6.25 Gb/s 850 nm Multi-Mode SFP+ Transceiver

SFP+ Series

- **Up to 6.25 Gb/s data links with DDM**
- **Up to 300 m transmission distance on MMF**
- **VSCEL 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 DDM SFP+ transceivers are designed for use in 6.25 Gigabit Ethernet links with distances up to 300 m over multi-mode fiber. These transceivers include a PIN photo detector diode and VSCEL transmitter. Digital diagnostic functions are available via a 2-wire interface.

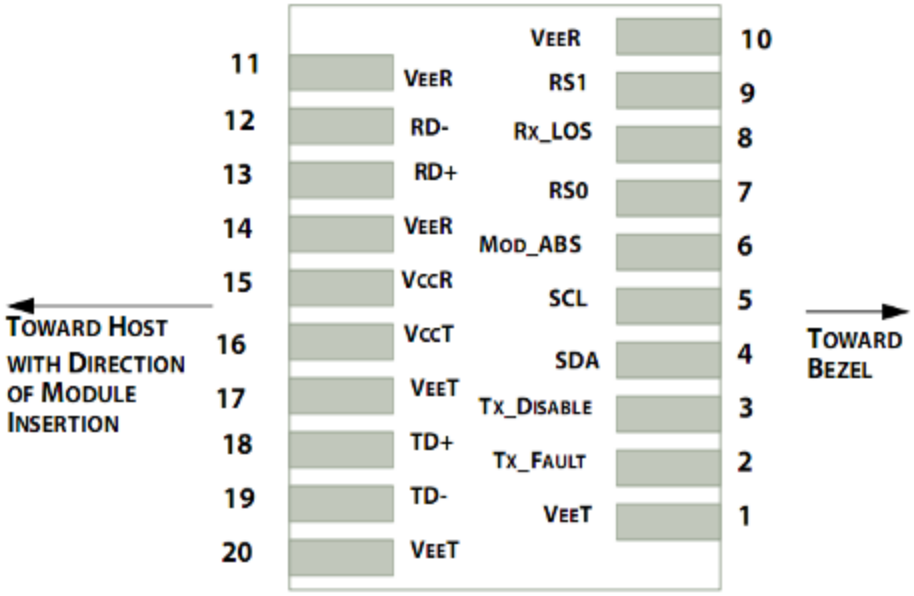
Ascent's SFP+ transceivers provide a unique enhanced digital diagnostic monitoring interface which allows real-time access to device operating parameters such as transceiver temperature, laser bias current, transmitted optical power, received optical power, and transceiver supply voltage. It also defines 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 DDM 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

- Supports up to 6.25 Gb/s bit rates with DDM
- Up to 300 m transmission distance on MMF
- VSCEL transmitter and PIN photo-detector
- Metal enclosure, for lower EMI
- 2-wire interface with integrated digital diagnostic monitoring
- Hot-pluggable SFP+ footprint
- Specifications compliant with SFF 8431 and SFF 8472
- Compliant with SFP+ MSA
- Single 3.3 V power supply

