



# Test Pro

Test and measurement cable assemblies

RADIAL   
The next conneXion

# COMPANY PROFILE



Technical information and sales contacts are available at : [www.radiall.com](http://www.radiall.com)

## Simply Your Best Connection

Radiall is a global leader in the design, development and manufacturing of leading edge interconnect solutions. Dedicated to understanding its customers' needs since 1952, Radiall has earned the reputation of being "the best of the best" in engineering ingenuity by providing a constant flow of creative system solutions serving the telecommunications, aerospace, defense, instrumentation, automotive, industrial, medical and broadcast markets.

## The Best End-to-End Interconnect Solutions

We offer an extensive range of solutions that support the most demanding signal transmission applications. 4G wireless infrastructure, active array radars, IED detection, electrical wiring in aircrafts, soldier tactical radios, in-vehicle communications networks, and magnetic resonance imaging systems are just a few of the complex applications that we support.

- RF coaxial connectors
- Fiber optic connectors and transceivers
- Coaxial and fiber optic cable assemblies and harnesses
- High frequency microwave components
- Coaxial switches, including the smallest and most reliable SPDT relay
- Multipin rectangular connectors
- Rack and panel connectors
- Antennas for tactical networks, aerospace and instrumentation

## Best Value-added Services

- **Collaboration:** We work closely with your engineers to understand your business, your technical needs, and your budgetary issues
- **Wide Product Range:** We manage our product lines throughout the entire lifecycle, in order to offer you a wide selection of standard products at an affordable cost
- **Custom Products:** We can custom tailor products to specific equipment and application needs;
- **Global Presence:** We're everywhere you need us, with worldwide sales, engineering support, R&D in North America, Europe, and Asia, and manufacturing facilities strategically located in the United States, Mexico, France, India, and China
- **Responsive Support and Service:** From the design stage, planning to post-installation support, we're with you at every step, whether you need sales support or engineering expertise
- **On-time Delivery:** We support your logistical needs so you get the products when and where you need them
- **Warranty:** We proudly stand behind our products

## Certifications and Environmental



Radiall is ISO 9001: 2008 certified and dedicated to continuous improvement programs that have resulted in also being AS9100, TS16949 and ISO 14001 certified. In addition, Radiall is committed to investing in its people, future technologies and the environment, such as being RoHS (Restriction of Hazardous Substances) and REACH (Registration, Evaluation, Authorization and Restriction of Chemical substances) compliant.



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The TestPro product range is dedicated to **Test and Measurement applications** requiring excellent electrical performance, high mechanical endurance and excellent resistance to wear and corrosion.

We offer 2 product categories to meet your needs:

- “**Phase stable TestPro**” are suitable for test benches in production or labs, due to their long life and stability in dynamic use. Test cable assemblies are intended for daily use in components and assembly shops, test labs and automatic test equipment applications.

They differ from standard cable assemblies in the fact that they are especially designed for applications that require repeated connection/disconnection procedures, strenuous flexing situations and applications where phase, loss and VSWR stability becomes an issue.

- “**Ultra low loss**” allow the use of long length cables with remote test stations and anechoic chambers. Their high stability with temperature makes them easy to use in temperature chambers. They are also suitable for high power applications.

Our TestPro product range is designed to operate in the DC – 40 GHz frequency range depending on connector and cable choice. Optional protective jacket, offer different armor level.

Our “**ProJack**” is excellent for all defense systems tests running outdoors.

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

## ONLINE WEBTOOL FOR QUICK SERVICE

To access our online tools and build the desired cable assembly, goto [www.radiall.com/cableassembly](http://www.radiall.com/cableassembly)

Select our “Test & Measurement” tool for TestPro cable assemblies.

This tool enables you to select from a list of standard assembly lengths, part numbers or to build your own TestPro assembly by selecting cable and connectors to meet your need. The TestPro tool also gives the performance of the desired cable assembly.

- Select standard assembly lengths      or      • build your assembly
- calculate performance



[www.radiall.com](http://www.radiall.com)





## CABLE DESIGN and MANUFACTURING

The TestPro cable range benefits from Radiall's 30 years of experience in manufacturing high tech microwave cable for the military and aerospace markets. The TestPro cables were designed to meet test and measurement requirements.

Manufacturing is attained on Radiall's own design manufacturing machines.

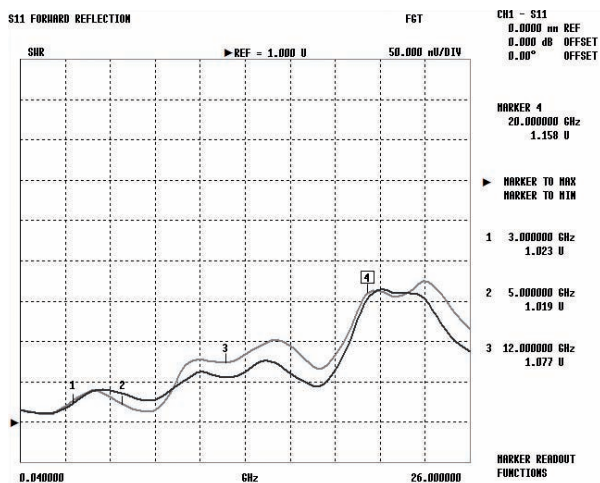
Low density PTFE tape wrapping is the heart of our process. It elevates our Ultra Low Loss TestPro cable to the position of best performance in the market.

Our mastery in high precision multilayer braiding and wrapping makes the TestPro cable range stable over thousands of bending life cycles compared to the competition.

## 5000 MATING CYCLES GUARANTEED

TestPro cable assemblies for test applications were developed using new highly ruggedized stainless steel connectors. Our TestPro connectors are extremely robust. The combination of higher grade stainless steel and a unique attachment method offers a very reliable product over multiple matings.

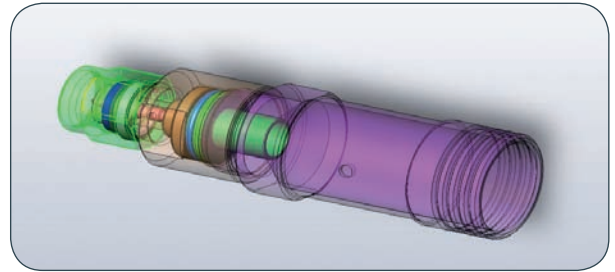
Performance after 5,000 matings



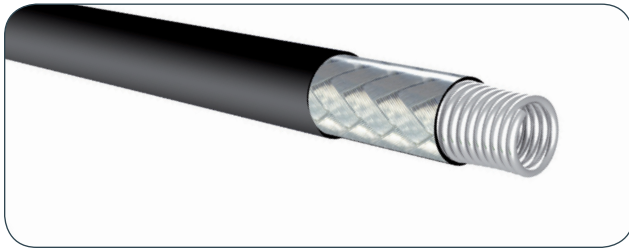
- Low contact resistance variation < 0.3 mΩ
- Very stable VSWR 1.11 @ 18 GHz

## CONNECTOR ATTACHMENT

The connector attachment is the main weakness, when using standard cable assemblies in test and measurement applications. Radiall TestPro connectors are designed with a unique attachment process which elevates the assembly ruggedness, provides high electrical stability, and a very long life.



## ARMOR OPTION



### APPLICATION NOTE

#### Main benefits:

- high mechanical protection (resistance to crush, traction, abrasion, etc.)
- high flexibility
- anti-torque
- strain relief
- anti-kinking action
- secured watertightness when used with compound chamber

Radiall p/n: G940RP10 - G941RP10

### • construction

|        | Material        |
|--------|-----------------|
| Spring | stainless steel |
| Braid  | stainless steel |
| Jacket | black PU        |

### • mechanical characteristics

|                  | For TestPro 4.2 and TestPro 5 | For TestPro 8      |
|------------------|-------------------------------|--------------------|
| Outer dia. (max) | 11 mm (0.433 in.)             | 15 mm (0.590 in.)  |
| Maximum weight   | 190 g/m (57.6 g/ft)           | 340 g/m (103 g/ft) |
| Min. bend radius | equal to cable bend radius    |                    |
| Crush resistance | 2 500 N / 100 mm              |                    |
| Tensile strength | 900 N                         |                    |

### • environmental characteristics

|                     |                                |
|---------------------|--------------------------------|
| Temperature*        | -55 / +100 ° C (-67 / +212° F) |
| Fire resistance     | yes (FAR 25 853)               |
| Halogen-free jacket | no                             |

\* operating temperature range

In many applications, specific assemblies are needed. The Radiall TestPro range is available in standard or custom lengths and configurations. Use the following pages to select a standard part number or make your choice of cable and connectors to meet your needs and send us your request for quotation.

## HOW TO ORDER

### Select the right TestPro cable.

- TestPro 3 and TestPro 4.2 “Phase stable” are suitable for test benches in production or labs, due to its long life and great stability in dynamic use.
- TestPro 5 and TestPro 8 “Ultra low loss” allow the use of long length cables with remote test stations and anechoic chambers. Their high stability with temperature makes them easy to use in temperature chambers. They are also suitable for high power applications.

### Select armor option for reinforced cable assemblies.

TestPro 3 is internally armored. For TestPro 4.2, TestPro 5 and TestPro 8 optional protective jackets, “ProJack” offers high armor level. “ProJack” is excellent for all defense systems tests running outdoors. See detailed protective jacket characteristics in page 6.

### Select connectors.

Select the right connectors compatible with your choice of TestPro cables.

Send quote requests to your Radiall sales contact.

