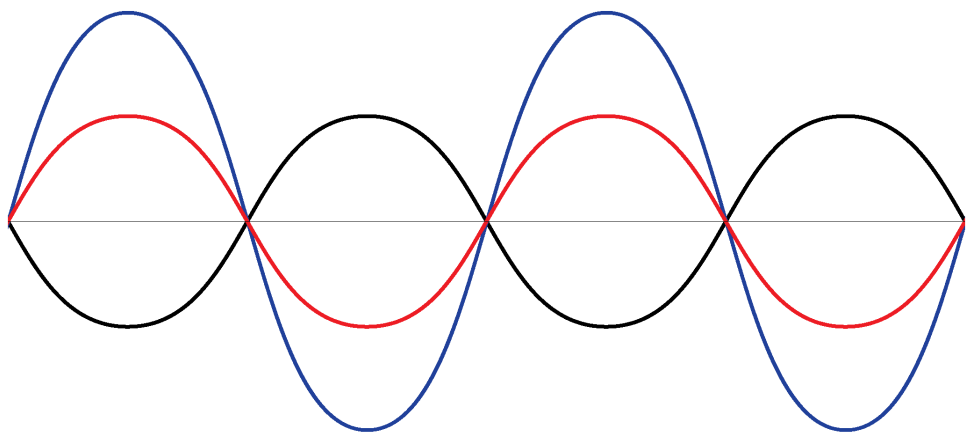


CT4560 Series 5mm Passive-Voltage Oscilloscope Probes

User Manual



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Yorba Linda, CA 92887 USA

Warranty

LIMITED TWO-YEAR WARRANTY

Cal Test Electronics, Inc warrants these products to be free from defective material or workmanship for a period of 2 years from the date of original purchase. Under this warranty, Cal Test Electronics, Inc is limited to repairing this product when returned to the factory, shipping charges prepaid, within the warranty period.

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

Cal Test Electronics, Inc 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 CAL TEST ELECTRONICS, INC IS AUTHORIZED TO ASSUME ANY OTHER OBLIGATION IN CONNECTION WITH THE SALE AND PURCHASE OF THIS DEVICE.

Contents

Notices	2
User Manual Part Number	2
Warranty	2
Contents	3
Compliance Information	4
Safety	4
EC Declaration of Conformity - Low Voltage	4
Environmental	4
Restriction of Hazardous Substances (RoHS 2)	4
Product End-of-Life Handling	4
Terms & Symbols	5
Terms	5
Symbols	5
Safety Information	6
Safety Notices	6
IEC Measurement Category & Pollution Degree Definitions	7
Operation Information	8
Overview	8
Initial Inspection	8
Using the Probe	9
Probe Compensation	9
Accessories	11
Included Accessories	11
Items and Usage	12
Specifications & Characteristics	14
Performance Plot	16
Cleaning	17
China RoHS 2	18
Hazardous Substances Disclosure Table	18
Notes	19

Compliance Information

Safety

EC Declaration of Conformity - Low Voltage

Compliance was demonstrated to the following specification as listed in the Official Journal of the European Communities: Low Voltage Directive: 2014/35/EU.

EN IEC 61010-031:2023 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.

Environmental

Restriction of Hazardous Substances (RoHS 2)

The product and its accessories conform to the Directive 2011/65/EU (RoHS 2) on the restriction of the use of certain hazardous substances in electrical and electronic equipment, inclusive of any modification and addendum to said Directive.

EN IEC 63000:2018 Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances.



China RoHS 2 refers to the Ministry of Industry and Information Technology Order No. 32, effective July 1, 2015. See “Hazardous Substances Disclosure Table” on page 18.

Product End-of-Life Handling

The equipment may contain substances that could be harmful to the environment or human health if improperly handled at the product’s end of life. To avoid release of such substances into the environment and to reduce the use of natural resources, we encourage you to recycle this product to an appropriate system that will ensure that most of the materials are reused or recycled appropriately.



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.

Terms & Symbols

The following terms, symbols, and definitions, individually or combination may appear on the product or in this user manual.

Terms

CAUTION

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.

WARNING

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.

NOTE

A note statement calls attention to an operating procedure, practice, or condition, which, should be noted before proceeding.

