Rosenberger

Low PIM Connectors and Components for Mobile Communication Applications

4.3-10

COMMUNICATION

Rosenberger Group

Rosenberger is one of the worldwide leading suppliers of controlled impedance and optical connectivity solutions, system components for mobile communications networks, data centers and test & measurement as well as high voltage contact systems.

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Our Rosenberger Online Catalog contains the current standard product range with specific details, including data sheets, assembly instructions and panel piercings.

catalog.rosenberger.com

Competencies & Technology

Rosenberger's mission is to be recognized as an innovation and technology leader within its business segments. The most modern manufacturing technologies, the highest possible levels of efficiency in production and continuous development are our core competencies guaranteeing not only fast delivery and strict adherence to delivery dates, but also the highest levels in product quality.

Research & Development

Science-based high frequency know-how enables us to continuously improve existing products and to design innovative products and solutions whether standard or customer specific. Numerous patents are proof of Rosenberger's leadership as a creative and innovative partner.

Assembly

As a global supplier of high frequency, fiber optic and power connectivity solutions, Rosenberger operates various connector and cable assembly locations around the world.

Production

Rosenberger is proud to offer as much in-house production as possible whether on RF, power or fiber optic component or system level. Streamlined processes and leading edge in-house production equipment and automated SMD lines guarantee precision, time saving, cost and quality. Rosenberger is certified according to ISO/TS 16949, ISO 9001 and ISO 14001.

Plating Technology

Whether corrosion protection, optimized conductivity or other technical and physical features, our components are quickly and flexibly electroplated in our in-house electro-plating plant.

Injection Molding

The most modern machinery and methods as well as the use of special materials and components form the basis for precision and durability of our tools and products. Rosenberger is able to process all available high-performance plastics.

4.3-10 Connectors

Rosenberger as a global leader in RF technology has been an active partner in the development of the 4.3-10 connector series for mobile communication applications.

The 4.3-10 connector series has been designed to meet the rising electrical and mechanical performance requirements – as well as provide for a low foot-print due to on-going space reductions of infrastructure equipment.

Very Low PIM – Independent of Torque

The 4.3-10 connector series is characterized by best electrical performance and very low passive intermodulation – independent of torque. Due to its dimensions, 4.3-10 connectors are the natural evolution of currently used connector systems used in the mobile communications industry.

Electrical and mechanical planes have been separated leading to significantly lower coupling torque. 4.3-10 connectors are available in three versions: Screw-on (HEX), hand-screw and push-pull coupling mechanisms.

One Jack for All Plug Types

Due to its mechanical design, the universal 4.3-10 jack type can be mated to all plug types:

Screw Type (HEX)

- Screw type with recommended tightening torque of 5 Nm
- Recommended for harsh environments

Hand Screw Type

- Hand screw (no torque)
- Special release inhibition against unintentional loosening the nut

Push-Pull Type

- Quick connection type
- No tools needed
- Self-locking

Universal Jack

- One jack for all 4.3-10 plug types

Features and Benefits

- Low, reliable and constant PIM independent of torque
- Outstanding insertion/return loss
- Small foot print – 40 % smaller than 7-16 connectors
- Low weight – 60 % reduction compared to other RF interfaces
- High flexibility – 3 different plug types to mate with a universal jack