You may also use our cable assembly builder at [www.radiall.com](http://www.radiall.com)

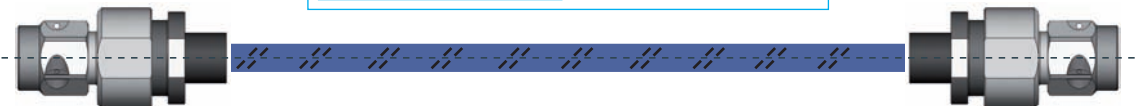
Select connector 1 ▼

Select your cable ▼  

TestPro 3  
 TestPro 4.2  
 TestPro 5  
 TestPro 8

Optional protection  
 • Highly rugged ProJack

Select connector 2 ▼



« L » +/- 2 %

## PHASE STABLE BENCH TEST CABLE ASSEMBLY

| Properties                   | TestPro 4.2              | TestPro 3 / TestPro 3 Low Profile          |
|------------------------------|--------------------------|--------------------------------------------|
| Frequency range              | DC - 20 GHz              | DC - 26.5 GHz and DC- 40 GHz               |
| Impedance                    | 50 $\Omega \pm 2 \Omega$ | 50 $\Omega \pm 1 \Omega$                   |
| IL (dB/m)                    | 1.90 @ 18 GHz            | 2.41 @ 26.5 GHz - 3.11 @ 40 GHz            |
| IL (dB/ft)                   | 0.58 @ 18 GHz            | 0.73 @ 26.5 GHz - 0.94 @ 40 GHz            |
| Phase with flexure stability | 2° @ 18 GHz              | 2° @ 26.5 GHz - 5° @ 40 GHz                |
| Amplitude stability (dB)     | < 0.05 @ 18 GHz          | < 0.1 @ 40 GHz                             |
| Shielding effectiveness      | -110 dB min @ 1 GHz      | -110 dB min @ 1 GHz                        |
| Crush resistance             | 135 lb/linear in.        | 260 lb/linear in. (*)                      |
| Minimum bend radius          | 25 mm (1 in.)            | 25 mm (1 in.)                              |
| Temperature (°C)             | -55 / + 105 °C           | -55 / + 125 °C                             |
| Connectors                   | SMA, N, TNC, PC7         | SMA3.5, SMA2.9 (K), NMD2.9, TVAC2.9, 2.4MM |
| Flexure life cycle           | 10,000                   | 20,000                                     |
| Mating cycles durability     | 5,000                    | 5,000                                      |
| Armor                        | Available                | Integrated                                 |
| ROHS / REACH                 | Yes                      | Yes                                        |

(\*) TestPro 3 low profile non-armored version is 23 lb/linear in.

## Application note

TestPro cables are designed specifically for testing and measurement and combine outstanding electrical performance with a specially designed protection system. These ruggedized assemblies offer excellent durability while remaining exceptionally flexible. The unique connector attachment system and strong cable structure provide high tensile stress resistance to the entire assembly.

## Key features &amp; benefits



- Phase and loss stable with flexure
- Crush torque and tensile resistant
- Flexible design
- Long service life
- Longer calibration intervals
- Easy to configure to DUT

Standard assembly lengths available 24", 36", and 72".

Custom cable lengths are available with short lead times.

Typical applications include: test labs, production floor testing, anechoic chambers, thermal vacuum chambers, and nearfield scanners.

All TestPro cable assemblies are delivered in individual packaging and corresponding test report.



## PHASE STABLE TEST BENCH CABLE ASSEMBLIES

| Part number     | Operating frequency | Connectors |            | Length          | Attenuation-Typ.<br>@2GHz - @18GHz | VSWR-Typ.<br>@18GHz |
|-----------------|---------------------|------------|------------|-----------------|------------------------------------|---------------------|
| R288940034      | DC - 18 GHz         | SMA male   | SMA male   | 24 in. / 61 cm  | 0.47 dB - 1.51 dB                  | 1.20                |
| R288940060      | DC - 18 GHz         | SMA male   | SMA female | 24 in. / 61 cm  | 0.47 dB - 1.51 dB                  | 1.20                |
| R288940001      | DC - 18 GHz         | SMA male   | SMA male   | 36 in. / 91 cm  | 0.64 dB - 2.14 dB                  | 1.20                |
| R288940002      | DC - 18 GHz         | SMA male   | SMA male   | 48 in. / 122 cm | 0.83 dB - 2.79 dB                  | 1.20                |
| R288940003      | DC - 18 GHz         | SMA male   | SMA male   | 72 in. / 183 cm | 1.19 dB - 4.07 dB                  | 1.20                |
| R288940035      | DC - 18 GHz         | SMA male   | N Type (*) | 24 in. / 61 cm  | 0.47 dB - 1.51 dB                  | 1.25                |
| R288940004      | DC - 18 GHz         | SMA male   | N Type (*) | 36 in. / 91 cm  | 0.64 dB - 2.14 dB                  | 1.25                |
| R288940005      | DC - 18 GHz         | SMA male   | N Type (*) | 48 in. / 122 cm | 0.83 dB - 2.79 dB                  | 1.25                |
| R288940006      | DC - 18 GHz         | SMA male   | N Type (*) | 72 in. / 183 cm | 1.19 dB - 4.07 dB                  | 1.25                |
| R288940007      | DC - 18 GHz         | N Type (*) | N Type (*) | 36 in. / 91 cm  | 0.64 dB - 2.14 dB                  | 1.25                |
| R288940008      | DC - 18 GHz         | N Type (*) | N Type (*) | 48 in. / 122 cm | 0.83 dB - 2.79 dB                  | 1.25                |
| R288940009      | DC - 18 GHz         | N Type (*) | N Type (*) | 72 in. / 183 cm | 1.19 dB - 4.07 dB                  | 1.25                |
| R288940010      | DC - 18 GHz         | PC7        | PC7        | 36 in. / 91 cm  | 0.64 dB - 2.14 dB                  | 1.30                |
| R288940011      | DC - 18 GHz         | PC7        | PC7        | 48 in. / 122 cm | 0.83 dB - 2.79 dB                  | 1.30                |
| R288940013      | DC - 18 GHz         | PC7        | SMA male   | 36 in. / 91 cm  | 0.64 dB - 2.14 dB                  | 1.30                |
| R288940014      | DC - 18 GHz         | PC7        | SMA male   | 48 in. / 122 cm | 0.83 dB - 2.79 dB                  | 1.30                |
| R288940016      | DC - 18 GHz         | PC7        | N Type (*) | 36 in. / 91 cm  | 0.64 dB - 2.14 dB                  | 1.30                |
| R288940017      | DC - 18 GHz         | PC7        | N Type (*) | 48 in. / 122 cm | 0.83 dB - 2.79 dB                  | 1.30                |
| 0100900900914GX | DC - 18 GHz         | TNC male   | TNC male   | 36in. / 91 cm   | 0.70 dB - 2.34 dB                  | 1.30                |

(\*) Quick turn N Type male connector. All TestPro cable assemblies are delivered in individual packaging with attached test report.

## VSWR

| Maximum<br>VSWR | 0-4 GHz |    | 4-8 GHz |    | 8-12.4 GHz |    | 12.4-18 GHz |    |
|-----------------|---------|----|---------|----|------------|----|-------------|----|
|                 | VSWR    | dB | VSWR    | dB | VSWR       | dB | VSWR        | dB |
| 2 x SMA         | 1.12    | 25 | 1.20    | 21 | 1.20       | 21 | 1.25        | 19 |
| 2 x N           | 1.15    | 23 | 1.25    | 19 | 1.25       | 19 | 1.30        | 18 |
| 2 x PC7         | 1.25    | 19 | 1.30    | 18 | 1.30       | 18 | 1.35        | 16 |

This table gives value for assembly lengths between 200 to 5000 mm (8 to 196 in.)

## TEMPERATURE DERATING

Attenuation at X°C = Attenuation (20°C) x (1 + (X - 20) x θ)

Ex: θ = 0.002 for copper and silver

## CONSTRUCTION / DIMENSIONS

|                  | Material                  |
|------------------|---------------------------|
| Center conductor | solid SPCC <sup>(1)</sup> |
| Dielectric       | solid PTFE <sup>(2)</sup> |
| Inner shield     | flat SPC tape             |
| Interlayer       | Aluminum-Polyimide tape   |
| Outer shield     | SPC braid                 |
| Jacket           | clear FEP <sup>(3)</sup>  |
| Outer diameter   | 4.81 mm (0.190 inches)    |

<sup>(1)</sup> SPCC = Silver Plated Copper-Clad Steel

<sup>(2)</sup> PTFE = Poly-TetraFluoroEthylene

<sup>(3)</sup> FEP = Fluorinated Ethylene Propylene

## ELECTRICAL CHARACTERISTICS

|                                     |                                  |                       |
|-------------------------------------|----------------------------------|-----------------------|
| Characteristic impedance            | 50 ohms $\pm$ 2 ohms             |                       |
| Operating frequency range           | DC - 20 GHz                      |                       |
| Cut-off frequency                   | 34 GHz                           |                       |
| Screening effectiveness             | > 100 dB (at 18 GHz)             |                       |
| Velocity of propagation             | 71 %                             |                       |
| Propagation time                    | 4.75 ns / m                      | 1.45 ns / ft          |
| Capacitance                         | 95 pF / m (at 1 GHz)             | 29 pF / ft (at 1 GHz) |
| Insulation resistance               | > 3 x 10 <sup>5</sup> MOhm / m   |                       |
| Nominal phase                       | 1645 ° / m / GHz                 |                       |
| Phase stability with bending*       | < 0.17° / 360° / GHz (at 18 GHz) |                       |
| Attenuation stability with bending* | < 0.015 dB (at 18 GHz)           |                       |
| Attenuation stability with shaking  | < 0.01 dB/m (at 18 GHz)          |                       |

\* = the cable is coiled up 10 times onto a mandrel of 100 mm (3.94") diameter.



## MECHANICAL CHARACTERISTICS

|                          |                  |            |
|--------------------------|------------------|------------|
| Maximum weight           | 60g / m          | 18.3g / ft |
| Recomm. min. bend radius | 25 mm            | 0.98 inch  |
| Crush resistance         | > 2300N / 100 mm |            |

## ENVIRONMENTAL CHARACTERISTICS

|                              |               |               |
|------------------------------|---------------|---------------|
| Operating temperature range* | -55 / +200° C | -67 / +392° C |
| Fire resistance              | yes           |               |
| Halogen-free jacket          | no            |               |

\* cable alone. Cable assembly operating temperature range is -55 / +105°C (-67 / + 221°F)

## APPLICATION NOTE

TestPro 4.2 is a high frequency microwave cable that delivers good attenuation characteristics. This low loss triple-shielded cable provides the best combination of low attenuation and VSWR/loss/phase stability, when compared to similar size flexible cables. The TestPro 4.2 rugged structure is perfectly adapted for dynamic applications such as laboratory measurements when assembled with TestPro connectors.

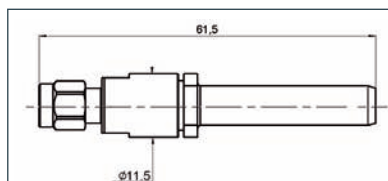
## FREQUENCY / ATTENUATION (typ.) / CW MAX POWER (\*)

| GHz                            | dB / m | dB / ft                                    | Watts |
|--------------------------------|--------|--------------------------------------------|-------|
| 1.0                            | 0.41   | 0.12                                       | 550   |
| 2.0                            | 0.60   | 0.18                                       | 295   |
| 4.0                            | 0.87   | 0.26                                       | 210   |
| 8.0                            | 1.29   | 0.39                                       | 150   |
| 12.4                           | 1.67   | 0.51                                       | 120   |
| 18.0                           | 2.10   | 0.64                                       | 95    |
| 20.0                           | 2.24   | 0.68                                       | 80    |
| Attenuation calculation (dB/m) |        | (0.384 x $\sqrt{f}$ GHz) + (0.026 x F GHz) |       |

(\*) = CW max power calculated at sea level / 40°C and VSWR 1:1  
(Power ratings may be limited by the connector type. Please contact us for specific needs).  
Note : typical attenuation for a couple of connectors (dB) = 0.0447 x  $\sqrt{f}$  (GHz) + 0.04

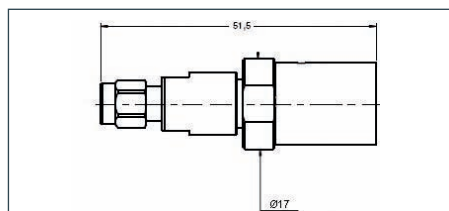
Connector part numbers are for indication only. Connectors and cables cannot be ordered separately.

