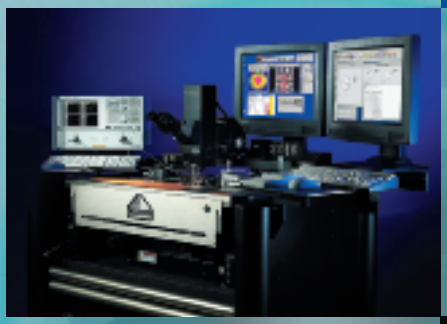
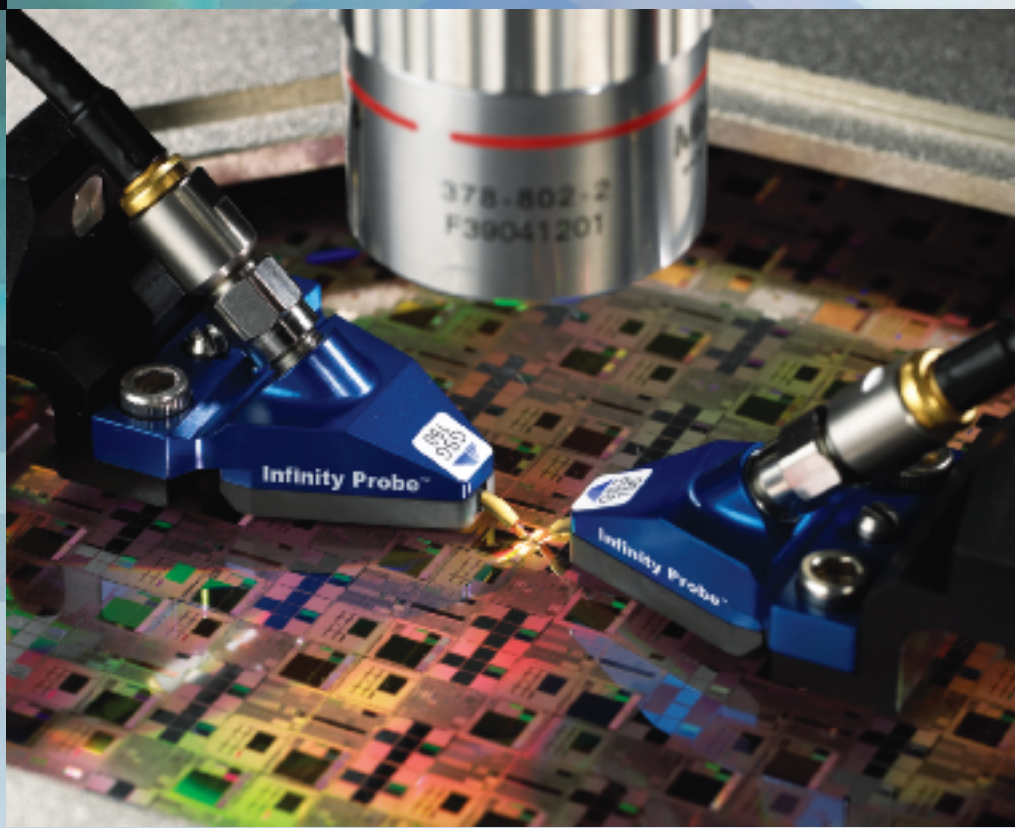




High-frequency performance with low, stable contact resistance on aluminum pads.

Introducing the Infinity Probe, the probe that sets a new benchmark for the device characterization and modeling community. This revolutionary probe combines extremely low contact resistance on aluminum pads with unsurpassed RF measurement accuracy to give you highly reliable, repeatable measurements.

CASCADE® MICROTECH

Innovating Test Technologies®

Cascade Microtech has developed a new technology for the Infinity Probe to meet the needs of both high-frequency performance and low and stable contact resistance (typically <0.1 Ohm on aluminum pads). The Infinity Probe sets a new benchmark in terms of mechanical and RF performance for the device characterization and modeling community.

Silicon RFICs bring new probing challenges: Aluminum is the most commonly used pad metal on silicon IC's, with some processes now migrating to copper pads. (Gold is a contaminant in CMOS, causing deep level traps.) Devices with aluminum pads are much more difficult to accurately probe than devices with gold pads, which are typical on III-V semiconductors.

