



OMNETICS
CONNECTOR CORPORATION

Spacewire

Spacewire Cable Assemblies

Omnetics Spacewire cable assemblies are offered in flight grade and lab grade in both Type A and Type AL versions. Low outgassing components are used to ensure vacuum compatibility. 100 Ohm impedance controlled cable with low cross talk and skew facilitate high signal integrity at speeds up to 400 Mbps. A variety of hardware options are available, including captivated jackscrews to decrease risk of FOD. The Spacewire assemblies can withstand extreme temperatures from -55°C to 125°C.

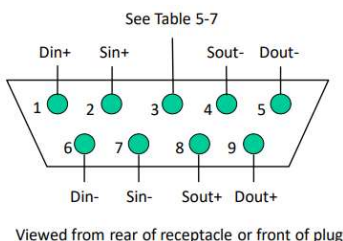
Cables

Cable per ESCC 3902/003 in 26 AWG and 28 AWG are available. The cable is constructed from four tightly controlled shielded twisted pairs with one gross overbraid for excellent EMI protection.

Connectors

Omnetics uses male pin 9 position Micro-D connectors for on Spacewire cable assemblies per ECSS-E-ST-50-12C Rev. 1. Omnetics also offers assemblies with 9 position Micro-D female socket connectors and custom options with other non-standard options. Reach out to a sales representative for custom options. Connector pinout names are designated per Figure 5-3 of ECSS-E-ST-50-12C Rev. 1.

Contact number	Signal name Connector with male contacts	Signal name Connector with female contacts
6	Din-	Din-
7	Sin-	Sin-
8	Sout+	Sout+
9	Dout+	Dout+



Viewed from rear of receptacle or front of plug

Figure 5-3: SpaceWire connector contact identification

Type A Cable Assemblies

Type A assemblies are wired per Figure 5-4 OF ECSS-E-ST-50-12C Rev. 1, which is the recommended type for new Spacewire applications. The shields of all signals are terminated to the shell of the connector, while position 3 of the connector remains unfilled.

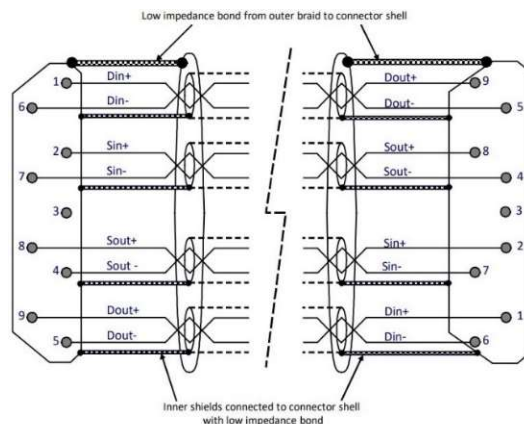


Figure 5-4: SpaceWire cable assembly Type A

Type AL Cable Assemblies

The 'L' in 'Type AL' stands for Legacy. As such, Type AL assemblies are used in legacy applications and are wired per Figure 5-5 OF ECSS-E-ST-50-12C Rev. 1. It is not recommended to use Type AL for new design activity.

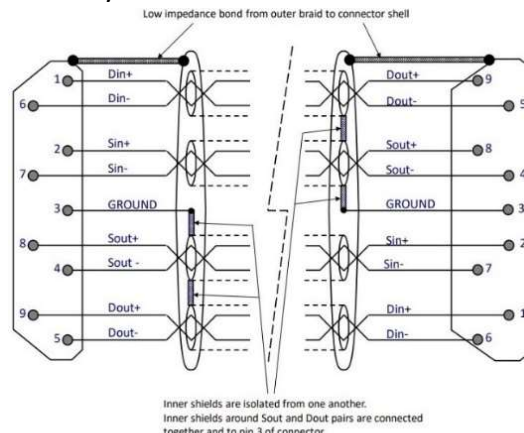


Figure 5-5: SpaceWire cable assembly Type AL

Technical Specifications

Material Specifications	
Contact	Copper Alloy per MIL-DTL-83513
Contact Finish	Gold per ASTM B488, Type II, Class 1.27, Code C Over Nickel Underplate
Insulator	Thermoplastic per MIL-DTL-83513
Interfacial Seal	Fluorosilicone Elastomer per A-A-59588
Hardware	Stainless Steel, 300 Series, Passivated per SAE AMS-2700
Cable	Per ESC-3902/003
Shell Options	Aluminum Shell, Electroless Nickel Plated: Alloy 6061 per SAE AMS-QQ-A-200/8 or ASTM B221 Nickel per SAE AMS-2404
	Stainless Steel Shell, Passivated: 300 Series, Passivated per SAE AMS-2700

