

## Gemini Series

D38999/LC<sup>®</sup> Field Optical Transceiver,  
GbE or 1x/2xFC Applications,  
Multimode or Single Mode\*

### Single Port, Dongle

#### FEATURES

- Suitable for GbE or 1x/2xFibre Channel applications from 1.0 to 2.5Gbps
- Optical fiber link distances up to 10.0 Kilometers (Single Mode) or 550 Meters (Multimode)
- Maximum optical channel bit error rate less than  $1 \times 10^{-12}$
- Operating temperature range from -40°C to +85°C
- Olive drab cadmium over electroless nickel plating meets stringent EMI / RFI performance specifications
- Aluminum alloy Mil-Dtl-38999 housings are strong, durable, corrosion resistant and light weight
- LC-Field<sup>®</sup> mating interface from Amphenol\*
- Connector insert configuration conforms to Mil-Std-1560

#### APPLICATIONS

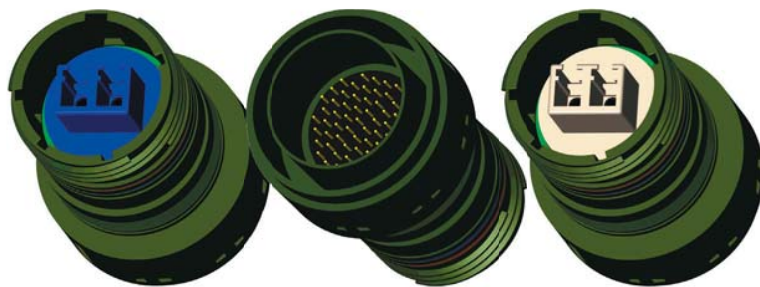
Gemini series external optical interface adapters enable high speed network communications over long distances in harsh environments.

- Gigabit Ethernet switches and peripherals
- Fibre Channel switches and peripherals
- 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 multimode or single mode 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.

\*LC-Field<sup>®</sup> is a trademark of Amphenol



One TX & One RX Channel Operating from 1.0 to 2.5Gbps

#### DESCRIPTION

Gemini series external optical interface adapters consist of optoelectronic transmitter and receiver functions integrated into a bulkhead mounted Mil-Dtl-38999, Series III receptacle connector with an LC-Field<sup>®</sup> interface.

The transmitter input lines are driven with differential CML signals applied to the transmitter (TX+ and TX-) lines. Dual loop, temperature compensated, laser drivers convert the transmitter input signals to suitable laser bias and modulation currents. The TX\_Fault circuit disables the optical transmitter output when the optical output power or internal current exceeds predefined limits. A CMOS fault signal is generated on the TX\_Fault line upon a transmitter optical or electrical fault condition. The fault signal is latched until reset by a toggle of TX\_Dis or V<sub>CC</sub>.

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 Gemini series external optical interface adapters is a Mil-Dtl-38999 Size 19-35 plug connector (D38999 / 26WF35PN) with 66 x MIL-C-39029 Size 22 electrical contacts.

Gemini series external optical interface adapters are vibration isolated, environmentally hardened components designed for use in harsh environment applications.

#### ORDERING INFORMATION

Application	Product Number
GbE, 1x/2xFC or sFPDP, MM	G38L-2S1D-FW
GbE, 1x/2xFC or sFPDP, SM	G38L-2L2D-FW

Single Port Gemini Series D38999 Duplex LC Optical Transceiver Dongle,  
Fast Ethernet, GbE, 1x/2xFC or sFPDP Applications

## 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
Data Input Voltage	$V_i$	-0.5		$V_{CC}$	V
Differential Input Voltage (p-p)	$V_D$			2.0	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)	$V_D$	0.35		1.25	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	30.0g	18mS
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

## 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

Single Port Gemini Series D38999 Duplex LC Optical Transceiver Dongle,  
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**OPTICAL TRANSMITTERS**  $T_A$  = Operating Temperature Range,  $V_{CC}$  = 3.135V to 3.465V