Current Limitations: When used on aluminum pads a probe has to break through the naturally forming aluminum oxide every time it makes contact. Conventional RF coaxial probes use tungsten tips to penetrate the aluminum oxide layer. Unfortunately, tungsten also oxidizes and the aluminum and aluminum oxide accumulates on the probe tips after only a few contacts, significantly increasing the contact resistance and hence resulting in poor measurement repeatability. As a remedy, frequent cleaning of the probe tips is obligatory. This is usually done abrasively, causing the probe tip size and shape to deteriorate, severely impacting measurement accuracy.

Current Implications: The test engineer is usually unsure of the precision of the measurements, due to the non-repeatable nature of the contact resistance. To improve consistency, measurements are often performed manually. This results in a considerable increase of test time, cost of test, and overall reduction in the productivity of the characterization lab.



Infinity Probe provides superior measurement accuracy and repeatability.

The Infinity Probe:

The Infinity Probe reaches this new performance level through the combination of Cascade Microtech's proprietary thin-film technology and coaxial probe technology.

Superior mechanical performance: The Infinity Probe is the first characterization probe that provides both low (typically < 0.1 Ohm) and consistent contact resistance when probing aluminum pads. The contact area of the probe tips is approximately 12 µm x 12 µm, which allows probing of very small pads. The force delivery innovation ensures only a small horizontal tip motion (scrub) is necessary to break through the aluminum oxide. The vertical overtravel required is approximately 50-75 µm (2-3 mils), resulting in about 25 µm (1 mil) of scrub. This small size and scrub minimizes the damage to the aluminum pad. The more consistent contact resistance minimizes the damage from reprobing.

Superior RF performance: The transmission lines on the thin-film confine fringing fields more tightly than conventional flexible coplanar tips. Better field confinement reduces unwanted couplings to nearby devices or other probe tips, thus increasing RF measurement accuracy. The Infinity Probe's RF characteristics are equal or superior to all other probe technologies in return loss, attenuation, crosstalk, and calibration verifications.

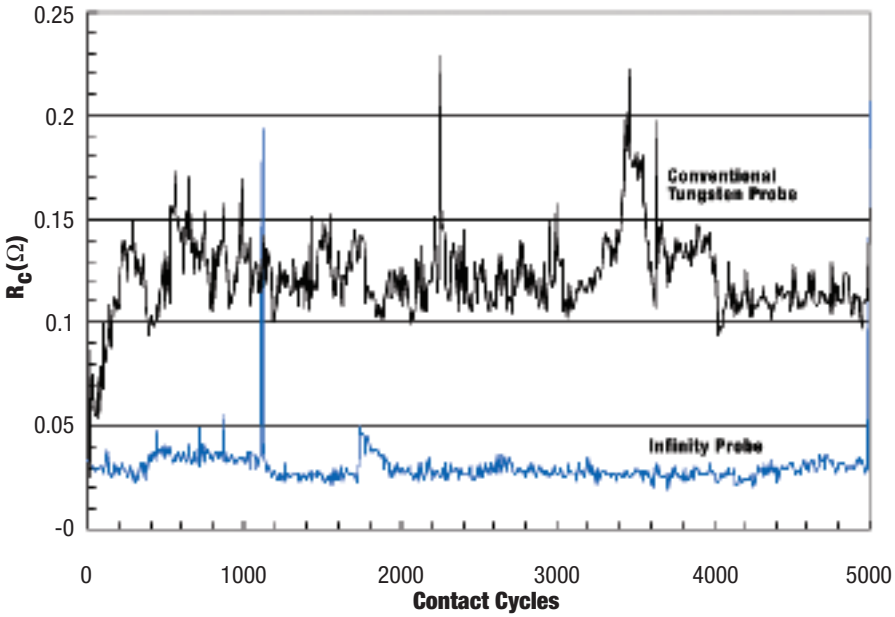
Features

- Lithographic thin-film construction
- Excellent crosstalk characteristics
- Non-oxidizing nickel alloy tips
- Innovative force delivery mechanism
- 40, 50, 67 GHz versions
- GSG, SG/GS configurations
- 100, 125, 150, 200 or 250 µm pitches

