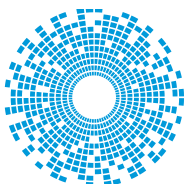




# Product Catalog



**cinch**  
CONNECTIVITY SOLUTIONS  
a bel group

## About Bel

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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

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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

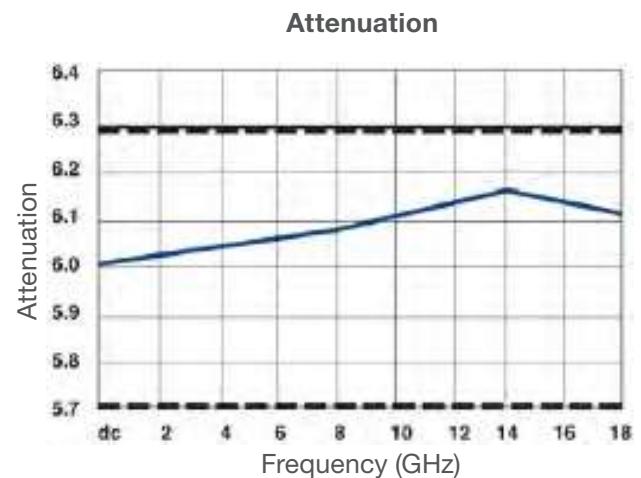
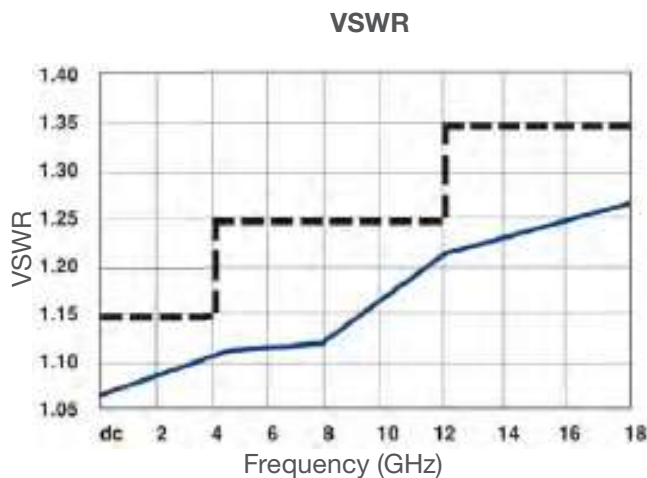
- MIL-DTL-3933 Qualified (QPL) Parts - see QPL section for product listing
- DC - 4, DC - 8, DC - 12.4, DC - 18, DC - 26 GHz, and DC - 40 GHz Performance
- Small Size, Light Weight, Rugged Construction
- Average Power up to 20 Watts
- SMA, N, TNC, BNC, 2.9mm, and 3.5mm Connector Configurations
- Designed 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  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  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

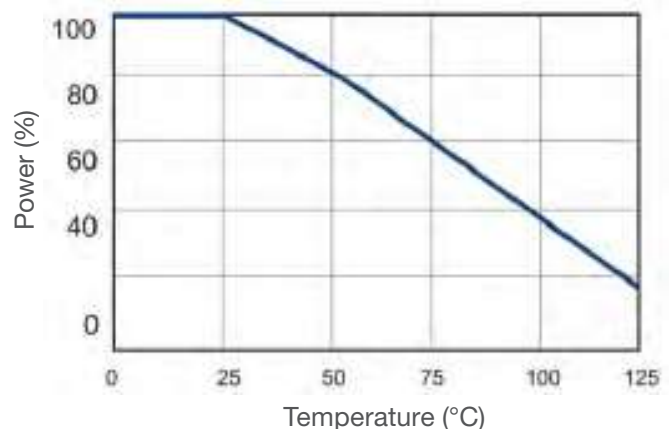
In addition to the wide variety of standard model attenuators available on an off the shelf basis, Midwest Microwave retains an extensive engineering staff to accommodate your special requirements. A complete in-house design and manufacturing facility is provided including all testing and documentation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

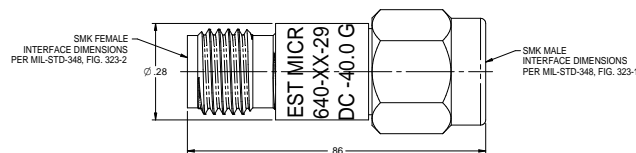
<b>Series</b>	ATT-0640	
<b>Frequency, (GHz)</b>	DC - 40	
<b>Attenuation Accuracy, (dB):</b>	<b>Attenuator Value</b>	<b>Tolerance (max)</b>
	3 & 6 (DC - 18 GHz)	± 0.5
	3 & 6 (18-40 GHz)	± 0.8
	10 & 20 (DC - 18 GHz)	± 0.6
	10 & 20 (18-40 GHz)	± 1.0
<b>VSWR table, (max.):</b>	<b>Freq. (GHz)</b>	<b>VSWR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

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

### DC - 40.0 GHz 640 Series

<b>Male/Female</b>
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

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

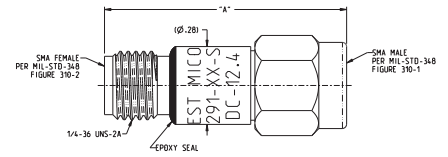
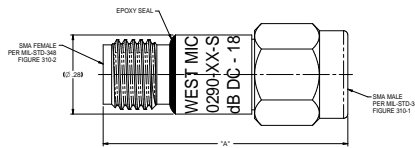
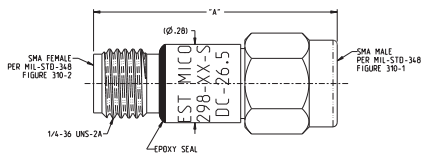
## DC - 2.0 GHz 294 Series

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

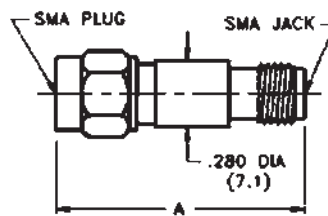
## DC - 18.0 GHz 451 Series

### 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 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

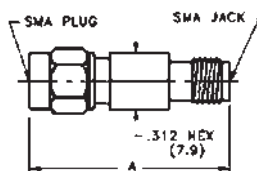
Male/Female
ATT-0292-XX-HEX-02*

### DC - 2.0 GHz Hex Body 294 HEX Series

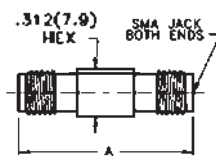
Male/Female
ATT-0294-XX-HEX-02*

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

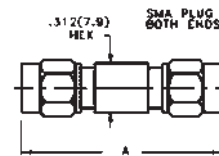
Contact factory for custom versions, different gender configurations, other dB values and 0.5dB increments



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

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

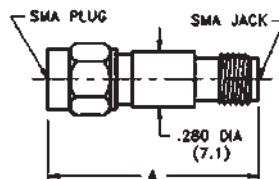
### DC - 18.0 GHz 444 Series

#### 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

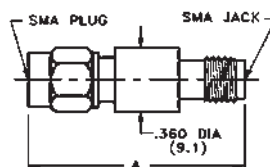
### DC - 12.4 GHz 205 Series

### 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

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

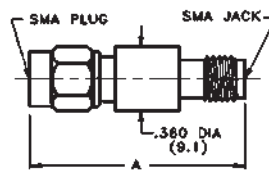
\* Rated @25°C, derated linearly to 0.5W @ 125°C

### DC - 18.0 GHz 333 Series

<b>Male/Female</b>
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

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

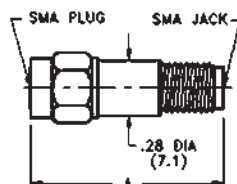
Male/Female
ATT-0276-XX-SMA-02*

### 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

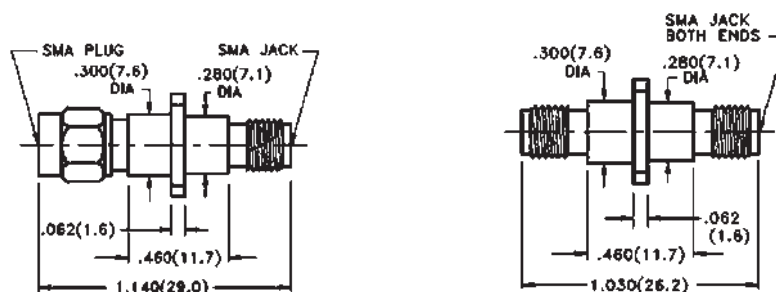
<b>Series</b>	ATT-0523	
<b>Frequency, (GHz)</b>	DC - 18.0	
<b>Attenuation Accuracy, (dB):</b>	Attenuator Value	Tolerance (max)
	1-6	± 0.3
	7-20	± 0.5
<b>VSWR formula, (max.):</b>	1.07 + 0.015 (f GHz)	
<b>VSWR table, (max.):</b>	Freq. (GHz)	VSWR
	DC - 8.0	1.19
	8.0-12.4	1.25
	12.4-18.0	1.34
<b>Average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

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

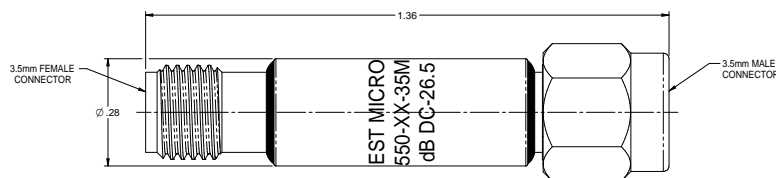
\* Rated @25°C, derated linearly to 0.5W @ 125°C

### DC - 26.5 GHz 550 Series

<b>Male/Female</b>
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

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

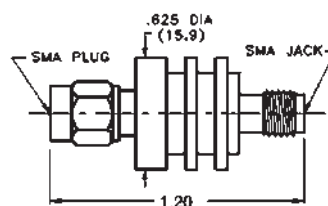
\* Rated @25°C, derated linearly to 0.5W @ 125°C

### DC - 18.0 GHz 473 Series

<b>Male/Female</b>
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

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

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

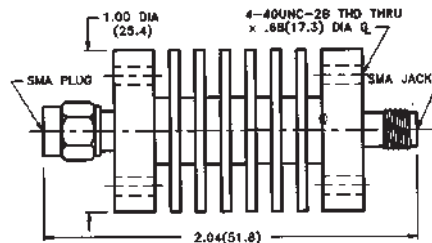
### DC - 18.0 GHz 303 Series

#### 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

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

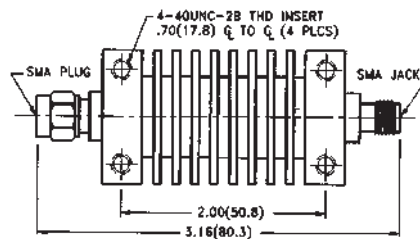
\* Rated @40°C, derated linearly to 5W @ 125°C

### DC - 15.0 GHz 553 Series

<b>Male/Female</b>
ATT-0553-XX-SMA-07*

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

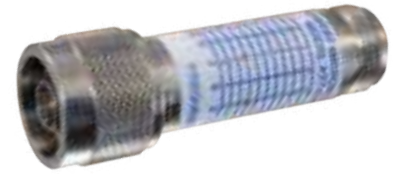
Contact factory for custom versions, different gender configurations, other dB values and 0.5dB increments



# 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

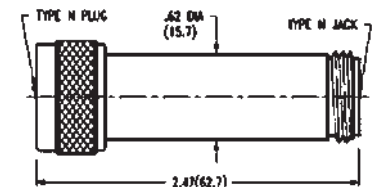
Attenuation Accuracy, (dB):	Attenuator Value	1-6	7-20	21-30
	Tolerance (max)	± 0.3	± 0.5	± 1.0
VSWR formula, (max.):	1.07 + 0.015 (f GHz)			
VSWR table, (max.):	Freq. (GHz)	VSWR		
	DC - 8.0	1.19		
	8.0-12.4	1.25		
	12.4-18.0	1.34		
Average Power*, (W):	2			
Operating Temperature, (°C)	-65 to +125			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

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

#### DC - 18.0 GHz 389 Series

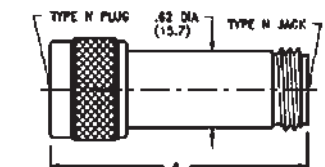
Part Number	Low VSWR
ATT-0389-XX-NNN-02	

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

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

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

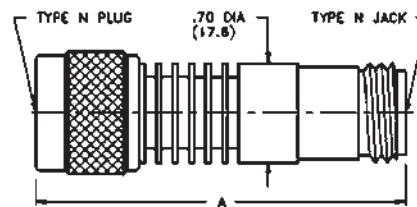
### DC - 12.4 GHz 391 Series

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

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

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

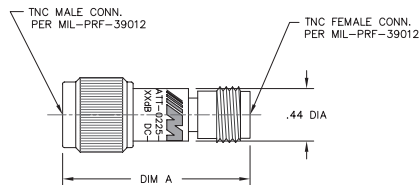
### DC - 18.0 GHz 225 Series

#### 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

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

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

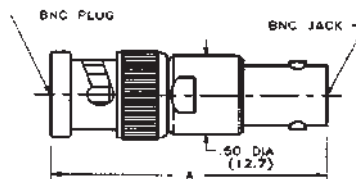
### DC - 4.0 GHz 313 Series

#### 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)

# ATTENUATORS

## SSMA Type

### DC - 18.0 GHz, SSMA Type



#### Technical Specification

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

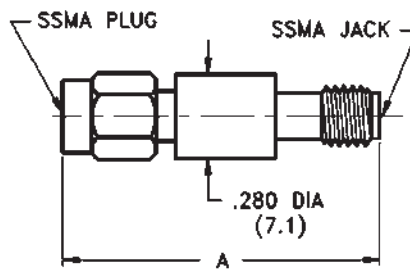
\* Rated @25°C, derated linearly to 0.5W @ 125°C

#### DC - 18.0 GHz 590 Series

<b>Male/Female</b>
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

<b>Series</b>	ATS-3554	ATS-3551
<b>Interface</b>	SMA	N
<b>Frequency, (GHz)</b>	DC - 18.0	DC - 18.0

#### Technical Specification

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

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

### SMA

#### DC - 18.0 GHz

<b>Male/Female</b>
ATS-3554-18-SMA-02



### Type N

#### DC - 18.0 GHz

<b>Male/Female</b>
ATS-3551-18-NNN-02





## General Information

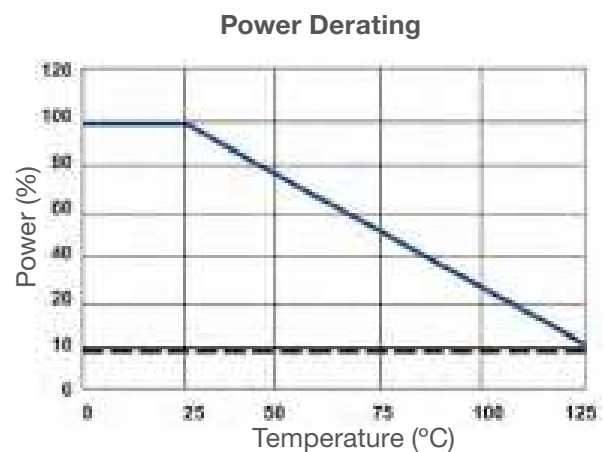
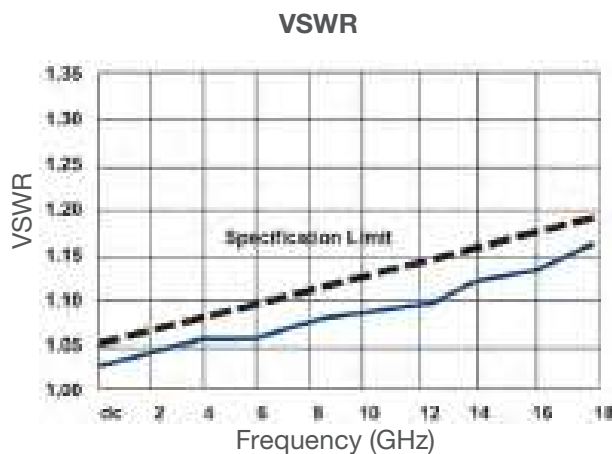
- MIL-DTL-39030 Qualified (QPL) - see QPL section for product listings
- DC - 26.5 GHz Performance
- Small Size, Light Weight, Rugged Construction
- Average Power up to 20 Watts
- SMA, BMA, N, TNC, BNC, 3.5mm, and 7mm Connector Configurations

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, ( $\Omega$ )	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

### DC - 26.5 GHz 2443 Series

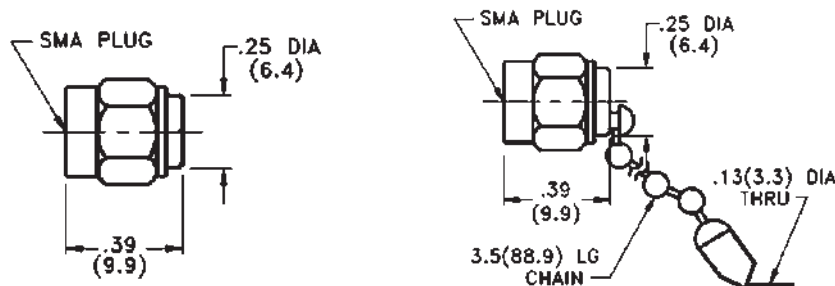
Male Plug	Male Plug with Chain
TRM-2443-M0-SMA-02	TRM-2443-MC-SMA-02

### 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

<b>Series</b>	TRM-2443	TRM-2444
<b>Frequency, (GHz)</b>	DC - 26.5	DC - 18.0

### Technical Specification

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

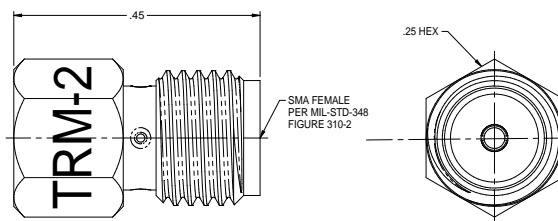
\* Rated @25 $^{\circ}$ C, derated linearly to 0W @ 125 $^{\circ}$ C

### DC - 26.5 GHz 2443 Series

<b>Female Jack</b>
TRM-2443-F0-SMA-02

### DC - 18.0 GHz 2444 Series

<b>Female Jack</b>
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 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, ( $\Omega$ )	50	
Average Power*, (W):	2	
Operating Temperature, ( $^{\circ}$ C)	-65 to +125	
Finish:	Passivated Stainless Steel	

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

### DC - 26.5 GHz 2054 Series

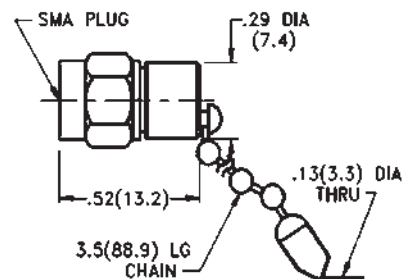
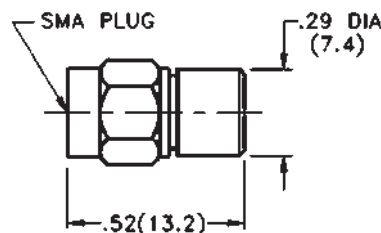
Male Plug	Male Plug with Chain
TRM-2054-M0-SMA-02	TRM-2054-MC-SMA-02

