smiths interconnect

Semi-rigid Cables

Space Qualified Cable Assemblies

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Designed and manufactured for a wide variety of applications ranging from space, aerospace, defence and satellite payload.

Smiths Interconnect's semi-rigid cable assemblies provide customers with high performance, reliable dielectric properties and excellent shielding qualities.

This product line is well suited for Satellite Payloads (GEO/MEO and LEO constellations), Deep Space Probes, Ground-based Antenna Networks, Satellite Integration and Space Robotic Systems.

Our semi-rigid cables are supplied with space orbit qualification. They are available unbent (shaping is done on-site) or pre-bent to customers' specifications and ready for installation. They are offered with a copper or aluminium jacket and with a selection of different platings and 4 different diameters (.047", .085", .141" & .250").

High frequency (up to 110 GHz), low insertion loss, superior shielding effectiveness, on-site qualification and years of heritage allow our semi-rigid cable assemblies to be ideal for excellent electrical performance in mission-critical systems.

Features and Benefits

- Pre-formed right angles available on some cable types
- Phase matched pairs and sets available
- Mode free operation DC to 110 GHz
- Light weight & high vibration resistance
- Semi-rigid frequency: up to 110 GHz
- High isolation: up to >100 dB
- Direct solder connectors: stainless steel construction (standard)

Applications

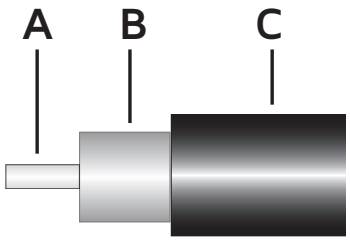
- Satellite communication and navigation
- Military, commercial, and scientific programs
- GEO/MEO/LEO and small satellites
- Manned space flights
- Radar applications
- In-the-box jumpers for communications equipment
- Missile telemetry applications

Technical Characteristics

Semi-rigid Cable Assemblies	0.047 Size	
	0.047TP	0.047
Electrical		
Frequency, Max (GHz)	110	110
Impedance, nominal (Ω)	50	50
Velocity of propagation effectiveness (%)	69.5	69.5
Shielding effectiveness, 18 GHz (dB/ft)	>100	>100
Capacitance (pF/ft)	29.5	29.5
Delay (ns/ft), (ns/meter)	1.46 (4.80)	1.46 (4.80)
Attenuation k1 (db/100ft) @ 23°C	1.014	1.014
Attenuation k2 (db/100ft) @ 23°C	0.0012	0.0012
Attenuation (Typical) at any Frequency = k1 x SqRt (FMHz) + k2 x (FMHz)		
Mechanical & Environmental		
Weight (lbs/100ft), (Kg/100m)	0.45 (0.68)	0.45 (0.68)
Temperature Range (˚C)	-40 to 100	-40 to 100
Minimum Bend Radius (inch), (mm)	0.15 (3.81)	0.15 (3.81)

Construction

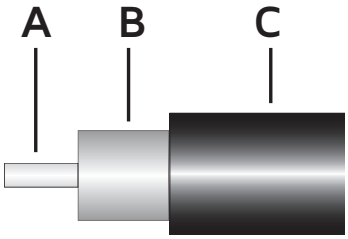
Inner Conductor	A	Silver Covered Copper Clad Steel	Silver Covered Copper Clad Steel
Dielectric	B	Polyetrafluoroethylene	Solid Polyetrafluoroethylene
Jacket	C	0.047 Tinned Copper	0.047 Bare Copper



