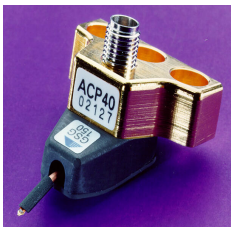
ACP40-GSG-xxx Probes

The ACP40-GSG-xxx probe features include:

- Standard Pitch: 100, 125, 150, 200 and 250µm
- 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).

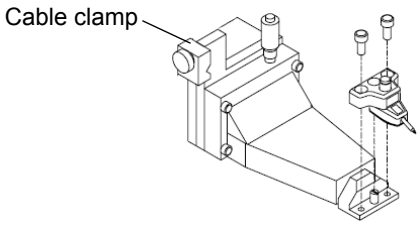
Your calibration kit coefficient definitions are found on the inside of the probe box lid.



CAUTION

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.

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 two mounting screws to snug-tighten the probe (use 9/64 Contact Substrate (PN 005-018) to planarize the probe using the positioner planarization adjustment.

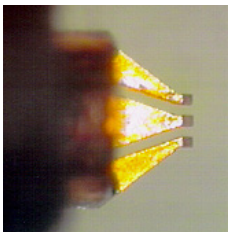
Use high-performance microwave cable with 2.92mm (K™ compatible) connectors.

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.

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.

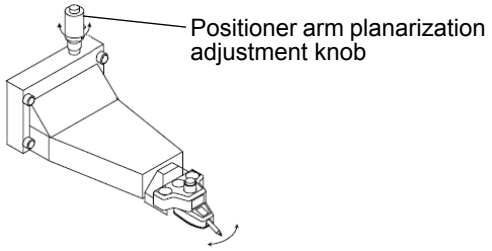
Use the x- and y-axis knobs to position the probe tip above the DUT contacts. Use the z-axis knob to bring the probe tips down to the device.

Before making contact, make sure that the probe station chuck is in the contact position and that the platen arm is fully down.

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.



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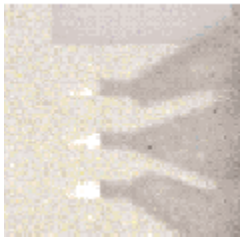
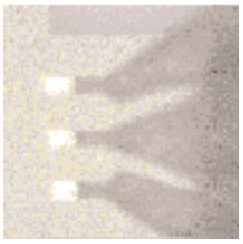
Observe the probe landing on the metal on the contact substrate. Raise the probe and adjust the planarization knob to ensure that each finger in the probe tip leaves marks of the same size and depth.

Not Planarized



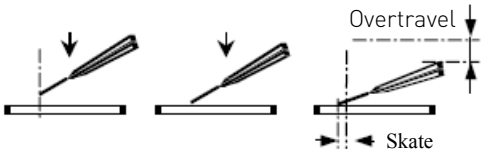
Properly Planarized



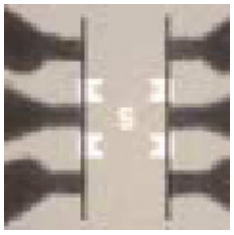
Making Contact

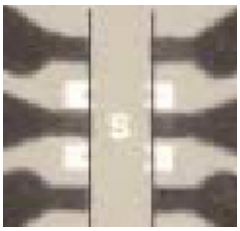
The Air Coplanar probe is designed to be used with a nominal overtravel (downward movement after initial touchdown) of 50-75µm. The resulting skate (forward movement resulting from overtravel) is about 20-30µm.

To obtain contact on extremely non-planar surfaces, you can use up to 250µm of overtravel without damaging the tip, although increased overtravel may reduce probe life.



Probe in the air | Probe at intial touchdown | Probe overtravel/skate





Proper amount of overtravel for calibration on Impedance Standard Substrates (ISS) can be set using alignment marks on the ISS.

Initial contact with the edge of the probe tips should be at the midpoint between the outer flat edge and the internal apex. With proper skate the probes will end up at the midpoint between the internal apex and the flag points.

