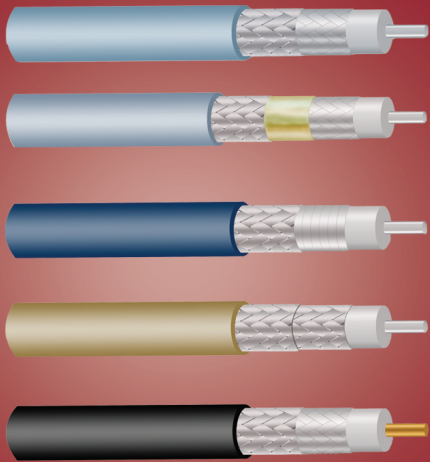



■ Connectivity for
Business-Critical Continuity™

Precision Microwave Coaxial Cable

Product Catalog



Semflex
Connectivity Solutions


EMERSON
Network Power



To our valued customers:

Emerson Connectivity Solutions, provider of both **Semflex** and **Midwest Microwave** branded cable products, is unique among microwave coaxial cable manufacturers because we design and manufacture both cable and connectors. By combining these two capabilities we offer what most other cable companies cannot, optimized interconnect solutions.

The cable is at the heart of every microwave interconnect. Because of this Emerson offers a variety of cable constructions tailored to fit specific performance and value requirements. We have invested substantially in our cable processing capabilities to insure the consistency and reliability of our cable products, creating a best in class high frequency solution in transmission lines for microwave systems.

In addition, **Emerson Connectivity Solutions** has extensive internal capabilities for the manufacturing and design of coaxial connector and microwave components. If your application requires a complete microwave solution then Emerson offers the product breadth, value and consistency in microwave interconnect solutions.

Emerson Connectivity Solutions is global provider with manufacturing, sales and engineering capabilities in the United States, the United Kingdom and China to meet our customer's requirements worldwide. Our goal is to continue to increase the breadth of range and the performance of our products to meet the most challenging needs.

Thank you for giving us the opportunity to serve you.

A handwritten signature in black ink, appearing to read "Brian G. Mason".

Brian G. Mason
President

Semflex invites you to see for yourself how our products and unique combination of manufacturing capabilities can provide solutions for your interconnect challenges

Superior Cable Technology

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High Performance Cable

Low Loss, High Power, Low Density PTFE Dielectrics

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Radio Grade (RG) - Type Cable

Standard Industry Sizes, High Temp, PTFE Dielectrics

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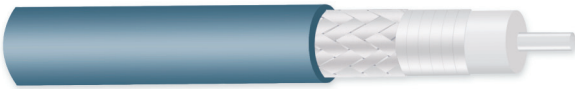
Additional Information

Semflex Family of Products	22
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Since no single cable is best suited for every type of application, Semflex offers a variety of 50 ohm cables carefully designed to meet specific performance/cost requirements. Different cable characteristics (i.e. flexibility, connector retention, torque and crush resistance, stability/repeatability with respect to temperature or flexure, cost, etc.) require special design considerations. Semflex's products lines take advantage of superior cable technology, carefully matching design and construction to specific application needs.

Jacket

Semflex utilizes a variety of jacket materials which are selected based on cost, flexibility, chemical and environmental considerations.



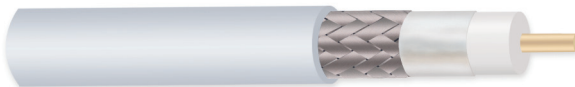
Polyurethane- Low temperature rating, UV resistant, abrasion resistant, flexible (-65 to 85°C).

FEP- High Temperature rating, chemical resistant, moisture resistant, low smoke, low outgassing (-65 to 200°C).

Shielding

Semflex provides several outer shield combinations comprised of silver or tin plated copper wire, bare copper or aluminum wire, and foil tapes ranging from 80 to 100% shielding coverage. Each cable is carefully designed to optimize braid design for cable function.

Braid coverage is highly dependent on braid angle, number of picks, wire gauge size and number of strands - all of which affect the attenuation, flexibility, and shielding effectiveness of the cable. As a general rule, higher braid coverage yields better shielding and lower attenuation. Lower braid coverage yields better flexibility.



Round Braid - lower material cost, most flexible braid option.



Woven Flat Braid - lower contact resistance between braid wires resulting in lower attenuation, better coverage provides increased shielding effectiveness. Smoother conductor for lower VSWR. Increased connector retention and torque resistance.

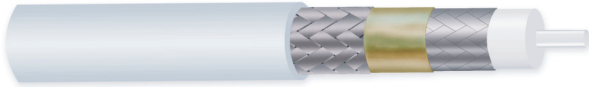


Helical Flat Braid - Improved flexibility and shielding, increased phase stability vs flexure, lower radial torque resistance.

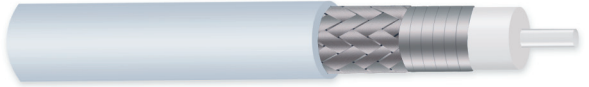


Wrapped or Folded Foil - Polyemide (helical wrap) provides increased mechanical strength, high temp, chemical resistant. Polyester (folded) low temp, low strength, lowers contact resistance and attenuation.

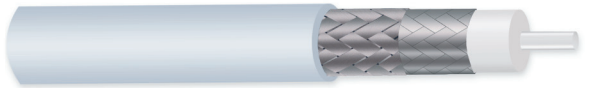
Shielding



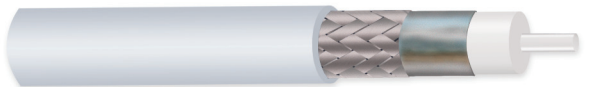
Triple Shield - Woven flat braid, polyamide foil, round braid. Provides >90 dB shielding effectiveness, high torque resistance, mechanically strong.



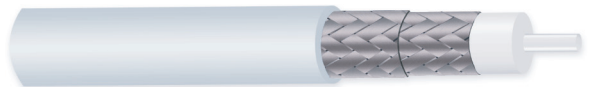
Double Shield - Helical flat braid, round braid. Provides >100 dB shielding effectiveness, phase stable vs flexure.



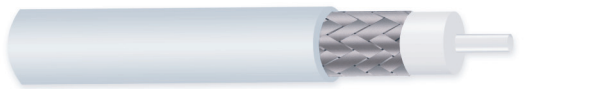
Double Shield - Woven flat braid, round braid. Provides >85 dB shielding effectiveness, low contact resistance.



Double Shield - Polyester foil, round braid. Provides >85 dB shielding effectiveness, cost effective.



Double Shield - Round braid, round braid. Provides >60 dB shielding effectiveness, flexible.

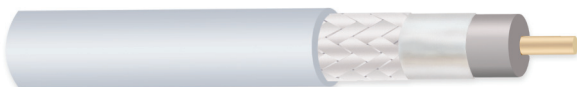


Single Shield - Round braid, provides >40 dB shielding effectiveness, very flexible.

Dielectric

Semflex utilizes a variety of dielectric materials which are selected based on signal loss (dissipation factor), temperature extremes, power rating and velocity of propagation. Our manufacturing process carefully controls the concentricity between the outer conductor and the center conductor to maintain consistent characteristic impedance and low structural return loss.

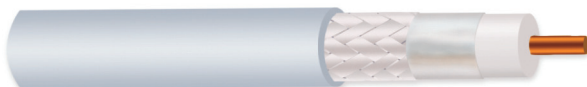
Characteristic Impedance Tolerances
Extruded dielectrics: < +/- 6%
Tape wrapped dielectrics: < +/- 2%



Polyethelene - Temp (-40 to 85°C), VP (66-85%)
Solid PTFE - Temp (-65 to 125°C), VP (70%)
Low Density PTFE - Temp (-65 to 200°C), VP (74-78%)
Ultra Low Density PTFE - Temp (-65 to 200°C), VP (82-85%)

Center Conductor

Semflex offers a variety of center conductor materials with several different platings.



Solid Conductors - Less resistance, lower loss, higher power.
Stranded Conductors - More flexible.

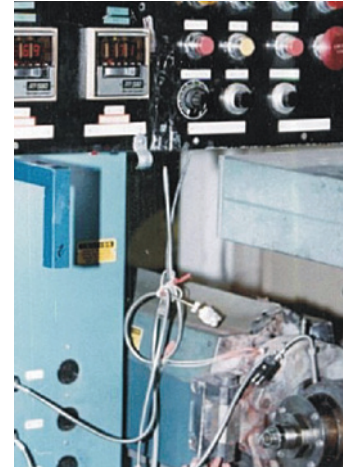
Silver Plating - Lowest loss, solderable.
Copper Clad - Cost effective, solderable.

"The difference starts with the cable..."

For more than a quarter of a century, Semflex has been manufacturing some of the highest quality coaxial cable in the world. Over the years, we have developed the expertise necessary to rapidly design and manufacture cable solutions to meet specific and unique requirements for a variety of environmental, mechanical and electrical conditions.

Semflex currently supplies cable products to a variety of industries including:

- Land, Sea, and Airborne Military Weapons Platforms
- Electronic Counter Measures and Jammers
- Cellular Antennas and Base Stations
- Satellite Antennas and Earth Stations
- Commercial and Military Airframes
- Precision Test and Measurement
- Semiconductor Sputtering
- Missile Guidance Systems
- Communication Systems
- High Power Applications
- Phased Array Radars
- Professional Audio
- Industrial Lasers
- Medical MRI



Semflex provides value to our customers with vertically integrated design and manufacturing capabilities designed to give fast response with custom engineered solutions.

Semflex offers a large selection of microwave connectors designed to provide excellent electrical transitions between the connector interface and cable resulting in very low VSWR characteristics. Along with the popular connectors listed in the following tables, Semflex has hundreds of other connector designs to meet a variety of special requirements (i.e. high power, swept 90 degree bends, environmental sealing, low intermod characteristics, special plating or finishes, etc). For special requirements, please contact customer service at 507.833.8822.

The High Performance Product Line includes three series of cables suitable for applications with the most stringent mechanical, electrical or environmental requirements, up to **50 GHz**. Low loss, low VSWR, high power, high temperature, flexibility and phase stability are all examples of the many.

