HPC40-GSG-XXX Probe

40 GHz Ground-Signal-Ground footprint microwave probe with Air Coplanar® tip and 2.92mm (K™ compatible) precision coaxial connector. XXX defines the pitch (center-to-center spacing between adjacent probe fingers)

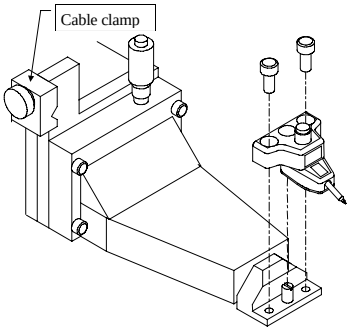
Quick Tips



- Use care when installing or handling the probe. Do not touch, bump or snag the probe tip. Do not bend or flex the microwave absorber
- Use high-performance microwave cable with 2.92mm (K™ compatible) connectors (see *Product Guide*).
- When connecting RF connectors, carefully mate the connectors and tighten them by rotating only the male connector nut. Use an 8 in-lb calibrated torque wrench to tighten the connectors
- Use the positioner cable clamp to relieve cable strain on the probe. Do not overtighten the clamp
- After mounting the probe on the positioner, planarize the positioner arm parallel to your wafer probing surface (see *Positioner Arm Planarization*)
- Use alignment marks on the ISS when probing (see *Making Contact*)
- Your calibration kit coefficient definitions are found on the inside of the probe box lid
- Follow probe cleaning procedures (see *Probe Cleaning*)

Probe Handling/Installation

- Before mounting, inspect the probe for signs of dirt or visible wear.
- Use a positioner with a standard 3-pin microwave mount. Use the middle (guide) pin to align the probe and 2 mounting screws to snug-tighten the probe (use 9/64-inch hexagonal driver). Use the Contact Substrate accessory (PN 005-018) to planarize the probe using the positioner planarization adjustment.
- When unused, always cover the probe precision connector with the plastic cap supplied with the probe.



Probe Viewing



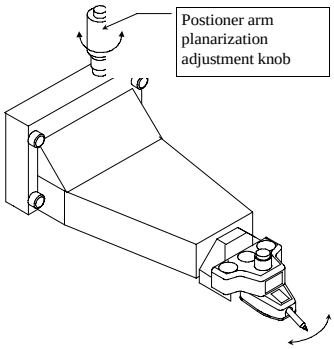
Always observe the probe tips when making the contact with the DUT. With the microscope focused on the DUT and the probe tips safely raised, the probe tips appear out of focus.

Use the x- and y-axis knobs to position the probe tip above the DUT contacts. Use the z-axis knob to bring the probe tips down to the device.

When contacting a device, watch the probe tips through the microscope. Do not use electrical readout as a substitute for microscope viewing. Observe contact and skating, then look for electrical readout.

Positioner Arm Planarization

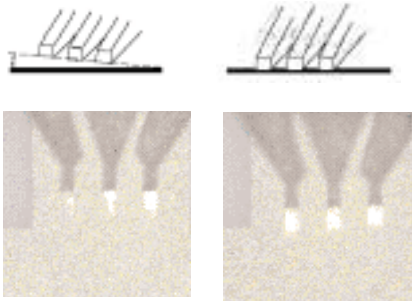
The probe tip itself is planarized with high precision. However, it may still be necessary to planarize the positioner arm to conform the probe tip plane to the plane of the device being probed.



Observe the probe landing on the metal on the contact substrate. Raise the probe and adjust the planarization knob to ensure that each finger in the probe tip leaves marks of the same size and depth.

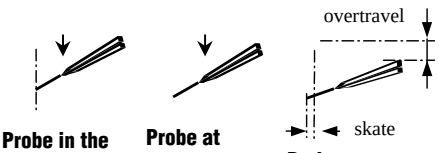
Making Contact

Not Planarized **Properly Planarized**

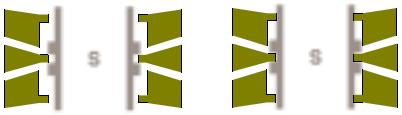


The High Performance Characterization™ probe is designed for a nominal overtravel (downward movement after initial touchdown) of 50mm (.002”).

The resulting skate (or forward movement resulting from overtravel) is about 25mm (.001”).



Probe in the air **Probe at initial touchdown** **Probe overtravel/skate**



initial contact **proper overtravel**

To obtain contact on extremely non-planar surfaces, you can use up to 10 mils of overtravel without damaging the tip, although increased overtravel may reduce probe life.

