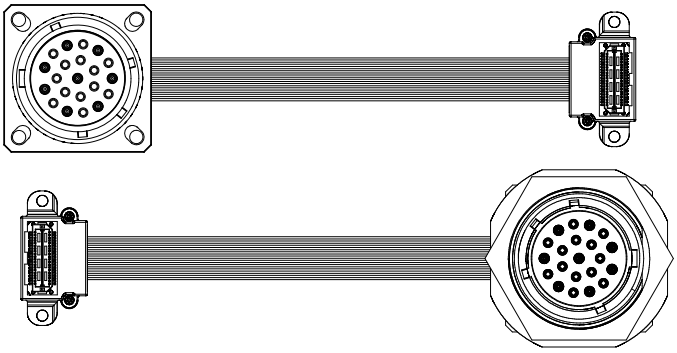
Lightning Series

MIL-DTL-38999 Optical Receivers, ARINC 818 & sFPDP Applications, Multimode, 850nM

Octal Port Receiver, Receptacle



Eight RX Channels Operating from 50Mbps to 3.2Gbps

FEATURES

- Suitable for ARINC 818, sFPDP and other applications from 50Mbps to 3.2Gbps
- Optical fiber link distances up to 550 Meters (50/125µ 500MHz*Km MMF)
- Maximum optical channel bit error rate less than $1x10^{-12}$
- 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
- Samtec EQCD Series electrical connector for SMT interface

APPLICATIONS

Lightning series bulkhead mounted optical receivers enable high speed communications links 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 quadrax copper conductors unacceptable.

DESCRIPTION

Lightning series optical fiber receivers consist of optoelectronic receiver functions integrated into a bulkhead mounted MIL-DTL-38999, Series III receptacle connector. The optical receivers consist of PIN and preamplifier assemblies and limiting post-amplifiers. Outputs from the receivers consist of differential CML data signals on the receiver (RX+ and RX-) lines and single ended CMOS indicator functions on the Loss of Signal (LOS) lines. The receiver data lines are squelched upon LOS assertion, preventing errant data generation when an invalid incoming optical signal is presented to the transceiver.

The electrical interface to the Lightning series optical receivers is a ribbon coax to Samtec EQCD high density cable assembly enabling SMT interconnection to a customer's backplane, motherboard or daughtercard.

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

ORDERING INFORMATION

Application	Part Number
50Mbps to 2.49Gbps, Flange	P38F-8R1D-HW-Lxxx
2.5Gbps to 3.2Gbps, Flange	P38F-8R1E-HW-Lxxx
50Mbps to 2.49Gbps, Jam Nut	P38J-8R1D-HW-Lxxx
2.5Gbps to 3.2Gbps, Jam Nut	P38J-8R1E-HW-Lxxx

See page 6 for standard part number / cable length options

MOOG PROTOKRAFT

Octal Port Lightning Series MIL-DTL-38999 Optical Receivers
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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
RX Output Current	I_O			50	mA

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

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
MIL-STD 810	Salt Fog	7 Days	5 wt. %
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

Octal Port Lightning Series MIL-DTL-38999 Optical Receivers
50Mbps to 3.2Gbps ARINC 818 & sFPDP Applications, Multimode, 850nM

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

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Optical Sensitivity (BER<10^{-12}, ER=9.0) P38x-xR1D-xx @ 125Mbps to 1.25Gbps P38x-xR1D-xx @ 2.125Gbps P38x-xR1E-xx @ 2.5Gbps to 3.2Gbps	P_I	 -17.0 -15.0 -14.0		0.0	dBm
Optical Wavelength	λ_{IN}	830		860	nM
RX Data Output - Low	V_{OL} - V_{CC}	-1.810		-1.475	V
RX Data Output - High	V_{OH} - V_{CC}	-1.165		-0.880	V