### 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

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

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

### DC - 26.5 GHz 2054 Series

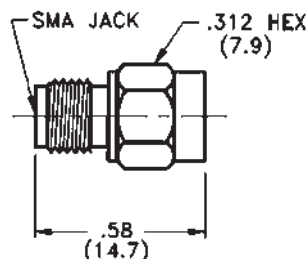
<b>Female Jack</b>
TRM-2054-F0-SMA-02

### DC - 18.0 GHz 2055 Series

<b>Female Jack</b>
TRM-2055-F0-SMA-02

### DC - 8.0 GHz 2058 Series

<b>Female Jack</b>
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, ( $\Omega$ )	50	
Average Power*, (W)	2	
Operating Temperature, ( $^{\circ}$ C)	-65 to +125	
Finish:	Passivated Stainless Steel	

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

### DC - 26.5 GHz 2089 Series

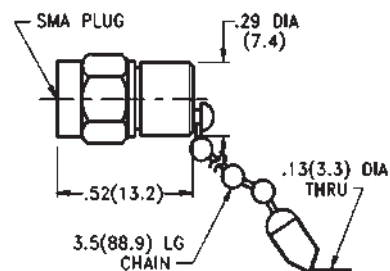
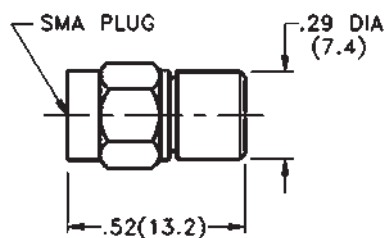
Male Plug	Male Plug with Chain
TRM-2089-M0-SMA-02	TRM-2089-MC-SMA-02

### 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, ( $\Omega$ )	50	
Average Power*, (W):	2	
Operating Temperature, ( $^{\circ}$ C)	-65 to +125	
Finish:	Passivated Stainless Steel	

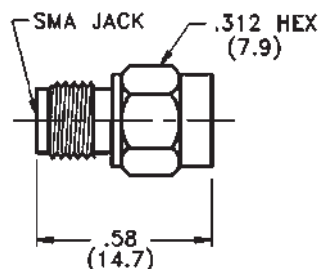
\* Rated @25 $^{\circ}$ C, derated linearly to 1W @ 125 $^{\circ}$ C

### 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, ( $\Omega$ )	50	
Average Power*, (W)	2	
Operating Temperature, ( $^{\circ}$ C)	-65 to +125	
Finish:	Passivated Stainless Steel	

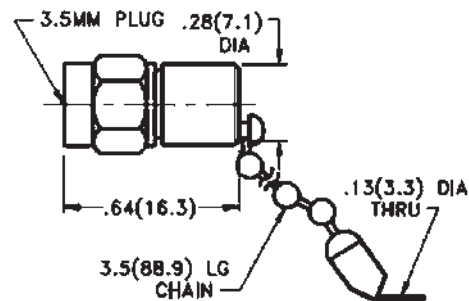
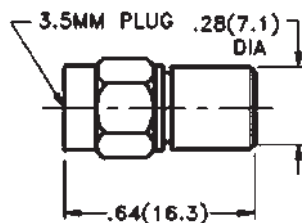
\* Rated @25 $^{\circ}$ C, derated linearly to 1W @ 125 $^{\circ}$ C

### 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

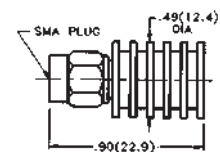
### Technical Specification

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

\* Rated @25 $^{\circ}$ C, derated linearly to 1W\* or 0.5W\*\* @ 125 $^{\circ}$ C

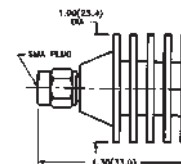
### 3 Watts - DC - 18.0 GHz 2057 Series

Male Plug
TRM-2057-M0-SMA-07



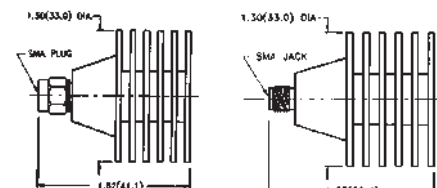
### 5 Watts - DC - 18.0 GHz 2010 Series

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

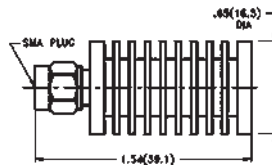
\*\* Rated @40°C, derated linearly to 5W @ 125°C

### Technical Specification

VSWR table, (max.):	Freq. (GHz)	VSWR
	DC - 12.4	1.25
	12.4-18.0	1.35
Nominal Impedance, ( $\Omega$ )	50	
Operating Temperature, ( $^{\circ}$ C)	-55 to +125	
Finish, Body:	Black Anodized Aluminum	
Finish, Connectors:	Passivated Stainless Steel	

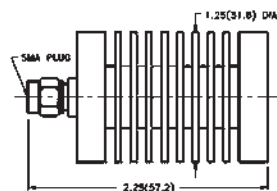
### 10 Watts - DC - 18.0 GHz 2138 Series

Male Plug
TRM-2138-M0-SMA-07



### 20 Watts - DC - 18.0 GHz 2129 Series

Male Plug
TRM-2129-M0-SMA-07



# TERMINATIONS

## 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

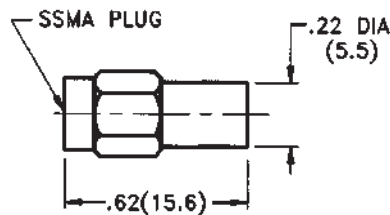
<b>Series</b>	TRM-2180	
<b>Interface</b>	SSMA	
<b>Frequency, (GHz)</b>	DC - 18.0	
<b>VSWR formula, (max.):</b>	1.1 + 0.01 (f GHz)	
<b>VSWR table, (max.):</b>	Freq. (GHz)	VSWR
	DC - 12.4	1.22
	12.4-18.0	1.28
<b>Nominal Impedance, (<math>\Omega</math>)</b>	50	
<b>Average Power*, (W):</b>	0.5	
<b>Operating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

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

## Subminiature

### DC - 18.0 GHz 2180 Series

<b>Male Plug</b>
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

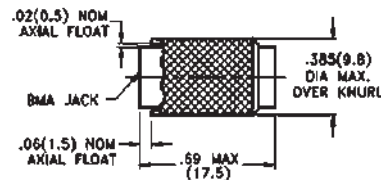
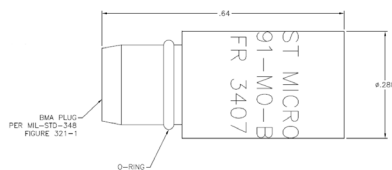
### Technical Specification

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, ( $\Omega$ )	50	
Average Power*, (W):	0.5	
Operating Temperature, ( $^{\circ}\text{C}$ )	-65 to +125	
Finish:	Passivated Stainless Steel	

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

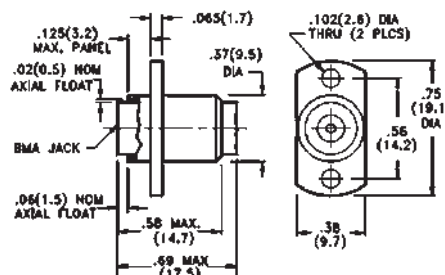
### DC - 18.0 GHz 2191 Series

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

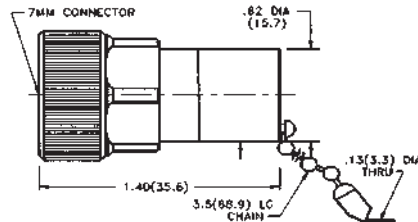
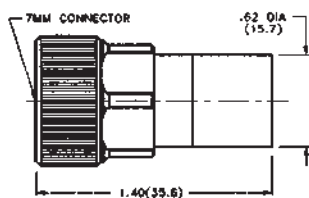
<b>Series</b>	TRM-2052	
<b>Frequency, (GHz)</b>	DC - 18.0	
<b>VSWR table, (max.):</b>	Freq. (GHz)	VSWR
	DC - 4.0	1.05
	4.0-12.0	1.1
	12.0-18.0	1.15
<b>Nominal Impedance, (<math>\Omega</math>)</b>	50	
<b>Operating Temperature, (<math>^{\circ}</math>C)</b>	-65 to +125	
<b>Average Power, (W)*</b>	2	
<b>Finish: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

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

<b>Series</b>	TRM-2001	TRM-2053
<b>Frequency, (GHz)</b>	DC - 18.0	DC - 12.4

### Technical Specification

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

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

### DC - 18.0 GHz - Precision N Performance

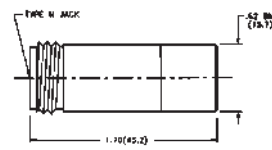
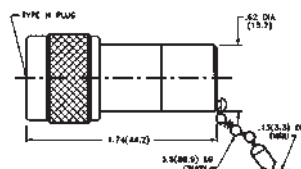
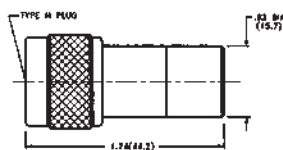
#### DC - 18.0 GHz 2001 Series

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, ( $\Omega$ )	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

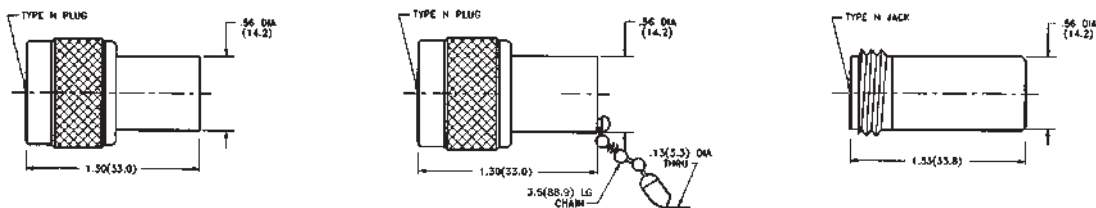
#### DC - 18.0 GHz 2070 Series

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 GHz)	
VSWR table, (max.):	Freq. (GHz)	VSWR
	DC - 12.4	1.17
	12.4-18.0	1.23
Nominal Impedance, ( $\Omega$ )	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

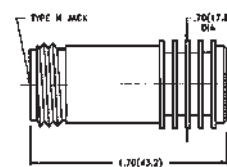
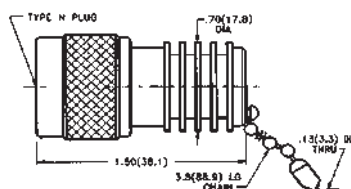
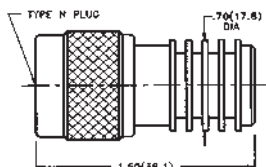
#### DC - 18.0 GHz 2098 Series

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





# TERMINATIONS

## 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

<b>Series</b>	TRM-2108	TRM-2107
<b>Frequency, (GHz)</b>	DC - 18.0	DC - 12.4

### Technical Specification

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

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

### DC - 18.0 GHz High Performance

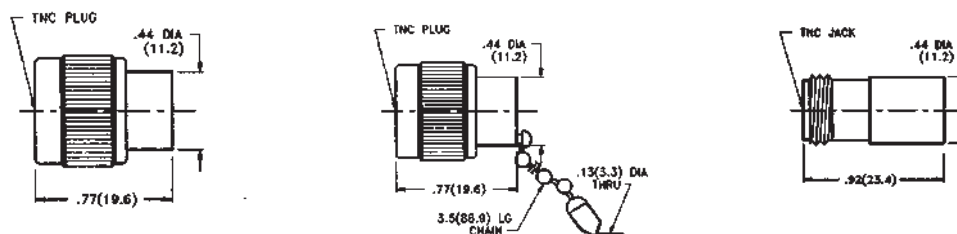
#### DC - 18.0 GHz 2108 Series

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

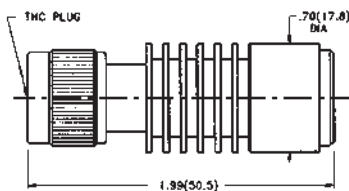
<b>Series</b>	TRM-2142	
<b>Frequency, (GHz)</b>	DC - 18.0	
<b>VSWR table, (max.):</b>	Freq. (GHz)	VSWR
	DC - 12.4	1.2
	12.4-18.0	1.3
<b>Nominal Impedance, (<math>\Omega</math>)</b>	50	
<b>Average Power*, (W):</b>	5	
<b>Peak Power, (kW):</b>	5	
<b>Operating Temperature, (<math>^{\circ}</math>C)</b>	-55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

<b>TNC Male Plug</b>
TRM-2142-M0-TNC-07



# TERMINATIONS

## 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

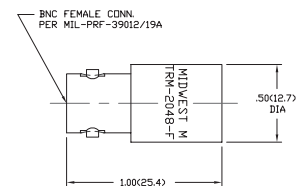
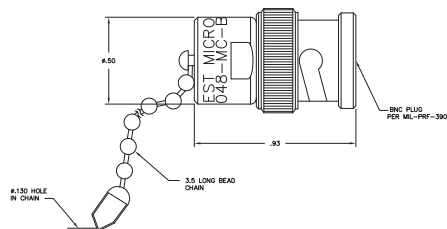
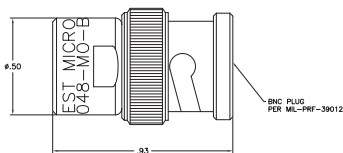
<b>Series</b>	TRM-2048	
<b>Frequency, (GHz)</b>	DC - 4.0	
<b>VSWR table, (max.):</b>	Freq. (GHz)	VSWR
	DC - 4.0	1.2
<b>Nominal Impedance, (<math>\Omega</math>)</b>	50	
<b>Average Power*, (W)</b>	2	
<b>Operating Temperature, (<math>^{\circ}</math>C)</b>	-55 to +125	
<b>Finish:</b>	Nickel Plated Brass	

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



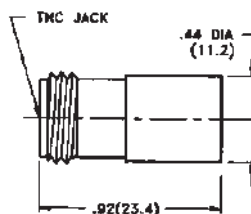
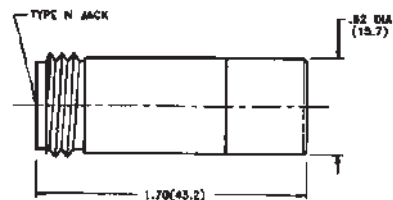
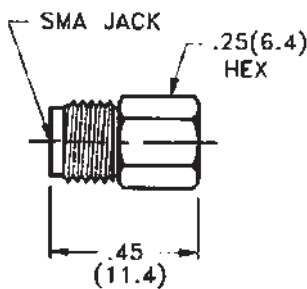
Midwest Microwave's series of Short and Open Circuits are conveniently offered in all of the popular male and female connector interfaces. They are particularly useful for performing phase measurement tests. The units are finished in passivated stainless steel. Contact factory for custom versions and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

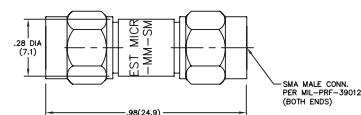
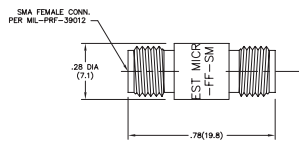
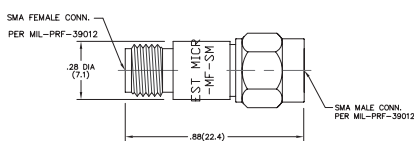
### Technical Specification

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

### Inside Only

#### 250.00 MHz - 18.5 GHz Inside Only 3510 Series

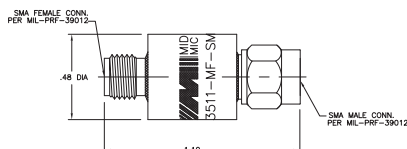
Male/Female	Female/Female	Male/Male
DCB-3510-MF-SMA-02	DCB-3510-FF-SMA-02	DCB-3510-MM-SMA-02



### 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

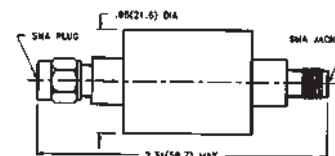
Finish, Body :	Delrin
Finish, Connectors:	Passivated Stainless Steel
Operating Temperature, (°C)	-20 to +100
Insertion Loss, (dB, max.):	0.5
Isolation @ 1kHz, (dB, min.):	65
VSWR , (max.):	1.20 max @ 0.01 - 8.0 GHz, 1.25 max @ 8.0 - 12.4 GHz, and 1.35 max @ 12.4 - 18.0 GHz
Nominal Impedance, (Ω)	50
DC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

### SMA Type

100.0 MHz - 18.0 GHz

100.0 MHz - 12.4 GHz

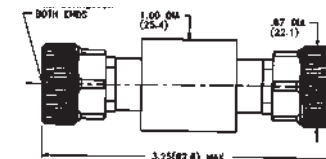
Male/Female	Male/Female
DCB-3538-IO-SMA-02	DCB-3537-IO-SMA-02



### 7mm

100.0 MHz - 18.0 GHz

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

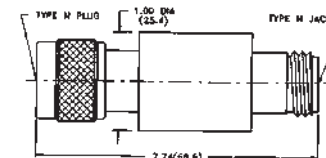


### N Type

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

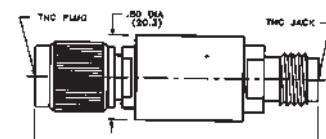


### TNC Type

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

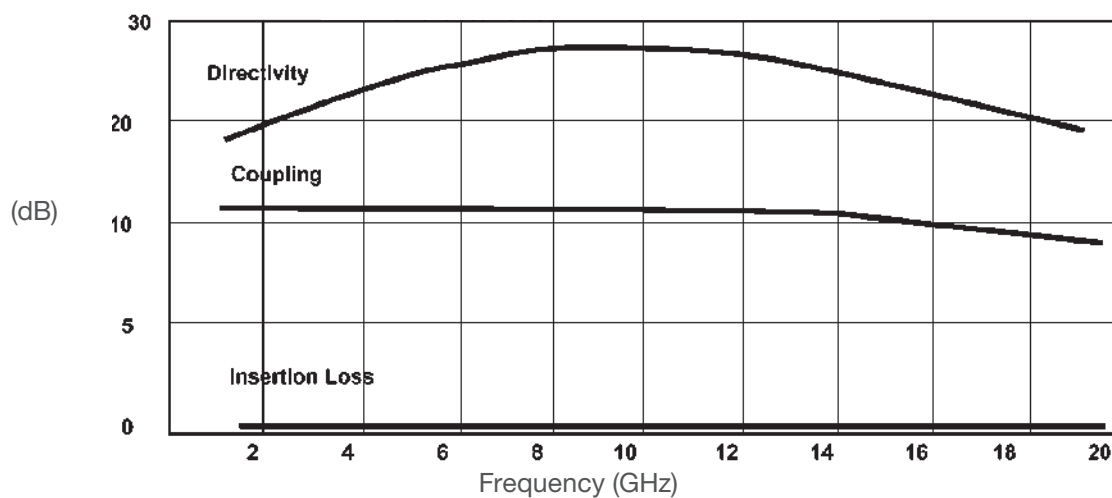
- 0.5 - 40 GHz High Directivity Performance
- Octave, Broadband and Ultrabroadband Frequency Coverage
- Small Size, Light Weight, Rugged Construction
- Designed to Meet Military and Space Environmental Specifications, see appendix for details

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 propogating 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:

$$\text{Coupling (dB)} = -10 \text{ Log} [ P3/P1 ]$$

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

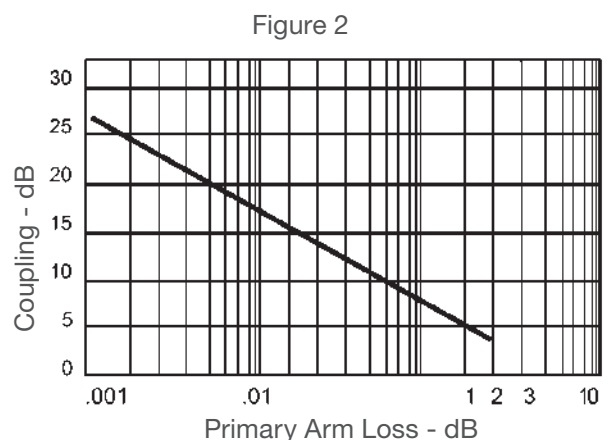
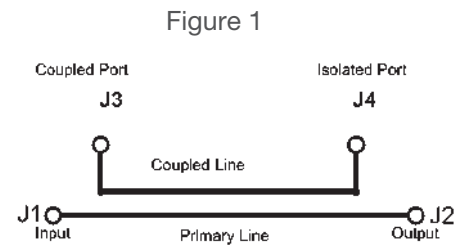
An example of a 10 dB coupler would direct 1/10 of the power input at J1 out of the coupled port at J3 and the remaining 9/10 of the power will continue to pass down the primary line to the J2 output port. The isolated port at J4 will not receive any power in a theoretically ideal coupler, but in reality 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:

$$\text{Insertion Loss (dB)} = 10 \text{ Log} [ 1-P3/P1 ]$$

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:

$$\text{Directivity (dB)} = -10 \text{ Log } [P4/P3]$$

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:

$$\text{Isolation (dB)} = -20 \text{ Log } [P4/P1]$$

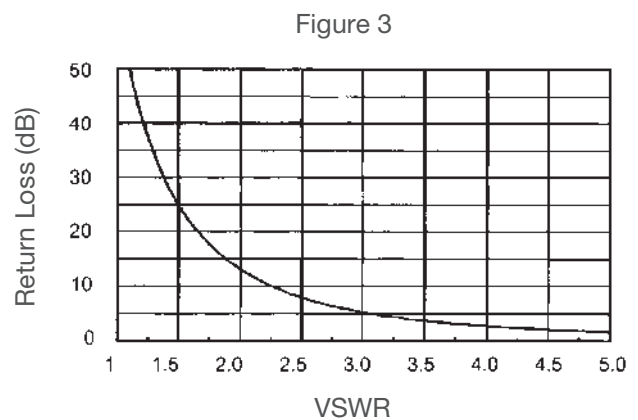
It is clear that Isolation and Directivity are really measuring the same characteristic, i.e.

