

Lightning Series

MIL-DTL-38999 Optical Transceiver,
100Base-FX/Fast Ethernet Applications,
Multimode, 1310nm

Quad Port, Receptacle

FEATURES

- Suitable for 100Base-FX / Fast Ethernet applications @ 125Mbps
- Optical fiber link distances up to 2.0Km (62.5/125µ MMF)
- 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 specifications
- 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

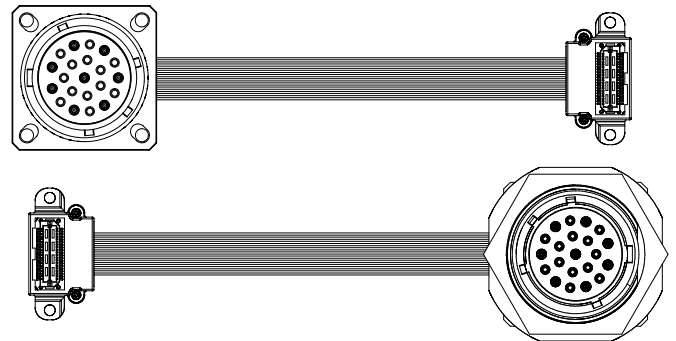
APPLICATIONS

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

- Fast switches and peripherals
- Industrial automation and process control systems
- Traffic control and campus security networks

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 quadrx copper conductors unacceptable.



Four TX & Four RX Channels Operating from 20Mbps to 250Mbps

DESCRIPTION

Lightning series optical fiber transceivers consist of optoelectronic transmitter and receiver functions integrated into a bulkhead mounted MIL-DTL-38999, Series III receptacle connector. The optical transmitters are 1310nm LED's. The transmitter input lines are driven with differential LVPECL signals applied to the transmitter (TX+ and TX-) lines. Temperature compensated LED drivers convert the transmitter input signals to suitable LED modulation currents.

The optical receivers consist of PIN and preamplifier assemblies and limiting post-amplifiers. Outputs from the receivers consist of differential LVPECL data signals on the receiver (RX+ and RX-) lines and single ended LVPECL indicators on the Signal Detect (SD) lines.

The receiver data lines are squelched upon loss of the incoming optical signals, preventing errant data generation when invalid incoming optical inputs are presented to the transceiver.

The electrical interface to the Lightning series optical transceivers 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 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	Part Number
Flange	P38F-8L1C-HW-Lxxx
Jam Nut	P38J-8L1C-HW-Lxxx

See page 6 for standard part number / cable length options

Quad Port Lightning Series MIL-DTL-38999 Optical Transceiver,
100Base-FX Applications, Multimode, 1310nm

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
TX_DIS Input Voltage	V_I	-0.5		$V_{CC} + 0.5$	V
Differential Input Voltage (p-p)	V_D			2.2	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
TX Common Mode Voltage	V_{CM}		2.0		V
TX Differential Input Voltage (p-p)	V_D	0.25		2.2	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

Quad Port Lightning Series MIL-DTL-38999 Optical Transceiver,
100Base-FX Applications, Multimode, 1310nm

TRANSMITTERS T_A = Operating Temperature Range

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Optical Output Power	P_o	-19.0		-14.0	dBm
Optical Output Wavelength	λ_{OUT}	1260	1310	1380	nM

RECEIVERS T_A = Operating Temperature Range

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Optical Sensitivity	P_i	-31.5		-12.0	dBm
Optical Wavelength	λ_{IN}	1100		1590	nM

SUPPLY CURRENT T_A = Operating Temperature Range

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Supply Current per Port	$I_{CC T}$		100	150	mA

OPTICAL FIBER LINK DISTANCES

Application	Fiber Specification	Distance
Fast Ethernet - IEEE 802.3u	62.5/125 μ - 500MHz*Km	2.0Km
FDDI PMD ISO / IEC 9314-3	50/125 μ - 500MHz*Km	2.0Km

COPPER CABLE LINK DISTANCES

Application	Cable Specification	Distance
Fast Ethernet - IEEE 802.3u	TIA/EIA-568-B Cat 5*	100M

