MPI TS2500-SE | 200 mm Fully Automated Probe System

For Accurate and Reliable 24/7 Production Tests at a Wide Temperature Range within MPI ShielDEnvironment™

FEATURES / BENEFITS

Designed for Wide Variety of On-Wafer Applications

- Simultaneously for RF, DC-IV / DC-CV / Pulsed-IV Measurements, down to few fA, µV
- Humidity or other environmental sensor tests under control test environment
- RF noise sensitive measurements

Production Reliability

- Designed for 24/7 production reliability
- Safety cover with interlocks providing a closed environment

Ergonomic Design and Options

- Designed with easy single wafer front loading and unloading
- Built-in MPI ShielDEnvironment™ for light tight and EMI-shielding
- Large Probe Platen supporting up to 8x DC or 4x RF + 4DC MicroPositioners or standard 4.5” / 6.5” probe card holder
- Standard two cassettes for 100, or 150 or 200 mm wafers
- Available with various ambient or thermal chucks from -60 to 300 °C
- Wide range of on-axis optics in addition to
- Standard off-axis wafer alignment camera
- Optional upward looking chuck camera for probe-to-pad alignment
- Dedicated thin wafer handling option down to 50 µm

STAGE SPECIFICATIONS

Chuck XY Stage (Programmable)	
Travel range	220 x 490 mm (8.66 x 19.29 in)
Resolution	0.2 µm
Accuracy	< 2.0 µm (0.08 mils)
Repeatability	< 1 µm
XY stage drive	Closed-loop high precision stepper motors
Speed*	Slowest: 10 µm / sec | Fastest: 50 mm / sec

Chuck Z Stage (Programmable)	
Travel range	30 mm (1.18 in)
Resolution	0.2 µm
Accuracy	< 2.0 µm
Repeatability	< 1.0 µm
Z stage drive	Closed-loop high precision stepper motor
Speed*	Slowest: 10 µm / sec | Fastest: 20 mm / sec
Guider	Precision ball bearings

**The speed is instantaneous speed, not average speed. There is accelerate and decelerate time when moving.*

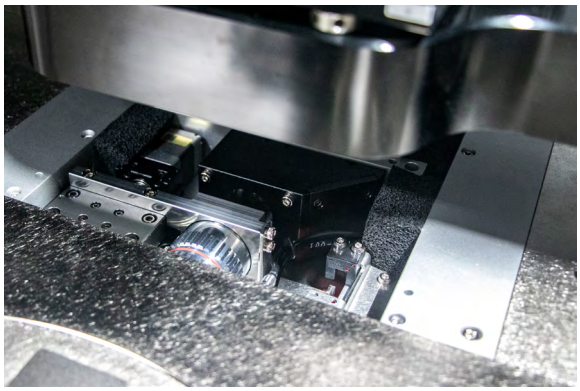
STAGE SPECIFICATIONS

Chuck Theta Stage (Programmable)	
Travel range	± 5.0°
Resolution	0.0001°
Accuracy	< 2.0 µm (measured at the edge of the 200 mm chuck)
Repeatabilty	< 1.0 µm
Theta stage drive	High resolution stepper motor with linear encoder feedback system

OPTION

Off-Axis Wafer Alignment System	
Number of pixels	5 MP
Optical resolution	2 µm
Field of view	3.4 x 2.8 mm
Illumination	coaxial

Chuck Camera Probe-To-Pad-Alignment System	
Number of pixels	5 MP
Optical resolution	2.5 µm
Field of view	4.2 x 3.5 mm
Illumination	coaxial and ring



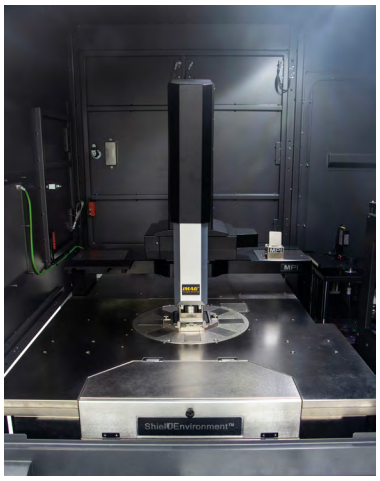
Off-axis wafer alignment camera

Optional upper looking chuck camera for probe-to-pad alignment

MICROSCOPE MOVEMENT

	XYZ Programmable	XY manual, Z programmable	XYZ manual
XY - Travel range	50 x 50 mm* / 100 x 50 mm / 200 x 200 mm	50 x 50 mm / 80 x 80 mm	50 x 50 mm / 100 x 100 mm
Resolution	1 µm (0.04 mils)	< 5 µm (0.2 mils)	< 5 µm (0.2 mils)
Repeatability	< 2 µm (0.08 mils)	N/A	N/A
Accuracy	< 5 µm (0.2 mils)	N/A	N/A
Z - Travel range	140 mm	140 mm	140 mm, pneumatic
Resolution	0.05 µm (0.002 mils)	0.05 µm (0.002 mils)	N/A
Repeatability	< 2 µm (0.08 mils)	< 2 µm (0.08 mils)	< 2 µm (0.08 mils)
Accuracy	< 4 µm (0.16 mils)	< 4 µm (0.16 mils)	N/A

