Quality&Precise

MAXWELLON

Commercial Space RF Connection Solutions

2023

MAXWELLON

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Satellite-borne products

SPACE Series
RF interconnect assembly

SP-220 & SP-360 & SP-500
DC~40GHz
VSWR：≤1.35
TML <1%; CVCM <0.1%
Irradiation resisitance: 30Mards

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SPACE Series
RF Connector

Unique Venting Hole
SMP detent structure
DC~40GHz

05

Adapter

2.92mm&2.4mm
DC~40GHz
VSWR：≤1.20
LSMP self-locking structure
Mechanical durability: 500 times

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for thermal vacuum test

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DC~40GHz
VSWR：≤1.30
TML <1%; CVCM <0.1%

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Auxiliary tools

Auxiliary tools

- Right-angle disassembly tool
- Flat pull type disassembly tool
- Torque wrench

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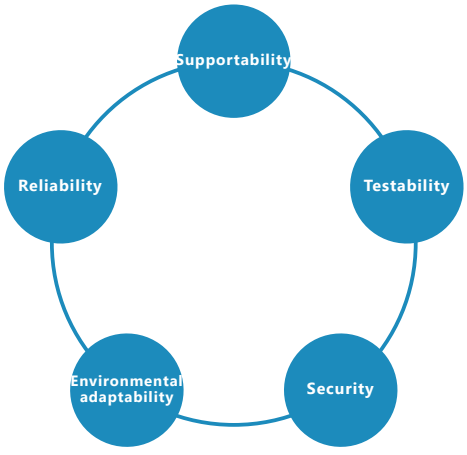
Satellite-borne products

SPACE series satellite-borne RF interconnect cable assembly

SPACE series satellite-borne RF interconnect assembly adopts six-layer special material cable with ultra-low insertion loss and high reliability; While the performance is reliable and stable, the weight is reduced by about 15% compared with ordinary cable; The jacket is made of black ETFE with high mechanical strength, good heat resistance and irradiation resistance. Optional connectors in addition to the conventional, in order to improve the retention force of the male and female pairs of locks and prevent accidental disconnection, we have also developed self-locking SMP connectors, whose unique self-locking structure simplifies installation and provides a secure connection, with an operating frequency of up to 40GHz.

SPACE series has passed ASTM E-595 and ECSS-Q-ST-70-02 C thermal vacuum outgassing tests, meeting the requirements of TML total mass loss <1%; CVCM <0.1%. At the same time, in order to ensure that the RF cable assembly meet the requirements of irradiation resistance in the space environment, Maxwellom commissioned a third-par ty authority to conduct irradiation resistance tests on the SPACE Aerospace series, and the test results prove that the SPACE series cable assemblies can meet the total metering 30Mrad requirements. At present, SPACE series cable assemblies have been flown in certain projects and obtained the relevant flight certification.



Product features

- Temperature range: -100~+165°C
- Irradiation resistance: 30Mrads
- SMP detent structure, easy and secure connection for batch assembly
- Ultra-low loss
- Connector with unique venting hole, lightweight
- 100% X-ray inspection for solder joints

Product application

- Satellite Communication and Navigation Military
- GEO/MEO/LEO and Small Satellites
- Satellite-based Electronic Countermeasures
- Satellite-based phased-array radar

Structure

1-Center conductor	SPC	4-Interlayer	LD-PTFE
2-Dielectric	LD-PTFE	5-Outer shield	SPC wire
3-Outer conductor	SPC tape	6-Jacket	Black ETFE

Cable specifications

Electrical Specifications

Cable Type	SP-220		SP-360		SP-500	
Operating Frequency(GHz)	40		40		26.5	
VSWR	1.35		1.35		1.30	
Impedance(Ω)	50					
Shield efficiency(dB)	>90					
Voltage withstand(DC)	500		900		1500	
Velocity of propagation	80%		82%		82%	
Attenuation&AVG.Power	Attenuation (+25°C±2°C) / AVG.Power (+40°C±2°C&Ambient; Sea level; VSWR1:1)					
Frequency (MHz)	dB/100m	KW	dB/100m	KW	dB/100m	KW
500	46.54	0.347	22.45	0.726	16.17	1.243
1000	66.27	0.244	31.91	0.511	22.96	0.875
2000	94.61	0.171	45.45	0.359	32.66	0.615
3000	116.71	0.138	55.97	0.291	40.18	0.500
6000	167.73	0.096	80.13	0.203	57.40	0.350
8000	195.31	0.083	93.13	0.175	66.64	0.302
12500	247.95	0.065	117.79	0.138	84.12	0.239
13500	258.45	0.063	122.70	0.133	87.58	0.229
15000	273.60	0.059	129.76	0.126	92.57	0.217
18000	302.11	0.054	143.02	0.114	101.92	0.197
24000	353.74	0.046	166.93	0.098	118.75	0.169
26500	373.66	0.043	176.12	0.093	125.20	0.160
30000	400.31	0.040	188.39	0.087		
40000	470.40	0.034	220.51	0.074		
Attenuation at frequency	dB/100m=K1*$\sqrt{FMHz}$+K2*FMHz					
K1	2.0475000		0.9915499		0.7156867	
K2	0.0015225		0.0005549		0.0003280	

