



Product Catalog



cinch
CONNECTIVITY SOLUTIONS
a bel group



About Bel

Bel is a publicly traded company that has been operated by the same family for over 65 years. Our history of organic growth and acquisitions have broadened our product portfolio. This has established Bel as a world leader with a diverse offering of power, protection and interconnect products. We design and manufacture these products which are primarily used in the networking, telecommunications, computing, military, aerospace, transportation and broadcasting industries. Bel’s portfolio of products also finds application in the automotive, medical and consumer electronics markets.

About Cinch Connectivity Solutions

For over 100 years, Cinch Connectivity Solutions has manufactured high quality and reliable high performance connectors and cable assemblies. Cinch is recognized as a world class connectivity supplier of RF, fiber optic, hybrid, microwave components, circular, d-subminiatures, modular rectangular, electronic enclosures and cable assemblies. Cinch provides innovative solutions to the military, commercial aerospace, networking, telecommunication, test and measurement, oil and gas and other harsh environment industries. We aim to exceed our customers’ expectations and continually offer innovative solutions to the rapidly changing needs of the markets and customers we serve.

Along with our parent company, Bel Fuse Inc., our mission is to provide products and services using established quality standards and to meet our customer expectations. To fulfill this objective, we strive to produce components and assemblies that embody optimum levels of reliability and performance in their design, manufacture, and delivery. Cinch Connectivity Solutions has consistently proven to be a valuable supplier to the foremost companies in its chosen industries by developing cost effective solutions for the challenges of new product development.

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General Information

Specifications

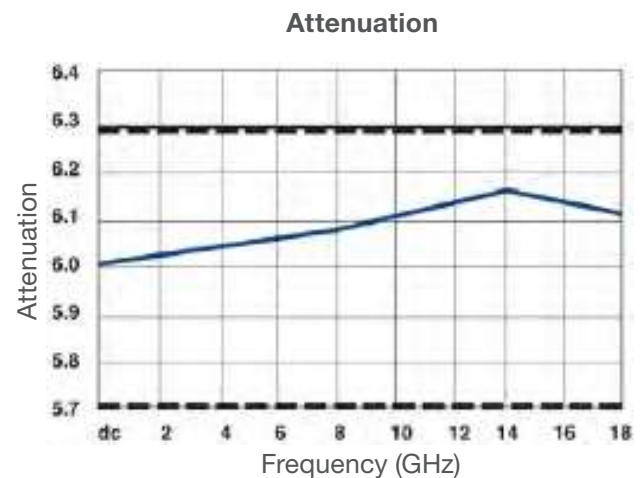
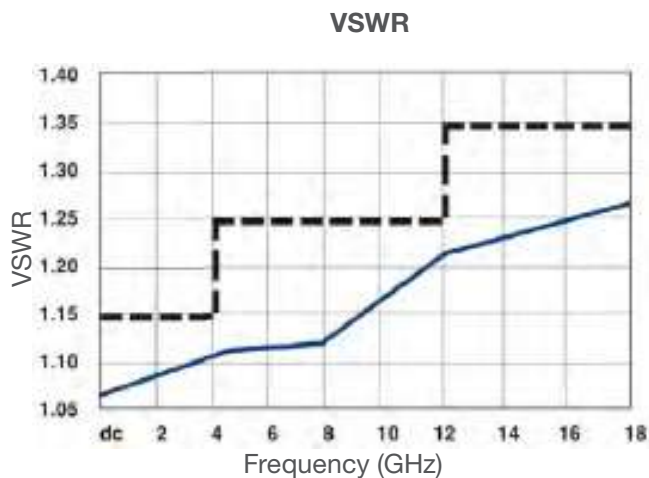
- MIL-DTL-3933 Qualified (QPL) Parts - see QPL section for product listing
- DC - 4, DC - 8, DC - 12.4, DC - 18, DC - 26 GHz, and DC - 40 GHz Performance
- Small Size, Light Weight, Rugged Construction
- Average Power up to 20 Watts
- SMA, N, TNC, BNC, 2.9mm, and 3.5mm Connector Configurations
- Designed to Meet Military and Space Environmental Specs, see appendix for details



Attenuators are passive components designed for the purpose of reducing the input power in a matched transmission line system by a predictable amount on a linear basis.

Midwest Microwave offers this complete product line of fixed coaxial attenuators, ruggedly designed for system or laboratory test use. These units exhibit low VSWR and high accuracy attenuation performance over the temperature range of -55°C to +125°C and meet the environmental requirements as outlined in the appendix. Medium power attenuators with average power levels of up to 20 Watts are available in up to 30 dB levels in .5 dB increments providing broadband performance and low frequency sensitivity while exhibiting very stable operation over temperature extremes. Standard catalog units are available off the shelf for immediate delivery and special units can be custom designed by Midwest's engineering staff to accommodate unique system needs. All Midwest Attenuators are completely manufactured in-house and are 100% tested to insure only the highest quality performance whether for military or space use or for commercial applications.

Typical Fixed Attenuator Performance Characteristics



Attenuation

The technical term is most often used in connection with loss or insertion loss in a transmission line. Insertion loss is a combination of two types of losses; impedance mismatch loss (reflective) and attenuation loss (dissipative). Mismatch loss is the ratio of power that would be absorbed by a unit or device under test, if it were perfectly impedance matched, to the actual power absorbed by the device. Attenuation is the ratio of power into a component to the power out under impedance matched conditions, and represents the actual power dissipated within the component. Thereby, Insertion loss is the ratio of the power delivered to a matched load by a matched generator before and after the insertion of a component into the transmission line. When a component is perfectly matched to the transmission line and to the load, the mismatch loss is zero and the insertion loss is the same as the attenuation.

Average Power

The maximum average (cw) power is the maximum input power specified and applied for one hour minimum at the specified temperature of 25° C with the output terminated in a matched impedance such that the specified properties of the attenuator will not be altered or changed after the unit is returned to ambient temperature at a power level that is 20 dB below the maximum specified input power. If the attenuator is operated at higher temperatures then it is necessary to derate the power rating accordingly. The derating curve and specifications shown below describes this specifically.

Peak Power

The maximum peak power at a pulse width or duty cycle of 5 microseconds together with the average power when applied for a minimum period of one hour with the output terminated with a matched load will not damage or permanently alter the specified properties of the attenuator.

Temperature Coefficient

The maximum change of insertion loss in dB per °C from 20°C over the maximum operating temperature range. To obtain the change in insertion loss, multiply the temperature coefficient by the temperature change and then by the value in dB of the attenuator.

Custom Design Availability

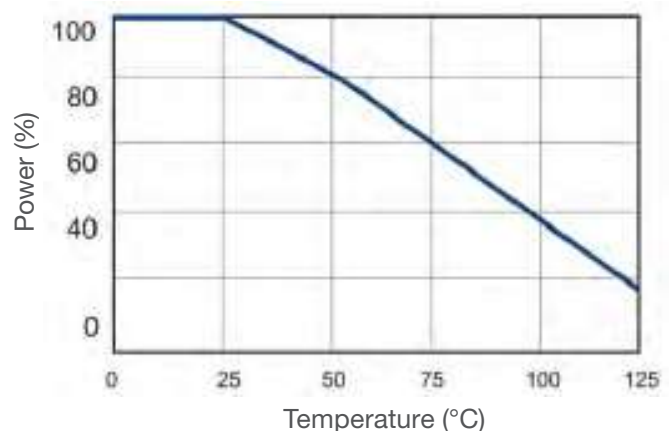
In addition to the wide variety of standard model attenuators available on an off the shelf basis, Midwest Microwave retains an extensive engineering staff to accommodate your special requirements. A complete in-house design and manufacturing facility is provided including all testing and documentation for high reliability aerospace applications.

- Frequency applications that are extended
- Attenuation values in .5 dB increments
- Higher power requirements
- High performance, narrow bandwidth applications
- Connector interfaces and mounting requirements that are extraordinary

Temperature Specifications

Operating Temperature Range: -55° C to +125° C

Temperature Coefficient: 1/10,000 dB /dB/ °C



ATTENUATORS

2.9mm DC - 40.0 GHz

Midwest Microwave's 2.9mm subminiature series of fixed coaxial attenuators provide temperature stable, ruggedly built, precision performance in a compact lightweight package size.



Technical Specification

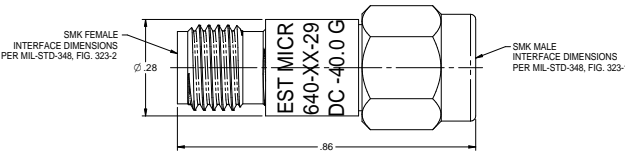
| | | |
|-----------------------------|----------------------------|-----------------|
| Series | ATT-0640 | |
| Frequency, (GHz) | DC - 40 | |
| Attenuation Accuracy, (dB): | Attenuator Value | Tolerance (max) |
| | 3 & 6 (DC - 18 GHz) | ± 0.5 |
| | 3 & 6 (18-40 GHz) | ± 0.8 |
| | 10 & 20 (DC - 18 GHz) | ± 0.6 |
| | 10 & 20 (18-40 GHz) | ± 1.0 |
| VSWR table, (max.): | Freq. (GHz) | VSWR |
| | DC - 18.0 | 1.3 |
| | 18.0-40.0 | 1.4 |
| Average Power*, (W): | 1 | |
| Operating Temperature, (°C) | -65 to +125 | |
| Finish: | Passivated Stainless Steel | |

* Rated @25°C, derated linearly to 0.5W @ 125°C

DC - 40.0 GHz 640 Series

| |
|---------------------|
| Male/Female |
| ATT-0640-XX-29M-02* |

* XX = Attenuation Value : Select 03, 06, 10 and 20 dB
For Attenuators with Hex Body substitute HEX for 29M in Model No.
Contact factory for custom versions and different gender configurations



| Attenuation Value | Length A in. (mm) |
|-------------------|-------------------|
| 3, 6, 10 & 20 dB | 0.86 (21.8) |

SMA Subminiature "MINIPAD"

DC - 26.5 GHz High Performance

- DC - 2, DC - 8, DC - 12.4, and DC - 18 GHz Units
- Rugged Stainless Steel Construction
- Any Male/Female Combinations
- Economical Alternatives



Midwest Microwave's SMA subminiature series of fixed coaxial attenuators provide temperature stable, ruggedly built, precision performance in a compact lightweight package size. Attenuation values up through 30 dB are available with any of the units described and with specified combination of female or male SMA connectors.

Frequency Specifications

| Series | ATT-0298 | ATT-0290 | ATT-0291 | ATT-0292 | ATT-0294 |
|------------------|-----------|-----------|-----------|----------|----------|
| Frequency, (GHz) | DC - 26.5 | DC - 18.0 | DC - 12.4 | DC - 8.0 | DC - 2.0 |

Technical Specification

| | | |
|------------------------------------|----------------------------|-------------------|
| VSWR formula, (max.): | 1.07 + 0.015(f GHz) | |
| VSWR table, (max.): | Freq. (GHz) | VSWR |
| | DC - 8.0 | 1.19 |
| | 8.0-18.0 | 1.34 |
| | 18.0-26.5 | 1.47 |
| Average Power*, (W): | 2 | |
| Peak Power, (W): | 200 | |
| Attenuation Accuracy, (dB): | Attenuator Value | Tolerance (max)** |
| | 1-6 | ± 0.3 |
| | 7-20 | ± 0.5 |
| | 21-30 | ± 1.0 |
| Operating Temperature, (°C) | -65 to +125 | |
| Finish: | Passivated Stainless Steel | |

* Rated @25°C, derated linearly to 0.5W @ 125°C

** Applies up to 18GHz only, see product drawings or contact factory for 26.5GHz models

DC - 26.5 GHz 298 Series

| Male/Female |
|---------------------|
| ATT-0298-XX-SMA-02* |

DC - 18.0 GHz 290 Series

| Male/Female | Female/Female | Male/Male |
|---------------------|---------------------|---------------------|
| ATT-0290-XX-SMA-02* | ATT-290F-XX-SMA-02* | ATT-290M-XX-SMA-02* |

DC - 12.4 GHz 291 Series

| Male/Female |
|---------------------|
| ATT-0291-XX-SMA-02* |

* XX = Attenuation Value : Select 01 to 12 dB in 1 dB increments, 15, 20, 25, and 30 dB

Contact factory for custom versions, different gender configurations, other dB values and 0.5dB increments

ATTENUATORS

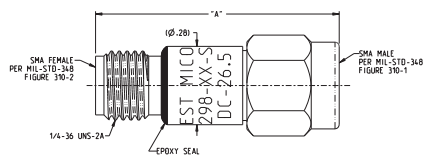
DC - 8.0 GHz 292 Series

| Male/Female |
|---------------------|
| ATT-0292-XX-SMA-02* |

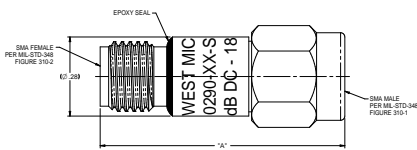
DC - 2.0 GHz 294 Series

| Male/Female |
|---------------------|
| ATT-0294-XX-SMA-02* |

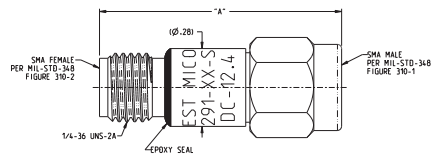
* XX = Attenuation Value : Select 01 to 12 dB in 1 dB increments, 15, 20, 25, and 30 dB
Contact factory for custom versions, different gender configurations, other dB values and 0.5dB increments



| Attenuation Value | Length A in. (mm) |
|-------------------|-------------------|
| 1-12 dB | 0.86 (21.8) |
| 13-30 dB | 1.02 (25.9) |



| Attenuation Value | Length A in. (mm) |
|-------------------|-------------------|
| 1-12 dB | 0.84 (21.3) |
| 13-30 dB | 0.97 (24.6) |



| Attenuation Value | Length A in. (mm) |
|-------------------|-------------------|
| 1-12 dB | 0.98 (24.9) |
| 13-30 dB | 1.12 (28.4) |

Low VSWR Version



Technical Specification

| | | |
|-----------------------------|----------------------------|-----------------|
| Series | ATT-451 | |
| Frequency, (GHz) | DC - 18.0 | |
| Attenuation Accuracy, (dB): | Attenuator Value | Tolerance (max) |
| | 1-6 | ± 0.3 |
| | 7-20 | ± 0.5 |
| | 21-30 | ± 1.0 |
| VSWR table, (max.): | Freq. (GHz) | VSWR |
| | DC-4.0 | 1.12 |
| | 4.0-8.0 | 1.15 |
| | 8.0-18.0 | 1.2 |
| Average Power*, (W): | 2 | |
| Peak Power, (W): | 200 | |
| Operating Temperature, (°C) | -65 to +125 | |
| Finish: | Passivated Stainless Steel | |

* Rated @25°C, derated linearly to 0.5W @ 125°C

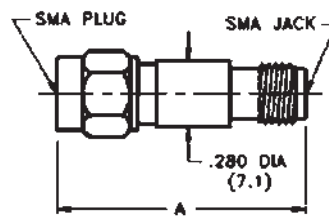
DC - 18.0 GHz 451 Series

Male/Female

ATT-0451-XX-SMA-02*

* XX = Attenuation Value : Select 01 to 12 dB in 1 dB increments, 15, 20, 25, and 30 dB

Contact factory for custom versions, different gender configurations, other dB values and 0.5dB increments



| Attenuation Value | Length A in. (mm) |
|-------------------|-------------------|
| 1-12 dB | 0.86 (21.8) |
| 13-30 dB | 1.02 (25.9) |

ATTENUATORS

Hex Body Types - High Performance



Frequency Specifications

| Series, Hex | ATT-0298 | ATT-0290 | ATT-0291 | ATT-0292 | ATT-0294 |
|------------------|-----------|-----------|-----------|----------|----------|
| Frequency, (GHz) | DC - 26.5 | DC - 18.0 | DC - 12.4 | DC - 8.0 | DC - 2.0 |

Technical Specification

| | | |
|------------------------------------|-------------------------------|-------------------|
| VSWR formula, (max.): | $1.07 + 0.015(f \text{ GHz})$ | |
| VSWR table, (max.): | Freq. (GHz) | VSWR |
| | DC-8.0 | 1.19 |
| | 8.0-18.0 | 1.34 |
| | 18.0-26.5 | 1.47 |
| Average Power*, (W): | 2 | |
| Peak Power, (W): | 200 | |
| Attenuation Accuracy, (dB): | Attenuator Value | Tolerance (max)** |
| | 1-6 | ± 0.3 |
| | 7-20 | ± 0.5 |
| | 21-30 | ± 1.0 |
| Operating Temperature, (°C) | -65 to +125 | |
| Finish: | Passivated Stainless Steel | |

* Rated @25°C, derated linearly to 0.5W @ 125°C

** Applies up to 18GHz only, see product drawings or contact factory for 26.5GHz models

DC - 26.5 GHz Hex Body 298 HEX Series

| Male/Female |
|---------------------|
| ATT-0298-XX-HEX-02* |

DC - 18.0 GHz Hex Body 290 HEX Series

| Male/Female | Female/Female | Male/Male |
|---------------------|----------------------|---------------------|
| ATT-0290-XX-HEX-02* | ATT-0290F-XX-HEX-02* | ATT-290M-XX-HEX-02* |

DC - 12.4 GHz Hex Body 291 HEX Series

| Male/Female |
|---------------------|
| ATT-0291-XX-HEX-02* |

DC - 8.0 GHz Hex Body 292 HEX Series

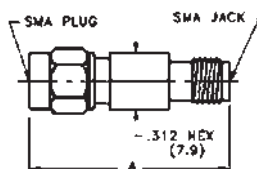
| Male/Female |
|---------------------|
| ATT-0292-XX-HEX-02* |

DC - 2.0 GHz Hex Body 294 HEX Series

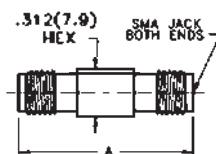
| Male/Female |
|---------------------|
| ATT-0294-XX-HEX-02* |

* XX = Attenuation Value : Select 01 to 12 dB in 1 dB increments, 15, 20, 25, and 30 dB

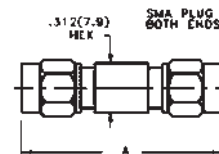
Contact factory for custom versions, different gender configurations, other dB values and 0.5dB increments



| Attenuation Value | Length A in. (mm) |
|-------------------|-------------------|
| 1-12 dB | 0.86 (21.8) |
| 13-30 dB | 1.02 (25.9) |



| Attenuation Value | Length A in. (mm) |
|-------------------|-------------------|
| 1-12 dB | 0.84 (21.3) |
| 13-30 dB | 0.97 (24.6) |



| Attenuation Value | Length A in. (mm) |
|-------------------|-------------------|
| 1-12 dB | 0.98 (24.9) |
| 13-30 dB | 1.12 (28.4) |

Round Body - Economical Version



Technical Specification

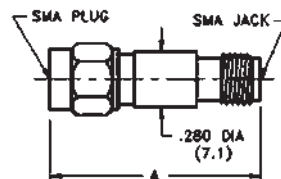
| | | |
|-----------------------------|----------------------------|-----------------|
| Series | ATT-444 | |
| Frequency, (GHz) | DC - 18.0 | |
| Attenuation Accuracy, (dB): | Attenuator Value | Tolerance (max) |
| | 1-4 | ± 0.75 |
| | 5-8 | ± 1.0 |
| | 9-12 | ± 1.25 |
| | 13-20 | ± 1.5 |
| | 21-30 | ± 2.0 |
| VSWR table, (max.): | Freq. (GHz) | VSWR |
| | DC - 4.0 | 1.25 |
| | 4.0-12.4 | 1.45 |
| | 12.4-18.0 | 1.65 |
| Average Power*, (W): | 2 | |
| Operating Temperature, (°C) | -65 to +125 | |
| Finish: | Passivated Stainless Steel | |

DC - 18.0 GHz 444 Series

| |
|---------------------|
| Male/Female |
| ATT-0444-XX-SMA-02* |

* XX = Attenuation Value : Select 01 to 12 dB in 1 dB increments, 15, 20, 25, and 30 dB

Contact factory for custom versions, different gender configurations, HEX body, other dB values and 0.5dB increments



| Attenuation Value | Length A in. (mm) |
|-------------------|-------------------|
| 1-12 dB | 0.86 (21.8) |
| 13-30 dB | 1.02 (25.9) |

SMA Miniature Type

DC - 18.0 GHz High Performance

- DC - 4.0 and DC - 12.4 Units
- 0 - 30 dB Attenuation Values
- Rugged Stainless Steel Construction
- Any Male/Female Combinations
- Economical Alternatives



Midwest Microwave's SMA miniature series of fixed coaxial attenuators provide temperature stable, ruggedly built, precision performance in a small light weight package size. Attenuation values 0 - 30 dB are available with any of the units described and with male to female SMA connectors.

Frequency Specifications

| Series | ATT-0263 | ATT-0205 | ATT-0238 |
|------------------|-----------|-----------|----------|
| Frequency, (GHz) | DC - 18.0 | DC - 12.4 | DC - 4.0 |

Technical Specification

| | | |
|-----------------------------|-------------------------------|-----------------|
| VSWR formula, (max.): | $1.07 + 0.015(f \text{ GHz})$ | |
| VSWR table, (max.): | Freq. (GHz) | VSWR |
| | DC - 4.0 | 1.13 |
| | 4.0-8.4 | 1.19 |
| | 8.0-18.0 | 1.34 |
| Average Power*, (W): | 2 | |
| Attenuation Accuracy, (dB): | Attenuator Value | Tolerance (max) |
| | 1-10 | ± 0.3 |
| | 11-20 | ± 0.5 |
| | 21-30 | ± 1.0 |
| Operating Temperature, (°C) | -65 to +125 | |
| Finish: | Passivated Stainless Steel | |

* Rated @25°C, derated linearly to 0.5W @ 125°C

DC - 18.0 GHz 263 Series

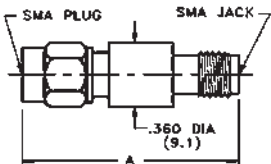
DC - 12.4 GHz 205 Series

DC - 4.0 GHz 238 Series

| Male/Female | Male/Female | Male/Female |
|---------------------|---------------------|---------------------|
| ATT-0263-XX-SMA-02* | ATT-0205-XX-SMA-02* | ATT-0238-XX-SMA-02* |

* XX = Attenuation Value : Select 01 to 12 dB in 1 dB increments, 15, 20, 25, and 30 dB

Contact factory for custom versions, different gender configurations, HEX body, other dB values and 0.5dB increments



| Attenuation Value | Length A in. (mm) |
|-------------------|-------------------|
| 1-30 dB | 1.20 (30.5) |

Economical Version



Technical Specification

| | | |
|------------------------------------|----------------------------|-----------------|
| Series | ATT-0333 | |
| Frequency, (GHz) | DC - 18.0 | |
| Attenuation Accuracy, (dB): | Attenuator Value | Tolerance (max) |
| | 1-4 | ± 0.75 |
| | 5-8 | ± 1.0 |
| | 9-12 | ± 1.25 |
| | 13-20 | ± 1.5 |
| | 21-30 | ± 2.0 |
| VSWR table, (max.): | Freq. (GHz) | VSWR |
| | DC - 4.0 | 1.25 |
| | 4.0-12.4 | 1.45 |
| | 12.4-18.0 | 1.65 |
| Average Power*, (W): | 2 | |
| Operating Temperature, (°C) | -65 to +125 | |
| Finish: | Passivated Stainless Steel | |

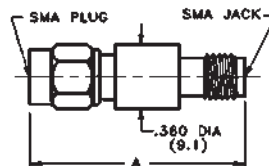
* Rated @25°C, derated linearly to 0.5W @ 125°C

DC - 18.0 GHz 333 Series

| |
|---------------------|
| Male/Female |
| ATT-0333-XX-SMA-02* |

* XX = Attenuation Value : Select 01 to 12 dB in 1 dB increments, 15, 20, 25, and 30 dB

Contact factory for custom versions, different gender configurations, HEX body, other dB values and 0.5dB increments



| Attenuation Value | Length A in. (mm) |
|-------------------|-------------------|
| 1-30 dB | 1.20 (30.5) |

SMA Ultraminiature Type

DC - 18.0 GHz High Performance

- DC - 8 and DC - 12.4 Units
- 0 - 30 dB Attenuation Values
- Temperature Stable
- Rugged Stainless Steel Construction
- Small Size – Light Weight



Frequency Specifications

| Series | ATT-0275 | ATT-0276 | ATT-0277 |
|------------------|-----------|-----------|----------|
| Frequency, (GHz) | DC - 18.0 | DC - 12.4 | DC - 8.0 |

Technical Specification

| | | |
|------------------------------------|-------------------------------|-----------------|
| VSWR formula, (max.): | $1.07 + 0.015(f \text{ GHz})$ | |
| VSWR table, (max.): | Freq. (GHz) | VSWR |
| | DC - 8.0 | 1.19 |
| | 8.0-12.4 | 1.25 |
| | 12.4-18.0 | 1.34 |
| Average Power*, (W): | 2 | |
| Attenuation Accuracy, (dB): | Attenuator Value | Tolerance (max) |
| | 1-6 | ± 0.3 |
| | 7-20 | ± 0.5 |
| | 21-30 | ± 1.0 |
| Operating Temperature, (°C) | -65 to +125 | |
| Finish: | Passivated Stainless Steel | |

* Rated @25°C, derated linearly to 0.5W @ 125°C

DC - 18.0 GHz 275 Series

| Male/Female |
|---------------------|
| ATT-0275-XX-SMA-02* |

DC - 12.4 GHz 276 Series

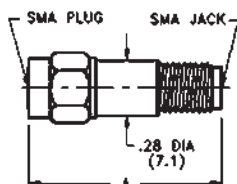
| Male/Female |
|---------------------|
| ATT-0276-XX-SMA-02* |

DC - 8.0 GHz 277 Series

| Male/Female |
|---------------------|
| ATT-0277-XX-SMA-02* |

* XX = Attenuation Value : Select 01 to 12 dB in 1 dB increments, 15, 20, 25, and 30 dB

Contact factory for custom versions, different gender configurations, HEX body, other dB values and 0.5dB increments



| Attenuation Value | Length A in. (mm) |
|-------------------|-------------------|
| 1-12 dB | 0.750 (19.0) |
| 13-30 dB | 0.875 (22.2) |

SMA Flanged Miniature “MINIPAD”

Flange Mount Types – High Performance

- Extended Frequency Performance
- Male / Female and Female / Female configurations available
- Rugged Stainless Steel Construction



Midwest Microwave’s SMA subminiature series of flanged fixed coaxial attenuators (MINIPAD) provide temperature stable, ruggedly built, precision performance in a compact lightweight package size. Attenuation values of 1, 2, 3, 4, 5, 10, and 20 dB are available as standard for both male-female and female-female models.

Technical Specification

| | | |
|------------------------------------|----------------------------|-----------------|
| Series | ATT-0523 | |
| Frequency, (GHz) | DC - 18.0 | |
| Attenuation Accuracy, (dB): | Attenuator Value | Tolerance (max) |
| | 1-6 | ± 0.3 |
| | 7-20 | ± 0.5 |
| VSWR formula, (max.): | 1.07 + 0.015 (f GHz) | |
| VSWR table, (max.): | Freq. (GHz) | VSWR |
| | DC - 8.0 | 1.19 |
| | 8.0-12.4 | 1.25 |
| | 12.4-18.0 | 1.34 |
| Average Power*, (W): | 2 | |
| Operating Temperature, (°C) | -65 to +125 | |
| Finish: | Passivated Stainless Steel | |

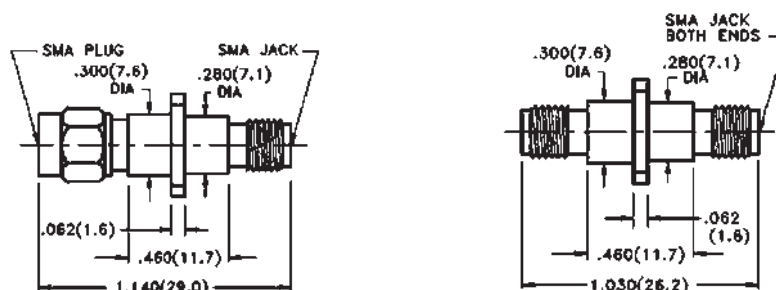
* Rated @25°C, derated linearly to 0.5W @ 125°C

DC - 18.0 GHz Flange Mount 523 Series

| Male/Female | Female/Female |
|---------------------|---------------------|
| ATT-0523-XX-SMA-02* | ATT-523F-XX-SMA-02* |

* XX = Attenuation Value. Select 01, 02, 03, 04, 05, 10 and 20 dB

Contact factory for custom versions, different gender configurations, other dB values, and 0.5 dB increments



3.5mm High Performance

DC - 26.5 GHz 3.5mm High Performance

- Extended Frequency Performance
- 0 - 30 dB Attenuation Values
- 3.5 mm Precision Connectors (Mates with SMA)
- Small Size – Light Weight
- Rugged Stainless Steel Construction



Midwest Microwave’s 3.5 mm subminiature series of precision fixed coaxial attenuators provide extended frequency operation of up to 26.5 GHz when mated with connector interfaces of the same family. These temperature stable, ruggedly built, precision attenuators allow high performance in a very small light weight package size.

Technical Specification

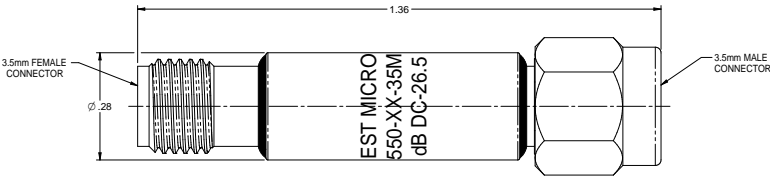
| | | |
|-----------------------------|----------------------------|-----------------|
| Series | ATT-0550 | |
| Frequency, (GHz) | DC - 26.5 | |
| Attenuation Accuracy, (dB): | Attenuator Value | Tolerance (max) |
| | 0-6 | ± 0.5 |
| | 7-20 | ± 0.7 |
| | 21-30 | ± 1.5 |
| VSWR table, (max.): | Freq. (GHz) | VSWR |
| | DC - 8.0 | 1.19 |
| | 8.0-18.0 | 1.34 |
| | 18.0-26.4 | 1.47 |
| Average Power*, (W): | 2 | |
| Operating Temperature, (°C) | -65 to +125 | |
| Finish: | Passivated Stainless Steel | |

* Rated @25°C, derated linearly to 0.5W @ 125°C

DC - 26.5 GHz 550 Series

| |
|---------------------|
| Male/Female |
| ATT-0550-XX-35M-02* |

* XX = Attenuation Value : Select 01 to 10 dB in 1 dB increments, 15, 20, and 30 dB
Contact factory for custom versions, different gender configurations, HEX body, other dB values and 0.5dB increments



SMA Medium Power Types

DC - 18.0 GHz High Performance, 5W

- DC - 18.0 GHz Performance
- Rugged Stainless Steel Interface Construction
- Male to Female Configurations
- Low VSWR – High Performance

Midwest Microwave's SMA series of medium power fixed coaxial attenuators provide temperature stable, ruggedly built, precision performance in light weight reasonably sized packages. Attenuation values range up to 30 dB and are available in SMA male to female configuration.



Technical Specification

| | | |
|------------------------------------|----------------------------|-----------------|
| Series | ATT-0473 | |
| Frequency, (GHz) | DC - 18.0 | |
| Attenuation Accuracy, (dB): | Attenuator Value | Tolerance (max) |
| | 1-6 | ± 0.3 |
| | 7-10 | ± 0.5 |
| | 11-20 | ± 0.7 |
| | 21-30 | ± 1.0 |
| VSWR table, (max.): | Freq. (GHz) | VSWR |
| | DC - 4.0 | 1.1 |
| | 4.0-8.0 | 1.15 |
| | 8.0-12.4 | 1.2 |
| | 12.4-18.0 | 1.3 |
| | | |
| Average Power*, (W): | 5 | |
| Operating Temperature, (°C) | -65 to +125 | |
| Finish Body: | Black Anodized Aluminum | |
| Finish Connectors: | Passivated Stainless Steel | |

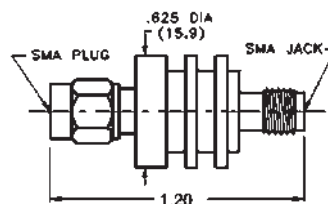
* Rated @25°C, derated linearly to 0.5W @ 125°C

DC - 18.0 GHz 473 Series

| |
|---------------------|
| Male/Female |
| ATT-0473-XX-SMA-07* |

* XX = Attenuation Value : Select 01, 02, 03, 04, 05, 06, 10, 15, 20 or 30 dB

Contact factory for custom versions, different gender configurations, other dB values and 0.5dB increments



ATTENUATORS

DC – 18.0 GHz High Performance, 10W



Technical Specification

| | | |
|-----------------------------|----------------------------|-----------------|
| Series | ATT-0303 | |
| Frequency, (GHz) | DC - 18.0 | |
| Attenuation Accuracy, (dB): | Attenuator Value | Tolerance (max) |
| | 1-10 | ± 0.5 |
| | 11-20 | ± 0.7 |
| VSWR table, (max.): | Freq. (GHz) | VSWR |
| | DC - 18.0 | 1.5 |
| Average Power*, (W): | 10 | |
| Peak Power, (W): | 50 | |
| Operating Temperature, (°C) | -65 to +125 | |
| Finish Body: | Black Anodized Aluminum | |
| Finish Connectors: | Passivated Stainless Steel | |

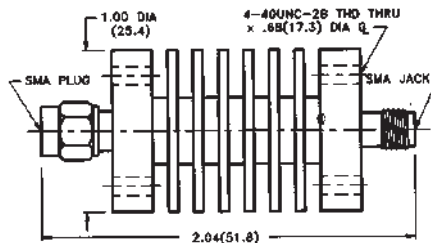
* Rated @40°C, derated linearly to 0.5W @ 125°C

DC - 18.0 GHz 303 Series

| |
|---------------------|
| Male/Female |
| ATT-0303-XX-SMA-07* |

* XX = Attenuation Value : Select 01, 02, 03, 04, 05, 06, 10, or 20 dB

Contact factory for custom versions, different gender configurations, other dB values and 0.5dB increments



SMA Medium Power Type

DC - 15.0 GHz High Performance, 20W



Technical Specification

| | | |
|-----------------------------|----------------------------|-----------------|
| Series | ATT-0553 | |
| Frequency, (GHz) | DC - 15.0 | |
| Attenuation Accuracy, (dB): | Attenuator Value | Tolerance (max) |
| | 1-6 | ± 0.5 |
| | 7-10 | ± 0.75 |
| | 11-20 | ± 1.0 |
| VSWR table, (max.): | Freq. (GHz) | VSWR |
| | DC - 12.4 | 1.35 |
| | 12.4-15.0 | 1.5 |
| Average Power*, (W): | 20 | |
| Peak Power, (W): | 500 | |
| Operating Temperature, (°C) | -65 to +125 | |
| Finish Body: | Black Anodized Aluminum | |
| Finish Connectors: | Passivated Stainless Steel | |

* Rated @40°C, derated linearly to 5W @ 125°C

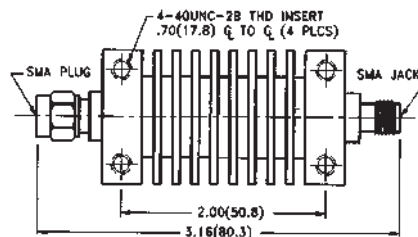
DC - 15.0 GHz 553 Series

Male/Female

ATT-0553-XX-SMA-07*

* XX = Attenuation Value : Select 01, 02, 03, 04, 05, 06, 10, or 20 dB

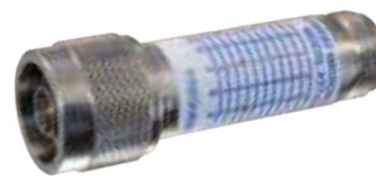
Contact factory for custom versions, different gender configurations, other dB values and 0.5dB increments



ATTENUATORS

Type N

DC - 18.0 GHz N Type, Lab Precision



Frequency Specifications

| Series | ATT-0389 | ATT-0219 | ATT-0218 |
|------------------|-----------|-----------|-----------|
| Frequency, (GHz) | DC - 18.0 | DC - 18.0 | DC - 12.4 |

Technical Specification - ATT-0389

| Attenuation Accuracy, (dB): | Attenuator Value | Tolerance (max) |
|------------------------------|----------------------------|-----------------|
| | 3 & 6 | ± 0.3 |
| | 10 & 20 | ± 0.5 |
| VSWR table, (max.): | Freq. (GHz) | VSWR |
| | DC - 4.0 | 1.12 |
| | 4.0-8.0 | 1.15 |
| | 8.0-18.0 | 1.2 |
| Average Power*, (W): | 2 | |
| Calibration supplied at, GHz | 4.0, 8.0, 12.0, 18.0 | |
| Operating Temperature, (°C) | -65 to +125 | |
| Finish Connectors: | Passivated Stainless Steel | |

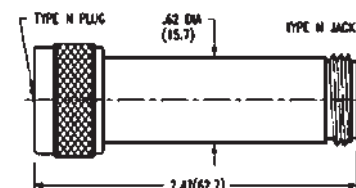
Technical Specification - ATT-0219 & ATT-0218

| Attenuation Accuracy, (dB): | Attenuator Value | 1-6 | 7-20 | 21-30 |
|-----------------------------|----------------------------|-------|-------|-------|
| | Tolerance (max) | ± 0.3 | ± 0.5 | ± 1.0 |
| VSWR formula, (max.): | 1.07 + 0.015 (f GHz) | | | |
| VSWR table, (max.): | Freq. (GHz) | VSWR | | |
| | DC - 8.0 | 1.19 | | |
| | 8.0-12.4 | 1.25 | | |
| | 12.4-18.0 | 1.34 | | |
| Average Power*, (W): | 2 | | | |
| Operating Temperature, (°C) | -65 to +125 | | | |
| Finish Connectors: | Passivated Stainless Steel | | | |

* Rated @40°C, derated linearly to 0.5W @ 125°C

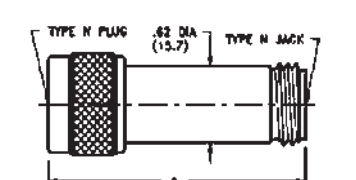
DC - 18.0 GHz 389 Series

| Part Number | |
|--|----------|
| ATT-0389-XX-NNN-02 | Low VSWR |
| XX = Attenuation Value: Select 3, 6, 10 or 20 dB | |



DC - 18.0 GHz 219 Series

| Male/Female | |
|---------------------|--|
| ATT-0219-XX-NNN-02* | |



DC - 12.4 GHz 218 Series

| Male/Female | |
|---------------------|--|
| ATT-0218-XX-NNN-02* | |

| Attenuation Value | Length A in. (mm) |
|-------------------|-------------------|
| 1 - 30 dB | 1.77 (45.0) |

* XX = Attenuation Value: Select 01-10 in 1 dB increments, 20dB or 30dB

Contact factory for custom versions, different gender configurations, other dB values and 0.5dB increments

Type N – Medium Power

DC – 12.4 GHz, N Type, 5W



Technical Specification

| | | |
|-----------------------------|----------------------------|-----------------|
| Frequency, (GHz) | DC - 12.4 | |
| Attenuation Accuracy, (dB): | Attenuator Value | Tolerance (max) |
| | 1-6 | ± 0.3 |
| | 7-20 | ± 0.5 |
| | 21-30 | ± 0.7 |
| VSWR formula, (max.): | 1.06 + 0.02 (f GHz) | |
| VSWR, (max.): | 1.3 | |
| Average Power*, (W): | 5 | |
| Operating Temperature, (°C) | -65 to +125 | |
| Finish Body: | Black Anodized Aluminum | |
| Finish Connectors: | Passivated Stainless Steel | |

* Rated @40°C, derated linearly to 1W @ 125°C

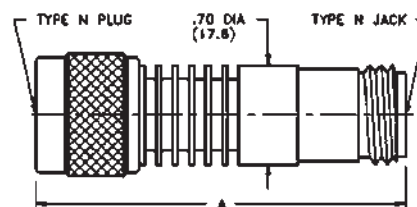
DC - 12.4 GHz 391 Series

Male/Female

ATT-0391-XX-NNN-07*

* XX = Attenuation Value : Select 03, 06, 10, 16, 20 or 30 dB

Contact factory for custom versions, different gender configurations, other dB values and 0.5dB increments



| Attenuation Value | Length A in. (mm) |
|-------------------|-------------------|
| 1 - 6 dB | 2.40 (61.0) |
| 7 - 30 dB | 2.84 (72.1) |

ATTENUATORS

TNC Type

DC - 18.0 GHz, TNC Type



Technical Specification

| | | |
|-----------------------------|----------------------------|-----------------|
| Series | ATT-0225 | |
| Frequency, (GHz) | DC - 18.0 | |
| Attenuation Accuracy, (dB): | Attenuator Value | Tolerance (max) |
| | 1-6 | ± 0.3 |
| | 7-20 | ± 0.5 |
| | 21-30 | ± 1.0 |
| VSWR formula, (max.): | 1.07 + 0.015 (f GHz) | |
| VSWR table, (max.): | Freq. (GHz) | VSWR |
| | DC - 12.4 | 1.25 |
| | 12.4-18.0 | 1.34 |
| Average Power*, (W): | 2 | |
| Operating Temperature, (°C) | -65 to +125 | |
| Finish Connectors: | Passivated Stainless Steel | |

* Rated @25°C, derated linearly to 0.5W @ 125°C

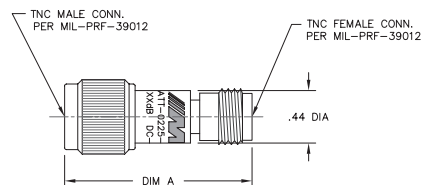
DC - 18.0 GHz 225 Series

Male/Female

ATT-0225-XX-TNC-02*

* XX = Attenuation Value : Select 01, 03, 06, 10, 15, 20 or 30 dB

Contact factory for custom versions, different gender configurations, other dB values and 0.5dB increments



| Attenuation Value | Length A in. (mm) |
|-------------------|-------------------|
| 1 -30 dB | 1.57 (39.9) |

BNC Type

DC - 4.0 GHz, BNC Type, 2W



Technical Specification

| | | |
|-----------------------------|---------------------|-----------------|
| Frequency, (GHz) | DC - 4.0 | |
| Attenuation Accuracy, (dB): | Attenuator Value | Tolerance (max) |
| | 1-6 | ± 0.3 |
| | 7-20 | ± 0.5 |
| | 21-30 | ± 0.8 |
| VSWR, (max.): | 1.25 | |
| Average Power*, (W): | 2 | |
| Operating Temperature, (°C) | -65 to +125 | |
| Finish Body: | Nickel Plated Brass | |
| Finish Connectors: | Nickel Plated Brass | |

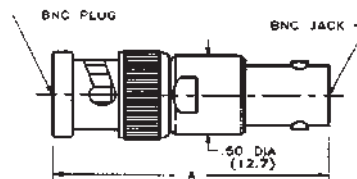
* Rated @25°C, derated linearly to 0.5W @ 125°C

DC - 4.0 GHz 313 Series

| |
|---------------------|
| Male/Female |
| ATT-0313-XX-BNC-10* |

* XX = Attenuation Value : Select 01 through 10 dB in 1 dB increments, and 12, 15, 20 or 30 dB

Contact factory for custom versions, different gender configurations, other dB values and 0.5dB increments



| Attenuation Value | Length A in. (mm) |
|-------------------|-------------------|
| 1-30 dB | 1.36 (34.5) |

SSMA Type

DC - 18.0 GHz, SSMA Type



Technical Specification

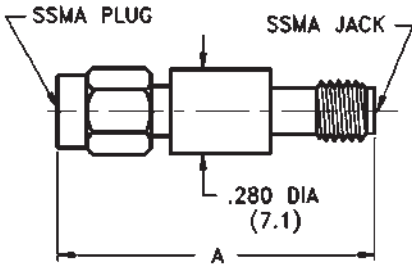
| | | |
|-----------------------------|----------------------------|-----------------|
| Series | ATT-0590 | |
| Frequency, (GHz) | DC - 18.0 | |
| Attenuation Accuracy, (dB): | Attenuator Value | Tolerance (max) |
| | 1-6 | ± 0.3 |
| | 7-10 | ± 0.5 |
| | 11-20 | ± 0.75 |
| VSWR table, (max.): | Freq. (GHz) | VSWR |
| | DC - 18.0 | 1.25 |
| | | |
| Average Power*, (W): | 2 | |
| Operating Temperature, (°C) | -65 to +125 | |
| Finish: | Passivated Stainless Steel | |

* Rated @25°C, derated linearly to 0.5W @ 125°C

DC - 18.0 GHz 590 Series

| |
|---------------------|
| Male/Female |
| ATT-0590-XX-SSM-02* |

* XX = Attenuation Value : Select 01, 06, 07, 08, 09, 15 or 20 dB
Contact factory for custom versions, different gender configurations, other dB values and 0.5dB increments



| Attenuation Value | Length A in. (mm) |
|-------------------|-------------------|
| 1 - 12 dB | 1.10 (27.9) |
| 13 - 20 dB | 1.24 (31.5) |

Calibrated Sets

DC - 18.0 GHz, Calibration Sets, SMA, N

Midwest Microwave's Calibrated Attenuator Sets consist of a set of four precision, broadband, fixed attenuators with values of 3, 6, 10, and 20 dB. These sets are available with a choice of SMA or N passivated stainless steel precision connectors.

