Typical Cable Construction

UTiFLEX high performance cable assemblies are manufactured in Pottstown, PA, under the guidance of our professional Engineering staff. Every cable assembly is tested for insertion loss and SWR and shipped with an individual test certificate.

Center Conductor

Solid or stranded silver-plated copper wire per ASTM B-298 or silver-plated copper clad steel wire per ASTM B-501. In comparison to equal size center conductors, the solid center conductor has less RF resistance, lower attenuation, and is more amplitude stable with flexure. The stranded center conductor is more flexible and more phase stable with flexure.

Dielectric

Low density PTFE per MIL-DTL-17, with a dielectric constant ranging from 1.4 to 1.7 depending on the cable type. Most transmission losses are caused either directly or indirectly by the dielectric. In addition, the dielectric determines the velocity of propagation, temperature range, power rating, phase and amplitude stability, and contributes to cable flexibility. The UTiFLEX PTFE dielectric is ideal for these critical parameters due to its low density and low thermal coefficient of expansion.

Inner Shield

Silver-plated copper tape per ASTM B-298, helically wrapped with 40% minimum overlap between layers. This shield allows for outstanding flexibility while providing 100% coverage. By closely monitoring the precision wrapping process and carefully matching the elasticity of the dielectric to the properties of the silver-plated copper tape, uniform impedance and ideal contact between individual layers of the shield are maintained.

Outer Shield

Silver-plated copper wire per ASTM B-298, tightly braided over the inner shield. The braids are primarily a strength member that also add additional RF shielding. For applications where weight is critical such as spaceflight, CarlisleIT offers ARACON® as the braiding material.

Jacket

Fluorinated Ethylene Propylene (FEP), colored light aqua blue. The FEP is excellent because of its high temperature resistance and chemical inertness. Other jacket materials are available such as DuPont™ Tefzel® and carbon loaded Tefzel® for spaceflight applications.

Cable Selection Guide

In order to simplify the cable selection process, individual cables have been grouped into product families. Most flexible cable users want minimal insertion loss consistent with smallest size and weight without sacrificing flexibility. Other parameters will influence price and performance. Use the tables and information below to select the cable that best suits your needs.

- » Cables with stranded center conductors tend to be more phase stable with flexure.
- » Cables with solid center conductors tend to be more amplitude stable with flexure.
- » For applications less than 26.5 GHz, start with the Low Loss UFA210A cable.
- » If the cable will be used in a test lab environment, consider MKR300C for applications less than 26.5 GHz.
- » If lower insertion loss is required, Ultra Low Loss UFB205A or UFB197C should be chosen. If the application is less than 18 GHz, choose the Ultra Low Loss UFB311A or UFB293C.
- » If size and flexibility are critical, consider the Low Loss UFA147B or Ultra Low Loss UFB142C cables.

MINIATURE LOW LOSS

Part Number		UGF070D	UFF092D	UFF092F
Impedance	ohms	50	50	50
Max. Frequency	GHz	18	18	18
Max. Insertion Loss dB/ft (db/m)	1 GHz	0.29 (0.95)	0.20 (0.66)	0.22 (0.72)
	10 GHz	1.01 (3.31)	0.66 (2.17)	0.71 (2.33)
	18 GHz	1.41 (4.63)	0.90 (2.95)	0.98 (3.22)
Power Handling	watts (CW) @ 10 GHz	36	63	60
Nominal Outer Dia.	inch (mm)	0.070 (1.78)	0.092 (2.34)	0.092 (2.34)
Maximum Weight	grams/ft (g/m)	3.0 (9.8)	5.0 (16.4)	5.0 (16.4)
Center Conductor	type	solid	solid	stranded
Static Bend Radius	inch (mm)	0.10 (2.54)	0.13 (3.30)	0.25 (6.35)
Detailed Information		page 9-10	page 9-10	page 9-10

LOW LOSS

Part Number		UFC092D	UFA125A	UFA147A	UFA147B	UFA210A	UFA210B
Impedance	ohms	50	50	50	50	50	50
Max. Frequency	GHz	65	50	40	40	26.5	26.5
Max. Insertion Loss dB/ft (dB/m)	1 GHz	0.20 (0.66)	0.14 (0.46)	0.11 (0.36)	0.16 (0.52)	0.08 (0.26)	0.09 (0.30)
	10 GHz	0.67 (2.20)	0.48 (1.57)	0.39 (1.28)	0.52 (1.71)	0.27 (0.89)	0.30 (0.98)
	18 GHz	0.92 (3.02)	0.66 (2.17)	0.54 (1.77)	0.72 (2.36)	0.38 (1.25)	0.42 (1.38)
	26.5 GHz	1.13 (3.71)	0.82 (2.69)	0.67 (2.20)	0.89 (2.92)	0.48 (1.57)	0.53 (1.74)
	40 GHz	1.42 (4.66)	1.04 (3.41)	0.85 (2.79)	1.12 (3.67)	-	-
	50 GHz	1.61 (5.28)	1.19 (3.90)	-	-	-	-
	65 GHz	1.86 (6.10)	-	-	-	-	-
Power Handling	watts (CW) @ 10 GHz	63	112	159	149	303	283
Nominal Outer Dia.	inch (mm)	0.092 (2.34)	0.125 (3.18)	0.147 (3.73)	0.147 (3.73)	0.210 (5.33)	0.210 (5.33)
Maximum Weight	grams/ft (g/m)	5.0 (16.4)	8.8 (28.9)	12.1 (39.7)	12.1 (39.7)	22 (72.2)	22 (72.2)
Center Conductor	type	solid	solid	solid	stranded	solid	stranded
Static Bend Radius	inch (mm)	0.13 (3.30)	0.20 (5.08)	0.25 (6.35)	0.25 (6.35)	0.38 (9.65)	0.38 (9.65)
Detailed Information		page 11-12	page 11-12	page 11-12	page 11-12	page 11-12	page 11-12

