

Probe Tips and Probe Holders Reference Manual



Micromanipulator

1555 Forrest Way
Carson City, Nevada 89706-0316
E-Mail: sales@micromanipulator.com
<http://www.micromanipulator.com>

Tel: 775-882-2400
Tel: 800-654-5659
Fax: 775-882-7694

1 Manipulator

Stabilized by either a vacuum base or a magnetic base, the manipulator sits on the probe station platen and supports the probe holder; available in manual, motorized or programmable versions. Guaranteed for 5-years, our manipulators are a proven solution!

2 Collet and Collet Shaft

The black plastic collet allows different probe holder shank widths to be attached firmly to the manipulator. Collet shafts are included with the manipulator, applicable collets are included with the probe holder.

3 Probe Holder

A metal shaft, either straight or bent, holds the probe tip on one end and is held by the manipulator collet shaft on the other. Most probe holders secure the probe tip with either a pin jack or set screw probe mount. Some probe holders feature a shaft lock that secures the probe tip by sliding the closure handle toward the probe point. Depending upon the test requirements, single wire, coaxial, triaxial, certified triax or Kelvin configurations are available.

4 Probe Tip

The Probe Tip (or needle) is the part of the unit that actually touches the device under test (DUT). Some probe holders have built-in tips, others use changeable or disposable tips. Many standard configurations are available and special tips may be made for a nominal setup charge (ask for our *Custom Probe Request* form; A1009253).



Manipulator and Collet



Probe Holder



Probe Tip

Q I have a complicated arrangement on my test station. I need uniquely shaped probe holders. The standard probe holders won't work, what other options do you offer?

A Choose your solution! Micromanipulator offers malleable (bendable) probe holders like our Model 72 that can be shaped and reshaped as desired. If a more exact configuration is required, custom probe holders are available. Ask for a *Custom Probe Holder Request* form.

Q Are the model numbers listed in this catalog complete part numbers? How do I place an order?

A Complete part numbers are not listed. There are too many configuration options to detail here. Please contact your local representative or the factory direct at 775-882-2400 for more information and to place your order.

Cleaning Probe Tips

Tungsten, Tungsten Carbide, Nickel Tips, HCT Tips and Custom probe tips coated with platinum

To remove deposits from the probe tip, rinse in deionized water using compressed air to dry excess water from the tip. To remove oxide deposits, dip probe tips into a 1.0 Normal sodium hydroxide (NaOH) solution for a few seconds. Then rinse with deionized water and dry with compressed air.

Beryllium Copper Tips

Like the probe tips above, to remove deposits from the probe tip, rinse with deionized water using compressed air to dry excess water from the tip. To remove oxide deposits from the tip, wash the tip in a 10% w/w sodium carbonate solution (Na₂CO₃) and rinse in deionized water. Do not dry the tips.

Next dip the tip into a 10% v/v nitric acid solution (HNO₃) until a reaction occurs. Rinse the tip in deionized water *immediately* after the acid reaction starts. Do not let the reaction continue for more than one second. After rinsing, dry excess water with compressed air.

Q I'd like to order another prober holder to match the one in the lab. I think I have a Model 79 but the picture shows a straight shank, the one I have is bent. What should I order?

A Micromanipulator offers both straight and bent style probe holders. If the chuck on your probe station is even with the platen, order the probe holder with a suffix '6000'. If your probe station's chuck is below the platen surface, order the probe holder with an '8000' suffix. Contact the factory for complete part numbers.

Q I prefer a probe holder with the probe tip built-in. Is this style available?

A Yes! While disposable point probes remain very popular because probe tips (or needles) can be quickly replaced (there is no 'down time' due to re-sharpening), many prefer or require the probe holder and tip in a single unit. This style is ideal for high frequency, low level signal testing or cutting. Our Model 44, is this type of probe.

Cleaning Probe Holders

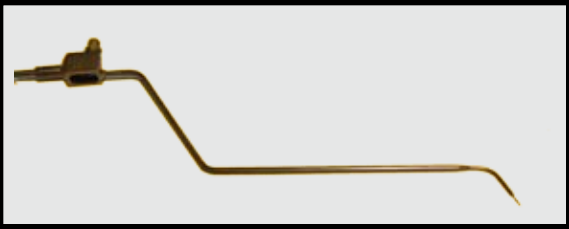
To clean the probe holders, apply a methanol solution the holder tip using a swab or another suitable applicator. Do not soak the holder in the solution. After applying the methanol, proceed with baking the shank at a temperature of 200° F-300° F for a minimum of 6-hours.

