

## Spitfire Series

Gigabit Ethernet, Mil-Dtl-38999,  
1000Base-TX/SX Media Converter,  
Multimode, 850nm, 3.3Vdc

### Single Port, Jam Nut Receptacle

#### FEATURES

- Compliant with IEEE-802.3:2002 Gigabit Ethernet 1000Base-SX and 1000Base-TX
- Optical fiber link distances up to 550 Meters (50/125)
- Copper link distances up to 100 Meters (EIA/TIA Cat-5E)
- Operating temperature range from -40°C to +85°C
- Shock, vibration and immersion resistant per Mil-Std-810
- Olive Drab Cadmium plating meets stringent EMI / RFI and corrosion resistance performance specifications
- Aluminum housings are strong, durable and light weight
- Mil-T-29504 compliant optical fiber connector interface
- Mil-Dtl-38999 fiber optic insert configuration per Mil-Std-1560
- Mil-Dtl-83513 electrical interface with #2-56 jackposts

#### APPLICATIONS

Spitfire series Gigabit Ethernet media converters enable high speed optical network communications over long distances in harsh environments.

- Gigabit Ethernet switches and peripherals
- Telecom and datacom switch / router rack-to-rack links
- Storage or computation clusters

The Mil-Dtl-38999, Series III shell provides a sealed optical interface that is water-tight to Mil-Std-810 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 quadrx copper conductors unacceptable.



D38999 to M83513 / Optical to Electrical Media Converter

#### DESCRIPTION

Spitfire series Gigabit Ethernet media converters consist of optoelectronic transmitter and receiver functions integrated along with the 1000Base-TX electrical to 1000Base-SX optical media conversion circuitry into a wall mount Mil-Dtl-38999 connector assembly.

The optical transmitters are high output 850nm VCSEL lasers. The optical receivers consist of GaAs PIN and preamplifier assemblies and limiting post-amplifiers.

The electrical interface to the Spitfire series optical media converters is a Mil-Dtl-83513 Micro D-Subminiature pin connector enabling interconnection to a customer supplied flexible circuit or cable assembly.

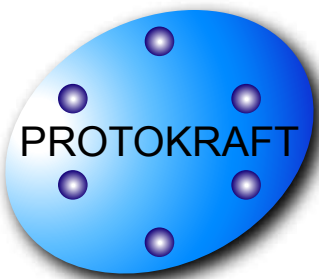
Spitfire series Gigabit Ethernet media converters are vibration isolated, environmentally hardened components designed for use in harsh environment applications.

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

### ORDERING INFORMATION

Application	Product Number
1000Base-T to 1000Base-SX	P38J-2S1T-DW-M
See Appendix A4 & A5 for more part number options	

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## Facilitating Secure Communications in Harsh Environments

Single Port Spitfire Series Mil-Dtl-38999 Jam Nut, 1000Base-T to 1000Base-SX Media Converter, Multimode, 3.3Volts, 850nm VCSELs

### 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		+4.5	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	$V_{cc}$	+3.135	3.3	+3.465	V
Power Supply Noise (p-p)	$N_p$			200	mV

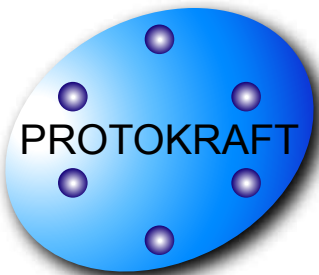
### SPECIFICATIONS COMPLIANCE

Requirement	Feature	Condition	Notes
MIL-STD-883	ESD	Class II	2200V
MIL-STD-810	Vibration	30.0g	18mS
MIL-STD-810	Shock	40.0g	6-9mS
MIL-STD-810	Immersion	1.0 meter	2 .0Hours
MIL-STD-1344	Flame Resistance	Method 1012	30 Seconds
MIL-STD-1344	Damp Heat	10 Cycles	24 Hours
MIL-STD-38999	Mating Durability	500 Cycles	<0.5dB Change
FDA / CDRH / IEC-825-1	Eye Safety	Class 1	No Safety Interlocks Required

### MATERIALS

Item	Detail	Notes
D38999 Cylindrical Shells	Aluminum Alloy	
D38999 Cylindrical Shell Platings	Olive Drab Cadmium	
Inserts	Thermoplastic	
Interfacial Seals	Elastomer	
Alignment Sleeves	Arcap	
Printed Circuits	Polyimide / FR-4	Mil-P-31032 Type 4
Backshell	Aluminum Alloy	