Semi-rigid 0.047TP, 0.047

Technical Characteristics

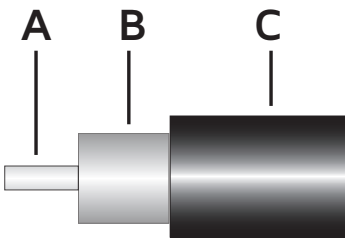
Semi-rigid Cable Assemblies		0.085 Size			
		085TP	RG405	AL085	AL085LLSP
Electrical					
Frequency, Max (GHz)		60	60	60	62
Impedance, nominal (Ω)		50	50	50	50
Velocity of propagation effectiveness (%)		69.5	69.5	69.5	76.5
Shielding effectiveness, 18 GHz (dB/ft)		>100	>100	>100	>100
Capacitance (pF/ft)		29.4	32	32	-
Delay (ns/ft), (ns/meter)		1.46 (4.80)	1.46 (4.80)	1.46 (4.80)	1.33 (4.36)
Attenuation k1 (db/100ft) @ 23°C		0.569	0.569	0.569	0.620
Attenuation k2 (db/100ft) @ 23°C		0.001200	0.001200	0.001200	0.000271
Attenuation (Typical) at any Frequency = k1 x SqRt (FMHz) + k2 x (FMHz)					
Mechanical & Environmental					
Weight (lbs/100ft), (Kg/100m)		1.53 (2.30)	1.53 (2.30)	1.53 (2.30)	0.73 (1.10)
Temperature Range (˚C)		-40 to +125	-40 to +125	-40 to +125	-65 to +225
Minimum Bend Radius (inch), (mm)		0.17 (4.27)	0.17 (4.27)	0.17 (4.27)	0.25 (6.35)
Construction					
Inner Conductor	A	Solid SCCS	Solid SCCS	Solid SCCS	Solid SPCW
Dielectric	B	Solid PTFE	Solid PTFE	Solid PTFE	Extru L D PTFE
Jacket	C	.086 Tin Plated Copper	.086 Bare Cop Tube	.086 Tin Plated Alum	.087 Bare Copper



Semi-rigid 085TP, Semi-rigid RG405, AL085, AL085LLSP

Technical Characteristics

Semi-rigid Cable Assemblies	0.141 Size				
	402TP	AL141	RG402	AL141LLSP	LL141TP
Electrical					
Frequency, Max (GHz)	35	35	35	35	34
Impedance, nominal (Ω)	50	50	50	50	50
Velocity of propagation effectiveness (%)	69.5	69.5	69.5	76.5	76.5
Shielding effectiveness, 18 GHz (dB/ft)	>100	>100	>100	>100	>100
Capacitance (pF/ft)	29.9	29.9	29.5	27.0	27.0
Delay (ns/ft), (ns/meter)	1.45 (4.77)	1.45 (4.77)	1.46 (4.80)	1.45 (4.77)	1.33 (4.36)
Attenuation k1 (db/100ft) @ 23°C	0.316	0.316	0.316	0.343	-
Attenuation k2 (db/100ft) @ 23°C	0.001200	0.001200	0.001200	0.000271	-
Attenuation (Typical) at any Frequency = k1 x SqRt (FMHz) + k2 x (FMHz)					
Mechanical & Environmental					
Weight (lbs/100ft), (Kg/100m)	3.44 (5.17)	1.88 (2.83)	3.44 (5.17)	1.60 (2.41)	3.10 (4.66)
Temperature Range (˚C)	-40 to +125	-40 to +125	-40 to +125	-65 to +200	-65 to +200
Minimum Bend Radius (inch), (mm)	0.32 (8.13)	0.32 (8.13)	0.32 (8.13)	0.50 (12.70)	0.50 (12.70)
Construction					
Inner Conductor A	Solid SCCS	Solid SCCS	Solid SCCS	Sil Pl Cop W	Solid SC
Dielectric B	Solid PTFE	Solid PTFE	Solid PTFE	Low Dens PTFE	Low Loss PTFE
Jacket C	0.141 Tin Pl Cop Tube	0.141 Tin Pl Alum	0.141 Bare Cop Tube	0.141 Sil Pl Alum Tube	0.141 Tin Pl Cop Tube



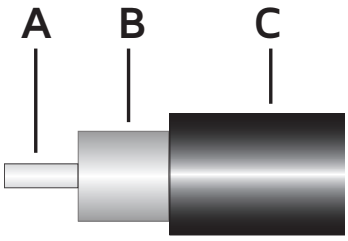
Semi-rigid 402TP, AL141, RG402, AL141LLSP, Semi-rigid LL14TP

