



## 3.3V SFP MTRJ Transceiver for Dual Rate Fibre Channel 850nm VCSEL for Multimode Fiber

E2O Communications, Inc.

### EM212-MP3TA Preliminary Data Sheet



#### Features

- 850nm Vertical Cavity Surface Emitting Laser (VCSEL) Source Technology
- Interoperable with CD laser based transceivers
- 1.06 and 2.125 Gbps Operating Data Rate
- Compliant with ANSI specifications for Fibre Channel Applications at 2.125 Gbps
- Compliant with Small Form-factor Pluggable (SFP) Multi-Source Agreement
- Compatible with Industry Standard RFT Electrical Connector & Cage
- MT-RJ Receptacle Compatible with Industry Standard MT-RJ Optical Connector
- Operates with 50  $\mu$ m and 62.5  $\mu$ m multimode optical fibers
- Class 1 Laser Safety Compliant
- Single +3.3V Power Supply
- Hot Pluggable
- EEPROM with Serial ID Functionality

#### Product Description

The EM212-MP3 from E2O Communications is a hot-pluggable 3.3V Small Form-Factor Pluggable transceiver designed for Dual Rate Fibre Channel applications up to 2.125 Gbps. The EM212-MP3 transceivers provide the MT-RJ optical receptacle that is compatible with the industry standard MT-RJ connector. The transceiver is also compatible with industry standard RFT connector and cage. The transceiver conforms to the Small Form-factor Pluggable (SFP) multi-source agreement (MSA).

Each EM212-MP3 transceiver consists of an optical subassembly housing both the transmitter and the receiver, and an electrical subassembly. All are packaged together with a top metal cover and plastic bottom base. The transmitter consists of a high-performance 850-nm VCSEL and the receiver consists of a GaAs PIN and a pre-amplifier.

A serial EEPROM in the transceiver allows the user to access information. Details of the Serial Identification Protocol will be contained in the SFP Multi-Source Agreement.

All EM212-MP3 transceivers include a Loss-Of-Signal-Detect circuit, which provides a TTL logic high output when an unusable input optical signal level is detected.

#### Electromagnetic Interference (EMI) & Immunity

To assist the customer in managing the overall equipment EMI performance, the EM212-MP3 transceiver is designed to be compatible with the industry-standard RFT cage. The RFT cage is designed to provide protection for EMI emission and EMI susceptibility. All transceivers comply with the FCC Class B limits.

#### Eye Safety

The EM212-MP3 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

EM212-MP3 T A -zz

zz (Actuator)  
MS = MSA Compliant  
MK = Extended Actuator  
MB = Bail Latch  
A (Coupling)  
A = AC  
T (Loss of Signal Detect)  
T = TTL

EB-SFP-A (Evaluation Board)



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### ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNITS	NOTES
Storage Temperature	$T_S$	-40		85	°C	
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		2.0	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	$V_{O,P-P}$	0.5		1.9	V	
Data Output Rise & Fall Times	$t_r, t_f$			0.20	ns	20-80%
Loss Signal Detect Output – High	$V_{oh}$	2.0		$V_{CC}$	V	
Loss Signal Detect Output - Low	$V_{ol}$	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	$P_{\text{OUT}}$	-9.5		-4	dBm avg.	
Output Optical Power 62.5/125 $\mu\text{m}$ , NA = 0.275 fiber	$P_{\text{OUT}}$	-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	$t_r / t_f$			0.15	ns	20-80% note 1.
Optical Modulation Amplitude (1.06 Gbps Data Rate)	OMA	160			$\mu\text{W}$	Pk to Pk
Optical Modulation Amplitude (2.125 Gbps Data Rate)	OMA	196			$\mu\text{W}$	Pk to Pk
Relative Intensity Noise	RIN		-122	-117	dB/Hz	
Transmitter Optical Contributed Jitter (TOTAL)	TJ			150	ps	
<b>RECEIVER</b>						
Minimum Optical Input Power (Sensitivity)	$P_{\text{IN Min}}$			-17	dBm avg.	
Maximum Optical Input Power (Saturation)	$P_{\text{IN Max}}$	0			dBm avg.	
Operating Center Wavelength	$\lambda_c$	770		860	nm	
Optical Modulation Amplitude (1.06 Gbps Data Rate)	OMA	31			$\mu\text{W}$	Pk to Pk
Optical Modulation Amplitude (2.125 Gbps Data Rate)	OMA	49			$\mu\text{W}$	Pk to Pk
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	

Note 1. measured with the 4<sup>th</sup> order BT filter off.



