TIMES MICROWAVE SYSTEMS
AN AMPHENOL COMPANY

SPACE FLIGHT

Cable Assemblies

SpaceFlight™

PhaseTrack®

SpaceFlight Catalog

Index

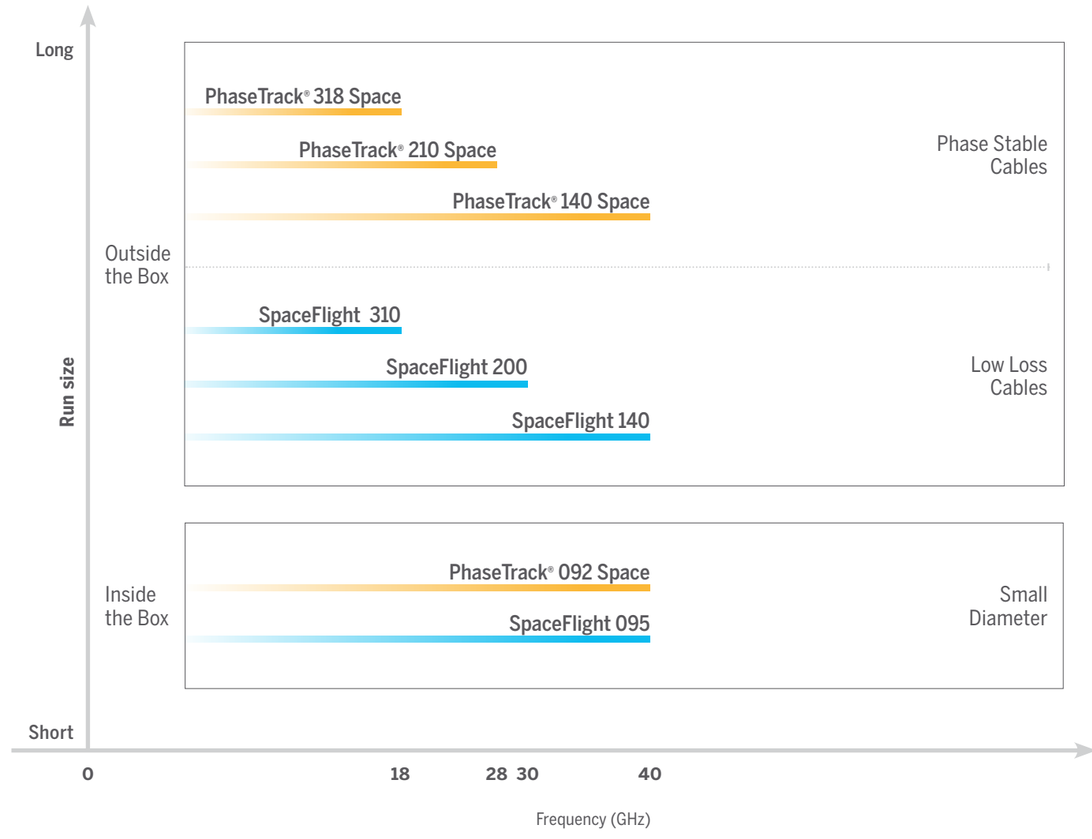
Our cable assemblies are low outgassing in accordance with NASA and ECSS standards and are designed for leading edge performance in challenging space applications. PhaseTrack® cable assemblies are designed for applications demanding minimal phase change over temperature. All PhaseTrack cables use a proprietary TF4® dielectric that does not have the abrupt shift in the phase that occurs with solid- or tape-wrapped PTFE-based products under normal room ambient temperature conditions.

Space Assembly Comparison Chart

Space Assembly Type	Cable	Max. Frequency
SpaceFlight™ Space Assemblies	SPFLT-095	40
	SPFLT-140	40
	SPFLT-200	30
	SPFLT-310	18.5
PhaseTrack® -SP Space Assemblies	PT092-SP	40
	PT140-SP	40
	PT210-SP	28
	PT318-SP	18

Cable Assembly Guide

Selecting the correct assembly for the right application is not always an easy task. Below are some considerations when selecting RF test assemblies.



