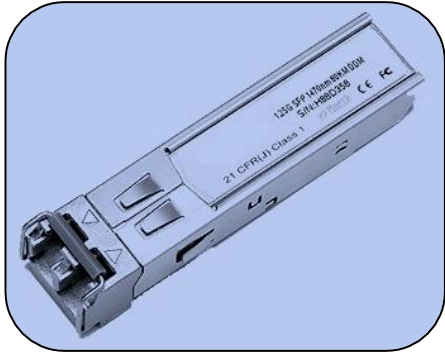




XSM851-M5Lx

1.25Gbps SFP Optical Transceiver, 550m Reach

XSM851-M5Lx 1.25Gbps SFP, 550 m Reach



Product Highlights

- Data-rate of 1.25Gbps operation
- 850nm VCSEL laser and PIN photodetector
- Compliant with SFP MSA and SFF-8472 with duplex LC receptacle
- Digital Diagnostic Monitoring: Internal Calibration or External Calibration
- 500m transmission with 50/125µm MMF
- 300m transmission with 62.5/125µm MMF
- Compatible with RoHS
- +3.3V single power supply
- Operating case temperature:
 - Standard : 0 to +70°C
 - Extended: -20 to +85°C
 - Industrial : -40 to +85°C

Applications

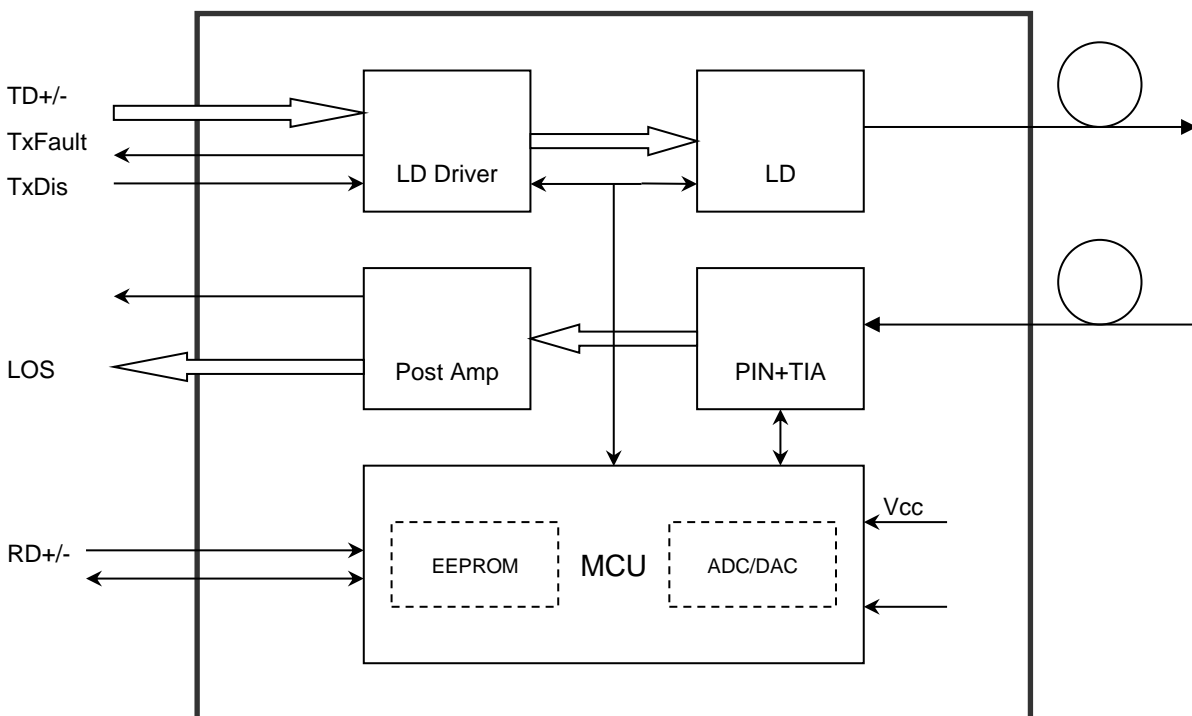
- Gigabit Ethernet
- Fiber Channel
- Switch to Switch interface
- Switched backplane applications
- Router/Server interface
- Other optical transmission systems

Description

The SFP transceivers are high performance, cost effective modules supporting data-rate of 1.25Gbps and 550m transmission distance with MMF.