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

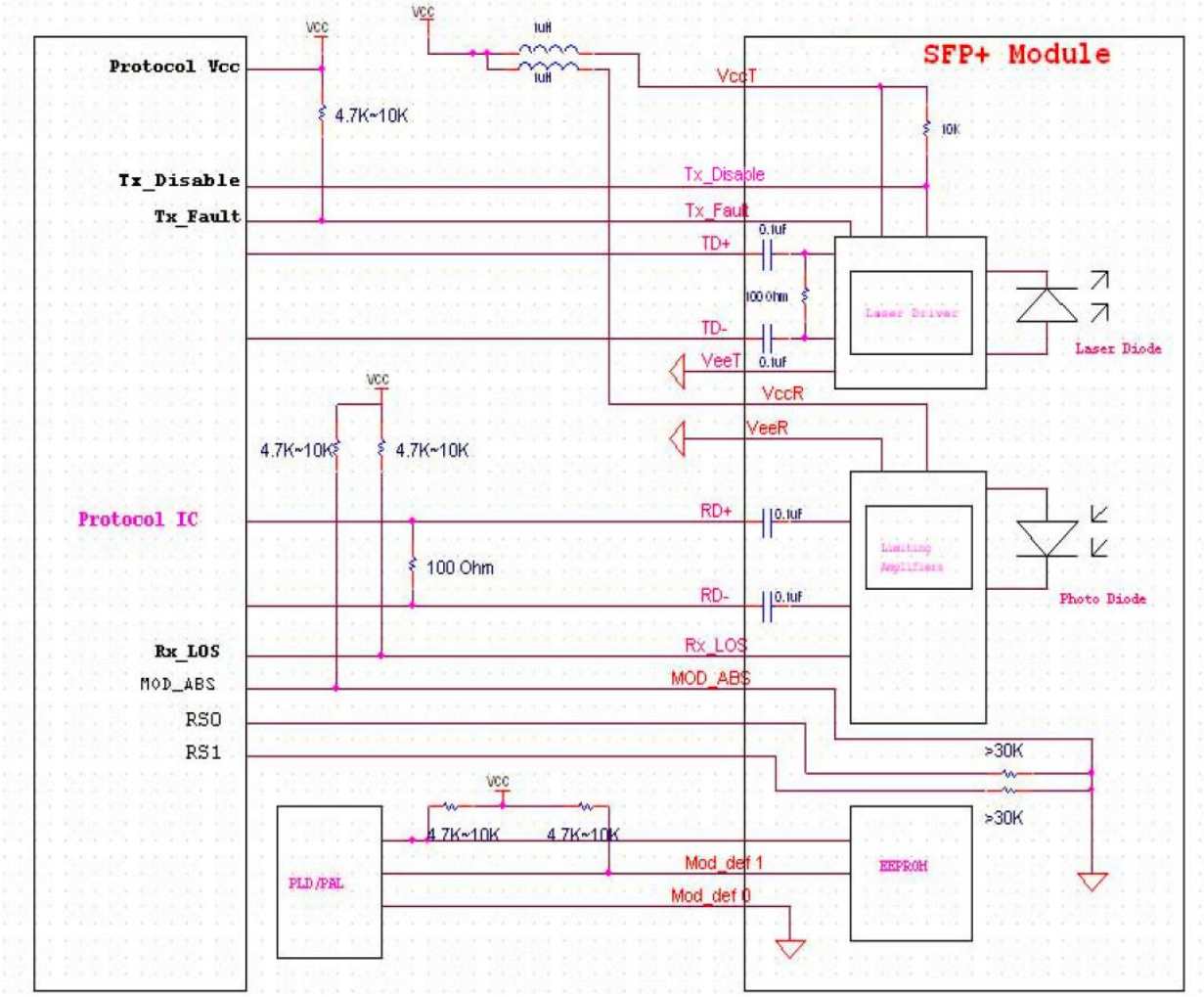
Notes:

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.

