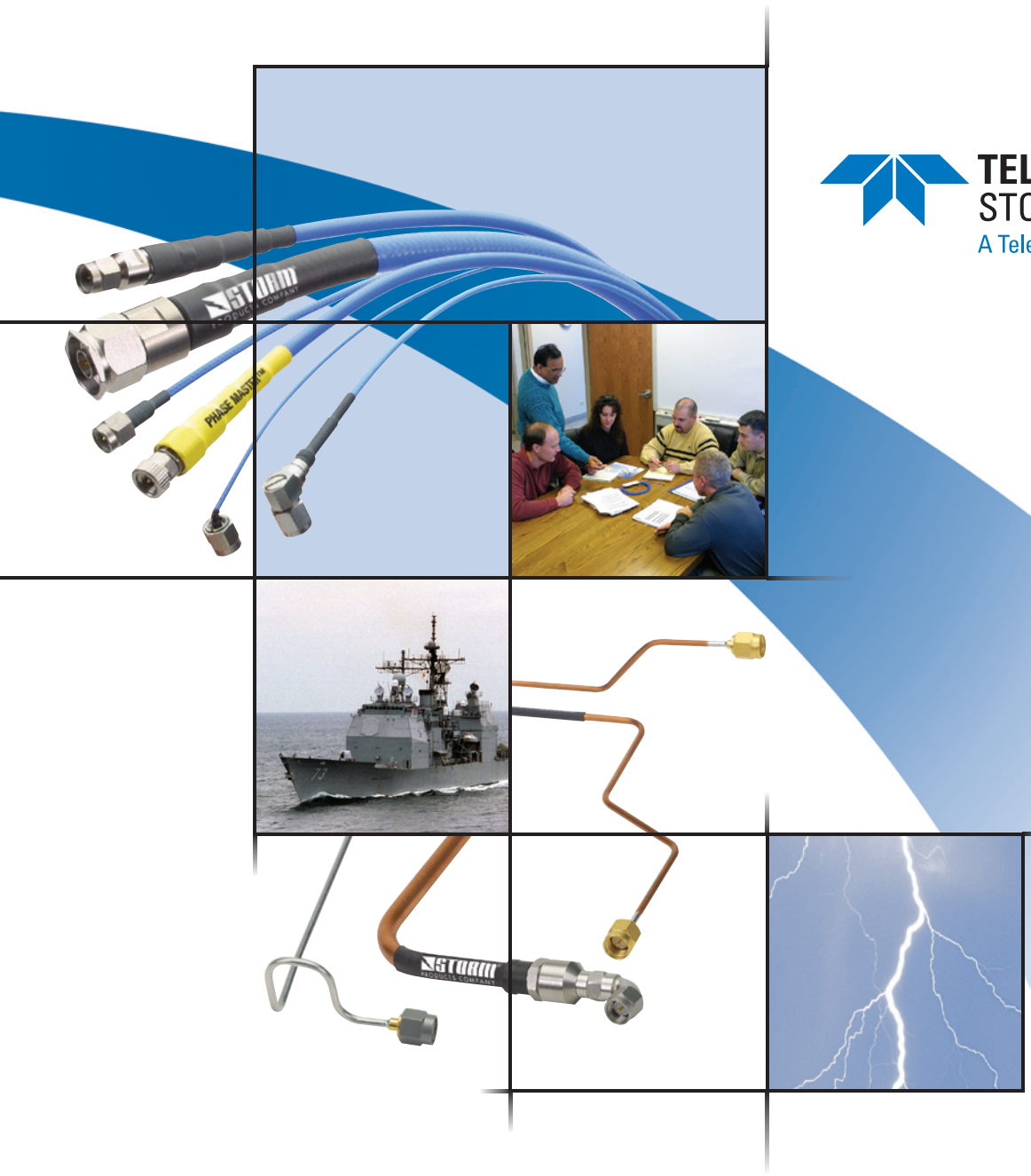

TELEDYNE
STORM PRODUCTS
A Teledyne Technologies Company

MICROWAVE:
HIGH PERFORMANCE INTERCONNECT PRODUCTS

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Please contact us if the products featured in this catalog do not meet your specific needs. As a solutions provider, we can modify existing cables or design new ones to satisfy unique system requirements.

Also available: Test & Measurement Products Catalog

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WHO WE ARE

Your projects are important. You need to know that the company you deal with and the products they provide will perform to your satisfaction now and over the long run.

Storm Products Company has been providing just such service and products for more than 40 years. We are well known not only for quality products but for quality customer relations based on an ongoing commitment to honesty and integrity.

STORM® PRODUCTS COMPANY

" ...combining leading technology with the Storm legacy of responsive, flexible, committed customer service."

STORM PRODUCTS COMPANY has been providing wire, cable, and interconnect solutions since Al Storm founded the company in the early 1950s. One of the early pioneers in the wire and cable distribution business, Storm Products was among the first to offer value-added services as part of the distribution activity—delivering just what the customer wanted, when they wanted it.

Storm Products soon moved from distribution to manufacturing and, in the late 1970s, Storm Products expanded its operations to include microwave cable and cable assembly products.

STORM PRODUCTS–MICROWAVE, located near Chicago, Illinois, was one of the first companies to offer high performance flexible and semi-rigid RF/microwave cable assemblies with low density, tape-wrapped dielectric. Today, Storm Microwave brings decades of microwave transmission line design experience to the table in solving design engineers' interconnect problems—combining leading technology with the Storm legacy of responsive, flexible, committed customer service.

ISO 9001

We actively work to stay on top of and implement those new and improved technologies and processes that will translate into better performance for your end product.

Storm Products is dedicated to developing and improving our quality system, and our ISO 9001 registration reflects a continuing commitment to quality in areas ranging from design to production, sales to shipping.

Quality Policy:
" To meet or exceed our customers' expectations at all times in terms of time, value, and performance."

OUR VISION

Within the high performance interconnect solutions market, become the most desirable company to do business with by delivering levels of value unmatched by the competition. Our value is based on responsiveness, process and product innovation, and an unwavering focus on meeting customer expectations.

TO MOVE TOWARD OUR VISION, WE:

- ***Operate based on an up-front, clear understanding of time, cost, and product performance expectations.***
- ***Support development projects with timely mechanical mockups, functional prototypes, and technical data.***
- ***Leverage existing product designs whenever possible to compress schedules, reduce development costs, and increase reliability.***
- ***Maintain a dedicated product development staff focused on delivering new product technologies to satisfy unique project needs.***
- ***Deliver cost-effective, reliable product on schedule, via a comprehensive process control system and select use of statistical techniques.***

MARKET FOCUS

STORM PRODUCTS FOCUSES ON THE FOLLOWING MARKETS:

- ***Customized microwave interconnect solutions for Defense and Aerospace markets.*** *This catalog is geared to customers requiring high performance cable assemblies for those applications.*
- ***Standard or customized microwave cable assemblies and accessories for test and measurement applications in Defense and Commercial markets.*** *Please request our Test & Measurement Catalog.*
- ***Manufacturing services involving microwave cable assemblies for Defense and select Commercial markets.*** *Please request our Capabilities Brochure.*

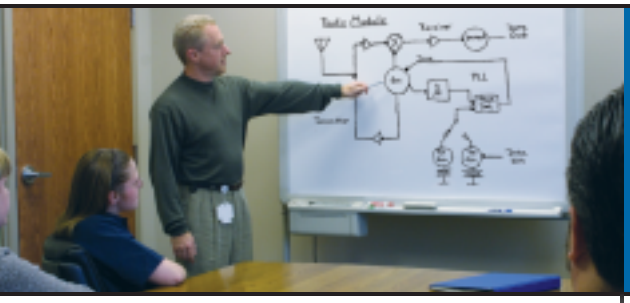
Put Storm Products to work for you. Call us today to discuss your project.

FROM CONCEPT TO PRODUCTION

THE PRODUCT DEVELOPMENT PROCESS

The elements of Storm's vision—responsiveness, process & product innovation, and an unwavering focus on meeting customer expectations—are an integral part of the Storm customer experience and the basis of our Product Development Process. This allows us to provide solutions specifically designed to satisfy your unique requirements.

Follow our process, and examine our capabilities and supporting case studies, to see how you can benefit from a Storm Products partnership.



RESPONSIVENESS

CHALLENGE #1

A customer is developing a technology demonstrator for a new phase array radar system with over 250 unique, undefined cable runs. They are looking for ways to compress the overall development cycle.

SOLUTION #1

Storm's technical staff starts by meeting with the customer to develop a clear, common understanding of the project. Due to the project's size and complexity, a dedicated project manager is assigned.Working with an aggressive build schedule, Storm develops the various cable routings; frequently reviewing progress and cable data with the customer.

THE RESULT: The customer not only receives cable assemblies and engineering data ahead of their need date, they save 2 days on installation because the assemblies fit so well.

APPLICATIONS ENGINEERING

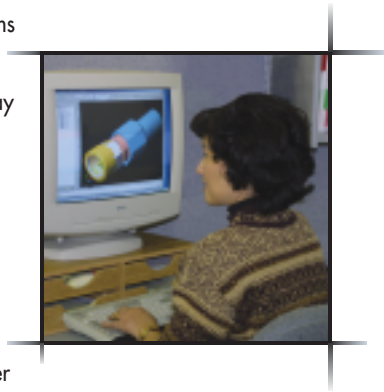
Storm's applications engineering staff is focused on solving your problems. To minimize delays, we begin by gaining a clear, common understanding of your particular time, cost, and performance requirements.

With that information in hand, the focus shifts to translating those needs into product requirements—and a product capable of meeting them. Project managers are assigned to larger or more complex projects to ensure continuity as the development process progresses from concept to production.

The entire process is accelerated by our knowledge of and experience with radar, EW, communications, and antenna systems.

PRODUCT DESIGN

Specializing in 50-ohm coax products featuring low density PTFE dielectrics, Storm has been solving tough problems in microwave systems for over 20 years.



During the product design stage—which may start with something as simple as a hand–drawn sketch—we look to leverage existing designs in order to provide the most cost effective, reliable design in the shortest time possible.

With in-house connector and cable design capability, Storm is able to optimize each design, ensuring a proper match to customer requirements. As product designs move forward, Storm uses statistical methods for validation. Product data is shared with your design team to reduce duplicated efforts.

THE PRODUCT DEVELOPMENT PROCESS

APPLICATIONS ENGINEERING → PRODUCT DESIGN → MOCK-UP / PROTOTYPES

QUALITY

CHALLENGE #2

A customer is developing airborne phased array radar requiring reduced phase shifts when exposed to operating temperatures. They are looking for cost effective alternatives to expensive SiO_2 options.

SOLUTION #2

Storm's applications engineering staff recognizes that the customer's system requirements can likely be met by leveraging a new ePTFE product being developed at Storm.

The design staff prototypes and tests the new semi-rigid cable within a compressed time frame. With positive results from preliminary tests in hand, functional models are built by Storm's quick-turn prototype team to system test the concept.

THE RESULT: The new product meets the customer's system requirements for less than 30% of the cost of comparable SiO_2 product.

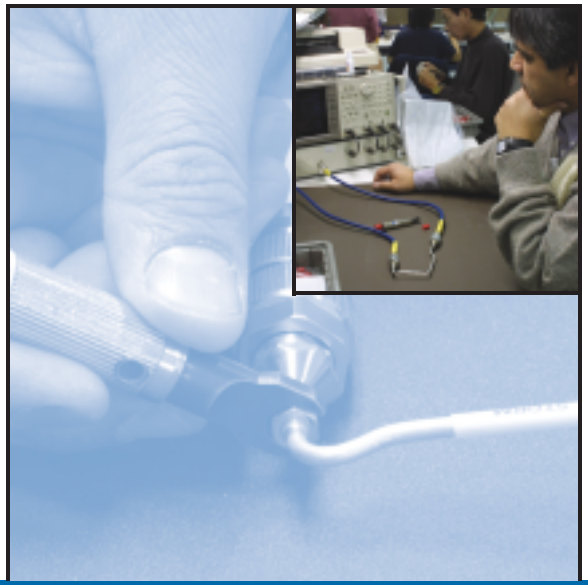
MOCK-UP / PROTOTYPES

During system development or update, Storm's prototype group acts as an extension of your design team. Our dedicated, quick-turn prototype team is equipped to produce both connector and cable assemblies in short time frames to help meet challenging schedules.

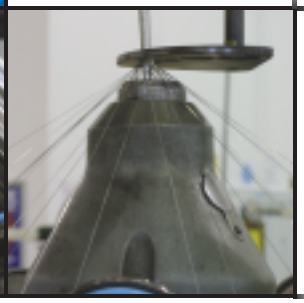
To ensure a smooth transition from prototype to production, data packages are created detailing each prototype configuration in terms of construction and process.

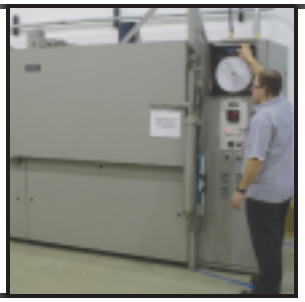
PROTOTYPE CAPABILITIES

- ***Machining (e.g., turning, milling, grinding)***
- ***Semi-rigid cable assembly***
- ***Flexible cable assembly***
- ***VNA characterization through 50 GHz***
- ***Environmental characterization***



THE PRODUCT DEVELOPMENT PROCESS





PROCESS DESIGN & CONTROL

To maximize performance and eliminate surprises, we emphasize process *design* over definition. This enables us to optimize the production process rather than settle for "any method that works."

As part of this effort, we use statistical methods to ensure that production processes are both understood and controlled. This allows for consistency over time.

Operators follow detailed control plans outlining equipment, critical process parameters, key product characteristics, and training requirements. This provides product-specific process skills. Operators are also trained in 8D problem solving.

MANUFACTURING & ASSEMBLY

To ensure compliance with the most challenging specifications, Storm produces both flexible and semi-rigid microwave coax cable in house.

Our environmentally controlled 70,000-square-foot facility ensures that product is produced under optimum, uniform conditions for consistent, predictable performance.

To deliver the highest performance, we utilize state-of-the-art manufacturing and assembly equipment. For the same reason, each assembly work cell is manned by a leader and team of operators trained and qualified in the operations used to build that cell's product.

MANUFACTURING CAPABILITIES

CABLE

- *ePTFE tape and foil-tape wrapping*
- *Flat and round wire braiding*
- *Textile braiding*
- *Low and high temperature extrusion*
- *Semi-rigid die sizing and cutting*

ASSEMBLIES

- *Automated flexible and semi-rigid cable cutting and stripping*
- *Automated bending of semi-rigid cable with diameters from 0.034" to 0.250"*
- *High reliability soldering processes against WS 6536, MIL-STD-2000, and ANSI-J-STD*
- *Miniature, blindmate connector assembly*
- *Precision phase matching*
- *Thermal preconditioning*

THE PRODUCT DEVELOPMENT PROCESS

TEST & MEASUREMENT

Storm's broad range of test & measurement capabilities plays a vital role in delivering reliable, high performance products at cost-effective prices.

To ensure our products meet system requirements, we have developed techniques for making extremely accurate measurements on a number of critical electrical tests; for example, phase vs. temperature, phase vs. flexure, and shielding effectiveness. Storm also has a long history and special competency in characterizing products with GPO®, GPPO®, GMS®, and other blindmate interfaces.

In addition, close partnership with a local test house facilitates the rapid completion of any qualification tests outside the scope of our in-house capabilities. Our internal model shop also contributes to the effort by responding quickly with specialized jigs and fixtures for product qualification or acceptance testing.

TEST & MEASUREMENT CAPABILITIES

- *VSWR*
- *Insertion loss*
- *Electrical length*
- *Phase tracking*
- *Additive phase noise*
- *Shielding effectiveness*
- *Electrical length vs. temperature*
- *Electrical length vs. flexure*
- *Impedance*
- *Capacitance*
- *Dielectric withstanding voltage*
- *Tensile strength/connector retention*
- *Mechanical measurements*
- *Interface gaging*
- *Thermal exposure*
- *Thermal shock*

PRODUCT & PROCESS INNOVATION

CHALLENGE #3

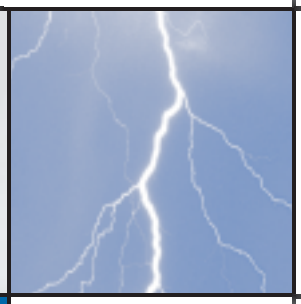
A customer is a developing a seeker for a guided munitions that requires a miniature 18 GHz blindmate interconnect. They are experiencing difficulty locating a cable combining the necessary flexibility, shielding effectiveness, and attenuation properties.

SOLUTION #3

Storm's design team responds by creating a new, miniature (< 0.039") ePTFE cable made possible by state-of-the-art production equipment and materials.

Small numbers of the cable assembly are prototyped by our quick-turn prototype team to support the customer's development schedule. Refinements to the cable and connector designs increase the interconnect's shielding effectiveness by nearly 20 dB, and full-scale production is initiated.

THE RESULT: The customer receives deliverable hardware that meets or exceeds their unique loss, size, flex force, and shielding requirements.



THE PRODUCT DEVELOPMENT PROCESS

CABLE SELECTION CHART

This cable selection chart is provided to assist you in choosing a cable to best fit your application. Please contact us if you have questions or if you do not see a cable presented in the catalog that meets your needs. As a solutions provider, we can modify existing cables as a cost effective way to meet your unique system requirements, or we can design new cables as needed.

50 Ohm Flexible Cables

ATTRIBUTE		PP. 21-27	PP. 29-46				PP. 47-64			
		PHASE STABLE	MINIATURE				LOW LOSS			
		PHASE MASTER 190	421-720	421-677	STORM FLEX 047	STORM FLEX 086	TRUE BLUE 125	TRUE BLUE 205	TRUE BLUE 290	TRUE BLUE 420
Diameter (in/mm)		0.190 / 4.83	0.039 / 1.40	0.088 / 2.24	0.055 / 2.44	0.096 / 0.99	0.125 / 3.18	0.205 / 5.21	0.290 / 7.37	0.420 / 10.67
Operating Frequency (Max, GHz.)		26.5	26.5	18	50	50	50	26.5	19.8	12
Attenuation–Nom @ 2 GHz (dB/ft)		0.110	0.80	0.33	0.59	0.28	0.230	0.110	0.078	0.054
Attenuation–Nom @ 10 GHz (dB/ft)		0.260	1.81	0.76	1.37	0.68	0.52	0.26	0.19	0.13
Attenuation–Nom @ 18 GHz (dB/ft)		0.360	2.44	1.05	1.89	0.95	0.71	0.36	0.26	–
Power Handling–Avg. (watts @ 1 GHz)		700	22	100	50	125	280	750	1400	1700
Phase vs. Temp Stability (ppm, nom)		500	5000	1000	6000	4700	2800	2100	1600	1500
Phase vs. Flex Stability* (deg @ 18 GHz, nom)		3.00	0.95	1.25	0.70	1.00	3.50	3.25	4.50	3.50†
Bend Radius–Min	DYNAMIC (in/mm)	2.20 / 55.88	0.500 / 15.24	0.900 / 22.86	0.600 / 25.40	1.000 / 12.70	1.25 / 31.75	2.10 / 53.34	2.90 / 73.66	4.00 / 101.60
	STATIC (in/mm)	1.00 / 25.40	0.125 / 2.54	0.450 / 11.43	0.100 / 4.75	0.187 / 3.18	0.50 / 12.70	1.00 / 25.40	1.50 / 38.10	2.50 / 63.50
Shielding Effectiveness–Min (dB @1 GHz)		–105	–75	–90	–85	–90	–90	–90	–90	–90
Weight (grams/ft/m)		16.65 / 54.63	0.51 / 1.67	3.90 / 12.80	1.54 / 5.05	5.25 / 17.22	8.00 / 26.25	20.00 / 65.62	36.00 / 118.11	85.00 / 278.87
Velocity of Propagation (%)		81.5	76.0	78.0	70.5	70.5	74.0	75.0	76.0	77.0
Temperature Range (deg C)		–54 to +150‡	–54 to +150	–54 to +150	–54 to +125	–54 to +125	–54 to +150	–54 to +150	–54 to +150	–54 to +150

** ± 90° Bends; for specific test parameters, call Storm* *† At 12 GHz* *‡ Subject to connector choice* ***Specifications subject to change without notice.***

50 Ohm Semi-Rigid Cables

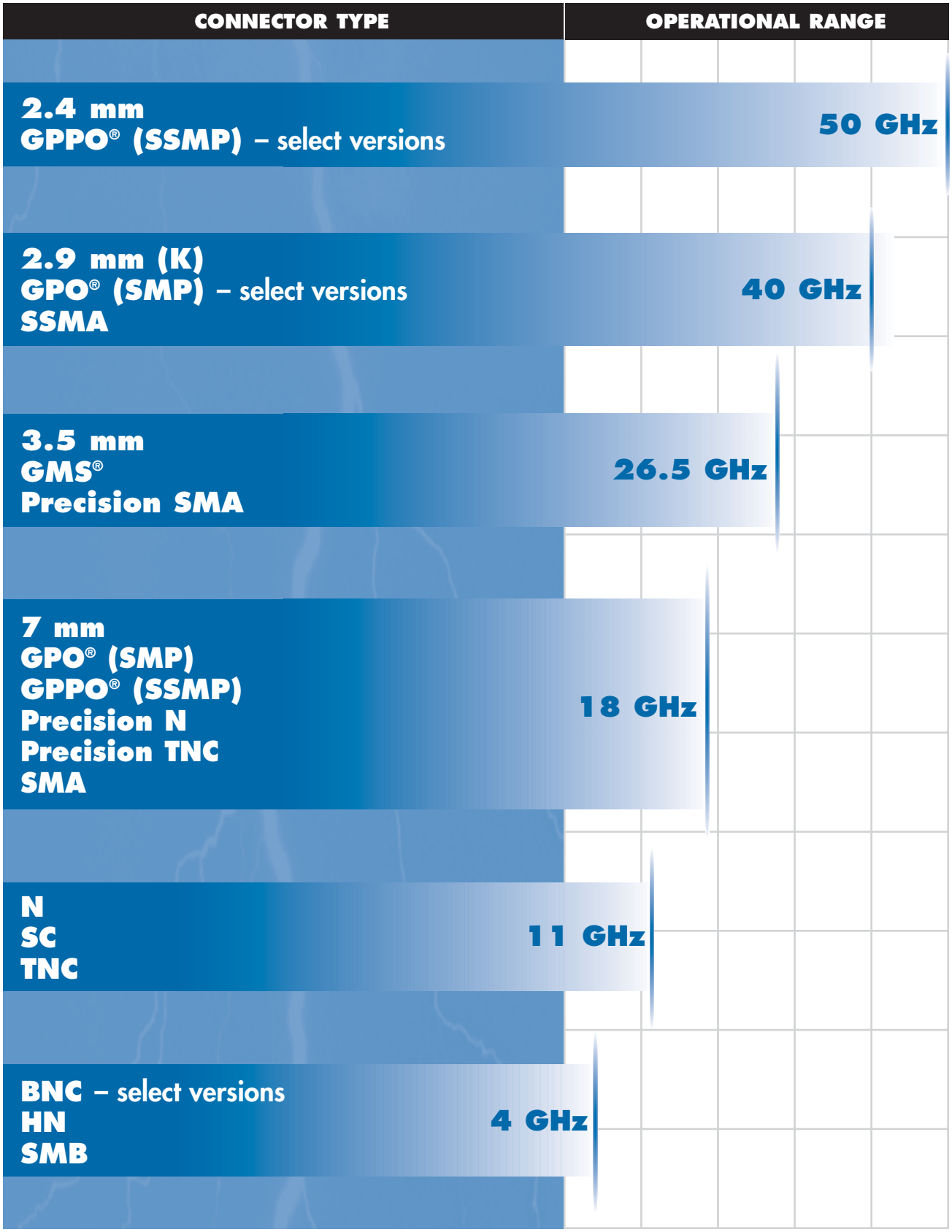
ATTRIBUTE	PP. 69-78 PHASE STABLE LOW LOSS				PP. 79-83 LOW LOSS RG REPLACEMENT	
	MAXIMIZER GOLD 086	MAXIMIZER GOLD 116	MAXIMIZER GOLD 141	MAXIMIZER GOLD 250	MAXIMIZER SILVER 086	MAXIMIZER SILVER 141
Diameter (in/mm)	0.086 / 2.18	0.116 / 2.95	0.141 / 3.58	0.250 / 6.35	0.086 / 2.18	0.141 / 3.58
Operating Frequency (Max, GHz.)	40	40	26.5	20	40*	26.5
Cutoff Frequency (GHz)	82.5	46	36	21	75	38
Attenuation–Nom @ 2 GHz (dB/ft)	0.270	0.170	0.200	0.072	0.27	0.15
Attenuation–Nom @ 10 GHz (dB/ft)	0.61	0.39	0.28	0.17	0.61	0.34
Attenuation–Nom @ 18 GHz (dB/ft)	0.84	0.54	0.38	0.24	0.83	0.46
Power Handling–Avg. (watts @ 1 GHz)	340	500	780	1800	340	600
Phase vs. Temp Stability (ppm, nominal)	600	980	560	870	835	2100
Minimum Bend Radius (centerline) (in/mm)	0.250 / 6.35	0.375 / 9.53	0.437 / 11.10	0.750 / 19.05	0.250 / 6.35	0.320 / 8.13
Weight (grams/ft/m)	6.72 / 22.05	10.09 / 33.10	12.50 / 41.01	41.58 / 136.42	6.95 / 22.80	14.80 / 48.56
Velocity of Propagation (%)	82.5	78.0	81.0	80.0	78.0	74.0
Temperature Range (deg C)	–55 to +200	–65 to +200	–65 to +200	–65 to +200	–65 to +200	–65 to +200

** Some versions of this cable operate to 65 GHz.*

Specifications subject to change without notice.

CABLE SELECTION CHART

CONNECTOR FREQUENCY CHART



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DIELECTRIC OPTIONS

Each time we develop a new product, we consider a number of dielectric options in order to provide the most cost-effective solution possible.

SOLID PTFE

Solid PTFE has been used in RF and microwave cables longer than either low loss, low density or microporous PTFE. Typically extruded, solid PTFE dielectrics are very consistent in terms of dielectric constant over length as well as from lot to lot. Solid PTFE has a dielectric constant of 2.02 and a loss tangent of 0.00022.

Mechanically, solid PTFE dielectrics are very durable and compression resistant. Chemically, the dielectric material is exceptionally inert, offering excellent resistance to many chemicals.

Thermally, solid PTFE dielectrics have a sharp "knee" in their CTE profile around room temperature. They also exhibit a substantial amount of volumetric expansion when exposed to extreme temperatures, particularly during soldering operations.

LOW LOSS, LOW DENSITY PTFE

Low loss, low density dielectrics have been used for over 20 years in RF and microwave cables. They may be tape wrapped or extruded, and typically yield greater variation in dielectric constant over length and between lots than solid PTFE dielectrics do. Low loss, low density dielectrics typically range in dielectric constant from 1.6 to 1.8 and have a loss tangent of 0.00005. The result is much lower loss at microwave frequencies than solid PTFE offers.

Mechanically, low loss, low density dielectrics are nearly as compression resistant as solid PTFE, but much more so than microporous options. Low loss, low density dielectrics will "wick" solvents and fluids, so careful consideration must be given to the cable assembly design and manufacture.

Thermally, low loss, low density PTFE dielectrics have a smaller "knee" in their CTE profile around room temperature. Unlike solid PTFE dielectrics, they remain stable when exposed to extreme temperatures, allowing them to be used for higher power applications.

MICROPOROUS OR EXPANDED PTFE

Microporous PTFE dielectrics have been used for over 20 years in RF and microwave cables. They may be tape wrapped or extruded, and typically yield greater variation in dielectric constant over length and between lots. Microporous dielectrics typically range in dielectric constant from 1.3 to 1.5 and have a loss tangent of 0.00005. This means that, for a given cable size, Microporous PTFE will yield lower loss than low loss, low density PTFE.

Mechanically, microporous dielectrics are fairly soft, requiring careful handling or some form of ruggedization. Microporous dielectrics will "wick" solvents and fluids, so careful consideration must be given to the cable assembly design and manufacture.

Thermally, microporous PTFE dielectrics have the smallest "knee" in their CTE profile around room temperature. This makes them an ideal choice where electrical length stability is critical. Like low loss, low density PTFE dielectrics, they remain stable when exposed to extreme temperatures, and this allows them to be used for higher power applications.

PHASE RELATED OPTIONS

Storm Products provides a wide variety of high performance products used in applications where electrical length or phase performance is critical to system performance. A brief discussion of specification options is outlined below. For additional assistance, please contact us.

ELECTRICAL LENGTH MATCH BETWEEN ASSEMBLIES — RELATIVE PHASE MATCH

This is typically specified in one of two ways: ± XX pS or ± X° @ YY GHz, relative to a "designated standard" cable assembly within the production batch.

PROs

- *Typically lowest unit cost, shortest lead time*
- *Typically easier to correlate results*
- *Less effort to properly specify*

CONs

- *Requires replacement of set, rather than single cable*

ELECTRICAL LENGTH MATCH BETWEEN ASSEMBLIES — ABSOLUTE PHASE MATCH

This is typically specified in one of two ways: XX nS ± XX pS or X, XXX°± X° @ YY GHz. In lieu of specifying an insertion phase, master standard cable may be built and maintained. This is used most frequently in higher volume applications.

PROs

- *Allows later replacement of single damaged or worn cable assembly*
- *Logistics easier because all cable assemblies are interchangeable*

CONs

- *Typically higher unit cost, more effort to properly specify*
- *More effort to correlate results*
- *Extra expense if master standard cable assembly is built & maintained*

ELECTRICAL LENGTH TRACKING BETWEEN ASSEMBLIES OVER TEMPERATURE

This is typically specified as XXX ppm ± XXX ppm relative to cable assembly electrical length @ 25° C. Generally required when cable assemblies may be at different temperatures within a system and phase is critical. Usually done as a qualification test, not an acceptance test.

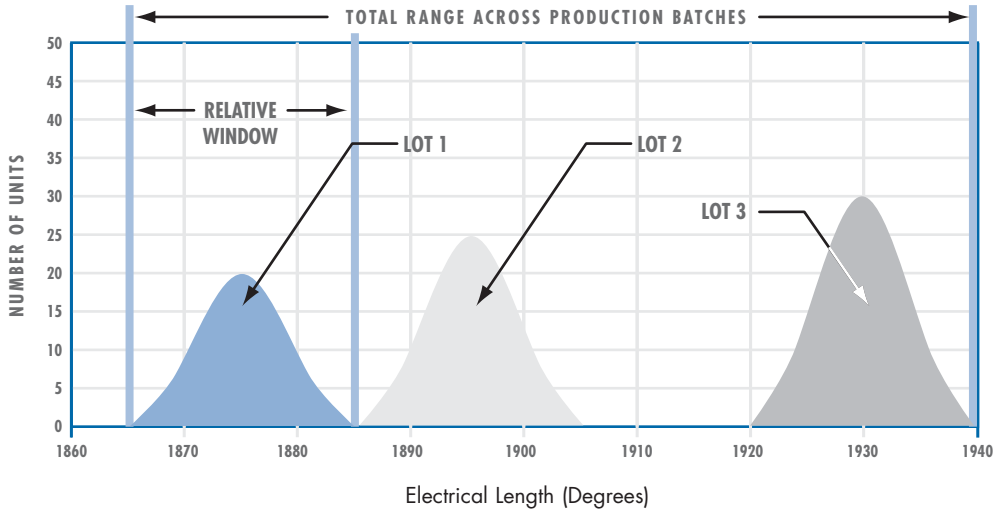
PROs

- *Reduces or eliminates need to calibrate system over time, temperature*
- *Reduces need for thermal management of system*

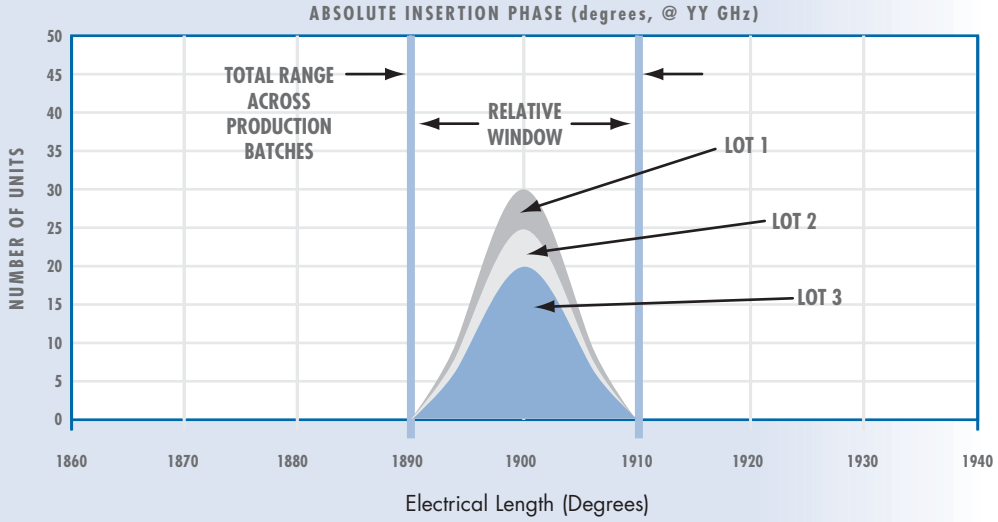
CONs

- *Requires most effort to correlate results*
- *Difficult to validate accurately on short cable assemblies*

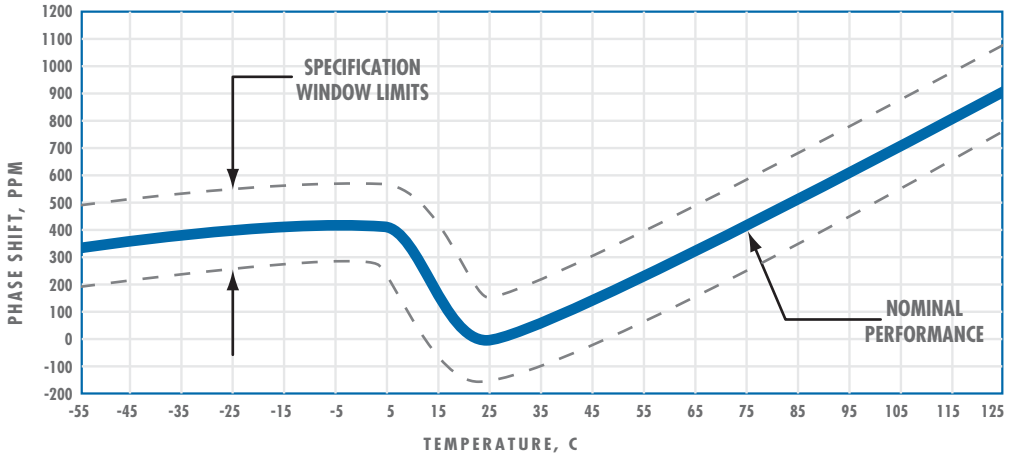
Relative Phase Match



Absolute Phase Match



Electrical Length vs. Temperature



VSWR PERFORMANCE

Assembly VSWR (return loss) is influenced by a number of factors including cable construction, assembly length, connector type and configuration (i.e., straight or angled), frequency range, and bend configuration (in semi-rigid assemblies).

FACTORS	KEY DRIVERS
CABLE CONSTRUCTION	~ *Stranded or solid conductor* ~ *Solid or tape–wrapped dielectric* ~ *Shield construction* ~ *Deployed configuration*
ASSEMBLY LENGTH	~ *Length > 4 feet*
CONNECTOR TYPE	~ *Size mismatch (i.e., small connector/large cable)* ~ *Air vs. PTFE interface*
CONNECTOR CONFIGURATION	~ *Angled or straight* ~ *Blindmate or threaded* ~ *High power*

VSWR TO RETURN LOSS CONVERSION

VSWR	RETURN LOSS
1.05:1	–32.25
1.10:1	–26.45
1.15:1	–23.12
1.20:1	–20.83
1.25:1	–19.09

VSWR TO RETURN LOSS CONVERSION

VSWR	RETURN LOSS
1.30:1	–17.70
1.35:1	–16.54
1.40:1	–15.56
1.45:1	–14.72
1.50:1	–13.98

Measured VSWR performance is also impacted by differences in equipment and test methods. As a result, it is not within the scope of this catalog to provide VSWR specifications that account for every possible combination of factors.

For convenience sake, the following table may be used as a general guideline. There is also a brief discussion of VSWR design considerations with low density dielectric semi-rigid assemblies on page 60 of this catalog.

CABLE LENGTH	FREQUENCY (GHz)	2 STRAIGHT		1 STRAIGHT / 1 ANGLED		2 ANGLED	
		MAX	BEST	MAX	BEST	MAX	BEST
< 48"	2 to 18	1.35:1	1.15:1	1.35:1	1.20:1	1.40:1	1.25:1
≥ 48"	2 to 18	1.35:1	1.15:1	1.40:1	1.20:1	1.45:1	1.25:1
< 48"	18 to 26.5	1.35:1	1.15:1	1.40:1	1.25:1	1.50:1	1.30:1
≥ 48"	18 to 26.5	1.40:1	1.20:1	1.45:1	1.25:1	1.55:1	1.30:1
< 48"	26.5 to 50	1.45:1	1.20:1	–	–	–	–
≥ 48"	26.5 to 50	1.50:1	1.20:1	–	–	–	–

Once specific assembly requirements and test methods are established, it is often possible to guarantee improved VSWR performance. Contact us for more specific information.

MARKER SLEEVE DESIGN CONSIDERATIONS

Over the years, we have noted that marker sleeve and marking issues account for a disproportionate number of delays in procuring and delivering cable assemblies. To avoid such delays, consider the following:

MARKER MATERIAL

The most frequently specified marker sleeve material on high performance, military, and aerospace microwave cable assemblies is crosslinked, flexible polyolefin, per MIL–DTL–23053/5, class 1. With an operating temperature range of –55° C to +135° C, this material is most widely available in white and black. On formed semi-rigid cable assemblies, the optimum size tubing is dependant on the cable size, marker length, and the part's bend configuration. Tightly bent cable assemblies make installing tubing more difficult, and smaller diameter cable types can be distorted during the process.

