

SHF cable-assemblies and accessories

Test & Measurement

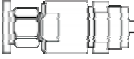
AS 9100 CERTIFIED

TEST & Measurement



ISO 9001 APPROVED





RADIALL, one of the world's leading manufacturers of coaxial connectors, has also been designing and manufacturing high performance coaxial cables and cable-assemblies for more than 15 years. RADIALL offers a broad range of high performance RF and microwave transmission lines (from DC to 40 GHz) for military, avionics, space, telecom and automotive applications.

RANGE FOR TEST & MEASUREMENT AND SEVERE ENVIRONMENT

HIGH PERFORMANCES

- Ultra Low loss
- Excellent return loss
- High Phase stability (Temperature & Bending)
- High mechanical and environmental resistance
- Long life connexion
- High flexibility
- Strain relief
- Rugged construction

This range is dedicated to **laboratory applications** requiring excellent electrical performance, high mechanical resistance and ability to repeated mating/unmating procedure.

To fulfill these requirements, RADIALL offers 2 technologies within this range :

- SHF bare cables without protective jackets
- SHF cables with **Projack** (details in page 5) protective jackets

All components are designed and manufactured by RADIALL in facilities running under ISO9001-V2000 / ASN9100 quality standards.

QUICK SERVICE




For better service, RADIALL innovates with extra advantages :

- build your assembly
- calculate performance
- get TDS with our online webtool on : www.radiall.com/services/test&measurementRFQ
- all components on stock for short lead time

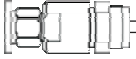
CUSTOM SOLUTIONS

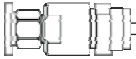
The following pages introduce standard ultra low-loss SHF cable-assemblies. RADIALL will also be pleased to design and manufacture tailor-made solution in accordance with customer specifications.

In addition, in order to complete the TEST & MEASUREMENT range, Radiall put at your disposal the  program for fast on-demand standard cable-assemblies (RG, handformable, BNC, SMB, ...)

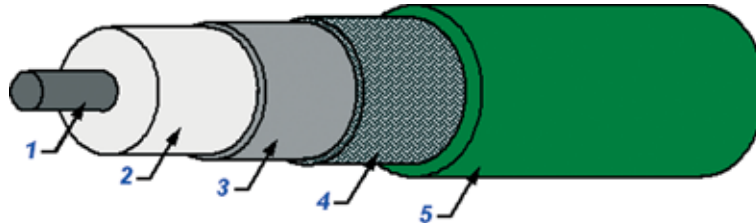


www.radiall.com/services/service+RFQ





CABLE



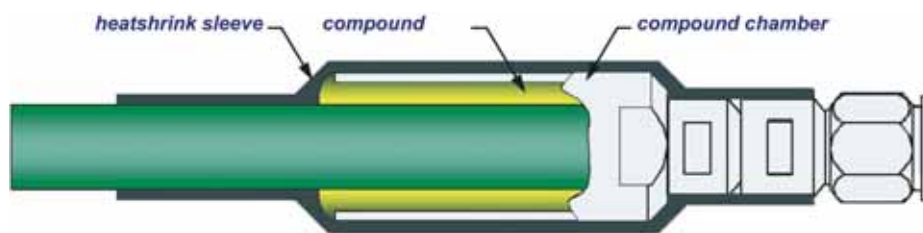
- 1 Inner conductor : Solid (SHFXM) silver-plated (2µm) copper wire
- 2 Dielectric : Low density PTFE (PolyTetraFluoroEthylene) tape
- 3 Inner shield : Silver-plated (2µm) copper tape
- 4 Outer shield : Silver-plated (2µm) copper braid (>90% covering)
- 5 Outer jacket : Extruded FEP (Fluorinated Ethylene Propylene)

ASSEMBLY LENGTH

Standard length* = 200 mm to 5000 mm.

CONNECTOR ATTACHMENT

For high mechanical protection and secured watertightness, all connectors in this range are equipped with new **compound chambers** (see drawing below) allowing the cable jacket to be hermetically sealed into the connector once the chamber is filled with compound.

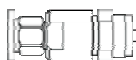


CONNECTORS SPECIFICATION

Connector design : RADIALL connectors meet or exceed the requirements of MIL-C-39012 standard. They are designed to provide optimal electrical, mechanical and environmental performances.

