Canon Industrial Products Division

Canon Industrial Products find their origins on Canon production lines where they are used in the manufacturing of Canon branded products. Canon’s ability to provide internal manufacturing innovations helps provide a strategic advantage and Canon leverages R&D efforts by providing Canon Industrial Products to global manufacturing organizations around the world.

Canon has the resources and the commitment to develop ultra-precision imaging, deposition, and automation product technologies to help achieve high performance and value. This enlightened thinking is the unique Canon value that helps contribute to a high return on investment for our customers.
CANON INDUSTRIAL PRODUCTS
ENABLING A WORLD OF INNOVATIONS

LITHOGRAPHY AND FLAT-PANEL DISPLAY
5 Canon FPA-6300 Series DUV Scanners
6 Canon FPA-55XX Series i-line Steppers
8 Canon FPA-3030 Series Steppers
9 Canon MPAsp Series Flat-Panel Exposure System
10 Canon NanolImprint Lithography (NIL) Technology

CANON ANELVA PRODUCTS
12 Semiconductor Manufacturing Equipment
15 Storage and Hard Disk Drive Manufacturing Equipment
16 Electronic Device Manufacturing Equipment
18 Vacuum Components

OPTOMECHATRONIC PRODUCTS
20 Optoelectronics
20 Motion Control Products
21 3-D Machine Vision System (RV-Series)
21 Surface Reflectance Analyzer

Sensors and IOT
PC and Mobile
Display and AR/VR
Automotive
Medical
Green Home
Wearables
Lithography and Flat-Panel Exposure Systems

Canon Photolithography and Flat-Panel Exposure Equipment have been designed to help provide exceptional quality, performance and cost of ownership for wafer and panel imaging applications.

Canon FPA (Fine Pattern Aligner) Series i-line and Deep Ultraviolet (DUV) lithography systems are used in the fabrication and heterogeneous integration of high-tech devices including integrated circuits, hard disk read/write heads, Microelectromechanical Systems (MEMS) devices, image sensors, displays, power devices and Light Emitting Diodes (LED).

Canon MPAsp (Mirror Pattern mask Aligner Smart Platform) Series panel exposure systems utilize mirror projection technology for fabrication of high-resolution displays required for Ultra-High Definition television, monitor, mobile, wearable and AR/VR display applications.

### LITHO PRODUCTS TARGET APPLICATIONS

<table>
<thead>
<tr>
<th>Litho Products</th>
<th>Technology</th>
<th>Resolution</th>
<th>Lens Red.</th>
<th>Field Size</th>
<th>Substrate Options</th>
<th>MRAM</th>
<th>Logic</th>
<th>Flash and DRAM</th>
<th>HDD and SCM</th>
<th>Power and Automotive</th>
<th>Waveguide and RF</th>
<th>Advanced Packaging</th>
<th>Optics and Photonics</th>
<th>MEMS Sensors and IOT</th>
<th>PC and Mobile</th>
<th>Wearables</th>
<th>AR/VR and Display</th>
<th>LED, MicroLED</th>
<th>OLED, MicroOLED</th>
</tr>
</thead>
<tbody>
<tr>
<td>FPA-6300ES6a</td>
<td>KrF (248 nm) Scanner</td>
<td>≤ 90 nm</td>
<td>4.1</td>
<td>26 × 33 mm</td>
<td>200 mm</td>
<td>300 mm</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>FPA-6300ESW</td>
<td>KrF (248 nm) Scanner</td>
<td>≤ 130 nm</td>
<td>3.125:1</td>
<td>33 × 42.2 mm</td>
<td>200 mm</td>
<td>300 mm</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>FPA-5550iZ2</td>
<td>i-line (365 nm) Stepper</td>
<td>≤ 280 nm</td>
<td>4.1</td>
<td>26 × 33 mm</td>
<td>200 mm</td>
<td>300 mm</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>FPA-5520iV</td>
<td>i-line (365 nm) Stepper</td>
<td>≤ 1.5 µm</td>
<td>2.1</td>
<td>52 × 34 mm</td>
<td>300 mm</td>
<td>365 × 318 mm</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>FPA-5510iX</td>
<td>i-line (365 nm) Stepper</td>
<td>≤ 0.6 µm</td>
<td>2.1</td>
<td>50 × 50 mm</td>
<td>300 mm</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>FPA-3030EX6</td>
<td>KrF (248 nm) Scanner</td>
<td>≤ 150 nm</td>
<td>5.1</td>
<td>22 × 22 mm</td>
<td>≤ 200 mm</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>FPA-3030i5+</td>
<td>i-line (365 nm) Stepper</td>
<td>≤ 350 nm</td>
<td>5.1</td>
<td>22 × 22 mm</td>
<td>≤ 200 mm</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>MPAsp-EB13</td>
<td>Mirror Projection</td>
<td>≤ 1.5 µm</td>
<td>1.1</td>
<td>750 × 1,100 mm</td>
<td>1,500 × 1,850 mm (Gen 6 Panels)</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>MPAsp-HB03</td>
<td>Mirror Projection</td>
<td>≤ 2.0 µm</td>
<td>1.1</td>
<td>750 × 1,320 mm</td>
<td>2,300 × 2,700 mm (Gen 8 Panels)</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td></td>
</tr>
</tbody>
</table>
FPA-6300 Body DUV (KrF, 248 nm) Lithography Systems are derived from the field-proven Canon FPA-6000 scanner platform and are designed for the mass production of memory, logic, microprocessor, color filter and imaging sensor devices.

