

MIL-SNF-LT11x-Rxxx

PIGTAIL MILITARY SFF OPTICAL TRANSCEIVER

Fast Ethernet Applications

3.3V, 1310nm LED, Multimode, Up to 2.0Km

PRELIMINARY

FEATURES

- Industry standard MSA 2x5 footprint
- Pigtail fiber for high vibration and humidity operation
- IPC Class III assembly and construction
- Industrial Temp range -40C to +85C operational
- All metal construction for rugged environments
- Optional Parylene C conformal coating
- LVTTTL RX Signal Detect pin
- RX data squelch on RX Signal Detect deassert
- Separate +3.3 V power pins per TX/RX port
- Industry standard duplex multimode LC receptacle
- Full compliance to IEEE and FDDI requirements
- EN-60825/ IEC-825 / CDRH Class 1 Compliant

APPLICATIONS

The MIL-SNF-LT11x-Rxxx multimode glass optical fiber transceivers provide low profile, cost effective solutions for Fast Ethernet multimode (up to 2.0 Km) optical fiber data links with a duplex pigtail connector interface.

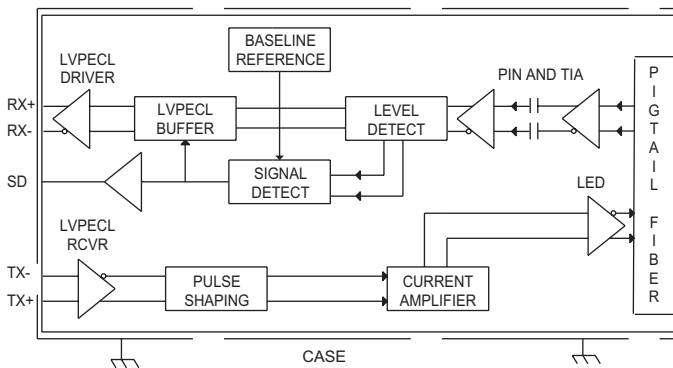
These transceivers are fully compliant with the IEEE 802.3u Fast Ethernet standard but can be used for any other data communications purpose within their operating parameters.

DESCRIPTION

The optic transceivers consist of transmitter and receiver functions combined in an Low Profile module. The optical transmitter is a high output 1310nm LED. The transmitter input lines are driven with differential LVPECL signals applied to the Transmit (TX+ and TX-) pins. These signals are internally converted to a suitable modulation current by a CMOS integrated circuit.

The optical receivers consist of PIN and Preamplifier assemblies and CMOS limiting post-amplifier integrated circuits. Outputs from the receivers consist of differential LVPECL data signals on the Receive (RX+ and RX-) pins and a single ended LVTTTL signal detect function on the Signal Detect (SD) pin. The RX data is squelched (JAM) upon Signal Detect deassert to prevent garbage data output when no optical signal is present.

BLOCK DIAGRAM



ORDERING INFORMATION

MIL - S N F - LT11 X - R X XX

Product Family	Shell Options	Application	Wavelength, Signal Detect, Fiber	Temperature and Coating	Pigtail	Fiber Type & Termination	Pigtail Length
MIL-S= Military SFF (IPC Class III)	N= No GND Tabs (Flat Shell)	F= Fast Ethernet	LT11= 1310 nm LED Multimode, LVTTTL Signal Detect	H= -40 to 85 C, No Coating	R= Rough/Idler Pigtail	A-Z= Fiber Type and Termination ID	00-99= Pigtail Length (inches)
				M= -40 to 85 C, Conformal Coating			



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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
Lead Soldering Temperature	T_{SOLD}			+260	°C
Lead Soldering Time	t_{SOLD}			10	Seconds
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
Output Current	I_o			50	mA

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Operating Temperature Limit	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
RX Data Output Load	R_L		50		Ohms