Technical Characteristics

Semi-rigid Cable Assemblies	0.250 Size	
	250TP	RG401
Electrical		
Frequency, Max (GHz)	18	18
Impedance, nominal (Ω)	50	50
Velocity of propagation effectiveness (%)	69.5	69.5
Shielding effectiveness, 18 GHz (dB/ft)	>100	>100
Capacitance (pF/ft)	29.6	29.6
Delay (ns/ft), (ns/meter)	1.46 (4.80)	1.46 (4.80)
Attenuation k1 (db/100ft) @ 23°C	0.178	0.178
Attenuation k2 (db/100ft) @ 23°C	0.0012	0.0012
Attenuation (Typical) at any Frequency = k1 x SqRt (FMHz) + k2 x (FMHz)		
Mechanical & Environmental		
Weight (lbs/100ft), (Kg/100m)	10.50 (15.78)	10.50 (15.78)
Temperature Range (˚C)	-40 to +125	-40 to +125
Minimum Bend Radius (inch), (mm)	0.50 (12.70)	0.50 (12.70)

Construction

Inner Conductor	A	Covered Solid Copper	Covered Solid Copper
Dielectric	B	Polyetrafluoroethylene	Polyetrafluoroethylene
Jacket	C	0.250 Bare Copper Tube	0.250 Silver Plated Copper Wire



Semi-rigid 250TP, RG401

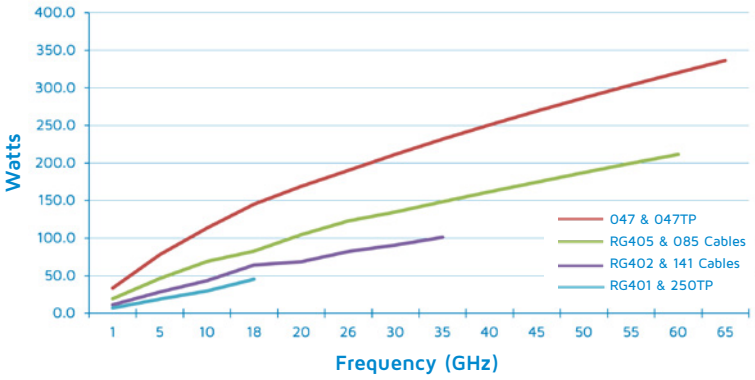
Technical Characteristics

Attenuation Standard Cables (dB/100ft)

GHz	047 & 047TP	RG405 & 085 Cables	RG402 & 141 Cables	RG401 & 250TP
1	33.3	19.2	11.2	6.8
5	77.7	46.2	28.3	18.6
10	113.4	68.9	43.6	29.8
18	145.0	82.5	64.0	45.5
20	169.0	104.5	68.7	
26	190.0	122.9	82.2	
30	211.6	134.6	90.7	
35	231.7	148.5	101.1	
40	250.8	161.8		
45	269.1	174.7		
50	286.7	187.2		
55	303.8	199.4		
60	320.4	211.4		
65	336.5			

Max Cable Loss at +25° C & Sea Level

Attenuation vs Frequency

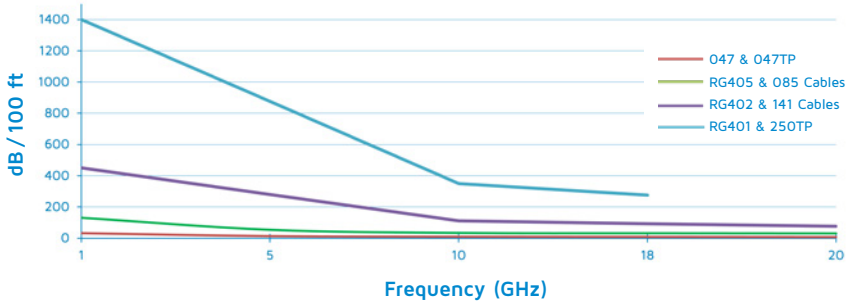


Average Power Rating (Watts)