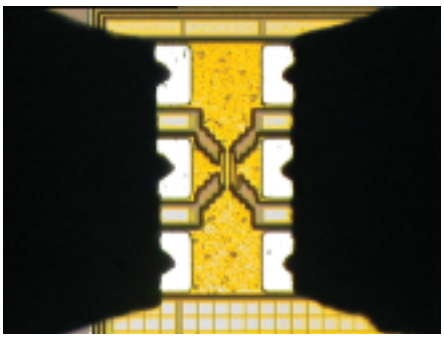
Benefits

- Superior field confinement reduces unwanted couplings to nearby devices and transmission modes
- Superior measurement accuracy and repeatability
- Small scrub minimizes damage to aluminum pad
- Typical contact resistance < 0.1 Ohm
- Save valuable wafer space and reduce pad parasitics by being able to shrink pad geometries to 50 x 50 µm
- Automation of measurements
- Reduction in modeling and design cycle time

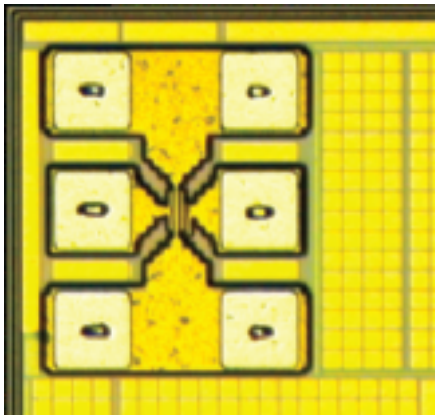
Superior Low and Stable Contact Resistance



Typical Contact Resistance vs Number of Touchdowns on clean aluminum pads for a Conventional Tungsten Probe vs Infinity Probe

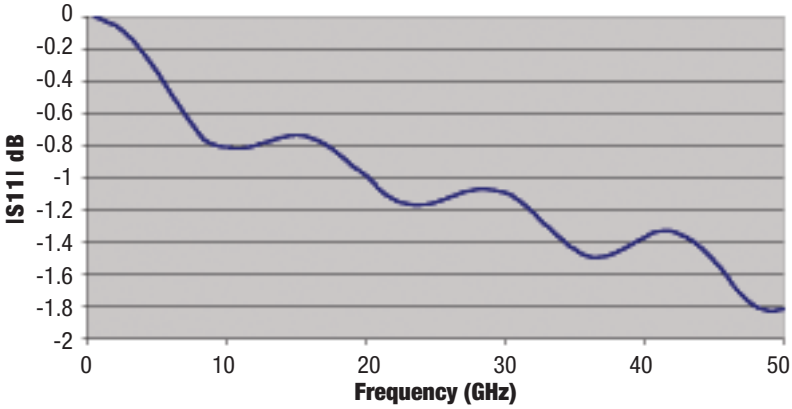


Excellent tip visibility
Infinity Probe contacting Silicon RF device



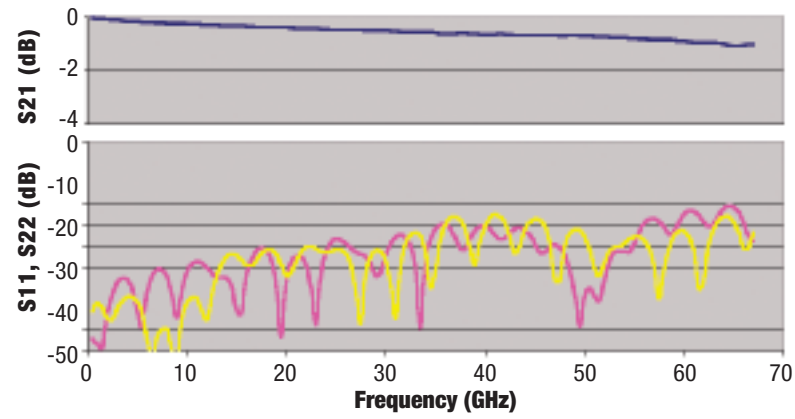
Small contact marks enable contact of 50 x 50 µm pads