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

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.

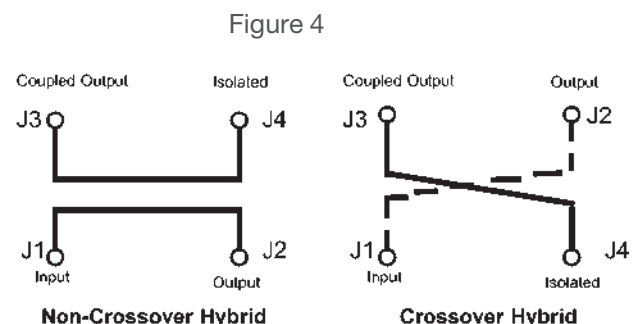
## VSWR

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

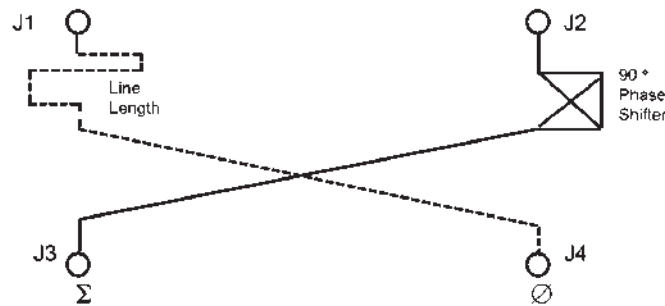
Hybrid Couplers are generally a 3 dB Directional Coupler where the coupled port output signal and the primary line output signal are out of phase with each other by 90°. Since -3 dB equates to half power, a 3 dB coupler is really a power divider that divides power equally between the primary line output 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.

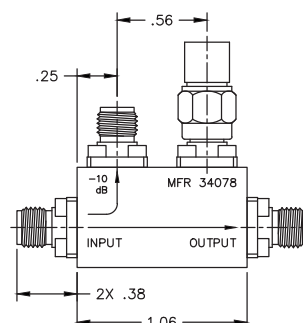
Part Number	Description
CPL-5536-10-29M-79	2.92mm Directional Coupler, 10 dB, 6-40 GHz
CPL-5536-20-29M-79	2.92mm Directional Coupler, 20 dB, 6-40 GHz

### 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

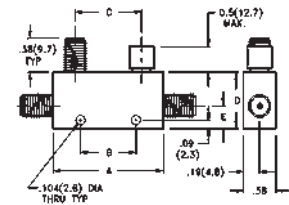


## Directional Couplers • Octave Bandwidths

### 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 ± dB (max.)	Frequency Sensitivity ± 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)

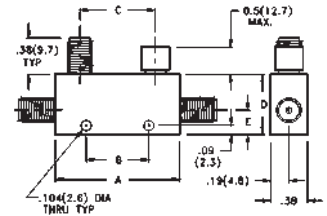
Case Style	A	B	C	D	E	Weight
1	1.00 (25.4)	N/A	0.50 (12.7)	0.50 (12.7)	0.22 (5.6)	0.60oz 17.0g
2	1.16 (29.4)	0.34 (8.7)	0.66 (16.7)	0.50 (12.7)	0.22 (5.6)	0.64oz 18.2g
3	1.78 (45.2)	0.94 (23.8)	1.28 (32.5)	0.50 (12.7)	0.22 (5.6)	0.82oz 23.2g
4	3.00 (76.2)	1.00 (25.5)	2.50 (63.5)	0.75 (19.1)	0.31 (7.9)	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 ± dB (max.)	Frequency Sensitivity ± 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)

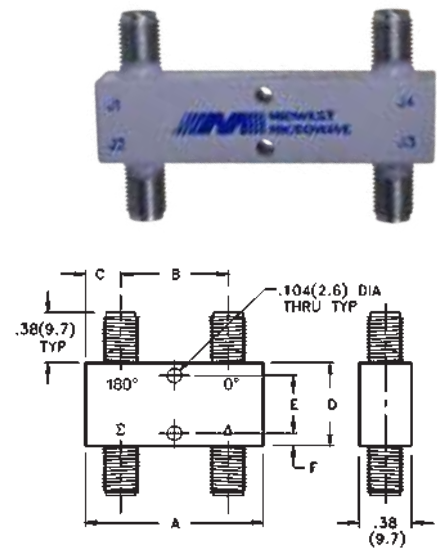
Case Style	A	B	C	D	E	F	G	H	Weight Oz	Gr
1	1.00 (25.4)	0.50 (12.7)	0.25 (6.3)	0.50 (12.7)	0.312 (7.9)	0.093 (2.4)	0.50 (12.7)	N/A	0.60	17
2	2.00 (50.8)	1.50 (38.1)	0.25 (6.3)	0.50 (12.7)	0.312 (7.9)	0.093 (2.4)	1.00 (25.4)	N/A	0.64	18
3	2.00 (50.8)	1.50 (38.1)	0.25 (6.3)	1.00 (25.4)	0.812 (22.1)	0.093 (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 ( $\Sigma$ ) port will result in two equal amplitude, in phase signals at the output ports. Conversely, a microwave signal applied at the difference ( $\Delta$ ) 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

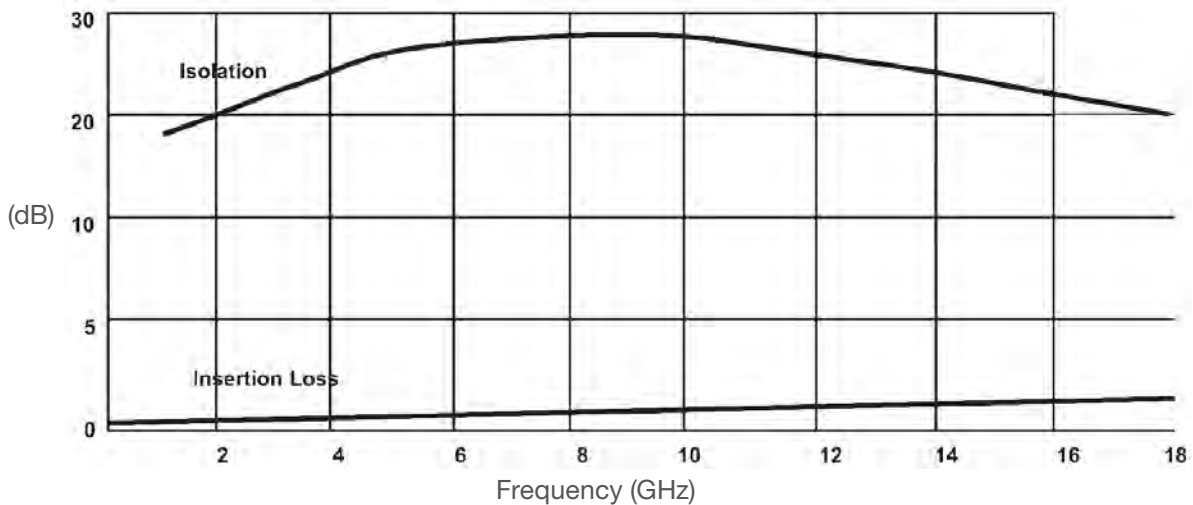
Power Dividers are passive devices that divide an input signal into any number of equal output signals. The ability of a power divider is to provide identical phase matched output signals from one input signal, measures its design integrity and quality. Attaining these equal output signals is also dependent 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

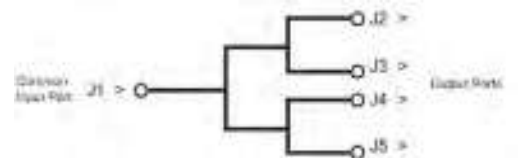
### Division/Combining

In-Phase power division is accomplished through a network with one signal input and “n” outputs whose phase difference is  $0^\circ$  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 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

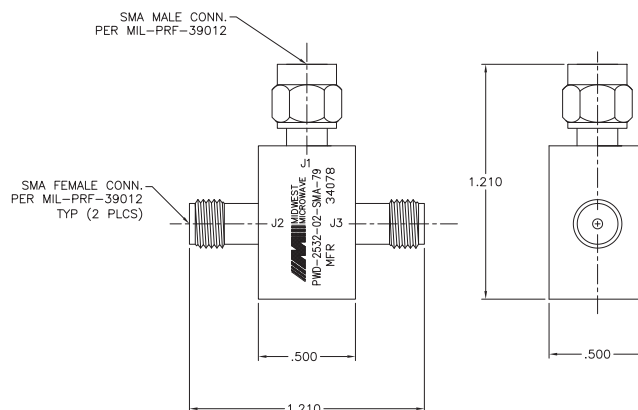
<b>Model</b>	PWD-2532	PWD-2533
<b>Frequency, (GHz)</b>	DC - 12.4	DC - 18.0

### Technical Specifications

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

Contact factory for different interfaces, configurations and custom versions.

<b>DC - 12.4 GHz</b>	<b>DC - 18.0 GHz</b>
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.

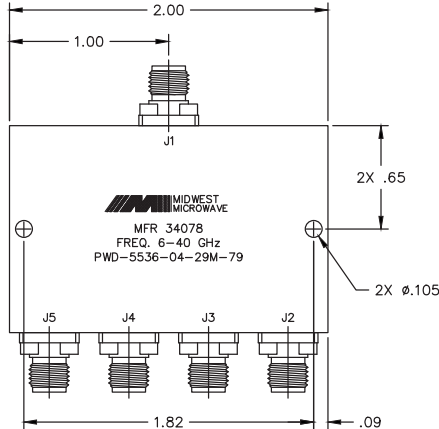
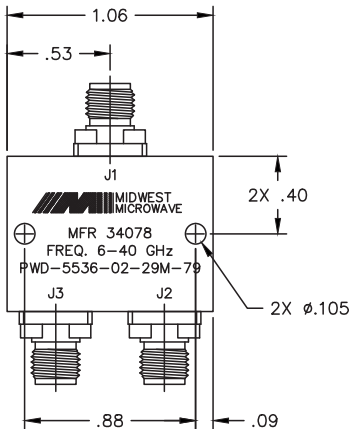
Part Number	Description
PWD-5536-02-29M-79	2.92mm Power Divider 2-way, Wilkinson-In Line, 6-40 GHz
PWD-5536-04-29M-79	2.92mm Power Divider 4-way, Wilkinson-In Line, 6-40 GHz

### 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

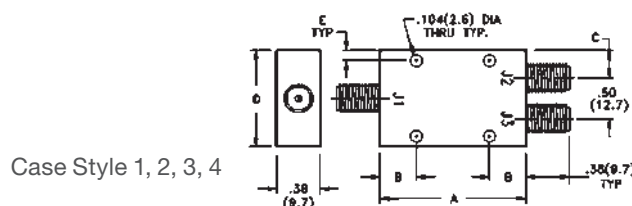
Frequency Range GHz	Case Style	Part Number	Amplitude Balance dB (max.)	Phase Balance ° (max.)	Insertion Loss dB (max.)	Isolation dB (min.)	VSWR (max.)	Average Power W (max.)
<b>Octave Bandwidth Types</b>								
1.0-2.0	2	PWD-5511-02-SMA-79	0.20	2	0.4	20	1.25	30
2.0-4.0	2	PWD-5512-02-SMA-79	0.20	2	0.4	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
<b>Multi- Octave Bandwidth Types</b>								
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.

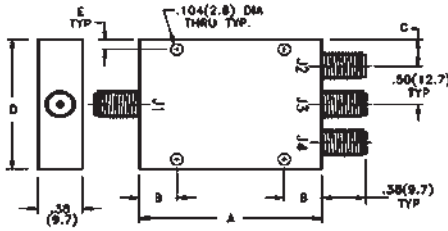
### Electrical Specifications

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

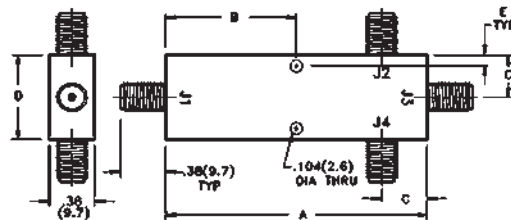
### Nominal Mechanical Specifications – inches (mm)

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

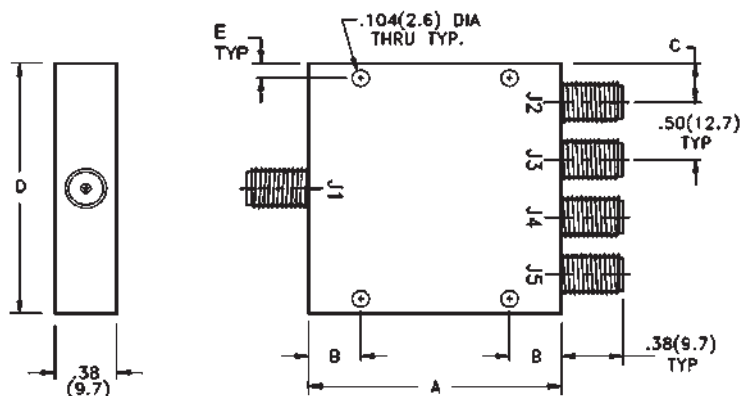
## Four Way Isolated

### 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.)
<b>Eight Way Multi-Octave Bandwidth Types</b>								
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

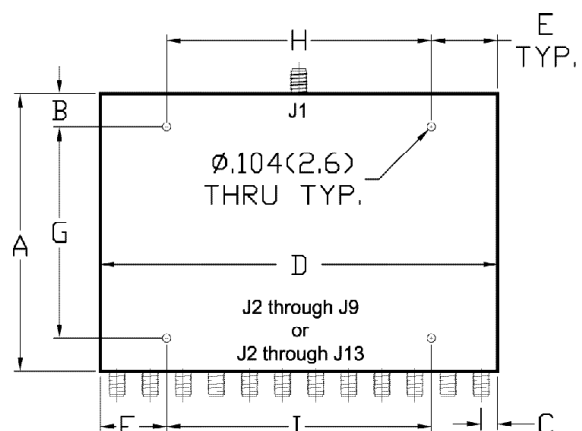
### Nominal Mechanical Specifications

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

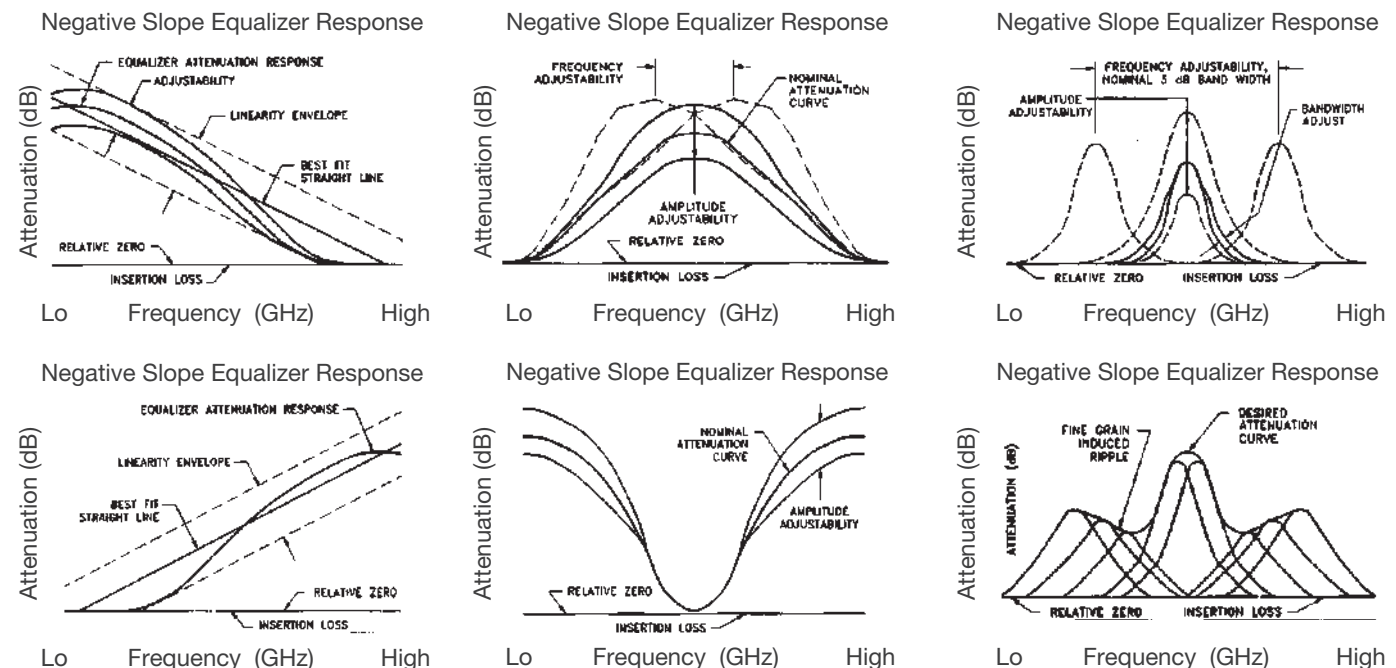


Equalizers are passive microwave devices that have an insertion loss characteristic that varies as a function of frequency. Midwest Microwave's Equalizers can be supplied with a precisely defined and preset loss characteristic, commonly known as a Fixed Loss Equalizer, or with the additional ability 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

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### 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

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

# BETWEEN SERIES ADAPTERS

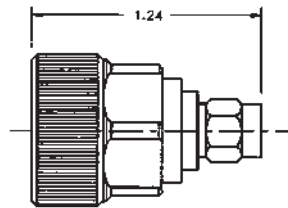
## 7mm to SMA

### 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

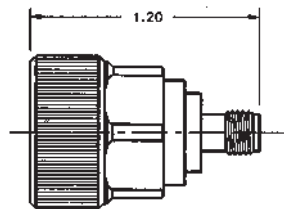


### 7mm to SMA Female

#### 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

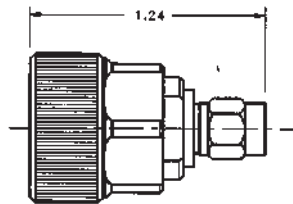
### 7mm to 3.5mm Male

#### Technical Specifications

<b>Frequency:</b>	DC – 18.0 GHz
<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.025 + .0025 f (GHz)
<b>Finish:</b>	Passivated Stainless Steel

#### Part No.

ADT-2701-7M-3MM-02



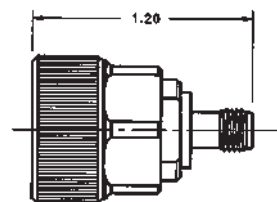
### 7mm to 3.5 mm Female

#### Technical Specifications

<b>Frequency:</b>	DC – 18.0 GHz
<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.025 + .0025 f (GHz)
<b>Finish:</b>	Passivated Stainless Steel

#### Part No.

ADT-2702-7M-3MF-02



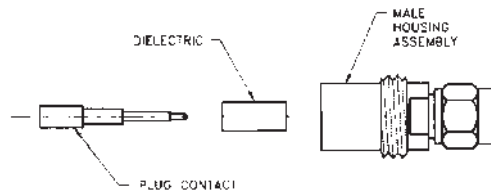
# BETWEEN SERIES ADAPTERS

## 7mm Rebuild Kits

### Rebuild Kit for 7mm to SMA Male

Part No.

