



1.25Gbps Dual fiber SFP Single Mode LC Transceiver

PA-SFP-1000B-LX-IT-TXO

Product Features

- LC Single Mode Transceiver
- Compliant with SFP MSA and SFF-8472 with LC receptacle
- Hot-pluggable
- Single +3.3 Power Supply
- Complies with Telcordia (Bellcore) GR-468-CORE
- Typical data rate 1.25Gbps
- Maximal reach 10Km
- RoHS compliance

Product Applications

- Gigabit Ethernet
- Fiber Channel
- Routers Hubs or Repeaters

General

The product is compliant with the Small Form-Factor Pluggable (SFP) Multi-Source Agreement (MSA) and SFF-8472. The Digital Diagnostic Monitoring functions as described in SFF-8472 are provided via an I2C serial interface. The transceiver block diagram is shown as below Fig. 1.

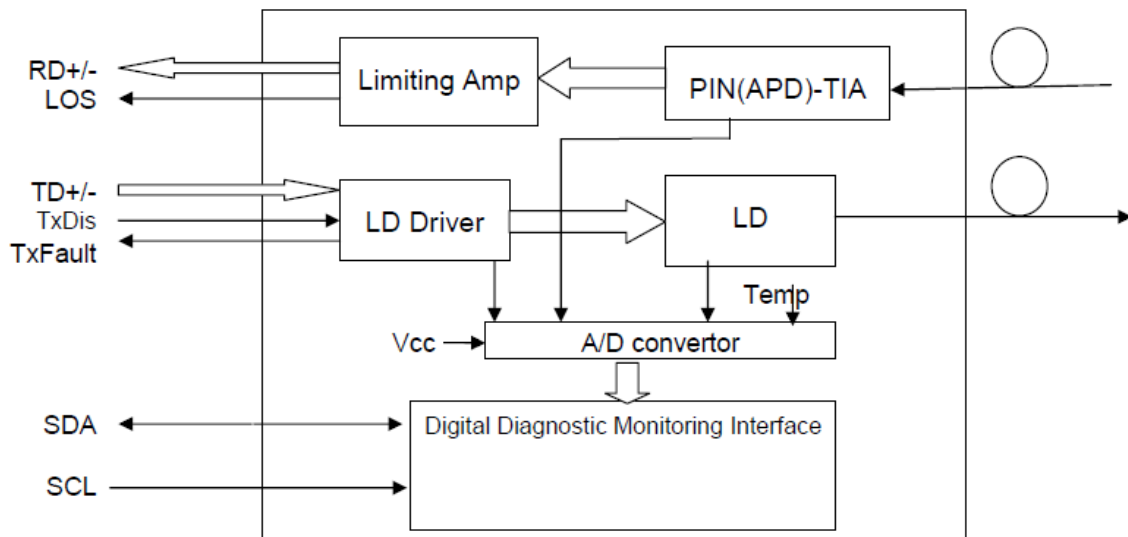


Fig. 1 - Transceiver Block Diagram

The module provides digital diagnostic information of its operating conditions and status, including transmitting power, laser bias, receiver input optical power, module temperature, and supply voltage. Calibration and alarm/warning threshold data are written and stored in internal memory (EEPROM). The memory map is compatible with SFF-8472, as shown in Fig. 2. The diagnostic data are raw A/D values and must be converted to real world units using calibration constants stored in EEPROM locations 56 – 95 in A2h.

