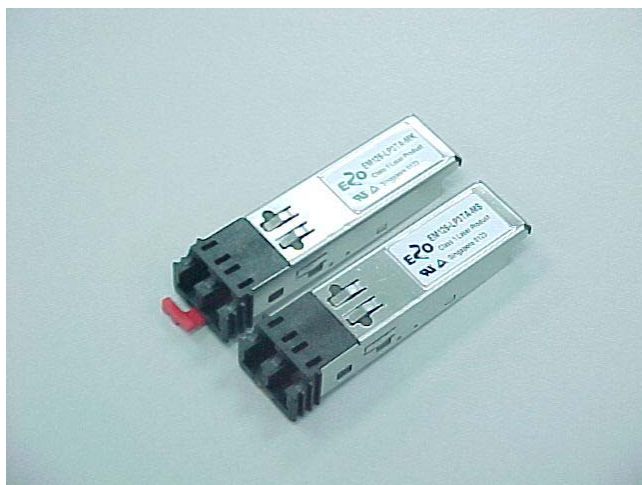




E2O Communications, Inc.

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

### EM212-LP3TA-zz 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
- LC Receptacle Compatible with Industry Standard LC 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-LP3 from E2O Communications is a hot-pluggable 3.3V Small Form-Factor Pluggable transceiver designed for Dual Fibre Channel applications up to 2.125 Gbps. The EM212-LP3 transceivers provide the LC optical receptacle that is compatible with the industry standard LC 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-LP3 transceiver consists of an optical subassembly housing both the transmitter and the receiver, and an electrical subassembly. All are housed within a plastic/metal package. 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-LP3 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

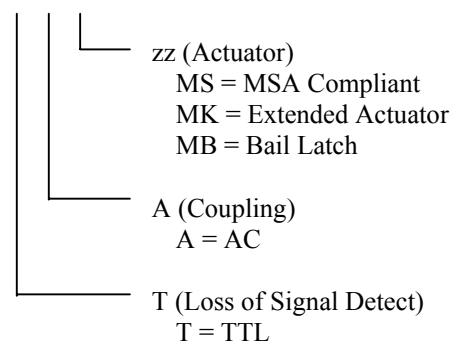
To assist the customer in managing the overall equipment EMI performance, the EM212-LP3 transceiver is designed to be compatible with the industry-standard RFT cage. The RFT cage is designed to provide protection for EMI emission and EMI susceptibility. All transceivers comply with the FCC Class B limits.

#### Eye Safety

The EM212-LP3 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-LP3 T A- zz



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 Of Signal Detect Output – High	$V_{oh}$	2.0		$V_{CC}$	V	
Loss Of Signal Detect Output - Low	$V_{ol}$	0.0		0.5	V	



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

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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	

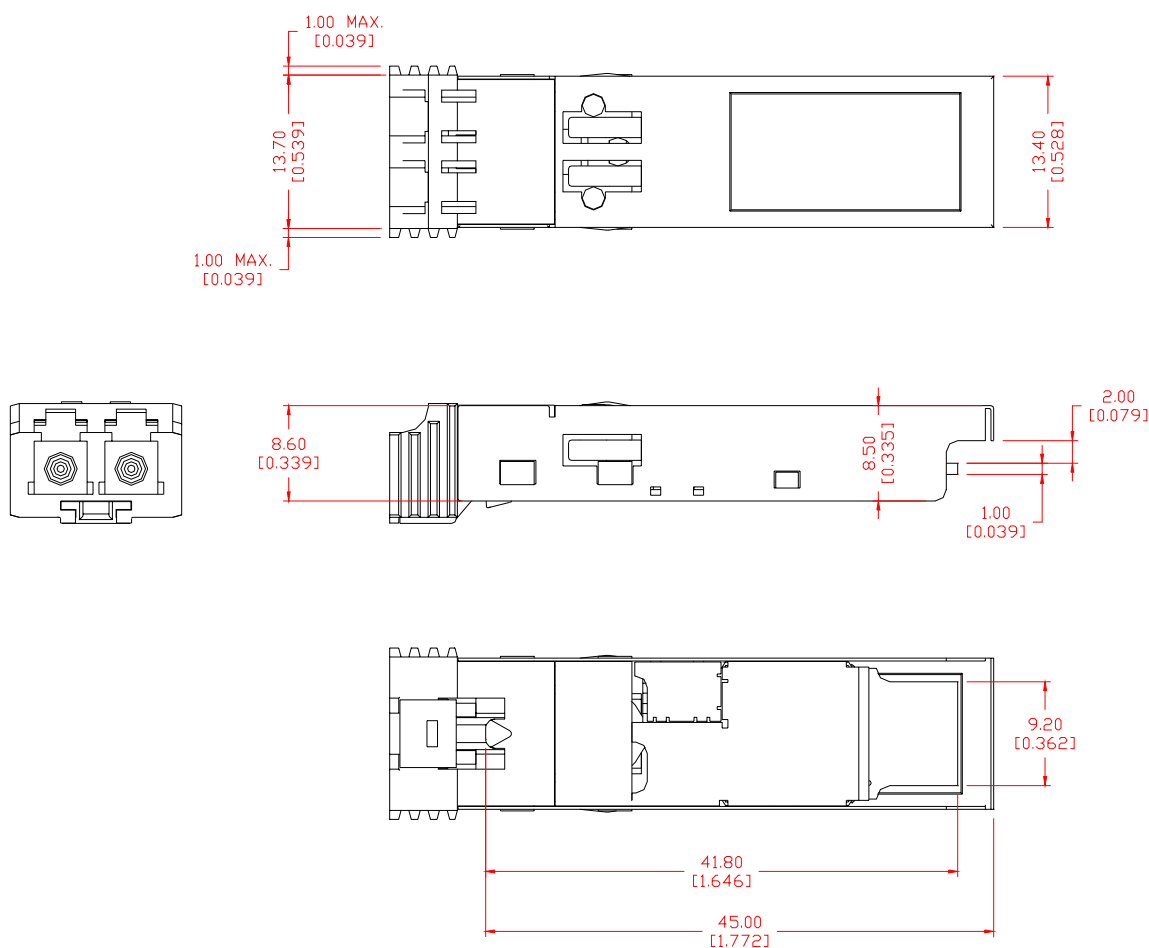
Note 1. measured with the 4<sup>th</sup> order BT filter off.