- Sold as cable assemblies
- Class 100,000 clean room manufacturing
- Vented connectors, if applicable
- Optimized for lowest attenuation
- Radiation Resistance: 100 MRads

SpaceFlight™ 095

Cable Assemblies • Space Flight Applications

Features

- Low Loss
- Radiation Resistant
- Low Outgassing
- Light Weight

Specifications

Impedance 50 Ohms

Op Temp -238 to +302°F -150 to +150°C

	Units	
Diameter	in (mm)	0.102 (2.5908)
Weight	lb/ft (kg/m)	0.081 (0.1205)
Minimum Bend Radius	in (mm)	0.5 (12.7)
Maximum Frequency	GHz	40
Maximum Operating Voltage	VACrms	1300
Capacitance	pF/ft (pF/m)	25.8 (83.62)
Velocity of Propagation	%	81
Delay	ns/ft (ns/m)	1.25 (4.1)
Shielding	dB	> 90

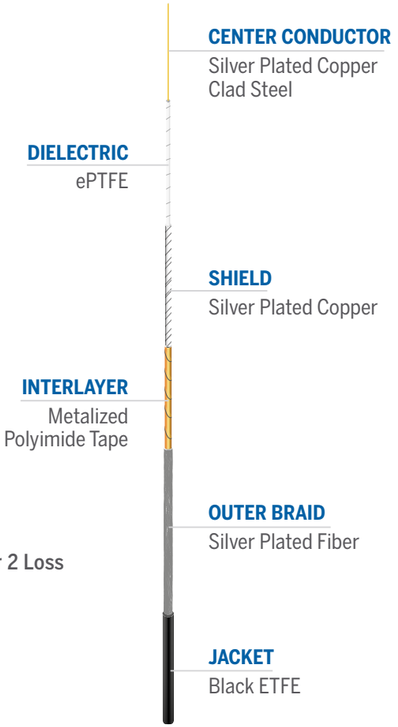
Calculation

IL = (K1 x √(f) + K2 x f) x Cable Length + Connector 1 Loss + Connector 2 Loss

(K1 x √(f) + K2 x f): Cable Insertion Loss, f = Frequency (MHz)

Cable Length: Use K values with matching length unit

K values	dB/ft	dB/m
K1	0.006525	0.021407
K2	0.0000015	0.0000050



Ordering Guide SPFLT095 -XXXXX XXXXX- XX.X X

- Connector A
- Connector B -
- Length
- I- Inches, F-Feet, M-Meter, C-Centimeters

Connector Code	Description	Connector Body	Center Contact	Loss
SP116	2.92mm, Male, Straight	Stainless Steel , ASTM A582; Gold Plate, MIL-DTL-45204	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	0.04 x √f (GHz)
SP054	2.92mm, Male, Right Angle	Stainless Steel, ASTM A582; Passivate, AMS-2700	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	0.05 x √f (GHz)
47211	SMA, Male, Straight	Stainless Steel, ASTM A582; Gold Plate, MIL-DTL-45204	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	0.04 x √f (GHz)
47212	SMA, Male, Right Angle	Stainless Steel, ASTM A582; Passivate, AMS-2700	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	0.05 x √f (GHz)
SP164	SMP, Female, Right Angle	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	Beryllium Copper, ASTM B196, ASTM B196; Gold Plate, MIL-DTL-45204	0.07 x √f (GHz)
SP099	SMA, Male, Straight	Stainless Steel, ASTM A582; Passivate, AMS-2700	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	0.04 x √f (GHz)
3190-3379	SMPM, Female, Right Angle	Beryllium Copper, ASTM B196; Gold Plate, ASTM B488, Over Nickel, AMS-QQ-N-290	Beryllium Copper, ASTM B196; Gold Plate, ASTM B488, Over Nickel, AMS-QQ-N-290	0.07 x √f (GHz)
3190-3378	SMPM, Female, Straight	Beryllium Copper, ASTM B196; Gold Plate, ASTM B488, Over Nickel, AMS-QQ-N-290	Beryllium Copper, ASTM B196; Gold Plate, ASTM B488, Over Nickel, AMS-QQ-N-290	0.06 x √f (GHz)