Symbols



CAUTION – Statements or instructions that must be consulted in order to find out the nature of the potential hazard and any actions which must be taken.



WARNING - HIGH VOLTAGE - possibility of electric shock.



The Conformité Européenne (CE) mark is the European Union's (EU) mandatory conformity marking for regulating the goods sold within the European Economic Area (EEA).

Safety Information

Safety Notices

These probes have been designed and tested in accordance with accepted industry and has been supplied in a safe condition. Before applying power, verify that the correct safety precautions are taken (see the following warnings). In addition, note the external markings on the instrument that are described under “Symbols” on page 5.

Throughout this manual and specifically in this section, there are warnings, cautions, and notes that you must follow to ensure safe operation and to maintain the probe in a safe condition.

WARNING To avoid personal injury and to prevent fire or damage to the probe and the products connected to it, review and comply with the following safety Warning and Cautions.

WARNING Do not use your probe in a manner not specified by the manufacturer. Be aware, that if used in a manner not specified by the manufacturer, the protection provided by the probe assembly may be impaired.

WARNING The Probe Must be Grounded.
Before making connections to the input of the probe, ensure that the output BNC connector is attached to the BNC input channel of the oscilloscope AND the oscilloscope is properly grounded.

WARNING Comply with the voltage derating curve.
When measuring higher frequency signals, be sure to comply with the Voltage vs Frequency Derating Curves, page 16.

WARNING Connect and Disconnect the Probe Properly.
Connect the probe to the oscilloscope before connecting the probe inputs to the circuit under test. Disconnect the probe inputs from the circuit under test before disconnecting the probe from the oscilloscope.

WARNING Observe Maximum Working Voltages.
To avoid injury, do not use the probes above 500 Vrms in a CAT II environment between input and earth.

WARNING Do not attempt internal service or adjustment.
Do not install substitute parts or perform unauthorized modifications to the probe. Service should be carried out by Cal Test authorized service personnel. For any service needs, contact Cal Test Electronics.

WARNING Do Not Operate Without Covers. To avoid electrical shock, or fire hazard, do not operate these probes with cover removed.

WARNING 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.

WARNING For Indoor Use Only. To avoid electric shock, injury, or fire hazard, do not operate this probe in wet or damp conditions or in an explosive atmosphere.

WARNING Periodically inspect the probe and probe cable to check for any damage. Do Not Operate with Visible or Suspected Failures. If you suspect there is damage, have it inspected by Cal Test authorized service personnel.

WARNING When it is likely that the ground protection is impaired, you must make the instrument inoperative and secure it against any unintended operation.

CAUTION The probe and its cable are sensitive parts and therefore, you should be careful not to damage them though excessive bending or pulling. Avoid any mechanical shocks to the probe to guarantee accurate performance and protection.

IEC Measurement Category & Pollution Degree Definitions

Measurement Category (CAT) - classification of testing and measuring circuits according to the types of mains circuits to which they are intended to be connected.

Measurement Category *other than* II, III, or IV: circuits that are not directly connected to the mains supply.

Measurement Category II (CAT II): test and measuring circuits connected directly to utilization points (socket outlets and similar prints) of the low-voltage mains installation..

Measurement Category III (CAT III): test and measuring circuits connected to the distribution part of a building's low-voltage mains installation.

Measurement Category IV (CAT IV): test and measuring circuits connected at the source of the building's low-voltage mains installation.

Mains Isolated: is for measurements performed on circuits not directly connected to a mains supply.

Pollution - addition of foreign matter, solid, liquid, or gaseous (ionized gases) that may produce a reduction of dielectric strength or surface resistivity.

Pollution Degree 2 (P2) - only non-conductive pollution occurs except that occasionally a temporary conductivity caused by condensation is expected.

Operation Information

Overview

The Cal Test Electronics CT4560 Series is a line of 5mm passive voltage oscilloscope probes designed for versatile electrical testing applications. These probes offer dependable performance and are built with high-quality materials for durability and precision. Available attenuation options include X1, X10, X100, as well as switchable X10/X1 settings. The frequency range spans from 55 MHz to 500 MHz, making them suitable for a wide variety of signal types.

