Lightning Series

Mil-Dtl-38999 Optical Transceiver, DC to 1.0MHz LVTTL Applications, Multimode, 850nM

Quad Port

Four TX & Four RX Channels Operating from DC to 1.0Mbps

FEATURES

- Multimode optical fiber link distances up to 2.0 kilometers
- Maximum optical channel bit error rate better than 10^{-8}
- Case operating temperature range from -40°C to +85°C
- Shock, vibration and immersion resistant per Mil-Std-810 and Mil-Std-1344
- Olive Drab Cadmium plating meets stringent EMI / RFI performance specifications
- Aluminum alloy bulkhead housings are strong, durable, corrosion resistant and light weight
- Mil-T-29504/04 compliant optical fiber connector interface
- Connector insert configuration conforms to Mil-Std-1560

APPLICATIONS

Lightning series bulkhead mounted optical transceivers enable LVTTL communications over long distances in harsh environments.

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.

DESCRIPTION

Lightning series optical fiber transceivers consist of optoelectronic transmitter and receiver functions integrated into a wall mounted Mil-Dtl-38999, Series III receptacle connector. The optical transmitters oerate at 850nm. The transmitter input lines are driven with single ended LVTTL signals applied to the transmitter input lines. Temperature compensated transmitter drivers convert the transmitter input signals to suitable modulation currents. The optical receivers consist of PIN and preamplifier assemblies and limiting amplifiers. Outputs from the receivers consist of single ended LVTTL data signals on the receiver output lines.

The electrical interface to the Lightning series optical transceivers is a 0.050” x 0.100” solder pin field enabling direct attachment to a printed circuit assembly.

Lightning series optical fiber transceivers 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
DC to 1.0MHz LVTTL @ 850nM	P38F-8SxZ-HW

See Appendix A3 & A4 for more part number options

MOOG

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

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Operating Temperature	T_A	-40		+85	°C
Supply Voltage	V_{CC}	+3.135		+3.465	V
Power Supply Noise (p-p)	N_P			200	mV
RX Output Voltage - High	V_{OH}	2.4			V
RX Output Voltage - Low	V_{OL}			0.4	V
TX Input Voltage - High	V_{IH}	2.0			V
TX Input Voltage - Low	V_{IL}			0.8	V

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

MATERIALS

Item	Detail	Notes
Shell	Aluminum Alloy	
Shell Plating	Olive Drab Cadmium over Nickel	QQ-P-416, QQ-N-290
Insert	Thermoplastic	
Interfacial Seal	Elastomer	
Alignment Sleeves	Composite Polymer	
Printed Circuits	Polyimide / FR-4	Mil-P-31032 Type 4

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

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Optical Output Power[1] P38F-8S1Z-Hx	P_o	-22.0		-4.0	dBm
P38F-8S3Z-Hx		-8.0		-3.0	
Optical Output Wavelength	λ_{OUT}	830	850	860	nM
Extinction Ratio	ER	10.0			dB
Optical Rise / Fall Time (10% to 90%)	$t_{R,F}$	0.6		3.0	nS

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

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Optical Sensitivity[1]	P_I	-26.0		-3.0	dBm
Optical Wavelength	λ_{IN}	700		900	nM

