



# 050-112

Media Converter, Dual or Single Channel, Panel Mount  
10/100/1000BASE-T to Fiber Optic Ethernet  
(1000BASE-SX/LX10 or 100BASE-FX),  
28VDC,  
M38999 (Signal & Power), GFOCA (Fiber Optic)

REV	DESCRIPTION	DATE	APPROVED
3	Preliminary	3/31/2015	MF

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



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



The Glenair 050-112 is a 10/100/1000BASE-T to Fiber Media converter that can be configured for 1 or 2 channels and can support conversion to 1000BASE-SX, 1000BASE-LX or 100BASE-FX protocols. It is designed for harsh environments and incorporates electronics in an environmentally sealed enclosure that incorporates two environmental connectors. One connector, M38999, is utilized for power and electrical signal and the second connector, GFOCA, is used for the Fiber Optic signals and can be configured to support either single mode or multi-mode fiber applications.

#### KEY FEATURES/BENEFITS

- 1310nm FP Lasers for 1000BASE-LX10
- InGaAs PIN PD for 1000BASE-LX10
- 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)

- Magnetics on the electrical signal input side to support 10/100/1000BASE-T operation over 100m Cat 5E
- IP67 in mated condition
- 38999 Electrical Signal & Power
- GFOCA Fiber Optic Connector
- Panel Mount

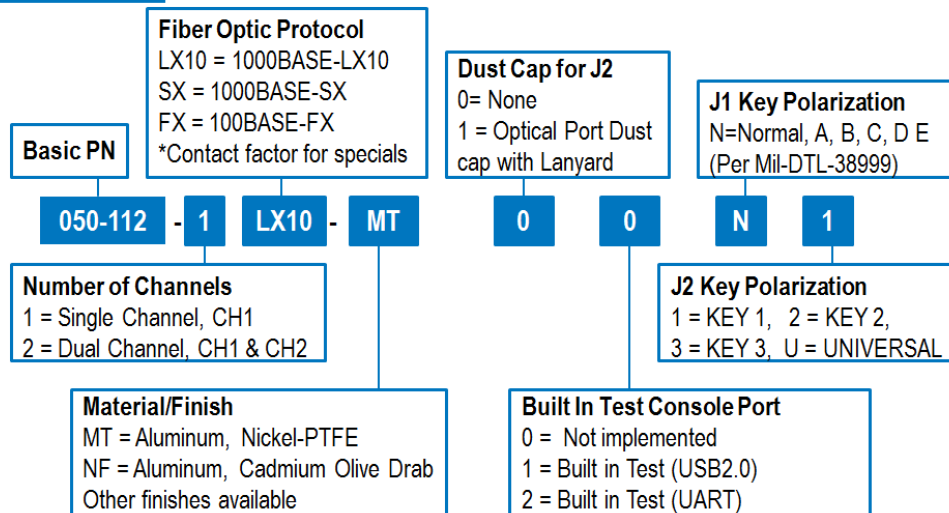
#### OPTIONAL FEATURES

- Built In Test Console Port accessible via USB2.0
- Built in Test Console Port accessible via UART RS422