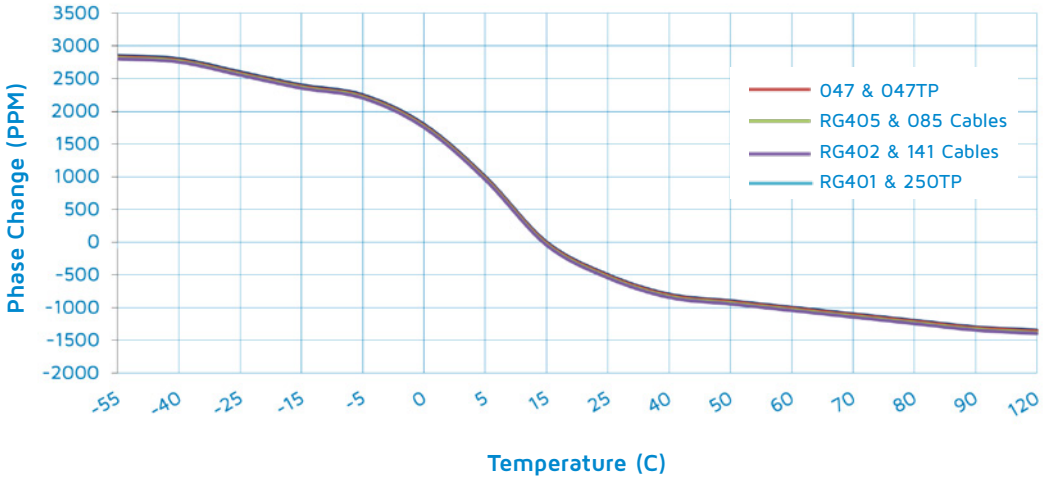
GHz	047 & 047TP	RG405 & 085 Cables	RG402 & 141 Cables	RG401 & 250TP
1	32	130	450	1400
5	13	53	280	875
10	9	33	110	350
18	8	31	93	276
20	7	30	76	

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

Average Power Rating



Phase vs. Temperature (°C)



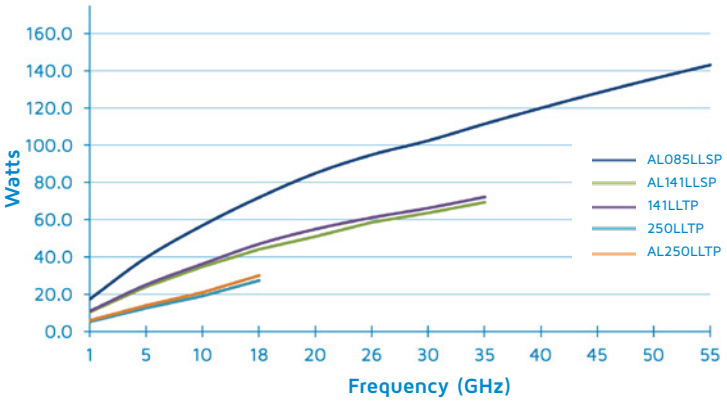
Technical Characteristics

Attenuation Standard Cables (dB/100ft)

GHz	AL085LLSP	AL141LLSP	141LLTP	250LLTP	AL250LLTP
1	19.9	10.4	10.9	5.1	5.8
5	45.3	24.0	25.1	12.6	14.0
10	65.0	34.7	36.3	19.0	21.0
18	88.6	47.8	50.0	27.3	30.0
20	93.7	50.7	52.9		
26	107.8	58.6	61.2		
30	116.4	63.6	66.3		
35	126.5	69.4	72.3		
40	136.0				
45	145.0				
50	153.6				
55	161.9				

Max Cable Loss at +25K C & Sea Level

Attenuation vs Frequency

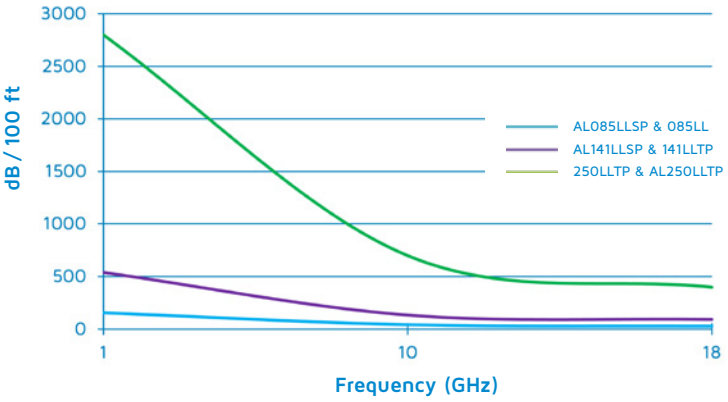


Average Power Rating (Watts)

