



Labs

**RF & MICROWAVE
CABLE ASSEMBLIES &
COAXIAL COMPONENTS**

Space
Test & Measurement
Aerospace & Defense
Mobile Communications





Stuart, FL, USA



Dundee, UK



Heredia, Costa Rica

Florida RF Labs is an international best-in-class supplier of high performance RF/MW cable assemblies featuring the Lab-Flex[®] brand of low loss, flexible cable assemblies and coaxial components based on Thermopad[®] and Diamond RF Resistives[®] technologies.

EMC Technology is an internationally recognized leader in the development and manufacturer of thin and thick film RF and Microwave resistive components, featuring the Thermopad[®] brand of compensated attenuators, signal distribution products and the HybriX[®] brand of ultra low loss SMT hybrids and couplers.

TRAK Microwave Ltd. is a trusted isolator, circulator and sub-assembly supplier for high-reliability markets specializing in ferrite RF, MW & mmW passive components for the space, defense and industrial markets.

Along with the other brands Kaelus, Radio Waves, TECOM, TRAK, LORCH, Millitech, Smiths Microwave is a leading provider of components, sub-assemblies, antennas and systems solutions, primarily for defense and aerospace applications, and solutions that test, filter and process high-frequency signals for wireless telecommunication networks.

With Smiths Connectors and Smiths Power, Smiths Microwave is part of the Smiths Interconnect division of Smiths Group, www.smiths.com, a global leader in applying advanced technologies for markets in threat and contraband detection, energy, medical devices, communications and engineered components. Smiths Group employs around 23,000 people in more than 50 countries.

Cable Assemblies & Coaxial Components

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LMR® is a registered trademark of Times Microwave Systems

*Waterproof Sealing is Standard with Options W, AW, & N

Cable Selection Guide

By Application

Max Frequency (GHz)	5.8	10	18	18	18	18	18	18	18	18	18	18
Applications												
2-Way Radio	LMR									CONFORMABLE BJ085		
Antenna Systems		LAB-FLEX 490S			LAB-FLEX 290	LAB-FLEX 335	LAB-FLEX 336SP					
Base Stations	LMR		RG FLEXIBLES <0.150 DIA.	RG FLEXIBLES >0.150 DIA.						CONFORMABLE BJ085	CONFORMABLE BJ141	
Cellular	LMR		RG FLEXIBLES <0.150 DIA.	RG FLEXIBLES >0.150 DIA.						CONFORMABLE BJ085	CONFORMABLE BJ141	
Earth Stations			RG FLEXIBLES <0.150 DIA.									MINI-FLEX 165
Fiber Optic Systems												
Field Test Setups					LAB-FLEX 290	LAB-FLEX 335	LAB-FLEX 336SP					
High Frequency Interconnects									CONFORMABLE BJ047	CONFORMABLE BJ085	CONFORMABLE BJ141	
Instrumentation								SEMI-RIGID 250	CONFORMABLE BJ047	CONFORMABLE BJ085	CONFORMABLE BJ141	MINI-FLEX 165
Interconnects	LMR		RG FLEXIBLES <0.150 DIA.	RG FLEXIBLES >0.150 DIA.						CONFORMABLE BJ085	CONFORMABLE BJ141	
Jumpers	LMR		RG FLEXIBLES <0.150 DIA.					SEMI-RIGID 250	CONFORMABLE BJ047	CONFORMABLE BJ085	CONFORMABLE BJ141	MINI-FLEX 165
Land Mobile	LMR											
Long Run Test Cables		LAB-FLEX 490S			LAB-FLEX 290	LAB-FLEX 335	LAB-FLEX 336SP					
Low Cost, High Frequency Jumpers			RG FLEXIBLES <0.150 DIA.	RG FLEXIBLES >0.150 DIA.					CONFORMABLE BJ047		CONFORMABLE BJ141	
Low Loss Jumpers	LMR											
Military Systems		LAB-FLEX 490S	RG FLEXIBLES <0.150 DIA.	RG FLEXIBLES >0.150 DIA.		LAB-FLEX 335	LAB-FLEX 336SP	SEMI-RIGID 250				MINI-FLEX 165
Mobile Antennas	LMR		RG FLEXIBLES <0.150 DIA.	RG FLEXIBLES >0.150 DIA.	LAB-FLEX 290	LAB-FLEX 335	LAB-FLEX 336SP					
PCS	LMR		RG FLEXIBLES <0.150 DIA.									
Radar Systems		LAB-FLEX 490S	RG FLEXIBLES <0.150 DIA.	RG FLEXIBLES >0.150 DIA.	LAB-FLEX 290		LAB-FLEX 336SP	SEMI-RIGID 250				
Radio Systems			RG FLEXIBLES <0.150 DIA.	RG FLEXIBLES >0.150 DIA.						CONFORMABLE BJ085		
Satcom		LAB-FLEX 490S		RG FLEXIBLES >0.150 DIA.	LAB-FLEX 290	LAB-FLEX 335	LAB-FLEX 336SP	SEMI-RIGID 250				
Satellites			LAB-FLEX 290Q									
Switch Interconnects									CONFORMABLE BJ047	CONFORMABLE BJ085		MINI-FLEX 165
Telecommunications			RG FLEXIBLES <0.150 DIA.	RG FLEXIBLES >0.150 DIA.						CONFORMABLE BJ085	CONFORMABLE BJ141	
Test Cables			RG FLEXIBLES <0.150 DIA.	RG FLEXIBLES >0.150 DIA.						CONFORMABLE BJ085	CONFORMABLE BJ141	
Test Equipment Interconnects												
Test Head Cables												
Test Set Ups												
Wireless Telemetry	LMR									CONFORMABLE BJ085		MINI-FLEX 165

Cable Selection Guide

By Application

Max Frequency (GHz)	26	32	35	35	40	40	50	50	50	55	60	65
Applications												
2-Way Radio						MINI-FLEX 105					SEMI-RIGID 086	
Antenna Systems	LAB-FLEX 235SP	LAB-FLEX 190Q			LAB-FLEX 180SP							
Base Stations												
Cellular												
Earth Stations	LAB-FLEX 235SP		SEMI-RIGID 141		LAB-FLEX 180SP	MINI-FLEX 105					SEMI-RIGID 086	
Fiber Optic Systems						LAB-FLEX 160		LAB-FLEX 100		MINI-FLEX 065		
Field Test Setups												
High Frequency Interconnects	LAB-FLEX 235SP			K-JUMPER	LAB-FLEX 180SP	LAB-FLEX 160	LAB-FLEX 125	LAB-FLEX 100			SEMI-RIGID 086	LAB-FLEX 115S
Instrumentation			SEMI-RIGID 141	K-JUMPER		MINI-FLEX 105	LAB-FLEX 125	LAB-FLEX 100		MINI-FLEX 065	SEMI-RIGID 086	LAB-FLEX 115S
Interconnects						MINI-FLEX 105	LAB-FLEX 125				SEMI-RIGID 086	
Jumpers			SEMI-RIGID 141	K-JUMPER		MINI-FLEX 105		LAB-FLEX 100		MINI-FLEX 065	SEMI-RIGID 086	
Land Mobile												
Long Run Test Cables												
Low Cost, High Frequency Jumpers				K-JUMPER				LAB-FLEX 100		MINI-FLEX 065		
Low Loss Jumpers								LAB-FLEX 100		MINI-FLEX 065		LAB-FLEX 115S
Military Systems	LAB-FLEX 235SP	LAB-FLEX 190Q	SEMI-RIGID 141		LAB-FLEX 180SP	LAB-FLEX 160					SEMI-RIGID 086	
Mobile Antennas	LAB-FLEX 235SP	LAB-FLEX 190Q										
PCS												
Radar Systems	LAB-FLEX 235SP	LAB-FLEX 190Q			LAB-FLEX 180SP	LAB-FLEX 160					SEMI-RIGID 086	
Radio Systems						MINI-FLEX 105						
Satcom	LAB-FLEX 235SP	LAB-FLEX 190Q			LAB-FLEX 180SP						SEMI-RIGID 086	
Satellites			SEMI-RIGID 141	LAB-FLEX 160Q	LAB-FLEX 160Q	LAB-FLEX 105Q					SEMI-RIGID 086	
Switch Interconnects						LAB-FLEX 160	LAB-FLEX 125	LAB-FLEX 100		MINI-FLEX 065	SEMI-RIGID 086	
Telecommunications						MINI-FLEX 105					SEMI-RIGID 086	
Test Cables	LAB-FLEX 235SP	LAB-FLEX 190Q	SEMI-RIGID 141	K-JUMPER	LAB-FLEX 180SP	LAB-FLEX 160	LAB-FLEX 125	LAB-FLEX 100			SEMI-RIGID 086	LAB-FLEX 115S
Test Equipment Interconnects	LAB-FLEX 235SP	LAB-FLEX 190Q				LAB-FLEX 160	LAB-FLEX 125					LAB-FLEX 115S
Test Head Cables	LAB-FLEX 235SP	LAB-FLEX 190Q				LAB-FLEX 160	LAB-FLEX 125	LAB-FLEX 100				LAB-FLEX 115S
Test Set Ups	LAB-FLEX 235SP	LAB-FLEX 190Q				LAB-FLEX 160	LAB-FLEX 125					
Wireless Telemetry												

Cable Selection Guide

By Critical Parameter

Max Frequency (GHz)	2.5	18	30
Insertion Loss			
Extremely Low	LMR 400		
Very Low	Lab-Flex 290, 335, 490S	Lab-Flex 290, 335	
Low	Lab-Flex 335SP, 200, 160, LMR 240	Lab-Flex 335SP, 200, 160	Lab-Flex 200, 160
Average	Lab-Flex 125, 235SP, 180SP, SF142	Lab-Flex 125, 235SP, 180SP, SF142	Lab-Flex 125, 180SP
High	RG142, BJ141, RG402, K-Jumper, Mini-Flex 165, 100	RG142, Lab-Flex 100	Lab-Flex 100
Very High	RG405, TF405, BJ085, SF316, Mini-Flex 105, 115S	RG405, Mini-Flex 105, BJ085, SF316, 115S	RG405, 115S, Mini-Flex 105
Extremely High	142D & 316D, RG316, Mini-Flex 065	142D Ultraflex, Mini-Flex 065	Mini-Flex 105
Harsh Environments			
Best	All Lab-Flex S Series with AW Option, All Lab-Flex AF	All Lab-Flex & Lab-Flex S Series with AW Option, All Lab-Flex AF	Lab-Flex 160AW, 200AW, 180AW, Lab-Flex 160AF
Better	LMR 240DB, LMR 400DB		
Good	All Lab-Flex Weatherized Series	All Lab-Flex Weatherized Series	Lab-Flex 125W, 160W, 200W, 180SPW
Fair	SF316, 100, All Mini-Flex	TF402, TF405, SF316, 100, Mini-Flex 065 & Mini-Flex 065	Lab-Flex 100, Mini-Flex 065 & Mini-Flex 105
Fair	RG142, RG400, RG316, RD316	RG142	
Not Recommended	BJ141, BJ085, K-Jumper, RG223, 142D & 316D Ultraflex	BJ141, BJ085, K-Jumper	
Flexibility			
Best	142D & 316D Ultraflex, Mini-Flex 065	142D Ultraflex, Mini-Flex 065	Mini-Flex 065
Better	RG316, RD316, SF316, 115S, 180SP, Mini-Flex 105	SF316, TF405, 100, 125, Mini-Flex 105	Lab-Flex 100, 125, Mini-Flex 105
Good	RG142, RG400, RG223, 235SP, 335SP, Lab-Flex 160	RG142, 235SP, 335SP, Lab-Flex 160	Lab-Flex 160
Fair	Lab-Flex Series, SF 142, Mini-Flex 165	Lab-Flex Series, SF142, Mini-Flex 165	Lab-Flex 200, Mini-Flex 165
Limited	BJ141, BJ085, K-Jumper, 490S	BJ141, BJ085, K-Jumper	K-Jumper
Phase Stability over Temperature			
Better	AL085LLSP, AL141LLSP, AL250LLTP	AL085LLSP, AL141LLSP, AL250LLTP	AL085LLSP, AL141LLSP
Good	LMR Series		
Good	All Lab-Flex & Lab-Flex S	All Lab-Flex & Lab-Flex S	Lab-Flex 100, 125, 160, 200, 115S, 180SP
Fair	BJ085, BJ141, K-Jumper, Mini-Flex	BJ085, BJ141, K-Jumper, Mini-Flex	K-Jumper, Mini-Flex 065 & Mini-Flex 105
Poor	Solid Dielectric Flexible	Solid Dielectric Flexible	
Poor	Solid Dielectric Semi-Rigid	Solid Dielectric Semi-Rigid	Solid Dielectric Semi-Rigid

Cable Selection Guide

By Critical Parameter

Max Frequency (GHz)	40	50
Insertion Loss		
Extremely Low		
Very Low		
Low	Lab-Flex 160	
Average	Lab-Flex 125, 180SP	Lab-Flex 125
High	Lab-Flex 100	Lab-Flex 100
Very High	RG405, 115S, Mini-Flex 105	RG405, 115S, Mini-Flex 105
Extremely High	Mini-Flex 065	Mini-Flex 065
Harsh Environments		
Best	Lab-Flex 160AW, 180SP, Lab-Flex 160AF	
Better		
Good	Lab-Flex 125W, 160W, 180SPW	Lab-Flex 125W
Fair	Lab-Flex 100, Mini-Flex 065 & Mini-Flex 105	Lab-Flex 100, Mini-Flex 065
Fair		
Not Recommended		
Flexibility		
Best	Mini-Flex 065	Mini-Flex 065
Better	Lab-Flex 100, 125, Mini-Flex 105	Lab-Flex 100 & 125
Good	Lab-Flex 160	
Fair		
Limited		
Phase Stability over Temperature		
Better	AL085LLSP	AL085LLSP
Good		
Good	Lab-Flex 100, 125, 160, 115S, 180SP	Lab-Flex 100, 125, 115S
Fair	Mini-Flex 065 & Mini-Flex 105	Mini-Flex 065
Poor		
Poor	Solid Dielectric Semi-Rigid	Solid Dielectric Semi-Rigid

Cable Selection Guide

By Attenuation (dB per 100 feet)

BAND Frequency (GHz)	L		S		C				X				Ku						K							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Lab-Flex, Low-Loss Flexible																										
Lab-Flex 335	4.6		8.4		11.1		14.5		16.5		18.4							23.4								
Lab-Flex 290	4.4		7.8			11.2	13.1				16.4							20.5								
Lab-Flex 200	10.0		17.0			21.0					33.0							40.0								54.0
Lab-Flex 160	12.6		22.5			32.8					48.2							60.7								75.2
Lab-Flex 125	18.0		33.0			49.0					74.0							94.0								118
Lab-Flex 100	19.5		35.3			52.1					77.9							99.3								124.6
Lab-Flex S, Low-Loss Flexible Stranded Center Conductor																										
Lab-Flex 490S	3.8		6.9		10.1				13.4																	
Lab-Flex 335SP	5.7		10.8		16.6						26.0							34.4								
Lab-Flex 235SP	11.5		20.6		30.1						44.4							56.1								69.8
Lab-Flex 180SP	17.3		30.7		44.5						65.0							81.6								101
Lab-Flex 115S	29.5		52.0		75.0				98.6		109							136.0								166.9
Lab-Flex AF, Air Frame Cable																										
Lab-Flex 160AF	12.6		22.5		32.7						48.1							60.6								
Lab-Flex 210AF	8.0		14.0		16.0						25.0							36.2								
Lab-Flex 340AF	5.0		8.0		11.0		13.0				16.0							20.0								
Lab-Flex Q, Space Cable																										
Lab-Flex 160Q	12.6		20.0		28.5				44.0	48.0								60.8								76.9
Lab-Flex 190Q	9.0		15.9		20.7				29.8	31.3								40.8								49.8
Lab-Flex 200Q	7.2		12.7		16.6				24.0	25.6								33.0								
Lab-Flex 290Q	4.3		7.7		10.5				13.7	16.4								20.6								
ASR Test Cables																										
ASR	17.4				43.6				57.0									77.9								94.9
ASR-F	18.0				49.0				66.0									94.0								118
Semi-Rigid, Low-Loss																										
AL250LLTP		7.0	10.0			14.2				17.6								21.8		34.0						
AL141LLSP		15.9	22.8			32.9				40.8								50.9								62.4
AL085LLSP		28.3	40.3			57.6				71.2								88.1								107.0
Semi-Rigid, Conformable (BJ), Flexible (Mini-Flex)																										
RG401 (.250 S/R)		10.4	16.1			25.5				33.9								45.5								
250TP		10.4	16.1			25.5				33.9								45.5								
Mini-Flex 165		17.2	25.7			39.1				50.6								65.9								
K-Jumper		17.6	26.3			40.0				51.7								67.2								86.0
BJ141		17.6	26.3			40.0				51.7								67.2								
RG402 (.141 S/R)		16.5	24.8			37.9				49.0								64.0								82.2
402TP		16.5	24.8			37.9				49.0								64.0								82.2
AL141TP		16.5	24.8			37.9				49.0								64.0								82.2
RG405 (.086 S/R)		27.9	40.8			60.5				76.7								97.9								123.0
405TP		27.9	40.8			60.5				76.7								97.9								123.0
AL085TP		29.5	43.1			63.8				80.8								102.9								128.9
Mini-Flex 105		27.7	34.5			45.7				67.5								95.1								
BJ085		29.2	42.8			63.3				80.1								102.1								
BJ047		47.8	68.9			100.3				125.5								157.6								
Mini-Flex 065 (.047 S/R)		51.1	72.7			103.6				127.7								157.6								191.0
		47.8	68.9			100.3				125.5								157.6								194.7
Standard MIL-C-17 / RG Series																										
SF 142		18.0	26.8			40.7				52.5								68.3								
RG142		18.9	28.1			42.5																				
RG400		21.5	31.7			47.7				61.1																
142D		24.7	37.8			59.4				78.2								104.0								
SF316		37.3	54.1			79.4				99.8								126.3								
RD316		37.6	54.6			79.9				100.6																
RG316		37.6																								
316D		39.0	57.1																							
RG223		19.7	29.3			44.4				57.2																
LMR																										
LMR-400		6.0	8.8			10.8																				
LMR-400-UF		7.2	10.5			24.4																				
LMR-240		11.5	16.6			20.4																				
LMR-240-LLPL		11.5	16.5			20.0																				
LMR-240-UF		13.9	10.5			24.4																				
LMR-195		16.9	24.5			29.9																				
LMR-100A-PVC		35.2	51.8			64.1																				

To select a cable first determine the maximum frequency the cable assembly needs to operate at. Cables under that frequency are listed by lowest (dB/100 ft) attenuation first.

Cable Selection Guide

By Power (Watts)

BAND Frequency (GHz)	L		S		C				X				Ku						K								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	
Lab-Flex, Low-Loss Flexible																											
Lab-Flex 335	1400		800		563					400																	
Lab-Flex 290	1800		1050			850				600																	
Lab-Flex 200	720		400		310					220																162	
Lab-Flex 160	1070		620			420						290														190	
Lab-Flex 125	650		380			260						180														120	
Lab-Flex 100	375		175			160				125																83	
Lab-Flex S, Low-Loss Flexible Stranded Center Conductor																											
Lab-Flex 490S	2300		1300			875				650																	
Lab-Flex 335SP	3020		2160			1470						990															590
Lab-Flex 235SP	1240		840			580						400														260	
Lab-Flex 180SP	870		490			340						240														160	
Lab-Flex 115S	390		220			160						110														70	
Lab-Flex AF, Air Frame Cable																											
Lab-Flex 160AF	1080		610			420						280															220
Lab-Flex 210AF	720		400			300						245															165
Lab-Flex 340AF	1920		1050			750						500															400
Lab-Flex Q, Space Cable																											
Lab-Flex 160Q	561		309			245				171	151																121
Lab-Flex 190Q	600		375			275				175	150																110
Lab-Flex 200Q	720		400			310				220	190																155
Lab-Flex 290Q	1800		1050			850				600	500																450
ASR Test Cables																											
ASR	450									165																	130
ASR-F	670									207																	150
Semi-Rigid, Low-Loss																											
AL250LLTP		2567		2100				1167				640															460
AL141LLSP		399		268				165				131															105
AL085LLSP		119		80				58				45															30
Semi-Rigid, Conformable (BJ), Flexible (Mini-Flex)																											
RG401 (.250 S/R)		1250		950				500				290															200
250TP		1250		950				500				290															200
Mini-Flex 165		550		450				250				130															100
K-Jumper		401		184				120				96															74
BJ141		401		184				120				96															74
RG402 (.141 S/R)		353		304				159				96															75
402TP		353		304				159				96															75
AL141TP		353		304				159				96															75
RG405 (.086 S/R)		116		88				47				29															23
405TP		116		88				47				29															23
AL085TP		116		88				47				29															23
Mini-Flex 105		110		90				50				26															20
BJ085		79		54				38				32															21
BJ047		79		54				38				32															21
Mini-Flex 065 (.047 S/R)		43		39				30				22															9
		29		22				12				8															7
Standard MIL-C-17 / RG Series																											
SF 142		340		239				150				114															85
RG142		330		229				140																			
RG400		290		190				130				100		93													
142D		150		105				70				58															45
SF316		140		90				60				50															30
RD316		123																									
RG316		123		93																							
316D		65		47		38																					
RG223		60		40				25				20		19													
LMR																											
LMR-400		370		250		200																					
LMR-400-UF		310		210		170																					
LMR-240		170		120		90																					
LMR-240-LLPL		140		100		80																					
LMR-240-UF		140		100		80																					
LMR-195		90		60		50																					
LMR-100A-PVC		30		20		10																					

Note: CW Power in watts at sea level and 25°C

To select a cable first determine the maximum frequency the cable assembly needs to operate at. Cables under that frequency are listed by Maximum Power Handling (Watts) first.

Consult Sales Department for Ratings

Cable Selection Guide

Cables & Connectors

Connector Frequency (Max)	GHz	Cable Freq. (Max)			Power				Subminiature			
		Type N	SC	7/16 DIN	Type N	SC	7/16 DIN	SSMA	SMA	SMB	SMC	
		18	11	7	18	11	7	36	18	10	10	
Lab-Flex, Low Loss Flexible												
Lab-Flex 100	100							36	18	10	10	
Lab-Flex 125	125							18				
Lab-Flex 160	160							18				
Lab-Flex 200	200							18				
Lab-Flex 290	290							18				
Lab-Flex 335	335							18				
Lab-Flex S, Low-Loss Flexible Stranded CC												
Lab-Flex 115S	115S							18				
Lab-Flex 180SP	180SP							18				
Lab-Flex 235SP	235SP							18				
Lab-Flex 335SP	335SP							18				
Lab-Flex 490S	490S				11							
Lab-Flex AF, Air Frame Cable												
Lab-Flex 160AF	160AF							18				
Lab-Flex 210AF	210AF							18				
Lab-Flex 340AF	340AF											
Lab-Flex Q, Space Cable												
Lab-Flex 160Q	160Q							18				
Lab-Flex 190Q	190Q							18				
Lab-Flex 200Q	200Q							18				
Lab-Flex 290Q	290Q							18				
Semi-Rigid, Low Loss												
AL085LLSP	AL085LLSP							36	18	10	10	
AL141LLSP	AL141LLSP							18	10			
AL250LLTP	AL250LLTP							18				
Semi-Rigid, Conformable (BJ), Flexible (Mini-Flex)												
(.047 S/R)	047							18				
047TP	047TP							18				
BJ047	BJ047				M17/151-00002			18				
Mini-Flex 065	065							18				
405TP	405TP							36	26	10	10	
RG405 (.086 S/R)	RG405				M17/133-RG405			36	26	10	10	
AL085TP	AL085				M17/133-00013			36	26	10	10	
BJ085	BJ086							18	18	10	10	
Mini-Flex 105	105							18	18	10	10	
K-Jumper	JUMP							36	26	10	10	
RG402 (.141S/R)	RG402				M17/130-RG402			18	10			
402TP	402TP				M17/130-00005			18	10			
AL141TP	AL141				M17/130-00009			18	10			
BJ141	BJ142							18	10			
Mini-Flex 165	165							18	10			
RG401 (.250 S/R)	RG401				M17/129-RG410			18				
250TP	250TP				M17/129-00001			18				
Standard MIL-C-17 / RG Series												
SF142	SF142					18	11	7				
142D	142D					18	11	7				
SF316	SF316					18			18	10	10	
RG142	RG142				M17/60-RG142	8	8	7	8			
RG223	RG223				M17/84-RG223	12	11	7	12			
RG400	RG400				M17/128-RG400	12	11	7	12			
RD316	RD316				M17/152-00001	12			12	10	10	
316D	316D					5			5	5	5	
RG316	RG316				M17/113-RG316	3			3	3	3	
LMR												
LMR-100A-PVC	L100				Times	5.8			5.8	5.8	5.8	
LMR-240	L240				Times	5.8			5.8			
LMR-240-DB	L240DB				Times	5.8			5.8			
LMR-240-UF	L240UF				Times	5.8			5.8			
LMR-240-LLPL	L240LLPL				Times	5.8			5.8			
LMR-400	L400				Times	5.8			5.8			
LMR-400-DB	L400DB				Times	5.8		5.8	5.8			
LMR-400-UF	L400UF				Times	5.8		5.8	5.8			
LMR-400-LLPL	L400LLPL				Times	5.8		5.8	5.8			

Cable Selection Guide

Cables & Connectors

	<u>Precision</u>			<u>Miniature</u>				<u>Microminiature</u>				
	1.85 mm	2.4 mm	2.92 mm	PKZ	OSP (BMA)	TNC	BNC	GPPO (SSMP)	GPO (SMP)	OSSP (BMMA)	MCX	MMCX
	65	50	40	26	22	18	4	65	40	28	6	6
Cable Family												
Lab-Flex, Low Loss Flexible												
Lab-Flex 100		50	40	26	22			50	40	28	6	6
Lab-Flex 125		50	40			18						
Lab-Flex 160		40	35			18						
Lab-Flex 200						18						
Lab-Flex 290						18						
Lab-Flex 335						18						
Lab-Flex S, Stranded CC												
Lab-Flex 115S	65	50	40									
Lab-Flex 180SP			40			18						
Lab-Flex 235SP						18						
Lab-Flex 335SP						18						
Lab-Flex 490S						18						
Lab-Flex AF, Air Frame Cable												
Lab-Flex 160AF												
Lab-Flex 210AF						18						
Lab-Flex 340AF						18						
Lab-Flex Q, Space Cable												
Lab-Flex 160Q												
Lab-Flex 190Q												
Lab-Flex 200Q						18						
Lab-Flex 290Q						18						
Semi-Rigid, Low Loss												
AL085LLSP	62	50	40	26	22	18	4	62	40	28	6	6
AL141LLSP			35	26	22	18	4				6	
AL250LLTP						18						
Semi-Rigid, Conformable, Flexible												
(.047 S/R)												
047TP								50	40			
BJ047								50	40			
Mini-Flex 065								18	18			
405TP		50	40	26	22	18	4	60	40	28	6	6
RG405 (.086 S/R)		50	40	26	22	18	4	60	40	28	6	6
AL085TP		50	40	26	22	18	4	60	40	28	6	6
BJ085		18	18	18	18	18	4	18	18	18	6	6
Mini-Flex 105		50	40	26	22	18	4					
K-Jumper			35									
RG402 (.141S/R)				26	22	18	4				6	
402TP				26	22	18	4				6	
AL141TP				26	22	18	4				6	
BJ141				18	18	18	4				6	
Mini-Flex 165				26	22	18	4				6	
RG401 (.250 S/R)						18						
250TP						18						
Standard MIL-C-17 / RG Series												
SF142				18	18	18	4					
142D				18	18	18	4					
SF316				18	18	18	4	18	18	6	6	
RG142				8	8	8	4					
RG223				12	12	12	4					
RG400				12	12	12	4					
RD316				12	12	12	4		12	6	6	
316D		5	5	5	5	5	4		5	5	5	
RG316		3	3	3	3	3	4	3	3	3	3	
LMR												
LMR-100A-PVC				5.8	5.8	5.8	4		5.8	5.8	5.8	5.8
LMR-240						5.8	4					
LMR-240-DB						5.8	4					
LMR-240-UF						5.8	4					
LMR-240-LLPL						5.8	4					
LMR-400						5.8	4					
LMR-400-DB						5.8	4					
LMR-400-UF						5.8	4					
LMR-400-LLPL						5.8	4					

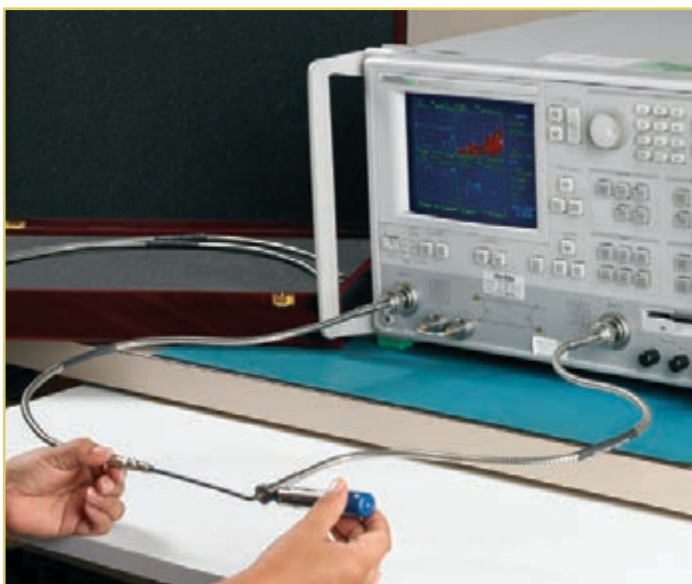
ASR Series Family of High-Performance VNA test port cables. These high frequency assemblies are available individually, in pairs and phase-matched pairs as needed. They are manufactured using the finest materials currently available; offering durable interfaces for repeated matings and special low-loss cable construction for stability over temperature. These high quality assemblies are protected by a stainless steel armor for long-lasting performance in your lab or production test environment. All ASR assemblies are guaranteed to have a minimum return loss of 16 dB at their highest rated frequency.

Features:

- Up to 50 GHz
- 40% Lower Loss than Solid Dielectrics
- Superior Shielding Effectiveness
- Stainless Steel Armor Protective Covering
- Extended Boots (ASR-F only)
- Stainless Steel Connectors
- Phased Matched Pairs and Sets Available:
Standard tolerance is ± 1 degree per GHz
(Equivalent to ± 2.8 picoseconds)

Typical Applications:

- Production and Lab Testing
- Environmental Testing



ASR Family

Specifications

General Specifications	ASR	ASR-F
Diameter	0.27	0.3
Frequency, Max (GHz)	50	50
Loss @ 5 GHz (dB/100ft)	39	35.9

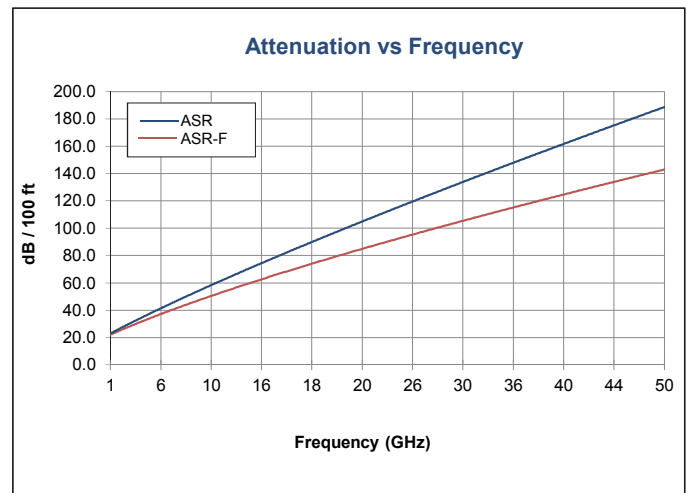
Electrical Specifications	ASR	ASR-F
Impedance, Nominal (Ω)	50	50
Velocity of Propagation (%)	76.5	78
Shielding Effectiveness, 18 GHz (dB/ft)	>100	>90
Capacitance (pF/ft)	27	26
Delay (ns/ft)	1.33	1.3

Mechanical Specifications	ASR	ASR-F
Temperature Range ($^{\circ}\text{C}$)	-55 to +100	-55 to +100
Minimum Bend Radius (inches)	1.5	1.8

Construction Data	ASR	ASR-F
Inner Conductor	Solid SC	Solid SC
Dielectric	Expanded PTFE	Expanded PTFE
First Outer Shield	N/A	Flat Braid SC
Second Outer Shield	N/A	Foil KP
Third Outer Shield	N/A	Braid SC
Inner Jacket	Tin Plated Copper	FEP
Damper Shield	Polyolefin	Polyolefin
Armor	Stay Lock	Monocoil
Second Jacket	N/A	Silicone
Covering	N/A	Nomex

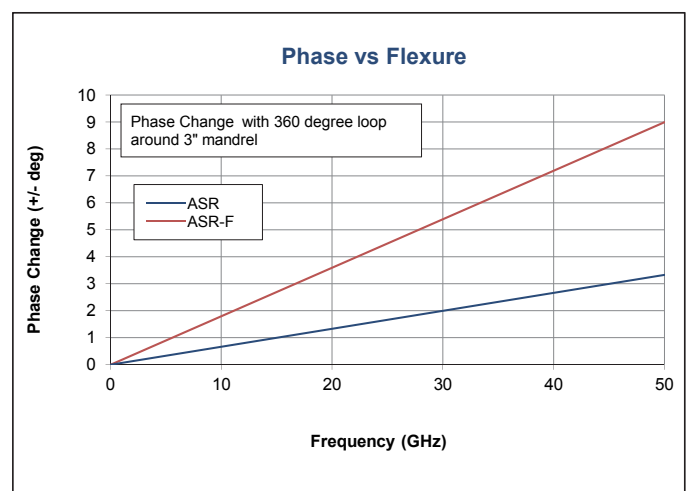
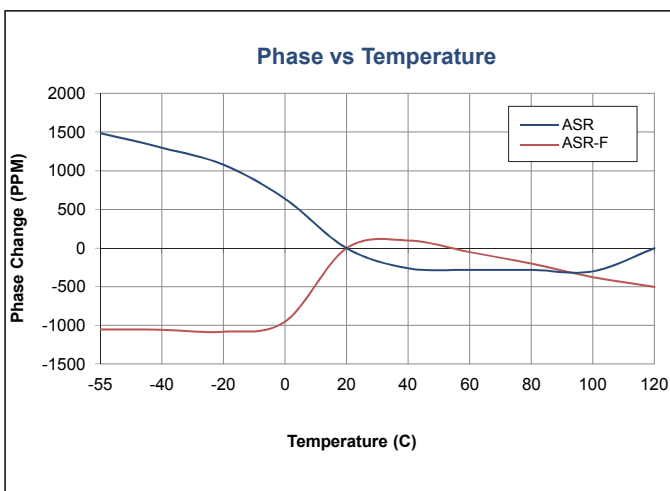
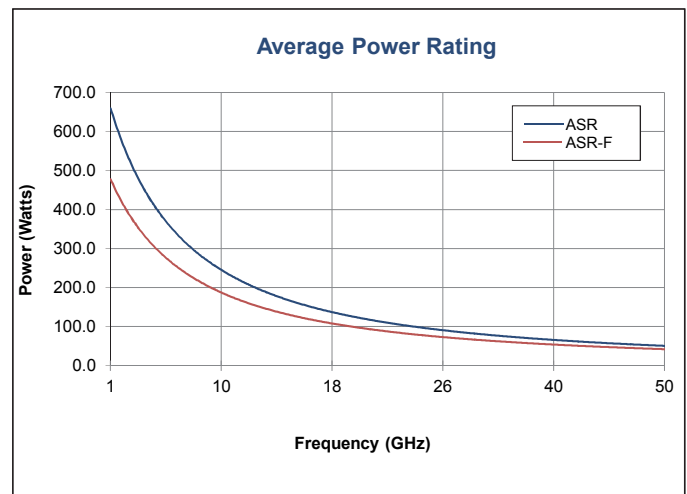
Attenuation (dB/100ft)		
GHz	ASR	ASR-F
1	17.4	18.0
6	43.6	49.0
10	57.0	66.0
16	73.1	88.0
18	77.9	94.0
20	82.4	100.0
26	94.9	118.0
30	102.5	130.0
36	113.3	146.0
40	120.0	156.0
44	126.5	166.0
50	135.8	180.0

Max Cable Loss at +25° C & Sea Level



Average Power Rating (Watts)		
GHz	ASR	ASR-F
1	450.0	670.0
10	165.0	207.0
18	130.0	150.0
26	95.0	110.0
40	60.0	75.0
50	30.0	40.0

Power handling is specified for ambient conditions at sea level and +25° C



ASR Family

Connector Selection & Options

ASR & ASR-F Standard Parts List			
ASR Model #	ASR Part Number	ASR-F Model #	ASR-F Part Number
ASR-1010-XX	KMS-ASR-XX.0-KMS	ASR-F-1010-XX	KMS-ASR-F-XX.0-KMS
ASR-1020-XX	KMS-ASR-XX.0-KFS	ASR-F-1020-XX	KMS-ASR-F-XX.0-KFS
ASR-2020-XX	KFS-ASR-XX.0-KFS	ASR-F-2020-XX	KFS-ASR-F-XX.0-KFS
ASR-1030-XX	KMS-ASR-XX.0-MMS	ASR-F-1030-XX	KMS-ASR-F-XX.0-MMS
ASR-1040-XX	KMS-ASR-XX.0-MFS	ASR-F-1040-XX	KMS-ASR-F-XX.0-NMS
ASR-3030-XX	MMS-ASR-XX.0-MMS	ASR-F-3030-XX	MMS-ASR-F-XX.0-MMS
ASR-3040-XX	MMS-ASR-XX.0-MFS	ASR-F-3040-XX	MMS-ASR-F-XX.0-MFS
ASR-4040-XX	MFS-ASR-XX.0-MFS	ASR-F-4040-XX	MFS-ASR-F-XX.0-MFS
ASR-5050-XX	NMS-ASR-XX.0-NMS	ASR-F-5050-XX	NMS-ASR-F-XX.0-NMS
ASR-5060-XX	NMS-ASR-XX.0-NFS	ASR-F-5060-XX	NMS-ASR-F-XX.0-NFS
ASR-6060-XX	NFS-ASR-XX.0-NFS	ASR-F-6060-XX	NFS-ASR-F-XX.0-NFS
ASR-0210-XX	NMD-KFS-ASR-XX.0-KMS	ASR-F-0210-XX	NMD-KFS-ASR-F-XX.0-KMS
ASR-0220-XX	NMD-KFS-ASR-XX.0-KFS	ASR-F-0220-XX	NMD-KFS-ASR-F-XX.0-KFS
ASR-0230-XX	NMD-KFS-ASR-XX.0-MMS	ASR-F-0230-XX	NMD-KFS-ASR-F-XX.0-MMS
ASR-0240-XX	NMD-KFS-ASR-XX.0-MFS	ASR-F-0240-XX	NMD-KFS-ASR-F-XX.0-MFS
ASR-0410-XX	NMD-MFS-ASR-XX.0-KMS	ASR-F-0410-XX	NMD-MFS-ASR-F-XX.0-KMS
ASR-0420-XX	NMD-MFS-ASR-XX.0-KFS	ASR-F-0420-XX	NMD-MFS-ASR-F-XX.0-KFS
ASR-0430-XX	NMD-MFS-ASR-XX.0-MMS	ASR-F-0430-XX	NMD-MFS-ASR-F-XX.0-MMS
ASR-0440-XX	NMD-MFS-ASR-XX.0-MFS	ASR-F-0440-XX	NMD-MFS-ASR-F-XX.0-MFS


XX Standard Lengths 12, 18 & 24 inches

For any connector combination at any length not listed in our standard parts list consult our sales department

Available Connectors	Description	Type	Model
KMS	2.9mm	Male	10
KFS	2.9mm	Female	20
MMS	2.4mm	Male	30
MFS	2.4mm	Female	40
NMS	Type N	Male	50
NFS	Type N	Female	60
S3KMS	3.5mm	Male	70
NMD-KFS	2.9mm	Female Test Port	02
NMD-MFS	2.4mm	Female Test Port	04
NMD-S3KFs	3.5mm	Female Test Port	06

* Phase Matched Sets Available: +/- 2.8 picoseconds

Certificate of Calibration



smths microwave

8851 SW Old Kansas Avenue, Stuart FL 34997, USA Phone: 800-554-5594 Fax: 772-283-5286

Certificate of Calibration

The product listed below has been built and/or calibrated in accordance with the Florida RF Labs Standard Operating Procedures and is certified in compliance with ISO 17025 and ANSINCSSL Z540.1. Accuracy of test equipment and standards is traceable to national and/or international standards, national metrology institutes (e.g., NIST, NPL, NMI, NIM), or derived from ratio type self calibration techniques. RF Labs suggested calibration interval is 12 months.

