# **Matrix Series**

MIL-DTL-38999 Optical Transceiver, GbE, FC, ARINC 818 or sFPDP Applications, Multimode, 850nM

# 8xTX & 8xRX or 16TX or 16RX, Flange Mount

#### **FEATURES**

- Suitable for GbE, Fibre Channel, ARINC 818 and sFPDP applications at up to 5.0Gbps
- Optical fiber link distances up to 550 Meters ( $50/125\mu$  2000MHz\*Km MMF)
- Maximum optical channel bit error rate less than 1x10<sup>-12</sup>
- Operating temperature range from -40°C to +85°C
- Shock, vibration and immersion resistant per MIL-STD-810 and Mil-Std-1344
- Aluminum alloy D8999 housings are strong, durable, corrosion resistant and light weight
- M29504 compliant optical fiber connector interface

#### **APPLICATIONS**

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

- · Gigabit Ethernet switches and peripherals
- · Fibre Channel switches and peripherals
- · Video displays and display drivers
- · High speed sensor data links

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 quadrax copper conductors unacceptable.





8xTX & 8xRX or 16TX or 16RX lines operating from 0.125 to 5.0Gbps

#### **DESCRIPTION**

Matrix series octal port (16xfiber) optoelectronic transceivers consist of up to 8 total optical transmitter and receiver functions (or 16 transmitter or 16 receive) integrated into a bulkhead mounted MIL-DTL-38999, Series III receptacle connector. The optical transmitters are 850nm VCSEL lasers. The transmitter input lines are driven with differential CML signals applied to the transmitter (TX+ and TX-) lines. Dual loop, temperature compensated, VCSEL drivers convert the transmitter input signals to suitable VCSEL bias and modulation currents.

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 Matrix series optical fiber transceivers is a controlled impedance connector enabling interface to a ribbon coax or twinax cable or flexible printed circuit assembly.

Matrix series octal port optical fiber transceivers are vibration isolated, environmentally hardened components designed for use in harsh environment applications.

- •Panel mounted D38999 interface sealed against liquid and solid contaminants
- Shock and vibration resistant

#### ORDERING INFORMATION

Application	Part Number
8xTX & 8xRX - 5.0Gbps	T38F-PS1K-Hx

See Appendix A2 for other part number options



### **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 <sub>s</sub>	-55		+100	°C
Supply Voltage	V <sub>cc</sub>	-0.3		+3.8	V
TX_DIS Input Voltage	V <sub>I</sub>	-0.5		Vcc + 0.5	V

# **RECOMMENDED OPERATING CONDITIONS**

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Operating Temperature	T <sub>A</sub>	-40		+85	°C
Supply Voltage	V <sub>cc</sub>	+3.135		+3.465	V
TX Common Mode Voltage	V <sub>CM</sub>		2.0		V
TX Differential Input Voltage (p-p)	$V_{_{\mathrm{D}}}$	0.25		2.2	V
Power Supply Noise (p-p)	N <sub>P</sub>			200	mV

## **SPECIFICATIONS COMPLIANCE**

Requirement	Feature	Condition	Notes
MIL-STD-883	ESD	Class II	2200V
MIL-STD-810	Vibration	3.8g <sup>2</sup> /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
Housing & Shell	Aluminum Alloy	
Housing & Shell Plating	Electroless Nickel or OD-CD	
Insert	Thermoplastic	
Interfacial Seal	Elastomer	
Optical Ferrules	Ceramic	
Printed Circuits	Polyimide / FR-4	

# 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> , PRBS= 2 <sup>7</sup> -1)	P。	-6.5		-1.0	dBm
Optical Output Wavelength	$\lambda_{_{ m OUT}}$	830	850	860	nM
Spectral Width	$\Delta \lambda_{_{RMS}}$			0.85	nM
Extinction Ratio	ER	3.0	5.5		dB

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

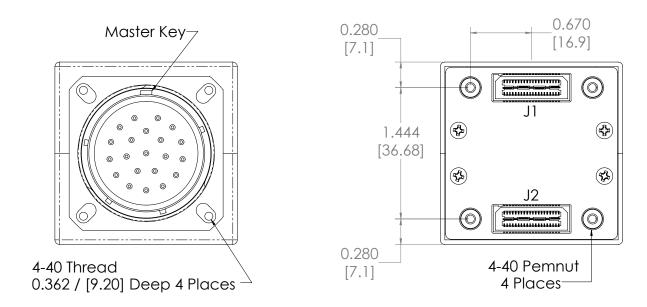
Parameter	Symbol	Minimum	Typical	Maximum	Unit
Optical Sensitivity (BER<10 <sup>-12</sup> , ER=5.0dB) 125Mbps to 5.0Gbps	P <sub>i</sub>	-14.0		0.0	dBm
Optical Wavelength	λ <sub>IN</sub>	830		860	nM

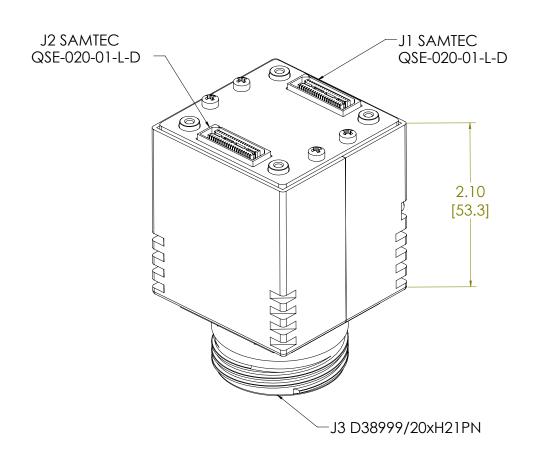
# POWER SUPPLY CURRENT $T_A$ = Operating Temperature Range, $V_{cc}$ = 3.135V to 3.465V