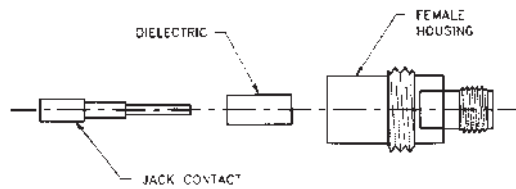
ADT-2542-7M-SMM-02



### Rebuild Kit for 7mm to SMA Female

Part No.

ADT-2543-7M-SMF-02



## 7mm to Type N

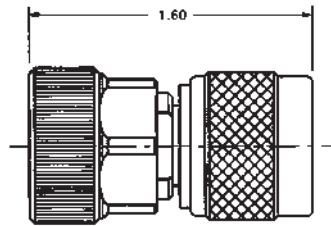
### 7mm to N Male

#### 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



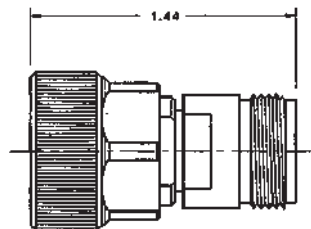
### 7mm to N Female

#### 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

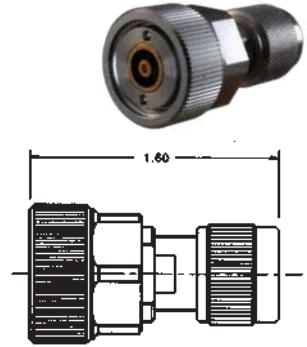
## 7mm to TNC / 7mm to SC

### 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

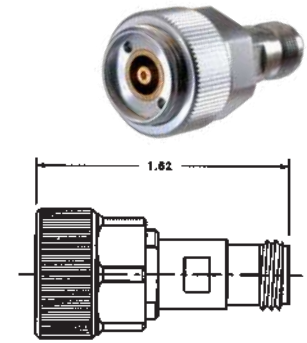


### 7mm to TNC Female

#### 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

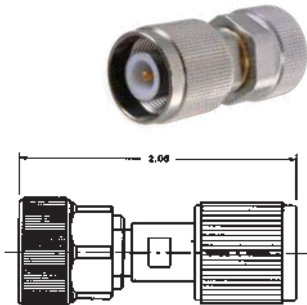


### 7mm to SC Male

#### 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

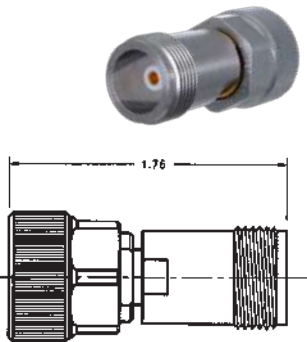


### 7mm to SC Female

#### 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

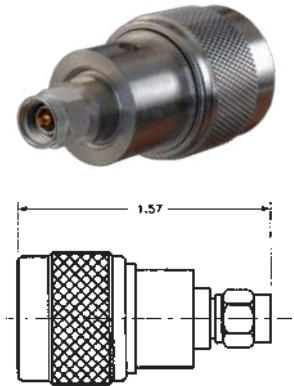


## N to 3.5mm

### N Male to 3.5mm Male

#### Technical Specifications

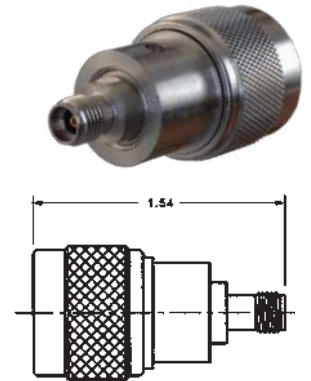
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<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.04 @ DC - 4.0 GHz 1.07 @ 4.0-8.0 GHz 1.12 @ 8.0-18.0 GHz
<b>Finish:</b>	Passivated Stainless Steel
<b>Part No.</b>	ADT-2712-NM-3MM-02



### N Male to 3.5mm Female

#### Technical Specifications

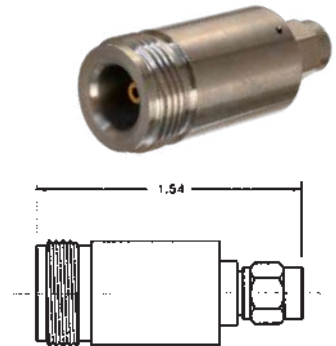
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<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.04 @ DC - 4.0 GHz 1.07 @ 4.0-8.0 GHz 1.12 @ 8.0-18.0 GHz
<b>Finish:</b>	Passivated Stainless Steel
<b>Part No.</b>	ADT-2713-NM-3MF-02



### N Female to 3.5mm Male

#### Technical Specifications

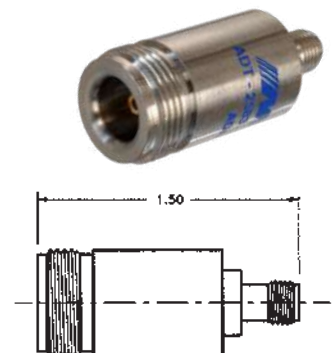
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<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.04 @ DC - 4.0 GHz 1.07 @ 4.0-8.0 GHz 1.12 @ 8.0-18.0 GHz
<b>Finish:</b>	Passivated Stainless Steel
<b>Part No.</b>	ADT-2714-NF-3MM-02



### N Female to 3.5mm Female

#### Technical Specifications

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





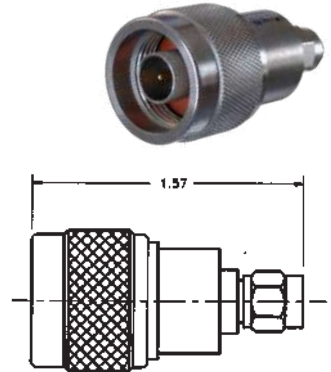
# BETWEEN SERIES ADAPTERS

## N to SMA

### N Male to SMA Male

#### Technical Specifications

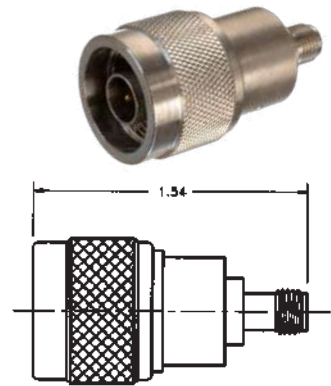
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<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.04 @ DC - 4.0 GHz 1.07 @ 4.0-8.0 GHz 1.12 @ 8.0-18.0 GHz
<b>Finish:</b>	Passivated Stainless Steel
<b>Part No.</b>	ADT-2580-NM-SMM-02



### N Male to SMA Female

#### Technical Specifications

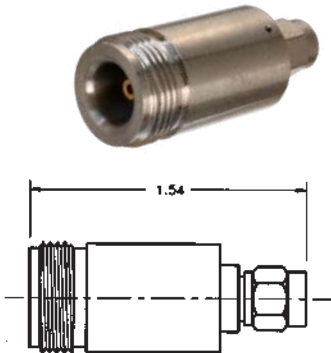
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<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.04 @ DC - 4.0 GHz 1.07 @ 4.0-8.0 GHz 1.12 @ 8.0-18.0 GHz
<b>Finish:</b>	Passivated Stainless Steel
<b>Part No.</b>	ADT-2581-NM-SMF-02



### N Female to SMA Male

#### Technical Specifications

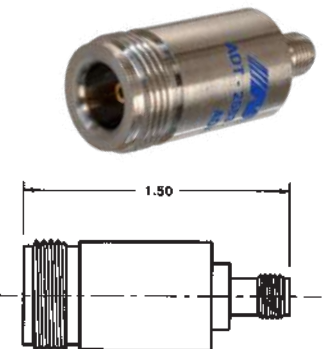
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<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.04 @ DC - 4.0 GHz 1.07 @ 4.0-8.0 GHz 1.12 @ 8.0-18.0 GHz
<b>Finish:</b>	Passivated Stainless Steel
<b>Part No.</b>	ADT-2582-NF-SMM-02



### N Female to SMA Female

#### Technical Specifications

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



## N Flange Mount to SMA

### N Flange Mount Male to SMA Male

#### Technical Specifications

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

<b>Part No.</b>	ADT-2576-NM-SMM-02
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### N Flange Mount Male to SMA Female

#### Technical Specifications

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

<b>Part No.</b>	ADT-2577-NM-SMF-02
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### N Flange Mount Female to SMA Male

#### Technical Specifications

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

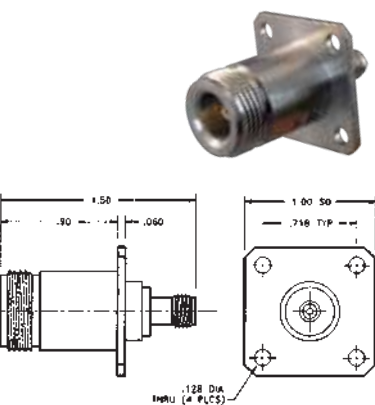
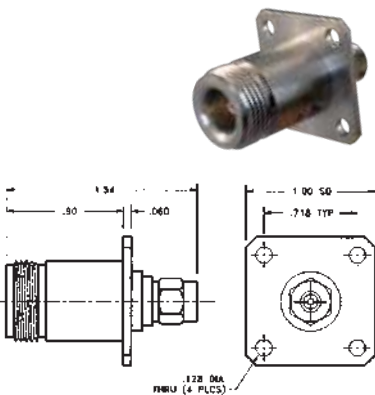
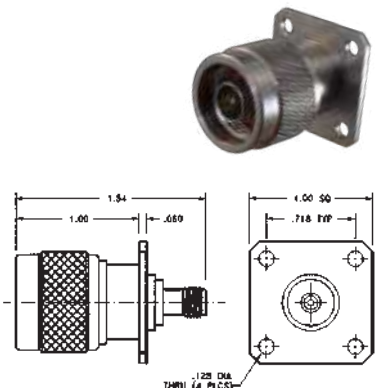
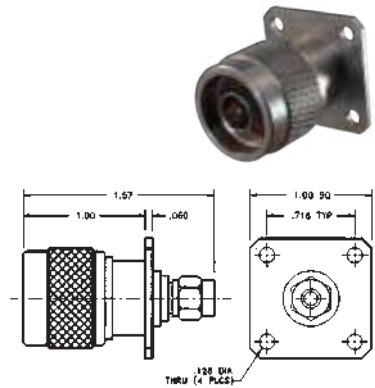
<b>Part No.</b>	ADT-2578-NF-SMM-02
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### N Flange Mount Female to SMA Female

#### Technical Specifications

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

<b>Part No.</b>	ADT-2579-NF-SMF-02
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# BETWEEN SERIES ADAPTERS

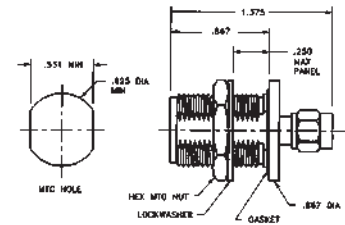
## N Bulkhead to SMA

### N Bulkhead Jack to SMA Male

#### Technical Specifications

<b>Frequency:</b>	DC – 18.0 GHz
<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.20 max
<b>Finish:</b>	Passivated Stainless Steel

<b>Part No.</b>	ADT-2810-NF-SMM-02
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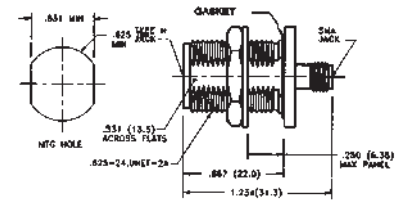


### N Bulkhead Female to SMA Female

#### Technical Specifications

<b>Frequency:</b>	DC – 18.0 GHz
<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.20 max
<b>Finish:</b>	Passivated Stainless Steel

<b>Part No.</b>	ADT-2840-NF-SMF-02
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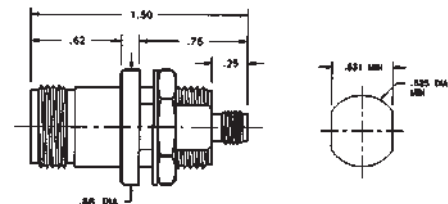


### N Rear Mount Bulkhead Female to SMA Female

#### Technical Specifications

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

<b>Part No.</b>	ADT-2599-NF-SMF-02
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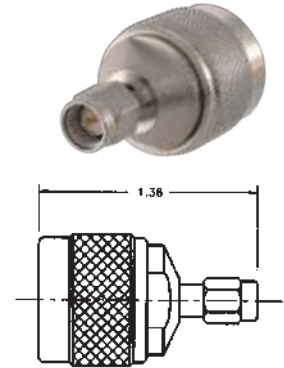
## N to SMA / Economical

### 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
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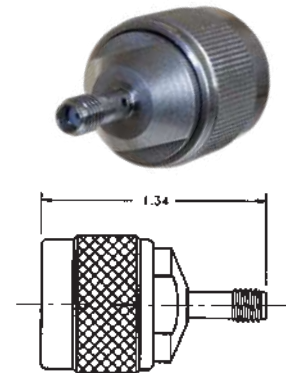


### N Male to SMA Female

#### 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
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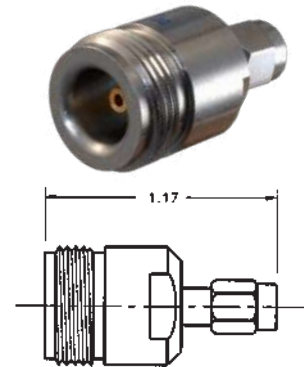


### N Female to SMA Male

#### 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
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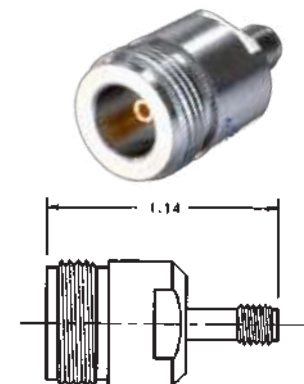


### N Female to SMA Female

#### 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
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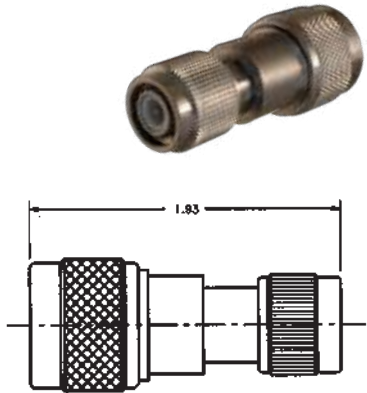
# BETWEEN SERIES ADAPTERS

## N to TNC

### N Male to TNC Male

#### Technical Specifications

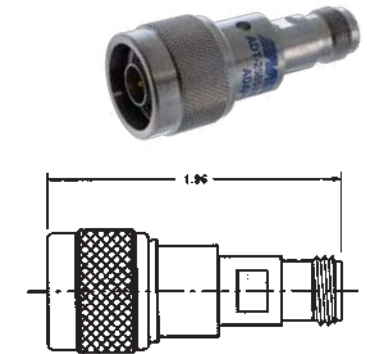
<b>Frequency:</b>	DC – 18.0 GHz
<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.04 @ DC - 4.0 GHz 1.07 @ 4.0-8.0 GHz 1.12 @ 8.0-18.0 GHz
<b>Finish:</b>	Passivated Stainless Steel
<b>Part No.</b>	ADT-2584-NM-TNM-02



### N Male to TNC Female

#### Technical Specifications

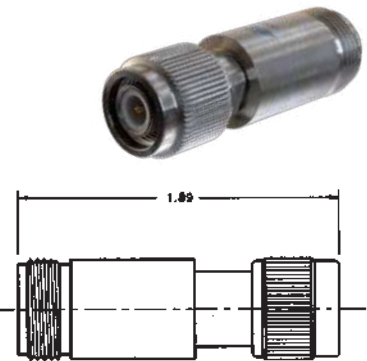
<b>Frequency:</b>	DC – 18.0 GHz
<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.04 @ DC - 4.0 GHz 1.07 @ 4.0-8.0 GHz 1.12 @ 8.0-18.0 GHz
<b>Finish:</b>	Passivated Stainless Steel
<b>Part No.</b>	ADT-2585-NM-TNF-02



### N Female to TNC Male

#### Technical Specifications

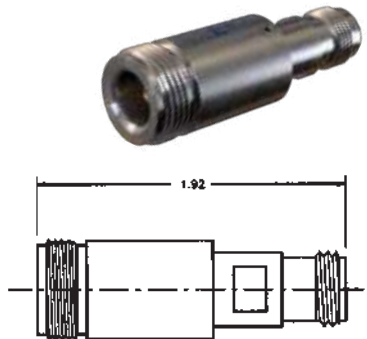
<b>Frequency:</b>	DC – 18.0 GHz
<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.04 @ DC - 4.0 GHz 1.07 @ 4.0-8.0 GHz 1.12 @ 8.0-18.0 GHz
<b>Finish:</b>	Passivated Stainless Steel
<b>Part No.</b>	ADT-2586-NF-TNM-02



### N Female to TNC Female

#### Technical Specifications

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



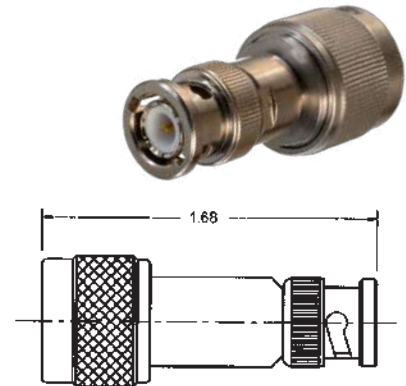
## N to BNC

### N Male to BNC Male

#### Technical Specifications

<b>Frequency:</b>	DC – 4.0 GHz
<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.25
<b>Finish:</b>	Type N – Passivated Stainless Steel BNC – Nickel Plated Brass