#### APPLICATIONS

- Harsh Environment Ethernet for Airborne, Tactical and Shipboard applications

#### How To Order

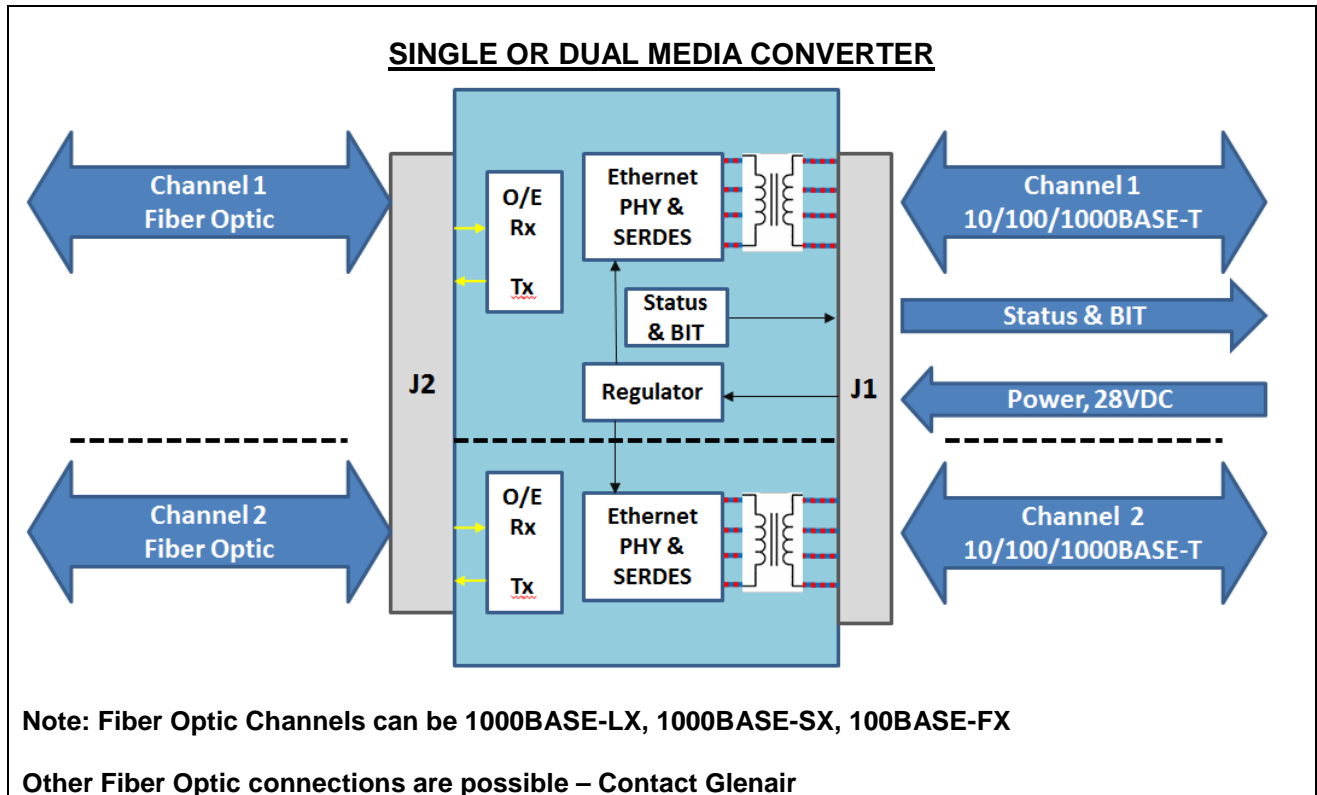


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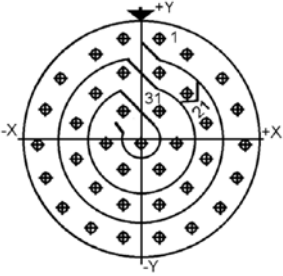
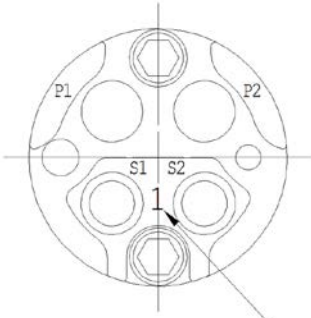
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### Functional Block Diagram