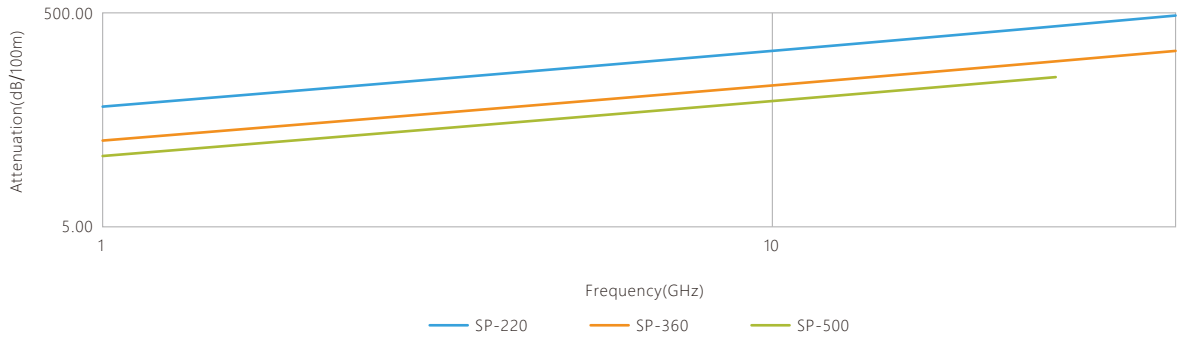
Non-armoured Mechanical Specifications

Cable O.D.(mm)	2.3	4.0	5.4
Min.Bend radius:installation(mm)	12	20	27
Min.Bend radius:repeated(mm)	23	40	54
Weight(g/m)	12	35	65

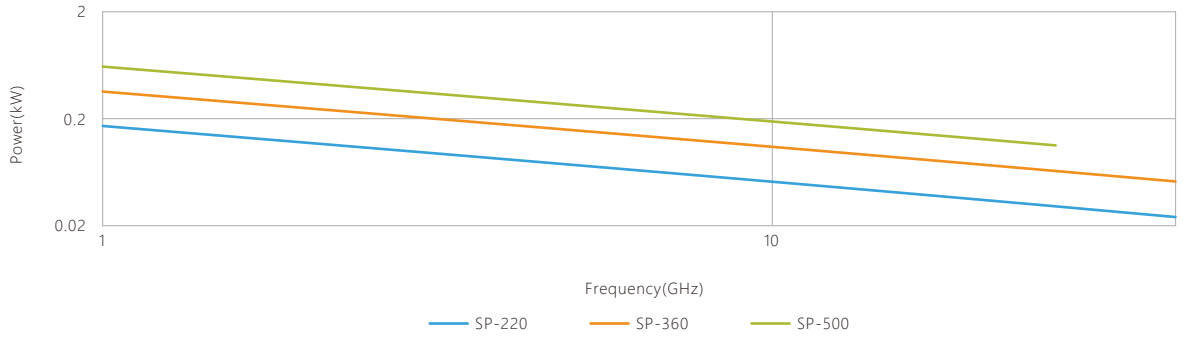
Armored Mechanical Specifications

Temperature (°C)	-55~+165°C
Outgassing(ASTM E-595)	TML<1%; CVCM<0 .1%
Irradiation resistance	30 Mrads

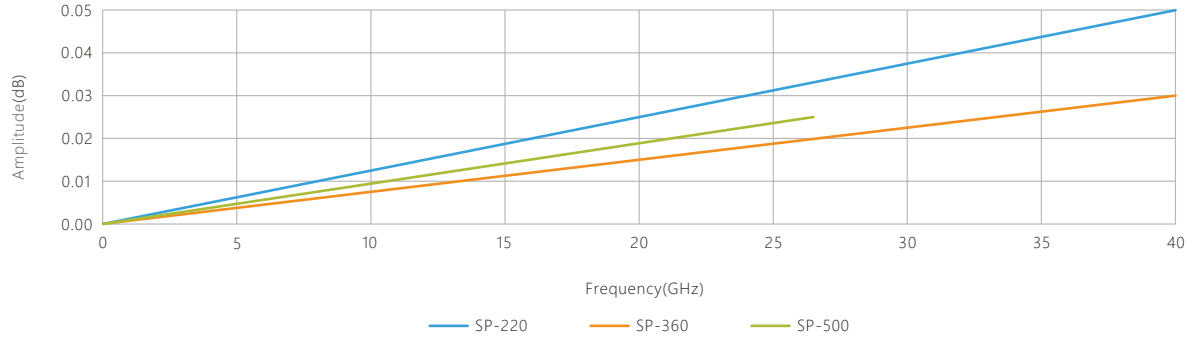
Frequency&Attenuation



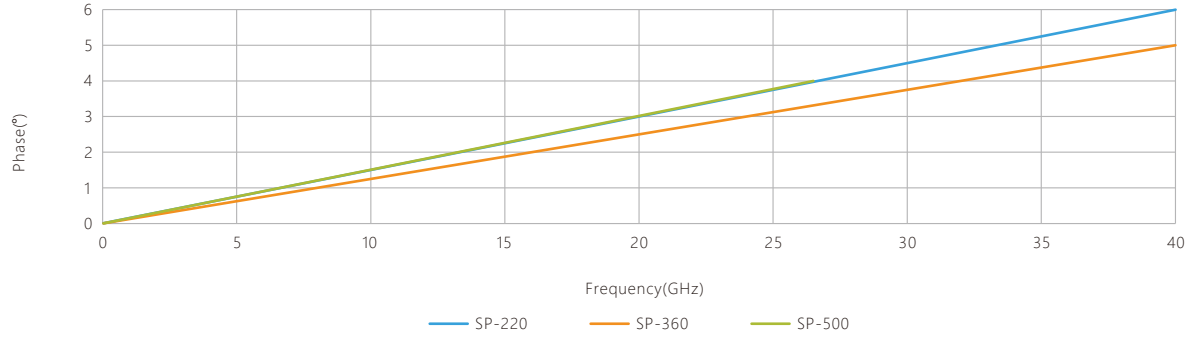
Frequency&Power



RF Amplitude Stability



RF Phase Stability



Assembly Selection Information

1	2	3	4	5	-	6	7	8	9	10	11	12	13	14	15	16	17	-	18	19	20	21	22	23
Cable Code						Connector Code													Length				Unit	