 **SW086**

Part Number	Description	Assembly Procedure
MCX109B	MCX Male	70025-652CU
MCX209B	MCX R/A Male	70025-653CU
SMA109B	SMA Male	70025-659CU
SMA209B	SMA R/A Male	70025-660CU

 **SW180**

Part Number	Description	Assembly Procedure
SMA108B	SMA Male	70025-649CU
SMA208B	SMA R/A Male	70025-633CU
TNC108B	TNC Male	70025-667CU
TNC208B	TNC R/A Male	70025-668CU
TNC408B	TNC Bhd	70025-669CU
N108B	N Male	70025-672CU
N208B	N R/A Male	70025-673CU
N408B	N Bhd	70025-674CU

 **HP160s**

Part Number	Description	Assembly Procedure
20668-111	2.4 mm Male	70025-818CU
20719-111	2.4 mm R/A Male	70025-818CU
20670-111	2.92 mm Male	70025-818CU
20723-111	2.92 mm R/A Male	70025-818CU
20724-111	2.92 mm Bhd	70025-818CU
20666-111	3.5mm Male	70025-818CU
20715-111	3.5mm R/A Male	70025-818CU
20716-111	3.5mm Bhd	70025-818CU

 **HP190s**

Part Number	Description	Assembly Procedure
20517-111	3.5mm Male	70025-297CU
20727-111	3.5mm R/A Male	70025-393CU
20493-111	SMA Male	70025-307CU
20494-111	SMA R/A Male	70025-384CU
20496-111	SMA Bhd	70025-386CU
20499-111	TNC Male	70025-346CU
20500-111	TNC R/A Male	70025-347CU
20502-111	TNC Bhd	70025-381CU
20511-111	N Male	70025-309CU
20512-111	N R/A Male	70025-298CU
20514-111	N Bhd	70025-259CU

 **HP305s**

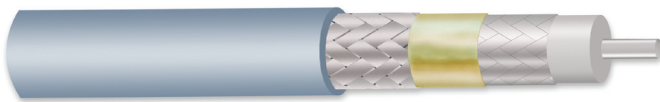
Part Number	Description	Assembly Procedure
20677-111	SMA Male	70025-288CU
20678-111	SMA R/A Male	70025-299CU
20680-111	SMA Bhd	70025-302CU
20683-111	TNC Male	70025-408CU
20684-111	TNC R/A Male	70025-409CU
20686-111	TNC Bhd	70025-411CU
20695-111	N Male	70025-315CU
20696-111	N R/A Male	70025-316CU
20698-111	N Bhd	70025-318CU

Military, Aerospace, Medical, Test & Measurement

The **High Performance Product Line** includes three series of cables suitable for applications with the most stringent mechanical, electrical or environmental requirements, up to 50 GHz. Low loss, low VSWR, high power, high temperature, flexibility and phase stability are all examples of the many special requirements this product line is suited for. Due to the custom nature of these cables, Semflex also offers a large selection of connectors.

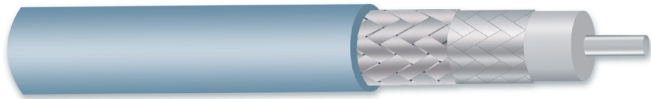


Cable Selection



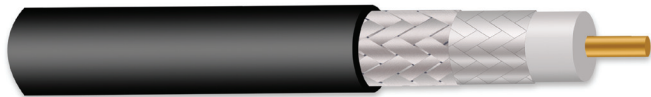
HP Series

Test & Measurement Interconnects - Robust Construction
Best all around choice for microwave test and interconnect cables. Low loss and VSWR to 55 GHz, toughest mechanical construction.



SW Series

Lower Cost - Ease of Assembly
Good electrical performance, low loss to 129 GHz.
Simplified connector attachments and assembly methods.

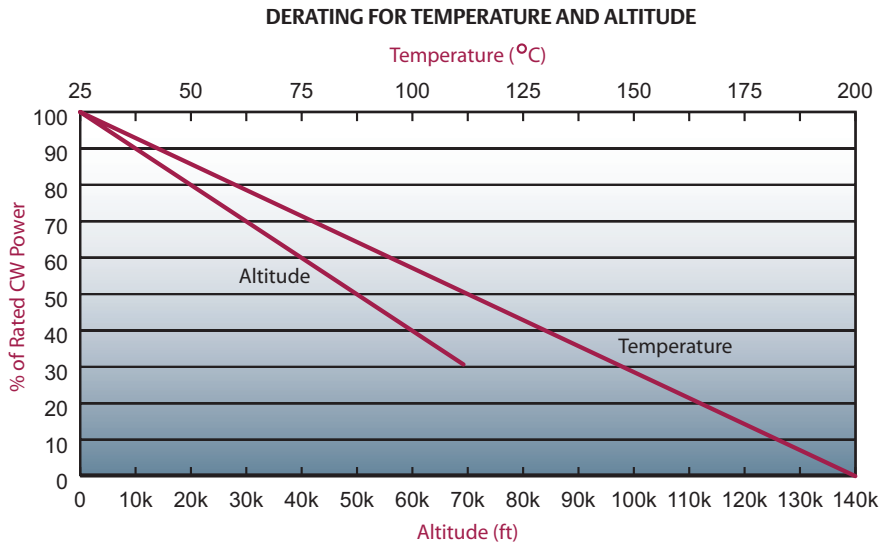


KW Series

Tight Installations - High Power
High power, low loss, high flexibility compared to air dielectric corrugated cables.

Power Handling

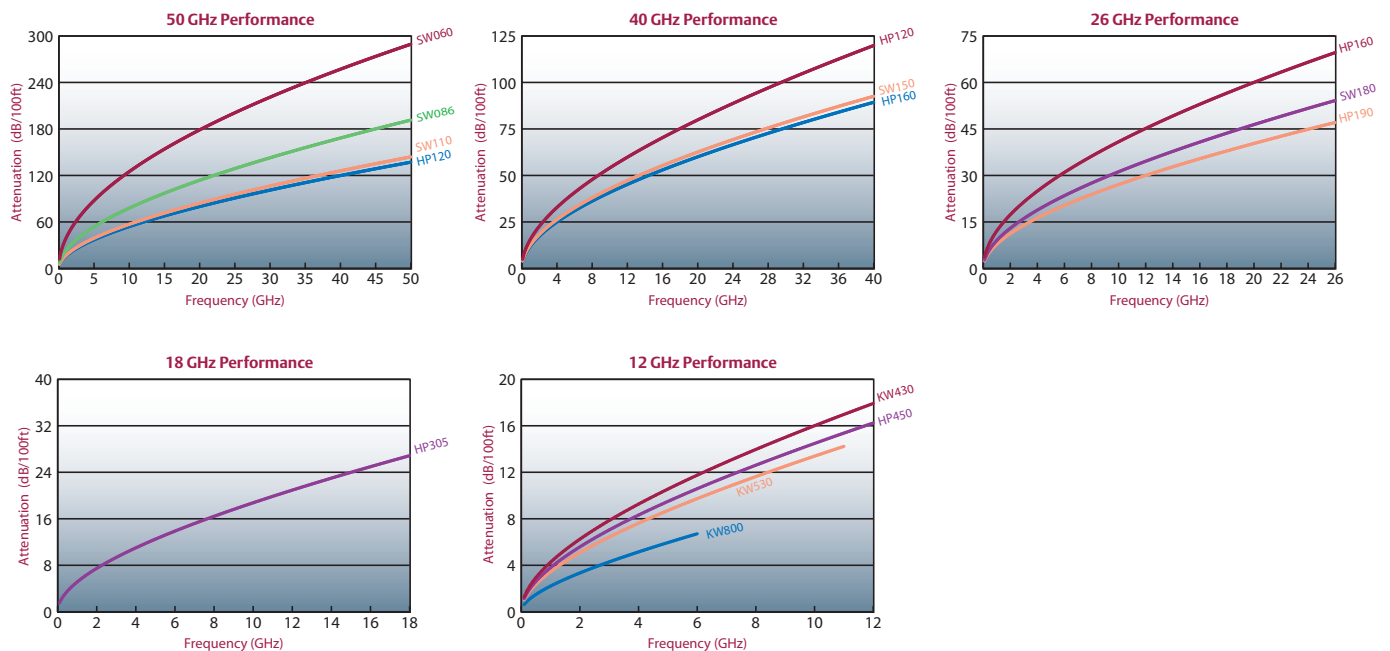
Average power ratings for coaxial cables are highly dependent on the long term operating temperature of the dielectric material. Semflex's published average power ratings are based on VSWR of 1.0:1, at sea level and an ambient temperature of 25° C. The base line power ratings can be adjusted to meet the actual conditions by using the derating factors for both temperature and altitude from the chart below.



Connector	Avg Power (Kw)	Peak Power (Kw)
SMA	.1	2.5
BNC	.1	5.6
TNC	.3	5.6
UHF	.3	10
N	.6	10
HN	.6	40
SC	1.2	44
7/16 DIN	3.0	40
4.1/9.5 DIN	1.2	16
LC	3.5	63
7/8" EIA	4.2	90
1-5/8" EIA	5.2	305

Average power ratings of connector interfaces are typical for most applications and based on 900 MHz.

High Performance Comparison Data



"The difference starts with the cable..."

The LA Series provides the best available combination of low attenuation, phase stability and mechanical performance. For example, the LA290 cable provides <20 dB/100 ft of signal loss at 18 GHz with a .290" overall diameter. Additionally, the carefully engineered construction provides excellent bend and crush resistance properties when compared to other ultra low loss cables. This cable series is the best choice for phase stability over temperature and flexure as outlined in electrical performance data.

CABLE PROPERTIES

Electrical Properties

	LA290
Impedance (ohms)	50
Capacitance (pf/ft)	24
Inductance (nH.ft)	59
Shielding Effectiveness (dB)	>100
Cut off Frequency (GHz)	19.7
Velocity of Propagation (%)	85
Breakdown Voltage (KV)	>15
Max Structural VSWR	1.20:1

Mechanical Properties

	LA290
Jacket O.D. (in)	0.292
Round Braid O.D. (in)	0.267
Helical Braid O.D. (in)	0.249
Dielectric O.D. (in)	0.235
Center Conductor O.D. (in)	0.089
Center Conductor Type	Solid
Inside Min Bend Radius (in)	1.600
Operating Temperature (°C)	-65/+200
Weight (lbs/ft)	0.090

Low Attenuation (LA) for the following applications:



CABLE CONSTRUCTION

The LA Series uses silver plated inner and outer conductors for excellent attenuation performance. The ultra low density microporous PTFE dielectrics and FEP jackets are engineered to provide the optimum combination of mechanical characteristics and stable electrical performance over temperature extremes. Low loss, phase stability, and shielding effectiveness of >100 dB results from combining a helically served flat braid with a 97% coverage round braid.



- Silver Plated Copper
- Ultra Low Density Microporous PTFE
- Helically Wrapped Silver Plated Copper Braid
- Silver Plated Copper Round Braid
- Extruded FEP Jacket - Blue Tint

Our LA290's published temperature range defines the hot and cold temperature extremes the cable will perform at. This is based on the material properties that are used to construct the LA290 cable. However, there are no implied performance guarantees with respect to rapid temperature excursions between hot and cold extremes in a thermal shock situation. Semflex can not predict the rate of temperature change or the number of temperature excursions our product will experience in all possible customer applications; therefore we do not give a blanket statement of guaranteed product performance for something as strenuous as thermal shock.

