Environmental Requirements

Table 2-1 Environmental Requirements

Parameter	Limits
Temperature	
Operating[a]	+20 °C to +26 °C
Storage	–40 °C to +75 °C
Error-corrected range[b]	±1 °C of measurement calibration temperature
Altitude	
Operating	< 4,500 meters (≈15,000 feet)
Storage	< 15,000 meters (≈50,000 feet)
Relative humidity	Always non-condensing
Operating	0 to 80% (26 °C maximum dry bulb)
Storage	0 to 90%

a. The temperature range over which the calibration standards maintain conformance to their specifications.
b. The allowable network analyzer ambient temperature drift during measurement calibration and during measurements when the network analyzer error correction is turned on. Also, the range over which the network analyzer maintains its specified performance while correction is turned on.

Temperature—What to Watch Out For

Changes in temperature can affect electrical characteristics. Therefore, the operating temperature is a critical factor in performance. During a measurement calibration, the temperature of the calibration devices must be stable and within the range shown in Table 2-1.

IMPORTANT Avoid unnecessary handling of the devices during calibration because your fingers are a heat source.

Mechanical Characteristics

Mechanical characteristics such as center conductor protrusion and pin depth are *not* performance specifications. They are, however, important supplemental characteristics related to electrical performance. Agilent Technologies verifies the mechanical characteristics of the devices in the kit with special gaging processes and electrical testing. This ensures that the device connectors do not exhibit any center conductor protrusion or improper pin depth when the kit leaves the factory.

"Gaging Connectors" on page 3-6 explains how to use gages to determine if the kit devices have maintained their mechanical integrity. Refer to Table 2-2 for typical and observed pin depth limits.

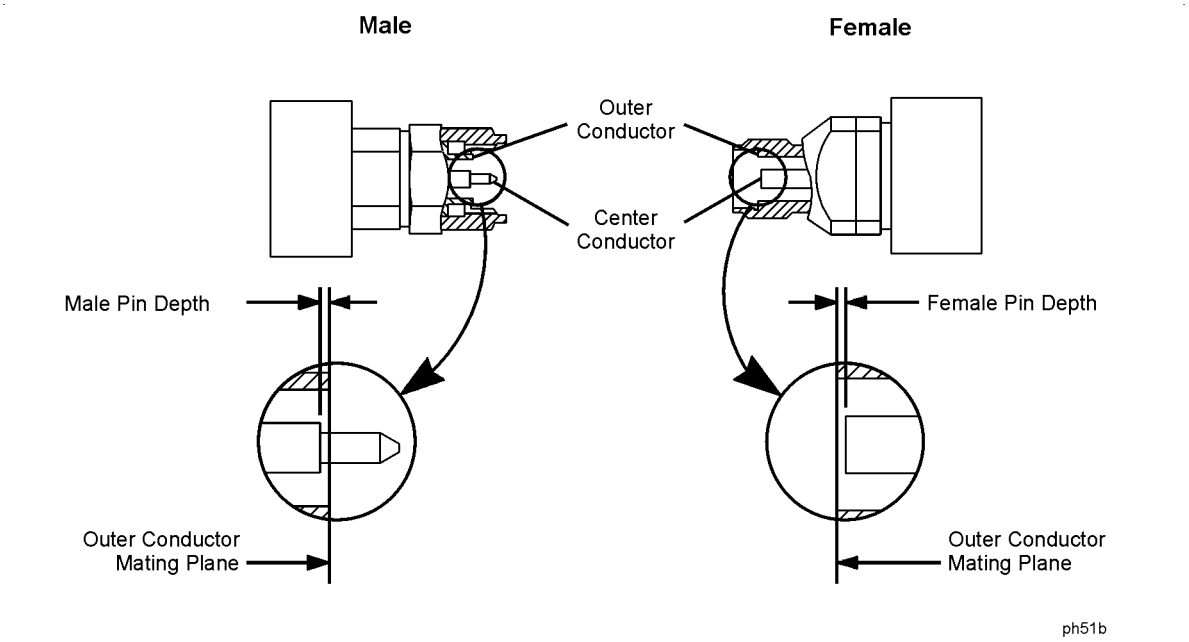
Pin Depth

Pin depth is the distance the center conductor mating plane differs from being flush with the outer conductor mating plane. See Figure 2-1. The pin depth of a connector can be in one of two states: either protruding or recessed.