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

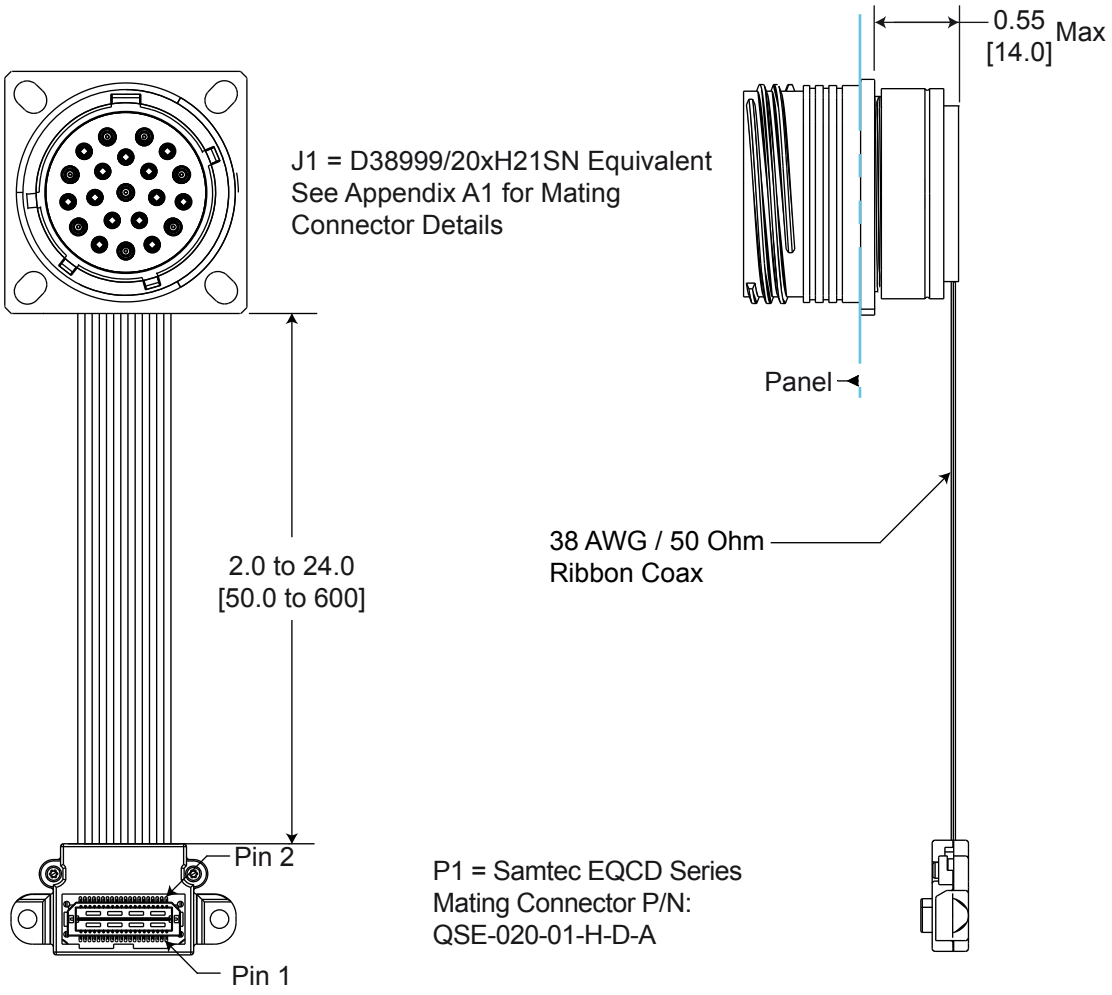
Parameter	Symbol	Minimum	Typical	Maximum	Unit
Supply Current per Port	I_{CCT}		70	100	mA

Octal Port Lightning Series MIL-DTL-38999 Optical Receivers
50Mbps to 3.2Gbps ARINC 818 & sFPDP Applications, Multimode, 850nM

OUTLINE DRAWING

Flange Mount Option

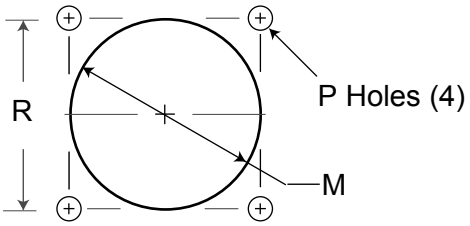
Dimensions are shown as: inches [mm]



Panel Cutout Dimensions

Rear Panel Mounting Only

Shell Size Code	Shell Size	M Min	P Holes	R Bsc
H	23	1.547 [39.29]	0.159 [4.0] / 0.149 [3.8]	1.375 [34.9]