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

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**Figure 1: SFP Transceiver Package Dimensions  
(-MS Version shown)**

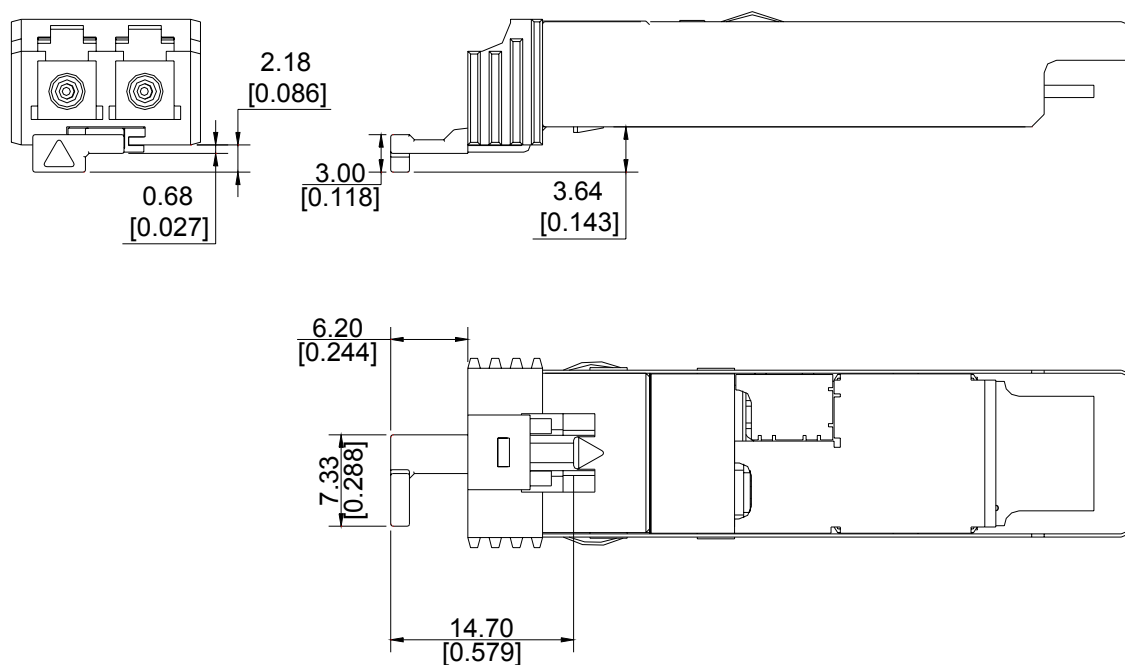




## 3.3V SFP LC Transceiver for Dual Rate Fibre Channel 850nm VCSEL for Multimode Fiber

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Figure 2: -MK Actuator Details ( mm[inches])