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TRANSMITTERS

VCCTX = 3.15V to 3.45V, T_A = Operating Temperature Range

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Optical Output Power ¹	P_o	-19.0		-14.0	dBm
Optical Output Center Wavelength	λ_{OUT}	1285	1310	1355	nm
Spectral Width	$\Delta\lambda_{RMS}$ $\Delta\lambda_{FWHM}$			63 175	nm
Extinction Ratio	ER	13			dB
Supply Current	I_{CC}		120	160	mA
Optical Rise / Fall Time	$t_{R,F}$			3.0	ns

1. BER=10⁻¹⁰ @ 125Mbps, PRBS 2⁷-1, NRZ, Compliant with FDDI PMD ISO / IEC 9314-3 and IEEE-802.3u testing with 62.5 MM Fiber.

RECEIVERS

VCCR_X = 3.15V to 3.45V, T_A = Operating Temperature Range

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Optical Sensitivity ¹	P_i	-32.0		-8.0	dBm
Optical Wavelength	λ_{IN}	1260		1380	nm
Supply Current	I_{CC}		70	120	mA
Signal Detect Assert Time	t_{SDAS}		<10	100	μ S
Signal Detect Deassert Time	t_{SDDA}		<10	350	μ S
Signal Detect Threshold ² Decreasing Light	LSTD	-45.0		-32.5	dBm
Increasing Light	LSTI	-45.0		-32.0	dBm
Signal Detect Hysteresis	HYS	0.5	2.25	3.5	dB
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

1. BER=10⁻¹⁰ @ 125Mbps, PRBS 2⁷-1, NRZ, Compliant with FDDI PMD ISO / IEC 9314-3 and IEEE-802.3u testing with 62.5 MM Fiber

2. RX Data outputs are squelched when Signal Detect is deasserted to prevent garbage data output when no optical signal is present. .

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CONFORMAL COATING OPTION

Parameter	Value
Specification	MIL-I-46058C, Type XY
Coating:	Parylene type C
Deposition:	Vacuum deposited
Film Thickness:	1 MIL +/- 0.0002

PIGTAIL BOND AND BACK-FILL

Parameter	Value
Adhesive Bond Line:	Ablelux AA50T, High viscosity, low shrinkage, low outgas for optics
Backfill Encapsulant:	Ablebond BF-4, Silica based, high shear strength, low moisture, low outgas for optics

LINK DISTANCES

Application	Fiber Specification	Distance
Fast Ethernet - IEEE 802.3u FDDI PMD ISO / IEC 9314-3	62.5/125 - 500MHz*Km	2.0Km
	50/125 - 500MHz*Km	2.0Km

REGULATORY COMPLIANCE

Requirement	Feature	Condition	Notes
MIL-STD-883-3015.7	ESD	Class II	2200V
IEC-801-2	ESD	Human Body Model	25KV
IEC-801-3	EMI	Immunity	10V/M
FCC	EMI	Class B	>20dB
EN 55022 (CISPR 22A)	EMI	Class B	10V/M
IEC-825 Issue 1993-11	Eye Safety	Class 1	TUV Certificate Number PENDING
FDA CDRH 21-CFR 1040	Eye Safety	Class 1	CDRH Accession Number PENDING



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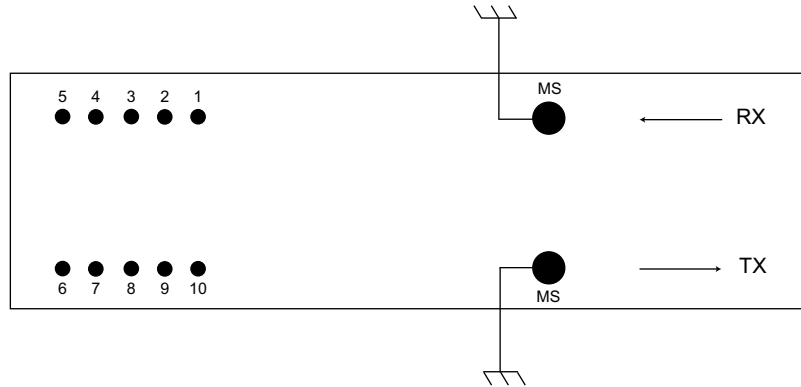
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MILITARY SMALL FORM FACTOR TRANSCEIVER PIN NUMBER ASSIGNMENTS TOP VIEW SHOWN



