

## 10 Gb/s 1550 nm SFP+ 80 km Transceiver

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### SFP Series



- Up to 11.1 Gbps Data Links
- Up to 80 km transmission on SMF
- EML transmitter and PIN receiver
- Metal enclosure, for lower EMI
- 2-wire interface with integrated Digital Diagnostic monitoring
- Hot-pluggable SFP+ footprint
- Specifications compliant with SFF 8472
- Compliant with SFP+ MSA with LC connector
- Single 3.3V power supply
- Power dissipation < 1.5 W

ASCENT's SFP+ transceiver SFPP-ATLP-51-80 is designed for use in 10-Gigabit Ethernet links up to 80 km over single mode fiber.

The module consists of 1550 EML Laser, InGaAs PIN and preamplifier in a high-integrated optical sub-assembly. Digital diagnostics functions are available via a 2-wire serial interface, as specified in SFF-8472. The module data link up to 80 km in 9/125  $\mu$ m single-mode fiber.

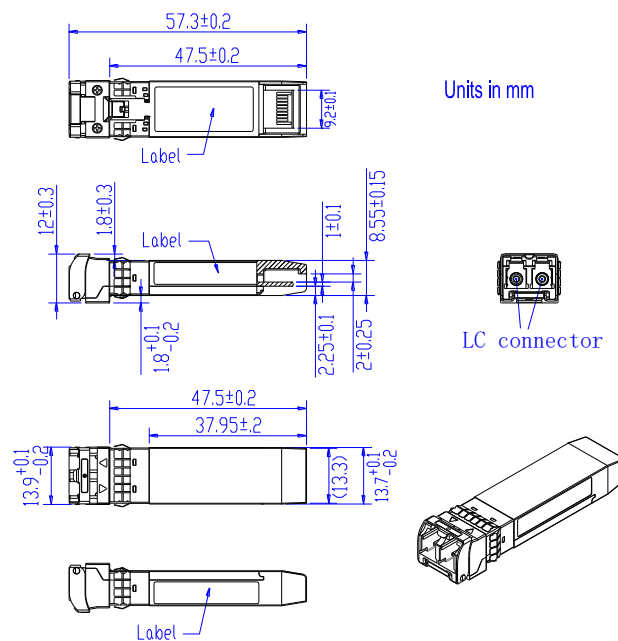
The SFP+ transceivers provide a unique enhanced digital diagnostic monitoring interface, which allows real-time access to device operating parameters such as transceiver temperature, laser bias current, transmitted optical power, received optical power, and transceiver supply voltage.

It also defines a sophisticated system of alarm and warning flags, which alerts end-users when particular operating parameters are outside of a factory set normal range.