Product Information

Part No.: ASR-3030-24	Serial No.: 114806 001
Calibration Date: 21-Jul-2014	

Test Equipment Used

Model Number	Description	Serial#	Calibration Due Date
37297C	65GHZ Vector Network Analyzer	TE30096	5/12/15
3654B	V Cal Kit	TE30098	5/12/15

Quality Engineer: J. Roger M Sadoques

J. Roger M Sadoques

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Interface Cleanliness - Clean Interfaces prolong connector life and produce more accurate, repeatable measurements. The use of connector end-caps to protect the cables and adapters when not in use is recommended.

Interface Cleaning Procedure:

- Solvents:** Connector Insulators, support beads, and seals are susceptible to solvent damage. Solvents can produce permanent physical and electrical damage. Isopropyl Alcohol is recommended for cleaning interfaces. It should be noted that connector interfaces should not be immersed in solvents of any kind because solvents can become trapped within the connectorized assembly. Trapped fluids can cause SWR, Phase, and Insertion Loss problems.
- Applicators:** Fibrous or Abrasive applicators can contaminate and even damage Interface surfaces. Clean lint free swabs should be used. They need to be sharp enough and hard enough to remove dirt and debris without damaging surfaces and/or dislodging center pins.
- Method:** Dip a clean lint free swab in clean isopropyl alcohol. Press excess alcohol out of swab on a clean lint free towel. Wipe the interface components as required to clean the interface. Blow-dry the interface with clean compressed air. Re-inspect the connector to verify that the interface is clean and ready for additional inspection procedures and interface gauging prior to use.

Interface Gauging - Incorrect center pin depths can produce inaccurate measurements and in the case of protruding center pins can damage test devices, adapters, and test ports. Frequent interface gauging can detect problems before they can ruin mating devices.

Recommended Coupling Torque - Incorrect torque can produce inaccurate measurements and over-torque coupling can damage test devices, adapters, and test ports. Torque wrenches should be utilized to for all Mate/De-mate processes.

Cable Routing:

Bend Radius - Care should be taken to avoid over-bending test cables beyond minimum bend radius guidelines. Over-bending can force cable center conductor off-center, and can force the outer conductor out of round even to the point of kinking and fracture. Over bending results in degraded IL and SWR performance. It should also be noted that coiling cables at small diameters could force connector center-pins to protrude beyond required interface dimensions.

Twisting - Twisting test cables should be avoided at all times. Excessive twist can damage cable assembly at the cable/connector junction or even mid-cable depending on how the twist is applied. Lower level twist can cause measurement problems as well. Inducted stresses on test ports and device ports can damage the ports. Low level stresses can cause connections to loosen up. When routing cables always connector any right angles first.

Cable Assembly Mate/De-Mate Process:

Interface Alignment - Contact Pins and Dielectrics can be damaged if misaligned connectors are mated. Make sure that mating interfaces are parallel and on center during Mate/De-Mate cycle.

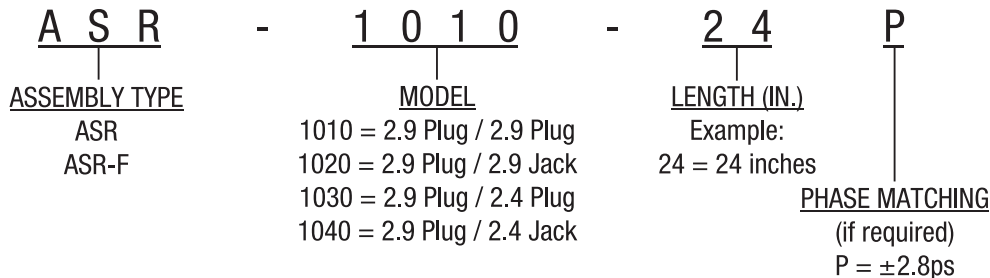
Interface Rotation - Plating and surface finish of outer and inner contacts can be damaged if connector bodies are allowed to rotate during Mate/De-mate cycle. Use wrench flats on connector bodies to keep them rotationally stationary while rotating coupling nut during Mate/De-Mate.

Minimized Load Configuration - Allow test cable to assume natural bend configuration route between test port and device port. Loosen test port and device port connection when test configuration is largely different than test configuration. Route cable, connect device port loosely then tighten both port connections to recommended coupling torque. This method will minimize most bend and twist loading issues.

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Part Numbering Code

Ordering Information





Description:

The ASR series of VNA test cables offers a high performance assembly for precision test applications. It provides a test setup which will maintain its configuration for a very repeatable test platform. The NMD connectors allow direct mating to the test port when a permanent test setup is desired.

Features/Benefits:

- Designs up to 50 GHz
- Phase Stability over Temperature
- High Mating Cycles
- Low Loss Construction
- Superior Shielding Effectiveness
- Phased Matched Sets Available
- Available in Standard Lengths of 12, 18 and 24 inches

Standard Connectors:

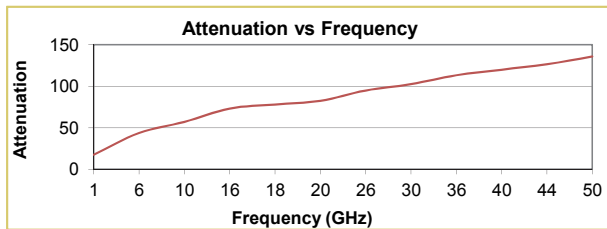
Connector Code	Series	Gender	Type	Loss per GHz	Frequency Max GHz
MMS	2.4mm	Male	Straight	0.012	50
MFS	2.4mm	Female	Straight	0.015	50
NMD-MFS	2.4mm	Female	Straight	0.015	50
NMD-KFS	2.9mm	Female	Straight	0.015	40
KMS	2.9mm	Male	Straight	0.01	40
KFS	2.9mm	Female	Straight	0.015	40
S3KMS	3.5mm	Male	Straight	0.01	35
NMD-S3KFS	3.5mm	Female	Straight	0.015	35
NMS	Type N	Male	Straight	0.011	18
NFS	Type N	Female	Straight	0.01	18

Applications:

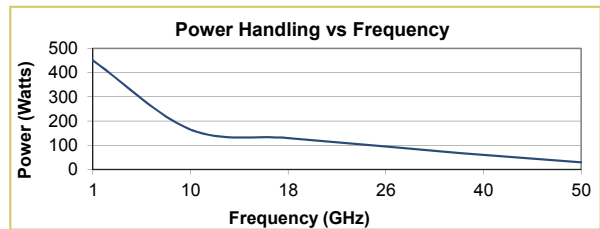
- Production and Lab Testing
- Environmental Testing

Standard Options:

Option Code	Option Description
±2.8PS	Phase Matched (+/-2.8 picoseconds)



(dB per 100 feet)



*CW Power in watts at sea level and 23°C

GHz	1	6	10	16	18	20	26	30	36	40	44	50
Atten	17	44	57	73	78	82	95	103	113	120	127	136

GHz	1	10	18	26	40	50
Pow.	450	165	130	95	60	30



Description:

The ASR-F series of VNA test cables offers a flexible alternative to the original high performance ASR design. It offers durable construction for long-lasting and repeatable test results. The NMD connectors allow for direct mating to the test port when a more permanent test setup is desired

Features/Benefits:

- Flexible Designs up to 50 GHz
- Phase Stability over Temperature and Flexure
- High Mating Cycles
- Low Loss Construction
- Superior Shielding Effectiveness
- Phased Matched Sets Available
- Available in Standard Lengths of 12 to 72 inches

Applications:

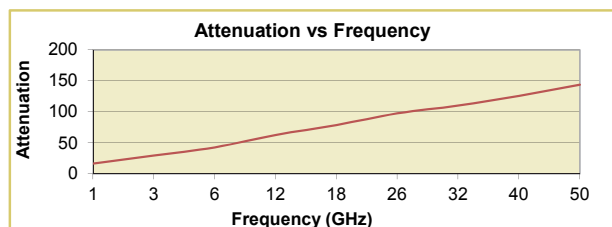
- Production and Lab Testing
- Environmental Testing

Standard Connectors:

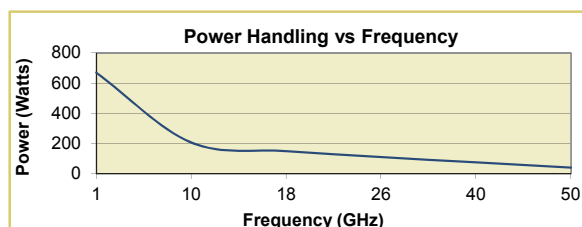
Connector Code	Series	Gender	Type	Loss per GHz	Frequency Max GHz
MMS	2.4mm	Male	Straight	0.012	50
MFS	2.4mm	Female	Straight	0.015	50
NMD-MFS	2.4mm	Female	Straight	0.015	50
KMS	2.9mm	Male	Straight	0.01	40
KFS	2.9mm	Female	Straight	0.015	40
NMD-KFS	2.9mm	Female	Straight	0.015	40
S3KMS	3.5mm	Male	Straight	0.01	35
NMD-S3KFS	3.5mm	Female	Straight	0.015	35
NMS	Type N	Male	Straight	0.011	18
NFS	Type N	Female	Straight	0.01	18

Standard Options:

Cable Code	Option Code	Option Description
ASR-F	±2.8PS	Phase Matched (+/-2.8 picoseconds)



(dB per 100 feet)



*CW Power in watts at sea level and 23°C

GHz	1	3	6	10	12	16	18	20	26	30	32	36	40	44	50
Atten	18	33	49	66	74	88	94	100	118	130	135	146	156	166	180

GHz	1	10	18	26	40	50
Pow.	670	207	150	110	75	40

The Lab-Flex® Family of cables offers you high performance flexible cable assemblies with the lowest insertion loss and highest frequency response when compared with other cables of similar diameters. They are designed with stainless steel connectors along with the strongest cable to connector termination of all the cables types. A wide selection of diameters, protective coverings and electrical options are available. Low PIM Assemblies are also available.

Features:

- Up to 50 GHz
- 40% Lower Loss than Solid Dielectrics
- Superior Shielding Effectiveness
- Direct Solder Sleeve to Outer Braid for Superior Reliability and Mechanical Integrity
- Available with Protective Coverings of:
 - Stainless Steel Armor
 - Various Weatherizing Jackets
 - Armored & Weatherized together
 - Extended Boots
- Stainless Steel Connectors
- Phased Matched Pairs and Sets Available
- Silver Plated Copper Conductors
- Low PIM versions as low as -165 dBc

Typical Applications:

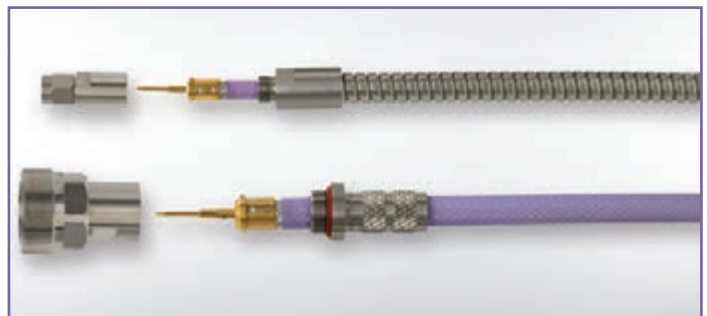
- Test Cables
- Low Loss Jumpers
- High Frequency Interconnects
- Mobile & Fixed Satcom Systems
- Instrumentation
- Antenna Systems
- Telecommunication Systems

The Solder Sleeve Advantage

A distinct advantage designed into our Lab-Flex® product is found in the cable to connector termination area, our solder sleeves. Common methods of cable termination such as crimping or clamping the outer cable braids to the connector body does not always capture all the of the braid, which can lead to intermittent electrical performance and low connector (retention) pull strength. With the Lab-Flex® solder sleeve, both the inner and outer braids are directly soldered 360 degrees around the sleeve. This unique solder sleeve design provides the best braid to connector termination assuring superior electrical performance and the highest connector retention.

Extended Boots

Our extended booting system protects the cable from kinking at the cable-to-connector termination area. This feature uses layers of different lengths and various types of shrink tubing which will distribute the force applied to the cable-to-connector termination over a 3 to 5 inch (7 to 13cm) length of cable, depending on cable diameter and length of the assembly. This method of strain relief is available on all flexible cable assemblies manufactured by Florida RF Labs.



Lab-Flex® Family

Specifications

General Specifications	Lab Flex 100	Lab Flex 125	Lab Flex 160	Lab Flex 200	Lab Flex 290	Lab Flex 335
Diameter	0.1	0.122	0.16	0.195	0.295	0.335
Frequency, Max (GHz)	50	50	40	32	18	18
Loss @ 5 GHz (dB/100ft)	48.5	35.9	30	20	10	11.1

Electrical Specifications	Lab Flex 100	Lab Flex 125	Lab Flex 160	Lab Flex 200	Lab Flex 290	Lab Flex 335
Impedance, Nominal (Ω)	50	50	50	50	50	50
Velocity of Propagation (%)	76	78	78	80	84.5	80
Shielding Effectiveness, 18 GHz (dB/ft)	>85	>90	>90	>90	>90	>90
Capacitance (pF/ft)	27	26	26	25.5	24	25
Delay (ns/ft)	1.34	1.3	1.3	1.27	1.21	1.27

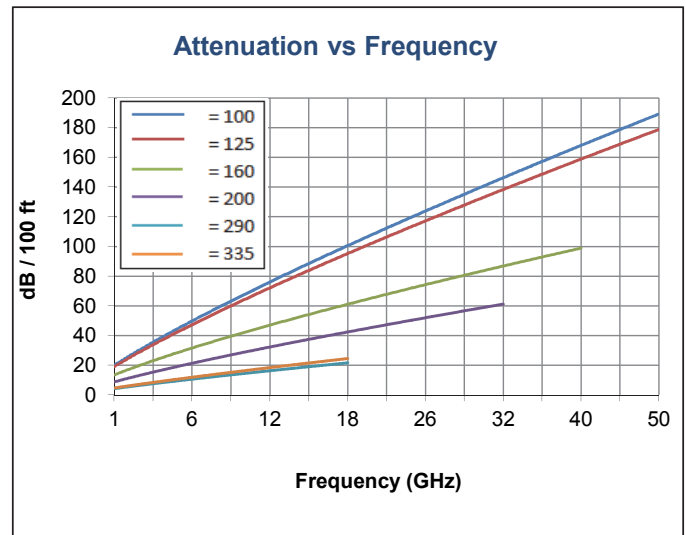
Mechanical Specifications	Lab Flex 100	Lab Flex 125	Lab Flex 160	Lab Flex 200	Lab Flex 290	Lab Flex 335
Weight (lbs/100ft)	1	1.8	3	4.8	8.4	8.5
Temperature Range ($^{\circ}$ C)*	-55 to +200	-55 to +200	-55 to +200	-55 to +200	-65 to +200	-55 to +200
Minimum Bend Radius (inches)	0.5	0.6	0.8	1	1.5	2

*Temperature Ranges with Standard Boots +100 $^{\circ}$ C Max

Construction Data	Lab Flex 100	Lab Flex 125	Lab Flex 160	Lab Flex 200	Lab Flex 290	Lab Flex 335
Inner Conductor	Solid SC	Solid SC	Solid SC	Solid SC	Solid SC	Solid SC
Dielectric	Expanded PTFE	Expanded PTFE	Expanded PTFE	Expanded PTFE	Expanded PTFE	Expanded PTFE
First Outer Shield	Flat Braid SC	Flat Braid SC	Flat Braid SC	Flat Braid SC	Flat Braid SC	Flat Braid SC
Second Outer Shield	N/A	Foil KP	Foil KP	Foil KP	N/A	Foil KP
Third Outer Shield	Braid SC	Braid SC	Braid SC	Braid SC	Braid SC	Braid SC
Jacket	FEP	FEP	FEP	FEP	FEP	FEP

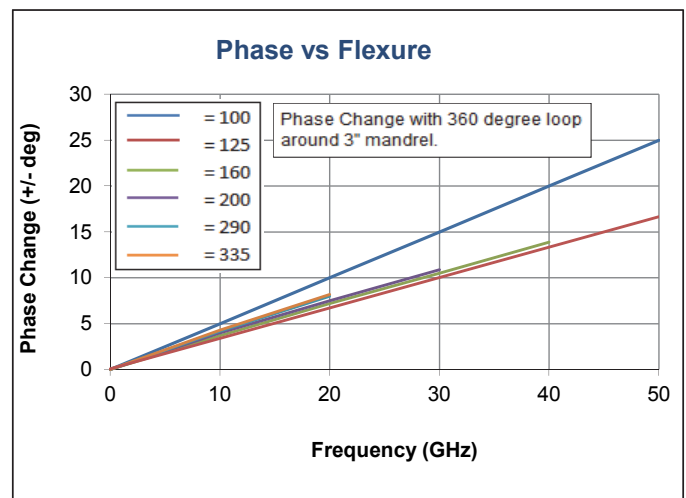
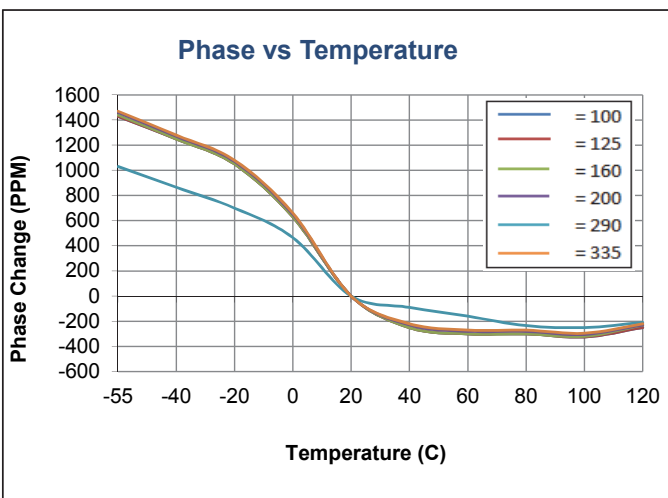
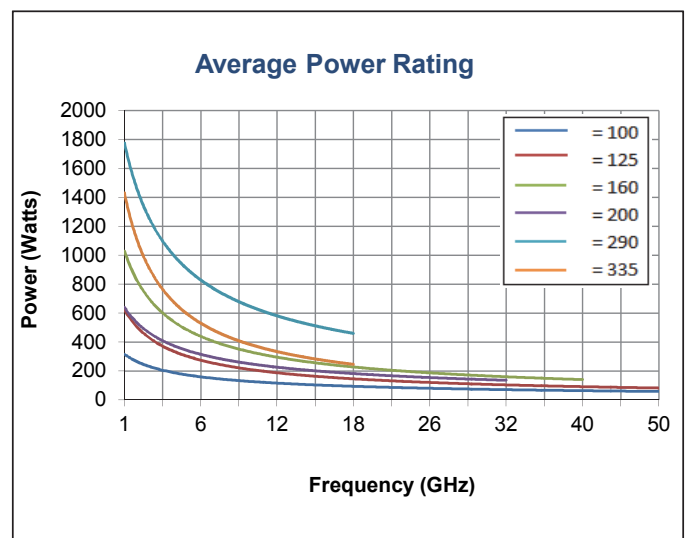
Attenuation (dB/100ft)						
GHz	100	125	160	200	290	335
1	20	18	13	9	4	5
3	35	33	23	15	8	8
6	52	49	33	22	11	12
10	66	66	40	29	14	17
12	78	74	48	32	16	20
16	84	88	55	37	20	22
18	99	94	61	39	21	23
20	105	100	69	47		
26	125	118	75	54		
30	140	130	84	58		
32	142	135	86	60		
36	154	146	90			
40	164	156	97			
44	181	166				
50	194	180				

Max Cable Loss at +25° C & Sea Level



Average Power Rating (Watts)						
GHz	100	125	160	200	290	335
1	375	650	1070	720	1800	1400
3	175	380	620	400	1050	800
6	160	260	420	290	850	563
10	125	206	370	220	650	400
12	110	180	290	207	600	380
16	102	150	230	180	500	300
18	95	140	200	165	450	230
20	90	135	195	164		
26	83	120	190	162		
30	75	115	173	161		
31	74	110	170	160		
36	69	105	155			
40	65	100	150			
44	63	90				
50	60	80				

Power handling is specified for ambient conditions at sea level and +25° C



Lab-Flex® Family

Connector Selection & Options

Connector Options				Frequency Max GHz*	Lab-Flex 100	Lab-Flex 125	Lab-Flex 160	Lab-Flex 200	Lab-Flex 290	Lab-Flex 335
1.85 mm	Plug	(Male)	Straight	65	VMS					
2.4 mm	Plug	(Male)	Straight	50	MMS	MMS	MMS			
2.4 mm	Jack	(Female)	Straight	50	MFS	MFS	MFS			
2.4 mm	Bulkhead	(Female)	Straight	50	MFBS					
2.9 mm	Plug	(Male)	Straight	40	KMS	KMS	KMS	KMS		
2.9 mm	Plug	(Male)	R/A	40			KMR			
2.9 mm	Jack	(Female)	Straight	40	KFS	KFS	KFS			
2.9 mm	Bulkhead	(Female)	Straight	40	KFBS		KFBS			
3.5 mm	Plug Jack	(Male)	Straight	35	3MS		3MS			
3.5 mm	Jack	(Female)	Straight	35	3FS		3FS			
GPO (SMP)	Jack	(Female)	Straight	40	SMPFBS					
GPO (SMP)	Jack	(Female)	R/A	40	SMPFR					
SMA	Plug	(Male)	Straight	26	SMS	SMS	SMS	SMS	SMS	SMS
SMA (low PIM)	Plug	(Male)	Straight	26			SMSP	SMSP		
SMA	Plug	(Male)	R/A	18	SMR		SMR	SMR	SMR	SMR
SMA	Jack	(Female)	Straight	18	SFS	SFS	SFS	SFS	SFS	SFS
SMA	Bulkhead	(Female)	Straight	18	SFBS		SFBS	SFBS	SFBS	SFBS
OSSP	Bulkhead	(Female)	Straight	18	OSSPMBS					
OSP	Bulkhead	(Male)	Straight	18	OSPMBS					
Type N	Plug	(Male)	Straight	18	NMS		NMS	NMS	NMS	NMS
Type N (low PIM)	Plug	(Male)	Straight	18			NMSP	NMSP		
Type N	Jack	(Female)	Straight	18			NFS	NFS	NFS	NFS
Type N	Bulkhead	(Female)	Straight	18	NFBS		NFBS	NFBS	NFBS	NFBS
Type N	Plug	(Male)	R/A	18			NMR	NMR	NMR	NMR
TNC	Plug	(Male)	Straight	18	TMS		TMS	TMS	TMS	TMS
TNC	Jack	(Female)	Straight	18			TFS	TFS	TFS	TFS
TNC	Plug	(Male)	R/A	18	TMR		TMR	TMR	TMR	TMR
TNC	Bulkhead	(Female)	Straight	18	TFBS		TFBS	TFBS	TFBS	TFBS
7 mm		N/A	Straight	18			A7			
SC	Plug	(Male)	Straight	10				SCMS	SCMS	SCMS
SC	Plug	(Male)	R/A	10				SCMR	SCMR	SCMR
SC	Bulkhead	(Female)	Straight	10				SCFBS	SCFBS	SCFBS
7/16 (low PIM)	Plug	(Male)	Straight	7.5			7/16MSP	7/16MSP		

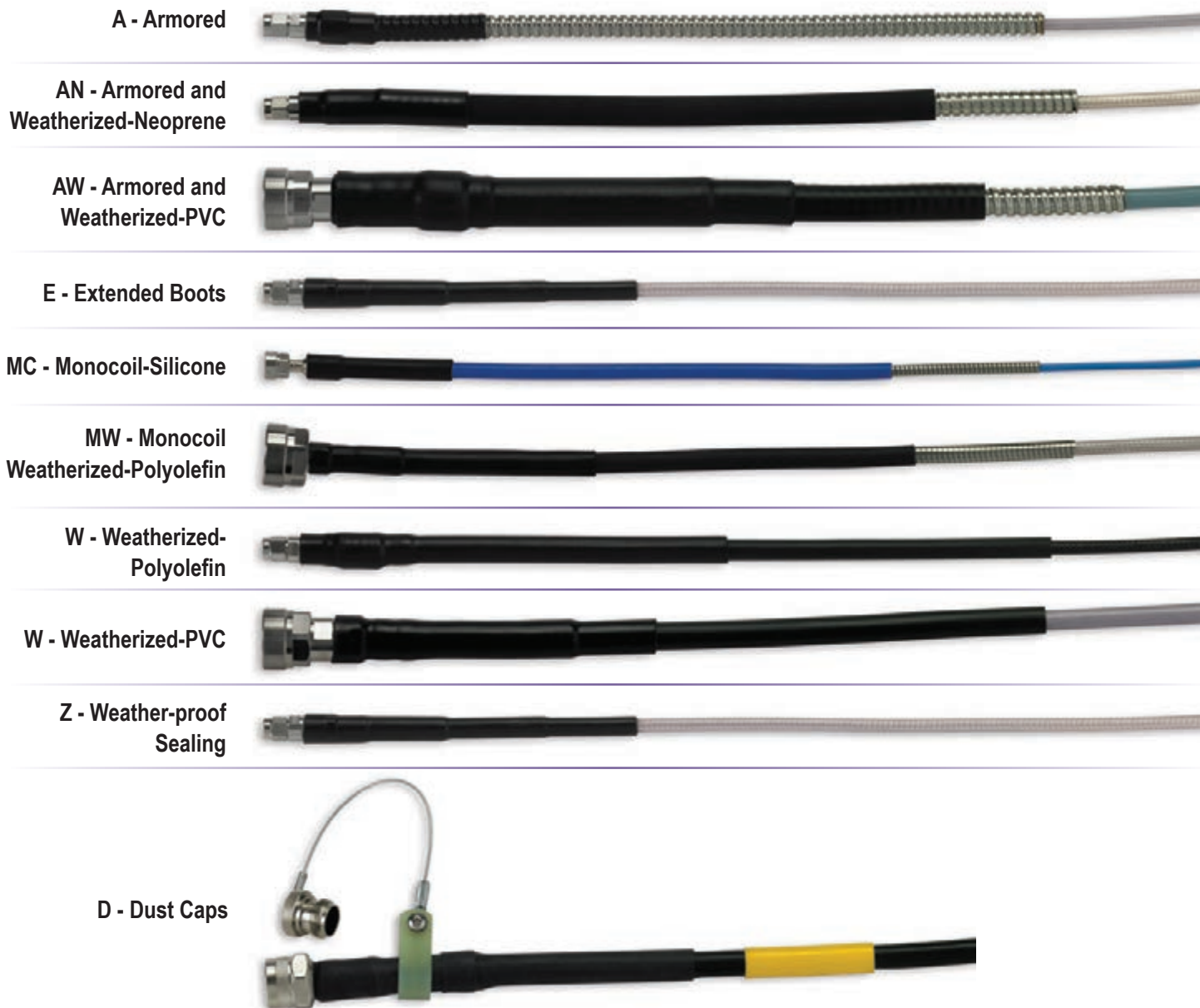
Gender of the connector is determined by center pin.

Consult sales department for other connectors and options not shown.

* Max Frequency of connectors may be limited by the cable selected.

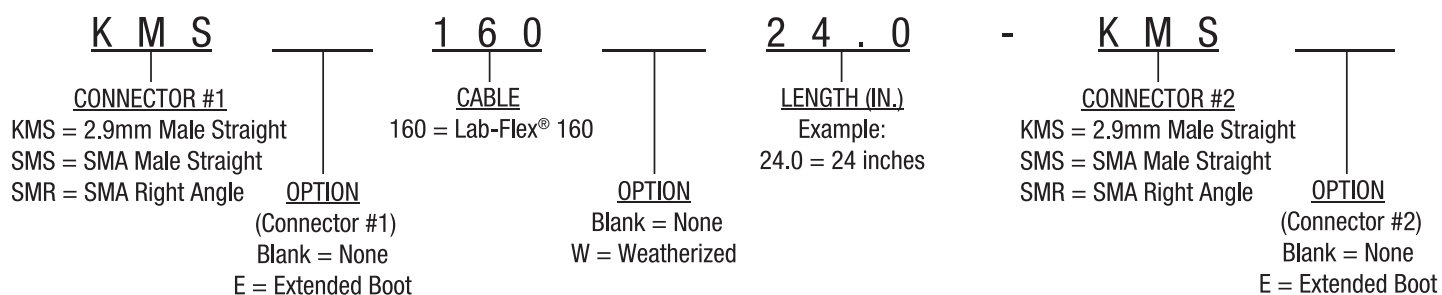
Cable Assembly Options	Option Code	Lab-Flex 100	Lab-Flex 125	Lab-Flex 160	Lab-Flex 200	Lab-Flex 290	Lab-Flex 335
Weatherized (PVC)	W			√	√	√	√
Weather-proof Sealing of connectors	Z	√	√	√	√	√	√
Weatherized (Neoprene)	N	√	√	√	√	√	√
Armorized	A			√	√	√	√
Armorized & Weatherized (PVC)	AW			√	√	√	√
Armorized & Weatherized (Neoprene)	AN			√	√	√	√
Armorized & Weatherized (Monocoil & Silicone)	MC	√	√	√	√		
Armorized & Weatherized (Monocoil & Polyolefin)	MP			√	√	√	
Extended Boots	E	√	√	√	√	√	√
Phase Matching	±2.8PS	√	√	√	√	√	√
Dust Caps	D	√	√	√	√	√	√

Cable Options



Part Numbering Code

Ordering Information



Lab-Flex® 100

DC to 50 GHz



Description:

Lab-Flex® 100 cable offers a reduction in loss and better phase stability when compared to flexible cables with solid dielectric cables in similar diameters. Offering a wide range of connectors, Lab-Flex® 100 provides a cost effective, low loss, flexible solution for frequencies up to 50 GHz.

Features/Benefits:

- Mode Free Operation to 50 GHz
- 76% Velocity Low Loss Dielectric
- Superior Shielding Effectiveness
- Stainless Steel Connectors

Applications:

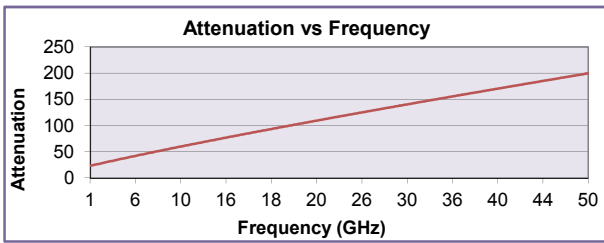
- Test Cables
- Test Head Cable
- Component Interconnects

Standard Connectors:

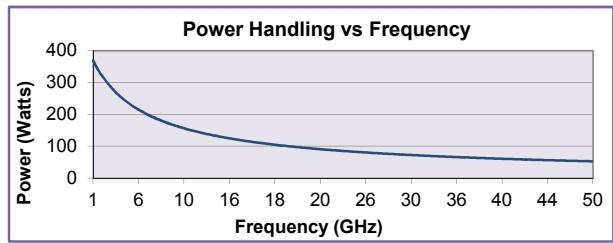
Connector Code	Series	Gender	Type	Loss per GHz	Frequency Max GHz
SMS	SMA	Male	Straight	0.01	26
SMR	SMA	Male	R/A	0.02	18
KMS	2.9mm	Male	Straight	0.01	40
KFS	2.9mm	Female	Straight	0.01	40
MMS	2.4mm	Male	Straight	0.012	50
MFS	2.4mm	Female	Straight	0.015	50

Standard Options:

Option Code	Option Description
±2.8PS	Phase Matched (+/-2.8 picoseconds)
E	Extended Boots
D	Dust Caps
MC	Monocoil
N	Neoprene



(dB per 100 feet)



*CW Power in watts at sea level and 23°C

GHz	1	6	10	16	18	20	26	30	36	40	44	50
Atten	20	52	66	84	99	105	125	140	154	164	181	194

GHz	1	6	10	16	18	20	26	30	36	40	44	50
Pow.	375	160	125	102	95	90	83	75	69	65	63	60



Lab-Flex® 125 cable offers about 40% reduction in loss and all the advantages of a flexible cable, when compared to solid dielectric cables in similar diameters. With 2.9mm and 2.4mm connectors Lab-Flex® 125 provides a cost effective, high performance, flexible cable for frequencies up to 50 GHz.

Features/Benefits:

- Mode Free Operation to 50 GHz
- 78% Velocity Low Loss Dielectric
- Superior Shielding Effectiveness
- Stainless Steel Connectors
- Phase Matched Sets Available

Applications:

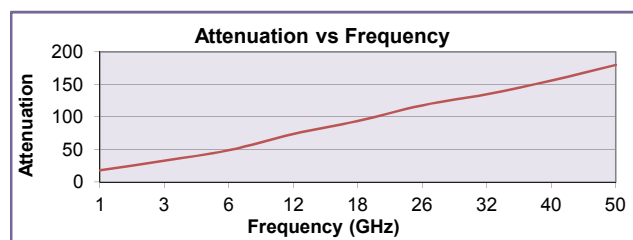
- Test Cables
- Test Head Cable
- Component Interconnects

Standard Options:

Connector Code	Series	Gender	Type	Loss per GHz	Frequency Max GHz
MMS	2.4mm	Male	Straight	0.012	50
MFS	2.4mm	Female	Straight	0.015	50
KMS	2.9mm	Male	Straight	0.01	40
KFS	2.9mm	Female	Straight	0.01	40
SMS	SMA	Male	Straight	0.01	26
SMR	SMA	Male	R/A	0.02	18
NMS	Type N	Male	Straight	0.011	18
NFS	Type N	Female	Straight	0.01	18

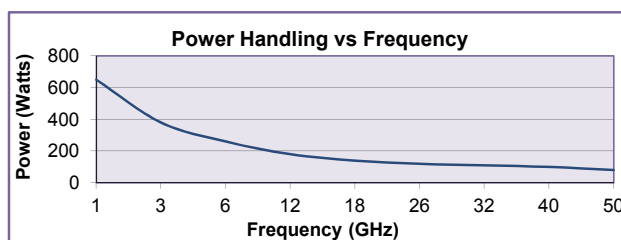
Standard Connectors:

Option Code	Option Description
±2.8PS	Phase Matched (+/-2.8 picoseconds)
E	Extended Boots
D	Dust Caps
MC	Monocoil
N	Neoprene



(dB per 100 feet)

GHz	1	3	6	12	18	26	32	40	50
Atten	18	33	49	74	94	118	135	156	180



*CW Power in watts at sea level and 23°C

GHz	1	3	6	12	18	26	32	40	50
Pow.	650	380	260	180	140	120	108	100	80

Lab-Flex® 160

DC to 40 GHz



Description:

Lab-Flex® 160 cable offers a very cost effective option for flexible cable assembly requirements up to 40 GHz. A wide range of high frequency, stainless steel connectors are available. The 78% velocity dielectric provides a low loss choice without sacrificing dielectric strength and phase stability.

Features/Benefits:

- Mode Free Operation to 40 GHz
- 78% Velocity Low Loss Dielectric
- Superior Shielding Effectiveness
- Stainless Steel Connectors
- Phase Matched Sets Available

Applications:

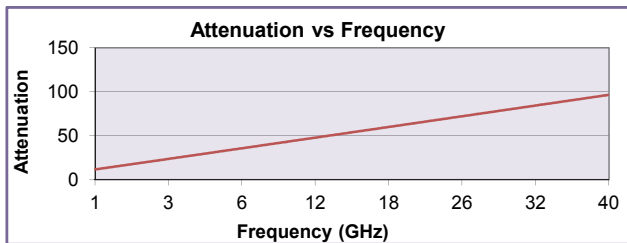
- Test Cables
- Test Head Cables
- Component Interconnects
- Radio Systems
- Test Equipment Interconnects

Standard Connectors:

Connector Code	Series	Gender	Type	Loss per GHz	Frequency Max GHz
MMS	2.4mm	Male	Straight	0.01	50
MFS	2.4mm	Female	Straight	0.015	50
KMS	2.9mm	Male	Straight	0.01	40
KFBS	2.9mm	Female	Straight	0.015	40
KFS	2.9mm	Female	Straight	0.015	40
KMR	2.9mm	Male	R/A	0.02	40
3MS	3.5mm	Male	Straight	0.01	35
3FS	3.5mm	Female	Straight	0.015	35
SMS	SMA	Male	Straight	0.01	18
SMR	SMA	Male	R/A	0.02	18
SFS	SMA	Female	Straight	0.01	18
NMS	Type N	Male	Straight	0.011	18

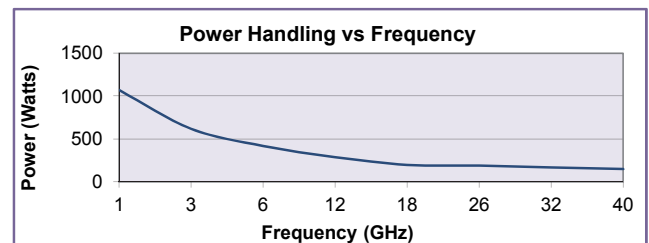
Standard Options:

Option Code	Option Description
A	Armorized
AW	Armorized & Weatherized
MC	Monocoil
W	Weatherized
N	Neoprene
±2.8PS	Phase Matched (+/- 2.8 picoseconds)
E	Extended Boots
D	Dust Caps
MP	Armorized Monocoil



(dB per 100 feet)

GHz	1	3	6	12	18	26	32	40
Atten	13	23	33	48	61	75	87	97



*CW Power in watts at sea level and 23°C

GHz	1	3	6	12	18	26	32	40
Pow.	1070	620	420	290	200	190	169	150



Description:

Lab-Flex® 200, our most popular low loss cable, is ideal as an alternative for solid dielectric cables. With an 80% velocity, low density PTFE dielectric, Lab-Flex® 200 offers a 40% insertion loss reduction over traditional solid dielectrics of the same size.

