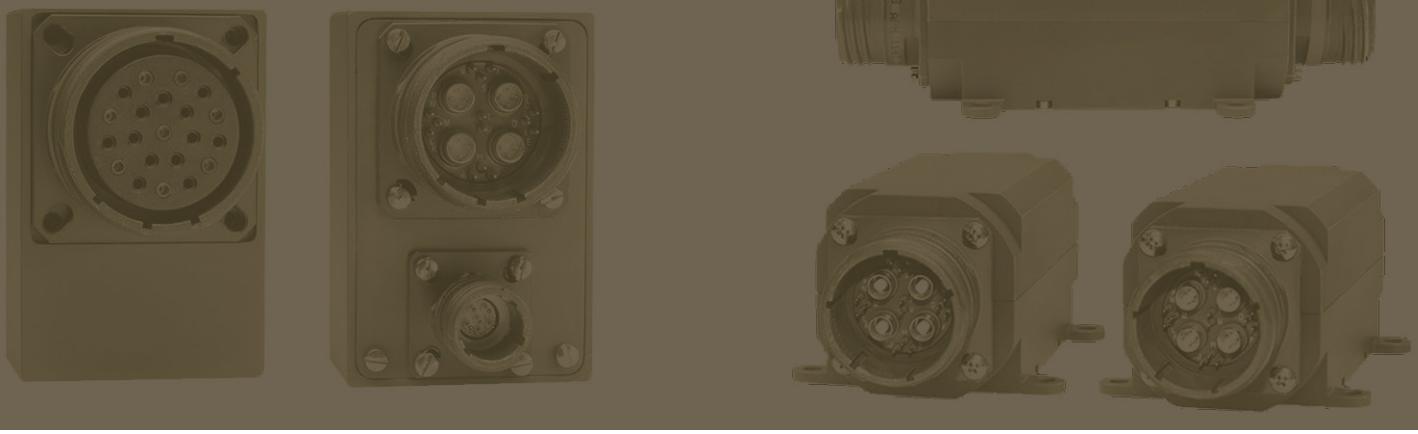


FALCON SERIES

DVI FIBER OPTIC MEDIA CONVERTER, 28 VDC, DUPLEX, MULTIMODE, 850 NM, QUADRAX

Falcon series DVI fiber optic media converters consist of optoelectronic transmitter and receiver functions integrated into a bulkhead mounted MIL-DTL-38999 connector assembly.

The optical transmitters are high output 850 nM VCSEL's. The optical receivers consist of GaAs PIN and preamplifier assemblies and limiting preamplifiers.

The electrical interface to the Falcon series DVI fiber optic media converters is a D38999/19-18 Quadrax connector enabling interconnection to a standard DVI connector interface with a Quadrax cable adaptor.

Falcon series DVI fiber optic media converters are vibration isolated, environmentally hardened components designed for use in harsh environment applications.

- Sealed against liquid and solid contaminants
- Shock and vibration resistant

MOOG

FALCON SERIES MIL-DTL-38999, DVI FIBER OPTIC MEDIA CONVERTER, QUADRAX, MULTIMODE, 28 VDC, 850 NM VCSEL'S

D38999 to Quadrax / Optical to Electrical Media Converter

FEATURES

- Optical fiber link distances up to 300 meters
- Maximum optical channel bit error rates less than $1x10^{-12}$
- Operating temperature range from -40° to +85° C
- Shock, vibration and immersion resistant per MIL-STD-810 and MIL-STD-1344
- Olive drab cadmium plating meets stringent corrosion performance specifications
- Aluminum alloy chassis and MIL-DTL-38999 housings are strong, durable, corrosion resistant and light weight
- MIL-T-29504 compliant optical fiber connector interface
- D38999 / Quadrax electrical interface provides robust interconnection to internal chassis wiring or backbone

APPLICATIONS

Falcon series bulkhead mounted DVI fiber optic media converters enable high speed video transmission over long distances in harsh environments.

- DVI link extension
- Remote display clusters
- Alternative display configurations

The MIL-DTL-38999, series III shell provides a sealed optical interface that is water-tight to MIL-STD-810 / IP67 / NEMA-4x when mated.

The multimode optical fiber interface supports applications where copper cable link distance, bandwidth, weight or bulk make the use of twisted pair, twinax or quadrax copper conductors unacceptable.

