



050-105

Copper to Fiber Ethernet Media Converter
10/100/1000BASE-T to Fiber Optic Ethernet
(1000BASE-SX, 1000BASE-LX10, 1000BASE-EX,
100BASE-FX), 28VDC,
M38999 (Signal), M38999 (Power), M38999 (Fiber Optic)

REV	DESCRIPTION	DATE	APPROVED
A	Initial release	9/5/2014	MF
B	Per DCN52472	10/7/2014	MF
C	Per DCN52728	10/27/2014	MF

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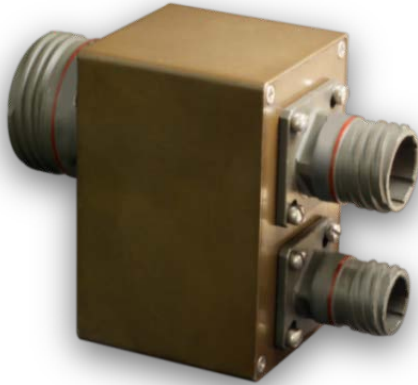
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10/100/1000BASE-T to Fiber Optic Ethernet (SX, LX10, EX, FX)



10/100/1000BASE-T to 1000BASE-SX, 1000BASE-LX10, or 100BASE-FX



The Glenair 050-105 is an Ethernet Copper to Fiber media converter that supports 10/100/1000BASE-T copper input/output and can be configured to support 1000BASE-SX, 1000BASE-LX10, 1000BASE-EX or 100BASE-FX protocols. It is designed for harsh environments and incorporates electronics in an environmentally sealed enclosure that incorporates three environmental M38999 connectors. The Glenair Ethernet media converter enables reliable communications over longer distances in harsh environment applications. It extends network link distances between switches, routers, and other Ethernet peripherals. It converts 10/100/1000BASE-T data from twisted pair copper cable to 1000BASE-SX/LX serial data transmitted over a pair of optical fibers. This allows legacy equipment running at 10/100/1000BASE-T to be connected to newer networks, and provides a smooth upgrade path.

KEY FEATURES/BENEFITS

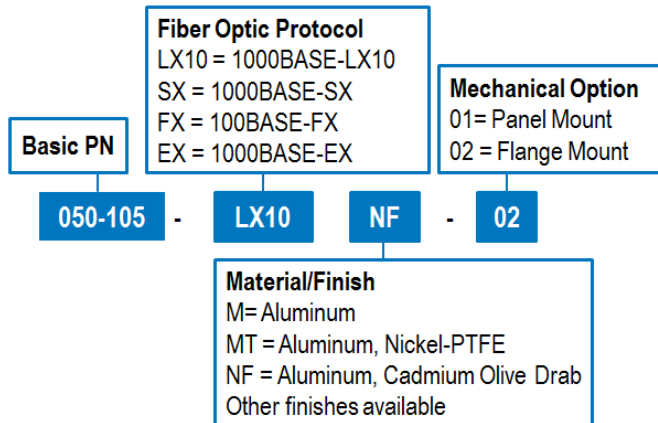
- 1310nm FP Lasers for 1000BASE-LX10
- 1310nm DFB Lasers for 1000BASE-EX
- InGaAs PIN PD for 1000BASE-LX10 & -EX
- 850nm Lasers for 1000BASE-SX
- GaAs PIN PD for 1000BASE-SX
- 1300nm LED for 100BASE-FX
- PIN PD for 100BASE-FX
- Wide Input Voltage Range: 5-36V
- Electrical Interface compliant with IEEE 802.3 (10/100/1000BASE-T)
- Optical Interface compliant with IEEE 802.3 (1000BASE-LX10 or 1000BASE-SX)

- -40°C to +85°C operating temperature range
- MIL-STD-810 Mechanical Shock and Vibration
- Up to 550 Meters over MMF (SX)
- Up to 10km over SMF (LX10)
- Up to 40km over SMF (EX)
- Magnetics on the electrical signal input side to support 10/100/1000BASE-T operation over 100m Cat 5E
- IP67 in mated condition
- M38999 Rugged connectors for Signal, Power & Fiber
- Panel Mount & Flange Mount Options