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Optical Output Power (BER<10 <sup>-12</sup> )	$P_o$	-9.5		-4.0	dBm
Optical Output Wavelength G38L-2S1D-FW G38L-2L2D-FW	$\lambda_{OUT}$	830 1266	850 1310	860 1360	nM
Spectral Width G38L-2S1D-FW G38L-2L2D-FW	$\Delta\lambda_{RMS}$			0.85 1.0	nM
Extinction Ratio	ER	9.0			dB
Optical Rise, Fall Time (20% to 80%)	$t_{R,F}$			150	pS

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

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Optical Sensitivity (BER<10 <sup>-12</sup> , ER=9.0)	$P_i$	-17.0		0.0	dBm
Optical Wavelength G38L-2S1D-FW G38L-2L2D-FW	$\lambda_{IN}$	830 1266		860 1360	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 (TX + RX)	$I_{CCT}$		100	140	mA

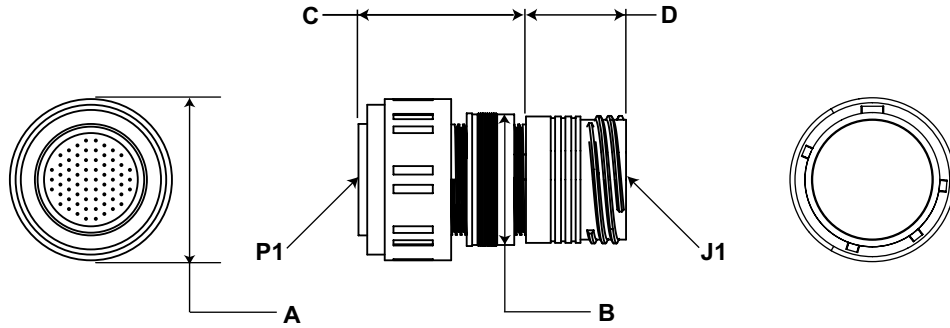
**OPTICAL LINK DISTANCES**

Protocol	62.5/125 $\mu$ MMF	50/125 $\mu$ MMF	9/125 $\mu$ SMF
2xFibre Channel - ANSI X3.297 FC-PI	150M	300M	10.0Km
Gigabit Ethernet - IEEE-802.3:2005	275M	550M	10.0Km
1xFibre Channel - ANSI X3.297 FC-PH-2	300M	500M	10.0Km

Single Port Gemini Series D38999 Duplex LC Optical Transceiver Dongle,  
Fast Ethernet, GbE, 1x/2xFC or sFPDP Applications

**OUTLINE DRAWING**

Dimensions are shown as: inches (mm)



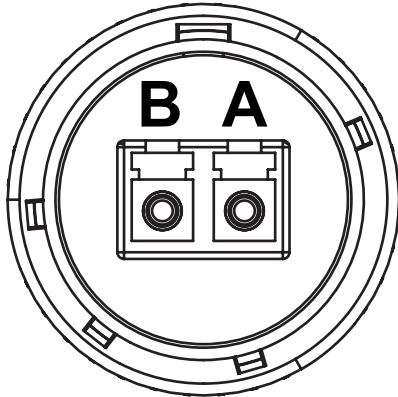
**Outline Dimensions**

Shell Size Code	Shell Size	J1	P1	A	B	C	D
F	19	LC® Field Interface See Appendix A2	D38999 / 26WF35PN	1.52 (38.5)	1.23 (31.2)	1.54 (39.1)	0.92 (23.4)

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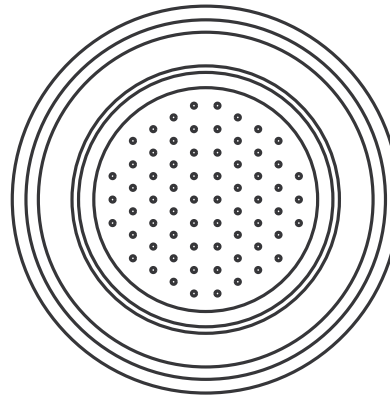
## OPTICAL TRANSCEIVER INSERT ARRANGEMENT

**TOP**  
**Optical Interface**



Front face of the optical transceiver insert shown, fiber optic cable plug opposite - see Appendix A2 for details

