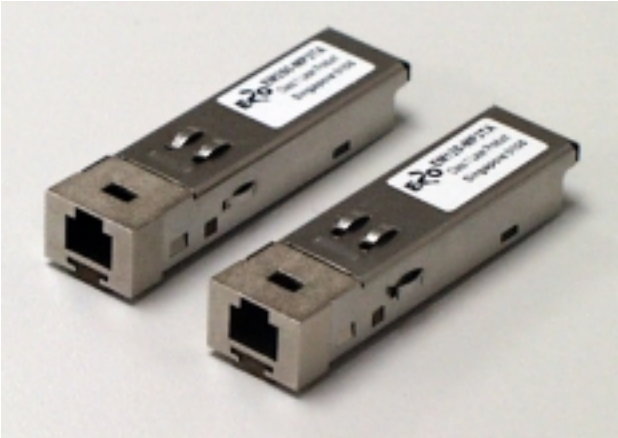
3.3V SFP MTRJ Transceiver for InfiniBand™
850nm VCSEL for Multimode Fiber

E2O Communications, Inc.

EM250-MP3TA
Preliminary Data Sheet



Features

- **850nm Vertical Cavity Surface Emitting Laser (VCSEL) Source Technology**
- **Compliant with InfiniBand Architecture (IBA) IB-1X-SX at 2.5 Gbps**
- **Compliant with specifications for IEEE-802.3z Gigabit Ethernet (1000Base-SX) at 1.25 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 µm and 62.5 µm multimode optical fibers**
- **Class 1 Laser Safety Compliant**
- **Single +3.3V Power Supply**
- **Hot Pluggable**
- **EEPROM with Serial ID Functionality**

Product Description

The EM250-MP3 from E2O Communications is a hot-pluggable 3.3V Small Form-Factor Pluggable transceiver designed for use in InfiniBand applications. The EM250-MP3 transceivers use 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 EM250-MP3 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 EM250-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 EM250-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 EM250-MP3 850-nm VCSEL-based transceivers have been designed to meet Class 1 eye safety and comply with FDA 21CFR 1040.10 and 1040.11and the IEC 825-1.

Ordering Information

EM250-MP3 T A

- A (Coupling)
  - A = AC
- T (Loss of Signal Detect)
  - T = TTL

EB-SFP-A (Evaluation Board)

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNITS	NOTES
Storage Temperature	T_S	-40		85	°C	
Supply Voltage	V_{CC}			5.0	V	Vcc – 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°C to 70°C, V_{CC} = 3.15V to 3.45V)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNITS	NOTES
TRANSMITTER						
Supply Current	I_{CCT}		80	100	mA	
RECEIVER						
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			0.15	ns	20-80%
Loss Signal Detect Output – High	Voh	2.0		Vcc	V	
Loss Signal Detect Output - Low	Vol	0.0		0.5	V	

OPTICAL CHARACTERISTICS (T_A = 0°C to 70°C, V_{CC} = 3.15V to 3.45V)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNITS	NOTES
TRANSMITTER						
Output Optical Power 50/125 µm, NA = 0.20 fiber	P_{OUT}	-9.5		-4	dBm avg.	
Output Optical Power 62.5/125 µm, NA = 0.275 fiber	P_{OUT}	-9.5		-4	dBm avg.	
Optical Extinction Ratio		9			dB	
Center Wavelength	λ_C	840	850	860	nm	
Spectral Width – rms	σ			0.85	nm	
Optical Rise/Fall Time	t_r / t_f			0.15	ns	20-80% note 1.
Optical Modulation Amplitude	OMA	196			µW	Pk to Pk Applies to FC
Relative Intensity Noise	RIN		-122	-117	dB/Hz	
Transmitter Optical Contributed Jitter (TOTAL)	TJ			150	ps	
RECEIVER						
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	λ_c	770		860	nm	
Optical Modulation Amplitude	OMA	50			µW	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	

Note 1. measured with the 4th order BT filter off.

Table 1: SFP Pin Definitions

PIN	SYMBOL	DESCRIPTION OF FUNCTION	IN	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].