Features/Benefits:

- Mode Free Operation to 32 GHz
- 80% Velocity Low Loss Dielectric
- Superior Shielding Effectiveness
- Stainless Steel Connectors
- Phase Matched Sets Available

Applications:

- Component Interconnects
- Antenna Systems
- Radar Systems

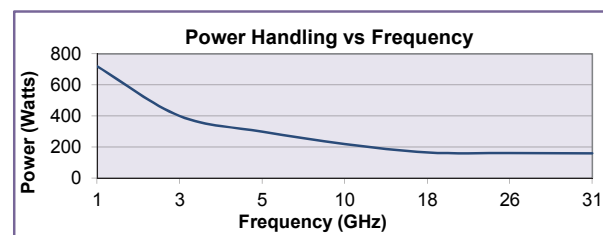
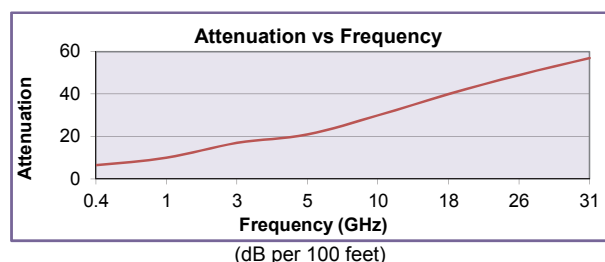
Standard Connectors:

Connector Code	Series	Gender	Type	Loss per GHz	Frequency Max GHz
KMS	2.9mm	Male	Straight	0.01	40
KMSV	2.9mm	Male	Vented	0.01	40
KFBS	2.9mm	Female	Straight	0.015	40
SMS	SMA	Male	Straight	0.01	18
SMSV	SMA	Male	Vented	0.01	18
SMR	SMA	Male	R/A	0.02	18
SMR90	SMA	Male	R/A	0.01	18
SFBS	SMA	Female	Straight	0.01	18
SFS	SMA	Female	Straight	0.01	18
NMS	Type N	Male	Straight	0.011	18
NMSV	Type N	Male	Vented	0.011	18
NMR	Type N	Male	R/A	0.02	18
NMR90	Type N	Male	R/A	0.01	18
NFBS	Type N	Female	Straight	0.01	18
NFS	Type N	Female	Straight	0.01	18
TMS	TNC	Male	Straight	0.01	18
TMSV	TNC	Male	Vented	0.01	18
TMR	TNC	Male	R/A	0.02	18
TFBS	TNC	Female	Straight	0.015	18
TFS	TNC	Female	Straight	0.015	18
7/16MS	7/16 DIN	Male	Straight	0.02	7.5
BMS	BNC	Male	Straight	0.01	4

Gender of the Connector is determined by center pin.

Standard Options:

Option Code	Option Description
A	Armorized
AW	Armorized & Weatherized
MC	Monocoil
MP	Armorized Monocoil
W	Weatherized
N	Neoprene
±2.8PS	Phase Matched (+/- 2.8 picoseconds)
E	Extended Boots
D	Dust Caps
RoHS	RoHS Compliant



*CW Power in watts at sea level and 23°C

GHz	0.4	1	2	4	6	8	10	12	14	16	18	26	32
Atten	6.5	8.6	12	18	22	25	29	32	34	37	39	54	60

GHz	1	3	5	10	18	26	31
Pow.	720	400	300	220	165	162	160

Lab-Flex® 290

DC to 18 GHz



Standard Connectors:

Connector Code	Series	Gender	Type	Loss per GHz	Frequency Max GHz
SMS	SMA	Male	Straight	0.012	18
SFS	SMA	Female	Straight	0.012	18
SFBS	SMA	Female	Straight	0.012	18
SMR	SMA	Male	R/A	0.023	18
NMS	Type N	Male	Straight	0.01	18
NMR	Type N	Male	R/A	0.02	18
NFBS	Type N	Female	Straight	0.01	18
NFS	Type N	Female	Straight	0.01	18
TMS	TNC	Male	Straight	0.01	18
TFS	TNC	Female	Straight	0.01	18
TFBS	TNC	Female	Straight	0.01	18
TMR	TNC	Male	R/A	0.02	18
SCMS	SC	Male	Straight	0.01	10
SCMR	SC	Male	R/A	0.02	10
SCFBS	SC	Female	Straight	0.01	10
7/16MS	7/16DIN	Male	Straight	0.02	7.5

Gender of the Connector is determined by center pin.

Description:

Lab-Flex® 290 offers the lowest loss in a flexible cable for applications up to 18 GHz. Especially suited for long lengths, this cable is also ideal where insertion loss or high power is a concern. All connector types are mode free to 18 GHz and have a rugged, stainless steel construction.

Features/Benefits:

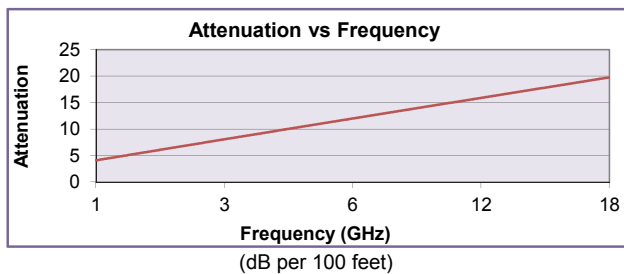
- Mode Free Operation to 18 GHz
- 84% Velocity Low Loss Dielectric
- Superior Shielding Effectiveness
- Stainless Steel Connectors
- Phase Matched Sets Available

Applications:

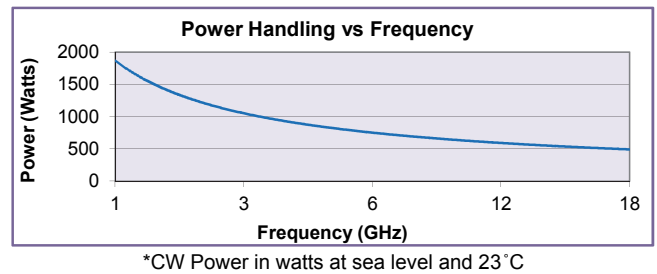
- Long Run Test Cables
- Field Test Setups
- Antenna Systems
- Radar Systems

Standard Options:

Option Code	Option Description
A	Armorized
AW	Armorized & Weatherized
MP	Armorized Monocoil
W	Weatherized
N	Neoprene
±2.8PS	Phase Matched (+/- 2.8 picoseconds)
E	Extended Boots
D	Dust Caps
RoHS	RoHS Compliant



GHz	1	3	6	12	18
Atten	4	8	11	16	21



*CW Power in watts at sea level and 23°C

GHz	1	3	6	12	18
Power	1800	1050	850	600	450



Description:

Lab-Flex® 335 is a high performance, low loss replacement for traditional cables such as RG214 & RG 393. With an 80% velocity, low density dielectric, Lab-Flex® 335 cable offer a 40% lower loss than solid dielectrics of the same size.

Features/Benefits:

- Mode Free Operation to 18 GHz
- 80% Velocity Low Loss Dielectric
- Superior Shielding Effectiveness
- Stainless Steel Connectors
- Phase Matched Sets Available

Applications:

- Long Run Test Cables
- Field Test Setups
- Antenna Systems
- Radar Systems

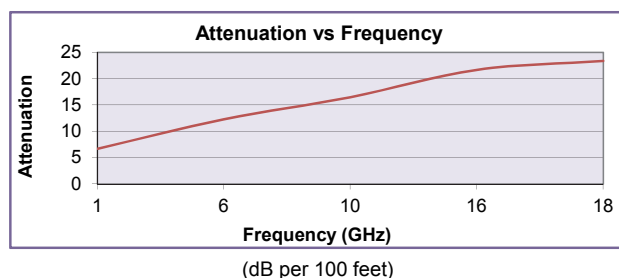
Standard Connectors:

Connector Code	Series	Gender	Type	Loss per GHz	Frequency Max GHz
SMS	SMA	Male	Straight	0.012	18
SFS	SMA	Female	Straight	0.012	18
SFBS	SMA	Female	Straight	0.012	18
SMR	SMA	Male	R/A	0.023	18
NMS	Type N	Male	Straight	0.01	18
NMR	Type N	Male	R/A	0.02	18
NFBS	Type N	Female	Straight	0.01	18
NFS	Type N	Female	Straight	0.01	18
TMS	TNC	Male	Straight	0.01	18
TFS	TNC	Female	Straight	0.01	18
TFBS	TNC	Female	Straight	0.01	18
TMR	TNC	Male	R/A	0.02	18
SCMS	SC	Male	Straight	0.01	10
SCMR	SC	Male	R/A	0.02	10
SCFBS	SC	Female	Straight	0.01	10

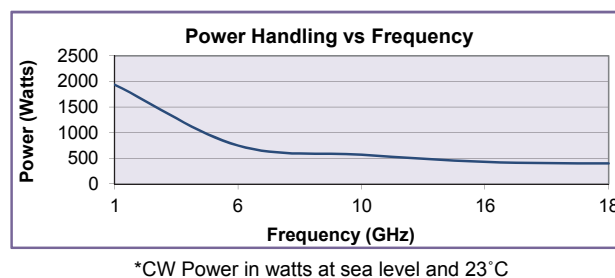
Gender of the Connector is determined by center pin.

Standard Options:

Option Code	Option Description
A	Armorized
AW	Armorized & Weatherized
W	Weatherized
N	Neoprene
±2.8PS	Phase Matched (+/- 2.8 picoseconds)
E	Extended Boots
D	Dust Caps
RoHS	RoHS Compliant



GHz	1	6	10	16	18
Atten	5	12	17	22	23



*CW Power in watts at sea level and 23°C

GHz	1	6	10	16	18
Pow.	1400	563	400	300	230

Lab-Flex® S Family cables utilize a stranded center conductor construction that promotes flexibility and long life cycles. It incorporates a low loss, ePTFE extruded dielectric that maintains its geometry through flexure. This helps to minimize phase and amplitude changes in the assembly. The cable design also utilizes a carbon tape between the inner and outer shields to minimize frictional heat build up that contributes to work hardening and potential breakage of the shields. These design attributes all contribute to make a very durable, high flexure life cycle in these cable assemblies.

Features:

- Designs up to 65 GHz
- Some Designed to Exceed 500,000 Flexures
- Stranded Copper Center Conductor
- 30% Lower Loss than Solid Dielectrics
- Superior Shielding Effectiveness
- Direct Solder Sleeve to Outer Braids
- Available with Protective Coverings of:
 - Weatherization
 - Extended Boots
- Phased Matched Pairs and Sets Available

Typical Applications:

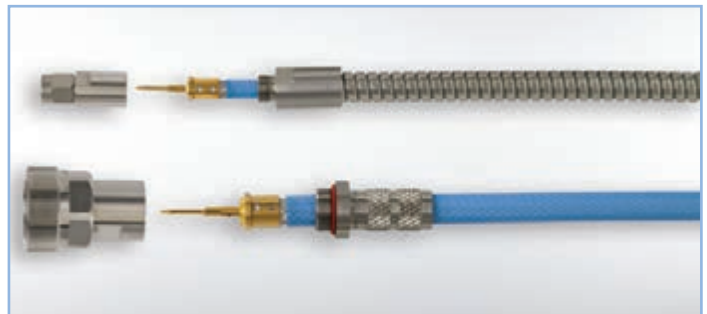
- Radar Systems
- Antenna Systems
- Production and Lab Testing

The Solder Sleeve Advantage

A distinct advantage designed into our Lab-Flex® product is found in the cable to connector termination area, our solder sleeves. Common methods of cable termination such as crimping or clamping the cable outer braids to the connector body does not always capture all the of the braid, which can lead to intermittent electrical performance and low connector (retention) pull strength. With the Lab-Flex® solder sleeve, both the inner and outer braids are directly soldered 360 degrees around the sleeve. This unique solder sleeve design provides the best braid to connector termination assuring superior electrical performance and the highest connector retention.

Extended Boots

Our extended booting system protects the cable from kinking at the cable-to-connector termination area. This feature uses layers of different lengths and various types of shrink tubing which will distribute the force applied to the cable-to-connector termination over a 3 to 5 inch (7 to 13cm) length of cable, depending on cable diameter and length of the assembly. This method of strain relief is available on all flexible cable assemblies manufactured by Florida RF Labs.



Lab-Flex® S Family

Specifications

General Specifications	Lab Flex 115S	Lab Flex 180SP	Lab Flex 235SP	Lab Flex 335SP	Lab Flex 490S
MIL Number	N/A	N/A	N/A	N/A	N/A
Diameter	0.105	0.18	0.235	0.335	0.49
Frequency, Max (GHz)	65	40	26.5	18	10
Loss @ 5 GHz (dB/100ft)	68.07	34	21	15	8.5

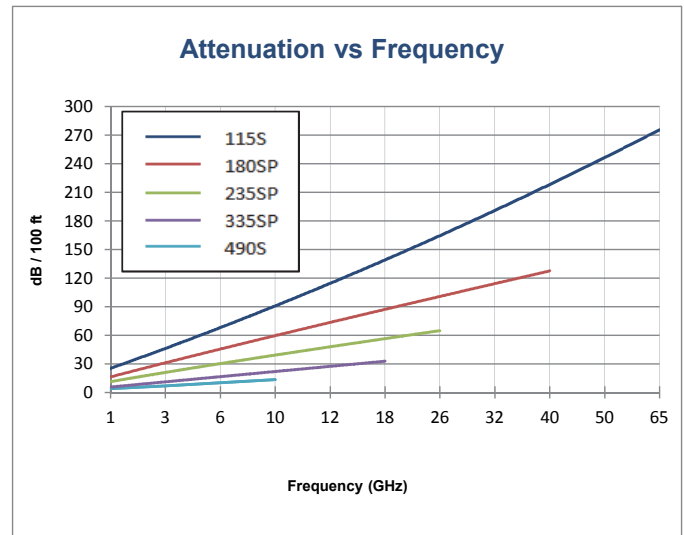
Electrical Specifications	Lab Flex 115S	Lab Flex 180SP	Lab Flex 235SP	Lab Flex 335SP	Lab Flex 490S
Impedance, Nominal (Ω)	50	50	50	50	50
Velocity of Propagation (%)	76	78	78	78	80
Shielding Effectiveness, 18 GHz (dB/ft)	>90	>90	>90	>90	>90
Capacitance (pF/ft)	27	27	27	27	25.5
Delay (ns/ft)	1.34	1.3	1.3	1.3	1.27

Mechanical Specifications	Lab Flex 115S	Lab Flex 180SP	Lab Flex 235SP	Lab Flex 335SP	Lab Flex 490S
Weight (lbs/100ft)	1.4	2.7	5.1	9	19.2
Temperature Range ($^{\circ}\text{C}$)	-55 to +200*	-65 to +85*	-65 to +85*	-65 to +85*	-55 to +200*
Minimum Bend Radius (inches)	0.5	0.9	1.2	1.6	2.5

Construction Data	Lab Flex 115S	Lab Flex 180SP	Lab Flex 235SP	Lab Flex 335SP	Lab Flex 490S
Inner Conductor	Stranded SC	Stranded SC	Stranded SC	Stranded SC	Stranded SC
Dielectric	Expanded PTFE	Expanded PTFE	Expanded PTFE	Expanded PTFE	Expanded PTFE
First Outer Shield	Flat Braid SC	Flat Braid SC	Flat Braid SC	Flat Braid SC	Flat Braid SC
Second Outer Shield	Conductive Tape	Conductive Tape	Conductive Tape	Conductive Tape	Conductive Tape
Third Outer Shield	Braid SC	Braid SC	Braid SC	Braid SC	Braid SC
Jacket	FEP	PUR	PUR	PUR	FEP

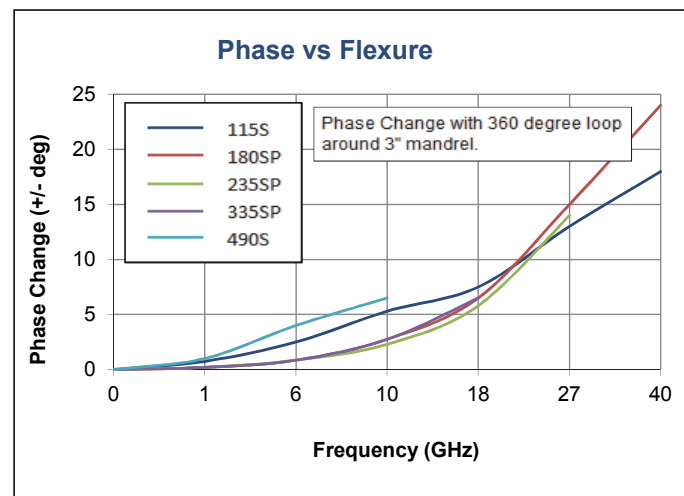
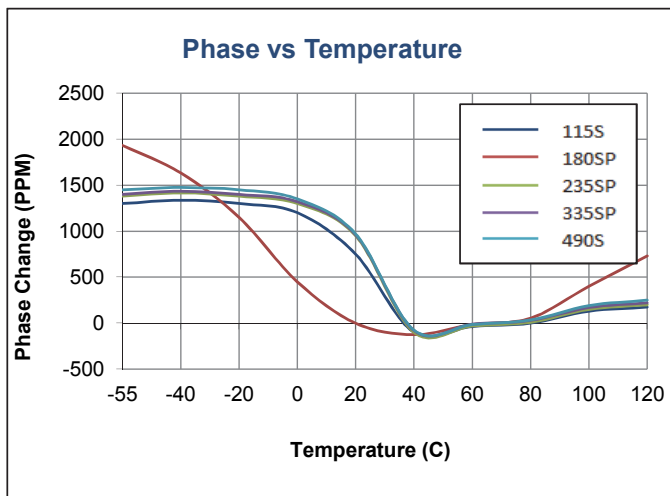
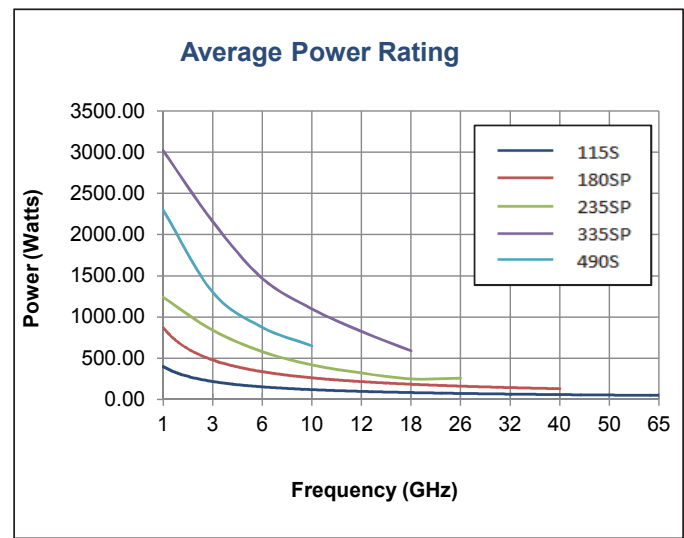
Attenuation (dB/100ft)					
GHz	115S	180SP	235SP	335SP	490S
1	29.45	17.28	11.51	5.67	3.8
3	52.03	30.69	20.61	10.77	6.9
6	74.99	44.46	30.08	16.55	10.07
10	98.61	59.95	40.27	20.59	13.4
12	108.86	64.98	44.4	26.04	
18	135.97	81.57	56.12	34.37	
26	166.91	100.65	69.77		
32	187.69	113.56			
40	213.22	129.49			
50	242.61				
65	283.02				

Max Cable Loss at +25° C & Sea Level



Average Power Rating (Watts)					
GHz	115S	180SP	235SP	335SP	490S
1	390	870	1240	3020	2300
3	220	490	840	2160	1300
6	160	340	580	1470	875
10	120	290	487	1107	650
12	110	240	400	990	
18	90	190	250	590	
26	70	160	260		
32	70	140			
40	60	120			
50	50				
65	40				

Power handling is specified for ambient conditions at sea level and +25° C



Lab-Flex® S Family

Connector Selection & Options

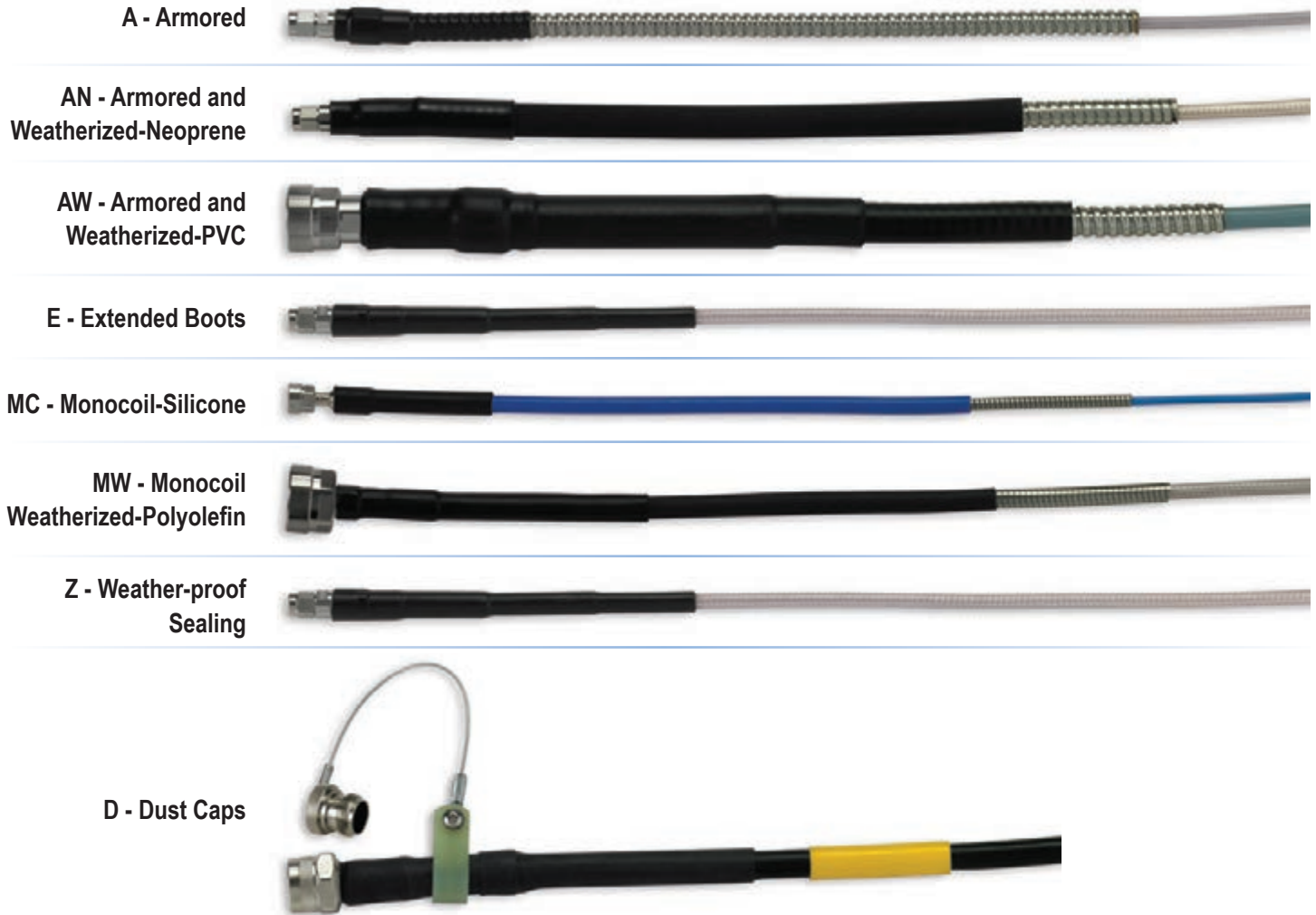
Connector Options				Frequency Max GHz*	Lab-Flex S 115S	Lab-Flex S 180SP	Lab-Flex S 235SP	Lab-Flex S 335SP	Lab-Flex S 490S
1.85 mm	Plug	(Male)	Straight	65	VMS				
2.4 mm	Plug	(Male)	Straight	50	MMS				
2.4 mm	Jack	(Female)	Straight	50		MFS			
2.4 mm	Bulkhead	(Female)	Straight	50					
2.9 mm	Plug	(Male)	Straight	40	KMS	KMS	KMS		
2.9 mm	Plug	(Male)	R/A	40					
2.9 mm	Jack	(Female)	Straight	40		KFS			
2.9 mm	Bulkhead	(Female)	Straight	40					
3.5 mm (S3K)	Plug Jack	(Male)	Straight	35		S3KMS			
3.5 mm (S3K)	Jack	(Female)	Straight	35		S3KFS			
SMA	Plug	(Male)	Straight	26	SMS	SMS	SMS	SMS	
SMA	Plug	(Male)	R/A	18		SMR	SMR		
SMA	Jack	(Female)	Straight	18			SFS		
SMA	Bulkhead	(Female)	Straight	18			SFBS		
Type N	Plug	(Male)	Straight	18		NMS	NMS	NMS	NMS
Type N	Jack	(Female)	Straight	18					
Type N	Bulkhead	(Female)	Straight	18		NFBS	NFBS		
Type N	Plug	(Male)	R/A	18		NMR	NMR		NMR
TNC	Plug	(Male)	Straight	18		TMS	TMS	TMS	TMS
TNC	Jack	(Female)	Straight	18					
TNC	Plug	(Male)	R/A	18			TMR		TMR
TNC	Bulkhead	(Female)	Straight	18			TFBS		
SC	Plug	(Male)	Straight	10					SCMS
SC	Plug	(Male)	R/A	10					SCMR
SC	Bulkhead	(Female)	Straight	10					SCFBS
7/16 DIN	Plug	(Male)	Straight	7.5				7/16MS	
BNC	Plug	(Male)	Straight	4			BMS		

Gender of the connector is determined by center pin.

Consult sales department for other connectors and options not shown.

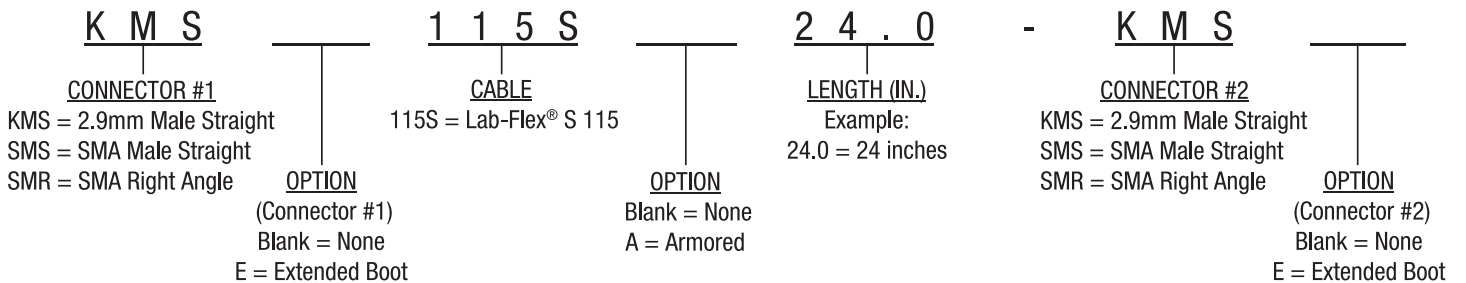
Cable Assembly Options	Option Code	Lab-Flex S 115S	Lab-Flex S 180SP	Lab-Flex S 235SP	Lab-Flex S 335SP	Lab-Flex S 490S
Armorized	A		√	√	√	√
Weather-proof Sealing of connectors	Z	√	√	√	√	√
Armorized & Weatherized (PVC)	AW		√	√	√	√
Armorized & Weatherized (Neoprene)	AN		√	√	√	√
Armorized & Weatherized (Monocoil & Silicone)	MC		√			
Armorized & Weatherized (Monocoil & Polyolefin)	MP		√	√		
Extended Boots	E	√	√	√	√	√
Phase Matching	±2.8PS	√	√	√	√	√
Dust Caps	D	√	√	√	√	√

Cable Options



Part Numbering Code

Ordering Information



Lab-Flex® 115S

DC to 65 GHz



Description:

Lab-Flex® 115S is a low-loss, high performance cable which is suitable for applications up to 70 GHz. Its small size lends itself to good connector compatibility with 1.85mm and 2.4mm connectors which are available in plugs and jacks. The stranded center conductor design provides a durable test cable and can also be used for high frequency jumpers with low connector strain when the assembly is mated to surface mount connector.

Features/Benefits:

- Mode Free Operation to 65 GHz
- 76% Velocity Low Loss Dielectric
- Superior Shielding Effectiveness
- 19 Strand Center Conductor

Applications:

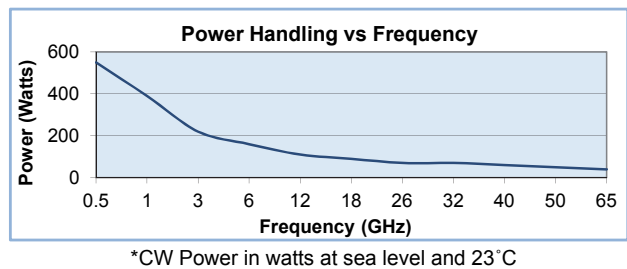
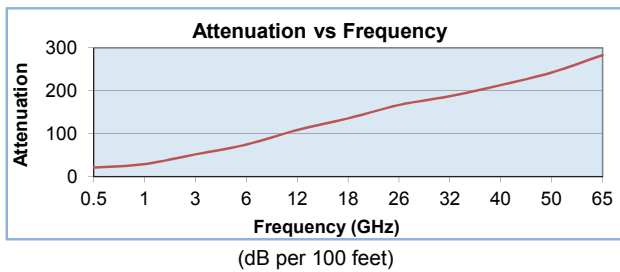
- High Frequency Interconnects
- Radar Systems
- Production and Lab Testing

Standard Connectors:

Connector Code	Series	Gender	Type	Loss per GHz	Frequency Max GHz
MMS	2.4mm	Male	Straight	0.012	50
KMS	2.9mm	Male	Straight	0.01	40
SMS	SMA	Male	Straight	0.01	18

Standard Options:

Option Code	Option Description
±2.8PS	Phase Matched (+/-2.8 picoseconds)
E	Extended Boots
D	Dust Caps



GHz	0.5	1	3	6	12	18	26	32	40	50	65
Atten	21	29	52	75	109	136	167	188	213	243	283

GHz	0.5	1	3	6	12	18	26	32	40	50	65
Power	550	390	220	160	110	90	70	70	60	50	35



Description:

Lab-Flex® 180SP offers outstanding performance in applications up to 40 GHz. With a stranded center conductor and polyurethane jacket, it provides a very flexible and durable test cable while offering a full range of stainless steel connectors from 2.92mm to Type N. When used in systems, its unique design provides a low loss solution for applications requiring flexure rates as high as 500,000 cycles.

Features/Benefits:

- Mode Free Operation to 40 GHz
- 78% Velocity Low Loss Dielectric
- Superior Shielding Effectiveness
- 19 Strand Center Conductor

Applications:

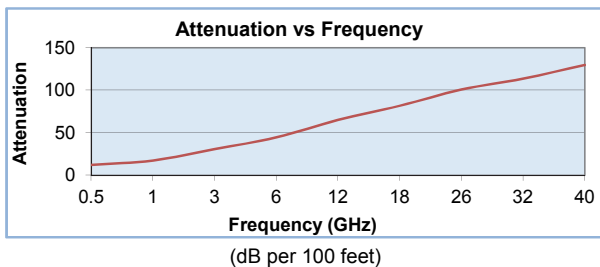
- High Frequency Interconnects
- Radar Systems
- Production and Lab Testing

Standard Connectors:

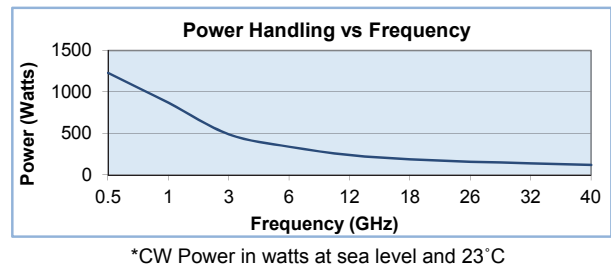
Connector Code	Series	Gender	Type	Loss per GHz	Frequency Max GHz
MMS	2.4mm	Male	Straight	0.012	50
MFS	2.4mm	Female	Straight	0.015	50
KMS	2.9mm	Male	Straight	0.01	40
KFS	2.9mm	Female	Straight	0.015	40
SMS	SMA	Male	Straight	0.01	18
SMR	SMA	Male	R/A	0.02	18
NMS	Type N	Male	Straight	0.011	18
NMR	Type N	Male	R/A	0.02	18
NFBS	Type N	Female	Straight	0.01	18
TMS	TNC	Male	Straight	0.01	18

Standard Options:

Option Code	Option Description
A	Armorized
±2.8PS	Phase Matched (+/- 2.8 picoseconds)
E	Extended Boots
AW	Armorized & Weatherized
AN	Armorized & Neoprene
D	Dust Caps
MC	Monocoil
MP	Monocoil & Weatherized



GHz	0.5	1	3	6	12	18	26	32	40
Atten	12	17	31	45	65	82	101	114	129



GHz	0.5	1	3	6	12	18	26	32	40
Pow.	1230	870	490	340	240	190	160	140	120

Lab-Flex® 235SP

DC to 26 GHz



Description:

Lab-Flex® 235SP offers excellent performance for applications up to 26 GHz. With a stranded center conductor and polyurethane jacket, it provides a very flexible and durable test cable. A full range of stainless steel connectors from 26 GHz SMA to Type N plugs are available. This cable is most often used in systems that may require a low loss, high flexure solution. With a relatively small .235" diameter, the 235SP is also a good choice for high density installs.

Features/Benefits:

- Mode Free Operation to 26 GHz
- 78% Velocity Low Loss Dielectric
- Superior Shielding Effectiveness
- 19 Strand Center Conductor

Applications:

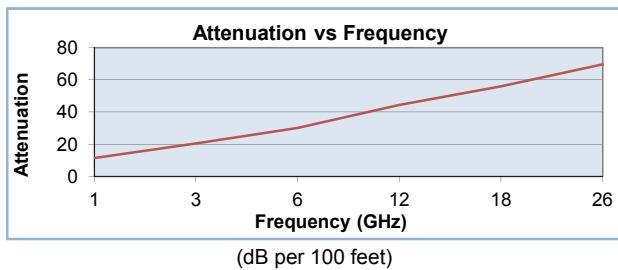
- Radar & Antenna Systems
- Production and Lab Testing
- Test Equipment Interconnects

Standard Connectors:

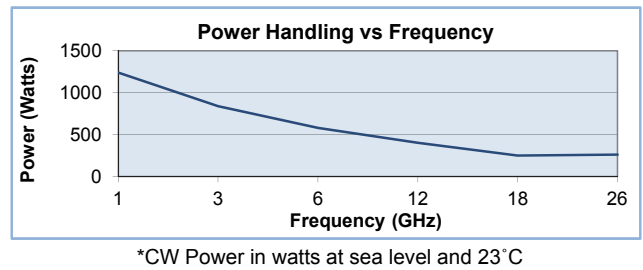
Connector Code	Series	Gender	Type	Loss per GHz	Frequency Max GHz
KMS	2.9mm	Male	Straight	0.01	40
SMS	SMA	Male	Straight	0.01	18
SMR	SMA	Male	R/A	0.02	18
SMR90	SMA	Male	R/A	0.02	18
SFBS	SMA	Female	Straight	0.01	18
SFS	SMA	Female	Straight	0.01	18
NMS	Type N	Male	Straight	0.011	18
NMR	Type N	Male	R/A	0.02	18
NMR90	Type N	Male	R/A	0.02	18
NFBS	Type N	Female	Straight	0.01	18
TMS	TNC	Male	Straight	0.01	18
BMS	BNC	Male	Straight	0.01	4

Standard Options:

Option Code	Option Description
A	Armorized
±2.8PS	Phase Matched (+/- 2.8 picoseconds)
E	Extended Boots
AW	Armorized & Weatherized
AN	Armorized & Neoprene
D	Dust Caps
MP	Weatherized Monocoil



GHz	1	3	6	12	18	26
Atten	12	21	30	44	56	70



GHz	1	3	6	12	18	26
Pow.	1240	840	580	400	250	260



Description:

Lab-Flex® 335SP offers superior performance in applications up to 18 GHz. Primarily used in systems, this cable provides excellent durability over flexure up to 500,000 cycles. 335SP has a 19-strand center conductor and polyurethane jacket for increased flexibility. Its robust, low loss construction makes it very suitable for field deployment. SMA, TNC and Type N stainless steel connectors are available.

Features/Benefits:

- Mode Free Operation to 18 GHz
- 78% Velocity Low Loss Dielectric
- Superior Shielding Effectiveness
- 19 Strand Center Conductor

Applications:

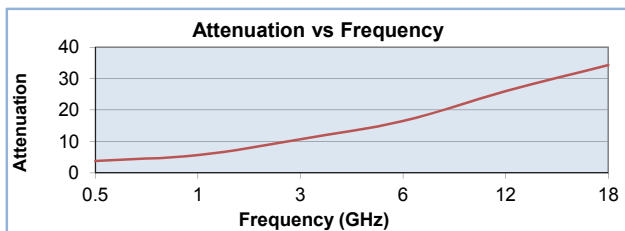
- Test Cables
- Test Head Cables
- Component Interconnects
- Radar and Antenna Systems

Standard Connectors:

Connector Code	Series	Gender	Type	Loss per GHz	Frequency Max GHz
SMS	SMA	Male	Straight	0.01	18
NMS	Type N	Male	Straight	0.011	18
NFBS	Type N	Female	Straight	0.01	18
TMS	TNC	Male	Straight	0.01	18
7/16MS	7/16 DIN	Male	Straight	0.01	7.5

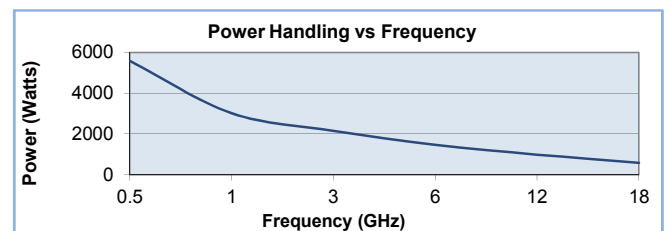
Standard Options:

Option Code	Option Description
A	Armorized
±2.8PS	Phase Matched (+/-2.8 picoseconds)
E	Extended Boots
AW	Armorized & Weatherized
AN	Armorized & Neoprene
D	Dust Caps



(dB per 100 feet)

GHz	0.5	1	3	6	12	18
Atten	4	6	11	17	26	34



*CW Power in watts at sea level and 23°C

GHz	0.5	1	3	6	12	18
Pow.	5580	3020	2160	147	990	590

Lab-Flex® 490S

DC to 10 GHz



Description:

Lab-Flex® 490S offers superior performance in applications up to 10 GHz. 490S is primarily designed for system uses where high power at high frequencies is needed. Its FEP jacket offers more flexibility than typical corrugated cable types while still supplying greater than 90dB of shielding effectiveness. High power type N, TNC and SC stainless steel connectors are available.