<b>Part No.</b>	ADT-2613-NM-BNM-02
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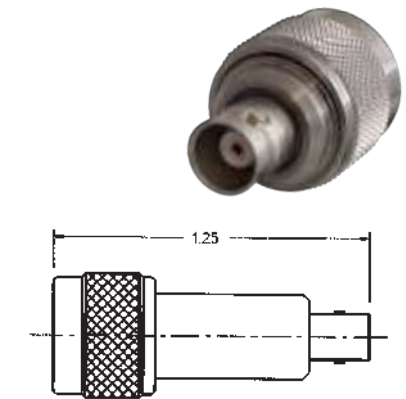


### N Male to BNC Female

#### Technical Specifications

<b>Frequency:</b>	DC – 4.0 GHz
<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.25
<b>Finish:</b>	Type N – Passivated Stainless Steel BNC – Nickel Plated Brass

<b>Part No.</b>	ADT-2614-NM-BNF-02
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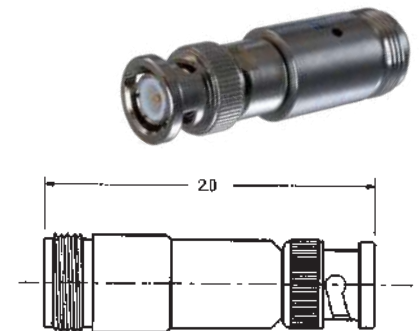


### N Female to BNC Male

#### Technical Specifications

<b>Frequency:</b>	DC – 4.0 GHz
<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.25
<b>Finish:</b>	Type N – Passivated Stainless Steel BNC – Nickel Plated Brass

<b>Part No.</b>	ADT-2615-NF-BNM-02
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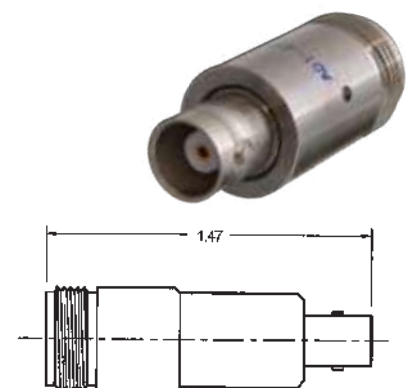


### N Female to BNC Female

#### Technical Specifications

<b>Frequency:</b>	DC – 4.0 GHz
<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.25
<b>Finish:</b>	Type N – Passivated Stainless Steel BNC – Nickel Plated Brass

<b>Part No.</b>	ADT-2616-NF-BNF-02
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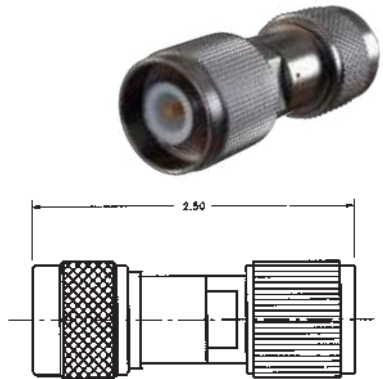
## N to SC

### N Male to SC Male

#### Technical Specifications

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

<b>Part No.</b>	ADT-2618-NM-SCM-02
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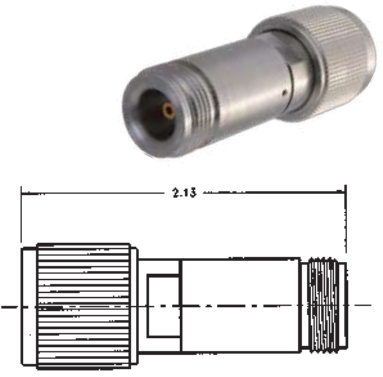


### N Female to SC Male

#### Technical Specifications

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

<b>Part No.</b>	ADT-2619-NF-SCM-02
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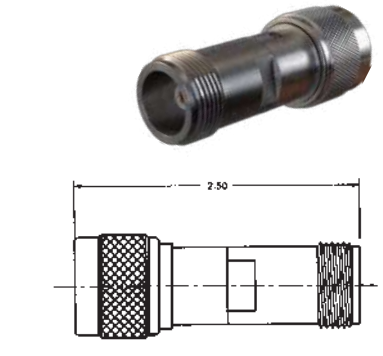


### N Male to SC Female

#### Technical Specifications

<b>Frequency:</b>	DC – 8.0 GHz
<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.2
<b>Finish:</b>	Passivated Stainless Steel

<b>Part No.</b>	ADT-2638-NM-SCF-02
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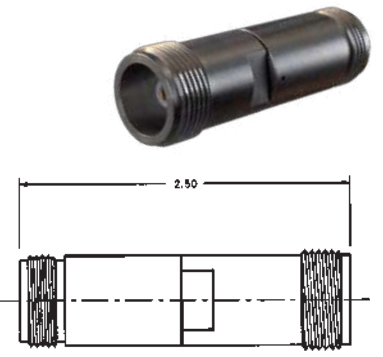


### N Female to SC Female

#### Technical Specifications

<b>Frequency:</b>	DC – 8.0 GHz
<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.2
<b>Finish:</b>	Passivated Stainless Steel

<b>Part No.</b>	ADT-2639-NF-SCF-02
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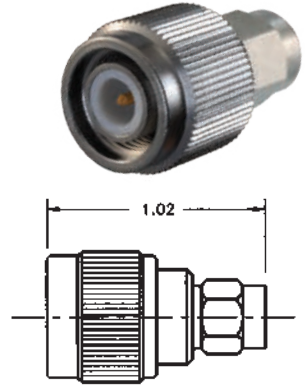
## TNC to SMA

### TNC Male to SMA Male

#### Technical Specifications

<b>Frequency:</b>	DC – 18.0 GHz
<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.07 + .015f GHz
<b>Finish:</b>	Passivated Stainless Steel

<b>Part No.</b>	ADT-2685-TM-SMM-02
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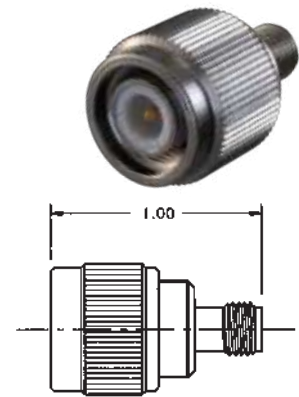


### TNC Male to SMA Female

#### Technical Specifications

<b>Frequency:</b>	DC – 18.0 GHz
<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.07 + .015f GHz
<b>Finish:</b>	Passivated Stainless Steel

<b>Part No.</b>	ADT-2686-TM-SMF-02
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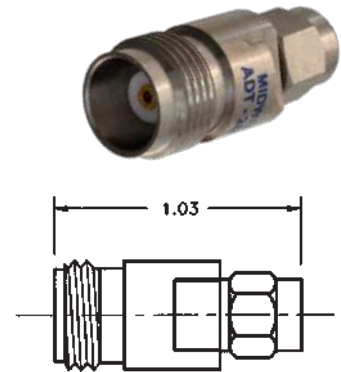


### TNC Female to SMA Male

#### Technical Specifications

<b>Frequency:</b>	DC – 18.0 GHz
<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.07 + .015f GHz
<b>Finish:</b>	Passivated Stainless Steel

<b>Part No.</b>	ADT-2687-TF-SMM-02
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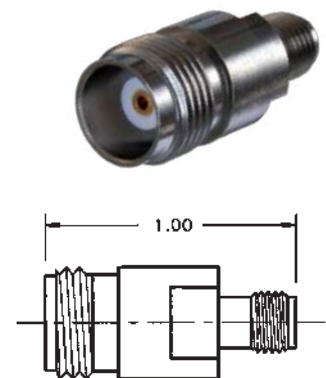


### TNC Female to SMA Female

#### Technical Specifications

<b>Frequency:</b>	DC – 18.0 GHz
<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.07 + .015f GHz
<b>Finish:</b>	Passivated Stainless Steel

<b>Part No.</b>	ADT-2688-TF-SMF-02
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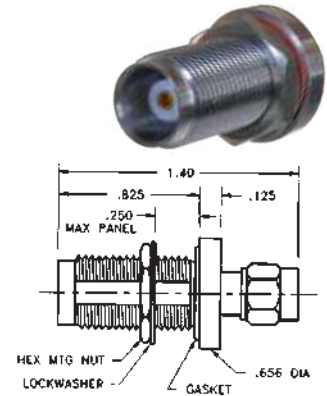
# BETWEEN SERIES ADAPTERS

## TNC Bulkhead to SMA / TNC Flange Mount to SMA

### TNC Bulkhead Female to SMA Male

#### Technical Specifications

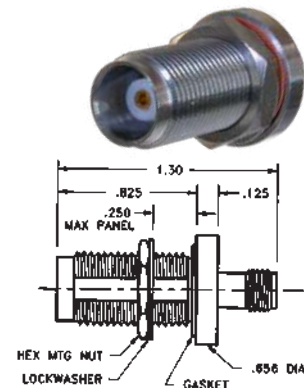
<b>Frequency:</b>	DC – 18.0 GHz
<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.07 + .015f GHz
<b>Finish:</b>	Passivated Stainless Steel
<b>Part No.</b>	
ADT-2815-TF-SMM-02	



### TNC Bulkhead Female to SMA Female

#### Technical Specifications

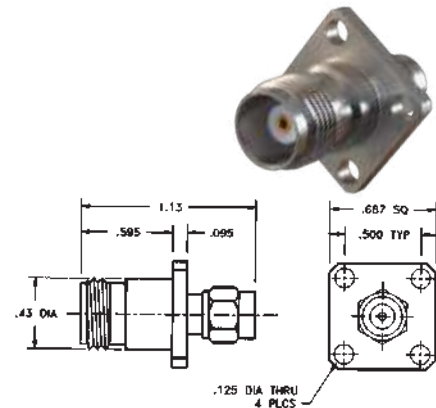
<b>Frequency:</b>	DC – 18.0 GHz
<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.07 + .015f GHz
<b>Finish:</b>	Passivated Stainless Steel
<b>Part No.</b>	
ADT-2793-TF-SMF-02	



### TNC Flange Mount Female to SMA Male

#### Technical Specifications

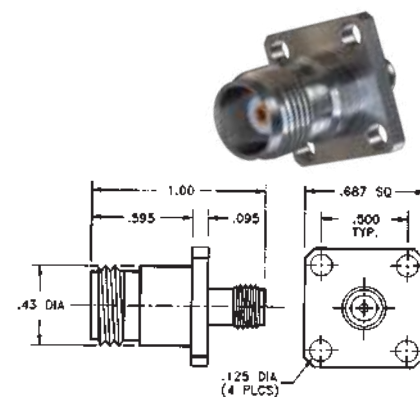
<b>Frequency:</b>	DC – 18.0 GHz
<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.07 + .015f GHz
<b>Finish:</b>	Passivated Stainless Steel
<b>Part No.</b>	
ADT-2689-TF-SMM-02	



### TNC Flange Mount Female to SMA Female

#### Technical Specifications

<b>Frequency:</b>	DC – 18.0 GHz
<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.07 + .015f GHz
<b>Finish:</b>	Passivated Stainless Steel
<b>Part No.</b>	
ADT-2699-TF-SMF-02	



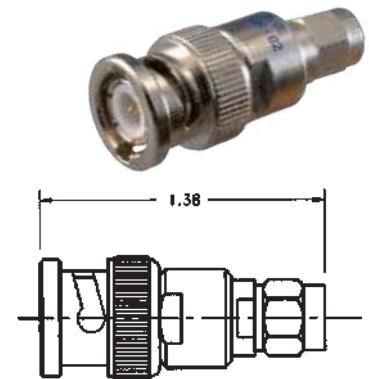
## BNC to SMA

### BNC Male to SMA Male

#### Technical Specifications

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

<b>Part No.</b>	ADT-2670-BM-SMM-02
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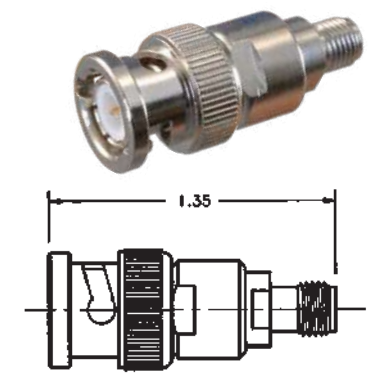


### BNC Male to SMA Female

#### Technical Specifications

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

<b>Part No.</b>	ADT-2671-BM-SMF-02
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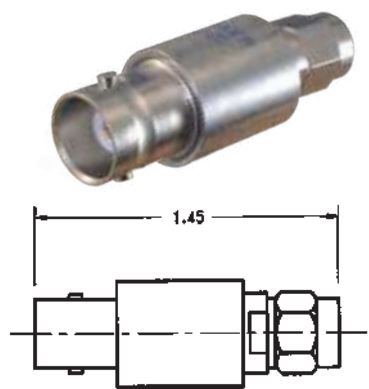


### BNC Female to SMA Male

#### Technical Specifications

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

<b>Part No.</b>	ADT-2672-BF-SMM-02
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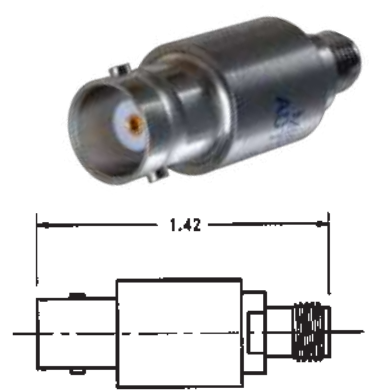


### BNC Female to SMA Female

#### Technical Specifications

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

<b>Part No.</b>	ADT-2673-BF-SMF-02
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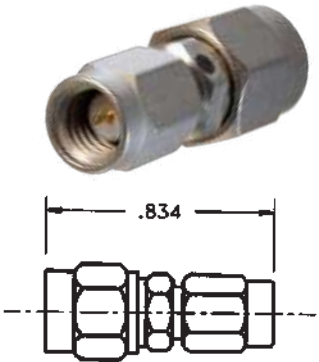
# BETWEEN SERIES ADAPTERS

## SMA to SSMA

### SMA Male to SSMA Male

#### Technical Specifications

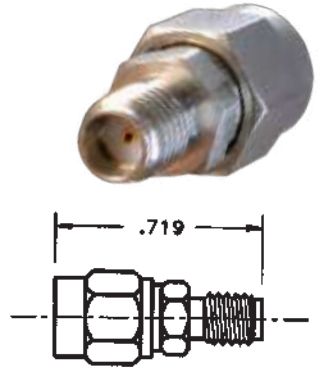
<b>Frequency:</b>	DC – 25.0 GHz
<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.06 + .009f (GHz) @ DC-12.4 GHz 1.05 + .01f (GHz) @ 12.4-25.0 GHz
<b>Finish:</b>	Passivated Stainless Steel
<b>Part No.</b>	ADT-2695-SM-SSM-02



### SMA Male to SSMA Female

#### Technical Specifications

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



### SMA Female to SSMA Male

#### Technical Specifications

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



### SMA Female to SSMA Female

#### Technical Specifications

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



## SMA to BMA

### SMA Male to BMA Female

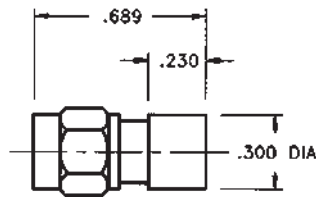
#### Technical Specifications



<b>Frequency:</b>	DC – 18.0 GHz
<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.05 + .005f (GHz)
<b>Finish:</b>	Passivated Stainless Steel

#### Part No.

ADT-2768-SM-BMF-02



### SMA Female to BMA Female – Bulkhead Mount

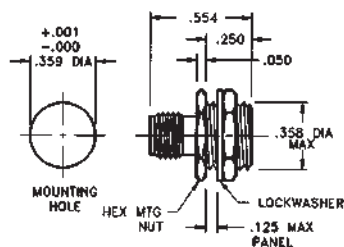
#### Technical Specifications



<b>Frequency:</b>	DC – 18.0 GHz
<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.05 + .005f (GHz)
<b>Finish:</b>	Passivated Stainless Steel

#### Part No.

ADT-2806-SF-BMF-02



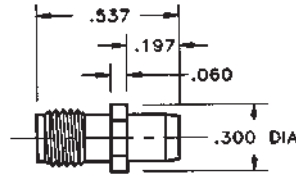
# BETWEEN SERIES ADAPTERS

## 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
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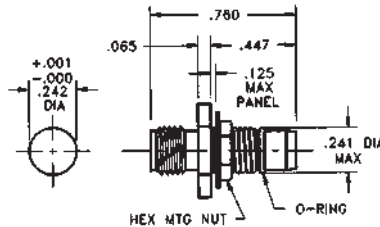


## SMA Female to BMA Male – Bulkhead Mount

### 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
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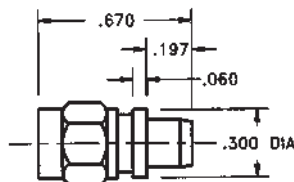


## SMA Male to BMA Male

### 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
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## SMA Female to BMA Female

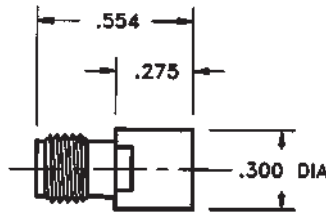
### Technical Specifications



<b>Frequency:</b>	DC – 18.0 GHz
<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.05 + .005f (GHz)
<b>Finish:</b>	Passivated Stainless Steel

### Part No.

ADT-2767-SF-BMF-02



## SMA Female to BMA Female – Floating Panel Mount

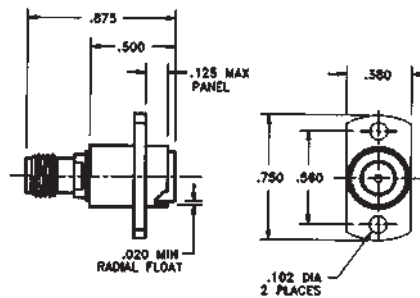
### Technical Specifications



<b>Frequency:</b>	DC – 18.0 GHz
<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.05 + .005f (GHz)
<b>Finish:</b>	Passivated Stainless Steel

### Part No.

ADT-2809-SF-BMF-02



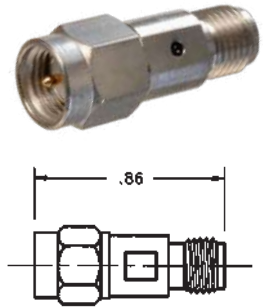
# IN-SERIES ADAPTERS

## SMA Types

### SMA Male to SMA Male

#### Technical Specifications

<b>Frequency:</b>	DC – 18.0 GHz
<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.05 + .005 f (GHz)
<b>Finish:</b>	Passivated Stainless Steel
<b>Part No.</b>	ADT-2593-MF-SMA-02



### SMA Female to SMA Female

#### Technical Specifications

<b>Frequency:</b>	DC – 18.0 GHz
<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.05 + .005 f (GHz)
<b>Finish:</b>	Passivated Stainless Steel
<b>Part No.</b>	ADT-2595-FF-SMA-02

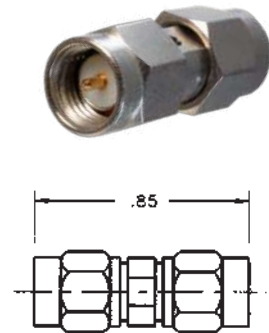


Note: Also available with knurled center section (0.875 O.A.L.) as ADT-2841-FF-SMA-02 and in 0.500 (12.7) O.A.L. with fully threaded barrel as ADT-8000-20-SMA-02