Part Number = *P38F-xxxx-Hx-Lxxx

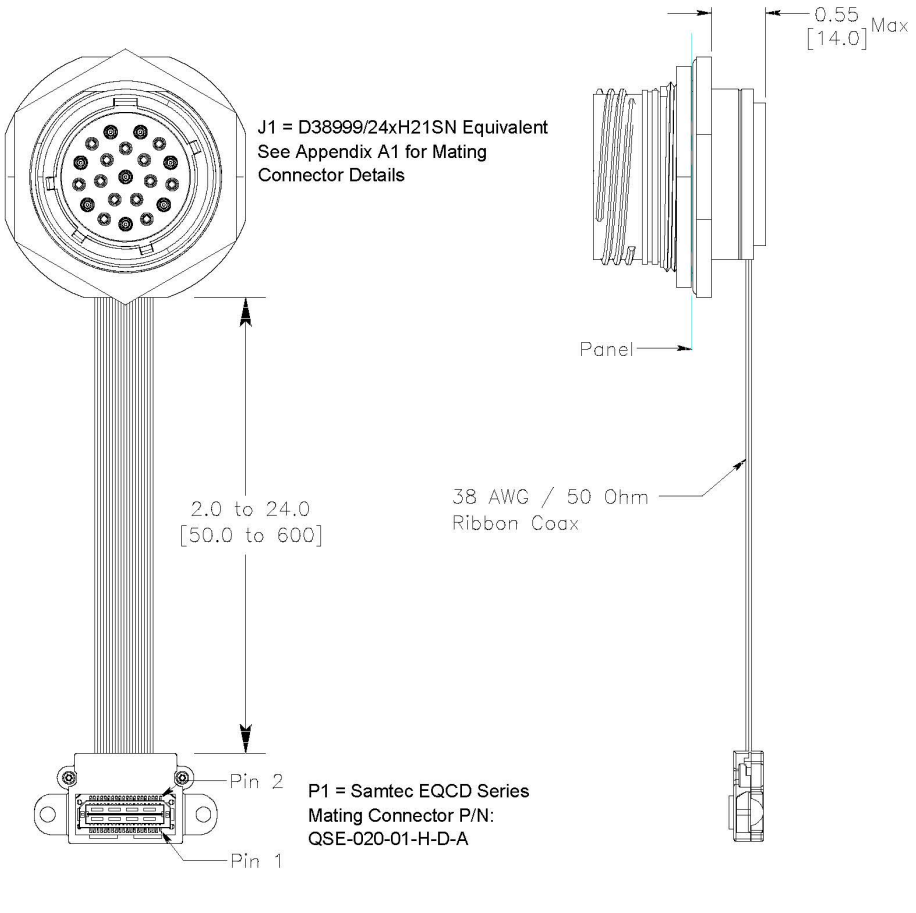
*see page 6 for part number / cable length options and page 12 for complete ordering options

Octal Port Lightning Series MIL-DTL-38999 Optical Receivers
50Mbps to 3.2Gbps ARINC 818 & sFPDP Applications, Multimode, 850nM

OUTLINE DRAWING

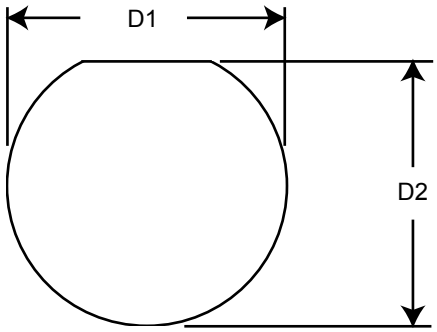
Jam Nut Option

Dimensions are shown as: inches [mm]



Panel Cutout Dimensions

Shell Size Code	Shell Size	D1 Min	D2 Min
H	23	1.635 [41.53]	1.585 [40.26]



