TESTEC

USER MANUAL

TT-SX 200

200MHz Active Differential Probe



CE UKCA

Notices

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Warranty

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 is limited to repairing this product 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, or that have been repaired by unauthorized persons, will not be covered by this warranty.

Testec 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.

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Contents

Notices 2
Warranty 2
Contents 3
1 Compliance Information 4
1.1 EMC 4
1.1.1 EC Declaration of Conformity - EMC 4
1.2 Safety 4
1.2.1 EC Declaration of Conformity - Low Voltage 4
1.3 Environmental 5
1.3.1 Restriction of Hazardous Substances (RoHS 2) 5
1.3.2 Product End-of-Life Handling 5
2 Terms & Symbols 6
2.1 Terms 6
2.2 Symbols 7
3 Safety Information 8
3.1 Safety Notices 8
3.2 IEC Measurement Category & Pollution Degree Definitions 13
4 Introduction 14
4.1 Overview 14
4.2 Description 15
4.3 Supplied Accessories 16
5 Setting Up and Using the Probe 17
5.1 Setting Up 17
5.2 Using 17
6 Specifications & Characteristics 19
6.1 Electrical Specifications 19
6.2 Mechanical Specifications 20
6.3 Environmental Specifications 20
7 Performance Plots 21
8 Cleaning 22
9 China RoHS 2 23
9.1 Hazardous Substances Disclosure Table 23

1 Compliance Information

1.1 EMC

1.1.1 EC Declaration of Conformity - EMC

Compliance was demonstrated to the following specifications listed in the Official Journal of the European Communities: EMC Directive 2014/30/EU.

EN 61326-1:2013. Electrical equipment for measurement, control and laboratory use- EMC requirements Part 1: General requirements.

1.2 Safety

1.2.1 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 61010-1:2010/AMD:2016. Safety requirements for electrical equipment for measurement, control and laboratory use - Part 031: General requirements

EN 61010-031:2015 Ed 2.0. 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.

1.3 Environmental

1.3.1 Restriction of Hazardous Substances (RoHS III)

The product and its accessories conform to the Directive 2015/863/EU (RoHS III) 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 ISO 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 23.

1.3.2 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.

2 Terms & Symbols

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

2.1 Terms

VORSICHT	Ein VORSICHT-Hinweis macht auf eine Arbeitsanweisung oder Vorgehensweise aufmerksam, die bei falscher Ausführung bzw. Nichtbeachtung zur Beschädigung oder Zerstörung von Teilen oder des gesamten Produkts führen kann.
CAUTION	A caution statement calls attention to an operating procedure or practice, which, if not followed correctly, could result in damage to or destruction of parts or the entire product.
MISE EN GARDE	Une mise en garde attire l'attention sur une procédure ou une pratique d'utilisation qui, si elles ne sont pas suivies correctement, pourraient endommager ou détruire une partie du produit ou le produit entier.
WARNUNG 	Eine WARNUNG macht auf eine Arbeitsanweisung oder Vorgehensweise aufmerksam, die bei falscher Ausführung bzw. Nichtbeachtung zu Verletzungen von Personen, unter Umstäden mit Todesfolge, führen kann.
WARNING	A warning statement calls attention to an operating procedure, or practice, which, if not followed correctly, could result in injury or death to personnel.
AVERTISSEMENT	Un avertissement attire l'attention sur une procédure ou pratique qui, si elles ne sont pas suivies correctement, pourraient entraîner des blessures, voire la mort de l'utilisateur.
HINWEIS	Ein HINWEIS macht auf eine Arbeitsanweisung, Vorgehensweise oder Bedingung aufmerksam, die beachtet werden sollte, bevor Sie fortfahren.
NOTE	A note statement calls attention to an operating procedure, practice, or condition, which, should be noted before proceeding.
REMARQUE	Un énoncé de note attire l'attention sur une procédure, une pratique ou une condition d'exploitation, qui doit être notée avant de continuer.

2.2 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.



Earth (ground) TERMINAL – Refer to the instructions accompanying this symbol in this manual.



The Conformitè Europëenne (CE) Mark is the European Union's (EU) mandatory conformity marking for regulating the goods sold within the European Economic Area (EEA).



The UKCA marking is the product marking used for products being placed on the market in Great Britain (England, Scotland and Wales).
The UKCA marking applies to most products previously subject to the CE marking.

3 Safety Information

3.1 Safety Notices

These test probes have been designed and tested in accordance with accepted industry and has been supplied is 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 7.

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.

