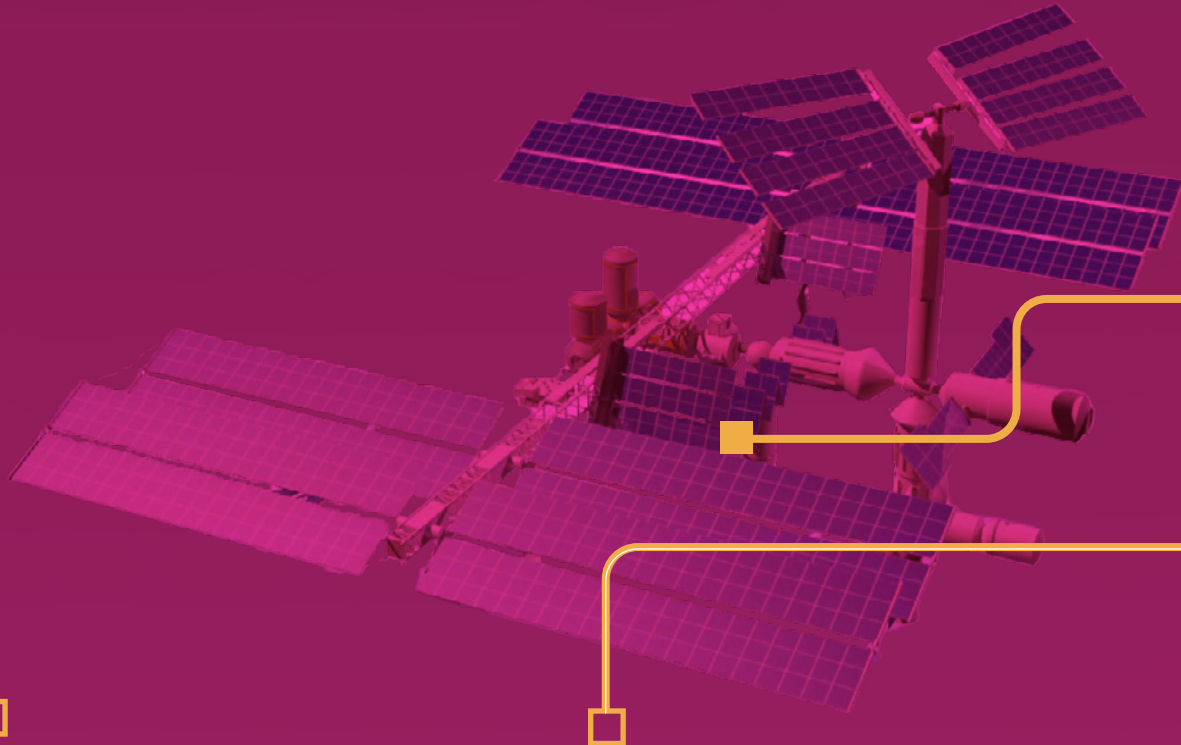




AXOSAT™

Microwave Coaxial Assemblies

50 GHz

50 GHz



AXOSAT™

Microwave Coaxial Assemblies

NOVEMBER, 2021

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AXOSAT™

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2.4 MM CONNECTOR

OUR SALES TEAM IS AT YOUR DISPOSAL FOR ANY ADVICE YOU MAY REQUIRE.

THIS CATALOGUE IS INTENDED AS A GUIDE TO HELP SELECTION OF AXON' PRODUCTS. THE INFORMATION IN THIS CATALOGUE IS ACCURATE TO THE BEST OF OUR KNOWLEDGE AT TIME OF GOING TO PRINT. HOWEVER, AXON' CANNOT BE HELD LIABLE FOR ANY ERRORS MADE AS A RESULT OF INFORMATION CONTAINED HEREIN. CHANGES AND MODIFICATIONS CAN BE MADE TO THIS BROCHURE AT ANY TIME WITHOUT PRIOR NOTICE.

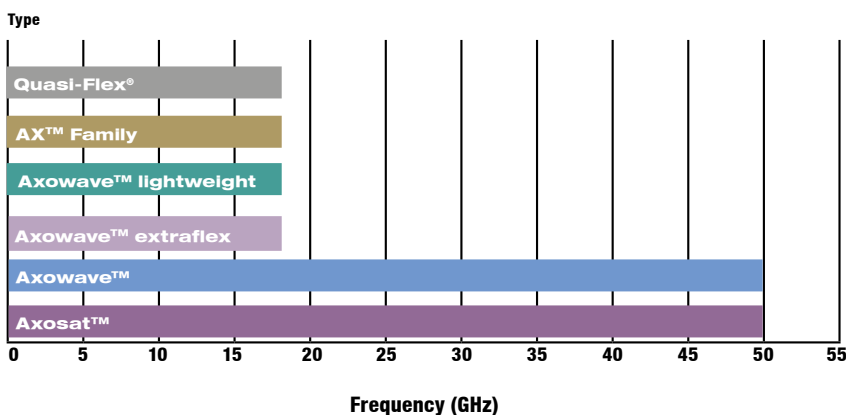
General information

Axon' Cable range summary

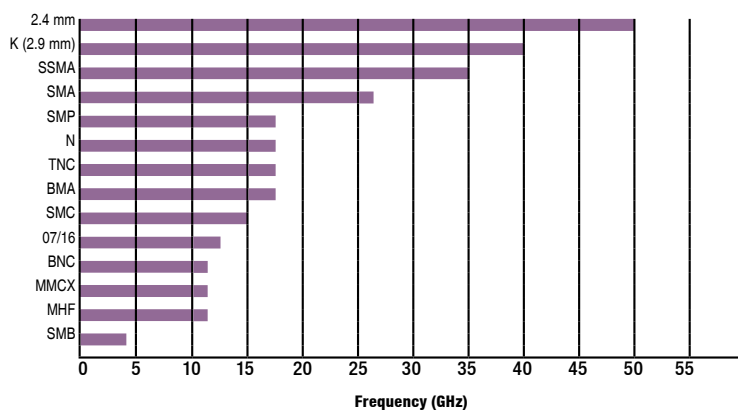
The range of Axon' Cable microwave coaxial assemblies comprises 6 major series with the following characteristics:

- Axowave™ optimized low loss coaxial cables.
- Axowave™ Extraflex, low loss coaxial cables with optimized flex-life.
- Axowave™ lightweight coaxial cables.
- Quasi-Flex® coaxial cables, hand formable semi-rigid substitutes.
- Ax™ coaxial cables, flexible semi-rigid substitutes.
- Axosat™ space grade coaxial cables.

Operating frequency by cable series



Operating frequency depending on connector type



2.4 MM CONNECTOR



2.9 MM CONNECTOR



SMA CONNECTOR



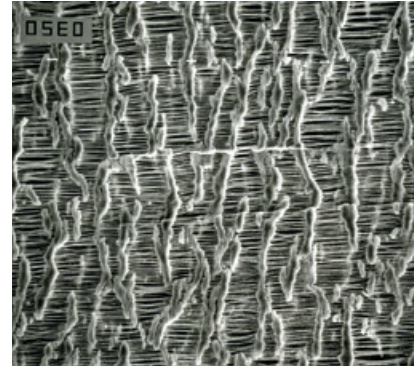
TNC/N CONNECTOR

CELLOFLON®: high performance dielectric

Axon' Cable uses a porous PTFE dielectric for the manufacture of microwave coaxial assemblies in order to obtain a dielectric constant as close as possible to air. The microwave performance is therefore improved. Axon' Cable has developed and patented its own expanded PTFE products, brand-named CELLOFLON®, available in both taped and extruded versions.

The low dielectric constant of CELLOFLON® helps to considerably improve the electrical performance of the cable, achieving lower insertion losses, a higher cut-off frequency and faster propagation velocity. For identical performances, the dimensions of a CELLOFLON® cable will be smaller and the cable's weight and volume lower.

The use of CELLOFLON® improves the phase stability of the assemblies under mechanical stress, as well as when submitted to temperature changes.



CELLOFLON® MICROSCOPIC VIEW

Specification

In order for Axon' engineers to offer the most appropriate solution for your requirements, as much as possible of the following information should be provided:

- › Conditions of use: frequency, temperature range;
- › Electrical characteristics: insertion loss in dB/m at specified frequency, VSWR, characteristic impedance;
- › Type of connectors;
- › Flex-life;
- › Phase matching;
- › Shield efficiency.

Cable assemblies are delivered in individual boxes and are identified by a yellow heatshrink tube with the following black marking: "Axon' Cable + plan number", batch number and serial number.

Quality assurance

Axon' Cable is ISO9001/2000 and EN9100 approved

Electrical and dimensional inspections are carried out at each stage of the cable manufacture.

The VSWR (return loss) and insertion losses are measured on 100% of all assemblies produced, and a test certificate is automatically supplied.

Other measurements can be carried out on request such as phase matching or shielding efficiency.

Identification code

Example: S C 30 S Q 1 S10A S10A - 100 C

USE

S = Space - None = Non-space

CABLE FAMILY

C = Celloflon® Axowave™ - H = Hand-formable (QFX)
L = Lighthweight - S = Space - U = Extraflex - X = AX

REFERENCE DIAMETER

Ø.D. X 10

CONDUCTOR TYPE

S = Solid - M = Stranded

JACKET TYPE

K = FEP - P = PFA - Q = Peek - W = None(*)

PROTECTION TYPE

1 = None

CONNECTOR TYPE(**)

S = SMA - K = 2.92 - Q = 2.4 - V = 1.85 - T = TNC - N = N

CONNECTOR STYLE

1 = plug - 2 = jack

CONNECTOR SHAPE

0 = straight - 1 = elbow (right angle) - 2 = 90° swept

CONNECTOR QUALIFICATION LEVEL

A = space grade Axon' qualified - E = ESCC qualified

LENGTH

LENGTH CODE

M = meter - C = centimeter

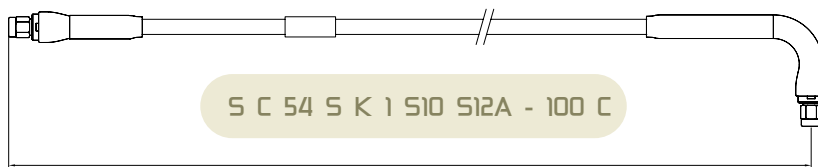
Example

The Axon' Cable identification code is made up of 19 or 20 alphanumeric characters. Each character refers to one defined technical characteristic of the cable assembly.

The first 6 characters (maximum 7) refer to the cable type, i.e series, diameter, type of conductor used, jacket type and protection type.

The next 6 characters refer to connectors used, type, version (male/female) and connector shape.

