Cascade

# TESLA200

## 200 mm On-Wafer Power Semiconductor Probing System

## Overview

Designed specifically for IGBT/power MOSFET (GaN, SiC, Si) device measurements at the wafer level, the new TESLA200 on-wafer power semiconductor probing system is engineered to provide accurate data up to 3,000 V (triaxial) / 10,000 V (coaxial) and 200 A (standard) / 600 A (high current). With next-generation test capabilities, anti-arcing solutions, wafer automation, and support for both engineering probes and T.I.P.S. “LuPo” High Voltage / High Power Probe Cards, the TESLA200 now enables complete thermal testing (-55°C to 300°C) with fully-automatic thin / TAIKO wafer loading. One system covers all on-wafer high power test needs, from R&D to niche production.


The new TESLA200, available in semi-automatic and fully-automatic models, is scalable and field upgradeable, allowing it to meet any budget requirements. The system is ideal for collecting high accuracy measurement data on single or volume wafers as fast as possible, and can be utilized in R&D, device characterization/modelling or niche production applications.

Patented AttoGuard® and MicroChamber® technologies built in TESLA200 significantly improve low-leakage and low-capacitance measurements. In combination with FormFactor’s patented TESLA FemtoGuard™ thermal chuck technology, the TESLA200 provides an ultra-low noise, fully guarded and shielded test environment. The high-power TESLA FemtoGuard chuck also incorporates MicroVac™ technology enabling low-contact resistance, thin-wafer handling and maximum power dissipation.

To ensure the utmost safety during high-voltage measurements, the TESLA200 on-wafer power semiconductor probing system employs a TUV-certified safety interlock system integrated with an ergonomic clear enclosure. With an advanced 200 mm fast stage, automatic wafer loader and thin wafer handling capability, TESLA200 provides everything needed for scientists, R&D / test engineers, or production operators to get their job done fast.

## Features / Benefits

| | |
|---|---|
| **High-voltage / Current Probes** | • On-wafer power device characterization up to 10,000 V DC / 600 A<br>• Reduced probe and device destruction at high currents up to 20 A DC and 300 A pulse (600 A when two probes are used in parallel)<br>• Increased isolation resistance and dielectric strength to provide full triaxial capability at high voltage (3,000 V) for low-leakage measurement |
| **T.I.P.S. “LuPo” High Voltage / High Power Probe Cards** | • On-wafer power device characterization up to 10,000 V DC<br>• Safe and convenient integration kits to support T.I.P.S. “LuPo” High Voltage / High Power Probe Cards |
| **Gold-plated TESLA High-power MicroVac Chucks** | • Prevent thin wafers from curling and breaking<br>• Advanced MicroVac chuck surface for minimum contact resistance between wafer and chuck<br>• Accurate Rds(on) measurement at high current<br>• Accurate UIS measurements at high temperature |
| **Safety for Operator** | • Safety interlock system with clear enclosure for operator safety during device measurements<br>• Roll-out stage for full wafer access and easy wafer loading/unloading |
| **Seamless Integration** | • Convenient connection kits for easy and safe system integration with power device analyzers from Keysight Technologies and other major suppliers<br>• Seamless integration between Velox and analyzers/measurement software |
| **Productivity** | • High throughput wafer auto-loading (standard, thinned, warped, TAIKO)<br>• Contact Intelligence enables higher yield, accurate Rds vertical device measurements over temperature automatically<br>• Easy on-screen navigation, wafer mapping, and operation of accessories with Velox software |

## Available Models

**Semi-automated Probe System**

**Fully-automated Probe System**

*Note: For physical dimensions and facility requirements, refer to the TESLA200 Facility Planning Guide.*

## Power Handling

| Tesla Chucks | Coax | Standard** | High Current** |
|---|---|---|---|
| Max voltage* | 10 kV (coaxial) | 3,000 V (triaxial), 10 kV (coaxial) | 3,000 V (triaxial), 10 kV (coaxial) |
| Max current | 200 A (pulsed), 10 A (DC) | 200 A (pulsed), 10 A (DC) | 600 A (pulsed), 20 A (DC) |
| Power dissipation | | | 100 W generated in 1 cm2 area at -40°C |

** Limited to 3kV for lift pin chucks. For automatic handling at higher test voltages, use non-liftpin chuck in combination with top-side wafer end effector.*

*** Performance is determined/selected with the connection breakout cable connecting the universal chuck connector to the instrument. Either max. voltage or max. current can be achieved, not simultaneously.*

## Measurement Performance

**Typical Chuck Noise (Triaxial)****

| | | TESLA200 AP Models | | TESLA200 M Models | | Settling Time*** |
|---|---|---|---|---|---|---|
| | | Standard | High Current | Standard | High Current | |
| 10 V | -55°C/-50°C/-40°C | 20 fA | 180 fA | 40 fA | 180 fA | < 200 fA @ 1.0 sec |
| | 25°C | 20 fA | 40 fA | 40 fA | 40 fA | < 200 fA @ 0.5 sec |
| | 200°C | 25 fA | 120 fA | 40 fA | 120 fA | < 200 fA @ 1.0 sec |
| | 300°C | 30 fA | 240 fA | 60 fA | 240 fA | < 200 fA @ 2.0 sec |
| 3 kV | -55°C/-50°C/-40°C | 2 pA | 4 pA | 4 pA | 4 pA | < 15 pA @ 1.5 sec |
| | 25°C | 2 pA | 4 pA | 4 pA | 4 pA | < 15 pA @ 1.5 sec |
| | 200°C | 3 pA | 4 pA | 6 pA | 4 pA | < 15 pA @ 1.5 sec |
| | 300°C | 6 pA | 12 pA | 10 pA | 12 pA | < 15 pA @ 4.5 sec |