Performance Specifications	
Operating Temperature	-55 - 125 °C
Dielectric Withstanding Voltage	600 VAC RMS @ sea level
Contact Resistance	26 milliohms max (65 mV drop) @ 2.5 Amps
Current Rating	3 Amps
Durability	> 2,000 mating cycles
Insulation Resistance	5000 Meg ohms @ 500 VDC
Shock	50 g's no discontinuities > 1 microseconds
Vibration	50 g's no discontinuities > 1 microseconds
Thermal Outgassing	1.0% max TML, 0.03% CVCM - NASA SP-R-0022
Mating/ Unmating Force	3 oz. (85g) typical per contact
Characteristic Performance	Per ECSS-E-ST-50-12C Rev.1
Differential Insertion Loss	> -7 dB to 600 MHz (3rd harmonic)
Differential Far End Crosstalk (FEXT)	> -20 dB to 1 GHz
Differential Near End Crosstalk (NEXT)	> -20 dB to 1 GHz
Intra-Pair Skew	< 0.1 ns/m
Inter-Pair Skew	< 0.1 ns/m + 0.07 ns

Spacewire Cable Assembly Ordering Guide

ORDERING GUIDE FOR METAL SPACEWIRE JUMPER ASSEMBLIES													
JUM-MMDP-MMDP-08-WC6X18.0-N01-AM50	EX. PART NUMBER	JUM	-MMDP-MMDP	-08	-WC	6	X	18.0	-N	01	-A	M50	
PRODUCT TYPE	JUM = JUMPER												
SERIES	MMDP = METAL MICRO-D PIN												
	MMDS = METAL MICRO-D SOCKET												
# OF LINES	-08 = 8 Lines												
TERMINATION	WC = WIRED CABLE												
WIRE AWG	8 = 28 AWG, 6 = 26 AWG												
WIRE TYPE	X = ESCC/033 TYPE CABLE												
TOTAL LENGTH	XX.X = LENGTH IN INCHES												
SHELL MATERIAL & FINISH	N = ELECTROLESS NICKEL PLATED ALUMINIUM SHELL, P = PASSIVATED STAINLESS												
HARDWARE	01 = FIXED JACKPOSTS (STD), 02 = JACKSCREWS, STD LENGTH, HEX HEAD (STD), 03 = JACKSCREWS, STD LENGTH, SLOTTED, 04 = JACKSCREWS, LONG HEX, 05 = JACKSCREWS, LONG SLOTTED, 08 = NON-REMOVEABLE JACKSCREWS												
	A = WIRED PER FIGURE 5-4 OF ECSS-E-ST-50-12C Rev.1 (FOR NEW APPLICATIONS), AL = WIRED PER FIGURE 5-5 OF ECSS-E-ST-50-12C Rev.1 (FOR LEGACY APPLICATIONS)												
SPACE LEVEL SCREENING	M50 = SPACE GRADE MICRO-D, LEVEL 1, PER EEE-INST-002,												
	M53 = SPACE GRADE MICRO-D, LEVEL 2, PER EEE-INST-002, LEAVE BLANK FOR LAB GRADE												



OMNETICS
CONNECTOR CORPORATION

7260 Commerce Circle East, Minneapolis, MN 55342 – USA

SpaceWire Micro-D High-Speed Characterization

T210102 Rev1 – January 28, 2021



1. Product Description

- 1.1. Assembly P/N: A115042-001
- 1.2. Connector Description: 1-meter SpaceWire Micro-D Jumper
- 1.3. Cable Primaries¹: 26 AWG ePTFE 4X STP
- 1.4. Cable Shield: 38 AWG Silver Plated Copper (90% Min coverage)
- 1.5. Cable Jacket: Fluoroplastic, Blue
- 1.6. Insulator: 9-position

