PROTOKRAFT

Facilitating Secure Communications in Harsh Environments

Mustang Series

Gigabit Ethernet, TFOCA II®, 1000Base-T/SX Media Converter, Multimode, 850nM

Dual Port, Jam Nut

TFOCA II to M83513 / Optical to Electrical Media Converter

FEATURES

- Compliant with IEEE-802.3:2005 Gigabit Ethernet 1000Base-T and 1000Base-SX
- Optical fiber link distances up to 550 meters
- Copper link distances up to 100 Meters (EIA/TIA Cat-5E)
- Operating temperature range from -40°C to +85°C
- Shock, vibration and immersion resistant per MIL-STD-810
- Zinc Nickel plating meets stringent EMI / RFI and corrosion resistance performance specifications
- Aluminum housings are strong, durable and light weight
- TFOCA II® compliant optical fiber connector interface
- M83513 Micro D or Samtec SMT electrical connector for interface to backplanes or motherboards

APPLICATIONS

Mustang series bulkhead mounted Gigabit Ethernet media converters enable high speed network communications over long distances in harsh environments.

- Gigabit Ethernet switches and peripherals
- Telecom and datacom switch / router rack-to-rack links
- Storage or computation clusters

The TFOCA II® shell provides a sealed optical interface that is water-tight to Mil-Std-810 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.

*TFOCA-II® is a registered trademark of Amphenol Fiber Systems International.

DESCRIPTION

Mustang series Gigabit Ethernet media converters consist of optoelectronic transmitter and receiver functions integrated along with the 1000Base-TX electrical to 1000Base-SX optical media conversion circuitry into a jam-nut TFOCA II® fiber optic connector assembly.

The optical transmitters are high output 850nM devices. The optical receivers consist of GaAs PIN and preamplifier assemblies and limiting post-amplifiers.

The electrical interface to the Mustang series optical media converters is an M83513 Micro D or Samtec SMT electrical connector for interface to backplanes or motherboards.

Mustang series Gigabit Ethernet media converters are vibration isolated, environmentally hardened components designed for use in harsh environment applications.

- Sealed against liquid and solid contaminants
- Shock and vibration resistant

ORDERING INFORMATION

Application	Product Number
Dual Port 1000Base-T / SX - 3.3VDC	P51J-4S1T-FZ-M
For additional product options see Appendix A2	

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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

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
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	3.8g²/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
FDA / CDRH / IEC-825-1	Eye Safety	Class 1	No Safety Interlocks Required

MATERIALS

Item	Detail	Notes
Shell	Aluminum Alloy	
Shell Plating	Zinc Nickel	SAE-AMS-2417
Insert	Aluminum Alloy	
Interfacial Seal	Elastomer	
Alignment Sleeves	Zirconia	
Printed Circuits	Polyimide / FR-4	Mil-P-31032 Type 4

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TRANSMITTERS T_A = Operating Temperature Range, Vcc = Operating Voltage Range

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Optical Output Power	P_o	-9.5		-3.0	dBm
Optical Output Wavelength	λ_{OUT}	830	850	860	nM

RECEIVERS T_A = Operating Temperature Range, Vcc = Operating Voltage Range

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Optical Sensitivity	P_I	-19.0		0.0	dBm
Optical Wavelength	λ_{IN}	700		900	nM

SUPPLY CURRENT T_A = Operating Temperature Range, Vcc = Operating Voltage Range

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Supply Current per Port	I_{CCT}		450	600	mA

OPTICAL FIBER LINK DISTANCES

Application	Fiber Specification	Distance
Gigabit Ethernet - 1000Base-SX IEEE 802.3:2005	62.5/125µ MMF 50/125µ MMF	275M 550M