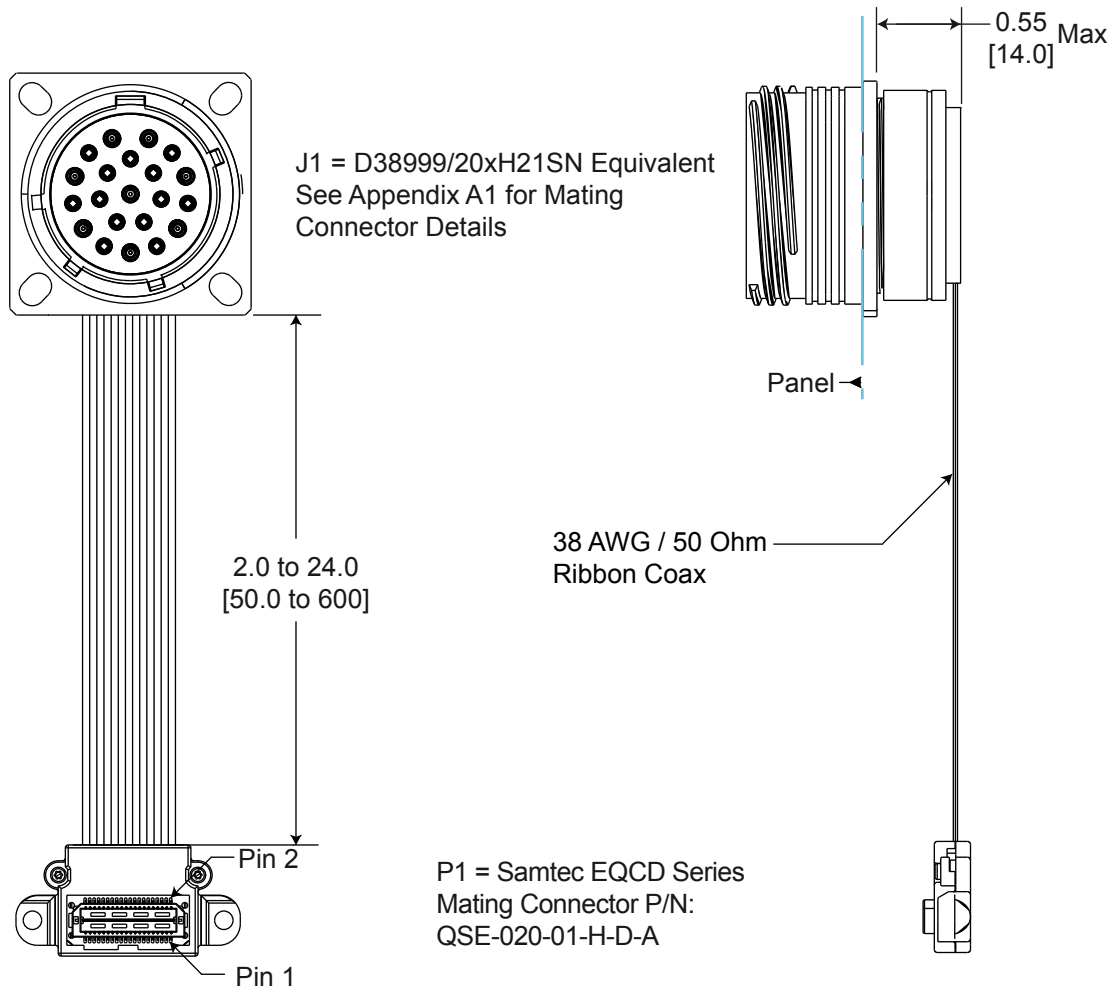
*for other transmission media, please consult the factory

Quad Port Lightning Series MIL-DTL-38999 Optical Transceiver,
100Base-FX Applications, Multimode, 1310nm