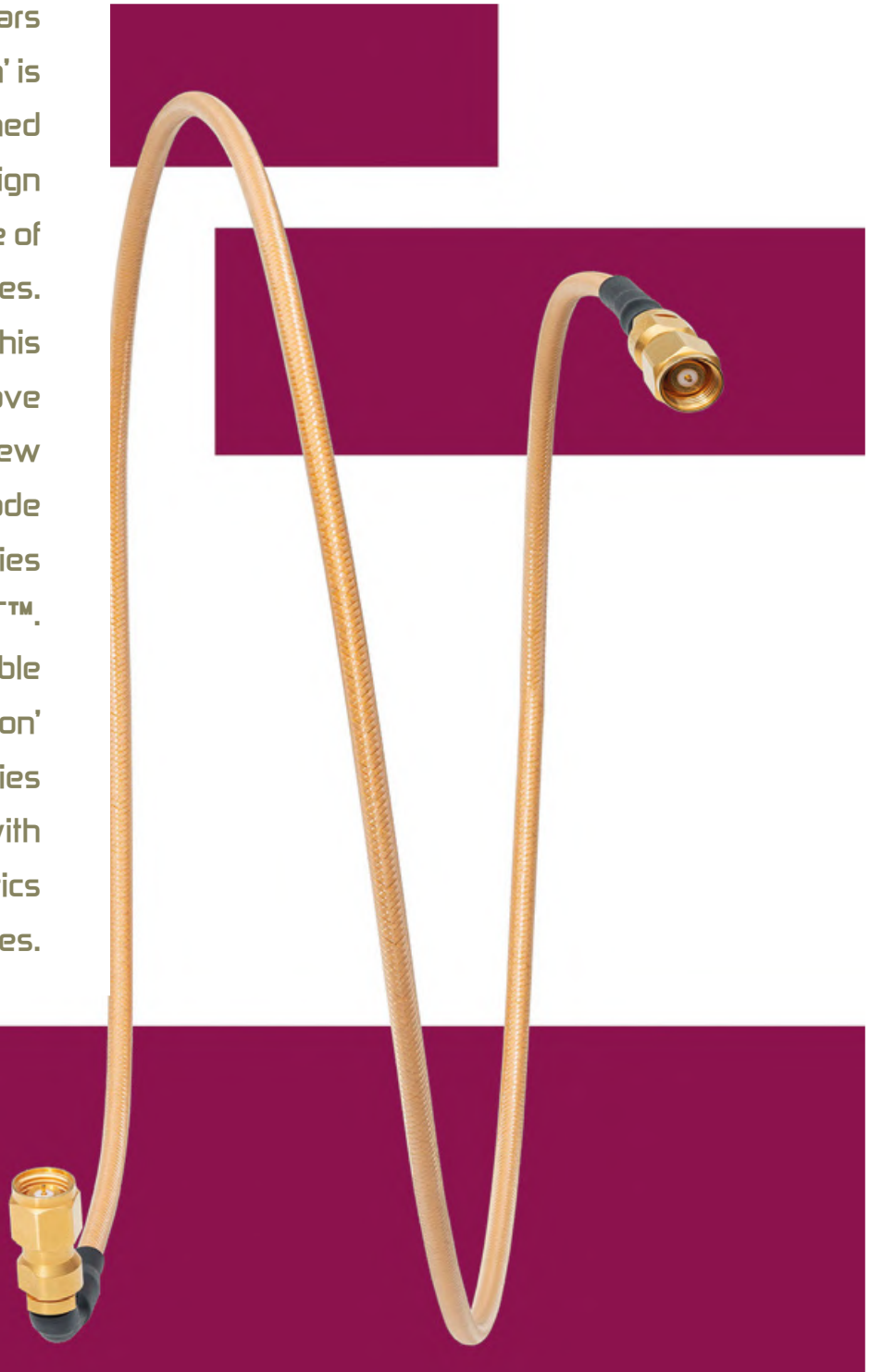
The last 4 characters define the final length of the cable assembly.



5.4 mm diameter CELLOFLON® Axowave™ made with a single-stranded Axowave™ cable insulated with FEP, terminated with a SMA plug connector and a 90° swept SMA connector, 1 m length.

AXOSAT™

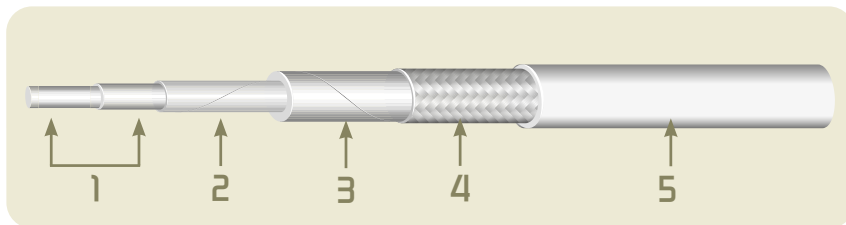
With well over 30 years experience, Axon' is a long-established expert in the design and manufacture of microwave assemblies. Axon' has used all this experience in microwave to develop a new range of space grade microwave assemblies called AXOSAT™. These are compatible with all existing Axon' microwave cable families and use connectors with specific characteristics such as venting holes.



Advantages

- › Compatible with specific coaxial assemblies (QUASI-FLEX®, AXOWAVE™, AX™) and lightweight conductors to save up to 30 % of the mass
- › Space grade microwave assemblies up to 50 GHz
- › Specific materials to limit outgassing, increase radiation resistance or ATOX resistance.
- › Compatible with connectors with specific characteristics such as venting holes.

Construction



1. CORE:
 - Silver thickness of 2 microns minimum.
 - Silver Plated Copper Clad Aluminium (for lightweight space grade conductor).
2. Taped shield: silver plated copper.
3. Separating tape
4. Shielding braid: silver plated copper.
5. Outer jacket: low outgassing jacket
Radiation resistance level:
 - FEP: 20 Mrad
 - PFA: 30 Mrad
 - Polyimide + PEEK braid: 300 Mrad.

Space grade specification

Connectors

- › Specific material and plating.
- › Venting holes.

Cable assemblies

- › Low outgassing materials.
- › Thermal stabilization.
- › X-ray analysis.
- › ISO7 Clean room manufacturing.



ISO7 CLEAN ROOM

Special design

Axon' offers custom designed AXOSAT™ cable assemblies:

- Over-screen can be added according to the customer requirements,
- Space version of an existing standard AXOWAVE™ is also possible,
- Custom designed, special parts, processes or tests can be studied to meet customer needs.

Radiation resistance

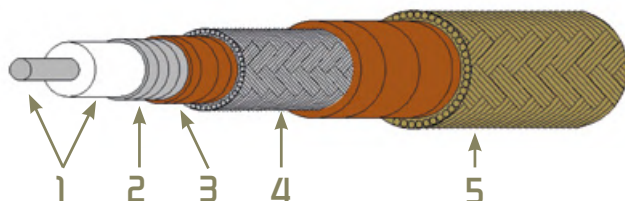
AXOSAT™ cables are compliant with standard ESCC3902 radiation requirements (1Mrad). AXOSAT™ can be used safely inside satellites structures for most space missions. Axon' space cable jackets can withstand even higher dose levels ($\geq 20\text{Mrad}$) based on IEC 60544 end-life criteria and Axon' test results.

Axon' also offers optimized wire and cable solutions with improved radiation resistance for the harshest environments such as scientific and exploration missions (ex: JUICE). The radiation depth-dose deposition simulation within each material layer of the cable (see chart overleaf) depends also on the dedicated mission and cable location. With a wealth of material radiation tolerance expertise, Axon' can offer cable constructions to optimize the balance of weight, performance and environmental resilience.

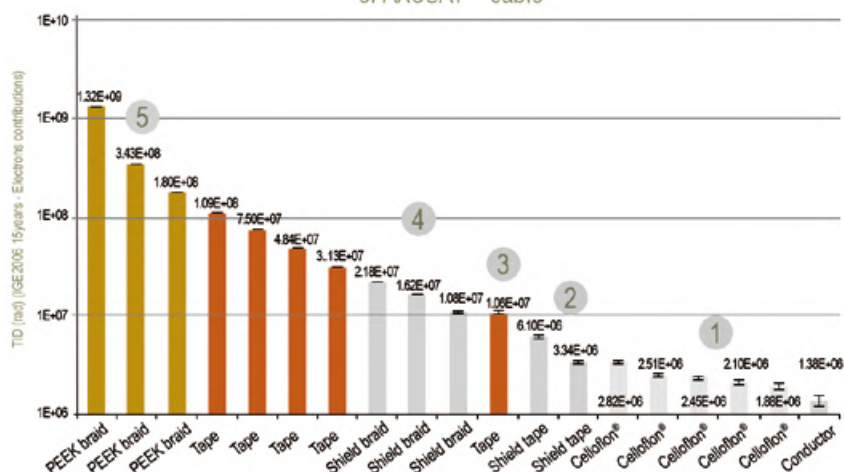
AXOSAT™ with PEEK braided jackets have been specially designed and optimized to guarantee outstanding radiation resistance combined with extra low mass and an easy-to-handle (hand formable) interconnect solution.



AXOSAT™ 2.4 MM CONNECTOR



Increasing Radiation Total Ionising Dose (TID) possible by layer of AXOSAT™ cable



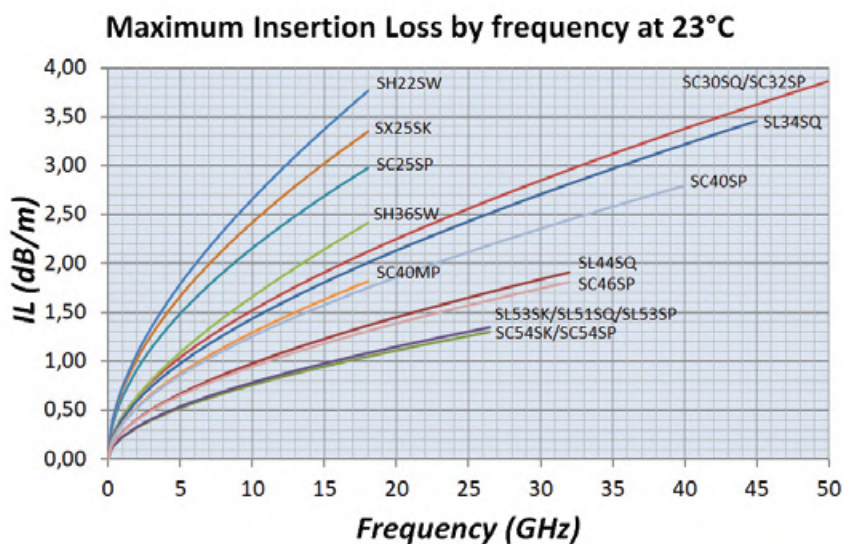
Technical characteristics

AXOSAT™ Reference	Max Freq (GHz)	Max loss at max freq (dB/m)	Capacitance (pF/m)	mass (g/m)	Outer Ø (mm)	mini bend radius (mm)	LEO		GEO	
							int.	ext.	int.	ext.
SH22SW	18	3.80	97	19	2.2	10	✓	✓	✓	x
SC25SP	18	2.98	87	17	2.5	15	✓	✓	✓	x
SX25SK	18	3.43	97	19	2.5	20	✓	✓	✓	x
SC30SQ	50	3.87	87	22	3.01	20	✓	x	✓	✓*
SC32SP	50	3.87	87	24	3.16	20	✓	✓	✓	x
SL34SQ	45	3.45	86	22	3.37	20	✓	x	✓	✓*
SH36SW	18	2.42	97	44	3.58	20	✓	✓	✓	x
SC40MP	18	1.83	87	39	4.0	20	✓	✓	✓	x
SL44SQ	32	1.91	87	34	4.35	25	✓	x	✓	✓*
SC46SP	32	1.85	86	51	4.60	25	✓	✓	✓	x
SL51SQ	26.5	1.35	87	47	5.12	30	✓	x	✓	✓*
SL53SP	26.5	1.35	87	51	5.28	30	✓	✓	✓	x
SL53SK	26.5	1.35	87	52	5.30	30	✓	✓	✓	x
SC54SP	26.5	1.30	87	70	5.40	30	✓	✓	✓	x
SC54SK	26.5	1.30	87	70	5.40	30	✓	✓	✓	x

(*) Under MLI, or with additional conductive layer to mitigates ESD issues



X-ray inspection machine



Space heritage

Axon's RF space heritage begins in 2011, with the very first Space Grade Flight Model order. Followed by others all around the world: Axosat S30SQ, Axosat SL44SQ, Axosat SC54SK and Axosat SL51SQ Flight Model and Engineering Model assemblies for space programs.

Axon' Cable has long experience supplying these high reliability networks to the Ariane launch vehicle and numerous satellite platforms. Equipped with several dedicated clean rooms, the group is very well versed in the requirements and challenges of space applications: weight saving, miniaturization, and materials designed for severe environments. Axon' Group expertise allows to have assemblies with low VSWR, low Insertion Loss, also optimized for customer frequency band, and low mass cables to withstand different levels of radiation.

ESCC3408 specification

The European Space Agency (ESA) ESCC3408 specification is one of only four standards that apply to specialized cable assembly types: RF/microwave, High Data Rate, High Voltage and Fiber Optics.