Connector material : **Stainless steel 316L** for highest mechanical and environmental resistance and long term use.

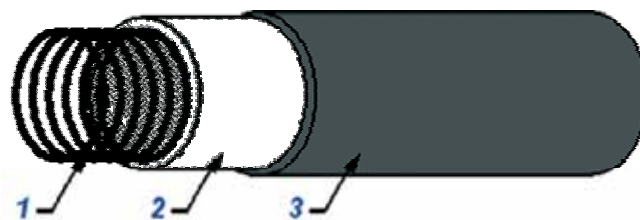
*For other length, please consult us or use our General RFQ webtool on www.radiall.com



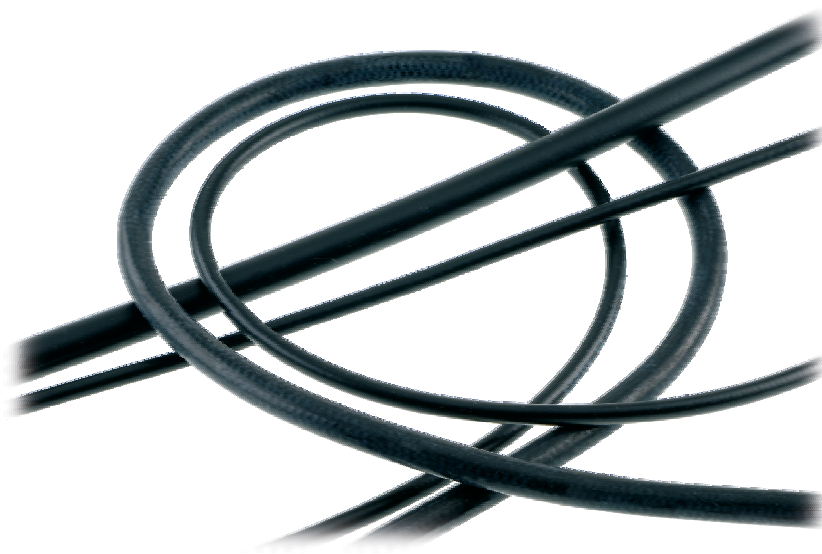
OPTIONAL Projack PROTECTIVE JACKETS

For higher mechanical protection, strain relief and secured watertightness, RADIALL advises the use of specific **Projack** protective jackets for test-bench cable-assemblies submitted to many manipulations and harsh environment.

Manufactured by RADIALL, these **Projack** outer jackets bring exceptional crush resistance and tensile strength while keeping a very good flexibility.



- 1 Stainless steel spring : crush resistance and flexibility
- 2 Stainless steel braid : tensile strength
- 3 Black Polyurethane jacket : UV, abrasion and chemical resistance, waterproofing



	Projack 5	Projack 8
Cable type	SHF 5MR	SHF 8MR
Maximum diameter (mm/inch)	11 / .433	15 / .590
Bending radius (mm/inch)	Equal to cable bend radius	Equal to cable bend radius
Temperature range (°C)	-55°C / +100°C	-55°C / +100°C
Maximum weight (g/m)	190	340
Crush resistance (N/100 mm)	2500	2500
Tensile strength (N)	900	900



CABLE MAXIMUM ATTENUATION (dB/m – dB/ft)

	1 GHz		2 GHz		4 GHz		8 GHz		12.4 GHz		18 GHz	
	VHF/UHF		Band L		Band S		Band C		Band X		Band Ku	
	dB/m	dB/ft	dB/m	dB/ft	dB/m	dB/ft	dB/m	dB/ft	dB/m	dB/ft	dB/m	dB/ft
SHF5 MR	0.25	0.08	0.35	0.12	0.50	0.17	0.72	0.24	0.91	0.30	1.11	0.37
SHF8 MR	0.16	0.05	0.23	0.08	0.33	0.11	0.48	0.16	0.61	0.20	0.75	0.25



CABLE PERFORMANCE

(detailed TDS on www.radiall.com/services/test&measurementRFQ)