MKR TEST CABLE

Part Number		MKR300C
Impedance	ohms	50
Max. Frequency	GHz	26.5
Max. Insertion Loss dB/ft (dB/m)	1 GHz	0.08 (0.26)
	10 GHz	0.27 (0.89)
	18 GHz	0.36 (1.18)
	26.5 GHz	0.44 (1.44)
	40 GHz	-
Power Handling	watts (CW) @ 10 GHz	175
Nominal Outer Dia.	inch (mm)	0.300 (7.62)
Maximum Weight	grams/ft (g/m)	51 (167.3)
Center Conductor	type	stranded
Static Bend Radius	inch (mm)	1.50 (38.10)
Detailed Information		page 17-18

ULTRA LOW LOSS

Part Number		UFB088D	UFB142C	UFB142A	UFC185A	UFB197C	UFB205A	UFB293C	UFB311A
Impedance	ohms	50	50	50	50	50	50	50	50
Max. Frequency	GHz	18	40	40	32	26.5	26.5	18	18
Max. Insertion Loss dB/ft (dB/m)	1 GHz	0.20 (0.66)	0.11 (0.36)	0.10 (0.33)	0.08 (0.26)	0.09 (0.28)	0.07 (0.23)	0.06 (0.20)	0.05 (0.16)
	10 GHz	0.66 (2.17)	0.36 (1.18)	0.33 (1.08)	0.27 (0.89)	0.28 (0.93)	0.23 (0.75)	0.18 (0.59)	0.15 (0.49)
	18 GHz	0.89 (2.92)	0.49 (1.61)	0.44 (1.44)	0.36 (1.18)	0.38 (1.26)	0.32 (1.05)	0.25 (0.82)	0.21 (0.69)
	26.5 GHz	-	0.59 (1.94)	0.54 (1.77)	0.44 (1.44)	0.47 (1.55)	0.39 (1.28)	-	-
	32 GHz	-	0.66 (2.16)	0.60 (1.97)	0.49 (1.61)	-	-	-	-
	40 GHz	-	0.74 (2.43)	0.68 (2.23)	-	-	-	-	-
Power Handling	watts (CW) @ 10 GHz	66	166	175	267	296	326	570	648
Nominal Outer Dia.	inch (mm)	0.088 (2.235)	0.142 (3.61)	0.142 (3.61)	0.185 (4.699)	0.197 (5.00)	0.205 (5.21)	0.293 (7.44)	0.311 (7.90)
Maximum Weight	grams/ft (g/m)	4.2 (13.78)	9.9 (32.5)	10.1 (33.1)	17.6 (57.74)	19.8 (65.0)	20 (65.6)	42 (137.8)	44.5 (146.0)
Center Conductor	type	solid	stranded	solid	solid	stranded	solid	stranded	solid
Static Bend Radius	inch (mm)	0.25 (6.35)	0.38 (9.65)	0.38 (9.65)	0.375 (9.525)	0.50 (12.70)	0.50 (12.70)	0.75 (19.05)	1.25 (31.75)
Detailed Information		page 13-14	page 13-14	page 13-14	page 13-14	page 13-14	page 13-14	page 13-14	page 13-14

ULTRA LIGHT*

Part Number		MCJ088D	MCJ142A	MCJ185A	MCJ205A	MCJ311A
Impedance	ohms	50	50	50	50	50
Max. Frequency	GHz	18	40	32	26.5	18
Max. Insertion Loss dB/ft (dB/m)	1 GHz	0.20 (0.66)	0.10 (0.33)	0.08 (0.26)	0.07 (0.23)	0.05 (0.16)
	10 GHz	0.66 (2.17)	0.33 (1.08)	0.27 (0.89)	0.23 (0.75)	0.15 (0.49)
	18 GHz	0.89 (2.92)	0.44 (1.44)	0.36 (1.18)	0.32 (1.05)	0.21 (0.66)
	26.5 GHz	-	0.54 (1.77)	0.44 (1.44)	0.39 (1.28)	-
	32 GHz	-	0.60 (1.97)	0.49 (1.61)	-	-
	40 GHz	-	0.68 (2.23)	-	-	-
Power Handling	watts (CW) @ 10 GHz	64	173	267	326	648
Nominal Outer Dia.	inch (mm)	0.088 (2.24)	0.142 (3.61)	0.185 (4.70)	0.205 (5.21)	0.310 (7.87)
Maximum Weight	grams/ft (g/m)	3.6 (11.8)	8.8 (28.9)	12.4 (40.7)	16.0 (52.5)	35 (114.8)
Center Conductor	type	solid	solid	solid	solid	solid
Static Bend Radius	inch (mm)	0.25 (6.35)	0.38 (9.65)	0.38 (9.65)	0.50 (12.70)	1.25 (31.75)
Detailed Information		page 15-16	page 15-16	page 15-16	page 15-16	page 15-16

*Ultra Light cables are also available with an aluminum center conductor which offers an additional weight savings of up to 10% depending on cable type.

UTiFLEX Miniature Low Loss Cable Assemblies

These general purpose microwave miniature cables have been designed to offer superior electrical performance in the smallest possible package for fixed installations. They are a cost-effective alternative when an RG cable cannot perform to your system needs or when a semi-rigid cable is too cumbersome. The UTiFLEX Miniature cables are available with a large selection of connectors and can be easily customized to meet your exact requirements.

Mechanical Characteristics

UTiFLEX TYPE		UGF070D	UFF092D	UFF092F
Outer Diameter	inch (mm)	0.070 (1.78)	0.092 (2.34)	0.092 (2.34)
Center Conductor Type	grams/ft (g/m)	solid	solid	stranded
Maximum Weight		3.0 (9.8)	5 (16.4)	5 (16.4)
Minimum Bend Radius	inch (mm)	0.10 (2.54)	0.13 (3.30)	0.25 (6.35)
Cable Flex Life *		100,000	25,000	170,000

* Cable shall withstand specified number of unrestrained flexures (snake test)