**FPA-6300ES6a**
FPA-6300ES6a [ES6a] high-resolution DUV Scanners provide high-throughput, high-overlay accuracy and low Cost-of-Ownership for memory and logic applications.

**Cost Efficient Lithography**
- 4X reduction, 26 × 33 mm field size
- Resolution ≤ 90 nm (2/3 Annular)
- Single Machine Overlay (SMO) ≤ 3 nm²
- Mix-&-Match Overlay (MMO) ≤ 5 nm²
- Throughput ≥ 260 wafers per hour (wph)\(^a\)

**Wide-Field Lithography**
- 3.125X reduction, 33 × 42.2 mm field size
- Resolution ≤ 130 nm (2/3 Annular)
- Single Machine Overlay ≤ 9 nm
- Throughput ≥ 210 wafers per hour

**FPA-6300ESW**
FPA-6300ESW [ESW] wide-field DUV Scanners are capable of high-resolution across a large exposure area to facilitate large device fabrication without stitching.

---

**FPA-6300 PLATFORM FEATURES**
Reliable and Extendable 6300 Body
- Extension of FPA-6000 scanner platform
- 6300 Body supports future upgrades

High-Productivity
- High-acceleration reticle and wafer stages minimize exposure and handling time
- Wafer handling and alignment sequence optimization shortens process time

High-Accuracy
- Single wafer stage simplifies overlay and reduces costs
- Advanced stage, alignment scope and precise temperature control improve overlay accuracy

Available Options\(^b\)
- 200, 300 mm wafer handling
- AFIS Illumination System
- Wide-Band Off-Axis Scope (WB-OAS)
- Each Shot High Order Correction (ESHOC)
- Pellicle Particle Checker
- SMIF Over Head Transport (OHT) Compatible
- PC Remote Console
- Online Functions (GEM2)

---

<table>
<thead>
<tr>
<th>Model</th>
<th>NA</th>
<th>Resolution</th>
<th>Field Size</th>
<th>Overlay</th>
<th>Throughput</th>
<th>Dimensions (W × D × H)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FPA-6300ES6a</td>
<td>0.50 – 0.86</td>
<td>≤ 90 nm</td>
<td>26 × 33 mm</td>
<td>SMO ≤ 3 nm²</td>
<td>≥ 260 wph(^a)</td>
<td>2.3 × 5.2 × 2.9 m</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>MMO ≤ 5 nm²</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FPA-6300ESW</td>
<td>0.45 – 0.70</td>
<td>≤ 130 nm</td>
<td>33 × 42.2 mm</td>
<td>SMO ≤ 9 nm</td>
<td>≥ 210 wph(^a)</td>
<td>2.3 × 5.2 × 2.9 m</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^a\) = Option Required
\(^b\) = All options may not be available on all models. Contact Canon for details at semi-info@cusa.canon.com.
FPA-5510, FPA-5520 and FPA-5550 Body i-line (365 nm) Steppers are designed to deliver flexible and cost-effective imaging solutions for advanced packaging, sensor and Front-End-of-the-Line applications.

**FPA-5550iZ2**

FPA-5550iZ2 [50iZ2] i-line Steppers offer a low cost Mix-&-Match lithography solution for advanced logic, memory and image sensor fabrication.

**High Performance Imaging**

- 4X reduction, 26 × 33 mm field size
- Resolution ≤ 280 nm (2/3 Annular)
- Single Machine Overlay (SMO) ≤ 15 nm
- Mix-&-Match Overlay (MMO) ≤ 2 nm
- Throughput ≥ 230 wafers per hour (wph)

---

**FPA-55XX PLATFORM FEATURES**

**Flexible and Reliable 55XX Body**

- Extension of field-proven FPA-5500 stepper platform
- 55XX Body flexibility supports process variation and future upgrades
- e-Console software supports automation and remote operation functions

**High Efficiency Illumination Systems**

- Variable NA Illumination System enables process optimization
- High-transmission optics provide high intensity and uniformity

**High-Productivity and Overlay Accuracy**

- Proven platform with high-throughput and utilization in the field

**Available Options**

- 200, 300 mm wafer and panel handling
- Warped/Bonded/Transparent Wafer handling
- Shot Shape Compensator (XandY mag and skew correction)
- Through Silicon Alignment (TSA) System
- Non-linear Overlay Compensation (EAGA-FL)
- Dual-side (D-Map) Metrology
- Resist Outgas Exhaust System
- Wafer Edge Exposure/Shielding
- Low/High Oxygen Exposure (LOX, HOX)

---

*a = Option Required
*b = All options may not be available on all models. Contact Canon for details at semi-info@cusa.canon.com.
FPA-5520iV
FPA-5520iV [20iV] wide field, low-NA i-line Steppers provide large Depth of Focus [DOF] imaging for advanced packaging applications.