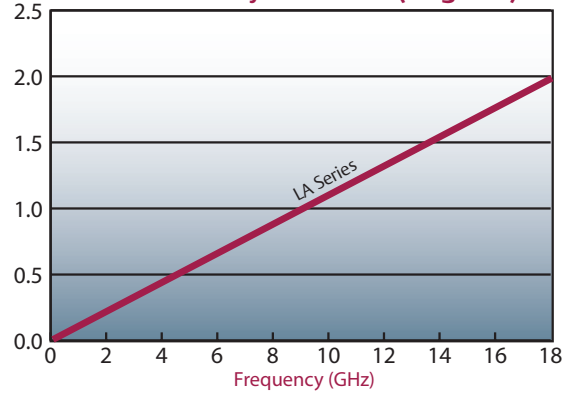
Attenuation (dB/100 ft)

GHz	LA290	LA290
0.45	2.90	2.93
1	4.35	4.43
3	7.69	7.90
6	11.07	11.50
12	16.06	16.91
18	20.04	21.32
*k1	4.240	4.240
*k2	0.114	0.185

Average Power (KW)

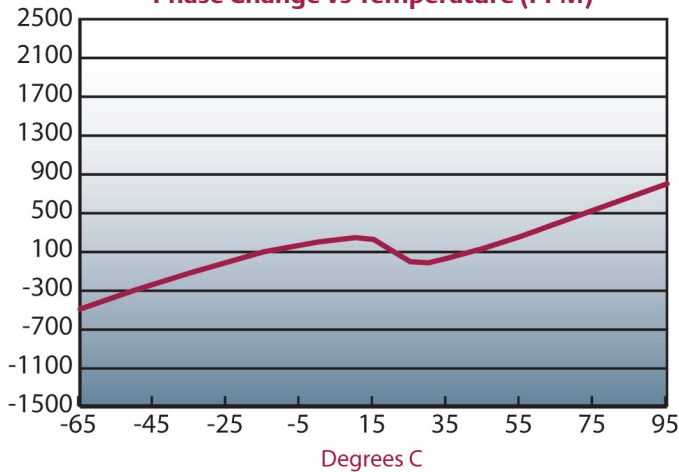
GHz	LA290
1	4.7
2	3.2
3	2.6
6	1.8
12	1.2
18	1.0

Phase Stability vs Flexure (Degrees)



Phase stability is defined as the change in phase when the cable is bent 360 degrees around its minimum bend radius.

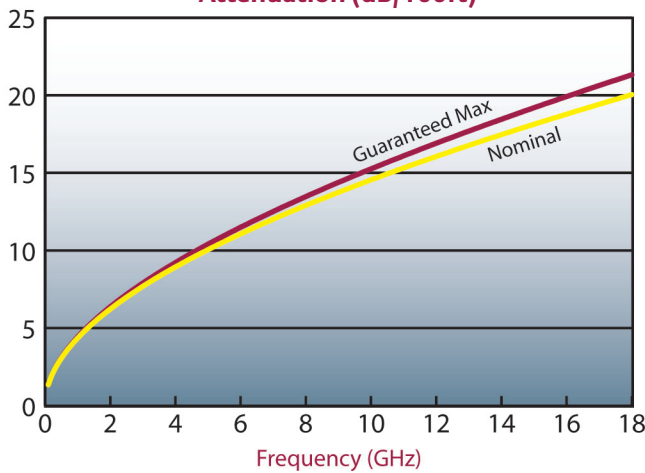
Phase Change vs Temperature (PPM)



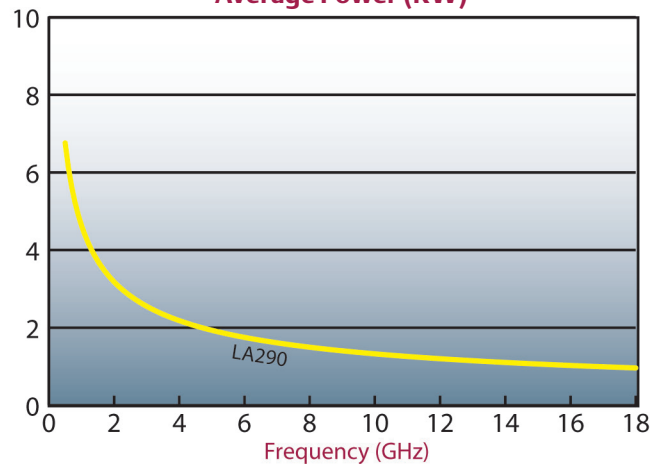
Cable Cross Reference

Semflex	Replacement
LA290	UFB311A, LL335, IW2801

Attenuation (dB/100ft)



Average Power (KW)



* Attenuation at any frequency
 $= (k1 \times \sqrt{\text{freq}(\text{GHz})}) + (k2 \times \text{freq}(\text{GHz}))$

"The difference starts with the cable..."

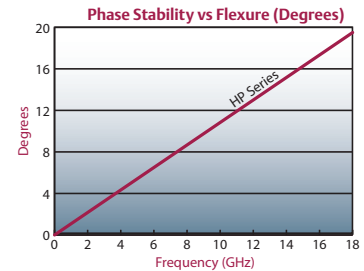
The HP Series has a long history in the military and aerospace industries as the interconnect cable of choice in ground, sea, and airborne systems. This series also excels in test and measurement applications offering high performance, flexibility, and a wide range of precision connectors for applications up to 50 GHz. The triple shield construction provides connector attachments that exceed *70 lbs of pull off force, (* HP190 with SMA connector) and harsh handling (i.e. radial torque, continuous flexing, or wide temperature extremes).



CABLE PROPERTIES

Mechanical Properties

	HP120s	HP160s	HP190s	HP305s	HP450
Jacket O.D. (in)	.124	.160	.205	.305	.450
Round Braid O.D. (in)	.104	.145	.188	.273	.403
Shield Interlayer O.D. (in)	.088	.129	.172	.256	.378
Flat Braid O.D. (in)	.080	.120	.163	.248	.369
Dielectric O.D. (in)	.074	.108	.151	.242	.357
Center Conductor O.D. (in)	.025	.036	.051	.078	.129
Center Conductor Type	Solid	Solid	Solid	Solid	Stranded
Inside Min Bend Radius (in)	.6	.9	1.1	1.8	2.5
Operating Temperature (°C)	-65/200	-65/200	-65/200	-65/200	-65/200
Weight (lbs/ft)	.02	.04	.05	.09	.20



Phase stability is defined as the change in phase when the cable is bent 360 degrees around its minimum bend radius.

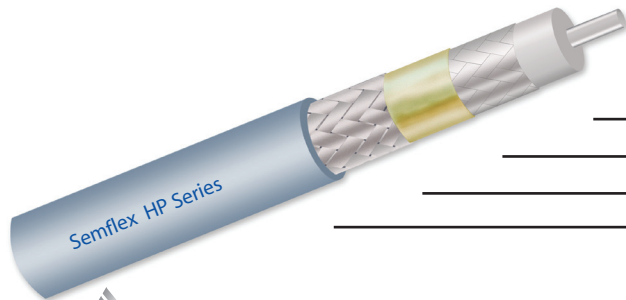
Electrical Properties

	HP120s	HP160s	HP190s	HP305s	HP450
Impedance (ohms)	50	50	50	50	50
Capacitance (pf/ft)	26.7	26.9	26.7	26.2	26
Inductance (nH.ft)	67	66	66	66	62
Shielding Effectiveness (dB)	>90	>90	>90	>90	>90
Cut off Frequency (GHz)	55	40	28	18	12
Velocity of Propagation	74%	75%	75.5%	77%	78%
Breakdown Voltage (KV)	>5	>7	>10	>15	>20
Max Structural VSWR	1.20:1	1.20:1	1.20:1	1.20:1	1.20:1



CABLE CONSTRUCTION

The HP Series uses silver plated copper inner and outer conductors for low attenuation. The microporous PTFE dielectrics and FEP jackets provide consistent performance over temperature extremes with better phase performance over temperature compared to solid PTFE dielectrics. Shielding effectiveness >90 dB results from a triple shield construction of woven flat braid, foil, and round braid. This construction also provides substantially better radial torque resistance and connector pull off strength than helically wrapped braid designs.



- Silver Plated Copper
- Low Density Microporous PTFE
- Silver Plated Copper Flat Braid
- Metalized Foil
- Silver Plated Copper Round Braid
- Extruded FEP Jacket - Blue Tint

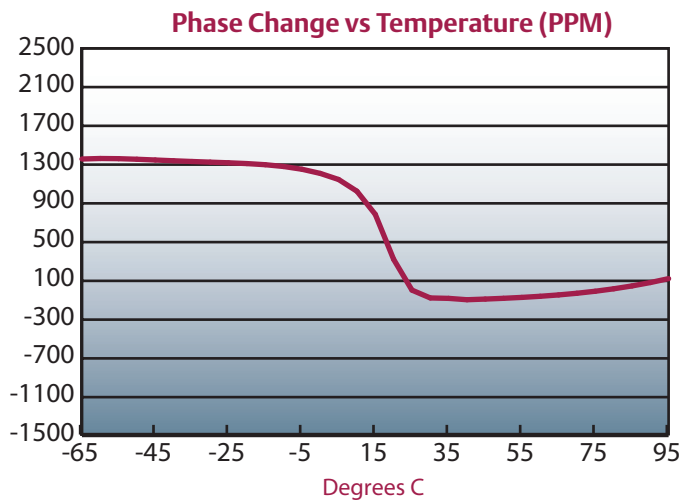
Attenuation (dB/100 ft)

GHz	HP120s	HP160s	HP190s	HP305s	HP450
.5	11.06	8.48	5.44	3.55	2.61
2	22.71	17.34	11.24	7.47	5.58
12	59.82	45.15	30.01	20.89	16.20
18	75.22	56.55	37.91	26.80	-
26	92.98	69.61	47.09	-	-
40	119.90	89.27	-	-	-
*k1	15.22	11.72	7.45	4.76	3.44
*k2	0.59	0.38	0.35	0.37	0.36

* Attenuation at any frequency
 $= (k1 \times \sqrt{\text{freq}(\text{GHz})}) + (k2 \times \text{freq}(\text{GHz}))$

Average Power (KW)

GHz	HP120s	HP160s	HP190s	HP305s	HP450
.5	-	-	3.1	6.4	12.1
1	-	-	2.1	4.4	8.2
2	-	-	1.4	3.0	5.5
6	-	-	.8	1.6	3.0
12	-	-	.5	1.1	2.0
18	-	-	.4	.9	-

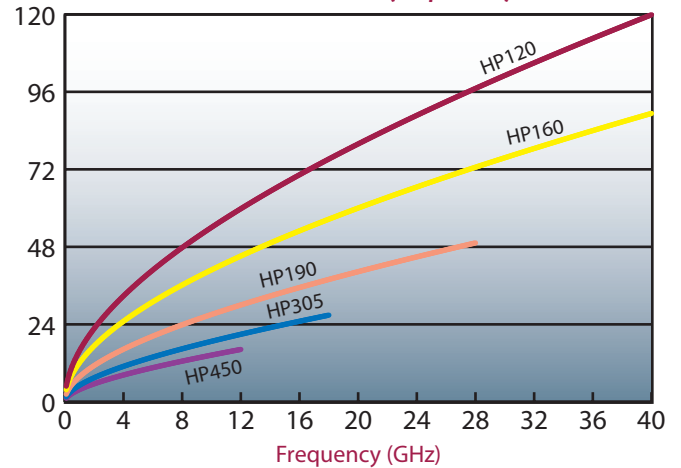


HP Series VSWR Chart**

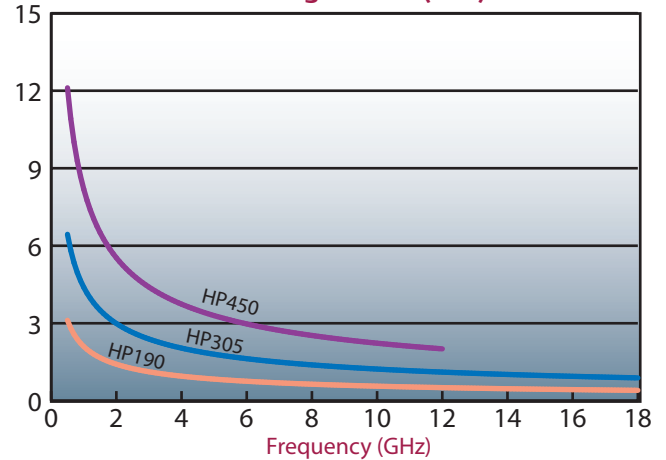
Configuration	Connector Type	0-8 GHz	8-18 GHz	18-26.5 GHz	26.5-40 GHz
2 Straights	SMA/2.2/2.9/3.5/7mm (7mm 0-18 only)	1.10:1*	1.20:1*	1.25:1*	1.40*
	Type N, TNC	1.15:1*	1.30:1*	N/A	N/A
Straight ; Rt. Angle	Mixed	1.20:1*	1.30:1*	1.35:1	1.45:1*
2 Rt. Angle	Mixed	1.20:1*	1.35:1*	1.40:1	1.55:1*

*Tighter spec available, special order
 **Assembly VSWR for HP Series only

Attenuation (dB/100ft)



Average Power (KW)



Cable Cross Reference

Semflex	Replacement
HP120	IW140x, UFB142, LL120
HP160	IW150x
HP190	IW180x, UFB197C, UFB205A
	LL142 (Triple Shield)
HP305	LL392-2

"The difference starts with the cable..."