ORDERING INFORMATION

Application	Part Number
Dual DVI Transmitter, 28 VDC	M38R-8SAV-Hx

See Appendix A5 for more part number options.

FALCON SERIES MIL-DTL-38999, DVI FIBER OPTIC MEDIA CONVERTER, QUADRAX, MULTIMODE, 28 VDC, 850 NM VCSEL'S

ABSOLUTE MAXIMUM RATINGS

Absolute maximum limits mean that no catastrophic damage will occur if the product is subjected to these ratings for short periods, provided each limiting parameter is in isolation and all other parameters have values within the performance specification. It should not be assumed that limiting values of more than one parameter can be applied to the product at the same time.

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Storage Temperature	T_S	-55		+100	°C
Supply Voltage	V_{CC}	-0.5		45.0	V
Data Input Voltage	V_I	-0.5		V_{CC}	V

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Operating Temperature	T_A	-40		+85	°C
Supply Voltage	V_{CC}	+18.0	+28.0	+36.0	VDC
Power Supply Noise (p-p)	N_P			200	mV

MATERIALS

Item	Detail	Notes
D38999 Cylindrical Shells	Aluminum Alloy	
Plating	Olive Drab Cadmium	
D38999 Inserts	Composite Polymer	
Interfacial Seals	Elastomer	
Optical Alignment Sleeves	Thermoplastic	
Printed Circuits	Polyimide / FR-4	MIL-P-31032 Type 4
Housing	Aluminum Alloy	

OPTICAL TRANSMITTERS T_A = OPERATING TEMPERATURE RANGE, V_{CC} = 18.0 V TO 36.0 V

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Optical Output Power (BER<10^{-12})	P_I	-6.5		-1.0	dBm
Optical Output Wavelength	λ_{OUT}	830	850	860	nM
Spectral Width	$\Delta\lambda_{RMS}$			0.85	nM
Extinction Ratio	ER	9.0			dB
Optical Rise, Fall Time (20% to 80%)	$t_{R,F}$			80	pS

OPTICAL RECEIVERS T_A = OPERATING TEMPERATURE RANGE, V_{CC} = 18.0 V TO 36.0 V

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Optical Sensitivity (BER<10^{-12}, ER=9.0)	P_I	-19.0		0.0	dBm
Optical Wavelength	λ_{IN}	770		860	nM

POWER SUPPLY CURRENT T_A = OPERATING TEMPERATURE RANGE, V_{CC} = 18.0 V TO 36.0 V

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Supply Current	I_{CCT}			250	mA

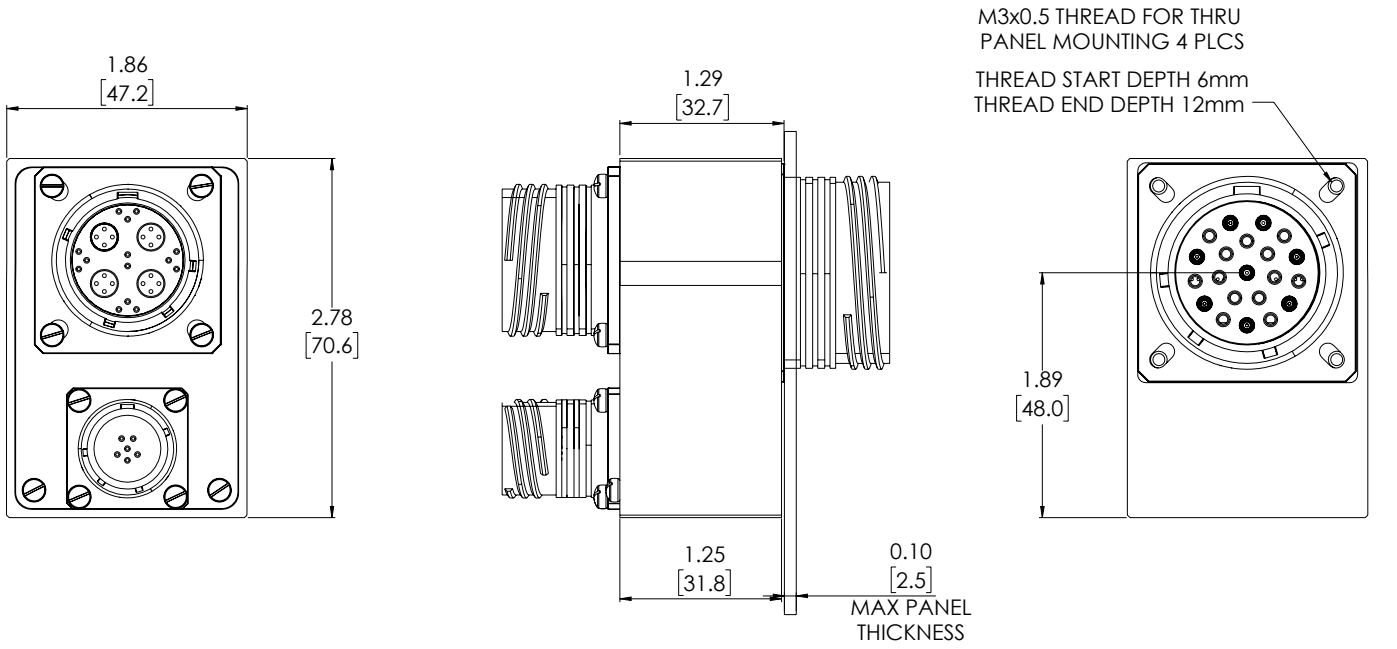
FALCON SERIES MIL-DTL-38999, DVI FIBER OPTIC MEDIA CONVERTER, QUADRAX, MULTIMODE, 28 VDC, 850 NM VCSEL'S

