

1.25 Gb/s 1310 nm Single-mode SFP Transceiver



SFP Series

- Up to 1.25 Gb/s data links
- DFB laser transmitter and PIN photo-detector
- Up to 40km on 9/125 μ m SMF
- Hot-pluggable SFP footprint
- Duplex LC/UPC type pluggable optical interface
- Low power consumption
- Metal enclosure, for lower EMI
- RoHS compliant and lead-free
- Single +3.3V power supply
- Support Digital Diagnostic Monitoring interface
- Compliant with SFF-8472

ASCENT's 1.25 Gb/s 1310 nm single-mode SFP transceivers provide a flexible and reliable interface solution for switches, routers, servers, and other optical networking applications. The modules are fully compliant with the Small Form Factor Pluggable (SFP) Multi-Source Agreement (MSA), ensuring broad compatibility across industry-standard platforms.

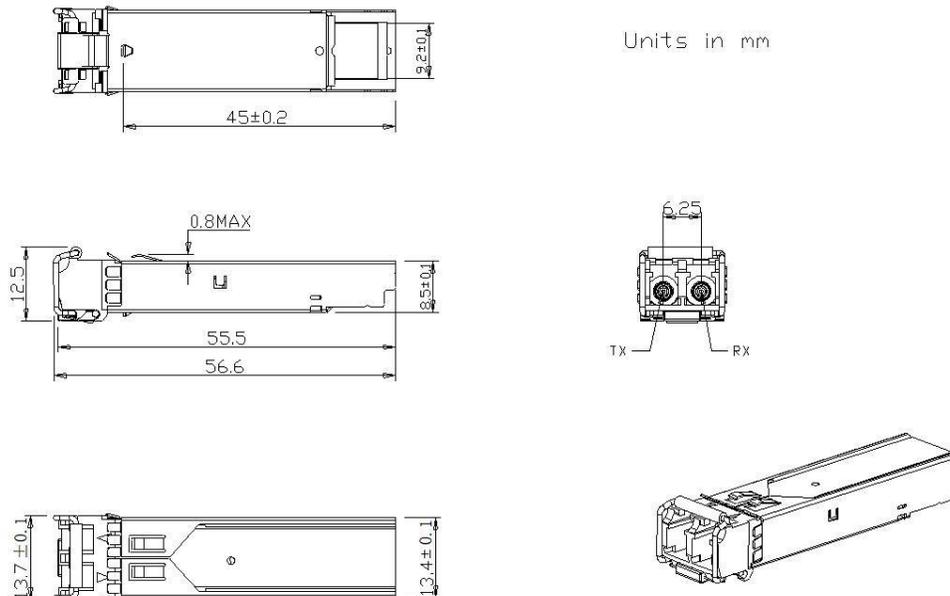
The transceiver integrates key functional components including a laser driver, limiting amplifier, digital diagnostic monitoring (DDM) interface, 1310 nm DFB laser transmitter, and PIN photodetector receiver. It supports data transmission over distances of up to 40 km on 9/125 μ m single-mode fiber, delivering stable performance for long-reach applications.

The module supports comprehensive control and monitoring features. The optical output can be disabled via a TTL high-level Tx Disable input, and the module can also be controlled through the I²C interface. A Tx Fault signal indicates laser degradation, while a Loss of Signal (LOS) output notifies the system of input signal loss or link status changes. These status signals—including LOS, Tx Disable, and Tx Fault—can also be accessed through I²C registers for enhanced system management.