Axon's ESA Qualified Parts List (QPL) listed for many more varieties of cable, connector and cable assembly than any other manufacturer worldwide, and can offer microwave assemblies in accordance with or fully qualified to the ESCC3408 standard.

Axon's expertise in connectors, cables and cable assemblies allows the company to offer high performance microwave solutions. As an example, a 1m SL34SQ assembly with 2.4 mm connectors has a VSWR of 1.25 max up to 45 GHz.

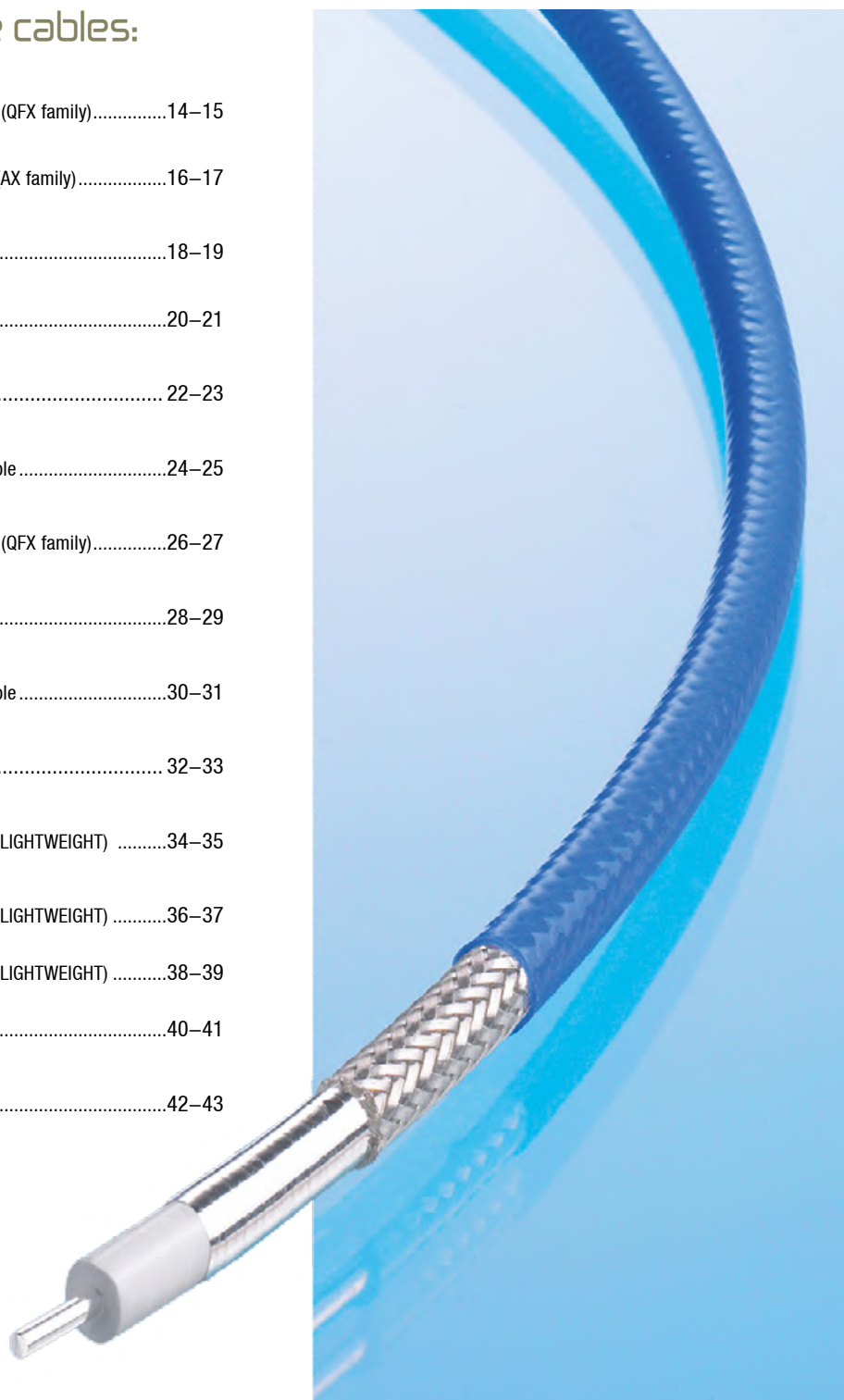
Axon' Space Microwave missions:

- › PeruSat-1 (Arianespace),
- › LNTHD,
- › PROBA-V (ESA),
- › Juice (ESA),
- › LuxSpace,
- › Military Satellites,
- › Axomach™ Programme,
- › Sky Brazil,
- › MeaSat 3D,
- › Lunar Pathfinder.

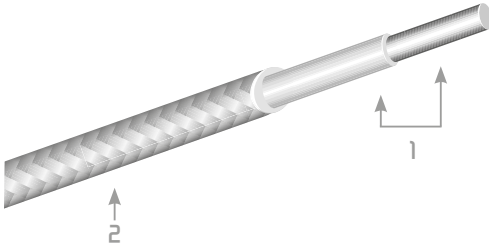
TECHNICAL DATA SHEETS

Axon' space grade cables:

AXOSAT™ SH22SW Space grade version of AXOWAVE™ H22SW (QFX family).....	14–15
AXOSAT™ SX25SK Space grade version of AXOWAVE™ X25SK (AX family).....	16–17
AXOSAT™ SC25SP Original 18 GHz space grade cable.....	18–19
AXOSAT™ SC30SQ Space grade version of AXOWAVE™ C32SP	20–21
AXOSAT™ SC32SP Space grade version of AXOWAVE™ C32SP	22–23
AXOSAT™ SL34SQ Original 45 GHz Lightweight space grade cable	24–25
AXOSAT™ SH36SW Space grade version of AXOWAVE™ H36SW (QFX family).....	26–27
AXOSAT™ SC40MP Original 18 GHz flexible space grade cable	28–29
AXOSAT™ SL44SQ Original 32 GHz Lightweight space grade cable	30–31
AXOSAT™ SC46SP Original 32 GHz space grade cable	32–33
AXOSAT™ SL51SQ Space grade version of AXOWAVE™ L53SK (LIGHTWEIGHT)	34–35
AXOSAT™ SL53SP Space grade version of AXOWAVE™ L53SK (LIGHTWEIGHT)	36–37
AXOSAT™ SL53SK Space grade version of AXOWAVE™ L53SK (LIGHTWEIGHT)	38–39
AXOSAT™ SC54SP Space grade version of AXOWAVE™ C54SK	40–41
AXOSAT™ SC54SK Space grade version of AXOWAVE™ C54SK	42–43



AXOSAT™ SH22SW (QFX086-S)

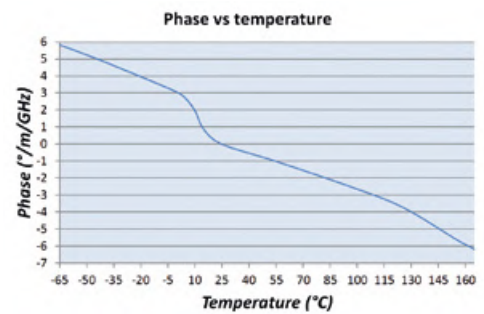


Coaxial cable construction

1. Core	Inner conductor	Silver Plated Copper, solid	-
	Dielectric	Solid PTFE	-
2. Braided shield		Tin soaked Silver Plated Copper	2.15 mm

Coaxial characteristics

Max. Insertion Loss at 18 GHz	3.77 dB/m
Characteristic impedance	50 ±2 Ω
Capacitance	97 pF/m
Max. mass	19 g/m
Min. bending radius for static applications	10 mm
Radiation resistance level	Contact us



Calculation of insertion loss

Frequency (GHz)	Nom. insertion loss (dB/m)	Max. insertion loss (dB/m)
$\alpha_{\max}(F) = 0.71 \times \sqrt{F} + 0.042 \times F$		
1	0.70	0.75
2	1.02	1.09
4	1.49	1.59
6	1.86	1.99
8	2.20	2.35
12	2.78	2.97
18	3.52	3.77



AXOSAT™

AXOSAT™ SH22SW (QFX086-S)

Coaxial cable assembly characteristics

Operating frequency	DC – 18 GHz
Nom. Insertion Loss at 18 GHz (1m assembly, SMA plug straight both ends)	3.78 dB
Max. Insertion Loss at 18 GHz (1m assembly, SMA plug straight both ends)	4.03 dB
VSWR (1m assembly, SMA plug straight both ends)	1.35 max. (DC-18GHz)
Operating temperature	-55°/+150°C
Shielding efficiency	90 dB up to 18 GHz

Mission orbit

	LEO 10 years	GEO 15 years
Assembly location Internal	✓	✓
Assembly location External	✓	No

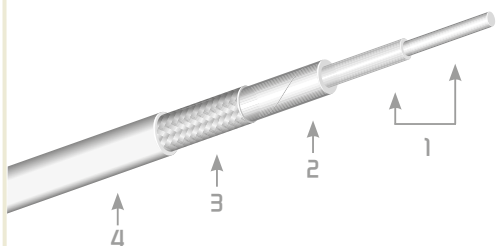
Available connectors

Up to 18 GHz:

SMA plug straight (S10E)	ESCC 3402/001 variant 01
SMA jack straight (S20E)	ESCC 3402/002 variant 01/09/68
SMA plug right angle (S11E)	ESCC 3402/001 variant 09
SSMA plug straight (SS10E)	ESCC 3402/004 variant 01
SSMA jack straight (SS20E)	ESCC 3402/005 variant 01/09
SSMA plug right angle (SS11E)	ESCC 3402/004 variant 09
2.92mm plug straight (K10E)	ESCC 3402/021 variant 01
2.92mm jack straight (K20E)	ESCC 3402/022 variant 01

AXOSAT™

AXOSAT™ SX25SK

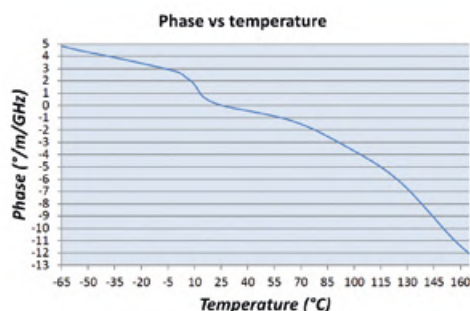


Coaxial cable construction

1. Core	Inner conductor	Solid Silver Plated Copper	-
	Dielectric	Solid PTFE	-
2. Taped shield		Solid Silver Plated Copper	-
3. Braided shield		Solid Silver Plated Copper	-
4. Outer jacket		FEP (brown)	2.50 mm

Coaxial cable characteristics

Max insertion loss at 18 GHz	3.43 dB/m
Characteristic impedance	$50 \pm 2 \Omega$
Capacitance	97 pF/m
Max mass	19 g/m
Min. bending radius for static applications	20 mm
Radiation resistance level	20 Mrad

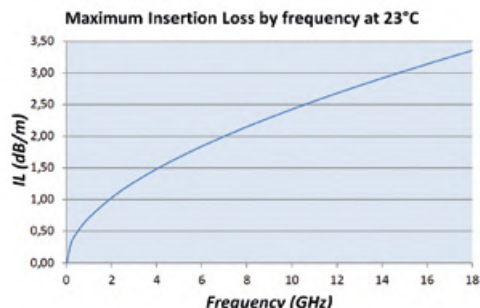


Calculation of insertion loss

Frequency (GHz)	Nom. insertion loss (dB/m)	Max. insertion loss (dB/m)
-----------------	----------------------------	----------------------------

$$\alpha_{\max.}(F) = 0.68 \times \sqrt{F} + 0.030 \times F$$

1	0.66	0.71
2	0.95	1.02
4	1.38	1.48
6	1.73	1.85
8	2.02	2.16
10	2.28	2.45
12	2.54	2.72
18	3.21	3.43



