

# Solstice® Series

## Advanced Electroplating Systems for Development and Production



A Powerful Single-Wafer Platform  
for Plating and Multiprocessing  
on 50-200mm Substrates

**ClassOne**  
TECHNOLOGY

*Advanced Plating for the Rest of Us*

## Solstice: Advanced Electroplating For the $\leq 200\text{mm}$ Wafer World

### Capability and economy — combined

Solstice® is the easiest and most cost-efficient route to volume production for smaller-substrate applications. Designed specifically for 200mm and smaller substrates, it means you don't need to buy a big, expensive 300mm tool from the Big Manufacturers. Solstice is a smarter and much more affordable solution.

Solstice is designed specifically for smaller wafers and smaller budgets — priced at *less than half* of what similarly configured plating systems from the larger manufacturers would cost. So it's a sensible way to replace wet benches or older plating systems. You'll get significant improvements in uniformity, consistency, productivity and ROI — to do more and do it better.

### Three models: from development to volume production

For process development you may choose the manual-load Solstice LT with one or two chambers. For mid-level production, the Solstice S4 provides up to four chambers and full cassette-to-cassette automation. For higher-volume production and maximum flexibility, the fully-automated Solstice S8 offers up to eight chambers and up to 75wph throughput.

All Solstice models share the same innovative high-performance chambers, software controls, electronics — and the same superior processing results. Each tool provides the same intuitive, touch-screen control, with GEM/SECSII interface, full reporting and a great deal more.

### Plus: world-class plating applications support

The ClassOne team has literally hundreds of combined years of experience developing ECD processes, and they are eager to help you. Plus, our world-class Applications Lab in Atlanta has all the right tools to process wafers and measure results, so we can help select chemistries and advise you on options each step of the way — to dial in your processes perfectly.

### Unique Solstice Advantages

- Use for plating, cleaning and etching
- From 2 to 8 process chambers
- For 50mm to 200mm substrates
- Quick and simple diameter change
- Faster plating rates, higher throughput
- Simpler operation, higher reliability
- Superior control, greater uniformity
- Unprecedented process flexibility
- Thin or bonded, transparent or opaque substrates
- Powerful Windows-based software



**Solstice S8** Up to eight chambers for high-volume, fully-automated, 75-wph, cassette-to-cassette production



**Solstice S4** Up to four chambers for mid-volume, fully-automated, cassette-to-cassette production



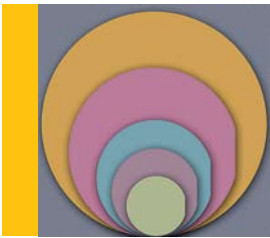
**Solstice LT** One or two chambers for manual-load semi-automated process development



**Fast** In plating gold, for example, Solstice is roughly *10x faster* than CVD or PVD deposition! And that's premium quality deposition with excellent uniformity and consistency — all on a smart, intuitive tool that speeds your process flow.



**Budget-friendly** Designed for the budget-challenged world of smaller wafer users, Solstice systems are priced at literally *half* what the large manufacturers would charge for their overkill 300mm tools with equivalent performance.



**Flexible** You can readily and easily switch wafer diameters in just a few minutes. It's the same if you want to switch from plating Cu to Ni, or Au to Ag — or to combine one process with another. Whatever you need to do, Solstice helps you do it.



**Elegant** Solstice was designed from the ground up to deliver maximum performance and flexibility along with elegant simplicity. It features up to 8 chambers to cover a broad range of processes with speed and ease of use.



**Multi-processing** Plating is just the start. In addition to ECD, Solstice chambers can also handle high-pressure Metal Lift Off, Resist Strip, UBM Etch and more to come — letting you do streamlined multiprocessing in one cycle on a single tool.

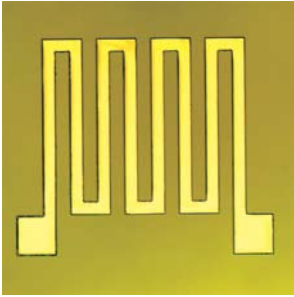


**Apps Support** When you buy a Solstice system you also get decades of wet processing experience to support you. ClassOne's world-class Applications Lab is always available to help get your new processes dialed in precisely the way you want them.

