Volta Series Probe Specifications

**Suitable for engineering plastic only**

*Suitable for engineering plastic and machined ceramic

**Notes:**

- **Probe Travel**
  - **Wafer Side**
    - 230 μm
    - 250 μm
    - 300 μm
    - 300 μm
  - **PWB Side**
    - 160 μm
    - 150 μm
    - 150 μm
    - 150 μm

- **Spring Material**
  - **music wire**
  - **stainless steel**
  - **stainless steel**
  - **stainless steel**

- **Device Side Contact Material**
  - **Homogenous**

- **Contact Resistance**
  - < 250 μm
  - < 150 μm
  - < 150 μm
  - < 150 μm

- **Continuous Current Carrying Capacity**
  - **Room Temp.**
    - 1.2 A
    - 2 A
    - 2.5 A
    - 3 A

- **Insulation Insertion (Pattern: R-S-R @ -1 dB)**
  - 22 GHz
  - 20 GHz
  - 20 GHz
  - 20 GHz

- **Wafer I/O Pitch**
  - Specifications
    - Volta 200
    - Volta 300
    - Volta 350
    - Volta 400

- **Wafer Level Testing**
  - Volta Series Probe Head
  - Wafer Level Chip Scale Packages (WL CSP) and Known Good Die (KGD)
  - The Volta Probe Head is capable of testing sorted die for engineering development or failure analysis. Volta Probe Heads offer a high performance, cost-effective, easily maintainable alternative to cantilever and vertical probe card technologies.
  - Smiths Interconnect’s high performance spring probe contacts are used in the Volta Series. It offers individually replaceable in the field with minimal tooling and technical expertise.

- **Features**
  - Proprietary engineered plastic and machined ceramics for improved planarity allowing increased site to site test parallelism.
  - Customized footprint with component clearance close to Die Level Test (DLT).
  - Probe need to PCB aligned by guide pins with optional fiducials.
  - Lid design options include individual spring loaded device plunger and device guide.
  - Easy maintenance and quick installation.
  - Field replaceable.
  - Compatible to industry standard diving stage.

- **Benefits**
  - Long product life.
  - Increased test throughput.
  - Greater signal integrity performance.
  - Reduced test set-up time.
  - Lower cost of ownership.

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- **Notes:**
  - * Suitable for engineering plastic only
  - ** Suitable for engineering plastic only

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- **The Volta Series Probe Head ensures improved efficiency in high reliability WLP, WLCSP and KGD testing.**

- **Volta Series Probe Head**
  - Wafer Level Testing

- **Smiths Interconnect’s Volta Series Probe Head addresses a need for reduced test time set-up and increased throughput in high reliability testing of WLP (Wafer Level Packages), WLCSP (Wafer Level Chip Scale Packages), and KGD (Known Good Die).**

- **The Volta Probe Head is capable of testing sorted die for engineering development or failure analysis. Volta Probe Heads offer a high performance, cost-effective, easily maintainable alternative to cantilever and vertical probe card technologies.**

- **Smiths Interconnect’s high performance spring probe contacts are used in the Volta Series. It offers individually replaceable in the field with minimal tooling and technical expertise.**

- **The state-of-the-art Volta Manual Actuator (LiD) design allows sorted die tests, at all sites, simultaneously. The unique lid design eliminates the possibility of the die cracking even after repetitive testing. This feature enables Probe Card bring-ups prior to even wafer availability.**

- **Smiths Interconnect’s highly proficient lab and engineering capabilities include design validation, ISET measurements and custom simulations including Probe Card Analyzer (PCA) test capability in Outlining Quality Assurance.**
Volta 200 Fan-out PCB

Value Proposition

Volta 200 Fan-out PCB

Optimized contact force for low and stable contact resistance
Higher compliance compared to traditional vertical, cobra or pyramid contact technologies
Sorted die test capability for test development
Probe Card Analyze (PCA) validation capability
Suit for tri-temp test
Replacement for cantilever and vertical probe card technologies
Available for 200, 300, 350, 400 (or above) μm pitch applications

