

16G FC 850 nm Multi-Mode SFP+ Transceiver

SFP+ Series

- Up to 14.3 Gbps data links
- Up to 100 m transmission on OM3 or 150 m on OM4 MMF
- 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 3.3V power supply
- <1 W power dissipation



Ascent's SFPP-16-LP-85-01 SFP+ transceiver is an integrated fiber optic transceiver that provides a high-speed serial link at signaling rates up to 16 Gb/s.

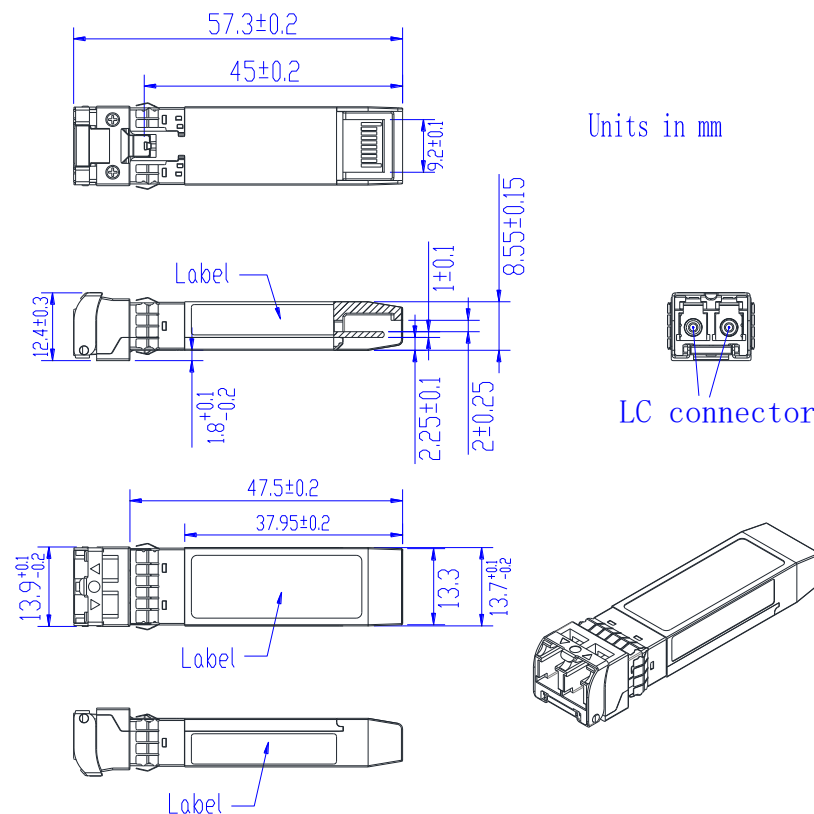
The module complies with SFF-8431 and SFF 8472 standards. It is suitable for 16G Ethernet applications and has a transmission distance of up to 100 m on OM3 and 150 m on OM4 multi-mode fibers.

The SFPP-16-LP-85-01 transceiver features a metal enclosure for lower EMI. It utilizes a 2-wire interface that is compliant with the serial communication protocol as defined in the SFP+ MSA. It also provides a unique integrated digital diagnostic monitoring interface, allowing for real-time access to device operating parameters. This module is also hot-pluggable.