AXOSAT™

AXOSAT™ SX25SK

Coaxial cable assembly characteristics

Operating frequency	DC – 18 GHz
Nom. Insertion Loss at 18 GHz (1m assembly, SMA plug straight both ends)	3.47 dB
Max. Insertion Loss at 18 GHz (1m assembly, SMA plug straight both ends)	3.69 dB
VSWR (1m assembly, SMA plug straight both ends)	1.35 max. (DC-18GHz)
Operating temperature	-55°/+150°C
Shielding efficiency	90 dB up to 18 GHz

Mission orbit

	LEO 10 years	GEO 15 years
Assembly location Internal	✓	✓
Assembly location External	✓	No

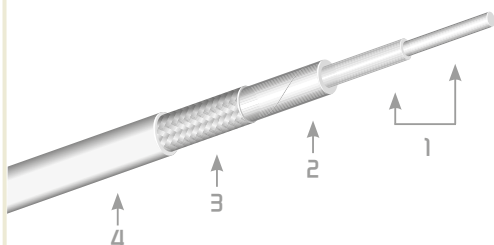
Available connectors

Up to 18 GHz:

SMA plug straight (S10E)	ESCC 3402/001 variant 01
SMA jack straight (S20E)	ESCC 3402/002 variant 01/09/68
SMA plug right angle (S11E)	ESCC 3402/001 variant 09
SSMA plug straight (SS10E)	ESCC 3402/004 variant 01
SSMA jack straight (SS20E)	ESCC 3402/005 variant 01/09
SSMA plug right angle (SS11E)	ESCC 3402/004 variant 09
2.92mm plug straight (K10E)	ESCC 3402/021 variant 01
2.92mm jack straight (K20E)	ESCC 3402/022 variant 01

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AXOSAT™ SC25SP

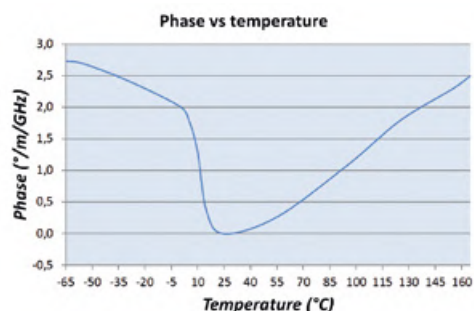


Coaxial cable construction

1. Core	Inner conductor	Solid Silver Plated Copper	-
	Dielectric	Celloflon® (Expanded PTFE)	-
2. Taped shield		Solid Silver Plated Copper	-
3. Braided shield		Solid Silver Plated Copper	-
4. Outer jacket		PFA (blue)	2.50 mm

Coaxial cable characteristics

Max insertion loss at 18 GHz	2.98 dB/m
Characteristic impedance	$50 \pm 2 \Omega$
Capacitance	87 pF/m
Max mass	17 g/m
Min. bending radius for static applications	15 mm
Radiation resistance level	30 Mrad

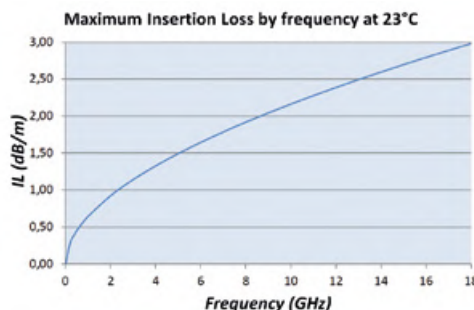


Calculation of insertion loss

Frequency (GHz)	Nom. insertion loss (dB/m)	Max. insertion loss (dB/m)
-----------------	----------------------------	----------------------------

$$\alpha_{\max.}(F) = 0.63 \times \sqrt{F} + 0.017 \times F$$

1	0.60	0.65
2	0.86	0.93
4	1.24	1.33
6	1.53	1.65
8	1.78	1.92
12	2.22	2.39
18	2.77	2.98



AXOSAT™

AXOSAT™ SC25P

Coaxial cable assembly characteristics

Operating frequency	DC - 18 GHz
Nom. Insertion Loss at 18 GHz (1m assembly, SMA plug straight both ends)	3.02 dB
Max. Insertion Loss at 18 GHz (1m assembly, SMA plug straight both ends)	3.25 dB
VSWR (1m assembly, SMA plug straight both ends)	1.20 max.
Operating temperature	-55°/+150°C
Shielding efficiency	90 dB up to 18 GHz

Mission orbit

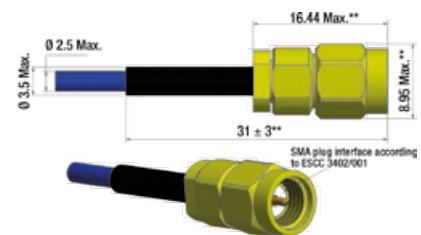
	LEO 10 years	GEO 15 years
Assembly location Internal	✓	✓
Assembly location External	✓	No

Available connectors

Up to 18 GHz:

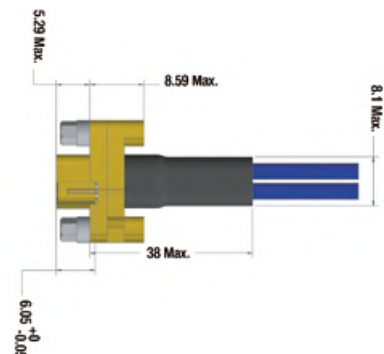
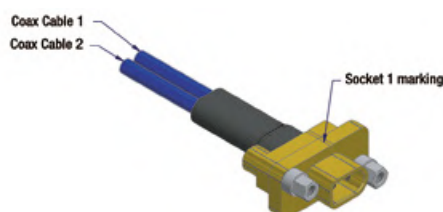
Axon' space grade SMA straight plug (S10A)

SMA plug straight (S10E)	ESCC 3402/005 variant 01/09
ESCC 3402/001 variant 01	SSMA plug right angle (SS11E)
SMA jack straight (S20E)	ESCC 3402/004 variant 09
ESCC 3402/002 variant 01/09/68	2.92mm plug straight (K10E)
SMA plug right angle (S11E)	ESCC 3402/021 variant 01
ESCC 3402/001 variant 09	2.92mm jack straight (K20E)
SSMA plug straight (SS10E)	ESCC 3402/022 variant 01
ESCC 3402/004 variant 01	
SSMA jack straight (SS20E)	



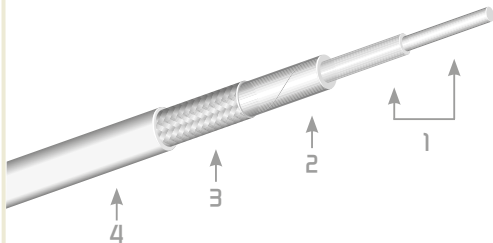
High data rate assemblies up to 10 Gb/s (ESCC3409):

AXOMACH plug in-line	ESCC 3409/001 variant 01
AXOMACH jack in-line	ESCC 3409/001 variant 04
AXOMACH jack panel mount	ESCC 3409/001 variant 07



AXOSAT™

AXOSAT™ SC30SQ

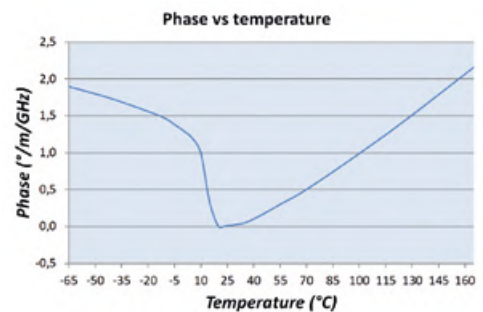


Coaxial cable construction

1. Core	Inner conductor	Solid Silver Plated Copper	-
	Dielectric	Celloflon® (Expanded PTFE)	-
2. Taped shield		Solid Silver Plated Copper	-
3. Braided shield		Solid Silver Plated Copper	-
4. Outer jacket		Polyimide tape + PEEK braid	3.01 mm

Coaxial cable characteristics

Max insertion loss at 50 GHz	3.87 dB/m
Characteristic impedance	$50 \pm 2 \Omega$
Capacitance	87 pF/m
Max mass	22 g/m
Min. bending radius for static applications	20 mm
Radiation resistance level	300 Mrad

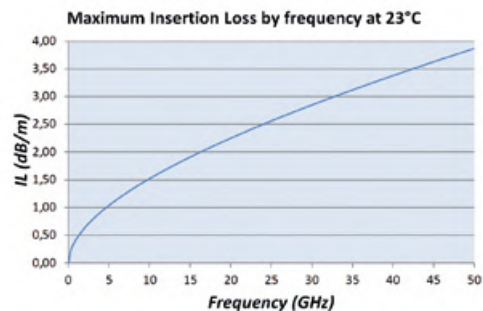


Calculation of insertion loss

Frequency (GHz)	Nom. insertion loss (dB/m)	Max. insertion loss (dB/m)
-----------------	----------------------------	----------------------------

$$\alpha_{\max.}(F) = 0.43 \times \sqrt{F} + 0.0165 \times F$$

1	0.42	0.45
2	0.60	0.65
4	0.87	0.93
6	1.08	1.16
8	1.26	1.35
12	1.58	1.69
18	1.98	2.13
26.5	2.48	2.66
40	3.16	3.38
50	3.61	3.87



AXOSAT™

AXOSAT™ SC30SQ

Coaxial cable assembly characteristics

Operating frequency	DC - 50 GHz
Nom. Insertion Loss at 50 GHz (1m assembly, 2.4mm plug straight both ends)	4.04 dB
Max. Insertion Loss at 50 GHz (1m assembly, 2.4mm plug straight both ends)	4.30 dB
VSWR (1m assembly, 2.4mm plug straight both ends)	1.25 max.
Operating temperature	-55°/+150°C
Shielding efficiency	90 dB up to 18 GHz

Mission orbit

	LEO 10 years	GEO 15 years
Assembly location Internal	✓	✓
Assembly location External	No (ATOX erosion)	✓*

* under MLI, or with additional conductive layer to mitigate ESD issues

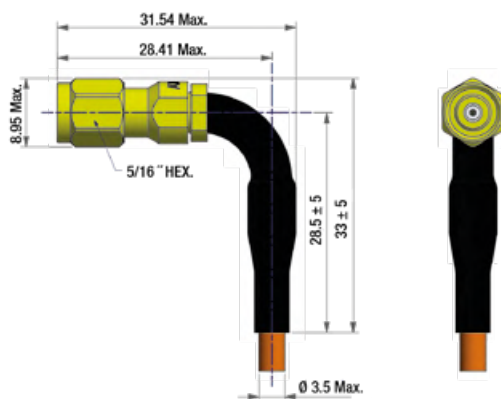
Available connectors

Up to 50 GHz:

Axon' space grade 2.4mm straight plug (Q10A)

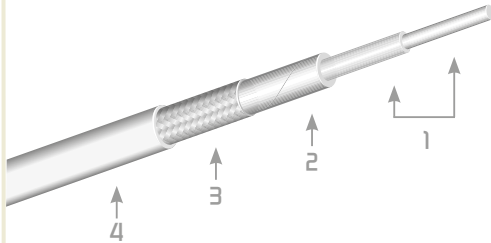


Axon' space grade 2.4mm swept plug (Q12A)



AXOSAT™

AXOSAT™ SC32SP

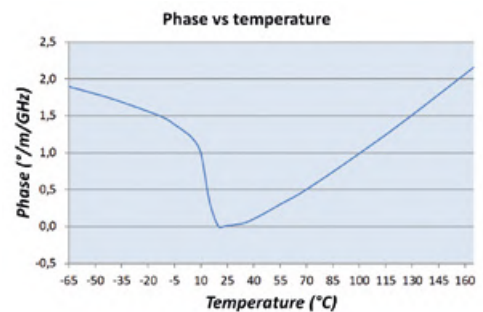


Coaxial cable construction

1. Core	Inner conductor	Solid Silver Plated Copper	-
	Dielectric	Celloflon® (Expanded PTFE)	-
2. Taped shield		Solid Silver Plated Copper	-
3. Braided shield		Solid Silver Plated Copper	-
4. Outer jacket		PFA (white)	3.16 mm