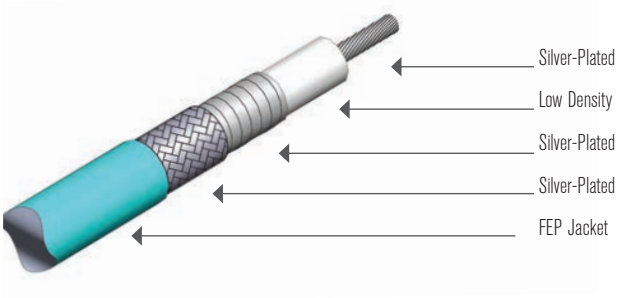
Electrical Characteristics

Impedance	ohms	50	50	50
Frequency Range	GHz	DC-18	DC-18	DC-18
Velocity of Propagation		78%	77%	77%
Capacitance	pF/ft (pF/m)	26.2 (86.0)	26.2 (86.0)	26.2 (86.0)
Shielding Effectiveness	(dB @ 1 GHz)	> 100	> 100	> 100
Maximum Insertion Loss dB/ft (dB/m)	See figure on next page			
	1 GHz	0.29 (0.95)	0.20 (0.66)	0.22 (0.72)
	10 GHz	1.01 (3.31)	0.67 (2.20)	0.71 (2.33)
	18 GHz	1.41 (4.63)	0.92 (3.02)	0.98 (3.22)
Phase Stability vs Flexure	10 GHz	2° *	2° **	2° **
	18 GHz	3° *	3° **	3° **
Phase Stability vs Temperature		See figure on next page		
Power Handling		See figure on next page		
VSWR		See connector selection guide		

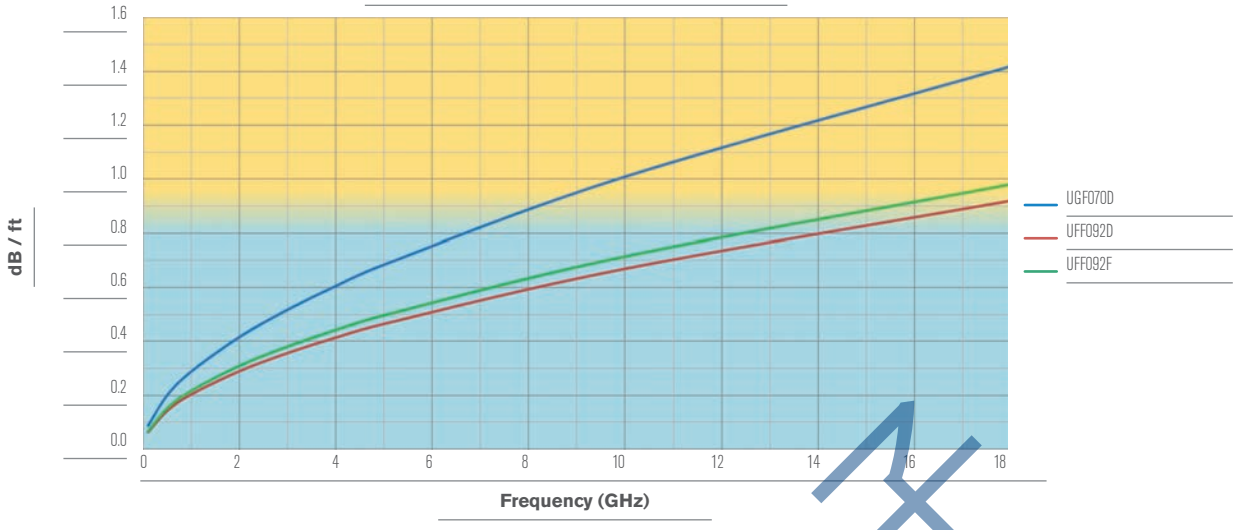
* Cable wrapped once around a 1.5 inch diameter mandrel
** Cable wrapped once around a 3 inch diameter mandrel

Environmental Characteristics

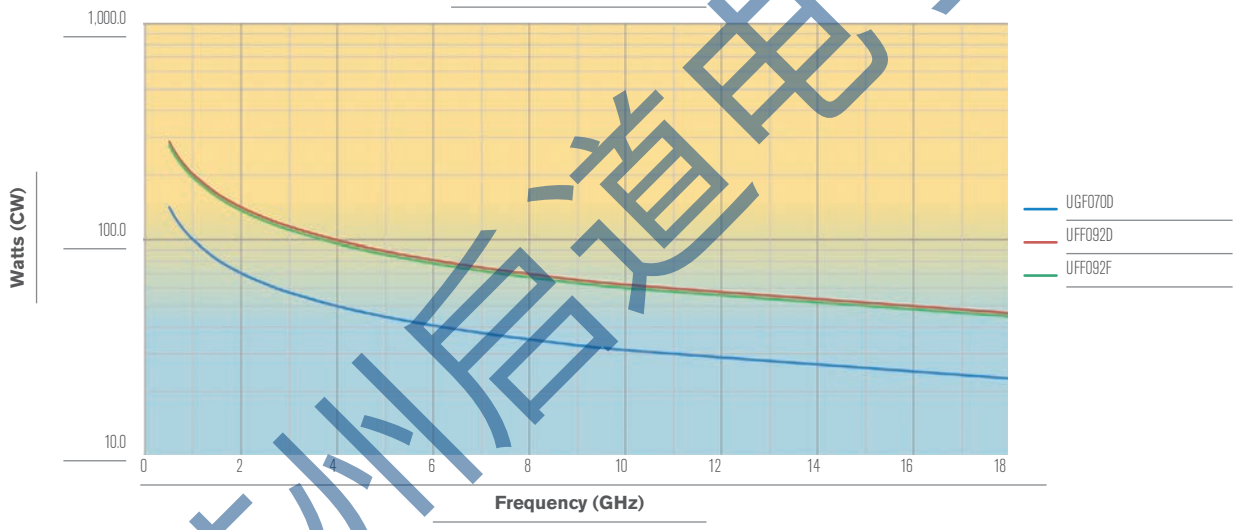
Temperature Range (Deg C)		-65/+165	-65/+165	-65/+165
	See page 21 for applicable environmental test			