Heavy duty version for laser cutter option available

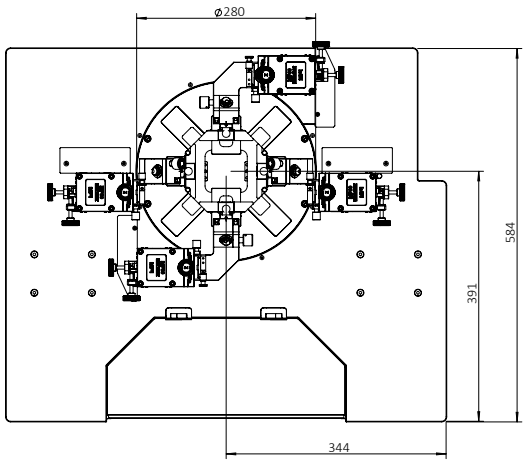


XYZ programmable movement

PROBE PLATEN

Specifications

Material	Nickel plated steel
Chuck to ShielDGuard height	min. 5 mm
Feature	Integrated Air-Cool platen control for thermal stability of MicroPositioners
Max. No of MicroPositioners	8x DC or 4x DC + 2x RF or 2x DC + 4x RF or 4x DC + 4x RF Setup



Optional MPI MP50 MicroPositioners are shown with the drawing

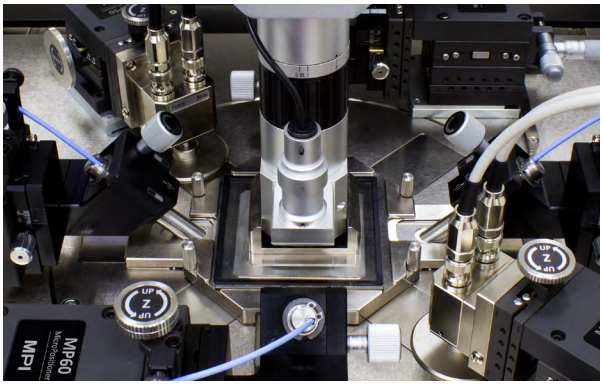
ShielDEnvironment™

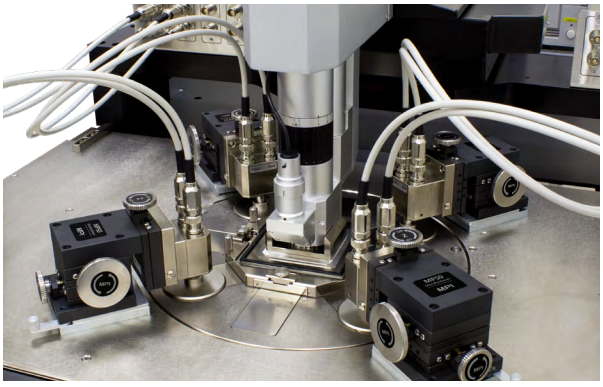
MPI ShielDEnvironment™ is a high performance local environmental chamber providing excellent EMI- and light-tight shielded test environment for ultra-low noise, low capacitance measurements.
MPI ShielDEnvironment™ allows up to 4-port RF or up to 8-ports DC/Kelvin or a combination of those configurations. MPI ShielDCap™ provides easy reconfiguration of measurement setup as well as EMI/noise shielding - which make great difference in simplifying day to day operations.

ShielDEnvironment™ Electrical Specifications*

EMI shielding	> 30 dB (typical) @ 1 kHz to 20 GHz
Light attenuation	≥ 130 dB
Spectral noise floor	≤ -180 dBVrms/rtHz (≤ 1 MHz)
System AC noise	≤ 5 mVp-p (≤ 1 GHz)