DESIGNED TO SPECIFICATIONS COMPLIANCE

Requirement	Condition	Specifications
Low Pressure-Altitude (Operating)	-15,000 feet, induced pressure (22.2 psia)	MIL-STD-810F, method 500.4 procedure II RTCA DO-160 Class I equipment specified in MIL-E-5400
High Pressure Altitude (Operating)	50,000 feet	MIL-STD-810F, method 500.4 procedure II RTCA DO-160 Class I equipment specified in MIL-E-5400
Rapid Decompression	8,000 ft (10.9 psia) to 42,000 ft (2.7 psia) in 15 seconds	MIL-STD-810F, method 500.4, procedure III RTCA DO-160
High Temperature Storage	Maximum temperature: 125° C (this is a non-operational test)	MIL-STD-810F, method 501.4 procedure I MIL-E-5400 class I equipment
High Temperature Operational	Maximum temperature: 85° C	MIL-STD-810F, method 501.4 procedure II MIL-E-5400 class I equipment– intermittent operation +71° C (30 minutes operating)
Low Temperature Storage	Minimum temperature: -55° C (this is a non-operational test)	MIL-STD-810F, method 502.4 procedure I MIL-E-5400 class I equipment
Low Temperature Operational	Minimum temperature: -40° C	MIL-STD-810F, method 502.4 procedure II MIL-E-5400 class I equipment
Rain, Wind Driven	Rainfall rate: 4.0 in/hr Wind @ 40 mph (wind from any directions) Duration: 40 minutes (this is a non-operational test)	MIL-STD-810F, method 506.4, procedure I
Humidity	100% RH, condensing in the form of both water and frost	MIL-STD-810G, method 507.5, procedure I, table 507.5 VII MIL-E-5400
Fungus	30° C, 94-100% RH, non-condensing, 28 days	MIL-STD-810F, method 508.5, table 508.5-I MIL-STD-454 requirement 4
Salt Fog	35° C, 4 days, 5 ± 1% solution concentration	MIL-STD-810F, method 509.4
Sand and Dust	6 hours continuous operation between 0.5 m/s – 2.4 m/s	MIL-STD-810F, methodD 510.4 procedure I, II and III
Explosive Atmosphere		MIL-STD-810F, method 511.4 procedure I MIL-E-5400
Acceleration (Structural)	9 g in each of three orthogonal axes	MIL-STD-810C method 513.2 procedure I
Acceleration (Operational)	6 g in each of three orthogonal axes	MIL-STD-810C method 513.2 procedure II
Vibration, Loose Cargo	This is a test of the shipping container	MIL-STD-810E, method 514.4, procedure II
Vibration, Performance	30 minutes of exposure Sinusodial fixed dwells: - 0.64 G's peak @ 102 Hz - 0.17 G's peak @ 204 Hz - 0.23 G's peak @ 306 Hz - 0.39 G's peak @ 408 Hz Random background: 0.0037 G2/Hz from 15 Hz to 500 Hz	MIL-STD-810E, method 514.4, procedure I, category 4
Vibration, Endurance	3 hours per axis of exposure Sinusodial fixed dwells: - 2.43 G's peak @ 102 Hz - 0.51 G's peak @ 204 Hz - 0.53 G's peak @ 306 Hz - 0.82 G's peak @ 408 Hz Random background: 0.0241 G2/Hz from 15 Hz to 500 Hz	MIL-STD-810E, method 514.4, procedure I, category 4
Shock, Operational	Figure 516.5-10, table 516.5-II flight vehicle equipment Three terminal peak saw tooth pulses_20 G peak, 11 msec Duration in each direction of three mutually perpendicular axes (18 total pulses)	MIL-STD-810F, method 516.5 procedure I (functional shock) RTCA/DO -160D, section 7, category A
Shock, Crash Safety	FIGURE 516.5-10, TABLE 516.5-VII Two terminal peak saw tooth pulses_40 G peak, 11 msec Duration in each direction of three mutually perpendicular axes (12 total pulses)	MIL-STD-810F, method 516.5, procedure V (crash hazard)
Shock, Transit Drop	48 inches	MIL-STD-810F, method 516.5, procedure IV