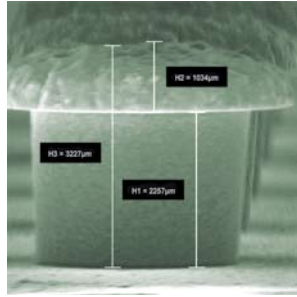
*The Solstice family: designed to deliver advanced plating performance at an affordable price — for emerging markets and everyone who works on 50mm to 200mm substrates.*



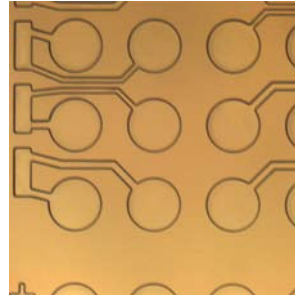
Elegant Modular Design Enables  
A Spectrum of Applications



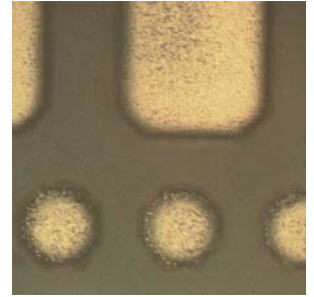
Au Pads



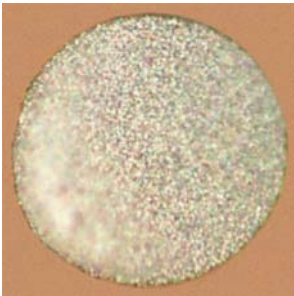
Ni Mushrooms



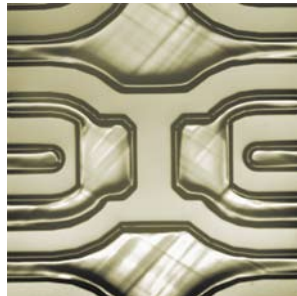
Cu RDL



Ni POR



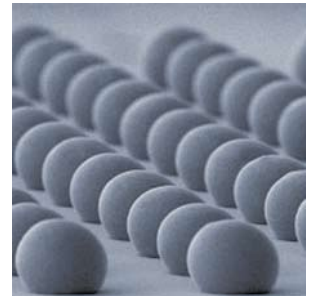
Cu/SnAg Pillar



MEMS



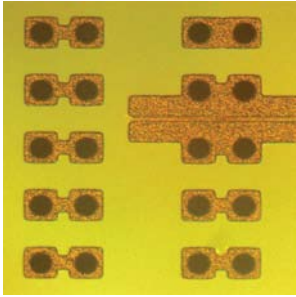
Sn POR



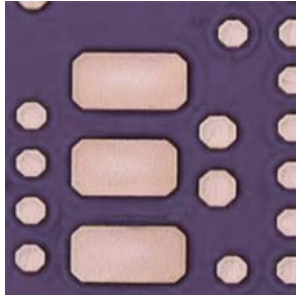
Solder Bumps

*The eight chambers of the Solstice S8 can each be used for a different process — to give the user unprecedented flexibility.*

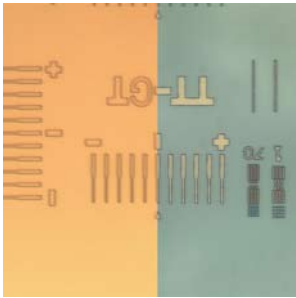




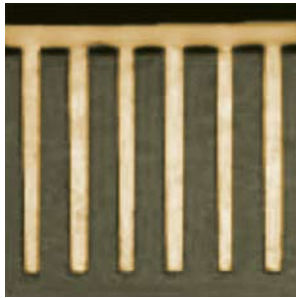
UBM Etch



Cu/Ni/Sn Bumps



Metal Lift Off



Cu TSV

### Plating-Plus™ — multiprocessing on Solstice

The Solstice S8's eight modular chamber positions can be used for multiple purposes. So, in addition to plating, the tool can now incorporate processes such as High-Pressure Metal Lift-Off, Resist Strip, and UBM (Under Bump Metallization) Etch — on a single tool.

This means that many users won't need to purchase additional downstream equipment. They can eliminate the costs of adding floor space, operators, training, spare parts, etc. They can also gain the benefits of single-wafer processing with reduced queue times and less excess capacity — which translates to better capacity matching and lower overall costs.

### Solstice saves up to 10x on gold plating

This tool can deliver major savings in gold deposition — from the elimination of gold waste, faster and simpler processing, and an innovative technique that can substantially reduce gold usage.

Previously-used CVD and PVD deposition methods “over-sprayed” gold on the entire chamber interior, which was difficult to remove, inefficient to reclaim and resulted in considerable net loss of gold. With Solstice, there is no gold waste and no need for cleaning or gold reclamation efforts. In addition, Solstice gold plating is roughly 10x faster than deposition by CVD or PVD.

Most notably, the Solstice's eight chambers enable the tool to employ an innovative technique that can replace a solid Au



pillar with a multi-metal stack of Au/Ni/Cu/Ni/Au layers which can use 10x less Au. And Solstice can deposit all five layers in a single cycle; so no additional process steps or time are required to gain the significant cost savings — which over the course of a year may well pay back the cost of the Solstice itself!

