155 Mb/s SFP Bi-Directional Transceiver

20 km

- Up to 155 Mbps data rate
- 1310/1550 nm FP laser and PIN photodetector
- Up to 20 km transmission distance
- Metal enclosure
- Compliant with SFP MSA and SFF 8472 with simplex LC receptacle
- RoHS Compliant

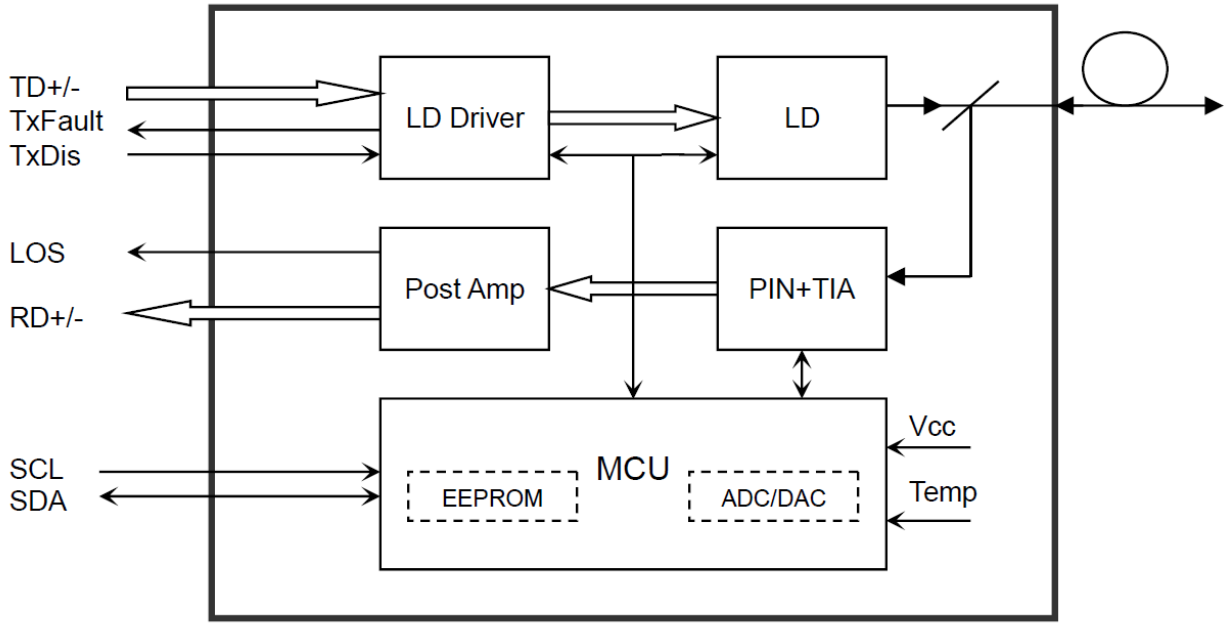
Ascent's SFPP-AF-LP-XXXX-20-AN transceivers are designed expressly for high-speed communication applications that require rates up to 155 Mb/s. They are designed to be compliant with the SFF-8472 SFP MSA. The module is suitable for data links up to 20 km in distance over a 9/125 µm single mode fiber.

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.