**Large DOF Exposure**
- 2X reduction, 52 × 34 mm field size
- Resolution \( \leq 1.0 \, \mu m \)
- Single Machine Overlay (front) \( \leq 150 \, nm \)
- Single Machine Overlay (back) \( \leq 500 \, nm \)
- Throughput \( \geq 160 \) wafers per hour (wph)

FPA-5510iX
FPA-5510iX [10iX] i-line Steppers feature a high-resolution, large-field lens for memory, image sensor and advanced packaging applications.

**Large Field Imaging**
- 2X reduction, 50 × 50 mm field size
- Resolution \( \leq 500 \, nm \)
- Single Machine Overlay \( \leq 50 \, nm \)
- Throughput \( \geq 145 \) wafers per hour

<table>
<thead>
<tr>
<th>Model</th>
<th>NA</th>
<th>Resolution</th>
<th>Field Size</th>
<th>Overlay</th>
<th>Throughput</th>
<th>Dimensions (W × D × H)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FPA-5550iZ2</td>
<td>0.45 – 0.57</td>
<td>( \leq 0.28 , \mu m ) (2.3 Anni.)</td>
<td>26 × 33 mm</td>
<td>SMO ( \leq 15 , nm ) MMO ( \leq 20 , nm )</td>
<td>( \geq 230 ) wph (96 shots)</td>
<td>2.3 × 3.66 × 3.0 m</td>
</tr>
<tr>
<td>FPA-5520iV</td>
<td>0.15 – 0.18</td>
<td>( \leq 1.5 , \mu m ) ( \leq 1.0 , \mu m )</td>
<td>52 × 34 mm</td>
<td>Front ( \leq 150 , nm ) Back ( \leq 500 , nm )</td>
<td>( \geq 160 ) wph (60 shots)</td>
<td>2.3 × 3.34 × 2.7 m</td>
</tr>
<tr>
<td>FPA-5510iX</td>
<td>0.28 – 0.37</td>
<td>( \leq 0.50 , \mu m )</td>
<td>50 × 50 mm</td>
<td>SMO ( \leq 50 , nm )</td>
<td>( \geq 145 ) wph (300 mm)</td>
<td>2.3 × 3.34 × 2.7 m</td>
</tr>
</tbody>
</table>

\( a = \) Option Required
FPA-3030 Body i-line (365 nm) and DUV (KrF, 248 nm) Steppers deliver advanced manufacturing technology for ≤ 200 mm wafer processes.

**FPA-3030EX6**

FPA-3030EX6 [EX6] DUV (KrF, 248 nm) Steppers are designed to help provide a long-term solution for high-resolution imaging of ≤ 200 mm wafers.

**High Performance Imaging**
- 5X reduction, 22 × 22 mm field size
- Resolution ≤ 150 nm
- Single Machine Overlay ≤ 25 nm
- Throughput ≥ 121 wafers per hour

**FPA-3030i5+**

FPA-3030i5+ [30i5+] i-line Steppers offer advanced process capabilities for ≤ 200 mm wafer processes including MEMS, LED, RF and Power Device fabrication.

**Cost-Effective Imaging**
- 5X reduction, 22 × 22 mm field size
- Resolution ≤ 350 nm
- Single Machine Overlay (front) ≤ 40 nm
- Single Machine Overlay (back) ≤ 500 nm
- Throughput ≥ 105 wafers per hour

**FPA-3030 PLATFORM FEATURES**
- Flexible and Reliable 3030 Body
- Successor to the field-proven FPA-3000 stepper platform inherits high-reliability and performance
- Designed to replace original 3000 body parts and units with readily available alternatives
- e-Console software supports automation and remote operation functions

Available Options:
- ≤ 200 mm Wafer Handling (3”, 4”, 5”, 6”, 8”)
- Multi-Wafer Size Handling Kit (3” and 4”, 4” and 6”, 6” and 8”)
- Warped/Bonded/Transparent Wafer Handling
- Through Silicon Alignment (TSA) System
- Non-linear Overlay Compensation (EAGA)
- Canon Internal Metrology (CanoMap)
- Pellicle Particle Checker
- PC Remote Console and Log Analysis
- Online Function (GEM2, GEM0304)

<table>
<thead>
<tr>
<th>Model</th>
<th>NA</th>
<th>Resolution</th>
<th>Field Size</th>
<th>Overlay</th>
<th>Throughput</th>
<th>Dimensions (W × D × H)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FPA-3030EX6</td>
<td>0.50 – 0.65</td>
<td>≤ 150 µm</td>
<td>22 × 22 mm</td>
<td>SMO ≤ 25 nm</td>
<td>≥ 121 wph (200 mm)</td>
<td>1.9 × 3.0 × 2.45 m</td>
</tr>
<tr>
<td>FPA-3030i5+</td>
<td>0.45 – 0.63</td>
<td>≤ 0.35 µm</td>
<td>22 × 22 mm</td>
<td>Front ≤ 40 nm Back ≤ 500 nm</td>
<td>≥ 105 wph (200 mm)</td>
<td>1.9 × 2.6 × 2.45 m</td>
</tr>
</tbody>
</table>

*a = Option Required*
MPAsp Series Flat-Panel Exposure Systems utilize mirror projection technology for Flat-Panel Display (FPD) processing for TV, monitor, mobile, wearable and AR/VR display applications.

**MPAsp-E813**

MPAsp-E813 FPD Exposure Systems achieve image resolution of 1.5 µm for Line and Space patterns (L/S) and 2.0 µm for Contact Holes (CH) on Generation 6 Panels (1,500 × 1,850 mm).

