1.25 Gb/s 1310 nm Single-Mode SFP Transceiver

SFP Series

- Up to 1.25 Gb/s data links
- 1310 nm FP laser transmitter and PIN photo-detector
- Up to 10(20) km on 9/125 µm SMF
- Hot-pluggable SFP footprint
- Duplex LC/UPC
- Low power consumption
- RoHS compliant and lead-free
- Single +3.3 V power supply
- Supports Digital Diagnostic Monitoring interface
- Compliant with SFF-8472
- Compliant with IEEE802.3z

ASCENT's SFP-AG-LP-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/TIA. The module data link up to 20 km in 9/125 µm Single-mode fiber.

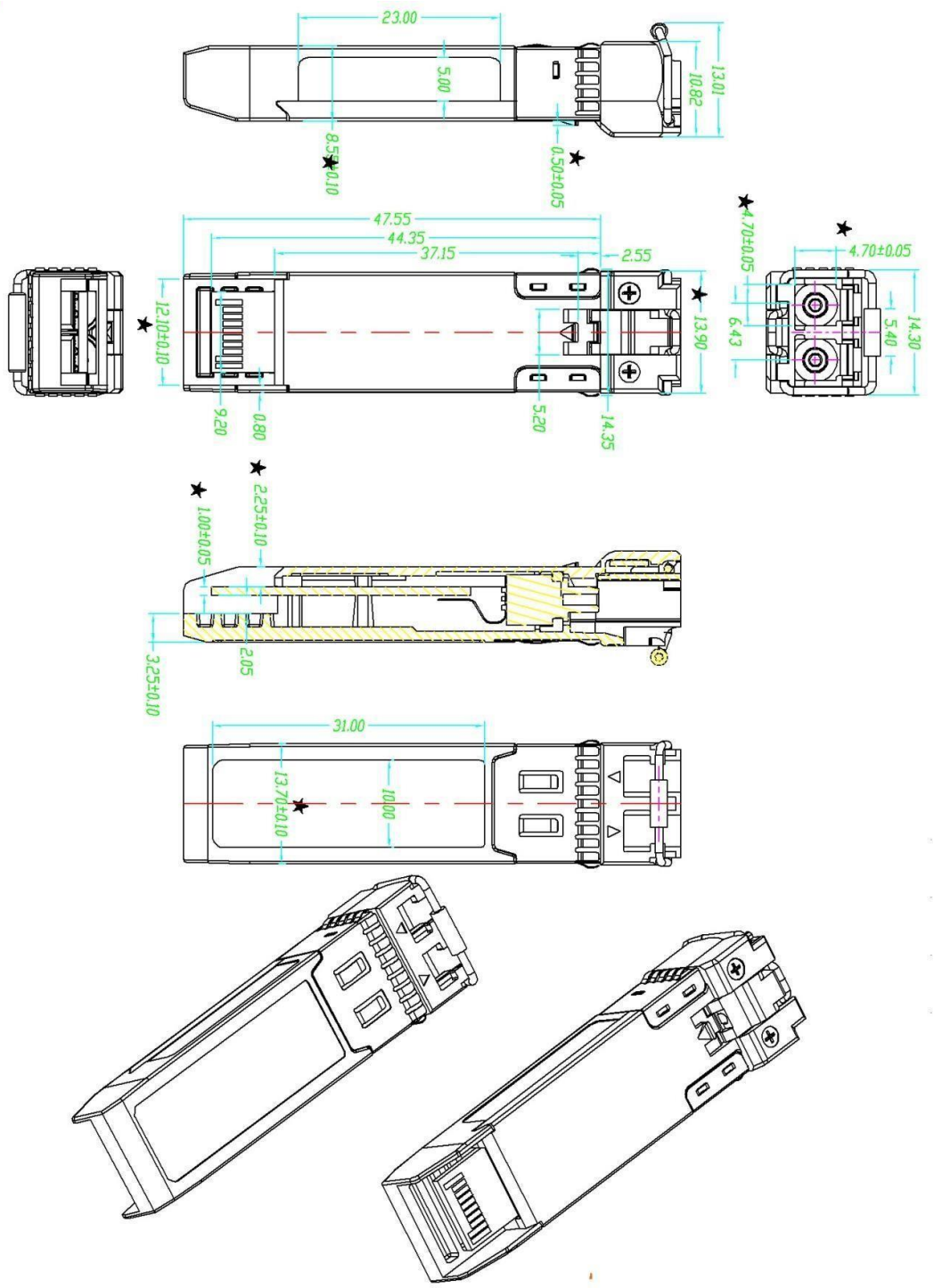
This transceiver meets the Small Form Pluggable (SFP) industry standard package utilizing an integral LC-Duplex optical interface connector. An enhanced Digital Diagnostic Monitoring Interface compliant with SFF-8472 has been incorporated into the transceiver. It allows real time access to the transceiver operating parameters such as transceiver temperature, laser bias current, transmitted optical power, and received optical power and transceiver supply voltage by reading a built-in memory with I2C interface.

