



Cables & Harnesses

FOR SPACE APPLICATIONS



MIL-STD-1553B DATABUS HARNESSSES

AXOBUS® HARNESS

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MICROCOUPLER

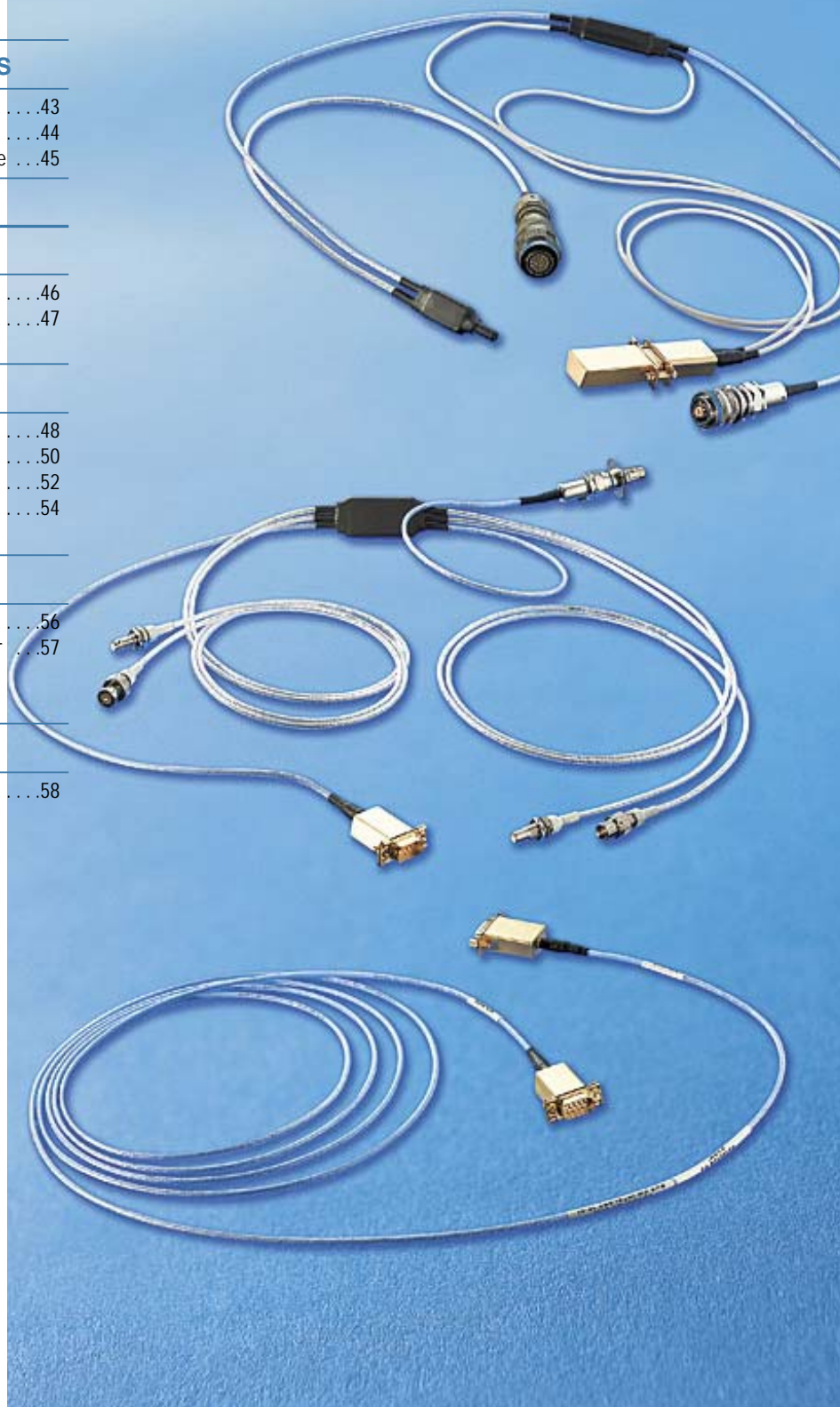
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AXON' databus harnesses and components

- The general identification code shows our commercial part numbers and the way in which to order in-line couplers with cable length (page 44) & terminators with cable length (page 45).

Note

- You must choose AMB/S for space use but all the versions are identified.
- You should consult us if you need a harness design. Axon' will allocate a study number and, when ready to manufacture, a plan number for ordering for each harness.

- Following on the different versions of databus cables are on pages 46 & 47. Those which are currently used for space are identified with "S" in the table.

Note

- There are different gauge available - AWG 2219, AWG 2419 (the most commonly used) and AWG 2619. The conductor area might be critical to the program. We have a light version of the cables.
- you can have several versions of shields giving different level of electromagnetic efficiency.

- The coupler and terminator specifications give a lot of technical data to help characterise the products. All of them are for space use. Please study carefully to ensure the best solution for your routing (number of stubs, PCB routing, integrated terminators...).

- To finish, some accessories such as removable terminators (77 Ohms in a space approved connector with or without ESD protection) and splices.

- For aeronautic programs we have developed many different products which are not included in this brochure (such as couplers with relays, box couplers, databus connectors, etc) Please don't hesitate to contact us if you have a specific need.

We have also specific product developed for the International Space Station (ISS) under SSQ specification.



AXOBUS[®] HARNESS

Identification code for space & aeronautics applications

AMB / S - C_x - XX - XX ^ XX-XX

AXON' MICROBUS

- AERONAUTICS VERSION **A**
- EUROFIGTHER VERSION **E**
- SPACE VERSION **S**

- C1 : SINGLE MICROCOUPLER with bus lines on opposite sides of the coupler
- C11 : SINGLE MICROCOUPLER with bus lines on same side of the coupler
- C2 : DOUBLE MICROCOUPLER with bus lines on opposite sides of the coupler
- C21 : DOUBLE MICROCOUPLER with bus lines on same side of the coupler
- C3 : 3 STUB MICROCOUPLER with bus lines on opposite sides of the coupler
- C31 : 3 STUB MICROCOUPLER with bus lines on same side of the coupler
- C4 : 4 STUB MICROCOUPLER with bus lines on opposite sides of the coupler
- C41 : 4 STUB MICROCOUPLER with bus lines on same side of the coupler

CABLE REFERENCES

(See cable construction page 47)

- 10 = TWINAX BUS 10 AWG24 SB [SINGLE BRAID] according to MIL-C17/176-00002 **A**
- 20 = TWINAX BUS 20 AWG24 SB [SINGLE BRAID] accord. to pr EN 3375-003 **A**
- 21 = TWINAX BUS 21 AWG24 DB [DOUBLE BRAID] accord. to pr EN 3375-004 **A**
- 22 = TWINAX BUS 22 AWG24 HI [HIGH IMMUNITY] accord. to pr EN 3375-005 **A**
- 31 = TWINAX BUS 31 AWG24 DB [DOUBLE BRAID] according to PAN6421 **E**
- 40 = TWINAX BUS 40 AWG24 SB [SINGLE BRAID] according to SSQ 21655 Rev. E **S**
- 41 = TWINAX BUS 41 AWG 24 DB [DOUBLE BRAID] **S**
- 43 = TWINAX BUS 43 AWG 26 SB [SINGLE BRAID] **S**
- 44 = TWINAX BUS 44 AWG26 DB [DOUBLE BRAID] **S**
- 45 = TWINAX BUS 45 AWG22 SB [SINGLE BRAID] according to SSQ 21655 Rev. E **S**
- 60 = TWINAX BUS 60 AWG24 SB [SINGLE BRAID] **A**
- 61 = TWINAX BUS 61 AWG24 DB [DOUBLE BRAID] **A**
- 70 = TWINAX BUS 70 AWG26 SB [SINGLE BRAID] **A**
- 71 = TWINAX BUS 71 AWG26 DB [DOUBLE BRAID] according to ECS 0700 **A**
- 72 = TWINAX BUS 72 AWG26 HI [HIGH IMMUNITY] **A**