SpaceFlight™ 140

Cable Assemblies • Space Flight Applications

TIMES MICROWAVE SYSTEMS AN AMPHENOL COMPANY

Features

- Low Loss
- Radiation Resistant
- Low Outgassing
- Light Weight

Specifications

Impedance 50 Ohms

Op Temp -238 to +302°F -150 to +150°C

	Units	
Diameter	in (mm)	0.139 (3.5306)
Weight	lb/ft (kg/m)	0.0148 (0.022)
Minimum Bend Radius	in (mm)	0.625 (15.875)
Maximum Frequency	GHz	40
Maximum Operating Voltage	VACrms	3000
Capacitance	pF/ft (pF/m)	25.4 (84.66)
Velocity of Propagation	%	80
Delay	ns/ft (ns/m)	1.29 (4.23)
Shielding	dB	> 90

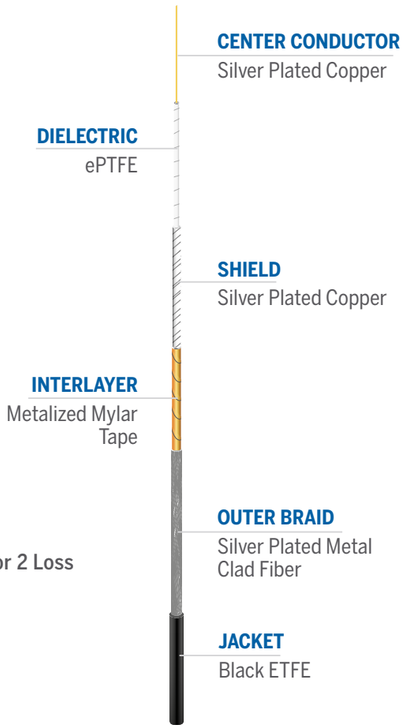
Calculation

IL = (K1 x √(f) + K2 x f) x Cable Length + Connector 1 Loss + Connector 2 Loss

(K1 x √(f) + K2 x f): Cable Insertion Loss, f = Frequency (MHz)

Cable Length: Use K values with matching length unit

K values	dB/ft	dB/m
K1	0.003640	0.011942
K2	0.0000014	0.0000047



Ordering Guide SPFLT140 -XXXXX XXXXX- XX.X X

- Connector A
- Connector B -
- Length
- I- Inches, F-Feet, M-Meter, C-Centimeters

Connector Code	Description	Connector Body	Center Contact	Loss
SP048	SMA, Male, Straight	Stainless Steel, ASTM A582; Gold Plate, MIL-DTL-45204	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	0.04 x √f (GHz)
SP047	SMA, Male, Right Angle	Stainless Steel, ASTM A582; Gold Plate, MIL-DTL-45204	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	0.05 x √f (GHz)
SP042	SMP, Female, Straight, Bulkhead	Stainless Steel, ASTM A582; Passivate, AMS-2700	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	0.05 x √f (GHz)
SP074	2.92mm, Male, Straight	Stainless Steel, ASTM A582; Passivate, AMS-2700	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	0.04 x √f (GHz)

SpaceFlight™ 200

Cable Assemblies • Space Flight Applications

Features

- Low Loss
- High Power Handling
- Multipaction Resistant
- Vented Connectors
- Radiation Resistant
- Low Outgassing

Specifications

Impedance 50 Ohms

Op Temp -238 to +302°F -150 to +150°C

	Units	
Diameter	in (mm)	0.194 (4.9276)
Weight	lb/ft (kg/m)	0.035 (0.0521)
Minimum Bend Radius	in (mm)	1.0 (25.4)
Maximum Frequency	GHz	30
Maximum Operating Voltage	VACrms	3000
Capacitance	pF/ft (pF/m)	25.81 (84.66)
Velocity of Propagation	%	80
Delay	ns/ft (ns/m)	1.27 (4.16)
Shielding	dB	> 90