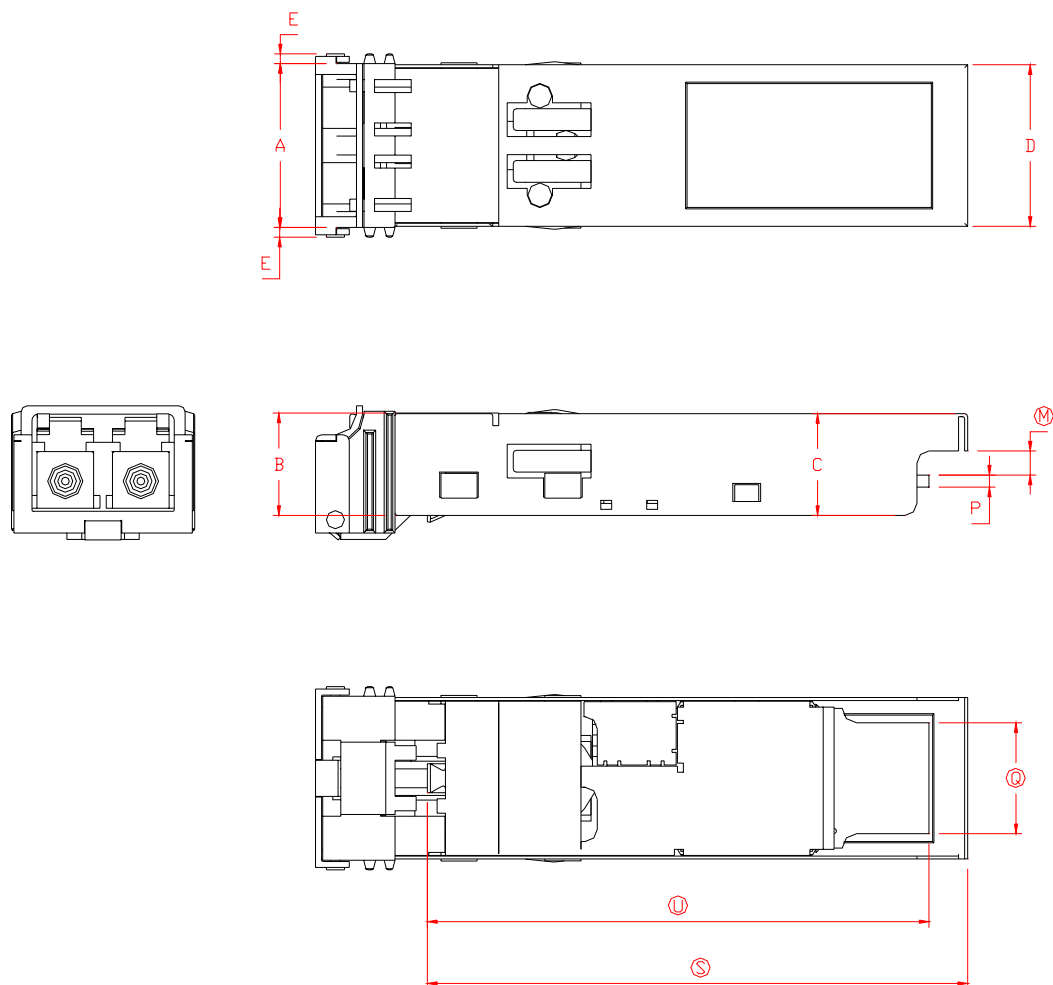




## 3.3V SFP LC Transceiver for Dual Rate Fibre Channel 850nm VCSEL for Multimode Fiber

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**Figure 3: SFP Transceiver Package Dimensions  
(-MB Version shown)**



Refs Des	Key MSA Parameter	Norm. Dim. (mm)	Tolerance	Tool
A	Transceiver Width (Front Section)	13.70	+/-0.10	Caliper
B	Transceiver Height (Front Section)	8.60	+/-0.10	Caliper
C	Transceiver Height (Rear Section)	8.50	+/-0.10	Caliper
D	Transceiver Width (Rear Section)	13.40	+/-0.10	Caliper
E	Extension of Front Sides Outside of Cage	1.00	Max.	ROI
(M)	Gap between PCB & Housing	2.00	+/-0.25	ROI
P	PCB Thickness	1.00	+/-0.10	ROI
(Q)	PCB Width	9.20	+/-0.10	Caliper
(S)	Distance between Latch to Rear of Housing	45.00	+/-0.20	ROI
(U)	Distance between Latch to Tip of PCB	41.80	+/-0.15	ROI

NOTE : Only circled alphabets are being measured.



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

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