**TOP**  
**Electrical Interface**



Back face of the optical transceiver dongle insert shown - see Electrical Pin Assignment pages for details

## OPTICAL TRANSCEIVER RECEPTACLE PORT ASSIGNMENTS

FUNCTION	OPTICAL		ELECTRICAL	
PORT NUMBER	TX	RX	TX (-,+)	RX (-,+)
0	B	A	6,13	54,61

Single Port Gemini Series D38999 Duplex LC Optical Transceiver Dongle,  
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### ELECTRICAL PIN FUNCTIONS

Pin Number	Symbol (Port)	Description	Logic Family
1	GND	Ground	N/A
2	GND	Ground	N/A
3	N/C	No Internal Connection	N/A
4	N/C	No Internal Connection	N/A
5	GND	Ground	N/A
6	TX-	Transmitter Data Input	CML (Internally AC Coupled) Internal 100Ω differential termination
7	GND	Ground	N/A
8	GND	Ground	N/A
9	N/C	No Internal Connection	N/A
10	N/C	No Internal Connection	N/A
11	GND	Ground	N/A
12	GND	Ground	N/A
13	TX+	Transmitter Data Input	CML (Internally AC Coupled) Internal 100Ω differential termination
14	GND	Ground	N/A
15	N/C	No Internal Connection	N/A
16	N/C	No Internal Connection	N/A
17	GND	Ground	N/A
18	GND	Ground	N/A
19	N/C	No Internal Connection	N/A
20	GND	Ground	N/A
21	GND	Ground	N/A
22	GND	Ground	N/A
23	GND	Ground	N/A
24	N/C	No Internal Connection	N/A
25	TX VCC	Transmitter Power Supply	N/A
26	TX Dis	Transmit Disable - Input Logic 1: Disable Optical Output Logic 0: Enable Optical Output	CMOS Internal 4.7KΩ to 10.0KΩ pullup
27	GND	Ground	N/A
28	GND	Ground	N/A
29	TX Fault	Internal TX Fault Indicator - Output Satisfactory Operation: Logic "0" Output Internal Fault: Logic "1" Output	Open Drain CMOS
30	GND	Ground	N/A

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### ELECTRICAL PIN FUNCTIONS

