MPI TS3000-HP | 300 mm Automated Probe System

For accurate and reliable High Power measurements

FEATURES / BENEFITS

Dedicated designed for High Voltage and High Current application

- On wafer high power device measurement up to 10 kV/600 A
- Gold plated chuck surface for minimum contact resistance and vacuum holes optimized for thin wafer handling down to 50 µm
- Taiko wafer chuck option
- Dedicated high voltage and high current probes
- Anti-arcing solutions

MPI ShieldEnvironment™ for Accurate Measurements

- Designed for Advanced EMI / RFI / Light-Tight Shielding
- fA low-leakage capabilities
- Ready for temperature range -60 °C to 300 °C

Ergonomic Design and Safety

- Easy wafer or single DUT loading from the front
- Regulatory approved safety interlocked light curtain to protect users
- Integrated active vibration isolation
- Completely integrated prober control for faster, safer and convenient system and test operation
- The Safety Test Management (STM™) option to load/unload wafers at any chuck temperatures and auto dew point control

STAGE SPECIFICATIONS

Chuck XY Stage (Programmable)

Travel range	310 mm x 335 mm (12.2 x 13.19 in)
Resolution	0.5 µm
Accuracy	< 2.0 µm (0.08 mils)
XY stage drive	Closed-loop high precision stepper motors
Speed	5-Speed XY chuck stage speed movement
Max. movement speed	50 mm / sec

Chuck Z Stage (Programmable)

Travel range	30 mm (1.18 in)
Resolution	0.2 µm
Accuracy	< 2 µm
Repeatability	< 1 µm
Z stage drive	Closed-loop high precision stepper motor
Guider	Precision ball bearings

STAGE SPECIFICATIONS

Chuck Theta Stage (Programmable)

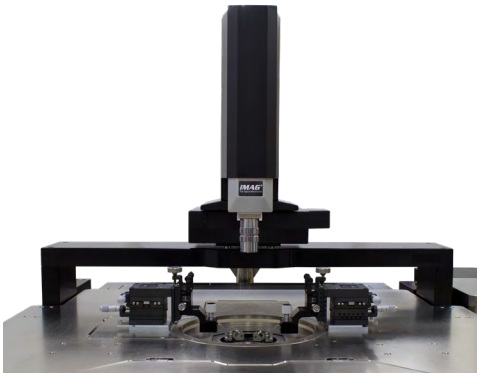
Travel range	± 5.0°
Resolution	0.0001° (0.24 µm @ 300mm edge)
Accuracy	< 2.0 µm (measured at the edge of the 300 mm chuck)
Repeatabilty	< 1.0 µm
Theta stage drive	High resolution stepper motor with linear encoder feedback system

MICROSCOPE MOVEMENT

XYZ Programmable

XY - Travel range*	50 x 50 mm / 300 x 300 mm
Resolution	1 µm (0.04 mils)
Repeatability	≤ 2 µm (0.08 mils)
Accuracy	≤ 5 µm (0.2 mils)
Z - Travel range	140 mm
Resolution	0.05 µm (0.002 mils)
Repeatability	≤ 2 µm (0.08 mils)
Accuracy	≤ 4 µm (0.16 mils)

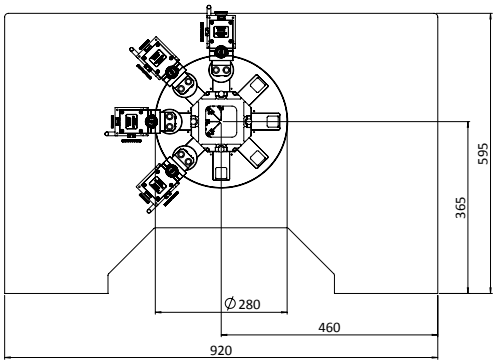
**In case of ShielDEnvironment™ X x Y: 25 mm x 25 mm*