1. BER=1x10^{-8} @ 1.0 Mbps @ 50% Duty Factor, tested with 62.5/125µ multi-mode fiber

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}		125	165	mA

Quad Port Lightning Series Mil-Dtl-38999 Optical Transceiver,
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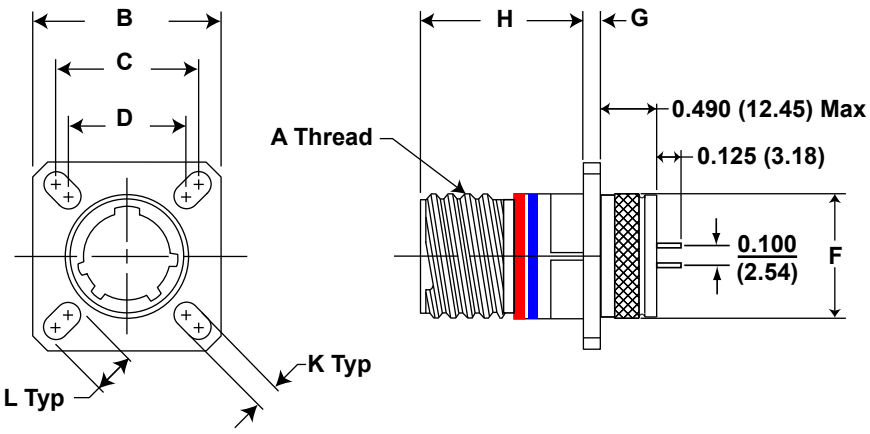
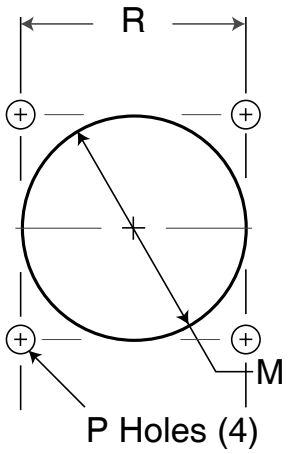
OUTLINE DRAWING

Dimensions are shown as: inches (mm)



Outline Dimensions

Shell Size Code	Shell Size	A Thread	B Sq Max	C Bsc	D BSC	F Max	G Max	H Max	K	L
H	23	1.5000-.1P-.3L-TS-2A	1.700 (43.2)	1.375 (34.9)	1.250 (31.8)	1.479 (37.57)	0.126 (3.2)	0.790 (20.1)	0.154 (3.9)	0.242 (6.2)



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)

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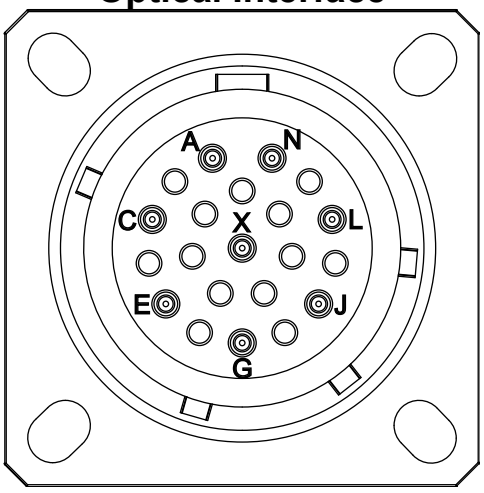
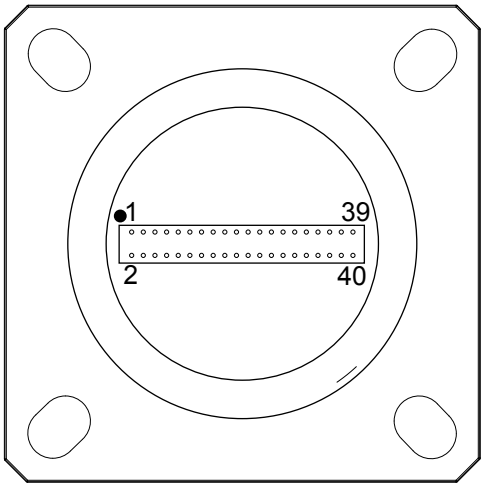
OPTICAL TRANSCEIVER INSERT ARRANGEMENT

TOP
Optical Interface



Front face of the optical transceiver insert shown, fiber optic cable plug opposite - see Appendix A2 for details

TOP
Electrical Interface



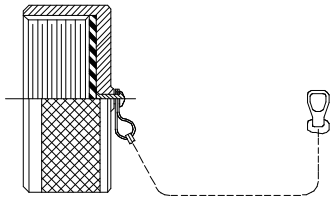
Back face of the optical transceiver insert shown - see Printed Circuit Board Footprint and Electrical Pin Assignment pages for details

