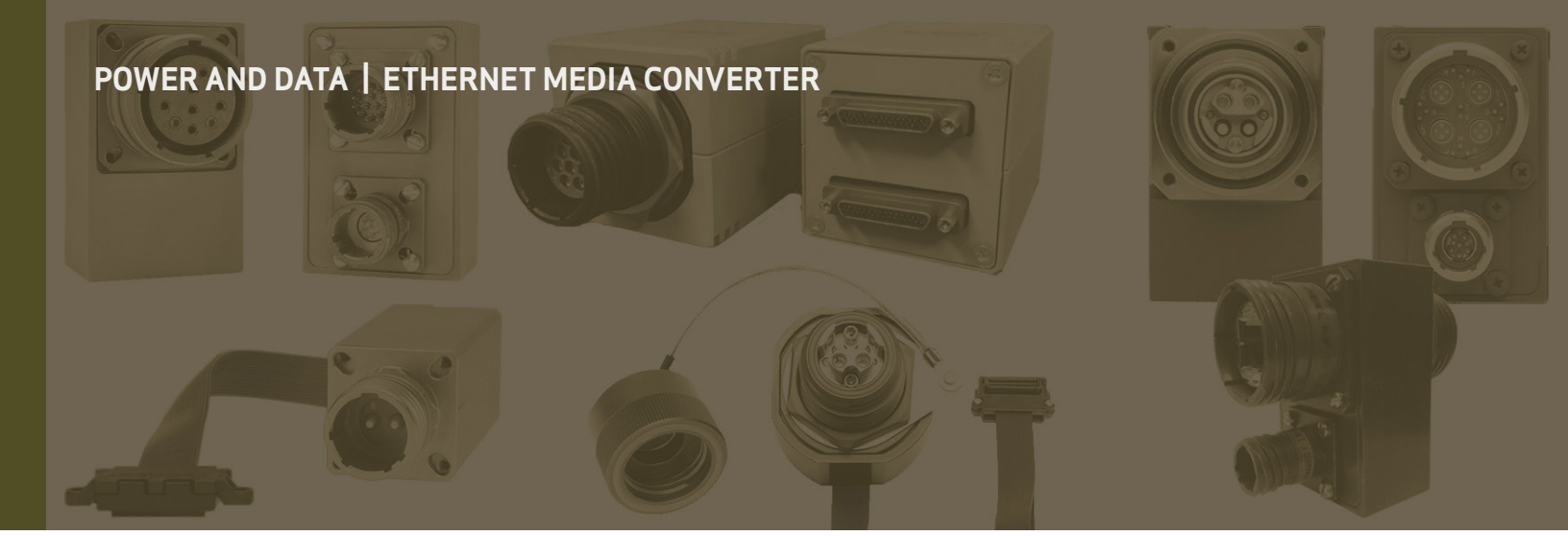
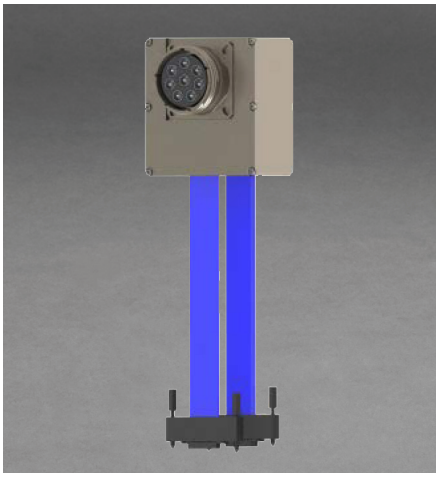


EXCALIBUR SERIES

MIL-DTL-38999 OPTICAL TRANSPONDER, XAUI TO 10GBASE-ZR APPLICATIONS, SINGLEMODE, 1550 nM



Excalibur series optical fiber transponders consist of optoelectronic transmitter and receiver functions integrated into a bulkhead mounted MIL-DTL-38999, series III receptacle connector along with the 10 Gbps / XAUI SerDes functions. The optical transmitters are 1550 nM lasers.

