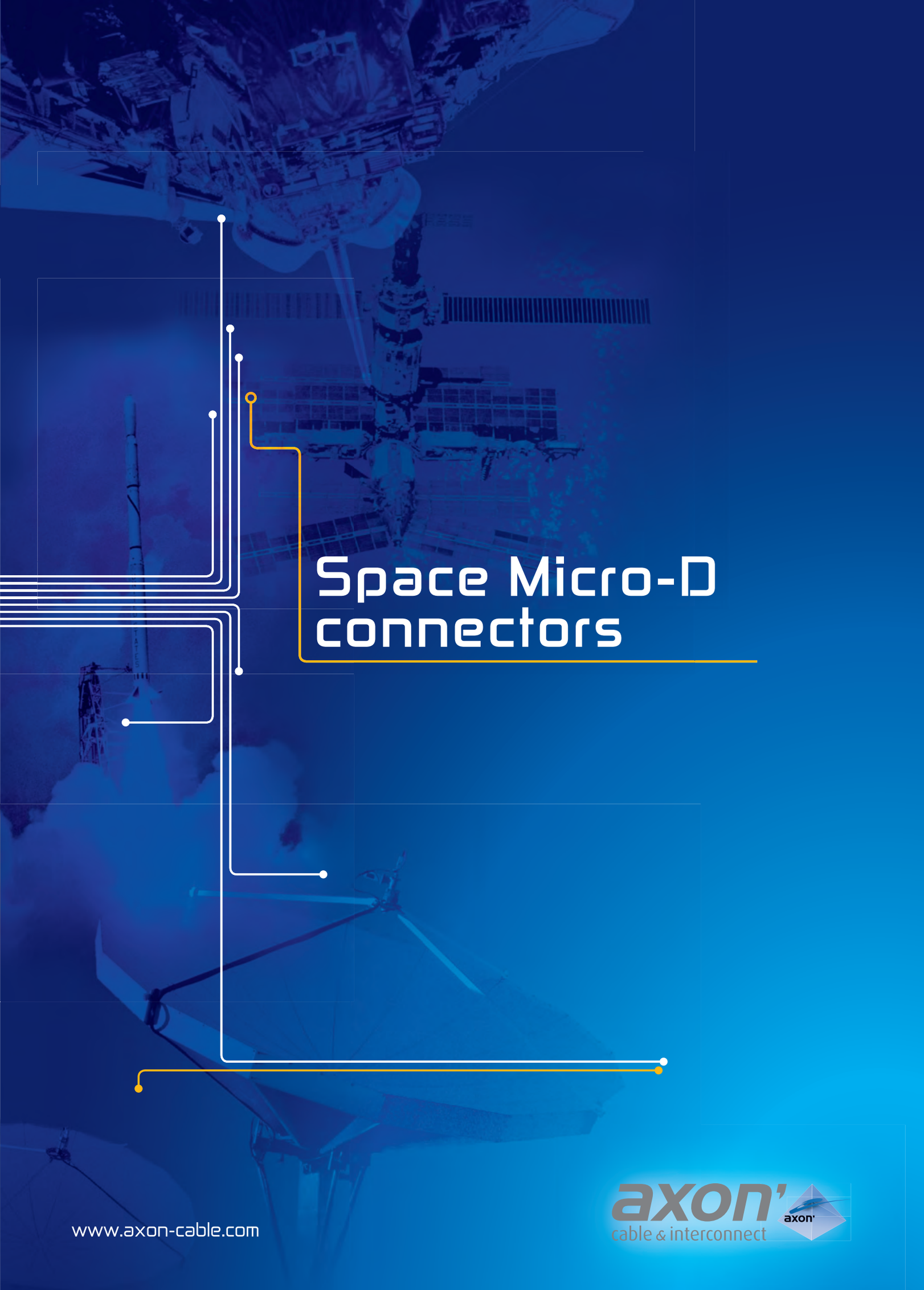


Space Micro-D connectors

www.axon-cable.com

axon' cable & interconnect

Space Micro-D connectors

Micro-D connectors

Space applications

ESA WIRES AND CABLES

ACCESSORIES

AXON' HAS MORE THAN 5,000 FT² (460 M²) OF CLEANROOM AREA DEDICATED TO SPACE APPLICATIONS

AXON' has been involved in numerous space approved projects such as:

› MIL-STD-1553 databus systems

› ESCC wires and cables
- ESCC 3901 001: Polyimide insulated wires.
- ESCC 3901 002: Lightweight polyimide insulated wires.
- ESCC 3901 012: Radiation cross-linked ETFE insulated cables.
- ESCC 3901 013: PTFE / polyimide insulated wires and cables.
- ESCC 3901 018: PTFE / polyimide insulated wires and cables.
- ESCC 3901 019: CELLOFLON® / polyimide insulated wires.
- ESCC 3901 021: PTFE / polyimide insulated wires and cables.
- ESCC 3901 024: Abrasion resistant PTFE tape wires and cables.
- ESCC 3902 002: Coaxial, triaxial and symmetrical cables.

› High Speed data links (IEEE 1394, SpaceWire)
- ESCC 3902/003 SpaceWire cable manufacturing.
- ECSS-E-50-12C SpaceWire cabling.

› Very High Speed data links up to 10Gb/s on dedicated 100Ω media low skew & low crosstalk with matched Micro-D connectors.
› Power distribution systems: aluminium busbars for reduced weight and improved voltage drop.
› MIL-STD-1553 connectors (ACB1) approved to ESCC3401 079.
› Various accessories available including halorings, backshells, and special hardware.
› Custom designed cables and assemblies with specific properties, such as temperature control, low electrostatic output and radiation resistance.

AXON' has been involved in numerous space approved projects such as:
› the International Space Station for manned flights.
› various satellites programmes (LEO and GEO).
› rocket launchers such as Ariane 5.

› Approval:
ESCC 3401/029 (ESA EPPL2)

MDSA range

Micro-D connectors and assemblies for space applications

AXON' has drawn upon long experience in the highly challenging environment of space electronics to develop Micro-D connectors and assemblies suitable for this demanding area. Marrying the Micro-D design with the need to be able to reliably transmit signals, power and high speed data, AXON' has developed custom solutions for a wide variety of applications in space.

AXON' space products are assembled to the highest standards, meeting the ECSS-Q-ST-70-08 and ECSS-Q-ST-70-26 requirements, and all such products are built in one of our humidity controlled, class 100,000 clean rooms.