CABLE LENGTH (in meters)

COLOUR OF THE BUS LINE

- H = blue
- L = white

COLOUR OF THE STUB LINE

- H = blue
- L = white
- HS = blue with black stripes
- LS = white with blue stripes

INTEGRATED TERMINATOR

- TL = Terminator on left side of coupler
- TR = Terminator on right side of coupler
- = No terminator
- TT** = Terminator on both sides

ATTENTION : please see the technical data sheets to verify the compatibility between the coupler version, cable type and cable colour. Also, verify the existence of the coupler and the colour of the cable.



AXOBUS[®] HARNESS

Terminator identification code for space & aeronautics applications

AMB / S- I - XX - XX ^ XX

AXON MICROBUS

AERONAUTICS VERSION **A**
EUROFIGHTER VERSION **E**
SPACE VERSION **S**

IN LINE BUS TERMINATOR

CABLE REFERENCES

(See cable specifications page 46)

- 10 = TWINAX BUS 10 AWG24 SB [SINGLE BRAID] according to MIL-C17/176-00002 **A**
- 20 = TWINAX BUS 20 AWG24 SB [SINGLE BRAID] according to PR EN 3375-003 **A**
- 21 = TWINAX BUS 21 AWG24 DB [DOUBLE BRAID] according to PR EN 3375-004 **A**
- 22 = TWINAX BUS 22 AWG24 HI [HIGH IMMUNITY] according to PR EN 3375-005 **A**
- 31 = TWINAX BUS 31 AWG24 DB [DOUBLE BRAID] according to PAN6421 **E**
- 40 = TWINAX BUS 40 AWG24 SB (single braid) according to SSQ 21655 Rev. E **S**
- 41 = TWINAX BUS 41 AWG 24 DB [DOUBLE BRAID] **S**
- 43 = TWINAX BUS 43 AWG 26 SB [SINGLE BRAID] **S**
- 44 = TWINAX BUS 44 AWG26 DB [DOUBLE BRAID] **S**
- 45 = TWINAX BUS 45 AWG22 SB [SINGLE BRAID] according to SSQ 21655 Rev. E **S**
- 60 = TWINAX BUS 60 AWG24 SB [SINGLE BRAID] **A**
- 61 = TWINAX BUS 61 AWG24 DB [DOUBLE BRAID] **A**
- 70 = TWINAX BUS 70 AWG26 SB [SINGLE BRAID] **A**
- 71 = TWINAX BUS 71 AWG26 DB [DOUBLE BRAID] according to ECS 0700 **A**
- 72 = TWINAX BUS 72 AWG26 HI [HIGH IMMUNITY] **A**

CABLE LENGTH (in meters)

COLOUR OF CABLE

H = blue

L = white

HS = blue with black stripes

LS = white with blue stripes

AXOBUS[®] CABLE

SPECIFICATIONS

MIL-STD-1553B
MIL-C-17/176-00002
pr EN 3375
PANAVIA 6421
ECS 0700
SSQ 21655

Operating temperature : -90°C to +200°C
(ambient and peak temperature)

Characteristic impedance : $77 \pm 7 \Omega$ at 1 MHz
($77 \pm 3 \Omega$ at 1 MHz for TWINAX BUS cable 31).

Linear capacitance between wires : see table on next page.



Type A (*)



Type B (*)



Type C (*)

(*) : See cable type in the chart on the next page

Special cable versions

- Supplementary jacket or protection on the jacket.
- Insertion of the Bus cables inside a complex round construction.
- In some cases possibility to differentiate Bus and Stub cable with a striped colour tape under the transparent jacket or the extrusion of a colour jacket.

Transfer impedance standard values $m\Omega/m$ max.

TYPE OF CABLE	CONSTRUCTION	FREQUENCY			
		0 Hz	1 MHz	10 MHz	30 MHz
TWINAX BUS 10	A	30	40	100	200
TWINAX BUS 20	A	45	45	45	100
TWINAX BUS 21	B	15	5	5	10
TWINAX BUS 22	C	15	2.5	2.5	0.1
TWINAX BUS 31 or 61	B	20	10	10	10
TWINAX BUS 40	A	30	40	100	200
TWINAX BUS 41	B	15	5	5	10
TWINAX BUS 43 or 70	A	100	100	100	100
TWINAX BUS 44 or 71	B	30	30	15	15

Note : The transfer impedance values of the TWINAX BUS 20, 21, 22 and 31 cables are specified in the corresponding standards.
The values of the other cable types are guaranteed by AXON'.