### SMA Male to SMA Male

#### Technical Specifications

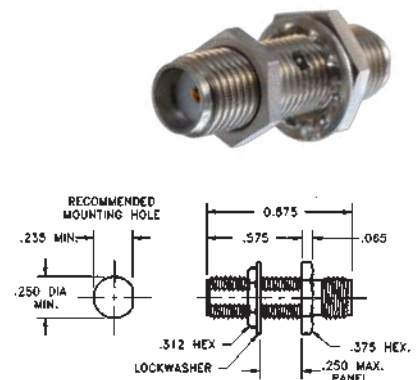
<b>Frequency:</b>	DC – 18.0 GHz
<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.05 + .005 f (GHz)
<b>Finish:</b>	Passivated Stainless Steel
<b>Part No.</b>	ADT-2594-MM-SMA-02



### SMA Female to SMA Female – Bulkhead Mount

#### Technical Specifications

<b>Frequency:</b>	DC – 18.0 GHz
<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.05 + .005 f (GHz)
<b>Finish:</b>	Passivated Stainless Steel
<b>Part No.</b>	ADT-2823-FF-SMA-02

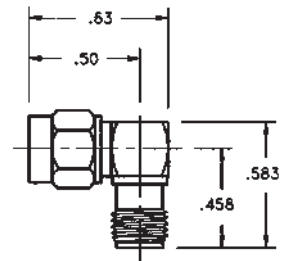


## Right Angle SMA Male to SMA Female

### 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
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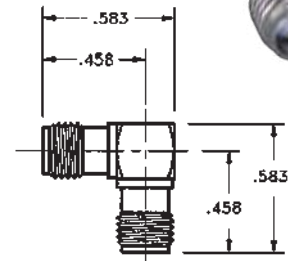


## Right Angle SMA Female to SMA Female

### 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
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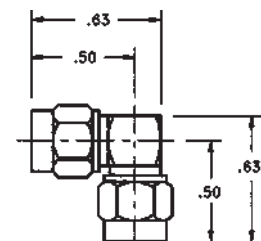


## Right Angle SMA Male to SMA Male

### 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
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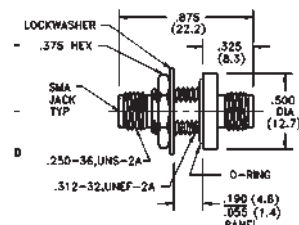


## SMA Female to SMA Female – Bulkhead Mount – Hermetic

### 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
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# IN-SERIES ADAPTERS

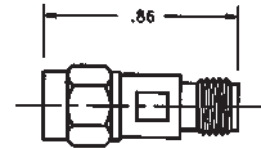
## 3.5mm Types

### 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
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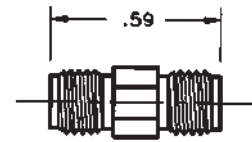


### 3.5mm Female to 3.5mm Female

#### 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
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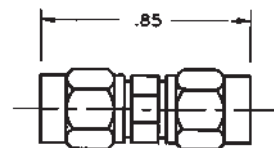


### 3.5mm Male to 3.5mm Male

#### 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
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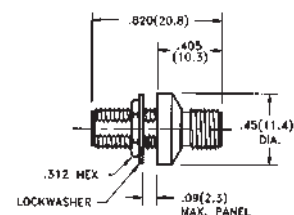


### 3.5mm Female to 3.5mm Female – Bulkhead Mount

#### 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
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## 2.9mm Types

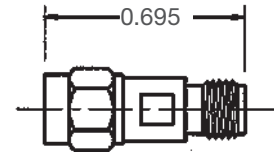
### 2.9mm Male to 2.9mm Female

#### 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



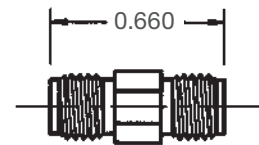
### 2.9mm Female to 2.9mm Female

#### 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



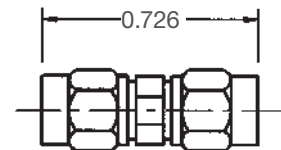
### 2.9mm Male to 2.9mm Male

#### 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



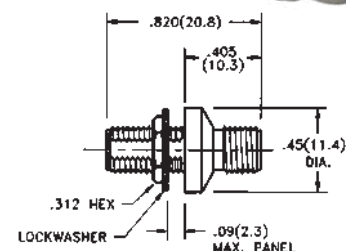
### 2.9mm Female to 2.9mm Female – Bulkhead Mount

#### Technical Specifications

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

#### Part No.

ADT-2854-FF-29M-02



# IN-SERIES ADAPTERS

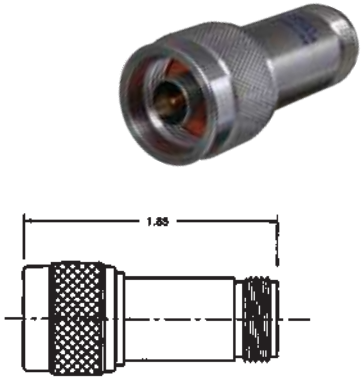
## N Type

### N Male to N Female

#### Technical Specifications

<b>Frequency:</b>	DC – 18.0 GHz
<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.04 @ DC - 4.0 GHz 1.06 @ 4.0-8.0 GHz 1.10 @ 8.0-18.0 GHz
<b>Finish:</b>	Passivated Stainless Steel

<b>Part No.</b>	ADT-2588-MF-NNN-02
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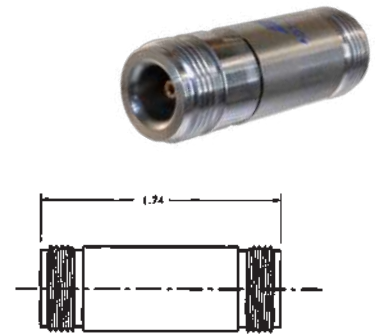


### N Female to N Female

#### Technical Specifications

<b>Frequency:</b>	DC – 18.0 GHz
<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.04 @ DC - 4.0 GHz 1.06 @ 4.0-8.0 GHz 1.10 @ 8.0-18.0 GHz
<b>Finish:</b>	Passivated Stainless Steel

<b>Part No.</b>	ADT-2590-FF-NNN-02
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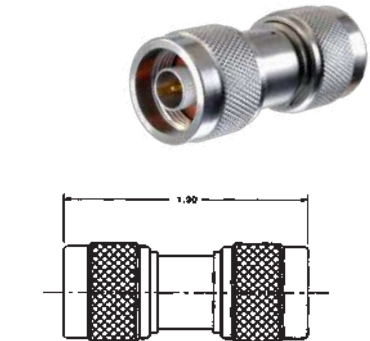


### N Male to N Male

#### Technical Specifications

<b>Frequency:</b>	DC – 18.0 GHz
<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.04 @ DC - 4.0 GHz 1.06 @ 4.0-8.0 GHz 1.10 @ 8.0-18.0 GHz
<b>Finish:</b>	Passivated Stainless Steel

<b>Part No.</b>	ADT-2589-MM-NNN-02
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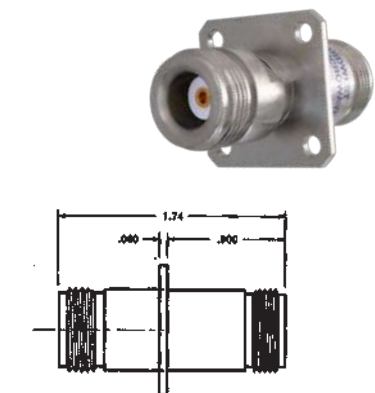


### N Female to N Female – Flange Mount

#### Technical Specifications

<b>Frequency:</b>	DC – 18.0 GHz
<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.04 @ DC - 4.0 GHz 1.06 @ 4.0-8.0 GHz 1.10 @ 8.0-18.0 GHz
<b>Finish:</b>	Passivated Stainless Steel

<b>Part No.</b>	ADT-2825-FF-NNN-02
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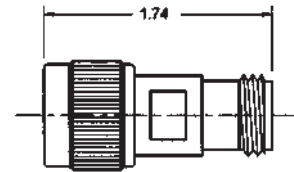


## TNC Types

### TNC Male to TNC Female

#### Technical Specifications

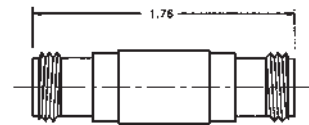
<b>Frequency:</b>	DC – 18.0 GHz
<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.05 @ DC - 4.0 GHz 1.10 @ 4.0-8.0 GHz 1.15 @ 8.0-18.0 GHz
<b>Finish:</b>	Passivated Stainless Steel
<b>Part No.</b>	ADT-2596-MF-TNC-02



### TNC Female to TNC Female

#### Technical Specifications

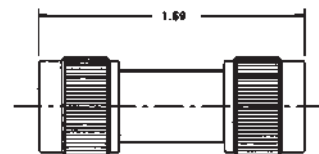
<b>Frequency:</b>	DC – 18.0 GHz
<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.05 @ DC - 4.0 GHz 1.10 @ 4.0-8.0 GHz 1.15 @ 8.0-18.0 GHz
<b>Finish:</b>	Passivated Stainless Steel
<b>Part No.</b>	ADT-2598-FF-TNC-02



### TNC Male to TNC Male

#### Technical Specifications

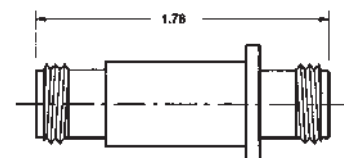
<b>Frequency:</b>	DC – 18.0 GHz
<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.05 @ DC - 4.0 GHz 1.10 @ 4.0-8.0 GHz 1.15 @ 8.0-18.0 GHz
<b>Finish:</b>	Passivated Stainless Steel
<b>Part No.</b>	ADT-2597-MM-TNC-02



### TNC Female to TNC Female – Flange Mount

#### Technical Specifications

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



## SC Types

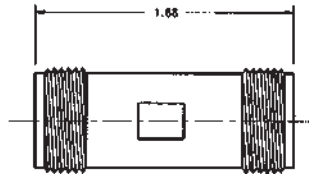
### SC Female to SC Female

#### Technical Specifications

<b>Frequency:</b>	DC – 11.0 GHz	
<b>Impedance:</b>	50 Ohms	
<b>VSWR:</b>	1.08 @ DC - 4.0 GHz	1.20 @ 4.0-11.0 GHz
<b>Finish:</b>	Passivated Stainless Steel	



<b>Part No.</b>
ADT-2833-FF-SC0-02



### SC Female to SC Female – Flange Mount

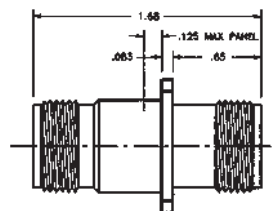
#### Technical Specifications

<b>Frequency:</b>	DC – 11.0 GHz	
<b>Impedance:</b>	50 Ohms	
<b>VSWR:</b>	1.08 @ DC - 4.0 GHz	1.20 @ 4.0-11.0 GHz
<b>Finish:</b>	Passivated Stainless Steel	



<b>Part No.</b>
ADT-2835-FF-SC0-02

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



## BNC Types

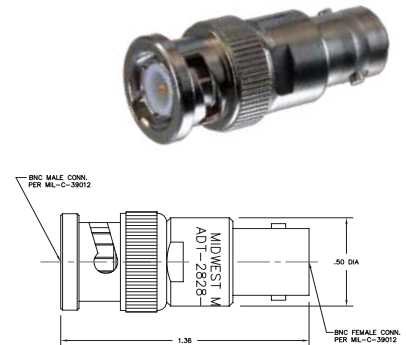
### BNC Male to BNC Female

#### Technical Specifications

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

#### Part No.

ADT-2828-MF-BNC-10



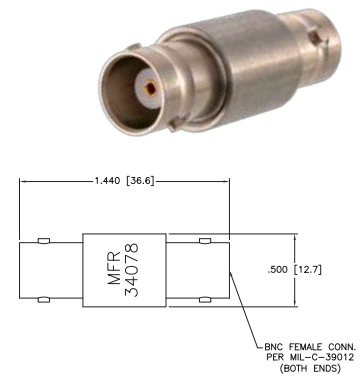
### BNC Female to BNC Female

#### Technical Specifications

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

#### Part No.

ADT-2829-FF-BNC-10



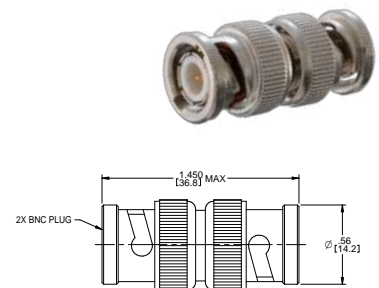
### BNC Male to BNC Male

#### Technical Specifications

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

#### Part No.

ADT-2830-MM-BNC-10



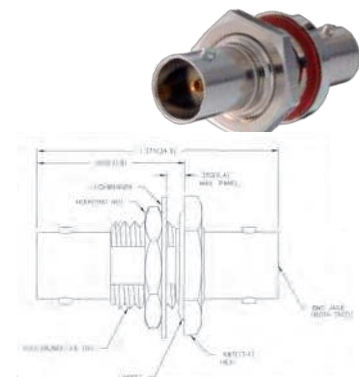
### BNC Female to BNC Female – Bulkhead Mount

#### Technical Specifications

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

#### Part No.

ADT-2831-FF-BNC-10



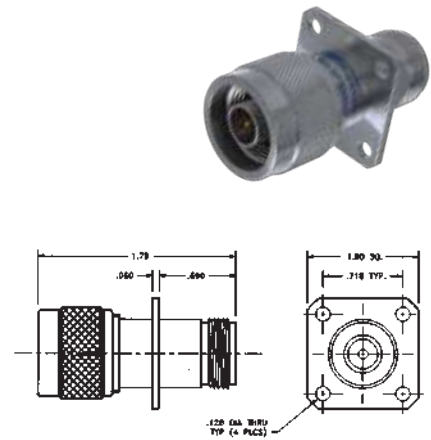
# IN-SERIES ADAPTERS

## Special Adapters

### N Male to N Female – Flange Mount

#### Technical Specifications

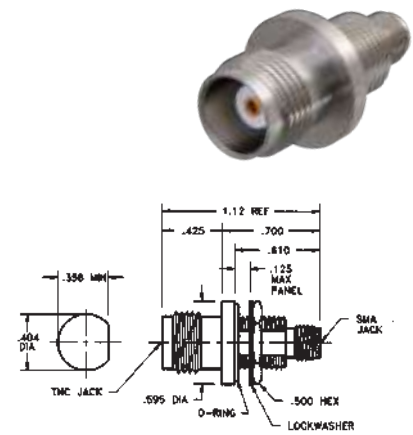
<b>Frequency:</b>	DC – 18.0 GHz
<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.05 @ DC - 4.0 GHz 1.06 @ 4.0-8.0 GHz 1.10 @ 8.0-18.0 GHz
<b>Finish:</b>	Passivated Stainless Steel
<b>Part No.</b>	ADT-2694-MF-NNN-02



### TNC Female to SMA Female – Rear Mount Bulkhead

#### Technical Specifications

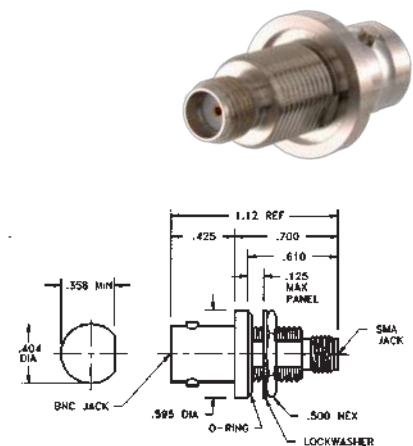
<b>Frequency:</b>	DC – 18.0 GHz
<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.10 @ DC - 4.0 GHz 1.15 @ 4.0-8.0 GHz 1.25 @ 8.0-18.0 GHz
<b>Finish:</b>	Passivated Stainless Steel
<b>Part No.</b>	ADT-2837-TF-SMF-02



### BNC Female to SMA Female – Rear Mount Bulkhead

#### Technical Specifications

<b>Frequency:</b>	DC – 4.0 GHz
<b>Impedance:</b>	50 Ohms
<b>VSWR:</b>	1.15
<b>Finish:</b>	Passivated Stainless Steel
<b>Part No.</b>	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
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### 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.



# CONNECTORS

Specification Requirement	MIL-C 39012 Paragraph	Detail Information
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## Mechanical

<b>Force to Engage</b>	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
<b>Coupling Nut Retention</b>	3.25	SMA - 60 lbs min. SSM - 40 lbs min. N, TNC, BNC, & SC - 100 lbs min.
<b>Coupling Proof Torque (min.)</b>	3.60	SMA - 15 in-lbs SSM - 4 in-lbs N - 30 in-lbs TNC & SC - 15 in-lbs
<b>Cable Retention</b>	3.24	Refer to the applicable military slash sheet or consult factory if one does not exist.
<b>Mating Characteristics</b>	3.70	SMA SSM BMA N TNC BNC SC
<b>Connector Durability</b>	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	
<b>Recommended Mating Torque</b>	-	SMA - 7-10 in-lbs SSM - 2 in-lbs N, TNC, & SC - 12-15 in-lbs BNC&BMA - N/A

## Environmental

<b>Vibration</b>	3.18	Per Specification MIL-STD-202, method 204, test condition D
<b>Shock</b>	3.19	Per Specification MIL-STD-202, method 213, test condition I
<b>Thermal Shock</b>	3.20	Refer to the applicable military slash sheet or consult factory if one does not exist.
<b>Corrosion (Salt Spray)</b>	3.13	Per Specification MIL-STD-202, method 101, test condition B
<b>Moisture Resistance</b>	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 $\mu$ s of 10 kA nominal
- Multi-strike lightning 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.