Calibration Verification Accuracy

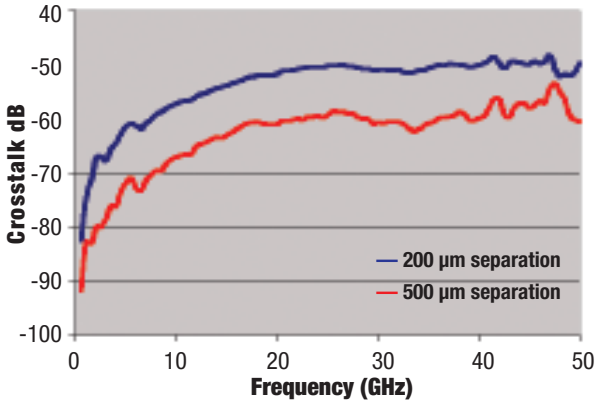


Verification Plot: Single port measurement of 40 ps transmission line

Typical RF performance to 67 GHz



Typical S-parameters of i67-A-GSG-150 probe



Excellent Crosstalk Characteristics

Preliminary Specifications

Frequency Range:	i40 – dc to 40 GHz i50 – dc to 50 GHz i67 – dc to 67 GHz
Typical Insertion Loss (GSG versions):	
dc to 40 GHz	<0.75 dB
40 to 50 GHz	<1 dB
50 to 65 GHz	<1.2 dB
Typical Return Loss (GSG versions):	
dc to 40 GHz	> 18 dB
40 to 50 GHz	> 15 dB
50 to 67 GHz	> 13 dB
Crosstalk @ 50 GHz:	< - 50 dB (< 0.3%) typical
Electrical Repeatability:	< - 60 dB (< 0.1%) typical
Contact Configuration:	Ground-Signal-Ground / GS, SG
Probe Pitch:	
Standard	100 µm, 125 µm, 150 µm, 200 µm, 250 µm
Recommended Overtravel:	75 µm (3 mils)
Maximum Safe Overtravel:	150 µm (6 mils)
Contact Life:	> 200,000 cycles typical
Maximum DC Current:	500 mA
Thermal Range:	-65°C to 125°C
Rc on Aluminum	Typically <0.1 Ω
*Rc Variation During a 5-hour Single Contact Cycle:	10 mΩ
Minimum probe pad contact area:	50 x 50 µm

All specifications are applicable at 25 °C operating temperature
*on clean aluminum

Ordering Information

40 GHz	i40-x-GS-XXX i40-x-SG-XXX i40-x-GSG-XXX
50 GHz	i50-x-GS-XXX i50-x-SG-XXX i50-x-GSG-XXX
67 GHz	i67-x-GS-XXX i67-x-SG-XXX i67-x-GSG-XXX

XXX = 100, 125, 150, 200 or 250
x = 'A' denotes 45 deg angled coaxial connector body style
x = 'V' denotes vertical coaxial connector body style

Recommended Calibration Substrates for Use with Infinity Probes (GSG only)

Freq	Pitch (µm)	Part Number
DC-40	100-250	101-190
DC-50	100-250	101-190
DC-67*	100-250	101-190

Note: For GS/SG configurations, the recommended ISS is P/N 103-726

*Recommend use with absorber ISS holder P/N 116-344

Recommended Cables for Use with Infinity Probes

Freq (GHz)	Body Style	Part Number	Description
DC-40	A	124-084	40 GHz K(F) Straight, K(M) Straight, 48"
	V	101-162	40 GHz K(F) Straight, K(M) 90 deg elbow, 48"
DC-50	A	124-085	50 GHz 2.4 mm Straight, 2.4 mm Straight, 48"
	V	103-202	50 GHz 2.4 mm Straight, 2.4 mm 90 deg elbow, 48"
DC-67	A	124-606	65 GHz 1.85 mm Straight, 1.85 mm Straight, 36"
	V	104-540	65 GHz 1.85 mm Straight, 1.85 mm 90 deg elbow, 24"

'A' denotes 45 deg angled coaxial connector body style;
'V' denotes vertical coaxial connector body style

CASCADE® MICROTECH

Innovating Test Technologies® for better measurements faster

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INFINITY-DS-1102
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