## Key Features

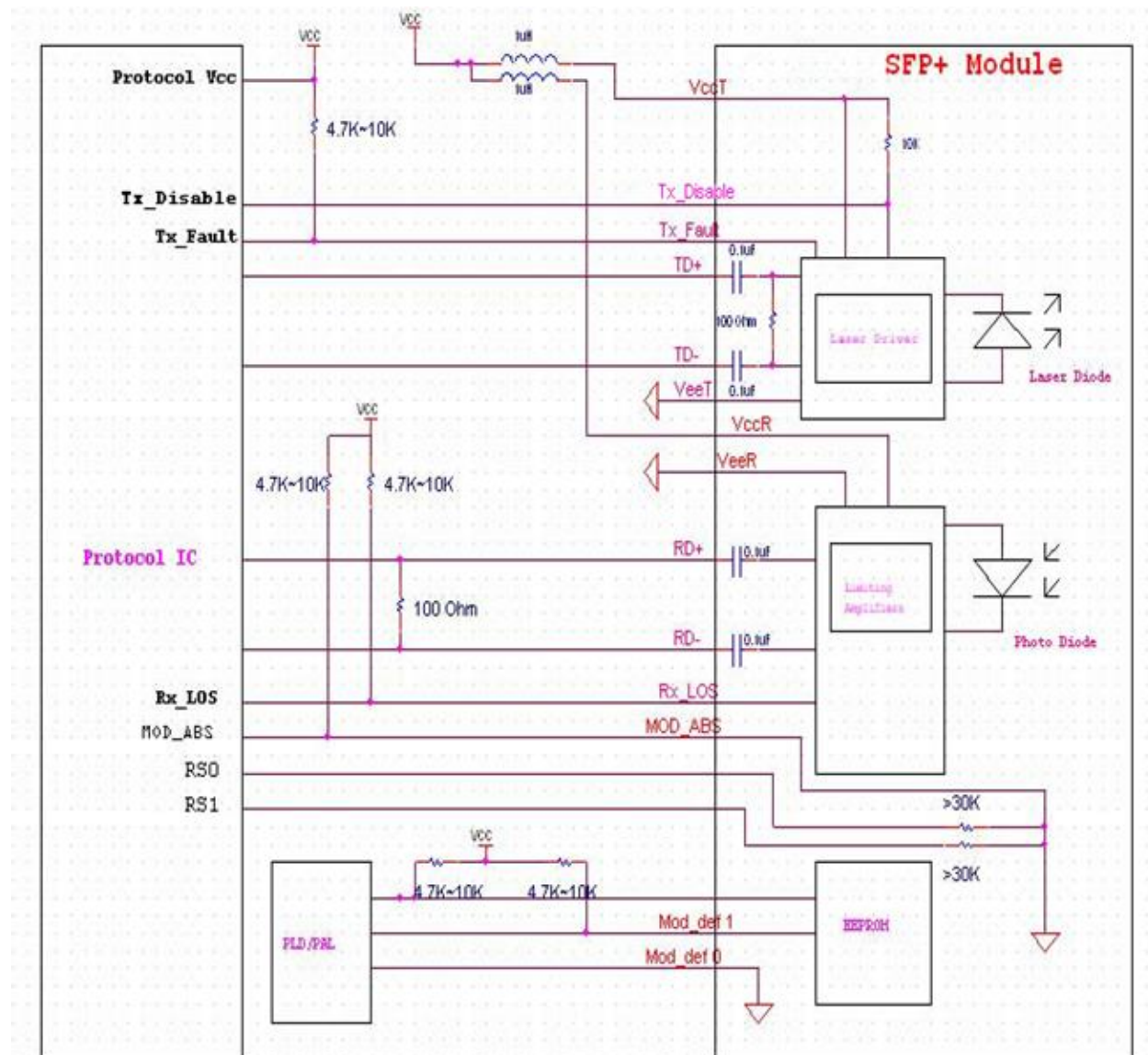
- Up to 11.1 Gbps Data Links
- Up to 80 km transmission on SMF
- EML transmitter and PIN receiver
- Metal enclosure, for lower EMI
- 2-wire interface with integrated Digital Diagnostic monitoring
- Hot-pluggable SFP+ footprint
- Compliant with SFP+ MSA with LC connector
- Compliant with SFF-8472
- Compliant with SFF-8431
- Single 3.3V power supply
- Case operating temperature range: 0 °C to 70 °C
- Power dissipation < 1.5 W
- 10BASE-ZR/ZW
- RoHS compliant