## SMA SERIES



### Designation Straight Plug

Item M125064C00  
Max. Freq 20 GHz

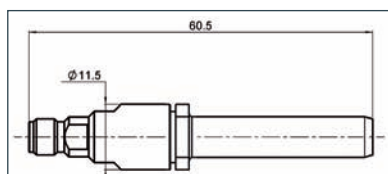


### Designation Straight Plug for ProJack

Item M125064C01  
Max. Freq 20 GHz

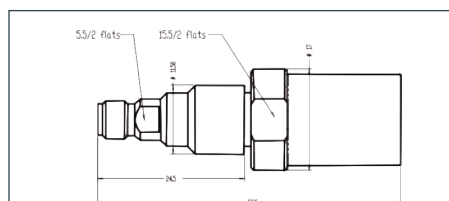
### SMA Series characteristics:

Voltage withstanding 750 Vrms  
Connector material is stainless steel.  
Finish is passivated  
Nominal coupling nut torque si 110 N  
Recommended torque wrench for plugs:  
R282320000 / 8 mm / 80-120 Ncm



### Designation Straight Jack

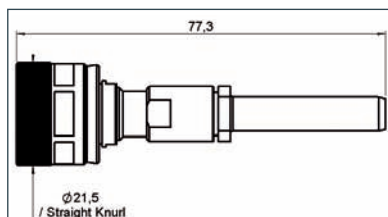
Item M125207C00  
Max. Freq 20 GHz



### Designation Straight Jack for ProJack

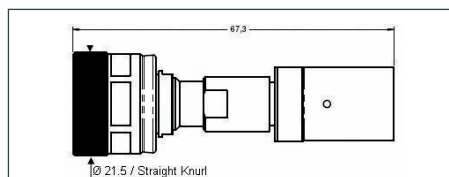
Item M125207C01  
Max. Freq 20 GHz

## PC7 SERIES



### Designation Straight Plug

Item M151064C00  
Max. Freq 18 GHz



### Designation Straight Plug for ProJack

Item M151064C01  
Max. Freq 18 GHz

### PC7 Series characteristics:

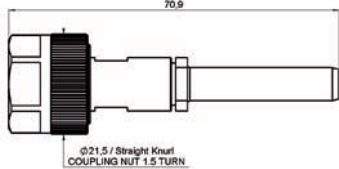
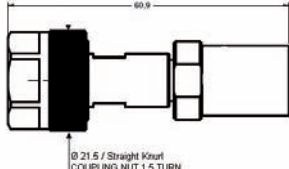
Voltage withstanding 750 Vrms  
Connector material is stainless steel.  
Finish is passivated

# CONNECTORS COMPATIBLE WITH



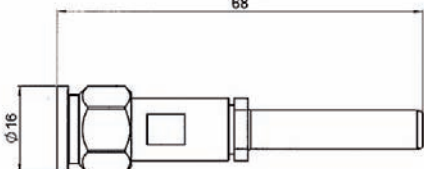
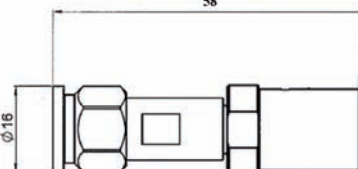
Connector part numbers are for indication only. Connectors and cables cannot be ordered separately.

## N SERIES

|                                                                                   |                      |                                                                                    |                                  |
|-----------------------------------------------------------------------------------|----------------------|------------------------------------------------------------------------------------|----------------------------------|
|  |                      |  |                                  |
| <b>Designation</b>                                                                | <b>Straight Plug</b> | <b>Designation</b>                                                                 | <b>Straight Plug For ProJack</b> |
| Item                                                                              | M163064C00           | Item                                                                               | M163064C01                       |
| Max. Freq                                                                         | 18 GHz               | Max. Freq                                                                          | 18 GHz                           |

**N Series characteristics:**  
Voltage withstanding 750 Vrms  
Quick turn (1.5 full rotation to mate)  
Connector material is stainless steel.  
Finish is passivated.  
Nominal coupling nut torque is 400 N  
Recommended torque wrench:  
R282303000 / 19 mm / 160 Ncm

## TNC SERIES

|                                                                                   |                      |                                                                                    |                                  |
|-----------------------------------------------------------------------------------|----------------------|------------------------------------------------------------------------------------|----------------------------------|
|  |                      |  |                                  |
| <b>Designation</b>                                                                | <b>Straight Plug</b> | <b>Designation</b>                                                                 | <b>Straight Plug For ProJack</b> |
| Item                                                                              | M143064C00           | Item                                                                               | M143064C01                       |
| Max. Freq                                                                         | 18 GHz               | Max. Freq                                                                          | 18 GHz                           |

**TNC Series characteristics:**  
Voltage withstanding 1500 Vrms  
Connector material is stainless steel.  
Finish is passivated.  
Nominal coupling nut torque is 330 N  
Recommended torque wrench:  
R282300000 / 14 mm / 265 Ncm

## PHASE STABLE TEST BENCH CABLE ASSEMBLIES

| Part number     | Operating frequency | Connectors   |                | Length          | Attenuation-Typ.<br>@2GHz - @Max F(GHz) | VSWR-Typ.<br>@Max F(GHz) |
|-----------------|---------------------|--------------|----------------|-----------------|-----------------------------------------|--------------------------|
| 1801171170610KE | DC - 26.5 GHz       | SMA 3.5 male | SMA 3.5 male   | 24 in. / 61 cm  | 0.44 dB - 1.44 dB                       | 1.27                     |
| 1801171180610KE | DC - 26.5 GHz       | SMA 3.5 male | SMA 3.5 female | 24 in. / 61 cm  | 0.44 dB - 1.44 dB                       | 1.27                     |
| 1801171170914KE | DC - 26.5 GHz       | SMA 3.5 male | SMA 3.5 male   | 36 in. / 91 cm  | 0.61 dB - 2.02 dB                       | 1.27                     |
| 1801171180914KE | DC - 26.5 GHz       | SMA 3.5 male | SMA 3.5 female | 36 in. / 91 cm  | 0.61 dB - 2.02 dB                       | 1.27                     |
| 1801171171219KE | DC - 26.5 GHz       | SMA 3.5 male | SMA 3.5 male   | 48 in. / 122 cm | 0.78 dB - 2.61 dB                       | 1.27                     |
| 1801171181219KE | DC - 26.5 GHz       | SMA 3.5 male | SMA 3.5 female | 48 in. / 122 cm | 0.78 dB - 2.61 dB                       | 1.27                     |
| 1801171171829KE | DC - 26.5 GHz       | SMA 3.5 male | SMA 3.5 male   | 72 in. / 183 cm | 1.12 dB - 3.78 dB                       | 1.27                     |
| 1801171181829KE | DC - 26.5 GHz       | SMA 3.5 male | SMA 3.5 female | 72 in. / 183 cm | 1.12 dB - 3.78 dB                       | 1.27                     |
| 1800920920610PJ | DC - 40 GHz         | SMA 2.9 male | SMA 2.9 male   | 24 in. / 61 cm  | 0.44 dB - 1.76 dB                       | 1.35                     |
| 1800920930610PJ | DC - 40 GHz         | SMA 2.9 male | SMA 2.9 female | 24 in. / 61 cm  | 0.44 dB - 1.76 dB                       | 1.35                     |
| 1800920920914PJ | DC - 40 GHz         | SMA 2.9 male | SMA 2.9 male   | 36 in. / 91 cm  | 0.61 dB - 2.46 dB                       | 1.35                     |
| 1800920930914PJ | DC - 40 GHz         | SMA 2.9 male | SMA 2.9 female | 36 in. / 91 cm  | 0.61 dB - 2.46 dB                       | 1.35                     |
| 1800920921219PJ | DC - 40 GHz         | SMA 2.9 male | SMA 2.9 male   | 48 in. / 122 cm | 0.78 dB - 3.19 dB                       | 1.35                     |
| 1800920931219PJ | DC - 40 GHz         | SMA 2.9 male | SMA 2.9 female | 48 in. / 122 cm | 0.78 dB - 3.19 dB                       | 1.35                     |
| 1800920921829PJ | DC - 40 GHz         | SMA 2.9 male | SMA 2.9 male   | 72 in. / 183 cm | 1.12 dB - 4.62 dB                       | 1.35                     |
| 1800920931829PJ | DC - 40 GHz         | SMA 2.9 male | SMA 2.9 female | 72 in. / 183 cm | 1.12 dB - 4.62 dB                       | 1.35                     |
| 1800940920914PJ | DC - 40 GHz         | NMD 2.9      | SMA 2.9 male   | 36 in. / 91 cm  | 0.61 dB - 2.46 dB                       | 1.35                     |
| 1800940930914PJ | DC - 40 GHz         | NMD 2.9      | SMA 2.9 female | 36 in. / 91 cm  | 0.61 dB - 2.46 dB                       | 1.35                     |
| 1800940921219PJ | DC - 40 GHz         | NMD 2.9      | SMA 2.9 male   | 48 in. / 122 cm | 0.78 dB - 3.19 dB                       | 1.35                     |
| 1800940931219PJ | DC - 40 GHz         | NMD 2.9      | SMA 2.9 female | 48 in. / 122 cm | 0.78 dB - 3.19 dB                       | 1.35                     |
| 1800940921829PJ | DC - 40 GHz         | NMD 2.9      | SMA 2.9 male   | 72 in. / 183 cm | 1.12 dB - 4.62 dB                       | 1.35                     |
| 1800940931829PJ | DC - 40 GHz         | NMD 2.9      | SMA 2.9 female | 72 in. / 183 cm | 1.12 dB - 4.62 dB                       | 1.35                     |

2.4MM connectors available soon, please consult us.

All TestPro cable assemblies are delivered in individual packaging with attached test report.

## THERMAL VACUUM

All configurations excepted NMD2.9 are available with vented connectors for TVAC applications.