No.1-5: Cable Type: SP220/SP360/SP500

No.6-11: Left connector, codes are listed below. Up to six digits, less than six digits are indented by the actual code

No.12-17: Right connector, codes are listed below. Up to six digits, less than six digits are indented by the actual code

No.18-21: Customized Length. e.g.: 1-"01.00"

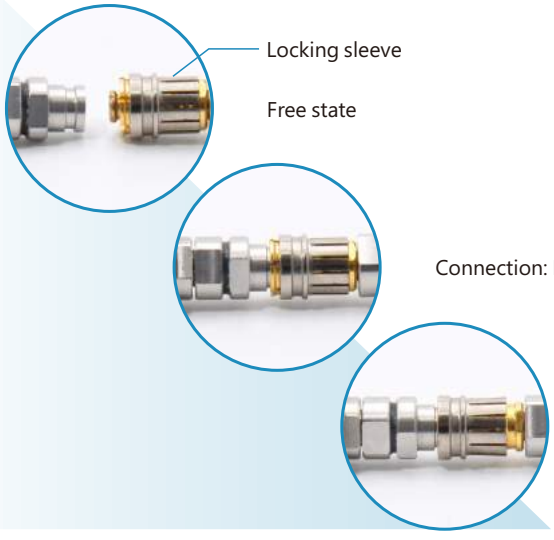
No.22-23: Unit: M-meter/IN-inch/F-feet, less than two digits, indent by one

For example: SP360-SMSM-01.00M

Connector Selection

Cable Type				SP220	SP360	SP500
Connector Code	Connector Type	O.D. / operating Freq	VSWR	2.3mm	4.0mm	5.4mm
LSMPF	LSMP Female	40GHz	1.35	●	●	
LSMPF(W)	LSMP Female 90°Right Angle	40GHz	1.35	●	●	
29M	2.92mm Male	40GHz	1.35	●	●	
29M(W)	2.92mm Male 90°Right Angle	40GHz	1.35	●	●	
SM	SMA Male	26.5GHz	1.30	●	●	●
SM(W)	SMA Male 90°Right Angle	26.5GHz	1.30	●	●	
NM	N Male	18GHz	1.25			●
TM	TNC Male	11GHz	1.25			●

LSMPM and LSMPF Connection Steps



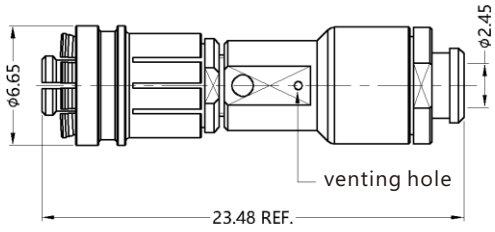
Connection: Insert the LSMPM fitting into the LSMPF

Locking: Push the locking sleeve to the invisible front gold-plated part to secure the connection

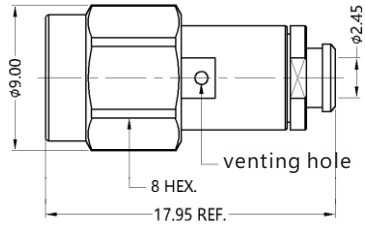
SPACE series satellite-borne RF connector

Implementation Standards：GJB681-2002&GJB5021-2011

	LSMP	2.92mm	SMA
Electrical Specifications			
Frequency(GHz)	40	40	26.5
VSWR	1.35	1.35	1.30
Mechanical Specifications			
Tension after mating(N)	>450N	-	-
Mechanical durability (times)	smooth bore: ≥1000 limited detent: ≥500 full detent: ≥100	≥500	≥500
Environmental Specifications			
TML	<1%		
CVCM	<0.1%		