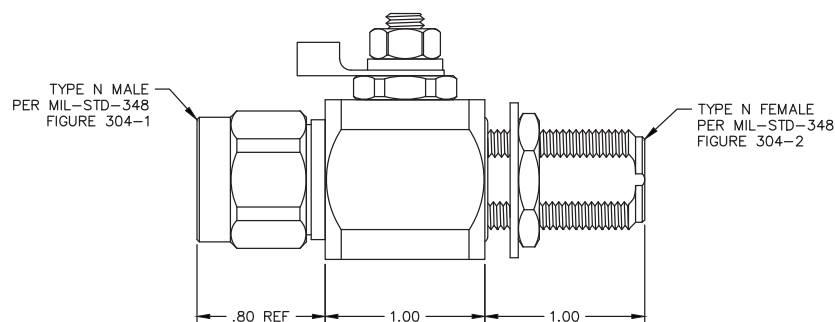
Part Number	Description
CGS-1030-00-NNN-34	Commercial grade surge arrester, 3 GHz, N male to N female

### 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 $\Omega$ nominal	
VSWR	1.20:1 maximum	
Surge Capability, 8/20 $\mu$ 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

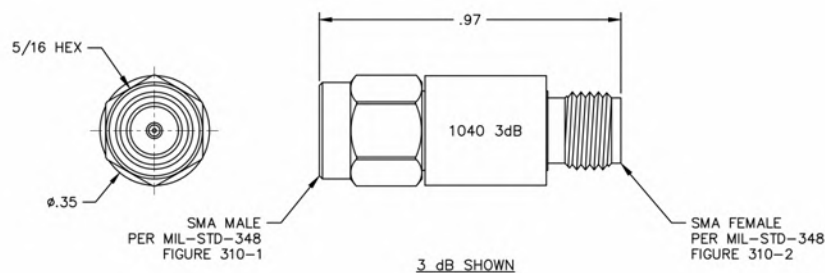
Housing	Passivated stainless steel
Coupling Nut	Passivated stainless steel
Male Center Contact	Gold plated brass
Female Center Contact	Gold-plated beryllium copper

### Environmental Specifications

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

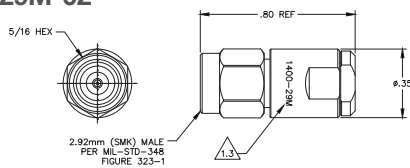
### Electrical Specifications

	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)

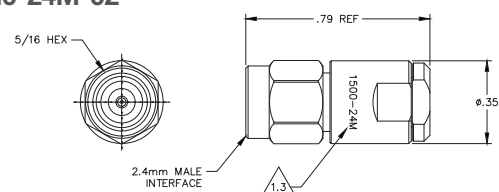
### Mechanical Specifications

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

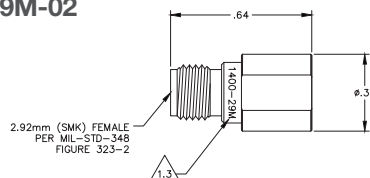
#### CGT-1400-M0-29M-02



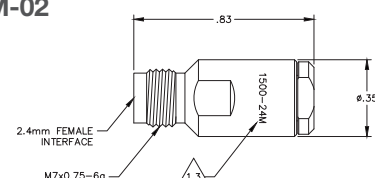
#### CGT-1500-M0-24M-02



#### 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

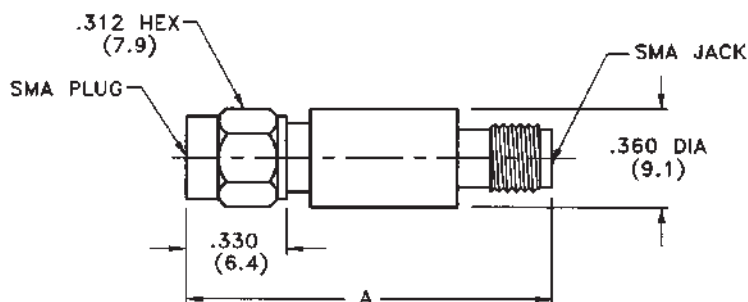


Midwest Microwave’s QPL Attenuator products were designed, tested and have been qualified to the stringent requirements of the latest effective issue of the applicable military specifications. By selecting a part that appears on a QPL list, a user is assured that the part will meet or exceed the performance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

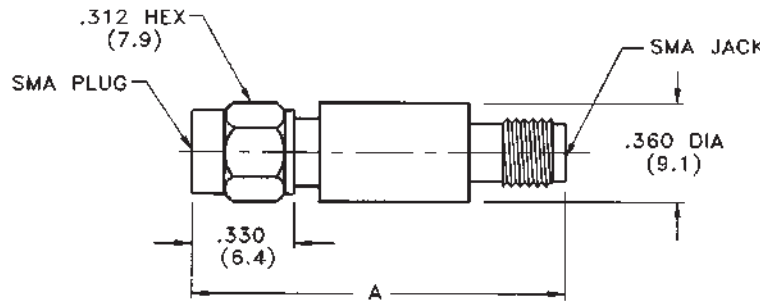
### MIL-DTL-3933/14



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

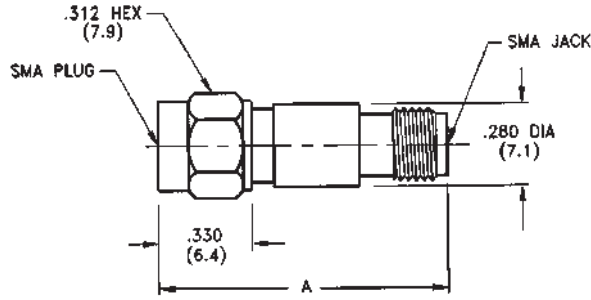
# QPL APPROVED PRODUCTS

Military Part No.	Cinch Midwest Part No.	Dimension A inches (mm) (max.)	Attenuation Value (dB) (nom.)	Frequency Range (GHz)	Closest Commercial Alternate
- 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

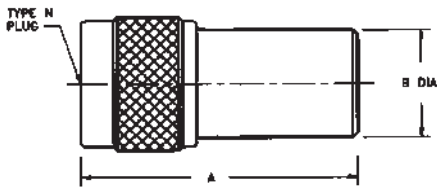


Figure 1

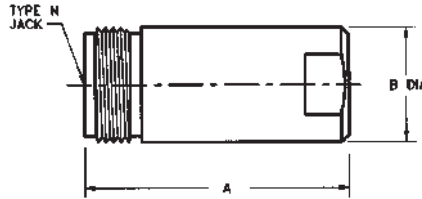


Figure 2

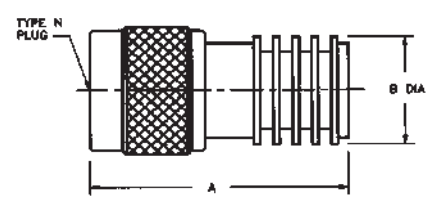
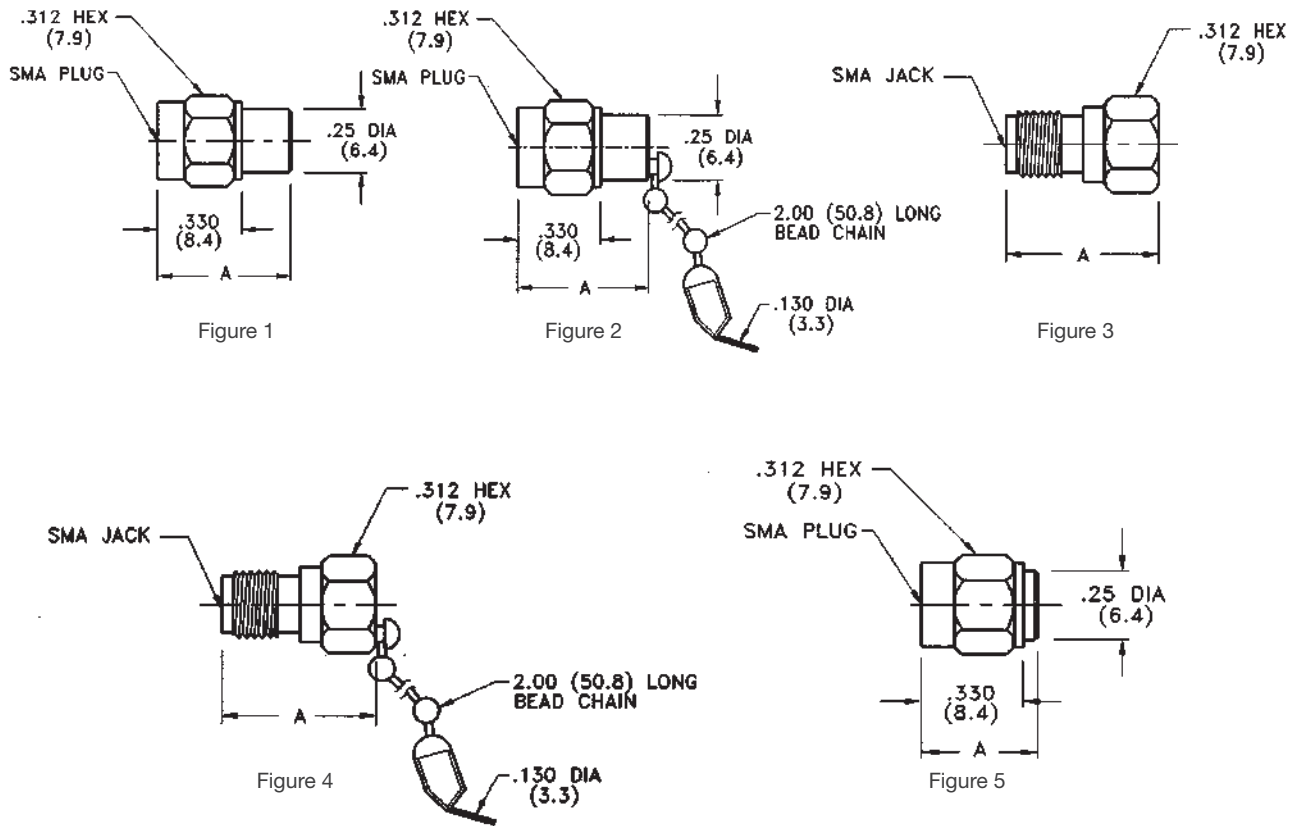


Figure 3

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



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:**

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

## Coaxial Interface Dimensions

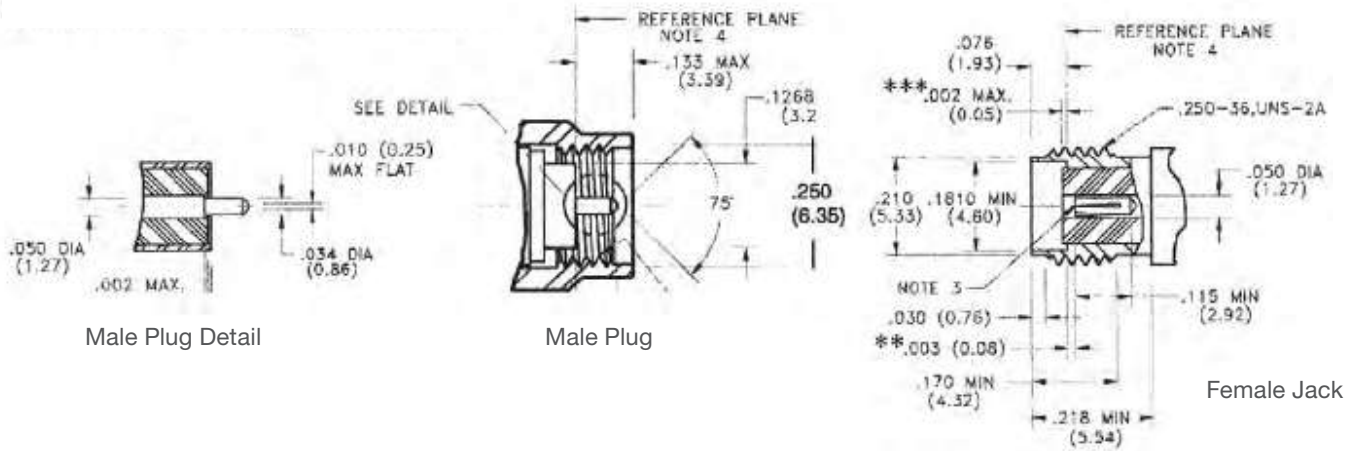
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This Appendix is meant to provide the user with some of the necessary supplementary information they may require to allow them to make reasonable and timely decisions on choices of types of components, connectors, coaxial cable and cable assemblies 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.

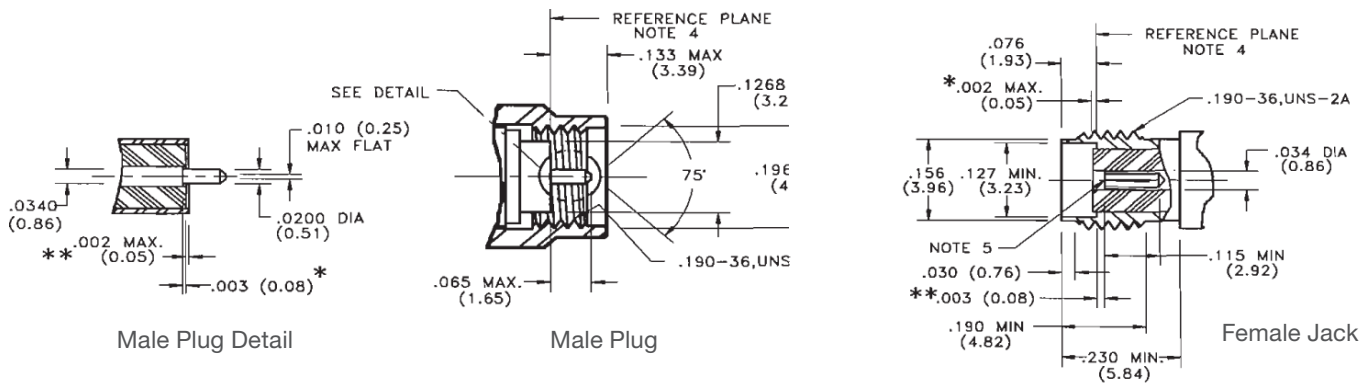
Mechanical dimensional specifications are stated in inches with metric equivalents (to the nearest 0.01 mm) given for reference information only, and are based on 1" = 25.4 millimeters.

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.

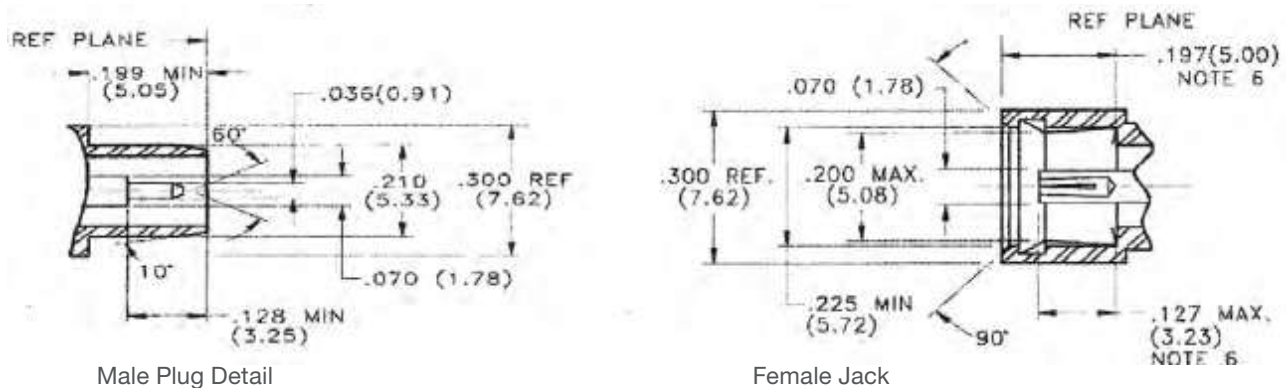
## SMA Interface Mating Dimensions



## 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.

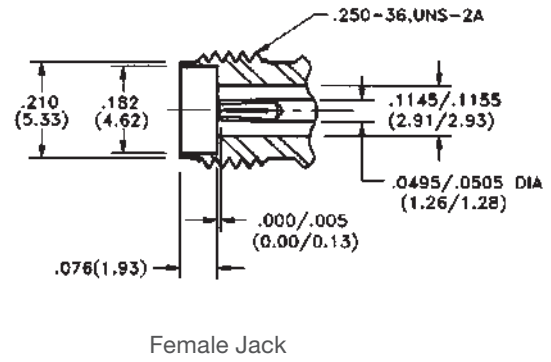
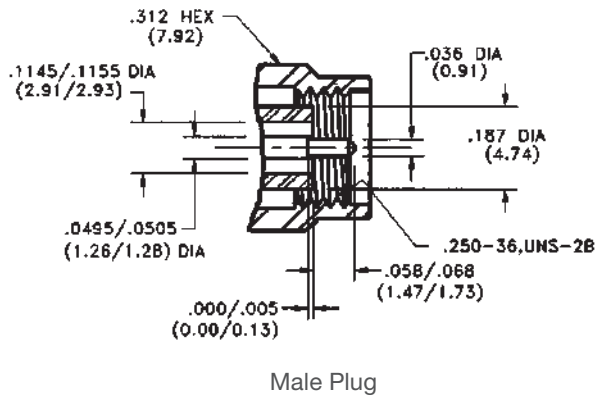
\*\* Center Contact Gap - measured from connector body reference plane .000 inches min. (flush) to .010 max. below.

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

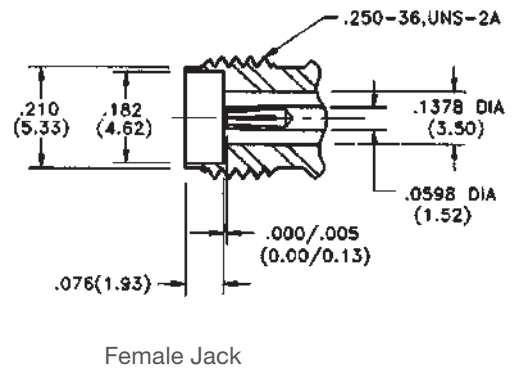
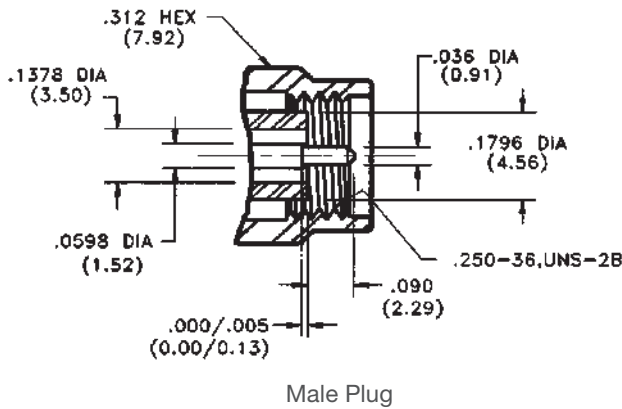
Notes:

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.