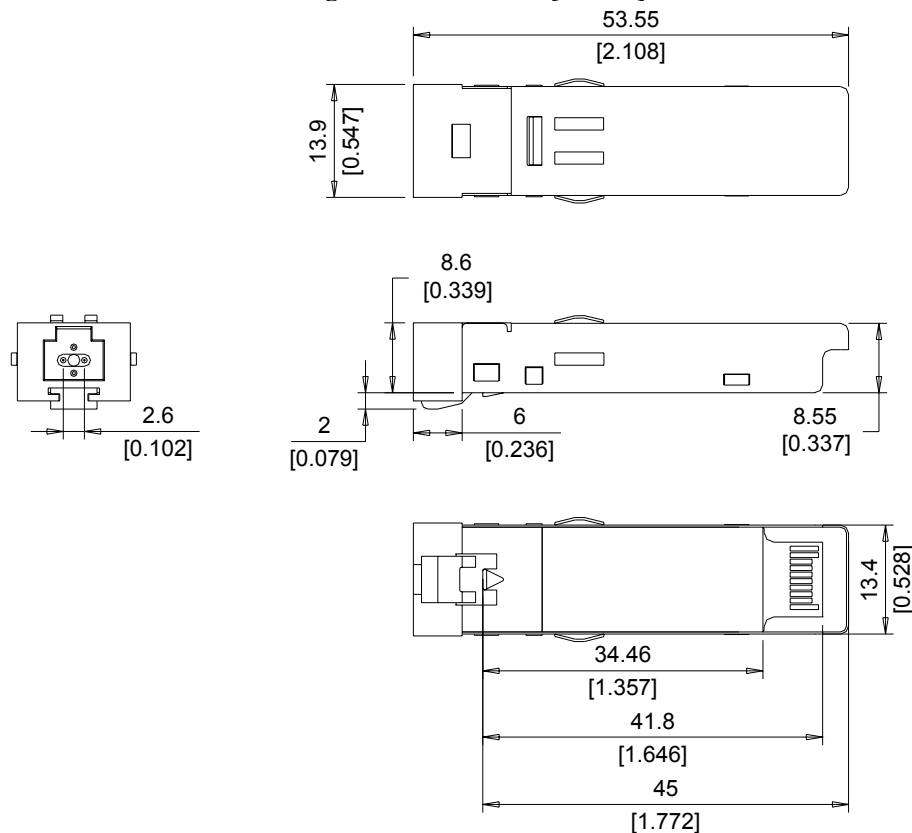
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**Table 1: SFP Pin Definitions**

PIN	SYMBOL	DESCRIPTION OF FUNCTION	PIN	SYMBOL	DESCRIPTION OF FUNCTION
1	VeeT	Transmitter Signal Ground	11	VeeR	Receiver Signal Ground
2	TX Fault	Transmitter Fault Indication	12	RD-	Received Data Inverted Differential Output
3	TX Disable	Transmitter Disable	13	RD+	Received Data Non-Inverted Differential Output
4	MOD-DEF2	Module Definition 2	14	VeeR	Receiver Signal Ground
5	MOD-DEF1	Module Definition 1	15	VccR	+3.3V Receiver Power Supply
6	MOD-DEF0	Module Definition 0	16	VccT	+3.3V Transmitter Power Supply
7	Rate Select	Select between full or reduced receiver bandwidth	17	VeeT	Transmitter Signal Ground
8	LOS	Loss of Signal	18	TD+	Transmitter Data Non-Inverted Differential Input
9	VeeR	Receiver Signal Ground	19	TD-	Transmitter Data Inverted Differential Input
10	VeeR	Receiver Signal Ground	20	VeeT	Transmitter Signal Ground

**Figure 1: SFP Transceiver Package Outline in mm [inches].**



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