

3M™ Ground Pro Ground Integrity Meter

Model CTM051



User's Guide

October 2014
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Intended Use:

The 3M Ground Pro Ground Integrity Meter measures several important parameters of grounding: ground impedance and high-frequency noise (EMI) on a ground.

This device is not intended to be used to measure mains voltage.

It is necessary to use proper equipment to check for stray voltage from mains prior to using the Ground Integrity Meter to measure ground.

Ground connectivity is measured in accordance with ANSI 6.1. It is measured as impedance in a way that is immune to parasitic signals on a ground. In addition to monitoring the ground connection, the Ground Pro measures high frequency noise (EMI) on the ground that is often present in a factory environment. Such interference causes problems with the operation of equipment.



The device must be used as specified in this user guide in an indoor commercial/ industrial environment, and has not been evaluated for other uses or locations. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

3M™ Ground Pro Ground Integrity Meter Model CTM051



Safety Information

Please read, understand, and follow all safety information contained in these instructions prior to the use of this device. Retain these instructions for future reference.

EXPLANATION OF SIGNAL WORD CONSEQUENCES

- | | |
|--|---|
|  WARNING: | Indicates a potentially hazardous situation, which – if not avoided – could result in death or serious injury and/or property damage. |
|  CAUTION: | Indicates a potentially hazardous situation, which – if not avoided – may result in minor or moderate injury and/or property damage. |
| NOTICE: | Indicates a potentially hazardous situation, which – if not avoided – may result in property damage. |

Summary of device labels containing safety information

- | | |
|--|--|
| | To reduce the risks associated with hazardous voltage: |
|  WARNING: | Do not replace battery while device is in use. Battery compartment is only intended to be open with the device powered off.
Do not operate if the battery door is not in place. |
|  WARNING: | Do not use on three-phase equipment. |

WARNING

To reduce the risks associated with fire and explosion:

- Do not use in Hazardous Locations.

To reduce the risks associated with hazardous voltage and fire:

- Do not use this device outdoors or in wet or humid environments.
- Do not use this device outside of the operating conditions listed in this user manual.

To reduce the risks associated with hazardous voltage:

- Do not replace battery while device is in use. Battery compartment is only intended to be open with the device powered off.
- Do not operate if the battery door is not in place.
- Do not use meter to test three-phase equipment.
- Do not use to measure mains voltage Disconnect circuit power and discharge all high-voltage capacitors before testing resistance, continuity, diodes, or capacitance.
- Always use proper terminals and device settings.
- Check the test leads for continuity before use. Do not use if the readings are high or noisy.
- Do not use the meter or test leads if damaged or are not operating properly.
- Do not modify or attempt to service the meter or leads; there are no user serviceable parts. Return to 3M for service.
- Do not use the Meter or test leads outside of the operating conditions listed in this user guide.
- Keep fingers behind the finger guards on the leads.
- All personnel using this device shall be certified or properly trained.

⚠ CAUTION:

To reduce the risks associated with environmental contamination:

Dispose of meter and all components in accordance with all applicable local and government regulations

⚠ NOTICE:

To reduce the risks associated with property damage:

- Before use, check that the meter is functioning correctly.
- Remove battery before long-term storage.

EXPLICATION DES CONSEQUENCES MOT SIGNAL

⚠ WARNING: Indique une situation dangereuse, qui, si elle n'est pas évitée, pourrait provoquer la mort ou des blessures graves.

⚠ CAUTION: Indique une situation dangereuse, qui, si elle n'est pas évitée, pourrait provoquer des blessures mineures ou modérées, ou des dégâts matériels.

NOTICE: Indique une situation qui, si elle n'est pas évitée, pourrait provoquer des dégâts matériels.

SOMMAIRE DES LABELS DE L'APPAREIL CONTENANT DE L'INFORMATION DE SÉCURITÉ

Pour réduire les risques associés aux tensions dangereuses :

- ⚠ WARNING:**
- Ne pas remplacer la pile lorsque l'appareil est en cours d'utilisation. Le compartiment de la pile doit uniquement être ouvert lorsque l'appareil est éteint.
 - Ne pas utiliser l'appareil si le couvercle du porte-pile n'est pas en place.

⚠ WARNING: Ne pas utiliser sur un équipement triphasé.