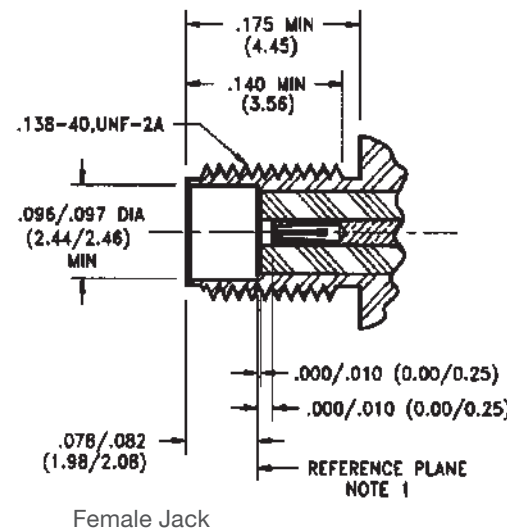
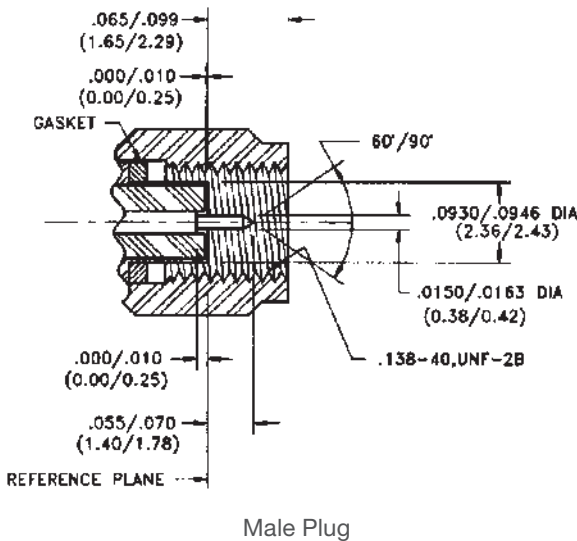
## 2.9 mm Precision Interface Mating Dimensions



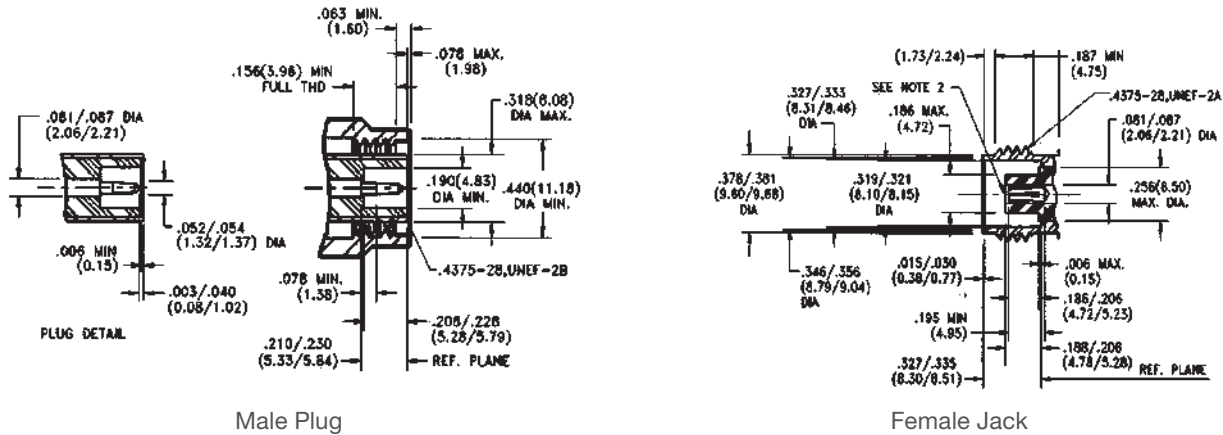
## 3.5 mm Precision Interface Mating Dimensions



## Type SMM Interface Mating Dimensions



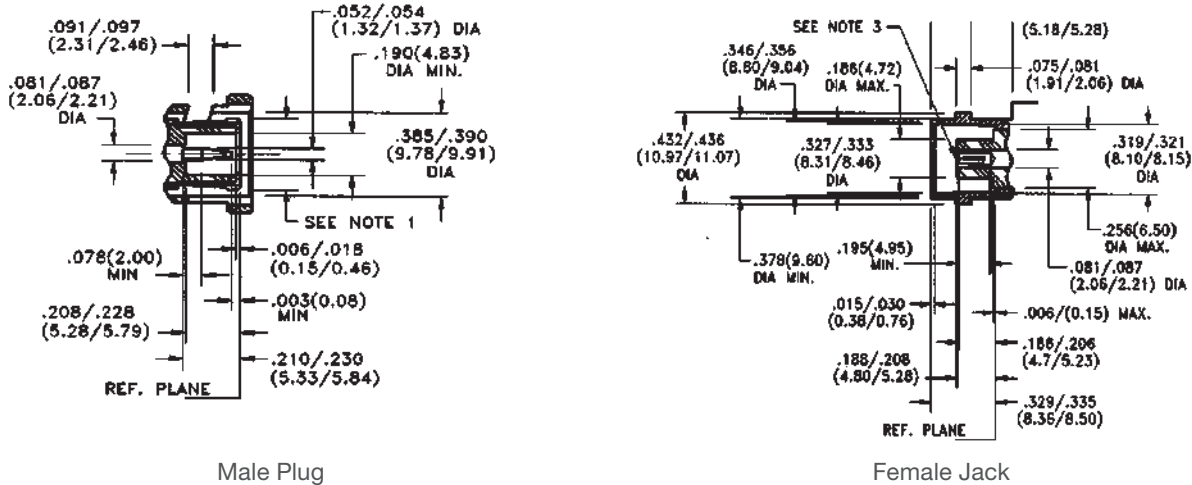
## Type TNC Interface Mating Dimensions



Male Plug

Female Jack

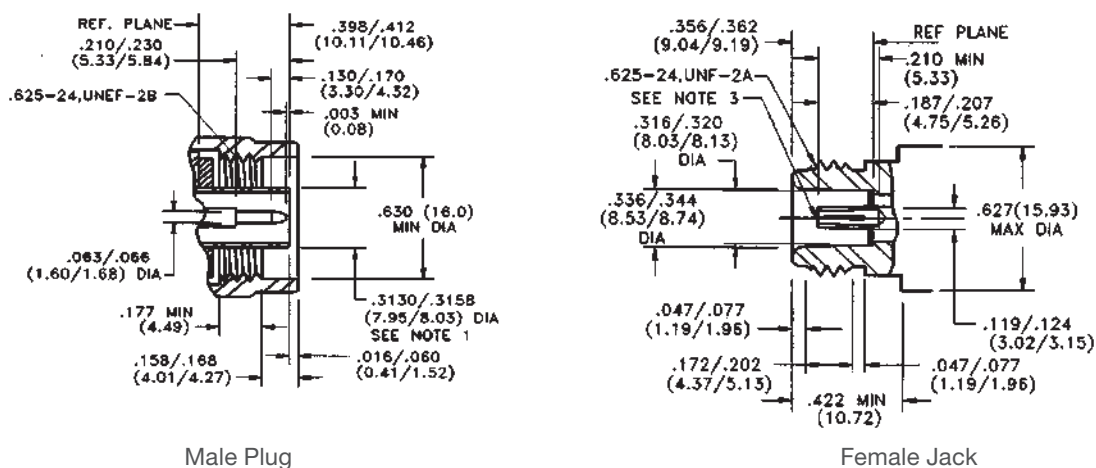
## Type BNC Interface Mating Dimensions



Male Plug

Female Jack

## Type N Interface Mating Dimensions



Male Plug

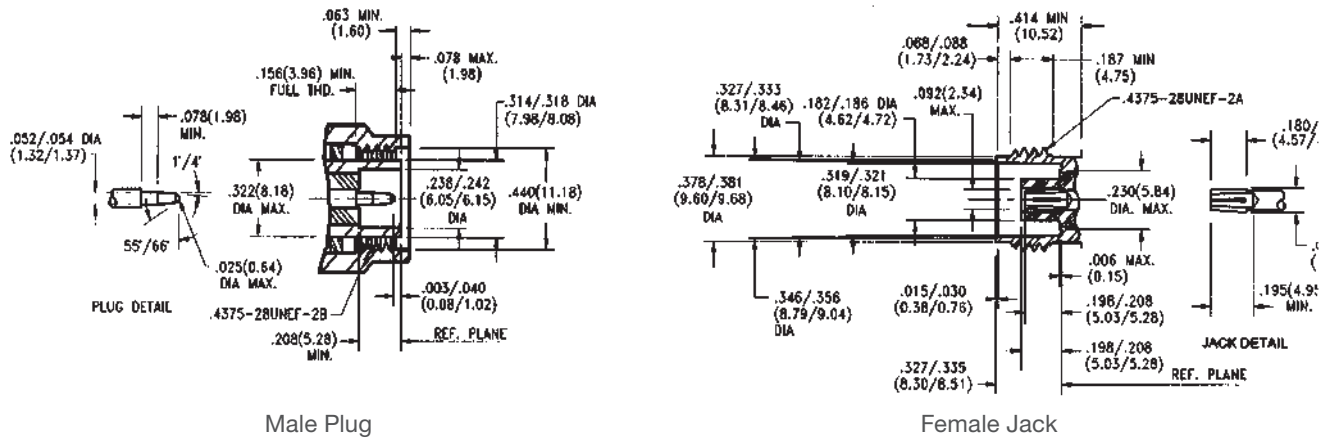
Female Jack

Notes:

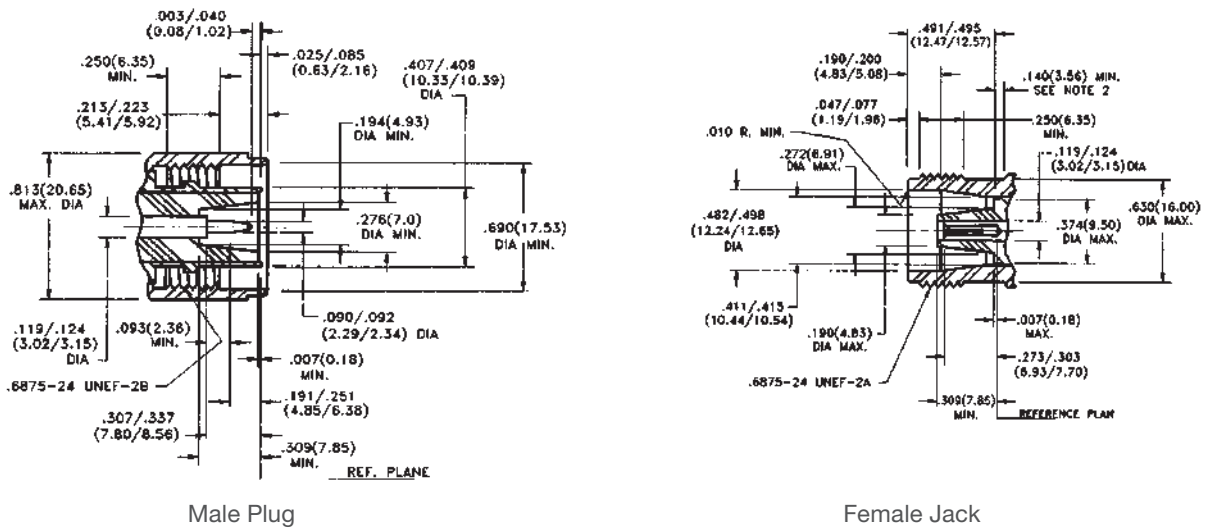
1. I.D. to meet VSWR and contact resistance when mated with .052/.054 (1.32/1.37 mm) Diameter male pin.
2. I.D. to meet VSWR and contact resistance when mated with .063/.066 (1.60/1.68 mm) Diameter male pin.
3. Metric equivalents (to nearest 0.01 mm) are for general information only.



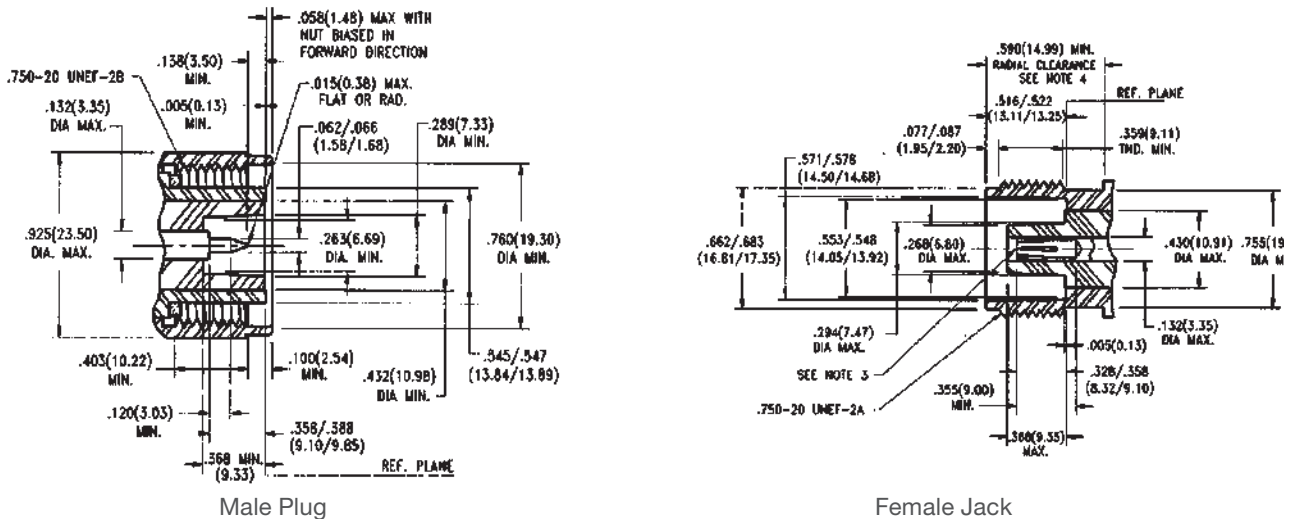
## Type TNC-A Interface Mating Dimensions



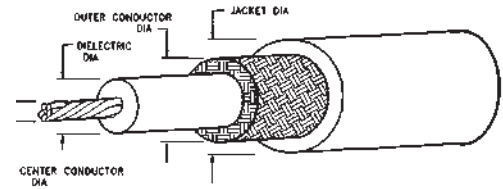
## Type SC Interface Mating Dimensions



## Type HN Interface Mating Dimensions



## 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 – Watts maximum at Frequency (GHz)					
	.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



## Space Qualified Parts

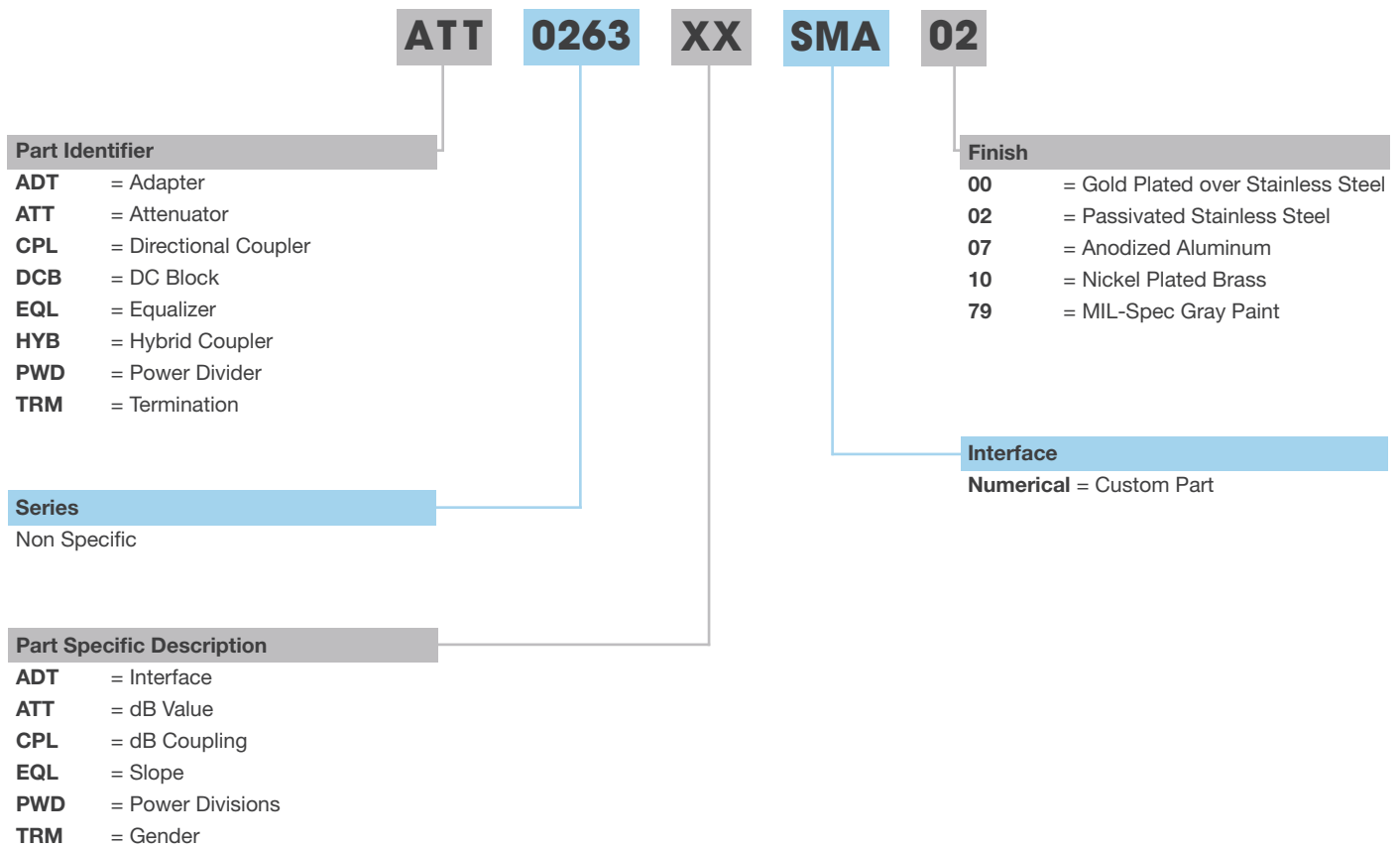
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Cinch Connectivity Solutions custom manufactures Midwest Microwave line of High Reliability (Hi-Rel) products suitable for use under space flight conditions. These products are manufactured using a system that provides complete traceability of all 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.

<b>Model No.</b>	<b>Page</b>	<b>Model No.</b>	<b>Page</b>	<b>Model No.</b>	<b>Page</b>
<b>Adapters - Coaxial</b>					
ADT-2540-7M-SMM-02	68	ADT-2685-TM-SMM-02	81	ADT-8000-MF-SMA-02	89
ADT-2541-7M-SMF-02	68	ADT-2686-TM-SMF-02	81	ADT-8000-MM-SMA-02	89
ADT-2542-7M-SMM-02	70	ADT-2687-TF-SMM-02	81	ATS-3551-18-NNN-02	25
ADT-2543-7M-SMF-02	70	ADT-2688-TF-SMF-02	81	ATS-3554-18-SMA-02	25
ADT-2544-7M-NNM-02	71	ADT-2689-TF-SMM-02	82	ATT-0205-XX-SMA-02	12
ADT-2545-7M-NNF-02	71	ADT-2694-MF-NNN-02	96	ATT-0218-XX-NNN-02	20
ADT-2546-7M-TNM-02	72	ADT-2695-SM-SSM-02	84	ATT-0219-XX-NNN-02	20
ADT-2547-7M-TNF-02	72	ADT-2696-SM-SSF-02	84	ATT-0225-XX-TNC-02	22
ADT-2576-NM-SMM-02	75	ADT-2697-SF-SSM-02	84	ATT-0238-XX-SMA-02	12
ADT-2577-NM-SMF-02	75	ADT-2698-SF-SSF-02	84	ATT-0263-XX-SMA-02	12
ADT-2578-NF-SMM-02	75	ADT-2699-TF-SMF-02	82	ATT-0275-XX-SMA-02	14
ADT-2579-NF-SMF-02	75	ADT-2701-7M-3MM-02	69	ATT-0276-XX-SMA-02	14
ADT-2580-NM-SMM-02	74	ADT-2702-7M-3MF-02	69	ATT-0277-XX-SMA-02	14
ADT-2581-NM-SMF-02	74	ADT-2712-NM-3MM-02	73	ATT-(0)290(f/m)-XX-HEX-02	10
ADT-2582-NF-SMM-02	74	ADT-2713-NM-3MF-02	73	ATT-(0)290(f/m)-XX-SMA-02	7
ADT-2583-NF-SMF-02	74	ADT-2714-NF-3MM-02	73	ATT-0291-XX-HEX-02	10
ADT-2584-NM-TNM-02	78	ADT-2715-NF-3MF-02	73	ATT-0291-XX-SMA-02	7
ADT-2585-NM-TNF-02	78	ADT-2733-MF-3MM-02	90	ATT-0292-XX-HEX-02	10
ADT-2586-NF-TNM-02	78	ADT-2734-MM-3MM-02	90	ATT-0292-XX-SMA-02	8
ADT-2587-NF-TNF-02	78	ADT-2735-FF-3MM-02	90	ATT-0294-XX-HEX-02	10
ADT-2588-MF-NNN-02	92	ADT-2767-SF-BMF-02	87	ATT-0294-XX-SMA-02	8
ADT-2589-MM-NNN-02	92	ADT-2768-SM-BMF-02	85	ATT-0298-XX-HEX-02	10
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ADT-2671-BM-SMF-02	83	ADT-2838-BF-SMF-02	96	CGA-1040-06-SMA-02	100
ADT-2672-BF-SMM-02	83	ADT-2840-NF-SMF-02	76	CGA-1040-10-SMA-02	100
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