In cases where the marker sleeve is being used strictly for identification purposes, We recommend omitting the size identifier and specifying only MIL–DTL–23053/5. This will ensure compliance with critical parameters.

MARKING

The amount of information that can be printed on a given marker sleeve is a function of its diameter, length, character height, and printing method. **To avoid conflicts between marker size and marker legend and allow use of automated printing methods, use the following guidelines:**

LINES PER SLEEVE

Cable diameter	TYPICAL TUBING DIAMETER	MAXIMUM # OF LINES – 9 PT.	MAXIMUM # OF LINES – 12 PT.
0.047"	3/32"	1	1
0.085"	3/16"	2	1
0.116"	1/4"	2	2
0.141"	1/4"	2	2
0.250"	3/8"	4	3

CHARACTER CALCULATOR

FONT SIZE	CHARACTER HEIGHT	TUBING LENGTH (INCHES) / CHARACTERS PER LINE						
		0.50"	0.75"	1.00"	1.25"	1.50"	1.75"	2.00"
9 pt	0.093"	6	10	13	17	20	25	27
12 pt	0.120"	4	7	10	12	15	18	20

NOTES:

1. *Character height is prior to shrinking. Final character height is a function of tubing recovery.*
2. *Other marking methods are available upon request; hot stamp techniques will allow printing on both sides of tubing.*

ENVIRONMENTAL DATA

Storm Products' cable assemblies are tested to a range of mechanical and environmental requirements, some of which are listed below. After exposure to these conditions, the assemblies did not show visible signs of damage and the VSWR, insertion loss, and connector interface dimensions remained within allowable limits.

- *Cold Bend per MIL–C–17, paragraph 4.8.19*
- *Stress Crack Resistance per MIL–C–17, paragraph 4.8.17*
- *Dimensional Stability per MIL–C–17, paragraph 4.8.20*
- *Concentrated Load per MIL–T–81490, paragraph 4.7.18*
- *Tensile Load per MIL–T–81490, paragraph 4.7.17*
- *Flexure per MIL–C–87104, paragraph 4.6.3.4, 5000 cycles*
- *Temperature per MIL–T–81490, paragraph 4.7.9, –54° C to +150° C*
- *Impact Shock per MIL–E–5272, paragraph 4.15, procedure V*
- *Vibration per MIL–T–81490, paragraph 4.7.12 (MIL–STD–202, method 204, test condition B)*
- *Flammability per MIL–C–87104, paragraph 4.6.4.8*
- *Humidity per MIL–T–81490, paragraph 4.7.22 (MIL–STD–810, method 507, procedure IV)*
- *Salt Fog per MIL–T–81490, paragraph 4.7.23 (MIL–STD–810, method 509)*
- *Thermal Shock per MIL–T–81490, paragraph 4.7.11 (MIL–STD–202, method 107, 25 cycles)*
- *Water Immersion–Leakage per MIL–C–87104, paragraph 4.6.4.13.2, procedure II*
- *Chemical Resistance per MIL–C–87104, paragraph 4.6.4.12*
  - *– JP–4*
  - *– Hydraulic fluid*
- *Vacuum per ASTM E–595, less than 1% TML and 0.10% CVCM*

All cable assemblies have not been tested to the same set of requirements. Detailed test procedures and test data are available upon request.

MICROWAVE CABLE ASSEMBLY CARE & HANDLING

Storm microwave coaxial cable assemblies will last longer and provide better performance when properly used and cared for. It is important to routinely clean the connectors and inspect the assembly for damage.

CABLE ASSEMBLY ROUTING & HANDLING

Care should be taken to avoid bending the assemblies beyond the minimum bend radius guidelines. Failure to do so will destroy the cable.

Twisting the cable should be avoided. Excessive twist can damage the cable assembly at the cable/connector interface. Even low-force torsion can affect electrical performance and cause connections to loosen.

Cable assemblies should be stored in a large coiled configuration (1–2 feet in diameter). When you need to use the cable, simply unroll it.

Avoid pinching or crushing the cable assembly. Never pull equipment around by the cable, and never expect the cable to support equipment or devices.

CABLE ASSEMBLY MATING & DE-MATING

Contact pins and dielectrics can be damaged if the connectors are misaligned during the mating process. Make sure that the mating interfaces are parallel and aligned while mating the connectors.

You can usually feel if the pins are aligned or not. When you sense that they are aligned, gently turn the coupling nut until mating is complete.

Insufficient coupling torque can produce inaccurate results, and over-torque coupling can damage the cable assembly and connecting equipment. When mating the connector, firmly hold the body of the connector to keep it from rotating. If the connector bodies are allowed to rotate during mating & de-mating, the plating and surface finish of the outer and inner contacts can be damaged. Also, rotation of the connector body transfers unwanted torque to the cable assembly.

Torque wrenches, set to the correct torque, should be used to mate a connector with wrench flats. To mate connectors with knurled nuts, use your fingers. ***Never use pliers to tighten any connector.*** Listed below are recommended coupling torque values for popular connectors.

CONNECTOR	COUPLING TORQUE
7 mm, N, Precision N, TNC	12 to 15 in–lbs
2.4 mm, 2.9 mm, 3.5 mm, SMA	8 to 10 in–lbs
SMA, TNC	5 in–lbs

CONNECTOR INTERFACE CLEANING

Clean interfaces extend connector life and provide more accurate, repeatable measurements. Moisten a clean, lint-free swab using isopropyl alcohol, remove any excess alcohol, wipe the interface components as required to eliminate debris, then blow-dry the interface with filtered compressed air or nitrogen. Re-inspect the connector to verify that the interface is clean and ready for use. Remember to clean the mating connectors, as they may be the source of debris.

The use of connector end caps is recommended when cables are not in use.

PHASE STABLE FLEXIBLE

Diameter 0.190" : PHASE MASTER® 190 22–27

Storm Products' **PHASE MASTER® 190** cable was developed to meet the needs of customers with demanding, phase-sensitive applications. Electrical stability makes Phase Master® the logical choice for phase-critical radar, EW, wireless, and other applications where system performance cannot be compromised.

The cable's high level of phase stability vs. temperature and flexure is a result of MicroForm™ Technology. Perfected over several years by our R&D department, MicroForm™ Technology is a unique application of materials and production techniques that offers a breakthrough in price-to-performance standards in the industry.

Phase Master® is available in both flexible and semi-rigid configurations (for semi-rigid, see page 64). With a frequency range from DC to 26.5 GHz, the cable is available with a variety of connector configurations and can be phase matched on request. As with all our products, Phase Master® can be customized to meet your specific program requirements.

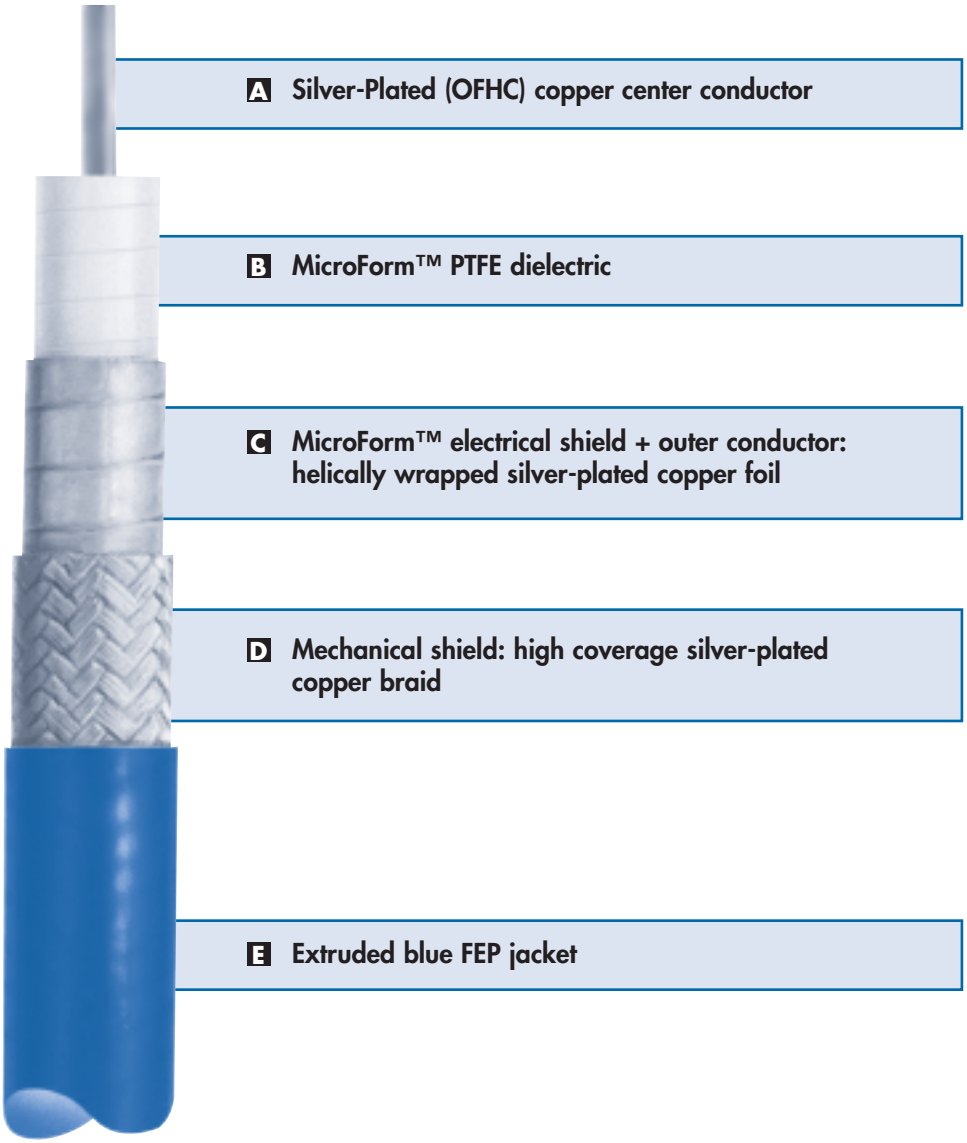
PHASE MASTER® 190
0.190" DIAMETER

FEATURES	BENEFITS
MicroForm™ construction featuring helically wrapped SPC flat wire shield	*Lower insertion loss at higher frequencies for size & weight* *Mechanical stability over wide operating temperature range* *Specialized construction provides low signal leakage* *Increased phase stability versus temperature and bending* *Increases shielding effectiveness and connector retention*
Fully captivated connectors	*Increased connector retention*
Highly reliable soldered connections	*Increased reliability*

0.190" Diameter cable : CABLE CONSTRUCTION

MicroForm™ Construction

High performance shielding technology combined with a unique composition of dielectric materials results in superior cable performance. Performance is further enhanced by our robust production process.



ARMORING & RUGGEDIZING OPTIONS

RUGGEDIZED

Designed for applications where weight, flexibility, and abrasion resistance are critical and moderate compression resistance is required (300 lbs/in). The cable is covered with a flexible wound helix of passivated stainless steel wire and an extruded polyurethane jacket. Temperature range –54° C to +100° C.

Cable	Weight*	Diameter	Min. bend rad.
PM 190R	31.9 gr/ft	0.360"	1.0"

* *Includes cable*

ARMORED

Designed for both inside and outside environments where the application requires the ultimate in cut and crush resistance (500 lbs/in). This cable is covered with a stainless steel interlocked armor; an additional polyolefin jacket is standard. Temperature range –54° C to +135° C.

Cable	Weight*	Diameter	Min. bend rad.
PM 190A	51.6 gr/ft	0.420"	1.75"

* *Includes cable*

0.190" Diameter Cable : TECHNICAL INFORMATION

MECHANICAL SPECS

Cable Diameter, nominal	0.190 in
Bend Radius *dynamic* *static*	 2.2 in 1.0 in
Operating Temperature	–54° C to +150° C*
Weight	16.65 g/ft
Inner Conductor Type	solid SPC
Dielectric	MicroForm™ PTFE
Connector Retention, minimum	50.0 lbs

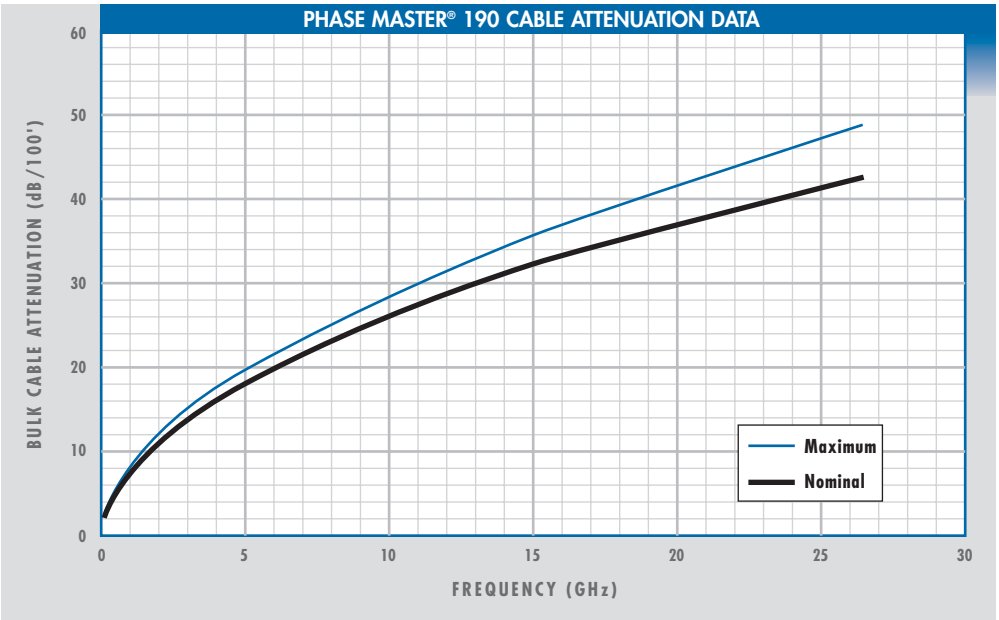
** Subject to connector choice.*

ELECTRICAL SPECS

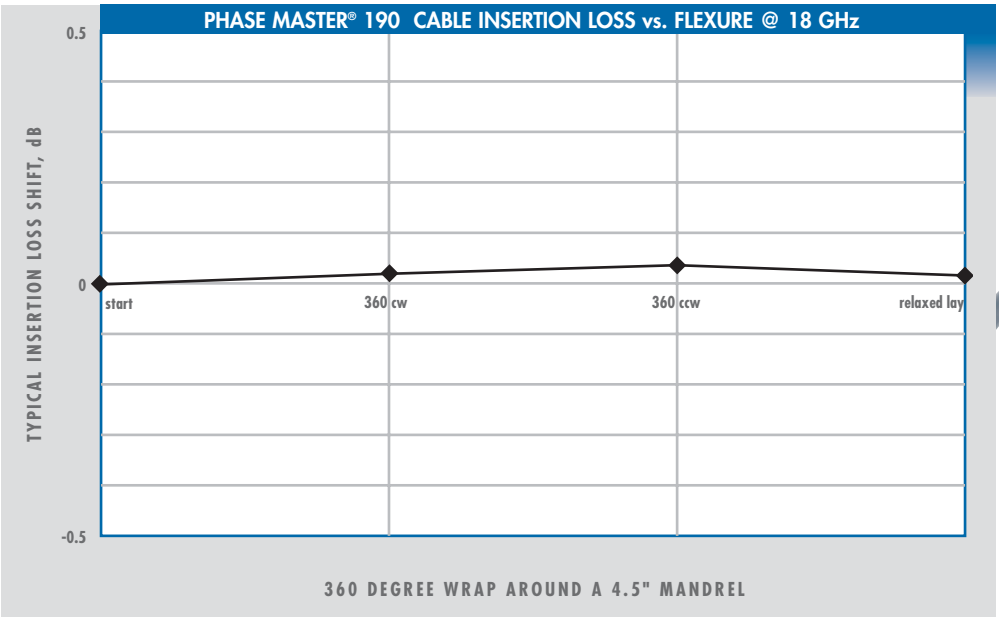
Frequency Range	DC to 26.5 GHz
Impedance	50 ±2 ohms
Capacitance, nominal	24 pF/ft
Time Delay, nominal	1.25 nsec/ft
Shielding Effectiveness, min (@ 1 GHz)	–105 dB

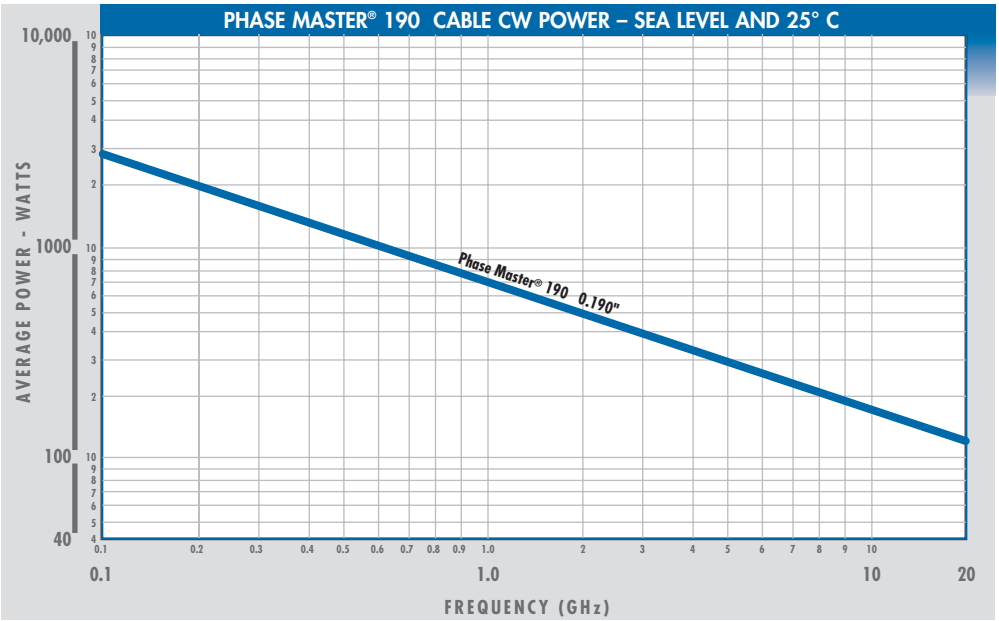
Power ratings (next page) are conservative; actual ratings depend on specific application. Please consult us regarding your application.

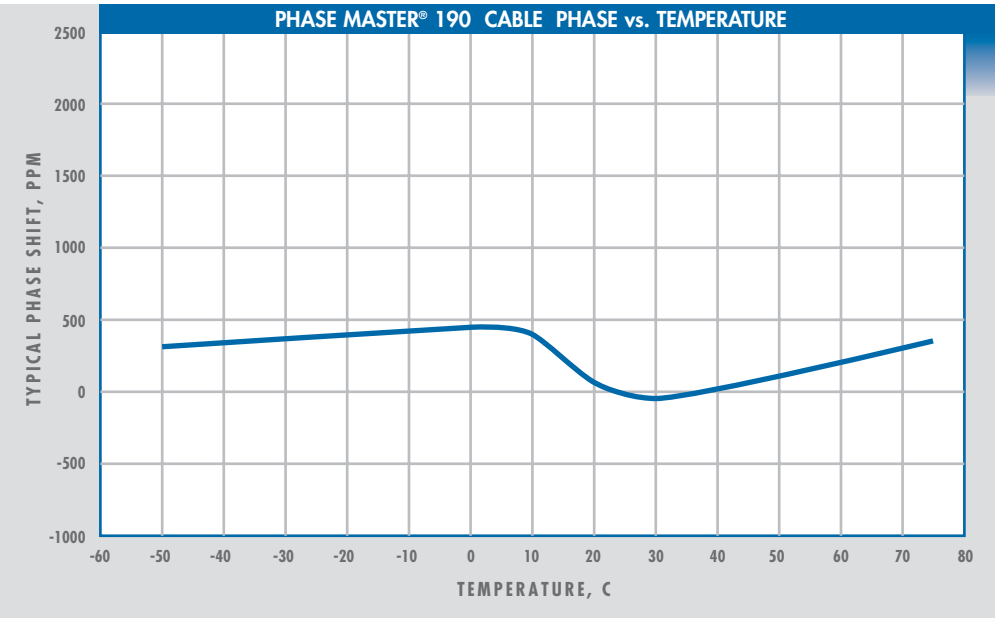
Specifications subject to change without notice.

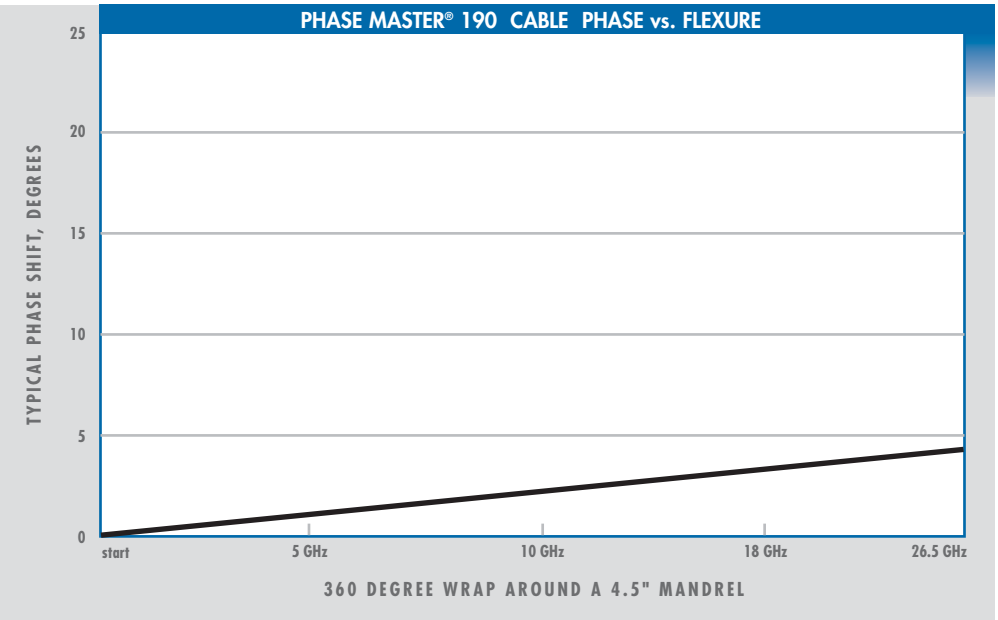


For cable assembly insertion loss, call us or visit our Web site, www.stormproducts.com/microwave



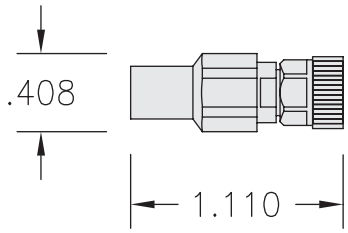

PHASE MASTER® 190 CABLE CW POWER – SEA LEVEL AND 25° C
AVERAGE POWER - WATTS
10,000
1000
100
40
Phase Master® 190 0.190"
0.1
1.0
10
20
FREQUENCY (GHz)


PHASE MASTER® 190 CABLE PHASE vs. TEMPERATURE
TYPICAL PHASE SHIFT, PPM
2500
2000
1500
1000
500
0
-500
-1000
-60
-50
-40
-30
-20
-10
0
10
20
30
40
50
60
70
80
TEMPERATURE, C

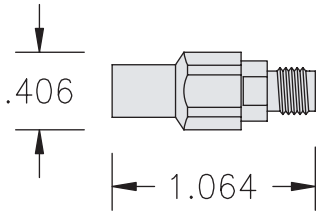

PHASE MASTER® 190 CABLE PHASE vs. FLEXURE
TYPICAL PHASE SHIFT, DEGREES
25
20
15
10
5
0
start
5 GHz
10 GHz
18 GHz
26.5 GHz
360 DEGREE WRAP AROUND A 4.5" MANDREL

0.190" Diameter cable : COMMONLY USED CONNECTORS

125° C MAX

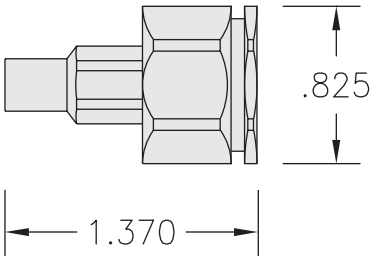


SMA SP



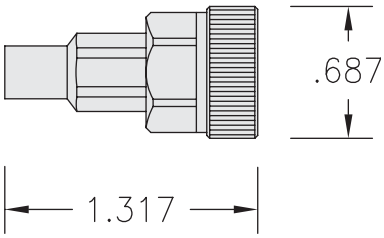
SMA SJ

125° C MAX

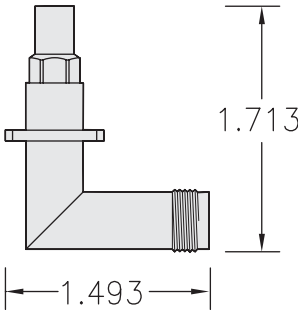


PRECISION N SP

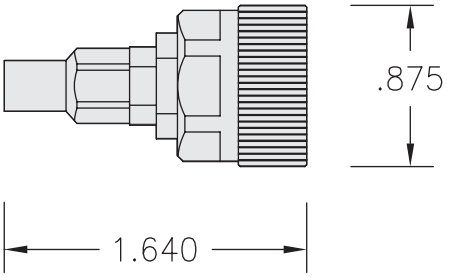
125° C MAX



TNC SP

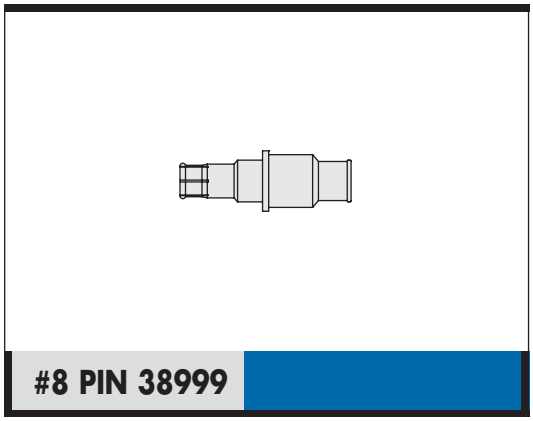


TNC RAJ MITERED

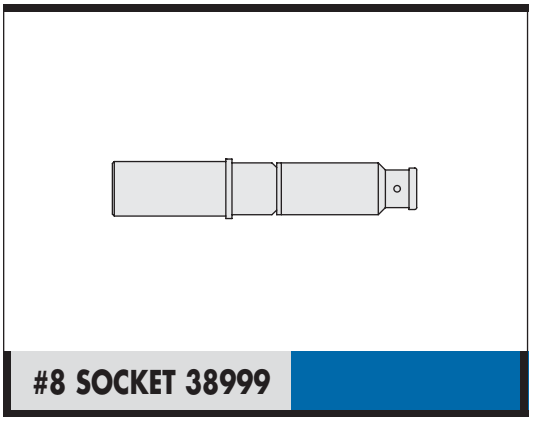


APC 7 mm

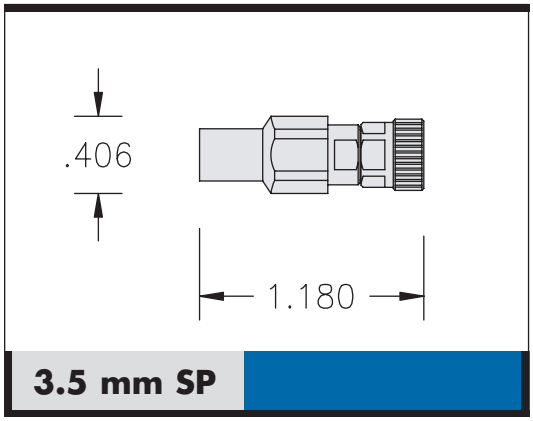
Dimensions in inches. Other connectors available; consult us for options.



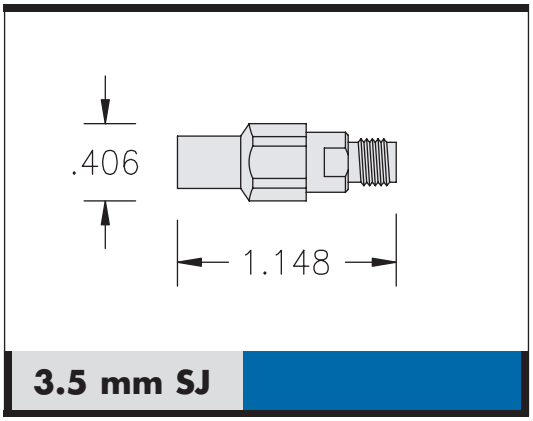
#8 PIN 38999



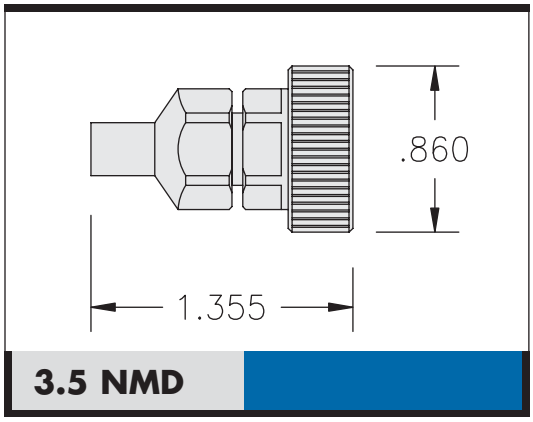
#8 SOCKET 38999



3.5 mm SP



3.5 mm SJ



3.5 NMD

PHASE STABLE FLEXIBLE : 0.190" Diameter : COMMONLY USED CONNECTORS

MINIATURE FLEXIBLE

0.039" Diameter : 421-720 31–34
0.055" Diameter : STORM FLEX™ 047 . . . 35–38
0.088" Diameter : 421-677 39–42
0.096" Diameter : STORM FLEX™ 086 . . . 43–46

Storm Products' **MINIATURE FLEXIBLE** assemblies—less than 0.100" in diameter—are designed to offer superior electrical performance for point-to-point microwave interconnections where space is at a premium. In addition, their ultra flexibility makes our miniature products the ideal choice for high performance applications, such as gimbal-mounted radars, that involve repetitive torque.

For applications that call for electrical performance typical of 0.047" or 0.086" semi-rigid assemblies *and* reduced development costs, the **Storm Flex™** product line offers a classic compromise.

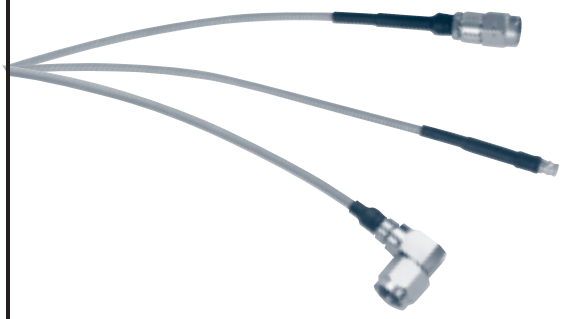
These 0.055"- and 0.096"-diameter flexible cables are designed to fit standard 0.047" and 0.086" semi-rigid connectors, eliminating costs associated with time-consuming semi-rigid cable layout. Storm Flex™ assemblies also readily accommodate tight bends near the connector.

All miniature cable types are available with a range of connector options and, as always, we can tailor miniature assemblies to meet your specific requirements.

0.039" DIAMETER 421-720

STORM FLEX™ 047 0.055" DIAMETER

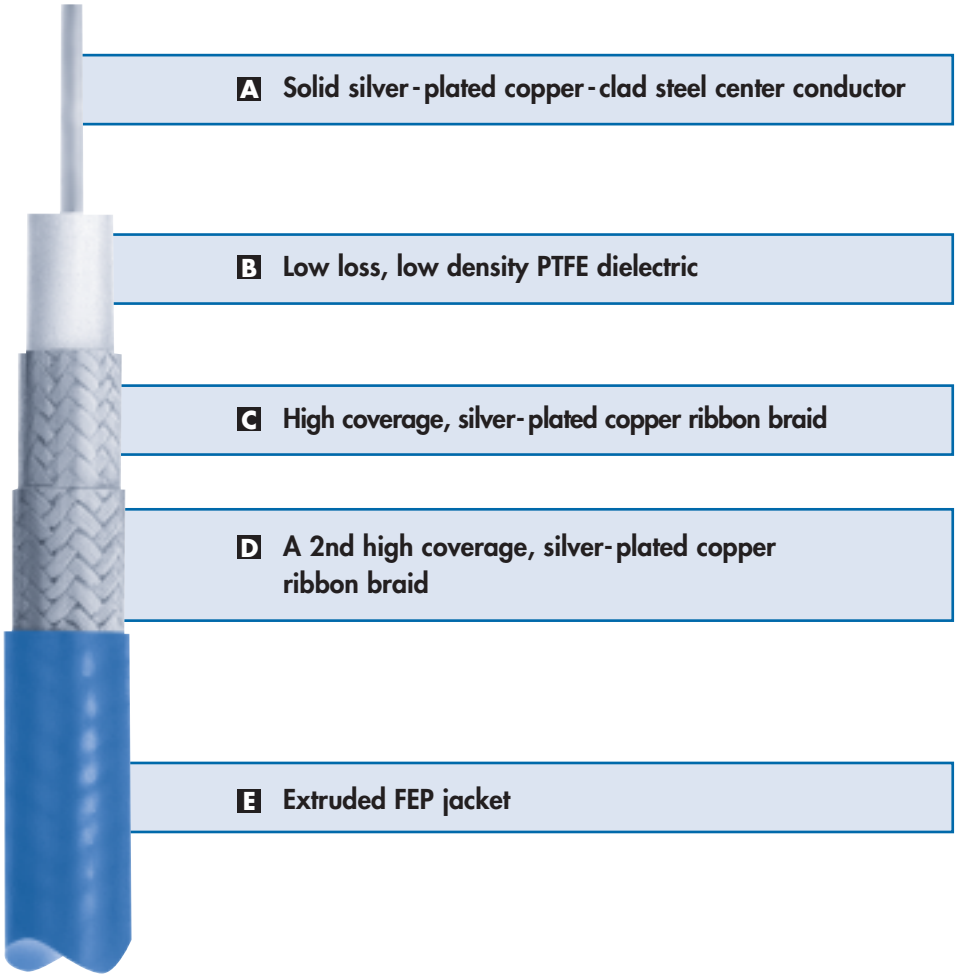
0.088" DIAMETER 421-677



STORM FLEX™ 086 0.096" DIAMETER

0.039" Diameter Cable : CABLE CONSTRUCTION

FEATURES	BENEFITS
Solid SPCCS center conductor	~ *Reduced cable attenuation*
Microporous tape dielectric	~ *Reduced flex force for gimbal and shock-sensitive applications* ~ *Reduced cable attenuation at higher frequencies* ~ *Reduced cable diameter*
Dual SPC flat wire braids	~ *Reduced cable attenuation* ~ *Greater than –75 dB shielding effectiveness through 18 Ghz* ~ *Reduced cable diameter*
0.039" overall diameter	~ *Reduced flex force for gimbal and shock-sensitive applications* ~ *Ideal for use with miniature blindmate connectors such as GPPO®*

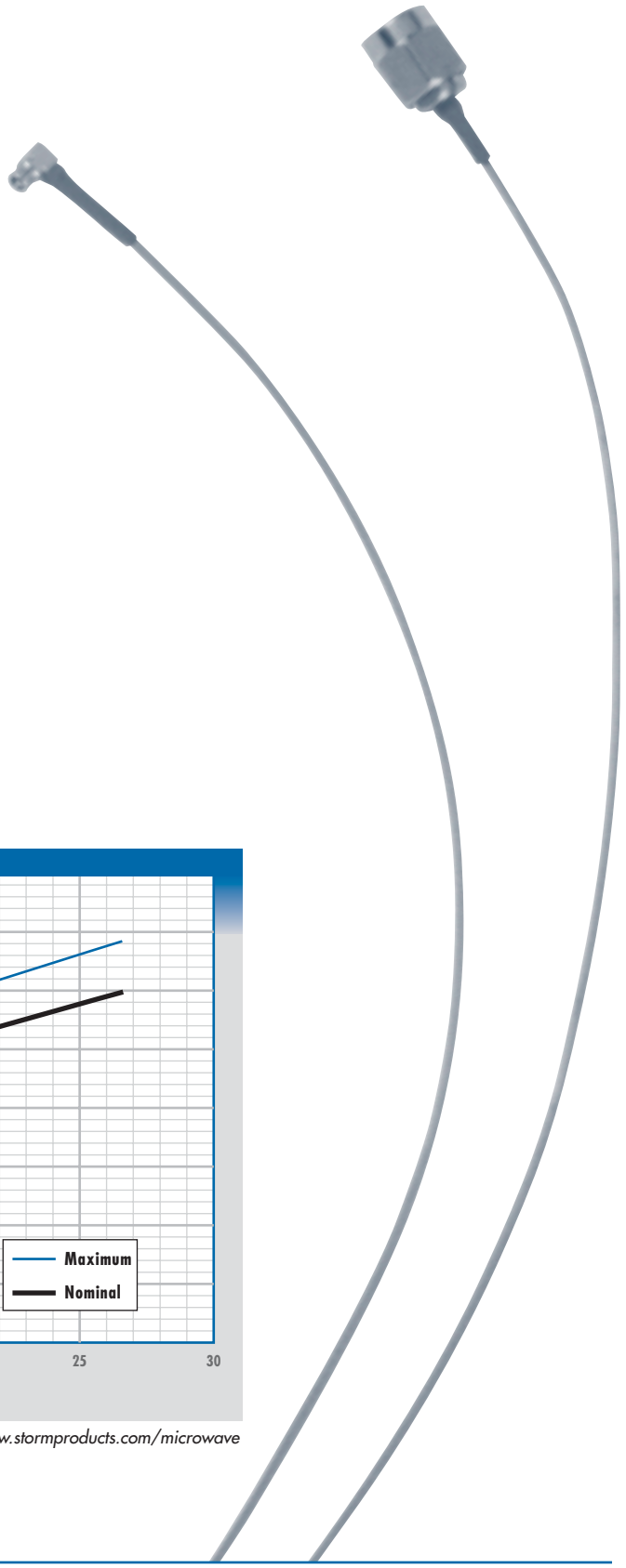


0.039" Diameter Cable : TECHNICAL INFORMATION

MECHANICAL SPECS*

Cable Diameter, nominal	0.039 in
Bend Radius *dynamic* *static*	 0.500 in 0.125 in
Operating Temperature	-54° C to +150° C
Weight	0.51 g/ft
Inner Conductor Type	solid SPCCS
Dielectric	microporous PTFE
Connector Retention, minimum	3.0 lbs