WARNUNG



Zur Vermeidung von Verletzungen, Feuer oder Schäden am Tastkopf und den damit verbundenen Geräten, bitte unbedingt die folgenden Warn- und Vorsichtshinweise lesen und beachten.

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.

AVERTISSEMENT

Pour éviter les blessures corporelles et éviter un incendie ou des dommages à la sonde et aux produits qui y sont connectés, lisez et respectez les avertissements et mises en garde de sécurité suivants.

WARNUNG



Den Tastkopf nicht entgegen den Angaben des Herstellers verwenden. Die durch die Konstruktion des Tastkopfes bestehende Schutzwirkung kann beeinträchtigt werden, wenn die Herstellerangaben nicht beachtet werden.

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.

AVERTISSEMENT

N’utilisez pas votre sonde d’une manière non spécifiée par le fabricant. Sachez que s’il est utilisé d’une manière non spécifiée par le fabricant, la protection fournie par l’ensemble de sonde peut être altérée.

WARNUNG



Der Tastkopf muss geerdet sein.
Vergewissern Sie sich vor dem Anschließen der Eingangskabel des Tastkopfs, dass der BNC-Ausgangsstecker mit der BNC-Buchse des Oszilloskops verbunden UND das Oszilloskop ordnungsgemäß geerdet ist.

WARNING

The Probe Must be Grounded.
Before making connections to the input leads 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.

AVERTISSEMENT

La sonde doit être mise à la terre.
Avant d'effectuer les connexions aux fils d'entrée de la sonde, assurez-vous que le connecteur BNC de sortie est connecté au canal d'entrée BNC de l'oscilloscope ET que l'oscilloscope est correctement mis à la terre.

WARNUNG



Den Tastkopf in der richtigen Reihenfolge anschließen und entfernen.
Schließen Sie den Tastkopf an das Oszilloskop an, bevor Sie die Tastkopf-Eingänge mit dem zu prüfenden Schaltkreis verbinden. Trennen Sie die Tastkopf-Eingänge von der zu prüfenden Schaltung, bevor Sie den Tastkopf vom Oszilloskop entfernen.

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.

AVERTISSEMENT

Connectez et déconnectez correctement la sonde.
Connectez la sonde à l'oscilloscope avant de connecter les entrées de la sonde au circuit à tester. Déconnectez les entrées de la sonde du circuit à tester avant de déconnecter la sonde de l'oscilloscope.

WARNUNG



Um Verletzungen zu vermeiden, die Tastkopf nicht über der maximal zulässigen Arbeitsspannung verwenden.

WARNING

To avoid injury, do not use the probe above maximum working voltage.

AVERTISSEMENT

Ne pas utiliser sans couvercles. Pour éviter les chocs électriques ou les risques d'incendie, n'utilisez pas ces sondes avec le couvercle retiré.

WARNUNG



Das Gerät nicht öffnen! Keine Ersatzteile einbauen und keine unzulässigen Änderungen am Tastkopf vornehmen. Die Wartung sollte durch Testec autorisiertes Fachpersonal durchgeführt werden. Wenden Sie sich bitte an Testec, wenn Sie Serviceleistungen benötigen.

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 Testec authorized service personnel. For any service needs, contact Testec Elektronik GmbH.

AVERTISSEMENT

Ne tentez pas d'entretien ou de réglage interne.
N'installez pas de pièces de rechange et n'effectuez pas de modifications non autorisées sur la sonde. Le service doit être effectué par le personnel de service autorisé par Testec. Pour tout besoin de service, contactez Testec Elektronik GmbH.

WARNUNG



Nicht ohne Gehäuseabdeckungen in Betrieb nehmen!
Um einen elektrischen Schlag oder Brandgefahr zu vermeiden, dürfen diese Tastköpfe nicht ohne Abdeckungen betrieben werden.

WARNING

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

AVERTISSEMENT

Ne pas utiliser sans couvercles. Pour éviter les chocs électriques ou les risques d'incendie, n'utilisez pas ces sondes avec le couvercle retiré.

WARNUNG

Keine ungeschützten Schaltkreise berühren!



Um Verletzungen zu vermeiden, legen Sie bitte Schmuck, wie z.B. Ringe, Uhren oder andere metallische Gegenstände ab. Keine freiliegenden Anschlüsse und Komponenten berühren, wenn Strom anliegt.

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.

AVERTISSEMENT

Évitez les circuits exposés. Pour éviter les blessures, retirez les bijoux tels que bagues, montres et autres objets métalliques. Ne touchez pas les connexions et les composants exposés lorsque l'alimentation est présente.