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Single Port Spitfire Series Mil-Dtl-38999 Jam Nut, 1000Base-T to 1000Base-SX Media Converter, Multimode, 3.3Volts, 850nM VCSELS

### OPTICAL TRANSMITTERS $T_A$ = Operating Temperature Range, $V_{CC}$ = 3.135V to 3.465V

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Optical Output Power	$P_o$	-9.5		-4.0	dBm
Optical Output Wavelength	$\lambda_{OUT}$	830	850	860	nM
Spectral Width	$\Delta\lambda_{RMS}$			0.85	nM

### OPTICAL RECEIVERS $T_A$ = Operating Temperature Range, $V_{CC}$ = 3.135V to 3.465V

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Optical Sensitivity	$P_i$	-17.0		-2.0	dBm
Optical Wavelength	$\lambda_{IN}$	830	850	860	nM

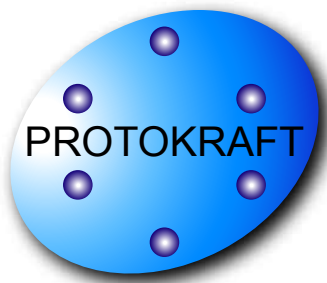
### POWER SUPPLY CURRENT $T_A$ = Operating Temperature Range, $V_{CC}$ = 3.135V to 3.465V

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Supply Current per Port	$I_{CCT}$		450	600	mA

### OPTICAL LINK DISTANCES

Protocol	Cable Specification	Distance
Gigabit Ethernet - IEEE-802.3:2005 - 1000BASE-SX	62.5/125 $\mu$ 200MHz*Km	275M
	50/125 $\mu$ 500MHz*Km	550M

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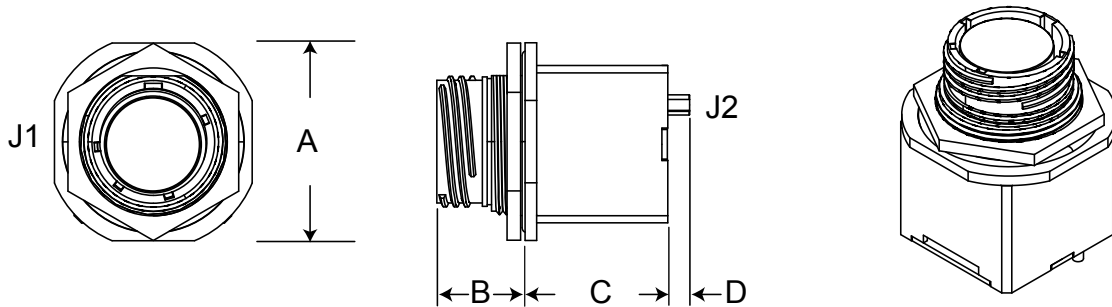


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Single Port Spitfire Series Mil-Dtl-38999 Jam Nut, 1000Base-T to 1000Base-SX Media Converter, Multimode, 3.3Volts, 850nm VCSELs

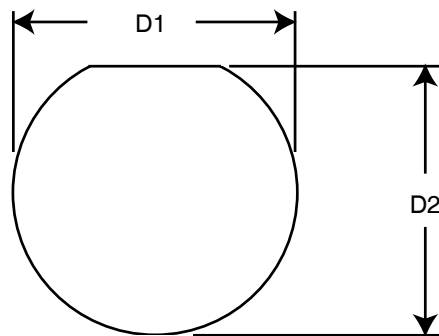
### OUTLINE DRAWING

Dimensions are shown as: inches (mm)



### Outline Dimensions

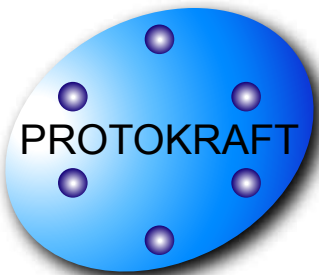
Shell Size Code	Shell Size	A Max	B Max	C Max	D Max	J1	J2
D	15	1.500 (38.10)	0.890 (22.60)	1.25 (31.75)	0.285 (7.239)	D38999/ 24WD5SN	Mil-Dtl-83513/ 28-B01NW



