

Lightning Series

MIL-DTL-38999 Optical

Transmitters, 100Mbps to 3.2Gbps

Applications, Multimode, 850nm

Dual Port Transmitter, Receptacle

FEATURES

- Suitable for ARINC 818, sFPDP and other applications from 100Mbps to 3.2Gbps
- Optical fiber link distances up to 550 Meters (50/125µ 500MHz*Km MMF)
- Maximum optical channel bit error rate less than 1×10^{-12}
- Operating temperature range from -40°C to +85°C
- Shock, vibration and immersion resistant per MIL-STD-810
- Olive drab cadmium over electroless nickel plating meets stringent corrosion resistance requirements
- Aluminum alloy MIL-DTL-38999 housings are strong, durable, and light weight
- MIL-T-29504 compliant optical fiber connector interface
- MIL-DTL-32139 Compliant

APPLICATIONS

Lightning series bulkhead mounted optical transmitters enable high speed network communications over long distances in harsh environments.

- sFPDP data links
- ARINC 818 Video displays and drivers

The MIL-DIL-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 quadax copper conductors unacceptable.

Two TX Channels Operating from 100Mbps to 3.2Gbps

DESCRIPTION

Lightning series optical fiber transmitters consist of optoelectronic transmitter functions integrated into a bulkhead mounted MIL-DTL-38999, Series III receptacle connector. The optical transmitters are 850nm VCSEL lasers. The transmitter input lines are driven with differential CML signals applied to the transmitter (TX+ and TX-) lines. Dual loop, temperature compensated, VCSEL drivers convert the transmitter input signals to suitable VCSEL bias and modulation currents.

The electrical interface to the Lightning series optical transmitters is a MIL-DTL-32139 compliant Nano-D connector.

Lightning series optical fiber transmitters are vibration isolated, environmentally hardened components designed for use in harsh environment applications.

ORDERING INFORMATION

Application	Part Number
100Mbps to 2.49Gbps	P38x-2T1D-Dx-ND
2.5Gbps to 3.2Gbps	P38x-2T1E-Dx-ND

Dual Port Lightning Series MIL-DTL-38999 Optical Transmitters, ARINC 818 and sFPDP Applications, Multimode

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
Differential Input Voltage (p-p)	V_D			2.0	V
					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
TX Differential Input Voltage (p-p)	V_D	0.25		2.0	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	3.8g ² /Hz	43G rms
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
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

Dual Port Lightning Series MIL-DTL-38999 Optical Transmitters,
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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 (BER<10 ⁻¹²)	P_o	-9.5		-4.0	dBm
Optical Output Wavelength	λ_{OUT}	830	850	860	nM
Spectral Width	$\Delta\lambda_{RMS}$			0.85	nM
Extinction Ratio	ER	9.0	11.0		dB
Optical Rise, Fall Time (20% to 80%)	$t_{R,F}$			150	pS