Features/Benefits:

- Mode Free Operation to 10 GHz
- 80% Velocity Low Loss Dielectric
- Superior Shielding Effectiveness
- 7 Strand Center Conductor

Applications:

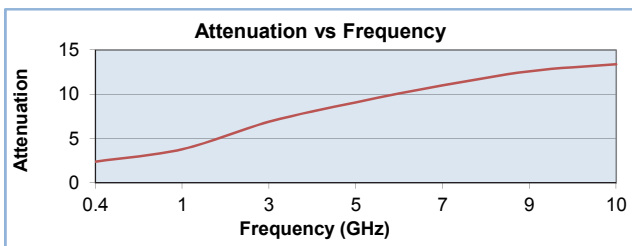
- Antenna Systems
- Radar Systems
- High Power Testing

Standard Connectors:

Connector Code	Series	Gender	Type	Loss per GHz	Frequency Max GHz
NMS	Type N	Male	Straight	0.011	18
NMR	Type N	Male	R/A	0.02	18
TMS	TNC	Male	Straight	0.01	18
SCMS	SC	Male	Straight	0.01	10
SCMR	SC	Male	R/A	0.02	10
SCFBS	SC	Female	Straight	0.01	10

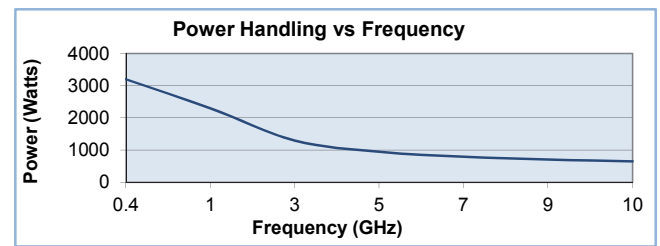
Standard Options:

Option Code	Option Description
A	Armorized
±2.8PS	Phase Matched (+/- 2.8 picoseconds)
E	Extended Boots
AW	Armorized & Weatherized
AN	Armorized & Neoprene
D	Dust Caps



(dB per 100 feet)

GHz	0.4	1	3	5	7	9	10
Atten	2	4	7	9	11	13	13



*CW Power in watts at sea level and 23°C

GHz	0.4	1	3	5	7	9	10
Pow.	3200	2300	1300	950	800	710	650

Lab-Flex® AF Family is an upgraded version of our popular Lab-Flex cable which has been modified to handle all of the harsh environments associated with most airborne, shipboard and ground-based applications. Our proprietary cable assembly design utilizes a redundant sealing system to ensure moisture resistance to both cable and connector interfaces. This design has been qualified to meet or exceed the requirements of MIL-T-81490. It also employs a very durable dielectric design which is able to withstand crushing or kinking.

This optimized, triple-shielded cable design is protected by a Nomex® jacket which provides abrasion resistance during installation and general use of the assembly.

Features:

- Designs up to 18 GHz
- Tested and Qualified to MIL-T-81490 & MIL-C-87104
- Redundant Moisture Sealing
- Direct Solder Sleeve to Outer Braid for Superior Electrical Reliability and Mechanical Integrity
- Hermetic Connectors
 - Sealed Connector Interface
 - Sealed Cable/Connector Junction
 - Stainless Steel Connectors
- Abrasion Resistant Nomex® Jacket
- Durable ePTFE Dielectric

Typical Applications:

- UAV Guidance Systems
- Aircraft Radar & Antenna Systems
- Shipboard Communication Systems
- Electronic Warfare Equipment
- Thermal Vacuum Test Assemblies
- Ground Based Communication Systems

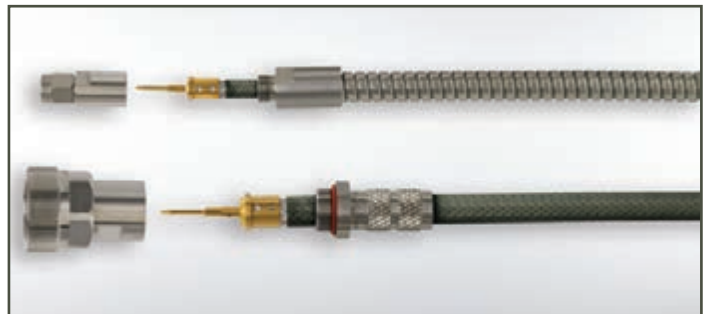
The Solder Sleeve Advantage

A distinct advantage designed into our Lab-Flex® AF product is found in the cable to connector termination area, our solder sleeves. Common methods of cable termination such as crimping or clamping the outer cable braids to the connector body does not always capture all the of the braid, which can lead to intermittent electrical performance and low connector (retention) pull strength. With the Lab-Flex® AF solder sleeve, both the inner and outer braids are directly soldered 360 degrees around the sleeve. This unique solder sleeve design provides the best braid to connector termination assuring superior electrical performance and the highest connector retention.

Extended Boots

Our extended booting system protects the cable from kinking at the cable-to-connector termination area. This feature uses layers of different lengths and various types of shrink tubing which will distribute the force applied to the cable-to-connector termination over a 3 to 5 inch (7 to 13 cm) length of cable, depending on cable diameter and length of the assembly. This method of strain relief is available on all flexible cable assemblies manufactured by Florida RF Labs.

Nomex® is a registered trademark of DuPont.



Lab-Flex® AF Family

Specifications

General Specifications	Lab Flex 160AF	Lab Flex 210AF	Lab Flex 340AF
Diameter	0.16	0.21	0.34
Frequency, Max (GHz)	18	18	18
Loss @ 5 GHz (dB/100ft)	30	21	10.2

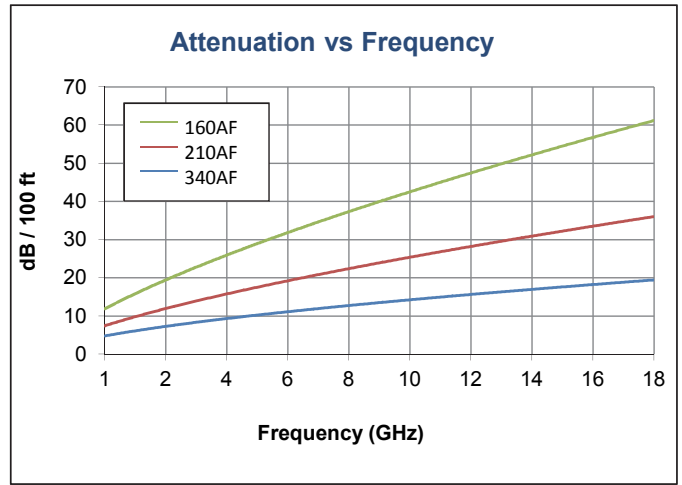
Electrical Specifications	Lab Flex 160AF	Lab Flex 210AF	Lab Flex 340AF
Impedance, Nominal (Ω)	50	50	50
Velocity of Propagation (%)	78	80	81
Shielding Effectiveness, 18 GHz (dB/ft)	>90	>90	>90
Capacitance (pF/ft)	26	25	24.75
Delay (ns/ft)	1.3	1.3	1.25

Mechanical Specifications	Lab Flex 160AF	Lab Flex 210AF	Lab Flex 340AF
Weight (lbs/100ft)	3.8	4.8	9.3
Temperature Range ($^{\circ}\text{C}$)	-55 to +200	-55 to +200	-55 to +200
Minimum Bend Radius (inches)	0.75	1	1.75

Construction Data	Lab Flex 160AF	Lab Flex 210AF	Lab Flex 340AF
Inner Conductor	Solid SPC	Solid SPC	Solid SPC
Dielectric	Expanded PTFE	Expanded PTFE	Expanded PTFE
First Outer Shield	Flat Braid SPC	Flat Braid SPC	Flat Spiral SPC
Second Outer Shield	Foil Tape	Foil Tape	Foil Tape
Third Outer Shield	Braid SC	Braid SC	Braid SC
Jacket	FEP	FEP	FEP
Vapor Barrier	Polyimide Tape	Polyimide Tape	Polyimide Tape
Outer Braid	Nomex®	Nomex®	Nomex®

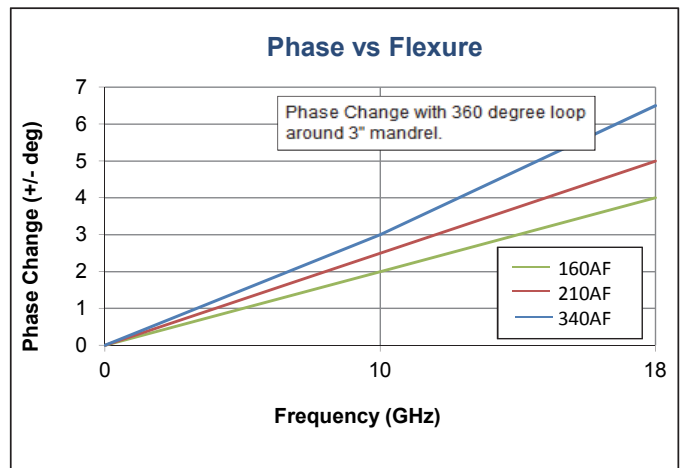
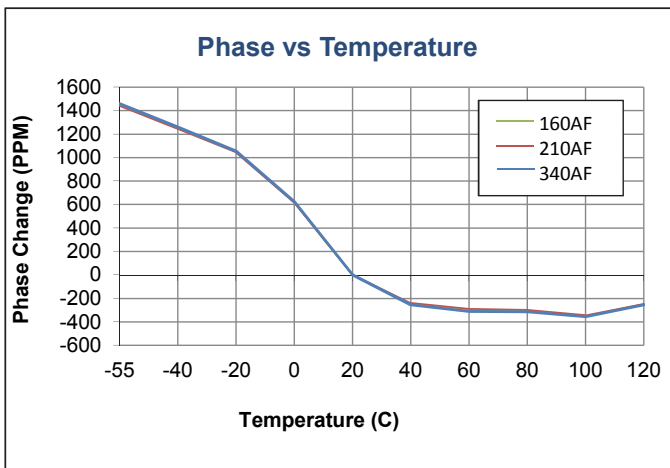
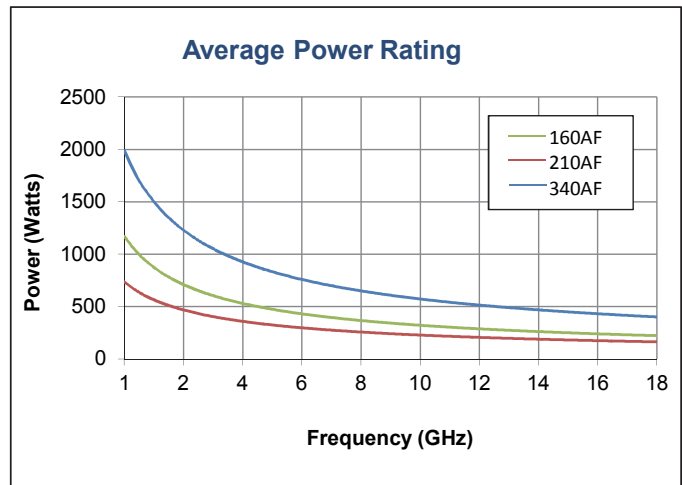
Attenuation (dB/100ft)			
GHz	160	210	340
1	12.6	8.0	5.0
3	22.5	14.0	8.0
6	32.7	16.0	11.0
12	48.1	25.0	16.0
18	60.6	36.2	20.0

Max Cable Loss at +25°C & Sea Level



Average Power Rating (Watts)			
GHz	160	210	340
1	1080	720	1920
3	610	400	1050
6	420	300	750
12	280	245	500
18	220	165	400

Power handling is specified for ambient conditions at sea level and +25°C



Lab-Flex® AF Family

Connector Selection & Options

Connector Options				Frequency Max GHz*	Lab-Flex 160AF	Lab-Flex 210AF	Lab-Flex 340AF
SMA	Plug	(Male)	Straight	18	SMS	SMS	
SMA	Plug	(Male)	R/A	18	SMR	SMR	
SMA	Bulkhead	(Female)	Straight	18	SFBS	SFBS	
Type N	Plug	(Male)	Straight	18		NMS	NMS
Type N	Bulkhead	(Female)	Straight	18		NFBS	NFBS
Type N	Plug	(Male)	R/A	18		NMR	NMR
TNC	Plug	(Male)	Straight	18		TMS	TMS
TNC	Plug	(Male)	R/A	18		TMR	TMR
TNC	Bulkhead	(Female)	Straight	18		TFBS	TFBS
2.9 mm	Plug	(Male)	Straight	18	KMS		
SC	Plug	(Male)	Straight	10			SCMS
SC	Plug	(Male)	R/A	10			SCMR
SC	Bulkhead	(Female)	Straight	10			SCFBS

Gender of the connector is determined by center pin.

Consult sales department for other connectors and options not shown.

* Max Frequency of connectors may be limited by the cable selected.

Cable Assembly Options	Option Code	Lab-Flex 160AF	Lab-Flex 210AF	Lab-Flex 340AF
Elastomeric Abrasion Tubing	ET	√	√	√
Extended Boots	E	√	√	√
Phase Matching	±2.8PS	√	√	√
Dust Caps	D	√	√	√

Cable Options

E - Extended Boots

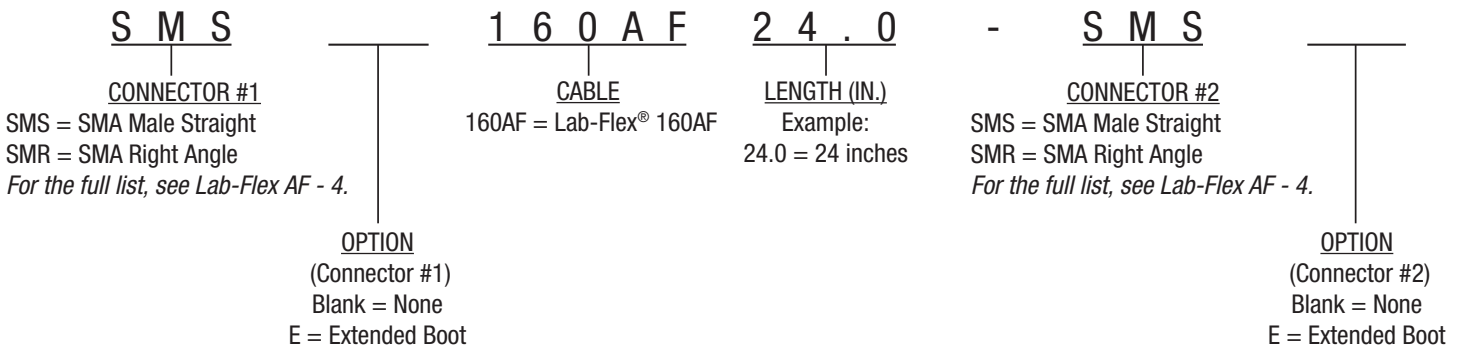


D - Dust Caps



Part Numbering Code

Ordering Information



Lab-Flex® 160AF



Description:

Lab-Flex® 160AF is the lightest weight flexible cable in our family of airframe qualified assemblies and offers excellent performance up to 18 GHz. A wide range of high frequency, stainless steel connectors are available. The 78% velocity dielectric provides a low loss choice without sacrificing dielectric strength and phase stability.

Features/Benefits:

- Mode Free Operation to 18 GHz
- 78% Velocity Low Loss Dielectric
- Superior Shielding Effectiveness
- Durable, Lightweight Construction
- All Stainless Steel Connectors
- Phase Matched Sets Available

Applications:

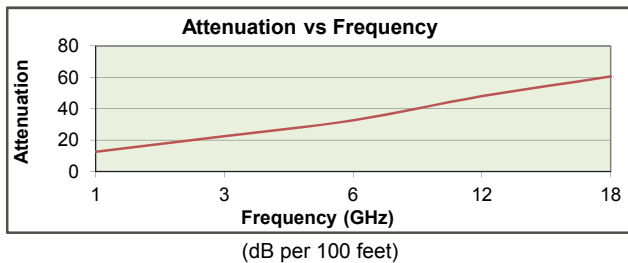
- Airborne Radar and Antenna Systems
- UAV Guidance Systems
- Shipboard Communications

Standard Connectors:

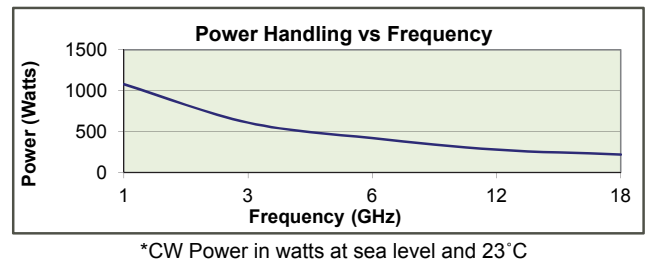
Connector Code	Series	Gender	Type	Loss per GHz	Frequency Max GHz
KMS	2.9 mm	Male	Straight	0.01	18
SMS	SMA	Male	Straight	0.01	18
SMR	SMA	Male	R/A	0.02	18
NMS	Type N	Male	Straight	0.011	18

Standard Options:

Option Code	Option Description
E	Extended Boots
±2.8PS	Phase Matched (+/- 2.8 picoseconds)
D	Dust Caps



GHz	1	3	6	12	18
Atten	13	23	33	48	61



GHz	1	3	6	12	18
Pow.	1080	610	420	280	220



Description:

Lab-Flex® 210AF is ideal for any airframe application that may require a durable low-loss cable with performance capabilities up to 18 GHz. With a 78% velocity, low density PTFE dielectric, Lab-Flex® 210AF provides a low loss flexible choice that is moisture sealed to withstand the harshest environments.

Features/Benefits:

- Mode Free Operation to 18 GHz
- 78% Velocity Low Loss Dielectric
- Superior Shielding Effectiveness
- Durable, Lightweight Construction
- All Stainless Steel Connectors
- Phase Matched Sets Available

Applications:

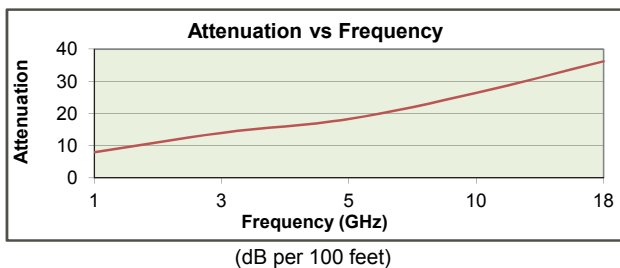
- Airborne (Commercial and EW)
- UAV Guidance Systems
- Antenna and Radar Systems

Standard Connectors:

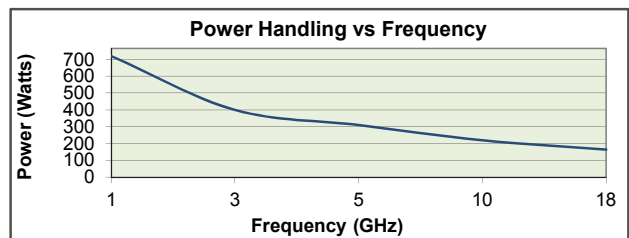
Connector Code	Series	Gender	Type	Loss per GHz	Frequency Max GHz
KMS	2.9 mm	Male	Straight	0.01	18
SMS	SMA	Male	Straight	0.01	18
SFBS	SMA	Female	Straight	0.01	18
SMR	SMA	Male	R/A	0.02	18
NMS	Type N	Male	Straight	0.01	18
NFBS	Type N	Female	Straight	0.01	18
NMR	Type N	Male	R/A	0.02	18
TMS	TNC	Male	Straight	0.01	18
TFBS	TNC	Female	Straight	0.015	18
TMR	TNC	Male	R/A	0.02	18

Standard Options:

Option Code	Option Description
E	Extended Boots
±2.8PS	Phase Matched (+/- 2.8 picoseconds)
D	Dust Caps



GHz	1	3	5	10	18
Atten	8	14	18	26	36



*CW Power in watts at sea level and 23°C

GHz	1	3	5	10	18
Pow.	720	400	310	220	165

Lab-Flex® 340AF



Description:

Lab-Flex® 340AF is the lowest loss version in our airborne qualified family of cables. With an 80% velocity, low density dielectric, this cable provides an exceptionally rugged design for applications requiring either the highest power handling or the lowest insertion loss up to 18 GHz.

Features/Benefits:

- Mode Free Operation to 18 GHz
- 80% Velocity Low Loss Dielectric
- Superior Shielding Effectiveness
- Durable, Lightweight Construction
- All Stainless Steel Hermetic Connectors
- Phase Matched Sets Available
- Moisture Sealed Cable Construction

Applications:

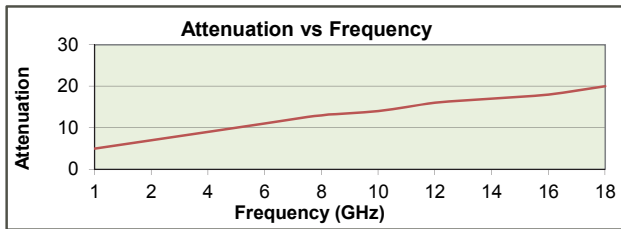
- Airborne (Commercial and EW)
- UAV Guidance Systems
- Antenna and Radar Systems
- Shipboard Communications

Standard Connectors:

Connector Code	Series	Gender	Type	Loss per GHz	Frequency Max GHz
SCMS	SC	Male	Straight	0.01	8
SCFBS	SC	Female	Straight	0.01	8
SCMRS	SC	Male	R/A	0.02	8
NMS	Type N	Male	Straight	0.01	18
NFBS	Type N	Female	Straight	0.01	18
NMR	Type N	Male	R/A	0.02	18
TMS	TNC	Male	Straight	0.01	18
TFBS	TNC	Female	Straight	0.015	18
TMR	TNC	Male	R/A	0.02	18
TMR	TNC	Male	R/A	0.02	18

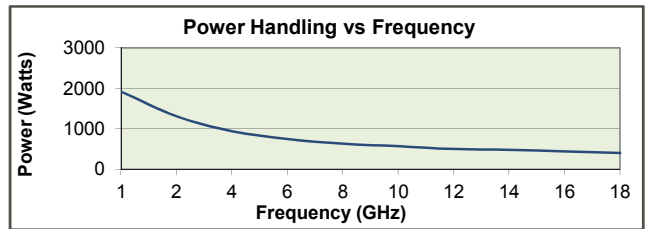
Standard Options:

Option Code	Option Description
E	Extended Boots
±2.8PS	Phase Matched (+/- 2.8 picoseconds)
D	Dust Caps



(dB per 100 feet)

GHz	1	2	4	6	8	10	12	14	16	18
Atten	5	7	9	11	13	14	16	17	18	20



*CW Power in watts at sea level and 23°C

GHz	1	2	4	6	8	10	12	14	16	18
Pow.	1920	1310	940	750	630	570	500	480	440	400

The Lab-Flex® Q Family assemblies are specifically designed for space applications using materials which meet stringent NASA outgassing requirements. They come with an ETFE material outer jacket for radiation resistance and offer you a high performance flexible cable assembly with the lowest insertion loss and highest frequency response when compared to other cables of the same diameter. They are designed with stainless steel connectors along with the strongest cable to connector termination of all the cables types.

Features:

- Up to 40GHz
- Stable Dielectric Material to Meet Temperature Variations
- High Powered Designs Available to Meet Multipaction Requirements
- Superior Shielding Effectiveness
- Direct Solder Sleeves to Outer Braids for Superior Reliability
- Vented Connector Designs for Pressure Equalization
- Stainless Steel Connectors
- Phased Matched Pairs and Sets Available (standard tolerance is +/- one degree per GHz or +/- 2.8 picoseconds)
- Silver Plated Copper Conductors

The Assembly Advantage:

The advantage of Lab-Flex Q cables is our robust and consistent solder termination process of center and outer conductors. This assembly process is precisely performed in a controlled environment. Also, our facility is equipped with a real-time radiographic (X-Ray) machine for solder joint verification. In our High Rel test lab we can validate all requirements needed for Engineering Models (EM) and Flight Models (FM).



Lab-Flex® Q Family

Specifications

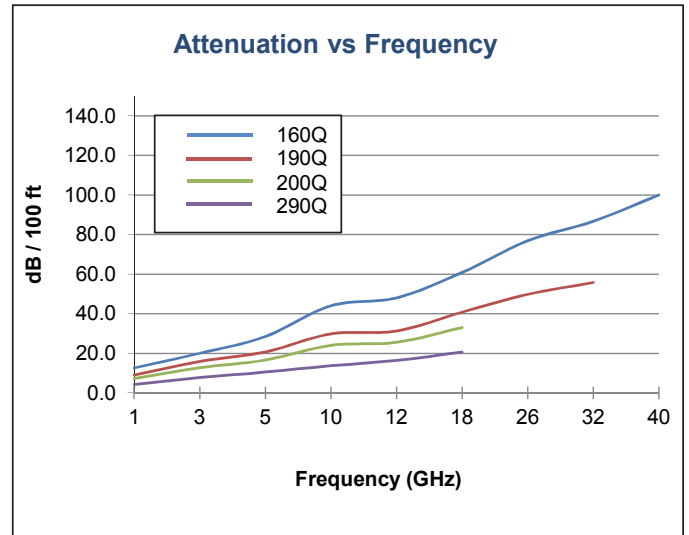
General Specifications	Lab-Flex 160Q	Lab-Flex 190Q	Lab-Flex 200Q	Lab-Flex 290Q
Diameter	0.160	0.190	0.208	0.290
Frequency, Max (GHz)	40	32	18	18

Electrical Specifications	Lab-Flex 160Q	Lab-Flex 190Q	Lab-Flex 200Q	Lab-Flex 290Q
Impedance, Nominal (Ω)	50	50	50	50
Velocity of Propagation (%)	78	80	78	84
Shielding Effectiveness, 18 GHz (dB/ft)	>90	>90	>90	>90
Capacitance (pF/ft)	26	25	26	24
Delay (ns/ft)	1.30	1.27	1.30	1.21

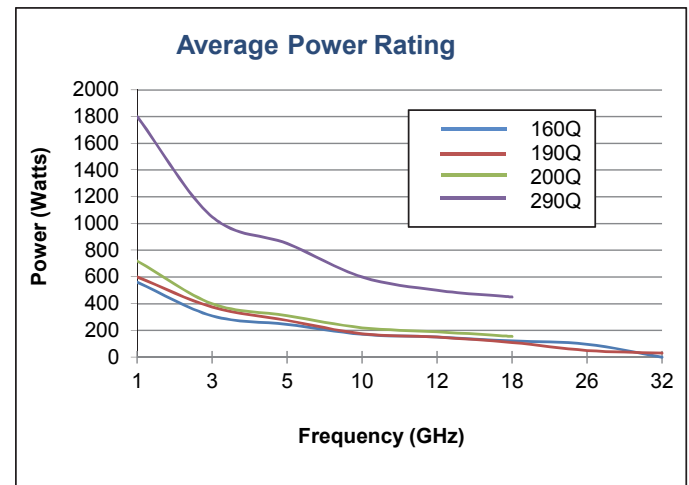
Mechanical Specifications	Lab-Flex 160Q	Lab-Flex 190Q	Lab-Flex 200Q	Lab-Flex 290Q
Weight (lbs/100ft)	3	3.3	4.9	7.5
Temperature Range ($^{\circ}\text{C}$)	-50 to +150	-50 to +150	-50 to +150	-50 to +150
Minimum Bend Radius (inches)	0.52	0.95	1	1.6

Construction Data	Lab-Flex 160Q	Lab-Flex 190Q	Lab-Flex 200Q	Lab-Flex 290Q
Inner Conductor	Solid SC	Solid SC	Solid SC	Solid SC
Dielectric	Expanded PTFE	Expanded PTFE	Expanded PTFE	Expanded PTFE
First Outer Shield	Flat Braid SC	Flat Braid SC	Flat Braid SC	Flat Braid SC
Second Outer Shield	Metalized Tape	Metalized Tape	Metalized Tape	Metalized Tape
Third Outer Shield	Round Braid SC	Round Braid SC	Round Braid SC	Round Braid SC
Jacket	ETFE	ETFE	ETFE	ETFE

Attenuation (dB/100ft)						
GHz	160Q	190Q	200Q	290Q		
1	12.6	9.0	7.2	4.3		
3	20.0	15.9	12.7	7.7		
5	28.5	20.7	16.6	10.5		
10	44.0	29.8	24.0	13.7		
12	48.0	31.3	25.6	16.4		
18	60.8	40.8	33.0	20.6		
26	76.9	49.8				
32	86.7	55.8				
40	100.0					
Max Cable Loss at +25° C & Sea Level						



Average Power Rating (Watts)						
GHz	160Q	190Q	200Q	290Q		
1	561	600	720	1800		
3	309	375	400	1050		
5	245	275	310	850		
10	171	175	220	600		
12	151	150	190	500		
18	121	110	155	450		
26	97	50				
32	-	30				
40	-					
Power handling is specified for ambient conditions at sea level and +25° C						



Lab-Flex® Q Family

Connector Selection & Options

Connector Options				Frequency Max GHz*	Lab-Flex Q 160Q	Lab-Flex Q 190Q	Lab-Flex Q 200Q	Lab-Flex Q 290Q
2.9 mm	Plug	(Male)	Straight	40	KMSV	KMSV	KMSV	
2.9 mm	Plug	(Male)	R/A	40	KMSRV	KMSRV	KMSRV	
SMA	Plug	(Male)	Straight	18	SMSV	SMSV	SMSV	SMS
SMA	Plug	(Male)	R/A	18	SMSRV	SMSRV	SMSRV	SMR
TNC	Plug	(Male)	Straight	18			TMSV	TMS
TNC	Plug	(Male)	R/A	18			TMRV	TMR
Type N	Plug	(Male)	Straight	18	NMSV		NMSV	NMS
Type N	Plug	(Male)	R/A	18			NMRV	NMR

Gender of the connector is determined by center pin.

Consult sales department for other connectors and options not shown.

***Phase Matched sets Available (+/- 2.8 picoseconds): ±2.8PS**

Part Numbering Code

Ordering Information

K M S V
|
CONNECTOR #1
KMSV = 2.9mm Male Straight
SMSV = SMA Male Straight
SMRV = SMA Right Angle

1 6 0 Q
|
CABLE
160Q = Lab-Flex® 160Q

2 4 . 0
|
LENGTH (IN.)
Example:
24.0 = 24 inches

- K M S V
|
CONNECTOR #2
KMSV = 2.9mm Male Straight
SMSV = SMA Male Straight
SMRV = SMA Right Angle

Lab-Flex® 160Q

DC to 40 GHz



Description:

Lab-Flex® 160Q is specifically designed for Space Applications, using materials which meet stringent NASA outgassing requirements. With an ETFE Jacket for maximum radiation resistance and a 78% velocity ePTFE dielectric core for low loss, the Lab-Flex® 160Q meets today's requirements for flexible Space Cable.

Features/Benefits:

- Mode Free Operation to 40 GHz
- 78% Velocity Low Loss Dielectric
- Direct Solder Sleeves for Superior Reliability
- Vented Connector Designs for Pressure Equalization
- Stainless Steel Connectors
- Superior Shielding Effectiveness

Applications:

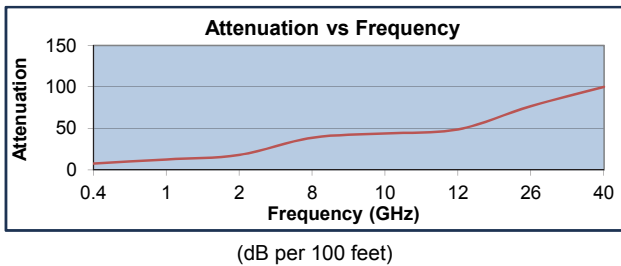
- Satellites
- Space Applications

Standard Connectors:

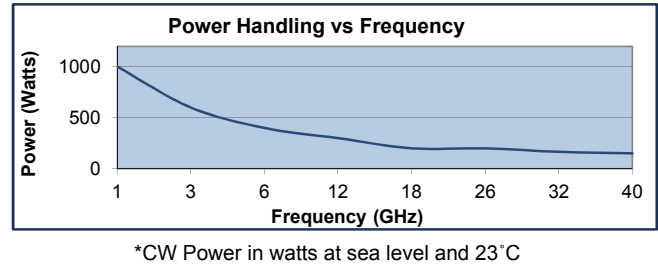
Connector Code	Series	Gender	Type	Loss per GHz	Frequency Max GHz
KMSV	2.9 mm	Male	Straight	0.01	40
KMRV	2.9 mm	Male	R/A	0.01	40
SMSV	SMA	Male	Straight	0.01	18
SMRV	SMA	Male	R/A	0.02	18
NMSV	Type N	Male	Straight	0.011	18

Standard Options:

Option Code	Option Description
±2.8PS	Phase Matched (+/- 2.8 picoseconds)



GHz	0.4	1	2	8	10	12	26	40
Atten	7.8	13	18	39	44	49	77	100



GHz	1	3	6	12	18	26	32	40
Pow.	1000	600	400	300	200	200	165	150



Description:

Lab-Flex® 190Q is specifically designed for Space Applications, using materials which meet stringent NASA outgassing requirements. With an ETFE Jacket for maximum radiation resistance and an 80% velocity ePTFE dielectric core for low loss, the Lab-Flex® 190Q meets today's requirements for flexible Space Cable.

Features/Benefits:

- Mode Free Operation to 32 GHz
- 80% Velocity Low Loss Dielectric
- Direct Solder Sleeves for Superior Reliability
- Vented Connector Designs for Pressure Equalization
- Stainless Steel Connectors
- Superior Shielding Effectiveness

Applications:

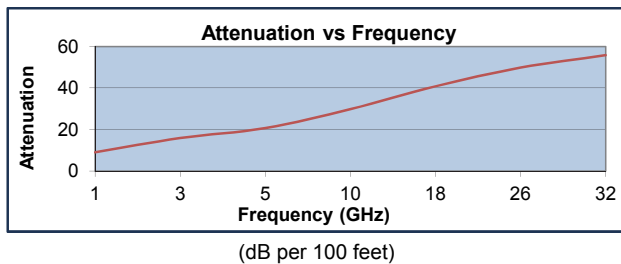
- Satellites
- Space Applications

Standard Connectors:

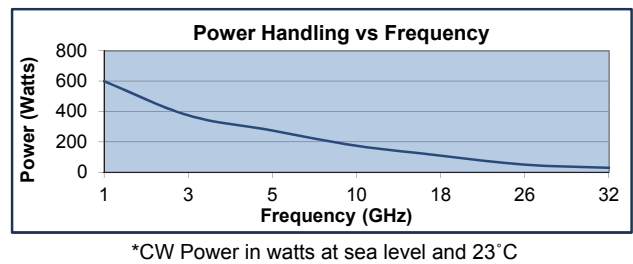
Connector Code	Series	Gender	Type	Loss per GHz	Frequency Max GHz
KMSV	2.9 mm	Male	Straight	0.01	32
KMRV	2.9 mm	Male	R/A	0.01	32
SMSV	SMA	Male	Straight	0.01	18
SMRV	SMA	Male	R/A	0.02	18
NMSV	Type N	Male	Straight	0.011	18

Standard Options:

Option Code	Option Description
±2.8PS	Phase Matched (+/- 2.8 picoseconds)



GHz	1	3	5	10	18	26	32
Atten	9	16	21	30	41	50	56



*CW Power in watts at sea level and 23°C

GHz	1	3	5	10	18	26	32
Pow.	600	375	275	175	110	50	30

Lab-Flex® 200Q

DC to 18 GHz



Description:

Lab-Flex® 200Q is specifically designed for Space Applications, using materials which meet stringent NASA outgassing requirements. With an ETFE Jacket for maximum radiation resistance and a 78% velocity ePTFE dielectric core for low loss, the Lab-Flex® 200Q meets today's requirements for flexible Space Cable.

Features/Benefits:

- Mode Free Operation to 18 GHz
- Stable Dielectric Material to Meet Temperature Variations
- Direct Solder Sleeves for Superior Reliability
- Vented Connector Designs for Pressure Equalization
- Stainless Steel Connectors
- Superior Shielding Effectiveness

Standard Connectors:

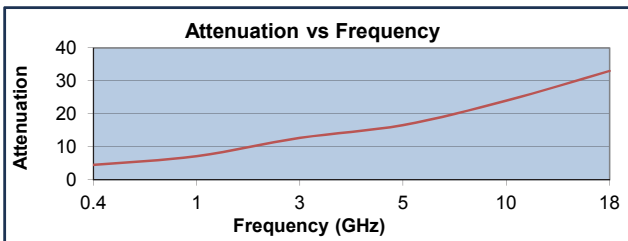
Connector Code	Series	Gender	Type	Loss per GHz	Frequency Max GHz
KMSV	2.9 mm	Male	Straight	0.01	20
KMRV	2.9 mm	Male	R/A	0.01	20
SMSV	SMA	Male	Straight	0.01	18
SMRV	SMA	Male	R/A	0.02	18
NMSV	Type N	Male	Straight	0.011	18
NMRV	Type N	Male	R/A	0.02	18
TMSV	TNC	Male	Straight	0.01	18
TMRV	TNC	Male	R/A	0.02	18

Applications:

- Satellites
- Space Applications

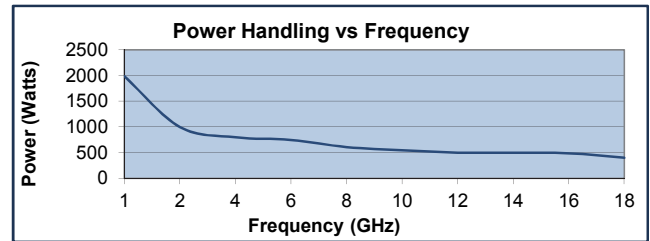
Standard Options:

Option Code	Option Description
±2.8PS	Phase Matched (+/- 2.8 picoseconds)



(dB per 100 feet)

GHz	0.4	1	3	5	10	18
Atten	4.5	7.2	13	17	24	33



*CW Power in watts at sea level and 23°C

GHz	1	2	4	6	8	10	12	14	16	18
Pow.	1990	1000	800	750	610	550	501	499	490	400



Description:

Lab-Flex® 290Q is specifically designed for Space Applications, using materials which meet stringent NASA outgassing requirements. With an ETFE Jacket for maximum radiation resistance and an 83% velocity ePTFE dielectric core for low loss, the Lab-Flex® 290Q meets today's requirements for flexible Space Cable.

