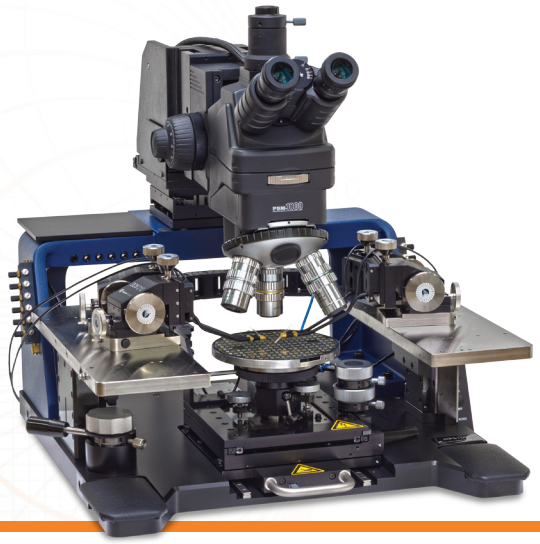
MPS150

150 mm Manual Probe System



DATA SHEET

The MPS150 is a very cost-effective and simple, yet highly-precise manual probe system for wafers and substrates up to 150 mm. It supports a wide variety of applications such as C-V/I-V, RF, mm-Wave and sub-THz measurements, device and wafer characterization tests (DWC), failure analysis (FA), submicron probing, MEMS, optoelectronic engineering tests and more. Its stable platen is designed to accommodate up to sixteen positioners, providing a function similar to a probe card for special wafer-level reliability (WLR) applications.

The MPS150 probe system provides a solid, compact and modular platform with integrated vibration-isolation solution and a unique pull-out chuck stage. The station can accommodate application-specific high-planarity-isolated chucks. The height of the solid platen can be adjusted up to 40 mm, allowing quick and easy setup of the system to accommodate any application. The highly-repeatable contact separation of 200 µm ensures excellent contact performance. In addition to the precision platen movement, the chuck provides precise wafer height alignment up to 10 mm and chuck stroke up to 3 mm. In addition, the rigid microscope bridge enhances contact stability and contact performance.

The modular design of the MPS150 allows you to mount a microscope of your choice, enabling you to upgrade the system from the simplest probing platform with a manual microscope to a highly-sophisticated probing platform with a programmable microscope, or to a wafer-level MEMS test system by simply adding a non-contact vibration analyzer.

FEATURES / BENEFITS

Flexibility	Ideal for a wide range of applications such as RF, mm-Wave and sub-THz characterization, FA, DWC, MEMS, optoelectronic tests and WLR A stable platen mounted with up to sixteen positioners provides a function similar to a probe card A variety of accessories are available such as laser cutters, platens and chucks for RF, mm-Wave and sub-THz testing
Stability	Solid station frame Built-in vibration-isolation solution for superior vibration attenuation Rigid microscope bridge
Ease of use	Ergonomic and straightforward design for comfortable and easy operation Low-profile design Simple microscope operation Quick and ergonomic change of DUT through pull-out stage

CascadeMicrotech®

MECHANICAL PERFORMANCE

Chuck Stage

Travel	155 mm x 155 mm (6 in. x 6 in.)
Resolution	5 µm
Planarity over 150 mm (6 inch)	< 10 µm
Load stroke, Y axis	90 mm
Z height adjustment range	10 mm
Z contact / separation / load stroke	0-3 mm adjustable
Theta travel (standard)	360°
Theta travel (fine)	± 8°
Theta resolution	7.5 x 10^{-3} gradient

Manual Microscope Stage (On Bridge)

Travel range	50 mm x 50 mm (2 in. x 2 in.) / 150 mm x 100 mm (6 in. x 4 in)
Resolution	≤ 5 µm (0.2 mils)
Scope lift	Manual, tilt-back or linear pneumatic

Programmable Microscope Stage *

Travel range	50 mm x 50 mm (2 in. x 2 in.)
Resolution	0.25 µm (0.01 mils)
Scope lift	Programmable 130 mm

** Electronics box for manual systems (P/N 157-137) required*

PHYSICAL DIMENSIONS

Station Platform, with Bridge *

Station dimensions	588 mm (W) x 638 mm (D) x 654 mm (H) (23 inch x 25 inch x 26 inch)
Weight	~60 kg (132 lb.)

** Station accessories such as cameras and laser cutters may increase the total height to 900 mm (35.4 inch)*

PLATEN SYSTEM

Platen

Platen space (typical)	Universal platen: space for up to four DPP2xx/DPP3xx/DPP4xx/RPP210 or up to twelve DPP105 positioners Universal platen with optional probe card adapter: space for up to eight DPP2xx/DPP3xx/DPP4xx/ RPP210 or up to sixteen DPP105 positioners MMW platen: space for up to four RPP305 or two LAP positioners
Z-Height adjustment range	Maximum 40 mm (depending on configuration)
Minimum platen-to-chuck height	16 mm (universal platen)
Separation lift	200 µm
Separation repeatability	< 1 µm
Vertical rigidity / force	5 µm / 10 N (0.2 mils / 2.2 lb.)
Accessory mounting options	Universal platen: magnetic, vacuum RF-platen: bolt-down, magnetic