OPTICAL TRANSCEIVER RECEPTACLE PORT ASSIGNMENTS

FUNCTION	OPTICAL		ELECTRICAL	
PORT NUMBER	**TX**	**RX**	**TX**	**RX**
0	N	A	9	5
1	L	C	19	15
2	J	E	29	25
3	G	X	39	35

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

Quad Port Lightning Series Mil-Dtl-38999 Optical Transceiver,
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ELECTRICAL PIN ASSIGNMENTS

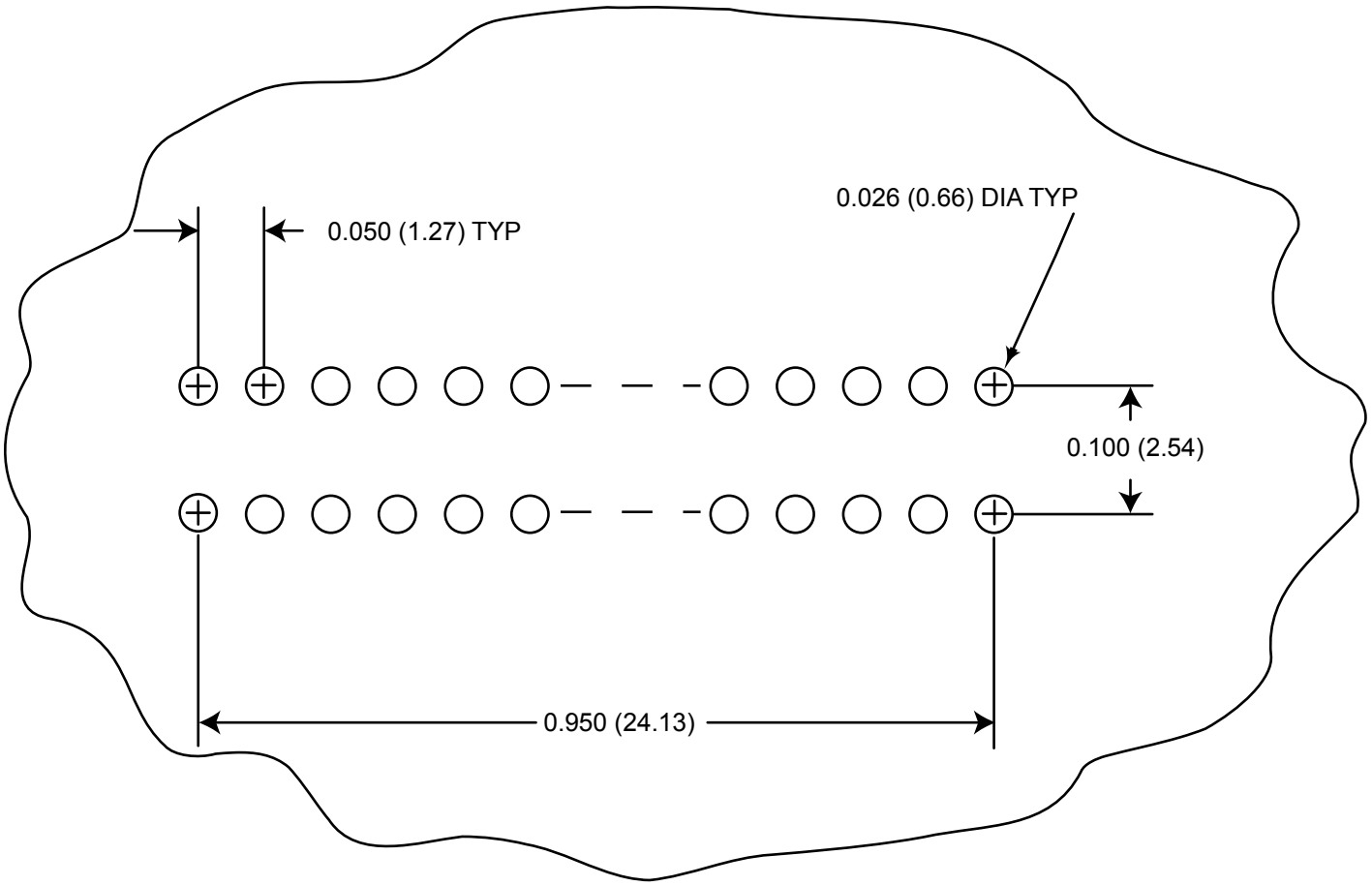
Pin	Symbol (Port)	Description	Logic Family
1	GND	Ground	N/A
2	GND	Ground	N/A
3	GND	Ground	N/A
4	GND	Ground	N/A
5	RX (0)	Receiver Data - Output	TTL
6	GND	Ground	N/A
7	GND	Ground	N/A
8	RX VCC (0)	Receiver Power Supply	N/A
9	TX (0)	Transmitter Data - Input	TTL
10	TX VCC (0)	Transmitter Power Supply	N/A
11	GND	Ground	N/A
12	GND	Ground	N/A
13	GND	Ground	N/A
14	GND	Ground	N/A
15	RX (1)	Receiver Data - Output	TTL
16	GND	Ground	N/A
17	GND	Ground	N/A
18	RX VCC (1)	Receiver Power Supply	N/A
19	TX (1)	Transmitter Data - Input	TTL
20	TX VCC (1)	Transmitter Power Supply	N/A
21	GND	Ground	N/A
22	GND	Ground	N/A
23	GND	Ground	N/A
24	GND	Ground	N/A
25	RX (2)	Receiver Data - Output	TTL
26	GND	Ground	N/A
27	GND	Ground	N/A
28	RX VCC (2)	Receiver Power Supply	N/A
29	TX (2)	Transmitter Data - Input	TTL
30	TX VCC (2)	Transmitter Power Supply	N/A
31	GND	Ground	N/A
32	GND	Ground	N/A
33	GND	Ground	N/A
34	GND	Ground	N/A