Key Features

- Up to 1.25 Gb/s data links
- DFB laser transmitter and PIN photo-detector
- Up to 40 km on 9/125 μ m SMF
- Hot-pluggable SFP footprint
- Duplex LC/UPC type pluggable optical interface
- Low power consumption
- Metal enclosure, for lower EMI
- RoHS compliant and lead-free
- Single +3.3V power supply
- Support Digital Diagnostic Monitoring interface
- Compliant with SFF-8472
- Operating case temperature
Commercial: 0°C to +70°C
Industrial: -40°C to +85°C

Outline Diagram



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	Vcc	-0.5		4	V	
Signal Input Voltage		-0.3		Vcc+0.3	V	
Receiver Damage Threshold		+5			dBm	

Recommended Operating Conditions

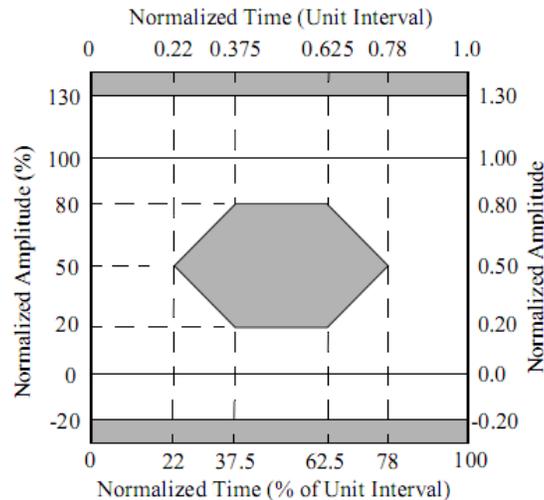
Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Case Operating Temperature	Tcase	0		70	°C	SFP-AG-LP-31-40
		-40		85		SFP-AG-LP-31-40A
Power Supply Voltage	Vcc	3.13	3.3	3.47	V	
Power Supply Current	Icc			280	mA	
Power Supply Noise Rejection				100	mVp-p	100 Hz to 1 MHz
Data Rate			1250/1250		Mbps	TX Rate/RX Rate
Transmission Distance				40	km	
Coupled Fiber	Single-mode fiber					9/125 μm SMF

Transmitter Specifications

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Average Output Power	P _{OUT}	-5		0	dBm	1
Extinction Ratio	ER	9			dB	
Center Wavelength	λ _c	1290	1310	1330	nm	DFB Laser
Side Mode Suppression Ratio	SMSR	30			dB	
Spectrum Bandwidth(-20dB)	σ			1	nm	
Transmitter OFF Output Power	P _{off}			-45	dBm	
Differential Line Input Impedance	RIN	90	100	110	Ω	
Output Eye Mask	Compliant with IEEE802.3 z (class 1 laser safety)					2

Notes:

1. Measure at 2⁷-1 NRZ PRBS pattern
2. Transmitter eye mask definition



Receiver Specifications

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Input Optical Wavelength	λ_{IN}	1270		1610	nm	PIN-TIA
Receiver Sensitivity	P_{IN}			-24	dBm	1
Input Saturation Power (Overload)	P_{SAT}	-1			dBm	
Loss Of Signal Assert	P_A			-25	dBm	
Loss Of Signal De-assert	P_D	-38			dBm	2
LOS Hysteresis	P_A-P_D	0.5	2	6	dB	

Notes

1. Measured with Light source 1310 nm, ER = 9 dB; BER $\leq 10^{-12}$ @ PRBS = 2^7-1 NRZ.
2. When LOS de-asserted, the RX data \pm output is high-level (fixed)

Electrical Interface Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter						
Total Supply Current	I_{CC}			A	mA	1
Transmitter Disable Input-High	V_{DISH}	2		$V_{CC}+0.3$	V	
Transmitter Disable Input-Low	V_{DISL}	0		0.8	V	
Transmitter Fault Input-High	V_{TXFH}	2		$V_{CC}+0.3$	V	
Transmitter Fault Input-Low	V_{TXFL}	0		0.8	V	
Receiver						
Total Supply Current	I_{CC}			B	mA	1
LOSS Output Voltage-High	V_{LOSH}	2		$V_{CC}+0.3$	V	LVTTL
LOSS Output Voltage-Low	V_{LOSL}	0		0.8	V	

Notes

1. A (TX) + B (RX) = 280mA (Not include termination circuit)

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 SFP-AG-LP-31-40 transceivers support the 2-wire serial communication protocol as defined in the SFP MSA. It is very closely related to the E2PROM defined in the GBIC standard, with the same electrical specifications.