### Improved WLP Processing

Solstice is easily configurable for — and able to optimize — the multiple metal depositions needed for Wafer-Level Packaging, including Cu plating, Cu RDL, Cu pillars, Cu bumps, barrier plating and lead-free solder plating.

For example, Solstice's Copper Redistribution Layers can provide more freedom to route signals within the die, for shorter signal paths and less loss. Also, the tool's simple but powerful single-anode chamber delivers a uniform electric field and fluid flow at the wafer surface, for exceptional results across a range of metal thicknesses. Solstice is able to work with many electrolyte types, and it can rotate the plating heads clockwise and counter-clockwise to prevent fluidic bias or tilting within a feature.

# Solstice Specifications and Features

## 2D and 3D Wafer Level Packaging Processing

	Cu RDL	Cu Pillar	Cu TSV	Low Stress Ni	Sn Pillar	Cu/Ni/Sn Pillar	SnAg Solder	AuSn Solder
Thickness (µm)	10	40	10	5	40	30/3/50	60	10
Feature Size (µm)	5-250	20-80	5-250 (8:1 AR)	5-250	20-80	5-250	5-150	5-150
Within-Wafer Uniformity*	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%
Wafer-to-Wafer Uniformity*	±1%	±1%	±1%	±1%	±1%	±1%	±1%	±1%
Est. Capacity (wafers/week)	2200	1800	1500	3400	1500	1000	1900	760

## MEMS, Sensors, Power, RF, LED, Photonics, Bio

	Au	Thick Cu	Thick Ni	Indium	Ag
Thickness (µm)	5	150	150	10	5
Feature Size (µm)	5-250	10-1000	10-1000	5-250	5-250
Within-Wafer Uniformity*	±5%	±5%	±5%	±5%	±5%
Wafer-to-Wafer Uniformity*	±1%	±1%	±1%	±1%	±1%
Est. Capacity (wafers/week)	2200	760	250	2200	4400

## ECD Process Specifications

- **Plating Rate:** Up to 4.0 µm/minute
- **Within Wafer Thickness Uniformity:** ≤3.3% 1sigma\*\*
- **Seal Edge Exclusion:** Nominal 2.5 ±0.5mm\*\*\*
- **Alloy Composition:** ±1% 1sigma
- **LPDs:** ≤20 adders at 0.2µm

## ECD Hardware Specifications

- **Fountain Plating Chambers:**
  - Rotating Disk Electrode w/ Uniform Fluid Flow • Face-down/Meniscus Plating • Sealed Ring Contact w/ Selectable Edge Exclusion
  - Soluble or Insoluble Anodes • In-situ Quench Rinse
- **Fully Programmable Power Supply with Multiple Operating Modes:**
  - DC Output Standard • Galvanostat, Potentiostat Modes • Integrated Coulombmeter/Endpoint • Line Regulation <1% setpoint, I & V
- **Bath Temperature Control:** 15 to 60C ±1C
- **Recipe-Programmable Electrolyte Flow:** 1 to 40 lpm per chamber
- **Wafer Rotation Speed:** 0 to 200 rpm (ECD), 0 to 2000 rpm (SRD & Spray)
- **On-board Dosing of up to Three Additives**
- **In-line Filtration and Segregated Chemical Drain/Reclaim Line**
- **1-year Warranty on Parts and Labor**

*The unique, elegant design of the Solstice allows wafer diameters and chambers to be changed very quickly and easily.*

\*Uniformity values represent 100 x Range / (2x Mean)