PIN FUNCTIONS

Pin Number	Symbol	Description	Logic Family
MS	MS	Mounting Studs Connect to chassis ground	N/A
1	VEERX	Receiver Signal Ground	N/A
2	VCCRX	Receiver Power Supply	N/A
3	SD	Signal Detect (1= detect, 0= no signal)	LVTTTL
4	RD-	Receive Data Out -	LVPECL
5	RD+	Receive Data Out +	LVPECL
6	VCCTX	Transmit Power Supply	N/A
7	VEETX	Transmit Signal Ground	N/A
8	N/C	No Connect	N/A
9	TD+	Transmit Data In +	LVPECL
10	TD-	Transmit Data In -	LVPECL

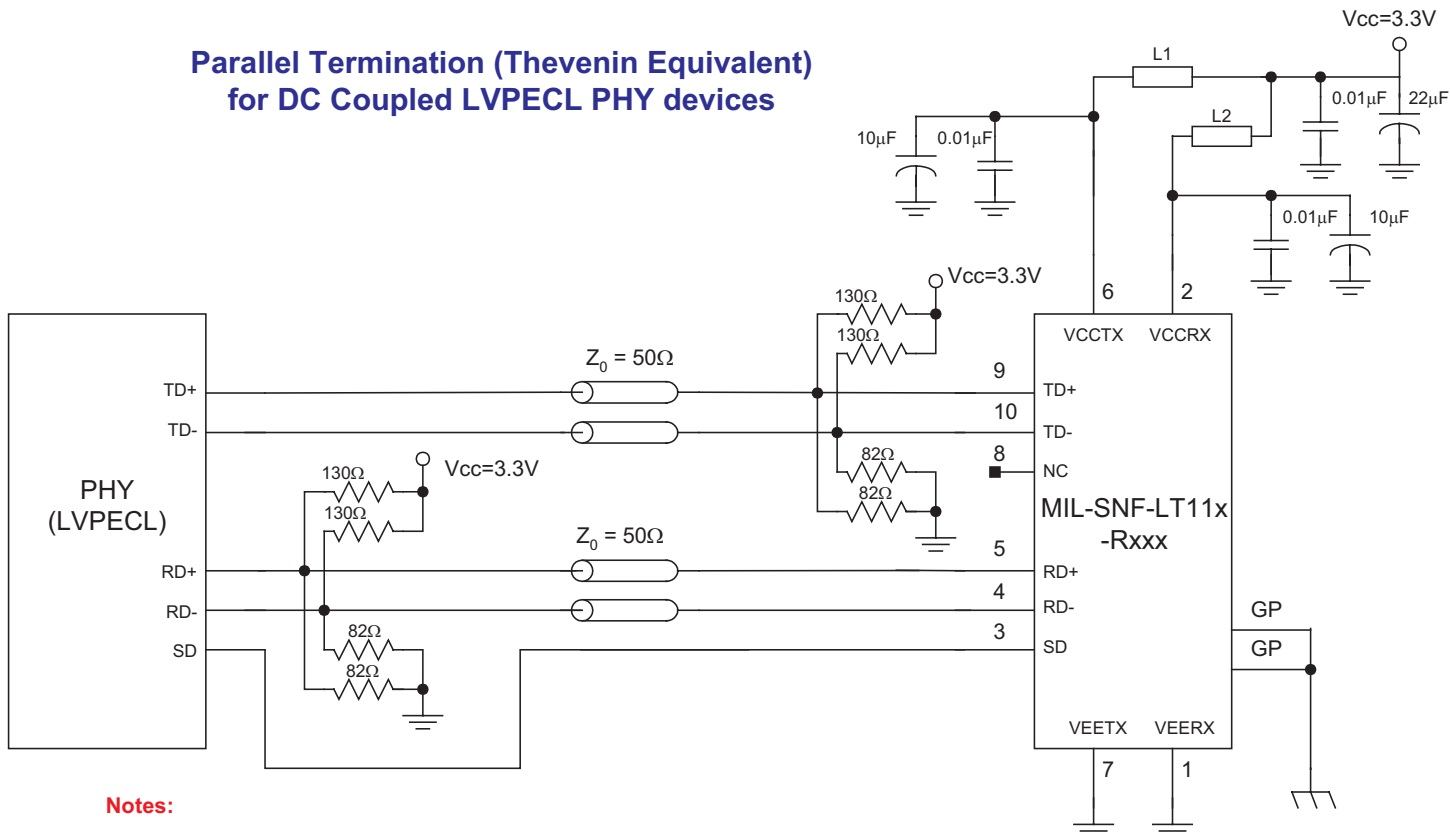
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PRELIMINARY