**Including 4 MicroPositioners.*

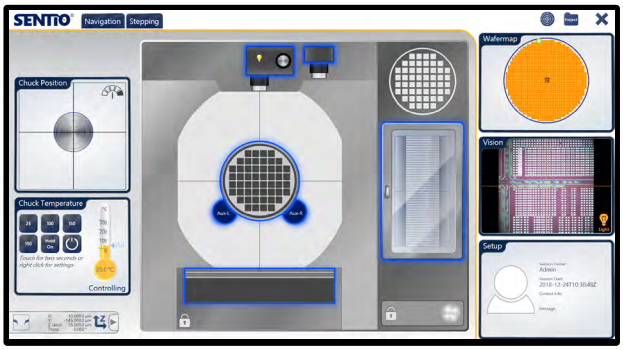


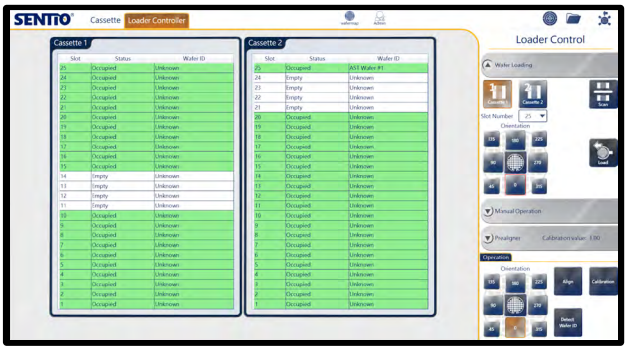


SOFTWARE SOLUTION

Unique and revolutionary multi-touch operation software SENTIO® controls MPI automated engineering probe systems. Its simple and intuitive operation concept significantly saves operator training time. Scroll, Zoon, and Move functions mimic modern smart mobile device interface. Switching between applications is just a matter of a simple finger swipe.
SENTIO® makes everyone the system operation expert in just minutes.

SENTIO® supports two SEMI standard cassettes from 3” to 200 mm for automated or manual wafer loading. Advanced and fast Wafer ID-Reader for top or bottom ID reading is optional available, providing revolutionary integrated RGB illumination and fully automatic exposure control.



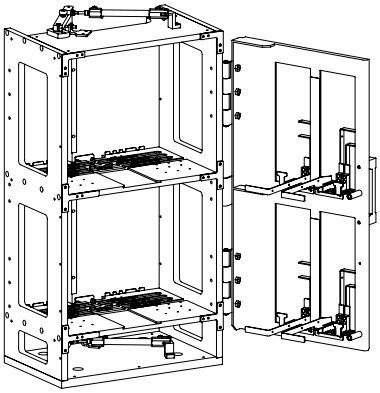


WAFER LOADING

Specifications

Wafer size	100, 150, 200 mm (4, 6, 8 in) or 75, 100, 150 mm (3, 4, 6 in)
Cassette type	Semi E1
Cassette capacity	2
Cassette loading time*	15 sec cassette (wafer scan)
First Wafer loading time*	40 sec (cassette → pre-alignment → chuck)
Next wafer exchange time*	40 sec (chuck → wafer unload and next wafer → chuck)
Thin wafer exchange function	Smart recipe for thin wafer lifting
Wafer support	Conventional and thin Wafer down to 50 µm
Pre-aligner	Optical, support notch and flats
Wafer ID reader (optional)	Optical, can configure top or bottom
Wafer scanning	Laser scanning for wafer indexing

**Typical values, depending on wafer size, thickness and surface condition*



TS2500-SE cassette station supports up to two 200 mm or two 150 mm or two 100 mm cassettes

NON-THERMAL CHUCKS

Standard Wafer Chuck

Connectivity	Coax BNC (f)
Diameter	210 mm
Material	Stainless steel
Chuck surface	Planar with centric engraved vacuum grooves
Vacuum grooves sections (diameter)	3, 27, 45, 69, 93, 117, 141, 164, 194 mm
Vacuum actuation	Multizone control - All connected in meander shape, center hole in 3 mm diameter
Supported DUT sizes	Single DUTs down to 5x5 mm size or wafers 50 mm (2 in) thru 200 mm (8 in)*
Surface planarity	≤± 5 µm**
Rigidity	< 15 µm / 10 N @edge

**Single DUT testing requires higher vacuum conditions dependent upon testing application.*
***By using SENTIO® topography*

RF Wafer Chuck

Connectivity	Kelvin Triax (f)
Diameter	210 mm with 2 integrated AUX areas
Material	Nickel plated aluminum (flat with 0.5 mm holes)
Chuck surface	Planar with 0.5 mm diameter holes in centric sections
Vacuum holes sections (diameter)	3, 27, 45, 69, 93, 117, 141, 164, 194 mm
SmartVacuum™ distribution	In center for 5x5 mm (4 holes), 100, 150, 200 mm (4, 6, 8 in)
Supported DUT sizes	Single DUTs down to 5x5 mm size or wafers 100 mm (4 in) thru 200 mm (8 in)*
Surface planarity	≤± 5 µm**
Rigidity	< 15 µm / 10 N @edge

**Single DUT testing requires higher vacuum conditions dependent upon testing application.*
***By using SENTIO® topography*