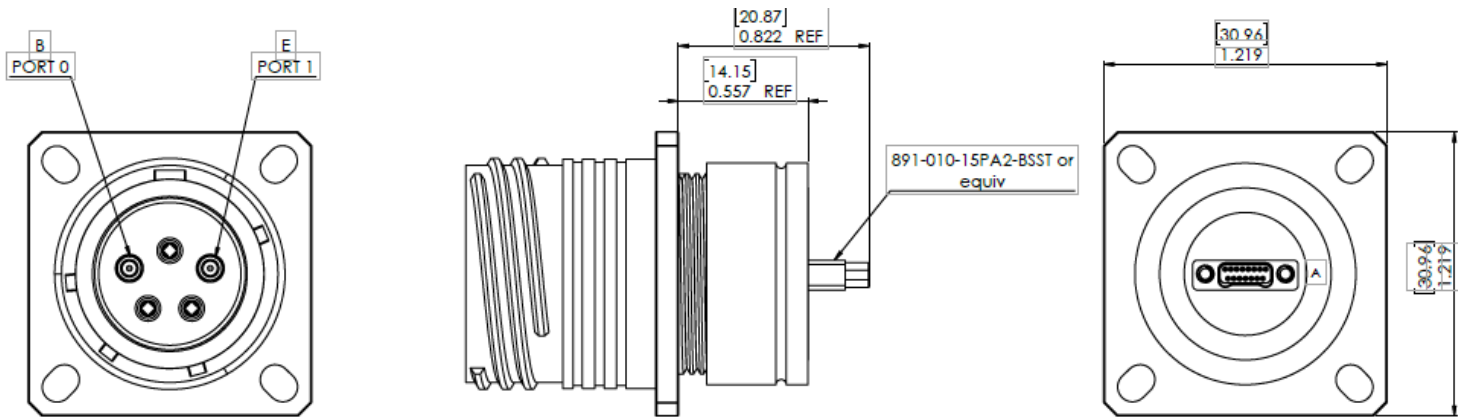
POWER SUPPLY CURRENT T_A = Operating Temperature Range, V_{CC} = 3.135V to 3.465V

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Supply Current per TX	I_{CCT}		90	120	mA

Dual Port Lightning Series MIL-DTL-38999 Optical Transmitters,
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OUTLINE DRAWING - Flange Option

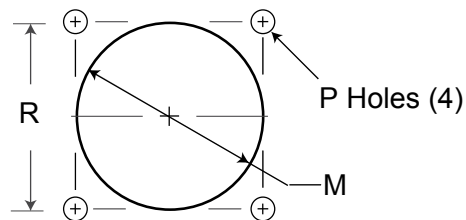
Dimensions are shown as: inches (mm)



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)



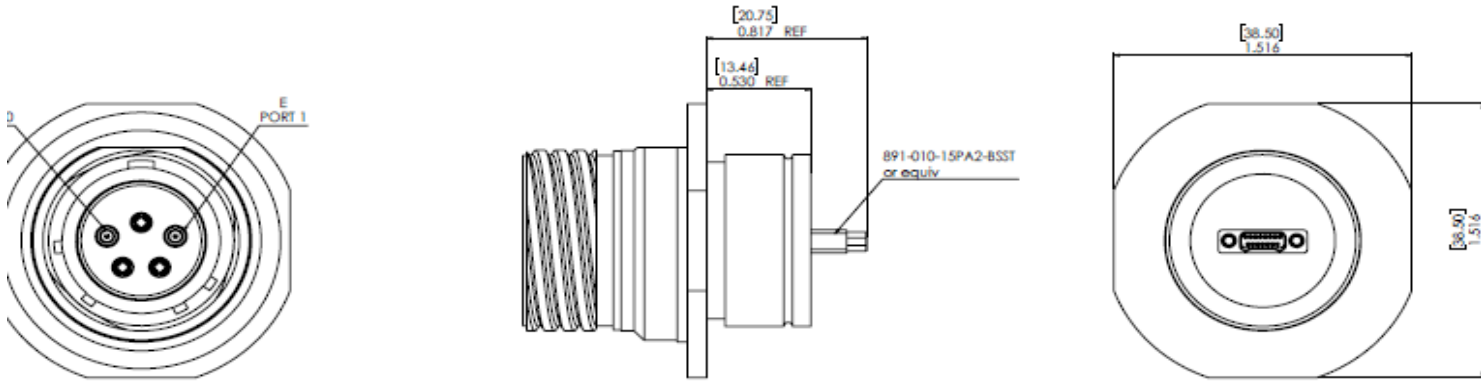
Part Number = *P38F-2xxx-Dx-Lxxx

*see page 6 for part number / cable length options and page 11 for complete ordering options

Dual Port Lightning Series MIL-DTL-38999 Optical Transmitters,
ARINC 818 and sFPDP Applications, Multimode