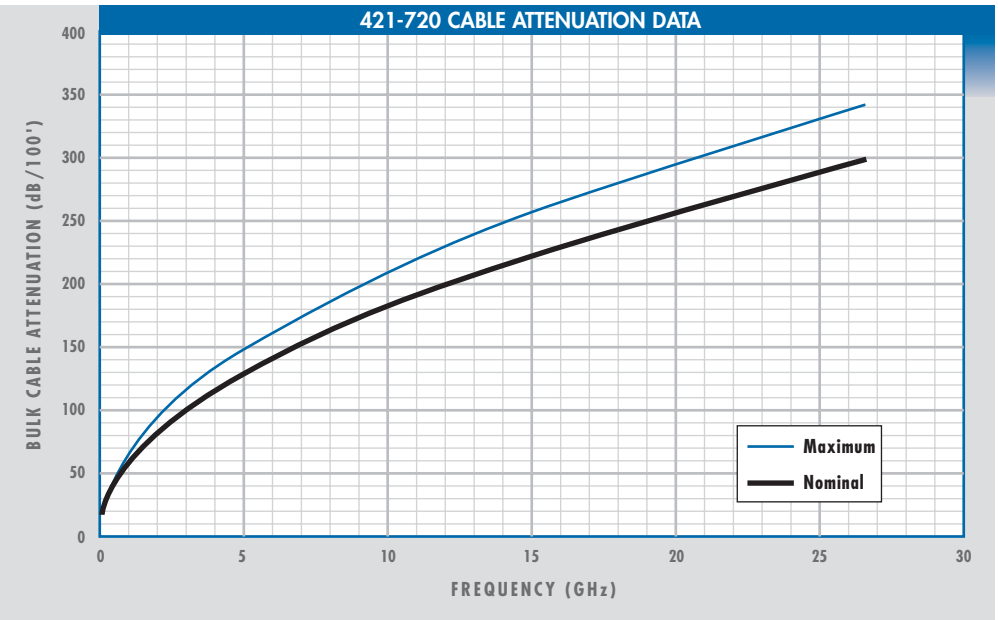
**This cable is designed to be used in applications requiring a high degree of flexibility. It should not be used in applications requiring high mechanical strength.*



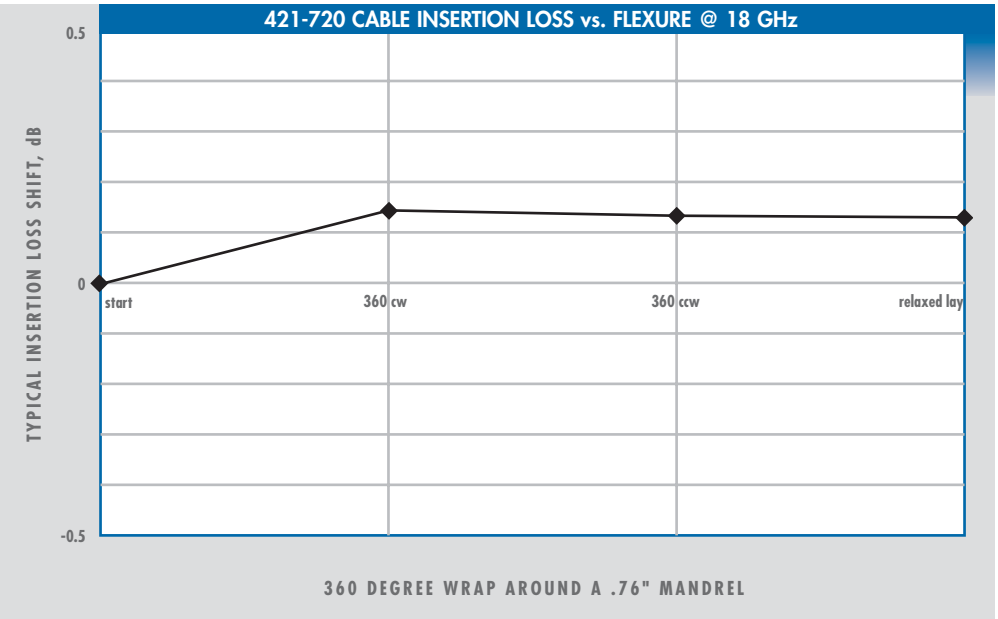
ELECTRICAL SPECS

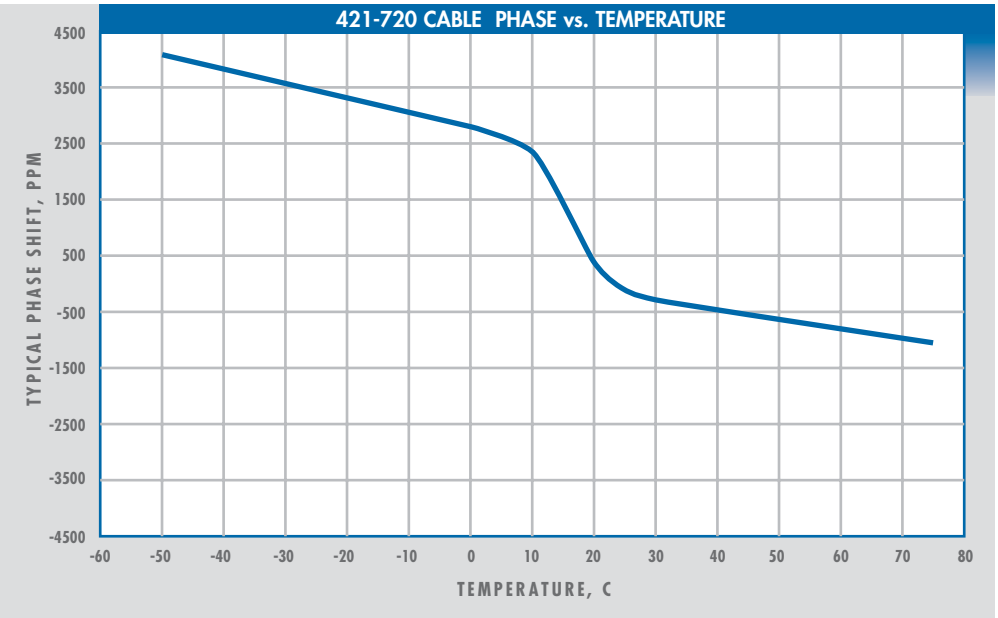
Frequency Range	DC to 26.5 GHz
Impedance	50 ±2 ohms
Capacitance, nominal	26.7 pF/ft
Time Delay, nominal	1.34 nsec/ft
Shielding Effectiveness, min (@ 0 to 18 GHz)	–75 dB

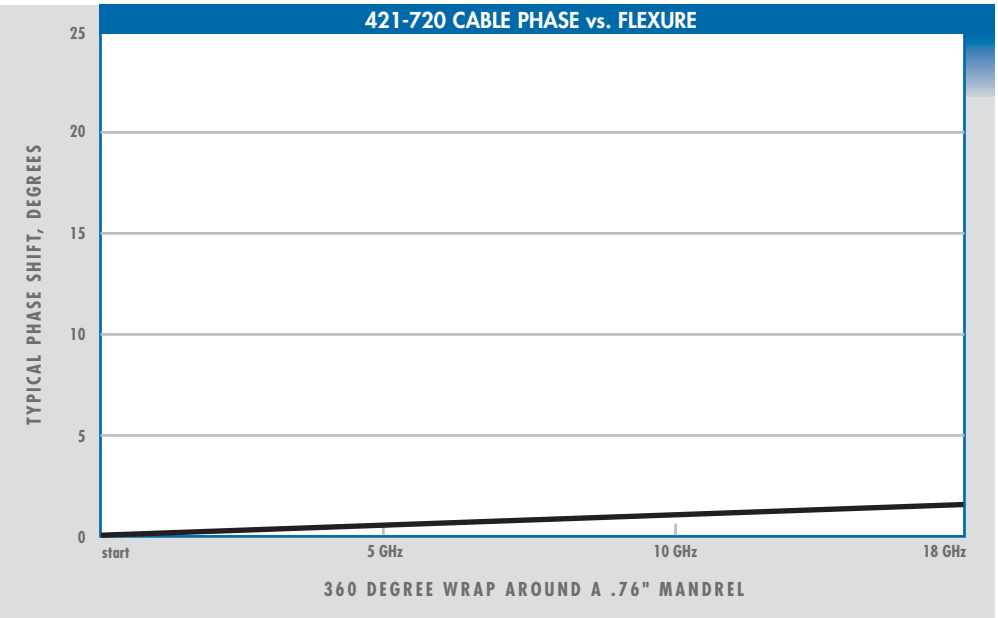
Specifications subject to change without notice.



For cable assembly insertion loss, call us or visit our Web site, www.stormproducts.com/microwave

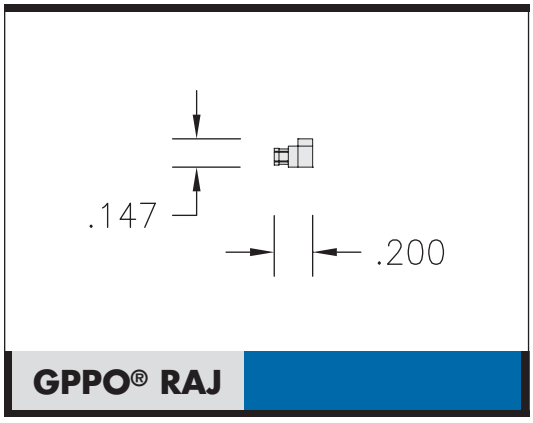

421-720 CABLE INSERTION LOSS vs. FLEXURE @ 18 GHz
TYPICAL INSERTION LOSS SHIFT, dB
0.5
0
-0.5
start
360 cw
360 ccw
relaxed lay
360 DEGREE WRAP AROUND A .76" MANDREL

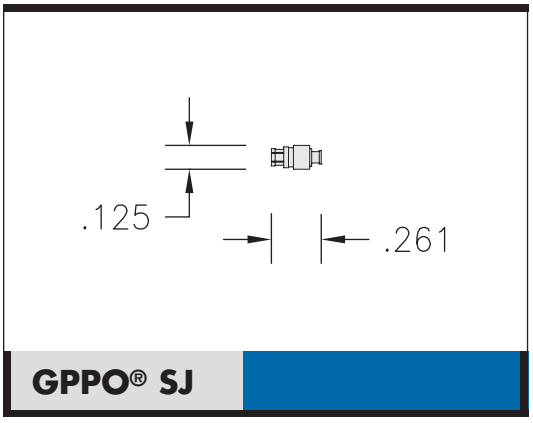

421-720 CABLE PHASE vs. TEMPERATURE
TYPICAL PHASE SHIFT, PPM
4500
3500
2500
1500
500
-500
-1500
-2500
-3500
-4500
-60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80
TEMPERATURE, C

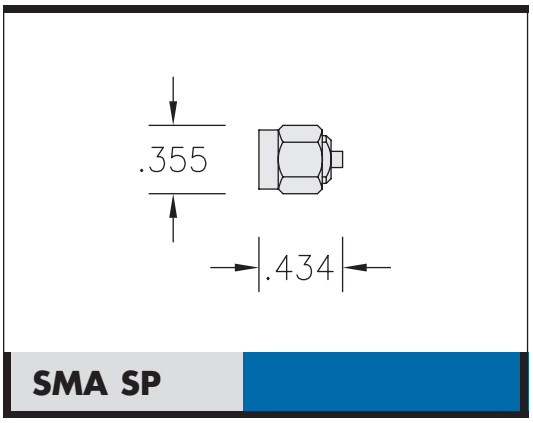

421-720 CABLE PHASE vs. FLEXURE
TYPICAL PHASE SHIFT, DEGREES
25
20
15
10
5
0
start
5 GHz
10 GHz
18 GHz
360 DEGREE WRAP AROUND A .76" MANDREL

0.039" Diameter Cable : COMMONLY USED CONNECTORS

Dimensions in inches. Other connectors available; consult us for options.

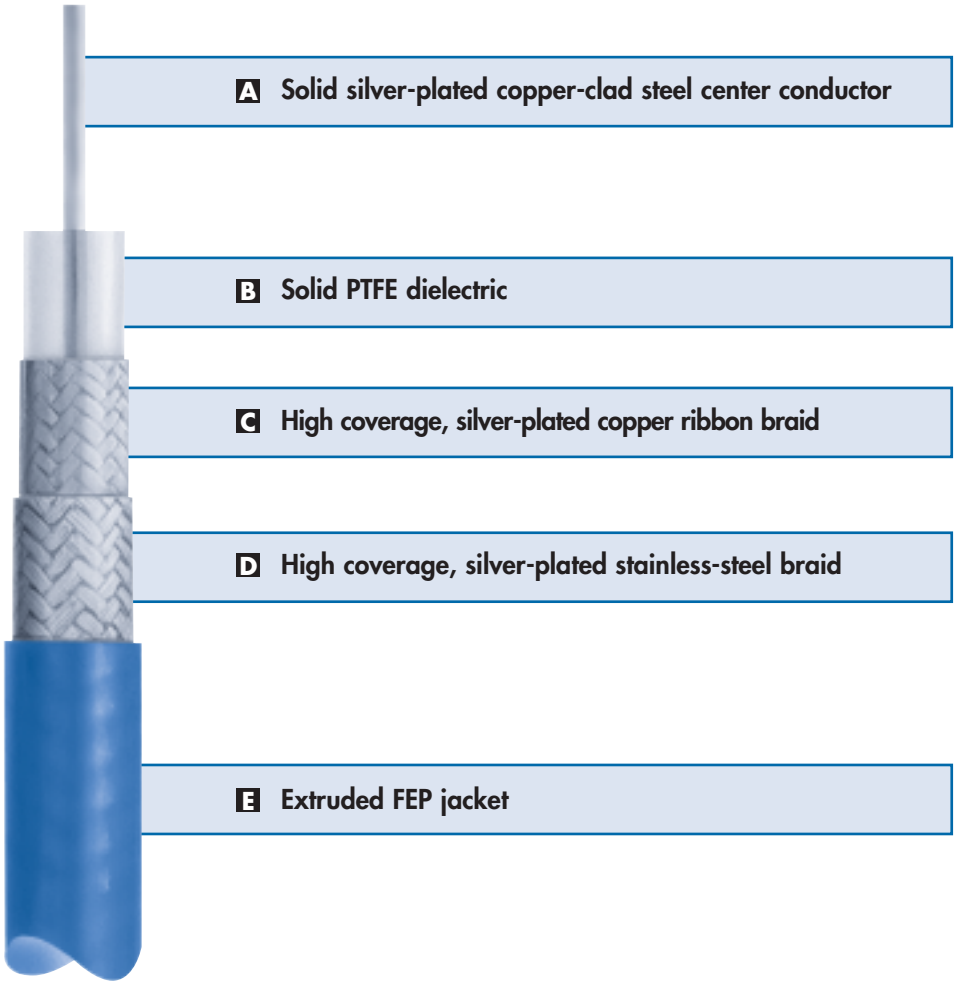






0.055" Diameter Cable : CABLE CONSTRUCTION

FEATURES	BENEFITS
Solid PTFE dielectric	~ *High compression resistance* ~ *Greater durability*
Ultra-high strength, multi-layer outer braid	~ *Eliminates cable breakage associated with repeated handling of small flexible and semi-conformable cable types* ~ *Greater than –85 dB shielding effectiveness through 18 Ghz*
0.055" overall diameter	~ *Provides alternative to 0.047" semi-rigid cable by eliminating costs associated with time-consuming cable layout*
Wide range of low profile SMA, GPO®, and GPPO® connectors	~ *Cable assemblies solve tough packaging challenges*



0.055" Diameter Cable : TECHNICAL INFORMATION

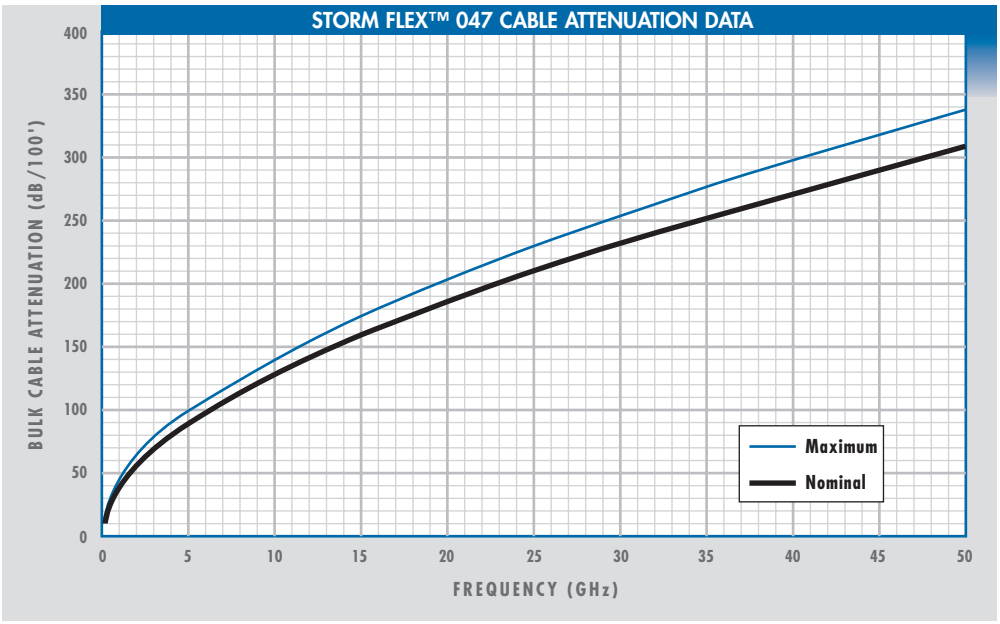
MECHANICAL SPECS

Cable Diameter, nominal	0.055 in
Bend Radius *dynamic* *static*	 0.6 in 0.1 in
Operating Temperature	–54° C to +125° C
Weight	1.54 g/ft
Inner Conductor Type	solid SPCCS
Dielectric	solid PTFE
Connector Retention, minimum straight pull right-angle pull	 10.0 lbs 5.0 lbs

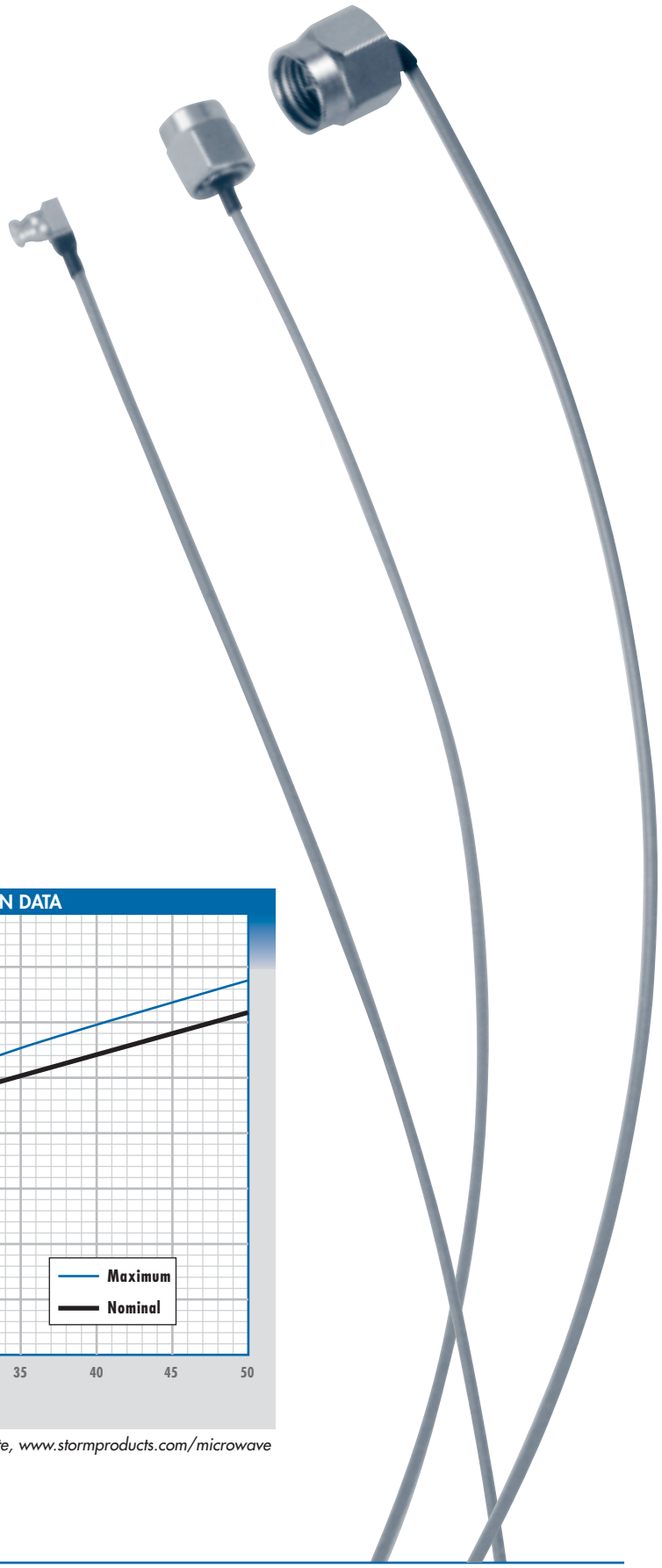
ELECTRICAL SPECS

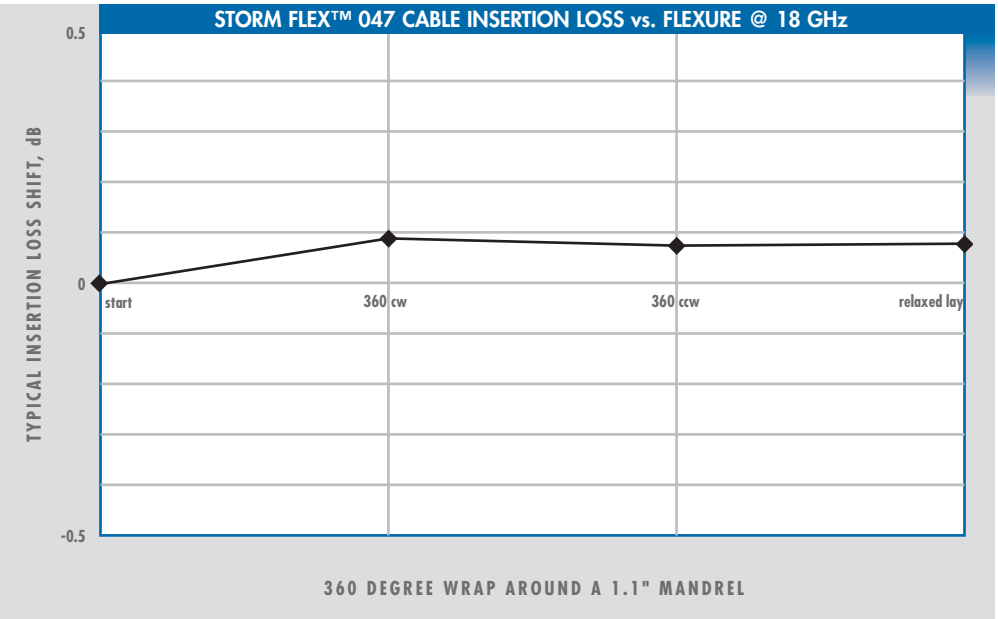
Frequency Range	DC to 50 GHz
Impedance	50 ±2 ohms
Capacitance, nominal	28.9 pF/ft
Time Delay, nominal	1.45 nsec/ft
Shielding Effectiveness, min (@ 0 to 18 GHz)	–85 dB

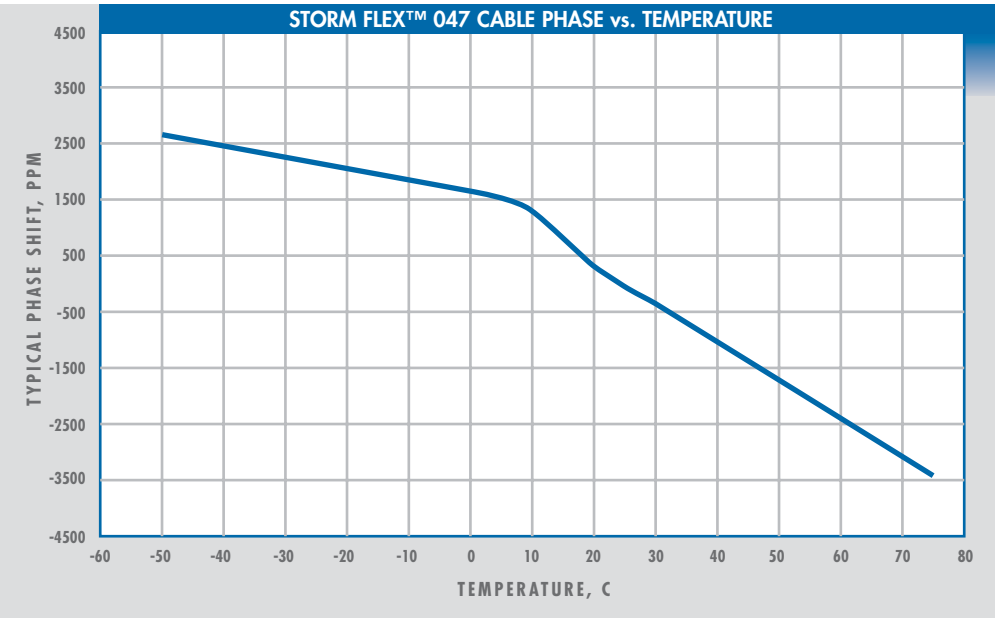
Specifications subject to change without notice.

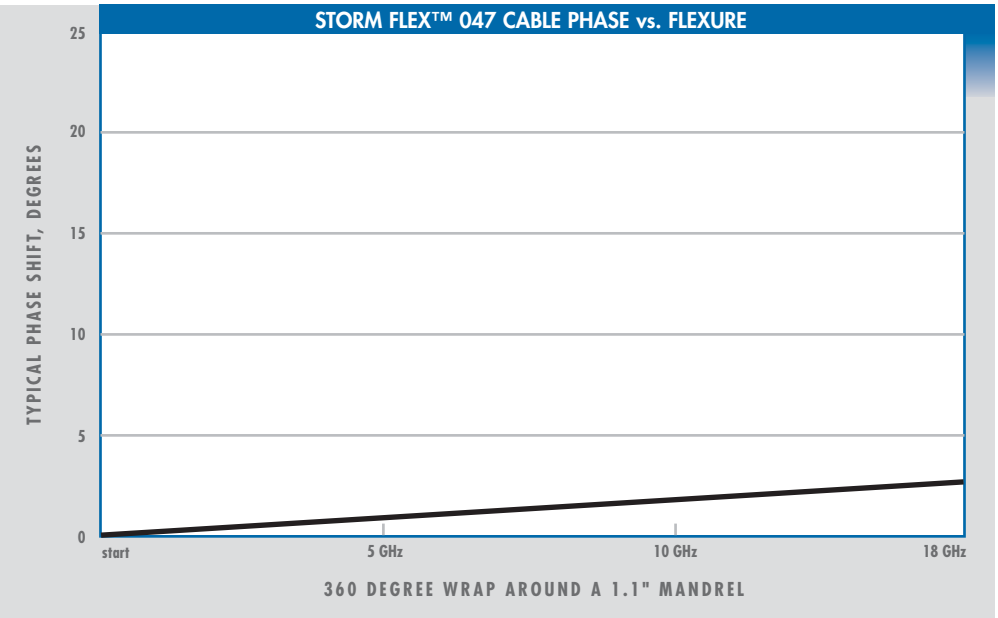


For cable assembly insertion loss, call us or visit our Web site, www.stormproducts.com/microwave



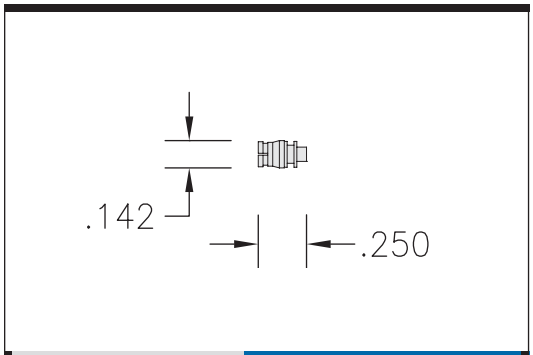

STORM FLEX™ 047 CABLE INSERTION LOSS vs. FLEXURE @ 18 GHz
TYPICAL INSERTION LOSS SHIFT, dB
0.5
0
-0.5
start
360 cw
360 ccw
relaxed lay
360 DEGREE WRAP AROUND A 1.1" MANDREL


STORM FLEX™ 047 CABLE PHASE vs. TEMPERATURE
TYPICAL PHASE SHIFT, PPM
4500
3500
2500
1500
500
-500
-1500
-2500
-3500
-4500
-60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80
TEMPERATURE, C

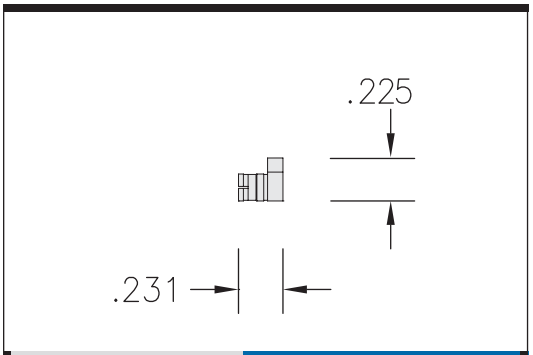

STORM FLEX™ 047 CABLE PHASE vs. FLEXURE
TYPICAL PHASE SHIFT, DEGREES
25
20
15
10
5
0
start
5 GHz
10 GHz
18 GHz
360 DEGREE WRAP AROUND A 1.1" MANDREL

0.055" Diameter Cable : COMMONLY USED CONNECTORS

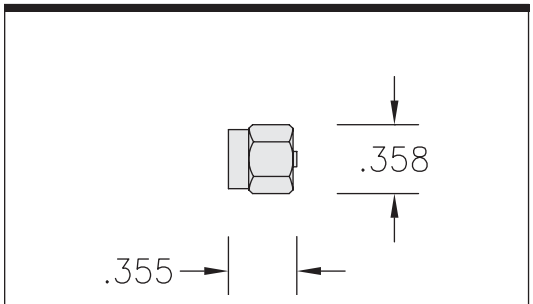
Dimensions in inches. Other connectors available; consult us for options.



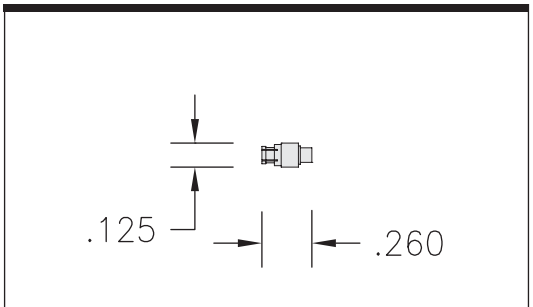
GPO® SJ



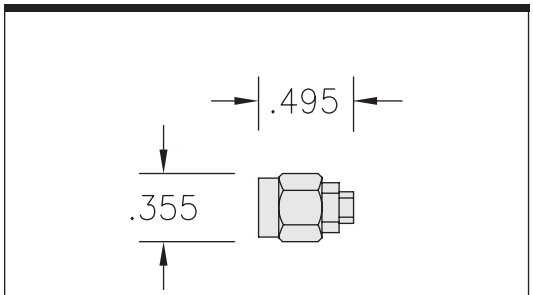
GPO® RAJ



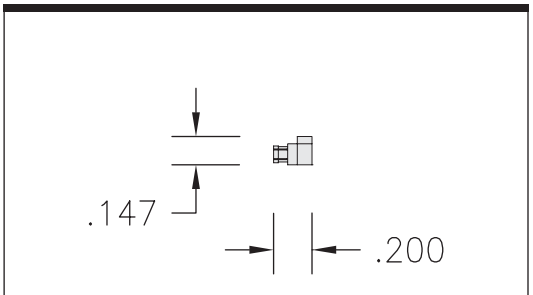
SMA SP



GPPO® SJ



2.4 mm SP



GPPO® RAJ

0.088" Diameter Cable : CABLE CONSTRUCTION

FEATURES	BENEFITS
Solid SPC conductor and microporous PTFE Dielectric	*~ Lower insertion loss at higher frequencies for size & weight* *~ Mechanical stability over wide operating temperature range*
Triple shielding	*~ Specialized construction provides low signal leakage* *~ Increased connector retention*
Highly reliable soldered connections	*~ Increased connector retention & cable assembly life*

A Solid silver-plated copper center conductor

B Microporous PTFE dielectric

C High coverage, silver-plated copper ribbon braid

D Overlapped aluminum laminate foil/mylar

E High coverage, silver-plated copper braid

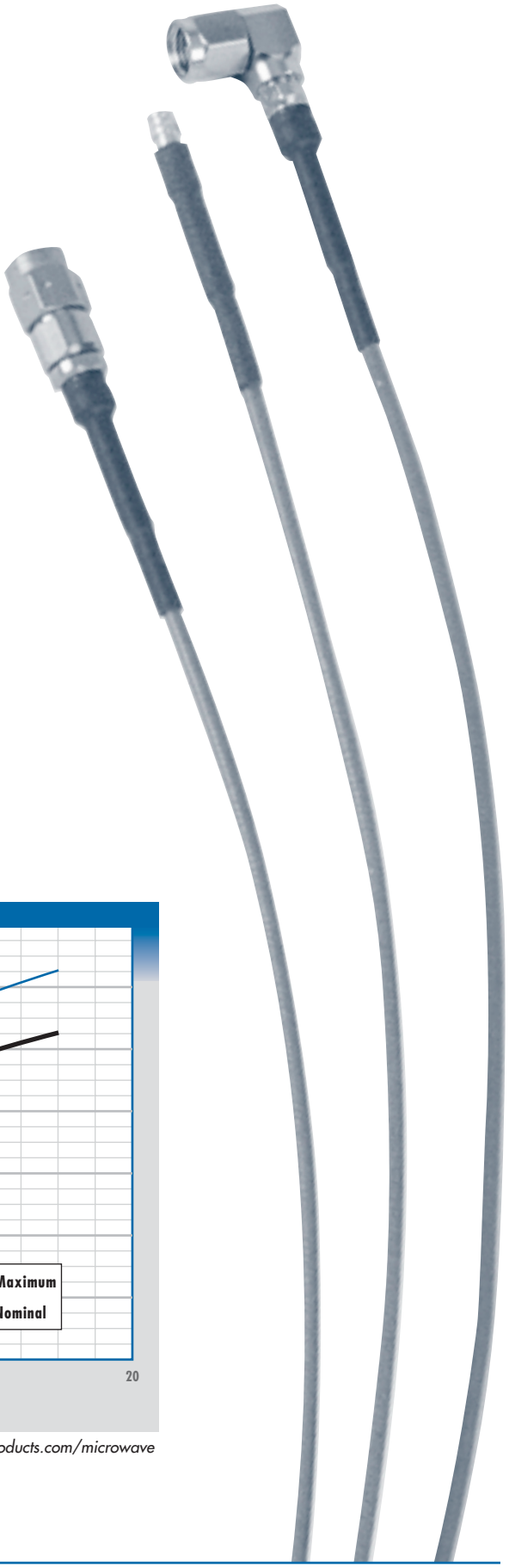
F Extruded FEP jacket

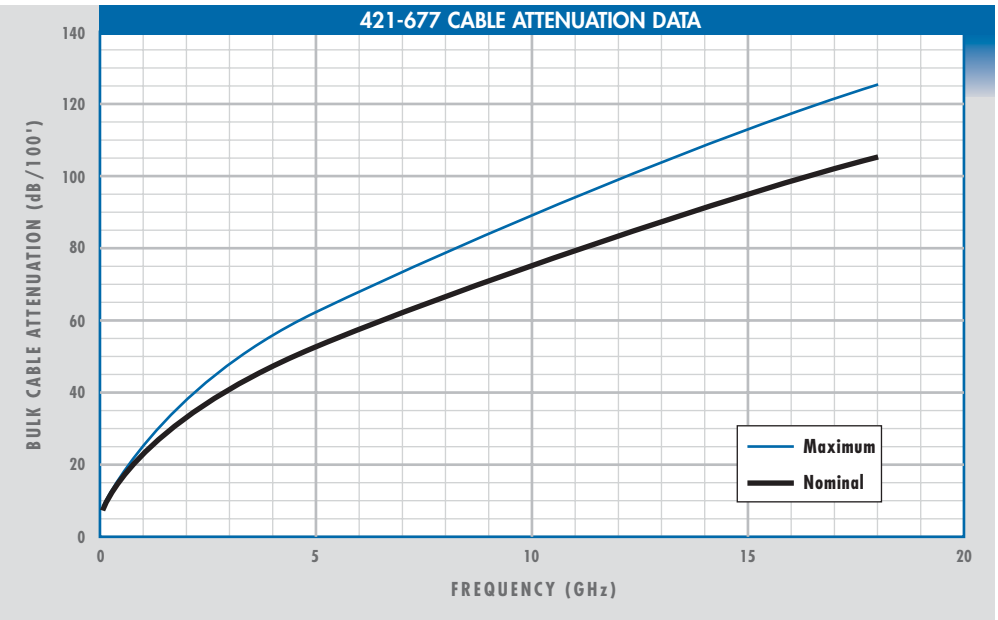
0.088" Diameter Cable : TECHNICAL INFORMATION

MECHANICAL SPECS	
Cable Diameter, nominal	0.088 in
Bend Radius *dynamic* *static*	 0.90 in 0.45 in
Operating Temperature	–54° C to +150° C
Weight	3.9 g/ft
Inner Conductor Type	solid SPC
Dielectric	microporous PTFE
Connector Retention, minimum	15.0 lbs

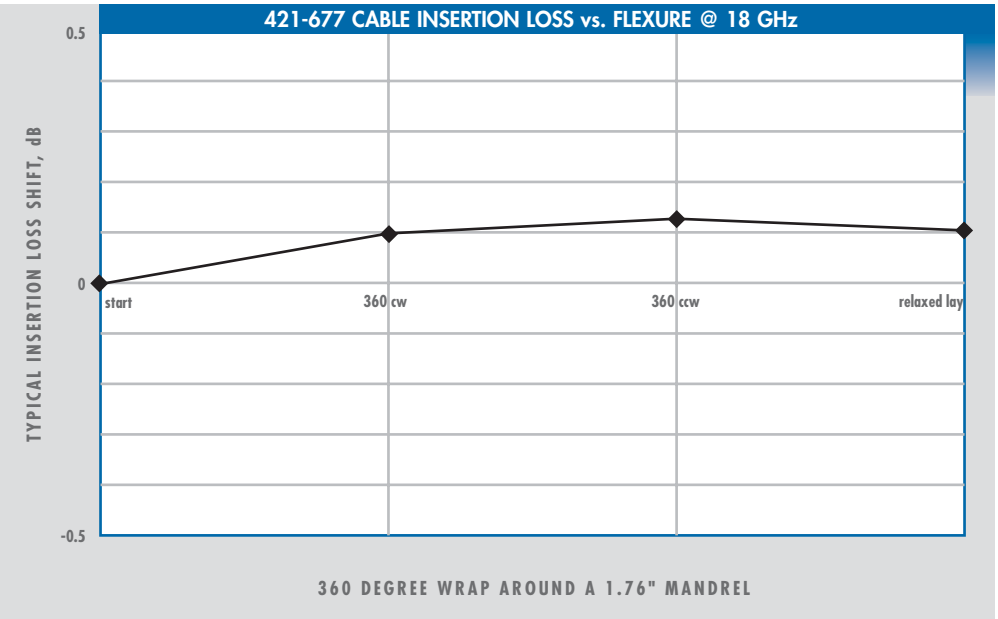
ELECTRICAL SPECS	
Frequency Range	DC to 18 GHz
Impedance	50 ±2 ohms
Capacitance, nominal	26 pF/ft
Time Delay, nominal	1.3 nsec/ft
Shielding Effectiveness, min (@ 1 GHz)	–90 dB

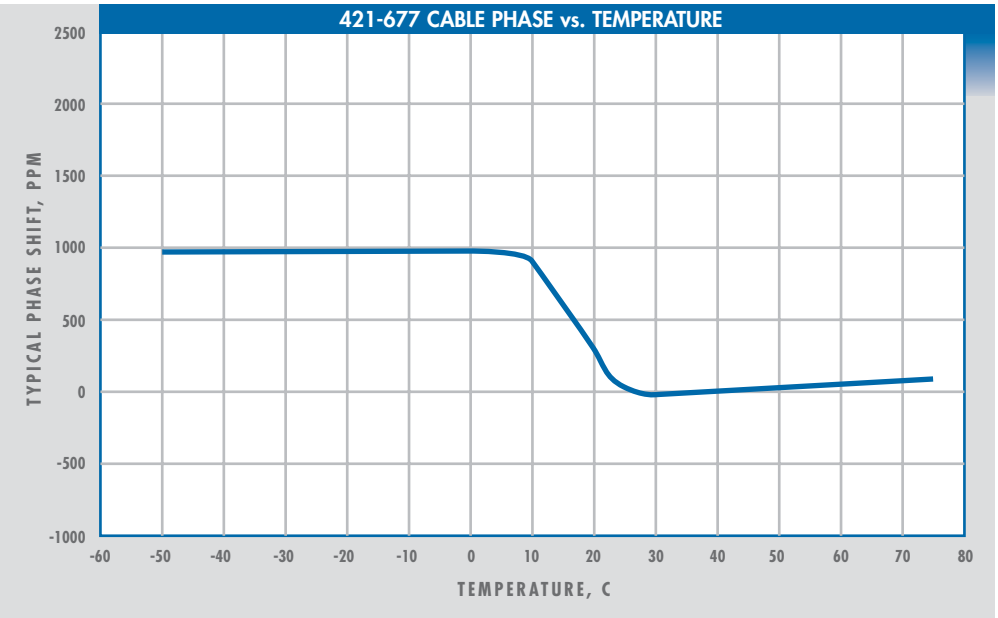
Specifications subject to change without notice.

