

See Probe Quick-Finder on Back Cover.

RF Probe Selection Guide

CASCADE® MICROTECH

Innovating Test™ Technologies

Infinity Probe®



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

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

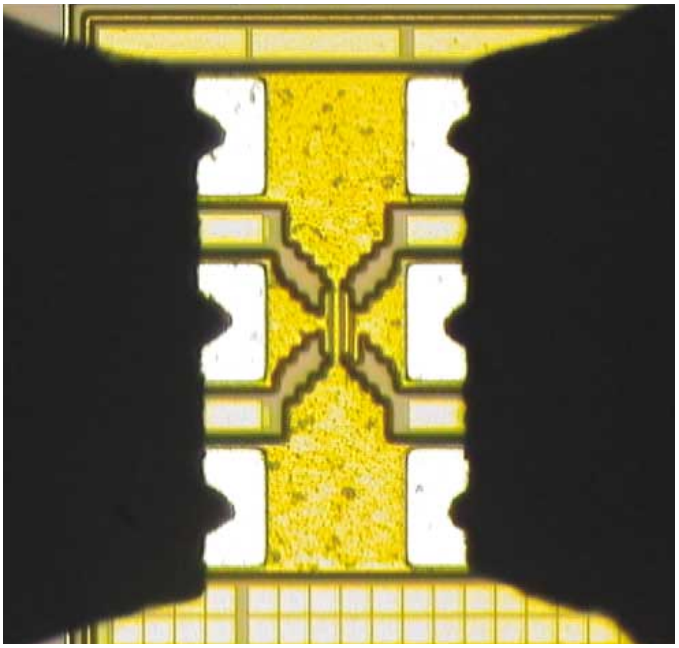
Featured in April '03 Edition of Microwaves & RF

Features

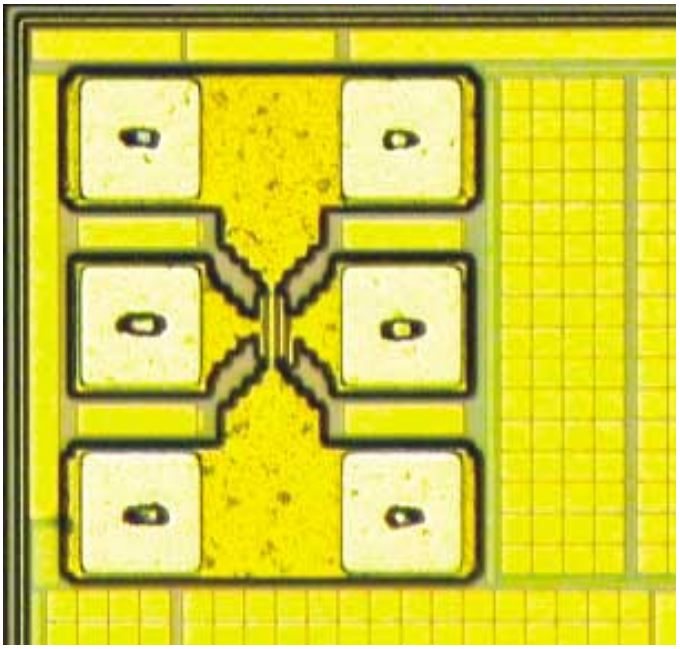
- Lithographic thin-film construction
- Excellent crosstalk characteristics
- Non-oxidizing nickel alloy tips
- Innovative force delivery mechanism
- 40, 50, 67, 110 GHz versions
- GSG, SG/GS configurations
- 100, 125, 150, 200 or 250 µm pitches
- Fast delivery

Advantages

- 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 < 0.05 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



Excellent tip visibility
Infinity Probe contacting Silicon RF device



Small contact marks enable contact of 50 x 50 µm pads

For more information see: Infinity Probe Data Sheet . . . . . .INFINITY-DS

Infinity Probe®

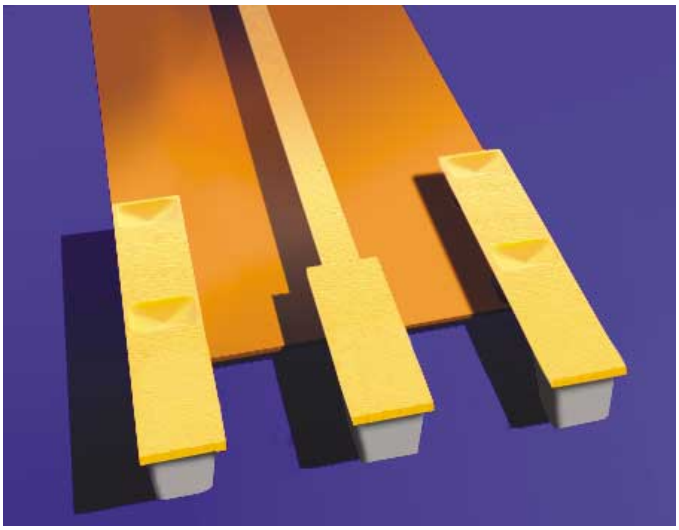
Probe	Part number (Notes 1, 2)	Insertion loss Max. (dB)	Micro-Chamber compatible	Connector & tip type	Recom-mended cable	Recommended ISS Standard (100-250µm)
40 GHz	i40-x-GS-XXX	0.75	yes		124-084 for “A”	103-726
	i40-x-SG-XXX	0.75	yes	2.92 mm	101-162 for “V”	103-726
	i40-x-GSG-XXX	0.75	yes			101-190
50 GHz	i50-x-GS-XXX	1	yes		124-085 for “A”	103-726
	i50-x-SG-XXX	1	yes	2.4mm	103-202 for “V”	103-726
	i50-x-GSG-XXX	1	yes			101-190
67 GHz	i67-x-GS-XXX	1.2	yes		124-606 for “A”	103-726 (note 4)
	i67-x-SG-XXX	1.2	yes	1.85mm	104-540 for “V”	103-726 (note 4)
	i67-x-GSG-XXX	1.2	yes			101-190* (note 4)
110 GHz (note 3)	i110-x-GSG-XXX	1.6	yes	1.0mm	contact factory	104-783* (note 4)

Note 1: XXX = 100, 125, 150, 200 or 250
x = “A” denotes 45 degree angled coaxial connector body style
x = Leave blank for vertical coaxial connector body style

Note 2: The convention for describing probe head footprints is the sequence of contacts as seen looking down on the probe head tip in its functional position, with the tip pointing away from the viewer, describing contacts from left to right.

Note 3: i110 available pitches are 100 µm, 125 µm, 150 µm

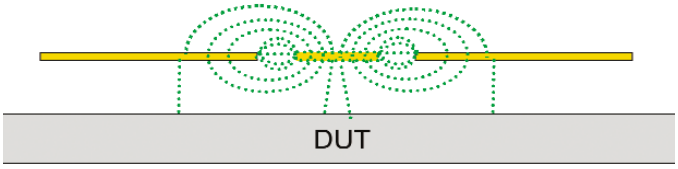
Note 4: 116-344 absorber recommended.