OUTLINE DRAWING

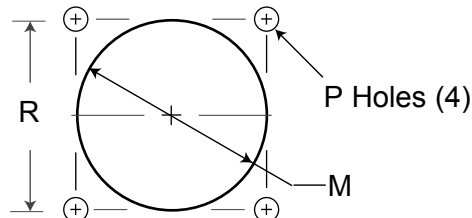
Flange Mount Option

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

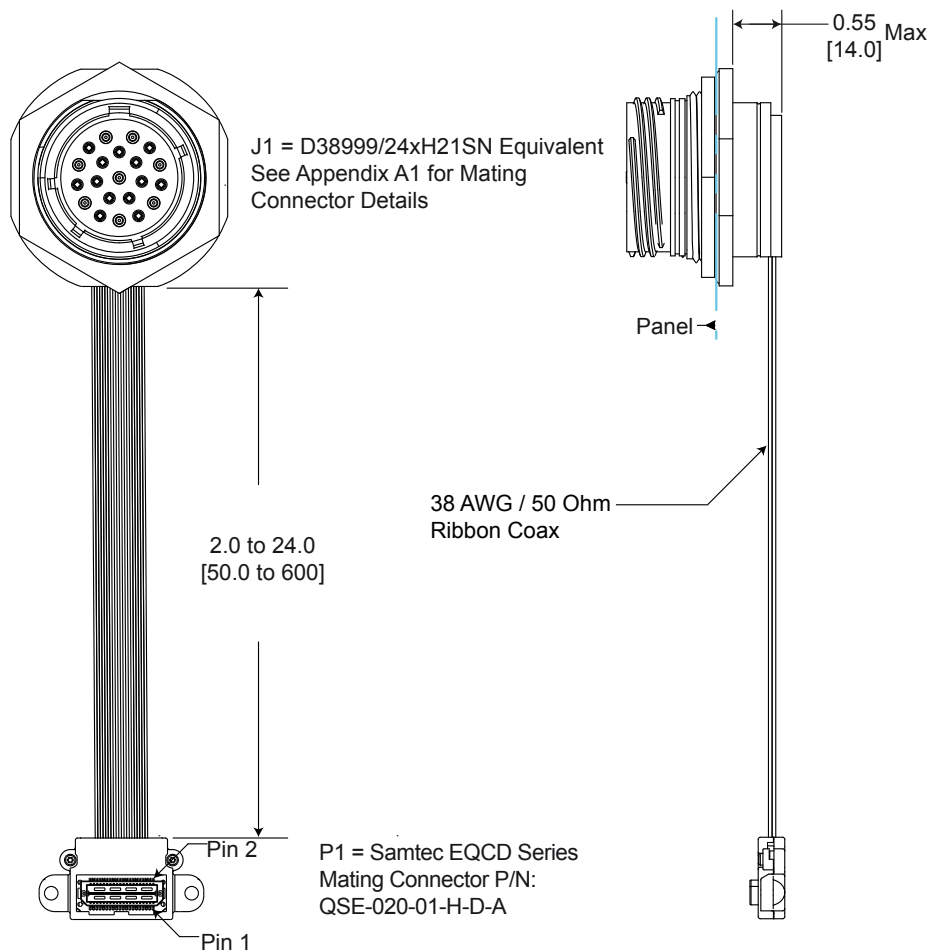
*see page 6 for part number / cable length options and page 12 for complete ordering options

Quad Port Lightning Series MIL-DTL-38999 Optical Transceiver,
100Base-FX Applications, Multimode, 1310nm

OUTLINE DRAWING

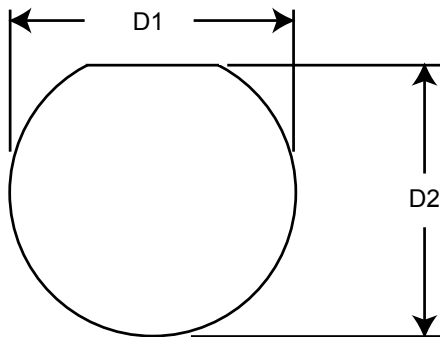
Jam Nut Option

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]



