SIMCO ION™
An ITW Company

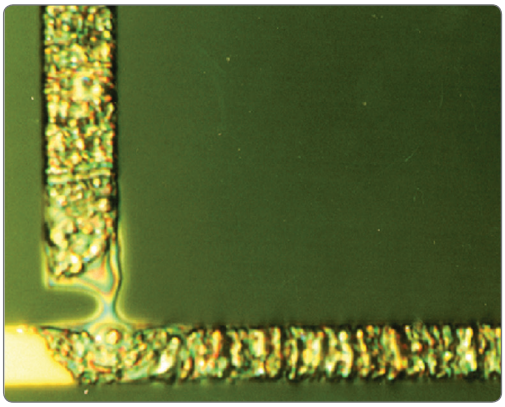
Ionization Solutions

Static Charge Control

FOR SEMICONDUCTOR MANUFACTURING

Static Charge in Semiconductor Manufacturing

Static charge is generated throughout the semiconductor manufacturing process, caused primarily by the contact and separation of dissimilar materials. Static charge affects productivity and yield in three ways. Static charge electrostatically attracts (ESA) particles from the air causing potential yield loss on wafers and reticles. Electrostatic discharge (ESD) of voltages cause instant or latent defects on reticles, wafers, or packaged chips. Electrostatic discharges can also create electromagnetic interference (EMI), triggering microprocessor lockup and robotic malfunctions that lead to product flow interruptions and costly tool downtime.



Reticle damage caused by ESD

Ionization and Continuous Process Monitoring

Air ionization maintains the integrity of cleanrooms and products by neutralizing static charge on fab surfaces. Our ionization products range from digital systems that manage and automate cleanroom and EFEM ionization to specialty ionizers inside tools that withstand extreme temperatures, fit into tight areas, or integrate into air lines to ionize airflows. Our Novx product line adds to our sensor capabilities with closed-loop integration to monitor the manufacturing environment. Experienced applications engineering ensures the selection of optimized ionization for your specific process applications. Simco-Ion has been the recognized leader in innovative semiconductor manufacturing ionization technology and products for over twenty-five years.

Static Charge Protection for Each Step of the Process

Our portfolio of static charge control solutions addresses all stages of wafer manufacturing from in-tool requirements and room environments to test, assembly, and packaging applications in final manufacturing.

Wafer Manufacturing: In-tool

Inside tool mini-environments and EFEMs, the Digital AeroBar® Ionization System Model 5225 uses IonMonitor software to adjust, control, and regulate ion output for continual optimized performance. The state-of-the-art Model 5635 AeroBar MP surpasses ISO Class 1 cleanliness, meeting "Extended ISO Class 1 for ≥10 nm particles", thereby providing the cleanest bar ionization available for leading edge wafer technologies.

The Model 5635M Metal-free AeroBar MP provides the same performance for wet-clean and CMP tools where the presence of metals may adversely affect processes and yields. In tight areas where space is limited, the tiny QuadBar™ Ionizers Models 4630/4635 deliver ionization at close distances.

The industry-standard Digital AeroBar system provides balanced, optimized ionization inside tools and mini-environments.

Typical semiconductor applications where ionization and monitoring solutions improve productivity:

Wafer Manufacturing
In-tool
- **Wet processes**
- **Thermal processes**
- **Implant**
- **Etch**
- **Deposition**
- **Wafer sort**
- **Metrology & inspection**

Cleanroom
- **Photolithography**
- **Reticle storage**
- **FOUP wash**
- **Wafer starts**

Final Manufacturing
- **Wafer mount**
- **Die attach**
- **Wire bond**
- **Packaging & test**
- **IC marking**

Inside tools with high temperature environments such as diffusion furnaces, the High Temperature Ionizer Model 4610TF eliminates charges as they develop.

In nitrogen or CDA gas flows, the In-line Gas Ionizer Model 4210u/un provides an ionized gas output in drying and chemically harsh environments. The Model 4214 Inline Ionizer provides ultra-clean ionization for leading edge processes using nitrogen.

Wafer Manufacturing: Cleanroom
Cleanroom critical areas such as photolithography, reticle storage, FOUP wash, and wafer starts require broad, overhead ionization for maximum defect reduction. Room System ionization (Model 5515 Emitter and 5582 Controller) provides protection for entire areas. IonManager Pro software manages the system to help reduce maintenance activity and cost.

Final Manufacturing & Test: In-tool
Inside test and assembly tools,ionizers used in combination with ESD event detection and field voltage monitors provide protection against costly ESD damage. The small Point-of-Use Blower Models 6422e-AC and 6432e direct ionized air to localized areas. For the most critical device requirements, Critical Environment Blowers Model 5822i In-tool Ionizer, the 5802i Benchtop Ionizer, and 5810i Overhead Ionizers in combination with our Novx monitors, control offset voltages to as low as 1V for voltage-sensitive devices. For optimal protection against latent defects going to the field, the Novx MiniPulse Monitor provides leading-edge in-tool ESD event detection.

Final Manuacturing & Test: Cleanroom
In test, assembly and packaging areas, benchtop blowers Model AeroStat PC and wide coverage Model AeroStat XC2 provide protection at the workbench. Overhead Blowers Guardian and CR2000 models protect products from above the workbench or table, providing large area coverage. The lightweight, ergonomic Ionizing Guns Model 6115 AirForce Gun and the Top Gun provides handheld blow-off ionization. For voltage sensitive applications, Critical Environment Blower models provide ionization at 3V and down to 1V when used with a Novx monitor.

Ultra-clean AeroBar® for Extended ISO Class 1

In-line Ultra-clean 99.999% Nitrogen Ionizer

Room Ionization System


Ionizing Blowers for Device Protection in Test and Assembly

Embeddable Process and ESD Monitoring

Standards for Static Charge Control

Several standards have been developed as guides for controlling the costly effects of static charge in fab environments. Ionization has shown to be effective and necessary in implementing these standards.

- The International Technology Roadmap for Semiconductors (ITRS) makes recommendations for maximum allowable voltages on devices, wafer and photomasks, and facility surfaces.
- The Semi E78 guideline helps tool manufacturers and fab owners assess and determine safe, allowable static charge levels inside their tools.
- The ESD Association's ANSI ESD S20.20 standard outlines the development of a fab-wide static charge control program.

Further Information

Implementing ionization ensures that static charge is controlled before it becomes a barrier to new technology introduction or slows the ramping of new factories.

Visit our web site to download general technical notes on ionization, technical articles and papers on ionization for semiconductor manufacturing, and datasheets for all the products mentioned in this brochure.

PAC
Production Automation Corporation

SIMCO ION™
An ITW Company

Production Automation Corporation

6200 Bury Drive
Eden Prairie, MN 55346
Tel: 888.903.0333
info@gotopac.com
www.gotopac.com

Semi Conductor Brochure - V2