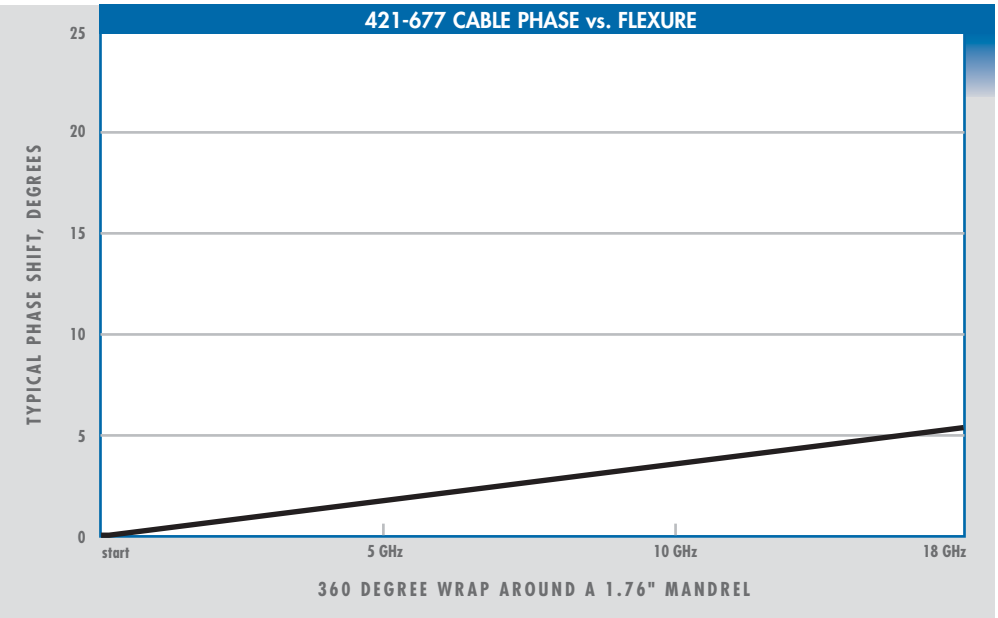




For cable assembly insertion loss, call us or visit our Web site, www.stormproducts.com/microwave

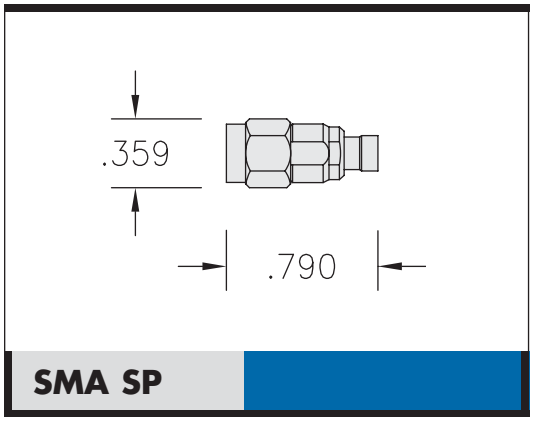

421-677 CABLE INSERTION LOSS vs. FLEXURE @ 18 GHz
TYPICAL INSERTION LOSS SHIFT, dB
0.5
0
-0.5
start
360 cw
360 ccw
relaxed lay
360 DEGREE WRAP AROUND A 1.76" MANDREL


421-677 CABLE PHASE vs. TEMPERATURE
TYPICAL PHASE SHIFT, PPM
2500
2000
1500
1000
500
0
-500
-1000
-60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80
TEMPERATURE, C

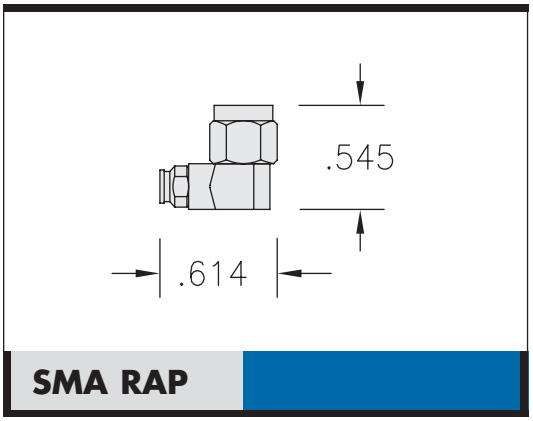

421-677 CABLE PHASE vs. FLEXURE
TYPICAL PHASE SHIFT, DEGREES
25
20
15
10
5
0
start
5 GHz
10 GHz
18 GHz
360 DEGREE WRAP AROUND A 1.76" MANDREL

0.088" Diameter Cable : COMMONLY USED CONNECTORS

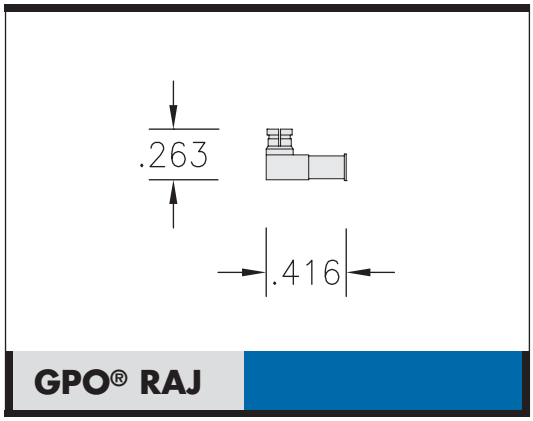
Dimensions in inches. Other connectors available; consult us for options.



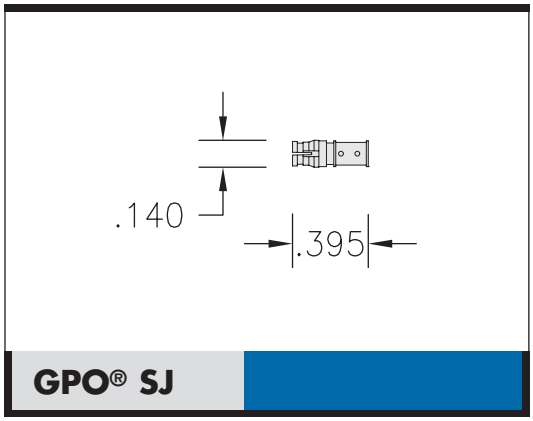
SMA SP



SMA RAP



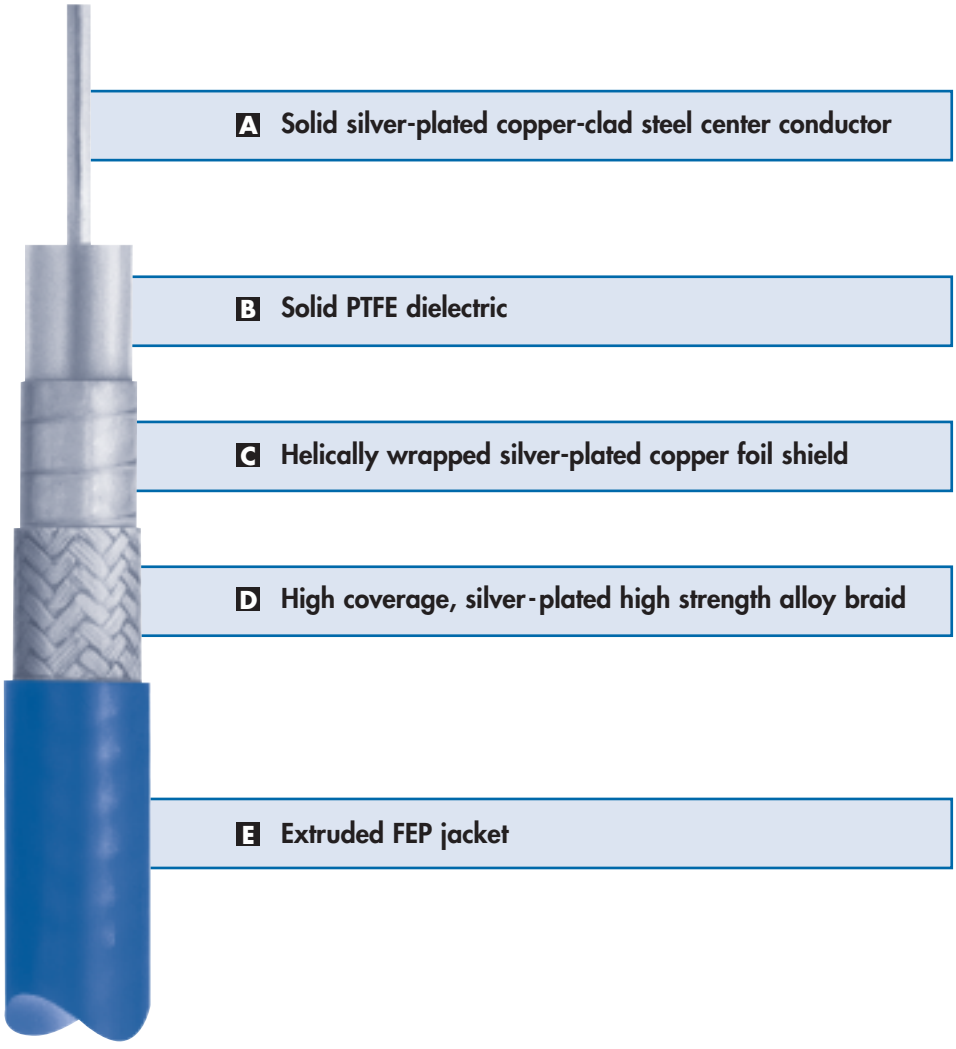
GPO® RAJ



GPO® SJ

0.096" Diameter Cable : CABLE CONSTRUCTION

FEATURES	BENEFITS
Solid PTFE dielectric	~ *High compression resistance* ~ *Greater durability*
Ultra-high strength, multi-layer outer braid	~ *Eliminates cable breakage associated with repeated handling of small flexible and semi-conformable cable types* ~ *Greater than –90 dB shielding effectiveness through 18 Ghz*
0.096" overall diameter	~ *Provides alternative to 0.086" semi-rigid cable by eliminating costs associated with time-consuming cable layout*
Wide range of low profile SMA, GPO®, and GPPO® connectors	~ *Cable assemblies solve tough packaging challenges*

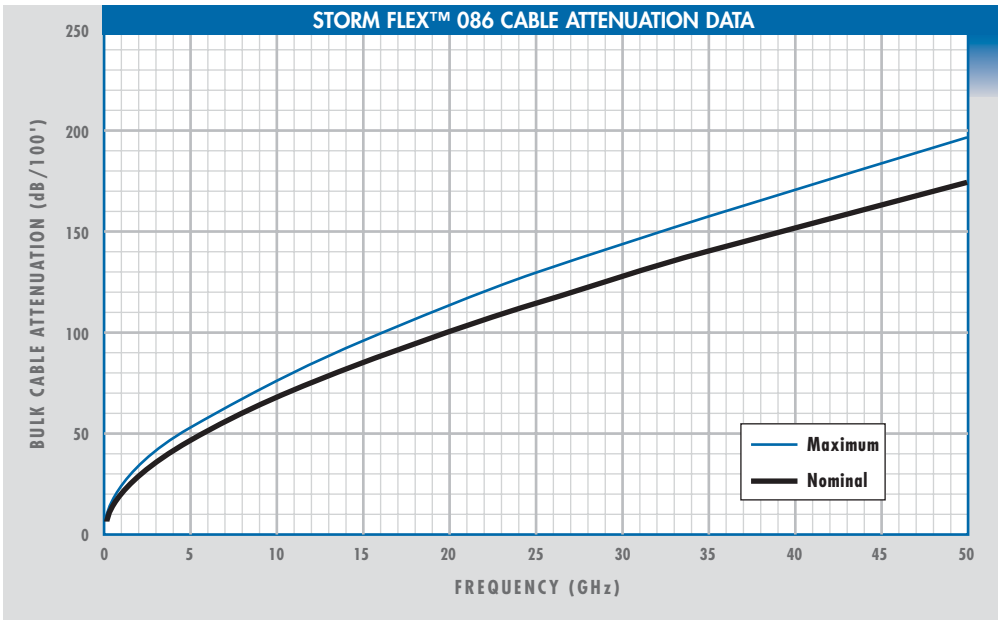


0.096" Diameter Cable : TECHNICAL INFORMATION

MECHANICAL SPECS	
Cable Diameter, nominal	0.096 in
Bend Radius *dynamic* *static*	 1.0 in 0.187 in
Operating Temperature	–54° C to +125° C
Weight	5.25 g/ft
Inner Conductor Type	solid SPCCS
Dielectric	solid PTFE
Connector Retention, minimum straight pull right-angle pull	 10.0 lbs 10.0 lbs

ELECTRICAL SPECS	
Frequency Range	DC to 50 GHz
Impedance	50 ±2 ohms
Capacitance, nominal	28.9 pF/ft
Time Delay, nominal	1.45 nsec/ft
Shielding Effectiveness, min (@ 0 to 18 GHz)	–90 dB

Specifications subject to change without notice.



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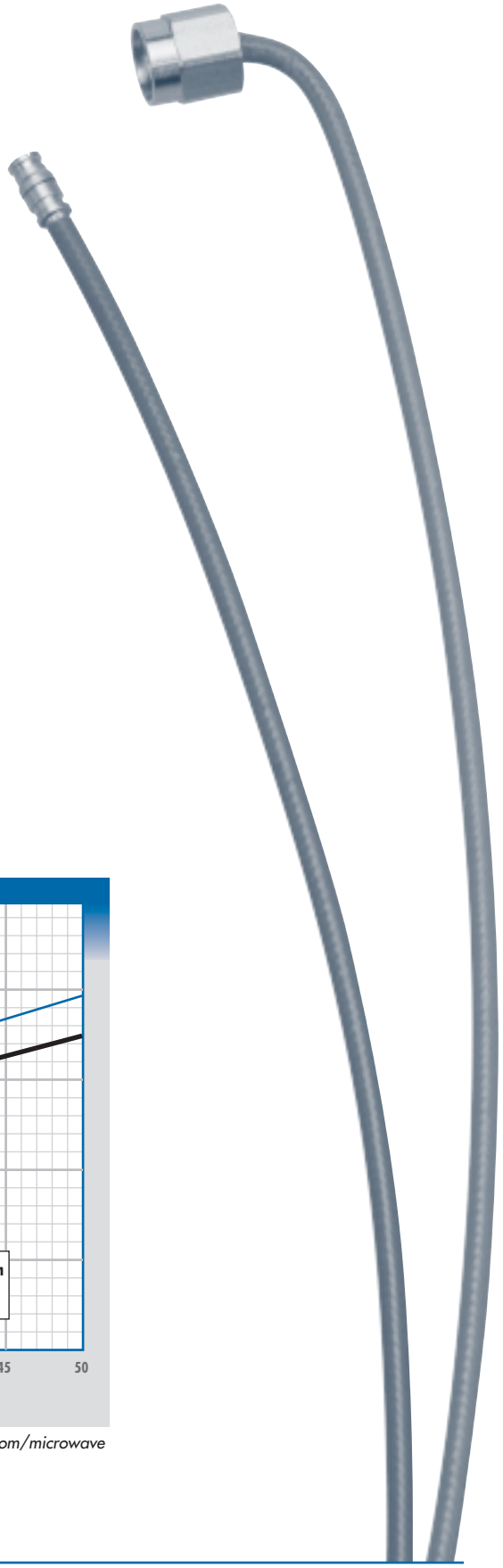
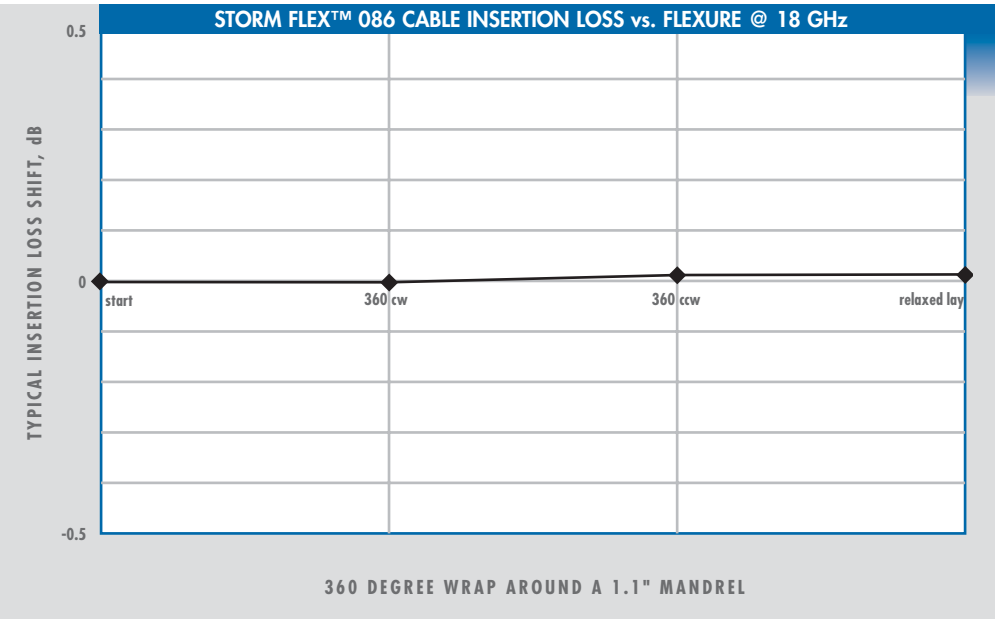
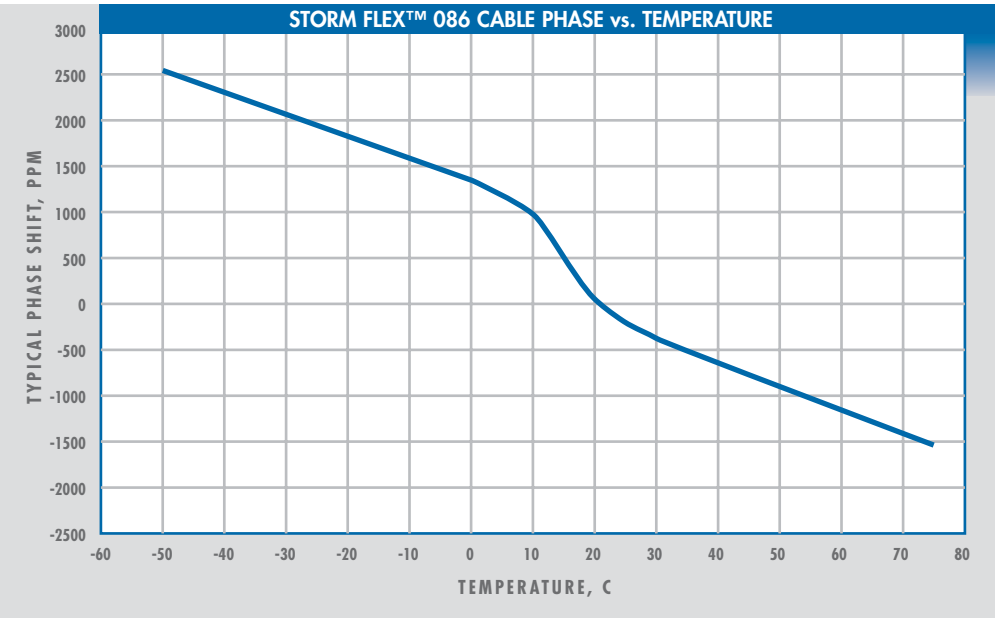
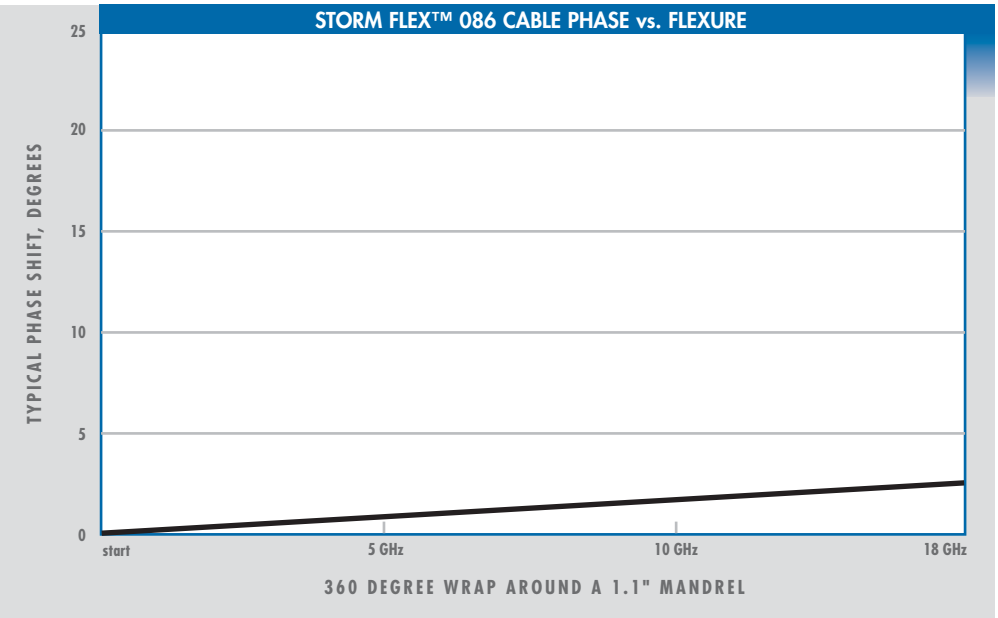


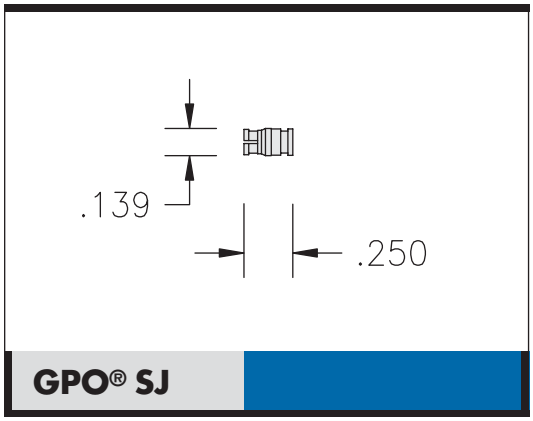

STORM FLEX™ 086 CABLE INSERTION LOSS vs. FLEXURE @ 18 GHz
TYPICAL INSERTION LOSS SHIFT, dB
0.5
0
-0.5
start
360 cw
360 ccw
relaxed lay
360 DEGREE WRAP AROUND A 1.1" MANDREL


STORM FLEX™ 086 CABLE PHASE vs. TEMPERATURE
TYPICAL PHASE SHIFT, PPM
3000
2500
2000
1500
1000
500
0
-500
-1000
-1500
-2000
-2500
-60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80
TEMPERATURE, C

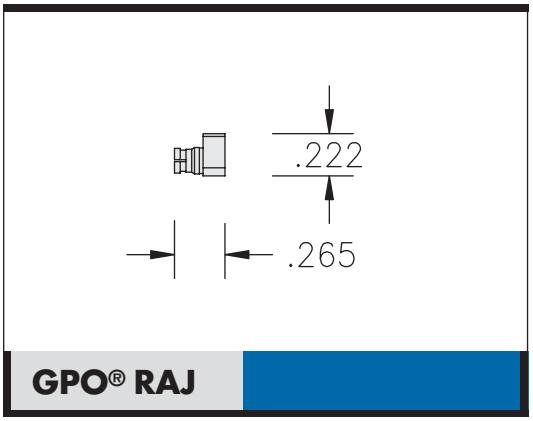

STORM FLEX™ 086 CABLE PHASE vs. FLEXURE
TYPICAL PHASE SHIFT, DEGREES
25
20
15
10
5
0
start
5 GHz
10 GHz
18 GHz
360 DEGREE WRAP AROUND A 1.1" MANDREL

0.096" Diameter Cable : COMMONLY USED CONNECTORS

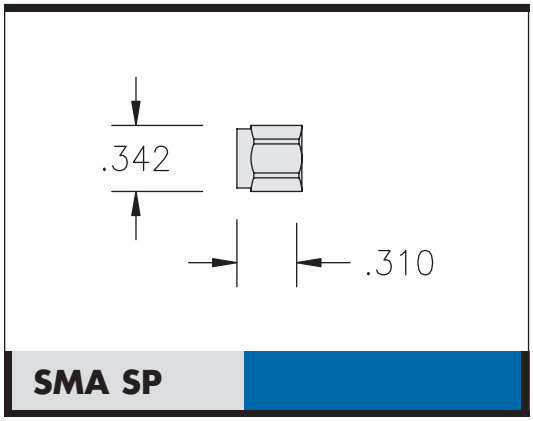
Dimensions in inches. Other connectors available; consult us for options.



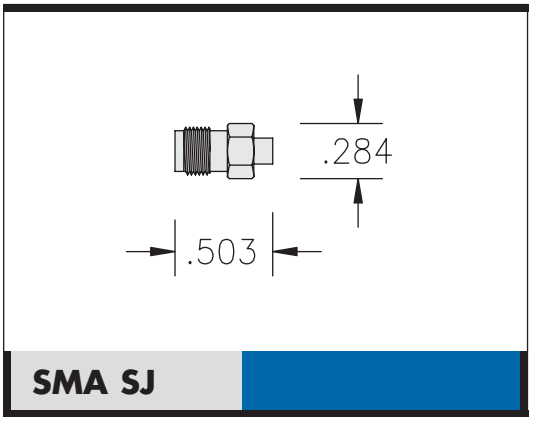
GPO® SJ



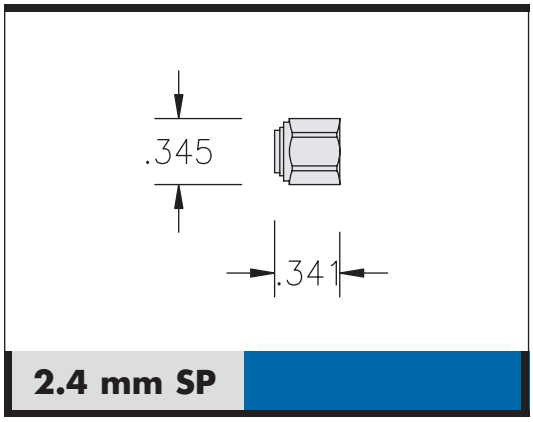
GPO® RAJ



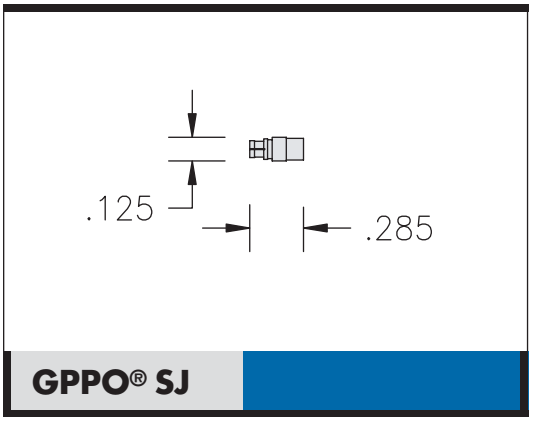
SMA SP



SMA SJ



2.4 mm SP



GPPO® SJ

LOW LOSS FLEXIBLE

0.125" Diameter : TRUE BLUE® 125 50–53
0.205" Diameter : TRUE BLUE® 205 54–57
0.290" Diameter : TRUE BLUE® 290 58–61
0.420" Diameter : TRUE BLUE® 420 62–64

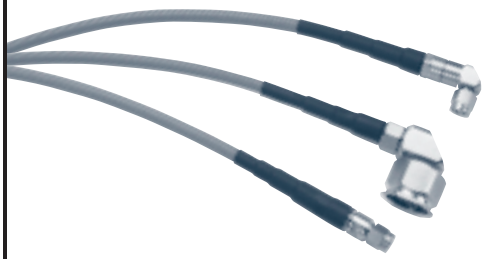
Storm Products' **TRUE BLUE®** line of high performance cable assemblies provides an unmatched combination of low loss, durability, and value. With an operating temperature of –54° C to +150° C and a design based entirely on high-performance materials, True Blue® products are ideally suited for most military and aerospace applications.

All True Blue® cable assemblies feature the same durable low loss, low density PTFE dielectric combined with our proven Quadraform™ shield. This time-tested construction plus tightly controlled production processes ensure an outstanding combination of electrical and mechanical performance specifications. A wide variety of standard connector configurations is available for each cable type, and custom connector configurations are available on request. To suit unique applications, True Blue® cable assemblies can be tailored to include specialized jackets or ruggedizing layers. Phase and amplitude matching available on request.

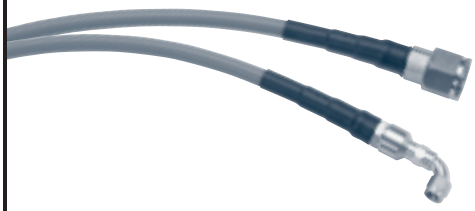
FEATURES	BENEFITS
Compression resistant low loss, low density dielectric	~ *Excellent insertion loss characteristics* ~ *Less prone to damage during handling and installation* ~ *Mechanical stability over wide temperature range*
Quadraform™ shielding	~ *Specialized construction provides low signal leakage* ~ *Excellent amplitude stability* ~ *Increased connector retention*
Highly reliable soldered connections	~ *Increased connector retention & cable assembly life*
Various standard connector options, including low profile SMA 90 connectors and precision interfaces	~ *Performance-proven solutions for many applications* ~ *Short lead time*

TRUE BLUE® 125
0.125" DIAMETER

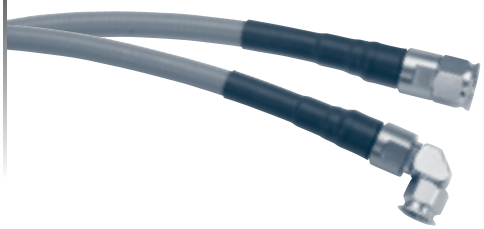
TRUE BLUE® 205
0.205" DIAMETER



TRUE BLUE® 290
0.290" DIAMETER



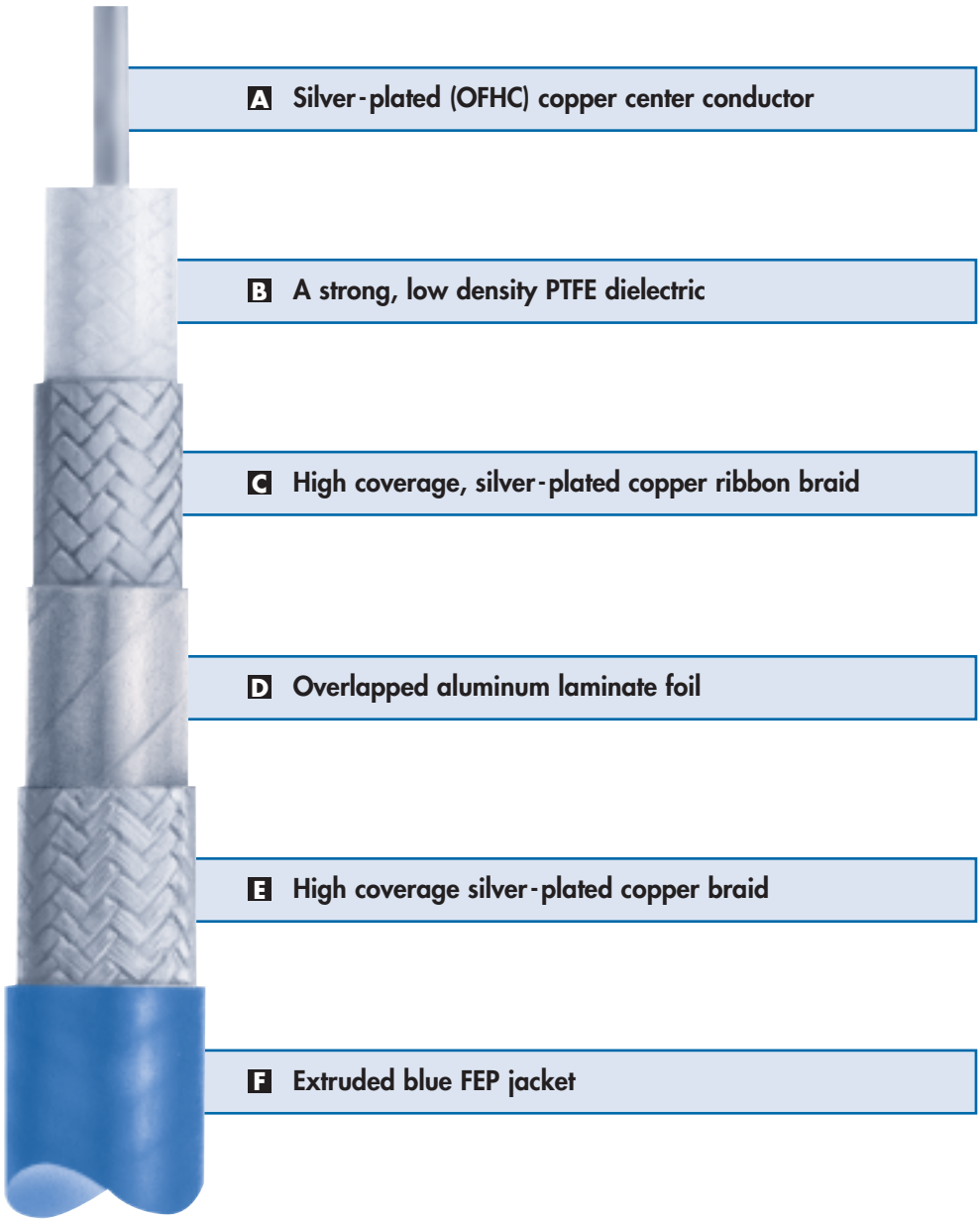
TRUE BLUE® 420
0.420" DIAMETER



CABLE CONSTRUCTION

Our flexible low loss microwave cables are built to withstand mechanical abuse without loss of performance. However, for extra rough applications Storm offers the additional protection of ruggedizing, armoring, and soft armoring.

