Probe
Selection Guide

More than 50 different probing solutions for wafer, package, and board level characterization.

Cascade Microtech offers a wide selection of engineering probes to meet the highly demanding and broad range of on-wafer and signal integrity applications.

Our families of RF, mixed-signal and DC probes are designed to meet the many challenges of the various probing environments and provide a durable, high-performance product that exceeds expectations.

CascadeMicrotech®

TABLE OF CONTENTS

PROBE FAMILY OVERVIEW

Cascade Microtech offers a wide selection of engineering probes to meet the highly demanding and broad range of on-wafer and signal integrity applications. Our families of RF, mixed-signal and DC probes are designed to meet the many challenges of the various probing environments and provide a durable, high-performance product that exceeds expectations.

Infinity Probes

The Infinity Probe is an ideal match for device characterization and modeling and differential applications, with industry-leading performance. The Infinity Probe provides unmatched performance in both single-signal and dual-signal (differential) applications, providing extremely low contact resistance on aluminum pads with unsurpassed RF measurement accuracy for highly reliable, repeatable measurements. The Infinity Probe is designed for on-wafer/planar surface work only. Proprietary thin-film and coaxial probe technology reduces unwanted couplings to nearby devices and transmission modes. (page 9)

Air Coplanar Probes

The Air Coplanar Probe (ACP) is a rugged microwave probe with a compliant tip for accurate, repeatable measurements for both on-wafer as well signal integrity applications. It features excellent probe-tip visibility and the lowest loss available. Configurations for both single and dual signal applications are available. The ACP probe combines outstanding electrical performance with precise probe mechanics and is today's most widely used microwave probe available. (page 13)

|Z| Probes

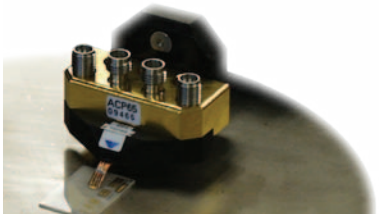
The |Z| Probes assure long probe lifetime and accurate measurements with superior tip compliance. The RF/Microwave signal makes only one transition to the coplanar contact structure within the shielded, air-isolated probe body maintaining signal integrity over a temperature range from 10 K to 300 °C. (page 16)

RFIC and Functional Test (multi-contact) Probes

Cascade Microtech offers a variety of durable, high-performance mixed-signal multi-contact probes to streamline RFIC engineering test and production applications up to 110 GHz. The multi-contact probe families include InfinityQuad Probe, Multi |Z| Probe, Unity Probe, ACP RF quadrant probe, Eye-Pass probe, DCQ and WPH probes. (page 17)

Board Test and Signal Integrity Probes

Cascade Microtech offers precision, durable fine-pitch probes, ideal for signal integrity probing on IC packages and circuit board work. Many of these probes allow for deep reach capabilities to access contacts over adjacent components. Probes are available to meet the performance requirements of both circuit work or material characterization. (page 23)



Special-purpose RF/microwave Probes

Cascade Microtech offers many custom probes, so if an exact match is not found in this guide, please contact us for a review to determine if we have a probe that will fit your requirements or if we can customize a probe to fit your application. Some example applications/probes are (page 25):

- Impedance matching probe
- High-performance quadrant probe
- Cryogenic probe
- Balun probe

Production Probe Cards for Parametric and Functional Test

Pyramid Probe® cards are rugged, robust, and well suited for the rigors of high-performance production wafer sort. Industry-leading signal integrity and mechanical alignment capabilities make these probe cards the perfect fit for multi-die testing for RF wireless, millimeter wave, RF, and high-speed digital in SiPs, SoCs, and leading edge DC and RF Parametric testing. Pyramid probe cards are not specifically covered in this guide. Please visit the Production Probes section on the Cascade Microtech website or contact a local sales representative for information on Pyramid Probe cards.

Quick Probe Selection Guide: RF Probes

			|Z| Probes		Infinity			ACP		
Key Specifications			Single	Dual	Single	Dual	Waveguide	Single	Dual	Waveguide
Maximum Frequency			67 GHz	50 GHz	110 GHz	110 GHz	500 GHz	110 GHz	110 GHz	140 GHz
Minimum Pad Size			50x50 µm	50x50 µm	25x35 µm	25x35 µm	25x35 µm	80x80 µm	80x80 µm	80x80 µm
Typical Raw Insertion Loss @ 40 GHz			0.8 dB	0.8 dB	0.7 dB	0.9 dB	NS	1.0/0.6 dB[3]	1.25 dB	NS
Compliance			50/300 µm[1]	50 µm	1 µm	1 µm	1 µm	25 µm	25 µm	25 µm
Standard Pitch Range			50-1250 µm	100-500 µm	50-250 µm	100-250 µm	50-150 µm	100-1250 µm	100-500 µm	100-250 µm
Maximum DC Current			1.5 A	1.5 A	0.5/2 A[4]	0.5 A	0.5 A	5 A	5 A	0.5 A
Maximum RF Power @ 2 GHz			15/65 W[2]	15 W	37 dBm	37 dBm	NS	30 W	30 W	NS
Typical Lifetime on Al Pads			>1,000,000	>1,000,000	>250,000	>250,000	>250,000	>500,000	>500,000	>500,000
Maximum Temperature			300° C	200° C	125° C	125° C	125° C	200° C	200° C	200° C
Typical Contact Resistance on Al			50 mΩ	50 mΩ	30 mΩ	30 mΩ	30 mΩ	100 mΩ	100 mΩ	100 mΩ
Device Modeling and Characterization - Si	2-Port S-Parameter Measurements	DC-67 GHz	◐	NR	●	NR	NR	○	NR	NR
		67-110 GHz	NR	NR	●	NR	NR	○	NR	NR
		110-500 GHz	NR	NR	NR	NR	●	NR	NR	NR
	Differential S-Parameter Measurements	DC-67 GHz	NR	◐	NR	●	NR	NR	○	NR
		67-110 GHz	NR	NR	NR	●	NR	NR	○	NR
	Load-Pull Measurements	DC-67 GHz	●	NR	◐	NR	NR	○	NR	NR
		67-110 GHz	NR	NR	●	NR	◐	○	NR	○
		110-500 GHz	NR	NR	NR	NR	●	NR	NR	to 140 GHz
Device Modeling and Characterization - GaAs	2-Port S-Parameter Measurements	DC-67 GHz	◐	NR	◐	NR	NR	●	NR	NR
		67-110 GHz	NR	NR	◐	NR	NR	●	NR	NR
		110-500 GHz	NR	NR	NR	NR	●	NR	NR	NR
	Differential S-Parameter Measurements	DC-67 GHz	NR	◐	NR	◐	NR	NR	●	NR
		67-110 GHz	NR	NR	NR	◐	NR	NR	●	NR
	Load-Pull Measurements	DC-67 GHz	●	NR	◐	NR	NR	◐	NR	NR
		67-110 GHz	NR	NR	◐	NR	NR	●	NR	WG 50-110 GHz
		110-500 GHz	NR	NR	NR	NR	140-500 GHz	NR	NR	WG 110-140 GHz
Production Testing - RF Discrete Devices	Al Pads	DC-67 GHz	●	For multi-port	◐	◐	NR	NR	NR	NR
		67-110 GHz	NR	NR	●	For multi-port	NR	NR	NR	NR
		110-500 GHz	NR	NR	NR	NR	●	NR	NR	NR
	Au Pads	DC-67 GHz	●	For multi-port	○	○	NR	◐	◐	NR
		67-110 GHz	NR	NR	○	○	NR	●	For multi-port	NR
		110-500 GHz	NR	NR	NR	NR	○	NR	NR	WG 110-140 GHz
PCB Board Test	Single Signal	DC-67 GHz	●	NR	NR	NR	NR	◐	NR	NR
		67-110 GHz	NR	NR	NR	NR	NR	●	NR	NR
		110-500 GHz	NR	NR	NR	NR	NR	NR	NR	WG 110-140 GHz
	Multi-port/ Differential	DC-67 GHz	NR	●	NR	NR	NR	NR	◐	NR
		67-110 GHz	NR	NR	NR	NR	NR	NR	●	NR

[1] For |Z| Probe PCB
[2] For high-power |Z| Probe
[3] For low-loss ACP probe
[4] For high-current Infinity Probe

● = Best (Recommended) ◐ = Good ○ = Acceptable NR = Not Recommended

Quick Probe Selection Guide: Mixed-Signal / Multi-Contact Probes

				Key Features	InfinityQuad	Multi |Z|	Unity	ACP-Q	|Z| Probe HF ProbeWedge™
				Maximum Number Contacts	25	35	12	16	12
				Maximum Frequency	110 GHz	15 GHz	20 GHz	110 GHz	67 GHz
				Maximum Number RF Signals	25	16	8	3	2
				Smallest Pad Size	30x50 µm	60x60 µm	70x70 µm	80x80 µm	80x80 µm
				Power De-coupling	Eye-Pass	On-board	Eye-Pass	On-Tip	On-Tip
				Non-Uniform Pitch	No	Yes	No	Yes	Yes
				Maximum Temperature	125° C	200° C	125° C	125° C	125° C
				Configurable	Yes	No	Yes	No	No
				Online Design Capture	Yes	No	Yes	No	No
IC Test Engineering	Characterization and Verification	Uniform Pitch	<20 GHz		◐	◐	●	○	○
			>20 GHz		●	NR	NR	○	○
		Non-Uniform Pitch	<20 GHz		NR	●	NR	◐	◐
			>20 GHz		NR	NR	NR	●	◐
	Failure Analysis and Design Debug	Uniform Pitch	<20 GHz		◐	◐	●	○	○
			>20 GHz		●	NR	NR	○	○
		Non-Uniform Pitch	<20 GHz		NR	●	NR	◐	◐
			>20 GHz		NR	NR	NR	●	◐
Production Test	Pre-Production	Uniform Pitch	<20 GHz		◐	◐	●	○	○
			>20 GHz		●	NR	NR	○	○
		Non-Uniform Pitch	<20 GHz		NR	●	NR	◐	◐
			>20 GHz		NR	NR	NR	●	◐
	Small Scale Production	Uniform Pitch	<20 GHz		◐	◐	●	○	○
			>20 GHz		●	NR	NR	○	○
		Non-Uniform Pitch	<20 GHz		NR	●	NR	◐	◐
			>20 GHz		NR	NR	NR	◐	●
	Large Scale Production	Uniform Pitch	<20 GHz		◐	●	◐	○	○
			>20 GHz		●	NR	NR	○	○
		Non-Uniform Pitch	<20 GHz		NR	●	NR	◐	◐
			>20 GHz		NR	NR	NR	◐	●
Application Specific	Small Pads and Scribe-Street Devices	Uniform Pitch	<20 GHz		●	NR	NR	NR	NR
			>20 GHz		●	NR	NR	NR	NR
		Non-Uniform Pitch	<20 GHz		NR	Recommend uniform pitch pads	NR	NR	NR
			>20 GHz		NR	NR	NR	NR	NR
	mm-Wave Complex IC test (Wireless HDMI, Automobile Radar)	Uniform Pitch	—		●	NR	NR	◐	NR
		Non-Uniform Pitch	—		NR	NR	NR	Recommend uniform pitch pads	NR
	PCB Board Test	Uniform Pitch	<20 GHz		NR	●	○	◐	◐
			>20 GHz		NR	NR	NR	◐	●
		Non-Uniform Pitch	<20 GHz		NR	●	NR	◐	◐
			>20 GHz		NR	NR	NR	◐	●
	Package Device Probing	Uniform Pitch	<20 GHz		NR	●	○	◐	◐
			>20 GHz		NR	NR	NR	◐	●
		Non-Uniform Pitch	<20 GHz		NR	●	NR	◐	◐
			>20 GHz		NR	NR	NR	◐	●