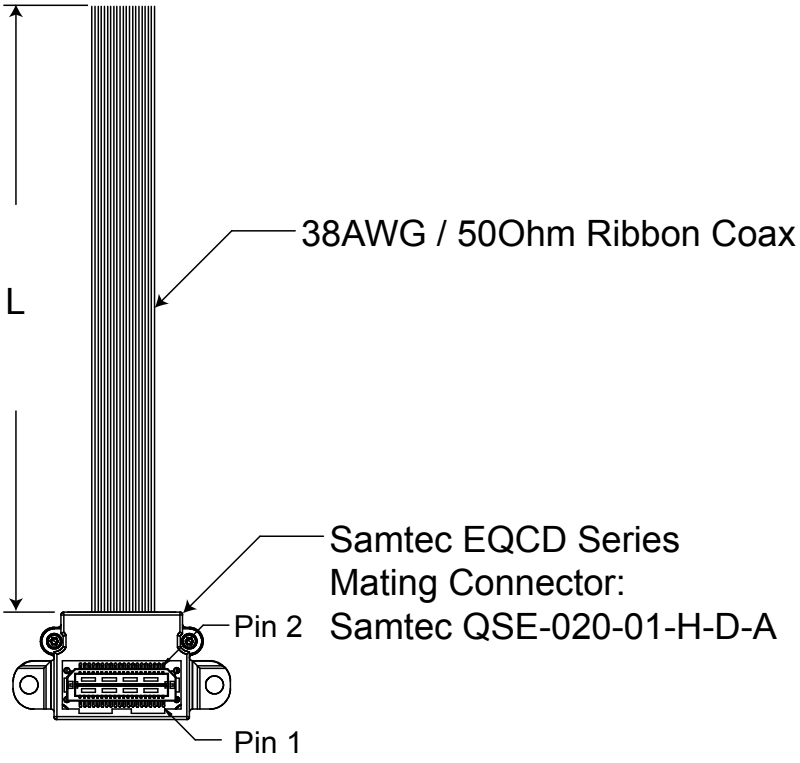
Part Number = *P38J-xxxx-Hx-Lxxx

*see page 6 for part number / cable length options and page 12 for complete ordering options

Octal Port Lightning Series MIL-DTL-38999 Optical Receivers
50Mbps to 3.2Gbps ARINC 818 & sFPDP Applications, Multimode, 850nM

OUTLINE DRAWING

Cable Length Options



Ribbon Coax Cable Length Options

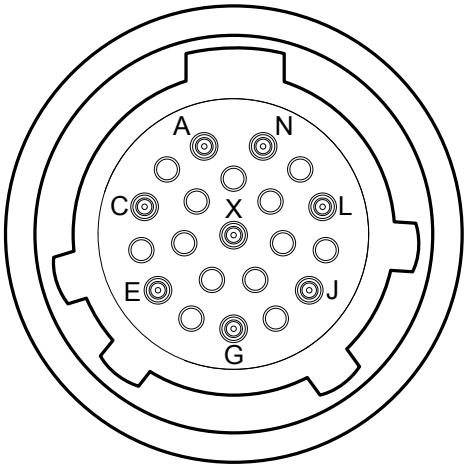
L (mm) +/- 6.0	ITEM #
50	xxxx-xxxx-xx-L050
100	xxxx-xxxx-xx-L100
150	xxxx-xxxx-xx-L150
200	xxxx-xxxx-xx-L200
250	xxxx-xxxx-xx-L250

Octal Port Lightning Series MIL-DTL-38999 Optical Receivers
50Mbps to 3.2Gbps ARINC 818 & sFPDP Applications, Multimode, 850nM

J1 D38999 PIN and PORT ASSIGNMENTS

TOP

Optical Interface



Front view of the D38999 optical insert shown, fiber optic cable plug opposite - see Appendix A1 for details