The SW Series provides low loss cable solutions that bridge the gap between lower performance RG cables and expensive high performance cables. This series employs the same microporous PTFE dielectrics used in high performance, low loss cables, but offers a simple double braid construction. This construction gives the SW series exceptional electrical performance and allows for simplified connector attachments to reduce overall costs. The SW060, SW086 and SW150 cable sizes can be assembled with standard semirigid or RG style crimp on connectors.



CABLE PROPERTIES

Mechanical Properties

	SW060	SW086	SW110	SW150	SW180
Jacket O.D. (in)	.060	.090	.118	.153	.196
Round Braid O.D. (in)	.049	.083	.096	.136	.180
Flat Braid O.D. (in)	.039	.065	.080	.120	.163
Dielectric O.D. (in)	.033	.059	.074	.108	.151
Center Conductor O.D. (in)	.011	.020	.025	.036	.051
Center Conductor Type	Solid	Solid	Solid	Solid	Solid
Inside Min Bend Radius (in)	.275	.4	.5	.8	1.0
Operating Temperature (°C)	-65/200	-65/200	-65/200	-65/200	-65/200
Weight (lbs/ft)	.010	.015	.020	.040	.050

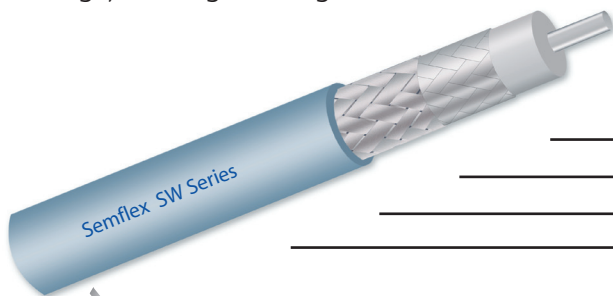
Electrical Properties

	SW060	SW086	SW110	SW150	SW180
Impedance (ohms)	50	50	50	50	50
Capacitance (pf/ft)	32	27	27	26.9	26.7
Inductance (nH.ft)	58	67	66	66	62
Shielding Effectiveness (dB)	>85	>85	>85	>85	>85
Cut off Frequency (GHz)	129	71	55	40	28
Velocity of Propagation	72%	74%	76%	76%	77%
Breakdown Voltage (KV)	>1	>3	>5	>7	>10
Max Structural VSWR	1.15:1	1.15:1	1.15:1	1.15:1	1.15:1



CABLE CONSTRUCTION

The SW Series uses silver plated inner and outer conductors for low attenuation. The microporous PTFE dielectrics and FEP jackets provide consistent performance over temperature extremes with better phase performance over temperature than solid PTFE dielectrics. The SW series construction is completed with two woven braids (97% coverage), offering shielding effectiveness >85dB.



- Silver Plated Copper
- Low Density Microporous PTFE
- Silver Plated Copper Flat Braid
- Silver Plated Copper Round Braid
- Extruded FEP Jacket - Blue Tint

Attenuation (dB/100 ft)

GHz	SW060	SW086	SW110	SW150	SW180
.5	27.31	16.31	11.72	8.97	6.29
1	38.73	23.25	16.75	12.79	9.02
2	54.99	33.25	24.03	18.29	12.98
6	96.15	59.19	43.13	32.56	23.48
12	137.24	85.92	63.09	47.27	34.58
18	169.27	107.31	79.23	59.03	43.64
*k1	38.375	22.621	16.151	12.446	8.624
*k2	.359	.630	.595	.346	.392

Average Power (KW)

GHz	SW060	SW086	SW110	SW150	SW180
.5	-	0.73	0.89	1.45	2.47
1	-	0.52	0.63	1.02	1.73
2	-	0.36	0.43	0.70	1.18
6	-	0.20	0.24	0.38	0.62
12	-	0.13	0.16	0.25	0.40
18	-	0.11	0.13	0.19	0.31

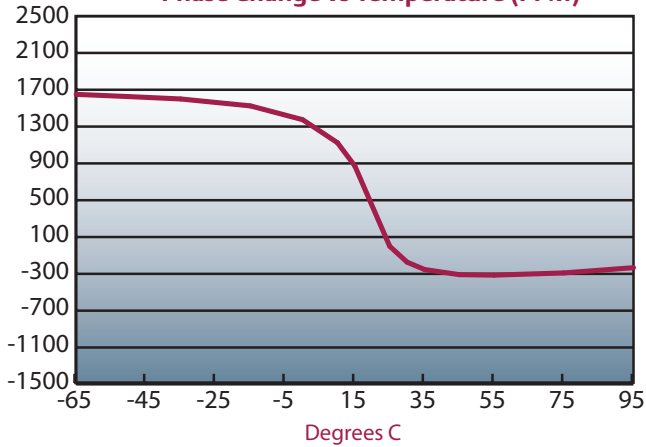
For RF and MW applications requiring interconnects for:

- Racks, cabinets or enclosures
- Miniature flex cable diameters
- Broad temperature extremes
- Tight bends

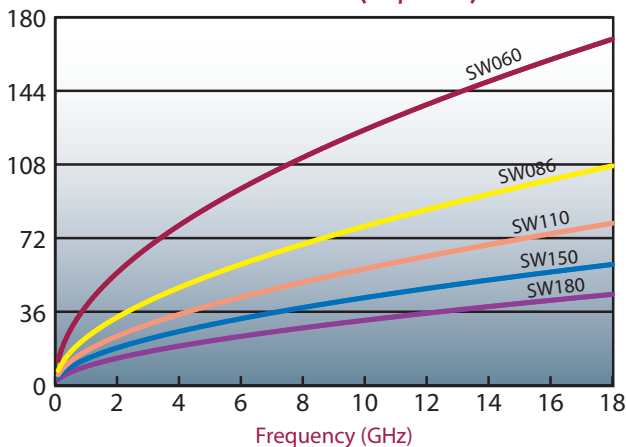
Cable Cross Reference

Semflex	Replacement
SW060	RG178, .047 Semi-rigid
SW086	RG316, .086 Semi-rigid
SW150	RG142, .141 Semi-rigid
SW180	LL142 (Double Shield)

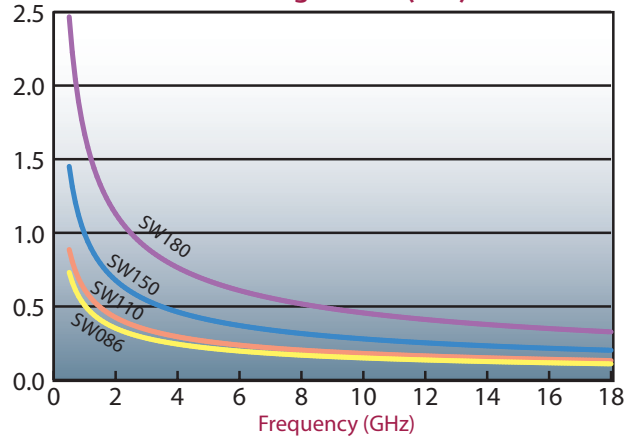
Phase Change vs Temperature (PPM)



Attenuation (dB/100ft)



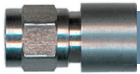
Average Power (KW)



* Attenuation at any frequency
 $= (k1 \times \sqrt{\text{freq}(\text{GHz})}) + (k2 \times \text{freq}(\text{GHz}))$

"The difference starts with the cable..."

The KW Series has the same ultra low attenuation of rigid, corrugated, air dielectric cables, while offering higher power ratings and incredible flexibility. A copper clad aluminum conductor and soft pliable polyurethane jacket provides the flexibility needed to easily route cable in tight spaces such as cabinets and airframes where rigid cables require special tooling or simply do not fit. These features combine to reduce overall system integration costs by allowing designers to save space and installers to save time.



CABLE PROPERTIES

Mechanical Properties

	KW430	KW530	KW800
Jacket O.D. (in)	.430	.530	.800
Round Braid O.D. (in)	.343	.433	.697
Flat Braid O.D. (in)	.327	.417	.685
Dielectric O.D. (in)	.315	.405	.670
Center Conductor O.D. (in)	.114	.144	.245
Center Conductor Type	Solid	Solid	Solid
Inside Min Bend Radius (in)	2.2	2.5	4.0
Operating Temperature (°C)	-65/85	-65/85	-65/85
Weight (lbs/ft)	.15	.20	.30

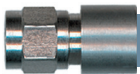
Electrical Properties

	KW430	KW530	KW800
Impedance (ohms)	50	50	50
Capacitance (pf/ft)	24	24	24
Inductance (nH.ft)	62	62	62
Shielding Effectiveness (dB)	>85	>85	>85
Cut off Frequency (GHz)	14	11	6
Velocity of Propagation	83%	83%	85%
Breakdown Voltage (KV)	>17	>20	>25
Max Structural VSWR	1.20:1	1.20:1	1.20:1

Superior Flexibility

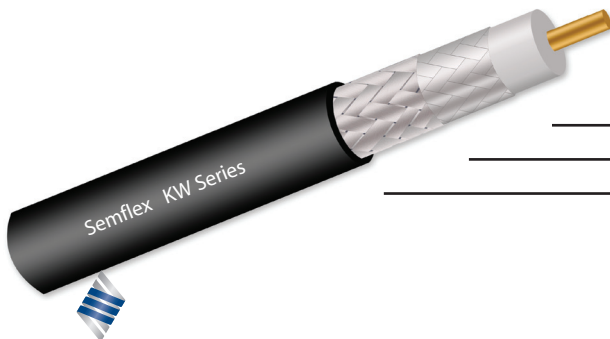


Compared to corrugated cables, the KW series offers much better flexibility. KW cables are easily hand formed and installed in spaces too tight for other high power or ultra low loss cables.



CABLE CONSTRUCTION

KW Series cable uses copper clad aluminum center conductors for increased flexibility. The microporous (expanded) PTFE dielectrics provide increased power handling. Silver plated flat and round braids combined provide >85 dB of shielding effectiveness and robust connector attachment. The soft and pliable polyurethane jacket is fire retardant and UV resistant, suitable for both indoor and outdoor applications.