⚠ WARNING

Réduire les risques liés aux feux et aux explosions:

- Ne pas utiliser dans des emplacements dangereux.

Réduire les risques liés aux tensions et feux dangereux:

- Ne pas utiliser cet appareil à l'extérieur ou dans des environnements humides ou mouillés.
- Ne pas utiliser cet appareil en dehors des conditions d'exploitation répertoriés dans le manuel d'utilisation.

Réduire les risques liés à une tension dangereuse:

- Ne pas remplacer la pile lorsque l'appareil est en cours d'utilisation. Le compartiment de la pile doit uniquement être ouvert lorsque l'appareil est éteint.
- Ne pas utiliser l'appareil si le couvercle du porte-pile n'est pas en place.
- Ne pas utiliser le multimètre pour tester les équipements triphasés.
- Ne pas appliquer plus que la tension nominale, indiquée sur compteur .
- L'alimentation du circuit de déconnexion et décharger tous les condensateurs à haute tension avant de tester la résistance, la continuité, les diodes ou la capacité.

⚠ WARNING (cont.)

Réduire les risques liés à une tension dangereuse:

- Utiliser toujours les bornes et les paramètres de l'appareil.
- Vérifiez les cordons de la continuité avant l'utilisation. Ne pas utiliser si les lectures sont élevées ou bruyantes.
- Ne pas utiliser l'appareil ou cordons de mesure s'ils sont endommagés ou ne fonctionnent pas correctement.
- Ne pas modifier ou tenter de réparer l'appareil ou les câbles; il n'y a aucune pièce réparable par l'utilisateur. Retour à 3M pour le service.
- Ne pas utiliser le multimètre ou ses cordons en dehors des conditions d'exploitation répertoriés dans ce guide d'utilisation.
- Gardez les doigts derrière les protège-doigts sur les pistes.

⚠ MISE EN GARDE:

Réduire les risques liés à la contamination de l'environnement:

- Éliminer mètres et tous les composants en conformité avec les réglementations locales et gouvernementales applicable.

⚠ NOTICE:

Réduire les risques liés aux dommages à la propriété:

- Avant utilisation, vérifier que le compteur fonctionne correctement.
- Retirez la batterie avant stockage à long terme.

FCC

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Industry Canada

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la NMB-003 du Canada.

Environmental Conditions

This equipment has been tested and found to be safe to operate within these environmental conditions.

This is not a warranty of equipment performance within these conditions

Indoor use only

Ingress Protection: IPX0

Altitude: Up to 2,000 m

Pollution degree 2

Temperature: Maximum 110°F/43°C Minimum 50°F/10°C

Humidity: Maximum relative humidity 80% for temperatures up to 31°C decreasing linearly to 50% relative humidity at 40°C

Package Contents

Your 3M™ Ground Pro Ground Integrity Meter should include the following*:

3M™ Ground Pro Ground Integrity Meter

1 pair of probe leads

9V battery included










General Product Specification

Your 3M™ Ground Pro Ground Integrity Meter should include the following*:

Power	Battery 9V Alkaline
Dimensions (approx.)	4.5" x 2.4" x 1.1" 114 mm x 60 mm x 28 mm
Weight (approx.)	223 g