FALCON SERIES MIL-DTL-38999, DVI FIBER OPTIC MEDIA CONVERTER, QUADRAX, MULTIMODE, 28 VDC, 850 NM VCSEL'S

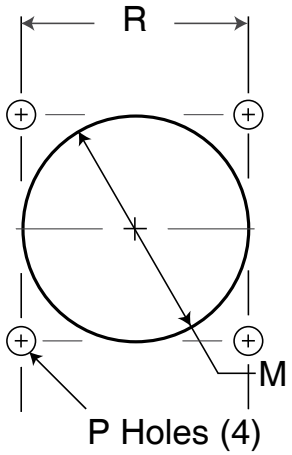
OUTLINE DRAWING



Dimensions are shown as: inches [mm]
Weight = 8.3 oz / 235 grams

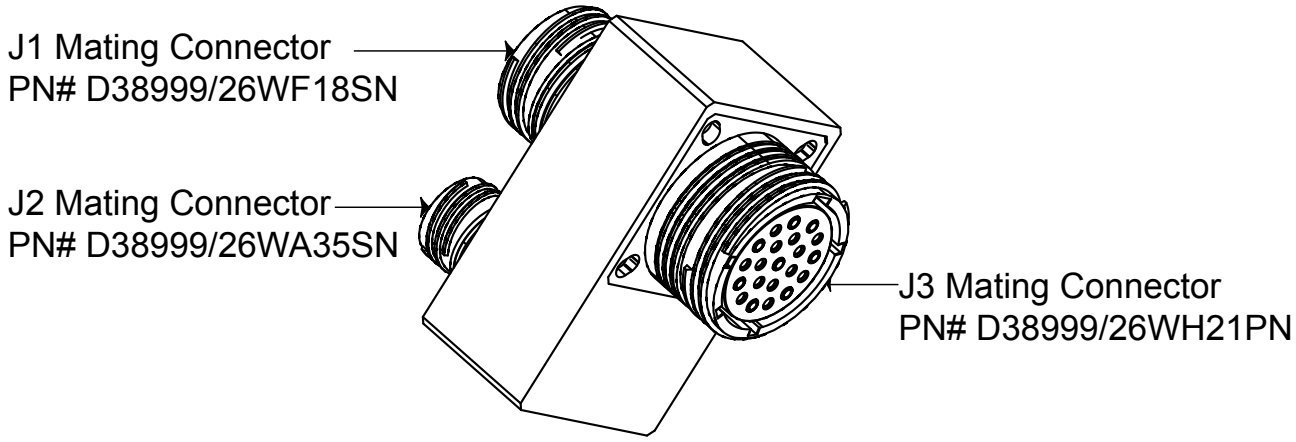
PANEL CUTOUT DIMENSIONS - REAR PANEL MOUNTING ONLY

Shell Size Code	Shell Size	M Min	P Holes	R Bsc
H	23	1.547 (39.29)	0.159 (4.0) 0.149 (3.8)	1.375 (34.9)



