

# SFP-M 1.25 Gigabit Ethernet-Multimode Transceiver

SFP, Duplex LC Connector, 850nm VCSEL for Multimode Fiber, RoHS Compliant



## Features

- 850nm VCSEL
- Data Rate: 1.25Gbps, NRZ
- Single +3.3V Power Supply
- RoHS Compliant and Lead-free
- AC/AC Differential Electrical Interface
- Compliant with Multi-Source Agreement (MSA) Small Form Factor Pluggable (SFP)
- Duplex LC Connector
- Compliance with specifications for IEEE-802.3z Gigabit Ethernet at 1.25 Gbps
- Compliance with ANSI specifications for Fiber Channel applications at 1.06 Gbps
- Eye Safety  
Designed to meet Laser Class 1, complies with EN60825-1



## Applications

- Gigabit Ethernet Links
- Fiber Channel Links at 1.06 Gbps
- High Speed Backplane Interconnects
- Switched Backbones

## Description

The SFP-M from AAXEON is the high performance and cost-effective module for serial optical data communication applications specified for multimode of 1.25 Gb/s. It operates on +3.3V power. The module is intended for multimode fiber, operates at a nominal wavelength of 850nm, and complies with Multi-Source Agreement (MSA) Small Form Factor Pluggable (SFP). Each module consists of a transmitter optical subassembly, a receiver optical subassembly, and an electrical subassembly. All are housed in a metal package and the combination produces a reliable component.

The module is a duplex LC connector transceiver designed for use in Gigabit Ethernet applications and to provide IEEE-802.3z compliant link for 1.25Gb/s short reach applications. The characteristics are performed in accordance with Telcordia Specification GR-468-CORE.

## EMC

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

To assist the customer in managing the overall equipment EMC performance, the transceivers have been designed to satisfy FCC class B limits and provide good immunity to radio-frequency electromagnetic fields.

## Eye Safety

The transceivers have been designed to meet Class 1 eye safety and comply with EN 60825-1.

# SFP-M 1.25 Gigabit Ethernet-Multimode Transceiver

## Product Information

Model Number	Operating Voltage & SD Output	Wavelength	Output Power	Sensitivity	Distance
SFP-M	3.3V TTL AC/AC	850 nm	-9.5 ~ -4 dBm	≤-17 dBm	$\frac{550 \text{ m}(50/125\mu\text{m})}{275 \text{ m}(62.5/125\mu\text{m})}$

## ABSOLUTE MAX RATINGS

PARAMETER	SYMBOL	MIN	MAX	UNIT	NOTE
Storage Temperature	$T_S$	-40	85	°C	
Supply Voltage	$V_{CC}$	0	6	V	
Supply Current	$I_S$		240	mA	

## OPERATING CONDITIONS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
Case Operating Temperature	$T_A$	0		70	°C	
Supply Voltage	$V_{CC}$	3.1		3.5	V	
Data Input Voltage Swing	$V_{ID}$	400		1660	mV	

## ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN	MAX	UNIT	NOTE
<b>Transmitter</b>					
Transmitter Supply Current	$I_{CCT}$		140	mA	
Tx_Disable Input Voltage - Low	$V_{IL}$	0	0.8	V	
Tx_Disable Input Voltage - High	$V_{IH}$	2.0	$V_{CC}$	V	
Tx_Fault Output Voltage - Low	$V_{OL}$	0	0.8	V	
Tx_Fault Output Voltage - High	$V_{OH}$	2.0	$V_{CC}$	V	
<b>Receiver</b>					
Receiver Supply Current	$I_{CCR}$		100	mA	
Receiver Data Output Differential Voltage	$V_{OD}$	0.4	1.3	V	
Rx_LOS Output Voltage - Low	$V_{OL}$	0	0.8	V	
Rx_LOS Output Voltage - High	$V_{OH}$	2.0	$V_{CC}$	V	
MOD_DEF (1) , MOD_DEF (2) - Low	$V_{IL}$	-0.6	$V_{CC} \times 0.3$	V	
MOD_DEF (1) , MOD_DEF (2) - High	$V_{IH}$	$V_{CC} \times 0.7$	$V_{CC} + 0.5$	V	

## TRANSMITTER ELECTRO-OPTICAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNIT	NOTE
Optical Output Power	$P_o$	-9.5		-4	dBm	1
Extinction Ratio	ER	9			dB	
Center Wavelength	$\lambda_c$	830	850	860	nm	
Spectral Width (RMS)	$\Delta\lambda$			0.85	nm	
RIN	RIN			-117	dB/Hz	
Coupled Power Ratio	CPR	9			dB	2
Optical Rise time (20%-80% )	$t_r$			260	ps	3
Optical Fall time (20%-80% )	$t_f$			260	ps	3
Output Eye		Compliant with IEEE802.3z/D5.0				