The microstrip extends all the way to the probe tips

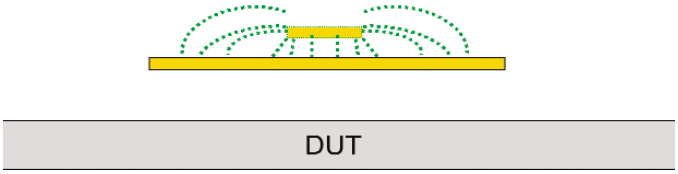
Probe Tip Shielding

Coplanar



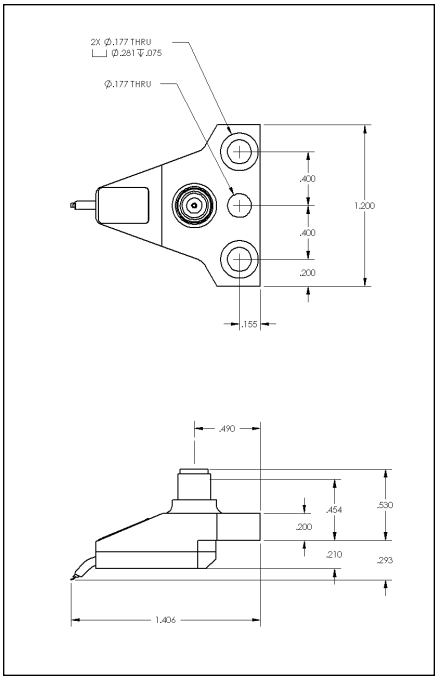
No shielding

Infinity Microstrip

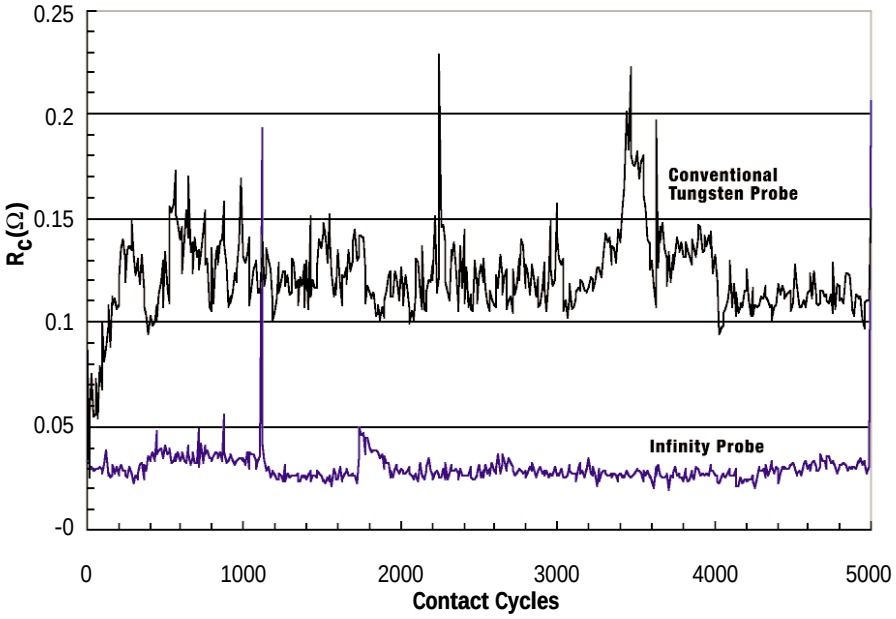


DUT is shielded by ground plane

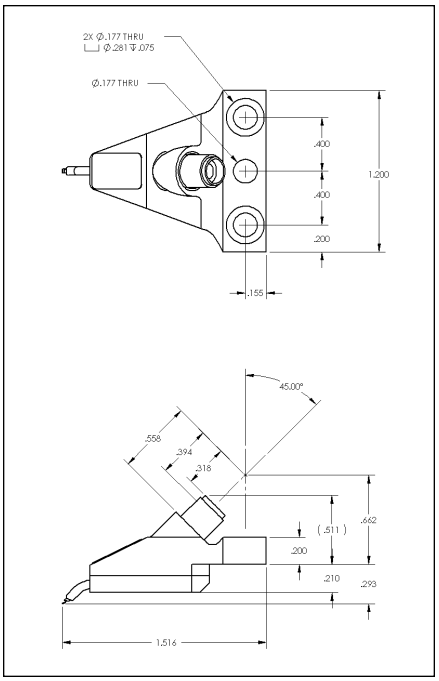
Infinity Probe®



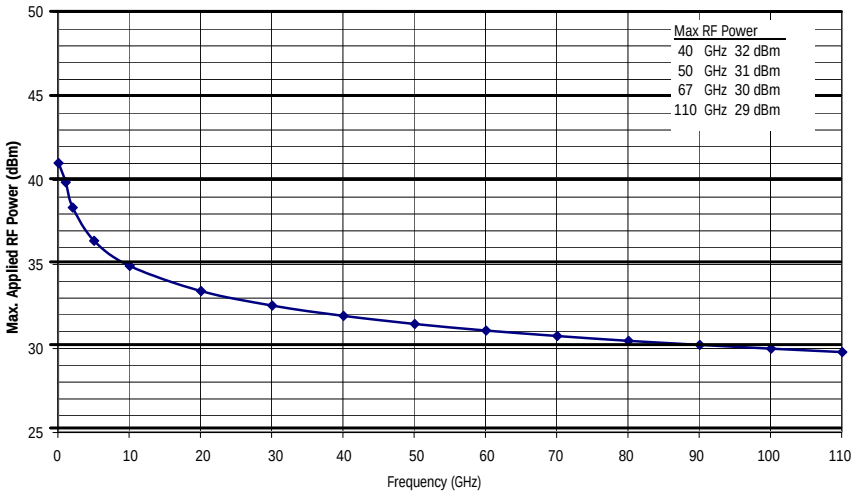
Superior Low and Stable Contact Resistance



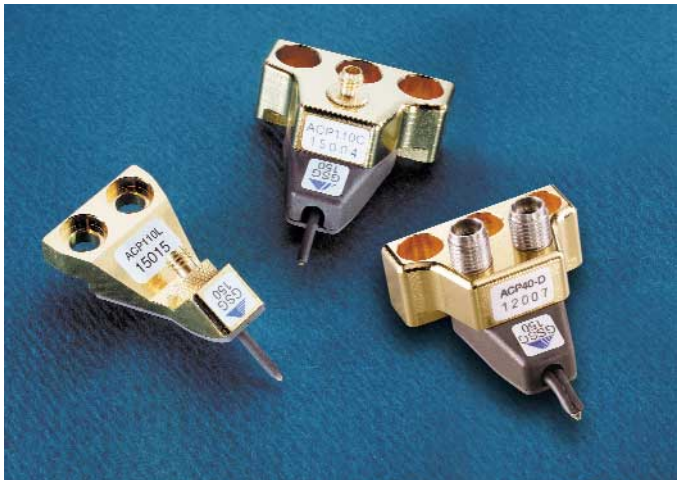
Typical Contact Resistance vs Number of Touchdowns on clean aluminum pads for a Conventional Tungsten Probe vs Infinity Probe



Max. Applied RF Power vs. Frequency



Air Coplanar® Probe Series



RF and Microwave On-wafer Probes: Long-lasting, rugged, ACP series

The Air Coplanar Probe was developed in response to the need for a rugged microwave probe with a compliant tip for accurate, repeatable measurements on-wafer. Air Coplanar Probes feature excellent probe-tip visibility and the lowest loss available. For measurements where pad area is at a premium, the ACP family is offered with a reduced contact (RC) area probe tip. The ACP probe family also features Dual signal line versions for differential and multiport measurements.

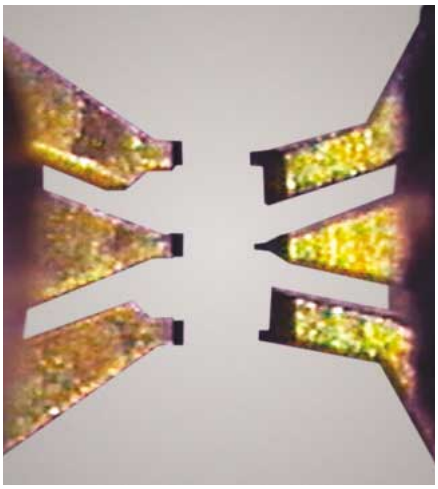
Combining outstanding electrical performance with precise probe mechanics, the ACP probe is the most widely used microwave probe available.

Features

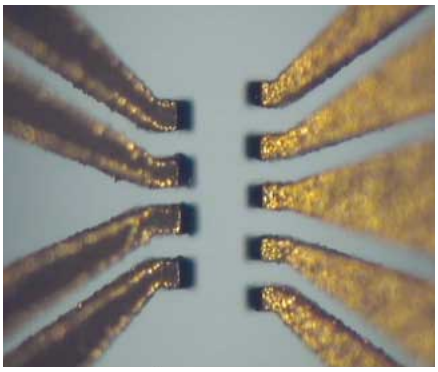
- Unique Air Coplanar tip design
- DC to 110 GHz models available in single and dual line versions
- Low insertion and return loss with ultra-low-loss (-L) versions
- Excellent crosstalk characteristics
- Wide operating temperature -65°C to +200°C
- Wide range of pitches available, from 50 to 1250 µm
- Fast delivery available on 100, 125, 150, 200, and 250 µm pitched probes
- Individually supported contacts
- Choice of beryllium copper (BeCu) or tungsten tip material
- Reduced contact (RC) probe tips for small pads
- Precision tip dual configuration available
- BeCu tip provides rugged, repeatable contact on gold pads

Advantages

- Good visibility at probe tip allows accurate placement on DUT contact pads
- Outstanding compliance for probing non-planar surfaces
- Stable and repeatable over-temperature measurements
- Typical probe life of 500,000 contacts on gold pads
- Reduction in development cycle time



Standard ACP tip (left) vs. ACP-RC tip (right)



ACP-GSSG (left) vs. ACP-GSGSG (right)

For more information see: Air Coplanar Probe Series . . . . . .ACP-DS
Air Coplanar Angle Series Probes . . . . . .ACP-A-DS