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Supply Current per each element	I <sub>CCT</sub>		90	100	mA

### **OUTLINE DRAWING**

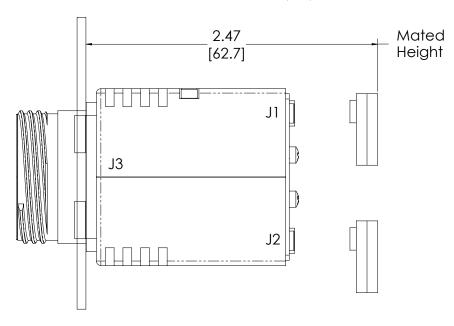
Dimensions are shown as: inches (mm)

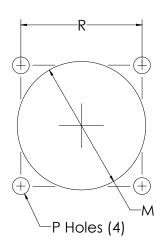




# PANEL MOUNTING REQUIREMENTS

Dimensions are shown as: inches (mm)

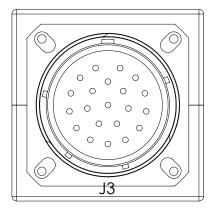




Panel Cutout Dimensions Rear Panel Mounting Only						
Shell Size Code	Shell Size	M Min	P Holes	R Bsc		
Н	23	1.547 (39.29)	0.159 (4.0) 0.149 (3.8)	1.375 (34.9)		

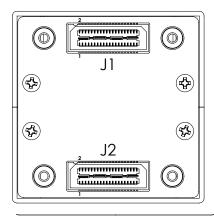
# OPTICAL TRANSCEIVER INSERT ARRANGEMENT TOP TOP

# **Optical Interface**



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

# **Electrical Interface**



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

## **OPTICAL TRANSCEIVER PORT ASSIGNMENTS**

Electrical Connector J1 / J2	J3 Optical Pin Assignment
	В
	Α
	N
	M
J1	С
	R
	W
	L
	D
	S
	V
	К
J2	E
	F
	Н
	J

# J1 ELECTRICAL PIN ASSIGNMENTS - 8TX + 8RX pattern indicated

*J1 Pin #	Symbol	I/O	J3 Pin #	Description	Logic Family
1	V <sub>cc</sub>	I	All	3.3VDC	N/A
2	TX_Dis	1	В	Transmitter Disable	LVTTL
3	V <sub>cc</sub>	I	All	3.3VDC	N/A
4	TX_Dis	1	Α	Transmitter Disable	LVTTL
5					
6					
7	RX+	О	C	Receiver Data	CML
8	TX+	1	В	Transmitter Data	CML
9	RX-	О	C	Receiver Data	CML
10	TX-	1	В	Transmitter Data	CML
11					
12					
13	RX+	О	R	Receiver Data	CML
14	TX+	L	Α	Transmitter Data	CML
15	RX-	О	R	Receiver Data	CML
16	TX-	1	Α	Transmitter Data	CML
17					
18					
19	RX+	О	W	Receiver Data	CML
20	TX+	1	N	Transmitter Data	CML
21	RX-	О	W	Receiver Data	CML
22	TX-	1	N	Transmitter Data	CML
23					
24					
25	RX+	О	L	Receiver Data	CML
26	TX+	1	М	Transmitter Data	CML
27	RX-	О	L	Receiver Data	CML
28	TX-	L	M	Transmitter Data	CML
29					
30					
31	RX_LOS	0	C	Loss Of Signal Indicator	Open Drain CMOS
32	RX_LOS	0	W	Loss Of Signal Indicator	Open Drain CMOS
33	RX_LOS	0	R	Loss Of Signal Indicator	Open Drain CMOS
34	RX_LOS	0	L	Loss Of Signal Indicator	Open Drain CMOS
35					
36					
37	TX_Dis	I	N	Transmitter Disable	LVTTL
38	GND	N/A	All	Signal Ground	Isolated from Case Ground
39	TX_Dis	I	М	Transmitter Disable	LVTTL
40	GND	N/A	All	Signal Ground	Isolated from Case Ground

<sup>\*</sup>J1 center slug is isolated GND

# Matrix Series MIL-DTL-38999 Optical Transceiver, Gigabit Ethernet, Fibre Channel, ARINC 818 Applications, Multimode, 850nM J2 ELECTRICAL PIN ASSIGNMENTS - 8TX + 8RX pattern indicated

#### \*J2 Pin # **Logic Family** I/O J3 Pin # **Symbol** Description $V_{cc}$ 1 ΑII 3.3VDC N/A 2 TX\_Dis D Transmitter Disable LVTTL 3.3VDC 3 Ι All N/A $V_{cc}$ 4 TX\_Dis S Transmitter Disable LVTTL 5 6 7 RX+ Е CML O Receiver Data 8 Transmitter Data CML TX+ 9 Е Receiver Data CML RX-O 10 TX-Transmitter Data CML 11 12 13 RX+ О F Receiver Data CML 14 TX+ S Transmitter Data CML 15 RX-O F Receiver Data CML s Transmitter Data CML 16 TX-17 18 19 RX+ O Н Receiver Data CML 20 Transmitter Data TX+ CML 21 RX-O Н Receiver Data CML 22 TX-Transmitter Data CML 23 24 25 RX+ О J Receiver Data CML 26 TX+ Κ Transmitter Data CML 27 RX-O J Receiver Data CML Transmitter Data 28 TX-Κ CML 29 30 31 RX LOS 0 Е Loss Of Signal Indicator Open Drain CMOS 32 RX\_LOS 0 Loss Of Signal Indicator Open Drain CMOS 33 RX LOS 0 F Loss Of Signal Indicator Open Drain CMOS 34 RX\_LOS 0 Loss Of Signal Indicator Open Drain CMOS 35 36 37 $TX_Dis$ ٧ Transmitter Disable LVTTL 1 38 GND N/A ΑII Signal Ground Isolated from Case Ground 39 TX\_Dis Κ Transmitter Disable LVTTL GND N/A ΑII Signal Ground Isolated from Case Ground 40