Auxiliary Chuck

Quantity	2 AUX chucks
Position	Integrated to front side of main chuck
Substrate size (W x L)	Max. 25 x 25 mm (1 x 1 in)
Material	Ceramic, RF absorbing material for accurate calibration
Surface planarity	≤± 5 µm
Vacuum control	Controlled independently, separate from chucks

Electrical Specification (Coax)

Operation voltage	In accordance with EC 61010, certificates for higher voltages available upon request
Maximum voltage between chuck top and GND	500 V DC
Isolation	> 2 GΩ

Electrical Specification (Triax)

Chuck isolation	Standard Chuck (10 V)
Force to guard	≥ 1 T Ω
Guard to shield	≥ 1 T Ω
Force to shield	≥ 5 T Ω

THERMAL CHUCKS

Specifications of MPI ERS AirCool® Technology

	Ambient to 150/200 °C	20 °C to 150/200 °C	-40 °C to 150/200 °C
Connectivity	Coax BNC (f)	Coax BNC (f)	Coax BNC (f)
Temperature control method	Cooling air / Resistance heater	Cooling air / Resistance heater	Cooling air / Resistance heater
Coolant	Air (user supplied)	Air (user supplied)	Air (user supplied)
Smallest temperature selection step	0.1 °C	0.1 °C	0.1 °C
Chuck temperature display resolution	0.1 °C	0.1 °C	0.1 °C
External touchscreen display operation	N/A	N/A	N/A
Temperature stability	±0.5 °C	±0.5 °C	±0.5 °C
Temperature accuracy	±1 °C	±1 °C	±1 °C
Control method	DC/PID	DC/PID	DC/PID
Chuck pinhole surface plating: 200 °C	Nickel	Nickel	Nickel
SmartVacuum™ distribution	In center for 5x5 mm (4 holes) 100, 150, 200 mm (4, 6, 8 in)		
Temperature sensor	Pt100 1/3DIN	Pt100 1/3DIN	Pt100 1/3DIN
Temperature uniformity	< ±1 °C	< ±1 °C	< ±1 °C
Surface flatness and base parallelism	< ±15 µm	< ±15 µm	< ±15 µm
Max. Voltage between			
Force-to-GND	500 V DC	500 V DC	500 V DC
Heating rates*	35 to 150 °C < 12 min 35 to 200 °C < 18 min	20 to 150 °C < 12 min 20 to 200 °C < 23 min	-40 to 25 °C < 12 min 25 to 200 °C < 16 min
Cooling rates*	150 to 35 °C < 15 min 200 to 35 °C < 18 min	150 to 20 °C < 18 min 200 to 20 °C < 30 min	200 to 25 °C < 20 min 25 to -40 °C < 36 min
Leakage @ 10 V	N/A	N/A	N/A
Electrical isolation	> 0.5 T Ω at 25 °C	> 0.5 T Ω at 25 °C	> 0.5 T Ω at 25 °C
Capacitance	< 750 pF	< 750 pF	< 750 pF