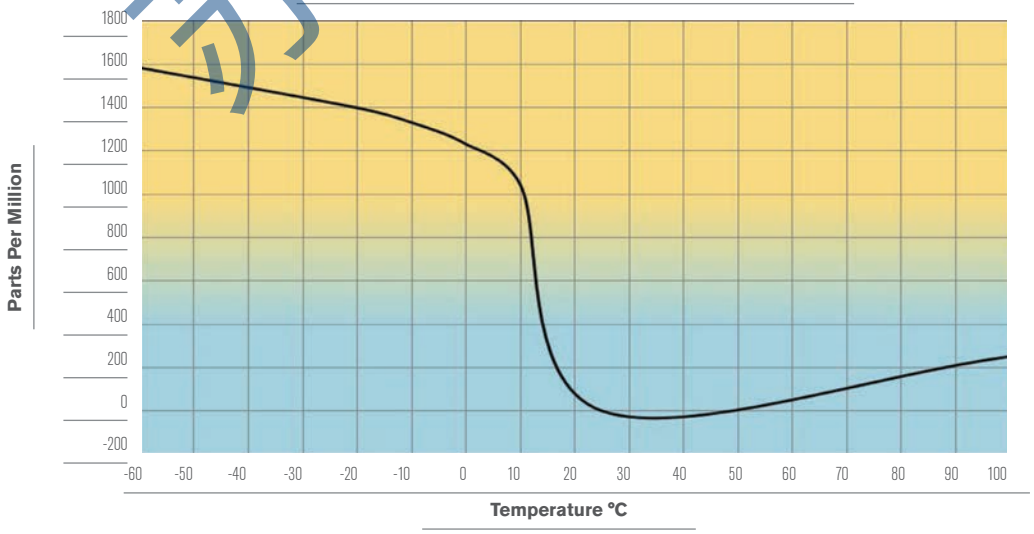
MAXIMUM INSERTION LOSS



POWER HANDLING



TYPICAL PHASE CHANGE VS. TEMPERATURE



UTiFLEX Low Loss Cable Assemblies

UTiFLEX Low Loss cable assemblies provide you with the complete high performance microwave cable. They have outstanding mechanical integrity without sacrificing insertion loss, phase stability, or SWR. UTiFLEX Low Loss cable assemblies are extremely versatile, moderately priced, and fit a large variety of applications.

Mechanical Characteristics

UTiFLEX TYPE		UFC092D	UFA125A	UFA147A	UFA147B	UFA210A	UFA210B
Outer Diameter	inch (mm)	0.092 (2.34)	0.125 (3.18)	0.147 (3.73)	0.147 (3.73)	0.210 (5.33)	0.210 (5.33)
Center Conductor Type		solid	solid	solid	stranded	solid	stranded
Maximum Weight	grams/ft (g/m)	5.0 (16.4)	8.8 (28.9)	12.1 (39.7)	12.1 (39.7)	22 (72.2)	22 (72.2)
Minimum Bend Radius	inch (mm)	0.13 (3.30)	0.20 (5.08)	0.25 (6.35)	0.25 (6.35)	0.38 (9.65)	0.38 (9.65)
Cable Flex Life *		3,000	10,000	10,000	100,000	100,000	250,000

* Cable shall withstand specified number of unrestrained flexures (snake test)

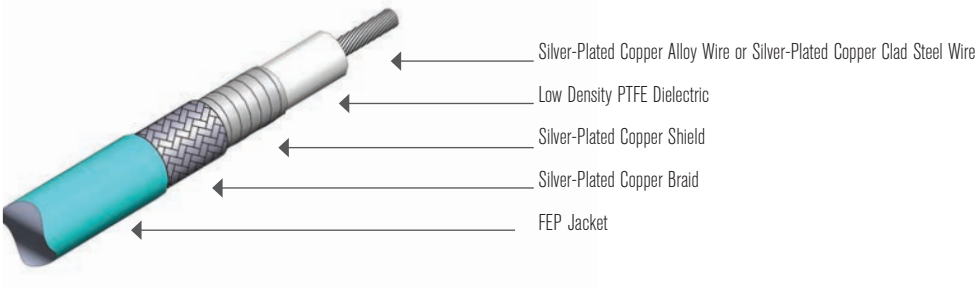
Electrical Characteristics

Impedance	ohms	50	50	50	50	50	50
Frequency Range	GHz	DC-65	DC-50	DC-40	DC-40	DC-26.5	DC-26.5
Velocity of Propagation		78%	77%	77%	77%	77%	77%
Capacitance	pF/ft (pF/m)	26.8 (87.9)	26.2 (86.0)	26.2 (86.0)	26.2 (86.0)	26.2 (86.0)	26.2 (86.0)
Shielding Effectiveness	(dB @ 1 GHz)	> 100	> 100	> 100	> 100	> 100	> 100
Maximum Insertion Loss dB/ft (dB/m)	See figure on next page						
	1 GHz	0.20 (0.66)	0.14 (0.46)	0.11 (0.36)	0.16 (0.52)	0.08 (0.26)	0.09 (0.30)
	10 GHz	0.67 (2.20)	0.48 (1.57)	0.39 (1.28)	0.52 (1.71)	0.27 (0.89)	0.30 (0.98)
	18 GHz	0.92 (3.02)	0.66 (2.17)	0.54 (1.77)	0.72 (2.36)	0.38 (1.25)	0.42 (1.38)
	26.5 GHz	1.13 (3.71)	0.82 (2.64)	0.67 (2.20)	0.89 (2.92)	0.48 (1.57)	0.53 (1.74)
	40 GHz	1.42 (4.66)	1.04 (3.41)	0.85 (2.79)	1.12 (3.67)	1.12 (3.67)	-
	50 GHz	1.61 (5.28)	1.19 (3.90)	-	-	-	-
	65 GHz	1.86 (6.10)	-	-	-	-	-
Phase Stability vs Flexure *	10 GHz	<0.5°	3°	2°	1°	2°	2°
	18 GHz	<0.5°	5°	4°	2°	4°	3°
Phase Stability vs Temperature	See figure on next page						
Power Handling	See figure on next page						
VSWR	Refer to connector selection guide						

