Besides general mechanical and electrical data, INGUN provides s-parameter measurement graphs for several product types in the 2009/2010 edition of the RF catalog. You can find a downloadable version of the catalog on our website www.ingun.com.
Radio-frequency Test Probes

Radio-frequency Test Probes are mainly used for measuring high-frequency signals (up to 6 GHz.). These Test Probes are designed co-axially, i.e. the measurement signals flow via the inner conductor and the outer conductor is used for the shielding of the signals. For the connection to the Test System the applicable co-axial cables are available.

Application Examples:
- Sensitive measurement tasks with high measurement frequencies
- 4-pole measurements
- Contacting of common RF-Plugs and RF-Jacks
- Contacting of RF Test Points on PC-Boards
- Available in non-rotating version with a cut-out on the GND-Tip (i.e. for when the signal track on the PC-Board has been laid out accordingly)

Advantages
- Very good measurement reliability
- Compact and stable design
- Modular design for flexible exchange of individual components (Note: in the series HFS-810 the inner and outer conductors are interchangeable)
- Large variety of different tip-styles for various RF-Plugs and RF-Jacks
HFS 010
Coaxial Dipole Probe/RF-Test Probe, 50 Ω, 200 MHz

Mounting and Functional Dimensions

Connection for SE-010 V

Available Tip Styles

Inner Conductor

Tip Style

Plating

Further Versions

Material

Tip Style Tip Diameter

Further Versions

ø 0.50
A

Available Tip Styles

Outer Plunger

02

Materials

Plunger:
BeCu, gold-plated

Barrel:
Brass, gold-plated

Spring:
Steel, gold-plated

Receptacle:
Brass, gold-plated

Insulation:
Delrin

Note:
The Receptacle KS-010 23 can be used from Grid 3.00 mm (120 Mil) up.

Note:
The Inner Conductor has a fixed connection with the Probe and therefore cannot be changed.

The spring-loaded Outer Plunger of the HFS-010 is also available with a shorter assembly-length on request.

Ordering Example

Test Probe:
Plug with RF-Coaxial Cable pre-wired,
Length 0.75 m (Special Length on request):
Receptacle:

Series Tip Material Tip Style Tip Diameter (1/100 mm) Plating Spring Force (dN) Outer Plunger Type
H F S 0 1 0 C 5 1 0 5 0 A 2 0 0 2 A
S E - 0 1 0 V
K S - 0 1 0 2 3

Mechanical Data

Working Stroke: 5.5 mm (.217)
Maximum Stroke: 7.5 mm (.295)
Spring Force at Working Stroke
- Outer Conductor: 1.2 N (4.3oz)
- Inner Conductor: 0.8 N (2.9oz)

Electrical Data

Frequency Range:
up to 200 MHz
Current Rating:
3 A
Rt typical: < 20 mΩ
Impedance Test Probe:
25 - 30 Ω
Impedance Cable:
50 Ω/200 MHz
90 pF/m

Mounting Hole Size

with Receptacle: ø 2.48 - 2.49 mm (.0976 - .0980)
without Receptacle: ø 2.00 mm (.0787)

Operating Temperature

Standard:
-40 up to +80 °C

Test Probe:
SE - 010 V
KS - 010 23

All specifications are subject to change without prior notification.
### Mounting and Functional Dimensions

- **HFS-110 with Plug Connection for SE-110**
- **SE-110 V**

- **Grid:**
  - ≥ 4,50 mm
  - ≥ 177 Mil

- **Installation Height:** 9,5 mm (.374)
- **Recommended Stroke:** 4,0 mm (.157)

### Available Tip Styles

#### Inner Conductor

<table>
<thead>
<tr>
<th>Material</th>
<th>Tip Style</th>
<th>Plating</th>
<th>Further Versions</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 01</td>
<td>0,50 A</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>3 02</td>
<td>0,50 A</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>3 03</td>
<td>1,15 A</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>3 04</td>
<td>1,15 A</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>3 05</td>
<td>1,15 A</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>3 06</td>
<td>1,15 A</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>3 08</td>
<td>1,15 A</td>
<td>A</td>
<td></td>
</tr>
</tbody>
</table>

#### Outer Plunger

- **KS-110 23**

### Mechanical Data

- **Working Stroke:** 4,0 mm (.157)
- **Maximum Stroke:** 5,0 mm (.197)
- **Spring Force at Working Stroke**
  - **Outer Conductor:** 3,0 N (10.8oz)
  - **Inner Conductor:** 1,5 N (5.4oz)