Parallel Termination (Thevenin Equivalent) for DC Coupled LVPECL PHY devices



Notes:

- 1) L1 and L2 = MuRata BLM21A601S or equivalent (600Ω at 100MHz or better).
- 2) Place LVPECL termination resistors (130 / 82 ohms) as close as possible to termination points.
- 3) Route the differential pairs (TD +/- and RD +/-) together using 50 ohm impedance matched traces.
- 4) Other DC coupled LVPECL termination techniques are also valid.
- 5) Use separate power supply filtering for VCCTX and VCCR, as shown.
- 6) Ground Posts (GP) are isolated from Signal Ground (Vee), and may be connected to Chassis Ground (as shown) or to Signal Ground if a Chassis Ground is not available.

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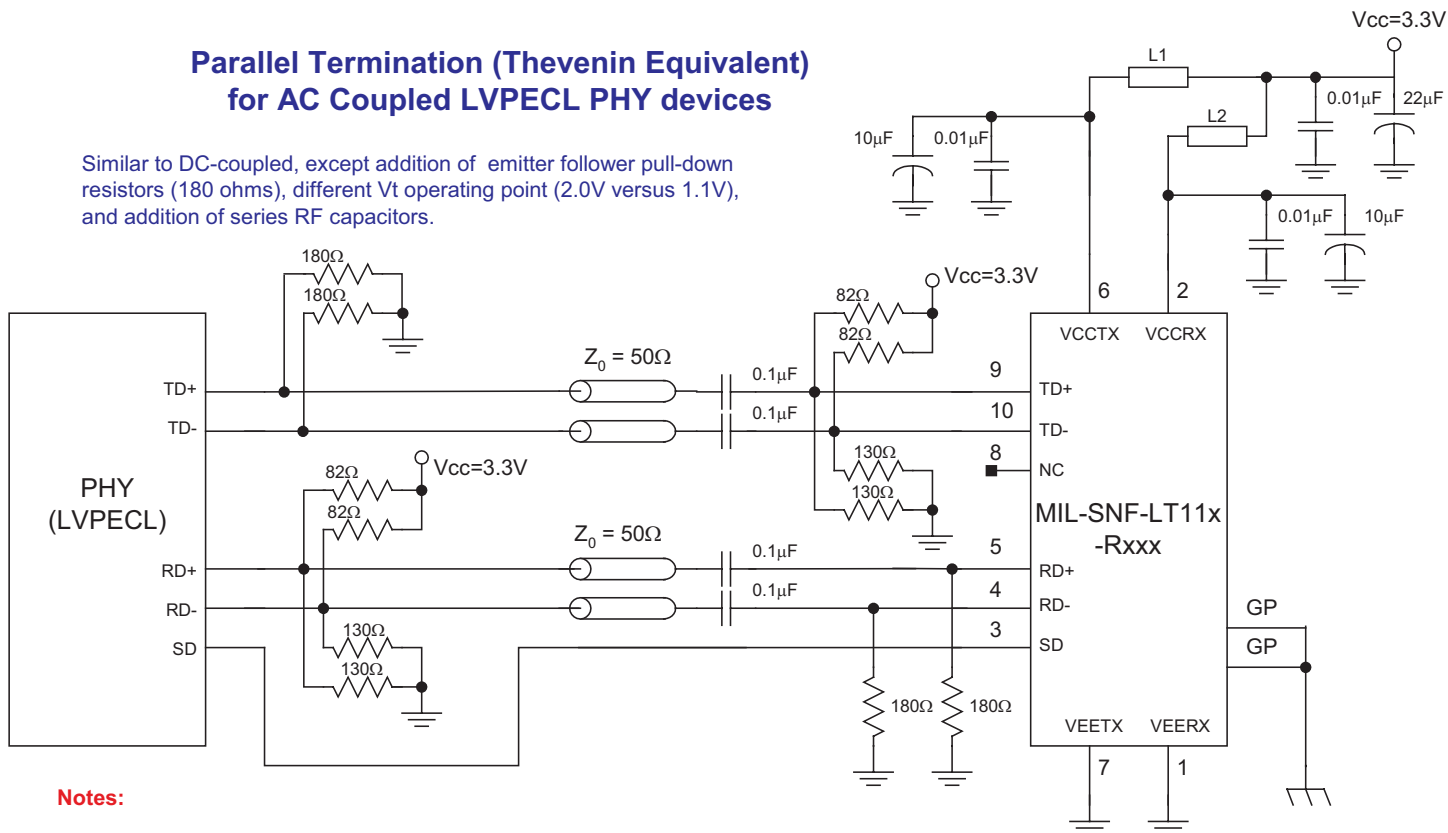
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PRELIMINARY