Controlling Corrosion

To eliminate the effects of corrosion for both the tips and holders, the original shipping box of the probe tips/probe holders should remain sealed and kept in a dry place until ready to use. After opening, the small desiccator package supplied should be left in the bottom of the product box.

Summary

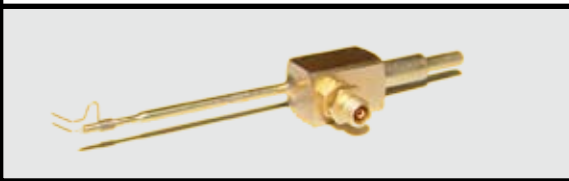
Procedures for corrosion protection and cleaning are different depending upon the material of your probe tips and holders. Use the above suggestions to care for probe tips and shanks to extend the life of your products. Protection against corrosion and proper cleaning procedures will help maintain the integrity of test probes and probe holders. Request the illustrated Application Note, *Care of Probe Tips and Probe Holders* (A1011462) for additional information.



Model 44



Model 44-D



Model 44-GP

Model 44

The Model 44 probe holder with its fixed probe tip is engineered for high frequency or low level signal testing. With a frequency range from DC to 3 GHz, this economical probe is ideal for the most common microwave tests. The coaxial shielding is extended from the cable connection through the body of gold-plated brass to the tungsten probe point. A single center (signal) probe point and a two (signal and ground) probe points versions are available. The coaxial connection to the probe is made through an *ultra miniature* UMC or standard SMA coaxial connector on the top of the body. Kelvin versions are available in single tip and two tip varieties. A small access hole is provided in the bottom of the body for connecting a small chip resistor which may be installed in *series* or *parallel*, *attenuating* or *terminating*. The Model 44 has so many options, it is almost a custom probe! Remember cables are ordered separately.

Following are just some of the configurations available:

- Model 44 probe with resistor standard UMC DC to 1 GHz, 950 ohm series, 50 ohm termination or special.
- Model 44-D Kelvin probe.
- Model 44-SMA Ultra High Frequency 3 GHz Probe.
- Model 44-X-GP Ground Plane tip is an auxiliary point that is attached to the shielding near the point (50 mils standard separation, 100 mils maximum to 10 mils minimum).

Most probe holders feature a probe tip attack angle of 45 or 60 degrees, however, the following holders are available with on-axis 0° or 80° probe tip attack angles.

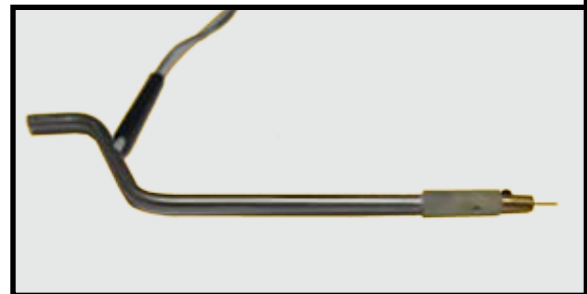
High Attack Angle Probe Holders

Model 75-80

Designed for hot stage probing and other applications where thermal expansion or vibration may make probing difficult. These holders will accept any Model 7 point but are intended to be used with high compliance points such as the Model 7F, 7F-10, 7F-C10 and 7S. Note, because of the high angle of attack, the probe point must be about 3/8" below the holder to be visible. Therefore compound microscope objectives with a working distance of less than 1/2 inch (12.5 mm) may not be able to be used.



Model 75-80



Model 79-0

On-Axis Probe Holders

Model 79-0

Allowing the probe tip to exit the probe holder straight from the end, the on-axis probe holder is ideal for *very low* profile probing. The tip can then be bent to the probing attack angle by hand or pre-bent probe tips (available in 45 or 60 degree attack angles—see probe tip reference chart) may be used. For hand-bending, malleable probe tips such as the 7A-M, 7F-M or 7X-M are recommended.

- The Model 79 probe holders in the on-axis configuration feature a set screw closure. This on-axis configuration is available for all Model 79 holders; coaxial, triaxial, Kelvin and high temperature versions.