Each probe is engineered to deliver accurate signal transmission and long-term reliability. A comprehensive set of accessories is included—such as probe tips, adapters, and ground leads—allowing users to customize the probe setup to meet specific testing requirements.

NOTE

5mm family designation is the diameter of the probe's tip ground ring.

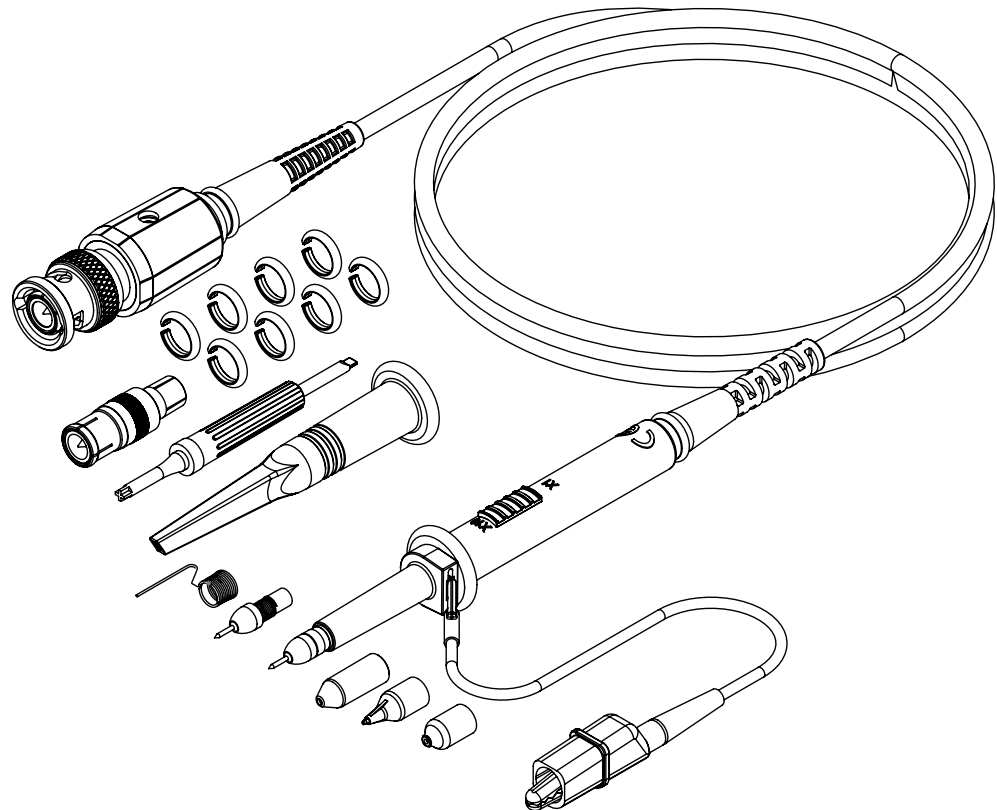


Figure 1 5mm CT4560 Series Probe example (CT4561 shown)

Initial Inspection

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

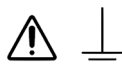
Using the Probe

WARNING



Before using the probe, read all the warnings in this section and all of the warnings in the section "Safety Information" on page 6.

WARNING



The Probe and Oscilloscope Must be Grounded.

Before connecting the probe's input to a single source, ensure that the output BNC connector is attached to the input channel of the oscilloscope AND the oscilloscope is properly grounded.

Probe Compensation

Proper compensation of the probe is required to assure amplitude accuracy of the waveform being measured by matching the probe to the oscilloscope's input capacitance.

NOTE

Low frequency compensation should be made whenever the probe is connected to or transferred between oscilloscopes.

Low-Frequency (LF):

1. Connect the BNC male output connector to an oscilloscope's input channel.
2. Apply a 1 kHz square wave to the probe or connect to the oscilloscope's calibrator output.
3. Adjust the trimmer located on the BNC compensation box for a flat-topped square wave.