● = Best (Recommended) ◐ = Good ○ = Acceptable NR = Not Recommended

Quick Probe Selection Guide: DC Multi-Contact Probes

				Key Features	Eye-Pass	DCQ	WPH-900	Multi |Z|	ProbeWedge WE	ProbeWedge WD
				Maximum Number Contacts	12	16	12	35	16	40
				Power De-coupling	Eye-Pass	On tip blade	On tip blade	On-board	On tip blade	On-board
				Maximum Current	1 A	500 mA	500 mA	1 A	100 mA	100 mA
				Maximum Voltage	50 V	50 V	50 V	100 V	50 V	50 V
				RF Bandwidth	500 MHz	500 MHz	500 MHz	500 MHz	500 MHz	50 MHz
				Contact Life	>250,000	>250,000	>250,000	>1,000,000	>250,000	>250,000
				Smallest Pad Size	80x80 µm	80x80 µm	80x80 µm	60x60 µm	80x80 µm	80x80 µm
				Non-Uniform Pitch	No	Yes	Yes	Yes	Yes	Yes
				Maximum Temperature	125° C	125° C	125° C	200° C	125° C	125° C
				Online Design Capture	Yes	No	No	No	No	No
IC Test Engineering	Simple IC Bias and Control	Uniform Pitch	<16 contacts		◐	●	●	◐	●	◐
			>16 contacts		NR	NR	NR	◐	NR	●
		Non-Uniform Pitch	<16 contacts		NR	●	●	◐	●	◐
			>16 contacts		NR	NR	NR	◐	NR	●
	Characterization and Verification	Uniform Pitch	<16 contacts		●	◐	◐	◐	◐	○
			>16 contacts		NR	NR	NR	●	NR	◐
		Non-Uniform Pitch	<16 contacts		NR	◐	◐	●	◐	○
			>16 contacts		NR	NR	NR	●	NR	◐
	Failure Analysis and Design Debug	Uniform Pitch	<16 contacts		●	◐	◐	◐	◐	○
			>16 contacts		NR	NR	NR	●	NR	◐
		Non-Uniform Pitch	<16 contacts		NR	◐	◐	●	◐	○
			>16 contacts		NR	NR	NR	●	NR	◐
Production Test	Pre-Production	Uniform Pitch	<16 contacts		●	◐	◐	◐	◐	○
			>16 contacts		NR	NR	NR	●	NR	◐
		Non-Uniform Pitch	<16 contacts		NR	◐	◐	●	◐	○
			>16 contacts		NR	NR	NR	●	NR	◐
	Small Scale Production	Uniform Pitch	<16 contacts		◐	◐	◐	●	◐	○
			>16 contacts		NR	NR	NR	●	NR	◐
		Non-Uniform Pitch	<16 contacts		NR	◐	◐	●	◐	○
			>16 contacts		NR	NR	NR	●	NR	◐
	Large Scale Production	Uniform Pitch	<16 contacts		◐	◐	◐	●	◐	○
			>16 contacts		NR	NR	NR	●	NR	◐
		Non-Uniform Pitch	<16 contacts		NR	◐	◐	●	◐	○
			>16 contacts		NR	NR	NR	●	NR	◐

● = Best (Recommended) ◐ = Good ○ = Acceptable NR = Not Recommended

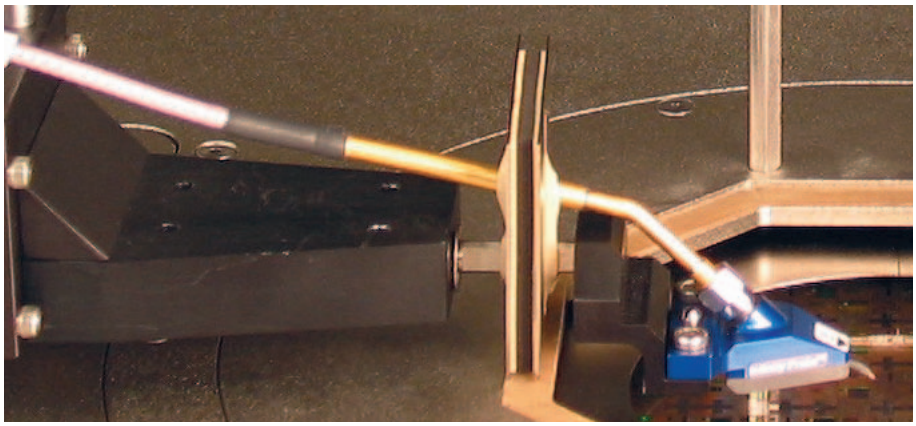
QUICK SELECTION GUIDE: FREQUENCY RANGE AND PERFORMANCE

The best case or maximum frequency range achievable for any given probe is determined by its connector and cable types. Beyond this, the probe tip configuration and pitch are other primary attributes that further limit the usable frequency range. Note that single coaxial probes achieve the best RF performance with a GSG tip configuration and a tip pitch from 75 µm to 250 µm. Above 50 GHz, the optimum performance is achieved with a tip pitch from 100 µm to 150 µm. For dual coaxial probes, the optimum tip configuration is GSGSG and the same probe tip pitch ranges. Cascade Microtech recommends that consideration be given to testability when laying out the pad locations to attain optimum performance.

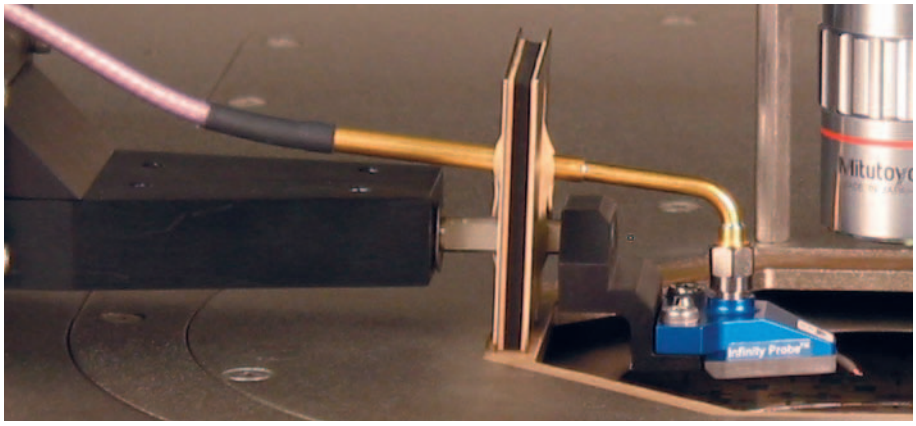
Connector (Max. frequency)	**Probe Body Style**	**Probe**
Gore 100 (20 GHz)	Unity probe	Unity Probe
2.92 mm/K(40 GHz) Compatible with SMA (20 GHz), 3.5 mm (26 GHz)	Vertical	i40 / ACP40
	Angled	i40-A / ACP40- A
2.4 mm (50 GHz)	Vertical	i50 / ACP50
	Angled and Low-loss version	i50-A / ACP50- A
1.85 mm (67 GHz)	Vertical	i67 / ACP65
	Angled and Low-loss version	i67-A / ACP65- A
1.0 mm (110 GHz)	Vertical	i110 / ACP110
	Angled	i110-A / ACP110- A

Notes:

1. Cascade probes use the 2.92 mm / K connector which is compatible with SMA and 3.5 mm, however it is recommended to use a 2.92 mm cable if possible.
2. ACQ probes use the corresponding connector and cable to match your frequency requirements, e.g., ACP-Q-50-xx-xx uses a RF probe with a 2.4 mm connector.



Angled probe body style



Vertical probe body style

INFINITY PROBES

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

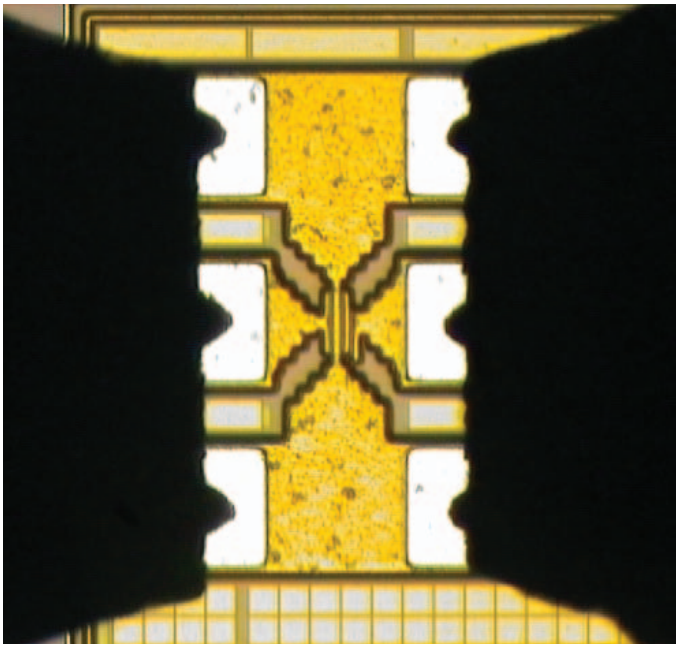
The Infinity Probe sets the benchmark for the device characterization and modeling community. This revolutionary probe combines extremely low contact resistance on aluminum pads with unsurpassed RF measurement accuracy to provide highly reliable, repeatable measurements. The Infinity Probe reaches this new performance level through the combination of Cascade Microtech's proprietary thin-film technology and coaxial probe technology.

Features

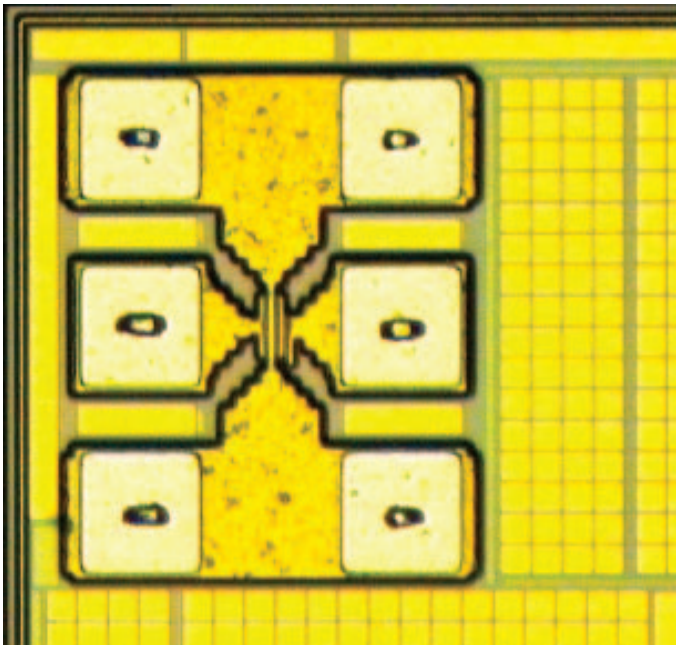
- Lithographic thin-film construction
- Excellent crosstalk characteristics
- Non-oxidizing nickel alloy tips
- Innovative force delivery mechanism
- 40 to 325 GHz versions
- GSG, SG/GS, GSGSG, GSSG, SGS configurations
- Probe pitch as narrow as 50 µm
- High current (2 A) version available

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 Ω on Al, < 0.02 Ω on Au
- Save valuable wafer space and reduce pad parasitics by being able to shrink pad geometries to 25 x 35 µm (best case)
- Reduction in modeling and design cycle time



Excellent tip visibility Infinity Probe contacting Silicon RF device



Small contact marks enable contact to small pads

INFINITY PROBES

Contact configuration	GSG, SG, GS	Connector	GSGSG, GSSG, SGS
Frequency range for coaxial probes	i40 – DC to 40 GHz i50 – DC to 50 GHz i67 – DC to 67 GHz i110 – DC to 110 GHz (GSG only)	i40 - 2.92 mm i50 - 2.4 mm i67 - 1.85 mm i110 - 1 mm	i40 i50 i67 i110
Typical insertion loss (GSG, GSGSG versions only)			
DC to 40 GHz	0.7 dB		0.9 dB
40 to 50 GHz	0.8 dB		0.9 dB
50 to 67 GHz	1.1 dB		1.2 dB
67 to 110 GHz	1.4 dB		1.6 dB
Typical return loss (GSG, GSGSG versions only)			
DC to 40 GHz	20 dB		15 dB
40 to 50 GHz	17 dB		15 dB
50 to 67 GHz	16 dB		13 dB
67 to 110 GHz	14 dB		11 dB
Crosstalk	-50 dB @ 50 GHz		Typically -40 dB @ 40 GHz; GSGSG 150 Typically -25 dB @ 40 GHz ; GSSG 150
Electrical repeatability	-60 dB		-60 dB
Probe pitch (25 µm increments)	50 to 250 µm pitch (i40, i50 and i67) 50 to 150 µm pitch (i110)		100 to 250 µm pitch -
Recommended overtravel	75 µm		75 µm
Max safe overtravel	150 µm		150 µm
Contact life	> 500,000		> 500,000
Max. DC current	500 mA (2 A for -HC version)*		500 mA
Thermal range	-65 to 125ºC		-65 to 125ºC
Rc on aluminum (gold)	Typically < 0.05 Ω (< 0.02 Ω)		Typically < 0.05 Ω (< 0.02 Ω)
Rc variation during one 5-hour single contact cycle**	10 mΩ		10 mΩ
Min. probe pad size	25 x 35 µm (best case)		25 x 35 µm (best case)