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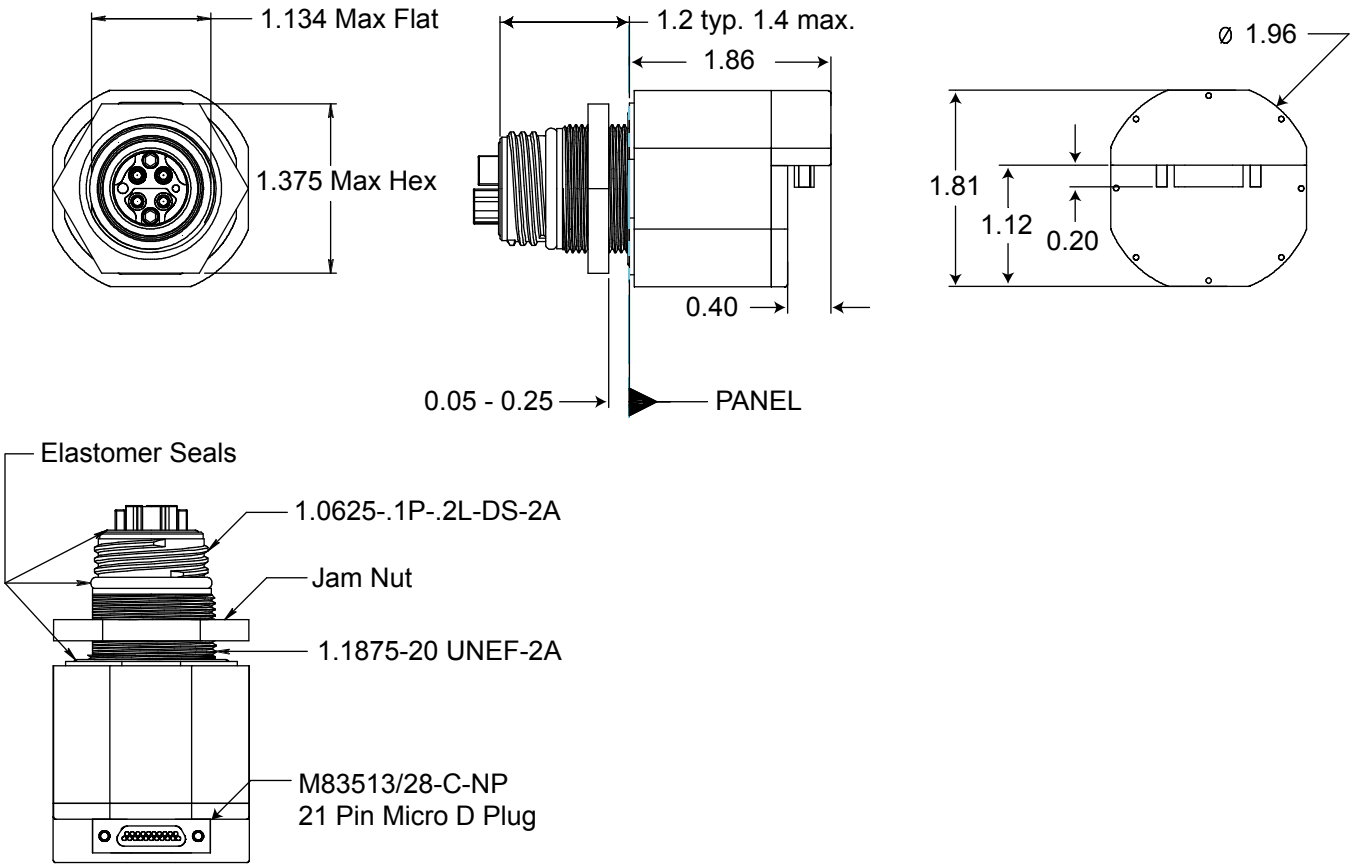
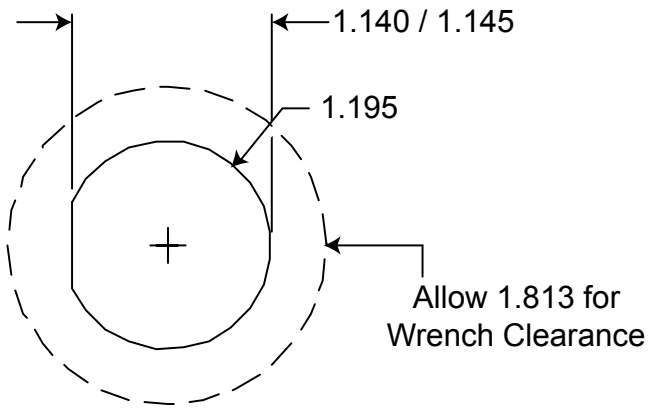
OUTLINE DRAWING