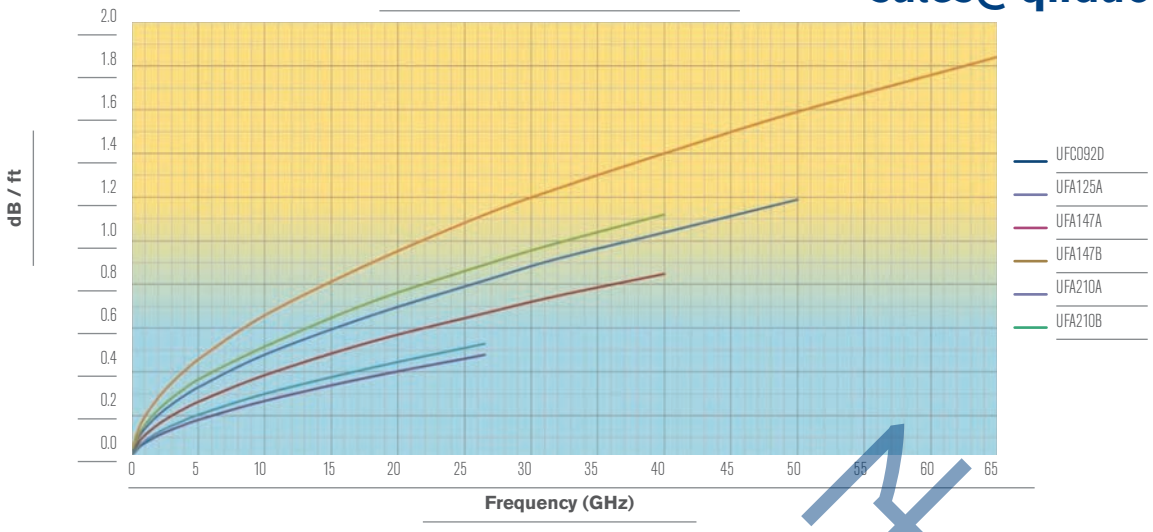
* Cable wrapped once around a 3 inch diameter mandrel

Environmental Characteristics

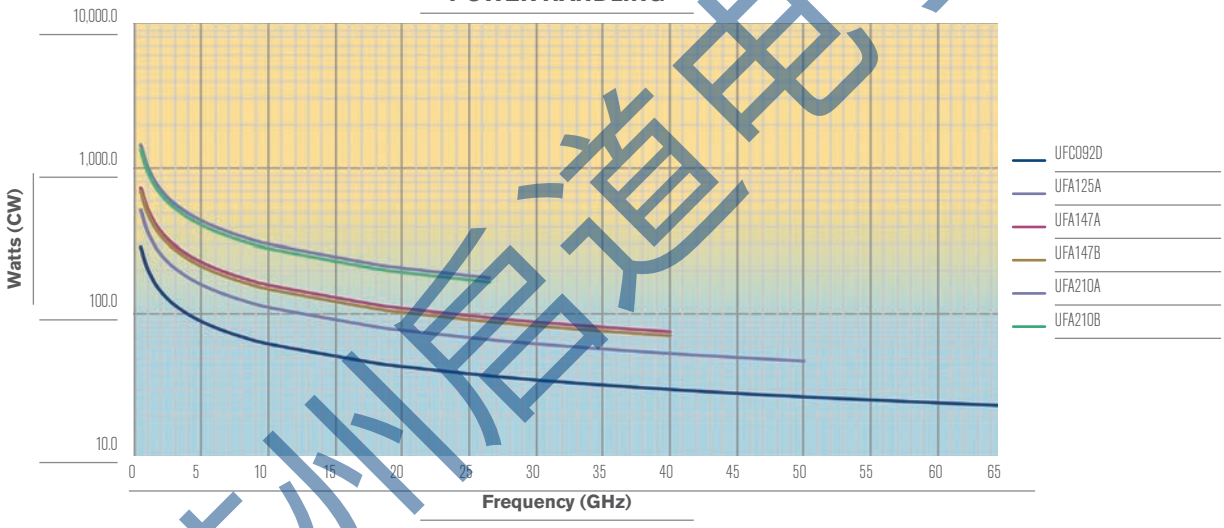
Temperature Range (Deg C)		-65/+165	-65/+165	-65/+165	-65/+165	-65/+165	-65/+165
		See page 21 for applicable environmental test					



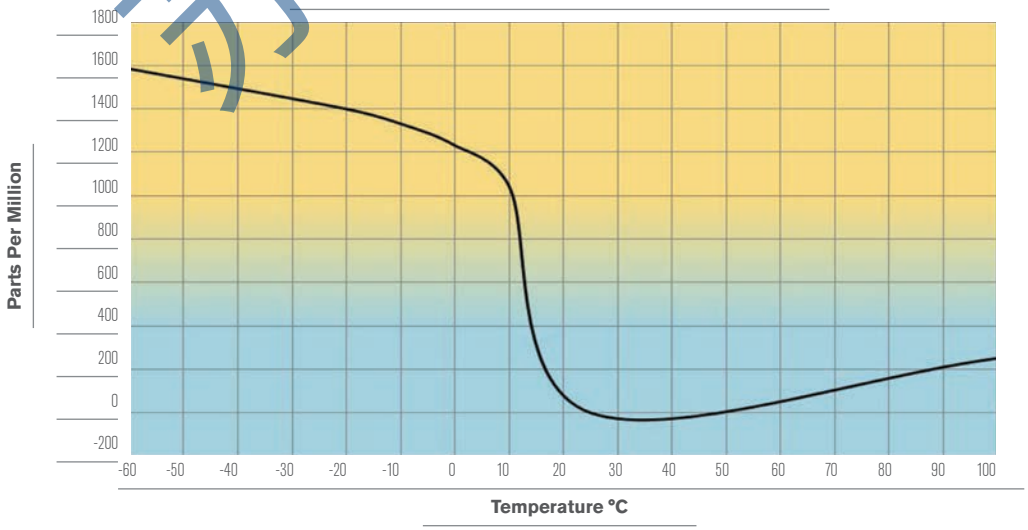
MAXIMUM INSERTION LOSS



POWER HANDLING



TYPICAL PHASE CHANGE VS. TEMPERATURE



UTiFLEX Ultra Low Loss Cable Assemblies

UTiFLEX Ultra Low Loss cable assemblies are optimized to provide the lowest insertion loss available in a flexible cable construction up to 18, 26.5, and 40 GHz. The cables utilize an ultra low density PTFE dielectric that lowers weight and insertion loss, improves electrical stability, and provides greater resilience and flexibility when compared to standard microwave cables.