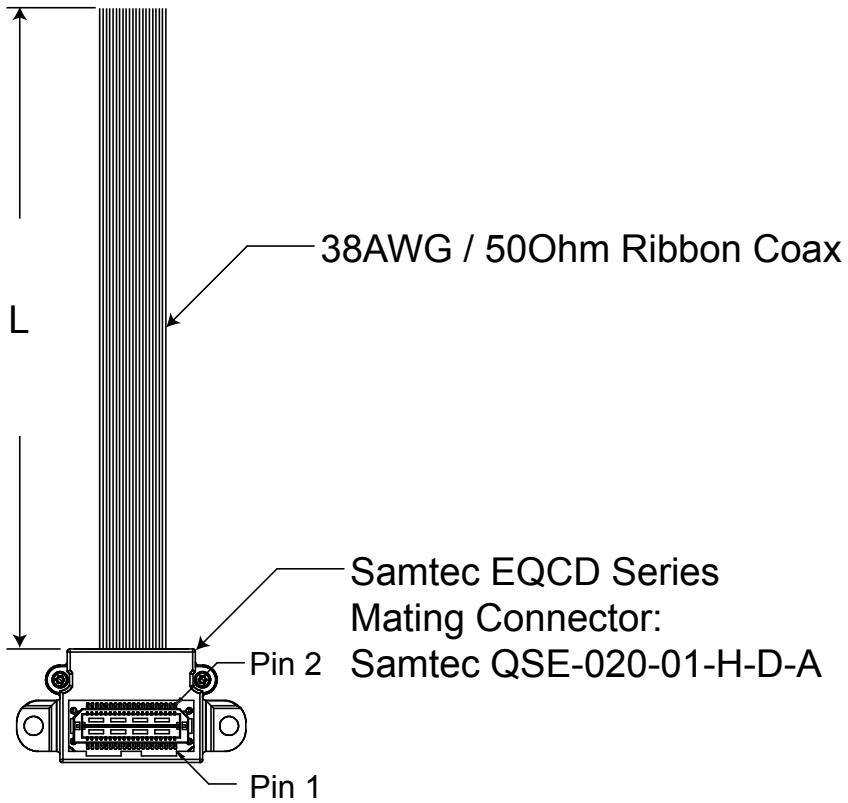
Part Number = *P38J-xxxx-Hx-Lxxx

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

Quad Port Lightning Series MIL-DTL-38999 Optical Transceiver,
 100Base-FX Applications, Multimode, 1310nm

OUTLINE DRAWING

Cable Length Options



Ribbon Coax Cable Length Options

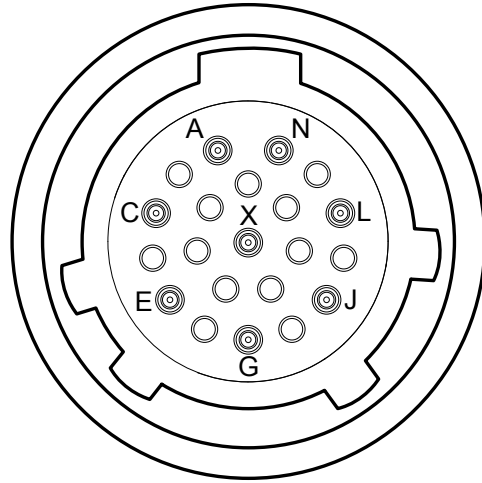
L (mm) +/- 6.0	ITEM #
50	xxxx-xxxx-xx-L050
100	xxxx-xxxx-xx-L100
150	xxxx-xxxx-xx-L150
200	xxxx-xxxx-xx-L200
250	xxxx-xxxx-xx-L250

Quad Port Lightning Series MIL-DTL-38999 Optical Transceiver,
100Base-FX Applications, Multimode, 1310nm

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

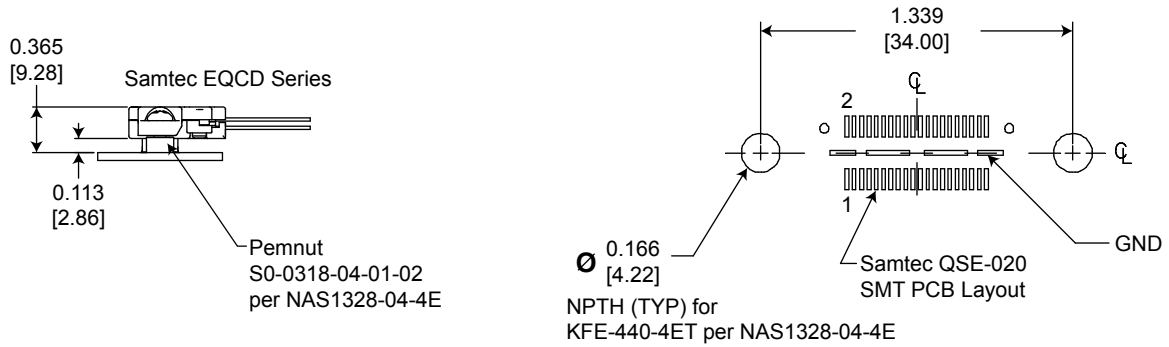
MIL-DTL-38999 OPTICAL INTERFACE

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

Quad Port Lightning Series MIL-DTL-38999 Optical Transceiver,
100Base-FX Applications, Multimode, 1310nm