### Electrical Data

- **Frequency Range:** up to 700 MHz
- **Current Rating:** 2 - 3 A
- **R<sub>i</sub>** typical:** < 20 mΩ
- **Impedance Test Probe:**
  - **50 - 60 Ω**
  - **700 MHz**
- **Impedance Cable:**
  - **50 Ω/200 MHz**
  - **96 pf/m**

### Materials

- **Plunger:** BeCu, gold-plated
- **Barrel:** Brass, gold-plated
- **Spring:** Steel, gold-plated
- **Receptacle:** Brass, gold-plated
- **Insulation:** Teflon

### Mounting Hole Size

- **With Receptacle:** Ø 3,98 - 3,99 mm
  - (.1567 - .1571)
- **Without Receptacle:** Ø 3,50 mm (.1378)

### Operating Temperature

- **Standard:** -40 up to +80 °C

### Note:

The Inner Conductor has a fixed connection with the Probe and therefore cannot be changed.

### Ordering Example

<table>
<thead>
<tr>
<th>Series</th>
<th>Test Probe</th>
<th>Tip Material</th>
<th>Tip Style</th>
<th>Tip Diameter (1/100 mm)</th>
<th>Plating A</th>
<th>Spring Force (dN)</th>
<th>Outer Plunger (alternative 06)</th>
<th>Type (alternative B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HFS 110</td>
<td>Plug with RF-Coaxial Cable pre-wired, Length 0,75 m (Special Length on request):</td>
<td>3 = BeCu</td>
<td>3</td>
<td>04</td>
<td>1 1 5</td>
<td>3 0</td>
<td>0 2</td>
<td>A</td>
</tr>
<tr>
<td>S E – 1 1 0 V</td>
<td>Cable Type: RG 178 B/U</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K S – 1 1 0 2 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

All specifications are subject to change without prior notification.
HFS 810 / 840
Coaxial RF-Test Probe, 50 Ω, 2 or 4 GHz

Mounting and Functional Dimensions

Spring Force
The Spring-Loaded Inner- and Outer Conductors are available with different Spring Forces (see „Mechanical Data“). To create the Ordering No. the individual values must be added together (see also „Ordering Example“ below).

<table>
<thead>
<tr>
<th>Spring Force of Inner Condutor (N)</th>
<th>Spring Force of Outer Condutor (N)</th>
<th>Character for ordering</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,3</td>
<td>4,0</td>
<td>53</td>
</tr>
<tr>
<td>2,0</td>
<td>4,0</td>
<td>60</td>
</tr>
<tr>
<td>1,3</td>
<td>8,0</td>
<td>93</td>
</tr>
<tr>
<td>2,0</td>
<td>8,0</td>
<td>99</td>
</tr>
</tbody>
</table>

Mechanical Data
Working Stroke: 4,0 mm (.157)
Maximum Stroke: 5,0 mm (.197)
Spring Force at Working Stroke: 1,3 N (4,7oz); 2,0 N (7.2oz)
Outer Cond.: 4,0 N (14,4oz); 8,0 N (28.8oz)
Inner Cond.: 1,3 N (4,7oz); 2,0 N (7.2oz)

Electrical Data
Frequency Range with HFS-810: bis 2 GHz
Frequency Range with HFS-840: bis 4 GHz
Frequency Range with HFS-860: bis 6 GHz
Current Rating:
- Outer Conductor: 8 - 10 A
- Inner Conductor: 2 - 3 A
Rt typical, Inner Conductor: ≤ 10 mΩ
Impedance Test Probe: 50 Ω
Impedance Cable: 50 Ω

Operating Temperature
Standard: -40 up to +80 °C

Materials Outconductor
Plunger: BeCu or Brass, gold-plated
Barrel: Brass, gold-plated
Spring: Stainless Steel
Receptacle: Brass, gold-plated
Insulation: Teflon

Materials Inner Conductor
Plunger: BeCu or Steel, gold-plated
Barrel: Bronze, gold-plated
Spring: Steel, gold-plated

Ordering Example

Test Probe with flat Outer Plunger:

Test Probe with serrated Outer Plunger:

MCX-Connector with RF-Coaxial Cable RG 316/U pre-wired, Length 0,7m (Special Length on request):
Receptacle:

Available Tip Styles for replaceable Inner Conductor

<table>
<thead>
<tr>
<th>Series</th>
<th>Tip Style</th>
<th>Plating</th>
<th>Further Versions</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>01</td>
<td>0,51</td>
<td>A</td>
</tr>
<tr>
<td>3</td>
<td>03</td>
<td>1,50</td>
<td>A, 0,90, 1,54</td>
</tr>
<tr>
<td>2</td>
<td>04</td>
<td>0,51</td>
<td>A</td>
</tr>
<tr>
<td>3</td>
<td>05</td>
<td>0,51</td>
<td>A</td>
</tr>
<tr>
<td>3</td>
<td>06</td>
<td>1,50</td>
<td>A</td>
</tr>
<tr>
<td>3</td>
<td>07</td>
<td>1,00</td>
<td>A</td>
</tr>
<tr>
<td>3</td>
<td>08</td>
<td>0,80</td>
<td>1,80 A</td>
</tr>
<tr>
<td>3</td>
<td>09</td>
<td>1,50</td>
<td>A</td>
</tr>
</tbody>
</table>

Inner Conductor replaceable
Ordering Example: GKS-051 201 051 A 1300

To change the inner-conductor, the outer plunger must be screwed off. Tools for disassembly and assembly: GS-810 SW 3,5 and GS-810 SW 4,0

Available Tip Styles

<table>
<thead>
<tr>
<th>Outer Plunger (secured against rotation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>02</td>
</tr>
<tr>
<td>02 S</td>
</tr>
<tr>
<td>06</td>
</tr>
<tr>
<td>06 S</td>
</tr>
</tbody>
</table>

Layout Suggestions
for above mentioned Standard Outer Plungers

Minimum Hole Size
with Receptacle KS 810: Ø 4,98 - 4,99 mm (.1961 - .1965)
with HAS-810 220: Ø 7,98 - 7,99 mm (.3142 - .3146)
without Receptacle: Ø 4,5 mm (.1772)
Coaxial RF-Test Probe, 50 Ω, 6 GHz

Application examples with various Special Plungers

The following overview of designs shows a small selection of the most common and already manufactured special solutions. The geometry of the individual components has been adjusted to those components which must be tested.

Note: In this case, it cannot be guaranteed that the upper frequency range can be reached without noise. Please note that in some cases special shapes and different dimensions are hidden behind the various Coax-Plug and Jack names such as „Fakra” or „MCX”.

For detailed information or further consulting in regard to the choice of tip-styles or regarding carrying out special developments for your specific demands, please contact our Design Department.

Contacting of BMA-Plugs, e.g.:
- **HFS-810 303 150 A 5302 D**
  Protruding Inner Plunger for contacting the lower set inner pin of a connector.

Contacting of Fakra-Plugs, e.g.:
- **HFS-810 303 150 A 5342 F**
  The protruding Outer Plunger reaches the connector first. The outer bevel sinks into the plastic housing of the connector and centres the Outer Plunger.

Contacting of SMB-Plugs, e.g.:
- **HFS-810 303 150 A 5343 Y**
  The protruding Outer Plunger engulfs the connector and centres it. After this the inner conductor is contacted with the Inner Probe of the HFS.

Contacting of PC-Boards:
- **HFS-810 201 051 A 5602 V2-18 S**
  Both Outer Conductors Plungers (Ground) are spring loaded and have a stroke of max. 2.0 mm (.079). Because both Plungers can travel individually this allows test pads with different heights to be contacted. Other positions for the spring-loaded Outer Plunger are available on request. The Inner Conductor (Sense) is designed as a rigid pin, which, however, is fixed to the base unit and therefore pressed in when the complete unit is activated.

### Mechanical Data,

- **Spring Force, Materials, Mounting Hole Size**

### Electrical Data

- **Frequency Range**: up to 6 GHz
- **Other values**: see HFS-810

### Contacting of "Switch Connectors"

- **HFS-860 305 051 A 5343 Y80**
  and **HFS-860 305 051 A 5343 Y82** see HFS-810

### Other solutions for 6 GHz-applications (W-LAN) on request.

### Connector, pre-wired with RF-Coaxial-Cable Multiflex for 6 GHz:

<table>
<thead>
<tr>
<th>Probe Side</th>
<th>SE-860 V-80</th>
<th>SE-860 V-MCX-W-80</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface Side</td>
<td>SMA-Plug, straight</td>
<td>SMA-Plug, straight</td>
</tr>
<tr>
<td>Cable length</td>
<td>0,8 m</td>
<td>0,8 m</td>
</tr>
</tbody>
</table>

**Note:**

- Grid: $\geq 5.50 \text{ mm}$, $\geq 217 \text{ Mil}$
- Installation Height: see below
- Recommended Stroke: 4.0 mm (.157)