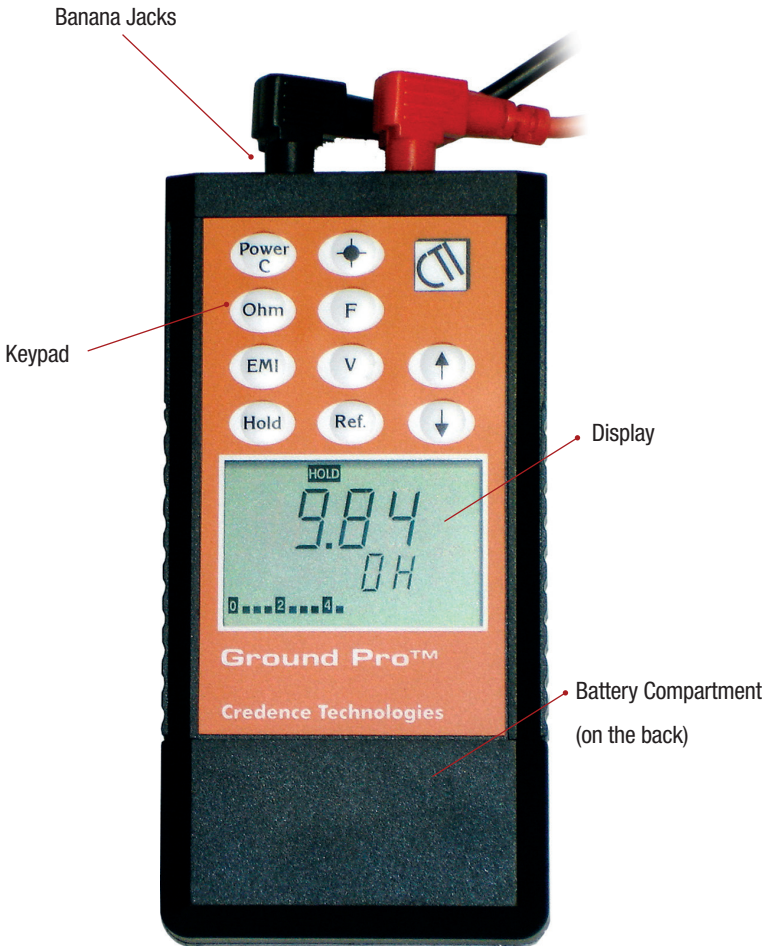
The 3M™ Ground Pro Ground Integrity Meter is a comprehensive instrument that measures the ground connection of your equipment in accordance with ANSI 6.1 and ANSI/ESDA S.20.20 standards. In addition to measuring ground impedance, it also measures AC and DC voltage on the ground as well as the presence of high-frequency noise or electromagnetic interference (EMI) on the ground, alerting you to possible functionality problems, such as tool lockups, erratic behavior and parametric errors.

Controls and Indicators

-  Turns the power on and off. Hold for a few seconds to turn the unit off. Also resets some parameters.
-  Switches the unit into impedance measurement mode.
-  Switches the unit into high-frequency noise (EMI) measurement mode.
-  Switches the unit into AC and DC voltage mode.
-  Sets up the reference for measurements and alarms.
-  Freezes the display/and shows the maximum measured value.
-  Adjusts the scale for some parameters and adjusts reference values.
-  Adjusts the scale for some parameters and adjusts reference values.
-  Display backlight on/off

Parts Description

Please refer to the rest of this User's Guide for detailed explanations of each control, indicator and connection.



General

Power

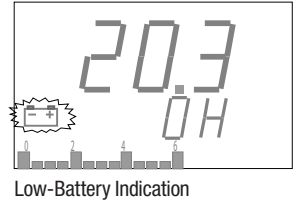
The 3M™ Ground Pro Ground Integrity Meter uses a 9V alkaline battery. Do not use any other battery. If you are not using your 3M™ Ground Pro Ground Integrity Meter for an extended period of time, remove the battery from the unit in order to prevent damage caused by a possible battery leakage.

Installing the Battery

Remove the screw from the battery lid. Slide off the battery lid at the back of the 3M™ Ground Pro Ground Integrity Meter and attach the 9V battery to the battery clip. Observe the polarity of the battery. Slide in the battery lid and secure it back with the screw.

Low-Battery Indicator

When battery voltage gets low (less than 20% capacity remains), the low battery indicator on the display appears. At this point, replace the battery.



Turning Unit On and Off

ON

Press the button. The battery voltage will be displayed for a moment in both volts and percentage of the full capacity. If the battery voltage is too low even to indicate low-voltage status on the display or if the self-diagnostic fails, you will hear a beep and the unit will shut itself off. If the battery is completely drained, there may not even be a beep. Please replace the battery. Use proper disposal method per local regulatory requirements.



OFF

Press the **Power/C** button for at least two seconds. The 3M™ Ground Pro Ground Integrity Meter will turn off.



Automatic Power Off

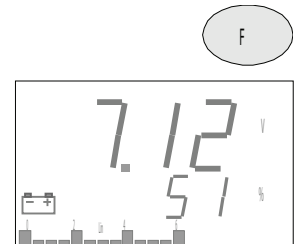
In order to save battery life, the 3M™ Ground Pro Ground Integrity Meter has an automatic power-off (APO) feature that will turn the unit off after approximately 10 minutes if no buttons are pressed. You can disable or enable APO



by depressing the F button several times until you get to the screen shown above. You can then enable or disable APO using the Up and Down arrow buttons. Please keep in mind that with APO disabled, the battery life will be shorter.