Air Coplanar® Probe Series

	Probe head type	Part number (Note 1,2)	Insertion loss Max. (dB)	Micro-Chamber compatible	Connector	Recommended cable	Recommended ISS Standard (100-250µm)	Recommended ISS Wide pitch (250-1250µm)
Single Coaxial	DC-40 GHz (Notes1, 2, 12)	ACP40-m-GS-xxx	2.0	Yes	2.92mm	101-162	103-726	106-683
		ACP40-m-SG-xxx	2.0	Yes			103-726	106-683
		ACP40-m-GSG-xxx	1.0	Yes			101-190	106-682
		ACP40-Am-GS-xxx	2.0	(Note 7)	2.92mm	124-084	103-726	106-683
		ACP40-Am-SG-xxx	2.0	(Note 7)			103-726	106-683
		ACP40-Am-GSG-xxx	1.0	(Note 7)			101-190	106-682
		ACP40-Lm-GSG-xxx	0.6 (Note 6)	(Note 7)			101-190	106-682
	DC-50 GHz (Notes 1, 2, 12)	ACP50-m-GS-xxx	2.0 @ 40 GHz	Yes	2.4mm	103-202	103-726	n/a
		ACP50-m-SG-xxx	2.0 @ 40 GHz	Yes			103-726	
		ACP50-m-GSG-xxx	1.4	Yes			101-190	
		ACP50-Am-GS-xxx	2.0 @ 40 GHz	(Note 7)	2.4mm	124-085	103-726	n/a
		ACP50-Am-SG-xxx	2.0 @ 40 GHz	(Note 7)			103-726	
		ACP50-Am-GSG-xxx	1.4	(Note 7)			101-190	
		ACP50-Lm-GSG-xxx		(Note 7)			101-190	
	DC-65 GHz (Notes 1, 2, 12)	ACP65-m-GS-xxx		Yes	1.85mm	104-540	103-726 (Note 9)	n/a
		ACP65-m-SG-xxx		Yes			103-726 (Note 9)	
		ACP65-m-GSG-xxx	2.0	Yes			101-190 (Note 9)	
		ACP65-Am-GS-xxx		(Note 7)	1.85mm	124-090	103-726 (Note 9)	n/a
		ACP65-Am-SG-xxx		(Note 7)			103-726 (Note 9)	
		ACP65-Am-GSG-xxx	2.0	(Note 7)			101-190 (Note 9)	
		ACP65-Lm-GSG-xxx		(Note 7)			101-190 (Note 9)	
	DC-110 GHz (Notes 1, 2, 11, 12)	ACP110-Cm-GSG-xxx	1.25	Yes	1.0 mm	(consult factory)	104-783 (Note 9)	n/a
		ACP110-Am-GSG-xxx	1.25	(Note 7)			104-783 (Note 9)	
		ACP110-Lm-GSG-xxx	1.15	(Note 7)			104-783 (Note 9)	
Dual coaxial	DC-110 GHz (Notes 1, 2, 3, 11)	ACPyy-Dm-GSGSG-xxx	1.25 @ 40 GHz (Note 4)	Yes	(Note 3)	Connector dependent. Recommendation same as single coaxial.	See ISS data sheet (ISS-DS)	005-016 (consult factory)
		ACPyy-Dm-GSGS-xxx	1.25 @ 18 GHz (Note 4)	Yes				
		ACPyy-Dm-GSS-xxx	1.0 @ 10 GHz (Note 4,5)	Yes				
		ACPyy-Dm-GSSG-xxx	1.0 @ 10 GHz (Notes 4)	Yes				
		ACPyy-Dm-SGS-xxx	1.25 @ 18 GHz (Note 4)	Yes				
		ACPyy-Dm-SGSG-xxx	1.25 @ 18 GHz (Note 4)	Yes				
		ACPyy-Dm-SSG-xxx	1.0 @ 10 GHz (Notes 4,5)	Yes				
Wave-guide	50-75 GHz (Notes 1, 2, 11)	ACP75-m-GSG-xxx	1.15	No	WR-15	n/a	104-783 (Note 9)	n/a
		ACP75-Mm-GSG-xxx	1.3	Yes (Note 8)	WR-15		104-783 (Note 9)	
	75-110 GHz (Notes 1, 2, 11)	ACP110-m-GSG-xxx	1.6	No	WR-10	n/a	104-783 (Note 9)	n/a
		ACP110-Mm-GSG-xxx	1.75	Yes (Note 8)	WR-10		104-783 (Note 9)	

Note 1: **m** refers to the tip material. Delete for BeCu. Change to **W** for tungsten.

Note 2: **xxx** refers to probe contact center to center spacing in microns, e.g. ACP40-GSG-150 is 150 µm. Contacts are on a constant pitch and width is approximately 50 um.

Note 3: **yy** refers to the connector type: 40 (2.92mm), 50 (2.4mm), 65 (1.85mm), 110 (1.0mm).

Note 4: Insertion loss specification is for a 2.92mm connectorized probe.

Note 5: Signal furthest from ground is not specified.

Note 6: Low-loss probe insertion loss for pitches greater than 150 µm and less than or equal to 250 µm is 0.8 dB.

Note 7: Requires new larger top hat assembly.

Note 8: Requires 105-555 small top hat assembly and accessories.

Note 9: Use of 116-344 ISS absorber recommended.

Note 10: The convention for describing probe head footprints is the sequence of contacts as seen looking down on the probe head tip in its functional position, with the tip pointing away from the viewer, describing contacts from left to right.

Note 11: ACP probes, except 110 models, are available in a wide range of pitches from 50 µm to 1250 µm. Insertion loss and frequency performance applies to pitches from 100-250 µm, unless otherwise noted. ACP110 probes available in pitches from 100-150 µm.

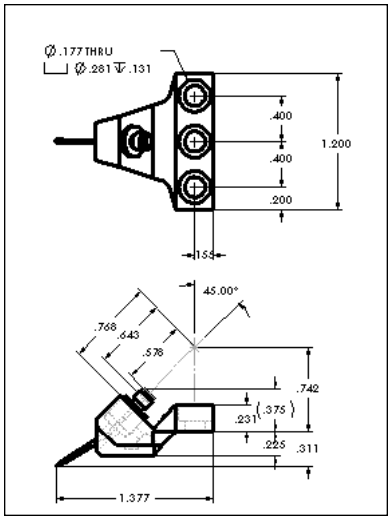
Note 12: Angled probes require the 114-592 probe mount for cable clearance.

Note 13: Electrical specifications apply to probe pitches of 100 to 250 µm, except for 110 GHz probes, where the maximum pitch is 150 µm.

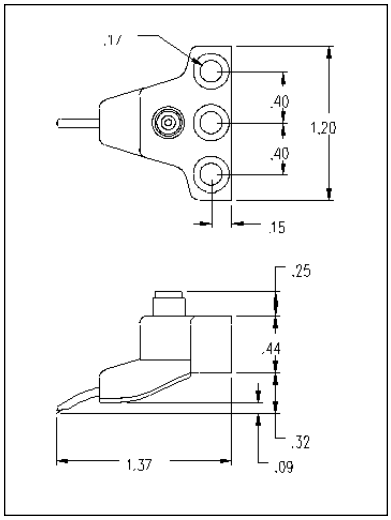
For Reduced Contact Probe part numbers, see table, above, and note below

ACP Reduced Contact Probes are available in the same configurations and body styles as the regular ACP series. The standard available pitches are from 100-250um. Other pitches are available upon request. When ordering, add "**RC**" to the end of the regular ACP part number from the above, e.g. “ACP40-W-GSG-150**RC**”

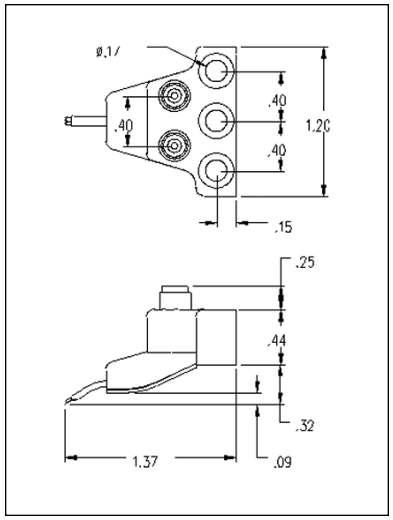
Air Coplanar® Probe Series



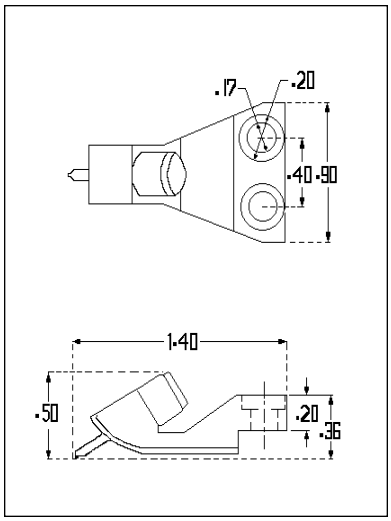
Probe style for: ACP40-Ax, ACP50-Ax, ACP65-Ax, ACP110-Ax.
Requires 114-592 probe mount.