***High current (2 A) version available up to 67 GHz (GSG only).**
****Specifications applicable at 25°C operating temperature on clean aluminum.**

Recommended Impedance Standard Substrates

Freq (GHz)	Config	Pitch	Part No.
DC to 40 DC to 50 DC to 67*	GSG	100 to 250	101-190
	GS/SG	100 to 250	103-726
	GSGSG, SGS	100 to 125	129-239
		150 to 225	129-240
		250	129-241
	GSSG	100 to 150	129-246
		200 to 250	129-247
DC to 110*	GSG	100 to 150	104-783
DC to 325*	GSG	50 to 75	138-356
DC to 325*	GSG	100 to 150	138-357

***Use of absorbing auxiliary chuck or absorbing ISS holder (p/n 116-344) recommended**

Cables for Use with Infinity Probes

Freq (GHz)	Probe station	Body style	Length	Part number
DC to 40 (2.92 mm connector)	Summit™ 11K/12K, S300	A	48 inch	132-423
		V	48 inch	132-420
	M150, RF-1,9K, no MicroChamber	A	48 inch	124-084-B
		V	48 inch	101-162-B
DC to 50 (2.4 mm connector)	Summit 11K/12K, S300	A	48 inch	132-424
		V	48 inch	132-421
	M150, RF-1,9K, no MicroChamber	A	48 inch	124-085-B
		V	48 inch	103-202-B
DC to 67 (1.85 mm connector)	Summit 11K/12K, S300	A	36 inch	132-425
		V	36 inch	132-422
	M150, RF-1,9K, no MicroChamber	A	36 inch	124-606-B
		V	36 inch	124-605-B
DC to 110 (1 mm connector)	Summit 11K/12K, S300	A, V	18 cm	132-458
	Elite300™	A, V	24 cm	147-316

'A' denotes 45º angled coaxial connector body style.
'V' denotes vertical coaxial connector body style.
Dual Infinity probe is "V" style only.

WAVEGUIDE INFINITY PROBES

For each rectangular waveguide designation there are two different probe models.

The "T" models are designed to be compatible with Cascade Microtech's Summit 11000/12000, S300 and Elite 300 probing stations.

These models are also top-hat compatible when used with top hat PNs 116-441 and 115-164.

The "S" probe models are compatible with Cascade Microtech's 150mm probing stations.

All models are available without a bias tee.

For Elite300 version waveguide, consult with Cascade Microtech or your local representative for compatibility.

	Body style "T" (tall)	Body style "S" (short)
Waveguide designator (Frequancy range)		
WR3 (220 to 325 GHz)	i325-T-GSG-xxx-BT	i325-S-GSG-xxx-BT
WR5 (140 to 220 GHz)	i220-T-GSG-xxx-BT	i220-S-GSG-xxx-BT
WR6 (110 to 170 GHz)	i170-T-GSG-xxx-BT	i170-S-GSG-xxx-BT
WR8 (90 to 140 GHz)	i140-T-GSG-xxx-BT	i140-S-GSG-xxx-BT
WR10 (75 to 110 GHz)	i110-T-GSG-xxx-BT	i110-S-GSG-xxx-BT
WR12 (60 to 90 GHz)	i90-T-GSG-xxx-BT	i90-S-GSG-xxx-BT
WR15 (50 to 75 GHz)	i75-T-GSG-xxx-BT	i75-S-GSG-xxx-BT
Typical insertion loss / return loss		
i325	6.2 dB / 13 dB	4 dB / 13 dB
i220	5.2 dB / 13 dB	4 dB / 13 dB
i170	4.7 dB / 13 dB	4 dB / 13 dB
i140	3.1 dB / 13 dB	3 dB / 13 dB
i110	2.6 dB / 13 dB	2 dB / 13 dB
i90	2.6 dB / 13 dB	2 dB / 13 dB
i75	2.1 dB / 13 dB	1.5 dB / 13 dB
Electrical repeatability	-60 dB	-60 dB
Probe pitch (25 µm increments)	50 to 100 µm (WR3, WR5, WR6, and WR8) 50 to 150 µm (WR10, WR12, and WR15)	50 to 100 µm (WR3, WR5, WR6, and WR8) 50 to 150 µm (WR10, WR12, and WR15)
Recommended overtravel	25 to 50 µm	25 to 50 µm
Maximum safe overtravel	100 µm	100 µm
Contact life	> 200,000	> 200,000
Maximum DC current	500 mA	500 mA
Thermal range	-65 to 125ºC	-65 to 125ºC
Rc on almunium	Typically < 0.05Ω	Typically < 0.05Ω
Rc on gold	Typically < 0.02Ω	Typically < 0.02Ω
Rc variation during one 5-hour single contact cycle*	10 mΩ	10 mΩ
Minimum probe pad size	25 x 35 µm (best case)	25 x 35 µm (best case)

***Specifications applicable at 25°C operating temperature on clean aluminum.**

Recommended Impedance Standard Substrates

Model	Config	Pitch	Part No.
WR3* WR5* WR6* WR8* WR10* WR12* WR15*	GSG	50 to 75 100 to 150	138-356 138-357

***Use of absorbing auxiliary chuck or absorbing ISS holder (p/n 116-344) recommended**

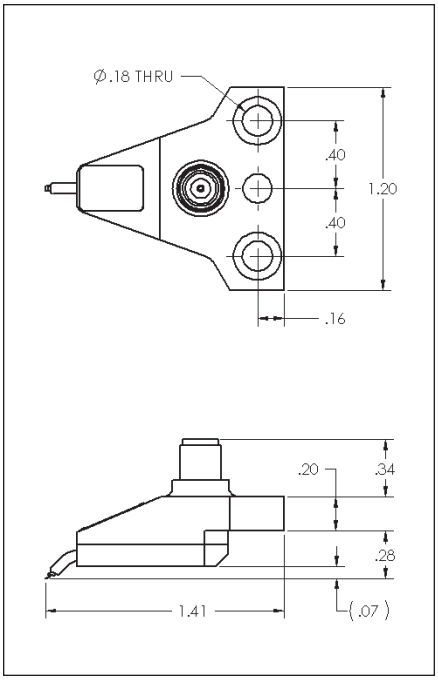
Waveguide Sections for Use with Waveguide Infinity Probes

*For Elite 300 version waveguide, consult with Cascade Microtech for compatibility.

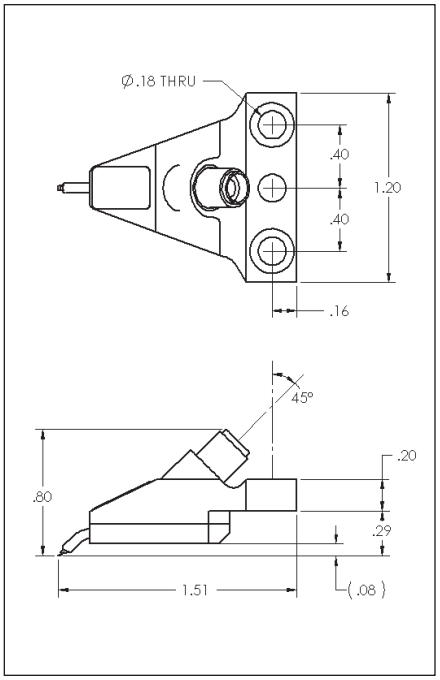
Waveguide "T" Model	Waveguide S-Bend section
WR3	147-309 (147-310 for Elite 300)
WR5	133-994
WR6	133-995
WR8	133-996
WR10	133-997
WR12	133-998
WR15	133-999

Waveguide "S" Model	Waveguide S-Bend section
WR3	144-399
WR5	133-988
WR6	133-989
WR8	133-990
WR10	133-991
WR12	133-992
WR15	133-993

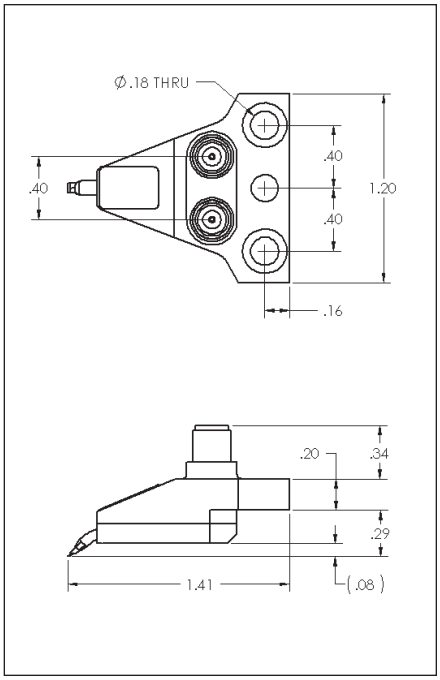
INFINITY PROBES



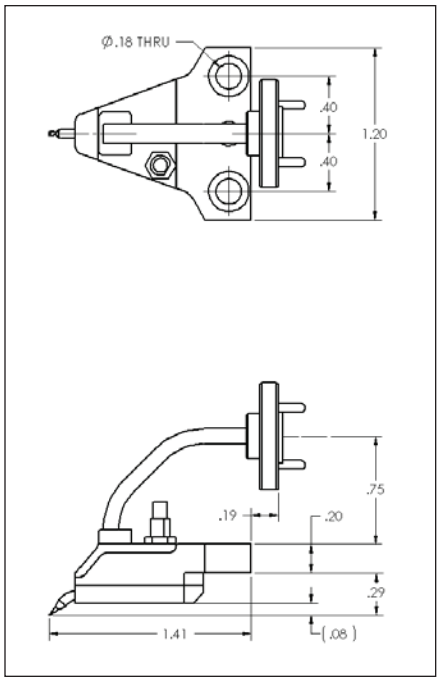
Infinity Probe, vertical body style

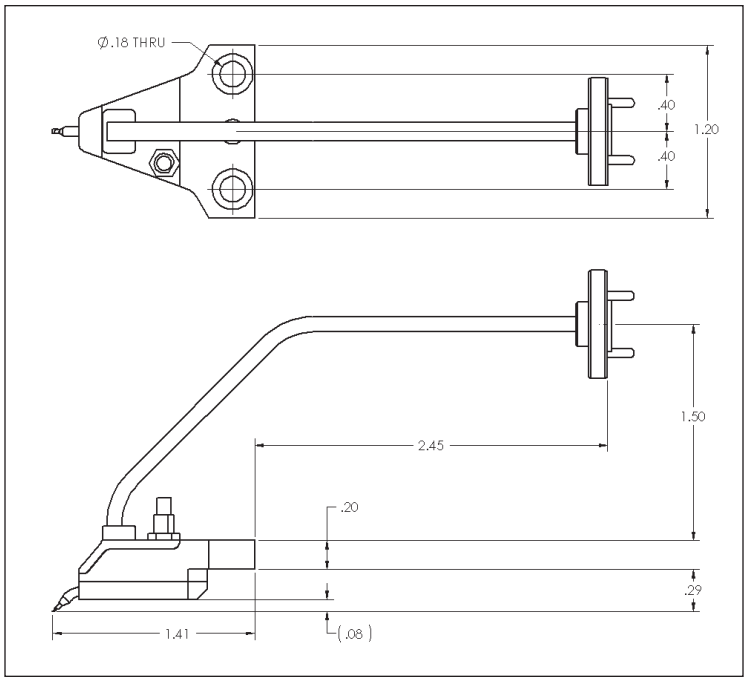


Infinity Probe, angled body style

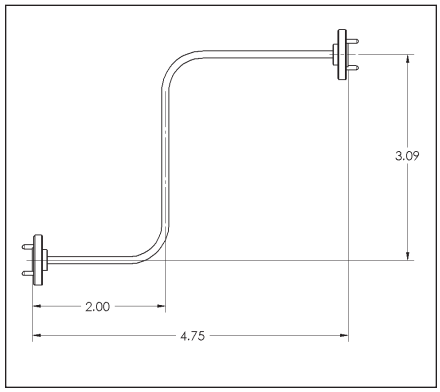


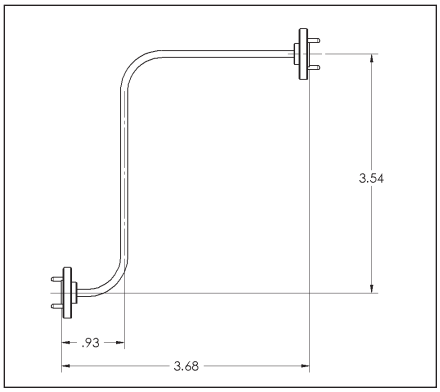
Dual Infinity Probe





Waveguide Infinity Probe - "S" Model on the left, and "T" Model on the right

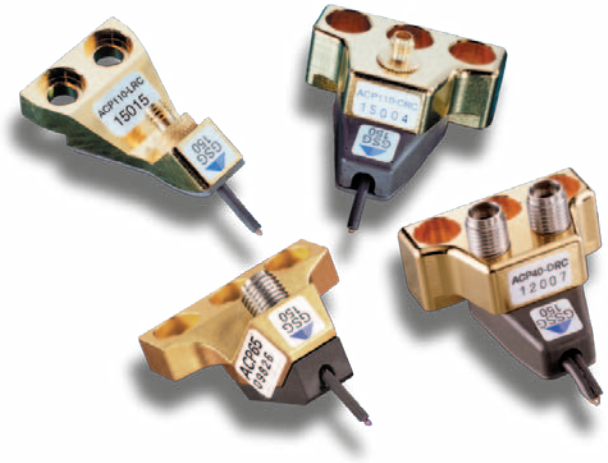




Waveguide S-Bend for Waveguide S & T models: left for 9k probe stations, right for Summit 11K/12K and S300 stations.