ELECTRICAL PIN FUNCTIONS (Continued)

Pin	Symbol (Port)	Description	Logic Family
35	RX (3)	Receiver Data - Input	TTL
36	GND	Ground	N/A
37	GND	Ground	N/A
38	RX VCC (3)	Receiver Power Supply	N/A
39	TX (3)	Transmitter Data - Input	TTL
40	TX VCC (3)	Transmitter Power Supply	N/A

PRINTED CIRCUIT BOARD FOOTPRINT

Mil-Dtl-38999 Series III Size 23-21
Dimensions are shown as: inches (mm)



Quad Port Lightning Series Mil-Dtl-38999 Optical Transceiver,
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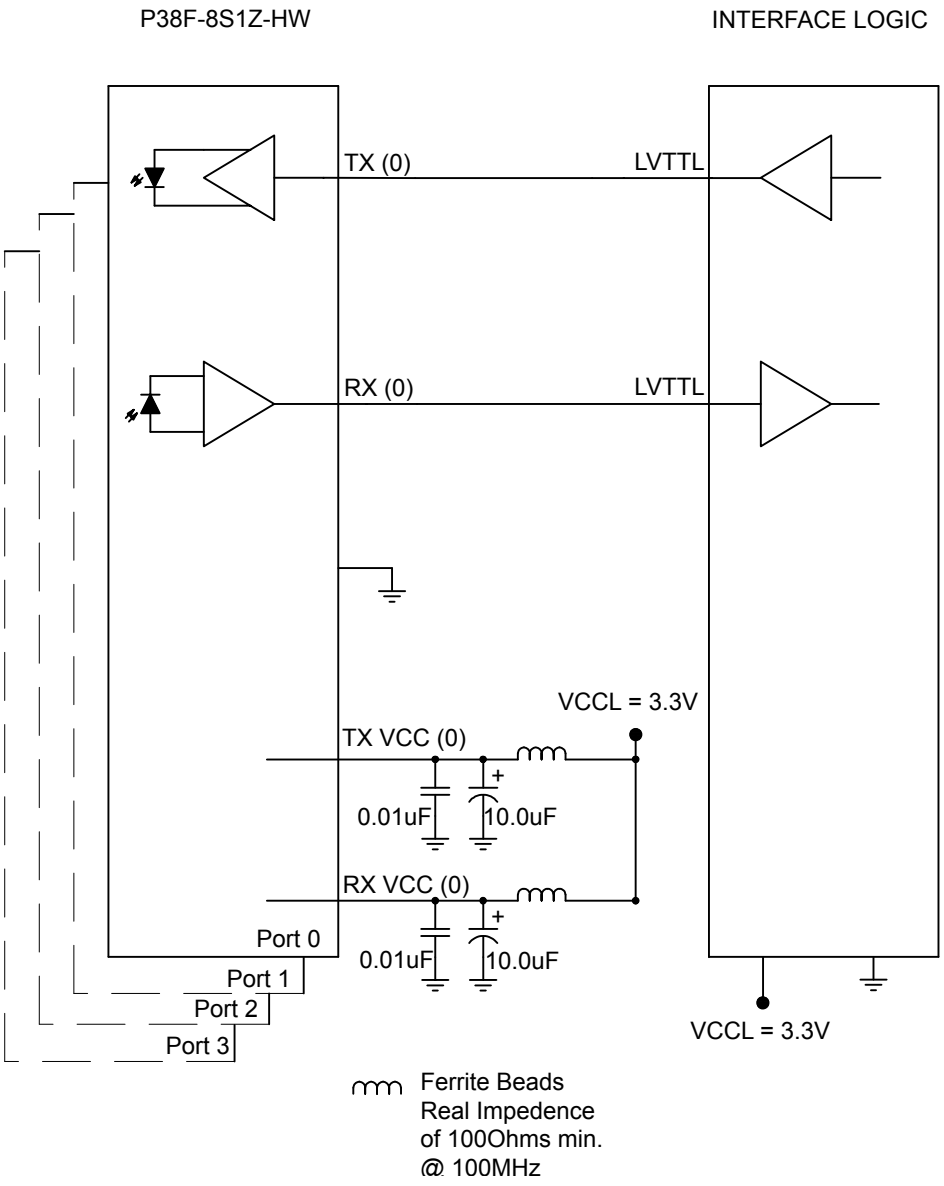
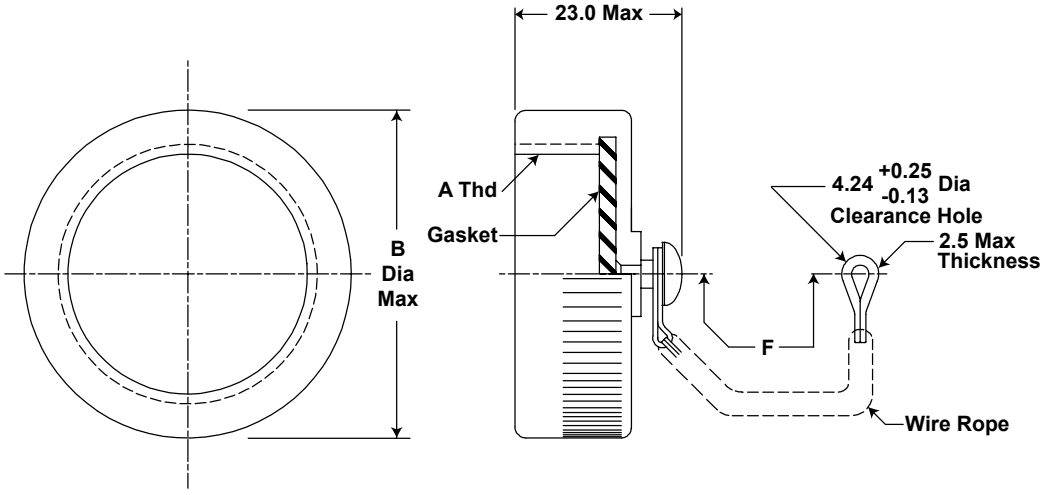
APPLICATION SCHEMATIC