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 #	FUNCTION
1	SD	LVPECL	0	A	RX
2	GND	NA	0-3	ALL	NA
3	RX-	CML	0	A	RX
4	GND	NA	0-3	ALL	NA
5	RX+	LVPECL	0	A	RX
6	GND	NA	0-3	ALL	NA
7	TX-	LVPECL	0	N	TX
8	V _{cc}	NA	0-3	ALL	NA
9	TX+	LVPECL	0	N	TX
10	V _{cc}	NA	0-3	ALL	NA
11	SD	LVPECL	1	C	RX
12	GND	NA	0-3	ALL	NA
13	RX-	LVPECL	1	C	RX
14	GND	NA	0-3	ALL	NA
15	RX+	LVPECL	1	C	RX
16	GND	NA	0-3	ALL	NA
17	TX-	LVPECL	1	L	TX
18	V _{cc}	NA	0-3	ALL	NA
19	TX+	LVPECL	1	L	TX
20	V _{cc}	NA	0-3	ALL	NA

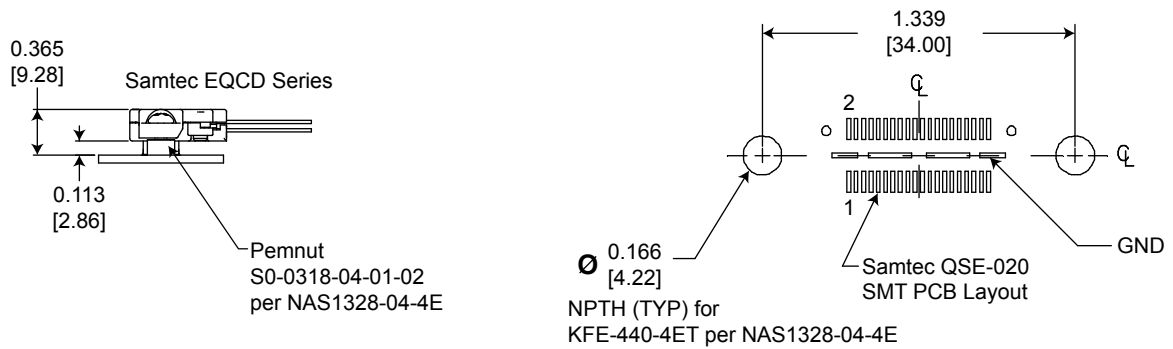
Center slug is Ground.

For All Signal Detect Functions: Satisfactory Optical Input: Logic "1" Output / Unsatisfactory Optical Input: Logic "0" Output

Quad Port Lightning Series MIL-DTL-38999 Optical Transceiver,
100Base-FX Applications, Multimode, 1310nm