Dimensions are shown as: inches



Panel Cutout Dimensions

Dimensions are shown as: inches



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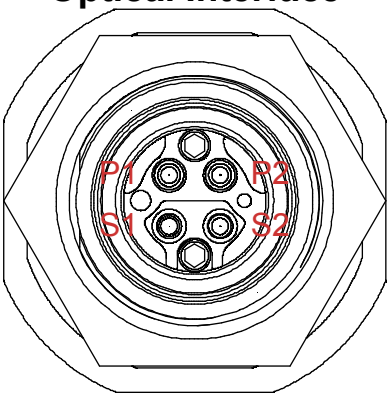
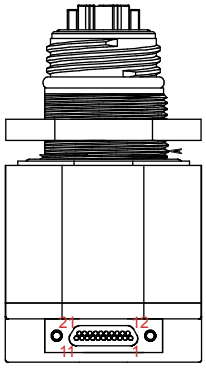
MEDIA CONVERTER OPTICAL INSERT AND ELECTRICAL PIN ARRANGEMENT

TOP
Optical Interface



Front view of the TFOCA II media converter optical insert shown - fiber optic cable plug opposite - see Appendix A1 for details

TOP
Electrical Interface



Back view of the media converter shown - see Electrical Pin Function Chart for more details

OPTICAL PORT ASSIGNMENTS

TFOCA II OPTICAL INTERFACE		
PORT NUMBER	**RX**	**TX**
0	P2	S2
1	P1	S1

ELECTRICAL PIN ASSIGNMENTS

MICRO-D ELECTRICAL INTERFACE					
PIN #	**PORT #**	**FUNCTION**	**PIN #**	**PORT #**	**FUNCTION**
1	0	MDA+	12	1	MDA+
2	0	MDA-	13	1	MDA-
3	0	MDB+	14	1	MDB+
4	0	MDB-	15	1	MDB-
5	0	MDC+	16	1	MDC+
6	0	MDC-	17	1	MDC-
7	0	MDD+	18	1	MDD+
8	0	MDD-	19	1	MDD-

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ELECTRICAL PIN ASSIGNMENTS

21 POSITION MICRO-D ELECTRICAL INTERFACE

PIN #	PORT #	FUNCTION	Input / Output	Logic Family
1	0	MDA+	Input / Output	IEEE-802.3:2005 1000Base-T
2	0	MDA-	Input / Output	IEEE-802.3:2005 1000Base-T
3	0	MDB+	Input / Output	IEEE-802.3:2005 1000Base-T
4	0	MDB-	Input / Output	IEEE-802.3:2005 1000Base-T
5	0	MDC+	Input / Output	IEEE-802.3:2005 1000Base-T
6	0	MDC-	Input / Output	IEEE-802.3:2005 1000Base-T
7	0	MDD+	Input / Output	IEEE-802.3:2005 1000Base-T
8	0	MDD-	Input / Output	IEEE-802.3:2005 1000Base-T
9	N/A	N/C	N/A	N/A
10	0	$\overline{\text{Reset}}$	Input	LVTTL - with Internal Pullup
11	1	$\overline{\text{Reset}}$	Input	LVTTL - with Internal Pullup
12	1	MDA+	Input / Output	IEEE-802.3:2005 1000Base-T
13	1	MDA-	Input / Output	IEEE-802.3:2005 1000Base-T
14	1	MDB+	Input / Output	IEEE-802.3:2005 1000Base-T
15	1	MDB-	Input / Output	IEEE-802.3:2005 1000Base-T
16	1	MDC+	Input / Output	IEEE-802.3:2005 1000Base-T
17	1	MDC-	Input / Output	IEEE-802.3:2005 1000Base-T
18	1	MDD+	Input / Output	IEEE-802.3:2005 1000Base-T
19	1	MDD-	Input / Output	IEEE-802.3:2005 1000Base-T
20	0 / 1	GND	N/A	N/A
21	0 / 1	Vcc	N/A	N/A