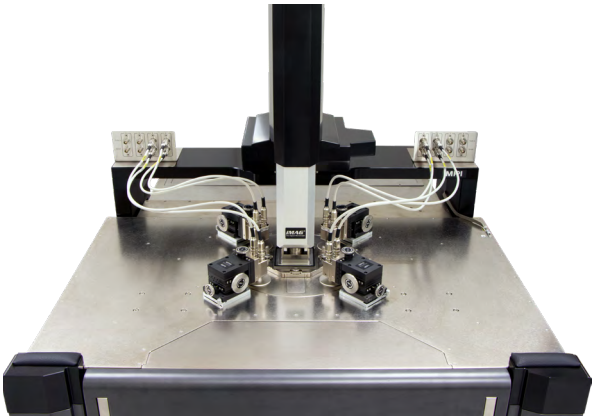


PROBE PLATEN

Specifications

Material	Nickel plated steel
Chuck to platen height	50 ± 0.5 mm
Platen cooling	Fully integrated CDA cooling, by using the chiller CDA
Configuration	Probe card holder 4.5 x 7” and/or MicroPositioners
Max. No. of MicroPositioners	8x DC MicroPositioners or 4x DC + 4x RF MicroPositioner Setup
RF MicroPositioner mounting	Magnetic with guided rail
DC MicroPositioner mounting	Magnetic





Large Probe Platen supporting up to 8x DC or 4x DC + 4x RF MicroPositioners or standard 4.5” probe card holder

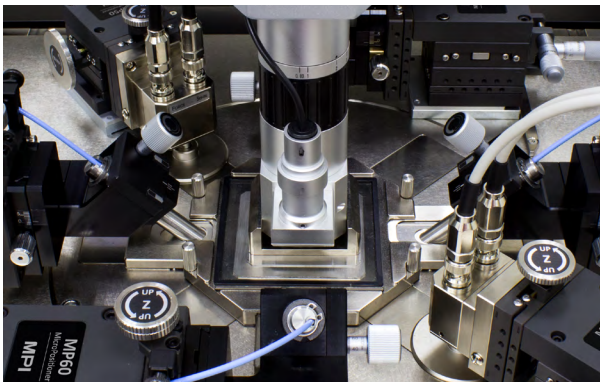
ShielDEnvironment™

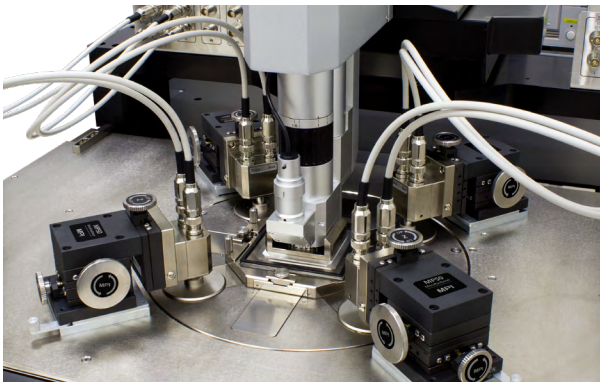
MPI ShielDEnvironment™ is a high performance local environmental chamber providing excellent EMI- and light-tight shielded test environment for ultra-low noise, low capacitance measurements.
MPI ShielDEnvironment™ allows up to 4-port RF or up to 8-ports DC/Kelvin or a combination of those configurations. 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.*

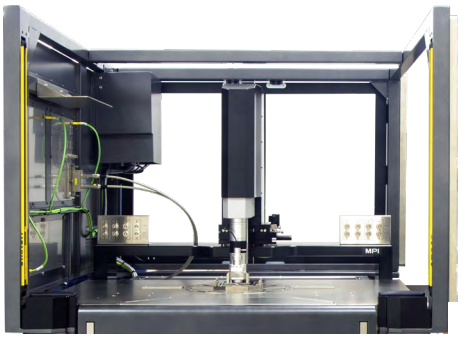




SAFETY MANAGEMENT

Light Curtain

Light Curtain Interlock protects user from accidental high voltage shock by shutting down the instrument through interlock system. The interlock system at rear doors provides safety, easy and convenient initial measurement set-up.



WAFER LOADING

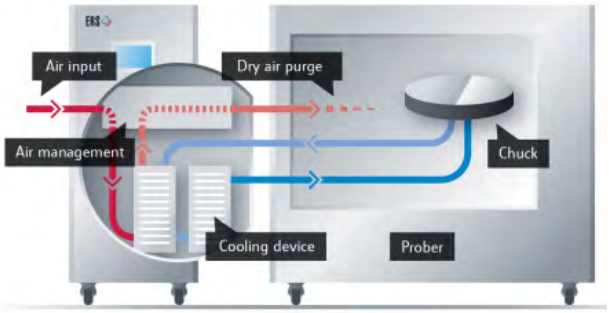
Loading or unloading of 150, 200 or 300 mm wafers or substrates is straight forward and intuitive. Special design of the chuck provides easy loading of a single IC of wafer fragments from the system front. SmartVacuum™ technology automatically recognizes size of the wafer on single IC. It also protects the wafer from unexpected release of vacuum due to inexperienced operation when the wafer is located in the IceFreeEnvironment™.
Easy access to the AUX chucks serves for quick exchange of RF calibration substrates, probe cleaning and planarization accessories.