WARNUNG Geeignete Stromquelle verwenden.



WARNING Use Proper Power Source.

AVERTISSEMENT Utilisez une source d'alimentation appropriée.

WARNUNG Nur zur Verwendung in Innenräumen. Zur Vermeidung von Stromschlägen, Verletzungen oder Feuer, den Tastkopf nicht in einer nassen, feuchten oder explosionsgefährdeten Umgebung verwenden.



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.

AVERTISSEMENT Pour une utilisation en intérieur uniquement. Pour éviter les chocs électriques, les blessures ou les risques d'incendie, n'utilisez pas cette sonde dans des conditions humides ou humides ou dans une atmosphère explosive.

WARNUNG Den Tastkopf und die Tastkopfkabel regelmäßig auf Beschädigungen überprüfen. Das Gerät nicht bei sichtbaren oder vermuteten Mängeln betreiben. Bei einer vermuteten Beschädigung den Tastkopf von autorisiertem Testec-Fachpersonal überprüfen lassen.



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

AVERTISSEMENT Inspectez périodiquement votre sonde et ses fils pour vérifier qu'ils ne sont pas endommagés. Ne pas utiliser avec des défaillances visibles ou suspectées. Si vous pensez qu'il y a des dommages, faites-le inspecter par le personnel de service autorisé de Testec.

WARNUNG Wenn Sie vermuten, dass der Erdungsschutz beeinträchtigt ist, setzen Sie das Gerät außer Betrieb und sichern es gegen unbeabsichtigten Betrieb.

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

AVERTISSEMENT Lorsqu'il est probable que la protection au sol soit altérée, vous devez rendre l'instrument inopérant et le sécuriser contre tout fonctionnement intempestif.

VORSICHT Der Tastkopf und die Kabel sind empfindliche Teile. Achten Sie daher darauf, dass sie nicht durch übermäßiges Biegen oder Ziehen beschädigt werden. Vermeiden Sie jegliche mechanische Erschütterung des Tastkopfs, um eine akkurate Funktion und den Schutz zu gewährleisten.

CAUTION The probe and its cables 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.

MISE EN GARDE La sonde et ses câbles sont des pièces sensibles et, par conséquent, vous devez faire attention à ne pas les endommager en les pliant ou en tirant excessivement. Évitez tout choc mécanique sur la sonde pour garantir des performances et une protection précises.

3.2 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.

4 Introduction

4.1 Overview

The Testec TT-SX 200 – 200MHz active differential probe allow conventional earth-grounded oscilloscopes to be used for floating signal measurements - up to ±60V common mode voltage with a fixed attenuation 10:1.

The probe is compatible with any oscilloscope having 50Ω or 1MΩ BNC female input and feature up to 200MHz of bandwidth.

TT-SX 200 can provide excellent differential signal testing for high-speed power measurement, vehicle bus testing and digital system design.
The probe can be powered by any oscilloscope USB port or supplied mains power adapter.



4.2 Description

	Description
Input Cables	Length approx. 15cm, used to measure the voltage input signal.
Offset Adjust	Resistor to adjust offset.
USB-B Input Power Port	To connect the supplied USB cable.
Overload Alarm Indicator	When the measuring range is over the limit, the overload indicator will be lighted and buzzer will be activated.
Output BNC	Standard BNC output connector can be connected to the oscilloscope by supplied BNC cable. The input impedance of the oscilloscope is required to be 50Ω or connect through supplied 50Ω feedthrough termination, with input on the scope set to 1MΩ.

4.3 Supplied Accessories



- TT-SI CR81 - Alligator Clips, black and red
- TT-SX DA - 50Ohm Feedthrough Termination
- TT-SI GR82 - Pincer Clips, black and red
- TT-SI GR81 - Hook Clips, black and red
- TT-SI BN8 - BNC Output Lead, 100cm
- TT-SI USB8 - USB Power Lead, 150cm
- TT-SI NT8 – USB Mains Adapter 5V/1A – EU version
- TT-SX HC200 – Hard Case

5 Setting Up and Using the Probe

WARNUNG



Bevor Sie den Tastkopf für Ihre Messung anschließen, bitte alle Warnhinweise in diesem Abschnitt und alle Warnhinweise im Abschnitt „Sicherheitsinformationen“ auf Seite 8 lesen.

WARNING

Before connecting the probe for your measurement, read all the warnings in this section and all of the warnings in the section “Safety Information” on page 8.

AVERTISSEMENT

Avant de connecter la sonde pour votre mesure, lisez tous les avertissements de cette section et tous les avertissements de la section « Informations de sécurité » à la page 8.

