SIMCO ION™
An ITW Company

APPLICATION NOTE

Model 5710

Pulse Ionization Confusion with ESD

The Model 5710 ionizing bar uses an advanced technology which limits electrical duty cycles for corona ionization through the use of high frequency micropulse power methods as a means to reduce contamination accumulation and product exposure to electric fields.

Ionizing bars, unless damaged or defective, do not produce electrostatic discharge (ESD) events. The use of improper analysis methods or equipment, however, will often register a false positive ESD event when high-frequency micro-pulse ionizing bars are present. In particular, ESD detection products can have difficulty in distinguishing 10 nanosecond duration ESD pulse events (see Fig. 1) from 40 microsecond (40,000 nanosecond) duration ionization pulses (see Fig. 2). The use of a time domain measurement instrument like a fast DSO (Digital Sampling Oscilloscope) will easily distinguish between the waveform for a true ESD event and the normal operation of a micro-pulse ionizing bar.

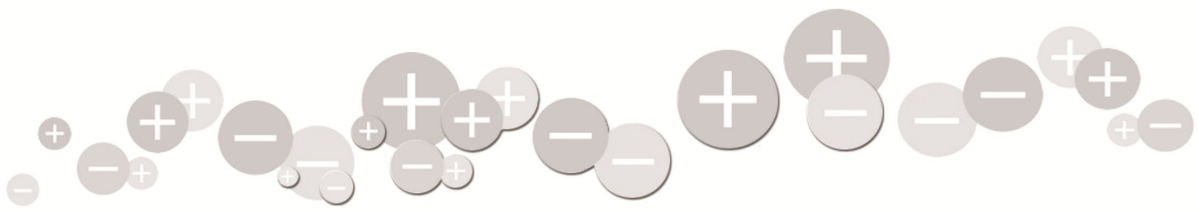
Ionizer Induced Voltages

All corona type ionizers produce electric fields as a result of placing voltage on either point or wire type emitter electrodes. Most corona ionizers produce sine wave structured electric fields which create positive and negative ion production cycles (see Fig. 3). These electric fields, which are separate from the ion fields which do the work of electrostatic charge removal, can induce voltages on sensitive exposed product under certain circumstances. However, damage to devices from ionizers is extremely rare and usually occurs at abnormally close distances to exposed product, and then only under special conditions.

Device Equipotential Factor

Rapid uncontrolled current flow, which is the most frequent culprit in electrostatic device damage, is caused by significant differences in electric potential. If a device experiences differences in electric potential across exposed conductive structures, depending upon a variety of factors, damage can occur if current flows from one part of a device to another in a rapid and uncontrolled manner.

However, if the electric potential gradient across the device is constant or very limited, then very low current flow (if any) is produced. Ionizer electric fields generally induce a very low electric gradient across exposed device structures due to the near equal potential of the electric field at the surface of the device. Simply put, significant current does not flow across device structures because there is no field induced difference in electrical potential across the device (see Fig 4).