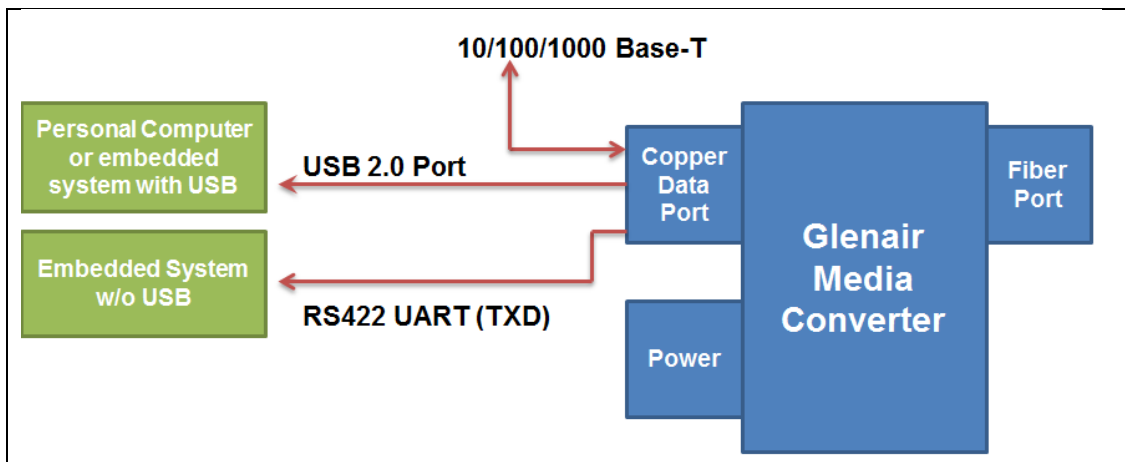
## Connectors

NAME	Insert Arrangement	Function	Media Converter	Mating PLUG Connector
J1	 <p>D38999 Series III MIL-STD-1560 Arrangement 15-35</p>	Electrical Signal, Status and Built In Test (BIT), & Power	D38999 Series III type 15-35  <u>PIN CONTACTS, 22D</u>	Generic PN D38999/26#D35SN  Glenair PN 233-105-G6#15-35SN  <u>SOCKET CONTACTS, 22D</u>
J2	 <p>KEY POLARIZATION</p>	Fiber Optic Signal	GFOCA Receptacle Polarization Key 1	Glenair PN Family 180-145 GFOCA Hermaphroditic Plug Connector MIL-DTL-83526/16 Type, 4 Channel

Note: # = Environmental Class (Material/Finish)

## Built In Test (BIT) Functionality - USB

This media converter can be offered with built in test functionality accessible through a Console Port via Universal Serial Bus 2.0 (USB 2.0) or via RS422 UART (TXD) or both options can be made available. Functional block diagram for these features is shown below.



### Universal Serial Bus (2.0) BIT

- Presents itself as a "Virtual" Communications Port
- Compatible with Microsoft Windows, Mac, and Linux OS's.
- On the computer side, open any terminal application (PuTTY, HyperTERM, TeraTERM, etc.) to communicate with the media converter hardware.
- Simple "Human Readable" status messages.

### RS422 UART (TXD) BIT

- Useful for when you are interfacing with a embedded microprocessor or micro controller.
- Status messages delimited to allow for easy parsing by embedded software.

### ALARM STATUS MESSAGES

#### Fiber Side Alarm/Status

- Temperature
- Transmitter Disable Status
- Transmitter Fault Alarm Status
- Receiver loss of signal (LOS) or signal Detect (SD) Status

#### Copper Side Status

- Link Status (Up or Down)

#### Unit Identification Information

- Unit Serial Number
- Unit Product Code
- Unit Description

### TYPICAL CONSOLE PORT WINDOW (PuTTY)

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```
COM1 - PuTTY
*****
Glenair *
Media Converter Service Port *
*****
Unit Identification Information
*****
Product Code: 050-112-1LX
Unit Serial Number: 0145
Firmware Revision: 1.2.0
Product Description: 10/100/1000 Mbps Ethernet Copper to Fiber Media Converter