**Typical data for all chucks based on FPS requirements.*

Specifications of MPI ERS AirCool® PRIME Technology

	Ambient to 200/300 °C	20 °C to 200/300 °C	Ambient to 200/300 °C	20 °C to 200/300 °C
Chuck type	RF	RF	Ultra low noise	Ultra low noise
Connectivity	Kelvin Triax (f)	Kelvin Triax (f)	Kelvin Triax (f)	Kelvin Triax (f)
Temperature control method	Cooling air / Resistance heater	Cooling air / Resistance heater	Cooling air / Resistance heater	Cooling air / Resistance heater
Coolant	Air (user supplied)	Air (user supplied)	Air (user supplied)	Air (user supplied)
Smallest temperature selection step	0.1 °C	0.1 °C	0.1 °C	0.1 °C
Chuck temperature display resolution	0.01 °C	0.01 °C	0.01 °C	0.01 °C
External touchscreen display operation	Yes	Yes	Yes	Yes
Temperature stability	±0.08 °C	±0.08 °C	±0.08 °C	±0.08 °C
Temperature accuracy	±0.1 °C	0.1 °C	0.1 °C	0.1 °C
Control method	Low noise DC/PID	Low noise DC/PID	Low noise DC/PID	Low noise DC/PID
Chuck pinhole surface plating: 200°C / 300°C	Nickel / Gold	Nickel / Gold	Nickel / Gold	Nickel / Gold
SmartVacuum™ distribution	In front for single DUT 5x5 mm (4 holes) and 50 mm (2 in) In center for 100, 150, 200 mm (4, 6, 8 in)			
Temperature sensor	Pt100 1/3DIN, 4-line wired	Pt100 1/3DIN, 4-line wired	Pt100 1/3DIN, 4-line wired	Pt100 1/3DIN, 4-line wired
Temperature uniformity	< ±0.5 °C at ≤ 200 °C < ±1 °C at > 200 °C	< ±0.5 °C at ≤ 200 °C < ±1 °C at > 200 °C	< ±0.5 °C at ≤ 200 °C < ±1 °C at > 200 °C	< ±0.5 °C at ≤ 200 °C < ±1 °C at > 200 °C
Surface flatness and base parallelism	< ±12 µm	< ±12 µm	< ±12 µm	< ±12 µm
Max. Voltage between				
Force-to-GND	600 V DC	600 V DC	600 V DC	600 V DC
Force-to-Guard	100 V DC	100 V DC	600 V DC	600 V DC
Guard-to-GND	400 V DC	400 V DC	400 V DC	400 V DC
Heating rates*	35 to 200 °C < 16 min 35 to 300 °C < 20 min	20 to 200 °C < 15 min 20 to 300 °C < 22 min	35 to 200 °C < 18 min 35 to 300 °C < 26 min	20 to 200 °C < 16 min 20 to 300 °C < 28 min
Cooling rates*	200 to 35 °C < 27 min 300 to 35 °C < 33 min	200 to 20 °C < 33 min 300 to 20 °C < 40 min	200 to 35 °C < 27 min 300 to 35 °C < 34 min	200 to 20 °C < 41 min 300 to 20 °C < 42 min
Leakage @ 10 V	N/A	N/A	< 15 fA at 25 °C < 30 fA at 200 °C < 50 fA at 300 °C	< 15 fA at 25 °C < 30 fA at 200 °C < 50 fA at 300 °C
Electrical isolation	> 5 T Ω at 25 °C > 1 T Ω at 200 °C > 0.5 T Ω at 300 °C	> 5 T Ω at 25 °C > 1 T Ω at 200 °C > 0.5 T Ω at 300 °C	N/A	N/A
Capacitance				
Force-to-Guard	< 1600 pF	< 1600 pF	< 600 pF	< 600 pF
Guard-to-Shield	< 2000 pF	< 2000 pF	< 2000 pF	< 2000 pF

**Typical data for all chucks based on FPS requirements.*

Specifications of MPI ERS AirCool® PRIME with Fusion Chiller Technology

		-10 °C to 200/300 °C	-40 °C to 200/300 °C	-60 °C to 200/300 °C
Chuck type		RF	RF	RF
Connectivity		Kelvin Triax (f)	Kelvin Triax (f)	Kelvin Triax (f)
Temperature control method		Cooling air / Resistance heater	Cooling air / Resistance heater	Cooling air / Resistance heater
Coolant		Air (user supplied)	Air (user supplied)	Air (user supplied)
Smallest temperature selection step		0.1 °C	0.1 °C	0.1 °C
Chuck temperature display resolution		0.01 °C	0.01 °C	0.01 °C
External touchscreen display operation		Yes	Yes	Yes
Temperature stability		±0.08 °C	±0.08 °C	±0.08 °C
Temperature accuracy		0.1 °C	0.1 °C	0.1 °C
Control method		Low noise DC/PID	Low noise DC/PID	Low noiseDC/PID
Interfaces		RS232C	RS232C	RS232C
Chuck pinhole surface plating: 200°C / 300°C		Nickel / Gold	Nickel / Gold	Nickel / Gold
SmartVacuum™ distribution		In front for single DUT 5x5 mm (4 holes) and 50 mm (2 in) In center for 100, 150, 200 mm (4, 6, 8 in)		
Temperature sensor		Pt100 1/3DIN, 4-line wired	Pt100 1/3DIN, 4-line wired	Pt100 1/3DIN, 4-line wired
Temperature uniformity		< ±0.5 °C at ≤ 200 °C < ±1 °C at > 200 °C	< ±0.5 °C at ≤ 200 °C < ±1 °C at > 200 °C	< ±0.5 °C at ≤ 200 °C < ±1 °C at > 200 °C
Surface flatness and base parallelism		< ±12 µm	< ±12 µm	< ±12 µm
Max. Voltage between				
	Force-to-GND	600 V DC	600 V DC	600 V DC
	Force-to-Guard	100 V DC	100 V DC	100 V DC
	Guard-to-GND	400 V DC	400 V DC	400 V DC
Heating rates*				
	25 °C	-10 to 25 °C < 2 min	-40 to 25 °C < 4 min	-60 to 25 °C < 5 min
	200 °C	25 to 200 °C < 13 min	25 to 200 °C < 12 min	
	300 °C	25 to 300 °C < 22 min	25 to 300 °C < 22 min	
Cooling rates*				
	AC3 Mode 300 °C	300 to 25 °C < 10 min	300 to 25 °C < 14 min	
	AC3 Mode 200 °C	200 to 25 °C < 9 min	200 to 25 °C < 11 min	
	AC3 Mode 25 °C	25 to -10 °C < 6 min	25 to -40 °C < 12 min	25 to -60 °C < 29 min
	TURBO Mode 300 °C	300 to 25 °C < 10 min	300 to 25 °C < 12 min	
	TURBO Mode 200 °C	200 to 25 °C < 9 min	200 to 25 °C < 9 min	
	TURBO Mode 25 °C	25 to -10 °C < 6 min	25 to -40 °C < 9 min	25 to -60 °C < 18 min
Leakage @ 10 V		N/A	N/A	N/A
Electrical isolation		> 5 T Ω at 25 °C or below > 1 T Ω at 200 °C, > 0.5 T Ω at 300 °C		
Capacitance				
	Force-to-Guard	< 1600 pF	< 1600 pF	< 1600 pF
	Guard-to-Shield	< 2000 pF	< 2000 pF	< 2000 pF