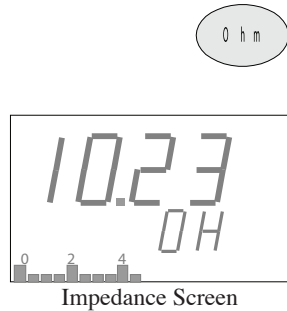
Checking the Battery Voltage

Press the F button several times until you get this screen. The upper display shows the battery voltage, and the lower display shows the percentage of usable battery life left.



Impedance Measurements

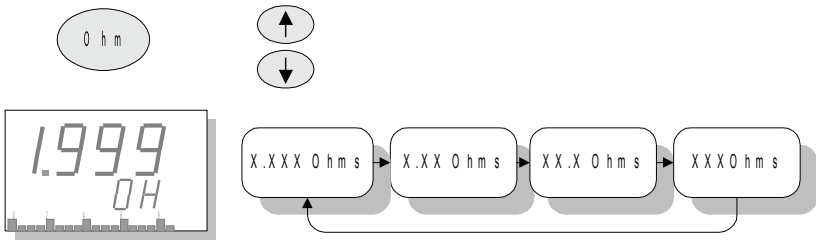
Press the Ohm button to go to ground impedance mode. You should see a screen similar to the one shown on the right. The impedance mode is indicated by “OH” on the bottom display line.



Scaling

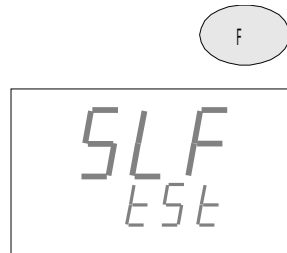
The 3M™ Ground Pro Ground Integrity Meter has four different scales for measuring ground impedance.

Choose the appropriate scale for your measurements using the Up and Down arrow buttons.



Auto-Zeroing Test Leads

Test leads offer added impedance and may alter measurement results, especially at a lower scale. In order to take impedance of test leads into account, short the ends of the test leads together and press the Function button (F) until you see the screen shown on Function button (F) until you see the screen shown on the right. In a few seconds, this screen will disappear and you will hear a short beep. The 3M™ Ground Pro Ground Integrity Meter will return to normal measurement mode. Now when the test leads are shorted together, the display should show zero Ohms, even though the test leads may have some impedance. The correction factor will be saved in the internal memory.



If the test leads are not shorted properly or become accidentally disconnected during this process, auto-zero will fail and you should hear a long beep before the display returns to the impedance measurement screen. In this case you will need to repeat this process again.

Voltage on Ground Measurements

Do not use to measure mains voltage.

The presence of voltage on a ground is never desirable. The 3M™ Ground Pro Ground Integrity Meter can measure both AC and DC voltages on a ground.



AC Voltage

Press the V button once. The 3M™ Ground Pro Ground Integrity Meter will switch to AC voltage measurement mode and you should see a screen similar to one on the right. You can adjust the measurement scale using the Up and Down arrow buttons.



DC Voltage

Press the V button again to switch to DC voltage measurement mode. You should see a screen similar to the one on the right. As in AC mode, you can adjust the measurement scale using the Up and Down arrow buttons.

Overload

If voltage on the ground is above the maximum level on a particular scale, you should see an overload indicator such as the one on the right. In such a case, go to the next scale using the Up arrow button.



Using Reference with Voltage Measurements

The Reference function helps to set limits at which an audio alarm sounds to indicate that the measured

impedance is below the specified limit. Unlike a regular multimeter, the

3M™ Ground Pro Ground

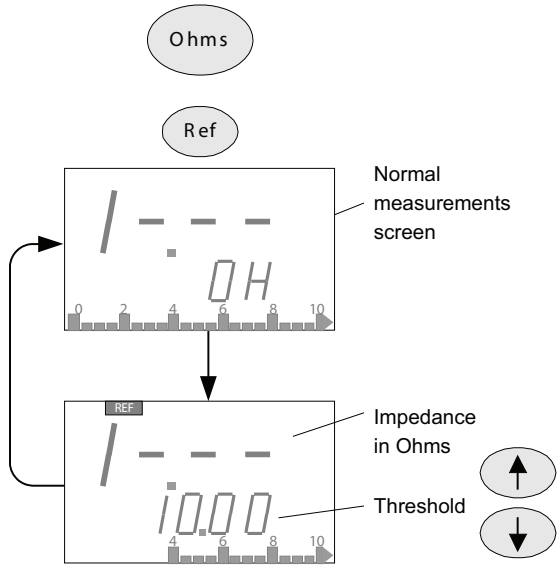
Integrity Meter allows

you to specify an exact impedance value at which the instrument will provide an audio indication. In

