

6.25 Gb/s 1310 nm Single-Mode SFP+ Transceiver

SFP+ Series

- Up to 6.25 Gb/s data links
- Up to 15 km transmission distance on SMF
- FP transmitter and PIN photo-detector
- Metal enclosure
- Low power dissipation
- 2-wire interface with integrated digital diagnostic monitoring
- Hot-pluggable SFP+ footprint
- Compliant with SFF 8431 and SFF 8472



Ascent's SFP+ transceivers are designed for use in 6.25 Gigabit Ethernet links with distances up to 15 km over single-mode fiber. These transceivers include a PIN photo detector diode and FP transmitter. Digital diagnostic functions are available via a 2-wire interface.

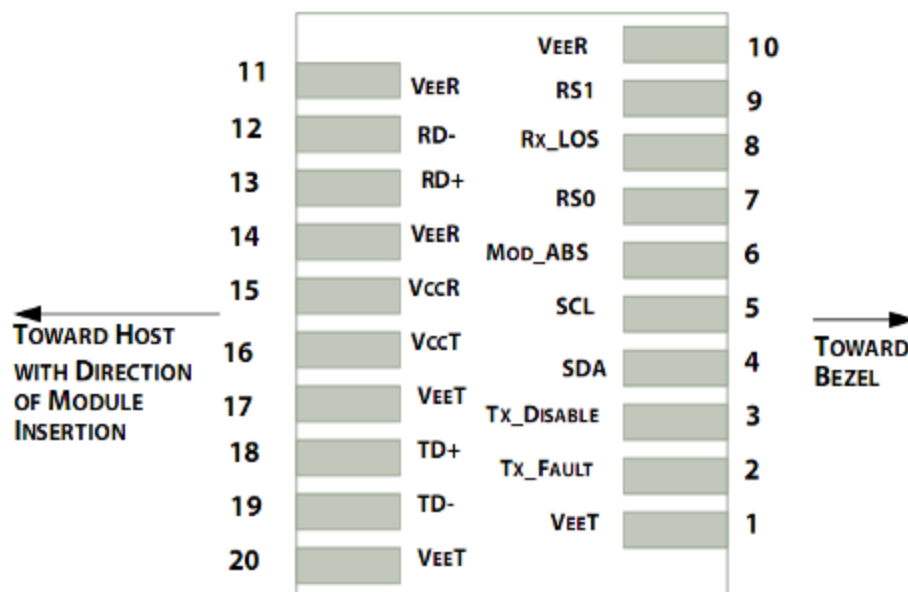
Ascent's SFP+ transceivers provide a unique enhanced digital diagnostic monitoring interface which allows real-time access to device operating parameters such as transceiver temperature, laser bias current, transmitted optical power, received optical power, and transceiver supply voltage. It also defines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

Ascent's 6.25G SFP+ transceivers are compliant with SFF 8431 and SFF 8472 standards, and offer a convenient solution for high-speed storage area networks, OBSAI and CPRI applications, and LTE optical repeater applications.

Key Features

- Up to 15 km transmission distance
- FP transmitter and PIN photo-detector
- Duplex LC connector
- Metal enclosure, for lower EMI
- Electrical interface compliant to SFF-8431 specifications
- 2-wire interface for management specifications compliant with SFF-8472
- compliant with SFP+ MSA
- Single 3.3V power supply
- Power dissipation < 1.2W
- Case operating temperature range: Commercial: 0 °C to +70 °C
 Industrial: -40 °C to +85 °C