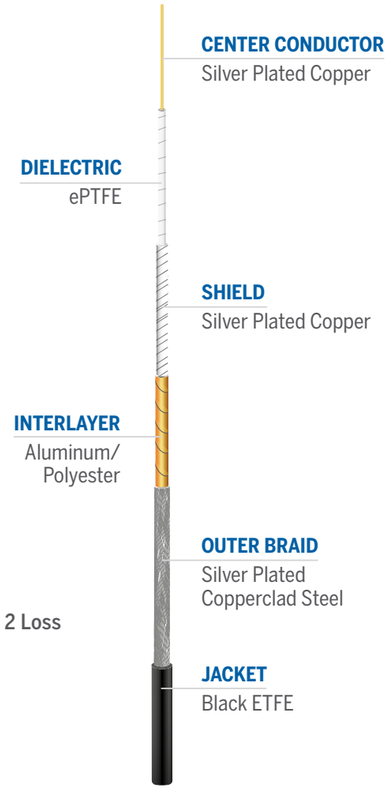
Calculation

IL = (K1 x √(f) + K2 x f) x Cable Length + Connector 1 Loss + Connector 2 Loss

(K1 x √(f) + K2 x f): Cable Insertion Loss, f = Frequency (MHz)

Cable Length: Use K values with matching length unit

K values	dB/ft	dB/m
K1	0.002201	0.007221
K2	0.0000014	0.0000046



Ordering Guide SPFLT200 -XXXXX XXXXX- XX.X X

- Connector A | Connector B - | Length | I- Inches, F-Feet, M-Meter, C-Centimeters

Connector Code	Description	Connector Body	Center Contact	Loss
SP068	2.92mm, Male, Right Angle	Stainless Steel, ASTM A582; Passivate, AMS-2700	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	0.05 x √f (GHz)
SP018	SMA, Male, Straight	Stainless Steel, ASTM A582; Passivate, AMS-2700	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	0.04 x √f (GHz)
SP028	SMA, Male, Right Angle	Stainless Steel, ASTM A582; Passivate, AMS-2700	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	0.05 x √f (GHz)
SP023	3.5mm, Male, Straight	Stainless Steel, ASTM A582; Passivate, AMS-2700	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	0.04 x √f (GHz)
SP021	2.92mm, Male, Straight	Stainless Steel, ASTM A582; Passivate, AMS-2700	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	0.04 x √f (GHz)

SpaceFlight™ 310

Cable Assemblies • Space Flight Applications

TIMES MICROWAVE SYSTEMS AN AMPHENOL COMPANY

Features

- Low Loss
- High Power Handling
- Multipaction Resistant
- Vented Connectors
- Radiation Resistant
- Low Outgassing

Specifications

Impedance 50 Ohms

Op Temp -238 to +302°F -150 to +150°C

	Units	
Diameter	in (mm)	0.313 (7.9502)
Weight	lb/ft (kg/m)	0.7176 (1.0679)
Minimum Bend Radius	in (mm)	1.5 (38.1)
Maximum Frequency	GHz	18.5
Maximum Operating Voltage	VACrms	1300
Capacitance	pF/ft (pF/m)	25.49 (83.62)
Velocity of Propagation	%	81
Delay	ns/ft (ns/m)	1.25 (4.11)
Shielding	dB	> 90

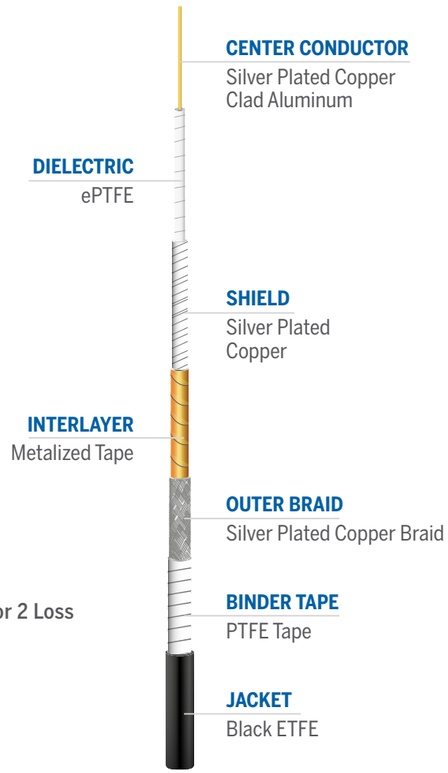
Calculation

IL = (K1 x √(f) + K2 x f) x Cable Length + Connector 1 Loss + Connector 2 Loss

(K1 x √(f) + K2 x f): Cable Insertion Loss, f = Frequency (MHz)