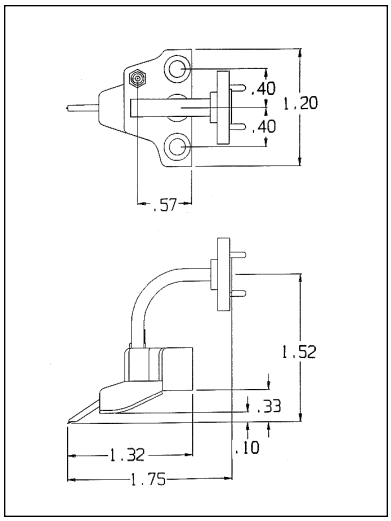
Probe style for: ACP40-x, ACP50-x, ACP65-x, ACP110-Cx.



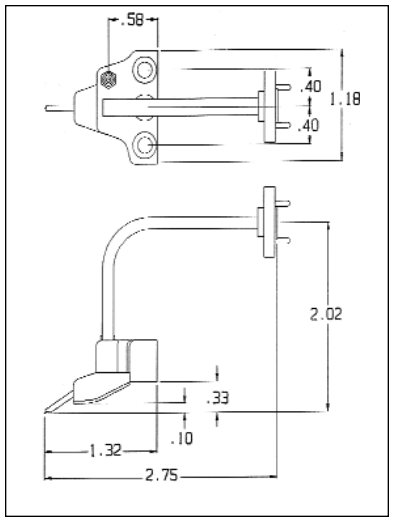
Probe style for: ACP40-Dx, ACP50-Dx, ACP65-Dx, ACP110-Dx.



Probe style for: ACP40-Lx, ACP50-Lx, ACP65-Lx, ACP110-Lx.



Probe style for: ACP75, ACP110



Probe style for: ACP75-M, ACP110-M (MicroChamber compatible)

RF Quadrant Probes



ACP40-Q-22 and ACP40-Q-12 Quadrant Probes

Multiple configurations for functional circuit testing

Quadrant Probes were developed in response to the need for multiple probe tips in a single module. Configurations consist of all RF or a combination of RF and DC.

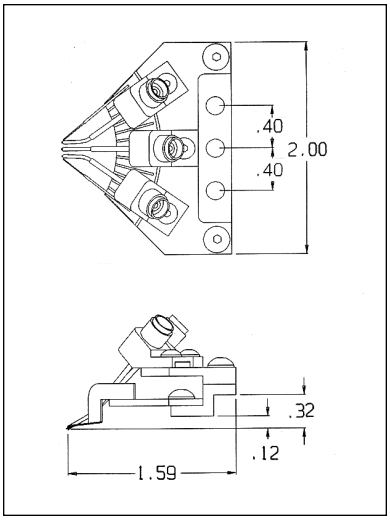
The RF probes use Air Coplanar technology to produce a rugged microwave probe with a compliant tip for accurate, repeatable measurements on-wafer. The DC probes use ceramic blade needles for low noise and high performance.

Features

- Customized to customer application
- Mixture of DC and RF in one probe module. Up to 3 RF. Up to 8 DC
- Utilizes ACP tip design, GSG, GS or SG
- RF tips available from DC to 100 GHz
- Choice of BeCu or tungsten tips
- DC needles come with a 100 pF capacitor to ground at the needle base

Advantages

- Ideal for probing the entire circuit for functional test
- Dual ACP configuration supports differential signaling applications
- DC probes can provide power or slow logic to circuit under test



Probe style for: ACPyy-Q-1x, 2x & 30

Probe head type	Part number	Number of RF probes	Number of DC probes
ACP Quadrant Probe	ACPyy-Q-11	1	1
	ACPyy-Q-12	1	2
	ACPyy-Q-13	1	3
	ACPyy-Q-14	1	4
	ACPyy-Q-15	1	5
	ACPyy-Q-16	1	6
	ACPyy-Q-17	1	7
	ACPyy-Q-18	1	8
	ACPyy-Q-21	2	1
	ACPyy-Q-22	2	2
	ACPyy-Q-23	2	3
	ACPyy-Q-24	2	4
	ACPyy-Q-30	3	0

Connector	Cable
2.92mm	124-084
2.4mm	124-085
1.85mm	124-090
1.0mm	consult factory

Note 1: **yy** refers to the connector type: 40 (2.92mm), 50 (2.4mm), 65 (1.85mm), 110 (1.0mm).

Note 2: Use ACP Quadrant form to specify number of RF probes, DC probes, pitch, tip material(BeCu or tungsten) and layout configuration.

Note 3: ACP110-Q-2x or ACP110-Q-3x require a minimum pitch of 1200 µm.

High Performance Bias Probe



Durable multicontact wafer probe with Eye-Pass™ controlled impedance power bypass technology

The multicontact Eye-Pass probe provides controlled impedance power connections enabling functional test of even the most challenging circuits on-wafer. The high-durability composite multi-finger tip provides high compliance and ensures precise alignment.

This custom probe allows the user to select the footprint pattern best suited for the application, with up to 12 contacts per probe head Available contact types are ground, logic, standard and Eye-Pass power supply, power supply sense, and ac signal. The probe design is customized for the particular customer application.

Features

- High performance power bypassing provides low-impedance and resonant-free connections to 20 GHz
- RF bandwidth to 500 MHz
- Long probe life: >250,000 contacts
- Flexible configuration; can mix ground, logic, power supply, ac signal, or power supply sense
- Up to 12 contacts per probe head
- Beryllium-copper tips for gold pads or tungsten for aluminum pads
- Single and ganged flexible coaxial assemblies available

Advantages

- Allows on-wafer evaluation of high-performance digital circuits
- Oscillation-free testing of wide-bandwidth analog circuits
- Use with ACP-series probes to provide functional at-speed testing for known-good-die
- Long life for production testing
- Fully compatible with your existing Cascade Microtech probes and probe stations

Create Part Number: EP-XX-YYY-Z

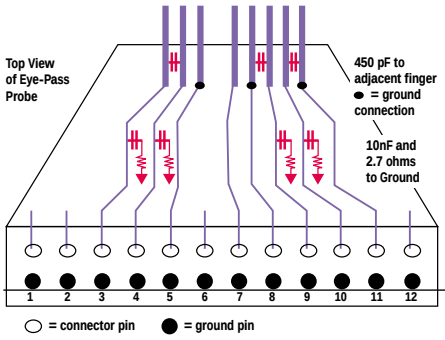
EP = "Eye-Pass Probe"
XX = # of contacts (up to 12)
YYY = Probe Pitch (100-250µm*)
Z = Tip Material (BeCu or W*)
Example: 8 contacts, 125µm contact spacing, tungsten = EP-08-125-W

***Probe pitch = spacing of contacts center to center in µm. Available in 100, 125, 150, 200, 250µm. Tip Material = BeCu (Beryllium Copper, recommended for gold pads), or W (Tungsten, recommended for aluminum pads)**

Ordering Information

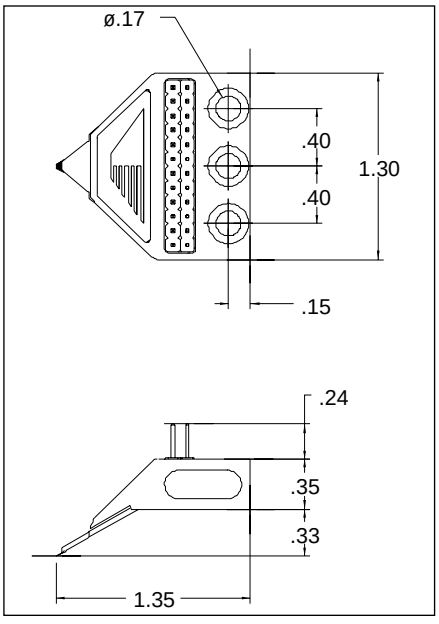
See *Eye-Pass Probe Design Capture* page at www.cascademicrotech.com/eyepass on how to create configuration code.

Sample Configuration: P'PGXLG'PP'G



Conn Pin #	Contact	Type
1		No Contact
2		No Contact
3	P	Eye-Pass Power**
4	P	Eye-Pass Power**
5	G	Ground
6	X	No Contact
7	L	Logic/Signal
8	G	Ground
9	P	Eye-Pass Power
10	P	Eye-Pass Power
11	G	Ground
12		

**Adjacent ground recommended for best EyePass Power performance



Multicontact DC Power Probe Series



Multiple configurations for functional circuit testing

Multicontact DC power probes were developed in response to the need for multiple probe tips in a single probe head.

The DCQ probes use controlled impedance, ceramic blade needles for low noise and high performance. This needle style allows the placement of high quality bypass capacitors with very little series inductance due to their close proximity to the probe tip. All of the needles are connected to a common ground plane but individual needles can be easily (ground) isolated for additional low noise performance. A maximum of 16 needles are available.

The WPH probe series features up to 12 all metal probe needles with a user defined 2 x 12 square pin cable interface. The circuit board has been laid out such that both series and shunt components can be added to the signal path of each needle.