<sup>\*</sup>J2 center slug is isolated GND

# Matrix Series MIL-DTL-38999 Optical Transceiver, Gigabit Ethernet, Fibre Channel, ARINC 818 Applications, Multimode, 850nM J1 ELECTRICAL PIN ASSIGNMENTS - 16TX pattern indicated

*J1 Pin #	Symbol	I/O	J3 Pin #	Description	Logic Family
1	$V_{cc}$	I	All	3.3VDC	N/A
2	TX_Dis	1	В	Transmitter Disable	LVTTL
3	V <sub>cc</sub>	I	All	3.3VDC	N/A
4	TX_Dis	1	А	Transmitter Disable	LVTTL
5					
6					
7	TX+	I	С	Transmitter Data	CML
8	TX+	1	В	Transmitter Data	CML
9	TX-	I	С	Transmitter Data	CML
10	TX-	1	В	Transmitter Data	CML
11					
12					
13	TX+	I	R	Transmitter Data	CML
14	TX+	1	Α	Transmitter Data	CML
15	TX-	I	R	Transmitter Data	CML
16	TX-	- 1	Α	Transmitter Data	CML
17					
18					
19	TX+	I	W	Transmitter Data	CML
20	TX+	- 1	N	Transmitter Data	CML
21	TX-	I	W	Transmitter Data	CML
22	TX-	1	N	Transmitter Data	CML
23					
24					
25	TX+	I	L	Transmitter Data	CML
26	TX+	I	M	Transmitter Data	CML
27	TX-	I	L	Transmitter Data	CML
28	TX-	I	M	Transmitter Data	CML
29					
30					
31	TX_Dis	I	С	Transmitter Disable	LVTTL
32	TX_Dis	I	W	Transmitter Disable	LVTTL
33	TX_Dis	1	R	Transmitter Disable	LVTTL
34	TX_Dis	- 1	L	Transmitter Disable	LVTTL
35					
36					
37	TX_Dis	I	N	Transmitter Disable	LVTTL
38	GND	N/A	All	Signal Ground	Isolated from Case Ground
39	TX_Dis	I	М	Transmitter Disable	LVTTL
40	GND	N/A	All	Signal Ground	Isolated from Case Ground

<sup>\*</sup>J1 center slug is isolated GND

# Matrix Series MIL-DTL-38999 Optical Transceiver, Gigabit Ethernet, Fibre Channel, ARINC 818 Applications, Multimode, 850nM J2 ELECTRICAL PIN ASSIGNMENTS - 16TX pattern indicated

*J2 Pin #	Symbol	I/O	J3 Pin #	Description	Logic Family
1	$V_{cc}$	ı	All	3.3VDC	N/A
2	TX_Dis	ı	D	Transmitter Disable	LVTTL
3	$V_{cc}$	I	All	3.3VDC	N/A
4	TX_Dis	ı	S	Transmitter Disable	LVTTL
5					
6					
7	TX+	I	Е	Transmitter Data	CML
8	TX+	ı	D	Transmitter Data	CML
9	TX-	I	Е	Transmitter Data	CML
10	TX-	ı	D	Transmitter Data	CML
11					
12					
13	TX+	I	F	Transmitter Data	CML
14	TX+	ı	S	Transmitter Data	CML
15	TX-	I	F	Transmitter Data	CML
16	TX-	ı	S	Transmitter Data	CML
17					
18					
19	TX+	I	Н	Transmitter Data	CML
20	TX+	I	V	Transmitter Data	CML
21	TX-	I	Н	Transmitter Data	CML
22	TX-	1	V	Transmitter Data	CML
23					
24					
25	TX+	I	J	Transmitter Data	CML
26	TX+	ı	К	Transmitter Data	CML
27	TX-	I	J	Transmitter Data	CML
28	TX-	ı	К	Transmitter Data	CML
29					
30					
31	TX_Dis	ı	Е	Transmitter Disable	LVTTL
32	TX_Dis	I	Н	Transmitter Disable	LVTTL
33	TX_Dis	ı	F	Transmitter Disable	LVTTL
34	TX_Dis	I	J	Transmitter Disable	LVTTL
35					
36					
37	TX_Dis	ı	V	Transmitter Disable	LVTTL
38	GND	N/A	All	Signal Ground	Isolated from Case Ground
39	TX_Dis	ı	К	Transmitter Disable	LVTTL
40	GND	N/A	All	Signal Ground	Isolated from Case Ground

<sup>\*</sup>J2 center slug is isolated GND

# Matrix Series MIL-DTL-38999 Optical Transceiver, Gigabit Ethernet, Fibre Channel, ARINC 818 Applications, Multimode, 850nM J1 ELECTRICAL PIN ASSIGNMENTS - 16RX pattern indicated

