



# 3.3V SFF MTRJ Transceiver for Fibre Channel & 1000Base-SX 850 nm VCSEL for Multimode Fiber

E2O Communications, Inc.

## EMxxx-M3Tz Preliminary Data Sheet



### Features

- 850nm Vertical Cavity Surface Emitting Laser (VCSEL) Source Technology
- Compliant with specifications for IEEE-802.3z Gigabit Ethernet (1000 Base-SX) at 1.25 Gbps
- Compliant with ANSI specifications for Fibre Channel Applications at 1.06 Gbps
- MTRJ Receptacle Compatible with Industry Standard MTRJ Optical Connector
- Compliant with Multi-Source Agreement (MSA) Small Form Factor (SFF) 2x5 Footprint
- Operates with 50  $\mu\text{m}$  and 62.5  $\mu\text{m}$  multimode optical fibers
- Class 1 Laser Safety Compliant
- Single +3.3V Power Supply
- Wave Solderable / Aqueous Washable

### Product Description

The EMxxx-M3 from E2O Communications is a 3.3V Small Form Factor transceiver designed for use with the MTRJ optical connector in Fibre Channel and Gigabit Ethernet applications. The transceiver complies with the industry standard 2x5 footprint and meets the mezzanine height requirement of 9.8 mm. The transmitter consists of

a high-performance 850-nm VCSEL while the receiver consists of a GaAs PIN and a preamplifier.

All EMxxx-M3 transceivers also include a Signal Detect circuit, which provides a TTL logic high output when a usable input optical signal level is detected.

### Electromagnetic Interference (EMI)

Most equipment utilizing high-speed transceivers will be required to meet the following requirements:

- 1) FCC in the United States
- 2) CENELEC EN55022 (CISPR 22) in Europe, and
- 3) VCCI in Japan.

To assist the customer in managing the overall equipment EMI performance, the EMxxx-M3 transceivers have been designed to perform to the specified limits. All transceivers comply with the FCC Class B limits.

### Immunity

The EMxxx-M3 transceiver has been designed to provide good immunity to radio-frequency electromagnetic fields. Key components to achieve the good electromagnetic compliance (EMC) are metal housing and the chassis shield.

### Eye Safety

The EMxxx-M3 850-nm VCSEL-based transceivers have been designed to meet Class 1 eye safety and comply with FDA 21CFR 1040.10 and 1040.11 and the IEC 825-1.

### Ordering Information

EMxxx-M3 T z

- z (Coupling)
  - A = AC
  - F = AC(Tx) / DC(Rx)
- T (Signal Detect)
  - T = TTL
- Signal Rate)
  - 106 = Fibre Channel
  - 125 = Gigabit Ethernet

EB-SFF-z (Evaluation Board)

- z (Coupling)
  - A = AC
  - D/F = AC/DC



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### 850 nm VCSEL for Multimode Fiber

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#### ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNITS	NOTES
Storage Temperature	$T_S$	-40		85	°C	
Soldering Temperature				260	°C	6 sec. on leads only
Supply Voltage	$V_{CC}$			5.0	V	$V_{CC}$ - ground

#### RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNITS	NOTES
Ambient Operating Temperature	$T_A$	0		70	°C	
Supply Voltage	$V_{CC}$	3.1		3.5	V	
Transmitter Differential Input Voltage	$V_D$	0.6		2.4	V	

#### ELECTRICAL CHARACTERISTICS ( $T_A = 0^{\circ}\text{C}$ to $70^{\circ}\text{C}$ , $V_{CC} = 3.15\text{V}$ to $3.45\text{V}$ )

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNITS	NOTES
<b>TRANSMITTER</b>						
Supply Current	$I_{CCT}$		80	100	mA	
<b>RECEIVER</b>						
Supply Current	$I_{CCR}$		100	200	mA	
Data Output Peak-to-Peak Differential Voltage	$V_{O,P-P}$	0.6		0.8	V	
Data Output Rise & Fall Times	$t_r, t_f$			0.25	ns	20-80%
TTL Signal Detect Output – High	$V_{OH, TTL}$	2.0		$V_{CC}$	V	
TTL Signal Detect Output - Low	$V_{OL, TTL}$	0.0		0.5	V	



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**OPTICAL CHARACTERISTICS** ( $T_A = 0^\circ\text{C}$  to  $70^\circ\text{C}$ ,  $V_{CC} = 3.15\text{V}$  to  $3.45\text{V}$ )