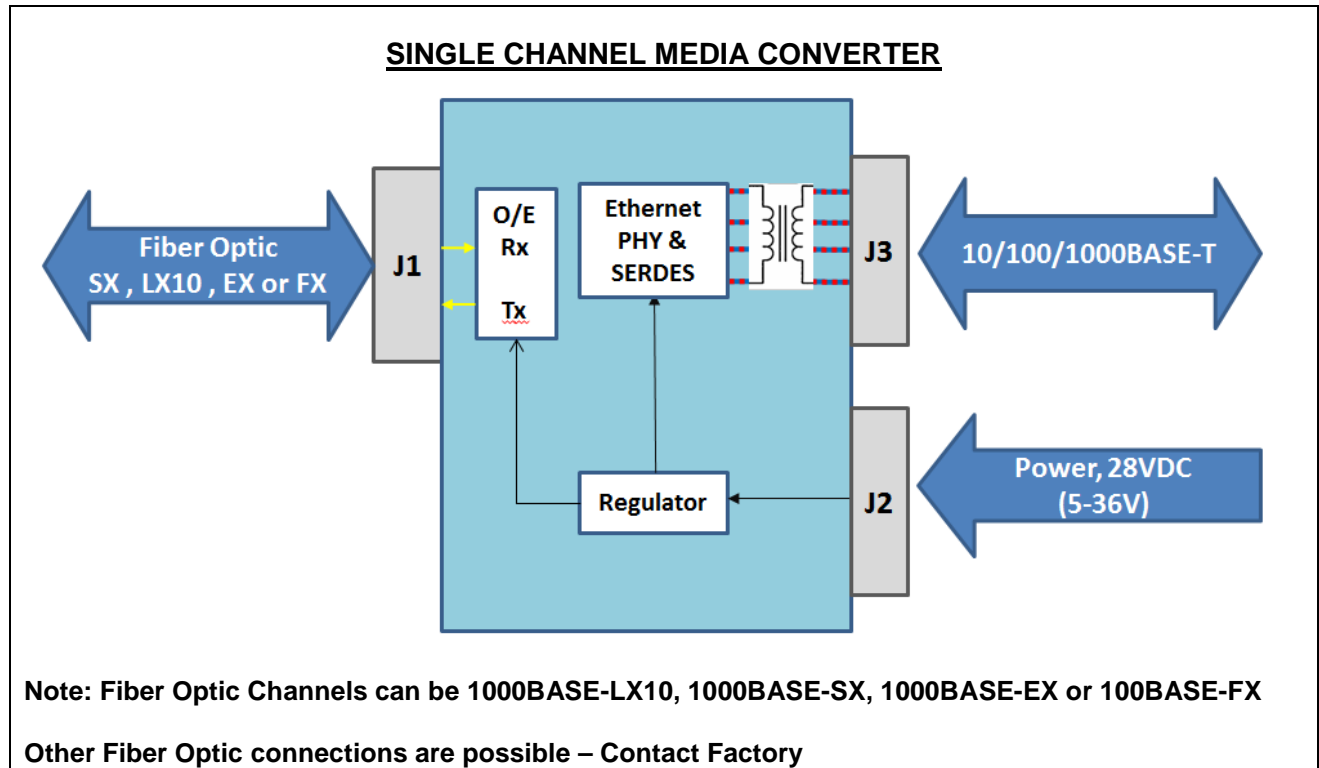
APPLICATIONS

- Harsh Environment Ethernet for Airborne, Tactical and Shipboard applications

How To Order



Functional Block Diagram



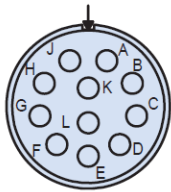
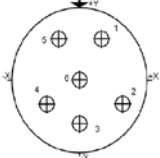
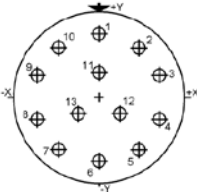
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10/100/1000BASE-T to Fiber Optic Ethernet (SX, LX10, EX, FX)