5.1 Setting Up

Connect the USB power cord to the probe and a USB port on the oscilloscope or use the supplied USB power adapter and connect to mains. The power LED lights up green.

5.2 Using

1. Connect the probe with the supplied BNC cable to an input channel of the oscilloscope.

WARNUNG



Der Tastkopf muss geerdet sein.
Vergewissern Sie sich vor dem Anschließen der Eingangskabel des Tastkopfs, dass der BNC-Ausgangsstecker mit der BNC-Buchse des Oszilloskops verbunden UND das Oszilloskop ordnungsgemäß geerdet ist.

WARNING

The Probe Must be Grounded.
Before making connections to the input leads 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.

AVERTISSEMENT

La sonde doit être mise à la terre.
Avant d’effectuer les connexions aux fils d’entrée de la sonde, assurez-vous que le connecteur BNC de sortie est connecté au canal d’entrée BNC de l’oscilloscope ET que l’oscilloscope est correctement mis à la terre.

2. Set the attenuation ratio of the oscilloscope to 10:1 and input impedance to 50Ω. If the scope output is port is 1MΩ only, please also use supplied 50Ohm Feedthrough Termination.

3. Make sure that the voltage source is switched off.

4. Press the desired 4mm accessories on its matching color 4 mm banana plug input lead and connect the probe hooks to the circuit under test.

WARNUNG Zum Schutz vor Stromschlag nur die mit diesem Tastkopf mitgelieferten Prüfspitzen verwenden.

WARNING To protect against electric shock, use only the probe hooks supplied with this probe.

AVERTISSEMENT Pour vous protéger contre les chocs électriques, utiliser uniquement les crochets de sonde fournis avec cette sonde.

5. After confirming that the probe operator is not touching the device under test, turn on the voltage source.

6. Measure the voltage under test and observe the waveform on the oscilloscope.

WARNUNG Denken Sie daran, dass die tatsächliche Spannung um den Teilungsfaktor größer ist als die Anzeige am Oszilloskop.

WARNING Remember the actual voltage is the attenuation factor greater than the oscilloscope waveform.

AVERTISSEMENT N'oubliez pas que la tension réelle est le facteur d'atténuation supérieur à la forme d'onde de l'oscilloscope.

10. Turn off the voltage source.

11. Disconnect the probe inputs from the voltage source.

6 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.

HINWEIS Alle Angaben in den folgenden Tabellen sind Kennwerte, sofern nicht anders angegeben.

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

REMARQUE Toutes les entrées incluses dans les tableaux suivants sont des caractéristiques, sauf indication contraire.

Safety Specifications

IEC/EN 61010-031:2015

6.1 Electrical Specifications

Typical data as well as nominal and measured values are not warranted by Testec.

	TT-SX 200
Part Number	15635
Bandwidth (-3dB)	DC to 200MHz
DC-Accuracy	±1%
Attenuation Ratio	10:1
Rise Time	< 1,75ns
Absolute Maximum Rated Input Voltage (each side to ground)	60V
Maximum Differential Input Voltage (DC + Peak AC)	±20V
Maximum Common Mode Input Voltage (DC + Peak AC)	±60V
Input Impedance	500kΩ, <7pF (single ended to ground) 1MΩ, <3,5pF (each side to ground)
Output Voltage	±2V (into 50Ω oscilloscope input)

Electrical Specifications (cont.)

	TT-SX 200
Offset (typical)	±2mV
Noise (typical)	6mVrms
CMRR (typical)	50Hz/60Hz: -80dB 10MHz: -50dB
Power Requirements	USB cable or USB cable with USB power supply
Power Source	Input: 100-240VAC Output: 5VDC - 1A

6.2 Mechanical Specifications

	Characteristic
Input Leads Length (each)	15cm ±3cm
Connecting Lead	68cm ±3cm
BNC Cable Length	100cm ±3cm
Dimension (L x W x H)	116mm x 22mm x 15mm (probe head) 124mm x 49mm x 27mm (controller unit)
Weight	185g
USB Cable Length	150cm ±3cm

6.3 Environmental Specifications

	Characteristic
Operating Temperature	0°C to 50°C
Storage Temperature	-30°C to 70°C
Operating Humidity	≤ 85% RH
Storage Humidity	≤ 90% RH
Altitude	Operating: 3000m Non-operating: 12000m
Pollution Degree	2