Features/Benefits:

- Mode Free Operation to 18 GHz
- Stable Dielectric Material to Meet Temperature Variations
- Direct Solder Sleeves for Superior Reliability
- Vented Connector Designs for Pressure Equalization
- Stainless Steel Connectors
- Superior Shielding Effectiveness

Applications:

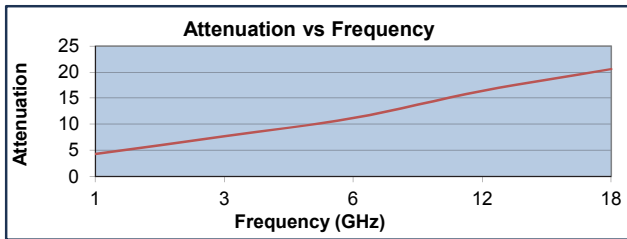
- Satellites
- Space Applications

Standard Connectors:

Connector Code	Series	Gender	Type	Loss per GHz	Frequency Max GHz
SMSV	SMA	Male	Straight	0.012	18
SMRV	SMA	Male	R/A	0.23	18
NMSV	Type N	Male	Straight	0.01	18
NMRV	Type N	Male	R/A	0.02	18
TMSV	TNC	Male	Straight	0.01	18
TMRV	TNC	Male	R/A	0.02	18

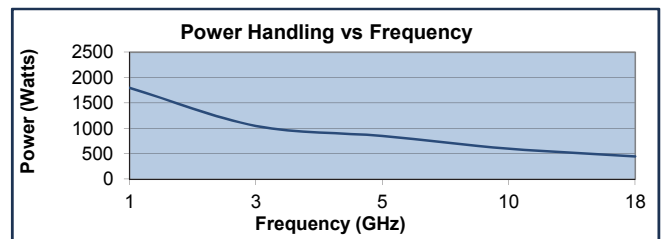
Standard Options:

Option Code	Option Description
±2.8PS	Phase Matched (+/- 2.8 picoseconds)



(dB per 100 feet)

GHz	1	3	6	12	18
Atten	4.3	7.7	11	16	21



*CW Power in watts at sea level and 23°C

GHz	1	3	5	10	18
Pow.	1800	1050	850	600	450

Semi-Rigid, Conformable & Flexible Family of cables use common connectors originally designed for semi-rigid type cable. The semi-rigid cables are available with a copper or aluminum jacket and available with a selection of different platings and in 4 different diameters (.047", .085", .141" & .250"). The Conformable®, or hand formable, (BJ - Braided Jacket), has a tin filled braid with a metal foil underlay for shielding and mechanical integrity. The flexible version, our Mini-Flex, has an FEP jacket, round braid and inner spiral shields and is available in 3 diameters, .065" .105" & .165". All 3 types, (Semi-Rigid, Conformable & Mini-Flex) are manufactured using the same type of dielectric core and have virtually the same electrical performance. Your cable choice should be primarily based upon your specific application and any mechanical considerations.



Features:

- 3 Basic Styles - Formed to Configuration, Hand-Formable and Flexible
- Pre-formed Right Angles Available on Some Cable Types
- High Frequency - Up to 65 GHz for Semi-Rigid and Mini-Flex, 18 GHz for BJ Hand-formable
- High Isolation: Up to >100 dB
- Direct Solder Connectors - Stainless Steel Construction is Standard
- Phase Matched Pairs and Sets Available
- Range of Protective Covering Options
- Many Cost-Effective Solutions

Typical Applications:

- In Box Interconnects
- Component Interconnects
- Test cables

Semi-Rigid Jacket Options:

- Copper - Bare, Tin & Silver plated
- Aluminum - Tin, Silver & Tin/Lead plated

Semi-Rigid, Conformable® & Flexible Family

.047" Specifications

General Specifications	Semi-Rigid		Conformable	Mini Flex
	047	047TP	BJ047	065
MIL Number	M17/151-00001	M17/151-00002	N/A	N/A
Diameter	0.047	0.047	0.047	0.068
Frequency, Max (GHz)	65	65	18	50
Loss @ 5 GHz (dB/100ft)	78	78	89	77

Electrical Specifications	047	047TP	BJ047	065
Impedance, Nominal (Ω)	50	50	50	50
Velocity of Propagation (%)	69.5	69.5	69.5	76
Shielding Effectiveness, 18 GHz (dB/ft)	>100	>100	>90	>85
Capacitance (pF/ft)	29.5	29.5	29.5	27
Delay (ns/ft)	1.46	1.46	1.46	1.34

Mechanical Specifications	047	047TP	BJ047	065
Weight (lbs/100ft)	0.45	0.45	0.38	0.95
Temperature Range (°C)	-55 to +125	-55 to +125	-55 to +170	-65 to +165
Minimum Bend Radius (inches)	0.15	0.15	0.12	0.3

Construction Data	047	047TP	BJ047	065
Inner Conductor	Solid SC	Solid SC	Solid SCCS	Solid SCCS
Dielectric	Solid PTFE	Solid PTFE	Solid TFE	Low Density ePTFE
First Outer Shield	N/A	N/A	N/A	Flat Braid SPC
Second Outer Shield	N/A	N/A	N/A	Round Braid SPC
Jacket	Bare Copper	Bare Copper	Unjacketed	ETFE

Semi-Rigid, Conformable® & Flexible Family

.085" Specifications

	Semi-Rigid			Conformable	Mini Flex
General Specifications	RG405	405TP	AL085	BJ085	105
MIL Number	M17/133-RG405	M17/133-00001	M17/133-00013	N/A	N/A
Diameter	0.086	0.086	0.086	0.085	0.105
Frequency, Max (GHz)	60	60	60	18	40
Loss @ 5 GHz (dB/100ft)	46	46	47	49	48

Electrical Specifications	RG405	405TP	AL085	BJ085	105
Impedance, Nominal (Ω)	50	50	50	50	50
Velocity of Propagation (%)	69.5	69.5	69.5	69.5	69.5
Shielding Effectiveness, 18 GHz (dB/ft)	>100	>100	>100	>90	>90
Capacitance (pF/ft)	29.4	29.4	29.4	29.4	29.4
Delay (ns/ft)	1.46	1.46	1.46	1.46	1.46

Mechanical Specifications	RG405	405TP	AL085	BJ085	105
Weight (lbs/100ft)	1.53	1.53	0.73	1.19	1.3
Temperature Range ($^{\circ}\text{C}$)	-55 to +125	-55 to +125	-55 to +125	-55 to +160	-55 to +170
Minimum Bend Radius (inches)	0.17	0.17	0.25	0.12	0.25

Construction Data	RG405	405TP	AL085	BJ085	105
Inner Conductor	Solid SCCS	Solid SCCS	Solid SCCS	Solid SCCS	Solid SCCS
Dielectric	Solid PTFE	Solid PTFE	Solid PTFE	Solid PTFE	Solid PTFE
First Outer Shield	N/A	N/A	N/A	N/A	Metal Tape SPC
Second Outer Shield	N/A	N/A	N/A	N/A	Braid SPC
Jacket	Bare Copper	Tin Plated Copper	Tin Plated Aluminum	Tin-Filled Composite	FEP

Semi-Rigid, Conformable® & Flexible Family

.141" Specifications

	Semi-Rigid		Conformable	Mini Flex	
General Specifications	RG402	AL141	BJ141	165	K-Jumper
MIL Number	M17/130-RG402	M17/130-00005	N/A	N/A	N/A
Diameter	0.141	0.141	0.141	0.162	0.165
Frequency, Max (GHz)	35	35	18	35	35
Loss @ 5 GHz (dB/100ft)	29	30	31	31	31

Electrical Specifications	RG402	AL141	BJ141	165	K-Jumper
Impedance, Nominal (Ω)	50	50	50	50	50
Velocity of Propagation (%)	69.5	69.5	69.5	69.5	69.5
Shielding Effectiveness, 18 GHz (dB/ft)	>100	>100	>90	>90	>90
Capacitance (pF/ft)	29.5	29.9	29.5	29.5	29.5
Delay (ns/ft)	1.46	1.45	1.46	1.45	1.46

Mechanical Specifications	RG402	AL141	BJ141	165	K-Jumper
Weight (lbs/100ft)	3.44	1.88	2.00	2.91	2.00
Temperature Range ($^{\circ}$ C)	-55 to +125	-50 to +125	-55 to +160	-55 to +125	-55 to +125
Minimum Bend Radius (inches)	0.32	0.32	0.25	0.50	0.25

Construction Data	RG402	AL141	BJ141	165	K-Jumper
Inner Conductor	Solid SCCS	Solid SCCS	Solid SCCS	Solid SCCS	Solid SCCS
Dielectric	Solid PTFE	Solid PTFE	Solid PTFE	Solid PTFE	Solid PTFE
First Outer Shield	N/A	N/A	N/A	Metal Tape SPC	Tin-Filled Composite
Second Outer Shield	N/A	N/A	N/A	Braid SPC	N/A
Jacket	Tin Plated Copper	Tin Plated Aluminum	Tin-Filled Composite	FEP	Polyolefin

General Specifications	Semi-Rigid	
	RG401	250TP
MIL Number	M17/129-RG401	M17/129-00001
Diameter	0.25	0.25
Frequency, Max (GHz)	18	18
Loss @ 5 GHz (dB/100ft)	19	19

Electrical Specifications	RG401	250TP
Impedance, Nominal (Ω)	50	50
Velocity of Propagation (%)	69.5	69.5
Shielding Effectiveness, 18 GHz (dB/ft)	>100	>100
Capacitance (pF/ft)	29.4	29.4
Delay (ns/ft)	1.46	1.46

Mechanical Specifications	RG401	250TP
Weight (lbs/100ft)	10.5	10.5
Temperature Range (°C)	-55 to +125	-55 to +125
Minimum Bend Radius (inches)	0.5	0.5

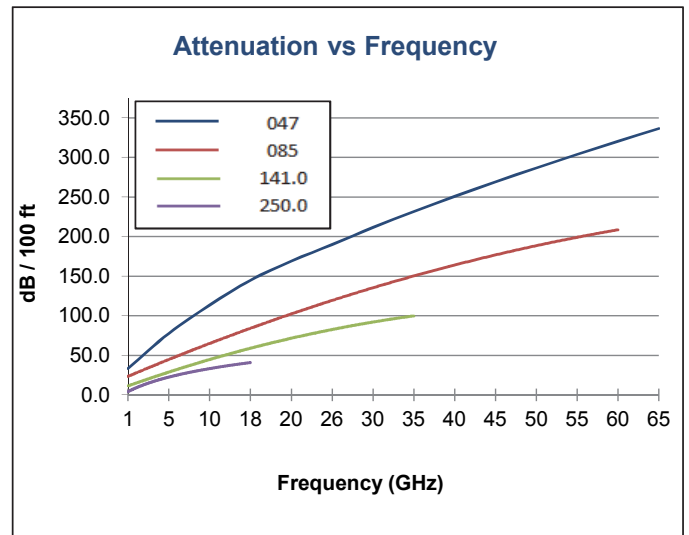
Construction Data	RG401	250TP
Inner Conductor	Solid SCCS	Solid SCCS
Dielectric	Solid PTFE	Solid PTFE
First Outer Shield	N/A	N/A
Second Outer Shield	N/A	N/A
Jacket	Bare Copper	Tin Plated Copper

Semi-Rigid, Conformable® & Flexible Family

Performance

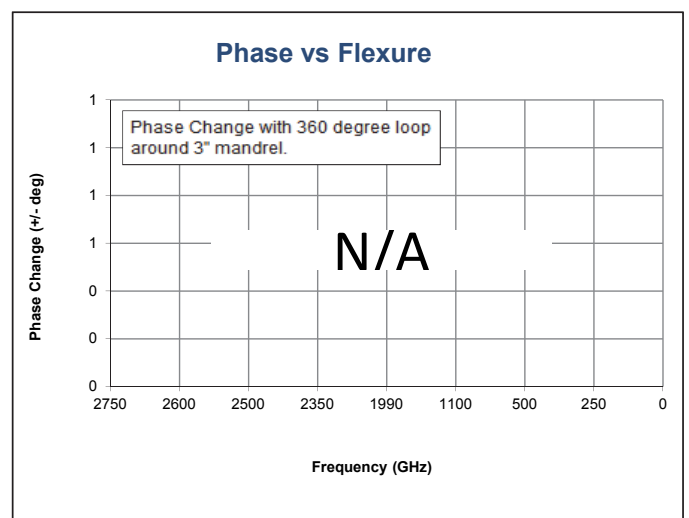
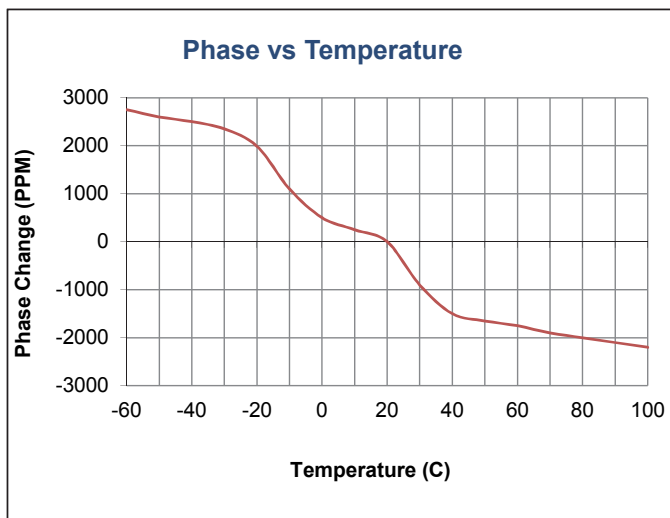
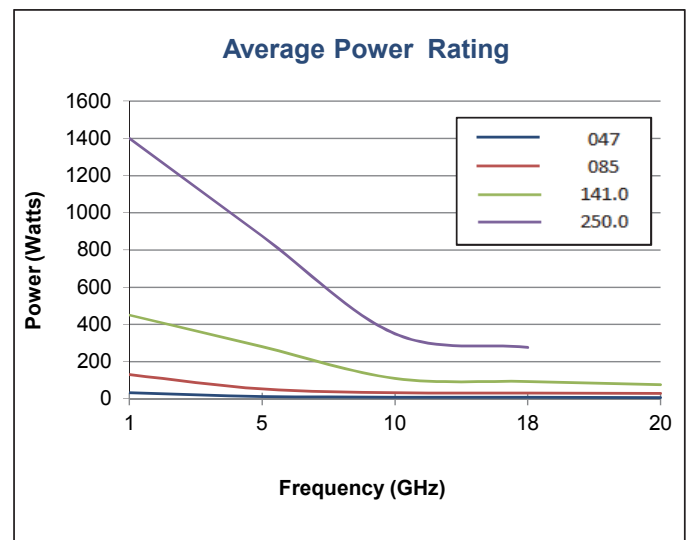
Attenuation (dB/100ft)						
GHz	047	085	141	250		
1	33.3	19.2	11.2	6.8		
5	77.7	46.2	28.3	18.6		
10	113.4	68.9	43.6	29.8		
18	145.0	82.5	64.0	45.5		
20	169.0	104.5	68.7			
26	190.0	122.9	82.2			
30	211.6	134.6	90.7			
35	231.7	148.5	101.1			
40	250.8	161.8				
45	269.1	174.7				
50	286.7	187.2				
55	303.8	199.4				
60	320.4	211.4				
65	336.5					

Max Cable Loss at +25° C & Sea Level



Average Power Rating (Watts)						
GHz	047	085	141	250		
1	32	130	450	1400		
5	13	53	280	875		
10	9	33	110	350		
18	8	31	93	276		
20	7	30	76			

Power handling is specified for ambient conditions at sea level and +25° C



Semi-Rigid, Conformable® & Flexible Family

Connector Selection & Options

Standard					Frequency Max GHz*	Series 047	Series 085	Series 141	Series 250
2.4 mm	Plug	(Male)	Straight	50			MMS		
2.4 mm	Plug	(Male)	R/A	50			MMSR ²		
2.4 mm	Jack	(Female)	Straight	50			MFS		
2.4 mm	Bulkhead	(Female)	Straight	50			MFBS		
2.9 mm	Plug	(Male)	Straight	40			KMS	KMS	
2.9 mm	Plug	(Male)	R/A	40			KMSR ²	KMSR ²	
2.9 mm	Jack	(Female)	Straight	40			KFS		
2.9 mm	Bulkhead	(Female)	Straight	40			KFBS		
GPPO	Jack	(Female)	Straight	50	GPPOFS	GPPOFS			
GPO	Jack	(Female)	Straight	40	SMPFS	SMPFS			
GPO	Jack	(Female)	R/A	40	SMPFR	SMPFR			
SMA	Plug	(Male)	Straight	18	SMS	SMS	SMS	SMS	
SMA	Plug	(Male)	R/A	18	SMSR ²	SMSR ²	SMSR ²	SMSR ²	
SMA	Plug	(Male)	R/A	18		SMR	SMR	SMR	
SMA	Jack	(Female)	Straight	18	SFS	SFS	SFS	SFS	
SMA	Bulkhead	(Female)	Straight	18		SFBS	SFBS	SFBS	
OSSP	Bulkhead	(Female)	Straight	18		OSSPMBS			
OSP	Bulkhead	(Male)	Straight	18		OSPMBS	OSPMBS	OSPMBS	
Type N	Plug	(Male)	Straight	18		NMS	NMS	NMS	NMS
Type N	Plug	(Male)	R/A	18			NMSR ²	NMSR ²	
Type N	Bulkhead	(Female)	Straight	18		NFBS	NFBS	NFBS	NFBS
TNC	Plug	(Male)	Straight	18		TMS	TMS	TMS	TMS
TNC	Plug	(Male)	R/A	18			TMSR ²	TMSR ²	
TNC	Jack	(Female)	Straight	18			TFS	TFS	
TNC	Plug	(Male)	R/A	18			TMR	TMR	
TNC	Bulkhead	(Female)	Straight	18			TFBS	TFBS	
MCX	Plug	(Male)	R/A	6			MCXMR	MCXMR	
MCX	Plug	(Male)	Straight	6			MCXMS	MCXMS	
MMCX	Plug	(Male)	Straight	6			MMCXMS		
MMCX	Plug	(Male)	R/A	6			MMCXMR		
SMB	Bulkhead	(Female)	Straight	4			SMBFS		
BNC	Plug	(Male)	Straight	4			BMS	BMS	
BNC	Bulkhead	(Female)	Straight	4			BFBS	BFBS	

Gender of the connector is determined by center pin.

² = Straight Connector with pre-bend cable to form right angle.

Consult sales department for other connectors and options not shown.

* Max Frequency of connectors may be limited by the cable selected.

* Phase Matched sets available: +/- 2.8 picoseconds

* Weatherization Protection Available (Polyolefin): Option W

Semi-Rigid, Conformable® & Flexible Family

Options & Ordering Information

Cable Options

W - Weatherized-Polyolefin



D - Dust Caps



Part Numbering Code

Ordering Information

S M S - B J 0 8 5 - 1 8 . 0 - S M R ± 2 . 8 P S
 CONNECTOR #1 CABLE TYPE OPTION LENGTH (IN.) CONNECTOR #2 OPTION
 Blank = None Example:
 W = Weatherized 18.0 = 18 inches
 P = Phase Matched

Semi-Rigid BJ047 Mini-Flex 065



Description:

The .047" diameter series offers one of the smallest diameter cables available for a range of subminiature connectors. This group, consisting of Semi-Rigid, BJ047 and Mini-Flex 065 is used where space is at a premium and higher losses can be tolerated.

Features/Benefits:

- Mode Free Operation to 65 GHz
- Superior Shielding Effectiveness
- Stainless Steel Connectors Available
- Maintains Tightly Controlled Mechanical Configurations
- High Vibration Resistance
- Light Weight

Applications:

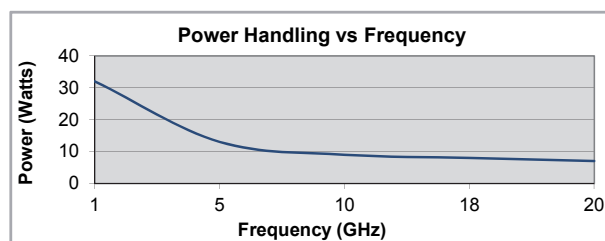
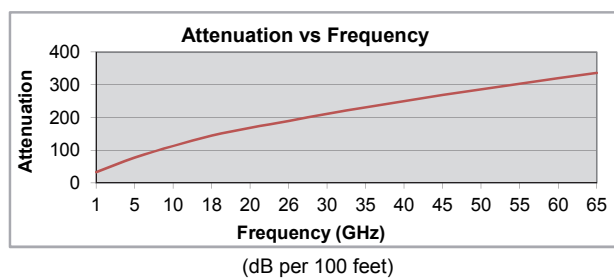
- Instrumentation
- Jumpers
- Military

Standard Connectors:

Connector Code	Series	Gender	Type	Loss per GHz	Frequency Max GHz
SMS	SMA	Male	Straight	0.01	18
SFS	SMA	Female	Straight	0.015	12
SMPFS	SMP	Female	Straight	0.02	40
SMPFR	SMP	Female	R/A	0.03	40
SSMS	SSMA	Male	Straight	0.01	34
SSMR	SSMA	Male	R/A	0.02	34

Standard Options:

Option Code	Option Description
W	Weatherized
N	Neoprene
±2.8PS	Phase Matched (+/-2.8 picoseconds)



*CW Power in watts at sea level and 23°C

GHz	1	5	10	18	26	30	35	40	45	50	55	60	65
Atten	33	78	113	145	190	212	232	251	269	287	304	320	336

GHz	1	6	10	18	20
Pow.	32	13	9	8	7

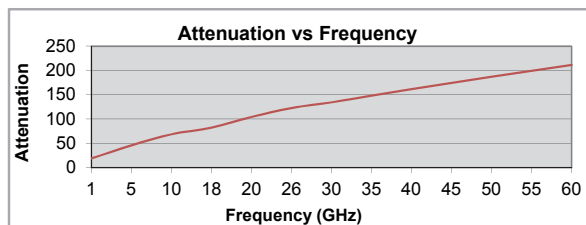
.085 Series

Semi-Rigid BJ085 Mini-Flex 105



Standard Connectors:

Connector Code	Series	Gender	Type	Loss per GHz	Frequency Max GHz
SMS	SMA	Male	Straight	0.01	18
SMR	SMA	Male	R/A	0.02	18
SFBS	SMA	Female	Straight	0.01	18
SFS	SMA	Female	Straight	0.01	18
NMS	Type N	Male	Straight	0.011	18
NFBS	Type N	Female	Straight	0.01	18
TMS	TNC	Male	Straight	0.01	18
TMR	TNC	Male	R/A	0.02	18
TFBS	TNC	Female	Straight	0.015	18
SMPFS	SMP	Female	Straight	0.015	40
SMPFR	SMP	Female	R/A	0.02	40
SMBFR	SMB	Female	R/A	0.02	40
SMBFS	SMB	Female	Straight	0.015	40
MCXMS	MCX	Male	Straight	0.01	6
MCXMR	MCX	Male	R/A	0.02	6
MMCXMS	MMCX	Male	Straight	0.01	6
MMCXMR	MMCX	Male	Straight	0.01	6
BMS	BNC	Male	Straight	0.01	4
BMR	BNC	Male	R/A	0.02	4
BFBS	BNC	Female	Straight	0.015	4
OSPMBS	OSP	Male	Straight	0.01	22
OSSPMBS	OSSP	Male	Straight	0.01	28



(dB per 100 feet)

GHz	1	5	10	18	20	26	30	35	40	45	50	55	60
Atten	19	46	69	83	105	123	135	149	162	175	187	199	211

Description:

The popular .085" diameter series offers a wide range of connector interfaces from GPPO to TNC. Semi-Rigid is typically used for high reliability applications, formable BJ085 for low cost interconnects and the Mini-Flex 105 for high frequency interconnects and test assemblies. Both the Semi-Rigid and Mini-Flex 105 are mode free to 60 GHz. The cost-effective BJ085 cable is typically used in lower frequency applications of 18 GHz or less.

Features/Benefits:

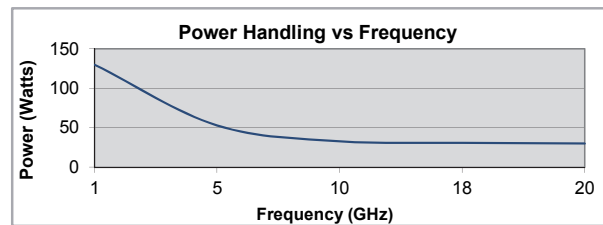
- Mode Free Operation to 60 GHz
- Superior Shielding Effectiveness
- Stainless Steel Connectors Available
- Maintains Tightly Controlled Mechanical Configurations
- High Vibration Resistance
- Light Weight

Applications:

- Instrumentation
- Jumpers
- Satellite Component Interconnects

Standard Options:

Option Code	Option Description
W	Weatherized
N	Neoprene
±2.8PS	Phase Matched (+/-2.8 picoseconds)



*CW Power in watts at sea level and 23 °C

GHz	1	5	10	18	20
Pow.	130	53	33	31	30

Semi-Rigid BJ141 K-Jumper Mini-Flex 165



Description:

The widely used .141" series offers a broad range of connectors from OSP to Type N. The Semi-Rigid, known for its excellent shielding, is popular in military applications, the hand-formable BJ141 for low cost interconnects and the Mini-Flex 165 can all use the same connectors. Semi-Rigid, K-Jumper and Mini-Flex 165 are all mode free to 36 GHz while the BJ141 is recommended for applications up to 18 GHz.

Features/Benefits:

- Mode Free Operation to 35 GHz
- Superior Shielding Effectiveness
- Wide Connector Selection
 - Maintains Tightly Controlled Mechanical Configurations
 - High Vibration Resistance
 - Light Weight

Applications:

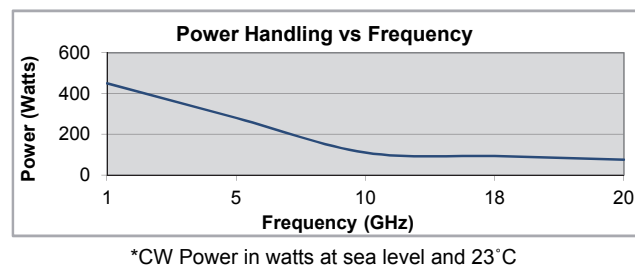
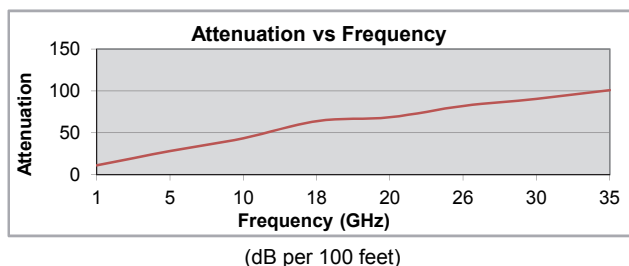
- Test Cables
- Jumpers
- Instrumentation
- High Frequency Interconnects

Standard Connectors:

Connector Code	Series	Gender	Type	Loss per GHz	Frequency Max GHz
KMS	2.9mm	Male	Straight	0.01	35
SMS	SMA	Male	Straight	0.01	18
SMR	SMA	Male	R/A	0.02	18
SFBS	SMA	Female	Straight	0.01	18
SFS	SMA	Female	Straight	0.01	18
NMS	Type N	Male	Straight	0.01	18
NFBS	Type N	Female	Straight	0.01	18
TMS	TNC	Male	Straight	0.01	18
TMR	TNC	Male	R/A	0.02	18
TFBS	TNC	Female	Straight	0.015	18
TFS	TNC	Female	Straight	0.015	18
MCXMS	MCX	Male	Straight	0.01	6
MCXMR	MCX	Male	R/A	0.02	6
BMS	BNC	Male	Straight	0.01	4
BFBS	BNC	Female	Straight	0.01	4
OSPMS	OSP	Male	Straight	0.01	22

Standard Options:

Option Code	Option Description
W	Weatherized
N	Neoprene
±2.8PS	Phase Matched (+/-2.8 picoseconds)



GHz	1	5	10	18	20	26	30	35
Atten	11	28	44	64	69	82	91	101

GHz	1	5	10	18	20
Pow.	450	280	110	93	76

.250 Series

Semi-Rigid RG401 401TP



Description:

Our .250" diameter Semi-Rigid cable is used wherever power and lower loss are required with the reliability of a high shielded cable. Larger connectors such as Type N and TNC with extended performance to 18 GHz offer excellent power handling performance. These cables are available in both copper and aluminum jackets and tin and silver plated.

Features/Benefits:

- Mode Free Operation to 18 GHz
- Superior Shielding Effectiveness
- Stainless Steel Connectors Available
- Maintains Tightly Controlled Mechanical Configurations
- High Vibration Resistance
- Light Weight
- High Power / Low Insertion Loss

Applications:

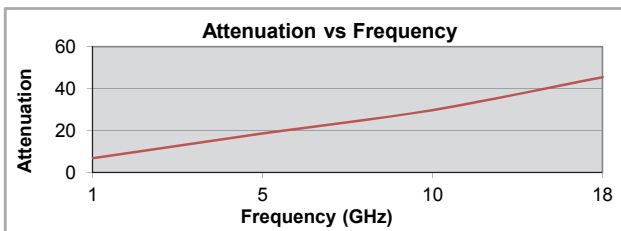
- RF Power Generators
- Jumpers
- Military
- Satcom

Standard Connectors:

Connector Code	Series	Gender	Type	Loss per GHz	Frequency Max GHz
SMS	SMA	Male	Straight	0.01	18
SFBS	SMA	Female	Straight	0.01	18
SFS	SMA	Female	Straight	0.01	18
NMS	Type N	Male	Straight	0.011	18
NFBS	Type N	Female	Straight	0.01	18
TMS	TNC	Male	Straight	0.01	18
TFBS	TNC	Female	Straight	0.015	18

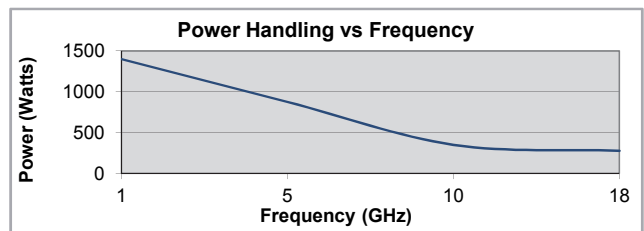
Standard Options:

Option Code	Option Description
D	Dust Caps
N	Neoprene
±2.8PS	Phase Matched (+/-2.8 picoseconds)



(dB per 100 feet)

GHz	1	5	10	18
Atten	7	19	30	46



*CW Power in watts at sea level and 23°C

GHz	1	5	10	18
Pow.	1400	875	350	276

Our **Low Loss Semi-Rigid Family** of cables are used in applications requiring superior phase stability and lower insertion loss than is possible with standard solid dielectric semi-rigid types. The aluminum jacketed cable is most popular for space applications since weight, loss and stability over temperature are all major concerns in this environment. Our special low density dielectric offers dramatically improved mechanical durability and phase stability over the solid dielectric types. Custom connectors must be used due to the special core diameters. Please contact our technical sales staff for custom configurations and special screening or testing requirements you may require.

Features:

- Superior Phase Stability
- Special Low Density Dielectric
- Space-Qualified
- Frequencies up to 55 GHz
- 100 dB Minimum Isolation
- Stainless Steel, Direct Solder Connectors are Standard
- Phase Matching Available

Typical Applications:

- Satellite Component Interconnects
- High Frequency Jumpers

Semi-Rigid Jacket Options:

- Aluminum - Tin or Silver
- Copper - Bare or Tin plated



Low Loss .085		
Part Number	Jacket	Finish
AL085LLTP	Aluminum	Tin
AL085LLSP	Aluminum	Silver
LL085	Copper	None
LL085TP	Copper	Tin

Low Loss 0141		
Part Number	Jacket	Finish
AL141LLTP	Aluminum	Tin
AL141LLSP	Aluminum	Silver
LL141	Copper	None
LL141TP	Copper	Tin

Low Loss .250		
Part Number	Jacket	Finish
AL250LLTP	Aluminum	Tin
AL250LLSP	Aluminum	Silver
LL250	Copper	None
LL250TP	Copper	Tin

Semi-Rigid Low Loss Family

Specifications

General Specifications	AL085LLSP	085LL	AL141LLSP	141LLTP	AL205LLTP	250LLTP
MIL Number	N/A	N/A	N/A	N/A	N/A	N/A
Diameter	0.085	0.085	0.141	0.141	0.250	0.250
Frequency, Max (GHz)	62	62	35	35	20	20
Loss @ 5 GHz (dB/100ft)	45	45	23	25.7	13.6	9.4

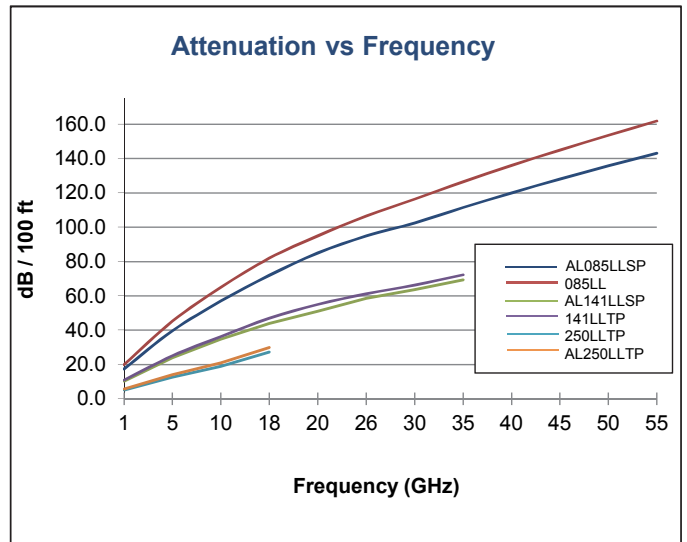
Electrical Specifications	AL085LLSP	085LL	AL141LLSP	141LLTP	AL205LLTP	250LLTP
Impedance, Nominal (Ω)	50	50	50	50	50	50
Velocity of Propagation (%)	76.5	76.5	76.5	76.5	76.5	76.5
Shielding Effectiveness, 18 GHz (dB/ft)	>100	>100	>100	>100	>100	>100
Capacitance (pF/ft)	27	27	27	27	27	27
Delay (ns/ft)	1.33	1.33	1.33	1.33	1.33	1.33

Mechanical Specifications	AL085LLSP	085LL	AL141LLSP	141LLTP	AL205LLTP	250LLTP
Weight (lbs/100ft)	0.78	1.36	1.9	3.24	6.09	9.9
Temperature Range ($^{\circ}\text{C}$)	-65 to +165	-65 to +165	-65 to +165	-65 to +165	-65 to +165	-65 to +165
Minimum Bend Radius (inches)	0.25	0.25	0.5	0.5	1.5	1

Construction Data	AL085LLSP	085LL	AL141LLSP	141LLTP	AL205LLTP	250LLTP
Inner Conductor	Solid SC	Solid SC	Solid SC	Solid SC	Solid SC	Solid SC
Dielectric	Low Loss PTFE	Low Loss PTFE	Low Loss PTFE	Low Loss PTFE	Low Loss PTFE	Low Loss PTFE
First Outer Shield	N/A	N/A	N/A	N/A	N/A	N/A
Second Outer Shield	N/A	N/A	N/A	N/A	N/A	N/A
Jacket	Aluminum Silver / Tin	Copper Bare	Aluminum Silver / Tin	Copper Bare / Tin	Aluminum / Tin	Copper Bare / Tin

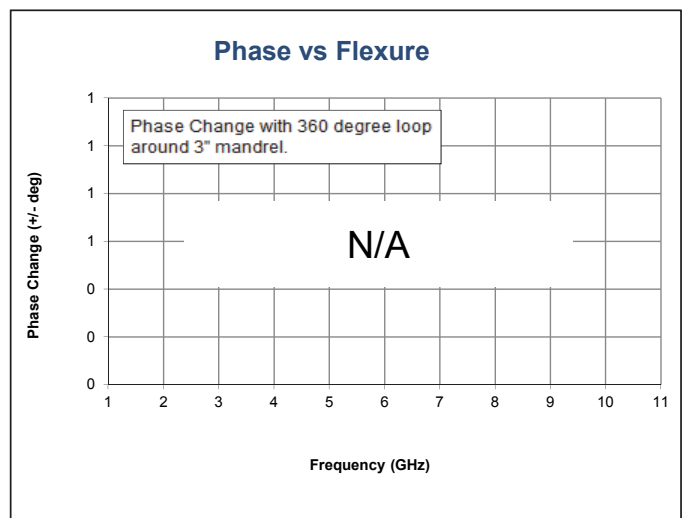
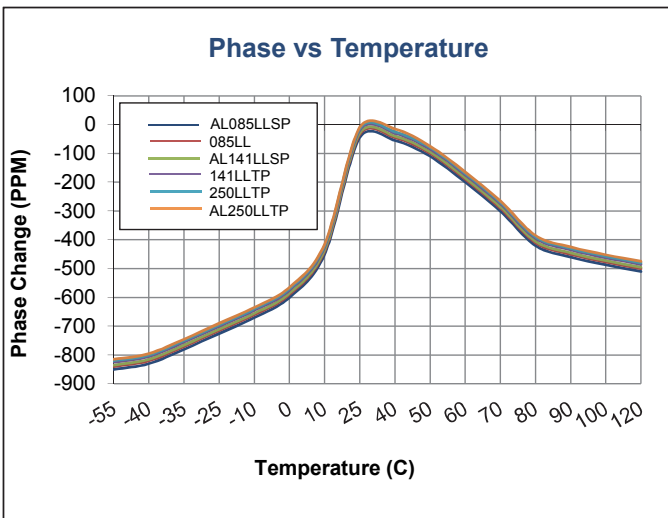
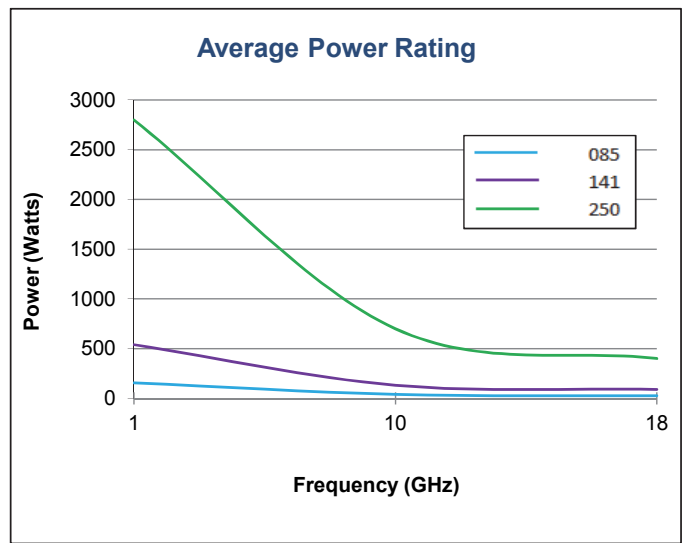
Attenuation (dB/100ft)						
GHz	AL085LLSP	085LL	AL141LLSP	141LLTP	250LLTP	AL250LLTP
1	17.4	19.9	10.4	10.9	5.1	5.8
5	39.7	45.3	24.0	25.1	12.6	14.0
10	57.0	65.0	34.7	36.3	19.0	21.0
18	77.9	88.6	47.8	50.0	27.3	30.0
20	82.4	93.7	50.7	52.9		
26	94.9	107.8	58.6	61.2		
30	102.5	116.4	63.6	66.3		
35	111.5	126.5	69.4	72.3		
40	120.0	136.0				
45	128.1	145.0				
50	135.8	153.6				
55	143.1	161.9				

Max Cable Loss at +25° C & Sea Level



Average Power Rating (Watts)						
GHz	AL085LLSP	085LL	AL141LLSP	141LLTP	250LLTP	AL250LLTP
1	156	156	540	540	2800	2800
10	40	40	132	132	700	700
18	27	27	90	90	400	400

Power handling is specified for ambient conditions at sea level and +25° C



Semi-Rigid Low Loss Family

Connector Selection & Options

Low Loss					Frequency Max GHz*	Series 085	Series 141	Series 250
Connector Options				Frequency Max GHz*	Series 085	Series 141	Series 250	
2.4 mm	Plug	(Male)	Straight	50	MMS			
2.4 mm	Plug	(Male)	R/A	50	MMSR ²			
2.4 mm	Jack	(Female)	Straight	50	MFS			
2.4 mm	Bulkhead	(Female)	Straight	50	MFBS			
2.9 mm	Plug	(Male)	Straight	40	KMS	KMS		
2.9 mm	Plug	(Male)	R/A	40	KMSR ²	KMSR ²		
2.9 mm	Jack	(Female)	Straight	40	KFS			
2.9 mm	Bulkhead	(Female)	Straight	40	KFBS			
SMA	Plug	(Male)	Straight	18	SMS	SMS	SMS	
SMA	Plug	(Male)	R/A	18	SMSR ²	SMSR ²		
SMA	Jack	(Female)	Straight	18	SFS			
SMA	Bulkhead	(Female)	Straight	18	SFBS			
Type N	Plug	(Male)	Straight	18			NMS	
TNC	Plug	(Male)	Straight	18	TMS	TMS	TMS	
TNC	Plug	(Male)	R/A	18			TMR	

Gender of the connector is determined by center pin.

