

Ground Pro Meter Installation, Operation and Maintenance



Made in the
United States of America



Figure 1. SCS CTM051 Ground Pro Meter

Description

The SCS CTM051 Ground Pro Meter is a comprehensive instrument that measures the ground connection of your equipment in accordance with Grounding standard ANSI/ESD S6.1 and ANSI/ESD S20.20. 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.

The Ground Pro Meter and its accessories are available as the following item numbers:

Item	Description
CTM051	Ground Pro Meter
NCA006	Replacement Test Leads, 1 Pair

Packaging

- 1 Ground Pro Meter
- 2 Test Leads
- 1 9V Alkaline Battery

Controls and Indicators

- POWER C** Hold to power the meter ON and OFF. Press once to return the meter to the home display.
- OHM** Switches the unit into impedance measurement mode
- EMI** Switches the unit into high-frequency noise or electromagnetic interference (EMI) measurement mode
- HOLD** Freezes the display/and shows the maximum measurement value
- Light Icon** Display backlight on/off
- F** Function button, also checks Battery Voltage
- V** Switches the unit into AC and DC voltage mode
- REF.** Sets up the reference for measurements and alarms
- Up Arrow** Adjusts the scale for some parameters and adjusts reference values
- Down Arrow** Adjusts the scale for some parameters and adjusts reference values

Features and Components



Figure 2. Ground Pro Meter features and components

Power

The Ground Pro Meter uses a 9V alkaline battery. Do not use any other battery. If you are not using your Ground Pro 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 Ground Pro 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.

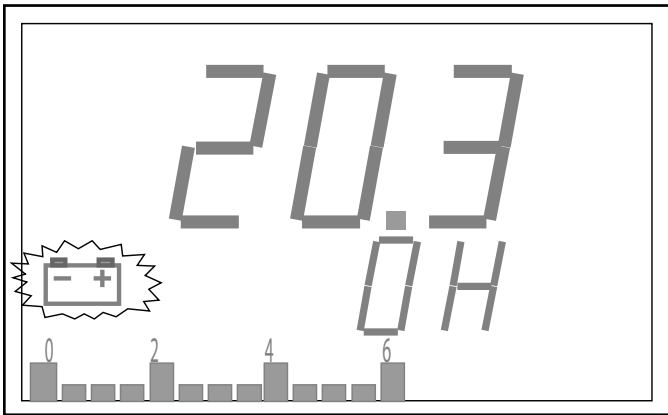


Figure 3. Low-battery indicator

Turning Unit On and Off

ON

Press the button. 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 Ground Pro Meter will turn off.



Automatic Power Off

The Ground Pro Meter is programmed to Automatically Power Off (APO) after 10 minutes of inactivity to save battery life. This setting can be seen by pressing the F button once. Automatic Power Off (APO) is always enabled, and it cannot be disabled.



Figure 4. Automatic Power Off (APO) display

Checking the Battery Voltage

Press the F button two times to get the screen in Figure 5. The upper display shows the battery voltage, and the lower display shows the percentage of usable battery life left.

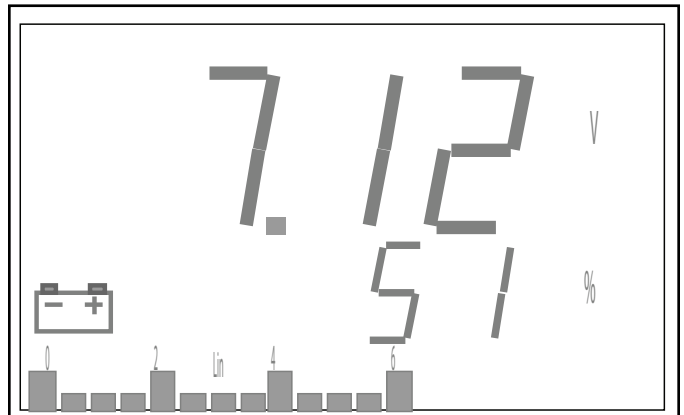


Figure 5. Battery voltage and percentage.

Impedance Measurements

Press the Ohm button to go to ground impedance mode. You should see a screen similar to the one shown in Figure 6. The impedance mode is indicated by "OH" on the bottom display line.