**Typical Chuck Leakage (Coaxial)**

| | | TESLA200 AP Models | | TESLA200 M Models | |
|---|---|---|---|---|---|
| | | Coax / Standard | High Current | Coax / Standard | High Current |
| 3 kV | -55°C/-50°C/-40°C | 2 nA | 4 nA | 2 nA | 4 nA |
| | 25°C | 2 nA | 4 nA | 2 nA | 4 nA |
| | 200°C | 2 nA | 4 nA | 2 nA | 4 nA |
| | 300°C | 4 nA | 10 nA | 4 nA | 10 nA |
| 10 kV | -55°C/-50°C/-40°C | 7 nA | 10 nA | 7 nA | 10 nA |
| | 25°C | 7 nA | 10 nA | 7 nA | 10 nA |
| | 200°C | 7 nA | 12 nA | 7 nA | 12 nA |
| | 300°C | 14 nA | 34 nA | 14 nA | 34 nA |

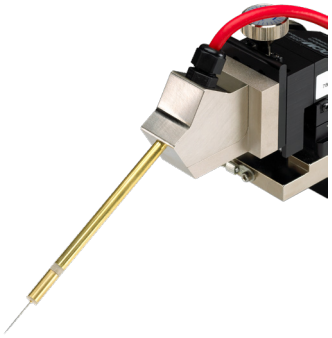
**System Residual Capacitance**

| | TESLA200 AP Models | TESLA200 M Models |
|---|---|---|
| Capacitance | 4.0 pF | 40 pF |

*** Overall leakage current is comprised of two separate components: 1) offset, and 2) noise. Offset is the DC value of current due to instrument voltage offset driving through isolation resistance and instrument offset current itself. Noise is low-frequency ripple superimposed on top of offset and is due to disturbances in the probe station environment. Noise and leakage are measured with a B1505A- B1510A (HPSMU) and or B1513A/B/C with Cascade Microtech setups or equivalent; 1s sample interval, auto or 1 nA range, 1 µA compliance, 40 PLC integration. Typical noise values are defined using the standard deviation. The maximum peak noise value may be 2-3 times higher than typical noise values depending on environmental factors such as humidity, vibration, temperature fluctuation, condition of the cable and connectors etc.*

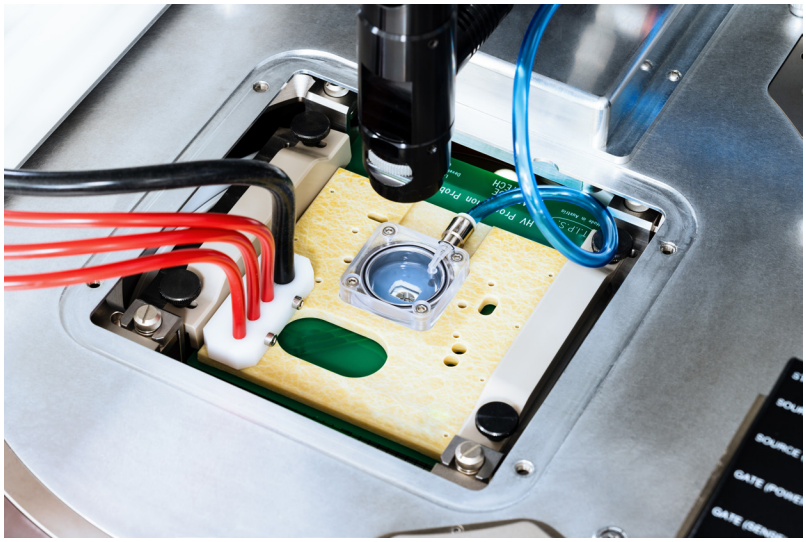
**** Settling time is measured with a B1505A/HPSMU Cascade Microtech setup or equivalent; 2 ms sampling interval, Fixed range: 1 nA, 1 µA compliance, 1 NPLC integration.*

## High Power Probes for TESLA200

| | Ultra High Power Probe | High-Current Probe | High-Voltage Probe |
|---|---|---|---|
| |   |  |  |
| Probe | UHP | HCP-XX | HVP-XX |
| Current | Up to 300 A | Up to 100 A | Up to 5 A |
| Voltage | Up to 10,000 V | Up to 500 V | Up to 3,000 V |

**See High-Power Probe data sheet for more information.*

## T.I.P.S. “LuPo” High Voltage / High Power Probe Cards



- Chip scale pressure chamber surrounds DUT to increase breakdown voltage
- On-wafer power device characterization up to 10,000 V DC
- Non-thermal and thermal probe cards with temperatures up to 200°C
- Engineering and production probe cards

## MicroChamber Performance

| Electrical | TESLA200 AP Models | TESLA200 M Models |
|---|---|---|
| Integrated technologies | AttoGuard and PureLine | |
| EMI shielding | ≥ 20 dB 0.5-3 GHz | ≥ 20 dB 0.5-20 GHz (typical) |
| | ≥ 30 dB 3-20 GHz (typical) | |

| Light Shielding | |
|---|---|
| Type | Complete dark enclosure around chuck |
| Wafer access | Front access door with rollout stage for easy manual wafer loading |
| | Side access door for fully automatic wafer loading |
| Probe compatibility | Standard MicroChamber TopHat™ allows access for up 8 probes |
| | Quad MicroChamber TopHat™ allows access for up 4 probes |
| Light attenuation | ≥ 120 dB |

| Purge and Condensation Control | |
|---|---|
| Test environment | Low volume for fast purge, external positioning and cable access to maintain sealed environment |
| Dew point capability | > -65° C for frost-free measurements* |
| Purge gas | Dry air or nitrogen* |
| Purge flow rate | Standard purge - manual controls, variable 0 to 110 l/min (4 CFM) at SATP |
| | Quick purge - manual/automated software control, standard purge rate or maximum > 110 l/min (4 CFM) at SATP* |
| Purge time | 15 min for measurements @ -55°C (typical) |
| External condensation control | Integrated laminar-flow air distribution on external MicroChamber surfaces to eliminate condensation |
| | Controls for ON/OFF and flow rate for both top and bottom surfaces |