2. High-Speed Performance Targets²

- 2.1. Insertion Loss: 7dB to 600 MHz (3rd Harmonic)
- 2.2. Far End Crosstalk (FEXT): < 20dB to 1 GHz
- 2.3. Near End Crosstalk (NEXT): < 20dB to 1 GHz
- 2.4. Intra-pair Skew_{MAX}: < 0.5ns
- 2.4. Inter-Pair Skew_{MAX}: Intra-pair Skew_{MAX} + 0.07ns

	Parameter		Spec	1-METER	3-METER
2.1	Connector Differential Impedance	Z _{MIN}	75 Ω	98 Ω	98 Ω
		Z _{MAX}	125 Ω	124 Ω	124 Ω
2.2	Cable Differential Impedance	Z _{MIN}	90 Ω	96 Ω	96 Ω
		Z _{MAX}	100 Ω	105 Ω	106 Ω
2.3	Differential Insertion Loss	0.825 GHz	5 dB	5 dB	2 dB
		2.475 GHz	12 dB	9 dB	5 dB
		4.125 GHz	20 dB	12 dB	5 dB
		5.100 GHz	25 dB	15 dB	8 dB
2.4	Differential Far-End Crosstalk	FEXT _{MAX}	< -20dB	-31 dB	-38 dB
2.5	Intra-Pair Skew	Skew _{MAX}	112ps	15 ps	47 ps

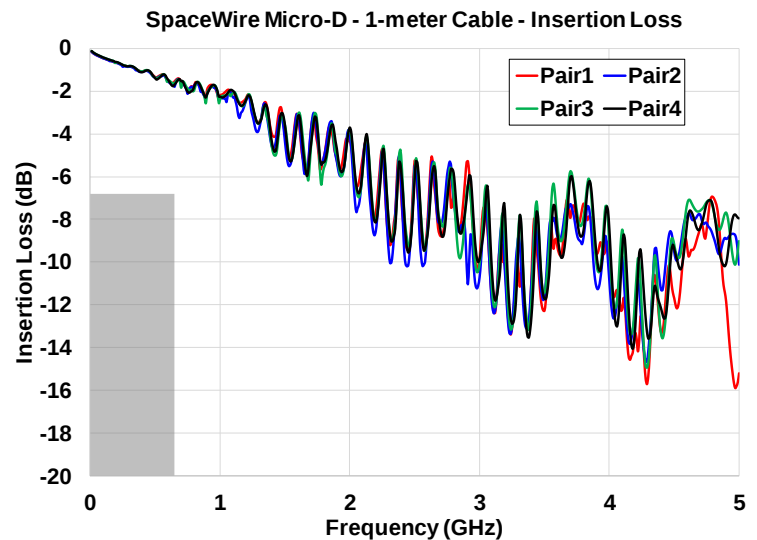
¹ Uses Gore GSC-05-82730-00 Cable.

² Per "ECSS-E-ST-50-12C-Rev.1", pages 46-50 (Section 5.3.4), May 15, 2019.

2.1 Differential Insertion Loss

Insertion loss is the ratio of the transmitted signal to the incident signal.