### Panel Cutout Dimensions

Shell Size Code	Shell Size	D1 Min	D2 Min
D	15	1.135 (28.83)	1.085 (27.56)

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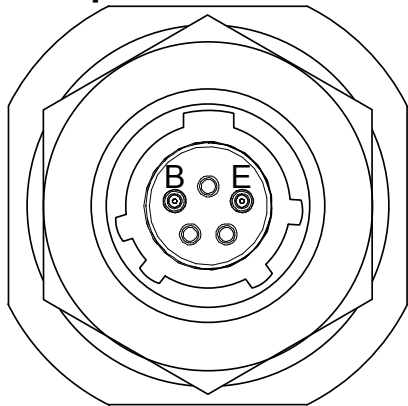


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Single Port Spitfire Series Mil-Dtl-38999 Jam Nut, 1000Base-T to 1000Base-SX Media Converter, Multimode, 3.3Volts, 850nm VCSELs

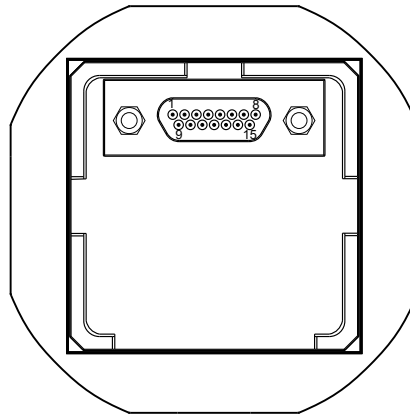
**MEDIA CONVERTER INSERT ARRANGEMENT**

**TOP**  
**Optical Interface**



Optical interface of the media converter shown, fiber optic cable plug opposite - see Appendix A2 for details

**TOP**  
**Electrical Interface**



Electrical interface of the media converter shown - see Electrical Pin Functions page and Appendix A3 for details

**MEDIA CONVERTER FIBER OPTIC RECEPTACLE PORT ASSIGNMENTS**

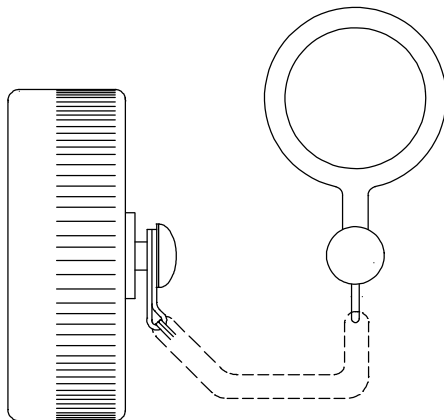
PORT NUMBER	TX	RX
0	B	E

**RECEPTACLE PROTECTION CAPS**

**\*MIL-DTL-38999/33 PROTECTION CAP PART NUMBERS**

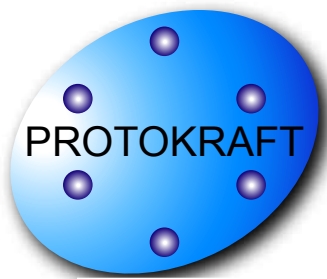
MS RECEPTACLE CAP P/N

See APPENDIX A1



\*See DSCC or SAE QPL for Approved Suppliers

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## Facilitating Secure Communications in Harsh Environments

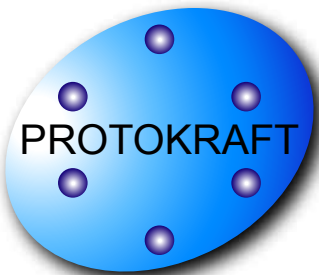
Single Port Spitfire Series Mil-Dtl-38999 Jam Nut, 1000Base-T to 1000Base-SX Media Converter, Multimode, 3.3Volts, 850nM VCSELS

### ELECTRICAL PIN ASSIGNMENTS

MIL-DTL-83513 MICRO D-SUBMINIATURE ELECTRICAL INTERFACE			
PIN #	FUNCTION	Input / Output	Logic Family
1	MDA+	Input / Output	IEEE-802.3:2005 1000Base-T
2	MDA-	Input / Output	IEEE-802.3:2005 1000Base-T
3	MDB+	Input / Output	IEEE-802.3:2005 1000Base-T
4	MDB-	Input / Output	IEEE-802.3:2005 1000Base-T
5	MDC+	Input / Output	IEEE-802.3:2005 1000Base-T
6	MDC-	Input / Output	IEEE-802.3:2005 1000Base-T
7	MDD+	Input / Output	IEEE-802.3:2005 1000Base-T
8	MDD-	Input / Output	IEEE-802.3:2005 1000Base-T
9	GND	N/A	N/A
10	GND	N/A	N/A
11	GND	N/A	N/A
12	GND	N/A	N/A
13	Vcc	N/A	N/A
14	Reset	Input	LVTTTL - with Internal Pullup
15	Vcc	N/A	N/A

