PROTOKRAFT

Facilitating Secure Communications in Harsh Environments

Spitfire Series

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

Single Port, Size 15 Flange Receptacles

Mil-DTL-38999 Optical to Mil-Dtl-83513 Electrical

FEATURES

- Compliant with IEEE-802.3:2005 Gigabit Ethernet 1000Base-SX and 1000Base-T
- Optical fiber link distances up to 550 Meters (50/125)
- 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 bulkhead mounted Gigabit Ethernet media converters enable high speed 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 quadrax copper conductors unacceptable.

DESCRIPTION

Spitfire series Gigabit Ethernet media converters consist of optoelectronic transmitter and receiver functions integrated along with the 1000Base-T 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	Item Number
1000Base-T to 1000Base-SX	P38F-2S1T-DW-M
See Appendix A4 & A5 for more part number options	

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Single Port Spitfire Series Mil-Dtl-38999, 1000Base-T to 1000Base-SX, Gigabit Ethernet Media Converter, Multimode, 3.3Vdc, 850nM 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		+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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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	λ_{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	λ_{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	62.5/125µ 200MHz*Km	275M
	50/125µ 500MHz*Km	550M

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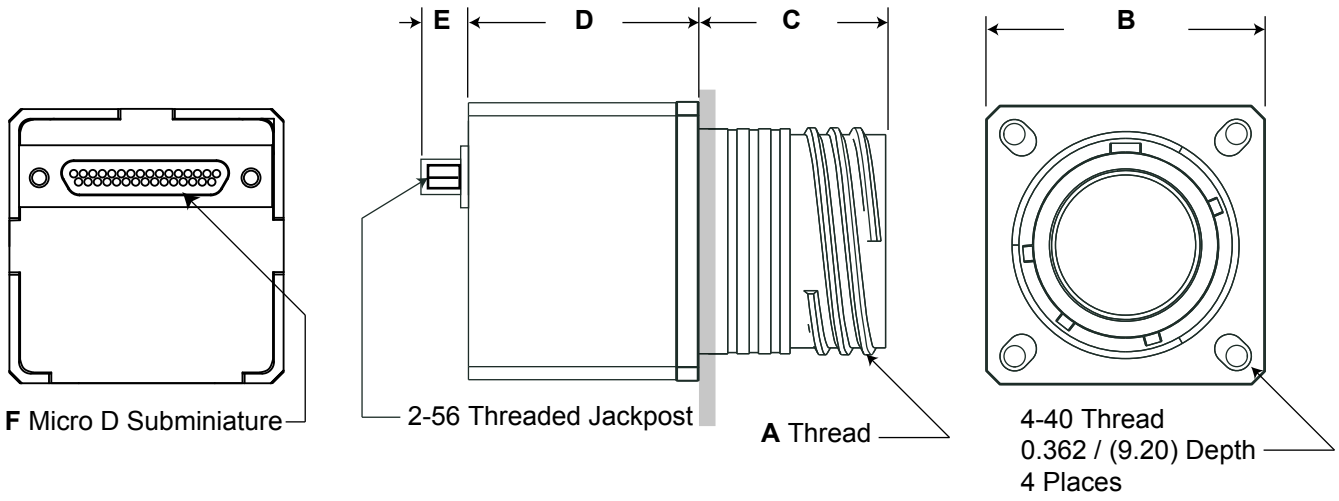
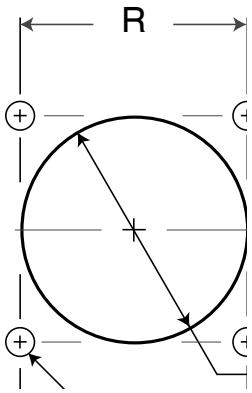
OUTLINE DRAWING

Dimensions are shown as: inches (mm)



Outline Dimensions

38999 Shell Size Code	38999 Shell Size	A Thread	B Sq. Max	C Max	D	E	F
D	15	1.0000-.1P-.3L-TS-2A	1.231 (31.3)	0.820 (20.8)	1.01 (25.7)	0.285 (7.239)	Mil-Dtl-83513/ 28-B01NW



Panel Cutout Dimensions

Rear Panel Mounting Only

Shell Size Code	Shell Size	M Min	P Holes	R Bsc
D	15	1.047 (26.59)	0.133 (3.4) 0.123 (3.1)	0.969 (24.6)