Note: Additional versions are available for the Elite300 probe station and for the i325 probe. Consult with factory for more information

AIR COPLANAR PROBES



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.

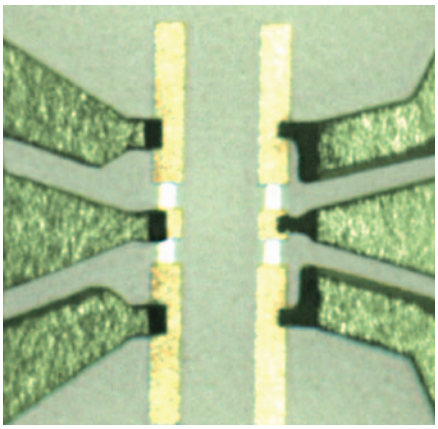
Combining outstanding electrical performance with precise probe mechanics, the ACP probe is the most widely used microwave probe available.

Features

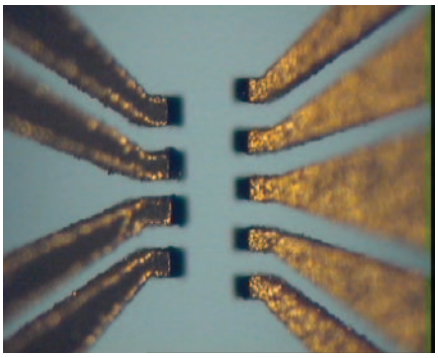
- Unique Air Coplanar tip design
- DC to 110 GHz models available in single and dual line versions
- Low insertion and return loss with ultra-low-loss (-L) versions
- Excellent crosstalk characteristics
- Wide operating temperature -65°C to +200°C
- Wide range of pitches available up to 1250 µm
- Fast 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) versus reduced contact ACP tip (right)



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

*For pad sizes smaller than 80 µm, use reduced contact area (RC) tips.

AIR COPLANAR PROBES

	Probe head type	Part number (Note 1,2)	Insertion loss Max. (dB) (Note 12)	Max DC current*	Max RF power**	MicroChamber compatible	Connector	Recommended ISS	
								Standard (100 to 250 µm)	Wide pitch (250 to 1250 µm)
Single Coaxial	DC to 40 GHz (Notes1, 2, 11)	ACP40-m-GS-xxx	2.0	5 A	6.5 W	Yes	2.92 mm	103-726	106-683
		ACP40-m-SG-xxx	2.0	5 A	6.5 W	Yes		103-726	106-683
		ACP40-m-GSG-xxx	1.0	5 A	6.5 W	Yes		101-190	106-682
		ACP40-Am-GS-xxx	2.0	5 A	6.5 W	(Note 7)	2.92 mm	103-726	106-683
		ACP40-Am-SG-xxx	2.0	5 A	6.5 W	(Note 7)		103-726	106-683
		ACP40-Am-GSG-xxx	1.0	5 A	6.5 W	(Note 7)		101-190	106-682
		ACP40-Lm-GSG-xxx	0.6 (Note 6)	5 A	6.5 W	(Note 7)		101-190	106-682
	DC to 50 GHz (Notes 1, 2, 11)	ACP50-m-GS-xxx	2.0 @ 40 GHz	5 A	5 W	Yes	2.4 mm	103-726	n/a
		ACP50-m-SG-xxx	2.0 @ 40 GHz	5 A	5 W	Yes		103-726	
		ACP50-m-GSG-xxx	1.4	5 A	5 W	Yes		101-190	
		ACP50-Am-GS-xxx	2.0 @ 40 GHz	5 A	5 W	(Note 7)	2.4 mm	103-726	n/a
		ACP50-Am-SG-xxx	2.0 @ 40 GHz	5 A	5 W	(Note 7)		103-726	
		ACP50-Am-GSG-xxx	1.4	5 A	5 W	(Note 7)		101-190	
		ACP50-Lm-GSG-xxx	1.4	5 A	5 W	(Note 7)		101-190	
	DC to 65 GHz (Notes 1, 2, 11)	ACP65-m-GS-xxx	2.0 @ 40 GHz	5 A	4 W	Yes	1.85 mm	103-726 (Note 8)	n/a
		ACP65-m-SG-xxx	2.0 @ 40 GHz	5 A	4 W	Yes		103-726 (Note 8)	
		ACP65-m-GSG-xxx	2.0	5 A	4 W	Yes		101-190 (Note 8)	
		ACP65-Am-GS-xxx	2.0 @ 40 GHz	5 A	4 W	(Note 7)	1.85 mm	103-726 (Note 8)	n/a
		ACP65-Am-SG-xxx	2.0 @ 40 GHz	5 A	4 W	(Note 7)		103-726 (Note 8)	
		ACP65-Am-GSG-xxx	2.0	5 A	4 W	(Note 7)		101-190 (Note 8)	
		ACP65-Lm-GSG-xxx	2.0	5 A	4 W	(Note 7)		101-190 (Note 8)	
	DC to 110 GHz (Notes 1, 2, 10, 11)	ACP110-Cm-GSG-xxx	1.25	5 A	2 W	Yes	1.0 mm	104-783 (Note 8)	n/a
		ACP110-Am-GSG-xxx	1.25	5 A	2 W	(Note 7)		104-783 (Note 8)	
		ACP110-Lm-GSG-xxx	1.15	5 A	2 W	(Note 7)		104-783 (Note 8)	
Dual coaxial	DC to 110 GHz (Notes 1, 2, 3, 10)	ACPyy-Dm-GSGSG-xxx	1.25 @ 40 GHz (Note 4)	5 A	2 W	Yes	User specified (Note 3)	See ISS data sheet (ISS-DS)	See ISS data sheet (ISS-DS)
		ACPyy-Dm-GSGS-xxx	1.25 @ 18 GHz (Note 4)	5 A	2 W	Yes			
		ACPyy-Dm-GSS-xxx	1.0 @ 10 GHz (Note 4,5)	5 A	2 W	Yes			
		ACPyy-Dm-GSSG-xxx	1.0 @ 10 GHz (Notes 4)	5 A	2 W	Yes			
		ACPyy-Dm-SGS-xxx	1.25 @ 18 GHz (Notes 4)	5 A	2 W	Yes			
		ACPyy-Dm-SGSG-xxx	1.25 @ 18 GHz (Notes 4)	5 A	2 W	Yes			
		ACPyy-Dm-SSG-xxx	1.0 @ 10 GHz (Notes 4,5)	5 A	2 W	Yes			
Waveguide	50 to 75 GHz (Notes 1, 2, 10)	ACP75-Sm-GSG-xxx	1.5	500 ma	4 W	No	WR-15	104-738 (Note 8)	n/a
		ACP75-Tm-GSG-xxx	2.0	500 ma	4 W	Yes	WR-15		
	60 to 90 GHz (Notes 1, 2, 10)	ACP90-Sm-GSG-xxx	2.0	500 ma	3 W	No	WR-12	104-738 (Note 8)	n/a
		ACP90-Tm-GSG-xxx	2.5	500 ma	3 W	Yes	WR-12		
	75 to 110 GHz (Notes 1, 2, 10)	ACP110-Sm-GSG-xxx	2.0	500 ma	2 W	No	WR-10	104-738 (Note 8)	n/a
		ACP110-Tm-GSG-xxx	2.5	500 ma	2 W	Yes	WR-10		
	90 to 140 GHz (Notes 1, 2, 10)	ACP140-Sm-GSG-xxx	2.5	500 ma	2 W	No	WR-8	138-356/357 (Note 8)	n/a
		ACP140-Tm-GSG-xxx	3.0	500 ma	2 W	Yes	WR-8		

*2.5 A for W tip, 5 A for BeCu tip, and 1 A for RC tip.
All specs are for probe and DUT at room temperature.
**Rated at highest probe frequency. Additionally each probe is capable of > 30W @ 2.4 GHz, > 10W @ 18 GHz, > 7.5W @ 26.5 GHz.

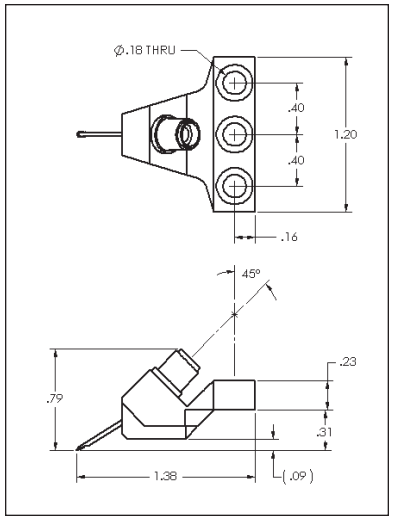
Notes:

1. **m** refers to the tip material. Delete for BeCu. Change to **W** for tungsten.
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 µm.
3. **yy** refers to the connector type. 40 (2.92mm), 50 (2.4 mm), 65-(1.85 mm), 110 (1.0 mm).
4. Insertion loss specification is for a 2.92mm connectorized probe.
5. Signal furthest from ground is not specified.
6. Low-loss probe insertion loss for pitches greater than 150 µm and less than or equal to 250 µm is 0.8 dB.
7. Requires new larger top hat assembly.
8. Use of 116-344 ISS absorber recommended.
9. 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.
10. 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 to 250 µm, unless otherwise noted. ACP110 probes available in pitches from 100 to 150 µm; minimum pitch for ACP dual probes is 100 µm.
11. Angled probes require the 114-592 probe mount for cable clearance.
12. Electrical specifications apply to probe pitches of 100 to 250 µm, except for 90, 110 and 140 GHz probes, where the maximum pitch is 150 µm.

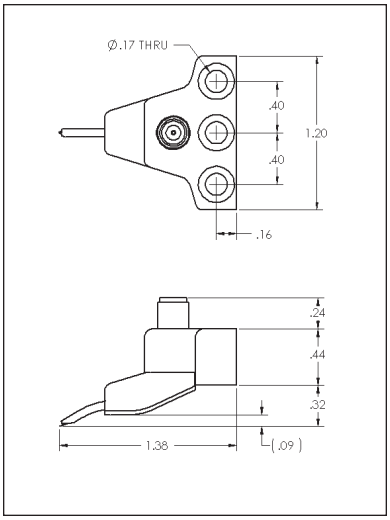
For Reduced Contact Probe part numbers, see table, above, and note below

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 to 250 µm. 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**"

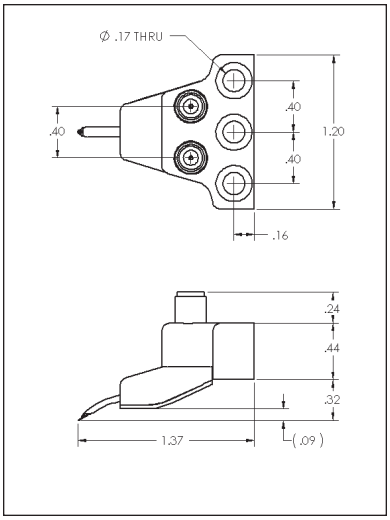
AIR COPLANAR PROBES



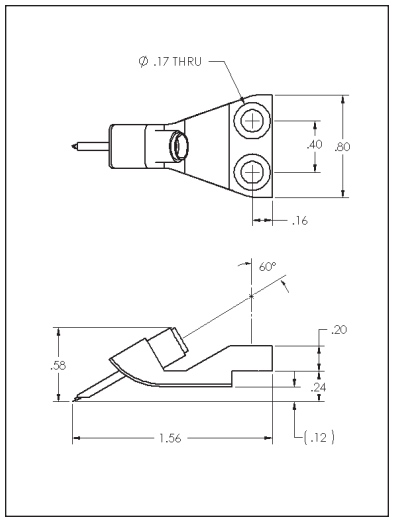
Probe style for: ACP40-Ax, ACP50-Ax, ACP65-Ax, ACP110-Ax.
Requires 114-592 probe mount.