*J1 Pin #	Symbol	I/O	J3 Pin #	Description	Logic Family
1	V <sub>cc</sub>	I	All	3.3VDC	N/A
2	RX_LOS	0	В	Loss Of Signal Indicator	Open Drain CMOS
3	V <sub>cc</sub>	I	All	3.3VDC	N/A
4	RX_LOS	0	Α	Loss Of Signal Indicator	Open Drain CMOS
5					
6					
7	RX+	О	С	Receiver Data	CML
8	RX+	0	В	Receiver Data	CML
9	RX-	О	С	Receiver Data	CML
10	RX-	0	В	Receiver Data	CML
11					
12					
13	RX+	О	R	Receiver Data	CML
14	RX+	0	Α	Receiver Data	CML
15	RX-	О	R	Receiver Data	CML
16	RX-	0	A	Receiver Data	CML
17					
18					
19	RX+	О	W	Receiver Data	CML
20	RX+	0	N	Receiver Data	CML
21	RX-	О	W	Receiver Data	CML
22	RX-	0	N	Receiver Data	CML
23					
24					
25	RX+	О	L	Receiver Data	CML
26	RX+	0	M	Receiver Data	CML
27	RX-	О	L	Receiver Data	CML
28	RX-	0	M	Receiver Data	CML
29					
30					
31	RX_LOS	О	С	Loss Of Signal Indicator	Open Drain CMOS
32	RX_LOS	0	W	Loss Of Signal Indicator	Open Drain CMOS
33	RX_LOS	О	R	Loss Of Signal Indicator	Open Drain CMOS
34	RX_LOS	0	L	Loss Of Signal Indicator	Open Drain CMOS
35					
36					
37	RX_LOS	0	N	Loss Of Signal Indicator	Open Drain CMOS
38	GND	N/A	All	Signal Ground	Isolated from Case Ground
39	RX_LOS	0	М	Loss Of Signal Indicator	Open Drain CMOS
40	GND	N/A	All	Signal Ground	Isolated from Case Ground

<sup>\*</sup>J1 center slug is isolated GND

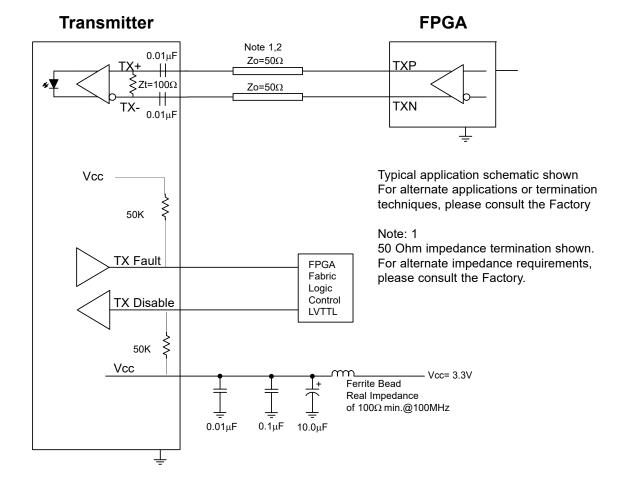
# J2 ELECTRICAL PIN ASSIGNMENTS - 16RX pattern indicated