# SFP-M 1.25 Gigabit Ethernet-Multimode Transceiver

## RECEIVER ELECTRO-OPTICAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNIT	NOTE
Maximum Input Optical Power	$P_{max}$	-3			dBm	4
Minimum Input Optical Power	$P_{min}$			-17	dBm	4
Operating Wavelength	$\lambda$	770		860	nm	
Optical Return Loss	ORL	12			dB	
Receiver Electrical 3dB Upper Cutoff Frequency	---			1500	MHz	
LOS of Signal - Asserted	$P_A$	-30			dBm	
LOS of Signal - Deasserted	$P_D$			-17	dBm	
Loss of Signal -Hysterisis	$P_D - P_A$	0.5			dB	

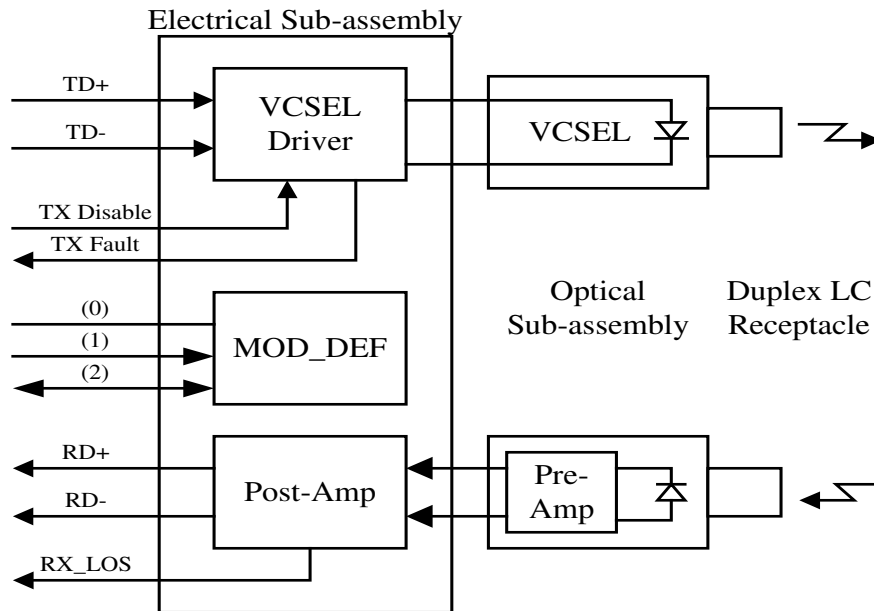
### Notes:

1. Measured average power coupled into 62.5/125 $\mu$ m, 0.275 NA or 50/125 $\mu$ m, 0.2 NA graded index multimode Fiber.
2. CPR is measured in accordance with EIA/TIA-526-14A as referenced in IEEE 802.3 section 38.6.10.
3. These are 20-80% values.
4. Measured with  $2^7-1$  PRBS at BER <  $10^{-12}$

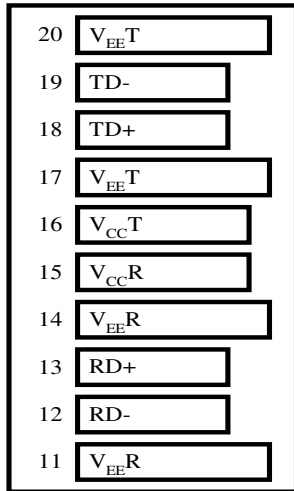
## TIMING CHARACTERISTICS

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNIT	NOTE
TX_DISABLE Assert Time	$t_{off}$			10	$\mu$ s	
TX_DISABLE Negate Time	$t_{on}$			1	ms	
Time to initialize, include reset of TX_FAULT	$t_{init}$			300	ms	
TX_FAULT from fault to assertion	$t_{fault}$			100	$\mu$ s	
TX_DISABLE time to start reset	$t_{reset}$	10			$\mu$ s	
Receiver Loss of Signal Assert Time (off to on)	$t_{A,RX\_LOS}$			100	$\mu$ s	
Receiver Loss of Signal Assert Time (on to off)	$t_{D,RX\_LOS}$			100	$\mu$ s	