APPENDIX A1

RECEPTACLE PROTECTION CAPS

*MIL-DTL-38999/33 PROTECTION CAP PART NUMBERS	
MS RECEPTACLE CAP P/N	*D38999/33M23R



*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
H	23	1.5000-0.1P-0.3L-TS	45.0	127.00

Quad Port Lightning Series Mil-Dtl-38999 Optical Transceiver,
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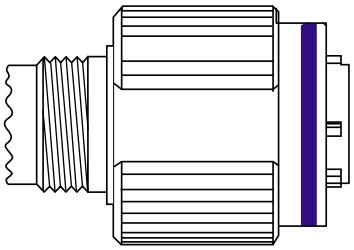
APPENDIX A2

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

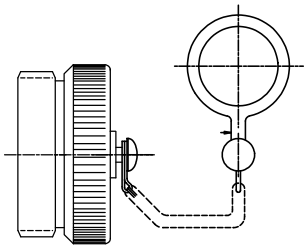
*D38999 PLUG - PIN INSERT

MIL-DTL-38999 CABLE PLUG	
MS PLUG P/N	*D38999/26WH21PN



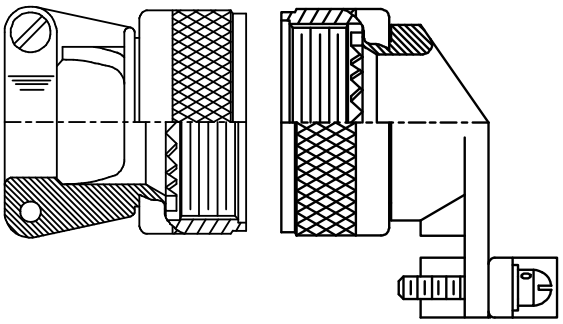
*CABLE PROTECTION CAP

D38999/32 PLUG PROTECTION CAP	
MS PLUG CAP P/N	*D38999/32W23N



*CABLE BACKSHELL

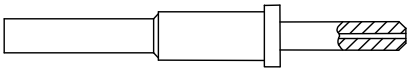
MIL-C-85049 CABLE BACKSHELL	
MS BACKSHELL P/N	*MS85049/xxxxxx**