Mechanical Characteristics

UTiFLEX TYPE		UFB088D	UFB142C	UFB142A	UFC185A	UFB197C	UFB205A	UFB293C	UFB311A
Outer Diameter	inch (mm)	0.088 (2.235)	0.142 (3.61)	0.142 (3.61)	0.185 (4.699)	0.197 (5.00)	0.205 (5.21)	0.293 (7.44)	0.311 (7.90)
Center Conductor Type		solid	stranded	solid	solid	stranded	solid	stranded	solid
Weight	grams/ft (g/m)	4.2 (13.78)	9.9 (32.5)	10.1 (33.1)	17.6 (57.74)	19.8 (65.0)	20.0 (65.6)	42.0 (137.8)	44.5 (146.0)
Minimum Bend Radius	inch (mm)	0.25 (6.35)	0.38 (9.65)	0.38 (9.65)	0.375 (9.525)	0.50 (12.70)	0.50 (12.70)	0.75 (19.05)	1.25 (31.75)
Cable Flex Life		25,000	75,000	75,000	10,000	150,000	25,000	50,000	15,000

* Cable shall withstand specified number of unrestrained flexures (snake test)

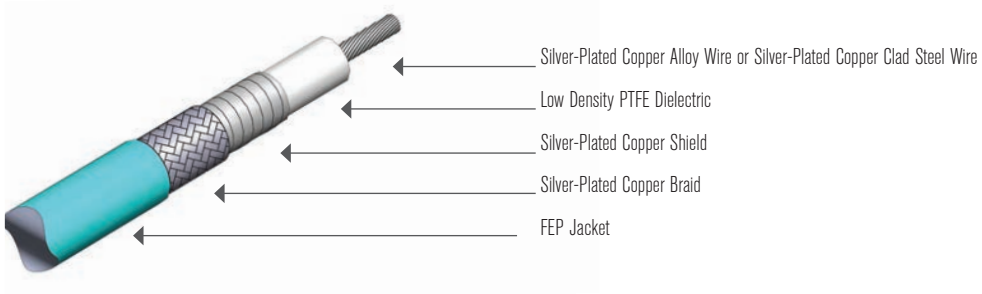
Electrical Characteristics

Impedance	ohms	50	50	50	50	50	50	50	50
Frequency Range	GHz	DC-18	DC-40	DC-40	DC-32	DC-26.5	DC-26.5	DC-18	DC-18
Velocity of Propagation		80%	83%	83%	83%	81%	83.5%	81.5%	84%
Capacitance	pF/ft (pF/m)	25.6 (84.0)	24.5 (80.4)	25.1 (82.4)	25.3 (83.0)	24.8 (81.4)	24.8 (81.4)	24.5 (80.4)	24.2 (79.4)
Shielding Effectiveness	(dB @ 1 GHz)	> 100	> 100	> 100	> 100	> 100	> 100	> 100	> 100
Maximum Insertion Loss dB/ft (dB/m)	See figure on next page								
	1 GHz	0.20 (0.66)	0.11 (0.36)	0.10 (0.33)	0.08 (0.26)	0.09 (0.28)	0.07 (0.23)	0.06 (0.20)	0.05 (0.16)
	10 GHz	0.66 (2.17)	0.36 (1.18)	0.33 (1.08)	0.27 (0.89)	0.28 (0.93)	0.23 (0.75)	0.18 (0.59)	0.15 (0.49)
	18 GHz	0.89 (2.92)	0.49 (1.61)	0.44 (1.44)	0.36 (1.18)	0.38 (1.26)	0.32 (1.05)	0.25 (0.82)	0.21 (0.69)
	26.5 GHz	-	0.59 (1.94)	0.54 (1.77)	0.44 (1.44)	0.47 (1.55)	0.39 (1.28)	-	-
	32 GHz	-	0.66 (2.16)	0.60 (1.97)	0.49 (1.61)	-	-	-	-
	40 GHz	-	0.74 (2.43)	0.68 (2.23)	-	-	-	-	-
Phase Stability vs Flexure *	10 GHz	2°	3°	2°	3°	2°	4°	2°	5°
	18 GHz	3°	5°	5°	6°	3°	7°	3°	1°
Phase Stability vs Temp	See figure on next page								
Power Handling	See figure on next page								
VSWR	Refer to Connector Selection Guide								

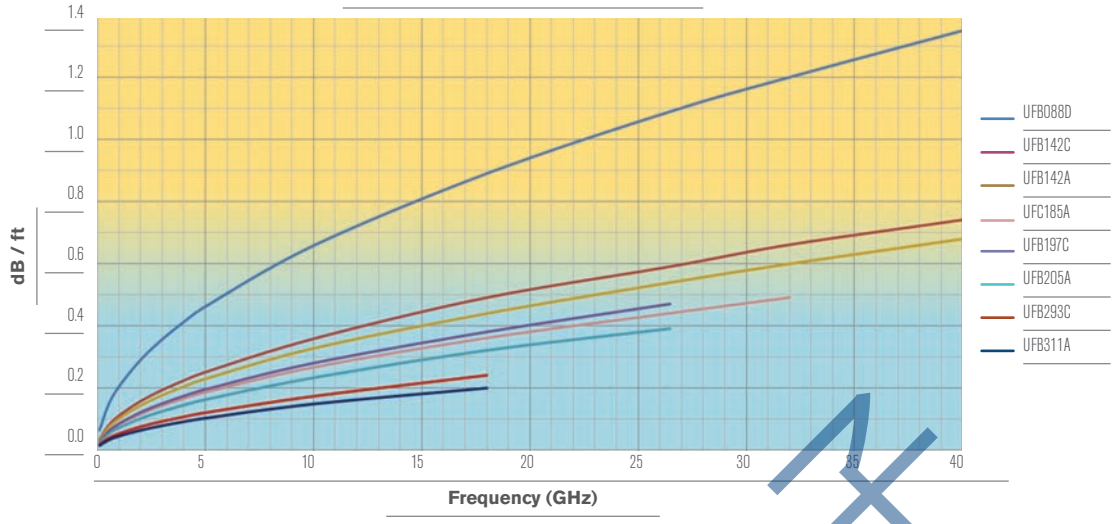
* Cable wrapped once around a 3 inch diameter mandrel