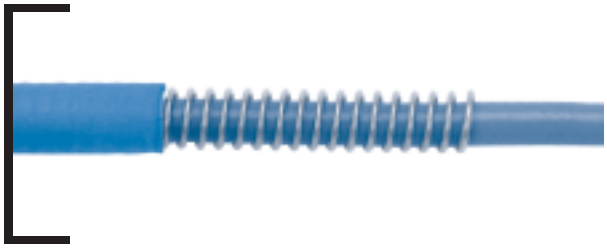
A silver-plated copper conductor is insulated with a tough, low density PTFE dielectric that is then shielded with multiple outer conductor layers and insulated with FEP, an inert jacketing material.



ARMORING & RUGGEDIZING OPTIONS

Cable types other than True Blue® 205 and True Blue® 290 armored or ruggedized on request. Consult us for options.

RUGGEDIZED – Polyolefin XL jacket



For applications requiring a slightly greater amount of compression resistance (300 lbs/in), but where weight and flexibility are also critical. The cable is covered with a flexible wound helix of passivated stainless steel wire and a cross-linked polyolefin jacket. Temperature: −54° C thru +135° C.

Cable	Weight *	Diameter	Min. bend rad.
TB 205	42 gr/ft	0.340"	1.0"
TB 290	60 gr/ft	0.405"	1.5"

* *Includes cable*

RUGGEDIZED – Polyurethane jacket

For applications similar to the above, where weight, flexibility, and moderate compression resistance (300 lbs/in) are important, but where abrasion resistance is also critical. The cable is covered with a flexible wound helix of passivated stainless steel wire and an extruded polyurethane jacket. Temperature: −54° C thru +100° C.

Cable	Weight *	Diameter	Min. bend rad.
TB 205	35 gr/ft	0.360"	1.0"
TB 290	55 gr/ft	0.420"	1.5"

* *Includes cable*

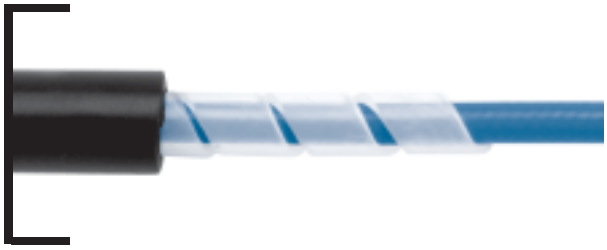
HARD ARMORED

Designed for both inside and outside environments where flexibility and weight are not as critical, but where the application requires the ultimate in cut and crush resistance (500 lbs/in). The cable is covered with a stainless steel interlocked armor; an additional cross-linked polyolefin jacket is standard on lengths up to fifty feet. Temperature: −54° C thru +135° C.

Cable	Weight *	Diameter	Min. bend rad.
TB 205	55 gr/ft	0.420"	1.75"
TB 290	78 gr/ft	0.530"	1.75"

* *Includes cable*

SOFT ARMORED



For applications requiring abrasion resistance combined with improved compression resistance (400 lbs/in). Product still remains very flexible. The FEP-jacketed cable is protected with a high density polyethylene anti-compression helix (010 only) that is covered with a tough fuel and oil resistant Neoprene™ synthetic rubber. Per MIL-R-6855, Class 2, Grade 60. Temperature: −54° C thru +100° C.

Cable	Weight *	Diameter	Min. bend rad.
TB 205	58 gr/ft	0.505"	1.75"
TB 290	68 gr/ft	0.470"	1.75"

* *Includes cable*

0.125" Diameter Cable : TECHNICAL INFORMATION

MECHANICAL SPECS

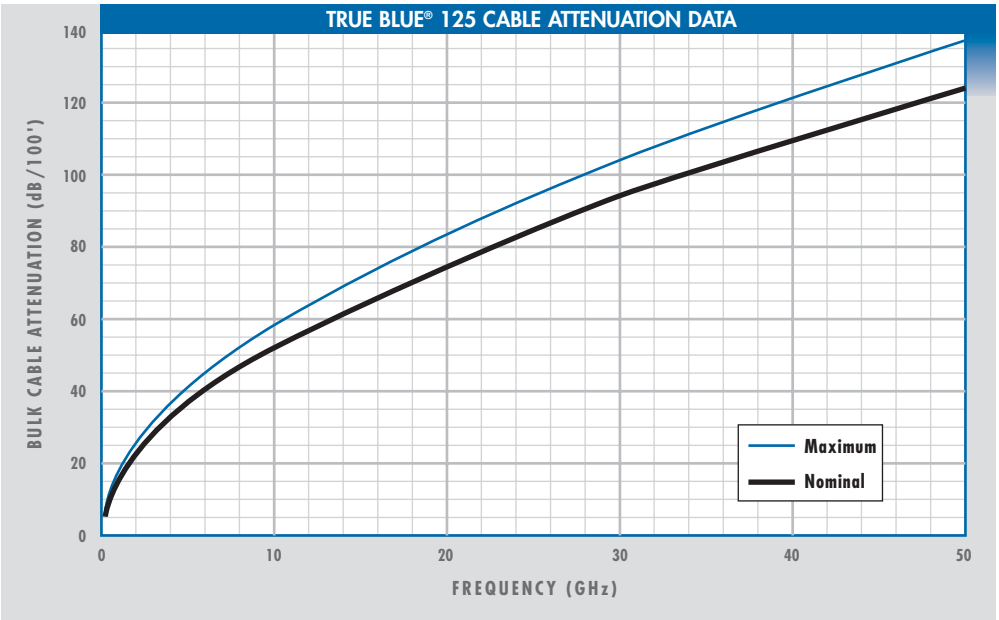
Cable Diameter, nominal	0.125 in
Bend Radius *dynamic* *static*	 1.25 in 0.50 in
Operating Temperature	–54° C to +150° C
Weight	8.0 g/ft
Inner Conductor Type	solid SPC
Dielectric	low density PTFE
Connector Retention, minimum	30.0 lbs

ELECTRICAL SPECS

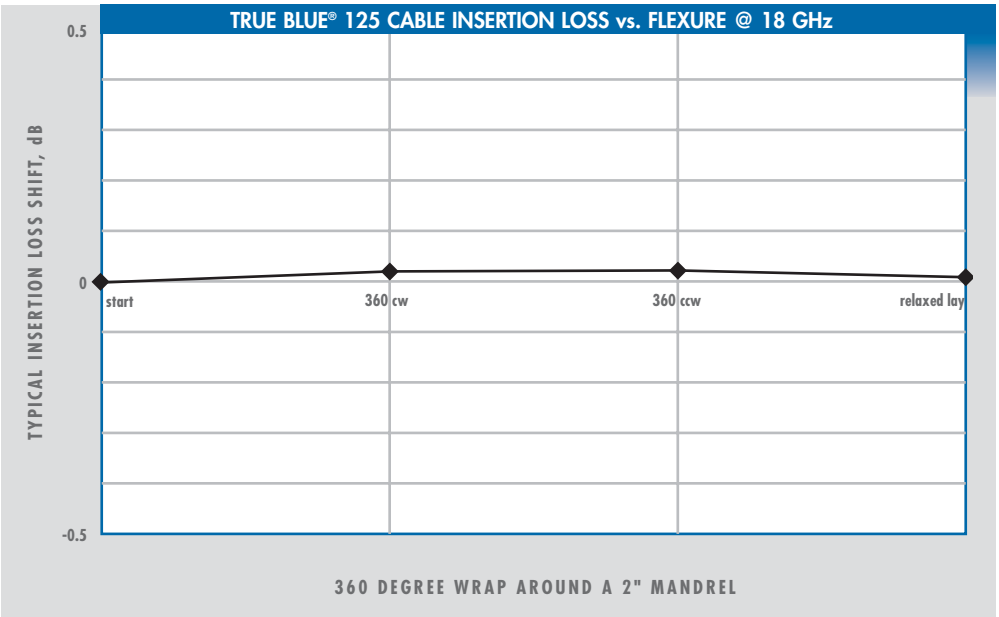
Frequency Range	DC to 50 GHz
Impedance	50 ±2 ohms
Capacitance, nominal	27.5 pF/ft
Time Delay, nominal	1.38 nsec/ft
Shielding Effectiveness, min (@ 1 GHz)	–90 dB

Power ratings (next page) are conservative; actual ratings depend on specific application. Please consult us regarding your application.

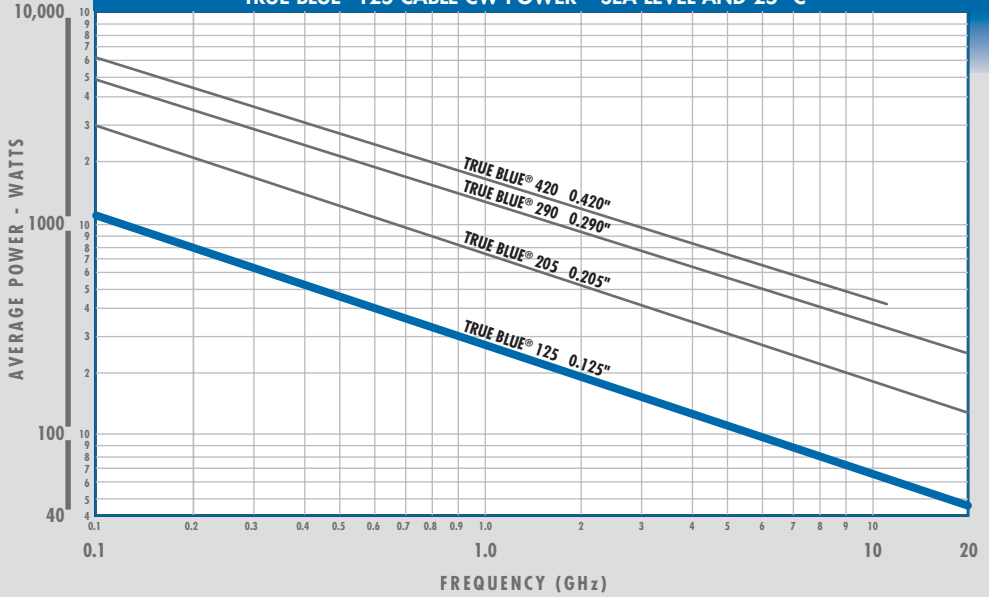
Specifications subject to change without notice.



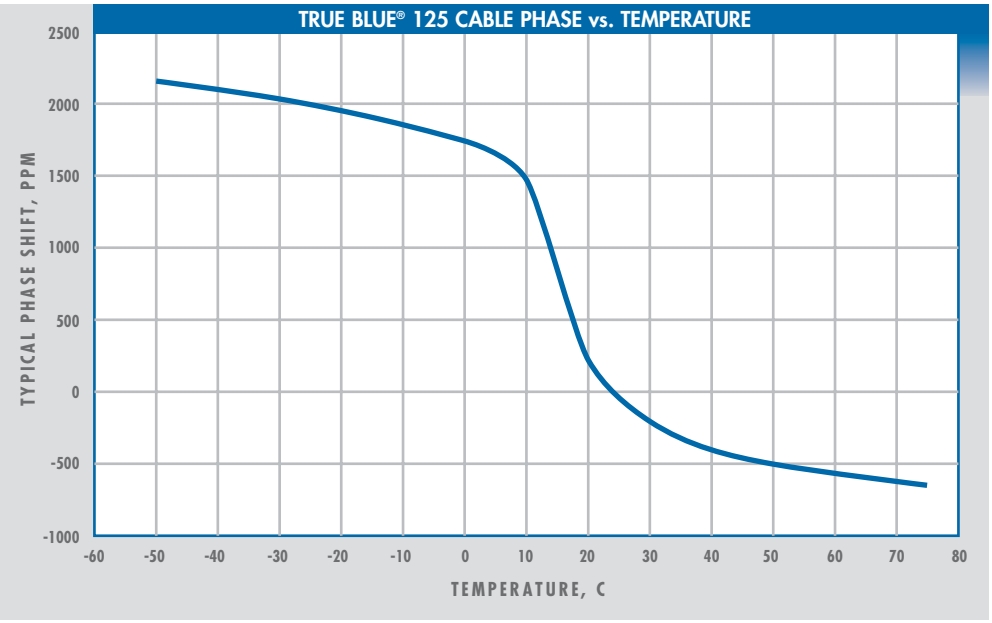
For cable assembly insertion loss, call us or visit our Web site, www.stormproducts.com/microwave



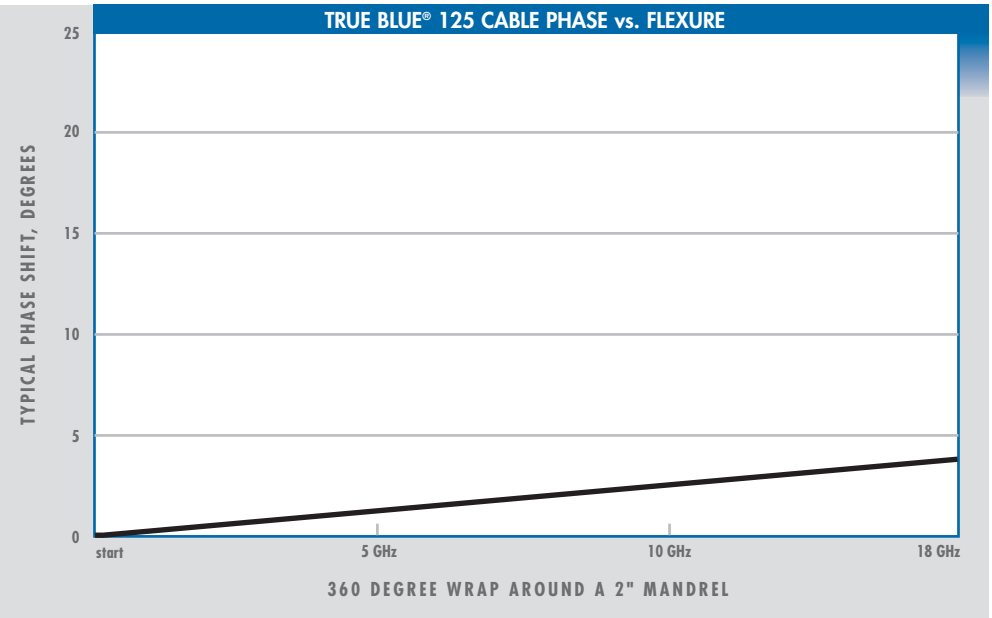
TRUE BLUE® 125 CABLE CW POWER – SEA LEVEL AND 25° C

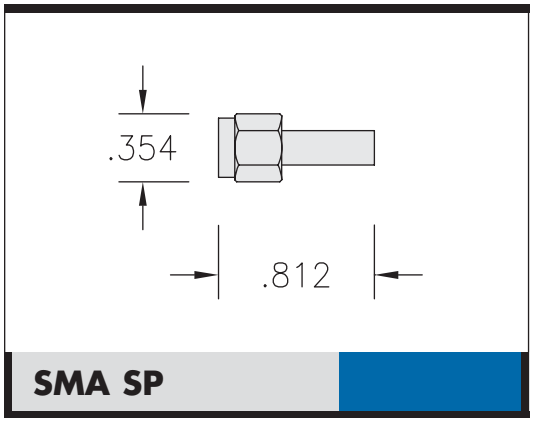


TRUE BLUE® 125 CABLE PHASE vs. TEMPERATURE

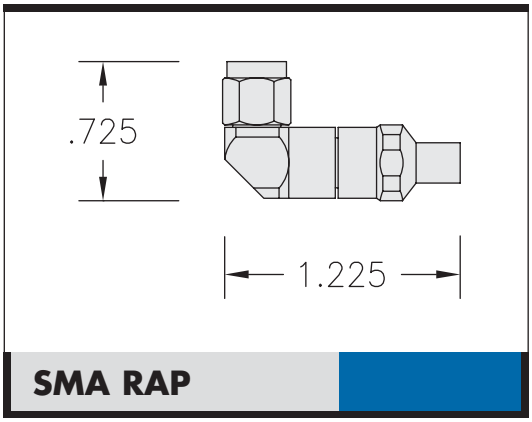


TRUE BLUE® 125 CABLE PHASE vs. FLEXURE

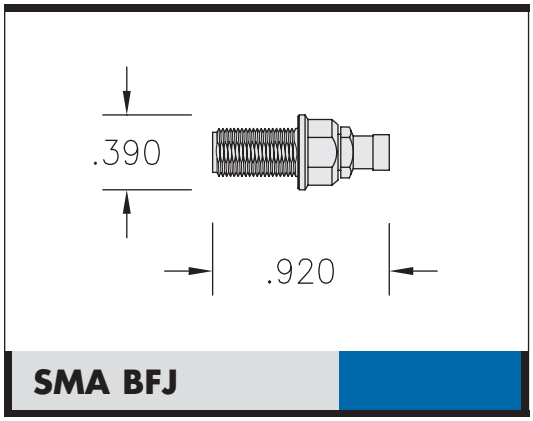




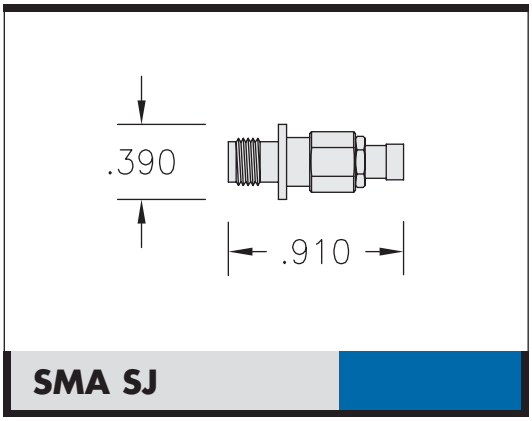
SMA SP



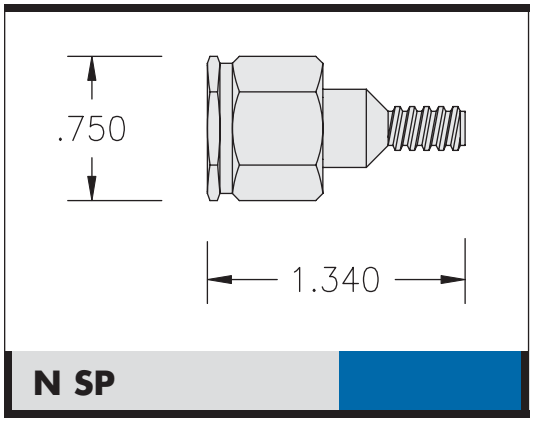
SMA RAP



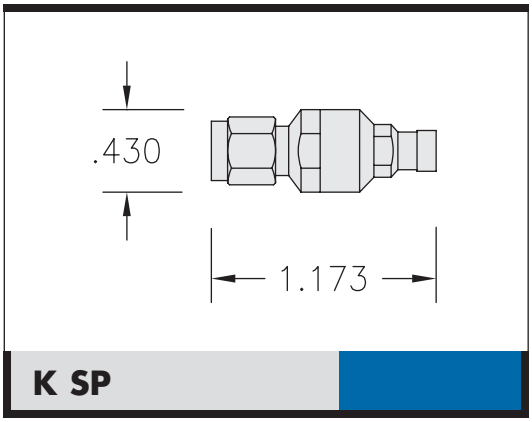
SMA BFJ



SMA SJ

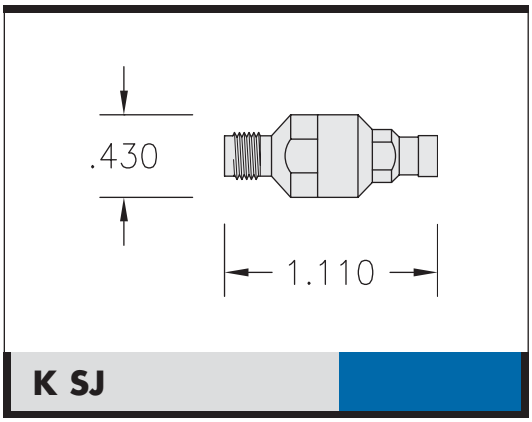


N SP

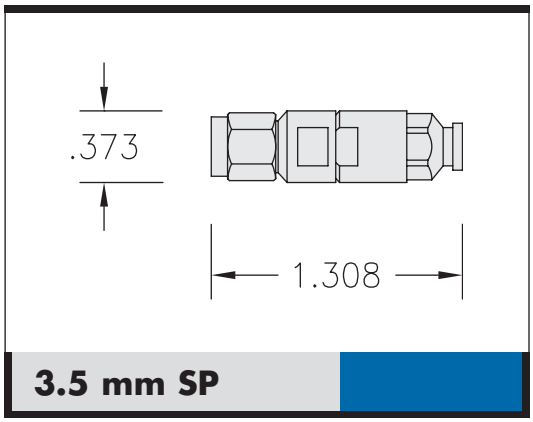


K SP

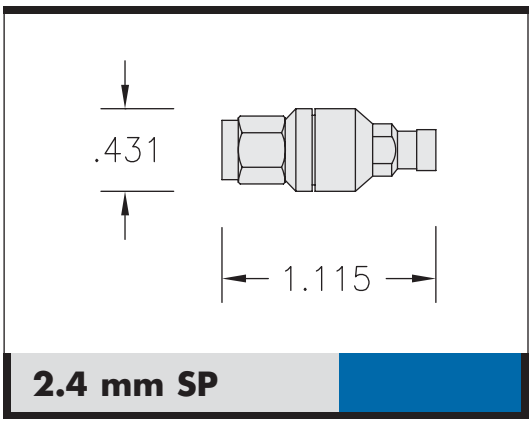
Dimensions in inches. Other connectors available; consult us for options.



K SJ



3.5 mm SP



2.4 mm SP

0.205" Diameter Cable : TECHNICAL INFORMATION

MECHANICAL SPECS

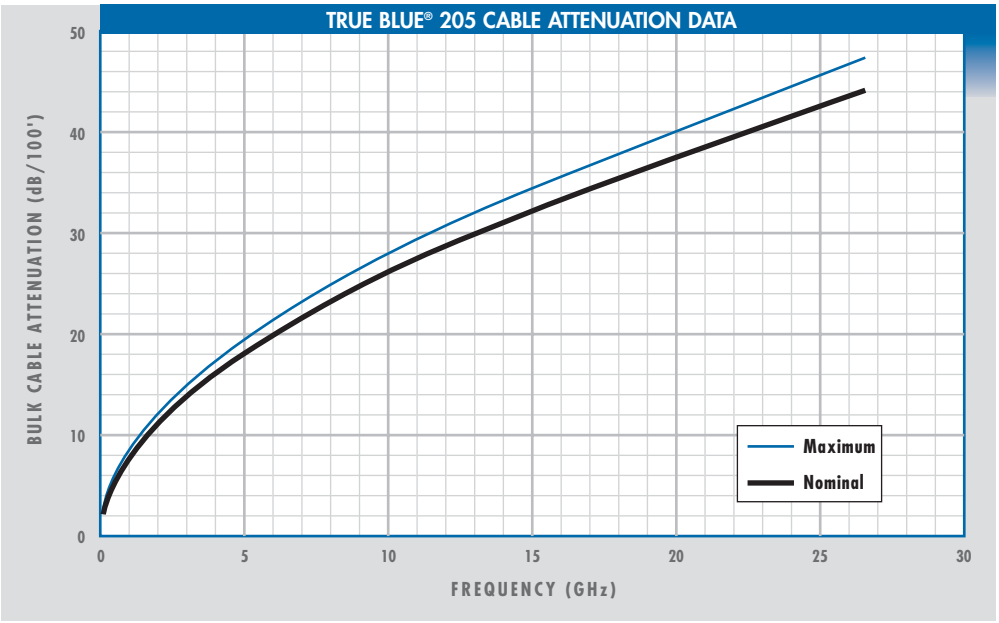
Cable Diameter, nominal	0.205 in
Bend Radius *dynamic* *static*	 2.1 in 1.0 in
Operating Temperature	–54° C to +150° C
Weight	20.0 g/ft
Inner Conductor Type	solid SPC
Dielectric	low density PTFE
Connector Retention, minimum	40.0 lbs

ELECTRICAL SPECS

Frequency Range	DC to 26.5 GHz
Impedance	50 ±2 ohms
Capacitance, nominal	27.7 pF/ft
Time Delay, nominal	1.39 nsec/ft
Shielding Effectiveness, min (@ 1 GHz)	–90 dB

Power ratings (next page) are conservative; actual ratings depend on specific application. Please consult us regarding your application.

Specifications subject to change without notice.



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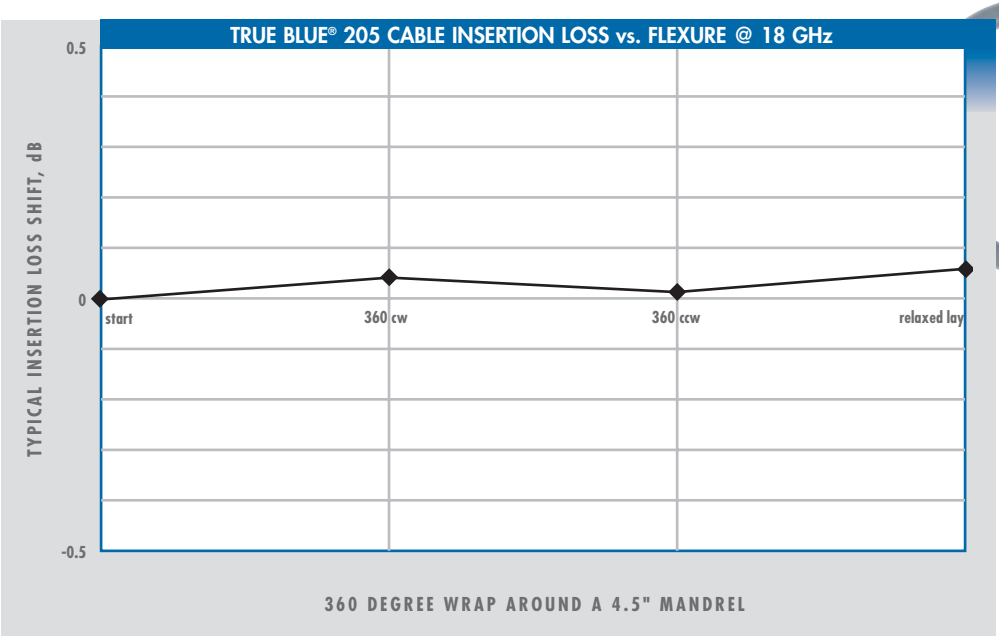
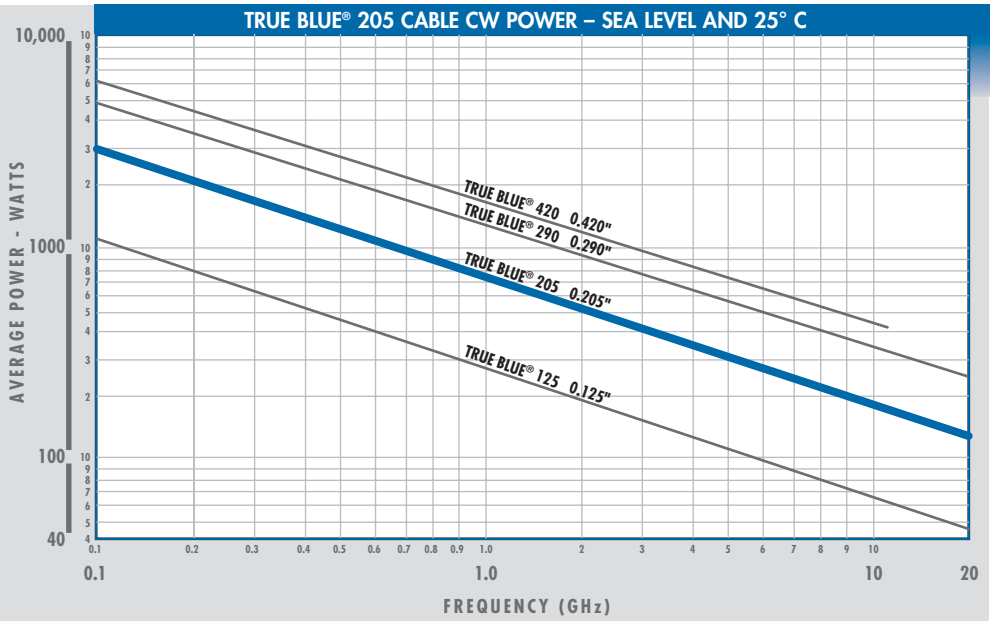
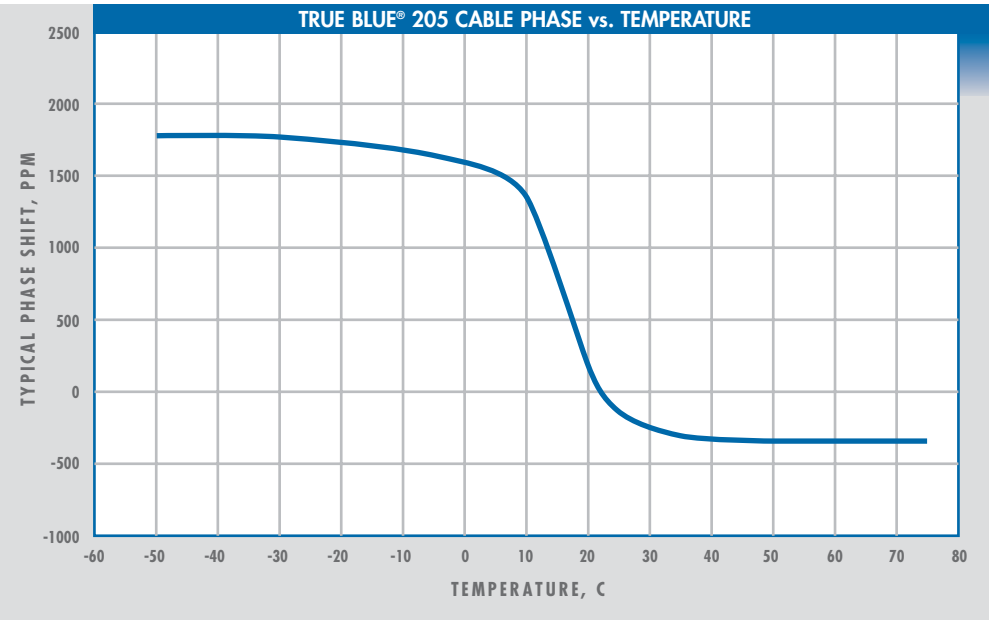


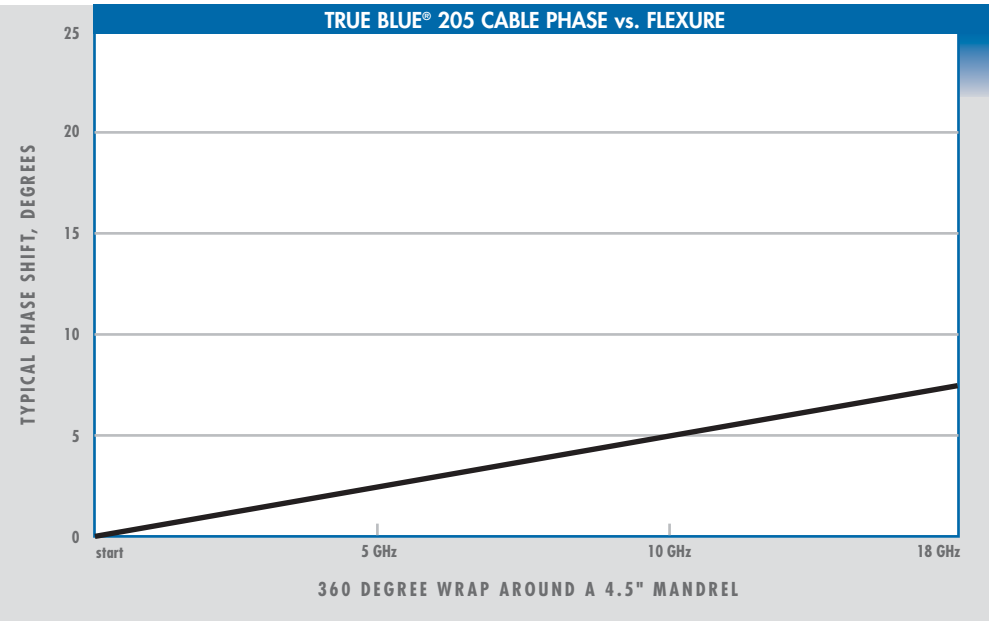
TRUE BLUE® 205 CABLE CW POWER – SEA LEVEL AND 25° C



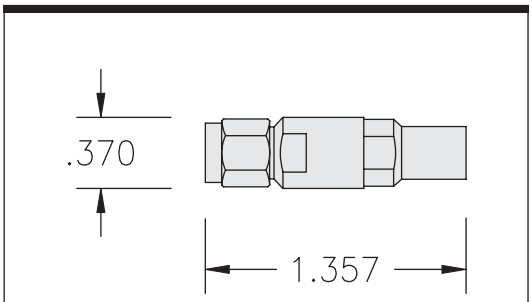
TRUE BLUE® 205 CABLE PHASE vs. TEMPERATURE



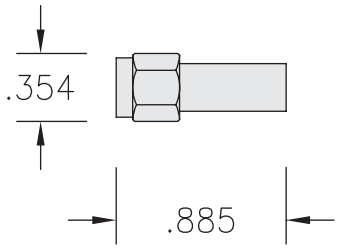
TRUE BLUE® 205 CABLE PHASE vs. FLEXURE



0.205" Diameter cable : COMMONLY USED CONNECTORS



SMA SP



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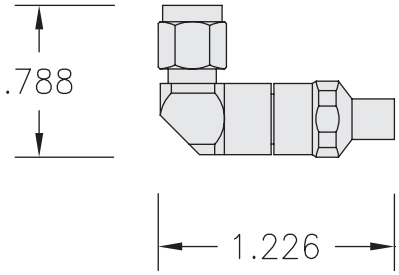
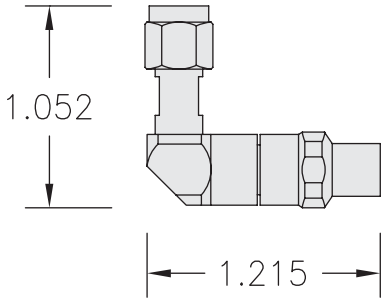


SMA RAP



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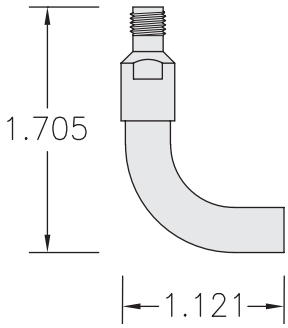
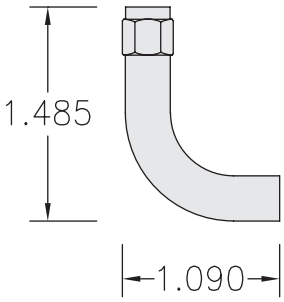


SMA E RAJ



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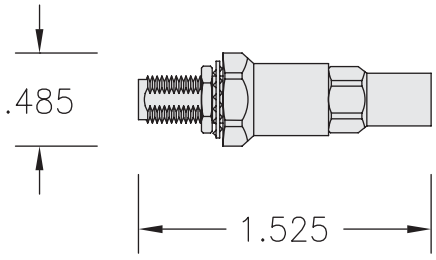

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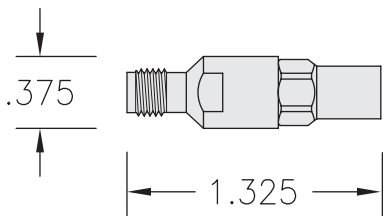
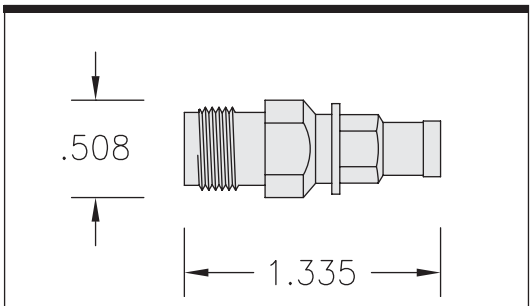
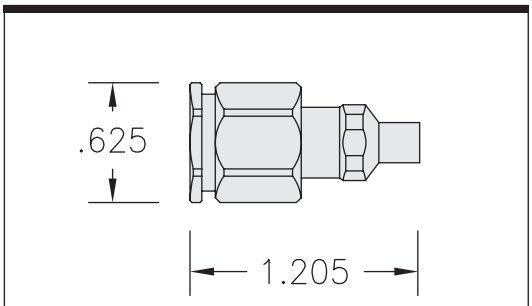


SMA SJ

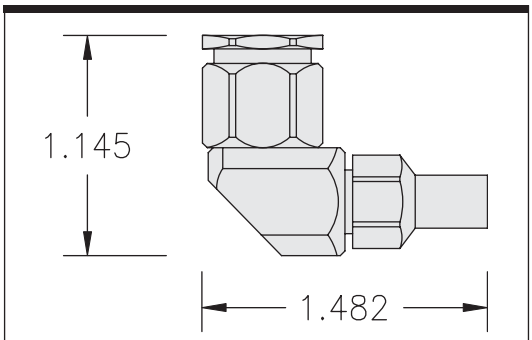
Dimensions in inches. Other connectors available; consult us for options.