*****
Unit Status
*****
Temperature: 45 degrees C
Power Supply Status: Good
RX Loss of Signal, CH1: False
Transceiver Disable, CH1: False
Transceiver, TX Fault, CH1: False
Copper-Side Link Status, CH1: Up
Fiber-Side Link Status, CH1: Up
```

## Built In Test (BIT) Functionality – UART

This media converter can be offered with built in test functionality accessible via an RS-422 Port. The UART Bit message is a 10 bit message with an update rate of 1 Hz. The message format can be seen below.

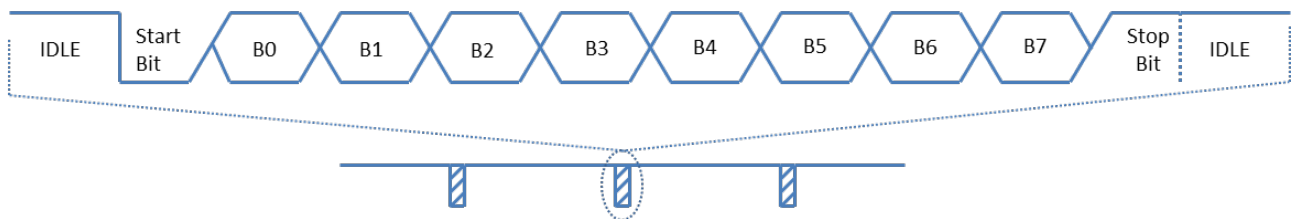
### ALARM STATUS MESSAGES

- Fiber Link Status (Up or Down)
- Copper Link Status (Up or Down)
- Power Supply Status (In Range, or Fault)

### Ethernet Media Converter Status Message Format

Standard UART-Type Format (Start and Stop Bits, 8 Data bits, no parity)

Data Rate = 9600 baud, RS422 Output, Message Repetition Rate = 1 Sec



### SERIAL STATUS MESSAGE BIT MAPPING

Bit	Description
0	Channel 1 Fiber Optic TX Fault (1 = Fault, 0 = No Fault)
1	Channel 1 Ethernet copper Link UP (1 = Link Up, 0 = Link Down)
2	Channel 1 Power Supply Voltage "In Range" Fault (1 = Fault, 0 = No Fault)
3	Not used
4	Channel 2 Fiber Optic TX Fault (1 = Fault, 0 = No Fault)
5	Channel 2 Ethernet copper Link UP (1 = Link Up, 0 = Link Down)
6	Channel 2 Power Supply Voltage "In Range" Fault (1 = Fault, 0 = No Fault)
7	Not Used

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## Ratings and Specifications – LX10 VERSION

### ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Typ	Max	Units	Notes
Storage Temperature	T <sub>s</sub>	-55		+100	°C	
Supply Voltage	V <sub>cc</sub>	-0.5		40	V	

### OPERATING CONDITIONS

Parameter	Symbol	Min	Typ	Max	Units	Notes
Operating Temperature	T <sub>op</sub>	-40		+85	°C	
Supply Voltage	V <sub>cc</sub>	5	28	36	V	