Probe Hover Control™

MPI Probe Hover Control PHC™ allows easy manual control of probe contact and separation to wafer. Separation distance can accurately control with micrometer feedback for probe to wafer/pad positioning. Ease of use guarantees the safest operation by minimizing error during critical set-up and probe change operations.

THERMAL CHILLER INTEGRATION

Minimized CDA Consumption
The CDA consumption is reduced by as much as 50% by purging IceFreeEnvironment™ with the re-used cold air of the chiller. Additional automated valve enables purge by Nitrogen*.
Additionally, recycled CDA cools the system probe platen and the probe card.
**ERS patented technology.*



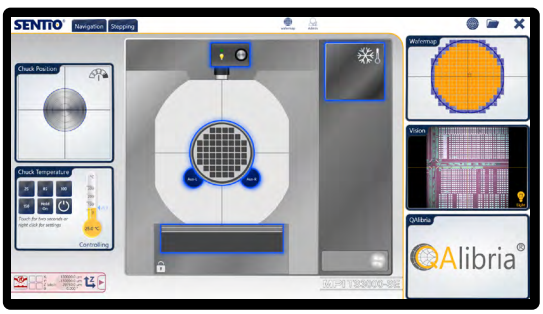
Picture is courteously provided by ERS.

INTEGRATED CONTROLS

Thermal chuck touchscreen control display is an alternative way of interaction with the thermal system. Its ergonomic location supports an operator when keying commands and monitoring system status. The fully integrated intelligent hardware control panel is design for intuitive and safe system control and operation. All these significantly increase the speed and improve convenience of the system interaction work flow.
The keyboard and mouse are placed on the sliding tray right below the system control panel. Both can control test instrumentation, if required.
USB port is also in front of the system. It removes any hassles when exchanging data.

SOFTWARE SOLUTION

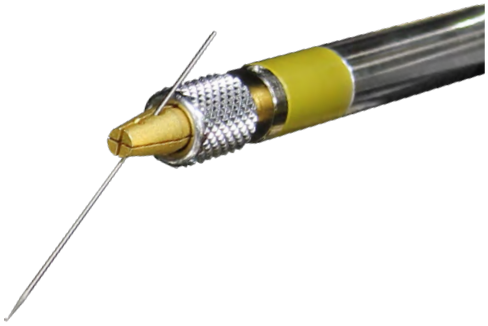
Unique and revolutionary multi-touch operation software SENTIO® controls MPI automated engineering probe systems. Its simple and intuitive operation concept significantly saves operator training time. Scroll, Zoon, and Move functions mimic modern smart mobile device interface. Switching between applications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



HIGH POWER PROBES

High Voltage Probes (HVP)

Low leakage probes specially designed to withstand high voltage up to 10 kV (coaxial) and 3 kV (triaxial). Choice of various connectors options such as Keysight Triax/UHV, Keithley Triax/UHV, SHV or Banana.



High Current Probe (HCP)

High performance probes specially designed for on wafer measurement of high current up to 200 A (pulse). MPI multi-fingers high current probes are single piece consturction to efficiently handle high current and provide low contact resistance.

HIGH POWER PROBES - SELECTION GUIDE

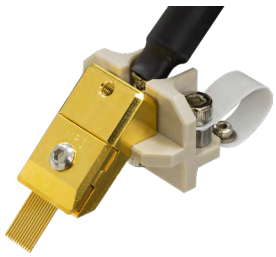
	High current probes			High voltage probes		
	3 fingers	5 fingers	7 fingers	PA-HVT	PA-HVC	PA-HVC-10KV
Max current	40 A	65 A	100 A	2 A	2 A	2 A
Max voltage	500 V	500 V	500 V	3,000 V	5,000 V	10,000 V
Residual resistance (Typical)	≤ 5 mΩ	≤ 3 mΩ	≤ 1 mΩ	--	--	--
Leakage @ max. V	--	--	--	≤ 1 pA	≤ 600 pA	> 35 TΩ
Connector options	Banana[3] plug or BNC[4]			HV triaxial[2]	SHV	10 KV UHV or banana[3] plug
Replaceable tip	Yes	Yes	Yes	Yes	Yes	Yes
Probe pitch[1]	350 µm (Std)	350 µm (Std)	350 µm (Std)	Single needle	Single needle	Single needle