All Reset Functions: Logic “0” Input = Restart, registers initialized; Logic “1”, Open or High Z Input = Normal Operation

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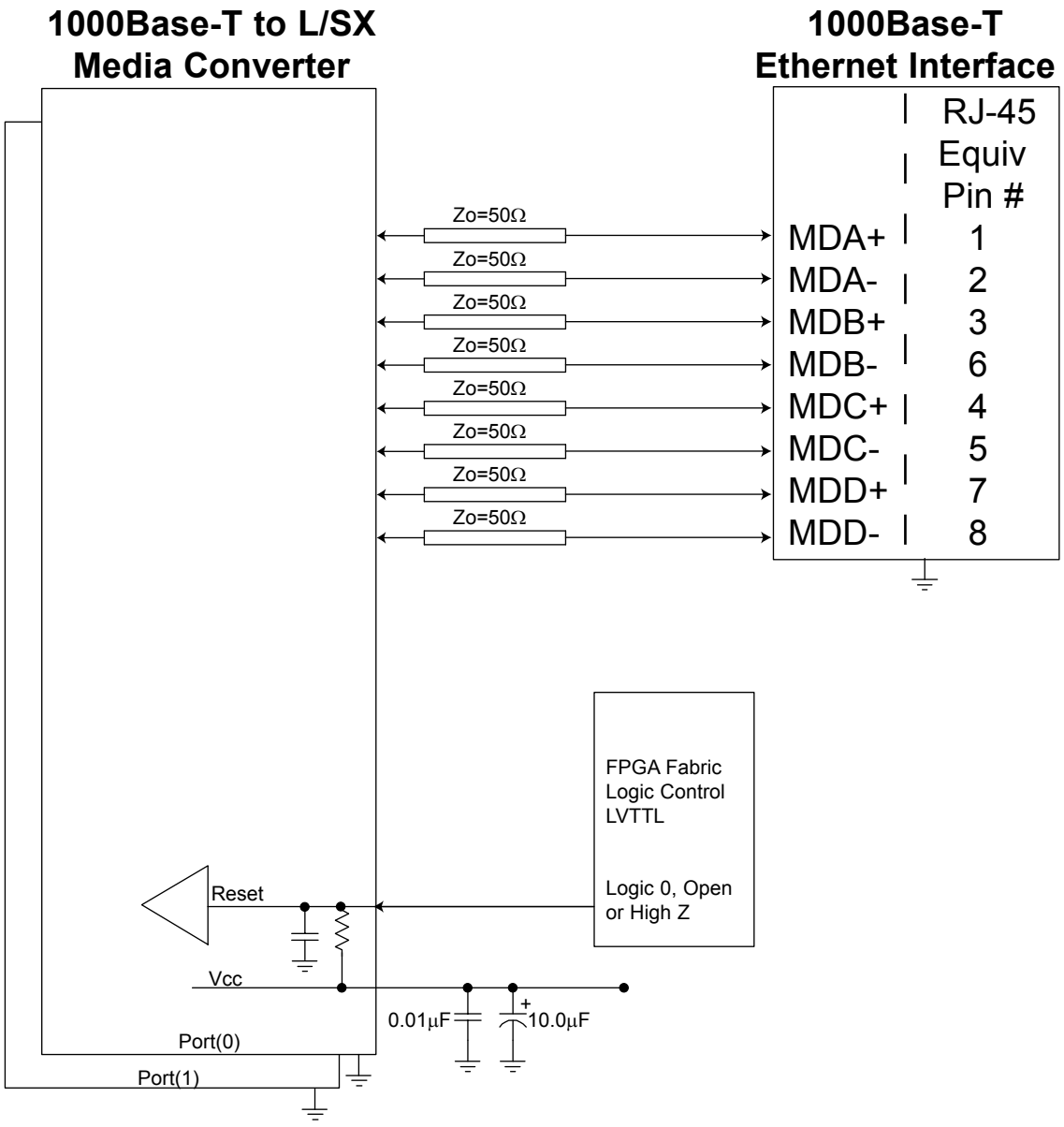
APPLICATION SCHEMATIC