		SHF5 MR	SHF8 MR
Maximum operation frequency (GHz)		26.5	18
Velocity of propagation (%)		85	85
Typical Attenuation formula (with F in GHz)	Db/m	$0.22 \times \sqrt{F} + 0.005 \times F$	$0.14 \times \sqrt{F} + 0.005 \times F$
	Db/100ft	$7.26 \times \sqrt{F} + 0.165 \times F$	$4.62 \times \sqrt{F} + 0.165 \times F$
Capacitance (pf/m pf/ft)		79 / 23.94	79 / 23.94
Corona extinction voltage (kV)		> 2.3	> 3.3
Nominal Phase (°/m/GHz)		1400	1400
Phase stability with t°C (°/m/GHz)*		< 1	< 1
Maximum diameter (mm/inch)		5.85 / 0.230	8.50 / 0.335
Maximum weight (g/m)		73	155
Bending radius (mm/inch)		25 / 0.984	40 / 1.574
Crush resistance (N/100mm)		> 700	> 1000

* Phase variation with t°C is given for temperature range : -55°C/+100°C



All connectors are offered with Cable Assembly and can not be sold separately.

FOR CABLE WITHOUT PROTECTIVE JACKET

(detailed TDS on www.radiall.com/services/test&measurementRFQ)

Connector interface	Function	SHF5 MR	SHF8 MR
SMA	Straight Plug	M125 065 L02	M125 068 L04
	Right Angle Plug	M125 195 L02	M125 199 L04
	Bulkhead Jack	M125 330 L02	M125 338 L04
TNC	Straight Plug	M143 065 L02	M143 068 L04
	Right Angle Plug	M143 195 L02	M143 198 L04
	Bulkhead Jack	M143 330 L02	M143 338 L04
N	Straight Plug	M163 065 L02	M163 068 L04
	Right Angle Plug	M163 195 L02	M163 198 L04
	Bulkhead Jack	M163 325 L02	M163 328 L04

FOR CABLE WITH Projack PROTECTIVE JACKET (see page 5)

(detailed TDS on www.radiall.com/services/test&measurementRFQ)

Connector interface	Function	SHF5 MR	SHF8 MR
SMA	Straight Plug	M125 065 L03	M125 068 L05
	Right Angle Plug	M125 195 L03	M125 199 L05
	Bulkhead Jack	M125 330 L03	M125 338 L05
TNC	Straight Plug	M143 065 L03	M143 068 L05
	Right Angle Plug	M143 195 L03	M143 198 L05
	Bulkhead Jack	M143 330 L03	M143 338 L05
N	Straight Plug	M163 065 L03	M163 068 L05
	Right Angle Plug	M163 195 L03	M163 198 L05
	Bulkhead Jack	M163 325 L03	M163 328 L05

COMPLETE ASSEMBLIES

In order to get optimized service and price, you can select in a list of existing assemblies off the shelf.

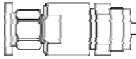
(detailed TDS on www.radiall.com/services/test&measurementRFQ)

Part Number	Assembly construction
R288 931 001	SMA straight plug / SHF5 MR cable / SMA straight plug / 1.00 m
R288 931 002	N straight plug / SHF5 MR cable / N straight plug / 1.00 m
R288 931 003	SMA straight plug / SHF5 MR cable / N straight plug / 1.00 m
R288 931 004	SMA straight plug / SHF8 MR cable / SMA straight plug / 1.00 m
R288 931 005	N straight plug / SHF8 MR cable / N straight plug / 1.00 m
R288 931 006	SMA straight plug / SHF8 MR cable / N straight plug / 1.00 m



- build your assembly,
- calculate performances,
- get TDS with our online web tool on :

www.radiall.com/services/test&measurementRFQ



VSWR FOR 200 TO 5000 mm CABLE ASSEMBLY

(This table gives value for length between 200 and 5000 mm. For other length please use our General RFQ webtool on www.radiall.com)

SHF5 MR	0-4 GHz		4-8 GHz		8-12.4 GHz		12.4-18 GHz	
	VSWR	RL (dB)	VSWR	RL (dB)	VSWR	RL (dB)	VSWR	RL (dB)
2 x SMA *	1.09	27	1.12	25	1.19	21	1.25	19
2 x TNC *	1.12	25	1.19	21	1.25	19	1.38	16
2 x N *	1.12	25	1.17	22	1.19	21	1.25	19

