

Robust Precision Interface up to 90 GHz

RPC-1.35 Connectors

TEST & MEASUREMENT





Company Profile

About Rosenberger

Rosenberger, a family owned company, is one of the world's leading manufacturers of impedance-controlled connectivity solutions in high-frequency, high-voltage and fiberoptic technology. Renowned companies in high-tech industries trust the precision and quality of Rosenberger products, e.g. mobile communication networks, data centers, test & measurement industries, automotive electronics, industrial and medical electronics, or aerospace engineering.

Worldwide, the Rosenberger group operates a global network of R&D, manufacturing and assembly locations as well as Rosenberger sales offices in Europe, Asia and North and South America where more than 10,000 employees develop, produce and sell our products.

Test & Measurement

Rosenberger is a dependable and renowned development partner in industrial measurement technology. The fact that we work with leading global companies from the electronic measurement technology field reflects the way that others trust our research and development, our high-quality manufacturing, and not least our customer-orientated "Made in Germany" service. Rosenberger provides customized solutions – cost-optimized and timely – from the initial idea right through to volume production.

Rosenberger develops and produces a comprehensive range of cost-effective, high-quality and high-precision test & measurement products and services – microwave measurements & VNA calibrations, lab and factory testing, semiconductor test applications, PCB connections or network testing.



RPC-1.35 - Precision Coaxial 1.35 mm Connectors

Due to the expanding market for 5G, industrial sensors in the E-Band, millimeter wave sensors for self-driving vehicles and WLAN IEEE 802.11ax and 802.11ay, there is a growing demand for proper RF-connections up to 90 GHz.

For achieving good RF performance, especially for applications in the range of 60 to 90 GHz (E-Band) a reliable coaxial interface connection is crucial. The unwanted unlocking of 1.00 mm coaxial thread which results in time-consuming calibrations are a common frustration in RF laboratories. The idea of a 1.35 mm connector, the E Connector, with a precise metric thread like the 1.85 mm connector and an integrated time-saving push-pull capability arise from these issues.

The 1.35 mm connector is perfect to carry out high-performance RF measurements in the E-Band without delays through fragile 1.00 mm coaxial connectors or reassembling WR 10 waveguide.

A working group consisting of:

- Physikalisch-Technische-Bundesanstalt PTB (Germany's national metrology institute)
- Rosenberger Hochfrequenztechnik GmbH & Co. KG
- Rohde & Schwarz GmbH & Co. KG
- Spinner GmbH

has designed the new 1.35 mm E Connector to close the gap between 1.85 mm and 1.00 mm connectors.

The standardization of the 1.35 mm interface is in progress for IEC (IEC 61169-65) and for IEEE (IEEE Std 287), therefore a manufacturer-independent supply of the new 1.35 E Connector is ensured.

| RPC-1.85 | RPC-1.35 | RPC-1.00 |
|---|--|--|
| 70 GHz | 90 GHz | 110 GHz |
| IEC 61169-32 V Connectors <ul style="list-style-type: none"> Single-mode operation up to 65 GHz (70 GHz) Robust, reliable design | IEC 61169-65 (in progress) E Connectors <ul style="list-style-type: none"> Single-mode operation up to 90 GHz Robust, reliable design | IEC 61169-31 W Connectors <ul style="list-style-type: none"> Single-mode operation up to 110 GHz Drawbacks <ul style="list-style-type: none"> Unintended unlocking caused by coarse coupling thread M4 x 0.7 Possible connector damage due to eccentricities Unnecessarily small/fragile for applications in the range of 70 to 90 GHz Pin diameter different from inner conductor diameter of any standard semi-rigid cable |

RPC-1.35 Characteristics

Target Specifications

- Operating frequency DC up to 90 GHz, E-Band
- Highly robust mechanics
 - minimum 3000 mating cycles
 - locking by threaded coupling nut that sufficiently secures against unintended opening
- Precision interface
 - well-defined reference plane
 - maximized return loss
 - high connector repeatability
 - suitable for precision S-parameter measurement
 - design similar to 1.85 mm connector
- "thru male" capability, i.e. pin diameter must coincide with inner conductor of standard 0.047-inch semi-rigid cable (largest cable covering the E-Band)
- Push-pull coupling as an option