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNITS	NOTES
<b>TRANSMITTER</b>						
Output Optical Power 50/125 $\mu\text{m}$ , NA = 0.20 fiber	$P_{OUT}$	-9.5		-4	dBm avg.	
Output Optical Power 62.5/125 $\mu\text{m}$ , NA = 0.275 fiber	$P_{OUT}$	-9.5		-4	dBm avg.	
Optical Extinction Ratio		9			dB	
Center Wavelength	$\lambda_c$	840	850	860	nm	
Spectral Width – rms	$\sigma$			0.85	nm	
Optical Rise/Fall Time	$t_r / t_f$			0.26	ns	20-80%
Optical Modulation Amplitude	OMA	160			$\mu\text{W}$	Pk to Pk Applies to FC
Relative Intensity Noise	RIN		-122	-117	dB/Hz	
Transmitter Optical Contributed Jitter (TOTAL)	TJ			225	ps	
<b>RECEIVER</b>						
Minimum Optical Input Power (Sensitivity)	$P_{IN}$ Min			-17	dBm avg.	
Maximum Optical Input Power (Saturation)	$P_{IN}$ Max	-3			dBm avg.	
Operating Center Wavelength	$\lambda_c$	770		860	nm	
Optical Modulation Amplitude	OMA	31			$\mu\text{W}$	Pk to Pk Applies to FC
Return Loss		12			dB	
Signal Detect – Asserted	$P_A$			-17	dBm avg.	
Signal Detect – Deasserted	$P_D$	-30			dBm avg.	
Signal Detect – Hysteresis	$P_A - P_D$	0.5		5.0	dB	



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Figure 1 – Module mechanical dimensions in mm [inches].