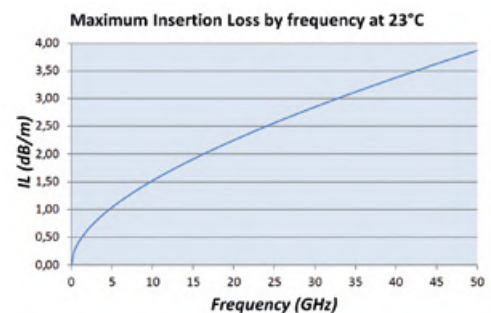
Coaxial cable characteristics

Max insertion loss at 50 GHz	3.87 dB/m
Characteristic impedance	$50 \pm 2 \Omega$
Capacitance	87 pF/m
Max mass	24 g/m
Min. bending radius for static applications	20 mm
Radiation resistance level	30 Mrad



Calculation of insertion loss

Frequency (GHz)	Nom. insertion loss (dB/m)	Max. insertion loss (dB/m)
$\alpha_{\max.}(F) = 0.43 \times \sqrt{F} + 0.0165 \times F$		
1	0.42	0.45
2	0.60	0.65
4	0.87	0.93
6	1.08	1.16
8	1.26	1.35
12	1.58	1.69
18	1.98	2.13
26.5	2.48	2.66
40	3.16	3.38
50	3.61	3.87



AXOSAT™

AXOSAT™ SC32SP

Coaxial cable assembly characteristics

Operating frequency	DC - 50 GHz	
Nom. Insertion Loss at 50 GHz (1m assembly, 2.4mm plug straight both ends)	4.04 dB	
Max. Insertion Loss at 50 GHz (1m assembly, 2.4mm plug straight both ends)	4.30 dB	
VSWR (1m assembly, 2.4mm plug straight both ends)	1.50 max @ 50 GHz	
	1.25 max @ 18 GHz	
Operating temperature	-55°/+150°C	
Shielding efficiency	90 dB up to 18 GHz	
Mission orbit		
	LEO 10 years	GEO 15 years
Assembly location Internal	✓	✓
Assembly location External	✓	No

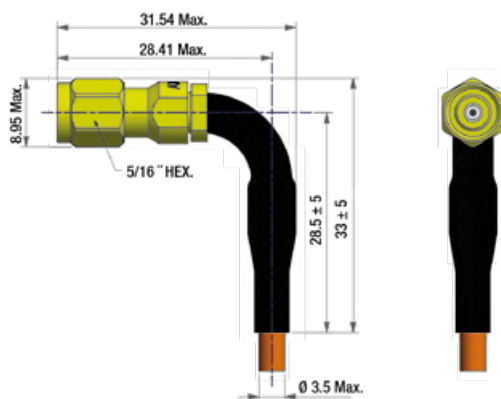
Available connectors

Up to 50 GHz:

Axon' space grade 2.4mm straight plug (Q10A)

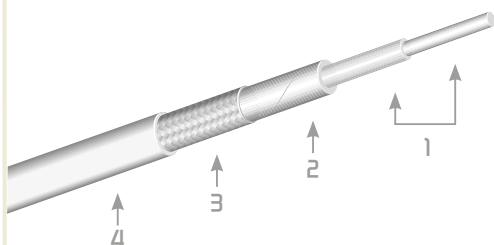


Axon' space grade 2.4mm swept plug (Q12A)



AXOSAT™

AXOSAT™ SL345Q (ESCC3408/003)



Coaxial cable construction

1. Core	Inner conductor	Solid Silver Plated Copper Clad Aluminium	-
	Dielectric	Celloflon® (Expanded PTFE)	-
2. Taped shield		Solid Silver Plated Copper	-
3. Braided shield		Solid Silver Plated Copper	-
4. Outer jacket		Polyimide tape + PEEK braid	3.37 mm

Coaxial cable characteristics

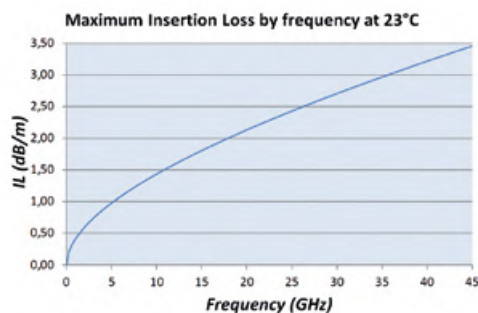
Max insertion loss at 45 GHz	3.45 dB/m
Characteristic impedance	$50 \pm 2 \Omega$
Capacitance	86 pF/m
Max mass	22 g/m
Min. bending radius for static applications	20 mm
Radiation resistance level	300 Mrad

Calculation of insertion loss

Frequency (GHz)	Nom. insertion loss (dB/m)	Max. insertion loss (dB/m)
-----------------	----------------------------	----------------------------

$$\alpha_{\max.}(F) = 0.401 \times \sqrt{F} + 0.017 \times F$$

1	0.39	0.42
2	0.56	0.61
4	0.81	0.87
6	1.01	1.09
8	1.19	1.28
12	1.49	1.60
18	1.88	2.01
26.5	2.35	2.82
40	3.01	3.22
45	3.24	3.45



AXOSAT™

AXOSAT™ SL345Q (ESCC3408/003)

Coaxial cable assembly characteristics

Operating frequency	DC - 45 GHz
Nom. Insertion Loss at 45 GHz (1m assembly, 2.4mm plug straight both ends)	3.64 dB
Max. Insertion Loss at 45 GHz (1m assembly, 2.4mm plug straight both ends)	3.85 dB
VSWR (1m assembly, 2.4mm plug straight both ends)	1.25 max.
Operating temperature	-55°/+125°C
Shielding efficiency	80 dB up to 18 GHz

Mission orbit

	LEO 10 years	GEO 15 years
Assembly location Internal	✓	✓
Assembly location External	No (ATOX erosion)	✓*

* under MLI, or with additional conductive layer to mitigate ESD issues

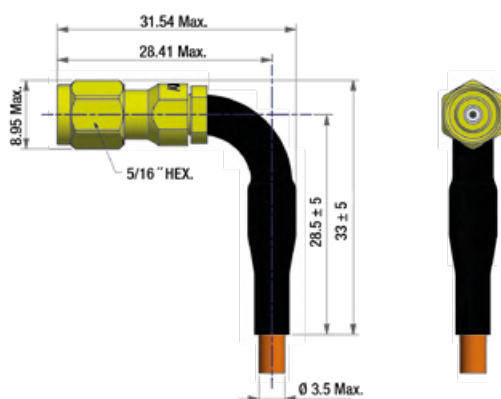
Available connectors

Up to 50 GHz:

Axon' space grade 2.4mm straight plug (Q10A)



Axon' space grade 2.4mm swept plug (Q12A)

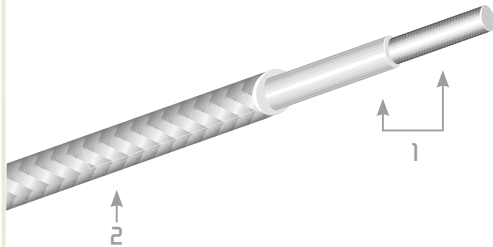


ESCC order code:

3408003	xx	xxxxx	/	x
Detail specification reference	Component Type Variant Number See § 1.4.2 of 3408/003	Total Length code (in mm)		Relative angle in the case of two swept connectors See § 1.6.1 of 3408/003



AXOSAT™ SH36SW (QFX141-S)

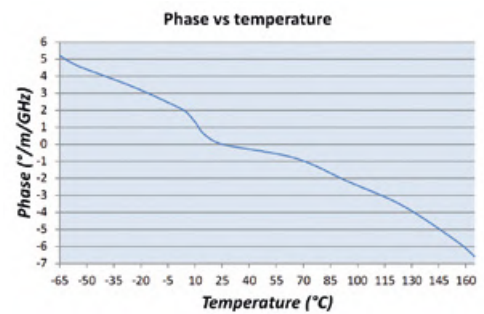


Coaxial cable construction

1. Core	Inner conductor	Solid Silver Plated Copper	-
	Dielectric	Solid PTFE	-
2. Braided shield		Tin soaked Silver Plated Copper	3.58 mm

Coaxial characteristics

Max insertion loss at 18 GHz	2.42 dB/m
Characteristic impedance	$50 \pm 2 \Omega$
Capacitance	97 pF/m
Max mass	44 g/m
Min. bending radius for static applications	20 mm
Radiation resistance level	Contact us

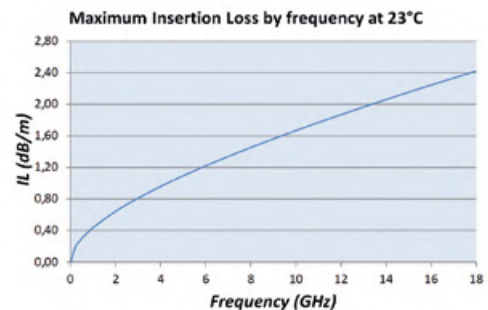


Calculation of insertion loss

Frequency (GHz)	Nom. insertion loss (dB/m)	Max. insertion loss (dB/m)
-----------------	----------------------------	----------------------------

$$\alpha_{\max.}(F) = 0.4 \times \sqrt{F} + 0.04 \times F$$

1	0.41	0.44
2	0.60	0.65
4	0.90	0.96
6	1.14	1.22
8	1.36	1.46
10	1.56	1.67
12	1.74	1.87
18	2.26	2.42



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AXOSAT™ SH36SW (QFX141-S)

Coaxial cable assembly characteristics

Operating frequency	DC – 18 GHz	
Nom. Insertion Loss at 18 GHz (1m assembly, SMA plug straight both ends)	2.50 dB	
Max. Insertion Loss at 18 GHz (1m assembly, SMA plug straight both ends)	2.70 dB	
VSWR (1m assembly, SMA plug straight both ends)	1.35 max. (DC-18GHz)	
Operating temperature	-55°/+150°C	
Shielding efficiency	90dB up to 18 GHz	
Mission orbit		
	LEO 10 years	GEO 15 years
Assembly location Internal	✓	✓
Assembly location External	✓	No

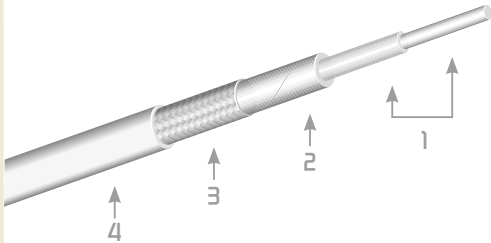
AXOSAT™

Available connectors

Up to 18 GHz:

SMA plug straight (S10E)	ESCC 3402/001 variant 02
SMA plug right angle (S11E)	ESCC 3402/001 variant 10
SMA jack straight (S20E)	ESCC 3402/002 variant 02/10/69
TNC plug straight (T10E)	ESCC 3402/008 variant 01
TNC jack straight (T20E)	ESCC 3402/009 variant 01
2.92mm plug straight (K10E)	ESCC 3402/021 variant 02
2.92mm jack straight (K20E)	ESCC 3402/022 variant 02

AXOSAT™ SC40MP



Coaxial cable construction

1. Core	Inner conductor	Stranded Silver Plated Copper	-
	Dielectric	Celloflon® (Expanded PTFE)	-
2. Taped shield		Solid Silver Plated Copper	-
3. Braided shield		Solid Silver Plated Copper	-
4. Outer jacket		PFA (white)	4.0 mm

Coaxial cable characteristics

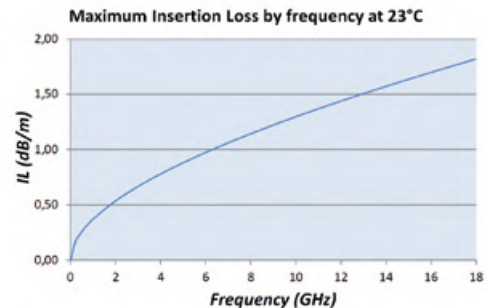
Max insertion loss at 18 GHz	1.83 dB/m
Characteristic impedance	$50 \pm 2 \Omega$
Capacitance	87 pF/m
Max mass	39 g/m
Min. bending radius for static applications	20 mm
Min. bending radius for dynamic applications	40 mm
Radiation resistance level	30 Mrad