Calibrated Attenuator Sets are intended for laboratory or field use. The precision, broadband, fixed attenuators are supplied in a shock resistant storage case. the inside cover of the storage case holds the calibration data.

The calibration data includes test results at DC, 4.0, 8.0, 12.4, and 18.0 GHz. All measurement standards used have calibration traceability to the National Bureau of Standards.

Frequency Specifications

| | | |
|-------------------------|-----------|-----------|
| Series | ATS-3554 | ATS-3551 |
| Interface | SMA | N |
| Frequency, (GHz) | DC - 18.0 | DC - 18.0 |

Technical Specification

| | | |
|-------------------------------------|----------------------------|-----------------|
| Attenuation Accuracy, (dB): | Attenuator Value | Tolerance (max) |
| | 3 & 6 | ± 0.3 |
| | 10 & 20 | ± 0.5 |
| VSWR formula, (max.): | 1.07 + 0.015(f GHz) | |
| VSWR table, (max.): | Freq. (GHz) | VSWR |
| | DC - 12.4 | 1.25 |
| | 12.4-18.0 | 1.34 |
| Average Power*, (W): | 2 | |
| Calibration supplied at, GHz | 4.0, 8.0, 12.4, 18.0 | |
| Operating Temperature, (°C) | -65 to +125 | |
| Finish: | Passivated Stainless Steel | |

* Rated @25°C, derated linearly to 0.5W @ 125°C

SMA

DC - 18.0 GHz

| |
|--------------------|
| Male/Female |
| ATS-3554-18-SMA-02 |



Type N

DC - 18.0 GHz

| |
|--------------------|
| Male/Female |
| ATS-3551-18-NNN-02 |



General Information

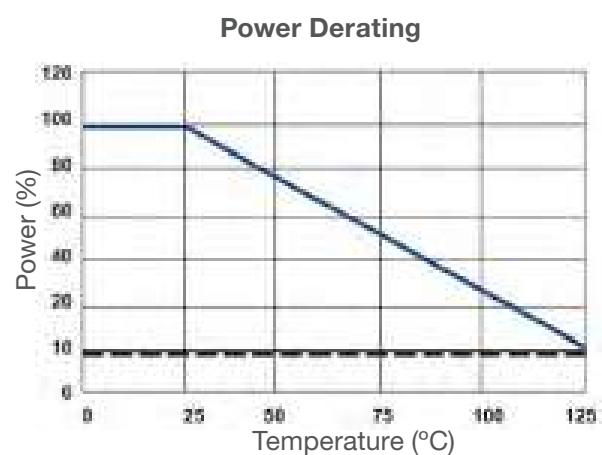
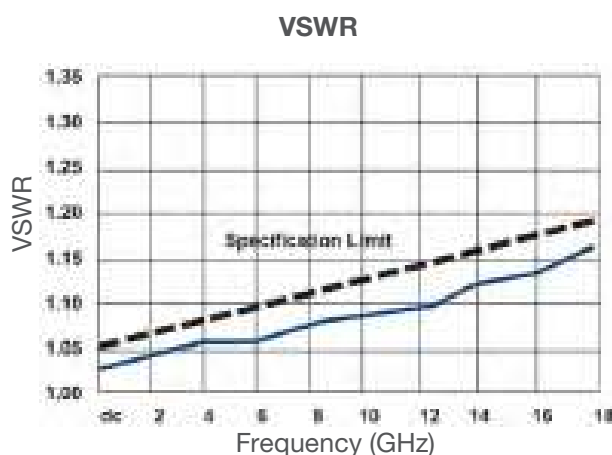
- MIL-DTL-39030 Qualified (QPL) - see QPL section for product listings
- DC - 26.5 GHz Performance
- Small Size, Light Weight, Rugged Construction
- Average Power up to 20 Watts
- SMA, BMA, N, TNC, BNC, 3.5mm, and 7mm Connector Configurations

Midwest Microwave Coaxial Terminations are designed to meet the extreme demands of today's microwave test or operating system applications. Standard catalog units are available off the shelf for immediate delivery, or special units can be custom designed by Midwest's engineering staff to accommodate unique system needs. All Midwest Terminations are completely manufactured in-house and are 100% tested to insure only the highest quality performance whether for military or space use or for commercial cellular or personal communication applications.

They are available in a complete assortment of connector interfaces and are small in size and light in weight. All Midwest Microwave Terminations are ruggedly constructed of stainless steel and are 100% swept frequency tested to assure that the highest quality performance possible is attained. They possess 50 Ohm impedance and will operate successfully over the temperature range of -55°C to +125°C and will exhibit low VSWR over the entire frequency range. Midwest Microwave offers this complete product line of Coaxial Terminations, ruggedly designed for system or laboratory and that meet the toughest environmental requirements. Average power levels of up to 20 Watts are available providing broadband performance and low frequency sensitivity with good temperature stability. Other standard Terminations such as short and open circuit units are also available.



Typical Coaxial Termination Performance



SMA Miniature Male Plug

Ultra Short – 0.5 Watt High Performance

- DC - 8.0, DC - 18.0, and DC - 26.5 GHz Units
- Low VSWR
- Rugged Stainless Steel Construction
- Small Size, Light Weight
- Bead Chain Available on 2443 and 2444 models



Midwest Microwave's SMA miniature series of high performance coaxial terminations provide temperature stable, ruggedly built, low VSWR precision performance in a compact light weight package size. Bead Chains are available with 2443 and 2444 models only. Contact the factory for custom versions and different configurations.

Frequency Specifications

| Series | TRM-2443 | TRM-2444 | TRM-2446 |
|------------------|-----------|-----------|----------|
| Frequency, (GHz) | DC - 26.5 | DC - 18.0 | DC - 8.0 |

Technical Specification

| | | |
|--|--|------|
| VSWR formula, (max.): | 1.05 + 0.008(f GHz) for DC-18 GHz only | |
| VSWR table, (max.): | Freq. (GHz) | VSWR |
| | DC - 8.0 | 1.11 |
| | 8.0-18.0 | 1.19 |
| | 18.0-26.5 | 1.3 |
| Nominal Impedance, (Ω) | 50 | |
| Average Power*, (W): | 0.5 | |
| Operating Temperature, ($^{\circ}$C) | -55 to +125 | |
| Finish: | Passivated Stainless Steel | |

* Rated @25°C, derated linearly to 0W @ 125°C

DC - 26.5 GHz 2443 Series

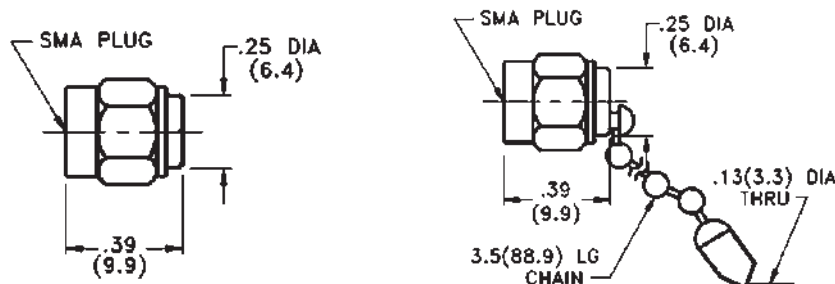
| Male Plug | Male Plug with Chain |
|--------------------|----------------------|
| TRM-2443-M0-SMA-02 | TRM-2443-MC-SMA-02 |

DC - 18.0 GHz 2444 Series

| Male Plug | Male Plug with Chain |
|--------------------|----------------------|
| TRM-2444-M0-SMA-02 | TRM-2444-MC-SMA-02 |

DC - 8.0 GHz 2446 Series

| Male Plug |
|--------------------|
| TRM-2446-M0-SMA-02 |



SMA Miniature Female Jack

Ultra Short – 0.5 Watt High Performance

- DC - 18.0, and DC - 26.5 GHz Units
- Low VSWR
- Rugged Stainless Steel Construction
- Small Size, Light Weight



Midwest Microwave’s SMA miniature series of high performance coaxial terminations provide temperature stable, ruggedly built, low VSWR precision performance in a compact light weight package size. Contact factory for custom versions and different configurations.

Frequency Specifications

| | | |
|------------------|-----------|-----------|
| Series | TRM-2443 | TRM-2444 |
| Frequency, (GHz) | DC - 26.5 | DC - 18.0 |

Technical Specification

| | | |
|--|--|------|
| VSWR formula, (max.): | 1.05 + 0.008(f GHz) for DC-18 GHz only | |
| VSWR table, (max.): | Freq. (GHz) | VSWR |
| | DC - 8.0 | 1.11 |
| | 8.0-18.0 | 1.19 |
| | 18.0-26.5 | 1.3 |
| Nominal Impedance, (Ω) | 50 | |
| Average Power*, (W): | 0.5 | |
| Operating Temperature, ($^{\circ}$ C) | -55 to +125 | |
| Finish: | Passivated Stainless Steel | |

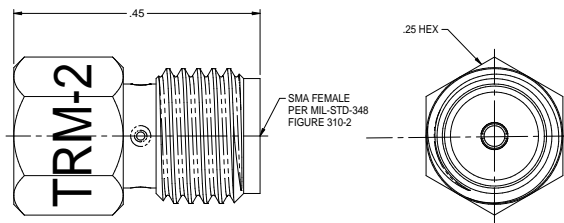
* Rated @25°C, derated linearly to 0W @ 125°C

DC - 26.5 GHz 2443 Series

| |
|--------------------|
| Female Jack |
| TRM-2443-F0-SMA-02 |

DC - 18.0 GHz 2444 Series

| |
|--------------------|
| Female Jack |
| TRM-2444-F0-SMA-02 |



SMA Miniature Male Plug

2 Watt High Performance

- DC - 8.0, DC - 18.0, and DC - 26.5 GHz Units
- Low VSWR
- Rugged Stainless Steel Construction
- Small Size, Light Weight
- Bead Chain Available on all Models



Midwest Microwave's SMA miniature series of high performance coaxial terminations provide temperature stable, ruggedly built, low VSWR precision performance in a compact light weight package size. Bead Chains are available with any of the units described. Contact factory for custom versions and different configurations.

Frequency Specifications

| Series | TRM-2054 | TRM-2055 | TRM-2058 |
|------------------|-----------|-----------|----------|
| Frequency, (GHz) | DC - 26.5 | DC - 18.0 | DC - 8.0 |

Technical Specification

| | | |
|---|--|------|
| VSWR formula, (max.): | $1.05 + 0.008(f \text{ GHz})$ for DC-18 GHz only | |
| VSWR table, (max.): | Freq. (GHz) | VSWR |
| | DC - 8.0 | 1.11 |
| | 8.0-18.0 | 1.19 |
| | 18.0-26.5 | 1.3 |
| Nominal Impedance, (Ω) | 50 | |
| Average Power*, (W): | 2 | |
| Operating Temperature, ($^{\circ}\text{C}$) | -65 to +125 | |
| Finish: | Passivated Stainless Steel | |

* Rated @25°C, derated linearly to 1W @ 125°C

DC - 26.5 GHz 2054 Series

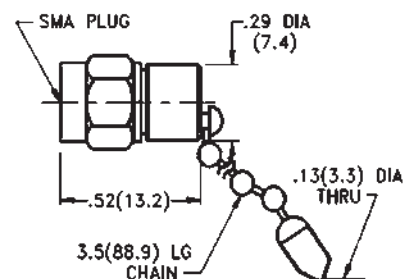
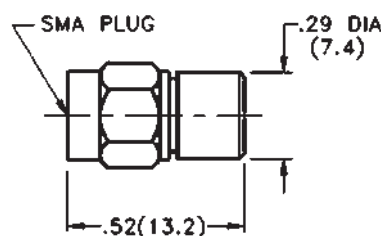
| Male Plug | Male Plug with Chain |
|--------------------|----------------------|
| TRM-2054-M0-SMA-02 | TRM-2054-MC-SMA-02 |

DC - 18.0 GHz 2055 Series

| Male Plug | Male Plug with Chain |
|--------------------|----------------------|
| TRM-2055-M0-SMA-02 | TRM-2055-MC-SMA-02 |

DC - 8.0 GHz 2058 Series

| Male Plug | Male Plug with Chain |
|--------------------|----------------------|
| TRM-2058-M0-SMA-02 | TRM-2058-MC-SMA-02 |



SMA Miniature Female Jack

Low VSWR – 2 Watt High Performance

- DC - 8.0, DC - 18.0, and DC - 26.5 GHz Units
- Low VSWR
- Rugged Stainless Steel Construction
- Small Size, Light Weight



Midwest Microwave's SMA miniature series of high performance coaxial terminations provide temperature stable, ruggedly built, low VSWR precision performance in a compact light weight package size. Contact factory for custom versions and different configurations.

Frequency Specifications

| Series | TRM-2054 | TRM-2055 | TRM-2058 |
|------------------|-----------|-----------|----------|
| Frequency, (GHz) | DC - 26.5 | DC - 18.0 | DC - 8.0 |

Technical Specification

| | | |
|---|--|------|
| VSWR formula, (max.): | 1.05 + 0.008(f GHz) for DC-18 GHz only | |
| VSWR table, (max.): | Freq. (GHz) | VSWR |
| | DC - 8.0 | 1.11 |
| | 8.0-18.0 | 1.19 |
| | 18.0-26.5 | 1.3 |
| Nominal Impedance, (Ω) | 50 | |
| Average Power*, (W): | 2 | |
| Operating Temperature, ($^{\circ}\text{C}$) | -65 to +125 | |
| Finish: | Passivated Stainless Steel | |

* Rated @25°C, derated linearly to 1W @ 125°C

DC - 26.5 GHz 2054 Series

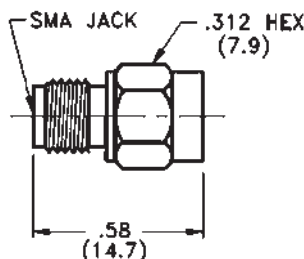
| Female Jack |
|--------------------|
| TRM-2054-F0-SMA-02 |

DC - 18.0 GHz 2055 Series

| Female Jack |
|--------------------|
| TRM-2055-F0-SMA-02 |

DC - 8.0 GHz 2058 Series

| Female Jack |
|--------------------|
| TRM-2058-F0-SMA-02 |



SMA Miniature Male Plug

Low VSWR 2 Watt High Performance

- DC - 8.0, DC - 18.0, and DC - 26.5 GHz Units
- Low VSWR
- Rugged Stainless Steel Construction
- Small Size, Light Weight
- Bead Chain Available on all Models



Midwest Microwave's SMA miniature series of high performance coaxial terminations provide temperature stable, ruggedly built, low VSWR precision performance in a compact light weight package size. These models offer improved, lower VSWR performance over other units described on the previous page. Bead Chains are available with any of the units described. Contact factory for custom versions and different configurations.

Frequency Specifications

| Series | TRM-2089 | TRM-2090 | TRM-2092 |
|------------------|-----------|-----------|----------|
| Frequency, (GHz) | DC - 26.5 | DC - 18.0 | DC - 8.0 |

Technical Specification

| | | |
|---|----------------------------|------|
| VSWR table, (max.): | Freq. (GHz) | VSWR |
| | DC - 4.0 | 1.05 |
| | 4.0-12.0 | 1.1 |
| | 12.0-18.0 | 1.14 |
| | 18.0-26.5 | 1.3 |
| Nominal Impedance, (Ω) | 50 | |
| Average Power*, (W): | 2 | |
| Operating Temperature, ($^{\circ}\text{C}$) | -65 to +125 | |
| Finish: | Passivated Stainless Steel | |

* Rated @25°C, derated linearly to 1W @ 125°C

DC - 26.5 GHz 2089 Series

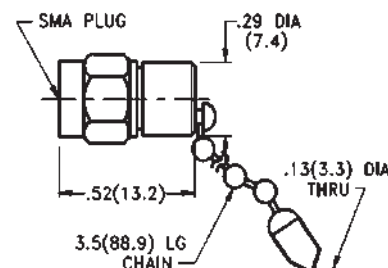
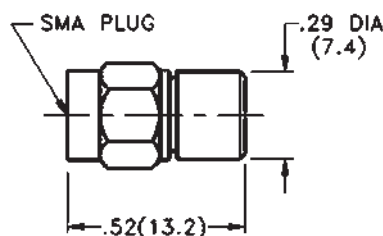
| Male Plug | Male Plug with Chain |
|--------------------|----------------------|
| TRM-2089-M0-SMA-02 | TRM-2089-MC-SMA-02 |

DC - 18.0 GHz 2090 Series

| Male Plug | Male Plug with Chain |
|--------------------|----------------------|
| TRM-2090-M0-SMA-02 | TRM-2090-MC-SMA-02 |

DC - 8.0 GHz 2092 Series

| Male Plug | Male Plug with Chain |
|--------------------|----------------------|
| TRM-2092-M0-SMA-02 | TRM-2092-MC-SMA-02 |



SMA Miniature Female Jack

Low VSWR – 2 Watt High Performance

- DC - 18.0 and DC - 26.5 GHz Units
- Low VSWR
- Rugged Stainless Steel Construction
- Small Size, Light Weight



Midwest Microwave's SMA miniature series of high performance coaxial terminations provide temperature stable, ruggedly built, low VSWR precision performance in a compact light weight package size. These models offer improved, lower VSWR performance over other units described on the previous page. Contact factory for custom versions and different configurations.

Frequency Specifications

| Series | TRM-2089 | TRM-2090 |
|------------------|-----------|-----------|
| Frequency, (GHz) | DC - 26.5 | DC - 18.0 |

Technical Specification

| VSWR table, (max.): | Freq. (GHz) | VSWR |
|--|----------------------------|------|
| | DC - 4.0 | 1.05 |
| | 4.0-12.0 | 1.1 |
| | 12.0-18.0 | 1.14 |
| | 18.0-26.5 | 1.3 |
| Nominal Impedance, (Ω) | 50 | |
| Average Power*, (W): | 2 | |
| Operating Temperature, ($^{\circ}$ C) | -65 to +125 | |
| Finish: | Passivated Stainless Steel | |

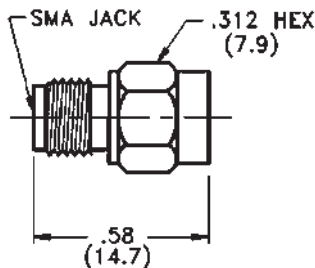
* Rated @25°C, derated linearly to 1W @ 125°C

DC - 26.5 GHz 2089 Series

| Female Jack |
|--------------------|
| TRM-2089-F0-SMA-02 |

DC - 18.0 GHz 2090 Series

| Female Jack |
|--------------------|
| TRM-2090-F0-SMA-02 |



3.5 mm 26.5 GHz Type

DC - 26.5 GHz - 2 Watts High Performance

- Low VSWR
- Rugged Stainless Steel Construction
- Small Size, Light Weight
- Bead Chain Available on all Models
- Mates with Standard SMA Interface



Midwest Microwave's 3.5mm series of high performance coaxial Terminations provide temperature stable, ruggedly built, low VSWR precision performance in a compact light weight package size. All Models mate non-destructively with standard SMA connector interfaces. Bead Chains are available with any of the units described. Contact factory for custom versions and different configurations.

Frequency Specifications

| Series | TRM-2160 | TRM-2161 |
|------------------|-----------|-----------|
| Frequency, (GHz) | DC - 26.5 | DC - 18.0 |

Technical Specification

| VSWR table, (max.): | Freq. (GHz) | VSWR |
|---|----------------------------|------|
| | DC - 18.0 | 1.12 |
| | 18.0-26.5 | 1.18 |
| Nominal Impedance, (Ω) | 50 | |
| Average Power*, (W): | 2 | |
| Operating Temperature, ($^{\circ}\text{C}$) | -65 to +125 | |
| Finish: | Passivated Stainless Steel | |

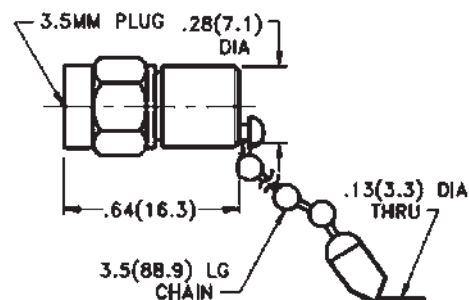
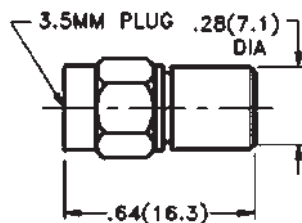
* Rated @25°C, derated linearly to 1W @ 125°C

DC - 26.5 GHz 2160 Series

| Male Plug | Male Plug with Chain |
|--------------------|----------------------|
| TRM-2160-M0-35M-02 | TRM-2160-MC-35M-02 |

DC - 18.0 GHz 2161 Series

| Male Plug | Male Plug with Chain |
|--------------------|----------------------|
| TRM-2161-M0-35M-02 | TRM-2161-MC-35M-02 |



SMA Medium Power Types

DC - 18.0 GHz High Performance

- 3, 5, and 10 Watt Model Selection
- Broad Frequency Band Coverage
- Low VSWR – 50 Ohm – High Performance.
- Rugged Stainless Steel Interface Construction

Midwest Microwave's SMA series of medium power coaxial Terminations provide temperature stable, ruggedly built, precision performance in light weight reasonably sized packages using stainless steel connectors and black anodized finned aluminum housings. Input Power levels of 3, 5, and 10 Watts are offered with low VSWR performance. Contact factory for custom versions and different configurations.



Frequency Specifications

| Series | TRM-2057 | TRM-2010 | TRM-2013 |
|--------------------|-----------|-----------|-----------|
| Average Power, (W) | 3* | 5** | 10* |
| Frequency, (GHz) | DC - 18.0 | DC - 18.0 | DC - 18.0 |

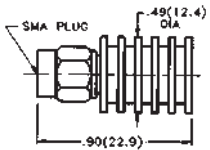
Technical Specification

| | | |
|---|-------------------------------|--|
| VSWR formula, (max.): | $1.05 + 0.01 (f \text{ GHz})$ | |
| VSWR table, (max.): | Freq. (GHz) | VSWR |
| | DC - 8.0 | 1.13 |
| | 8.0-18.0 | 1.23 |
| Nominal Impedance, (Ω) | 50 | |
| Operating Temperature, ($^{\circ}\text{C}$) | -65 to +125 | |
| Finish, Body: | Body: Black Anodized Aluminum | Connectors: Passivated Stainless Steel |

* Rated @25°C, derated linearly to 1W* or 0.5W** @ 125°C

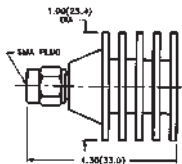
3 Watts - DC - 18.0 GHz 2057 Series

| Male Plug |
|--------------------|
| TRM-2057-M0-SMA-07 |



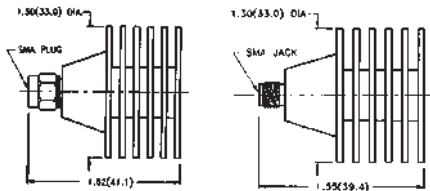
5 Watts - DC - 18.0 GHz 2010 Series

| Male Plug |
|--------------------|
| TRM-2010-M0-SMA-07 |



10 Watts - DC - 18.0 GHz 2013 Series

| Male Plug | Female Jack |
|--------------------|--------------------|
| TRM-2013-M0-SMA-07 | TRM-2013-F0-SMA-07 |



10 and 20 Watt - DC - 18.0 GHz

- 10 and 20 Watt Model Selection
- Broad Frequency Band Coverage
- Low VSWR
- Rugged Stainless Steel Interface Construction



Midwest Microwave's SMA series of medium power coaxial Terminations provide temperature stable, ruggedly built, precision performance in light weight reasonably sized packages using stainless steel connectors and black anodized finned aluminum housings. Input Power levels of 10 and 20 Watts are offered with low VSWR performance. Contact factory for custom versions and different configurations.

Frequency Specifications

| Series | TRM-2138 | TRM-2129 |
|--------------------|-----------|-----------|
| Average Power, (W) | 10* | 20** |
| Peak Power, (kW): | 1 | 6 |
| Frequency, (GHz) | DC - 18.0 | DC - 18.0 |

* Rated @25°C, derated linearly to 0W @ 125°C

** Rated @40°C, derated linearly to 5W @ 125°C

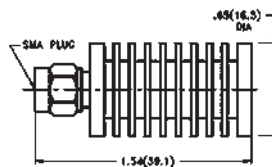
Technical Specification

| | | |
|---------------------------------|----------------------------|------|
| VSWR table, (max.): | Freq. (GHz) | VSWR |
| | DC - 12.4 | 1.25 |
| | 12.4-18.0 | 1.35 |
| Nominal Impedance, (Ω) | 50 | |
| Operating Temperature, (°C) | -55 to +125 | |
| Finish, Body: | Black Anodized Aluminum | |
| Finish, Connectors: | Passivated Stainless Steel | |

10 Watts - DC - 18.0 GHz 2138 Series

Male Plug

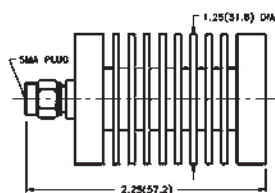
TRM-2138-M0-SMA-07



20 Watts - DC - 18.0 GHz 2129 Series

Male Plug

TRM-2129-M0-SMA-07



SSMA

DC – 18.0 GHz – 0.5 Watts High Performance

- Low VSWR
- Rugged Stainless Steel Construction
- Small Size, Light Weight



Midwest Microwave’s SSMA Subminiature series of high performance coaxial Terminations provide temperature stable, ruggedly built, low VSWR precision performance in a compact light weight package size. Contact factory for custom versions and different configurations.

Technical Specification

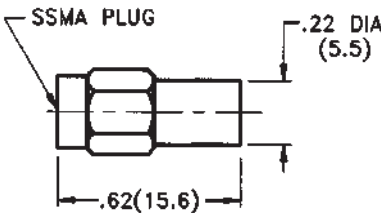
| | | |
|--|----------------------------|------|
| Series | TRM-2180 | |
| Interface | SSMA | |
| Frequency, (GHz) | DC - 18.0 | |
| VSWR formula, (max.): | 1.1 + 0.01 (f GHz) | |
| VSWR table, (max.): | Freq. (GHz) | VSWR |
| | DC - 12.4 | 1.22 |
| | 12.4-18.0 | 1.28 |
| Nominal Impedance, (Ω) | 50 | |
| Average Power*, (W): | 0.5 | |
| Operating Temperature, ($^{\circ}$ C) | -55 to +125 | |
| Finish: | Passivated Stainless Steel | |

* Rated @25 $^{\circ}$ C, derated linearly to 0W @ 125 $^{\circ}$ C

Subminiature

DC - 18.0 GHz 2180 Series

| |
|--------------------|
| Male Plug |
| TRM-2180-M0-SSM-02 |



BMA Blind Mate Types

DC - 18.0 GHz - 0.5 Watt High Performance

- Low VSWR
- Rugged Stainless Steel Construction
- Small Size, Light Weight



Midwest Microwave's BMA Miniature series of high performance coaxial Terminations provide temperature stable, ruggedly built, low VSWR precision performance in a compact light weight package size. Contact factory for custom versions and different configurations.

Frequency Specifications

| Series | TRM-2191 | TRM-2193 |
|------------------|-----------|-----------|
| Frequency, (GHz) | DC - 18.0 | DC - 18.0 |

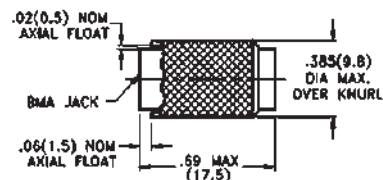
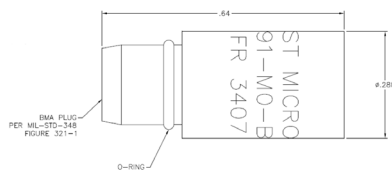
Technical Specification

| | | |
|---|------------------------------|------|
| VSWR formula, (max.): | $1.1 + 0.01 (f \text{ GHz})$ | |
| VSWR table, (max.): | Freq. (GHz) | VSWR |
| | DC - 12.4 | 1.22 |
| | 12.4-18.0 | 1.28 |
| Nominal Impedance, (Ω) | 50 | |
| Average Power*, (W): | 0.5 | |
| Operating Temperature, ($^{\circ}\text{C}$) | -65 to +125 | |
| Finish: | Passivated Stainless Steel | |

* Rated @25 $^{\circ}\text{C}$, derated linearly to 0W @ 125 $^{\circ}\text{C}$

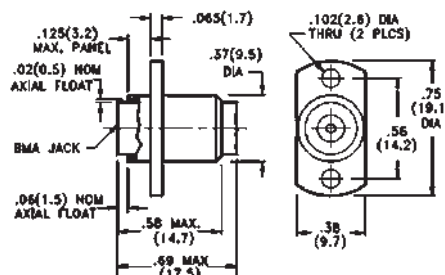
DC - 18.0 GHz 2191 Series

| Male Plug | Female Jack |
|--------------------|--------------------|
| TRM-2191-M0-BMA-02 | TRM-2191-F0-BMA-02 |



DC - 18.0 GHz 2193 Series

| Female Jack |
|--------------------|
| TRM-2193-F0-BMA-02 |



TERMINATIONS

7mm Type

DC - 18.0 GHz Precision Performance

- 7mm Precision Performance
- Broad Frequency Band Coverage
- Low VSWR – 50 Ohm – High Performance
- Rugged Stainless Steel Interface Constructions



Midwest Microwave's 7mm series of coaxial Terminations provide temperature stable, ruggedly built, precision performance in light weight reasonably sized packages using stainless steel connectors. Low VSWR performance is exhibited and units are suitable for laboratory test systems as well as operating systems. Contact factory for custom versions and different configurations.

Technical Specification

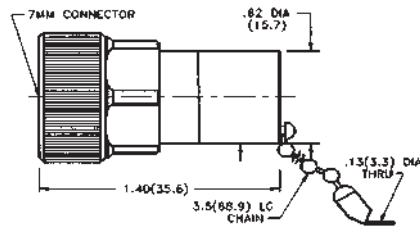
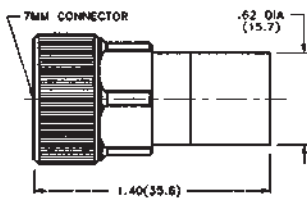
| | | |
|---|----------------------------|------|
| Series | TRM-2052 | |
| Frequency, (GHz) | DC - 18.0 | |
| VSWR table, (max.): | Freq. (GHz) | VSWR |
| | DC - 4.0 | 1.05 |
| | 4.0-12.0 | 1.1 |
| | 12.0-18.0 | 1.15 |
| Nominal Impedance, (Ω) | 50 | |
| Operating Temperature, ($^{\circ}\text{C}$) | -65 to +125 | |
| Average Power, (W)* | 2 | |
| Finish: | Passivated Stainless Steel | |

* Rated @25°C, derated linearly to 0.5W @ 125°C

Broadband Performance DC - 18.0 GHz

DC - 18.0 GHz 2052 Series

| 7mm | 7mm with Chain |
|--------------------|--------------------|
| TRM-2052-00-7MM-02 | TRM-2052-0C-7MM-02 |



Type N

DC - 18.0 GHz - High Performance

- Precision and Broadband Model Selection
- Broad Frequency Band Coverage
- Low VSWR – 50 Ohm – High Performance
- Rugged Stainless Steel Interface Constructions



Midwest Microwave's N Type series of coaxial Terminations provide temperature stable, ruggedly built, precision performance in light weight reasonably sized packages using stainless steel connectors and housings. Input Power levels of 2 Watts is offered with low VSWR performance. Contact factory for custom versions and different configurations.

Frequency Specifications

| Series | TRM-2001 | TRM-2053 |
|------------------|-----------|-----------|
| Frequency, (GHz) | DC - 18.0 | DC - 12.4 |

Technical Specification

| | | |
|---|----------------------------|------|
| VSWR formula, (max.): | 1.03+.005 (f GHz) | |
| VSWR table, (max.): | Freq. (GHz) | VSWR |
| | DC - 4.0 | 1.05 |
| | 4.0-12.4 | 1.09 |
| | 12.4-18.0 | 1.12 |
| Nominal Impedance, (Ω) | 50 | |
| Operating Temperature, ($^{\circ}\text{C}$) | -55 to +125 | |
| Average Power, (W)* | 2 | |
| Finish: | Passivated Stainless Steel | |

* Rated @25°C, derated linearly to 0.5W @ 125°C

DC - 18.0 GHz - Precision N Performance

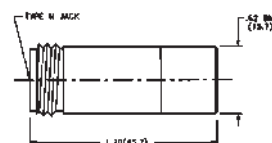
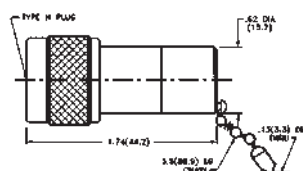
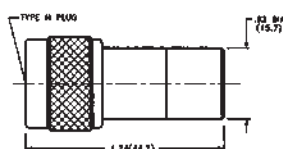
DC - 18.0 GHz 2001 Series

| Male Plug | Male Plug with Chain | Female Jack |
|--------------------|----------------------|--------------------|
| TRM-2001-M0-NNN-02 | TRM-2001-MC-NNN-02 | TRM-2001-F0-NNN-02 |

DC - 12.4 GHz - Broadband Performance

DC - 12.4 GHz 2053 Series

| Male Plug | Male Plug with Chain | Female Jack |
|--------------------|----------------------|--------------------|
| TRM-2053-M0-NNN-02 | TRM-2053-MC-NNN-02 | TRM-2053-F0-NNN-02 |



Type N Economical Types

Economical DC – 18.0 GHz Performance

- Type N
- Broad Frequency Band Coverage
- Low VSWR
- Rugged Stainless Steel Interface Construction



Midwest Microwave's Type N series of economical coaxial Terminations provide temperature stable, ruggedly built, precision performance in light weight reasonably sized packages using stainless steel connectors. The units are designed to optimize cost reduction and their performance per cost ratio is excellent. Low VSWR performance is exhibited and units are suitable for a variety of commercial operating or test systems. Contact factory for custom versions and different configurations.

Frequency Specifications

| Series | TRM-2070 | TRM-2071 |
|------------------|-----------|----------|
| Frequency, (GHz) | DC - 18.0 | DC - 4.0 |

Technical Specification

| | | |
|--|----------------------------|------|
| VSWR table, (max.): | Freq. (GHz) | VSWR |
| | DC - 4.0 | 1.25 |
| | 4.0-18.0 | 1.25 |
| Nominal Impedance, (Ω) | 50 | |
| Operating Temperature, ($^{\circ}$ C) | -55 to +125 | |
| Average Power, (W)* | 2 | |
| Finish: | Passivated Stainless Steel | |

* Rated @25 $^{\circ}$ C, derated linearly to 0.5W @ 125 $^{\circ}$ C

Economical DC – 18.0 GHz

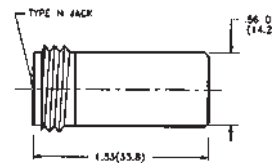
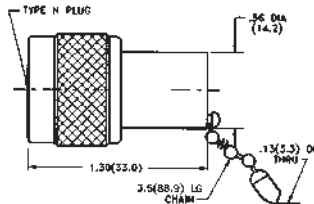
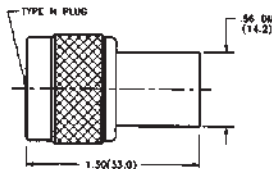
DC - 18.0 GHz 2070 Series

| N Male Plug | N Male Plug with Chain | Female Jack |
|--------------------|------------------------|--------------------|
| TRM-2070-M0-NNN-07 | TRM-2070-MC-NNN-072 | TRM-2070-F0-NNN-07 |

Economical DC – 4.0 GHz

DC - 4.0 GHz 2071 Series

| N Male Plug | N Male Plug with Chain | Female Jack |
|--------------------|------------------------|--------------------|
| TRM-2071-M0-NNN-07 | TRM-2071-MC-NNN-07 | TRM-2071-F0-NNN-07 |



Type N – Medium Power Types

DC – 18.0 GHz – 10 Watt Performance

- DC - 12.4 and DC - 18.0 GHz Model Selection
- 10 Watts of Power Handling at 25°C
- Low VSWR – 50 Ohm – High Performance
- Rugged Stainless Steel Interface Construction



Midwest Microwave's Type N series of medium power coaxial Terminations provide temperature stable, ruggedly built, precision performance in light weight reasonably sized packages using stainless steel connectors and housings of black anodized finned aluminum for maximum heat dissipation. Input Power levels of 10 Watts is offered with low VSWR performance. Contact factory for custom versions and different configurations.

Frequency Specifications

| Series | TRM-2098 | TRM-2080 |
|------------------|-----------|-----------|
| Frequency, (GHz) | DC - 18.0 | DC - 12.4 |

Technical Specification

| | | |
|---------------------------------|-------------------------------|------|
| VSWR formula, (max.): | $1.05 + 0.01 (f \text{ GHz})$ | |
| VSWR table, (max.): | Freq. (GHz) | VSWR |
| | DC - 12.4 | 1.17 |
| | 12.4-18.0 | 1.23 |
| Nominal Impedance, (Ω) | 50 | |
| Average Power*, (W): | 10 | |
| Peak Power, (W): | 250 | |
| Operating Temperature, (°C) | -65 to +125 | |
| Finish, Body : | Black Anodized Aluminum | |
| Finish, Connectors: | Passivated Stainless Steel | |

* Rated @25°C, derated linearly to 1W @ 125°C

DC – 18.0 GHz, 10 Watts

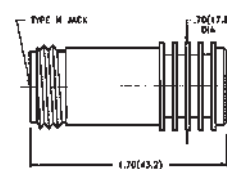
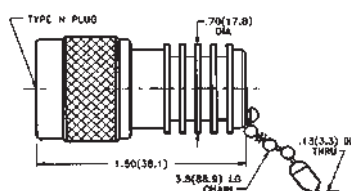
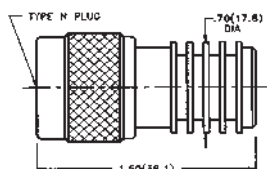
DC - 18.0 GHz 2098 Series

| Male Plug | Male Plug with Chain | Female Jack |
|--------------------|----------------------|--------------------|
| TRM-2098-M0-NNN-07 | TRM-2098-MC-NNN-07 | TRM-2098-F0-NNN-07 |

DC – 12.4 GHz, 10 Watts

DC - 18.0 GHz 2080 Series

| Male Plug | Male Plug with Chain | Female Jack |
|--------------------|----------------------|--------------------|
| TRM-2080-M0-NNN-07 | TRM-2080-MC-NNN-07 | TRM-2080-F0-NNN-07 |



TNC Type

DC - 18.0 GHz - High Performance

- DC - 18.0 GHz and DC - 12.4 GHz Models Selection
- Broad Frequency Band Coverage
- Low VSWR
- Rugged Stainless Steel Interface Construction



Midwest Microwave's TNC Type series of coaxial Terminations provide temperature stable, ruggedly built, precision performance in light weight reasonably sized packages using stainless steel connectors and housings. Input Power levels of 2 Watts is offered with low VSWR performance. Contact factory for custom versions and different configurations.