SHF8 MR	0-4 GHz		4-8 GHz		8-12.4 GHz		12.4-18 GHz	
	VSWR	RL (dB)	VSWR	RL (dB)	VSWR	RL (dB)	VSWR	RL (dB)
2 x SMA *	1.12	25	1.17	22	1.22	20	1.29	18
2 x TNC *	1.12	25	1.19	21	1.25	19	1.38	16
2 x N *	1.12	25	1.17	22	1.19	21	1.25	19

MAXIMUM POWER HANDLING, 20°C, SEA LEVEL (W)

Cable and Connectors	1 GHz	2 GHz	4 GHz	8 GHz	12,4 GHz	18 GHz	
	VHF/UHF	Band L	Band S	Band C	Band X	Band Ku	
SHF5 MR and	2 x SMA *	533	377	266	188	151	126
	2 x TNC *	710	502	355	251	202	167
	2 x N *	806	570	403	285	229	190
SHF8 MR and	2 x SMA *	651	460	326	230	185	153
	2 x TNC *	1184	837	592	419	336	279
	2 x N *	1344	950	672	475	382	317

MAXIMUM CABLE ASSEMBLY INSERTION LOSS (dB at 20°C)

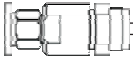
<p>Cable Loss x Cable Length</p> <p>↓</p> <p>Cable Loss :</p> <p>For SHF5 MR : $0.240 \times \sqrt{F} + 0.005 \times F$ For SHF8 MR : $0.155 \times \sqrt{F} + 0.005 \times F$</p>	+	<p>couple of connectors Loss</p> <p>↓</p> <p>Couple of connectors loss :</p> <p>For SMA, N, TNC $0.045 \times \sqrt{F} + 0.04$</p>
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F in GHz - L in meter

TEMPERATURE DERATING

Attenuation at X°C = Attenuation (20°C) x (1 + (X - 20) x θ).
 Temperature coefficient depends on the conductor materials.
 Ex : θ = 0.002 for copper and silver.

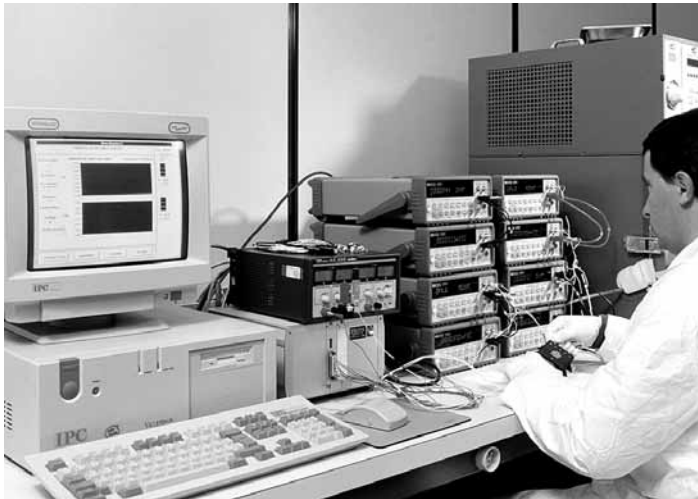
*For a precise calculation according to your specific construction, please use our Test & Measurement webtool on www.radiall.com



ELECTRICAL

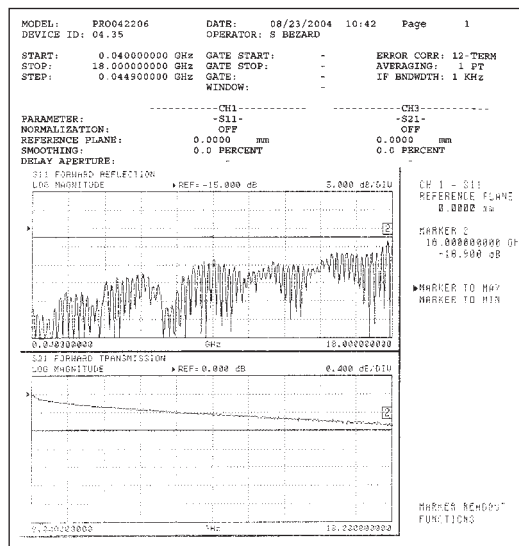
Impedance	50Ω ±1Ω
High amplitude stability under flexures	Better than 0.005dB/GHz during and after repeated bending on dynamic radius
High phase stability under flexures	Better than 0.4°/GHz during and after repeated bending on dynamic bending radius
High phase stability with temperature	See detailed cable specification
Insertion loss variation with temperature	< 0.2% / °C
Screening effectiveness	Better than 90dB up to 18 GHz
Phase matching	By set, with master or per absolute phase, available with a typical phase matching of ±0.4°/GHz
V.S.W.R.	Depends on cable-assembly configuration (see page 8)
Large temperature range	-55°C/+125°C (except Projack = -55°C/+100°C)