**Generation 6 Panel Processing**
- 1X mirror projection
- 750 × 1,100 mm field size
- Resolution (L/S) ≤ 1.5 µm, (CH) ≤ 2.0 µm
- Single Machine Overlay ≤ 0.35 µm
- Max Panel Size = 1,500 × 1,850 mm (Gen 6)
- Throughput ≥ 78 panels per hour (equivalent to ≥ 15,500 5.5” smartphone displays per hour)

**MPAsp-H803**

MPAsp-H803 FPD Exposure Systems are designed for patterning of Full-High Definition (FHD) and Ultra-High Definition (UHD) or 4K/8K resolution displays on Generation 8 glass panels (2,200 mm x 2,500 mm)

**Generation 8 Panel Processing**
- 1X mirror projection
- 750 × 1,320 mm field size
- Resolution (L/S) ≤ 2.0 µm
- Single Machine Overlay ≤ 0.5 µm
- Max Panel Size = 2,200 × 2,500 mm (Gen 8)
- Throughput ≥ 63 panels per hour (equiv. to ≥ 375 55” UHD displays per hour)

### MPAsp PLATFORM FEATURES
- Designed for 1.5 – 2.0 µm imaging of ultra-thin glass panels up to 0.3 mm thickness
- Single-shot exposure of high-definition displays maximizes productivity and utilization
- Stage precision and body rigidity are designed for high reliability and utilization
- MPAsp Alignment Systems are designed to minimize alignment time and improve overlay accuracy
- MPAsp Magnification Correction and Temperature Control Systems improve overlay accuracy

### Model Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>Lens Reduction</th>
<th>Resolution (L/S)</th>
<th>Exposure Area</th>
<th>Max Panel Size</th>
<th>Overlay</th>
<th>Throughput (panels per hour)</th>
<th>Throughput (devices per hour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPAsp-E813</td>
<td>4:1</td>
<td>≤ 1.5 µm</td>
<td>750 × 1,100 mm</td>
<td>Gen 6 (1,500 × 1,850 mm)</td>
<td>≤ 0.35 µm</td>
<td>≥ 78 pph (6 shots)</td>
<td>≥ 15,500 dph (5.5” smartphones)</td>
</tr>
<tr>
<td>MPAsp-H803</td>
<td>4:1</td>
<td>≤ 2.0 µm</td>
<td>750 × 1,320 mm</td>
<td>Gen 8 (2,200 × 2,500 mm)</td>
<td>≤ 0.50 µm</td>
<td>≥ 63 pph (6 shots)</td>
<td>≥ 376 dph (55” UHD TVs)</td>
</tr>
</tbody>
</table>
Since 2004, Canon has been carrying out R&D in the field of next-generation NanoImprint Lithography (NIL) technology to enable semiconductor manufacturing of circuit patterns as small as 10 nm.

Canon NIL technology utilizes a patterning process that involves field-by-field jetting of a low viscosity resist, followed by an imprint and cure step where an etched quartz mask is used to reproduce patterns with a high resolution and great uniformity. Canon NIL technology does not require wide-diameter lenses or expensive light sources necessary for optical photolithography equipment, facilitating a simple, compact design that allows for multiple units to be clustered together to offer a low Cost-of-Ownership.

In 2017, Canon NanoImprint Lithography technology was introduced to high-volume semiconductor memory wafer production lines and mass-production NIL mask replication lines. NIL is seen as a promising patterning option for a wide range of advanced semiconductor processes.

FPA-1200NZ2C
- FPA-1200NZ2C [NZ2C] NIL cluster tool has been introduced in semiconductor memory mass production lines
- NZ2C NIL systems are designed to enable semiconductor manufacturing of circuit patterns as small as 10 nm

FPA-1100NR2
- FPA-1100NR2 [NR2] NIL systems are the world’s first mass-production equipment designed for nanoimprint mask replication
- NR2 mask replication systems duplicate lithography masks utilizing low-cost NIL technology

Nanoimprint lithography

1. Inkjet technology applies droplets of liquid resin or resist to the substrate surface, with the drop position based on circuit pattern.

2. A mold (or mask), into which a circuit pattern has been etched, is aligned to the substrate and pressed into the resist applied to the substrate surface.

3. Ultraviolet light is used to cure and solidify the resist to form the final circuit pattern. The mask is separated from resist and NIL process is repeated for all fields.
Canon U.S.A. provides sales, marketing, service and engineering support for products manufactured by Canon ANELVA Corporation. Canon ANELVA develops and manufactures Physical Vapor Deposition (PVD) and etching equipment for use in semiconductor, storage media and display production lines.