Frequency Specifications

| Series | TRM-2108 | TRM-2107 |
|------------------|-----------|-----------|
| Frequency, (GHz) | DC - 18.0 | DC - 12.4 |

Technical Specification

| | | |
|--|----------------------------|------|
| VSWR table, (max.): | Freq. (GHz) | VSWR |
| | DC - 8.0 | 1.2 |
| | 8.0-18.0 | 1.25 |
| Nominal Impedance, (Ω) | 50 | |
| Average Power*, (W): | 2 | |
| Peak Power, (W): | 250 | |
| Operating Temperature, ($^{\circ}$ C) | -55 to +125 | |
| Finish: | Passivated Stainless Steel | |

* Rated @25 $^{\circ}$ C, derated linearly to 0.5W @ 125 $^{\circ}$ C

DC - 18.0 GHz High Performance

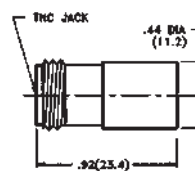
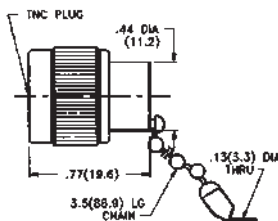
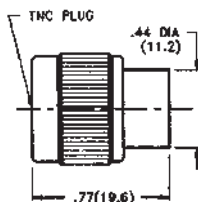
DC - 18.0 GHz 2108 Series

| TNC Male Plug | TNC Male Plug with Chain | TNC Female Jack |
|--------------------|--------------------------|--------------------|
| TRM-2108-M0-TNC-02 | TRM-2108-MC-TNC-02 | TRM-2108-F0-TNC-02 |

DC - 12.4 GHz High Performance

DC - 12.4 GHz 2107 Series

| TNC Male Plug | TNC Male Plug with Chain | TNC Female Jack |
|--------------------|--------------------------|--------------------|
| TRM-2107-M0-TNC-02 | TRM-2107-MC-TNC-02 | TRM-2107-F0-TNC-02 |



TNC Medium Power Types

DC - 18.0 GHz - 5 Watt Performance

- Precision TNC Performance
- 5 Watt Average – 5 kW Peak Power
- Low VSWR
- Rugged Stainless Steel Interface Construction



Midwest Microwave's TNC type series of coaxial medium power Terminations provide temperature stable, precision performance in light weight reasonably sized packages using stainless steel connectors and black anodized finned aluminum housings. The units are designed to optimize performance and reliability with low VSWR performance. Contact factory for custom versions and different configurations.

Technical Specification

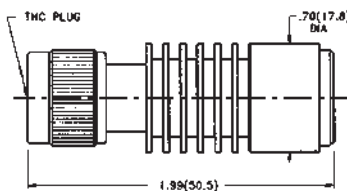
| | | |
|--|----------------------------|------|
| Series | TRM-2142 | |
| Frequency, (GHz) | DC - 18.0 | |
| VSWR table, (max.): | Freq. (GHz) | VSWR |
| | DC - 12.4 | 1.2 |
| | 12.4-18.0 | 1.3 |
| Nominal Impedance, (Ω) | 50 | |
| Average Power*, (W): | 5 | |
| Peak Power, (kW): | 5 | |
| Operating Temperature, ($^{\circ}$C) | -55 to +125 | |
| Finish, Body : | Black Anodized Aluminum | |
| Finish, Connectors: | Passivated Stainless Steel | |

* Rated @25 $^{\circ}$ C, derated linearly to 1W @ 125 $^{\circ}$ C

5 Watts - DC - 18 GHz

DC - 18.0 GHz 2142 Series

| |
|----------------------|
| TNC Male Plug |
| TRM-2142-M0-TNC-07 |



BNC Type

DC - 4.0 GHz Performance

- Economical Model Selection
- Broad Frequency Band Coverage
- Low VSWR
- 50 Ohm Performance



Midwest Microwave's BNC Type series of coaxial Terminations provide temperature stable, ruggedly performance in light weight reasonably sized packages using high quality connectors and housings. Input Power levels of 2 Watts is offered with low VSWR performance. Contact factory for custom versions and different configurations.

Technical Specification

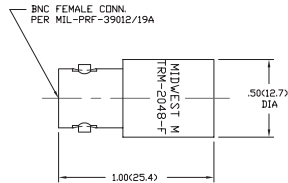
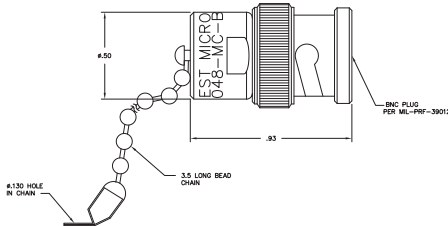
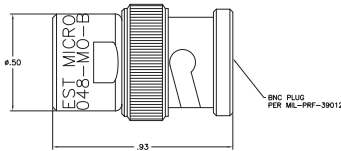
| | | | |
|-----------------------------|---------------------|------|--|
| Series | TRM-2048 | | |
| Frequency, (GHz) | DC - 4.0 | | |
| VSWR table, (max.): | Freq. (GHz) | VSWR | |
| | DC - 4.0 | 1.2 | |
| Nominal Impedance, (Ω) | 50 | | |
| Average Power*, (W): | 2 | | |
| Operating Temperature, (°C) | -55 to +125 | | |
| Finish: | Nickel Plated Brass | | |

* Rated @25°C, derated linearly to 0.5W @ 125°C

2 Watts DC - 4.0 GHz Performance

DC - 4.0 GHz 2048 Series

| BNC Male Plug | BNC Male Plug with Chain | BNC Female Jack |
|--------------------|--------------------------|--------------------|
| TRM-2048-M0-BNC-10 | TRM-2048-MC-BNC-10 | TRM-2048-F0-BNC-10 |



Short and Open Circuits

Short and Open Circuits for Testing

- SMA, N, and TNC Types
- Convenient for Phase Testing
- Small Size, Light Weight



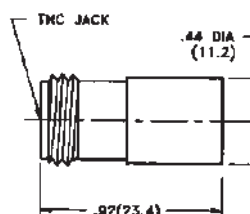
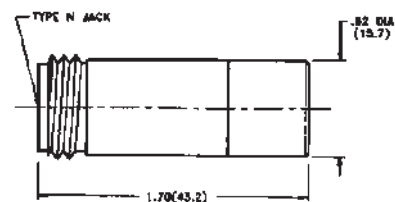
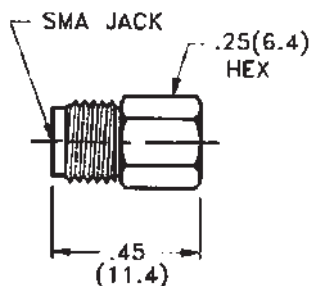
Midwest Microwave's series of Short and Open Circuits are conveniently offered in all of the popular male and female connector interfaces. They are particularly useful for performing phase measurement tests. The units are finished in passivated stainless steel. Contact factory for custom versions and different configurations.

Short Circuit Part No.

| Male Plug | Female Jack | Connector Type |
|--------------------|--------------------|----------------|
| SHT-2172-M0-SMA-02 | SHT-2172-F0-SMA-02 | SMA |
| SHT-2174-M0-NNN-02 | SHT-2174-F0-NNN-02 | Type N |
| SHT-2175-M0-TNC-02 | SHT-2175-F0-TNC-02 | TNC |

Open Circuit Part No.

| Male Plug | Female Jack | Connector Type |
|--------------------|--------------------|----------------|
| OPN-2182-M0-SMA-02 | OPN-2182-F0-SMA-02 | SMA |
| OPN-2184-M0-NNN-02 | OPN-2184-F0-NNN-02 | Type N |
| OPN-2185-M0-TNC-02 | OPN-2185-F0-TNC-02 | TNC |



SMA Type

18.5 GHz Performance

- Inside/Outside and Inside Only
- Greater Than 60 dB Isolation at 1kHz
- Low VSWR and Insertion Loss
- Rugged Stainless Steel Construction



Midwest Microwave’s Inside/Outside and Inside only DC Blocks pass all frequencies from 500.0 MHz to 18.0 GHz while exhibiting low insertion loss and low VSWR. The inner only DC Blocks pass all frequencies from 250 MHz to 18.5 GHz while also exhibiting low insertion loss and low VSWR. Both types pose a very high insertion loss to frequencies such as 60 Hz, 120 Hz, 400 Hz, and 1 kHz. They are manufactured using rugged stainless steel and are 100% tested to assure dependable high quality performance. Contact factory for custom versions and different configurations.

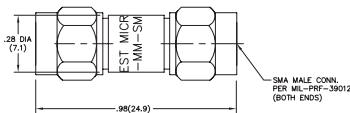
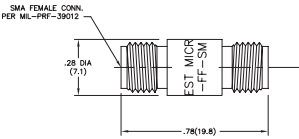
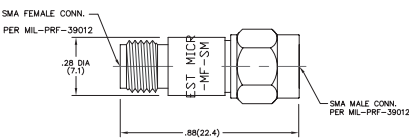
Technical Specification

| | | |
|-------------------------------|----------------------------|----------------------------|
| Series | DCB-3510 | DCB-3511 |
| Configuration | Inside | Inside/ Outside |
| Finish, Body: | Passivated Stainless Steel | Delrin |
| Finish, Connectors: | Passivated Stainless Steel | Passivated Stainless Steel |
| Operating Temperature, (°C) | -65 to +125 | -20 to +100 |
| Frequency, (GHz) | 0.25 - 18.5 | 0.5 - 18.0 |
| Insertion Loss, (dB, max.): | 0.5 | 0.5 |
| Isolation @ 1kHz, (dB, min.): | 60 | 60 |
| VSWR , (max.): | 1.35 | 1.35 |
| Nominal Impedance, (Ω) | 50 | 50 |
| DC Voltage (V, max.): | 200 | 200 |

Inside Only

250.00 MHz - 18.5 GHz Inside Only 3510 Series

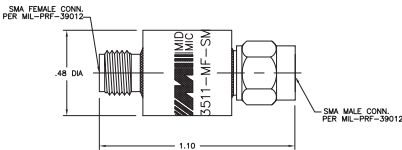
| Male/Female | Female/Female | Male/Male |
|--------------------|--------------------|--------------------|
| DCB-3510-MF-SMA-02 | DCB-3510-FF-SMA-02 | DCB-3510-MM-SMA-02 |



Inside / Outside

500.00 MHz - 18.5 GHz Inside/Outside 3511 Series

| Male/Female |
|--------------------|
| DCB-3511-MF-SMA-02 |



SMA • 7mm • N • TNC

Inside/Outside High Performance

- 0.1 - 12.4 GHz and 0.1 - 18.0 GHz Units
- Greater than 65 dB Isolation at 1kHz
- Low VSWR and Insertion Loss
- Rugged Stainless Steel Construction

Midwest Microwave's high performance Inside/Outside DC Blocks pass all frequencies from 100.0 MHz to 18.0 GHz while exhibiting low insertion loss and low VSWR. The units pose a very high insertion loss to frequencies such as 60 Hz, 120 Hz, 400 Hz, and 1 kHz. They are designed for laboratory, production line, or system use and are available in all of the popular connector interfaces. They are manufactured using rugged stainless steel and are 100% tested to assure dependable high quality performance. Contact factory for custom versions and different configurations.



Frequency Specification

| Series | DCB-3537 | DCB-3538 | DCB-3549 | DCB-3524 | DCB-3525 | DCB-3534 | DCB-3535 |
|------------------|------------|------------|------------|------------|------------|------------|------------|
| Interface | SMA | SMA | 7mm | N | N | TNC | TNC |
| Frequency, (GHz) | 0.1 - 12.4 | 0.1 - 18.0 | 0.1 - 18.0 | 0.1 - 12.4 | 0.1 - 18.0 | 0.1 - 12.4 | 0.1 - 18.0 |

Technical Specification

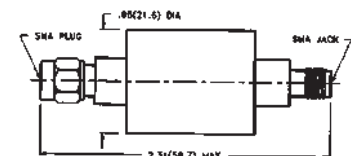
| | |
|-------------------------------|--|
| Finish, Body : | Delrin |
| Finish, Connectors: | Passivated Stainless Steel |
| Operating Temperature, (°C) | -20 to +100 |
| Insertion Loss, (dB, max.): | 0.5 |
| Isolation @ 1kHz, (dB, min.): | 65 |
| VSWR , (max.): | 1.20 max @ 0.01 - 8.0 GHz, 1.25 max @ 8.0 - 12.4 GHz, and 1.35 max @ 12.4 - 18.0 GHz |
| Nominal Impedance, (Ω) | 50 |
| DC Voltage (V, max.): | 200 |

SMA Type

100.0 MHz - 18.0 GHz

100.0 MHz - 12.4 GHz

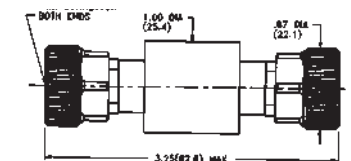
| Male/Female | Male/Female |
|--------------------|--------------------|
| DCB-3538-IO-SMA-02 | DCB-3537-IO-SMA-02 |



7mm

100.0 MHz - 18.0 GHz

| Male/Female |
|--------------------|
| DCB-3549-IO-SMA-02 |

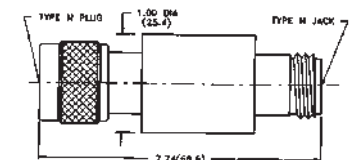


N Type

100.0 MHz - 18.0 GHz

100.0 MHz - 12.4 GHz

| Male/Female | Male/Female |
|--------------------|--------------------|
| DCB-3525-IO-NNN-02 | DCB-3524-IO-NNN-02 |

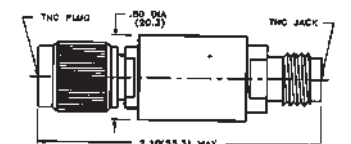


TNC Type

100.0 MHz - 18.0 GHz

100.0 MHz - 12.4 GHz

| Male/Female | Male/Female |
|--------------------|--------------------|
| DCB-3535-IO-TNC-02 | DCB-3534-IO-TNC-02 |



General Information

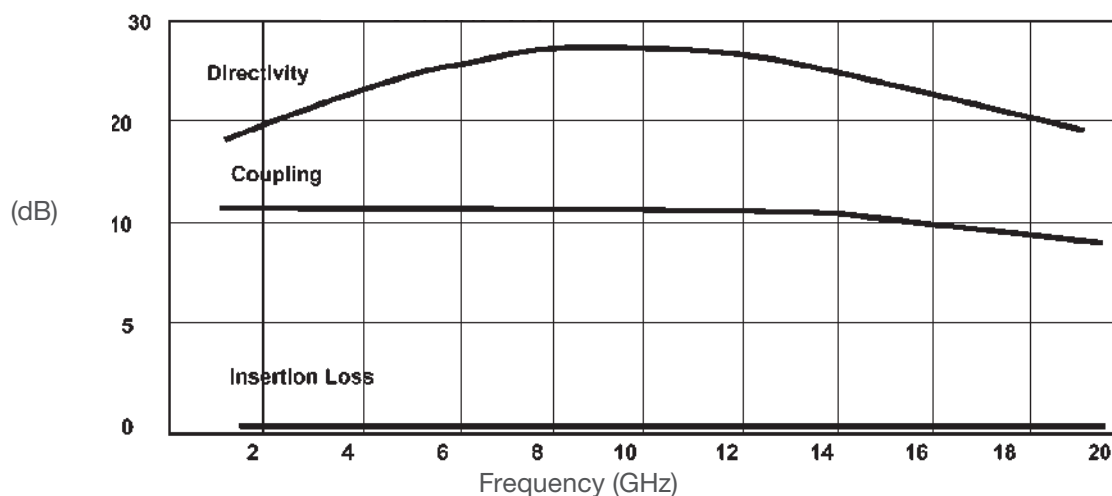
- 0.5 - 40 GHz High Directivity Performance
- Octave, Broadband and Ultrabroadband Frequency Coverage
- Small Size, Light Weight, Rugged Construction
- Designed to Meet Military and Space Environmental Specifications, see appendix for details

Couplers are usually four port passive devices containing two separate transmission lines, each having one port on each end that come into proximity to each other such that microwave energy propagating on one of the lines will couple to the other. The four ports are almost always matched to an impedance of 50 ohms.

Midwest Microwave manufactures three basic types of couplers. Directional Couplers, 90° Hybrid Couplers, and 180° Hybrid Couplers. They are small, lightweight, broadband couplers that most often use rugged stripline circuit construction and perform extremely well over the wide temperature range of -55°C to +125°C. They are also designed to perform with low insertion loss and high isolation. Units are available in octave and multi-octave frequency bandwidths with some ultra-broadband units available covering the band of 0.5 to 18.0 GHz with a few models operating up to 26.5 GHz. They exhibit low ripple and high directivity. The 90° and 180° Hybrid Couplers are available in both crossover and non-crossover configurations. The Couplers are designed to meet the stringent environmental requirements. Standard catalog units are available with SMA connectors with other connector types available upon special request. Some items are available off the shelf for immediate delivery or special units can be custom designed by Midwest Microwave's experienced engineering staff to accommodate unique system needs. All Midwest Couplers are completely manufactured in house and are 100% tested to insure only the highest quality performance whether for military or space use or for commercial cellular or personal communications applications.



Typical Directional Coupler Characteristics



Definition of Parameters

Coupler

A four port device that contains two separate transmission lines, the Primary Line (J1-J2), and the Coupled Line (J3-J4), each having one port at each end, (as designated in figure 1). Because of their proximity to each other, microwave energy propagating on one of the lines, couples unidirectionally to the other line causing microwave energy to appear on it.

Frequency

Directional Couplers will only perform satisfactorily over a finite frequency band. Design goals are continually aimed toward broadening the frequency bandwidth as much as possible.

Primary Line

The transmission line (primary circuit) between the input port J1 and the output port J2 is called the Primary Line. It is usually the line on which the signal to be coupled or sampled is propagating.

Coupled Line

The transmission line to which the Primary Line signal is coupled is called the Coupled Line. It is usually terminated at the isolated port with a 50 ohm termination.

Coupling

The coupling of energy from the primary line to the coupled line is accomplished as follows: A portion of the microwave power input at port J1, (see Figure 1), is coupled to port J3 and the remaining power continues out through the output port J2. The amount of coupled energy will vary slightly over the frequency range of the coupler. This characteristic is known as 'ripple' and is controllable through design technique, but cannot be completely eliminated.

Coupling is expressed as follows:

$$\text{Coupling (dB)} = -10 \log [P_3/P_1]$$

Note: P3 and P1 represent the microwave power levels at ports J3 and J1 respectively.

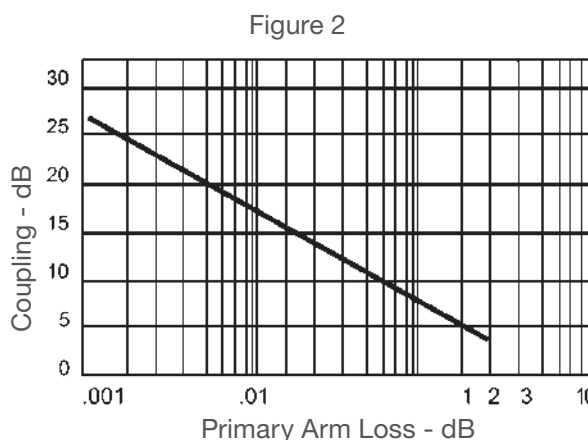
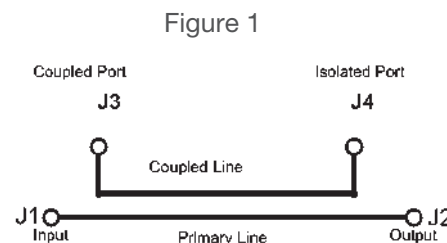
An example of a 10 dB coupler would direct 1/10 of the power input at J1 out of the coupled port at J3 and the remaining 9/10 of the power will continue to pass down the primary line to the J2 output port. The isolated port at J4 will not receive any power in a theoretically ideal coupler, but in reality it is usually terminated to absorb any reflected power from J3. Conversely, if power were input in the opposite direction at J2, J4 would become the coupled port and J3 would become the isolated port.

Insertion Loss

In a directional coupler, the total insertion loss from the primary line input to the primary line output is equal to the coupling loss plus resistive, dielectric and reflection losses. In an ideal coupler, where dissipative losses are ignored, the primary line loss due to the coupling effect of power going to the coupled line is expressed as follows:

$$\text{Insertion Loss (dB)} = 10 \log [1 - P_3/P_1]$$

The relationship of coupling loss to coupling for an ideal (dissipationless) coupler is shown in figure 2.



Directivity

The measure of how well the isolated port is isolated, such that the highest amount of coupled power actually gets to the coupled port. In reality, not all of the power ever does, some of the power always arrives at the isolated port. If the power at the isolated port is 20 dB below the power at the coupled port, the coupler is said to have 20 dB of directivity.

Directivity is expressed as follows:

$$\text{Directivity (dB)} = -10 \log [P_4/P_3]$$

Note: Assuming that the input power is at the input port J1

Isolation

Isolation is another way of expressing the measure of how much power is leaking to the isolated port. It is expressed as follows:

$$\text{Isolation (dB)} = -20 \log [P_4/P_1]$$

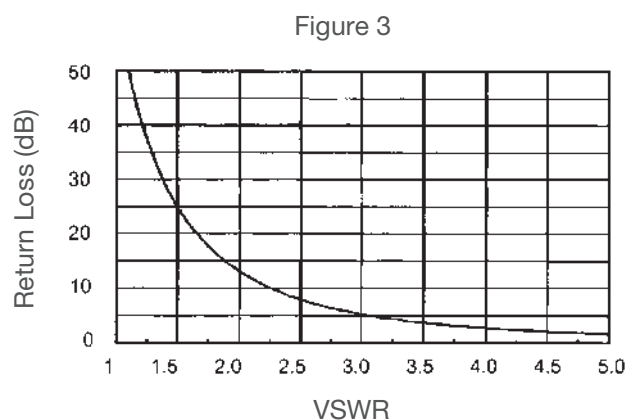
It is clear that Isolation and Directivity are really measuring the same characteristic, i.e.

$$\text{Isolation (dB)} = \text{Coupling (dB)} + \text{Directivity (dB)}$$

A simple example would be that of a 10 dB coupler with 20 dB directivity which would obviously then have 30 dB of isolation. Directivity rather than isolation is usually specified on directional couplers where isolation is usually specified on Hybrid Couplers.

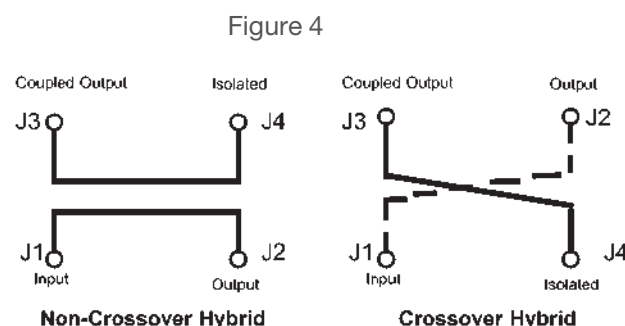
VSWR

Directional Couplers unfortunately possess many reflections as a result of impedance mismatches and other discontinuities contained in their circuitry usually caused by practical physical constraints imposed by system space requirements. Referring to Figure 1, a mismatch at the output port J2 or at the coupled port J3, will reduce directivity by an amount equal to the return loss (in dB) of the mismatch. It does not matter whether the mismatch is connected to the output port of the coupler J2, or is inherent in the coupler circuit itself. By measuring the directivity of a coupler which has very high directivity and low VSWR, the VSWR of the termination or load connected to the output port J2 can be determined. This is a very convenient characteristic that allows Directional Couplers to be extremely useful in measuring VSWR. Reflectometer test methods utilize this characteristic of directional couplers. The relationship between return loss (dB) and VSWR is shown in figure 3.



90° Hybrid Couplers

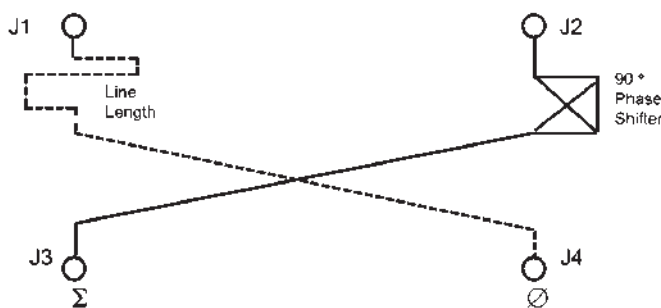
Hybrid Couplers are generally a 3 dB Directional Coupler where the coupled port output signal and the primary line output signal are out of phase with each other by 90°. Since -3 dB equates to half power, a 3 dB coupler is really a power divider that divides power equally between the primary line output port and the coupled line output port while providing a 90° phase difference between the two signals. Hybrid Couplers are available in crossover configurations, where both the primary and the coupled output ports are physically on the same side of the circuit, and in non-crossover configurations where



the coupled output port is physically on the opposite side of the primary output port. This location option is purely for mechanical convenience. 90° Hybrid Couplers are also known as Quadrature Hybrids because the 90° phase difference is called a Quadrant. It may also be noted that any one of the four ports can be designated the input port and the same relationship between ports will remain. This occurs because electrically as well as mechanically a 90° Hybrid Coupler is symmetrical. Figure 4 describes both the crossover and non-crossover 90° Hybrid Couplers.

180° Hybrid Couplers

When a 90° Phase Shifter is added in front of the output port J2, microwave power input at the sum (S) port will divide equally in amplitude between port J1 and port J2 and will be in phase with each other. The difference (D) being the isolated port. If the power is input at the difference (D) port, the power will divide equally in amplitude, however port J1 and port J2 will now have a 180° phase difference and the sum (S) port will become the isolated port. In addition when simultaneous coherent microwave signal inputs are supplied to ports J1 and J2, the S port will produce a signal that is the sum (S) of the two input signals, and the D port will produce a signal that is the difference (D) between the two input signals.



Directional Couplers

40 GHz Directional Couplers

- 6-40 GHz bandwidth
- 2.92 mm stainless steel connectors
- Low VSWR, High Directivity/ Isolation
- 50 Ohms nominal impedance
- -55°C to +85°C operation



Midwest Microwave 40 GHz directional couplers are small, lightweight, and ruggedly built. They cover a wide bandwidth of 6-40 GHz with low insertion loss and low VSWR. Directional couplers incorporate strip line design with high directivity. They use 2.92mm female stainless-steel interface and are built in aluminum housing coated with gray paint.

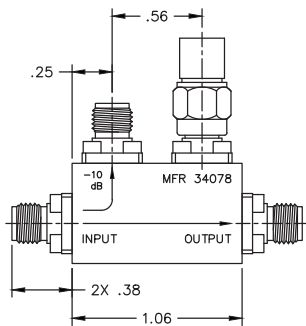
| Part Number | Description |
|--------------------|---|
| CPL-5536-10-29M-79 | 2.92mm Directional Coupler, 10 dB, 6-40 GHz |
| CPL-5536-20-29M-79 | 2.92mm Directional Coupler, 20 dB, 6-40 GHz |

Electrical Specification

| Series | CPL-5536-10-29M-79 | CPL-5536-20-29M-79 |
|----------------------------------|--------------------|--------------------|
| Frequency Range (GHz) | 6 to 40 | 6 to 40 |
| VSWR, (max) | 1.9 | 1.9 |
| Insertion Loss, dB (max) | 1.5 | 1.3 |
| Average Power, W (max) | 20 | 20 |
| Nominal Coupling, dB | 10 | 20 |
| Coupling Accuracy, ±dB (max) | 1.25 | 1.5 |
| Frequency Sensitivity, ±dB (max) | 0.65 | 0.5 |
| Directivity, dB (min) | 10 | 10 |

Mechanical & Environmental Specifications

| Dimension, LxWxH, in (nom) | 1.06 x 0.63 x 0.5 |
|----------------------------------|---|
| Weight, oz (nom) | 1.0 |
| Housing Material | Gray paint over RoHS compliant chemical conversion, coated aluminum |
| 2.92mm Female Connector Material | Housing: Passivated stainless steel Contacts: Gold plated beryllium copper |
| Operating Temperature (nom) | -55°C to +85°C |

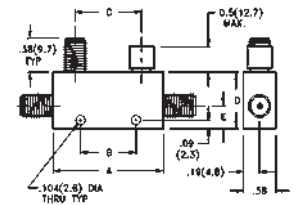


Directional Couplers • Octave Bandwidths

SMA Miniature High Performance

- Full Octave Frequency Band Performance
- Low VSWR – High Directivity
- Small Light Weight
- 50 Ohms Nominal Impedance

Midwest Microwave's SMA miniature series of high performance directional couplers are small, lightweight, ruggedly constructed stripline units that possess inherently low insertion loss and VSWR with high directivity. Units are available in octave frequency bandwidths covering the range of 1.0-18.0 GHz.



Electrical Specifications

| Frequency Range GHz | Case Style | Part Number | Nominal Coupling dB | Coupling Accuracy \pm dB (max.) | Frequency Sensitivity \pm dB (max.) | Insertion Loss dB (max.) | Directivity dB (min.) | VSWR (max.) | Average Power W (max.) | Reflected Power W (max.) | Peak Power kW (max.) |
|---------------------|------------|--------------------|---------------------|-----------------------------------|---------------------------------------|--------------------------|-----------------------|-------------|------------------------|--------------------------|----------------------|
| 1.0 - 2.0 | 3 | CPL-5211-06-SMA-79 | 6 | 1.0 | 0.60 | 0.20 | 25 | 1.15 | 50 | 4 | 4 |
| 1.0 - 2.0 | 3 | CPL-5211-10-SMA-79 | 10 | 1.0 | 0.75 | 0.20 | 25 | 1.15 | 50 | 10 | 4 |
| 1.0 - 2.0 | 3 | CPL-5211-20-SMA-79 | 20 | 1.0 | 0.75 | 0.20 | 25 | 1.15 | 50 | 50 | 4 |
| 1.0 - 2.0 | 3 | CPL-5211-30-SMA-79 | 30 | 1.0 | 0.75 | 0.20 | 25 | 1.15 | 50 | 50 | 4 |
| 2.0 - 4.0 | 2 | CPL-5212-06-SMA-79 | 6 | 1.0 | 0.60 | 0.20 | 22 | 1.15 | 50 | 4 | 4 |
| 2.0 - 4.0 | 2 | CPL-5212-10-SMA-79 | 10 | 1.0 | 0.75 | 0.20 | 22 | 1.15 | 50 | 10 | 4 |
| 2.0 - 4.0 | 2 | CPL-5212-20-SMA-79 | 20 | 1.0 | 0.75 | 0.20 | 22 | 1.15 | 50 | 50 | 4 |
| 2.0 - 4.0 | 2 | CPL-5212-30-SMA-79 | 30 | 1.0 | 0.75 | 0.20 | 22 | 1.15 | 50 | 50 | 4 |
| 4.0 - 8.0 | 1 | CPL-5214-06-SMA-79 | 6 | 1.0 | 0.50 | 0.35 | 20 | 1.25 | 50 | 4 | 4 |
| 4.0 - 8.0 | 1 | CPL-5214-10-SMA-79 | 10 | 1.0 | 0.50 | 0.35 | 20 | 1.25 | 50 | 10 | 4 |
| 4.0 - 8.0 | 1 | CPL-5214-20-SMA-79 | 20 | 1.0 | 0.50 | 0.35 | 20 | 1.25 | 50 | 50 | 4 |
| 4.0 - 8.0 | 1 | CPL-5214-30-SMA-79 | 30 | 1.0 | 0.50 | 0.35 | 20 | 1.25 | 50 | 50 | 4 |
| 7.0 - 12.4 | 1 | CPL-5215-06-SMA-79 | 6 | 1.0 | 0.40 | 0.40 | 17 | 1.35 | 50 | 4 | 4 |
| 7.0 - 12.4 | 1 | CPL-5215-10-SMA-79 | 10 | 1.0 | 0.50 | 0.40 | 17 | 1.35 | 50 | 10 | 4 |
| 7.0 - 12.4 | 1 | CPL-5215-20-SMA-79 | 20 | 1.0 | 0.50 | 0.30 | 17 | 1.35 | 50 | 50 | 4 |
| 7.0 - 12.4 | 1 | CPL-5215-30-SMA-79 | 30 | 1.0 | 0.50 | 0.30 | 17 | 1.35 | 50 | 50 | 4 |
| 7.0 - 18.0 | 1 | CPL-5216-06-SMA-79 | 6 | 1.0 | 0.50 | 0.50 | 15 | 1.35 | 50 | 4 | 4 |
| 7.0 - 18.0 | 1 | CPL-5216-10-SMA-79 | 10 | 1.0 | 0.50 | 0.50 | 15 | 1.40 | 50 | 10 | 4 |
| 7.0 - 18.0 | 1 | CPL-5216-20-SMA-79 | 20 | 1.0 | 0.75 | 0.50 | 15 | 1.45 | 50 | 50 | 4 |
| 7.0 - 18.0 | 1 | CPL-5216-30-SMA-79 | 30 | 1.0 | 0.75 | 0.50 | 15 | 1.45 | 50 | 50 | 4 |
| 12.4 - 18.0 | 1 | CPL-5217-06-SMA-79 | 6 | 1.0 | 0.40 | 0.50 | 15 | 1.35 | 50 | 4 | 2 |
| 12.4 - 18.0 | 1 | CPL-5217-10-SMA-79 | 10 | 1.0 | 0.50 | 0.50 | 15 | 1.45 | 50 | 10 | 2 |
| 12.4 - 18.0 | 1 | CPL-5217-20-SMA-79 | 20 | 1.0 | 0.50 | 0.50 | 15 | 1.45 | 50 | 50 | 2 |
| 12.4 - 18.0 | 5 | CPL-5217-30-SMA-79 | 30 | 1.0 | 0.50 | 0.50 | 15 | 1.45 | 50 | 50 | 2 |

Contact factory for different coupling values, interfaces, different configurations and custom versions.

Mechanical Specifications – inches (mm)

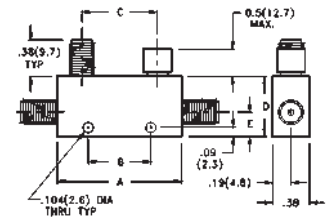
| Case Style | A | B | C | D | E | Weight |
|------------|-------------|-------------|-------------|-------------|------------|--------------|
| 1 | 1.00 (25.4) | N/A | 0.50 (12.7) | 0.50 (12.7) | 0.22 (5.6) | 0.60oz 17.0g |
| 2 | 1.16 (29.4) | 0.34 (8.7) | 0.66 (16.7) | 0.50 (12.7) | 0.22 (5.6) | 0.64oz 18.2g |
| 3 | 1.78 (45.2) | 0.94 (23.8) | 1.28 (32.5) | 0.50 (12.7) | 0.22 (5.6) | 0.82oz 23.2g |
| 4 | 3.00 (76.2) | 1.00 (25.5) | 2.50 (63.5) | 0.75 (19.1) | 0.31 (7.9) | 1.50oz 43.0g |
| 5 | 1.00 (25.4) | N/A | 0.50 (12.7) | 0.63 (15.9) | 0.22 (5.6) | 0.67oz 19.0g |
| 6 | 3.50 (88.9) | 2.00 (50.8) | 3.00 (76.2) | 0.75 (19.1) | 0.25 (6.3) | 1.75oz 49.6g |
| 7 | 2.00 (50.8) | 0.95 (24.2) | 1.50 (38.1) | 0.63 (16.0) | 0.22 (5.6) | 1.30oz 36.9g |

Directional Couplers • Ultra-Wideband

Ultra-Wideband Performance

- Full 0.5 – 18.0 GHz Bandwidth Units
- Low VSWR – High Directivity
- Rugged Stripline Construction
- 50 Ohms Nominal Impedance

Midwest Microwave's SMA miniature series of Ultra-Wideband high performance directional couplers are small, lightweight, components that perform extremely well over multi-octave and Ultra-Wideband frequencies covering the entire range of 0.5 - 18.0 GHz.



Electrical Specifications

| Frequency Range GHz | Case Style | Part Number | Nominal Coupling dB | Coupling Accuracy \pm dB (max.) | Frequency Sensitivity \pm dB (max.) | Insertion Loss dB (max.) | Directivity dB (min.) | VSWR (max.) | Average Power *** W (max.) | Peak Power kW (max.) |
|---------------------|------------|--------------------|---------------------|-----------------------------------|---------------------------------------|--------------------------|-----------------------|-------------|----------------------------|----------------------|
| 0.5 - 2.0 | 6 | CPL-5220-06-SMA-79 | 6 | 1.0 | 0.50 | 0.4 | 22 | 1.20 | 50 | 3 |
| 0.5 - 2.0 | 6 | CPL-5220-10-SMA-79 | 10 | 1.0 | 0.50 | 0.4 | 22 | 1.20 | 50 | 3 |
| 0.5 - 2.0 | 6 | CPL-5220-16-SMA-79 | 16 | 1.0 | 0.50 | 0.4 | 22 | 1.20 | 50 | 3 |
| 0.5 - 2.0 | 6 | CPL-5220-20-SMA-79 | 20 | 1.0 | 0.50 | 0.4 | 22 | 1.20 | 50 | 3 |
| 2.0 - 8.0 | 7 | CPL-5222-06-SMA-79 | 6 | 1.0 | 0.50 | 0.5 | 20 | 1.25 | 50 | 3 |
| 2.0 - 8.0 | 7 | CPL-5222-10-SMA-79 | 10 | 1.0 | 0.50 | 0.5 | 20 | 1.25 | 50 | 3 |
| 2.0 - 8.0 | 7 | CPL-5222-16-SMA-79 | 16 | 1.0 | 0.50 | 0.5 | 20 | 1.25 | 50 | 3 |
| 2.0 - 8.0 | 7 | CPL-5222-20-SMA-79 | 20 | 1.0 | 0.50 | 0.5 | 20 | 1.25 | 50 | 3 |
| 6.0 - 18.0 | 1 | CPL-5226-06-SMA-79 | 6 | 1.0 | 0.50 | 0.6 | 15 | 1.40 | 50 | 3 |
| 6.0 - 18.0 | 1 | CPL-5226-10-SMA-79 | 10 | 1.0 | 0.50 | 0.6 | 15 | 1.40 | 50 | 3 |
| 6.0 - 18.0 | 1 | CPL-5226-16-SMA-79 | 16 | 1.0 | 0.50 | 0.6 | 15 | 1.40 | 50 | 3 |
| 6.0 - 18.0 | 1 | CPL-5226-20-SMA-79 | 20 | 1.0 | 0.50 | 0.6 | 15 | 1.40 | 50 | 3 |
| 0.5 - 18.0 | 6 | CPL-5230-10-SMA-79 | 10* | 1.5 | 1.00 | 1.0 | 15** | 1.50 | 50 | 3 |
| 0.5 - 18.0 | 6 | CPL-5230-16-SMA-79 | 16* | 1.5 | 1.00 | 1.0 | 15** | 1.50 | 50 | 3 |
| 0.5 - 18.0 | 6 | CPL-5230-20-SMA-79 | 20* | 1.5 | 1.00 | 1.0 | 15** | 1.50 | 50 | 3 |
| 2.0 - 18.0 | 7 | CPL-5232-06-SMA-79 | 6* | 1.0 | 0.50 | 0.8 | 15** | 1.40 | 20 | 3 |
| 2.0 - 18.0 | 7 | CPL-5232-10-SMA-79 | 10* | 1.0 | 0.50 | 0.8 | 15** | 1.40 | 20 | 3 |
| 2.0 - 18.0 | 7 | CPL-5232-16-SMA-79 | 16* | 1.0 | 0.50 | 0.8 | 15** | 1.40 | 20 | 3 |
| 2.0 - 18.0 | 7 | CPL-5232-20-SMA-79 | 20* | 1.0 | 0.50 | 0.8 | 15** | 1.40 | 20 | 3 |

* Coupling is referenced to the output port.

** Directivity is 12 dB from 12.4 - 18.0 GHz.

*** At input port.

Contact factory for different coupling values, interfaces, different configurations and custom versions.