AXON' has been approved to ESCC 3401/029 EPPL2 since 2006.

General characteristics

Electrical & mechanical characteristics

CHARACTERISTICS	SPECIFICATION	TEST METHOD
CURRENT RATING (derating according to ESCC 3401 / 029)	2.5 A max for AWG26 & uninsulated wires 1.5 A max for AWG28 wires	
CONTACT RESISTANCE	5 mΩ @ current rating 6 mΩ @ low level current	Para 9.1.1.3 of ESCC 3401
INSULATION RESISTANCE	5000 MΩ min @ 500 V_{DC}	Para 9.1.1.1 of ESCC 3401
DIELECTRIC WITHSTANDING VOLTAGE	600 V_{RMS} / 2 mA (leakage current)	Para 9.1.1.2 of ESCC 3401
WORKING VOLTAGE - Sea level 0m - Altitude 33km (70.000 FT)	 150 V_{RMS} 100 V_{RMS}	Para 9.13.5 of ESCC 3401
CONTACT ENGAGING & SEPARATION FORCE	1.667 N max 0.137 N min	Para 4.3.9 of ESCC 3401/029
CONNECTOR MATING & DE-MATING FORCE	Mating: 20N (9 ways) to 113N (100 ways) max Demating: 20N max / 1.3N min (9 ways) to 113N max / 7.1N min (100 ways)	Para 9.20 of ESCC 3401
CONTACT RETENTION	22.25 N for female contacts	Para 9.17 of ESCC 3401
DURABILITY	500 mating cycles min.	Para 9.18 of ESCC 3401
TEMPERATURE RANGE	-55°C / +125°C	
VIBRATION	20g's - no discontinuity > 1µs	Para 9.11 of ESCC 3401
SHOCK	50g's - no discontinuity > 1µs	Para 9.12 of ESCC 3401
SALT SPRAY	48 Hours	Para 9.22 of ESCC 3401

Materials & finish

COMPONENT	MATERIAL	FINISH
MALE CONTACT (TWIST PIN)	COPPER AND BERYLLIUM COPPER	GOLD PLATING IN ACCORDANCE WITH ASTM-B488, TYPE II, CLASS 1 (1.27µM (0.050") MIN), CODE C OVER NICKEL UNDERPLATE IN ACCORDANCE WITH SAE-AMS-QQ-N-290 ALLOY CLASS 2 (1.27µM (0.050") TO 3.81µM (0.150"))
FEMALE CONTACT	COPPER ALLOY	
METAL SHELL	ALUMINIUM ALLOY, TYPE 6061 IN ACCORDANCE WITH SAE-AMS-QQ-A-250/11	HIGH-PHOSPHOROUS ELECTROLESS NICKEL PLATING – 25.4 µm MIN. 25.4µm GOLD PLATING OVER NICKEL UNDERPLATING
PLASTIC INSERT / PCB TRAY	LIQUID CRYSTAL POLYMER, 30% LOADED GLASS FIBRE POLYESTER, 94VO, IN ACCORDANCE WITH MIL-M-24519 (200°C)	
INTERFACIAL SEAL	FLUOROSILICONE RUBBER IN ACCORDANCE WITH A-A-59588	
HARDWARE	STAINLESS STEEL, 300 SERIES	PASSIVATION IN ACCORDANCE WITH SAE-AMS2700
ENCAPSULANT	SPACE GRADE EPOXY RESIN	
INSULATED WIRE	- POLYIMIDE INSULATED WIRES IN ACCORDANCE WITH ESCC 3901/002 - PTFE INSULATED WIRES IN ACCORDANCE WITH ESCC 3901/013 - ETFE INSULATED SILVER PLATED COPPER IN ACCORDANCE WITH SAE-AS22759/33	
UNINSULATED WIRE	SOLID COPPER WIRES IN ACCORDANCE WITH QQ-W-343 TYPE 'S' GOLD PLATED ACCORDING TO MIL-G-45204, CLASS 2 GRADE C OR D	

Pigtail connectors

METAL SHELL

- Nickel or gold plated shells for space applications.
- Supplied pre-wired and fully potted.

For more information (e.g. dimensions, panel mounting guide) please refer to our Micro-D catalogue.

IDENTIFICATION CODE

MDSA 2 15 P E F 46 M

SERIES
MDSA: Micro-D Space AXON' connectors

PLATING
2: Nickel plated
5: Gold plated

NUMBER OF CONTACTS
9, 15, 21, 25, 31, 37, 51

GENDER
P: Male crimped contacts
S: Female crimped contacts

WIRE TYPE
V01301: Single wire ESCC 3901 013 - Variant01 (AWG28)
V01302: Single wire ESCC 3901 013 - Variant02 (AWG26)
V00261: Single wire ESCC 3901 002 - Variant61 (AWG28)
V00256: Single wire ESCC 3901 002 - Variant56 (AWG26)
G: Uninsulated ESCC wires AWG2501 gold plated
E: Single wire M22759/33-26 (recommended for space application by MIL-DTL-83513)
NB: Other wires upon request

WIRE COLOUR
ESCC wires only: **BLANK** (see wire descriptions and wire colours page D-9)
Uninsulated wires only: **BLANK** (see wire descriptions and wire colours page D-9)
Insulated wires:
F: Yellow (for wire code E only)
L: White (for wire code E only)
W: 10 colours code per MIL-STD-681, as required by MIL-DLT-83513 (for wire code E only)

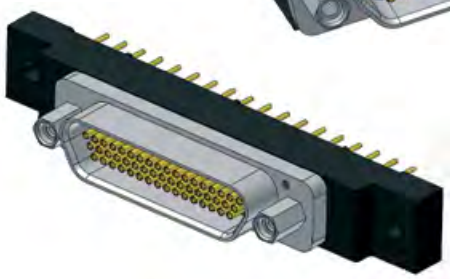
WIRE LENGTH
XXX = length in cm

L in cm (inches)	L ≤ 10 L ≤ 3.940	10 < L ≤ 100 3.940 < L ≤ 39.40	L > 100 L > 39.40
TOLERANCE in cm (inches)	-0 / +0.5 -0 / +0.200	-0 / +3 -0 / +1.180	-0 / +5 -0 / +1.970

HARDWARE
B: Fixed mounting holes (no hardware)
M: Low profile Allen head jackscrews (removable)
N: High profile Allen head jackscrews (removable)
S: Low profile slot head jackscrews (removable)
T: High profile slot head jackscrews (removable)
P: Jackpost
K: High profile slot head jackscrews (non-removable)
L: Low profile Allen head jackscrews (non-removable)
F: Floating mount (non-removable)

LAT Level to be indicated when ordering - see page D-10

PCB connectors



METAL SHELL

- Nickel or gold plated shells for space applications.
- Board right angle or straight to accomodate all configurations.
- To be used with flexible and rigid printed circuit boards.
- Several tail lengths available.