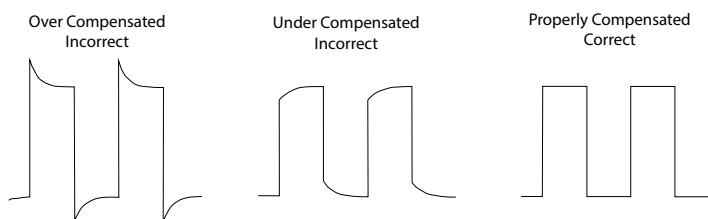
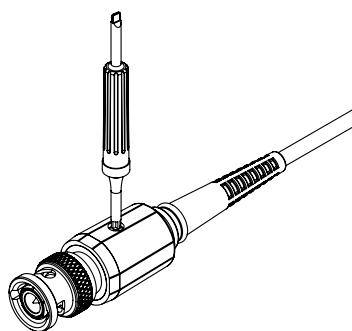


Figure 2 LF Trimmer Points

High-Frequency (HF):

NOTE

Should seldom be required, however, if the probe has HF adjustment capability and adjustment is necessary, continue with the steps below.

4. Apply a 1 MHz square wave to the probe (<700 ps rise-time).
5. Remove cover plugs, if installed, and alternately adjust trimmers located on the bottom side of the BNC compensation box for a flat-topped square wave.

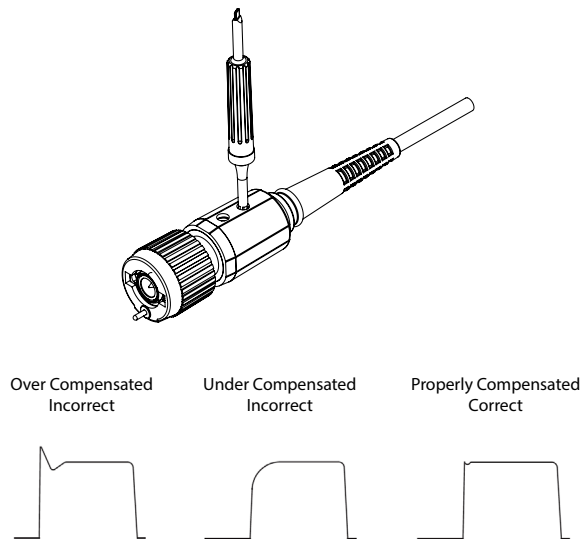


Figure 3. HF Compensation Waveforms

Accessories

Included Accessories

Table 1 Kit Contents

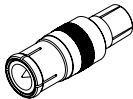
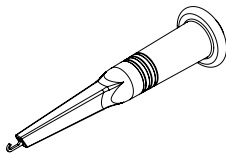
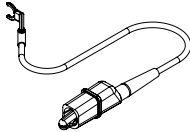
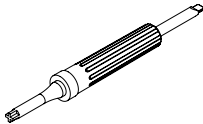
Model Number	BNC Adapter CT2908	Sprung Hook CT2709A-#	GND Lead, Clip CT2710-15-#	Rigid Tip CT2711A-#	Tip Insulator CT2712A-#	IC Tip Insulator CT2713A-#	Probe Tip GND CT2714	Trimmer Tool CT3648	ID Rings CT3662	Tip GND Kit CT3668	Twin Lead Adp. CT3679	Tip Cover CT4408-#	GND Lead Kit CT4550	Tip, Rigid, 4kV CT4573-#	Tip Cover, 4kV CT4574-#	Tip Insulator, 4kV CT4575-#	BNC Adapter, 4kV CT4576	Sprung Hook, 4kV CT4577-#
CT4560	✓	✓-0	✓-0	✓-0	✓-0	✓-0			✓			✓-0						
CT4561	✓	✓-0	✓-0	✓-0	✓-0	✓-0	✓	✓	✓			✓-0						
CT4562RA	✓	✓-0	✓-0	✓-0	✓-0	✓-0	✓	✓	✓			✓-0						
CT4563	✓	✓-0	✓-0	✓-0	✓-0	✓-0	✓	✓	✓			✓-0						
CT4564RA	✓	✓-0	✓-0	✓-0	✓-0	✓-0	✓	✓	✓			✓-0						
CT4565	✓	✓-0	✓-0	✓-0	✓-0	✓-0	✓	✓	✓			✓-0						
CT4566RA	✓	✓-0	✓-0	✓-0	✓-0	✓-0	✓	✓	✓			✓-0						
CT4567RA	✓	✓-0	✓-0	✓-0	✓-0	✓-0	✓	✓	✓			✓-0						
CT4567ARA	✓	✓-0	✓-0	✓-0	✓-0	✓-0	✓	✓	✓	✓	✓	✓-0	✓					
CT4568	✓	✓-2	✓-0	✓-0	✓-0	✓-0		✓	✓			✓-0						
CT4568RA	✓	✓-2	✓-0	✓-0	✓-0	✓-0		✓	✓			✓-0						
CT4570RA	✓	✓-2	✓-0	✓-0	✓-0	✓-0		✓	✓			✓-0						
CT4571RA			✓-0					✓	✓					✓-0	✓-0	✓-0	✓	✓-2
CT4572RA			✓-0					✓	✓					✓-0	✓-0	✓-0	✓	✓-2