Calculation of insertion loss

Frequency (GHz)	Nom. insertion loss (dB/m)	Max. insertion loss (dB/m)
-----------------	----------------------------	----------------------------

$$\alpha_{\max.}(F) = 0.357 \times \sqrt{F} + 0.017 \times F$$

1	0.35	0.38
2	0.50	0.54
4	0.73	0.79
6	0.91	0.98
8	1.07	1.15
12	1.35	1.45
18	1.71	1.83



AXOSAT™

AXOSAT™ SC40MP

Coaxial cable assembly characteristics

Operating frequency	DC - 18 GHz
Nom. Insertion Loss at 18 GHz (1m assembly, SMA plug straight both ends)	1.91 dB
Max. Insertion Loss at 18 GHz (1m assembly, SMA plug straight both ends)	2.08 dB
VSWR (1m assembly, SMA plug straight both ends)	1.25 max.
Operating temperature	-55°/+125°C
Shielding efficiency	90 dB up to 18 GHz

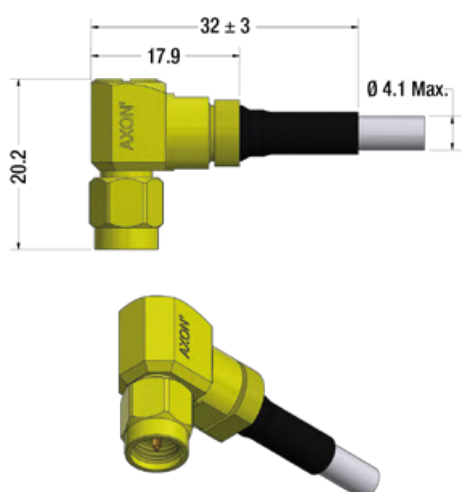
Mission orbit

	LEO 10 years	GEO 15 years
Assembly location Internal	✓	✓
Assembly location External	✓	No

Available connectors

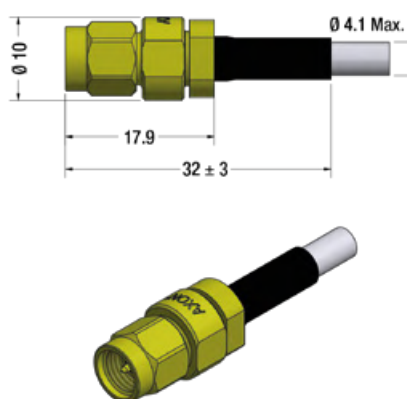
Up to 8.4 GHz:

Axon' SMA plug right angle (S11A)



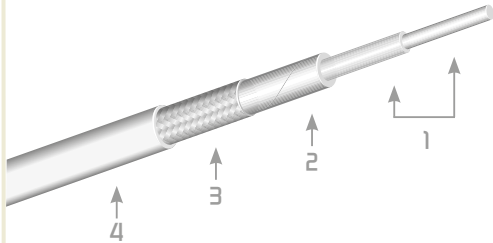
Up to 18 GHz:

Axon' space grade SMA straight plug (S10A)



AXOSAT™

AXOSAT™ SL445Q

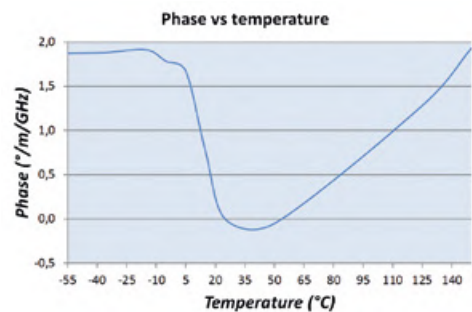


Coaxial cable construction

1. Core	Inner conductor	Solid Silver Plated Copper Clad Aluminium	-
	Dielectric	Celloflon® (Expanded PTFE)	-
2. Taped shield		Solid Silver Plated Copper	-
3. Braided shield		Solid Silver Plated Copper	-
4. Outer jacket		Polyimide tape + PEEK braid	4.35 mm

Coaxial cable characteristics

Max insertion loss at 32 GHz	1.91 dB/m
Characteristic impedance	$50 \pm 2 \Omega$
Capacitance	87 pF/m
Max mass	34 g/m
Min. bending radius for static applications	25 mm
Radiation resistance level	300 Mrad

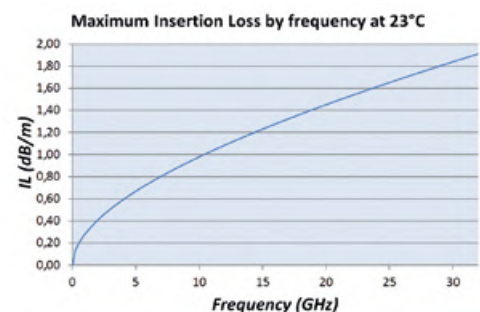


Calculation of insertion loss

Frequency (GHz)	Nom. insertion loss (dB/m)	Max. insertion loss (dB/m)
-----------------	----------------------------	----------------------------

$$\alpha_{\max.}(F) = 0.275 \times \sqrt{F} + 0.011 \times F$$

1	0.26	0.29
2	0.38	0.42
4	0.54	0.60
6	0.68	0.74
8	0.79	0.87
12	0.99	1.09
18	1.25	1.37
26.5	1.56	1.71
32	1.74	1.91



AXOSAT™

AXOSAT™ SL445Q

Coaxial cable assembly characteristics

Operating frequency	DC - 32 GHz
Nom. Insertion Loss at 32 GHz (1m assembly, 2.92mm plug straight both ends)	2.05 dB
Max. Insertion Loss at 32 GHz (1m assembly, 2.92mm plug straight both ends)	2.20 dB
VSWR (1m assembly, 2.92mm plug straight both ends)	1.25 max.
Operating temperature	-55°/+125°C
Shielding efficiency	80 dB up to 18 GHz

Mission orbit

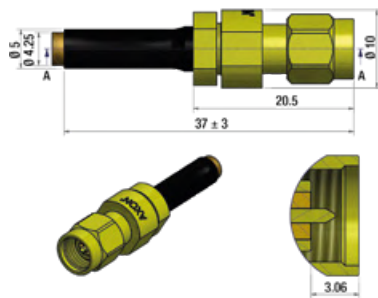
	LEO 10 years	GEO 15 years
Assembly location Internal	✓	✓
Assembly location External	No (ATOX erosion)	✓*

* under MLI, or with additional conductive layer to mitigate ESD issues

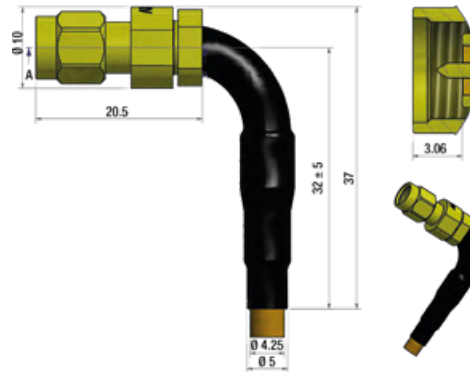
Available connectors

Up to 32 GHz:

Axon' space grade 2.92mm straight plug (K10A)

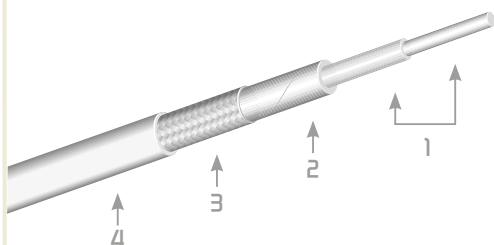


Axon' space grade 2.92mm swept plug (K12A)



AXOSAT™

AXOSAT™ SC46SP

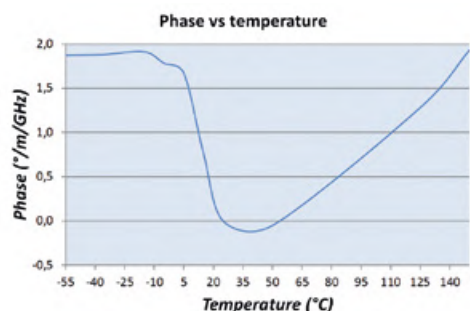


Coaxial cable construction

1. Core	Inner conductor	Solid Silver Plated Copper	-
	Dielectric	Celloflon® (Expanded PTFE)	-
2. Taped shield		Solid Silver Plated Copper	-
3. Braided shield		Solid Silver Plated Copper	-
4. Outer jacket		PFA (white)	4.60 mm

Coaxial cable characteristics

Max insertion loss at 32 GHz	1.82 dB/m
Characteristic impedance	$50 \pm 2 \Omega$
Capacitance	86 pF/m
Max mass	51 g/m
Min. bending radius for static applications	25 mm
Min. bending radius for dynamic applications	50 mm
Radiation resistance level	30 Mrad

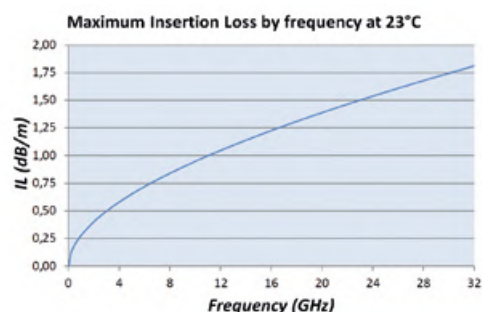


Calculation of insertion loss

Frequency (GHz)	Nom. insertion loss (dB/m)	Max. insertion loss (dB/m)
-----------------	----------------------------	----------------------------

$$\alpha_{\max.}(F) = 0.275 \times \sqrt{F} + 0.008 \times F$$

1	0.27	0.29
2	0.38	0.41
4	0.55	0.59
6	0.68	0.73
8	0.80	0.85
12	1.00	1.05
18	1.23	1.32
26.5	1.55	1.63
32	1.71	1.82



AXOSAT™

AXOSAT™ SC46SP

Coaxial cable assembly characteristics

Operating frequency	DC - 32 GHz
Nom. Insertion Loss at 32 GHz (1m assembly, 2.92 mm plug straight both ends)	2.00 dB
Max. Insertion Loss at 32 GHz (1m assembly, 2.92 mm plug straight both ends)	2.10 dB
VSWR (1m assembly, 2.92 mm plug straight both ends)	1.25 max
Operating temperature	-55°/+150°C
Shielding efficiency	90 dB up to 18 GHz

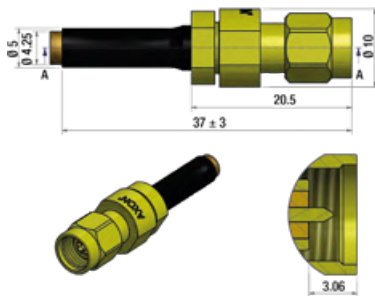
Mission orbit

	LEO 10 years	GEO 15 years
Assembly location Internal	✓	✓
Assembly location External	✓	No

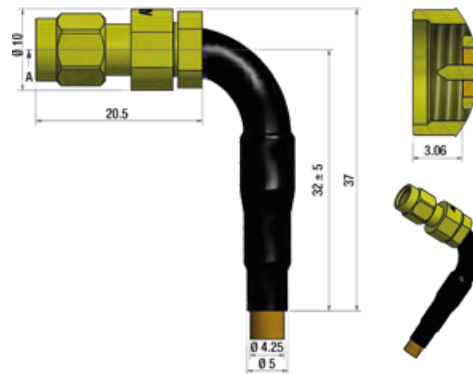
Available connectors

Up to 32 GHz:

Axon' space grade 2.92mm straight plug (K10A)