Special Design Features

- Only precision connector which ensures a pin gap in mated condition to avoid near field effects from impairing connector repeatability
- Only precision connector which uses a common reference for all eccentricity tolerances to prevent for a tolerance chain
- Only precision connector for higher frequencies with a provision for push-pull locking
- High-quality low budget jumper cables possible, because pin diameter is equal to ~~centre~~ conductor of 0.047-inch semi-rigid cables.
- Can be used with the same torque wrench as most precision connectors (3.50 mm, 2.92 mm, 2.40 mm, 1.85 mm)



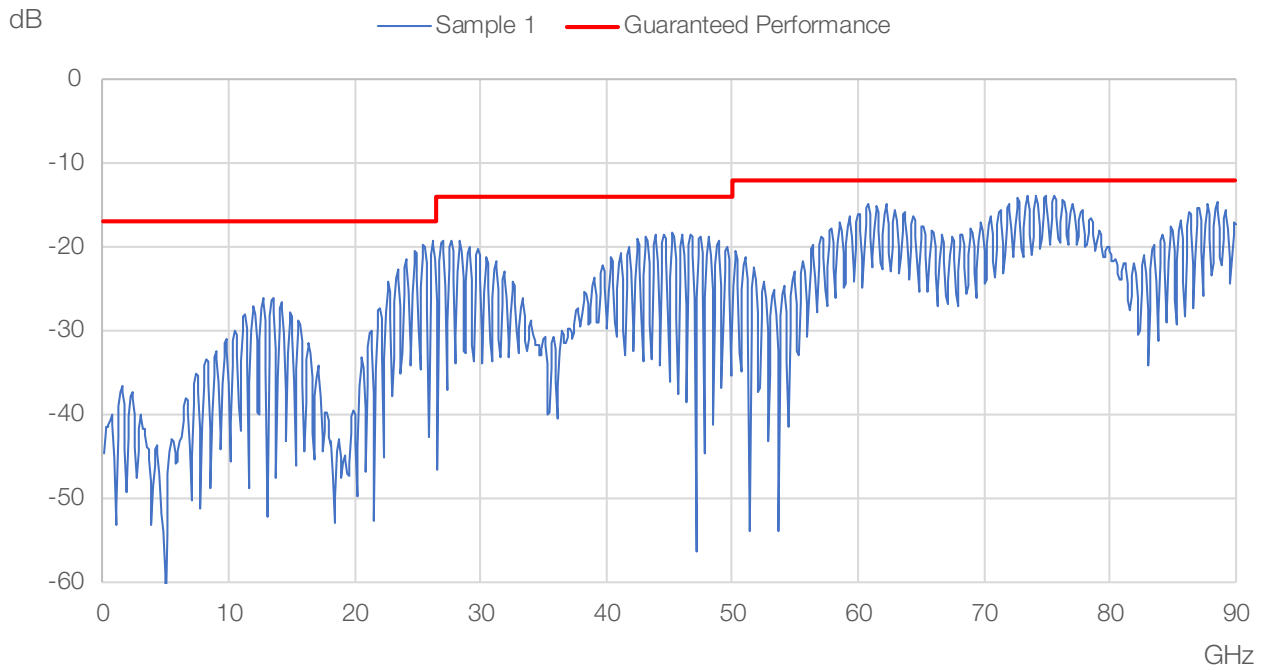
Comparison of Technical Data

| Technical Data | 1.85 mm/V Connector | 1.35 mm/E Connector | 1.00 mm/W Connector |
|----------------------------|---|--|---|
| Upper operating frequency | 65 (70) GHz | 90 GHz | 110 GHz |
| Cut-off frequency | 72 GHz | 98 GHz | 133 GHz |
| Outer conductor diameter | 1.85 mm | 1.35 mm | 1.00 mm |
| Inner conductor diameter | 0.8036 mm | 0.586 mm | 0.434 mm |
| Pin diameter | 511 μ m | 290 μ m | 250 μ m |
| Thread | M7 x 0.75 | M5.5 x 0.5 | M4 x 0.7 |
| Coupling torque | 0.9 Nm | 0.9 Nm | 0.45 Nm |
| Flat wrench size | 8 mm | 8 mm | 6 mm |
| Optional push-pull locking | No | Yes | No |
| Mating Cycles | > 500 (IEC) | > 3000 | > 500 (IEC) |
| |  |  |  |