PRINTED CIRCUIT BOARD FOOTPRINT

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



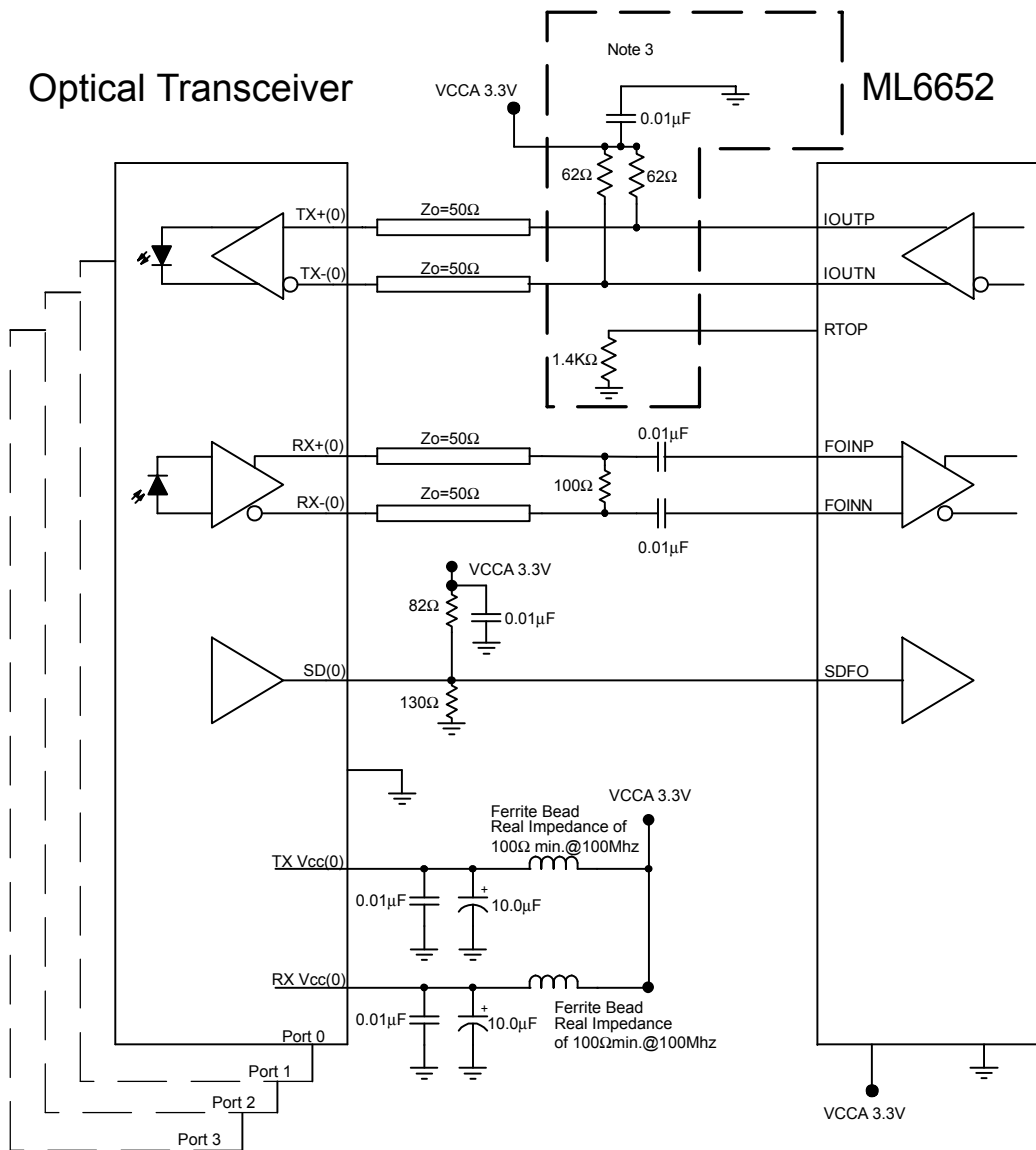
Samtec EQCD PIN ASSIGNMENTS - Continued from the previous page

ELECTRICAL			PORT #	OPTICAL	
PIN #	FUNCTION	LOGIC FAMILY		PIN #	FUNCTION
21	SD	LVPECL	2	E	RX
22	GND	NA	0-3	ALL	ALL
23	RX-	LVPECL	2	E	RX
24	GND	NA	0-3	ALL	ALL
25	RX+	LVPECL	2	E	RX
26	GND	NA	0-3	ALL	ALL
27	TX-	LVPECL	2	J	TX
28	V _{cc}	NA	0-3	ALL	ALL
29	TX+	LVPECL	2	J	TX
30	V _{cc}	NA	0-3	ALL	All
31	SD	LVPECL	3	X	RX
32	GND	NA	0-3	ALL	ALL
33	RX-	LVPECL	3	X	RX
34	GND	NA	0-3	ALL	ALL
35	RX+	LVPECL	3	X	RX
36	GND	NA	0-3	ALL	ALL
37	TX-	LVPECL	3	G	TX
38	V _{cc}	NA	0-3	ALL	ALL
39	TX+	LVPECL	3	G	TX
40	V _{cc}	NA	0-3	ALL	ALL

Center slug is Ground.

