FLORIDA RF Labs

Cable Assemblies

Volume 8

ASR

Lab-Flex®

Lab-Flex® S

Lab-Flex® AF

Semi-Rigid, Conformable & Flexible

Semi-Rigid Low Loss

RG Series

smiths interconnect
bringing technology to life

Stuart, FL, USA

Heredia, Costa Rica

Florida RF Labs & EMC Technology, a Smiths Interconnect company, 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 featuring the HybriX® brand of ultra low loss SMT hybrids and couplers, and high performance RF cable assemblies featuring the Lab-Flex® brand of low loss, flexible cable assemblies. We have serviced the Telecom, Wireless, Broadcast, Medical, Space, Aerospace, Military, Test and Measurement, and Automotive market segments for over 80 years combined.

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EMC Technology & Florida RF Labs is the industry benchmark and sets quality standards in our serviceable markets with extensive design, manufacturing, inspection, testing and quality assurance programs. We are certified to AS 9100, ISO 9001, ISO 14001 and OSHAS 18001.

EMC Technology Cage Code 24602
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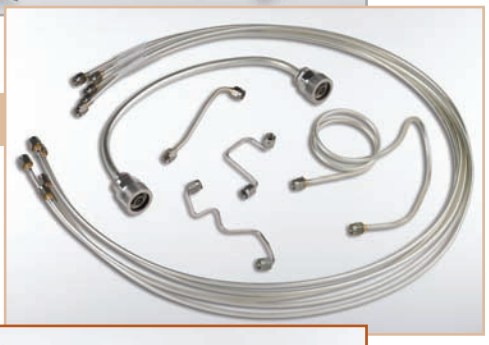

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FLORIDA RF Labs

Cable Assembly

Specification Sheet

CUSTOMER NAME:			
CONTACT NAME & PHONE:			
PROJECT REFERENCE:			
CABLE TYPE: (If known)		WEATHERIZED:	
CABLE LOSS: (dB/ft)		ARMORED:	
CABLE LENGTH: (inch / mm)		OTHER OPTIONS:	
CONNECTOR #1:		CONN.#1 MATERIAL & PLATING	
CONNECTOR #2:		CONN.#2 MATERIAL & PLATING	
CABLES NEEDED: (qty)		DELIVERY DATE NEEDED:	
CABLE APPLICATION:			
CABLE DIAMETER: (max)			
BEND RADIUS: (Static Min.)		BEND RADIUS (Dynamic Min.)	
OPERATING FREQ.: (max)		GHz	
IMPEDANCE:		Ohms (Standard 50 Ohms)	
TEMPERATURE RANGE:		Min - Max Operating (Standard -65º to 125ºC)	
ENVIRONMENT:		Test, Ground, Shipboard, Air Frame, Space, Medical	
PHASE MATCHED:		Sets, Pairs, Standard, Electrical Length	
ROHS COMPLIANT:		(Standard non compliant)	
CABLE ASSEMBLY WEIGHT:		(Maximum weight requirement)	

MOST CRITICAL: (Check all that apply)

- ☐ INSERTION LOSS
- ☐ PHASE STABILITY
- ☐ VSWR
- ☐ TEMPERATURE
- ☐ OTHER

CABLE ASSEMBLY PERFORMANCE:

VSWR: (max)		at FREQUENCY	GHz
INSERTION LOSS: (max)		at FREQUENCY	GHz
POWER HANDLING:		at FREQUENCY	GHz
PHASE MATCH DEGREES:		at FREQUENCY	GHz
PHASE MATCH LENGTH:		at FREQUENCY	GHz
PHASE FLEXURE: (± or <)		at FREQUENCY	GHz

To complete form, go to the Cable Selector Section of our website: www.EMC-RFLABS.com

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 335SP					
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 335SP					
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 335SP					
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 335SP	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 335SP					
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 335SP	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 335SP	SEMI-RIGID 250				
SATELLITES												
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

MAX FREQUENCY (GHz)	26	31	35	35	40	40	50	50	50	55	60	65	110
APPLICATIONS													
2-WAY RADIO									MINI-FLEX 105		SEMI-RIGID 086		
ANTENNA SYSTEMS	LAB-FLEX 235SP	LAB-FLEX 200			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	SEMI-RIGID 047
INSTRUMENTATION			SEMI-RIGID 141	K-JUMPER			LAB-FLEX 125	LAB-FLEX 100	MINI-FLEX 105	MINI-FLEX 065	SEMI-RIGID 086	LAB-FLEX 115S	SEMI-RIGID 047
INTERCONNECTS							LAB-FLEX 125		MINI-FLEX 105		SEMI-RIGID 086		
JUMPERS			SEMI-RIGID 141	K-JUMPER				LAB-FLEX 100	MINI-FLEX 105	MINI-FLEX 065	SEMI-RIGID 086		SEMI-RIGID 047
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 200	SEMI-RIGID 141		LAB-FLEX 180SP	LAB-FLEX 160					SEMI-RIGID 086		SEMI-RIGID 047
MOBILE ANTENNAS	LAB-FLEX 235SP	LAB-FLEX 200											
PCS													
RADAR SYSTEMS	LAB-FLEX 235SP	LAB-FLEX 200			LAB-FLEX 180SP	LAB-FLEX 160			MINI-FLEX 105		SEMI-RIGID 086		
RADIO SYSTEMS									MINI-FLEX 105				
SATCOM	LAB-FLEX 235SP	LAB-FLEX 200			LAB-FLEX 180SP						SEMI-RIGID 086		SEMI-RIGID 047
SATELLITES			SEMI-RIGID 141								SEMI-RIGID 086		
SWITCH INTERCONNECTS						LAB-FLEX 160	LAB-FLEX 125	LAB-FLEX 100	MINI-FLEX 105	MINI-FLEX 065	SEMI-RIGID 086		
TELECOMMUNICATIONS									MINI-FLEX 105		SEMI-RIGID 086		
TEST CABLES	LAB-FLEX 235SP	LAB-FLEX 200	SEMI-RIGID 141	K-JUMPER	LAB-FLEX 180SP	LAB-FLEX 160	LAB-FLEX 125	LAB-FLEX 100	MINI-FLEX 105		SEMI-RIGID 086	LAB-FLEX 115S	SEMI-RIGID 047
TEST EQUIPMENT INTERCONNECTS	LAB-FLEX 235SP	LAB-FLEX 200				LAB-FLEX 160	LAB-FLEX 125		MINI-FLEX 105			LAB-FLEX 115S	
TEST HEAD CABLES	LAB-FLEX 235SP	LAB-FLEX 200				LAB-FLEX 160	LAB-FLEX 125	LAB-FLEX 100	MINI-FLEX 105			LAB-FLEX 115S	
TEST SET UPS	LAB-FLEX 235SP	LAB-FLEX 200				LAB-FLEX 160	LAB-FLEX 125						
WIRELESS TELEMETRY													

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, SF316, 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 065
Must Endure Outdoor Environments			
Best	All Lab-Flex & Lab-Flex S Series w/AW Option	All Lab-Flex & Lab-Flex S Series w/AW Option	Lab-Flex 160AW, 200AW, 180SP
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 105	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, SF142, 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

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
Must Endure Outdoor Environments		
Best	Lab-Flex 160AW, 180SP	
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 & Mini-Flex 105
Fair		
Not Recommended		
Flexibility		
Best	Mini-Flex 065	Mini-Flex 065
Better	Lab-Flex 100, 125, Mini-Flex 105	Lab-Flex 100, 125, Mini-Flex 105
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 & Mini-Flex 105
Poor		
Poor	Solid Dielectric Semi-Rigid	Solid Dielectric Semi-Rigid

By Attenuation (dB per 100 feet)

BAND	L		S		C				X				Ku						K							
Frequency (GHz)	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 290	6.3		9.1		13.1				16.4				20.5													
Lab-Flex 335	6.7		9.8		14.5				18.4				23.4													
Lab-Flex 200	11.3		16.5		24.1				30.3				38.3													47.6
Lab-Flex 160	15.8		22.7		33.0				41.2				51.6													63.5
Lab-Flex 125	22.3		31.9		46.0				57.1				71.0													86.9
Lab-Flex 100	29.2		42.8		63.3				80.2				102.1													128.0
Lab-Flex S, Low-Loss Flexible Stranded Center Conductor																										
Lab-Flex 490S	5.0		7.5		11.3				13.0																	
Lab-Flex 335SP	8.8		13.2		20.4				26.5				34.8													
Lab-Flex 235SP	14.4		20.7		30.2				37.7				47.4													58.5
Lab-Flex 180SP	20.7		30.1		44.2				55.8				70.6													88.0
Lab-Flex 115S	35.7		51.3		74.1				92.4				115.5													141.9
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	30.6		44.6		66.0				83.4				106.1													
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	51.1		72.7		103.6				127.7				157.6													191.0
(.047 S/R)	47.8		68.9		100.3				125.5				157.6													194.7
Standard MIL-C-17 / RG Series																										
SF142	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		79.99				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		10.82																					
LMR-400-UF	7.2		10.5		24.38																					
LMR-240	11.5		16.6		20.35																					
LMR-240-LLPL	11.5		16.5		20.0																					
LMR-240-UF	13.9		10.5		24.38																					
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/100ft) attenuation first.

By Attenuation (dB per 100 feet)

Ka													mm																	
27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
		52.3																															
		69.0					75.5					81.6																					
		94.1					102.5					110.5					118.1				125.4											
		140.0					154.3					168.1					181.3				194.2											
		96.0					105.5					114.6																					
		153.9					168.0					181.5					194.3				206.64						218.5					230.1
		67.5					73.7																									
		115.5					125.5					134.8					143.7															
		94.9					105.6																									
		90.7					101.1																									
		90.7					101.1																									
		90.7					101.1																									
		134.6					148.45					161.8					174.7				187.1						199.4					
		134.6					148.45					161.8					174.7				187.1						199.4					
		141.0					155.4					169.2					182.6				195.4						208.1					
		205.9					223.3					239.7																					
		211.6					231.7					250.8					269.1				286.7											

By Power (Watts)

BAND Frequency (GHz)	L 1 2	S 3 4	C 5 6 7 8	X 9 10 11 12	Ku 13 14 15 16 17 18	K 19 20 21 22 23 24 25 26
Lab-Flex, Low-Loss Flexible						
Lab-Flex 290	1702	1226	660	523	400	
Lab-Flex 335	1422	1026	550	433	330	
Lab-Flex 200	648	463	344	194	156	132
Lab-Flex 160	473	339	188	158	120	103
Lab-Flex 125	403	289	158	130	105	88
Lab-Flex 100	392	276	143	117	95	83
Lab-Flex S, Low-Loss Flexible Stranded Center Conductor						
Lab-Flex 490S	1850	1033	667	633		
Lab-Flex 335SP	1500	950	607	563	400	
Lab-Flex 235SP	638	423	284	247	160	110
Lab-Flex 180SP	420	270	194	177	100	65
Lab-Flex 115S	263	133	90	80	50	35
Semi-Rigid, Low-Loss						
AL250LLTP	2567	2100	1167	640	460	400
AL141LLSP	399	268	165	131	105	
AL085LLSP	119	80	58	45	30	22
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	43	39	30	22	9	
(.047 S/R)	29	22	12	8	7	
Standard MIL-C-17 / RG Series						
SF142	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 25ºC

Consult Sales Department for Ratings

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.

By Power (Watts)

Ka													mm																				
27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
			119																														
			95					90					80																				
			80					75					70					68					65										
			75					70					65					63					60										
			58					49					40																				
			32					29					25					22					19					16					13

Common Interfaces			Cable Freq. (Max)	Power			Subminiature			
				Type N	SC	7/16 DIN	SSMA	SMA	SMB	SMC
Connector Frequency (Max)			GHz	18	11	7	36	18	10	10
CABLE FAMILY	**CABLE CODE**	**SPEC.**								
Lab-Flex, Low Loss Flexible										
Lab-Flex 100	100	FRFL	50				36	18	10	10
Lab-Flex 125	125	FRFL	50					18		
Lab-Flex 160	160	FRFL	40	18				18		
Lab-Flex 200	200	FRFL	30	18				18		
Lab-Flex 290	290	FRFL	18	18				18		
Lab-Flex 335	335	FRFL	18	18				18		
Lab-Flex S, Low-Loss Flexible Stranded CC										
Lab-Flex 115S	115S	FRFL	65					18		
Lab-Flex 180SP	180SP	FRFL	40	18				18		
Lab-Flex 235SP	235SP	FRFL	26	18				18		
Lab-Flex 335SP	335SP	FRFL	18	18				18		
Lab-Flex 490S	490S	FRFL	10	18	11					
Semi-Rigid, Low Loss										
AL085LLSP	AL085LLSP	FRFL	62	18			36	18	10	10
AL141LLSP	AL141LLSP	FRFL	35	18				18	10	
AL250LLTP	AL250LLTP	FRFL	20	18				18		
Semi-Rigid, Comformable (BJ), Flexible (Mini-Flex)										
(.047 S/R)	047	FRFL	50					18		
047TP	047TP	M17/151-00002	50					18		
BJ047	BJ047	FRFL	18					18		
Mini-Flex 065	065	FRFL	55					18		
405TP	405TP	FRFL	60	18			36	26	10	10
RG405 (.086 S/R)	RG405	M17/133-RG405	60	18			36	26	10	10
AL085TP	AL085	M17/133-00013	60	18			36	26	10	10
BJ085	BJ085	FRFL	18	18			18	18	10	10
Mini-Flex 105	105	FRFL	60	18			36	26	10	10
K-Jumper	JUMP	FRFL	35							
RG402 (.141 S/R)	RG402	M17/130-RG402	35	18				18	10	
402TP	402TP	M17/130-00005	35	18				18	10	
AL141TP	AL141	M17/130-00009	35	18				18	10	
BJ141	BJ141	FRFL	18	18				18	10	
Mini-Flex 165	165	FRFL	35	18				18	10	
RG401 (.250 S/R)	RG401	M17/129-RG410	18	18				18		
250TP	250TP	M17/129-00001	18	18				18		
Standard MIL-C-17 / RG Series										
SF142	SF142	FRFL	18	18	11	7		18		
142D	142D	FRFL	18	18	11	7		18		
SF316	SF316	FRFL	18	18			18	18	10	10
RG142	RG142	M17/60-RG142	8	8	8	7		8		
RG223	RG223	M17/84-RG223	12	12	11	7		12		
RG400	RG400	M17/128-RG400	12	12	11	7		12		
RD316	RD316	M17/152-00001	12	12			12	12	10	10
316D	316D	FRFL	5	5			5	5	5	5
RG316	RG316	M17/113-RG316	3	3			3	3	3	3
LMR										
LMR-100A-PVC	L100	Times	5.8				5.8	5.8	5.8	5.8
LMR-240	L240	Times	5.8	5.8				5.8		
LMR-240-DB	L240DB	Times	5.8	5.8				5.8		
LMR-240-UF	L240UF	Times	5.8	5.8				5.8		
LMR-240-LLPL	L240LLPL	Times	5.8	5.8				5.8		
LMR 400	L400	Times	5.8	5.8		5.8		5.8		
LMR-400-DB	L400DB	Times	5.8	5.8		5.8		5.8		
LMR-400-UF	L400UF	Times	5.8	5.8		5.8		5.8		
LMR-400-LLPL	L400LLPL	Times	5.8	5.8		5.8		5.8		

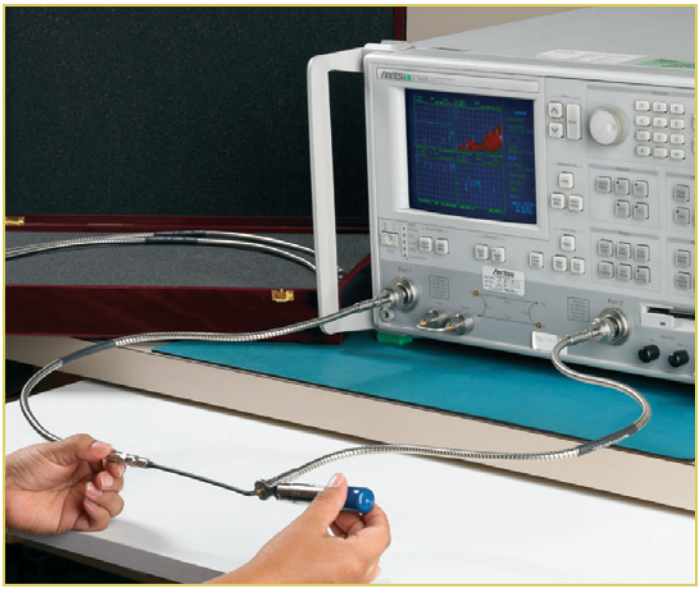
Select cable then connector to determine maximum frequency of cable assembly.
Note: Connector frequencies are shown as reference only can change based upon the configuration.

Precision			Miniature				MicroMiniature				
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
	50	40	26	22			50	40	28	6	6
	50	40									
	40	35									
					18						
					18						
					18						
65	50	40									
		40			18						
					18						
					18						
					18						
62	50	40	26	22	18	4	62	40	28	6	6
		35	26	22	18	4				6	
					18						
							50	40			
							50	40			
							18	18			
	50	40	26	22	18	4	60	40	28	6	6
	50	40	26	22	18	4	60	40	28	6	6
	50	40	26	22	18	4	60	40	28	6	6
	18	18	18	18	18	4	18	18	18	6	6
	50	40	26	22	18	4					
		35									
			26	22	18	4				6	
			26	22	18	4				6	
			26	22	18	4				6	
			18	18	18	4				6	
			26	22	18	4				6	
					18						
					18						
			18	18	18	4					
			18	18	18	4					
			18	18	18	4		18	18	6	6
			8	8	8	4					
			12	12	12	4					
			12	12	12	4					
			12	12	12	4			12	6	6
			5	5	5	4			5	5	5
			3	3	3	4		3	3	3	3
			5.8	5.8	5.8	4		5.8	5.8	5.8	5.8
					5.8	4					
					5.8	4					
					5.8	4					
					5.8	4					
					5.8	4					
					5.8	4					
					5.8	4					

Select cable then connector to determine maximum frequency of cable assembly.
Note: Connector frequencies are shown as reference only can change based upon the configuration.

Introduction

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)
- Silver Plated Copper Conductors

Typical Applications:

- Production and Lab Testing
- Environmental Testing

General Specifications	ASR	ASR-F				
Return Loss, Minimum (dB)	16	16				
Diameter (inches)	0.266	0.304				
Frequency, Max (GHz)	50	50				
Loss @ 5 GHz (dB/100ft)	39.0	35.9				

Electrical Specifications	ASR	ASR-F				
Impedance, Nominal (Ω)	50	50				
Velocity of Propagation (%)	76.5	78				
Shielding Effectiveness, 1 GHz (dB/ft)	>100	>90				
Capacitance (pF/ft)	27	26				
Delay (ns/ft)	1.33	1.30				

Mechanical Specifications	ASR	ASR-F				
Weight (lbs/100ft)	N/A	N/A				
Temperature Range (˚C)	-65 to +225*	-55 to +200*				
Minimum Bend Radius (inches)	1.00	1.00				

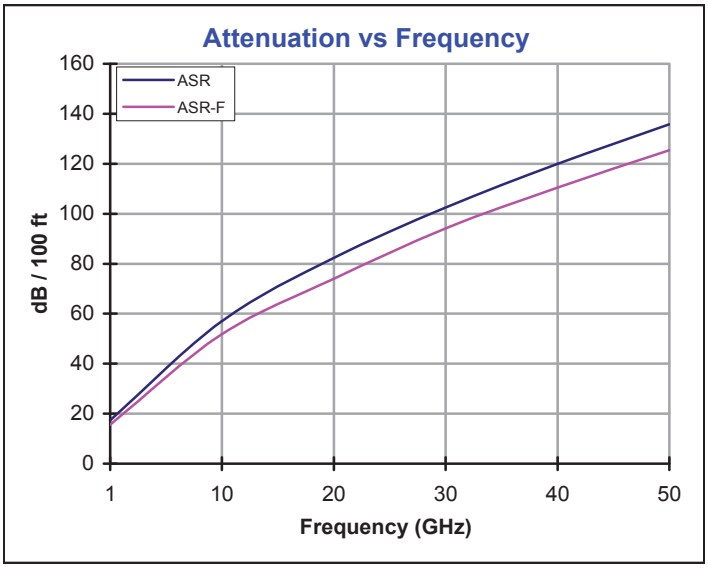
*Temperature ranges on standard boots -55 + 100C

Construction Data	ASR	ASR-F				
Inner Conductor	N/A	N/A				
Dielectric	N/A	N/A				
First Outer Shield	N/A	N/A				
Second Outer Shield	N/A	N/A				
Third Outer Shield	N/A	N/A				
Jacket	0.266	0.304				

Attenuation (dB/100ft)

GHz	ASR	ASR-F				
1	17.4	15.6				
6	43.6	39.6				
10	57.0	52.0				
16	73.1	67.1				
18	77.9	71.6				
20	82.4	75.9				
26	94.9	87.8				
30	102.5	95.1				
36	113.3	105.5				
40	120.0	112.0				
44	126.5	118.3				
50	135.8	127.3				

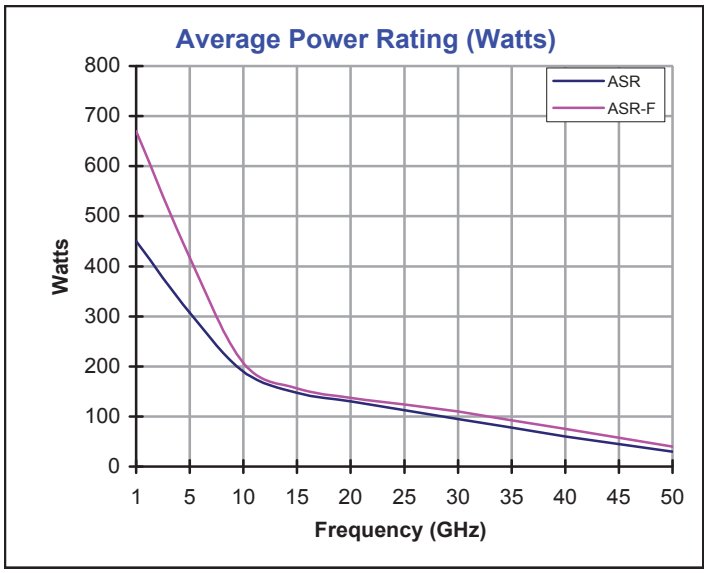
Max Cable Loss at +25°C & Sea Level

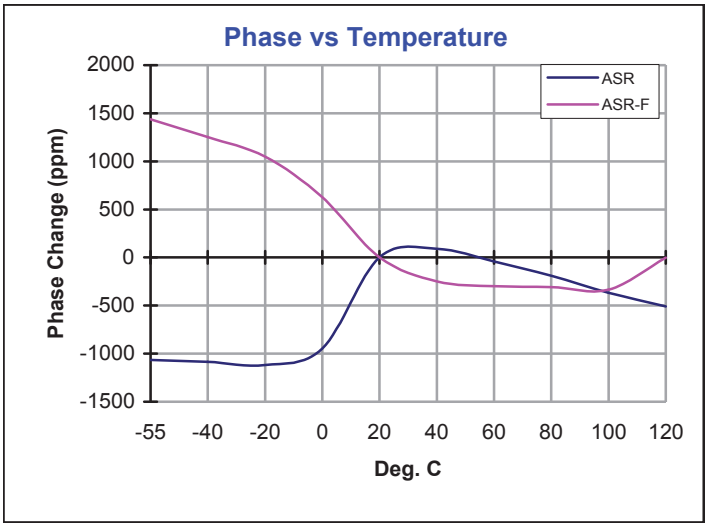


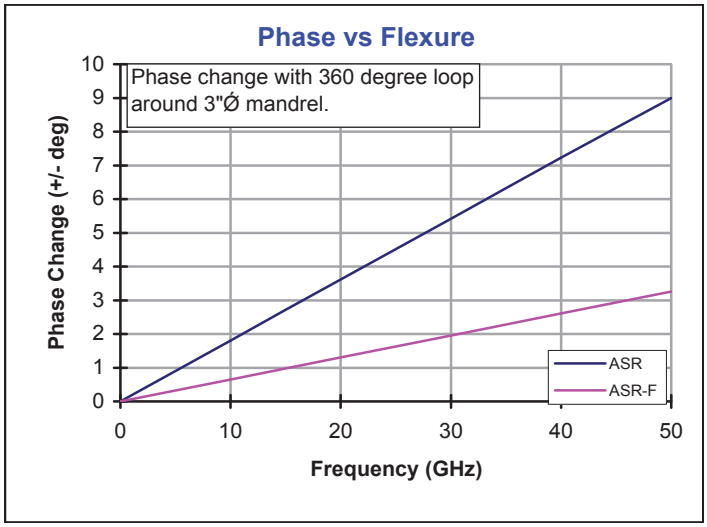
Average Power Rating (Watts)

GHz	ASR	ASR-F				
1	450	670				
10	165	207				
18	130	150				
26	95	110				
40	60	75				
50	30	40				

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







Connector Selection & Options

Connector #1	Connector #2	Frequency Max GHz	ASR	ASR-F				
2.9mm Plug	2.9mm Plug	40	1010	1010				
2.9mm Plug	2.9mm Jack	40	1020	1020				
2.9mm Plug	2.4mm Plug	40	1030	1030				
2.9mm Plug	2.4mm Jack	40	1040	1040				
2.4mm Plug	2.4mm Plug	50	3030	3030				
2.4mm Plug	2.4mm Jack	50	3040	3040				
2.4mm Jack	2.4mm Jack	50	4040	4040				
Type N Plug	Type N Plug	18	5050	5050				
Type N Jack	Type N Jack	18	5060	5060				
Type N Jack	Type N Jack	18	6060	6060				
NMD 2.9mm Jack	2.9mm Plug	40	0210	0210				
NMD 2.9mm Jack	2.9mm Jack	40	0220	0220				
NMD 2.9mm Jack	2.4mm Plug	40	0230	0230				
NMD 2.9mm Jack	2.4mm Jack	40	0240	0240				
NMD 2.4mm Jack	2.9mm Plug	40	0410	0410				
NMD 2.4mm Jack	2.9mm Jack	40	0420	0420				
NMD 2.4mm Jack	2.4mm Plug	50	0430	0430				
NMD 2.4mm Jack	2.4mm Jack	50	0440	0440				

Gender of the connector is determined by center pin.

Consult sales department for other connectors and other options not shown.

Cable Assembly Options	Option Code	ASR	ASR-F				
Weatherized (Polyolefin or PVC)	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						

Certificate of Calibration

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. Accuracy of test equipment and standards is traceable to national and/or international standards, national metrology institutes (e.g., NIST, NPL, NMIJ, NIM), or derived from ratio type self calibration techniques.

Florida RF Labs' suggested calibration interval is 12 months from delivery date.

Customer:	Model:
	Serial Number:
	Calibration Date:
Customer ID:	Shop Order:
Customer PO:	Router #:
Calibrated By: FLORIDA RF LABS 8851 SW OLD KANSAS AVE. STUART, FL 34997	

Test Equipment Used

Model Number	Description	Serial#	Calibration Due Date

Quality: _____
Signature Date

Florida RF Labs is an AS9100 & ISO 9001 registered company by ORI, certificate number A0002152-1

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 product 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 enough 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 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.

Part Numbering Code

Ordering Information

A S R - 1 0 1 0 - 2 4 P

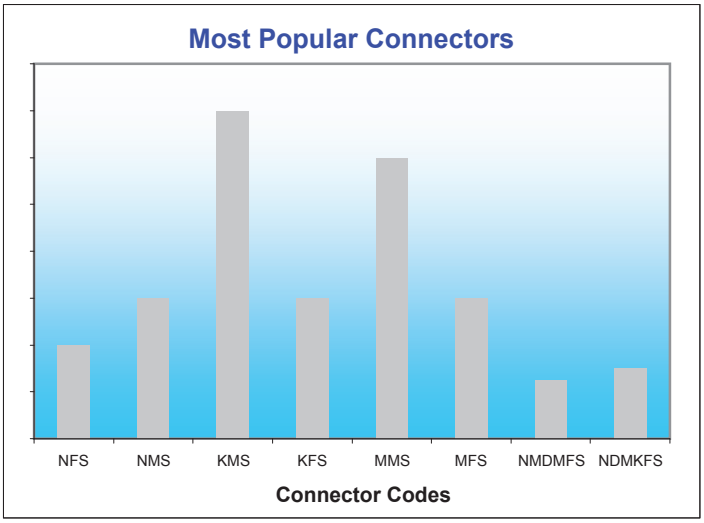
ASSEMBLY TYPE
ASR
ASR-F

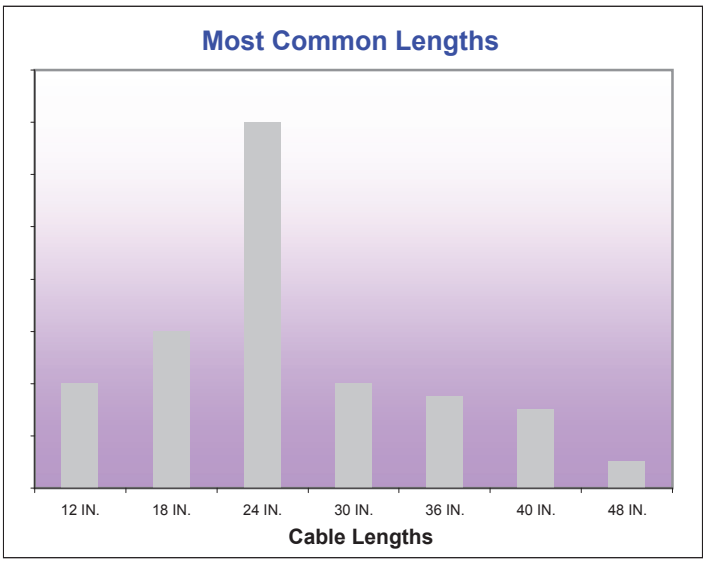
MODEL
1010 = 2.9 Plug / 2.9 Plug
1020 = 2.9 Plug / 2.9 Jack
1030 = 2.9 Plug / 2.4 Plug
1040 = 2.9 Plug / 2.4 Jack

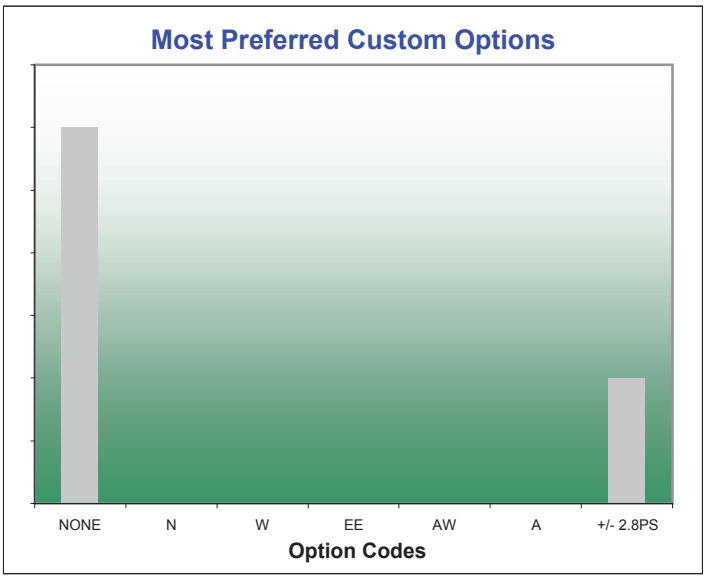
LENGTH (IN.)
Example:
24 = 24 inches

PHASE MATCHING
(if required)
P = ±2.8ps

For the full list of connector options, see page - 4 of this section.







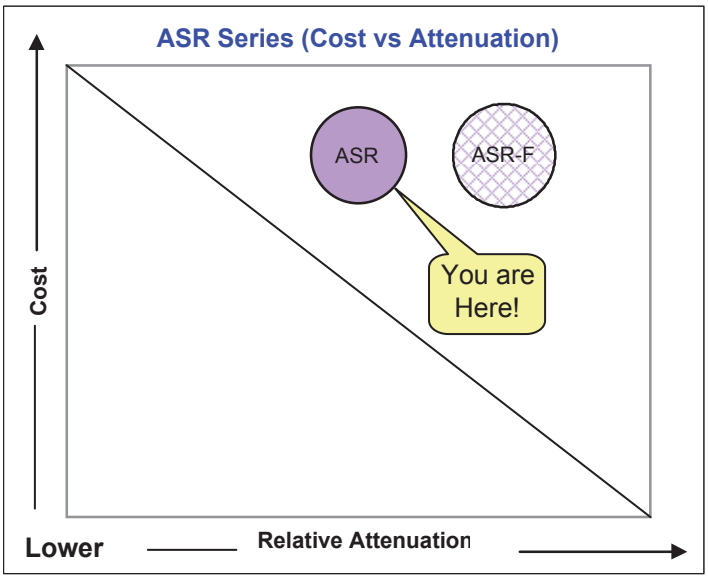
The ASR series of VNA test cables offers a high performance assembly for precision test applications. It provides a test setup which will maintain its configuration for a very repeatable test platform. The NMD connectors allow direct mating to the test port when a permanent test setup is desired.

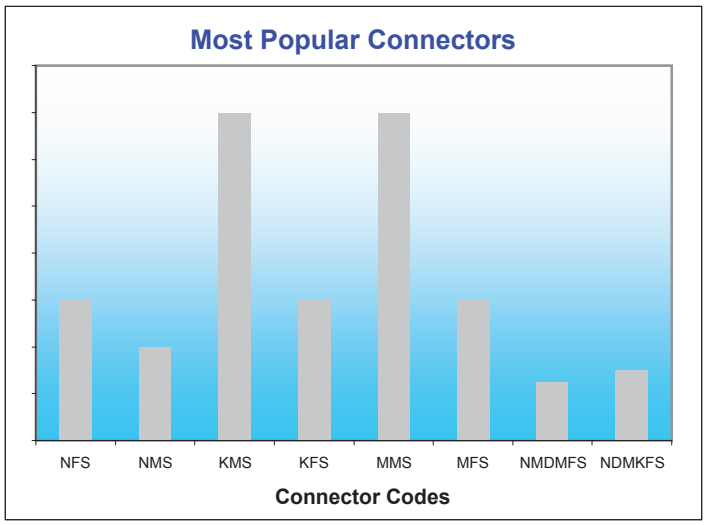
Features/Benefits:

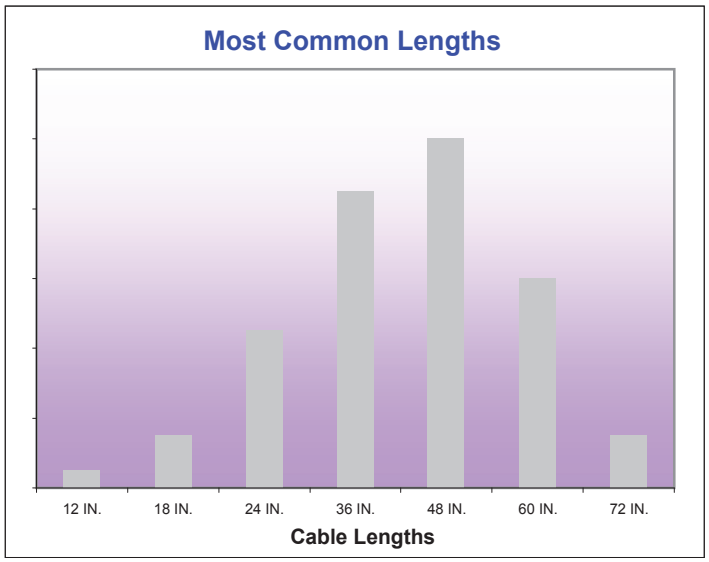
- Designs up to 50 GHz
- Phase Stability over Temperature
- High Mating Cycles
- Low Loss Construction
- Superior Shielding Effectiveness
- Phased Matched Sets Available
- Available in Standard Lengths of 12, 18 and 24 inches

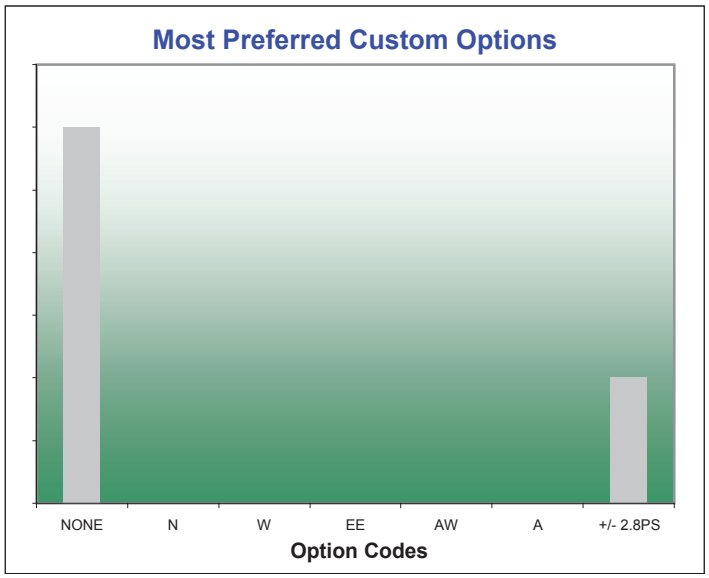
Applications:

- Production and Lab Testing
- Environmental Testing









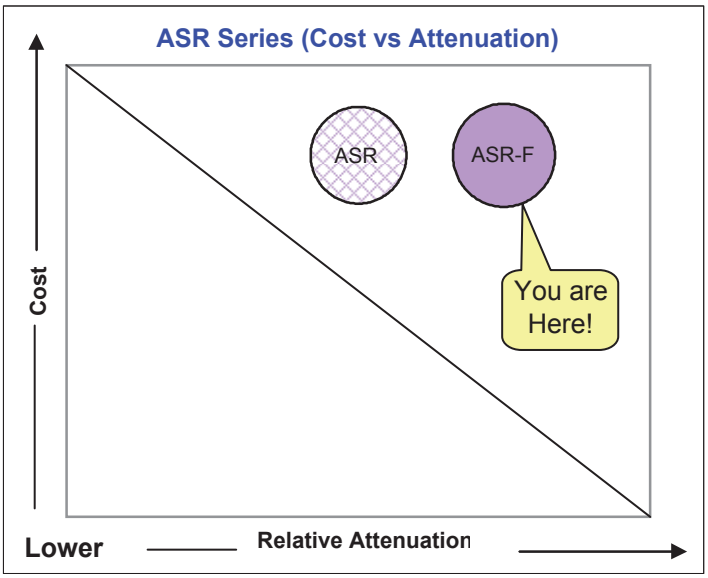
The ASR-F series of VNA test cables offers a flexible alternative to the original high performance ASR design. It offers a durable construction for long-lasting and repeatable test results. The NMD connectors allow for direct mating to the test port when a more permanent test setup is desired.

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

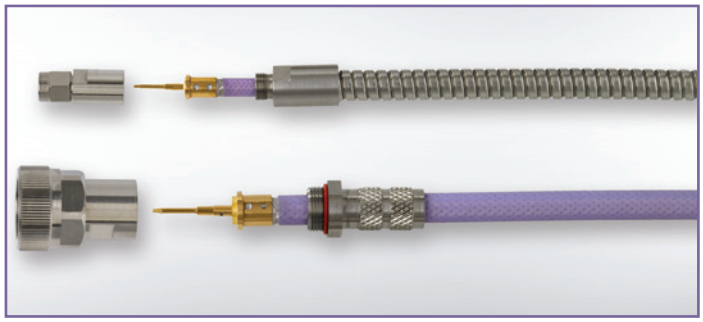
Applications:

- Production and Lab Testing
- Environmental Testing



Introduction

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.

