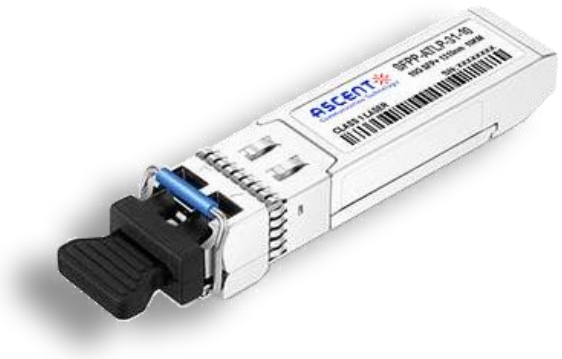
10 Gb/s 1310 nm SFP+ 10 km Transceiver

SFP+ Series



- **Up to 11.3 Gbps Data Links**
- **Up to 10 km transmission on SMF**
- **DFB Laser and PIN/TIA 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 3.3 V power supply**
- **Power dissipation < 1.2 W**

ASCENT's SFPP-ATLP-31-10 Small Form Factor Pluggable (SFP) transceivers are compatible with the Small Form Factor Pluggable Multi-Sourcing Agreement (MSA).

The transceiver consists of five sections: the LD driver, the limiting amplifier, the digital diagnostic monitor, the 1310nm FP laser and the PIN photo-detector. The module data link up to 10 km using 9/125 µm single-mode fiber.

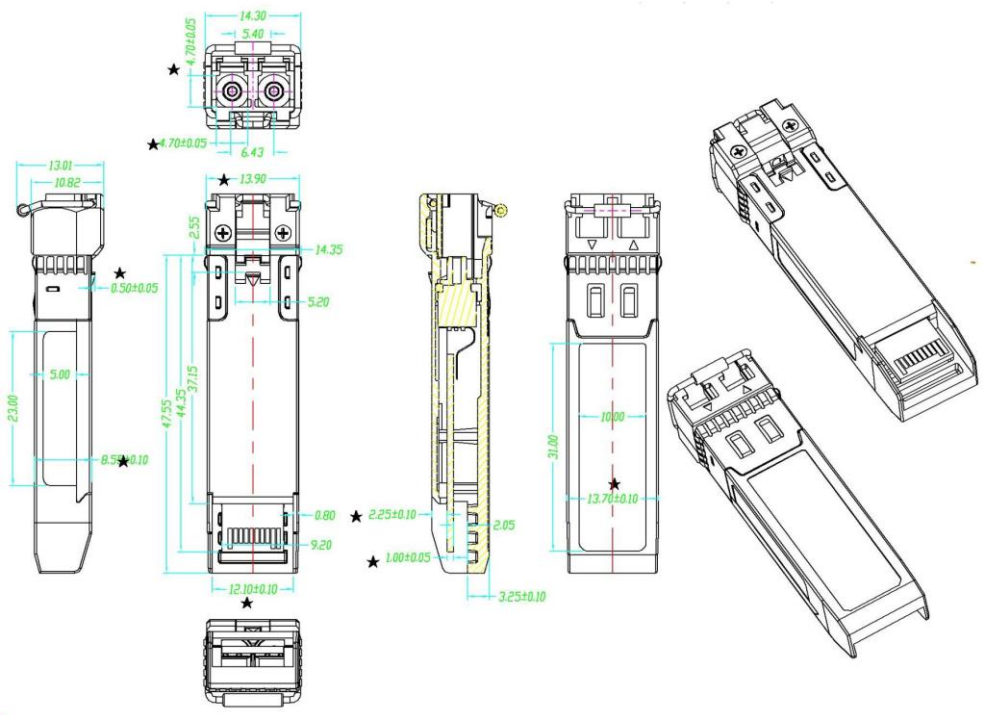
The optical output can be disabled by a TTL logic high-level input of Tx Disable, and the system also can disable the module via I2C. Tx Fault is provided to indicate that degradation of the laser. Loss Of signal (LOS) output is provided to indicate the loss of an input optical signal of receiver or the link status with partner.

The system can also get the LOS (or Link)/Disable/Fault information via I2C register access.