**See Facility Planning Guide for details.*

## Mechanical Performance*

| X-Y Stage | Semi-/Fully-automated |
|---|---|
| Travel | 203 mm x 203 mm (8 in. x 8 in.) |
| Motion control | High performance stepper motors and manual remote control |
| Resolution | 0.2 µm (0.008 mils) |
| Feedback system | Closed loop optical linear encoder |
| Max speed | Up to 100 mm/sec (4 in./sec) |

| X-Y Speed/Accuracy | Fast Mode | Standard Mode | Accurate Mode |
|---|---|---|---|
| Accuracy | ≤5.0 µm | ≤2.5 µm | ≤2.0 µm |
| Repeatability | ≤3.5 µm | ≤2.0 µm | ≤1.5 µm |
| Typical stepping time for a 200Z – 1000X/Y – 200Z µm movement | 550 ms | 750 ms | 960 ms |

*Note: Shown values are typical values and can slightly vary depending on machine configuration.*

| Z Stage | Semi-/Fully-automated |
|---|---|
| Travel | 35 mm (1.4 in.) |
| Resolution | 1 µm (0.04 mils) |
| Repeatability | ≤ 1 µm (0.04 mils) |

| Theta Stage | Semi-/Fully-automated |
|---|---|
| Travel | ± 7.5° |
| Resolution | 0.5 µm (0.02 mils)** |
| Repeatability | < 1.5 µm (0.06 mils)** |
| Accuracy | ± 2 µm (0.08 mils)** standard moves<br>± 3 µm (0.12 mils)** large moves |

** Specification valid for standard chuck. Mechanical performance might slightly deviate for high current chuck.*
***Measured at edge of 200 mm chuck*

## Platen System

**Platen**

| | |
|---|---|
| Material | Steel for magnetic positioners |
| Dimensions | 74.5 cm (W) x 63.5 cm (D) x 20 mm (T) (29.3 in. x 23.4 in. x 0.78 in.) |
| Mounting system | Kinematic or fixed |
| Accessory compatibility | Minimum of 8 DC or 4 RF positioners allowed, compatible simultaneous probe card holder use |
| HTS thermal management | Integrated laminar-flow air-cooling for thermal expansion control |
| Standard interface | For MicroChamber, TopHat, probe card holders and custom adapters |

**Platen Lift***

| | |
|---|---|
| Type | Precision 4-point linear lift |
| Range** | 5.0 mm (0.20 in.) |
| Repeatability | ≤ 3 µm (0.12 mils) |
| Lift control | Ergonomic handle with 90° stroke. Optional micrometer control for fine adjustment of probe card contact. |

** Optional on some models.*

*** 3.0 mm for application layers that exceed the platen size to the left*

## Platform

**General**

| | |
|---|---|
| Physical dimensions | Please consult Facilities Planning Guide |
| Vibration isolation | Attenuation ≥ 0 dB @ 6 Hz, 5 dB per octave @ 6 Hz to 48 Hz,≥ 15 dB above 48 Hz* |
| Probe-force capability | 20 kg (44 lb.) maximum |
| Probe-force deflection | ≤ 0.0015 µm/µm slope per 10 kg load |
| System chuck planarity** (thermal chuck) | < 20 µm (0.8 mils) @ 25°C |
| | < 30 µm (1.2 mils) @ -60°C |
| | < 30 µm (1.2 mils) @ 200°C |
| | < 40 µm (1.6 mils) @ 300°C |
| Station Controller | High-performance system controller with Velox probe station control software and Windows 10 |
| Die cycling | Chuck stepping time ≤ 0.75 sec (200 µm Z down – 1000 µm X-Y – 200 µm Z up) |

* *Please see facilities planning guide for minimal environment background vibrations.*

** *Calibrated within 180 mm diamater area at 25° C.*

**Communication Ports**

| Type | User-accessible | Location | Note |
|---|---|---|---|
| USB 2.0 | 0 | Station Controller - Rear | For security keys and USB instrument control |
| USB 2.0 | (2) | Station Controller - Front | |
| USB 3.0 | 1 | Station Controller - Rear | |
| LAN GbE | 1 | Station Controller - Rear | |
| RS-232 | 2 | Station Controller - Rear | For instrument control (thermal, microscope, etc). |
| GPIB IEEE 488.2 | 1 (option) | Station Controller - Rear | Supplied with USB adapter for test instrument control |

**Accessory Interface Ports**

| Type | Qty | Location | Note |
|---|---|---|---|
| Edge-sense | 1 | IO- / Pneumatic module | Probe card contact sense |
| INKER | 2 | IO- / Pneumatic module | Control for die inker |

## Wafer and AUX Chuck

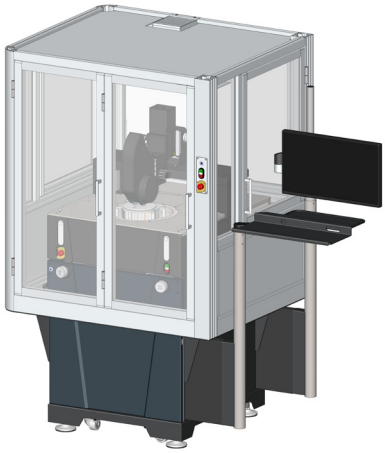
| Wafer Chuck | Coax | Standard | High Current |
|---|---|---|---|
| Type | HV Coaxial (standard & 3kV) | HV FemtoGuard Triaxial | HV FemtoGuard Triaxial |
| Diameter | | | |
| 200 mm (8in.) - Thermal | ● | ● | ● |
| 200 mm (8in.) - Non Thermal | ● | ● | |
| Material | Gold (Au) plated aluminum | | |
| Electrical connection | Dual HV triax cables with integrated chuck port (except Coax 3kV - SHV connectors) | | |
| Supported measurement modes | | | |
| Coaxial | ● | ● | ● |
| Triaxial | ● | ● | |
| Vacuum uniformity | Patented MicroVac technology using 495 micro-hole pattern for uniform vacuum hold down of thin, warped and partial wafers, and uniform temperature conductivity. | | |
| Vacuum zones | 5 selectable zones, with hole patterns arranged in approximately 9, 70, 93, 143 and 178 mm diameters (0.4, 2.8, 3.8, 5.6 and 7 in.) | | |
| Vacuum actuation | Easy access multi-zone manual vacuum controls, and software control (semi-automated) | | |
| Thin wafer support | Thin wafers down to 50 µm and optional support for Taiko wafers | | |