All Reset Functions: Logic "0" Input = Restart, registers initialized; Logic "1", Open or High Z Input = Normal Operation

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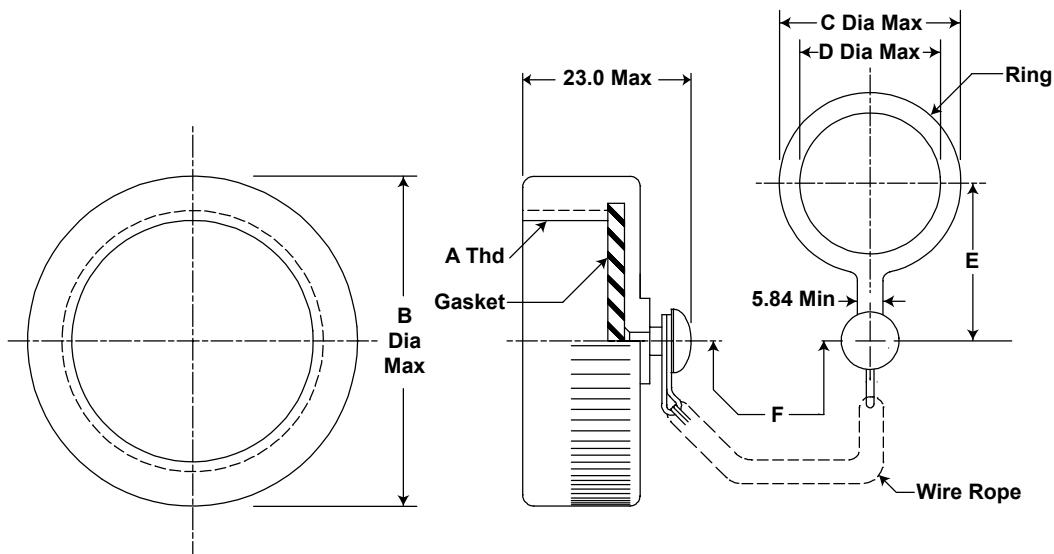
**APPENDIX A1**

**RECEPTACLE PROTECTION CAPS**

**\*MIL-DTL-38999/33 PROTECTION CAP PART NUMBERS**

MS RECEPTACLE CAP P/N

\*D38999/33W15N

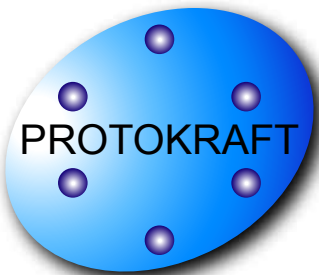


\*See DSCC or SAE QPL for Approved Suppliers  
<http://www.dsccl.dla.mil/programs/qmlqpl/QPLdetail.asp?QPL=38999>

**MIL-DTL-38999/33 Outline Dimensions - mm**

Shell Size Code	Shell Size	A Thread (inches)	B Max Dia	C Max Dia	D Max Dia	E	F +13.0 -7.0
D	15	1.0000-0.1P-0.3L-TS	32.0	40.0	29.92	31.00 25.00	127.0

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Single Port Spitfire Series Mil-Dtl-38999 Jam Nut, 1000Base-T to 1000Base-SX Media Converter, Multimode, 3.3Volts, 850nm VCSELs

## APPENDIX A2

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

\*See DSCC or SAE QPL for Approved Suppliers

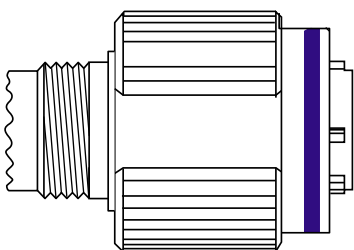
<http://www.dsccl.dla.mil/programs/qmlqpl/QPLdetail.asp?QPL=38999>

