

10 Gb/s 1550nm SFP+ 40 km Transceiver

Property of the second second

SFPP Series

- Support data rate up to 11.3 Gb/s
- Temperature-Stabilized
 EML Transmitter and PIN
 Receiver
- Hot-Pluggable SFP
 Footprint and Duplex LC
 Connector
- Up to 40km reach for G.652 SMF
- Support Commercial and Industrial Temperature
- Compliant with SFP-8431, SFP-8432, SFP-8472 and IEEE802.3ae

ASCENT's SFP+ transceiver SFPP-ATLP-51-40 is designed for use in 10-Gigabit Ethernet links up to 40km over single mode fiber.

The module consists of 1550 EML Laser, InGaAs PIN and Preamplifier in a high-integrated optical subassembly. Digital diagnostics functions are available via a 2-wire serial interface, as specified in SFF¬8472. The module data link up to 40km in 9/125um single mode fiber.

The 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.



Key Features -

- Support data rate up to 11.3Gb/s
- Temperature-Stabilized EML Transmitter and PIN Receiver
- Hot-Pluggable SFP Footprint and Duplex LC Connector
- Up to 40km reach for G.652 SMF
- Temperature Range:

Commercial: 0°C to +70°C

Industrial: -40°C to +85°C

- Compliant with SFP-8431
- Compliant with SFP-8432
- Compliant with SFP-8472
- Compliant with IEEE802.3ae

Recommend Circuit Schematic



Outline Dimension



Pin Assignment -VEER 10 11 VEER RS1 9 12 RD-Rx_LOS 8 RD+ 13 RS0 7 14 VEER MOD_ABS 6 15 VccR SCL 5 TOWARD HOST VCCT TOWARD 16 4 WITH DIRECTION SDA BEZEL VEET OF MODULE 17 TX_DISABLE 3 INSERTION TD+ 18 TX_FAULT 2 TD-19 VEET 1 20 VEET

PIN #	Name	Function	Notes
1	VeeT	Module transmitter ground	1
2	Tx Fault	Module transmitter fault	2
3 4	Tx Disable SDL	Transmitter Disable; Turns off transmitter laser output 2 wire serial interface data input/output (SDA)	3 4
5	SCL	2 wire serial interface clock input (SCL)	4
6 7	MOD-ABS RS0	Module Absent, connect to VeeR or VeeT in the module Rate select0, optionally control SFP+ receiver. When high, input data rate >4.5Gb/ s; when low, input data rate <=4.5Gb/s	4 5
8	LOS	Receiver Loss of Signal Indication	6
9	RS1	Rate select0, optionally control SFP+ transmitter. When high, input data rate >4.5Gb/s; when low, input data rate <=4.5Gb/s	1
10	VeeR	Module receiver ground	1
11	VeeR	Module receiver ground	1
12	RD-	Receiver inverted data out put	
13	RD+	Receiver non-inverted data out put	
14	VeeR	Module receiver ground	1
15	VccR	Module receiver 3.3V supply	
16	VccT	Module transmitter 3.3V supply	
17	VeeT	Module transmitter ground	1
18	TD+	Transmitter inverted data out put	
19	TD-	Transmitter non-inverted data out put	
20	VeeT	Module transmitter ground	1

Note:

1. Circuit ground is internally isolated from chassis ground

2. Tx FAULT is an open collector/drain output, which should be pulled up with a 4.7k – 10k Ohms resistor on the host board if intended for use. Pull up voltage should be between 2.0V to Vcc + 0.3V.A high output indi cates 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 Tx DIS >2.0V or open, enabled on Tx DIS <0.8V.
- 4. Should be pulled up with $4.7k\Omega$ $10k\Omega$ host board to a voltage between 2.0V and 3.6V. MOD_ABS pulls line low to indicate module is plugged in.
- 5. Internally pulled down per SFF-8431 Rev 4.1.
- 6. LOS is open collector output. It should be pulled up with $4.7k\Omega 10k\Omega$ on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

SFP Module EEPROM Information and Management

The SFP modules implement the 2-wire serial communication protocol as defined in the SFP -8472.

The serial ID information of the SFP modules and Digital Diagnostic Monitor parameters can be accessed through the I2C interface at address A0h and A2h.

The memory is mapped in below figure.

Detailed ID information (A0h) is listed in Table 2. And the DDM specification at address A2h.

For more details of the memory map and byte definitions, please refer to the SFF-8472, "Digital Diagnostic Monitoring Interface for Optical Transceivers". The DDM parameters have been internally calibrated.