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

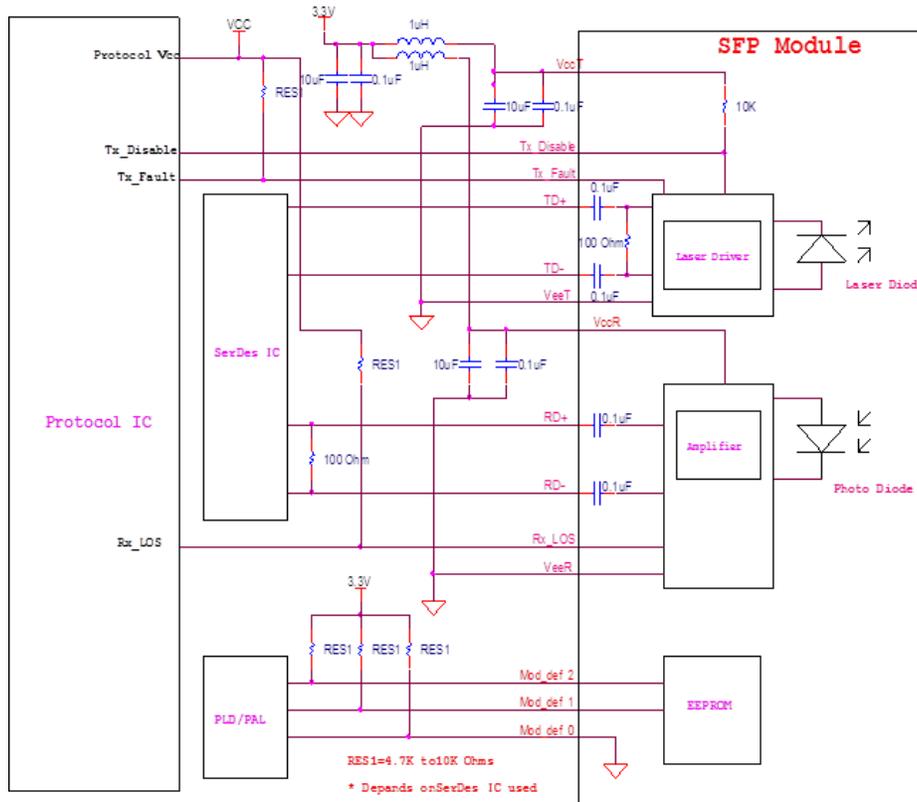
Additionally, ASCENT SFP transceivers provide a unique enhanced digital diagnostic monitoring interface, which allows real-time access to device operating parameters such as transceiver temperature, laser bias current, transmitted optical power, received optical power and transceiver supply voltage. 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 E2PROM 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 interface is identical to, and is thus fully backward compatible with both the GBIC Specification and the SFP Multi Source Agreement.