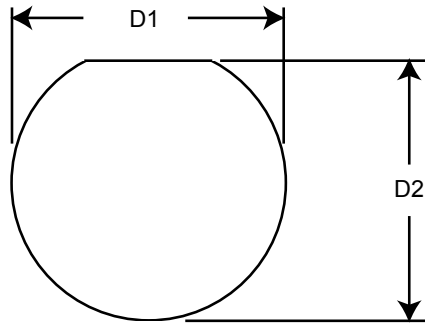
OUTLINE DRAWING - Jam Nut Option

Dimensions are shown as: inches [mm]



Panel Cutout Dimensions

Shell Size Code	Shell Size	D1 Min	D2 Min
D	15	1.135 [28.83]	1.085 [27.56]



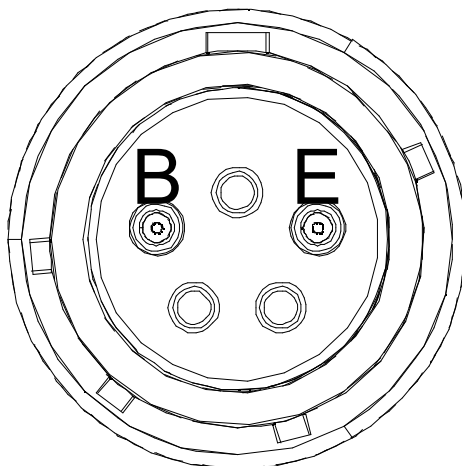
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*see page number 6 for part number / cable length options and page 11 for complete ordering options

Dual Port Lightning Series MIL-DTL-38999 Optical Transmitters,
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OPTICAL INSERT ARRANGEMENT

TOP



Front view of the MIL-DTL-38999 optical
insert shown, fiber optic cable plug
opposite - see Appendix A1
for mating connector details

OPTICAL PORT ASSIGNMENTS

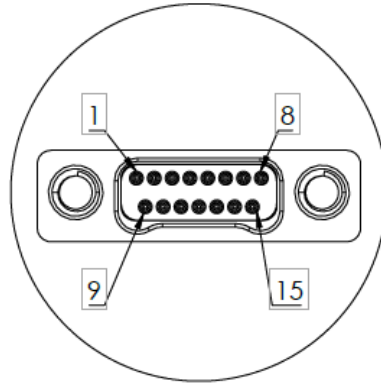
MIL-DTL-38999 OPTICAL INTERFACE

PORT #	PIN #
0	B
1	E

Dual Port Lightning Series MIL-DTL-38999 Optical Transmitters,
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NANO-D ELECTRICAL PIN ASSIGNMENTS