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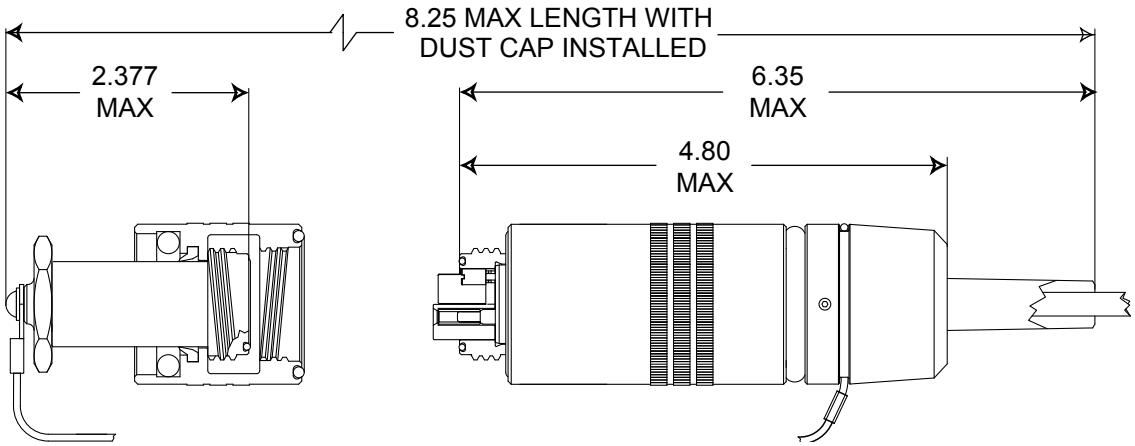
APPENDIX A1

TFOCA-II® 4 Channel Fiber Optic Cable Plug

Dimensions are shown as: inches

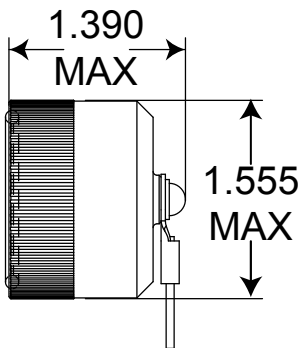


Amphenol Fiber Systems International®
TFOCA-II® 4-Channel Connector Part Numbers*