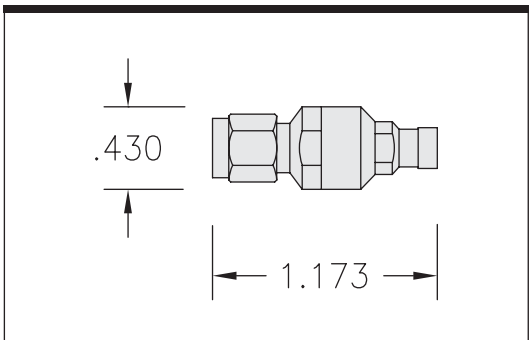
TNC SJ



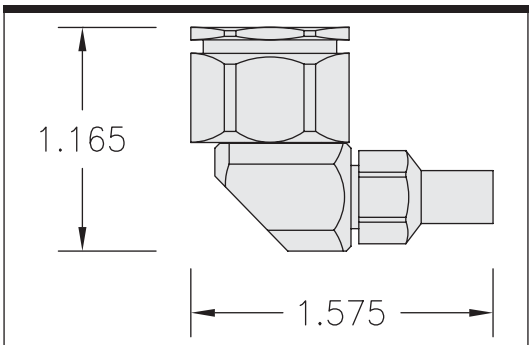
TNC SP



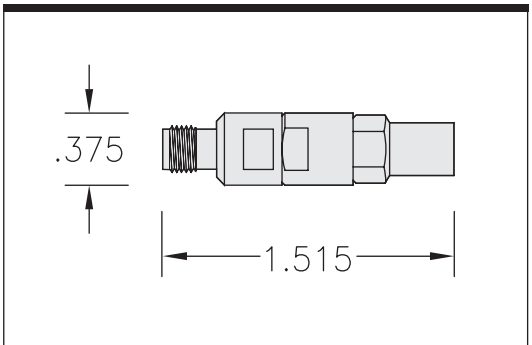
TNC RAP



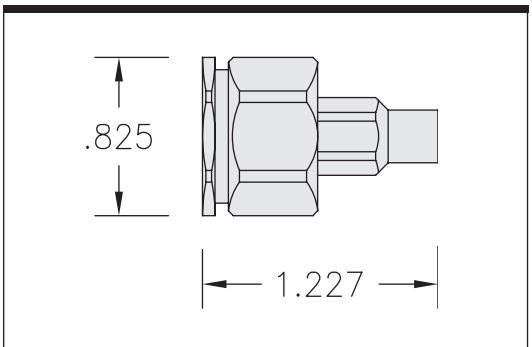
K SP



N RAP



3.5 mm SJ



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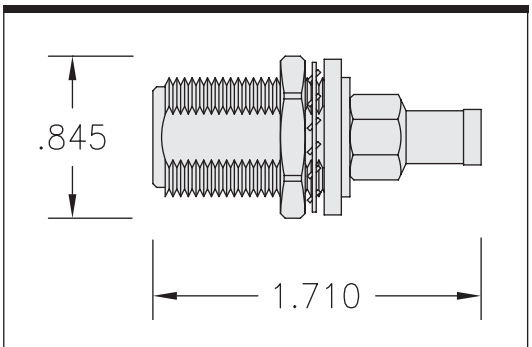


N BFJ

0.290" Diameter Cable : TECHNICAL INFORMATION

MECHANICAL SPECS

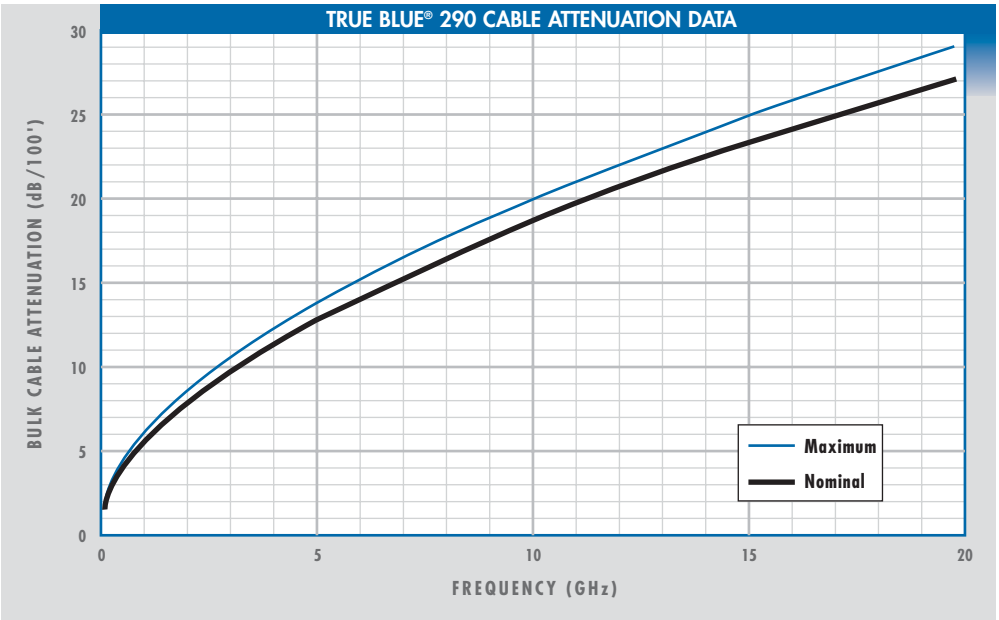
Cable Diameter, nominal	0.290 in
Bend Radius *dynamic* *static*	 2.9 in 1.5 in
Operating Temperature	–54° C to +150° C
Weight	36.0 g/ft
Inner Conductor Type	solid SPC
Dielectric	low density PTFE
Connector Retention, minimum	50.0 lbs

ELECTRICAL SPECS

Frequency Range	DC to 19.8 GHz
Impedance	50 ±2 ohms
Capacitance, nominal	26.8 pF/ft
Time Delay, nominal	1.37 nsec/ft
Shielding Effectiveness, min (@ 1 GHz)	–90 dB

Power ratings (next page) are conservative; actual ratings depend on specific application. Please consult us regarding your application.

Specifications subject to change without notice.



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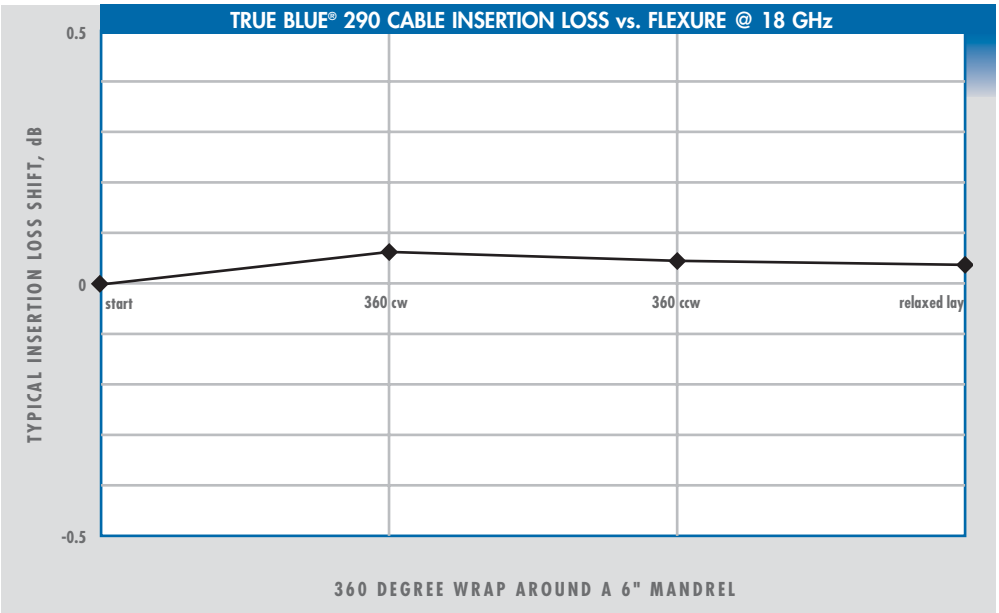
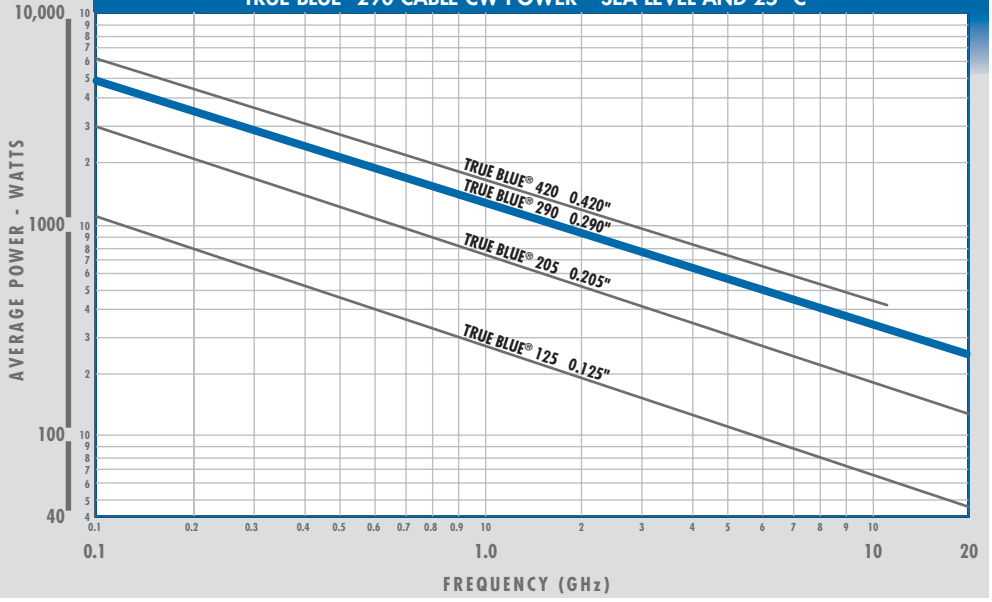
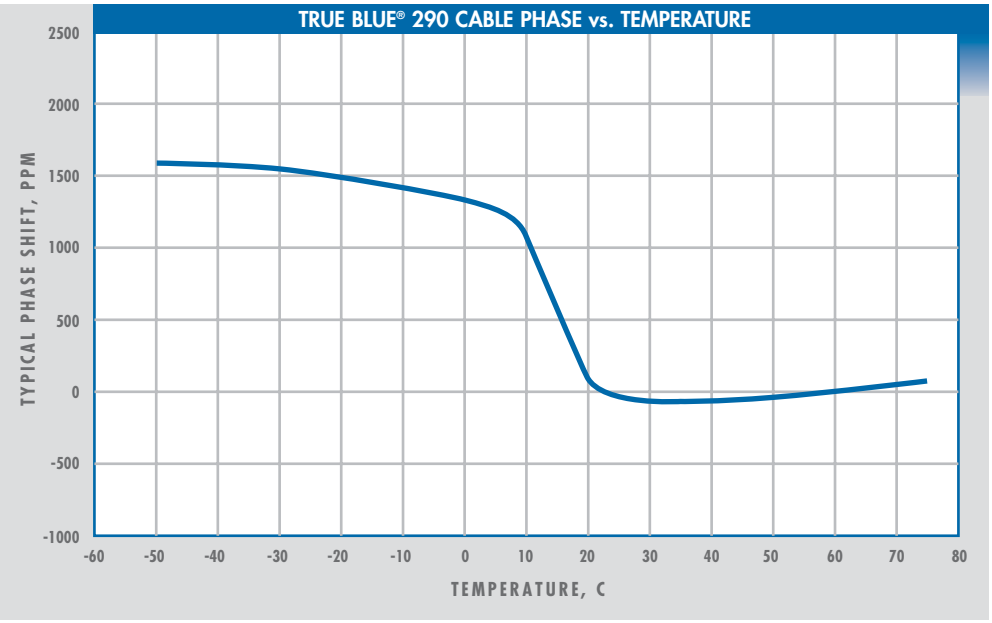


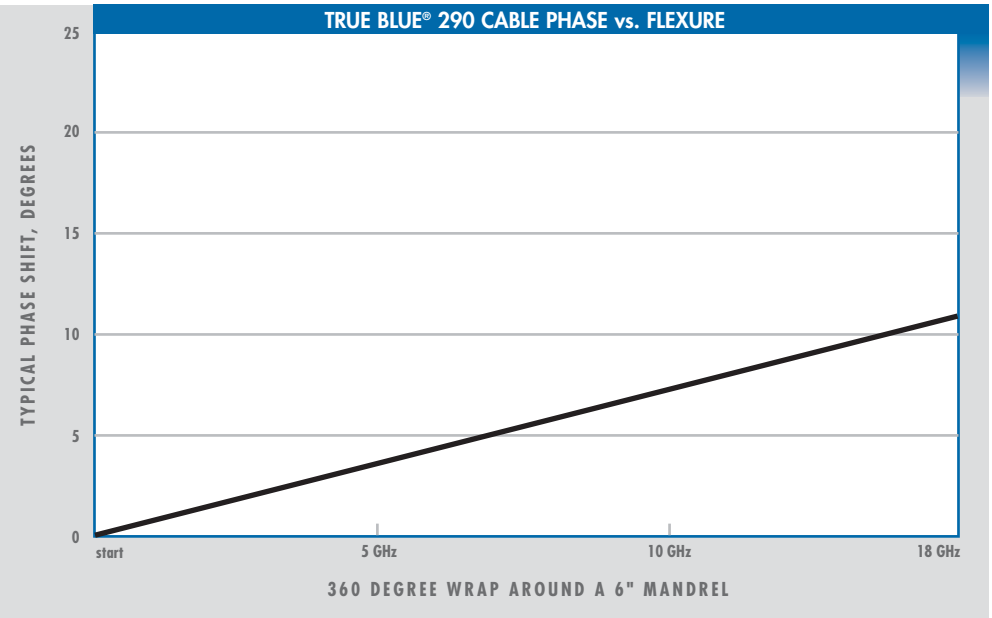
TRUE BLUE® 290 CABLE CW POWER – SEA LEVEL AND 25° C



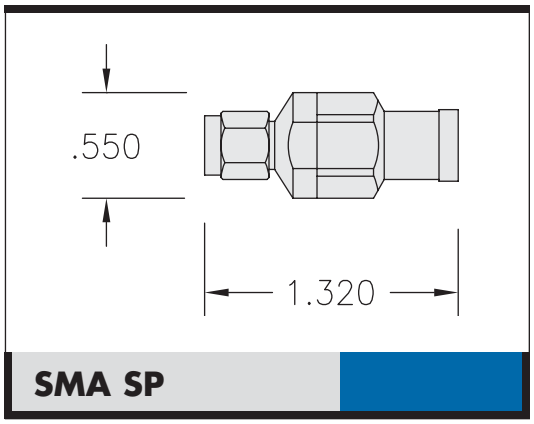
TRUE BLUE® 290 CABLE PHASE vs. TEMPERATURE



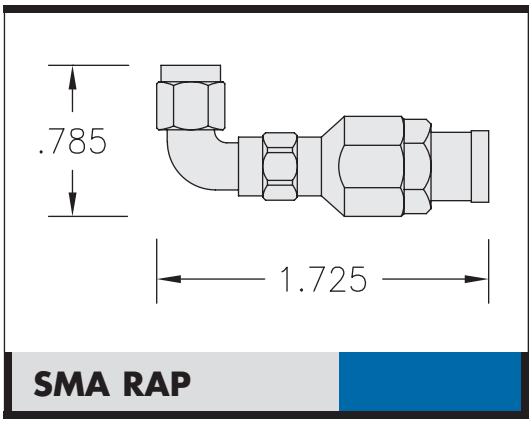
TRUE BLUE® 290 CABLE PHASE vs. FLEXURE



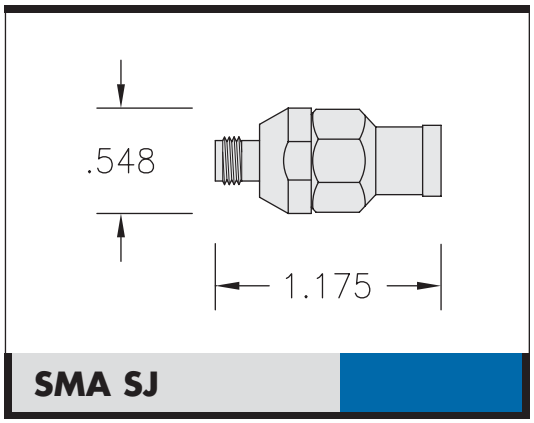
0.290" Diameter cable : COMMONLY USED CONNECTORS



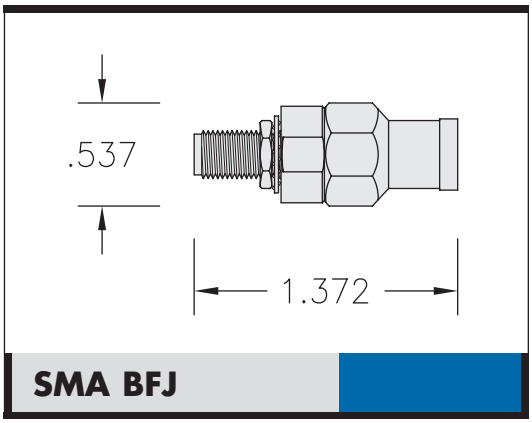
SMA SP



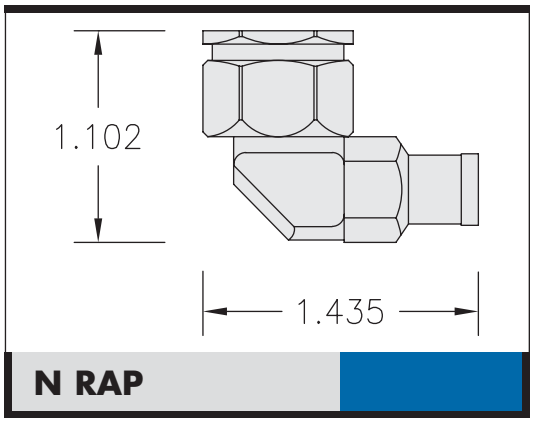
SMA RAP



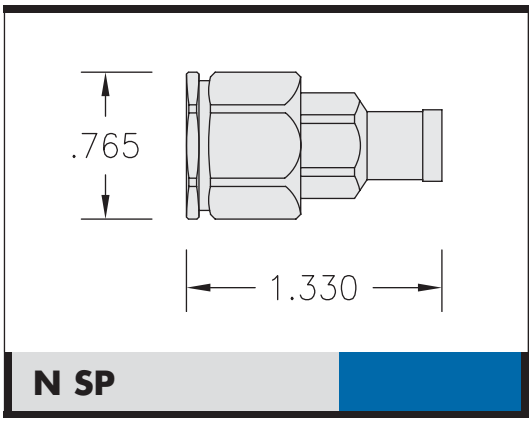
SMA SJ



SMA BFJ

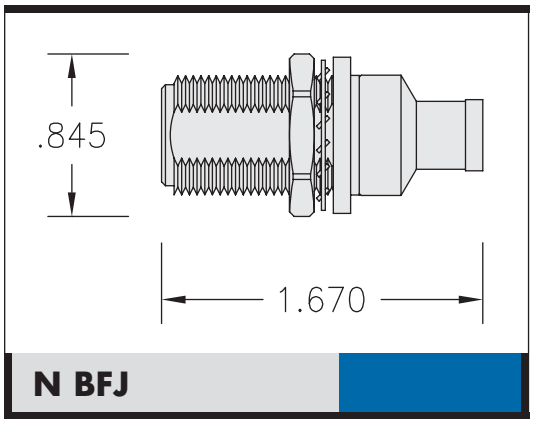


N RAP

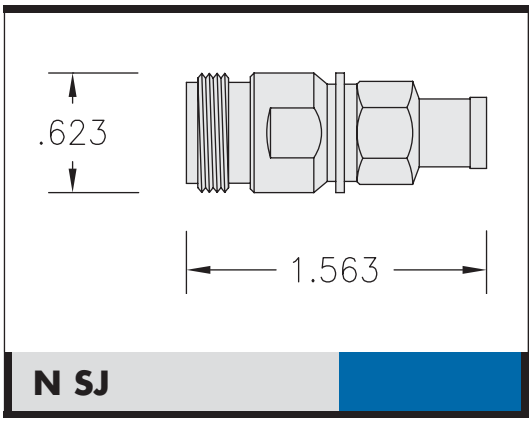


N SP

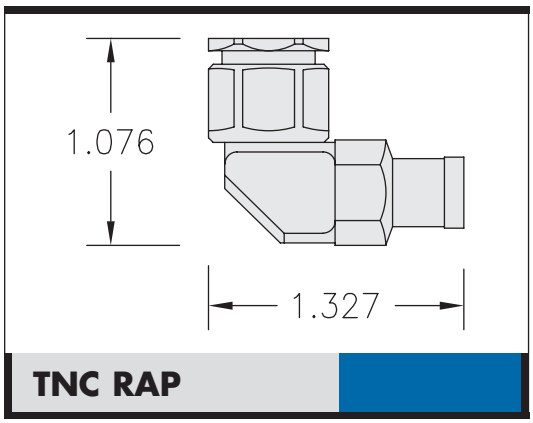
Dimensions in inches. Other connectors available; consult us for options.



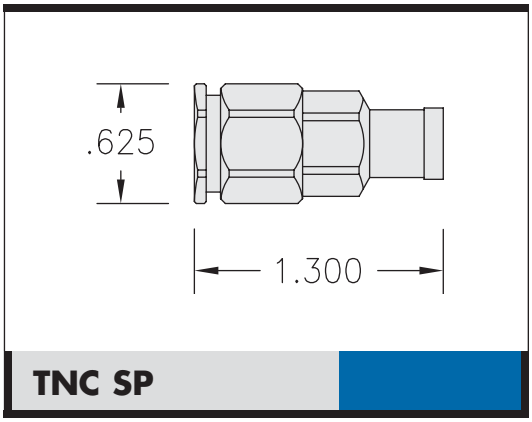
N BFJ



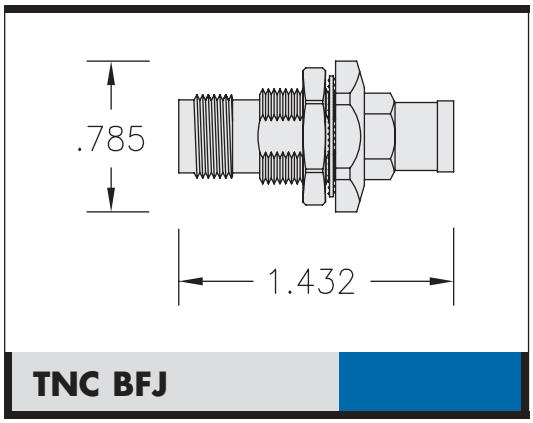
N SJ



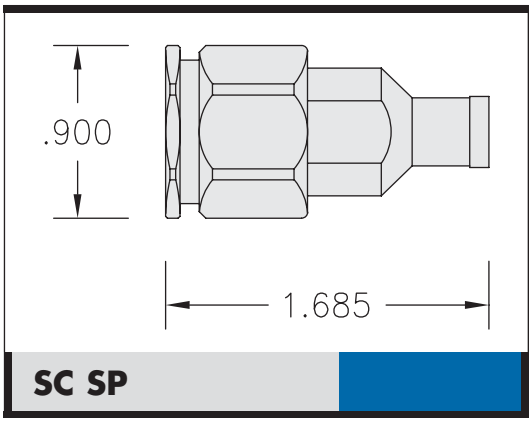
TNC RAP



TNC SP



TNC BFJ



SC SP

0.420" Diameter Cable : TECHNICAL INFORMATION

MECHANICAL SPECS

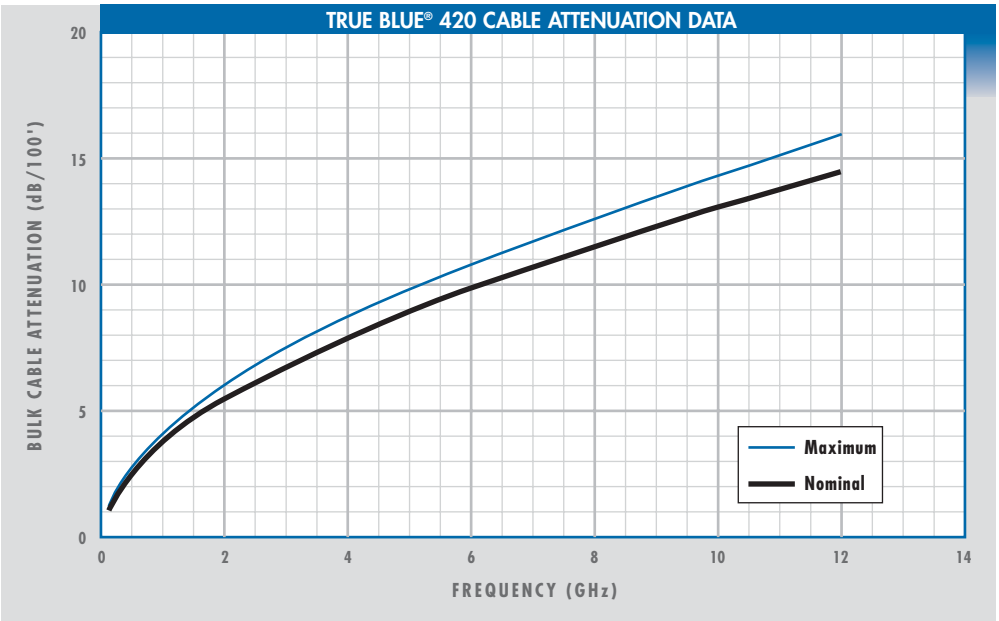
Cable Diameter, nominal	0.420 in
Bend Radius *dynamic* *static*	 4.0 in 2.5 in
Operating Temperature	–54° C to +150° C
Weight	85.0 g/ft
Inner Conductor Type	solid SPC
Dielectric	low density PTFE
Connector Retention, minimum	50.0 lbs

ELECTRICAL SPECS

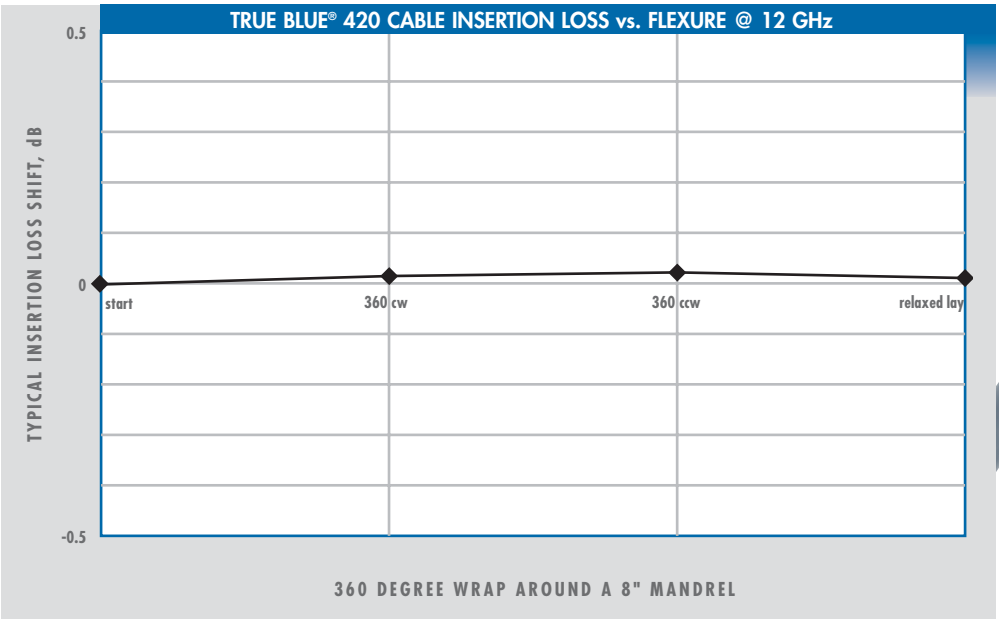
Frequency Range	DC to 12 GHz
Impedance	50 ±2 ohms
Capacitance, nominal	26.5 pF/ft
Time Delay, nominal	1.35 nsec/ft
Shielding Effectiveness, min (@ 1 GHz)	–90 dB

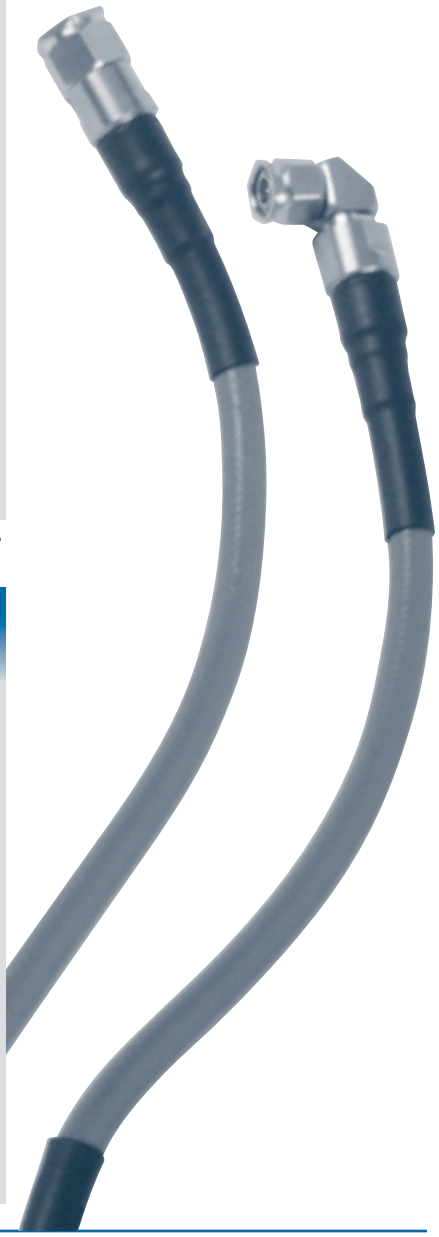
Power ratings (next page) are conservative; actual ratings depend on specific application. Please consult us regarding your application.

Specifications subject to change without notice.

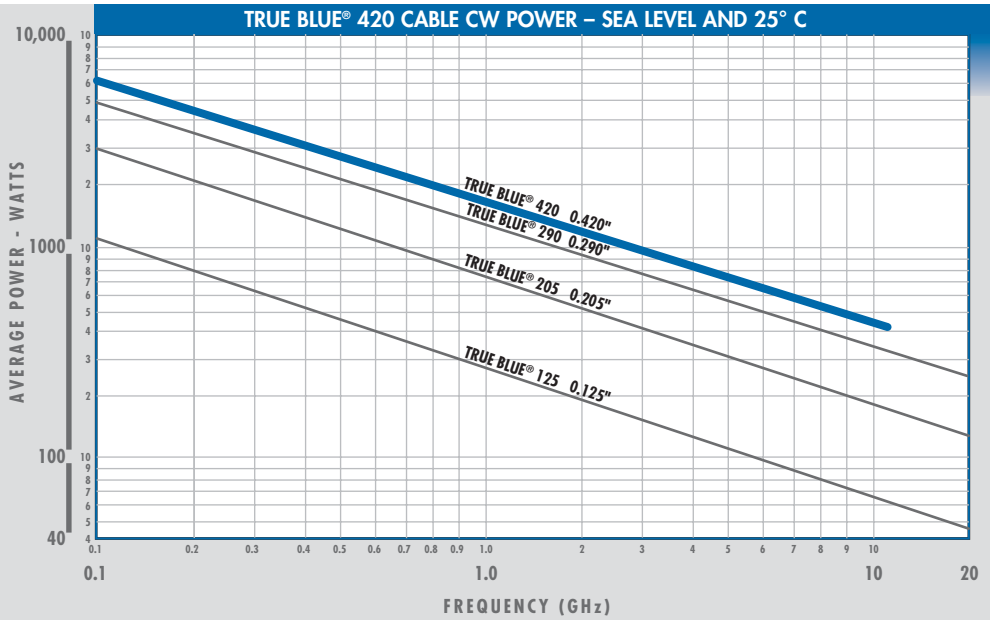


For cable assembly insertion loss, call us or visit our Web site, www.stormproducts.com/microwave

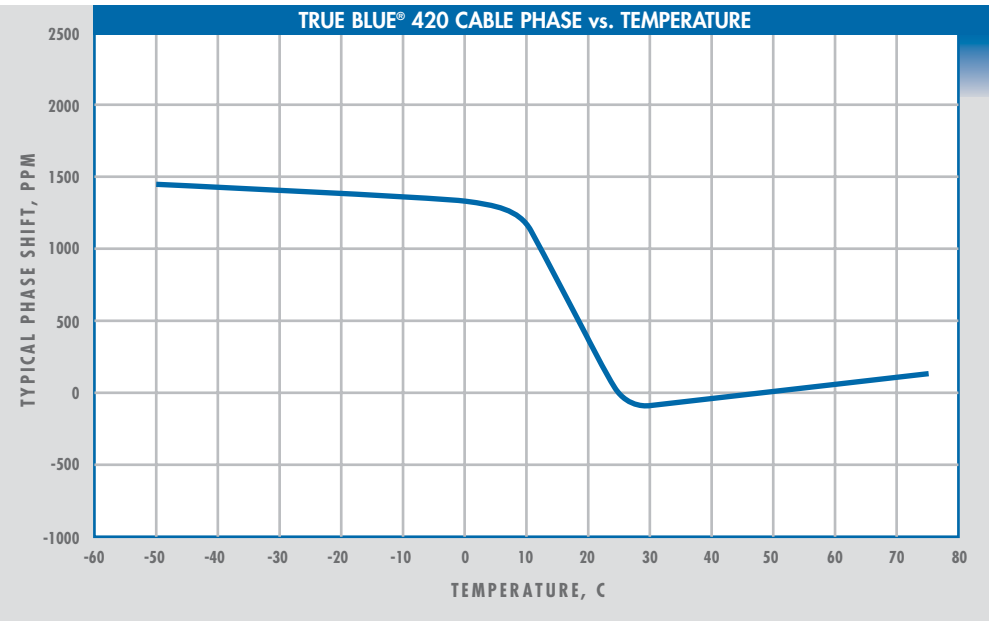




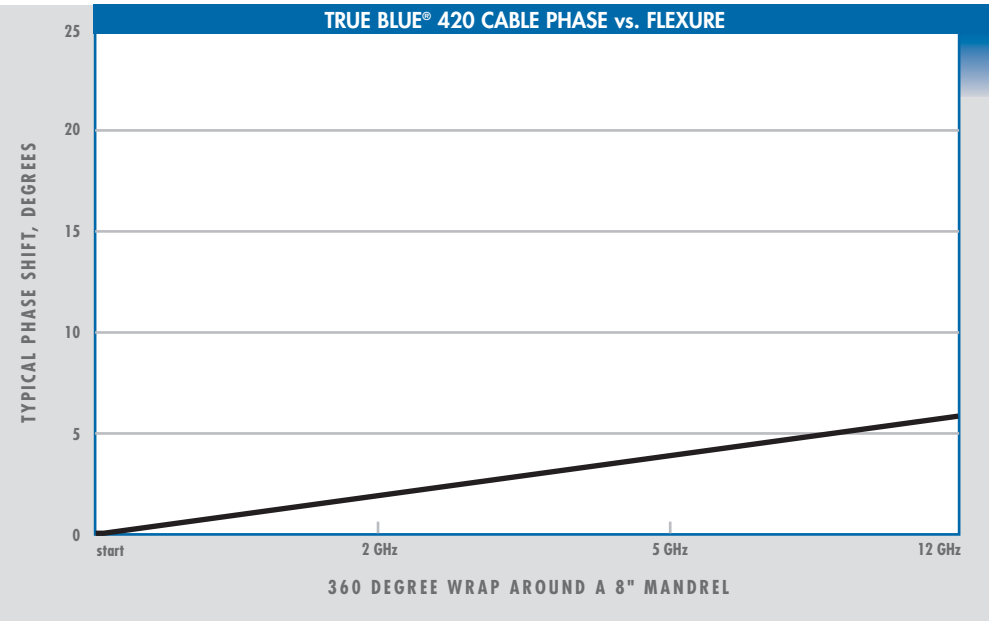
TRUE BLUE® 420 CABLE CW POWER – SEA LEVEL AND 25° C



TRUE BLUE® 420 CABLE PHASE vs. TEMPERATURE

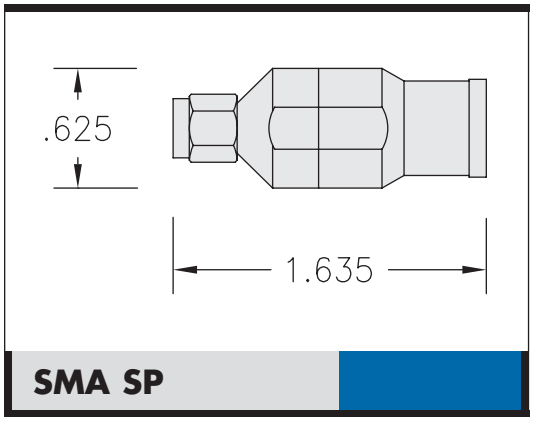


TRUE BLUE® 420 CABLE PHASE vs. FLEXURE

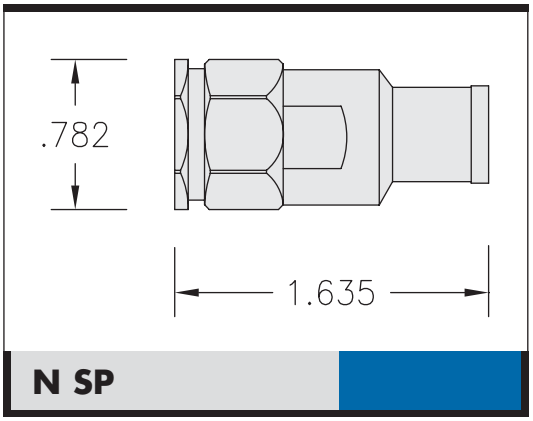


0.420" Diameter cable : COMMONLY USED CONNECTORS

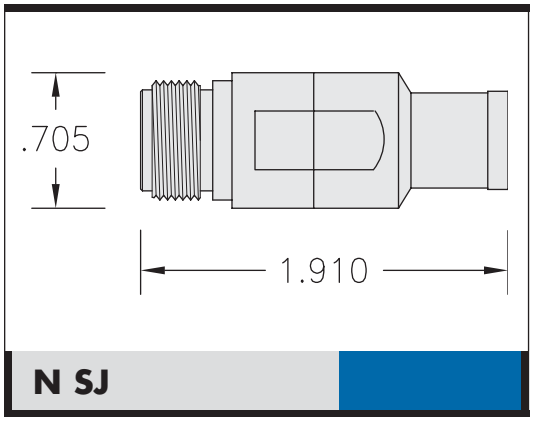
Dimensions in inches. Other connectors available; consult us for options.