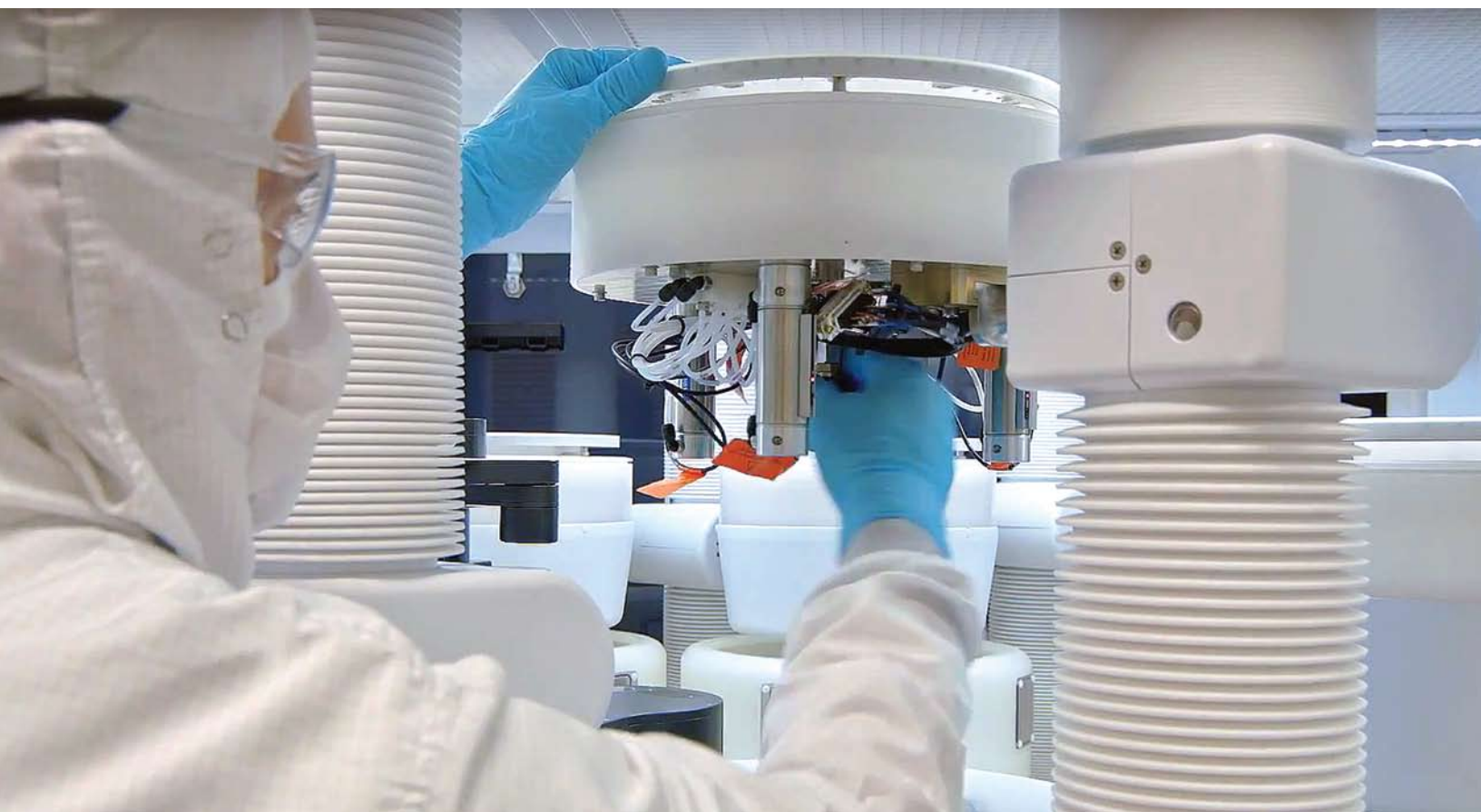
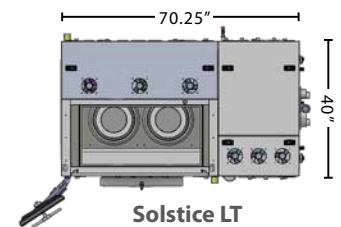
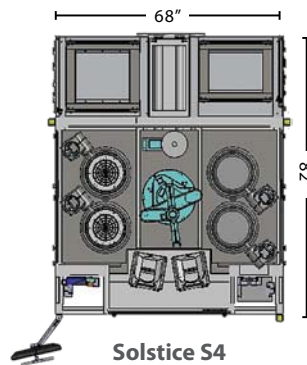
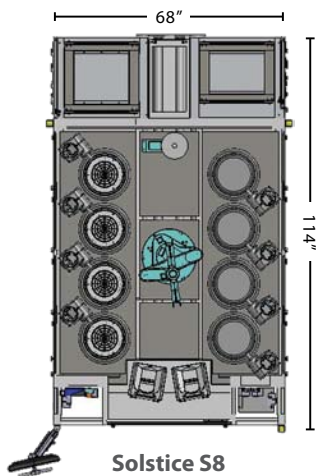
\*\*Assumes sufficiently thick/uniform seed layer.

\*\*\*Can be customer-selected at time of order.

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## Solaris™ Windows®7-based Control Software

- SEMI E95-compliant, intuitive, touch-screen GUI
  - Front and rear control screens
  - 4-color, programmable light tower
  - Common software for all tools
  - Advanced data logging, programmable alarms
  - Predictive maintenance functions
  - Remote control and remote service capability
  - RAID2 storage array
  - USB and Ethernet ports
  - GEM/SECSII communications
  - One year free correction of any bugs or safety issues
  - Software license included
- 



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Serving the World



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