Supply Current	I <sub>cc</sub>		100	150	mA	@28VDC PER CHANNEL
Supply Current	I <sub>cc</sub>		500		mA	@5VDC, PER CHANNEL
Power Supply Noise (Peak-Peak)	V <sub>cc ripple</sub>			200	mV	

### OPTICAL CHARACTERISTICS – TRANSMITTER

Parameter	Symbol	Min	Typ	Max	Units	Notes
Optical Output Power	P <sub>OUT</sub>	-8.5	-4	-3	dBm	1310nm Fabry-Perot
Optical Wavelength	λ <sub>OUT</sub>	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 <sub>IN OP</sub>	-20		0	dBm	
Min. Sensitivity, BER 10 <sup>-12</sup> , PRBS 2 <sup>7</sup> -1	P <sub>IN MIN</sub>		-22	-20	dBm	PIN PD, LX10 source
Overload, BER 10 <sup>-12</sup> , PRBS 2 <sup>7</sup> -1	P <sub>IN MAX</sub>	0			dBm	
Optical Wavelength	λ <sub>IN</sub>	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	



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## Ratings and Specifications – SX VERSION

### ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Typ	Max	Units	Notes
Storage Temperature	T <sub>s</sub>	-55		+100	°C	
Supply Voltage	V <sub>cc</sub>	-0.5		40	V	

### OPERATING CONDITIONS

Parameter	Symbol	Min	Typ	Max	Units	Notes
Operating Temperature	T <sub>op</sub>	-40		+85	°C	
Supply Voltage	V <sub>cc</sub>	5	28	36	V	
Supply Current	I <sub>cc</sub>		100	150	mA	@28VDC PER CHANNEL
Supply Current	I <sub>cc</sub>		500		mA	@5VDC, PER CHANNEL
Power Supply Noise (Peak-Peak)	V <sub>cc ripple</sub>			200	mV	

### OPTICAL CHARACTERISTICS – TRANSMITTER

Parameter	Symbol	Min	Typ	Max	Units	Notes
Optical Output Power	P <sub>OUT</sub>	-9.5		-4	dBm	VCSEL, 62.5/125µm MM
Optical Wavelength	λ <sub>OUT</sub>	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 <sub>IN OP</sub>	-17		-2	dBm	
Min. Sensitivity, BER 10 <sup>-12</sup> , PRBS 2 <sup>7</sup> -1	P <sub>IN MIN</sub>		-22	-17	dBm	PIN PD
Overload, BER 10 <sup>-12</sup> , PRBS 2 <sup>7</sup> -1	P <sub>IN MAX</sub>	-2	-1		dBm	