For more information (e.g. dimensions, panel mounting guide) please refer to our Micro-D catalogue.

IDENTIFICATION CODE MDSA 2 25 P CBR P G 1

SERIES
MDSA: Micro-D Space AXON' connectors

PLATING
2: Nickel plated
5: Gold plated

NUMBER OF CONTACTS
9, 15, 21, 25, 31, 37, 51

GENDER
P: Male crimped contacts
S: Female crimped contacts

TERMINATION TYPE
BS: Board Straight version
BR: Board Right Angle version
CBR: Condensed Board Right Angle version

HARDWARE
B: No jackpost or threaded PCB mounting holes
P: Jackpost installed, no threaded PCB mounting holes
T: Threaded PCB mounting holes only
W: Jackpost installed and threaded PCB mounting holes

CONDUCTOR TYPE
G: Uninsulated ESCC wires AWG2501 gold plated

TAIL LENGTH
1: 2.80 mm - 0.109"
2: 3.80 mm - 0.150"
3: 4.80 mm - 0.190"
4: 6.35 mm - 0.250"

Tolerance: ± 0.38 mm (0.015")
NB: Other wires upon request

LAT Level to be indicated when ordering - see page D-10

Wire descriptions

Insulated wire AWG28, in accordance with ESCC 3901/013 Variant 01 (V01301)

Conductor	Max Ø: 0.42 mm
	Nominal cross-section: 0.089 mm²
Insulation	Max Ø: 0.82 mm
	Max weight: 1.8 g/m
	Colour: Natural

Insulated wire AWG26, in accordance with ESCC 3901/013 Variant 02 (V01302)

Conductor	Max Ø: 0.50 mm
	Nominal cross-section: 0.14 mm²
Insulation	Max Ø: 0.89 mm
	Max weight: 2.3 g/m
	Colour: Natural

Insulated wire AWG28, in accordance with ESCC 3901/002 Variant 61 (V00261)

Conductor	Max Ø: 0.43 mm
	Nominal cross-section: 0.10 mm²
Insulation	Max Ø: 0.68 mm
	Max weight: 1.23 g/m
	Colour: Brown

Insulated wire AWG26, in accordance with ESCC 3901/002 Variant 56 (V00256)

Conductor	Max Ø: 0.53 mm
	Nominal cross-section: 0.15 mm²
Insulation	Max Ø: 0.78 mm
	Max weight: 1.93 g/m
	Colour: Black

Uninsulated solid wire AWG2501, in accordance with QQ-W-343 type "S" (G)

Gold plated per MIL-G-45204, Class 2 grade C or D
Conductor Ø: 0.455 ± 0.005 mm
Min gold plating thickness: 0.5 µm
Max weight: 1.6 g/m

Insulated wire M22759/33-26 (E)

Conductor	Nom Ø: 0.483 mm
	Nominal cross-section: 0.154 mm²
Insulation	Nom Ø: 0.81 mm
	Max weight: 2.1 g/m

LAT Levels

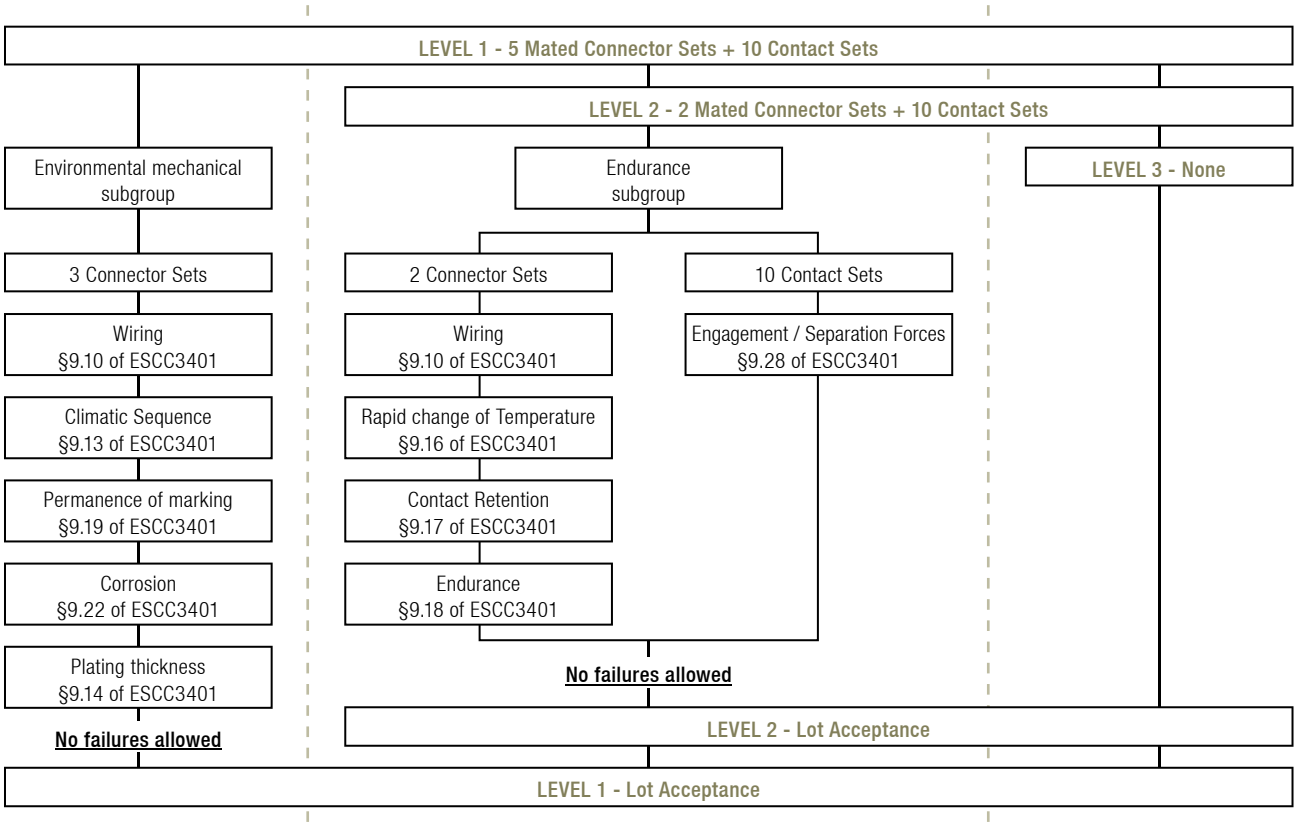
The required level of Lot Acceptance Testing is to be specified when ordering.
The sample size of the three Lot Acceptance Tests are shown in the diagram below.
All components assigned to a subgroup shall be subjected to all the tests of that subgroup in the table test sequence.