Parallel Termination (Thevenin Equivalent) for AC Coupled LVPECL PHY devices

Similar to DC-coupled, except addition of emitter follower pull-down resistors (180 ohms), different V_t operating point (2.0V versus 1.1V), and addition of series RF capacitors.



Notes:

- 1) L1 and L2 = MuRata BLM21A601S or equivalent (600 Ω at 100MHz or better).
- 2) Place LVPECL termination resistors (82 / 130 ohms) as close as possible to termination points. Place LVPECL emitter follower pull-down (180 ohms) as close as possible to source points.
- 3) Route the differential pairs (TD +/- and RD +/-) together using 50 ohm impedance matched traces.
- 4) Other AC coupled LVPECL termination techniques are also valid.
- 5) Use separate power supply filtering for VCCTX and VCCR, as shown.
- 6) Ground Posts (GP) are isolated from Signal Ground (Vee), and may be connected to Chassis Ground (as shown) or to Signal Ground if a Chassis Ground is not available.
- 7) Use low ESR capacitors, such as NPO or COG, for AC coupling of TD +/- and RD +/- signals.

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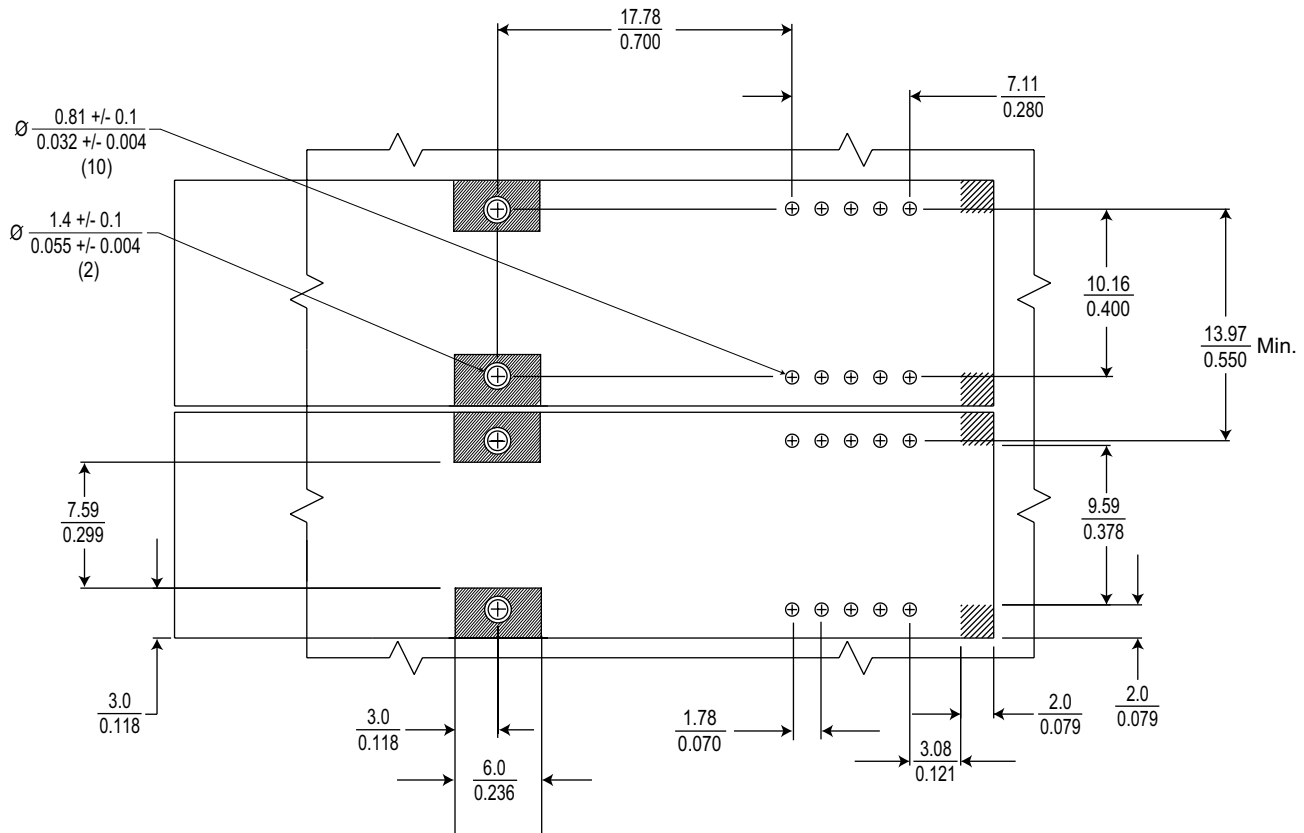
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PRELIMINARY