## VSWR

| Maximum VSWR   | 0-4 GHz |      | 4-12.4 GHz |      | 12.4-18 GHz |      | 18-26.5 GHz |      | 26.5-32 GHz |      | 32-40 GHz |      |
|----------------|---------|------|------------|------|-------------|------|-------------|------|-------------|------|-----------|------|
|                | VSWR    | dB   | VSWR       | dB   | VSWR        | dB   | VSWR        | dB   | VSWR        | dB   | VSWR      | dB   |
| 2 x SMA3.5     | 1.15    | 23.1 | 1.20       | 20.8 | 1.25        | 19.1 | 1.30        | 17.7 | -           | -    | -         | -    |
| 2 x SMA2.9 (K) | 1.15    | 23.1 | 1.20       | 20.8 | 1.25        | 19.1 | 1.27        | 18.5 | 1.35        | 16.5 | 1.35      | 15.6 |

This table gives value for assembly lengths between 200 to 5000 mm (8 to 196 in.)

## TEMPERATURE DERATING

Attenuation at X°C = Attenuation (20°C) x (1 + (X - 20) x θ). Ex: θ = 0.002 for copper and silver



## CONSTRUCTION / DIMENSIONS

|                   | Material               |
|-------------------|------------------------|
| Center conductor  | SPCCS <sup>(1)</sup>   |
| Dielectric        | PTFE <sup>(2)</sup>    |
| Electrical shield | SPC <sup>(3)</sup>     |
| Interlayer        | aluminum-polyimide     |
| Inner braid       | SPC <sup>(3)</sup>     |
| Inner jacket      | PFA <sup>(4)</sup>     |
| Crush protection  | stainless steel        |
| Strength braid    | stainless steel        |
| Outer jacket      | fibrillated braid      |
| Outer diameter    | 7.04 mm (0.277 inches) |

<sup>(1)</sup> SPCCS = Silver Plated Copper-Clad Steel

<sup>(2)</sup> PTFE = Poly-TetraFluoroEthylene

<sup>(3)</sup> SPC = Silver-Plated Copper

<sup>(4)</sup> PFA = PerFluoroAlkoxy

## ELECTRICAL CHARACTERISTICS

|                                      |                                                           |                         |
|--------------------------------------|-----------------------------------------------------------|-------------------------|
| Characteristic impedance             | 50 ohms $\pm$ 1 ohms                                      |                         |
| Operating frequency range            | DC - 40 GHz                                               |                         |
| Cut-off frequency                    | 44 GHz                                                    |                         |
| Screening effectiveness              | > 110 dB at 1 GHz; > 90dB at 18 GHz                       |                         |
| Velocity of propagation              | 76 %                                                      |                         |
| Propagation time                     | 4.4 ns / m                                                | 1.3 ns / ft             |
| Capacitance                          | 88 pF / m (at 1 GHz)                                      | 26.7 pF / ft (at 1 GHz) |
| Insulation resistance                | > 3 x 10 <sup>5</sup> MOhm / m                            |                         |
| Corona extinction voltage            | -                                                         |                         |
| Nominal phase                        | 1590 ° / m / GHz                                          |                         |
| Phase stability with temperature     | < 4° / m / GHz; <2820ppm (-55 / +125°C)                   |                         |
| Phase stability with bending**       | 5° Typ. / 9.5° Max. (at 40 GHz)                           |                         |
| Attenuation stability with bending** | < 0.1 dB (at 40 GHz)                                      |                         |
| Attenuation stability with shaking   | < 0.03 dB/m (at 40 GHz)                                   |                         |
| Atten. variation with temperature    | Att. (at X° C) = att. (at 20° C) x (1 + (X - 20) x 0.002) |                         |

\*\* according to IEC966-1, bending method n°2



## MECHANICAL CHARACTERISTICS

|                             |                                             |             |
|-----------------------------|---------------------------------------------|-------------|
| Maximum weight              | 150 g / m                                   | 46.3 g / ft |
| Recommend. min. bend radius | 25 mm                                       | 0.984 inch  |
| Crush resistance            | > 4,400 N / 100 mm (260 lb per linear inch) |             |
| Flex life cycle             | 20,000 (IEC 966-1 section 9.3)              |             |
| Tensile strength            | 200 N                                       |             |

### APPLICATION NOTE

TestPro 3 is a 40 GHz measurement cable. It combines electrical advantages and Integrated protection system. These ruggedized assemblies offer excellent durability while remaining exceptionally flexible, a unique connector attachment system and strong cable.

## ENVIRONMENTAL CHARACTERISTICS

|                              |                                              |                |
|------------------------------|----------------------------------------------|----------------|
| Operating temperature range* | -55 / +200 ° C                               | -67 / +392 ° F |
| Fire resistance              | yes (MIL C 87104)                            |                |
| Abrasion resistance          | yes (SAE AS5756, edge 0.5 mm, load 2 pounds) |                |
| Halogen-free jacket          | no                                           |                |
| ROHS / REACH                 | yes                                          |                |

\* cable alone. Cable assembly operating temperature range is -55 / + 125 °C (-67 / +257°F)

## FREQUENCY / ATTENUATION (typ.) / CW MAX POWER (\*)

| GHz                            | dB / m | dB / ft                                        | Watts |
|--------------------------------|--------|------------------------------------------------|-------|
| 1.0                            | 0.39   | 0.12                                           | 400   |
| 2.0                            | 0.56   | 0.17                                           | 280   |
| 4.0                            | 0.81   | 0.25                                           | 200   |
| 6.0                            | 1.01   | 0.31                                           | 160   |
| 8.0                            | 1.19   | 0.36                                           | 140   |
| 12.4                           | 1.53   | 0.46                                           | 120   |
| 18.0                           | 1.91   | 0.58                                           | 90    |
| 26.5                           | 2.41   | 0.73                                           | 80    |
| 40.0                           | 3.11   | 0.94                                           | 60    |
| Attenuation calculation (dB/m) |        | Typ: (0.365 x $\sqrt{f}$ GHz) + (0.02 x F GHz) |       |

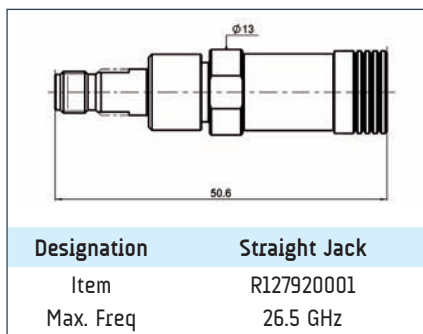
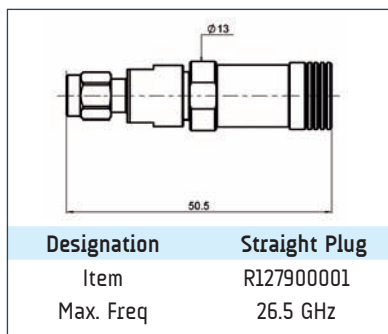
(\*) = CW max power calculated at sea level / 40°C and VSWR 1:1

(Power ratings may be limited by the connector type. Please contact us for specific needs).

Note : typical attenuation for a couple of connectors (dB) = 0.0447 x  $\sqrt{f}$  (GHz) + 0.04

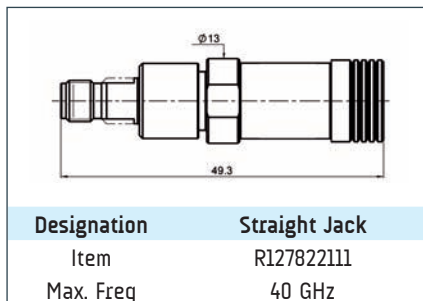
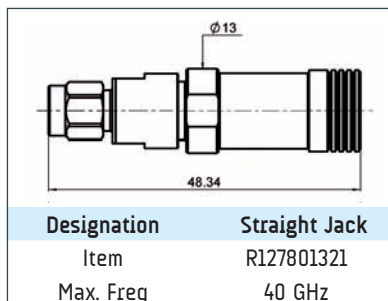
Connector part numbers are for indication only. Connectors and cables cannot be ordered separately.

## SMA 3.5 SERIES

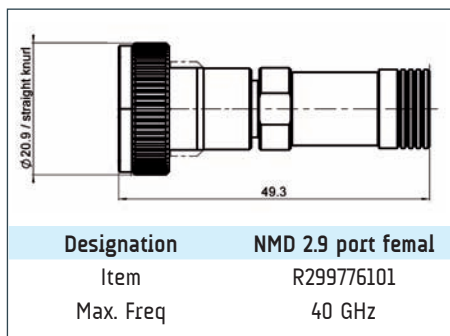


**SMA 3.5 Series characteristics:**  
 Voltage withstanding 750 Vrms  
 Connector material is stainless steel.  
 Finish is passivated  
 Nominal coupling nut torque is 110 N  
 Recommended torque wrench for plugs:  
 R282320000 / 8 mm / 80-120 Ncm

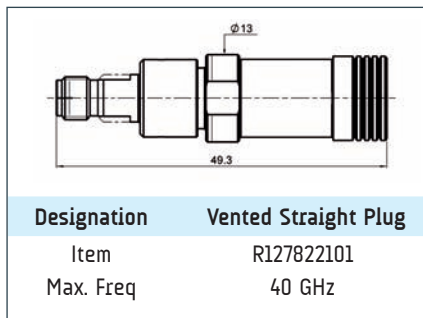
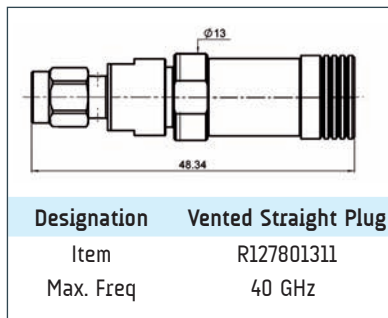
## SMA2.9 (K) SERIES



**SMK Series characteristics:**  
 Voltage withstanding 750 Vrms.  
 Connector material is stainless steel.  
 Finish is passivated.  
 Nominal coupling nut torque is 110 N.  
 Recommended torque wrench for plugs:  
 R282320000 / 8 mm / 80-120 Ncm



## VENTED CONNECTORS SMA2.9 (K) SERIES



## 2.4MM CONNECTORS

Please consult us.

