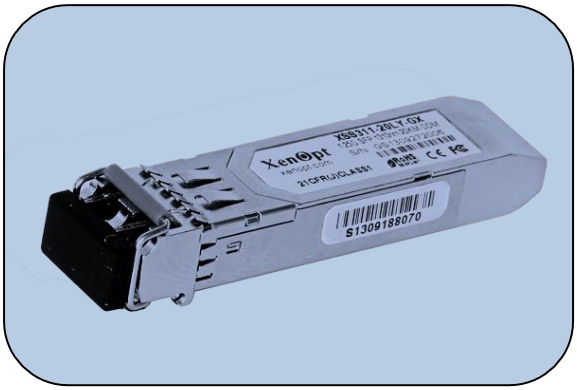
XSS311-10Lx

1.25 Gbps SFP Optical Transceiver, 10 km Reach



Product Highlights

- Data-rate of 1.25Gbps/1.063Gbps operation
- 1310nm VCSEL laser and PIN photodetector for 10 km transmission
- Compliant with SFP MSA and SFF-8472 with duplex LC receptacle
- Digital Diagnostic Monitoring: Internal Calibration or External Calibration
- Compatible with SONET OC-24-LR-1
- Compatible with RoHS
- +3.3V single power supply
- Operating case temperature:
  Standard: 0 to +70°C
  Industrial: -40 to +85°C

Applications

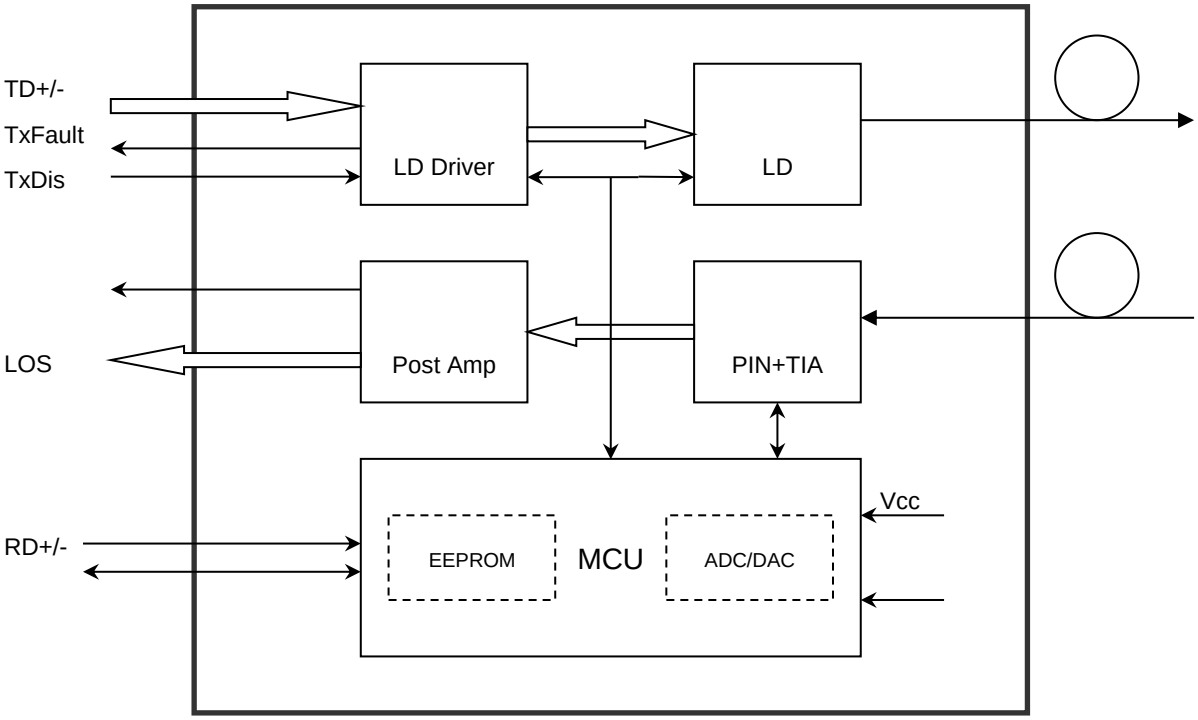
- Gigabit Ethernet
- Fiber Channel
- Switch to Switch interface
- Switched backplane applications
- Router/Server interface
- Other optical transmission systems

Description

The SFP transceivers are high performance, cost effective modules supporting dual data-rate of 1.25Gbps/1.0625Gbps and 10km transmission distance with SMF.