Environmental Characteristics

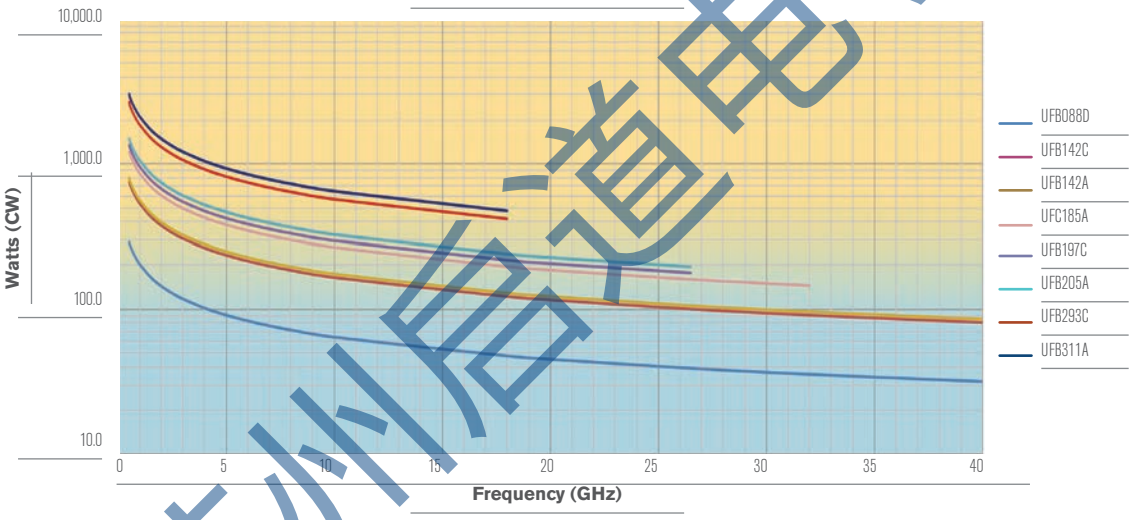
Temperature Range (Deg C)		-65/+165	-65/+165	-65/+165	-65/+165	-65/+165	-65/+165	-65/+165	-65/+165
	See page 21 for applicable environmental test								



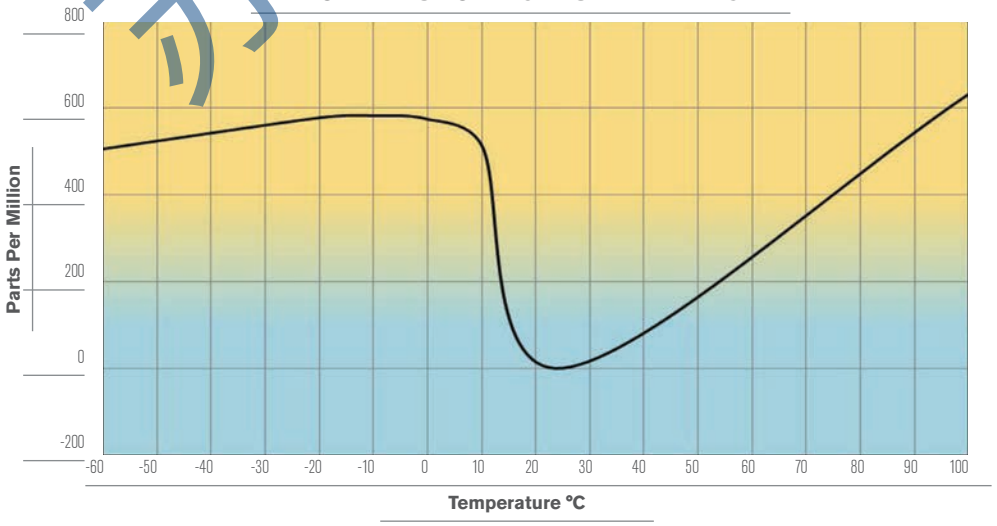
MAXIMUM INSERTION LOSS



POWER HANDLING



TYPICAL PHASE CHANGE VS. TEMPERATURE



UTiFLEX Ultra Light Cable Assemblies

UTiFLEX Ultra Light cable assemblies are optimized for spaceflight applications. They provide the lightest weight, lowest insertion loss, and best radiation resistance in a flexible cable construction. The cables utilize CarlisleIT's ARACON® for the outer shield, an ultra low density PTFE for the dielectric, and a DuPont Tefzel® jacket. If required, cable assemblies are manufactured in a Class 10,000 clean room by certified solder technicians.

Mechanical Characteristics

UTiFLEX TYPE		MCJ088D	MCJ142A	MCJ185A	MCJ205A	MCJ311A
Outer Diameter	inch (mm)	0.088 (2.24)	0.142 (3.61)	0.185 (4.70)	0.205 (5.21)	0.310 (7.87)
Center Conductor Type		Solid	Solid	Solid	Solid	Solid
Maximum Weight	g/ft (g/m)	3.6 (11.8)	8.8 (28.9)	12.4 (40.7)	16.0 (52.5)	35 (114.8)
Minimum Bend Radius	inch (mm)	0.25 (6.35)	0.38 (9.65)	0.38 (9.65)	0.5 (12.70)	1.25 (31.75)