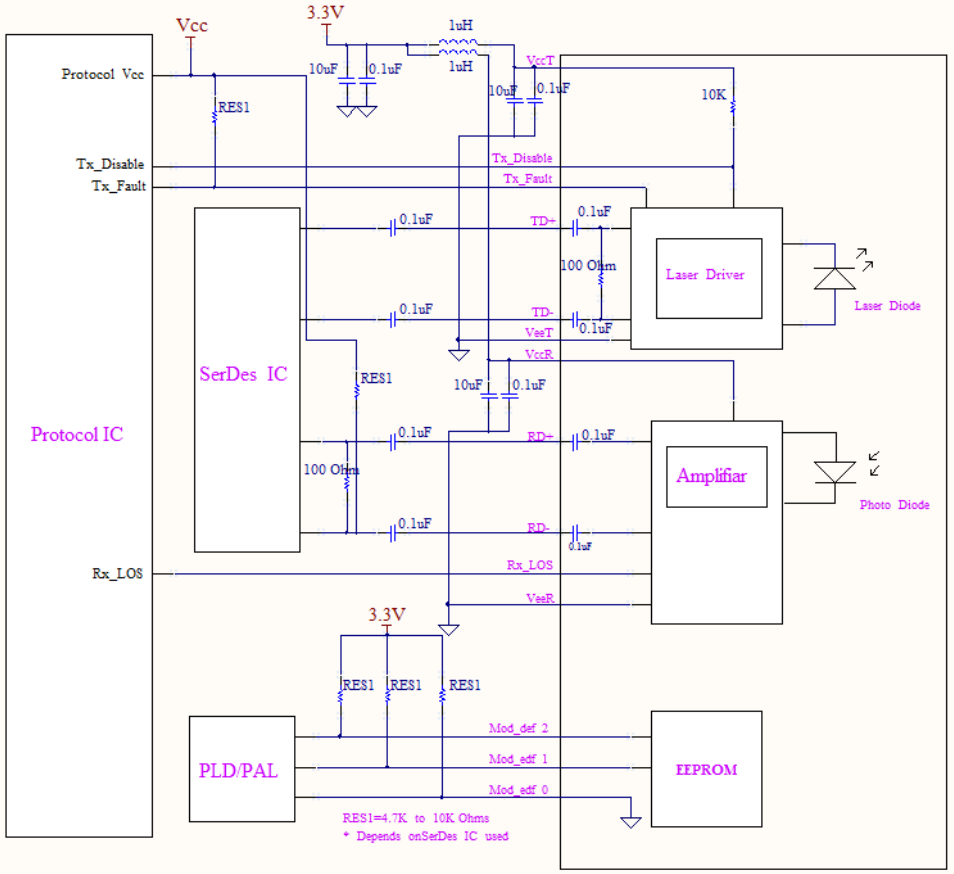
Key Features

- Up to 11.3 Gbps Data Links
- Up to 10 km transmission on SMF
- 1310 nm DFB Laser and PIN/TIA 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
- Single 3.3 V power supply
- Case operating temperature range: 0°C to 70°C
- Power dissipation < 1.2 W
- 10GBASE-LR/LW & 10G Ethernet
- Compliant with SFF-8431
- Compliant with SFF 8472
- RoHS, FCC compliant

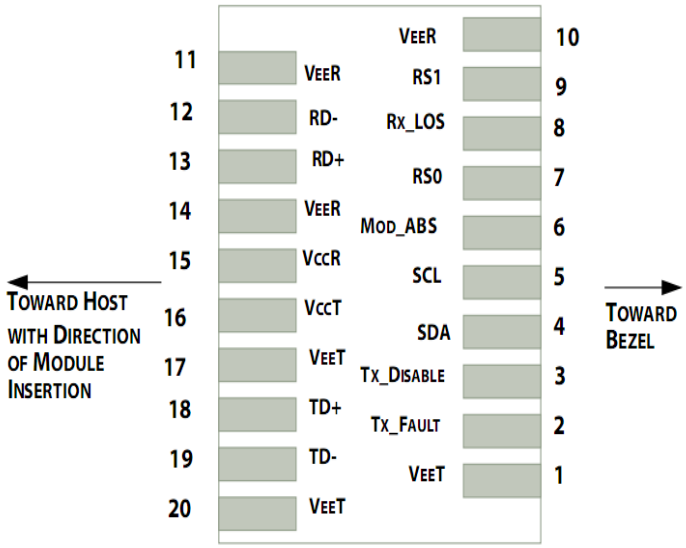
Outline Diagram



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 threshold. A low output indicates normal operation. In the low state, the output is pulled to <0.8 V.
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 2.0V 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 4.7 kΩ to 10 kΩ 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_S	-40		85	°C	
Storage Ambient Relative Humidity	H_A	0		85	%	
Power Supply Voltage	V_{CC}	-0.5		4	V	
Signal Input Voltage		-0.3		Vcc+0.3	V	
Receiver Damage Threshold		+3			dBm	
Lead Soldering Temperature/Time	T_{SOLD}			260/10	°C/sec	1
Lead Soldering Temperature/Time	T_{SOLD}			360/10	°C/sec	2

Notes

1. Suitable for wave soldering.
2. Only for soldering by iron.

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Case Operating Temperature	T_{case}	0		70	°C	
Ambient Humidity	H_A	5		70	%	Non-condensing
Data Rate		10.3125/10.3125			Gbps	TX Rate/RX Rate
Transmission Distance				10	km	
Coupled Fiber		Single-mode fiber				9/125 µm G.652