Connectors

NAME	Insert Arrangement	Function	Media Converter Connector	Mating PLUG Connector
J1	 <p>D38999 Series III MIL-STD-1560 Arrangement 19-11 (Mating face - PIN insert shown)</p>	Fiber Optic Signal Connector	D38999 Series III type 180-091#S7-19-11SN (D38999/20WF11SN) <u>SOCKET TERMINUS</u> SX or FX CONFIGURATION: 181-001-126 (M29504/5-4239) LX10 or EX CONFIGURATION: 181-001-125 (M29504/5-4237)	D38999 Series III type 180-091#06-19-11PN (D38999/26WF11PN type) <u>PIN TERMINUS</u> SX or FX CONFIGURATION: 181-002-126 (M29504/4-4210) LX10 or EX CONFIGURATION: 181-002-125 (M29504/4-4208)
J2	 <p>D38999 Series III MIL-STD-1560 Arrangement 9-35 (Mating face - PIN insert shown)</p>	Power Connector	D38999 Series III type 233-105-00#09-35PN (D38999/20WA35PN) <u>PIN CONTACTS</u> 850-002-22-360 (M39029/58-360)	D38999 Series III type 233-105-G6#09-35SN (D38999/26WA35SN) <u>SOCKET CONTACTS</u> 850-002-22-348 (M39029/56-348)
J3	 <p>D38999 Series III MIL-STD-1560 Arrangement 11-35 (Mating face - PIN insert shown)</p>	Electrical Ethernet Signal Connector	D38999 Series III type 233-105-00#11-35PN (D38999/20WB35PN) <u>PIN CONTACTS</u> 850-002-22-360 (M39029/58-360)	D38999 Series III type 233-105-G6#11-35SN (D38999/26WB35SN) <u>SOCKET CONTACTS</u> 850-002-22-348 (M39029/56-348)

Note: # = Environmental Class (Material/Finish)

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Ratings and Specifications – LX10 VERSION

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Typ	Max	Units	Notes
Storage Temperature	T _s	-55		+100	°C	
Supply Voltage	V _{cc}	-0.5		40	V	

OPERATING CONDITIONS

Parameter	Symbol	Min	Typ	Max	Units	Notes
Operating Temperature	T _{op}	-40		+85	°C	
Supply Voltage	V _{cc}	5	28	36	V	
Supply Current	I _{cc}		100	150	mA	@28VDC
Supply Current	I _{cc}		600		mA	@5VDC

OPTICAL CHARACTERISTICS – TRANSMITTER

Parameter	Symbol	Min	Typ	Max	Units	Notes
Optical Output Power	P _{OUT}	-8.5	-4	-3	dBm	1310nm Fabry-Perot
Optical Wavelength	λ _{OUT}	1285	1310	1345	nm	
Spectral Width	Δλ			3.5	nm	

OPTICAL CHARACTERISTICS – RECEIVER

Parameter	Symbol	Min	Typ	Max	Units	Notes
Optical Sensitivity (Input Power Range)	P _{IN OP}	-20		0	dBm	
Min. Sensitivity, BER 10 ⁻¹² , PRBS 2 ⁷ -1	P _{IN MIN}		-22	-20	dBm	PIN PD, LX10 source
Overload, BER 10 ⁻¹² , PRBS 2 ⁷ -1	P _{IN MAX}	0			dBm	
Optical Wavelength	λ _{IN}	1100	1310	1590	nm	

ETHERNET COMPLIANCE

Parameter	Medium Type	Distance	Notes
Gigabit Ethernet, IEEE 802.3ab, 1000BASE-T	TIA/EIA-568-B Cat 5E	100m	
Gigabit Ethernet, IEEE 802.3z, 1000BASE-LX10	Single Mode Fiber (9/125μm)	10km	



Ratings and Specifications – EX VERSION

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Typ	Max	Units	Notes
Storage Temperature	T _s	-55		+100	°C	
Supply Voltage	V _{cc}	-0.5		40	V	

OPERATING CONDITIONS

Parameter	Symbol	Min	Typ	Max	Units	Notes
Operating Temperature	T _{op}	-40		+85	°C	
Supply Voltage	V _{cc}	5	28	36	V	
Supply Current	I _{cc}		100	150	mA	@28VDC
Supply Current	I _{cc}		600		mA	@5VDC