## ANELVA PRODUCTS TARGET APPLICATIONS

| ANELVA Product     | Technology/ Environment | Key Features and Options | Process | Substrate Options | MRAM      | Logic | Flash and DRAM | HED and SCM | Power and Automotive | Waveguide and IF | Advanced Packaging | Optics and Photonics | MEMS, Sensors and IOT | AV/VR and Display | LED, MicroLED | Compatible |
|--------------------|--------------------------|--------------------------|---------|-------------------|-----------|-------|----------------|--------------|---------------------|----------------|----------------------|-------------------|---------------------|---------------------|-----------------------------|----------------|----------------|------------|
| NC7900             | UHV PVD Cluster HVM      | Oblique and Multi-Cathode| Planar and Perpendiculer MTJ | 300 mm   | ✓                |
| NC8000             | Ion Beam Etching Cluster HVM | Optimized Ion Source Optical Endpoint Control | Planar and Perpendiculer MTJ | 300 mm   | ✓ |
| EC7800             | UHV PVD Cluster R&D and Small Scale | Oblique and Multi-Cathode | Planar and Perpendiculer MTJ | 300 mm   | ✓ |
| EC8000             | Dry Etch Cluster R&D     | Integrated Etch and CVD  | Planar and Perpendiculer MTJ | 300 mm   | ✓ |
| FC7100             | UHV PVD Cluster HVM      | Damage-less Deposition   | Planar Metal Gate | 300 mm   | ✓ ✓ ✓ ✓ |
| IC7500             | UHV PVD Cluster HVM      | Reactive PVD and High-Stress Materials | Metal Interconnect | 300 mm   | ✓ ✓ |
| IC7200             | UHV PVD Cluster HVM      | Reactive PVD and High-Stress Materials | Metal Interconnect | 200 mm   | ✓ ✓ |
| IC7400             | PVD Cluster HVM          | Low-Temp Damage-less Deposition | Under Bump Metalization (UBM) | 300 mm   | ✓ |
| EL3400             | Vertical Inline PVD HVM  | Single or Dual-Side deposition Multiple Targets | Barrier and Copper Seed layer | 650 × 650 300 mm + 4 pcs | ✓ ✓ ✓ ✓ |
| HC7100             | UHV PVD Cluster HVM      | Oblique and Multi-Cathode | TMR and GMR Magnetic Resistant (MR) Sensors | 200 mm   | ✓ ✓ |
| ML3000 Series      | Inline PVD System        | High-Vacuum Quality      | Magnetic Media Next Generation Media | 1,800 disks per hour | ✓ |
| HC7300             | PVD System HVM           | Integrate Deposition, Milling, Insulation, Hard Bias and Cap Layer Processes | Magnetic Head | 200 mm   | ✓ |
| EB1000             | Compact PVD System R&D and Small Scale | 3 Cathodes, Co-Sputtering Option, High-Temp Option | General Purpose PVD | ≤ 100 mm | ✓ ✓ ✓ ✓ ✓ ✓ |
| EB1000             | High-Performance PVD R&D and Small Scale | 4 Cathodes, Co-Sputtering Option, High-Temp Option | General Purpose PVD | ≤ 220 mm | ✓ ✓ ✓ ✓ ✓ ✓ |
| EC7000 Series      | Compact PVD Cluster R&D and Small Scale | 4 Cathodes, 2 PVD Chambers Load Lock and Transfer Chambers | High-Flexibility and Productivity PVD | ≤ 220 mm | ✓ ✓ ✓ ✓ ✓ ✓ ✓ |
| EC7400             | Compact PVD Cluster R&D and Small Scale | 4 Cathodes Space Saving Design | Electronic Components | ≤ 200 mm | ✓ ✓ ✓ ✓ ✓ |
| EL3000 Series      | Batch PVD System HVM     | 4 Cathodes Rotary Deposition | ITO Film and Metal Electrode | ≤ 200 mm | ✓ ✓ ✓ ✓ ✓ |
| EC8100             | Tray Transport PVD HVM   | 3 PVD Chambers Damage-Less Deposition | ITO Film and Metal Electrode | ≤ 200 mm | ✓ ✓ ✓ ✓ ✓ |
| EL3200             | Horizontal Inline PVD HVM | 3 Cathodes Top, Bottom or Dual-Side Deposition | Printed Circuit Board | 300 × 450 mm | ✓ ✓ ✓ ✓ ✓ |
| EC7200             | Annealing System R&D and HVM | Electron Bombardment High-Temperature Vacuum Annealing | SiC Power Device Activation | ≤ 150 mm | ✓ |
| X-Ray Source       | Microfocus X-Ray R&D and HVM | High-Power, High-Speed, High-Resolution | X-Ray Radioscopy X-Ray Computer Tomography (CT) X-Ray Inspection | NA | ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ |
| Vacuum Components  | Components R&D and HVM   | Pumps, Gauges, Leak Detectors, Mass Spectrometers, and Others | Low-Vacuum Ultra-High Vacuum | NA | ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ |

Compatible
Canon ANELVA manufactures Physical Vapor Deposition (PVD), Ion Beam Etching (IBE), and other types of equipment for semiconductor and data storage industries. The products provide nanometer level processing control required for manufacturing high technology semiconductor devices including Magnetic Random Access Memory (MRAM), Complimentary Metal Oxide Semiconductor (CMOS), and Hard Disk Drive (HDD).