- Copper Clad Aluminum
- Low Density Microporous PTFE
- Silver Plated Copper Flat Braid
- Silver Plated Copper Round Braid
- Extruded Black Polyurethane Jacket - Passes UL94 Vertical Flame Test Condition V-0

Attenuation (dB/100 ft)

GHz	Guaranteed Max	KW430	KW530	KW800
.45		2.78	2.23	1.40
1		4.26	3.44	2.21
3		7.85	6.43	4.29
6		11.75	9.73	6.71
10		16.00	13.39	-
14		19.74	-	-
*k1		3.894	3.079	1.845
*k2	.369	.365	.365	

Average Power (KW)

GHz	Power Rating	KW430	KW530	KW800
.45		9.8	15.4	21.3
1		6.4	10.0	13.5
3		3.5	5.4	7.0
6		2.3	3.6	4.5
10		1.7	2.6	-
14		1.4	-	-

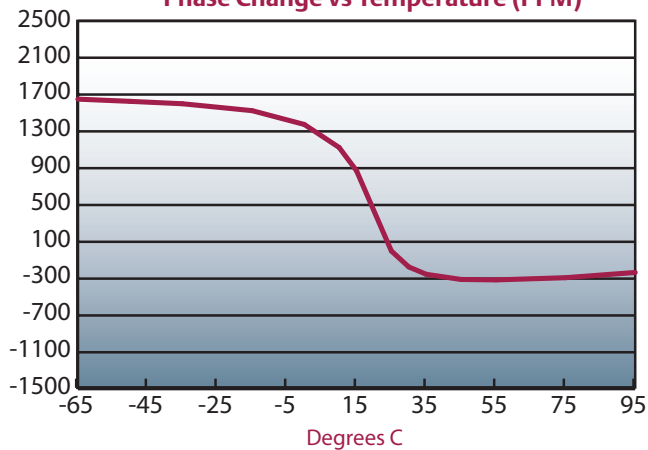
For applications up to 14 GHz requiring:

- Improved flexibility over corrugated
- Tight installation spaces
- Ultra low loss
- High power

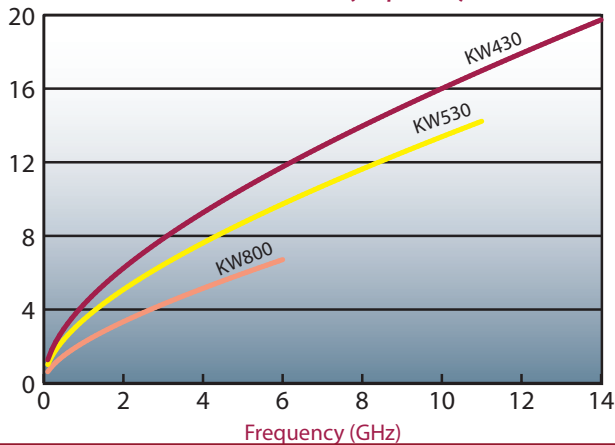
Cable Cross Reference

Semflex	Replacement
KW430	FSJ2-50, ETS2-50, EFX2-50, LDF2-50
KW530	FSJ4-50, LDF4-50
KW800	LDF5-50

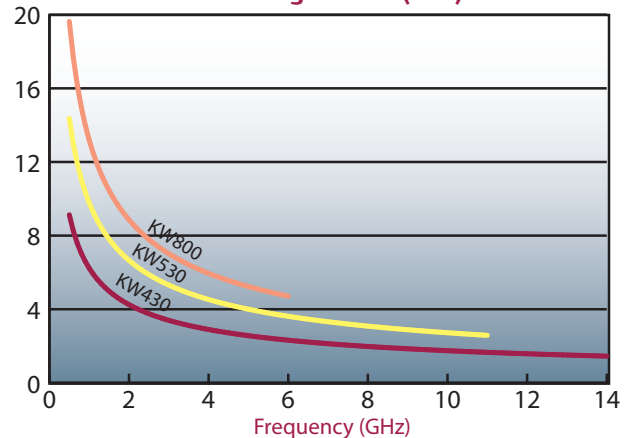
Phase Change vs Temperature (PPM)



Attenuation (dB/100ft)



Average Power (KW)



* Attenuation at any frequency
 $= (k1 \times \sqrt{\text{freq}(\text{GHz})}) + (k2 \times \text{freq}(\text{GHz}))$

"The difference starts with the cable..."

Radio Grade (RG) - Type Cable

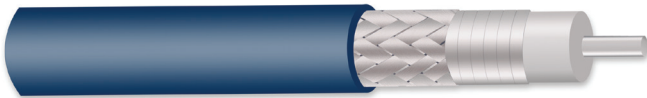
Connectivity for
Business-Critical Continuity™

Military, Aerospace, Commercial

The **RG/Military Product Line** includes five series of cables suitable for applications in which using a standard industry sized cable and connector is preferable, yet extra performance margins are required. These cables feature lower loss and improved VSWR over basic cables and offer an appealing cost vs. performance ratio.

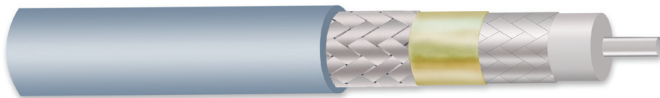


Cable Selection



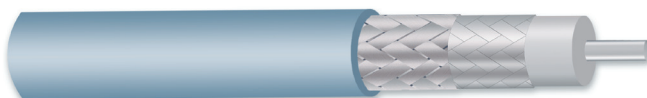
SM Series

Conformable or Semi-Rigid Replacement
Flexible alternative to semi-rigid cable. Uses semi-rigid connectors for .086 and .141 cable sizes.



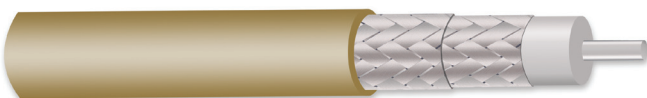
RG Upgrade - SI Series

Triple shielded RG equivalent cable for >90dB shielding.
Durable, low loss up to 18 GHz.



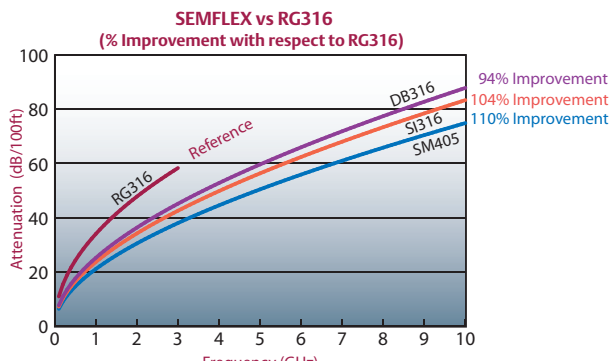
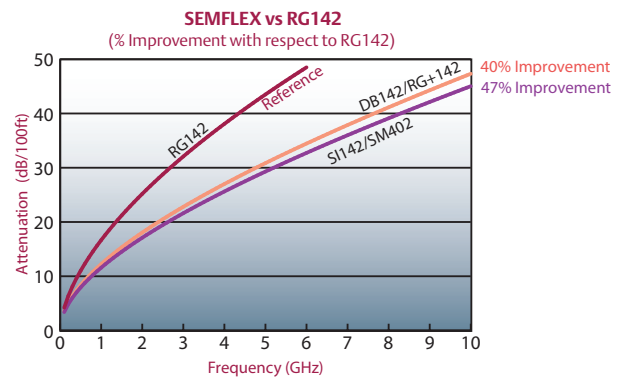
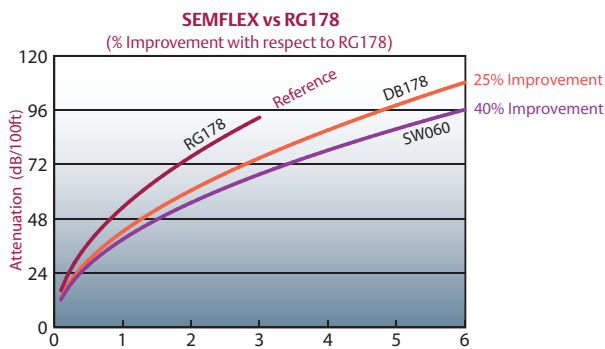
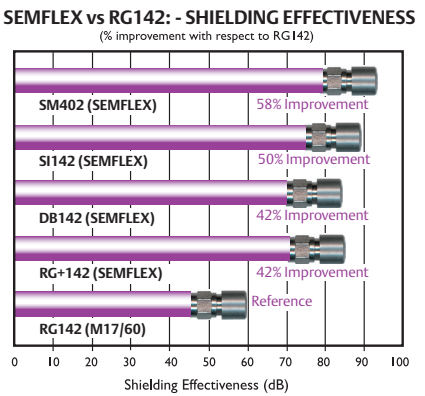
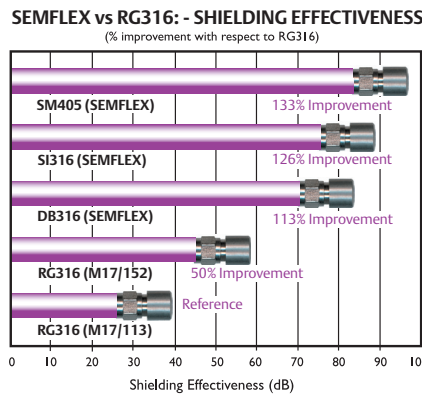
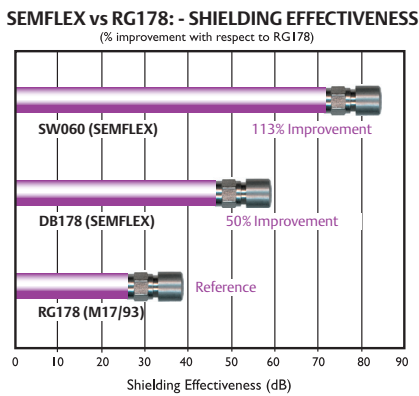
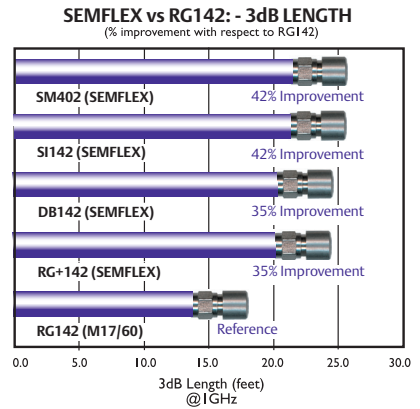
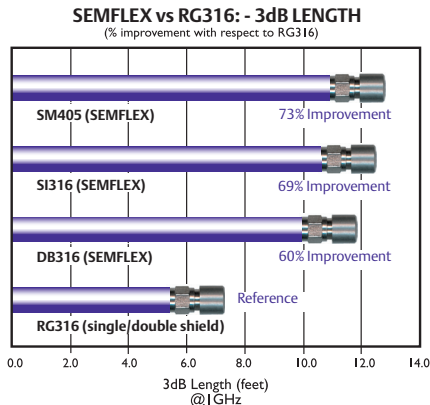
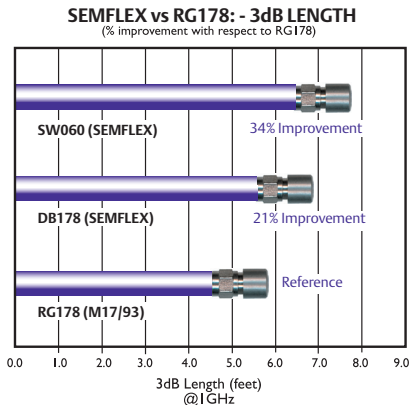
RG Upgrade - DB Series

Low loss RG compatible. Easier connector termination than the SI Series while maintaining improved performance over RG cable.