EEPROM Serial ID Memory Contents (A0h)

Data Address Base ID Fields	Length (Byte)	Name of Length	Description and Contents
0	1	Identifier	Type of Serial transceiver (03h=SFP)
1	1	Reserved	Extended identifier of type serial transceiver (04h)
2	1	Connector	Code of optical connector type (07=LC)
3-10	8	Transceiver	10G Base-ER
11	1	Encoding	64B/66B



12	1	BR, Nominal	Nominal baud rate, unit of 100Mbps
13-14	2	Reserved	(0000h)
15	1	Length(9um)	Link length supported for 9/125um fiber, units of 100m
16	1	Length(50um)	Link length supported for 50/125um fiber, units of 10m
17	1	Length(62.5um)	Link length supported for 62.5/125um fiber, units of 10m
18	1	Length(Copper)	Link length supported for copper, units of meters
19	1	Reserved	
20-35	16	Vendor Name	SFP vendor name: Ascent
36	1	Reserved	
37-39	3	Vendor OUI	SFP transceiver vendor OUI ID
40-55	16	Vendor PN	Part Number: "SFPP-ATLP-51-40" (ASCII)
56-59	4	Vendor rev	Revision level for part number
60-62	3	Reserved	
63	1	CCID	Least significant byte of sum of data in address 0-62
Extended ID Fi	elds		
64-65	2	Option	Indicates which optical SFP signals are implemented (001Ah = LOS, TX_FAULT, TX_DISABLE all supported)
66	1	BR, max	Upper bit rate margin, units of %
67	1	BR, min	Lower bit rate margin, units of %
68-83	16	Vendor SN	Serial number (ASCII)
84-91	8	Date code	Manufacturing date code
92-94	3	Reserved	
95	1	CCEX	Check code for the extended ID Fields (addresses 64 to 94)
Vendor Specifi	c ID Fields		·
96-127	32	Readable	Specific date, read only
128-255	128	Reserved	Reserved for SFF-8079

Alarm and Warning Thresholds (A2h)

Data Address Base ID Fields	Length (Byte)	Name of Length	Description and Contents
00-01	2	Temp High Alarm	MSB at low address
02-03	2	Temp Low Alarm	MSB at low address
04-05	2	Temp High Warning	MSB at low address
06-07	2	Temp Low Warning	MSB at low address
08-09	2	Voltage High Alarm	MSB at low address
10-11	2	Voltage Low Alarm	MSB at low address
12-13	2	Voltage High Warning	MSB at low address
14-15	2	Voltage Low Warning	MSB at low address
16-17	2	Bias High Alarm	MSB at low address
18-19	2	Bias Low Alarm	MSB at low address
20-21	2	Bias High Warning	MSB at low address
22-23	2	Bias Low Warning	MSB at low address
24-25	2	TX Power High Alarm	MSB at low address
26-27	2	TX Power Low Alarm	MSB at low address



28-29	2	TX Power High Warning	MSB at low address
30-31	2	TX Power Low Warning	MSB at low address
32-33	2	RX Power High Alarm	MSB at low address
34-35	2	RX Power Low Alarm	MSB at low address
36-37	2	RX Power High Warning	MSB at low address
38-39	2	RX Power Low Warning	MSB at low address
40-41	2	Optional Laser Temp High	MSB at low address
		Alarm	
42-43	2	Optional Laser Temp Low	MSB at low address
44-45	2	Optional Laser Temp High	MSB at low address
		Warning	
46-47	2	Optional Laser Temp Low	MSB at low address
		Warning	
48-49	2	Optional TEC Current High Alarm	MSB at low address
50-51	2	Optional TEC Current Low	MSB at low address
52-53	2	Optional TEC Current High	MSB at low address
	2	Warning Optional TEC Current Low	MSP at low address
54-55	5	Warning	WISD at IOW address
56-91	36	Calibration Constants for External	Refer to the SFP 8472 Rev12.4
	_	Calibration Option	
92-94	3	Reserved	
95	1	Checksum	Byte 95 contains the low order 8 bits of the sum of bytes 0- o4
Real Time Diagno	stic and Control R	egisters	
96-110	15	A/D Values and	Refer to the SFP 8472 Rev12.4
		Status Bits	
111	1	Reserved	Reserved (was assigned to SFF-8079).
Alarm and Warnii	ng Flag Bits		
112-117	6	Optional Alarm and Warning	Refer to the SFP 8472 Rev12.4
		Flag	
		Bits	
Extended Module	Control/Status B	ytes	
118-119	2	Extended Module Control/Status Bytes	Refer to the SFP 8472 Rev12.4
Optional Page Sel	ect Byte		
120-126	7	Vendor Specific	Vendor specific memory addresses
127	1	Optional Page Select	Defines the page number for subsequent reads and writes to locations A2b
User Accessible El	EPROM Locations		
128-247	120	User EEPROM	User writable EEPROM
Vendor Specific C	ontrol Function L	ocations	-
248-255	8	Vendor Specific	Vendor specific control functions
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Specifications _____

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	Ts	-40	+85	
Maximum Supply Voltage	Vcc	-0.5	3.6	V
Operating Relative Humidity	RH		95	V