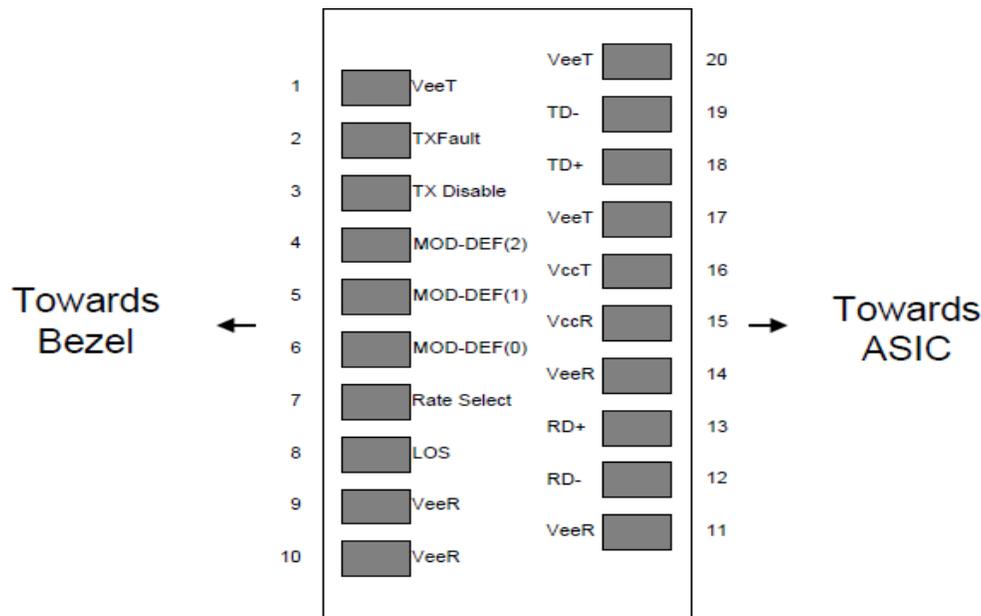
The operating and diagnostics information is monitored and reported by a Digital Diagnostics Transceiver Controller (DDTC) inside the transceiver, which is accessed through a 2-wire serial interface. When the serial protocol is activated, the serial clock signal (SCL, Mod Def 1) is generated by the host. 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.

Digital diagnostics for the SFP-AG-LP-31-40-A are internally calibrated by default.

Recommended Interface Circuit



Pin Description



Pin	Symbol	Name/Description	Note
1	V _{EET}	Transmitter Ground (Common with Receiver Ground)	1
2	T _{FAULT}	Transmitter Fault.	
3	T _{DIS}	Transmitter Disable. Laser output disabled on high or open.	2
4	MOD_DEF(2)	Module Definition 2. Data line for Serial ID.	3
5	MOD_DEF(1)	Module Definition 1. Clock line for Serial ID.	3
6	MOD_DEF(0)	Module Definition 0. Grounded within the module.	3
7	Rate Select	No connection required	4
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation.	5
9	V _{EER}	Receiver Ground (Common with Transmitter Ground)	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:

- Circuit ground is internally isolated from chassis ground.
- Laser output disabled on T_{DIS} >2.0V or open, enabled on T_{DIS} <0.8V.
- Should be pulled up with 4.7k - 10kΩ on host board to a voltage between 2.0V and 3.6V. MOD_DEF (0) pulls line low to indicate module is plugged in.
- This is an optional input used to control the receiver bandwidth for compatibility with multiple data rates (most likely Fiber Channel 1x and 2x Rates). If implemented, the input will be internally pulled down with > 30kΩ resistor. The input states are:
 - Low (0 – 0.8V): Reduced Bandwidth
 - (>0.8, < 2.0V): Undefined
 - High (2.0 – 3.465V): Full Bandwidth
 - Open: Reduced Bandwidth
- LOS is open collector output should be pulled up with 4.7k - 10kΩ on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

Ordering Information

Product Name	Product Description
SFP-AG-LP-31-40	SFP Plug-in, 1.25Gbps, 40km, TX=1310/RX wide, on two single mode fibers, LC/PC Blue
SFP-AG-LP-31-40A	SFP Plug-in, 1.25Gbps, 40km, TX=1310/RX wide, on two single mode fibers, LC/PC Blue, Industrial Temp -40 °C to +85 °C
JSP-AG-LP-31-40	SFP Plug-in, 1.25Gbps, 40km, TX=1310/RX wide, on two single mode fibers, LC/PC Blue, Compatible with Juniper
JSP-AG-LP-31-40A	SFP Plug-in, 1.25Gbps, 40km, TX=1310/RX wide, on two single mode fibers, LC/PC Blue, Compatible with Juniper, Industrial Temp -40 °C to +85 °C

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