Mechanical Specifications – inches (mm)

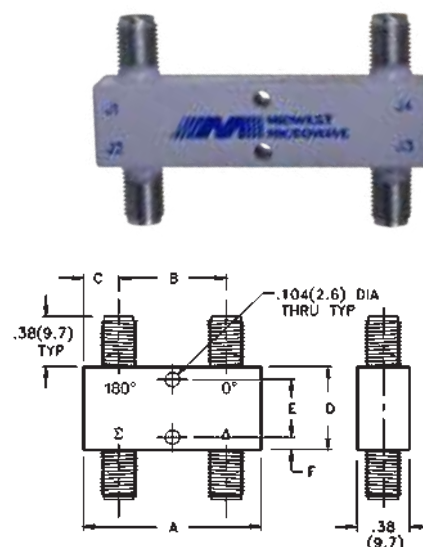
| Case Style | A | B | C | D | E | F | G | H | Weight Oz Gr | |
|------------|--------------|--------------|-------------|-------------|--------------|-------------|-------------|---------------|-----------------|-----|
| 1 | 1.00 (25.4) | 0.50 (12.7) | 0.25 (6.3) | 0.50 (12.7) | 0.312 (7.9) | 0.093 (2.4) | 0.50 (12.7) | N/A | 0.60 | 17 |
| 2 | 2.00 (50.8) | 1.50 (38.1) | 0.25 (6.3) | 0.50 (12.7) | 0.312 (7.9) | 0.093 (2.4) | 1.00 (25.4) | N/A | 0.64 | 18 |
| 3 | 2.00 (50.8) | 1.50 (38.1) | 0.25 (6.3) | 1.00 (25.4) | 0.812 (22.1) | 0.093 (2.4) | 1.00 (25.4) | N/A | 0.82 | 23 |
| 4 | 2.70 (68.6) | 2.20 (55.9) | 0.25 (6.3) | 1.06 (26.9) | 0.86 (21.8) | 0.10 (2.54) | 0.84 (21.3) | 1.030 (26.2) | 2.30 | 65 |
| 5 | 2.70 (68.6) | 2.20 (55.9) | 0.25 (6.3) | 0.86 (21.8) | N/A | 0.43 (10.9) | 0.58 (14.7) | 1.560 (39.6) | 2.70 | 75 |
| 6 | 7.00 (177.8) | 6.10 (155.0) | 0.45 (11.4) | 1.50 (38.1) | 1.180 (30.0) | 0.16 (4.1) | 2.25 (57.2) | 2.500 (63.5) | 8.00 | 227 |
| 7 | 5.58 (141.7) | 5.00 (127.0) | 0.29 (7.4) | 0.70 (17.8) | N/A | 0.35 (8.9) | 0.08 (2.0) | 5.420 (137.7) | 2.35 | 67 |

3 dB 180° Hybrids – Crossover Type

Excellent Phase and Amplitude Balance

- 500.0 MHz to 18.0 GHz Performance
- 0° or 180° Phase Difference
- Low VSWR – High Isolation
- Rugged Stripline Construction
- 50 Ohm Nominal Impedance

Midwest Microwave's series of 3 dB 180° Hybrid Couplers may be used as a power divider or combiner. A microwave signal applied at the sum (Σ) port will result in two equal amplitude, in phase signals at the output ports. Conversely, a microwave signal applied at the difference (Δ) port will result in two equal amplitude but 180° out of phase signals at the output ports.



Electrical Specifications

| Frequency Range GHz | Case Style | Part Number | Amplitude Balance \pm dB (max.) | Insertion Loss dB (max.) | Isolation dB (min.) | VSWR (max.) | Phase Balance \pm° (max.) | Average Power W (max.) | Peak Power kW (max.) |
|---------------------|------------|--------------------|-----------------------------------|--------------------------|---------------------|-------------|----------------------------------|------------------------|----------------------|
| 1.0-2.0 | 2 | HYB-5411-X3-SMA-79 | 0.5 | 0.50 | 25 | 1.35 | 10 | 30 | 3 |
| 2.0-4.0 | 3 | HYB-5412-X3-SMA-79 | 0.5 | 0.70 | 22 | 1.35 | 10 | 30 | 3 |
| 2.6-5.2 | 4 | HYB-5413-X3-SMA-79 | 0.5 | 0.70 | 20 | 1.35 | 8 | 30 | 3 |
| 4.0-8.0 | 4 | HYB-5414-X3-SMA-79 | 0.5 | 0.70 | 20 | 1.35 | 8 | 30 | 3 |
| 4.0-12.4 | 5 | HYB-5423-X3-SMA-79 | 0.6 | 1.00 | 17 | 1.50 | 6 | 30 | 3 |
| 7.0-12.4 | 6 | HYB-5415-X3-SMA-79 | 0.5 | 0.80 | 17 | 1.45 | 6 | 30 | 3 |
| 7.0-18.0 | 6 | HYB-5416-X3-SMA-79 | 0.6 | 1.20 | 14 | 1.70 | 6 | 30 | 3 |
| 12.4-18.0 | 6 | HYB-5417-X3-SMA-79 | 0.6 | 1.20 | 12 | 1.70 | 6 | 30 | 3 |

Contact factory for different coupling values, interfaces, different configurations and custom versions.

Mechanical Specifications – inches (mm)

| Case Style | A | B | C | D | E | F | Weight | |
|------------|-------------|-------------|-------------|-------------|-------------|------------|--------|----|
| | | | | | | | Oz | Gr |
| 1 | 3.25 (82.6) | 2.5 (63.5) | 0.50 (12.7) | 1.25 (31.8) | 1.00 (25.4) | 0.13 (3.2) | 2.8 | 70 |
| 2 | 2.00 (50.8) | 1.25 (31.8) | 0.50 (12.7) | 1.25 (31.8) | 1.00 (25.4) | 0.13 (3.2) | 2.0 | 47 |
| 3 | 1.44 (36.5) | 0.69 (17.5) | 0.38 (9.7) | 1.25 (31.8) | 1.00 (25.4) | 0.13 (3.2) | 1.5 | 38 |
| 4 | 1.25 (31.8) | 0.50 (12.7) | 0.38 (9.7) | 1.25 (31.8) | 1.00 (25.4) | 0.13 (3.2) | 1.5 | 38 |
| 5 | 1.50 (38.1) | 0.75 (19.1) | 0.38 (9.7) | 1.00 (25.4) | 0.75 (19.1) | 0.13 (3.2) | 1.2 | 34 |
| 6 | 1.25 (31.8) | 0.50 (12.7) | 0.38 (9.7) | 1.00 (25.4) | 0.75 (19.1) | 0.13 (3.2) | 1.1 | 31 |

General Information

- DC - 40.0 GHz High Performance
- Broadband and Ultra-Broadband Frequency Coverage
- High Isolation – Low Phase and Amplitude Unbalance
- Small Size, Light Weight, Rugged Construction

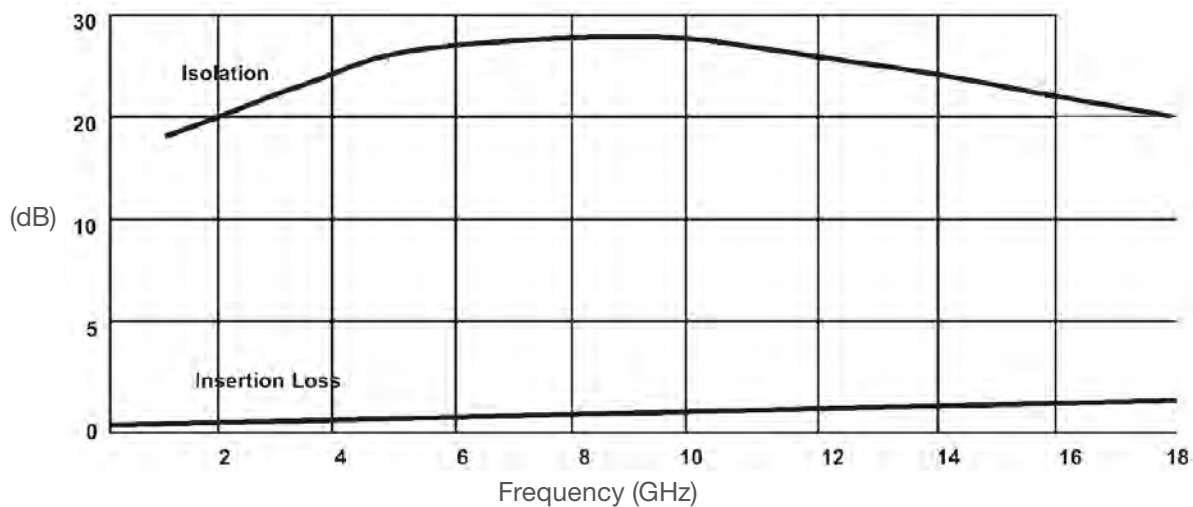
Power Dividers are passive devices that divide an input signal into any number of equal output signals. The ability of a power divider is to provide identical phase matched output signals from one input signal, measures its design integrity and quality. Attaining these equal output signals is also dependent on the impedance match of the device or microwave system it is being used in conjunction with as well as the level of isolation between output ports.

Midwest Microwave manufactures Wilkinson type isolated power dividers covering octave and multi-octave frequency bandwidths as well as ultra-wide frequency bandwidth types. The Wilkinson design types are particularly useful in systems where the divided signals are required to remain in phase with each other and their amplitudes relatively equal.

Resistive power dividers are also available that offer very broadband performance. This type is small and very broadband and maintains an equal and consistent VSWR and insertion loss. Standard catalog units are available with SMA connectors with other connector types available upon special request. Some items are available off the shelf for immediate delivery or special units can be custom designed by Midwest Microwave's experienced engineering staff to accommodate unique system needs. All Midwest Power Dividers are completely manufactured in house and are 100% tested to insure only the highest quality performance whether for military or space use or for commercial cellular or personal communications applications.



Typical Power Divider Characteristics



Definition of Parameters

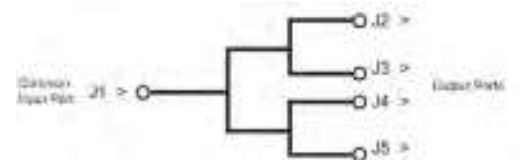
Division/Combining

In-Phase power division is accomplished through a network with one signal input and “n” outputs whose phase difference is 0° and resulting signal amplitudes are equal at each output. When combining signals, the relationship between each input signal must also be equal in phase and amplitude so that the combination can be accomplished with the lowest amount of power loss.



VSWR

The VSWR performance of a power divider is defined as the maximum value measured over the entire specified frequency band when a signal input at the common input port and all output ports are terminated in 50 Ohms.



Frequency

Power Dividers, if designed properly, will perform satisfactorily over wide frequency bands. The lower the operating frequency the longer the wavelength and hence the longer the physical length of the power divider must be. Design goals are continually aimed toward broadening the frequency bandwidth as much as possible while simultaneously maintaining as short and small a unit as possible to satisfy system size and weight requirements.

Insertion Loss

In Power Dividers, insertion loss is defined as the loss measured through the power divider excluding the power division factor. More specifically, it is the ratio of the power output to the power input, with the assumption that the source of power is matched as well as the terminated ports when the measurement was taken. Since transmission line loss increases with frequency, the values shown are minimal at the lowest frequency and increase linearly as the length of the power divider increases.

Loss due to dissipation in the circuit will increase the insertion loss by the amount of power dissipation in dB.

Isolation

Isolation in Power Dividers is defined as the isolation between any two output ports. Expressed in dB, it is the ratio of the output power of one output port to the input power of any other output port, when measured with matched terminations on all other ports. High isolation between ports is a very desirable feature in most power divider applications especially between adjacent ports because it is there that signal interaction is most likely to take place.

Amplitude Balance

The amplitude balance, expressed in dB, is the difference between the amplitude of the signal at each of the output ports. It is the ratio of the level of maximum signal at any output port to the level of the minimum signal at any other output port. Usually this unbalance is quite low in isolated (Wilkinson) two way power dividers and increases as the number of output ports increases.

Phase Balance

The phase unbalance is the difference between the phase of the signals that arrive at each output port. It is expressed in degrees. It is the maximum deviation that is measured between any one output port and any other output port. The average phase unbalance is substantially lower particularly at the lower frequencies.

Power, Average

The maximum power that may be applied to the common or input port with all other output ports terminated in 50 Ohm loads that have inherent VSWR's that do not exceed 2.0:1.

Resistive Types

Two Way Broadband Power Division

- DC - 12.4 and DC - 18.0 GHz Bandwidth Units
- Symmetrical Loss and Phase Balance
- Rugged Construction



Midwest Microwave’s series of Resistive Two Way Power Dividers are very broadband devices that are small, lightweight, ruggedly constructed units that possess consistent VSWR and insertion loss. They also exhibit excellent phase and amplitude tracking. Units are available in wideband frequency bandwidths covering the range of DC - 12.4 GHz and DC - 18.0 GHz.

Frequency Specifications

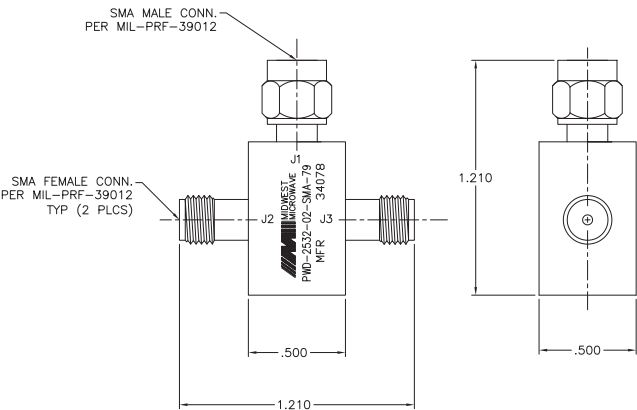
| | | |
|------------------|-----------|-----------|
| Model | PWD-2532 | PWD-2533 |
| Frequency, (GHz) | DC - 12.4 | DC - 18.0 |

Technical Specifications

| | |
|---|----------------------------|
| Nominal Impedance, (Ω) | 50 |
| Nominal Insertion Loss, (dB): | 6 |
| Insertion Loss Tolerance, (+/- dB, max): | |
| DC-10.0 GHz | 1.2/ 0.2 |
| 10.0-18.0 GHz | 1.5/ 0.2 |
| Assymetry, (dB, max.) | |
| DC-4.0 GHz | 0.4 |
| 10.0-18.0 GHz | 0.5 |
| VSWR, (max.): | |
| DC-10.0 GHz | 1.25 |
| 10.0-18.0 GHz | 1.35 |
| Average Input Power, (W, max): | 1 |
| Operating Temperature, ($^{\circ}$ C) | -55 to +125 |
| Finish Connectors: | Passivated Stainless Steel |

Contact factory for different interfaces, configurations and custom versions.

| | |
|--------------------|--------------------|
| DC - 12.4 GHz | DC - 18.0 GHz |
| PWD-2532-02-SMA-79 | PWD-2533-02-SMA-79 |



40 GHz Power Dividers

- 6-40 GHz bandwidth
- 2.92 mm stainless steel connectors
- Low VSWR, High Directivity/ Isolation
- 50 Ohms nominal impedance
- -55°C to +85°C operation



Midwest Microwave 40 GHz power dividers are small, lightweight, and ruggedly built. They cover a wide bandwidth of 6-40 GHz with low insertion loss and low VSWR. Power dividers use Wilkinson design for the lowest insertion loss and the highest isolation. They use 2.92mm female stainless-steel interface and are built in aluminum housing coated with gray paint.

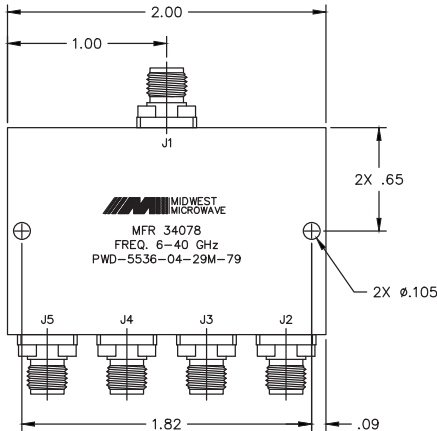
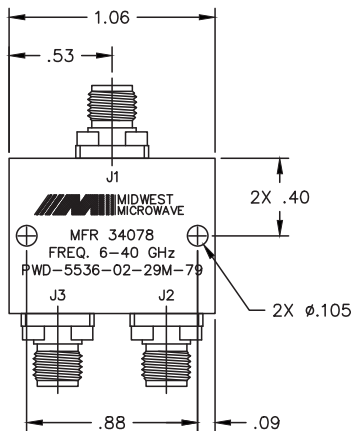
| Part Number | Description |
|--------------------|---|
| PWD-5536-02-29M-79 | 2.92mm Power Divider 2-way, Wilkinson-In Line, 6-40 GHz |
| PWD-5536-04-29M-79 | 2.92mm Power Divider 4-way, Wilkinson-In Line, 6-40 GHz |

Electrical Specification

| Series | PWD-5536-02-29M-79 | PWD-5536-04-29M-79 |
|-----------------------------|---------------------|---------------------|
| Frequency Range (GHz) | 6 to 40 | 6 to 40 |
| VSWR, (max) | 1.8 | 1.8 |
| Insertion Loss, dB (max) | 1.8 + division loss | 2.6 + division loss |
| Average Power, W (max) | 30 | 30 |
| Amplitude Balance, dB (max) | 0.5 | 1 |
| Phase Balance, ° (max) | 8 | 14 |
| Isolation, dB (min) | 14.5 | 13 |

Mechanical & Environmental Specifications

| Series | PWD-5536-02-29M-79 | PWD-5536-04-29M-79 |
|----------------------------------|---|--------------------|
| Dimension, LxWxH, in (nom) | 1.06 x 0.8 x 0.38 | 2 x 1.3 x 0.38 |
| Weight, oz (nom) | 0.8 | 2 |
| Housing Material | Gray paint over RoHS compliant chemical conversion, coated aluminum | |
| 2.92mm Female Connector Material | Housing: Passivated stainless steel Contacts: Gold plated beryllium copper | |
| Operating Temperature (nom) | -55°C to +85°C | |



Two Way Isolated

500.0 MHz – 18.0 GHz High Performance

- Full Octave, Multi-Octave, and Ultra-Wideband Performance
- Excellent Phase and Amplitude Tracking
- Small Lightweight Rugged Stripline Construction
- 50 Ohm Nominal Impedance



Midwest Microwave's series of high performance isolated Power Dividers are small, lightweight, ruggedly constructed stripline units that possess inherently low insertion loss and VSWR with high isolation and excellent phase and amplitude tracking. Units are available in octave, multi-octave, and ultra-wideband frequency bandwidths covering the entire range of 0.5 - 18.0 GHz.

Electrical Specifications

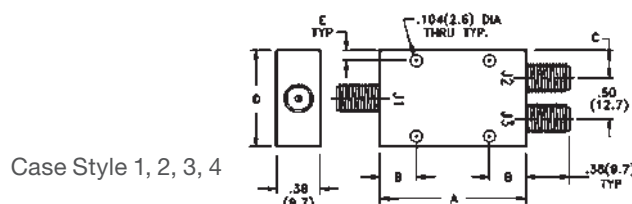
| Frequency Range GHz | Case Style | Part Number | Amplitude Balance dB (max.) | Phase Balance ° (max.) | Insertion Loss dB (max.) | Isolation dB (min.) | VSWR (max.) | Average Power W (max.) |
|--------------------------------------|------------|--------------------|-----------------------------|------------------------|--------------------------|---------------------|-------------|------------------------|
| Octave Bandwidth Types | | | | | | | | |
| 1.0-2.0 | 2 | PWD-5511-02-SMA-79 | 0.20 | 2 | 0.4 | 20 | 1.25 | 30 |
| 2.0-4.0 | 2 | PWD-5512-02-SMA-79 | 0.20 | 2 | 0.4 | 20 | 1.35 | 3 |
| 4.0-8.0 | 1 | PWD-5514-02-SMA-79 | 0.20 | 3 | 0.5 | 20 | 1.35 | 30 |
| 8.0-12.4 | 1 | PWD-5515-02-SMA-79 | 0.30 | 5 | 0.5 | 20 | 1.50 | 30 |
| 12.4-18.0 | 1 | PWD-5517-02-SMA-79 | 0.30 | 5 | 0.5 | 20 | 1.50 | 30 |
| Multi- Octave Bandwidth Types | | | | | | | | |
| 0.5-2.0 | 2 | PWD-5520-02-SMA-79 | 0.20 | 4 | 0.5 | 20 | 1.25 | 20 |
| 2.0-8.0 | 2 | PWD-5522-02-SMA-79 | 0.30 | 4 | 0.5 | 20 | 1.35 | 30 |
| 6.0-18.0 | 1 | PWD-5526-02-SMA-79 | 0.30 | 5 | 0.6 | 18 | 1.50 | 3 |
| 2.0-18.0 | 3 | PWD-5532-02-SMA-79 | 0.25 | 8 | 1.0 | 17 | 1.60 | 10 |
| 2.0-18.0 | 2 | PWD-5533-02-SMA-79 | 0.30 | 5 | 0.8 | 15 | 1.50 | 10 |
| 0.5-18.0 | 4 | PWD-5530-02-SMA-79 | 0.30 | 5 | 2.1 | 18 | 1.50 | 10 |

Contact factory for different interfaces, different configurations, TEE style housing and custom versions.

Mechanical Specifications – Nominal

| Case Style | A | | B | | C | | D | | E | | Weight | |
|------------|------|-------|------|------|------|------|------|------|------|-----|--------|-----|
| | in | mm | in | mm | in | mm | in | mm | in | mm | oz | g |
| 1 | 1.00 | 25.4 | 0.50 | 12.7 | 0.25 | 6.35 | 1.00 | 25.4 | 0.08 | 1.9 | 1.0 | 27 |
| 2 | 2.00 | 50.8 | 0.50 | 12.7 | 0.25 | 6.35 | 1.00 | 25.4 | 0.08 | 1.9 | 2.2 | 60 |
| 3 | 2.25 | 57.1 | 0.50 | 12.7 | 0.25 | 6.35 | 1.00 | 25.4 | 0.08 | 1.9 | 2.5 | 67 |
| 4 | 5.50 | 139.7 | 0.75 | 19.1 | 0.25 | 6.35 | 1.00 | 25.4 | 0.20 | 5.1 | 3.7 | 100 |

Specifications assume that all of the outputs are terminated with a load that has a VSWR not greater than 2.0:1.



Three Way Isolated

True Three Way Isolated Power Division

- Full 2.0 - 18.0 GHz Bandwidth Units
- Low VSWR – High Isolation
- Rugged Stripline Construction
- 50 Ohm Nominal Impedance



Midwest Microwave’s series of high performance isolated Three Way Power Dividers are true three way dividers. They are small, lightweight, ruggedly constructed stripline units that possess inherently low insertion loss and VSWR with high isolation and excellent phase and amplitude tracking. Units are available in ultra-wideband frequency bandwidths covering the entire range of 2.0 - 18.0 GHz.

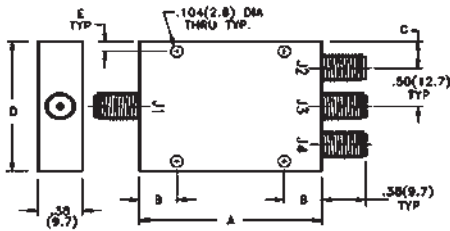
Electrical Specifications

| Frequency Range GHz | Case Style | Part Number | Amplitude Balance dB (max.) | Phase Balance ° (max.) | Insertion Loss dB (max.) | Isolation dB (min.) | VSWR (max.) | Average Power W (max.) |
|---------------------|------------|--------------------|-----------------------------|------------------------|--------------------------|---------------------|-------------|------------------------|
| 0.5-2.0 | 1 | PWD-5520-03-SMA-79 | 0.5 | 5 | 1.0 | 15 | 1.5 | 5 |
| 2.0-18.0 | 2 | PWD-5532-03-SMA-79 | 0.5 | 5 | 1.0 | 20 | 1.5 | 10 |
| 2.0-18.0 | 1 | PWD-5533-03-SMA-79 | 0.5 | 10 | 1.2 | 15 | 1.8 | 30 |

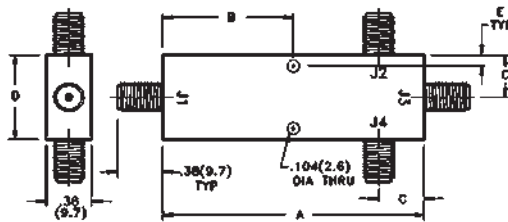
Nominal Mechanical Specifications – inches (mm)

| Case Style | A | B | C | D | E | Weight | |
|------------|-------------|-------------|--------------|-------------|-------------|--------|----|
| | | | | | | oz | g |
| 1 | 3.00 (76.2) | 0.63 (16.0) | 0.250 (6.35) | 1.50 (38.1) | 0.080 (2.0) | 3.15 | 89 |
| 2 | 2.50 (63.5) | 1.25 (31.8) | 0.375 (9.5) | 0.75 (19.0) | 0.080 (2.0) | 1.80 | 51 |

Specifications assume that all of the outputs are terminated with a load that has a VSWR not greater than 2.0:1. Contact factory for different interfaces, configurations and custom versions.



Case Style 1



Case Style 2

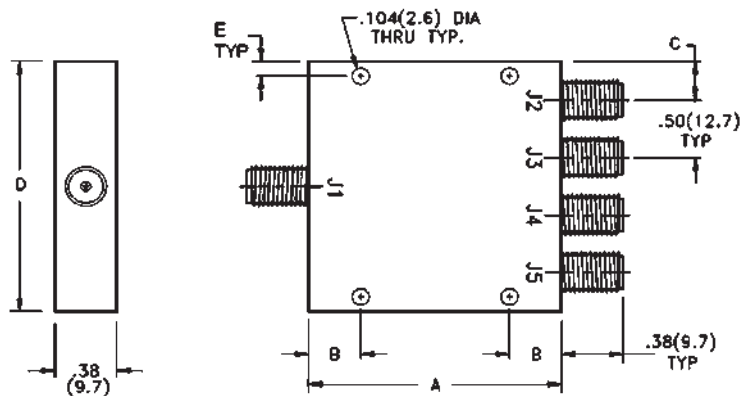
Four Way Isolated

500.0 MHz – 18.0 GHz High Performance

- Full 0.5 - 18.0 GHz Bandwidth Units
- Low VSWR – High Isolation
- Rugged Stripline Construction
- 50 Ohm Nominal Impedance



Midwest Microwave's series of high performance isolated Power Dividers are small, lightweight, ruggedly constructed stripline units that possess inherently low insertion loss and VSWR with high isolation and excellent phase and amplitude tracking. Units are available in multi-octave, and ultra-wideband frequency bandwidths covering the entire range of 0.5 - 18.0 GHz.



Electrical Specifications

| Frequency Range GHz | Case Style | Part Number | Amplitude Balance dB (max.) | Phase Balance ° (max.) | Insertion Loss dB (max.) | Isolation dB (min.) | VSWR (max.) | Average Power W (max.) |
|---------------------|------------|--------------------|-----------------------------|------------------------|--------------------------|---------------------|-------------|------------------------|
| 0.5-2.0 | 1 | PWD-5520-04-SMA-79 | 0.5 | 10 | 1.0 | 18 | 1.50 | 5 |
| 2.0-8.0 | 1 | PWD-5522-04-SMA-79 | 0.5 | 10 | 1.0 | 18 | 1.50 | 5 |
| 6.0-18.0 | 2 | PWD-5526-04-SMA-79 | 0.5 | 10 | 1.0 | 18 | 1.50 | 5 |
| 2.0-18.0 | 1 | PWD-5532-04-SMA-79 | 0.5 | 10 | 1.5 | 18 | 1.50 | 5 |
| 0.5-18.0 | 3 | PWD-5530-04-SMA-79 | 0.5 | 10 | 4.1 | 16 | 1.50 | 5 |

Nominal Mechanical Specifications – inches (mm)

| Case Style | A | B | C | D | E | Weight | |
|------------|--------------|-------------|--------------|-------------|--------------|--------|-----|
| | | | | | | oz | g |
| 1 | 3.00 (76.2) | 0.63 (16.0) | 0.250 (6.35) | 2.00 (50.8) | 0.080 (2.00) | 5.2 | 140 |
| 2 | 1.46 (37.1) | 0.73 (18.5) | 0.250 (6.35) | 2.00 (50.8) | 0.080 (2.00) | 2.05 | 58 |
| 3 | 5.20 (132.1) | 1.00 (25.4) | 0.250 (6.35) | 2.00 (50.8) | 0.080 (2.00) | 7.30 | 207 |

Specifications assume that all of the outputs are terminated with a load that has a VSWR not greater than 2.0:1. Contact factory for different interfaces, configurations and custom versions.

Eight Way

0.5 – 18.0 GHz High Performance

- Full 0.5 - 18.0 GHz Bandwidth Units
- Low VSWR – High Isolation
- Rugged Stripline Construction
- 50 Ohm Nominal Impedance



Midwest Microwave's series of high performance isolated Power Dividers are small, lightweight, ruggedly constructed stripline units that possess inherently low insertion loss and VSWR with high isolation and excellent phase and amplitude tracking. Units are available in multi-octave, and ultra-wideband frequency bandwidths covering the entire range of 0.5 - 18.0 GHz.

Electrical Specifications

| Frequency Range GHz | Case Style | Part Number | Amplitude Balance dB (max.) | Phase Balance ° (max.) | Insertion Loss dB (max.) | Isolation dB (min.) | VSWR (max.) | Average Power W (max.) |
|--|------------|--------------------|-----------------------------|------------------------|--------------------------|---------------------|-------------|------------------------|
| Eight Way Multi-Octave Bandwidth Types | | | | | | | | |
| 0.5-2.0 | 1 | PWD-5520-08-SMA-79 | 0.5 | 5 | 1.2 | 15 | 1.50 | 10 |
| 2.0-8.0 | 2 | PWD-5522-08-SMA-79 | 0.8 | 10 | 1.2 | 15 | 1.50 | 30 |
| 5.0-19.0 | 3 | PWD-5526-08-SMA-79 | 0.6 | 8 | 1.9 | 18 | 1.50 | 10 |
| 2-0-18.0 | 2 | PWD-5532-08-SMA-79 | 0.6 | 10 | 2.5 | 15 | 1.50 | 50 |
| 0.5-18.0 | 4 | PWD-5530-08-SMA-79 | 1.0 | 15 | 5.5 | 15 | 1.50 | 30 |

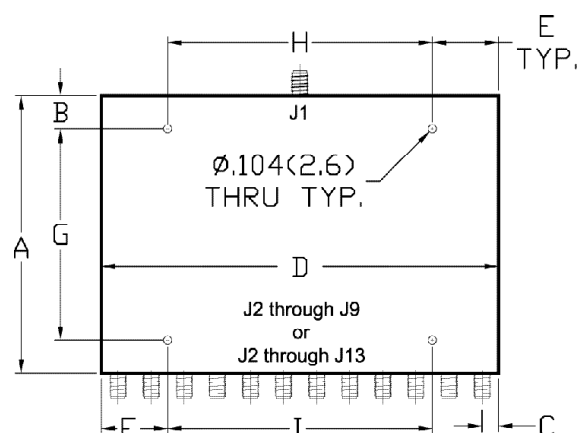
Nominal Mechanical Specifications

| Case Style | A | | B | | C | | D | | E | | F | | G | | H | | I | |
|------------|-----|-------|------|------|------|-----|----|-------|------|------|------|------|-----|------|-----|------|-----|------|
| | in | mm | in | mm | in | mm | in | mm | in | mm | in | mm | in | mm | in | mm | in | mm |
| 1 | 3 | 76.2 | 0.15 | 3.8 | 0.25 | 6.4 | 4 | 101.6 | 0.5 | 12.7 | 1 | 25.4 | 2.6 | 66 | 3 | 76.2 | 2 | 50.8 |
| 2 | 4.6 | 116.8 | 0.55 | 14 | 0.25 | 6.4 | 4 | 101.6 | 0.25 | 6.35 | 0.25 | 6.35 | 3.5 | 88.9 | 3.5 | 88.9 | 3.5 | 88.9 |
| 3 | 3.5 | 88.9 | 0.5 | 12.7 | 0.25 | 6.4 | 4 | 101.6 | 0.2 | 5.08 | 0.2 | 5.08 | 2.5 | 63.5 | 3.6 | 91.4 | 3.6 | 91.4 |
| 4 | 5.2 | 132.1 | 1 | 25.4 | 0.25 | 6.4 | 4 | 101.6 | 0.2 | 5.08 | 0.2 | 5.08 | 3.2 | 81.3 | 3.6 | 91.4 | 3.6 | 91.4 |

Specifications assume that all of the outputs are terminated with a load that has a VSWR not greater than 2.0:1.

Contact factory for different interfaces, configurations, 12 way and custom versions.

| Case Style | Weight | |
|------------|--------|-----|
| | oz | g |
| 1 | 8.4 | 239 |
| 2 | 12.3 | 349 |
| 3 | 9 | 273 |
| 4 | 13.9 | 390 |



General Information

- DC - 18.0 GHz High Performance
- Broadband or Narrowband Frequency Coverage
- Linear Slope – Positive or Negative
- Half Sine or Half Sine Inverted*
- Linear Slope/Fine Grain and Half Sine/Fine Grain*

*Available as Custom Models

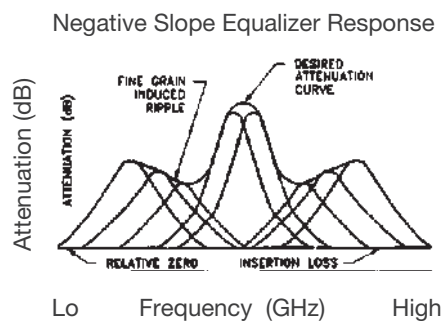
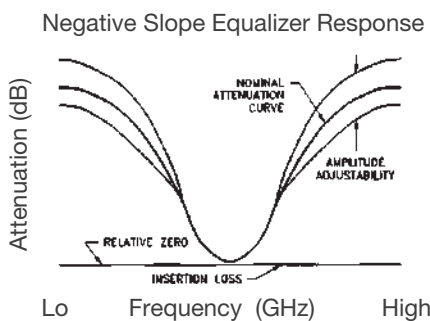
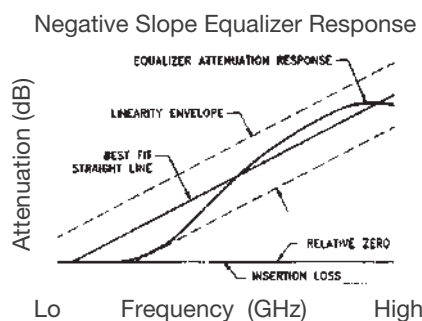
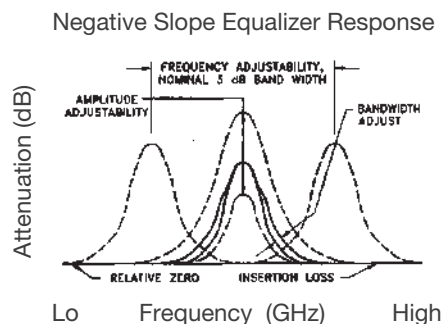
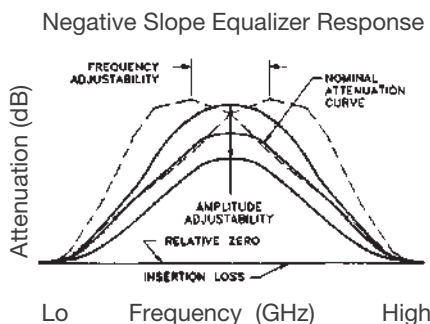
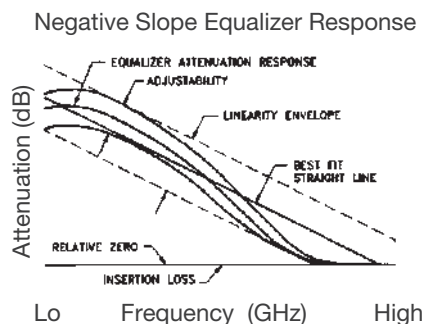


Equalizers are passive microwave devices that have an insertion loss characteristic that varies as a function of frequency. Midwest Microwave's Equalizers can be supplied with a precisely defined and preset loss characteristic, commonly known as a Fixed Loss Equalizer, or with the additional ability to be loss adjusted to custom fit the particular variable requirements needed to fine tune a system. When this added tuning ability is included, the units are known as Adjustable Equalizers. When a Harmonic Phase Shifter is added, usually built-in to the assembly, the device is known as an Optimizer. Further enhancement can be attained by adding Isolators to the assembly to form an Iso-Optimizer. Midwest Microwave manufactures all of the fore mentioned devices on custom bases covering a wide range of frequency bands and in a wide variety of configurations and interfaces.

Application of equalizers usually falls into the following categories:

1. To introduce an insertion loss characteristic that is identical but opposite to the gain characteristic of a traveling wave tube amplifier (TWT) such that the two devices together will exhibit a flat gain characteristic over a specified frequency band.
2. To introduce an insertion loss characteristic that is opposite to the insertion loss characteristic of a fixed length of coaxial cable or waveguide transmission line such that the two components together exhibit a flat loss characteristic over a specified frequency band.
3. To introduce an insertion loss characteristic in a series of microwave components that includes both gain and loss such that the resultant loss characteristic is flat over the frequency band.

Typical Gain Equalizer Characteristics



Definition of Parameters

Frequency Range

The operating frequency band specified by the user over which the microwave system or devices must exhibit the desired attenuation vs. frequency response and must otherwise perform to the required specifications. Frequency bandwidths can vary from less than 1% to multi-octave and can occur anywhere over the range of 500.0 MHz to 26.5 GHz.

Attenuation

The compensation, adjustment, and shaping of the attenuation vs. frequency response of a singular device or of a complete system of microwave devices such that the resultant power output curve is either flat with frequency or is shaped in the desired way that permits the system to operate efficiently. This is the primary goal of a Gain Equalizer.

Insertion Loss

In Gain Equalizers, the insertion loss is the sum of both absorptive and reflective losses, measured at the frequency where minimum attenuation occurs for linear slope Equalizers; at the highest and the lowest operating frequencies for parabolic half sine type Equalizers; and at the band edges for the parabolic inverted half sine type Equalizers. It is clear that the specified attenuation level is always relative to the insertion loss of a Gain Equalizer. A typical method used in selecting an insertion loss specification is to take 10% of the maximum attenuation point and add .25 dB to that value.

VSWR

The input VSWR performance of an Equalizer is defined as the maximum value measured over the entire specified frequency band when a signal is input at the input port and the output ports is terminated in 50 Ohms. VSWR is dependent on such factors as attenuation level, operating frequency range, size, configuration and adjustability requirements. Input and output VSWR usually will not exceed 2.0:1.

Linearity

is defined as the deviation from the best fit straight line through the measured attenuation curve. Usually this deviation is less than $\pm 7\%$ of the maximum attenuation level. The allowable loss deviation from the nominal curve can be specified in dB or percent of loss.

Adjustability

Equalizers can be amplitude and frequency adjustable to allow the user to compensate for changes in amplifier gain response. The adjustment range to be built into the Equalizer will determine the number of loss sections both fixed and adjustable required to provide the specified adjustment range. Typically the adjustment range is $\pm 15\%$ of the maximum attenuation. In the case of parabolic Equalizers, this adjustment can be made over a bandwidth that is approximately $\pm 5\%$ of the frequency at which the maximum attenuation occurs.

Tuner

User adjustable loss element that is used to adjust loss characteristics and loss curve with frequency.

Tuner Bandwidth

The frequency span measured at the 3 dB loss points of the loss introduced by the tuner.

Fixed Loss Equalizer

Equalizers that are adjusted and pre-set at the factory, sealed, and used as fixed loss devices over their frequency of operation.

Negative Linear Slope

Insertion Loss decreases linearly with frequency, maximum loss occurs at the lowest frequency.

Positive Linear Slope

Insertion Loss increases linearly with frequency, maximum loss occurs at the highest frequency.

Parabolic Half Sine

Attenuation increases from the low frequency band edge reaching its peak at mid-frequency, then decreases from high to low at the upper frequency band edge. This type of Equalizer is used primarily for compensating gain variations in traveling wave tube or solid state amplifiers where the maximum gain is at or near the middle of the frequency band.

Parabolic Inverted Half Sine

Attenuation decreases monotonically with frequency from both band edges to its lowest point at mid-frequency band. This type of Equalizer compensates for accumulative gain variations of a system when the gain is highest at the upper most and lowest operating frequencies.

Connectors

SMA female connectors are standard however other SMA, TNC, N, and other connectors are also available upon request.

Contact factory for your equalizer needs.

Adapter Selection Guide

DC – 40.0 GHz Performance

- Low VSWR and Insertion Loss
- 100% Swept Frequency Tested
- MIL-C-39012 Interfaces
- Rugged Stainless Steel Construction

Midwest Microwave offers this complete line of high performance precision Coaxial Adapters. They are available in almost all of the popular connector interfaces including 2.92mm, 3.5mm, and 7mm. They incorporate design features that provide consistent low VSWR and insertion loss performance in a minimum length compact physical package that operates over a broad frequency range. Special designed adapters are also available in a wide variety of configurations and interfaces upon request.



Technical Specifications

| | |
|-------------------------------|---|
| Frequency: | DC – 40.0 GHz typical |
| Impedance: | 50 Ohms |
| VSWR: | as noted |
| Insertion Loss: | 0.5 dB max. typical |
| Operating Temperature: | -65 to +125°C |
| Construction | Outer Conductor Housings: Passivated Stainless Steel or Nickel Plated Brass as noted |
| | Inner Conductors: Gold Plated Beryllium Copper |
| | Dielectric Insulators: Polytetrafluorethylene (PTFE) |

Selection Guide

Choose Adapter combination desired from the vertical and horizontal columns and find page no. at their intersection.

| | SMA | SSMA | BMA | 2.9mm | 3.5mm | 7mm | N | TNC | BNC | SC |
|-------|-------|------|-------|-------|-------|-----|-------|-------|-----|----|
| SMA | 88-89 | 84 | 85-87 | | | 68 | 74-77 | 81-82 | 83 | |
| SSMA | 84 | | | | | | | | | |
| BMA | 85-87 | | | | | | | | | |
| 2.9mm | | | | 91 | | | | | | |
| 3.5mm | | | | | 90 | 69 | 73 | | | |
| 7mm | 68 | | | | 69 | | 71 | 72 | | 72 |
| N | 74-77 | | | | 73 | 71 | 92 | 78 | 79 | 80 |
| TNC | 81-82 | | | | | 72 | 78 | 93 | | |
| BNC | 83 | | | | | | 79 | | 95 | |
| SC | | | | | | 72 | 80 | | | 94 |

Please contact customer service for availability for those indicated as well as for those desired Adapters that are not indicated.