[1]Configurable
[2]Keysight or Keithley
[3]Banana: 100 A max, 1 ms max PW, 1% max PLC
[4]BNC: 40 A max, 1 ms max PW, 1% Max PLC

ULTRA HIGH POWER PROBES

Ultra High Power Probe (UHP)

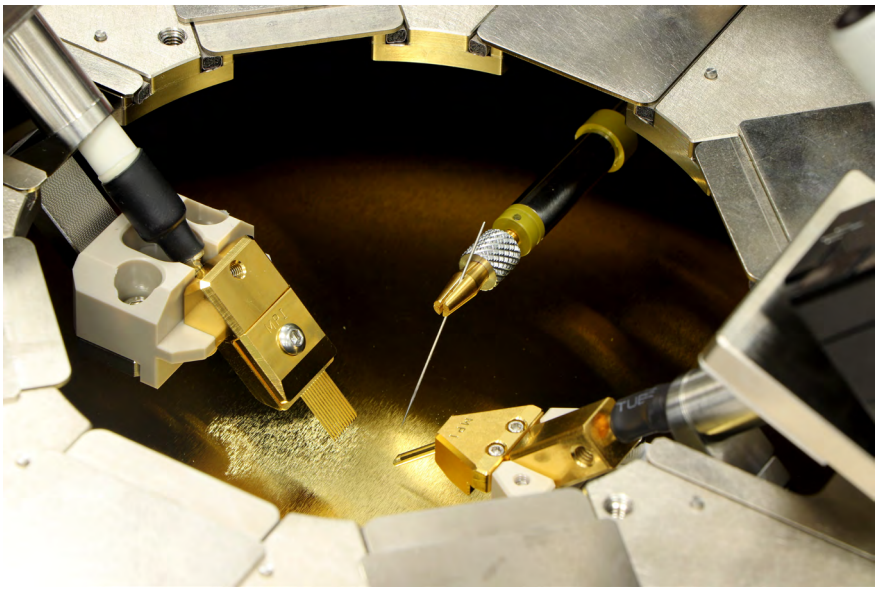
Designed for Ultra high voltage and current on wafer measurement up to 10 kV/600 A (pulse). MPI replaceable multi-fingers probes tips and probe arms are design for low contact resistance for ultra-high current measurement and to support ultra-high voltage of up to 10 KV, without having to change probes for high voltage and current application.



ULTRA HIGH POWER PROBES - SELECTION GUIDE

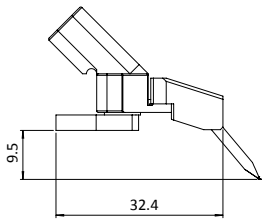
	1 finger	4 fingers	6 fingers	8 fingers	12 fingers
Max current*	20 A	80 A	120 A	160 A	250 A
Max voltage	10 KV	10 KV	10 KV	10 KV	10 KV
Residual resistance (Typical)	≤ 5 mΩ	≤ 3 mΩ	≤ 1 mΩ	≤ 1 mΩ	≤ 1 mΩ
Connector options	Banana	Banana	Banana	Banana	Banana
Replaceable tip	Yes	Yes	Yes	Yes	Yes
Probe tip width	250 µm	250 µm	250 µm	250 µm	250 µm
Probe pitch	--	650 µm	650 µm	650 µm	650 µm

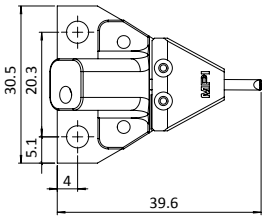
**1 ms Max PW, 0.4% max PLC*



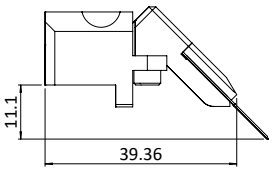
DIMENSIONS

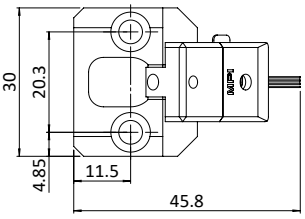
High current probe





Ultra High Power probe

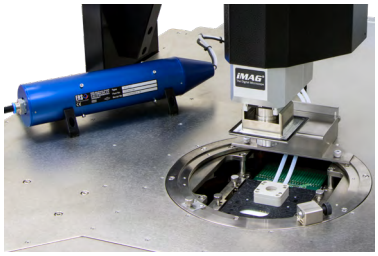




ANTI-ARCING SOLUTIONS

Optional Anti-Arcing Probe Card

In addition, MPI is offering optional temperature control of the pressurized air in a range of 20 to 200 °C, which correlate direct with the chuck set temperature.
High-voltage testing without arcing at higher temperatures are possible now.