## Outline Diagram

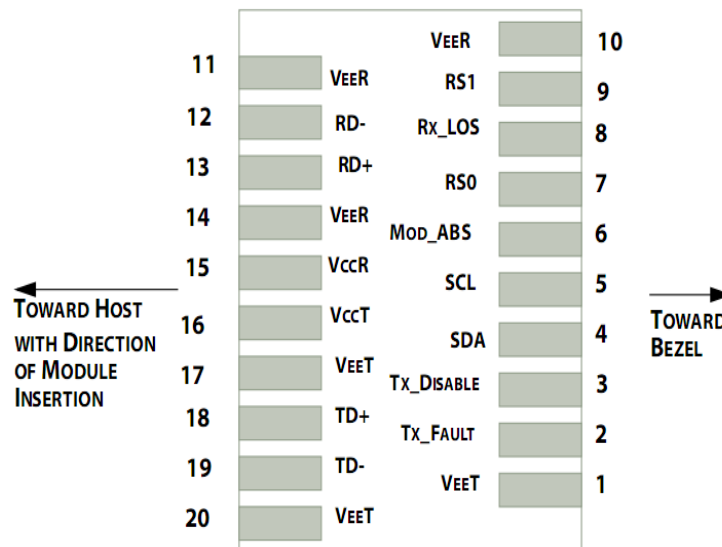


**SFP-ATLP-51-80 Mechanical Specifications**

## Recommended Interface Circuit



## Pin Description



Pin	Symbol	Name/Description	Note
1	V <sub>EET</sub>	Transmitter Ground (Common with Receiver Ground)	1
2	T <sub>FAULT</sub>	Transmitter Fault.	2
3	T <sub>DIS</sub>	Transmitter Disable. Laser output disabled on high or open.	3
4	SDA	2-wire Serial Interface Data Line	4
5	SCL	2-wire Serial Interface Clock Line	4
6	MOD_ABS	Module Absent. Grounded within the module	4
7	RS0	Rate Select 0	5
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation.	6
9	RS1	No connection required	1
10	V <sub>EER</sub>	Receiver Ground (Common with Transmitter Ground)	1
11	V <sub>EER</sub>	Receiver Ground (Common with Transmitter Ground)	1
12	RD-	Receiver Inverted DATA out. AC Coupled	
13	RD+	Receiver Non-inverted DATA out. AC Coupled	
14	V <sub>EER</sub>	Receiver Ground (Common with Transmitter Ground)	1
15	V <sub>CCR</sub>	Receiver Power Supply	
16	V <sub>CCT</sub>	Transmitter Power Supply	
17	V <sub>EET</sub>	Transmitter Ground (Common with Receiver Ground)	1
18	TD+	Transmitter Non-Inverted DATA in. AC Coupled.	
19	TD-	Transmitter Inverted DATA in. AC Coupled.	
20	V <sub>EET</sub>	Transmitter Ground (Common with Receiver Ground)	1

## Notes:

1. Circuit ground is internally isolated from chassis ground.
2. T<sub>FAULT</sub> is an open collector/drain output, which should be pulled up with a 4.7k – 10k  $\Omega$  resistor on the host board if intended for use. Pull up voltage should be between 2.0V to V<sub>CC</sub> + 0.3V. A high output indicates a transmitter fault caused by either the TX bias current or the TX output power exceeding the preset alarm thresholds. A low output indicates normal operation. In the low state, the output is pulled to <0.8V.
3. Laser output disabled on T<sub>DIS</sub> >2.0V or open, enabled on T<sub>DIS</sub> <0.8V.
4. Should be pulled up with 4.7 k $\Omega$  to 10 k $\Omega$  host board to a voltage between 2.0V and 3.6V. MOD\_ABS pulls line low to indicate module is plugged in.
5. Internally pulled down per SFF-8431 Rev 4.1.
6. LOS is open collector output. It should be pulled up with 4.7k $\Omega$  – 10k $\Omega$  on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

## Specifications

### Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Storage Temperature	T <sub>s</sub>	-40	-	85	°C	
Relative Humidity	RH	5	-	95	%	
Power Supply Voltage	V <sub>CC</sub>	-0.3	-	4	V	
Signal Input Voltage		V <sub>CC</sub> -0.3	-	V <sub>CC</sub> +0.3	V	

### Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Case Operating Temperature	T <sub>case</sub>	0	-	+70	°C	Commercial
		-40	-	+85	°C	Industrial
Power Supply Voltage	V <sub>CC</sub>	3.14	3.3	3.47	V	
Power Supply Current	I <sub>CC</sub>	-		450	mA	
Data Rate	BR		10.3125		Gbps	
Transmission Distance	TD		-	80	km	
Coupled fiber	Single-mode fiber					9/125 $\mu$ m SMF

### Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
<b>Transmitter</b>						
Average Launched Power	PO	-1		+4	dBm	1
Extinction Ratio	ER	8.2			dB	
Center Wavelength	$\lambda_c$	1530	1550	1565	nm	
Spectrum Band Width (RMS)	$\sigma$			1.0	nm	
SMSR		30			dB	
Transmitter OFF Output Power	POff			-30	dBm	

Transmitter and Dispersion Penalty	TDP	3.0	dB	
Output Eye Mask	Compliant with IEEE 802.3ae			
<b>Receiver</b>				
Input Optical Wavelength	$\lambda$	1270	1610	nm
Receiver Sensitivity	Psen	-23	dBm	2
Input Saturation Power (Overload)	Psat	-6	dBm	
Receiver Reflectance	Rrx	-27	dB	
LOS Assert	LOSA	-35	dBm	
LOS De-Assert	LOSD	-26	dBm	
LOS Detect Hysteresis	PHYS	0.5	dB	