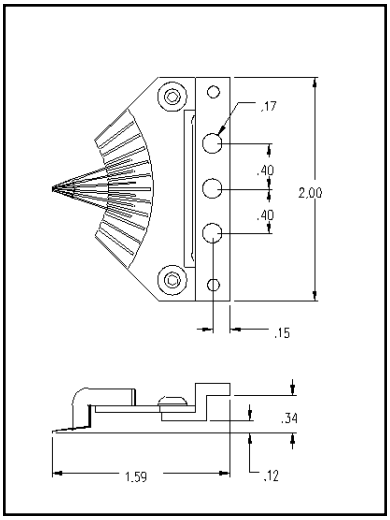
Features

- Customized to customer application
- Up to 16 DC
- Standard tungsten 0.01 inch (0.75mm) diameter needles
- Supports collinear and non-standard needle configurations

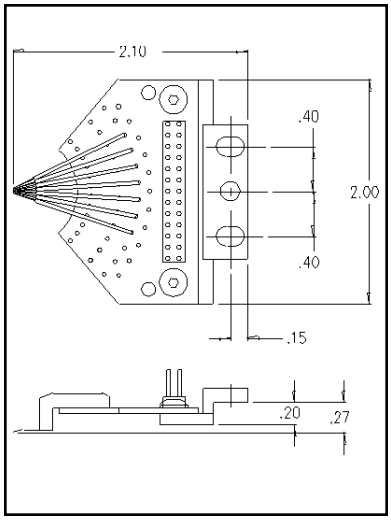
Advantages

- Ideal for probing the entire circuit for functional test
- DC probes can provide power or slow logic to circuit under test

Probe head type	Part number (yy= # of DC probes)	Max. number of DC probes	MicroChamber compatible	Connector
DCQ Quadrant probe (Note 1)	DCQ-yy	16	Yes (Note 7)	(Note 2)
WPH needle probe heads (Note 3)	WPH-9yy-xxx (Note 4)	12	No	(Note 6)
	WPH-9yy-NS (Note 5)	12	No	



Probe style for: DCQ-YY



Probe style for: WPH-9YY

Note 1: Use DCQ Quadrant Probe Order Form to specify number of DC needles and layout of DC lines.

Note 2: DCQ DC connections are supplied via a wire pig-tail to square-pin header, standard. Custom cable harnesses are also available.

Note 3: See app. note “Layout Rules for WPH-900 Series Probes”

Note 4: The -xxx suffix indicates probe contact center-to-center spacing (pitch) in microns, e.g. WPH-908-150 has 8 needles with a spacing of 150 µm (5.91 mils). Needles are in a collinear pattern with constant pitch.

Note 5: Needles may be in a non-standard pattern to be specified by the customer.

Note 6: Circuit board mounted square-pin header, standard.

Note 7: MicroChamber compatibility up to 12 needles.

Fixed Pitch Compliant Series



Module and Circuit Board Probes: Rugged, deep reach RF probing

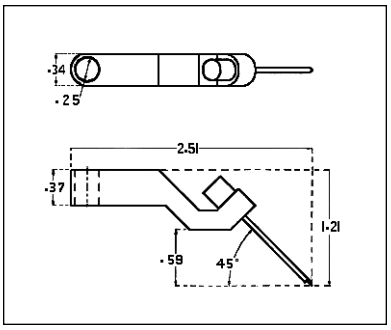
The FPC-Series (Fixed-Pitch Compliant) is a high frequency 50-ohm coaxial probe that offers a signal line with either one or two low-inductance fixed-pitch ground contacts. The probe tip structure is lithographically defined for unsurpassed impedance control, preserving the highest integrity possible when launching and receiving signals from SMT boards, hybrids and multi-chip modules (MCM).

Features

- DC - 40 GHz bandwidth
- 10 ps rise time
- Low insertion and return loss
- 2 mils of tip-to-tip compliance
- High probing angle and clearance

Advantages

- Maintains 50-ohm environment which allows accurate high-frequency measurement of microelectronic modules
- Compliant tips allow probing of non-planar structures
- BeCu tips provide longer probing life and reduce probe damage
- Access contacts close to components, module walls, or other obstructions



Probe style for: FPC

Probe head type	Part Number (Notes 1,2,3)	Insertion loss, typical	Return loss min.	Connector & tip type	Recommended cable	Recommended ISS Standard (100-250µm)	Recommended ISS Wide pitch (250-1250µm)
DC-40 GHz	FPC-GS-xxx	2.0 dB		BeCu.		103-726	106-683
(Note 4, 5)	FPC-SG-xxx	2.0 dB	10 dB	2.92mm	124-084	103-726	106-683
	FPC-GSG-xxx	1.0 dB				101-190	106-682
DC-40 GHz	FPC-W-GS-xxx	2.0 dB		Tungsten		103-726	106-683
(Note 4, 5)	FPC-W-SG-xxx	2.0 dB	10 dB	2.92mm	124-084	103-726	106-683
	FPC-W-GSG-xxx	1.0 dB				101-190	106-682

Note 1: The **-xxx** suffix indicates probe contact center-to-center spacing (pitch) in microns, e.g. FPC40-SG-150 is 150 µm (5.91 mils). Contacts are on a constant pitch and width is approximately 50 µm.

Note 2: The convention for describing probe head footprints is the sequence of contacts as seen looking down on the probe head tip in its functional position, with the tip pointing away from the viewer, describing contacts from left to right.

Note 3: FPC standard pitches are 100, 125, 150, 200, 250, 350, 500, 650, 750, 1000 and 1250 µm. Non-standard pitches are available from 100 µm to 1250 µm and by special order to 3000 µm. Insertion loss applies to standard pitch range. Other pitches may have increased insertion loss. Adapter 106-835 is required for Summit Series positioners.

Note 4: FPC GSG probes - 40 GHz up to 250 µm pitch, 20 GHz up to 1250 µm pitch and 3 GHz up to 3000 µm pitch..
FPC GS/SG probes - 40 GHz up to 250 µm pitch, 18 GHz up to 500 µm pitch, 10 GHz up to 1250 µm pitch and 3 GHz up to 3000 µm pitch.

Note 5: FPC probes are not designed for use with MicroChamber probing stations.

Fine Pitch Microprobes



FPM probe with low inductance grounding wire

Module and Circuit Board Probes: Accurate probing for test and troubleshooting

The FPM-(Fine Pitch Microprobe) Series provides a superior range of probes for characterizing and troubleshooting high-speed, high-density microcircuits with pads as small as 25 microns.

Features

- 18 GHz bandwidth for 10x, 20x, 100x
- Sub 30 ps rise time
- Low input capacitance
- Choice of ground configurations

Advantages

- Ten times less tip capacitance than traditional hand held probes
- Minimizes signal distortion by providing high bandwidth
- 1% accuracy for model development
- Low invasiveness for detecting conditions like metastability

Probe head type	Part number	Connector	Attenuation	Bandwidth 3 dB	Input resistance	Input capacitance	Rise time
Fine-Pitch	FPM-1X	2.92mm	1x	dc - 5 GHz	50 ohms	0.15 pF	<100 ps
Microprobes	FPM-10X		10x	dc - 18 GHz	500 ohms	0.03 pF	<30 ps
	FPM-20X		20x	dc - 18 GHz	1000 ohms	0.02 pF	<30 ps
	FPM-100X		100x	dc - 18 GHz	5000 ohms	0.02 pF	<30 ps

Note 1: Fine-pitch series probes are not designed for use with MicroChamber probing systems.

For more information see: FPR-Series Fine-Pitch Resistive Divider Probe . . . .FPM-DS

Impedance Matching Probes



Special Purpose Probes: Designed for your application

Cascade Microtech's Impedance Matching Probes, using proven Air Coplanar Probe technology, are available in both reactive and resistive versions. A choice of either ACP or FPC body styles is available.

Reactive matching probes provide low-loss transitions such as to the low impedance outputs of power devices. Resistive matching probes are frequently used to singly terminate the patch to a low dynamic resistance laser diode for maximally flat modulation frequency response.