**Typical data for all chucks based on FPS requirements.*

Specifications of MPI ERS AirCool® PRIME with Fusion Chiller Technology

		-10 °C to 200/300 °C	-40 °C to 200/300 °C	-60 °C to 200/300 °C
Chuck type		Ultra low noise	Ultra low noise	Ultra low noise
Connectivity		Kelvin Triax (f)	Kelvin Triax (f)	Kelvin Triax (f)
Temperature control method		Cooling air / Resistance heater	Cooling air / Resistance heater	Cooling air / Resistance heater
Coolant		Air (user supplied)	Air (user supplied)	Air (user supplied)
Smallest temperature selection step		0.1 °C	0.1 °C	0.1 °C
Chuck temperature display resolution		0.01 °C	0.01 °C	0.01 °C
External touchscreen display operation		Yes	Yes	Yes
Temperature stability		±0.08 °C	±0.08 °C	±0.08 °C
Temperature accuracy		0.1 °C	0.1 °C	0.1 °C
Control method		Low noise DC/PID	Low noise DC/PID	Low noise DC/PID
Interfaces		RS232C	RS232C	RS232C
Chuck pinhole surface plating: 200°C / 300°C		Nickel / Gold	Nickel / Gold	Nickel / Gold
SmartVacuum™ distribution		In front for single DUT 5x5 mm (4 holes) and 50 mm (2 in) In center for 100, 150, 200 mm (4, 6, 8 in)		
Temperature sensor		Pt100 1/3DIN, 4-line wired	Pt100 1/3DIN, 4-line wired	Pt100 1/3DIN, 4-line wired
Temperature uniformity		< ±0.5 °C at ≤ 200 °C < ±1 °C at > 200 °C	< ±0.5 °C at ≤ 200 °C < ±1 °C at > 200 °C	< ±0.5 °C at ≤ 200 °C < ±1 °C at > 200 °C
Surface flatness and base parallelism		< ±12 µm	< ±12 µm	< ±12 µm
Max. Voltage between				
Force-to-GND		600 V DC	600 V DC	600 V DC
Force-to-Guard		600 V DC	600 V DC	600 V DC
Guard-to-GND		400 V DC	400 V DC	400 V DC
Heating rates*				
25 °C		-10 to 25 °C < 3 min	-40 to 25 °C < 4 min	-60 to 25 °C < 5 min
200 °C			25 to 200 °C < 15 min	
300 °C			25 to 300 °C < 26 min	
Cooling rates*				
AC3 Mode	300 °C	300 to 25 °C < 14 min	300 to 25 °C < 16 min	
	200 °C	200 to 25 °C < 11 min	200 to 25 °C < 13 min	
	25 °C	25 to -10 °C < 8 min	25 to -40 °C < 15 min	25 to -60 °C < 30 min
TURBO Mode	300 °C	300 to 25 °C < 14 min	300 to 25 °C < 14 min	
	200 °C	200 to 25 °C < 11 min	200 to 25 °C < 11 min	
	25 °C	25 to -10 °C < 8 min	25 to -40 °C < 13 min	25 to -60 °C < 20 min
Leakage @ 10 V				
-10, -40 or -60 °C		< 30 fA	< 30 fA	< 30 fA
25 °C		< 15 fA	< 15 fA	< 15 fA
200 °C		< 30 fA	< 30 fA	< 30 fA
300 °C		< 50 fA	< 50 fA	< 50 fA
Capacitance				
Force-to-Guard		< 600 pF	< 600 pF	< 600 pF
Guard-to-Shield		< 2000 pF	< 2000 pF	< 2000 pF

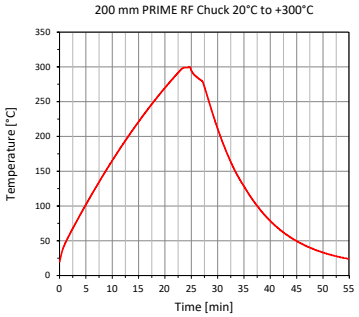
**Typical data for all chucks based on FPS requirements.*