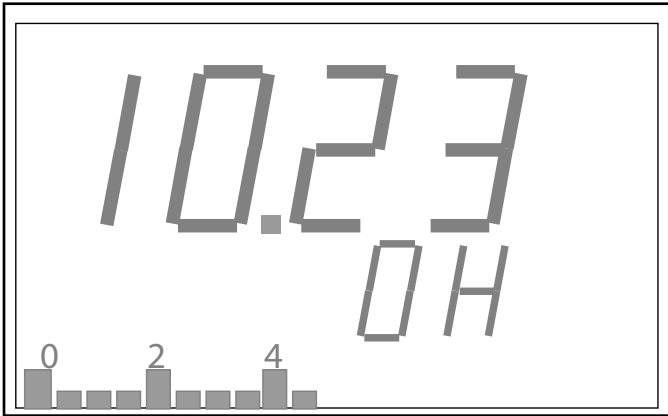


Figure 6. Impedance screen

Scaling

The Ground Pro Meter has four different scales for measuring ground impedance. Choose the appropriate scale for your measurements using the Up and Down arrow buttons.

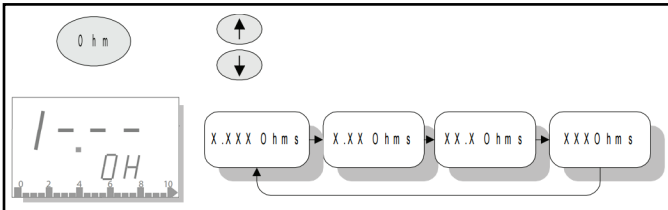


Figure 7. Changing the measurement scale

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 in Figure 8. In a few seconds, this screen will disappear and you will hear a short beep. The Ground Pro 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.

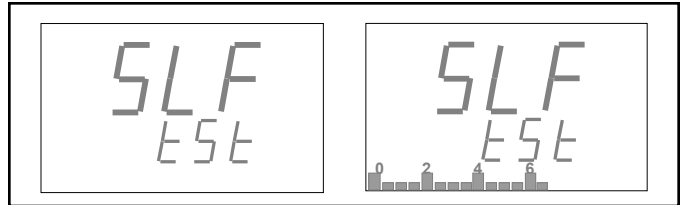


Figure 8. Auto-zero test screens

Voltage on Ground Measurements

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



AC Voltage

Integrity Meter will switch to AC voltage measurement mode and you should see a screen similar to one in Figure 9. You can adjust the measurement scale using the Up and Down arrow buttons.



Figure 9. AC voltage display

DC Voltage

Press the V button again to switch to DC voltage measurement mode. You should see a screen similar to the one in Figure 10. 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 in Figure 10. In such a case, go to the next scale using the Up arrow button.

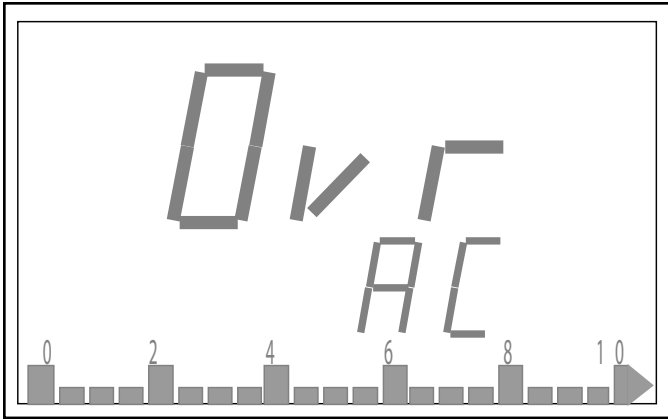


Figure 10. AC voltage screen.

Using Reference with Impedance 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 multi meter, the Ground Pro 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 in Figure 11 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.

