SIMCO ION™
An ITW Company

APPLICATION NOTE

ESD vs. Electromagnetic Noise

Separating ESD from all the Rest

Traditionally, finding and monitoring ESD events has usually been limited to investigation with oscilloscopes and suitable antennas or simple voltage threshold detection devices. A gap has existed between digitally sampling ESD waveforms to identify and determine individual event characteristics and using lower cost devices restricted to sensing analog voltage levels at the specific application point.

To address the functionality gap, a hybrid sensor has been developed which combines some features of both approaches and lends itself to embedded ESD detection in noisy electronic environments as well as more general applications.

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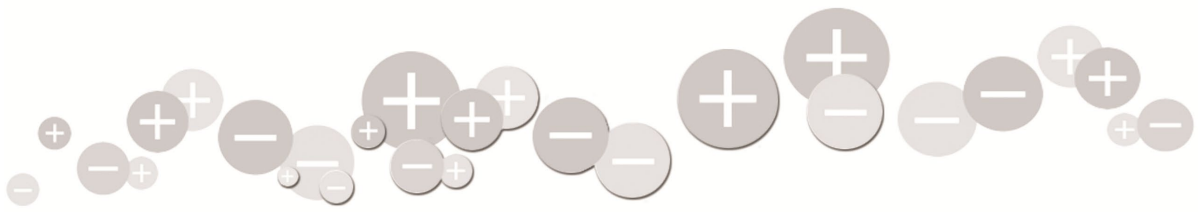
Definitive analysis of ESD events will likely remain in the high-bandwidth digital oscilloscope (DSO) realm, where high resolution time domain measurements and waveform characterization are available. However, dedicating this type of equipment to long-term monitoring is not feasible for a variety of reasons (equipment cost and availability among them). Also, the learning curve involved in becoming proficient with high-end scopes and other attendant equipment to successfully evaluate ESD is pretty steep. Even when the equipment and expertise is available, deploying this equipment to chase false ESD alarms from dedicated sensors quickly proves tiresome and unworkable.

Add to this the fact that modern manufacturing environments are utilizing ever increasing automation for product handling, and it becomes apparent that ambient noise levels can present an ESD detection problem for radiated field strength monitoring alone.

Another source of interference which has troubled ESD sensors has been the rise in general RF usage in manufacturing facilities. It is now becoming common for cell phones and two-way pagers to be authorized for use on the process floor. WiFi and Bluetooth applications are migrating into sensitive process and tool areas with the potential for disruption in ESD monitoring for very sensitive applications. RFID applications are also beginning to become popular as comprehensive tracking methods for product and personnel alike – another addition to the electronic soup.

A New Approach

The NanoPulse uses dynamic threshold analysis to determine ambient noise level and form the first part of ESD pulse event discrimination. It also addresses a spectral range of 1 MHz to 8 GHz, which accommodates ESD event bandwidth as well as most commonly encountered electromagnetic noise frequencies. The NanoPulse also tracks electromagnetic noise levels separately from ESD event detection and analysis, allowing separate alarm reporting. Alarm reporting levels for both ESD events and EM levels are user programmable.



Another feature of the NanoPulse is antenna independence. Both active and passive antennas in a variety of configurations can be implemented to further tune ESD event detection. In some cases, specialized antennas can be implemented which are direct analogs for very sensitive product and which can correctly represent true product vulnerabilities to radiated energy.

In applications with accessibility and space restraints, small form-factor antennas can be installed directly at the monitoring point with sensor processing taking place in the Series 7000 at a more accessible location.

Reporting and Monitoring

The NanoPulse is typically deployed in Novx Series 7000, which has advanced features for reporting and monitoring. Typical methods of reporting ESD events are cell phones (text messaging, voice mail), pagers and email in addition to local alarming for tools and processes.

The Series 7000 can also utilize Ethernet, Wireless LAN (802.11x) and RS-485 to communicate alarms to area networks or to individual tools while embedded.

Conclusion

The NanoPulse has been developed for ESD/EMI applications requiring a constant dedicated monitoring strategy in highly constrained processing environments. The combination of smart signal processing to identify ESD events from most background noise with the freedom to adapt antenna types and configurations for specific applications makes it a valuable addition to process monitoring.

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