FormFactor™

DCP-X Probe

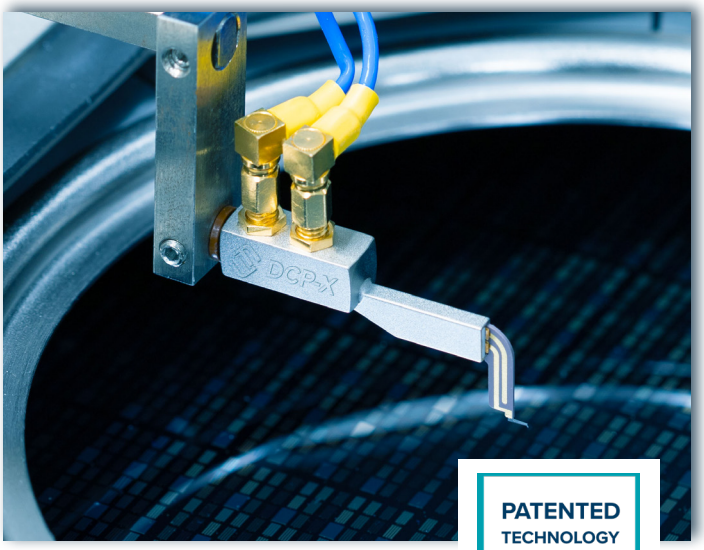
Advanced MEMS technology measures devices error-free

Overview

The new DCP-X probe is designed for device characterization, R&D, test services engineers, and scientists who need to perform highly accurate and repeatable on-wafer device electrical measurements (IV, CV, LFN) for device characterization and modeling, as well as general DC testing on small pads.

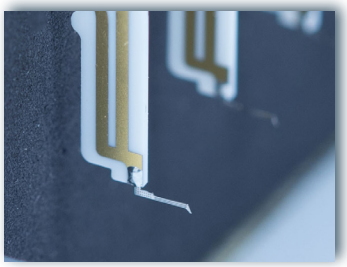
The DCP-X probe, featuring MEMS technology, measures existing and leading-edge (2 nm, 3 nm, 5 nm) devices error-free on all pad materials, micro-bumps, and slotted pads down to 20 µm, virtually eliminating "re-testing" due to poor contact, and requiring little to no cleaning over the full thermal range. It also delivers significantly lower cost of testing (CoT).

Traditional DC probes, which use single cantilever tungsten needles, have high series resistance (probe and pad Rc), causing inaccurate data, damaging pads due to heavy overdrive/skating, and requiring frequent cleaning. In contrast, the new FormFactor DCP-X probe, featuring the world's first true-Kelvin guarding and advanced MEMS contacting technology, delivers revolutionary performance with 1000x lower probe Rc, 0.15% error on a 2Ω RDS device, reduced skate, and a long lifetime of over 500K contacts.

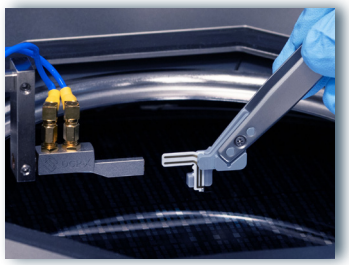


Features & Benefits

Eliminate errors	• Virtually error-free (0.15% on a 2Ω RDS device) vs. typical wafer process variation of 0.3% • High accuracy with no misleading test data • 1000x lower probe contact resistance (1-5 mΩ) • Low leakage fA guard plane (force/sense)
Reduce pad damage	• Small scrub (7 µm) with only 20 µm overdrive • Minimal pad damage with optimized micro-scrub • Small 6 µm tip size, and 20 µm pitch (Kelvin version)
Probe smaller	• Advanced MEMS tip with ruggedized design • Can probe all pad materials and slotted pads without tip deformation • Can probe micro-bumps down to ~50 µm • Supports temperatures from -55°C to 175°C