Recommended Operating Conditions

Parameter	Symbol	Min.	Тур.	Max.	Unit	Note
Case Operating Temperature	T _{op}	0		+70	°C	SFPP-ATLP-51-40
		-40		+85	°C	SFPP-ATLP-51- 40A
Power Supply Voltage	Vcc	3.13	3.3	3.47	V	
Data Rate	BR		10.3125	11.3	Gbps	
				5.5		
Transmission Distance	TD			40	km	
Coupled fiber	Single-mode fi	ber				9/125 μm SMF

Electrical Characteristics (TOP = Tc, Vcc = 3.135 to 3.465 Volts)

Parameter	Symbol	Min	Тур	Max	Unit	Notes
Transmitter						
Supply Voltage	Vcc	3.135		3.465	V	
Supply Current (Commercial)	lcc			450	mA	
Supply Current (Industrial)	lcc			540	mA	
Power Consumption (Commercial)	Ρ			1.5	W	
Power Consumption (Industrial)	Р			1.8	W	1
Transmitter Section						
CML Inputs(Differential)	Vin	150		1200	mVpp	1
Input Impedance(Differential)	Zin	85	100	115	ohm	
TX_DIS Disable		2		Vcc+0.3	V	
TX_DIS Enable		0		0.8	V	
TX_FAULT Fault		2		Vcc+0.3	V	
TX_FAULT Normal		0		0.5	V	
Receiver Section						
CML Outputs (Differential)	Vout	350		700	mVpp	1
Output Impedance (Differential)	Zout	85	100	115	Ohm	
RX_LOS LOS						
RX_LOS Normal		0		0.8	V	2
MOD_DEF (0:2) VoH		2.5			V	With Serial ID
MOD_DEF (0:2) VoL		0		0.5	V	With Serial ID

Note:

1. CML logic, internally AC coupled.

2. Loss of Signal is LVTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.

Optical Characteristics

Parameter	Symbol	Min.	Тур.	Max.	Unit	Note
Data Rate		14	10.3125	11.3	иь Gbps	
Transmitter					·	
Center Wavelength	λ_c	1530	1550	1565	nm	Center Wavelength
Spectral Width (-20dB)	Δλ			1	nm	0.
Side Mode Suppression Ratio	SMSR	30			dB	
Average Output Power	Pout	-1		4	dBm	2
Extinction Ratio	ER	8.2			dB	
Average Power of OFF Transmitter	P _{off}			-30	dBm	
Relative Intensity Noise	RIN			-128	dB/H z	3
Receiver						
Wavelength Range	λc	1270		1610	dBm	
Receiver Sensitivity	Pmin			-16	dBm	4
Receiver Overload	Pmax	0			dBm	
LOS De-Assert	LOSD			-17	dBm	
LOS Assert	LOSA	-30			dBm	
LOS-Hysteresis	Phys	0.5			dB	

Notes:

1. Corresponds to approximately 0.8 nm.

2. Output is coupled into a 9/125um SMF.

3. 12dB reflection.

4. Measured with worst ER, BER less than 1E-12 and PRBS 2^{A31}-1 at 10.3125 Gbps.

Digital Diagnostic Functions

Parameter	Range	Unit	Accuracy	Calibration
Commercial Temperature	0 to +70	°C	±3°C	Internal / External
Industrial Temperature	-40 to +85	°C	±3°C	Internal / External
Voltage	3.0 to 3.6	V	±3%	Internal / External
Bias Current	30 to 100	mA	±10%	Internal / External
TX Power	0 to +4	dBm	±3dB	Internal / External
RX Power	-23 to -6	dBm	±3dB	Internal / External

Note:

The transceivers provide serial ID memory contents and diagnostic information about the present operating conditions by the 2-wire serial interface (SCL, SDA). The diagnostic information with internal calibration or external calibration all are implemented, including received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring.

Timing Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit
TX_Disable Assert Time	t_off			100	us
TX_Disable Negate Time	t_on			2	ms
Time to Initialize Include Reset of TX_FAULT	t_int			300	ms

TX_FAULT from Fault to Assertion	t_fault		100	us
TX_Disable Time to Start Reset	t_reset	10		us
Receiver Loss of Signal Assert Time	TA,RX_LOS		100	us
Receiver Loss of Signal Deassert Time	Td,RX_LOS		100	us
Rate-Select Change Time	t_ratesel		10	us
Serial ID Clock Time	t_serial-clock		100	kHz

Ordering Information

Product Description
SFP+ Plug-in, 10Gbps, 40km, TX=1550/RX wide, on two single mode fibers, LC/PC
Blue
SFP+ Plug-in, 10Gbps, 40km, TX=1550/RX wide, on two single mode fibers, LC/PC
Blue, Industrial Temp -40 to 85°C

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