Optical Wavelength	λ <sub>IN</sub>	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

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## Ratings and Specifications – FX VERSION

### ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Typ	Max	Units	Notes
Storage Temperature	T <sub>s</sub>	-55		+100	°C	
Supply Voltage	V <sub>cc</sub>	-0.5		40	V	

### OPERATING CONDITIONS

Parameter	Symbol	Min	Typ	Max	Units	Notes
Operating Temperature	T <sub>op</sub>	-40		+85	°C	
Supply Voltage	V <sub>cc</sub>	5	28	36	V	
Supply Current	I <sub>cc</sub>			150	mA	@28VDC PER CHANNEL
Supply Current	I <sub>cc</sub>		500		mA	@5VDC, PER CHANNEL
Power Supply Noise (Peak-Peak)	V <sub>cc ripple</sub>			200	mV	

### OPTICAL CHARACTERISTICS – TRANSMITTER

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

### OPTICAL CHARACTERISTICS - RECEIVER

Parameter	Symbol	Min	Typ	Max	Units	Notes
Sensitivity, BER 10 <sup>-10</sup> , PRBS 2 <sup>-7</sup> -1	P <sub>IN</sub>			-32	dBm	PIN PD
Overload, BER 10 <sup>-10</sup> , PRBS 2 <sup>-7</sup> -1	P <sub>IN</sub>	-14			dBm	
Optical Wavelength	λ <sub>IN</sub>	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	

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## Ratings and Specifications - (continued)

### COMPLIANCE SPECIFICATIONS

CHARACTERISTIC	Standard	Condition	Notes
Mechanical Shock	MIL-STD-810	40g	6-9rms
Mechanical Vibration	MIL-STD-810	30g rms	
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	EIA364-321		240 hours
Aircraft Electrical Power Characteristics	MIL-STD-704F		28V DC Systems
Eye Safety	CDRH and IEC-825	Class 1 Laser Product	

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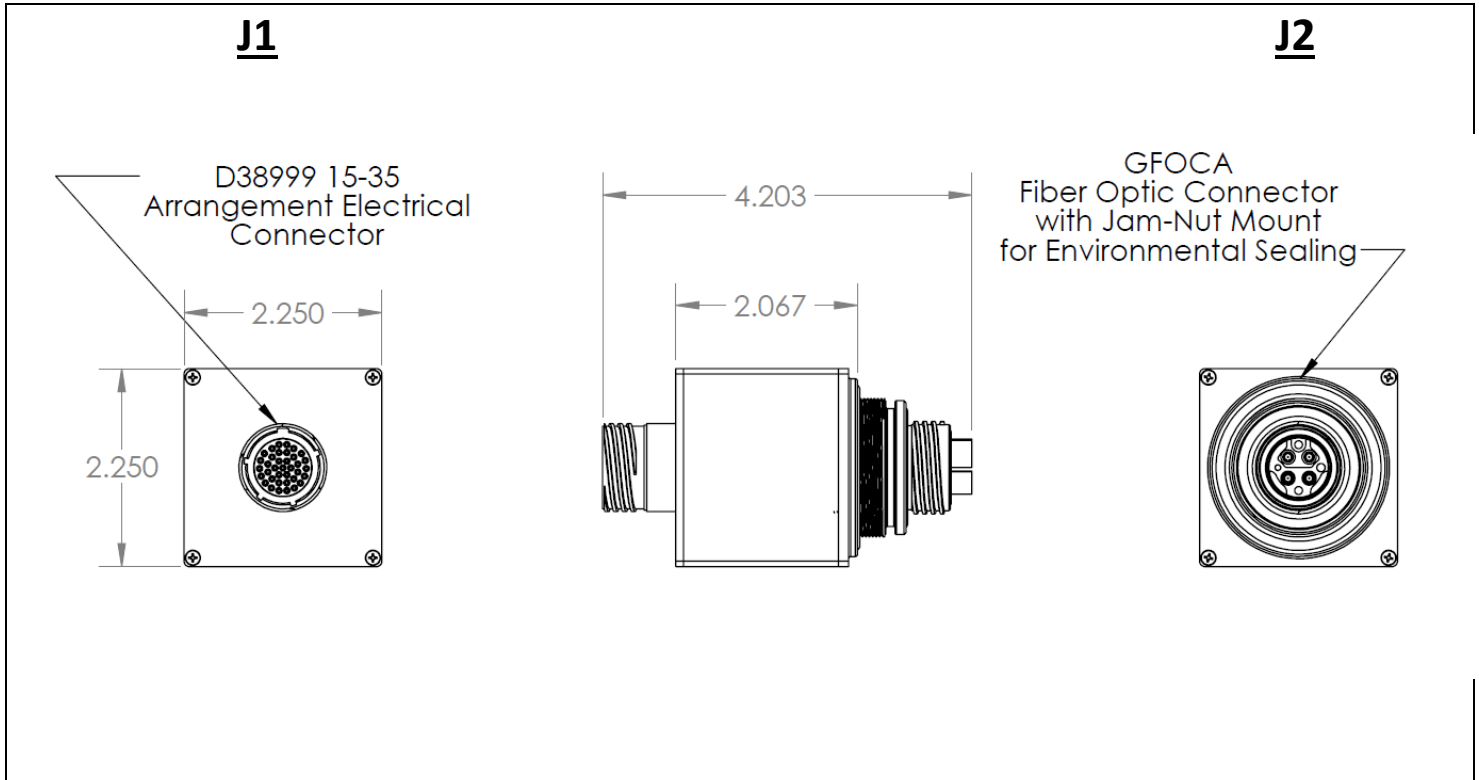
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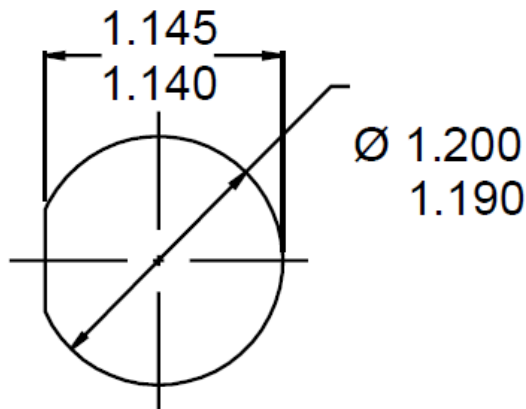