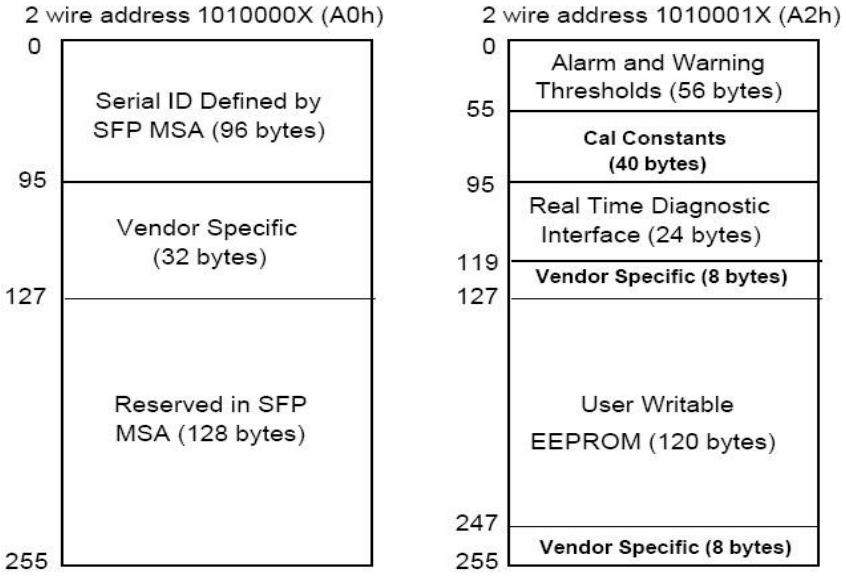
Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter						
Average Output Power	P_{OUT}	-8.2		+0.5	dBm	
Extinction Ratio	ER	3			dB	
Center Wavelength	λ_C	1290	1310	1330	nm	DFB Laser
Side Mode Suppression Ratio	SMSR	30			dBm	DFB Laser
Spectrum Width (RMS)	σ			1	nm	
Transmitter OFF Output Power	P_{Off}			-30	dBm	
Output Eye Mask	Compatible with IEEE 802.3ae					
Receiver						
Input Optical Wavelength	λ_{IN}	1260		1610	nm	
Rx Sensitivity	R_{SENS1}			-14.4	dBm	1
Rx Sensitivity (OMA)	R_{SENS2}			-10.3	dBm	2
Input Saturation Power (Overload)	PSAT	-3			dBm	
Loss of Signal Assert	P_A	-30			dBm	
Loss of Signal De-assert	P_D			-15.4	dBm	
LOS Hysteresis	P_D-P_A	0.5		6	dB	

Notes:

1. With worst-case extinction ratio. Measured with a PRBS 2^{31}-1 test pattern, @10.3125 Gb/s, BER < 10^{-12}.
2. Valid between 1260 nm and 1355 nm. Per IEEE 802.3ae.

Digital Diagnostic Memory Map



Digital Diagnostic Monitoring Information

Parameter	Unit	Accuracy
Case Temperature	°C	±3
Supply Voltage	V	±3%
Tx Bias Current	mA	±10%
Tx Optical Power	dB	±3
Rx Optical Power	dB	±3

Electrical Interface Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	V_{CC}	3.13	3.30	3.47	V	
Supply Current	I_{CC}		200	285	mA	
Transmitter						
Input Different Impedance	R_{in}	90	100	110	Ω	1
Single-Ended Data Input Swing	$V_{in, pp}$	180		700	mV	
Transmitter Disable Voltage	VDIS	2		VCC	V	
Transmitter Enable Voltage	VEN	0		0.8	V	
Receiver						
Output Difference Impedance	R_{out}	90	100	110	Ω	1
Single-Ended Data Output Swing	$V_{out, pp}$	300		850	mV	2

LOS Asserted	V_{LOSA}	2	VCCHOST	V	3
LOS De-Asserted	V_{LOSD}	0	0.8	V	3

Notes:

1. Connected directly to TX data input pins. AC coupled thereafter.
2. Into 100 Ω differential termination.
3. Loss Of Signal is LVTTL. Logic “0” indicates normal operation; logic “1” indicates no signal detected.

Regulatory Compliance

Feature	Reference	Performance
Electrostatic Discharge (ESD)	IEC/EN 61000-4-3	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

Ordering Information

Product Name	Product Description
SFPP-ATLP-31-10	SFP+ plug-in, 10 Gbps, 10 km, TX=1310/RX wide, on two single-mode fibers, LC/PC Blue
SFPP-ATLP-31-10A	SFP+ plug-in, 10 Gbps, 10 km, TX=1310/RX wide, on two single-mode fibers, LC/PC Blue, Industrial Temp

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Ver. ACT_SFPP-ATLP-31-10_Datasheet_V1cc_Jan_2021