RGE Series

Single and double shielded cables
manufactured to meet or exceed MIL-C/17 requirements.



"The difference starts with the cable..."

The SM Series offers a flexible alternative to semi-rigid cable, employing the same connectors and assembly tooling used for .086 and .141 versions. This allows designers to bypass the cumbersome and costly step of fabricating three dimensional drawings, for significant cost savings and accelerated time to market. This solution is ideal for applications such as military ECM and guidance systems, commercial antennas, communications applications, and anywhere compact or densely-spaced coaxial interconnects are needed.

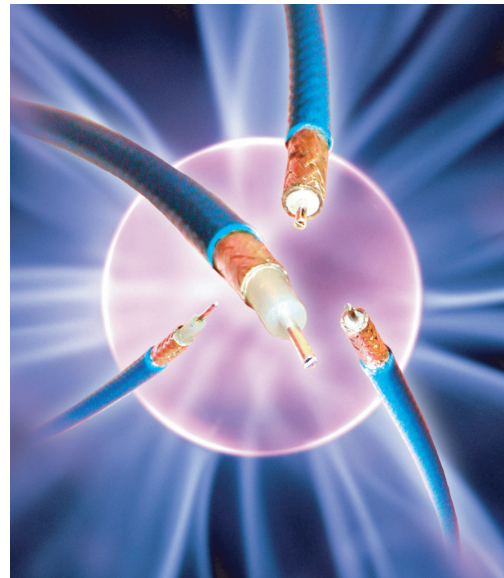
CABLE PROPERTIES

Mechanical Properties

	SM405	SM402
Jacket O.D. (in)	.101	.161
Round Braid O.D. (in)	.083	.141
Helical Braid O.D. (in)	.066	.124
Dielectric O.D. (in)	.060	.116
Center Conductor O.D. (in)	.020	.036
Center Conductor Type	Stranded	Solid
Inside Min Bend Radius (in)	.150	.250
Operating Temperature (°C)	-65/125	-65/125
Weight (lbs/ft)	.015	.033

Electrical Properties

	SM405	SM402
Impedance (ohms)	50	50
Capacitance (pf/ft)	29.4	29.4
Inductance (nH.ft)	71	71
Shielding Effectiveness (dB)>100	>100	
Cut off Frequency (GHz)	60	34
Velocity of Propagation	70%	70%
Breakdown Voltage (KV)	>2	>5
Max Structural VSWR	1.20:1	1.20:1



CABLE CONSTRUCTION

The SM Series uses silver plated inner and outer conductors for low attenuation. The solid PTFE dielectrics and FEP jackets provide a -65 to +125 degrees C temperature range. The outer shield construction consists of a helically wrapped braid combined with a second woven round braid to provide >100 dB of shielding effectiveness.



- Silver Plated Copper or Silver Plated Copper Clad Steel *
- Solid PTFE
- Helically Wrapped Silver Plated Copper Braid *
- Silver Plated Copper Round Braid *
- Extruded FEP Jacket - Blue Tint
- * Silver Plating per ASTM-B-289

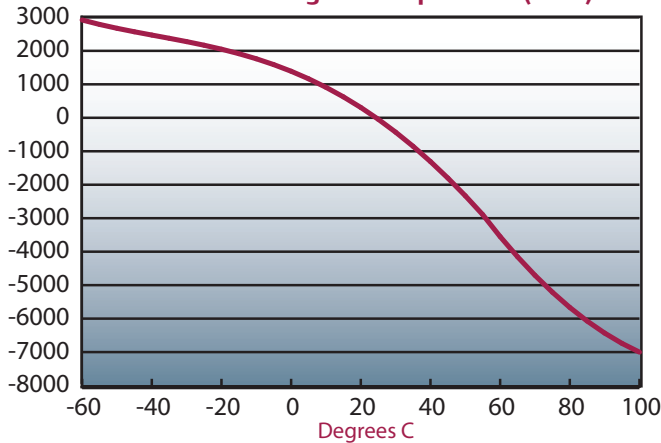
Attenuation (dB/100 ft)

GHz		SM405	SM402
.5	Nominal	17.6	7.94
1		25.2	11.59
2		36.3	17.12
6		65.9	32.79
12		97.5	50.73
18		123.3	66.23
*k1		23.98	10.35
*k2		1.20	1.24

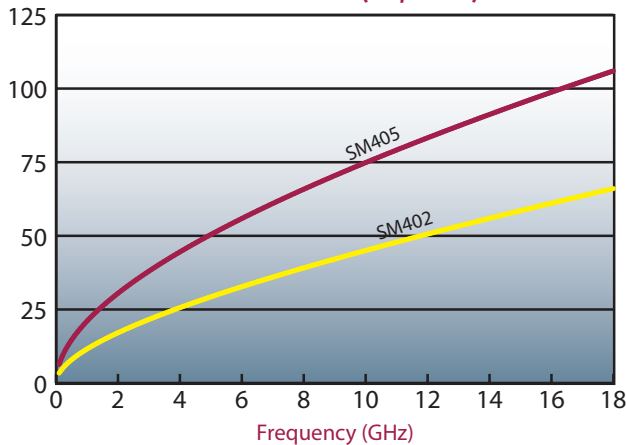
Cable Cross Reference

Semflex	Replacement
SM405	.086 Semi-rigid, TFlex-405, MF405, SS405, EZ Flex 405, Maxflex .086
SM402	.141 Semi-rigid, TFlex-402, MF402, SS402, EZ Flex 402, Maxflex .141

Phase Change vs Temperature (PPM)



Attenuation (dB/100ft)



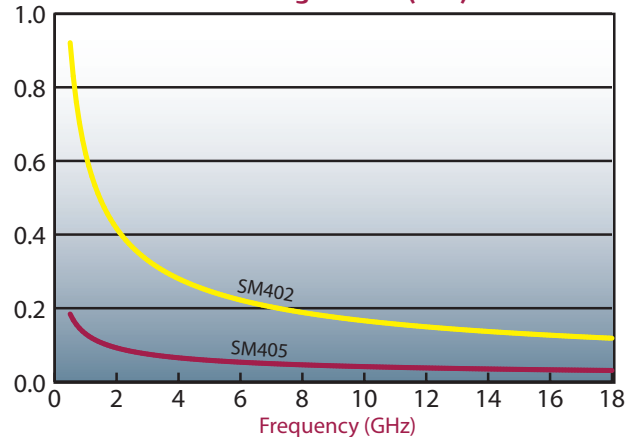
For RF and MW applications requiring inter-connects for:

- Semi-rigid replacement
- Military and commercial applications
- Densely packed cable systems
- Communication systems
- Commercial antennas

Average Power (KW)

GHz		SM405	SM402
.5	Power Rating	.18	.92
1		.13	.62
2		.09	.42
6		.05	.22
12		.04	.15
18		.03	.12

Average Power (KW)



* Attenuation at any frequency
 $= (k1 \times \sqrt{\text{freq}(\text{GHz})}) + (k2 \times \text{freq}(\text{GHz}))$

"The difference starts with the cable..."

The Semflex line of RG compatible cables are designed to offer significant performance upgrades over popular RG178, RG316, and RG142 cable types while using commercially available connectors. The below charts show evidence of Semflex's performance advantages. In some cases, as much as 126% improvement in shielding effectiveness and 73% improvement in attenuation are realized.



CABLE PROPERTIES

Mechanical Properties

	DB178	DB316	SI316	DB142	SI142
Jacket O.D. (in)	.080	.097	.110	.165	.175
Round Braid O.D. (in)	.065	.082	.091	.144	.153
Shield Interlayer O.D. (in)	-	-	.075	-	.137
Flat Braid O.D. (in)	.049	.066	.066	.128	.128
Dielectric O.D. (in)	.033	.060	.060	.116	.116
Center Conductor O.D. (in)	.012	.020	.020	.036	.036
Center Conductor Type	Stranded	Stranded	Stranded	Solid	Solid
Inside Min Bend Radius (in)	.4	.5	.5	1.1	1.1
Operating Temperature (°C)	-65/125	-65/125	-65/125	-65/125	-65/125
Weight (lbs/ft)	.01	.02	.02	.05	.05

Electrical Properties

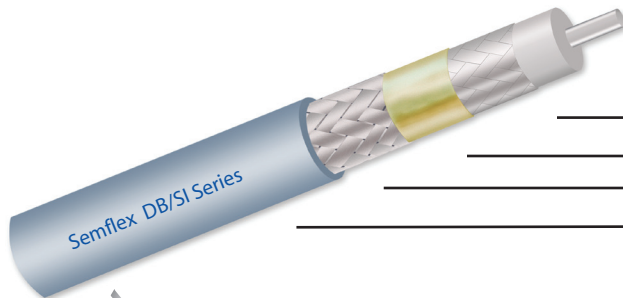
	DB178	DB316	SI316	DB142	SI142
Impedance (ohms)	50	50	50	50	50
Capacitance (pf/ft)	32	32	32	32	32
Inductance (nH.ft)	69	69	69	69	69
Shielding Effectiveness (dB)>85	>85	>90	>85	>90	
Cut off Frequency (GHz)	117	68	68	34	34
Velocity of Propagation	70%	70%	70%	70%	70%
Breakdown Voltage (KV)	>1	>2	>2	>5	>5
Max Structural VSWR	1.20:1	1.20:1	1.20:1	1.20:1	1.20:1



CABLE CONSTRUCTION

DB Series: This series uses the same solid PTFE core as RG cable but has a double shielded construction with a tightly woven flat and round braid.

SI Series: This series uses the same solid PTFE core as RG cable but has a triple shielded construction with a tightly woven flat braid, wrapped foil, and round braid.



- Silver Plated Copper or Silver Plated Copper Clad Steel *
- Solid PTFE
- Silver Plated Copper Flat Braid*
- Metalized Foil (SI Series Only)
- Silver Plated Copper Round Braid*
- Extruded FEP Jacket - Blue Tint
- * Silver Plating per ASTM-B-289

Attenuation (dB/100 ft)

GHz		DB178	DB316	SI316	DB142	SI142
.5	Nominal	29.51	17.9	17.6	8.69	7.94
1		42.15	25.7	25.2	12.24	11.59
2		60.43	37.1	36.3	18.05	17.12
6		108.22	67.4	65.9	34.46	32.79
12		157.96	99.6	97.5	53.16	50.73
18		198.09	126.0	123.3	69.26	66.23
*k1		40.75	24.49	23.98	10.98	10.35
*k2		1.40	1.23	1.20	1.26	1.24

Average Power (KW)

GHz		DB178	DB316	SI316	DB142	SI142
.5	Power Rating	.09	.12	.12	.29	.29
1		.06	.08	.08	.20	.20
2		.05	.07	.07	.15	.15
6		.03	.05	.05	.10	.10
12		.02	.04	.04	.06	.06
18		-	-	.02	.05	.05

Application Note:

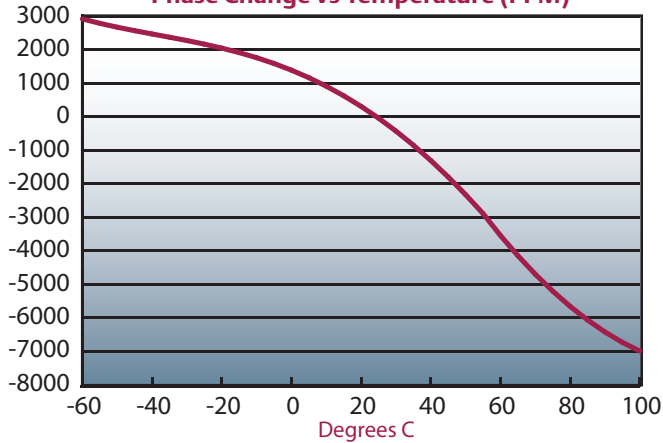
DB Series - uses the same connectors designed for double shielded RG cables.