**NC7900**
Ultra-High Vacuum (UHV) PVD cluster tool for 300 mm MRAM high-volume manufacturing.

**Features:**
- Compatible with planar and perpendicular Magnetic Tunnel Junction (MTJ) formation
- High throughput ($\geq 25$ wph for perpendicular MTJ)
- Oblique and multi-cathode PVD chambers with extensive module line up such as heating, cooling, and pre-cleaning
- Fine interface control with ultra-thin multi-layers

**NC8000**
Ion Beam Etching (IBE) cluster tool for 300 mm MRAM high-volume manufacturing.

**Features:**
- Optimized ion beam source
- High etching performance with high productivity
- Clampless holder with 2-axis revolution and stage angle
- Optical end point detection system for precise etching depth control

**EC7800**
Ultra-High Vacuum (UHV) PVD cluster tool for 300 mm R&D and small scale MRAM production.

**Features:**
- Low pressure remote P-plasma sputtering technology delivering ultrathin multilayer stacks
- An order of magnitude lower pressure discharge (0.02 Pa) than conventional PVD processes
- Excellent film thickness uniformity ($< \pm 1\%$)
- Smooth and low resistance films
- Provides high Magneto-Resistance (MR) ratio with excellent distribution
- Oblique and multi-cathode PVD chambers with extensive module line up such as heating, cooling, and pre-cleaning
EC8000
Dry etching cluster tool for 300 mm MRAM R&D.
Features:
- Integrated processing – MTJ dry etching and protective film Chemical Vapor Deposition (CVD)
- Low-damage process with CH$_3$OH gas
- Enables micro-patterning with less shorts (high yield)
- Capable of retaining a high Magneto-Resistance (MR) ratio even after etching
- Easy maintenance and flexible equipment configuration

FC7100
Ultra-High Vacuum (UHV) PVD cluster tool provides planar metal gate deposition for 300 mm high-volume manufacturing.
Features:
- Suitable for planar metal gate deposition
- Precise control of film thickness (~ 0.1 nm)
- Excellent thickness uniformity (1 $\sigma < 1\%$)
- Film composition control
- Small size cathode for low material cost

IC7500
Ultra-High Vacuum (UHV) PVD cluster tool for metal interconnect fabrication in 300 mm high-volume manufacturing of semiconductor memory.
Features:
- Excellent uniformity and low particles even for reactive PVD processes and high stress materials
- High productivity to reduce production cost
- World’s High Throughput (80 wph)
- Uptime > 90% (Failure time < 1%)
- Cathode magnet position change through recipe facilitates easy optimization
IC7200
Ultra-High Vacuum (UHV) PVD cluster tool for metal interconnect processes in 200 mm high-volume manufacturing of semiconductor memory.

Features:
- High reliability 200 mm cluster tool
- Excellent uniformity and low particles even for reactive PVD processes and high stress materials
- Cathode magnet position change through recipe facilitates easy optimization
- Add-on options for step coverage improvement and plasma damage reduction

IC7400
PVD cluster tool for Under Bump Metallization (UBM) processes in 300 mm high-volume memory packaging.

Features:
- Used by leading suppliers of 300 mm UBM processes
- Stress control
- Low temperature deposition
- Damage-less deposition
- Improved adhesion
- Easy to customize hardware

EL3400
Panel PVD System for Advance Packaging applications including barrier and Copper seed deposition.

Features:
- Vertical linear transport system
- Compatible with various substrates (Si, glass, organic, …)
- Large deposition area (650 mm × 2 panels, 300 mm × 8 wafers, 300 mm × 8 panels)
- Moisture control
- Plasma surface activation for superior adhesion
- Single side or double side deposition
- Multiple targets for multilayer deposition
Canon ANELVA commands the world's largest market share of the PVD equipment used for production of high density magnetic heads and disks for use in PCs and servers. Using proprietary technology, Canon ANELVA intends to continue our market leadership in the evolution of hard disk drives and innovative storage media.

**HC7100**
200 mm PVD cluster tool for production of hard disk head and magnetoresistive sensors.

**Features:**
- Compatible with Tunnel Magneto-Resistance (TMR) and Giant Magneto-Resistance (GMR) processes
- An order of magnitude lower pressure discharge (0.02 Pa) than conventional PVD processes
- Excellent film thickness uniformity (< ± 1%)
- Smooth and low resistance films
- Provides high Magneto-Resistance (MR) ratio with excellent distribution
- Oblique and multi-cathode PVD chambers with extensive module line up such as heating, cooling, and pre-cleaning

**ML3000 SERIES**
Inline PVD tool for R&D and mass production of next generation Hard Disk Drive (HDD) magnetic media.

**Features:**
- High productivity (up to 1,800 disks/hr) with a 90 m² footprint
- Over 10 days of continuous operation is possible
- Emphasis on vacuum (~ 10⁻⁶ Pa) quality to improve magnetic characteristics of media
- High temperature heating and cooling units for the development of next generation thermally assisted magnetic recording media

**HC7300**
PVD tool for Hard Disk Drive (HDD) magnetic head production.

**Features:**
- Effectively consolidates magnetic head production processes – milling ➔ insulator ➔ hard bias ➔ cap layer
- Module lineup enables optimum shape required by read element (IBE, anisotropic deposition, isotropic deposition, RIE, etc…)
- Excellent deposition characteristic and high productivity
Canon ANELVA’s versatile device lineup supports next generation technology development and manufacturing of thin film devices such as Light Emitting Diodes (LEDs), CMOS Image Sensors, Compound Semiconductors, Piezoelectric Devices, and Power Devices.