1 Fan-out routing approximately 600 pins from 200μm to ≳0.8mm per site, up to 10 sites
2 Identical routing for each site in parallel configuration
3 Up to 6 layers of Signal I/Os using laser stacked micro via
4 Up to 10 layers of Ground and Power I/Os; 18 layers maximum
5 Typical board size is 127x51 mm (1.5 mm thickness)
6 Fiducial Pads for accurate Probe Head true position
7 Optimized low loss material for high speed performance

Superior Durability

World-class Technology

Non-plated noble material spring probe contact
Optimized contact force for low and stable contact resistance
Higher compliance compared to traditional vertical, cobra or pyramid contact technologies
Sorted die test capability for test development
Probe Card Analyze (PCA) validation capability
Suit for tri-temp test
Replacement for cantilever and vertical probe card technologies
Available for 200, 300, 350, 400 (or above) μm pitch applications

Metal frame with removable cartridge
Proprietary engineered plastic material for high rigidity
Easy maintenance and field repairable
100% in-house manufacturing

Optimized Design

Improved structure based on finite element and Monte Carlo analyses
Machinable ceramic material option for increased planarity
Excellent site to site coplanarity
High test parallelism (over 32 sites)
4-pt pin crown (less bump damage)

1 Fan-out routing approximately 600 pins from 200μm to ≳0.8mm per site, up to 10 sites
2 Identical routing for each site in parallel configuration
3 Up to 6 layers of Signal I/Os using laser stacked micro via
4 Up to 10 layers of Ground and Power I/Os; 18 layers maximum
5 Typical board size is 127x51 mm (1.5 mm thickness)
6 Fiducial Pads for accurate Probe Head true position
7 Optimized low loss material for high speed performance

Exceptional Performance*

High Current Carrying Capacity (CCC)
Excellent DC and RF performance
Low and stable contact resistance
Reduced signal path
Long product life

*Ceramic PEEK Frame & Body
*SST Frame & Material “PI-1” Body
*SST Frame & Proprietary Material “PEEK Rigid” Body

Probe Head Preload Deflection FEA Analysis

Max Deflection Due to Preload

<table>
<thead>
<tr>
<th>Ceramic PEEK Frame &amp; Body</th>
<th>Stainless Steel Frame &amp; Proprietary Material “PEEK Rigid” Body</th>
<th>Stainless Steel Frame &amp; Material “PI-1” Body</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max Deflection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.298 mm</td>
<td>0.023 mm</td>
<td>0.059 mm</td>
</tr>
</tbody>
</table>
## Value Proposition

### World-class Technology
- Non-plated noble material spring probe contact
- Optimized contact force for low and stable contact resistance
- Higher compliance compared to traditional vertical, cobra or pyramid contact technologies
- Sorted die test capability for test development
- Probe Card Analyzer (PCA) validation capability
- Adapted for Fflash and vertical probe card technologies
- Available for 200, 300, 350, 400 (or above) μm pitch applications

### Superior Durability
- Metal frame with removable cartridge
- Proprietary engineered plastic material for high rigidity
- Easy maintenance and field repairable
- 100% in-house manufacturing

### Optimized Design
- Improved structure based on finite element and Monte Carlo analyses
- Machinable ceramic material option for increased planarity
- Excellent site to site coplanarity
- High test parallelism (over 32 sites)
- 4-pit pin crown (less bump damage)

### Exceptional Performance*
- High Current Carrying Capacity (CCC)
- Excellent DC and RF performance
- Low and stable contact resistance
- Reduced signal path
- Long product life

---

## Volta 200 Fan-out PCB

1. Fan-out routing approximately 600 pins from 200μm to >0.8mm per site, up to 10 sites
2. Identical routing for each site in parallel configuration
3. Up to 6 layers of Signal I/Os using laser stacked micro via
4. Up to 10 layers of Ground and Power I/Os; 18 layers maximum
5. Typical board size is 127x51 mm (1.5 mm thickness)
6. Fiducial Pads for accurate Probe Head true position
7. Optimized low loss material for high speed performance