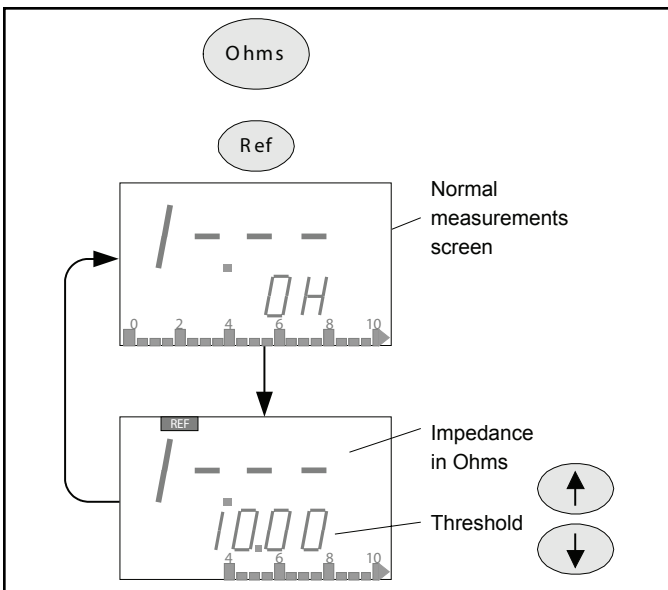


Figure 11. Impedance measurements screen

EMI Measurements

High frequency noise or ElectroMagnetic Interference (EMI) on a ground causes equipment malfunction and damage to sensitive components. The Ground Pro 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 dB μ V. The latter is a logarithmic measure of voltage where 0 dB μ V is referenced to 1 μ V.

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

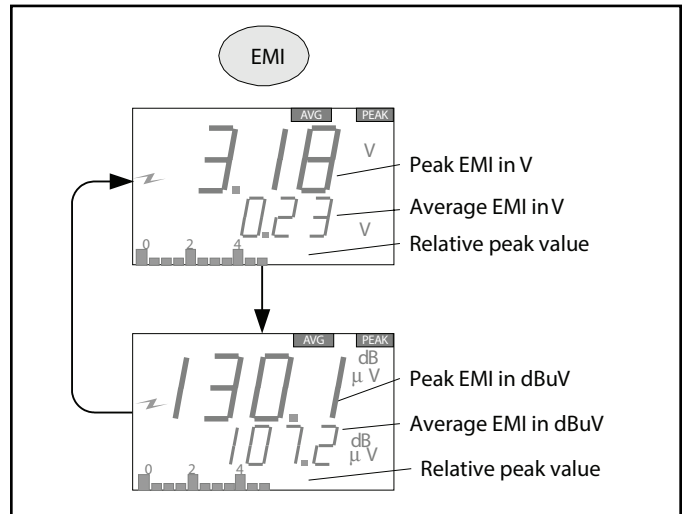


Figure 12. EMI Measurement screen

Auto Scale

The Ground Pro Meter uses auto scaling in ElectroMagnetic Interference (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 peak signal. Adjust the reference level using the Up and Down arrow buttons. Now whenever the peak 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 average signal as shown below.

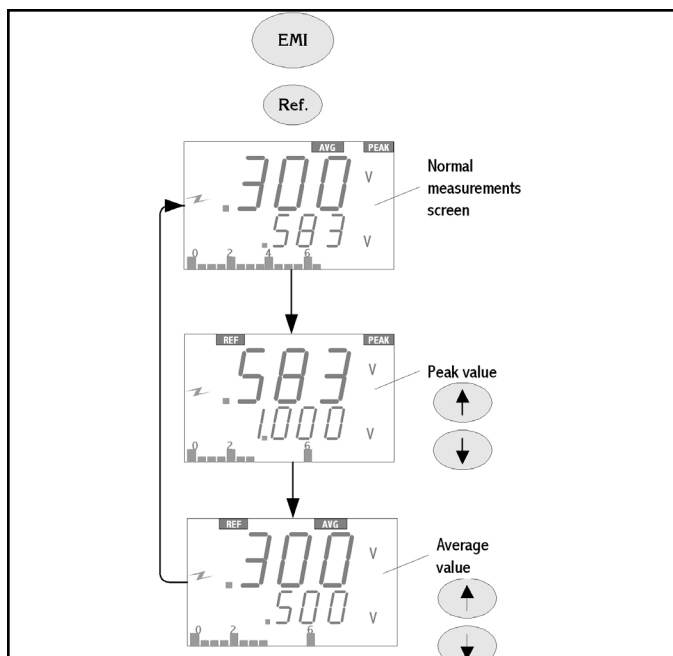


Figure 13. Reference mode with EMI

Hold Function

Pressing the Hold button once while in any measurement mode will cause the Ground Pro 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.

Note: If you power down the Ground Pro 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.

