SFP 1003

1.25G 1310/1550nm&1550/1310nm 20km Transceiver

- Supports 1.25Gbps /1.0625Gbps bit rates
- Bi-Directional LC connector
- Hot pluggable SFP footprint
- SFP 1003-T:1310nm FP laser and1550nm PIN photo detector
- SFP 1003-R:1550nm DFB laser and 1310nm PIN photo detector
- Applicable for 20Km SMF connection
- Low power consumption, < 0.8W
- Digital Diagnostic Monitor Interface
- Compliant with SFP MSA and SFF-8472
- Very low EMI and excellent ESD protection
- Operating case temperature: Commercial: 0 to 70 °C

Applications

Gigabit Ethernet
Fiber Channel
Switch to Switch interface
Switched backplane applications
Router/Server interface
Other optical links

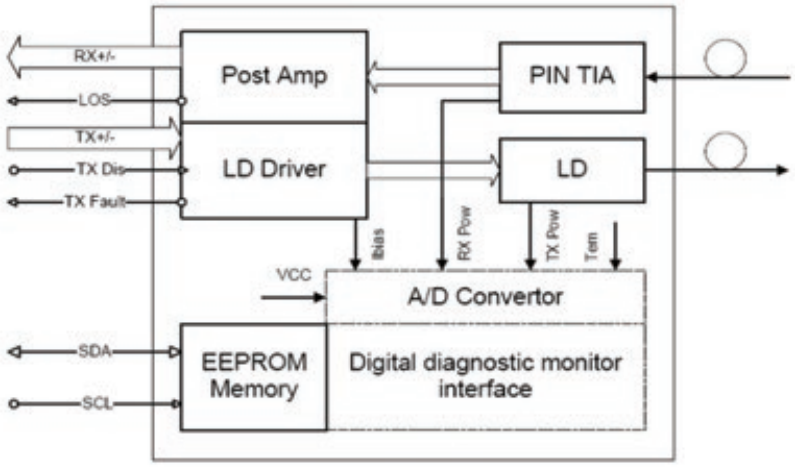
Description

SFP 1003, SFP-BIDI transceivers are high performance, cost effective modules supporting dual data-rate of 1.25Gbps/1.0625Gbps and 20km transmission distance with SMF.

The transceiver consists of three sections: a FP/DFB laser transmitter, a PIN photodiode integrated with a trans-impedance preamplifier (TIA) and MCU control unit.

All modules satisfy class I laser safety requirements. The transceivers are compatible with SFP Multi-Source Agreement (MSA) and SFF-8472. For further information, please refer to SFP MSA.

Functional Diagram



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Absolute Maximum Ratings

Parameter	Symbol	Min.	Max	Unit	Notes
Supply Voltage	Vcc	-0.5	4.0	V	
Storage Temperature	Ts	-40	85	°C	
Relative Humidity	RH	0	85	%	

Note: Stress in excess of the maximum absolute ratings can cause permanent damage to the transceiver.

General Operating Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Data Rate	DR	1.0625	1.25		Gb/s	
Supply Voltage	Vcc	3.13	3.3	3.3	V	
Supply Current	Icc_5			220	mA	
Operating Case Temperature	Tc	0		70	°C	
	Ti	-40		85		

Electrical Characteristics (TOP(c) = 0 to 70 ,Vcc = 3.13 to 3.47 V)

· Transmitter

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Differential data input swing	VIN,PP	120		820	mVpp	1
Tx Disable Input-High	VIH	2.0		Vcc+0.3	V	
Tx Disable Input-Low	VIL	0		0.8	V	
Tx Fault Output-High	VOH	2.0		Vcc+0.3	V	2
Tx Fault Output-Low	VOL	0		0.8	V	2
Input differential impedance	Rin		100		Ω	

· Receiver

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Diff. Output Voltage Swing	Vout,pp	340	650	800	mVpp	3
Rx LOS Output-High	VROH	2.0		Vcc+0.3	mVpp	2
Rx LOS Output-Low	VROL	0		0.8	V	2

1. TD+/- are internally AC coupled with 100Ω differential termination inside the module.
2. Tx Fault and Rx LOS are open collector outputs, which should be pulled up with 4.7k to 10kΩ resistors on the host board. Pull up voltage between 2.0V and Vcc+0.3V.
3.RD+/- outputs are internally AC coupled, and should be terminated with 100Ω (differential) at the user SERDES.