The optical receivers consist of PIN and preamplifier assemblies and limiting post-amplifiers. The XAUI electrical interface to the Excalibur series optical fiber transponders is a Samtec controlled impedance connector enabling interface to a ribbon TWINAX cable or flexible printed circuit assembly.

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

MOOG

QUAD PORT EXCALIBUR SERIES MIL-DTL-38999 OPTICAL TRANSPONDER, XAUI TO 10G ETHERNET APPLICATIONS, SINGLEMODE, 1550 NM

Quad Port

FEATURES

- Suitable for 10GBASE-ZR 10G Ethernet applications @ 10.3125 Gbps
- Optical fiber link distances up to 80 KM (9 / 125 μ SMF)
- Maximum optical channel bit error rate less than $1x10^{-12}$
- Operating temperature range from -40° to +85° C
- Shock, vibration and immersion resistant per MIL-STD-810 and MIL-STD-1344
- Aluminum alloy MIL-DTL-38999 housings are strong, durable, corrosion resistant and light weight
- ARINC 801 compliant optical fiber connector interface

APPLICATIONS

Excalibur series bulkhead mounted optical transponders enable extremely high speed network communications over long distances in harsh environments.

- 10 Gigabit Ethernet switches and peripherals
- Serial data links
- Video displays

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 singlemode 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.

ORDERING INFORMATION

Application	Part Number
Quad Port, XAUI to 10GBase-ZR	E38M-8xCK-JD-L889-L660

QUAD PORT EXCALIBUR SERIES MIL-DTL-38999 OPTICAL TRANSPONDER, XAUI TO 10G ETHERNET APPLICATIONS, SINGLEMODE, 1550 NM

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		+6.0	V

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Operating Temperature	T_A	-40		+75	°C
Supply Voltage	V_{CC}	+4.75		+5.25	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

CONNECTOR INTERFACE SPECIFICATIONS COMPLIANCE

Requirement	Feature	Condition	Notes
MIL-STD-883	ESD	Class II	2200 V
MIL-STD-810	Vibration	3.8 g^2 / Hz	43 G rms
MIL-STD-810	Shock	40.0 g	6-9 mS
MIL-STD-810	Immersion	1.0 Meter	2.0 Hours
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	< 0.5 dB Change
FDA / CDRH / IEC-825-1	Eye Safety	Class 1	No Safety Interlocks Required

MATERIALS

Item	Detail	Notes
Housing and Shell	Aluminum Alloy	
Housing and Shell Plating	Electroless Nickel	
Insert	Thermoplastic	
Interfacial Seal	Elastomer	
Optical Ferrules	Ceramic	
Printed Circuits	Polyimide / FR-4	

QUAD PORT EXCALIBUR SERIES MIL-DTL-38999 OPTICAL TRANSPONDER, XAUI TO 10G ETHERNET APPLICATIONS, SINGLEMODE, 1550 NM

OPTICAL TRANSMITTERS T_A = OPERATING TEMPERATURE RANGE, V_{CC} = 4.75 V TO 5.25 V

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Optical Output Power (BER < 10^{-12})	P_O	0		+5	dBm
Optical Output Wavelength	λ_{OUT}	1530		1565	nM
Extinction Ratio	ER	8.2			dB

OPTICAL RECEIVERS T_A = OPERATING TEMPERATURE RANGE, V_{CC} = 4.75 V TO 5.25 V

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Optical Sensitivity (BER < 10^{-12})	P_I	-20		-7	dBm
Optical Wavelength	λ_{IN}	1530		1565	nM

ELECTRICAL AC CHARACTERISTICS T_A = OPERATING TEMPERATURE RANGE, V_{CC} = 4.75 V TO 5.25 V

Parameter	Symbol	Minimum	Typical	Maximum	Unit
XAUI Input / Output Baud Rate - TXLANE [0..3] and RXLANE [0..3]	$R_{XAUI\ IN\ /\ OUT}$		3.125		Gbit/s
Baud Rate Variation	$R_{XAUI\ IN\ /\ OUT}$	-100		100	ppm
Differential Input / Output Impedance	$Z_{XAUI\ IN\ /\ OUT}$	80	100	120	Ω
Input Differential Skew	$t_{SKEW\ IN}$			75	ps
Output Differential Skew	$t_{SKEW\ OUT}$			15	ps