OPTICAL CHARACTERISTICS – TRANSMITTER

Parameter	Symbol	Min	Typ	Max	Units	Notes
Optical Output Power	P _{OUT}	-1	+1	+3	dBm	1310nm DFB
Optical Wavelength	λ _{OUT}	1285	1310	1345	nm	
Spectral Width	Δλ			1	nm	

OPTICAL CHARACTERISTICS – RECEIVER

Parameter	Symbol	Min	Typ	Max	Units	Notes
Optical Sensitivity (Input Power Range)	P _{IN OP}	-20		0	dBm	
Min. Sensitivity, BER 10 ⁻¹² , PRBS 2 ⁷ -1	P _{IN MIN}		-22	-20	dBm	PIN PD
Overload, BER 10 ⁻¹² , PRBS 2 ⁷ -1	P _{IN MAX}	0			dBm	
Optical Wavelength	λ _{IN}	1100	1310	1590	nm	

ETHERNET COMPLIANCE

Parameter	Medium Type	Distance	Notes
Gigabit Ethernet, IEEE 802.3ab, 1000BASE-T	TIA/EIA-568-B Cat 5E	100m	
Derived from Gigabit Ethernet, IEEE 802.3z	Single Mode Fiber (9/125μm)	40km**	** 19dB optical Loss budget, 0.35dB/km loss assumed



Ratings and Specifications – SX VERSION

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Typ	Max	Units	Notes
Storage Temperature	T _s	-55		+100	°C	
Supply Voltage	V _{cc}	-0.5		40	V	1 second maximum

OPERATING CONDITIONS

Parameter	Symbol	Min	Typ	Max	Units	Notes
Operating Temperature	T _{op}	-40		+85	°C	
Supply Voltage	V _{cc}	5	28	36	V	
Supply Current	I _{cc}		100	150	mA	@28VDC
Supply Current	I _{cc}		600		mA	@5VDC

OPTICAL CHARACTERISTICS – TRANSMITTER

Parameter	Symbol	Min	Typ	Max	Units	Notes
Optical Output Power	P _{OUT}	-9.5		-4	dBm	VCSEL, 62.5/125µm MM
Optical Wavelength	λ _{OUT}	830	850	860	nm	
Spectral Width	Δλ			0.85	nm	

OPTICAL CHARACTERISTICS - RECEIVER

Parameter	Symbol	Min	Typ	Max	Units	Notes
Optical Sensitivity (Input Power Range)	P _{IN OP}	-17		-2	dBm	
Min. Sensitivity, BER 10 ⁻¹² , PRBS 2 ⁷ -1	P _{IN MIN}		-22	-17	dBm	PIN PD
Overload, BER 10 ⁻¹² , PRBS 2 ⁷ -1	P _{IN MAX}	-2	-1		dBm	
Optical Wavelength	λ _{IN}	770	850	860	nm	

ETHERNET COMPLIANCE

Parameter	Medium Type	Distance	Notes
Gigabit Ethernet, IEEE 802.3ab, 1000BASE-T	TIA/EIA-568-B Cat 5E	100m	
Gigabit Ethernet, IEEE 802.3z, 1000BASE-SX	OM3 MMF (50/125µm) OM3 MMF (62.5/125µm)	550m 275m	850nm VCSEL



Ratings and Specifications – FX VERSION

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Typ	Max	Units	Notes
Storage Temperature	T _s	-55		+100	°C	
Supply Voltage	V _{cc}	-0.5		40	V	1 second maximum

OPERATING CONDITIONS

Parameter	Symbol	Min	Typ	Max	Units	Notes
Operating Temperature	T _{op}	-40		+85	°C	
Supply Voltage	V _{cc}	5	28	36	V	
Supply Current	I _{cc}		100	150	mA	@28VDC
Supply Current	I _{cc}		600		mA	@5VDC