---

## Structural Simulation

### Probe Head Preload Deflection FEA Analysis

- Ceramic PEEK Frame & Body
- SST Frame & Proprietary Material “PI-1” Body

### Max Deflection Due to Preload

<table>
<thead>
<tr>
<th>Ceramic PEEK Frame &amp; Body</th>
<th>Stainless Steel Frame &amp; Proprietary Material “PEEK Rigid” Body</th>
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</tr>
<tr>
<td></td>
<td>0.059 mm</td>
<td></td>
</tr>
</tbody>
</table>

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* Refer to the Volta Series Probe Specifications.
Volta 200 Fan-out PCB

Value Proposition

World-class Technology

- Non-plated noble material spring probe contact
- Optimized contact force for low and stable contact resistance
- Higher compliance compared to traditional vertical,cobra or pyramid contact technologies
- Sorted die test capability for test development
- Probe Card Analyzer (PCA) validation capability
- Suits for tri-temp test
- Replacement for cantilever and vertical probe card technologies
- Available for 200, 300, 350, 400 (or above) μm pitch applications

Superior Durability

- Metal frame with removable cartridge
- Proprietary engineered plastic material for high rigidity
- Easy maintenance and field repairable
- 100% in-house manufacturing

Optimized Design

- Improved structure based on finite element and Monte Carlo analyses
- Machinable ceramic material option for increased planarity
- Excellent site to site coplanarity
- High test parallelism (over 32 sites)
- 4-pt pin crown (less bump damage)

Exceptional Performance*

- High Current Carrying Capacity (CCC)
- Excellent DC and RF performance
- Low and stable contact resistance
- Reduced signal path
- Long product life

* Refer to the Volta Series Probe Specifications

- Fan-out routing approximately 600 pins from 200μm to >0.8mm per site, up to 10 sites
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- Up to 10 layers of Ground and Power I/Os; 18 layers maximum
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- Fiducial pads for accurate Probe Head true position
- Optimized low loss material for high speed performance

Structural Simulation

Probe Head Preload Deflection FEA Analysis

- Ceramic PEEK Frame & Body
- SST Frame & Proprietary Material “PEEK Rigid” Body

Max Deflection Due to Preload

- Ceramic PEEK Frame & Body: 0.298 mm
- Stainless Steel Frame & Proprietary Material “PI-1” Body: 0.023 mm
- Stainless Steel Frame & Material “PI-1” Body: 0.059 mm

Manual Actuator for Sorted Die Test
### Volta Series Probe Specifications

#### Wafer i/O Pitch

<table>
<thead>
<tr>
<th>Voltage</th>
<th>200 μm</th>
<th>300 μm</th>
<th>350 μm</th>
<th>400 μm</th>
<th>500 μm</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 μm</td>
<td>200 μm</td>
<td>300 μm</td>
<td>350 μm</td>
<td>400 μm</td>
<td>500 μm</td>
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<tr>
<td>30 μm</td>
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<td>350 μm</td>
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<tr>
<td>35 μm</td>
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<td>300 μm</td>
<td>350 μm</td>
<td>400 μm</td>
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</tr>
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<td>200 μm</td>
<td>300 μm</td>
<td>350 μm</td>
<td>400 μm</td>
<td>500 μm</td>
</tr>
</tbody>
</table>

#### Probe Travel

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Wafer Side</th>
<th>PCB Side</th>
</tr>
</thead>
<tbody>
<tr>
<td>200 μm</td>
<td>230 μm</td>
<td>160 μm</td>
</tr>
<tr>
<td>300 μm</td>
<td>250 μm</td>
<td>150 μm</td>
</tr>
<tr>
<td>350 μm</td>
<td>300 μm</td>
<td>150 μm</td>
</tr>
<tr>
<td>400 μm</td>
<td>300 μm</td>
<td>150 μm</td>
</tr>
</tbody>
</table>

#### Spring Material

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Wafer Side</th>
<th>PCB Side</th>
</tr>
</thead>
<tbody>
<tr>
<td>200 μm</td>
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<td>300 μm</td>
<td>150 μm</td>
</tr>
<tr>
<td>400 μm</td>
<td>300 μm</td>
<td>150 μm</td>
</tr>
</tbody>
</table>