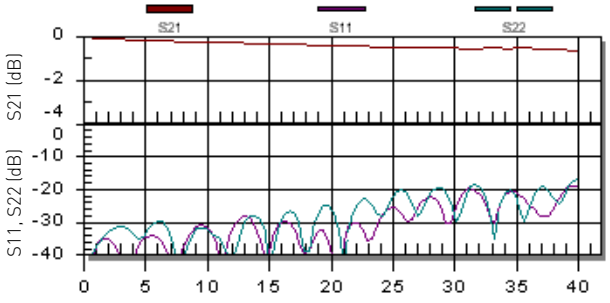
Accessories

PN 101-190	Calibration ISS
PN 101-162	Precision microwave cable with 2.92mm (K™ compatible) coaxial connectors
PN 005-016	Verification ISS
PN 005-018	Contact substrate

Probe Verification

To verify the performance of the probe, you can use the Probe Test feature of FormFactor'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.

ACP-GSG 150 Probe Test



(GHz)
07-27-1998 15:55:16
C-open = -9.7 fF L-short = 4.8 pH L-term = -1.70 pH
S21 max = -0.67 dB S11 min = -12.59 dB S22 min = -15.53 dB

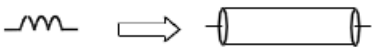
VNA Calibration and Verification

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 FormFactor WinCal software.

If you choose to do SOLT calibration, Calibration Kit Definitions for your probes are found on the inside of the probe box lid. Use 1ps for the delay of the Thru standard on the ISS 101-190.

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:

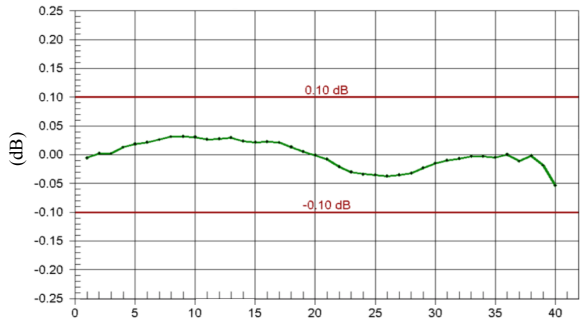
L = -1.7 pH Z = 500 ohm

T_d = -0.0034 ps

For verification of your calibration, measure S11 of an open standard and an open-ended transmission line located at the bottom of the ISS (PN 101-190). Typical plots of such measurements with LRRM calibration are shown below.

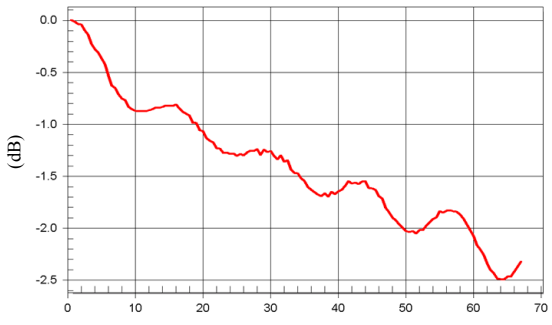
Note that in the case of SOLT calibration the S11 of an Open standard will look perfect at 0dB (reflection coefficient of 1) with variation due only to system repeatability; therefore, it is not a good choice for verification of your calibration accuracy.

Magnitude - S11 Open



(GHz)
Frequency range: 1.000-40.000 GHz, 40
101-190 GSG, Virtual VNA, Summit - Nucleus 2.7
09-07-2004 16:11:55 LRM open-load

Magnitude - S11 Open-Ended Transmission Line



(GHz)

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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.

For more information, visit www.formfactor.com.

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 LR(R)M calibration
	Cal kit is not defined correctly	Verify your cal kit definitions
Poor calibration repeatability	Poor connection in the system	Check and retighten your RF connections
	Defective cable	Check the cable using VNA transmission calibration
	Large temperature variations in the lab	Switch to controlled temperature lab

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