Connectors in Comparison – Technical Data

Connector Type	4.3-10	7-16 (DIN)	N Series
Minimum flange size	25.4 mm	32 mm	32 mm
Return loss	≥ 36 dB @ DC to 4 GHz ≥ 32 dB @ 4 GHz to 6 GHz	≥ 36 dB @ DC to 4 GHz ≥ 32 dB @ 4 GHz to 6 GHz	≥ 35 dB @ DC to 1 GHz ≥ 30 dB @ 1 GHz to 2.7 GHz
RF-leakage	≥ 120 dB @ DC to 3 GHz (screw, HEX) ≥ 90 dB @ DC to 3 GHz (hand-screw) ≥ 70 dB @ 3 to 6 GHz (push-pull)	≥ 110 dB @ DC to 1 GHz (tool types)	≥ 110 dB @ DC to 1 GHz (tool types)
Passive intermodulation	≥ 166 dBc @ 2 x 43 dBm	≥ 160 dBc @ 2 x 43 dBm	≥ 160 dBc @ 2 x 43 dBm
Degree of protection (water tightness)	IP 68 (@ 25 m, 1 hour)	IP 68 (@ 25 m, 1 hour)	IP 68 (@ 25 m, 1 hour)
Mating cycles	≥ 100	≥ 500	≥ 500
Coupling mechanisms	Screw (HEX), hand-screw, push-pull	Screw (HEX)	Screw (HEX)
Coupling torque (screw-on type)	> 5 Nm	> 25 Nm	0.7 – 1.1 Nm

4.3-10 Series

7-16 Series

N Series

4.3-10 Torque Wrench

Rosenberger No.	Torque setting (Nm)	Opening
64W022-001	5 ± 0.3	22 mm

64W022-001

4.3-10 Coaxial Cable Connectors

As a global supplier of high-frequency and fiber optic connector solutions, Rosenberger operates many manufacturing and assembly locations around the world for connectors, cable assemblies and cable fabrication.

Rosenberger 4.3-10 connectors are available for all commonly used coaxial cable types:

- semi-flexible cables
- semi-rigid cables
- field installable corrugated cables

Semi-Rigid/Semiflex Cables

Semi-rigid/semi-flexible cables provide the best results in optimum impedance control as well as the lowest possible insertion loss and weight to size ratio.

Applications: splitter and filter systems, plug-in chassis systems.

Connector Type	Rosenberger No.		
	RG 401 / Semiflex 250	RG 402 / Semiflex 141	RG 405 / Semiflex 085
4.3-10 male straight; screw type	64S101-273N1	64S101-272N1	64S101-271N1
4.3-10 male straight; hand-screw type	64S131-273N1	64S131-272N1	64S131-271N1
4.3-10 male straight; quick-lock type	64S161-273N1	64S161-272N1	64S161-271N1
4.3-10 male right angle; screw type	64S201-273N1	64S201-272N1	64S201-271N1
4.3-10 female straight; 4-hole flange	64K401-273B1	64K401-272B1	64K401-271B1
4.3-10 female straight; bulkhead	64K501-273B1	64K501-272B1	64K501-271B1

Field Installable 4.3-10 Connector – Corrugated Cables

Rosenberger connectors have excellent mechanical and environmental properties that ensure long-term durability and performance in both indoor and outdoor installations.

All Rosenberger connectors are coated with white bronze plating. This coating is specifically selected to provide protection against oxidation while delivering exceptional intermodulation performance and electrical conductivity.

4.3-10 Cable Connectors – Super Flexible Corrugated Cables

Connector Type	Rosenberger No.		
	1/4" super flexible corrugated	3/8" super flexible corrugated	1/2" super flexible corrugated
4.3-10 male straight; screw type	64S1C7-C09N1	64S1C7-C02N1	64S1C7-C08N1
4.3-10 male right angle; screw type	64S2C7-C09N1	64S2C7-C02N1	64S2C7-C08N1
4.3-10 female straight	64K1C7-C09B1	64K1C7-C02B1	64K1C7-C08B1

4.3-10 Cable Connectors – Flexible Corrugated Cables

Connector Type	Rosenberger No.			
	1/4" flexible corrugated	7/8" flexible corrugated	1 1/4" flexible corrugated	1 5/8" flexible corrugated
4.3-10 male straight; screw type	64S1C7-C03N1	64S1C7-CX5N1	64S1D7-C06N1	64S1D7-C07N1
4.3-10 male right angle; screw type	64S2C7-C03N1			
4.3-10 female straight	64K1C7-C03B1	64K1C7-CX5B1	64K1D7-C06B1	64K1D7-C07B1

64S1C7-C08N1

4.3-10 Coax Jumper Assemblies

Rosenberger coaxial jumpers have been designed using the many years of experience gained by Rosenberger engineers in this field. Rosenberger's unique knowledge of designing and manufacturing world-leading PIM testing equipment is directly reflected in the jumpers.