Cable construction

PRODUCT DESIGNATION	VERSIONS	SPECIFICATION	CABLE		PRIMARY WIRE			SHIELD NOM. Ø	BRAID & TAPE MATERIAL	OUTER JACKET	INSULATED CABLE		CAPA- CITY pF/m
			TYPE	AWG	CONDUCTOR MATERIALS AND CONSTRUCTION	DIELECTRIC AND FILLER MATERIALS	OUTER DIAM. (mm)				WEIGHT (g/m)		
TWINAX BUS 10 P 502810	A	MIL-STD-1553B MIL-C-17/176-00002	A	24	SPC alloy 19 x 0.127 mm	Extruded PTFE	2.60	Single braid : SPC alloy	PFA	3.15 to 3.40	26.80 nom.	< 78.75	
TWINAX BUS 20 P 502805	A	MIL-STD-1553B NF-L-52161-1 pr EN 3375-003	A	24	SPC alloy 19 x 0.120 mm	Extruded PTFE	2.58	Single braid : SPC	FEP	3.10 to 3.30	24.00 nom.	< 78.75	
TWINAX BUS 21 P 512806	A	MIL-STD-1553B NF-L-52161-2 pr EN 3375-004	B	24	SPC alloy 19 x 0.120 mm	Extruded PTFE	3.00	Double braid : SPC	FEP	3.60 to 3.80	37.00 nom.	< 78.75	
TWINAX BUS 22 P 512807	A	MIL-STD-1553B NF-L-52161-3 pr EN 3375-005	C	24	SPC alloy 19 x 0.120 mm	Extruded PTFE	3.10	Double braid : SPC - High magnetic per- meability tape	FEP	3.70 to 3.90	43.30 nom.	< 78.75	
TWINAX BUS 31 PANAVIA BUS P 507991	E	MIL-STD-1553B PAN 6421	B	24	SPC alloy 19 x 0.118 mm	Polyimide tape and PTFE filler	3.14	Double braid : SPC	FEP	3.50 to 3.80	29.00 max.	< 98.40	
TWINAX BUS 40 BUS BOEING/NASA NDBC-TFE-24S2SJ-75 P 512296	S	MIL-STD-1553B SSQ 21655 Rev. E	A	24	SPC alloy 19 x 0.127 mm Silver plating 2mm	Extruded PTFE	2.58	Single braid : SPC alloy Silver plating 2mm	FEP	3.175 to 3.37	21.50 nom.	< 80	
TWINAX BUS 41	S	MIL-STD-1553B	B	24	SPC alloy 19 x 0.120 mm Silver plating 2mm	Extruded PTFE	3.00	Double braid : SPC Silver plating 2mm	FEP	3.60 to 3.80	37.00 nom.	< 78.75	
TWINAX BUS 43	S	MIL-STD-1553B	A	26*	SPC 19 x 0.102 mm Silver plating 2mm	Extruded PTFE	2.05	Single braid : SPC Silver plating 2mm	FEP	2.40 to 2.60	14.60 nom.	< 78.75	
TWINAX BUS 44 P530781	S	MIL-STD-1553B	B	26*	SPC 19 x 0.102 mm Silver plating 2mm	Extruded PTFE	2.40	Double braid : SPC Silver plating 2mm	FEP	2.80 to 3.00	21.00 max.	< 80	
TWINAX BUS 45 BUS BOEING/NASA NDBC-TFE-22S2SJ-75 P 812302	S	MIL-STD-1553B SSQ 21655 Rev. E	A	22*	SPC alloy 19 x 0.16 mm Silver plating 2mm	CELLOFLON® expanded PTFE	3.09	Single braid : SPC alloy Silver plating 2mm	FEP	3.76 to 4.06	27.70 nom.	< 80	
TWINAX BUS 60 P 819845	A	MIL-STD-1553B	A	24	SPC 19 x 0.127 mm	CELLOFLON® expanded PTFE	2.41	Single braid : SPC	FEP	2.90 to 3.10	18.00 nom.	< 70.00	
TWINAX BUS 61 P 815721	A	MIL-STD-1553B	B	24	SPC 19 x 0.127 mm	CELLOFLON® expanded PTFE	2.76	Double braid : SPC	FEP	3.10 to 3.30	24.00 nom.	< 70.00	
TWINAX BUS 70 P 504621	A	MIL-STD-1553B	A	26*	SPC 19 x 0.102 mm	Extruded PTFE	2.05	Single braid : SPC	FEP	2.40 to 2.60	14.60 nom.	< 78.75	
TWINAX BUS 71 P 517417	A	MIL-STD-1553B ECS 0700	B	26*	SPC 19 x 0.102 mm	Extruded PTFE	2.40	Double braid : SPC	FEP	2.80 to 3.00	21.00 max.	< 80	
TWINAX BUS 72 P511981	A	MIL-STD-1553B	C	26	SPC 19 x 0.102 mm	Extruded PTFE	2.45	Double braid : SPC -High magnetic per- meability tape	FEP	2.90 to 3.10	25.00 nom.	< 80	

Other cables on request.

SPC : Silver Plated Copper - * In case of AWG26 or AWG22 cable, please ask AXON® for compatibility with crimp connectors.



Single inline microcoupler

SPECIFICATIONS

Microcoupler
 MIL-STD-1553B (STANAG 3838)
 SSQ 21676 (NASA-BOEING)
 PID (CNES), SPE-J-403-A-0070

Testing
 AS-SAE-4115

Resistor
 ESA-ESCC-4002/005,
 or MIL-R-39007

Solder
 ESA-ECSS-Q-70-08,
 MIL-STD-2000,NHB 5300.4.

Derating
 ESA PSS-01-301

Potting material
 ESA-ECSS-Q-70-02, ASTM E595,
 and ESA-ECSS-Q-70-29
 or NHB 8060.1.

Connector assemblies
 ESA-ECSS-Q-70-26
 or NHB 5300.4.

Transformer
 JN1081 approved
 DDP-J-403-A-022
 ESA approved (COF-BCS-PAD01)

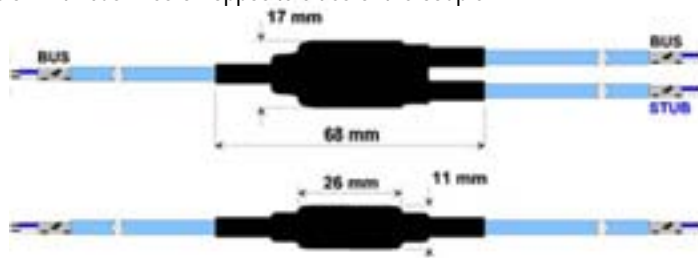
All processes, materials and components are approved by CNES (see CNES-PID-02-AXON') and BOEING/NASA.

AMB / S - C1 - XX

AMB / S - C11 - XX

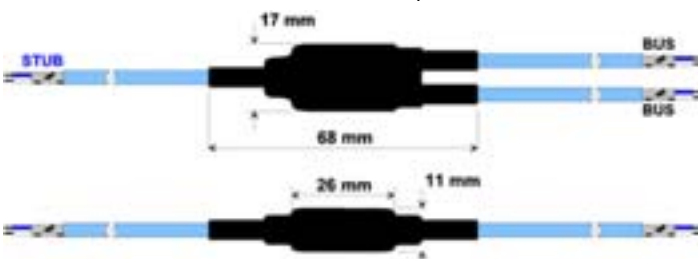
AMB / S - C1 - XX

Version with bus lines on opposite sides of the coupler.



AMB / S - C11 - XX

Version with bus lines on same side of the coupler.

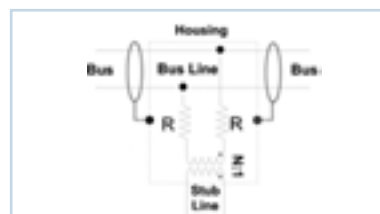


Electrical scheme

$N = 1,41 \pm 3\%$

$R = \text{fault Protection Resistance}$

$R = 0.75 Z_0 = 57,6 \Omega \pm 1\%$



Identification code

AMB /	S	CX	XX
AXON' MICROBUS (see complete reference of the coupler on Bus Standard sheet).	S : SPACE VERSION	1 : SINGLE MICROCOUPLER Version with bus lines on opposite sides of the coupler. 11 : SINGLE MICROCOUPLER Version with bus lines on same side of the coupler.	CABLE REFERENCES 40 = TWINAX BUS AWG 24 SB (single braid) according to SSQ 21655 (NASA qualified). 41 = TWINAX BUS AWG 24 DB (double braid) 43 = TWINAX BUS AWG 26 SB (single braid) 44 = TWINAX BUS AWG 26 DB (double braid) 45 = TWINAX BUS AWG 22 SB (double braid) according to SSQ 21655 (NASA qualified).

Note : CABLE LENGTH AND CABLE COLOUR TO BE DEFINED WHEN ORDERING (possibility to differentiate Bus and Stub cable with a striped colour tape under the transparent jacket or the extrusion of a colour jacket). Possibility to integrate terminator in the couplers.