PHYSICAL DIMENSIONS

Standard Wafer Chuck

Diameter	150 mm
Material	Stainless steel
DUT sizes supported	Shards or wafers 25 mm (1 in.) through 150 mm (6 in.)
Vacuum ring diameter	Universal: 4 mm, 7 mm, 22 mm, 42 mm, 66 mm, 88 mm, 110 mm, 132 mm Standard: 22 mm, 42 mm, 66 mm, 88 mm, 110 mm, 132 mm
Vacuum ring actuation	Universal: all connected in meander, center hole 1.5 mm diameter Standard: mechanically selected, center hole 1.0 mm diameter
Chuck surface	Planar with centric-engraved vacuum grooves
Surface planarity	≤ ± 3 µm
Rigidity	< 15 µm / 10 N @ edge

RF Wafer Chuck

Diameter	150 mm with two additional AUX chucks
Material	Stainless steel with HF/OPTO surface (flat with 0.7 mm holes)
DUT sizes supported	Main: single DUTs down to 3 mm x 5 mm size or wafers 25 mm (1 inch) through 150 mm (6 inch) AUX: up to 18 mm x 26 mm (1 in. x 0.7 inch) each
Vacuum hole sections (diameter)	22 mm, 42 mm, 66 mm, 88 mm, 110 mm, 132 mm (four holes in center with 2.5 mm x 4.3 mm distance)
Vacuum hole actuation	Mechanically selected
Chuck surface	Planar with 0.7mm diameter holes in centric sections
Surface planarity	≤ ± 3 µm
Rigidity	< 15 µm / 10N @ edge

TRIAX Wafer Chuck

Diameter	150 mm with three additional AUX chucks (two with vacuum fixation)
Material	Stainless steel
DUT sizes supported	Main: wafers 50 mm through 150 mm AUX: up to 18 mm x 26 mm (1 inch x 0.7 inch) each
Vacuum hole sections (diameter)	50 mm, 100 mm, 150 mm (2 inch, 4 inch, 6 inch)
Vacuum hole actuation	3x vacuum switch unit
Chuck surface	Planar with 0.4 mm diameter holes in centric sections
Surface planarity	≤ ±5 µm

NON-THERMAL CHUCKS

Note: Results measured with non-thermal chuck at standard probing height (10,000 µm) with chuck in a dry environment. Moisture in the chuck may degrade performance.

MPS-CHUCK150-COAX

Operation voltage	Standard: in accordance with EC 61010, certificates for higher voltages available upon request
Isolation*	> 2 GΩ
Capacitance	100 pF

** Factory test with multimeter with maximum 2 GΩ range.*

MPS-CHUCK150-RF

Operation voltage	Standard: in accordance with EC 61010, certificates for higher voltages available upon request
Isolation (Signal-Shield)	> 200 GΩ
Capacitance (Signal-Shield)	80 pF

MPS-CHUCK150-TRIAX[1]

	In Purged Shield Enclosure	Open[2]
Humidity[2]	< 30%	50%
Leakage (1 sigma)	< 50 fA	< 200 fA
Leakage (average)	NA	NA
Leakage (P-P)	< 100 fA	< 1000 fA
Resistance (F-G)	> 1 TΩ	> 1 TΩ
Resistance (G-S)	> 1 TΩ	> 1 TΩ
Resistance (F-S)	> 1 TΩ	> 1 TΩ
Residual capacitance @ 3 pA Tx	< 20 pF	< 20 pF
Capacitance @ 300 pA (F-G)	< 400 pF	< 400 pF
Capacitance @ 300 pA (G-S)	< 400 pF	< 400 pF

TRIAXIAL PROBE ARMS[1]

	Standard Triaxal Arm (PN 100525)	Advanced Triax Option (PN 157-450 and DCP)
	In Purged Shield Enclosure	In Purged Shield Enclosure
Humidity[3]	< 30%	< 30%
Leakage (1 sigma)	< 5 fA	< 2 fA
Resistance (F-G)	> 20 TΩ	> 50 TΩ
Resistance (G-S)	> 4 TΩ	NA
Residual capacitance @ 3 pA Tx	< 1 pF	< 0.3 fF
Capacitance @ 300 pA (F-G)	< 300 pF	< 150 pF
Capacitance @ 300 pA (G-S)	< 400 pF	< 200 pF

COAXIAL PROBE ARMS[1]

	Coaxial Probe Arm (PN 100561)
	Open / Ambient [2,4]
Resistance (Signal-Shield)	> 20 TΩ
Capacitance (Signal-Shield)	< 200 pF

1. Test conditions: B1500 with SMU B1517, triax test cables and adapter ground unit (104-337). Resistor test setup: 10 V HR Mode PCL Factor 15. Capacitor test setup: 3 pA / 300 pA HR Mode PCL Factor 4. Leakage test setup: 10 V HR Mode PCL Factor 40.