### Device Side Contact Material

- Homogenous

### Notes

- **Suitable for engineering plastic only**
- **Suitable for engineering plastic and machined ceramic**

### Insertion Loss

<table>
<thead>
<tr>
<th>Voltage</th>
<th>1.2A</th>
<th>2A</th>
<th>2.5A</th>
<th>3A</th>
<th>3A</th>
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</thead>
<tbody>
<tr>
<td>200 μm</td>
<td>&lt; 70 mΩ</td>
<td>&lt; 50 mΩ</td>
<td>&lt; 50 mΩ</td>
<td>&lt; 50 mΩ</td>
<td>&lt; 50 mΩ</td>
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<tr>
<td>300 μm</td>
<td>&lt; 70 mΩ</td>
<td>&lt; 50 mΩ</td>
<td>&lt; 50 mΩ</td>
<td>&lt; 50 mΩ</td>
<td>&lt; 50 mΩ</td>
</tr>
<tr>
<td>350 μm</td>
<td>&lt; 70 mΩ</td>
<td>&lt; 50 mΩ</td>
<td>&lt; 50 mΩ</td>
<td>&lt; 50 mΩ</td>
<td>&lt; 50 mΩ</td>
</tr>
<tr>
<td>400 μm</td>
<td>&lt; 70 mΩ</td>
<td>&lt; 50 mΩ</td>
<td>&lt; 50 mΩ</td>
<td>&lt; 50 mΩ</td>
<td>&lt; 50 mΩ</td>
</tr>
</tbody>
</table>

### Capacitance

<table>
<thead>
<tr>
<th>Voltage</th>
<th>0.56 nF</th>
<th>0.79 nF</th>
<th>0.82 nF</th>
<th>0.82 nF</th>
<th>0.82 nF</th>
</tr>
</thead>
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<td>200 μm</td>
<td>0.56 nF</td>
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<tr>
<td>400 μm</td>
<td>0.56 nF</td>
<td>0.79 nF</td>
<td>0.82 nF</td>
<td>0.82 nF</td>
<td>0.82 nF</td>
</tr>
</tbody>
</table>

### Loop Inductance

<table>
<thead>
<tr>
<th>Voltage</th>
<th>0.22 μH</th>
<th>0.39 μH</th>
<th>0.30 μH</th>
<th>0.35 μH</th>
<th>0.35 μH</th>
</tr>
</thead>
<tbody>
<tr>
<td>200 μm</td>
<td>0.22 μH</td>
<td>0.39 μH</td>
<td>0.30 μH</td>
<td>0.35 μH</td>
<td>0.35 μH</td>
</tr>
<tr>
<td>300 μm</td>
<td>0.22 μH</td>
<td>0.39 μH</td>
<td>0.30 μH</td>
<td>0.35 μH</td>
<td>0.35 μH</td>
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<tr>
<td>350 μm</td>
<td>0.22 μH</td>
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<td>400 μm</td>
<td>0.22 μH</td>
<td>0.39 μH</td>
<td>0.30 μH</td>
<td>0.35 μH</td>
<td>0.35 μH</td>
</tr>
</tbody>
</table>

### Working Temperature

<table>
<thead>
<tr>
<th>Voltage</th>
<th>-55°C to 120°C</th>
<th>-55°C to 150°C</th>
<th>-55°C to 150°C</th>
<th>-55°C to 150°C</th>
<th>-55°C to 150°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>200 μm</td>
<td>-55°C to 120°C</td>
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<td>-55°C to 150°C</td>
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<tr>
<td>300 μm</td>
<td>-55°C to 120°C</td>
<td>-55°C to 150°C</td>
<td>-55°C to 150°C</td>
<td>-55°C to 150°C</td>
<td>-55°C to 150°C</td>
</tr>
<tr>
<td>350 μm</td>
<td>-55°C to 120°C</td>
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<td>-55°C to 150°C</td>
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</tr>
<tr>
<td>400 μm</td>
<td>-55°C to 120°C</td>
<td>-55°C to 150°C</td>
<td>-55°C to 150°C</td>
<td>-55°C to 150°C</td>
<td>-55°C to 150°C</td>
</tr>
</tbody>
</table>

### Max. Number of Test Sites

- Defined by the FEA [Total pin count at a defined area is the limit]

### Sorted Die Test Feature

- Alignment Plate and Manual Actuator

### Individual Contact Replacement

- Yes

### Volta Series Probe Head

#### Wafer Level Testing

Smiths Interconnect’s Volta Series Probe Head addresses a need for reduced test time set-up and increased throughput in high-reliability testing of Wafer Level Packages (WLP), Wafer Level Chip Scale Packages (WLCSP) and Known Good Die (KGD).