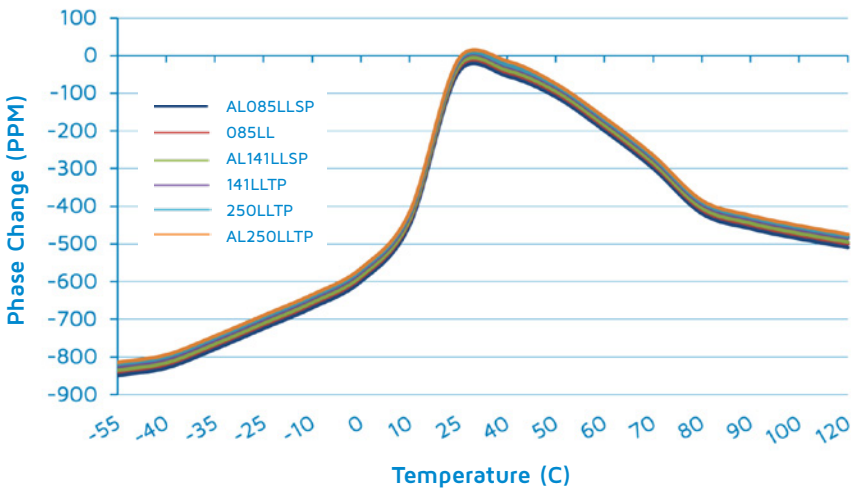
GHz	AL085LLSP & 085LL	AL141LLSP & 141LLTP	250LLTP & AL250LLTP
1	156	540	2800
10	40	132	700
18	27	90	400

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

Average Power Rating



Phase vs. Temperature (°C)



Technical Characteristics

Cable Code	Connector Code	Series	Gender	Type	C-Nut Style[1]	Body Material[2]	Body Finish[3]	Loss per GHz	Frequency Max GHz
047, 047TP	SMPMFS	SMPM	Female	Straight	NA	Be	G	0.015	50
047, 047TP	SMPFS	SMP	Female	Straight	NA	Be	G	0.015	40
047, 047TP	SMPFR	SMP	Female	Right Angle	NA	Be	G	0.025	40
047, 047TP	SMS	SMA	Male	Straight	H	B	G	0.01	18
047, 047TP	SFS	SMA	Female	Straight	NA	B	G	0.015	18
047, 047TP	MLFS	Mini-Lock	Female	Straight	L	Be	G	0.01	110
047, 047TP	TRIM	No Connector (Ends Trimmed)							
RG405, 085TP, AL085	SMS	SMA	Male	Straight	H	SS	G	0.01	18
RG405, 085TP, AL085	SFS	SMA	Female	Straight	NA	SS	G	0.015	18
RG405, 085TP, AL085	SMR	SMA	Male	Right Angle	H	SS	G	0.02	18
RG405, 085TP, AL085	MMS	2.4mm	Male	Straight	H	SS	G	0.01	50
RG405, 085TP, AL085	MFS	2.4mm	Female	Straight	NA	SS	G	0.015	50
RG405, 085TP, AL085	KMS	2.9mm	Male	Straight	H	SS	G	0.01	40
RG405, 085TP, AL085	KFS	2.9mm	Female	Straight	NA	SS	G	0.015	40
RG405, 085TP, AL085	NMS	Type N	Male	Straight	H	B	N	0.01	12
RG405, 085TP, AL085	NFBS	Type N	Female	Bulkhead Straight	NA	B	N	0.015	12
RG405, 085TP, AL085	TMS	TNC	Male	Straight	H	B	N	0.01	12
RG405, 085TP, AL085	TMR	TNC	Male	Right Angle	H	B	N	0.02	12
RG405, 085TP, AL085	SMPFS	SMP	Female	Straight	NA	Be	G	0.015	40
RG405, 085TP, AL085	SMPFR	SMP	Female	Right Angle	NA	Be	G	0.02	26
RG405, 085TP, AL085	SMBFS	SMB	Female	Straight	NA	B	G	0.015	4
RG405, 085TP, AL085	BMS	BNC	Male	Straight	B	B	G	0.01	4
RG402, 402TP, AL141	SMS	SMA	Male	Straight	H	G	G	0.01	18
RG402, 402TP, AL141	SMSR	SMA	Male	Pre-Bend Right Angle	H	SS	G	0.01	18
RG402, 402TP, AL141	SMR	SMA	Male	Right Angle	H	SS	G	0.02	12
RG402, 402TP, AL141	SFS	SMA	Female	Straight	NA	SS	G	0.01	18
RG402, 402TP, AL141	SFBS	SMA	Female	Bulkhead Straight	NA	SS	G	0.015	18
RG402, 402TP, AL141	KMS	2.9mm	Male	Straight	H	SS	G	0.01	35
RG402, 402TP, AL141	KMSR	2.9mm	Male	Pre-Bend Right Angle	H	SS	G	0.01	35
RG402, 402TP, AL141	KFS	2.9mm	Female	Straight	NA	SS	G	0.015	35
RG402, 402TP, AL141	OSPMBS	OSP	Male	Bulkhead Straight	H	SS	G	0.01	18
RG402, 402TP, AL141	NMS	Type N	Male	Straight	HK	B	T	0.01	18
RG402, 402TP, AL141	NMSR	Type N	Male	Pre-Bend Right Angle	HK	B	T	0.01	18
RG402, 402TP, AL141	NFBS	Type N	Female	Bulkhead Straight	NA	SS	P	0.015	18
RG402, 402TP, AL141	TMS	TNC	Male	Straight	H	SS	G	0.01	18
RG402, 402TP, AL141	TMSR	TNC	Male	Pre-Bend Right Angle	H	SS	G	0.01	18
RG402, 402TP, AL141	TMR	TNC	Male	Right Angle	NA	SS	G	0.02	18
RG402, 402TP, AL141	TFBS	TNC	Female	Bulkhead Straight	NA	B	G	0.015	18
RG402, 402TP, AL141	TFS	TNC	Female	Straight	NA	B	G	0.015	12
RG402, 402TP, AL141	MCXMR	MCX	Male	Right Angle	H	B	G	0.015	6
RG402, 402TP, AL141	BMS	BNC	Male	Straight	B	B	N	0.01	4
RG402, 402TP, AL141	BFBS	BNC	Female	Bulkhead Straight	NA	B	N	0.015	4