AMB / S - C1 - XX

AMB / S - C11 - XX

Electrical characteristics

PARAMETERS	REQUIRED	ACTUAL
Nominal line impedance *	70 to 84	77
Turns ratio	1.41 ± 3 %	1.41 ± 3 %
CMR	< -45 dB at 1 MHz	< -50 dB at 1 MHz
Input impedance	> 3000 Ω in the frequency range (75 KHz to 1 MHz) and in the indicated temp. range (-65°C to 150°C)	> 3000 Ω
Fault protection insulation resistors in series on each bus winding connection	0.75 Zo ± 2 %	57.6 Ω +/- 1 %
Insulation resistance between : bus / stub inner wires / shield	100 MΩ 100 MΩ	> 1 000 MΩ at 250 VDC > 1 000 MΩ at 500 VDC
Transfer impedance	-	plot available
Shield continuity	-	10 mΩ max.
Shield coverage	Cable 90 % Connection 75 %	Cable 90 % min. Connection 100 %
Dielectric withstanding strength : between shield and inner wires between outer insulation and shield	- -	500 Vrms 500 Vrms

* Impedance : seen from the stub when the Bus line is loaded with Zo at both sides of the coupler.

Environmental characteristics

PARAMETERS	REQUIRED	ACTUAL
Operating temperature	-	-65° to + 150°C
Out-gassing	SP-R-0022 - TML <1 % ASTM-E-595 - CVCM < 0.1 % ESA-ECSS-Q-70-02	TML = 0.0005 %, CVCM = 0 % WVR = 0.00023 % and RML = 0.00027 %
Off-gassing	NHB 8060.1 Test 7 ESA-ECSS-Q-70-29	T = 0.00024 for 65 m³ volume per coupler MLW (#) = 2112 for 65 m³ volume
MTBF according to MIL HDBK-217	-	7.20 x 10⁷ hrs at 25°C and SF environment

Out and Off-gassing results, flammability available for all materials used.

Mechanical characteristics

PARAMETERS	REQUIRED	ACTUAL
Weight	-	10 g
Life test	-	1 000 hrs. at 120°C
Shocks	-	15g's in all directions
Acceleration	-	20 g's in all directions
Random vibrations	-	Wo = 0.2 g² / Hz (functional at 120°) Wo = 0.83 g² / Hz (endurance)

OTHER MECHANICAL AND ENVIRONMENTAL TESTS AVAILABLE ON REQUEST.

Transformer characteristics

PARAMETERS	REQUIRED VALUES BY MIL-STD-1553 STANDARD or SAE AS 4117	NOMINAL VALUE OR AXON' REQUIRED VALUE	
		NOMINAL	REQUIRED BY AXON' / QUALITY PLAN
The Curie point	-	-	Over 195° C
Primary DC resistance	-	Rp = 3 Ω	Rp < 3.5 Ω
Secondary C resistance	Rs < 5 Ω	Rs = 2 Ω	Rs < 2.5 Ω
Insulation resistance (winding to winding)	Ri > 100 MΩ	-	Ri > 1 000 MΩ with 250 VDC test
Transformer open circuit impedance	[Z] > 3 kΩ from 75KHz to 1MHz (tested with a 1 Vrms sine wave)	at T = 25° C [Z] > 10 kΩ from 75KHz to 1 MHz at T = -65° C [Z] > 4.8 kΩ from 75KHz to 1 MHz at T = -85° C [Z] > 4 kΩ from 75 kHz to 1 MHz	[Z] > 10 kΩ from 75 KHz to 1 MHz @ = 25° C***
Primary parallel inductance	-	22 mH	> 20 mH
Primary parallel capacitance	-	10 pF	< 12 pF
Inter-winding capacitance	-	45 pF	-
Primary leakage inductance	-	-	< 6.0 μH
Droop *	< 20 %	4.5 % **	< 20 % **
Overshoot and ringing *	± 1 V	0.30 V**	< ± 1 V**

* Tested with a 250 kHz square wave of 27 Vpp with 100ns rise and fall times through a 360 ± 5 % Ω resistor.

** Average values taken during the JN 1081N qualification.

*** 10 kΩ @ T = 25°C guarantees 3 KΩ from T = -65°C to T = 150°C



Double inline microcoupler

SPECIFICATIONS

Microcoupler

MIL-STD-1553B (STANAG 3838)
 SSQ 21676 (NASA-BOEING)
 PID (CNES), SPE-J-403-A-0070

Testing

AS-SAE-4115

Resistor

ESA ESCC-4002/005,
 or MIL-R-39007

Solder

ESA-ECSS-Q-70-08,
 MIL-STD-2000,NHB 5300.4.

Derating

ESA PSS-01-301

Potting material

ESA-ECSS-Q-70-02, ASTM E595,
 and ESA-ECSS-Q-70-29
 or NHB 8060.1.

Connector assemblies

ESA-ECSS-Q-70-26
 or NHB 5300.4.

Transformer

JN1081 approved
 DDP-J-403-A-022
 ESA approved (COF-BCS-PAD01)

All processes, materials and
 components are approved
 by CNES (see CNES-PID-02-
 AXON') and BOEING/NASA.

AMB / S - C2 - XX

AMB / S - C21 - XX

AMB / S - C2 - XX

Version with bus lines on opposite sides of the coupler



AMB / S - C21 - XX

Version with bus lines on same side of the coupler



Electrical scheme

$N = 1,41 \pm 3\%$
 $R = \text{fault Protection Resistance}$
 $R = 0.75 Z_0 = 57,6 \Omega \pm 1\%$



Identification code

AMB /	S	CX	XX	...
AXON' MICROBUS (see complete reference of the coupler on Bus Standard sheet).	S : SPACE VERSION	2 : DOUBLE MICROCOUPLER Version with bus lines on opposi- te sides of the coupler. 21 : DOUBLE MICROCOUPLER Version with bus lines on same side of the coupler.	CABLE REFERENCES 40 = TWINAX BUS AWG 24 SB (single braid) according to SSQ 21655 (NASA qualified). 41 = TWINAX BUS AWG 24 DB (Double braid) 43 = TWINAX BUS AWG 26 SB (single braid) 44 = TWINAX BUS AWG 26 DB (double braid) 45 = TWINAX BUS AWG 22 SB (double braid) according to SSQ 21655 (NASA qualified).	

Note : CABLE LENGTH AND CABLE COLOUR TO BE DEFINED WHEN ORDERING
 (possibility to differentiate Bus and Stub cable with a striped colour tape under the transparent jacket or the extrusion of a colour jacket).
 Possibility to integrate terminator in the couplers.



AMB / S - C2 - XX

AMB / S - C21 - XX

Electrical characteristics

PARAMETERS	REQUIRED	ACTUAL
Nominal line impedance *	70 to 84	77
Turns ratio	1.41 ± 3 %	1.41 ± 3 %
CMR	< -45 dB at 1 MHz	< -50 dB at 1 MHz
Input impedance	> 1500 Ω in the frequency range (75 KHz to 1 MHz) and in the indicated temp. range (-65°C to 150°C)	> 1500 Ω
Fault protection insulation resistors in series on each bus winding connection	0.75 Zo ± 2 %	57.6 Ω +/- 1 %
Insulation resistance between : bus / stub inner wires / shield	100 MΩ 100 MΩ	> 1 000 MΩ at 250 VDC > 1 000 MΩ at 500 VDC
Transfer impedance	-	plot available
Shield continuity	-	10 mΩ max.
Shield coverage	Cable 90 % Connection 75 %	Cable 90 % min. Connection 100 %
Dielectric withstanding strength : between shield and inner wires between outer insulation and shield	- -	500 Vrms 500 Vrms

* Impedance : seen from the stub when the Bus line is loaded with Zo at both sides of the coupler.