POWER SUPPLY CURRENT T_A = OPERATING TEMPERATURE RANGE, V_{CC} = 4.75 V TO 5.25 V

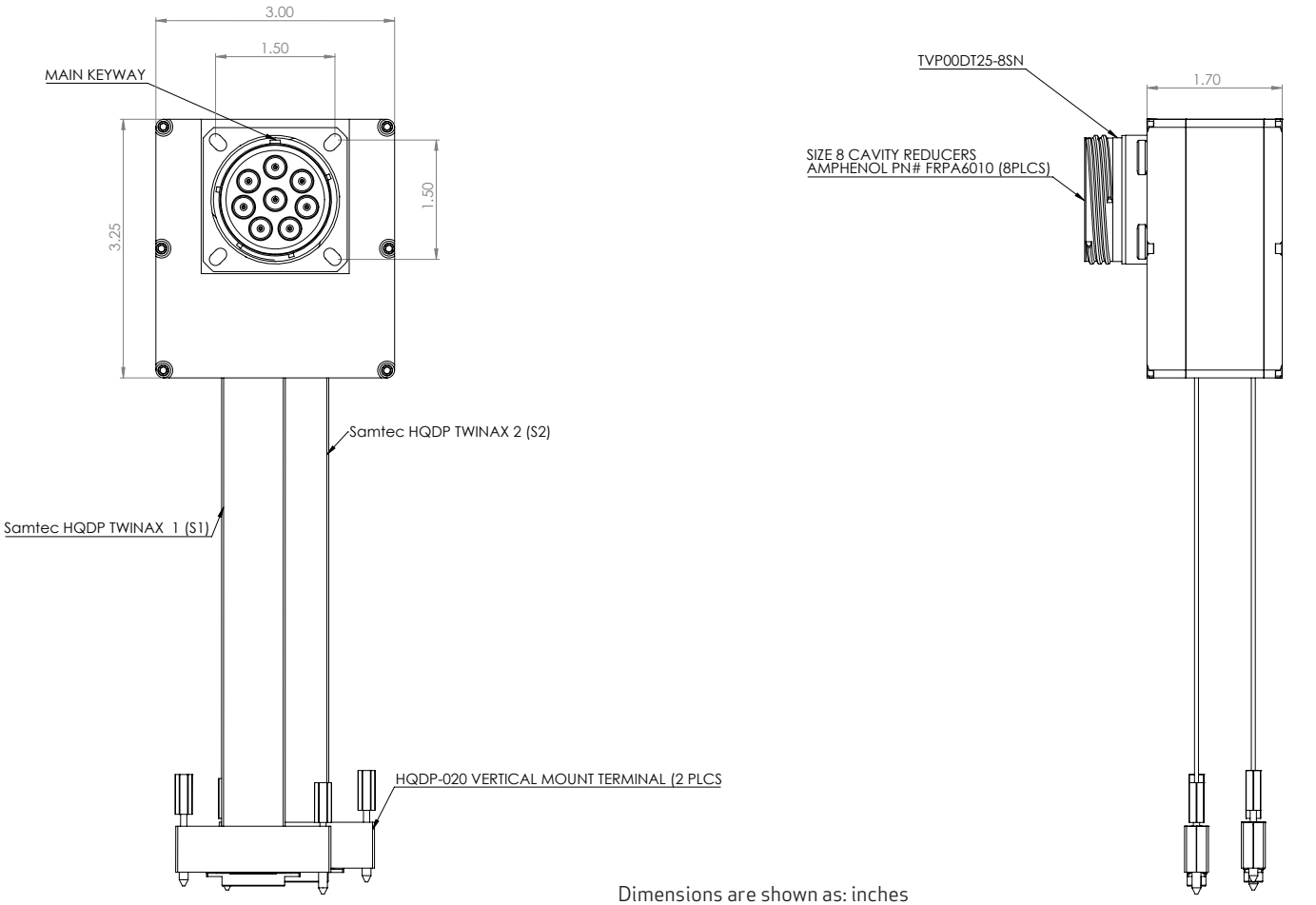
Parameter	Symbol	Minimum	Typical	Maximum	Unit
Supply Current Per Port	I_{CCT}		.5	.750	A