**EB1000**
Compact and flexible PVD system for ≤ 100 mm general purpose R&D applications.

**Features:**
- Three Φ 2” compact cathodes
- Various deposition geometries (offset rotation, static) by tray transport
- Supports substrates up to Φ 100 mm
- High temperature (800 °C) substrate heating (option)
- Load lock chamber (option)
- Ternary co-sputtering (option)
- Auto-pumping and manual transportation/deposition operation
- Space saving design (standard footprint W 1.8 m × D 1.1 m × H 1.55 m)

**EB1100**
High-performance PVD system for ≤ 220 mm R&D and small scale production.

**Features:**
- Fully automated operation
- Supports up to four Φ 4” cathodes
- Supports substrates up to Φ 220 mm
- Various deposition geometries (offset rotation, static) by tray transport
- High temperature (800 °C) substrate heating (option)
- Space saving unit body design (standard footprint W 1.45 m × D 1.6 m × H 1.85 m)
- Co-sputtering (option)

**EC7000 SERIES**
Compact PVD cluster system for ≤ 220 mm R&D and small scale production of LEDs, Compound Semiconductors, and Power Devices.

**Features:**
- Equipped with load lock stocker chamber and transfer chamber
- Supports up to two sputtering chambers
- Fully automated operation
- Supports up to four Φ 4” cathodes
- Supports substrates up to Φ 220 mm
- Various deposition geometries (offset rotation, static) by tray transport
- High temperature (800 °C) substrate heating (option)
- Space saving unit body design (standard footprint W 1.45 m × D 2.3 m × H 1.85 m)
- Co-sputtering (option)

**EC7400**
Compact cluster tool for ≤ 200 mm production of electronic components such as SAW Filters, TC-SAW Filters, Piezoelectric Devices, and Power Devices.

**Features:**
- Fully automated operation
- Able to accommodate a variety of process modules according to requirements
- High target utilization
- Substrate size up to Φ 200 mm
- Up to four Φ 7.1” cathodes
- Space saving design
EL3000 SERIES
Batch type PVD system for LED production.
Features:
• Ideal for Indium Tin Oxide (ITO) transparent conductive film deposition, metal electrode film deposition, etc.
• Rotary deposition facilitates batch processing of multiple wafers and good uniformity
• Fully automated operation
• Supports substrates up to Φ 200 mm
• Tray transport (50 Φ 2” wafers/batch)
• Supports up to four Φ 7.1” or Φ 12.5” cathodes
• High target utilization to help reduce cost
• Customizable configuration according to application and production volume

EC8100
Tray Transport PVD cluster system for small wafer and LED production.
Features:
• Ideal for Indium Tin Oxide (ITO) transparent conductive film deposition, metal electrode film deposition, etc.
• Long distance sputtering
• Excellent uniformity over large area
• Multiple wafers deposition per batch (four Φ 8”, eight Φ 6”, etc.)
• High target utilization
• Fully automated operation
• Up to three sputtering chambers

EL3200
Horizontal linear transport PVD system for production of electronic components such as Sensor Devices.
Features:
• Configurable for single side or dual-side deposition according to production volume
• Supports laminated films by using up to 3 (single side) cathodes
• Can accommodate up to 25 trays in the stocker chamber
• Pre-heating chamber (Option)
• 300 mm × 450 mm effective deposition area

EC7200
Electron Bombardment vacuum annealing tool for SiC power device activation in ≤ 150 mm R&D and mass production.
Features:
• High temperature (up to 1850 °C) process for implant activation
• In situ carbon capping for low surface roughness
• Clean vacuum
• Cluster tool configuration that supports up to three annealing chambers
• Substrate size up to Φ 6”
• Excellent repeatability (sheet resistance uniformity ± 4.9% @ 1,000 runs)
• High electrical activation, low sheet resistance, reduction of diode leakage current, and low surface roughness
Thin-Film manufacturers and R&D facilities use Canon ANELVA vacuum components as virtually indispensable parts in systems incorporating vacuum technology. Canon ANELVA vacuum technology contributes to stable operation of equipment and measuring instruments.

**X-RAY SOURCE**
Sealed, transmissive-type, high-power, high-speed, micro-focus X-ray source for high-resolution imaging.

**Features:**
- Radioscopy, X-ray Computer Tomography (CT), and Automated X-ray Inspection (AXI) applications†
- Thin (0.29 mm) diamond window
- High resolution and high power simultaneously
- Wide (168°) X-ray cone angle
- Quick warm-up (≤ 3 min)
- Fast image capture (0 kV to 110 kV within 1 sec)
- Pulse mode (option)

† = X-ray sources are developed specifically for industrial use and cannot be used in food, beverage or human medical imaging

**QUADRUPOLE MASS SPECTROMETERS**
Versatile instruments used to monitor process gases and analyze residual, inorganic and desorbed gases.

**Available Products:**
- Compact gas analysis system, D-series (M-101/201/400GA-D Series)
- Process gas monitor (M-080QA-HPM)
- Transducer type spectrometer (M-070QA-TDF, M-101QA-TDF, M-101/201QA-TDM)
- High speed and high sensitivity spectrometer (M-401QA-MU/G)

**VACUUM PUMPS**
Canon ANELVA offers a wide range of vacuum pumps from low-vacuum to ultra-high-vacuum applications and high efficiency cryopumps.