Impedance mode, press the Ref. button. You should see a screen similar to the one on the right with the REF

indicator on. The top line of the display shows the current impedance value (in this example it is an open circuit)

and the bottom line shows the reference level. Adjust the reference level by using the Up and down arrow buttons. Now when the impedance is below the reference value, you should hear a beep. The reference value is set for a particular range – you may need to readjust it for a different range. The reference value will be saved in the internal memory.

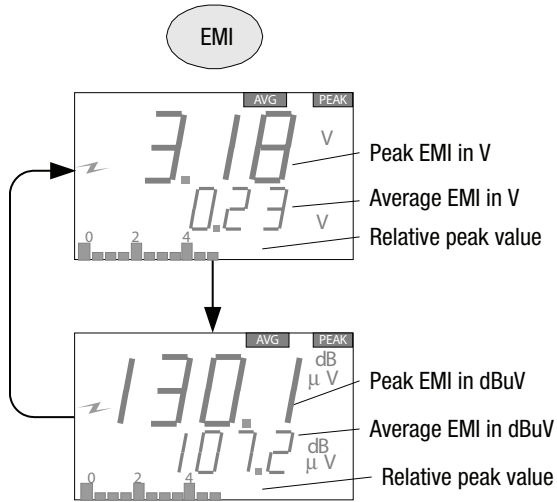


EMI Measurements

High frequency noise (EMI) on a ground causes equipment malfunction and damage to sensitive components. The 3M™ Ground Pro Ground Integrity Meter measures

high-frequency noise on a ground in a wide frequency and dynamic range.

High-frequency noise is measured in two different units — volts and dBuV. The latter is a logarithmic measure of voltage where 0dB is referenced to 1uV.



In order to measure EMI on a ground, press the EMI button. The screen will show the average value of the high-frequency signal in Volts on the top display line and the magnitude of the envelope peak of the signal (i.e. transients or spikes) on the bottom line. By pressing the EMI button one more time you can switch to dBuV units, as shown above.

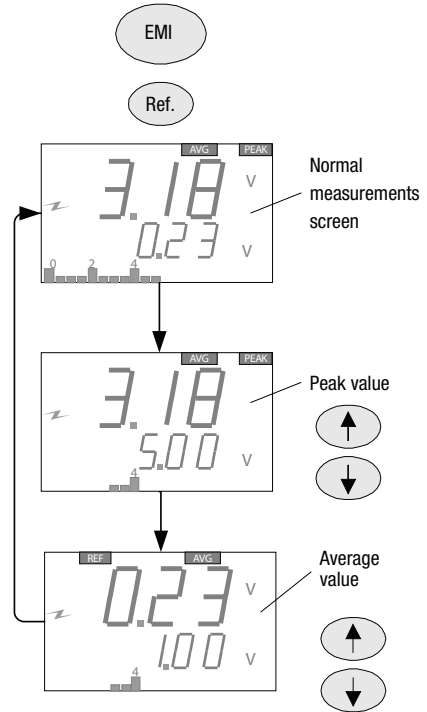
Autoscale

The 3M™ Ground Pro Ground Integrity Meter uses auto scaling in EMI mode. No scale switching is necessary.

Using Reference with EMI

Reference mode is helpful if you wish to hear an audio alarm whenever the EMI signal exceeds a certain level. In order to use this mode, depress the REF button while in any of the EMI screens. You should see the REF indicator at the top of the display. The bottom line of the display will now show the reference value of the average signal instead of the peak value of the signal. Adjust the reference level using the Up and Down arrow buttons. Now whenever the average value of the EMI signal exceeds this reference level, an audio alarm will sound.