For All Signal Detect Functions: Satisfactory Optical Input: Logic "1" Output / Unsatisfactory Optical Input: Logic "0" Output

Quad Port Lightning Series MIL-DTL-38999 Optical Transceiver,
 100Base-FX Applications, Multimode, 1310nm
APPLICATION SCHEMATIC
 For +3.3V LVPECL PHY Circuits



Typical application schematic shown.
 For Alternative applications or termination techniques please consult the Factory

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

Note: 2
 50 ohm impedance termination shown. For other impedance requirements please consult the factory

Note: 3
 These values per Microlinear ML6652 datasheet: DS6652-F-02

All Protokraft statements, technical information and recommendations related to the products herein are based upon information believed to be reliable or accurate. However, the accuracy or completeness thereof is not guaranteed, and Protokraft assumes no responsibility for any inaccuracies. The user assumes all risks and liability whatsoever in connection with the use of a product or its application. Protokraft reserves the right to change at any time, without prior or subsequent notice, the design, specifications, function, fit or form of its products described herein, including withdrawal at any time of a product offered for sale herein. Protokraft makes no representations that the products herein are free from any intellectual property claims of others. Protokraft and the Protokraft logo are trademarks of Protokraft, LLC. Other trademarks are the property of their respective holders. Contact Protokraft for prices and availability. For the most recent version of this data sheet, please go to the Protokraft website at <http://www.protokraft.com>. In case of discrepancy, the web version takes precedence over any printed literature. ©2004 Protokraft, LLC. All rights reserved.

APPENDIX A2

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

*See DSCC or SAE QPL for Approved Suppliers

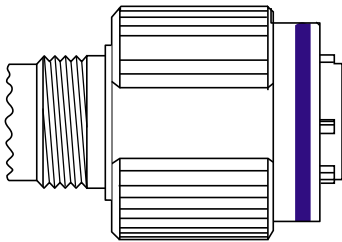
<http://www.dsccl.dla.mil/programs/qmlqpl/QPLdetail.asp?QPL=38999>

*D38999 PLUG - PIN INSERT

MIL-DTL-38999 CABLE PLUG

MS PLUG P/N

*D38999/26FH21PN



*FIBER OPTIC PIN TERMINUS

MIL-T-29504 PIN TERMINUS

MS PIN TERMINUS P/N

*M29504/04-xxxx**



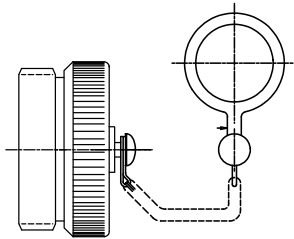
**defined by fiber optic cable configuration

*CABLE PROTECTION CAP

D38999/32 PLUG PROTECTION CAP

MS PLUG CAP P/N

*D38999/32F23N

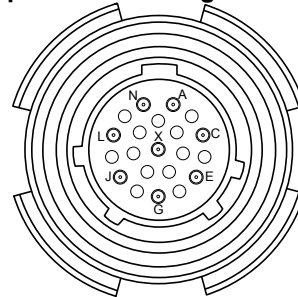


D38999 PLUG PORT FUNCTIONS

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

TOP

Optical Cable Plug Interface



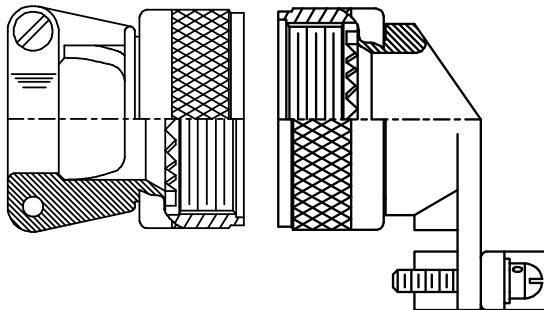
Front face of the optical cable plug pin insert shown. Transceiver insert opposite.