SI Series - uses the same connectors designed for double shielded RG cables. In most applications, the foil interlayer must be removed prior to connector termination.

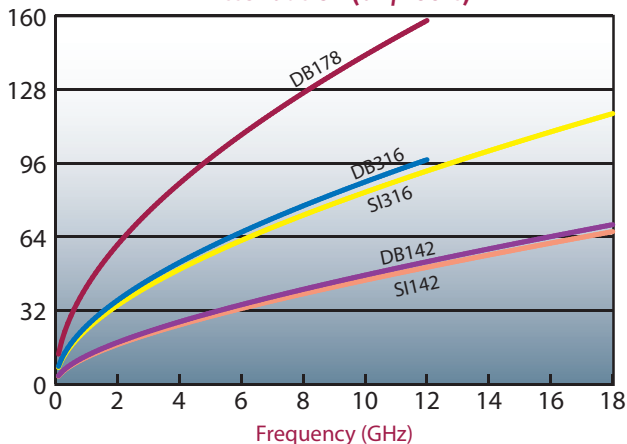
Cable Cross Reference

Semflex	Replacement
DB178	RG178, CN178
DB316	RG316, RD316, CN316
SI316	RG316, RD316, SF316, SB316
DB142	RG142, RD142, CN142
SI142	RG142, RD142, SF142, SB142

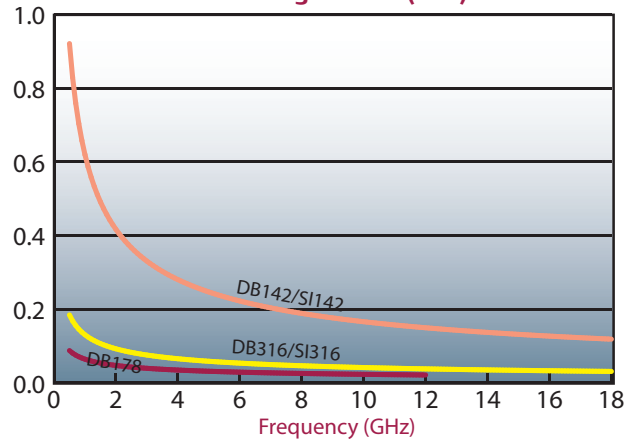
Phase Change vs Temperature (PPM)



Attenuation (dB/100ft)



Average Power (KW)



* Attenuation at any frequency
 $= (k1 \times \sqrt{\text{freq}(\text{GHz})}) + (k2 \times \text{freq}(\text{GHz}))$

"The difference starts with the cable..."

Our fully staffed engineering department has expertise in both cable and connector design. For over a quarter of a century, Semflex has engineered special products for applications with harsh environmental conditions, extreme flexure, high power, and tight mechanical constraints. Some of the many types of assemblies Semflex manufactures include:



Test Cables - HPT Series and DKT Series product lines offer a range of test cables to meet various testing needs from DC to 50 GHz. These cable assemblies are made specifically for the rigorous environments associated with medium and high volume testing.

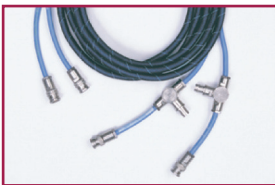
Interconnect Cable Assemblies - Five product lines provide a cost effective solution for any RF/Microwave application from DC - 50 GHz. The RGI Series uses standard industry cable and components to make various cable and harness assemblies for 50 and 75 ohm applications. The LAI, HPI, SWI & RTI Series use microporous dielectric cables to provide the best performing 50 ohm assemblies up to 50 GHz.



Semi-rigid and Conformable Assemblies - The SCI and SCA Cable Series are hand formable cable assemblies stocked in standard lengths for immediate delivery. SMI Series assemblies offer a flexible alternative to semi-rigid cables while the SRI Series are formed semi-rigid assemblies made to custom specifications to meet even the most stringent electrical and mechanical requirements.



Twinax/Triax Assemblies - Twinax and triax cable assemblies featuring M49142, M39029 and a variety of commercial connectors. Pin/socket assemblies from combo D-Sub and DIN to size 8 circular.



Custom Splitters and Power Dividers - 3 and 4 way splitting on most coax, twinax, and triax cables. Complete selection of connectors available.



Cable Harnesses - Combining any combination of 50 or 75 ohm coaxial cable, discrete wiring and single or multiple pin connectors for 1553 DataBus, video, instrumentation and many more commercial or military applications.

Emerson Network Power Connectivity Solutions, Inc. is herein referred to as the "Seller" and the customer or person or entity purchasing goods ("Goods") from Seller is referred to as the "Buyer." These Terms and Conditions, any price list or schedule, quotation, acknowledgment or invoice from Seller relevant to the sale of the Goods and all documents incorporated by specific reference herein or therein, constitute the complete and exclusive statement of the terms of the agreement governing the sale of Goods by Seller to Buyer. Buyer's acceptance of the Goods will manifest Buyer's assent to these Terms and Conditions. Seller reserves the right in its sole discretion to refuse orders.

1. **PRICES:** Unless otherwise specified in writing by Seller, the price quoted or specified by Seller for the Goods shall remain in effect for thirty (30) days after the date of Seller's quotation or acknowledgment of Buyer's order for the Goods, whichever occurs first, provided an unconditional authorization from Buyer for the shipment of the Goods is received and accepted by Seller within such time period. If such authorization is not received by Seller within such thirty (30) day period, Seller shall have the right to change the price for the Goods to Seller's price for the Goods at the time of shipment. All prices are exclusive of taxes, transportation and insurance, which are to be borne by Buyer.

2. **TAXES:** Any current or future tax or governmental charge (or increase in same) affecting Seller's costs of production, sale, or delivery or shipment, or which Seller is otherwise required to pay or collect in connection with the sale, purchase, delivery, storage, processing, use or consumption of Goods, shall be for Buyer's account and shall be added to the price.

3. **TERMS OF PAYMENT:** Unless otherwise specified by Seller, terms are net thirty (30) days from date of Seller's invoice in U.S. currency. Seller shall have the right, among other remedies, either to terminate this agreement or to suspend further performance under this and/or other agreements with Buyer in the event Buyer fails to make any payment when due, which other agreements Buyer and Seller hereby amend accordingly. Buyer shall be liable for all expenses, including attorneys' fees, relating to the collection of past due amounts. If any payment owed to Seller is not paid when due, it shall bear interest, at a rate to be determined by Seller, which shall not exceed the maximum rate permitted by law, from the date on which it is due until it is paid. Should Buyer's financial responsibility become unsatisfactory to Seller, cash payments or security satisfactory to Seller may be required by Seller for future deliveries and for the Goods theretofore delivered. If such cash payment or security is not provided, in addition to Seller's other rights and remedies, Seller may discontinue deliveries.

4. **SHIPMENT AND DELIVERY:** While Seller will use all reasonable commercial efforts to maintain the delivery date(s) acknowledged or quoted by Seller, all shipping dates are approximate and not guaranteed. Seller reserves the right to make partial shipments. Seller, at its option, shall not be bound to tender delivery of any Goods for which Buyer has not provided shipping instructions and other required information. If the shipment of the Goods is postponed or delayed by Buyer for any reason, Buyer agrees to reimburse Seller for any and all storage costs and other additional expenses resulting therefrom. Risk of loss and legal title to the Goods shall transfer to Buyer for sales in which the end destination of the Goods is outside of the United States immediately after the Goods have passed beyond the territorial limits of the United States. For all other shipments, risk of loss for damage and responsibility shall pass from Seller to Buyer upon delivery to and receipt by carrier at Seller's shipping point. All shipments are F.O.B. Seller's shipping point. Any claims for shortages or damages suffered in transit are the responsibility of Buyer and shall be submitted by Buyer directly to the carrier.

Shortages or damages must be identified and signed for at the time of delivery. Buyer shall inspect Goods delivered to it by Seller immediately upon receipt, and, any course of dealing to the contrary notwithstanding, failure of Buyer to give Seller notice of any claim within 30 days after receipt of such Goods shall be an unqualified acceptance of such Goods.

5. **LIMITED WARRANTY:** Subject to the limitations of Section 6, Seller warrants that the Goods manufactured by Seller will be free from defects in material and workmanship under normal use and regular service and maintenance for a period of one year from the date of shipment of the Goods by Seller, unless otherwise specified by Seller in writing. **THIS IS THE SOLE AND EXCLUSIVE WARRANTY GIVEN BY SELLER WITH RESPECT TO THE GOODS AND IS IN LIEU OF AND EXCLUDE ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, ARISING BY OPERATION OF LAW OR OTHERWISE, INCLUDING WITHOUT LIMITATION, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WHETHER OR NOT THE PURPOSE OR USE HAS BEEN DISCLOSED TO SELLER IN SPECIFICATIONS, DRAWINGS OR OTHERWISE, AND WHETHER OR NOT SELLER'S PRODUCTS ARE SPECIFICALLY DESIGNED AND/OR MANUFACTURED BY SELLER FOR BUYER'S USE OR PURPOSE.**

This warranty does not extend to any losses or damages due to misuse, accident, abuse, neglect, normal wear and tear, negligence (other than Seller's), unauthorized modification or alteration, use beyond rated capacity, unsuitable power sources or environmental conditions, improper installation, repair, handling, maintenance or application or any other cause not the fault of Seller. To the extent that Buyer or its agents has supplied specifications, information, representation of operating conditions or other data to Seller in the selection or design of the Goods and the preparation of Seller's quotation, and in the event that actual operating conditions or other conditions differ from those represented by Buyer, any warranties or other provisions contained herein which are affected by such conditions shall be null and void.

If within thirty (30) days after Buyer's discovery of any warranty defects within the warranty period, Buyer notifies Seller thereof in writing, Seller shall, at its option and as Buyer's exclusive remedy, repair, correct or replace F.O.B. point of manufacture, or refund the purchase price for, that portion of the Goods found by Seller to be defective. Failure by Buyer to give such written notice within the applicable time period shall be deemed an absolute and unconditional waiver of Buyer's claim for such defects. All costs of dismantling, reinstallation and freight and the time and expense of Seller's personnel and representatives for site travel and diagnosis under this warranty shall be borne by Buyer unless accepted in writing by Seller. Goods repaired or replaced during the warranty period shall be covered by the foregoing warranty for the remainder of the original warranty period or ninety (90) days from the date of shipment, whichever is longer.

