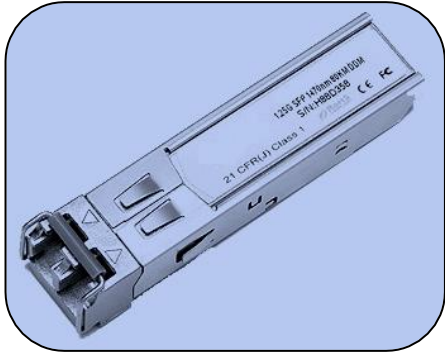




XSS31C-20Lx

155 Mbps SFP Optical Transceiver, 20 km Reach

XSS31C-20Lx 155 Mbps SFP, 20 km Reach



Product Highlights

- Up to 155 Mbps data-rate
- 1310 nm FP (LED) laser and PIN photodetector for 20 km transmission
- Compliant with SFP MSA and SFF-8472 with duplex LC receptacle
- Digital Diagnostic Monitoring: Internal Calibration or External Calibration
- Compatible with RoHS
- +3.3 V single power supply
- Operating case temperature:
Standard : 0 to +70°C
Industrial : -40 to +85°C

Applications

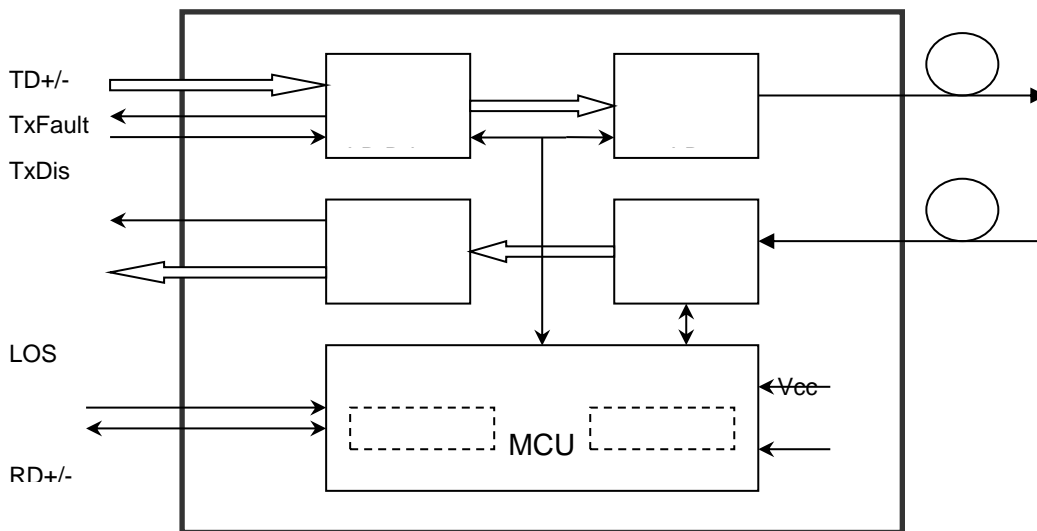
- SDH STM-1, S-1.1.1, L-1.1, L-1.2
- Sonet OC-3 IR1, LR1, LR2
- Other Optical Links

Description

The SFP transceivers are high performance, cost effective modules supporting 155Mbps data-rate and 20km transmission distance with MMF.

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	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 - Ind	T _c	-40		85	°C
Data Rate			155		Mbps

Table 2 - Recommended Operating Conditions

Optical and Electrical Characteristics

XSS31C-20Lx: (FP and PIN, 1310nm, 20km 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	P _{out}	-14		-8	dBm	1
Extinction Ratio	ER	9			dBm	
Data Input Swing Differential	V _{IN}	400		1800	dB	2
Input Differential Impedance	Z _{IN}	90	100	110	dBm	
TX Disable	Enable	2.0		V _{CC}	V	
	Disable	0		0.8	V	
TX Fault	Fault	2.0		V _{CC}	V	
	Normal	0		0.8	V	
Receiver						
Centre Wavelength	λ_c	1260		1580	nm	
Receiver Sensitivity				-32	dBm	3
Receiver Overload		-3			dBm	3