Optional Anti-Arcing LiquidTray™

Specially designed anti-arcing LiquidTray™ can be used for arcing suppressing by simply place on the high power chuck surface. Wafers can be safely placed inside the tray to submerge in the liquid for arcing free high voltage test.

NON-THERMAL HIGH POWER CHUCKS

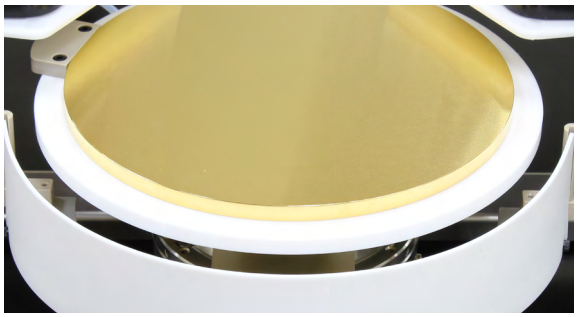
High Power Wafer Chucks

Connectivity 1	10 kV Coaxial (Banana or SHV)
Connectivity 2	Kelvin Triax (f), 3 kV or 10 kV Coaxial
Diameter	310 mm with 2 integrated AUX areas
Material	Gold plated aluminum (flat with 100 µm holes)
Chuck surface	Planar with 0.5 mm diameter holes in centric sections
Vacuum holes sections (diameter)	4, 24, 48, 72, 96, 120, 144, 168, 192, 216, 240, 264, 288 mm
SmartVacuum™ distribution	In front for single DUT 5x5 mm (4 holes) and 75 mm (3 in) In center for 150, 200, 300 mm (6, 8, 12 in)
Supported DUT sizes	Single DUTs down to 5x5 mm size or wafers 100 mm (4 in) thru 300 mm (12 in)*
Surface planarity	≤± 5 µm
Rigidity	< 15 µm / 10 N @edge

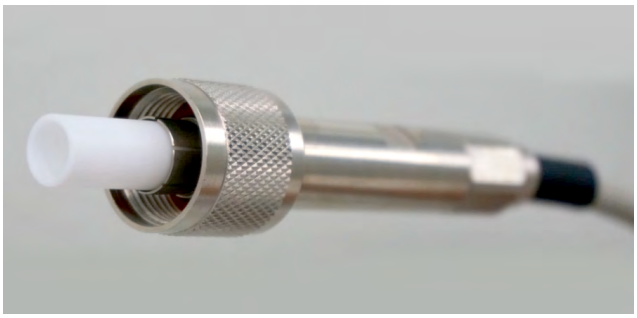
**Single DUT testing requires higher vacuum conditions dependent upon testing application.*

Electrical Specification (Triax)

Chuck isolation	> 30 TΩ
Force to guard	> 30 TΩ
Guard to shield	> 500 GΩ
Force to shield	> 100 GΩ



MPI Non-thermal Triaxial High Power Chuck with gold plated surface for low contact resistance