1         V <sub>C</sub> I         All         3.3 VDC         N/A           2         RX_LOS         O         D         Loss Of Signal Indicator         Open Drain CMOS           3         V <sub>T</sub> I         All         3.3 VDC         N/A           4         RX_LOS         O         S         Loss Of Signal Indicator         Open Drain CMOS           5         S         Loss Of Signal Indicator         Open Drain CMOS           6         S         Loss Of Signal Indicator         Open Drain CMOS           7         RX+         O         D         Receiver Data         CML           8         RX+         O         D         Receiver Data         CML           10         RX-         O         D         Receiver Data         CML           11         C         C         C         C         CML           12         C         C         C         C         C         CML           13         RX+         O         F         Receiver Data         CML         CML           14         RX+         O         F         Receiver Data         CML         CML           16         RX+	*J2 Pin #	Symbol	I/O	J3 Pin #	Description	Logic Family
2         RX_LOS         O         D         Loss Of Signal Indicator         Open Drain CMOS           3         V <sub>Vc</sub> I         All         3.3VC         NNA           4         RX_LOS         O         S         Loss Of Signal Indicator         Open Drain CMOS           5         RX_LOS         O         S         Loss Of Signal Indicator         Open Drain CMOS           6         RX_LOS         O         E         Receiver Data         CML           8         RX_LOS         O         E         Receiver Data         CML           9         RX_LOS         O         E         Receiver Data         CML           10         RX_LOS         O         F         Receiver Data         CML           11         RX_LOS         O         F         Receiver Data         CML           12         RX_LOS         O         F         Receiver Data         CML           14         RX_LOS         O         F         Receiver Data         CML           15         RX_LOS         O         F         Receiver Data         CML           16         RX_LOS         O         F         Receiver Data         CML	1		ı	All	3.3VDC	N/A
4         RX_LOS         O         S         Loss Of Signal Indicator         Open Drain CMOS           5         6         - <td>2</td> <td></td> <td>0</td> <td>D</td> <td>Loss Of Signal Indicator</td> <td>Open Drain CMOS</td>	2		0	D	Loss Of Signal Indicator	Open Drain CMOS
4         RX_LOS         0         S         Loss Of Signal Indicator         Open Drain CMOS           5         6         1         6         1         6         1         6         1         6         1         6         1         6         1         6         1         6         1         6         1         6         1         6         1         6         1         6         1 <td>3</td> <td>V<sub>cc</sub></td> <td>I</td> <td>All</td> <td>3.3VDC</td> <td>N/A</td>	3	V <sub>cc</sub>	I	All	3.3VDC	N/A
6         RX+         O         E         Receiver Data         CML           8         RX+         O         D         Receiver Data         CML           9         RX-         O         E         Receiver Data         CML           10         RX-         O         D         Receiver Data         CML           11         C         C         C         CML           11         C         C         C         CML           12         C         C         CML         CML           14         RX+         O         F         Receiver Data         CML           15         RX-         O         F         Receiver Data         CML           16         RX-         O         S         Receiver Data         CML           17         C         C         S         Receiver Data         CML           18         C         O         H         Receiver Data         CML           20         RX+         O         H         Receiver Data         CML           21         RX-         O         H         Receiver Data         CML           22         RX- <td>4</td> <td></td> <td>0</td> <td>S</td> <td>Loss Of Signal Indicator</td> <td>Open Drain CMOS</td>	4		0	S	Loss Of Signal Indicator	Open Drain CMOS
7         RX+         O         E         Receiver Data         CML           8         RX+         O         D         Receiver Data         CML           9         RX-         O         D         Receiver Data         CML           10         RX-         O         D         Receiver Data         CML           11         C         C         C         CML         CML           12         C         C         C         CML         CML           13         RX+         O         F         Receiver Data         CML         CML           14         RX+         O         F         Receiver Data         CML         CML           15         RX-         O         F         Receiver Data         CML         CML           16         RX-         O         H         Receiver Data         CML         CML           17         RX+         O         H         Receiver Data         CML         CML           20         RX+         O         H         Receiver Data         CML         CML           21         RX-         O         J         Receiver Data         CML	5					
8         RX+         O         D         Receiver Data         CML           9         RX-         O         E         Receiver Data         CML           10         RX-         O         D         Receiver Data         CML           11         CML         CML         CML         CML           12         CML         CML         CML         CML           13         RX+         O         F         Receiver Data         CML           14         RX+         O         F         Receiver Data         CML           15         RX-         O         F         Receiver Data         CML           16         RX-         O         F         Receiver Data         CML           17         CML         CML         CML         CML           18         CML         CML         CML         CML           20         RX+         O         H         Receiver Data         CML           21         RX-         O         H         Receiver Data         CML           22         RX-         O         J         Receiver Data         CML           26         RX+	6					
9         RX-         O         E         Receiver Data         CML           10         RX-         O         D         Receiver Data         CML           11         RX-         O         F         Receiver Data         CML           13         RX+         O         S         Receiver Data         CML           14         RX-         O         F         Receiver Data         CML           15         RX-         O         F         Receiver Data         CML           16         RX-         O         S         Receiver Data         CML           17         B         CML         CML         CML           19         RX+         O         H         Receiver Data         CML           20         RX+         O         H         Receiver Data         CML           21         RX-         O         H         Receiver Data         CML           22         RX-         O         J         Receiver Data         CML           25         RX+         O         J         Receiver Data         CML           26         RX+         O         J         Receiver Data	7	RX+	О	E	Receiver Data	CML
10	8	RX+	0	D	Receiver Data	CML
11         1	9	RX-	О	E	Receiver Data	CML
12         RX+         O         F         Receiver Data         CML           14         RX+         O         S         Receiver Data         CML           15         RX-         O         F         Receiver Data         CML           16         RX-         O         S         Receiver Data         CML           17         B         CML         CML         CML           18         CML         CML         CML         CML           20         RX+         O         H         Receiver Data         CML           21         RX-         O         H         Receiver Data         CML           22         RX-         O         V         Receiver Data         CML           23         CML         CML         CML         CML           24         CML         CML         CML         CML           25         RX+         O         J         Receiver Data         CML           26         RX+         O         J         Receiver Data         CML           28         RX-         O         K         Receiver Data         CML           29         CML	10	RX-	0	D	Receiver Data	CML
13         RX+         O         F         Receiver Data         CML           14         RX+         O         S         Receiver Data         CML           15         RX-         O         F         Receiver Data         CML           16         RX-         O         S         Receiver Data         CML           17         B         CML         CML         CML           18         B         CML         CML         CML           20         RX+         O         H         Receiver Data         CML           21         RX-         O         H         Receiver Data         CML           22         RX-         O         V         Receiver Data         CML           23         C         CML         CML         CML           24         C         C         V         Receiver Data         CML           25         RX+         O         J         Receiver Data         CML           26         RX+         O         K         Receiver Data         CML           27         RX-         O         K         Receiver Data         CML           28	11					