The transceiver consists of three sections: a VCSEL laser transmitter, a PIN photodiode integrated with a trans-impedance preamplifier (TIA) and MCU control unit. All modules satisfy class I laser safety requirements.

The transceivers are compatible with SFP Multi-Source Agreement (MSA) and SFF-8472. For further information, please refer to SFP MSA.



Absolute Maximum Ratings

Parameters	Symbol	Min.	Max.	Unit
Power Supply Voltage	V _{CC}	-0.5	4.5	V
Storage Temperature	T _{st}	-40	85	°C
Operating Humidity		5	85	%

Table 1 - Absolute Maximum Ratings

Recommended Operating Environment

Parameters	Symbol	Min.	Typical	Max.	Unit
Power Supply Voltage	V _{CC}	3.13	3.3	3.47	V
Power Supply Current	I _{CC}			300	mA
Operating Case temperature - Std	T _c	0		70	°C
Operating Case temperature - Ext	T _c	-20		85	°C
Operating Case temperature - Ind	T _c	-40		85	°C
Data Rate			1.25		Gbps

Table 2 - Recommended Operating Conditions

Optical and Electrical Characteristics

XSM851-M5Lx: (VCSEL and PIN, 500m Reach)

Parameters	Symbol	Min.	Typical	Max.	Unit	Notes
Transmitter						
Center Wavelength	λ_c	830	850	860	nm	
Spectral Width (RMS)	$\Delta\lambda$			0.85	nm	
Average Output Power	P _{out}	-9.5		-3.5	dBm	1
Extinction Ratio	ER	9			dB	
Optical Rise/Fall Time (20%~80%)	t _r /t _f			0.26	ns	
Data Input Swing Differential	V _{IN}	400		1800	mV	2
Input Differential Impedance	Z _{IN}	90	100	110	Ω	
TX Disable	Enable	2.0		V _{CC}	V	V
	Disable	0		0.8	V	V
TX Fault	Fault	2.0		V _{CC}	V	V
	Normal	0		0.8	V	V

Parameters	Symbol	Min.	Typical	Max.	Unit	Notes
Receiver						
Centre Wavelength	λ_c	770		860	nm	
Receiver Sensitivity				-18	dBm	3
Receiver Overload		0			dBm	3
LOS De-Assert	LOS _D			-18	dBm	
LOS Assert	LOS _A	-30			dBm	
LOS Hysteresis		1		4	dB	
Data Output Swing Differential	V _{out}	370		1800	mV	4
LOS	Enable	High	2.0		V _{cc}	V
	Disable	Low			0.8	V

Notes:

1. The optical power is launched into SMF.
2. PECL input, internally AC-coupled and terminated.
3. Measured with a PRBS 2⁷-1 test pattern @1250Mbps, BER ≤1×10⁻¹².
4. Internally AC-coupled.

Table 3 - Optical and Electrical Characteristics**Timing and Electrical**

Parameters	Symbol	Min.	Typical	Max.	Unit
Tx Disable Negate Time	t _{on}			1	ms
Tx Disable Assert Time	t _{off}			10	μs
Time To Initialize, including Reset of Tx Fault	t _{init}			300	ms
Tx Fault Assert Time	t _{fault}			100	μs
Tx Disable To Reset	t _{reset}	10			μs
LOS Assert Time	t _{loss_on}			100	μs
LOS De-assert Time	t _{loss_off}			100	μs
Serial ID Clock Rate	f _{serial_clock}			400	KHz
MOD_DEF (0:2)-High	VH	2		V _{cc}	V
MOD_DEF (0:2)-Low	VL			0.8	V

Table 4 - Timing and Electrical

Diagnostics

Parameters	Range	Unit	Accuracy	Calibration
Temperature	0 to +70	°C	±3°C	Internal / External
	-40 to +85			
Voltage	3.0 to 3.6	V	±3%	Internal / External
Bias Current	0 to 100	mA	±10%	Internal / External
TX Power	-9.5 to -3.5	dBm	±3dB	Internal / External
RX Power	-18 to -3	dBm	±3dB	Internal / External