OPTICAL CHARACTERISTICS – TRANSMITTER

Parameter	Symbol	Min	Typ	Max	Units	Notes
Optical Output Power	P _{OUT}	-19		-14	dBm	1300nm LED (IEC 9314-3)
Optical Wavelength	λ _{OUT}	1270	1310	1380	nm	
Spectral Width	Δλ		150		nm	

OPTICAL CHARACTERISTICS - RECEIVER

Parameter	Symbol	Min	Typ	Max	Units	Notes
Sensitivity, BER 10 ⁻¹⁰ , PRBS 2 ⁷ -1	P _{IN}			-32	dBm	PIN PD
Overload, BER 10 ⁻¹⁰ , PRBS 2 ⁷ -1	P _{IN}	-14			dBm	
Optical Wavelength	λ _{IN}	1270	1310	1380	nm	

ETHERNET COMPLIANCE

Parameter	Medium Type	Distance	Notes
Fast Ethernet, IEEE 802.3u, 100BASE-T	TIA/EIA-568-B Cat 5E	100m	
Fast Ethernet, IEEE 802.3u, 100BASE-FX, IEC 9314-3	MMF (50/125μm) & (62.5/125μm)	2km	



Ratings and Specifications - (continued)

COMPLIANCE SPECIFICATIONS

CHARACTERISTIC	Standard	Condition	Notes
Mechanical Shock	MIL-STD-810G	40g	6-9 ms pulses
Mechanical Vibration	MIL-STD-810G	30 grms	
ESD	MIL-STD-883	Class II	2200V HBM
Conducted Emissions, Power Leads, 30 Hz to 10 kHz	MIL-STD-461F	CE101	
Conducted Emissions, Power Leads, 10 kHz to 10 MHz	MIL-STD-461F	CE102	
Conducted Susceptibility, Power Leads, 30 Hz to 150KHz	MIL-STD-461F	CS101	
Conducted Susceptibility, Transients, Power Leads	MIL-STD-461F	CS106	
Conducted Susceptibility, Structure Current, 60 Hz to 100 kHz	MIL-STD-461F	CS109	
Conducted Susceptibility, Bulk Cable Injection, 10 kHz to 200 MHz	MIL-STD-461F	CS114	
Radiated Susceptibility, Magnetic Field, 30 Hz to 100 kHz	MIL-STD-461F	RS101	
Radiated Susceptibility, Electric Field, 2 MHz to 18 GHz	MIL-STD-461F	RS103	
Radiated Emissions, Magnetic Field, 30 Hz to 100 kHz	MIL-STD-461F	RE101	
Radiated Emissions, Electric Field, 10 kHz to 18 GHz	MIL-STD-461F	RE102	
Mating Durability	MIL-DTL-38999/20	500 Cycles	
Flame Resistance	EIA364-104		30 seconds
Damp Heat	MIL-STD-810G		120 hours
Aircraft Electrical Power Characteristics	MIL-STD-704F		28V DC Systems
Military Vehicle Electrical Power Characteristics	MIL-STD-1275		28V DC Systems
Eye Safety	CDRH and IEC-825	Class 1 Laser Product	

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10/100/1000BASE-T to Fiber Optic Ethernet (SX, LX10, EX, FX)



Ratings and Specifications - (continued)

Material/Finish

Item	Material/Finish
Housing & Connector Shell	Aluminum
Plating Finish: M	Nickel
Plating Finish: MT	Nickel PTFE
Plating Finish: NF	Olive Drab Cadmium
Contacts	Copper alloy, 50 µInch gold plated
D38999 Inserts	Thermoplastics
Interfacial Seals, 38999 only	Elastomer, Fluorosilicon
Optical Ferrules & Sleeves	Zirconia, Ceramic
Insulators	Liquid crystal polymer (LCP)
Contact retention clip	Beryllium copper alloy
Seal, O-rings	Fluorosilicone rubber
Seal	Silicone elastomer
Spring	Nickel-plated beryllium copper
PC tail contacts	Copper alloy/gold plated
PCB flex	FR4 & Polyimide
Encapsulant	HYSOL
Solder type	RoHS compliant Sn95/Sb5 (232°C melting temp) & RoHS compliant Sn96.5/Ag3.0/Cu0.5 (217° melting)

