SIMCO ION™
An ITW Company

APPLICATION NOTE

CDM Event Simulator (CDMES)

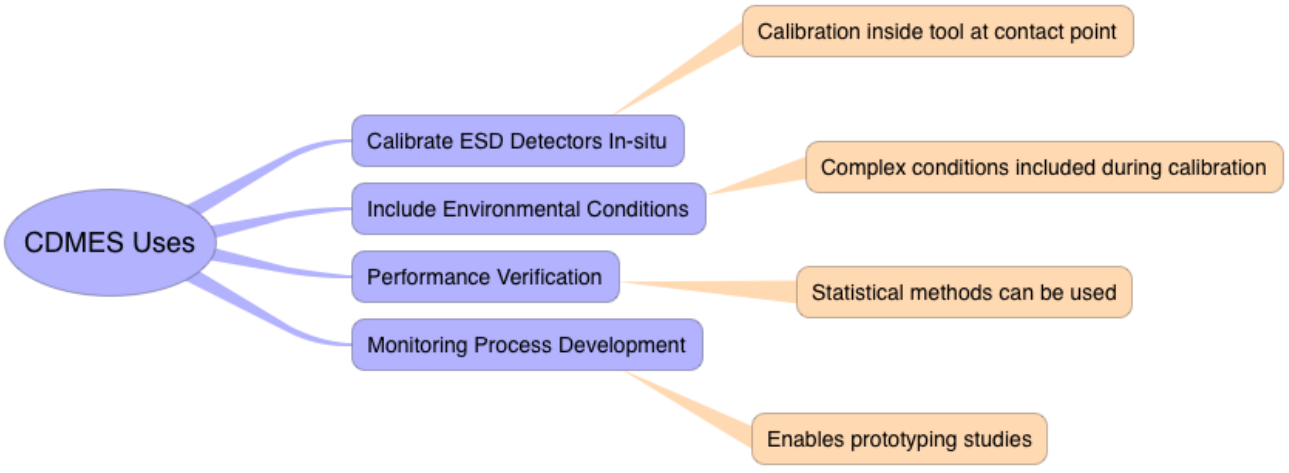
Calibrating ESD Event Detectors

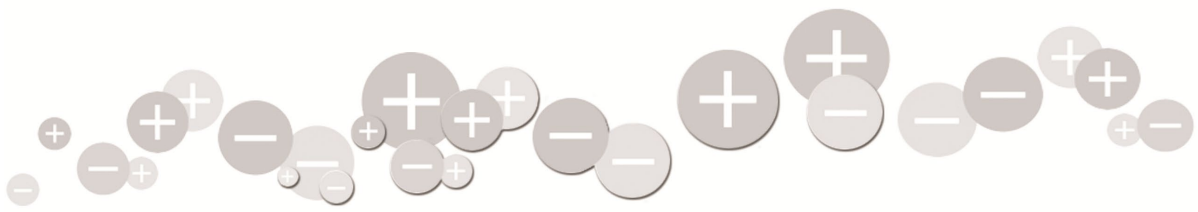
The Simco-Ion CDM Event Simulator (CDMES) was designed to allow ESD detectors to be calibrated inside the tools and operations where CDM (Charged Device Model) events occur. This simulation tool allows calibrated CDM events of different magnitudes to be produced at the point where production devices are most vulnerable and where ESD monitoring sensors are located. This approach allows the highest level of handling safety for sensitive devices.

Devices are usually characterized for failure thresholds in formal test beds and machines designed to simulate discharges on the various device input and output connections. This information is used to assess risk during all phases of device manufacture and system integration. Using this specific device failure threshold information in conjunction with the CDMES allows ESD detectors to be calibrated for specific location and device ESD event monitoring.

Many applications in semiconductor manufacturing, FPD manufacturing, PCB manufacturing and assembly and general electronics manufacturing, handle sensitive product in locations where damaging ESD events can occur. Traditionally, simulating CDM events at the point of monitoring has posed challenges when attempting to use actual charged devices. Part of this difficulty concerns repeatability of the discharge events themselves. Other difficulties exist due to conditions imposed upon the radiated ESD waveform by the materials and configuration of the manufacturing process point itself.

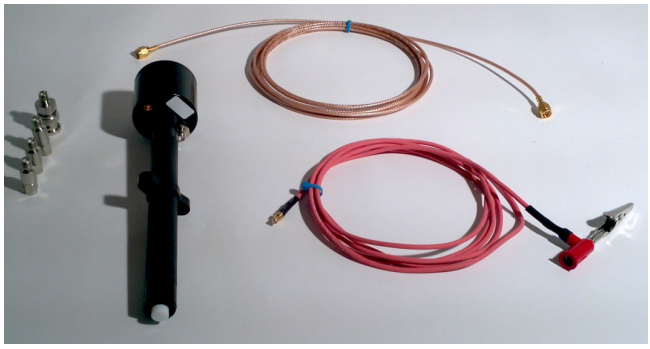
The CDMES was developed to alleviate these problems by providing a repeatable CDM calibration event at the process point which takes into account uncharacterized location conditions.



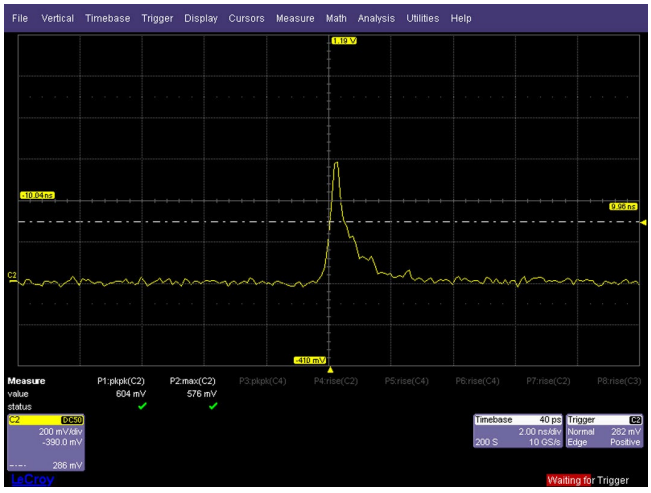


In addition, the use of a consistent calibration method allows statistically based ESD detector calibrations to be employed. ESD programs require that calibration and ESD variable test results be recorded. Some advanced programs also require that methods adhere to a minimal statistical requirement. The adoption of a "calibration measurement set" for validation can eliminate errors. This can be especially important in tools and processes where environmental conditions can challenge the detection and classification of ESD radiated signals.

How It Works



The CDMES uses an enclosed mechanical gap control system to simulate the electrostatic discharge which occurs between a charged object and a ground reference. Specifically, it simulates the Charged Device Model (CDM) discharge type which is characterized by a fast single-peak pulse waveform of transferred current between the device and ground.



CDMES Produced Single Peak CDM Pulse

The CDM power circuit incorporates high resistance so that the voltage across the gap is high and current is low. The discharge created by the simulated CDM event between the electrode and anode across an enclosed air gap produces a radiating electromagnetic pulse transient. This propagating electric field expands outward from the tip of the CDMES emulating the type of electrostatic discharge which would occur for an arbitrary charged device and typical ground contact. The CDM pulse as reproduced on the oscilloscope is a graph of the CDMES current pulse waveform and corresponds to the classical CDM waveform referenced in all standards documents. The produced waveform also corresponds to the input CDM pulse waveform which formal device test machines use to evaluate device susceptibility. The CDMES was designed specifically to field calibrate the Simco-Ion MiniPulse ESD Event Detector.

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