*Contact Amphenol Fiber Systems International for more information

TFOCA II® RECEPTACLE PROTECTION CAPS

RECEPTACLE CAP P/N	Contact Amphenol Fiber Systems International



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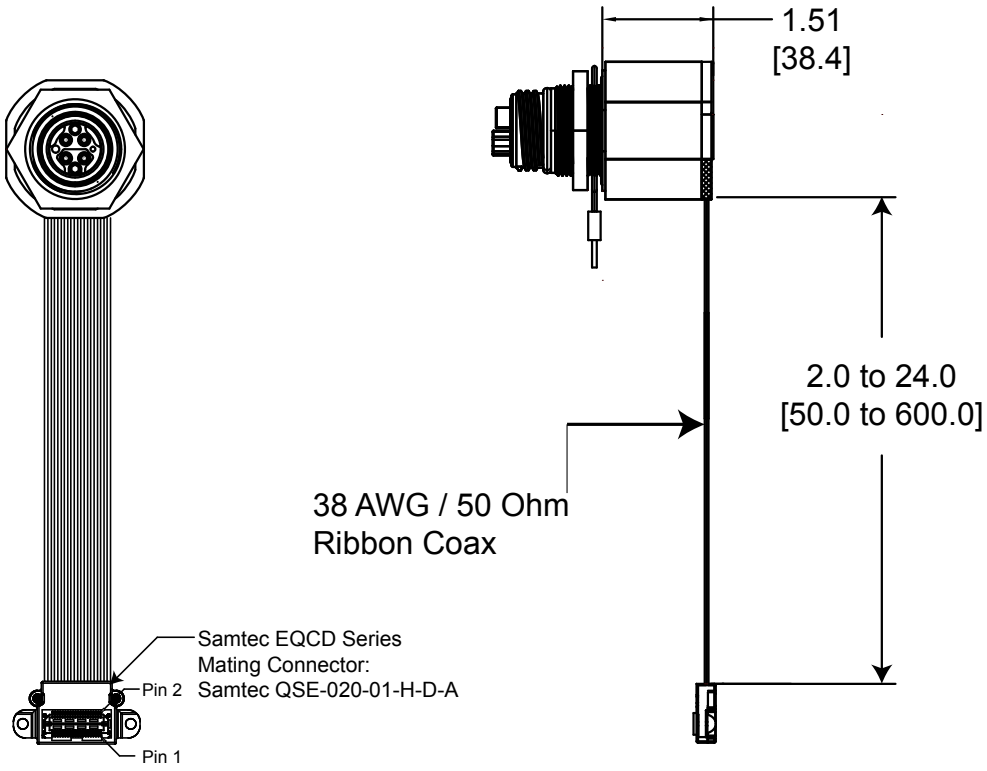
APPENDIX A2

CABLE ASSEMBLY CONSTRUCTION OPTIONS

Dimensions are shown as: inches (mm)



Part Number = P51J-xxxx-xx-Lxxx*

* See page 10 for standard length options

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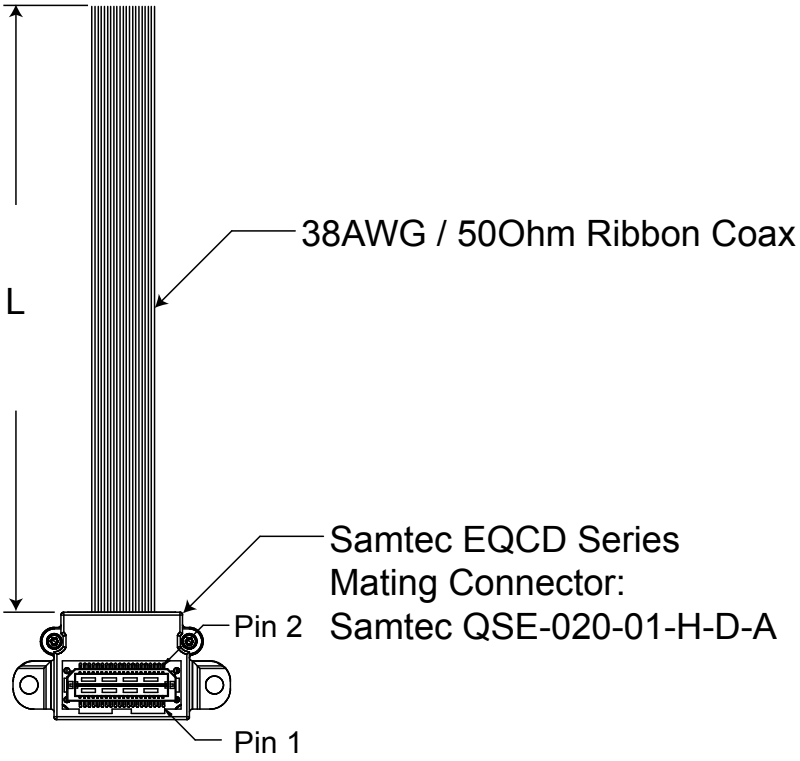
OUTLINE DRAWING

Cable Length Options



Ribbon Coax Cable Length Options

L (mm) +/- 6.0	ITEM #
50	xxxx-xxxx-xx-L050
100	xxxx-xxxx-xx-L100
150	xxxx-xxxx-xx-L150
200	xxxx-xxxx-xx-L200
250	xxxx-xxxx-xx-L250