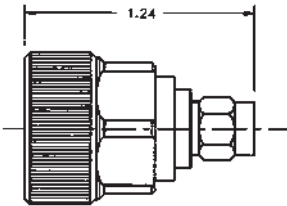
7mm to SMA

7mm to SMA Male

Technical Specifications

| | |
|------------|----------------------------|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.025 + .0025 f (GHz) |
| Finish: | Passivated Stainless Steel |

| |
|--------------------|
| Part No. |
| ADT-2540-7M-SMM-02 |

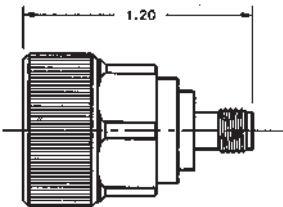


7mm to SMA Female

Technical Specifications

| | |
|------------|----------------------------|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.025 + .0025 f (GHz) |
| Finish: | Passivated Stainless Steel |

| |
|--------------------|
| Part No. |
| ADT-2541-7M-SMF-02 |



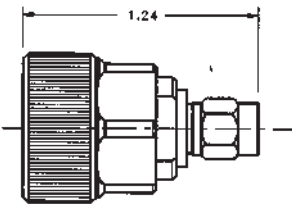
7mm to 3.5mm

7mm to 3.5mm Male

Technical Specifications

| | |
|------------|----------------------------|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.025 + .0025 f (GHz) |
| Finish: | Passivated Stainless Steel |

| |
|--------------------|
| Part No. |
| ADT-2701-7M-3MM-02 |

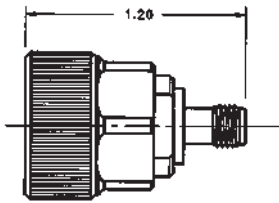


7mm to 3.5 mm Female

Technical Specifications

| | |
|------------|----------------------------|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.025 + .0025 f (GHz) |
| Finish: | Passivated Stainless Steel |

| |
|--------------------|
| Part No. |
| ADT-2702-7M-3MF-02 |

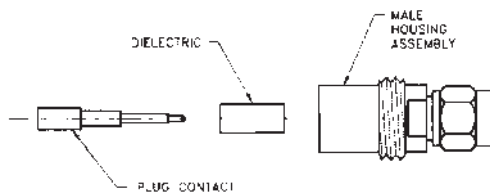


7mm Rebuild Kits

Rebuild Kit for 7mm to SMA Male

Part No.

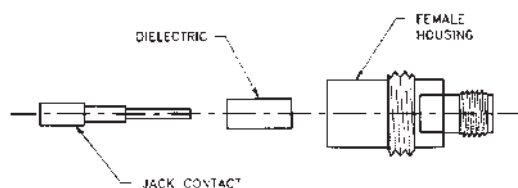
ADT-2542-7M-SMM-02



Rebuild Kit for 7mm to SMA Female

Part No.

ADT-2543-7M-SMF-02



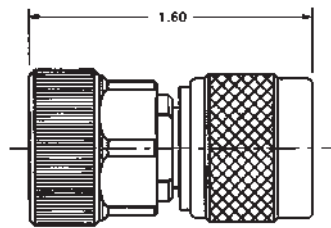
7mm to Type N

7mm to N Male

Technical Specifications

| | |
|------------|----------------------------|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.025 + .0025 f (GHz) |
| Finish: | Passivated Stainless Steel |

| |
|--------------------|
| Part No. |
| ADT-2544-7M-NNM-02 |

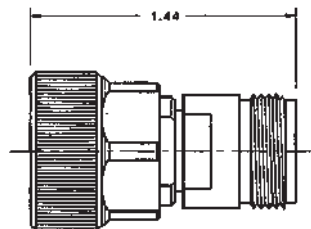


7mm to N Female

Technical Specifications

| | |
|------------|----------------------------|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.025 + .0025 f (GHz) |
| Finish: | Passivated Stainless Steel |

| |
|--------------------|
| Part No. |
| ADT-2545-7M-NNF-02 |



BETWEEN SERIES ADAPTERS

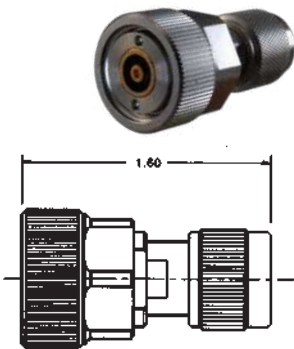
7mm to TNC / 7mm to SC

7mm to TNC Male

Technical Specifications

| | |
|------------|----------------------------|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.02 + .006 f (GHz) |
| Finish: | Passivated Stainless Steel |

| |
|--------------------|
| Part No. |
| ADT-2546-7M-TNM-02 |

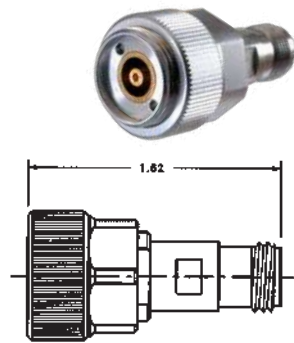


7mm to TNC Female

Technical Specifications

| | |
|------------|----------------------------|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.02 + .006 f (GHz) |
| Finish: | Passivated Stainless Steel |

| |
|--------------------|
| Part No. |
| ADT-2547-7M-TNF-02 |

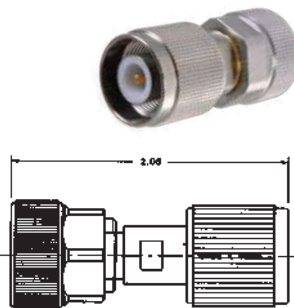


7mm to SC Male

Technical Specifications

| | |
|------------|---|
| Frequency: | DC – 11.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.04 max @ DC - 4.0 GHz 1.07 max @ 4.0 - 8.0 GHz |
| Finish: | Passivated Stainless Steel |

| |
|--------------------|
| Part No. |
| ADT-2591-7M-SCM-02 |

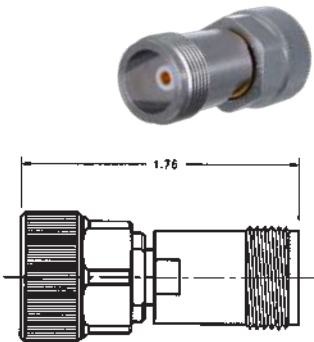


7mm to SC Female

Technical Specifications

| | |
|------------|---|
| Frequency: | DC – 11.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.04 max @ DC - 4.0 GHz 1.07 max @ 4.0 - 8.0 GHz |
| Finish: | Passivated Stainless Steel |

| |
|--------------------|
| Part No. |
| ADT-2592-7M-SCF-02 |

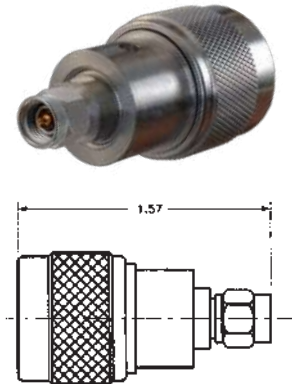


N to 3.5mm

N Male to 3.5mm Male

Technical Specifications

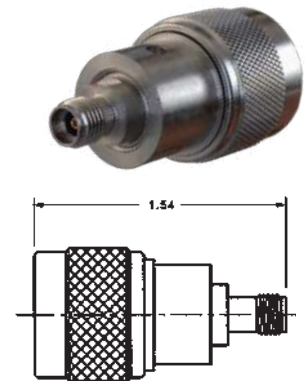
| | |
|--------------------|--|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.04 @ DC - 4.0 GHz 1.07 @ 4.0-8.0 GHz 1.12 @ 8.0-18.0 GHz |
| Finish: | Passivated Stainless Steel |
| Part No. | |
| ADT-2712-NM-3MM-02 | |



N Male to 3.5mm Female

Technical Specifications

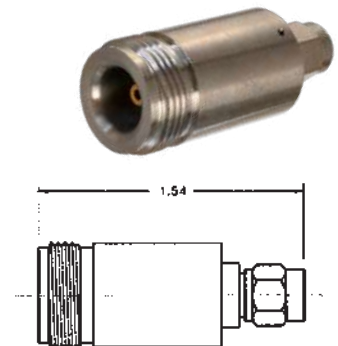
| | |
|--------------------|--|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.04 @ DC - 4.0 GHz 1.07 @ 4.0-8.0 GHz 1.12 @ 8.0-18.0 GHz |
| Finish: | Passivated Stainless Steel |
| Part No. | |
| ADT-2713-NM-3MF-02 | |



N Female to 3.5mm Male

Technical Specifications

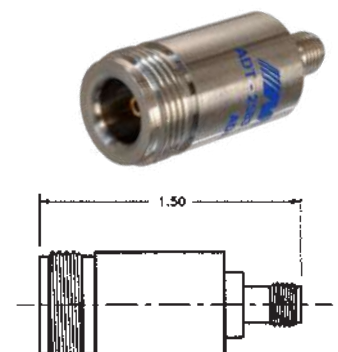
| | |
|--------------------|--|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.04 @ DC - 4.0 GHz 1.07 @ 4.0-8.0 GHz 1.12 @ 8.0-18.0 GHz |
| Finish: | Passivated Stainless Steel |
| Part No. | |
| ADT-2714-NF-3MM-02 | |



N Female to 3.5mm Female

Technical Specifications

| | |
|--------------------|--|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.04 @ DC - 4.0 GHz 1.07 @ 4.0-8.0 GHz 1.12 @ 8.0-18.0 GHz |
| Finish: | Passivated Stainless Steel |
| Part No. | |
| ADT-2715-NF-3MF-02 | |



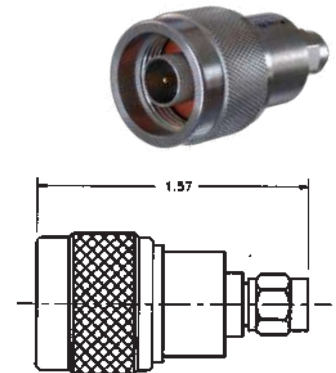
BETWEEN SERIES ADAPTERS

N to SMA

N Male to SMA Male

Technical Specifications

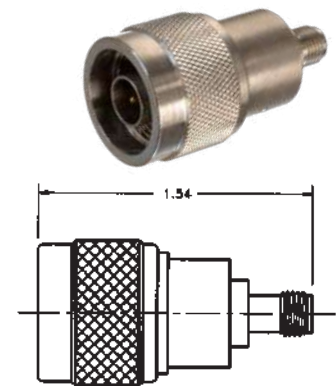
| | |
|------------|--|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.04 @ DC - 4.0 GHz 1.07 @ 4.0-8.0 GHz 1.12 @ 8.0-18.0 GHz |
| Finish: | Passivated Stainless Steel |
| Part No. | ADT-2580-NM-SMM-02 |



N Male to SMA Female

Technical Specifications

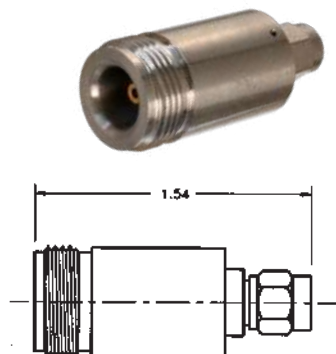
| | |
|------------|--|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.04 @ DC - 4.0 GHz 1.07 @ 4.0-8.0 GHz 1.12 @ 8.0-18.0 GHz |
| Finish: | Passivated Stainless Steel |
| Part No. | ADT-2581-NM-SMF-02 |



N Female to SMA Male

Technical Specifications

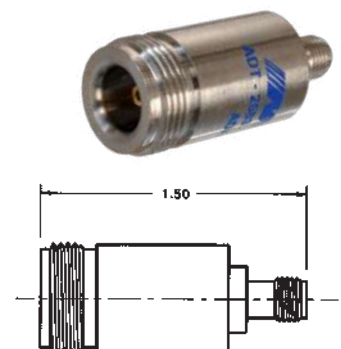
| | |
|------------|--|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.04 @ DC - 4.0 GHz 1.07 @ 4.0-8.0 GHz 1.12 @ 8.0-18.0 GHz |
| Finish: | Passivated Stainless Steel |
| Part No. | ADT-2582-NF-SMM-02 |



N Female to SMA Female

Technical Specifications

| | |
|------------|--|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.04 @ DC - 4.0 GHz 1.07 @ 4.0-8.0 GHz 1.12 @ 8.0-18.0 GHz |
| Finish: | Passivated Stainless Steel |
| Part No. | ADT-2583-NF-SMF-02 |



N Flange Mount to SMA

N Flange Mount Male to SMA Male

Technical Specifications

| | |
|------------|--|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.04 @ DC - 4.0 GHz 1.07 @ 4.0-8.0 GHz 1.12 @ 8.0-18.0 GHz |
| Finish: | Passivated Stainless Steel |
| Part No. | ADT-2576-NM-SMM-02 |

N Flange Mount Male to SMA Female

Technical Specifications

| | |
|------------|--|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.04 @ DC - 4.0 GHz 1.07 @ 4.0-8.0 GHz 1.12 @ 8.0-18.0 GHz |
| Finish: | Passivated Stainless Steel |
| Part No. | ADT-2577-NM-SMF-02 |

N Flange Mount Female to SMA Male

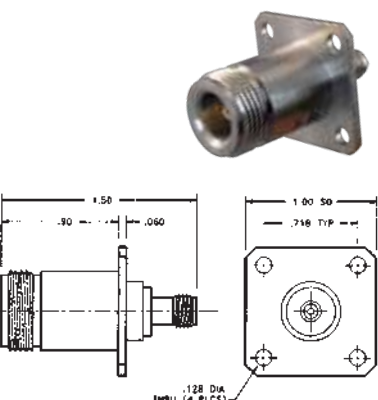
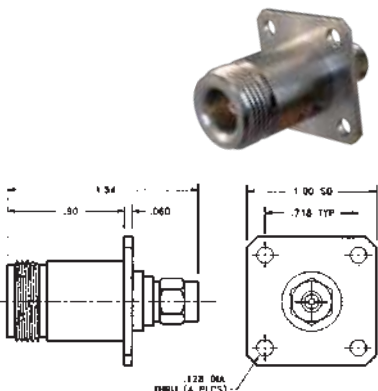
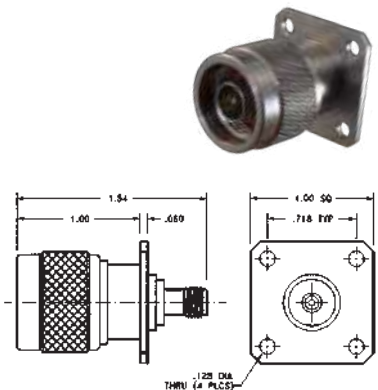
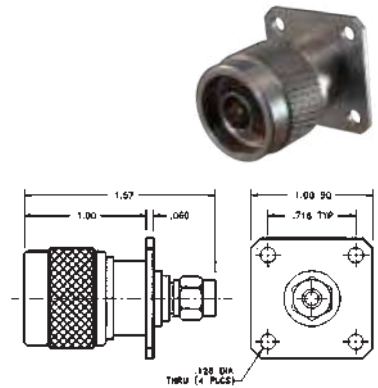
Technical Specifications

| | |
|------------|--|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.04 @ DC - 4.0 GHz 1.07 @ 4.0-8.0 GHz 1.12 @ 8.0-18.0 GHz |
| Finish: | Passivated Stainless Steel |
| Part No. | ADT-2578-NF-SMM-02 |

N Flange Mount Female to SMA Female

Technical Specifications

| | |
|------------|--|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.04 @ DC - 4.0 GHz 1.07 @ 4.0-8.0 GHz 1.12 @ 8.0-18.0 GHz |
| Finish: | Passivated Stainless Steel |
| Part No. | ADT-2579-NF-SMF-02 |



BETWEEN SERIES ADAPTERS

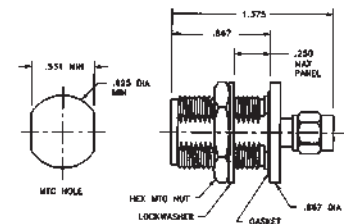
N Bulkhead to SMA

N Bulkhead Jack to SMA Male

Technical Specifications

| | |
|------------|----------------------------|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.20 max |
| Finish: | Passivated Stainless Steel |

| |
|--------------------|
| Part No. |
| ADT-2810-NF-SMM-02 |

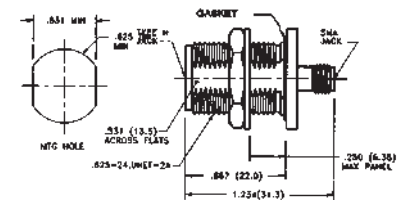


N Bulkhead Female to SMA Female

Technical Specifications

| | |
|------------|----------------------------|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.20 max |
| Finish: | Passivated Stainless Steel |

| |
|--------------------|
| Part No. |
| ADT-2840-NF-SMF-02 |

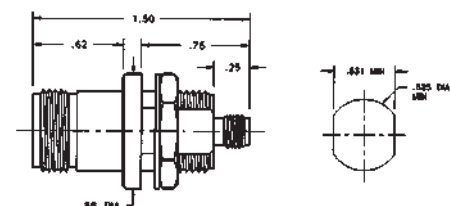


N Rear Mount Bulkhead Female to SMA Female

Technical Specifications

| | |
|------------|--|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.04 @ DC - 4.0 GHz 1.07 @ 4.0-8.0 GHz 1.12 @ 8.0-18.0 GHz |
| Finish: | Passivated Stainless Steel |

| |
|--------------------|
| Part No. |
| ADT-2599-NF-SMF-02 |



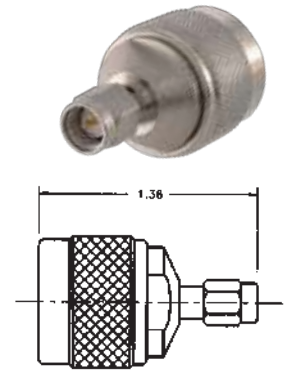
N to SMA / Economical

N Male to SMA Male

Technical Specifications

| | |
|------------|----------------------------|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.25 max |
| Finish: | Passivated Stainless Steel |

| |
|--------------------|
| Part No. |
| ADT-2680-NM-SMM-02 |

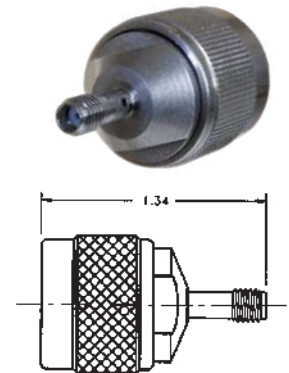


N Male to SMA Female

Technical Specifications

| | |
|------------|----------------------------|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.25 max |
| Finish: | Passivated Stainless Steel |

| |
|--------------------|
| Part No. |
| ADT-2681-NM-SMF-02 |

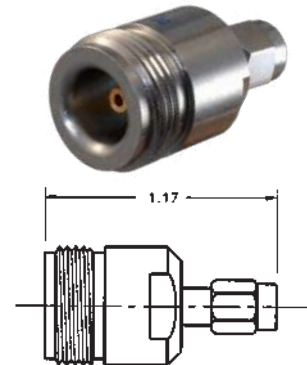


N Female to SMA Male

Technical Specifications

| | |
|------------|----------------------------|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.25 max |
| Finish: | Passivated Stainless Steel |

| |
|--------------------|
| Part No. |
| ADT-2682-NF-SMM-02 |

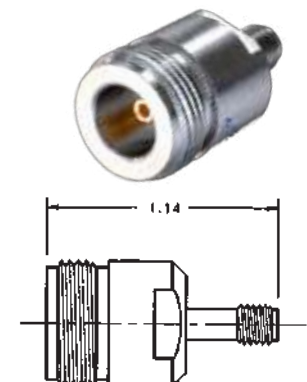


N Female to SMA Female

Technical Specifications

| | |
|------------|----------------------------|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.25 max |
| Finish: | Passivated Stainless Steel |

| |
|--------------------|
| Part No. |
| ADT-2683-NF-SMF-02 |



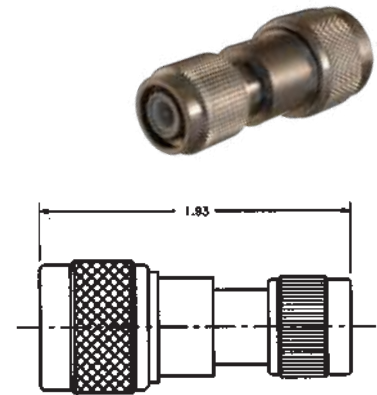
BETWEEN SERIES ADAPTERS

N to TNC

N Male to TNC Male

Technical Specifications

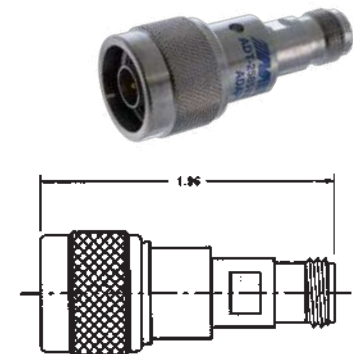
| | |
|------------|--|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.04 @ DC - 4.0 GHz 1.07 @ 4.0-8.0 GHz 1.12 @ 8.0-18.0 GHz |
| Finish: | Passivated Stainless Steel |
| Part No. | ADT-2584-NM-TNM-02 |



N Male to TNC Female

Technical Specifications

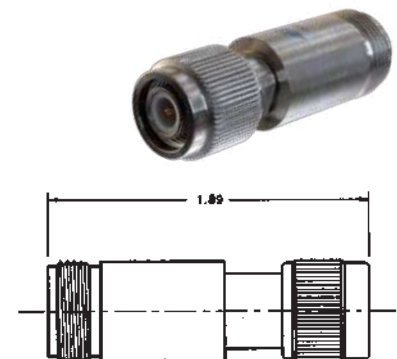
| | |
|------------|--|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.04 @ DC - 4.0 GHz 1.07 @ 4.0-8.0 GHz 1.12 @ 8.0-18.0 GHz |
| Finish: | Passivated Stainless Steel |
| Part No. | ADT-2585-NM-TNF-02 |



N Female to TNC Male

Technical Specifications

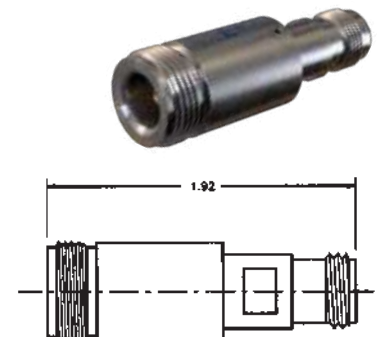
| | |
|------------|--|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.04 @ DC - 4.0 GHz 1.07 @ 4.0-8.0 GHz 1.12 @ 8.0-18.0 GHz |
| Finish: | Passivated Stainless Steel |
| Part No. | ADT-2586-NF-TNM-02 |



N Female to TNC Female

Technical Specifications

| | |
|------------|--|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.04 @ DC - 4.0 GHz 1.07 @ 4.0-8.0 GHz 1.12 @ 8.0-18.0 GHz |
| Finish: | Passivated Stainless Steel |
| Part No. | ADT-2587-NF-TNF-02 |



N to BNC

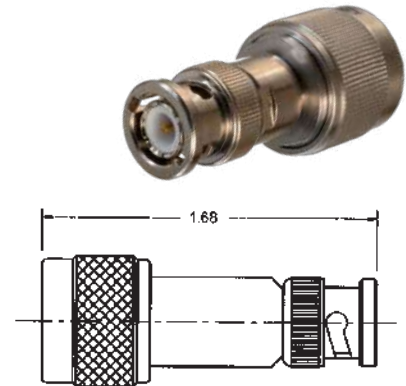
N Male to BNC Male

Technical Specifications

| | |
|------------|--|
| Frequency: | DC – 4.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.25 |
| Finish: | Type N – Passivated Stainless Steel BNC – Nickel Plated Brass |

Part No.

ADT-2613-NM-BNM-02



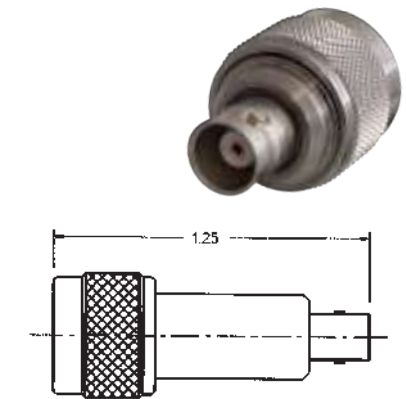
N Male to BNC Female

Technical Specifications

| | |
|------------|--|
| Frequency: | DC – 4.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.25 |
| Finish: | Type N – Passivated Stainless Steel BNC – Nickel Plated Brass |

Part No.

ADT-2614-NM-BNF-02



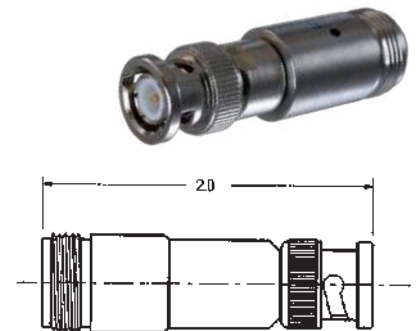
N Female to BNC Male

Technical Specifications

| | |
|------------|--|
| Frequency: | DC – 4.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.25 |
| Finish: | Type N – Passivated Stainless Steel BNC – Nickel Plated Brass |

Part No.

ADT-2615-NF-BNM-02



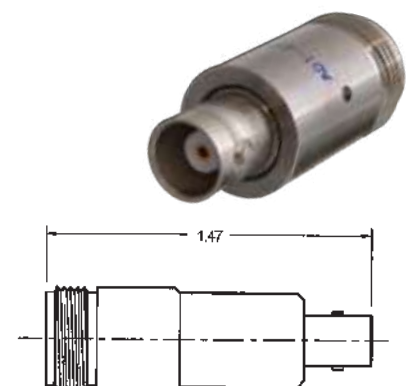
N Female to BNC Female

Technical Specifications

| | |
|------------|--|
| Frequency: | DC – 4.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.25 |
| Finish: | Type N – Passivated Stainless Steel BNC – Nickel Plated Brass |

Part No.

ADT-2616-NF-BNF-02



N to SC

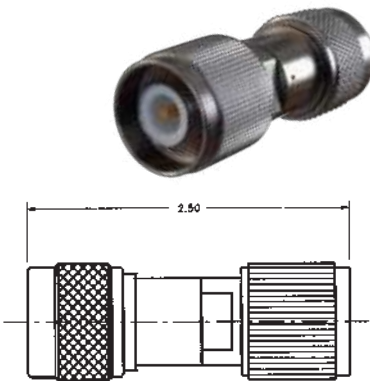
2.17

N Male to SC Male

Technical Specifications

| | |
|------------|---|
| Frequency: | DC – 11.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.08 @ DC - 4.0 GHz 1.20 @ 4.0-8.0 GHz |
| Finish: | Passivated Stainless Steel |

| |
|--------------------|
| Part No. |
| ADT-2618-NM-SCM-02 |

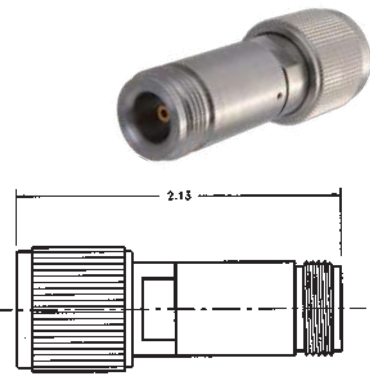


N Female to SC Male

Technical Specifications

| | |
|------------|---|
| Frequency: | DC – 11.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.08 @ DC - 4.0 GHz 1.20 @ 4.0-8.0 GHz |
| Finish: | Passivated Stainless Steel |

| |
|--------------------|
| Part No. |
| ADT-2619-NF-SCM-02 |

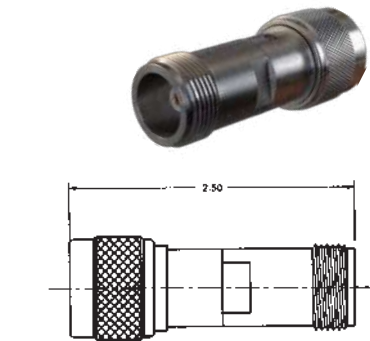


N Male to SC Female

Technical Specifications

| | |
|------------|----------------------------|
| Frequency: | DC – 8.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.2 |
| Finish: | Passivated Stainless Steel |

| |
|--------------------|
| Part No. |
| ADT-2638-NM-SCF-02 |

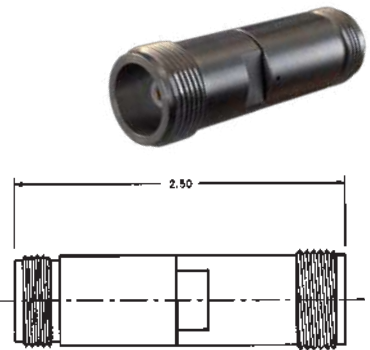


N Female to SC Female

Technical Specifications

| | |
|------------|----------------------------|
| Frequency: | DC – 8.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.2 |
| Finish: | Passivated Stainless Steel |

| |
|--------------------|
| Part No. |
| ADT-2639-NF-SCF-02 |



TNC to SMA

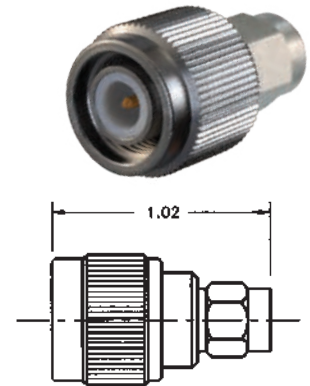
TNC Male to SMA Male

Technical Specifications

| | |
|------------|----------------------------|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.07 + .015f GHz |
| Finish: | Passivated Stainless Steel |

Part No.

ADT-2685-TM-SMM-02



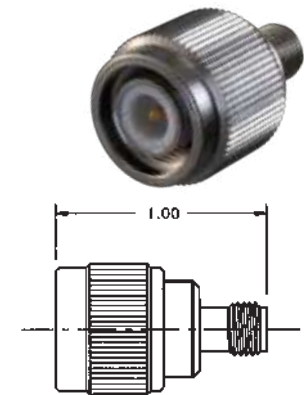
TNC Male to SMA Female

Technical Specifications

| | |
|------------|----------------------------|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.07 + .015f GHz |
| Finish: | Passivated Stainless Steel |

Part No.

ADT-2686-TM-SMF-02



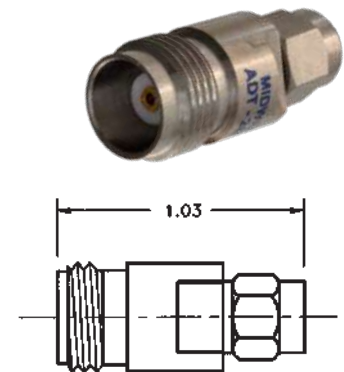
TNC Female to SMA Male

Technical Specifications

| | |
|------------|----------------------------|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.07 + .015f GHz |
| Finish: | Passivated Stainless Steel |

Part No.

ADT-2687-TF-SMM-02



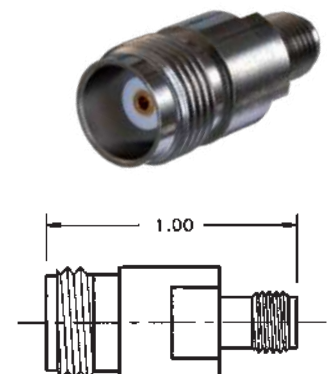
TNC Female to SMA Female

Technical Specifications

| | |
|------------|----------------------------|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.07 + .015f GHz |
| Finish: | Passivated Stainless Steel |

Part No.

ADT-2688-TF-SMF-02



BETWEEN SERIES ADAPTERS

TNC Bulkhead to SMA / TNC Flange Mount to SMA

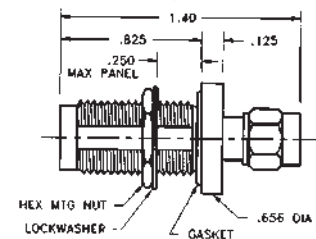
TNC Bulkhead Female to SMA Male

Technical Specifications

| | |
|------------|----------------------------|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.07 + .015f GHz |
| Finish: | Passivated Stainless Steel |

Part No.

ADT-2815-TF-SMM-02



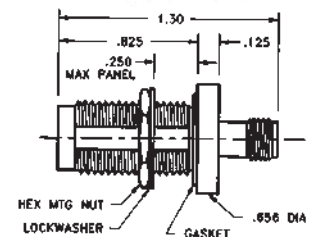
TNC Bulkhead Female to SMA Female

Technical Specifications

| | |
|------------|----------------------------|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.07 + .015f GHz |
| Finish: | Passivated Stainless Steel |

Part No.

ADT-2793-TF-SMF-02



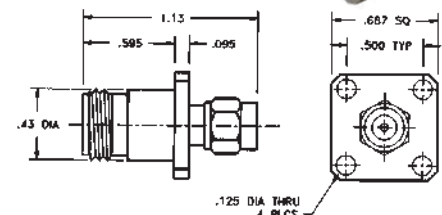
TNC Flange Mount Female to SMA Male

Technical Specifications

| | |
|------------|----------------------------|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.07 + .015f GHz |
| Finish: | Passivated Stainless Steel |

Part No.

ADT-2689-TF-SMM-02



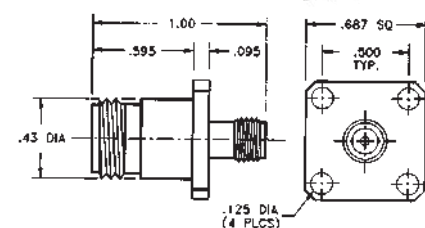
TNC Flange Mount Female to SMA Female

Technical Specifications

| | |
|------------|----------------------------|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.07 + .015f GHz |
| Finish: | Passivated Stainless Steel |

Part No.

ADT-2699-TF-SMF-02



BNC to SMA

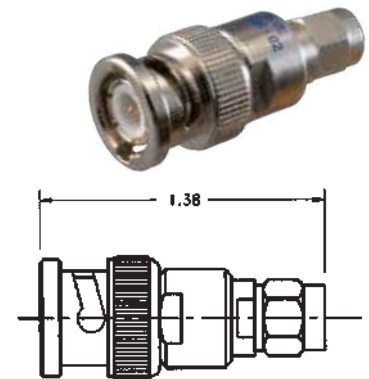
BNC Male to SMA Male

Technical Specifications

| | |
|------------|---|
| Frequency: | DC – 8.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.15 @ DC - 4.0 GHz 1.25 @ 4.0-8.0 GHz |
| Finish: | Passivated Stainless Steel BNC Housing Nickel Plated Brass |

Part No.

ADT-2670-BM-SMM-02



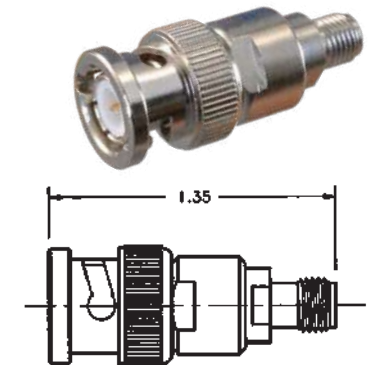
BNC Male to SMA Female

Technical Specifications

| | |
|------------|---|
| Frequency: | DC – 8.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.15 @ DC - 4.0 GHz 1.25 @ 4.0-8.0 GHz |
| Finish: | Passivated Stainless Steel BNC Housing Nickel Plated Brass |

Part No.

ADT-2671-BM-SMF-02



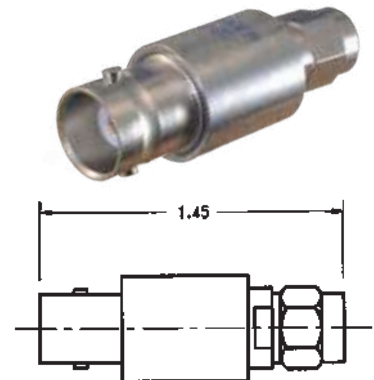
BNC Female to SMA Male

Technical Specifications

| | |
|------------|---|
| Frequency: | DC – 8.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.15 @ DC - 4.0 GHz 1.25 @ 4.0-8.0 GHz |
| Finish: | Passivated Stainless Steel BNC Housing Nickel Plated Brass |

Part No.

ADT-2672-BF-SMM-02



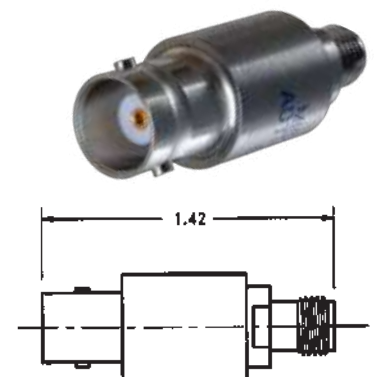
BNC Female to SMA Female

Technical Specifications

| | |
|------------|---|
| Frequency: | DC – 8.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.15 @ DC - 4.0 GHz 1.25 @ 4.0-8.0 GHz |
| Finish: | Passivated Stainless Steel BNC Housing Nickel Plated Brass |

Part No.