The transceiver consists of three sections: a FP 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	Tst	-40	85	°C
Operating Humidity		5	85	%

Table 1 - Absolute Maximum Ratings

Recommended Operating Environment

Parameters	Symbol	Min.	Typical	Max.	Unit
Power Supply Voltage	Vcc	3.13	3.3	3.47	V
Power Supply Current	Icc			300	mA
Operating Case temperature - Std	Tc	0		70	ºC
Operating Case temperature - Ind	Tc	-40		85	ºC
Data Rate – Gigabit Ethernet			1.25		Gbps
Data Rate – Fibre Channel			1.063		Gbps

Table 2 - Recommended Operating Conditions

Optical and Electrical Characteristics

XSS311-10Lx: (FP and PIN, 1310nm, 10km Reach)

Parameters		Symbol	Min.	Typical	Max.	Unit	Notes
Transmitter							
Center Wavelength		λ_c	1260	1310	1360	nm	
Spectral Width (RMS)		$\Delta\lambda$			4	nm	
Average Output Power		Pout	-9		-3	dBm	1
Extinction Ratio		ER	9			dB	
Optical Rise/Fall Time (20%~80%)		tr/tf			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		Vcc	V	V	
	Disable	0		0.8	V	V	
TX Fault	Fault	2.0		Vcc	V	V	
	Normal	0		0.8	V	V	
Receiver							

Parameters		Symbol	Min.	Typical	Max.	Unit	Notes
Centre Wavelength		λc	1260		1580	nm	
Receiver Sensitivity					-23	dBm	3
Receiver Overload			-3			dBm	3
LOS De-Assert		LOS_D			-24	dBm	
LOS Assert		LOS_A	-30			dBm	
LOS Hysteresis			1		4	dB	
Data Output Swing Differential		Vout	400		1800	mV	4
LOS	Enable	High	2.0		Vcc	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 2^7-1 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		Vcc	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 to -3	dBm	±3dB	Internal / External
RX Power	-23 to -3	dBm	±3dB	Internal / External