14         RX+         O         S         Receiver Data         CML           15         RX-         O         F         Receiver Data         CML           16         RX-         O         S         Receiver Data         CML           17         C         C         CML         CML           18         C         C         CML         CML           19         RX+         O         H         Receiver Data         CML           20         RX+         O         H         Receiver Data         CML           21         RX-         O         H         Receiver Data         CML           22         RX-         O         V         Receiver Data         CML           23         C         C         C         CML           24         C         C         C         CML           25         RX+         O         J         Receiver Data         CML           26         RX+         O         K         Receiver Data         CML           27         RX-         O         K         Receiver Data         CML           28         RX-         O	12					
15         RX-         O         F         Receiver Data         CML           16         RX-         O         S         Receiver Data         CML           17         C         C         CML         CML           18         C         C         CML         CML           19         RX+         O         M         Receiver Data         CML           20         RX+         O         M         Receiver Data         CML           21         RX-         O         M         Receiver Data         CML           22         RX-         O         V         Receiver Data         CML           23         C         C         J         Receiver Data         CML           24         C         C         J         Receiver Data         CML           25         RX+         O         K         Receiver Data         CML           27         RX-         O         J         Receiver Data         CML           28         RX-         O         K         Receiver Data         CML           30         C         E         Loss Of Signal Indicator         Open Drain CMOS	13	RX+	О	F	Receiver Data	CML
16         RX-         O         S         Receiver Data         CML           17         18         -	14	RX+	0	S	Receiver Data	CML
17         18         18         18         18         18         19         RX+         0         H         Receiver Data         CML           20         RX+         0         V         Receiver Data         CML           21         RX-         0         H         Receiver Data         CML           22         RX-         0         V         Receiver Data         CML           23         -         -         -         -           24         -         -         -         -           25         RX+         0         J         Receiver Data         CML           26         RX+         0         J         Receiver Data         CML           27         RX-         0         J         Receiver Data         CML           28         RX-         0         K         Receiver Data         CML           29         -         -         -         -           30         RX-         0         K         Receiver Data         -         -           31         RX-LOS         0         K         Receiver Data         -         -         -           31	15	RX-	О	F	Receiver Data	CML
18         RX+         O         H         Receiver Data         CML           20         RX+         O         V         Receiver Data         CML           21         RX-         O         H         Receiver Data         CML           22         RX-         O         V         Receiver Data         CML           23         -         -         -         -           24         -         -         -         -           25         RX+         O         J         Receiver Data         CML           26         RX+         O         J         Receiver Data         CML           27         RX-         O         J         Receiver Data         CML           28         RX-         O         K         Receiver Data         CML           29         -         -         -         -           30         -         -         -         -           31         RX_LOS         O         E         Loss Of Signal Indicator         Open Drain CMOS           32         RX_LOS         O         F         Loss Of Signal Indicator         Open Drain CMOS           34	16	RX-	0	S	Receiver Data	CML
19         RX+         O         H         Receiver Data         CML           20         RX+         O         V         Receiver Data         CML           21         RX-         O         H         Receiver Data         CML           22         RX-         O         V         Receiver Data         CML           23         CML         CML         CML         CML           24         CML         CML         CML         CML           25         RX+         O         J         Receiver Data         CML           26         RX+         O         K         Receiver Data         CML           27         RX-         O         J         Receiver Data         CML           28         RX-         O         K         Receiver Data         CML           29         CML         CML         CML           30         CML         CML         CML           31         RX_LOS         O         E         Loss Of Signal Indicator         Open Drain CMOS           32         RX_LOS         O         F         Loss Of Signal Indicator         Open Drain CMOS           34         R	17					
20         RX+         O         V         Receiver Data         CML           21         RX-         O         H         Receiver Data         CML           22         RX-         O         V         Receiver Data         CML           23         -         -         -         -           24         -         -         -         -           25         RX+         O         J         Receiver Data         CML           26         RX+         O         J         Receiver Data         CML           27         RX-         O         J         Receiver Data         CML           28         RX-         O         K         Receiver Data         CML           29         -         -         -         -           30         RX-         O         K         Receiver Data         CML           29         -         -         -         -           30         RX-LOS         O         E         Loss Of Signal Indicator         Open Drain CMOS           31         RX_LOS         O         F         Loss Of Signal Indicator         Open Drain CMOS           34	18					
21         RX-         O         H         Receiver Data         CML           22         RX-         O         V         Receiver Data         CML           23	19	RX+	О	Н	Receiver Data	CML
22         RX-         O         V         Receiver Data         CML           23         -         -         -         -           24         -         -         -         -           25         RX+         O         J         Receiver Data         CML           26         RX+         O         K         Receiver Data         CML           27         RX-         O         J         Receiver Data         CML           28         RX-         O         K         Receiver Data         CML           29         -         -         -         -           30         -         -         -         -           31         RX_LOS         O         E         Loss Of Signal Indicator         Open Drain CMOS           32         RX_LOS         O         F         Loss Of Signal Indicator         Open Drain CMOS           34         RX_LOS         O         J         Loss Of Signal Indicator         Open Drain CMOS           36         -         -         -         -         -           37         RX_LOS         O         V         Loss Of Signal Indicator         Open Drain CMOS </td <td>20</td> <td>RX+</td> <td>0</td> <td>V</td> <td>Receiver Data</td> <td>CML</td>	20	RX+	0	V	Receiver Data	CML
23         RX+         O         J         Receiver Data         CML           25         RX+         O         J         Receiver Data         CML           26         RX+         O         K         Receiver Data         CML           27         RX-         O         J         Receiver Data         CML           28         RX-         O         K         Receiver Data         CML           29         CML         CML         CML           30         CML         CML         CML           31         RX_LOS         O         E         Loss Of Signal Indicator         Open Drain CMOS           32         RX_LOS         O         F         Loss Of Signal Indicator         Open Drain CMOS           34         RX_LOS         O         J         Loss Of Signal Indicator         Open Drain CMOS           35         CML         CML         CML         CML         CML           36         CML         CML         CML         CML         CML           37         RX_LOS         O         V         Loss Of Signal Indicator         Open Drain CMOS           38         GND         N/A         All	21	RX-	О	Н	Receiver Data	CML
