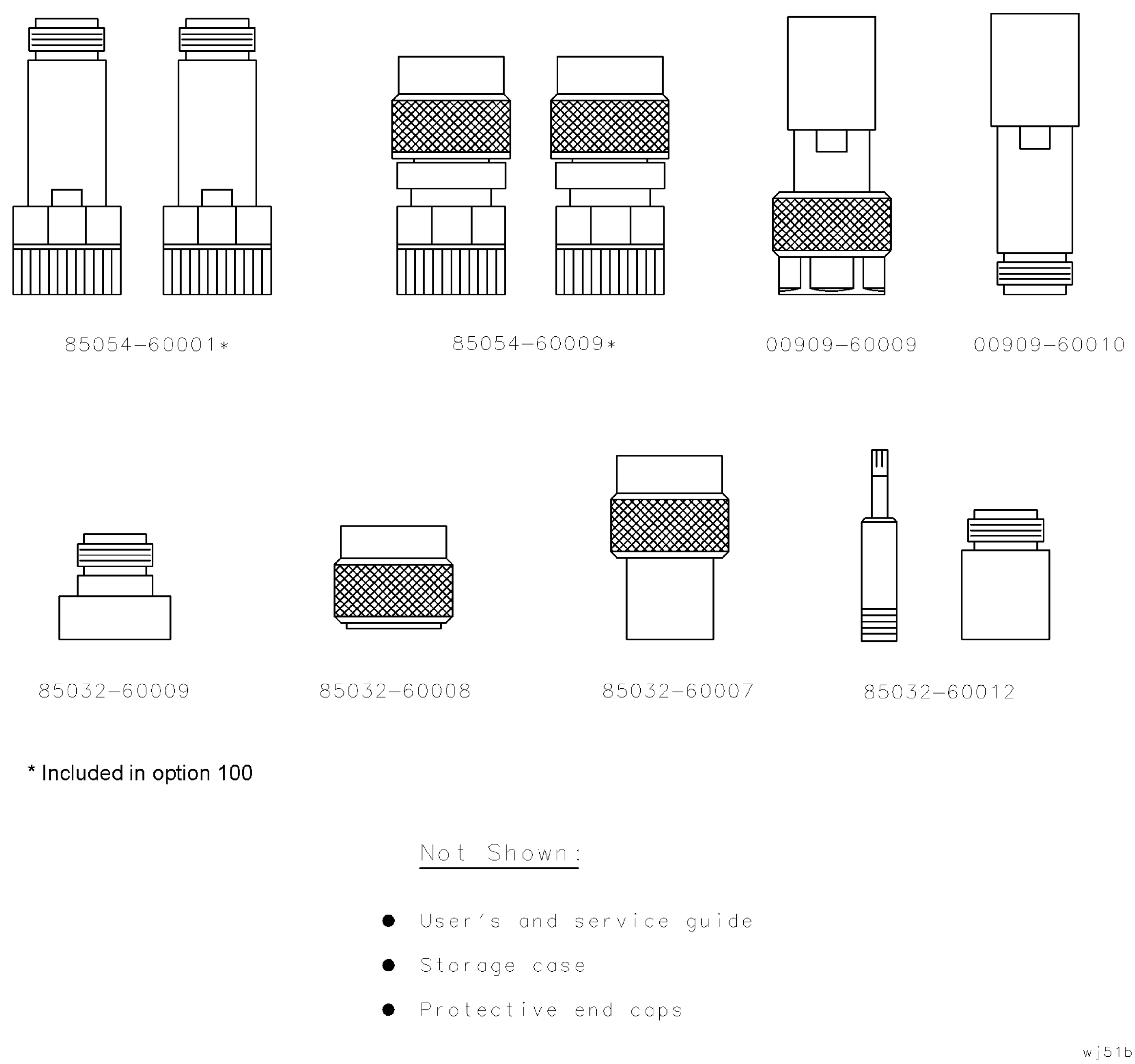
d. Refer to "Printing Copies of Documentation from the Web" on page -iii

**Figure 6-1 Replaceable Parts for the 85032B Calibration Kit**



# 2 Specifications

# Environmental Requirements

**NOTE** Samples of this product have been type-tested in accordance with the Agilent Environmental Test Manual and verified to be robust against the environmental stresses of storage, transportation and end-use; those stresses include but are not limited to temperature, humidity, shock, vibration, altitude and power-line conditions. Test methods are aligned with IEC 60068-2 and levels are similar to MIL-PRF-28800F Class 3.

**Table 2-1 Environmental Requirements**

| Parameter | Limits |
|---|---|
| Operating temperature[a] | +15 °C to +35 °C (+59 °F to +95 °F) |
| Error-corrected temperature range[b] | ±1 °C of measurement calibration temperature |
| Storage temperature | –40 °C to +75 °C (–40 °F to +167 °F) |
| Altitude | |
| Operation | < 4,500 meters (≈15,000 feet) |
| Storage | < 15,000 meters (≈50,000 feet) |
| 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 specified 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 this kit with special gaging processes and electrical testing. This ensures that the device connectors do not exhibit any 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 2-4 for typical and observed pin depth limits.)