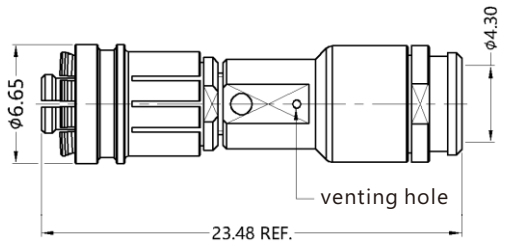


Type	LSMP
Code	LSMPF
Description	LSMP Female
Cable	SP-220

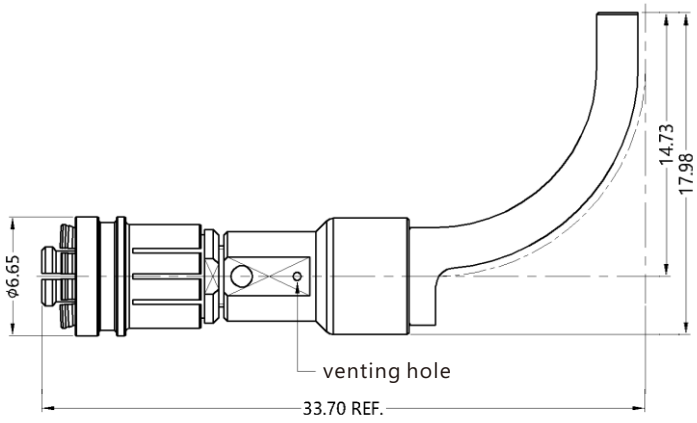


Type	SMA
Code	SM
Description	SMA Male
Cable	SP-220

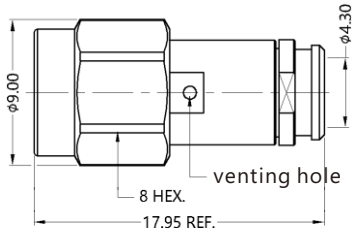
	LSMP	2.92mm	SMA
Electrical Specifications			
Frequency(GHz)	40	40	26.5
VSWR	1.35	1.35	1.30
Mechanical Specifications			
Tension after mating(N)	>450N	-	-
Mechanical durability (times)	smooth bore: ≥1000 limited detent: ≥500 full detent: ≥100	≥500	≥500
Environmental Specifications			
TML	<1%		
CVCM	<0.1%		



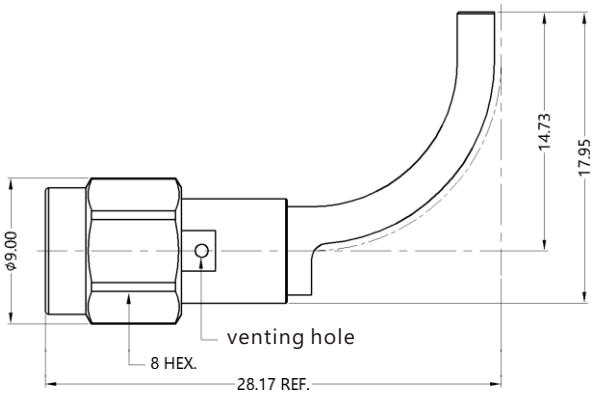
Type	LSMP
Code	LSMPF
Description	LSMP Female
Cable	SP-360



Type	LSMP
Code	LSMPF(W)
Description	LSMP Female 90° Right Angle
Cable	SP-360



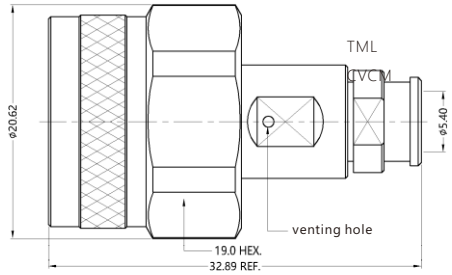
Type	SMA
Code	SM
Description	SMA Male
Cable	SP-360



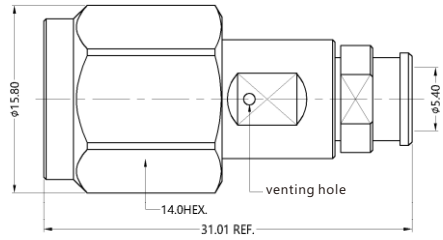
Type	SMA
Code	SM(W)
Description	SMA Male 90° Right Angle
Cable	SP-360

Satellite-borne products

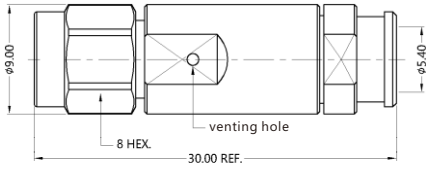
	SMA	N Type	TNC
Electrical Specifications			
Frequency(GHz)	26.5	18	11
VSWR	1.30	1.25	1.25
Mechanical Specifications			
Mechanical durability (times)		≥500	
Environmental Specifications			
TML		<1%	
CVCM		<0.1%	



Type	N
Code	NM
Description	N Male
Cable	SP-500



Type	TNC
Code	TM
Description	TNC Male
Cable	SP-500



Type	SMA
Code	SM
Description	SMA Male
Cable	SP-500

Adapter

Implementation Standards: GJB681-2002&GJB5021-2011

PN	Description	Frequency	VSWR	Mechanical durability (times)
29F-LSMPF-001	2.92mm Female to LSMP Female adapter	DC-40GHz	≤1.20	500
29F-LSMPM-001	2.92mm Female to LSMP Male adapter	DC-40GHz	≤1.20	500
29M-LSMPF-001	2.92mm Male to LSMP Female adapter	DC-40GHz	≤1.20	500
29M-LSMPM-001	2.92mm Male to LSMP Male adapter	DC-40GHz	≤1.20	500
24F-LSMPF-002	2.4mm Female to LSMP Female adapter	DC-40GHz	≤1.20	500
24F-LSMPM-002	2.4mm Female to LSMP Male adapter	DC-40GHz	≤1.20	500
24M-LSMPF-002	2.4mm Male to LSMP Female adapter	DC-40GHz	≤1.20	500
24M-LSMPM-002	2.4mm Male to LSMP Male adapter	DC-40GHz	≤1.20	500
LSMPM-LSMPM-001	LSMP Male to LSMP Male with 2 holes flange adapter	DC-40GHz	≤1.20	500