General Specifications	Lab-Flex 100	Lab-Flex 125	Lab-Flex 160	Lab-Flex 200	Lab-Flex 290	Lab-Flex 335
MIL Number	N/A	N/A	N/A	N/A	N/A	N/A
Diameter (inches)	0.100	0.125	0.160	0.200	0.290	0.335
Frequency, Max (GHz)	50	50	40	31**	18	18
Loss @ 5 GHz (dB/100ft)	48.5	35.9	25.6	18.6	10.2	11.1

** Standard is 26.5 GHz, screened to 31 GHz

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	80
Shielding Effectiveness, 18 GHz (dB/ft)	>85	>90	>90	>90	>90	>90
Capacitance (pF/ft)	27	26	27	25	24	25
Delay (ns/ft)	1.34	1.30	1.34	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)	1.00	2.00	3.00	5.60	7.50	8.50
Temperature Range (˚C)	-55 to +200*	-55 to +200*	-55 to +200*	-55 to +200*	-55 to +200*	-55 to +200*
Minimum Bend Radius (inches)	0.50	0.60	0.80	1.00	1.60	2.00

*Temperature ranges on standard boots -55 to +100C

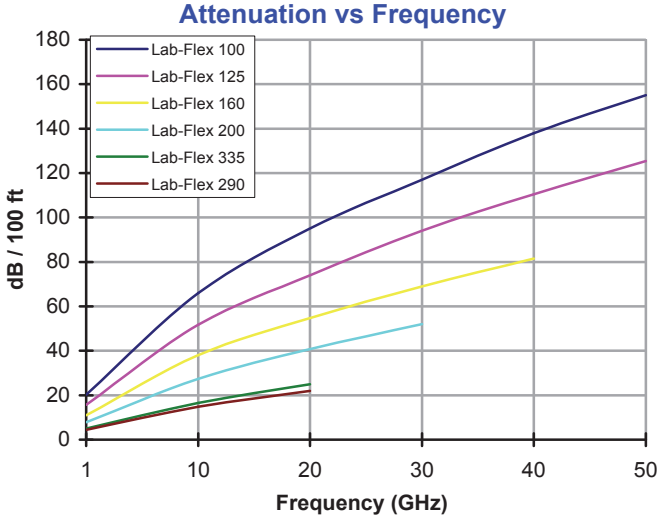
Construction Data	Lab-Flex 100	Lab-Flex 125	Lab-Flex 160	Lab-Flex 200	Lab-Flex 290	Lab-Flex 335
Inner Conductor	Solid SC	Solid SC	Solid SC	Solid SC	Solid SC	Solid SC
Dielectric	Expanded PTFE	Expanded PTFE	Expanded PTFE	Expanded PTFE	Expanded PTFE	Expanded PTFE
First Outer Shield	Flat Braid SC	Flat Braid SC	Flat Braid SC	Flat Braid SC	Flat Spiral 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	335	290
1	29.2	22.3	15.8	11.3	6.7	4.5
6	50.4	39.6	30.2	18.7	12.3	11.3
10	65.7	55.2	39.5	28.7	16.5	15.2
16	84.0	67.1	48.5	36.5	21.7	19.2
18	102.1	71.0	51.6	38.3	23.4	20.5
20	104.5	75.9	57.2	41.8		
26	128.0	86.9	63.5	47.6		
30	140.0	94.1	69.0	52.3		
36	154.3	105.5	75.5			
40	168.1	110.5	81.6			
44	181.3	118.1				
50	194.2	125.4				

Max Cable Loss at +25°C & Sea Level

Attenuation vs Frequency

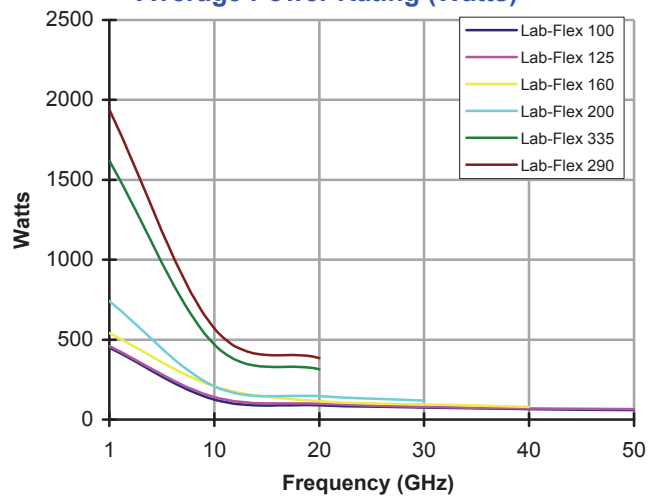


Average Power Rating (Watts)

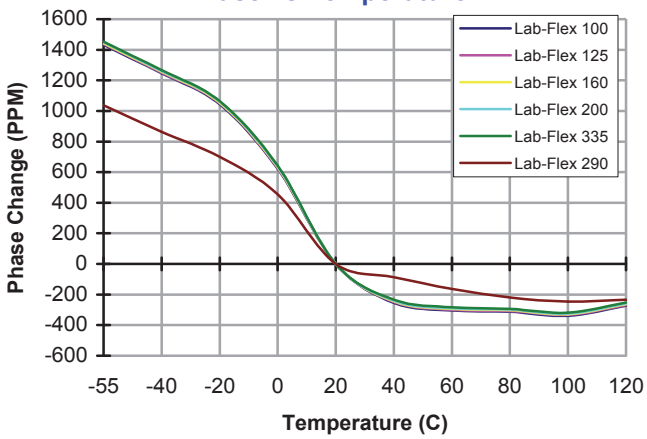
GHz	100	125	160	200	335	290
1	450	460	540	740	1620	1940
6	160	175	279	279	630	750
10	125	140	170	208	470	570
16	102	112	133	166	360	430
18	5	105	120	156	330	400
20	90	100	115	147		
26	83	88	103	132		
30	75	80	95	119		
36	69	74	88			
40	65	70	80			
44	63	68				
50	60	65				

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

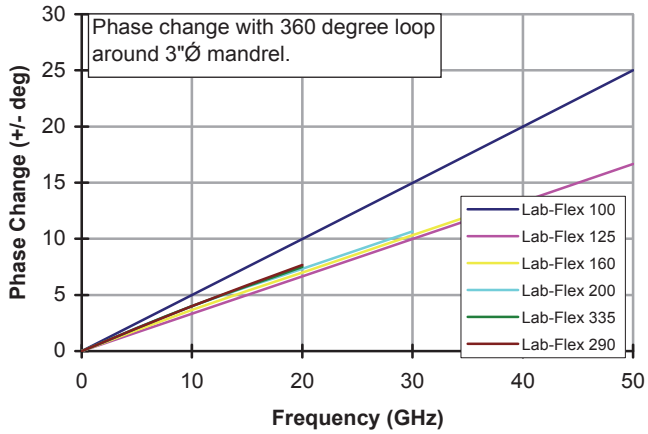
Average Power Rating (Watts)



Phase vs Temperature



Phase vs Flexure



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	(Male)	Straight	35	3MS		3MS			
3.5 mm	Jack	(Female)	Straight	35	3FS		3FS			
GPO (SMP)	Jack	(Female)	Straight	40	SMPFS					
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
SMA	Bulkhead	(Female)	Straight	18	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
Type N	Bulkhead	(Female)	Straight	18	NFBS			NFBS	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				TFS	TFS	TFS
TNC	Plug	(Male)	R/A	18	TMR			TMR	TMR	TMR
TNC	Bulkhead	(Female)	Straight	18	TFBS			TFBS	TFBS	TFBS
7 mm		N/A	Straight	18				A7		
SC	Plug	(Male)	Straight	10					SCMS	SCMS
SC	Plug	(Male)	R/A	10					SCMR	SCMR
SC	Bulkhead	(Female)	Straight	10					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 other 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 (Polyolefin or PVC)**	W	√	√	√	√	√	√
Weatherized (Neoprene)	N	√	√	√	√	√	√
Armored	A			√	√	√	√
Armored & Weatherized (PVC)	AW			√	√	√	√
Armored & Weatherized (Neoprene)	AN			√	√	√	√
Armored & Weatherized (Monocoil & Silicone)	MC	√		√	√	√	
Armored & Weatherized (Monocoil & Polyolefin)	MW			√	√	√	
Extended Boots	E	√	√	√	√	√	√
Phase Matching (+/- 2.8 picoseconds)	+/-2.8 PS	√	√	√	√	√	√
Dust Caps	D	√	√	√	√	√	√

**Standard cable diameter <0.150 built with Polyolefin, cable diameter >0.150 built with PVC

Cable Options

A - Armored

AN - Armored and Weatherized-Neoprene

AW - Armored and Weatherized-PVC

E - Extended Boots

MC - Monocoil-Silicone

MW - Monocoil Weatherized-Polyolefin

W - Weatherized-Polyolefin

W - Weatherized-PVC

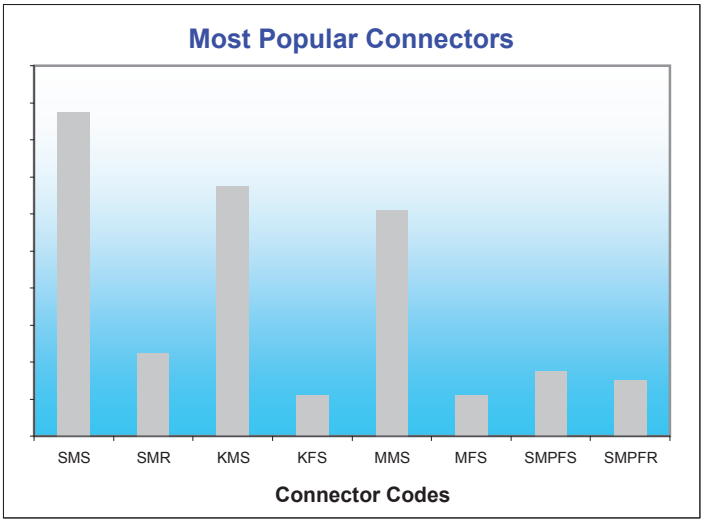
D - Dust Caps

Part Numbering Code

Ordering Information

K M S	_____	1 0 0	_____	2 4 . 0	-	K M S	_____
CONNECTOR #1	OPTION	CABLE	OPTION	LENGTH (IN.)		CONNECTOR #2	OPTION
KMS = 2.9mm Male Straight SMS = SMA Male Straight SMR = SMA Right Angle	(Connector #1) Blank = None E = Extended Boot	100 = Lab-Flex® 100	Blank = None W = Weatherized	Example: 24.0 = 24 inches		KMS = 2.9mm Male Straight SMS = SMA Male Straight SMR = SMA Right Angle	(Connector #2) Blank = None E = Extended Boot

For the full list of cable choices see page - 2, and for available connectors and other Options see pages - 4 & - 5 of this section.



Lab-Flex® 100 cable offers a reduction in loss and better phase stability when compared with flexible cable 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.

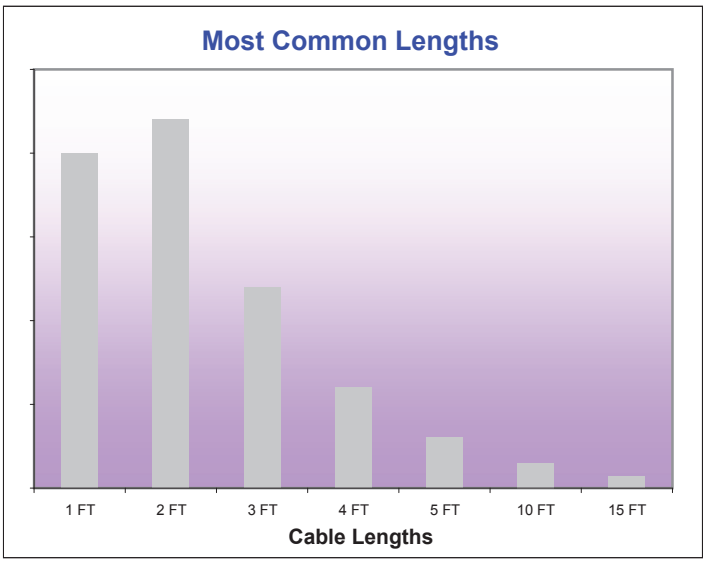
Features/Benefits:

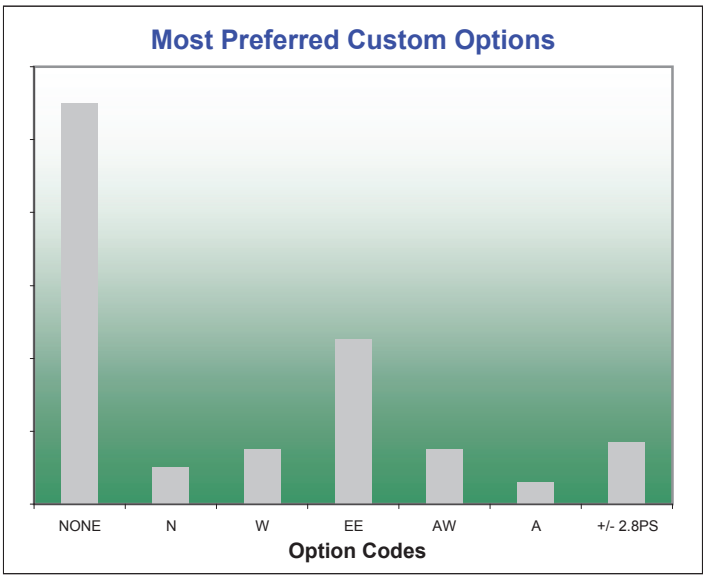
Mode Free Operation to 50 GHz
76% Velocity Low Loss Dielectric
Superior Shielding Effectiveness
Available with Protective Coverings of:
- Weatherized
- Armor/Weatherized (MC)

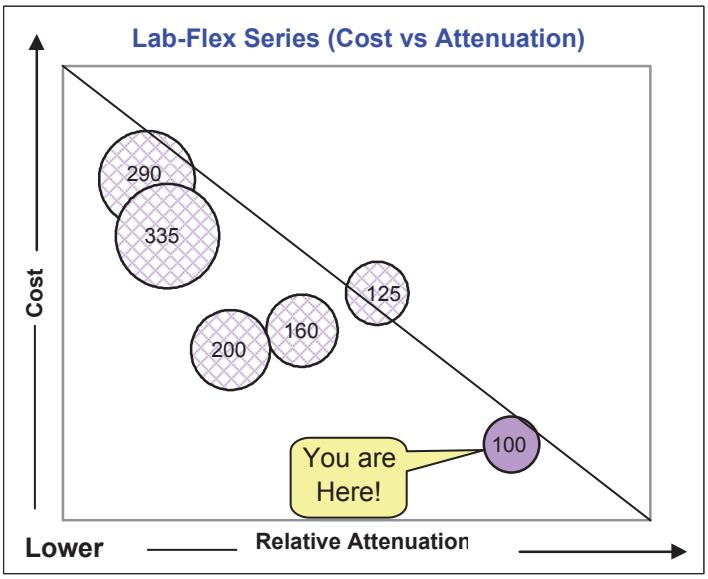
Stainless Steel Connectors
Phase Matched Sets Available

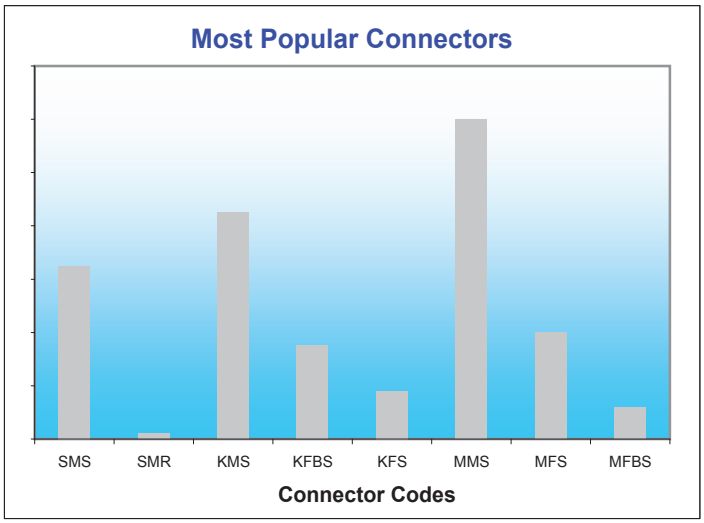
Applications:

Test Cables
Test Head Cable
Component Interconnects









Lab-Flex® 125 cable offers about 40% reduction in loss and all the advantages of a flexible cable, when compared with 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.

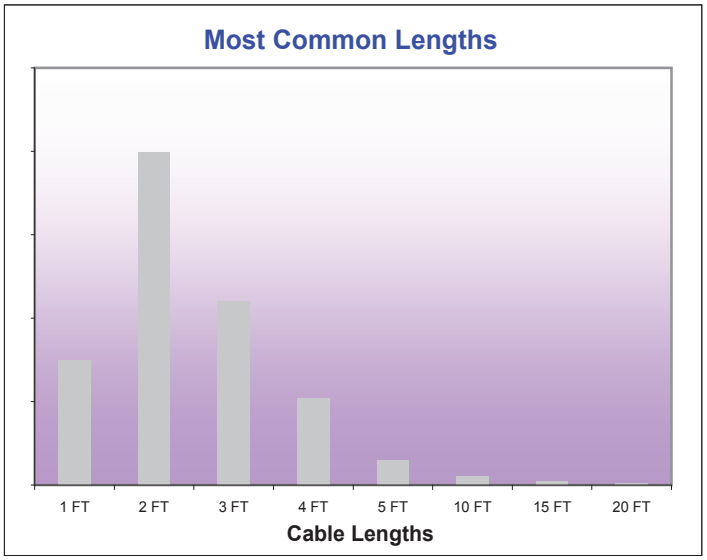
Features/Benefits:

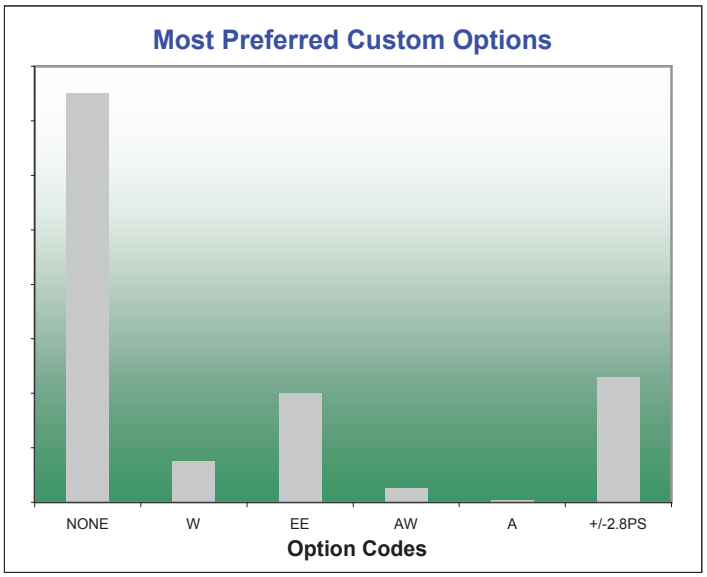
Mode Free Operation to 50 GHz
78% Velocity Low Loss Dielectric
Superior Shielding Effectiveness
Available with Protective Coverings of:
- Armor
- Weatherized
- Armor/Weatherized

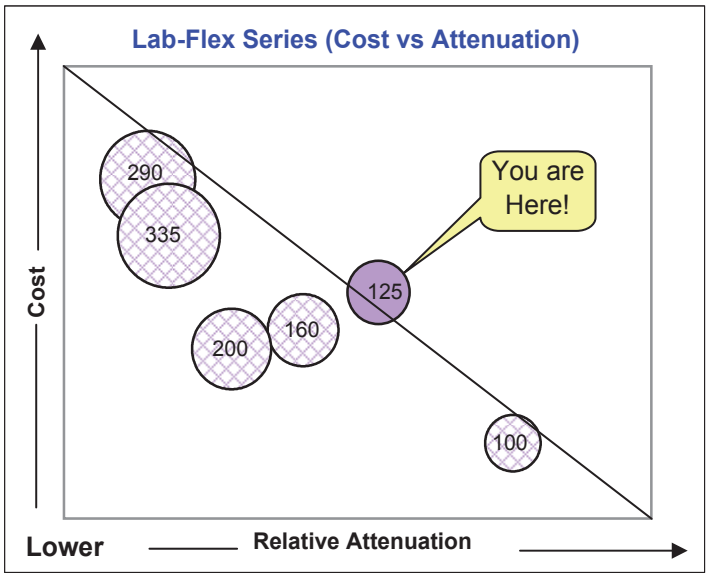
Stainless Steel Connectors
Phase Matched Sets Available

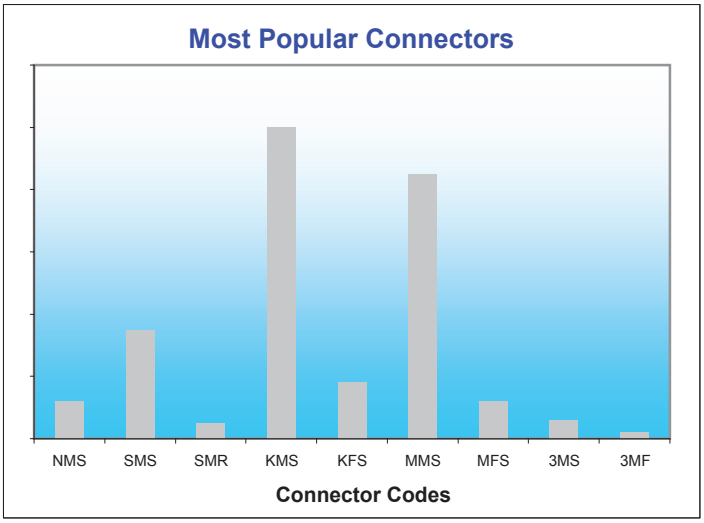
Applications:

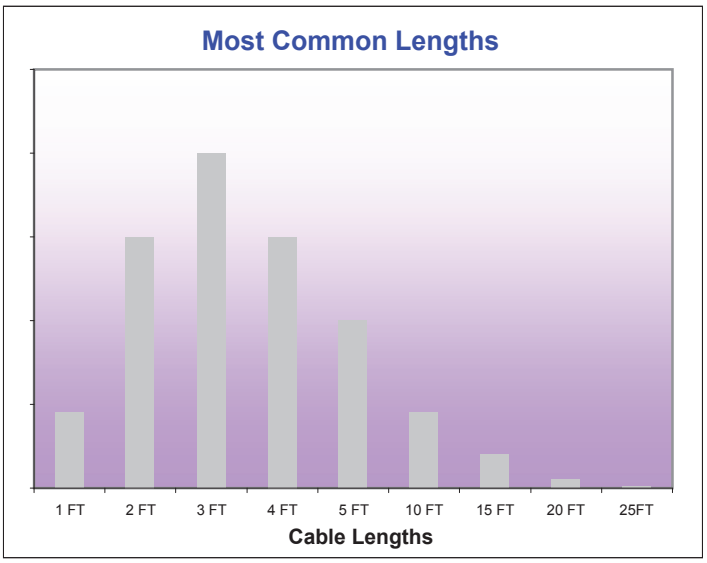
Test Cables
Test Head Cable
Component Interconnects

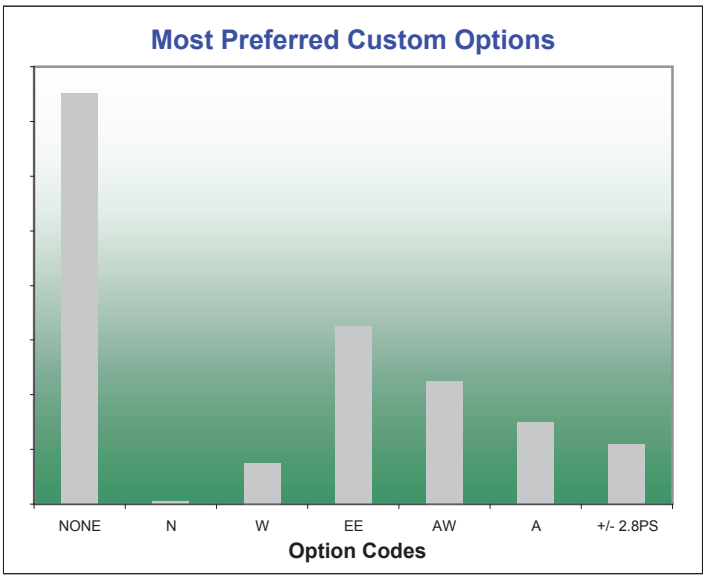












Our Lab-Flex® 160 cable offers a very cost effective option for flexible cable assembly requirements up to 40 GHz. A wide range of high frequency, stainless steel connectors are available. The 78% velocity dielectric provides a low loss choice without sacrificing dielectric strength and phase stability.

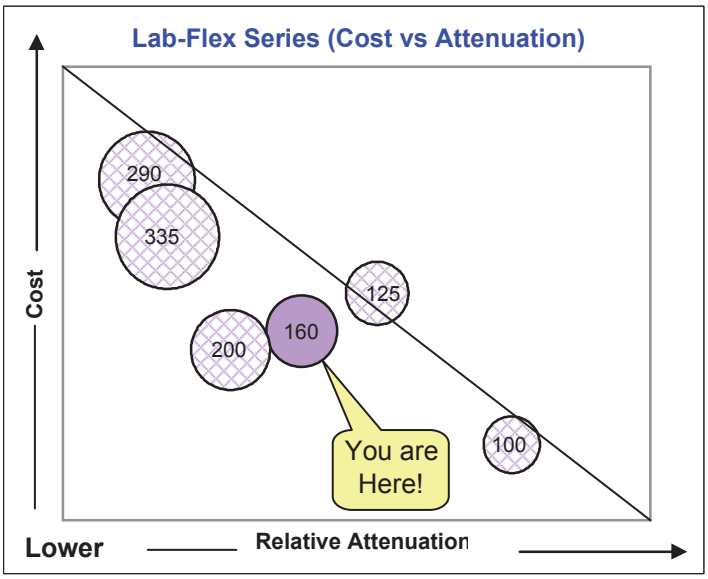
Features/Benefits:

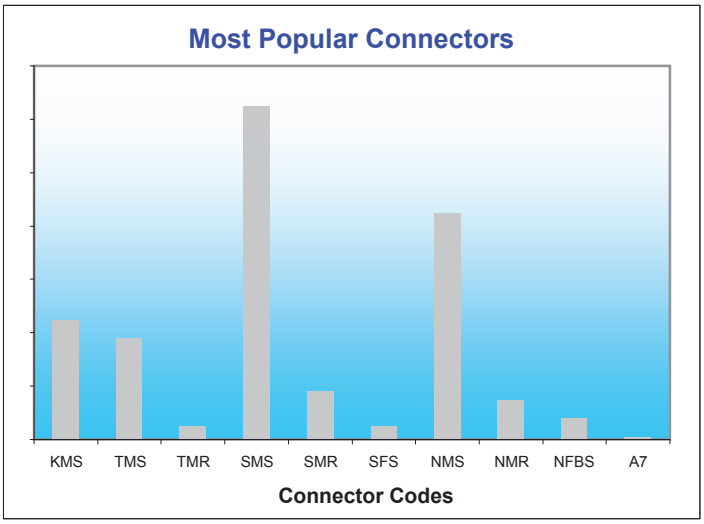
Mode Free Operation to 40 GHz
78% Velocity Low Loss Dielectric
Superior Shielding Effectiveness
Available with Protective Coverings of:
- Armor
- Weatherized
- Armor/Weatherized

Stainless Steel Connectors
Phase Matched Sets Available

Applications:

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





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.

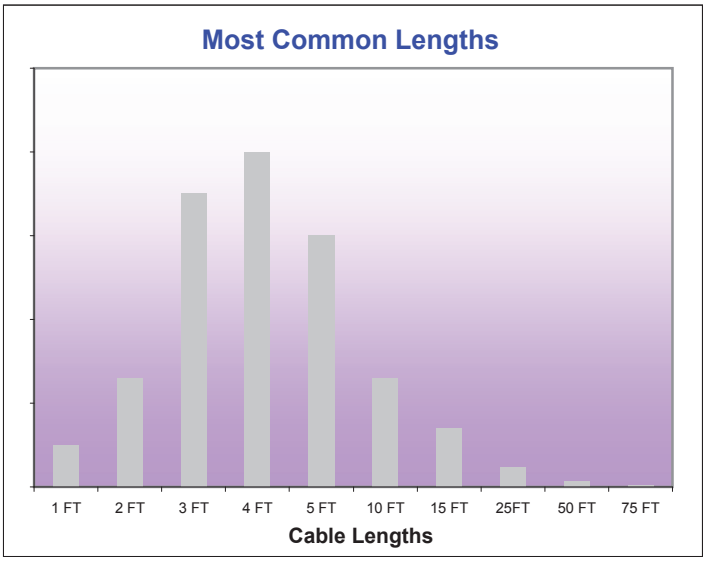
Features/Benefits:

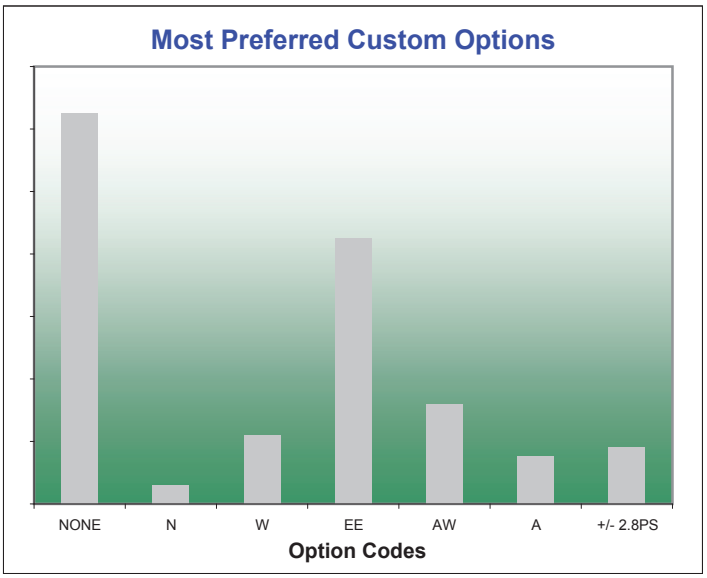
Mode Free Operation to 31 GHz
80% Velocity Low Loss Dielectric
Superior Shielding Effectiveness
Available with Protective Coverings of:
- Armor
- Weatherized
- Armor/Weatherized

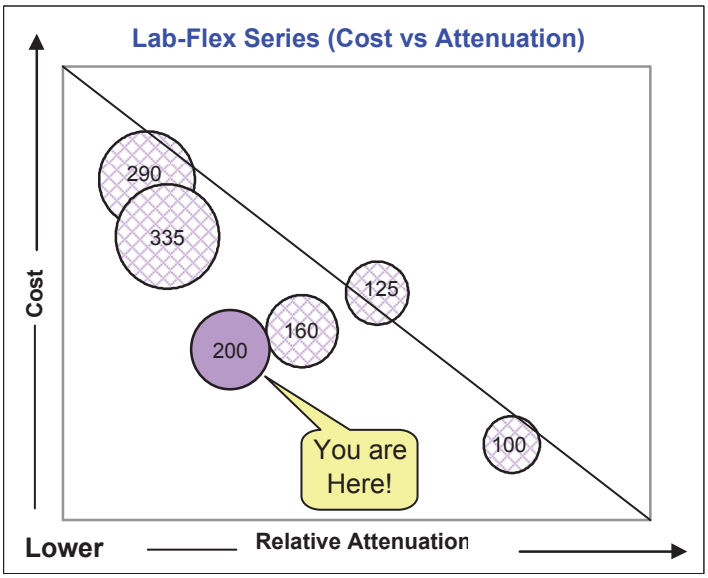
Stainless Steel Connectors
Phase Matched Sets Available

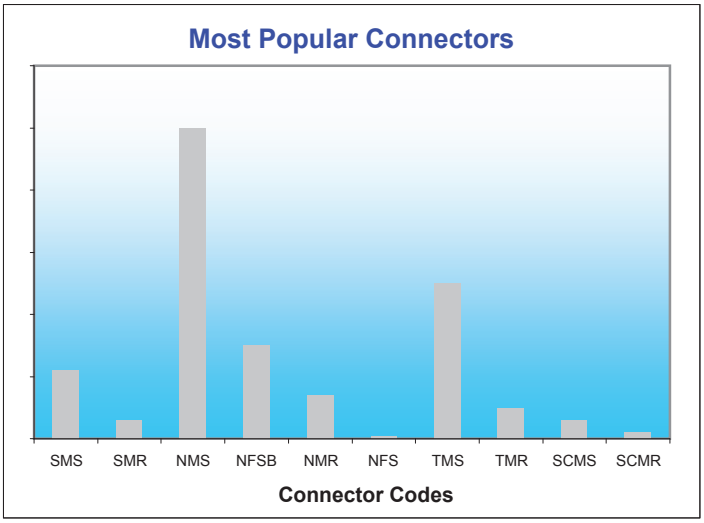
Applications:

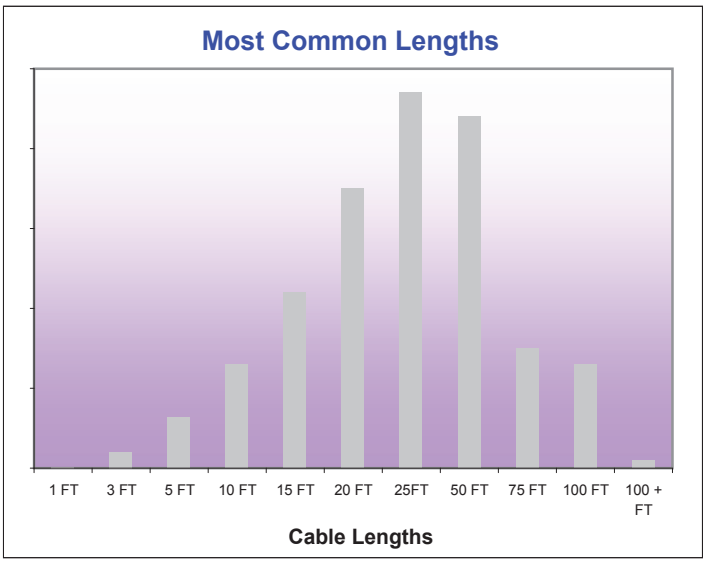
Test Cables
Test Head Cables
Component Interconnects
Antenna Systems
Radar Systems

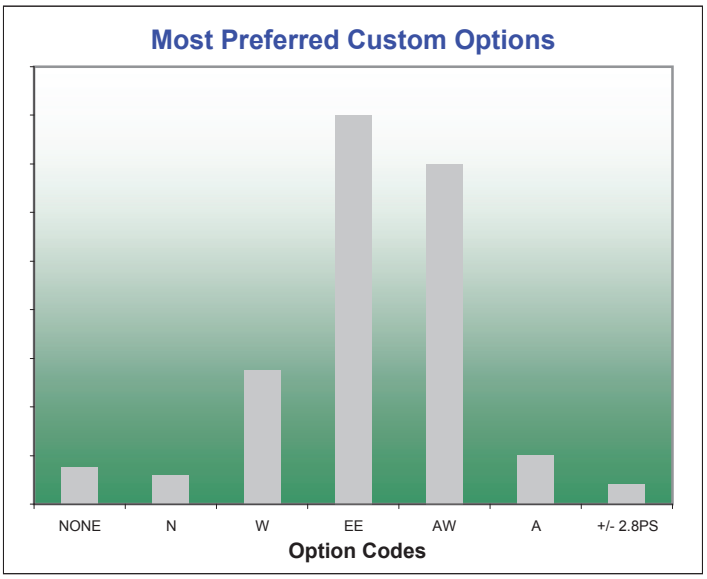












Lab-Flex® 290 offers the lowest loss in a flexible cable for applications up to 18 GHz. Especially suited for long lengths, this cable is also ideal where insertion loss or high power is a concern. All connector types are mode free to 18 GHz and have a rugged, stainless steel construction.

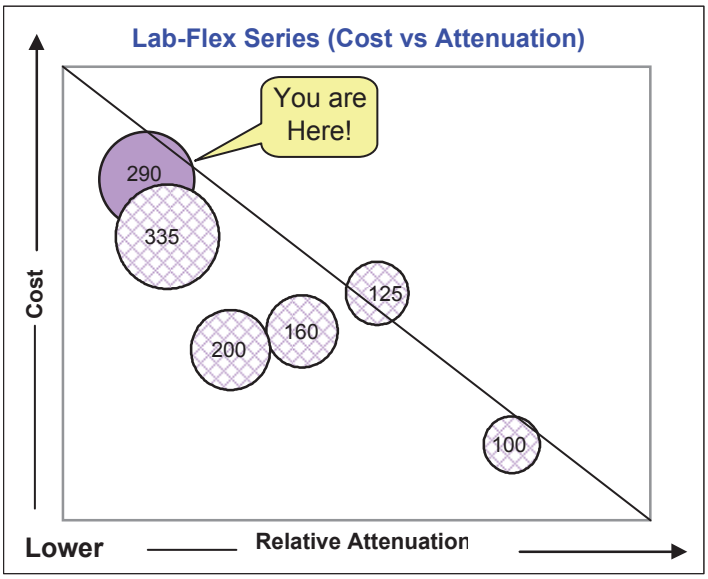
Features/Benefits:

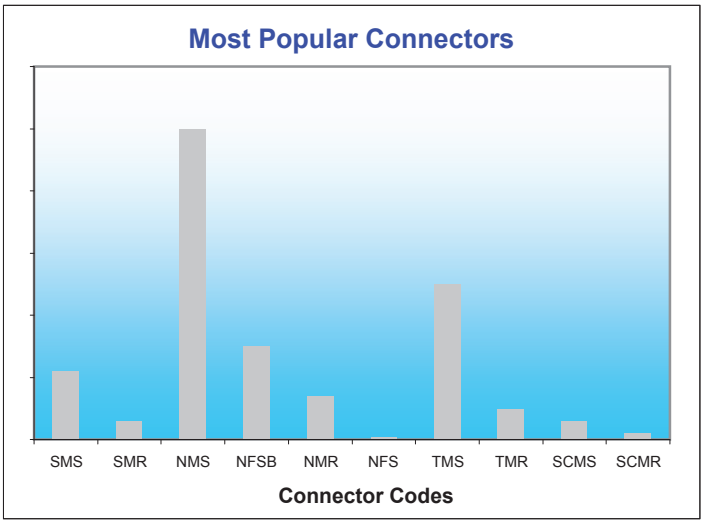
Mode Free Operation to 18 GHz
84% Velocity Low Loss Dielectric
Superior Shielding Effectiveness
Available with Protective Coverings of:
- Armor
- Weatherized
- Armor/Weatherized

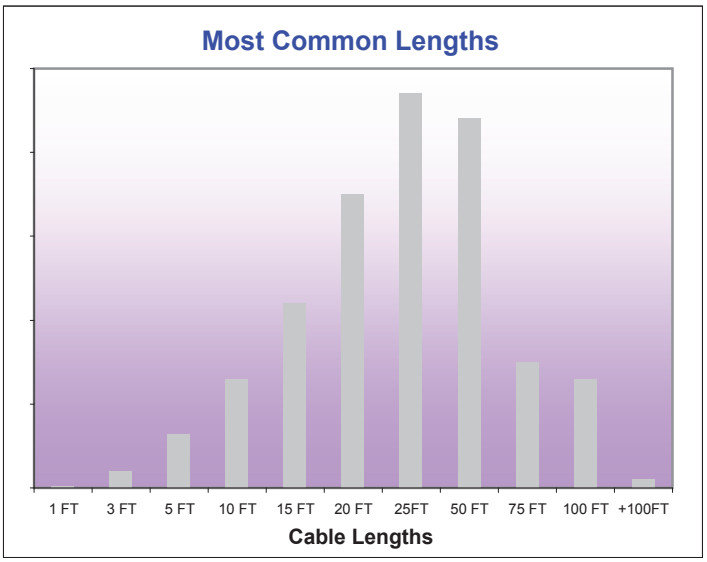
Stainless Steel Connectors
Phase Matched Sets Available

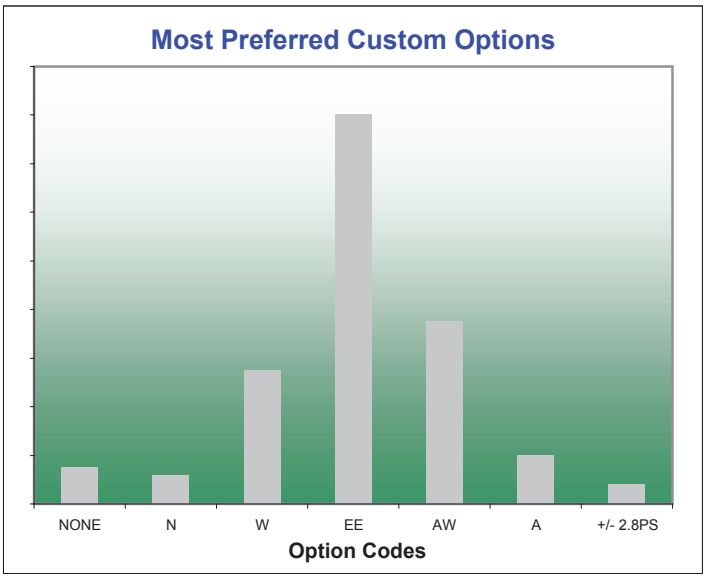
Applications:

Long Run Test Cables
Field Test Setups
Antenna Systems
Radar Systems









Lab-Flex® 335 is a high performance, low loss replacement for traditional cables such as RG214 & RG393. With an 80% velocity, low density dielectric, Lab-Flex® 335 cable offers a 40% lower loss then solid dielectrics of the same size.

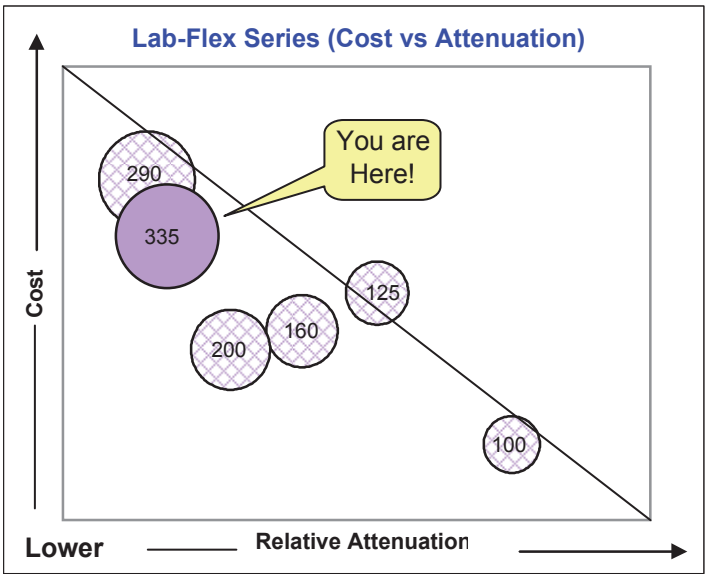
Features/Benefits:

Mode Free Operation to 18 GHz
80% Velocity Low Loss Dielectric
Superior Shielding Effectiveness
Available with Protective Coverings of:
- Armor
- Weatherized
- Armor/Weatherized

Stainless Steel Connectors
Phase Matched Sets Available

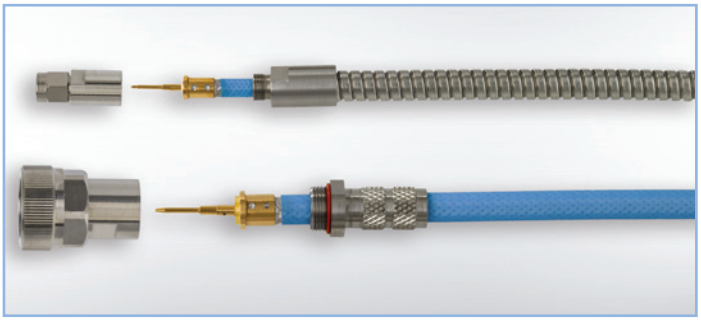
Applications:

Long Run Test Cables
Field Test Setups
Antenna Systems
Radar Systems



Introduction

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
- 7 & 19 Strand Copper Conductor Versions
- 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.