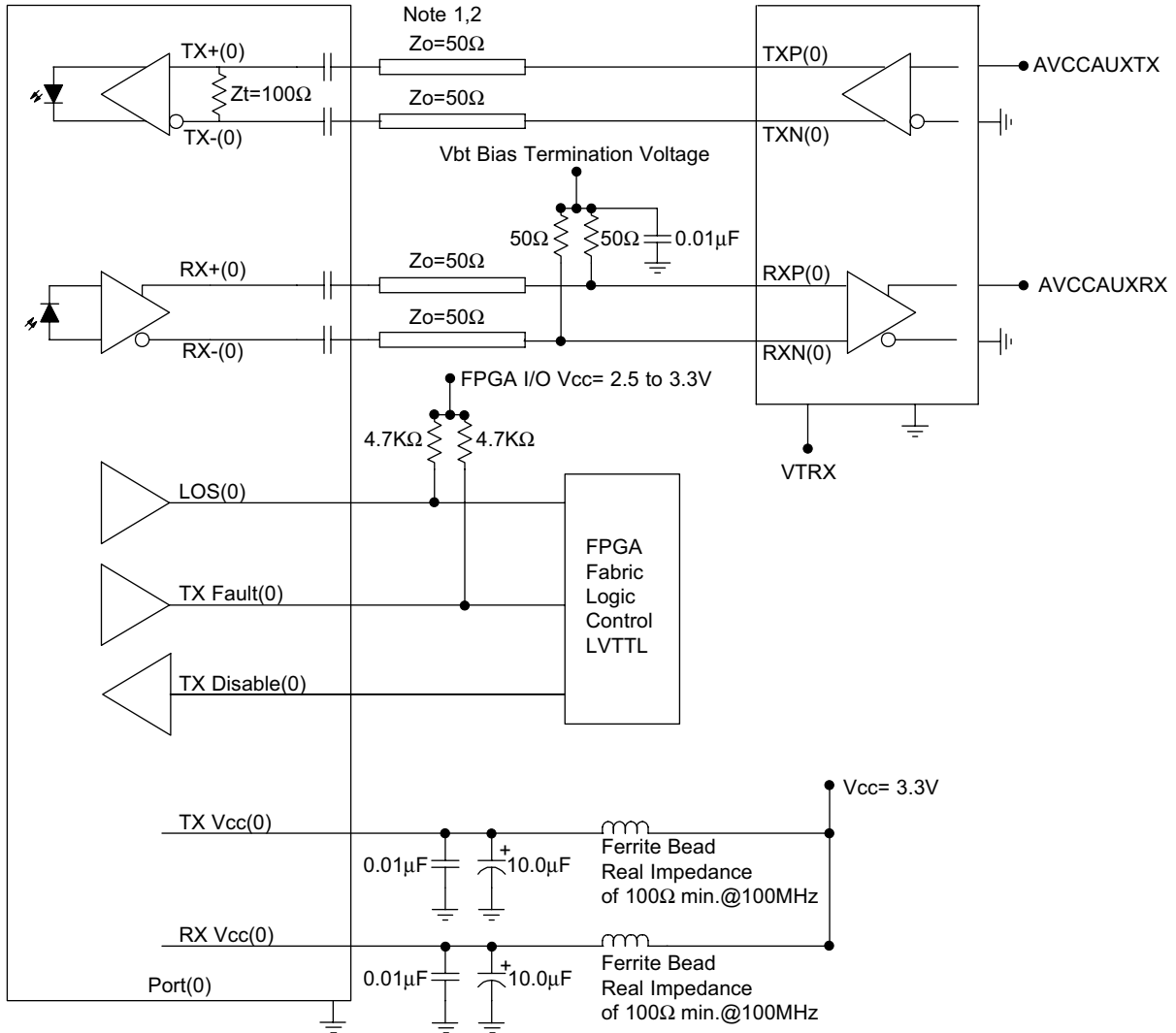
Pin Number	Symbol (Port)	Description	Logic Family
32	N/C	No Internal Connection	N/A
33	N/C	No Internal Connection	N/A
34	RX VCC	Receiver Power Supply	N/A
35	LOS	Loss of Signal - Output Satisfactory Optical Input: Logic "0" Output Unsatisfactory Optical Input: Logic "1" Output	Open Drain CMOS
36	GND	Ground	N/A
37	GND	Ground	N/A
38	GND	Ground	N/A
39	N/C	No Internal Connection	N/A
40	N/C	No Internal Connection	N/A
41	N/C	No Internal Connection	N/A
42	N/C	No Internal Connection	N/A
43	GND	Ground	N/A
44	GND	Ground	N/A
45	N/C	No Internal Connection	N/A
46	GND	Ground	N/A
47	GND	Ground	N/A
48	GND	Ground	N/A
49	GND	Ground	N/A
50	N/C	No Internal Connection	N/A
51	N/C	No Internal Connection	N/A
52	GND	Ground	N/A
53	GND	Ground	N/A
54	RX-	Receiver Data - Input	CML (Internally AC Coupled)
55	GND	Ground	N/A
56	N/C	No Internal Connection	N/A
57	N/C	No Internal Connection	N/A
58	N/C	No Internal Connection	N/A
59	GND	Ground	N/A
60	GND	Ground	N/A
61	RX+	Receiver Data - Input	CML (Internally AC Coupled)
62	GND	Ground	N/A
63	N/C	No Internal Connection	N/A
64	N/C	No Internal Connection	N/A
65	GND	Ground	N/A
66	GND	Ground	N/A

Single Port Gemini Series D38999 Duplex LC Optical Transceiver Dongle,  
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**APPLICATION SCHEMATIC**  
For Xilinx Rocket I/O Interfaces

**Bulkhead Transceiver**

**Xilinx Rocket I/O**



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\_Emphasis,  
lengths of 1.0meter are obtainable.