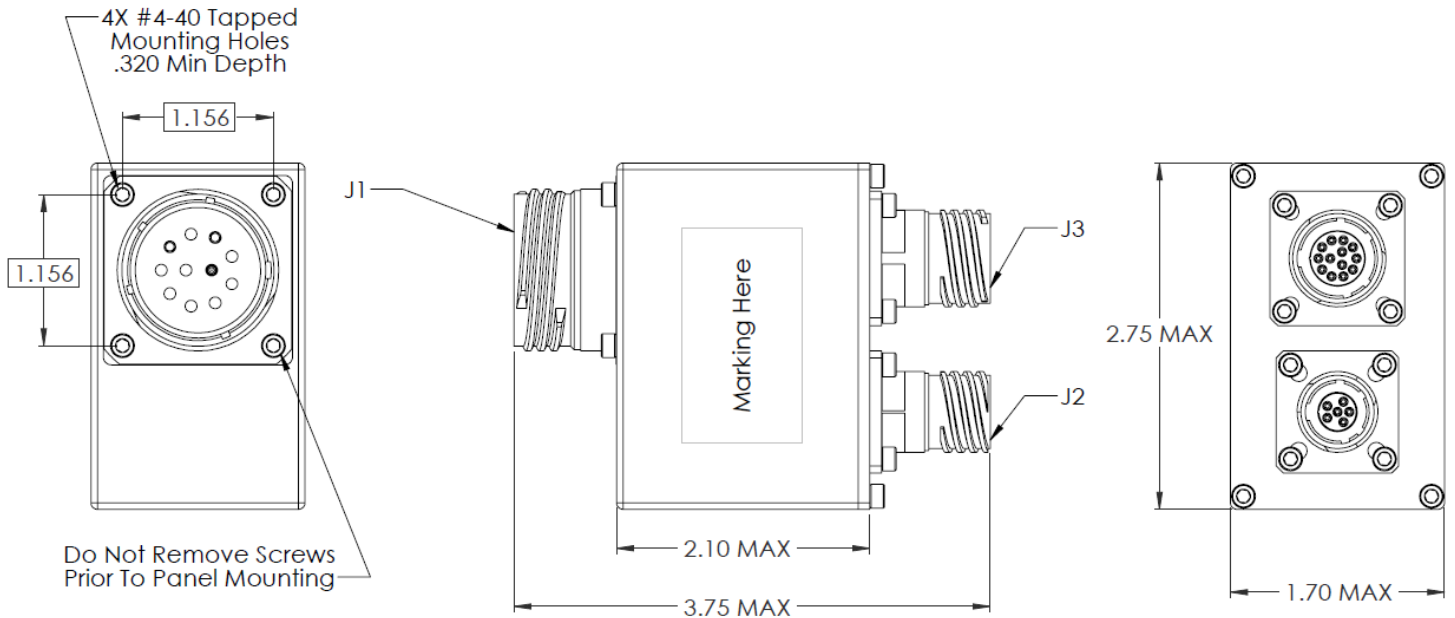
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Copper to Fiber Ethernet Media Converter
10/100/1000BASE-T to Fiber Optic Ethernet (SX, LX10, EX, FX)



OUTLINE DRAWING

-01 (PANEL MOUNT)



Dimensional Tolerances Unless specified otherwise:

0.x ± 0.1"

0.xx ± 0.03"

0.xxx ± 0.015"

Marking

Assembly is identified with Manufacture's Name, Cage Code, Part Number, Date Code and Serial Number in approximate location shown