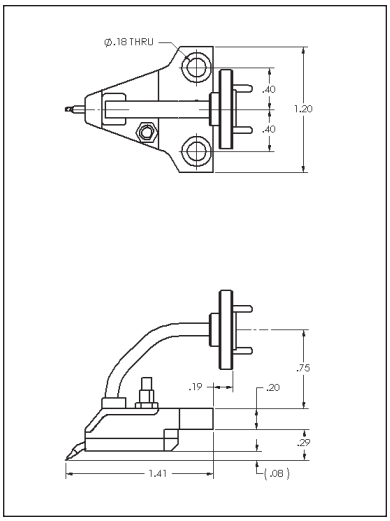
Probe style for: ACP40-x, ACP50-x, ACP65-x, ACP110-Cx.

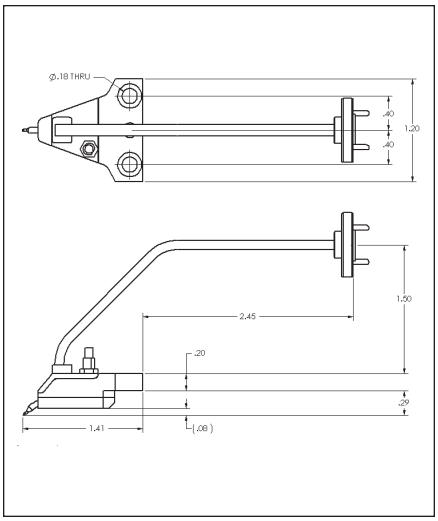


Probe style for: ACP40-Dx, ACP50-Dx, ACP65-Dx, ACP110-Dx.



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





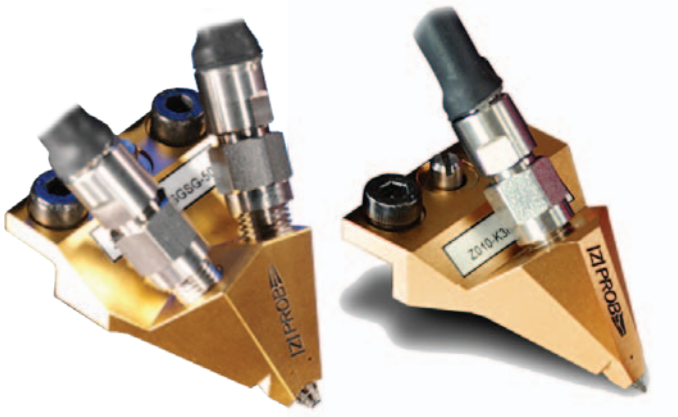
Waveguide ACP Probe - "S" Model on the left, and "T" Model on the right.

Cables for Use with Air Coplanar Probes

Freq (GHz)	Probe station	Body style	Length (inch)	Part number
DC to 40	Summit 11K/12K, S300	A	48 inch	132-423
		V	48 inch	132-420
	M150, RF-1,9K, no MicroChamber	A	48 inch	124-084-B
		V	48 inch	101-162-B
DC to 50	Summit 11K/12K, S300	A	48 inch	132-424
		V	48 inch	132-421
	M150, RF-1,9K, no MicroChamber	A	48 inch	124-085-B
		V	48 inch	103-202-B
DC to 65	Summit 11K/12K, S300	A	36 inch	132-425
		V	36 inch	132-422
	M150, RF-1,9K, no MicroChamber	A	36 inch	124-606-B
		V	36 inch	124-605-B
DC to 110	Summit 11K/12K, S300	A, V	18 cm	132-458

'A' denotes 45º angled coaxial connector body style.
'V' denotes vertical coaxial connector body style.
For waveguide sections and cables for Elite300, consult with Cascade Microtech or your local representative for compatibility.

|Z| PROBES



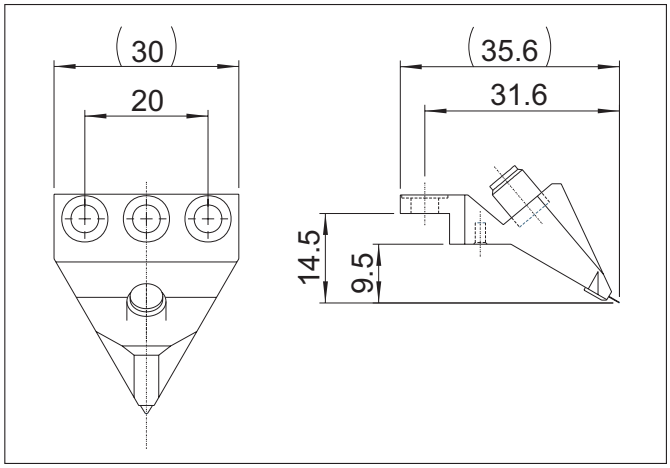
|Z| Probes for RF/Microwave Applications

Excellent performance over a temperature range from 10 K to 300 °C with the long life time
Durable |Z| Probes enable easy and repeatable contacts to DUTs. Its robust design of the coplanar contact structure ensures long probe life time. The probe tips can move independently of one another, enabling probing of pad-height deviation of up to 50 µm.

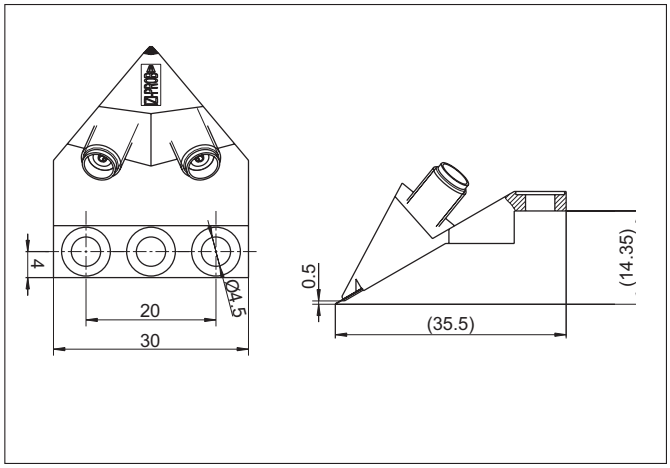
Features

- Long life time (typically > 1,000,000 touchdowns on Al pads)
- Independent, long contact springs to overcome pad height differences up to 50 µm
- Excellent performance in vacuum environments and in a wide temperature range (from 10 K to 300 °C)
- High impedance control with perfectly-symmetrical coplanar contact structure, eliminating signal distortion

Probe Type	Frequency	Configuration	Pitch	Application
|Z| Probe	DC – 67 GHz	GSG, GS, SG	50 - 1250 µm	Single-port RF
Dual |Z| Probe	DC – 50 GHz	GSGSG, GSSG, SGS	100 - 500 µm	Multi-port/differential
|Z| Probe Power	DC – 40 GHz	GSG	100 - 500 µm	High power/low loss
|Z| Probe PCB	DC – 20 GHz	GSG, GS, SG	500 - 2500 µm	PCB, IC pins and ceramic substrate probing



Probe style for |Z| Probes



Probe style for Dual |Z| Probes

For more details, visit www.cascademicrotech.com/products/probes/

MULTI-CONTACT RF PROBES

InfinityQuad Probe

The first and only configurable multi-contact RF/mmW probe For repeatable and precise engineering tests of DC, logic, RF and mmWave RFIC devices, the InfinityQuad probe ensures reliable measurement results up to 110 GHz over a wide temperature range (-40 to +125 °C). The durable photo-lithographically defined fine-pitch tip structure enables probing of small pads down to 30 x 50 µm with minimum pad damage and consistent low contact resistance. The durable probe tips with small contact area of ~10 µm diameter ensure more than 250,000 touchdowns on Al pads and Au pads, and provide accurate X, Y and Z alignment.

For more details, visit www.cascademicrotech.com/products/probes/infinityquad

Features

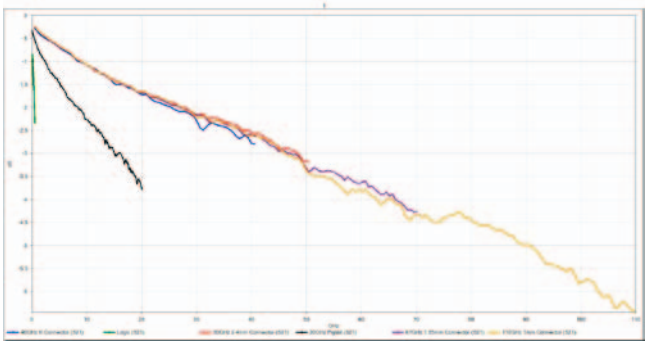
- Customizable configuration up to 25 contacts: RF, Eye-Pass power, ground, logic
- Fine-pitch probe tips enables probing of pitches as small as 75 µm and 30 x 50 µm pads
- Low and repeatable contact resistance on aluminum pads (< 0.05 Ω) ensures accurate results
- Durable probe structure ensures more than 250,000 contacts
- Intuitive design capture tool ensures accurate design and fast product delivery

Specifications

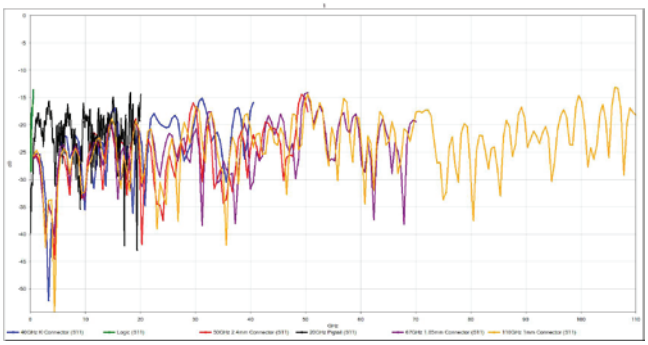
- Number of contacts: From 4 to 25
- Number of 'Premium' channels: Up to four 40, 50, 67 or 110 GHz Premium channels
- Available contact pitch: 75, 80, 100, 125, 150, 200 and 250 µm
- Tip material: Non-oxidizing nickel ally tips
- Minimum pad size: 30 x 50 µm (see Pad layout rules for details)
- Contact area: 12 x 8 µm (nominal)
- Operating temperature: -40 °C to +125 °C (max. -55 °C to +150 °C)
- Contact life: > 250,000 cycles
- Recommended overtravel: 50 - 75 µm
- Maximum safe overtravel: > 250 µm
- Maximum DC current: 400 mA
- Maximum DC voltage: 50 V power bypass (100 V other)
- Series resistance (not including contact): < 2 Ω

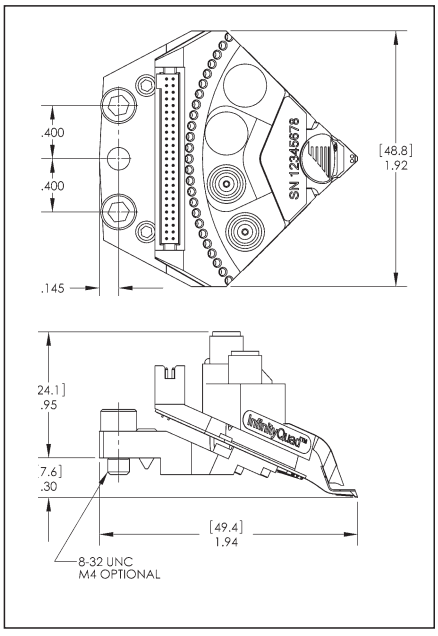
Performance:

Insertion loss

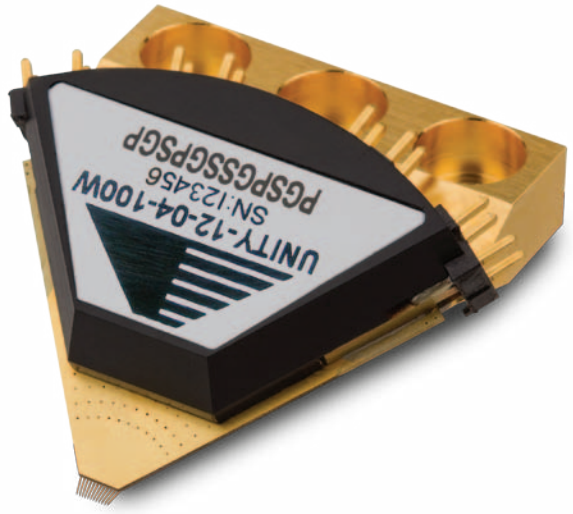


Return loss





MULTI-CONTACT RF PROBES



Unity Probe

The multi-contact Unity Probe provides highly flexible configurability, unprecedented durability and ease-of-use for RFIC engineering test. Unlike "bent-to-order" needle-probe solutions, Unity Probes are quickly "built to order" with a precision tip cluster featuring multiple independently compliant fingers to isolate chip components from probing stresses — maximizing probe life and durability. Each contact can be configured to one or several contact types and frequencies, and the Unity Probe delivers on the legendary quality you've come to expect from Cascade Microtech's comprehensive suite of probing solutions.