FALCON SERIES MIL-DTL-38999, DVI FIBER OPTIC MEDIA CONVERTER, QUADRAX, MULTIMODE, 28 VDC, 850 NM VCSEL'S

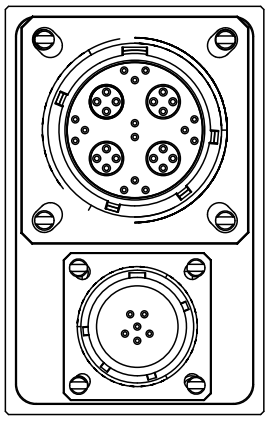
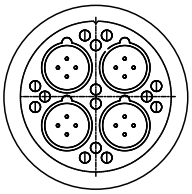
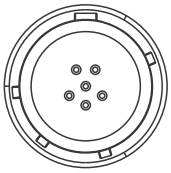
CONNECTION REQUIREMENTS

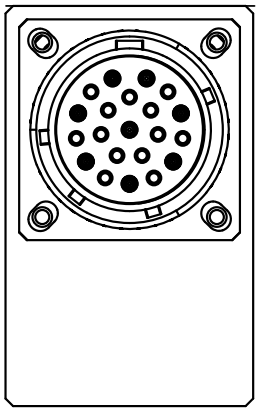
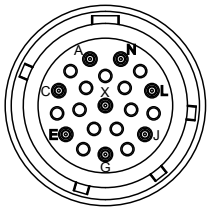


J3 Pin Number	DVI Port Number	DVI Cable Color	J3 Input / Output
J	0	Blue	O - TX
L	0	Blue	I - RX
N	1	Green	O - TX
G	1	Green	I - RX
X	2	Red	O - TX
A	2	Red	I - RX
E	3	Clock	O - TX
C	3	Clock	I - RX

FALCON SERIES MIL-DTL-38999, DVI FIBER OPTIC MEDIA CONVERTER, QUADRAX, MULTIMODE, 28 VDC, 850 NM VCSEL'S

MEDIA CONVERTER INSERT ARRANGEMENTS

		Media Converter Insert Assignments	Media Converter Pin Functions
	J1		**Electrical Signal Interface** See Appendix A3
	J2		**Power Supply Interface** See Appendix A4

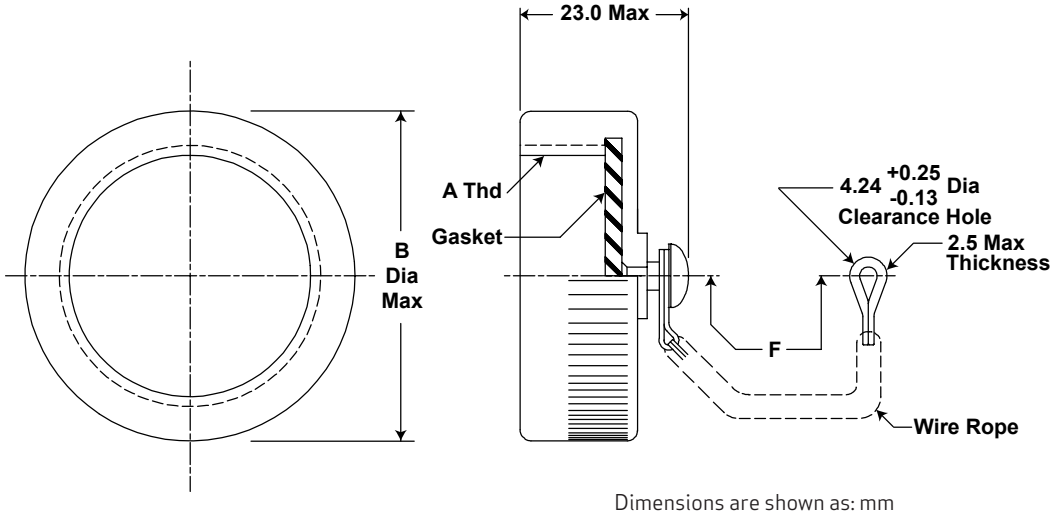
		Media Converter Optical Pin Numbers	Media Converter Optical Functions
	J3		**Optical Fiber Interface** See Appendix A2