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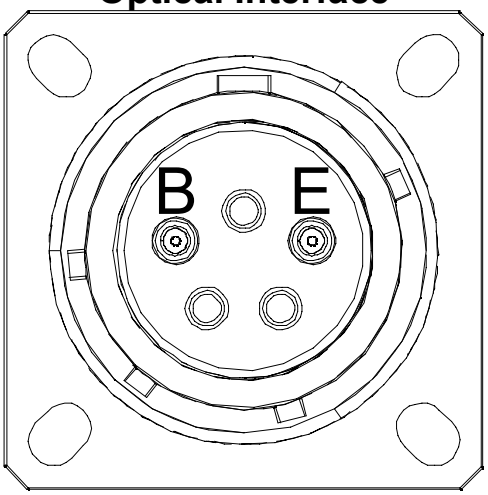
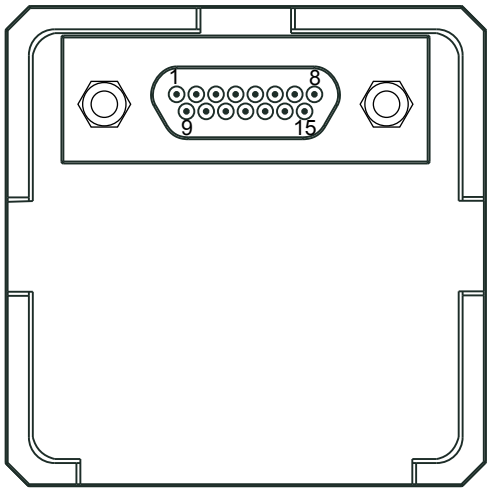
MEDIA CONVERTER OPTICAL INSERT AND ELECTRICAL PIN ARRANGEMENT

TOP
Optical Interface



Front view of the media converter 38999 optical insert shown, fiber optic cable plug opposite - see Appendix A2 for details

TOP
Electrical Interface



Back view of the media converter Micro D Pin arrangement shown, electrical cable receptacle opposite - see Appendix A3 for details