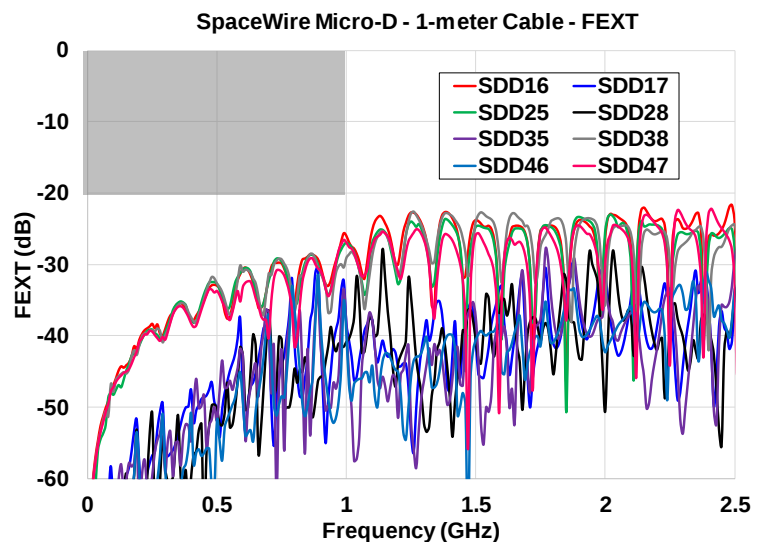
		Spec	1-meter
Differential Insertion Loss	LOSS _{600MHz}	> -7 dB	-1.6 dB



2.2 Differential Far-End Crosstalk (FEXT)

Far-End Crosstalk measures the unwanted coupling between differential pairs, measured from the input of one pair to the output of another pair.

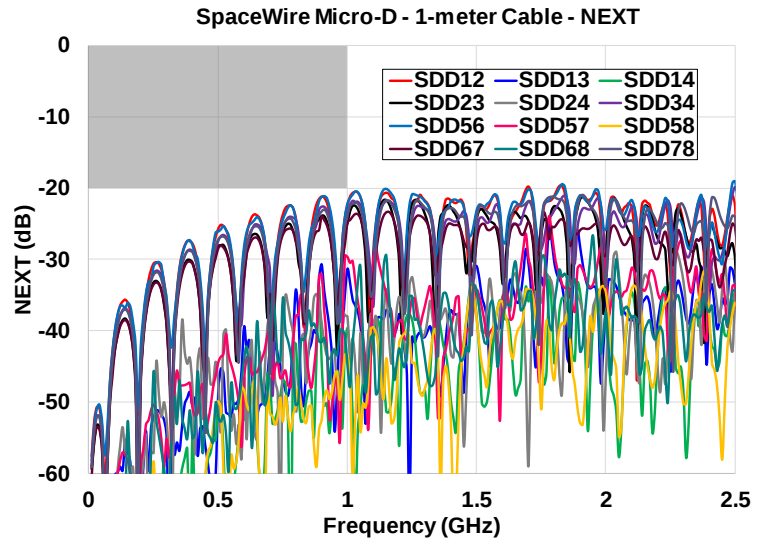
	SPEC	NEXT
SDD16	-20 dB	-26 dB
SDD17	-20 dB	-30 dB
SDD25	-20 dB	-27 dB
SDD28	-20 dB	-36 dB
SDD34	-20 dB	-23 dB
SDD35	-20 dB	-33 dB
SDD46	-20 dB	-31 dB
SDD47	-20 dB	-27 dB



2.3 Differential Near-End Crosstalk

Near-End Crosstalk measures the unwanted coupling between differential pairs, measured from the input of one pair to the input of another pair.

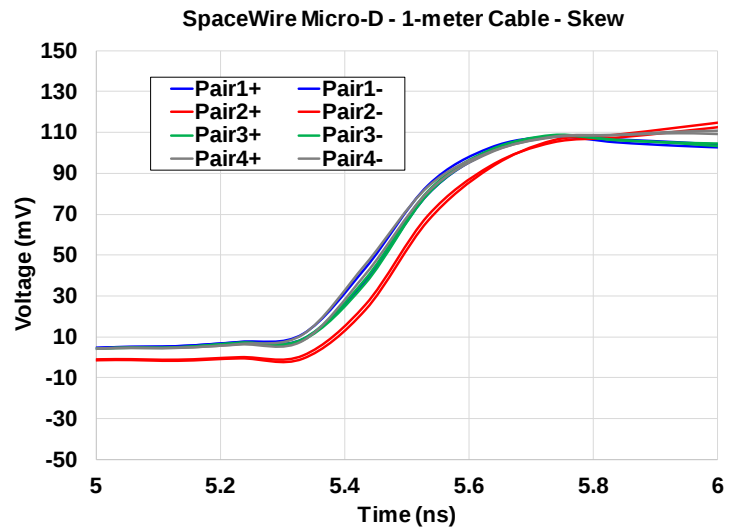
	SPEC	NEXT
SDD12	-20 dB	-21 dB
SDD13	-20 dB	-31 dB
SDD14	-20 dB	-34 dB
SDD23	-20 dB	-24 dB
SDD24	-20 dB	-35 dB
SDD56	-20 dB	-21 dB
SDD57	-20 dB	-29 dB
SDD58	-20 dB	-43 dB
SDD67	-20 dB	-24 dB
SDD68	-20 dB	-35 dB
SDD78	-20 dB	-23 dB