29F-LSMPM-001

29M-LSMPM-001

29F-LSMPF-001

29M-LSMPF-001

24F-LSMPM-002

24M-LSMPM-002

24F-LSMPF-002

24M-LSMPF-002

PCB end connector

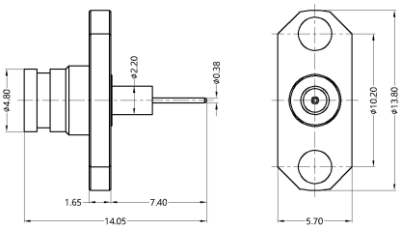
SMP Series

Material/Surface process:
Body: Stainless steel/ Passivation
Contact pin: Beryllium Copper / Gold plating
Insulator: PTFE

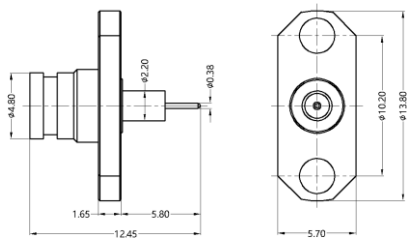
Mechanical Specifications:
Mechanical durability: ≥500 times

Environmental Specifications:
Operation temperature: -65~+165°C

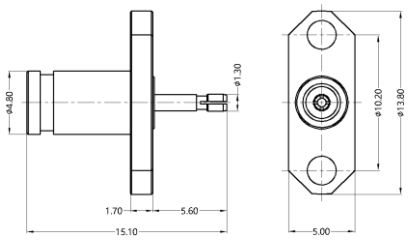
PN	Description	Interface Structure	Frequency	VSWR
PM-SMPM-FL2-A	SMP Male for PCB with 2 holes flange	Limited detent	DC~40GHz	≤1.25
PM-SMPM-FL2-C	SMP Male for PCB with 2 holes flange	Limited detent	DC~40GHz	≤1.25
PM-SMPM-FL2-D	SMP Male for PCB with 2 holes flange	Limited detent	DC~40GHz	≤1.35
PM-SMPM-FL2-E	SMP Male for PCB with 2 holes flange	Limited detent	DC~40GHz	≤1.35



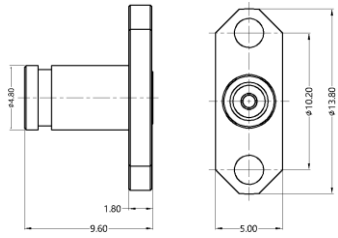
PM-SMPM-FL2-A



PM-SMPM-FL2-C



PM-SMPM-FL2-D



PM-SMPM-FL2-E

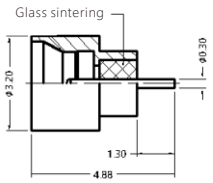
SSMP Series

Material/Surface process:
Body: Stainless steel Passivation/Kovar alloy 4J29 Gold plating
Contact pin: Beryllium Copper Gold plating/Kovar alloy 4J29 Gold plating
Insulator: PTFE/ Glass

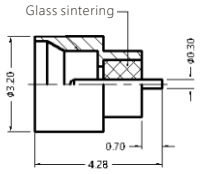
Mechanical Specifications:
Mechanical durability: ≥500 times

Environmental Specifications:
Operation temperature: -65~+165℃

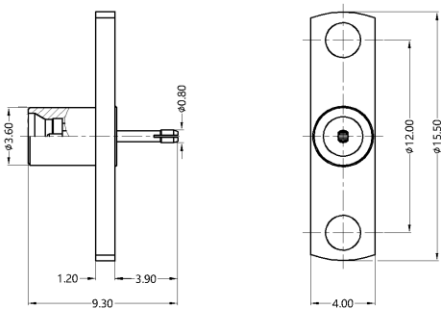
PN	Description	Interface Structure	Frequency	VSWR
PM-SSMPM-E	SSMP Male for PCB with 2 holes flange	Detent, Glass Sintering	DC~40GHz	≤1.40
PM-SSMPM-F	SSMP Male for PCB with 2 holes flange	Smooth bore, Glass Sintering	DC~40GHz	≤1.40
PM-SSMPM-G	SSMP Male for PCB with 2 holes flange	Detent	DC~40GHz	≤1.40
PM-SSMPM-D	SSMP Male for PCB with 2 holes flange	Smooth bore	DC~40GHz	≤1.40



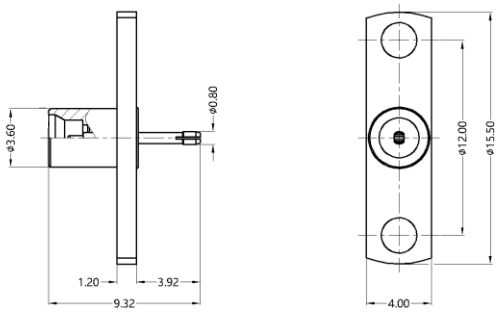
PM-SSMPM-E



PM-SSMPM-F



PM-SSMPM-G



PM-SSMPM-D

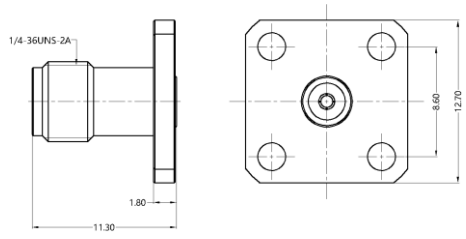
2.92mm Series

Material/Surface process:
Body: Stainless steel Passivation
Contact pin: Beryllium Copper Gold plating
Insulator: PEI