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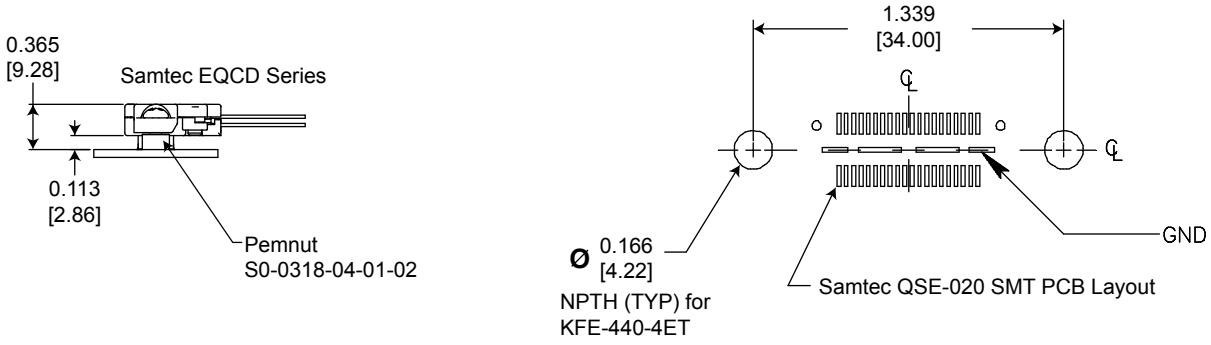
PRINTED CIRCUIT BOARD FOOTPRINT

All dimensions shown are for reference only: inches [mm]



Samtec EQCD PIN ASSIGNMENTS

PIN #	PORT #	FUNCTION	Input / Output	RJ-45 PIN#	Logic Family
1	0	MDA+	Input / Output	1	IEEE-802.3:2005 1000Base-TX
2	1	MDA+	Input / Output	1	IEEE-802.3:2005 1000Base-TX
3	0	MDA-	Input / Output	2	IEEE-802.3:2005 1000Base-TX
4	1	MDA-	Input / Output	2	IEEE-802.3:2005 1000Base-TX
5	0	MDB+	Input / Output	3	IEEE-802.3:2005 1000Base-TX
6	1	MDB+	Input / Output	3	IEEE-802.3:2005 1000Base-TX
7	0	MDB-	Input / Output	6	IEEE-802.3:2005 1000Base-TX
8	1	MDB-	Input / Output	6	IEEE-802.3:2005 1000Base-TX
9	0	MDC+	Input / Output	4	IEEE-802.3:2005 1000Base-TX
10	1	MDC+	Input / Output	4	IEEE-802.3:2005 1000Base-TX
11	0	MDC-	Input / Output	5	IEEE-802.3:2005 1000Base-TX
12	1	MDC-	Input / Output	5	IEEE-802.3:2005 1000Base-TX
13	0	MDD+	Input / Output	7	IEEE-802.3:2005 1000Base-TX
14	1	MDD+	Input / Output	7	IEEE-802.3:2005 1000Base-TX
15	0	MDD-	Input / Output	8	IEEE-802.3:2005 1000Base-TX
16	1	MDD-	Input / Output	8	IEEE-802.3:2005 1000Base-TX
17	0	*Reset_Low	$\overline{\text{Input}}$	N/A	LVTTL with Internal Pullup
18	1	*Reset_Low	$\overline{\text{Input}}$	N/A	LVTTL with Internal Pullup
19	0-1	V_{CC}	Input	N/A	3.135 to 3.465VDC
20	0-1	V_{CC}	Input	N/A	3.135 to 3.465VDC
21	0-1	V_{CC}	Input	N/A	3.135 to 3.465VDC
22	0-1	V_{CC}	Input	N/A	3.135 to 3.465VDC

*Reset Function: Logic “0” Input = Restart, registers initialized; Logic “1”, Open or High Z Input = Normal Operation, center slug is isolated GND, all other pins are N/C

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