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

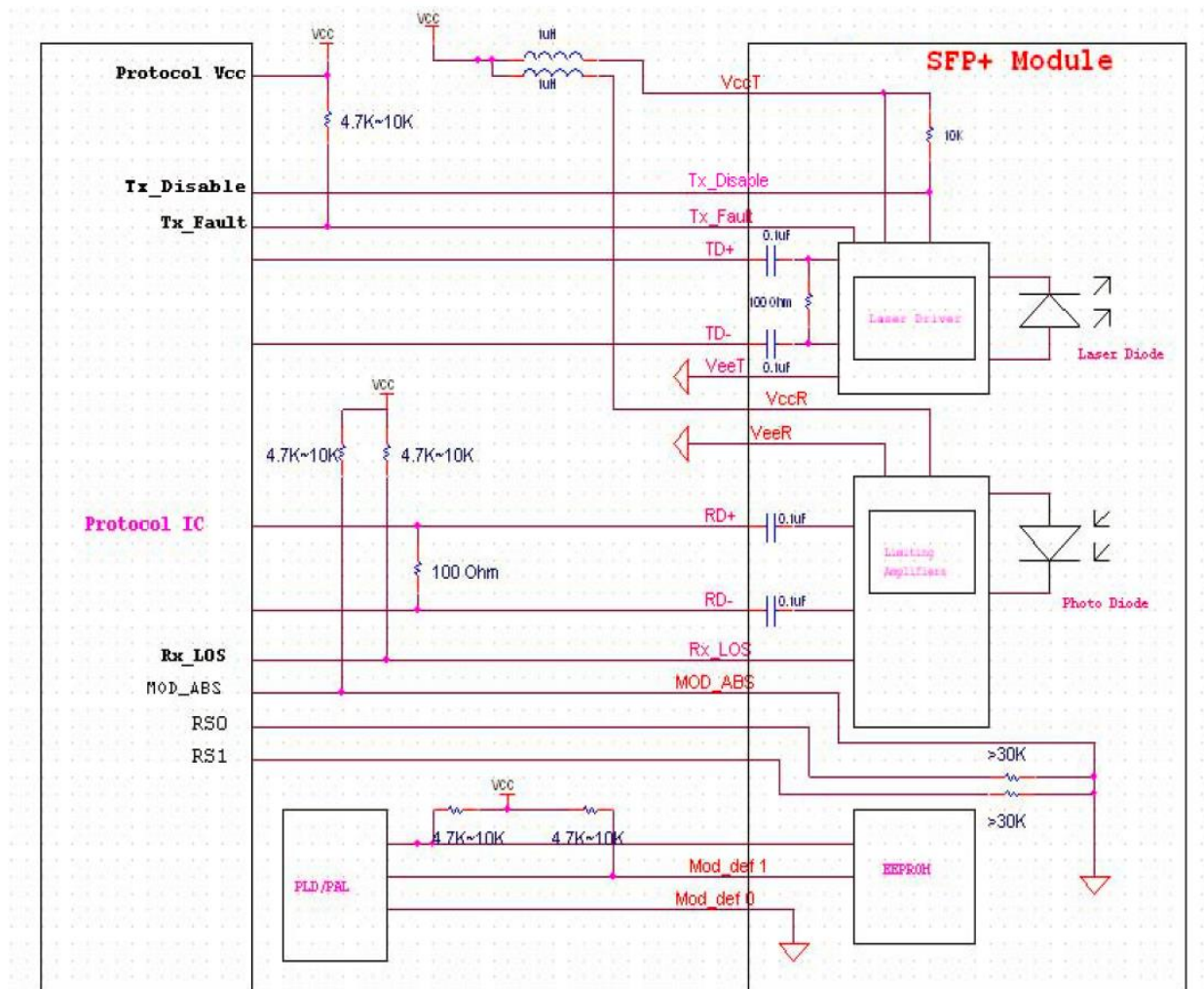
Notes:

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 V_{CC} + 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.