Buyer assumes all other responsibility for any loss, damage, or injury to persons or property arising out of, connected with, or resulting from the use of Goods, either alone or in combination with other products/components.

Section 5 applies to any entity or person who may buy, acquire or use the Goods, including any entity or person who obtains the Goods from Buyer, and shall be bound by the limitations therein, including Section 6. Buyer agrees to provide such subsequent transferee conspicuous, written notice of the provisions of Sections 5 and 6.

6. LIMITATION OF REMEDY AND LIABILITY: THE SOLE AND EXCLUSIVE REMEDY FOR BREACH OF ANY WARRANTY HEREUNDER OTHER THAN THE WARRANTY PROVIDED UNDER SECTION 7 SHALL BE LIMITED TO REPAIR, CORRECTION OR REPLACEMENT, OR REFUND OF THE PURCHASE PRICE UNDER SECTION 5.

SELLER SHALL NOT BE LIABLE FOR DAMAGES CAUSED BY DELAY IN PERFORMANCE AND THE REMEDIES SET FORTH IN THIS AGREEMENT ARE EXCLUSIVE. IN NO EVENT, REGARDLESS OF THE FORM OF THE CLAIM OR CAUSE OF ACTION (WHETHER BASED IN CONTRACT, INFRINGEMENT, NEGLIGENCE, STRICT LIABILITY, OTHER TORT OR OTHERWISE), SHALL SELLER'S LIABILITY TO BUYER AND/OR ITS CUSTOMERS EXCEED THE PRICE PAID BY BUYER FOR THE SPECIFIC GOODS PROVIDED BY SELLER GIVING RISE TO THE CLAIM OR CAUSE OF ACTION. BUYER AGREES THAT IN NO EVENT SHALL SELLER'S LIABILITY TO BUYER AND/OR ITS CUSTOMERS EXTEND TO INCLUDE INCIDENTAL, CONSEQUENTIAL OR PUNITIVE DAMAGES. The term "consequential damages" shall include, but not be limited to, loss of anticipated profits, business interruption, loss of use, revenue, reputation and data, costs incurred, including without limitation, for capital, fuel, power and loss or damage to property or equipment.

Buyer expressly acknowledges and agrees that Seller has set its prices and entered into this agreement in reliance upon the limitations of liability and other terms and conditions specified herein, which allocates the risk between Seller and Buyer and form a basis of this bargain between the parties.

It is expressly understood that any technical advice furnished by Seller with respect to the use of the Goods is given without charge, and Seller assumes no obligation or liability for the advice given, or results obtained, all such advice being given and accepted at Buyer's risk.

7. **PATENTS AND COPYRIGHTS:** Subject to the limitations of the second paragraph of Section 6, Seller warrants that the Goods sold, except as are made specifically for Buyer according to Buyer's specifications, do not infringe any valid U.S. patent or copyright in existence as of the date of shipment. This warranty is given upon the condition that Buyer promptly notify Seller of any claim or suit involving Buyer in which such infringement is alleged and cooperate fully with Seller and permit Seller to control completely the defense, settlement or compromise of any such allegation of infringement. Seller's warranty as to use patents only applies to infringement arising solely out of the inherent operation according to Seller's specifications and instructions (i) of such Goods, or (ii) of

any combination of Goods acquired from Seller in a system designed by Seller. In the event such Goods are held to infringe such a U.S. patent or copyright in such suit, and the use of such Goods is enjoined, or in the case of a compromise or settlement by Seller, Seller shall have the right, at its option and expense, to procure for Buyer the right to continue using such Goods, or replace them with non-infringing Goods, or modify same to become non-infringing, or grant Buyer a credit for the depreciated value of such Goods and accept return of them. In the event of the foregoing, Seller may also, at its option, cancel the agreement as to future deliveries of such Goods, without liability.

8. **EXCUSE OF PERFORMANCE:** Seller shall not be liable for delays in performance or for non-performance due to acts of God; acts of Buyer; war; fire; flood; weather; sabotage; strikes or labor disputes; civil disturbances or riots; governmental requests, restrictions, allocations, laws, regulations, orders or actions; unavailability of or delays in transportation; default of suppliers; or unforeseen circumstances or any events or causes beyond Seller's reasonable control. Deliveries or other performance may be suspended for an appropriate period of time or canceled by Seller upon notice to Buyer in the event of any of the foregoing, but the balance of the agreement shall otherwise remain unaffected as a result of the foregoing.

If Seller determines that its ability to supply the total demand for the Goods, or to obtain material used directly or indirectly in the manufacture of the Goods, is hindered, limited or made impracticable due to causes set forth in the preceding paragraph, Seller may allocate its available supply of the Goods or such material without obligation to acquire other supplies of any such Goods or material among itself and its purchasers on such basis as Seller determines to be equitable without liability for any failure of performance which may result therefrom.

9. **CANCELLATION:** Unless otherwise agreed in writing by Seller, orders under this agreement may not be canceled by Buyer for any reason.

10. **CHANGES:** Buyer may request changes or additions to the Goods consistent with Seller's specifications and criteria. In the event such changes or additions are accepted by Seller, Seller may revise the price and dates of delivery.

Seller reserves the right to change designs and specifications for the Goods without prior notice to Buyer, except with respect to Goods being made-to-order for Buyer. Seller shall have no obligation to install or make such change in any Goods manufactured prior to the date of such change.

11. **NUCLEAR/MEDICAL:** GOODS AND SERVICES SOLD HEREUNDER ARE NOT FOR USE IN CONNECTION WITH ANY NUCLEAR, MEDICAL, LIFE-SUPPORT AND RELATED APPLICATIONS. Buyer accepts goods and services with the foregoing understanding, agrees to communicate the same in writing to any subsequent purchasers or users and to defend, indemnify and hold harmless Seller from any claims, losses, suits, judgments and damages, including incidental and consequential damages, arising from such use, whether the cause of action be based in tort, contract or otherwise, including allegations that the Seller's liability is based on negligence or strict liability.

12. **BUYER'S COMPLIANCE WITH LAWS:** In connection with the transactions contemplated by this agreement, Buyer is familiar with and shall fully comply with all applicable laws, regulations, rules and other requirements of the United States and of any applicable state, foreign and local governmental body in connection with the purchase, receipt, use, transfer and disposal of the Goods.

13. **EXPORT/IMPORT:** Buyer agrees that all applicable import and export control laws, regulations, orders and requirements, including without limitation those of the United States and the European Union, and the jurisdictions in which the Seller and Buyer are established or from which Goods and Services may be supplied, will apply to their receipt and use. In no event shall Buyer use, transfer, release, import, export, Goods in violation of such applicable laws, regulations, orders or requirements.

14. **TOOLING:** Tool, die, and pattern charges, if any, are in addition to the price of the Goods and are due and payable upon completion of the tooling. All such tools, dies and patterns shall be and remain the property of Seller. Charges for tools, dies, and patterns do not convey to Buyer, title, ownership interest in, or rights to possession or removal, or prevent their use by Seller for other purchasers, except as otherwise expressly provided by Seller and Buyer in writing with reference to this provision.

15. **RETURNED GOODS:** Except as otherwise provided with respect to warranty defects in Section 5, advance written permission to return Goods must be obtained from Seller's customer service department. Such Goods must be current, unused, catalogued Goods and must be shipped, transportation prepaid, to the Seller's specified return location. Returns made without proper written permission will not be accepted by Seller. Credit or exchange for such returned Goods will be at the billing price or current price, whichever is lower, from which will be deducted an inspection, restocking and repacking charge and the cost of any reconditioning. Seller reserves the right to inspect Goods prior to authorizing return.

16. **BUYER SUPPLIED DATA:** To the extent that Seller has been provided by or on behalf of Buyer any specifications, description of operating conditions or other data and information in connection with the selection or design of the Goods, and the actual operating conditions or other circumstances differ from those provided by Buyer and relied upon by Seller, any warranties or other provisions contained herein which are affected by such conditions shall be null and void.

17. **DRAWINGS:** Seller's prints and drawings (including without limitation, the underlying technology) furnished by Seller to Buyer in connection with this agreement are the property of Seller and Seller retains all rights, including without limitation, exclusive rights of use, licensing and sale. Possession of such prints or drawings does not convey to Buyer any rights or license, and Buyer shall return all copies (in whatever medium) of such prints or drawings to Seller immediately upon request therefore.

18. **ASSIGNMENT:** Buyer shall not assign its rights or delegate its duties hereunder or any interest herein without the prior written consent of Seller, and any such assignment, without such consent, shall be void.

19. **GENERAL PROVISIONS:** These terms and conditions supersede all other communications, negotiations and prior oral or written statements regarding the subject matter of these terms and conditions. No change, modification, rescission, discharge, abandonment, or waiver of these terms and conditions shall be binding upon the Seller unless made in writing and signed on its behalf by a duly authorized representative of Seller. No conditions, usage of trade, course of dealing or performance, understanding or agreement purporting to modify, vary, explain, or supplement these terms and conditions shall be binding unless hereafter made in writing and signed by the party to be bound, and no modification or additional terms shall be applicable to this agreement by Seller's receipt, acknowledgment, or acceptance of purchase orders, shipping instruction forms, or other documentation containing terms at variance with or in addition to those set forth herein. Any such modifications or additional terms are specifically rejected and deemed a material alteration hereof. If this document shall be deemed an acceptance of a prior offer by Buyer, such acceptance is expressly conditional upon Buyer's assent to any additional or different terms set forth herein. No waiver by either party with respect to any breach or default or of any right or remedy, and no course of dealing, shall be deemed to constitute a continuing waiver of any other breach or default or of any other right or remedy, unless such waiver be expressed in writing and signed by the party to be bound. All typographical or clerical errors made by Seller in any quotation, acknowledgment or publication are subject to correction.

The validity, performance, and all other matters relating to the interpretation and effect of this agreement shall be governed by the law of the state of Missouri. Buyer and Seller agree that the proper venue for all actions arising in connection herewith shall be only in Missouri and the parties agree to submit to such jurisdiction. No action, regardless of form, arising out of transactions relating to this contract, may be brought by either party more than two (2) years after the cause of action has accrued. The U.N. Convention on Contracts for the International Sales of Goods shall not apply to this agreement.

Semflex is proud to manufacture cable for our sister brand Midwest Microwave. Below is a cross reference sheet for our cables.

Semflex-Midwest Microwave Comparison Chart

Solid Center Conductor Cable		
Semflex PN	Diameter	Midwest Microwave PN
HP120S	0.124"	Midwest Microwave M-38
HP160S	0.160"	Midwest Microwave M-46
HP190S	0.205"	Midwest Microwave M-54
HP305S	0.305"	Midwest Microwave M-82
HP450S	0.450"	Midwest Microwave M-92

Stranded Center Conductor Cable		
Semflex PN	Diameter	Midwest Microwave PN
HP120	0.124"	Midwest Microwave M-36
HP160	0.160"	Midwest Microwave M-44
HP190	0.205"	Midwest Microwave M-52
HP305	0.305"	Midwest Microwave M-80
HP350	0.350"	Midwest Microwave M-90
HP500	0.500"	Midwest Microwave M-100

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Emerson Network Power

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