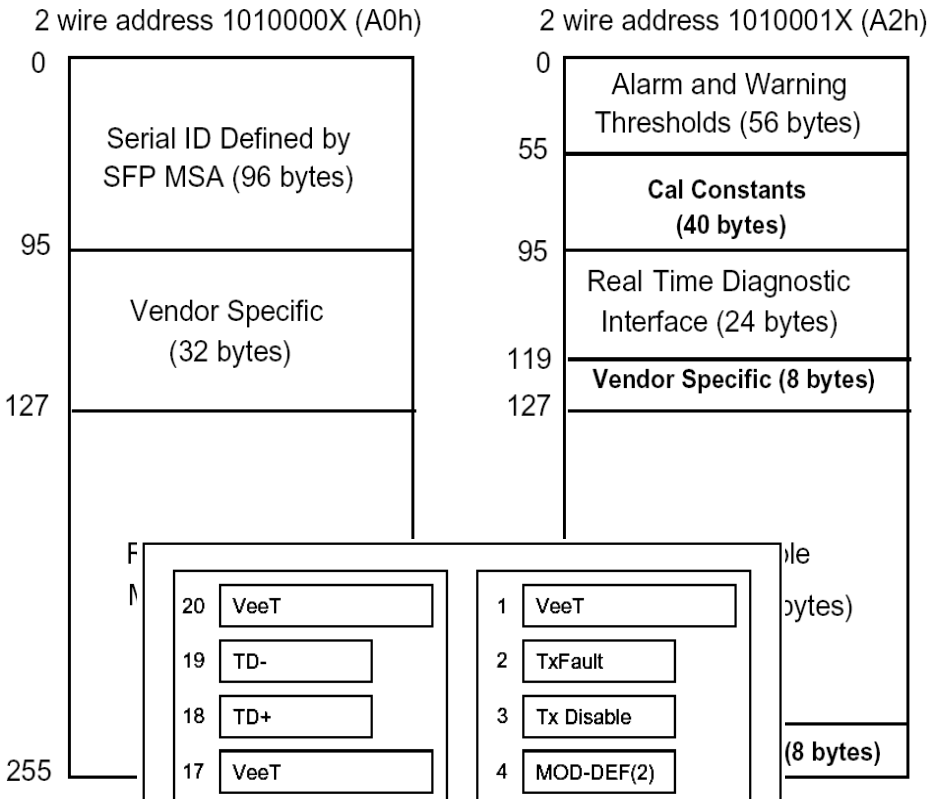
Table 5 – Diagnostics Specification

Digital Diagnostic Memory Map

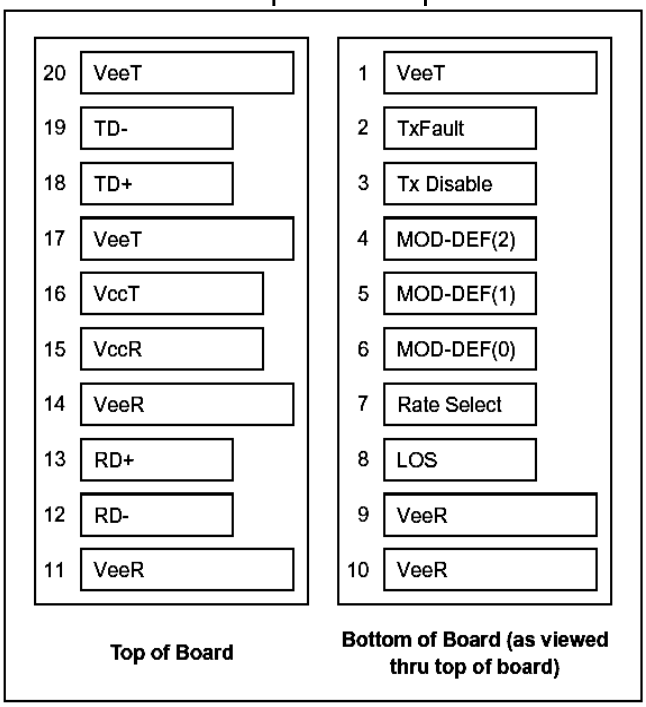
The transceivers provide serial ID memory contents and diagnostic information about the present operating conditions by the 2-wire serial interface (SCL, SDA).

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~10kΩ resistor on the host board to a voltage between 2.0V and Vcc+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~10kΩ 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~10kΩ resistor on the host board. The pull-up voltage shall be VccT or VccR.

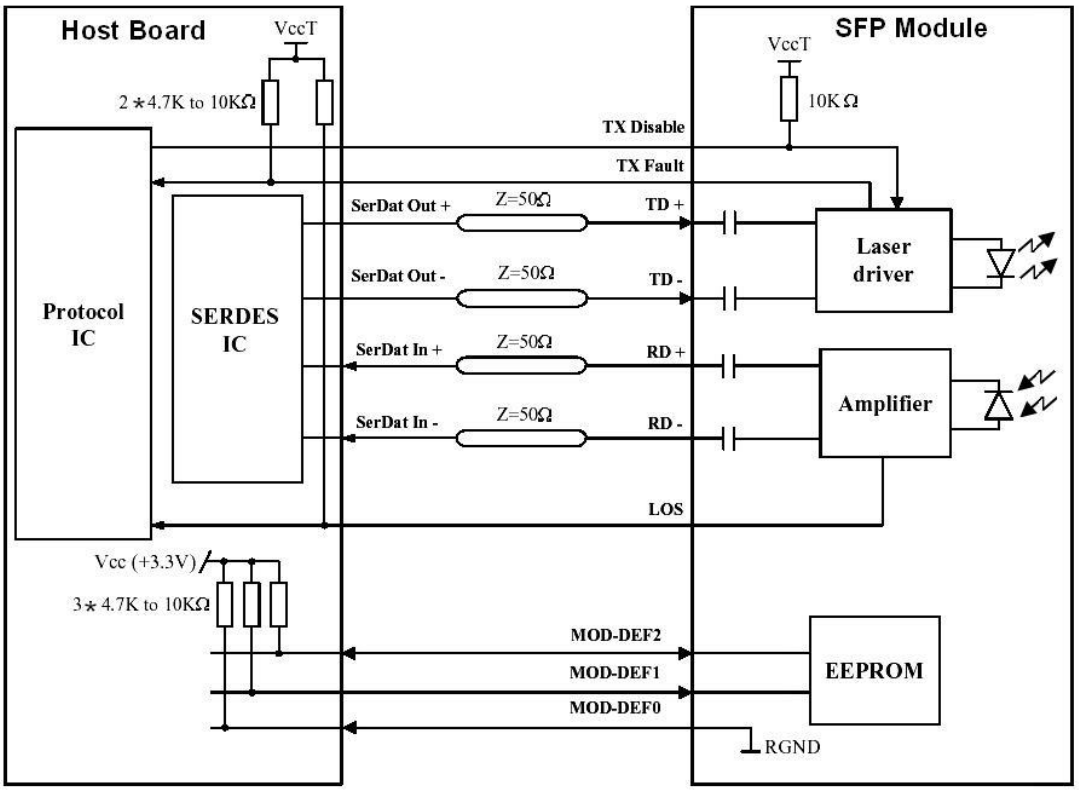
Mod-Def 0 is grounded by the module to indicate that the module is present
Mod-Def 1 is the clock line of two wire serial interface for serial ID
Mod-Def 2 is the data line of two wire serial interface for serial ID