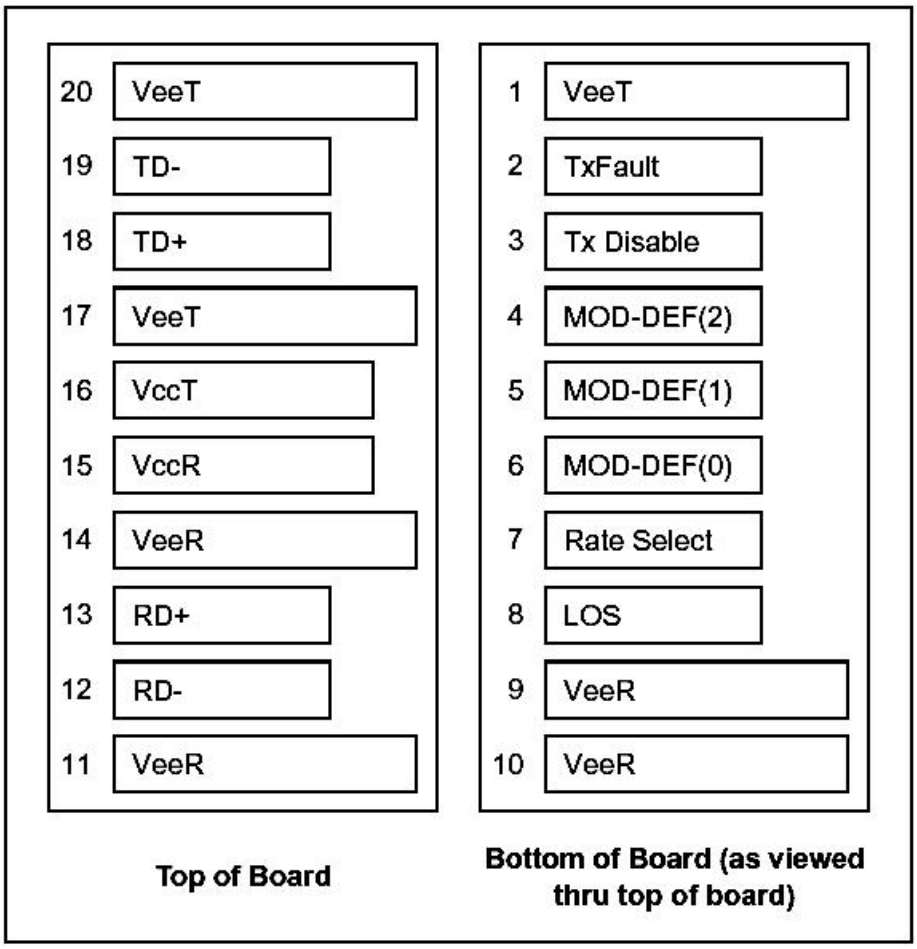
Key Features

- Up to 155 Mbps Data Links
- Up to 20 km transmission on SMF
- 1310 nm FP laser and PIN receiver for SFP-AF-LP-5531-20-AN
- 1550 nm FP laser and PIN receiver for SFP-AF-LP-3155-20-AN
- Compliant with SFP+ MSA with LC connector
- Compliant with SFF 8472
- +3.3 V single power supply

Block Diagram



Pin Assignment



Pin	Signal Name	Description	Plug Seq.	Notes
1	V_{EET}	Transmitter Ground	1	
2	TX FAULT	Transmitter Fault Indication	3	Note 1
3	TX DISABLE	Transmitter Disable	3	Note 2
4	MOD_DEF(2)	SDA Serial Data Signal	3	Note 3
5	MOD_DEF(1)	SCL Serial Clock Signal	3	Note 3
6	MOD_DEF(0)	TTL Low	3	Note 3
7	Rate Select	Not Connected	3	
8	LOS	Loss of Signal	3	Note 4
9	V_{EER}	Receiver ground	1	
10	V_{EER}	Receiver ground	1	
11	V_{EER}	Receiver ground	1	
12	RD-	Inv. Received Data Out	3	Note 5
13	RD+	Received Data Out	3	Note 5

14	V_{EER}	Receiver ground	1	
15	V_{CCR}	Receiver Power Supply	2	
16	V_{CCT}	Transmitter Power Supply	2	
17	V_{EET}	Transmitter Ground	1	
18	TD+	Transmit Data In	3	Note 6
19	TD-	Inv. Transmit Data In	3	Note 6
20	V_{EET}	Transmitter Ground	1	

Notes:

Plug Seq.: Pin engagement sequence during hot plugging.

1. TX Fault is an open collector output, which should be pulled up with a 4.7kΩ to 10kΩ resistor on the host board to a voltage between 2.0V and Vcc+0.3V. Logic 0 indicates normal operation; Logic 1 indicates a laser fault of some kind. In the low state, the output will be pulled to less than 0.8V.
2. TX Disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7k to 10kΩ resistor. Its states are:

   Low (0 to 0.8V): Transmitter on

   (>0.8V, < 2.0V): Undefined

   High (2.0 to 3.465V): Transmitter Disabled

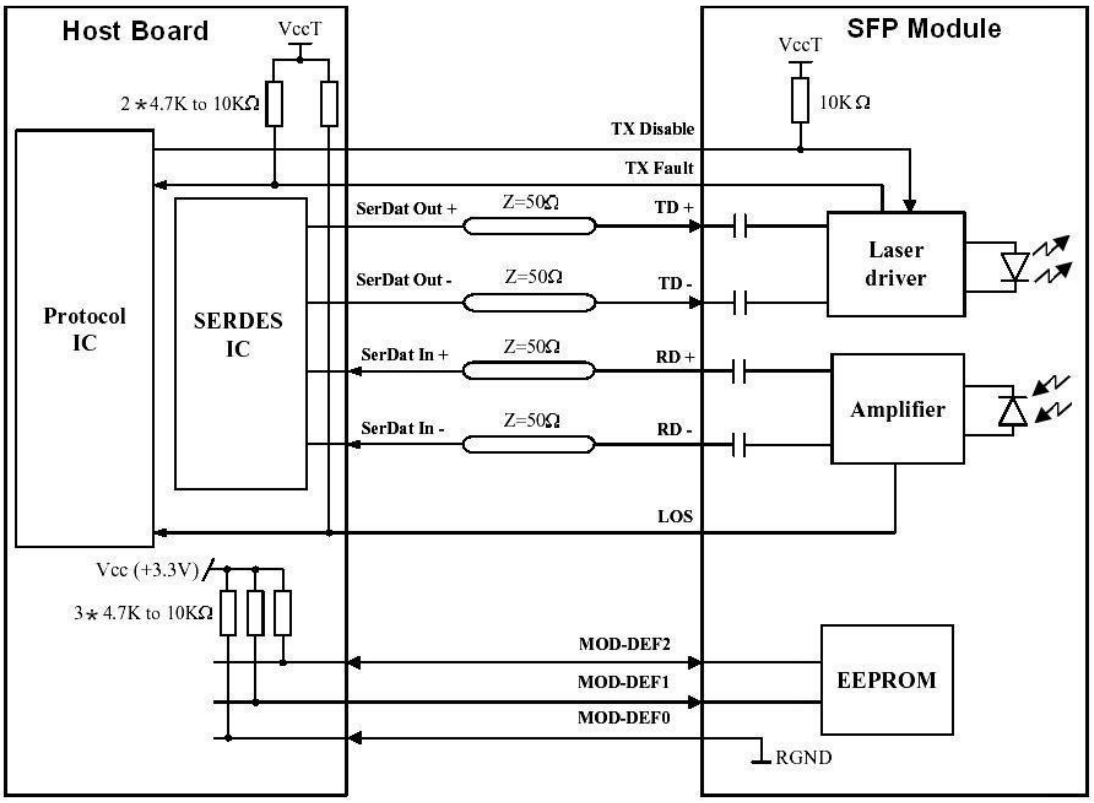
   Open: Transmitter Disabled
3. Mod-Def 0, 1, 2. These are the module definition pins. They should be pulled up with a 4.7k to 10kΩ resistor on the host board. The pull-up voltage shall be VccT or VccR.

   Mod-Def 0 is grounded by the module to indicate that the module is present

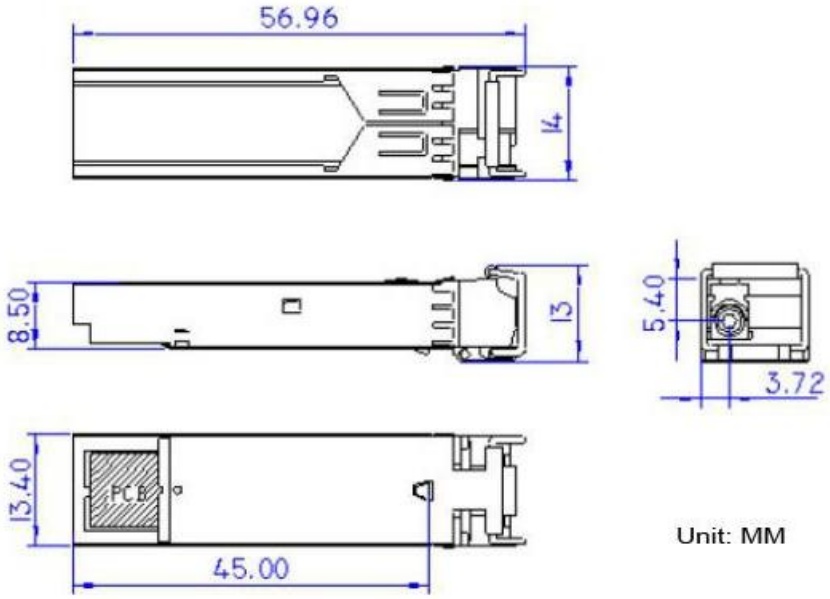
   Mod-Def 1 is the clock line of two wire serial interface for serial ID

