

Problem: Noise in Low Current Measurements

Low current measurements (current <1nA) often encounter noise. Here are a few likely causes of noise in low current measurements and how they can be avoided.

Potential Cause: Electrostatic Coupling

This occurs when an electrically charged object is brought near an uncharged object.

Remedies

- A. Shield the device/circuit—High impedance materials do not allow the charge to decay quickly. Shielding the device or circuit to be measured greatly reduces the electrostatic interference. Connect the shield to circuit low.
- B. Movement—Avoid movement and vibration near the test area.
- C. Keep all charged objects (including people) and conductors away from sensitive areas of the test circuit.

Potential Cause: Vibration

Vibration can cause noise currents to flow due to the triboelectric effect.

Remedies

- A. Use low noise cables, which have graphite lubrication on the shield braid, to cut down the friction between insulators in the cable to reduce this effect.
- B. Secure the cables to avoid any unnecessary vibration.

Potential Cause: Low Source Impedance

Remedies


- A. When the impedance of the source is low a less sensitive measurement range can be used.
- B. Adding some series resistance when measuring current from a capacitive source reduces noise.

- C. A useful alternative to the series resistance is to put a forward-biased diode in series. The diode acts like a variable resistance—low when the charging current is high and then increasing in value as the current decreases with time.

Potential Cause: Offset Current Drift

Offset currents can drift over a period of time, usually because of temperature changes in the device and the meter.

Remedy

Stabilize the temperature of the meter, the device, and the general environment of the measurement. 

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