2 Specifications

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
Relative humidity	Type tested, 0% to 95% at 40 °C, non-condensing

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 on page 2-5 for typical and observed pin depth limits.

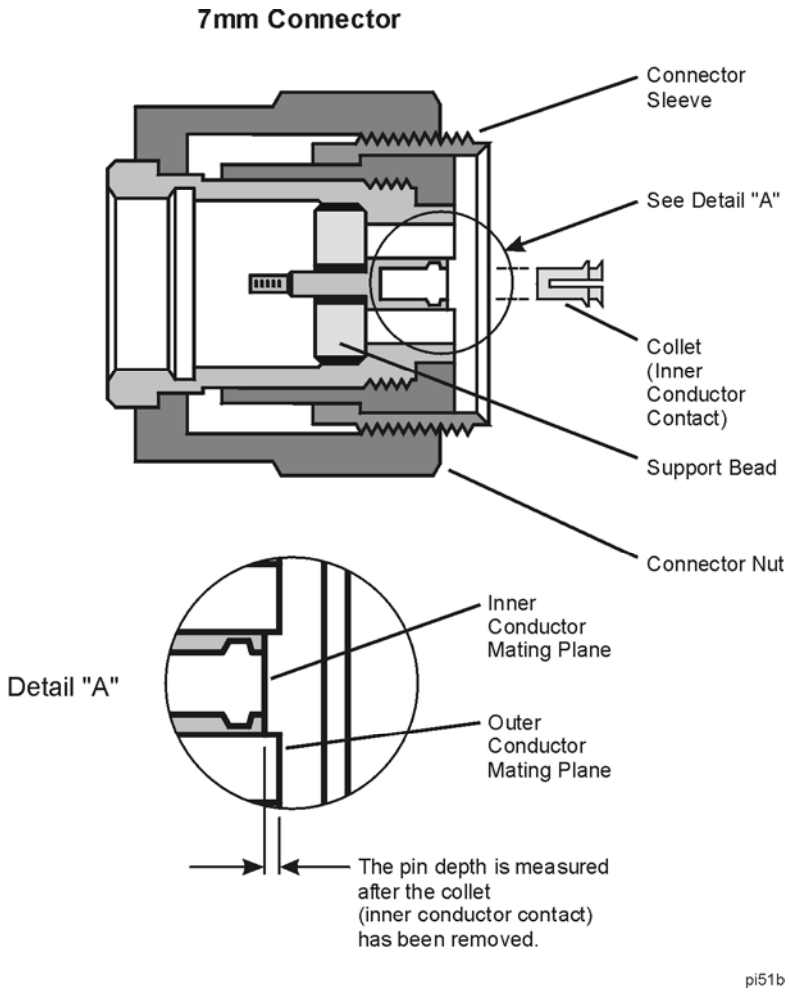
Pin Depth

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 micrometers (10^{-4} inches)	Measurement Uncertainty[a] micrometers (10^{-4} inches)	Observed Pin Depth Limits[b] micrometers (10^{-4} inches)
Opens	0 to –12.7 (0 to –5.0)	+10.2 to –10.2 (+ 4.0 to –4.0)	+10.2 to –22.91 (+ 4.0 to –9.0)
Shorts	0 to –5.1 (0 to –2.0)	+6.4 to –6.4 (+ 2.5 to –2.5)	+6.4 to –11.4 (+ 2.5 to –4.5)
Broadband loads	0 to –7.62 (0 to –3.0)	+4.1 to –4.1 (+ 1.6 to –1.6)	+4.1 to –11.7 (+ 1.6 to –4.6)
Lowband loads	-5 to –63.5 (-2 to –25.0)	+4.1 to –4.1 (+ 1.6 to –1.6)	-0.9 to –67.6 (-0.4 to –26.6)
Sliding loads	0 to –7.6 (0 to –3.0)	+4.1 to –4.1 (+ 1.6 to –1.6)	+4.1 to –11.1 (+ 1.6 to –4.6)

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.

NOTE When measuring pin depth, the measured value (resultant average of three or more measurements) is *not* the true value. Always compare the measured value with the observed pin depth limits in Table 2-2 to evaluate the condition of device connectors.

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 85050B 7 mm Devices

Device	Specification	Frequency (GHz)
Lowband loads	≥ 52 dB Return loss	dc to 2 GHz
Broadband loads	≥ 38 dB Return loss	dc to 18 GHz
Sliding loads[a]	≥ 52dB Return loss	dc to 18 GHz[b]
Short[c] (collet style)	± 0.2° from nominal ± 0.3° from nominal ± 0.5° from nominal	dc to 2 GHz[d] 2 to 8 GHz[d] 8 to 18 GHz[d]
Open[c] (with collet pusher)	± 0.3° from nominal ± 0.4° from nominal ± 0.6° from nominal	dc to 2 GHz[d] 2 to 8 GHz[d] 8 to 18 GHz[d]

a. Assuming proper usage, the specifications for the residual return loss after calibration for the sliding load termination include:
   - the quality of the airline portions within the sliding load, combined with
   - the effective stability of the sliding element.

   Proper usage includes the following practices:
   - Connector mating surfaces are clean.
   - The changes in slide positioning are NOT done in equal steps since this results in very poor calibration for some portions of the frequency range.
   - The center conductor of test port connectors are nominally set back from the outer conductor.

   Sliding loads are designed to allow the center conductor to be moved. The position of the sliding load center conductor should be set by a reference block and not positioned flush against the center conductor of the test port.

b. The ratio of center conductor diameter to outer conductor diameter is selected from the mechanical tolerance range to meet electrical specifications.

c. The specifications for the opens and shorts are given as allowed deviation from the nominal model as defined in the standard definitions.

d. Nominal, in this case, means the electrical characteristics as defined by the calibration definitions downloaded from the Web at http:na.tm.agilent.com/pna/caldefs/stddefs.html