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Optical Characteristics (TOP(C) = 0 to 70 °C,VCC = 3.13 to 3.47 V)

· Transmitter

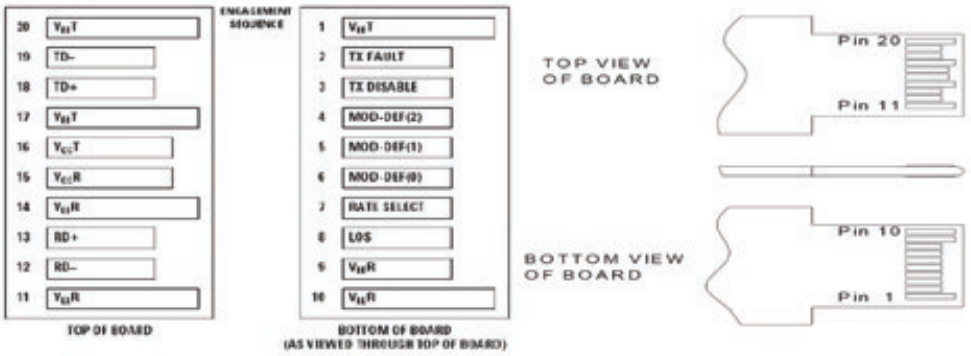
Parameter	Symbol	Min.	Type	Max.	Unit	Notes
Operating Wavelength	λ	1270	1310	1360	nm	SFP 1003-T
		1510	1550	1570		SFP 1003-R
Ave. output power (Enabled)	PAVE	-9		-3	dBm	1
Extinction Ratio	ER	9			dB	1
Side-Mode Suppression Ratio	SMSR	30			dB	
RMS spectral width 1310nm FP	Δλ			3	nm	
RMS spectral width 1550nm DFB				1	nm	
Rise/Fall time (20%~80%)	Tr/Tf			0.26	ns	2
Dispersion penalty	TDP			3.9	dB	
Output Optical Eye	Compliant with IEEE802.3 z (class 1 aser safety)					

· Receiver

Parameter	Symbol	Min.	Type	Max.	Unit	Notes
Operating Wavelength	λ	1510	1550	1570	nm	SFP 1003-T
		1270	1310	1360	nm	SFP 1003-R
Receiver Sensitivity	Pseni			-22	dBm	3
Overload	PAVE	-3			dBm	3
LOS Assert	Pa	-35			dBm	
LOS De-assert	Pd			-24	dBm	
LOS Hysteresis	Pd-Pa	0.5			dB	

1.Measured at 1250Mb/s with PRBS 2 223 – 1NRZ test pattern.
2.Unfiltered, measured with a PRBS223 – 1 test pattern @1.25Gbps
3.Measured at 1250Mb/s with PRBS 223 – 1 NRZ test pattern for BER < 1x10-12

Pin Definitions and Functions



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PIN #	Name	Function	Notes
1	VeeT	Tx ground	
2	Tx Fault	Tx fault indication, Open Collector Output, active "H"	1
3	Tx Disable	LVTTL Input, internal pull-up, Tx disabled on "H"	2
4	MOD-DEF2	2 wire serial interface data input/output (SDA)	3
5	MOD-DEF1	2 wire serial interface clock input (SCL)	3
6	MOD-DEF0	Model present indication	3
7	Rate select	No connection	
8	LOS	Rx loss of signal, Open Collector Output, active "H"	4
9	VeeR	Rx ground	
10	VeeR	Rx ground	
11	VeeR	Rx ground	
12	RD-	Inverse received data out	5
13	RD+	Received data out	5
14	VeeR	Rx ground	
15	VccR	Rx power supply	
16	VccT	Tx power supply	
17	VeeT	Tx ground	
18	TD+	Transmit data in	6
19	TD-	Inverse transmit data in	6
20	VeeT	Tx ground	

Note 1.When high, this output indicates a laser fault of some kind. Low indicates normal operation. And should be pulled up with a 4.7 – 10KΩ resistor on the host board.
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 4.7 – 10KΩ resistor. Its states are:
Low (0 – 0.8V): Transmitter on (>0.8, < 2.0V): Undefined
High (2.0V~Vcc+0.3V): 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 – 10KΩ resistor on the host board. The pull-up voltage shall be between 2.0V~Vcc+0.3V.
Mod-Def 0 has been 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.When high, this output indicates loss of signal (LOS). Low indicates normal operation.

5.RD+/-: These are the differential receiver outputs. They are AC coupled 100Ω differential lines which should be terminated with 100Ω (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board.

6. TD+/-: These are the differential transmitter inputs. They are AC-coupled, differential lines with 100Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board.

Digital Diagnostics Specification

The transceivers can be used in host systems that require either internally or externally calibrated digital diagnostics.

Parameter	Symbol	Units	Min.	Max.	Accuracy	Note
Transceiver temperature	DTemp-E	ºC	-5	+75	±5ºC	
Transceiver supply voltage	DVoltage	V	2.8	4.0	±3%	
Transmitter bias current	DBias	mA	2	80	±10%	1
Transmitter output power	DTx-Power	dBm	-12	0	±3dB	
Receiver average input power	DRx-Power	dBm	-25	0	±3dB	

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Typical Interface Circuit