24         RX+         O         J         Receiver Data         CML           26         RX+         O         K         Receiver Data         CML           27         RX-         O         J         Receiver Data         CML           28         RX-         O         K         Receiver Data         CML           29         CML         CML         CML         CML           30         CML         CML         CML         CML           31         RX_LOS         O         E         Loss Of Signal Indicator         Open Drain CMOS           32         RX_LOS         O         F         Loss Of Signal Indicator         Open Drain CMOS           34         RX_LOS         O         J         Loss Of Signal Indicator         Open Drain CMOS           35         CML         CML         CML         CML         CML         CML           36         CML         CM	22	RX-	0	V	Receiver Data	CML
25         RX+         O         J         Receiver Data         CML           26         RX+         O         K         Receiver Data         CML           27         RX-         O         J         Receiver Data         CML           28         RX-         O         K         Receiver Data         CML           29         CML         CML         CML         CML           30         CML         CML         CML         CML           31         RX_LOS         O         E         Loss Of Signal Indicator         Open Drain CMOS           32         RX_LOS         O         F         Loss Of Signal Indicator         Open Drain CMOS           34         RX_LOS         O         J         Loss Of Signal Indicator         Open Drain CMOS           35         CML         CML         CML         CML         CML         CML           36         CML         CM	23					
26         RX+         O         K         Receiver Data         CML           27         RX-         O         J         Receiver Data         CML           28         RX-         O         K         Receiver Data         CML           29         CML         CML         CML         CML           30         CML         CML         CML         CML           31         RX_LOS         O         E         Loss Of Signal Indicator         Open Drain CMOS           32         RX_LOS         O         F         Loss Of Signal Indicator         Open Drain CMOS           34         RX_LOS         O         J         Loss Of Signal Indicator         Open Drain CMOS           35         CML         CML         CML         CML         CML         CML           36         CML         CML </td <td>24</td> <td></td> <td></td> <td></td> <td></td> <td></td>	24					
27         RX-         O         J         Receiver Data         CML           28         RX-         O         K         Receiver Data         CML           29         CML         CML         CML           30         CML         CML         CML           31         RX_LOS         O         E         Loss Of Signal Indicator         Open Drain CMOS           32         RX_LOS         O         F         Loss Of Signal Indicator         Open Drain CMOS           33         RX_LOS         O         J         Loss Of Signal Indicator         Open Drain CMOS           34         RX_LOS         O         J         Loss Of Signal Indicator         Open Drain CMOS           35         CML         CML         CML         CML         CML         CML           36         CML	25	RX+	О	J	Receiver Data	CML
28         RX-         O         K         Receiver Data         CML           29         CML         CML         CML         CML           30         CML         CML         CML         CML           31         RX_LOS         O         E         Loss Of Signal Indicator         Open Drain CMOS           32         RX_LOS         O         F         Loss Of Signal Indicator         Open Drain CMOS           34         RX_LOS         O         J         Loss Of Signal Indicator         Open Drain CMOS           35         CML         CML         CML         CML         CML           36         CML         CML         CML         CML         CML           36         CML         CML         CML         CML         CML         CML           38         GND         N/A         All         Signal Ground         Isolated from Case Ground           39         RX_LOS         O         K         Loss Of Signal Indicator         Open Drain CMOS	26	RX+	0	К	Receiver Data	CML
29         Book of Signal Indicator         Open Drain CMOS           31         RX_LOS         O         E         Loss Of Signal Indicator         Open Drain CMOS           32         RX_LOS         O         H         Loss Of Signal Indicator         Open Drain CMOS           33         RX_LOS         O         F         Loss Of Signal Indicator         Open Drain CMOS           34         RX_LOS         O         J         Loss Of Signal Indicator         Open Drain CMOS           35         36         Signal Indicator         Open Drain CMOS           37         RX_LOS         O         V         Loss Of Signal Indicator         Open Drain CMOS           38         GND         N/A         All         Signal Ground         Isolated from Case Ground           39         RX_LOS         O         K         Loss Of Signal Indicator         Open Drain CMOS	27	RX-	О	J	Receiver Data	CML
30         RX_LOS         O         E         Loss Of Signal Indicator         Open Drain CMOS           32         RX_LOS         O         H         Loss Of Signal Indicator         Open Drain CMOS           33         RX_LOS         O         F         Loss Of Signal Indicator         Open Drain CMOS           34         RX_LOS         O         J         Loss Of Signal Indicator         Open Drain CMOS           35         S         O         V         Loss Of Signal Indicator         Open Drain CMOS           36         S         O         V         Loss Of Signal Indicator         Open Drain CMOS           38         GND         N/A         All         Signal Ground         Isolated from Case Ground           39         RX_LOS         O         K         Loss Of Signal Indicator         Open Drain CMOS	28	RX-	0	К	Receiver Data	CML
31RX_LOSOELoss Of Signal IndicatorOpen Drain CMOS32RX_LOSOHLoss Of Signal IndicatorOpen Drain CMOS33RX_LOSOFLoss Of Signal IndicatorOpen Drain CMOS34RX_LOSOJLoss Of Signal IndicatorOpen Drain CMOS35Open Drain CMOS36COpen Drain CMOS37RX_LOSOVLoss Of Signal IndicatorOpen Drain CMOS38GNDN/AAllSignal GroundIsolated from Case Ground39RX_LOSOKLoss Of Signal IndicatorOpen Drain CMOS	29					
32       RX_LOS       O       H       Loss Of Signal Indicator       Open Drain CMOS         33       RX_LOS       O       F       Loss Of Signal Indicator       Open Drain CMOS         34       RX_LOS       O       J       Loss Of Signal Indicator       Open Drain CMOS         35       Signal Indicator       Open Drain CMOS         36       Signal Indicator       Open Drain CMOS         38       GND       N/A       All       Signal Ground       Isolated from Case Ground         39       RX_LOS       O       K       Loss Of Signal Indicator       Open Drain CMOS	30					
33 RX_LOS O F Loss Of Signal Indicator Open Drain CMOS 34 RX_LOS O J Loss Of Signal Indicator Open Drain CMOS 35 Open Drain CMOS 36 Open Drain CMOS 37 RX_LOS O V Loss Of Signal Indicator Open Drain CMOS 38 GND N/A All Signal Ground Isolated from Case Ground 39 RX_LOS O K Loss Of Signal Indicator Open Drain CMOS	31	RX_LOS	О	Е	Loss Of Signal Indicator	Open Drain CMOS
34         RX_LOS         O         J         Loss Of Signal Indicator         Open Drain CMOS           35         36         36         37         RX_LOS         O         V         Loss Of Signal Indicator         Open Drain CMOS           38         GND         N/A         All         Signal Ground         Isolated from Case Ground           39         RX_LOS         O         K         Loss Of Signal Indicator         Open Drain CMOS	32	RX_LOS	0	н	Loss Of Signal Indicator	Open Drain CMOS
35         36         36         37         RX_LOS         O         V         Loss Of Signal Indicator         Open Drain CMOS         38         GND         N/A         All         Signal Ground         Isolated from Case Ground         39         RX_LOS         O         K         Loss Of Signal Indicator         Open Drain CMOS	33	RX_LOS	О	F	Loss Of Signal Indicator	Open Drain CMOS
36     RX_LOS     O     V     Loss Of Signal Indicator     Open Drain CMOS       38     GND     N/A     All     Signal Ground     Isolated from Case Ground       39     RX_LOS     O     K     Loss Of Signal Indicator     Open Drain CMOS	34	RX_LOS	0	J	Loss Of Signal Indicator	Open Drain CMOS
37RX_LOSOVLoss Of Signal IndicatorOpen Drain CMOS38GNDN/AAllSignal GroundIsolated from Case Ground39RX_LOSOKLoss Of Signal IndicatorOpen Drain CMOS	35					
38 GND N/A All Signal Ground Isolated from Case Ground 39 RX_LOS O K Loss Of Signal Indicator Open Drain CMOS	36					
39 RX_LOS O K Loss Of Signal Indicator Open Drain CMOS	37	RX_LOS	0	V	Loss Of Signal Indicator	Open Drain CMOS
	38	GND	N/A	All	Signal Ground	Isolated from Case Ground
40 GND N/A All Signal Ground Isolated from Case Ground	39	RX_LOS	0	К	Loss Of Signal Indicator	Open Drain CMOS
	40	GND	N/A	All	Signal Ground	Isolated from Case Ground