Specifications

General Specifications	Lab-Flex S 115S	Lab-Flex S 180SP	Lab-Flex S 235SP	Lab-Flex S 335SP	Lab-Flex S 490S	
MIL Number	N/A	N/A	N/A	N/A	N/A	
Diameter (inches)	0.105	0.180	0.235	0.335	0.490	
Frequency, Max (GHz)	65	40	26	18	10	
Loss @ 5 GHz (dB/100ft)	57.6	34.0	25.1	15.2	8.5	

Electrical Specifications	Lab-Flex S 115S	Lab-Flex S 180SP	Lab-Flex S 235SP	Lab-Flex S 335SP	Lab-Flex S 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	1.30	1.30	1.30	1.27	

Mechanical Specifications	Lab-Flex S 115S	Lab-Flex S 180SP	Lab-Flex S 235SP	Lab-Flex S 335SP	Lab-Flex S 490S	
Weight (lbs/100ft)	2.00	3.00	5.50	9.00	19.20	
Temperature Range (˚C)	-55 to +200*	-65 to +85	-65 to +85	-65 to +85	-55 to +200*	
Minimum Bend Radius (inches)	0.50	0.90	1.10	1.60	2.50	

*Temperature ranges on standard boots -65 + 100C

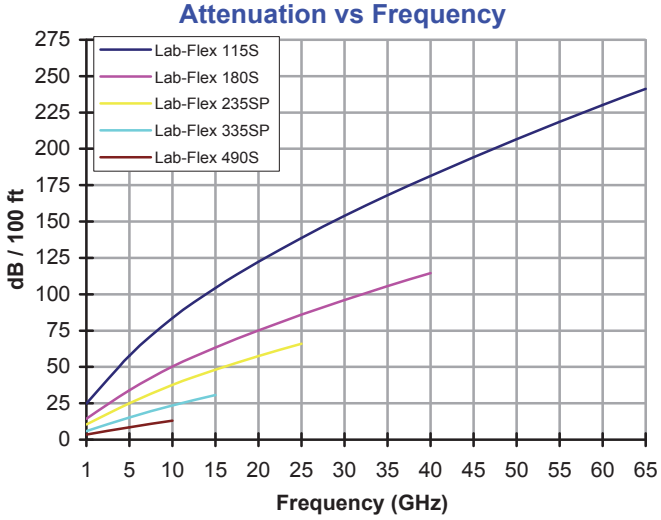
Construction Data	Lab-Flex S 115S	Lab-Flex S 180SP	Lab-Flex S 235SP	Lab-Flex S 335SP	Lab-Flex S 490S	
Inner Conductor	Stranded SC	Stranded SC	Stranded SC	Stranded SC	Stranded SC	
Dielectric	Expanded PTFE	Expanded PTFE	Expanded PTFE	Expanded PTFE	Expanded PTFE	
First Outer Shield	Flat Braid SC	Flat Braid SC	Flat Braid SC	Flat Braid SC	Flat Braid SC	
Second Outer Shield	Conductive Tape	Conductive Tape	Conductive Tape	Conductive Tape	Aluminum Polyester	
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	24.7	14.3	9.6	6.1	3.7
5	57.3	33.8	22.5	14.8	8.7
10	83.0	19.1	33.0	22.2	13.9
18	114.5	67.6	46.1	31.7	
20	121.6	71.7	49.1		
26	141.0	83.1	57.4		
30	153.2	90.5			
35	167.3	98.8			
40	180.6	106.6			
45	193.3				
50	205.0				
55	217.3				
60	228.8				
65	240.1				

Max Cable Loss at 25°C & Sea Level

Attenuation vs Frequency

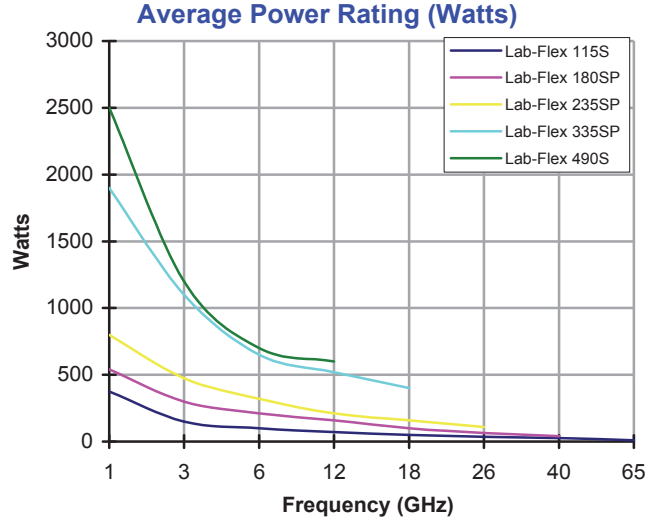


Average Power Rating (Watts)

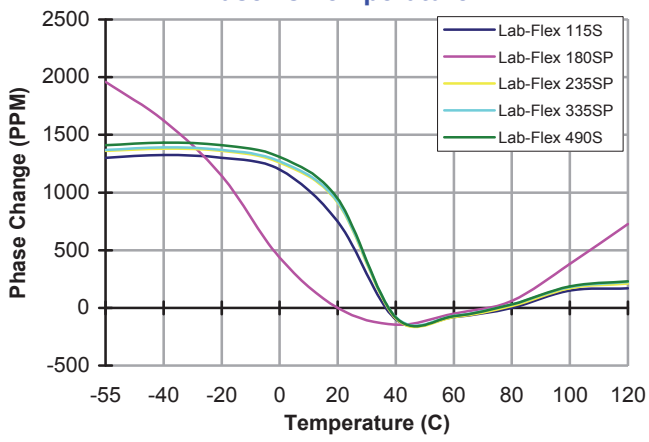
GHz	115S	180SP	235SP	335SP	490S
1	375	540	800	1900	2500
3	150	300	475	1100	1200
6	100	210	320	650	700
10	80	177	247	563	633
12	70	160	210	520	
18	50	100	160	400	
26	35	65	110		
32	31	54			
40	25	40			
50	19				
65	10				

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

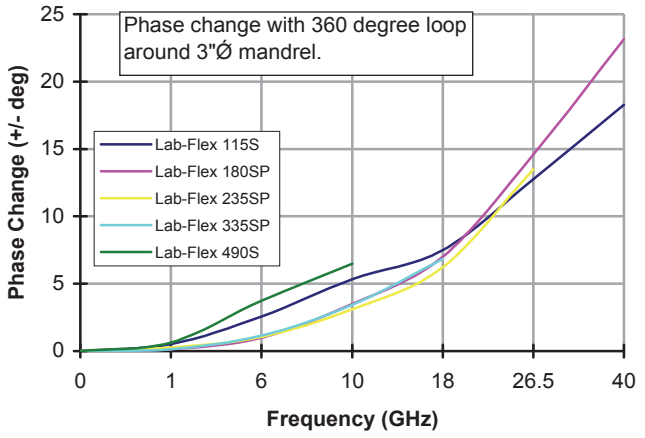
Average Power Rating (Watts)



Phase vs Temperature



Phase vs Flexure



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	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		KMR			
2.9 mm	Jack	(Female)	Straight	40		KFS			
2.9 mm	Bulkhead	(Female)	Straight	40		KFBS			
3.5 mm	Plug	(Male)	Straight	35		3MS			
3.5 mm	Jack	(Female)	Straight	35		3FS			
SMA	Plug	(Male)	Straight	26	SMS	SMS	SMS	SMS	
SMA	Plug	(Male)	R/A	18		SMR	SMR	SMR	
SMA	Jack	(Female)	Straight	18			SFS	SFS	
SMA	Bulkhead	(Female)	Straight	18			SFBS	SFBS	
Type N	Plug	(Male)	Straight	18		NMS	NMS	NMS	NMS
Type N	Jack	(Female)	Straight	18			NFS	NFS	
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			TFS	TFS	
TNC	Plug	(Male)	R/A	18			TMR	TMR	TMR
TNC	Bulkhead	(Female)	Straight	18			TFBS	TFBS	
7 mm		N/A	Straight	18			A7		
SC	Plug	(Male)	Straight	10				SCMS	SCMS
SC	Plug	(Male)	R/A	10				SCMR	SCMR
SC	Bulkhead	(Female)	Straight	10				SCFBS	SCFBS
HN	Plug	(Male)	Straight	4					HNMS

Gender of the connector is determined by center pin.

Consult sales department for other connectors and other 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
Weatherized (Polyolefin)	W	√	√	√	√	√
Weatherized (Neoprene)	N	√	√	√	√	√
Armored	A		√	√	√	√
Armored & Weatherized (PVC)	AW		√	√	√	√
Armored & Weatherized (Neoprene)	AN		√	√	√	√
Armored & Weatherized (Monocoil & Silicone)	MC		√			
Armored & Weatherized (Monocoil & Polyolefin)	MW		√	√		
Extended Boots	E	√	√	√	√	√
Phase Matching (+/- 2.8 picoseconds)	+/- 2.8 PS	√	√	√	√	√
Dust Caps	D	√	√	√	√	√

Options & Ordering Information

Cable Options

A - Armored

AN - Armored and Weatherized-Neoprene

AW - Armored and Weatherized-PVC

E - Extended Boots

MC - Monocoil-Silicone

MW - Monocoil Weatherized-Polyolefin

W - Weatherized-Polyolefin

W - Weatherized-PVC

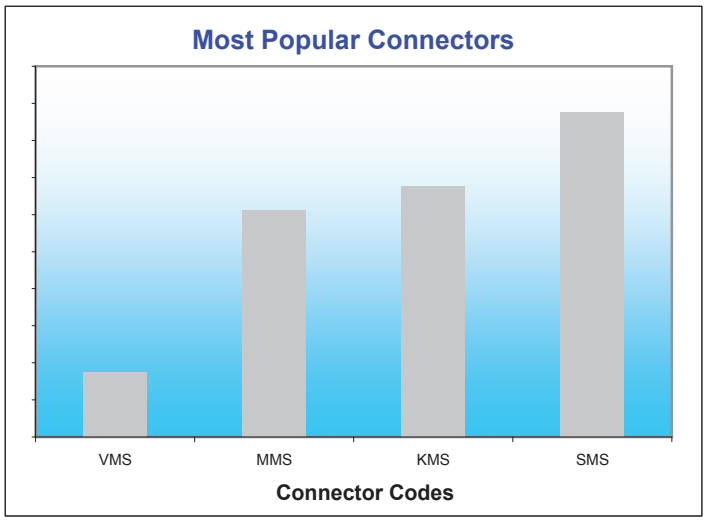
D - Dust Caps

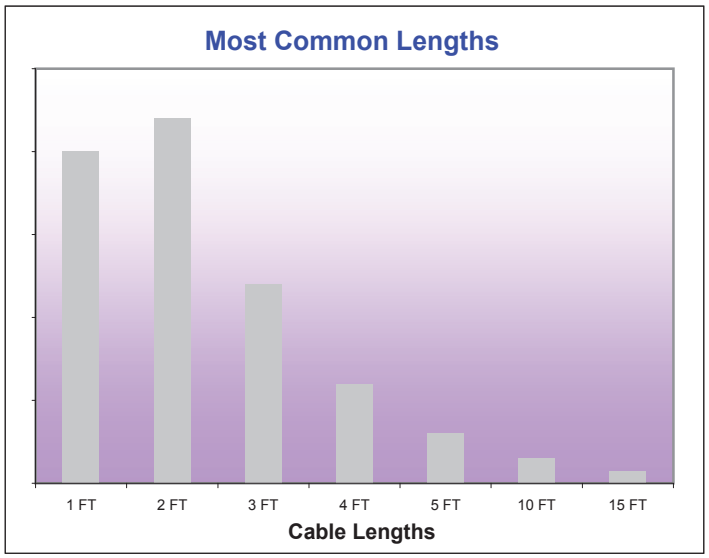
Part Numbering Code

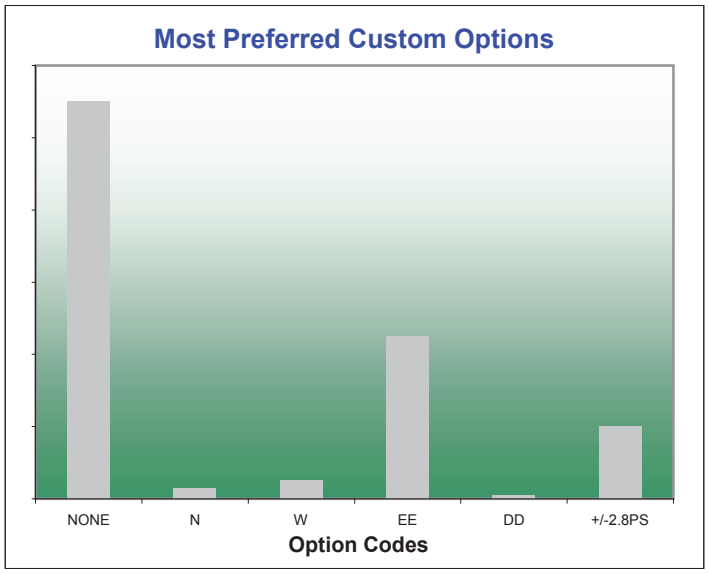
Ordering Information

K M S		1 1 5 S		2 4 . 0	-	K M S	
CONNECTOR #1 KMS = 2.9mm Male Straight SMS = SMA Male Straight SMR = SMA Right Angle	OPTION (Connector #1) Blank = None E = Extended Boot	CABLE 115S = Lab-Flex® S 115	OPTION Blank = None W = Weatherized	LENGTH (IN.) Example: 24.0 = 24 inches		CONNECTOR #2 KMS = 2.9mm Male Straight SMS = SMA Male Straight SMR = SMA Right Angle	OPTION (Connector #2) Blank = None E = Extended Boot

For the full list of cable choices see pages - 2 & - 3, and for available connectors and other Options see pages pages - 4 & - 5 of this section.







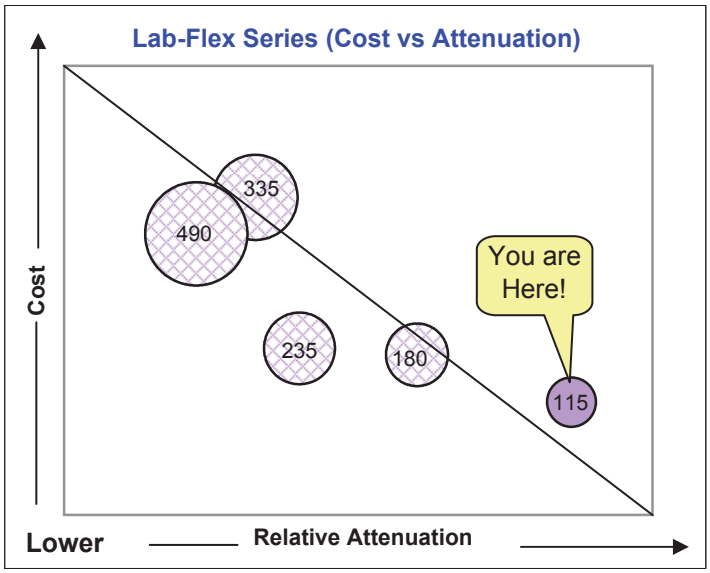
Lab-Flex® 115S is a low-loss, high performance cable which is suitable for applications up to 65 GHz. Its small size lends itself to good connector compatibility with 1.85mm and 2.4mm connectors which are available in plugs and jacks. The stranded center conductor design provides a durable test cable and can also be used for high frequency jumpers with low connector strain when the assembly is mated to a surface mount connector.

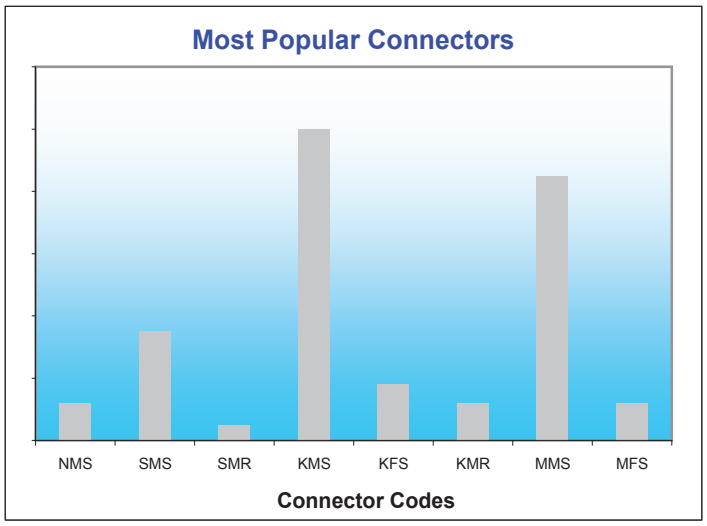
Features/Benefits:

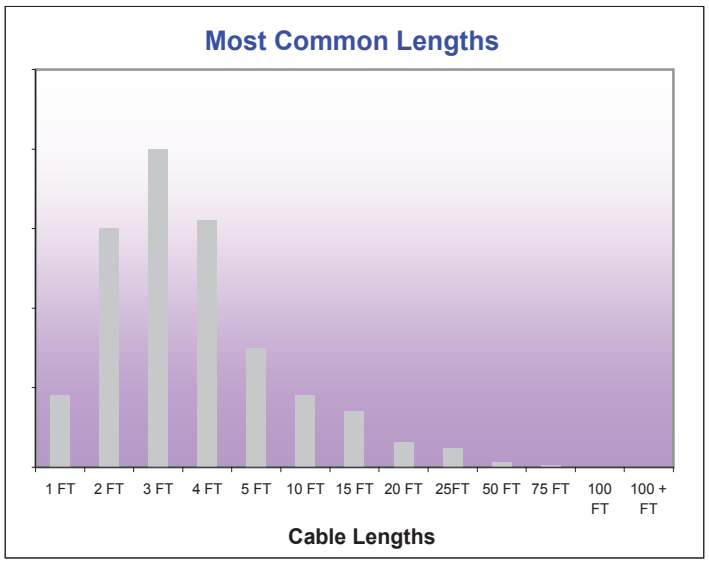
Mode Free Operation to 65 GHz
76% Velocity Low Loss Dielectric
Superior Shielding Effectiveness
19 Strand Center Conductor
Available with Protective Coverings of:
- Weatherized

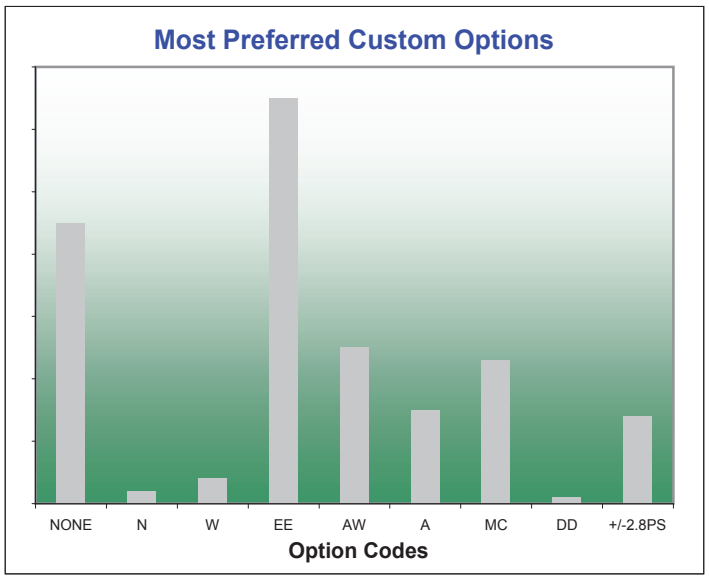
Applications:

High Frequency Interconnects
Radar Systems
Production and Lab Testing









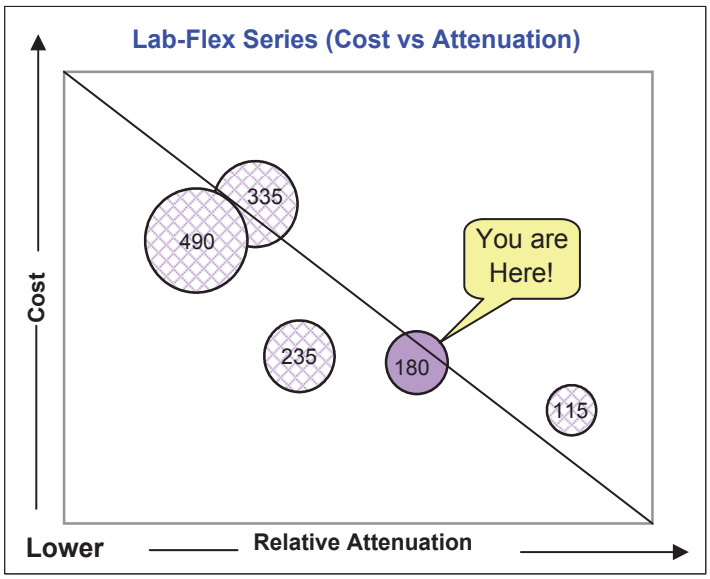
Lab-Flex® 180SP offers outstanding performance in applications up to 40 GHz. With a stranded center conductor and polyurethane jacket, it provides a very flexible and durable test cable while offering a full range of stainless steel connectors from 2.92mm to Type N. When used in systems, its unique design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

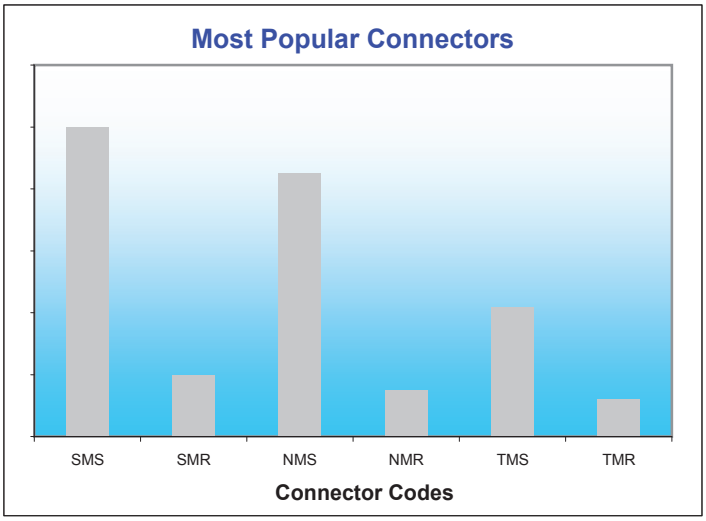
Features/Benefits:

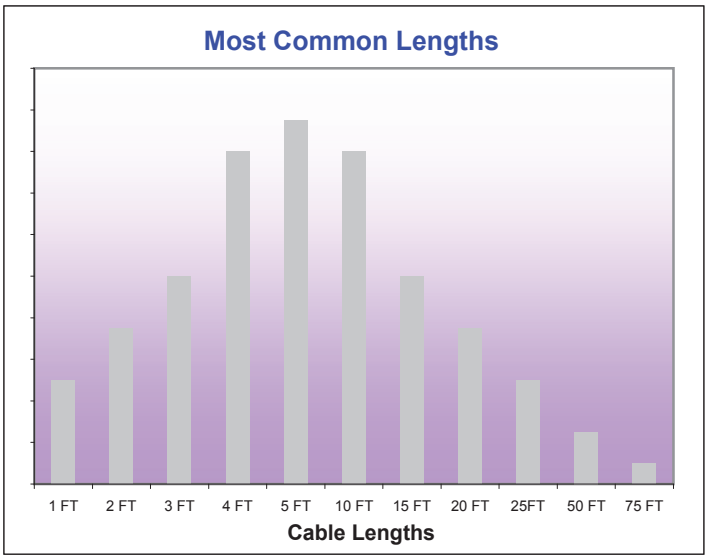
Mode Free Operation to 40 GHz
78% Velocity Low Loss Dielectric
Superior Shielding Effectiveness
19 Strand Center Conductor
Available with Protective Coverings of:
- Weatherized
- Armor/Weatherized
Phase Matched Pairs Available

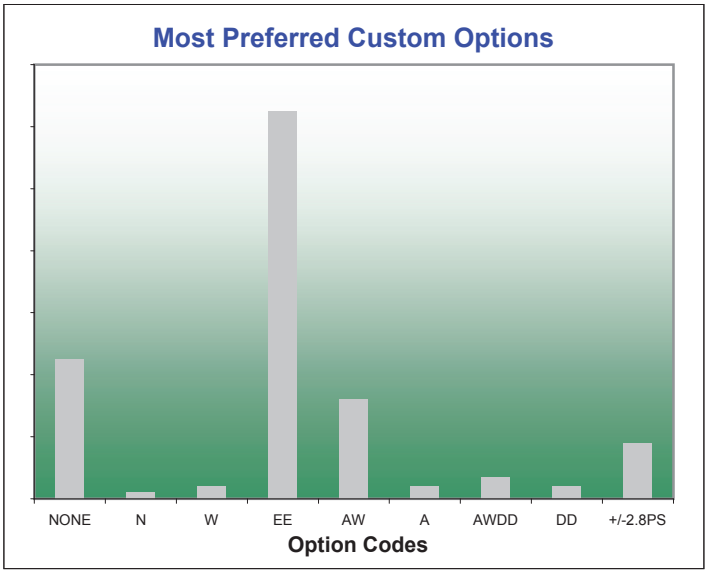
Applications:

Antenna Systems
Radar Systems
Production and Lab Testing









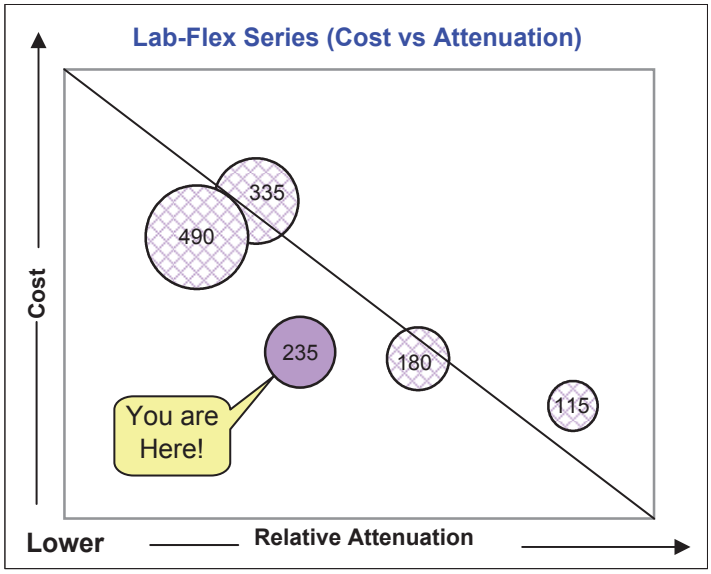
Lab-Flex® 235SP offers excellent performance for applications up to 26 GHz. With a stranded center conductor and polyurethane jacket, it provides a very flexible and durable test cable. A full range of stainless steel connectors from 26 GHz SMA to Type N plugs are available. This cable is most often 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.

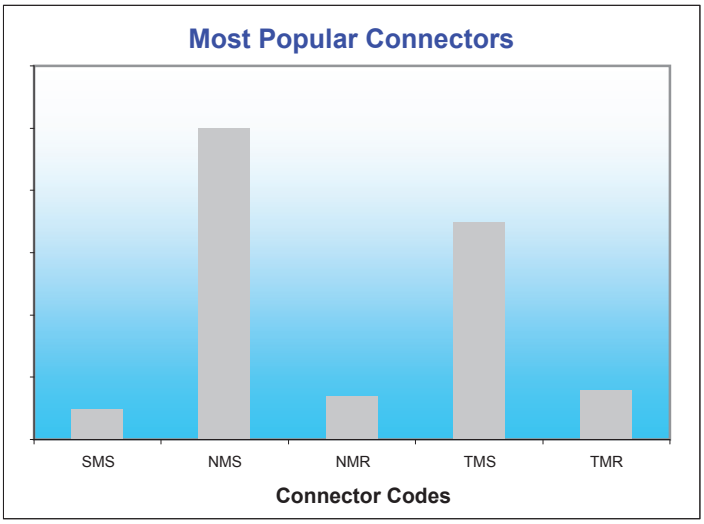
Features/Benefits:

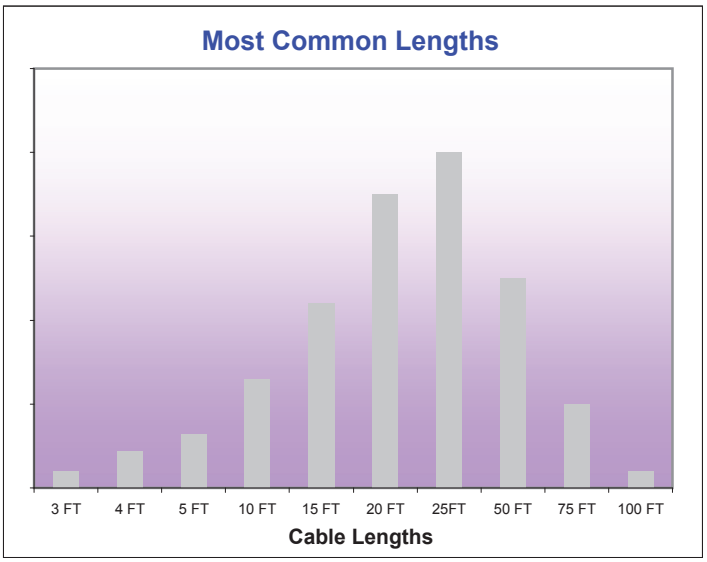
Mode Free Operation to 26 GHz
78% Velocity Low Loss Dielectric
19 Strand Center Conductor
Superior Shielding Effectiveness
Available with Protective Coverings of:
- Weatherized
- Armor/Weatherized
Phase Matched Pairs & Sets Available

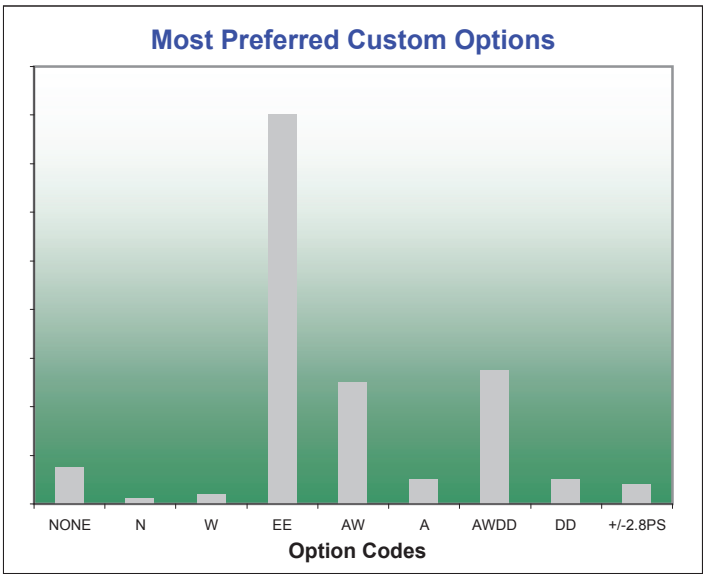
Applications:

Radar & Antenna Systems
Production and Lab Testing
Test Equipment Interconnects









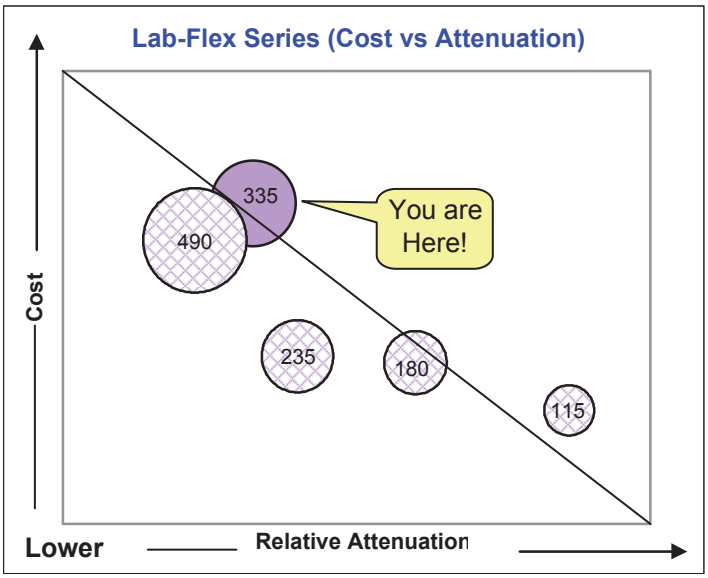
Lab-Flex® 335SP offers superior performance in applications up to 18 GHz. Primarily used in systems, this cable provides excellent durability over flexure up to 500,000 cycles. 335SP has a 19-strand center conductor and polyurethane jacket for increased flexibility. Its robust, low loss construction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

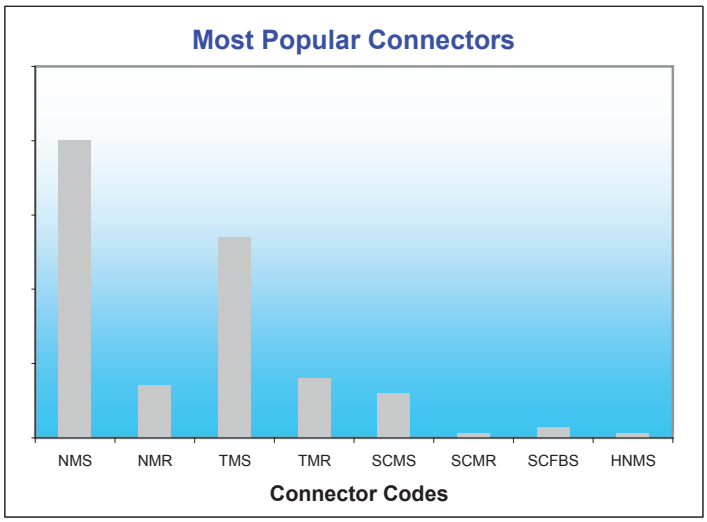
Features/Benefits:

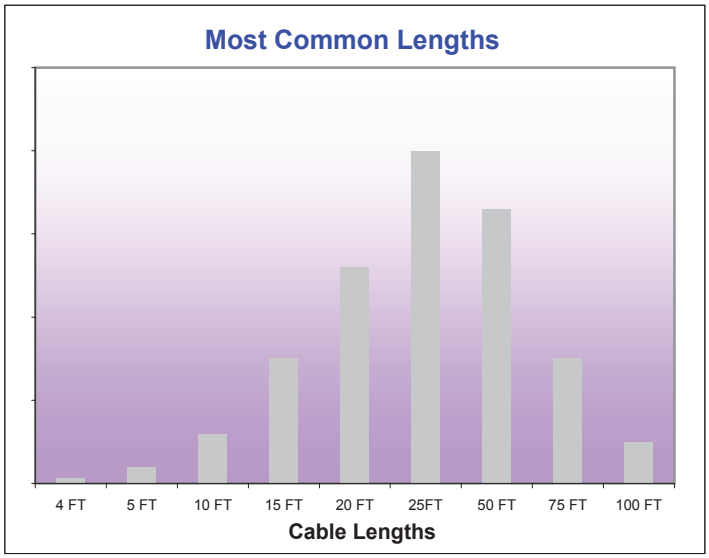
Mode Free Operation to 18 GHz
78% Velocity Low Loss Dielectric
19 Strand Center Conductor
Superior Shielding Effectiveness
Available with Protective Coverings of:
- Weatherized
- Armor/Weatherized
Phase Matched Pairs & Sets Available

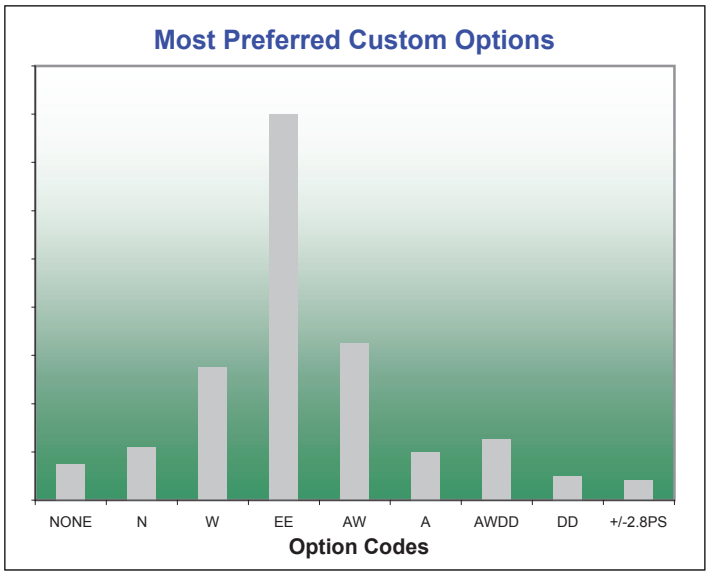
Applications:

Test Cables
Test Head Cables
Component Interconnects
Radar & Antenna Systems









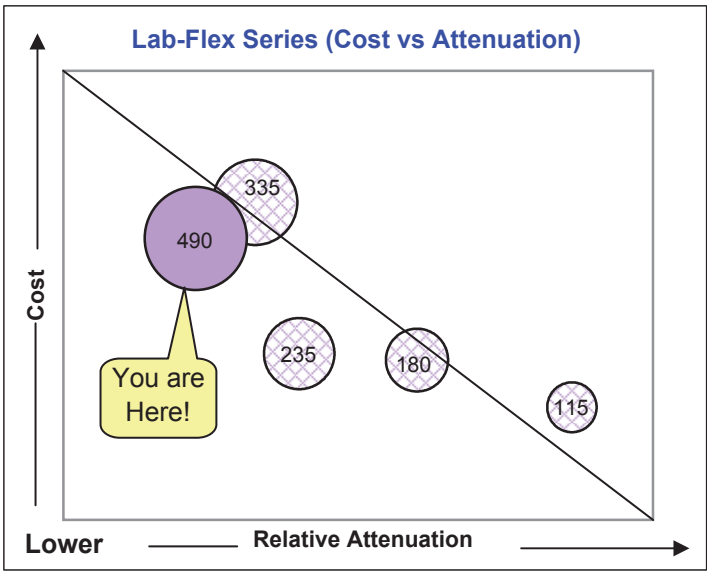
Lab-Flex® 490S offers superior performance in applications up to 10 GHz. 490S is primarily designed for system uses where high power at high frequencies are needed. Its FEP jacket offers more flexibility than typical corrugated cable types while still supplying greater then 90dB of shielding effectiveness. 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
7 Strand Center Conductor
Superior Shielding Effectiveness
Available with Protective Coverings of:
- Weatherized
- Armor/Weatherized
Stainless Steel, High Power Connectors

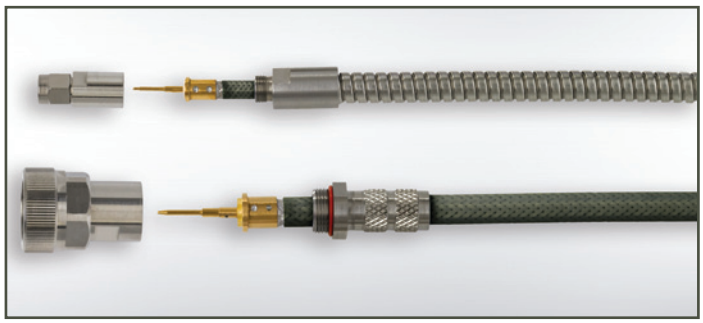
Applications:

Antenna Systems
Radar Systems
High Power Testing



Introduction

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 fully qualified to meet or exceed all 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 40 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 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.

General Specifications	Lab-Flex 160AF	Lab-Flex 210AF	Lab-Flex 255AF	Lab-Flex 310AF	Lab-Flex 340AF	
MIL Number	N/A	N/A	N/A	N/A	N/A	
Diameter (inches)	0.100	0.210	0.255	0.310	0.340	
Frequency, Max (GHz)	40	26	18	18	18	
Loss @ 5 GHz (dB/100ft)	30.0	21.0	18.0	11.5	10.2	

Electrical Specifications	Lab-Flex 160AF	Lab-Flex 210AF	Lab-Flex 255AF	Lab-Flex 310AF	Lab-Flex 340AF	
Impedance, Nominal (Ω)	50	50	50	50	50	
Velocity of Propagation (%)	78	78	78	80	80	
Shielding Effectiveness, 18 GHz (dB/ft)	>90	>90	>90	>90	>90	
Capacitance (pF/ft)	26	26	26	24.9	24.9	
Delay (ns/ft)	1.3	1.3	1.3	1.24	1.24	

Mechanical Specifications	Lab-Flex 160AF	Lab-Flex 210AF	Lab-Flex 255AF	Lab-Flex 310AF	Lab-Flex 340AF	
Weight (lbs/100ft)	1.00	5.90	6.40	7.70	8.00	
Temperature Range (˚C)	-55 to +200*	-55 to +200*	-55 to +200*	-55 to +200*	-55 to +200*	
Minimum Bend Radius (inches)	0.75	1.00	1.25	1.60	1.60	

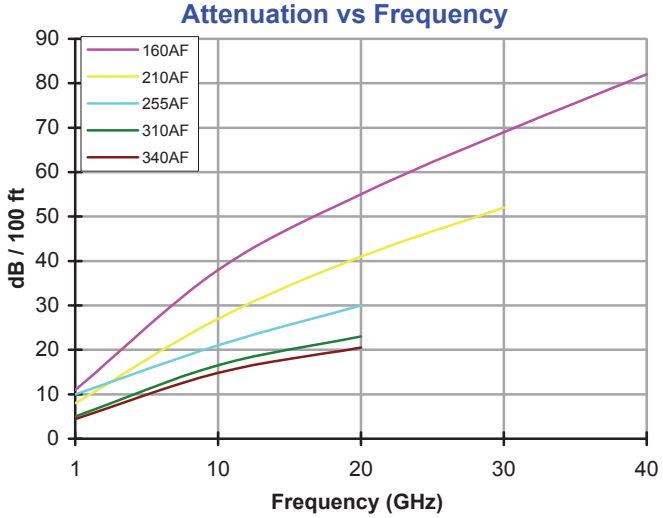
Construction Data	Lab-Flex 160AF	Lab-Flex 210AF	Lab-Flex 255AF	Lab-Flex 310AF	Lab-Flex 340AF	
Inner Conductor	Solid SC	Solid SC	Solid SC	Solid SC	Solid SC	
Dielectric	Expanded PTFE	Expanded PTFE	Expanded PTFE	Expanded PTFE	Expanded PTFE	
First Outer Shield	Flat Braid SC	Flat Braid SC	Flat Braid SC	Flat Braid SC	Flat Spiral SC	
Second Outer Shield	Foil Tape	Foil Tape	Foil Tape	Foil Tape	Foil Tape	
Third Outer Shield	Braid SC	Braid SC	Braid SC	Braid SC	Braid SC	
Jacket	Nomex	Nomex	Nomex	Nomex	Nomex	

Attenuation (dB/100ft)

GHz	160	210	255	310	340	
1	15.8	11.3	10.2	6.7	4.5	
6	30.2	18.7	18.7	12.3	11.3	
10	39.5	28.7	21.0	16.5	15.2	
16	48.5	36.5	27.5	21.7	19.2	
18	51.6	38.3	30.1	23.4	20.5	
20	57.2	41.8				
26	63.5	47.6				
30	69.0					
36	75.5					
40	81.6					
44						
50						

Max Cable Loss at +25°C & Sea Level

Attenuation vs Frequency

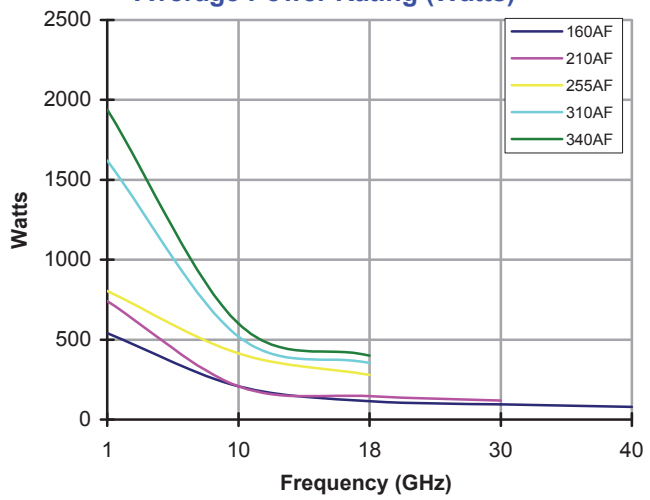


Average Power Rating (Watts)

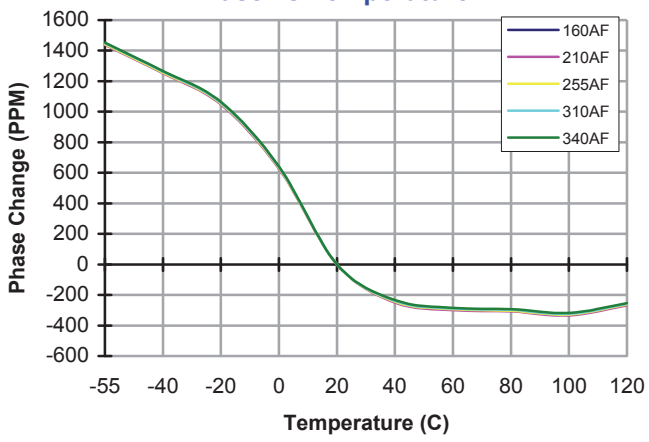
GHz	160	210	255	310	340	
1	540	740	805	1620	1940	
6	279	279	575	630	750	
10	170	208	415	470	600	
16	133	166	340	380	450	
18	120	156	280	355	400	
20	115	147				
26	103	132				
30	95					
36	88					
40	80					
44						
50						

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

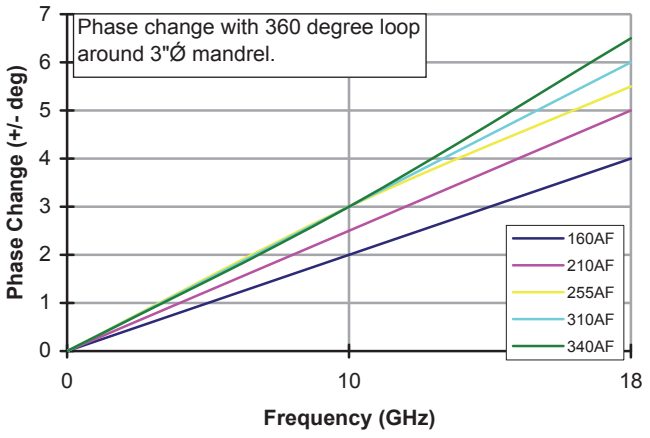
Average Power Rating (Watts)



Phase vs Temperature



Phase vs Flexure



Connector Selection & Options

Connector Options				Frequency Max GHz*	Lab-Flex 160AF	Lab-Flex 210AF	Lab-Flex 255AF	Lab-Flex 310AF	Lab-Flex 340AF	
SMA	Plug	(Male)	Straight	26	SMS	SMS	SMS			
SMA	Plug	(Male)	R/A	18	SMR	SMR	SMR			
SMA	Jack	(Female)	Straight	18	SFS	SFS	SFS			
SMA	Bulkhead	(Female)	Straight	18	SFBS	SFBS				
Type N	Plug	(Male)	Straight	18		NMS	NMS	NMS	NMS	
Type N	Jack	(Female)	Straight	18		NFS	NFS	NFS	NFS	
Type N	Bulkhead	(Female)	Straight	18		NFBS	NFBS	NFBS	NFBS	
Type N	Plug	(Male)	R/A	18		NMR	NMR	NMR	NMR	
TNC	Plug	(Male)	Straight	18		TMS	TMS	TMS	TMS	
TNC	Jack	(Female)	Straight	18		TFS	TFS	TFS	TFS	
TNC	Plug	(Male)	R/A	18		TMR	TMR	TMR	TMR	
TNC	Bulkhead	(Female)	Straight	18		TFBS	TFBS	TFBS	TFBS	
SC	Plug	(Male)	Straight	10				SCMS	SCMS	
SC	Plug	(Male)	R/A	10				SCMR	SCMR	
SC	Bulkhead	(Female)	Straight	10				SCFBS	SCFBS	

Gender of the connector is determined by center pin.