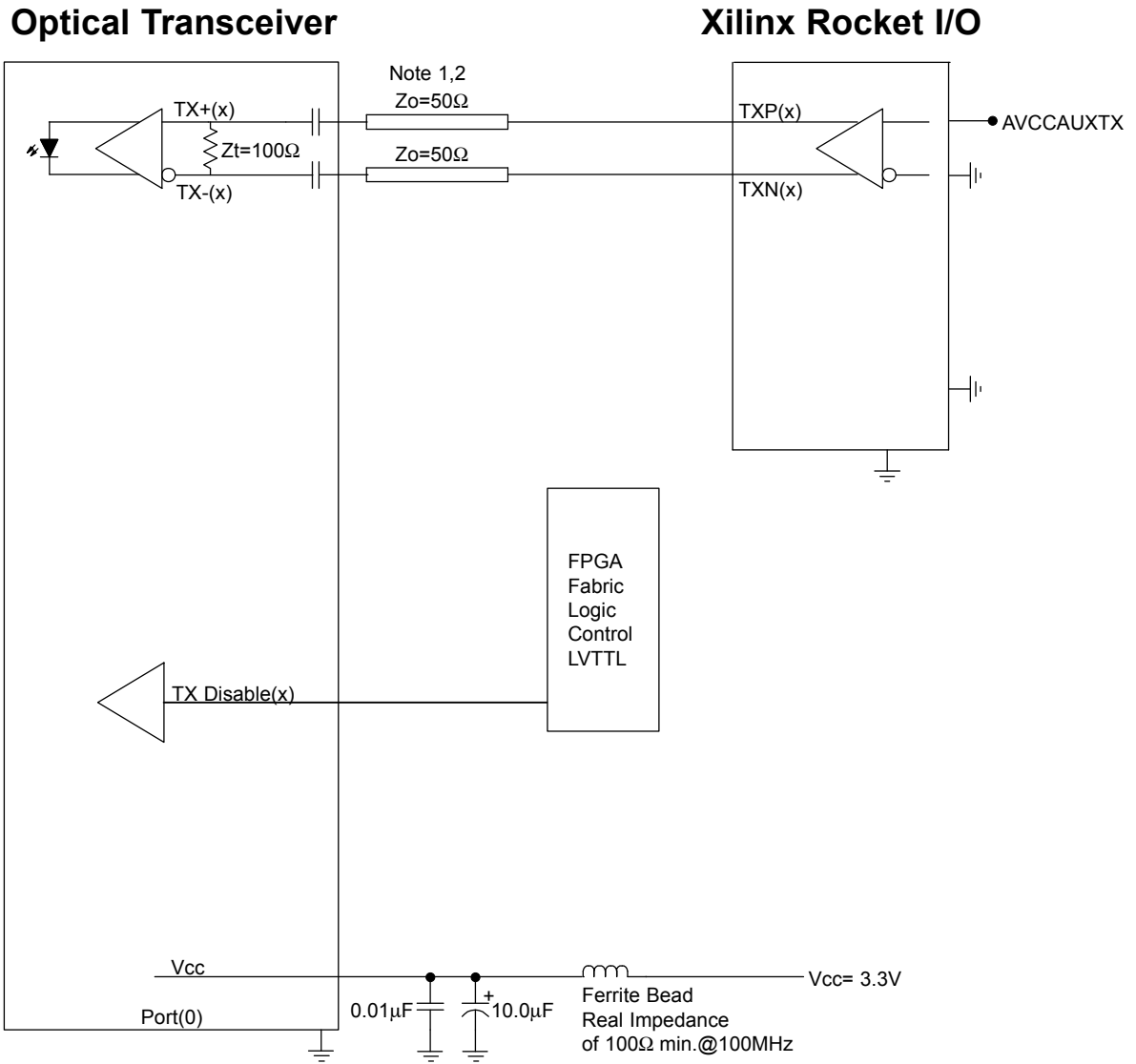
All dimensions shown are for reference only: inches [mm]



PIN NUMBER	SYMBOL	PORT	DESCRIPTION	LOGIC FAMILY
1	TX_VCC	ALL	POWER SUPPLY	N/A
2	GND	ALL	GROUND	N/A
3	TX_DIS	1	Transmit Disable - Input Logic 1: Disable Optical Output Logic 0: Enable Optical Output	CMOS Internal 4.7KΩ to 10.0KΩ pullup
4	NC	-	FACTORY CONNECT ONLY	N/A
5	TX_DIS	0	Transmit Disable - Input Logic 1: Disable Optical Output Logic 0: Enable Optical Output	CMOS Internal 4.7KΩ to 10.0KΩ pullup
6	NC	-	FACTORY CONNECT ONLY	N/A
7	GND	ALL	GROUND	N/A
8	TX_VCC	ALL	POWER SUPPLY	N/A
9	GND	ALL	GROUND	N/A
10	TX+	1	TRANSMITTER DATA INPUT	CML (INTERNALLY AC COUPLED) Internal 100Ω differential termination
11	TX-	1	TRANSMITTER DATA INPUT	CML (INTERNALLY AC COUPLED) Internal 100Ω differential termination
12	GND	ALL	GROUND	N/A
13	TX-	0	TRANSMITTER DATA INPUT	CML (INTERNALLY AC COUPLED) Internal 100Ω differential termination
14	TX+	0	TRANSMITTER DATA INPUT	CML (INTERNALLY AC COUPLED) Internal 100Ω differential termination
15	GND	ALL	GROUND	N/A

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APPLICATION SCHEMATIC



Typical application schematic shown
For alternate applications or termination
techniques, please consult the Factory

Note: 1
When using controlled impedance cable
(Coaxial cable) and Pre_Emphasis,
lengths of 1.0meter are obtainable.