OPTICAL PORT ASSIGNMENTS

MIL-DTL-38999 OPTICAL INTERFACE		
PORT NUMBER	**TX**	**RX**
0	B	E

ELECTRICAL PIN ASSIGNMENTS

MIL-DTL-83513 ELECTRICAL INTERFACE	
PIN NUMBER	**FUNCTION**
1	MDA+
2	MDA-
3	MDB+
4	MDB-
5	MDC+
6	MDC-
7	MDD+
8	MDD-

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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	$\overline{\text{Input}}$	LVTTL - 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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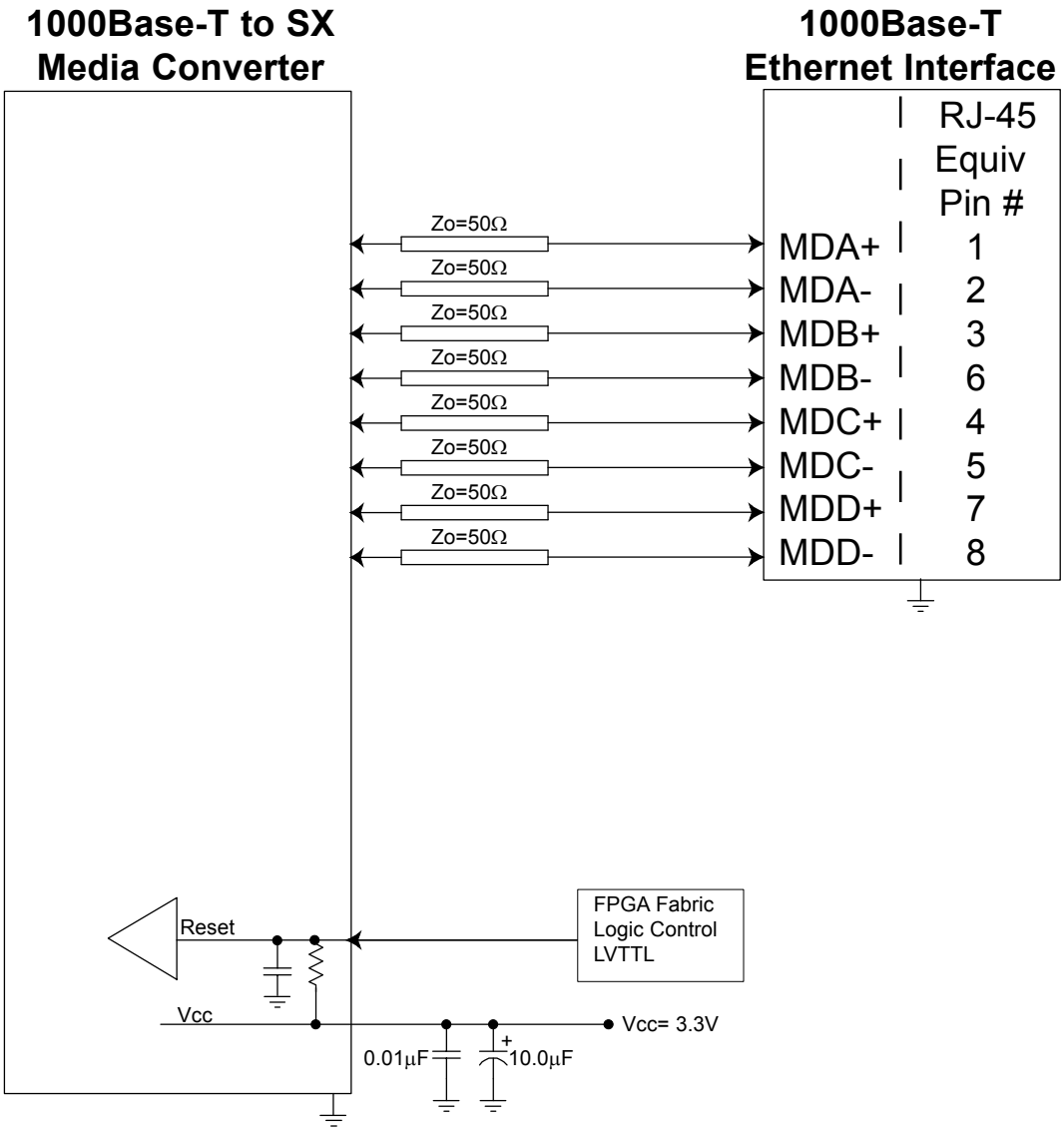
APPLICATION SCHEMATIC

For Single Port 1000Base-T to 1000Base-SX Media Converter Applications



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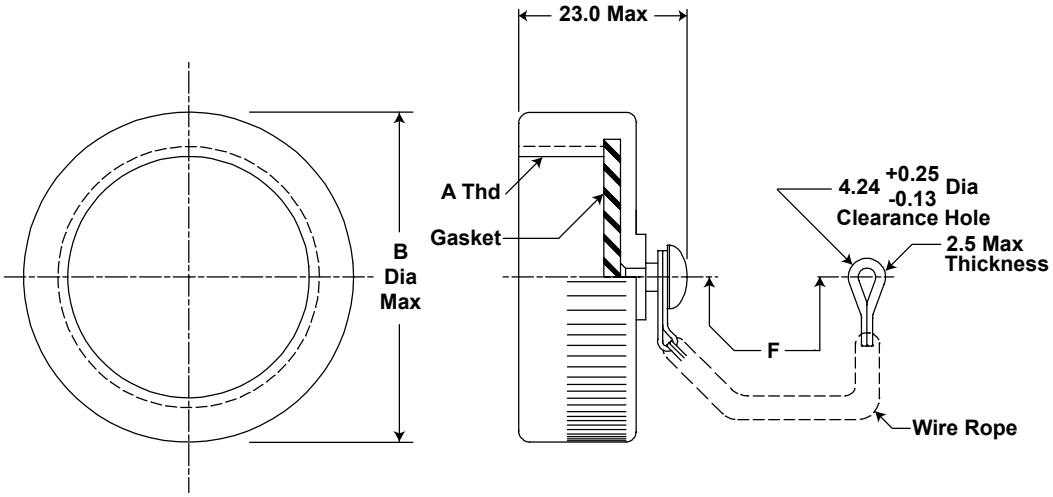
APPENDIX A1