Consult sales department for other connectors and other 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 255AF	Lab-Flex 310AF	Lab-Flex 340AF	
Weatherized (Polyolefin or PVC)	W						
Weatherized (Neoprene)	N						
Armored	A						
Armored & Weatherized (PVC)	AW						
Armored & Weatherized (Neoprene)	AN						
Armored & Weatherized (Monocoil & Silicone)	MC						
Armored & Weatherized (Monocoil & Polyolefin)	MW						
Extended Boots	E	√	√	√	√	√	
Phase Matching (+/- 2.8 picoseconds)	+/-2.8 PS	√	√	√	√	√	
Dust Caps	D	√	√	√	√	√	

Options & Ordering Information

Cable Options

A - Armored

AN - Armored and Weatherized-Neoprene

AW - Armored and Weatherized-PVC

E - Extended Boots

MC - Monocoil-Silicone

MW - Monocoil Weatherized-Polyolefin

W - Weatherized-Polyolefin

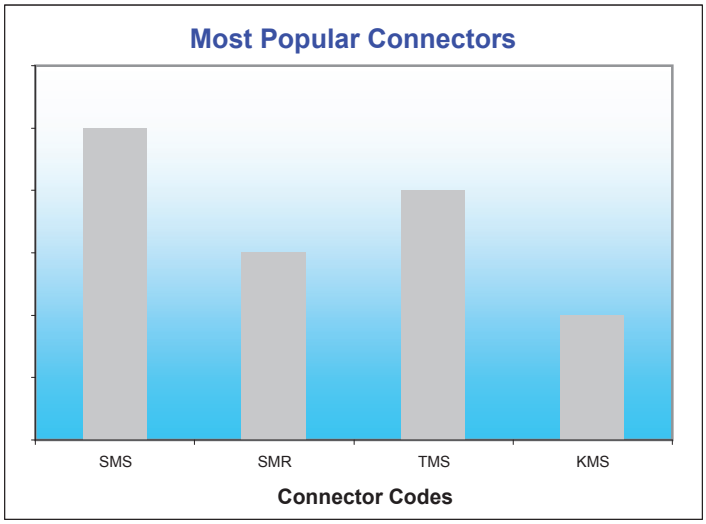
W - Weatherized-PVC

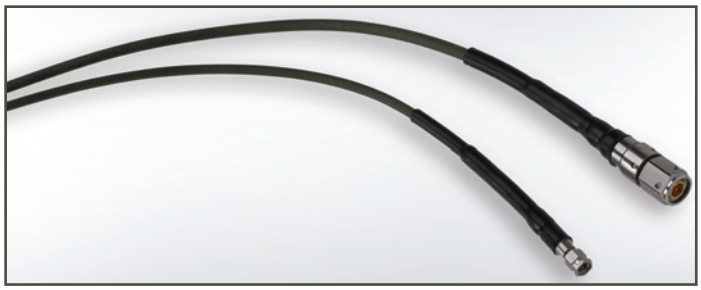
D - Dust Caps

Part Numbering Code

Ordering Information

S M S		1 6 0 A F	2 4 . 0	-	S M S	
CONNECTOR #1	OPTION	CABLE	LENGTH (IN.)		CONNECTOR #2	OPTION
SMS = SMA Male Straight SMR = SMA Right Angle *For the full list, see Lab-Flex AF - 4.*	(Connector #1) Blank = None E = Extended Boot	160AF = Lab-Flex® 160AF	Example: 24.0 = 24 inches		SMS = SMA Male Straight SMR = SMA Right Angle *For the full list, see Lab-Flex AF - 4.*	(Connector #2) Blank = None E = Extended Boot





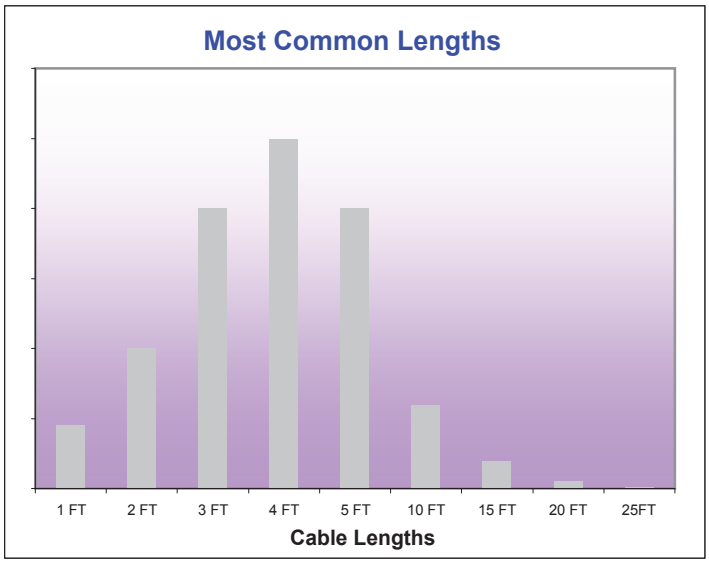
Lab-Flex® 160AF is the lightest weight flexible cable in our family of airframe qualified assemblies and offers excellent performance up to 40 GHz. A wide range of high frequency, stainless steel connectors are available. The 78% velocity dielectric provides a low loss choice without sacrificing dielectric strength and phase stability.

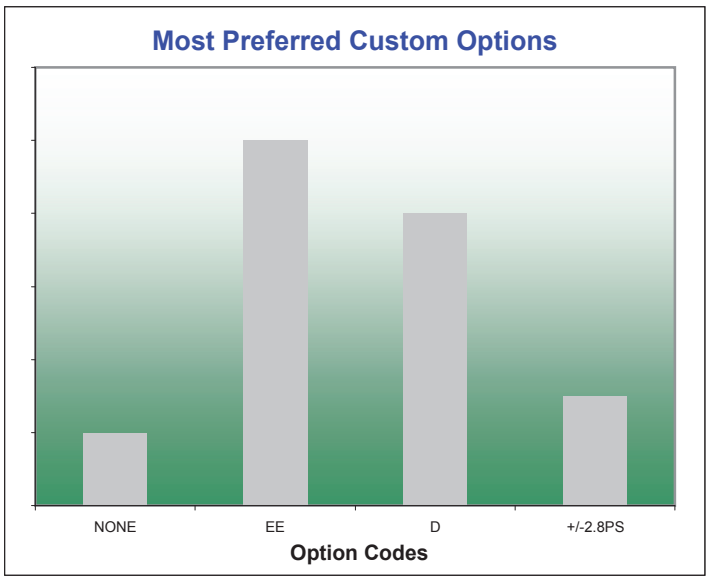
Features/Benefits:

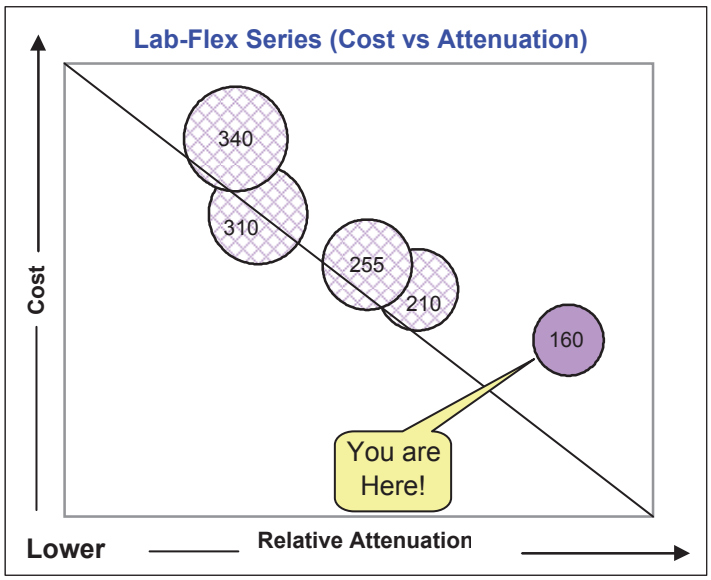
- Mode Free Operation to 40 GHz
- 78% Velocity Low Loss Dielectric
- Superior Shielding Effectiveness
- Durable, Lightweight Construction
- All Stainless Steel Connectors
- Phase Matched Sets Available

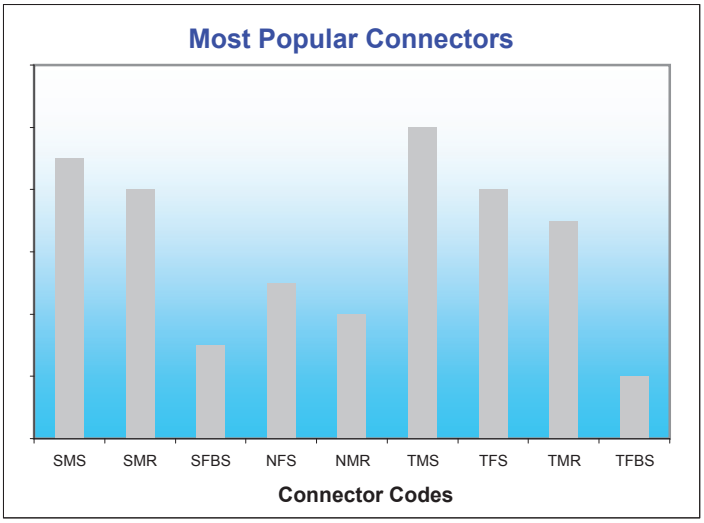
Applications:

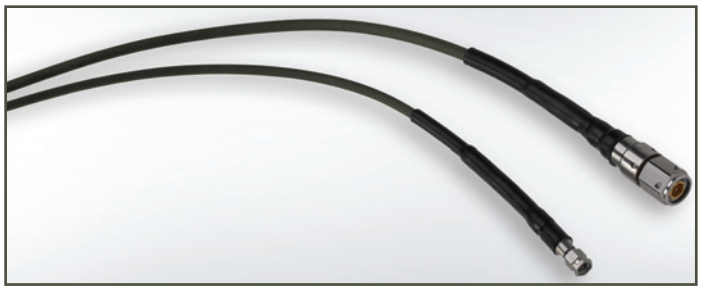
- Airborne Radar and Antenna Systems
- UAV Guidance Systems
- Shipboard Communications











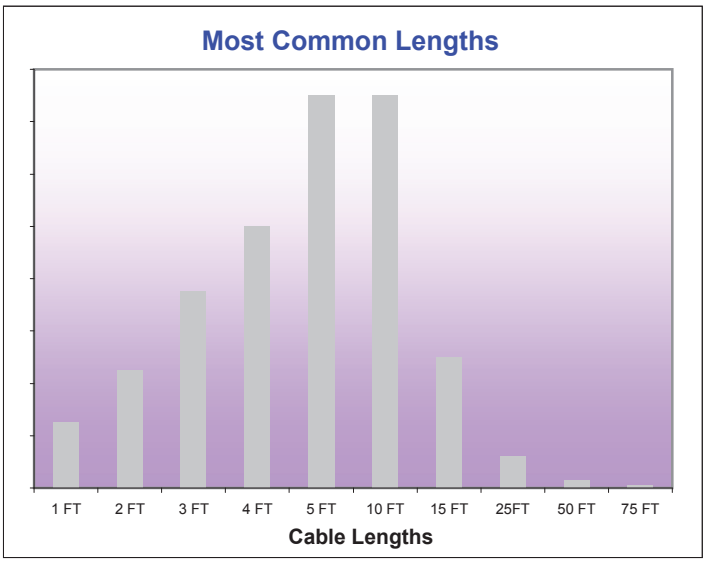
Lab-Flex® 210AF is ideal for any airframe applications that may require a durable low-loss cable with performance capabilities up to 26 GHz. With a 78% velocity, low density PTFE dielectric, Lab-Flex® 210AF provides a low loss flexible choice that is moisture sealed to withstand the harshest environments.

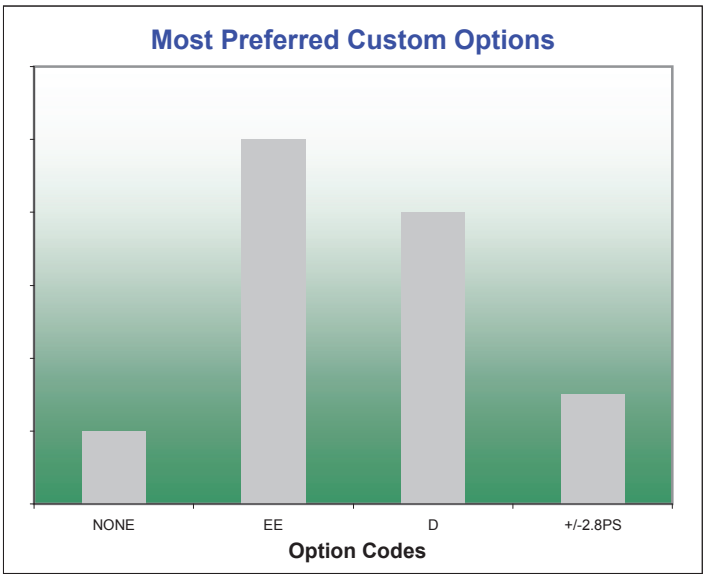
Features/Benefits:

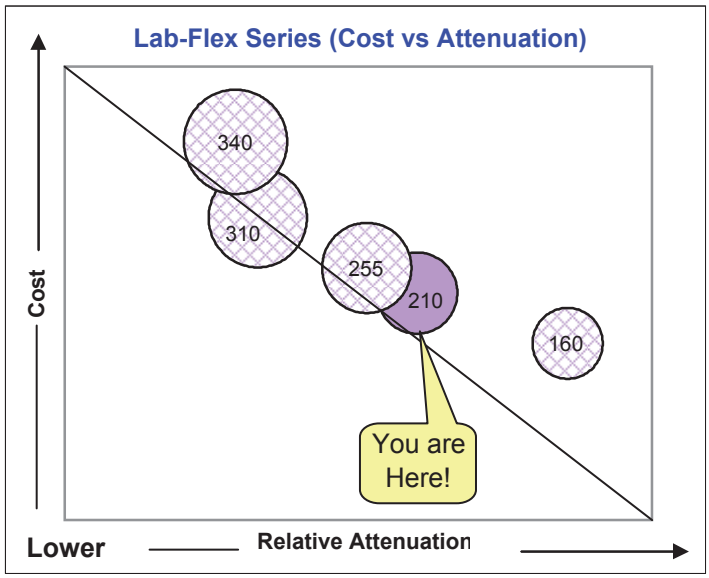
- Mode Free Operation to 26 GHz
- 78% Velocity Low Loss Dielectric
- Superior Shielding Effectiveness
- Durable, Lightweight Construction
- All Stainless Steel Hermetic Connectors
- Phase Matched Sets Available

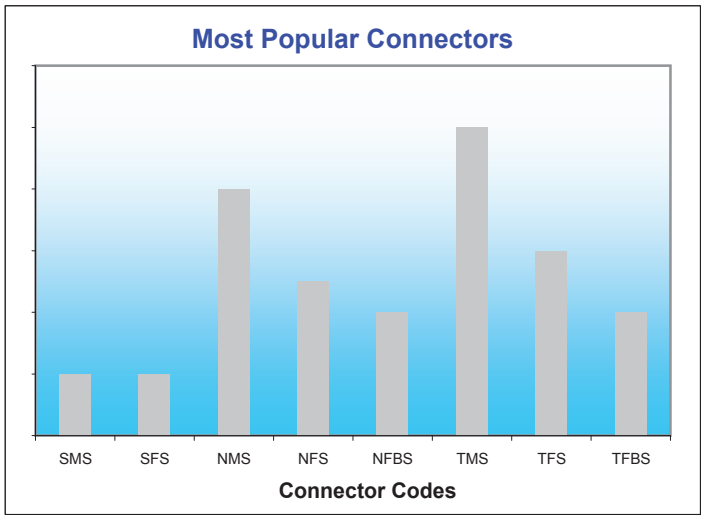
Applications:

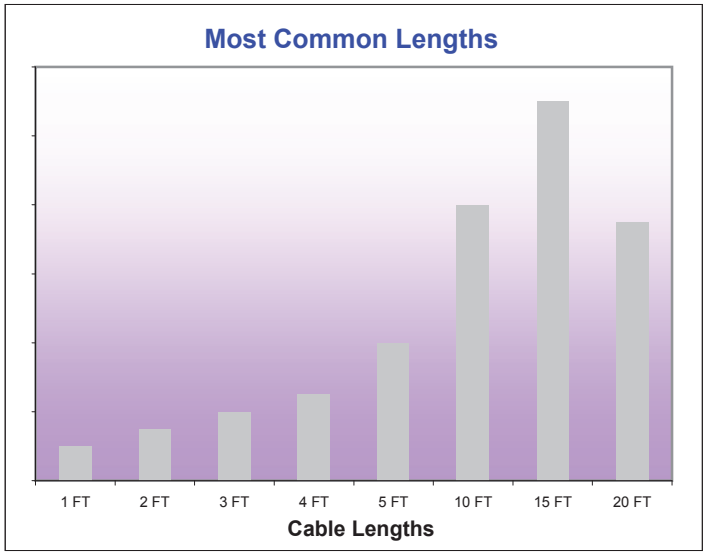
- Airborne (Commercial and EW)
- UAV Guidance Systems
- Antenna and Radar Systems

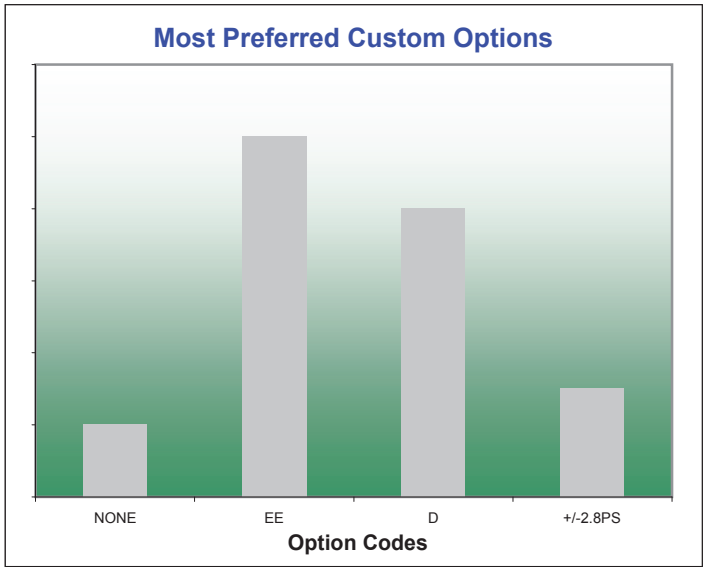


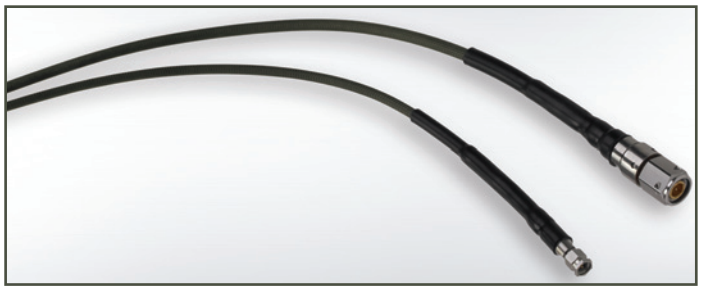












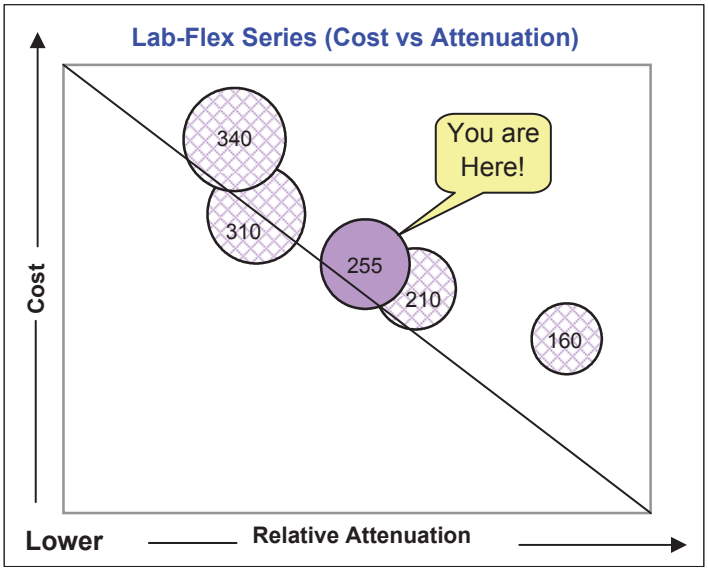
Lab-Flex® 255AF cable is our lightest weight, airborne-qualified cable type for use up to 18 GHz. With hermetically sealed connectors Lab-Flex® 255AF provides a durable, cost effective, high performance, flexible cable that will withstand severe environments.

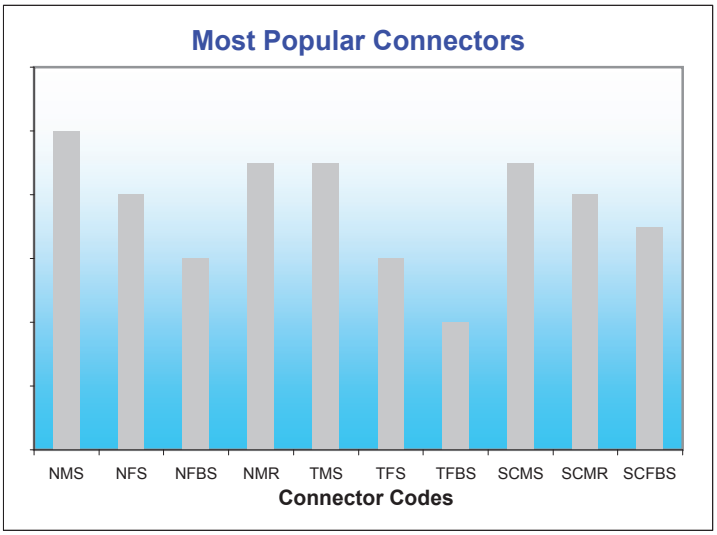
Features/Benefits:

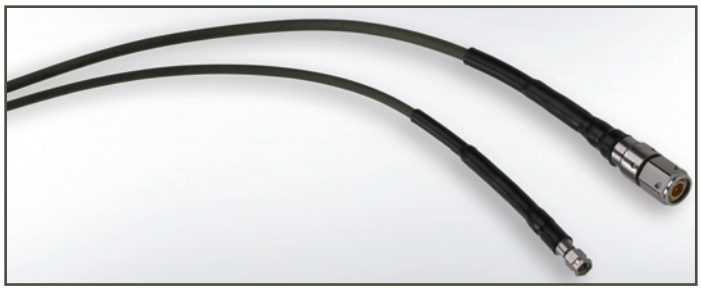
- Mode Free Operation to 18 GHz
- 78% Velocity Low Loss Dielectric
- Moisture Sealed Cable Construction
- Superior Shielding Effectiveness
- Durable Lightweight Construction
- All Stainless Steel Hermetic Connectors
- Phase Matched Sets Available

Applications:

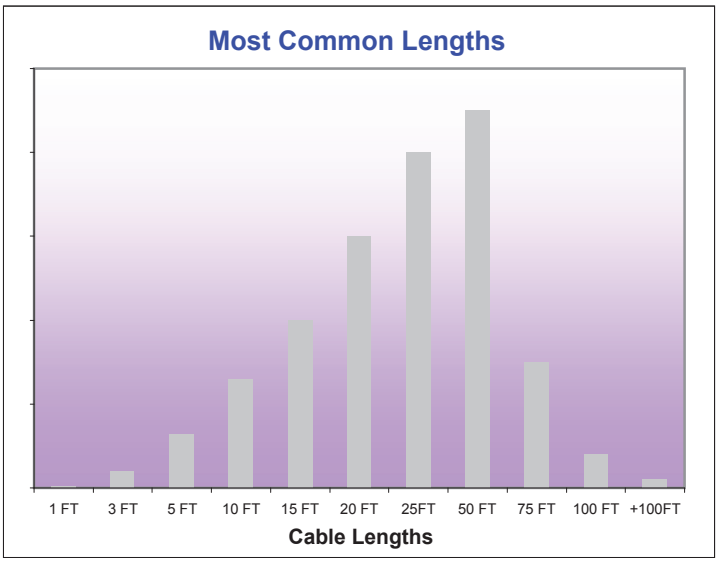
- Airborne (Commercial & EW)
- Radar and Antenna Systems
- UAV Guidance Systems







Lab-Flex® 310AF is a low loss, flexible cable for harsh environment applications up to 18 GHz. Specially suited for longer lengths, this cable is ideal where insertion loss or high power is a concern. The extensive list of connector types all have a rugged, stainless steel construction that is hermetically sealed. This cable also features several SC connectors for higher power applications.

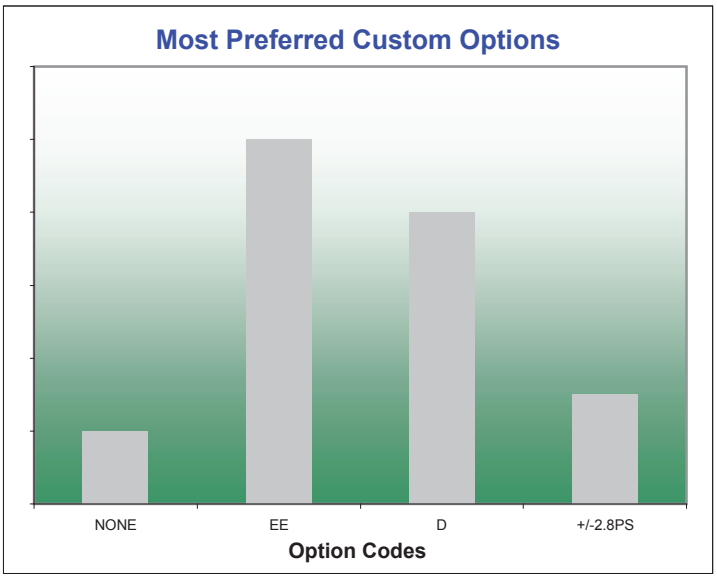


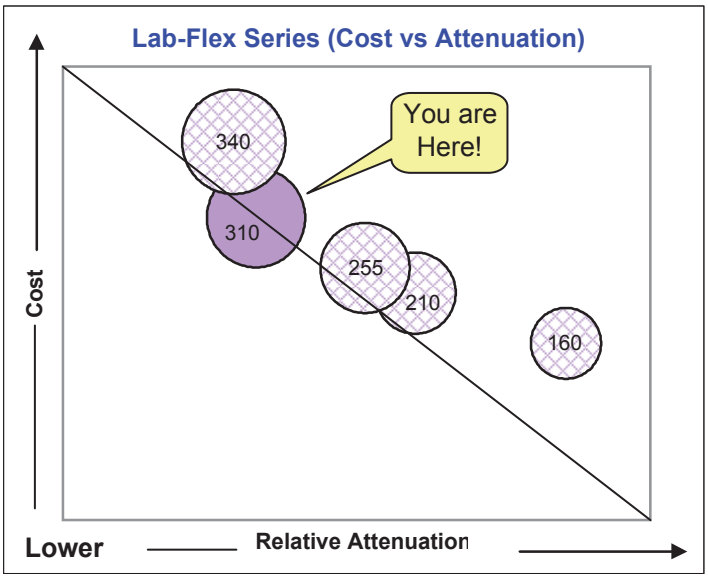
Features/Benefits:

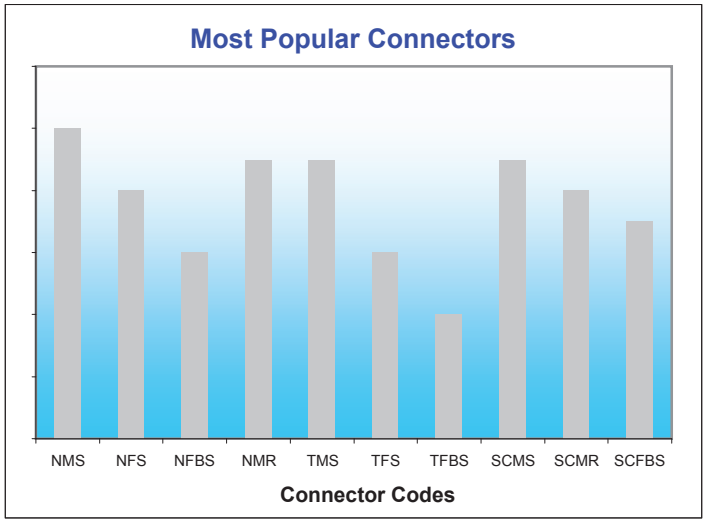
- Mode Free Operation to 18 GHz
- 80% Velocity Low Loss Dielectric
- Moisture Sealed, Durable Cable Construction
- Superior Shielding Effectiveness
- All Stainless Steel Hermetic Connectors
- Phase Matched Sets Available

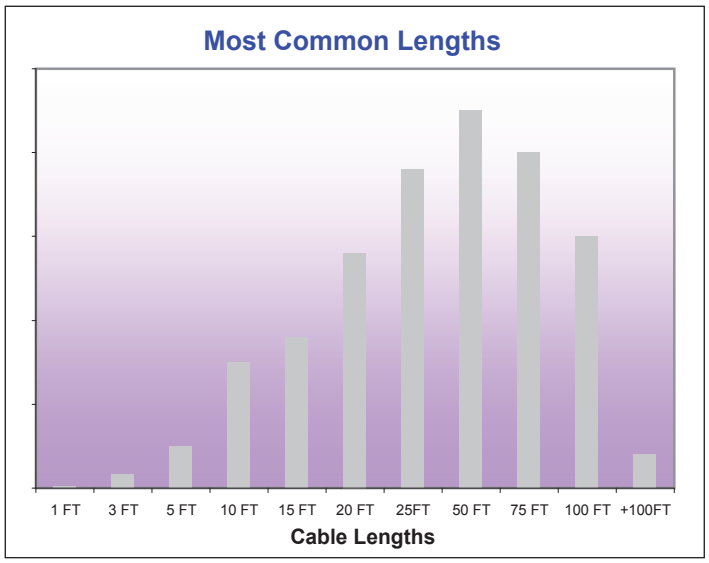
Applications:

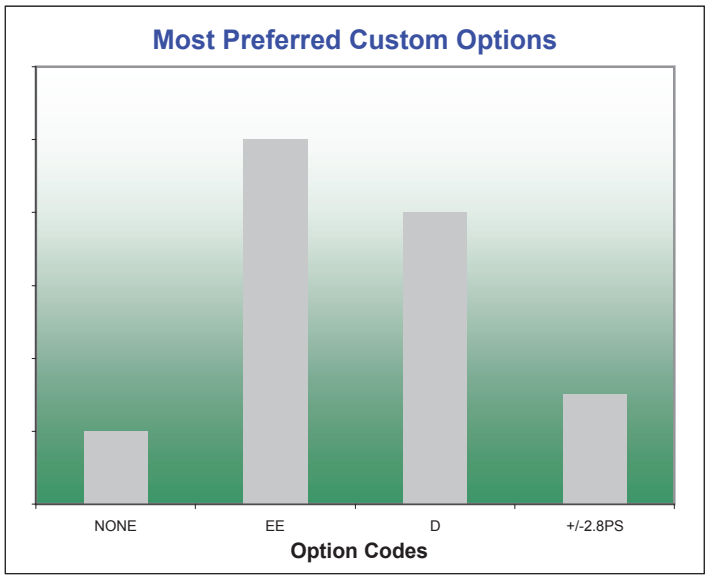
- Airborne (Commercial & EW)
- Antenna & Radar Systems
- UAV Guidance Systems

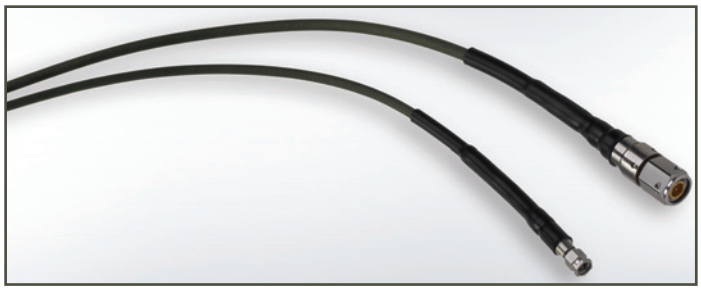












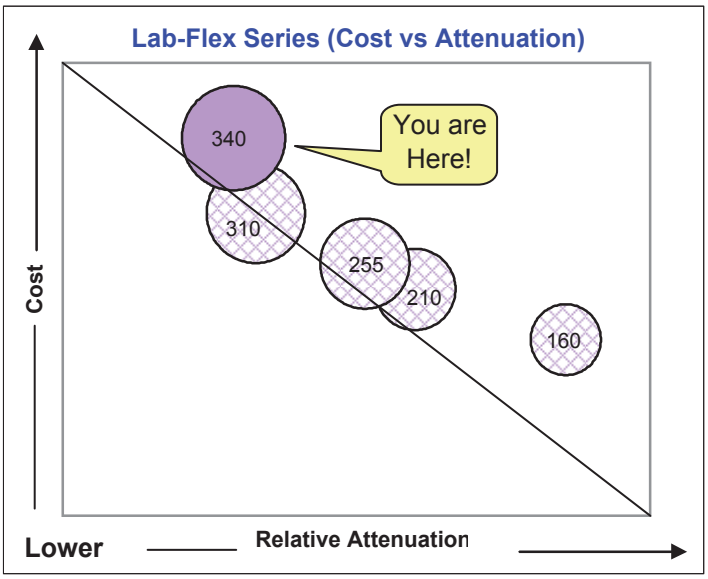
Lab-Flex® 340AF is the lowest loss version in our airborne qualified family of cables. With an 80% velocity, low density dielectric, this cable provides an exceptionally rugged design for applications requiring either the highest power handling or the lowest insertion loss up to 18 GHz.