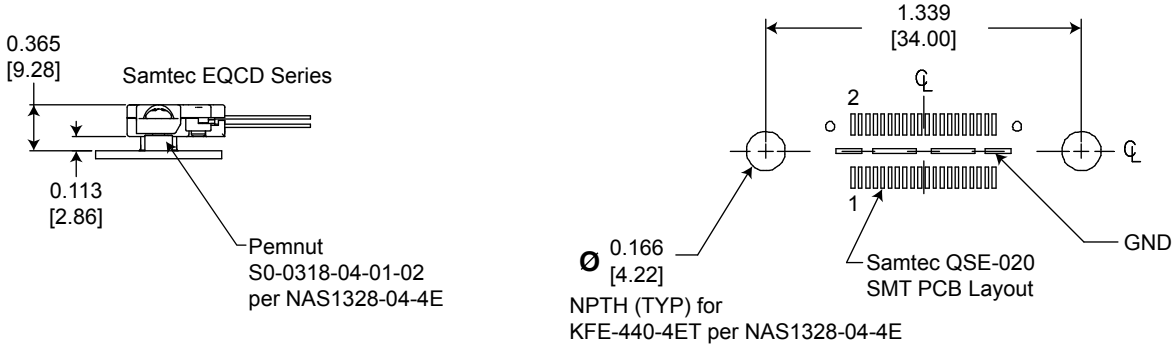
MIL-DTL-38999 OPTICAL INTERFACE

PORT NUMBER	PIN NUMBER
0	**L**
1	**J**
2	**G**
3	**N**
4	**X**
5	**A**
6	**E**
7	**C**

Octal Port Lightning Series MIL-DTL-38999 Optical Receivers
50Mbps to 3.2Gbps ARINC 818 & sFPDP Applications, Multimode, 850nM

PRINTED CIRCUIT BOARD FOOTPRINT

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



SAMTEC EQCD PIN ASSIGNMENTS - Continued on the next page

ELECTRICAL			PORT #	OPTICAL	
PIN #	FUNCTION	LOGIC FAMILY		PIN #	
1	LOS	Open Drain CMOS	0	L	
2	GND	NA	0-7	ALL	
3	RX-	CML	0	L	
4	GND	NA	0-7	ALL	
5	RX+	CML	0	L	
6	Vcc	NA	0-7	ALL	
7	RX-	CML	1	J	
8	GND	NA	0-7	ALL	
9	RX+	CML	1	J	
10	Vcc	NA	0-7	ALL	
11	LOS	Open Drain CMOS	1	J	
12	GND	NA	0-7	ALL	
13	RX-	CML	2	G	
14	LOS	Open Drain CMOS	2	G	
15	RX+	CML	2	G	
16	Vcc	NA	0-7	ALL	
17	RX-	CML	3	N	
18	GND	NA	0-7	ALL	
19	RX+	CML	3	N	
20	Vcc	NA	0-7	ALL	

Center slug is Ground.

All CML functions are internally AC coupled with 100Ω differential termination.

Octal Port Lightning Series MIL-DTL-38999 Optical Receivers
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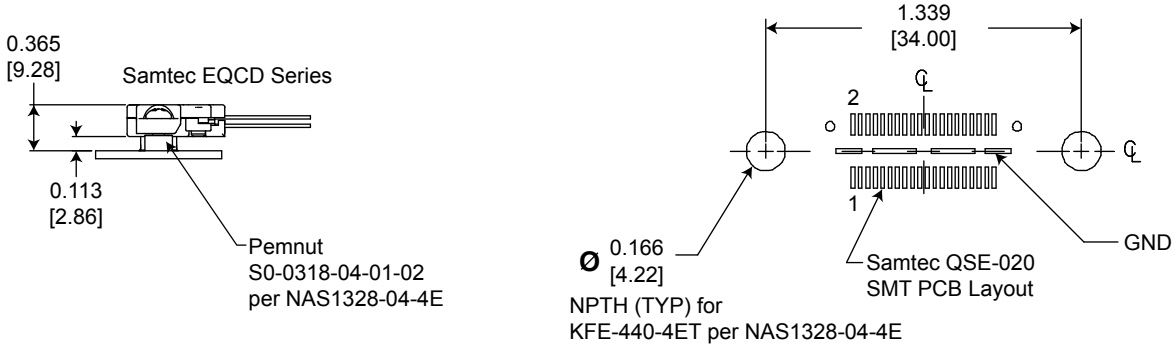
PRINTED CIRCUIT BOARD FOOTPRINT

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



SAMTEC EQCD PIN ASSIGNMENTS - Continued from the previous page

ELECTRICAL			PORT #	OPTICAL	
PIN #	FUNCTION	LOGIC FAMILY		PIN #	
21	LOS	Open Drain CMOS	3	N	
22	GND	NA	0-7	ALL	
23	RX-	CML	4	X	
24	LOS	Open Drain CMOS	4	X	
25	RX+	CML	4	X	
26	Vcc	NA	0-7	ALL	
27	RX-	CML	5	A	
28	GND	NA	0-7	ALL	
29	RX+	CML	5	A	
30	Vcc	NA	0-7	ALL	
31	LOS	Open Drain CMOS	5	A	
32	GND	NA	0-7	ALL	
33	RX-	CML	6	E	
34	LOS	Open Drain CMOS	6	E	
35	RX+	CML	6	E	
36	LOS	Open Drain CMOS	7	C	
37	RX-	CML	7	C	
38	GND	NA	0-7	ALL	
39	RX+	CML	7	C	
40	Vcc	NA	0-7	ALL	

Center slug is Ground.
All CML functions are internally AC coupled with 100Ω differential termination.