RECEPTACLE PROTECTION CAPS

*MIL-DTL-38999/33 PROTECTION CAP PART NUMBERS	
MS RECEPTACLE CAP P/N	*D38999/33W15R



*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 - mm				
Shell Size Code	Shell Size	A Thread (inches)	B Max Dia	F +13.0 -7.0
D	15	1.0000-.1P-.3L-TS-2A	32.0	127.0

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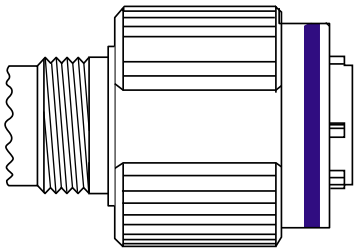
APPENDIX A2

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

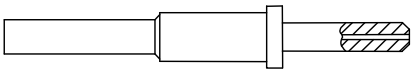
*D38999 PLUG - PIN INSERT

MIL-DTL-38999 CABLE PLUG	
MS PLUG P/N	*D38999/26WD5PN



*FIBER OPTIC PIN TERMINUS

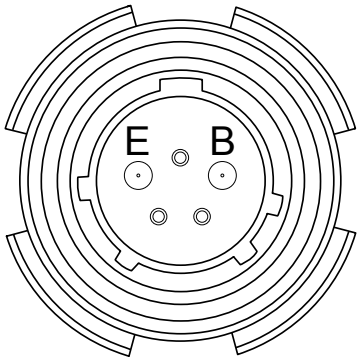
MIL-T-29504 PIN TERMINUS	
MS PIN TERMINUS P/N	*M29504/04-xxxx**



**defined by fiber optic cable configuration

D38999 PLUG PORT FUNCTIONS

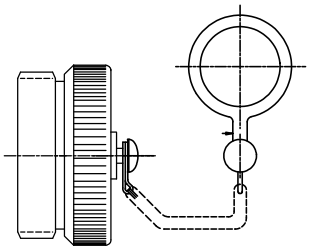
PORT NUMBER	TX	RX
0	B	E



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

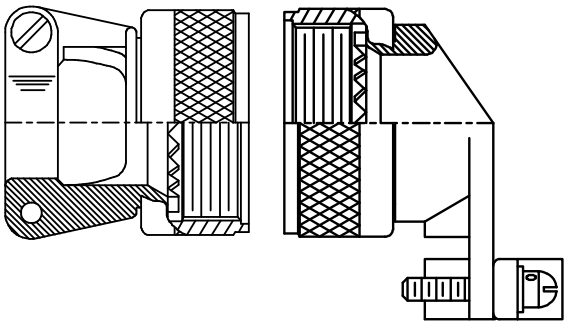
*CABLE PROTECTION CAP

D38999/32 PLUG PROTECTION CAP	
MS PLUG CAP P/N	*D38999/32W15N

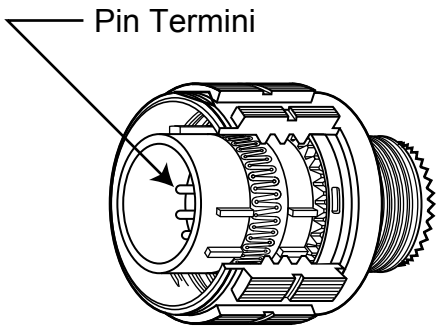


*CABLE BACKSHELL

MIL-C-85049 CABLE BACKSHELL	
MS BACKSHELL P/N	*MS85049/xxxxxx**



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



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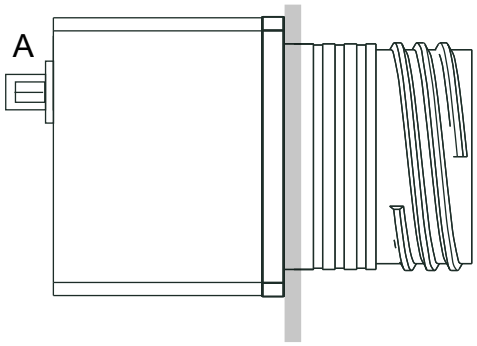
APPENDIX A3

