10 Gb/s 1550 nm Single-Mode CDR SFP+ Transceiver

SFP+ Series

- Up to 11.3 Gbps data links
- Up to 100 km transmission on SMF
- EML transmitter and APD 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
- ≤1.8 W power dissipation

Ascent's SFPP-ATLP-51-100 SFP+ transceivers are high performance, cost effective modules supporting data rate of 10 Gbps and 100 km transmission distance with SMF. They offer the most efficient way to meet the demanding needs of the next-generation data center networking environment.

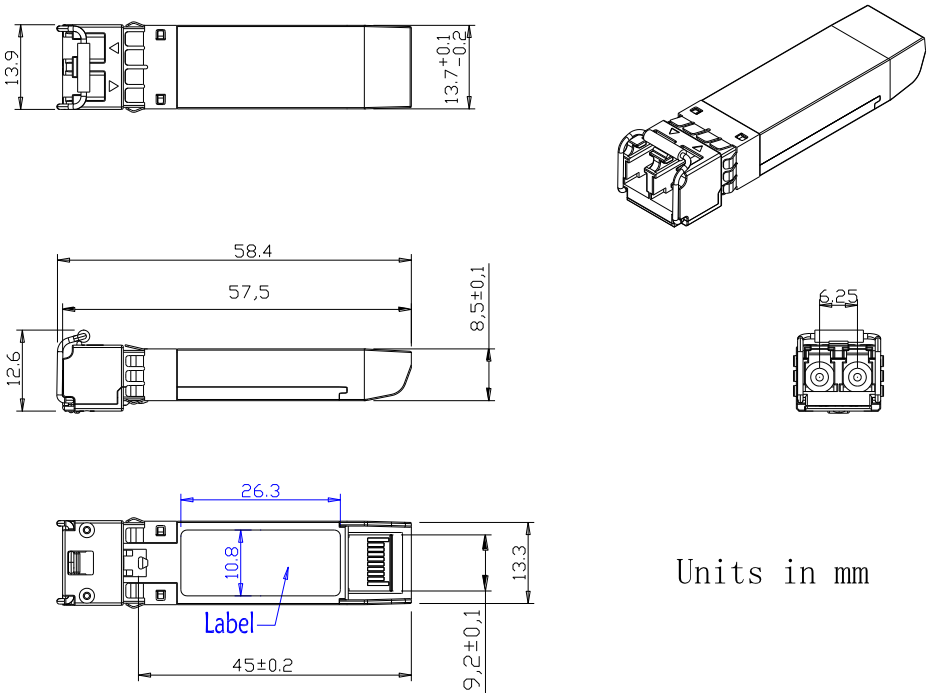
The module consists of 1550 EML Laser, APD photo-detector into a duplex LC optical connector and preamplifier in a high-integrated optical sub-assembly.

The transceivers module complies with SFP+ MSA specifications (SFF-8431, SFF-8432, SFF-8472), 10 Gigabit Ethernet specifications (10GBASE-ZR/ZW per IEEE 802.3ae), and 10G Fibre Channel. It's suitable for use with 10GbE Ethernet switches, routers, network interface cards (NICs), fiber media converters and storage networking equipment.