OPTICAL LINK DISTANCES

Cable Type	9 / 125 µ	
Maximum Supported Link Distance - Km	80	

QUAD PORT EXCALIBUR SERIES MIL-DTL-38999 OPTICAL TRANSPONDER, XAUI TO 10G ETHERNET APPLICATIONS, SINGLEMODE, 1550 NM

OUTLINE DRAWING

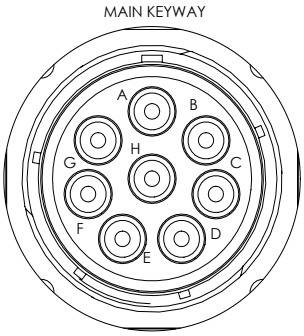


Dimensions are shown as: inches

QUAD PORT EXCALIBUR SERIES MIL-DTL-38999 OPTICAL TRANSPONDER, XAUI TO 10G ETHERNET APPLICATIONS, SINGLEMODE, 1550 NM

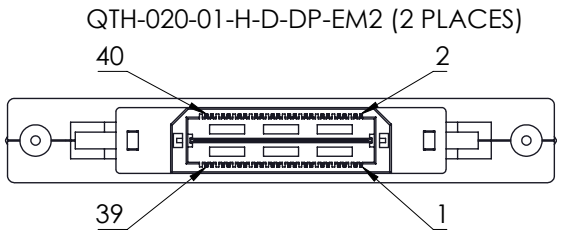
OPTICAL TRANSCEIVER INSERT ARRANGEMENT

Optical Interface



Front face of the optical transponder insert shown, fiber optic cable plug opposite - see Appendix A1 for details.

Electrical Interface



See Electrical Pin Assignment pages for details.

OPTICAL TRANSPONDER PORT ASSIGNMENTS

Position	Function	Port Number
A	CH1 TX	1
B	CH1 RX	1
C	CH2 TX	2
D	CH2 RX	2
E	CH3 TX	3
F	CH3 RX	3
G	CH4 TX	4
H	CH4 RX	4