## CABLE CHARACTERISTICS



## CONSTRUCTION / DIMENSIONS

|                   | Material               |
|-------------------|------------------------|
| Center conductor  | SPCCS <sup>(1)</sup>   |
| Dielectric        | PTFE <sup>(2)</sup>    |
| Electrical shield | SPC <sup>(3)</sup>     |
| Interlayer        | aluminum-polyimide     |
| Strength braid    | SPC <sup>(3)</sup>     |
| Outer jacket      | PFA <sup>(4)</sup>     |
| Outer diameter    | 3,95 mm (0,156 inches) |

<sup>(1)</sup> SPCCS = Silver Plated Copper-Clad Steel

<sup>(2)</sup> PTFE = Poly-TetraFluoroEthylene

<sup>(3)</sup> SPC = Silver-Plated Copper

<sup>(4)</sup> PFA = PerFluoroAlkoxy

## ELECTRICAL CHARACTERISTICS

|                                      |                                                           |
|--------------------------------------|-----------------------------------------------------------|
| Characteristic impedance             | 50 ohms ± 1 ohms                                          |
| Operating frequency range            | DC - 40 GHz                                               |
| Cut-off frequency                    | 44 GHz                                                    |
| Screening effectiveness              | > 110 dB at 1 GHz; > 90dB at 18 GHz                       |
| Velocity of propagation              | 76 %                                                      |
| Propagation time                     | 4.4 ns / m      1.3 ns / ft                               |
| Capacitance                          | 88 pF / m (at 1 GHz)      26.7 pF / ft (at 1 GHz)         |
| Insulation resistance                | > 3 x 10 <sup>5</sup> MOhm / m                            |
| Corona extinction voltage            | -                                                         |
| Nominal phase                        | 1590 ° / m / GHz                                          |
| Phase stability with temperature     | < 4° / m / GHz; <2820ppm (-55 / +125°C)                   |
| Phase stability with bending**       | 5° Typ. / 9.5° Max. (at 40 GHz)                           |
| Attenuation stability with bending** | < 0.1 dB (at 40 GHz)                                      |
| Attenuation stability with shaking   | < 0.03 dB/m (at 40 GHz)                                   |
| Atten. variation with temperature    | Att. (at X° C) = att. (at 20° C) x (1 + (X - 20) x 0.002) |

\*\* according to IEC966-1, bending method n°2

## MECHANICAL CHARACTERISTICS

|                             |                                          |             |
|-----------------------------|------------------------------------------|-------------|
| Maximum weight              | 50 g / m                                 | 15.3 g / ft |
| Recommend. min. bend radius | 25 mm                                    | 0.984 inch  |
| Crush resistance            | > 400 N / 100 mm (23 lb per linear inch) |             |
| Flex life cycle             | 20,000 (IEC 966-1 section 9.3)           |             |
| Tensile strength            | 200 N                                    |             |

## ENVIRONMENTAL CHARACTERISTICS

|                              |                   |                |
|------------------------------|-------------------|----------------|
| Operating temperature range* | -55 / +200 ° C    | -67 / +392 ° F |
| Fire resistance              | yes (MIL C 87104) |                |
| Halogen-free jacket          | no                |                |
| ROHS / REACH                 | yes               |                |

\* cable alone. Cable assembly operating temperature range is -55 / + 125 °C (-67 / +257°F)

## APPLICATION NOTE

TestPro 3 is a 40GHz measurement cable. It combines electrical advantages and Integrated protection system. These ruggedized assemblies offer excellent durability while remaining exceptionally flexible, a unique connector attachment system and strong cable.



## FREQUENCY / ATTENUATION (typ.) / CW MAX POWER (\*)

| GHz                            | dB / m | dB / ft                                | Watts |
|--------------------------------|--------|----------------------------------------|-------|
| 1.0                            | 0.39   | 0.12                                   | 400   |
| 2.0                            | 0.56   | 0.17                                   | 280   |
| 4.0                            | 0.81   | 0.25                                   | 200   |
| 6.0                            | 1.01   | 0.31                                   | 160   |
| 8.0                            | 1.19   | 0.36                                   | 140   |
| 12.4                           | 1.53   | 0.46                                   | 120   |
| 18.0                           | 1.91   | 0.58                                   | 90    |
| 26.5                           | 2.41   | 0.73                                   | 80    |
| 40.0                           | 3.11   | 0.94                                   | 60    |
| Attenuation calculation (dB/m) |        | Typ: (0.365 x √F GHz) + (0.02 x F GHz) |       |

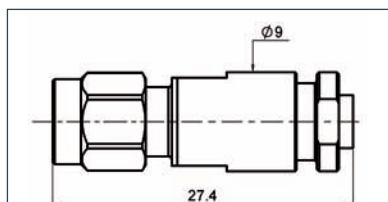
(\*) = CW max power calculated at sea level / 40°C and VSWR 1:1

(Power ratings may be limited by the connector type. Please contact us for specific needs.)

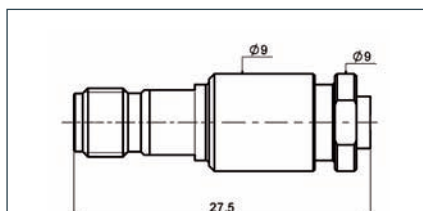
Note : typical attenuation for a couple of connectors (dB) = 0.0447 x √F (GHz) + 0.04

Connector part numbers are for indication only. Connectors and cables cannot be ordered separately.

## SMA 3.5 SERIES



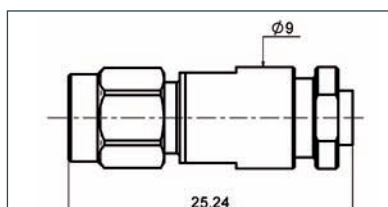
| Designation | Straight Plug |
|-------------|---------------|
| Item        | R127900011    |
| Max. Freq   | 26.5 GHz      |



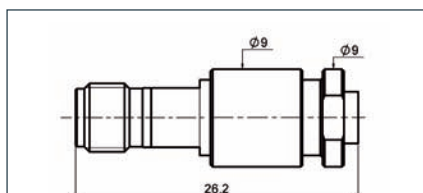
| Designation | Straight Jack |
|-------------|---------------|
| Item        | R127920011    |
| Max. Freq   | 26.5 GHz      |

**SMA 3.5 Series characteristics:**  
 Voltage withstanding 750 Vrms  
 Connector material is stainless steel.  
 Finish is passivated  
 Nominal coupling nut torque is 110 N  
 Recommended torque wrench for plugs:  
 R282320000 / 8 mm / 80-120 Ncm

## SMA2.9 (K) SERIES



| Designation | Straight Plug |
|-------------|---------------|
| Item        | R127801331    |
| Max. Freq   | 40 GHz        |



| Designation | Straight Jack |
|-------------|---------------|
| Item        | R127822121    |
| Max. Freq   | 40 GHz        |

**SMA2.9 (K) Series characteristics:**  
 Voltage withstanding 750 Vrms  
 Connector material is stainless steel.  
 Finish is passivated  
 Nominal coupling nut torque is 110 N  
 Recommended torque wrench for plugs:  
 R282320000 / 8 mm / 80-120 Ncm

## 2.4MM CONNECTORS

Please consult us.

## MAIN CHARACTERISTICS



### ULTRA LOW LOSS BENCH TEST CABLE ASSEMBLY

| Properties                   | TestPro 5                | TestPro 8                |
|------------------------------|--------------------------|--------------------------|
| Frequency range              | DC - 26.5 GHz            | DC - 18 GHz              |
| Impedance                    | 50 $\Omega \pm 1 \Omega$ | 50 $\Omega \pm 1 \Omega$ |
| IL (dB/m)                    | 1.02 @ 18 GHz            | 0.68 @ 18 GHz            |
| IL (dB/ft)                   | 0.31 @ 18 GHz            | 0.21 @ 18 GHz            |
| Phase with flexure stability | 7.2° @ 18 GHz            | 7.2° @ 18 GHz            |
| Amplitude stability (dB)     | < 0.05 @ 18 GHz          | < 0.05 @ 18 GHz          |
| Shielding Effectiveness      | -110 dB min @ 1 GHz      | -110 dB min @ 1 GHz      |
| Crush resistance             | 40 lb/linear in.         | 60 lb/linear in.         |
| Minimum bend radius          | 25 mm (1 in.)            | 40 mm (1.6 in.)          |
| Temperature (°C)             | -55 / + 125 °C           | -55 / + 125 °C           |
| Connectors                   | SMA, N, TNC              | SMA, N, TNC              |
| Flexure life cycle           | 5,000                    | 5,000                    |
| Mating cycles durability     | 5,000                    | 5,000                    |
| Armor                        | Available                | Available                |
| ROHS / REACH                 | Yes                      | Yes                      |

#### Application note

TestPro 5 and TestPro 8 benefit from Radiall's 30 years of expertise in manufacturing ultra low loss microwave cables. Radiall's mastery of low density PTFE tape wrapping elevates TestPro 5 and TestPro 8 to the position of best performance in the market.

To meet test and measurement requirements, these cables are reinforced. They are terminated with ruggedized TestPro connectors. The combination of the unique center contact captivation system and attachment methods offers very reliable products over multiple matings.

TestPro ultra low loss test and measurement cables are required when loss becomes an issue. Their high stability with temperature makes them easy to use in temperature chambers. They are also suitable for high power applications.

#### Key features & benefits



- Ultra low loss
- High phase stability with temperature
- Strain relief
- Crush resistance
- Very precise phase matching
- Long length available

Standard available assembly length: 39 inches

Custom lengths available with short lead time.

Typical applications include: test labs, production floor testing, anechoic chambers.

All TestPro cable assemblies are delivered in individual packaging with attached test report.

## ULTRA LOW LOSS TEST CABLE ASSEMBLIES

| Part number | Operating frequency | Connectors |            | Length            | Attenuation-Nom @2GHz - @18GHz | VSWR-Nom @18GHz |
|-------------|---------------------|------------|------------|-------------------|--------------------------------|-----------------|
| TestPro 5   |                     |            |            |                   |                                |                 |
| R288931001  | DC - 26.5 GHz       | SMA male   | SMA female | 39.4 in. / 100 cm | 0.42 dB - 1.25 dB              | 1.20            |
| R288931002  | DC - 18 GHz         | N male     | N male     | 39.4 in. / 100 cm | 0.42 dB - 1.25 dB              | 1.25            |
| R288931003  | DC - 18 GHz         | N male     | SMA male   | 39.4 in. / 100 cm | 0.42 dB - 1.25 dB              | 1.25            |
| TestPro 8   |                     |            |            |                   |                                |                 |
| R288931004  | DC - 18 GHz         | SMA male   | SMA female | 39.4 in. / 100 cm | 0.31 dB - 0.91 dB              | 1.25            |
| R288931005  | DC - 18 GHz         | N male     | N male     | 39.4 in. / 100 cm | 0.31 dB - 0.91 dB              | 1.25            |
| R288931006  | DC - 18 GHz         | N male     | SMA male   | 39.4 in. / 100 cm | 0.31 dB - 0.91 dB              | 1.25            |

TNC male connector also available. All TestPro cable assemblies are delivered in individual packaging with attached test report.