RF Jumper Cables – Superior performance up to 6 GHz

Rosenberger Coax Jumpers have the industry-best PIM levels
-117 dBm / 160 dBc @ 2 x 20 W (typ. -120 dBm / -163 dBc @ 2 x 20 W)

Technical Data

Range	Return Loss	Insertion Loss typ. (1/2"R – flexible)	Insertion Loss typ. (1/2"S – super flexible)
DC - 1 GHz	≥ 32 dB	≤ 0.07 dB/m + 0.01 dB	≤ 0.10 dB/m + 0.01 dB
1 - 2.2 GHz	≥ 30 dB	≤ 0.11 dB/m + 0.015 dB	≤ 0.168 dB/m + 0.015 dB
2.2 - 2.7 GHz	≥ 28 dB	≤ 0.125 dB/m + 0.016 dB	≤ 0.19 dB/m + 0.016 dB
2.7 - 6 GHz	≥ 23 dB	≤ 0.22 dB/m + 0.01 dB	≤ 0.31 dB/m + 0.01 dB

Traceability – Online Measurement Reports

Every single Coax Jumper is tested for its Return Loss and PIM values after its assembly. By entering the serial number on our web-portal our customers are able to download the measurement reports of their cables.

Online Measurement Reports

Download VSWR and PIM measurements jumper.rosenberger.com

For a more convenient verification of the performance, the measurement report can easily be downloaded to mobile devices by scanning the DataMatrix code on the packaging.

4.3-10 Panel Connectors

Customize Your Needed Features (for 4.3-10 Panel Jacks)

Rosenberger designs and produces panel and bulkhead connectors in a very versatile manner. Due to the flexible inhouse piece part production, Rosenberger is able to respond to customer specific needs and demands. Different linear and radial dimensions can be implemented as well as variations in the flange size. The pattern and hole size of the drilling holes can be adapted. Different center contact connections (solder end, coaxial end, …) as well as sealing options can also be integrated according to customer demands.

Center Contact Connections

Solder end (-200)

Coaxial end (-500)
also with thread

Special end (-900)

Rosenberger No.	Flange size	Height interface side	Pattern	Sealing	Center Contact Connection
64K401-200B1	□ 25.4 mm	18.5 mm	19 mm with hole 3.4 mm	yes	solder
64K409-200B1	□ 25.4 mm	26 mm	19 mm with hole 3.4 mm	yes	solder
64K409-500B1	□ 25.4 mm	26 mm	19 mm with hole 3.4 mm	yes	coaxial with thread M3
64K409-900B1	□ 25.4 mm	26 mm	19 mm with hole 3.4 mm	yes	special

4.3-10 Adaptors

Rosenberger offers a full range of in-series and inter-series adaptors. Adaptors are commonly used in applications requiring different RF interfaces to be connected.

In-Series

Product Features

- Intermodulation < 166 dBc, 2 × 20 W, 0.4 to 4 GHz
- Return Loss (typ.) ≥ 40 dB DC - 2 GHz
  ≥ 36 dB 2 - 3 GHz
  ≥ 28 dB 3 - 6 GHz

64S101-S00N1

64K501-K00B1

Connector Type	Rosenberger No.	
	4.3-10 male	**4.3-10 female**
4.3-10 male	64S101-S00N1	64S101-K00B1
4.3-10 female	64S101-K00B1	64K101-K00B1
	64S201-K00B1 (right angle)	64K501-K00B1 (bulkhead)

Inter-Series

Product Features

- Intermodulation < 166 dBc, 2 × 20 W, 0.4 to 4 GHz
- Return Loss (typ.) ≥ 40 dB DC - 2 GHz
  ≥ 36 dB 2 - 3 GHz
  ≥ 28 dB 3 - 6 GHz