Key Features

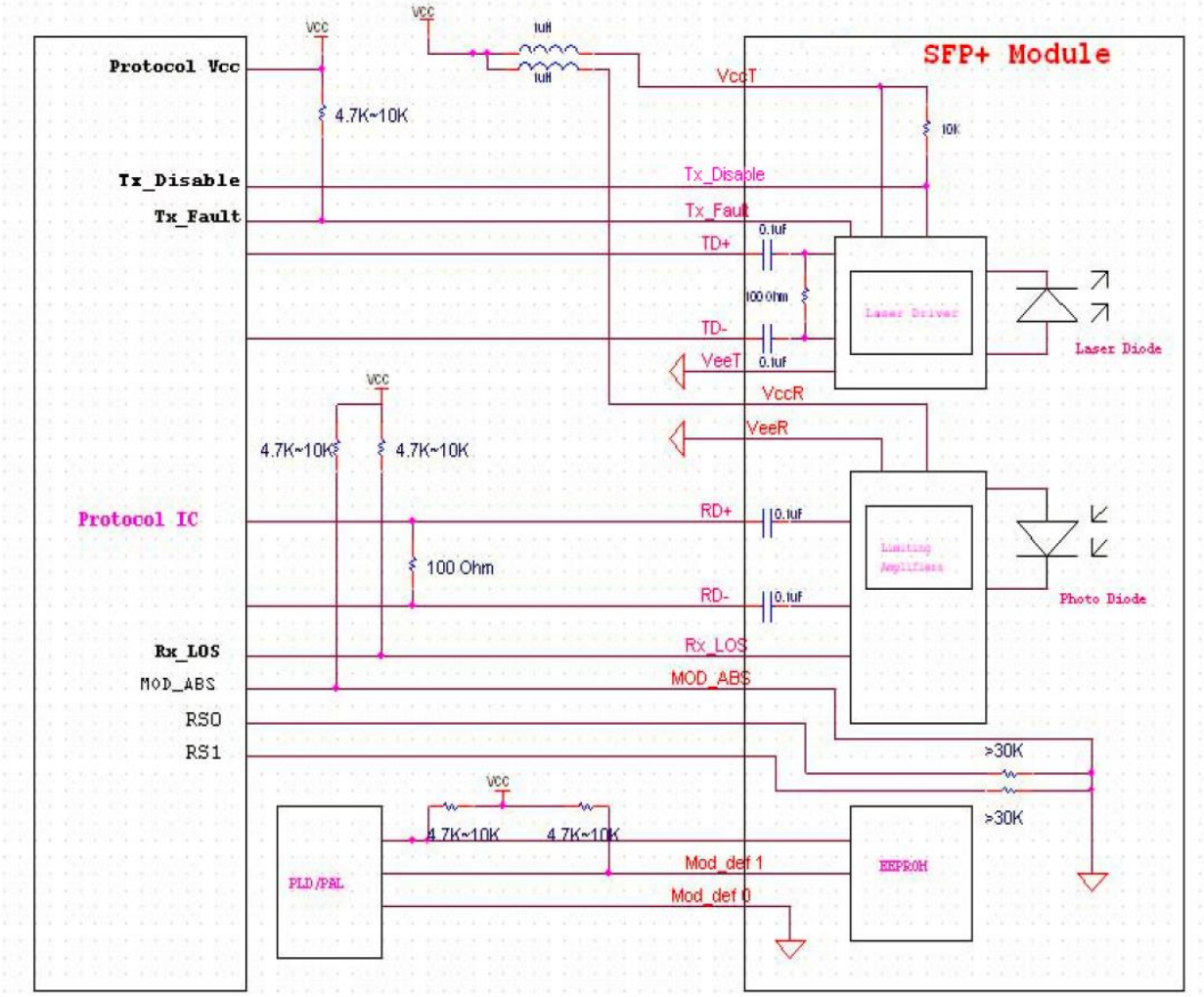
- Up to 11.3 Gbps data links
- Up to 100 km transmission on SMF
- EML transmitter and APD receiver
- Metal enclosure for lower EMI
- 2-wire interface with integrated Digital Diagnostic monitoring
- Hot-pluggable SFP+ footprint
- Specifications compliant with SFF 8472
- Compliant with SFP+ MSA with LC connector
- Single 3.3V power supply
- Operating temperature range: 0 °C to +70 °C (commercial) / -40 °C to +85 °C (industrial)
- With CDR supported 9.8 Gb/s to 11.3 Gb/s reference-free
- ≤1.8 W power dissipation

Outline Dimensions

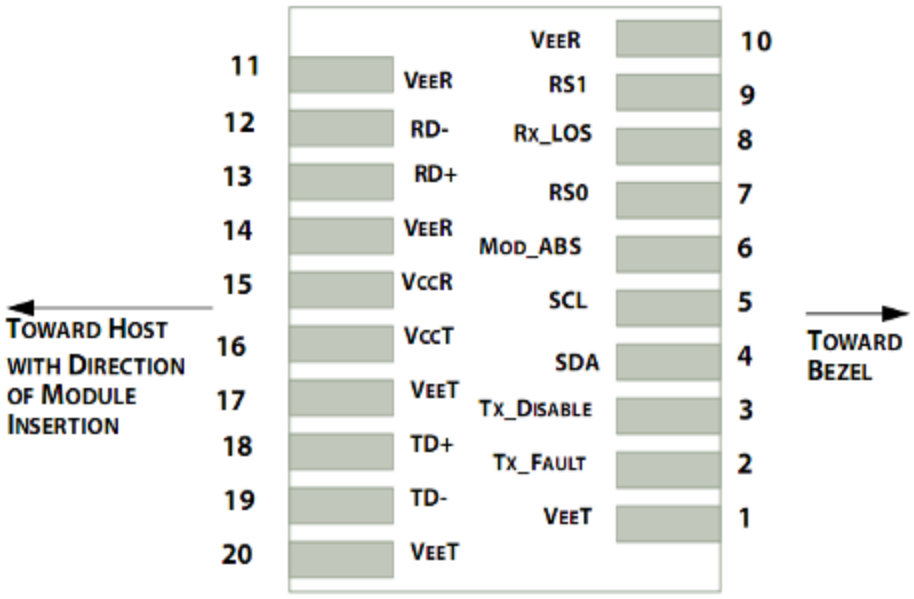


Units in mm

Host – Transceiver Interface Block Diagram



Pin Assignment



Pin out of Connector Block on Host Board

Pin	Symbol	Name/Description	Note
1	V_{EET}	Transmitter Ground (Common with Receiver Ground)	1
2	T_{FAULT}	Transmitter Fault.	2
3	T_{DIS}	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_{EER}	Receiver Ground (Common with Transmitter Ground)	1
11	V_{EER}	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_{EER}	Receiver Ground (Common with Transmitter Ground)	1
15	V_{CCR}	Receiver Power Supply	
16	V_{CCT}	Transmitter Power Supply	
17	V_{EET}	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_{EET}	Transmitter Ground (Common with Receiver Ground)	1