Lot Acceptance “level 3”:
No tests or inspections are required for this level.

Lot Acceptance “level 2”:
This level includes the electrical and endurance subgroup.

Lot Acceptance “level 1”:
This level includes everything in level 2 plus environmental and mechanical subgroups.

SAMPLE SIZES ACCORDING TO REQUIRED LAT LEVEL



120 Way Micro-D connectors

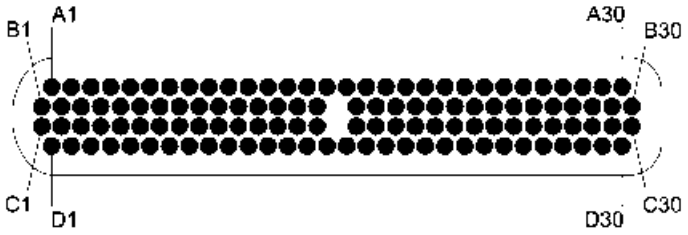
120 WAY MICRO-D CARD EDGE CONNECTOR

An enduring trend in the electronics industry is the continuing drive towards miniaturisation. This leads in turn to ever greater cabling densities with an ever larger number of signals required within limited space constraints. In answer to these challenges, AXON' CABLE has developed a range of 120 way Micro-D connectors. They are available as pigtails or within assemblies but can equally be supplied as PCB connectors in either surface mount or through hole format. Connector savers are part of the range.

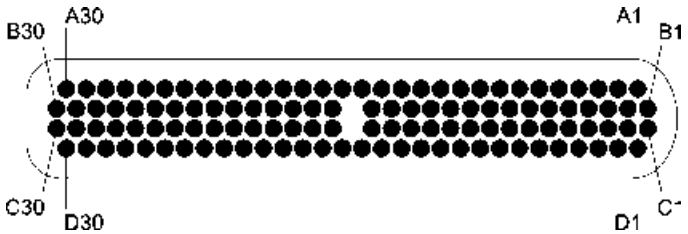
These connectors have been developed and tested for the challenging requirements of space electronics, and can be used for any applications where severe environmental conditions and high density cabling are critical. Keying hardware is an option.

AXON' can offer specific numbers of contacts for custom designed applications. Specific designs are not contained within the MIL specification but AXON's solutions remain fully compatible with the MIL-DTL-83513 standard as far as performance and construction are concerned.

Contact arrangements



MATING FACE OF THE 120 WAY MALE CONNECTOR



MATING FACE OF THE 120 WAY FEMALE CONNECTOR

1.27 mm (.050") contact spacing.
1.27 mm (.050") spacing between two rows.

References

DESCRIPTION	REFERENCE	COMMENTS	PAGE
120 WAY PLUG CONNECTOR FOR CABLE OR ASSEMBLY	MDA 2 120 P 000 J	Wire, length and colour type to be defined	D-14
120 WAY SOCKET CONNECTOR FOR CABLE OR ASSEMBLY	MDA 2 120 S 000 H	Wire, length and colour type to be defined	D-14
120 WAY SOCKET SMT	MDA 2 120 S SMT H	Can only be mated with pigtail plug	D-15
120 WAY SMT PLUG (TO MATE WITH SMT SOCKET ONLY)	MDA 2 120 P SMTX J	Can only be mated with SMT socket	D-16
120 WAY SMT SOCKET (TO MATE WITH SMT PLUG ONLY)	MDA 2 120 S SMTX H	Can only be mated with SMT plug	D-16
120 WAY SOCKET PANEL MOUNT SMT	MDA 2 120 S PSMT H		D-17
120 WAY SOCKET PANEL MOUNT PIGTAIL	MDA 2 120 S P000 H	Wire, length and colour type to be defined	D-17
120 WAY BS PLUG	MDA 2 120 P BS J		D-18
120 WAY CONNECTOR SAVER	MDA 2 120 CS 1 HJ		D-18

Keying hardware

SPECIAL 120 WAY MALE HARDWARE KIT WITH KEYWAY: J	SPECIAL 120 WAY FEMALE HARDWARE KIT WITH KEYWAY: H
	

Electrical & mechanical characteristics

CHARACTERISTICS	SPECIFICATIONS	TEST METHODS
CURRENT RATING	2.5 A max. 1.5 A max. for SMT & PCB connectors	EIA-364-70
CONTACT RESISTANCE	8 mΩ max.	EIA-364-06
INSULATION RESISTANCE	5000 MΩ min. @ 500 VDC	EIA-364-21
DIELECTRIC WITHSTANDING VOLTAGE - Sea level 0 m - Altitude 33 km (70.000 FT) SMT connectors	600 VAC 150 VAC 250 VAC	EIA-364-20
CONTACT ENGAGING & SEPARATION FORCE	170 g max. (6 oz) 14 g min. (0.5 oz)	EIA-364-37
CONNECTOR MATING & DE-MATING FORCES	283 g (10 oz) X Number of contact max.	EIA-364-13
CONTACT RETENTION	2.26 kg (5 lbs) for 5 seconds min.	EIA-364-29
DURABILITY	500 mating cycles min.	EIA-364-09
TEMPERATURE RANGE	-55°C / +125°C	
VIBRATION	20 g's - no discontinuity > 1 µs	EIA-364-28 TEST CONDITION IV
SHOCK	50 g's - no discontinuity > 1 µs	EIA-364-27 TEST CONDITION E
SALT SPRAY	48 hours	EIA-364-26 TEST CONDITION B
HUMIDITY	Insulation resistance > 1 MΩ	EIA-364-31 TEST METHOD IV