| Auxiliary Chucks | |
|---|---|
| Quantity | Up to three total AUX chucks |
| Design | High-voltage 10 kV compatible |
| Substrate size (maximum) | 15.2 mm x 22.1 mm (0.59 in. x 0.87 in.) ISS substrate<br>19 mm x 19 mm (0.75 in. x 0.75 in.) substrate |
| Material | Absorber (magnetically loaded)<br>Ceramic |
| Thermal isolation | Ensures negligible load drift on ISS |
| Flatness | ≤ 8 µm (0.3 mils) adjustable planarity |
| Vacuum actuation | Independently controlled apart from wafer vacuum zones |

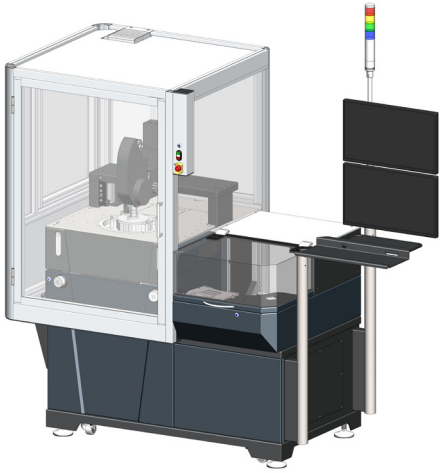
## Tesla Safety Systems

**TUV-certified Safety System and Enclosure for TESLA200 Power Semiconductor Probing System**

- Safety-rated interlock system for high-power testing (meets EN 60947-5-1, EN 60204-1 )
- Impact resistant safety approved clear enclosure
- Front opening door for ergonomic test setup and operation
- Side and rear access panels for easy equipment configuration
- Integrated design using TESLA200 universal mounting system



**TESLA200 Semi-automated Model**



**TESLA200 Fully-automated Model**

## Wafer Loader

| **Test Automation** | |
|---|---|
| Supported cassettes | 25 wafers with 100 mm or 150 mm (SEMI E1) or 200 mm (SEMI E1 like)* |
| Cassette stations | Up to 2 |
| Wafer handling | Wafers in compliance with SEMI M1<br>Handling of non-SEMI M1 compliant (“thin”) wafers to be tested prior to quote, special solutions available |
| Pre-alignment | Optical pre-aligner with flat/notch detection<br>Translucent wafer materials require test prior to quote |
| Wafer ID reading | Optional at top or bottom side (user changeable)<br>Supports barcode (BC 412 SEMI T1-95 standard) and IBM 412, OCR text (SEMI M12, M13 and M1.15 standard),<br>IBM, triple and OCR-A fonts or 2D code (Data Matrix T7 and M1.15 standard) |
| Quick access port | Optional – storage of up to 2 wafers (100 mm / 150 mm / 200 mm) for throughput enhancement or procedure support |
| Wafer handling @ ambient | ≤ 18 sec cassette load (incl. wafer scan) after latching door<br>≤ 38 sec first wafer (cassette → pre-aligner → prober chuck) (SEMI M1 wafer)<br>≤ 47 sec next wafer with quick access port (prober chuck → wafer unload and next wafer → prober chuck)<br>≤ 57 sec next wafer without quick access port (prober chuck → wafer unload and next wafer → prober chuck) |
| Automation management | Integrated into Velox Probe Station Control Software.<br>The creation of workflows and receipts is as simple as it can get. |

** Restrictions may apply for 200 mm cassettes of some vendors, as there is no uniform standard. Double-check required to confirm compatibility.*

## Wafer Loader (continued)

**Wafer End Effector**

| | | |
|---|---|---|
| X2-EHS48 | Wafer end effector for auto-loading, standard, 4-8" wafers | • With standard wafer scanner for standard silicon wafers<br>• Bottom side wafer lifting blade with vacuum hold<br>• For standard thickness and “low warp” thinned wafers<br>• Requires wafer chuck with lift pins |
| X2-EHS48P | Wafer end effector for auto-loading, standard, 4-8” wafers | • With advanced wafer scanner for non-silicon, glass and non-standard wafers<br>• Bottom side wafer lifting blade with vacuum hold<br>• For standard thickness and “low warp” thinned wafers<br>• Requires wafer chuck with lift pins |
| X2-EVTS48 | Wafer end effector for auto-loading, top-side, 4-8" wafers | • Top-side wafer lifting blade, patented Vacuum Grip (3-point/center)<br>• Optimized for “compliant handling” of warped thinned wafers<br>• Supports standard wafers and all chucks (with or without lift pins) |
| X2-ECTS68 | Wafer end effector for auto-loading, top-side, edge, 6-8" wafers | • Top-side wafer lifting blade with CYCLONE “Bernoulli” design<br>• Edge grip for warped thinned wafers (6 mm exclusion required)<br>• Supports standard wafers and all chucks (with or without lift pins) |
| X2-ECTS4 | Wafer end effector for auto-loading, top-side, edge, 4" wafers | • Top-side wafer lifting blade using CYCLONE “Bernoulli” design<br>• Edge grip for warped thinned wafers (6 mm exclusion required)<br>• Supports standard wafers and all chucks (with or without lift pins) |

## Velox Probe Station Control Software

The TESLA200 is equipped with Velox probe station control software and optional VeloxPro SEMI E95-compliant test executive software that enables simplified and safe automation of the entire wafer test cycle. Operating system is Windows 10.