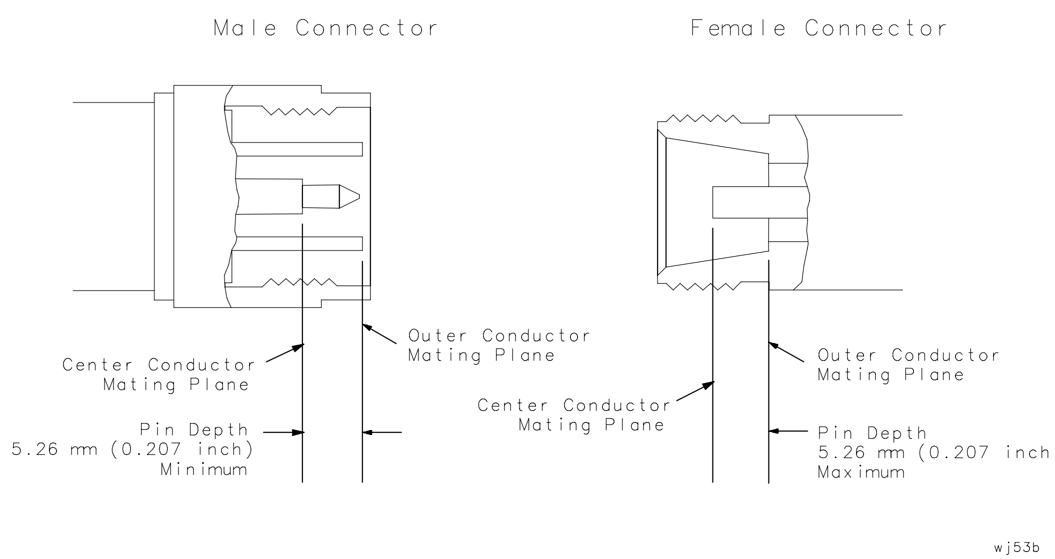
## Pin Depth

Pin depth is the distance the center conductor mating plane differs from being flush with the outer conductor mating plane. Refer to Figure 2-1. Some coaxial connectors, such as 2.4 mm and 3.5 mm, are designed to have these planes nearly flush. Type-N connectors, however, are designed with a pin depth offset of approximately 5.26 mm (0.207 inch), not permitting these planes to be flush. The male center conductors are recessed by the offset value while the female center conductors compensate by protruding the same amount. This offset necessitates the redefining of pin depth with regard to protrusion and recession.

**Protrusion** refers to a male type-N connector center conductor having a pin depth value less than 5.26 mm (0.207 inch), or a female type-N connector center conductor having a pin depth value greater than 5.26 mm (0.207 inch).

**Recession** refers to a male type-N connector center conductor having a pin depth value greater than 5.26 mm (0.207 in), or a female type-N connector center conductor having a pin depth value less than 5.26 mm (0.207 inch).

**Figure 2-1 Connector Pin Depth**



**NOTE** The gages for measuring type-N connectors compensate for the designed offset of 5.26 mm (0.207 inch), therefore, protrusion and recession readings are in relation to a *zero* reference plane (as if the inner and outer conductor planes were intended to be flush). Gage readings can be directly compared with the *observed* values listed in Table 2-2.

The pin depth value of each calibration device in this 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 this 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 an illustration of pin depth in type-N connectors.

**Table 2-2 Pin Depth Limit**

| Device | Typical Pin Depth | Measurement Uncertainty[a] | Observed Pin Depth Limits[b] |
|---|---|---|---|
| Opens | Not Applicable | Not Applicable | Not Applicable |
| Shorts | 0 to –0.003 in | +0.00015 to –0.00015 in | +0.00015 to –0.00315 in |
| Fixed Loads | 0 to –0.0020 in | +0.00015 to –0.00015 in | +0.00015 to –0.00215 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 50Ω Type-N Devices**

| Device | Specification | Frequency (GHz) |
|---|---|---|
| Loads | Return loss ≥ 49 dB (ρ ≤ 0.00355) | DC to ≤ 2 |
| | Return loss ≥ 46 dB (ρ ≤ 0.00501) | > 2 to ≤ 3 |
| | Return loss ≥ 40 dB (ρ ≤ 0.01000) | > 3 to ≤ 6 |
| Female open[a] | ±0.501 ° ±0.484 °/GHz deviation from nominal | DC to ≤ 6 |
| Female short[a] | ±0.490 ° ±0.385 °/GHz deviation from nominal | DC to ≤ 6 |
| Male open[a] | ±0.501 ° ±0.234 °/GHz deviation from nominal | DC to ≤ 6 |
| Male short[a] | ±0.441 ° ±0.444 °/GHz deviation from nominal | DC to ≤ 6 |
| Adapters (type-N to 7-mm) | Return loss ≥ 30 dB (ρ ≤ 0.03162) | DC to ≤ 6 |

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

## Certification

Agilent Technologies certifies that this product met its published specifications at the time of shipment from the factory. Agilent further certifies that its calibration measurements are traceable to the United States National Institute of Standards and Technology (NIST) to the extent allowed by the institute's calibration facility, and to the calibration facilities of other International Standards Organization members. See "How Agilent Verifies the Devices in This Kit" on page 4-2 for more information.

## Supplemental Electrical Characteristics

Supplemental electrical characteristics are values which are typically met by a majority of the calibration kit devices tested. These supplemental characteristics are intended to provide information in calibration kit applications by giving typical, but non-warranted, performance parameters. Table 2-4 lists the typical electrical characteristics of the 50Ω loads and adapters in the 85032B/E calibration kit.

**Table 2-4 Supplemental Electrical Characteristics**

| Device | Specification | Frequency (GHz) |
|---|---|---|
| Loads | Return loss ≥ 23 dB (ρ ≤ 0.07079) | > 6 to ≤ 18 |
| Adapters (type-N to 7-mm) | Return loss ≥ 34 dB (ρ ≤ 0.01995) | DC to ≤ 8 |
| | Return loss ≥ 28 dB (ρ ≤ 0.03981) | > 8 to ≤ 18 |