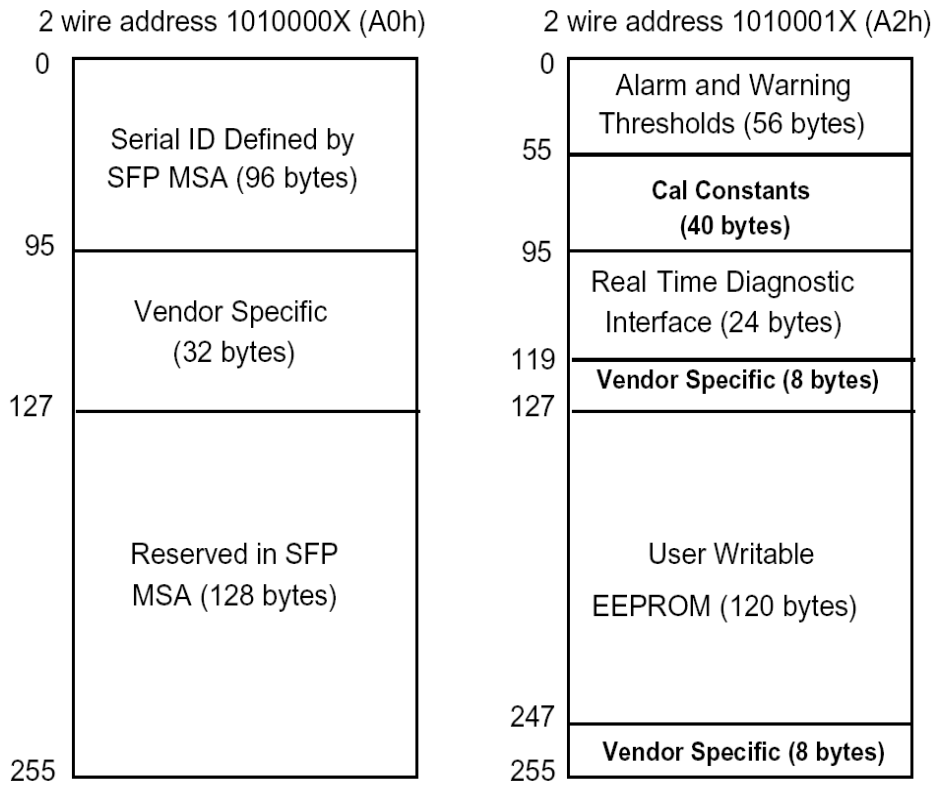
Table 5 – Diagnostics Specification

Digital Diagnostic Memory Map

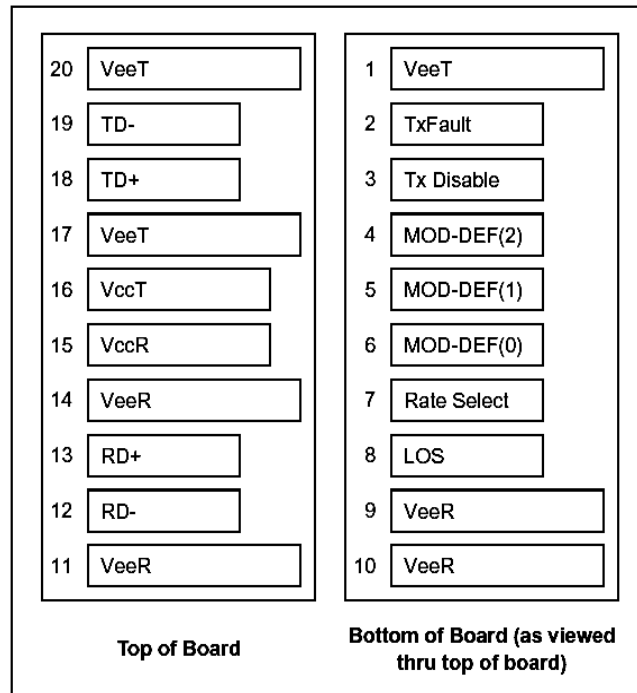
The transceivers provide serial ID memory contents and diagnostic information about the present operating conditions by the 2-wire serial interface (SCL, SDA).

The diagnostic information with internal calibration or external calibration all are implemented, including received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring.

The digital diagnostic memory map specific data field defines as following.