Materials & finish

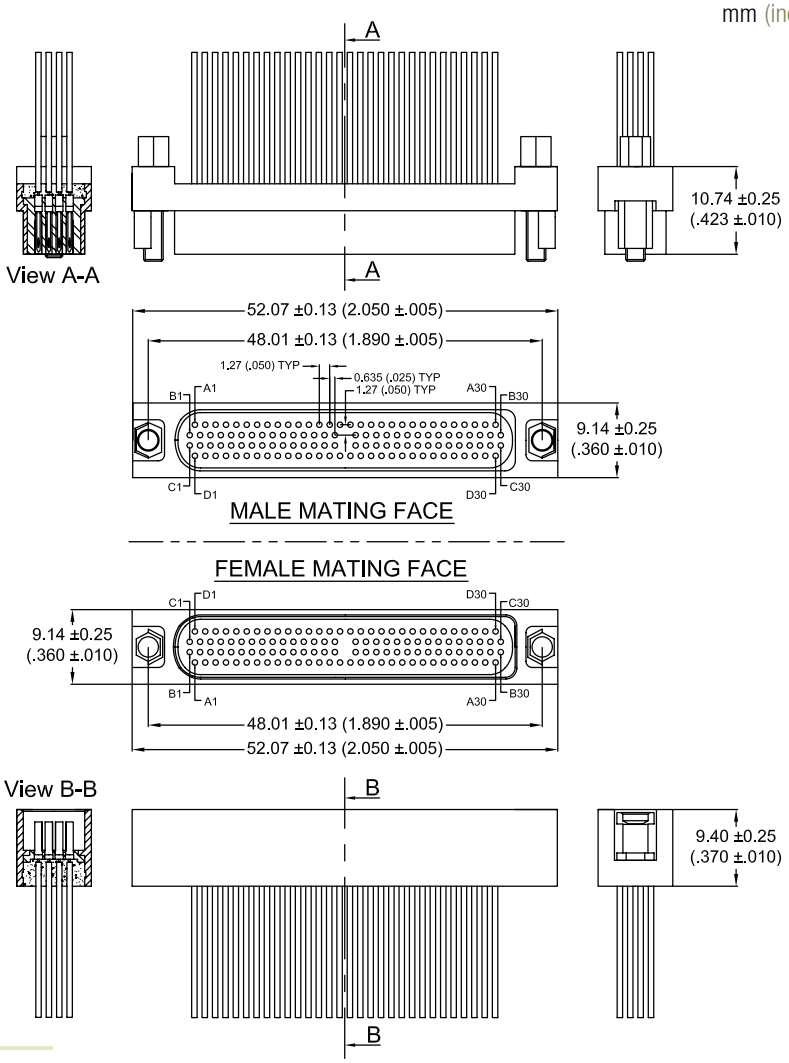
COMPONENTS	MATERIAL	FINISH
MALE CONTACT (TWIST PIN)	COPPER AND BERYLLIUM IN ACCORDANCE WITH ASTM-B-194	GOLD PLATING IN ACCORDANCE WITH ASTM-B488, TYPE II, CLASS 1 (1.27 µm MIN), CODE C, OVER NICKEL UNDERPLATE IN ACCORDANCE WITH SAE-AMS-QQ-N-290, CLASS 2 (1.27 µm TO 3.81 µm)
FEMALE CONTACT	COPPER ALLOY	
METAL SHELL	ALUMINIUM ALLOY, TYPE 6061 IN ACCORDANCE WITH SAE-AMS-QQ-A-250/11	ELECTROLESS NICKEL PLATING IN ACCORDANCE WITH SAE-AMS2404, CLASS 3 OR 4, .0005 INCH MIN.
INSERTS	LIQUID CRYSTAL POLYMER, 30% LOADED GLASS FIBRE POLYESTER, 94VO, IN ACCORDANCE WITH MIL-M-24519 (200°C)	
HARDWARE	STAINLESS STEEL, 300 SERIES	PASSIVATION IN ACCORDANCE WITH SAE-AMS2700
ENCAPSULANT	EPOXY RESIN	
UNINSULATED WIRE	AWG 2801 SOLID COPPER WIRE	GOLD PLATED IN ACCORDANCE WITH A-A-59551

120 way male and female connectors for cables and harnesses

Both male and female connectors can be assembled with various wire sizes in shielded and unshielded forms. High speed variants can also be produced, using controlled impedance shielded twisted pairs which allow data rates of up to 880 Mbps. For space applications, these connectors are assembled in a class 100.000 clean room, and can be terminated with ESA ESCC (European Space Agency) approved wires.

MDA 2 120 P 000 J
MDA 2 120 S 000 H

mm (inch)



Surface Mount PCB card edge connectors

Surface Mount (SMT) connectors have two rows of 28 AWG gold plated leads at 0.635 mm (.025") pitch spacing to terminate to PCB's by soldering. Lugs on either side of the connector allow for mechanical clamping onto the PCB.