Parameters	Symbol	Min.	Typical	Max.	Unit	Notes
LOS De-Assert	LOS _D			-34	dBm	
LOS Assert	LOS _A	-45			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 223-1 test pattern @155Mbps, BER $\leq 1 \times 10^{-10}$.
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	μ s
Time To Initialize, including Reset of Tx Fault	t _{init}			300	ms
Tx Fault Assert Time	t _{fault}			100	μ s
Tx Disable To Reset	t _{reset}	10			μ s
LOS Assert Time	t _{loss_on}			100	μ s
LOS De-assert Time	t _{loss_off}			100	μ s
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	$\pm 3^\circ\text{C}$	Internal / External
	-40 to +85			
Voltage	3.0 to 3.6	V	$\pm 3\%$	Internal / External
Bias Current	0 to 100	mA	$\pm 10\%$	Internal / External
TX Power	-14 to -8	dBm	$\pm 3\text{dB}$	Internal / External
RX Power	-28 to -3	dBm	$\pm 3\text{dB}$	Internal / External

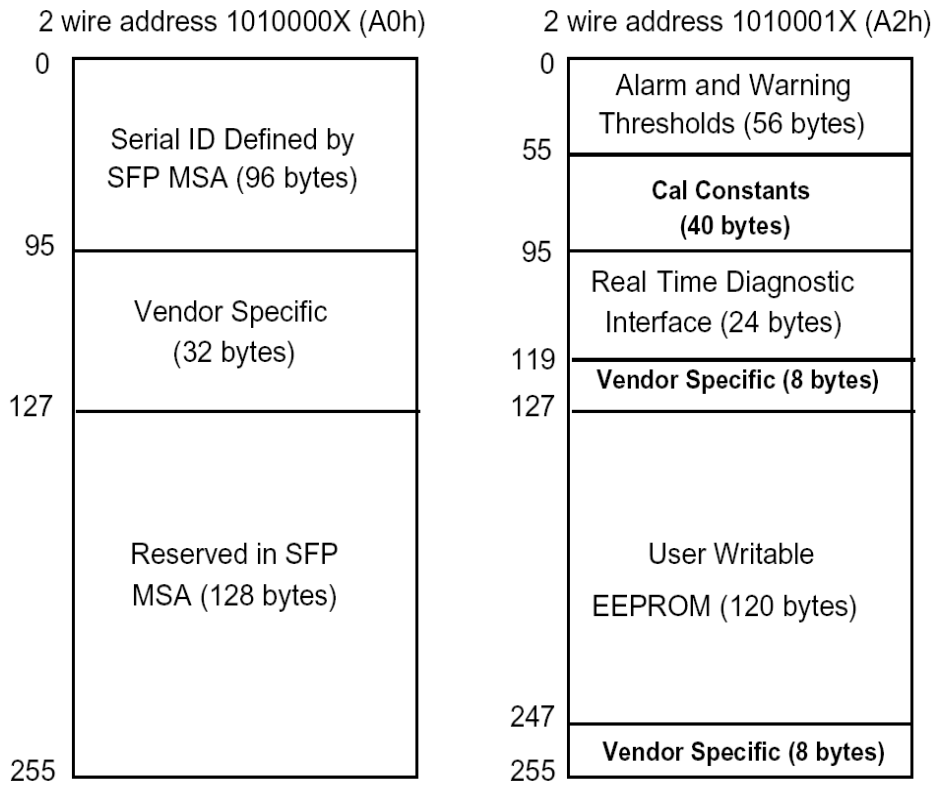
Table 5 – Diagnostics Specification

Digital Diagnostic Memory Map

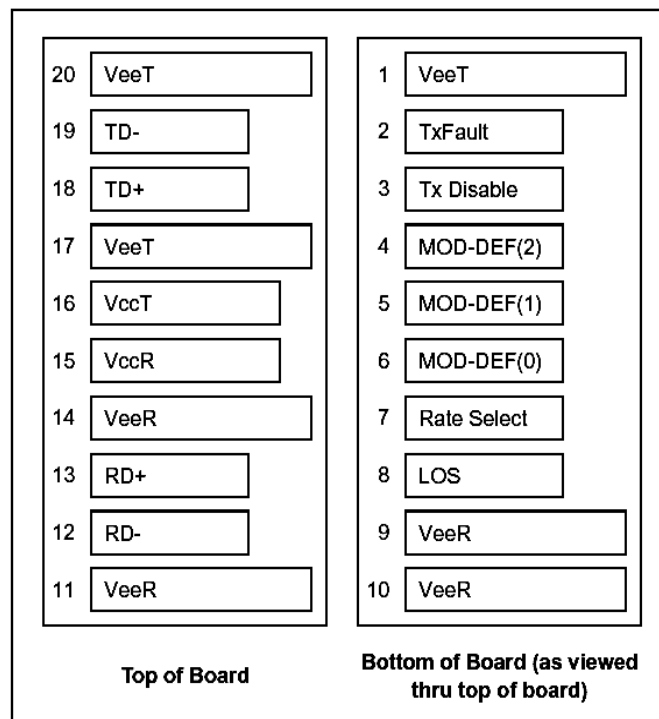