Features
- Up to 12 contacts; any contact can be DC, Power, Logic to 500 MHz, or RF to 20 GHz
- Online design configuration tool helps you to specify your probe in minutes
- All designs are fully quadrant compatible
- Full solution includes probes, calibration substrates, stations, accessories and calibration software
- Scalable architecture for future needs

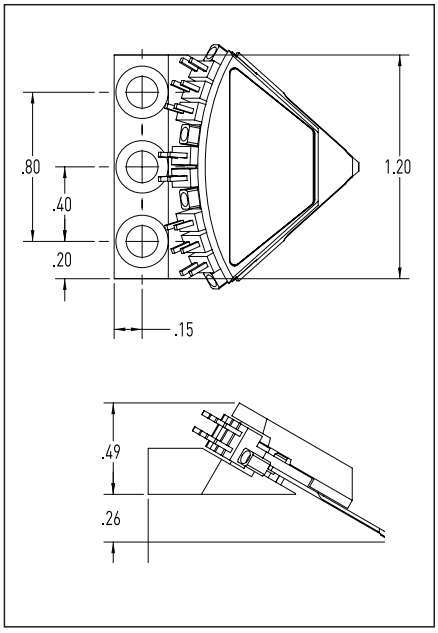
Electrical
- Maximum DC current: 1 A
- Maximum DC voltage: 50 V power bypass (>100 V other)
- Series resistance (not including contact): < 0.2 Ω
- Rc on aluminum at 25°C: < 0.1 Ω
- RF connector: Gore 100 series
- DC/Logic connector: Two 0.025 inch square pins on 0.100 inch pitch
- Eye-Pass bypass inductance: 0.4 nH

Mechanical
- Number of contacts: 3 to 12 (Missing contacts count toward max.)
- Available contact pitch: 100 to 250 µm (25 µm steps)
- Tip material: Beryllium copper (BeCu) or tungsten (W)
- Contact area: 50 x 50 µm (nominal)
- Contact life > 250 k cycles on aluminum pads, > 500 k cycles on gold pads

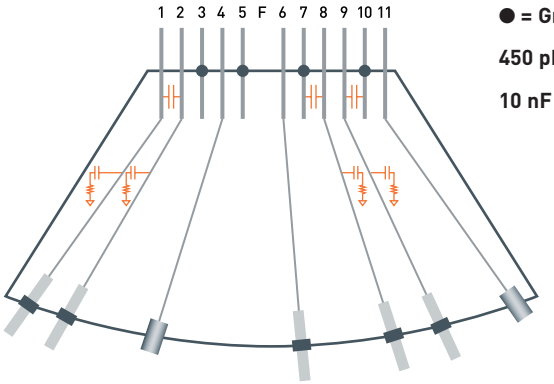
Ordering Information
See Unity Probe product page at www.cascademicrotech.com to learn how to create a configuration code.

Optional cables available

P/N 147-295	SMA Female to square pin 8in. (20cm) flex cable
P/N 147-364	2.92mm Female to Gore 100 8in. (20cm) flex cable



Sample Configuration: P'PGXLG'PP'G



● = Ground connection

450 pF to adjacent finger

10 nF and 2.7 Ω to Ground

MULTI-CONTACT RF PROBES

ACP Quadrant Probes

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.

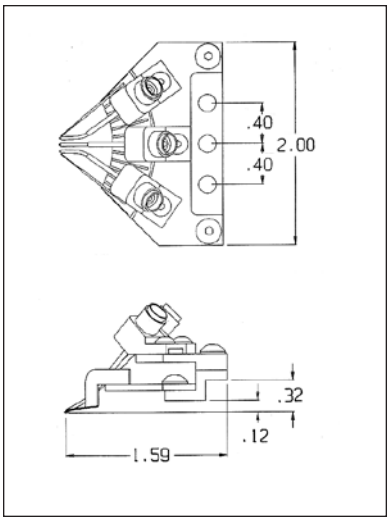
The RF probes use Air Coplanar technology to produce a rugged microwave probe with a compliant tip for accurate, repeatable measurements on-wafer. The DC probes use ceramic blade needles for low noise and high performance.

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
- Other values available upon request
- Power bypass inductance: 8 nH

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	Probe station	Cable
2.92 mm	Summit 11K/12K, S300	132-423
	M150, RF-1, 9K, no MicroChamber	101-162B
2.4 mm	Summit 11K/12K, S300	132-424
	M150, RF-1, 9K, no MicroChamber	102-202B
1.85 mm	Summit 11K/12K, S300	132-425
	M150, RF-1, 9K, no MicroChamber	124-605B
1.0 mm	Elite300	147-316

Notes:

1. yy refers to the connector type: 40 (2.92 mm), 50-(2.4 mm), 65 (1.85 mm), 110-(1.0 mm).
2. Use ACP Quadrant form to specify number of RF-probes, DC probes, pitch, tip material (BeCu or tungsten) and layout configuration.
3. ACP110-Q-2x or ACP110-Q-3x require a minimum pitch of 1200 µm.
4. A design capture form is available online to help with configuring and specifying the probe.

|Z| PROBES

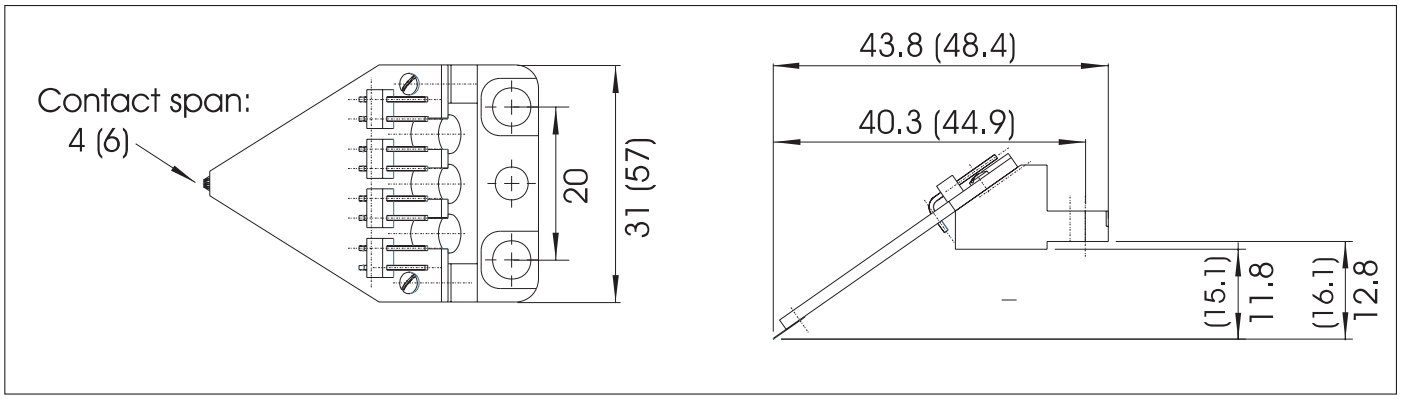
|Z| Probes for Mixed-Signal Applications

Accurate multi-contact probes with long life time for multiport and digital signal testing
Based on the durable |Z| Probe design, Multi |Z| Probes and ProbeWedge series allow up to 35 mixed-signal contacts on one probe, with optional on-board components. The Multi |Z| Probe can also be integrated into the |Z| Probe Card for high-throughput RF testing.

Features

- Mix DC and RF/Microwave contacts
- Long lifetime (typically > 1,000,000 touchdowns)
- Excellent performance in temperatures ranging from 10 K to 200 °C
- Probe on any pad material with minimal damage

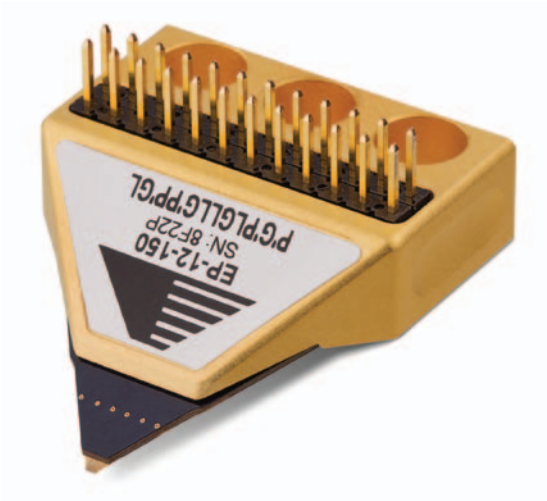
Probe Type	Frequency	Configurable	Non-Uniform Pitch	Number of Contacts
Multi |Z| Probe	DC – 25 GHz	No	Yes	Up to 35 contacts
HF ProbeWedge	DC – 67 GHz	No	Yes	Up to 12 contacts
ProbeWedge WE	DC – 20 GHz	No	Yes	Up to 16 contacts
ProbeWedge WD	DC – 20 GHz	No	Yes	Up to 40 contacts



Multi |Z| Probe 3 to 7 pins with medium board size.
Variational figures for Multi |Z| Probe 7 to 25 pins with large board size in brackets.

For more details, visit www.cascademicrotech.com/products/probes/

MULTI-CONTACT DC PROBES



Eye-Pass Probe

The Eye-Pass multi-contact DC probe is designed to provide a multitude of simultaneous connections to a wafer or similar devices. The connections may be ground, logic/signal, standard power and Eye-Pass power. For power-supply connections, Eye-Pass high-performance power-bypass technology delivers low impedance and resonance-free power connections over an extremely wide frequency range. Used with ACP-series probes and/or multi-contact RF Unity Probes, Eye-Pass probes provide functional at-speed testing for Known-Good-Die. Customized for the user-selected footprint that best suits your application, Eye-Pass probes feature up to 12 contacts per probe head, precisely aligned in a highly durable precision tip cluster to provide high compliance.

Features

- High-performance power bypassing for low-impedance and oscillation-free testing to more than 20 GHz
- Mix multiple contact types: Ground, Power (Standard or Eye-Pass), Logic/Signal
- Low and repeatable contact resistance on aluminum pads (< 0.25 Ω on Al, < 0.01 Ω on Au)
- Long probe life with more than 250 k cycles for moderate volume production test

Electrical

- Maximum DC current: 1 A
- Maximum DC voltage: 50 V power bypass (>100 V other)
- Series resistance: < 1 Ω (not including Rc)
- Connector: 2 x12 square pin header (ground row furthest from tip), Direct mapping of connector pins to contacts (no custom routing)
- Eye-Pass bypass inductance: 0.4 nH

Mechanical

- Number of contacts: 2 to 12 (Missing contacts count toward max.)
- Available contact pitch: 100 to 250 µm uniform spacing
- Tip material Beryllium copper (BeCu) for gold pads (Au) or tungsten (W)
- Contact area: 50 µm x 50 µm (nominal)
- Contact life > 250 k cycles on aluminum pads, > 500 k cycles on gold pads

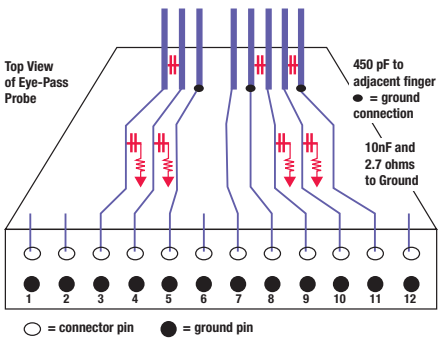
Ordering Information

See Eye-Pass Probe Design Capture page on Eye-Pass probe page at www.cascademicrotech.com to learn how to create a configuration code.