Available versions

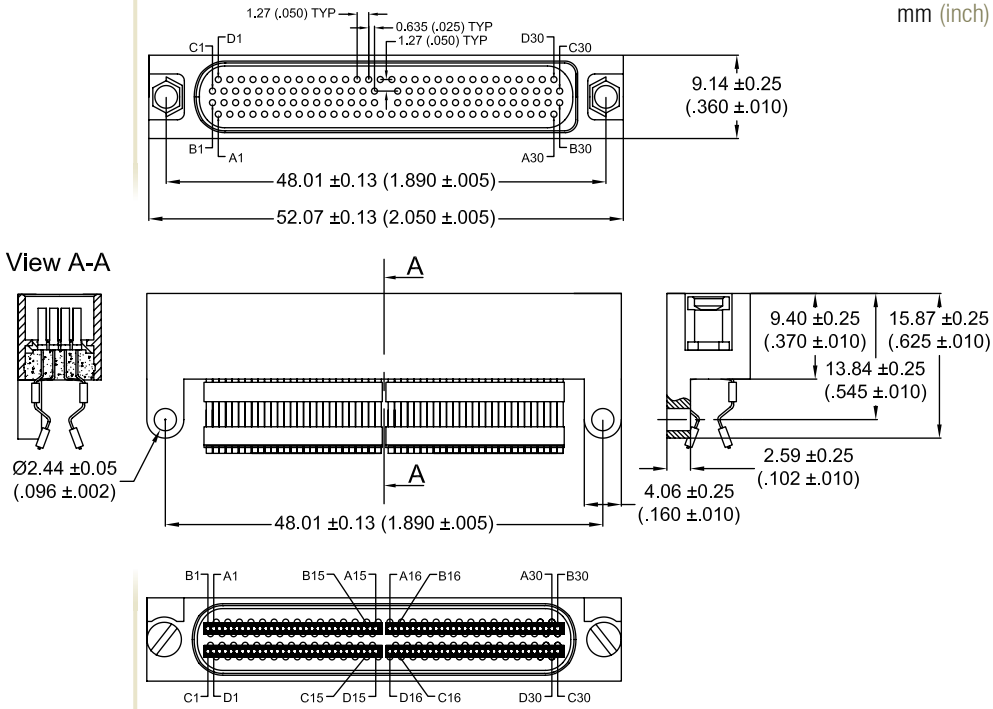
- Female style to mate a male pigtail or assembly connector.
- Male and female styles to mate together (this option has a longer shell to retain the keying hardware system).
- Female style for panel mount.

Female SMT

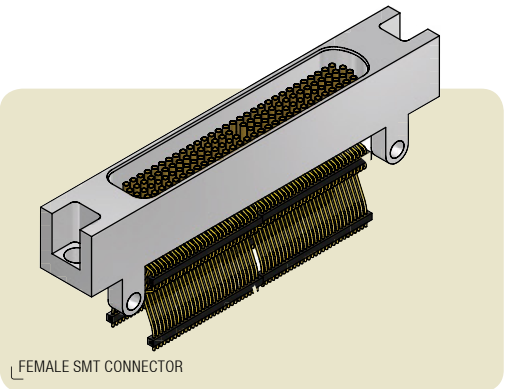
to mate a male cable connector.

MDA 2 120 S SMT H

mm (inch)



SEE CONTACT LAYOUT ON PCB PAGE D-19



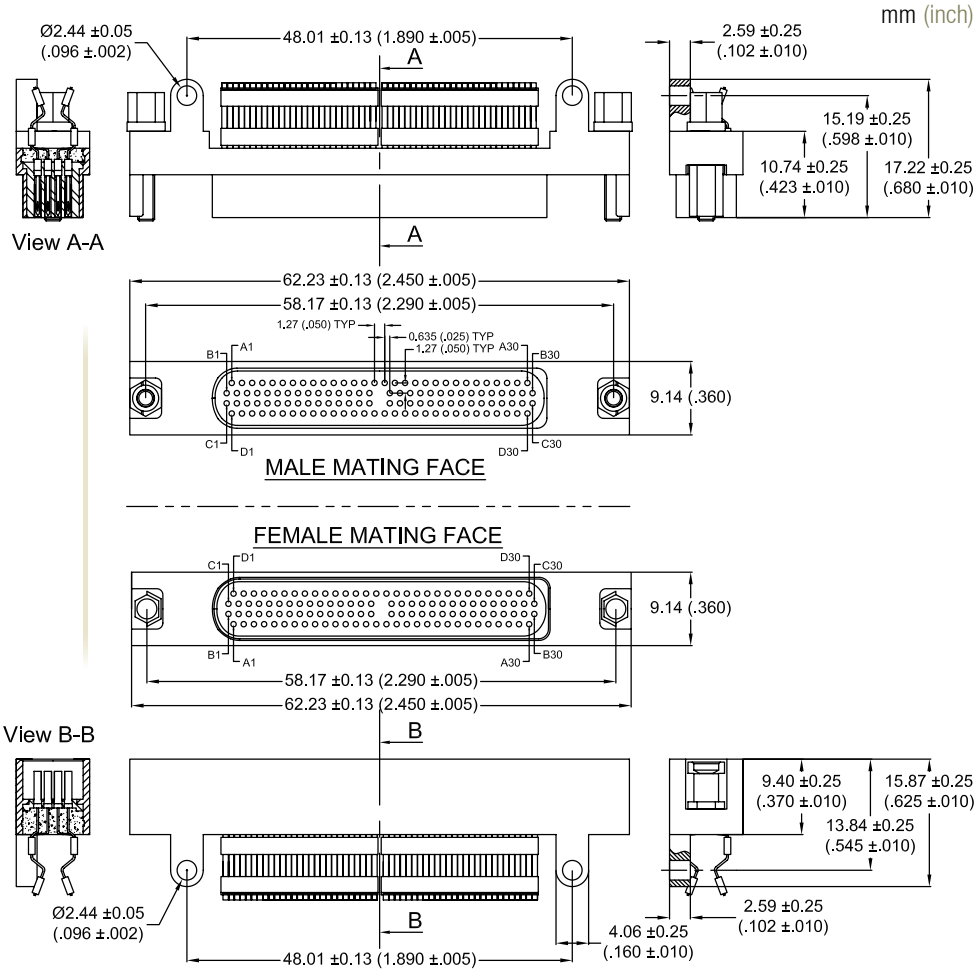
FEMALE SMT CONNECTOR

Male & female SMT connectors

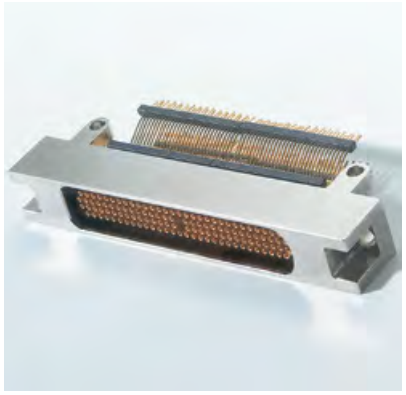
mating exclusively with each other

MDA 2 120 P SMTX J
MDA 2 120 S SMTX H

mm (inch)



