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.

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**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.*

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**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.
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**

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.

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**

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<tr>
<th>PN</th>
<th>Product Description</th>
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<tr>
<td>101-190</td>
<td>Calibration ISS</td>
</tr>
<tr>
<td>101-162</td>
<td>Precision microwave cable with 2.92mm (K™ compatible) coaxial connectors</td>
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<tr>
<td>005-016</td>
<td>Verification ISS</td>
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<td>005-018</td>
<td>Contact substrate</td>
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**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. 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 Z₀ 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:

\[ T_d = \frac{L}{Z_0} \]

For example:

\[ L = -1.7 \text{ pH} \quad Z = 500 \text{ ohm} \]

\[ T_d = -0.0034 \text{ ps} \]

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.
Quick Reference Guide
ACP40-GSG-xxx Probes

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, contact the nearest Cascade Microtech sales office, or in the U.S. call customer service at (800) 550-3279 or (503) 601-1000.

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