7 Performance Plots

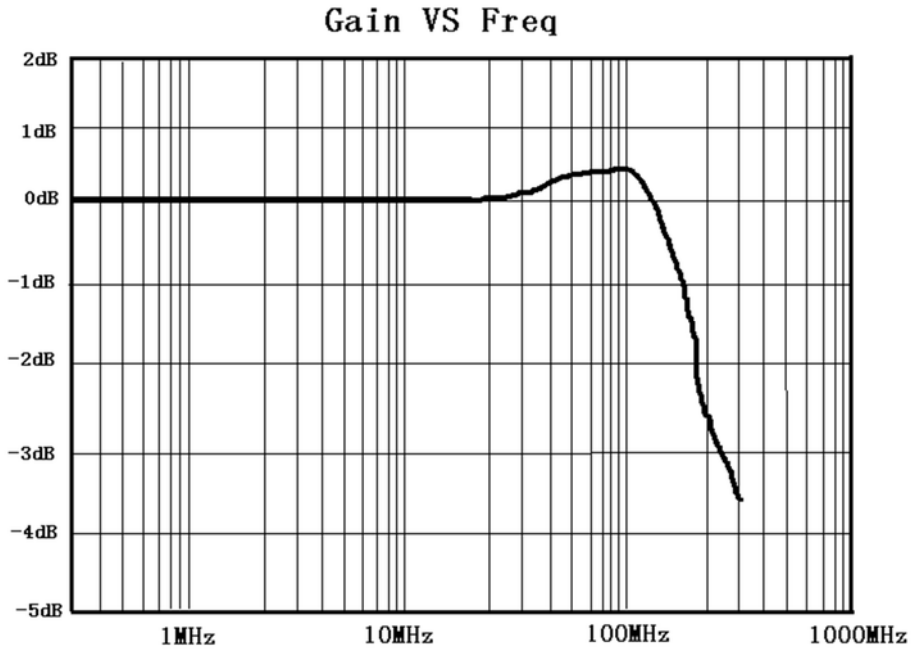

Figure 1 Frequency Response Curve

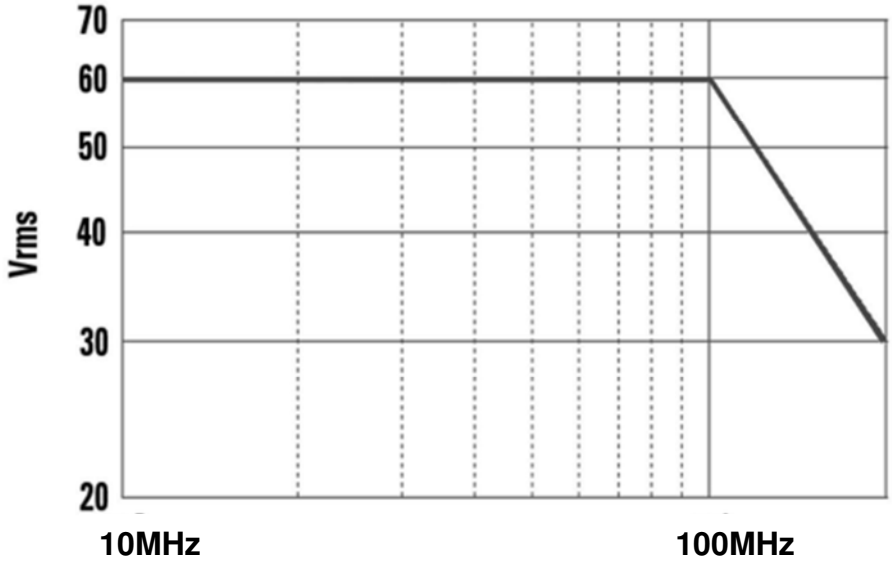

Figure 2 Voltage Derating Curve

8 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.

WARNUNG Den Tastkopf gründlich abtrocknen und gut trocknen lassen, bevor Sie versuchen, Spannungsmessungen durchzuführen.

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

AVERTISSEMENT Séchez soigneusement la sonde avant d'essayer d'effectuer des mesures de tension.

VORSICHT Setzen Sie den Tastkopf und die Kabel keinen Lösungsmitteln oder Lösungsmitteldämpfen aus. Das könnte den Tastkopf oder die Kabel beschädigen.

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

MISE EN GARDE Ne soumettez pas la sonde à des solvants ou à des vapeurs de solvants car ceux-ci peuvent détériorer le corps de la sonde et les câbles.

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9 China RoHS 2

9.1 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 25 years in accordance with the Marking for the Restricted Use of Hazardous Substances in Electronic and Electrical Products, SJT 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 SJT 11364 將本產品的環保使用期限 (EPUP) 確定為 25 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。



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