² = Straight Connector with pre-bend cable to form right angle.

Consult sales department for other connectors and options not shown.

** Max Frequency of connectors may be limited by the cable selected.*

*** Phase Matched sets available: +/- 2.8 picoseconds**

*** Weatherized Protection available (Polyolefin): Option W**

Cable Options

W - Weatherized-
Polyolefin



Part Numbering Code

Ordering Information

K M S - A L 1 4 1 L L S P - 1 2 . 0 - K M S ± 2 . 8 P S
CONNECTOR #1 CABLE TYPE OPTION LENGTH (IN.) CONNECTOR #2 OPTION
Blank = None Example: P = Phase Matched
W = Weatherized 12.0 = 12 inches

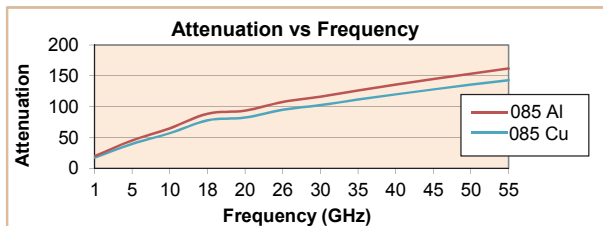
.085 Low Loss Semi-Rigid

AL085LLSP AL085LLTP LL085 LL085TP



Standard Connectors:

Connector Code	Series	Gender	Type	Loss per GHz	Frequency Max GHz
MMS	2.4mm	Male	Straight	0.012	50
MFBS	2.4mm	Female	Straight	0.015	50
MFS	2.4mm	Female	Straight	0.015	50
KMS	2.9mm	Male	Straight	0.01	40
KFBS	2.9mm	Female	Straight	0.015	40
KFS	2.9mm	Female	Straight	0.015	40
SMS	SMA	Male	Straight	0.01	18
SMR	SMA	Male	R/A	0.02	18
SFBS	SMA	Female	Straight	0.01	18
SFS	SMA	Female	Straight	0.01	18
TMS	TNC	Male	Straight	0.01	18
SMPFS	SMP	Female	Straight	0.015	40
SMPFR	SMP	Female	R/A	0.02	40
OSPMBS	OSP	Male	Straight	0.01	22
OSSPMBS	OSSP	Male	Straight	0.01	28



(dB per 100 feet)

GHz	1	5	10	18	26	30	35	40	45	50	55
085 AL Atten	20	45	65	89	108	116	127	136	145	154	162
085 Cu Atten	17	40	57	78	95	103	112	120	128	136	143

Description:

The Low Loss, Semi-Rigid .085" diameter is very popular and has a wide range of available connectors from GPPO to SMA. This low loss cable is specially suited for high reliability applications, especially when temperature changes are a concern. Our special low-density dielectric is very stable in this environment while also offering mechanical durability during any forming of the outer jacket.

Features/Benefits:

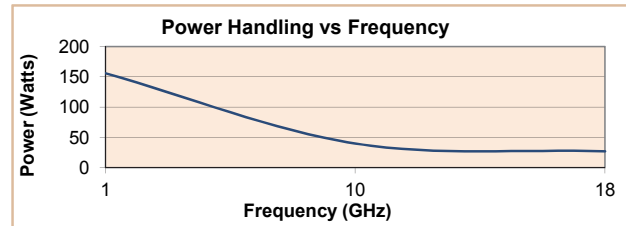
- Mode Free Operation to 60 GHz
- Superior Shielding Effectiveness - 100dB Min.
- Stainless Steel Connectors
- Copper Jacket Bare or Tin Finish
- Aluminum Jacket Bare or Tin Finish
- High Vibration Resistance
- Aluminum 40% Lighter Weight than Copper

Applications:

- Instrumentation
- Jumpers
- Satellite Component Interconnects

Standard Options:

Option Code	Option Description
W	Weatherized
N	Neoprene
±2.8PS	Phase Matched (+/-2.8 picoseconds)



*CW Power in watts at sea level and 23°C

GHz	1	10	18
Pow.	156	40	27

.141 Low Loss Semi-Rigid

AL141LLSP AL141LLTP LL141 LL141TP



Description:

This widely used .141" diameter Low Loss cable offers a wide range of connectors from GPO to Type N. This low loss cable is specially suited for high reliability applications, especially when temperature changes are a concern. Our special low-density dielectric is very stable in this environment while also offering mechanical durability during any forming of the outer jacket.

Features/Benefits:

- Mode Free Operation to 35 GHz
- Superior Shielding Effectiveness - 100dB Min.
- Stainless Steel Connectors
- Copper Jacket Bare or Tin Finish
- Aluminum Jacket Bare or Tin Finish
- High Vibration Resistance
- Aluminum 40% Lighter Weight than Copper

Applications:

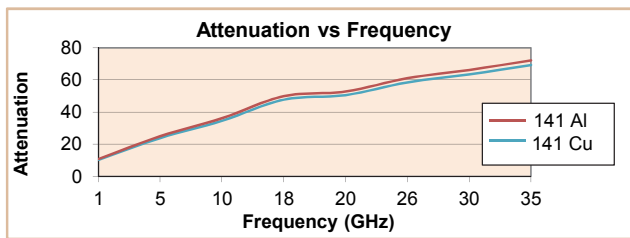
- Instrumentation
- High Frequency Interconnects
- Satellite Component Interconnects

Standard Connectors:

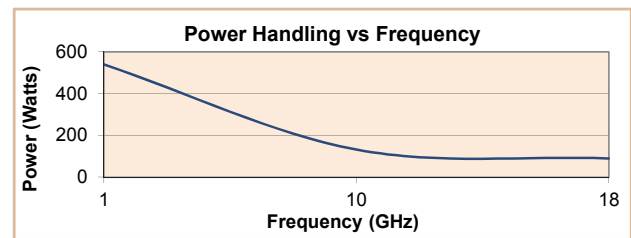
Connector Code	Series	Gender	Type	Loss per GHz	Frequency Max GHz
KMS	2.9mm	Male	Straight	0.01	40
SMS	SMA	Male	Straight	0.01	18
SMR	SMA	Male	R/A	0.02	18
TMS	TNC	Male	Straight	0.01	18

Standard Options:

Option Code	Option Description
W	Weatherized
N	Neoprene
±2.8PS	Phase Matched (+/-2.8 picoseconds)



(dB per 100 feet)



*CW Power in watts at sea level and 23°C

GHz	1	5	10	18	20	26	30	35
141 Al Atten	11	25	36	50	53	61	66	72
141 Cu Atten	10	24	35	48	51	59	64	69

GHz	1	10	18
Pow.	540	132	90

.250 Low Loss Semi-Rigid

AL250LLSP 250LLTP



Description:

Our .250" diameter Low Loss Semi-Rigid cable is used where power and lower loss are required with the reliability and shielding of a Semi-Rigid cable. Larger Connectors such as Type N and TNC with extended Performance to 18 GHz offer excellent power handling performance.

Features/Benefits:

- Mode Free Operation to 18 GHz
- Superior Shielding Effectiveness - 100dB Min.
- Stainless Steel Connectors
- Copper Jacket Bare or Tin Finish
- Aluminum Jacket Bare or Tin Finish
- High Vibration Resistance
- Aluminum 40% Lighter Weight than Copper

Applications:

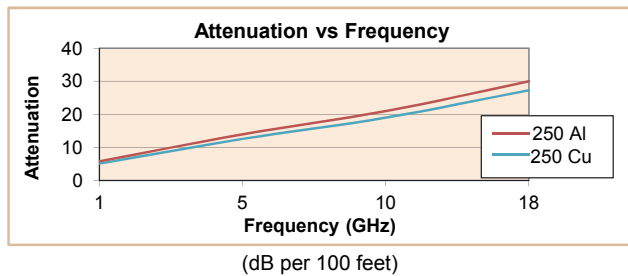
- Instrumentation
- Radar Transmitter
- RF Power Generators
- Satcom

Standard Connectors:

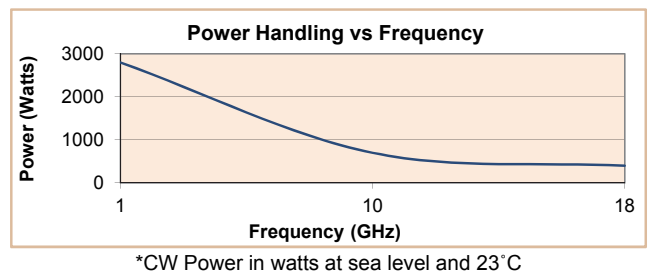
Connector Code	Series	Gender	Type	Loss per GHz	Frequency Max GHz
SMS	SMA	Male	Straight	0.01	18
NMS	Type N	Male	Straight	0.011	18
TMS	TNC	Male	Straight	0.01	18
TMR	TNC	Male	R/A	0.02	18

Standard Options:

Option Code	Option Description
W	Weatherized
N	Neoprene
±2.8PS	Phase Matched (+/-2.8 picoseconds)



GHz	1	5	10	18
250 Al Atten	6	14	21	30
250 Cu Atten	5	13	19	27



GHz	1	10	18
Pow.	2800	700	400

MIL-C-17 / RG Series Family of cables includes familiar RG cable part numbers that have been superseded by MIL-C-17 numbers and alternative custom cables with improved electrical performance over standard M17 cables. The cables have been grouped by outer diameter, (under .150" and over .150"). In addition, this family of cables contains alternatives to the standard RG cables that offer features like increased flexibility, improved shielding or lower insertion loss.

Features:

- Performance up to 18 GHz
- Cost-Effective Flexible Assemblies
- Construction Variety for Applications Requiring:
 - Increased Flexibility
 - Improved Shielding
 - Lower Insertion Loss

Typical Applications:

- Component Interconnects
- Test Cables
- Jumper Assemblies
- In-Box Assemblies

Available Connectors

This family of cables offers a wide variety of connectors. The available interfaces will be dictated largely by the cable diameter selected. Typical interfaces are: SMA, SSMA, MCX, MMCX and SMB for the smaller diameter cables and Type N, TNC and BNC for the larger diameter cables.



MIL-C-17 | RG Series Family & Alternatives

Specifications - Under 0.150" Diameter

General Specifications	RG316	316D	RD316	SF316
MIL Number	M17/113-RG316	N/A	M17/152-00001	N/A
Diameter	0.098	0.124	0.114	0.110
Frequency, Max (GHz)	3	6	12.4	18
Loss @ 5 GHz (dB/100ft)	N/A	76	63	62

Electrical Specifications	RG316	316D	RD316	SF316
Impedance, Nominal (Ω)	50	50	50	50
Velocity of Propagation (%)	69.5	69.5	69.5	69.5
Shielding Effectiveness, 18 GHz (dB/ft)	>40	>60	>60	>90
Capacitance (pF/ft)	29.4	28.8	29.4	29.4
Delay (ns/ft)	1.46	1.44	1.46	1.46

Mechanical Specifications	RG316	316D	RD316	SF316
Weight (lbs/100ft)	1.2	1.4	1.85	1.3
Temperature Range ($^{\circ}$ C)	-55 to +200	-40 to +105	-55 to +200	-55 to +200
Minimum Bend Radius (inches)	0.4	0.5	0.5	0.5

Temperature Ranges on Standard boots +100 $^{\circ}$ C

Construction Data	RG316	316D	RD316	SF316
Inner Conductor	Stranded SCCS	Stranded SCCS	Stranded SCCS	Stranded SCCS
Dielectric	PTFE	PTFE	PTFE	PTFE
First Outer Shield	SPC Round Braid	SPC Round Braid	SPC Round Braid	SPC Flat Ribbon
Second Outer Shield	N/A	SPC Round Braid	SPC Round Braid	Aluminum Tape
Third Outer Shield	N/A	N/A	N/A	SPC Round Braid
Jacket	FEP	RADOX	FEP	FEP

MIL-C-17 | RG Series Family & Alternatives

Specifications - Over 0.150" Diameter

General Specifications	RG223	RG400	RG142	142D	SF142
MIL Number	M17/84-RG223	M17/128-RG400	M17/60-RG142	N/A	N/A
Diameter	0.212	0.195	0.195	0.195	0.195
Frequency, Max (GHz)	12.4	12.4	18	5	18
Loss @ 5 GHz (dB/100ft)	34	32	32	40	32

Electrical Specifications	RG223	RG400	RG142	142D	SF142
Impedance, Nominal (Ω)	50	50	50	50	50
Velocity of Propagation (%)	66	69.5	70	69	70
Shielding Effectiveness, 18 GHz (dB/ft)	>60	>60	>60	>60	>95
Capacitance (pF/ft)	30.8	29.4	29.4	29	29.4
Delay (ns/ft)	1.54	1.46	1.46	1.44	1.46

Mechanical Specifications	RG223	RG400	RG142	142D	SF142
Weight (lbs/100ft)	4.1	5	4.3	3.99	4.3
Temperature Range ($^{\circ}\text{C}$)	-40 to +85	-55 to +200	-55 to +200	-40 to +105	-55 to +200
Minimum Bend Radius (inches)	1	1	1	1	1

Temperature Ranges on Standard Boots +100 $^{\circ}\text{C}$ Max

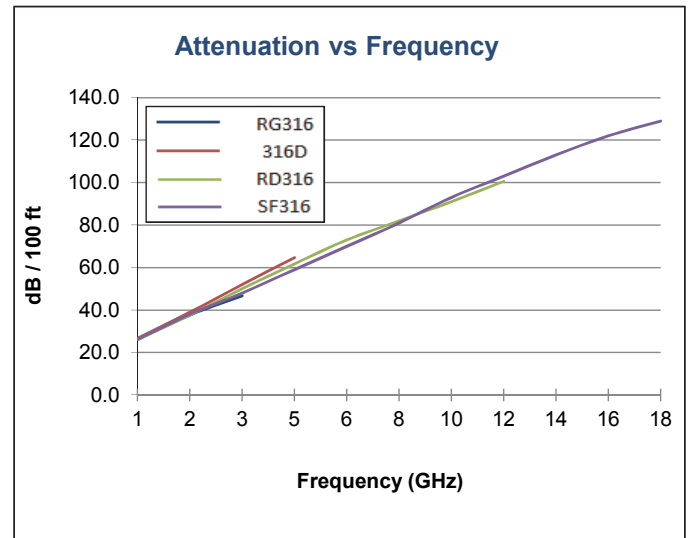
Construction Data	RG223	RG400	RG142	142D	SF142
Inner Conductor	Solid SPC	Stranded SPC	Solid SCCS	Solid SPC	Solid SCCS
Dielectric	PE	PTFE	PTFE	SPEX	PTFE
First Outer Shield	SPC Round Braid	SPS Round Braid	SPC Round Braid	SPC Round Braid	SPC Flat Ribbon
Second Outer Shield	SPC Round Braid	SPC Round Braid	SPC Round Braid	SPC Round Braid	Aluminum Tape
Third Outer Shield	N/A	N/A	N/A	N/A	SPC Round Braid
Jacket	PVC	FEP	FEP	RADOX	FEP

MIL-C-17 | RG Series Family & Alternatives

Performance

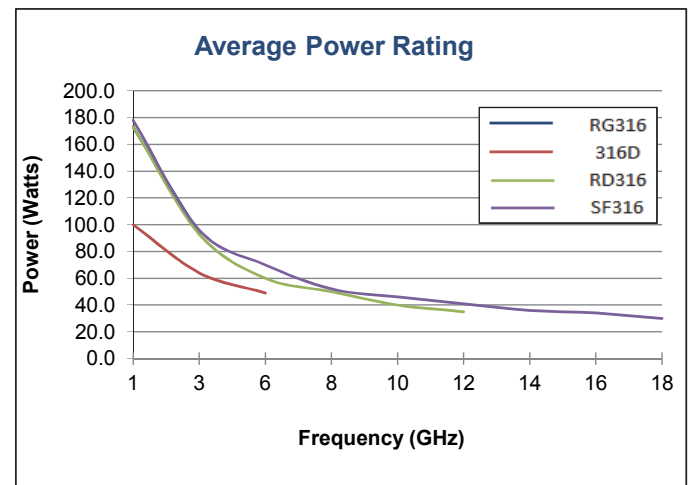
Attenuation (dB/100ft)				
GHz	RG316	316D	RD316	SF316
0.1	8.0	8.1	8.0	8.0
0.4	16.2	16.6	16.2	16.4
1	26.1	26.8	26.1	26.2
2	37.6	39.0	37.6	38.0
3	46.7	48.6	46.7	47.0
5		64.7	61.7	62.2
6			68.2	66.8
8			80.0	80.7
10			90.7	91.5
12			100.6	101.5
14				111.0
16				120.0
18				128.5

Max Cable Loss at +25° C & Sea Level



Average Power Rating (Watts)				
GHz	RG316	316D	RD316	SF316
1	173.0	100.0	173.0	178.0
3	93.0	64.0	93.0	96.0
6		49.0	60.0	70.0
8			50.0	52.0
10			40.0	46.0
12			35.0	41.0
14				36.0
16				34.0
18				30.0

Power handling is specified for ambient conditions at sea level and +25° C



Connector Options				Frequency Max GHz*	Under 0.150"	Over 0.150"
SSMA	Plug	(Male)	Straight	18	SSMS	
SSMA	Plug	(Male)	R/A	18	SSMR	
SMA	Plug	(Male)	Straight	18	SMS	SMS
SMA	Plug	(Male)	R/A	18	SMR	SMR
SMA	Jack	(Female)	Straight	18	SFS	SFS
SMA	Bulkhead	(Female)	Straight	18	SFBS	SFBS
OSSP	Bulkhead	(Female)	Straight	18	OSSPMBS	
OSP	Bulkhead	(Male)	Straight	18	OSPMBS	
Type N	Plug	(Male)	Straight	18	NMS	NMS
Type N	Bulkhead	(Female)	Straight	18	NFBS	NFBS
Type N	Plug	(Male)	R/A	18	NMR	NMR
Type N	Jack	(Female)	Straight	18		NFS
TNC	Plug	(Male)	Straight	18	TMS	TMS
TNC	Plug	(Male)	R/A	18	TMR	TMR
TNC	Bulkhead	(Female)	Straight	18	TFBS	TFBS
TNC	Jack	(Female)	Straight	18		TFS
SMC		(Female)	Straight	6	SMCFS	
MCX	Plug	(Male)	R/A	6	MCXMR	
MCX	Plug	(Male)	Straight	6	MCXMS	
MCX	Jack	(Female)	Straight	6	MCXFS	
MMCX	Plug	(Male)	Straight	6	MMCXMS	
MMCX	Plug	(Male)	R/A	6	MMCXMR	
SMB	Plug	(Male)	Straight	6	SMBMS	
SMB	Plug	(Male)	R/A	6	SMBMR	
SMB	Jack	(Female)	Straight	6	SMBFS	
SMB	Jack	(Female)	R/A	6	SMBFR	
BNC	Plug	(Male)	Straight	4	BMS	BMS
BNC	Plug	(Male)	R/A	4	BMR	BMR
BNC	Bulkhead	(Female)	Straight	4	BFBS	BFBS
BNC	Jack	(Female)	Straight	4		BFS

Gender of the connector is determined by center pin.

Consult sales department for other connectors and options not shown.

*Note: maximum frequency of assembly is dependant on cable and connector.

If operating frequency is over 6 Ghz notify sales department on RFQ.

Cable Assembly Options	Option Code	Under 0.150"	Over 0.150"
Weatherized (Polyolefin)	W	√	√
Weatherized (Neoprene)	N		
Armorized	A		
Armorized & Weatherized (PVC)	AW		
Armorized & Weatherized (Neoprene)	AN		
Armorized & Weatherized (Monocoil & Silicone)	MC		
Armorized & Weatherized (Monocoil & Polyolefin)	MP		
Extended Boots	E	√	√
Phase Matching	±2.8PS	√	√
Dust Caps	D		

MIL-C-17 | RG Series & Alternatives

Options & Ordering Information

Cable Options

E - Extended Boots



W - Weatherized-
Polyolefin



Part Numbering Code

Ordering Information

S M S - R G 1 4 2 - - 1 8 . 0 - S M S ± 2 . 8 P S
CONNECTOR #1 CABLE TYPE OPTION LENGTH (IN.) CONNECTOR #2 OPTION
Blank = None Example:
W = Weatherized 18.0 = 18 inches
P = Phase Matched

Under .150" Diameter Series

Standard Flexible



Description:

Standard Flexible cables under 0.150 inch diameter offer a lightweight and flexible interconnect where loss and power are not a concern. The SF316 cable offers the lowest loss and highest shielding while 316D cable provides great flexibility, useful in test conditions. Stainless steel connectors are available for test cable requirements, but must be specified, if required.

Features/Benefits:

- Includes RG Cables and Their Alternatives
- More Cost-Effective than Low-loss Cable Types
- High Shielding Types Available
- Ultra-Flexible Types Available

Applications:

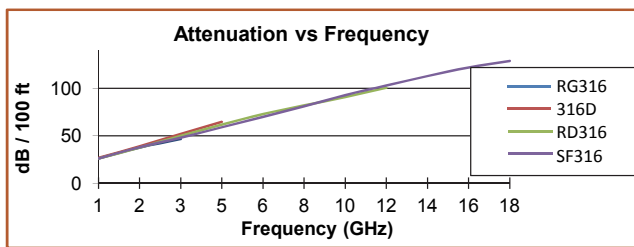
- Component Interconnects
- Test Cables
- Jumper Assemblies
- In-Box Assemblies

Standard Connectors:

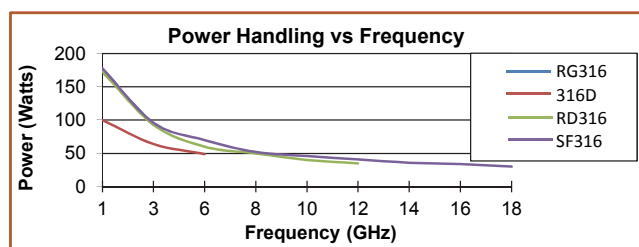
Connector Code	Series	Gender	Type	Loss per GHz	Frequency Max GHz
SMS	SMA	Male	Straight	0.01	18
SMR	SMA	Male	R/A	0.02	18
SFBS	SMA	Female	Straight	0.01	18
SFS	SMA	Female	Straight	0.01	18
NMS	Type N	Male	Straight	0.011	18
NMR	Type N	Male	R/A	0.02	18
NFBS	Type N	Female	Straight	0.01	18
TMS	TNC	Male	Straight	0.01	18
TMR	TNC	Male	R/A	0.02	18
TFBS	TNC	Female	Straight	0.015	18
SMBFR	SMB	Female	R/A	0.02	40
SMBFS	SMB	Female	Straight	0.01	40
MCXMS	MCX	Male	Straight	0.01	6
MCXMR	MCX	Male	R/A	0.02	6
MMCXMS	MMCX	Male	Straight	0.01	6
MMCXMR	MMCX	Male	Straight	0.02	6
BMS	BNC	Male	Straight	0.01	4
BMR	BNC	Male	R/A	0.02	4
BFBS	BNC	Female	Straight	0.01	4
OSPMBS	OSP	Male	Straight	0.01	22
OSSPMBS	OSSP	Male	Straight	0.01	28
SSMS	SSMA	Male	Straight	0.01	34
SSMR	SSMA	Male	R/A	0.02	34

Standard Options:

Option Code	Option Description
W	Weatherized
±2.8PS	Phase Matched (+/-2.8 picoseconds)
E	Extended Boots



GHz	1	2	3	5	8	12	14	16	18
RG316 Atten	26	38	47						
316D Atten	27	39	49	65					
RD316 Atten	26	38	47	62	80	101			
SF316 Atten	26	38	47	62	81	102	111	120	129



GHz	1	3	6	8	10	12	14	16	18
RG316 Power	173	93							
316D Power	100	64	49						
RD316 Power	173	93	60	50	40	35			
SF316 Power	178	96	70	52	46	41	36	34	30

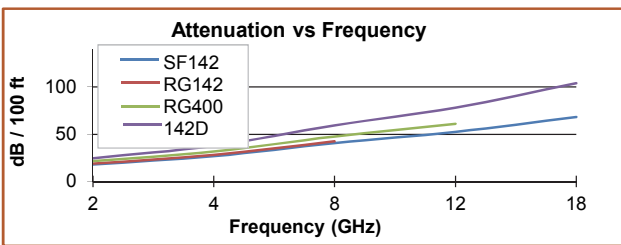
Over .150" Diameter Series

Standard Flexible



Standard Connectors:

Connector Code	Series	Gender	Type	Loss per GHz	Frequency Max GHz
SMS	SMA	Male	Straight	0.01	18
SMR	SMA	Male	R/A	0.02	18
SFBS	SMA	Female	Straight	0.01	18
SFS	SMA	Female	Straight	0.01	18
NMS	Type N	Male	Straight	0.011	18
NMR	Type N	Male	R/A	0.02	18
NFBS	Type N	Female	Straight	0.01	18
TMS	TNC	Male	Straight	0.01	18
TMR	TNC	Male	R/A	0.02	18
TFBS	TNC	Female	Straight	0.015	18
BMS	BNC	Male	Straight	0.01	4
BMR	BNC	Male	R/A	0.02	4
BFBS	BNC	Female	Straight	0.01	4



(dB per 100 feet)

GHz	2	4	8	12	18
SF142 Atten	18	27	41	53	68
RG142 Atten	19	28	43		
RG400 Atten	22	32	48	61	
142D Atten	25	38	59	78	104

Description:

Standard Flexible cables over 0.150 inch diameter offer a moderate weight and flexible interconnect where loss or power may be a concern and cannot be met with smaller diameter cables. SF142 cable offers the lowest loss and highest shielding while 142D cable provides great flexibility useful in some test conditions. Stainless steel connectors are available for test cable requirements, (stainless steel must be specified).

Features/Benefits:

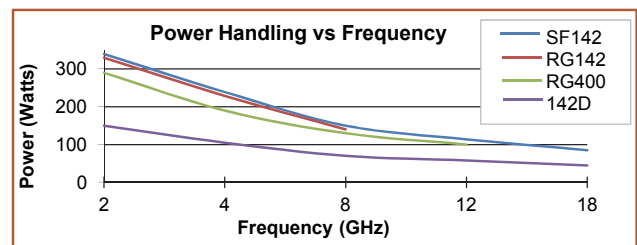
- Includes RG Cables and Their Alternatives
- More Cost-Effective than Low-loss Cable Types
- High Shielding Types Available
- Ultra-Flexible Types Available

Applications:

- Component Interconnects
- Test Cables
- Jumper Assemblies
- In-Box Assemblies

Standard Options:

Option Code	Option Description
W	Weatherized
±2.8PS	Phase Matched (+/-2.8 picoseconds)
E	Extended Boots



*CW Power in watts at sea level and 23°C

GHz	2	4	8	12	18
SF142 Power	340	239	150	114	85
RG142 Power	330	229	140		
RG400 Power	290	190	130	100	
142D Power	150	105	70	58	45

LMR® Cable Assemblies are the most suitable selection for interconnect applications up to 5.8 GHz. They offer low loss and high shielding at very reasonable costs. Typical connector types are: SMA, TNC, Type N, BNC, and UHF.

Features:

- Low Loss
- DC to 5.8 GHz
- Phase Matched Sets Available
- Water Tight Jacket Available
- L240DB & L400DB
- UltraFlex (Stranded Center Conductor) Available
L240UF & L400UF
- Plenum Rated Available

Typical Applications:

- Interconnects
- Land Mobile
- Cellular
- Paging
- PCS
- 2-way Radio
- LMDS
- WLL
- CLEC
- ISM
- Wireless Telemetry
- Base Stations
- Mobile Antennas



LMR® Family

Specifications

General Specifications	LMR-100A	LMR-195	LMR-240	LMR-400
Diameter	0.11	0.195	0.24	0.405
Frequency, Max (GHz)	5.8	5.8	5.8	5.8
Loss @ 5.8 GHz (dB/100ft)	64.1	29.9	20.4	10.8

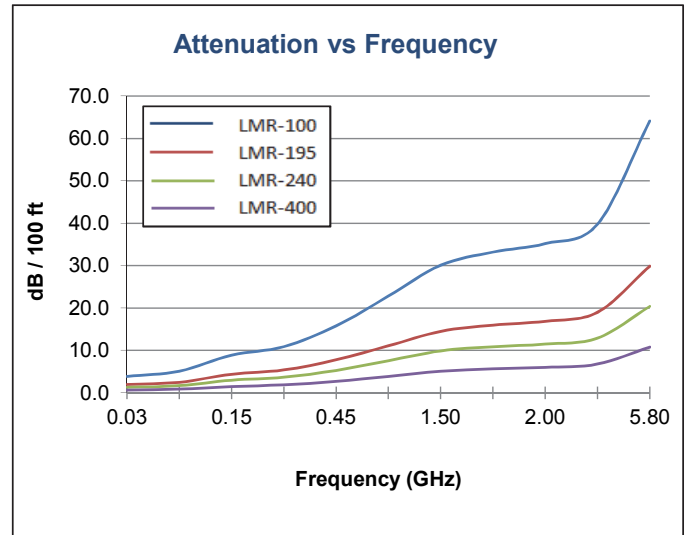
Electrical Specifications	LMR-100A	LMR-195	LMR-240	LMR-400
Impedance, Nominal (Ω)	50	50	50	50
Velocity of Propagation (%)	66	76	84	85
Shielding Effectiveness (dB/ft)	>90	>90	>90	>90
Capacitance (pF/ft)	30.8	25.4	24.2	23.9
Delay (ns/ft)	1.54	1.27	1.21	1.2

Mechanical Specifications	LMR-100A	LMR-195	LMR-240	LMR-400
Weight (lbs/100ft)	0.92	2.1	3.4	6.8
Temperature Range ($^{\circ}$ C)	-40 to 85	-40 to 85	-40 to 85	-40 to 85
Minimum Bend Radius (inches)	0.25	0.5	0.75	1

Construction Data	LMR-100A	LMR-195	LMR-240	LMR-400
Inner Conductor	Bare Copper Clad Steel	Bare Copper	Bare Copper	Bare Copper Clad Aluminum
Dielectric	Polyethylene	Foam Polyethylene	Foam Polyethylene	Foam Polyethylene
First Outer Shield	Aluminum Tape	Aluminum Tape	Aluminum Tape	Aluminum Tape
Second Outer Shield	Tinned Copper	Tinned Copper	Tinned Copper	Tinned Copper
Third Outer Shield	N/A	N/A	N/A	N/A
Jacket	Extruded PVC	Extruded Polyethylene	Extruded Polyethylene	Extruded PE

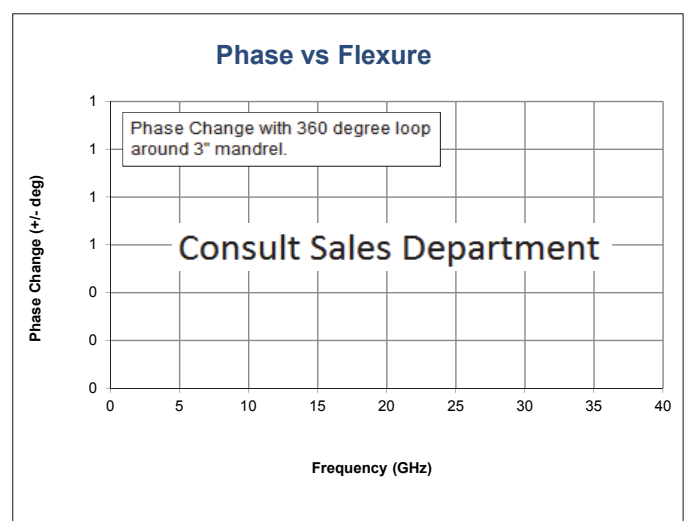
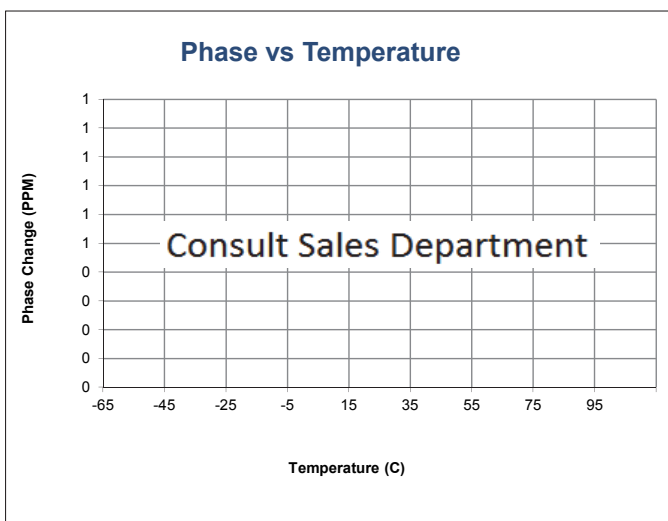
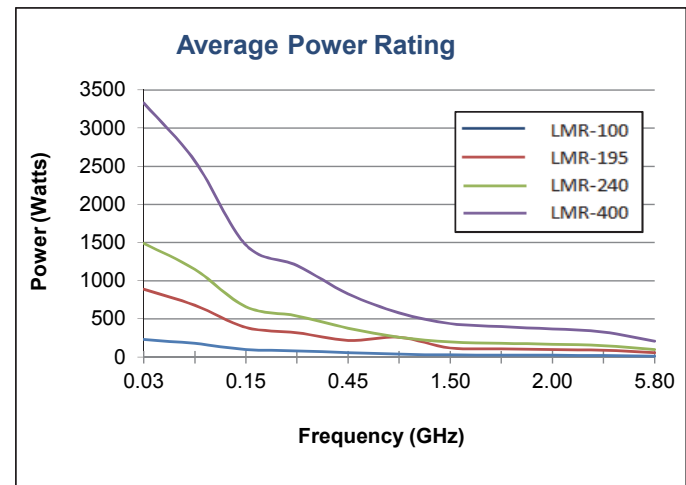
Attenuation (dB/100ft)				
GHz	LMR-100	LMR-195	LMR-240	LMR-400
0.03	3.9	2.0	1.3	0.7
0.05	5.1	2.5	1.7	0.9
0.15	8.9	4.4	3.0	1.5
0.22	10.9	5.4	3.7	1.9
0.45	15.8	7.8	5.3	2.7
0.90	22.8	11.1	7.6	3.9
1.50	30.1	14.5	9.9	5.1
1.80	33.2	16.0	10.9	5.7
2.00	35.2	16.9	11.5	6.0
2.50	39.8	19.0	12.9	6.8
5.80	64.1	29.9	20.4	10.8

Max Cable Loss at +25° C & Sea Level



Average Power Rating (Watts)				
GHz	LMR-100	LMR-195	LMR-240	LMR-400
0.03	230	890	1490	3330
0.05	180	680	1150	2570
0.15	100	390	660	1470
0.22	83	320	540	1200
0.45	57	220	380	830
0.90	39	260	260	580
1.50	29	120	200	440
1.80	27	110	180	400
2.00	25	100	170	370
2.50	22	90	150	330
5.80	13	60	100	210

Power handling is specified for ambient conditions at sea level and +25° C



LMR® Family

Connector Selection & Options

Connector Options				Frequency Max GHz*	LMR-100A	LMR-195	LMR240	LMR-400
Type N	Plug	(Male)	Straight	5.8	NMS	NMS	NMS	NMS
Type N	Plug	(Male)	R/A	5.8	NMR	NMR	NMR	NMR
Type N	Bulkhead	(Female)	Straight	5.8	NFBS	NFBS	NFBS	NFBS
Type N	Jack	(Female)	Straight	5.8		NFS		NFS
SMA	Plug	(Male)	Straight	5.8	SMS	SMS	SMS	SMS
TNC	Plug	(Male)	Straight	5.8	TMS	TMS	TMS	TMS
TNC	Plug	(Male)	R/A	5.8	TMR	TMR	TMR	TMR
BNC	Plug	(Male)	Straight	4	BMS	BMS	BMS	BMS

Gender of the connector is determined by center pin.

Consult sales department for other connectors and options not shown.

** Max Frequency of connectors may be limited by the cable selected.*

*** Extended Boots Available : Option E**

*** Dust Caps Available: Option D**

*** Armored Protective Covering Available: Option A**

Cable Options

E - Extended Boots



A - Armored



D - Dust Caps



Part Numbering Code

Ordering Information

<p><u>S M S</u></p> <p>CONNECTOR #1</p> <p>SMS = SMA Male Straight NMS = Type N Male Straight TMS = TNC Male Straight</p>	<p>_____</p> <p>OPTION</p> <p>(Connector #1)</p> <p>Blank = None E = Extended Boot</p>	<p><u>1 0 0</u></p> <p>CABLE</p> <p>L10 = LMR®-100 L19 = LMR®-195 L40 = LMR®-400</p>	<p>_____</p> <p>OPTION</p> <p>Blank = None</p>	<p><u>2 4 . 0</u></p> <p>LENGTH (IN.)</p> <p>Example: 24.0 = 24 inches</p>	<p>-</p> <p><u>S M S</u></p> <p>CONNECTOR #2</p> <p>SMS = SMA Male Straight NMS = Type N Male Straight TMS = TNC Male Straight</p>	<p>_____</p> <p>OPTION</p> <p>(Connector #2)</p> <p>Blank = None E = Extended Boot</p>
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LMR® 100A

Flexible Communications Coax



Description:

LMR®-100A has a PVC Jacket and is designed for Low-Loss general purpose indoor / outdoor applications and is somewhat more flexible than the standard polyethylene jacketed LMR.

Features/Benefits:

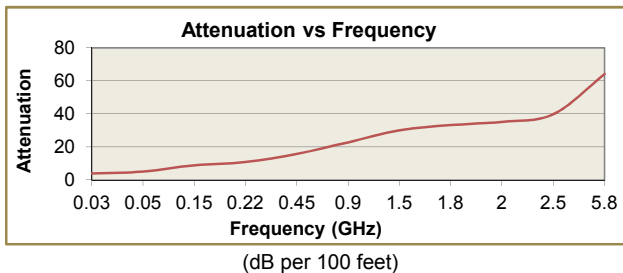
- Drop-in Replacement for RG-316/RG-174
- Enhanced Flexibility when compared to standard LMR
- Most Suitable for Applications up to 5.8 GHz
- Low Loss & High Shielding at Very Reasonable Cost.