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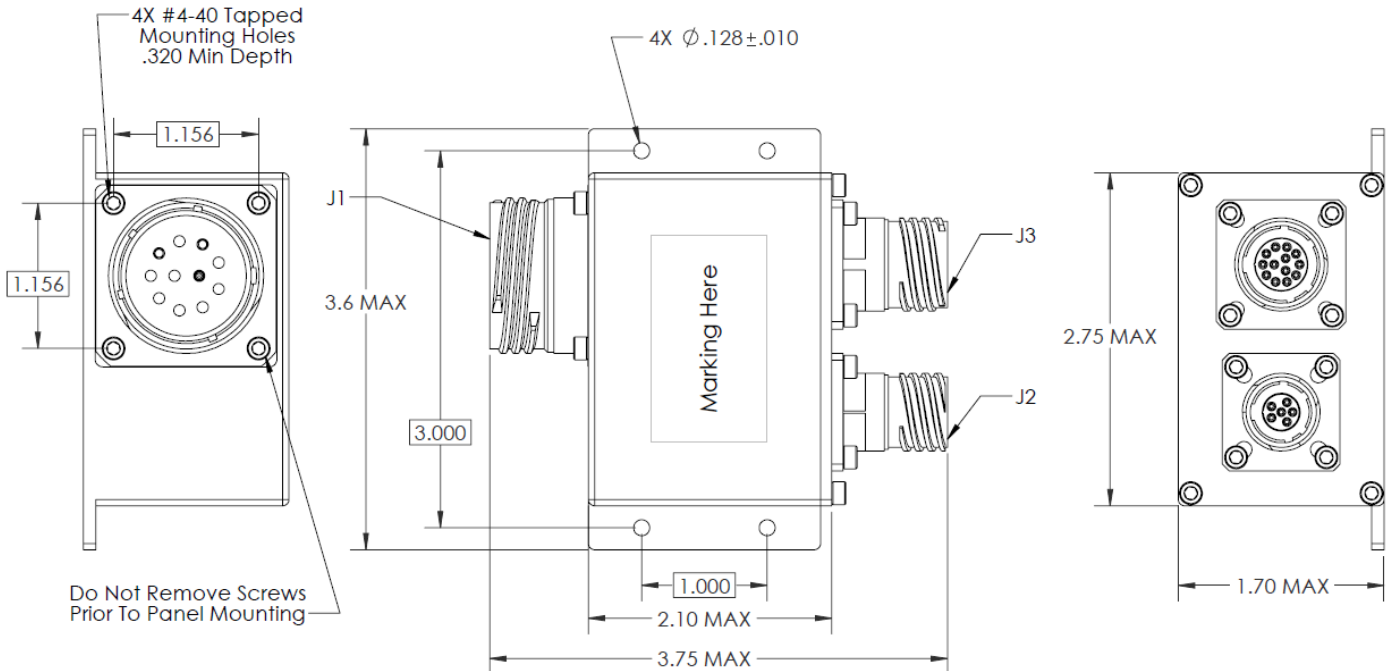
Copper to Fiber Ethernet Media Converter

10/100/1000BASE-T to Fiber Optic Ethernet (SX, LX10, EX, FX)



OUTLINE DRAWING (Continued)

-02 (FLANGE MOUNT)



Dimensional Tolerances Unless specified otherwise:

0.x ± 0.1"

0.xx ± 0.03"

0.xxx ± 0.015"

Marking:

Assembly is identified with Manufacturer's Name, Cage Code, Part Number, Date Code and Serial Number in approximate location shown

Weight:

Mechanical Configuration	Weight (lbs)
-01 (Panel Mount)	0.553 nominal
-02 (Flange Mount)	0.553 nominal