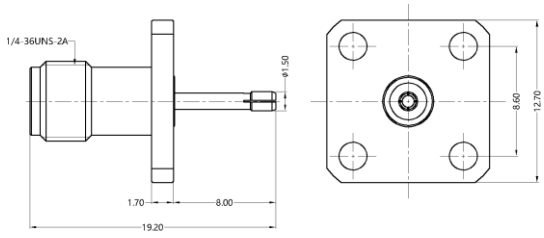
Mechanical Specifications:
Mechanical durability: ≥500 times

Environmental Specifications:
Operation temperature: -65~+165℃

PN	Description	Frequency	VSWR
PM-29F-FL4-A	2.92mm Female for PCB with 4 holes flange	DC~40GHz	≤1.30
PM-29F-FL4-B	2.92mm Female for PCB with 4 holes flange	DC~40GHz	≤1.30



PM-29F-FL4-A



PM-29F-FL4-B

Satellite-borne products

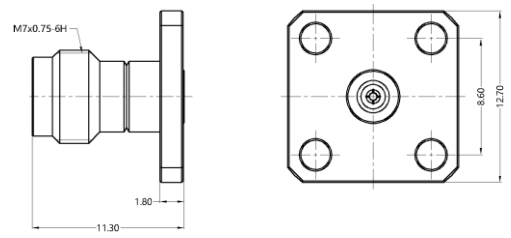
2.4mm Series

Material/Surface process:
Body: Stainless steel Passivation
Contact pin: Beryllium Copper Gold plating
Insulator: PEI

Mechanical Specifications:
Mechanical durability: ≥500 times

Environmental Specifications:
Operation temperature: -65~165℃

PN	Description	Frequency	VSWR
PM-24F-FL4-A	2.4mm Female for PCB with 4 holes flange	DC~50GHz	≤1.30



PM-24F-FL4-A

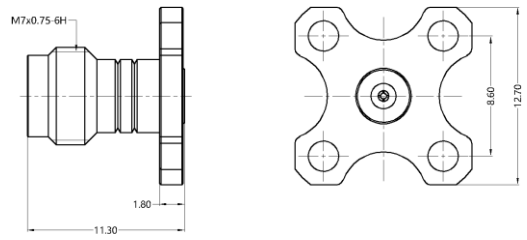
1.85mm Series

Material/Surface process:
Body: Stainless steel Passivation
Contact pin: Beryllium Copper Gold plating
Insulator: PEI

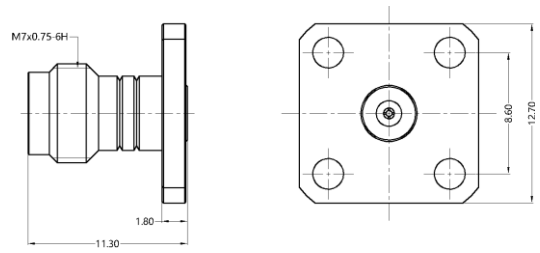
Mechanical Specifications:
Mechanical durability: ≥500 times

Environmental Specifications:
Operation temperature: -65~+165℃

PN	Description	Frequency	VSWR
PM-18F-FL4-A	1.85mm Female for PCB with 4 holes flange	DC~67GHz	≤1.30
PM-18F-FL4-C	1.85mm Female for PCB with 4 holes flange	DC~67GHz	≤1.30



PM-18F-FL4-A



PM-18F-FL4-C

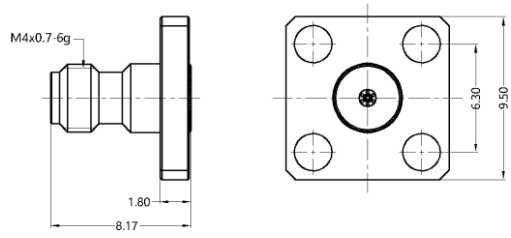
1.00mm Series

Material/Surface process:
Body: Stainless steel Passivation
Contact pin: Beryllium Copper Gold plating
Insulator: PEI

Mechanical Specifications:
Mechanical durability: ≥500 times

Environmental Specifications:
Operation temperature: -65~+165℃

PN	Description	Frequency	VSWR
PM-10F-FL4-A	1.0mm Female for PCB with 4 holes flange	DC~110GHz	≤1.35



PM-10F-FL4-A

TVAC
Thermal Vacuum Testing Cabe Assemblies

TVAC thermal vacuum RF test cable assemblies adopt special low outgassing materials and have passed the ASTM E-595 standard test and received third-party test certification,which proposes a maximum total mass loss (TML of 1% and 0.1% of the maximum CVCM; TVAC series products have reliable phase and amplitude stability, effectively ensuring the simulation of outer space conditions; Maxwellon can also customize special phase matching assemblies for you.

Product features

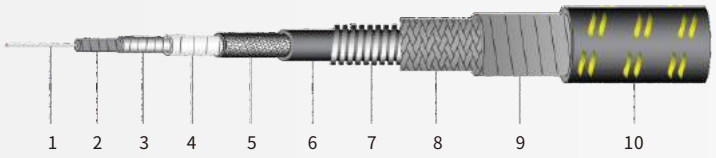
- Wide temperature range
- Thermal vacuum outgassing meets NASA ASTM E-595
- Third party test reports available
- Ultra-low loss
- High power
- Connector venting design

Product application

- RF testing in a thermal vacuum chamber
- Satellite test connection in vacuum chamber
- Connection to test equipment in vacuum chamber