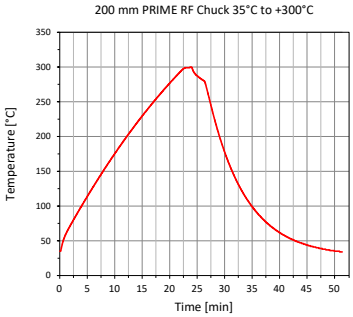
ERS AirCool® Fusion*, Controller Integrated Chiller -40 °C / -60 °C

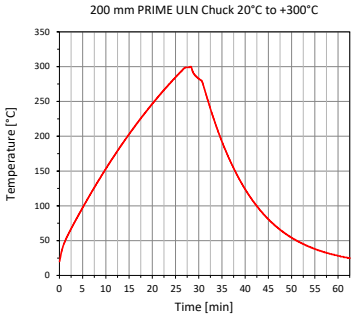
ERS AirCool® Fusion*, Controller Integrated Chiller -10 °C

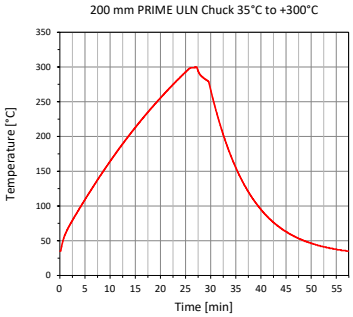
**ERS electronic GmbH patented solution*

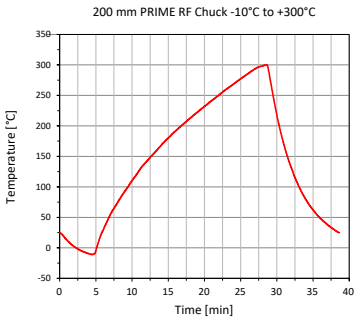
TYPICAL TRANSITION TIME

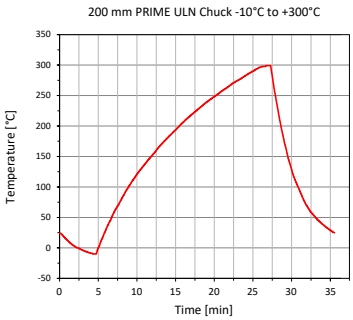


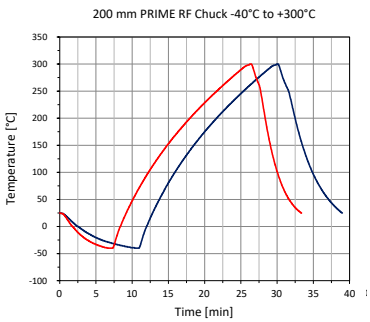


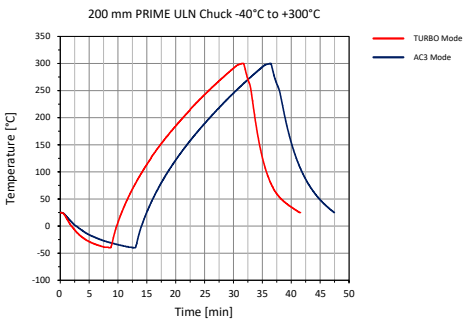


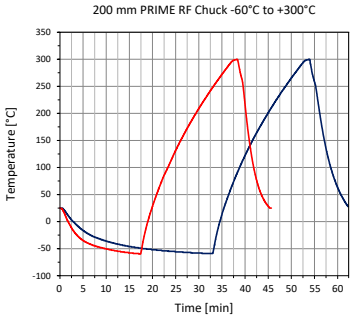


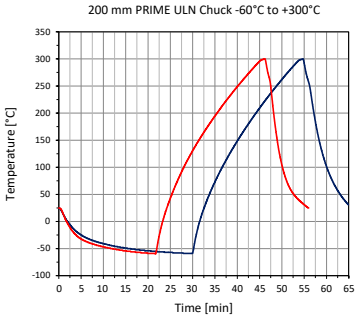












SYSTEM CONTROLLER SPECIFICATIONS

CPU	Intel Core i9
RAM	16 GB
64 bit operating system	Windows 11 Enterprise LTSC (English) 64 bit
Storage	500 GB SSD
LAN	1 x internal, 1 x external TCP/IP port
USB Ports	3 x internal, 1 x external
GPIB interface	Optional

SUPPORTED SOFTWARE PLATFORMS

Drivers	WaferPro / IC-CAP & EasyEXPERT from Keysight, BSIMPro & NoisePro from ProPlus, ACS from Keithley
Emulation mode	Available for various prober control software*

