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# HIGH SPEED SPACE interconnect



# HIGH SPEED SPACE INTERCONNECT



Involved in a great number of space projects in orbit and beyond for over 20 years, Axon' Cable has a wealth of experience in designing and manufacturing interconnect solutions able to withstand the stresses of launch and the harsh environment of space.

The company is particularly strong in the area of high data rate interconnect, and has provided high speed links on-board telecommunication, military, scientific and earth observation satellites including Alphabus, ISS, Astro H, Bepi Colombo, Maven, Sentinel and Solar Orbiter.

## APPLICATIONS

High speed data links offered by Axon' Cable are designed to be used in spacecraft for different applications including:

SATELLITE AND LAUNCHER CABLING  
CONNECTION BETWEEN THE MAST OF THE LAUNCHER AND THE CONTROL SYSTEM  
SPACECRAFT COMMUNICATION NETWORK

DRIVER TECHNOLOGY COMPATIBILITY : LVDS (LOW VOLTAGE DIFFERENTIAL SIGNALING)

HIGH DATA RATE PAYLOADS :  
-INTERCONNECTION OF HIGH DEFINITION IMAGERY SENSORS IN SATELLITES  
-SYNTHETIC APERTURE RADAR AND HYPER-SPECTRAL OPTICAL INSTRUMENTS  
-DRIVER TECHNOLOGY COMPATIBILITY : CML (CURRENT MODE LOGIC)



## MIL-STD-1553 DATABUS HARNESSES

Axon' Cable combines a wide range of expertise in cable and connector manufacturing. For example, the company designs and manufactures all the key components (cables, couplers and connectors) used in data transmission systems in compliance with the **MIL-STD-1553** standard for aeronautics and space applications.

Axon' has been supplying these databus looms to the Ariane 5 launcher since the early '90's.

## SPACEWIRE: INTEGRITY OF LVDS SIGNALS

In addition to bus harnesses which ensure the connection between on-board devices, **SpaceWire** links enable data transfer rates of up to 400 Mb/s. The ESCC3902/003 qualified cable and ESCC 3401/029 EPPL2 connectors and accessories manufactured by Axon' protect the integrity of LVDS signals provided by the devices.

The 9 way micro-D connector can be used with a wide variety of cable types.

Axon' also offers a solution to lighten traditional high speed links: the **Low Mass SpaceWire** (qualified to ESCC3902/004)).

## MICROMACH®: HIGHER PERFORMANCE

As data rates and EMI requirements increase, the micro-D becomes more limited. Axon' has therefore developed **MicroMach®**, a new, optimized SpaceWire connector. Through an ESA Technology Research Project, the MicroMach® connector is born, drawing on the twin heritages of Axon's blisteringly fast **AxoMach®** range and the tried and tested Micro-D with its high-reliability, **Twist Pin** contact system.

This new connector:  
>Is very close in size to the 9 way Micro-D, so little additional footprint on equipments  
>Has matched 100 ohm impedance pairs, so provides excellent continuity of signal  
>Enjoys a robust EMC design, providing protection for both the cable and the equipment  
>Is capable of data rates well in excess of typical SpaceWire performance – up to 3Gb/s  
The MicroMach® range includes four in-line connector variant, three PCB variants and a saver connector.

## AXOMACH®, HIGH DATA RATE LINKS FOR FASTER DATA TRANSMISSION

For even higher data rates Axon' offers **AxoMach®**, a range of very high data rate links composed of low loss microwave coaxial cables and different connector types: as well as in-line male and female variants, **AxoMach®** connectors are available in panel mount, SMD or saver connectors and can also be terminated with SMA panel mount RF connectors. The data transmission rate on this range is up to 10 Gb/s per lane. The new SpaceFibre protocol (ECSS-E-ST-50-11C) is also covered by a special condensed 2 way **AxoMach® SpFi** variant.

## ULTRA LOW MASS COAX LINK

The Ultra Low Mass Coax link based on Axon' coaxial cable expertise is almost **30% lighter** than the already very light Low Mass SpaceWire. This radical solution is significantly smaller and more flexible than the conventional twisted pair approach and exceeds the performance requirements for high speed serial data links compared to twisted pair cables. It can be an interesting alternative for applications where installation space and mass budgets are extremely limited, or particularly where an alternative protocol to SpaceWire is used.



## Which Axon' solutions for which data rate ?

DATA RATE (BASE BAND) PROTOCOL	UP TO 1MB/S	UP TO 400MB/S	UP TO 3GB/S	UP TO 10GB/S
SPACEWIRE	9-WAY MICRO-D (STANDARD CABLE: ESCC3902 003 VARIANT 01 ET 02) OR LOW MASS CABLE (ESCC3902 004 VARIANT 01) OR MICROMACH® FOR HIGHER ELECTRICAL PERFORMANCES (XTALK/EMI/SIGNAL INTEGRITY)			
SPACEFIBRE, WIZARDLINK		MICROMACH®-BASED LINK*		SPACEFIBRE & AXOMACH®
TT-ETHERNET (ETHERSPACE)		MICROMACH®		
XAUI		MICROMACH®-BASED LINK*		SPACEFIBRE & AXOMACH®
RS 422/ RS 485 / CAN	D-SUB & MICRO-D CONNECTORS 120 OHM TWISTED SHIELDED PAIRS ESCC3902.002 VARIANT 21 TO 30 (100 OR 120 OHMS SHIELDED PAIRS)			
BUS 1553	D-SUB & ACB1 CONNECTORS BUS COUPLERS ACB1 TRIAXIAL CONNECTORS			