Note: 2
50 Ohm impedance termination shown.
For alternate impedance requirements,
please consult the Factory.

APPENDIX A1

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

*See DSCC or SAE QPL for Approved Suppliers

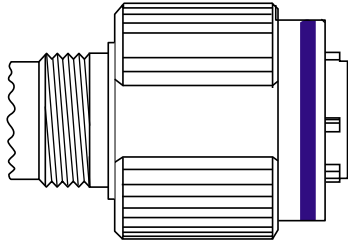
<http://www.dsccl.dla.mil/programs/qmlqpl/QPLdetail.asp?QPL=38999>

*D38999 PLUG - PIN INSERT

MIL-DTL-38999 CABLE PLUG

MS PLUG P/N

*D38999/26WD5PN

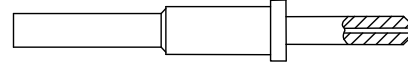


*FIBER OPTIC PIN TERMINUS

MIL-T-29504 PIN TERMINUS

MS PIN TERMINUS P/N

*M29504/04-xxxx**



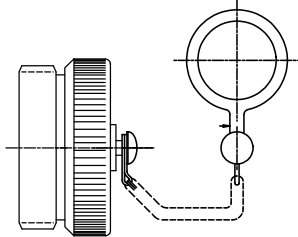
**defined by fiber optic cable configuration

*CABLE PROTECTION CAP

D38999/32 PLUG PROTECTION CAP

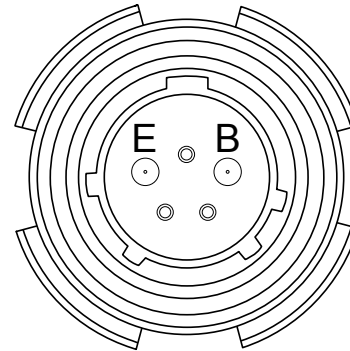
MS PLUG CAP P/N

*D38999/32W15N



D38999 PLUG PORT FUNCTIONS

PORT NUMBER	TX
0	B
1	E



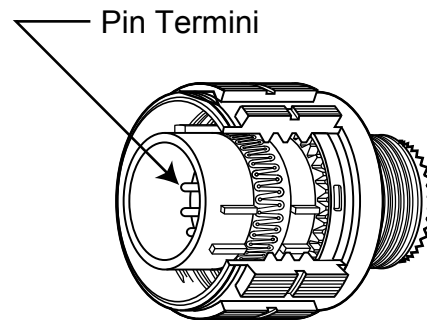
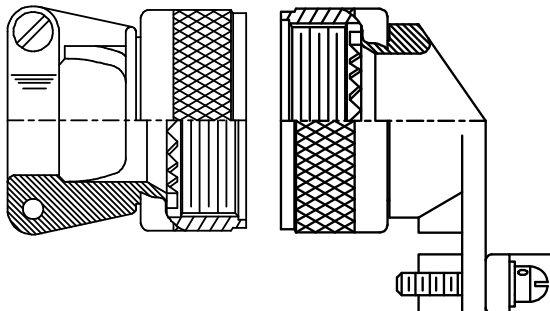
Front face of the optical cable plug pin insert shown. Transceiver insert opposite.