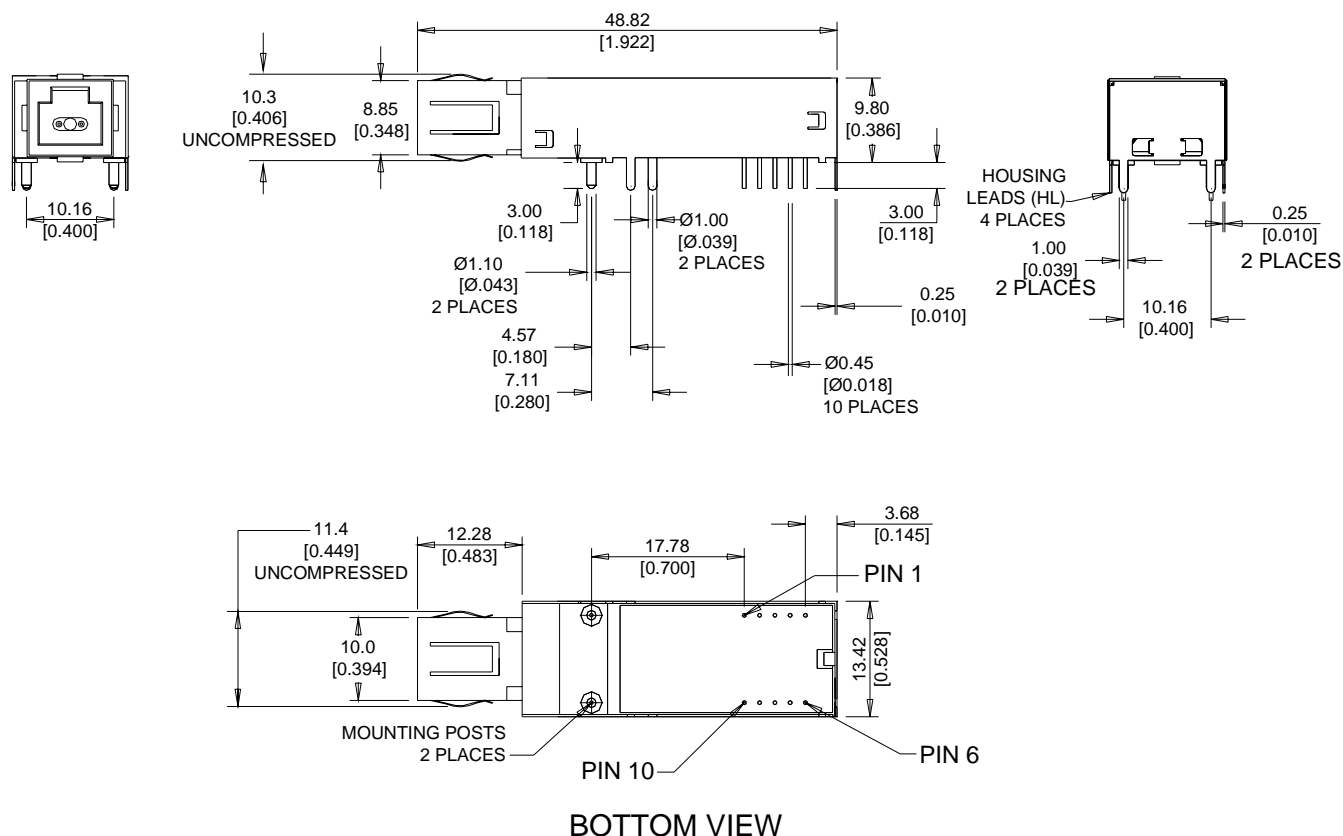


Table 1. Pinout Table (Refer to Figure 1)

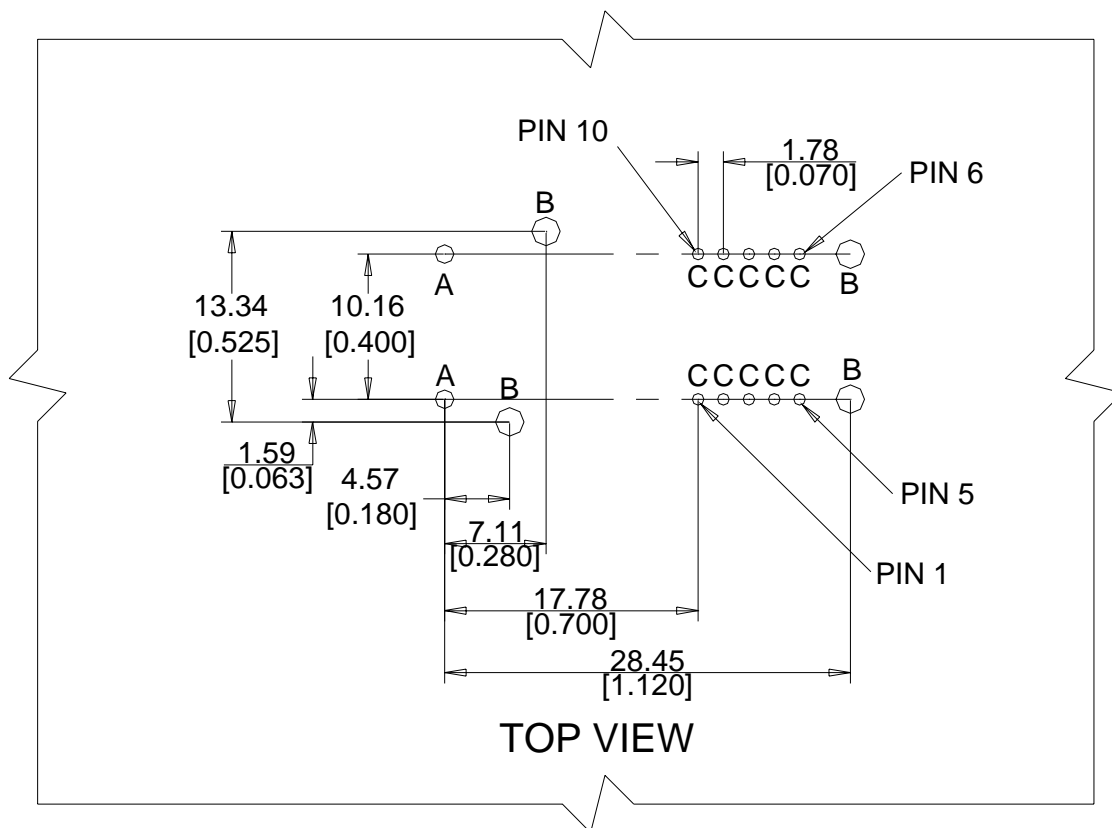
Pin	Symbol	Functional Description
Mounting Posts		The mounting posts are provided for transceiver mechanical attachment to the circuit board. They should not be connected to the circuit ground but can be connected to the chassis ground.
Housing Leads		The housing leads should be connected to circuit ground.
1	V <sub>EER</sub>	Receiver Signal Ground
2	V <sub>CCR</sub>	+3.3 Volt Receiver Power Supply
3	SD	Signal Detect is a TTL output. A high level indicates a valid optical signal.
4	RD-	Receiver Data Inverted Differential Output
5	RD+	Receiver Data Non-inverted Differential Output
6	V <sub>CCT</sub>	+3.3V Transmitter Power Supply
7	V <sub>EET</sub>	Transmitter Signal Ground
8	TXdis	Transmitter Disable
9	TD+	Transmitter Data Non-inverted Differential Input
10	TD-	Transmitter Data Inverted Differential Input