**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**

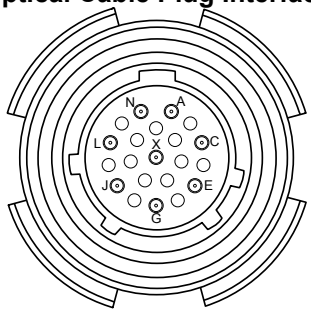


**defined by fiber optic cable configuration

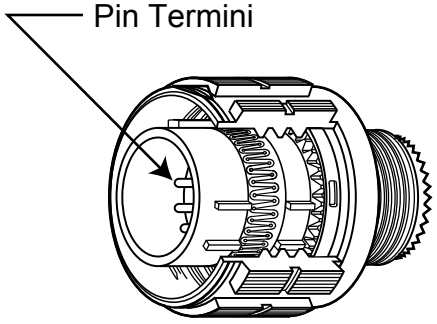
D38999 PLUG PORT FUNCTIONS

PORT NUMBER	TX	RX
0	N	A
1	L	C
2	J	E
3	G	X

TOP
Optical Cable Plug Interface



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



Quad Port Lightning Series Mil-Dtl-38999 Optical Transceiver,
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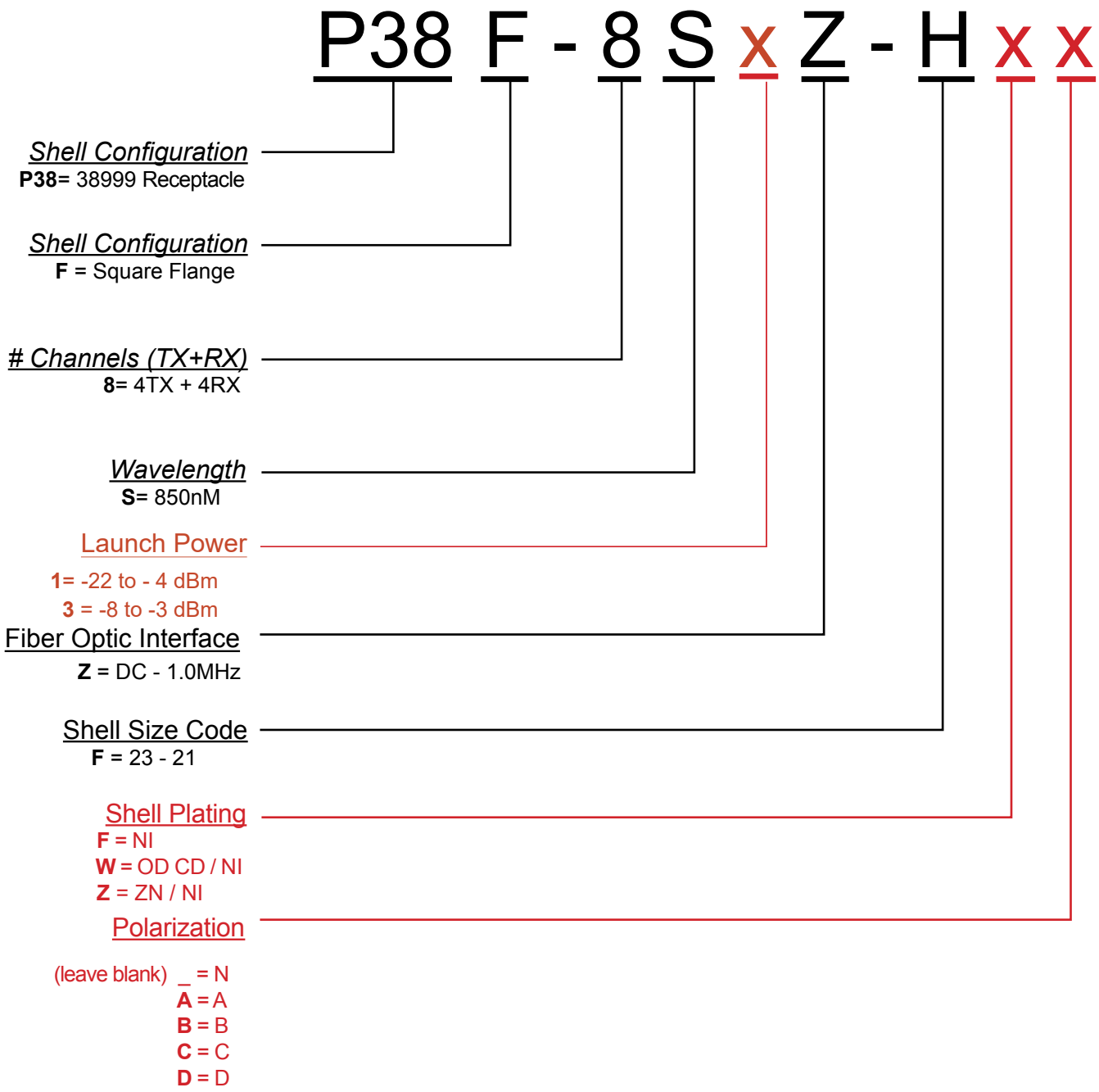
APPENDIX A3