ADT-2673-BF-SMF-02



BETWEEN SERIES ADAPTERS

SMA to SSMA

SMA Male to SSMA Male

Technical Specifications

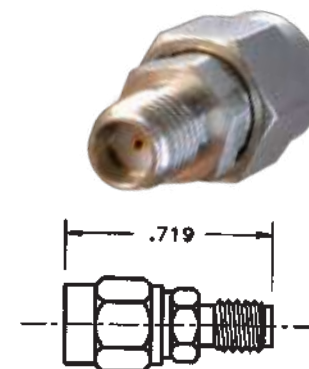
| | |
|--------------------|---|
| Frequency: | DC – 25.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.06 + .009f (GHz) @ DC-12.4 GHz 1.05 + .01f (GHz) @ 12.4-25.0 GHz |
| Finish: | Passivated Stainless Steel |
| Part No. | |
| ADT-2695-SM-SSM-02 | |



SMA Male to SSMA Female

Technical Specifications

| | |
|--------------------|---|
| Frequency: | DC – 25.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.06 + .009f (GHz) @ DC - 12.4 GHz 1.05 + .01f (GHz) @ 12.4-25.0 GHz |
| Finish: | Passivated Stainless Steel |
| Part No. | |
| ADT-2696-SM-SSF-02 | |



SMA Female to SSMA Male

Technical Specifications

| | |
|--------------------|---|
| Frequency: | DC – 25.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.06 + .009f (GHz) @ DC - 12.4 GHz 1.05 + .01f (GHz) @ 12.4-25.0 GHz |
| Finish: | Passivated Stainless Steel |
| Part No. | |
| ADT-2697-SF-SSM-02 | |



SMA Female to SSMA Female

Technical Specifications

| | |
|--------------------|---|
| Frequency: | DC – 25.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.06 + .009f (GHz) @ DC - 12.4 GHz 1.05 + .01f (GHz) @ 12.4-25.0 GHz |
| Finish: | Passivated Stainless Steel |
| Part No. | |
| ADT-2698-SF-SSF-02 | |



SMA to BMA

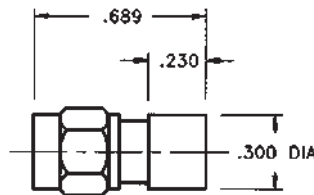
SMA Male to BMA Female

Technical Specifications

| | |
|------------|----------------------------|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.05 + .005f (GHz) |
| Finish: | Passivated Stainless Steel |



| Part No. |
|--------------------|
| ADT-2768-SM-BMF-02 |



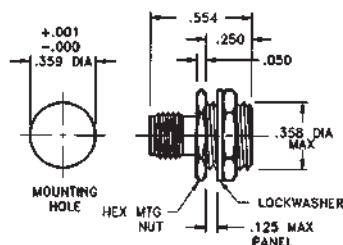
SMA Female to BMA Female – Bulkhead Mount

Technical Specifications

| | |
|------------|----------------------------|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.05 + .005f (GHz) |
| Finish: | Passivated Stainless Steel |



| Part No. |
|--------------------|
| ADT-2806-SF-BMF-02 |



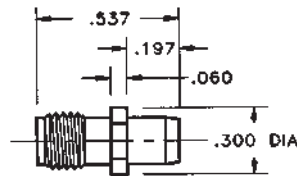
BETWEEN SERIES ADAPTERS

SMA Female to BMA Male

Technical Specifications

| | |
|------------|----------------------------|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.05 + .005 f (GHz) |
| Finish: | Passivated Stainless Steel |

| |
|--------------------|
| Part No. |
| ADT-2769-SF-BMM-02 |

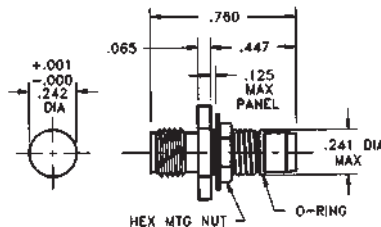


SMA Female to BMA Male – Bulkhead Mount

Technical Specifications

| | |
|------------|----------------------------|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.05 + .005 f (GHz) |
| Finish: | Passivated Stainless Steel |

| |
|--------------------|
| Part No. |
| ADT-2797-SF-BMM-02 |

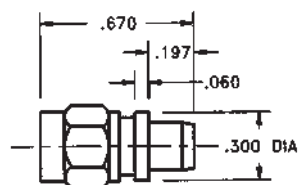


SMA Male to BMA Male

Technical Specifications

| | |
|------------|----------------------------|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.05 + .005 f (GHz) |
| Finish: | Passivated Stainless Steel |

| |
|--------------------|
| Part No. |
| ADT-2770-SM-BMM-02 |

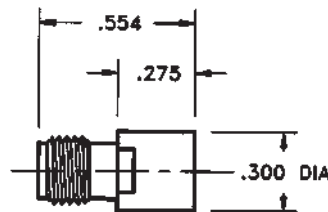


SMA Female to BMA Female

Technical Specifications

| | |
|------------|----------------------------|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.05 + .005f (GHz) |
| Finish: | Passivated Stainless Steel |

| |
|--------------------|
| Part No. |
| ADT-2767-SF-BMF-02 |

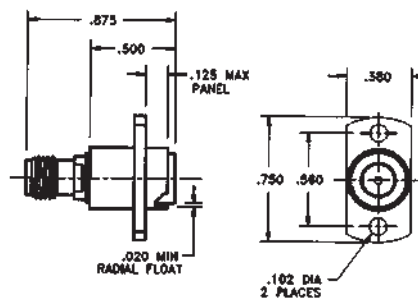


SMA Female to BMA Female – Floating Panel Mount

Technical Specifications

| | |
|------------|----------------------------|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.05 + .005f (GHz) |
| Finish: | Passivated Stainless Steel |

| |
|--------------------|
| Part No. |
| ADT-2809-SF-BMF-02 |



IN-SERIES ADAPTERS

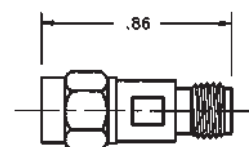
SMA Types

SMA Male to SMA Male

Technical Specifications

| | |
|------------|----------------------------|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.05 + .005 f (GHz) |
| Finish: | Passivated Stainless Steel |

| |
|--------------------|
| Part No. |
| ADT-2593-MF-SMA-02 |



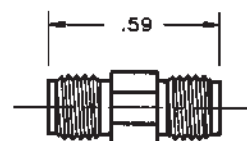
SMA Female to SMA Female

Technical Specifications

| | |
|------------|----------------------------|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.05 + .005 f (GHz) |
| Finish: | Passivated Stainless Steel |

| |
|--------------------|
| Part No. |
| ADT-2595-FF-SMA-02 |

Note: Also available with knurled center section (0.875 O.A.L.) as ADT-2841-FF-SMA-02 and in 0.500 (12.7) O.A.L. with fully threaded barrel as ADT-8000-20-SMA-02

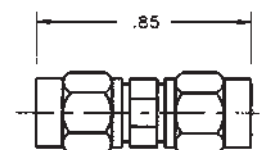


SMA Male to SMA Male

Technical Specifications

| | |
|------------|----------------------------|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.05 + .005 f (GHz) |
| Finish: | Passivated Stainless Steel |

| |
|--------------------|
| Part No. |
| ADT-2594-MM-SMA-02 |

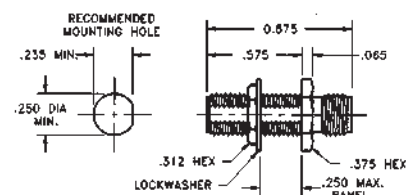


SMA Female to SMA Female – Bulkhead Mount

Technical Specifications

| | |
|------------|----------------------------|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.05 + .005 f (GHz) |
| Finish: | Passivated Stainless Steel |

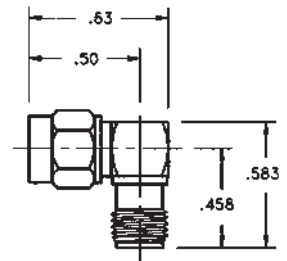
| |
|--------------------|
| Part No. |
| ADT-2823-FF-SMA-02 |



Right Angle SMA Male to SMA Female

Technical Specifications

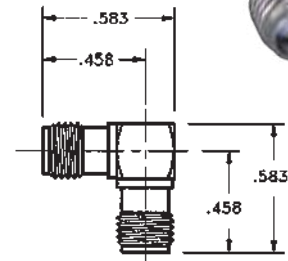
| | |
|------------|----------------------------|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.05 + .010 f (GHz) |
| Finish: | Passivated Stainless Steel |
| Part No. | ADT-8000-MF-SMA-02 |



Right Angle SMA Female to SMA Female

Technical Specifications

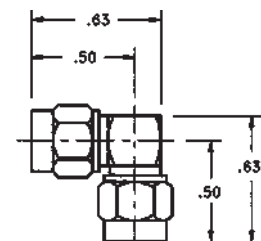
| | |
|------------|----------------------------|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.05 + .010 f (GHz) |
| Finish: | Passivated Stainless Steel |
| Part No. | ADT-8000-FF-SMA-02 |



Right Angle SMA Male to SMA Male

Technical Specifications

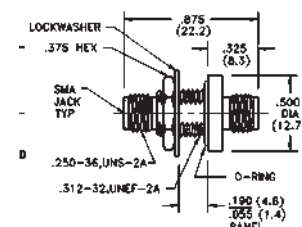
| | |
|------------|----------------------------|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.05 + .010 f (GHz) |
| Finish: | Passivated Stainless Steel |
| Part No. | ADT-8000-MM-SMA-02 |



SMA Female to SMA Female – Bulkhead Mount – Hermetic

Technical Specifications

| | |
|------------|----------------------------|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.05 + .010 f (GHz) |
| Finish: | Passivated Stainless Steel |
| Part No. | ADT-2824-FF-SMA-02 |



IN-SERIES ADAPTERS

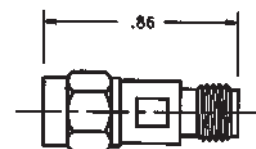
3.5mm Types

3.5mm Male to 3.5mm Female

Technical Specifications

| | |
|------------|--|
| Frequency: | DC – 26.5 GHz |
| Impedance: | 50 Ohms |
| VSWR: | DC - 20 GHz: 1.10 20-26.5 GHz: 1.15 |
| Finish: | Passivated Stainless Steel |

| Part No. |
|--------------------|
| ADT-2733-MF-3MM-02 |

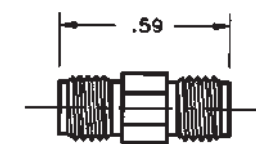


3.5mm Female to 3.5mm Female

Technical Specifications

| | |
|------------|--|
| Frequency: | DC – 26.5 GHz |
| Impedance: | 50 Ohms |
| VSWR: | DC - 20 GHz: 1.10 20-26.5 GHz: 1.15 |
| Finish: | Passivated Stainless Steel |

| Part No. |
|--------------------|
| ADT-2735-FF-3MM-02 |

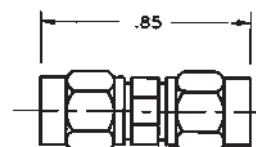


3.5mm Male to 3.5mm Male

Technical Specifications

| | |
|------------|--|
| Frequency: | DC – 26.5 GHz |
| Impedance: | 50 Ohms |
| VSWR: | DC - 20 GHz: 1.10 20-26.5 GHz: 1.15 |
| Finish: | Passivated Stainless Steel |

| Part No. |
|--------------------|
| ADT-2734-MM-3MM-02 |

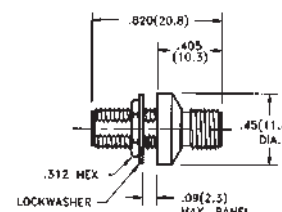


3.5mm Female to 3.5mm Female – Bulkhead Mount

Technical Specifications

| | |
|------------|----------------------------|
| Frequency: | DC – 26.5 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.05 + .005 f (GHz) |
| Finish: | Passivated Stainless Steel |

| Part No. |
|--------------------|
| ADT-2850-FF-35M-02 |



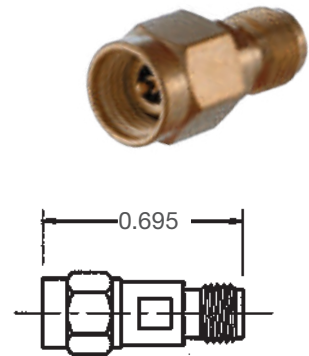
2.9mm Types

2.9mm Male to 2.9mm Female

Technical Specifications

| | |
|------------|-----------------------------|
| Frequency: | DC – 40.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.20 |
| Finish: | Gold Plated Stainless Steel |

| |
|--------------------|
| Part No. |
| ADT-2851-MF-29M-00 |

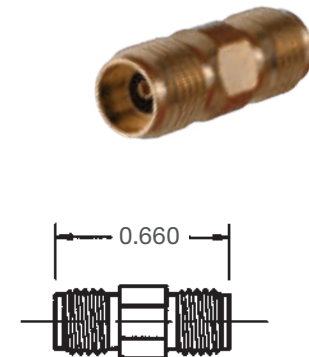


2.9mm Female to 2.9mm Female

Technical Specifications

| | |
|------------|-----------------------------|
| Frequency: | DC – 40.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.20 |
| Finish: | Gold Plated Stainless Steel |

| |
|--------------------|
| Part No. |
| ADT-2852-FF-29M-00 |

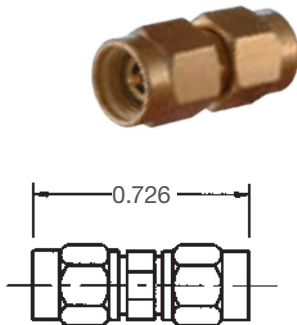


2.9mm Male to 2.9mm Male

Technical Specifications

| | |
|------------|-----------------------------|
| Frequency: | DC – 40.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.20 |
| Finish: | Gold Plated Stainless Steel |

| |
|--------------------|
| Part No. |
| ADT-2853-MM-29M-00 |

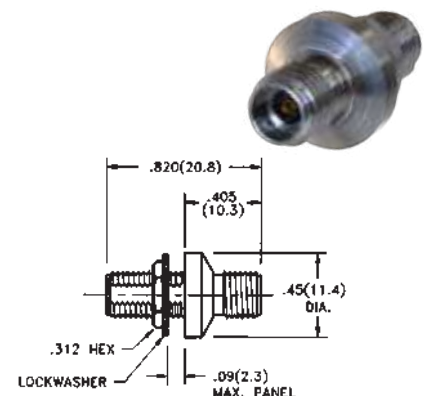


2.9mm Female to 2.9mm Female – Bulkhead Mount

Technical Specifications

| | |
|------------|----------------------------|
| Frequency: | DC – 40.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.20 |
| Finish: | Passivated Stainless Steel |

| |
|--------------------|
| Part No. |
| ADT-2854-FF-29M-02 |

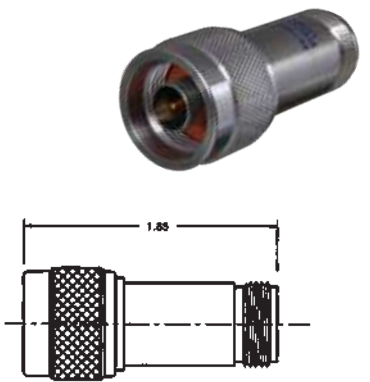


N Type

N Male to N Female

Technical Specifications

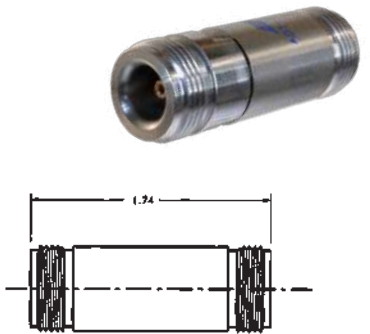
| | |
|------------|--|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.04 @ DC - 4.0 GHz 1.06 @ 4.0-8.0 GHz 1.10 @ 8.0-18.0 GHz |
| Finish: | Passivated Stainless Steel |
| Part No. | ADT-2588-MF-NNN-02 |



N Female to N Female

Technical Specifications

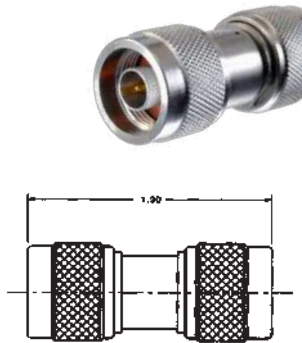
| | |
|------------|--|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.04 @ DC - 4.0 GHz 1.06 @ 4.0-8.0 GHz 1.10 @ 8.0-18.0 GHz |
| Finish: | Passivated Stainless Steel |
| Part No. | ADT-2590-FF-NNN-02 |



N Male to N Male

Technical Specifications

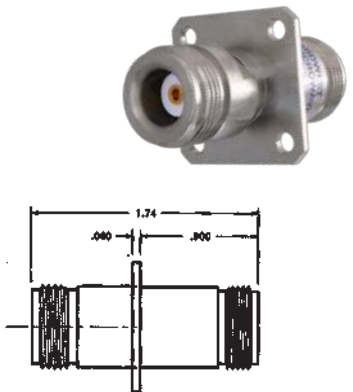
| | |
|------------|--|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.04 @ DC - 4.0 GHz 1.06 @ 4.0-8.0 GHz 1.10 @ 8.0-18.0 GHz |
| Finish: | Passivated Stainless Steel |
| Part No. | ADT-2589-MM-NNN-02 |



N Female to N Female – Flange Mount

Technical Specifications

| | |
|------------|--|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.04 @ DC - 4.0 GHz 1.06 @ 4.0-8.0 GHz 1.10 @ 8.0-18.0 GHz |
| Finish: | Passivated Stainless Steel |
| Part No. | ADT-2825-FF-NNN-02 |

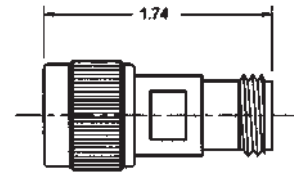


TNC Types

TNC Male to TNC Female

Technical Specifications

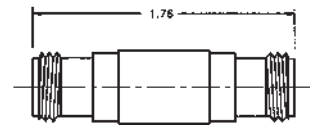
| | |
|------------|--|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.05 @ DC - 4.0 GHz 1.10 @ 4.0-8.0 GHz 1.15 @ 8.0-18.0 GHz |
| Finish: | Passivated Stainless Steel |
| Part No. | ADT-2596-MF-TNC-02 |



TNC Female to TNC Female

Technical Specifications

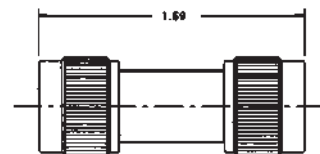
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|------------|--|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.05 @ DC - 4.0 GHz 1.10 @ 4.0-8.0 GHz 1.15 @ 8.0-18.0 GHz |
| Finish: | Passivated Stainless Steel |
| Part No. | ADT-2598-FF-TNC-02 |



TNC Male to TNC Male

Technical Specifications

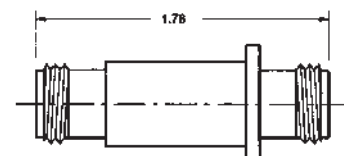
| | |
|------------|--|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.05 @ DC - 4.0 GHz 1.10 @ 4.0-8.0 GHz 1.15 @ 8.0-18.0 GHz |
| Finish: | Passivated Stainless Steel |
| Part No. | ADT-2597-MM-TNC-02 |



TNC Female to TNC Female – Flange Mount

Technical Specifications

| | |
|------------|--|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.05 @ DC - 4.0 GHz 1.10 @ 4.0-8.0 GHz 1.15 @ 8.0-18.0 GHz |
| Finish: | Passivated Stainless Steel |
| Part No. | ADT-2826-FF-TNC-02 |



SC Types

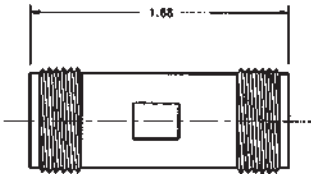
SC Female to SC Female

Technical Specifications

| | | |
|------------|----------------------------|---------------------|
| Frequency: | DC – 11.0 GHz | |
| Impedance: | 50 Ohms | |
| VSWR: | 1.08 @ DC - 4.0 GHz | 1.20 @ 4.0-11.0 GHz |
| Finish: | Passivated Stainless Steel | |



| |
|--------------------|
| Part No. |
| ADT-2833-FF-SC0-02 |



SC Female to SC Female – Flange Mount

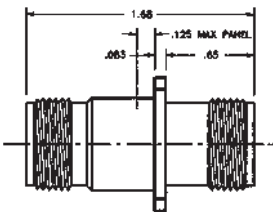
Technical Specifications

| | | |
|------------|----------------------------|---------------------|
| Frequency: | DC – 11.0 GHz | |
| Impedance: | 50 Ohms | |
| VSWR: | 1.08 @ DC - 4.0 GHz | 1.20 @ 4.0-11.0 GHz |
| Finish: | Passivated Stainless Steel | |



| |
|--------------------|
| Part No. |
| ADT-2835-FF-SC0-02 |

Note: Also available in bulkhead mount as ADT-2836-FF-SC0-02.



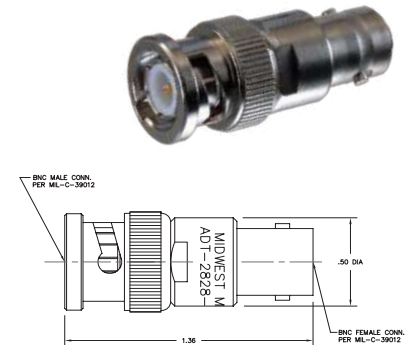
BNC Types

BNC Male to BNC Female

Technical Specifications

| | |
|------------|---------------------|
| Frequency: | DC – 4.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.25 |
| Finish: | Nickel Plated Brass |

| |
|--------------------|
| Part No. |
| ADT-2828-MF-BNC-10 |

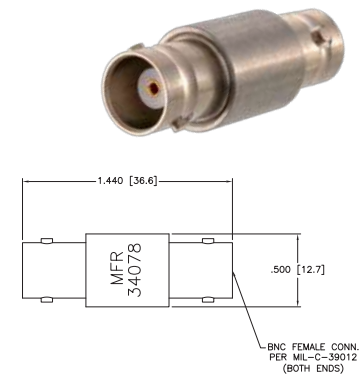


BNC Female to BNC Female

Technical Specifications

| | |
|------------|---------------------|
| Frequency: | DC – 4.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.25 |
| Finish: | Nickel Plated Brass |

| |
|--------------------|
| Part No. |
| ADT-2829-FF-BNC-10 |

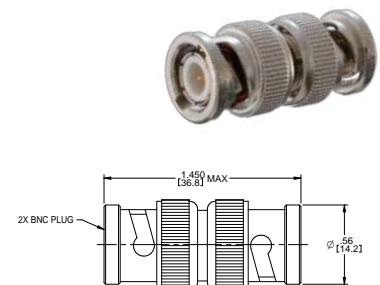


BNC Male to BNC Male

Technical Specifications

| | |
|------------|---------------------|
| Frequency: | DC – 4.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.25 |
| Finish: | Nickel Plated Brass |

| |
|--------------------|
| Part No. |
| ADT-2830-MM-BNC-10 |

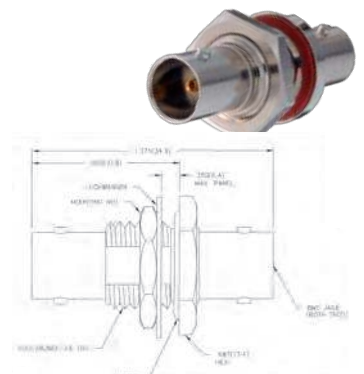


BNC Female to BNC Female – Bulkhead Mount

Technical Specifications

| | |
|------------|---------------------|
| Frequency: | DC – 4.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.25 |
| Finish: | Nickel Plated Brass |

| |
|--------------------|
| Part No. |
| ADT-2831-FF-BNC-10 |



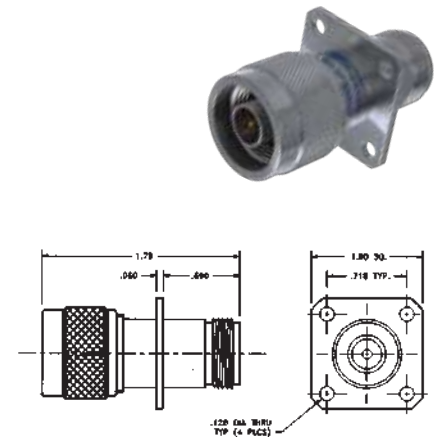
IN-SERIES ADAPTERS

Special Adapters

N Male to N Female – Flange Mount

Technical Specifications

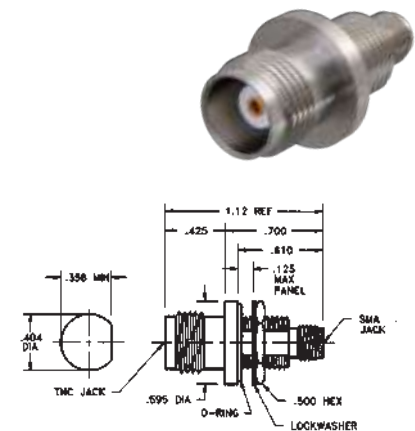
| | |
|------------|--|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.05 @ DC - 4.0 GHz 1.06 @ 4.0-8.0 GHz 1.10 @ 8.0-18.0 GHz |
| Finish: | Passivated Stainless Steel |
| Part No. | ADT-2694-MF-NNN-02 |



TNC Female to SMA Female – Rear Mount Bulkhead

Technical Specifications

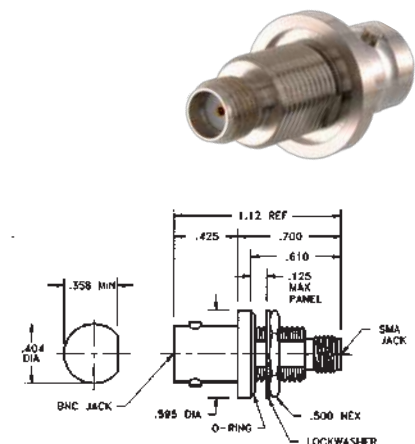
| | |
|------------|--|
| Frequency: | DC – 18.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.10 @ DC - 4.0 GHz 1.15 @ 4.0-8.0 GHz 1.25 @ 8.0-18.0 GHz |
| Finish: | Passivated Stainless Steel |
| Part No. | ADT-2837-TF-SMF-02 |



BNC Female to SMA Female – Rear Mount Bulkhead

Technical Specifications

| | |
|------------|----------------------------|
| Frequency: | DC – 4.0 GHz |
| Impedance: | 50 Ohms |
| VSWR: | 1.15 |
| Finish: | Passivated Stainless Steel |
| Part No. | ADT-2838-BF-SMF-02 |



General Information

- SMA, BMA, N, TNC, BNC, 3.5mm, 7mm Interfaces
- Semi-Rigid and Flexible Cable Accommodation
- Panel, Bulkhead, and Printed Circuit Mounts

Midwest Microwave offers coaxial connectors that include most all of the popular interfaces. They are constructed using rugged stainless steel for the ultimate in wear resistant reliability and conform to the requirements of MIL-PRF-39012. The selection of catalog standard items is broad and provides the flexibility for custom engineered designs to meet unique system requirements. Connectors for semi-rigid and flexible cable in a wide variety of configurations are offered as well as a complete assortment of panel and bulkhead mounted receptacles. SMA, SSMA, SMM, BMA, N, TNC, BNC, SC, and precision 2.9mm, 3.5mm, and 7mm connectors provide a full spectrum of interface types. In addition, field replaceable hermetic launchers with drop-in hermetic seals are available to fulfill the growing requirement for field replaceable connectors on integrated microwave circuit packages. Please contact the factory for all of your connector needs.

General Specifications

| Specification Requirement | MIL-C 39012 Paragraph | Detail Information |
|---------------------------|-----------------------|--------------------|
|---------------------------|-----------------------|--------------------|

General

| | | |
|----------|------|--|
| Material | 3.3 | Stainless Steel, corrosion resistant per ASTM-A-582 and ASTM-A-484, Type 303. Brass, half hard per ASTM-B16. Beryllium Copper per ASTM-B196. PTFE Fluorocarbon per ASTM-D-4894, and ASTM-D-4895. |
| Finish | 3.31 | Center contacts shall be gold plated to a minimum thickness of 50 micro inches per ASTM B 488, type II, code C. All other metal parts shall be finished so as to provide the required protection to meet the corrosion specification requirements. |
| Design | 3.40 | The design of the connectors herein shall be such that the outline drawings shown in this catalog and the coaxial interface mating dimensions shown in the Appendix meet the requirements of MIL-STD-348. |

Electrical

| | | |
|---------------------------------|------|---|
| Insulation Resistance | 3.11 | Insulation Resistance shall not be less than 5,000 megohms. |
| Corona Level | 3.22 | Refer to the applicable military slash sheet or consult factory if one does not exist. |
| Dielectric Withstanding Voltage | 3.17 | Refer to the applicable military slash sheet or consult factory if one does not exist. |
| RF High Potential | 3.23 | Refer to the applicable military slash sheet or consult factory if one does not exist. |
| Contact Resistance | 3.16 | Refer to the applicable military slash sheet or consult factory if one does not exist. |
| VSWR | 3.14 | Refer to the applicable military slash sheet or consult factory if one does not exist. VSWR and Frequency Range is dependent on the type and size cable used. |
| RF Leakage | 3.26 | Refer to the applicable military slash sheet or consult factory if one does not exist. |
| Insertion Loss | 3.27 | Refer to the applicable military slash sheet or consult factory if one does not exist. Insertion Loss is dependent on the type and size cable used. |

| Specification Requirement | MIL-C 39012 Paragraph | Detail Information |
|---------------------------|-----------------------|--------------------|
|---------------------------|-----------------------|--------------------|

Mechanical

| | | |
|------------------------------|-------|--|
| Force to Engage | 3.5.1 | Torque required to engage and disengage shall not exceed: SMA - 2 in-lbs SMM - 1 in-lbs N&SC - 6 in-lbs TNC - 2 in-lbs BNC - 2.5 in-lbs Longitudinal Force not applicable except for BNC = 3 lbs max. BMA - Engage = 3 lbs max. Disengage = 1.5 lbs max |
| Coupling Nut Retention | 3.25 | SMA - 60 lbs min. SSM - 40 lbs min. N, TNC, BNC, & SC - 100 lbs min. |
| Coupling Proof Torque (min.) | 3.60 | SMA - 15 in-lbs SSM - 4 in-lbs N - 30 in-lbs TNC & SC - 15 in-lbs |
| Cable Retention | 3.24 | Refer to the applicable military slash sheet or consult factory if one does not exist. |
| Mating Characteristics | 3.70 | SMA SSM BMA N TNC BNC SC |
| Connector Durability | 3.15 | Oversize Test Pin min.: .0375 .0165 .0372 .067 .055 .055 .093 |
| | | Insertion Depth: .045 .045 .045 .125 .125 .125 .125 |
| | | Insertion Force max.: 2 lbs 2 lbs 2 lbs 2 lbs 2 lbs 2 lbs 2 lbs |
| | | Insertion Pin Dia min.: .0370 .0163 .0370 .0658 .054 .054 .092 |
| | | Withdrawal Force min.: 1 oz. .5 oz. 1 oz. 2 oz. 2 oz. 1 oz. 2 oz. |
| | | Withdrawal Pin Dia max.: .0355 .015 .0355 .0645 .052 .052 .090 |
| Recommended Mating Torque | - | SMA - 7-10 in-lbs SSM - 2 in-lbs N, TNC, & SC - 12-15 in-lbs BNC&BMA - N/A |

Environmental

| | | |
|------------------------|------|---|
| Vibration | 3.18 | Per Specification MIL-STD-202, method 204, test condition D |
| Shock | 3.19 | Per Specification MIL-STD-202, method 213, test condition I |
| Thermal Shock | 3.20 | Refer to the applicable military slash sheet or consult factory if one does not exist. |
| Corrosion (Salt Spray) | 3.13 | Per Specification MIL-STD-202, method 101, test condition B |
| Moisture Resistance | 3.21 | Per Specification MIL-STD-202, method 106, no measurements at high humidity. Insulation resistance shall be 200 megohms minimum within 5 minutes of humidity. |

Commercial Grade Surge Arresters

- DC - 3 GHz Frequency Range
- VSWR of 1.2
- Insertion loss of 0.3 dB
- Surge capability 8/20 μ s of 10 kA nominal
- Multi-strike lighting capability
- Tri-alloy plated brass construction
- RoHS compliant



Power surges or indirect lightning strikes can create network problems by causing network downtimes with potential of millions of dollars of revenue losses. Midwest Microwave surge arresters can protect networks from surges without sacrificing RF performance. Midwest surge arresters can be used to protect cellular base stations, public safety systems, Wi-Fi networks, active antenna systems, and 5G or GPS applications.

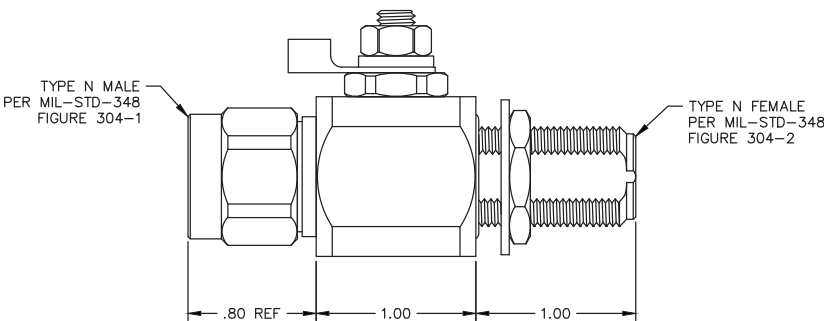
| Part Number | Description |
|--------------------|--|
| CGS-1030-00-NNN-34 | Commercial grade surge arrester, 3 GHz, N male to N female |

Material Specifications

| | |
|-----------------------|------------------------------|
| Housing | Tri-alloy plated brass |
| Coupling Nut | Tri-alloy plated brass |
| Male Center Contact | Gold plated brass |
| Female Center Contact | Gold-plated beryllium copper |

Electrical Specifications

| | | |
|--------------------------------|---------------------|-------------|
| Frequency Range | DC - 2.5 GHz | 2.5 - 3 GHz |
| Insertion Loss | 0.25 dB | 0.3 dB |
| Impedance | 50 Ω nominal | |
| VSWR | 1.20:1 maximum | |
| Surge Capability, 8/20 μ s | 10 kA nominal | |



Commercial Grade Attenuators

CGA-1040 Series

- Best combination of price and performance
- For general commercial use
- 4 GHz operation
- Passivated stainless steel construction
- SMA Male to SMA Female



| Part Number | Attenuator | Attenuation | Power | Frequency |
|--------------------|------------------------|-------------|-------|-----------|
| CGA-1040-01-SMA-02 | SMA Male to SMA Female | 1 dB | 2W | DC - 4GHz |
| CGA-1040-02-SMA-02 | SMA Male to SMA Female | 2 dB | 2W | DC - 4GHz |
| CGA-1040-03-SMA-02 | SMA Male to SMA Female | 3 dB | 2W | DC - 4GHz |
| CGA-1040-06-SMA-02 | SMA Male to SMA Female | 6 dB | 2W | DC - 4GHz |
| CGA-1040-10-SMA-02 | SMA Male to SMA Female | 10 dB | 2W | DC - 4GHz |
| CGA-1040-20-SMA-02 | SMA Male to SMA Female | 20 dB | 2W | DC - 4GHz |

Material Specifications

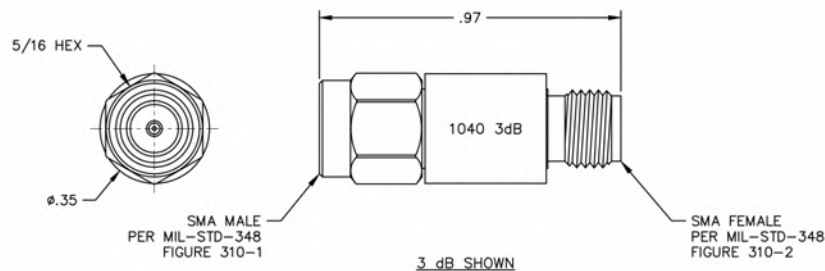
| | |
|-----------------------|------------------------------|
| Housing | Passivated stainless steel |
| Coupling Nut | Passivated stainless steel |
| Male Center Contact | Gold plated brass |
| Female Center Contact | Gold-plated beryllium copper |

Environmental Specifications

| | |
|-----------------------|--------------|
| Operating Temperature | -65° to 85°C |
|-----------------------|--------------|

Electrical Specifications

| | |
|------------------------------|---|
| Frequency of Operation | DC-4GHz |
| Impedance | 50Ω (Nominal) |
| Attenuation values available | 1, 2, 3, 6, 10, 20 dB |
| Attenuation Accuracy | 1 and 2 dB ±0.35 dB 3 and 6 dB ±0.40 dB 10 and 20 dB ±0.50 dB |
| VSWR | 1.18:1 (max.) |
| Input Power (at 25°C) | 2W (CW) |



Commercial Grade Terminations

- Best combination of price and performance
- For all commercial use
- Passivated stainless-steel construction
- Male and Female versions available



| Part Number | Termination Type | Frequency |
|--------------------|------------------|-----------|
| CGT-1400-F0-29M-02 | 2.92mm Female | 40GHz |
| CGT-1400-M0-29M-02 | 2.92mm Male | 40GHz |
| CGT-1500-F0-24M-02 | 2.4mm Female | 50GHz |
| CGT-1500-M0-24M-02 | 2.4mm Male | 50GHz |

Material Specifications

| | |
|-----------------------|------------------------------|
| Housing | Passivated stainless steel |
| Coupling nut | Passivated stainless steel |
| Male Center Contact | Gold plated beryllium copper |
| Female Center Contact | Gold plated beryllium copper |

Environmental Specifications

| | |
|-----------------------|---|
| Thermal Shock | MIL-STD-202G Method 107, Test Condition B |
| Vibration | MIL-STD-202G Method 204, Test Condition D |
| Shock | MIL-STD-202G Method 213, Test Condition I |
| Humidity | MIL-STD-202G Method 106 |
| Salt Spray | MIL-STD-202G Method 101, Test Condition B |
| Operating Temperature | -55°C to 125°C |

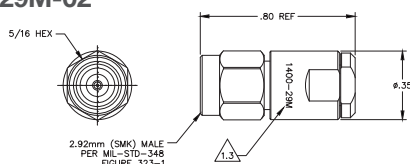
Electrical Specifications

| | 2.92mm Models | 2.4mm Models |
|------------------------|---------------|---------------|
| Frequency of Operation | DC-40GHz | DC-50GHz |
| Impedance | 50Ω (Nominal) | 50Ω (Nominal) |
| VSWR | 1.2:1 (max.) | 1.22:1 (max.) |
| Input Power (at 25°C) | 0.25W (CW) | 0.25W (CW) |

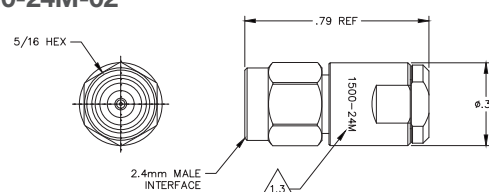
Mechanical Specifications

| | |
|---------------|-------------------|
| Mating Torque | 7-10 inch-pounds |
| Durability | 500 cycles (min.) |

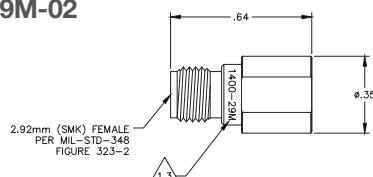
CGT-1400-M0-29M-02



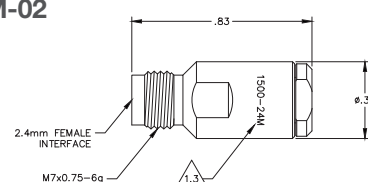
CGT-1500-M0-24M-02



CGT-1400-F0-29M-02



CGT-1500-F0-24M-02



Qualified Parts List Products

- MIL-DTL-3933/14, 16, and /25 SMA Attenuators
- MIL-DTL-39030/3 and /6 SMA and N Terminations

The Qualified Parts Listing (QPL) is a list compiled by the U.S. Government of products that are used by the Government and are covered by military specifications. The purpose of the list is to provide a simple way of accessing identification of those products and the vendors that have been qualified to manufacture them such that procurement may be easily accomplished. All products listed on a particular QPL have been tested and have qualified to the requirements for that product, as specified in the latest effective issue of the applicable military specification. By using a part that appears on the QPL list, a user is assured that the part will meet or exceed the performance specifications set forth in the MIL Specification as a minimum standard of performance.

Cinch Connectivity Solutions is a leading manufacturer of Midwest Microwave product line of Attenuators, Terminations, Adapters, and Connectors and is the originator of the “Minipad” Attenuator around which the military specifications were written. The company’s technical leadership and extensive experience combined with its broad product capability provide the user with a reliable, high quality source for high performance QPL coaxial microwave components.

QPL Products

| | | | |
|--------------|---------|-------------|---------------|
| Attenuators | 0-20 dB | DC-18.0 GHz | MIL-DTL-3933 |
| Terminations | | DC-18.0 GHz | MIL-DTL-39030 |

Attenuators (QPL)

MIL-DTL-3933 Qualified (QPL)

- Non-Screened and Screened Units Available
- 100% Tested
- Military Applications

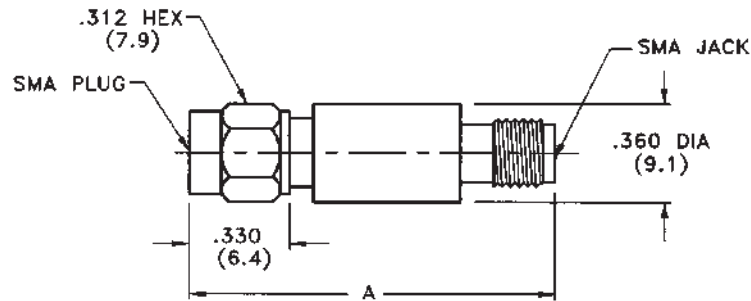
Midwest Microwave’s QPL Attenuator products were designed, tested and have been qualified to the stringent requirements of the latest effective issue of the applicable military specifications. By selecting a part that appears on a QPL list, a user is assured that the part will meet or exceed the performance specifications set forth in the MIL Specification as a minimum standard of performance.



| MIL Part Slash No. Group | Description | Frequency (GHz) | Attenuation (dB) |
|--------------------------|--------------------------------|--------------------------------|------------------|
| MIL-DTL-3933/25 | SMA Subminiature - Male/Female | DC - 4.0, DC - 12.4, DC - 18.0 | 0 - 20 |
| MIL-DTL-3933/14 | SMA Miniature - Male/Female | DC - 12.4 | 1 - 20 |
| MIL-DTL-3933/16 | SMA Miniature - Male/Female | DC - 18.0 | 0 - 20 |

Attenuators – Fixed Coaxial

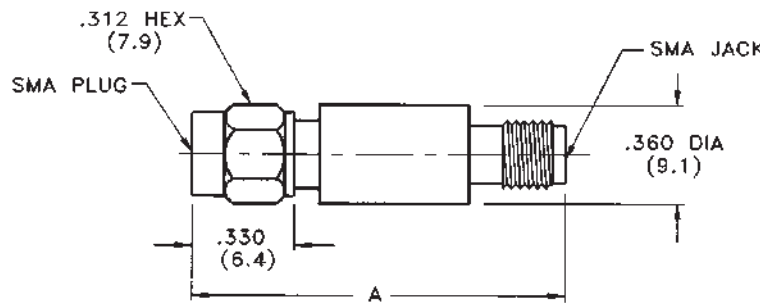
MIL-DTL-3933/14



| Military Part No. | Cinch Midwest Part No. | Dimension A inches (mm) (max.) | Attenuation Value (dB) (nom.) | Frequency Range (GHz) | Closest Commercial Alternate |
|-------------------|------------------------|--------------------------------|-------------------------------|-----------------------|------------------------------|
| - 01 | M3933/14-01N | 1.20 (30.5) | 3.0 | DC - 12.4 | ATT-0205-03-SMA-02 |
| - 02 | M3933/14-02N | 1.20 (30.5) | 6.0 | DC - 12.4 | ATT-0205-06-SMA-02 |
| - 03 | M3933/14-03N | 1.20 (30.5) | 10.0 | DC - 12.4 | ATT-0205-10-SMA-02 |
| - 04 | M3933/14-04N | 1.20 (30.5) | 20.0 | DC - 12.4 | ATT-0205-20-SMA-02 |
| - 05 | M3933/14-05N | 1.20 (30.5) | 15.0 | DC - 12.4 | ATT-0205-15-SMA-02 |
| - 06 | M3933/14-06N | 1.20 (30.5) | 1.0 | DC - 12.4 | ATT-0205-01-SMA-02 |
| - 07 | M3933/14-07N | 1.20 (30.5) | 2.0 | DC - 12.4 | ATT-0205-02-SMA-02 |
| - 08 | M3933/14-08N | 1.20 (30.5) | 4.0 | DC - 12.4 | ATT-0205-04-SMA-02 |
| - 09 | M3933/14-09N | 1.20 (30.5) | 5.0 | DC - 12.4 | ATT-0205-05-SMA-02 |
| - 10 | M3933/14-10N | 1.20 (30.5) | 7.0 | DC - 12.4 | ATT-0205-07-SMA-02 |
| - 11 | M3933/14-11N | 1.20 (30.5) | 8.0 | DC - 12.4 | ATT-0205-08-SMA-02 |
| - 12 | M3933/14-12N | 1.20 (30.5) | 9.0 | DC - 12.4 | ATT-0205-09-SMA-02 |
| - 18 | M3933/14-18N | 1.20 (30.5) | 16.0 | DC - 12.4 | ATT-0205-16-SMA-02 |
| - 19 | M3933/14-19N | 1.20 (30.5) | 14.0 | DC - 12.4 | ATT-0205-14-SMA-02 |
| - 20 | M3933/14-20N | 1.20 (30.5) | 13.0 | DC - 12.4 | ATT-0205-13-SMA-02 |
| - 21 | M3933/14-21N | 1.20 (30.5) | 12.0 | DC - 12.4 | ATT-0205-12-SMA-02 |
| - 22 | M3933/14-22N | 1.20 (30.5) | 11.0 | DC - 12.4 | ATT-0205-11-SMA-02 |
| - 23 | M3933/14-23N | 1.20 (30.5) | 1.5 | DC - 12.4 | ATT-0205-72-SMA-02 |

Notes: 1. Midwest Microwave part number reflects a non-screened part. For a screened part, change suffix "N" to "S".
2. See Appendix for description of connector interface.