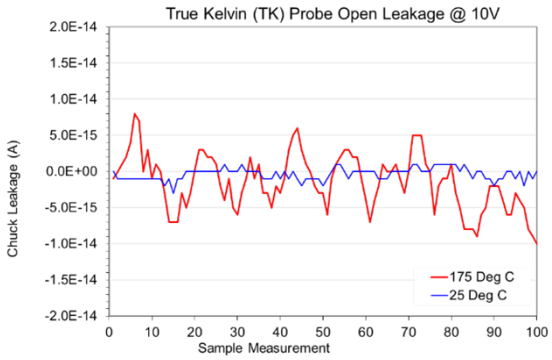
Save time	• Quick probe setup using a standard probe mount • Easy probe tip replacement in the prober with a special tool • Reduced tip damage and contamination • Compatible with manual or motorized positioners • Optimized for fast testing with Autonomous DC probing
Lower costs	• Production-level quality in engineering probes • Replaceable blade/tip design • Long lifetime with >500,000 touchdowns (Kelvin version) • 98% cost reduction (tips) compared to the DCP-HTR
Test faster	• Less time spent cleaning, with the low-scrub MEMS tip minimizing debris • Minimal to no cleaning required with the Kelvin tip • Low cleaning required with the single (quasi-Kelvin) tip

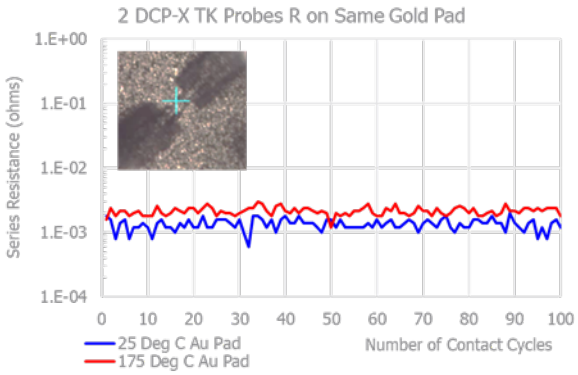


Product Specifications

Electrical Performance

Breakdown voltage	> 500 V
Isolation resistance	> 1 x 10E13 Ω
Frequency response (3 dB)	150 MHz
Typical leakage & noise current	±10 fA at -65°C to 175°C
Residual capacitance	<100 fF (probe tip in air at room temperature)
Characteristic impedance	50 Ω
Contact resistance	Al/Cu pads <5 mΩ Au pads 1-3 mΩ





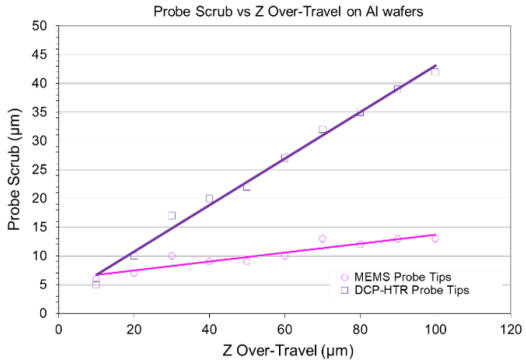
MEMS Tip Performance

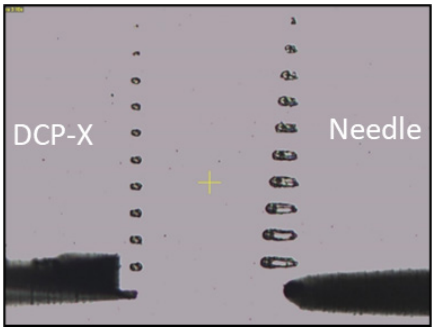
Tip size	6 µm x 6 µm
Tip pitch (kelvin)	20 µm
Tip material	Rhodium
Contact force	1 gram/mil (25 µm)
Scrub	Typically 4 µm + 10% Overdrive (10:1 skate ratio)
Optical fiducial position	50 µm vertically above probe tip
Cleaning cycle	Single: Between 200 and 1000 contacts (depending on pad material, temperature, and overdrive). Use PN 908-014 for cleaning pad material. Kelvin: Not required to maintain Rc.