Advantages 1.35 mm Connector Series

- Optimized for frequently used bands
- Allows "thru male" design with multiple cables
- Thread and coupling torque prevents unintended opening

Typical Reflection of L70-324-140



Product Portfolio

Semi-Rigid Cable Assemblies

| Rosenberger No. ¹⁾ | Connector 1 | Connector 2 | Return Loss |
|-------------------------------|---------------|---------------|--|
| L70-324-XXX | RPC-1.35 male | RPC-1.35 male | ≥ 17 dB, DC to 26.5 GHz ≥ 14 dB, 26.5 GHz to 50 GHz ≥ 12 dB, 50 GHz to 90 GHz |

Flexible Cable Assemblies

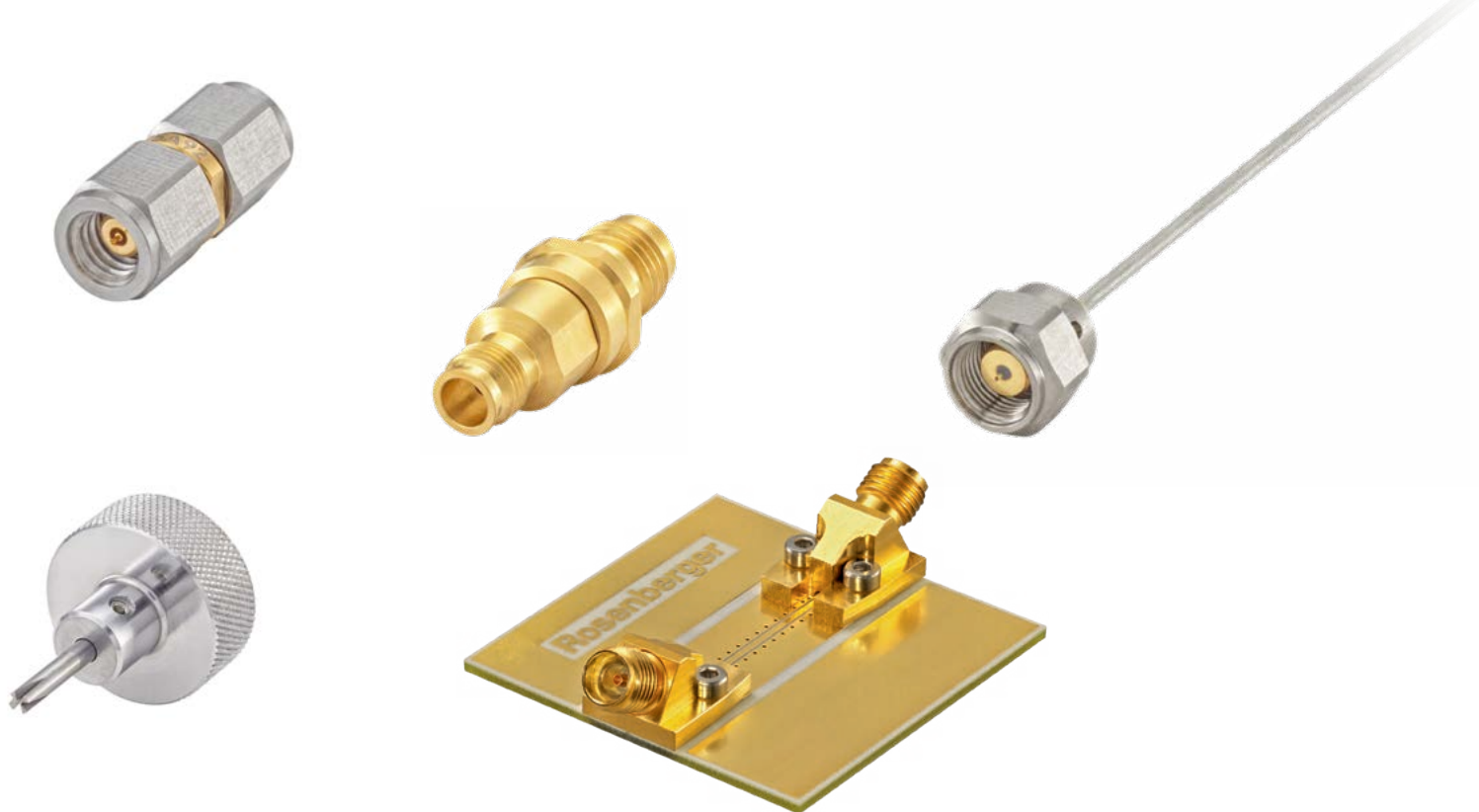
| Rosenberger No. ¹⁾ | Connector 1 | Connector 2 | Return Loss |
|-------------------------------|---------------|---------------|--|
| L70-345-XXX | RPC-1.35 male | RPC-1.35 male | ≥ 17 dB, DC to 50 GHz ≥ 14 dB, 50 GHz to 90 GHz |
| L70-346-XXX | RPC-1.35 male | RPC-1.85 male | ≥ 17 dB, DC to 50 GHz ≥ 14 dB, 50 GHz to 70 GHz |
| L70-347-XXX | RPC-1.00 male | RPC-1.35 male | ≥ 17 dB, DC to 50 GHz ≥ 14 dB, 50 GHz to 90 GHz |