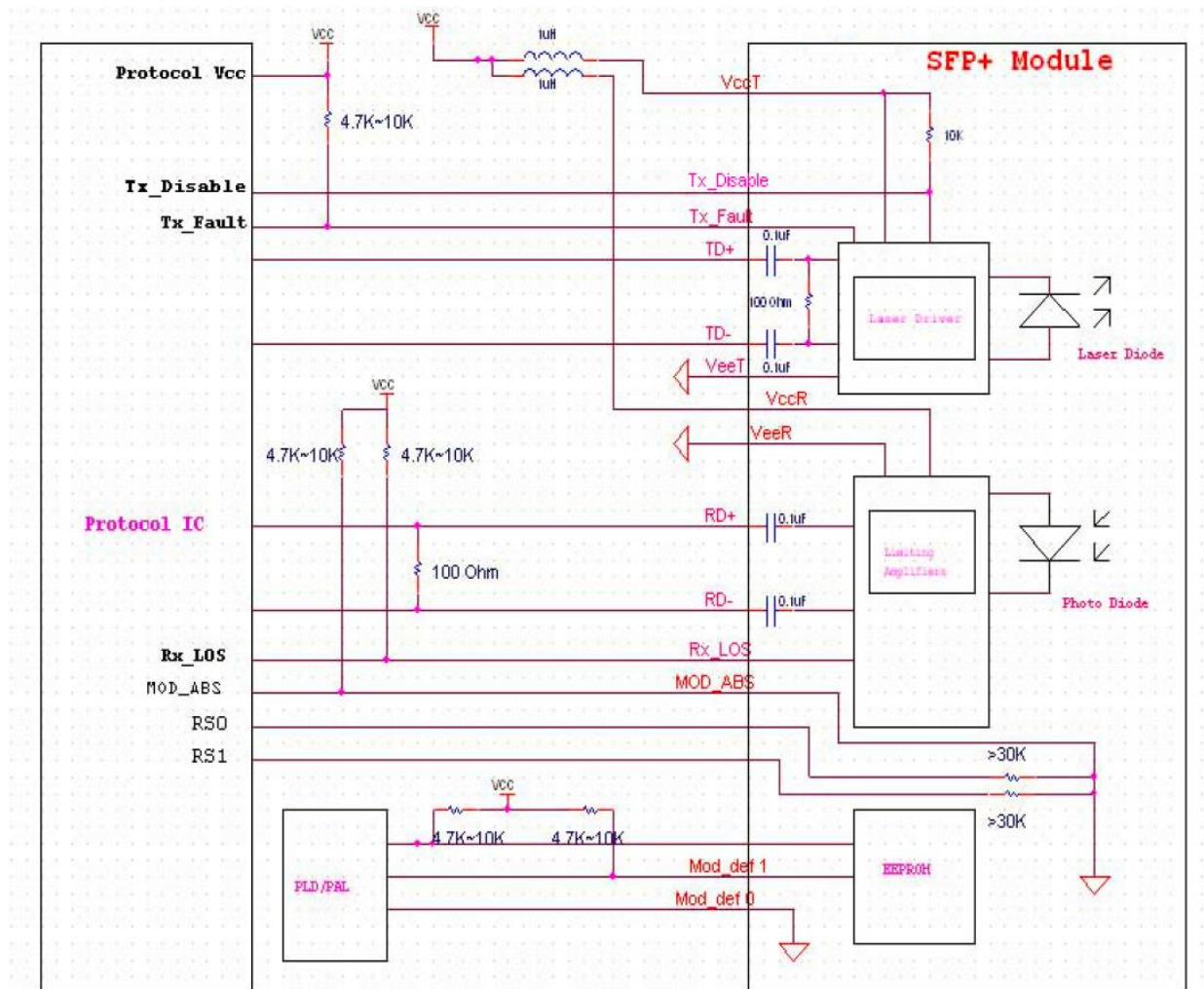
Key Features

- Up to 14.025 Gbps Data Link
- Maximum link length of 100 m links on OM3 or
- 150 m links on OM4 multi-mode fiber
- Power dissipation < 1W
- VSCSEL laser and PIN 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 3.3V power supply
- Case operating temperature range: Commercial: 0 °C to +70 °C