**Velox Probe Station Control Software**

Velox software provides all features and benefits required for semi- and fully-automated operation of the probe system, such as:

- **User-centered design:** Minimized training costs and enhanced efficiency.
- **Windows 10 compatible:** Highest performance and safe operation with state-of-the-art hardware.
- **Loader integration:** No need for any additional software. Easy creation of workflows and receipts.
- **Smart automation features:** Faster time to data due to reduced test cycle times.
- **Hundreds of tuneable options:** High flexibility for a large variety of applications.
- **Simplified operation for inexperienced users:** Reduced training costs with Workflow Guide and condensed graphical user interface.

**VeloxPro Package (Optional)**

VeloxPro is a SEMI E95-compliant enhancement with test executive capabilities, featuring:

- **SEMI E95-compliant** probe station control software with condensed graphical user interface for simplified operation
- **Test executive software** enabling control of third-party measurement equipment via the probe station

**Tester Interface**

The TESLA200 uses commands through GPIB as a permanent listener. The GPIB interface provides the ability to:

- Request an inventory of all wafers available in the cassettes
- Define a wafer map
- Define a job (out of wafers and recipe)
- Change chuck temperature and initiate re-alignment
- Receive notifications when the wafer is aligned and ready to test

# Thermal System Performance

| Thermal System Overview | | | Coax | Standard | High Current |
|---|---|---|---|---|---|
| Temperature ranges | -50°C to 200°C, ATT, liquid cool (200 mm) | | ● | ● | ● |
| | -55°C to 300°C, ATT, air cool (200 mm) | | ● | ● | ● |
| | -40°C to 300°C, ATT, air cool (200 mm) | | ● | ● | ● |
| | +20°C to 300°C, ATT, air cool (200 mm) | | ● | ● | ● |
| | +30°C to 300°C, ATT, air cool (200 mm) | | ● | ● | ● |
| Wafer temperature accuracy | Standard[1, 2] | ± 2.5°C at 100°C | | | |
| | High Accuracy[3] | ± 0.05°C (0 to 250°C) | | | |
| Thermal uniformity | Coax, Standard, High Current[4] | ≤ ± 0.5C° @ 25°C, ≤ ± 1.5°C @ -60°C, ≤ ± 0.85°C @ 200°C, ≤ ± 1.5°C @ 300°C | | | |

*1. As measured with an Anritsu WE-11K-TSI-ANP or WE-12K-GW1-ANP type K thermocouple surface temperature measurement probe with offset calibration procedure. Conditions: closed chamber with minimum recommended purge air, probe centered on a blank silicon wafer, chuck at center of travel and standard probe height. Typical type K thermocouple probe tolerances are ±2.2°C or ±0.75% of the measured temperature in °C (whichever is greater).*

*2. The test setup can change the wafer temperature accuracy from the calibration by ±5°C (typical). Test setup attributes include open or closed chamber, probe or probe card construction and number of contacts, purge air flow rate, and lab environmental conditions.*

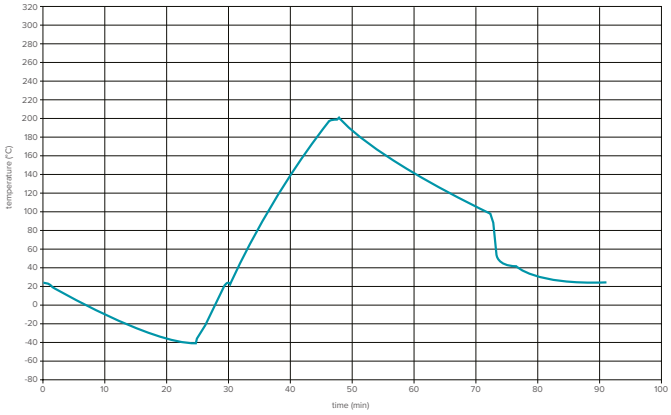
*3. Special high accuracy calibration using KLA Sense array wafer (Consult factory for pricing and availability)*

*4. As measured at DUT (device under test) probing location.*

**ATT Thermal System Specifications, 200 mm** (liquid cool, -55°C to 200°C)

| | |
|---|---|
| Temperature ranges | -55°C to 200°C |
| Transition time – Heating (-55°C to 25°C) | 5 min (typical) |
| Transition time – Heating (25°C to 200°C) | 14 min (typical) |
| Transition time – Cooling (200°C to 25°C) | 34 min (typical) |
| Transition time – Cooling (25°C to -55°C) | 20 min (typical) |
| Temperature resolution | 0.1° C |
| Audible noise | < 60 dB (A) |

**ATT Thermal Transition Time** (-55°C to 200°C)

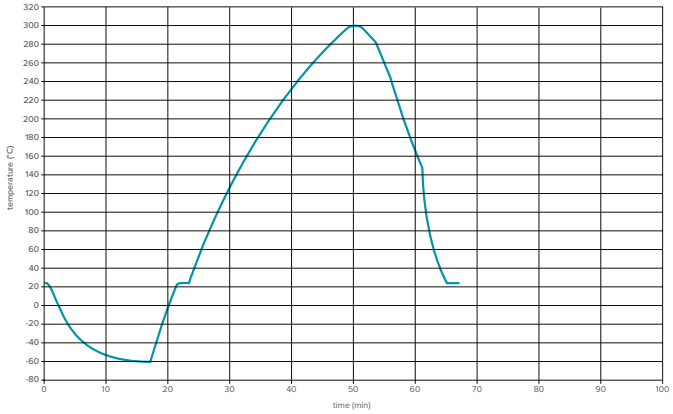



*Typical times using TESLA200-AP with FemtoGuard Chuck.*

**ATT Thermal System Specifications, 200 mm** (air cool, -60°C to 300°C)

| | |
|---|---|
| Temperature range | -60°C to 300°C |
| Transition time – Heating (-60°C to 25°C) | 5 min (typical) |
| Transition time – Heating (25°C to 300°C) | 27 min (typical) |
| Transition time – Cooling (300°C to 25°C) | 15 min (typical) |
| Transition time – Cooling (25°C to -60°C) | 15 min (typical) |
| Temperature resolution | 0.1°C |
| Audible noise | < 63 dB (A) |