Optional cables available

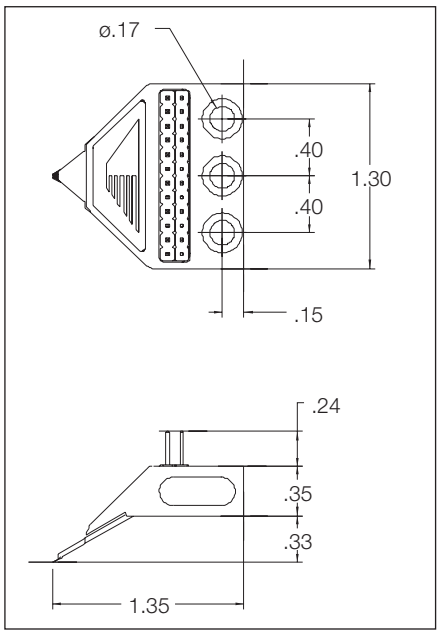
P/N 124-082 BNC Male to 2 pin Molex connector cable, 4ft length (single channel)

Sample Configuration: P'PGXLG'PP'G



Conn Pin number	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		No Contact

**Adjacent ground recommended for best Eye-Pass Power performance



MULTI-CONTACT DC PROBES

Multiple configurations for functional circuit testing

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 probes feature 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.

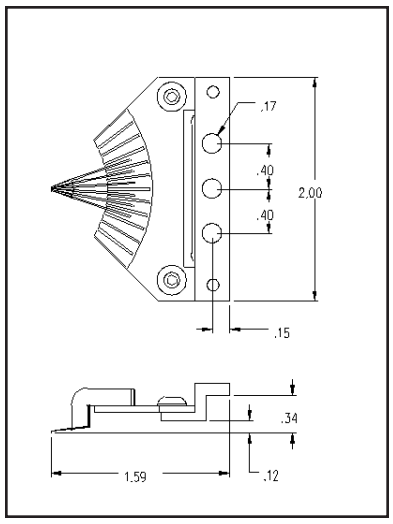
Features

- Customized to customer application
- Up to 16 DC
- Standard tungsten 0.01 inch (0.75mm) diameter needles
- Supports collinear and non-standard needle configurations
- Power bypass inductance: DCQ 8 nH, WPH 16 nH

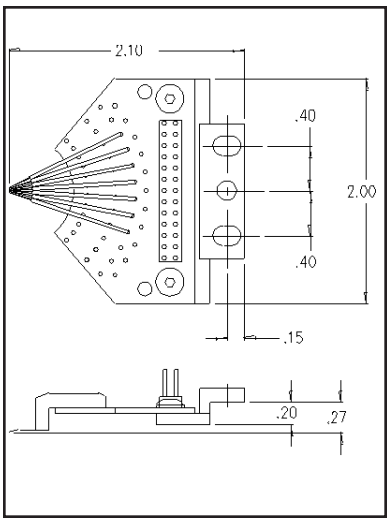
Advantages

- 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= number of DC probes)	Max. number of DC probes	MicroChamber compatible	Connector
DCQ Quadrant probe (Note 1)	DCQ-yy	16	Yes (Note 6)	DCQ DC connections are supplied via a wire pig-tail to square pin header, standard. (Note 3)
WPH needle probe heads (Note 3)	WPH-9yy-xxx (Note 4) WPH-9yy-NS (Note 5)	12 12	No No	Circuit board mounted square-pin header, standard.



Probe style for: DCQ-YY

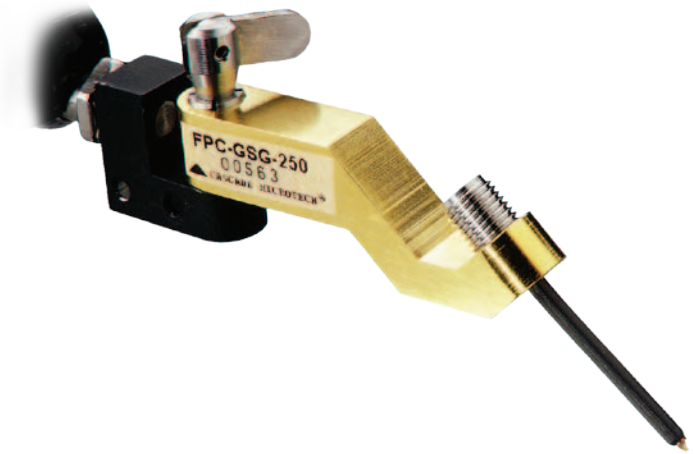


Probe style for: WPH-9YY

Notes:

1. Use DCQ Quadrant Probe Order Form to specify number of DC needles and layout of DC lines.
2. Custom cable harnesses are also available.
3. See app. note "Layout Rules for WPH-900 Series Probes"
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.
5. Needles may be in a non-standard pattern to be specified by the customer.
6. MicroChamber compatibility up to 12 needles.

BOARD TEST AND SIGNAL INTEGRITY PROBES

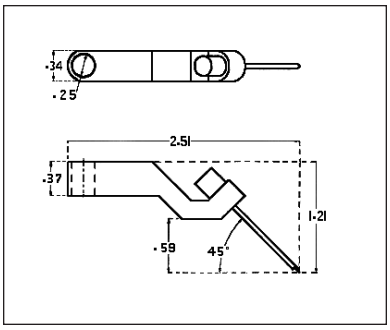


Fixed-Pitch Compliant Probe (FPC)

The FPC-Series (Fixed-Pitch Compliant) is a high-frequency 50 Ω 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 to 40 GHz bandwidth
- 10 ps rise time
- Low insertion and return loss
- 2 mils of tip-to-tip compliance
- High probing angle and clearance
- High-power handling capability

Advantages
- Maintains 50 Ω 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 to 250 µm)	Wide pitch (250 to 1250 µm)
DC-40 GHz (Note 4, 5)	FPC-GS-xxx	2.0 dB	10 dB	BeCu. 2.92 mm	124-084-B	103-726	106-683
	FPC-SG-xxx	2.0 dB				103-726	106-683
	FPC-GSG-xxx	1.0 dB				101-190	106-682
DC-40 GHz (Note 4, 5)	FPC-W-GS-xxx	2.0 dB	10 dB	Tungsten 2.92 mm	124-084-B	103-726	106-683
	FPC-W-SG-xxx	2.0 dB				103-726	106-683
	FPC-W-GSG-xxx	1.0 dB				101-190	106-682

Notes:

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.
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.
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.
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.
5. FPC probes are not designed for use with MicroChamber probing stations.
6. Use the standard RF mount to FP adapter (P/N 104-913).

Fine-Pitch Microprobe (FPM)

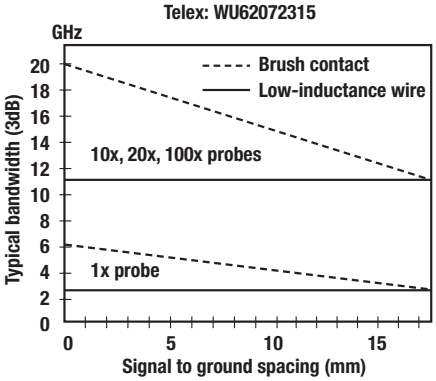
The FPM (Fine-Pitch Microprobe) Series provides a superior range of probes for characterizing and troubleshooting high-speed, high-density microcircuits with pads as small as 25 µm.

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



Electrical specifications	FPM-1X	FPM-10X	FPM-20X	FPM-100X
Attenuation*	1x	10x	20x	100x
Bandwidth (3 dB)*	DC to 5 GHz	DC to 18 GHz	DC to 18 GHz	DC to 18 GHz
Input resistance*	50	50	1000	5000
Input capacitance	0.15 pF	0.03 pF	0.02 pF	0.02 pF
Rise time	< 100 ps	< 30 ps	< 30 ps	< 30 ps
Settling time (2%)**	500 ps	500 ps	500 ps	500 ps

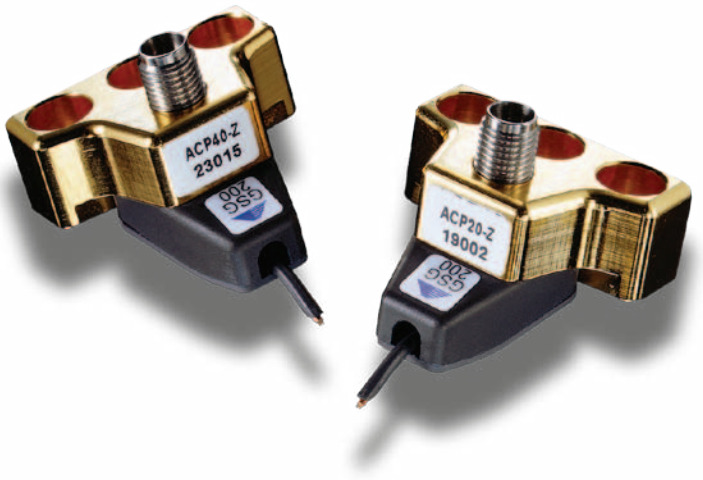
* 50 instrument impedance **Measured using 1 meter coax cable

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

Notes:

1. Fine-pitch series probes are not designed for use with MicroChamber probing systems.
2. Use the standard RF mount to FP adapter, variable ground (P/N 106-835).

SPECIAL PURPOSE PROBES



Impedance Matching Probe

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.

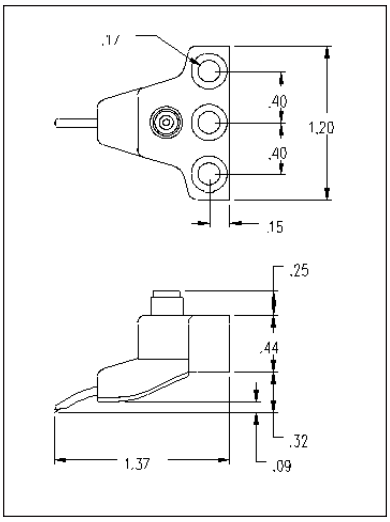
Reactive matching probes provide low-loss transitions such as to the low impedance outputs of power devices. Resistive matching probes are frequently used to singly terminate the patch to a low dynamic resistance laser diode for maximally flat modulation frequency response.

Features

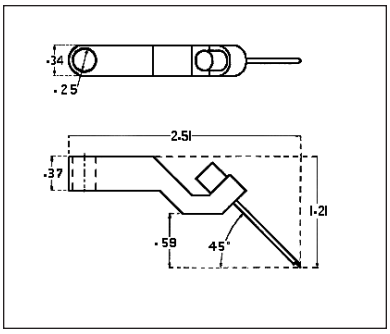
- Choice of reactive or resistive probe
- Choice of center frequency range, value and bandwidth
- Choice of probe tip impedance
- Choice of body styles, ACP or FPC

Advantages

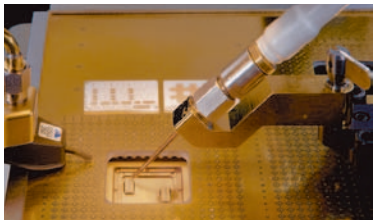
- Improved load-pull measurement tuning range
- Ability to make accurate on-wafer measurement of low-impedance power devices
- Stabilize oscillations in high-gain devices
- Impedance match to low dynamic resistance laser diodes
- Custom configured for your application



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



Probe style for: FPC-R

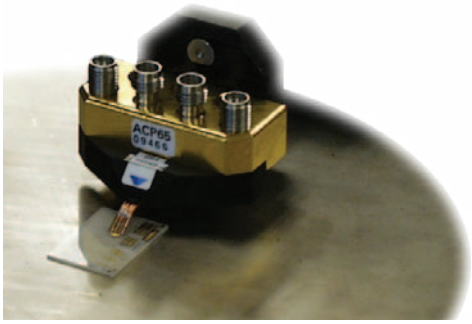


Probe head type	Part number (Note 1, 2, 3)	Center frequency	Bandwidth (GHz)	Connector & tip type	Impedance range (Ω)	MicroChamber compatible
Reactive Probe (Note 4)	ACP20-Z-GSG-xxx	0.85 to 20 GHz	< 10% Std. 10% to 20% optional	2.92 mm BeCu	24 to 50 Std. 10 to 24 optional	Yes
	ACP40-Z-GSG-xxx	20 to 40 GHz				
Resistive Probe (Note 4)	ACP-R-GS-xxx ACP-R-SG-xxx ACP-R-GSG-xxx		0 to 10	2.92 mm BeCu	45 ±5% Std. 10 to 300 optional	Yes
Resistive Probe (Note 4)	FPC-R-GS-xxx FPC-R-SG-xxx FPC-R-GSG-xxx		0 to 10	2.92 mm BeCu	45 ±5% Std. 10 to 300 optional	No
Recommended cable: 132-420 for Summit 11K/12K, and S300 probe stations; 101-162-B for M150, RF-1 and 9K non-MicroChamber stations						

Notes:

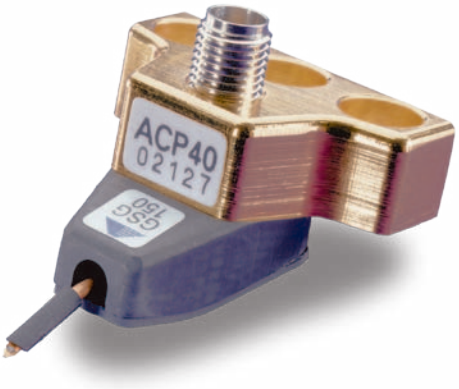
1. The **-xxx** suffix indicates probe contact center-to-center spacing (pitch) in microns, e.g. ACP40-Z-GSG-150 is 150 µm (5.91 mils). Contacts are on a constant pitch and width is approximately 50 µm.
2. The convention for describing probe head footprints is the sequence of contacts as seen looking down on the probe head tip in its functional position, with the tip pointing away from the viewer, describing contacts from left to right.
3. ACP pitches are available from 50 µm to 1250 µm.
4. Use Impedance Matching Probe Order Form to specify center frequency, tip impedance, bandwidth, resistance value and pitch.