## VSWR

| Maximum VSWR | 0-4 GHz |    | 4-8 GHz |    | 8-12.4 GHz |    | 12.4-18 GHz |    |
|--------------|---------|----|---------|----|------------|----|-------------|----|
| TestPro 5    | VSWR    | dB | VSWR    | dB | VSWR       | dB | VSWR        | dB |
| 2 x SMA (*)  | 1.15    | 23 | 1.20    | 21 | 1.20       | 21 | 1.25        | 19 |
| 2 x TNC      | 1.20    | 21 | 1.20    | 21 | 1.20       | 21 | 1.35        | 17 |
| 2 x N        | 1.20    | 21 | 1.25    | 19 | 1.25       | 19 | 1.30        | 18 |
| TestPro 8    | VSWR    | dB | VSWR    | dB | VSWR       | dB | VSWR        | dB |
| 2 x SMA      | 1.15    | 23 | 1.20    | 21 | 1.20       | 21 | 1.25        | 19 |
| 2 x TNC      | 1.20    | 21 | 1.20    | 21 | 1.20       | 21 | 1.35        | 17 |
| 2 x N        | 1.20    | 21 | 1.25    | 19 | 1.25       | 19 | 1.30        | 18 |

This table gives values for assembly lengths between 200 to 5000 mm (8 to 196 in.) with straight connectors.

(\*) @26.5 GHz VSWR = 1.27 - 18 dB

## POWER HANDLING

TestPro 5 & 8 are particularly well suited for Ultra Low Loss and high power applications.

Max power handling is related to connector configurations and customer applications.

Please specify the working frequency, temperature and altitude/pressure.

For more detailed information please consult with Radiall directly.

## TEMPERATURE DERATING

Attenuation at X°C = Attenuation (20°C) x (1 + (X - 20) x θ). Ex: θ = 0.002 for copper and silver



## CONSTRUCTION / DIMENSIONS

|                  | Material                        |
|------------------|---------------------------------|
| Center conductor | solid SPC <sup>(1)</sup>        |
| Dielectric       | low density PTFE <sup>(2)</sup> |
| Inner shield     | SPC tape                        |
| Outer shield     | SPC braid                       |
| Jacket           | green FEP <sup>(3)</sup>        |
| Outer diameter   | 5.85 mm (0.230 inches)          |

<sup>(1)</sup> SPC = Silver-Plated Copper<sup>(2)</sup> PTFE = Poly-TetraFluoroEthylene<sup>(3)</sup> FEP = Fluorinated Ethylene Propylene

## ELECTRICAL CHARACTERISTICS

|                                    |                                                         |                         |
|------------------------------------|---------------------------------------------------------|-------------------------|
| Characteristic impedance           | 50 ohms $\pm$ 1 ohms                                    |                         |
| Operating frequency range          | DC - 26.5 GHz                                           |                         |
| Cut-off frequency                  | 31 GHz                                                  |                         |
| Screening effectiveness            | > 90 dB (at 18 GHz)                                     |                         |
| Velocity of propagation            | 85 %                                                    |                         |
| Propagation time                   | 3.9 ns / m                                              | 1.2 ns / ft             |
| Capacitance                        | 79 pF / m (at 1 GHz)                                    | 23.9 pF / ft (at 1 GHz) |
| Insulation resistance              | > 3 x 10 <sup>5</sup> MOhm / m                          |                         |
| Corona extinction voltage          | > 2.3 kV                                                |                         |
| Nominal phase                      | 1400 ° / m / GHz                                        |                         |
| Phase stability with temperature   | < 1° / m / GHz (-55 / +100°C)                           |                         |
| Phase stability with bending       | < 0.4° / 360° / GHz                                     |                         |
| Attenuation stability with bending | < 0.05 dB (at 18 GHz) / < 0.1 dB (at 26.5 GHz)          |                         |
| Attenuation stability with shaking | < 0.01 dB/m (at 18 GHz) / < 0.015 dB/m (at 26.5 GHz)    |                         |
| Atten. variation with temperature  | Att. (at X° C) = att. (at 20° C) x 1 + (X - 20) x 0.002 |                         |



## APPLICATION NOTE

This ultra- low loss cable is fully adapted to laboratory applications. It can be reinforced with the "ProJack" protective jacket for high mechanical stress applications.

## Main benefits:

- ultra- low loss
- high electrical stability with bending and temperature
- high phase stability with temperature
- strain relief
- high mechanical strength and crush resistance
- broad range of connectors available

## MECHANICAL CHARACTERISTICS

|                             |                 |            |
|-----------------------------|-----------------|------------|
| Maximum weight              | 73g / m         | 22.1g / ft |
| Recommend. min. bend radius | 25 mm           | 0.984 inch |
| Crush resistance            | > 700N / 100 mm |            |

## ENVIRONMENTAL CHARACTERISTICS

|                              |                   |               |
|------------------------------|-------------------|---------------|
| Operating temperature range* | -70 / +200° C     | -94 / +392° C |
| Fire resistance              | yes (MIL C 87104) |               |
| Halogen-free jacket          | no                |               |

\* cable alone. Cable assembly operating temperature range is -55 / +125°C (-67 / + 257°F)

## FREQUENCY / ATTENUATION (typ.) / CW MAX POWER (\*)

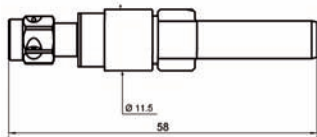
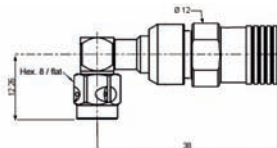
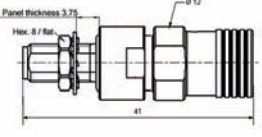
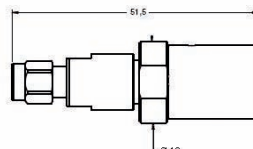
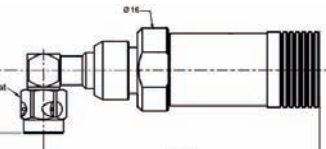
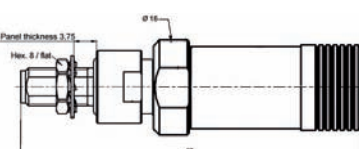
| GHz                            | dB / m | dB / ft                                   | Watts |
|--------------------------------|--------|-------------------------------------------|-------|
| 1.0                            | 0.23   | 0.07                                      | 850   |
| 2.0                            | 0.32   | 0.10                                      | 600   |
| 4.0                            | 0.46   | 0.14                                      | 420   |
| 6.0                            | 0.57   | 0.17                                      | 340   |
| 8.0                            | 0.66   | 0.20                                      | 300   |
| 10.0                           | 0.75   | 0.23                                      | 270   |
| 12.4                           | 0.84   | 0.25                                      | 240   |
| 18.0                           | 1.02   | 0.31                                      | 200   |
| 26.5                           | 1.27   | 0.38                                      | 190   |
| Attenuation calculation (dB/m) |        | (0.22 x $\sqrt{f}$ GHz) + (0.005 x F GHz) |       |

\* = CW max power calculated at sea level / 40°C and VSWR 1:1 (Cable-assembly power ratings may be limited by the connector type. Please contact us for specific needs).

Note: typical attenuation for two connectors (dB) = 0.045 x  $\sqrt{f}$  GHz + 0.04

Connector part numbers are for indication only. Connectors and cables cannot be ordered separately.

## SMA SERIES

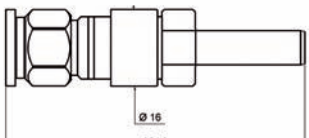
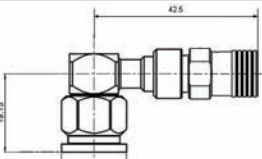
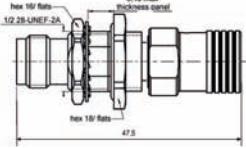
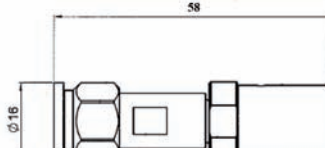
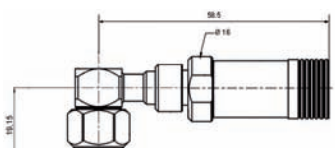
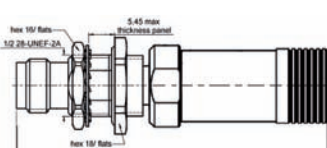
|                                                                                                     |                                                                                                      |                                                                                                                                                                   |
|-----------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    |                     |                                                                                |
| <b>Designation</b> Straight Plug<br><b>Item</b> M125065C00<br><b>Max. Freq</b> 26.5 GHz             | <b>Designation</b> Right Angle Plug<br><b>Item</b> M125195L02<br><b>Max. Freq</b> 18 GHz             | <b>Designation</b> Straight Jack<br><b>Item</b> M125330L02<br><b>Max. Freq</b> 26.5 GHz<br><b>Miscellaneous</b> Panel sealed<br>panel nut torque 200N             |
|                    |                     |                                                                                 |
| <b>Designation</b> Straight Plug For ProJack<br><b>Item</b> M125065C03<br><b>Max. Freq</b> 26.5 GHz | <b>Designation</b> Right Angle Plug For ProJack<br><b>Item</b> M125195L03<br><b>Max. Freq</b> 18 GHz | <b>Designation</b> Straight Jack For ProJack<br><b>Item</b> M125330L03<br><b>Max. Freq</b> 26.5 GHz<br><b>Miscellaneous</b> Panel sealed<br>panel nut torque 200N |

### SMA Series characteristics:

Voltage withstanding 1000 Vrms. Connector material is stainless steel. Finish is passivated.

Nominal coupling nut torque is 110 N (recommended torque wrench for plugs: R28220000 / 8 mm / 80-120 Ncm)

## TNC SERIES

|                                                                                                   |                                                                                                      |                                                                                                                                                                 |
|---------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                   |                                                                             |
| <b>Designation</b> Straight Plug<br><b>Item</b> M143065C00<br><b>Max. Freq</b> 18 GHz             | <b>Designation</b> Right Angle Plug<br><b>Item</b> M143195L02<br><b>Max. Freq</b> 18 GHz             | <b>Designation</b> Straight Jack<br><b>Item</b> M143330L02<br><b>Max. Freq</b> 18 GHz<br><b>Miscellaneous</b> Panel sealed<br>panel nut torque 370N             |
|                |                   |                                                                             |
| <b>Designation</b> Straight Plug For ProJack<br><b>Item</b> M143065C03<br><b>Max. Freq</b> 18 GHz | <b>Designation</b> Right Angle Plug For ProJack<br><b>Item</b> M143195L03<br><b>Max. Freq</b> 18 GHz | <b>Designation</b> Straight Jack For ProJack<br><b>Item</b> M143330L03<br><b>Max. Freq</b> 18 GHz<br><b>Miscellaneous</b> Panel sealed<br>panel nut torque 370N |

### TNC Series characteristics:

Voltage withstanding 1500 Vrms. Connector material is stainless steel. Finish is passivated.