Protrusion is the condition in which the center conductor extends beyond the outer conductor mating plane. This condition will indicate a positive value on the connector gage.

Recession is the condition in which the center conductor is set back from the outer conductor mating plane. This condition will indicate a negative value on the connector gage.

Figure 2-1 Connector Pin Depth



The pin depth value of each calibration device in the kit is not specified, but is an important mechanical parameter. The electrical performance of the device depends, to some extent, on its pin depth. The electrical specifications for each device in the kit take into account the effect of pin depth on the device's performance. Table 2-2 lists the typical pin depths and measurement uncertainties, and provides observed pin depth limits for the devices in the kit. If the pin depth of a device does not measure within the *observed* pin depth limits, it may be an indication that the device fails to meet electrical specifications. Refer to Figure 2-1 for a visual representation of proper pin depth (slightly recessed).

Table 2-2 Pin Depth Limits

Device	Typical Pin Depth	Measurement Uncertainty[a]	Observed Pin Depth Limits[b]
Opens	0 to –0.0127 mm 0 to –0.00050 in	+0.0064 to –0.0064 mm +0.00025 to –0.00025 in	+0.0064 to –0.0191 mm +0.00025 to –0.00075 in
Shorts	0 to –0.0127 mm 0 to –0.00050 in	+0.0041 to –0.0041 mm +0.00016 to –0.00016 in	+0.0041 to –0.0168 mm +0.00016 to –0.00066 in
Fixed loads	–0.0025 to –0.0254 mm –0.0001 to –0.0010 in	+0.0041 to –0.0041 mm +0.00016 to –0.00016 in	+0.0016 to –0.0295 mm +0.0006 to –0.00116 in
Adapter	–0.0025 to –0.0254 mm –0.0001 to –0.0010 in	+0.0041 to –0.0041 mm +0.00016 to –0.00016 in	+0.0016 to –0.0295 mm +0.0006 to –0.00116 in

a. Approximately +2 sigma to –2 sigma of gage uncertainty based on studies done at the factory according to recommended procedures.
b. Observed pin depth limits are the range of observation limits seen on the gage reading due to measurement uncertainty. The depth could still be within specifications.

Electrical Specifications

The electrical specifications in Table 2-3 apply to the devices in your calibration kit when connected with an Agilent precision interface.

Table 2-3 Electrical Specifications for 85052D 3.5 mm Devices

Device	Specification	Frequency (GHz)
Broadband loads (male and female)	Return loss ≥ 46 dB (ρ ≤ 0.00501) Return loss ≥ 44 dB (ρ ≤ 0.00631) Return loss ≥ 38 dB (ρ ≤ 0.01259) Return loss ≥ 36 dB (ρ ≤ 0.01585) Return loss ≥ 34 dB (ρ ≤ 0.01995)	dc to ≤ 2 > 2 to ≤ 3 > 3 to ≤ 8 > 8 to ≤ 20 > 20 to ≤ 26.5
Offset opens[a] (male and female)	±0.65° deviation from nominal ±1.20° deviation from nominal ±2.00° deviation from nominal ±2.00° deviation from nominal	dc to ≤ 3 > 3 to ≤ 8 > 8 to ≤ 20 > 20 to ≤ 26.5
Offset shorts[a] (male and female)	±0.50° deviation from nominal ±1.00° deviation from nominal ±1.75° deviation from nominal ±1.75° deviation from nominal	dc to ≤ 3 > 3 to ≤ 8 > 8 to ≤ 20 > 20 to ≤ 26.5
Adapters	Return loss ≥ 30 dB (ρ ≤ 0.03162) Return loss ≥ 28 dB (ρ ≤ 0.03981) Return loss ≥ 26 dB (ρ ≤ 0.05012)	dc to ≤ 8 > 8 to ≤ 18 > 18 to ≤ 26.5

a. The specifications for the opens and shorts are given as allowed deviation from the nominal model as defined in the standard definitions (see "Nominal Standard Definitions" on page A-8).