** Please contact your local support for more details.*

FACILITY REQUIREMENTS

General Probe System

Power	100-240 V AC nominal ; 50/60 Hz
Vacuum	-0.9 bar
Compressed air	6.0 bar

REGULATORY COMPLIANCE

3rd party, TÜV tested according to

- IEC 61010-1: 2010 + Am1:2016; EN 61010-1: 2010; IEC/EN 61010-2-010: 2014; IEC/EN 61010-2-081: 2015; EN ISO 12100: 2010; UL 61010-1: 2012/R: 2016-04; UL 61010-2-010: 2015; CAN/CSA-C22.2 No. 61010-1: 2012/U2: 2016-04; CAN/CSA-C22.2 No. 61010-2-010:2015

and certified for CE and US/Canada (NRTL), SEMI S2 and S8.
Copies of certificates are available on request

WARRANTY

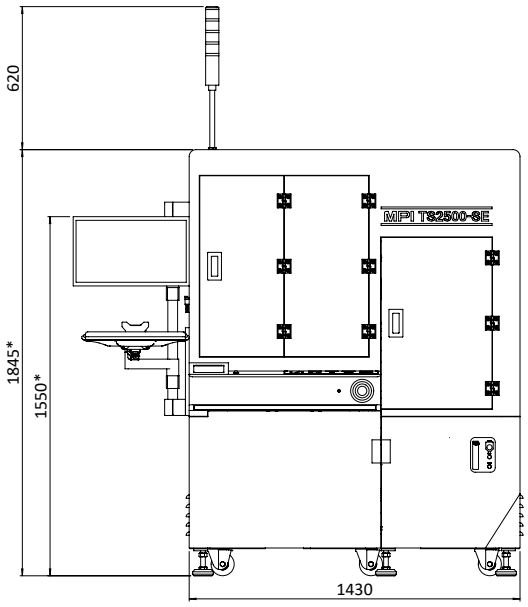
- Warranty*: 12 months
- Extended service contract: contact MPI Corporation for more information

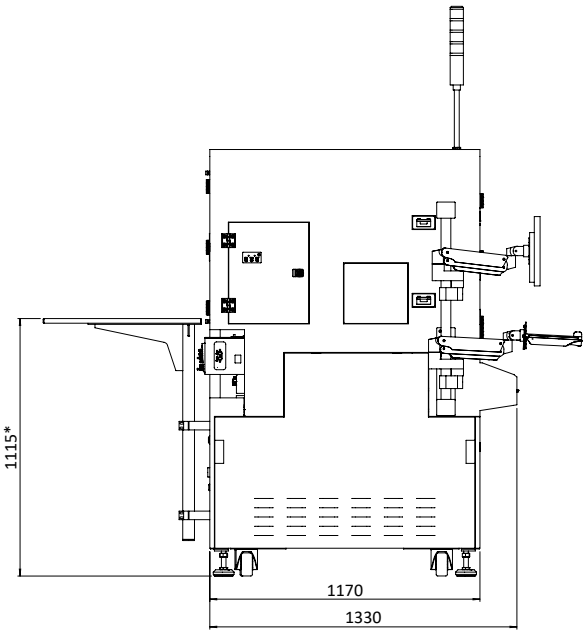
**See MPI Corporation's Terms and Conditions of Sale for more details.*

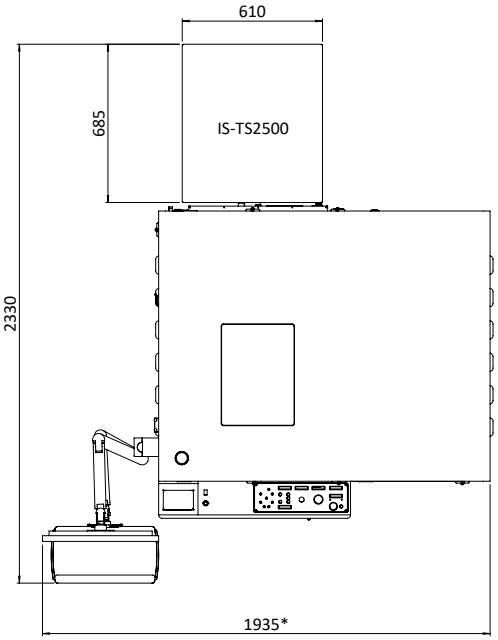
PHYSICAL DIMENSIONS

Specifications

System dimensions (W x D x H)	1430 x 1330 x 2465 mm (56.3 x 52.4 x 97.0 in)
Weight	950 kg







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MPI global presence: for your local support, please find the right contact here:
mpi-corporation.com/ast/support/regional-sales-contact

MPI Global Presence