2. Depending on DC-/AC-noise environment.

3. Environment data (not specification data).

4. Depending on humidity.

THERMAL CHUCK PERFORMANCE

MPS-TC150-CTX-300C[1]

		Triax @ 25°C	Triax @ 200°C	Triax @ 300°C
Breakdown voltage[2]	Force-to-guard	≥ 500 V	≥ 500 V	≥ 500 V
	Guard-to-shield	≥ 500 V	≥ 500 V	≥ 500 V
	Force-to-shield	≥ 500 V	≥ 500 V	≥ 500 V
Resistance[3]	Force-to-guard	≥ 1 x 10^{12}	≥ 1 x 10^{11}	≥ 5 x 10^{9}
	Guard-to-shield	≥ 1 x 10^{11}	≥ 1 x 10^{10}	≥ 1 x 10^{9}
	Force-to-shield	≥ 5 x 10^{12}	≥ 2 x 10^{11}	≥ 5 x 10^{9}
Chuck leakage[4]		≤ 100 fA	≤ 10 pA	≤ 300 pA
Residual capacitance		≤ 50 pF		
Settling time[6] @ 10 V 50 fA		500 ms (typical)		

MPS-TC150-CTX-300C (using coax-triax adapter)[1, 5]

		Coax @ 25°C	Coax @ 200°C	Coax @ 300°C
Breakdown voltage[2]		≥ 500 V	≥ 500 V	≥ 500 V
Resistance[3]	Signal-to-shield	≥ 1 x 10^{12}	≥ 1 x 10^{11}	≥ 5 x 10^{9}
Chuck leakage[4]		≤ 600 fA	≤ 15 pA	≤ 1 nA
Residual capacitance		≤ 600 pF		

MPS-TC150-RF-300C[1, 5]

	Coax @ 25°C	Coax @ 200°C	Coax @ 300°C
Breakdown voltage[2]	≥ 500 V	≥ 500 V	≥ 500 V
Resistance[3]	≥ 1 x 10^{12}	≥ 1 x 10^{11}	≥ 5 x 10^{9}
Chuck leakage[4]	≤ 600 fA	≤ 15 pA	≤ 1 nA
Residual capacitance	≤ 600 pF		

1. Performance values determined using EMV shielded chamber. Actual value depend on electromagnatic surrounding and shielding situation of the probe station.

2. For fully-baked chuck: 90°C for 60 minutes + 200°C for 240 minutes + 300°C for 480 minutes.

3. For fully-baked chuck: 90°C for 60 minutes + 200°C for 240 minutes + 300°C for 480 minutes; controller on; 21-23C° environment with ≤ 50% humidity.

4. 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. 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 4156C NOISE.dat CMI program or equivalent; 4ms sample rate, auto scale, 1nA compliance, 1 NPLC integration.

5. Chuck: Guard-Shield shorted, B1500: triax, guard open.

6. Settling time is measured with a 4156C SETLB.dat CMI program or equivalent; 2 ms sampling rate, limited auto 1 nA, 1 µA compliance, 3 NPLC integration.

Transition Time

	Heating			Cooling		
	25°C to 100°C°	100°C to 200°C	200°C to 300°C	300°C to 200°C	200°C to 100°C	100°C to 25°C
MPS-TC150-CTX-300C	145 sec	155 sec	300 sec	145 sec	245 sec	1525 sec
MPS-TC150-RF-300C	180 sec	300 sec	540 sec	165 sec	310 sec	1650 sec

MPS-TC150-CTX-300C and MPS-TC150-RF-300C Specifications

Temperature range	+ 30°C to 300°C
Temperature accuracy	± 0.1°C (with calibrated controller)
Temperature resolution	0.1°C
Temperature uniformity	≤ 0.5°C @ 30°C, ≤ 3.0°C @ 300°C
Chuck flatness	≤ 30 µm (0.12 mils) @ +30°C to 300°C
Audible noise	< 58 dB
Supply voltage	100/230 VAC 50/60 Hz
Supply air	350 liters/min (12.4 SCFM)
Power consumption	530 VA (typical)
Dimensions	300 mm (W) x 360 mm (D) x 135 mm (H) (11.8 in. x 14.2 in. x 5.3 in.)
Weight	12 kg (26.5 lb.)

FACILITY REQUIREMENTS

Power	Base machine (without accessories and thermal chuck*): Not required
Vacuum	-0.8 bar
Compressed air	4 bar

**See Probe Station Accessory Catalog for power requirements for accessories and ERS AirCool3 Facility Planning Guide for power requirements for thermal chucks.*

ORDERING INFORMATION

MPS150-based Application-dedicated Pre-configured Packages

Part Number	Description
EPS150COAX	150 mm manual probing solution for DC parametric test
EPS150COAXPLUS	150 mm manual probing solution for DC parametric test (including platen lift)
EPS150TRIAX	150 mm manual probing solution for low-noise measurements
EPS150RF	150 mm manual probing solution for RF applications
EPS150MMW	150 mm manual probing solution for mmW, THz and load pull applications
EPS150FA	150 mm manual probing solution for failure analysis

REGULATORY COMPLIANCE

Certification	CE, cNRTLus, CB

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 Cascade Microtech's Terms and Conditions of Sale for more details.*

MPS150-DS-0715

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