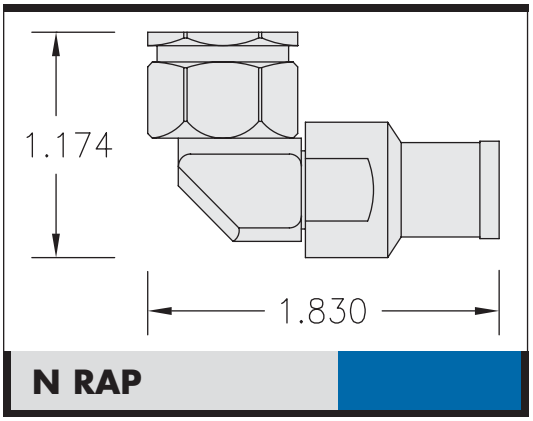
SMA SP



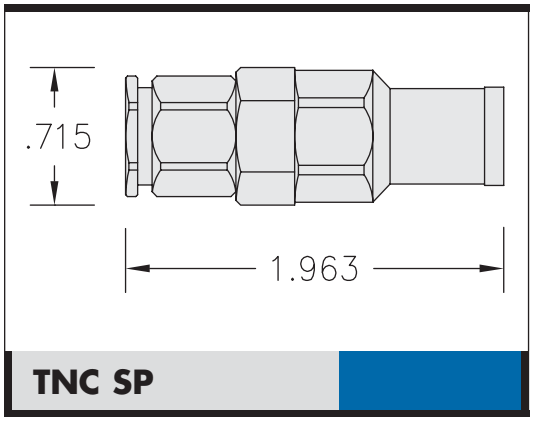
N SP



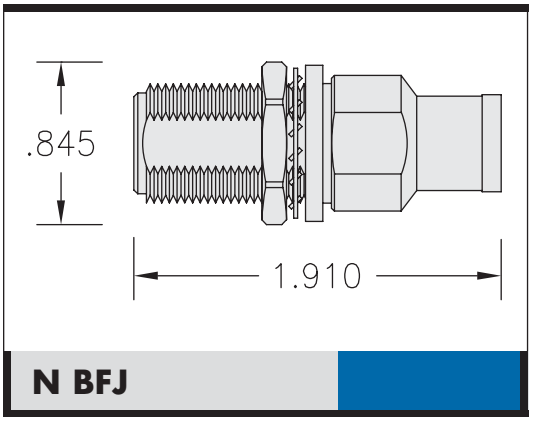
N SJ



N RAP



TNC SP



N BFJ

HIGH PERFORMANCE SEMI-RIGID

MAXIMIZER GOLD™ 69–78
MAXIMIZER SILVER™ 79–83

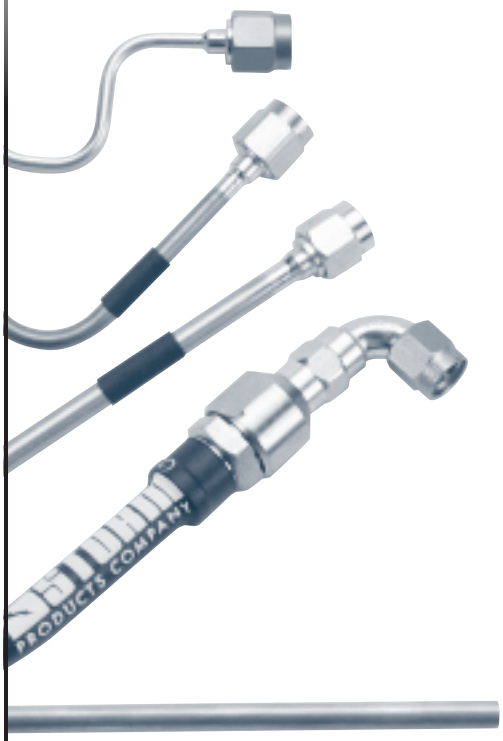
Storm Products' **MAXIMIZER™** line of high performance semi-rigid cable products provides two options for extending your system's performance.

For the most demanding applications, our **phase stable low loss Maximizer Gold™** products offer the highest performance in terms of low loss, high power handling, and increased electrical length stability over temperature.

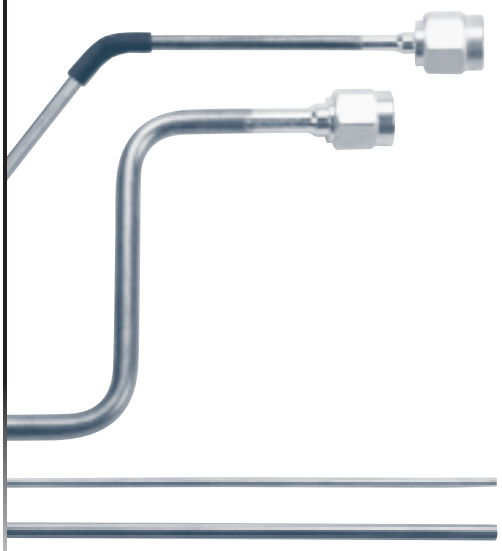
Our **low loss RG replacement Maximizer Silver™** products offer significantly lower loss than standard, solid PTFE microwave semi-rigid cables and fit readily available connectors, thus providing a very cost-effective solution to many design challenges.

High performance semi-rigid cables are available as custom-built assemblies, in coils, or in a variety of straight lengths, with copper, tin, or silver-plate finish. Custom finishes and performance specifications are available on request. All of our semi-rigid products feature a tape-wrapped dielectric to eliminate the normal dielectric expansion that occurs during soldering operations.

MAXIMIZER GOLD™



MAXIMIZER SILVER™



DESIGN CONSIDERATIONS WITH LOW DENSITY DIELECTRICS

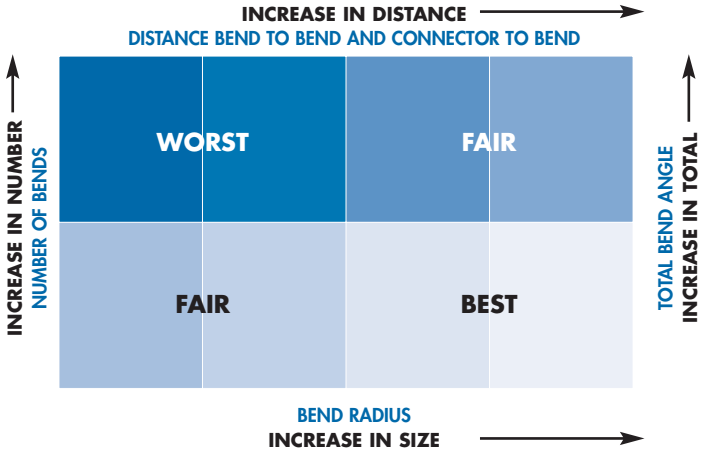
When designing semi-rigid cable assemblies constructed from low density or microporous PTFE products, a number of factors should be taken into consideration to ensure optimum performance:

BENDING AND VSWR EFFECTS

The low density dielectric provides considerably less support for the cable's outer conductor than solid PTFE configurations. This results in greater amounts of deformation around the bend during forming. Such deformation causes proportional changes in impedance, resulting in larger signal reflections and higher VSWR. Additionally, since the reflections are vector quantities, they will combine constructively at a frequency relating to their spacing along the cable.

Semi-rigid cables constructed with low density PTFE dielectrics should be designed with the largest bend radius possible to ensure optimum VSWR performance. This is particularly critical in high power and ultra-low loss applications. Whenever possible, a single bend radius should be used throughout a cable assembly. This allows use of automated bending equipment, which reduces production costs.

Good design practices can be illustrated as follows:



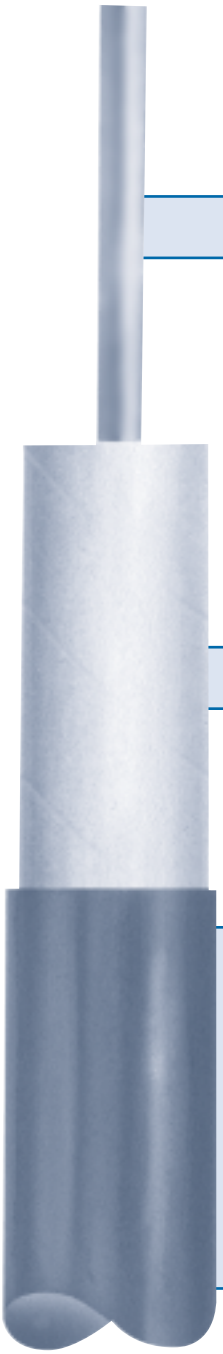
NOTE: Minimum bend radii listed in this catalog are the absolute minimums recommended, based solely on mechanical considerations.

ELECTRICAL LENGTH OR PHASE MATCHING

When using microporous or low density semi-rigid products in applications where matched electrical length or insertion phase is important, consideration must be given to both the mechanical length of the cable assembly and the variation in dielectric constant along the developed length of cable. Microporous or low density dielectrics typically are not as homogeneous as solid PTFE dielectrics.

To avoid changes in electrical length due to normal variation in cable properties, electrical length requirements should be explicitly stated during discussion with an applications engineer and on any engineering drawings.

CABLE CONSTRUCTION



A **Silver-plated, solid OFHC copper center conductor**

B **Low density or microporous PTFE dielectric**

C **Material used as outer conductor:**

*Seamless, OFHC **copper** tubing (CDA Alloy 101 or 102). Available with:*

- *Tin-plate finish per ASTM-B-545 Class C 0.0003" minimum thickness or*
- *Silver-plate finish per QQ-S-365, Type I, Grade B 0.0002" minimum thickness*

*Lightweight, seamless **aluminum** tubing (Alloy 1060-F) with an irridite finish per MIL-C-5541 is available on certain cables. Call us for details.*

INTRODUCTION

0.086" Diameter : MAXIMIZER GOLD™ 086 . . . 70–71
0.116" Diameter : MAXIMIZER GOLD™ 116 . . . 72–73
0.141" Diameter : MAXIMIZER GOLD™ 141 . . . 74–75
0.250" Diameter : MAXIMIZER GOLD™ 250 . . . 76–78

For the most demanding applications, our phase stable low loss **MAXIMIZER GOLD™** products offer the highest performance in terms of low loss, high power handling, and increased electrical length stability over temperature.

FEATURES	BENEFITS
Larger solid SPC center conductor than standard solid PTFE semi-rigid cables	*Reduced cable attenuation over operating frequency range* *Increased power handling*
MicroForm™ tape-wrapped dielectric	*Increased electrical length stability over wide temperature range* *Reduced cable attenuation at high frequencies…up to 33%* *Increased power handling over operating frequency range* *Increased mechanical stability over wide temperature range* *Reduced weight*
Available in straight lengths, coils, or as finished assemblies	*Options to fit many applications*
Range of available connector options	*Reduced lead time*

0.086" Diameter Cable : TECHNICAL INFORMATION

MECHANICAL SPECS	
Dielectric Material	MicroForm™-type PTFE
Dielectric Application	tape
Diameter, nominal	0.086 in
Center Conductor Diameter, nominal	0.0201 in
Weight, nominal	6.72 g/ft
Temperature Range	–55° C to +200° C
Minimum Bend Radius*†	0.250 in
Outer Conductor	Cu

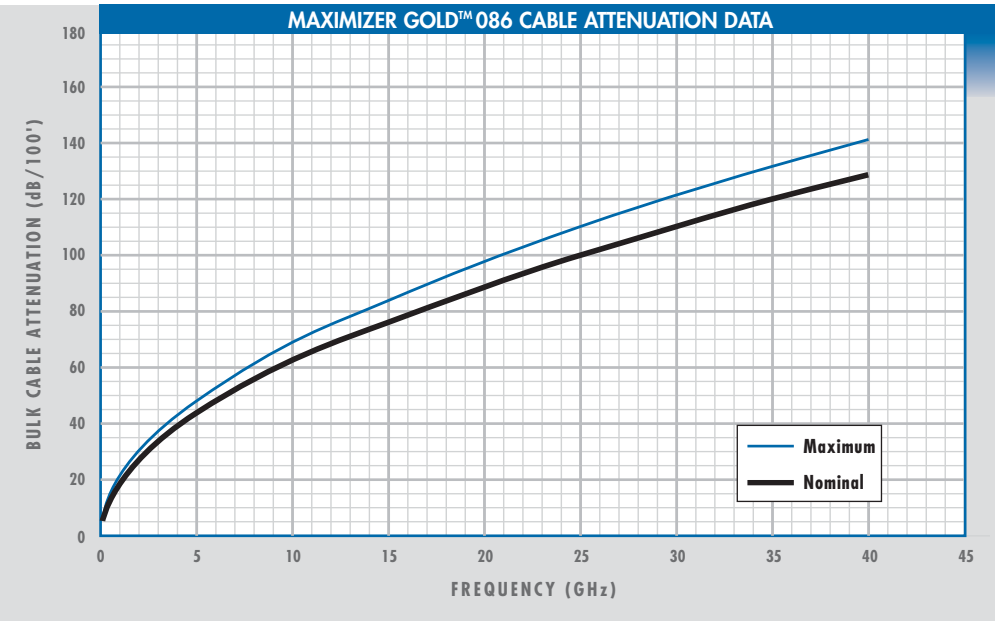
ELECTRICAL SPECS	
Operating Frequency, maximum	40 GHz
Impedance	50 ± 2 ohms
Velocity of Propagation, nominal	82.5
Capacitance, nominal	25.1 pF/ft
Delay, nominal	1.23 nsec/ft
Voltage Withstanding, minimum	1500 Vrms

Power ratings (next page) are conservative; actual ratings depend on specific application. Please consult us regarding your application.

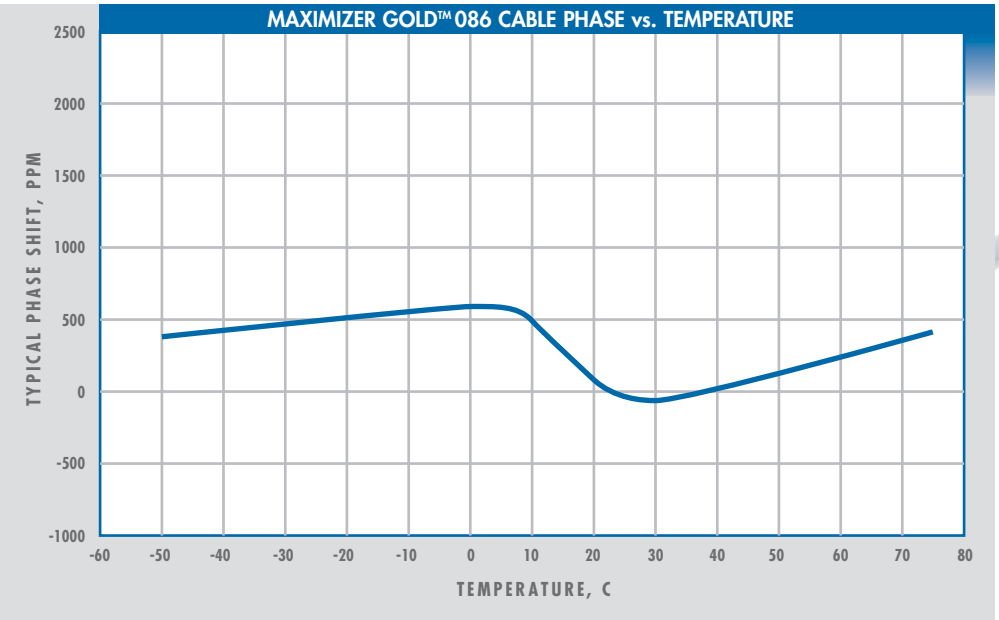
Specifications subject to change without notice.

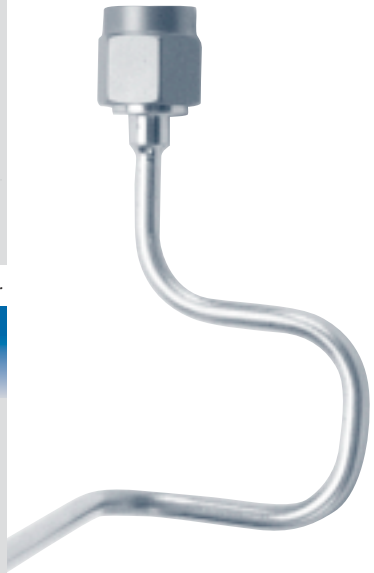
* *Mechanical limit only; larger bend radii required for optimum VSWR performance. See "Design Considerations with Low Density Dielectrics" on page 60.*

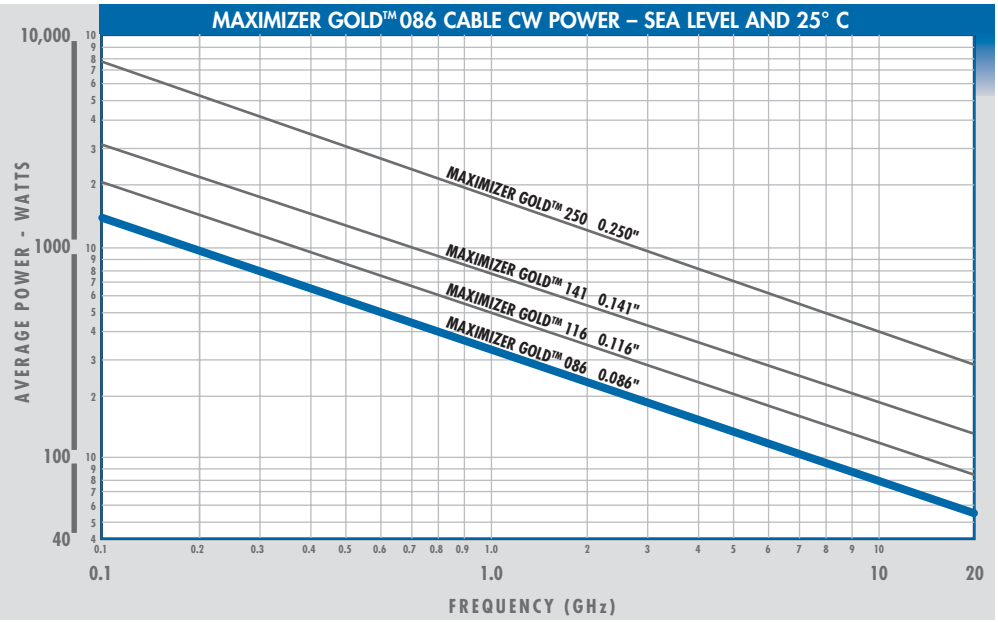
† *Centerline*



For cable assembly insertion loss, please contact Storm.

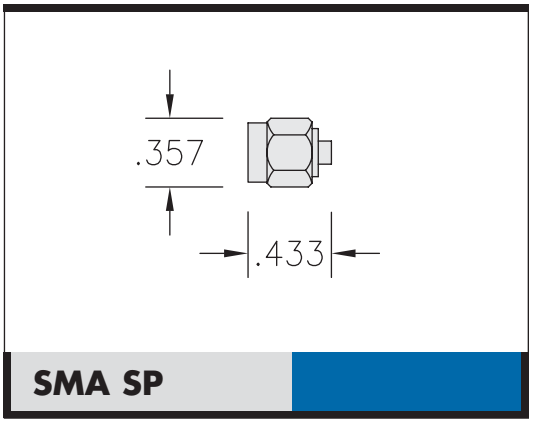






MAXIMIZER GOLD™ 086 : COMMONLY USED CONNECTORS

Dimensions in inches. Other connectors available; consult us for options.



0.116" Diameter Cable : TECHNICAL INFORMATION

MECHANICAL SPECS	
Dielectric Material	Microporous PTFE
Dielectric Application	tape
Diameter, nominal	0.116 in
Center Conductor Diameter, nominal	0.0315 in
Weight, nominal	10.09 g/ft
Temperature Range	–65° C to +200° C
Minimum Bend Radius*†	0.375 in
Outer Conductor	Cu

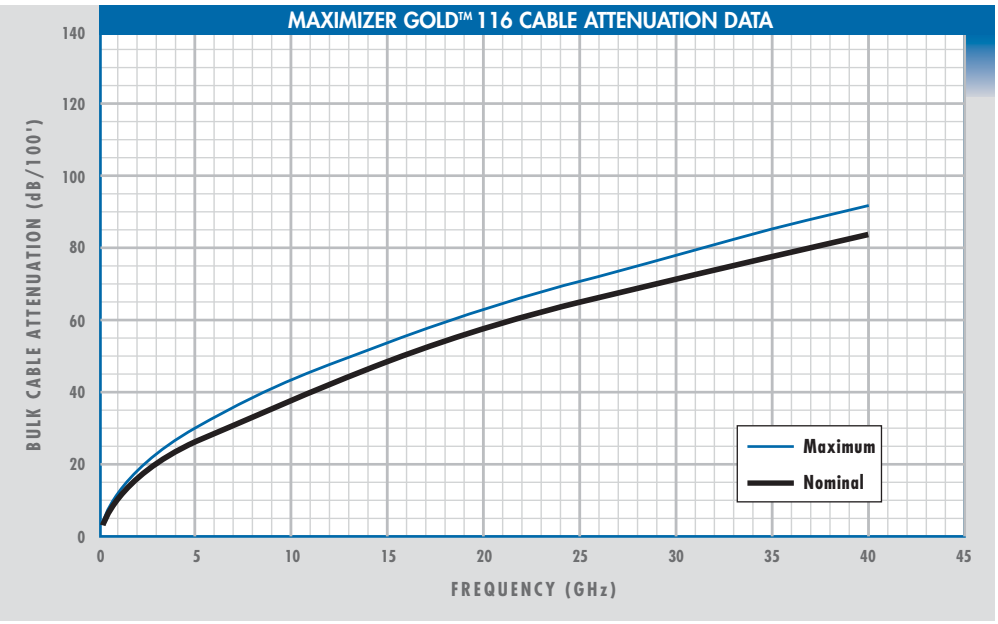
* *Mechanical limit only; larger bend radii required for optimum VSWR performance. See "Design Considerations with Low Density Dielectrics" on page 60.*

† *Centerline*

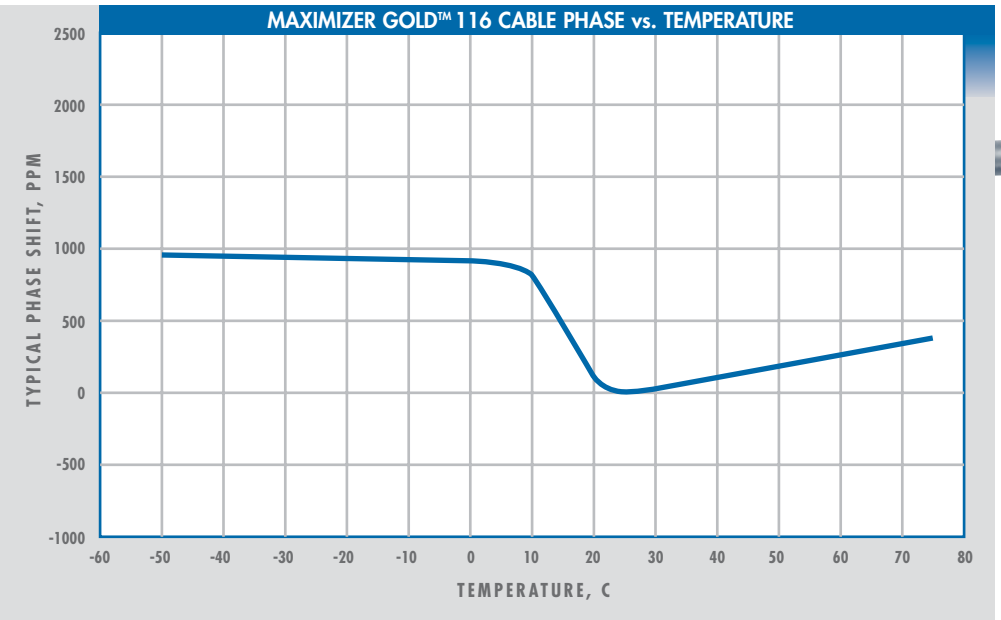
ELECTRICAL SPECS	
Operating Frequency, maximum	40 GHz
Impedance	50 ± 2 ohms
Velocity of Propagation, nominal	78
Capacitance, nominal	26 pF/ft
Delay, nominal	1.3 nsec/ft
Voltage Withstanding, minimum	3500 Vrms

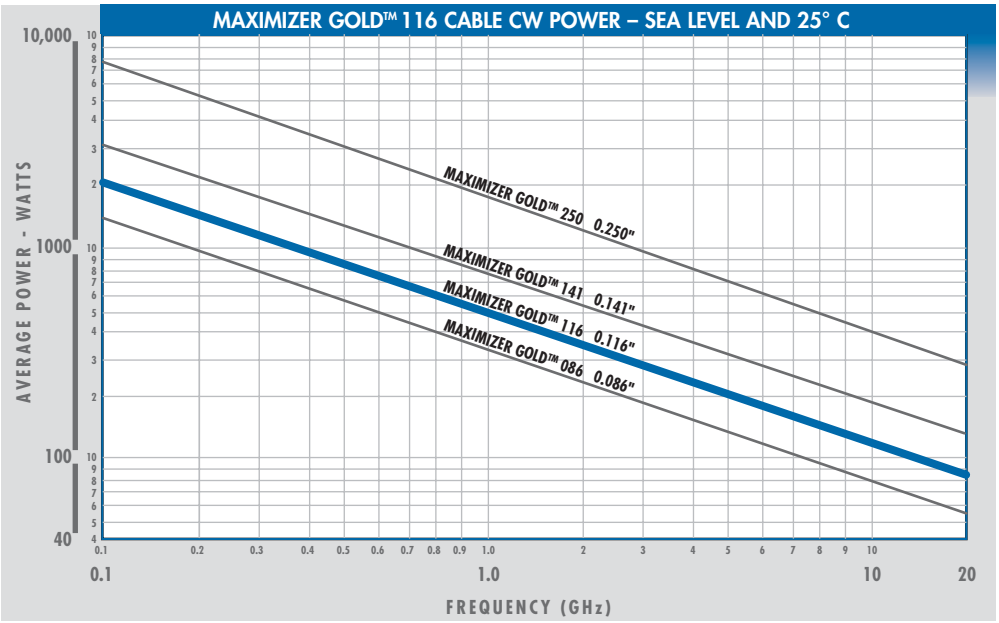
Power ratings (next page) are conservative; actual ratings depend on specific application. Please consult us regarding your application.

Specifications subject to change without notice.



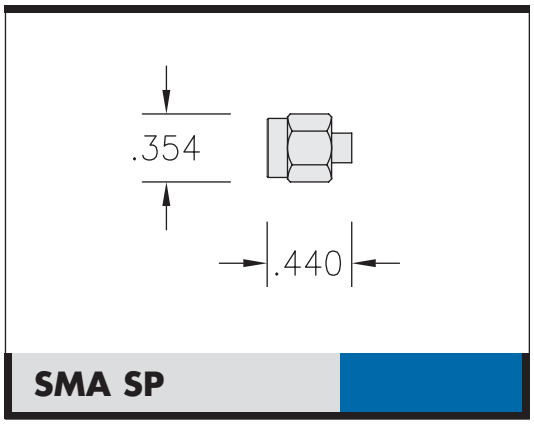
For cable assembly insertion loss, please contact Storm.

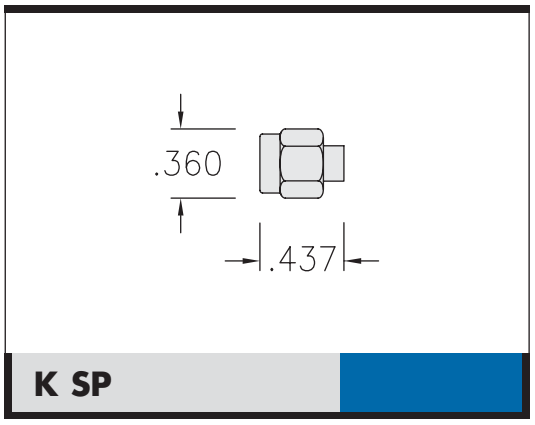


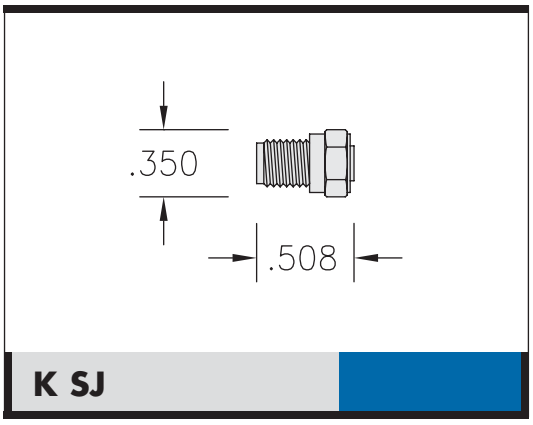


MAXIMIZER GOLD™ 116 : COMMONLY USED CONNECTORS

Dimensions in inches. Other connectors available; consult us for options.







0.141" Diameter Cable : TECHNICAL INFORMATION

MECHANICAL SPECS	
Dielectric Material	Microporous PTFE
Dielectric Application	tape
Diameter, nominal	0.141 in
Center Conductor Diameter, nominal	0.043 in
Weight, nominal	12.50 g/ft
Temperature Range	–65° C to +200° C
Minimum Bend Radius*†	0.437 in
Outer Conductor	Cu

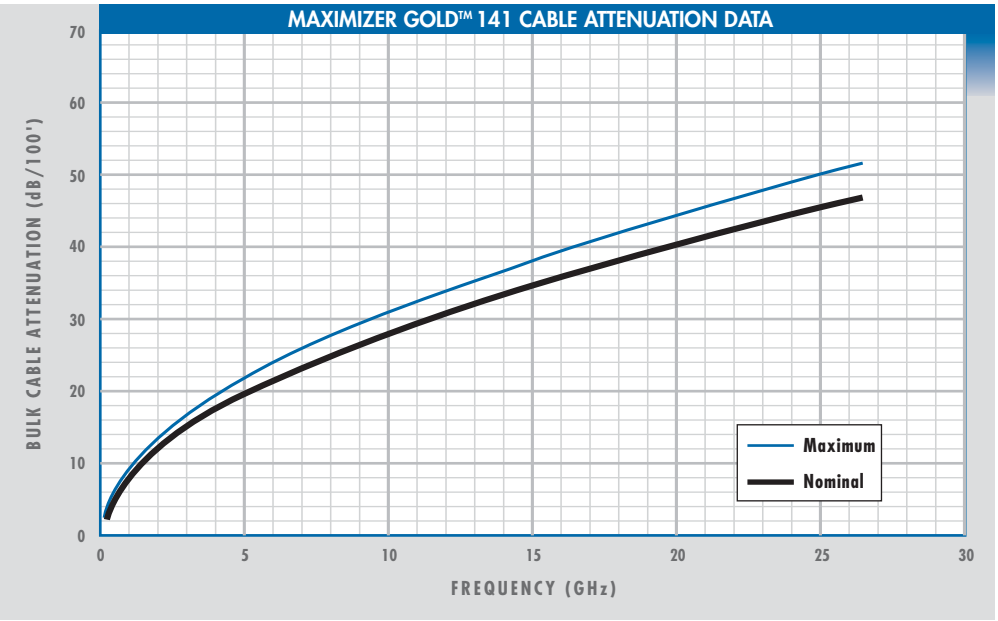
* *Mechanical limit only; larger bend radii required for optimum VSWR performance. See "Design Considerations with Low Density Dielectrics" on page 60.*

† *Centerline*

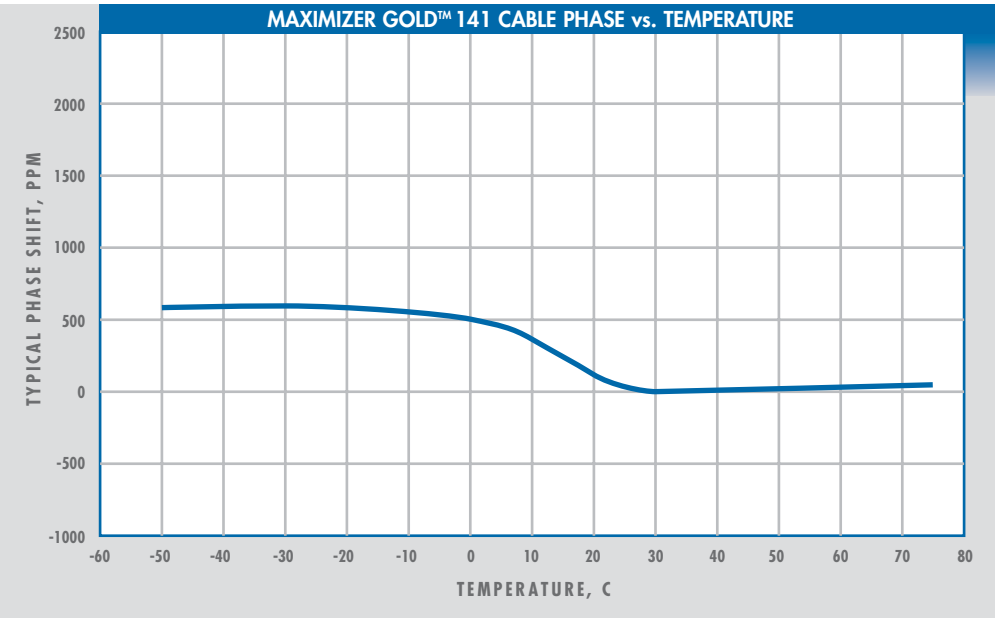
ELECTRICAL SPECS	
Operating Frequency, maximum	26.5 GHz
Impedance	50 ± 2 ohms
Velocity of Propagation, nominal	81
Capacitance, nominal	25.4 pF/ft
Delay, nominal	1.26 nsec/ft
Voltage Withstanding, minimum	5000 Vrms

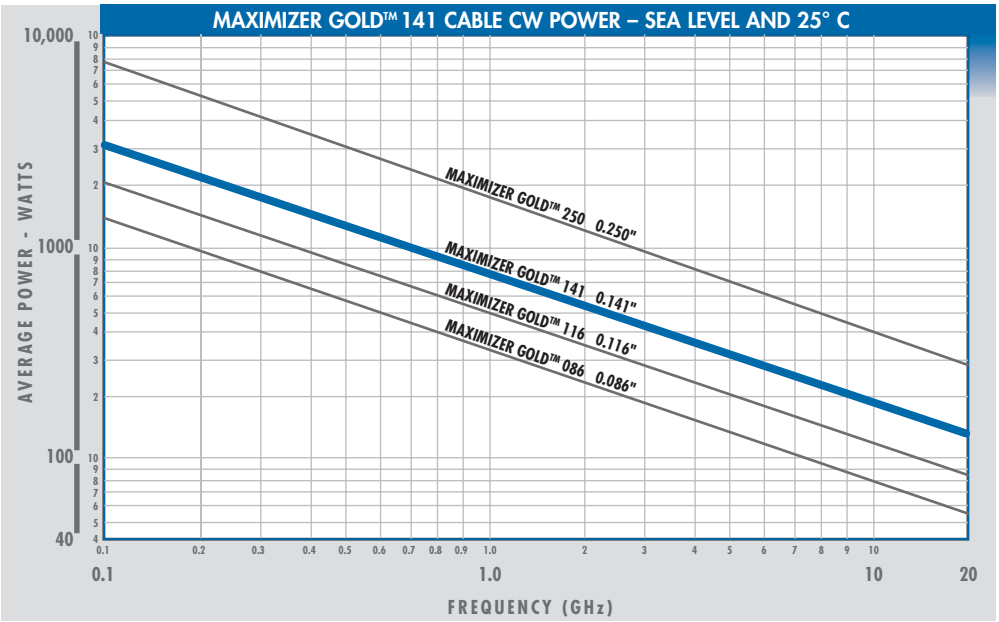
Power ratings (next page) are conservative; actual ratings depend on specific application. Please consult us regarding your application.

Specifications subject to change without notice.



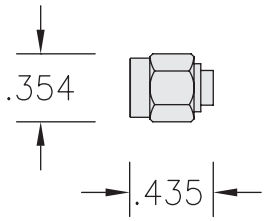
For cable assembly insertion loss, please contact Storm.



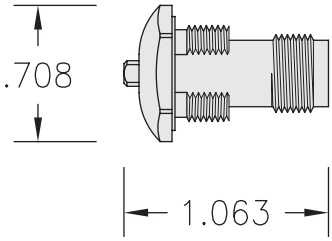


MAXIMIZER GOLD™ 141 : COMMONLY USED CONNECTORS

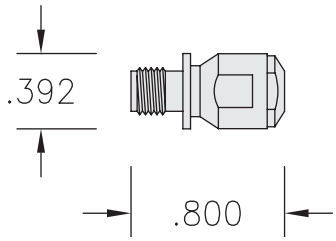
Dimensions in inches. Other connectors available; consult us for options.