The optical output can be disabled by a LVTTL 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.

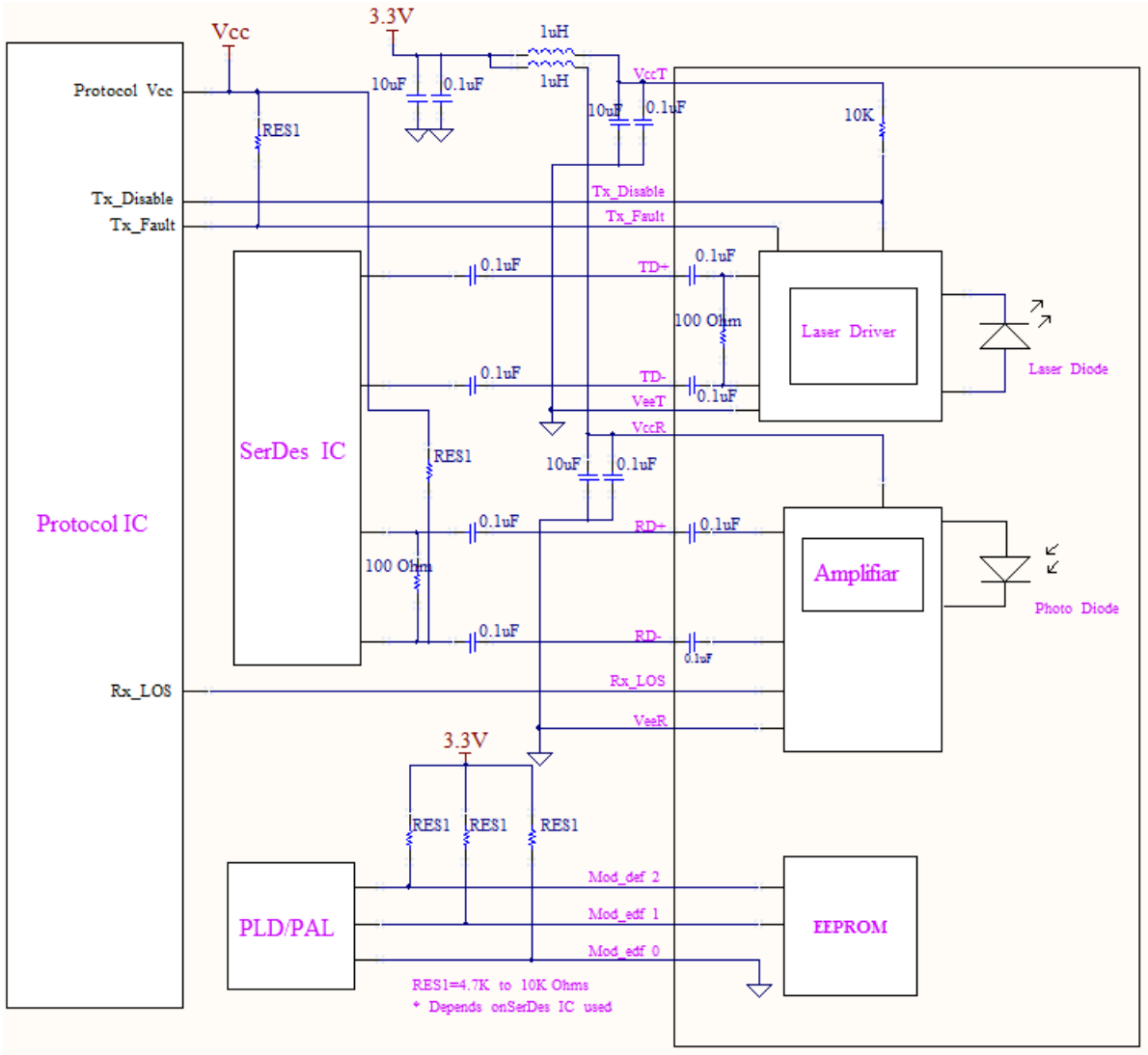
Key Features

- Up to 1.25 Gb/s data links
- FP laser transmitter and PIN photo-detector
- Up to 10(20) km on 9/125 μm 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 +3.3 V power supply
- Supports Digital Diagnostic Monitoring interface
- Compliant with SFF-8472 and IEEE802.3z
- Switch to Switch Interface
- Gigabit Ethernet
- Switched Backplane Applications
- Router/Server Interface
- Other Optical Links