Cable Structure

1- Center conductor	SPC	4- Interlayer	LD-PTFE
2-Dielectric	LD-PTFE	5- Outer shield	SPC wire
3-Outer conductor	SPC tape	6-Jacket	Black ETFE



1 Center conductor	SPC	6 Jacket	Black ETFE
2 Dielectric	LD-PTFE	7 Armored Spring	Stainless Steel Spring
3 Outer conductor	SPC tape	8 Strengthen Net	SPC wire
4 Inter layer	LD-PTFE	9 Anti-twist layer	PTFE
5 Outer shield	SPC wire	10 Armored Jacket	PTFE wire(gray+yellow)

Cable Specifications

Electrical Specifications

Cable Type	TVAC-360		TVAC-500		TVAC-800	
Operating Frequency(GHz)	40		26.5		18	
VSWR	1.30		1.30		1.30	
Impedance(Ω)	50					
Shield efficiency(dB)	>90					
Voltage withstand(DC)	900		1500		3600	
Velocity of propagation	82%					
Attenuation&AVG.Power	Attenuation (+25°C±2°C) / AVG.Power (+40°C±2°C&Ambient; Sea level; VSWR1:1)					
Frequency (MHz)	dB/100m	KW	dB/100m	KW	dB/100m	KW
500	22.45	0.726	16.17	1.243	10.37	2.579
1000	31.91	0.511	22.96	0.875	14.76	1.812
2000	45.45	0.359	32.66	0.615	21.07	1.269
3000	55.97	0.291	40.18	0.500	25.98	1.029
6000	80.13	0.203	57.40	0.350	37.32	0.716
8000	93.13	0.175	66.64	0.302	43.44	0.615
12500	117.79	0.138	84.12	0.239	55.12	0.485
13500	122.70	0.133	87.58	0.229	57.45	0.465
15000	129.76	0.126	92.57	0.217	60.81	0.440
18000	143.02	0.114	101.92	0.197	67.13	0.398
24000	166.93	0.098	118.75	0.169		
26500	176.12	0.093	125.20	0.160		
30000	188.39	0.087				
40000	220.51	0.074				
Attenuation at frequency	$dB/100m=K1*\sqrt{FMHz}+K2*FMHz$					
K1	0.9915499		0.7156867		0.4563799	
K2	0.0005549		0.0003280		0.0003280	

Non-armoured Mechanical Specifications

Cable O.D.(mm)	3.8	5.3	7.8
Min.Bend radius:installation(mm)	19	27	39
Min.Bend radius:repeated(mm)	38	53	80
Weight(g/m)	32	63	131

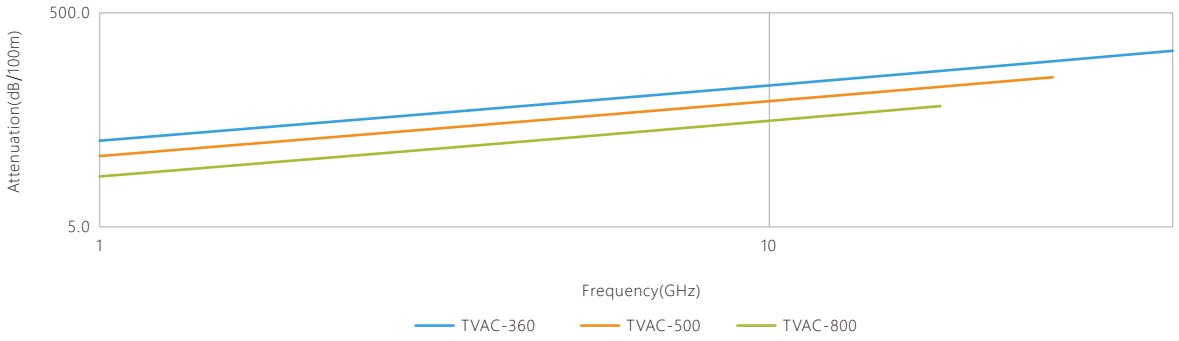
Armored Mechanical Specifications

Cable O.D.(mm)	6.2	7.8	10.4
Min.Bend radius:installation(mm)	31	39	52
Min.Bend radius:repeated(mm)	62	78	104
Weight(g/m)	86	141	251