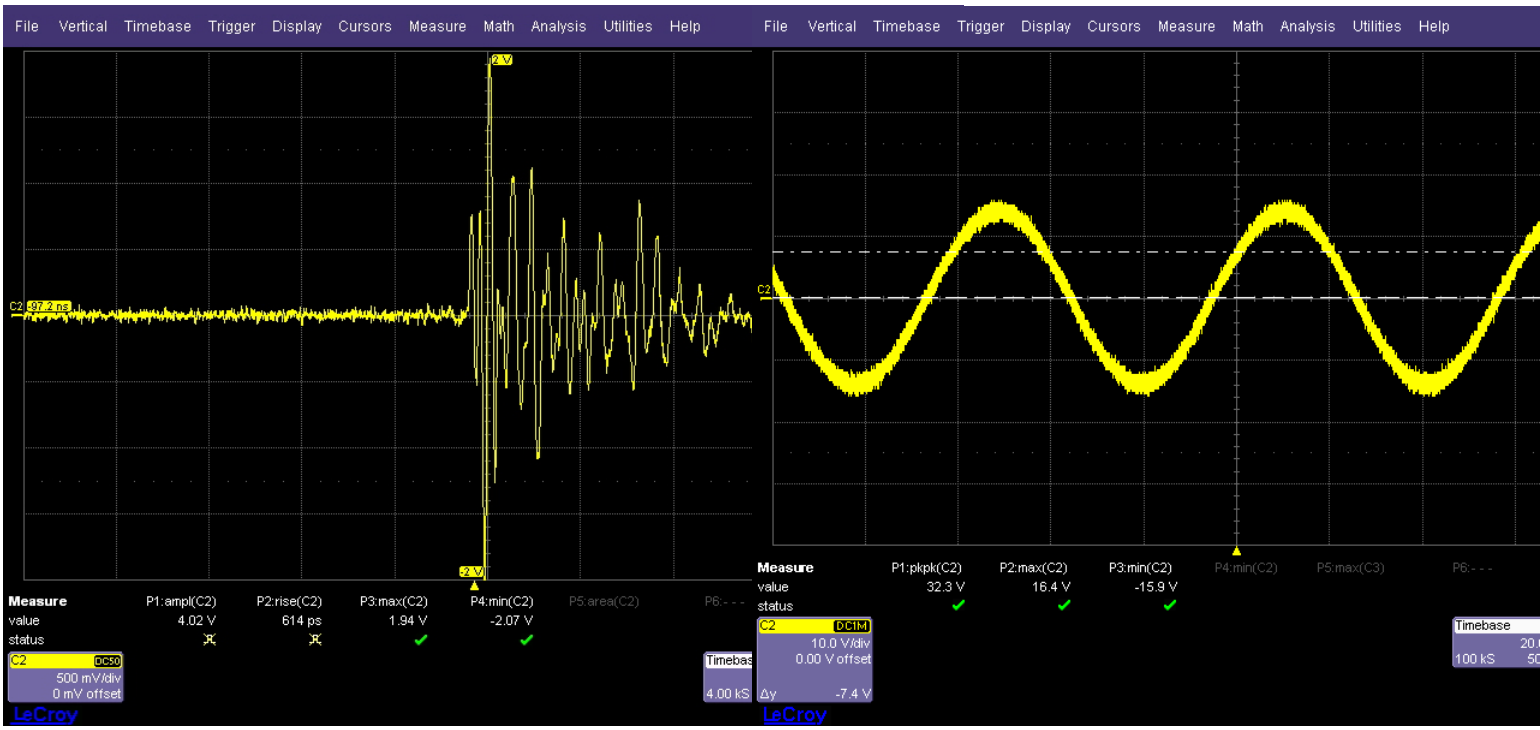


Figure 1. Typical general ESD event captured by an oscilloscope with E-field antenna. Signal duration <40 nsec. Note that most of this waveform is due to antenna-cable-oscilloscope reflection noise.

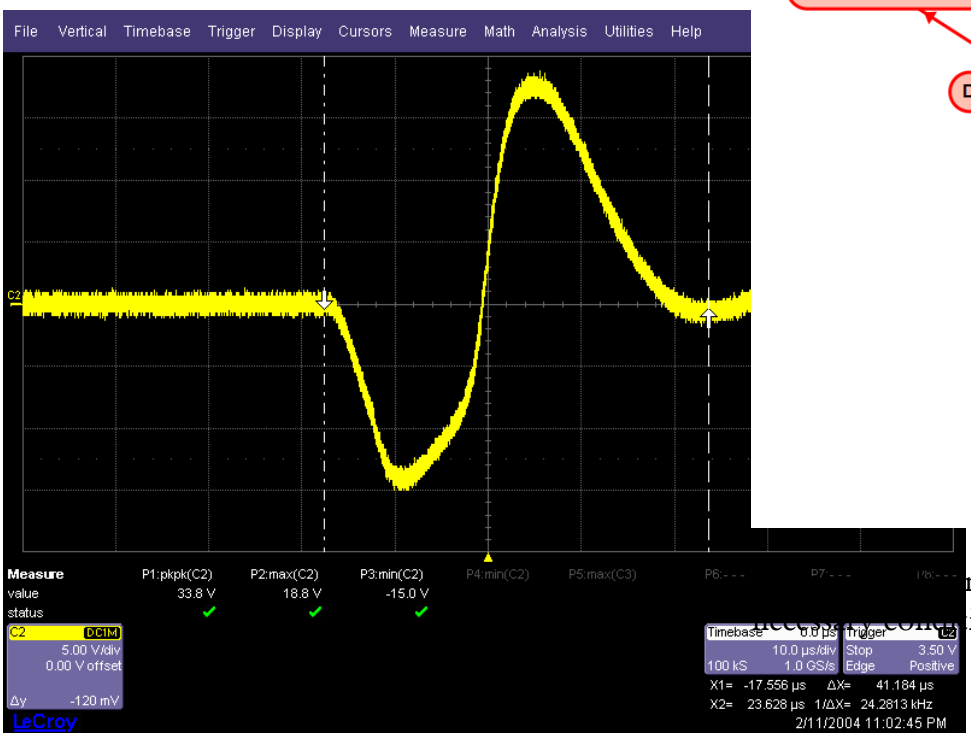
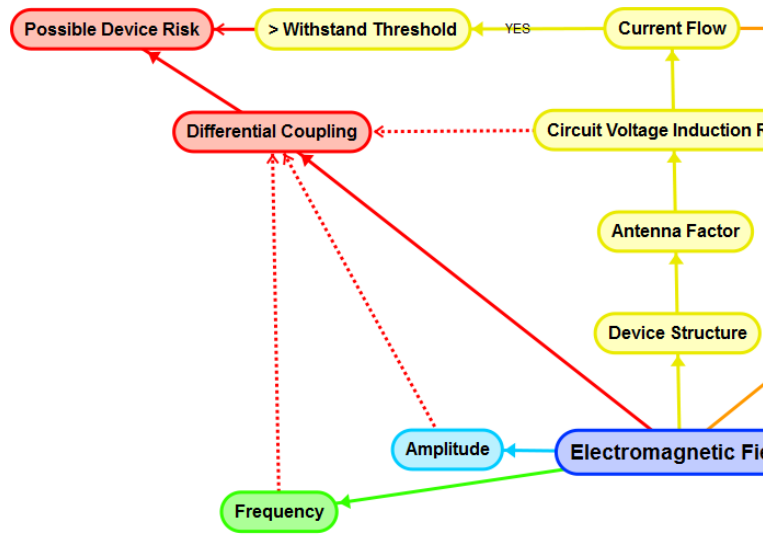


Figure 2. Model 5710 MicroPulse single pulse signature at 10 cm distance. Signal duration is 41 μs.

Figure 3. The electromagnetic signature for a non-MicroPulse ionizing bar at 10 cm shows the absence of pulse events. Cycle duration is ~60 μs.



mple schematic representation of
ions for field induced device failure.

Conclusion

The Model 5710 MicroPulse ionizer does not produce ESD events. It does produce micro-second duration ionization pulses which are similar in electromagnetic wave structure to other conventional ionizing bars. It is strongly advised that standard engineering practice using digital oscilloscopes and appropriate antennas be used to measure for ESD events so that waveforms can be accurately identified.

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