TESTING

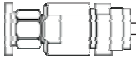


All our cable assemblies are 100% controlled in our laboratories qualified ISO9001-V2000 and AS9100.

CONTROLS



- Aspect / Marking
- Length
- Connectors orientation
- Dielectric withstanding voltage
- Insertion loss
- VSWR
- IL and VSWR curves are delivered with every assembly



BETWEEN SERIES ADAPTORS (DC-18 GHz)



Interface	PC7	N18 male	N18 female	N18 female bulkhead panel sealed
SMA male	R191 009 000			
SMA female	R191 011 000			
SMA 3.5 male	R191 010 000	R191 324 000	R191 326 000	R191 333 000
SMA 3.5 female	R191 012 000	R191 328 000	R191 330 000	
TNC male	R191 017 000			
TNC female	R191 019 000			
TNC 18 male	R191 017 700			
TNC 18 female	R191 019 700			

IN-SERIES ADAPTORS (DC-18 GHz)



interface	male - male	male - female	female - female	f - f square flange	f - f bulkhead
gold plated stainless steel SMA	R125 703 000	R125 704 000	R125 705 000		
passivated stainless steel SMA	R125 703 001	R125 704 001	R125 705 001		
TNC18	R143 703 700	R143 705 700	R143 704 700	R143 710 700	R143 730 700
N18	R163 703 701	R163 708 701	R163 705 701		
N18 silicon gasket	R163 703 001	R163 708 001	R163 705 001		

LOADS (DC-18 GHz)



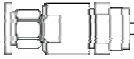
Interface	Part Number	Gender	Power (W)	Remark
SMA	R404 210 000	M	2	-
	R404 210 120	M		with cord
	R404 215 000	F		-
	R404 523 000	M	6	-
	R404 523 500	F		-
	R404 573 000	M	12	-
	R404 573 500	F		-
	R404 589 000	M	20	-
R404 589 500	F	-		
TNC	R404 370 000	M	2	-
	R404 370 120	M		with chain
	R404 375 000	F		-
	R404 521 000	M	6	-
	R404 521 500	F		-
	R404 571 000	M	12	-
	R404 571 500	F		-
	R404 586 000	M	20	-
R404 586 500	F	-		
N	R404 340 000	M	2	-
	R404 340 120	M		with chain
	R404 355 000	F		-
	R404 522 000	M	6	-
	R404 522 500	F		-
	R404 572 000	M	12	-
	R404 572 500	F		-
	R404 588 000	M	20	-
R404 588 500	F	-		

Short-circuit cap : TNC18 male = R143 850 700

ATTENUATORS (DC-18 GHz) xx = attenuation value



Interface	Part number	Attenuation (dB)	Power (W)	Remark
SMA	R411 8xx 121	0 to 30	2	flat frequency response
	R413 8xx 000	0 to 60		
	R416 1xx 000	3 to 20	10 to 15	
TNC	R414 5xx 161	0 to 20	2	-
	R416 8xx 000	3 to 20	10 to 15	
N	R414 7xx 161	0 to 20	2	-
	R416 0xx 000	3 to 20	10 to 15	



PART OF RADIALL'S TESTING CAPABILITIES

Since 1989, RADIALL has centralised the main part of its measurements capabilities in VOIRON (France).

In this Independent Testing Laboratory, engineers and technicians have run high-quality systems in compliance with ISO/ICE17025.



LCE Accredited test laboratory offers Environmental, Mechanical, Electrical and Optical Testing Services.