[1] C-Nut Style: H=Hex, K=Knurled, HK=Hex Nut & Knurled, L=Locking
[2] Body Materials: B=Brass, SS=Stainless, Be=Beryllium Copper
[3] Body Finish: N=Nickel, S=Silver, G=Gold, P=Passivated
Connector gender is determined by center conductor

Technical Characteristics

Cable Code	Connector Code	Series	Gender	Type	C-Nut Style[1]	Body Material[2]	Body Finish[3]	Loss per GHz	Frequency Max GHz
RG401, 250TP	SMS	SMA	Male	Straight	H	SS	P	0.01	18
RG401, 250TP	NMS	Type N	Male	Straight	H	SS	P	0.01	12
LL141TP, AL141LLSP	SMS	SMA	Male	Straight	H	SS	G	0.01	18
LL141TP, AL141LLSP	SMSR	SMA	Male	Pre-Bend Right Angle	H	SS	G	0.01	18
LL141TP, AL141LLSP	SFS	SMA	Female	Straight	NA	SS	G	0.01	18
LL141TP, AL141LLSP	SFBS	SMA	Female	Straight	NA	SS	G	0.01	18
LL141TP, AL141LLSP	KMS	2.9mm	Male	Straight	H	SS	G	0.01	34
LL141TP, AL141LLSP	KMSR	2.9mm	Male	Pre-Bend Right Angle	H	SS	G	0.01	34
LL141TP, AL141LLSP	NMS	Type N	Male	Straight	HK	B	T	0.01	34
LL141TP, AL141LLSP	NFBS	Type N	Female	Bulkhead Straight	NA	B	T	0.01	34
LL141TP, AL141LLSP	TMS	TNC	Male	Straight	H	SS	G	0.01	34
AL085LLSP	MMS	2.4mm	Male	Straight	H	SS	P	0.01	50
AL085LLSP	MMSR	2.4mm	Male	Pre-Bend Right Angle	H	SS	P	0.01	50
AL085LLSP	MFS	2.4mm	Female	Straight	NA	SS	G	0.015	50
AL085LLSP	MFBS	2.4mm	Female	Bulkhead Straight	NA	SS	G	0.015	50
AL085LLSP	KMS	2.9mm	Male	Straight	H	SS	P	0.01	40
AL085LLSP	KMSR	2.9mm	Male	Pre-Bend Right Angle	H	SS	P	0.01	40
AL085LLSP	KFS	2.9mm	Female	Straight	NA	SS	P	0.015	40
AL085LLSP	SMPFS	SMP	Female	Straight	NA	Be	G	0.015	40
AL085LLSP	SMPFR	SMP	Female	Right Angle	NA	Be	G	0.015	26
AL085LLSP	OSSPMBS	OSSP	Male	Bulkhead Straight	NA	SS	G	0.015	28
AL085LLSP	OSPMBS	OSP	Male	Bulkhead Straight	NA	SS	G	0.01	22
AL085LLSP	SMS	SMA	Male	Straight	H	SS	P	0.01	26
AL085LLSP	SMSR	SMA	Male	Pre-Bend Right Angle	H	SS	P	0.01	26
AL085LLSP	SFS	SMA	Female	Straight	NA	SS	G	0.015	18
AL085LLSP	SFBS	SMA	Female	Bulkhead Straight	NA	SS	G	0.015	18
AL085LLSP	SMR	SMA	Male	Right Angle	H	SS	P	0.02	12