MPI 10 kV Triaxial Connector used for Kelvin chuck connection

HIGH POWER THERMAL CHUCKS

Specifications		TC-300N Power Series	TC-300NT Power Series	TC-300NT ULN Power Series
Max. Voltage		1.1 kV	3 kV	3 kV Triax or 10 kV Coax
Connectivity		Keithley Kelvin Triax (f)	MPI Kelvin Triax (f)	MPI Kelvin Triax (f)
Temperature Range - Minimum		-60 °C, -40 °C, -10 °C, 20 °C or 35 °C versions		
Temperature Range - Maximum		200 °C	200 °C	300 °C
Temperature control method		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		±0.5 °C	±0.5 °C	±0.5 °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
Chuck pinhole surface plating		Gold** (others on requests)		
SmartVacuum™ distribution*		In front for single DUT 5x5 mm (4 holes) and 75 mm (3 in) In center for 150, 200, 300 mm (6, 8, 12 in)		
Temperature sensor		Pt100 1/3DIN, 4-line wired		
Temperature uniformity		< ±0.5 °C at ≤ 200 °C	< ±0.5 °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
Heating rates**				
-60 to 25 °C		< 6 min	< 6 min	< 6 min
-40 to 25 °C		< 5 min	< 5 min	< 5 min
-10 to 25 °C		< 3 min	< 3 min	< 3 min
35 to 200 °C		< 16 min	< 25 min	< 25 min
20 to 200 °C		< 18 min	< 32 min	< 32 min
35 to 300 °C		N/A	N/A	< 45 min
20 to 300 °C		N/A	N/A	< 50 min
Cooling rates** (faster with -60 °C chiller)				
AC3 Mode	25 to -10 °C	< 11 min	< 12 min	< 18 min
	25 to -40 °C	< 18 min	< 28 min	< 28 min
	25 to -60 °C	< 36 min	< 66 min	< 66 min
	200 to 35 °C	< 24 min	< 35 min	< 35 min
	200 to 20 °C	< 28 min	< 48 min	< 48 min
	300 to 35 °C	N/A	N/A	< 41 min
	300 to 20 °C	N/A	N/A	< 54 min
TURBO Mode	25 to -10 °C	< 11 min	< 12 min	< 18 min
	25 to -40 °C	< 16 min	< 27 min	< 27 min
	25 to -60 °C	< 34 min	< 65 min	< 65 min
	200 to 35 °C	< 24 min	< 35 min	< 35 min
	200 to 20 °C	< 28 min	< 48 min	< 48 min
	300 to 35 °C	N/A	N/A	< 41 min
	300 to 20 °C	N/A	N/A	< 54 min

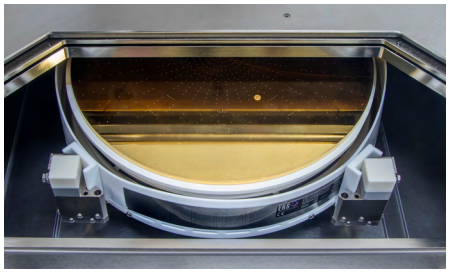
Leakage

@ Voltage and:	10 V	1.1 kV	10 V	3 kV	10 V	3 kV	10 kV
@ -60 °C	< 2 pA	< 220 pA	< 300 fA	< 100 pA	< 30 fA	< 10 pA	< 6 nA
@ 25 °C	< 1 pA	< 110 pA	< 150 fA	< 50 pA	< 15 fA	< 5 pA	< 6 nA
@ 200 °C	< 1 nA	< 110 nA	< 300 fA	< 150 pA	< 30 fA	< 10 pA	< 15 nA
@ 300 °C	N/A	N/A	N/A	N/A	< 50 fA	< 15 pA	< 40 nA

Capacitance

Force-to-Guard	< 1600 pF	< 600 pF	< 600 pF
Guard-to-Shield	< 2000 pF	< 2000 pF	< 2000 pF
Residual Capacitance	N/A	≤ 2.5 pF	≤ 2.5 pF

** Taiko-wafer support is optional available, please contact MPI local technical support.*
*** Typical values, depends on chiller type and facility supply, please check MPI FPS for the certain chuck and system.*



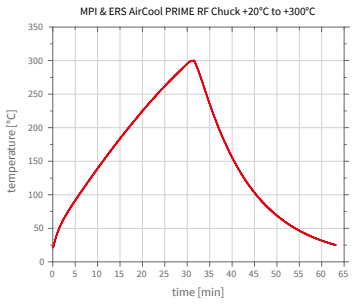
ERS High Power Thermal Chuck

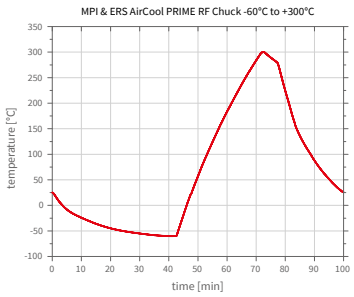
ERS AirCool® Fusion*, Controller Integrated Chiller -40 °C / -60 °C