Applications:

- Jumpers
- Short Antenna Feeder runs
- Mobile Antennas
- GPS
- WLAN
- WiMax

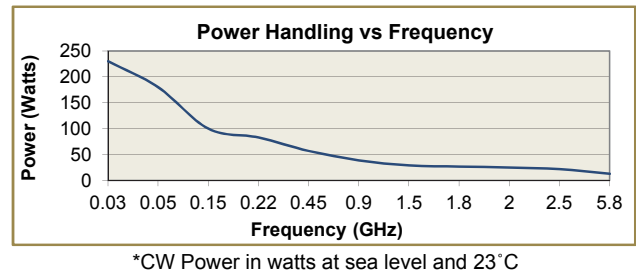
Standard Connectors:

Connector Code	Series	Gender	Type	Loss per GHz	Frequency Max GHz
NMS	Type N	Male	Straight	0.01	5.8
NMR	Type N	Male	R/A	0.015	5.8
NFBS	Type N	Female	Straight	0.012	5.8
SMS	SMA	Male	Straight	0.01	5.8
SMR	SMA	Male	Straight	0.015	5.8
SFBS	SMA	Female	Straight	0.01	5.8
TMS	TNC	Male	Straight	0.01	5.8
TMR	TNC	Male	R/A	0.015	5.8
TFBS	TNC	Female	Straight	0.012	5.8
MCXMR	MCX	Male	R/A	0.01	5.8
MCXFS	MCX	Female	Straight	0.01	5.8
BMS	BNC	Male	Straight	0.01	4



GHz	0.03	0.05	0.15	0.22	0.45	0.90	1.50	1.80	2.00	2.50	5.80
Atten	3.9	5.1	8.9	10.9	15.8	22.8	30.1	33.2	35.2	39.8	64.1

Standard Options:



GHz	0.03	0.05	0.15	0.22	0.45	0.90	1.50	1.80	2.00	2.50	5.80
Pow.	230	180	100	83	57	39	29	27	25	22	13

Flexible Communications Coax



Description:

LMR®-195 standard is a UV Resistant Polyethylene jacketed cable designed for 20-year service outdoor use. The bending and handling characteristics are significantly better than air-dielectric and corrugated hard-line cables

Features/Benefits:

- Drop-in Replacement for RG-58/RG-142
- Flexible Outer Conductor Enables Tight Bend Radius.
- Most Suitable for Applications up to 5.8 GHz
- Low Loss & High Shielding at Very Reasonable Cost.

Applications:

- Jumpers
- Short Antenna Feeder runs
- Mobile Antennas
- GPS
- WLAN
- WiMax

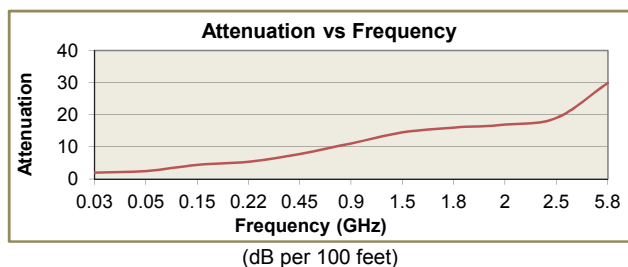
Standard Connectors:

Connector Code	Series	Gender	Type	Loss per GHz	Frequency Max GHz
NMS	Type N	Male	Straight	0.01	5.8
NMR	Type N	Male	R/A	0.015	5.8
NFBS	Type N	Female	Straight	0.012	5.8
SMS	SMA	Male	Straight	0.01	5.8
SMR	SMA	Male	Straight	0.015	5.8
SFS	SMA	Female	R/A	0.01	5.8
SFBS	SMA	Female	Straight	0.01	5.8
TMS	TNC	Male	Straight	0.01	5.8
TMR	TNC	Male	R/A	0.015	5.8
TFBS	TNC	Female	Straight	0.012	5.8
BMS	BNC	Male	Straight	0.01	4
BMR	BNC	Male	R/A	0.015	4
BFBS	BNC	Female	Straight	0.012	4

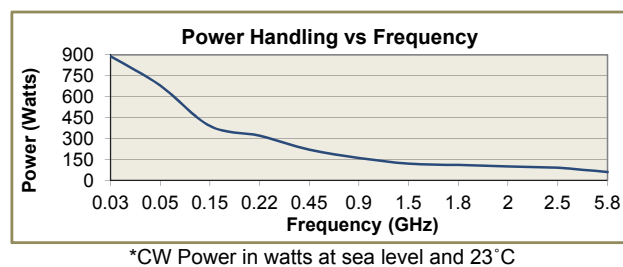
Standard Options:

Option Code	Option Description
A	Armorized
D	Dust Caps
E	Extended Boots

Variations:



GHz	0	0.1	0.2	0.2	0.5	0.9	1.5	1.8	2.0	2.5	5.8
Atten	2.0	2.5	4.4	5.4	7.8	11.1	14.5	16.0	16.9	19.0	29.9



GHz	0	0.1	0.2	0.2	0.5	0.9	1.5	1.8	2.0	2.5	5.8
Pow.	890	680	390	320	220	160	120	110	100	90	60

LMR® 240

Flexible Communications Coax



Description:

LMR®-240 standard is a UV Resistant Polyethylene jacketed cable designed for 20-year service outdoor use. The bending and handling characteristics are significantly better than air-dielectric and corrugated hard-line cables.

Features/Benefits:

Flexible Outer Conductor Enables Tight Bend Radius.
Most Suitable for Applications up to 5.8 GHz
Low Loss & High Shielding at Very Reasonable Cost.

Applications:

- Jumpers
- Short Antenna Feeder runs
- Mobile Antennas
- GPS
- WLAN
- WiMax

Standard Connectors:

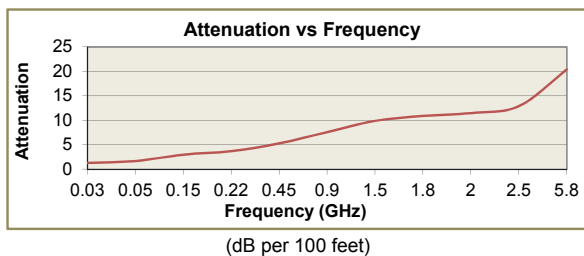
Connector Code	Series	Gender	Type	Loss per GHz	Frequency Max GHz
NMS	Type N	Male	Straight	0.01	5.8
NMR	Type N	Male	R/A	0.015	5.8
NFBS	Type N	Female	Straight	0.012	5.8
SMS	SMA	Male	Straight	0.01	5.8
SMR	SMA	Male	Straight	0.015	5.8
SFBS	SMA	Female	Straight	0.01	5.8
TMS	TNC	Male	Straight	0.01	5.8
TMR	TNC	Male	R/A	0.015	5.8
TFBS	TNC	Female	Straight	0.012	5.8
BMS	BNC	Male	Straight	0.01	4

Standard Options:

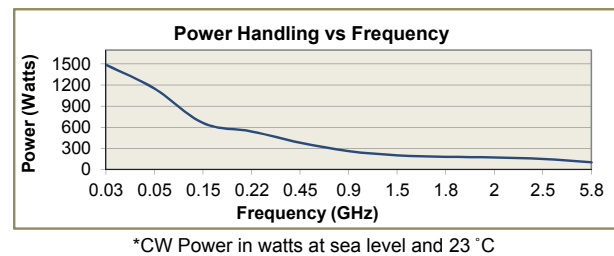
Option Code	Option Description
A	Armorized
D	Dust Caps
E	Extended Boots

Variations:

Part Number	Cable Code	Description
LMR-240UF	L240UF	Stranded Center Conductor
LMR-240LLPL	L240LLPL	Plenum Rated
LMR-240DB	L240DB	Water Tight Jacket



GHz	0.03	0.05	0.15	0.22	0.45	0.90	1.50	1.80	2.00	2.50	5.80
Atten	1.3	1.7	3	3.7	5.3	7.6	9.9	11	12	13	20



GHz	0.03	0.05	0.15	0.22	0.45	0.90	1.50	1.80	2.00	2.50	5.80
Pow.	1490	1150	660	540	380	260	200	180	170	150	100

Flexible Communications Coax



Description:

LMR®-400 standard is a Polyethylene jacketed cable designed for 20-year service outdoor use and incorporates the best materials for UV Resistance. Low Loss is a hallmark feature of the LMR®-400.

Features/Benefits:

- Drop-in Replacement for RG-8/9913 Air-Dielectric Cable.
- Flexible Outer Conductor Enables Tight Bend Radius
- Most Suitable for Applications up to 5.8 GHz.
- Low Loss & High Shielding at Very Reasonable Cost.

Applications:

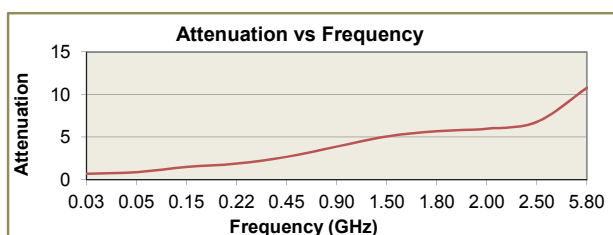
- Jumpers
- Short Antenna Feeder runs
- Mobile Antennas
- GPS
- WLAN
- WiMax

Standard Connectors:

Connector Code	Series	Gender	Type	Loss per GHz	Frequency Max GHz
NMS	Type N	Male	Straight	0.01	5.8
NMR	Type N	Male	R/A	0.015	5.8
NFBS	Type N	Female	Straight	0.012	5.8
SMS	SMA	Male	Straight	0.01	5.8
TMS	TNC	Male	Straight	0.01	5.8
TMR	TNC	Male	R/A	0.015	5.8
BMS	BNC	Male	Straight	0.01	4

Standard Options:

Option Code	Option Description
A	Armorized
D	Dust Caps
E	Extended Boots

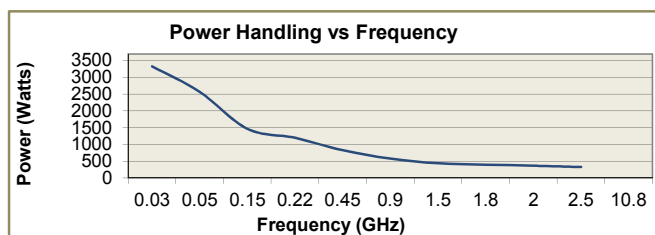


(dB per 100 feet)

GHz	0.03	0.05	0.15	0.22	0.45	0.90	1.50	1.80	2.00	2.50	5.80
Atten	0.7	0.9	1.5	1.9	2.7	3.9	5.1	5.7	6	6.8	11

Variations:

Part Number	Cable Code	Description
LMR-400UF	L400UF	Stranded Center Conductor
LMR-400LLPL	L400LLPL	Plenum Rated
LMR-400DB	L400DB	Water Tight Jacket



*CW Power in watts at sea level and 23°C

GHz	0.03	0.05	0.15	0.22	0.45	0.90	1.50	1.80	2.00	2.50	5.80
Pow.	3330	2570	1470	1200	830	580	440	400	370	330	210

Notes

Armored Overall Length



Cable Option - A An armored protective covering constructed of a flexible stainless steel armor that is installed over the entire length of the cable jacket and locked in place from connector to connector. This prevents damage to the cable from being stepped on or run over by light equipment and prevents cable kinking throughout the assembly. Also adds 20-30 dB of shielding effectiveness.

Typical Applications:

- Production and Lab Testing
- Environmental Testing
- Outdoor Installations

Typical Properties

Armor Material	Stainless Steel 304 alloy
Construction	SquareLok & InterLok style

Armored Overall Length Protective Covering (Optional)

Cable Code	Option Code	Description	Diameter Outside	Bend Radius	Break lbs/linear	Crush* lbs/inch	Weight lbs/100 ft
160	A	Armor 7/32	0.303	0.9	155	434	3.3
180SP	A	Armor 1/4	0.329	1.0	250	286	4.6
200	A	Armor 1/4	0.329	1.0	250	286	4.6
235SP	A	Armor 5/16	0.410	1.0	200	280	5.5
290	A	Armor 3/8	0.500	1.0	225	525	8.8
335	A	Armor 3/8	0.500	1.0	225	525	8.8
335SP	A	Armor 3/8	0.500	1.0	225	525	8.8
490S	A	Armor 1/2	0.625	1.3	250	400	10.6

Properties information is typical data only and should not be used for specification requirements.

* Crush strength test per ISO 15465-2003 Section 7.2.

Consult Sales Department for others types of covering.

Cable Assembly Options

Option - Z

Weatherized Overall Length



Cable Option - Z Our “Weather-proof Sealing” Technique ensures a water tight barrier between the connector back body and the cable jacket. **This option is standard with all available weatherized configurations** including, Weatherized PVC (Option - W), Neoprene (Option - N), and Armored Weatherized (Option - AW). *Stand alone “Weather-Proof Sealing” (Option - Z) does not include UV protection of the cable and is available for Lab-Flex® and Lab-Flex® S families.

Typical Applications:

- Production and Lab Testing
- Environmental Testing
- Harsh Chemical Environments
- Outdoor Testing

Option - Z Inclusion		
Available Options	Automatically Included	Description
Option - A (Armored)		
Option - AW (Armored & Weatherized)	√	"Z" does not have to be called out in cable code.
Option - MC (Monocoil)		
Option - MP (Armored Monocoil)		
Option - W (Weatherized)	√	"Z" does not have to be called out in cable code.
Option - N (Neoprene)	√	"Z" does not have to be called out in cable code.

* Note:

Option - Z is also available for all Lab-Flex® & Lab-Flex® S that are not provided with Weatherization (Option - W), Neoprene (Option - N) or Armored & Weatherized (Option AW), to order add “Z” after cable code.

Example: SMS - 200Z - 48.0 - SMS

Weatherized Overall Length



Polyolefin or PVC (W) Jacket Overall Length

Cable Jacket

Cable Option - W The Weatherized option for Lab-Flex® series consists of a polyolefin (shrink tubing) jacket or PVC extruded over the entire length of the cable jacket to provide additional protection from UV, moisture and other elements encountered in outdoor applications. All connectors when mated are assured to be water tight using our “Weather Proof Sealing” Technique (Option - Z) not relying on traditional heat shrink booting.

Now Lab-Flex® series “W” offers a polyolefin (shrink tubing) jacket that protects from shorting and additional protection from UV.

Typical Applications:

- Production and Lab Testing
- Environmental Testing
- Outdoor Environments

Typical Properties (Polyolefin)	
Jacket Material	Polyolefin (Shrink Tube)
Temperature Rating (°C)	-55 to +135
Tensile Strength	2400 PSI
Heat Aging	336 HRS @ 175°C = 175% Elongation
Heat Shock	4 HRS @ 250°C = No Dripping or Cracking
Low Temperature. Flexibility	4 HRS @ -55°C = No Cracking
Flammability	Self Extinguishing
Corrosive Effect	Non-Corrosive
Solvent Resistance	Tensile Strength = 1000 PSI
Water Absorption	0.20%
Fungus Resistance	Non-Nutrient

Meets the following specifications: MIL-I-23053/5, CLASS 1, 2; AMS-3636; AMS-3637; UL; CSA

Typical Properties (PVC)		
Jacket Material	PVC (Extruded Thermoplastic Elastomer)	
Temperature Rating (°C)	-20 to +135	
Specific Gravity	1.36	ASTM-D-792
Durometer (Shore "A" Sec.)	70	ASTM-D-1709
Tensile Strength (psi)	2,100	ASTM-D-638
Elongation (%)	350	ASTM-D-638
Brittle Point (°C)	-42	ASTM-D-746
Oxygen (%)	38.0	ASTM-D-2863

Weatherized Overall Length Protective Covering (Optional)				
Cable Code	Option Code	Description	Diameter Outside	Weight lbs/100 ft
100	W	Polyolefin (Shrink Tubing)	0.14	1.29
125	W	Polyolefin (Shrink Tubing)	0.16	2.44
160	W	PVC (Extruded)	0.21	3.70
200	W	PVC (Extruded)	0.31	6.75
290	W	PVC (Extruded)	0.40	11.02
335	W	PVC (Extruded)	0.47	14.24

Properties information is typical data only and should not be used for specification requirements.

* Crush strength test per ISO 15465-2003 Section 7.2.

Consult Sales Department for others types of covering.

Cable Assembly Options

Option - AW

Armored & Weatherized Overall Length



Cable Option - AW An armored protective covering constructed of a flexible stainless steel armor that is installed over the entire length of the cable jacket and locked in place from connector to connector. This prevents damage to the cable from being stepped on or run over by light equipment and prevents cable kinking throughout the assembly. Then a PVC jacket is extruded over the entire length of stainless steel armor, to prevent dirt, water and other elements from penetrating into the armor. Also adds 20-30 dB of shielding effectiveness.

Typical Applications:

- Production and Lab Testing
- Environmental Testing
- Outdoor Installations

Typical Properties		
Armor Material	Stainless Steel 304 alloy	
Jacket Material	Thermoplastic Elastomer (PVC)	
Temperature Rating	-20 to +135	
Specific Gravity	1.36	ASTM-D-792
Durometer (Shore "A" Sec.)	70	ASTM-D-1709
Tensile Strength (psi)	2,100	ASTM-D-638
Elongation (%)	350	ASTM-D-638
Brittle Point (°C)	-42	ASTM-D-746
Oxygen (%)	38.0	ASTM-D-2863

Armored & Weatherized Overall Length Protective Covering (Optional)							
Cable Code	Option Code	Description	Diameter Outside	Bend Radius	Break lbs/linear	Crush* lbs/inch	Weight lbs/100 ft
160	A	Armor 7/32 PVC Jacket	0.40	0.90	155	434	7.79
180SP	A	Armor 1/4 PVC Jacket	0.44	1.00	250	286	7.89
200	A	Armor 1/4 PVC Jacket	0.44	1.00	250	286	7.89
235SP	A	Armor 5/16 PVC Jacket	0.52	1.00	200	280	9.48
290	A	Armor 3/8 PVC Jacket	0.61	1.00	225	525	13.11
335	A	Armor 3/8 PVC Jacket	0.61	1.00	225	525	13.11
335SP	A	Armor 3/8 PVC Jacket	0.61	1.00	225	525	13.11
490S	A	Armor 1/2 PVC Jacket	0.74	1.25	250	400	17.24

Properties information is typical data only and should not be used for specification requirements.

* Crush strength test per ISO 15465-2003 Section 7.2.

Consult Sales Department for others types of covering.

Weatherized Overall Length



Cable Option - N This option for Lab-Flex® series consists of Neoprene jacket over the entire length of the cable to provide additional protection from UV, moisture and other elements encountered in outdoor applications. All connectors when mated are assured to be water tight using our “Weather Proof Sealing” Technique (Option - Z) not relying on traditional heat shrink booting.

Typical Applications:

- Outdoor Testing
- Environmental Testing
- Harsh Chemical Environments

Typical Properties (Neoprene)	
Jacket Material	Neoprene shrink tube
Temperature Rating (°C)	-75 to +200
Tensile Strength	
Heat Aging	
Heat Shock	4 HRS @ 200°C = No Dripping or Cracking
Low Temperature. Flexibility	4 HRS @ -75°C = No Cracking
Flammability	Self Extinguishing
Corrosive Effect	Non-Corrosive
Solvent Resistance	Tensile Strength = 1000 PSI
Water Absorption	
Fungus Resistance	

Meets the following specifications: MIL-I-23053/1, CLASS 1 & 2; AMS-3623; UL; MIL-R-49846, CLASS 1

Weatherized Overall Length Protective Covering (Optional)				
Cable Code	Option Code	Description	Diameter Outside	Weight lbs/100 ft
100	N	Neoprene (Shrink Tubing)	0.12	1.38
125	N	Neoprene (Shrink Tubing)	0.15	2.38
160	N	Neoprene (Shrink Tubing)	0.21	3.38
200	N	Neoprene (Shrink Tubing)	0.25	6.30
290	N	Neoprene (Shrink Tubing)	0.34	8.53
335	N	Neoprene (Shrink Tubing)	0.39	9.81

Properties information is typical data only and should not be used for specification requirements. Consult Sales Department for others types of covering.

Cable Assembly Options

Option - MC

Monocoil Overall Length



Cable Option - MC Monocoil armor is made from a flat T-304 stainless steel strip, spiral wound to form a long spring like tube. A layer of braided fiberglass is added to prevent armor tubing from stretching. The jacket is an extruded elastomer silicone rubber to prevent dirt, water and other elements from penetrating into the armor.

Typical Applications:

- Production and Lab Testing
- Environmental Testing

Monocoil Style



Typical Properties

Armor Material	Stainless Steel 304 alloy
Armor Construction	Spiral Wound Spring Tube
Inner Layer	Fiberglass Braid
Jacket Material	Extruded Elastomer Silicone Rubber
Temperature Rating (°C)	-50 to +200

Armored & Weatherized Overall Length Protective Covering (Optional)

Cable Code	Option Code	Description	Diameter Outside	Bend Radius	Break lbs/linear	Crush* lbs/inch	Weight lbs/100 ft
105	MC	SST Monocoil Armor & Jacket	0.22	0.38	-	500	2.67
160	MC	SST Monocoil Armor & Jacket	0.30	0.50	-	-	5.24
180SP	MC	SST Monocoil Armor & Jacket	0.38	0.50	-	-	6.94
200	MC	SST Monocoil Armor & Jacket	0.38	0.63	-	-	6.94
235SP	MC	SST Monocoil Armor & Jacket	0.41	0.69	-	-	7.00
290	MC	SST Monocoil Armor & Jacket	0.47	0.75	-	-	7.25

Properties information is typical data only and should not be used for specification requirements.

* Crush strength test per ISO 15465-2003 Section 7.2.

Consult Sales Department for others types of covering.

Light Gauge Armor & Weatherized Overall Length



Cable Option - MP Monocoil armor is made from a flat T-304 stainless steel strip, spiral wound to form a long spring-like tube. A polyolefin jacket (shrink tubing) is applied over the length of the stainless steel armor prevent dirt, water and other elements from penetrating into the

armor.

Typical Applications:

- Production and Lab Testing
- Environmental Testing

Monocoil Style



Typical Properties	
Armor Material	Stainless Steel 304 alloy
Armor Construction	Spiral Wound Spring Tube
Inner Layer	N/A
Jacket Material	Polyolefin shrink tube
Temperature Rating (°C)	-55 to +135

Armored & Weatherized Overall Length Protective Covering (Optional)							
Cable Code	Option Code	Description	Diameter Outside	Bend Radius	Break lbs/linear	Crush* lbs/inch	Weight lbs/100 ft
105	MP	SST Monocoil Armor & Polyolefin Jacket	0.19	0.25	N/A	500	3.09
160	MP	SST Monocoil Armor & Polyolefin Jacket	0.25	0.50	N/A	-	3.31
180SP	MP	SST Monocoil Armor & Polyolefin Jacket	0.29	0.63	N/A	-	4.41
200	MP	SST Monocoil Armor & Polyolefin Jacket	0.29	0.63	N/A	-	4.41
235SP	MP	SST Monocoil Armor & Polyolefin Jacket	0.30	0.69	N/A	-	5.51
290	MP	SST Monocoil Armor & Polyolefin Jacket	0.38	0.75	N/A	-	7.05

Properties information is typical data only and should not be used for specification requirements.

* Crush strength test per ISO 15465-2003 Section 7.2.

Consult Sales Department for others types of covering.

Cable Assembly Options

Option - D



Cable Option - D Dust caps help protect connector mating interfaces from contaminants in harsh environments when cables are not in use. They also prevent physical damage to mating pins during transportation and storage.

Typical Applications:

- Outdoor RF Communication Equipment
- Dusty Environments
- Chemical Environments

Dust Caps (Optional)		
Connector Code	Option Code	Description
SMS	D	SMA Series Connector
SMR	D	SMA Series Connector
SFBS	D	SMA Series Connector
SFS	D	SMA Series Connector
TMS	D	TNC Series Connector
TMR	D	TNC Series Connector
TFBS	D	TNC Series Connector
TFS	D	TNC Series Connector
NMS	D	Type N Series Connector
NMR	D	Type N Series Connector
NFBS	D	Type N Series Connector
NFS	D	Type N Series Connector
NFFS	D	Type N Series Connector
BMS	D	BNC Series Connector
BMR	D	BNC Series Connector
BFBS	D	BNC Series Connector
BFS	D	BNC Series Connector

*Note: Most common connector dust caps shown.
Consult Sales Department for others types of dust caps.*

Extended Boots



Cable Option - E The Extended Boot protects the cable from kinking at the cable-to-connector termination. This method uses layers of different lengths of shrink tubing. This will distribute the force applied to the cable-to-connector termination over a 3-5 inch (7-13 cm) length of cable, depending on cable diameter. This method of additional strain relief is available on all flexible cable assemblies manufactured by Florida RF Labs.

Typical Applications:

- Production and Lab Testing
- Environmental Testing

Typical Properties	
Boot Material	Includes several types of Polyolefin shrink tubing**
Temperature Rating (°C)	-55 to +110
Tensile Strength	2200 PSI
Heat Aging	168 HRS @ 175°C = 175% Elongation
Heat Shock	4 HRS @ 250°C = No Dripping or Cracking
Low Temperature. Flexibility	4 HRS @ -55°C = No Cracking
Flammability	Self Extinguishing
Corrosive Effect	Non-Corrosive
Solvent Resistance	Tensile Strength = >1500 PSI
Water Absorption	0.10%
Fungus Resistance	Non-Nutrient

**Meets the following specifications: MIL-I-23053/5 & /4; AMS-3636; AMS-3637; UL; CSA

Extended Boots (Optional)					
Cable Code	Option Code	Description	Length (Inches)		Bend Radius
			Boot A (Inner)	Boot B (Outer)	
100	E	Shrink Tube Extended Boot	2.5"	2.5"	0.5"
125	E	Shrink Tube Extended Boot	2.5"	2.5"	0.6"
160	E	Shrink Tube Extended Boot	2.5"	4.0"	0.8"
200	E	Shrink Tube Extended Boot	2.5"	4.0"	1.0"
290	E	Shrink Tube Extended Boot	4.0"	6.0"	1.5"
335	E	Shrink Tube Extended Boot	4.0"	6.0"	2.0"

Properties information is typical data only and should not be used for specification requirements. Consult Sales Department for others types of booting.

Cable Assembly Options

Option - $\pm 2.8\text{PS}$

Cable Option - $\pm 2.8\text{PS}$ The electrical length of coaxial assemblies are often required to be an exact length. The electrical length is determined by the electrical properties of the cable and its mechanical length. Florida RF Labs offers phase matching for Lab-Flex and other types of cable. There are several types of phase matching and tolerances, offered by Florida RF Labs. The most common are listed below.

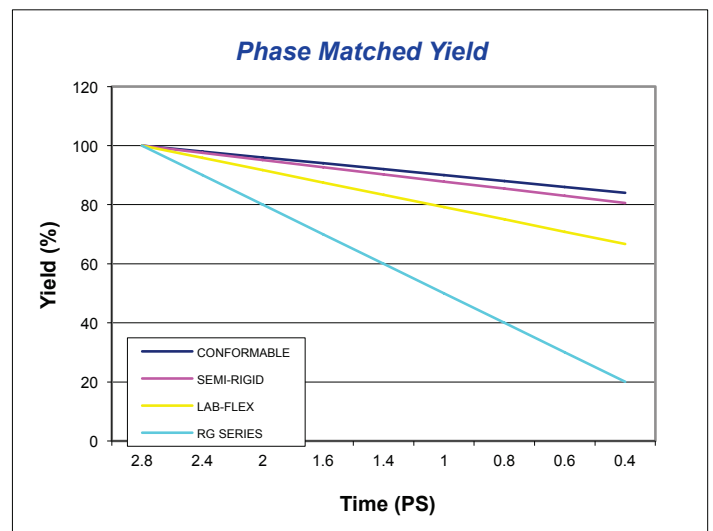
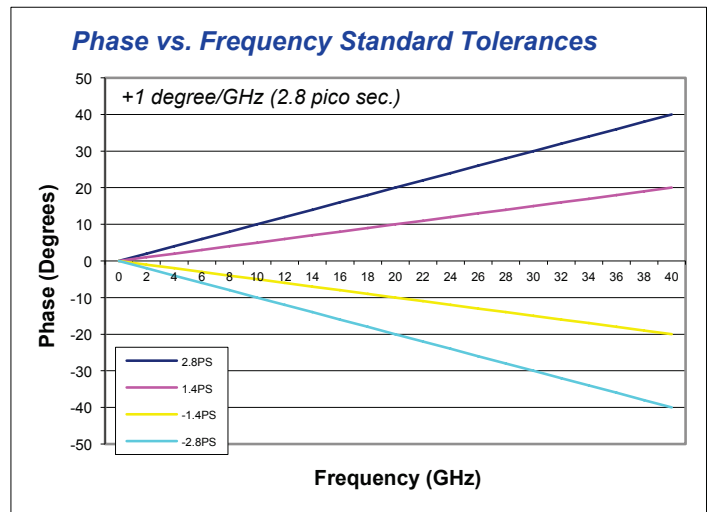
Typical Applications:

- Production and Lab Testing
- Environmental Testing
- Phase-array

- Group* - Phase matched in sets - All of the cable assemblies are matched to each other.
- Absolute** - Phase matched to an electrical length. As with a mechanical standard, this electrical length measured in degrees or time is determined by the customer or provided upon delivery by Florida RF Labs.
- Pairs** - Phase matched in pairs - Selected from large groups of phase matched assemblies.
- Standard** - Phase matched to a standard - All of the cables are matched to a standard. This standard may have been established from a previous lot or provided by the customer.
- Offset** - Phased offset matching - One or more assemblies are provided with defined phase offset as compared to other assemblies.

* Standard Phase Matching

** Custom Phase Matching, please consult sales department for more details.



Phase Matching (Optional)			
Cable Code	Option Code	Description	Other
ALL	+/-2.8PS	Phase matched in sets (Relative)	With Electrical Test Data Sheets

Consult Sales Department for others types of Phase Matching.



Cable Option - RoHS Florida RF Labs has been RoHS (European Directive for Reduction of Hazardous Substances) compliant since April 2005. RoHS compliance requires restriction of the use of Lead (Pb), Mercury (Hg), Cadmium (Cd), Hexavalent Chromium (Cr-VI), Polybrominated Biphenyls (PBB) and Polybrominated Diphenylethers (PBDE) per European Union Directive 2011/65/EU. As the RoHS compliance mandate went into effect in July 2006, Florida RF Labs would like to confirm that RoHS compliant parts are available across the entire product portfolio.

Florida RF Labs' RoHS compliant products allow for both tin/lead and lead free solder attachment methods. Where solder is required for assembly of final product, RoHS compliant solders will be used. Products are qualified RoHS compliant in accordance with IPC and JEDEC industry standards. Qualification tests have been performed in accordance with our ISO 9001 certification. This certification signifies that parts meet an internally acceptable set of quality standards. All products that ship as RoHS compliant will be labeled as such on the packaging.



Cable Length Definition and Tolerances

Cable Length Definition

The cable length is defined by the length as measured between the following:

Straight Connectors - From reference plane per M39012. If the connector is not covered in this Mil-Spec, the reference plane is per the connector manufacturer.

Right Angle Connectors - From center line of the inner contact of connector.

Bulkhead - From inside mounting flange of connector.

Cable Length Tolerance (Standard)

Standard Length (inches)			Finished Length Tolerance (inches)
6.0	to	11.9	+0.25, -0.0
12.0	to	23.9	+0.5, -0.0
24.0	to	119.9	+1.0, -0.0
120.0	to	167.9	+2.0, -0.0
168.0	to	215.9	+2.5, -0.0
216.0	to	299.9	+3.0, -0.0
300.0	to	599.9	+6.0, -0.0
600.0	to	UP	+10.0, -0.0

Tighter cable length tolerance can be provided at additional cost.

Tightest tolerance available:

Semi-Rigid/Conformable/BJ under 24 inches: ± 0.030

Flexible under 24 inches: ± 0.075

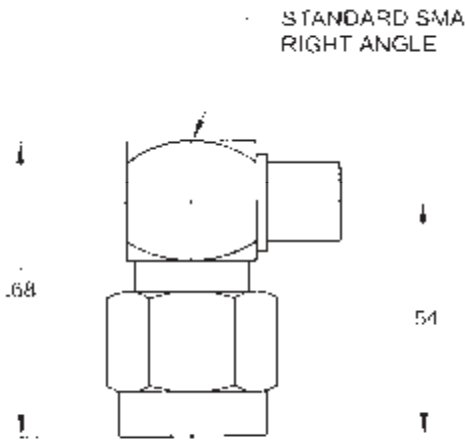
Note: A tightly controlled length does not assure that the phase will also be controlled (see Phase Matching Option).

Application Notes

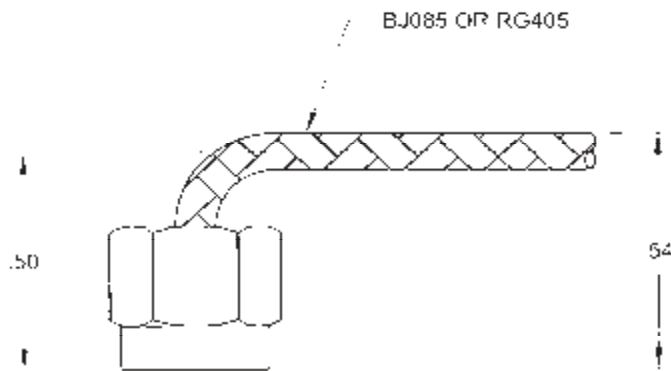
Cable Pre-Formed Right Angle

SMA Right Angles

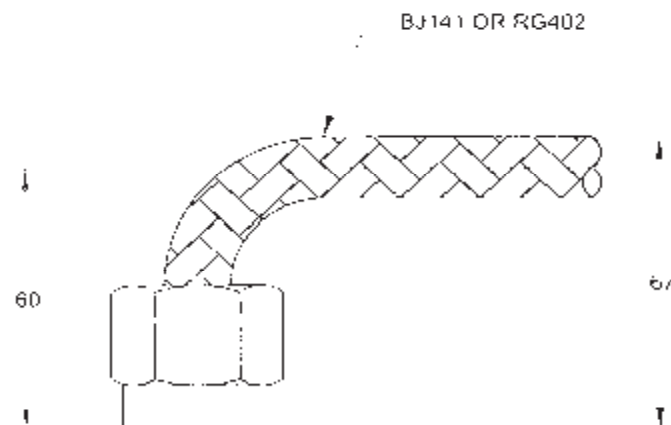
Using either Semi-Rigid or Conformable® cable, Florida RF Labs can pre-bend the cable to form a right angle prior to soldering a low profile SMA plug onto the cable. The cable must be formed before the connector is soldered on in order to prevent any weakening or damage to the solder joint. The electrical performance of the pre-form is better than a swept or cubed right angle connector, and in most cases, is more cost effective.



*Standard right angle connector (SMR)
DC to 12.4 GHz - VSWR 1.35 Typical*



*SMSR for 085 cable
DC to 18.0 GHz - VSWR 1.30 Typical*



*SMSR for 141 cable
DC to 18.0 GHz - VSWR 1.23 Typical*

Conformable® is a registered trademark of Belden

Florida RF Labs offers a wide range of connectors. Listed below are some of the most commonly used connectors with their product codes and part numbers for ordering. If you can not find the connector type you need, please consult the sales department.

Series	Gender		Type	Max Freq.	Code
PRECISION HIGH FREQUENCY					
2.4 mm	Plug	(Male)	Straight	50 GHz	MMS
2.4 mm	Bulkhead	(Female)	Straight	50 GHz	MFBS
2.4 mm	Jack	(Female)	Straight	50 GHz	MFS
2.4 mm	Plug	(Male)	Right angle	40 GHz	MMR
GPPO (SMPM)	Bulkhead	(Female)	Straight	50 GHz	SMPMFBS
GPPO (SMPM)	Jack	(Female)	Straight	50 GHz	SMPMFS
GPPO (SMPM)	Jack	(Female)	Right angle	50 GHz	SMPMFR
2.9 mm	Plug	(Male)	Straight	40 GHz	KMS
2.9 mm	Plug	(Male)	Right angle	40 GHz	KMR
2.9 mm	Bulkhead	(Female)	Straight	40 GHz	KFBS
2.9 mm	Jack	(Female)	Straight	40 GHz	KFS
GPO™ (SMP)	Plug	(Male)	Straight	40 GHz	SMPMS
GPO™ (SMP)	Bulkhead	(Female)	Straight	40 GHz	SMPFBS
GPO™ (SMP)	Jack	(Female)	Straight	40 GHz	SMPFS
GPO™ (SMP)	Jack	(Female)	Flange	40 GHz	SMPFF
GPO™ (SMP)	Jack	(Female)	Right angle	40 GHz	SMPFR
3.5 mm	Plug	(Male)	Straight	35 GHz	3MS
3.5 mm	Bulkhead	(Female)	Straight	35 GHz	3FBS
3.5 mm	Jack	(Female)	Straight	35 GHz	3FS
STANDARD					
7 mm (APC7)	N/A	N/A	Straight	18 GHz	A7
SMA	Plug	(Male)	Straight	18 GHz	SMS
SMA	Plug	(Male)	Right angle	18 GHz	SMR
SMA	Bulkhead	(Female)	Straight	18 GHz	SFBS
SMA	Jack	(Female)	Straight	18 GHz	SFS
TNC	Plug	(Male)	Straight	18 GHz	TMS
TNC	Plug	(Male)	Right angle	18 GHz	TMR
TNC	Bulkhead	(Female)	Straight	18 GHz	TFBS
TNC	Jack	(Female)	Straight	18 GHz	TFS
TYPE N	Plug	(Male)	Straight	18 GHz	NMS
TYPE N	Plug	(Male)	Right angle	18 GHz	NMR
TYPE N	Bulkhead	(Female)	Straight	18 GHz	NFBS
TYPE N	Jack	(Female)	Straight	18 GHz	NFS
TYPE N	Jack	(Female)	Flange	18 GHz	NFFS
BNC	Plug	(Male)	Straight	4 GHz	BMS
BNC	Plug	(Male)	Right angle	4 GHz	BMR
BNC	Bulkhead	(Female)	Straight	4 GHz	BFBS
BNC	Jack	(Female)	Straight	4 GHz	BFS
PKZ	Plug	(Male)	Straight	32 GHz	PKZMS
PKZ	Bulkhead	(Female)	Straight	32 GHz	PKZFBS
PKZ	Jack	(Female)	Straight	32 GHz	PKZFS

VSWR 1.45 max DC to Max Frequency.

Gender of the connector is determined by center pin.