Model 72



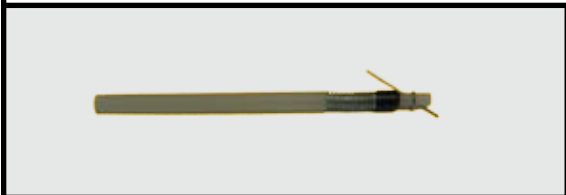
Model 75-8000-R



Model 75-FPC



Model 77A



Model 78

Model 79

Review the variety of configurations, you'll see why the Model 79 is one of our most popular probe holders. Choose Coaxial, Triaxial, Kelvin (single point dual wire). Choose Standard Attack Angle or On-Axis probe clamps. Then select styles for Fixed Position Probe Cards, Standard Temperature or High Temperature application probe holders.

Unless otherwise indicated, all model 79 probe holders accept all 7 series probe tips. See the following pages for details:

Model 72

This malleable (bendable) probe holder with a low resistance probe assembly can be formed and reformed to any shape desired. Nominal contact resistance between point and leadwire is .1 to .2 ohms. The probe shaft is available from 1.5" to 4.0" in quarter-inch increments. This probe is available with either a pin jack or set screw probe mount. The pin jack version is available at a 45 degree angle only. The Model 72 accepts all series 7 disposable probe tips.

Model 75 and 75-FPC

The model 75 probe holder is a general purpose, single wire probe holder. Models are available for 6000 series probe stations, or 4000/8000 (200mm) through 9000/300 (300 mm) series stations. The FPC versions are designed for use with fixed position probe cards. The probe mount is set at a 45 degree angle and is available in two configurations, a pin jack to quickly change probe tips or a 2-56 set screw which secures the probe point in gold-plated contacts to provide a low resistance connection (0.1 to 0.2 ohms). The model 75 will accept all Model 7 disposable probe points. Because of this probe holder's strength, it may be used to scribe and cut when used with rugged points such as the Model 7B, 7D or 7G.

Model 77A

Ideal for general applications for 6000 series stations, this probe holder is available with 30° or 60° from horizontal probe tip attack angles. Quick probe tip replacement is enhanced by the spring load mechanism in the Model 77A. This holder will accept all Model 7 probe points.

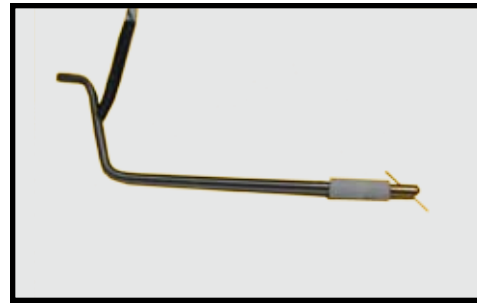
Model 78

Constructed of glass epoxy (G-10) insulating material to isolate the Model 7 probe point, the point is held in place by a spring and insulating slide ring. For low capacitance and high frequency measurements on 6000 series probe stations, an active probe should be attached directly to the probe point. The probe point shank may be cut to remove any unused portion thereby reducing capacitance. Nominal inherent capacitance of the Model 7 series point is 0.25 pico farad. Recommended probe points are 7A, 7F, 7H and 7X.

Model 79 Standard Temperature Coaxial Probe Holder

For measurement of high frequency or low level signals, the Model 79 is a coaxially shielded probe holder. The outer conductor of the coax runs down to within 0.2 inch (5mm) of the pin jack which holds the probe point.

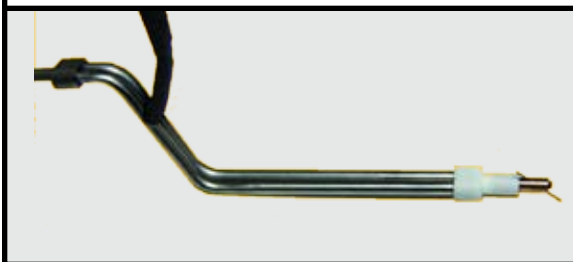
A connection wire is provided for grounding the outer conductor close to the probe tip. The coaxial cable is 30" in length and terminates in a BNC connector. This is a RG 178B/U 50 ohm cable with a capacitance of 29pf per foot (75pf total) and attenuation of 0.29 db/foot at 400 MHz.



Model 79-R



Model 79-6000-T



Model 79-8000-TD



Model 79 On-Axis



Model 79-FPC

Model 79-T Triaxial Probe Holders

These triaxially shielded probe holders are ideal for low current and low noise testing. The center conductor is connected to the point. The inner shield floats (not connected at the probe end). The outer shield is attached to a 6-inch ground wire at the probe holder for connection at DUT. Isolation is $>5 \times 10^{12}$ ohms between the center conductor and inner shield.