1) XXX: Please fill in the requested length. Standard = 140 mm

PCB Connectors

| Rosenberger No. | Version | Remarks | Return Loss |
|-----------------|-------------|--|--|
| P9K80A-40ML5 | 30° Angle | Solderless PCB connector, female Can be screwed anywhere on the board without soldering | ≥ 21 dB, DC to 26.5 GHz ≥ 19 dB, 26.5 GHz to 40 GHz ≥ 17 dB, 40 GHz to 60 GHz ≥ 14 dB, 60 GHz to 70 GHz ≥ 12 dB, 70 GHz to 90 GHz |
| P9K241-40ML5 | Right Angle | Soldered PCB connector, female Edge mount | ≥ 20 dB, DC to 40 GHz ≥ 14 dB, 40 GHz to 70 GHz ≥ 12 dB, 70 GHz to 90 GHz |

For specific details refer to the technical data sheets in our online catalog.
www.rosenberger.com/ok

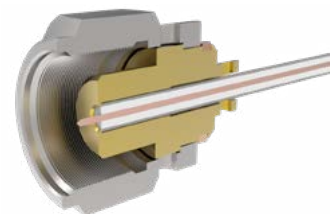


Test PCBs

| Rosenberger No. | Connector | Return Loss |
|-----------------|------------------|---------------------------|
| PCB-K2702D-SB | 2 x P9K80A-40ML5 | ≥ 12 dB, DC to 70 GHz |
| PCB-S2402-SB | 2 x P9K241-40ML5 | ≥ 10 dB, 70 GHz to 90 GHz |

Cable Connectors

| Rosenberger No. | Version | Remarks | Return Loss |
|-----------------|----------|--|---|
| P9S101-270E | Straight | Cable inner contact is connector pin Pin diameter matches semi rigid cable 0.047" | ≥ 23 dB, DC to 26.5 GHz ≥ 20 dB, 26.5 GHz to 50 GHz ≥ 18 dB, 50 GHz to 90 GHz |



Tools

| Rosenberger No. | Remarks |
|-----------------|---|
| P9W001-000 | Soldering fixture for outer conductor of P9S101-270E |
| P9W002-000 | Cutting bit to sharp the center conductor 0.047-inch semi-rigid cable |
| 03W008-000 | Combi Wrench with 5 mm, 6 mm, 7 mm and 8 mm across flats |
| 03W021-000 | Torque Wrench with 8 mm across flats, 0.90 Nm |



Product Portfolio

In-Series Adaptors

| Rosenberger No. | Version | Interface | Return Loss |
|-----------------|----------|-----------------------------------|---------------------------|
| P9K121-K00D3 | Straight | RPC-1.35 female – RPC-1.35 female | ≥ 28 dB, DC to 20 GHz |
| P9S121-K00D3 | Straight | RPC-1.35 male – RPC-1.35 female | ≥ 19 dB, 20 GHz to 40 GHz |
| P9S121-S00D3 | Straight | RPC-1.35 male – RPC-1.35 male | ≥ 17 dB, 40 GHz to 90 GHz |