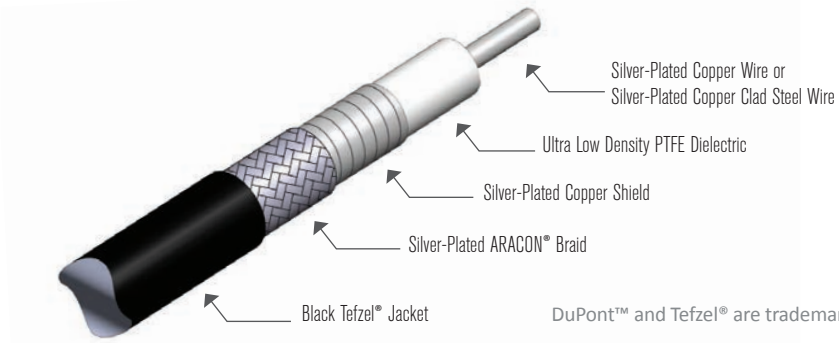
Electrical Characteristics

Impedance	ohms	50	50	50	50	50
Frequency Range	GHz	DC-18	DC-40	DC-32	DC-26.5	DC-18
Velocity of Propagation		80%	83%	83%	84%	83%
Capacitance	pF/ft (pF/m)	25.5 (83.7)	24.5 (80.4)	24.5 (80.4)	24.2 (79.4)	24.5 (80.4)
Shielding Effectiveness	(dB @ 1 GHz)	> 100	>100	>100	>100	>100
Maximum Insertion Loss dB/ft (dB/m)	See figure on next page					
	1 GHz	0.20 (0.66)	0.10 (0.33)	0.08 (0.26)	0.07 (0.23)	0.05 (0.16)
	10 GHz	0.66 (2.17)	0.33 (1.08)	0.27 (0.89)	0.23 (0.75)	0.15 (0.49)
	18 GHz	0.89 (2.92)	0.44 (1.44)	0.36 (1.18)	0.32 (1.05)	0.21 (0.66)
	26.5 GHz	-	0.54 (1.77)	0.44 (1.44)	0.39 (1.28)	-
	32 GHz	-	0.60 (1.97)	0.49 (1.61)	-	-
	40 GHz	-	0.68 (2.23)	-	-	-
Phase Stability vs Flexure *	10 GHz	2°	2°	2°	1°	3°
	18 GHz	2°	3°	6°	2°	5°
Phase Stability vs Temperature	See figure on next page					
Power Handling	See figure on next page					
VSWR	Refer to Connector Selection Guide					

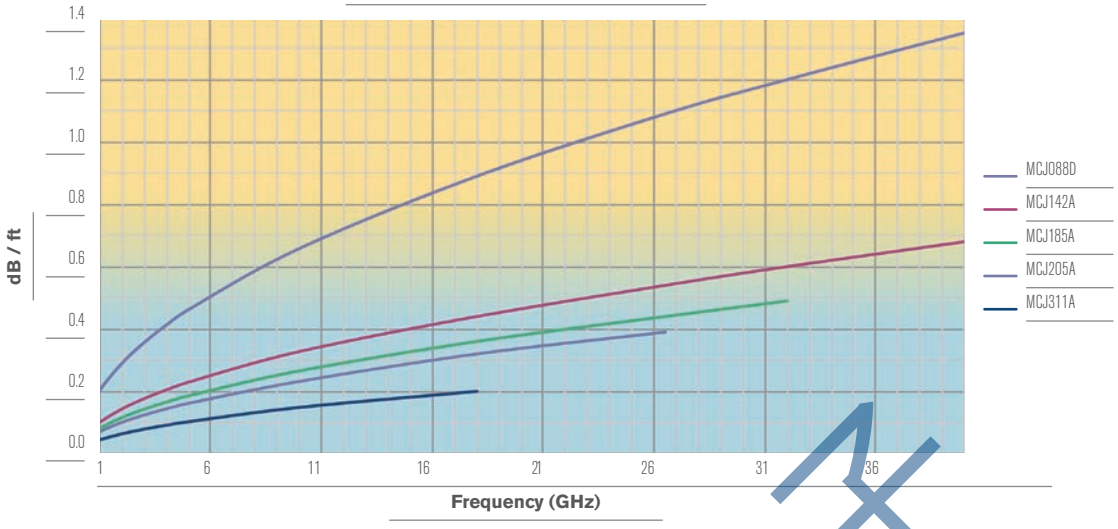
* Cable wrapped once around a 3 inch diameter mandrel

Environmental Characteristics

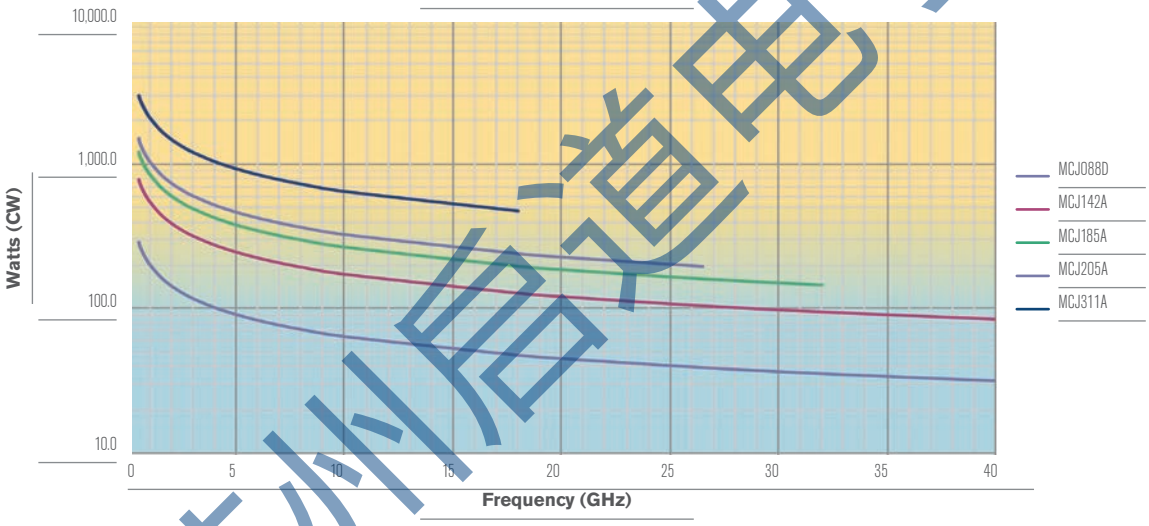
Temperature Range (Deg C)		-150C/+165	-150C/+165	-150C/+165	-150C/+165	-150C/+165
See page 21 for applicable environmental test						



MAXIMUM INSERTION LOSS



POWER HANDLING



TYPICAL PHASE CHANGE VS. TEMPERATURE