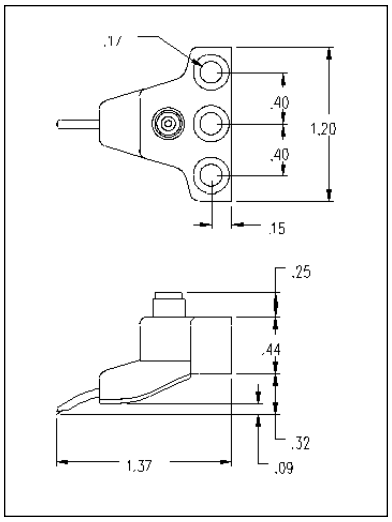
ACP20-Z and ACP40-Z Reactive probes

Features

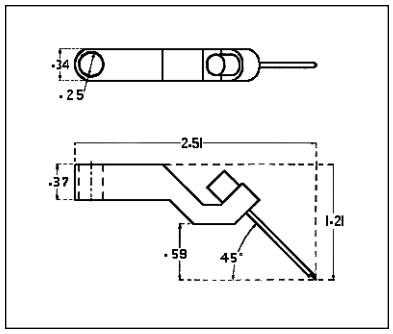
- Choice of reactive or resistive probe
- Choice of center frequency range, value and bandwidth
- Choice of probe tip impedance
- Choice of body styles, ACP or FPC

Advantages

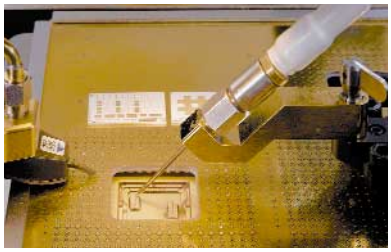
- Improved load-pull measurement tuning range
- Ability to make accurate on-wafer measurement of low-impedance power devices
- Stabilize oscillations in high-gain devices
- Impedance match to low dynamic resistance laser diodes
- Custom configured for your application



Probe style for: ACP20-Z, ACP40-Z and ACP-R



Probe style for: FPC-R



Probe head type	Part number (Note 1, 2, 3)	Center frequency	Bandwidth (GHz)	Connector & tip type	Recommended cable	Impedance range (Ohms)	MicroChamber compatible
Reactive Probe (Note 4)	ACP20-Z-GSG-xxx ACP40-Z-GSG-xxx	0.85 - 20GHz 20 - 40GHz	<10% Std. 10% - 20% optional	2.92mm BeCu	101-162	24 - 50 Std. 10 - 24 optional	Yes
Resistive Probe (Note 4)	ACP-R-GS-xxx ACP-R-SG-xxx ACP-R-GSG-xxx		0 - 10	2.92mm BeCu	101-162	45 ±5% Std. 10 - 300 optional	Yes
Resistive Probe (Note 4)	FPC-R-GS-xxx FPC-R-SG-xxx FPC-R-GSG-xxx		0 - 10	2.92mm BeCu	101-162	45 ±5% Std. 10 - 300 optional	No

Note 1: The **-xxx** suffix indicates probe contact center-to-center spacing (pitch) in microns, e.g. ACP40-Z-GSG-150 is 150 µm (5.91 mils). Contacts are on a constant pitch and width is approximately 50 µm.

Note 2: The convention for describing probe head footprints is the sequence of contacts as seen looking down on the probe head tip in its functional position, with the tip pointing away from the viewer, describing contacts from left to right.

Note 3: ACP pitches are available from 50 µm to 1250 µm.

Note 4: Use Impedance Matching Probe Order Form to specify center frequency, tip impedance, bandwidth, resistance value and pitch.

Lightwave Probe Series



Special Purpose Probes: DC to daylight

Cascade Microtech's range of probes cover everything from DC to light. The LWP Series of lightwave probes enables on-wafer optical measurements of top-illuminated edge-emitting photo-diodes, VCSEL, edge coupled laser bars, modulators, and optoelectronic integrated circuits. Versions are available for both cleaved fiber and lensed fiber applications.

Specially designed probes are also available for your unique application from the fastest high-speed telecommunications to the extremes of cryogenic temperatures.

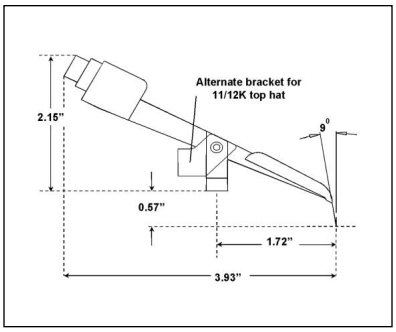
Features

- Choice of cleaved or micro-machined lensed optical fiber
- Field-interchangeable fiber-optic pigtails
- Standard FC type fiber optic connection
- Low-cost, field-replaceable optical fibers

Advantages

- Brings optical test equipment capability to the wafer level
- Enables fast, accurate measurements of photodiodes and OEICs
- Eliminates need to dice wafer for at-speed testing
- Removes carrier bondwire parasitics

For more information see: LWP-Series Lightwave Probe . . . . . .LWP-DS

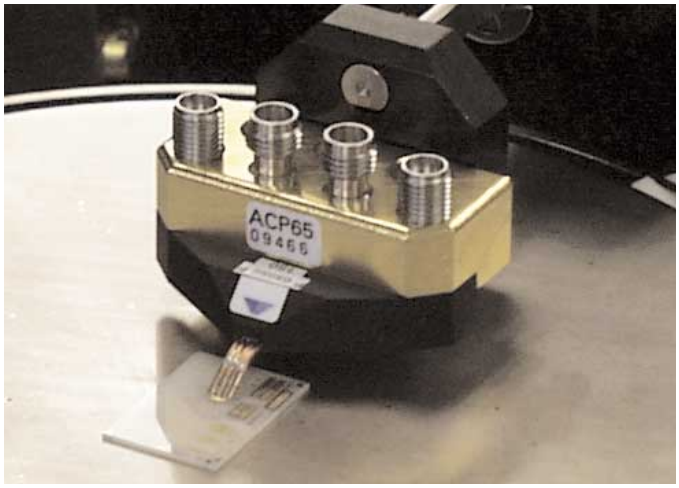


Probe style for: LWP

Part Number	Fiber Type	Useable Illumination Diameter Range (µm)		Wavelength (nm)	Numeric Aperture	Insertion loss (dB)
LWP-CLV-SM	Cleaved-Singlemode	25 or larger	400 - 1750*	0.13	0.5	
LWP-CLV-MM	Cleaved-Multimode	75 or larger	400 - 1750	0.28	0.5	
LWP-CLV50-MM	Cleaved 50 µm-Multimode	75 or larger	400 - 1750	0.2	0.5	
LWP-LEN-SM	Lensed-Singlemode	5 - 25	400 - 1750*		0.5	
LWP-LEN-MM	Lensed-Multimode	15 - 75	400 - 1750		0.5	
LWP-LEN50-MM	Lensed 50 µm-Multimode	15 - 75	400 - 1750		0.5	

* Fiber operates as multimode from 400 to 800 nm.

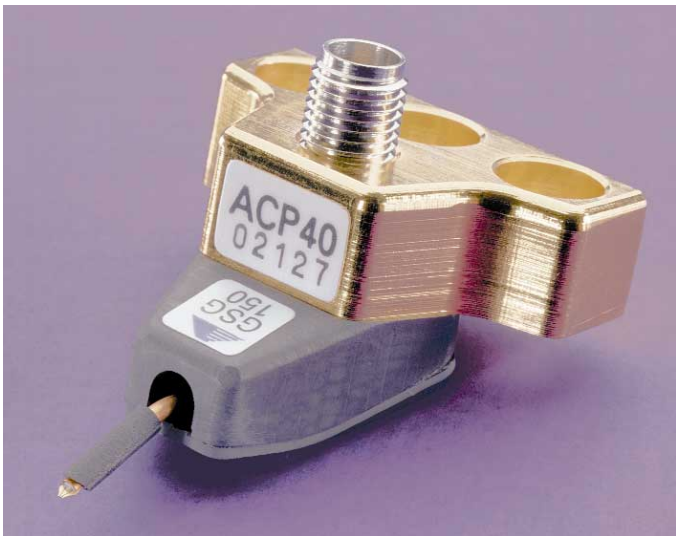
Special Purpose Probes



40/80 Gb/s High Performance Quadrant

Designed to provide wide bandwidth RF connections and simultaneous resonant free power bypass connections for the special needs of high-speed mixed mode IC's for optical networks.

- Low RF loss and excellent impedance control over very wide bandwidth
- High performance resonance free bypass for low impedance power supplies
- Allows on-wafer evaluation of high performance digital circuits
- Minimal distortion of high-speed digital signals
- Maximized eye diagram test performance at wafer test
- Durable Air CoPlanar tip technology for long contact life



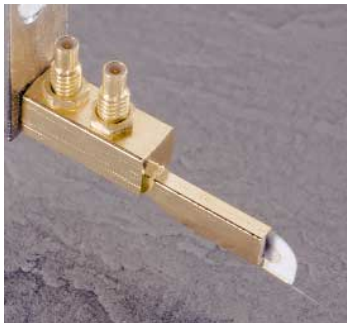
Cryogenic ACP Probe

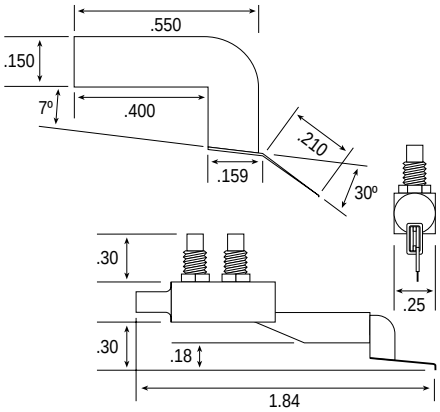
Designed to provide superior mechanical properties at cryogenic temperatures while maintaining solid RF measurement performance.