PART NUMBER OPTIONS

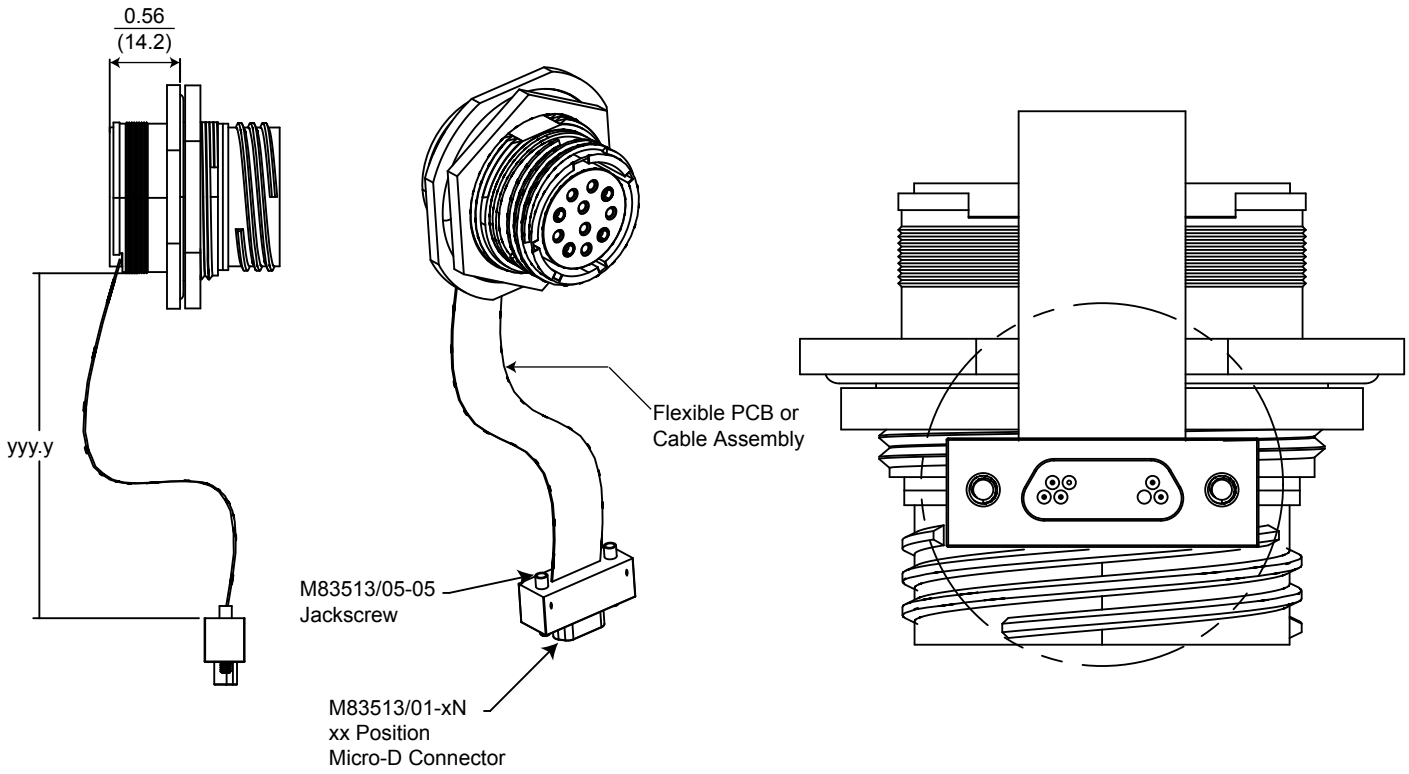
Quad Port, Square Flange



Other wavelength,mounting and port count options are available.

APPENDIX A4

CABLE ASSEMBLY PART NUMBER OPTIONS



P38x-xxxx-xxx-Lxxx

xxx = ID # assigned by Protokraft

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