Inter-Series Adaptors

| Rosenberger No. | Version | Interface | Return Loss |
|-----------------|----------|-----------------------------------|---------------------------|
| P9K101-K00D3 | Straight | RPC-1.35 female – RPC-1.00 female | ≥ 28 dB, DC to 20 GHz |
| P9S101-S00D3 | Straight | RPC-1.35 male – RPC-1.00 male | ≥ 20 dB, 20 GHz to 40 GHz |
| P9K108-K00D3 | Straight | RPC-1.35 female – RPC-1.85 female | ≥ 17 dB, 40 GHz to 90 GHz |
| P9S108-S00D3 | Straight | RPC-1.35 male – RPC-1.85 male | ≥ 28 dB, DC to 20 GHz |
| | | | ≥ 20 dB, 20 GHz to 50 GHz |
| | | | ≥ 17 dB, 50 GHz to 70 GHz |



Floating Adaptor

| Rosenberger No. | DUT Device Under Test | Adaptor | | Return Loss |
|-----------------|--------------------------|------------------------------|--------------------------------|--|
| | | Connector Floating – Side | Connector Fixed – Port Side | |
| P9K721-S23S3 | RPC-1.35 female | RPC-1.35 male | RPC-1.35 female | ≥ 16 dB, DC to 40 GHz ≥ 14 dB, 40 GHz to 90 GHz |

Test-Port Adaptor

| Rosenberger No. | Interface | Return Loss |
|-----------------|---|--|
| 01KR1P9-K0AS3 | RPC-1.00 female, ruggedized – RPC-1.35 female | ≥ 28 dB, DC to 20 GHz ≥ 19 dB, 20 GHz to 40 GHz ≥ 17 dB, 40 GHz to 90 GHz |

Waveguide-to-Coaxial Adaptors

| Rosenberger No. | Version | Interface | Frequency Range | Return Loss |
|-----------------|----------|-------------------------|------------------|--------------|
| P9K620-385 | Straight | RPC-1.35 female – WR-15 | 50 GHz to 75 GHz | ≥ 16 dB |
| P9S620-385 | Straight | RPC-1.35 male – WR-15 | | |
| P9K740-387 | Straight | RPC-1.35 female – WR-12 | 60 GHz to 90 GHz | |
| P9S740-387 | Straight | RPC-1.35 male - WR-12 | | |



Product Portfolio

Gauge Kit

The mechanical gauging of connectors is essential to ensure correct fit and to achieve the best performance. This means that all coaxial connectors fitted on all equipment, cables and terminations etc. should be gauged on a regular basis in order to detect any out of tolerance conditions that may impair the electrical performance. Inner conductor protrusion can damage the equipment and recession can influence the electrical measurement. For details please see the operating manual.

| Rosenberger No. | Remarks |
|-----------------|--|
| P9GK0KS-010 | Rosenberger gauge kits are delivered in a stable wooden box with gauge male/female incl. gauge block male/female |

Calibration Kits

Rosenberger calibration kits are delivered in stable wooden boxes including factory calibration certificate.

| Rosenberger No. | Remarks |
|-----------------|--|
| P9CK001-150 | Full version with open, short, load in male and female, in-series adaptors male/male and female/female, torque wrench, combi wrench and gauges male/female incl. gauge block male/female |
| P9CK010-150 | Industrial version with open, short, load as male and female, in-series adaptors male/male and female/female, torque wrench and combi wrench |

All parts from the calibration kits and gauge kits (calibration standards, calibration adaptors, gauges) are also available as separate parts.





Website

For more information refer to our website:
www.rosenberger.com/t&m

Rosenberger

Rosenberger Hochfrequenztechnik GmbH & Co. KG

Hauptstraße 1 | 83413 Fridolfing

P.O. Box 1260 | 84526 Tittmoning

Germany

Phone +49 8684 18-0

info@rosenberger.com

www.rosenberger.com

Certified by IATF 16949 · DIN EN 9100 · ISO 9001 · ISO 14001

Order No.

pA 405951 · Info356RPC1.35FlyEN

2000/2019

Rosenberger® is a registered trademark of Rosenberger Hochfrequenztechnik GmbH & Co. KG.
All rights reserved.

© Rosenberger 2019