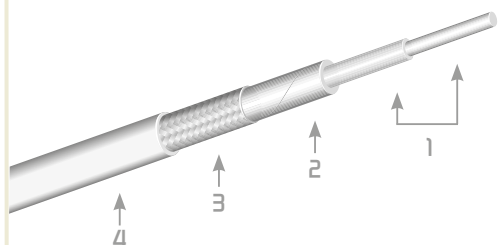


Axon' space grade 2.92mm swept plug (K12A)



AXOSAT™

AXOSAT™ SL515Q (5D-S LW PEEK)

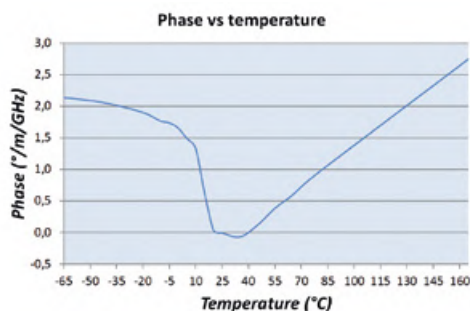


Coaxial cable construction SL515Q

1. Core	Inner conductor	Solid Silver Plated Copper Clad Aluminium	-
	Dielectric	Celloflon® (Expanded PTFE)	-
2. Taped shield		Silver Plated Copper	-
3. Braided shield		Silver Plated Aluminium	-
4. Outer jacket		Polyimide tape + Peek braid	5.12 mm

Coaxial cable characteristics

Max insertion loss at 26.5 GHz	1.35 dB/m
Characteristic impedance	$50 \pm 2 \Omega$
Capacitance	87 pF/m
Max mass	47 g/m
Min. bending radius for static applications	30 mm
Radiation resistance level	300 Mrad

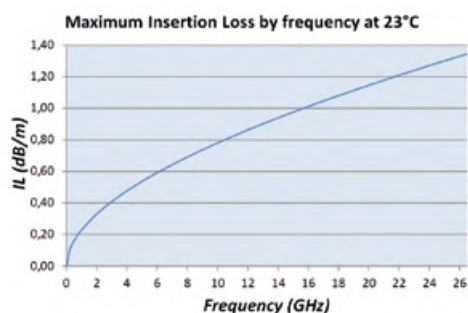


Calculation of insertion loss

Frequency (GHz)	Nom. insertion loss (dB/m)	Max. insertion loss (dB/m)
-----------------	----------------------------	----------------------------

$$\alpha_{\max} (F) = 0.225 \times \sqrt{F} + 0.007 \times F$$

1	0.22	0.24
2	0.31	0.34
4	0.45	0.48
6	0.55	0.60
8	0.65	0.70
12	0.81	0.87
18	1.01	1.09
26.5	1.26	1.35



AXOSAT™

AXOSAT™ SL51SQ (5D-5 LW PEEK)

Coaxial cable assembly characteristics

Operating frequency	DC – 26.5 GHz
Nom. Insertion Loss at 26.5 GHz (1m assembly, SMA plug straight both ends)	1.55 dB
Max. Insertion Loss at 26.5 GHz (1m assembly, SMA plug straight both ends)	1.70 dB
VSWR (1m assembly, 2.92 mm plug straight both ends)	1.25 max. (DC-18GHz) 1.35 max. (18-26.5GHz)
Operating temperature	-55°/+150°C
Shielding efficiency	90 dB up to 18 GHz

Mission orbit

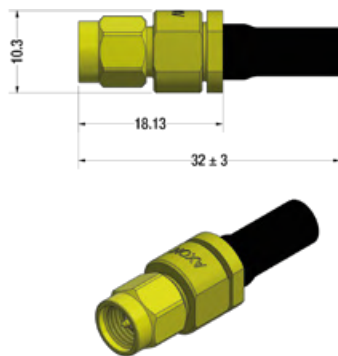
	LEO 10 years	GEO 15 years
Assembly location Internal	✓	✓
Assembly location External	No (ATOX erosion)	✓*

* under MLI, or with additional conductive layer to mitigate ESD issues

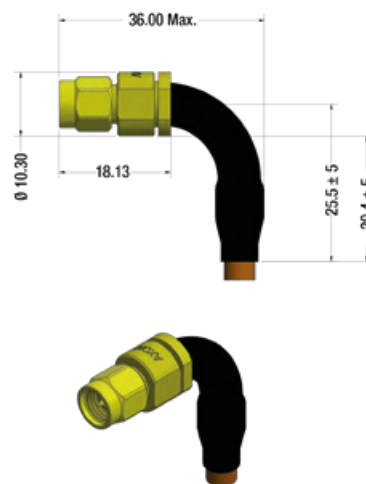
Available connectors

Up to 26.5 GHz:

Axon' space grade SMA straight plug (S10A)



Axon' space grade SMA swept plug (S12A)

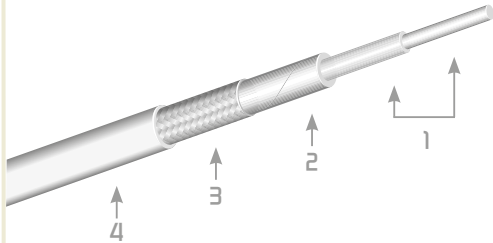


Up to 18 GHz:

SMA plug straight (S10E)	ESCC 3402/001 variant 29 + Axon' straight ferrule
SMA plug swept (S12E)	ESCC 3402/001 variant 29 + Axon' swept ferrule
TNC plug straight (T10E)	ESCC 3402/008 variant 03 + Axon' straight ferrule

AXOSAT™

AXOSAT™ SL53SP (5D-S LW)

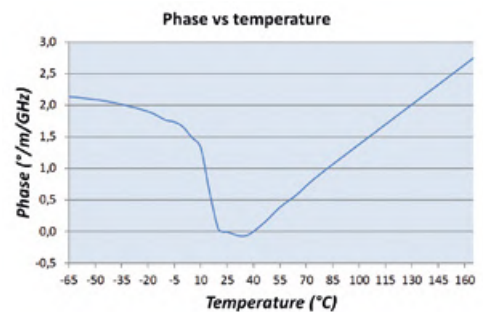


Coaxial cable construction

1. Core	Inner conductor	Solid Silver Plated Copper Clad Aluminium	-
	Dielectric	Celloflon® (Expanded PTFE)	-
2. Taped shield		Silver Plated Copper	-
3. Braided shield		Silver Plated Aluminium	-
4. Outer jacket		PFA (white)	5.28 mm

Coaxial cable characteristics

Max insertion loss at 26.5 GHz	1.35 dB/m
Characteristic impedance	$50 \pm 2 \Omega$
Capacitance	87 pF/m
Max mass	53 g/m
Min. bending radius for static applications	30 mm
Radiation resistance level	30 Mrad



Calculation of insertion loss

Frequency (GHz)	Nom. insertion loss (dB/m)	Max. insertion loss (dB/m)
-----------------	----------------------------	----------------------------

$$\alpha_{\max.}(F) = 0.225 \times \sqrt{F} + 0.007 \times F$$

1	0.22	0.24
2	0.31	0.34
4	0.45	0.48
6	0.55	0.60
8	0.65	0.70
12	0.81	0.87
18	1.01	1.09
26.5	1.26	1.35



AXOSAT™

AXOSAT™ SL53SP (5D-5 LW)

Coaxial cable assembly characteristics

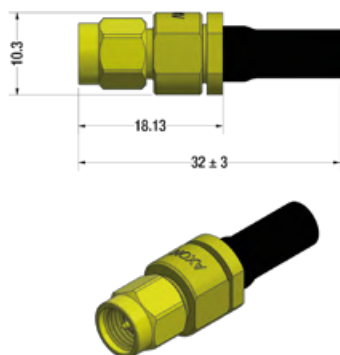
Operating frequency		DC – 26.5 GHz	
Nom. Insertion Loss at 26.5 GHz (1m assembly, SMA plug straight both ends)		1.55 dB	
Max. Insertion Loss at 26.5 GHz (1m assembly, SMA plug straight both ends)		1.70 dB	
VSWR (1m assembly, 2.92 mm plug straight both ends)		1.25 max. (DC-18GHz 1.35 max. (18-26.5GHz)	
Operating temperature		-55°/+150°C	
Shielding efficiency		90 dB up to 18 GHz	
Mission orbit			
		LEO 10 years	GEO 15 years
Assembly location	Internal	✓	✓
Assembly location	External	No (ATOX erosion)	✓*

* under MLI, or with additional conductive layer to mitigate ESD issues

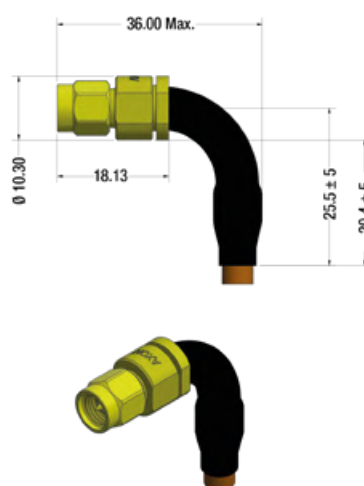
Available connectors

Up to 26.5 GHz:

Axon' space grade SMA straight plug (S10A)



Axon' space grade SMA swept plug (S12A)

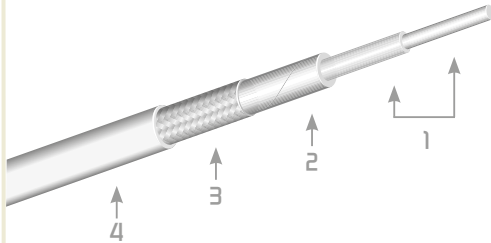


Up to 18 GHz:

SMA plug straight (S10E)	ESCC 3402/001 variant 29 + Axon' straight ferrule
SMA plug swept (S12E)	ESCC 3402/001 variant 29 + Axon' swept ferrule
TNC plug straight (T10E)	ESCC 3402/008 variant 03 + Axon' straight ferrule

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AXOSAT™ SL53SK (5D-S LW)

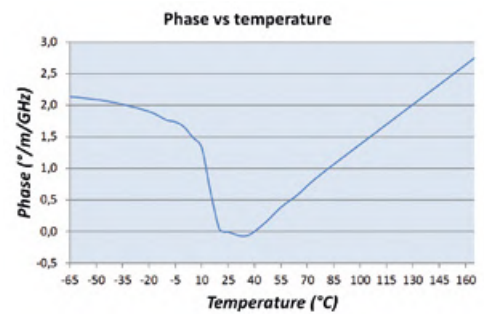


Coaxial cable construction

1. Core	Inner conductor	Solid Silver Plated Copper Clad Aluminium	-
	Dielectric	Celloflon® (Expanded PTFE)	-
2. Taped shield		Solid Silver Plated Copper	-
3. Braided shield		Silver Plated Aluminium	-
4. Outer jacket		FEP (blue)	5.30 mm

Coaxial cable characteristics

Max insertion loss at 26.5 GHz	1.35 dB/m
Characteristic impedance	$50 \pm 2 \Omega$
Capacitance	87 pF/m
Max mass	53 g/m
Min. bending radius for static applications	30 mm
Radiation resistance level	20 Mrad

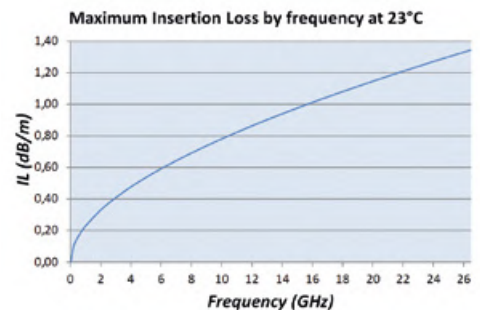


Calculation of insertion loss

Frequency (GHz)	Nom. insertion loss (dB/m)	Max. insertion loss (dB/m)
-----------------	----------------------------	----------------------------

$$\alpha_{\max.}(F) = 0.225 \times \sqrt{F} + 0.007 \times F$$

1	0.22	0.24
2	0.31	0.34
4	0.45	0.48
6	0.55	0.60
8	0.65	0.70
12	0.81	0.87
18	1.01	1.09
26.5	1.26	1.35