The standard cable length is 30" which terminates in a TRB (triaxial bayonet 3 lug) connector. The cable has an impedance of 50 ohms and capacitance of 29.4pf per foot inner and 100pf per foot outer.

Model 79 Kelvin Probe Holders - Coaxial and Triaxial

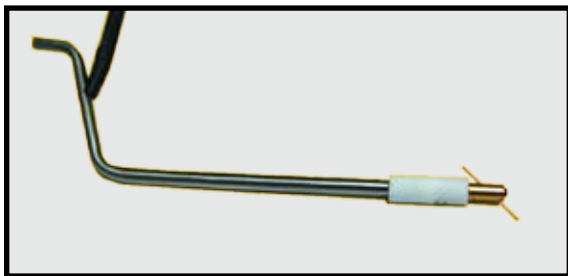
For the benefits of a probe holder with two cable output (Kelvin probe) with the convenience of a single tip, choose the Model 79-D (coaxial) or 79-TD (triaxial). The wiring configuration joins the center conductors of the two cables at the point holder. Kelvin probing, with a single point Model 79 rather than dual points (per probe), eliminates the problem of planarization and contact uniformity.

Model 79 On-Axis Probe Holders

Designed for applications where low profile probing is needed or where multiple probe tips are needed in a very small space. The on-axis design allows the probe tip to be inserted into the end of the probe holder at a 0° angle. The probe tip is then bent to the desired angle. Pre-bent probe tips may also be used. Available with set screw probe mounting only, the 79 On-Axis holders will accept all Model 7 probe tip styles except the Model 7D tungsten carbide probe tip which cannot be bent without breaking.

Model 79-FPC Probe Holders

For probing with individual probes when using a fixed position probe card, the model 79-FPC has the reach and flexibility required. Available with set screw or pin jack probe mounting.



Model 79-8000-H

Model 79-H for High Temperature Applications

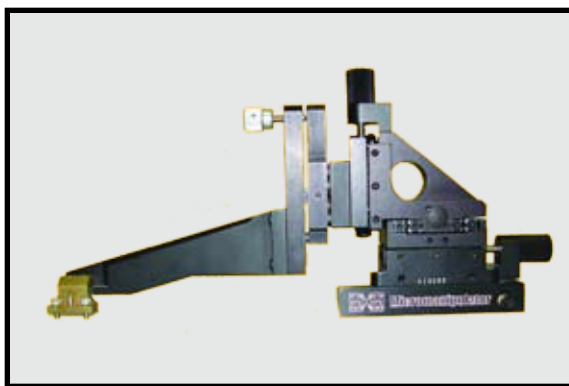
These ceramic insulated probe holders are designed to be used in applications where the probe holder is positioned above a high temperature chuck and sample. The Model 79-Hs are available with coax or triax connections and conform to the same specifications as the regular Model 79 probe holders. The Model 79-H probes provide enhanced low leakage characteristics. Standard isolation characteristics @ 500 VDC are >5 Teraohms. The Model 79-Hs are available in all typical configurations including Kelvin and work with standard manipulators and probing systems.

Micromanipulator offers two solutions for RF/Microwave probing applications.

DC to 3 GHz range

When probing in the DC to 3 GHz range, the low cost Model 44RF is ideal. The Model 44RF is designed for testing ground and signal contacts on high frequency hybrid and integrated circuits. The probe's return loss can be increased by the addition of internal loss. It is designed for use with manipulators for fast accurate positioning of the probe tips.

Micromanipulator provides either series resistive elements within the probe housing or parallel terminations. Customer access to these terminations is provided, field changes or additions can be accomplished readily. More than 20 versions of Model 44RF are available. For more information, see our Model 44RF (A1013702) data sheet.



RF/Microwave manipulator with Probe Link Arm

>3 GHz range

For very high frequency (> 3GHz or microwave), low capacitive loading, or high input impedance probing, Micromanipulator distributes the Picoprobe® series of probes.

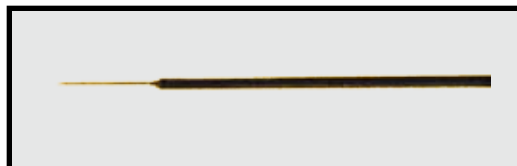
Microwave probe heads require the WAVE100 or WAVE200 RF/Microwave style manipulator with appropriate probe link arms (PLS or PLF) and cables.