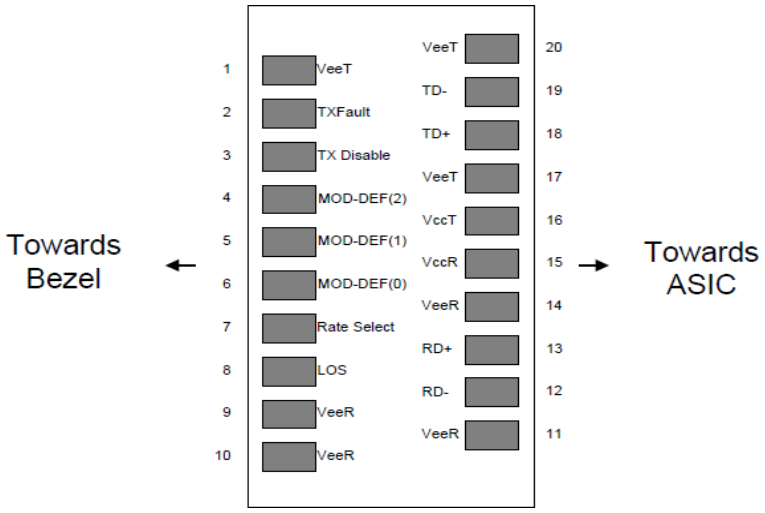
Outline Diagram



Recommend Circuit Schematic



Pin Description



Pin out of Connector Block on Host Board

Pin Descriptions

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.	4
6	MOD_DEF(0)	Module Definition 0. Grounded within the module.	4
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:

1. Circuit ground is internally isolated from chassis ground.

2. TX Fault is an open drain output, which should be pulled up with 4.7 kΩ to 10 kΩ resistor on the host board. Pull up voltage between 2.0 V to V_{ccT}/R+0.3 V. When high, output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to <0.8 V. When sensing an improper power level in the laser driver, the SFP sets this signal high and turns off the laser. TX-FAULT can be reset with the TX-DISABLE line. The signal is in LVTTL level.

3. TX disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with 4.7 kΩ to 10 kΩ resistor. Its states are: Low (0 V to 0.8 V): Transmitter on; (>0.8 V, <2.0 V): Undefined; High (2.0 V to V_{ccT}/R+0.3 V): Transmitter Disabled; Open: Transmitter Disabled. The TX-DISABLE signal is high (LVTTL logic "1") to turn off the laser output. The laser will turn on when TX-DISABLE is low (LVTTL logic "0").

4. Should be pulled up with 4.7 kΩ to 10 kΩ on host board to a voltage between 2.0 V to V_{ccT}/R+0.3 V. MOD_DEF(0) pulls line low to indicate module is plugged in.

5. LOS (Loss of Signal) is an open collector/drain output, which should be pulled up with 4.7 kΩ to 10 kΩ resistor. Pull up voltage between 2.0 V to V_{ccT}/R+0.3 V. When high, this output indicates the received optical power is below the worst-case receiver sensitivity (as defined by the standard in use). Low indicates normal operation. In the low state, the output will be pulled to <0.8 V.

The RX-LOS is high (LVTTL logic "1") when there is no incoming light from the companion transceiver. This signal is normally used by the system for the diagnostic purpose. The signal is operated in LVTTL level.

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	Commercial
		-40		+85	°C	Industrial
Ambient Humidity	H_A	5		70	%	Non-condensing
Power Supply Voltage	V_{CC}	3.13	3.3	3.47	V	

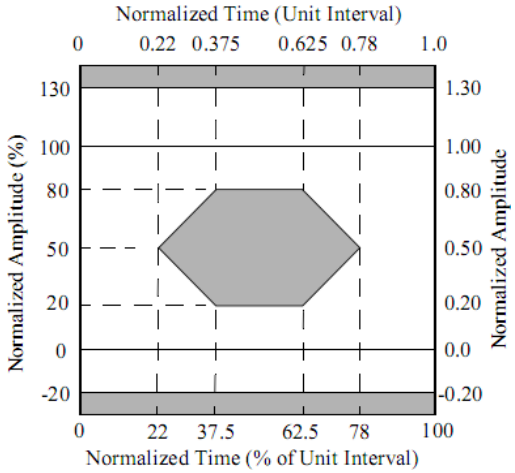
Power Supply Current	I_{CC}		280	mA	
Data Rate		1250/1250		Mbps	TX rate/RX rate
Transmission Distance			20	km	
Coupled Fiber	Single-mode fiber				9/125 µm G.652

Specification of Transmitter

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Average Output Power	P_{OUT}	-9		-3	dBm	
Extinction Ratio	ER	9			dB	
Center Wavelength	λ_C	1260	1310	1360	nm	
Spectrum Bandwidth (RMS)	σ			3.5	nm	FP Laser
Transmitter OFF Output Power	P_{Off}			-45	dBm	
Jitter p-p	t_J			0.1	UI	1
Output Eye Mask	Compliant with IEEE802.3z (class 1 laser safety)					2