Octal Port Lightning Series MIL-DTL-38999 Optical Receivers
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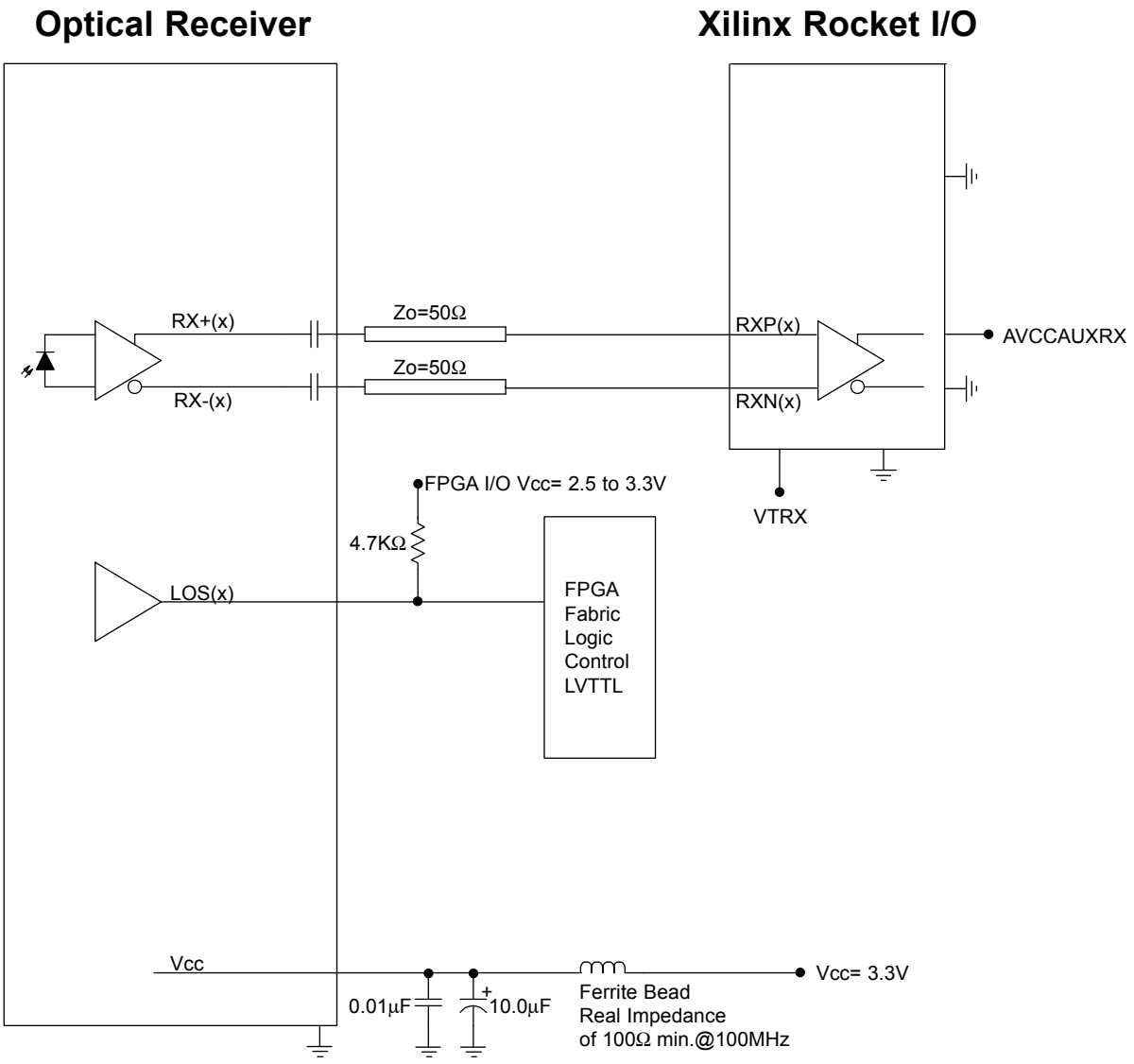
APPLICATION SCHEMATIC



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_Emphisis, lengths of 1.0meter are obtainable.