Nominal coupling nut torque is 330 N (recommended torque wrench for plugs: R282300000 / 14 mm / 265 Ncm).

# CONNECTORS COMPATIBLE WITH



Connector part numbers are for indication only. Connectors and cables cannot be ordered separately.

## N 18 SERIES

### N 18 Series characteristics:

Voltage withstanding 1500 Vrms

Connector material is stainless steel. Finish is passivated

Nominal coupling nut torque is 400 N (recommended torque

wrench for plugs : R282303000 / 19 mm / 160 Ncm)

|                    |                                       |                    |                                       |
|--------------------|---------------------------------------|--------------------|---------------------------------------|
|                    |                                       |                    |                                       |
| <b>Designation</b> | <b>Straight Plug</b>                  | <b>Designation</b> | <b>Straight Plug For ProJack</b>      |
| Item               | M163065C00                            | Item               | M163065C03                            |
| Max. Freq          | 18 GHz                                | Max. Freq          | 18 GHz                                |
|                    |                                       |                    |                                       |
| <b>Designation</b> | <b>Straight Jack</b>                  | <b>Designation</b> | <b>Straight Jack For ProJack</b>      |
| Item               | M163325L02                            | Item               | M163325L03                            |
| Max. Freq          | 18 GHz                                | Max. Freq          | 18 GHz                                |
| Miscellaneous      | Panel sealed<br>panel nut torque 500N | Miscellaneous      | Panel sealed<br>panel nut torque 500N |
|                    |                                       |                    |                                       |
| <b>Designation</b> | <b>Right Angle Plug For ProJack</b>   | <b>Designation</b> | <b>Right Angle Plug</b>               |
| Item               | M163195L03                            | Item               | M163195L02                            |
| Max. Freq          | 18 GHz                                | Max. Freq          | 18 GHz                                |

## CONSTRUCTION / DIMENSIONS

|                  | Material                        |
|------------------|---------------------------------|
| Center conductor | solid SPC <sup>(1)</sup>        |
| Dielectric       | low density PTFE <sup>(2)</sup> |
| Inner shield     | SPC tape                        |
| Outer shield     | SPC braid                       |
| Jacket           | green FEP <sup>(3)</sup>        |
| Outer diameter   | 8.50 mm (0.335 inches)          |

- <sup>(1)</sup> SPC = Silver-Plated Copper  
<sup>(2)</sup> PTFE = Poly-TetraFluoroEthylene  
<sup>(3)</sup> FEP = Fluorinated Ethylene Propylene

## ELECTRICAL CHARACTERISTICS

|                                    |                                                         |                         |
|------------------------------------|---------------------------------------------------------|-------------------------|
| Characteristic impedance           | 50 ohms $\pm$ 1 ohms                                    |                         |
| Operating frequency range          | DC - 18 GHz                                             |                         |
| Cut-off frequency                  | 20 GHz                                                  |                         |
| Screening effectiveness            | > 90 dB (at 18 GHz)                                     |                         |
| Velocity of propagation            | 85 %                                                    |                         |
| Propagation time                   | 3.9 ns / m                                              | 1.2 ns / ft             |
| Capacitance                        | 79 pF / m (at 1 GHz)                                    | 23.9 pF / ft (at 1 GHz) |
| Insulation resistance              | > 3 x 10 <sup>5</sup> MOhm / m                          |                         |
| Corona extinction voltage          | > 3.3 kV                                                |                         |
| Nominal phase                      | 1400 ° / m / GHz                                        |                         |
| Phase stability with temperature   | < 1° / m / GHz (-55 / +100°C)                           |                         |
| Phase stability with bending       | < 0.4° / 360° / GHz                                     |                         |
| Attenuation stability with bending | < 0.05 dB (at 18 GHz)                                   |                         |
| Attenuation stability with shaking | < 0.01 dB/m (at 18 GHz)                                 |                         |
| Atten. variation with temperature  | Att. (at X° C) = att. (at 20° C) x 1 + (X - 20) x 0.002 |                         |



## MECHANICAL CHARACTERISTICS

|                             |                  |            |
|-----------------------------|------------------|------------|
| Maximum weight              | 155g / m         | 47.0g / ft |
| Recommend. min. bend radius | 40 mm            | 1.575 inch |
| Crush resistance            | > 1000N / 100 mm |            |

## ENVIRONMENTAL CHARACTERISTICS

|                              |                   |               |
|------------------------------|-------------------|---------------|
| Operating temperature range* | -70 / +200° C     | -94 / +392° C |
| Fire resistance              | yes (MIL C 87104) |               |
| Halogen-free jacket          | no                |               |

\* cable alone. Cable assembly operating temperature range is -55 / +125°C (-67 / + 257°F)

### APPLICATION NOTE

This Ultra- low loss cable is fully adapted to laboratory applications. It can be reinforced with the "ProJack" protective jacket for high mechanical stress applications.

#### Main benefits:

- ultra- low loss
- high electrical stability with bending and temperature
- high phase stability with temperature
- strain relief
- high mechanical strength and crush resistance
- broad range of connectors available

## FREQUENCY / ATTENUATION (typ.) / CW MAX POWER (\*)

| GHz                            | dB / m | dB / ft                                   | Watts |
|--------------------------------|--------|-------------------------------------------|-------|
| 1.0                            | 0.15   | 0.04                                      | 1600  |
| 2.0                            | 0.21   | 0.06                                      | 1100  |
| 3.0                            | 0.26   | 0.08                                      | 920   |
| 4.0                            | 0.30   | 0.09                                      | 800   |
| 5.0                            | 0.34   | 0.10                                      | 710   |
| 6.0                            | 0.37   | 0.11                                      | 650   |
| 8.0                            | 0.44   | 0.13                                      | 560   |
| 10.0                           | 0.49   | 0.15                                      | 500   |
| 12.4                           | 0.55   | 0.17                                      | 450   |
| 18.0                           | 0.68   | 0.21                                      | 380   |
| Attenuation calculation (dB/m) |        | (0.14 x $\sqrt{f}$ GHz) + (0.005 x F GHz) |       |

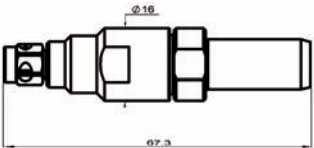
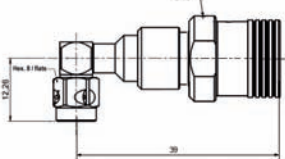
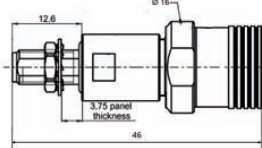
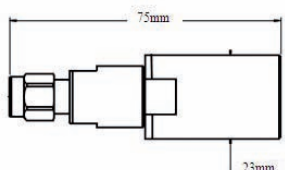
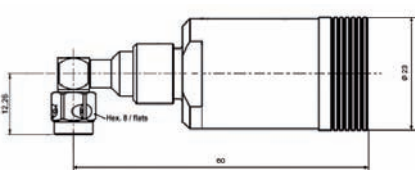
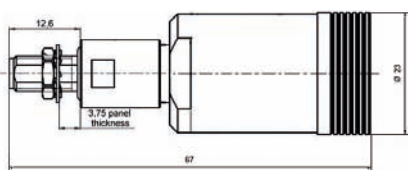
\* = CW max power calculated at sea level / 40°C and VSWR 1:1 (Cable-assembly power ratings may be limited by the connector type. Please contact us for specific needs.)  
 Note: typical attenuation for two connectors (dB) = 0.0447 x  $\sqrt{f}$  GHz + 0.04

## CONNECTORS COMPATIBLE WITH



Connector part numbers are for indication only. Connectors and cables cannot be ordered separately.

## SMA SERIES

|                                                                                   |                           |                                                                                   |                              |                                                                                     |                                       |
|-----------------------------------------------------------------------------------|---------------------------|-----------------------------------------------------------------------------------|------------------------------|-------------------------------------------------------------------------------------|---------------------------------------|
|  |                           |  |                              |  |                                       |
| Designation                                                                       | Straight Plug             | Designation                                                                       | Right Angle Plug             | Designation                                                                         | Straight Jack                         |
| Item                                                                              | M125068C00                | Item                                                                              | M125199L04                   | Item                                                                                | M125338L04                            |
| Max. Freq                                                                         | 18 GHz                    | Max. Freq                                                                         | 18 GHz                       | Max. Freq                                                                           | 18 GHz                                |
|                                                                                   |                           |                                                                                   |                              | Miscellaneous                                                                       | Panel sealed<br>panel nut torque 250N |
|  |                           |  |                              |  |                                       |
| Designation                                                                       | Straight Plug For ProJack | Designation                                                                       | Right Angle Plug For ProJack | Designation                                                                         | Straight Jack For ProJack             |
| Item                                                                              | M125068C05                | Item                                                                              | M125199L05                   | Item                                                                                | M125338L05                            |
| Max. Freq                                                                         | 18 GHz                    | Max. Freq                                                                         | 18 GHz                       | Max. Freq                                                                           | 18 GHz                                |
|                                                                                   |                           |                                                                                   |                              | Miscellaneous                                                                       | Panel sealed<br>panel nut torque 250N |

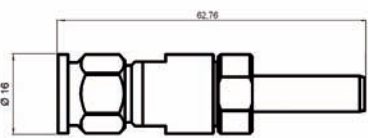
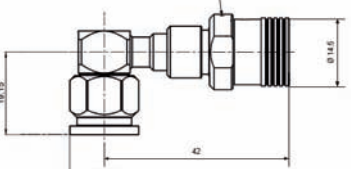
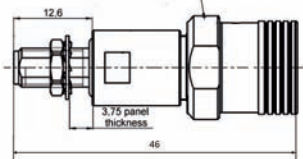
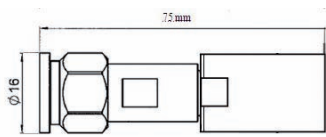
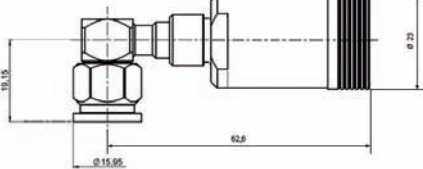
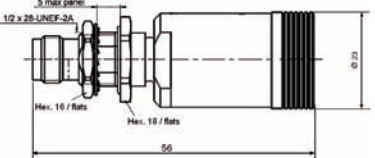
## SMA Series characteristics:

Voltage withstanding 1000 Vrms. Connector material is stainless steel.

Finish is passivated.