MIL-DTL-3933/16

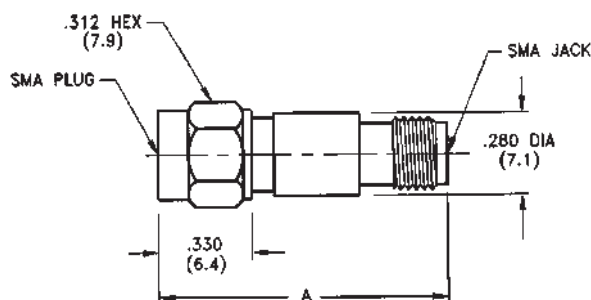


| Military Part No. | Cinch Midwest Part No. | Dimension A inches (mm) (max.) | Attenuation Value (dB) (nom.) | Frequency Range (GHz) | Closest Commercial Alternate |
|-------------------|------------------------|-----------------------------------|----------------------------------|--------------------------|---------------------------------|
| - 01 | M3933/16-01N | 1.20 (30.5) | 3.0 | DC - 18.0 | ATT-0263-03-SMA-02 |
| - 02 | M3933/16-02N | 1.20 (30.5) | 6.0 | DC - 18.0 | ATT-0263-06-SMA-02 |
| - 03 | M3933/16-03N | 1.20 (30.5) | 10.0 | DC - 18.0 | ATT-0263-10-SMA-02 |
| - 04 | M3933/16-04N | 1.20 (30.5) | 20.0 | DC - 18.0 | ATT-0263-20-SMA-02 |
| - 05 | M3933/16-05N | 1.20 (30.5) | 1.0 | DC - 18.0 | ATT-0263-01-SMA-02 |
| - 06 | M3933/16-06N | 1.20 (30.5) | 2.0 | DC - 18.0 | ATT-0263-02-SMA-02 |
| - 07 | M3933/16-07N | 1.20 (30.5) | 4.0 | DC - 18.0 | ATT-0263-04-SMA-02 |
| - 08 | M3933/16-08N | 1.20 (30.5) | 5.0 | DC - 18.0 | ATT-0263-05-SMA-02 |
| - 09 | M3933/16-09N | 1.20 (30.5) | 7.0 | DC - 18.0 | ATT-0263-07-SMA-02 |
| - 10 | M3933/16-10N | 1.20 (30.5) | 8.0 | DC - 18.0 | ATT-0263-08-SMA-02 |
| - 11 | M3933/16-11N | 1.20 (30.5) | 9.0 | DC - 18.0 | ATT-0263-09-SMA-02 |
| - 16 | M3933/16-16N | 1.20 (30.5) | 0 | DC - 18.0 | ATT-0263-00-SMA-02 |
| - 17 | M3933/16-17N | 1.20 (30.5) | 0.5 | DC - 18.0 | ATT-0263-70-SMA-02 |
| - 18 | M3933/16-18N | 1.20 (30.5) | 1.5 | DC - 18.0 | ATT-0263-71-SMA-02 |
| - 19 | M3933/16-19N | 1.20 (30.5) | 2.5 | DC - 18.0 | ATT-0263-72-SMA-02 |
| - 20 | M3933/16-20N | 1.20 (30.5) | 3.5 | DC - 18.0 | ATT-0263-73-SMA-02 |
| - 21 | M3933/16-21N | 1.20 (30.5) | 4.5 | DC - 18.0 | ATT-0263-74-SMA-02 |
| - 22 | M3933/16-22N | 1.20 (30.0) | 5.5 | DC - 18.0 | ATT-0263-75-SMA-02 |
| - 23 | M3933/16-23N | 1.20 (30.5) | 6.5 | DC - 18.0 | ATT-0263-76-SMA-02 |
| - 24 | M3933/16-24N | 1.20 (30.5) | 7.5 | DC - 18.0 | ATT-0263-77-SMA-02 |
| - 25 | M3933/16-25N | 1.20 (30.5) | 8.5 | DC - 18.0 | ATT-0263-78-SMA-02 |
| - 26 | M3933/16-26N | 1.20 (30.5) | 9.5 | DC - 18.0 | ATT-0263-79-SMA-02 |
| - 27 | M3933/16-27N | 1.20 (30.5) | 10.5 | DC - 18.0 | ATT-0263-80-SMA-02 |
| - 28 | M3933/16-28N | 1.20 (30.5) | 11.0 | DC - 18.0 | ATT-0263-11-SMA-02 |
| - 29 | M3933/16-29N | 1.20 (30.5) | 11.5 | DC - 18.0 | ATT-0263-81-SMA-02 |
| - 30 | M3933/16-30N | 1.20 (30.5) | 12.0 | DC - 18.0 | ATT-0263-12-SMA-02 |
| - 31 | M3933/16-31N | 1.20 (30.5) | 12.5 | DC - 18.0 | ATT-0263-82-SMA-02 |
| - 32 | M3933/16-32N | 1.20 (30.5) | 13.0 | DC - 18.0 | ATT-0263-13-SMA-02 |
| - 33 | M3933/16-33N | 1.20 (30.5) | 13.5 | DC - 18.0 | ATT-0263-83-SMA-02 |
| - 34 | M3933/16-34N | 1.20 (30.5) | 14.0 | DC - 18.0 | ATT-0263-14-SMA-02 |
| - 35 | M3933/16-35N | 1.20 (30.5) | 14.5 | DC - 18.0 | ATT-0263-84-SMA-02 |
| - 36 | M3933/16-36N | 1.20 (30.0) | 15.0 | DC - 18.0 | ATT-0263-15-SMA-02 |

| Military Part No. | Cinch Midwest Part No. | Dimension A inches (mm) (max.) | Attenuation Value (dB) (nom.) | Frequency Range (GHz) | Closest Commercial Alternate |
|-------------------|------------------------|--------------------------------|-------------------------------|-----------------------|------------------------------|
| - 37 | M3933/16-37N | 1.20 (30.5) | 15.5 | DC - 18.0 | ATT-0263-85-SMA-02 |
| - 38 | M3933/16-38N | 1.20 (30.5) | 16.0 | DC - 18.0 | ATT-0263-16-SMA-02 |
| - 39 | M3933/16-39N | 1.20 (30.5) | 16.5 | DC - 18.0 | ATT-0263-86-SMA-02 |
| - 40 | M3933/16-40N | 1.20 (30.5) | 17.0 | DC - 18.0 | ATT-0263-17-SMA-02 |
| - 41 | M3933/16-41N | 1.20 (30.5) | 17.5 | DC - 18.0 | ATT-0263-87-SMA-02 |
| - 42 | M3933/16-42N | 1.20 (30.5) | 18.0 | DC - 18.0 | ATT-0263-18-SMA-02 |
| - 43 | M3933/16-43N | 1.20 (30.5) | 18.5 | DC - 18.0 | ATT-0263-88-SMA-02 |
| - 44 | M3933/16-44N | 1.20 (30.5) | 19.0 | DC - 18.0 | ATT-0263-19-SMA-02 |
| - 45 | M3933/16-45N | 1.20 (30.5) | 19.5 | DC - 18.0 | ATT-0263-89-SMA-02 |

Notes: 1. Midwest Microwave part number reflects a non-screened part. For a screened part, change suffix "N" to "S".
2. See Appendix for description of connector interface.

MIL-DTL-3933/25



| Military Part No. | Cinch Midwest Part No. | Dimension A inches (mm) (max.) | Attenuation Value (dB) (nom.) | Frequency Range (GHz) | Closest Commercial Alternate |
|-------------------|------------------------|-----------------------------------|----------------------------------|--------------------------|---------------------------------|
| - 01 | M3933/25-01N | 0.86 (21.9) | 1.0 | DC - 2.0 | ATT-0294-01-SMA-02 |
| - 02 | M3933/25-02N | 0.86 (21.9) | 2.0 | DC - 2.0 | ATT-0294-02-SMA-02 |
| - 03 | M3933/25-03N | 0.86 (21.9) | 3.0 | DC - 2.0 | ATT-0294-03-SMA-02 |
| - 04 | M3933/25-04N | 0.86 (21.9) | 4.0 | DC - 2.0 | ATT-0294-04-SMA-02 |
| - 05 | M3933/25-05N | 0.86 (21.9) | 5.0 | DC - 2.0 | ATT-0294-05-SMA-02 |
| - 06 | M3933/25-06N | 0.86 (21.9) | 6.0 | DC - 2.0 | ATT-0294-06-SMA-02 |
| - 07 | M3933/25-07N | 0.86 (21.9) | 7.0 | DC - 2.0 | ATT-0294-07-SMA-02 |
| - 08 | M3933/25-08N | 0.86 (21.9) | 8.0 | DC - 2.0 | ATT-0294-08-SMA-02 |
| - 09 | M3933/25-09N | 0.86 (21.9) | 9.0 | DC - 2.0 | ATT-0294-09-SMA-02 |
| - 10 | M3933/25-10N | 0.86 (21.9) | 10.0 | DC - 2.0 | ATT-0294-10-SMA-02 |
| - 11 | M3933/25-11N | 0.86 (21.9) | 11.0 | DC - 2.0 | ATT-0294-11-SMA-02 |
| - 12 | M3933/25-12N | 0.86 (21.9) | 12.0 | DC - 2.0 | ATT-0294-12-SMA-02 |
| - 13 | M3933/25-13N | 1.02 (26.0) | 13.0 | DC - 2.0 | ATT-0294-13-SMA-02 |
| - 14 | M3933/25-14N | 1.02 (26.0) | 14.0 | DC - 2.0 | ATT-0294-14-SMA-02 |
| - 15 | M3933/25-15N | 1.02 (26.0) | 15.0 | DC - 2.0 | ATT-0294-15-SMA-02 |
| - 16 | M3933/25-16N | 1.02 (26.0) | 16.0 | DC - 2.0 | ATT-0294-16-SMA-02 |
| - 17 | M3933/25-17N | 1.02 (26.0) | 17.0 | DC - 2.0 | ATT-0294-17-SMA-02 |
| - 18 | M3933/25-18N | 1.02 (26.0) | 18.0 | DC - 2.0 | ATT-0294-18-SMA-02 |
| - 19 | M3933/25-19N | 1.02 (26.0) | 19.0 | DC - 2.0 | ATT-0294-19-SMA-02 |
| - 20 | M3933/25-20N | 1.02 (26.0) | 20.0 | DC - 2.0 | ATT-0294-20-SMA-02 |
| - 27 | M3933/25-27N | 0.86 (21.9) | 1.0 | DC - 12.4 | ATT-0291-01-SMA-02 |
| - 28 | M3933/25-28N | 0.86 (21.9) | 2.0 | DC - 12.4 | ATT-0291-02-SMA-02 |
| - 29 | M3933/25-29N | 0.86 (21.9) | 3.0 | DC - 12.4 | ATT-0291-03-SMA-02 |
| - 30 | M3933/25-30N | 0.86 (21.9) | 4.0 | DC - 12.4 | ATT-0291-04-SMA-02 |
| - 31 | M3933/25-31N | 0.86 (21.9) | 5.0 | DC - 12.4 | ATT-0291-05-SMA-02 |
| - 32 | M3933/25-32N | 0.86 (21.9) | 6.0 | DC - 12.4 | ATT-0291-06-SMA-02 |
| - 33 | M3933/25-33N | 0.86 (21.9) | 7.0 | DC - 12.4 | ATT-0291-07-SMA-02 |
| - 34 | M3933/25-34N | 0.86 (21.9) | 8.0 | DC - 12.4 | ATT-0291-08-SMA-02 |
| - 35 | M3933/25-35N | 0.86 (21.9) | 9.0 | DC - 12.4 | ATT-0291-09-SMA-02 |
| - 36 | M3933/25-36N | 0.86 (21.9) | 10.0 | DC - 12.4 | ATT-0291-10-SMA-02 |
| - 37 | M3933/25-37N | 0.86 (21.9) | 11.0 | DC - 12.4 | ATT-0291-11-SMA-02 |
| - 38 | M3933/25-38N | 0.86 (21.9) | 12.0 | DC - 12.4 | ATT-0291-12-SMA-02 |
| - 39 | M3933/25-39N | 0.94 (23.9) | 13.0 | DC - 12.4 | ATT-0291-13-SMA-02 |

Notes: Part number reflects a non-screened part. For a screened part, change suffix "N" to "S". See Appendix for description of connector interface.

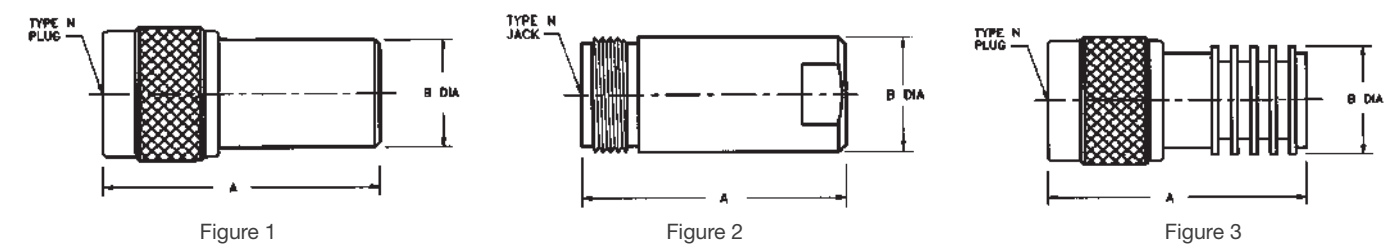
QPL APPROVED PRODUCTS

| Military Part No. | Cinch Midwest Part No. | Dimension A inches (mm) (max.) | Attenuation Value (dB) (nom.) | Frequency Range (GHz) | Closest Commercial Alternate |
|-------------------|------------------------|--------------------------------|-------------------------------|-----------------------|------------------------------|
| - 40 | M3933/25-40N | 0.94 (23.9) | 14.0 | DC - 12.4 | ATT-0291-14-SMA-02 |
| - 41 | M3933/25-41N | 0.94 (23.9) | 15.0 | DC - 12.4 | ATT-0291-15-SMA-02 |
| - 42 | M3933/25-42N | 0.94 (23.9) | 16.0 | DC - 12.4 | ATT-0291-16-SMA-02 |
| - 43 | M3933/25-43N | 0.94 (23.9) | 17.0 | DC - 12.4 | ATT-0291-17-SMA-02 |
| - 44 | M3933/25-44N | 0.94 (23.9) | 18.0 | DC - 12.4 | ATT-0291-18-SMA-02 |
| - 45 | M3933/25-45N | 0.94 (23.9) | 19.0 | DC - 12.4 | ATT-0291-19-SMA-02 |
| - 46 | M3933/25-46N | 1.02 (26.0) | 20.0 | DC - 12.4 | ATT-0291-20-SMA-02 |
| - 58 | M3933/25-58N | 0.86 (21.9) | 0 | DC - 18.0 | ATT-0290-00-SMA-02 |
| - 59 | M3933/25-59N | 0.86 (21.9) | 0.5 | DC - 18.0 | ATT-0290-70-SMA-02 |
| - 60 | M3933/25-60N | 0.86 (21.9) | 1.0 | DC - 18.0 | ATT-0290-01-SMA-02 |
| - 61 | M3933/25-61N | 0.86 (21.9) | 1.5 | DC - 18.0 | ATT-0290-71-SMA-02 |
| - 62 | M3933/25-62N | 0.86 (21.9) | 2.0 | DC - 18.0 | ATT-0290-02-SMA-02 |
| - 63 | M3933/25-63N | 0.86 (21.9) | 2.0 | DC - 18.0 | ATT-0290-72-SMA-02 |
| - 64 | M3933/25-64N | 0.86 (21.9) | 3.0 | DC - 18.0 | ATT-0290-03-SMA-02 |
| - 65 | M3933/25-65N | 0.86 (21.9) | 3.5 | DC - 18.0 | ATT-0290-73-SMA-02 |
| - 66 | M3933/25-66N | 0.86 (21.9) | 4.0 | DC - 18.0 | ATT-0290-04-SMA-02 |
| - 67 | M3933/25-67N | 0.86 (21.9) | 4.5 | DC - 18.0 | ATT-0290-74-SMA-02 |
| - 68 | M3933/25-68N | 0.86 (21.9) | 5.0 | DC - 18.0 | ATT-0290-05-SMA-02 |
| - 69 | M3933/25-69N | 0.86 (21.9) | 5.5 | DC - 18.0 | ATT-0290-75-SMA-02 |
| - 70 | M3933/25-70N | 0.86 (21.9) | 6.0 | DC - 18.0 | ATT-0290-06-SMA-02 |
| - 71 | M3933/25-71N | 0.86 (21.9) | 6.5 | DC - 18.0 | ATT-0290-76-SMA-02 |
| - 72 | M3933/25-72N | 0.86 (21.9) | 7.0 | DC - 18.0 | ATT-0290-07-SMA-02 |
| - 73 | M3933/25-73N | 0.86 (21.9) | 7.5 | DC - 18.0 | ATT-0290-77-SMA-02 |
| - 74 | M3933/25-74N | 0.86 (21.9) | 8.0 | DC - 18.0 | ATT-0290-08-SMA-02 |
| - 75 | M3933/25-75N | 0.86 (21.9) | 8.5 | DC - 18.0 | ATT-0290-78-SMA-02 |
| - 76 | M3933/25-76N | 0.86 (21.9) | 9.0 | DC - 18.0 | ATT-0290-09-SMA-02 |
| - 77 | M3933/25-77N | 0.86 (21.9) | 9.5 | DC - 18.0 | ATT-0290-79-SMA-02 |
| - 78 | M3933/25-78N | 0.86 (21.9) | 10.0 | DC - 18.0 | ATT-0290-10-SMA-02 |
| - 79 | M3933/25-79N | 0.86 (21.9) | 11.0 | DC - 18.0 | ATT-0290-11-SMA-02 |
| - 80 | M3933/25-80N | 0.86 (21.9) | 12.0 | DC - 18.0 | ATT-0290-12-SMA-02 |
| - 81 | M3933/25-81N | 0.94 (23.9) | 13.0 | DC - 18.0 | ATT-0290-13-SMA-02 |
| - 82 | M3933/25-82N | 0.94 (23.9) | 14.0 | DC - 18.0 | ATT-0290-14-SMA-02 |
| - 83 | M3933/25-83N | 1.02 (26.0) | 15.0 | DC - 18.0 | ATT-0290-15-SMA-02 |
| - 84 | M3933/25-84N | 1.02 (26.0) | 16.0 | DC - 18.0 | ATT-0290-16-SMA-02 |
| - 85 | M3933/25-85N | 1.02 (26.0) | 17.0 | DC - 18.0 | ATT-0290-17-SMA-02 |
| - 86 | M3933/25-86N | 1.02 (26.0) | 18.0 | DC - 18.0 | ATT-0290-18-SMA-02 |
| - 87 | M3933/25-87N | 1.02 (26.0) | 19.0 | DC - 18.0 | ATT-0290-19-SMA-02 |
| - 88 | M3933/25-88N | 1.02 (26.0) | 20.0 | DC - 18.0 | ATT-0290-20-SMA-02 |

Notes: Part number reflects a non-screened part. For a screened part, change suffix "N" to "S". See Appendix for description of connector interface.

Terminations

N Type Terminations MIL-DTL-39030/6



| Military Part No. | Cinch Midwest Part No. | Figure | Dimension A inches (mm) | Dimension B inches (mm) | Closest Commercial Alternate |
|-------------------|------------------------|--------|-------------------------|-------------------------|------------------------------|
| - 01 | M39030/6-01N | 1 | 1.60 (40.6) | .625 (15.9) | TRM-2053-MO-NNN-02 |
| - 02 | M39030/6-02N | 1 | 1.60 (40.6) | .625 (15.9) | TRM-2053-MO-NNN-02 |
| - 03 | M39030/6-03N | 1 | 1.51 (38.4) | .380 (9.70) | TRM-2053-MO-NNN-02 |
| - 04 | M39030/6-04N | 2 | 1.48 (37.6) | .380 (9.70) | TRM-2053-FO-NNN-02 |
| - 05 | M39030/6-05N | 3 | 1.60 (40.6) | .700 (17.8) | TRM-2080-MO-NNN-07 |
| - 06 | M39030/6-06N | 1 | 1.60 (40.6) | .625 (15.9) | TRM-2169-MO-NNN-02 |
| - 07 | M39030/6-07N | 2 | 1.60 (40.6) | .625 (15.9) | TRM-2169-FO-NNN-02 |

Midwest Microwave part number reflects a non-screened part. For a screened part, change suffix "N" to "S".

SMA Type Terminations MIL-DTL-39030/3

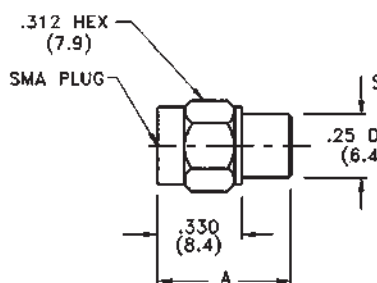


Figure 1

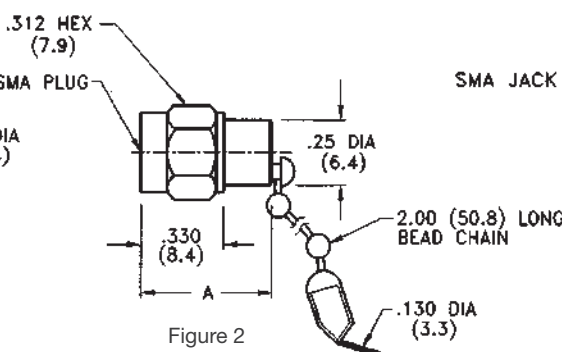


Figure 2

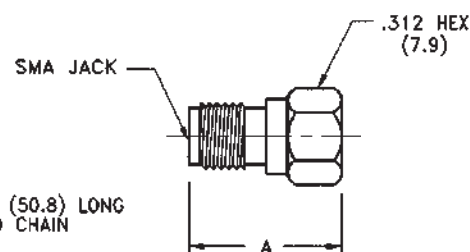


Figure 3

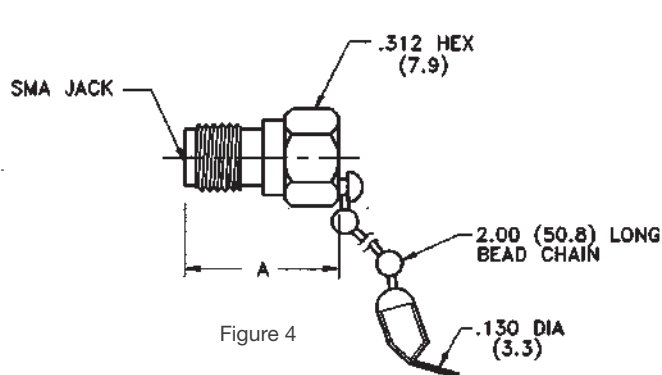


Figure 4

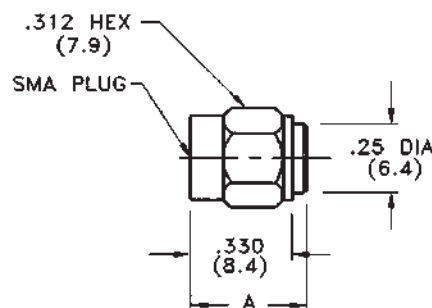


Figure 5

| Military Part No. | Cinch Midwest Part No. | Figure | Dimension A inches (mm) | Closest Commercial Alternate |
|-------------------|------------------------|--------|-------------------------|------------------------------|
| - 01 | M39030/3-01N | 1 | .52 (13.2) | TRM-2090-MO-SMA-00 |
| - 02 | M39030/3-02N | 1 | .52 (13.2) | TRM-2090-MO-SMA-02 |
| - 03 | M39030/3-03N | 2 | .52 (13.2) | TRM-2090-MC-SMA-00 |
| - 04 | M39030/3-04N | 2 | .52 (13.2) | TRM-2090-MC-SMA-02 |
| - 05 | M39030/3-05N | 3 | .53 (13.5) | TRM-2090-FO-SMA-00 |
| - 06 | M39030/3-06N | 3 | .53 (13.5) | TRM-2090-FO-SMA-02 |
| - 07 | M39030/3-07N | 4 | .53 (13.5) | TRM-2090-FC-SMA-00 |
| - 08 | M39030/3-08N | 4 | .53 (13.5) | TRM-2090-FC-SMA-02 |
| - 09 | M39030/3-09N | 1 | .52 (13.2) | TRM-2090-MO-SMA-00 |
| - 11 | M39030/3-11N | 5 | .39 (9.90) | TRM-2444-MO-SMA-00 |
| - 12 | M39030/3-12N | 1 | .52 (13.2) | TRM-2090-MO-SMA-00 |
| - 13 | M39030/3-13N | 2 | .52 (13.2) | TRM-2090-MC-SMA-00 |
| - 15 | M39030/3-15N | 1 | .52 (13.2) | TRM-2090-MO-SMA-00 |

Notes:

- Midwest Microwave part number reflects a non-screened part. For a screened part, change suffix "N" to "S".

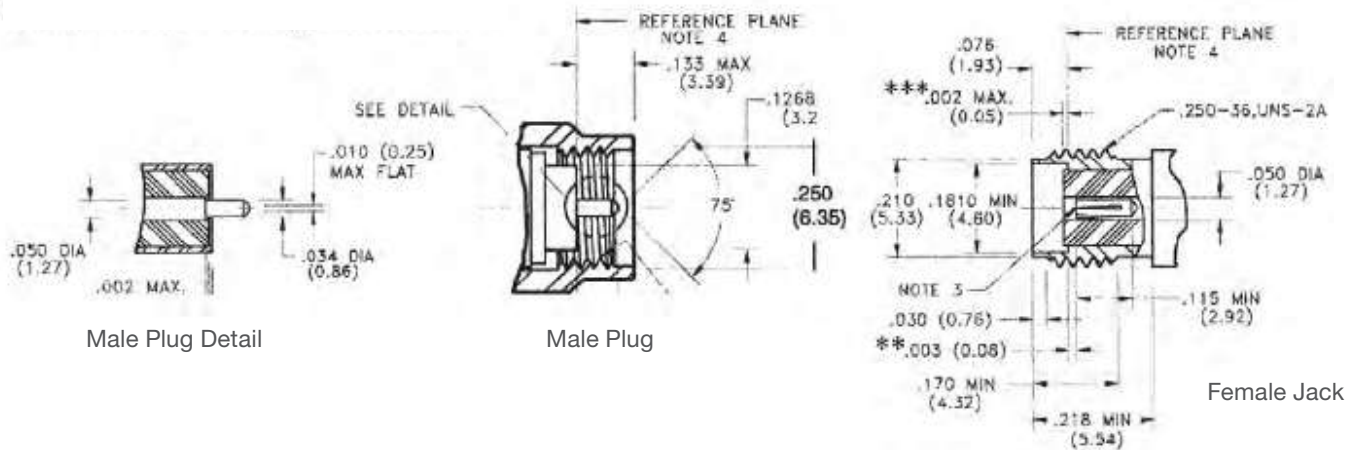
Coaxial Interface Dimensions

This Appendix is meant to provide the user with some of the necessary supplementary information they may require to allow them to make reasonable and timely decisions on choices of types of components, connectors, coaxial cable and cable assemblies in order to complete an up to date microwave system or subsystem. Should the user be unable to locate the information they require, please contact the factory and further information will be provided.

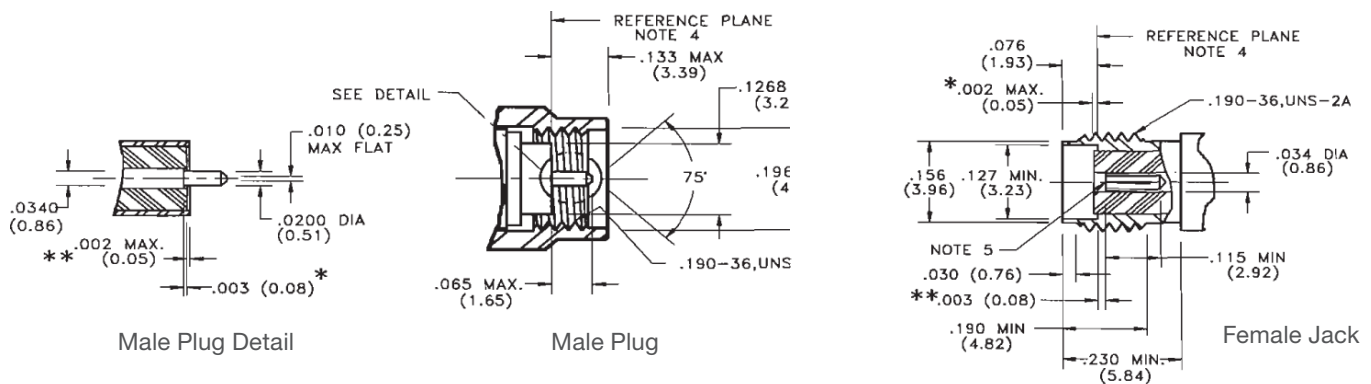
Mechanical dimensional specifications are stated in inches with metric equivalents (to the nearest 0.01 mm) given for reference information only, and are based on 1" = 25.4 millimeters.

While every precaution has been taken to ensure accuracy and completeness herein, Cinch Connectivity Solutions assumes no responsibility, and disclaims all liability for damages resulting from use of this information or for any errors or omissions. Specifications subject to change without notice.

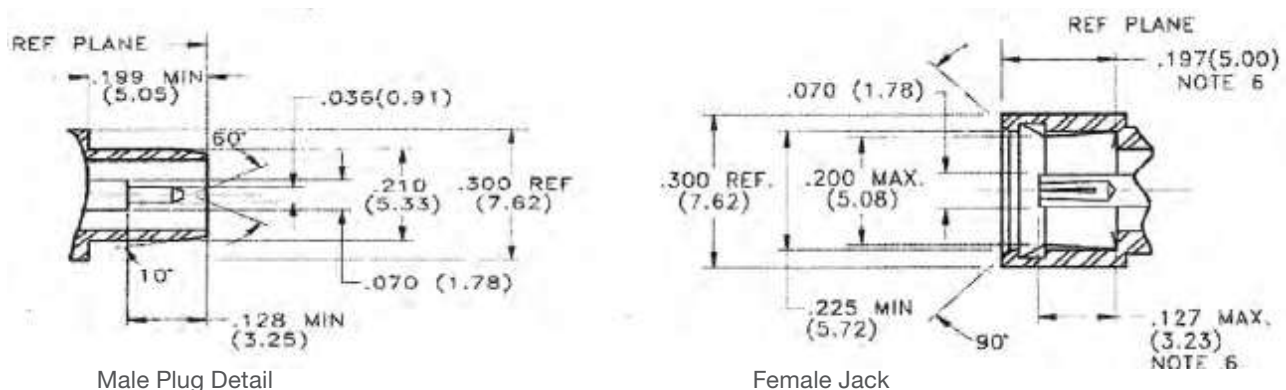
SMA Interface Mating Dimensions



SSMA Interface Mating Dimensions



BMA Interface Mating Dimensions



* Dielectric Insulator Gap - measured from connector body reference plane .002 inches max. above to .010 inches max. below.

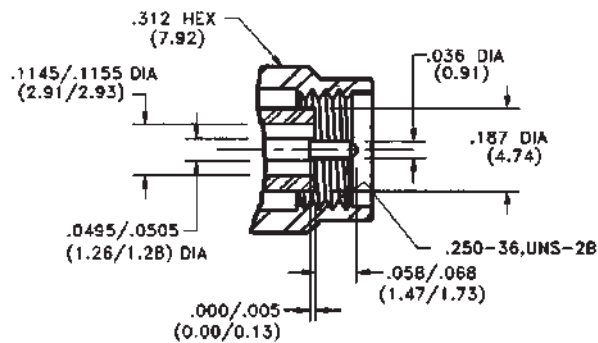
** Center Contact Gap - measured from connector body reference plane .000 inches min. (flush) to .010 max. below.

*** Dielectric Insulator Gap - measured from connector body reference plane .002 inches max. above to .005 inches max. below.

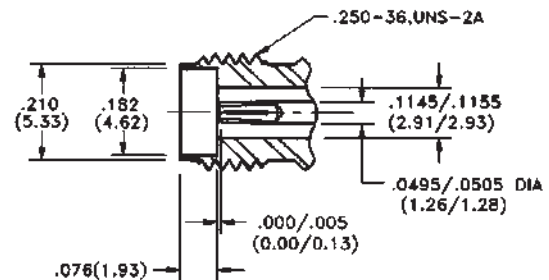
Notes:

1. Except where specified, all dimensions shown are nominal.
2. Metric equivalents (to the nearest 0.01 mm) are given for general information only and are based on 1 inch = 25.4 millimeters.
3. ID to meet VSWR, and contact resistance when mated with .0360 +.0010/-.0005 (0.914 +.0254/-.0127 mm) diameter pin.
4. When fully engaged, the two reference planes must coincide with metal to metal contact.
5. ID to meet VSWR, and contact resistance when mated with .0200 +.0008/-.0005 (0.508 +.0203/-.0127 mm) diameter pin.
6. Measured with outer contact spring bottomed as occurs in complete mating.

2.9 mm Precision Interface Mating Dimensions

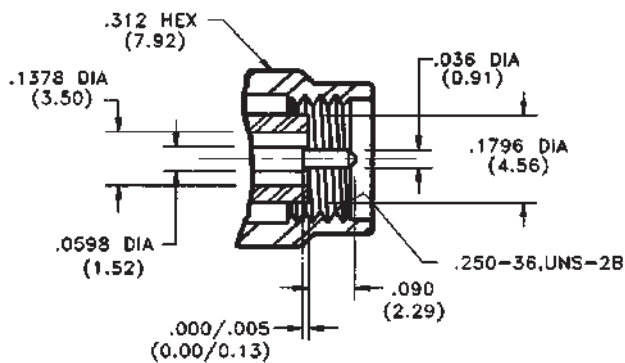


Male Plug

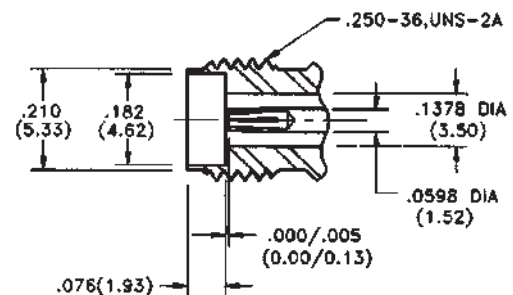


Female Jack

3.5 mm Precision Interface Mating Dimensions

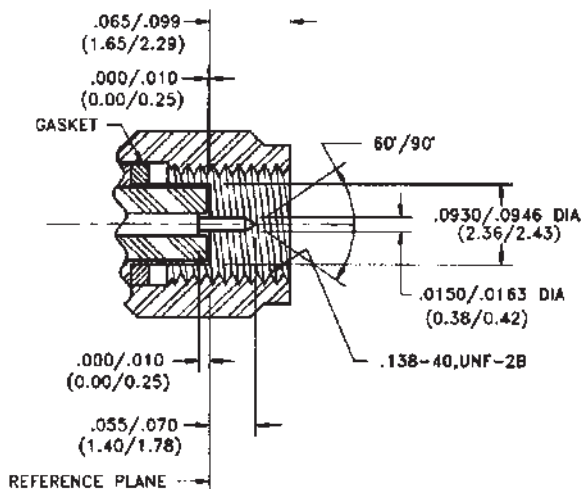


Male Plug

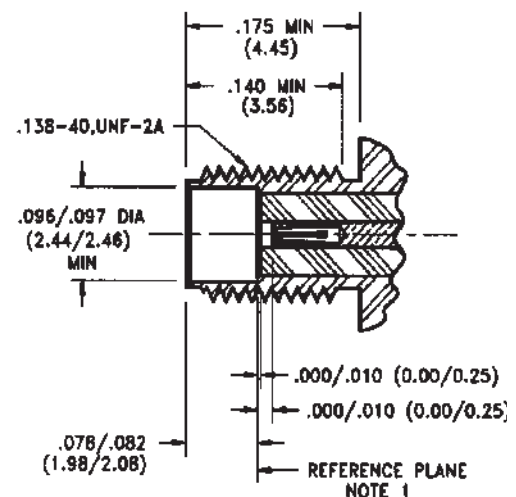


Female Jack

Type SMM Interface Mating Dimensions

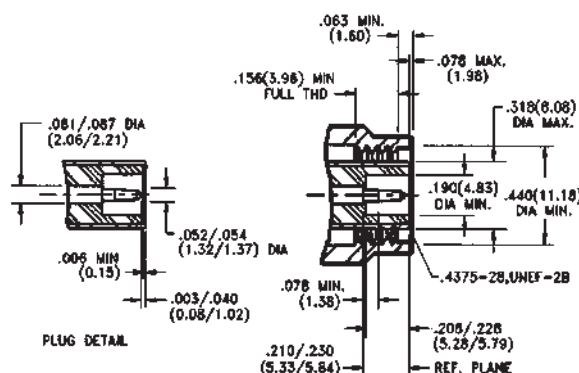


Male Plug

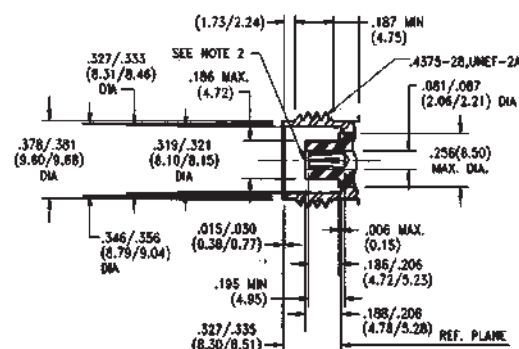


Female Jack

Type TNC Interface Mating Dimensions

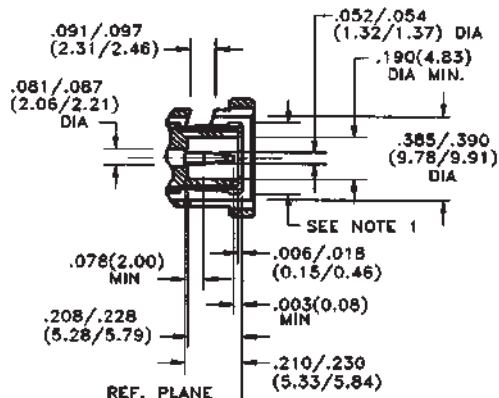


Male Plug

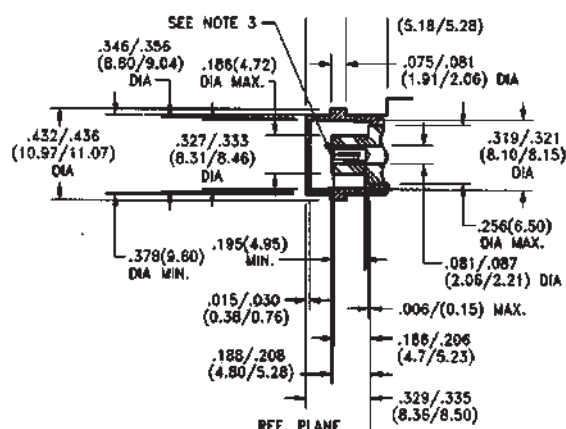


Female Jack

Type BNC Interface Mating Dimensions

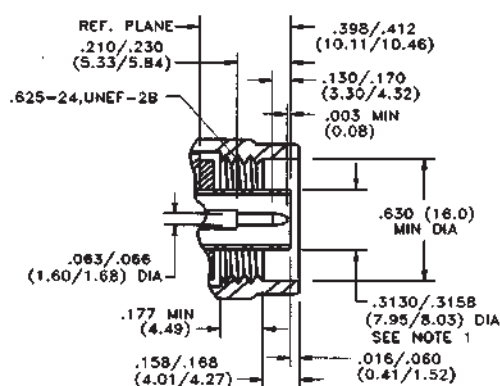


Male Plug

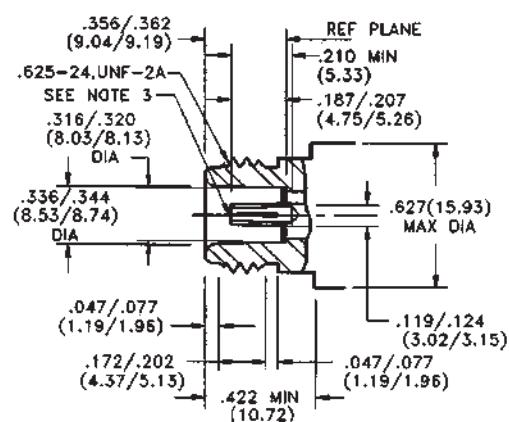


Female Jack

Type N Interface Mating Dimensions



Male Plug

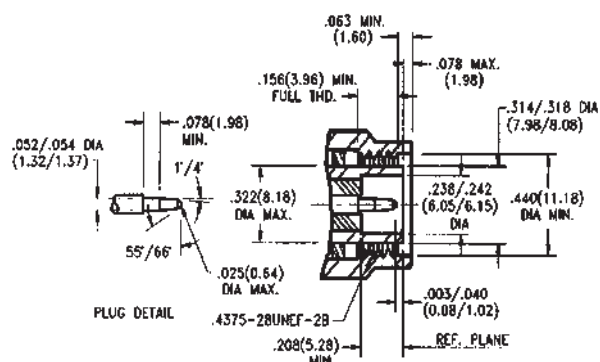


Female Jack

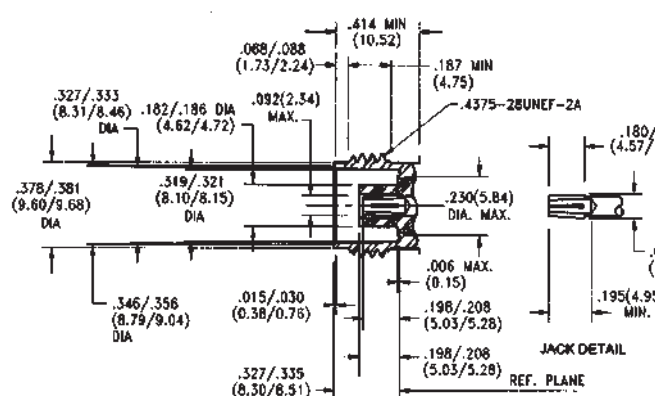
Notes:

1. I.D. to meet VSWR and contact resistance when mated with .052/.054 (1.32/1.37 mm) Diameter male pin.
2. I.D. to meet VSWR and contact resistance when mated with .063/.066 (1.60/1.68 mm) Diameter male pin.
3. Metric equivalents (to nearest 0.01 mm) are for general information only.