LCE provides :

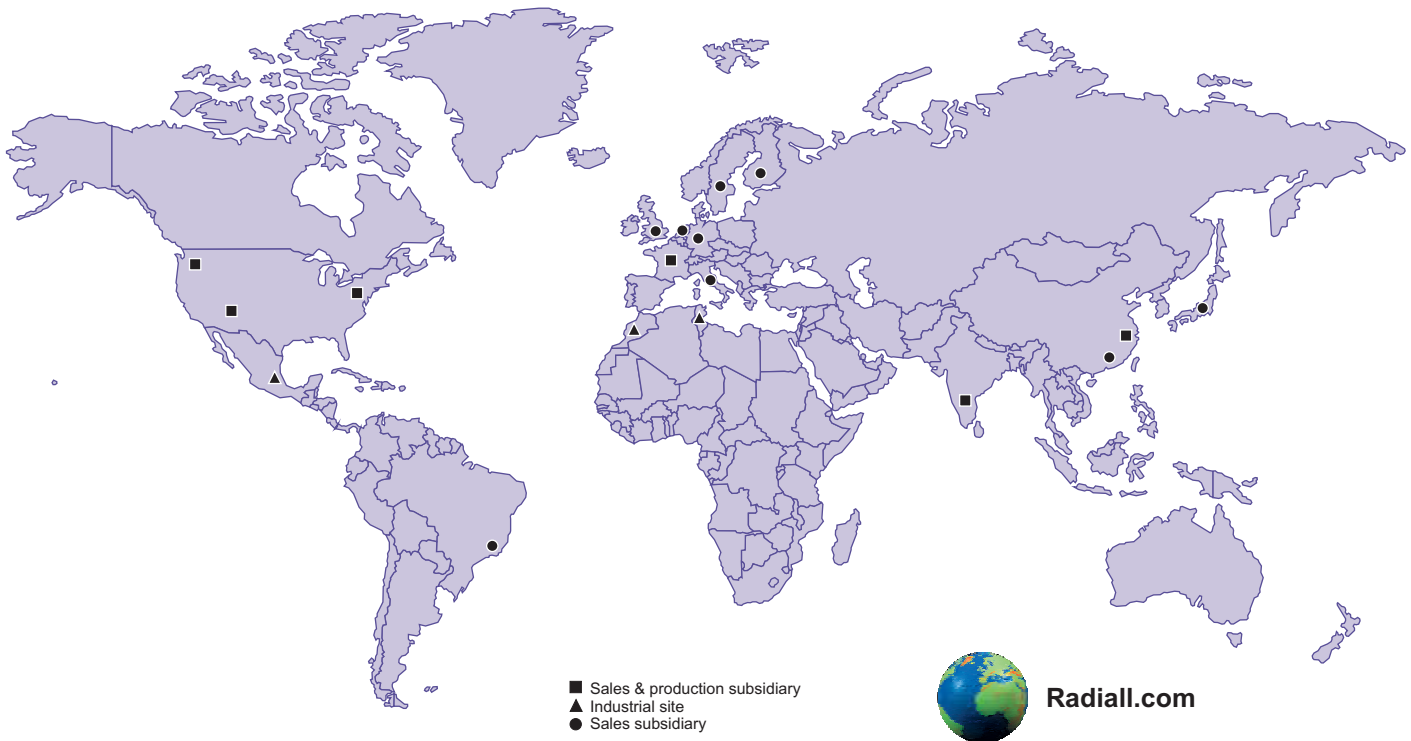
- IEC, CECC, MIL (QPL), ESA/SCC, Bellcore and customers' qualification tests.
- Evaluation, Homologation or Qualification of your product.
- Calibration of a wide range of equipment (Electrical, Optical, Dimensional...).

Various Standards (COFRAC) are available :

- Development of specific new measurement methodologies with real-time acquisition measurement facilities.
- CAD Design, Modal analysis and manufacturing of vibration specific device.
- Investigation and analysis of materials.

LCE Accredited test laboratory has over 12 years of experience in testing :

- RF & microwave passive components and antennas.
- Electrical and coaxial connectors.
- Aerospace/military components and devices.
- Automotive and commercial products.
- Fiber optic connectors, optical components, cable assemblies and optoelectronic devices.
- ...



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For the above countries, please contact the local agent or RADIALL at info@radiall.com

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