Features/Benefits:

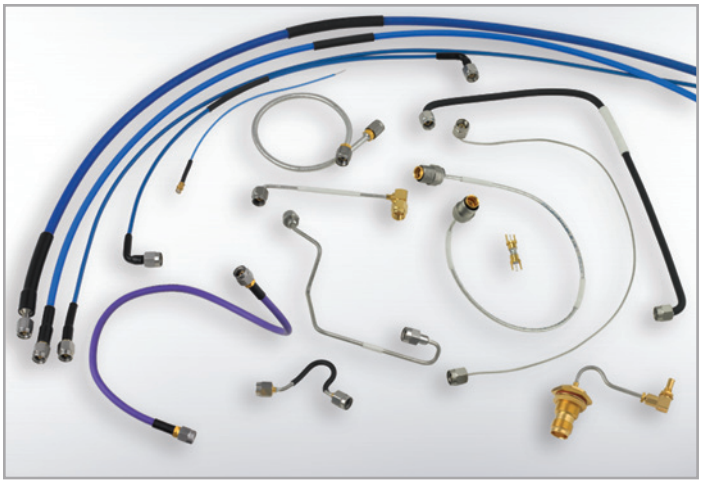
- Mode Free Operation to 18 GHz
- 80% Velocity Low Loss Dielectric
- Moisture Sealed Cable Construction
- Superior Shielding Effectiveness
- Durable and Lightweight
- All Stainless Steel Hermetic Connectors
- Phase Matched Sets Available

Applications:

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



Introduction



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

.047" Specifications

General Specifications	Semi-Rigid 047	Semi-Rigid 047TP	Conformable BJ047	Mini-Flex 065		
MIL Number	M17/151/ -00001	M17/151/-00002	N/A	N/A		
Diameter (inches)	0.047	0.047	0.047	0.068		
Frequency, Max (GHz)	65	65	18	50		
Loss @ 5 GHz (dB/100ft)	78.0	78.0	89.0	77.0		

Electrical Specifications	Semi-Rigid 047	Semi-Rigid 047TP	Conformable BJ047	Mini-Flex 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	Semi-Rigid 047	Semi-Rigid 047TP	Conformable BJ047	Mini-Flex 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	0.30		

*Temperature ranges on standard boots -55 + 100C

Construction Data	Semi-Rigid 047	Semi-Rigid 047TP	Conformable BJ047	Mini-Flex 065		
Inner Conductor	Solid SCPW	Solid SCPW	Solid SPCCS	Solid SPCCS		
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		
Third Outer Shield	N/A	N/A	N/A	N/A		
Jacket	Bare Copper	Tinned Copper	Tin-Filled Composite	ETFE		

.085" Specifications

General Specifications	Semi-Rigid RG405	Semi-Rigid 405TP	Semi-Rigid AL085	Conformable BJ085	Mini-Flex 105	
MIL Number	M17/133-RG405	M17/133-00001	M17/133-00013	N/A	N/A	
Diameter (inches)	0.086	0.860	0.860	0.085	0.100	
Frequency, Max (GHz)	60	60	60	18	60	
Loss @ 5 GHz (dB/100ft)	46.0	46.0	47.0	48.0	48.5	

Electrical Specifications	Semi-Rigid RG405	Semi-Rigid 405TP	Semi-Rigid AL085	Conformable BJ085	Mini-Flex 105	
Impedance, Nominal (Ω)	50	50	50	50	50	
Velocity of Propagation (%)	69.5	69.5	69.5	69.5	70	
Shielding Effectiveness, 1 GHz (dB/ft)	>100	>100	>100	>90	>85	
Capacitance (pF/ft)	32	32	32	32	32	
Delay (ns/ft)	1.46	1.46	1.46	1.46	1.46	

Mechanical Specifications	Semi-Rigid RG405	Semi-Rigid 405TP	Semi-Rigid AL085	Conformable BJ085	Mini-Flex 105	
Weight (lbs/100ft)	1.53	1.53	0.73	1.19	1.30	
Temperature Range (˚C)	-55 to +125	-55 to +125	-55 to +125	-55 to +170	-55 to +170*	
Minimum Bend Radius (inches)	0.17	0.17	0.20	0.12	0.25	

*Temperature ranges on standard boots -55 + 100C

Construction Data	Semi-Rigid RG405	Semi-Rigid 405TP	Semi-Rigid AL085	Conformable BJ085	Mini-Flex 105	
Inner Conductor	Solid SPCCS	Solid SPCCS	Solid SPCCS	Solid SPCCS	Solid SPCCS	
Dielectric	Solid PTFE	Solid PTFE	Solid PTFE	Solid TFE	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	
Third Outer Shield	N/A	N/A	N/A	N/A	N/A	
Jacket	Bare Copper	Tin plated Copper	Tin plated Aluminum	Tin-Filled Composite	FEP	

.141" Specifications

General Specifications	Semi-Rigid RG402	Semi-Rigid 402TP	Semi-Rigid AL141	Conformable BJ141	MINI-FLEX 165	K-JUMPER
MIL Number	M17/13-RG402	M17/130-00005	M17/130-00009	N/A	N/A	N/A
Diameter (inches)	0.141	0.141	0.141	0.138	0.162	0.165
Frequency, Max (GHz)	35	35	35	18	35	35
Loss @ 5 GHz (dB/100ft)	28.0	28.0	29.0	31.0	29.5	31.0

Electrical Specifications	Semi-Rigid RG402	Semi-Rigid 402TP	Semi-Rigid AL141	Conformable BJ141	MINI-FLEX 165	K-JUMPER
Impedance, Nominal (Ω)	50	50	50	50	50	50
Velocity of Propagation (%)	69.5	69.5	69.5	69.5	69.5	69.5
Shielding Effectiveness, 18 GHz (dB/ft)	>100	>100	>100	>90	>90	>90
Capacitance (pF/ft)	29.5	29.9	29.9	29.5	29.4	29.5
Delay (ns/ft)	1.46	1.45	1.45	1.46	1.45	1.46

Mechanical Specifications	Semi-Rigid RG402	Semi-Rigid 402TP	Semi-Rigid AL141	Conformable BJ141	MINI-FLEX 165	K-JUMPER
Weight (lbs/100ft)	3.44	3.44	1.88	2.00	2.91	2.00
Temperature Range (˚C)	-55 to +125	-55 to +125	-55 to +125	-55 to +160	-55 to +125	-55 to +100
Minimum Bend Radius (inches)	0.25	0.25	0.13	0.25	0.50	0.25

Construction Data	Semi-Rigid RG402	Semi-Rigid 402TP	Semi-Rigid AL141	Conformable BJ141	MINI-FLEX 165	K-JUMPER
Inner Conductor	Solid SPCCS	Solid SPCCS	Solid SPCCS	Solid SPCCS	Solid SPCCS	Solid SPCCS
Dielectric	Solid PTFE	Solid PTFE	Solid PTFE	Solid TFE	Solid PTFE	Solid TFE
First Outer Shield	N/A	N/A	N/A	N/A	Metal Tape SPC	Tin-Filled Composite
Second Outer Shield	N/A	N/A	N/A	N/A	Braid SPC	N/A
Third Outer Shield	N/A	N/A	N/A	N/A	N/A	N/A
Jacket	Bare Copper	Tin plated Copper	Tin plated Aluminum	Tin-Filled Composite	FEP	Polyolefin

General Specifications	Semi-Rigid RG401	Semi-Rigid 250TP				
MIL Number	M17/129-RG401	M17/129-00001				
Diameter (inch)	0.250	0.250				
Frequency, Max (GHz)	18	18				
Loss @ 5 GHz (dB/100ft)	19.0	19.0				

Electrical Specifications	Semi-Rigid RG402	Semi-Rigid 402TP				
Impedance, Nominal (Ω)	50	50				
Velocity of Propagation (%)	69.5	69.5				
Shielding Effectiveness, 1 GHz (dB/ft)	>100	>100				
Capacitance (pF/ft)	29.5	29.9				
Delay (ns/ft)	1.46	1.45				

Mechanical Specifications	Semi-Rigid RG402	Semi-Rigid 402TP				
Weight (lbs/100ft)	10.50	10.50				
Temperature Range (˚C)	-55 to +200	-55 to +125				
Minimum Bend Radius (inch)	0.50	0.50				

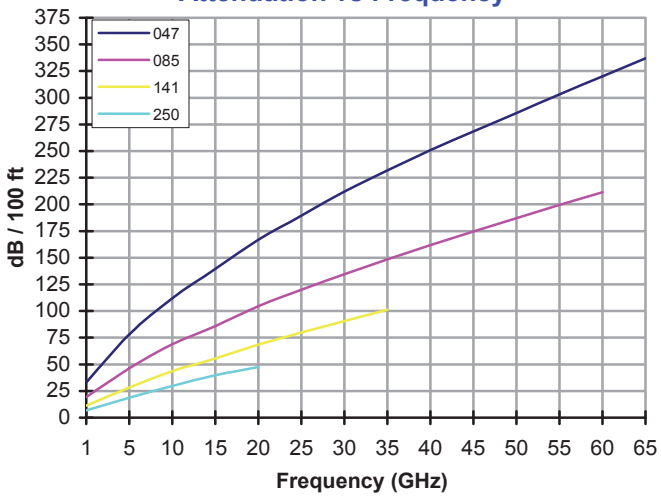
Construction Data	Semi-Rigid RG402	Semi-Rigid 402TP				
Inner Conductor	Solid SPCCS	Solid SPCCS				
Dielectric	Solid PTFE	Solid PTFE				
First Outer Shield	N/A	N/A				
Second Outer Shield	N/A	N/A				
Third Outer Shield	N/A	N/A				
Jacket	Bare Copper	Tin Plated Copper				

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	157.6	22.5	64.0	45.5		
20	167.4	104.5	68.7			
26	194.7	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

Attenuation vs Frequency

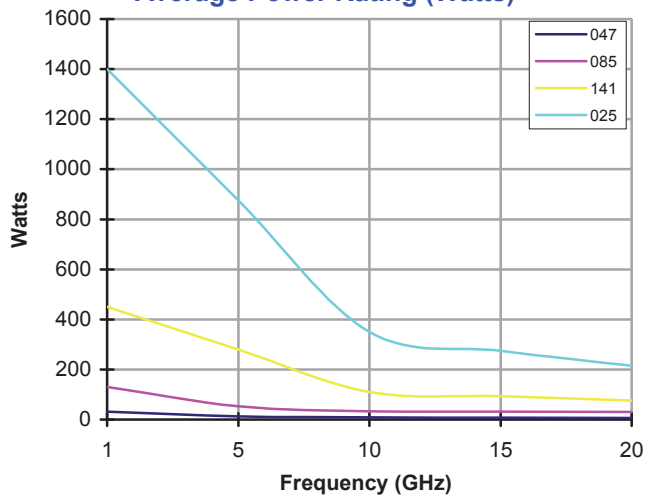


Average Power Rating (Watts)

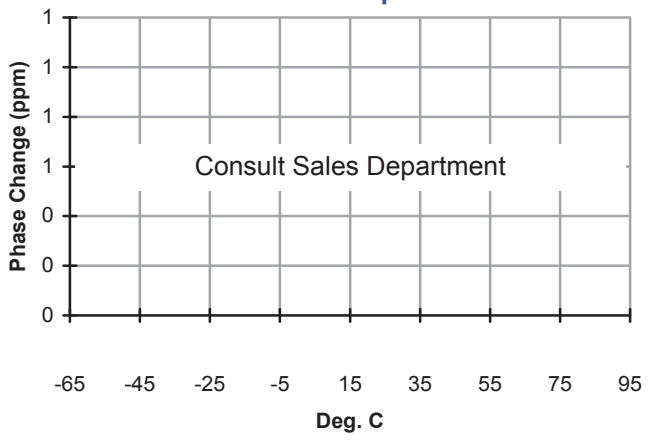
GHz	047	085	141	250		
1	32	130	450	1400		
5	13	53	280	875		
10	9	33	110	350		
18	8	31	93	276		
20	7	30	76			

Power handling is specified for ambient conditions
at sea level and +25° C. *Consult Sales Department

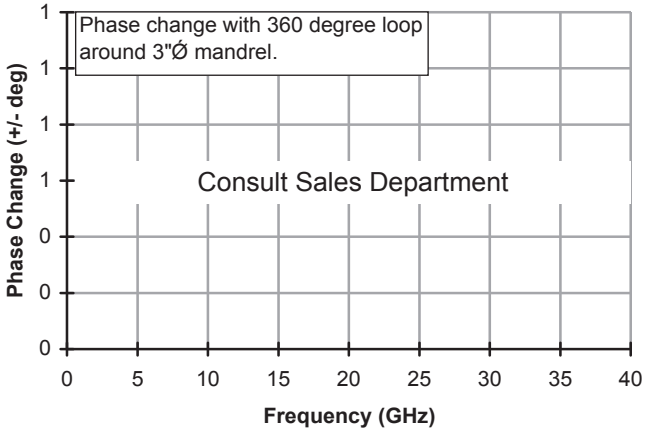
Average Power Rating (Watts)



Phase vs Temperature



Phase vs Flexure



Connector Selection & Options

Connector Options				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		MMSR²				
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		KMSR²	KMSR²			
2.9 mm	Jack	(Female)	Straight	40		KFS				
2.9 mm	Bulkhead	(Female)	Straight	40		KFBS				
GPPO (SMMP)	Jack	(Female)	Straight	50	SMMPFS					
GPO (SMP)	Jack	(Female)	Straight	40	SMPFS	SMPFS				
GPO (SMP)	Jack	(Female)	R/A	40	SMPFR	SMPFR				
SMA	Plug	(Male)	Straight	18	SMS	SMS	SMS	SMS		
SMA	Plug	(Male)	R/A	18	SMSR²	SMSR²	SMSR²			
SMA	Plug	(Male)	R/A	18		SMR	SMR			
SMA	Jack	(Female)	Straight	18	SFS	SFS	SFS			
SMA	Bulkhead	(Female)	Straight	18		SFBS	SFBS			
SMA	Plug	(Male)	Straight	18		SMSAT¹	SMSAT¹			
OSSP	Bulkhead	(Female)	Straight	18		OSSPMBS				
OSP	Bulkhead	(Male)	Straight	18		OSPMBS	OSPMBS			
Type N	Plug	(Male)	Straight	18		NMS	NMS	NMS		
Type N	Plug	(Male)	R/A	18			NMSR²			
Type N	Bulkhead	(Female)	Straight	18		NFBS	NFBS	NFBS		
TNC	Plug	(Male)	Straight	18		TMS	TMS	TMS		
TNC	Plug	(Male)	R/A	18			TMSR²	TMSR²		
TNC	Jack	(Female)	Straight	18			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.

SMSAT¹ = Anti-Torque, ² = Connector pre-bend cable to form right angle.

Consult sales department for other connectors and other options not shown.

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

Cable Assembly Options	Option Code	Series 047	Series 085	Series 141	Series 250		
Weatherized (Polyolefin or PVC)	W	√	√	√			
Weatherized (Neoprene)	N	√	√	√	√		
Armored	A						
Armored & Weatherized (PVC)	AW						
Armored & Weatherized (Neoprene)	AN						
Armored & Weatherized (Monocoil & Silicone)	MC						
Armored & Weatherized (Monocoil & Polyolefin)	MW						
Extended Boots	E						
Phase Matching (+/- 2.8 picoseconds)	+/-2.8 PS	√	√	√	√		
Dust Caps	D				√		

Cable Options

A - Armored

AN - Armored and Weatherized-Neoprene

AW - Armored and Weatherized-PVC

E - Extended Boots

MC - Monocoil-Silicone

MW - Monocoil Weatherized-Polyolefin

W - Weatherized-Polyolefin

W - Weatherized-PVC

D - Dust Caps

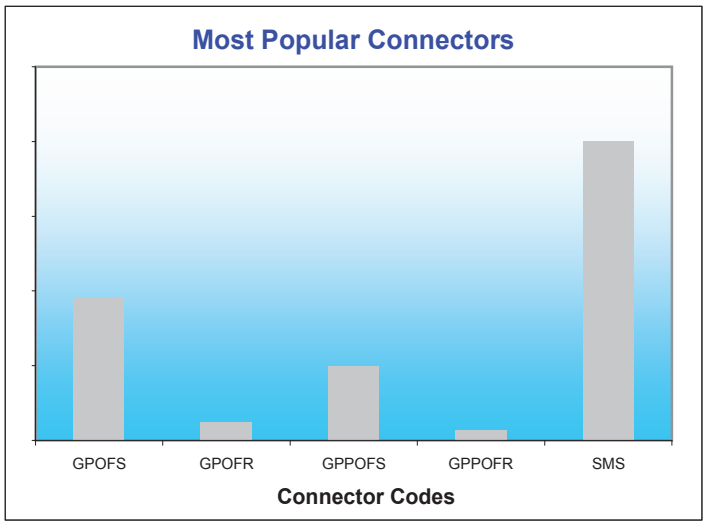
Part Numbering Code

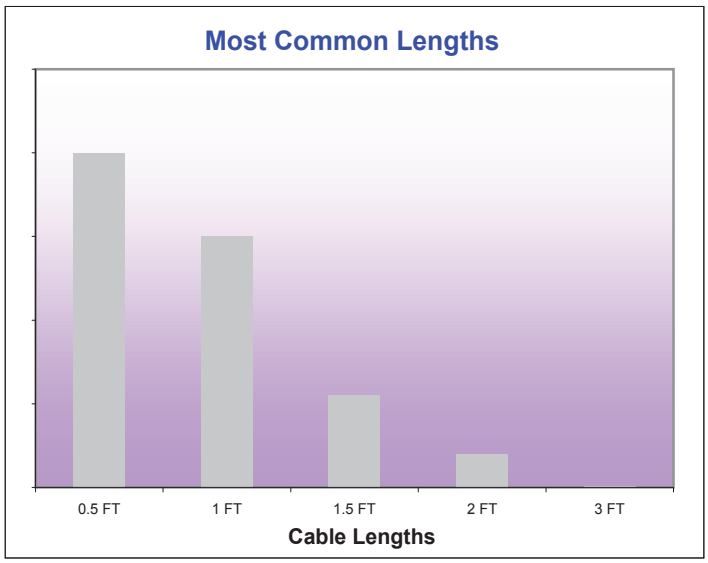
Ordering Information

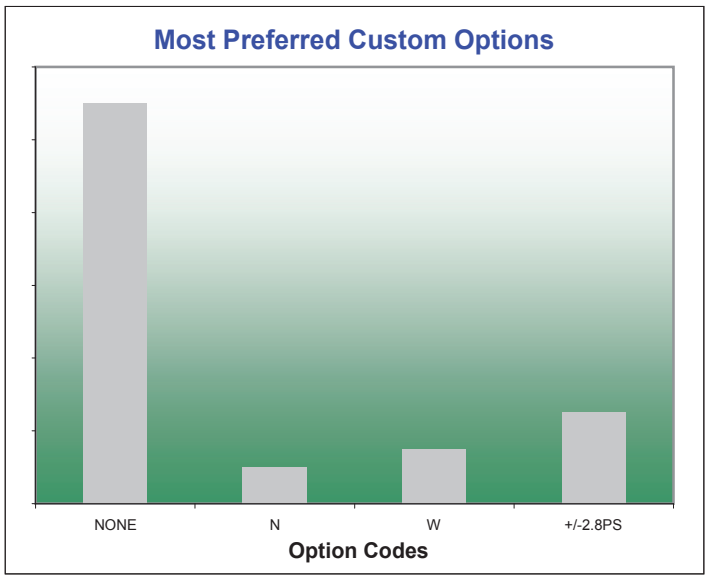
S M S	-	B J 0 8 5	_	-	1 8 . 0	-	S M R	± 2 . 8 P S
CONNECTOR #1		CABLE TYPE	OPTION Blank = None W = Weatherized		LENGTH (IN.) Example: 18.0 = 18 inches		CONNECTOR #2	OPTION P = Phase Matched

For the full list of cable choices see pages - 2 through - 5, and for available connectors and other Options see pages - 7 of this section.

Semi-Rigid BJ047 Mini-Flex 065







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.

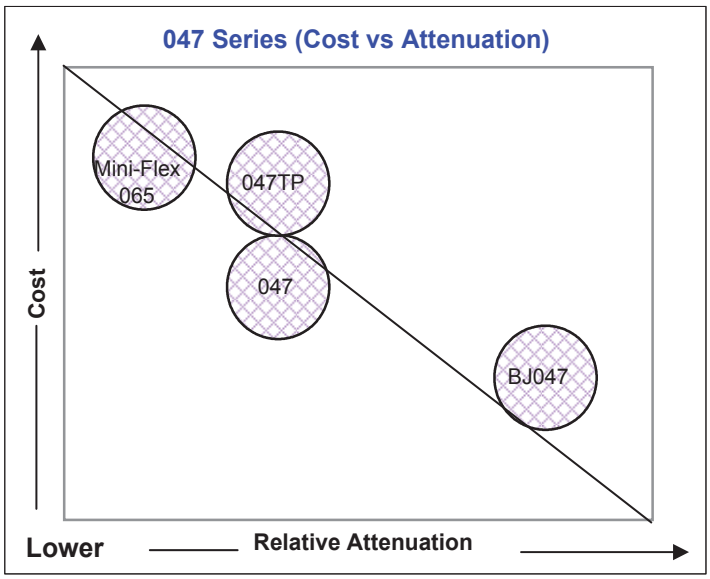
Features/Benefits:

Mode Free Operation to 65 GHz
Superior Shielding Effectiveness
Stainless Steel Connectors Available
Phase Matched Sets Available
- Standard Tolerance ± 2.8 Picoseconds
- Equating to ± 1 Degree / GHz

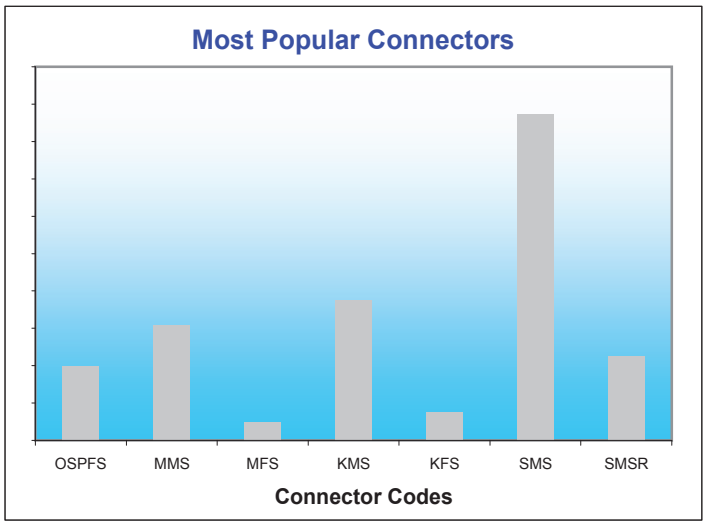
Maintains Tightly Controlled Mechanical Configurations
- High Vibration Resistance
- Light Weight

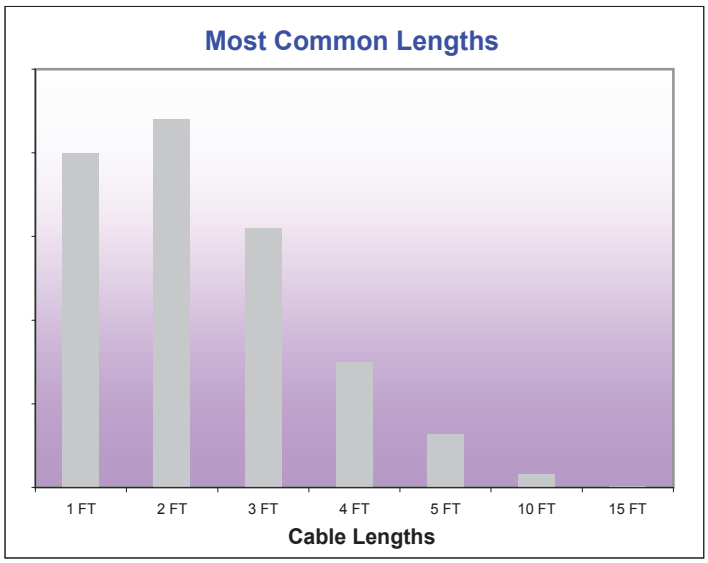
Applications:

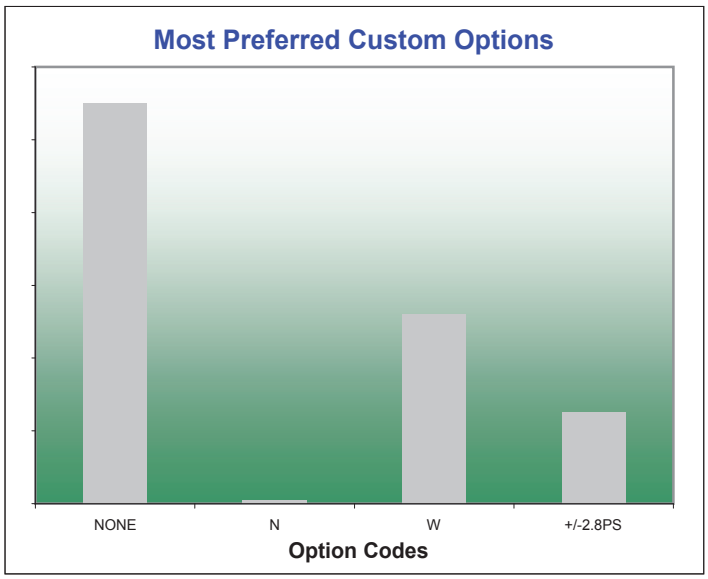
Instrumentation
Jumpers
Military



Semi-Rigid BJ085 Mini-Flex 105







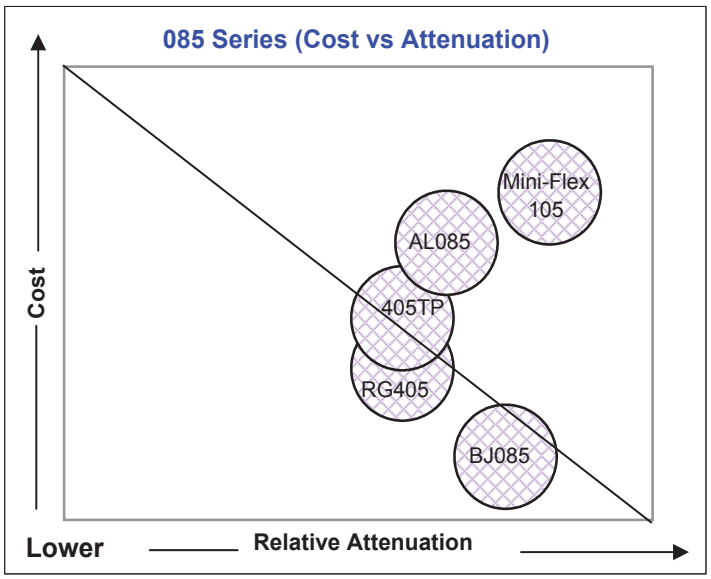
The popular .085" diameter series offers a wide range of connector interfaces from GPPO to TNC. Semi-Rigid is typically used for high reliability applications, formable BJ085 for low cost interconnects and the Mini-Flex 105 for high frequency interconnects and test assemblies. Both the Semi-Rigid and 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:

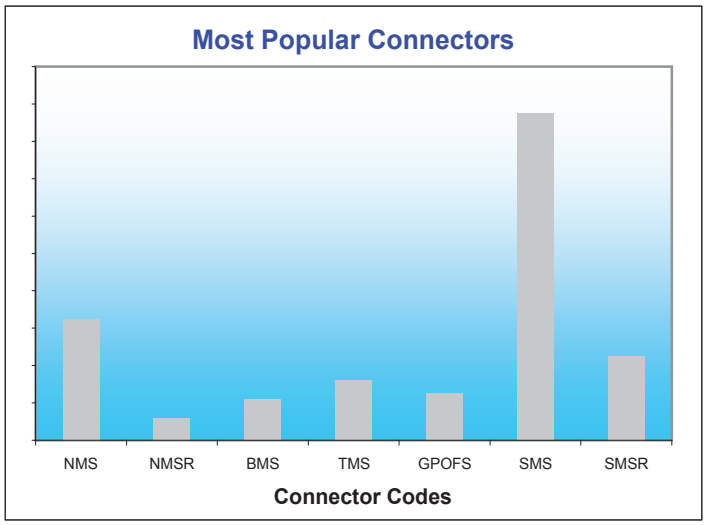
- Mode Free Operation to 60 GHz
- Superior Shielding Effectiveness
- Stainless Steel Connectors Available
- Phase Matched Sets Available
- Maintains Tightly Controlled Mechanical Configurations
- High Vibration Resistance
- Light Weight

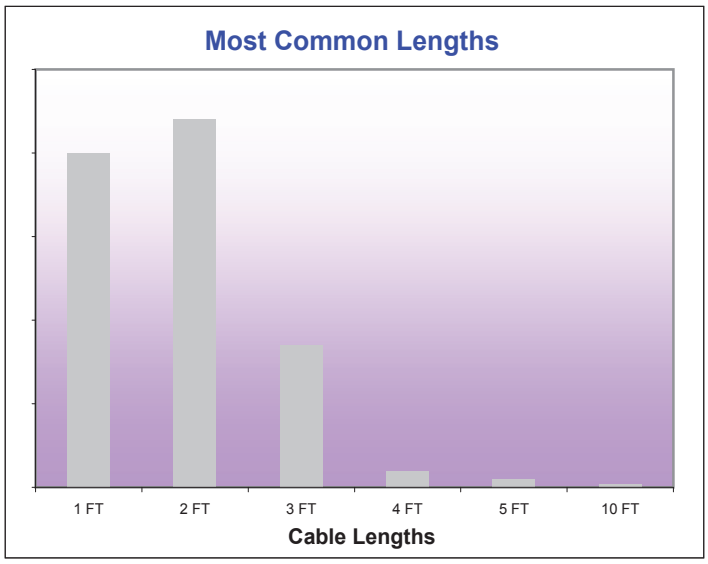
Applications:

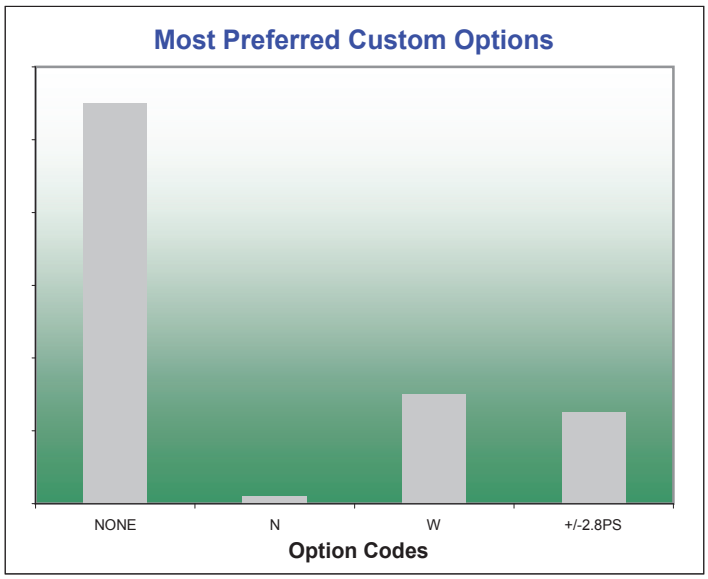
- Instrumentation
- Jumpers
- Satellite Component Interconnects



Semi-Rigid BJ141 K-Jumper Mini-Flex 165







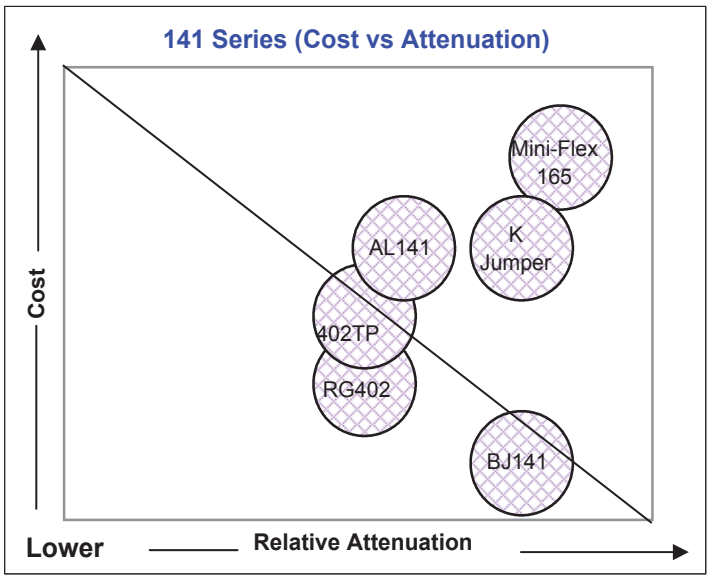
The widely used .141" series offers a broad range of connectors from GPO to Type N. The Semi-Rigid, known for its excellent shielding, is popular in military applications, the hand-formable BJ141 for low cost interconnects and the Mini-Flex 165 can all use the same connectors. Semi-Rigid, K-Jumper and Mini-Flex 165 are all mode free to 35 GHz while the BJ141 is recommended for applications up to 18 GHz.

Features/Benefits:

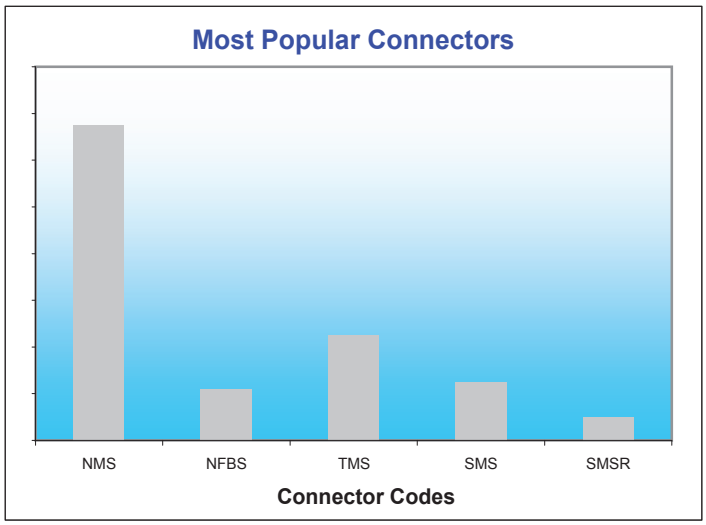
- Mode Free Operation to 35 GHz
- Superior Shielding Effectiveness
- Wide Connector Selection
- Phase Matched Sets Available
- Maintains Tightly Controlled Mechanical Configurations
- High Vibration Resistance
- Light Weight

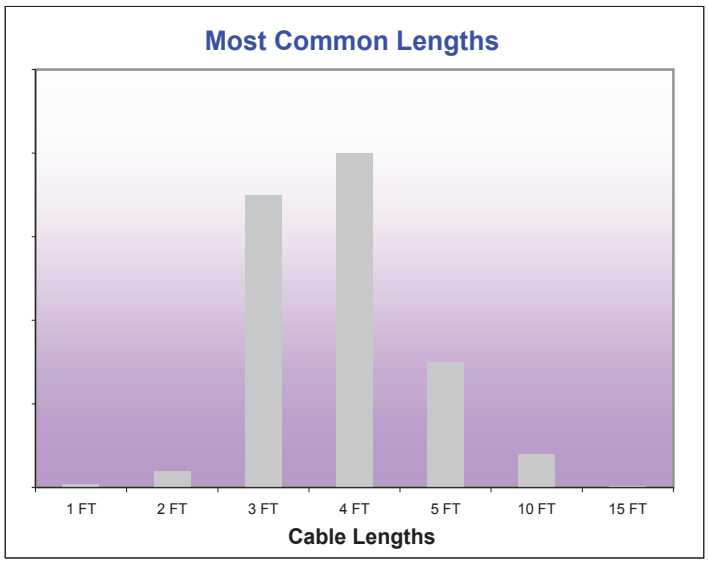
Applications:

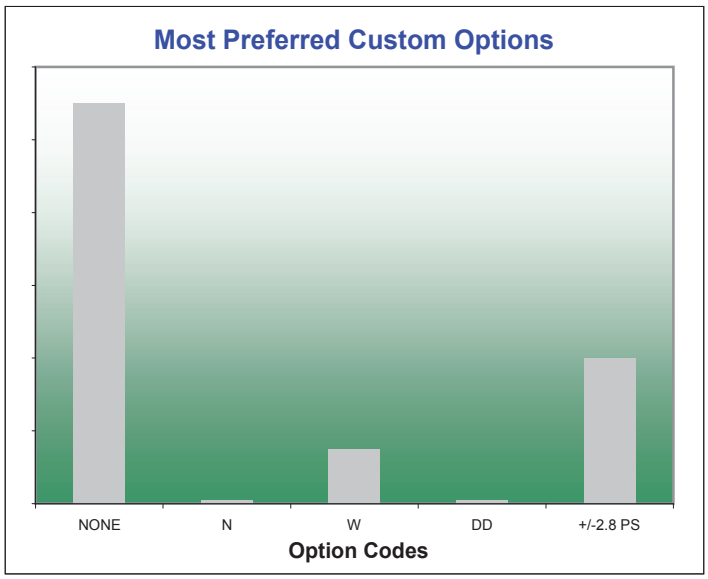
- Test Cables
- Jumpers
- Instrumentation
- High Frequency Interconnects



Semi-Rigid RG401 401TP







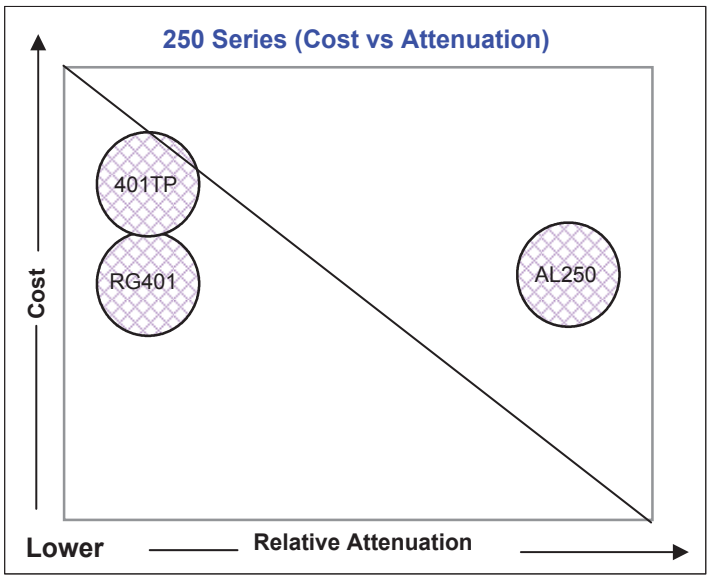
Our .250" diameter Semi-Rigid cable is used where power and lower loss are required with the reliability of a high shielded cable. Larger connectors such as Type N and TNC with extended performance to 18 GHz offer excellent power handling performance. These cables are available in both copper and aluminum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

Features/Benefits:

- Mode Free Operation to 18 GHz
- Superior Shielding Effectiveness
- Stainless Steel Connectors Available
- Phase Matched Sets Available
- Maintains Tightly Controlled Mechanical Configurations
- High Power / Low Insertion Loss

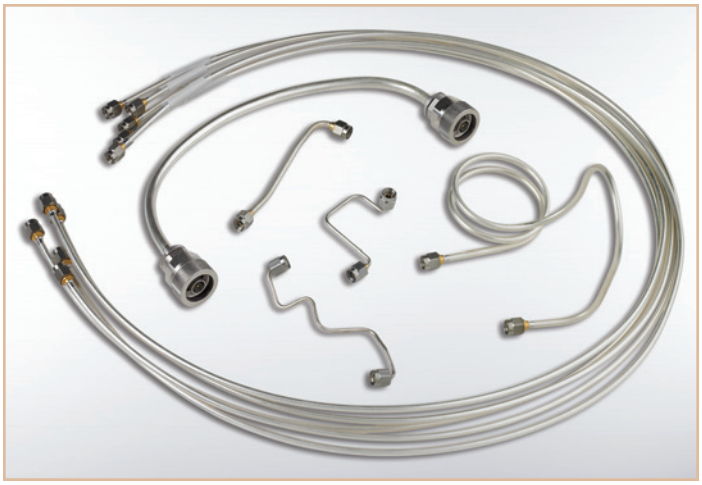
Applications:

- RF Power Generators
- Jumpers
- Military
- Satcom



Introduction

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	Alumimum	Tin
AL085LLSP	Alumimum	Silver
LL085	Copper	None
LL085TP	Copper	Tin

Low Loss .141		
Part Number	Jacket	Finish
AL141LLTP	Alumimum	Tin
AL141LLSP	Alumimum	Silver
LL141	Copper	None
LL141TP	Copper	Tin

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

Specifications

General Specifications	Semi-Rigid 085 Al	Semi-Rigid 085 Cu	Semi-Rigid 141 Al	Semi-Rigid 141 Cu	Semi-Rigid 250 Al	Semi-Rigid 250 Cu
MIL Number	N/A	N/A	N/A	N/A	N/A	N/A
Diameter (inch)	0.087	0.087	0.141	0.141	0.250	0.250
Frequency, Max (GHz)	62	62	35	35	20	20
Loss @ 5 GHz (dB/100ft)	45.0	45.0	23.0	25.7	13.6	9.4

Electrical Specifications	Semi-Rigid 085 Al	Semi-Rigid 085 Cu	Semi-Rigid 141 Al	Semi-Rigid 141 Cu	Semi-Rigid 250 Al	Semi-Rigid 250 Cu
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, 1 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

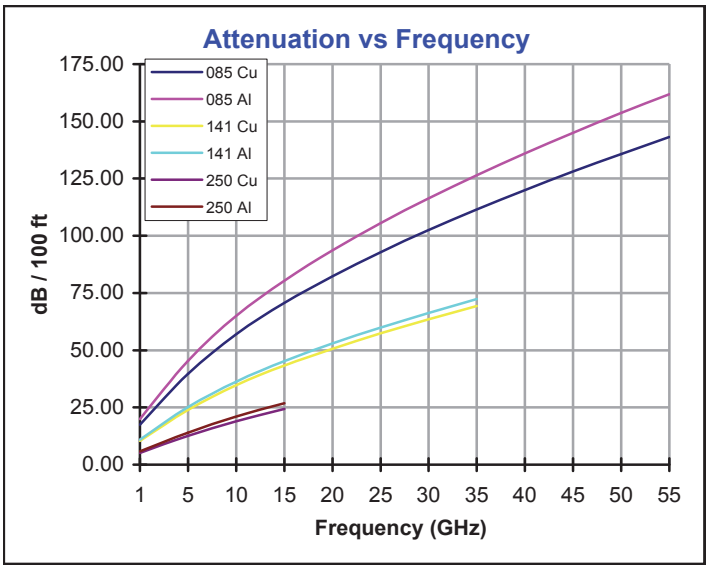
Mechanical Specifications	Semi-Rigid 085 Al	Semi-Rigid 085 Cu	Semi-Rigid 141 Al	Semi-Rigid 141 Cu	Semi-Rigid 250 Al	Semi-Rigid 250 Cu
Weight (lbs/100ft)	0.78	1.36	1.90	3.24	6.09	9.90
Temperature Range (˚C)	-65 to +165	-65 to +165	-65 to +165	-65 to +165	-65 to +165	-65 to +165
Minimum Bend Radius (inch)	0.25	0.25	0.75	0.50	1.50	1.00

Construction Data	Semi-Rigid 085 Al	Semi-Rigid 085 Cu	Semi-Rigid 141 Al	Semi-Rigid 141 Cu	Semi-Rigid 250 Al	Semi-Rigid 250 Cu
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 T-PTFE	Low Loss T-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
Third Outer Shield	N/A	N/A	N/A	N/A	N/A	N/A
Jacket	Aluminum Silver / Tin	Copper Bare / Tin	Aluminum Silver / Tin	Copper Bare / Tin	Aluminum Silver / Tin	Copper Bare / Tin

Attenuation (dB/100ft)

GHz	085 Cu	085 Al	141 Cu	141 Al	250 Cu	250 Al
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				

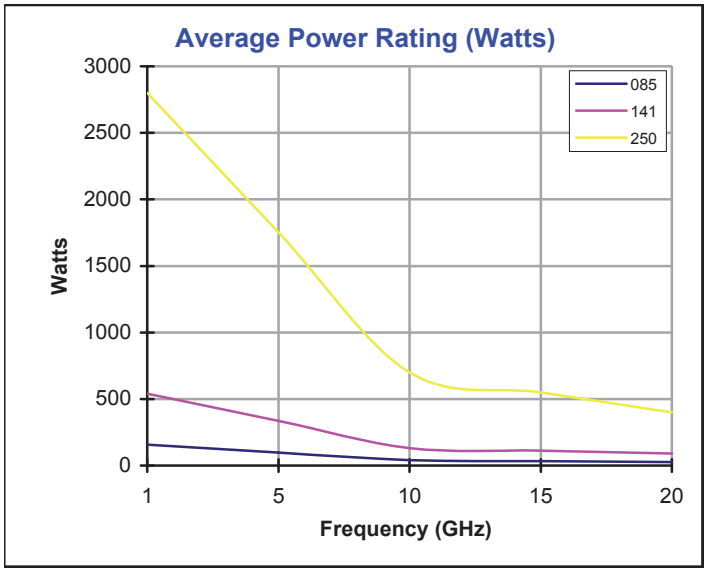
Max Cable Loss at 25°C & Sea Level

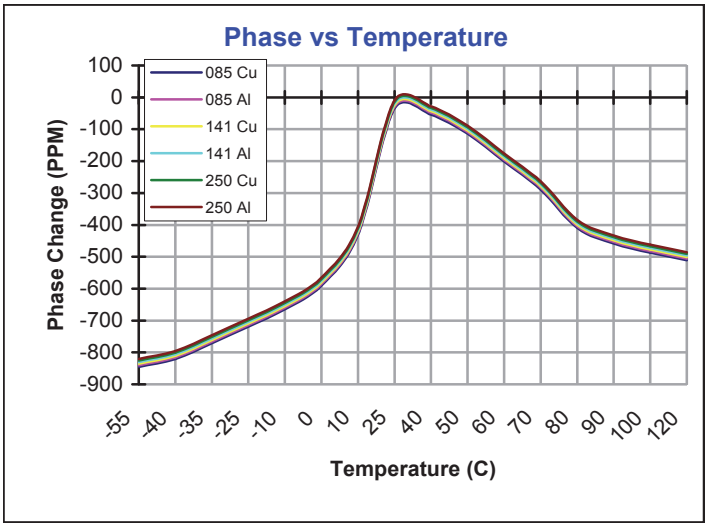


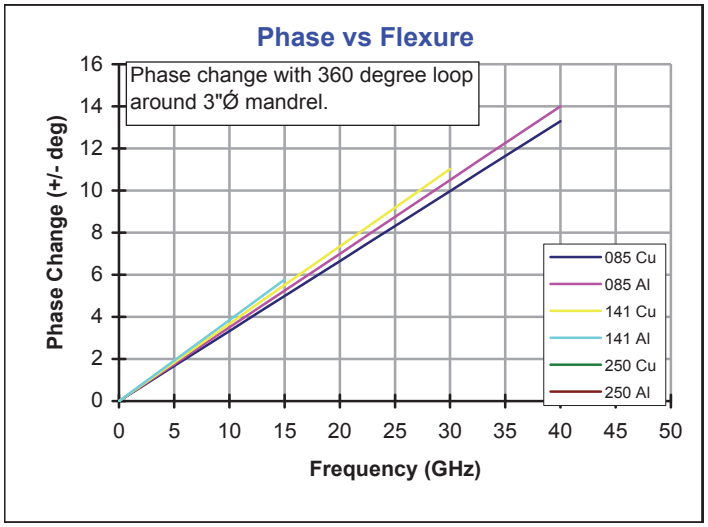
Average Power Rating (Watts)

GHz	085 Cu	085 Al	141 Cu	141 Al	250 Cu	250 Al
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.