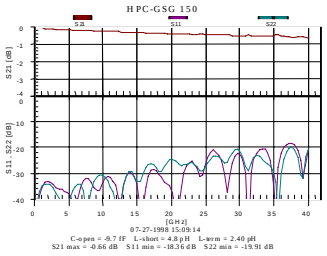
Set proper overtravel for calibration using the alignment marks on the Cascade Microtech Impedance Standard Substrates (ISS). Initial contact with the edge of the probe tips should be even with the outer flat tab edges. With proper skate the probes should end up with the tips even with the inside edge of the long bar.

Accessories

HPC Impedance Standard Substrate	PN 114-456
Precision microwave cable with 2.92mm (K™ compatible) coaxial connectors	PN 101-162
Contact substrate	PN 005-018
Probe cleaning brush, MP4	PN 113-477
Probe wrench, 9/64 & 3/32 inch hex	PN 110-206

For further details, see Product Guide

Probe Verification



To verify the performance of the probe, you can use the Probe Test feature of Cascade Microtech's WinCal™ software. An active cable calibration in the VNA and measurements of ISS Short, Open and Load standards are used to provide insertion and return loss for the probe.

VNA Calibration and Verification

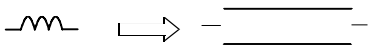
To achieve best measurement accuracy when doing microwave on-wafer measurements above 10-15 GHz, use LRRM calibration routine with automatic load inductance determination as implemented in Cascade Microtech WinCal software.

For verification of your calibration, measure S11 of an open standard and an open-ended transmission line located at the bottom of your Impedance Standard Substrate (PN 114-456). Typical plots of such measurements with LRRM calibration are shown below.

If you must use SOLT calibration, Calibration Kit Definitions for your probes are found on the inside of the probe box lid. Use 2 ps for the delay of the Thru standard on the 114-456 HPC ISS.

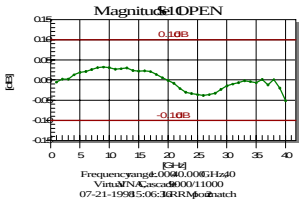
Some network analyzers do not support lumped inductance model and require offset Z_0 and offset T_d. In this case, model your parasitic inductor for both Short and Load standards as a short piece of transmission line. Assume the maximum impedance that the network analyzer allows (typically 500 ohm) and calculate T_d using the following equation: $T_d = L/Z_0$

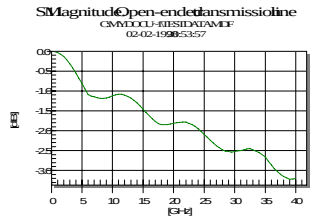
For example:



L = -1.7pH Z_0 = 500 ohm,
T_d = -0.0034ps

In the case of SOLT calibration the S_{11} of an Open standard will look perfect at 0 dB (reflection coefficient of 1) with variation due only to system repeatability; therefore, the open is not a good choice for verification of your calibration accuracy. Use the offset open instead.





Probe Cleaning

Clean the probe tips and connectors occasionally, or when you suspect contact problems. Follow your microwave cable or network analyzer manufacturer instructions for cleaning the precision microwave connector. Try cleaning the probe tip with air before using solvent. Blow from the probe body to the tip, nearly parallel to the probe. If necessary, use isopropyl alcohol (IPA), an approved solvent for cleaning probe tips. Use a small amount of clean IPA on an MP4 brush (PN 113-477) or a non-fibrous swab. Clean from the body to the tip, being careful not to snag or pull on the tip. Allow sufficient time for the probe to thoroughly dry.

Troubleshooting Guide

Symptom	Possible causes	Solution
Probe is pulled to the side when trying to land on the device	Cable applies strain on the probe	Use positioner cable clamp to strain-relieve the probe
Intermittent electrical contact	Dirty/contaminated probe tip	Clean the probe tip
	Dirty RF connectors	Clean the RF connectors
	Probe overtravel is not sufficient	Adjust the overtravel
	Positioner arm is not planarized after mounting the probe	Planarize the positioner arm
Poor calibration accuracy	SOLT calibration is used above 10GHz	Use LRRM or TRL calibration
	Cal kit is not defined correctly	Verify your cal kit definitions
Poor calibration repeatability	Poor connection in the system	Check and re-tighten your RF connections
	Defective cable	Check the cable using VNA transmission calibration
	Large temperature variations in the lab	Switch to controlled temperature lab

Cascade Microtech, Inc., 2430 NW 206th Ave, Beaverton OR 97006, USA
Tel: (503) 601-1000 Fax: (503) 601-1002 E-mail: sales@cmicro.com
Japan: (03) 5478-6100; Europe: +44 (0) 1295-812828
www.cascademicrotech.com

Innovating Test Technologies