60S164-S00N1

53S164-K00N1

Connector Type	Rosenberger No.	
	4.3-10 male	**4.3-10 female**
SMA male	32S164-S00N1	32S164-K00N1
SMA female	32K164-S00N1	32K164-K00B1
N male	53S164-S00N1	53S164-K00N1
N female	53K164-S00N1	53K164-K00B1
7-16 male	60S164-S00N1	60S164-K00N1
7-16 female	60K164-S00N1	60K164-K00B1
	60K164-S60N1 (push-pull)	

4.3-10 Measurement Components

The following Rosenberger components are available to enable VNA calibration in order to support measurements of the scattering parameters on the 4.3-10 interface. The listed components enable our customers to choose between different calibration methods such as OSL, OSLT as well as calibration via well-known N-type precision interface and switching to 4.3-10 measurement by our high precision adapters.

Calibration Kits

Rosenberger No.	Type	Frequency range
64CK010-150	Full Calibration Kit in wooden box	DC - 12 GHz
64CK070-150	Full Calibration Kit together with RPC-N Calibration Kit in wooden box	DC - 12 GHz

64CK070-150

Compact Calibration Kits

Rosenberger No.	Type	Connector Type
64S30R-MSOTS3	4-in-1 OSLT Compact Calibration Kit, DC - 12 GHz	4.3-10 male, screw type
64K30R-MSOTS3	4-in-1 OSLT Compact Calibration Kit, DC - 12 GHz	4.3-10 female
64S36R-MSOS3	3-in-1 OSL Compact Calibration Kit, DC - 6 GHz	4.3-10 male, screw type
64K36R-MSOS3	3-in-1 OSL Compact Calibration Kit, DC - 6 GHz	4.3-10 female

64S36R-MSOS3

Calibration Adaptors

Rosenberger No.	Connector type Side A	Connector type Side B	Remarks
64S121-K20S3	4.3-10 male, screw type	4.3-10 female	upgrade for OSLT calibration
64S121-S20S3	4.3-10 male, screw type	4.3-10 male, screw type	upgrade for OSLT calibration
64K121-K20S3	4.3-10 female	4.3-10 female	upgrade for OSLT calibration

64S121-K20S3

Precision Adaptors, Grade 0

Rosenberger No.	Connector type Side A	Connector type Side B	Remarks
05S164-S20S3	RPC-N male	4.3-10 male, screw type	measuring adaptor
05K164-K20S3	RPC-N female	4.3-10 female	measuring adaptor
03K764-S22S3	RPC-3,50 female	4.3-10 male, slide on	floating adaptor

05S164-S20S3

Terminations

Rosenberger No.	Power Handling	Connector Type
64S17R-001S3	1W @ 25°C derated linearity to 0 Watts at 125°C	4.3-10 male, screw type
64S17R-005S3	5W @ 25°C derated linearity to 0 Watts at 125°C	4.3-10 male, screw type
64K17R-001S3	1W @ 25°C derated linearity to 0 Watts at 125°C	4.3-10 female
64K17R-005S3	5W @ 25°C derated linearity to 0 Watts at 125°C	4.3-10 female

64S17R-001S3

Passive Components for DAS Systems

With the development of modern wireless communication technologies, mobile wireless networks are deployed requiring wideband universal passive components. Rosenberger supplies a complete range of passive components for DAS systems.

Power Splitters

The Rosenberger power splitters split one signal or combine several signals with low loss and high isolation provided between ports.