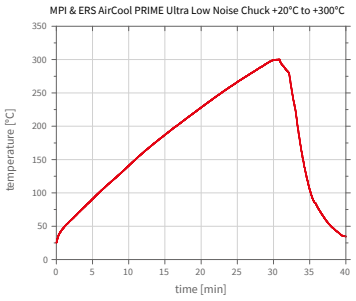
ERS AirCool® Fusion*, Controller Integrated Chiller -10 °C

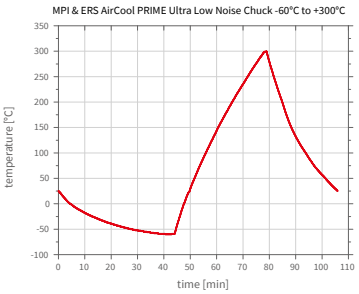
**ERS electronic GmbH patented solution*

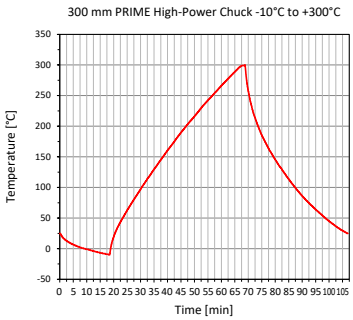
TYPICAL TRANSITION TIME











INSTRUMENT CONNECTION PACKAGES

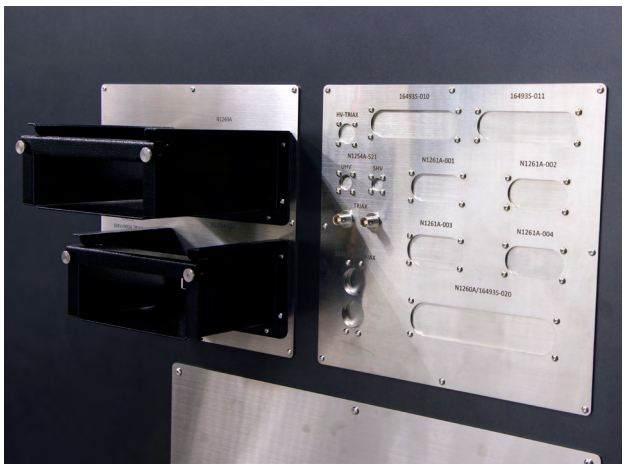
TS3000-HP can be configured with instrument connection package. The packages consists of necessary high voltage/high current probes and cabling accessories for optimal connection to the test instruments.

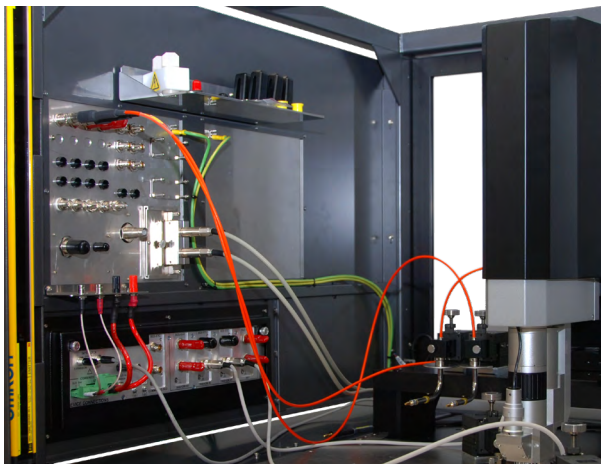
Keysight B1505A

Seven MP40 MicroPositioners
Two RF probe arms for MP40
Five universal DC adapters
Two High-current probes
Three High-voltage (Coax) probe arms
Two High-voltage probe arms with Keysight HV Triax connector
Box of High-current multi-finger probe tips (5 tips)
Box of probe tips needle (25 tips)
High Power connection panel for Dark Box
Three High power chuck connection cables (Keysight Triax, SHV and BNC)
High Power chuck shorting and floating plugs

Keithley 2600-PCT-XB

Five MP40 MicroPositioners
Two RF probe arms for MP40
Three universal DC adapters
Two High-current probes
Three High-voltage probe arms with Keithley HV Triax connector
Box of High-current multi-finger probe tips (5 tips)
Box of probe tips needle (25 tips)
High Power connection panel for Dark Box
Three High power chuck connection cables (Keithley Triax, SHV and BNC)
High Power chuck shorting and floating plugs





Example of Keysight B1505A and Keithley 2600-PCT-XB connection panels.