MSA 2x5 SFF TRANSCEIVER PRINTED CIRCUIT BOARD LAYOUT

Top View Shown

Dimensions Are Shown As: $\frac{\text{mm}}{\text{inches}}$



CROSS-HATCHED AREAS SHOULD HAVE NO SIGNAL TRACES ON THE TOP LAYER

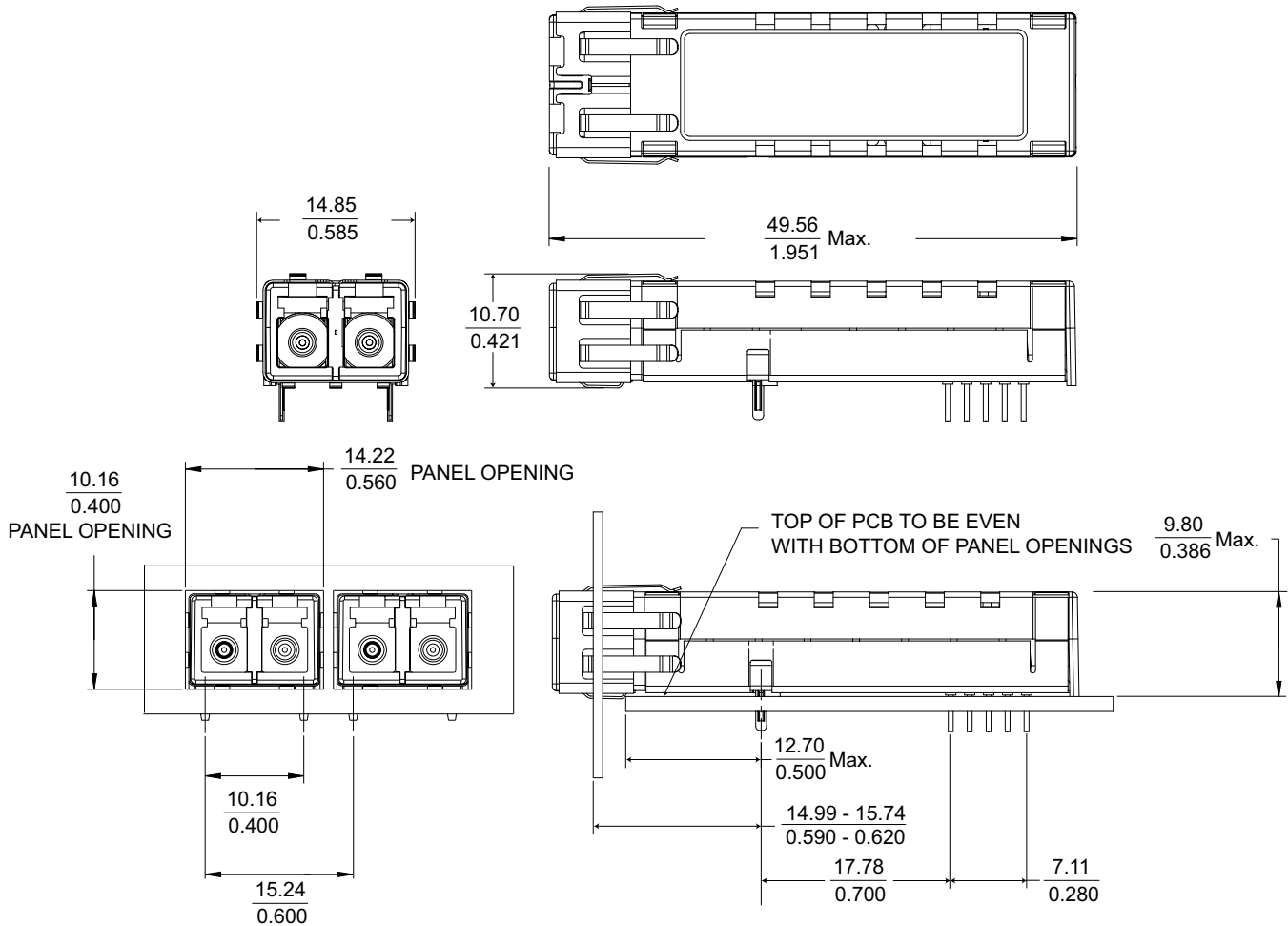
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MSA 2 x 5 OUTLINE DIMENSIONS For 0.600" Center to Center Mounting Dimensions Are Shown As: $\frac{\text{mm}}{\text{inches}}$



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Pigtail Fiber Type and Termination ID Options

Part ID	Fiber Type	Termini / Connectors	Description
A	AX01	M29504/14-4131C	Fiber terminus for 38999 / 28876 / TFOCA shells
B	AX01	LuxCis	Fiber terminus for ARINC and Circular connectors
C	AX01	LC	Industry standard LC
D	AX01	MU	Industry standard MU
E	AX01	SC	Industry standard SC
F	AX01	ST	Industry standard ST
G	AX01	FC	Industry standard FC

Fiber Types:

AX01 = AX01-020F-WLS/900-OFNR (Multimode 62.5 /125 um, 2mm outside diameter)

Pigtail Fiber Length Options

Fiber Length: Specified in Part Number field as a value from 04 to 99
4 inches min to 99 inches max, increments of 1 inch.
Pigtail length accuracy of +/- 0.5 inch or 10% total length, whichever is greater.
Pigtail length as measured from Roughrider body to terminus (does not include body or terminus)

Consult the factory for custom lengths, fiber types, or other terminus options

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