Environmental characteristics

PARAMETERS	REQUIRED	ACTUAL
Operating temperature	-	-65° to + 150°C
Out-gassing	SP-R-0022 - TML <1 % ASTM-E-595 - CVCM < 0.1 % ESA-ECSS-Q-70-02	TML = 0.0005 %, CVCM = 0 % WVR = 0.00023 % and RML = 0.00027 %
Off-gassing	NHB 8060.1 Test 7 ESA-ECSS-Q-70-29	T = 0.00024 for 65 m³ volume per coupler MLW (#) = 2112 for 65 m³ volume
MTBF according to MIL HDBK-217	-	4.37 x 10 ⁷ hrs at 25°C and SF environment

Out and Off-gassing results, flammability available for all materials used.

Mechanical characteristics

PARAMETERS	REQUIRED	ACTUAL
Weight	-	16 g
Life test	-	1 000 hrs. at 120°C
Shocks	-	15g's in all directions
Acceleration	-	20 g's in all directions
Random vibrations	-	Wo = 0.2 g ² / Hz (functional at 120°) Wo = 0.83 g ² / Hz (endurance)

OTHER MECHANICAL AND ENVIRONMENTAL TESTS AVAILABLE ON REQUEST.

Transformer characteristics

PARAMETERS	REQUIRED VALUES BY MIL-STD-1553 STANDARD or SAE AS 4115	NOMINAL VALUE OR AXON' REQUIRED VALUE	
		NOMINAL	REQUIRED BY AXON' / QUALITY PLAN
The Curie point	-	-	Over 195° C
Primary DC resistance	-	Rp = 3 Ω	Rp < 3.5 Ω
Secondary C resistance	Rs < 5 Ω	Rs = 2 Ω	Rs < 2.5 Ω
Insulation resistance (winding to winding)	Ri > 100 MΩ	-	Ri > 1 000 MΩ with 250 VDC test
Transformer open circuit impedance	[Z] > 3 kΩ from 75KHz to 1MHz (tested with a 1 Vrms sine wave)	at T = 25° C [Z] > 10 kΩ from 75KHz to 1MHz at T = -65° C [Z] > 4.8 kΩ from 75KHz to 1MHz at T = -85° C [Z] > 4 kΩ from 75 kHz to 1 MHz	[Z] > 10 kΩ from 75 KHz to 1 MHz @ = 25° C***
Primary parynce	-	22 mH	> 20 mH
Primary parallel capacitance	-	10 pF	< 12 pF
Inter-winding capacitance	-	45 pF	-
Primary leakage inductance	-	-	< 6.0 μH
Droop *	< 20 %	4.5 % **	< 20 % **
Overshoot and ringing *	± 1 V	0.30 V**	< ± 1 V**

* Tested with a 250 kHz square wave of 27 Vpp with 100ns rise and fall times through a 360 ± 5 % Ω resistor.

** Average values taken during the JN 1081N qualification.

*** 10 kΩ @ T = 25°C guarantees 3 KΩ from T = -65°C to T = 150°C



SPECIFICATIONS

Microcoupler

MIL-STD-1553B (STANAG 3838)
 SSQ 21676 (NASA-BOEING)
 PID (CNES)

Testing

AS-SAE-4115

Resistor

ESA ESCC-4002/005,
 or MIL-R-39007

Solder

ESA-ECSS-Q-70-08,
 MIL-STD-2000,NHB 5300.4.

Derating

ESA PSS-01-301

Potting material

ESA-ECSS-Q-70-02, ASTM E595,
 and ESA-ECSS-Q-70-29
 or NHB 8060.1.

Connector assemblies

ESA-ECSS-Q-70-26
 or NHB 5300.4.

Transformer

JN1081 approved
 DDP-J-403-A-022
 ESA approved (COF-BCS-PAD01)

All processes, materials and
 components are approved
 by CNES (see CNES-PID-02-
 AXON') and BOEING/NASA.

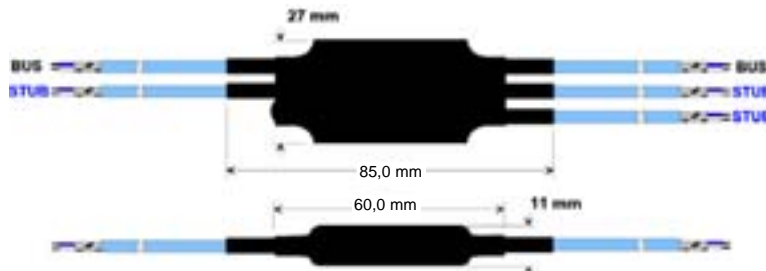
3 ways inline microcoupler

AMB / S - C3 - XX

AMB / S - C31 - XX

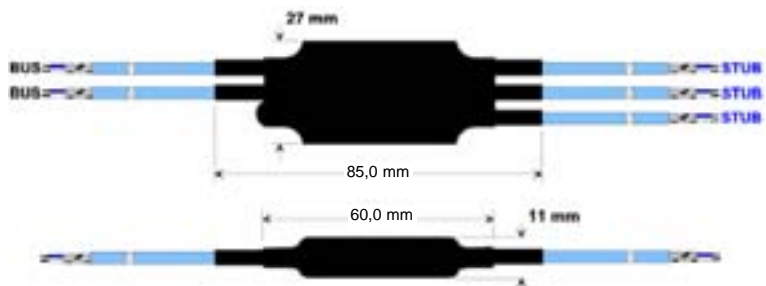
AMB / S - C3 - XX

Version with bus lines on opposite sides of the coupler



AMB / S - C31 - XX

Version with bus lines on same side of the coupler



Electrical scheme

$N = 1,41 \pm 3\%$
 $R = \text{Fault Protection Resistance}$
 $R = 0.75 Z_0 = 57,6 \Omega \pm 1\%$



Identification code

AMB /	S	CX	XX	...
AXON' MICROBUS (see complete reference of the coupler on Bus Standard sheet).	S : SPACE VERSION	3 : 3 STUB MICROCOUPLER Version with bus lines on opposite sides of the coupler 31 : 3 STUB MICROCOUPLER Version with bus lines on same side of the coupler	CABLE REFERENCES 40 = TWINAX BUS AWG 24 SB (SINGLE BRAID) according to SSQ 21655 (NASA qualified). 41 = TWINAX BUS AWG 24 DB (DOUBLE BRAID) 43 = TWINAX BUS AWG 26 SB (SINGLE BRAID) 44 = TWINAX BUS AWG 26 DB (DOUBLE BRAID) 45 = TWINAX BUS AWG 22 SB (DOUBLE BRAID) according to SSQ 21655 (NASA qualified).	

Note : CABLE LENGTH AND CABLE COLOUR TO BE DEFINED WHEN ORDERING
 (possibility to differentiate Bus and Stub cable with a striped colour tape under the transparent jacket or the extrusion of a colour jacket).
 Possibility to integrate terminator in the couplers.