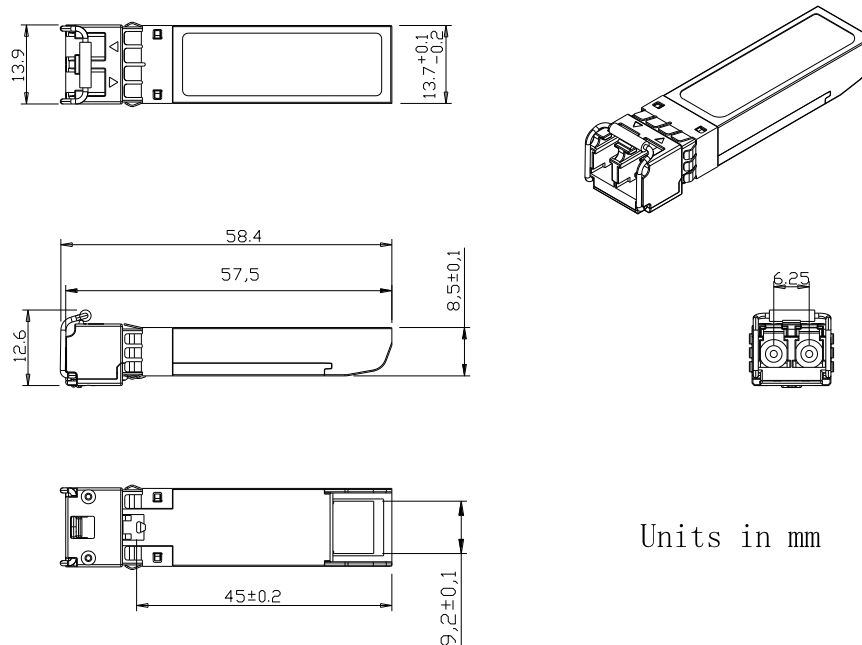
Regulatory Compliance

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

Host – Transceiver Interface Block Diagram



Outline Dimensions



Digital Diagnostic Functions

ASCENT SFPP-A6-LP-31-15 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.

Specifications

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Storage Temperature	Ts	-40	-	85	°C	
Operating Temperature	Ts	-10	-	80	°C	
Relative Humidity	RH	5	-	95	%	
Power Supply Voltage	VCC	-0.3	-	4	V	

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Case Operating Temperature	Tcase	0	-	70	°C	Commercial
		-40	-	85	°C	Industrial
Power Supply Voltage	VCC	3.14	3.3	3.47	V	
Power Supply Current	ICC	-		360	mA	
Data Rate	BR		6.25		Gbps	
Transmission Power			≥318		μW	
Transmission Distance	TD		15		km	
Coupled Fiber	Single-mode fiber					9/125 μm SMF

Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	Vcc	3.15	3.3	3.46	V	
Supply Current	Icc			360	mA	
Transmitter						
Input Differential Impedance	Rin		100		Ω	1
Differential Data Input Swing	V _{in,pp}	180		600	mV	
Transmit Disable Voltage	V _{DIS}	V _{cc} -1.3		V _{cc}	V	
Transmit Enable Voltage	V _{EN}	V _{ee}		V _{ee} + 0.8	V	2
Transmit Disable Assert Time				10	μs	
Receiver						
Differential Data Output Swing	V _{out,pp}	300		850	mV	3
Data Output Rise Time	t _r	28			ps	4
Data Output Fall Time	t _f	28			ps	4
LOS Fault	V _{LOS fault}	V _{cc} -1.3		V _{CCHOST}	V	5
LOS Normal	V _{LOS norm}	V _{ee}		V _{ee} +0.8	V	5

Notes:

1. Connected directly to TX data input pins. AC coupled thereafter.
2. Or open circuit.
3. Into 100 Ω differential termination.
4. 20 % to 80 %.
5. Loss Of Signal is LVTTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.

Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter						
Average Output Power	P _{OUT}	-4.0		0.5	dBm	1
Optical Wavelength	λ	1260		1355	nm	
Center Wavelength			1310		nm	
Spectral Width (RMS)	σ			1	nm	
Optical Extinction Ratio	ER	3.5			dB	
Side Mode Suppression Ratio	SMSR	30			dB	
RIN	RIN			-128	dB/Hz	
Receiver						
Rx Sensitivity	R _{SEN}			-15.0	dBm	2
Input Saturation Power (Overload)	P _{SAT}	0.5			dBm	
Input Optical Wavelength	λ _C	1270		1610	nm	
LOS De -Assert	LOSD			-17	dBm	
LOS Assert	LOSA	-30			dBm	
LOS Hysteresis		0.5	1.0		dB	
Return Loss			12		dB	
Transmission Delay				75	μs	

Notes:

1. Class 1 Laser Safety per FDA/CDRH and IEC-825-1 regulations.
2. Measured with a PRBS 2³¹-1 test pattern @ 6.25 Gb/s, BER<10⁻¹².
3. LC connector follow ANSI TIA/EIA-568-B.1, TIA/EIA604-10 (FOCIS 10), IEC 61754-20 standards.

Ordering Information

Product Name

SFPP-A6-LP-31-15

Product Description

SFP+ plug-in, 6.25G Fibre Channel 1310 nm 15 km single-mode DOM transceiver

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
Phone: +852-2851 4722

USA

2710 Thomes Ave
Cheyenne, WY 82001, USA
Phone: +1-203 816 5188

VIETNAM

15 /F TTC Building, Duy Tan Street
Cau Giay Dist., Hanoi, VIETNAM
Phone: +84 243 795 5917

WEB: www.ascentcomtec.com

EMAIL: sales@ascentcomtec.com

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