Product Features

- Guaranteed PIM performance
- High isolation, low VSWR and loss
- High power performance

S-2-8F-64F-T

Rosenberger No.	Specification				
	Frequency range	PIM	Power handling	Environment	Connect
S-2-8F-64F-T3	698-2700 MHz	-161 dBc	300 W	IP 65	4.3-10 female
S-3-8F-64F-T3	698-2700 MHz	-161 dBc	300 W	IP 65	4.3-10 female
S-4-8F-64F-T	698-2700 MHz	-161 dBc	300 W	IP 65	4.3-10 female

Directional Couplers

Directional couplers are used to divide an input signal into two proportional power levels. Manufactured in 5 dB to 40 dB coupling ratios, the value needed for most applications is available. Designed with minimal internal connections, these couplers have a PIM specification of -161 dBc, low VSWR, high isolation and cover a frequency range from 698 to 2700 MHz.

Product Features

- Guaranteed PIM performance
- High isolation, low VSWR and loss
- High power performance

DC-6-8F-64F-T

Rosenberger No.	Specification				
	Frequency range	PIM	Power handling	Environment	Connect
DC-6-8F-64F-T	698-2700 MHz	-161 dBc	300 W	IP 65	4.3-10 female
DC-8-8F-64F-T	698-2700 MHz	-161 dBc	300 W	IP 65	4.3-10 female
DC-10-8F-64F-T	698-2700 MHz	-161 dBc	300 W	IP 65	4.3-10 female
DC-15-8F-64F-T	698-2700 MHz	-161 dBc	300 W	IP 65	4.3-10 female
DC-20-8F-64F-T	698-2700 MHz	-161 dBc	300 W	IP 65	4.3-10 female
DC-30-8F-64F-T	698-2700 MHz	-161 dBc	300 W	IP 65	4.3-10 female

In-Building Antennas

The Rosenberger broadband in-building antennas with 4.3-10 connectors are suitable for all indoor distribution systems mainly used in shopping malls, restaurants, office buildings or sports facilities.

Product Features

- Ultra-wideband Indoor Ceiling Mounting Antenna
- Vertical Polarization
- Cover 2G/3G/LTE
- Small and compact

Ceiling Mounting Antenna

Rosenberger No.	Frequency Band (MHz)	PIM	
8FW-OD-3-64K-B4	698-960 and 1695-2690	≤ -150 dBc	

Wall Mounting Antenna

Rosenberger No.	Frequency Band (MHz)	PIM	
8FW/8FW-65-8D-64K-B4	2 x (698-960 and 1695-2690)	≤ -150 dBc	

Omni Slim MIMO Antenna

Rosenberger No.	Frequency Band (MHz)	PIM	
8FW/8FW-OD-6-64K-B4	2 x (698-960 and 1695-2690)	≤ -150 dBc	

PIM Measurement

Excellent PIM performance is a MUST in today's mobile communication network. Rosenberger offers a complete range of PIM loads, measurement assemblies and adaptors that meet our customers' expectations to outstanding PIM performance.

PIM Load

For testing and troubleshooting, these high quality precision loads are typically used to terminate system components at the characteristic impedance.

Rosenberger No.	Interface	Frequency	
60Z150-012	4.3-10 / 7-16	700 MHz to 3.6 GHz	

Measurement Assemblies

The PIM optimized measurement assemblies ensure optimum accuracy and stability for testing.

Rosenberger No.	Description	
LC02-269-xxx	7-16 male – 4.3-10 male	
LC02-270-xxx	7-16 male – 4.3-10 female	

xxx = cable length in mm

Adaptors

Rosenberger precision adaptors can be used at the test port of the analyzer or its extension cable to provide a compatible interface with the specified system test point. The PIM optimized adaptors ensure optimum accuracy and stability for testing.