<sup>\*</sup>J2 center slug is isolated GND

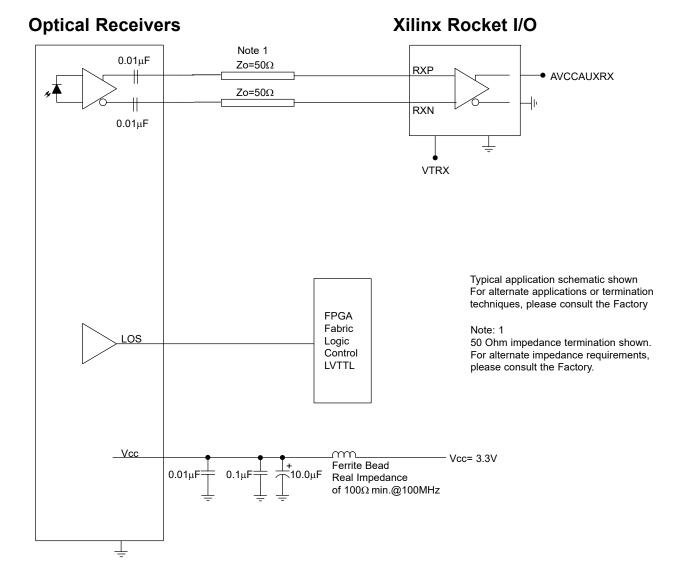
# TRANSMITTER APPLICATION SCHEMATIC

For Xilinx Rocket I/O Interfaces



# **RECEIVER APPLICATION SCHEMATIC**

For Xilinx Rocket I/O Interfaces



# **APPENDIX A1**

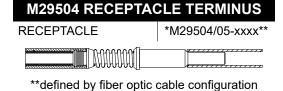
## MIL-DTL-38999 FIBER OPTIC CABLE PLUG / MIL-T-29504 RECEPTACLE TERMINI

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

### \*D38999 PLUG - RECEPTACLE INSERT

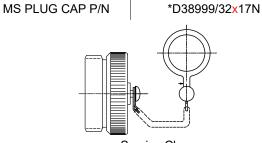
# MIL-DTL-38999 CABLE PLUG MS PLUG P/N \*D38999/26xH21SN x = Service Class

## \*FIBER OPTIC TERMINUS



#### \*CABLE PROTECTION CAP

#### D38999/32 PLUG PROTECTION CAP

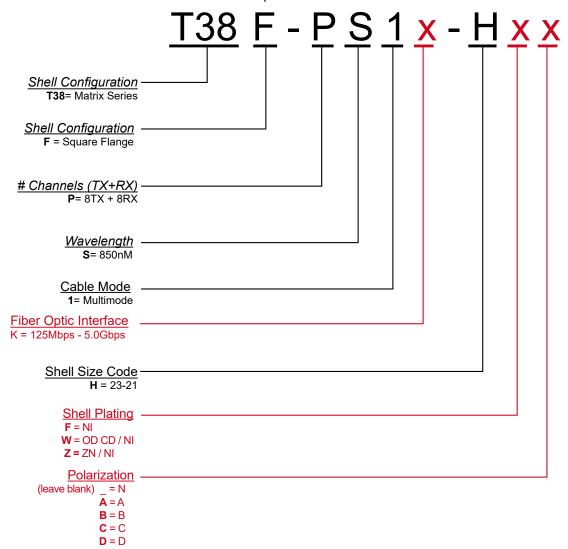


x = Service Class

# **APPENDIX A2**

#### **PART NUMBER OPTIONS**

Matrix Optical Transceivers





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