FALCON SERIES MIL-DTL-38999, DVI FIBER OPTIC MEDIA CONVERTER, QUADRAX, MULTIMODE, 28 VDC, 850 NM VCSEL'S

APPENDIX A1 RECEPTACLE PROTECTION CAPS

*MIL-DTL-38999 / 33 Protection Cap Part Numbers

MS RECEPTACLE CAP P/N	*D38999 / 33W23R



Dimensions are shown as: mm

*See DSCC or SAE QPL for Approved Suppliers
http://www.dscc.dla.mil/programs/qmlqpl/QPLdetail.asp?QPL=38999

MIL-DTL-38999 / 33 OUTLINE DIMENSIONS

Shell Size Code	Shell Size	A Thread (Inches)	B Max Dia	F +13.0 -7.0
H	23	1.5000-0.1P-0.3L-TS	45.0	127.00

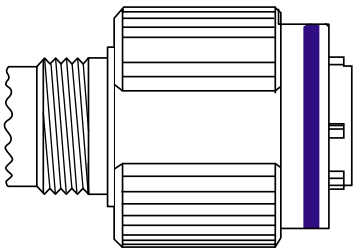
FALCON SERIES MIL-DTL-38999, DVI FIBER OPTIC MEDIA CONVERTER, QUADRAX, MULTIMODE, 28 VDC, 850 NM VCSEL'S

APPENDIX A2 MIL-DTL-38999 FIBER OPTIC CABLE PLUG / MIL-T-29504 PIN TERMINI

*See DSCC or SAE QPL for Approved Suppliers
http://www.dscc.dla.mil/programs/qmlqpl/QPLdetail.asp?QPL=38999

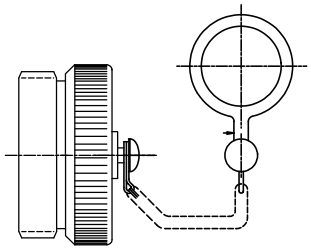
*D38999 PLUG - PIN INSERT
MIL-DTL-38999 CABLE PLUG