All model Picoprobes are offered. Popular models include: PP12C: 1 M ohm/ 0.1pf loading, PP18 and 19: 10 fA/0.02pf, PP34: 10M ohm/0.1pF, PP35: dc to 26 GHz 1.25 M ohm/0.05pf, PP40: microwave to 40 GHz, PP325 to 325GHz.

High Conductance Probe Tips (HCT)

High conductance probe tips are specially manufactured to increase tip conductance and therefore reduce probe scrub needed by a factor of 5 or more.

Models 7A, 7B, 7F, 7G, 7S, 7X and alternate radius tip probes may be ordered with a high conductance tip (Just add "-HCT" suffix to the part number).



Model 7A-HCT

Recommended Applications for Probe Tips

MODEL #	DESCRIPTION	APPLICATION
7A	Fine-tip (.005") flexible shank	<1 micron targets
B series	Heavy Duty needle for larger targets	General Purpose
7B-G suffix	General Purpose, gold-plated (exceptions: 7B, 7B-1, 7B-2)	Low Resistance Probing, high current probing
7C	Cat-whisker (.005") for small targets, very strong probe	Min compliance, for lightly passivated or oxidized surfaces
7D	Tungsten Carbide point for cutting	Cutting
7F	Specialized probe point (.001"), nickel shank for small targets	Thermal (hot chuck) applications, probe tip is compliant; will follow expansion and contraction of target
7G series	Heavy Duty needle same shape as Model 7B, shorter length	General Purpose
7H	Beryllium-Copper probe point	Delicate target or surface, soft tip with low resistance
7X and 7X-SHORT	Sharpest probe needle available, flexible cat-whisker (.003")	Sub-micron targets
7S	Tungsten, very sharp, most flexible probe tip	Very compliant, ideal for thermal applications

Probe Applications

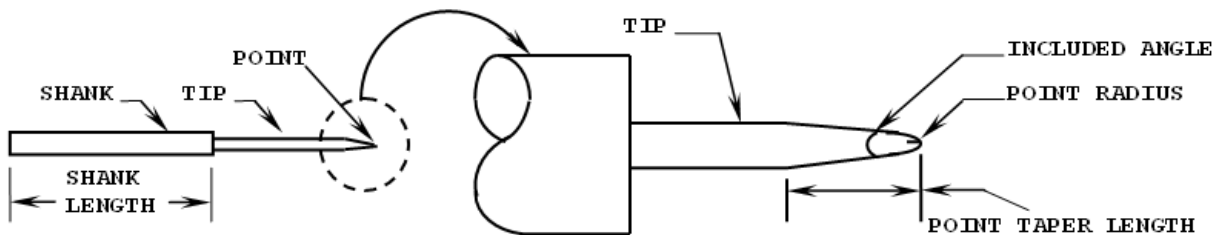
Pre-Bent (Angled) Disposable Probe Tip Reference Chart

45 = 45 degree attack angle 60 = 60 degree attack angle		Tip Diameter	Point Radius in Microns	Point Taper Length	Included Angle (degrees)	Overall Shank Length	Shank Diameter	Material	Attributes
Style	Model Number								
Fine-tip	7A-45 or 7A-60-SHORT 7A-45 or 7A-60-LONG	.005" .005"	0.35 0.35	.020" .020"	14 14	5/8" 1 1/8"	.020" .020"	Shank: Nickel Tip: Tungsten	bendable shanks flexible tip shaft
Heavy Duty Needle	7B-45 or 7B-60-SHORT 7B-45 or 7B-60-LONG	.020" .020"	0.5 0.5	.060" .060"	19 19	5/8" 1 1/8"	.020" .020"	Tungsten	larger targets general purpose
Small Targets Hot Stage	7F-45 or 7F-60-SHORT 7F-45 or 7F-60-LONG	.001" .001"	0.5 0.5	.0027" .0027"	21 21	5/8" 1 1/8"	.020" .020"	Shank: Nickel Tip: Tungsten	bendable shanks & tips, super flexible
Very Small Targets	7X-45 or 7X-60-SHORT 7X-45 or 7X-60-LONG	.003" .003"	0.1 0.1	.013" .013"	13 13	5/8" 1 1/8"	.020" .020"	Shank: Nickel Tip: Tungsten	bendable shanks sharpest probe