Cable Length: Use K values with matching length unit

K values	dB/ft	dB/m
K1	0.001404	0.004606
K2	0.0000012	0.0000039



Ordering Guide SPFLT310 -XXXXX XXXXX- XX.X X

- Connector A | Connector B - | Length | I- Inches, F-Feet, M-Meter, C-Centimeters

Connector Code	Description	Connector Body	Center Contact	Loss
SP052	SMA, Male, Straight	Stainless Steel, ASTM A582; Passivate, AMS-2700	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	0.04 x √f (GHz)
SP077	TNC, Male, Straight, High Power	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	0.07 x √f (GHz)
SP076	TNC, Female, Straight, High Power	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	0.07 x √f (GHz)
SP055	SMA, Male, Right Angle	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	0.05 x √f (GHz)

PhaseTrack® 092-SP

Cable Assemblies • Space Flight Applications

Features

- Superior Phase Stability
- PTFE "Knee" is Nonexistent
- TF4™ Dielectric Technology
- Radiation Resistant
- Low Outgassing

CENTER CONDUCTOR
Silver-Plated Copper Clad Steel

DIELECTRIC
TF4®

SHIELD
Silver Plated Copper

INTERLAYER
Metalized Polyimide Tape

OUTER BRAID
Silver-Plated Metal Clad Fiber

JACKET
Black ETFE

Specifications

Impedance 50 Ohms | Op Temp -238 to +302°F -150 to +150°C

	Units	
Diameter	in (mm)	0.103 (2.62)
Weight	lb/ft (kg/m)	0.0113 (0.00513)
Minimum Bend Radius	in (mm)	0.500 (12.70)
Maximum Frequency	GHz	40
Maximum Operating Voltage	VACrms	500
Capacitance	pF/ft (pF/m)	24.2 (79.4)
Velocity of Propagation	%	80
Delay	ns/ft (ns/m)	1.24 (4.07)
Shielding	dB	> 90

Calculation

IL = (K1 x √(f) + K2 x f) x Cable Length + Connector 1 Loss + Connector 2 Loss

Cable Insertion Loss
f = Frequency (MHz)

Use **K** values with matching length unit

K values	dB/ft	dB/m
K1	0.006575	0.021571
K2	0.0000096	0.0000315

Ordering Guide PT092 -XXXXX XXXXX- XX.X X

- Connector A | Connector B - | Length | I- Inches, F-Feet, M-Meter, C-Centimeters

Connector Code	Description	Connector Body	Center Contact	Loss
SP116	2.92mm, Male, Straight	Stainless Steel, ASTM A582; Gold Plate, MIL-DTL-45204	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	0.04 x vf (GHz)
SP054	2.92mm, Male, Right Angle	Stainless Steel, ASTM A582; Passivate, AMS-2700	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	0.05 x vf (GHz)
47211	SMA, Male, Straight	Stainless Steel, ASTM A582; Gold Plate, MIL-DTL-45204	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	0.04 x vf (GHz)
47212	SMA, Male, Right Angle	Stainless Steel, ASTM A582; Passivate, AMS-2700	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	0.05 x vf (GHz)
SP164	SMP, Female, Right Angle	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	0.07 x vf (GHz)
SP099	SMA, Male, Straight	Stainless Steel, ASTM A582; Passivate, AMS-2700	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	0.04 x vf (GHz)

PhaseTrack® 140-SP

TIMES MICROWAVE SYSTEMS
AN AMPHENOL COMPANY

Cable Assemblies • Space Flight Applications

Features

- Superior Phase Stability
- PTFE "Knee" is Nonexistent
- TF4™ Dielectric Technology
- Radiation Resistant
- Low Outgassing