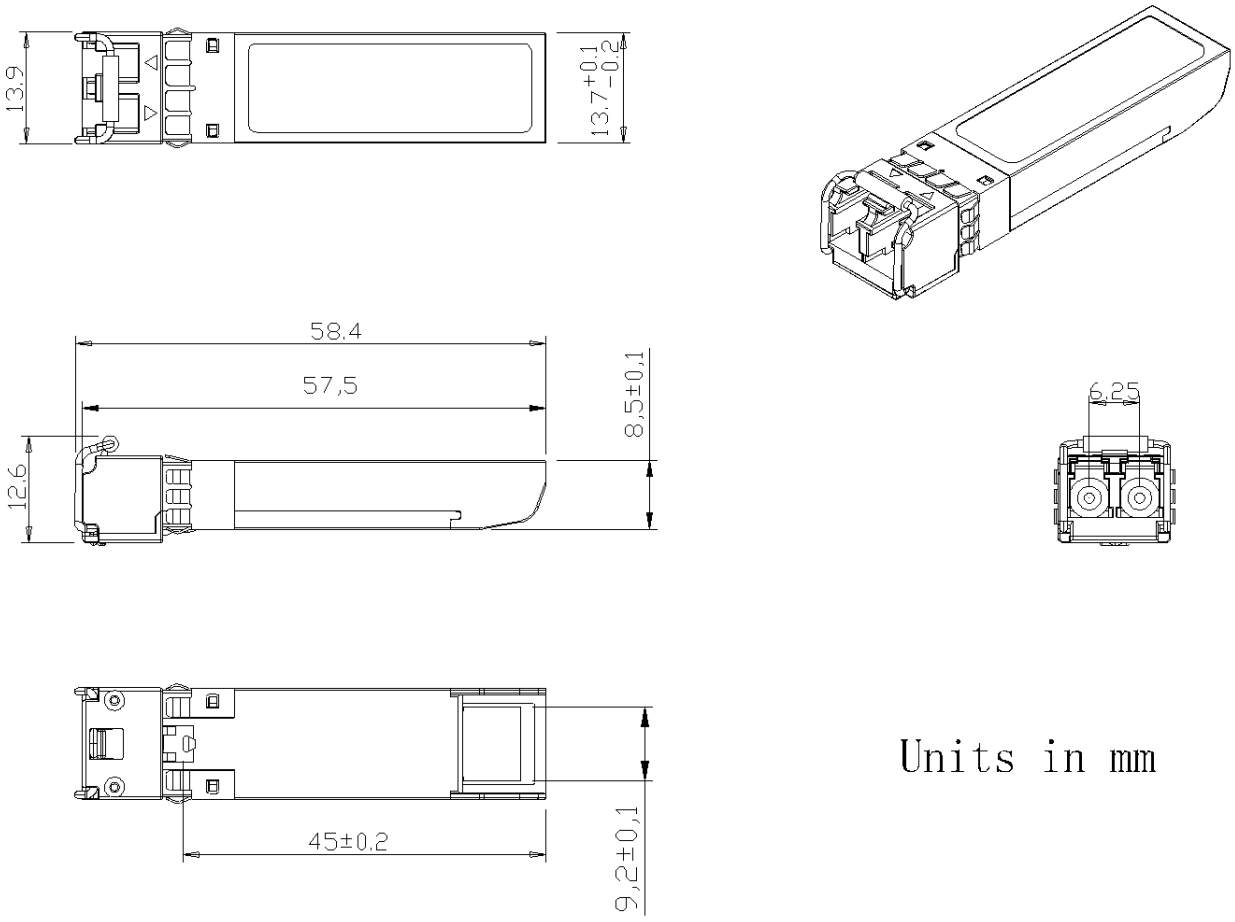
Regulatory Compliance

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

Host – Transceiver Interface Block Diagram



Outline Dimensions



Digital Diagnostic Functions

ASCENT SFPP-A6-LP-85-03 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
Maximum Supply Voltage	Vcc	3.15	-	3.46	V	
Storage Temperature	TS	-40	-	85	°C	
Case Operating Temperature	Tcase	0	-	70	°C	Commercial
		-40	-	85	°C	Industrial

Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	Vcc	3.15	3.3	3.46	V	
Supply Current	Icc			300	mA	
Transmitter						
Input Differential Impedance	Rin		100		Ω	1
Differential Data Input Swing	Vin,pp	180		700	mV	
Transmit Disable Voltage	V_{DIS}	Vcc-1.3		Vcc	V	
Transmit Enable Voltage	V_{EN}	Vee		Vee+ 0.8	V	2
Transmit Disable Assert Time				10	us	
Receiver						
Differential Data Output Swing	Vout,pp	300		850	mV	3
Data Output Rise Time	tr	28			ps	4
Data Output Fall Time	tf	28			ps	4
LOS Fault	$V_{LOS\ fault}$	Vcc-1.3		V_{CCHOST}	V	5
LOS Normal	$V_{LOS\ norm}$	Vee		Vee+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 LVTTL. 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}	-6		-1	dBm	1
Optical Wavelength	λ	830		860	nm	
Spectral Width (RMS)	σ			0.85	nm	
Optical Extinction Ratio	ER	3.5			dB	
RIN	RIN			-128	dB/Hz	
Receiver						
Rx Sensitivity	R_{SEN}			-12	dBm	2
Input Saturation Power (Overload)	P_{SAT}	-1			dBm	
Input Optical Wavelength	λC	830		860	nm	
LOS De -Assert	LOSD			-13	dBm	
LOS Assert	LOSA	-30			dBm	
LOS Hysteresis		0.5	1.0		dB	

Notes:

1. Class 1 Laser Safety per FDA/CDRH and IEC-825-1 regulations.
2. With worst-case extinction ratio. Measured with a PRBS 2^{31}-1 test pattern, BER<10^{-12}.

Ordering Information

Product Name	Product Description
SFPP-A6-LP-85-03	SFP+ Plug-in, 6.25G Fibre Channel 850 nm 300 m DOM Transceiver

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