The transceivers provide serial ID memory contents and diagnostic information about the present operating conditions by the 2-wire serial interface (SCL, SDA).

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	V _{EET}	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	V _{EER}	Receiver ground	1	
10	V _{EER}	Receiver ground	1	
11	V _{EER}	Receiver ground	1	
12	RD-	Inv. Received Data Out	3	Note 5
13	RD+	Received Data Out	3	Note 5
14	V _{EER}	Receiver ground	1	
15	V _{CCR}	Receiver Power Supply	2	
16	V _{CCT}	Transmitter Power Supply	2	
17	V _{EET}	Transmitter Ground	1	
18	TD+	Transmit Data In	3	Note 6
19	TD-	Inv. Transmit Data In	3	Note 6
20	V _{EET}	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 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~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 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

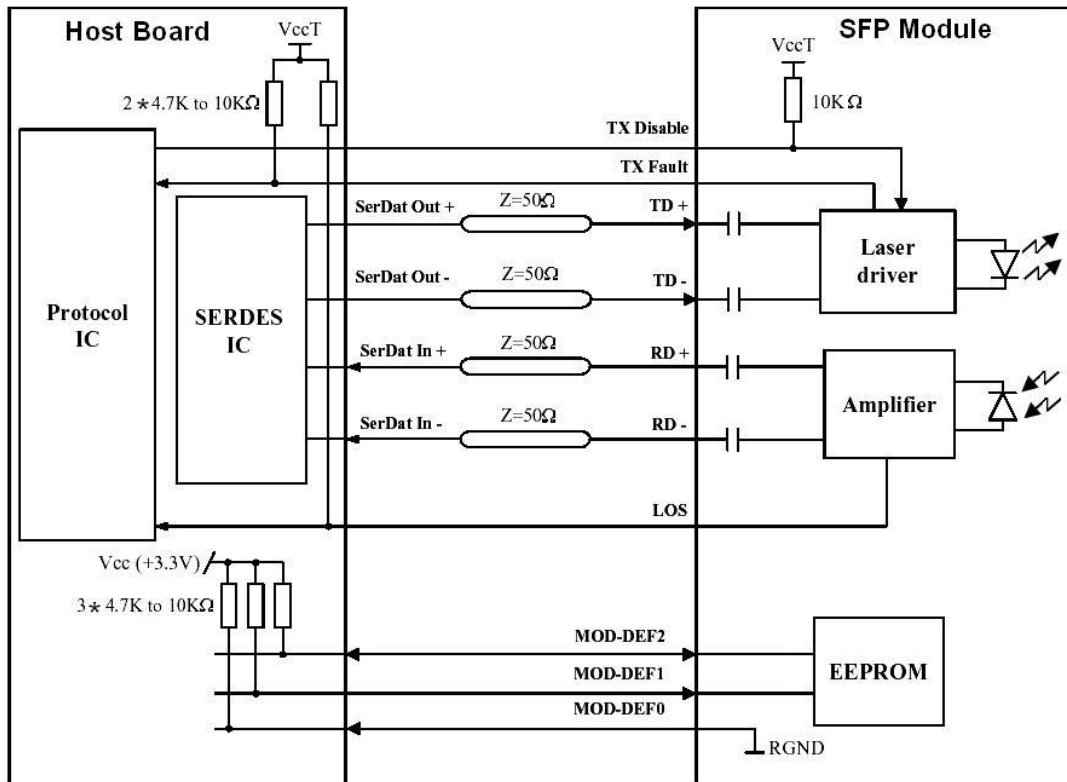
Mod-Def 2 is the data line of two wire serial interface for serial ID