   Mod-Def 2 is the data line of two wire serial interface for serial ID
4. LOS is an open collector output, which should be pulled up with a 4.7k to 10kΩ resistor. Pull up voltage between 2.0V and Vcc+0.3V. Logic 1 indicates loss of signal; Logic 0 indicates normal operation. In the low state, the output will be pulled to less than 0.8V.
5. RD-/+: These are the differential receiver outputs. They are internally AC-coupled 100 differential lines which should be terminated with 100Ω (differential) at the user SERDES.
6. TD-/+: These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100Ω differential termination inside the module.

Host - Transceiver Interface Block Diagram



Outline Dimensions

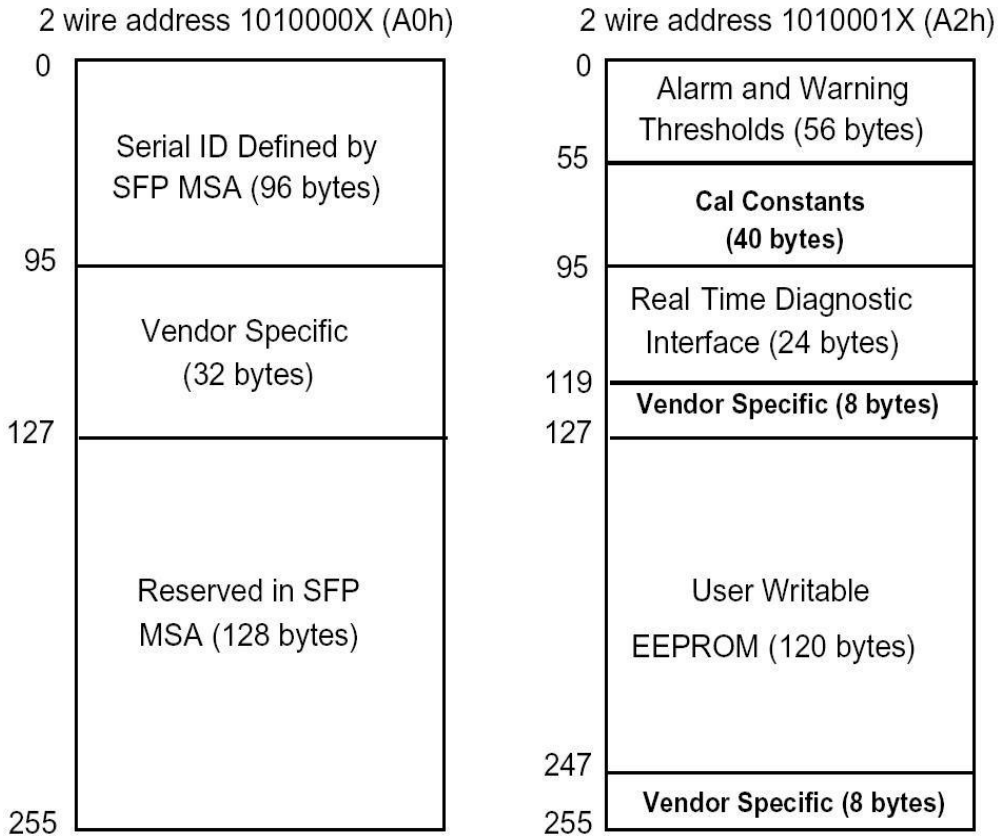


Digital Diagnostic Functions

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.