2.4 & 2.5 Intra-pair/Inter-pair Skew

Crosstalk measures the unwanted coupling between differential pairs.

		SPEC	Skew
Intra-pair Skew	Pair1	500 ps	9 ps
	Pair2	500 ps	15 ps
	Pair3	500 ps	5 ps
	Pair4	500 ps	3 ps
Inter-pair Skew	Pair1-Pair2	85 ps	20 ps
	Pair1-Pair3	85 ps	10 ps
	Pair1-Pair4	85 ps	10 ps
	Pair2-Pair3	85 ps	10 ps
	Pair2-Pair4	85 ps	30 ps
	Pair3-Pair4	85 ps	20 ps



Appendix 1 - Equipment List:

VNA	Keysight Technologies 2x M9805A, 4-port DC-26.5GHz Network Analyzer
Test Fixtures	Omnetics Custom

Revision Control:

Rev1	January 28. 2021
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MATERIALS

HOUSING & BACKSHELL:

ALUMINUM 6061-T6, NICKEL PLATE
PER SAE-AMS-2404

LATCH:

STAINLESS STEEL, NICKEL PLATE PER
ASTM D5138

INSULATOR:

LIQUID CRYSTAL POLYMER (LCP) PER
ASTM D5138

CONTACT:

BERYLLIUM COPPER PER ASTM B194,
C17200, GOLD PLATED PER ASTM
B488, (HARD GOLD) TYPE II CODE
C, CLASS 1.27

RETAINING PIN, SPRING, BAND CLAMP:

STAINLESS STEEL

HEAT SHRINK:

CROSS-LINKED POLYOLEFIN

CABLE:

PER ESCC-3902/003

NOTES:

1. P1 DIMENSIONS AND
NOTES APPLY TO P2
AND VICE VERSA.

2. MARK SHRINK TUBE
WITH THE FOLLOWING:

SPACEWIRE TYPE A

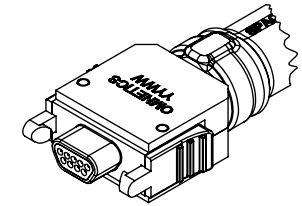
3. DIMENSIONS IN []
ARE IN MILLIMETERS
UNLESS OTHERWISE NOTED
AND ARE FOR
REFERENCE ONLY.