**ATT Thermal Transition Time** (-60°C to 300°C)



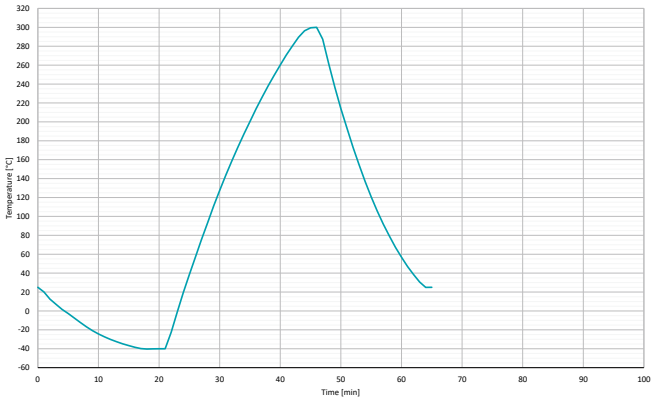

*Typical times using TESLA200-AP with FemtoGuard Chuck.*

# Thermal System Performance (continued)

**ATT Thermal System Specifications, 200 mm (air cool, -40°C to 300°C)**

| | Standard Mode | Power Mode |
|---|---|---|
| Temperature range | -40°C to 300°C | -40°C to 300°C |
| Transition time – Heating (-40°C to 25°C) | 5 min (typical) | 5 min (typical) |
| Transition time – Heating (25°C to 300°C) | 27 min (typical) | 27 min (typical) |
| Transition time – Cooling (300°C to 25°C) | 18 min (typical) | 14 min (typical) |
| Transition time – Cooling (25°C to -40°C) | 22 min (typical) | 19 min (typical) |
| Temperature resolution | 0.1°C | 0.1°C |
| Audible noise | < 55 dB (A) | < 55 dB (A) |

**ATT Thermal Transition Time (-40°C to 300°C)**

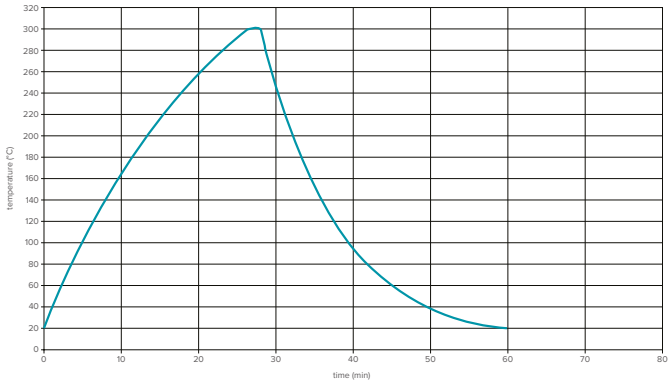



*Typical times using TESLA200-AP with FemtoGuard Chuck.*

**ATT Ambient Option Specifications, 200 mm** (air cool, + 20°C to 300°C)

| | |
|---|---|
| Temperature range | + 20°C to 300°C |
| Transition time - Heating | 27 min 200 mm (typical) |
| Transition time - Cooling | 31 min 200 mm (typical) |
| Temperature resolution | 0.1°C |
| Audible noise | < 55 dB (A) |

**ATT Thermal Transition Time** (+20°C to 300°C)

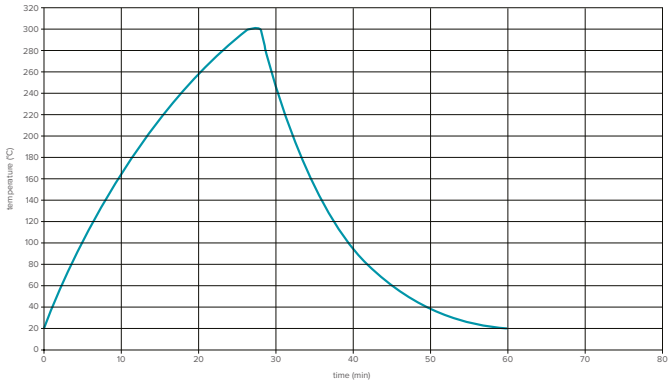



*Typical times using TESLA200-AP with FemtoGuard Chuck.*

**ATT Ambient Option Specifications, 200 mm** (air cool, +30°C to 300°C)

| | |
|---|---|
| Temperature range | + 30 to 300°C |
| Transition time - Heating | 25 min (typical) |
| Transition time - Cooling | 36 min (typical) |
| Temperature resolution | 0.1°C |
| Audible noise | < 55 dB (A) |

