

## Section 2. Specifications

This section provides the environmental, mechanical and electrical specifications for the devices in the HP 85052A 3.5 mm calibration kit.

### ENVIRONMENT

Table 2-1 lists the environmental specifications for the devices in the HP 85052A 3.5 mm calibration kit.

Table 2-1. Environmental Specifications

Calibration Temperature	+20° to +26° (+68° to +79°F)
Accuracy Enhanced Operating Temperature	Calibration Temperature $\pm 1^{\circ}\text{C}$ (1.8°F)
Barometric Pressure Operation Storage	<4,500 metres (15,000 feet) <15,000 metres (50,000 feet)
Relative Humidity Operation Storage	Non-Condensing at All Times 20-80% (26°C maximum dry bulb temperature) 5 to 95%

### Temperature

Temperature of the calibration devices is critical because device dimensions (and therefore electrical characteristics) change with temperature. The temperature of the calibration devices and all connectors must be stable before use.

After measurement calibration, performance verification and actual device measurements must be made within the accuracy enhanced operating temperature specification. This is true even if the accuracy enhanced operating temperature falls outside of the calibration temperature window.

Example. If measurement calibration is performed at +20°C (+68°F), verification and measurements must be made between +19°C (+66.2°F) and +21°C (+69.8°F). Also, if the accuracy enhanced operating temperature deviates from the allowable range a new measurement calibration must be performed to assure optimum accuracy.

Remember that your fingers are a heat source, so avoid unnecessary handling of the devices during calibration.

### Barometric Pressure and Relative Humidity

Barometric pressure and relative humidity also affect device performance. Air exists between the inner and outer conductors of these devices and the dielectric constant of air depends on pressure and humidity.

## MECHANICAL SPECIFICATIONS

Table 2-2 lists and Figure 2-1 shows the allowable center conductor recessions for the devices in the HP 85052A 3.5 mm calibration kit.

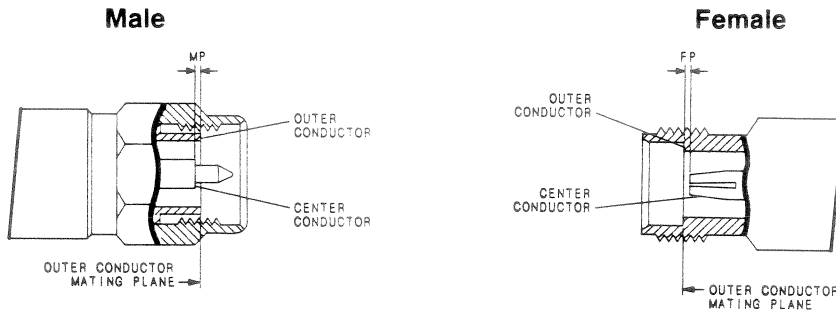
Table 2-2. Mechanical Specifications

3.5 mm Connectors	Allowable Recession
Devices and adapters (unless stated otherwise)	0.000 to +0.003 in 0.000 to +0.08 mm
Sliding Load	set by user
15 cm Airline* (Option 010)	0.0000 to +0.0005 in 0.000 to +0.013 mm
*The recession of the airline is predetermined from the relationship between the length of the outer conductor to the length of the inner conductor.	

No protrusion of the shoulder of the male conductor pin or of the tip of the female contact fingers in front of the outer conductor mating plane is allowable on *any* 3.5 mm connectors.

Note that a positive number shows a recession for 3.5 mm connectors while a negative number shows a recession for 7 mm connectors.

### Fixed Load Terminators



### Short Circuit

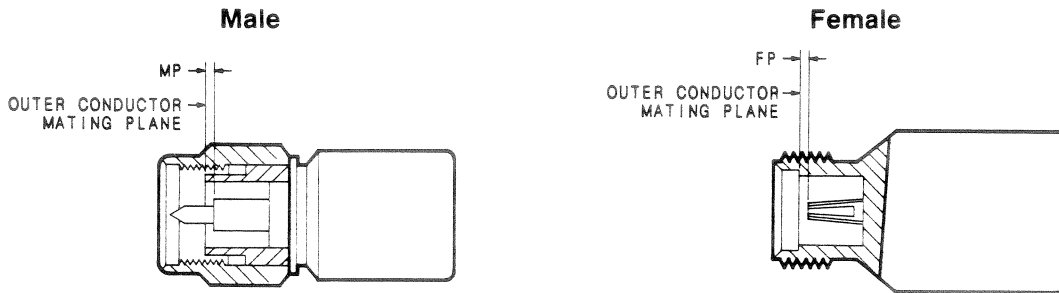


Figure 2-1. 3.5 mm Short Circuit and Fixed Load Terminations

**MP** = recession of the male contact pin shoulder behind the outer conductor mating plane.

**FP** = recession of the end of female center pin behind the outer conductor mating plane.

Figures 2-2 and 2-3 illustrate the mechanical dimensions of the open circuit termination, the sliding load termination and the 15 cm beadless airline that are included in the HP 85052A 3.5 mm calibration kit.