SYSTEM CONTROLLER SPECIFICATIONS

CPU	Intel Core i7
RAM	16 GB
64 bit operating system	Windows 10 Professional (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

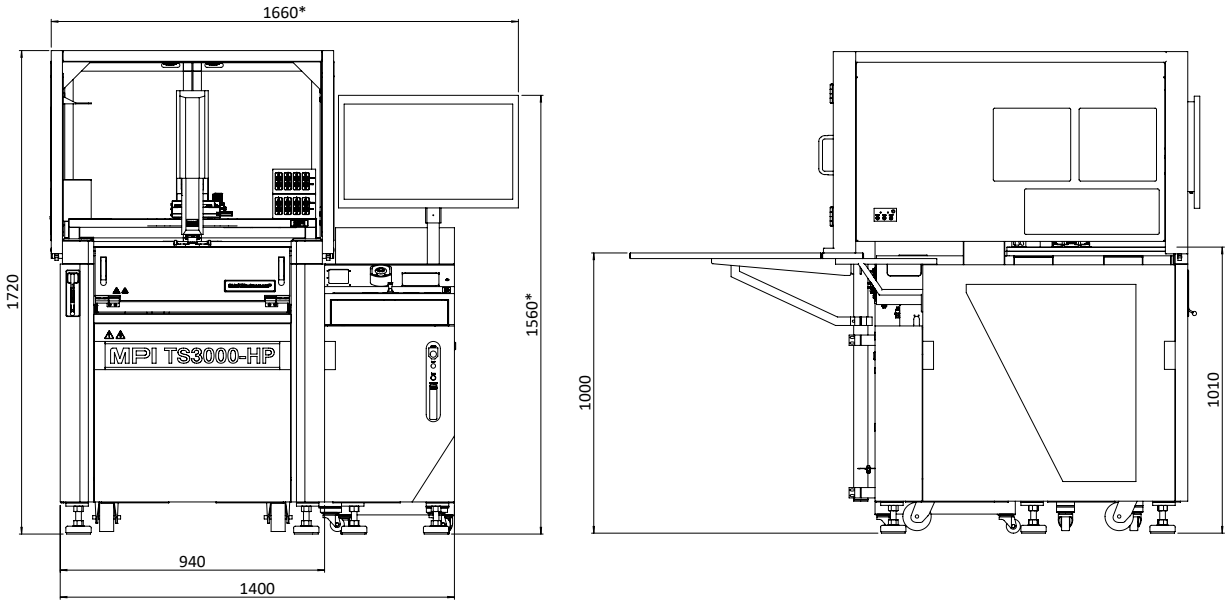
**See MPI Corporation's Terms and Conditions of Sale for more details.*

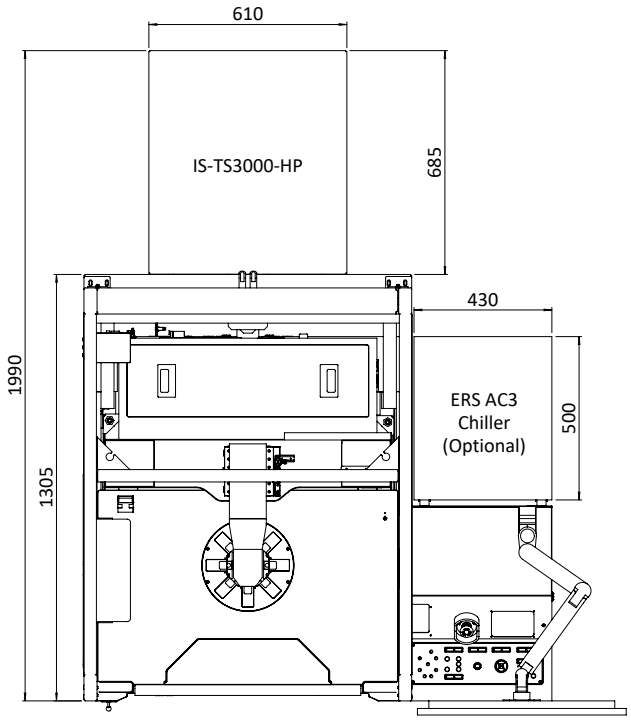
PHYSICAL DIMENSIONS

TS3000-HP

System Dimensions (W x D x H)	1660 x 1305 x 1720 mm (65.4 x 51.4 x 67.7 in)
Weight	960 kg

**Can vary depends on monitor/chiller position.*





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

MPI Global Presence