Rosenberger No.	Description	
60S164-K00N1	7-16 male – 4.3-10 male	
60S164-S00N1	7-16 male – 4.3-10 female	

Number Codes

Rosenberger Number Code – Jumper Assemblies

SLJ	12	S	P -	60	M	64	R -	10m -	00
									Successive Number
								Length in meters (m) or feet (ft)*	
								*metric lengths shorter than 10 meters with one decimal lace, point as delimiter	
							Connector Type/Gender Side 2		
							M male straight		
							H male straight, hand screw (only series 64)		
							Q male straight, push-pull (only series 64)		
							F female straight		
							R male right angle		
							X male right angle, hand screw (only series 64)		
							Y male right angle, push-pull (only series 64)		
						Connector Series Side 2 (higher number)			
						53 N			
						60 7-16			
						64 4.3-10			
						65 4.1-9.5			
					Connector Type/Gender Side 1				
					M male straight				
					H male straight, hand screw (only series 64)				
					Q male straight, push-pull (only series 64)				
					F female straight				
					R male right angle				
					X male right angle, hand screw (only series 64)				
					Y male right angle, push-pull (only series 64)				
				Connector Series Side 1 (lower number)					
				53 N					
				60 7-16					
				64 4.3-10					
				65 4.1-9.5					
			Cable Jacket						
			P PE						
			F FRNC						
		Cable Type							
		R flexible, ring corrugation							
		S super flexible, spiral corrugation							
	Cable Size								
	14 1/4"								
	38 3/8"								
	12 1/2"								
Rosenberger Jumper									

Jumper Cable Configurator

Configure your individual jumper cable online: rosenberger.com/siso/#jumperconf

Rosenberger No.

03K764-S22S3 13
05K164-K20S3 13
05S164-S20S3 13
8FW/8FW-65-8D-64K-B4 15
8FW/8FW-OD-6-64K-B4 15
8FW-OD-3-64K-B4 15
32K164-K00B1 12
32K164-S00N1 12
32S164-K00N1 12
32S164-S00N1 12
53K164-K00B1 12
53K164-S00N1 12
53S164-K00N1 12
53S164-S00N1 12
60K164-K00B1 12
60K164-S00N1 12
60K164-S60N1 12
60S164-K00N1 12, 16
60S164-S00N1 12, 16
60Z150-012 16
64CK010-150 13
64CK070-150 13
64K1C7-C02B1 9
64K1C7-C03B1 9
64K1C7-C08B1 9
64K1C7-C09B1 9
64K1C7-CX5B1 9
64K1D7-C06B1 9
64K1D7-C07B1 9
64K17R-001S3 13
64K17R-005S3 13
64K30R-MSOTS3 13
64K36R-MSOS3 13
64K101-K00B1 12
64K121-K20S3 13
64K401-200B1 11
64K401-271B1 8
64K401-272B1 8
64K401-273B1 8
64K409-200B1 11
64K409-500B1 11
64K409-900B1 11
64K501-271B1 8
64K501-272B1 8
64K501-273B1 8
64K501-K00B1 12
64S1C7-C02N1 9
64S1C7-C03N1 9
64S1C7-C08N1 9
64S1C7-C09N1 9
64S1C7-CX5N1 9
64S1D7-C06N1 9
64S1D7-C07N1 9
64S2C7-C02N1 9
64S2C7-C03N1 9
64S2C7-C08N1 9
64S2C7-C09N1 9
64S17R-001S3 13
64S17R-005S3 13
64S30R-MSOTS3 13
64S36R-MSOS3 13
64S101-271N1 8
64S101-272N1 8
64S101-273N1 8
64S101-K00B1 12
64S101-S00N1 12
64S121-K20S3 13
64S121-S20S3 13
64S131-271N1 8
64S131-272N1 8
64S131-273N1 8
64S161-271N1 8
64S161-272N1 8
64S161-273N1 8
64S201-271N1 8
64S201-272N1 8
64S201-273N1 8
64S201-K00B1 12
64W022-001 7
DC-6-8F-64F-T 14
DC-8-8F-64F-T 14
DC-10-8F-64F-T 14
DC-15-8F-64F-T 14
DC-20-8F-64F-T 14
DC-30-8F-64F-T 14
LC02-269-1500 16
LC02-270-1499 16
S-2-8F-64F-T3 14
S-3-8F-64F-T3 14
S-4-8F-64F-T 14

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Website

For further information refer to our website:
www.rosenberger.com

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