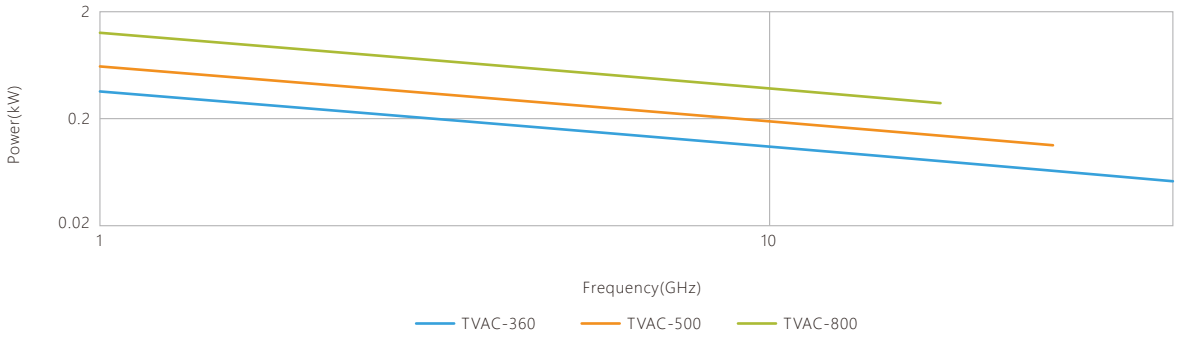
Environmental Specifications

Temperature Range(°C)	-55~+165
Outgassing(ASTM E-595)	TML<1%; CVCM <0.1%

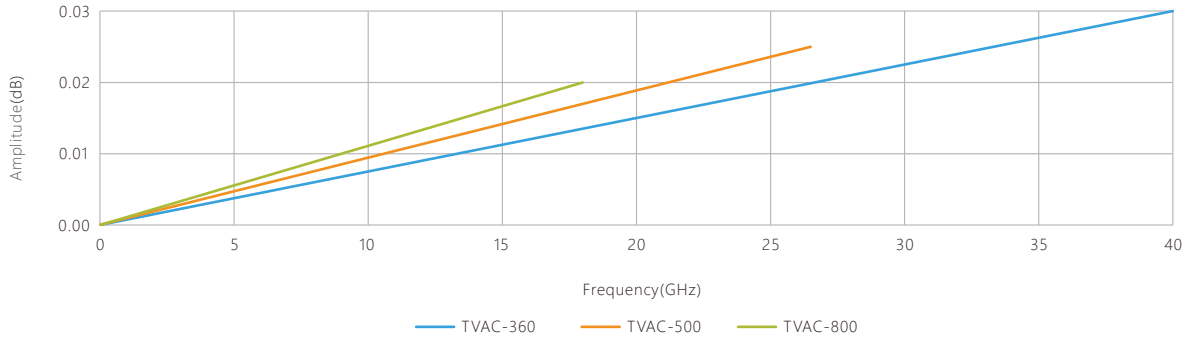
Frequency&Attenuation



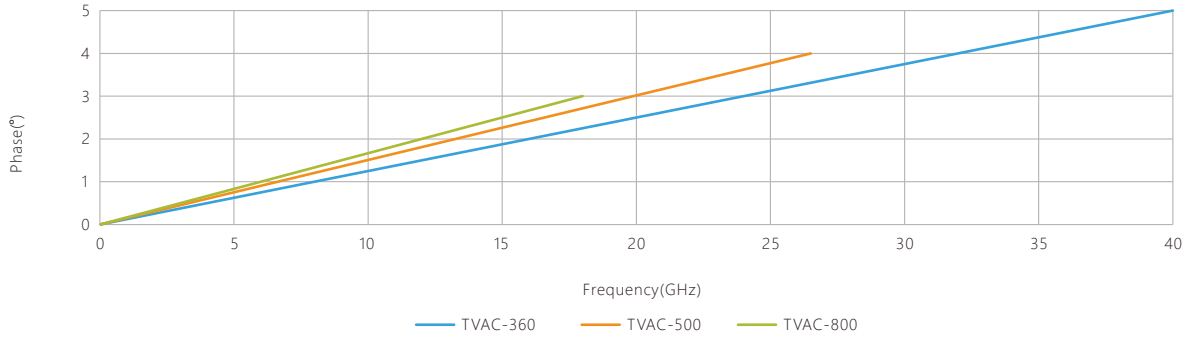
Frequency&Power



RF Amplitude Stability



RF Phase Stability



Assembly Selection Information

1	2	3	4	5	6	7	-	8	9	10	11	12	13	14	15	16	17	-	18	19	20	21	22	23
Cable Code					Armor			Connector Code											Length				Unit	

No.1-6: Cable Code: TVAC36/TVAC50/TVAC80

No: 7: A-Armored; non-Armored, without digit

No: 8-11: Left connector code

No:12-17: Right connector code

The codes are listed below. Up to five digits, less than five digits are indented by the actual code

No:18-21: Customized Length. e.g.: 1- "01.00"

No:22-23: M-meter/IN-inch/F-feet, less than two digits, indent by one

For example: TVAC50-SMSM-01.00M

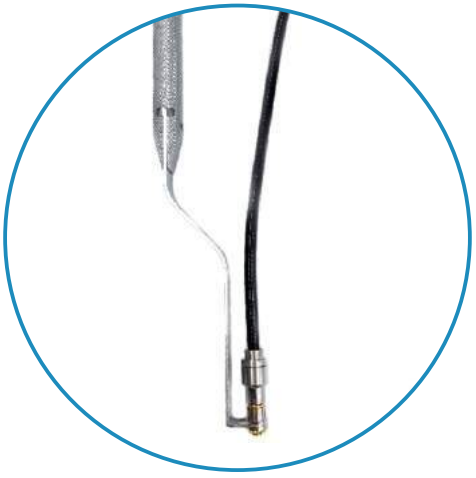
TVAC36A-29M29M-01.00M (armored)

Connector Selection

Cable Type				TVAC36	TVAC36A	TVAC50	TVAC50A	TVAC80	TVAC80A
Connector Code	Connector Type	O.D. / operating Freq	VSWR	3.8mm	6.2mm	5.3mm	7.8mm	7.8mm	10.4mm
29M	2.92mm Male	40GHz	1.30		●		●		
SSMAM	SSMA Male	18GHz	1.30	●					
SM	SMA Male	18GHz	1.30		●		●		●
NM	N Male	18GHz	1.30				●		●
TM	TNC Male	11GHz	1.30				●		●

PN	Description	Products
FM188	Self-lock LSMP right-angle disassembly tool	
FM163	Self-lock LSMP flat pull type disassembly tool	
FT0001SS	8.0mm open-end torque wrench	

Right-angle disassembly



Flatwise disassembly

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