AMB / S - C3 - XX

AMB / S - C31 - XX

Electrical characteristics

PARAMETERS	REQUIRED	ACTUAL
Nominal line impedance *	70 to 84	77
Turns ratio	1.41 ± 3 %	1.41 ± 3 %
CMR	< -45 dB at 1 MHz	< -50 dB at 1 MHz
Input impedance	> 1000 Ω in the frequency range (75 KHz to 1 MHz) and in the indicated temp. range (-65°C to 150°C)	> 1000 Ω
Fault protection insulation resistors in series on each bus winding connection	0.75 Zo ± 2 %	57.6 Ω +/- 1 %
Insulation resistance between : bus / stub inner wires / shield	100 MΩ 100 MΩ	> 1 000 MΩ at 250 VDC > 1 000 MΩ at 500 VDC
Transfer impedance	-	plot available
Shield continuity	-	10 mΩ max.
Shield coverage	Cable 90 % Connection 75 %	Cable 90 % min. Connection 100 %
Dielectric withstanding strength : between shield and inner wires between outer insulation and shield	- -	500 Vrms 500 Vrms

* Impedance : seen from the stub when the Bus line is loaded with Zo at both sides of the coupler.

Environmental characteristics

PARAMETERS	REQUIRED	ACTUAL
Operating temperature	-	-65° to + 150°C
Out-gassing	SP-R-0022 - TML <1 % ASTM-E-595 - CVCM < 0.1 % ESA-ECSS-Q-70-02	TML = 0.0005 %, CVCM = 0 % WVR = 0.00023 % and RML = 0.00027 %
Off-gassing	NHB 8060.1 Test 7 ESA-ECSS-Q-70-29	T = 0.00024 for 65 m ³ volume per coupler MLW (#) = 2112 for 65 m ³ volume
MTBF according to MIL HDBK-217	-	3.20 x 10 ⁷ hrs at 25°C and SF environment

Out and Off-gassing results, flammability available for all materials used.

Mechanical characteristics

PARAMETERS	REQUIRED	ACTUAL
Weight	-	< 25 g
Life test	-	1 000 hrs. at 120°C
Shocks	-	15g's in all directions
Acceleration	-	20 g's in all directions
Random vibrations	-	Wo = 0.2 g ² / Hz (functional at 120°) Wo = 0.83 g ² / Hz (endurance)

OTHER MECHANICAL AND ENVIRONMENTAL TESTS AVAILABLE ON REQUEST.

Transformer characteristics

PARAMETERS	REQUIRED VALUES BY MIL-STD-1553 STANDARD or SAE AS 4115	NOMINAL VALUE OR AXON' REQUIRED VALUE	
		NOMINAL	REQUIRED BY AXON' / QUALITY PLAN
The Curie point	-	-	Over 195° C
Primary DC resistance	-	Rp = 3 Ω	Rp < 3.5 Ω
Secondary C resistance	Rs < 5 Ω	Rs = 2 Ω	Rs < 2.5 Ω
Insulation resistance (winding to winding)	Ri > 100 MΩ	-	Ri > 1 000 MΩ with 250 VDC test
Transformer open circuit impedance	[Z] > 3 kΩ from 75KHz to 1MHz (tested with a 1 Vrms sine wave)	at T = 25° C [Z] > 10 kΩ from 75KHz to 1MHz at T = -65° C [Z] > 4.8 kΩ from 75KHz to 1MHz at T = -85° C [Z] > 4 kΩ from 75 kHz to 1 MHz	[Z] > 10 kΩ from 75 KHz to 1 MHz @ = 25° C***
Primary parallel inductance	-	22 mH	> 20 mH
Primary parallel capacitance	-	10 pF	< 12 pF
Inter-winding capacitance	-	45 pF	-
Primary leakage inductance	-	-	< 6.0 μH
Droop *	< 20 %	4.5 % **	< 20 % **
Overshoot and ringing *	± 1 V	0.30 V**	< ± 1 V**

* Tested with a 250 kHz square wave of 27 Vpp with 100ns rise and fall times through a 360 ± 5 % Ω resistor.

** Average values taken during the JN 1081N qualification.

*** 10 kΩ @ T = 25° C guarantees 3 kΩ from T = -65° C to T = 150° C



SPECIFICATIONS

Microcoupler

MIL-STD-1553B (STANAG 3838)
SSQ 21676 (NASA-BOEING)
PID (CNES),

Testing

AS-SAE-4115

Resistor

ESA ESCC-4002/005,
or MIL-R-39007

Solder

ESA-ECSS-Q-70-08,
MIL-STD-2000,NHB 5300.4.

Derating

ESA PSS-01-301

Potting material

ESA-ECSS-Q-70-02, ASTM E595,
and ESA-ECSS-Q-70-29
or NHB 8060.1.

Connector assemblies

ESA-ECSS-Q-70-26
or NHB 5300.4.

Transformer
JN1081 approved
DDP-J-403-A-022
ESA approved (COF-BCS-PAD01)

All processes, materials and
components are approved
by CNES (see CNES-PID-02-
AXON[®]) and BOEING/NASA.

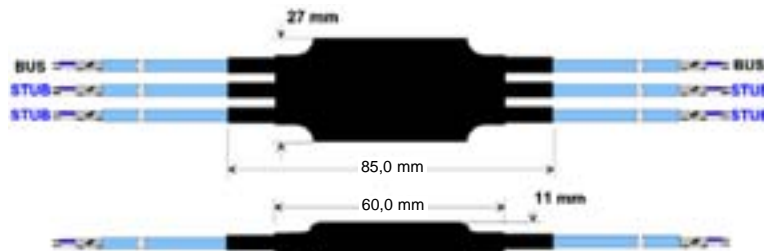
4 ways inline microcoupler

AMB / S - C4 - XX

AMB / S - C41 - XX

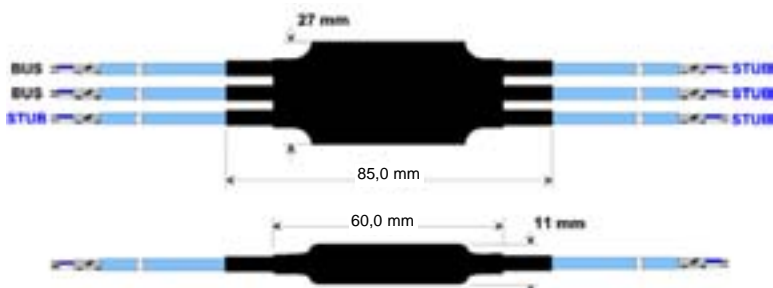
AMB / S - C4 - XX

Version with bus lines on opposite sides of the coupler.



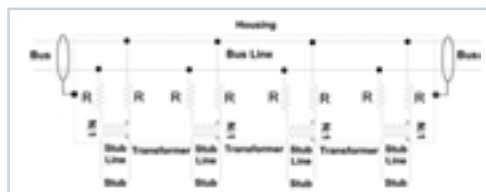
AMB / S - C41 - XX

Version with bus lines on same side of the coupler.