### Material/Finish

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 EE4215
Solder type	RoHS compliant Sn95/Sb5 (232°C melting temp) & RoHS compliant Sn96.5/Ag3.0/Cu0.5 (217° melting)

**OUTLINE DRAWING & PANEL CUT OUT**

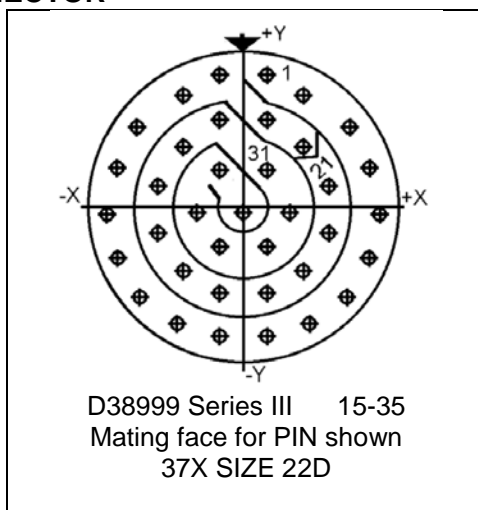


**PANEL CUT OUT – J2  
(as viewed from the front of the panel)**



## Input/Output Definition

### J1 – ELECTRICAL SIGNAL CONNECTOR



### J1 PIN FUNCTION ASSIGNMENTS

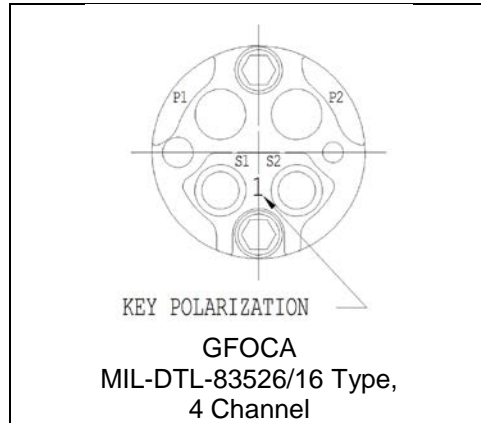
PIN	NAME	DESCRIPTION	NOTES	PIN	NAME	DESCRIPTION	NOTES
1	NC	No Connection		19	NC	No Connection	
2	CH2_MDC-		2	20	CH2_MDC+		2
3	CH2_MDD-		2	21	PSS	Power Supply Status	1
4	CH2_MDD+		2	22	CH1_MDD+		2
5	CH2_MDB-		2	23	CH1_MDC+		2
6	CH2_MDB+		2	24	CH1_MDB+		2
7	CH1_MDD-		2	25	CH1_MDA-		2
8	CH1_MDC-		2	26	USB_VBUS_RTN	USB RETURN	3
9	CH1_MDB-		2	27	UART_P	RS422 BIT OUTPUT	4
10	USB_DP	USB DATA +	3	28	NC	No Connection	
11	USB_DM	USB DATA -	3	29	UART_N	RS422 BIT OUTPUT	4
12	USB_VBUS	USB +5V INPUT	3	30	NC	No Connection	
13	NC	No Connection		31	NC	No Connection	
14	VIN_RTN	VIN RETURN		32	CH2_MDA-		2
15	VIN_RTN	VIN RETURN		33	NC	No Connection	
16	VIN	+28 VIN		34	CH1_MDA+		2
17	VIN	+28 VIN		35	NC	No Connection	
18	NC	No Connection		36	NC	No Connection	
				37	CH2_MDA+		2

#### Notes

1. Power Supply Status indicator is high, referenced to 3.3VDC, when power supply is working correctly and low for fault or warning condition.
2. IEEE-802.3 1000BASE-T compliant
3. Built In Test Port, USB2.0
4. Built In Test Port, RS422 UART (TXD)

## Input/Output Definition (continued)

### J2 OPTICAL CONNECTOR



### J2 PIN FUNCTION ASSIGNMENTS

PIN	NAME	DESCRIPTION	NOTES
S1	TX2	Channel 2 Transmitter	
S2	TX1	Channel 1 Transmitter	
P1	RX2	Channel 2 Receiver	
P2	RX1	Channel 1 Receiver	