QUAD PORT EXCALIBUR SERIES MIL-DTL-38999 OPTICAL TRANSPONDER, XAUI TO 10G ETHERNET APPLICATIONS, SINGLEMODE, 1550 NM

S1 ELECTRICAL PIN ASSIGNMENTS

Pin	Symbol	Port	Lane	I / O	Logic Family
1	CH1 XAUI 1 RX+	1	1	O	AC-Coupled, Internally Biased Differential XAUI
2	CH2 XAUI 1 RX+	2	1	O	AC-Coupled, Internally Biased Differential XAUI
3	CH1 XAUI 1 RX-	1	1	O	AC-Coupled, Internally Biased Differential XAUI
4	CH2 XAUI 1 RX-	2	1	O	AC-Coupled, Internally Biased Differential XAUI
5	CH1 XAUI 1 TX+	1	1	I	AC-Coupled, Internally Biased Differential XAUI
6	CH2 XAUI 1 TX+	2	1	I	AC-Coupled, Internally Biased Differential XAUI
7	CH1 XAUI 1 TX-	1	1	I	AC-Coupled, Internally Biased Differential XAUI
8	CH2 XAUI 1 TX-	2	1	I	AC-Coupled, Internally Biased Differential XAUI
9	CH1 XAUI 2 RX+	1	2	O	AC-Coupled, Internally Biased Differential XAUI
10	CH2 XAUI 2 RX+	2	2	O	AC-Coupled, Internally Biased Differential XAUI
11	CH1 XAUI 2 RX-	1	2	O	AC-Coupled, Internally Biased Differential XAUI
12	CH2 XAUI 2 RX-	2	2	O	AC-Coupled, Internally Biased Differential XAUI
13	CH1 XAUI 2 TX+	1	2	I	AC-Coupled, Internally Biased Differential XAUI
14	CH2 XAUI 2 TX+	2	2	I	AC-Coupled, Internally Biased Differential XAUI
15	CH1 XAUI 2 TX-	1	2	I	AC-Coupled, Internally Biased Differential XAUI
16	CH2XAUI 2 TX-	2	2	I	AC-Coupled, Internally Biased Differential XAUI
17	CH1 XAUI 3 RX+	1	3	O	AC-Coupled, Internally Biased Differential XAUI
18	CH2 XAUI 3 RX+	2	3	O	AC-Coupled, Internally Biased Differential XAUI
19	CH1 XAUI 3 RX-	1	3	O	AC-Coupled, Internally Biased Differential XAUI
20	CH2 XAUI 3 RX-	2	3	O	AC-Coupled, Internally Biased Differential XAUI
21	CH1XAUI 3 TX+	1	3	I	AC-Coupled, Internally Biased Differential XAUI
22	CH2 XAUI 3 TX+	2	3	I	AC-Coupled, Internally Biased Differential XAUI
23	CH1 XAUI 3 TX-	1	3	I	AC-Coupled, Internally Biased Differential XAUI
24	CH2 XAUI 3 TX-	2	3	I	AC-Coupled, Internally Biased Differential XAUI
25	CH1 XAUI 4 RX+	1	4	O	AC-Coupled, Internally Biased Differential XAUI
26	CH2 XAUI 4 RX+	2	4	O	AC-Coupled, Internally Biased Differential XAUI
27	CH1 XAUI 4 RX-	1	4	O	AC-Coupled, Internally Biased Differential XAUI
28	CH2 XAUI 4 RX-	2	4	O	AC-Coupled, Internally Biased Differential XAUI
29	CH1 XAUI 4 TX+	1	4	I	AC-Coupled, Internally Biased Differential XAUI
30	CH2 XAUI 4 TX+	2	4	I	AC-Coupled, Internally Biased Differential XAUI
31	CH1 XAUI 4 TX-	1	4	I	AC-Coupled, Internally Biased Differential XAUI
32	CH2 XAUI 4 TX-	2	4	I	AC-Coupled, Internally Biased Differential XAUI
33	5 V POWER	1 / 2	N/A	I	N/A
34	5 V POWER	1 / 2	N/A	I	N/A
35	GROUND	1 / 2	N/A	N/A	N/A
36	GROUND	1 / 2	N/A	N/A	N/A
37	MDIO	All	N/A	I / O	Open Drain LVTTL, Management Data Bus, Internal Pull-up
38	MDC	All	N/A	I	LVTTL, Management Data Clock
39	LOS_CH1 / 2	1 / 2	N/A	O	Open Drain CMOS, Logic High = Unsatisfactory Optical
40	TX DIS_CH1 / 2	1 / 2	N/A	I	Input / Low=Satisfactory Optical Input LVTTL, Logic High=Off / Low=On