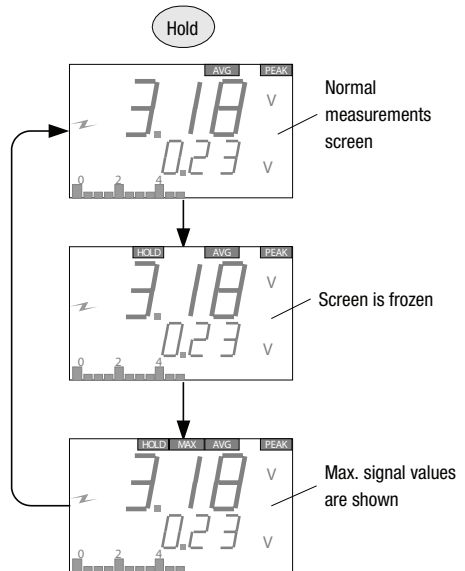
By pressing the REF button again, you can adjust the reference level for the peak signal as shown on the right.

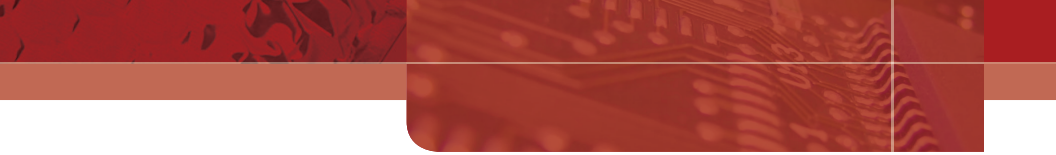


Hold Function

Pressing the Hold button once while in any measurement mode will cause the 3M™ Ground Pro Ground Integrity Meter to enter the Hold mode. The display will freeze, showing the value at the moment the button was pressed. Pressing the Hold button a second time the display will show the maximum value of the signal accumulated from the moment of pressing the button.

Please note that if you power down the Ground Pro while in any of these modes, it will collect the maximum value of the measured parameter for as long as this mode





is active. Please note that if you power down the 3M™ Ground Pro Ground Integrity Meter while in any of these modes, it will remain in the same mode when the unit is powered up again.

Pressing the Hold button one more time puts the Ground Pro back into regular mode.

Maintenance

Procedures for Cleaning and Decontamination

Clean using a dry brush or vacuum cleaner around the device. In case of contact malfunction, clean contacts using a contact cleaner or a brush and tighten all connections.

Repairs and Servicing

Do not attempt to repair the product yourself. Contact a 3M sales representative or authorized dealer to request inspection and repair. There are no user-serviceable parts.

Device Calibration

Contact a 3M sales representative or authorized dealer to request for product calibration if needed.



3M™ Ground Pro Ground Integrity Meter Model CTM051

Regulatory Information

China RoHS

Electronic Industry Standard of the People's Republic of China, SJ/T11363-2006, Requirements for Concentration Limits for Certain Hazardous Substances in Electronic Information Products

This symbol, per Marking for the Control of Pollution Caused by Electronic Information Products, SJ/T11364-2006, means that the product or part does contain a substance, as detailed in the chart below, in excess of the following maximum concentration values in any homogeneous material: (a) 0.1% (by weight) for lead, mercury, hexavalent chromium, polybrominated biphenyls or polybrominated diphenyl ethers; or (b) 0.01% (by weight) for cadmium. Unless otherwise stated by 3M in writing, this information represents 3M's best knowledge and belief based upon information provided by third party suppliers to 3M.



This numerical reference should not be construed as a representation regarding the product's life or an extension of a product warranty. In the event any product is proven not to conform with 3M's Regulatory Information Sheet, then 3M's entire liability and buyer's exclusive remedy, will be at 3M's option either: (i) replacement of product with a conforming product, or (ii) refund of the purchase price paid by buyer for each non-conforming product, within a reasonable time after written notification of said non-conformance and return of said product to 3M. 3M shall not under any circumstances be liable for direct, incidental, special, or consequential damages (including but not limited to loss of profits, revenue, or business) related to or arising out of this certification, including, the use, misuse or inability to use the product. Unless stated otherwise in writing, the foregoing language cannot be waived, modified, or supplemented in any manner whatsoever.