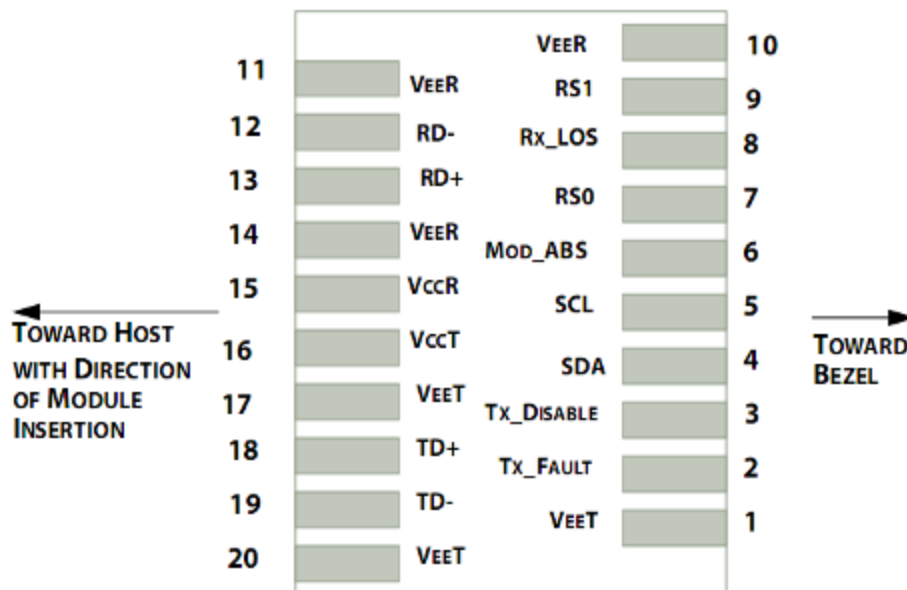
Outline Dimensions



Host – Transceiver Interface Block Diagram



Pin Assignment



Pin out of Connector Block on Host Board

Pin	Symbol	Name/Description	Note
1	VEET	Transmitter Ground (Common with Receiver Ground)	1
2	TFAULT	Transmitter Fault.	2
3	TDIS	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	VEER	Receiver Ground (Common with Transmitter Ground)	1
11	VEER	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	VEER	Receiver Ground (Common with Transmitter Ground)	1
15	VCCR	Receiver Power Supply	
16	VCCT	Transmitter Power Supply	
17	VEET	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	VEET	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 k Ω to 10 k Ω 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 k Ω to 10 k Ω 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 k Ω to 10 k Ω 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

Specifications

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Storage Temperature	T_s	-40	-	85	$^{\circ}\text{C}$	
Relative Humidity	RH	5	-	95	%	
Power Supply Voltage	VCC	-0.3	-	4	V	
Signal Input Voltage		$V_{CC}-0.3$	-	$V_{CC}+0.3$	V	

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Case Operating Temperature	T_{case}	0	-	70	$^{\circ}\text{C}$	Commercial
Power Supply Voltage	VCC	3.14	3.3	3.47	V	
Power Supply Current	ICC	-		300	mA	
Data Rate	BR			14.025	Gbps	
Transmission Distance	TD		-	150	m	OM4 or 100m OM3
Coupled Fiber						50/125um OM4

Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Transmitter						

Output Opt. Power	P _{OUT}	-7.8	2.4	dBm	1
Optical Wavelength	λ	840	850	860	nm
Spectral Width (RMS)	σ			0.6	nm
Optical Extinction Ratio	ER	3.0			dB
RIN	RIN			-128	dB/Hz
Receiver					
Rx Sensitivity	R _{SENS}			-10.5	dBm
Input Saturation Power (Overload)	Psat	0			dBm
Wavelength Range	λ_c	770	850	860	nm
LOS De -Assert	LOSD			-13	dBm
LOS Assert	LOSA	-30			dBm
LOS Hysteresis		0.5			dB

Notes:

1. Class 1 Laser Safety per FDA/CDRH and IEC-825-1 regulations.
2. Measured with a PRBS 2³¹-1 test pattern, @14.025 Gb/s, BER<10⁻¹²

Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Supply Voltage	V _{cc}	3.14	3.3	3.46	V	
Supply Current	I _{cc}			300	mA	
Transmitter						
Input Differential Impedance	R _{in}		100		Ω	1
Single Ended Data Input Swing	V _{in} , pp	180		700	mV	
Transmit Disable Voltage	VD	V _{cc} -1.3		V _{cc}	V	
Transmit Enable Voltage	VEN	V _{ee}		V _{ee} + 0.8	V	2
Receiver						
Differential Data Output Swing	V _{out} , pp	300		850	mV	3
LOS Fault	VLOS fault	V _{cc} -1.3		V _{cc} HOST	V	4
LOS Normal	VLOS norm	V _{ee}		V _{ee} +0.8	V	4

Notes:

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

Digital Diagnostic Functions

ASCENT SFPP-16-LP-85-01 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.

Ordering Information

Product Name	Product Description
SFPP-16-LP-85-01	SFP+ Plug-in, 16 Gbps, 850 nm, on two multi-mode fiber, 100 m, LC, DOM

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