Nominal coupling nut torque is 110 N (recommended torque wrench for plugs : R282320000 / 8 mm / 80-120 Ncm)

## TNC SERIES

|                                                                                     |                           |                                                                                     |                              |                                                                                       |                                       |
|-------------------------------------------------------------------------------------|---------------------------|-------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------|---------------------------------------|
|  |                           |  |                              |  |                                       |
| Designation                                                                         | Straight Plug             | Designation                                                                         | Right Angle Plug             | Designation                                                                           | Straight Jack                         |
| Item                                                                                | M143068C00                | Item                                                                                | M143198L04                   | Item                                                                                  | M143338L04                            |
| Max. Freq                                                                           | 18 GHz                    | Max. Freq                                                                           | 18 GHz                       | Max. Freq                                                                             | 18 GHz                                |
|                                                                                     |                           |                                                                                     |                              | Miscellaneous                                                                         | Panel sealed<br>panel nut torque 370N |
|  |                           |  |                              |  |                                       |
| Designation                                                                         | Straight Plug For ProJack | Designation                                                                         | Right Angle Plug For ProJack | Designation                                                                           | Straight Jack For ProJack             |
| Item                                                                                | M143068C05                | Item                                                                                | M143198L05                   | Item                                                                                  | M143338L05                            |
| Max. Freq                                                                           | 18 GHz                    | Max. Freq                                                                           | 18 GHz                       | Max. Freq                                                                             | 18 GHz                                |
|                                                                                     |                           |                                                                                     |                              | Miscellaneous                                                                         | Panel sealed<br>panel nut torque 370N |

## TNC Series characteristics:

Voltage withstanding 1500 Vrms.

Connector material is stainless steel. Finish is passivated.

Nominal coupling nut torque is 330 N (recommended torque wrench for plugs: R282300000 / 14 mm / 265 Ncm)

[www.radiall.com](http://www.radiall.com)

Connector part numbers are for indication only. Connectors and cables cannot be ordered separately.

## N 18 SERIES

### N 18 Series characteristics:

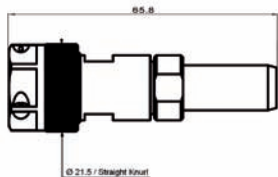
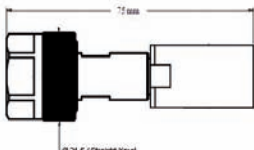
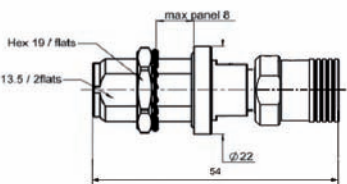
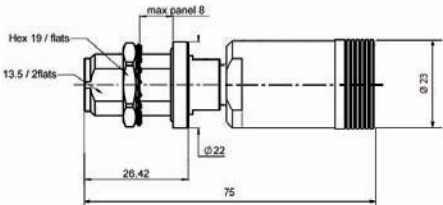
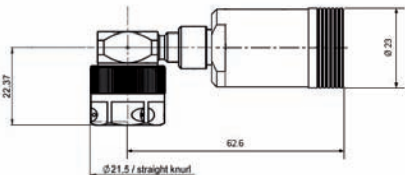
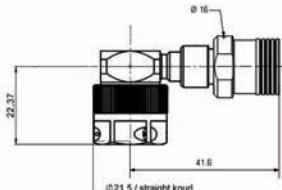
Voltage withstanding 1500 Vrms

Connector material is stainless steel.

Finish is passivated.

Nominal coupling nut torque is 400 N

(recommended torque wrench for plugs:  
R282303000 / 19 mm / 160 Ncm)

|                                                                                     |                                       |                                                                                     |                                       |
|-------------------------------------------------------------------------------------|---------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------|
|    |                                       |   |                                       |
| Designation                                                                         | Straight Plug                         | Designation                                                                         | Straight Plug For ProJack             |
| Item                                                                                | M163068C00                            | Item                                                                                | M163068C05                            |
| Max. Freq                                                                           | 18 GHz                                | Max. Freq                                                                           | 18 GHz                                |
|    |                                       |   |                                       |
| Designation                                                                         | Straight Jack                         | Designation                                                                         | Straight Jack For ProJack             |
| Item                                                                                | M163328L04                            | Item                                                                                | M163328L05                            |
| Max. Freq                                                                           | 18 GHz                                | Max. Freq                                                                           | 18 GHz                                |
| Miscellaneous                                                                       | Panel sealed<br>panel nut torque 500N | Miscellaneous                                                                       | Panel sealed<br>panel nut torque 500N |
|  |                                       |  |                                       |
| Designation                                                                         | Right Angle Plug For ProJack          | Designation                                                                         | Right Angle Plug                      |
| Item                                                                                | M163198L05                            | Item                                                                                | M163198L04                            |
| Max. Freq                                                                           | 18 GHz                                | Max. Freq                                                                           | 18 GHz                                |



## IN-SERIES ADAPTORS (DC-18 GHZ)



| Interface | Male - Male              | Male - Female            | Female - Female                        | Miscellaneous                                             |
|-----------|--------------------------|--------------------------|----------------------------------------|-----------------------------------------------------------|
| SMA       | R125703000<br>R125703001 | R125704000<br>R125704001 | R125705000<br>R125705001               | Gold-plated stainless steel<br>Passivated stainless steel |
| TNC 18    | R143703700               | R143705700               | R143704700<br>R143710700<br>R143730700 | Square flange<br>Bulkhead                                 |
| N 18      | R163703001               | R163708001               | R163705001                             | Silicon gasket                                            |

## BETWEEN SERIES ADAPTORS (DC-18 GHZ)



| Interface |        | PC7        | N 18       |            |                              |
|-----------|--------|------------|------------|------------|------------------------------|
|           |        |            | Male       | Female     | Female bulkhead panel sealed |
| SMA       | Male   | R191009000 |            |            |                              |
|           | Female | R191011000 |            |            |                              |
| PC 3.5    | Male   | R191010000 | R191324000 | R191326000 |                              |
|           | Female | R191012000 | R191328000 | R191330000 | R191333000                   |

## ATTENUATORS



| Interface m/f | Average power (W) | Frequency (GHz) |                 |                |            |            |                |                |            |
|---------------|-------------------|-----------------|-----------------|----------------|------------|------------|----------------|----------------|------------|
|               |                   | 3               | 4               | 6              | 8          | 12.4       | 18             | 26.5           | 40         |
| N             | 1                 |                 |                 | R4127xx124     |            |            |                |                |            |
|               | 2                 |                 |                 |                |            | R4147xx000 | R4147xx161     |                |            |
|               | 15                |                 |                 |                | R4157xx000 |            | R4160xx000     |                |            |
| QMA           | 1                 |                 |                 | R4117xx124     |            |            |                |                |            |
| SMA           | 1                 |                 |                 | R4118xx124 (*) |            |            |                |                |            |
|               | 2                 |                 | R4138xx115 (**) |                |            |            | R4118xx121 (*) | R4138xx121 (*) |            |
|               | 15                |                 |                 |                | R4153xx000 |            | R4161xx000     |                |            |
| SMA2.9        | 2                 |                 |                 |                |            |            |                |                | R4133xx000 |
| TNC           | 1                 | R4125xx124      |                 |                |            |            |                |                |            |
|               | 2                 |                 |                 |                |            | R4145xx000 | R4145xx161     |                |            |
|               | 15                |                 |                 |                | R4155xx000 |            | R4168xx000     |                |            |

xx for attenuation. Typical values are 03, 06, 10, 20, 30. For other attenuation value please consult us.

High power attenuators available (up to 100W)

BNC and 7/16 interface available

\* .75 in. attenuators

\*\* .86 in. attenuators

## TERMINATIONS



| Interface |        | Average power (W) | Frequency (GHz) |            |            |            |            |
|-----------|--------|-------------------|-----------------|------------|------------|------------|------------|
|           |        |                   | 4               | 12.4       | 18         | 26.5       | 40         |
| N         | male   | 1                 | R404131000      | R404240000 |            |            |            |
|           | female | 1                 | R404132000      | R404245000 |            |            |            |
| QMA       | male   | 2                 |                 |            | R404340000 |            |            |
|           | female | 2                 |                 |            | R404355000 |            |            |
| QMA       | male   | 1                 | R404114000      |            |            |            |            |
| QN        | male   | 1                 | R404116000      |            |            |            |            |
| SMA       | male   | 1                 | R404101000      |            |            |            |            |
|           | female | 1                 | R404102000      |            |            |            |            |
| SMA2.9    | male   | 2                 |                 |            | R404210000 | R404213000 |            |
|           | female | 2                 |                 |            |            | R404219000 |            |
| TNC       | male   | 1                 | R404121000      | R404225000 |            |            | R404280000 |
|           | female | 1                 | R404122000      |            |            |            | R404285000 |
| TNC       | male   | 2                 |                 |            | R404370000 |            |            |
|           | female | 2                 |                 |            | R404375000 |            |            |

Medium and high power terminations also available (6 to 1000 W)

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| 1800920920914PJ | 13   | M143064C00  | 12   | R127920001            | 15   |
| 1800920921219PJ | 13   | M143064C01  | 12   | R127920011            | 17   |
| 1800920921829PJ | 13   | M151064C00  | 11   | R143703700            | 26   |
| 1800920930610PJ | 13   | M151064C01  | 11   | R143704700            | 26   |
| 1800920930914PJ | 13   | M163064C00  | 12   | R143705700            | 26   |
| 1800920931219PJ | 13   | M163064C01  | 12   | R143710700            | 26   |
| 1800920931829PJ | 13   |             |      | R143730700            | 26   |
| 1800940920914PJ | 13   | R288931001  | 19   | R163703001            | 26   |
| 1800940921219PJ | 13   | R288931002  | 19   | R163705001            | 26   |
| 1800940921829PJ | 13   | R288931003  | 19   | R163708001            | 26   |
| 1800940930914PJ | 13   | R288931004  | 19   | R191009000            | 26   |
| 1800940931219PJ | 13   | R288931005  | 19   | R191010000            | 26   |
| 1800940931829PJ | 13   | R288931006  | 19   | R191011000            | 26   |
| 1801171170610PJ | 13   | R288940001  | 9    | R191012000            | 26   |
| 1801171170914PJ | 13   | R288940002  | 9    | R191324000            | 26   |
| 1801171171219PJ | 13   | R288940003  | 9    | R191326000            | 26   |
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| 1801171180610PJ | 13   | R288940005  | 9    | R191330000            | 26   |
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| 1801171181829PJ | 13   | R288940008  | 9    | R299776101            | 15   |
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| M125065C03      | 21   | R288940016  | 9    | R404121000            | 26   |
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| M125068C05      | 24   | R288940034  | 9    | R404131000            | 26   |
| M125195L02      | 21   | R288940035  | 9    | R404132000            | 26   |
| M125195L03      | 21   | R288940060  | 9    | R404210000            | 26   |
| M125199L04      | 24   |             |      | R404213000            | 26   |
| M125199L05      | 24   | R4117xx124  | 26   | R404219000            | 26   |
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