Advanced Wafer Probe Cards

High-performance probe cards for memory, RF, foundry and logic devices
FormFactor, Inc. - Company Profile

FormFactor, Inc. (NASDAQ:FORM) is a leading provider of essential test and measurement technologies along the full IC life cycle – from characterization, modeling, reliability, and design de-bug, to qualification and production test.

Vision & Mission
Our heritage is innovation.

/ We constantly strive to help our customers solve the advanced test challenges of the broader semiconductor industry.
/ Our focus on customer partnership, innovation, agility and operational excellence allows us to earn sustainable business every day.

Key Facts
FormFactor at a glance.

/ Founded in 1993, IPO 2003
/ #1 Advanced Probe Card Supplier
/ #1 Engineering Probe Systems Supplier
/ Named as a BEST Supplier in customer satisfaction surveys, year-after-year
/ Ship >50 million MEMS probes annually
/ Over 10,000 probe systems installed

Customer Collaboration
Global and local.

/ Enable customer success through technology, partnerships, “First Time Right” product quality, global customer support
/ 1600 employees, with >500 directly supporting customers
/ 22 service and repair centers
/ 13 sales offices
/ 9 design centers
### Apollo™ Vertical Probe Cards for Bump/ Cu Pillar Probing

**High Current Capacity for Artificial Intelligence, Applications Processors and Server Chips**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Pitch scalability to 40 µm</td>
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<tr>
<td>Variety of metallurgies and geometries</td>
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<tr>
<td>Best-in-class contact stability and lifetime</td>
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<tr>
<td>Membrane, MLO, MLC space transformation options</td>
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#### Customer Applications

- High pin-count and multi-site: >50k probes
- Ideal for AI, AP and server chip testing: >1.5A CCC/probe
- DirectDock for KGD performance
- Low-force probing for Cu pillar and bumps

![Apollo for fine pitch, flip-chip wafer probing](image)

![Direct-Dock solution for V93K](image)

### Katana™ Vertical MEMS Probe Cards for Al/Cu Pads Probing

**Low Impact Probe (LIP) Optimized for Automotive Applications**

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<td>No-float architecture for stable Cres, planarity and alignment (-40 to 165°C) at 60 µm pitch and higher</td>
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<tr>
<td>High current-carrying capability, 0.8A CCC &amp; 0.6A MAC</td>
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<tr>
<td>Low-impact probe to minimize pad damage: &lt;2g at production overdrive; &gt;10 TDs with no punch-through or dielectric cracking</td>
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<td>Wear-resistive PA2 tip material for long lifetime</td>
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</table>

![Wear-resistive PA2 tip material for long life. Constant probe pressure to minimize pad damage.](image)

![8k pins pointed tip probe card for pre-bump application.](image)
Matrix Family of Full Wafer Contactor Probe Cards
Targeting 1-4 Touchdowns with 256-3200 Sites in Parallel

- Lowest full wafer contactor planarity for optimum scrub performance and contact resistance
- Industry-leading electrical performance
- Advanced tester resource extension (ATRE) capability: Maximize parallelism with high performance and reliability on existing AT to minimize CAPEX investment
- HFTAP (High Frequency Test at Speed) for KGD (Known Good Die) applications and Advanced memory characterization up to 3.2Ghz

Customer Applications
- DRAM Sort and BI – over 150K springs (Smart Matrix)
- NAND and NOR Flash (TouchMatrix)
- SoC embedded Memory (TrueScale Matrix)
- Automotive wide temperature probing, from -40°C to 165°C

FormFactor’s unique “dutlet” architecture enables superior scrub margin performance, zero soak, wide temperature range, and high speed testing.

TouchMatrix™ enables one touchdown Flash probing on 300 mm wafers
SmartMatrix™ enables parallel testing of >3000 DRAM DUTs on 300 mm wafers
TrueScale Matrix™ enables testing of SoC with embedded memory on 300 mm wafers
Superior measurement accuracy with excellent signal integrity, minimum contact resistance and repeatable results.

High test efficiency with straightforward cleaning and maintenance. Minimum contact force and easily replaceable probes.

Long lifetime for lower cost of test.

Versatile Pyrana offers potential of generic PCBs to support families of similar devices.

Pyramid Probe® for High-Performance RF Applications
With Patented Membrane Technology

High-bandwidth RF microstrip transmission lines to probe tips guarantee performance and ensure low signal loss.

Consistent low contact resistance and low-inductance probe tips ensure accurate and repeatable RF measurements.

Patented ground and power planes, provide resonance-free stable power supplies directly to the DUTs

Permanent probe tip placement improves test cell uptime reducing the cost of ownership compared to other probing technologies.

Pyramid probe head wafer-side view
Pyramid probe tips

Pyramid Probe™ for RF Device Production Test
High Performance Vertical MEMS Probe Card

Superior measurement accuracy with excellent signal integrity, minimum contact resistance and repeatable results.

Long lifetime for lower cost of test.

High test efficiency with straightforward cleaning and maintenance. Minimum contact force and easily replaceable probes.

Versatile Pyrana offers potential of generic PCBs to support families of similar devices.
The world's most comprehensive portfolio of wafer probe cards with an extensive library of advanced probe contact technologies.

<table>
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<tr>
<th>Parametric</th>
<th>RF</th>
<th>SOC WLCSP</th>
<th>SOC Grid Array</th>
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<tbody>
<tr>
<td>Takumi™</td>
<td>Pyramid</td>
<td>QiLin</td>
<td>Apollo</td>
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<tr>
<td>Pyramid</td>
<td>Katana-RF</td>
<td>Katana</td>
<td>Vx</td>
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<td>Cantilever</td>
<td>Pyrana</td>
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FormFactor’s industry leading MEMS factories enable wafer test capability across SoC, Foundry, DRAM and Flash markets.

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<th>SOC Optical IC</th>
<th>SOC Wire Bond</th>
<th>DRAM</th>
<th>Flash</th>
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<tbody>
<tr>
<td>Hikari for Image Sensor</td>
<td>TrueScale Matrix</td>
<td>SmartMatrix</td>
<td>TouchMatrix</td>
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<td>Akari for LED</td>
<td>PH</td>
<td>HFTAP</td>
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<td>Katana</td>
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FormFactor is the world's #1 supplier of advanced wafer probe cards, shipping more than 50 million MEMs probes annually.