CENTER CONDUCTOR
Silver Plated Copper

DIELECTRIC
TF4®

SHIELD
Silver Plated Copper

INTERLAYER
Metalized Polyimide Tape

OUTER BRAID
Silver Plated Metal Clad Fiber

JACKET
Black ETFE

Specifications

Impedance 50 Ohms | Op Temp -238 to +302°F -150 to +150°C

	Units	
Diameter	in (mm)	0.144 (3.6576)
Weight	lb/ft (kg/m)	0.01975 (0.0895)
Minimum Bend Radius	in (mm)	0.75 (19.05)
Maximum Frequency	GHz	40
Maximum Operating Voltage	VACrms	500
Capacitance	pF/ft (pF/m)	25.23 (82.78)
Velocity of Propagation	%	81
Delay	ns/ft (ns/m)	1.26 (4.13)
Shielding	dB	> 90

Calculation

IL = (K1 x √(f) + K2 x f) x Cable Length + Connector 1 Loss + Connector 2 Loss

Cable Insertion Loss
f = Frequency (MHz)

Use **K** values with matching length unit

K values	dB/ft	dB/m
K1	0.004233	0.013886
K2	0.0000054	0.0000176

Ordering Guide PT140 -XXXXX XXXXX- XX.X X

- Connector A | Connector B - | Length | I- Inches, F-Feet, M-Meter, C-Centimeters

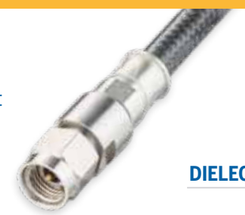
Connector Code	Description	Connector Body	Center Contact	Loss
SP002	SMA, Male, Straight	Stainless Steel, ASTM A582; Passivate, AMS-2700	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	0.04 x vf (GHz)
SP043	SMA, Male, Right Angle	Stainless Steel, ASTM A582; Passivate, AMS-2700	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	0.05 x vf (GHz)
SP046	SMA, Female, Straight, Bulkhead	Stainless Steel, ASTM A582; Passivate, AMS-2700	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	0.05 x vf (GHz)
3190-3212	Mini SMP, Female, Straight	Beryllium Copper, ASTM B196; Gold Plate, ASTM B488, Over Nickel, AMS-QQ-N-290	Beryllium Copper, ASTM B196; Gold Plate, ASTM B488, Over Nickel, AMS-QQ-N-290	0.07 x vf (GHz)
SP062	SMP, Female, Straight	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	0.06 x vf (GHz)
SP081	2.92mm, Male, Straight	Stainless Steel, ASTM A582; Passivate, AMS-2700	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	0.04 x vf (GHz)
SP042	SMA, Female, Straight, Bulkhead	Stainless Steel, ASTM A582; Passivate, AMS-2700	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	0.05 x vf (GHz)

PhaseTrack® 210-SP

Cable Assemblies • Space Flight Applications

Features

- Superior Phase Stability
- PTFE "Knee" is Nonexistent
- TF4™ Dielectric Technology
- High Power Handling
- Multipaction Resistant
- Vented Connectors
- Radiation Resistant
- Low outgassing



Specifications

Ω Impedance 50 Ohms

Op Temp -238 to +302°F -150 to +150°C

	Units	
Diameter	in (mm)	0.224 (5.69)
Weight	lb/ft (kg/m)	0.048 (0.02177)
Minimum Bend Radius	in (mm)	1.125 (28.575)
Maximum Frequency	GHz	28
Maximum Operating Voltage	VACrms	1900
Capacitance	pF/ft (pF/m)	24.4 (80.06)
Velocity of Propagation	%	83
Delay	ns/ft (ns/m)	1.23 (4.04)
Shielding	dB	> 90

Calculation

IL = (K1 x √(f) + K2 x f) x Cable Length + Connector 1 Loss + Connector 2 Loss

Cable Insertion Loss
f = Frequency (MHz)

Use K values with matching length unit

K values	dB/ft	dB/m
K1	0.002597	0.008520
K2	0.0000944	0.0003095

Ordering Guide PT210SP -XXXXX XXXXX- XX.X X

-XXXXX: - Connector A
XXXXX-: Connector B -
XX.X: Length
X: I- Inches, F-Feet, M-Meter, C-Centimeters