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

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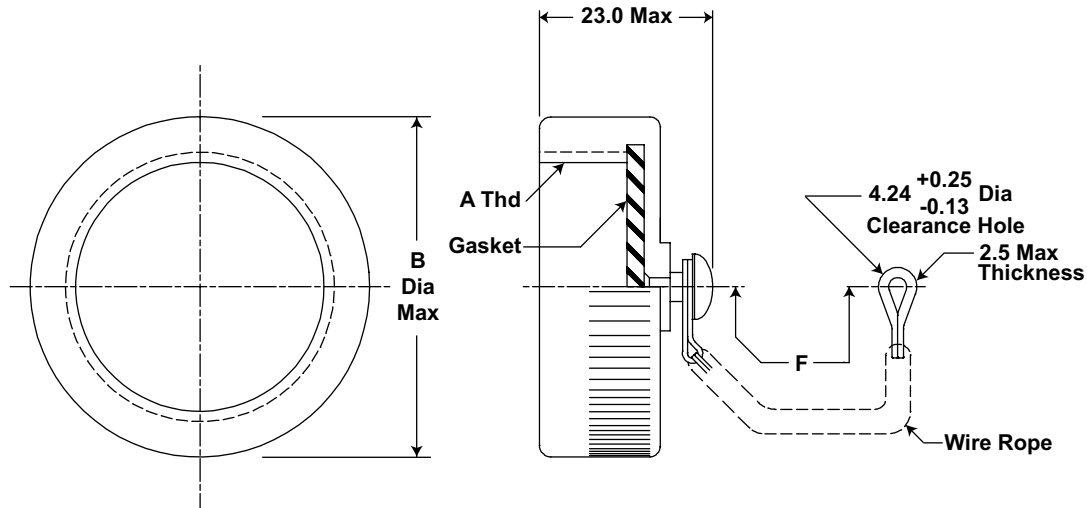
## APPENDIX A1

### RECEPTACLE PROTECTION CAPS

#### \*MIL-DTL-38999/33 PROTECTION CAP PART NUMBERS

MS RECEPTACLE CAP P/N

\*D38999/33W19R



\*See DSCC or SAE QPL for Approved Suppliers

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

#### MIL-DTL-38999/33 Outline Dimensions - mm

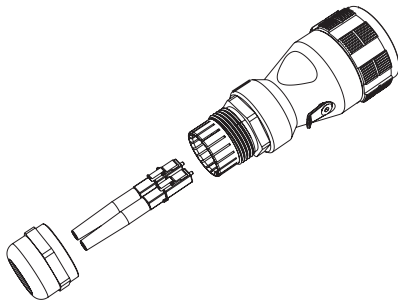
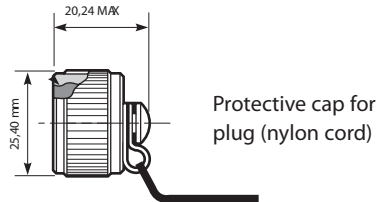
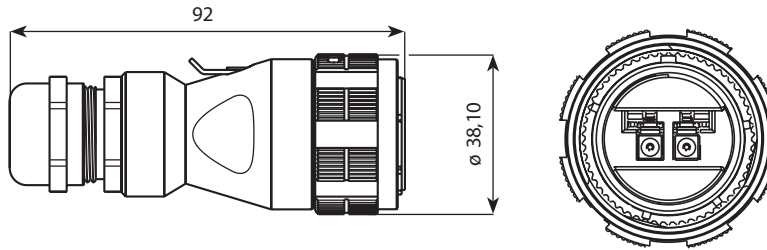
Shell Size Code	Shell Size	A Thread (inches)	B Max Dia	F
F	19	1.2500-0.1P-0.3L-TS	39.0	+13.0 -7.0

Single Port Gemini Series D38999 Duplex LC Optical Transceiver Dongle,  
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## APPENDIX A2

# Amphenol LC Field® Fiber Optic Cable Plug

Dimensions are shown as: mm



**Amphenol LC Field® Cable Plug Part Number: LCFTV6xxGN**  
Please contact your local Amphenol sales representative for more  
information about the LC-Field®

**MOOG**  
PROTOKRAFT

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