Connector Selection & Options

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	MMSR²					
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	KMSR²	KMSR²				
2.9 mm	Jack	(Female)	Straight	40	KFS					
2.9 mm	Bulkhead	(Female)	Straight	40	KFBS					
GPO (SMP)	Jack	(Female)	Straight	40	SMPFS					
GPO (SMP)	Jack	(Female)	R/A	40	SMPFR					
SMA	Plug	(Male)	Straight	18	SMS	SMS	SMS			
SMA	Plug	(Male)	R/A	12	SMR	SMR				
SMA	Plug	(Male)	R/A	18	SMSR²	SMSR²				
SMA	Jack	(Female)	Straight	18	SFS					
SMA	Bulkhead	(Female)	Straight	18	SFBS					
OSSP	Bulkhead	(Female)	Straight	18	OSSPMBS					
OSP	Bulkhead	(Male)	Straight	18	OSPMBS					
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 = Connector pre-bend cable to form right angle.

Consult sales department for other connectors and other options not shown.

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

Cable Assembly Options	Option Code	Series 085	Series 141	Series 250			
Weatherized (Polyolefin or PVC)	W	√	√	√			
Weatherized (Neoprene)	N	√	√	√			
Armored	A						
Armored & Weatherized (PVC)	AW						
Armored & Weatherized (Neoprene)	AN						
Armored & Weatherized (Monocoil & Silicone)	MC						
Armored & Weatherized (Monocoil & Polyolefin)	MW						
Extended Boots	E						
Phase Matching (+/- 2.8 picoseconds)	+/-2.8PS	√	√	√			
Dust Caps	D						

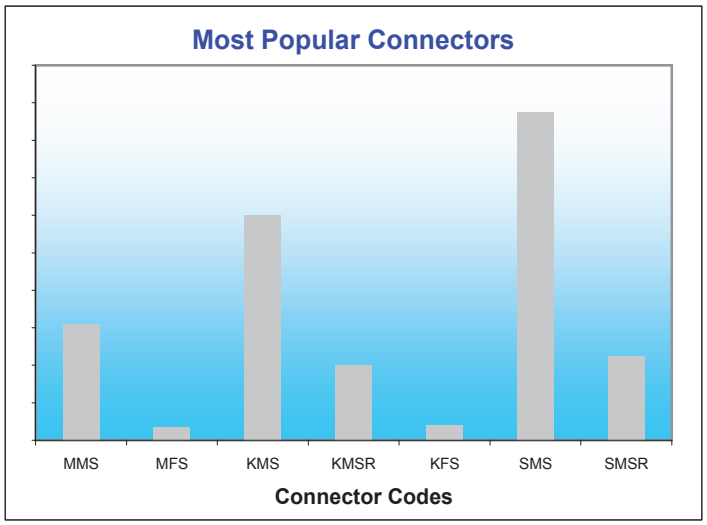
Part Numbering Code

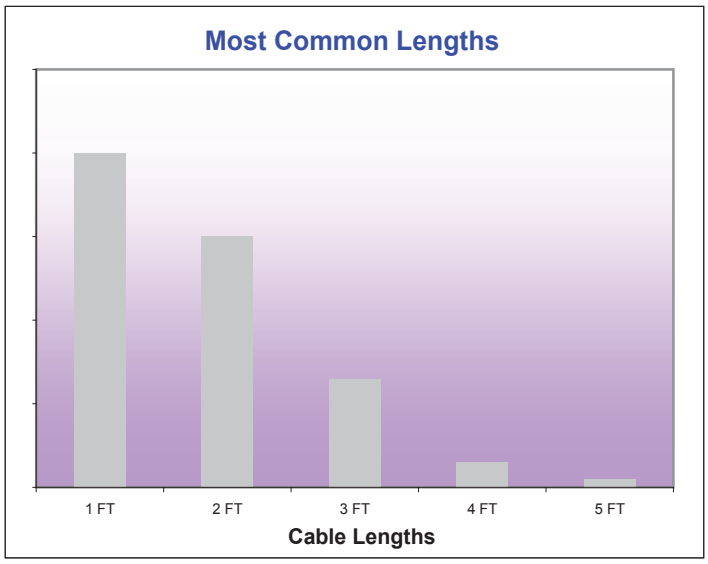
Ordering Information

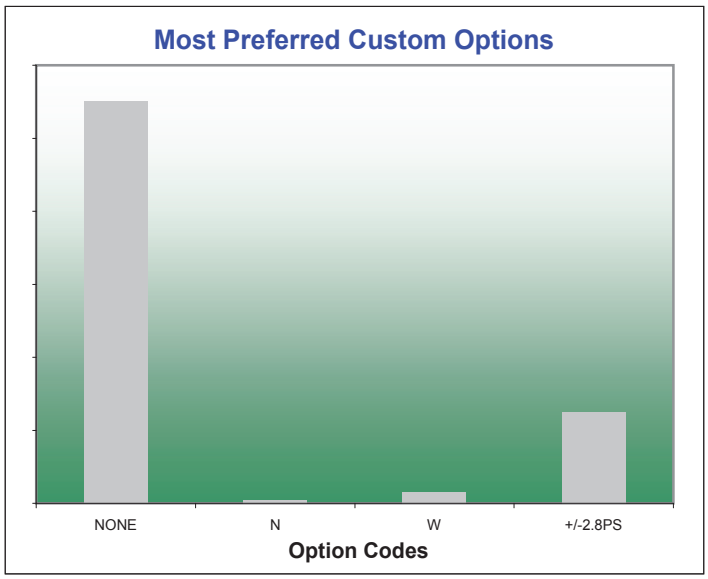
KMS	-	AL141LLSP	__	-	12.0	-	KMS	±2.8PS
CONNECTOR #1		CABLE TYPE	OPTION Blank = None W = Weatherized		LENGTH (IN.) Example: 12.0 = 12 inches		CONNECTOR #2	OPTION P = Phase Matched

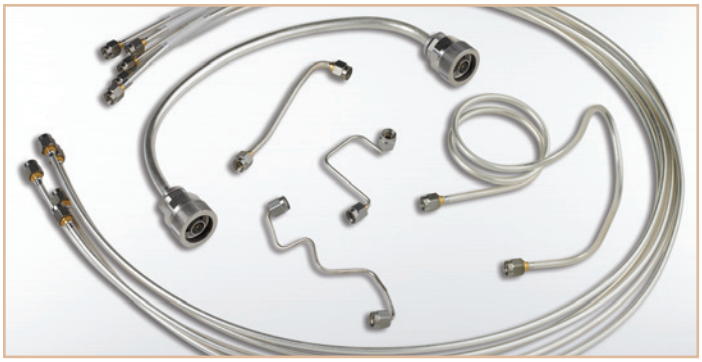
For the full list of cable choices see pages - 1, and for available connectors and other Options see pages - 4 of this section.

AL085LLSP AL085LLTP LL085 LL085TP









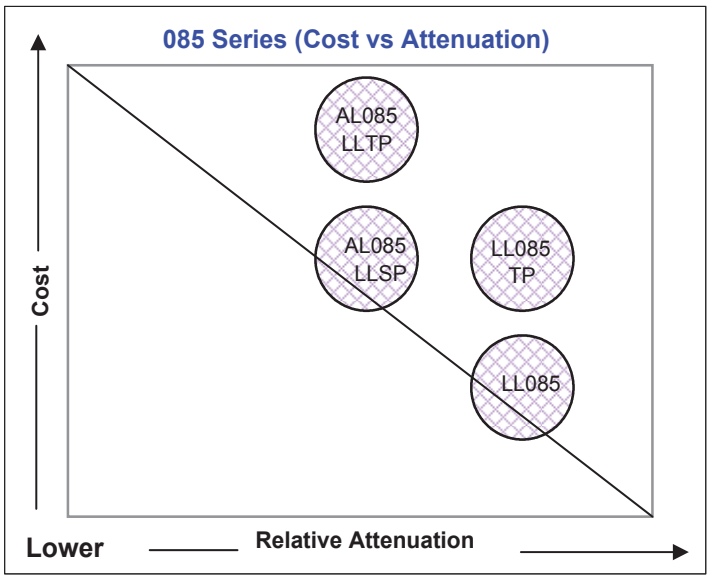
The Low Loss, Semi-Rigid .085" diameter is very popular and has a wide range of available connectors from GPPO to SMA. This low loss cable is specially suited for high reliability applications, especially when temperature changes are a concern. Our special low-density dielectric is very stable in this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

Features/Benefits:

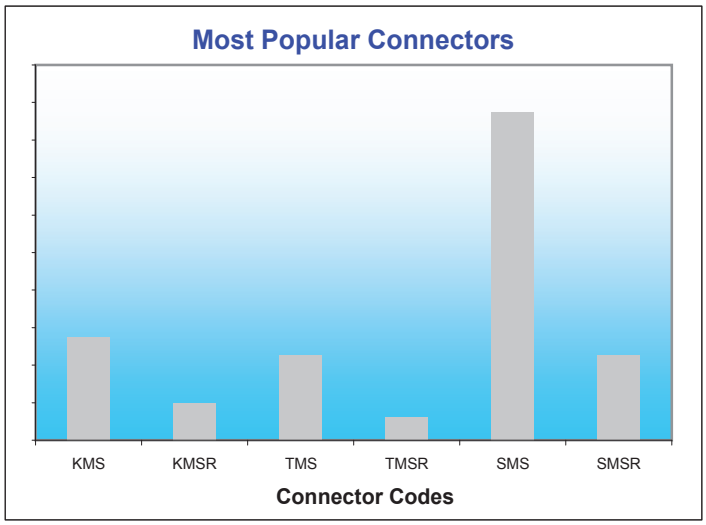
- Mode Free Operation to 60 GHz
- Superior Shielding Effectiveness - 100dB Min.
- Stainless Steel Connectors
- Phase Matched Sets Available
- Copper Jacket Bare or Tin Finish
- Aluminum Jacket Silver or Tin Finish
- High Vibration Resistance
- Aluminum 40% Lighter Weight than Copper

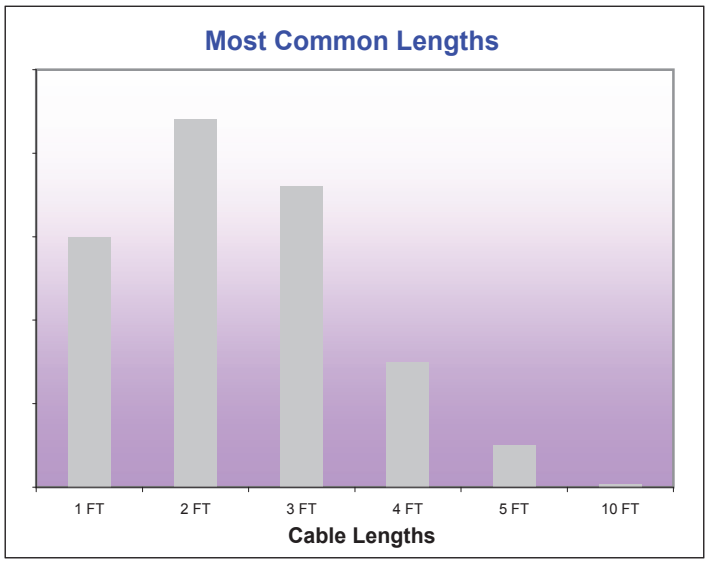
Applications:

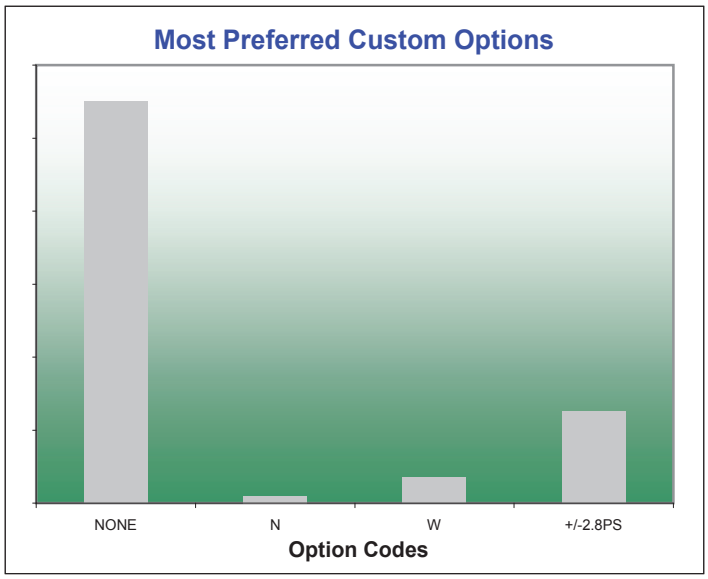
- Instrumentation
- Jumpers
- Satellite Component Interconnects



AL141LLSP AL141LLTP LL141 LL141TP







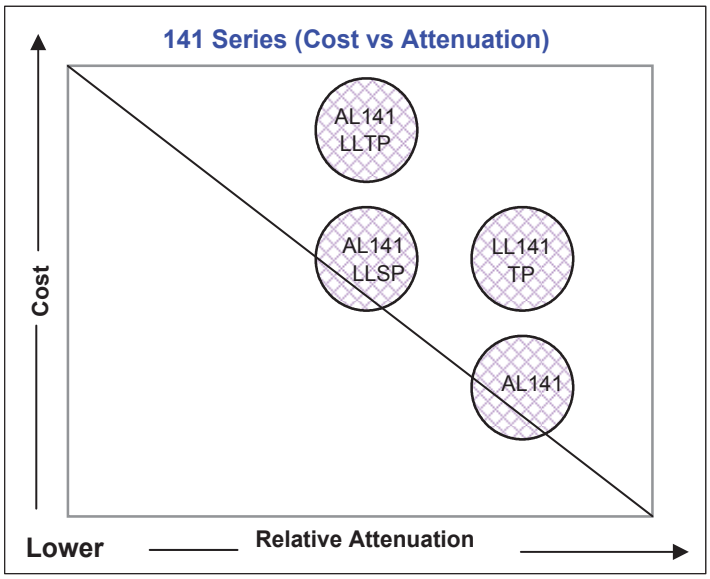
This widely used .141" diameter Low Loss cable offers a wide range of connectors from GPO to Type N. This low loss cable is specially suited for high reliability applications, especially when temperature changes are a concern. Our special low-density dielectric is very stable in this environment while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

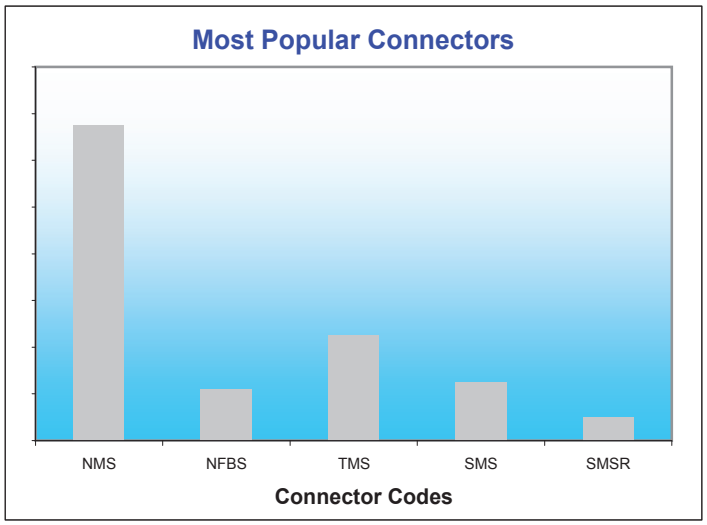
Features/Benefits:

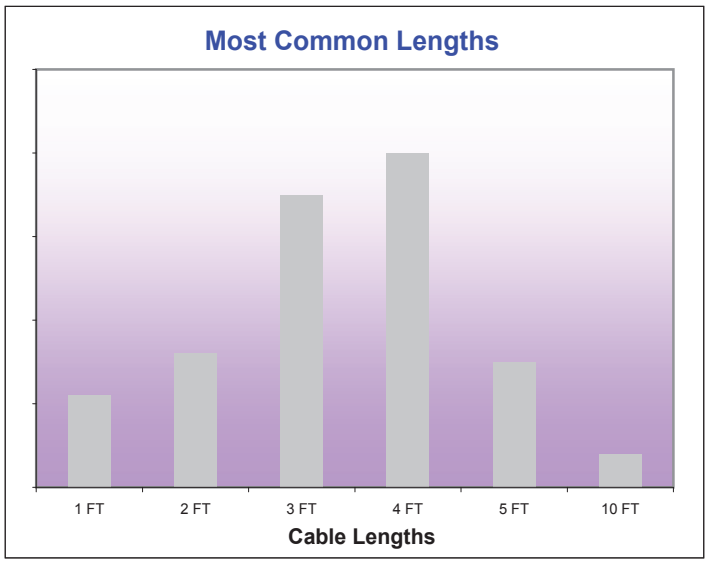
- Mode Free Operation to 35 GHz
- Superior Shielding Effectiveness - 100dB Min.
- Stainless Steel Connectors Available
- Copper Jacket Bare or Tin Finish
- Aluminum Jacket Silver or Tin Finish
- High Vibration Resistance
- Aluminum 40% Lighter Weight than Copper

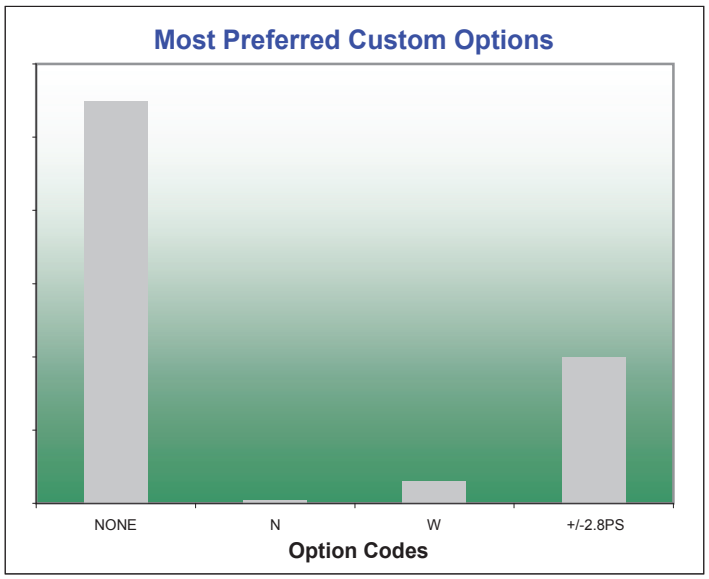
Applications:

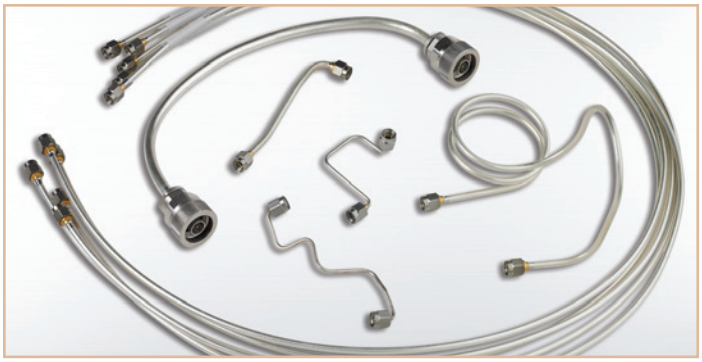
- Satellite Component Interconnects
- Instrumentation
- High Frequency Interconnects











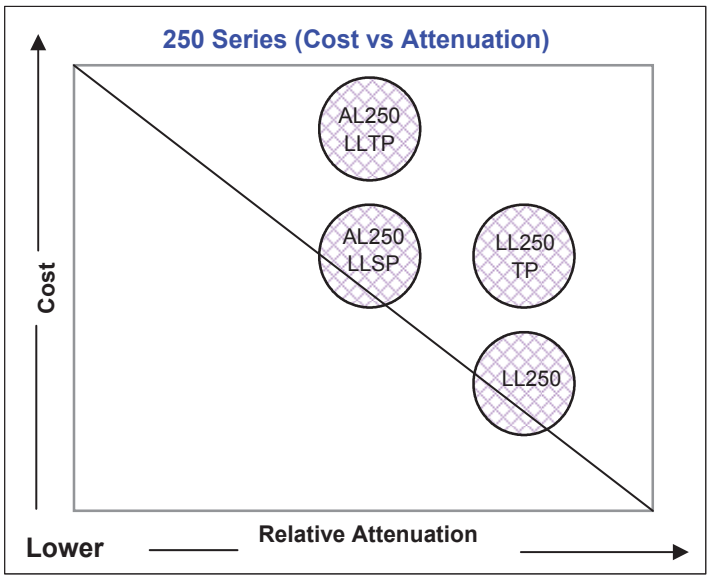
Our .250" diameter Low Loss Semi-Rigid cable is used where power and lower loss are required with the reliability and shielding of a Semi-Rigid cable. Larger connectors such as Type N and TNC with extended performance to 18 GHz offer excellent power handling performance.

Features/Benefits:

- Mode Free Operation to 18 GHz
- Superior Shielding Effectiveness
- Stainless Steel Connectors Available
- Phase Matched Sets Available
- Copper Jacket Bare or Tin Finish
- Aluminum Jacket Silver or Tin Finish
- High Vibration Resistance
- Aluminum 40% Lighter Weight than Copper

Applications:

- Instrumentation
- Radar Transmitter
- RF Power Generators
- Satcom



Introduction

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.

Specifications - Under 0.150" Diameter

General Specifications	Flexible RG316	Flexible 316D	Flexible RD316	Flexible SF316		
MIL Number	M17/113-RG316	N/A	M17/152-00001	N/A		
Diameter (inches)	0.098	0.124	0.114	0.110		
Frequency, Max (GHz)	3	5	12	18		
Loss @ 5 GHz (dB/100ft)	N/A	76.0	63.0	62.0		

Electrical Specifications	Flexible RG316	Flexible 316D	Flexible RD316	Flexible SF316		
Impedance, Nominal (Ω)	50	50	50	50		
Velocity of Propagation (%)	69.5	70.7	69.5	69.5		
Shielding Effectiveness, (dB/ft)	>40	>70	>60	>95		
Capacitance (pF/ft)	29.4	28.8	29.4	29.4		
Delay (ns/ft)	1.46	1.44	1.46	1.46		

Mechanical Specifications	Flexible RG316	Flexible 316D	Flexible RD316	Flexible SF316		
Weight (lbs/100ft)	1.20	1.40	1.85	1.30		
Temperature Range (˚C)	-55 to +200*	-40 to +105*	-55 to +200*	-55 to +200*		
Minimum Bend Radius (inches)	0.40	0.60	0.50	0.50		

*Temperature ranges on standard boots -55 + 100C

Construction Data	Flexible RG316	Flexible 316D	Flexible RD316	Flexible 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		

Specifications - Over 0.150" Diameter

General Specifications	Flexible RG223	Flexible RG400	Flexible RG142	Flexible 142D	Flexible SF142	
MIL Number	M17/84-RG223	M17/128-RG400	M17/60-RG142	N/A	N/A	
Diameter (inches)	0.212	0.195	0.195	0.195	0.195	
Frequency, Max (GHz)	12	12	18	18	18	
Loss @ 5 GHz (dB/100ft)	34.0	32.0	32.0	40.0	32.0	

Electrical Specifications	Flexible RG223	Flexible RG400	Flexible RG142	Flexible 142D	Flexible SF142	
Impedance, Nominal (Ω)	50	50	50	50	50	
Velocity of Propagation (%)	66	69.5	70	69	70	
Shielding Effectiveness, (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	1.30	1.45	1.30	

Mechanical Specifications	Flexible RG223	Flexible RG400	Flexible RG142	Flexible 142D	Flexible SF142	
Weight (lbs/100ft)	4.10	5.00	4.30	3.99	4.30	
Temperature Range (˚C)	-40 to +85*	-55 to +200*	-55 to +200*	-40 to +105*	-55 to +200*	
Minimum Bend Radius (inches)	1.00	1.00	1.00	1.00	1.00	

*Temperature ranges on standard boots -55 + 100C

Construction Data	Flexible RG223	Flexible RG400	Flexible RG142	Flexible 142D	Flexible 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	SPC 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	

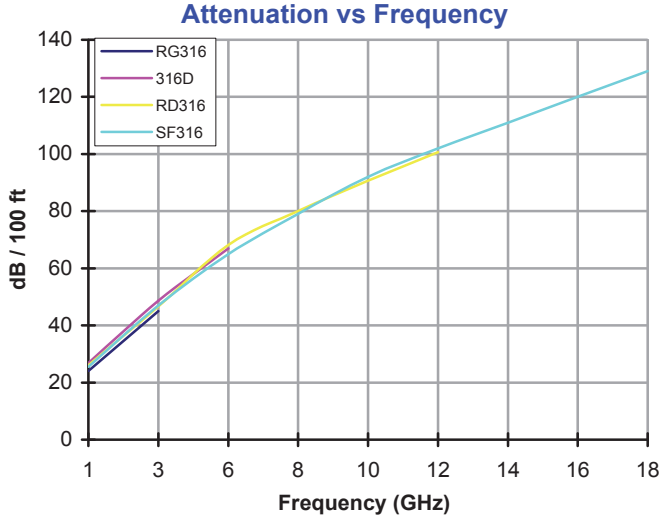
Performance

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

Attenuation vs Frequency

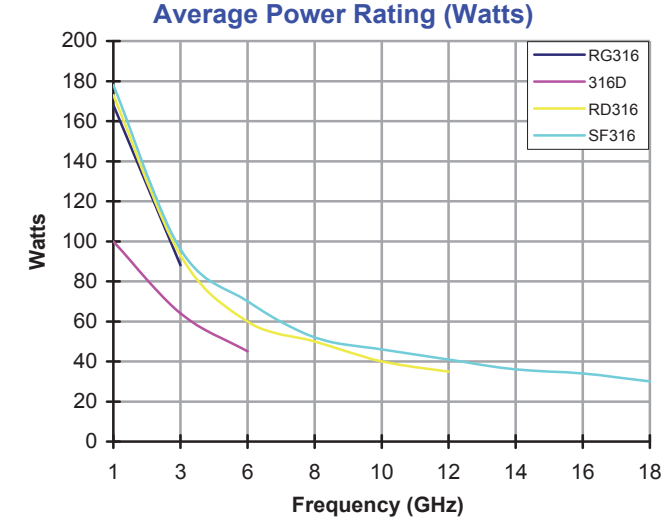


Average Power Rating (Watts)

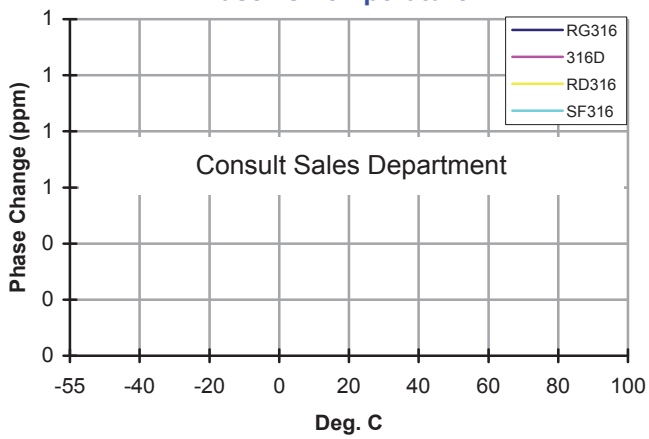
GHz	RG316	316D	RD316	SF316		
1	173	100	173	178		
3	93	64	93	96		
6		49	60	70		
8			50	52		
10			40	46		
12			35	41		
14				36		
16				34		
18				30		

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

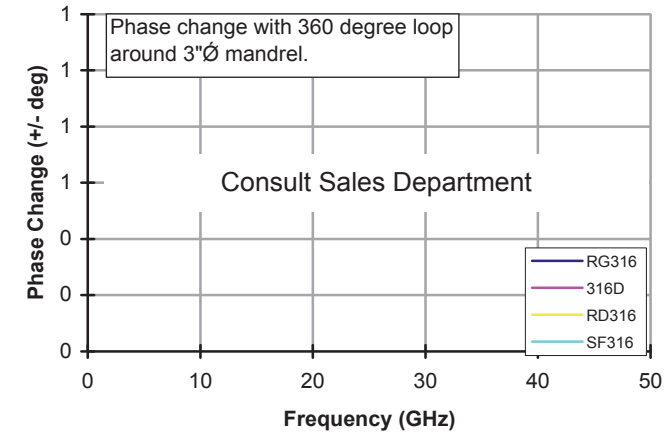
Average Power Rating (Watts)



Phase vs Temperature



Phase vs Flexure



Connector Selection & Options

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 other options not shown.

Note: maximum frequency of assembly is dependent 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 or PVC)	W	√	√				
Weatherized (Neoprene)	N						
Armored	A						
Armored & Weatherized (PVC)	AW						
Armored & Weatherized (Neoprene)	AN						
Armored & Weatherized (Monocoil & Silicone)	MC						
Armored & Weatherized (Monocoil & Polyolefin)	MW						
Extended Boots	E	√	√				
Phase Matching (+/- 2.8 picoseconds)	+/-2.8 PS	√	√				
Dust Caps	D						

Options & Ordering Information

Cable Options

A - Armored

AN - Armored and Weatherized-Neoprene

AW - Armored and Weatherized-PVC

E - Extended Boots

MC - Monocoil-Silicone

MW - Monocoil Weatherized-Polyolefin

W - Weatherized-Polyolefin

W - Weatherized-PVC

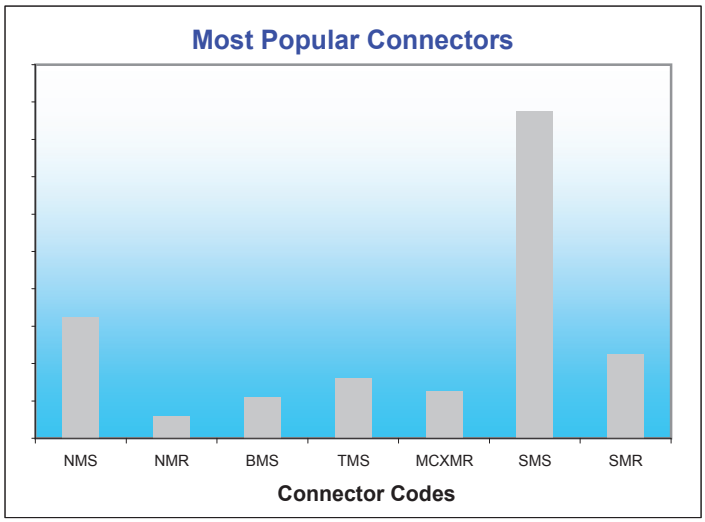
D - Dust Caps

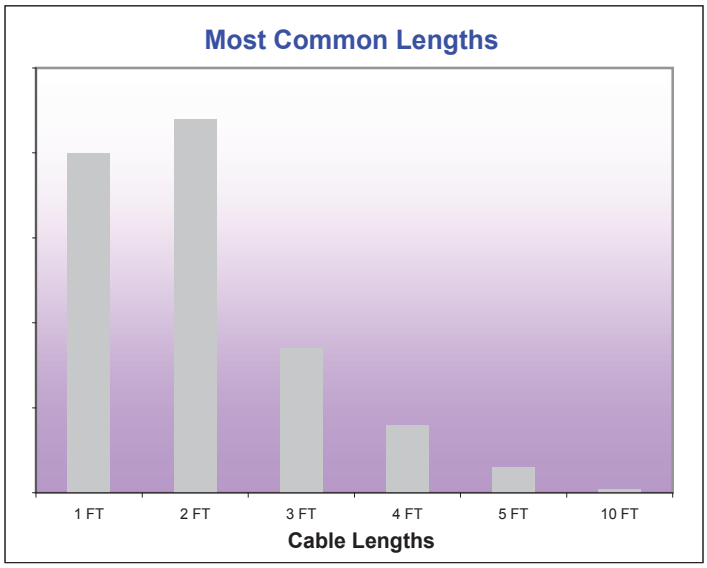
Part Numbering Code

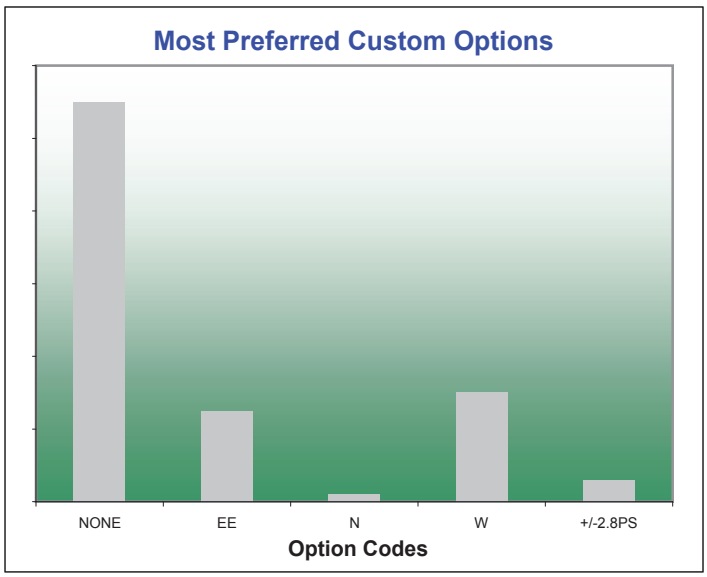
Ordering Information

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

For the full list of cable choices see pages - 2 & - 3, and for available connectors and other Options see pages - 4 & - 6 of this section.







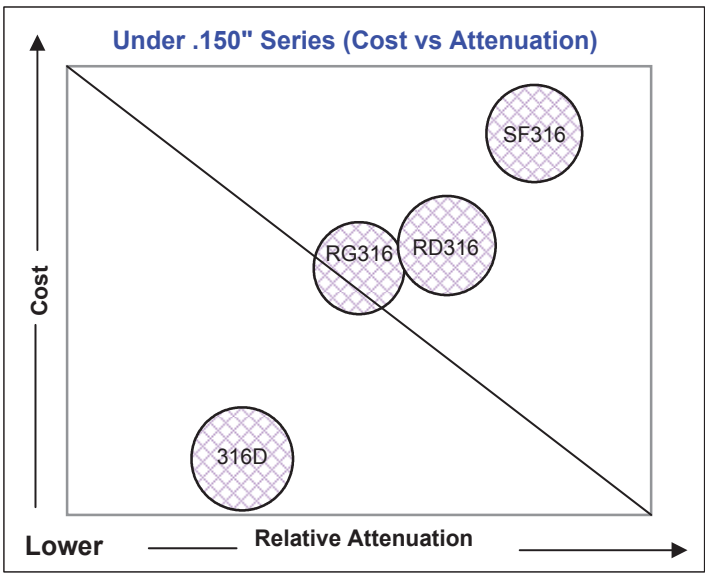
Standard Flexible cables under 0.150 inch diameter offer a lightweight and flexible interconnect where loss and power is not a concern. The SF316 cable offers the lowest loss and highest shielding while 316D cable provides great flexibility, useful in test conditions. Stainless steel connectors are available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

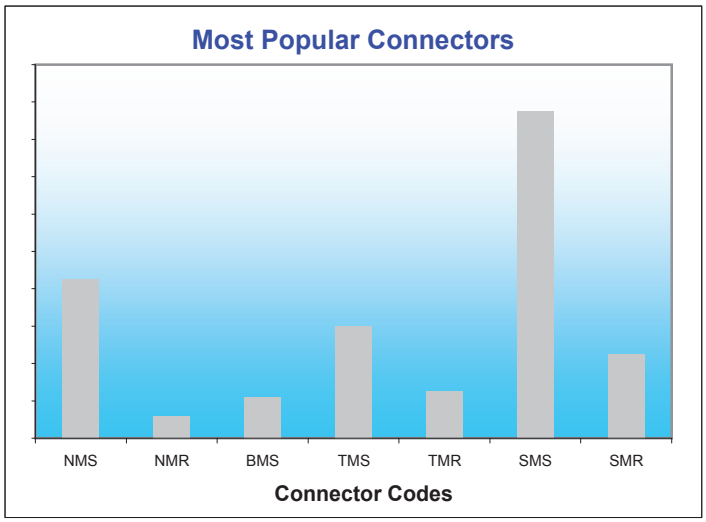
Features/Benefits:

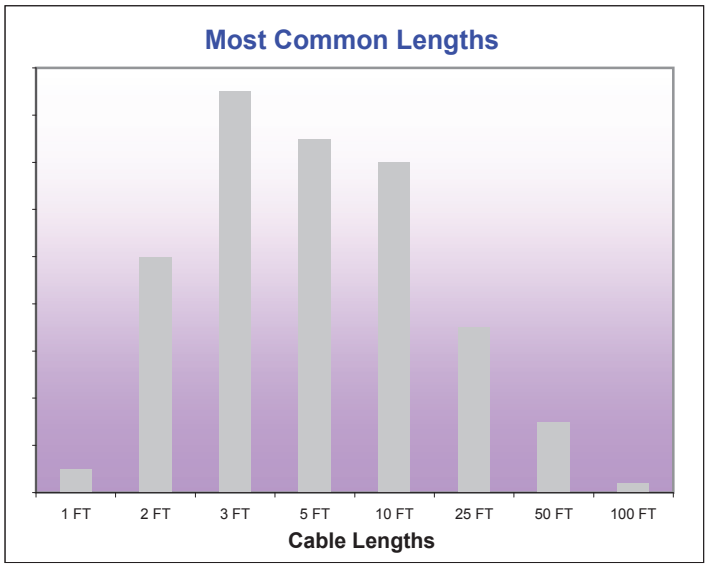
- Includes RG Cables and Their Alternatives
- More Cost-Effective than Low-loss Cable Types
- High Shielding Types Available
- Ultra-Flexible Types Available

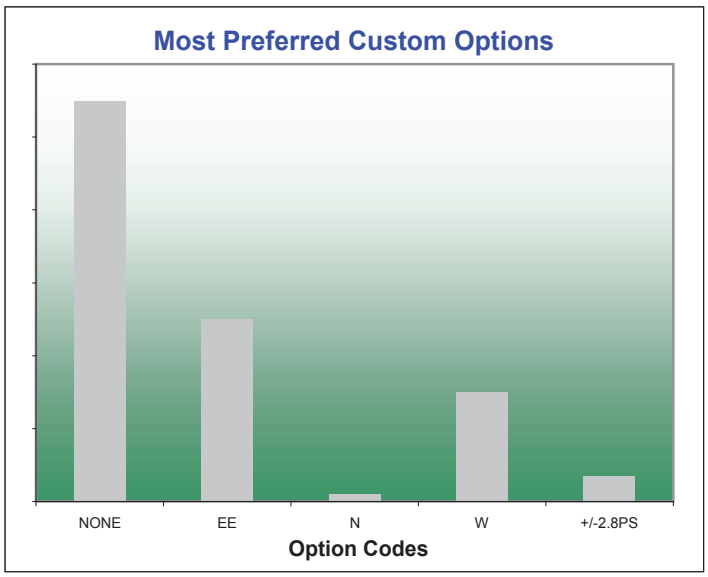
Applications:

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









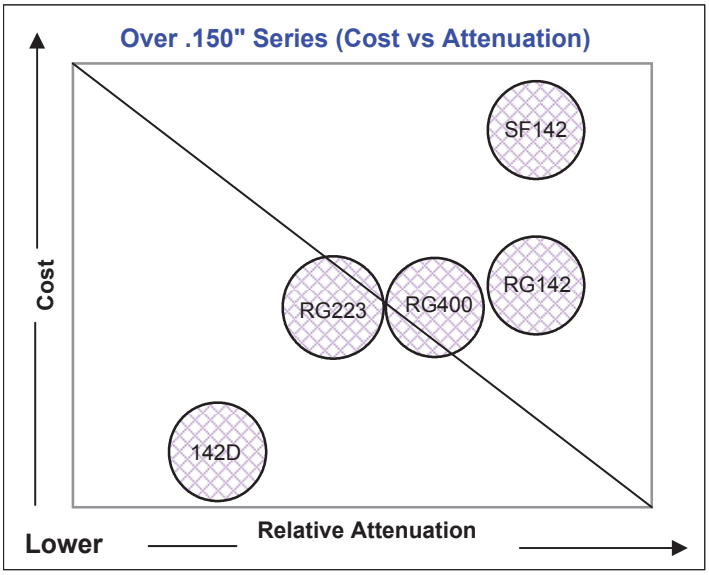
Standard Flexible cables over 0.150 inch diameter offer a moderate weight and flexible interconnect where loss or power may be a concern and cannot be met with smaller diameter cables. SF142 cable offers the lowest loss and highest shielding while 142D cable provides great flexibility useful in some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

Features/Benefits:

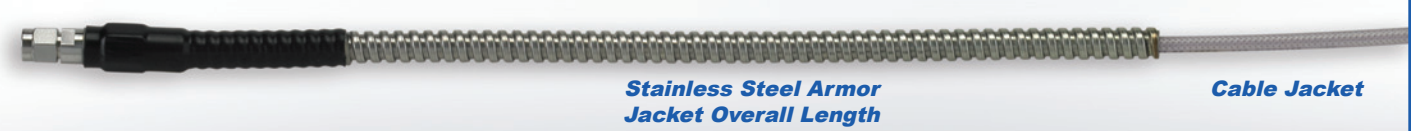
- Includes RG Cables and Their Alternatives
- More Cost-Effective than Low-loss Cable Types
- High Shielding Types Available
- Ultra-Flexible Types Available

Applications:

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



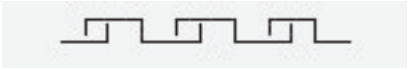
Armored Overall Length



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

SquareLok Style 

InterLok Style 

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 (SquareLok)	0.303	0.9	155	434	3.3
180SP	A	Armor 1/4 (InterLok)	0.329	1.0	250	286	4.6
200	A	Armor 1/4 (InterLok)	0.329	1.0	250	286	4.6
235SP	A	Armor 5/16 SquareLok)	0.410	1.0	200	280	5.5
290	A	Armor 3/8 (SquareLok)	0.500	1.0	225	525	8.8
335	A	Armor 3/8 (SquareLok)	0.500	1.0	225	525	8.8
335SP	A	Armor 3/8 (SquareLok)	0.500	1.0	225	525	8.8
490S	A	Armor 1/2 (SquareLok)	0.625	1.3	250	400	10.6

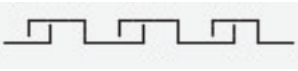
Properties information is typical data only and should not be used for specification requirements.
** Crush strength test per ISO 15465-2003 Section 7.2.*
Consult Sales Department for others types of covering.