QUAD PORT EXCALIBUR SERIES MIL-DTL-38999 OPTICAL TRANSPONDER, XAUI TO 10G ETHERNET APPLICATIONS, SINGLEMODE, 1550 NM

S2 ELECTRICAL PIN ASSIGNMENTS

Pin	Symbol	Port	Lane	I / O	Logic Family
1	CH3 XAUI 1 RX+	3	1	O	AC-Coupled, Internally Biased Differential XAUI
2	CH4 XAUI 1 RX+	4	1	O	AC-Coupled, Internally Biased Differential XAUI
3	CH3 XAUI 1 RX-	3	1	O	AC-Coupled, Internally Biased Differential XAUI
4	CH4 XAUI 1 RX-	4	1	O	AC-Coupled, Internally Biased Differential XAUI
5	CH3 XAUI 1 TX+	3	1	I	AC-Coupled, Internally Biased Differential XAUI
6	CH4 XAUI 1 TX+	4	1	I	AC-Coupled, Internally Biased Differential XAUI
7	CH3 XAUI 1 TX-	3	1	I	AC-Coupled, Internally Biased Differential XAUI
8	CH4 XAUI 1 TX-	4	1	I	AC-Coupled, Internally Biased Differential XAUI
9	CH3 XAUI 2 RX+	3	2	O	AC-Coupled, Internally Biased Differential XAUI
10	CH4 XAUI 2 RX+	4	2	O	AC-Coupled, Internally Biased Differential XAUI
11	CH3 XAUI 2 RX-	3	2	O	AC-Coupled, Internally Biased Differential XAUI
12	CH4 XAUI 2 RX-	4	2	O	AC-Coupled, Internally Biased Differential XAUI
13	CH3 XAUI 2 TX+	3	2	I	AC-Coupled, Internally Biased Differential XAUI
14	CH4 XAUI 2 TX+	4	2	I	AC-Coupled, Internally Biased Differential XAUI
15	CH3 XAUI 2 TX-	3	2	I	AC-Coupled, Internally Biased Differential XAUI
16	CH4XAUI 2 TX-	4	2	I	AC-Coupled, Internally Biased Differential XAUI
17	CH3 XAUI 3 RX+	3	3	O	AC-Coupled, Internally Biased Differential XAUI
18	CH4 XAUI 3 RX+	4	3	O	AC-Coupled, Internally Biased Differential XAUI
19	CH3 XAUI 3 RX-	3	3	O	AC-Coupled, Internally Biased Differential XAUI
20	CH4 XAUI 3 RX-	4	3	O	AC-Coupled, Internally Biased Differential XAUI
21	CH3XAUI 3 TX+	3	3	I	AC-Coupled, Internally Biased Differential XAUI
22	CH4 XAUI 3 TX+	4	3	I	AC-Coupled, Internally Biased Differential XAUI
23	CH3 XAUI 3 TX-	3	3	I	AC-Coupled, Internally Biased Differential XAUI
24	CH4 XAUI 3 TX-	4	3	I	AC-Coupled, Internally Biased Differential XAUI
25	CH3 XAUI 4 RX+	3	4	O	AC-Coupled, Internally Biased Differential XAUI
26	CH4 XAUI 4 RX+	4	4	O	AC-Coupled, Internally Biased Differential XAUI
27	CH3 XAUI 4 RX-	3	4	O	AC-Coupled, Internally Biased Differential XAUI
28	CH4 XAUI 4 RX-	4	4	O	AC-Coupled, Internally Biased Differential XAUI
29	CH3 XAUI 4 TX+	3	4	I	AC-Coupled, Internally Biased Differential XAUI
30	CH4 XAUI 4 TX+	4	4	I	AC-Coupled, Internally Biased Differential XAUI
31	CH3 XAUI 4 TX-	3	4	I	AC-Coupled, Internally Biased Differential XAUI
32	CH4 XAUI 4 TX-	4	4	I	AC-Coupled, Internally Biased Differential XAUI
33	5 V POWER	3 / 4	N/A	I	N/A
34	5 V POWER	3 / 4	N/A	I	N/A
35	GROUND	3 / 4	N/A	N/A	N/A
36	GROUND	3 / 4	N/A	N/A	N/A
37	SPARE	All	N/A	—	—
38	SPARE	All	N/A	—	—
39	LOS_CH3 / 4	3 / 4	N/A	O	Open Drain CMOS, Logic High = Unsatisfactory Optical
40	TX DIS_CH3 / 4	3 / 4	N/A	I	Input / Low = Satisfactory Optical Input LVTTL, Logic High = Off / Low = On

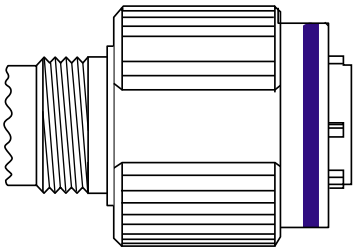
QUAD PORT EXCALIBUR SERIES MIL-DTL-38999 OPTICAL TRANSPONDER, XAUI TO 10G ETHERNET APPLICATIONS, SINGLEMODE, 1550 NM