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AXOSAT™ SL53SK (5D-5 LW)

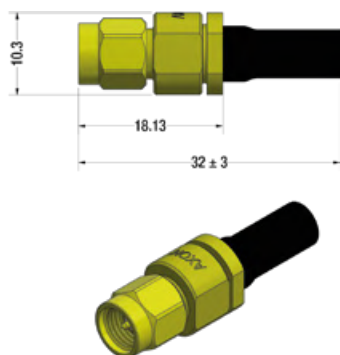
Coaxial cable assembly characteristics

Operating frequency		DC – 26.5 GHz	
Nom. Insertion Loss at 26.5 GHz (1m assembly, SMA plug straight both ends)		1.55 dB	
Max. Insertion Loss at 26.5 GHz (1m assembly, SMA plug straight both ends)		1.70 dB	
VSWR (1m assembly, 2.92 mm plug straight both ends)		1.25 max. (DC-18GHz 1.35 max. (18-26.5GHz)	
Operating temperature		-55/+150°C	
Shielding efficiency		90 dB up to 18 GHz	
Mission orbit			
		LEO 10 years	GEO 15 years
	Assembly location Internal	✓	✓
	Assembly location External	✓	No

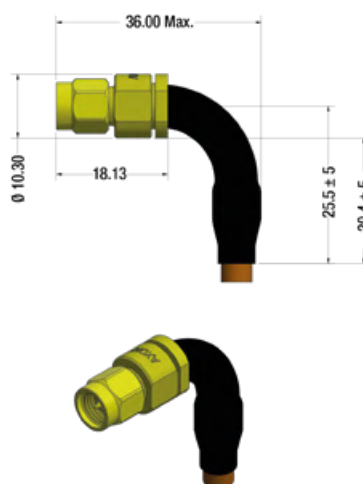
Available connectors

Up to 26.5 GHz:

Axon' space grade SMA straight plug (S10A)



Axon' space grade SMA swept plug (S12A)

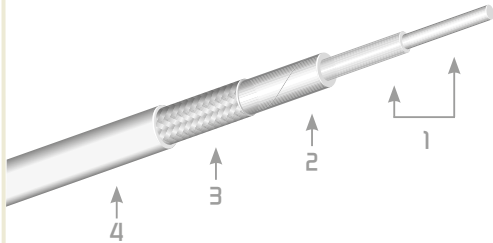


Up to 18 GHz:

SMA plug straight (S10E)	ESCC 3402/001 variant 29 + Axon' straight ferrule
SMA plug swept (S12E)	ESCC 3402/001 variant 29 + Axon' swept ferrule
TNC plug straight (T10E)	ESCC 3402/008 variant 03 + Axon' straight ferrule

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AXOSAT™ SC54SP (5D-5)

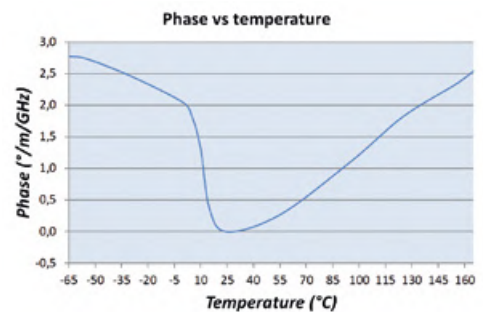


Coaxial cable construction

1. Core	Inner conductor	Solid Silver Plated Copper	-
	Dielectric	Celloflon® (Expanded PTFE)	-
2. Taped shield		Silver Plated Copper	-
3. Braided shield		Silver Plated Copper	-
4. Outer jacket		PFA (blue)	5.40 mm

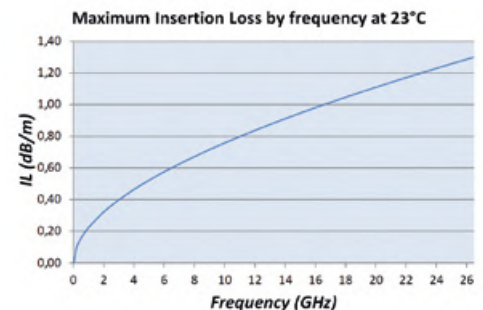
Coaxial cable characteristics

Max insertion loss at 26.5 GHz	1.30 dB/m
Characteristic impedance	$50 \pm 2 \Omega$
Capacitance	87 pF/m
Max mass	70 g/m
Min. bending radius for static applications	30 mm
Radiation resistance level	30 Mrad



Calculation of insertion loss

Frequency (GHz)	Nom. insertion loss (dB/m)	Max. insertion loss (dB/m)
$\alpha_{\max.}(F) = 0.22 \times \sqrt{F} + 0.0063 \times F$		
1	0.21	0.23
2	0.30	0.33
4	0.43	0.47
6	0.54	0.58
8	0.63	0.68
12	0.78	0.84
18	0.98	1.05
26.5	1.21	1.30



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AXOSAT™ SC54SP (5D-S)

Coaxial cable assembly characteristics

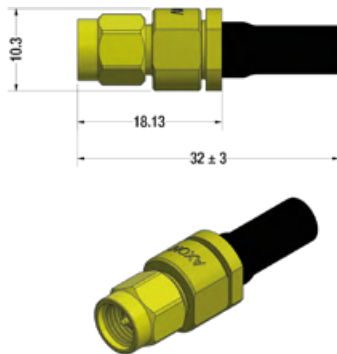
Operating frequency	DC – 26.5 GHz	
Nom. Insertion Loss at 26.5 GHz (1m assembly, SMA plug straight both ends)	1.50 dB	
Max. Insertion Loss at 26.5 GHz (1m assembly, SMA plug straight both ends)	1.65 dB	
VSWR (1m assembly, SMA plug straight both ends)	1.25 max. (DC-18GHz) 1.35 max. (18-26.5GHz)	
Operating temperature	-55°/+150°C	
Shielding efficiency	90 dB up to 18 GHz	
Mission orbit		
	LEO 10 years	GEO 15 years
Assembly location Internal	✓	✓
Assembly location External	✓	No

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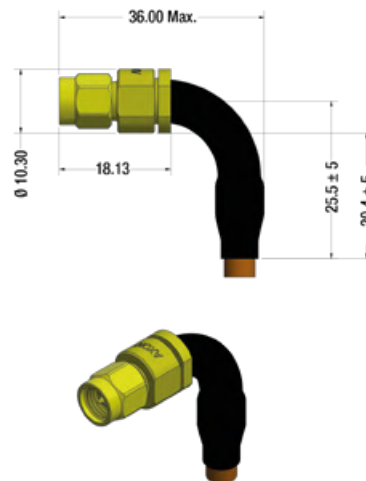
Available connectors

Up to 26.5 GHz:

Axon' space grade SMA straight plug (S10A)



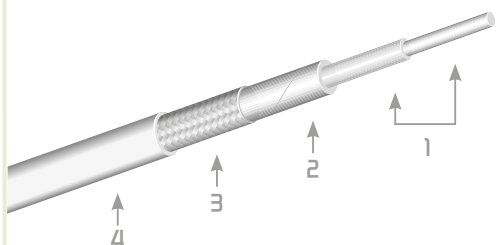
Axon' space grade SMA swept plug (S12A)



Up to 18 GHz:

SMA plug straight (S10E)	ESCC 3402/001 variant 29 + Axon' straight ferrule
SMA plug swept (S12E)	ESCC 3402/001 variant 29 + Axon' swept ferrule
TNC plug straight (T10E)	ESCC 3402/008 variant 03 + Axon' straight ferrule

AXOSAT™ SC54SK (5D-S)

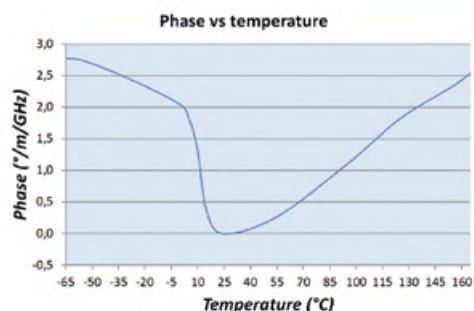


Coaxial cable construction

1. Core	Inner conductor	Solid Silver Plated Copper	-
	Dielectric	Celloflon® (Expanded PTFE)	-
2. Taped shield		Silver Plated Copper	-
3. Braided shield		Silver Plated Copper	-
4. Outer jacket		FEP (blue)	5.40 mm

Coaxial cable characteristics

Max insertion loss at 26.5 GHz	1.30 dB/m
Characteristic impedance	$50 \pm 2 \Omega$
Capacitance	87 pF/m
Max mass	70 g/m
Min. bending radius for static applications	30 mm
Radiation resistance level	20 Mrad

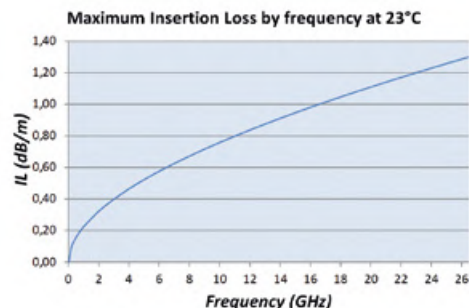


Calculation of insertion loss

Frequency (GHz)	Nom. insertion loss (dB/m)	Max. insertion loss (dB/m)
-----------------	----------------------------	----------------------------

$$\alpha_{\max.}(F) = 0.22 \times \sqrt{F} + 0.0063 \times F$$

1	0.21	0.23
2	0.30	0.33
4	0.43	0.47
6	0.54	0.58
8	0.63	0.68
12	0.78	0.84
18	0.98	1.05
26.5	1.21	1.30



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AXOSAT™ SC54SSK (5D-S)

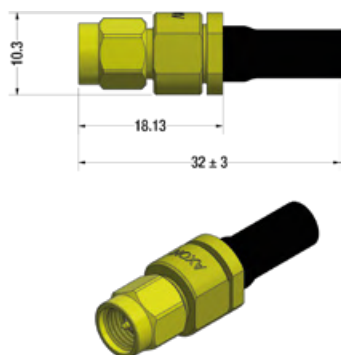
Coaxial cable assembly characteristics

Operating frequency		DC – 26.5 GHz	
Nom. Insertion Loss at 26.5 GHz (1m assembly, SMA plug straight both ends)		1.50 dB	
Max. Insertion Loss at 26.5 GHz (1m assembly, SMA plug straight both ends)		1.65 dB	
VSWR (1m assembly, SMA plug straight both ends)		1.25 max. (DC-18GHz 1.35 max. (18-26.5GHz)	
Operating temperature		-55°/+150°C	
Shielding efficiency		90 dB up to 18 GHz	
Mission orbit			
		LEO 10 years	GEO 15 years
Assembly location	Internal	✓	✓
Assembly location	External	✓	No

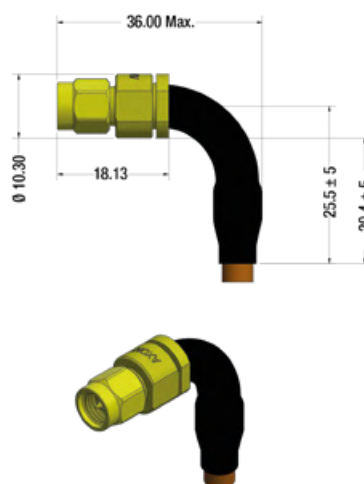
Available connectors

Up to 26.5 GHz:

Axon' space grade SMA straight plug (S10A)



Axon' space grade SMA swept plug (S12A)



Up to 18 GHz:

SMA plug straight (S10E)	ESCC 3402/001 variant 29 + Axon' straight ferrule
SMA plug swept (S12E)	ESCC 3402/001 variant 29 + Axon' swept ferrule
TNC plug straight (T10E)	ESCC 3402/008 variant 03 + Axon' straight ferrule

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