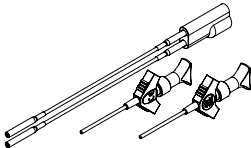
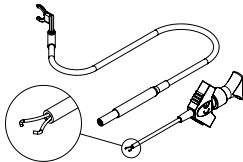
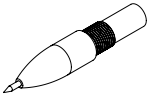
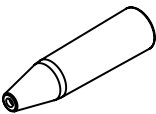
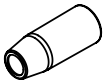
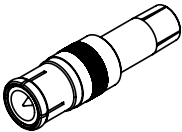
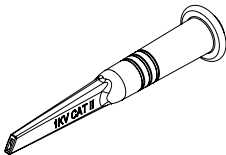
✓ = included

✓-# = included & color -#: -0 Black, -2 Red

Items and Usage

Table 2 General-Purpose Probe Accessories

Item	Image	Model No.	Usage
BNC Adapter, 5mm		CT2708	Press adapter onto tip of probe and into BNC female coax connector.
Sprung-Hook, 5mm		CT2709A-# -0 Black	Press sprung hook onto probe tip until it snap-locks then retract hook and clip onto circuit under test.
GND Lead w/Mini-Alligator Clip, 12 cm Length		CT2710-12-# -0 Black	Insert C-clip into probe body and alligator clip to circuit ground.
Replacement Tip		CT2711A-# -0 Black	Thread replacement tip into probe body.
Tip Insulator, 5mm		CT2712A-# -0 Black	Press insulator over probe tip so only a small portion of the tip is exposed.
IC Tip Insulator, 5mm		CT2713A-# -0 Black	Press insulator over probe tip so only a small side of the tip is exposed.
Probe Tip Ground		CT2714	Fit wound spring over tip and onto 5 mm GND ring. Touch GND point close to signal point.
Trimmer Tool		CT3648	Use tool to adjust probe compensation points.
Color ID Rings, 5 Colors		CT3662 (2 ea. Red, Green, Blue, Yellow, Orange)	Snap one ID ring on probe boot and same color ID ring on connector boot.

Item	Image	Model No.	Usage
Probe Tip Ground, Kit		CT3668 (2.5, 5, 7.5 & 10 mm distance from centerline)	Fit wound spring over tip and onto 5 mm GND ring. Choose the desired distance to GND point.
Twin-Lead Adapter w/2 SMD Clips		CT3679	Press adapter onto tip of probe and SMD clips onto 0.6 mm sockets. Red lead signal input and Black lead GND
Probe Tip Cover, 5mm		CT4408-# -0 Black	Press tip cover over probe tip so as to protect the tip during storage or transport.
GND Lead Kit		CT4550	Insert C-clip into probe body and attached 0.6 mm socket to GND pin or attach CT3659-8 SMD Clip.
Tip, Rigid, 4kV		CT4573-# -0 Black	Thread replacement tip into 4kV probe body.
Tip Cover, 4kV		CT4574-# -0 Black	Press tip cover over 4kV probe tip so as to protect the tip during storage or transport.
Tip Insulator, 4kV		CT4575-# -0 Black	Press insulator over 4kV probe tip so only a small portion of the tip is exposed.
BNC Adapter, 4kV		CT4576	Press adapter onto tip of 4kV probe and into BNC female coax connector.
Sprung-Hook, 4kV		CT4577-# -2 Red	Press sprung hook onto 4kV probe tip then retract hook and clip onto circuit - 1000 V CATII Max.