#### \*D38999 PLUG - PIN INSERT

##### MIL-DTL-38999 CABLE PLUG

MS PLUG P/N

\*D38999/26WD5PN

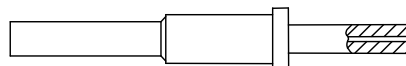


#### \*FIBER OPTIC PIN TERMINUS

##### MIL-T-29504 PIN TERMINUS

MS PIN TERMINUS P/N

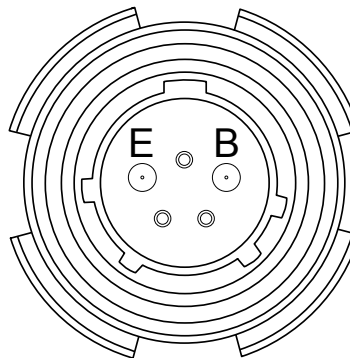
\*M29504/04-xxxx\*\*



\*\*defined by fiber optic cable configuration

#### D38999 PLUG PORT FUNCTIONS

PORT NUMBER	TX	RX
0	B	E



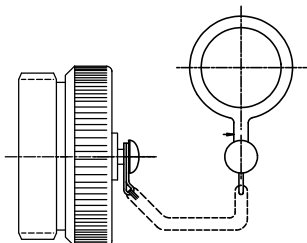
Front face of the optical cable plug pin insert shown. Transceiver insert opposite.

#### \*CABLE PROTECTION CAP

##### D38999/32 PLUG PROTECTION CAP

MS PLUG CAP P/N

\*D38999/32W15N

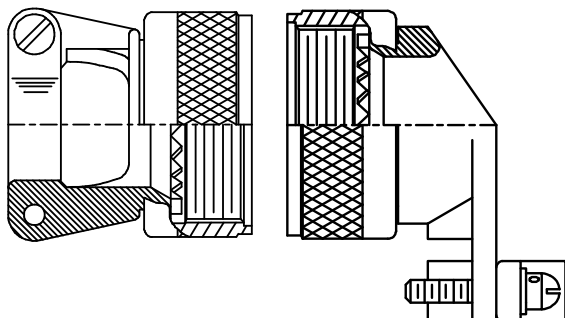


#### \*CABLE BACKSHELL

##### MIL-C-85049 CABLE BACKSHELL

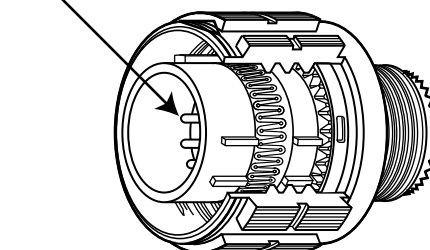
MS BACKSHELL P/N

\*MS85049/xxxxxx\*\*

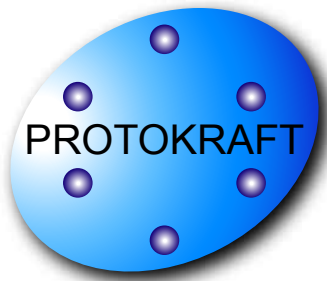


\*\*Straight or angled backshell - defined by application / mounting configuration

Pin Termini







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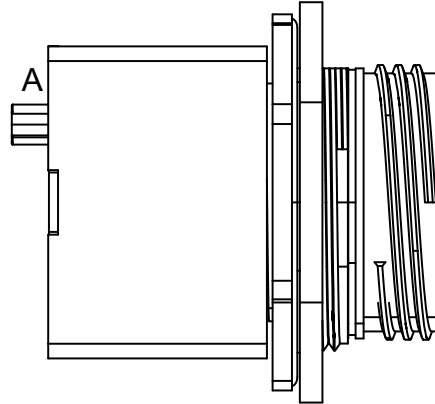
Single Port Spitfire Series Mil-Dtl-38999 Jam Nut, 1000Base-T to 1000Base-SX Media Converter, Multimode, 3.3Volts, 850nm VCSELs