*CABLE BACKSHELL

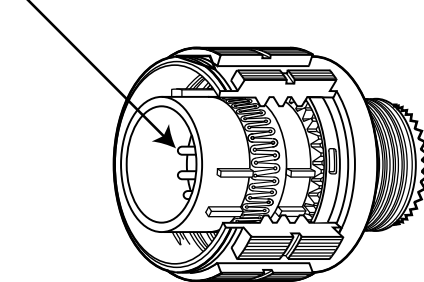
MIL-C-85049 CABLE BACKSHELL

MS BACKSHELL P/N

*MS85049/xxxxx**



Pin Termini

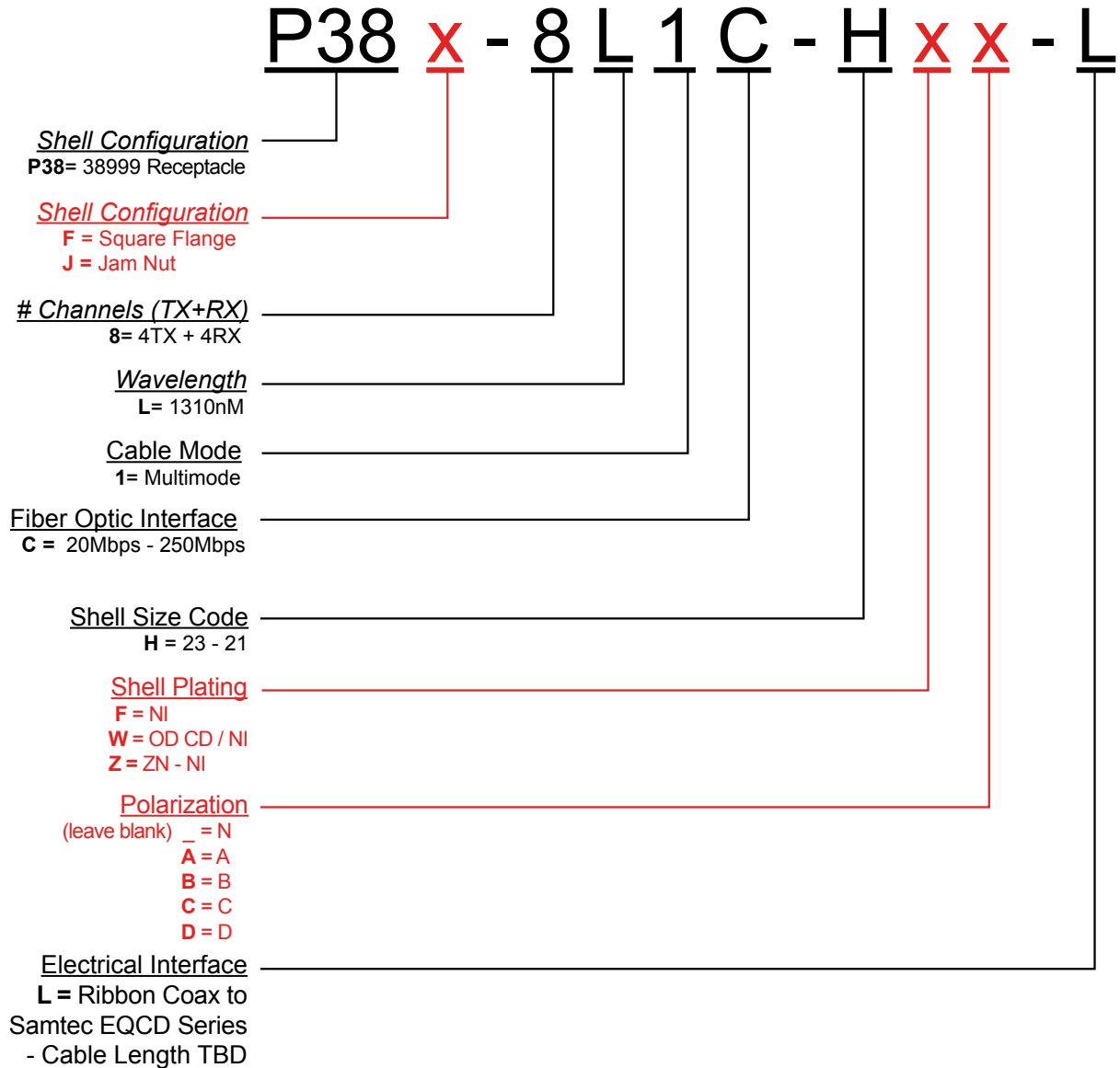


**Straight or angled backshell - defined by application / mounting configuration

APPENDIX A2

PART NUMBER OPTIONS

Quad Port, Square Flange, 1310nm



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



192 Bob Fitz Road, Johnson City, TN 37615
salesmp@moog.com
moogprotokraft.com