SEE CONTACT LAYOUT ON PCB PAGE D-19

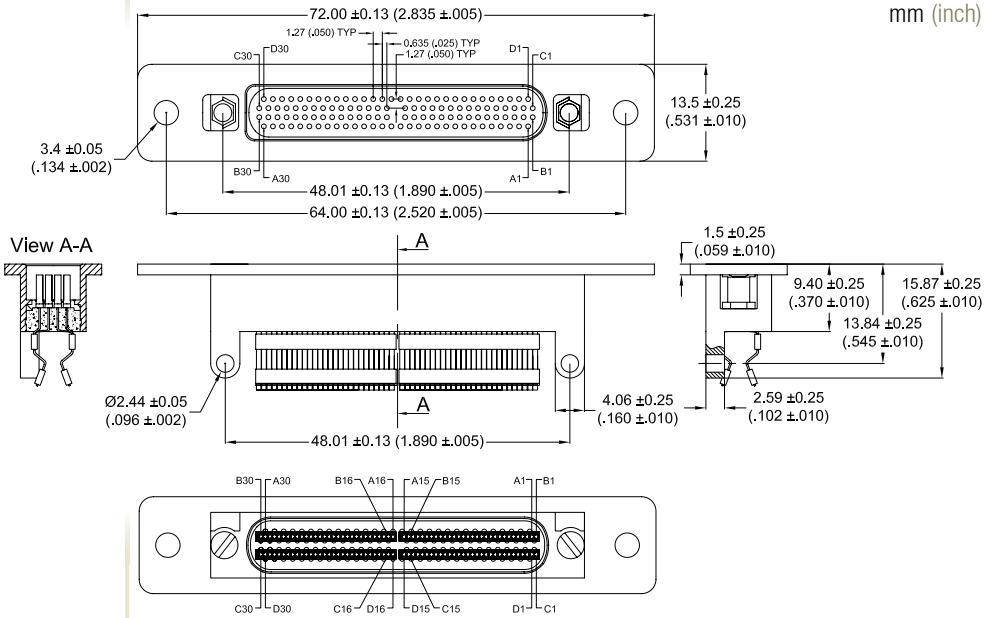


FEMALE SMT CONNECTOR

Female SMT connector for panel mount

MDA 2 120 S PSMT H

mm (inch)

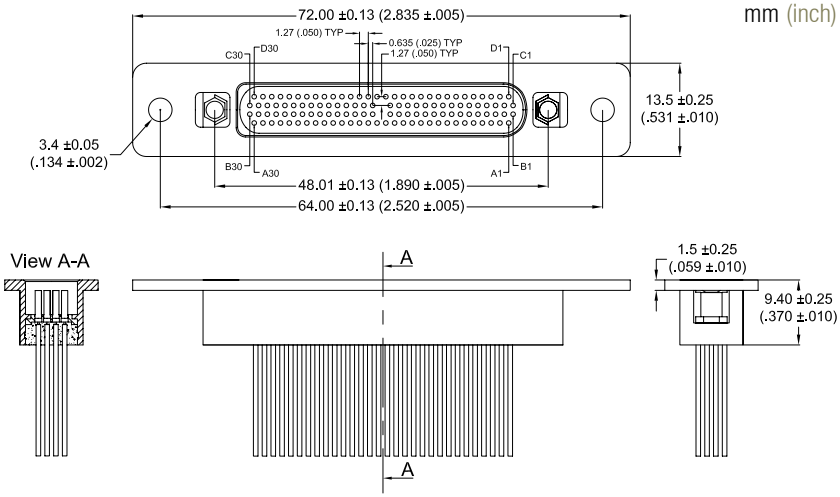


SEE CONTACT LAYOUT ON PCB PAGE D-19

Female panel mount connector for cable and assembly

MDA 2 120 S P000 H

mm (inch)

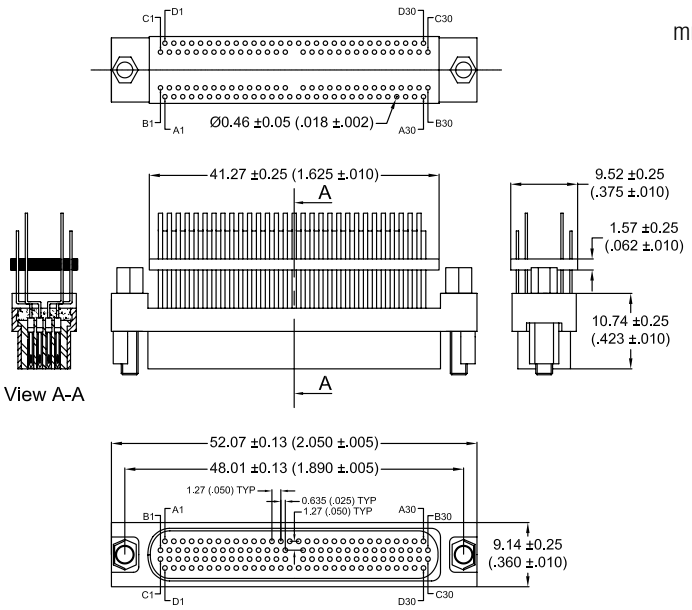


BS connector

The BS version is similar to straight PCB connector style of the MIL standard. Available in male version only.

MDA 2 120 P BS J

mm (inch)



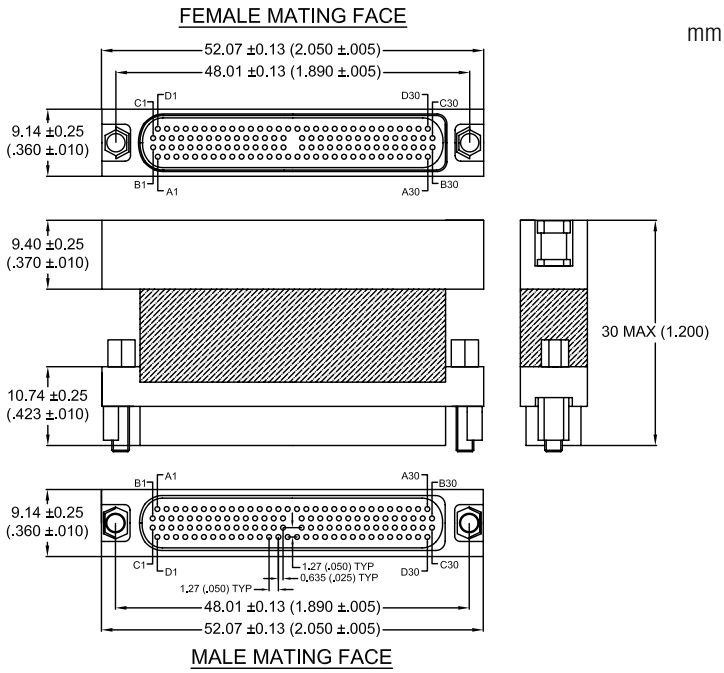
SEE CONTACT LAYOUT ON PCB PAGE D-20

Connector saver

Connector savers have been developed to protect expensive equipment. Typical applications include test equipment and space-grade instruments.