- Functional temperature range of -263 to +150°C
- Stainless steel tip material for thermal decoupling
- Coaxial cable with TCE matched inner and outer conductors
- Consistent tip geometry even at cryogenic temperatures

For more information see: 40/80 Gb/s High Performance Quadrant Probe . . . .SPACP-DS
Cryogenic ACP Probe . . . . . .SPCRYO-DS

DC Probes





Dimensions for the AttoGuard DCP-HTR Tip and Standard DCP-HTR Probe Holder (in inches)

The DCP-HTR Probe Holder delivers fA-level measurement capability from -65°C to 300°C for state-of-the-art characterization and reliability testing. Its unique design offers superior guarding and shielding over temperature, overcoming the high-temperature performance limitations of standard coaxial needles.

Features

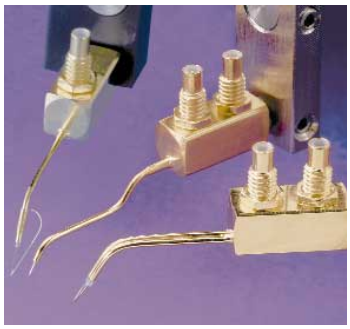
- High-quality construction with low-noise electrical performance
- Precision SSMC 50Ω connectors
- Replaceable microstrip probe tips
- Fully guarded measurements to fA and fF levels
- Individual connectors for force-sense connections

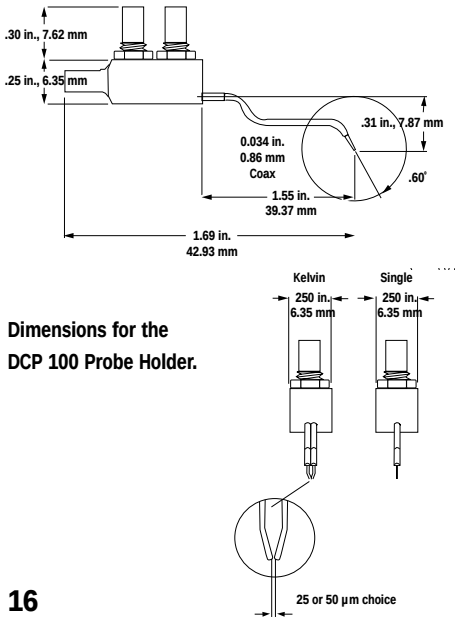
Advantages

- Ultra-low, fA and fF measurements from -65°C to 300°C
- Full electrical guard to the probe tip
- Integrally designed as part of Cascade's complete measurement solution
- Highly reliable, stable and repeatable

Part Number	Description
DCP-HTR	High performance DC probe holder
109-946	Standard (box of 10) DC probe points
118-945	AttoGuard (box of 10) DC probe points

For more information see: DCP-HTR Data sheet . . . . . .DCPHTR-DS





Dimensions for the DCP 100 Probe Holder.

The DCP100 Series Probe Holder delivers the measurement accuracy needed for advanced on-wafer process and device characterization and reliability testing. With superior guarding and shielding, these probes overcome the performance limitations of non-coaxial needle probes.

Features

- High-quality construction with low-noise electrical performance
- Kelvin version for convenient 4-point measurements
- Choice of tip radii
- SSMC 50Ω connectors
- Replaceable coaxial probe tips

Advantages

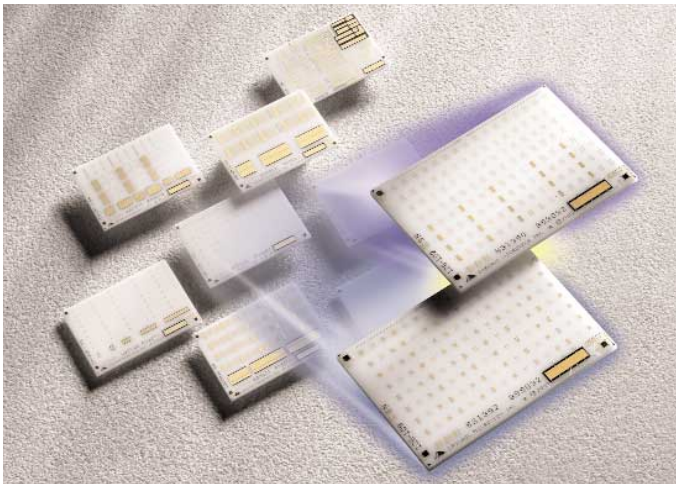
- Ultra-low, fA and fF measurements from -65°C to 150°C
- Full electrical guard to the probe tip
- Integrally designed as part of Cascade's complete measurement solution
- Highly reliable, stable and repeatable

Part Number	Description
DCP-105R	Probe holder, dual SSMC input with single replaceable 0.5 µm radius probe tip
DCP-115R	Probe holder, dual SSMC input with single replaceable 1.5 µm radius probe tip
*DCP-150K-25	Probe holder, dual SSMC input, dual 5 µm radius probe tips, 25 µm pitch
*DCP-150K-50	Probe holder, dual SSMC input, dual 5 µm radius probe tips, 50 µm pitch
107-159	Replaceable tips (Quantity 10), 0.5 µm tip radius
107-157	Replaceable tips (Quantity 10), 1.5 µm tip radius
107-158	Replaceable tips (Quantity 10), 5 µm tip radius

* Dual-tip Kelvin coaxial probes (non-replaceable tips)

For more information see: DCP100 Data sheet DCP100-DS

Supporting Accessories

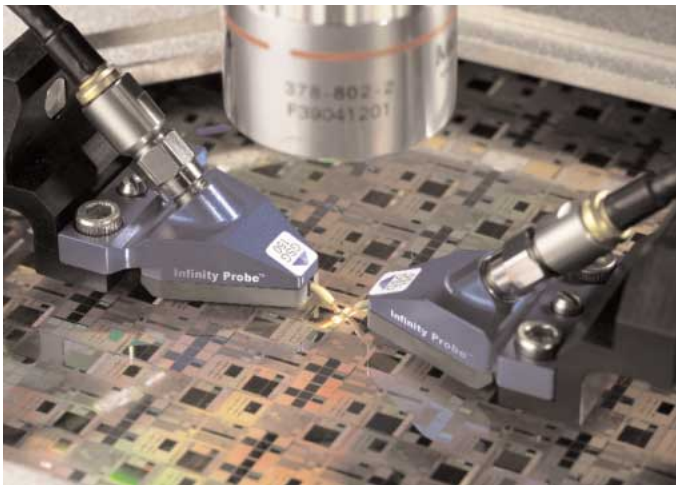


Impedance Standard Substrates

Cascade Microtech's family of Impedance Standard Substrates (ISS) support all of your high-frequency probing applications. Using them ensures greater accuracy and better repeatability in on-wafer calibration of vector network analyzers. Only Cascade Microtech offers the proven accuracy of LRRM calibrations with automatic load inductance compensation.

ISS	Part #	Pitch
General Purpose	005-016	various
GSG	101-190	100-250 µm
GS/SG	103-726	100-250 µm
W-band GSG	104-783	100-250 µm
Narrow pitch GSG	104-909	50-150 µm
Wide pitch GSG	106-682	250-1250 µm
Wide pitch GS/SG	106-683	250-1250 µm
Right angle GSG	109-531	100-500 µm

ISS	Part #	Pitch
High performance, GSG	114-456	100-150 µm
GSGSG	126-102	150 µm
GSSG	126-109	100-150 µm
GSGSG	129-239	100-125 µm
GSGSG	129-240	150-225 µm
GSGSG	129-241	250 µm
Absorbing ISS holder	116-344	NA
Surrogate chip kit	SCK-999	NA



Cables and Adapters

Cascade's range of low-loss, thermally stable cables ensure higher quality measurements and longer lasting calibrations. Each cable has a male connector at one end that connects to the probe and a female connector at the other end to connect to the test instrumentation. For vertical style probes, the male connector includes an integrated 90° elbow.