Application Notes

Connector Product Codes

Series	Gender	Type	Max Freq.	Code
SUB-MINIATURES				
SSMA	Plug (Male)	Straight	34 GHz	SSMS
SSMA	Jack (Female)	Straight	34 GHz	SSFS
SSMA	Plug (Male)	Right Angle	34 GHz	SSMR
MCX	Plug (Male)	Straight	6 GHz	MCXMS
MCX	Plug (Male)	Right Angle	6 GHz	MCXMR
MCX	Bulkhead (Female)	Straight	6 GHz	MCXFBS
MCX	Jack (Female)	Straight	6 GHz	MCXFS
MMCX	Plug (Male)	Straight	6 GHz	MMCXMS
MMCX	Plug (Male)	Right Angle	6 GHz	MMCXMR
MMCX	Bulkhead (Female)	Straight	6 GHz	MMCXFBS
MMCX	Jack	Straight	6 GHz	MMCXFS
SMC	Plug (Male)	Straight	10 GHz	SMCMS
SMC	Plug (Male)	Right Angle	10 GHz	SMCMR
SMC	Jack (Female)	Right Angle	10 GHz	SMCFR
SMC	Jack (Female)	Straight	10 GHz	SMCFS
SMB	Plug (Male)	Straight	4 GHz	SMBMS
SMB	Plug (Male)	Right Angle	4 GHz	SMBMR
SMB	Jack (Female)	Straight	4 GHz	SMBFS
SMB	Jack (Female)	Right Angle	4 GHz	SMBFR
OTHERS				
7/16 DIN	Plug (Male)	Straight	7.5 GHz	7/16MS
7/16 DIN	Plug (Male)	Right Angle	7.5 GHz	7/16MR
7/16 DIN	Bulkhead (Female)	Straight	7.5 GHz	7/16FBS
7/16 DIN	Jack (Female)	Straight	7.5 GHz	7/16FS
OSSP (BMMA)	Plug (Male)	Straight	28 GHz	OSSPMS
OSSP (BMMA)	Bulkhead (Female)	Straight	28 GHz	OSSPFBS
OSSP (BMMA)	Jack (Female)	Straight	28 GHz	OSSPFS
OSP (BMA)	Plug (Male)	Straight	22 GHz	BMAMS
OSP (BMA)	Jack (Female)	Straight	22 GHz	BMAFS
OSP (BMA)	Bulkhead (Female)	Straight	22 GHz	BMAFBS
SC	Plug (Male)	Straight	10 GHz	SCMS
SC	Bulkhead (Female)	Straight	10 GHz	SCFBS

VSWR 1.45 max DC to Max Frequency.

Gender of the connector is determined by center pin.

Material and Plating

Standard material for high performance connectors is stainless steel, passivated. Gold plated stainless steel is also available in most cases. Many low frequency or low cost connectors are available in brass with gold, nickel or tri-metal plating.

Passive Intermodulation Concerns

To reduce problems with intermodulation distortion, Florida RF Labs offers connectors with silver or tri-metal plating (no nickel) on brass bodies. They can be used with cables that have silver plated copper center and outer conductors.

Interseries Mating of Precision Connectors

The five connectors listed here will inter-mate since they all have 0.036 inch diameter mating contacts and a common coupling nut size. Mechanical properties of these five connectors are shown below:

Mechanical Properties of 0.036 Diameter Center Conductor Connectors

Connector	Center Diameter inches (mm)	Center Length inches (mm)	Dielectric	Inner Diameter of Connector Body inches (mm)
SMA	0.036 (0.91)	0.100 (25.4)	PTFE (Teflon)	0.161 (4.1)
3.5mm	0.036 (0.91)	0.065 (1.65)	Air	0.138 (3.5)
2.9mm (K)	0.036 (0.91)	0.065 (1.65)	Air	0.115 (2.9)
K-Compatible (used on K-Jumper)	0.036 (0.91)	0.065 (1.65)	PTFE (Teflon)	0.138 (3.5)
SMA Point & Face (used on BJ141 cable)	0.036 (0.91)	0.065 (1.65)	PTFE (Teflon)	0.138 (3.5)

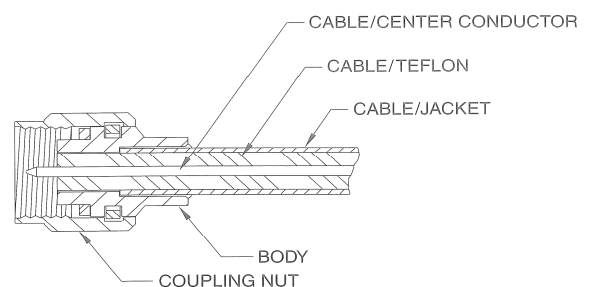
The differences between the 5 connectors are the length of the mating contact, the dielectric material, and the inside diameter of the connector body. The standard SMA plug has a mating contact up to 0.100 inches long, which can engage the female contact before the connector bodies align the contacts and damage the female contact.

The K-Compatible and the SMA Point and Face both use a mating contact length of 0.065 inches that prevents damage to the female contact.

Electrical Properties of 0.036 Diameter Center Conductor Connectors

Connector Mating	Typical Match in dB (Return Loss)	Electrical Mating Comments
SMA to SMA	20-25 dB @ 18 GHz	Fair
SMA to 3.5mm	22-27 dB @ 18 GHz	Good
SMA to 2.9mm	24-29 dB @ 18 GHz	Excellent
SMA to K-Jumper	22-27 dB @ 18 GHz	Good
SMA to SMS-BJ141	22-25 dB @ 18 GHz	Fair
3.5mm to 3.5mm	20-25 dB @ 18 GHz	Fair
3.5mm to 2.9mm	20-24 dB @ 18 GHz	Fair
3.5mm to K-Jumper	20-24 dB @ 18 GHz	Fair
3.5mm to SMS-BJ141	19-23 dB @ 18 GHz	Fair
2.9mm to 2.9mm	21-24 dB @ 18 GHz	Good
2.9mm to K-Jumper	20-24 dB @ 18 GHz	Fair
2.9mm to SMS-BJ141	19-23 dB @ 18 GHz	Fair

Point and Face Design



Both the K-Jumper and SMS-BJ141 use the center conductor of the cable as the male contact. The cable center conductor has a 0.036 inch diameter; the conductor is cut and pointed to a length of 0.065 inches to form the connector contact. The cable jacket stops midway through the connector body and is soldered in place. The cable used in the K-Jumper and SMS-BJ141 assemblies have a stable dielectric, which resists dielectric growth under temperature extremes.

The K-Compatible connectors used in K-Jumper assemblies are designed to mate with 2.9mm and 3.5mm connectors. The frequency limit of the K-Jumper is the cutoff frequency of the cable, 35.5 GHz.

Application Notes

Care and Handling

Connector Interfaces:

Interface Cleanliness - Clean Interfaces prolong connector life and produce more accurate, repeatable measurements. The use of connector end-caps to protect the cables and adapters when not in use is recommended.

Interface Cleaning Procedure:

- 1. Solvents:** Connector Insulators, support beads, and seals are susceptible to solvent damage. Solvents can produce permanent physical and electrical damage. Isopropyl alcohol is recommended for cleaning interfaces. It should be noted that connector interfaces should not be immersed in solvents of any kind because solvents can become trapped within the connectorized assembly. Trapped fluids can cause SWR, Phase, and Insertion Loss problems.
- 2. Applicators:** Fibrous or Abrasive applicators can contaminate and even damage interface surfaces. Clean, lint free swabs should be used. They need to be sharp and hard enough to remove dirt and debris without damaging surfaces and/or dislodging center pins.
- 3. Method:** Dip a clean, lint free swab in clean isopropyl alcohol. Press excess alcohol out of swab on a clean, lint free towel. Wipe the interface components as required to clean the interface. Blow-dry the interface with clean compressed air. Re-inspect the connector to verify that the interface is clean and ready for additional inspection procedures and interface gauging prior to use.

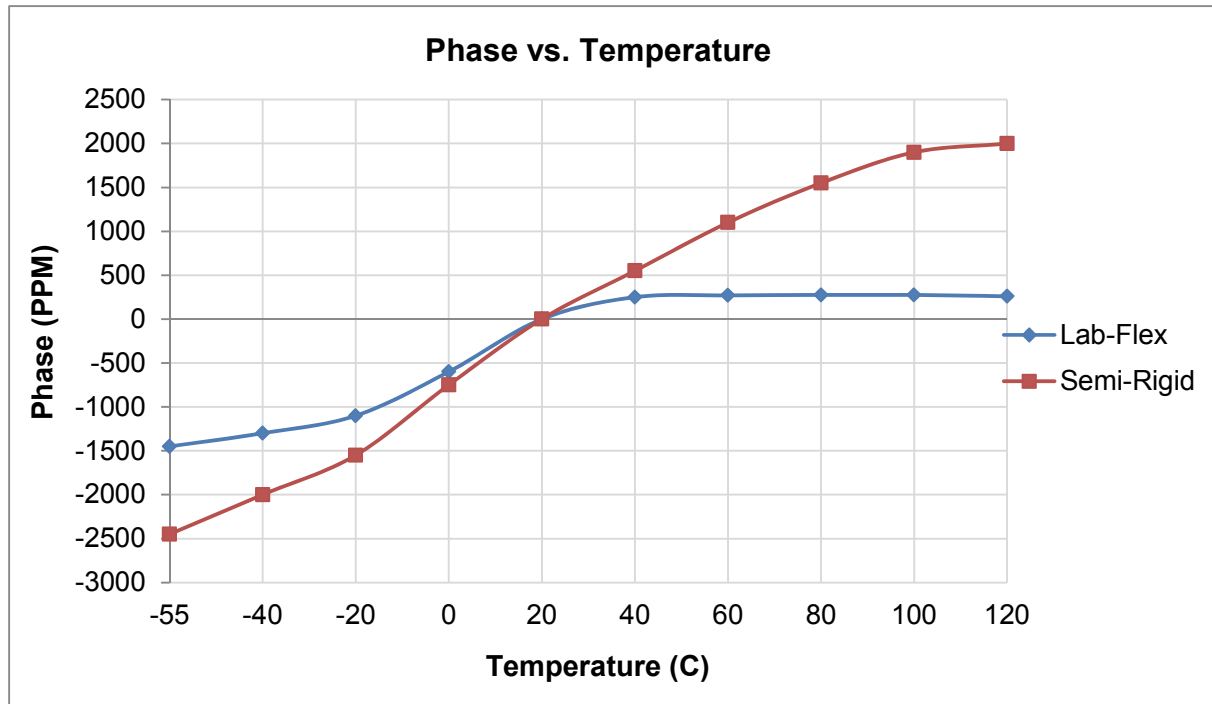
Interface Gauging:

Incorrect center pin depths can produce inaccurate measurements and in the case of protruding center pins can damage test devices, adapters, and test ports. Frequent interface gauging can detect problems before they ruin mating devices (see Table I for connector interface pin depths).

Table I: Connector Interface Pin Depths

Connector Interface	Reference Plane (in)	Specification
7mm	1	IEEE STD 287
N Male	0.210/-0.230	MIL-STD-348
N Female	0.903381643	MIL-STD-348
3.5mm	0/-0.003	IEEE STD 287
2.92mm	0/-0.003	IEEE STD 287
2.4mm	0/-0.002	IEEE STD 287
1.85mm	0/-0.002	IEEE STD 287
SMA	0/-0.010	MIL-STD-348
TNC / BNC	0.913043478	MIL-STD-348
TNC / BNC	0.902912621	MIL-STD-348
7/16 Male	0.830703013	IEC 169-4
7/16 Female	0.855214724	IEC 169-4

Typical Phase Stability versus Temperature



PPM Calculations

The electrical phase length of any coaxial cable will change over temperature.

To calculate the expected phase change of a Lab-Flex cable for any given temperature ranges use the following method.

Example: Calculate the phase change of a 120 inch long Lab Flex assembly at -30°C at 10 GHz.
 EI @ 10 GHz = 46,585.90
 PPM @ -30 = -1180
 $(EI \times PPM) / 1,000,000 = -54.97136$ degrees of change @ -30 Celsius

Materials Abbreviations

CONDUCTORS & BRAID MATERIALS		
AL	Aluminum	per MIL-C-17
BC	Bare Copper	per MIL-C-17
BeCu	Beryllium-Copper Alloy 172	per MIL-C-17
BCCAI	Bare Copper Clad Aluminum	per MIL-C-17
CCS	Bare Copper Clad Steel	per MIL-C-17
GS	Galvanized Steel	per MIL-C-17
HR	High Resistance Wire	per MIL-C-17
MW	Magnet Wire	per MIL-C-17
NC	Nickel Covered Copper	per MIL-C-17
SA	Silver Covered Alloy	per MIL-C-17
SC	Silver Covered Copper	per MIL-C-17
SCBeCu	Silver Covered Beryllium Copper	per MIL-C-17
SCCadBr	Silver Covered Cadmium Bronze	per MIL-C-17
SCCA	Silver Covered Copper Clad Aluminum	per MIL-C-17
SCCS	Silver Covered Copper Clad Steel	per MIL-C-17
SNCCS	Silver Covered Nickel Covered Copper Clad Steel	per MIL-C-17
SCS	Silver Covered Copper Strip	per MIL-C-17
TC	Tinned Copper	per MIL-C-17
TCCS	Tinned Copper Clad Steel	per MIL-C-17
DIELECTRIC MATERIALS		
PE	Solid Low Density Polyethylene	per MIL-C-17
PTFE	Solid Polytetrafluoroethylene	per MIL-C-17
LDTFE	Low Density PTFE	per MIL-C-17
Foam PE	Gas Injected Foam PE	per MIL-C-17
FEP	Solid Fluorinated Ethylene Propylene	per MIL-C-17
CPT	Conductive PTFE	per MIL-C-17
CPE	Conductive Polyethylene	Type A-5 per MIL-C-170
Rubber	per MIL-C-17 (obsolete)	per MIL-C-17
MGO	Magnesium Oxide	per MIL-C-17
INTERLAYER MATERIALS		
PE	Solid Polyethylene	per MIL-C-17
PTFE	Solid Polytetrafluoroethylene	per MIL-C-17
MY	Polyester	per MIL-C-17
KP	Polyimide	per MIL-C-17
ALMY	Aluminum-Polyester Laminate	per MIL-C-17
ALKP	Aluminum-Polyimide Laminate	per MIL-C-17
CPC	Copper-Polyester-Copper Laminate	per MIL-C-17
JACKET MATERIALS		
E-CTFE	Ethylene Chlorotrifluoroethylene	Type XI per MIL-C-17
ETFE	Ethylene Tetrafluoroethylene Copolymer	Type X per MIL-C-17
FEP	Fluorinated Ethylene Propylene	Type IX per MIL-C-17
FG Braid	Fiberglass; Impregnated	Type V per MIL-C-17
PE	Clear Polyethylene	Type III per MIL-C-17
LS/LT	Low Smoke/Low Toxicity	(XLPE)
PE	Polyethylene, black HMW	Type IIIA per MIL-C-17
PFA	Perfluoroalkoxy	Type-XIII per MIL-C-17
PTFE	Polytetrafluoroethylene	Type VIIA per MIL-C-17
PUR	Polyurethane, black	Type XII per MIL-C-17
PVC-I	Polyvinyl Chloride, black (contaminating)	Type I per MIL-C-17
PVC-II	Polyvinyl Chloride, grey (non-contaminating)	Type II per MIL-C-17
PVC-IIA	Polyvinyl Chloride, black (non-contaminating)	Type IIA per MIL-C-17
Rubber	Obsolete	per MIL-C-17
SIL/DAC	Dacron Braid over Silicone Rubber	Type VI per MIL-C-17
TPE	Thermo Plastic Elastomer	
XLPE	Cross linked Polyolefin	Type XIV per MIL-C-17

Florida RF Labs offers a line of **coaxial components** that are rugged, versatile and complement our cable assembly line up. We offer coaxial fixed and temperature variable attenuators along with coaxial termination and coaxial remote termination.

Features

- Excellent high frequency and wideband performance
- Robust construction - shock and vibration resistant
- Products available for small signal and high power applications
- Superior attenuation accuracy and VSWR from DC to 40 GHz
- Terminations available with SMA, 3.5 and 2.9 mm interfaces
- High reliability for military and space applications



Coaxial Attenuators

Our line of precision coaxial attenuators is usable for power applications up to 2 watts. The rugged construction of the device ensures reliability and continuous performance. The standard connector is SMA M/F with other connectors available upon request.

Coaxial Thermopads®

Our line offers the popular temperature variable attenuator in a coaxial package. The coaxial Thermopad offers the same benefits as the standard temperature variable attenuator with the added benefit of a SMA plug to SMA jack interface from DC to 20 GHz.

Coaxial Terminations

Florida RF Labs/EMC Technology has a complete series of SMA, 3.5mm and 2.9mm interface compatible coaxial terminations. Some designs are specifically suited for narrow or wide band applications. These terminations have low VSWR, and operate at frequencies from DC to 26.5 GHz. They are ideal for both laboratory measurements and system use.

Coaxial Remote Terminations

For applications where a high power termination is required to be remotely located, the 12-5000 series of Coaxial Remote Terminations feature integral coaxial cable inputs. They also offer ultra-low VSWR. These devices decrease the number of interconnections in your system at reduced cost over a discrete cable and termination or attenuator approach.

Coaxial Components

Coaxial Fixed Attenuators

Our line of precision coaxial attenuators offer an easy to use attenuation solution for applications with up to 2 watts of input power. The rugged construction of the device ensures reliability and uninterrupted high performance with operating frequencies up to 40 GHz.

Features

- Rugged Construction
- Excellent Performance
- Value Pricing
- Subsystem Connector Interface
- SMA & 2.92mm



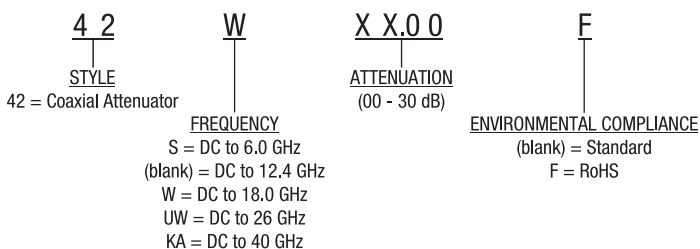
General Specifications

Impedance	Power	Operating Temp.	Pins	Body & Nut
50 Ohms	2 Watts	-55°C to +150°C	Beryllium Copper, Gold Plated	Stainless Steel, Passivated

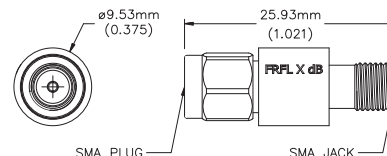
Series Specifications

Series	Frequency Range	Connector	VSWR (Max)
42S	DC to 6.0 GHz	SMA Male/Female	1.35
42	DC to 12.4 GHz	SMA Male/Female	1.30
42W	DC to 18.0 GHz	SMA Male/Female	1.35
42UW	DC to 26 GHz	SMA Male/Female	1.50
42KA	DC to 40 GHz	2.92 Male/Female	1.40

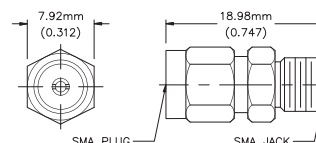
Part Numbering Code



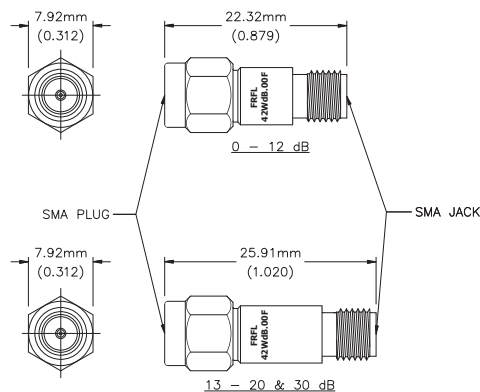
42S Series



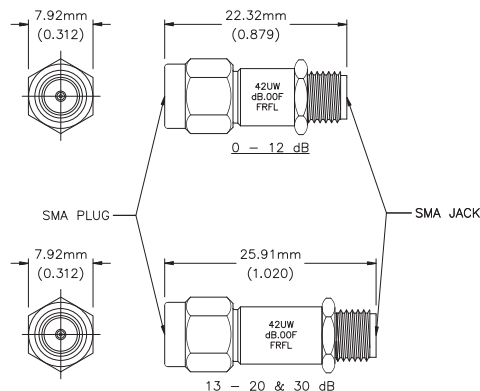
42 Series



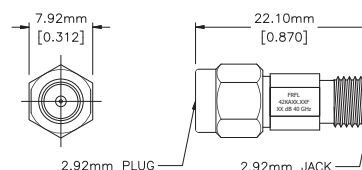
42W Series



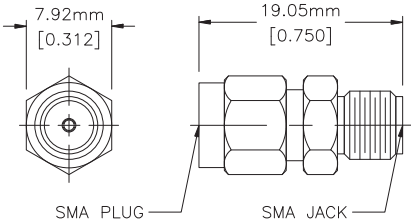
42UW Series



42KA Series



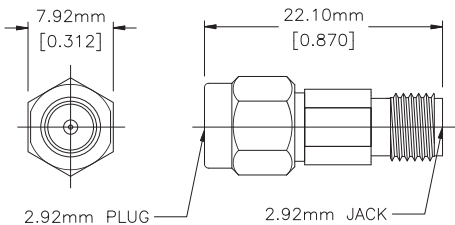
42TVA Series - 6 GHz



Combining EMC Technology components with Florida RF Labs connector expertise to offer the popular temperature variable attenuator in a coaxial package. The coaxial Thermopad® offers the same benefits as the standard temperature variable attenuator with the added benefit of a coaxial package.



42WTVA Series - 20 GHz

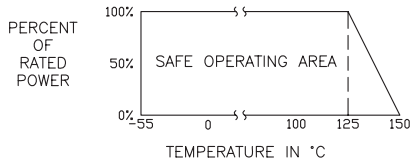


Specifications 42TVA

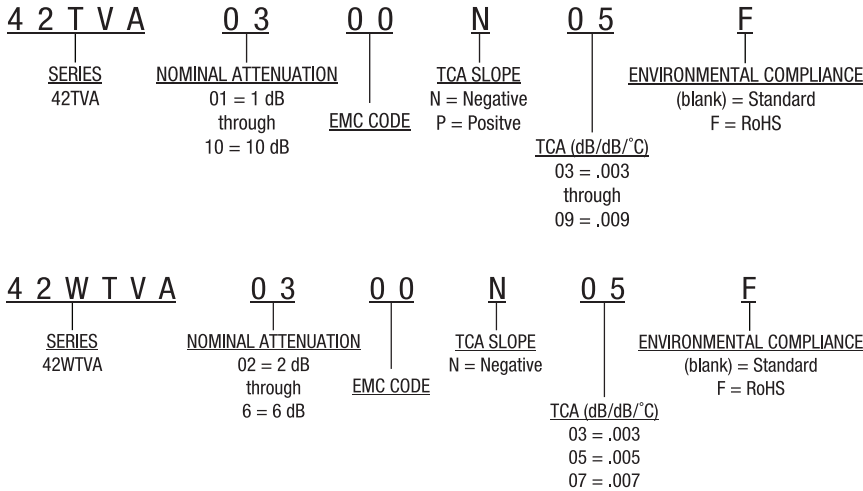
42WTVA

Size	19.05 mm x 7.92 mm [0.750 in x 0.312 in]	22.10 mm x 7.92 mm [0.870 in x 0.312 in]
Impedance	50 Ohms	50 Ohms
Frequency Range	DC to 6 GHz	DC to 20 GHz
TCA Tolerance	±0.001 dB/dB/°C	±0.001 dB/dB/°C
VSWR (Typical)	1.35 @ 1 GHz	1.25 @ 1 GHz
Power Rating	2.0 Watts	0.2 Watts
Operating Temperature	-55°C to 150°C	-55°C to 150°C
Substrate	Alumina	Alumina
Resistive Material	Thick Film	Thick Film
Terminal Material	Plated Thick Film	Plated Thick Film
Body and Nut	Stainless Steel	Stainless Steel
Contact	Beryllium Copper	Beryllium Copper
Dielectric	Tetrafluoroethylene	Tetrafluoroethylene
Interface	SMA Male/ SMA Female	2.92mm Male/ 2.92mmFemale
Body	Passivated	Passivated

Power Rating and Derating



Part Numbering Code



Coaxial Components

Coaxial Terminations

Attenuators aren't the only products where we have combined EMC Technology components with Florida RF Labs connector expertise! We also offer a complete series of SMA, 3.5 mm and 2.9 mm interface compatible coaxial terminations. Some designs are specifically suited for narrow or wide band applications. These terminations have low VSWR, and operate at frequencies from DC to 26.5 GHz. They are ideal for both laboratory measurements and system use.



Specifications

Impedance	50 Ohms
Connector	SMA, 3.5mm, 2.9mm
Frequency Range	DC to 26.5 GHz
Power	0.5 to 3 Watts
Power Rating	100% @ 100°C
Derates to	0% @ 150 °C
Operating Temperature	-55 °C to 150 °C
Resistor	Thin Film
Substrate	BeO or Alumina
Body & Coupling Nut Material	Stainless Steel
Body & Coupling Nut Finish	Passivated
Contact	Beryllium Copper
Contact Finish	Gold

Part Numbering Code

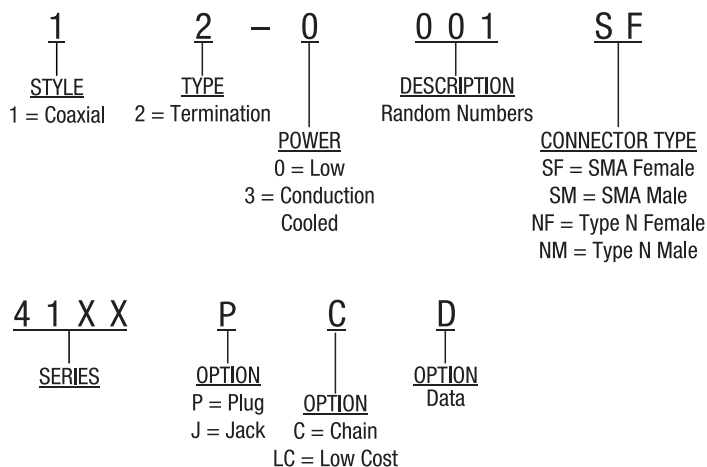


Figure 1 - SMA Plug/Male

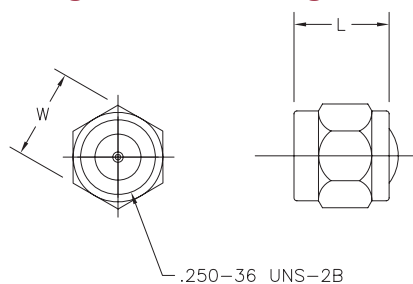


Figure 2 - SMA Jack/Female

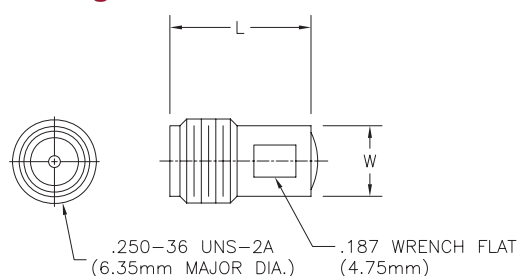


Figure 3 - SMA Jack/Female

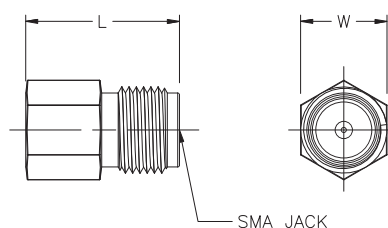


Figure 4 - High Power SMA

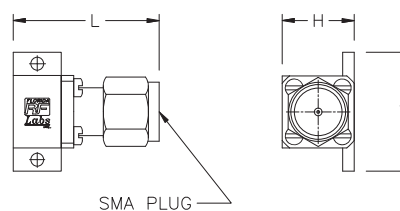


Figure 4a

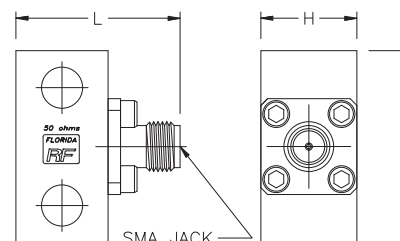


Figure 4b

Low Power

Part Series #	Power (Watts)	Substrate	Max Freq (GHz)	VSWR Max:1	L		W		Figure #
					mm [inches]				
12-0001*	1.0	Alumina	18.0	1.15	8.89	[0.350]	7.92	[0.312]	1
12-0002*	1.0	Alumina	26.5	1.10	8.89	[0.350]	7.92	[0.312]	1
12-0006*	0.5	Alumina	12.4	1.17	13.33	[0.525]	7.92	[0.312]	1
12-0007*	0.5	Alumina	6.0	1.10	8.89	[0.350]	7.92	[0.312]	1
12-0008*	1.0	Alumina	18.0	1.30	8.89	[0.350]	7.92	[0.312]	1
12-0009*	3.0	BeO	18.0	1.20	13.33	[0.525]	7.92	[0.312]	1
12-0028*	1.0	Alumina	2.0	1.10	8.89	[0.350]	7.92	[0.312]	1
12-0101*	1.0	Alumina	18.0	1.15	13.33	[0.525]	7.92	[0.312]	2
12-0102*	1.0	Alumina	26.5	1.10	13.33	[0.525]	7.92	[0.312]	2
4110J	2.0	Alumina	18.0	1.20	11.30	[0.445]	6.35	[0.250]	3
4111P	2.0	Alumina	18.0	1.15	12.70	[0.500]	7.92	[0.312]	1
4111PCD	2.0	Alumina	18.0	1.10	12.70	[0.500]	7.92	[0.312]	1
4112P	1.0	Alumina	18.0	1.25	8.38	[0.330]	7.92	[0.312]	1
4112PLC	1.0	Alumina	2.5	1.05	8.38	[0.330]	7.92	[0.312]	1
4113P	1.0	Alumina	18.0	1.15	8.38	[0.330]	7.92	[0.312]	1
4113PCD	1.0	Alumina	18.0	1.10	8.38	[0.330]	7.92	[0.312]	1

Peak power is typically 10 times the max power rating with a 1% duty cycle and 10 microsecond pulse width.

Please call for your specific application

“*” is a place holder. See part number configurations to complete the part number.

Conduction Cooled

Part Series #	Power (Watts)	Substrate	Max Freq (GHz)	VSWR Max:1	L		W		H		Figure #
					mm [inches]						
12-3001*	15.0	BeO	18.0	1.20	6.35	[0.250]	15.75	[0.620]	9.53	[0.375]	4
12-3002*	15.0	BeO	18.0	1.30	12.19	[0.480]	25.40	[1.000]	12.70	[0.500]	4
12-3005*	50.0	BeO	6.0	1.35	34.93	[1.375]	24.38	[0.960]	14.22	[0.560]	4
12-3007*	100.0	BeO	3.0	1.25	34.93	[1.375]	24.38	[0.960]	14.22	[0.560]	4
12-3022*	25.0	BeO	18.0	1.25	17.27	[0.680]	22.23	[0.875]	12.70	[0.500]	4

Peak power is typically 10 times the max power rating with a 1% duty cycle and 10 microsecond pulse width.

Please call for your specific application

“*” is a place holder. See part number configurations to complete the part number.



Coaxial Components

Adapters



Florida RF Labs coaxial adapters feature rugged stainless steel construction and precision machining for reliable and repeatable connections. Adapters are available as in-series and between-series options in Type N, TNC, SMA, 2.92mm and 2.4mm.

In-Series Adapters

Part Number	Connector 1	Connector 2	Frequency Range	VSWR
SMS-SMS	SMA Male	SMA Male	DC - 18 GHz	1.15:1 Max
SFS-SFS	SMA Female	SMA Female	DC - 18 GHz	1.15:1 Max
SMS-SFS	SMA Male	SMA Male	DC - 18 GHz	1.15:1 Max
NMS-NMS	Type N Male	Type N Male	DC - 18 GHz	1.12:1 Max
NFS-NFS	Type N Female	Type N Female	DC - 18 GHz	1.12:1 Max
NMS-NFS	Type N Male	Type N Female	DC - 18 GHz	1.12:1 Max
KMS-KMS	2.92mm Male	2.92mm Male	DC - 40 GHz	1.25:1 Max
KFS-KFS	2.92mm Female	2.92mm Female	DC - 40 GHz	1.25:1 Max
KMS-KFS	2.92mm Male	2.92mm Female	DC - 40 GHz	1.25:1 Max
MMS-MMS	2.4mm Male	2.4mm Male	DC - 50 GHz	1.30:1 Max
MFS-MFS	2.4mm Female	2.4mm Female	DC - 50 GHz	1.30:1 Max
MMS-MFS	2.4mm Male	2.4mm Female	DC - 50 GHz	1.30:1 Max

Between Series Adapters

Part Number	Connector 1	Connector 2	Frequency Range	VSWR
SMS-NFS	SMA Male	Type N Female	DC - 18 GHz	1.25:1 Max
NMS-SFS	Type N Male	SMA Female	DC - 18 GHz	1.25:1 Max
TMS-SMS	TNC Male	SMA Male	DC - 18 GHz	1.25:1 Max

Circulators and Isolators



Joining the EMC Technology and Florida RF Labs family in 2014, Trak Microwave Limited in Dundee, UK brings an excellent portfolio of coaxial components and five decades of experience in providing highly sophisticated technical solutions for a wide variety of applications.

Coaxial Circulators and Isolators

- Custom and standard products covering 400 MHz to 26 GHz with in line or orthogonal interfaces
- Compact & rugged, vibration qualified up to +150g_{rms}
- Wideband solutions support up to 100% fractional bandwidth
- Standard interfaces include SMA & TNC
- Low to high power handling (up to 5 kW peak and 500 W average)
- Most feature TRAK's unique "Solid" interconnect machined as part of the stainless steel housing.
- Optional extended barrel length
- Designs can be mounted on either face
- Magnetically shielded, rugged solid body construction with excellent EMC available for space and defence applications
- Extensive space heritage – from near earth orbit to planetary exploration
- Termination options include bulk absorber, ceramic resistives, and Diamond Rf Resistives®
- Devices available over extended operating temperature ranges

Typical Performance

Isolator / Circulator Operating Bands [GHz]	Typical Performance IL / Isolation / Return Loss [dB]
0.95 to 1.225	0.50 / 18.0 / 18.0
1.0 to 1.1	0.40 / 20.0 / 20.0
1.0 to 1.2	0.40 / 20.0 / 20.0
2.7 to 3.1	0.50 / 20.0 / 20.0
3.7 to 4.2	0.30 / 23.0 / 23.0
4.4 to 4.8	0.30 / 23.0 / 23.0
5.0 to 10.0	0.50 / 18.0 / 18.0
5.2 to 5.9	0.30 / 23.0 / 23.0
5.9 to 6.5	0.50 / 20.0 / 20.0
6.5 to 7.2	0.50 / 20.0 / 20.0
6.0 to 18.0	0.70 / 11.0 / 11.0
8.0 to 10.0	0.30 / 23.0 / 23.0
8.0 to 16.0	0.50 / 18.0 / 18.0
10.0 to 12.0	0.50 / 20.0 / 20.0
10.0 to 15.0	0.50 / 20.0 / 20.0
10.7 to 12.8	0.30 / 23.0 / 23.0
12.0 to 18.0	0.50 / 18.0 / 18.0
12.7 to 14.5	0.30 / 23.0 / 23.0
15.0 to 18.0	0.50 / 21.0 / 21.0
18.0 to 20.0	0.30 / 23.0 / 23.0
18.0 to 26.5	0.70 / 13.0 / 13.0
18.0 to 22.0	0.50 / 18.0 / 18.0
20.0 to 22.0	0.30 / 23.0 / 23.0

Coaxial Components

Coaxial to Waveguide Transitions



Coaxial to Waveguide Transitions Iso-adapters

- A broad range of components and capability to transition from coaxial to waveguide interfaces, ranging from 1 to 46 GHz with in-line or orthogonal interfaces
- Isolating and non-isolating architectures available
- Standard coaxial interfaces ranging from SMA to 2.4 mm (male or female).
- Low & high power designs available with standard and custom flanges
- Mass-minimized Aluminum housing with chemical conversion or silver-plated finish.
- Full WG band operation available.
- Standard and reduced height waveguide
- Substantial experience and heritage in all markets including space, avionics, satcom and radar.

Typical Configurations and Performance

WAVEGUIDE TRANSITIONS		
Operating Freq [GHz]	Typical IL / Return Loss [dB]	Interfaces
1.2 to 1.4	0.15 / 23.0	WR650 to TNC, 7/16", SMA
2.7 to 3.3	0.15 / 23.0	WR284 to TNC, 7/16", SMA
3.4 to 4.2	0.15 / 23.0	WR229 to TNC, 7/16", SMA
5.4 to 5.9	0.15 / 23.0	WR187 to TNC, 7/16", SMA
5.9 to 6.5	0.15 / 23.0	WR137 to TNC/SMA
6.4 to 7.1	0.15 / 23.0	WR137 to TNC/SMA
8.0 to 10.0	0.15 / 23.0	WR90 to SMA
10.7 to 12.8	0.15 / 23.0	WR75 to SMA
12.7 to 14.5	0.15 / 23.0	WR75 to SMA
18.0 to 20.0	0.15 / 23.0	WR51/42 to SMA
20.0 to 22.0	0.15 / 23.0	WR51/42 to SMA / 2.9mm
27.0 to 31.0	0.15 / 23.0	WR34/28 to 2.9mm
42.0 to 46.0	0.25 / 21.0	WR22 to 2.4mm

ISO-ADAPTERS		
Operating Freq [GHz]	Typical IL / Return Loss [dB]	Interfaces
1.2 to 1.4	0.40 / 23.0 / 23.0	WR650 to TNC, 7/16", SMA
2.7 to 3.3	0.35 / 23.0 / 23.0	WR284 to TNC, 7/16", SMA
3.4 to 4.2	0.35 / 23.0 / 23.0	WR229 to TNC, 7/16", SMA
5.4 to 5.9	0.40 / 23.0 / 23.0	WR187 to TNC, 7/16", SMA
5.9 to 6.5	0.40 / 23.0 / 23.0	WR137 to TNC/SMA
6.4 to 7.1	0.40 / 23.0 / 23.0	WR137 to TNC/SMA
8.0 to 10.0	0.40 / 23.0 / 23.0	WR90 to SMA
10.7 to 12.8	0.40 / 23.0 / 23.0	WR75 to SMA
12.7 to 14.5	0.40 / 23.0 / 23.0	WR75 to SMA
18.0 to 20.0	0.40 / 23.0 / 23.0	WR51/42 to SMA
20.0 to 22.0	0.40 / 23.0 / 23.0	WR51/42 to SMA / 2.9mm
27.0 to 31.0	0.30 / 23.0 / 23.0	WR34/28 to 2.9mm
42.0 to 46.0	0.50 / 21.0 / 21.0	WR22 to 2.4mm

Isolators that include transitions from coaxial to waveguide interfaces operate at 1 to 46 GHz with in-line or orthogonal interfaces.



WHO WE ARE

- We are a best-in-class, international leader in RF/MW cable assemblies led by our Lab-Flex® low-loss line of flexible cables for high-reliability, aerospace, test and specialty applications. A line of coaxial components and adaptors that are rugged, versatile and complement our cable assemblies is available
- We are a trusted isolator, circulator and sub-assembly supplier for high-reliability markets. A leader in the design & manufacturing of RF, MW & mmW passive components specializing in ferrite products for the space, defense and industrial markets.
- We are the world leader in passive temperature variable and fixed attenuators from DC through Q band, featuring our patented Thermopad® line of products.
- We are one of the top two suppliers of RF/MW terminations and resistors, including our proprietary Diamond Rf Resistives®.
- We are a recognized leader in signal distribution components featuring our HybriX® line of 3 dB hybrid and directional couplers, power dividers & RF cross-overs.

Our businesses are based on:

Extraordinary customer service

Custom engineered solutions and application specific designs

Unique technologies

High-reliability testing

Tighter tolerances

Leadership that strives to really know our customers' needs and expectations.

Three centers of excellence to meet our customers' needs –

Design, prototyping & mid-volume manufacturing in Florida, USA and Dundee, UK

Mid-to-high volume production in our 300+ employee facility in Costa Rica

We continue to expand our portfolio of great new products.

Customer Service!

Design Service!

Technical Service!



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