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

4545 West Stone Drive, Kingsport, TN 37660 USA +1.423.578.7200 salesMP@moog.com www.moogprotokraft.com

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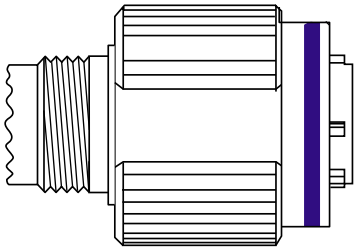
APPENDIX A1

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

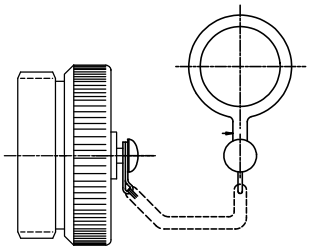
*D38999 PLUG - PIN INSERT

MIL-DTL-38999 CABLE PLUG	
MS PLUG P/N	*D38999/26MH21PN



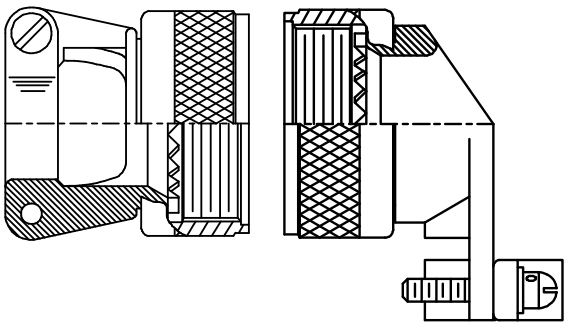
*CABLE PROTECTION CAP

D38999/32 PLUG PROTECTION CAP	
MS PLUG CAP P/N	*D38999/32M23N



*CABLE BACKSHELL

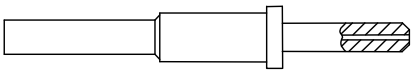
MIL-C-85049 CABLE BACKSHELL	
MS BACKSHELL P/N	*MS85049/xxxxxx**



**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**

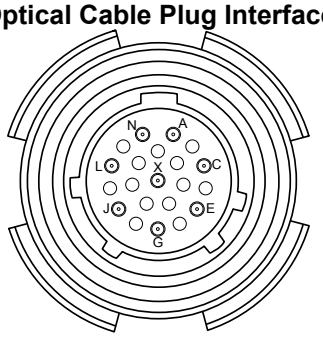


**defined by fiber optic cable configuration

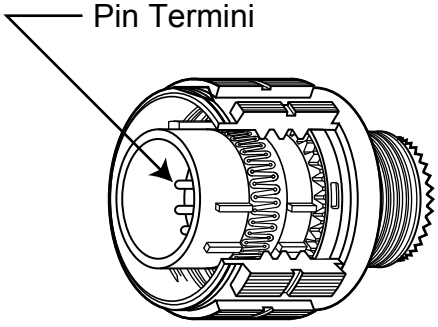
D38999 PLUG PORT ASSIGNMENTS

PORT	PIN	PORT	PIN
0	L	4	X
1	J	5	A
2	G	6	E
3	N	7	C

TOP
Optical Cable Plug Interface



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



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Octal Port Lightning Series MIL-DTL-38999 Optical Receivers
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APPENDIX A2

PART NUMBER OPTIONS

Octal Port Transmitters / Receivers, VCSEL

P38 x - 8 x 1 x - H x x - L

Shell Configuration
P38= 38999 Receptacle

Shell Configuration
F = Square Flange
J = Jam Nut

 # Channels (TX+RX)
8= 8TX or 8RX

Functions
T= TX
R= RX

Cable Mode
1= Multimode

Fiber Optic Interface
D = 50Mbps - 2.49Gbps
E = 2.5Gbps-3.2Gbps

Shell Size Code
H = 23 - 21

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

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

Electrical Interface
L = Ribbon Coax to Samtec EQCD Series - Cable Length TBD

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

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