Specifications & Characteristics

The probe and oscilloscope should be warmed up for at least 20 minutes before any testing and the environmental conditions should not exceed the probe's specified limits.

NOTE All entries included in the following tables are characteristics unless otherwise stated.

Table 3 Safety Specifications

Parameter	Condition
EN IEC 61010-031:2023	Measurement Category II

Table 4 Electrical Specifications (Not Warranted)

Model	Attenuation	Bandwidth	Input Impedance		Rise Time	Max Input Voltage	Output Imp.	Comp. Range
			R	C				
CT4560	X1	55 MHz	1 M Ω	45 pF	6.4 ns	55 Vrms CAT II	1 M Ω	–
CT4561	X10/X1	150/17 MHz	10/1 M Ω	12/45 pF	2.3/20 ns	500 Vrms CAT II	1 M Ω	8–25 pF
CT4562RA	X10	150 MHz	10 M Ω	12 pF	2.3 ns	500 Vrms CAT II	1 M Ω	8–25 pF
CT4563	X10/X1	250/25 MHz	10/1 M Ω	12/45 pF	1.4/14 ns	500 Vrms CAT II	1 M Ω	8–25 pF
CT4564RA	X10	250 MHz	10 M Ω	12 pF	1.4 ns	500 Vrms CAT II	1 M Ω	8–25 pF
CT4565	X10/X1	350/25 MHz	10/1 M Ω	12/45 pF	1.0/14 ns	500 Vrms CAT II	1 M Ω	8–25 pF
CT4566RA	X10	350 MHz	10 M Ω	12 pF	1.0 ns	500 Vrms CAT II	1 M Ω	8–25 pF
CT4567RA	X10	500 MHz	10 M Ω	12 pF	0.7 ns	500 Vrms CAT II	1 M Ω	8–25 pF
CT4567ARA	X10	500 MHz	10 M Ω	12 pF	0.7 ns	500 Vrms CAT II	1 M Ω	8–25 pF
CT4568	X100	300 MHz	100 M Ω	5 pF	1.2 ns	2 kVrms	1 M Ω	8–25 pF
CT4568RA	X100	300 MHz	100 M Ω	5 pF	1.2 ns	2 kVrms	1 M Ω	8–25 pF
CT4570RA	X100	500 MHz	100 M Ω	5 pF	0.7 ns	2 kVrms	1 M Ω	8–25 pF
CT4571RA	X100	300 MHz	100 M Ω	5 pF	1.2 ns	4 kVrms	1 M Ω	8–25 pF
CT4572RA*	X100	500 MHz	100 M Ω	5 pF	0.7 ns	4 kVrms	1 M Ω	8–25 pF

RA = readout actuator

*Precision 1%

Table 5 Mechanical Specifications (same for both versions)

Parameter	Characteristic
BNC Cable Length	120 cm $\pm$ 3 cm
Weight	48 - 53 g

Table 6 Environmental Specifications (same for both versions)

Parameter	Characteristic
Operating Temperature	0°C to 40°C
Storage Temperature	-30°C to 70°C
Humidity	$\leq$ 80% RH @ 25°C to 35°C (77°F to 95°F)
Altitude	Operating: 2000 m Non-operating: 15000 m
Pollution Degree	P2

