An Improved Instrument for Locating Static Charge Problems

By William A. Maryniak
Senior Applications Engineer

The Advanced Energy Trek 520 Hand-Held Electrostatic Voltmeter provides a better method for locating and measuring static charges on surfaces than conventional fieldmeters.

Hand-held electrostatic instruments are widely used for making measurements of charge levels in the assembly, and during testing, of semiconductors, hard disk drives, and other static-sensitive devices. As is well known, the buildup of static charge can result in an electrostatic discharge (ESD) event, causing product failures.

Hand-held fieldmeters have been used to measure levels and locations of static charge, but they are limited due to the spatial resolution of the instrument (i.e., the size of the test area that is measured by the meter). Typically, fieldmeters are recommended to be used at a one-inch probe-to-surface spacing which severely limits their use in accurately measuring localized areas of static charge.

The Trek 520 offers the capability to accurately measure surface voltages, while allowing for its probe to be placed over a wide range of 5 mm to 25 mm from the test surface. The 520 is designed with an AC feedback technique to provide an accurate measurement over this probe-to-surface spacing range. This allows the user to more easily locate the probe around the surface to be tested. In addition, when the 520 is used around the 5 mm spacing, the instrument is able to resolve small areas of charge on the surface under test, providing improved capability to locate static charge problems.

The spot resolution capability of the instrument will affect the level of voltage or field read when measuring surfaces that have small areas of localized charge, as the instrument will read an average of the charged areas and the uncharged areas that are incorporated into its spot resolution area. An instrument with a large spatial resolution, such as a fieldmeter, measuring a surface with a localized charge will report lower level measurements, thus causing under-reporting of the level of hazard present. Therefore, the higher resolution capability of the Trek 520 provides an improved indication of the presence, location, and value of the actual static charge.

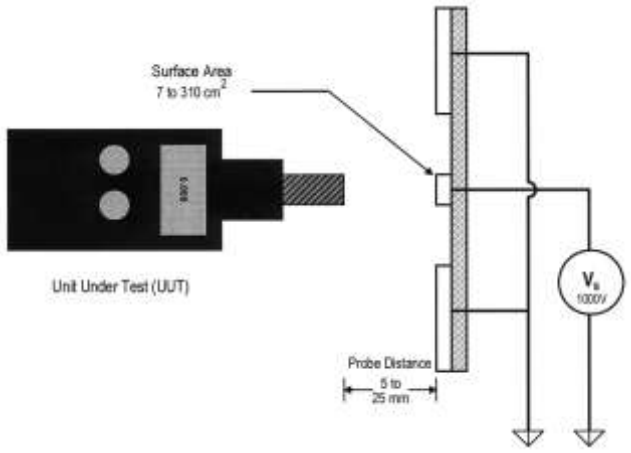

Figure 1 - Test Setup

The accuracy of the meters was tested with a fixed test surface area, radius 100 mm (Figure 1). The results below (Figure 2) show the high accuracy of the Trek 520 as compared to the fieldmeter over a probe-to-surface spacing of 5.0 mm to 25.0 mm. A potential of 1000 V is applied to the test surface.

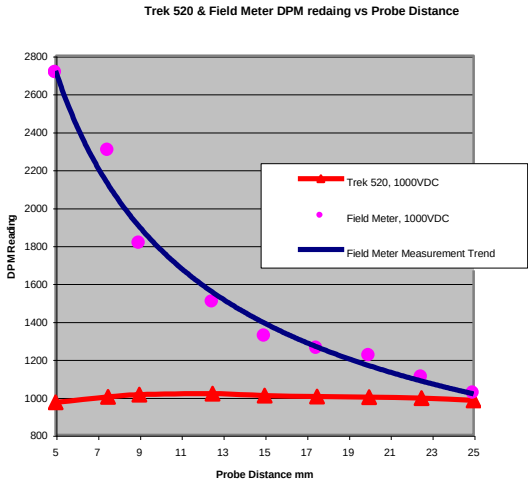

Figure 2 - Trek 520 and Fieldmeter DPM Reading vs. Probe Distance

Tests were also run to examine the ability of the units to measure small areas of charge.

Figure 3 - Spot Resolution Comparisons at the Recommended Probe-to-Surface Spacings

Figure 3 shows a comparison of the spatial resolution of the instruments. At the recommended spacing of one inch, the fieldmeter requires a spot size area of 235 sq. cm to make a measurement with a 5% error, while the 520 is able to measure a spot size of 28.3 sq. cm with a 5% error at its recommended spacing of 5 mm.

As the charged spot area is decreased, the fieldmeter measurement display (in volts) varies widely. The Trek 520 maintains a more consistent and accurate measurement reading while measuring larger or smaller charged spot areas.

In conclusion, the window of error for the Field Meter during these tests was significantly large, approximately –70% to about +270%. The Trek 520 provided better spatial resolution than the Field Meter and maintained an error of less than 5%.

The Trek 520 provides the user with a low cost portable instrument that can be relied upon to provide an accurate measurement of surface voltage that is virtually independent of probe-to-surface spacing.

Advanced Energy

For international contact information, visit advancedenergy.com.

sales.support@aei.com
+1 970 221 0108

PRECISION | POWER | PERFORMANCE