[1] C-Nut Style: H=Hex, K-Knurled, HK=Hex Nut & Knurled
[2] Body Materials: B=Brass, SS=Stainless, Be=Beryllium Copper
[3] Body Finish: N=Nickel, S=Silver, G=Gold, P=Passivated
Connector gender is determined by center conductor

Cable Code	Option Code	Option Description	Option Details
047, RG405, RG402, RG401	W	Weatherized	Polyolifen shrink tube over jacket
047, 047TP, RG405, 085TP, AL085, RG402, 402TP, AL141, RG401, 250TP, AL085LLSP, LL141TP, AL141LLSP	+/-2.8ps[4]	Phase Matched	Standard Tolerance of +/-2.8ps
047, 047TP, RG405, 085TP, AL085, RG405, 402TP, AL141, RG401, 250TP, AL085LLSP, LL141TP, AL141LLSP	- RoHS[5]	RoHS compliant	Per EU Directive 2002/95/EC

[4]for phase matched assemblies (+/-2.8ps) is required to be added to the end of the standard part number
Example: SMS-RG405-12.0-SMS +/-2.8ps

[5]for RoHS compliant assemblies (-RoHS) is required to be added to the end of the standard part number
Example: SMS-RG402-12.0-SMS-RoHS

Custom Options:
The above cables, connectors, and options represent the most common types used. Smiths Interconnect offers a wide range of cables, connectors, and options.
If you do not find the option you are looking for in the catalog, please consult our sales department or send an inquiry via our website.

How To Order

____ –	_____	–	___.___	–	_____
1	2	3	4	5	6

1 Connector #1 (See connector charts for list of most available options)

SMS	SMA Male Straight	SMR	SMA Male Right Angle	SFBS	SMA Female Bulkhead Straight
KMS	2.9mm Male Straight	NMS	Type N Male Straight	NFS	Type N Female Straight
MLFS	Mini-Lock Female Straight				

2 Cable

047TP	M17/151-00002	RG402	M17/130-RG402	AL085LLSP	Aluminum Jacketed, Low loss, Silver plated .085 diameter cable
047	M17/151-00001	402TP	M17/130-00001	AL141LLSP	Aluminum Jacketed, Low loss, Silver Plated .141 Diameter cable
RG405	M17/133-RG405	AL141	M17/130-00009		
405TP	M17/133-00001	RG401	M17/129-RG401		
AL085	M17/133-00013	250TP	M17/129-00001		

3 Cable Options

W	Weatherized

4 Length *(inches)*

60.0	Example: 60.0 = 60 in.	08.5	08.5 = 8.5 Inches

5 Connector #2 (See connector charts for list of most available options)

SMPFR	SMP Female Right Angle	TFBS	TNC Female Bulkhead Straight)
MMS	2.4mm Male Straight	SMSR	SMA Male Straight connector with Prebent Right Angle)

6 Assembly Option

+/-2.8 ps	standard phase match option equivalent to +/-1deg/GHz	-RoHS	RoHS compliant cable assembly

Worldwide Support

Connectors

Americas

Sales
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Technical Support
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Europe

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