**ATT Thermal Transition Time** (+30°C to 300°C)




*Typical times using TESLA200-AP with FemtoGuard Chuck.*

# TESLA200 Station Models and Included Features

| Station Type | Fully-automated | | Semi-automated | |
|---|---|---|---|---|
| **Models** | **AP** | **M** | **AP** | **M** |
| **Features** | | | | |
| High-power safety enclosure (TUV certified) | ● | ● | ● | ● |
| MicroChamber for dark, dry and enhanced EMI-shielding enclosure | ● | ● | ● | ● |
| PureLine technology for premium signal path fidelity | ● | | ● | |
| AttoGuard for enhanced IV and CV testing | ● | | ● | |
| **Fully-automatic station (base)** | ● | ● | | |
| • Precision 4-axis 200 mm wafer stage | | | | |
| • High rigidity universal platen for stable probe contact | | | | |
| • Station frame with integrated control electronics and computer (with LCD, ergo mounts) | | | | |
| • Passive vibration isolation for full-auto station frame | | | | |
| • Automatic wafer loader module ( incl. single cassette port, robot, pre-aligner) | | | | |
| • Velox probe station control software, with | | | | |
| + Complete automation tools - AutoAlign, AutoDie, AutoXYZT Correction | | | | |
| + Thermal control, video window, wafermap, remote access | | | | |
| • User guides, tools, and accessories, and universal power cord kit | | | | |
| **Semi-automatic station (base)** | | | ● | ● |
| • Precision 4-axis 200 mm wafer stage | | | | |
| • High rigidity universal platen for stable probe contact | | | | |
| • Station frame with integrated control electronics and computer (with LCD, ergo mounts) | | | | |
| • Passive vibration isolation for semi-auto station frame | | | | |
| • Velox probe station control software, with | | | | |
| + Complete automation tools - AutoAlign, AutoDie, AutoXYZT Correction | | | | |
| + Thermal control, video window, wafermap, remote access | | | | |
| • User guides, tools, and accessories, and universal power cord kit | | | | |
| Microscope bridge / transport – High stability programmable 50 mm (2x2") (X2-TMT50P) | ● | | ● | |
| Microscope bridge / transport – High stability manual 50 mm (2x2") (X2-MT50) | | ● | | ● |
| Manual XY ergonomic controls for motorized wafer stage (X2-TXYCTRL) | ● | | ● | |
| Precision 4-point platen lift and kinematic mount (X2-PLA) | ● | | ● | |
| Fixed platen mount (X2-FPM) | | ● | | ● |
| High temperature stability module for platen (X2-HTSM) | ● | | ● | |
| Fixed chuck mount adapter (non-rollout) (X2-FCM) | ● | ● | | |
| Wafer chuck rollout module (X2-WRO) | | | ● | ● |
| Smart door lock for MicroChamber (X2-DLCK) | ● | | ● | |
| AUX chucks - High Voltage (positions 1 and 2) (X2-TAUXA1 and X2-TAUXA2) | ● | | ● | |
| Platen insert - MicroChamber TopHat (8 sides) with AttoGuard (X2-PIMTH8A) | ● | | ● | |
| Platen insert - MicroChamber TopHat (8 sides) (X2-PIMTH8) | | ● | | ● |
| GPIB Interface (X2-GPIB) | ● | ● | ● | ● |

● = *Base features and options included in Model/Package (consult FormFactor representative for more information).*

## Thermal Options

| TESLA200 Non-Thermal Chucks | | Chuck Compatibility | |
|---|---|---|---|
| **Part Number** | **General Description** | **AP** | **M** |
| TC-007-2x4 | Coaxial TESLA Chuck, non-thermal, 200mm (8"), Au | | ● |
| TC-007-2x4-SHV | SHV Coaxial TESLA Chuck, non-thermal, 3kV with SHV connectors, 200mm (8"), Au | | ● |
| TC-007-4x4 | FemtoGuard Triaxial TESLA Chuck, non-thermal, 200mm (8"), Au | ● | ● |

| TESLA200 Thermal Chucks | | Cooling | Chuck Compatibility | |
|---|---|---|---|---|
| **Part Number** | **General Description** | | **AP** | **M** |
| TC-417-2x4 | Coaxial TESLA Chuck, -55°C to +300°C, 200mm (8"), Au | Air | | ● |
| TC-417-4x4 | FemtoGuard Triaxial TESLA Chuck, standard, -55°C to +300°C, 200mm (8"), Au | Air | ● | ● |
| TC-417-504 | FemtoGuard Triaxial TESLA Chuck, high-current (600A), -55°C to +300°C, 200mm (8"), Au | Air | ● | ● |
| TC-407-2x4 | Coaxial TESLA Chuck, -50°C to +200°C, 200mm (8"), Au | Liquid | | ● |
| TC-407-4x4 | FemtoGuard Triaxial TESLA Chuck, standard, -50°C to +200°C, 200mm (8"), Au | Liquid | ● | ● |
| TC-407-504 | FemtoGuard Triaxial TESLA Chuck, high-current (600A), -50°C to +200°C, 200mm (8"), Au | Liquid | ● | ● |

**x=0 standard (10 kV), x=3 lift pin ready (3 kV limit)*

| TESLA200 Thermal Systems | | Cooling |
|---|---|---|
| **Part Number** | **General Description** | |
| TS-417-02T | Thermal system for SUMMIT200/TESLA200, +30°C to 300°C (100-230 VAC 50/60 Hz) | Air |
| TS-417-05T | Thermal system for SUMMIT200/TESL200, +20°C to 300°C (100-230 VAC 50/60 Hz) | Air |
| TS-427-08R | Thermal system for SUMMIT200, -40°C to 300°C, ATT, air cool (200-220 VAC 60 Hz, UL-certified) | Air |
| TS-427-08P | Thermal system for SUMMIT200, -40°C to 300°C, ATT, air cool (200-230 VAC 50/60 Hz) | Air |
| TS-417-14R | Thermal system for SUMMIT200/TESL200, -60°C to 300°C (200-220 VAC 60 Hz, 200 VAC 50 Hz) | Air |
| TS-417-14E | Thermal system for SUMMIT200/TESL200, -60°C to 300°C (200-240 VAC 50 Hz) | Air |
| TS-407-07E | Thermal system for SUMMIT200/TESL200, -55°C to 200°C (230 VAC 50 Hz) | Liquid |