MIL-DTL-38999 FIBER OPTIC CABLE PLUG

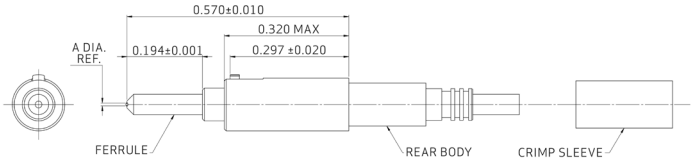
*See DSCC or SAE QPL for Approved Suppliers
http://www.dscc.dla.mil/programs/qmlqpl/QPLdetail.asp?QPL=38999

D38999 PLUG - RECEPTACLE INSERT
MIL-DTL-38999 CABLE PLUG

Consult Amphenol for appropriate mating connector part number



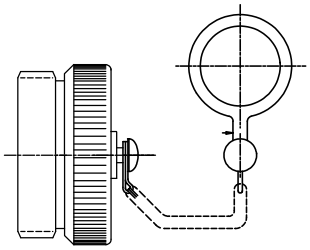
FIBER OPTIC TERMINUS
ARINC 801 TERMINUS



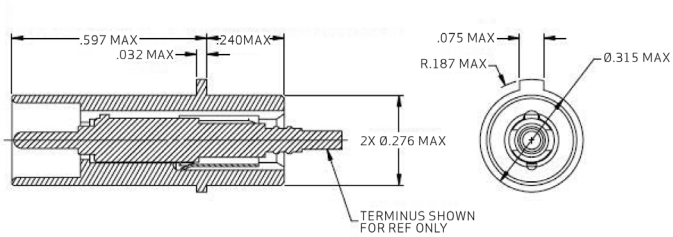
**Defined by fiber optic cable configuration
***Amphenol part number CF-198148-126

CABLE PROTECTION CAP
D38999 / 32 PLUG PROTECTION CAP

MS Plug Cap P/N *D38999 / 32W25N



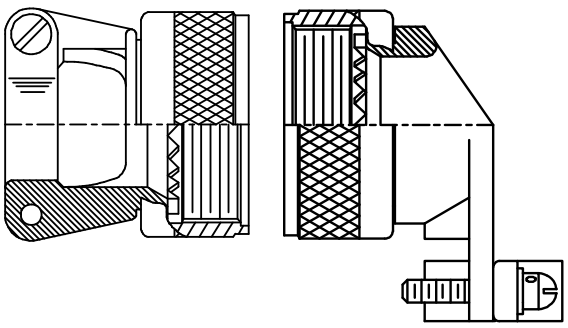
ARINC 801 SIZE 8 CAVITY REDUCER



**Defined by fiber optic cable configuration
***Consult Amphenol for appropriate cavity reducer part number

CABLE BACKSHELL
MIL-C-85049 CABLE BACKSHELL

MS Backshell P/N *MS85049 / XXXXXX**



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

QUAD PORT EXCALIBUR SERIES MIL-DTL-38999 OPTICAL TRANSPONDER, XAUI TO 10G ETHERNET APPLICATIONS, SINGLEMODE, 1550 NM

APPENDIX A2 PART NUMBER OPTIONS

E38 M - 8 x C K - J x x - Lxxx - Lxxx

PRODUCT CONFIGURATION
E38 = Excalibur Series

SHELL CONFIGURATION
M = Flange Modified Pin Out

CHANNELS (TX + RX)
8 = 4 TX + 4 RX

WAVELENGTH
S = 850 nM
E = 1550 nM ZR

POWER SUPPLY
C = +5 VDC

FIBER OPTIC INTERFACE
K = 10 Gbps

SHELL SIZE CODE
J = 25-08

SHELL PLATING
F = NI
W = OD CD / NI
Z = ZN / NI
D = Durmalon

POLARIZATION
(Leave blank) = N
A = A
B = B
C = C
D = D

ELECTRICAL INTERFACE
L = Ribbon Coax to Samtec HQDP Series - Cable Length of S1

ELECTRICAL INTERFACE
L = Ribbon Coax to Samtec HQDP Series - Cable Length of S2

MOOG PROTOKRAFT

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salesmp@moog.com
moogprotokraft.com