4) LOS is an open collector output, which should be pulled up with a 4.7k~10kΩ 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.

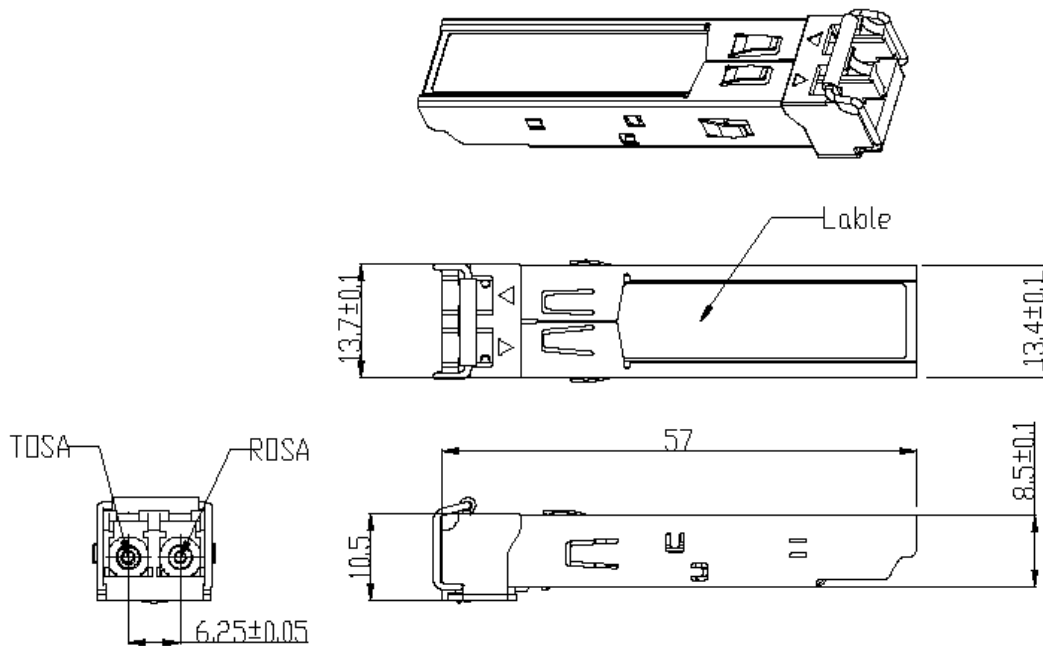
5) RD-/+ : These are the differential receiver outputs. They are internally AC-coupled 100 differential lines which should be terminated with 100Ω (differential) at the user SERDES.

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
XSS31C-20LN	1310nm, 155Mbps, 20km, 0°C ~ +70°C
XSS31C-20LY	1310nm, 155Mbps, 20km, 0°C ~ +70°C, with Digital Diagnostic Monitoring
XSS31C-20LL	1310nm, 155Mbps, 20km, -40°C ~ +85°C
XSS31C-20LM	1310nm, 155Mbps, 20km, -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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