### APPENDIX A3 Mil-Dtl-83513 Conector / Cable Assembly Guide

#### Cable Assembly or Flexible PCB

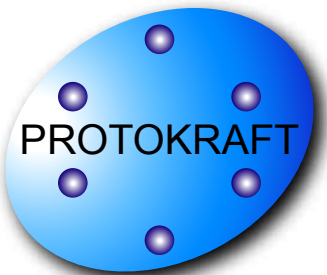


#### Optical Media Converter



A= M83513 / 28 - BO1NW  
B= M83513 / 02 - BN

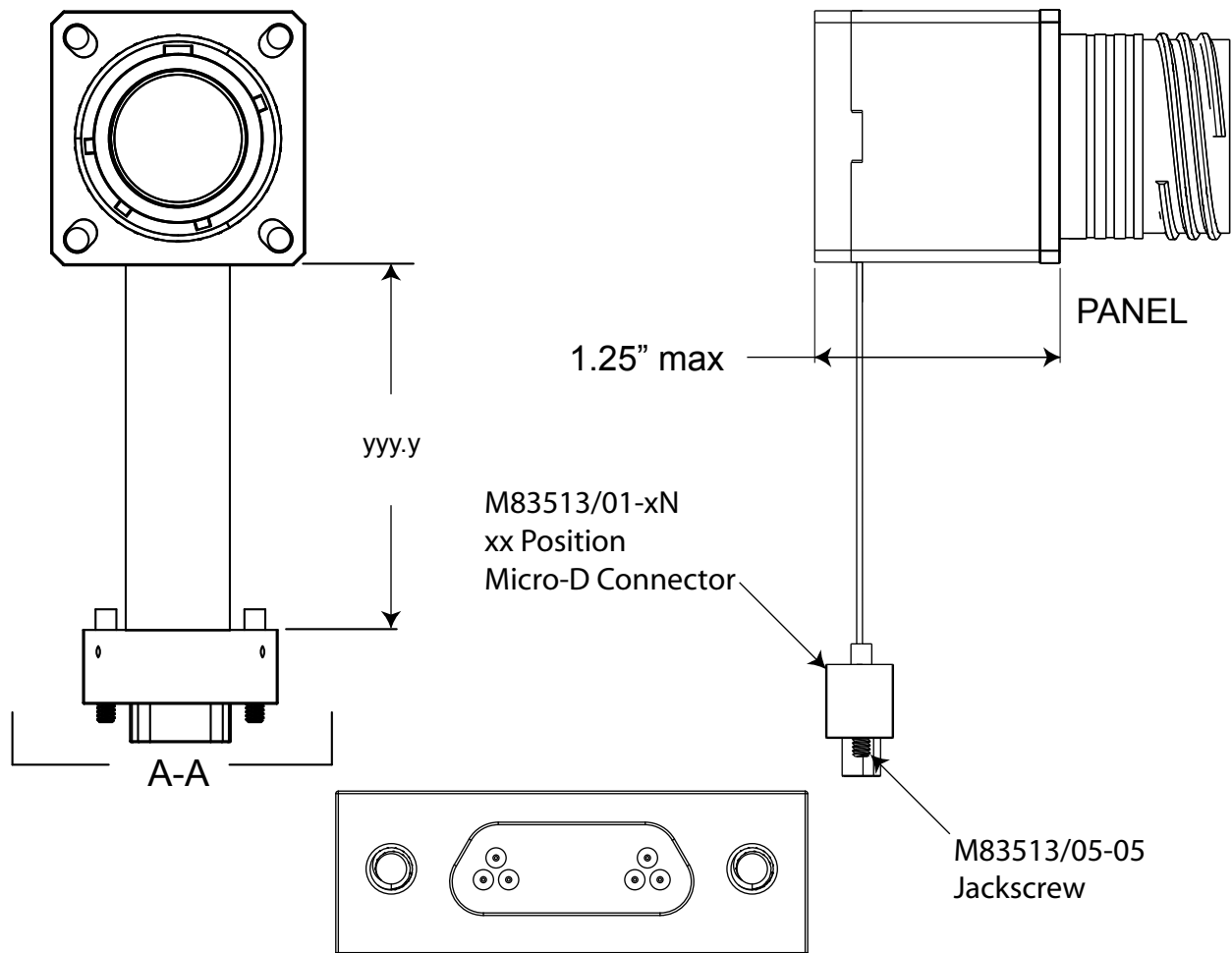
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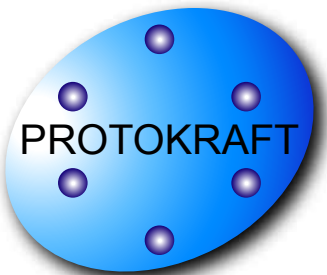
**APPENDIX A4**  
**CABLE ASSEMBLY PART NUMBER OPTIONS**