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Figure 2 – Recommended PCB Layout in mm [inches].



### RECOMMENDED HOLE SIZES

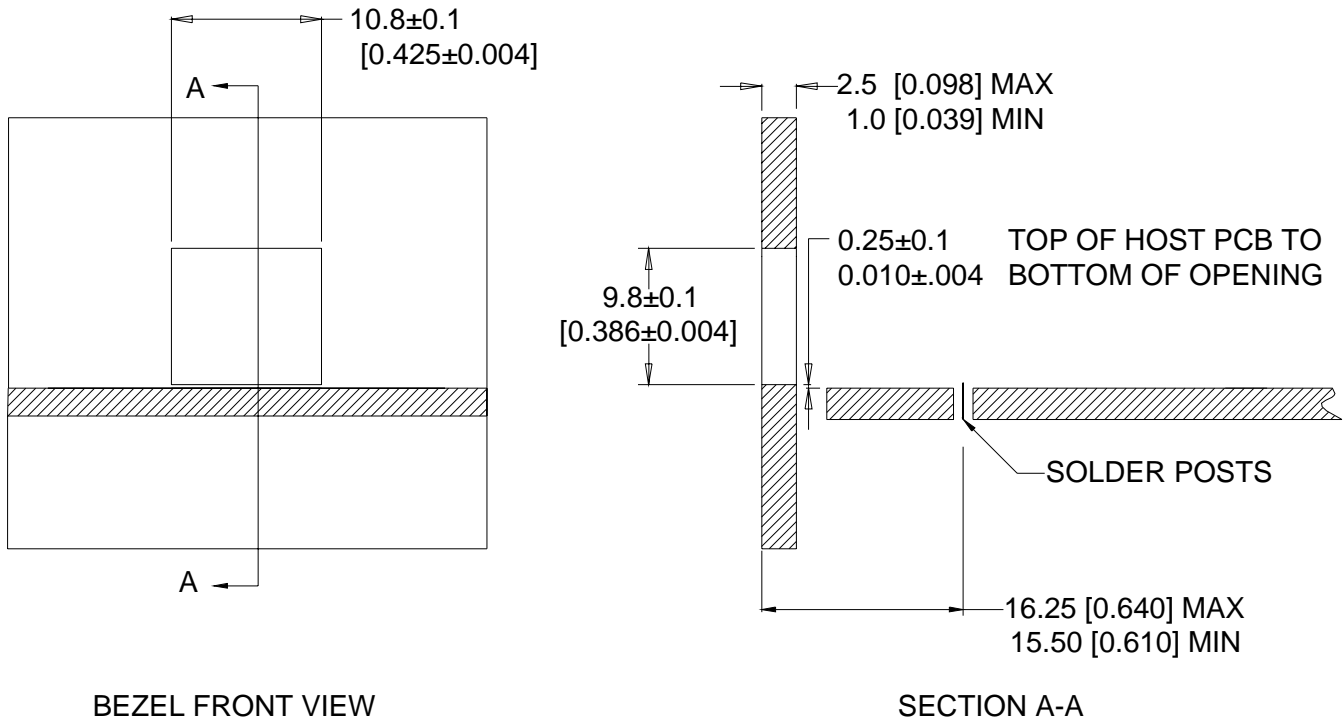
SYMBOL	QTY	DIAMETER(mm)	DIAMETER[inches]
A	2	1.40±0.1	[0.055±0.004]
B	4	1.40±0.1	[0.055±0.004]
C	10	0.81±0.1	[0.032±0.004]



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Figure 3 – Bezel Opening Dimensions. Units are mm [inches].



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