产品中有毒有害物质或元素的名称及含量

Name and Content of Hazardous Substances or Elements

(Nom et contenu des substances ou des éléments dangereux)

部件名称 (Part or Component Name) (Nom de la pièce ou du composant)	有毒有害物质或元素 (Hazardous Substances or Elements) (Substances ou éléments dangereux)					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
电容引脚 (Termination in capacitor) (Terminaison d'un condensateur)	×	○	○	○	○	○
电位器中的电阻油墨 (Resistor ink in potentiometer) (Encre du résistor d'un potentiomètre)	×	○	○	○	○	○
二极管焊接部 (Solder in diode) (Soudure d'un diode)	×	○	○	○	○	○
二极管电镀 (Finish in diode) (Fini d'un diode)	×	○	○	○	○	○
印刷电路板焊盘/安装孔 (Terminations in PCBs) (Terminaisons des PCB)	×	○	○	○	○	○
电阻引脚 (Terminations in resistors) (Terminaisons des résistors)	×	○	○	○	○	○
电阻电镀部 (Plating in resistors) (Placage des résistors)	×	○	○	○	○	○
连接器 (Connector) (Connecteur)	×	○	○	○	○	○
三极管 (Transistor) (Transistor)	×	○	○	○	○	○
电感器 (Inductor) (Inducteur)	×	○	○	○	○	○
电磁干扰滤波器 (EMI filter) (Filtre anti-perturbation électromagnétique)	×	○	○	○	○	○
装置的焊接部 (Solder in instrument) (Soudure d'un instrument)	×	○	○	○	○	○
IC焊接部 (Solder in IC) (Soudure d'un circuit intégré)	×	○	○	○	○	○

3M™ Ground Pro Ground Integrity Meter Model CTM051

Impedance

Range	Range: 0.000 – 1.999 Ohm, 2% + 0.01 Ohm Range: 00.00 – 19.99 Ohm, 1% + 0.05 Ohm Range: 000.0 – 199.9 Ohm, 1% + 0.5 Ohm Range: 0000 – 1999 Ohm, 1% + 5 Ohm Automatic auto-zero for test leads
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EMI (noise on ground)

Bandwidth	9kHz – 450MHz
Measurement Range	10mV – 5Vpeak 80dBuV – 134 dBuV
Measurement Type	Average Peak

Voltage on Ground

AC (50 – 500 Hz)	0.001 – 10 V RMS
DC	0.001 – 10 V

General

Power	Battery 9V Alkaline
Dimensions (approx.)	4.5" x 2.4" x 1.1" 114 mm x 60 mm x 28 mm

有毒有害物质或元素

(Hazardous Substances or Elements)
(Substances ou éléments dangereux)

部件名称 (Part or Component Name) (Nom de la pièce ou du composant)	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
蜂鸣器焊接部 (Solder in buzzer) (Soudure dans un bouton-signal)	×	○	○	○	○	○
音频插孔 (Audio jack) (Prise audio)	×	○	○	○	○	○

“○：表示该有毒有害物质在该部件所有均质材料中的含量均在SJ/T11363-2006 标准规定的限量要求以下。(Indicates that this hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006.) (Indique que cette substance dangereuse contenue dans tous les matériaux homogènes de cette pièce se situe sous la limite permise conformément aux exigences de la norme SJ/T11363-2006.)

“×：表示该有毒有害物质至少在该部件的某一均质材料中的含量超出SJ/T11363-2006 标准规定的限量要求。(Indicates that this hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in SJ/T11363-2006.)” (Indique que cette substance dangereuse contenue dans au moins un des matériaux homogènes de cette pièce se situe au-dessus de la limite permise conformément aux exigences de la norme SJ/T11363-2006.)



This is the EU symbol for equipment that is covered under the Waste from Electrical and Electronic Equipment (WEEE) directive per CENELEC Specification 5041. It indicates that certain products should not be discarded in the trash, but rather should be recycled. This applies to all electronic pluggable and battery powered products.

Ceci est le symbole de l'UE pour l'équipement assujéti à la directive relative aux déchets d'équipements électriques et électroniques (DEEE) conformément à la spécification 5041 du CENELEC. Cette directive stipule que certains produits ne doivent pas être jetés aux ordures, mais doivent plutôt être recyclés. Elle s'applique à tous les appareils électroniques enfichables et à tous les produits alimentés par une pile.

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