4. TERMINATE SHIELD OF
TWISTED PAIRS TO
BACKSHELL UNDER
BANDCLAMP.

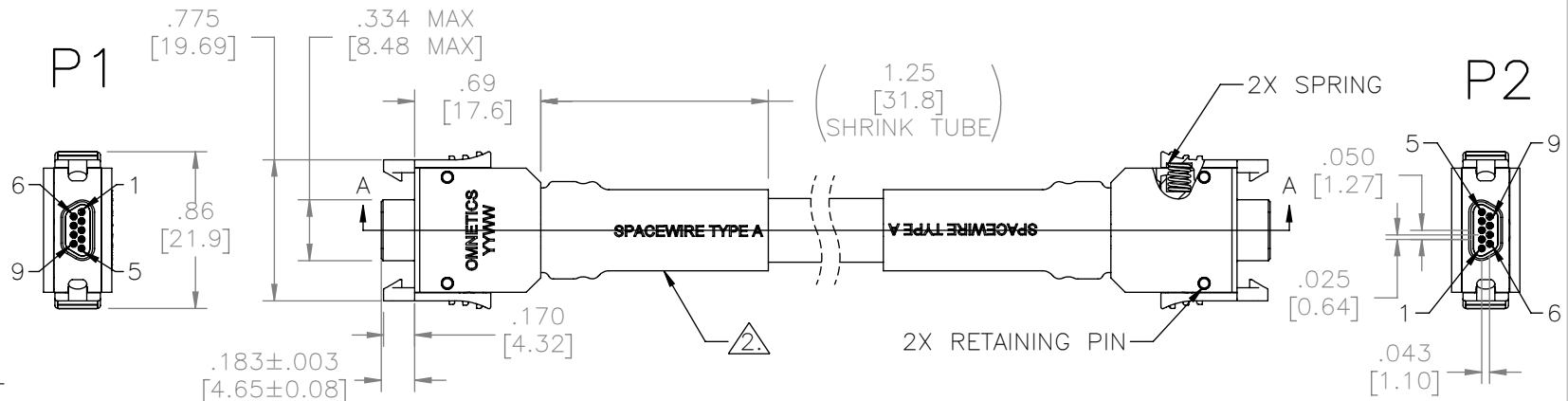
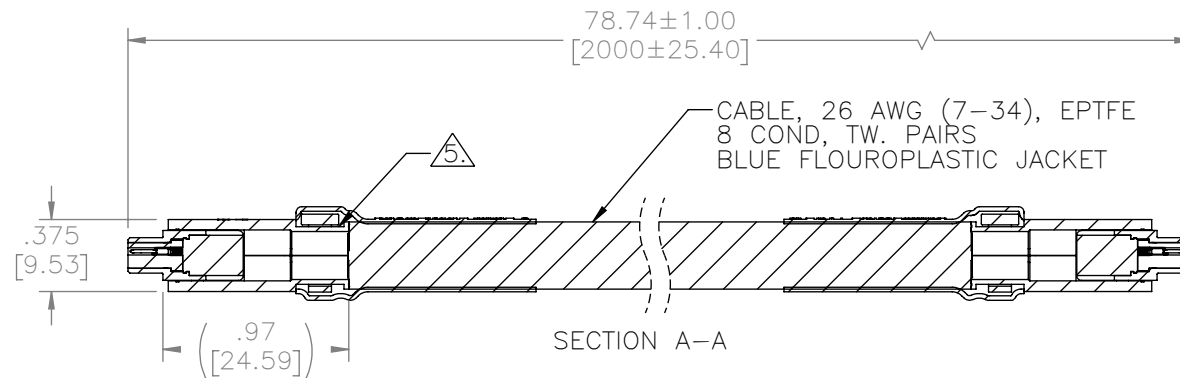
5. TERMINATE OUTERMOST
SHIELD UNDER BAND
CLAMP AND COVER
WITH SHRINK TUBE.

6. OMNETICS NOT
RESPONSIBLE FOR
CORROSION DUE TO
WIRE INSULATION.

WIRING DIAGRAM PER ECSS-E-ST-50-12C FIGURE 5-4						
P1 SIGNAL	P1	COLOR	P2	P2 SIGNAL	NOTES	
DIN+	1	WHITE	9	DOUT+		
DIN-	6	WHITE	5	DOUT-		
SIN+	2	WHITE	8	SOUT+		
SIN-	7	WHITE	4	SOUT-		
-	3	LEADLESS	3	-	-	-
SOUT-	4	WHITE	7	SIN-		
SOUT+	8	WHITE	2	SIN+		
DOUT-	5	WHITE	6	DIN-		
DOUT+	9	WHITE	1	DIN+		



ACTUAL SIZE
EXCLUDING CABLE LENGTH



THIRD ANGLE	
-TOLERANCES-	
UNLESS OTHERWISE NOTED	
DIMENSIONS IN INCHES	
2	PL DEC± .01
3	PL DEC± .005
4	PL DEC± .0005
ANGLES ± 1°	

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TITLE:
(8) LINE MALE/MALE
MICRO-D JUMPER ASSEMBLY
SPACEWIRE TYPE A
DFTM. JBE
DATE
03-06-20

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DWG NO. CAGE CODE **61873**
A115042-001
SHEET 1 OF 1 SCALE: 1:1 REV 2