Pin Definition Diagram



PIN description

Pin	Symbol	Name/Description	Plug Seq.	Note
1	VEET	Transmitter Ground	1	
2	TX_Fault	Transmitter Fault Indication	3	Note 1
3	TX_Disable	Transmitter Disable	3	Note 2
4	MOD_DEF(2)	SDA Serial Data Signal	3	Note 3
5	MOD_DEF(1)	SCL Serial Clock Signal	3	Note 3
6	MOD_DEF(0)	TTL Low	3	Note 3
7	Rate Select	Not Connected	3	
8	LOS	Loss of Signal	3	Note 4
9	VEER	Receiver ground	1	
10	VEER	Receiver ground	1	
11	VEER	Receiver ground	1	
12	RD-	Inv. Received Data Out	3	Note 5
13	RD+	Received Data Out	3	Note 5
14	VEER	Receiver ground	1	
15	VCCR	Receiver Power Supply	2	
16	VCCT	Transmitter Power Supply	2	
17	VEET	Transmitter Ground	1	
18	TD+	Transmit Data In	3	Note 6
19	TD-	Inv. Transmit Data In	3	Note 6
20	VEET	Transmitter Ground	1	

Notes:

Plug Seq.: Pin engagement sequence during hot plugging.

1) TX Fault is an open collector output, which should be pulled up with a $4.7k\sim 10k\Omega$ resistor on the host board to a voltage between 2.0V and $V_{cc}+0.3V$. Logic 0 indicates normal operation; Logic 1 indicates a laser fault of some kind. In the low state, the output will be pulled to less than 0.8V.

2) TX Disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a $4.7k\sim 10k\Omega$ resistor. Its states are:

Low (0 to 0.8V): Transmitter on

(>0.8V, < 2.0V): Undefined

High (2.0 to 3.465V): Transmitter Disabled

Open: Transmitter Disabled

3) Mod-Def 0,1,2. These are the module definition pins. They should be pulled up with a $4.7k\sim 10k\Omega$ resistor on the host board. The pull-up voltage shall be V_{ccT} or V_{ccR} .

Mod-Def 0 is grounded by the module to indicate that the module is present

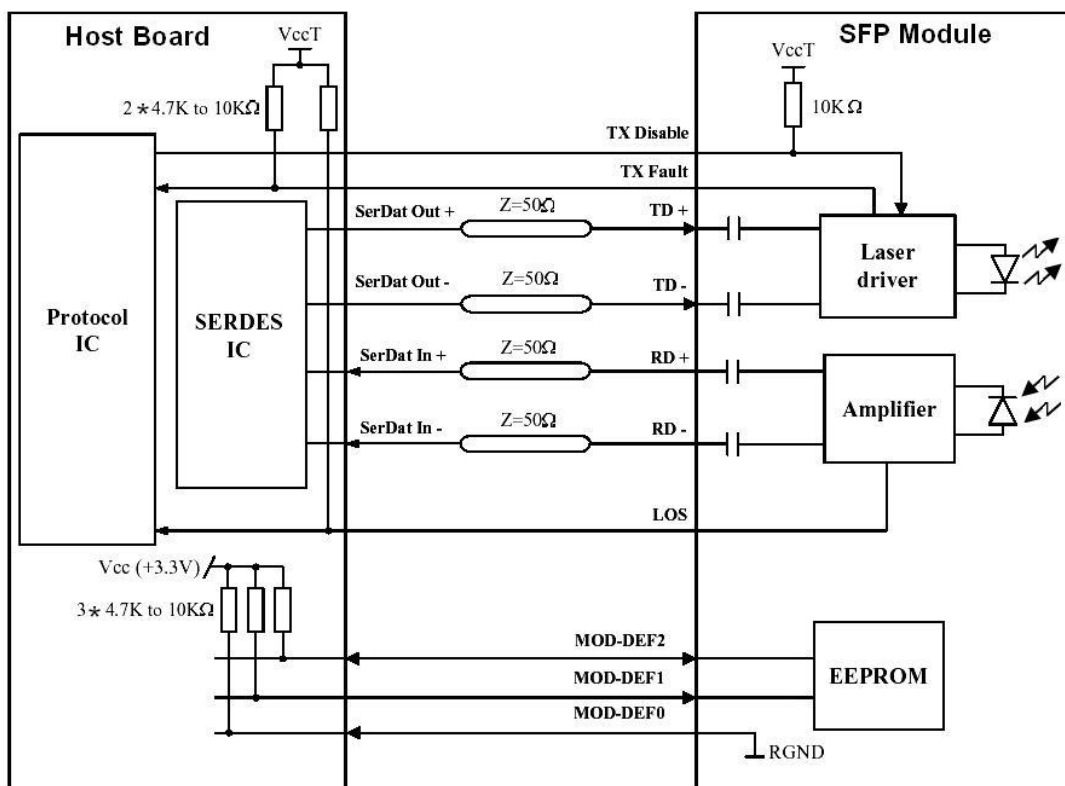
Mod-Def 1 is the clock line of two wire serial interface for serial ID