Temperature range	-55°C to 175°C (Refer to the table below)

Maximum Probe Over Travel vs Wafer Temperature		
	Up to 125° C	126-175° C
DCP-X-Single-106	75 um	40 um
DCP-X-Kelvin-206-20	40 um	

Cleaning substrate	Single: Use P/N 908-014 “probe clean XTRA“ Kelvin: Use P/N 908-014 “probe clean“
Typical tip lifetime	>500,000 Kelvin tip (using Autonomous DC) >300,000 Single tip (using Autonomous DC)



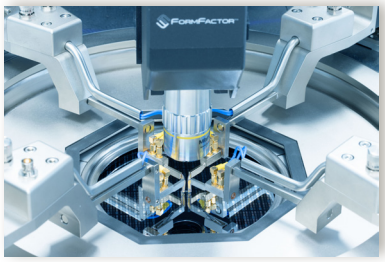


General

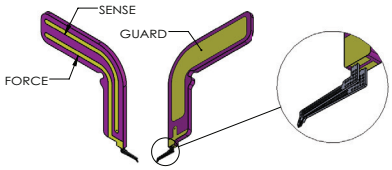
Probe body material	Nickel plated brass
Connector type	SSMC (dual)
MicroChamber compatible	Yes
AttoGuard compatible	Yes

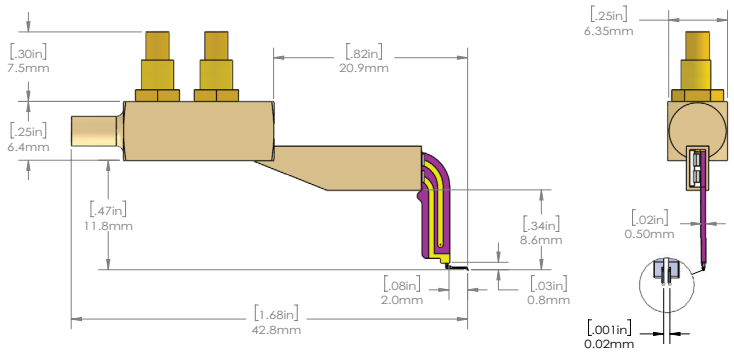
Probe Station Compatibility

Hardware	• DCP-X-Body compatible exclusively with FormFactor probe systems • DCP-X Top-Hat FlexShield & dual-triax probe adapter
Software support	• Velox Prober Control (Ver 3.4.2 onwards) • VueTrack and VueTrack PRO • Autonomous DC Assistant



DCP-X Dimensions





Ordering Information

Part number	Description
DCP-X-Body	Probe Body, DCP-X series MEMS probe, Kelvin, 2 SSMC connectors, qty 1
DCP-X-Single-106	Probe TIP blade, DCP-X Series MEMS Probe, SINGLE, Quasi-Kelvin, 6 µm tip, Box of 4 (2 left, 2 right)
DCP-X-Kelvin-206-20	Probe TIP blade, DCP-X Series MEMS Probe, DUAL, True-Kelvin, 6 µm tips, 20um pitch, Box of 4
DCP-X-Tool	Tool, hand tweezers with blade gripper for DCP-X series MEMS probe, Box of 2 (1 left, 1 right)
908-014	Probe needle cleaning pads, .5 x .75 inches, "probe clean XTRA", for DCP-X single probes, pkg of 5
134-208	Probe needle cleaning pads, .5 x .75 inches, "probe clean", pkg of 5
144-362	Top-Hat slider assembly, Standard (Non RF version)
	Dual-triax adapter box & FlexShield for Top-hat, optimized for DCP-X, manual & programable positioners
	DCP-X probe mount with 15 deg offset, for DC positioners

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