SPECIAL PURPOSE PROBES



40/80 Gb/s High-Performance Quadrant Probe
Designed to provide wide bandwidth RF connections and simultaneous resonant free power bypass connections for the special needs of high-speed mixed-mode IC 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

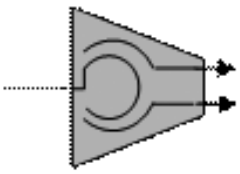


Cryogenic Probe
Designed to provide superior mechanical properties at cryogenic temperatures while maintaining solid RF measurement performance.

- 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

Balun Probe
The Balun probe incorporates a balun in the probe tip to provide a simple way to test millimeter-wave devices and circuits with differential inputs or outputs.

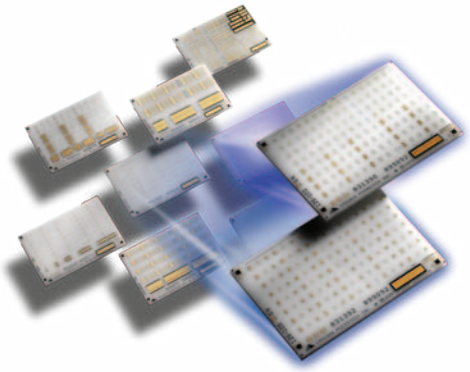
- Integrated Marchand-style balun covering approximately 40 to 80 GHz
- Small contact area, non-oxidizing nickel alloy tips
- GSSG-150 primary supported configuration, other variations possible upon request
- Thin-film design incorporated in tip structure minimizes phase skew
- Differential signaling virtual ground eliminates interconnect ground inductance issues



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.



Ordering Information

Part number	Description	Cal sites	Pitch µm
005-016	General purpose	Cal sites vary	
101-190	LRM	27 GSG	100 to 250
103-726	GS	27 GS or SG	100 to 250
104-783	W-band	27 GSG	75 to 150
104-909	Narrow pitch	13 GSG, 7 GS, 7 SG	50 to 150
106-682	Wide pitch GSG	8 GSG	250 to 1250
106-683	Wide pitch GS/SG	8 GS, 8 SG	250 to 1250
106-686	GP membrane	25 loads	80 to 3000
108-010	Very wide pitch GSG	4 GSG	150 to 3000
108-011	Very wide pitch GS/SG	4 GS, 4 SG	150 to 3000
109-531	Right angle	5 N-E, 5 N-W, 5 E-W	100 to 500
114-456	ACP-RC	27 GSG	100 to 150
126-102	Dual/Differential	17 GSGSG, SGS, SGSG, GSGS	150
129-239	Dual/Differential	17 GSGSG, SGS, SGSG, GSGS	100 to 125
129-240	Dual/Differential	17 GSGSG, SGS, SGSG, GSGS	150 to 225
129-241	Dual/Differential	10 GSGSG, SGS, SGSG, GSGS	250
129-246	Dual/Differential	18 GSSG, SSG, GSS	100 to 150
129-247	Dual/Differential	18 GSSG, SSG, GSS	175 to 250
129-248[1]	General purpose thru	Qty four each, straight, cross, loop back thrus	GSGSG (300 to 650) GSSG (300 to 950)
129-249[1]	General purpose thru	Qty four each, straight, cross, loop back thrus	GSGSG (700 to 1250)[2] GSSG (1000 to 1250)[2]
138-356	Waveguide Infinity Probe	15 GSG for 50 µm 15 GSG for 75 µm	GSG 50 to 75
138-357	Waveguide Infinity Probe	9 GSG for 100 µm 9 GSG for 125 µm 12 GSG for 150 µm	GSG 100 to 150
143-033	W-band	27 GSG	150 to 250
147-405	1ps thru and attenuator pads	Noise and load pull	100 to 250

Notes:

1. Requires p/n 106-682 (GSGSG) or 106-683 (GSSG) ISS for wide pitch differential/multiport applications
2. Qty 2 each for pitches 1000-1250 µm

Cables

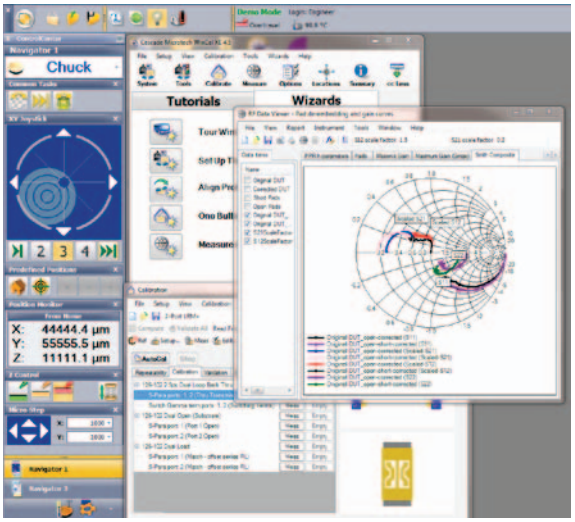
Cascade Michrotech's range of low-loss, thermally-stable cables ensure higher-quality measurements and longer-lasting calibrations. Each cable has a male connector at one end that connects to the probe and a female connector at the other end to connect to the test instrumentation. For vertical style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

Cables for Use with Infinity and ACP Probes

Freq (GHz)	Probe station	Body style	Length (inch)	Part number
DC to 40	Summit 11K/12K, S300	A	48 inch	132-423
		V	48 inch	132-420
	M150, RF-1,9K, no MicroChamber	A	48 inch	124-084-B
		V	48 inch	101-162-B
DC to 50	Summit 11K/12K, S300	A	48 inch	132-424
		V	48 inch	132-421
	M150, RF-1,9K, no MicroChamber	A	48 inch	124-085-B
		V	48 inch	103-202-B
DC to 67	Summit 11K/12K, S300	A	36 inch	132-425
		V	36 inch	133-422
	M150, RF-1,9K, no MicroChamber	A	36 inch	124-606-B
		V	36 inch	124-605-B
DC to 110	Summit 11K/12K, S300	A, V	18 cm	132-458
	Elite300	A, V	24 cm	147-316

'A' denotes 45° angled coaxial connector body style.
'V' denotes vertical coaxial connector body style.
NB: Dual Infinity probe is "V" style only.
For Waveguide sections consult factory.

SUPPORTING SOFTWARE

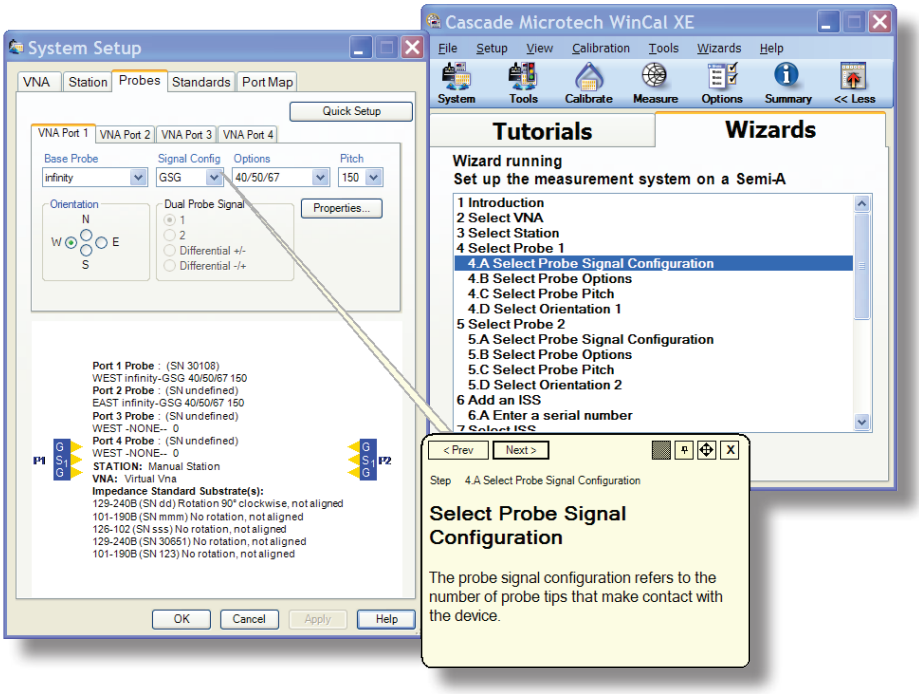


Accurate on-wafer S-parameter measurements up to 500 GHz and beyond

The WinCalXE software accurately calibrates the measurement system and automates measurements, data collection and data transformation, providing repeatable and precise S-parameter data. The WinCal XE 4.5 version is fully compatible with |Z| Probe, ACP probe and Infinity Probe families and supports both ISS and CSR calibration substrates. It is also compatible with ProberBench™ and Nucleus™ probe station software, and most commercially available Vector Network Analyzers.

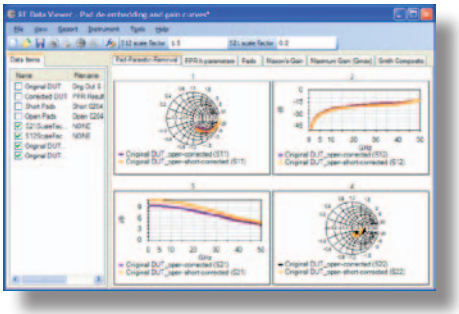
Easy, fast, and accurate RF measurement

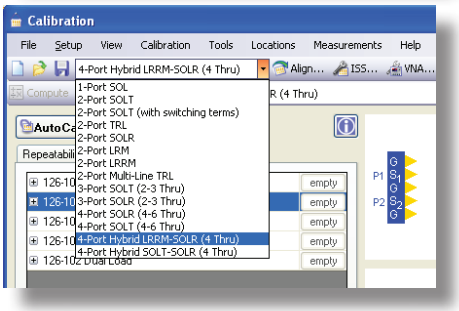
WinCal XE's guided and smart system setup and customizable Wizards ensure a correct system setup, reliable VNA calibration, and repeatable data.



Advanced capability for both present and the future

WinCal XE easily converts S-parameters to a device appropriate format, and also enables immediate and live data reduction and viewing. WinCal XE also provides the broadest range of VNA calibration choices up to 4 ports.





Key Features:

- Automatic VNA calibration using calibration method of your choice
- Extensive guidance for correct system setup and calibration
- Convert S-parameters to a device appropriate format
- Customizable display templates and Wizards that adapt to your need
- Powerful measurement sequencing capabilities
- LRRM-SOLR hybrid 4-port calibrations for precision 4-port calibrations
- Error Set Manager provides error set augmentation and error set comparison tools
- Multi-line TRL cal to compare your preferred calibration methods to a NIST-style calibration

Ordering information:

Part number	Description
142-171	WinCal XE, full version (USB)
142-173	WinCal XE, 30-day demo (USB)
142-178	WinCal XE, field upgrade (from demo to full version)

Cascade Microtech, Inc.
Corporate Headquarters
toll free: +1-800-550-3279
phone: +1-503-601-1000
email: cmi_sales@cmicro.com

Germany
phone: +49-89-9090195-0
email: cmg_sales@cmicro.com

Japan
phone: +81-3-5615-5150
email: cmj_sales@cmicro.com

China
phone: +86-21-3330-3188
email: cmc_sales@cmicro.com

Singapore
phone: +65-6873-7482
email: cms_sales@cmicro.com

Taiwan
phone: +886-3-5722810
email: cmt_sales@cmicro.com

www.cascademicrotech.com