Cables

Frequency	Connector	Part #
DC - 40 GHz	2.92 mm	101-162*
		124-084**
DC - 50 GHz	2.4 mm	103-202*
		124-085**
DC - 67 GHz	1.85 mm	104-540*
		124-090**
DC - 110 GHz	1.0 mm	consult factory

* Used for vertical style probes

**Used for angle style probes

Adapters	Part #
BNC male - SMA female	103-290
2.4 mm 90° elbow	105-010
2.4 mm f - 2.92 mm male	105-097
Waveguide, W band, 6 in.	104-837
Waveguide, W band, 90°	104-838

Supporting Software



Total on-wafer microwave measurement solution:
Cascade S300 probe system with Agilent Technologies PNA

Not just probes but a complete solution

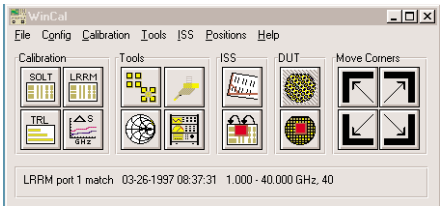
To ensure successful measurements from probe tip to VNA, rely on Cascade Microtech for a complete on-wafer RF/Microwave test solution. Selecting the correct accessories for use with the probe station and probes is critical to ensure a total solution. Measurement and calibration software, calibration standards, cables and adapters are all available. A list of data sheets, application notes and ordering guides are provided in the next section to help you make the right choice for your application.

WinCal VNA Calibration Software

WinCal VNA software is an integral part of a complete microwave probing solution from Cascade Microtech. It provides the simplest, most complete and repeatable network analyzer on-wafer calibrations. One-step pad parasitic removal routines are provided, along with the ability to monitor system drift and perform quick, convenient recalibration.

WinCal Features:

- Automatically steps you through NIST-verified LRRM calibration method
- Conveniently retrieves calibration coefficients for probes
- Reads, displays and stores S-parameters in Touchstone file format
- Quickly locates, displays and archives measurement data
- Supports Agilent (HP) and Anritsu (Wiltron) VNAs



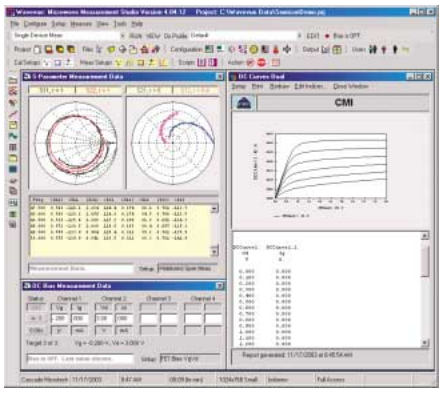
WinCal for:	Part #
Summit semiautomatic and S300 stations	125-115
Summit manual and other probe stations	125-116

Wavevue Measurement Studio™

Wavevue is a measurement application software package that integrates all of the tasks of test setup, measurement and data collection, report setup and generation, data analysis and data archiving. Wavevue becomes the basis for wide productivity improvements in all phases of device characterization.

Measurement Capability

- S-parameters of 1 and 2 port active or passive devices
- Automated DC biasing of active devices, DC curves
- IV (Gummels, forward and reverse breakdowns)
- CV measurements versus bias, frequency, AC signal level
- Temperature control
- Wafer Stepping
- Instant report generation and export
- Data Manager (Compare data from different measurement sessions)
- Transfer data to IC-CAP software (MDM format) for model extraction



For more information see: ISS Series of Impedance Standard Substrates . . . .ISS-DS
WinCal Calibration Software . . . . . .WINCAL-DS
Wavevue Measurement Studio Software Solution . . . . . .WAVEVUE-DS

Associated Literature by Application

On-wafer RF probing

A Probe Technology for 110+GHz Integrated Circuits w/ Aluminum . . . . . .ALPADS-APP
Benefits of Using the New Infinity Probe on Devices with Aluminum Pads . . . .INFGOLD-APP
Care and Cleaning of coaxial input microwave probes PROBE990
Comparison between Beryllium-Copper and Tungsten
High Frequency Air Coplanar Probes AR125
Cryogenic On-Wafer Measurement Techniques to 18K TB8
High-Frequency, Over-Temperature Measurements TB7-694
High-Frequency, Over-Temperature Measurements and Modeling 10600AP
Layout Rules for GHz Probing LAYOUT19
Multiport Differential Characterization . . . . . .DIFF-SOL
On Wafer Vector Network Analyzer Calibration and measurements . . . . . .ONWAFER
On-Wafer Probes Test Si ICs to 110 GHz AR-134
Network Analysis Probes New Territory AR-135
Recommended cleaning procedures for Infinity Probes 131-355

Module and Package probing

Accurate Measurements of High-Speed Package and Interconnects IEEE1988
MCM Test Point Design Rules TPDR292
Microprobing Essentials for Fine-Pitch Modules . . . . . .MEFPM

Special purpose probing

Impedance Matching Probes for Wireless Applications AR126
Layout Rules for WPH-900 Series Probes LAYOUT89
On-Wafer Photodiode Measurements
with a Lightwave Component Analyzer System AR99
VNA Calset Port Augmentation for Impedance Matching Probe . . . . . .CALSET-APP

Calibration

An SOLR Calibration for Accurate Measurements
of Orthogonal on Wafer DUTs AR122
Comparing the Accuracy and Repeatability
of On-Wafer Calibration Techniques to 110 GHz AR132
LRM and LRRM Calibrations with Automatic Determination
of Load Inductance AR114
On-Wafer Multiport Calibration Using the ENA Series Network Analyzer
with Cascade Microtech Probe System . . . . . .ENA-Multiport-APP
Planar Impedance Standards and Considerations in Vector Network Analysis . .J1988
Proper Infinity Probe Alignment on Various ISS . . . . . .INFISS-APP
Sensitivity Analysis of Calibration Standards for SOLT and LRRM . . . . . .SOLT-LRRM-APP
Technique Verifies LRRM Calibrations on GaAs Substrates TB6
Vector Network Analyzer Calibration with Surrogate Chip TB5
Verification of LRRM Calibrations with Load Inductance Compensation
for CPW Measurements on GaAs Substrates AR117

Supporting software

Enterprise Software for RF Device Characterization AR136
Summit Labview Integration Toolkit . . . . . .LABVIEW-APP
WinCal User's Guide (CD) 125-114

Q&A Documents

Turnkey On-Wafer Millimeter-Wave Device Characterization Solution . . . . . .MMWAVE-QA
The Infinity Probe for On-Wafer Device Characterization &
Modeling to 110 GHz . . . . . .INFINITY-QA
On-Wafer Differential/Multiport Characterization Solution . . . . . .DIFF-QA
Wavevue Measurement Studio Software for On-Wafer
Device Characterization . . . . . .WAVEVUE-QA

Probe Quick Finder

Application:	Probe . . . Page	Infinity Probe . . 2	ACP 5	ACP-RC 5	ACP-L 5	ACP-Z 13	ACP Dual 5	ACP-Q 8	DC-Q 10	Eye-Pass 9	FPC 11	FPM 12	WPH-9XX . . . 10	LWP 14
40 GHz		X	X	X	X	X	X	X		3	X			
50 GHz		X	X	X	X		X	X						
67 GHz		X	X	X	X		X	X						
110 GHz		X	X	X	X		X	X						
DC only									X	X			X	
Au pads		X	X	X	X	X	X	X	X	X	X	X	X	4
Al pads		X	W	W	W	W	W	W	W	W	W		W	4
Rc < 0.05 Ohms		X												
S parameters		X	X	X	X		X	X						
TDR		X	X	X	X	X	X	X			X	X		
Differential		X	X				X	X						
Load pull					X	X					X			
Noise parameters		X	X	X	X	X								
Mixed signal								X						
Electro-optic		X	X	X	X			X						X
Wafer measurements		X	X	X	X	X	X	X	X	X	X	X	X	X
Module measurements								X			X	X		X
PCB measurements											X	X		X
250µm<Pitch<1250µm			X					X			X	X	X	
1250µm<Pitch<3000µm			X					X			X	X	X	
MicroChamber		X	X	X	X	X	X	X	X	X				X
Waveguide			X	X										
RF bypass			X	X				X	X	X				
Impedance matching						X						X		

Notes:

1. X indicates compatibility.
2. W indicates Tungsten tip required for compatibility.
3. RF bandwidth 500 MHz, effective power by-passing to 20 GHz.
4. Pad not required.
5. ACP, FPC, or FPM should be used for applications where probe tip compliance of greater than 1 µm is required.
6. If in doubt about application compatibility, please consult Cascade Microtech.

CASCADE® MICROTECH

Innovating Test Technologies™ for better measurements faster

Cascade Microtech, Inc., 2430 NW 206th Avenue,
Beaverton, Oregon 97006, USA
Toll Free: 1-800-550-3279
Phone: 503-601-1000 Fax: 503-601-1002
Europe: +44 1295-812828 Japan: 03-5478-6100
Email: sales@cmicro.com www.cascademicrotech.com

Copyright © 2003 Cascade Microtech, Inc.MicroChamber, FemtoGuard, AttoGuard, Air Coplanar, EZ Probe, Eye-Pass, Infinity Probe and the Cascade Microtech logo are trademarks of Cascade Microtech, Inc. All other trademarks are the property of their respective owners. All specifications subject to change.

Agilent Technologies
Channel Partner

RFPSG-1103
Data subject to change without notice