The digital diagnostic memory map specific data field defines as following:



Specifications

Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply Voltage	Vcc	-0.5	4.5	V
Storage Temperature	Ts	-40	+85	°C
Operating Humidity	-	5	85	%

Recommended Operating Conditions

Parameter		Symbol	Min	Typical	Max	Unit
Operating Case Temperature	Standard	Tc	0		+70	°C
	Industrial		-40		+85	°C
Power Supply Voltage		Vcc	3.13	3.3	3.47	V
Power Supply Current		Icc			300	mA
Data Rate				155		Mbps

Optical and Electrical Characteristics (SFP-AF-LP-5531-20-AN)

Parameter		Symbol	Min	Typical	Max	Unit	Notes
Transmitter							
Centre Wavelength		λc	1500	1550	1600	nm	
Spectral Width (-20dB)		Δλ			4	nm	
Average Output Power		Pout	-14		-8	dBm	1
Extinction Ratio		ER	9			dB	
Data Input Swing Differential		VIN	400		1800	mV	2
Input Differential Impedance		ZIN	90	100	110	Ω	
	Disable		2.0		Vcc	V	
TX Disable	Enable		0		0.8	V	
	Fault		2.0		Vcc	V	
TX Fault	Normal		0		0.8	V	
Receiver							
Centre Wavelength		λc	1260		1360	nm	
Receiver Sensitivity					-32	dBm	3
Receiver Overload			-3			dBm	3
LOS De-Assert		LOSD			-32	dBm	
LOS Assert		LOSA	-45			dBm	
LOS Hysteresis			1		4	dB	
Data Output Swing Differential		Vout	400		1800	mV	4
		High	2.0		Vcc	V	
LOS		Low			0.8	V	

Notes:

1. The optical power is launched into SMF.
2. PECL input, internally AC-coupled and terminated.

3. Measured with a PRBS 223-1 test pattern @155Mbps, BER ≤1×10-10.
4. Internally AC-coupled.

Optical and Electrical Characteristics (SFP-AF-LP-3155-20-AN)

Parameter		Symbol	Min	Typical	Max	Unit	Notes
Transmitter							
Centre Wavelength		λc	1260	1310	1360	nm	
Spectral Width (RMS)		Δλ			4	nm	
Average Output Power		Pout	-15		-7	dBm	1
Extinction Ratio		ER	9			dB	
Data Input Swing Differential		VIN	400		1800	mV	2
Input Differential Impedance		ZIN	90	100	110	Ω	
	Disable		2.0		Vcc	V	
TX Disable	Enable		0		0.8	V	
	Fault		2.0		Vcc	V	
TX Fault	Normal		0		0.8	V	
Receiver							
Centre Wavelength		λc	1480		1580	nm	
Receiver Sensitivity					-28	dBm	3
Receiver Overload			-3			dBm	3
LOS De-Assert		LOSD			-29	dBm	
LOS Assert		LOSA	-45			dBm	
LOS Hysteresis			0.5	2	6	dB	
Data Output Swing Differential		Vout	400		1800	mV	4
		High	2.0		Vcc	V	
LOS		Low			0.8	V	

Notes:

1. The optical power is launched into SMF.
2. PECL input, internally AC-coupled and terminated.
3. Measured with a PRBS 223-1 test pattern @155Mbps, BER ≤1×10-10.
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Timing and Electrical

Parameter	Symbol	Min	Typical	Max	Unit
Tx Disable Negate Time	t_on			1	ms
Tx Disable Assert Time	t_off			10	μs
Time To Initialize, including Reset of Tx Fault	t_init			300	ms
Tx Fault Assert Time	t_fault			100	μs
Tx Disable To Reset	t_reset	10			μs
LOS Assert Time	t_loss_on			100	μs
LOS De-assert Time	t_loss_off			100	μs
Serial ID Clock Rate	f_serial_clock			400	KHz
MOD_DEF (0: 2)-High	VH	2		Vcc	V

MOD_DEF (0: 2)-Low	VL	0.8	V

Diagnostics

Parameter	Range	Unit	Accuracy	Calibration
Temperature	0 to +70 (standard) -40 to +85 (industrial)	°C	±3°C	Internal / External
Voltage	3.0 to 3.6	V	±3%	Internal / External
Bias Current	0 to 100	mA	±10%	Internal / External
TX Power	-14 to -8	dBm	±3dB	Internal / External
RX Power	-30 to -8	dBm	±3dB	Internal / External

Ordering Information

Model	Description
SFP-AF-LP-5531-20-AN	SFP Plug-in, 10/100Mbps, 20km, BIDI, TX=1550nm, RX=1310nm, LC/PC blue
SFP-AF-LP-3155-20-AN	SFP Plug-in, 10/100Mbps, 20km, BIDI, TX=1310nm, RX=1550nm, LC/PC blue

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

Specifications and product availability are subject to change without notice.

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