Mod-Def 2 is the data line of two wire serial interface for serial ID

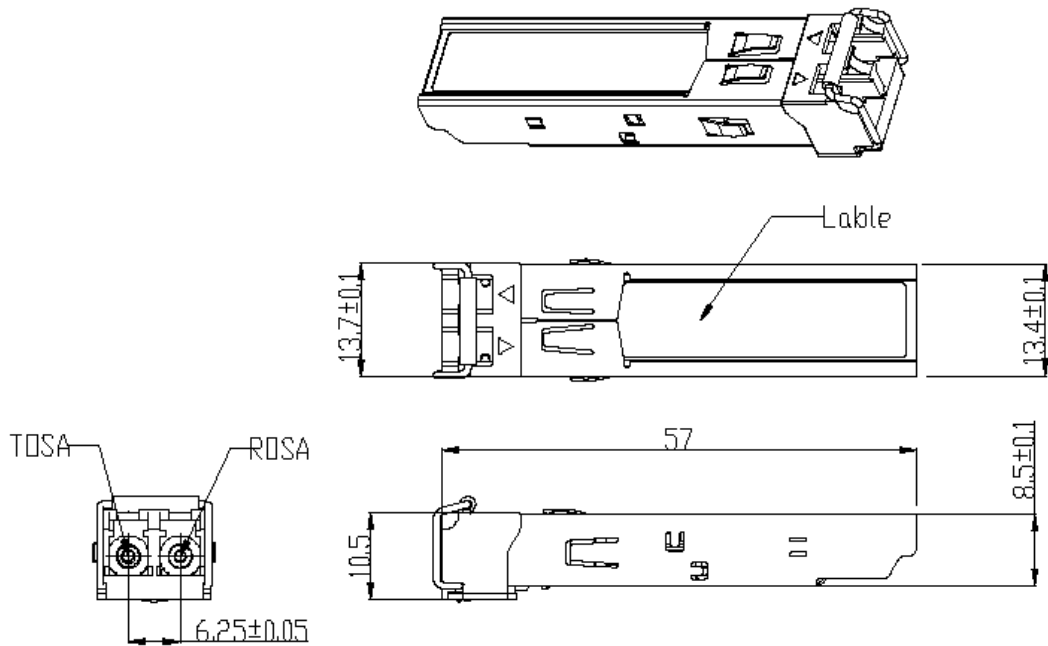
4) LOS is an open collector output, which should be pulled up with a $4.7k\sim 10k\Omega$ resistor. Pull up voltage between 2.0V and $V_{cc}+0.3V$. Logic 1 indicates loss of signal; Logic 0 indicates normal operation. In the low state, the output will be pulled to less than 0.8V.

5) RD-/+ : These are the differential receiver outputs. They are internally AC-coupled 100 differential lines which should be terminated with 100Ω (differential) at the user SERDES.

6) TD-/+ : These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100Ω differential termination inside the module.

Recommended Interface Circuit

Mechanical Dimensions



Ordering information

Part Number	Product Description
XSM851-M5LN	850nm, 1.25Gbps, 550m, 0°C ~ +70°C
XSM851-M5LY	850nm, 1.25Gbps, 550m, 0°C ~ +70°C, With Digital Diagnostic Monitoring
XSM851-M5LD	850nm, 1.25Gbps, 550m, -20°C ~ +85°C
XSM851-M5LE	850nm, 1.25Gbps, 550m, -20°C ~ +85°C, With Digital Diagnostic Monitoring
XSM851-M5LL	850nm, 1.25Gbps, 550m, -40°C ~ +85°C
XSM851-M5LM	850nm, 1.25Gbps, 550m, -40°C ~ +85°C, With Digital Diagnostic Monitoring

Notice. Please specify any compatibility requirements at time of ordering. Standard MSA compatible pluggable components may not work or some function of these components may not be available in devices that require customized compatible devices. Pluggable components compatible with one type of communications equipment may not work in other type of communications equipment.

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