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

SquareLok Style 

InterLok Style 

Typical Properties		
Armor Material	Stainless Steel 304 alloy	
Construction	SquareLok & InterLok style	
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 (ºC)	-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 (SquareLok) & PVC Jacket	0.40	0.90	155	434	7.79
180SP	A	Armor 1/4 (InterLok) & PVC Jacket	0.44	1.00	250	286	7.89
200	A	Armor 1/4 (InterLok) & PVC Jacket	0.44	1.00	250	286	7.89
235SP	A	Armor 5/16 SquareLok) & PVC Jacket	0.52	1.00	200	280	9.48
290	A	Armor 3/8 (SquareLok) & PVC Jacket	0.61	1.00	225	525	13.11
335	A	Armor 3/8 (SquareLok) & PVC Jacket	0.61	1.00	225	525	13.11
335SP	A	Armor 3/8 (SquareLok) & PVC Jacket	0.61	1.00	225	525	13.11
490S	A	Armor 1/2 (SquareLok) & 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.

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 - MW 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	MW	SST Monocoil Armor & Jacket	0.19	0.25	N/A	500	3.09
160	MW	SST Monocoil Armor & Jacket	0.25	0.50	N/A	-	3.31
180SP	MW	SST Monocoil Armor & Jacket	0.29	0.63	N/A	-	4.41
200	MW	SST Monocoil Armor & Jacket	0.29	0.63	N/A	-	4.41
235SP	MW	SST Monocoil Armor & Jacket	0.30	0.69	N/A	-	5.51
290	MW	SST Monocoil Armor & 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.

Weatherized Overall Length

Cable Option - W The Weatherized option 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.

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 @ 175ºC = 175% Elongation
Heat Shock	4 HRS @ 250ºC = No Dripping or Cracking
Low Temperature. Flexibility	4 HRS @ -55ºC = No Cracking
Flammability	Self Extinguishing
Corrosive Effect	Non-Corrosive
Solvent Resistance	Tensile Strength = 1000 PSI
Water Absorption	0.20%
Fungus Resistance	Non-Nutrient

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 (ºC)	-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.

Weatherized Overall Length

Cable Option - N Neoprene is a highly durable covering that can be applied over the entire length of the cable jacket to provide additional protection from UV, moisture and other elements encountered in outdoor applications.

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 @ 200ºC = No Dripping or Cracking
Low Temperature. Flexibility	4 HRS @ -75ºC = 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.

Dust Caps

Cable Option - D Dust caps help protect connector mating interfaces from contaminates 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 (7-13cm) 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 @ 175ºC = 175% Elongation
Heat Shock	4 HRS @ 250ºC = No Dripping or Cracking
Low Temperature. Flexibility	4 HRS @ -55ºC = 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 CLASS 1, 2; AMS-3636; AMS-3637; UL; CSA*

Extended Boots (Optional)			
Cable Code	*Option Code*	*Description*	*Bend Radius*
100	E	Shrink Tube Extended Boot	1.25"
125	E	Shrink Tube Extended Boot	1.50"
160	E	Shrink Tube Extended Boot	1.80"
200	E	Shrink Tube Extended Boot	2.00"
290	E	Shrink Tube Extended Boot	3.20"
335	E	Shrink Tube Extended Boot	4.00"
142	E	Shrink Tube Extended Boot	2.00"
223	E	Shrink Tube Extended Boot	2.00"
400	E	Shrink Tube Extended Boot	2.00"
SF142	E	Shrink Tube Extended Boot	2.00"

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

Option - ±1.4PS or ±2.8PS

Cable Option - ±1.4PS or ±2.8PS 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

Relative* - 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.

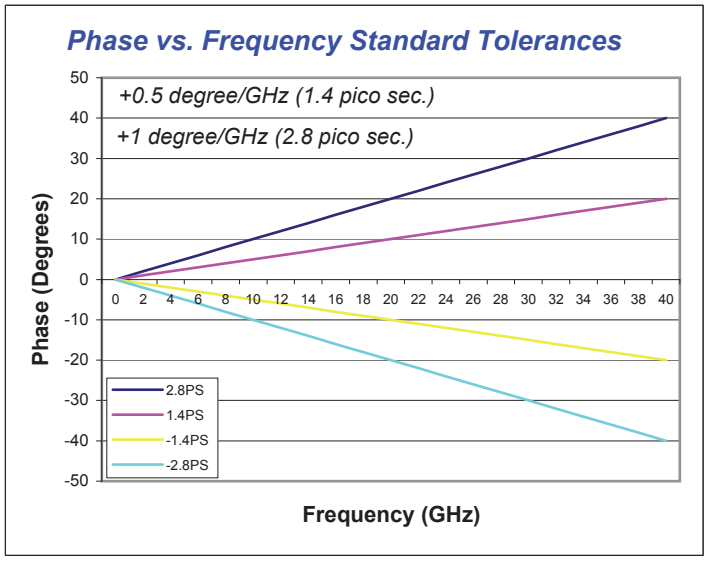
Pairs** - Phase matched in pairs - Selected from large groups of phase matched assemblies.

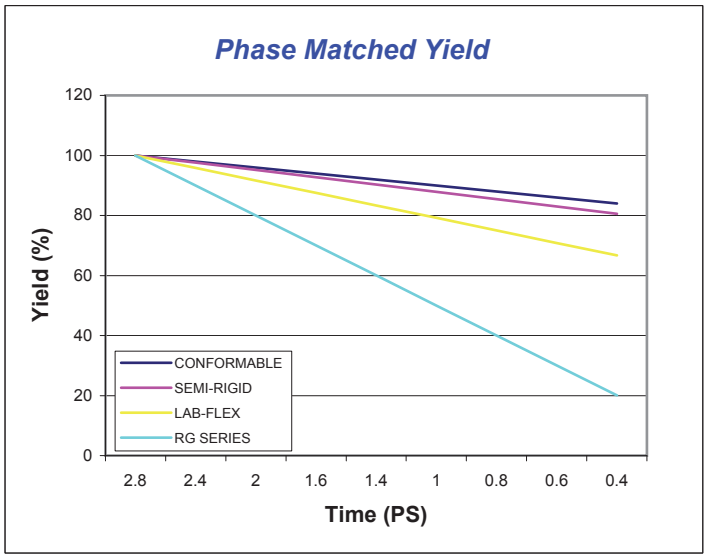
Standard** - Phase matched to a standard - All of the cables are matched to a standard. This standard may have been established from a previous lot or provided by the customer.

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	+/-1.4PS	Phase matched in sets (Relative)	With Electrical Test Data Sheets
ALL	+/-2.8PS	Phase matched in sets (Relative)	With Electrical Test Data Sheets

Consult Sales Department for others types of Phase Matching.

Option - RoHS

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 EU directive 2002/95/EC. 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.

RoHS COMPLIANT PART

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)

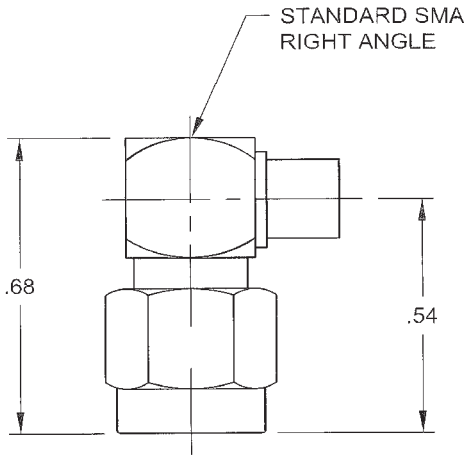
Cable Assembly Finished Length (inches)			Tolerance (inches)
0.0	to	12	± 0.125
12	to	24	± 0.250
24	to	120	± 0.500
120	to	168	± 1.000
168	to	216	± 1.250
216	to	300	± 1.500
300	to	600	± 3.000
600	to	1200	± 5.000
1200	up		Consult Sales Department

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

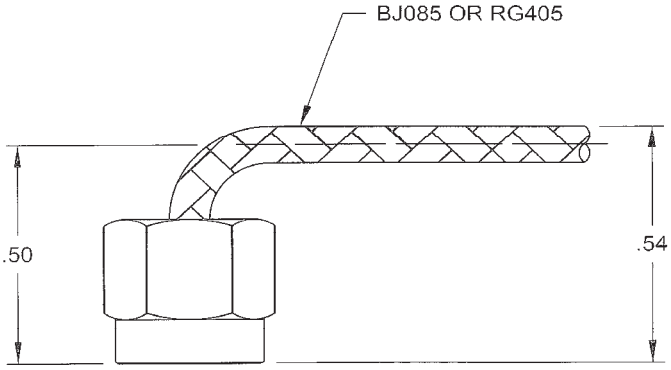
Note: A tightly controlled length does not assure that the phase will also be controlled (see Phase Matching Option).

SMA Right Angles

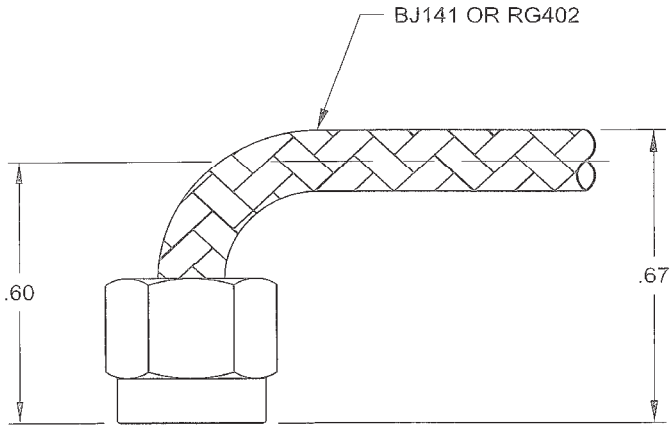
Using either Semi-Rigid or Conformable® cable, Florida RF Labs can pre-bend the cable to form a right angle prior to soldering a low profile SMA plug onto the cable. The cable must be formed before the connector is soldered on in order to prevent any weakening or damage to the solder joint. The electrical 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
(Point and Face designs: see page 50)

Conformable® is a registered trademark of Belden

Connector Product Codes

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 (SMMP)	Bulkhead	(Female)	Straight	50 GHz	SMMPFBS
GPPO (SMMP)	Jack	(Female)	Straight	50 GHz	SMMPFS
GPPO (SMMP)	Jack	(Female)	Right angle	50 GHz	SMMPFR
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.*

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

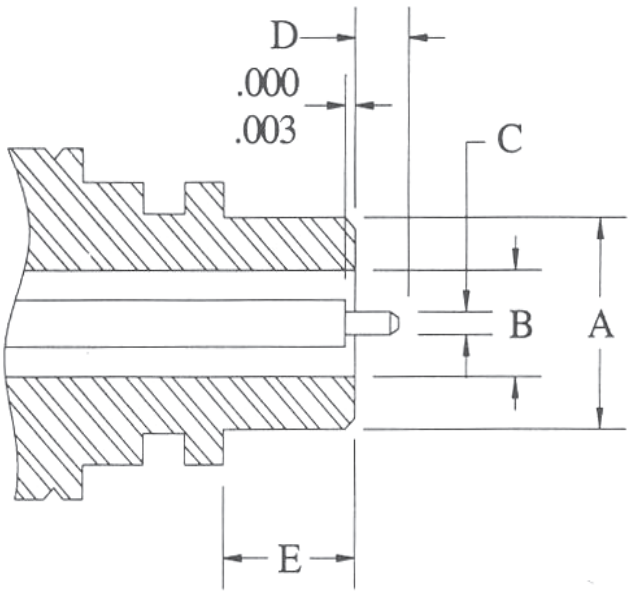
VSWR 1.45 max DC to Max Frequency. *Gender of the connector is determined by center pin.*

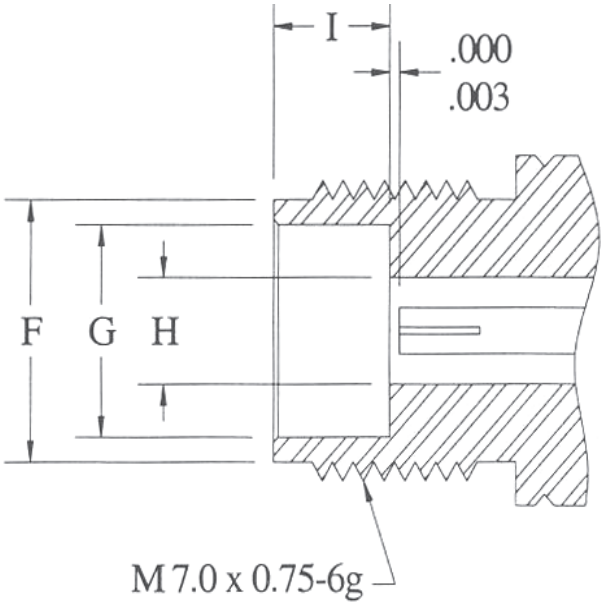
Material and Plating

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.

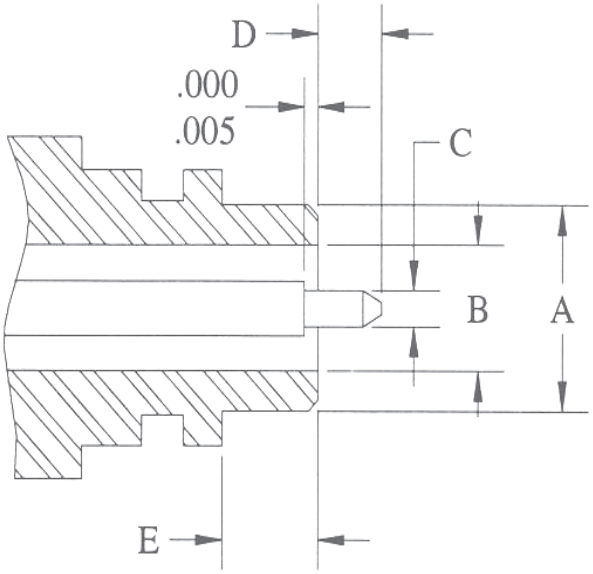


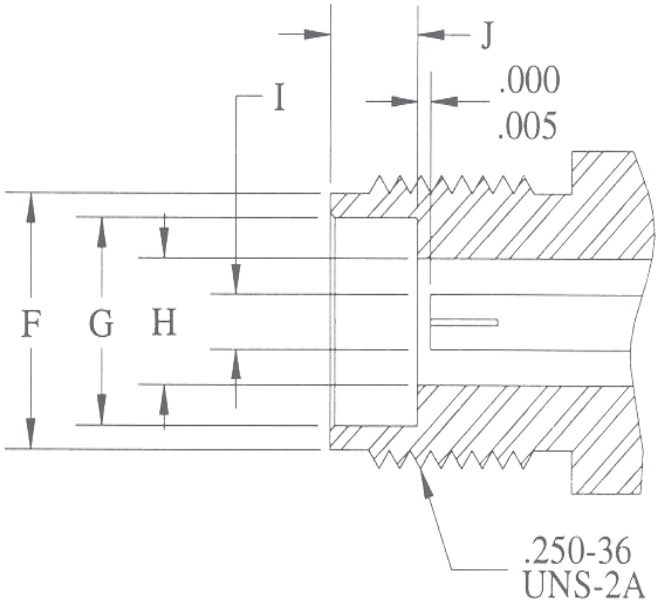


DIMENSIONS		
LETTER	INCHES	mm
A	.1875/.1865	4.7
B	.095/.094	2.4
C	.0205/.0195	0.5
D	.058/.052	1.4
E	.137/.133	3.4

DIMENSIONS		
LETTER	INCHES	mm
F	.232/.229	5.8
G	.1886/.1880	4.8
H	.095/.094	2.4
I	.121/.119	3.0

2.9mm Connector Interface

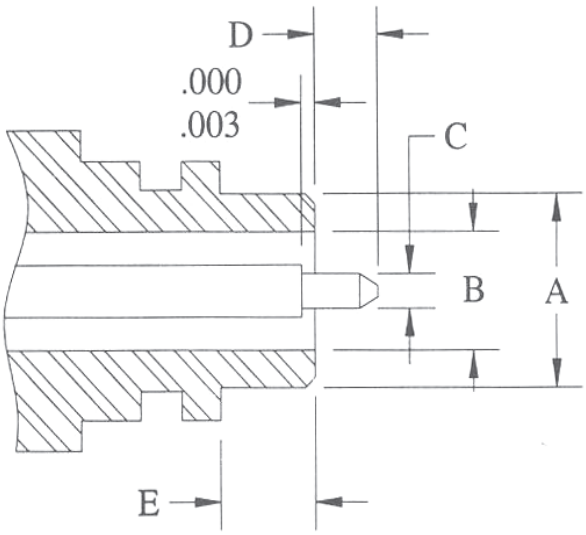


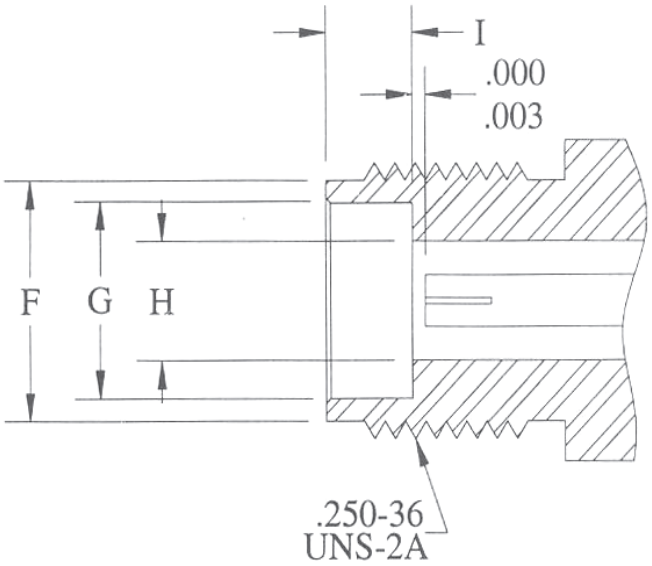


DIMENSIONS		
LETTER	INCHES	mm
A	.1808/.1783	4.54
B	.1153/.1147	2.9
C	.0365/.0355	.914
D	.070/.060	1.65
E	.096/.092	2.38

DIMENSIONS		
LETTER	INCHES	mm
F	.212/.208	5.33
G	.183/.181	4.62
H	.1153/.1147	2.9
I	.0503/.0497	1.27
J	.077/.075	1.93

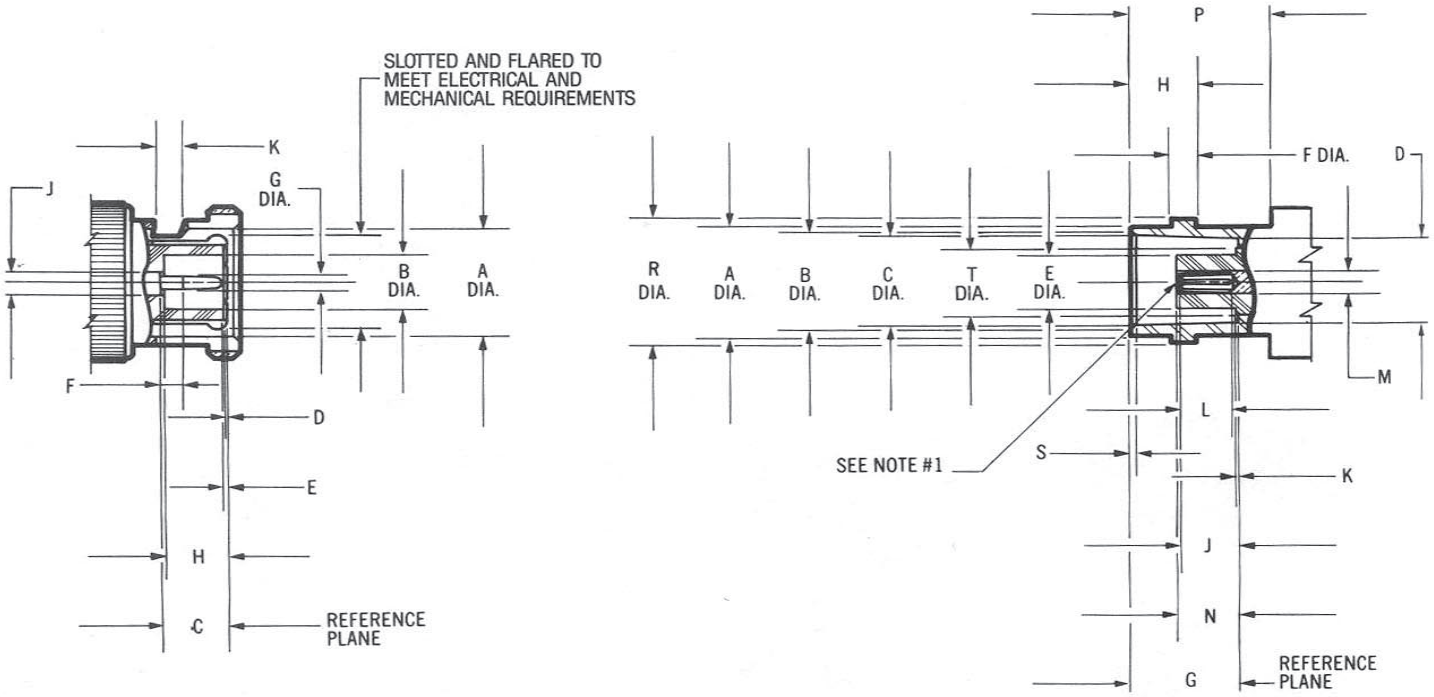
3.5mm Connector Interface





DIMENSIONS		
LETTER	INCHES	mm
A	.1808/.1783	4.54
B	.1383/.1373	3.5
C	.0365/.0355	.914
D	.070/.060	1.65
E	.096/.092	2.38

DIMENSIONS		
LETTER	INCHES	mm
F	.212/.208	5.33
G	.183/.181	4.62
H	.1383/.1373	3.5
I	.077/.075	1.93



(Male) Plug

Letter	Inches (Millimeters)[3]	
	Minimum	Maximum
A	.385 (9.78)	.390 (9.91)
B	.190 (4.83)	-
C	.210 (5.33)	.230 (5.8)
D	.006 (0.15)	.018 (0.46)
E	.003 (0.08)	-
F	.078 (2.00)	-
G	.052 (1.32)	.054 (1.37)
H	.208 (5.28)	.228 (5.79)
J	.081 (2.06)	.087 (2.21)
K	.091 (2.31)	.097 (2.46)

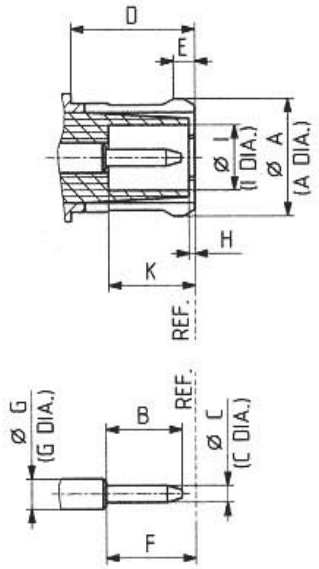
(Female) Jack

Letter	Inches (Millimeters)[3]	
	Minimum	Maximum
A	.378 (9.60)	-
B	.346 (8.80)	.356 (9.04)
C	.327 (8.31)	.333 (8.46)
D	.319 (8.10)	.321 (8.15)
E	-	.186 (4.72)
F	.075 (1.91)	.081 (2.06)
G	.329 (8.36)	.335 (8.50)
H	.204 (5.18)	.208 (5.28)
J	.186 (4.7)	.206 (5.23)
K	-	.006 (0.15)
L	.195 (4.95)	-
M	.081 (2.06)	.087 (2.21)
N	.188 (4.80)	.208 (5.28)
P	.414 (10.52)	-
R	.432 (10.97)	.436 (11.07)
S	.015 (0.38)	.030 (0.76)
T	-	.256 (6.50)

1. ID to meet VSWR, contact resistance and insertion withdrawal forces when mated with .053 ± .001 (1.34 ± .02mm) dia. pin.
2. When fully engaged, the two reference planes must coincide with metal to metal contact.
3. Metric equivalents (to the nearest 0.01mm) are given for general information only.

Interface Dimensions

(Male) Plug

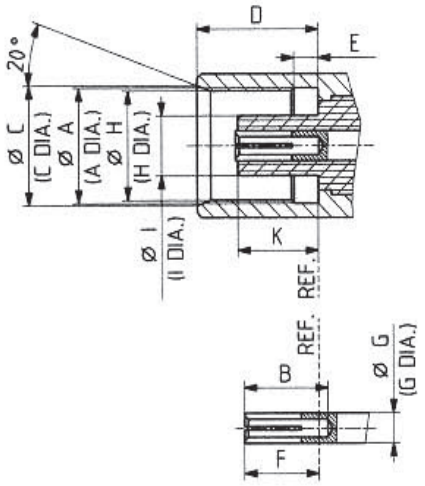


Interface Dimensions in mm/inches

	Plug		Jack	
	min.	max.	min.	max.
A	3.72/.146*	3.80/.150*	3.60/.142	3.70/.146
B	2.49/.098	2.59/.102	2.80/.110	—
C	0.48/.019	0.53/.021	3.75/.148	3.85/.152
D	4.15/.163	—	4.00/.157	4.12/.162
E	0.70/.028	0.75/.030	0.75/.030	0.85/.033
F	2.80/.110	3.20/.126	2.30/.091	2.80/.110
G	0.95/.037 nom.		0.95/.037 nom.	
H	—	0.30/.012	3.42/.135	3.48/.137
I	2.00/.079	2.07/.081	1.80/.071	1.98/.078
K	2.80/.110	3.20/.126	2.60/.102	2.80/.110

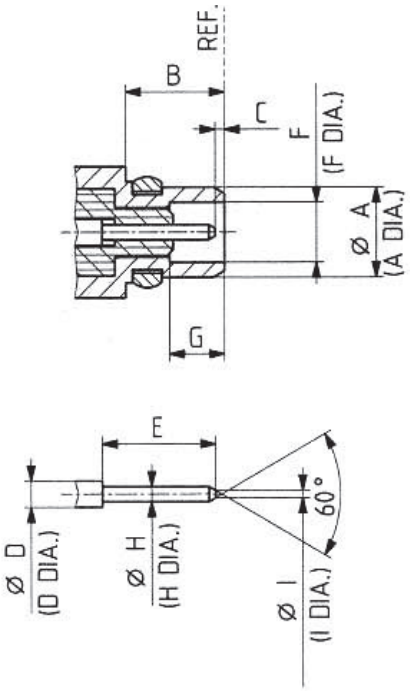
* prior to slotting

(Female) Jack

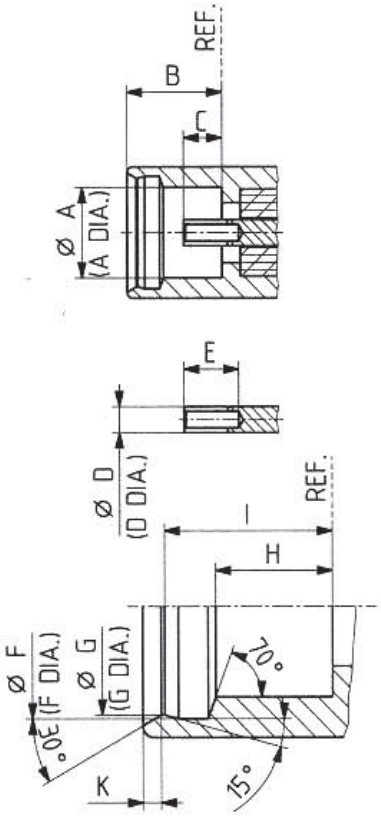


Interface Dimensions

(Male) Plug

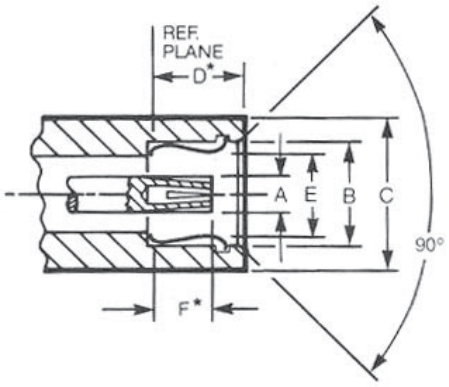


(Female) Jack



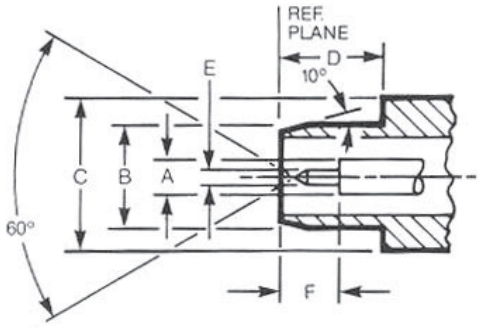
Interface Dimensions in mm/inches

	Plug		Jack	
	min.	max.	min.	max.
A	—	2.40/.094	2.41/.095	—
B	2.70/.106	—	2.60/.102	—
C	0.00/.000	0.25/.010	0.90/.035	1.20/.047
D	0.70/.028 nom.		0.70/.028 nom.	
E	—	3.15/.124	1.40/.055	—
F	1.58/.062	1.62/.064	3.00/.118	3.04/.120
G	1.45/.057	—	2.88/.113	2.90/.114
H	0.38/.015	0.42/.017	1.57/.062	1.63/.064
I	—	0.20/.008	2.30/.091	2.34/.092
K	—	—	—	0.23/.009



(Female) Jack

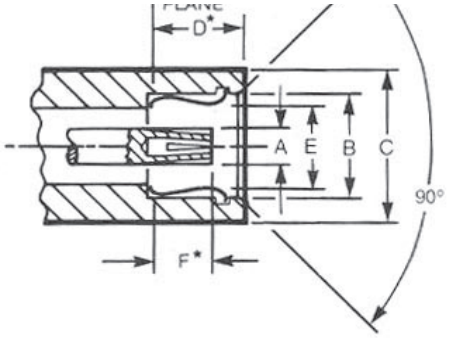
Letter	Inches (Millimeters)
A	.070 (1.78) Nom.
B	.225 (5.72) Min.
C	.300 (7.62) Ref.
D	.197 (5.00) Nom.*
E	.200 (5.08) Max.
F	.127 (3.23) Max.*



(Male) Plug

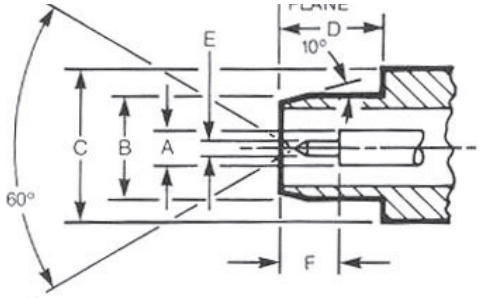
Letter	Inches (Millimeters)
A	.070 (1.78) Nom.
B	.210 (5.33) Nom.
C	.300 (7.62) Ref.
D	.199 (5.05) Min.
E	.036 (0.91) Nom.
F	.128 (3.25) Min.

*With spring bottomed.
Metric equivalents (to the nearest 0.01mm) are given for general information only.



(Female) Jack

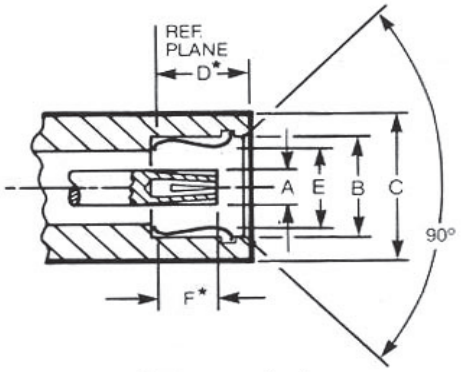
Letter	Inches (Millimeters)
A	.070 (1.78) Nom.
B	.225 (5.72) Min.
C	.300 (7.62) Ref.
D	.197 (5.00) Nom.*
E	.200 (5.08) Max.
F	.127 (3.23) Max.*



(Male) Plug

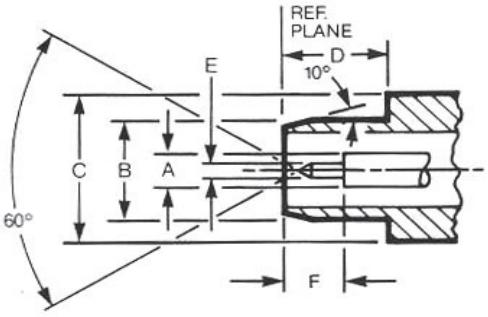
Letter	Inches (Millimeters)
A	.070 (1.78) Nom.
B	.210 (5.33) Nom.
C	.300 (7.62) Ref.
D	.199 (5.05) Min.
E	.036 (0.91) Nom.
F	.128 (3.25) Min.

*With spring bottomed.
Metric equivalents (to the nearest 0.01mm) are given for general information only.



(Female) Jack

Letter	Inches (Millimeters)
A	.048 (1.22) Nom.
B	.154 (3.91) Min.
C	.210 (5.33) Ref.
D	.197 (5.00) Nom.*
E	.132 (3.35) Max.
F	.127 (3.23) Max.*



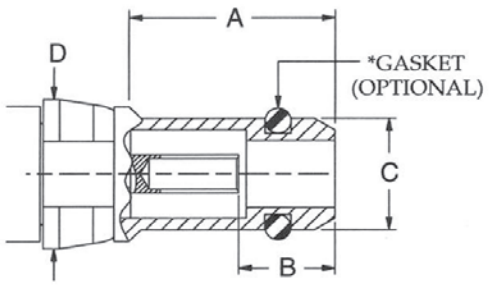
(Male) Plug

Letter	Inches (Millimeters)
A	.048 (1.22) Nom.
B	.140 (3.56) Nom.
C	.210 (5.33) Ref.
D	.199 (5.00) Min.
E	.020 (0.51) Nom.
F	.128 (3.25) Min.

*With spring bottomed.
Metric equivalents (to the nearest 0.01mm) are given for general information only.

PkZ® 26 SERIES
SIZE 8 CONTACT

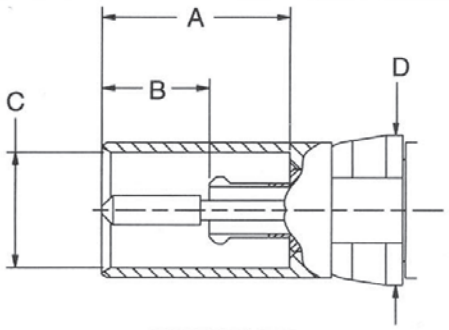
INTERFACE DRAWINGS



PLUG

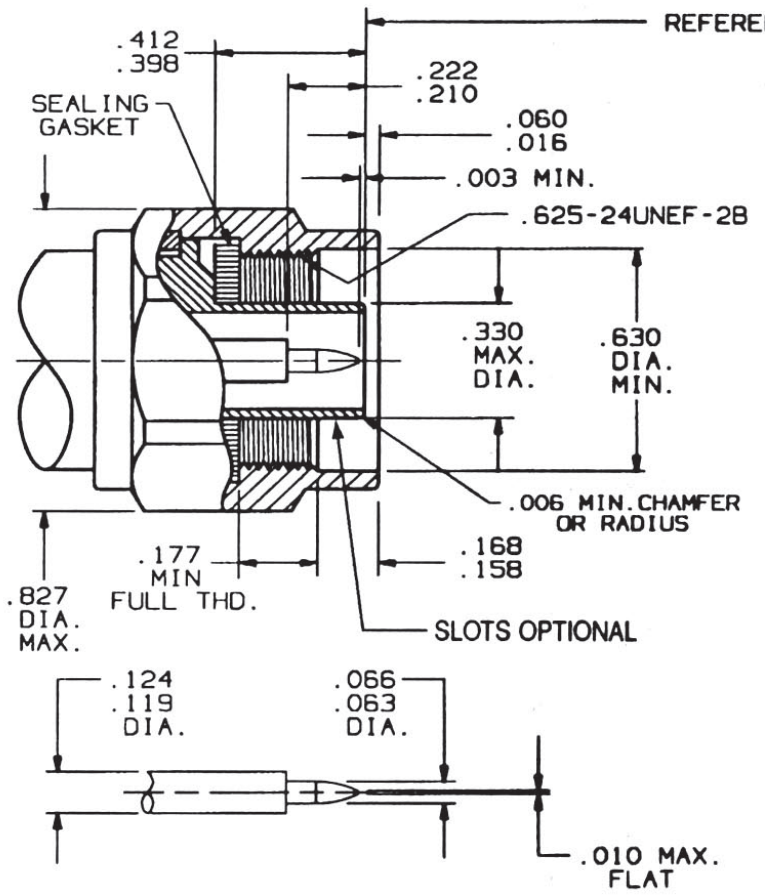
	INCH	(MM)
A MIN	.250	(6.35)
B	.129	(3.28)
C	Ø.153 / .156	Ø(3.89) / (3.96)
D	Ø.206	Ø(5.23)

	INCH	(MM)
A MIN	.245	(6.22)
B	.145	(3.68)
C MIN	Ø.157	Ø(3.99)
D	Ø.206	Ø(5.23)



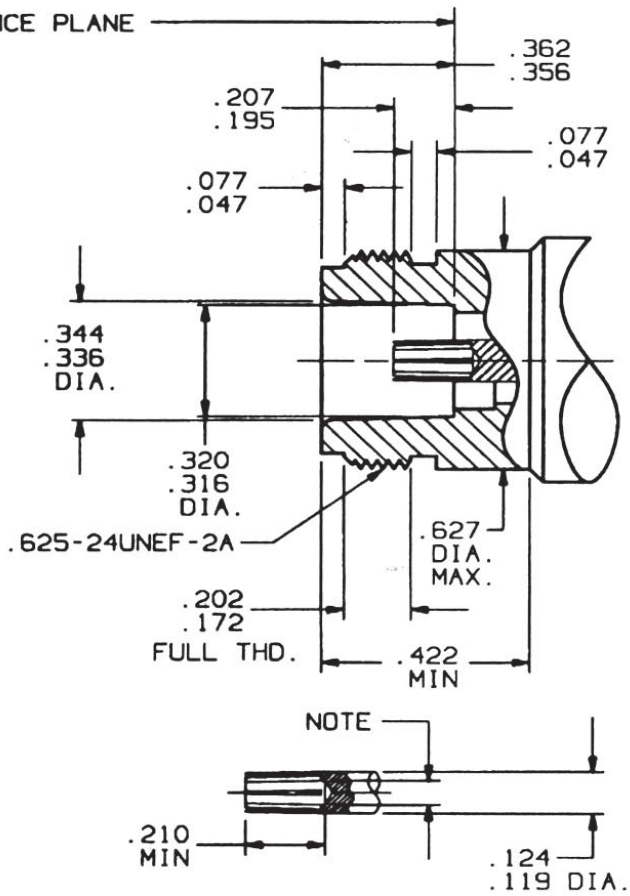
RECEPTACLE

(Male) Plug

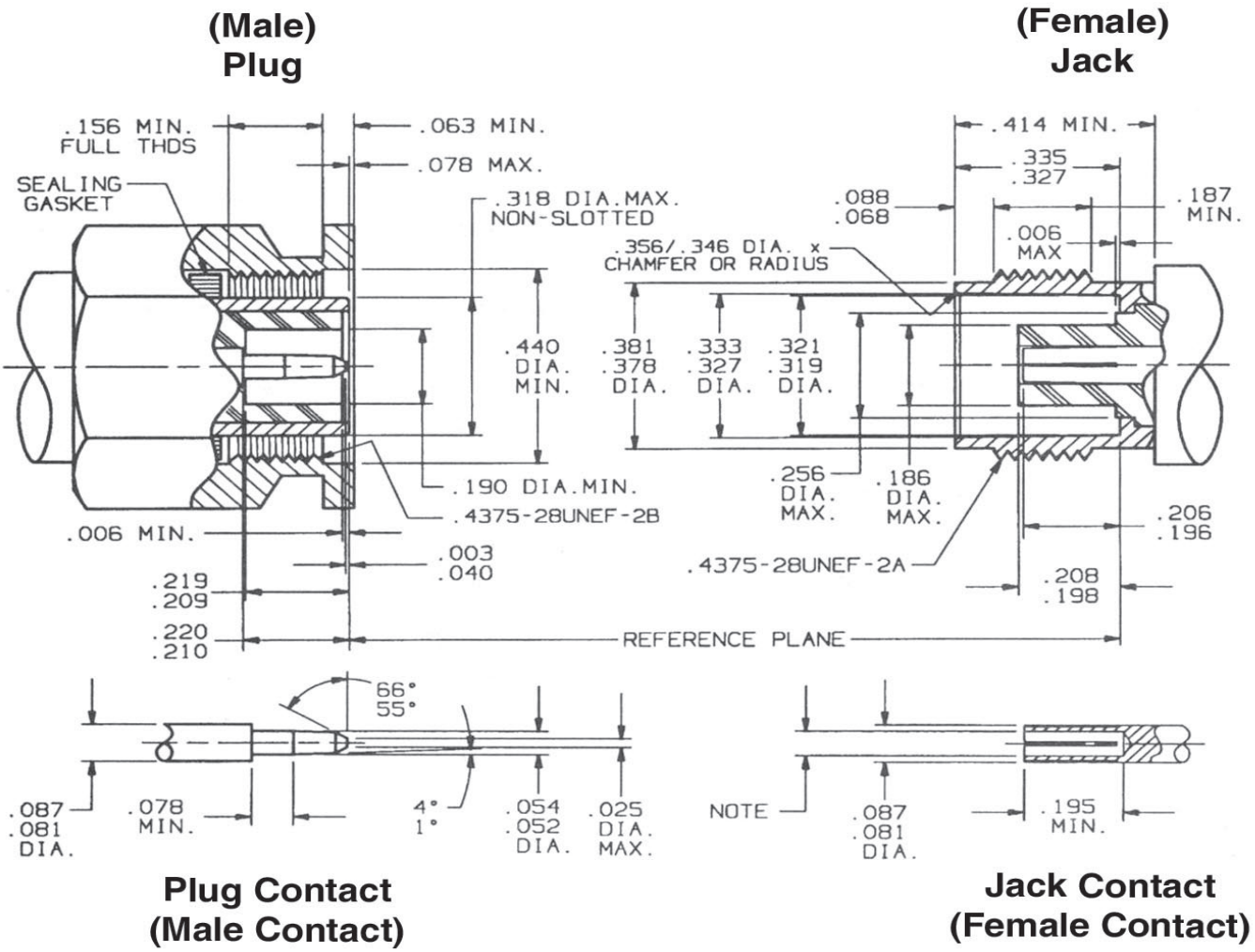


Plug Contact (Male Contact)