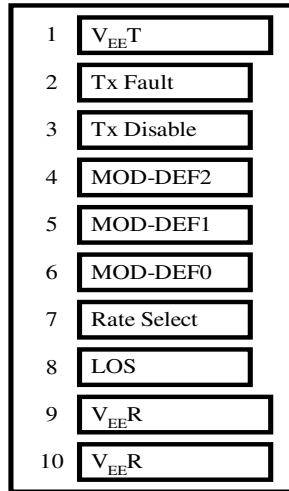
**BLOCK DIAGRAM OF TRANSCEIVER**



## PIN OUT DIAGRAM OF TRANSCEIVER



Top of Board

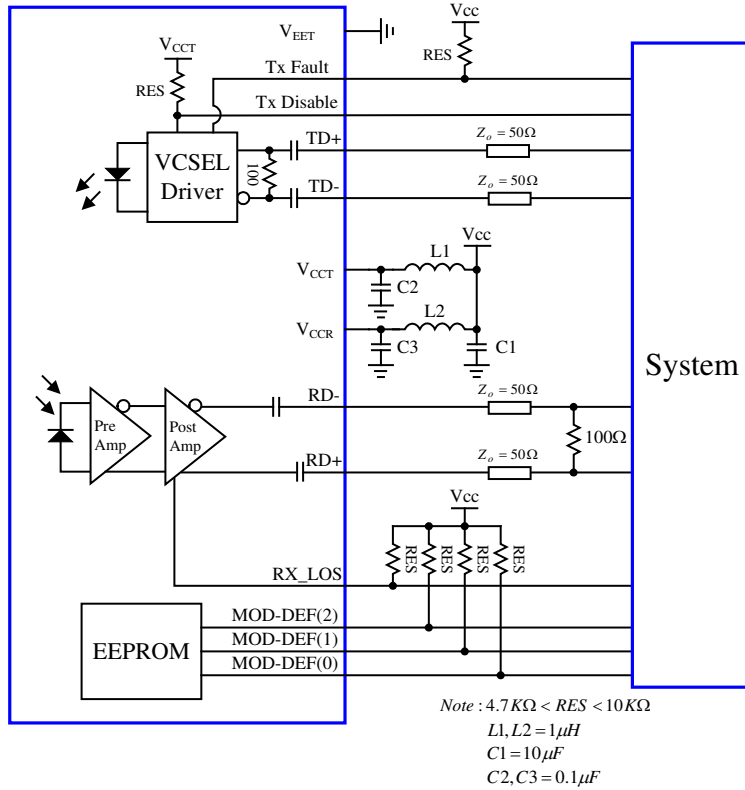


Bottom of Board (As Viewed through Top of Board)

## PIN OUT TABLE

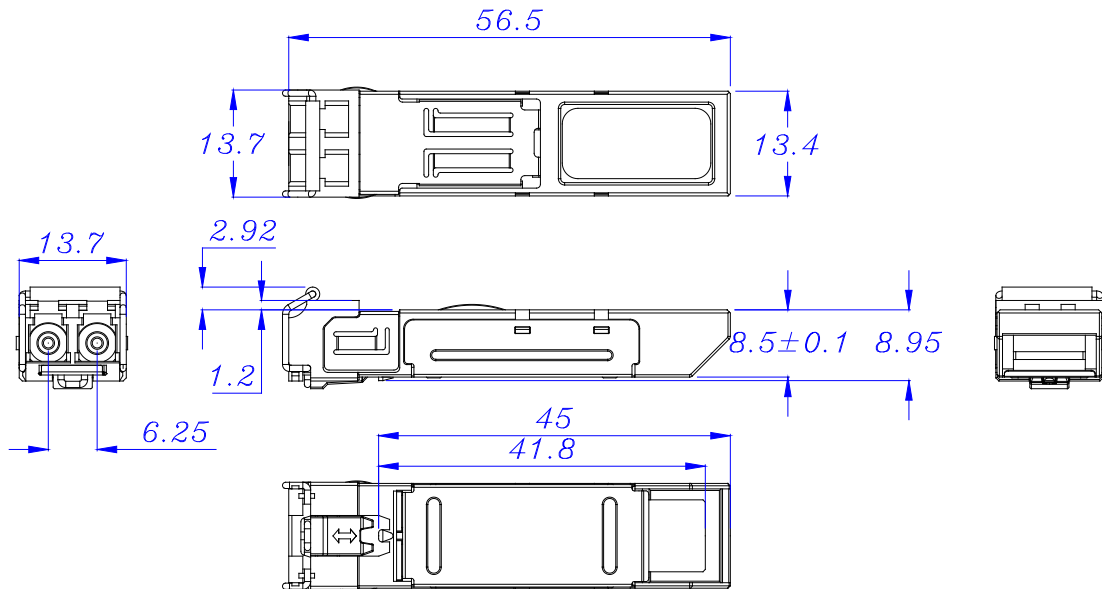
Pin	Symbol	Functional Description
1	VeeT	Transmitter Ground
2	TX Fault	Transmitter Fault Indication
3	TX Disable	Transmitter Disable – Module disables on high or open
4	MOD-DEF(2)	Module Definition 2 – Two wire serial ID interface
5	MOD-DEF(1)	Module Definition 1 – Two wire serial ID interface
6	MOD-DEF(0)	Module Definition 0 – Grounded in module
7	Rate Select	Not Connected
8	LOS	Loss of Signal
9	VeeR	Receiver Ground
10	VeeR	Receiver Ground
11	VeeR	Receiver Ground
12	RD-	Inverse Received Data Out
13	RD+	Received Data Out
14	VeeR	Receiver Ground
15	VccR	Receiver Power
16	VccT	Transmitter Power
17	VeeT	Transmitter Ground
18	TD+	Transmitter Data In
19	TD-	Inverse Transmitter Data In
20	VeeT	Transmitter Ground

## RECOMMENDED CIRCUIT SCHEMATIC



## MECHANICAL DIMENSIONS

Units in mm



All dimensions are  $\pm 0.2\text{mm}$  unless otherwise specified.