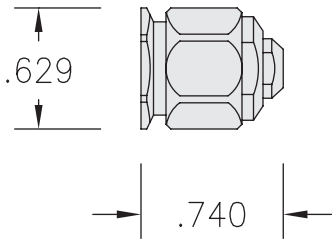
SMA SP



TNC BFJ



SMA SJ



TNC SP

0.250" Diameter Cable : TECHNICAL INFORMATION

MECHANICAL SPECS	
Dielectric Material	Microporous PTFE
Dielectric Application	tape
Diameter, nominal	0.25 in
Center Conductor Diameter, nominal	0.074 in
Weight, nominal	41.58 g/ft
Temperature Range	–65° C to +200° C
Minimum Bend Radius*†	0.75 in
Outer Conductor	Cu

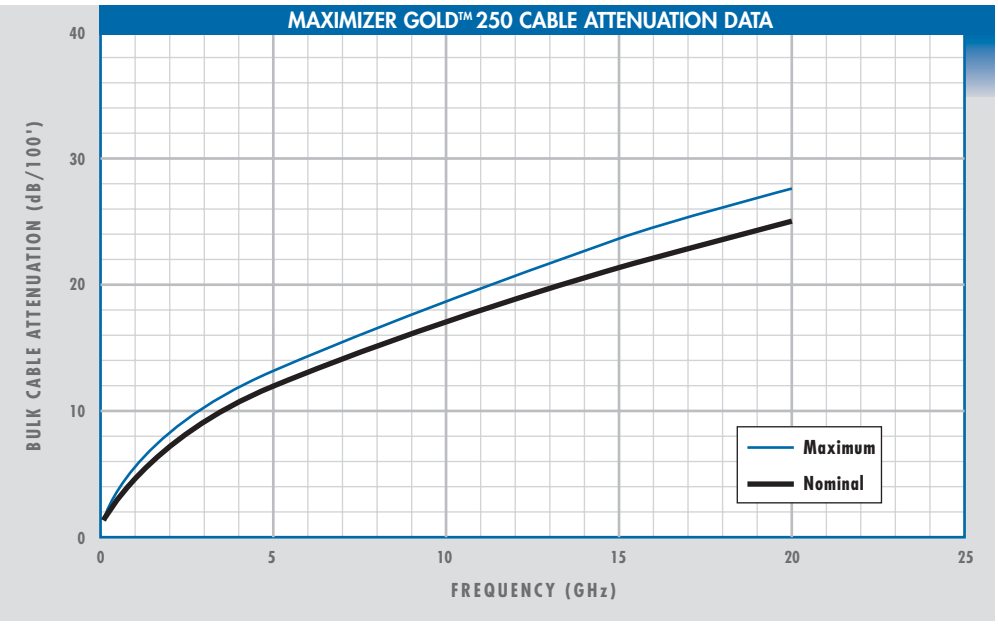
ELECTRICAL SPECS	
Operating Frequency, maximum	20 GHz
Impedance	50 ± 2 ohms
Velocity of Propagation, nominal	80
Capacitance, nominal	25.33 pF/ft
Delay, nominal	1.27 nsec/ft
Voltage Withstanding, minimum	6000 Vrms

Power ratings (next page) are conservative; actual ratings depend on specific application. Please consult us regarding your application.

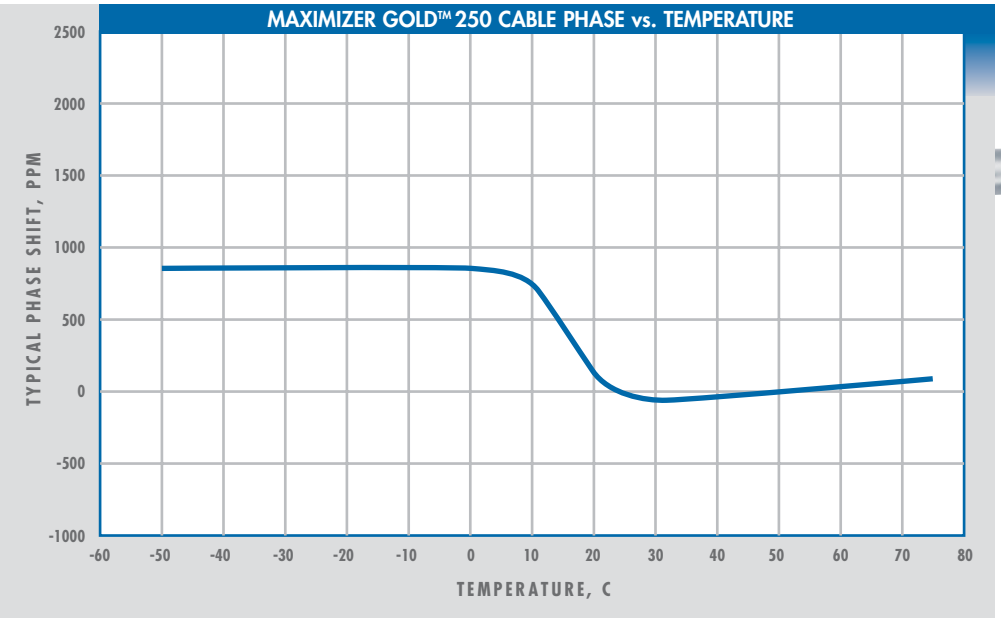
Specifications subject to change without notice.

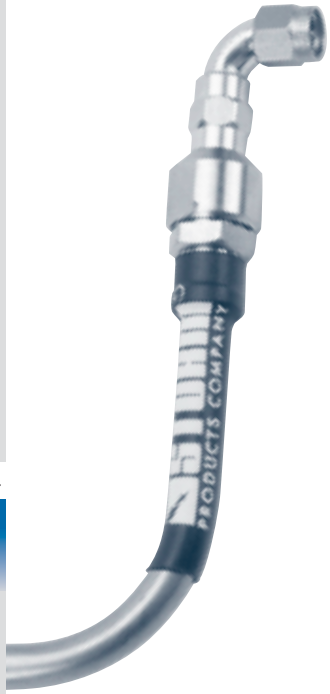
* *Mechanical limit only; larger bend radii required for optimum VSWR performance. See "Design Considerations with Low Density Dielectrics" on page 60.*

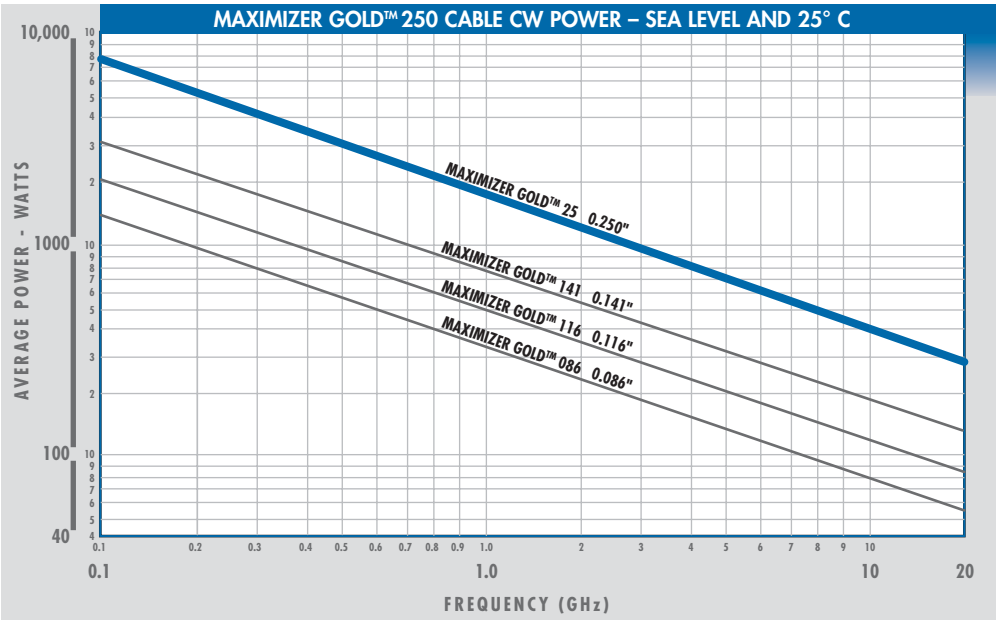
† *Centerline*



For cable assembly insertion loss, please contact Storm.

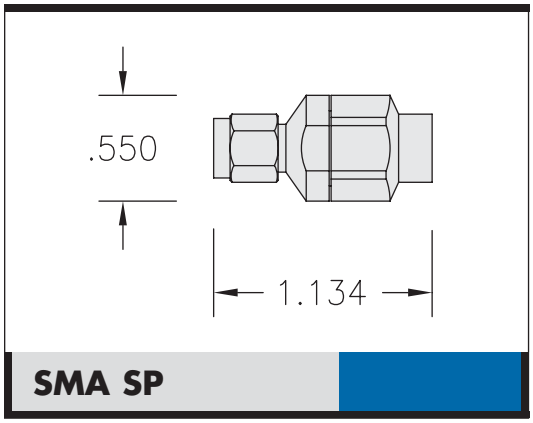


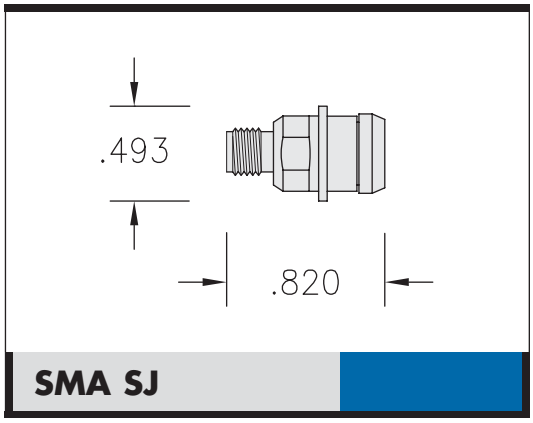


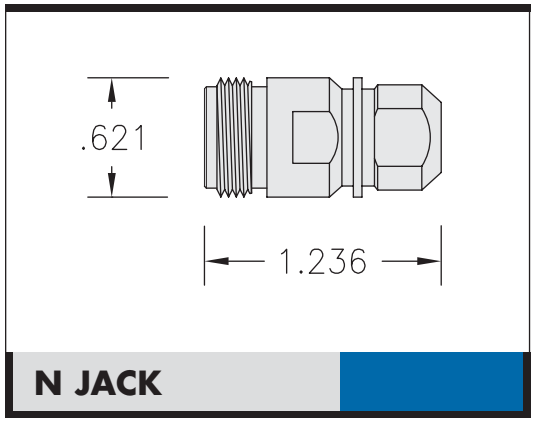


MAXIMIZER GOLD™ 250 : COMMONLY USED CONNECTORS

Dimensions in inches. Other connectors available; consult us for options.



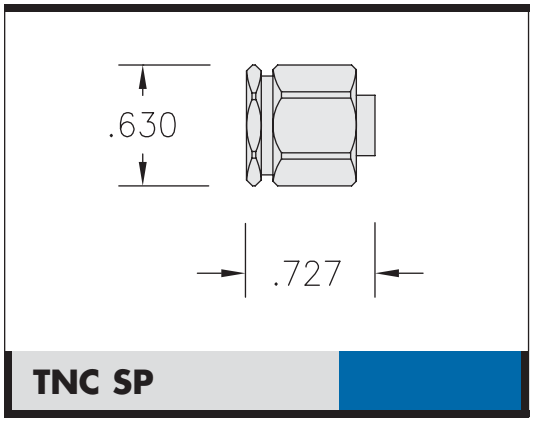


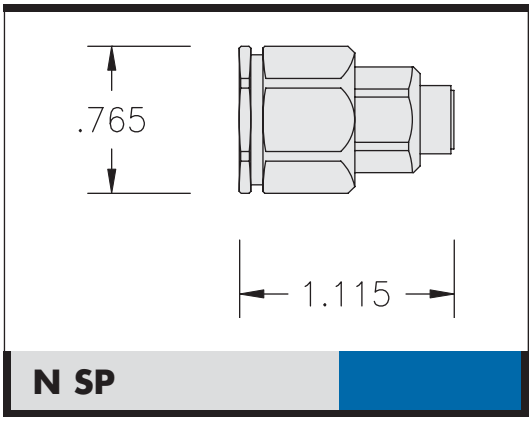


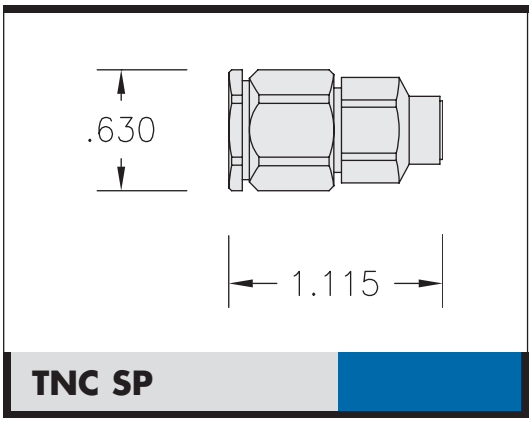
Connectors continued on next page.

0.250" Diameter cable : COMMONLY USED CONNECTORS

Dimensions in inches. Other connectors available; consult us for options.







INTRODUCTION

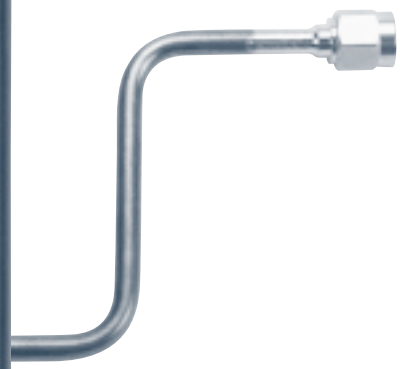
0.086" Diameter : MAXIMIZER SILVER™ 086 . . 80–81
0.141" Diameter : MAXIMIZER SILVER™ 141 . . 82–83

Our low loss RG replacement **MAXIMIZER SILVER™** products offer significantly lower loss than standard, solid PTFE microwave semi-rigid cables and fit readily available connectors, thus providing a very cost-effective solution to many design challenges.

FEATURES	BENEFITS
Standard size solid center conductor	~ *Accepts standard connectors, increasing cost effectiveness*
Low density PTFE tape-wrapped dielectric	~ *Increased mechanical stability over wide temperature range…stable during exposure to soldering temperatures*
	~ *Reduced cable attenuation at high frequencies…up to 18%*
	~ *Excellent dB/nS ratio for delay line applications*
	~ *Increased electrical length stability over wide temperature range*
	~ *Increased power handling over operating frequency range*
Available in straight lengths, coils, or as finished assemblies	~ *Options to fit many applications*

MAXIMIZER SILVER™ 086
0.086" DIAMETER

MAXIMIZER SILVER™ 141
0.141" DIAMETER



0.086" Diameter Cable : TECHNICAL INFORMATION

MECHANICAL SPECS	
Dielectric Material	Microporous PTFE
Dielectric Application	tape
Diameter, nominal	0.086 in
Center Conductor Diameter, nominal	0.0201 in
Weight, nominal	6.95 g/ft
Temperature Range	–65° C to +200° C
Minimum Bend Radius*†	0.25 in
Outer Conductor	Cu

* *Mechanical limit only; larger bend radii required for optimum VSWR performance. See "Design Considerations with Low Density Dielectrics" on page 60.*

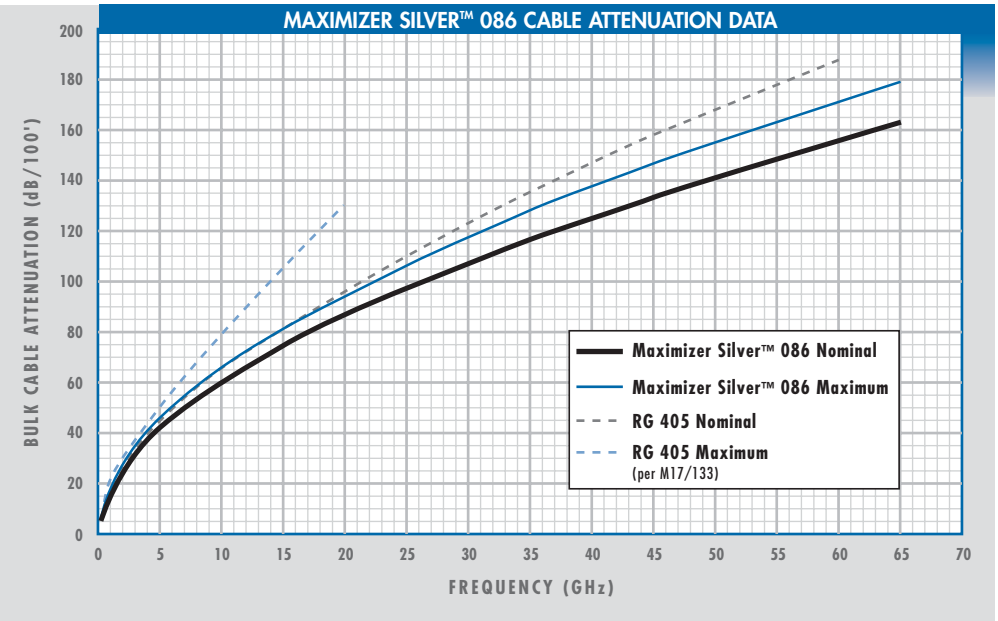
† *Centerline*

ELECTRICAL SPECS	
Operating Frequency, maximum	40 GHz‡
Impedance	50 ± 2 ohms
Velocity of Propagation, nominal	78
Capacitance, nominal	26.5 pF/ft
Delay, nominal	1.3 nsec/ft
Voltage Withstanding, minimum	2000 Vrms

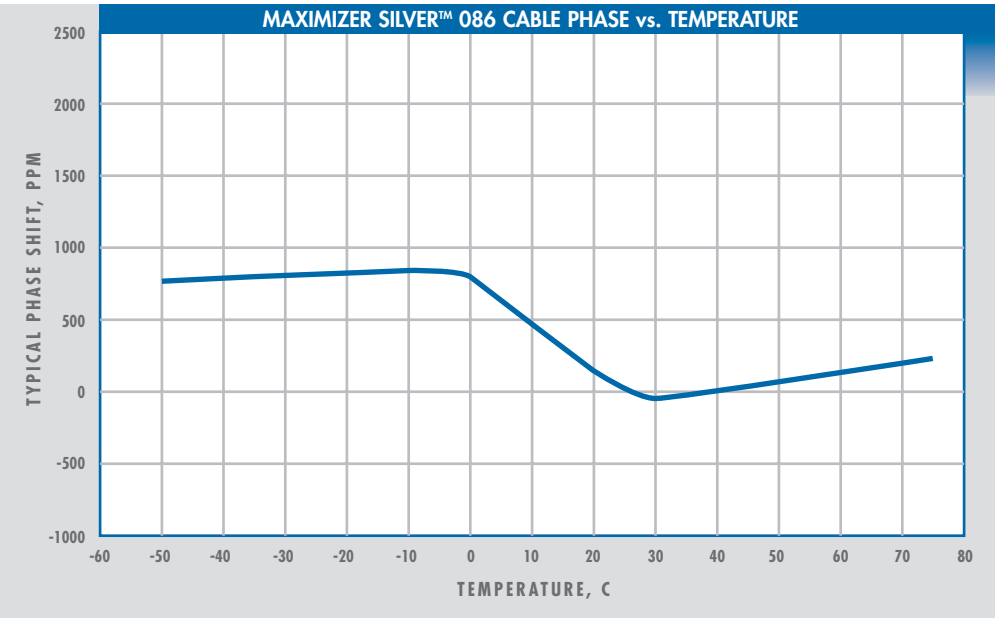
‡ *Some versions of this cable operate to 65 GHz.*

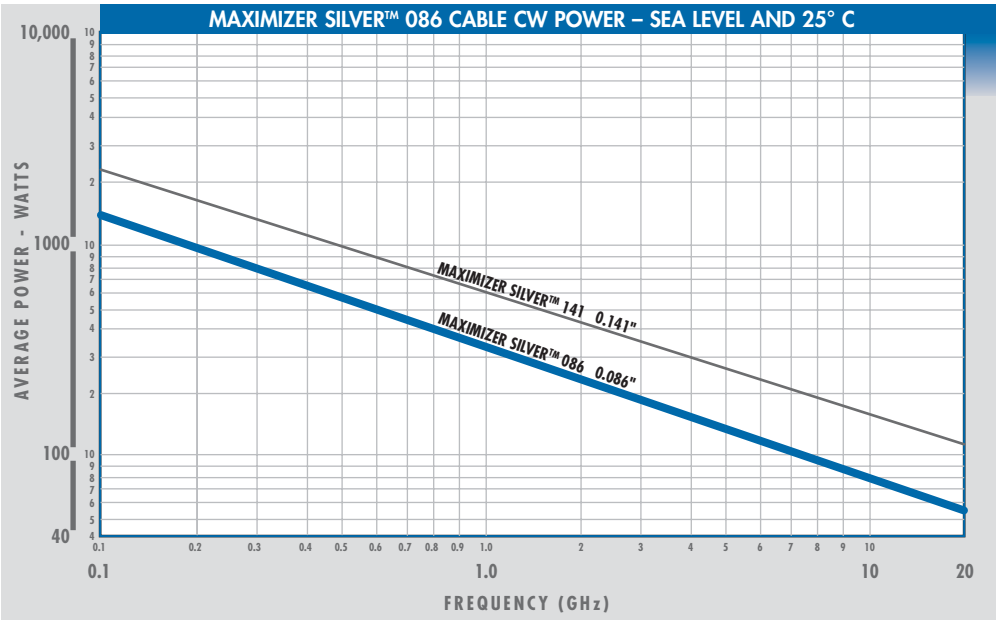
Power ratings (next page) are conservative; actual ratings depend on specific application. Please consult us regarding your application.

Specifications subject to change without notice.



For cable assembly insertion loss, please contact Storm.

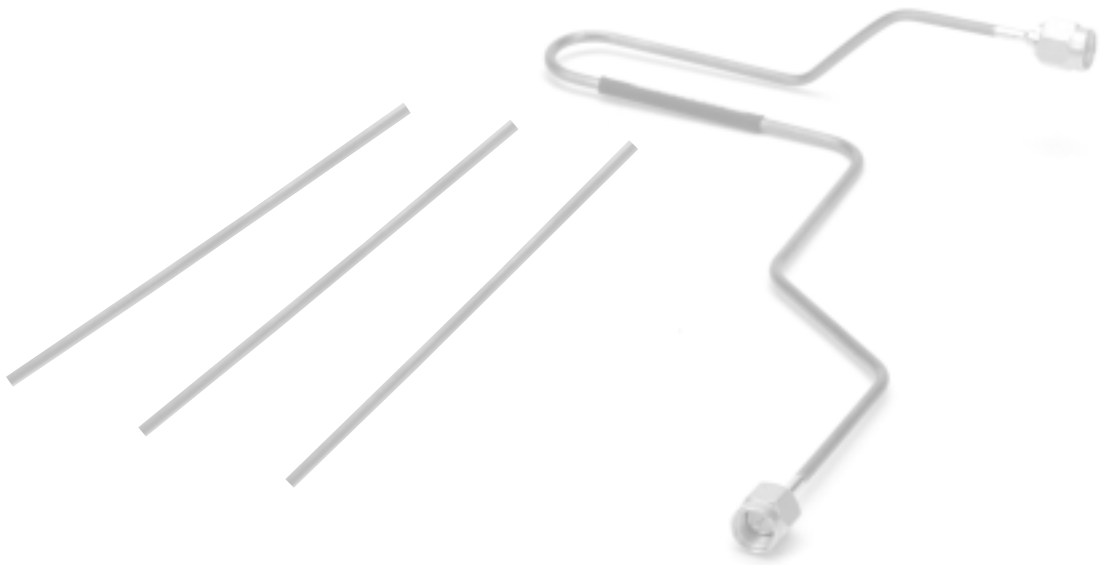




MAXIMIZER SILVER™ 086 : COMMONLY USED CONNECTORS

This cable accepts most standard 0.086" semi-rigid connectors.

- *SMA*
- *GPO® (SMP)*
- *GPPO® (SSMP)*
- *SSMA*
- *TNC*
- *N*
- *OSP*
- *2.9 mm (K)*
- *2.4 mm*
- *3.5 mm*
- *7 mm*



0.141" Diameter cable : TECHNICAL INFORMATION

MECHANICAL SPECS	
Dielectric Material	Microporous PTFE
Dielectric Application	tape
Diameter, nominal	0.141 in
Center Conductor Diameter, nominal	0.036 in
Weight, nominal	14.8 g/ft
Temperature Range	–65° C to +200° C
Minimum Bend Radius*†	0.32 in
Outer Conductor	Cu

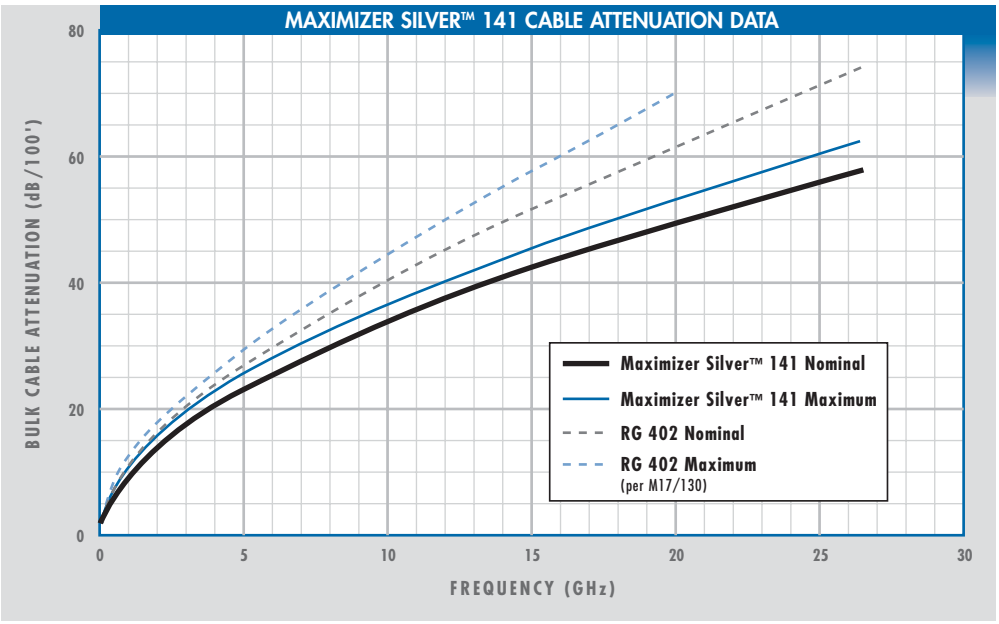
ELECTRICAL SPECS	
Operating Frequency, maximum	26.5 GHz
Impedance	50 ± 2 ohms
Velocity of Propagation, nominal	74
Capacitance, nominal	27.8 pF/ft
Delay, nominal	1.39 nsec/ft
Voltage Withstanding, minimum	1900 Vrms

Power ratings (next page) are conservative; actual ratings depend on specific application. Please consult us regarding your application.

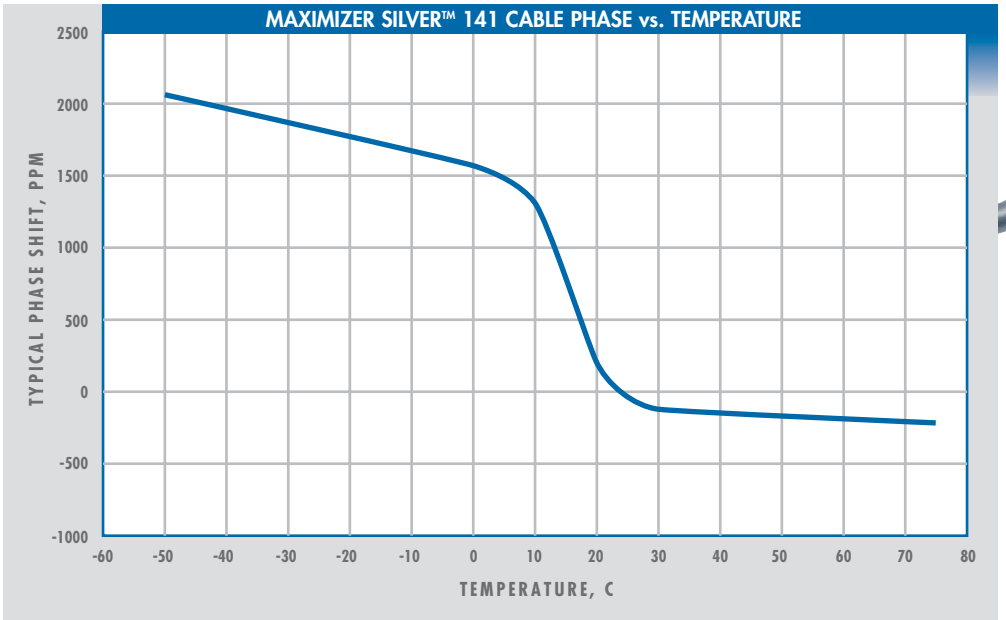
Specifications subject to change without notice.

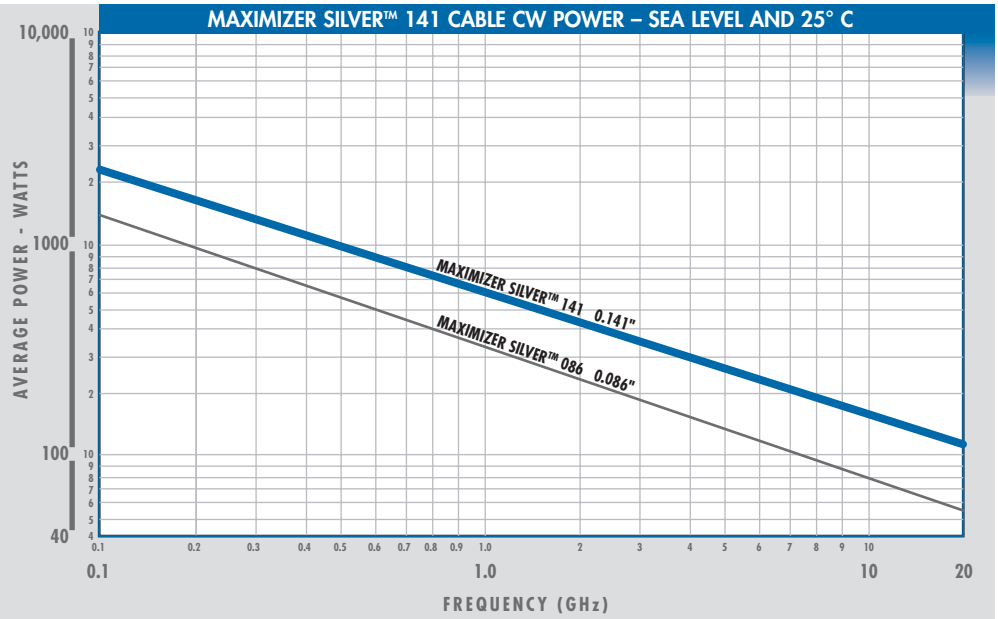
* *Mechanical limit only; larger bend radii required for optimum VSWR performance. See "Design Considerations with Low Density Dielectrics" on page 60.*

† *Centerline*



For cable assembly insertion loss, please contact Storm.

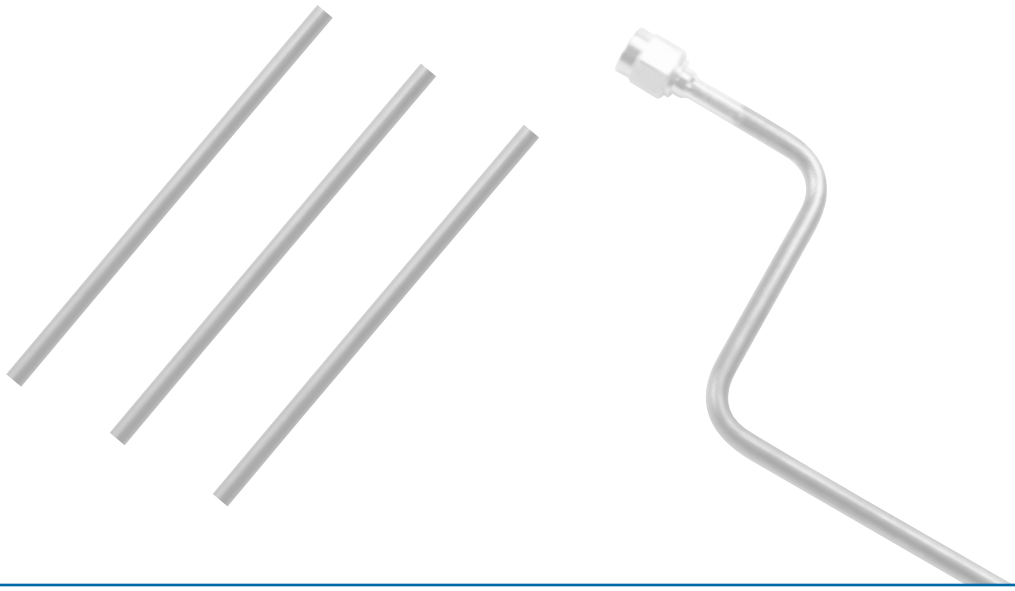




MAXIMIZER SILVER™ 141 : COMMONLY USED CONNECTORS

This cable accepts most standard 0.141" semi-rigid connectors.

- *SMA*
- *TNC*
- *N*
- *OSP*
- *2.9 mm (K)*
- *3.5 mm*
- *7 mm*



ENGINEERING INFORMATION

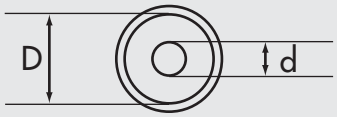
USEFUL CONVERSION FORMULAE

TO CONVERT...

FROM TO	TO FROM	MULTIPLY BY DIVIDE BY
µm	mils	.03937
mm	in	.03937
cm	in	.39370
m	ft	3.2808
km	ft	3280.8
km	mi	.62137
kg	lbs	2.2046
kg/km	lbs/1000 ft	.67197
N	lbs	.22492
N-m	ft-lbs	.73793
kPa	PSI	.14511
°F	°C	Subtract 32 *(then divide by 1.8)*
°C	°F	Multiply by 1.8 *(then add 32)*

USEFUL DESIGN FORMULAE

Characteristic Impedance



$$Z_o = \frac{138}{\sqrt{\varepsilon_r}} \log\left(\frac{D}{d}\right)$$

Where ε_r = dielectric constant

Velocity of Propagation

$$Vp\ (\%) = \frac{1 \times 100}{\sqrt{\varepsilon_r}}$$

Capacitance

$$C\ (pF/ft) = \frac{7.35\ \varepsilon_r}{\log_{10}\frac{D}{d}}$$

Cutoff Frequency

$$F\ (GHz) \approx \frac{7.52}{\sqrt{\varepsilon_r}\ (D+d)}$$

Delay

$$T = 1.016\sqrt{\varepsilon_r}\ \ldots ns/ft$$

DESIGN WORKSHEET

Please copy this sheet, fill out, and fax to us at 630-754-3500. We will respond within 24 hours of receiving your information. Or, call us at 888-347-8676 (toll free); 630-754-3300; or visit us on the Web at www.stormproducts.com/microwave.

GENERAL INFORMATION

Company: _____

Name: _____

Address: _____

Phone:_____ E-mail: _____

CABLE TYPE: Flexible Semi-Rigid

ELECTRICAL REQUIREMENTS

Frequency range: _____

Insertion loss: _____

VSWR: _____

Power handling: _____ CW or Peak *(circle one)*

Phase matching required? Define:_____

Other requirements? _____

MECHANICAL REQUIREMENTS

Assembly length (in/mm; ft/m): _____

Connector 1:_____ Connector 2: _____

Maximum outside cable diameter (in/mm): _____

Minimum bend radius (in/mm): _____

ENVIRONMENTAL CONSIDERATIONS

Inside/Outside use: _____

Temperature: _____

Pressure: _____

Flexure: _____

Vibration: _____

Other: _____

APPLICATION

Radar, EW, telecom, wireless, etc.:_____

Program: _____

Number of assemblies: _____

Quote required? Yes No

Samples required? Yes No How many?_____By when?_____

ORDERING AND SERVICE INFORMATION

ORDERING INFORMATION

Standard or custom microwave cable assemblies can be ordered directly from Storm Products or through any Storm Products Representative. Contact us directly at:

Storm Products–Microwave
10221 Werch Drive
Woodridge, IL 60517

Phone: 888.347.8676 (toll free) or 630.754.3300
Fax: 630.754.3500
e-mail: microwave@stormproducts.com

TERMS

Formal price quotations are valid for 30 days unless otherwise specified in writing. Payment is Net 30 Days from time of invoice, subject to credit approval. We reserve the right to alter the terms and fix a limit of credit.

PAYMENTS

Remit checks to:

Lockbox No. 72643
WFBCI for Storm Products, Co.
Dept. # 2643
Los Angeles, CA 90084–2643

Remit wire transfers and ACH payments to:

Wells Fargo Bank, San Francisco, CA
ABA: 121000248
Cash Collateral Account No: 4945–033900
Acct. Name: WFBCI for Storm Products Company
Ref. Invoice Number(s):_____

For microwave product billing issues contact Storm Products, Woodridge, IL, at 888.347.8676 (toll free) or 630.754.3300.

SHIPPING

Shipments are FOB Woodridge, IL. Excess transportation costs resulting from special routing, requested by the Buyer, shall be billed not subject to discount.

WARRANTY

One year on materials and workmanship.

RETURN POLICY

Returns will not be accepted without Return Merchandise Authorization (RMA). Contact Storm Products' Woodridge facility to obtain an RMA number. Normal policy is to issue a credit and rebill.

CONTACT STORM TO REQUEST OUR:

Test & Measurement Products Catalog

TELEDYNE
STORM PRODUCTS
A Teledyne Technologies Company

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Toll Free 888.347.8676
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www.teledynestorm.com

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