**Available Products:**
- Ion pumps/noble pumps
- Excel pumps
- Titanium sublimation pump/tie-back pumps
- Combination pumps
- Cryopumps
- Cryogenic traps
- Air cooled freezer module
- Foreline traps
- Screw type dry pumps
- Roots type dry pump

**LEAK DETECTORS**
Canon ANELVA helium leak detectors support a variety of quality control applications requiring high sealing performance.

**Features:**
- Used by customers in a variety of industries
- Compact, lightweight, and portable design
- Various models available to choose from
- Simple operation
- High sensitivity, stability, and response
- Uses a tungsten filament to help enable long term high-sensitivity measurement
VACUUM PARTS
Canon ANELVA offers various high quality ancillary vacuum parts to support your vacuum systems.
Available Products:
• Ultra-High Vacuum (UHV) flange
• Fittings and adaptors with ICF flange
• Quick release couplings
• Vacuum switch
• UHV view ports
• Sheathed heater and moly paste

VACUUM FEEDTHROUGHS
Vacuum Feedthroughs can be used to introduce rotary and/or linear motion to a device installed in vacuum.
Available Products:
• Magnetic Coupling Type Rotary Feedthrough
• Bellows Type Rotary Feedthrough
• Linear Feedthrough
• R/L Feedthrough
• Current Terminal

VACUUM GAUGES AND CONTROLLERS
Canon ANELVA offers a diverse lineup of gauges to meet a variety of application requirements.
Available Products:
• Cold Cathode Gauge (M-370CG)
• Cold Cathode Pirani Gauge (M-361CP)
• Capacitance Diaphragm Gauge (M-342DG)
• Pirani Gauge (M-350PG)
• Corrosion-resistant Pirani Gauge (M-351PG)
• Ion Gauge (M-311HG)
• Crystal Ion Gauge (M-336MX)
• Crystal Gauge (M-320XG)
• Wide Range Ionization Vacuum Gauges (M-431HG, M-833HG)
• Ionization Vacuum Gauge (M-723HG, M-823HG, M-923HG)
• Thermocouple Vacuum Gauge (M-012DM)
• Miniature Gauge (MG-2, MG-2M, MG-2F, MG-2/WF)
• Vacuum Gauge (Shultz, B-A, Nude Ion, Pirani, Thermocouple)

VACUUM VALVES
Canon ANELVA offers a variety of vacuum valves.
Available Products:
• UHV Type-L All-metal Valve
• UHV Type-L Polyimide Valve
• “V Series” Roughing pump valve V-025RV
• “V Series” Type-L Valves V-040LV/ V-065LV/ V-100LV
• UHV Variable Leak Valve
• Inlet valve
• Leak valve
• Isolate Valve V-025SV
• UHV Gate Valve MSB Series
• UHV Gate Valve STD Series
Canon Optomechatronics Products

Canon Optomechatronic Products blend optics, analytics, motion control technology to enable advanced and automated processes. Canon has been developing industrial components with precision and accuracy using optical technology developed and accumulated for over half a century.

**OPTOELECTRONICS**

Canon Optoelectronics integrate optical and electronic technologies with precise fabrication to produce a line of products for advanced R&D and production.

**Available Products:**
- Digital Laser Scanner System
- Optical Digital Laser Rotary Encoder
- Interpolator Board
- Laser Doppler Velocity Sensor
- Custom Design Encoders

**MOTION CONTROL PRODUCTS**

Canon’s DC Micro-Motors can be found in robotic systems, semiconductor process equipment, sporting equipment, ATMs, medical devices and pumps.

**Available Products:**
- Brushless Motors
- Coreless Motors
- Iron Core Motors
- Actuator Units

GM-1000 Series Digital Galvano Motors support beam diameters between 5 and 30mm. Options such as gear units and encoders can be added to Canon motors. Speed, reduction rate and other parameters can be customized to fit your exact requirements.
3-D MACHINE VISION SYSTEM (RV-SERIES)

RV-Series 3-D Machine Vision Systems are designed to work with robotic arm systems as an “eye” for three-dimensional recognition of the position and orientation of objects and to instruct the robotic system how to approach and pick up individual parts.

Features:
- 3-Dimensional, Image Recognition of Target Parts
- Simple and Easy Preparation with CAD data and Image File
- One-time Measurement of 3-D Pose
- Position and Orientation: 6 Degrees of Freedom

Canon’s 3-D Machine Vision System was developed in response to the manufacturing industry need for a solution for 3D robotic random bin picking.

SURFACE REFLECTANCE ANALYZER

Canon’s RA-532H Surface Reflectance Analyzer is a portable measuring device to evaluate surface conditions of objects including standard compliant Gloss, Haze, Image Clarity and 2-D BRDF measurements.

Features:
- Single analysis for 4 surface conditions: Gloss, Haze, Image Clarity, and Bidirectional Reflectance Distribution Function (BRDF)
- 2-D BRDF measurement in the palm of your hand
- Outputs the angular distribution of incident reflected light intensity
- Monitoring camera function displays measurement area results

Industries With a Need for Surface Appearance Quality Measurement
Canon Industrial Products Markets

- Litho Products
- Flat-Panel Exposure
- ANELVA PVD and Etch
- ANELVA Panel Products
- X-Ray Source
- Vacuum Components
- Optoelectronic Products
- DC Micro Motors
- 3-D Machine Vision
- Surface Reflectance Analyzer