Performance Plot

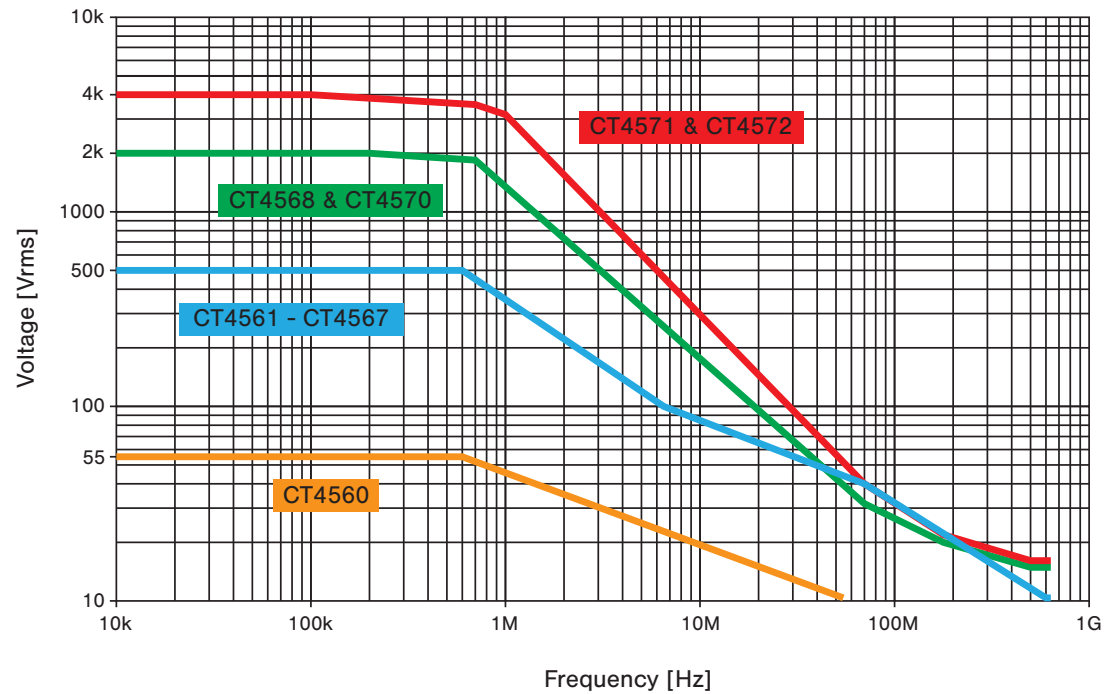


Figure 4 Voltage Derating Curves

Cleaning

Clean only the exterior probe body and cables. Use a soft cotton cloth light moistened with a mild solution of detergent and water. Do not allow any portion of the probe to be submerged at any time.

WARNING Dry the probe thoroughly before attempting to make voltage measurements.

CAUTION Do not subject the probe to solvents or solvent fumes as these can cause deterioration of the probe body and cables.

China RoHS 2

Hazardous Substances Disclosure Table



China RoHS 2 refers to the Ministry of Industry and Information Technology Order No. 32, effective July 1, 2015, titled Management Methods for the Restriction of the Use of Hazardous Substances in Electrical and Electronic Products. To comply with China RoHS 2, we determined this product's Environmental Protection Use Period (EPUP) to be 50 years in accordance with the Marking for the Restricted Use of Hazardous Substances in Electronic and Electrical Products, SJ/T 11364.

中國 RoHS 2 指工業和信息化部令第 32 號，自 2015 年 7 月 1 日起生效，題為《電氣電子產品有害物質限制使用管理辦法》。為符合中國 RoHS 2，我們根據電子電氣產品有害物質限制使用標誌 SJ/T 11364 將本產品的環保使用期限 (EPUP) 確定為 50 年。

Part Name 零件名稱	Hazardous Substance 有害物質					
	Lead (Pb) 鉛	Mercury (Hg) 汞	Cadmium (Cd) 鎘	Hexavalent Chromium (Cr (VI)) 六價鉻	Polybrominated biphenyls (PBB) 多溴聯苯	Polybrominated diphenyl ethers (PBDE) 多溴二苯醚
Printed Circuit Board Assemblies 印刷電路板組件	X	O	O	O	O	O
Electrical Components 電氣元件	X	O	O	O	O	O
Metal Components 金屬部件	X	O	O	O	O	O
Plastic Components 塑料部件	O	O	O	O	O	O
This table is made per guidance of SJ/T 11364. 該表是根據 SJ/T 11364 的指南製作的。 O: Indicates that this hazardous substance contained in all of the homogeneous materials for the part is below the limit requirement in GB/T 26572. O: 表示該有害物質在該部件的所有均質材料中的含量低於 GB/T 26572 中的限量要求。 X: Indicates that this hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in GB/T 26572. X: 表示該有害物質在用於該部件的至少一種均質材料中的含量高於 GB/T 26572 中的限量要求。						

Notes



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