## Note:

1. Launched power (avg.) is power coupled into a single-mode fiber with master connector. (Before of Life)
2. Measured with conformance test signal for BER =  $10^{-12}$  @ 10.3125 Gbps, PRBS=2<sup>31</sup>-1, NRZ

## Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Note
Supply Voltage	Vcc	3.14	3.3	3.46	V	
Supply Current	Icc			450	mA	Commercial
				550	mA	Industrial
Transmitter						
Input Differential Impedance	Rin		100		Ω	1
Single Ended Data Input Swing	Vin, pp	180		700	mV	
Transmit Disable Voltage	VD	Vcc−1.3		Vcc	V	
Transmit Enable Voltage	VEN	Vee		Vee+ 0.8	V	2
Transmit Disable Assert Time				10	μs	
Receiver						
Differential data output swing	Vout, pp	300		850	mV	3
Data output rise time	tr	28			ps	4
Data output fall time	tf	28			ps	4
LOS Fault	VLOS fault	Vcc−1.3		VccHOST	V	5
LOS Normal	VLOS norm	Vee		Vee+0.8	V	5
Power Supply Rejection	PSR	100			mVpp	6

## Notes:

1. Connected directly to TX data input pins. AC coupled thereafter.
2. Or open circuit.
3. Into 100  $\Omega$  differential termination.
4. 20 % to 80 %.
5. Loss Of Signal is LVTTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.
6. Receiver sensitivity is compliant with power supply sinusoidal modulation of 20 Hz to 1.5 MHz up to specified value applied through the recommended power supply filtering network.

## Regulatory Compliance

Feature	Reference	Performance
Electrostatic Discharge (ESD)	IEC/EN 61000-4-2	Compatible with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN 55022 Class B (CISPR 22A)	Compatible with standards
Laser Eye Safety	FDA 21CFR 1040.10, 1040.11 IEC/EN 60825-1, 2	Class 1 laser product
Component Recognition	IEC/EN 60950, UL	Compatible with standards
ROHS	2002/95/EC	Compatible with standards
EMC	EN61000-3	Compatible with standards

## Digital Diagnostic Functions

ASCENT SFPP-ATLP-51-80 transceivers support the 2-wire serial communication protocol as defined in the SFP+MSA.

The standard SFP serial ID provides access to identification information that describes the transceiver's capabilities, standard interfaces, manufacturer, and other information.

Additionally, ASCENT SFP+ transceivers provide a unique enhanced digital diagnostic monitoring interface, which allows real-time access to device operating parameters such as transceiver temperature, laser bias current, transmitted optical power, received optical power, and transceiver supply voltage. It also defines a sophisticated system of alarm and warning flags, which alerts end-users when particular operating parameters are outside of a factory set normal range.

The SFP MSA defines a 256-byte memory map in EEPROM that is accessible over a 2-wire serial interface at the 8 bit address 1010000X (A0h). The digital diagnostic monitoring interface makes use of the 8 bit address 1010001X (A2h), so the originally defined serial ID memory map remains unchanged.

The operating and diagnostics information is monitored and reported by a Digital Diagnostics Transceiver Controller (DDTC) inside the transceiver, which is accessed through a 2-wire serial interface. When the serial protocol is activated, the serial clock signal (SCL, Mod Def 1) is generated by the host. The positive edge clocks data into the SFP transceiver into those segments of the E2PROM that are not write-protected. The negative edge clocks data from the SFP transceiver. The serial data signal (SDA, Mod Def 2) is bi-directional for serial data transfer. The host uses SDA in conjunction with SCL to mark the start and end of serial protocol activation. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially.

## Ordering Information

Product name	Product description
SFPP-ATLP-51-80	SFP+ plug-in, 10 Gbps, 80 km, TX = 1550/RX wide, on two single-mode fibers, LC/PC blue
SFPP-ATLP-51-80A	SFP+ plug-in, 10 Gbps, 80 km, TX = 1550/RX wide, on two single-mode fibers, LC/PC blue, -40 °C to +85 °C industrial

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