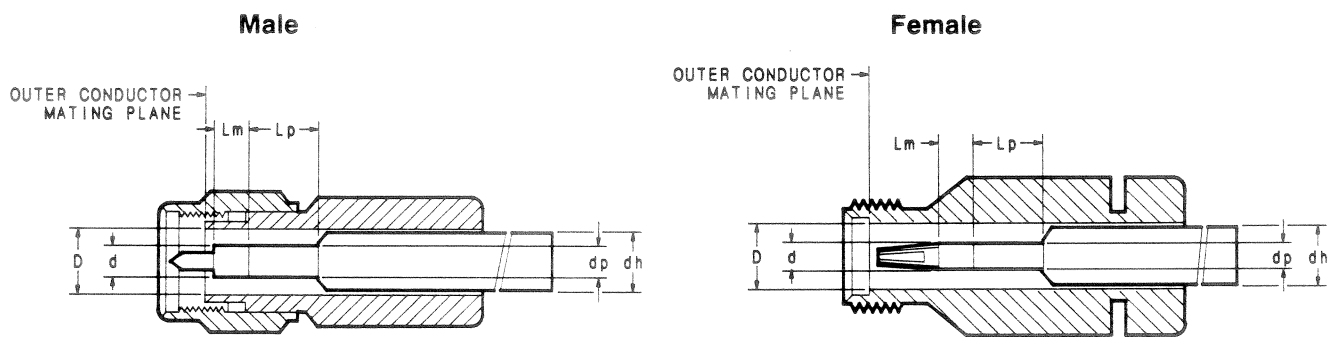
If you wish to make the measurements shown in Figures 2-2 or 2-3, the expected electrical performance of the devices can be calculated from the equations in these two publications:

Nelson, Robert E., and Marlene R. Coryell, "Electrical Parameters of Precision, Coaxial, Air-Dielectric Transmission Lines", U.S. National Bureau of Standards Monograph No. 96.

Somlo, P.I., "The Computation of Coaxial Line Step Capacitances", IEEE Transactions on Microwave Theory and Techniques, Volume MTT-15, No. 1, January, 1967.

This measurement method may be used for a general idea of the expected device characteristic impedance. Variations in connector interfaces can have a large effect on your actual electrical measurements.

### Open Circuit



Mechanical Dimensions	
$D = 0.1378 \pm 0.0003$ in $0.500 \pm 0.008$ mm	$L_m = 0.171 \pm 0.001$ in $4.343 \pm 0.025$ mm
$d = 0.05984 \pm 0.0003$ in $1.520 \pm 0.008$ mm	
$d_p = 0.060 \pm 0.002$ in $1.52 \pm 0.05$ mm	$L_p = 0.250 \pm 0.005$ in $6.35 \pm 0.13$ mm
$d_h = 0.1370 \begin{matrix} + 0.0000 \\ - 0.0010 \end{matrix}$ in $3.480 \begin{matrix} + 0.000 \\ - 0.025 \end{matrix}$ mm	
Concentricity < 0.003 FIM(TIR)	

Figure 2-2. Open Circuit Termination

### SLIDING LOAD (HP 1250-1891)

#### Diameters

<b>D</b> (outer conductor)	0.1378 ± 0.0003 in 3.500 ± 0.008 mm
<b>d</b> (center conductor)	0.05984 ± 0.0002 in 1.520 ± 0.005 mm

#### Straightness

<b>D</b> (outer conductor)	0.0002/in	0.002 mm/cm
<b>d</b> (center conductor)	0.0003/in	0.003 mm/cm

### 15 cm BEADLESS AIRLINE (HP 1250-1876)

#### Diameters

<b>D</b> (outer conductor)	0.1378 ± 0.00025 in 3.500 ± 0.008 mm
<b>d</b> (center conductor)	0.05984 ± 0.0002 in 1.520 ± 0.005 mm

#### Outer Conductor Length

Length	5.899 ± 0.0005 in 149.83 ± 0.013 mm
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#### Straightness

<b>D</b> (outer conductor)	0.0002/in	0.002 mm/cm
<b>d</b> (center conductor)	0.0003/in	0.003 mm/cm

#### Length Difference

Length of center conductor in relation to outer conductor	0.0000 to +0.0005 in 0.000 to +0.013 mm
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Figure 2-3. Sliding Load and Airline Dimensions

## ELECTRICAL SPECIFICATIONS

The electrical specifications of the devices in the HP 85052A 3.5 mm calibration kit are listed in Table 2-3. Note that the specifications for the 15 cm airline and the sliding load termination include the airline portions *only*.

Table 2-3. Electrical Specifications

Device	Specification
Fixed Loads	> 36 dB Return Loss, DC to 2 GHz
Sliding Load	> 42 dB Return Loss, 2 to 26.5 GHz airline portion <i>only</i> *
15 cm Airline (Option 010)	> 44 dB Return Loss, 2 to 26.5 GHz airline portion <i>only</i> *
Short Circuit	$\pm 2.6$ degrees, DC to 26.5 GHz $\pm 1^\circ$ average deviation
Open Circuit	$\pm 2.6$ degrees, DC to 26.5 GHz $\pm 1^\circ$ average deviation
* The connector interfaces on the sliding load termination and the airline, and the sliding load element on the sliding load are excluded from these specifications.	