

Putting Your Components to the ESD Test

Testing Sensitivity

Testing the sensitivity of components to ESD (electrostatic discharge) can be done in a couple of different ways. Either way, you're determining what it takes to make a device fail when subjected to an electrostatic discharge (ESD). The two primary models for ESD testing include the Human Body Model (HBM) and Charged Device Model (CDM).

The models can simulate events; though they can't completely mimic the entire range of potential ESD incidents. These two tests, HBM and CDM have proven to be successful at reproducing more than 99% of ESD field failure signatures. Through these tests industries can -

- Create and quantify suitable on-chip protection
- Make comparisons between devices
- Form a classification system for ESD sensitivity to help ESD design and monitoring requirements of manufacturing and assembly settings
- Access documented test procedures to substantiate reliable and repeatable results

Human Body Model Testing

It doesn't take much to cause a discharge. Walk across the floor in your socks and you're adding an electrostatic charge to your body. After doing so, if you were to touch your finger to a lead on an ESDS device or assembly, your finger could discharge and possibly cause damage to the object.

The oldest and most common form of testing, the HBM classifies ESD sensitivity by using a simulator with a special output circuit. The device is placed in a test system and contact is made through a relay matrix where the device is zapped with ESDs.

The device is considered to have failed if it doesn't meet the datasheet parameters using parametric and functional testing. Failures can include junction damage, metal penetration, melting of metal layers, contact spiking and damaged gate oxides.

Charged Device Model (CDM) Testing

A charge can also come from an electrostatic discharge sensitive (ESDS) device and cause an ESD event. For instance, if a device slides down a feeder in an automated assembler, the device can become charged. If it were to touch the insertion head or another conductive device, a quick discharge could take place. This represents a Charged Device Model (CDM) event and is potentially more destructive than an HBM event. Damage can take place in as little as a nanosecond.

This type of event generally happens in automated-manufacturing environments where machines may always stay turned on and cause electronic integrated circuits (ICs) to become charged. If the part touches a grounded conductor, the built-up storage of energy discharges. CDM discharge depends mostly on the parasitic parameters of the discharge as well as the size and type of the component package.

To test in this manner, a device is placed on a field plate with the leads pointing up; then the device is charged and discharged.