MS Plug P/N *D38999 / 26WH21PN



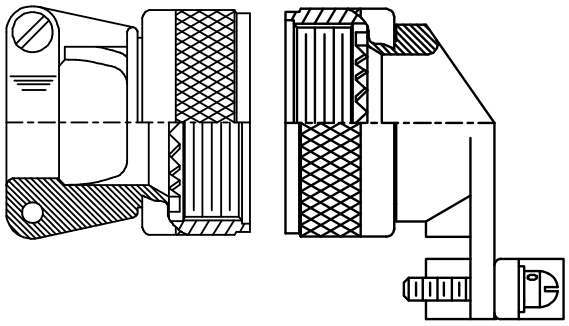
*CABLE PROTECTION CAP
D38999 / 32 PLUG PROTECTION CAP

MS Plug Cap P/N *D38999 / 32W23N



*CABLE BACKSHELL
MIL-C-85049 CABLE BACKSHELL

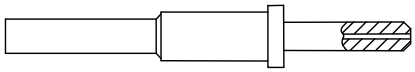
MS Backshell P/N *MS85049 / XXXXXX**



**Straight or angled backshell - defined by application / mounting configuration

*FIBER OPTIC PIN TERMINUS
MIL-T-29504 PIN TERMINUS

MS Pin Terminus P/N *M29504 / 04-xxxx**

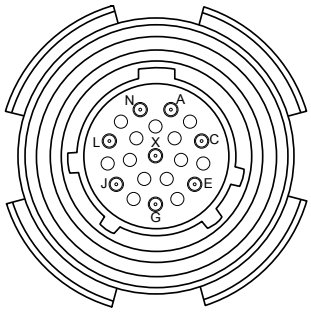


**Defined by fiber optic cable configuration

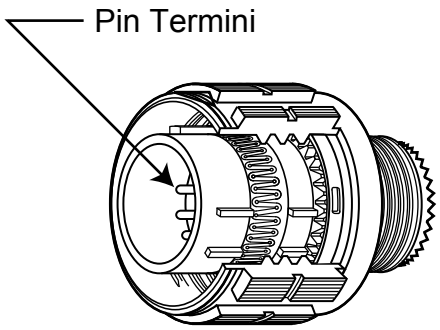
D38999 PLUG PORT FUNCTIONS

Port Number	TX	RX
0	J	L
1	N	G
2	X	A
3	E	C

TOP
Optical Cable Plug Interface

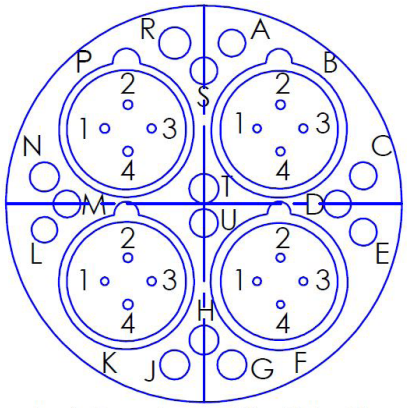


Front face of the optical cable plug pin insert shown. Transceiver insert oppostie.



APPENDIX A3 - J1 PIN FUNCTIONS - ELECTRICAL DATA CONNECTOR WIRING SCHEMATIC

TOP



Front of Quadrax - Pin Side Shown

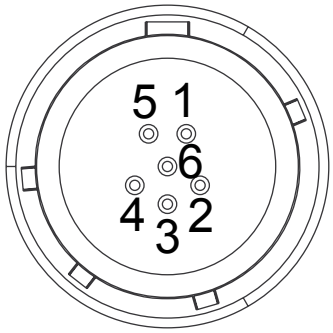
DVI TRANSMITTER AND RECEIVERS

Pin	Channel	Function	I/O	+ / -	Pin	Channel	Function	I/O	+ / -
A	N/A	No Connect	N/A	N/A	K1	3	TMDS - Clock	O	-
B1	3	TMDS - Clock	I	+	K2	3	TMDS - Clock	O	+
B2	3	TMDS - Clock	I	-	K3	2	TMDS - Red	O	-
B3	2	TMDS - Red	I	+	K4	2	TMDS - Red	O	+
B4	2	TMDS - Red	I	-	L	N/A	No Connect	N/A	N/A
C	N/A	No Connect	N/A	N/A	M	N/A	No Connect	N/A	N/A
D	N/A	No Connect	N/A	N/A	N	N/A	No Connect	N/A	N/A
E	N/A	No Connect	N/A	N/A	P1	1	TMDS - Green	O	-
F1	1	TMDS - Green	I	+	P2	1	TMDS - Green	O	+
F2	1	TMDS - Green	I	-	P3	0	TMDS - Blue	O	-
F3	0	TMDS - Blue	I	+	P4	0	TMDS - Blue	O	+
F4	0	TMDS - Blue	I	-	R	N/A	No Connect	N/A	N/A
G	N/A	No Connect	N/A	N/A	S	N/A	No Connect	N/A	N/A
H	N/A	No Connect	N/A	N/A	T	N/A	No Connect	N/A	N/A
J	N/A	No Connect	N/A	N/A	U	N/A	No Connect	N/A	N/A

APPENDIX A4 - J2 PIN FUNCTIONS - POWER SUPPLY CONNECTOR

ELECTRICAL POWER CABLE - CONNECTOR WIRING SCHEMATIC

TOP



Front view of the D38999 / 09-06 electrical insert shown, mating electrical cable plug opposite.

Pin	Function
1	Isolated Case Ground
2	Isolated Case Ground
3	Isolated Case Ground
4	Isolated Case Ground
5	18 - 36 VDC Return
6	18 - 36 VDC

FALCON SERIES MIL-DTL-38999, DVI FIBER OPTIC MEDIA CONVERTER, QUADRAX, MULTIMODE, 28 VDC, 850 NM VCSEL'S

APPENDIX A5 PART NUMBER OPTIONS

DVI FIBER OPTIC MEDIA CONVERTER, 850 nM

M38R - 8 S A V - H x x

SHELL CONFIGURATION
M38R = 38999 Receptacle

FIBER CHANNELS
8 = Eight

FIBER OPTIC INTERFACE
S = 850 nM MM

POWER SUPPLY VOLTAGE
A = 28.0 VDC

ELECTRICAL INTERFACE
V = DVI

SHELL SIZE CODE
H = 23 - 21

SHELL PLATING
F = NI
W = OD CD / NI
Z = ZN / NI

SHELL POLARIZATION
(Leave Blank) _ = N
A = A
B = B
C = C
D = D

Other wavelength, mounting and mounting and port options are available.

Please consult the website for alternate configurations.

MOOG

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www.moog.com