Recommended Applications for Probe Holders

Application	Recommended Probe Models
General Purpose	0, 00, 72, 75, 76, or 77 with 7 series probe tips
Thin Film	11 probe holder with 9 or 13 probe tips or 72, 75, 77 with 7F series probe tips
Low Capacitance	78, 83, Picoprobes
High Frequency	44, 44-SMA, 44-RF, 79, Picoprobes
Cutting	00-MUC-DL, 00-MUC-SP, 75 with 7B, 7D or 7G probe tips
Hot Stage	On-Axis, High Attack Angle, 79-H with 7F or 7S probe tips
High Impedance (Active Probes)	Picoprobes, 44 with series resistor
Low Profile Probing	74-0, 79-0 with 7A-M, 7X-M or pre-bent probe tips
Triaxial	83, 79-T, 79-HT, 79-T-O, single Triax cable
Kelvin	44-D, 79-D, 79-TD, 79-HTD, 80 with 81SD probe tips
Microwave	44-RF, Picoprobes available DC to 120 GHz

Probe Tip Reference	Style	Model Number	Tip Diameter*	Point Radius in Microns *	Point Taper Length*	Included Angle (degrees)*	Overall Length*	Shank Diameter*	Material	Attributes
	Fine-tip	7A	.005"	0.35	.020"	14	1.4"	.020"	Shank: Nickel	Bendable shank cat-whisker
		7A-M	.005"	0.35	.020"	14	1.4"	.020"	Tip: Tungsten	
	Heavy Duty Needle	7B	.020"	0.5	.060"	19	1.4"	.020"	Tungsten	Bendable shank and tip Larger targets General purpose * may be Gold plated, add "G" to part number
		7B-1	.020"	1.0	.070"	16	1.4"	.020"		
		7B-2	.020"	2.0	.090"	13	1.4"	.020"		
		7B-5*	.020"	5.0	.090"	13	1.4"	.020"		
		7B-10*	.020"	10.0	.075"	15	1.4"	.020"		
		7B-25*	.020"	25.0	.080"	14	1.4"	.020"		
		7B-50*	.020"	50.0	.080"	11	1.4"	.020"		
		7B-100*	.020"	100.0	.080"	9	1.4"	.020"		
7B-200*	.020"	200.0	.080"	3	1.4"	.020"				
Small Targets with 'C' bend	7C	.005"	0.35	.025"	14	1.3"	.020"	Dumet (CU.FE)	Bendable shank cat-whisker	
Tungsten Carbide	7D	.020"	5.0	.075"	15	1.4"	.020"	Tungsten Carbide	For cutting	
	7D-3/4	.020"	5.0	.075"	15	0.75"	.020"			
Small Targets High Temperature	7F	.001"	0.5	.0027"	21	1.50"	.020"	Shank: Nickel Tip: Tungsten	Bendable shank and tip cat-whisker super flexible	
	7F-10	.001"	10.0	.001"	45	1.50"	.020"			
	7F-C10 with 'C' bend	7F-C10	.003"	10.0	.004"	37	1.50"			.020"
Heavy Duty Needle	7G	.020"	0.5	.060"	19	0.5"	.020"	Tungsten	Same as Model 7B but shorter shank length * may be Gold plated, add "G" to part number	
	7G-1	.020"	1.0	.070"	16	0.5"	.020"			
	7G-2	.020"	2.0	.090"	13	0.5"	.020"			
	7G-5*	.020"	5.0	.090"	13	0.5"	.020"			
	7G-10*	.020"	10.0	.075"	15	0.5"	.020"			
	7G-25*	.020"	25.0	.080"	14	0.5"	.020"			
	7G-50*	.020"	50.0	.080"	11	0.5"	.020"			
	7G-100*	.020"	100.0	.080"	9	0.5"	.020"			
7G-200*	.020"	200.0	.080"	3	0.5"	.020"				
Low Contact Resistance	7H	.020"	1.0	.135"	8	1.4"	.020"	Beryllium Copper	Low contact resistance	
Very Small Targets	7X	.003"	0.1	.013"	13	1.4"	.020"	Shank: Nickel Tip: Tungsten	Bendable shank cat-whisker sharpest probe	
	7X-SHORT	.003"	0.1	.008"	21	1.4"	.020"			
	7X-M	.003"	0.1	.013"	13	1.4"	.020"			Bendable
High Compliance	7S	.005"	0.35	.020"	14	1-5/8"	.020"	Tungsten	Very flexible	



Specifications subject to change without notice.