Connector Code	Description	Connector Body	Center Contact	Loss
SP039	SMA, Male, straight	Stainless Steel, ASTM A582; Passivate, AMS-2700	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	0.04 x √f (GHz)
SP024	SMA, Male, Right Angle	Stainless Steel, ASTM A582; Passivate, AMS-2700	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	0.05 x √f (GHz)
SP080	2.92mm, Male, Straight	Stainless Steel, ASTM A582; Passivate, AMS-2700	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	0.04 x √f (GHz)
SP030	TNC, Male, Staight, High Power	Stainless Steel, ASTM A582; Passivate, AMS-2700	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	0.07 x √f (GHz)
SP001	Precision TNC, Male, Staight	Stainless Steel, ASTM A582; Passivate, AMS-2700	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	0.06 x √f (GHz)

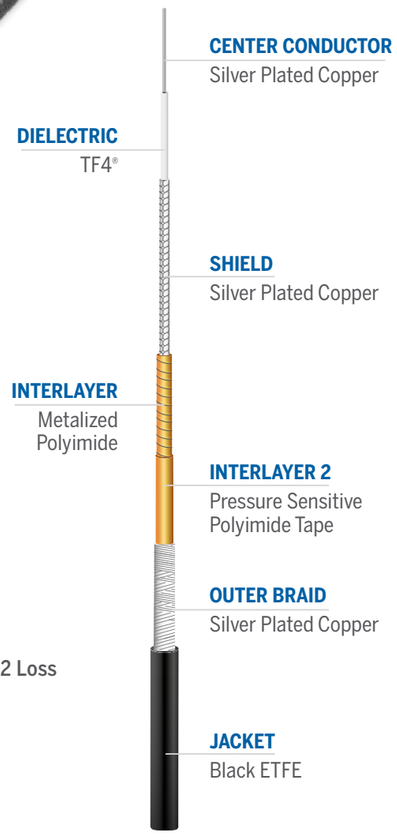
PhaseTrack® 318-SP

Cable Assemblies • Space Flight Applications

TIMES MICROWAVE SYSTEMS
AN AMPHENOL COMPANY

Features

- Superior Phase Stability
- PTFE "Knee" is Nonexistent
- TF4™ Dielectric Technology
- High Power Handling
- Multipaction Resistant
- Vented Connectors
- Radiation Resistant
- Low outgassing



Specifications

Ω Impedance 50 Ohms

Op Temp -238 to +302°F -150 to +150°C

	Units	
Diameter	in (mm)	0.32 (8.128)
Weight	lb/ft (kg/m)	0.0874 (0.1301)
Minimum Bend Radius	in (mm)	1.75 (44.45)
Maximum Frequency	GHz	18
Maximum Operating Voltage	VACrms	500
Capacitance	pF/ft (pF/m)	24.0 (78.74)
Velocity of Propagation	%	82.5
Delay	ns/ft (ns/m)	1.23 (4.04)
Shielding	dB	> 90

Calculation

IL = (K1 x √(f) + K2 x f) x Cable Length + Connector 1 Loss + Connector 2 Loss

Cable Insertion Loss
f = Frequency (MHz)