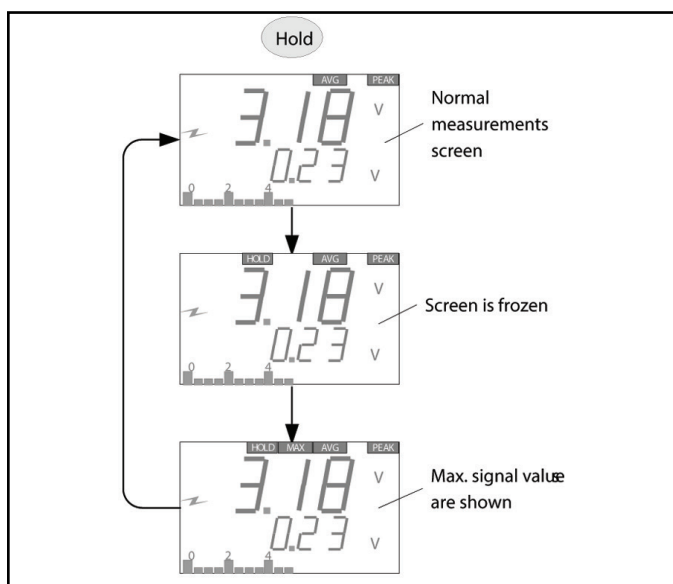


Figure 14. Hold mode

Maintenance

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.

Do not attempt to repair the product yourself. The Ground Pro Meter requires little maintenance, and there are no user-serviceable parts. If your unit requires service beyond cleaning or replacing the battery, please contact [SCS Customer Service](#).

Calibration

Calibration of the Ground Pro Meter requires specialized proprietary equipment. It must be performed by the SCS factory. The frequency of calibration is driven by the amount of risk exposure that can occur between tests, however, in general we recommend annual calibration. See [SCS Calibration Terms and Conditions](#).

Specifications

Power

Battery 9V Alkaline

Impedance

Range 0.000 to 1.999 Ω
00.00 to 19.99 Ω
000.0 to 199.9 Ω
0000 to 1999 Ω
Automatic auto-zero for test leads

Accuracy $\pm(2\% + 0.01 \Omega)$ for 0.000 to 1.999 Ω
 $\pm(2\% + 0.03 \Omega)$ for 00.00 to 19.99 Ω
 $\pm(2\% + 0.3 \Omega)$ for 000.0 to 199.9 Ω
 $\pm(2\% + 3 \Omega)$ for 0000 to 1999 Ω

Test Signal Frequency 600 Hz, square pulse

EMI (ElectroMagnetic Interference or high-frequency noise)

Bandwidth 9 kHz to 450 MHz
Measurement Range 10 mV to 5V peak
80 dB μ V to 134 dB μ V

Measurement Type Average Peak

Voltage on Ground

AC (50 to 500 Hz) 0.001 to 250 V RMS
DC 0.001 to 350 V

General

Dimensions (approx) 4.5" x 3.6" x 1.1"
(114 mm x 92 mm x 28 mm)
Weight (approx) .3 lbs (.14 kg)

Safety Information

Intended Use

The Ground Pro Meter measures several important parameters of grounding: ground impedance and high-frequency noise or ElectroMagnetic Interference (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 Pro Meter to measure ground.

Ground connectivity is measured in accordance with ANSI/ESD 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 or ElectroMagnetic Interference (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.

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

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 SCS 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

Notice: To reduce the risks associated with property damage:

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

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

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 SCS in writing, this information represents SCS best knowledge and belief based upon information provided by third party suppliers to SCS.

Part or Component Name	Hazardous Substances or Elements					
	(Pb)	(Hg)	(Cd)	(CrVI)	(PBB)	(PBDE)
Termination in capacitor 0603	X	O	O	O	O	O
Solder in diode	X	O	O	O	O	O
Finish in diode	X	O	O	O	O	O
Terminations in PCBs	X	O	O	O	O	O
Terminations in resistors 0603	X	O	O	O	O	O
Plating in resistors 0603	X	O	O	O	O	O
Resistor ink in potentiometer	X	O	O	O	O	O
Solder in instrument	X	O	O	O	O	O
Solder in IC	X	O	O	O	O	O
Solder in buzzer	X	O	O	O	O	O
Audio jack	X	O	O	O	O	O
O: Indicates that this hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in the SJ/T11363-2006.						
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 the SJ/T11363-2006.						

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 SCS's Regulatory Information Sheet, then SCS's entire liability and buyer's exclusive remedy, will be at SCS's option either: (i) replacement of product with a conforming product, or (ii) refund of the purchase price paid by buyer for each nonconforming product, within a reasonable time after written notification of said nonconformance and return of said product to SCS. SCS 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.

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.



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 A digital apparatus complies with Canadian ICES-003.

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

Limited Warranty, Warranty Exclusions, Limit of Liability and RMA Request Instructions

See the SCS Warranty - StaticControl.com/Limited-Warranty.aspx