(Female) Jack

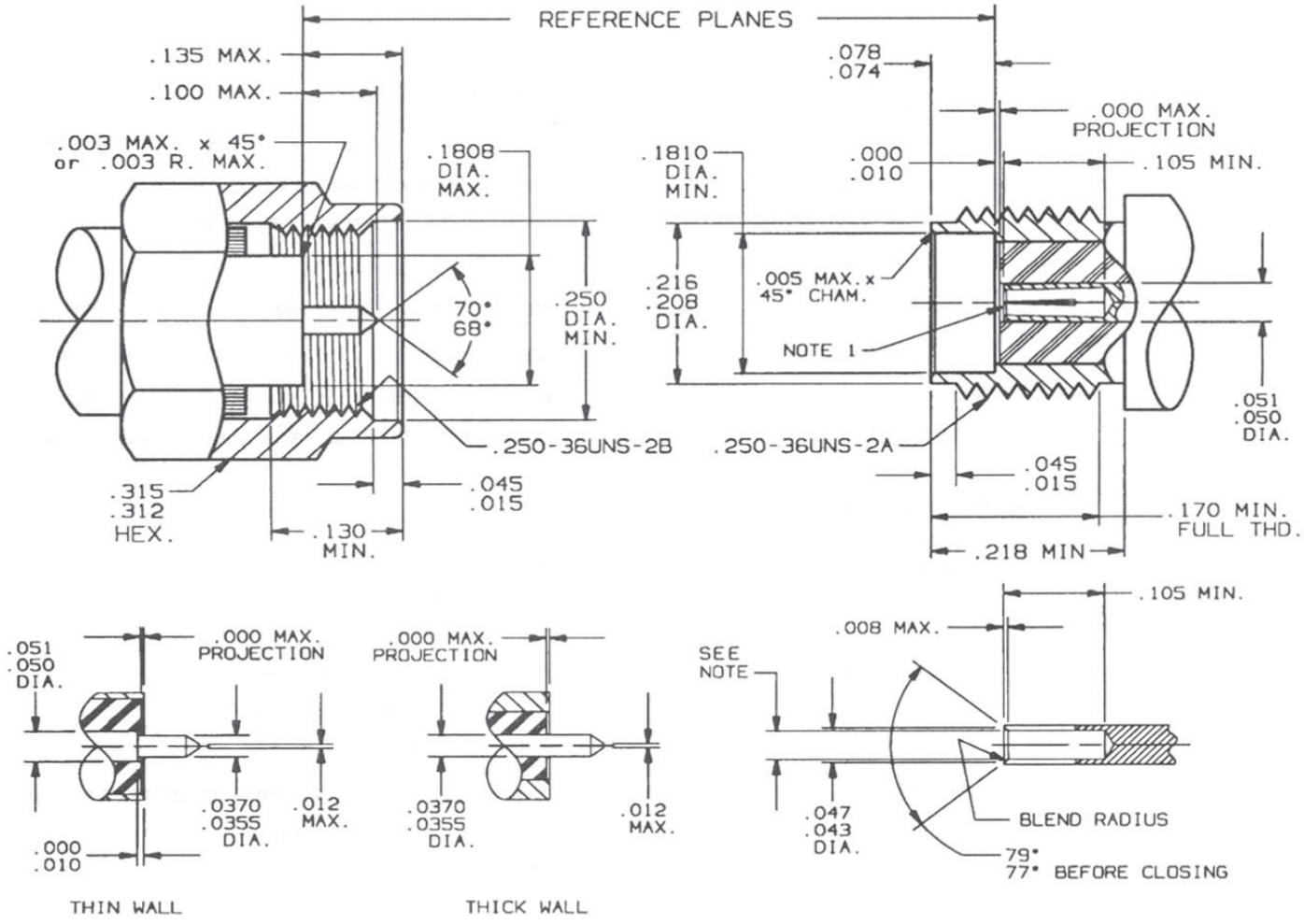


Jack Contact (Female Contact)


(Male)
Plug
(Female)
Jack
.156 MIN.
FULL THDS
.063 MIN.
.078 MAX.
SEALING
GASKET
.318 DIA.MAX.
NON-SLOTTED
.440
DIA.
MIN.
.190 DIA.MIN.
.4375-28UNEF-2B
.006 MIN.
.003
.040
.219
.209
.220
.210
REFERENCE PLANE
.414 MIN.
.335
.327
.088
.068
.187
MIN.
.006
MAX
.356/.346 DIA. x
CHAMFER OR RADIUS
.381
.378
DIA.
.333
.327
DIA.
.321
.319
DIA.
.256
DIA.
MAX.
.186
DIA.
MAX.
.206
.196
.4375-28UNEF-2A
.208
.198
66°
55°
.087
.081
DIA.
.078
MIN.
4°
1°
.054
.052
DIA.
.025
DIA.
MAX.
NOTE
.087
.081
DIA.
.195
MIN.
Plug Contact
(Male Contact)
Jack Contact
(Female Contact)

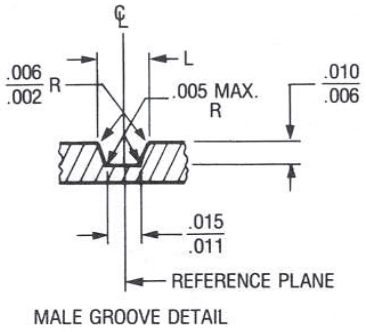
(Male) Plug

(Female) Jack

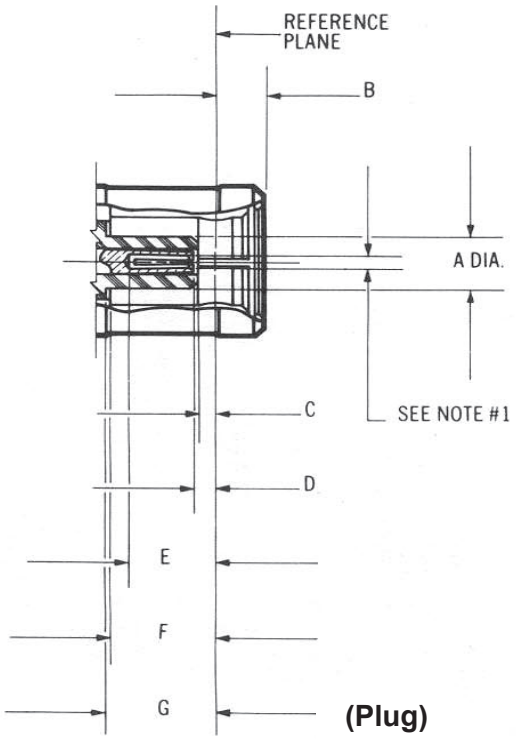


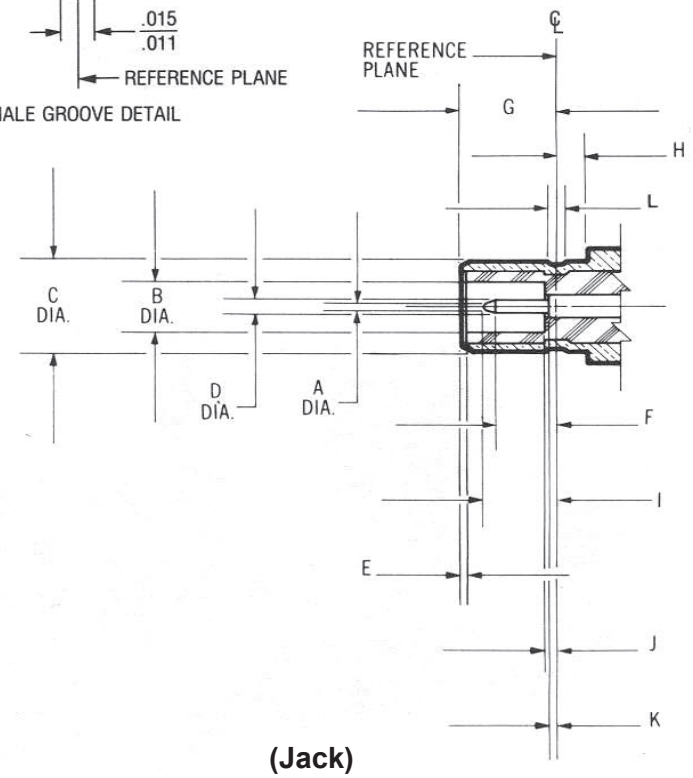
Plug Contact (Male Contact)

Jack Contact (Female Contact)



MALE GROOVE DETAIL





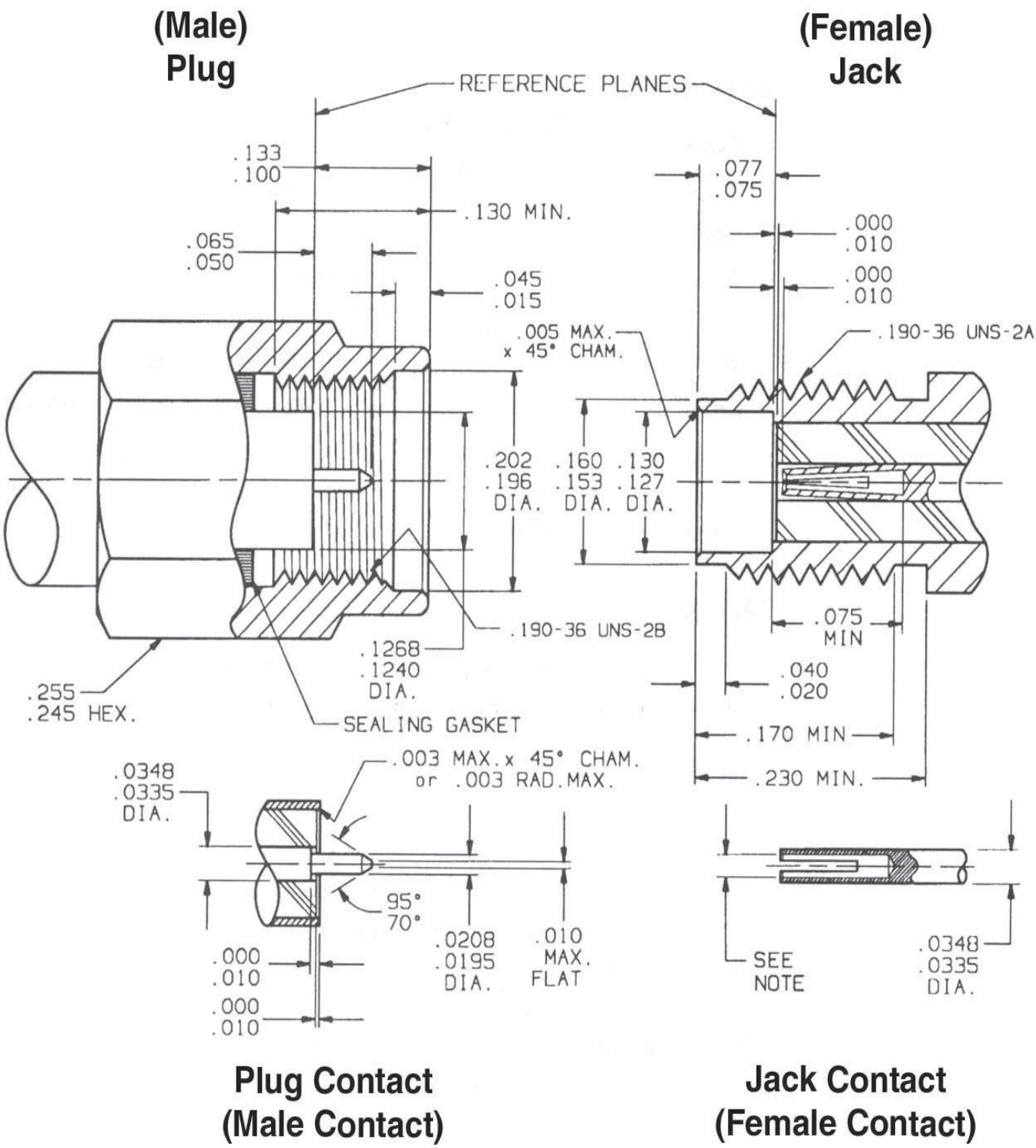
(Plug)
FEMALE

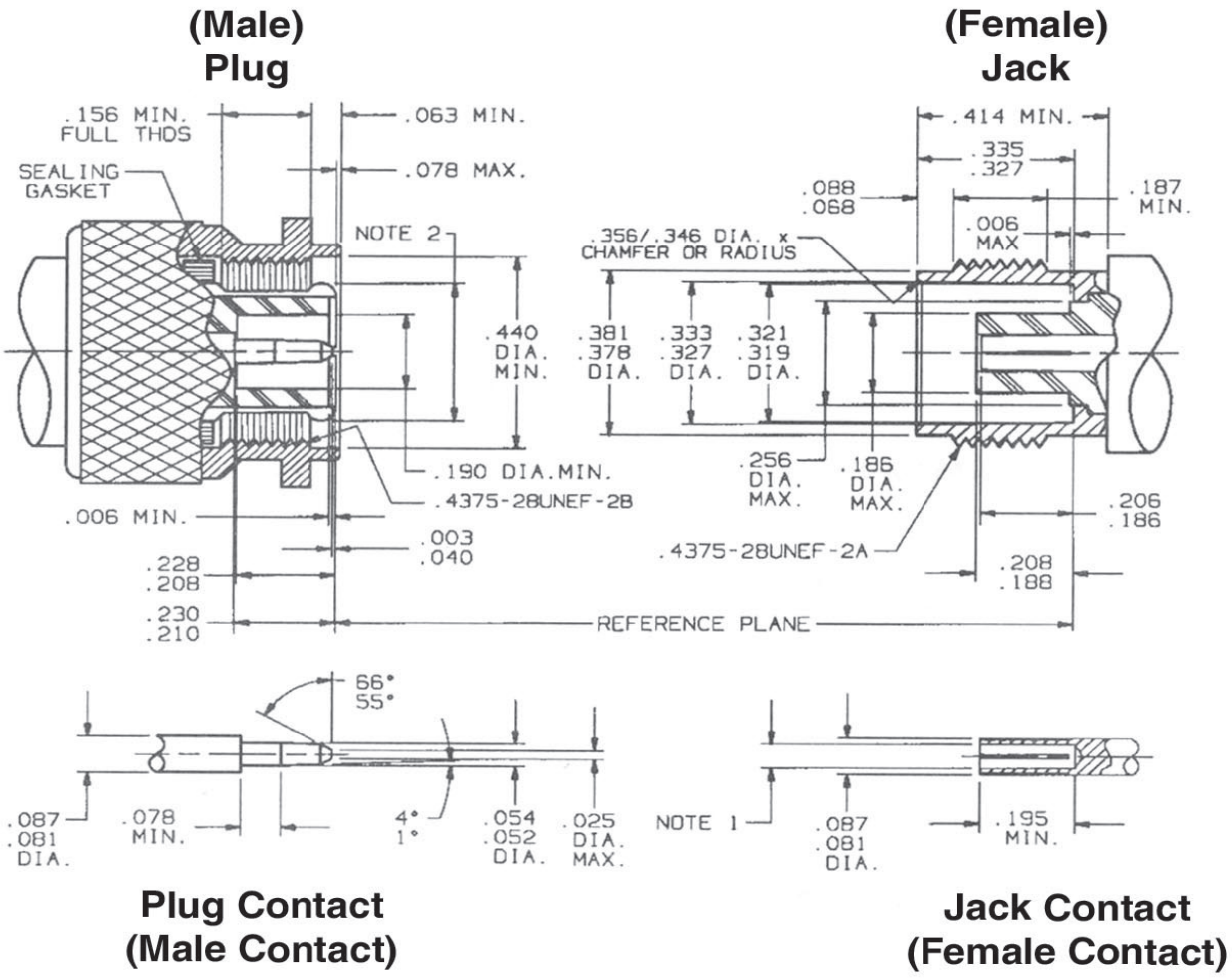
Letter	Inches (Millimeters)[2]	
	Minimum	Maximum
A	-	.081 (2.06)
B	-	.064 (1.63)
C	.007 (0.18)	-
D	.007 (0.18)	.037 (0.94)
E	.117 (2.97)	-
F	.141 (3.58)	-
G	.141 (3.58)	-

(Jack)
MALE

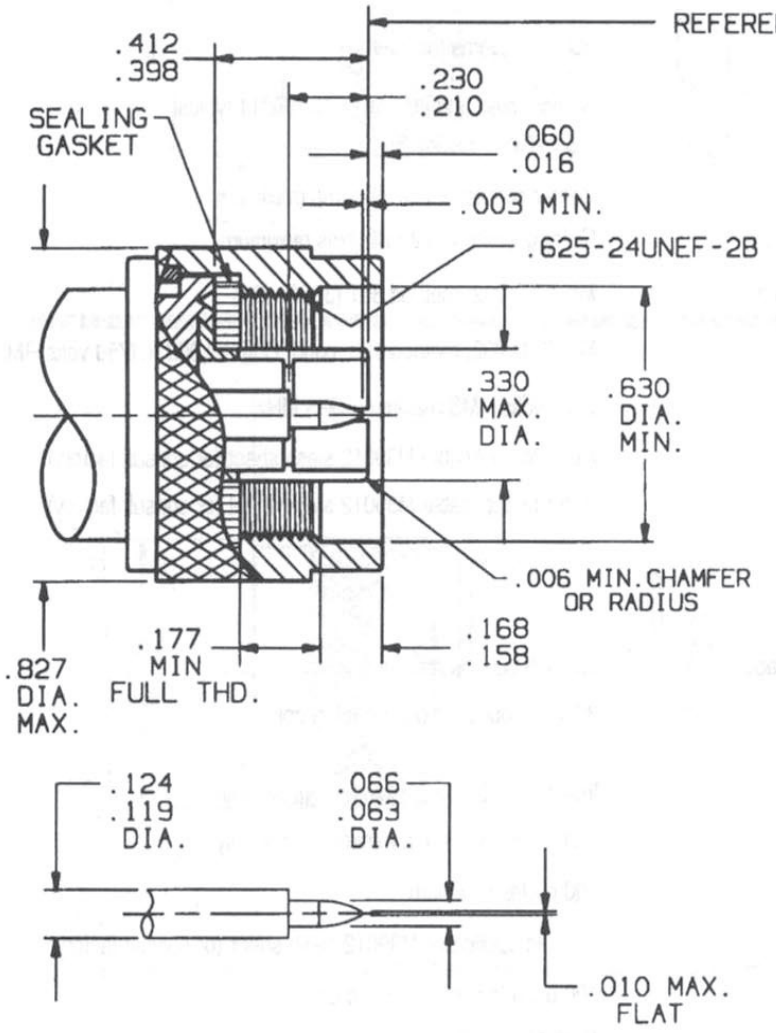
Letter	Inches (Millimeters)[2]	
	Minimum	Maximum
A	-	.010 (0.25)
B	.082 (2.08)	.085 (2.16)
C	-	.146 (3.71)
D	.019 (0.48)	.021 (0.53)
E	.000 (0.00)	-
F	.052 (1.32)	-
G	.131 (3.33)	.141 (3.58)
H	.065 (1.65)	-
I	-	.117 (2.97)
J	-	.007 (0.18)
K	-	.007 (0.18)
L	.027 (0.69)	.037 (0.94)

1. ID to meet VSWR and contact resistance when mated with .020 ± .001 (.508 ± .0254mm) dia. pin.
2. Metric equivalents (to the nearest 0.01mm) are given for general information only.


(Male)
Plug
(Female)
Jack
REFERENCE PLANES
.133
.100
.130 MIN.
.065
.050
.045
.015
.005 MAX.
x 45° CHAM.
.202
.196
DIA.
.160
.153
DIA.
.130
.127
DIA.
.077
.075
.000
.010
.000
.010
.190-36 UNS-2A
.190-36 UNS-2B
.1268
.1240
DIA.
.255
.245 HEX.
SEALING GASKET
.075
MIN
.040
.020
.170 MIN
.230 MIN.
.003 MAX. x 45° CHAM.
or .003 RAD. MAX.
.0348
.0335
DIA.
95°
70°
.0208
.0195
DIA.
.010
MAX.
FLAT
.000
.010
.000
.010
SEE
NOTE
.0348
.0335
DIA.
Plug Contact
(Male Contact)
Jack Contact
(Female Contact)

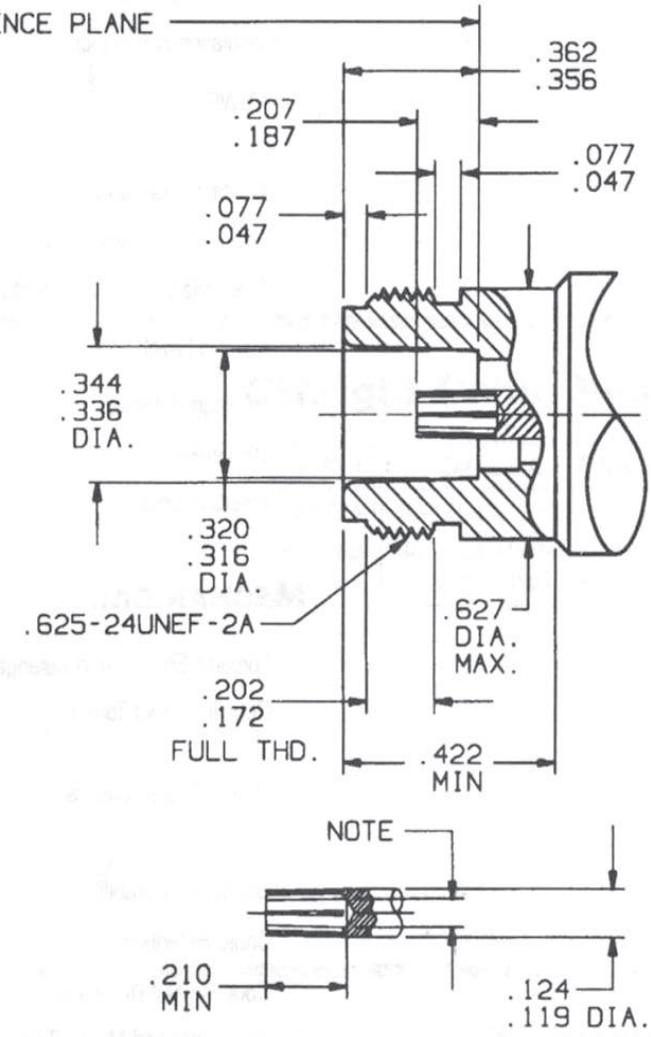

(Male)
Plug
(Female)
Jack
.156 MIN.
FULL THDS
.063 MIN.
.078 MAX.
SEALING
GASKET
NOTE 2
.440
DIA.
MIN.
.190 DIA.MIN.
.4375-28UNEF-2B
.006 MIN.
.003
.040
.228
.208
.230
.210
REFERENCE PLANE
.414 MIN.
.335
.327
.088
.068
.187
MIN.
.006
MAX
.356/.346 DIA. x
CHAMFER OR RADIUS
.381
.378
DIA.
.333
.327
DIA.
.321
.319
DIA.
.256
DIA.
MAX.
.186
DIA.
MAX.
.4375-28UNEF-2A
.206
.186
.208
.188
66°
55°
.087
.081
DIA.
.078
MIN.
4°
1°
.054
.052
DIA.
.025
DIA.
MAX.
NOTE 1
.087
.081
DIA.
.195
MIN.
Plug Contact
(Male Contact)
Jack Contact
(Female Contact)

(Male) Plug



Plug Contact (Male Contact)

(Female) Jack



Jack Contact (Female Contact)

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)

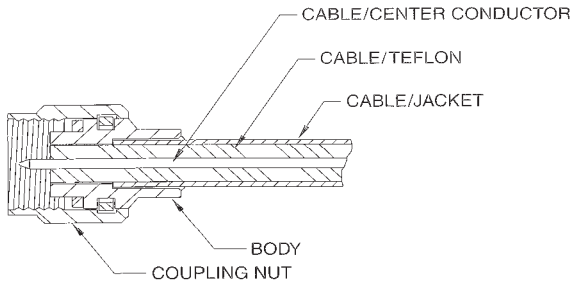
The differences between the 5 connectors are the length of the mating contact, the dielectric material, and the inside diameter of the connector body. The standard SMA plug has a mating contact up to 0.100 inches long, which can engage the female contact before the connector bodies align the contacts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

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	0.903382	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	0.913043	MIL-STD-348
TNC / BNC	0.902913	MIL-STD-348
7/16 Male	0.830703	IEC 169-4
7/16 Female	0.855215	IEC 169-4

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 (see Table II for recommended coupling torque values).

Table II: Recommended Coupling Torque

Connector Type	Material	Recommended Torque
7/16	Brass	221 - 265 in-lbs
Type N	Stainless Steel	12 - 15 in-lbs
Type N	Brass	6.2 - 9.7 in-lbs
TNC	Stainless Steel	12 - 15 in-lbs
TNC	Brass	4.1 - 6.1 in-lbs
SMA	Stainless Steel	7 -10 in-lbs
SMA	Brass	3 - 5 in-lbs
SSMA	Stainless Steel	3 - 5 in-lbs
OSMM	Stainless Steel	2.0 in-lbs
SMC	Brass	1.9 - 3.1 in-lbs

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. Induced stresses on test and device ports can damage test equipment and test cables. Low level stresses can cause connections to loosen. When routing cables always connect any right angle connectors first.

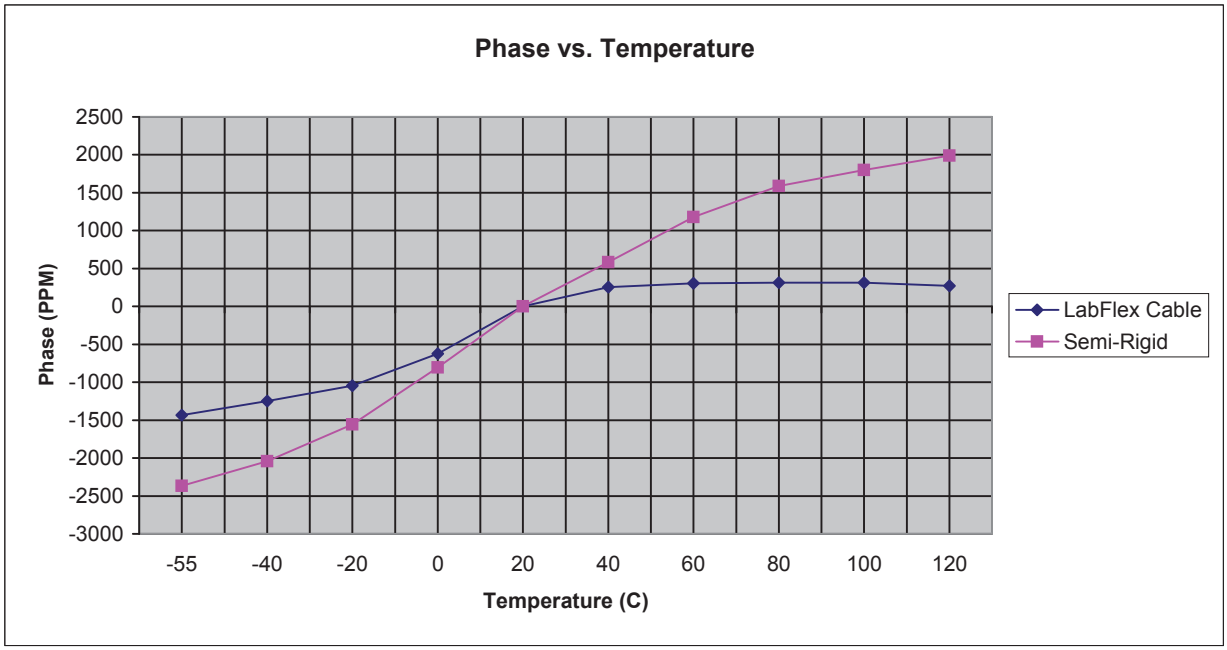
Cable Assembly Mate/De-Mate Process:

Interface Alignment - Contact Pins and Dielectrics can be damaged if misaligned connectors are mated. Make sure that mating interfaces are parallel and on center while mating and unmating connectors.

Interface Rotation - Plating and surface finish of outer and inner contacts can be damaged if connector bodies are allowed to rotate while mating and unmating. Use wrench flats on connector bodies to keep them rotationally stationary while torquing coupling nuts.

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 (see Table II above). This method will minimize most bend and twist loading issues.

Phase Stability versus Temperature



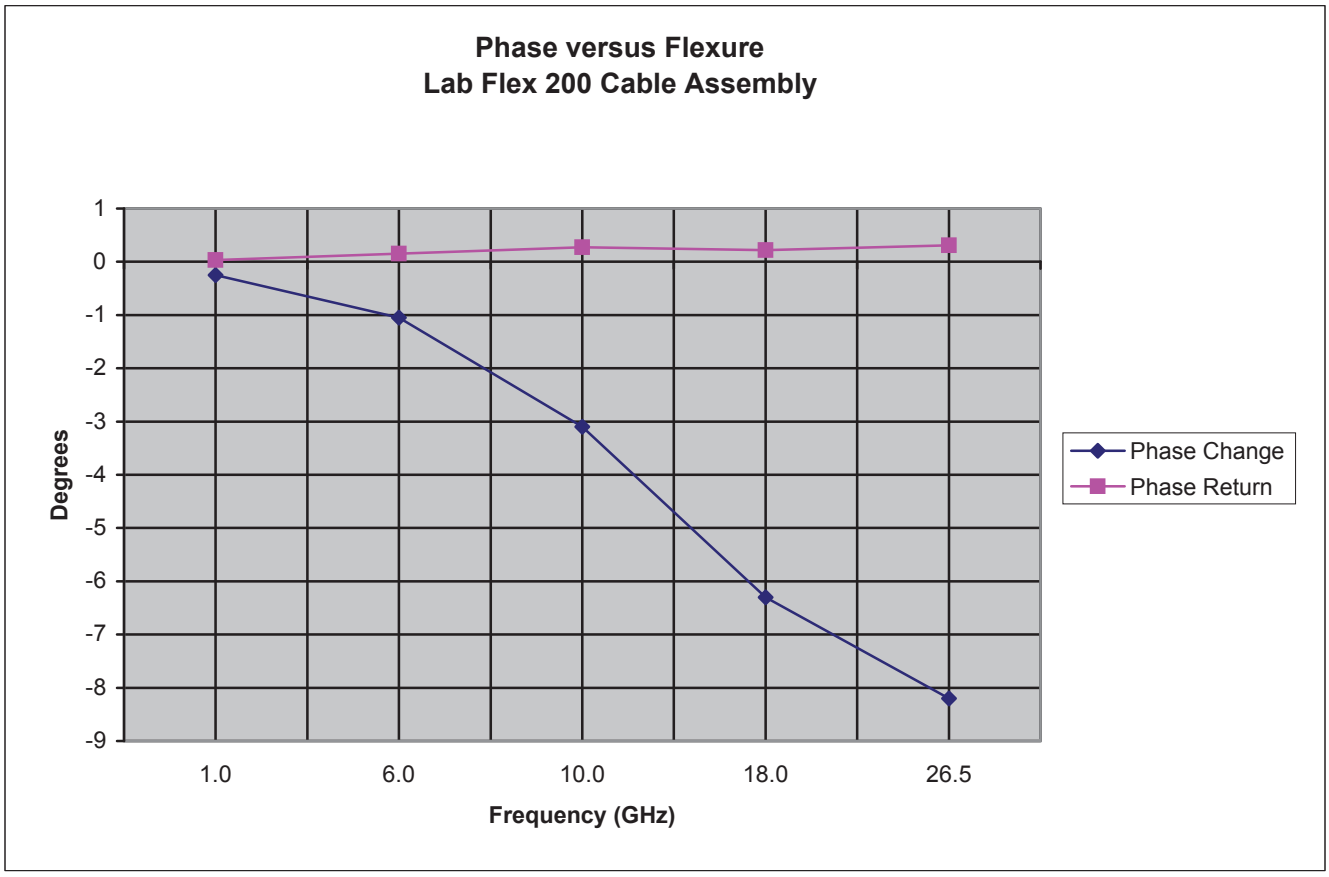
PPM Calculations

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 range use the following method.

Example: Calculate the phase change of a 120 inch long Lab-Flex assembly at -30˚C at 10 GHz.

El @ 10 GHz = 46,585.90
PPM @ -30 = -1180
(El x PPM) / 1,000,000 = -54.97136 degrees of change @ -30˚ Celsius

Phase Stability versus Flexure



Above: Lab-Flex® 200 Cable phase change, when cable is wrapped, 360 degrees around a 3" diameter mandrel. Please consult the sales department for specific phase requirements. Florida RF Labs provides both, absolute and relative matching.

CONDUCTORS & BRAIDS		
AL	Aluminum	per MIL-C-17
BC	Bare Copper	per MIL-C-17
BeCu	Beryllium-Copper Alloy 172	per MIL-C-17
BCCAl	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
SCCAl	Silver Covered Copper Clad Aluminum	per MIL-C-17
SCCS	Silver Covered Copper Clad Steel	per MIL-C-17
SNCCS	Silver & 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
DIELECTRICS		
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
INTERLAYERS		
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
JACKETS		
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

Dielectric & Center Conductor Properties

Dielectric Type	Impedance (ohms)	Capacitance (p/F/foot)	Velocity (%)	Dielectric Constant	Time Delay (nS/foot)
Solid Polyethylene	50	30.8	65.9	2.30	1.54
Foam PE	50	24.5	83.0	1.45	1.22
Foam PE	50	24.2	84.0	1.42	1.21
Foam PE	50	23.9	85.0	1.38	1.20
Foam PE	50	23.6	86.0	1.35	1.18
Foam PE	50	23.3	87.0	1.32	1.17
Foam PE	50	23.1	88.0	1.29	1.16
Solid PTFE	50	29.2	69.5	2.07	1.46
Tape PTFE	50	28.6	71.0	1.98	1.43
Low Density PTFE	50	26.7	76.0	1.73	1.34
Low Density PTFE	50	25.4	80.0	1.56	1.27

Center Conductor		For 30 AWG Wire					Temperature Coefficient[2]	
Material	Relative Resistance	Ohms per 1000 ft.	Lbs per 1000 ft.	Ohm-Lbs[1] per 1000 ft.	Melting Point (ºC)	Specific Gravity	ΔR per ºC	Δ Length % per ºC
Copper	1	103	0.304	31.4	1083	8.89	0.0039	16.1
Aluminum	1.64	169	0.092	15.6	660	2.7	0.0039	28.7
Silver	0.94	97	0.359	34.9	961	10.5	0.0038	18.8
Gold	1.42	146	0.661	96.6	1063	19.32	0.0034	14.3
Tin	6.7	691	0.25	172.7	232	7.3	0.0042	26.9

% Relative to Copper								
Copper	100%	100%	100%	100%	100%	100%	100%	100%
Aluminum	164%	164%	30%	50%	61%	30%	99%	178%
Silver	94%	94%	118%	111%	89%	118%	97%	117%
Gold	142%	142%	217%	308%	98%	217%	87%	89%
Tin	670%	670%	82%	550%	21%	82%	107%	167%

Comparison chart of common conducting materials.

[1]**Ohm-Lbs per 1m ft.** is a calculated figure which illustrates the relative weight advantage of each material. This is only for comparison purposes and has no real design purpose.

[2]**Temperature Coefficient** is the factor which applies to changes in resistance, or physical dimension for each degree Centigrade.

Note the considerable difference in coefficient of expansion between copper and aluminum yet another reason for their incompatibility. It can be noted that aluminum's main advantage is weight.

Insulation Properties

Material	Dielectric Constant	Dissipation Factor	Volume-Resistivity (ohm-cm)	Operating Temperature (Range ºC)
PTFE	2.07	0.0003	10^{19th}	-75 to +250
Polyethylene	2.3	0.0003	10^{16th}	-65 to +80
Foam Polyethylene	1.29 - 1.64	0.0001	10^{12th}	-65 to +100
Polyvinylchoride	3.0 - 8.0	0.07 - 0.16	$2x10^{12th}$	-50 to +105
Polyamide	3.5 - 4.6	0.03 - 0.4	$4x10^{14th}$	-60 to +120
Silicone Rubber	2.1 - 3.5	0.007 -0.016	10^{13th}	-70 to +250
Ethylene Propylene	2.24	0.00046	10^{17th}	-40 to +105
FEP	2.1	0.0007	10^{18th}	-70 to +200
Low Density PTFE	1.38 - 1.73	0.00005	10^{19th}	-75 to +250
Foam FEP	1.45	0.0007	10^{18th}	-75 to +200
Polymide	3.0 - 3.5	0.002 - 0.003	10^{13th}	-75 to +300
PTA	2.1	0.001	10^{16th}	-75 to +260
ETFE	2.6	0.005	10^{16th}	-75 to +150
ECTFE	2.5	0.0015	10^{16th}	-65 to +150
PVDF	7.8	0.02	10^{14th}	-75 to +125

VSWR Conversions

VSWR (:1)	Return Loss (dB)	Reflection Coefficient	Mismatch Loss (dB)	Match Efficiency (%)
1.011	45	0.006	0.000	100.00
1.020	40	0.010	0.000	99.99
1.036	35	0.018	0.001	99.97
1.065	30	0.032	0.004	99.90
1.074	29	0.035	0.005	99.87
1.08	28	0.400	0.007	99.84
1.09	27	0.045	0.009	99.80
1.11	26	0.050	0.011	99.75
1.12	25	0.056	0.014	99.68
1.13	24	0.063	0.017	99.60
1.15	23	0.071	0.022	99.50
1.17	22	0.079	0.027	99.37
1.20	21	0.089	0.035	99.21
1.22	20	0.100	0.044	99.00
1.25	19	0.112	0.055	98.74
1.29	18	0.126	0.069	98.42
1.33	17	0.141	0.088	98.00
1.38	16	0.158	0.110	97.49
1.43	15	0.178	0.140	96.84
1.50	14	0.200	0.176	96.02
1.58	13	0.224	0.223	94.99
1.67	12	0.251	0.283	93.69
1.78	11	0.282	0.359	92.06
1.92	10	0.316	0.458	90.00
2.10	9	0.355	0.584	87.41
2.32	8	0.398	0.749	84.15
2.61	7	0.447	0.967	80.05
3.01	6	0.501	1.256	74.88
3.57	5	0.562	1.651	68.38
4.42	4	0.631	2.205	60.19
5.85	3	0.708	3.021	49.88

FREQUENCY BANDS

MILITARY RADAR	L	S	C	X	Ku	K	Ka			Mm	
QUICK FREQUENCY	4 GHz		12.4 GHz		18 GHz		30 GHz	35 GHz	40 GHz	45 GHz	60 GHz

CABLE SELECTION GUIDE BY FREQUENCY SORTED BY MAX ATTENUATION & FAMILY (dB per 100 feet)

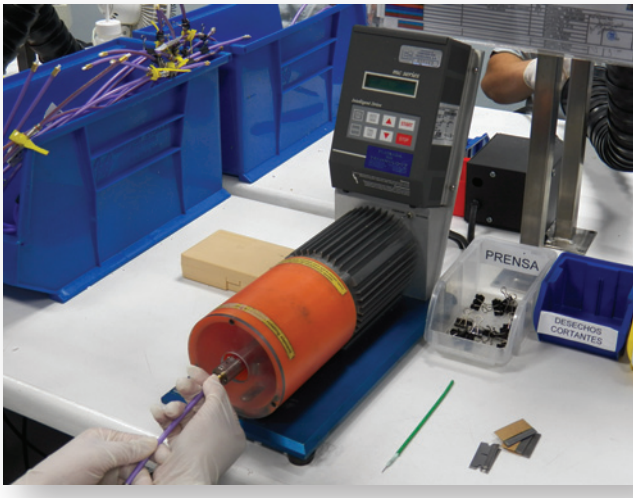
LAB-FLEX® LOW-LOSS, FLEXIBLE											
Lab-Flex® 290	6.3	9.1	13.1	16.4	20.5						
Lab-Flex® 335	6.7	9.8	14.5	18.4	23.4						
Lab-Flex® 200	11.3	16.5	24.1	30.3	38.3	47.6					
Lab-Flex® 160	15.8	22.7	33.0	41.6	51.6	63.5	69.0	75.4	81.6		
Lab-Flex® 125	22.3	31.9	39.5	57.1	71.0	86.9	94.1	102.5	110.5	118.4	125.4
Lab-Flex® 100	29.2	42.8	63.3	80.2	102.1	128.0	140.0	154.3	168.1	181.3	219.0
LAB-FLEX® S LOW-LOSS, FLEXIBLE, STRANDED CENTER CONDUCTOR											
Lab-Flex® S 490S	5.0	7.5	11.3	13.0							
Lab-Flex® S 335SP	8.8	13.2	20.4	26.5	34.8						
Lab-Flex® S 235SP	14.4	20.7	30.2	37.7	47.4	58.5					
Lab-Flex® S 180SP	20.7	30.1	44.2	55.8	70.6	88.0	96.0	105.5	114.6		
Lab-Flex® S 115S	35.7	51.3	74.1	92.4	115.5	141.9	153.9	168.0	181.5	194.3	230.1
SEMI-RIGID, LOW-LOSS											
.250 Low-Loss	7.0	10.0	14.2	17.6	21.8	34.0					
.141 Low-Loss	15.9	22.8	32.9	40.8	50.9	62.4	67.5	73.7			
.085 Low-Loss	28.3	40.3	57.6	71.2	88.1	107.0	115.5	125.5	134.8	143.7	168.1
SEMI-RIGID, CONFORMABLE® (BJ), FLEXIBLE VERSION (MINI-FLEX)											
.250 Series (RG401)	10.4	16.1	25.5	33.9	45.5						
.141 Series (RG402)	16.5	24.8	37.9	49.0	64.0	82.2	90.7	101.1			
Mini-Flex 165	17.2	25.7	39.1	50.6	65.9						
.085 Series (RG405)	27.9	40.8	60.5	76.7	97.9	123.0	134.6	148.5	161.8	174.7	199.4
Mini-Flex 105	30.6	44.6	66.0	83.4	106.1						
.047 Series	47.8	68.9	100.3	125.5	157.6	194.7	211.6	231.7	250.8	269.1	286.7
STANDARD FLEXIBLE											
SF142	18.0	26.8	40.7	52.5	68.3						
RG142	18.9	28.1	42.5								
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	80.0	100.6							
316D	39.0	57.1									
LMR®											
LMR®-400	6.3	9.0	10.8								
LMR®-240	11.5	16.6	20.4								

Note: There are several versions of frequency band allocations and this chart should be used as reference only.
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) attenuation first.

EMC FLORIDA RF Technology Labs

WHO WE ARE

- We are a best-in-class, international leader in MW cable assemblies Lab-Flex® premium coaxial assemblies
  - test, space, aircraft, ruggedized field specialties
  - broad range of flexible, semi-rigid and conformable
- We are a global powerhouse in RF/MW passive resistive components
  - the “Attenuator Authority”, inventor of Thermopad®
  - SMT & high-power terminations and resistors
  - Diamond Rf™ Resistives and Smart Detectors
  - high-temperature specialties
- We are a technological leader in signal distribution
  - HybriX® hybrid & directional couplers
  - Doupler™ combiners
  - power dividers, Rf cross-overs
- We are an operating company of Smiths Interconnect, a division of Smiths Group plc (LSE:SMIN)



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