### Features

- Proprietary engineered plastic and machined ceramic for improved planarity allowing increased site to site test parallelism
- Customizable footprint with component clearance close to Die and Wafer Test (DUT)
- Probe head to PCB alignment by guide pins with optional fiducials
- Lid design options include individual spring loaded device plunger and device guide
- Easy maintenance and quick installation
- Field repairable
- Compatible to industry standard die piercing

### Benefits

- Improved product life cycle
- Increased test throughput
- Enhanced signal integrity and performance
- Reduced test setup time
- Lower cost of ownership

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- info.uk@smithsinterconnect.com
- +44 20 7004 1600
Volta Series Probe Specifications

**Volta Series Probe Specifications**

Volta 200  Volta 300  Volta 350  Volta 400

<table>
<thead>
<tr>
<th>Wafer I/O Pitch</th>
<th>200 μm</th>
<th>300 μm</th>
<th>350 μm</th>
<th>400 μm</th>
<th>500 μm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Probe Depth (All Test)</td>
<td>2.85 mm</td>
<td>3.80 mm</td>
<td>3.50 mm</td>
<td>2.90 mm</td>
<td>2.90 mm</td>
</tr>
<tr>
<td>Probe Travel</td>
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<td>230 μm</td>
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</tr>
<tr>
<td>PCB Side</td>
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</tr>
</tbody>
</table>

**Notes:**

- **Suitable for engineering plastic only**
- **Suitable for engineering plastic and machined ceramic**

**Specifications:**

- **Probe Travel**
  - Wafer Side: 230 μm, 250 μm, 300 μm, 310 μm, 300 μm
  - PCB Side: 160 μm, 150 μm, 150 μm, 150 μm, 150 μm

- **Contact Resistance**
  - ≤ 250 mΩ, ≤ 150 mΩ, ≤ 70 mΩ, ≤ 50 mΩ, ≤ 50 mΩ

- **Continuous Current Carrying Capacity**
  - Room Temp.: 1.2A, 2A, 2.50A, 3A, 3A

- **Insertion Loss (Pattern: R-S-R @ -1 dB)**
  - 22 GHz, 20 GHz, 20 GHz, 20 GHz, 10 GHz

- **Capacitance**
  - 0.22 pF, 0.39 pF, 0.39 pF, 0.25 pF, 0.45 pF

- **Spring Force**
  - 10 gf, 17.5 gf, 16 gf, 17 gf, 17 gf

- **Spring Material**
  - music wire, stainless steel, stainless steel, stainless steel, stainless steel

- **Contact Material**
  - Homogenous, music wire, stainless steel, stainless steel, stainless steel

- **Spring Material**
  - a need for reduced test time set-up and increased throughput in high reliability testing of Wafer Level Packages (WLP), Wafer Level Chip Scale Packages (WL CSP) and KGD testing.

**Features:**

- Proprietary engineered plastic and machined ceramic for improved planarity allowing increased site to site test parallelism
- Customized footprint with component clearance close to Die Canterbury Test (DUT)
- Probe need to PCB aligned by guide pins with optional fiducials
- Lid design options include individual spring loaded device plunger and device guide
- Easy maintenance and quick installation
- Field repairable
- Compatible to industry standard in-depth cleaning

**Benefits:**

- Reduced test set-up time
- Longer test set-up time
- Lower cost of ownership

**Contact:**

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- Singapore  
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info.singapore@smithsinterconnect.com

**The Volta Series Probe Head does not require the use of a test chart holder, ensuring consistent and reliable test results.**