Notes:

1. Circuit ground is internally isolated from chassis ground.

2. T_{FAULT} is an open collector/drain output, which should be pulled up with a 4.7 kΩ to 10 kΩ resistor on the host board if intended for use. Pull up voltage should be between 2.0 V to Vcc + 0.3 V. 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_{DIS} > 2.0 V or open, enabled on T_{DIS} < 0.8 V.
4. Should be pulled up with 4.7 kΩ to 10 kΩ host board to a voltage between 2.0 V and 3.6 V. MOD_ABS pulls line low to indicate module is plugged in.
5. Internally pulled down per SFF-8431 Rev 4.1.
6. LOS is an open collector output. It should be pulled up with 4.7 kΩ to 10 kΩ on the host board to a voltage between 2.0 V and 3.6 V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

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

Specifications

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Storage Temperature	Ts	-40	-	85	°C	
Relative Humidity	RH	5	-	95	%	
Power Supply Voltage	V_{CC}	-0.3	-	4	V	
Signal Input Voltage		Vcc-0.3	-	Vcc+0.3	V	

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Case Operating Temperature	Top	0	-	70	°C	Commercial
		-40	-	85		Industrial
Power Supply Voltage	V_{CC}	3.14	3.3	3.47	V	
Data Rate	BR		10.3125		Gbps	
Transmission Distance	TD			100	km	
Coupled fiber	Single-mode fiber					9/125 µm SMF

Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Transmitter						
Average Launched Power	PO	1		5	dBm	1
Extinction Ratio	ER	8.2			dB	2
Center Wavelength	λc	1530	1550	1565	nm	
Spectrum Band Width (-20dB)	σ			0.3	nm	
SMSR		30			dB	
Transmitter OFF Output Power	POff			-30	dBm	
Transmitter and Dispersion Penalty	TDP			4.0	dB	3
Output Eye Mask	Compliant with IEEE 802.3ae					
Receiver						
Input Optical Wavelength	λ	1270		1610	nm	
Receiver Sensitivity	P_{sen}			-25.0	dBm	4
Input Saturation Power (Overload)	P_{sat}	-6.0			dBm	
Receiver Reflectance	R_{rx}			-27	dB	
LOS Assert	LOSA	-37			dBm	
LOS De-assert	LOSD			-26	dBm	
LOS Detect Hysteresis	P_{hys}	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 test signal@10.3125Gbps, PRBS=2^31-1, NRZ, O/E module 86105D (ER at least 1 dB lower than 86105D when using 86105C)
3. Measured with conformance test signal for BER = 10^–12.@10.3125Gbps, PRBS=2^31-1, NRZ, Optical source with worst ER, Wavelength 1550nm with 100km fiber
4. Measured with conformance test signal for BER = 10^–12.@10.3125Gbps, PRBS=2^31-1, NRZ, Optical source with worst ER, Wavelength 1550nm; back to back

Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Supply Voltage	Vcc	3.14	3.3	3.46	V	
Supply Current (Note 1)	Icc			490	mA	Commercial
				550		Industrial
Transmitter						
Input Differential Impedance	Rin		100		Ω	2
Single Ended Data Input Swing	Vin-pp	180		700	mV	
Transmit Disable Voltage	VDis	2.0		Vcc	V	3
Transmit Enable Voltage	VEN	Vee		Vee+ 0.8	V	
Transmit Disable Assert Time				10	μs	
Receiver						
Differential Data Output Swing	Vout-pp	400		800	mV	4
Data Output Rise Time	tr	28			ps	5
Data Output Fall Time	tf	28			ps	5

LOS Output High Level	VLOS-H	2.0	VCCHOST	V	6
LOS Output Low Level	VLOS-L	Vee	Vee+0.8	V	6

Notes:

1. Measured with receive Pin=Psen, Vcc=3.3V, operation temperature range, without air flow
2. Connected directly to TX data input pins. AC coupled.
3. Or open circuit.
4. Into 100 Ω differential termination.
5. 20 % to 80 %.
6. Loss Of Signal is LVTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.

Digital Diagnostic Functions

ASCENT SFPP-ATLP-51-100-L 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-51-100	SFP+ Plug-in, 10 Gbps, 100 km, TX=1550/RX wide, on two single mode fibers, LC/PC Blue

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Specifications and product availability are subject to change without notice.

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