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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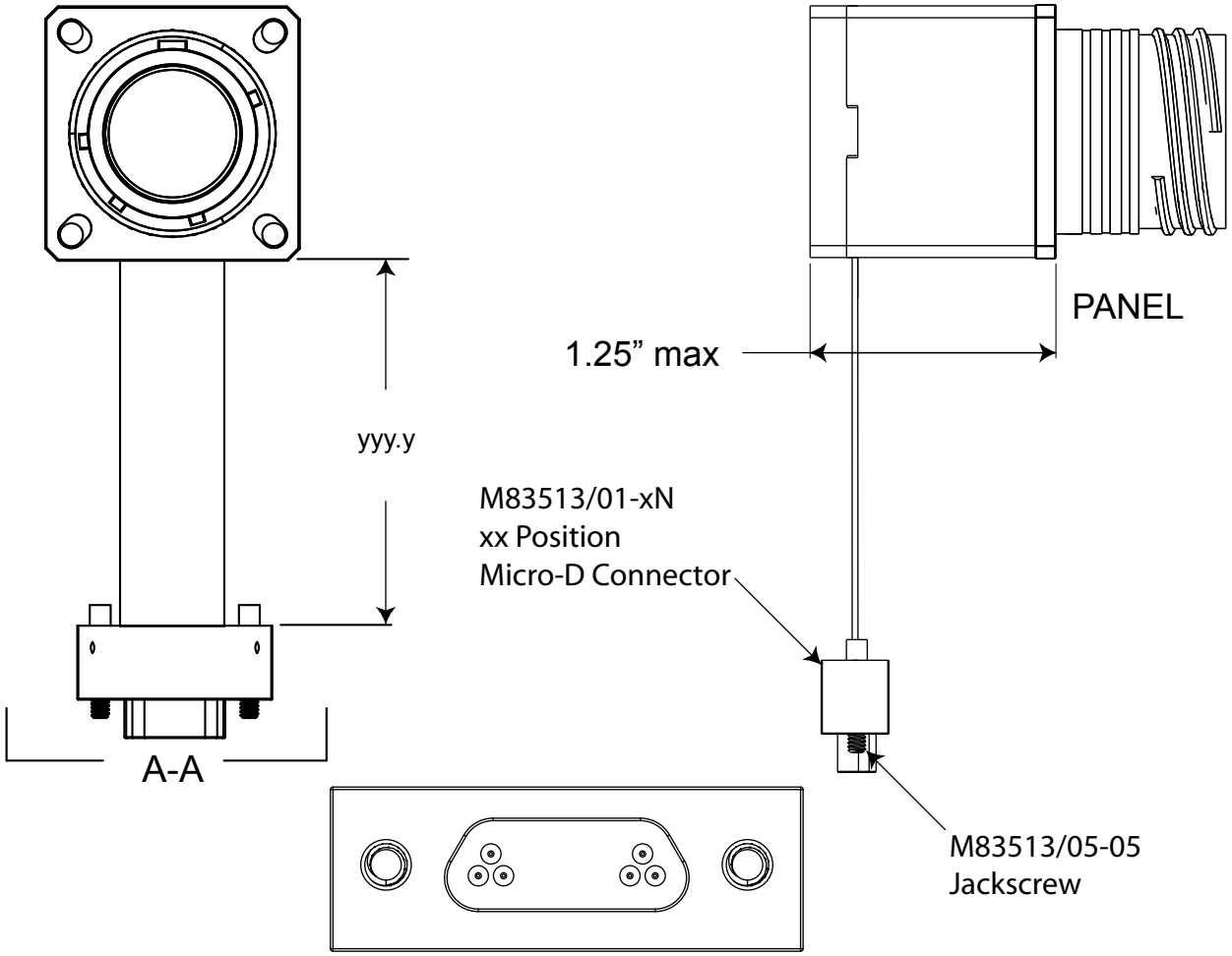
APPENDIX A4

CABLE ASSEMBLY PART NUMBER OPTIONS



VIEW A-A

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

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APPENDIX A5

PART NUMBER OPTIONS

Single Port, GbE, Square Flange, VCSEL

P38 F - 2 S 1 T - D x x - M

Shell Configuration
P38= 38999 Receptacle

Shell Configuration
F = Square Flange

 # Channels (TX+RX)
2= 1TX + 1RX

Wavelength
S= 850nM

Cable Mode
1= Multimode

Fiber Optic Interface
T = 1.25 Gbps

Shell Size Code
D = 15 - 5

Shell Plating
F = NI
W = OD CD / NI
Z = ZN / NI

Shell Polarization
(leave blank) _ = N
A = A
B = B
C = C
D = D

Electrical Interface
M = Micro D-Sub

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

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