Electrical scheme

$N = 1,41 \pm 3\%$
 $R = \text{Fault Protection Resistance}$
 $R = 0.75 Z_0 = 57,6 \Omega \pm 1\%$



Identification code

AMB /	S	CX	XX	...
AXON [®] MICROBUS (see complete reference of the coupler on Bus Standard sheet).	S : SPACE VERSION	4 : 4 STUB MICROCOUPLER Version with bus lines on opposite sides of the coupler. 41 : 4 STUB MICROCOUPLER Version with bus lines on same side of the coupler.	CABLE REFERENCES 40 = TWINAX BUS AWG 24 SB (SINGLE BRAID) according to SSQ 21655 (NASA qualified). 41 = TWINAX BUS AWG 24 DB (DOUBLE BRAID) 43 = TWINAX BUS AWG 26 SB (SINGLE BRAID) 44 = TWINAX BUS AWG 26 DB (DOUBLE BRAID) 45 = TWINAX BUS AWG 22 SB (DOUBLE BRAID) according to SSQ 21655 (NASA qualified).	

Note : CABLE LENGTH AND CABLE COLOUR TO BE DEFINED WHEN ORDERING
(possibility to differentiate Bus and Stub cable with a striped colour tape under the transparent jacket or the extrusion of a colour jacket).
Possibility to integrate terminator in the couplers.

ESA : European Space Agency - CNES : French Space Agency - P.I.D. : Part Identification Document.



AMB / S - C4 - XX

AMB / S - C41 - XX

Electrical characteristics

PARAMETERS	REQUIRED	ACTUAL
Nominal line impedance *	70 to 84	77
Turns ratio	1.41 ± 3 %	1.41 ± 3 %
CMR	< -45 dB at 1 MHz	< -50 dB at 1 MHz
Input impedance	> 750 Ω in the frequency range (75 KHz to 1 MHz) and in the indicated temp. range (-65°C to 150°C)	> 750 Ω
Fault protection insulation resistors in series on each bus winding connection	0.75 Zo ± 2 %	57.6 Ω +/- 1 %
Insulation resistance between : bus / stub inner wires / shield	100 MΩ 100 MΩ	> 1 000 MΩ at 250 VDC > 1 000 MΩ at 500 VDC
Transfer impedance	-	plot available
Shield continuity	-	10 mΩ max.
Shield coverage	Cable 90 % Connection 75 %	Cable 90 % min. Connection 100 %
Dielectric withstanding strength : between shield and inner wires between outer insulation and shield	- -	500 Vrms 500 Vrms

* Impedance : seen from the stub when the Bus line is loaded with Zo at both sides of the coupler.

Environmental characteristics

PARAMETERS	REQUIRED	ACTUAL
Operating temperature	-	-65° to + 150°C
Out-gassing	SP-R-0022 - TML <1 % ASTM-E-595 - CVCM < 0.1 % ESA-ECSS-Q-70-02	TML = 0.0005 %, CVCM = 0 % WVR = 0.00023 % and RML = 0.00027 %
Off-gassing	NHB 8060.1 Test 7 ESA-ECSS-Q-70-29	T = 0.00024 for 65 m ³ volume per coupler MLW (#) = 2112 for 65 m ³ volume
MTBF according to MIL HDBK-217	-	2.45 x 10 ⁷ hrs at 25°C and SF environment

Out and Off-gassing results, flammability available for all materials used.

Mechanical characteristics

PARAMETERS	REQUIRED	ACTUAL
Weight	-	< 25 g
Life test	-	1 000 hrs. at 120°C
Shocks	-	15g's in all directions
Acceleration	-	20 g's in all directions
Random vibrations	-	Wo = 0.2 g ² / Hz (functional at 120°) Wo = 0.83 g ² / Hz (endurance)

OTHER MECHANICAL AND ENVIRONMENTAL TESTS AVAILABLE ON REQUEST.

Transformer characteristics

PARAMETERS	REQUIRED VALUES BY MIL-STD-1553 STANDARD or SAE AS 4115	NOMINAL VALUE OR AXON' REQUIRED VALUE	
		NOMINAL	REQUIRED BY AXON' / QUALITY PLAN
The Curie point	-	-	Over 195° C
Primary DC resistance	-	Rp = 3 Ω	Rp < 3.5 Ω
Secondary C resistance	Rs = 5 Ω	Rs = 2 Ω	Rs < 2.5 Ω
Insulation resistance (winding to winding)	Ri > 100 MΩ	-	Ri > 1 000 MΩ with 250 VDC test
Transformer open circuit impedance	[Z] > 3 kΩ from 75KHz to 1MHz (tested with a 1 Vrms sine wave)	at T = 25° C [Z] > 10 kΩ from 75KHz to 1MHz at T = -65° C [Z] > 4.8 kΩ from 75KHz to 1MHz at T = -85° C [Z] > 4 kΩ from 75 kHz to 1 MHz	[Z] > 10 kΩ from 75 KHz to 1 MHz @ = 25° C***
Primary parallel inductance	-	22 mH	> 20 mH
Primary parallel capacitance	-	10 pF	< 12 pF
Inter-winding capacitance	-	45 pF	-
Primary leakage inductance	-	-	< 6.0 μH
Droop *	< 20 %	4.5 % **	< 20 % **
Overshoot and ringing *	± 1 V	0.30 V**	< ± 1 V**

* Tested with a 250 kHz square wave of 27 Vpp with 100ns rise and fall times through a 360 ± 5 % Ω resistor.

** Average values taken during the JN 1081N qualification.

*** 10 kΩ @ T = 25° C guarantees 3 KΩ from T = -65° C to T = 150° C

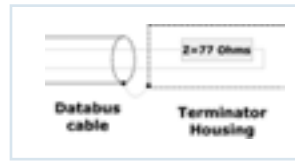


Inline bus terminator

SPECIFICATIONS

PR EN 3567
MIL-STD-1553B
[STANAG 3838]
JN 1101, PID (CNES),

AMB / S - I - XX



Electrical characteristics

- Impedance : $Z = 77 \Omega \pm 1\%$
- Insulation resistance (500 Vdc) :
 - . Outer jacket / conductor : $> 1000 \text{ M} \Omega \text{ min.}$,
 - . Between shield / conductors : $> 1000 \text{ M} \Omega \text{ min.}$
- Dielectric withstanding strength :
 - . outer jacket / shield : 500 Vrms
 - . Between shield / conductors : 500 Vrms.
- Shield connection resistance : $10 \text{ m} \Omega \text{ max.}$
- MTBF available following MIL-HDBK 217
(environment and operating temperature to be specified).

Mechanical characteristics

- Weight : $< 3 \text{ g}$ (without harnessing accessories).
- Traction resistance : 100 N.
- Excellent vibration and shock resistance.
- Crush resistance : 500 N

Environmental characteristics

- Operating temperature : -65°C to $+150^\circ\text{C}$

Identification code

AMB /	S	I	XX
AXON' MICROBUS (see complete reference of the coupler on Bus Standard sheet).	S : SPACE VERSION	INLINE BUS TERMINATOR	CABLE REFERENCES 40 = TWINAX BUS AWG 24 SB (SINGLE BRAID) according to SSQ 21655 (NASA qualified). 41 = TWINAX BUS AWG 24 DB (DOUBLE BRAID) 43 = TWINAX BUS AWG 26 SB (SINGLE BRAID) 44 = TWINAX BUS AWG 26 DB (DOUBLE BRAID) 45 = TWINAX BUS AWG 22 SB (DOUBLE BRAID) according to SSQ 21655 (NASA qualified).