VIEW A-A

**P38x-xxxx-xxx-M-Cxxx**  
**xxx = ID # assigned by Protokraft**

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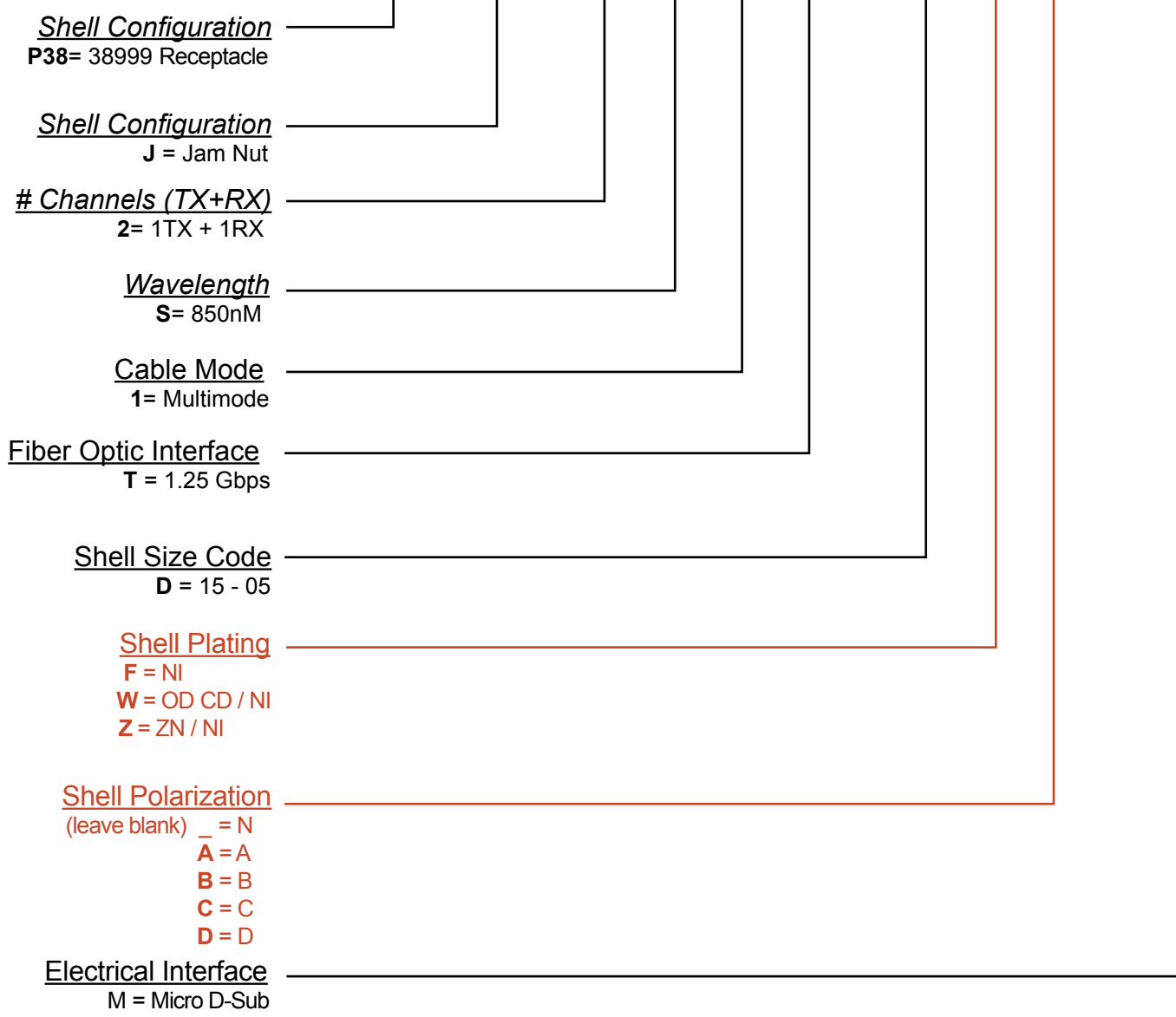


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### APPENDIX A5 PART NUMBER OPTIONS Dual Port, GbE, Jam Nut, VCSEL

**P38 J - 2 S 1 T - D X X - M**



Other wavelength, mounting and port count options are available. Please consult the Protokraft website for alternate configurations.

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