Type TNC-A Interface Mating Dimensions

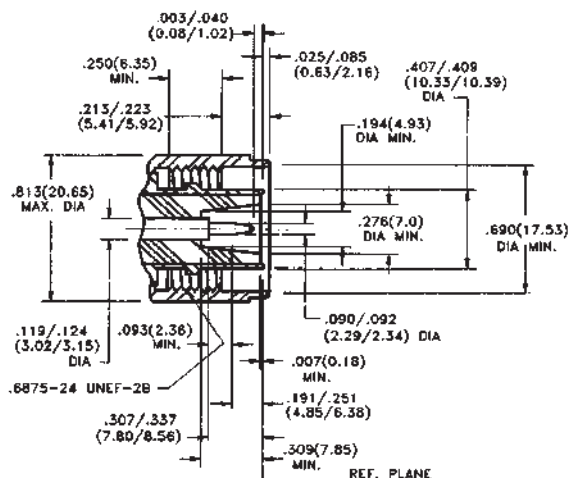


Male Plug

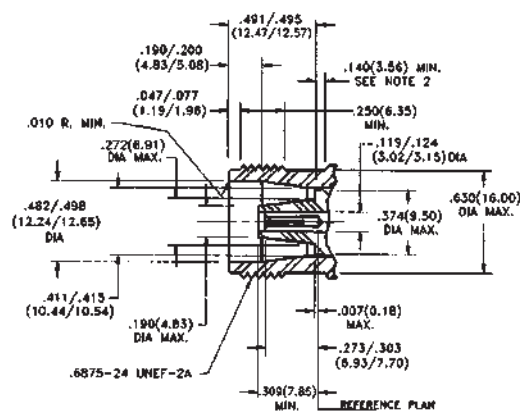


Female Jack

Type SC Interface Mating Dimensions

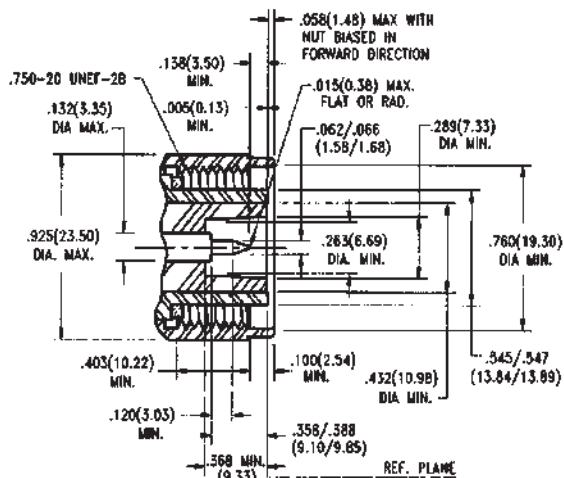


Male Plug

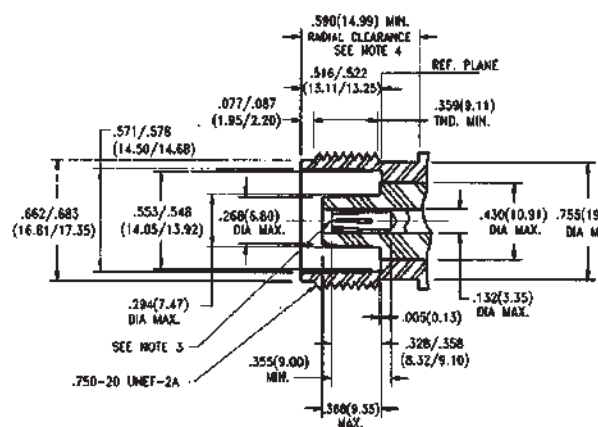


Female Jack

Type HN Interface Mating Dimensions

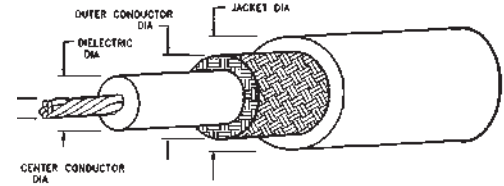


Male Plug



Female Jack

Flexible Coaxial Cable Information



| Cable Type | Impedance (Ohms) | Jacket Diameter | Outer Conductor Diameter | Dielectric Diameter | Center Conductor Diameter |
|------------|------------------|-----------------|--------------------------|---------------------|---------------------------|
| RG55/U | 53.5 | .216 max | .176 max | .116±.005 | .032 nom |
| RG58/U | 50 | .195±.004 | .150 max | .116±.004 | .0375 nom |
| RG141/U | 50 | .190±.005 | .146 max | .116±.005 | .039±.001 |
| RG142/U | 50 | .195±.005 | .171 max | .116±.005 | .039±.001 |
| RG174/U | 50 | .100±.005 | .088 max | .080±.003 | .020 nom |
| RG178/U | 50 | .075 max | .054 max | .034±.002 | .012 nom |
| RG179/U | 75 | .100±.005 | .084 max | .036±.003 | .012 nom |
| RG180/U | 95 | .145 max | .124 max | .102±.003 | .012 nom |
| RG187/U | 75 | .110 max | .084 max | .060±.003 | .012 nom |
| RG188/U | 50 | .110 max | .081 max | .060±.003 | .020 nom |
| RG195/U | 95 | .155 max | .124 max | .102±.003 | .012 nom |
| RG196/U | 50 | .080 max | .054 max | .034±.002 | .012 nom |
| RG214/U | 50 | .425±.007 | .360 max | .285±.003 | .089±.001 |
| RG223/U | 50 | .2165 max | .176 max | .116±.004 | .035±.001 |
| RG303/U | 50 | .170±.005 | .146 max | .1160±.005 | .039±.001 |
| RG316/U | 50 | .102 max | .081 max | .060±.003 | .020 nom |

| Cable | Attenuation – dB per 100 ft. at Frequency (GHz) | | | | | | | | Power – | | | | | |
|-------|---|------|------|------|------|--------|--------|-------|---------|-----|-----|-----|-----|-----|
| | .1 | .2 | .4 | 1 | 3 | 5 | 10 | .1 | .2 | .4 | 1 | 3 | 5 | 10 |
| 55 | 4.8 | 7.0 | 10.0 | 16.5 | 30.5 | 46.0 | >100.0 | 480 | 320 | 215 | 120 | 60 | 40 | - |
| 58 | 4.6 | 6.9 | 10.6 | 17.5 | 37.5 | 60.0 | >100.0 | 300 | 200 | 135 | 80 | 40 | 20 | - |
| 141 | 3.9 | 5.6 | 8.0 | 13.5 | 27.0 | 39.0 | 70.0 | 1,700 | 1,200 | 830 | 450 | 220 | 140 | 65 |
| 142 | 3.9 | 5.6 | 8.0 | 13.5 | 27.0 | 39.0 | 70.0 | 1,800 | 1,300 | 800 | 530 | 265 | 175 | 100 |
| 174 | 8.9 | 12.0 | 17.5 | 30.0 | 64.0 | 99.0 | >100.0 | 110 | 80 | 60 | 35 | 15 | 10 | - |
| 178 | 14.0 | 19.0 | 28.0 | 46.0 | 85.0 | >100.0 | >100.0 | 240 | 180 | 120 | 75 | 40 | - | - |
| 179 | 10.0 | 12.5 | 16.0 | 24.0 | 44.0 | 65.0 | >100.0 | 480 | 420 | 320 | 190 | 100 | 73 | - |
| 180 | 5.7 | 7.5 | 10.8 | 17.0 | 35.0 | 50.0 | 88.0 | 800 | 570 | 400 | 240 | 130 | 90 | 50 |
| 187 | 10.0 | 12.5 | 16.0 | 24.0 | 44.0 | 69.0 | >100.0 | 480 | 420 | 320 | 190 | 100 | 73 | - |
| 188 | 11.4 | 14.2 | 16.7 | 31.0 | 60.0 | 82.0 | >100.0 | 400 | 325 | 275 | 150 | 80 | 55 | - |
| 195 | 5.7 | 7.6 | 10.8 | 17.0 | 35.0 | 50.0 | 88.0 | 800 | 570 | 400 | 240 | 130 | 90 | 50 |
| 196 | 14.0 | 19.0 | 28.0 | 46.0 | 85.0 | >100.0 | >100.0 | 240 | 180 | 120 | 75 | 40 | - | - |
| 214 | 2.3 | 3.3 | 5.0 | 8.8 | 18.0 | 27.0 | 45.0 | 780 | 550 | 360 | 200 | 100 | 65 | 40 |
| 223 | 4.8 | 7.0 | 10.0 | 16.5 | 30.5 | 46.0 | >100.0 | 480 | 320 | 215 | 120 | 60 | 40 | - |
| 303 | 3.9 | 5.6 | 8.0 | 13.5 | 27.0 | 39.0 | 70.0 | 1,800 | 1,300 | 900 | 500 | 265 | 175 | 100 |
| 316 | 11.4 | 14.2 | 16.7 | 31.0 | 60.0 | 82.0 | >100.0 | 400 | 325 | 275 | 150 | 80 | 55 | - |

VSWR vs. Return Loss Table

| VSWR | R. L. (dB) | VSWR | R. L. (dB) | VSWR | R. L. (dB) | VSWR | R. L. (dB) | VSWR | R. L. (dB) |
|-------|------------|-------|------------|-------|------------|-------|------------|--------|------------|
| 1.001 | 66.025 | 1.060 | 30.714 | 1.138 | 23.803 | 1.480 | 14.264 | 5.400 | 3.255 |
| 1.002 | 60.009 | 1.061 | 30.575 | 1.140 | 23.686 | 1.490 | 14.120 | 5.600 | 3.136 |
| 1.003 | 56.491 | 1.062 | 30.438 | 1.142 | 23.571 | 1.500 | 13.979 | 5.800 | 3.025 |
| 1.004 | 53.997 | 1.063 | 30.303 | 1.144 | 23.457 | 1.520 | 13.708 | 6.000 | 2.923 |
| 1.005 | 52.063 | 1.064 | 30.171 | 1.146 | 23.346 | 1.540 | 13.449 | 6.200 | 2.827 |
| 1.006 | 50.484 | 1.065 | 30.040 | 1.148 | 23.235 | 1.560 | 13.201 | 6.400 | 2.737 |
| 1.007 | 49.149 | 1.066 | 29.912 | 1.150 | 23.127 | 1.580 | 12.964 | 6.600 | 2.653 |
| 1.008 | 47.993 | 1.067 | 29.785 | 1.152 | 23.020 | 1.600 | 12.736 | 6.800 | 2.573 |
| 1.009 | 46.975 | 1.068 | 29.661 | 1.154 | 22.914 | 1.620 | 12.518 | 7.000 | 2.499 |
| 1.010 | 46.064 | 1.069 | 29.538 | 1.156 | 22.810 | 1.640 | 12.308 | 7.200 | 2.428 |
| 1.011 | 45.240 | 1.070 | 29.417 | 1.158 | 22.708 | 1.660 | 12.107 | 7.400 | 2.362 |
| 1.012 | 44.489 | 1.071 | 29.298 | 1.160 | 22.607 | 1.680 | 11.913 | 7.600 | 2.299 |
| 1.013 | 43.798 | 1.072 | 29.181 | 1.162 | 22.507 | 1.700 | 11.725 | 7.800 | 2.239 |
| 1.014 | 43.159 | 1.073 | 29.066 | 1.164 | 22.408 | 1.720 | 11.545 | 8.000 | 2.183 |
| 1.015 | 42.564 | 1.074 | 28.952 | 1.166 | 22.311 | 1.740 | 11.370 | 8.200 | 2.129 |
| 1.016 | 42.007 | 1.075 | 28.839 | 1.168 | 22.215 | 1.760 | 11.202 | 8.400 | 2.078 |
| 1.017 | 41.485 | 1.076 | 28.728 | 1.170 | 22.120 | 1.780 | 11.039 | 8.600 | 2.029 |
| 1.018 | 40.993 | 1.077 | 28.619 | 1.172 | 22.027 | 1.800 | 10.881 | 8.800 | 1.983 |
| 1.019 | 40.528 | 1.078 | 28.511 | 1.174 | 21.934 | 1.820 | 10.729 | 9.000 | 1.938 |
| 1.020 | 40.086 | 1.079 | 28.405 | 1.176 | 21.843 | 1.840 | 10.581 | 9.200 | 1.896 |
| 1.021 | 39.667 | 1.080 | 28.299 | 1.178 | 21.753 | 1.860 | 10.437 | 9.400 | 1.855 |
| 1.022 | 39.267 | 1.081 | 28.196 | 1.180 | 21.664 | 1.880 | 10.298 | 9.600 | 1.816 |
| 1.023 | 38.885 | 1.082 | 28.093 | 1.182 | 21.576 | 1.900 | 10.163 | 9.800 | 1.779 |
| 1.024 | 38.520 | 1.083 | 27.992 | 1.184 | 21.489 | 1.920 | 10.032 | 10.000 | 1.743 |
| 1.025 | 38.170 | 1.084 | 27.892 | 1.186 | 21.403 | 1.940 | 9.904 | 11.000 | 1.584 |
| 1.026 | 37.833 | 1.085 | 27.794 | 1.188 | 21.318 | 1.960 | 9.780 | 12.000 | 1.451 |
| 1.027 | 37.510 | 1.086 | 27.696 | 1.190 | 21.234 | 1.980 | 9.660 | 13.000 | 1.339 |
| 1.028 | 37.198 | 1.087 | 27.600 | 1.192 | 21.151 | 2.000 | 9.542 | 14.000 | 1.243 |
| 1.029 | 36.898 | 1.088 | 27.505 | 1.194 | 21.069 | 2.100 | 8.999 | 15.000 | 1.160 |
| 1.030 | 36.607 | 1.089 | 27.411 | 1.196 | 20.988 | 2.200 | 8.519 | 16.000 | 1.087 |
| 1.031 | 36.327 | 1.090 | 27.318 | 1.198 | 20.907 | 2.300 | 8.091 | 17.000 | 1.023 |
| 1.032 | 36.055 | 1.091 | 27.226 | 1.200 | 20.828 | 2.400 | 7.707 | 18.000 | 0.966 |
| 1.033 | 35.792 | 1.092 | 27.135 | 1.210 | 20.443 | 2.500 | 7.360 | 19.000 | 0.915 |
| 1.034 | 35.537 | 1.093 | 27.046 | 1.220 | 20.079 | 2.600 | 7.044 | 20.000 | 0.869 |
| 1.035 | 35.290 | 1.094 | 26.957 | 1.230 | 19.732 | 2.700 | 6.755 | 22.000 | 0.790 |
| 1.036 | 35.049 | 1.095 | 26.869 | 1.240 | 19.401 | 2.800 | 6.490 | 24.000 | 0.724 |
| 1.037 | 34.816 | 1.096 | 26.782 | 1.250 | 19.085 | 2.900 | 6.246 | 26.000 | 0.668 |
| 1.038 | 34.588 | 1.097 | 26.697 | 1.260 | 18.783 | 3.000 | 6.021 | 28.000 | 0.621 |
| 1.039 | 34.367 | 1.098 | 26.612 | 1.270 | 18.493 | 3.100 | 5.811 | 30.000 | 0.579 |
| 1.040 | 34.151 | 1.099 | 26.528 | 1.280 | 18.216 | 3.200 | 5.617 | 32.000 | 0.543 |
| 1.041 | 33.941 | 1.100 | 26.444 | 1.290 | 17.949 | 3.300 | 5.435 | 34.000 | 0.511 |
| 1.042 | 33.763 | 1.102 | 26.281 | 1.300 | 17.692 | 3.400 | 5.265 | 36.000 | 0.483 |
| 1.043 | 33.536 | 1.104 | 26.120 | 1.310 | 17.445 | 3.500 | 5.105 | 38.000 | 0.457 |
| 1.044 | 33.341 | 1.106 | 25.963 | 1.320 | 17.207 | 3.600 | 4.956 | 40.000 | 0.434 |

| VSWR | R. L. (dB) | VSWR | R. L. (dB) | VSWR | R. L. (dB) | VSWR | R. L. (dB) | VSWR | R. L. (dB) |
|-------|------------|-------|------------|-------|------------|-------|------------|---------|------------|
| 1.045 | 33.150 | 1.108 | 25.809 | 1.330 | 16.977 | 3.700 | 4.815 | 42.000 | 0.414 |
| 1.046 | 32.963 | 1.110 | 25.658 | 1.340 | 16.755 | 3.800 | 4.682 | 44.000 | 0.395 |
| 1.047 | 32.780 | 1.112 | 25.510 | 1.350 | 16.540 | 3.900 | 4.556 | 46.000 | 0.378 |
| 1.048 | 32.602 | 1.114 | 25.364 | 1.360 | 16.332 | 4.000 | 4.437 | 48.000 | 0.362 |
| 1.049 | 32.427 | 1.116 | 25.221 | 1.370 | 16.131 | 4.100 | 4.324 | 50.000 | 0.347 |
| 1.050 | 32.256 | 1.118 | 25.081 | 1.380 | 15.936 | 4.200 | 4.217 | 55.000 | 0.316 |
| 1.051 | 32.088 | 1.120 | 24.943 | 1.390 | 15.747 | 4.300 | 4.115 | 60.000 | 0.290 |
| 1.052 | 31.923 | 1.122 | 24.808 | 1.400 | 15.563 | 4.400 | 4.018 | 65.000 | 0.267 |
| 1.053 | 31.762 | 1.124 | 24.675 | 1.410 | 15.385 | 4.500 | 3.926 | 70.000 | 0.248 |
| 1.054 | 31.604 | 1.126 | 24.544 | 1.420 | 15.211 | 4.600 | 3.838 | 75.000 | 0.232 |
| 1.055 | 31.449 | 1.128 | 24.415 | 1.430 | 15.043 | 4.700 | 3.753 | 80.000 | 0.217 |
| 1.056 | 31.297 | 1.130 | 24.289 | 1.440 | 14.879 | 4.800 | 3.673 | 85.000 | 0.204 |
| 1.057 | 31.147 | 1.132 | 24.164 | 1.450 | 14.719 | 4.900 | 3.596 | 90.000 | 0.193 |
| 1.058 | 31.000 | 1.134 | 24.042 | 1.460 | 14.564 | 5.000 | 3.522 | 95.000 | 0.183 |
| 1.059 | 30.856 | 1.136 | 23.921 | 1.470 | 14.412 | 5.200 | 3.383 | 100.000 | 0.174 |

Product Environmental Specifications

Cinch Connectivity Solutions has used the guidelines of MIL-HDBK-5400 and MIL-HDBK-2036 to specify the below listed environmental condition that the standard non QPL catalog products of Midwest Microwave product line are designed to meet.

| | |
|--------------------------------|--|
| Temperature range: | Operating -55°C to +125°C Non-Operating -65°C to +125°C |
| Thermal Shock: | MIL-STD-202G Method 107, Test Condition B, 5 cycles, -65°C to +125°C |
| Vibration: | MIL-STD-202G Method 204, Test Condition B .06" Double Amplitude Displacement 10 - 70 Hz 15 G's peak 70 - 2000 Hz 12 cycles (10 - 2000 - 10 Hz) each axis for 20 min per cycle |
| Shock: | MIL-STD-202G Method 213, Test Condition J 1/2 Sine, 30 G's, 11 millisecond duration. 3 shock pulses in each direction along 3 perpendicular axis. Total 18 pulses |
| Humidity: | MIL-STD-202G Method 106, Except for steps 7a & 7b 98% relative humidity, 25°C to 65°C, 10 cycles, 240 Hrs |
| Salt Spray (Corrosion): | MIL-STD-202G Method 101, Test Condition B (48 Hrs) |
| RFI Leakage: | -40dBc |
| Altitude: | 70,000ft Max |

Requirements other than those specified above need to be reviewed on a case-by-case basis. Midwest Microwave products have routinely met environmental requirements more severe than noted above, but in each case they were treated as custom parts with specially assigned custom part numbers. Please contact customer service to inquire about any custom requirements.

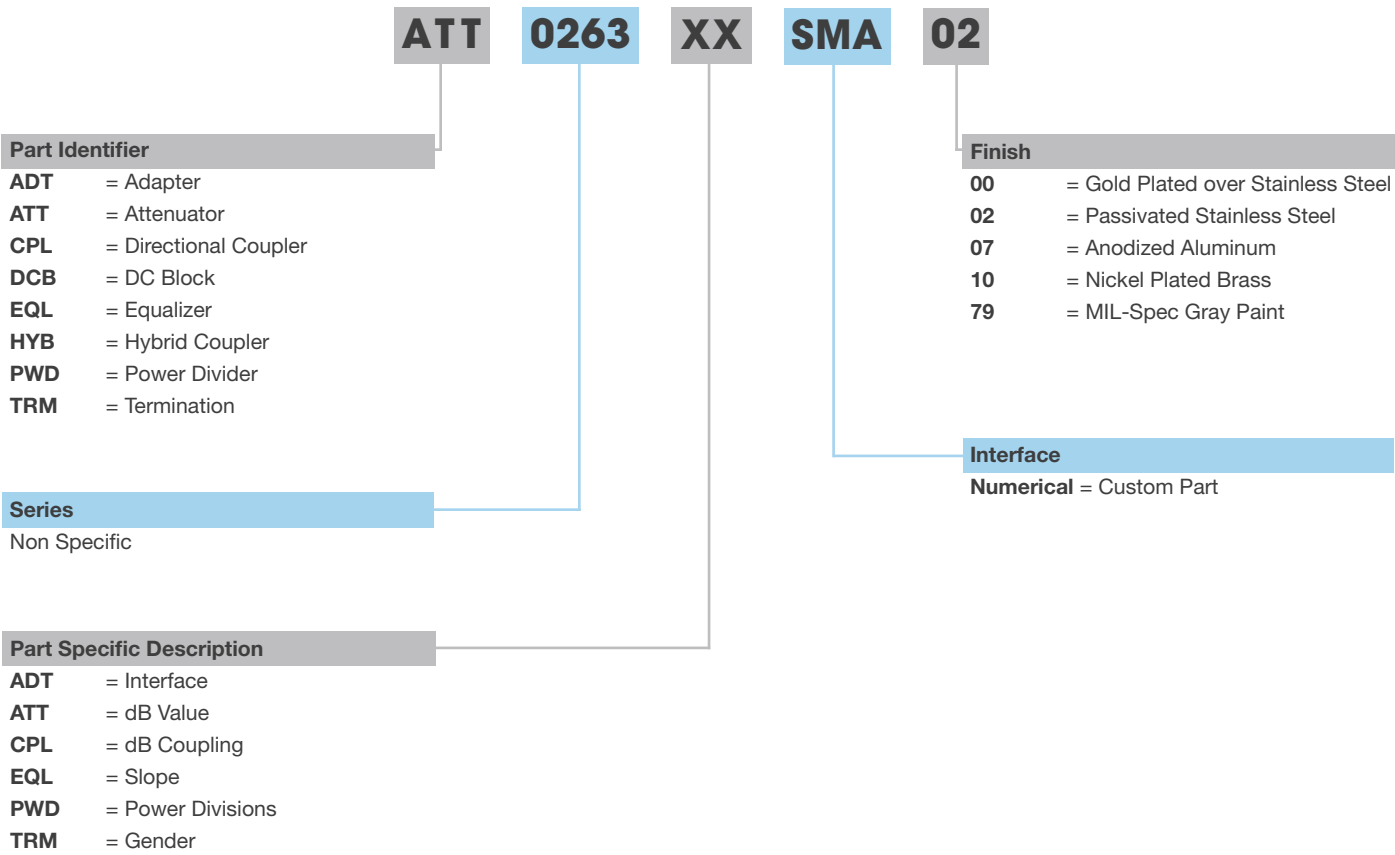
Space Qualified Parts

Cinch Connectivity Solutions custom manufactures Midwest Microwave line of High Reliability (Hi-Rel) products suitable for use under space flight conditions. These products are manufactured using a system that provides complete traceability of all of the piece parts that make up their assembly. All materials used meet or exceed the 1% TML and 0.1% CVCM requirements as tested per ASTM E595.

Hi-Rel parts are manufactured to individual customer specifications and undergo extensive testing as required by the customer. Example below shows how a space rated attenuator inspection and testing requirements may look like.

Please contact us for custom designs for space attenuators, terminations, connectors and adapters.

General Part Number Logic*



* Does not apply to connectors and QPL parts.

| Model No. | Page | Model No. | Page | Model No. | Page |
|---------------------------|------|--------------------|------|------------------------------------|------|
| Adapters - Coaxial | | ADT-2685-TM-SMM-02 | 81 | ADT-8000-MF-SMA-02 | 89 |
| ADT-2540-7M-SMM-02 | 68 | ADT-2686-TM-SMF-02 | 81 | ADT-8000-MM-SMA-02 | 89 |
| ADT-2541-7M-SMF-02 | 68 | ADT-2687-TF-SMM-02 | 81 | ATS-3551-18-NNN-02 | 25 |
| ADT-2542-7M-SMM-02 | 70 | ADT-2688-TF-SMF-02 | 81 | ATS-3554-18-SMA-02 | 25 |
| ADT-2543-7M-SMF-02 | 70 | ADT-2689-TF-SMM-02 | 82 | ATT-0205-XX-SMA-02 | 12 |
| ADT-2544-7M-NNM-02 | 71 | ADT-2694-MF-NNN-02 | 96 | ATT-0218-XX-NNN-02 | 20 |
| ADT-2545-7M-NNF-02 | 71 | ADT-2695-SM-SSM-02 | 84 | ATT-0219-XX-NNN-02 | 20 |
| ADT-2546-7M-TNM-02 | 72 | ADT-2696-SM-SSF-02 | 84 | ATT-0225-XX-TNC-02 | 22 |
| ADT-2547-7M-TNF-02 | 72 | ADT-2697-SF-SSM-02 | 84 | ATT-0238-XX-SMA-02 | 12 |
| ADT-2576-NM-SMM-02 | 75 | ADT-2698-SF-SSF-02 | 84 | ATT-0263-XX-SMA-02 | 12 |
| ADT-2577-NM-SMF-02 | 75 | ADT-2699-TF-SMF-02 | 82 | ATT-0275-XX-SMA-02 | 14 |
| ADT-2578-NF-SMM-02 | 75 | ADT-2701-7M-3MM-02 | 69 | ATT-0276-XX-SMA-02 | 14 |
| ADT-2579-NF-SMF-02 | 75 | ADT-2702-7M-3MF-02 | 69 | ATT-0277-XX-SMA-02 | 14 |
| ADT-2580-NM-SMM-02 | 74 | ADT-2712-NM-3MM-02 | 73 | ATT-(0)290(f/m)-XX-HEX-02 | 10 |
| ADT-2581-NM-SMF-02 | 74 | ADT-2713-NM-3MF-02 | 73 | ATT-(0)290(f/m)-XX-SMA-02 | 7 |
| ADT-2582-NF-SMM-02 | 74 | ADT-2714-NF-3MM-02 | 73 | ATT-0291-XX-HEX-02 | 10 |
| ADT-2583-NF-SMF-02 | 74 | ADT-2715-NF-3MF-02 | 73 | ATT-0291-XX-SMA-02 | 7 |
| ADT-2584-NM-TNM-02 | 78 | ADT-2733-MF-3MM-02 | 90 | ATT-0292-XX-HEX-02 | 10 |
| ADT-2585-NM-TNF-02 | 78 | ADT-2734-MM-3MM-02 | 90 | ATT-0292-XX-SMA-02 | 8 |
| ADT-2586-NF-TNM-02 | 78 | ADT-2735-FF-3MM-02 | 90 | ATT-0294-XX-HEX-02 | 10 |
| ADT-2587-NF-TNF-02 | 78 | ADT-2767-SF-BMF-02 | 87 | ATT-0294-XX-SMA-02 | 8 |
| ADT-2588-MF-NNN-02 | 92 | ADT-2768-SM-BMF-02 | 85 | ATT-0298-XX-HEX-02 | 10 |
| ADT-2589-MM-NNN-02 | 92 | ADT-2769-SF-BMM-02 | 86 | ATT-0298-XX-SMA-02 | 7 |
| ADT-2590-FF-NNN-02 | 92 | ADT-2770-SM-BMM-02 | 86 | ATT-0303-XX-SMA-07 | 18 |
| ADT-2591-7M-SCM-02 | 72 | ADT-2793-TF-SMF-02 | 82 | ATT-0313-XX-BNC-10 | 23 |
| ADT-2592-7M-SCF-02 | 72 | ADT-2797-SF-BMM-02 | 86 | ATT-0333-XX-SMA-02 | 13 |
| ADT-2593-MF-SMA-02 | 88 | ADT-2806-SF-BMM-02 | 85 | ATT-0389-XX-NNN-02 | 20 |
| ADT-2594-MM-SMA-02 | 88 | ADT-2809-NF-SMM-02 | 87 | ATT-0391-XX-NNN-07 | 21 |
| ADT-2595-FF-SMA-02 | 88 | ADT-2810-NF-SMM-02 | 76 | ATT-0444-XX-SMA-02 | 11 |
| ADT-2596-MF-TNC-02 | 93 | ADT-2815-TF-SMM-02 | 82 | ATT-0451-XX-SMA-02 | 9 |
| ADT-2597-MM-TNC-02 | 93 | ADT-2823-FF-SMA-02 | 88 | ATT-0473-XX-SMA-07 | 17 |
| ADT-2598-FF-TNC-02 | 93 | ADT-2824-FF-SMA-02 | 89 | ATT-(0)523(f)-XX-SMA-02 | 15 |
| ADT-2599-NF-SMF-02 | 76 | ADT-2825-FF-NNN-02 | 92 | ATT-0550-XX-35M-02 | 16 |
| ADT-2613-NM-BNM-02 | 79 | ADT-2826-FF-TNC-02 | 93 | ATT-0553-XX-SMA-07 | 19 |
| ADT-2614-NM-BNF-02 | 79 | ADT-2828-MF-BNC-10 | 95 | ATT-0590-XX-SSM-02 | 24 |
| ADT-2615-NF-BNM-02 | 79 | ADT-2829-FF-BNC-10 | 95 | ATT-0640-XX-29M | 6 |
| ADT-2616-NF-BNF-02 | 79 | ADT-2830-MM-BNC-10 | 95 | | |
| ADT-2618-NM-SCM-02 | 80 | ADT-2831-FF-BNC-10 | 95 | Commercial Grade Components | |
| ADT-2619-NF-SCM-02 | 80 | ADT-2833-FF-SCO-02 | 94 | CGA-1040-01-SMA-02 | 100 |
| ADT-2638-NM-SCF-02 | 80 | ADT-2835-FF-SCO-02 | 94 | CGA-1040-02-SMA-02 | 100 |
| ADT-2639-NF-SCF-02 | 80 | ADT-2837-TF-SMF-02 | 96 | CGA-1040-03-SMA-02 | 100 |
| ADT-2670-BM-SMM-02 | 83 | ADT-2838-BF-SMF-02 | 96 | CGA-1040-06-SMA-02 | 100 |
| ADT-2671-BM-SMF-02 | 83 | ADT-2840-NF-SMF-02 | 76 | CGA-1040-10-SMA-02 | 100 |
| ADT-2672-BF-SMM-02 | 83 | ADT-2850-FF-35M-02 | 90 | CGA-1040-20-SMA-02 | 100 |
| ADT-2673-BF-SMF-02 | 83 | ADT-2851-MF-29M-00 | 91 | CGS-1030-00-NNN-34 | 99 |
| ADT-2680-NM-SMM-02 | 77 | ADT-2852-FF-29M-00 | 91 | CGT-1400-F0-29M-02 | 101 |
| ADT-2681-NM-SMF-02 | 77 | ADT-2853-MM-29M-00 | 91 | CGT-1400-M0-29M-02 | 101 |
| ADT-2682-NF-SMM-02 | 77 | ADT-2854-FF-29M-02 | 91 | CGT-1500-F0-24M-02 | 101 |
| ADT-2683-NF-SMF-02 | 77 | ADT-8000-FF-SMA-02 | 89 | CGT-1500-M0-24M-02 | 101 |

| Model No. | Page | Model No. | Page | Model No. | Page |
|-------------------------------|------|------------------------------------|---------|-------------------------------|------|
| Couplers - Directional | | DCB-3511-MF-SMA-02 | 46 | PWD-5530-02-SMA-79 | 60 |
| CPL-5211-06-SMA-79 | 53 | DCB-3524-IO-NNN-02 | 47 | PWD-5530-04-SMA-79 | 62 |
| CPL-5211-10-SMA-79 | 53 | DCB-3525-IO-NNN-02 | 47 | PWD-5530-08-SMA-79 | 63 |
| CPL-5211-20-SMA-79 | 53 | DCB-3534-IO-TNC-02 | 47 | PWD-5532-02-SMA-79 | 60 |
| CPL-5211-30-SMA-79 | 53 | DCB-3535-IO-TNC-02 | 47 | PWD-5532-03-SMA-79 | 61 |
| CPL-5212-06-SMA-79 | 53 | DCB-3537-IO-SMA-02 | 47 | PWD-5532-04-SMA-79 | 62 |
| CPL-5212-10-SMA-79 | 53 | DCB-3538-IO-SMA-02 | 47 | PWD-5532-08-SMA-79 | 63 |
| CPL-5212-20-SMA-79 | 53 | DCB-3549-IO-SMA-02 | 47 | PWD-5533-02-SMA-79 | 60 |
| CPL-5212-30-SMA-79 | 53 | Hybrid Couplers | | PWD-5533-03-SMA-79 | 61 |
| CPL-5214-06-SMA-79 | 53 | HYB-5411-X3-SMA-79 | 55 | PWD-5536-02-29M-79 | 59 |
| CPL-5214-10-SMA-79 | 53 | HYB-5412-X3-SMA-79 | 55 | PWD-5536-04-29M-79 | 59 |
| CPL-5214-20-SMA-79 | 53 | HYB-5413-X3-SMA-79 | 55 | Shorts - Coaxial | |
| CPL-5214-30-SMA-79 | 53 | HYB-5414-X3-SMA-79 | 55 | SHT-2172-(F0/M0)-SMA-02 | 45 |
| CPL-5215-06-SMA-79 | 53 | HYB-5415-X3-SMA-79 | 55 | SHT-2174-(F0/M0)-NNN-02 | 45 |
| CPL-5215-10-SMA-79 | 53 | HYB-5416-X3-SMA-79 | 55 | SHT-2175-(F0/M0)-TNC-02 | 45 |
| CPL-5215-20-SMA-79 | 53 | HYB-5417-X3-SMA-79 | 55 | Terminations - Coaxial | |
| CPL-5215-30-SMA-79 | 53 | HYB-5423-X3-SMA-79 | 55 | TRM-2001-F0-NNN-02 | 39 |
| CPL-5216-06-SMA-79 | 53 | Military Part Numbers - QPL | | TRM-2001-(MC/M0)-NNN-02 | 39 |
| CPL-5216-10-SMA-79 | 53 | MIL-DTL-3933/14 | 103 | TRM-2010-M0-SMA-07 | 34 |
| CPL-5216-20-SMA-79 | 53 | MIL-DTL-3933/16 | 104-105 | TRM-2013-F0-SMA-07 | 34 |
| CPL-5216-30-SMA-79 | 53 | MIL-DTL-3933/25 | 106-107 | TRM-2013-M0-SMA-07 | 34 |
| CPL-5217-06-SMA-79 | 53 | MIL-DTL-39030/3 | 109 | TRM-2048-F0-BNC-10 | 44 |
| CPL-5217-10-SMA-79 | 53 | MIL-DTL-39030/6 | 108 | TRM-2048-(MC/M0)-BNC-10 | 44 |
| CPL-5217-20-SMA-79 | 53 | Opens - Coaxial | | TRM-2052-(00/0C)-7MM-02 | 38 |
| CPL-5217-30-SMA-79 | 53 | OPN-2182-(F0/M0)-SMA-02 | 45 | TRM-2053-F0-NNN-02 | 39 |
| CPL-5220-06-SMA-79 | 54 | OPN-2184-(F0/M0)-NNN-02 | 45 | TRM-2053-(MC/M0)-NNN-02 | 39 |
| CPL-5220-10-SMA-79 | 54 | OPN-2185-(F0/M0)-TNC-02 | 45 | TRM-2054-F0-SMA-02 | 30 |
| CPL-5220-16-SMA-79 | 54 | Power Dividers | | TRM-2054-(MC/M0)-SMA-02 | 29 |
| CPL-5220-20-SMA-79 | 54 | PWD-2532-02-SMA-79 | 58 | TRM-2055-F0-SMA-02 | 30 |
| CPL-5220-30-SMA-79 | 54 | PWD-2533-02-SMA-79 | 58 | TRM-2055-(MC/M0)-SMA-02 | 29 |
| CPL-5222-06-SMA-79 | 54 | PWD-5511-02-SMA-79 | 60 | TRM-2057-M0-SMA-07 | 34 |
| CPL-5222-10-SMA-79 | 54 | PWD-5512-02-SMA-79 | 60 | TRM-2058-F0-SMA-02 | 30 |
| CPL-5222-16-SMA-79 | 54 | PWD-5514-02-SMA-79 | 60 | TRM-2058-(MC/M0)-SMA-02 | 29 |
| CPL-5222-20-SMA-79 | 54 | PWD-5515-02-SMA-79 | 60 | TRM-2070-F0-NNN-07 | 40 |
| CPL-5222-30-SMA-79 | 54 | PWD-5517-02-SMA-79 | 60 | TRM-2070-(MC/M0)-NNN-07 | 40 |
| CPL-5226-06-SMA-79 | 54 | PWD-5520-02-SMA-79 | 60 | TRM-2071-F0-NNN-07 | 40 |
| CPL-5226-10-SMA-79 | 54 | PWD-5520-03-SMA-79 | 61 | TRM-2071-(MC/M0)-NNN-07 | 40 |
| CPL-5226-16-SMA-79 | 54 | PWD-5520-04-SMA-79 | 62 | TRM-2080-F0-NNN-07 | 41 |
| CPL-5226-20-SMA-79 | 54 | PWD-5520-08-SMA-79 | 63 | TRM-2080-(MC/M0)-NNN-07 | 41 |
| CPL-5226-30-SMA-79 | 54 | PWD-5522-02-SMA-79 | 60 | TRM-2089-F0-SMA-02 | 32 |
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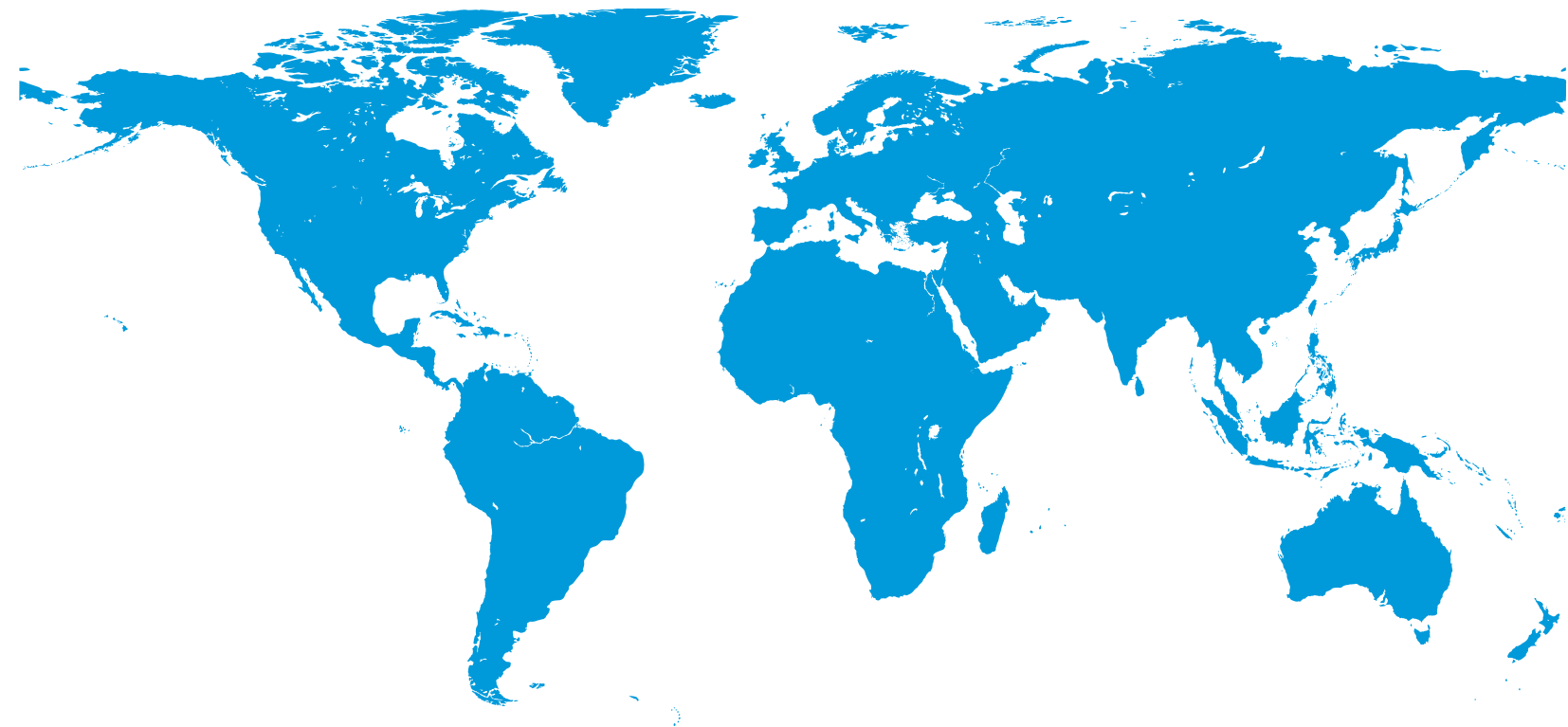
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