*CABLE BACKSHELL

MIL-C-85049 CABLE BACKSHELL

MS BACKSHELL P/N

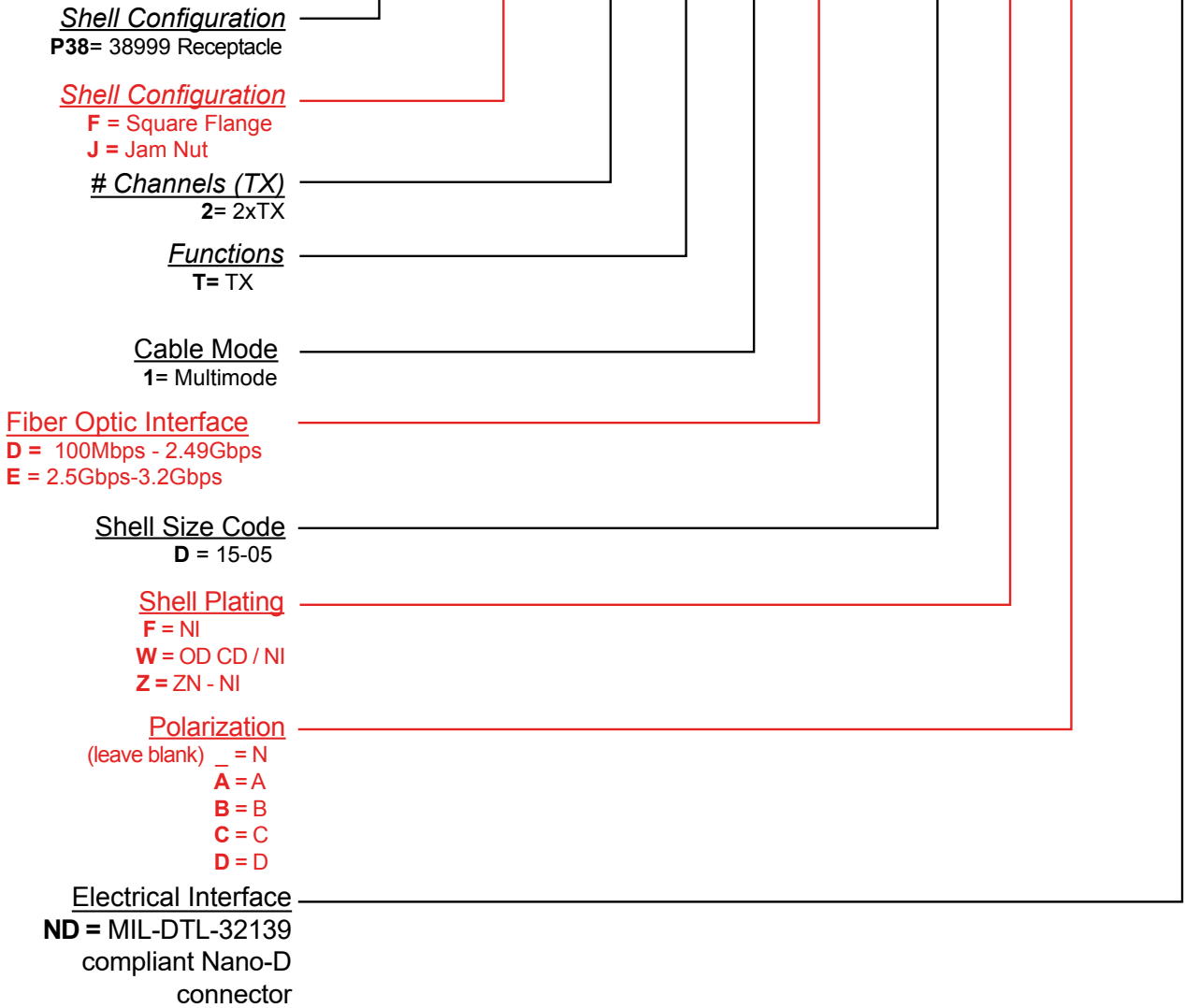
*MS85049/xxxxxx**



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

APPENDIX A2
PART NUMBER OPTIONS
Dual Port Transmitters

P38 X - 2 T 1 X - D X X - ND



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



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