MDA 2 120 CS 1 HJ

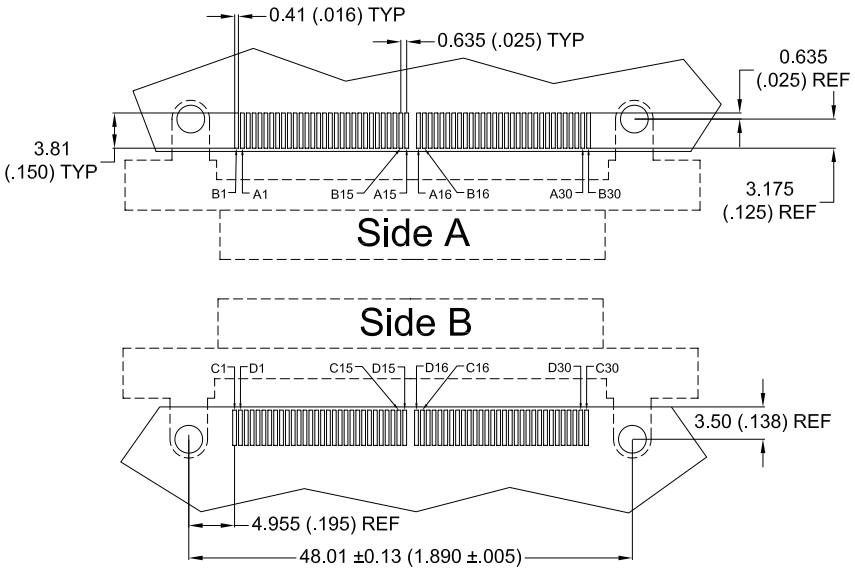
mm (inch)



PCB layout

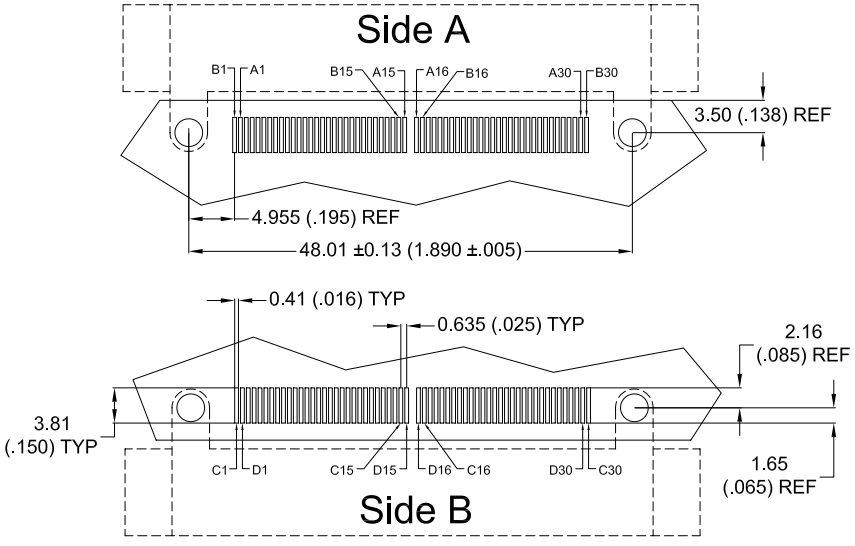
Male SMT (surface mount style) connector

mm (inch)



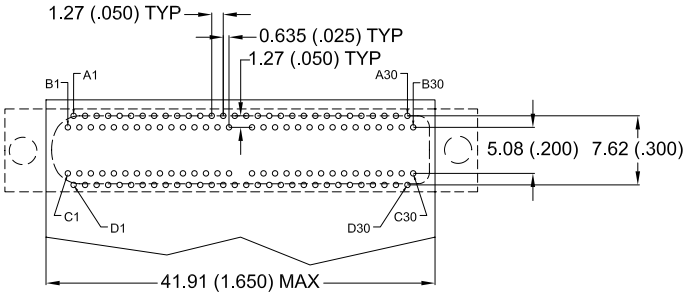
Female SMT (surface mount style) connector

mm (inch)

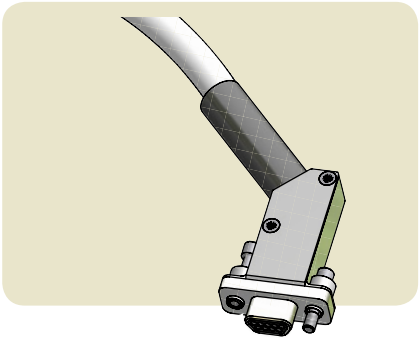


BS version (male only)

mm (inch)

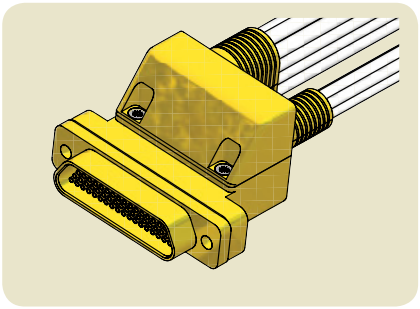


Custom space applications



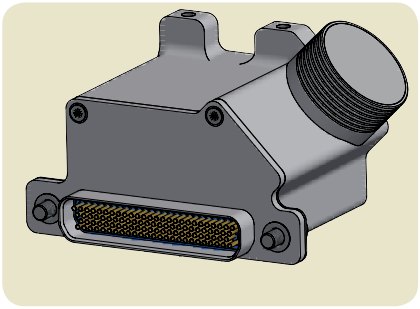
SpaceWire or IEEE 1394 with custom backshell

45° Entry for the backshell.
This addition to the High speed family features a new backshell entry. This design is used when space is limited behind the connector.



Space Micro-D with custom backshell

Two different funnel entries, making it possible to separate two different cable bundles. This request features two different bundle routings.



Multi-LVDS pairs with custom backshell

This custom backshell has two lugs with threads in order to improve the stability and the fixation of this connector, causing less stress on the contacts.