Notes:

1. Measure at 2^7-1 NRZ PRBS pattern.
2. Transmitter eye mask definition.



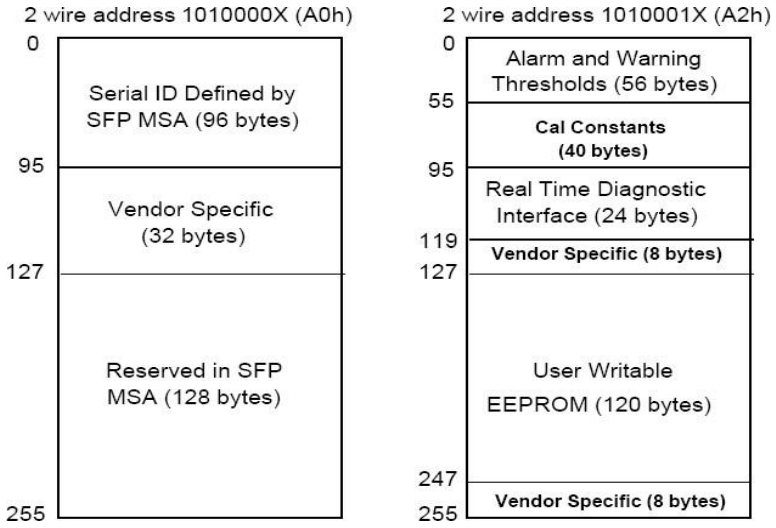
Specification of Receiver

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Input Optical Wavelength	λIN	1270		1610	nm	
Receiver Sensitivity	PIN			-24	dBm	1
Input Saturation Power (Overload)	PSAT	-3			dBm	
Loss of Signal Assert	PA	-45			dBm	
Loss of Signal De-assert	PD			-24.5	dBm	2
LOS Hysteresis	PD-PA	0.5		6	dB	

Notes:

1. Measured with light source 1310 nm, ER = 9 dB; BER ≤ 10^{-12} @ PRBS = 2^7-1 NRZ
2. When LOS De-asserted, the RX data± output is signal output.

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
Transmitter						
Total Supply Current	I_{CC}			A	mA	1
Transmitter Disable Input-High	V_{DISH}	2		Vcc+0.3	V	LVTTL
Transmitter Disable Input-Low	V_{DISL}	0		0.8	V	LVTTL
Transmitter Fault Input-High	V_{TxFH}	2		Vcc+0.3	V	LVTTL
Transmitter Fault Input-Low	V_{TxFL}	0		0.8	V	LVTTL
Receiver						
Total Supply Current	I_{CC}			B	mA	1
LOS Output Voltage-High	V_{LOSH}	2		Vcc+0.3	V	LVTTL
LOS Output Voltage-Low	V_{LOSL}	0		0.8	V	LVTTL

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

Ordering Information

Product Name	Product Description
SFP-AG-LP-31-10	SFP Plug-in, 1.25 Gbps, 10 km, TX=1310/RX wide, on two single-mode fibers, LC/PC Blue
SFP-AG-LP-31-10A	SFP Plug-in, 1.25 Gbps, 10km, TX=1310/RX wide, on two single mode fibers, LC/PC Blue, Industrial Temp -40 °C to +85 °C
JSP-AG-LP-31-10	SFP Plug-in, 1.25 Gbps, 10 km, TX=1310/RX wide, on two single-mode fibers, LC/PC Blue, Compatible with Juniper
JSP-AG-LP-31-10A	SFP Plug-in, 1.25 Gbps, 10km, TX=1310/RX wide, on two single mode fibers, LC/PC Blue, Compatible with Juniper, Industrial Temp -40 °C to +85 °C

Contact Information

Ascent Communication Technology Ltd

AUSTRALIA
140 William Street, Melbourne
Victoria 3000, AUSTRALIA
Phone: +61-3-8691 2902

CHINA
Unit 1933, 600 Luban Road
200023, Shanghai, CHINA
Phone: +86-21-60232616

EUROPE
Pfarrer-Bensheimer-Strasse 7a
55129 Mainz, GERMANY
Phone: +49 (0) 6136 926 3246

Hong Kong SAR
Unit 9, 12th Floor, Wing Tuck Commercial Centre
177 Wing Lok Street, Sheung Wan, Hong Kong SAR
Phone: +852-2851 4722

USA
2710 Thomes Ave
Cheyenne, WY 82001, USA
Phone: +1 203 350 9822

VIETNAM
11th Floor, Hoa Binh Office Tower
106 Hoang Quoc Viet Street, Nghia Do Ward
Cau Giay District, Hanoi 10649, VIETNAM
Phone: +84-24-37955917

Ver. ACT_SFP-AG-LP-31-10_Datasheet_V1g_Dec_2020