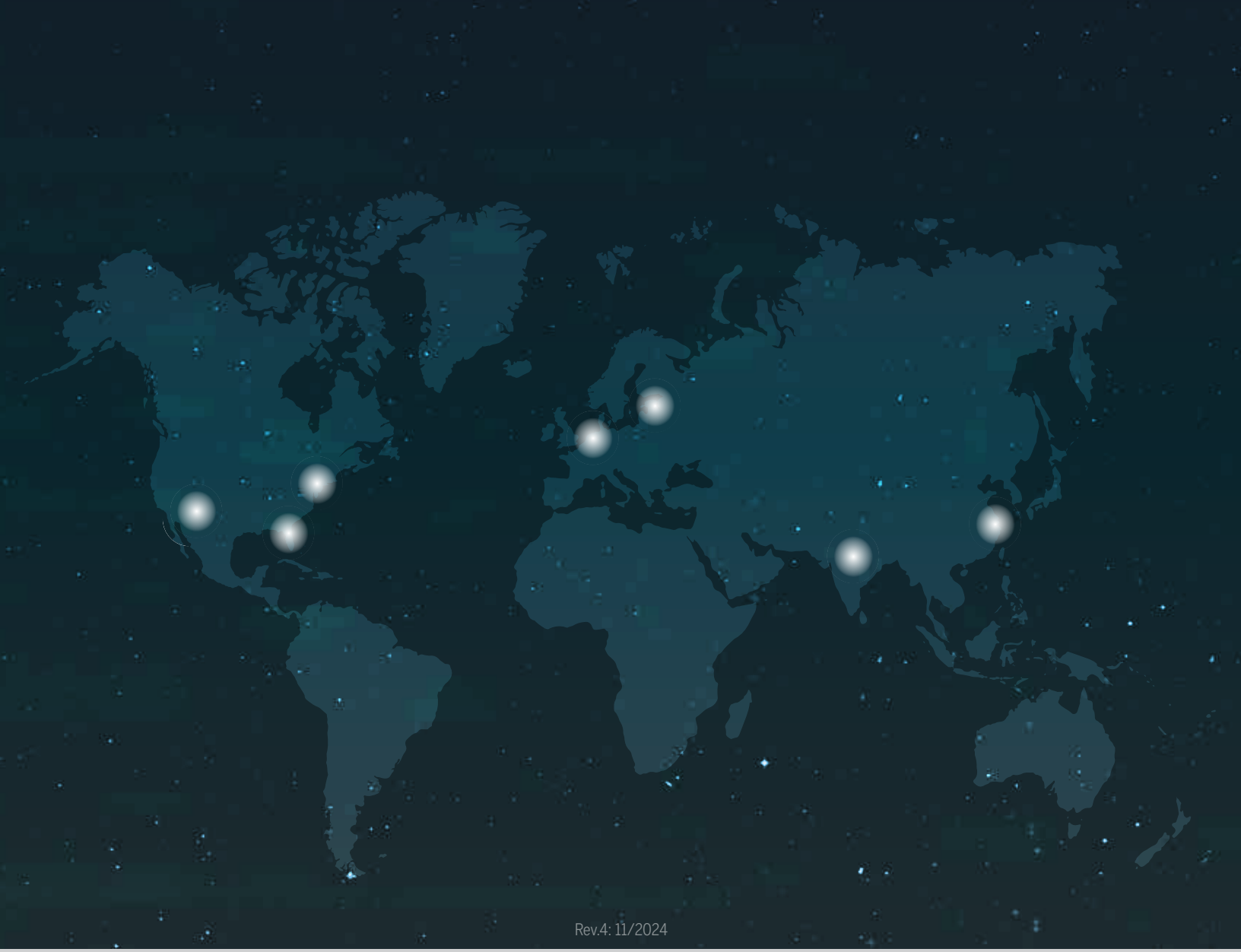
Use K values with matching length unit

K values	dB/ft	dB/m
K1	0.001415	0.004642
K2	0.0000070	0.0000229

Ordering Guide PT318SP -XXXXX XXXXX- XX.X X

-XXXXX: - Connector A
XXXXX-: Connector B -
XX.X: Length
X: I- Inches, F-Feet, M-Meter, C-Centimeters

Connector Code	Description	Connector Body	Center Contact	Loss
SP070	SMA, Male, Straight	Stainless Steel, ASTM A582; Passivate, AMS-2700	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	0.04 x √f (GHz)
SP051	TNC, Male, Staight, High Power	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	0.07 x √f (GHz)
SP104	2.92mm, Male, Straight	Stainless Steel, ASTM A582; Passivate, AMS-2700	Beryllium Copper, ASTM B196; Gold Plate, MIL-DTL-45204	0.04 x √f (GHz)



Rev.4: 11/2024

TIMES
MICROWAVE SYSTEMS
AN AMPHENOL COMPANY

Times Microwave Systems
358 Hall Avenue
Wallingford, CT 06492, USA
T 800. 867.2629