4) LOS is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor. Pull up voltage between 2.0V and Vcc+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.

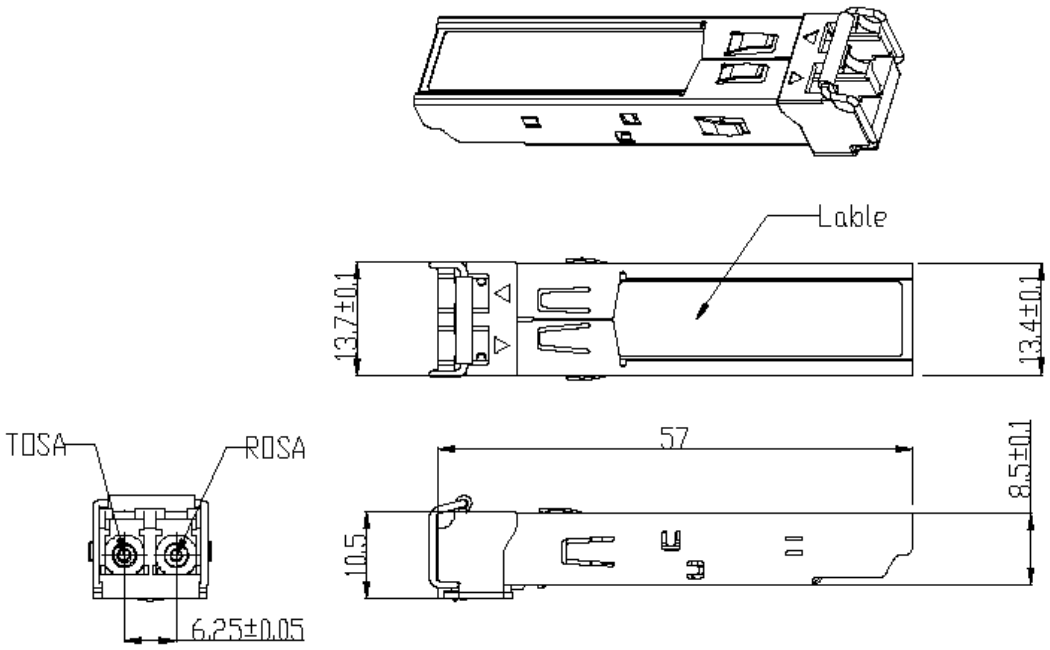
5) RD-/+: These are the differential receiver outputs. They are internally AC-coupled 100 differential lines which should be terminated with 100Ω (differential) at the user SERDES.

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
XSS311-10LN	1310nm, 1.25Gbps, 10km, LC, 0ºC ~ +70ºC
XSS311-10LY	1310nm, 1.25Gbps, 10km, LC, 0ºC ~ +70ºC, With Digital Diagnostic Monitoring
XSS311-10LD	1310nm, 1.25Gbps, 10km, LC, -20ºC ~ +85ºC
XSS311-10LE	1310nm, 1.25Gbps, 10km, LC, -20ºC ~ +85ºC, With Digital Diagnostic Monitoring
XSS311-10LL	1310nm, 1.25Gbps, 10km, LC, -40ºC ~ +85ºC
XSS311-10LM	1310nm, 1.25Gbps, 10km, LC, -40ºC ~ +85ºC, 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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