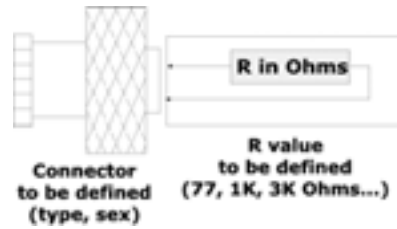
Note : cable length and cable colour to be defined when ordering
These impedances can be integrated in the couplers - See complete reference of the coupler on Bus Standard sheet.

Dismountable bus terminator or stub impedance

SPECIFICATIONS

MIL-STD-1553B
[STANAG 3838], PID (CNES),

AMB / S - R or AMB / S - D



Use

To match the bus line (AMB / X - D) or to load a stub line by high impedance value, the type of connector must be specified.

Electrical characteristics

- Impedance : . AMB / S - D = bus terminator (77 Ω)
. AMB / S - R = sub impedance (1 k Ω or 3 k Ω *)
- Insulation resistance (under 500 V_{DC}) :
. Outer jacket / conductor : > 1000 M Ω min.,
. Between shield / conductors : > 1000 M Ω min.
- Shield connection resistance : 10 m Ω max.
- MTBF available following MIL-HDBK 217 (environment and operating temperature to be specified).

Mechanical characteristics

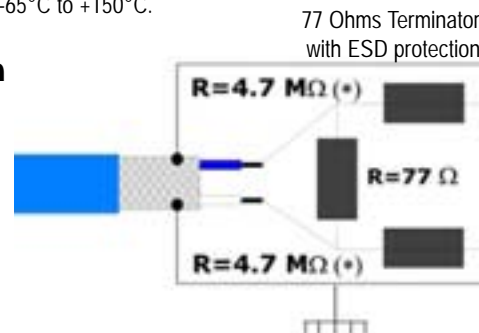
- Weight : according to connector type.
- Robust, light, compact construction (maximum reduction of space requirement).

Environmental characteristics

- Operating temperature : -65°C to +150°C.

ESD* protection

on request when possible.
A protective passive resistance can be added to evacuate ESD



*(could be modified)

Identification code

AMB /	S	X	CONNECTOR IDENTIFICATION
AXON [®] MICROBUS CONNECTOR SERIES TO BE SPECIFIED	S : SPACE VERSION	R = DISMOUNTABLE STUB IMPEDANCE (VALUE TO BE SPECIFIED). D= Dismountable bus terminator	SPECIFIED ON REQUEST.

ESD : electrical static discharge - * : other values of resistance can be specified

Databus inline splice crimp

AMB / S - S - XX

SPECIFICATIONS

MIL-STD-1553 B
Digital time division command / response multiplex data bus

MIL-C-39029
Contact specification for MIL-C-38999 connectors

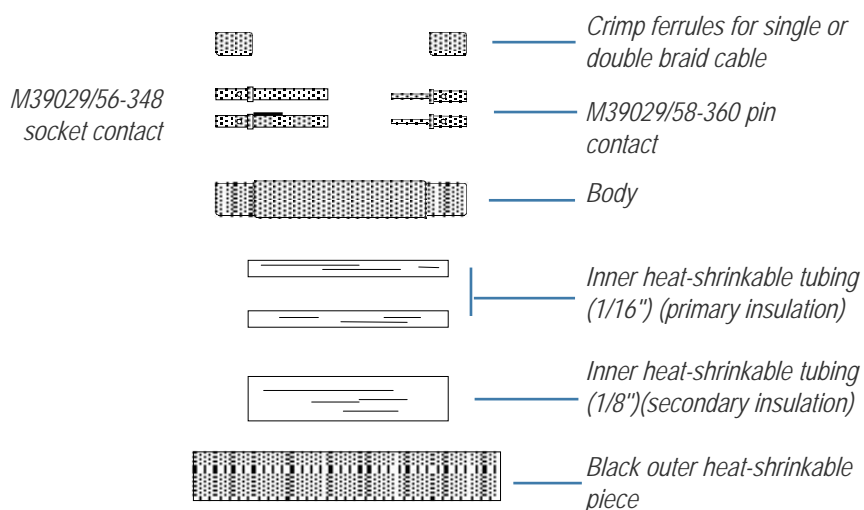
ESA-ECSS-Q-70-26
Crimping of high-reliability electrical connections



AXON's AMB/A-S-xx splices are designed specifically to interconnect two MIL-STD-1553B data bus cables for space industry. These splices are designed to comply with MIL-STD-1553-B. These splices are crimp terminated, can be fitted to AWG 24 & 26 data bus cables. Crimp tools according to MIL-C-22520.

Composition

The splice is composed of 11 pieces as follow :

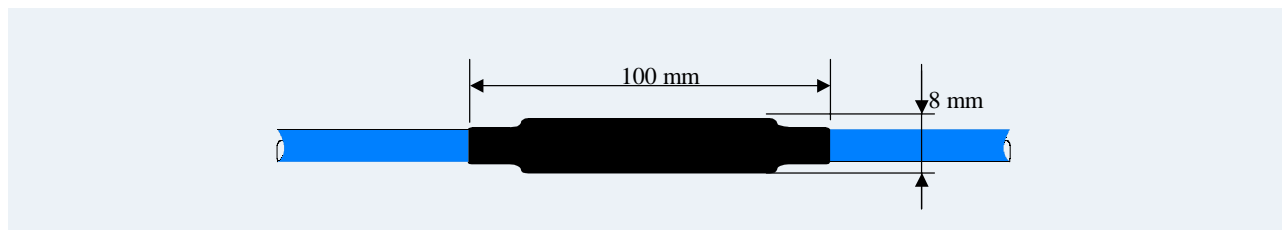


Identification code

AMB /	S	S	XX
AXON' MICROBUS (see complete reference of the coupler on Bus Standard sheet).	S : SPACE VERSION (for aeronautic application please consult us)	SPLICE	TYPE OF FERRULE SB: for single braid cable DB: for double braid cable

Dimensions

Length end to end with the shrinkable sleeve



Mechanical characteristics

PARAMETERS	
Weight	6 g maxi
Type of cable	All type of AWG 26 to 24 (outer diameter < 3.8 mm)

Electrical characteristics

PARAMETERS	VALUE	UNITS	min / max
Insulation resistance (under 500 DC)	5000	M ohms	min
Contact resistance	8	m ohms	max
Characteristics impedance	77	ohms	nominal

Mechanical and environmental characteristics

PARAMETERS	
Temperature range	-65°+150°
TML	<1%
CVCM	<0.1%
Irradiation exposure	up to 20 Mrads

Material used for crimping the connector on the cable

AXON' CABLING INSTRUCTION : 95021-PM_SPLICE-01-A
 (respect the crimping rules for MIL-C-39029 contacts or ESA-ECSS-Q-70-26 for space application)

TYPE OF CRIMPING	CRIMPING TOOL	DIE / POSITIONING
Pin contact	M22520/2-01	M22520/2-09 Setting 2 for AWG 26 setting 4 for AWG 24
Socket contact	M22520/2-01	M22520/2-07 Setting 2 for AWG 26 setting 4 for AWG 24
Body	M22520/10-01	M22520/10-23



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