*Note: Thermal systems must match the thermal chuck selected, i.e. TS-417-xxx thermal systems are compatible only with TC-417-xxx chucks.*

## Standard Options for Microscope Mounts

| **High Stability Bridge/Transport** (programmable) | **Part Number X2-TMT50P** |
|---|---|
| Travel X-Y | 50 mm x 50 mm (2 in. x 2 in.) |
| Travel X-Y in 8-sided TopHat and shielded probe card adapters | 26 mm x 26 mm (1 in. x 1 in.) |
| Travel X-Y in 4-sided RF TopHat | 5 mm x 5 mm (0.2 in. x 0.2 in.) |
| Type | Stepper motor with closed loop encoder system |
| Resolution X-Y | 0.4 µm (0.016 mils) |
| Repeatability X-Y | ≤ 2 µm (0.08 mils) |
| Accuracy X-Y | ≤ 5 µm (0.2 mils) |
| Speed X-Y | 5 mm (0.2 in.) /sec |
| Planarity | 10 µm (0.4 mils) over full travel with 5 kg (11 lb.) load |
| Z gross lift | 100 mm (4 in.) vertical lift, pneumatic with up/down, for easy probe access |
| Z gross repeatability | 1 µm (0.04 mils) |
| Z focus | Coarse/fine focus uses microscope system |

## Standard Options for Microscope Mounts (continued)

| **High Stability Bridge/Transport** (manual) | **Part Number X2-MT50** |
|---|---|
| Travel X-Y | 50 mm x 50 mm (2 in. x 2 in.) |
| Travel X-Y in 8-sided TopHat and shielded probe card adapters | 26 mm x 26 mm (1 in. x 1 in.) |
| Travel X-Y in 4-sided RF TopHat | 5 mm x 5 mm (0.2 in. x 0.2 in.) |
| Resolution X-Y | 5 mm (0.2 in.) / turn, coaxial XY control |
| Planarity | 10 µm (0.4 mils) over full travel with 5 kg (11 lb.) load |
| Z gross lift | 4” vertical lift, pneumatic with up/down, for easy probe access |
| Z gross repeatability | 1 µm (0.04 mils) |

| **High Stability Bridge/Transport (manual, fixed XY)** | **Part Number X2-MTF** |
|---|---|
| Planarity | 10 µm (0.4 mils) over full travel with 5 kg (11 lb.) load |
| Z gross lift | 4” vertical lift, pneumatic with up/down, for easy probe access |
| Z gross repeatability | 1 µm (0.04 mils) |

## TESLA200 Station Accessories

| **Microscope / video system** |
|---|
| Probe card holders |
| RF and DC probes, needles and probe cards |
| RF and DC cables and adapters |
| RF and DC probe positioners |
| Calibration software and standards |
| Vacuum pump, air compressor |

## Probing Kits

Probing kit includes necessary accessories, such as high-current/voltage probes, probe holders, positioners and interconnect cables for typical vertical and lateral device measurement setup.

**Probing Kit for Keysight B1505A**

| **Item** | **Description** |
|---|---|
| High-current probe package | HCP high-current parametric probe holder with BNC connector (quantity of two) |
| | Replaceable probe tips (box of five) |
| | Probe micropositioner (quantity of two) |
| High-voltage probe package with Kelvin sense capability | HVP high-voltage parametric probe holders with SHV connectors (quantity of three), or with Keysight triaxial connectors (quantity of two) |
| | Replaceable probe tips (box of 25) |
| | Probe micropositioner (quantity of five) |
| System interface panels | Keysight B1505A accessory mounting kit |
| Cables | Basic cable kit for Keysight B1505A accessory connection, including probe-to-panel, panel-to-chuck and chuck-to-instruments cables |

## Probing Kits (Continued)

**Probing Kit for Keithley Equipment 236/237**

| Item | Description |
|---|---|
| High-current probe package | HCP high-current parametric probe holder with banana jack (quantity of two) |
| | Replaceable probe tips (box of five) |
| | Probe micropositioner (quantity of two) |
| High-voltage probe package with Kelvin sense capability | HVP high-voltage parametric probe holders with Amphenol triaxial connectors (quantity of three) |
| | Replaceable probe tips (box of 25) |
| | Probe micropositioner (quantity of three) |
| System interface panels | High-voltage interface panel (triaxial) |
| | High-current interface panel |
| Cables | High-voltage triaxial cable package, including probe-to-panel, panel-to-instrument and chuck-to-instruments cables |

## VueTrack™ Technology Upgrade

The VueTrack technology provides a novel method to track probe tips and correct for drift, allowing a customer to run a probe station unattended at multiple temperatures with no operator intervention. The VueTrack technology significantly increases test productivity and test cell efficiency by eliminating the idle time between temperature transitions and automatically generating parametric and reliability data. VueTrack technology works best with high thermal stability probe arms/probe card holder.

**Available Items***

| Part Number | Description |
|---|---|
| 151-243 | VueTrack 30 day demo license** |
| X2-PIPCHMH | HTS Probe Card Holder, 40 mm, universal |
| 151-359 | VueTrack onsite PTPA option** |
| | Various HTS single probe arms* |

** See FormFactor's Station Accessory Guide for other available items, such as HTS probe arms and probe tips.*

*** eVue PRO model required. Contact FormFactor for eVue PRO upgrade.*

## Regulatory Compliance

| | |
|---|---|
| Certification | TÜV compliance tested for CE and CB, certified for US and Canada, SEMI S2 and S8 |

## Warranty*

| | |
|---|---|
| Warranty | Fifteen months from date of delivery or twelve months from date of installation |
| Service contracts | Single and multi-year programs available to suit your needs |

**See Terms and Conditions for Sale for more details.*



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TESLA200-DS-0822