Connectors will be covered with protective caps at time of shipment

Please contact Glenair for other configurations

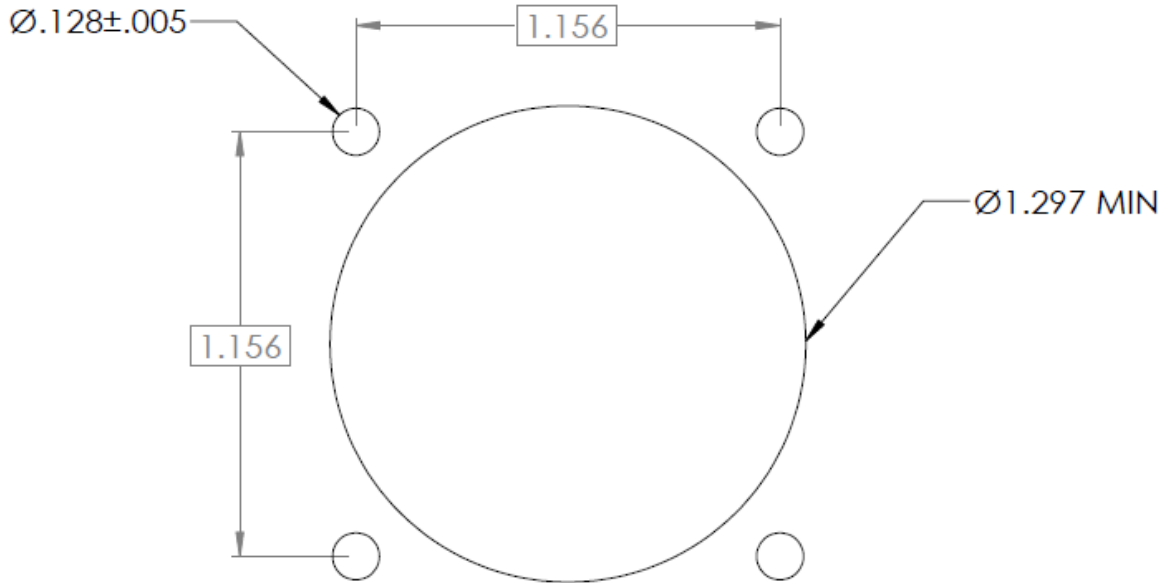
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PANEL CUT OUT

RECOMMENDED PANEL CUT OUT – J1

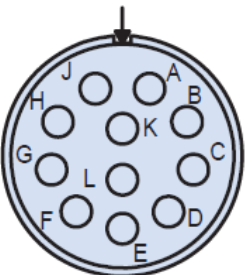


Max Panel Thickness 0.250"

Input/Output Definition

J1 PIN FUNCTION ASSIGNMENTS (FIBER OPTIC)

PIN	NAME	DESCRIPTION	NOTES
A	NC	No connect	
B	NC	No connect	
C	NC	No connect	
D	NC	No connect	
E	NC	No connect	
F	RX	Optical Receive	1
G	NC	No connect	
H	TX	Optical Transmit	1
J	NC	No connect	
K	NC	No connect	
L	NC	No connect	



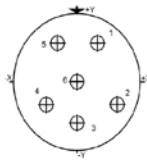
D38999
19-11
(Mating face - PIN insert shown)

Notes

1. 1000BASE-SX, 1000BASE-LX10, 1000BASE-EX or 100BASE-FX

J2 PIN FUNCTION ASSIGNMENTS (POWER)

PIN	NAME	DESCRIPTION	NOTES
1	NC	No connect	
2	NC	No connect	
3	NC	No connect	
4	NC	No connect	
5	VCC	Supply Voltage (DC)	
6	GND	Supply Return	

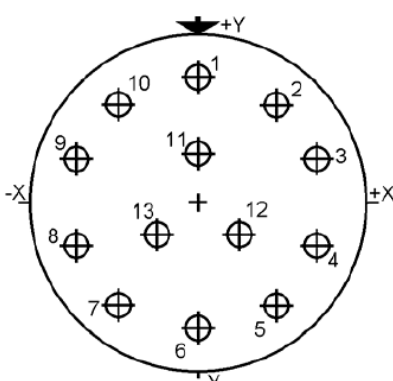


D38999
9-35
(Mating face - PIN insert shown)

Input/Output Definition (continued)

J3 PIN FUNCTION ASSIGNMENTS (ELECTRICAL ETHERNET DATA)

PIN	NAME	DESCRIPTION	NOTES
1	NC	No connect, Factory Use	
2	MDA+		1
3	MDA-		1
4	MDB+		1
5	MDB-		1
6	NC	No connect, Factory Use	
7	MDC-		1
8	MDC+		1
9	MDD-		1
10	MDD+		1
11	NC	No connect, Factory Use	
12	NC	No connect, Factory Use	
13	NC	No connect, Factory Use	



D38999 Series III
MIL-STD-1560 Arrangement
11-35
(Mating face - PIN insert shown)

Notes

1. IEEE 802.3 10/100/1000BASE-T