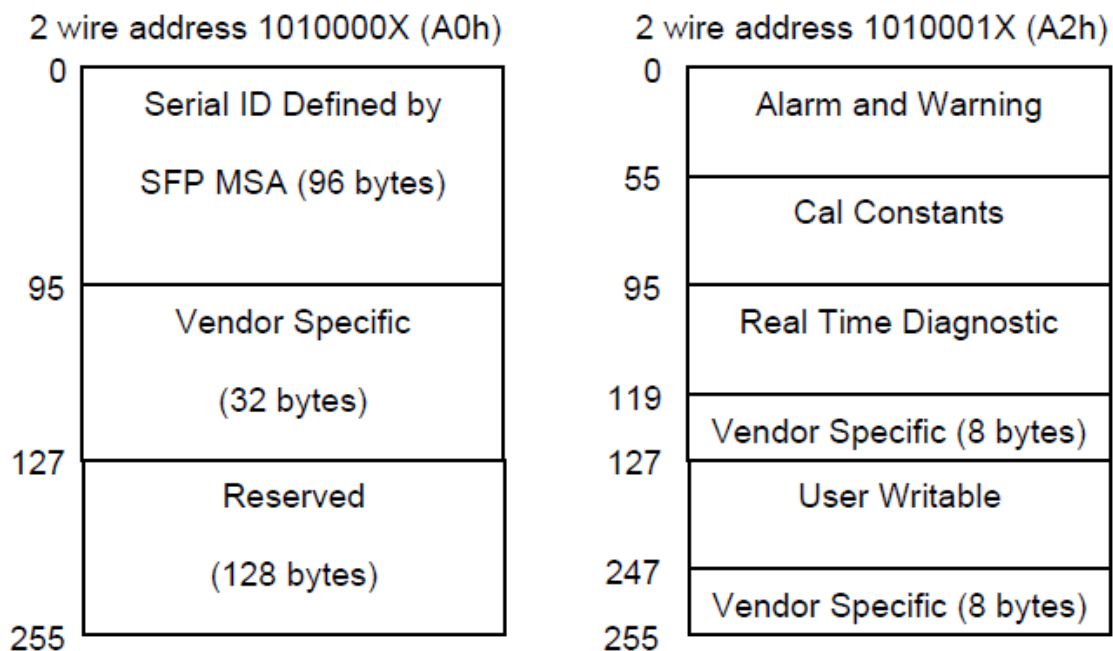


Fig. 2 - EEPROM Information

Performance Specifications

Absolute Maximum Ratings					
Parameter	Symbol	Min.	Max.	Unit	Note
Storage Temperature	Tst	-40	+85	°C	
Operating Case Temperature	Tc	-40	85	°C	Industrial
Input Voltage	-	GND	Vcc	V	
Power Supply Voltage	Vcc- Vee	-0.5	+3.6	V	

Recommended Operating Conditions						
Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Power Supply Voltage	Vcc	3.135	3.3	3.465	V	-
Operating Case Temperature	Tc	-40	-	85	°C	Industrial
Data Rate	DR	-	1.25	-	Gbps	-
Total Supply Current	-	-	-	300	mA	-

Electrical-Optical Specification						
<u>Transmitter</u>						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Optical Central Wavelength	λ	1270	1310	1355	nm	
Optical Spectral Width (RMS)	$\Delta\lambda$	-	-	4	nm	

Average Optical Output Power	Po	-9	-	-3	dBm	
Extinction Ratio	Er	9	-	-	dB	
Differential Input Voltage	V _{PP-DIF}	500	-	2400	mV	-
Optical Rise / Fall Time	Tr/Tf			260	ps	-
Output Eye	Compliant with ITU recommendation IEEE802.3Z					

Optical-Electrical Specification						
<u>Receiver</u>						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Operate Wavelength	-	1260	-	1580	nm	-
Sensitivity	Pr	-	-	-23	dBm	
Saturation	Ps	-3	-	-	dBm	
LOS De-assert Level		-	-	-23	dBm	
		-	-	-24	dBm	
		-	-	-32	dBm	

LOS Assert Level		-45	-	-	dBm	
LOS Hysteresis	-	0.5	-	5	dB	
Receiver Reflectance	-	-	-	-12	dB	
Differential Data Output Voltage	V _{PP-DIF}	370	-	2000	mV	
LOS Output Voltage-Low	V _{OL}	-	-	0.8	V	
LOS Output Voltage-High	V _{OH}	2.0	-	-	V	

Note:

1. Minimum Sensitivity and saturation levels for an 8B10B 2⁷-1 NRZ PRBS. BER≤10⁻¹², 1.25Gbps, ER=9dB.

EEPROM Information

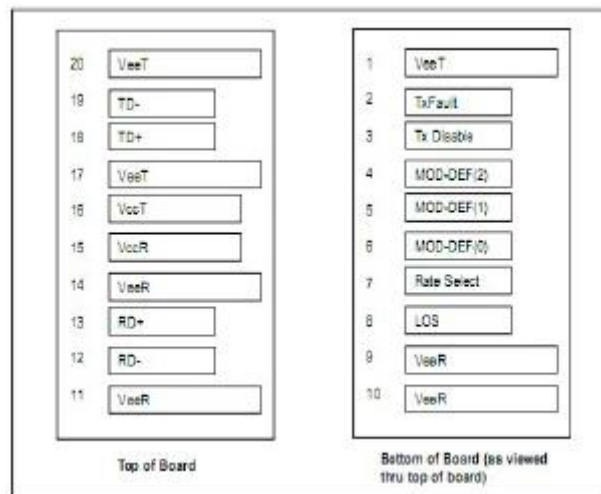
EEPROM Serial ID Memory Contents (A0h)					
Addr. (decimal)	Field Size (Bytes)	Name of Field	Content (Hex)	Content (Decimal)	Description
0	1	Identifier	03	3	SFP
1	1	Ext. Identifier	04	4	MOD4
2	1	Connector	07	7	LC
3-10	8	Transceiver	00 00 xx 02 12 00 01 01	00 00 xx 02 18 00 01 01	Gigabit IR LR
11	1	Encoding	01	1	8B10B
12	1	BR, nominal	0D	12	1.25Gbps
13	1	Reserved	00	0	-
14	1	Length (9um)-km	0A	10	10km
15	1	Length (9um)	64	100	10 km
16	1	Length (50um)	00	0	-
17	1	Length (62.5um)	00	0	-
18	1	Length (copper)	00	0	-
19	1	Reserved	00	0	-
20-35	16	Vendor name	xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx	xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx	'Vendor name' (ASCII)
36	1	Reserved	00	0	-
37-39	3	Vendor OUI	00 00 00	0 0 0	-
40-55	16	Vendor PN	xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx	xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx	ASCII
56-59	4	Vendor rev	30 30 30 20	48 48 48 32	"000" (ASCII)
60-61	2	Wavelength	05 1E	05 30	1310
62	1	Reserved	00	0	-
63	1	CC BASE	-	-	Check sum of bytes 0-62
64	1	Reserved	00	0	
65	1	Options	1A	26	
66	1	BR, max	00	0	-
67	1	BR, min	00	0	
68-83	16	Vendor SN	-	-	ASCII
84-91	8	Vendor date	-	-	Year (2 bytes),

					Month (2 bytes), Day (2 bytes)
92	1	DDM Type	58	88	External/Internal Calibrated
93	1	Enhanced Option	B0	176	LOS, TX_FAULT and Alarm/warning flags implemented
94	1	SFF-8472 Compliance	02	2	SFF-8472 Rev10.3
95	1	CC EXT	-	-	Check sum of bytes 64-94
96-255	160	Vendor spec			

Alarm and Warning Thresholds (Serial ID A2H)						
Parameter (Unit)	C Temp (°C)	I Temp (°C)	Voltage (V)	Bias (mA)	TX Power (dBm)	RX Power (dBm)
High Alarm	100	100	3.6	90	-3	-3
Low Alarm	-10	-40	3	0	-9	-23
High Warning	95	95	3.5	70	-4	-4
Low Warning	0	-30	3.1	0	-8	-22

Digital Diagnostic Monitor Accuracy				
Parameter	Unit	Accuracy	Range	Calibration
Tx Optical Power	dB	±3	Po: -Pomin~Pomax dBm, Recommended operation conditions	External/Internal
Rx Optical Power	dB	±3	Pi: Ps~Pr dBm, Recommended operation conditions	External/Internal
Bias Current	%	±10	Id: 1-100mA, Recommended operation conditions	External/Internal
Power Supply Voltage	%	±3	Recommended operation conditions	External/Internal
Internal Temperature	°C	±3	Recommended operation conditions	External/Internal

PIN Diagram



PIN Description

Pin No.	Name	Function	Plug Seq.	Notes
1	VeeT	Transmitter Ground	1	
2	Tx Fault	Transmitter Fault Indication	3	Note 1
3	Tx Disable	Transmitter Disable	3	Note 2
4	MOD-DEF2	Module Definition 2	3	Note 3
5	MOD-DEF1	Module Definition 1	3	Note 3
6	MOD-DEF0	Module Definition 0	3	Note 3
7	Rate Select	NC	3	
8	LOS	Los Of Signal	3	Note 4
9	VeeR	Receiver Ground	1	Note 5
10	VeeR	Receiver Ground	1	Note 5
11	VeeR	Receiver Ground	1	Note 5
12	RD-	Inv. Receiver Data Out	3	Note 6
13	RD+	Receiver Data Out	3	Note 6
14	VeeR	Receiver Ground	1	Note 5
15	VccR	Receiver Power Supply	2	Note 7, 3.3V±5%

16	VccT	Transmitter Power Supply	2	Note 7, 3.3V±5%
17	VeeT	Transmitter Ground	1	Note 5
18	TD+	Transmitter Data In	3	Note 8
19	TD-	Inv. Transmitter Data In	3	Note 8
20	VeeT	Transmitter Ground	1	Note 5

Notes:

1. TX Fault is an open collector/drain output, which should be pulled up with a 4.7k-10kΩ resistor on the host board. Pull up voltage between 2.0V and VccT, R+0.3V. When high, output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to <0.8V.

2. TX disable is an input that is used to shut down the transmitter optical power. 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 (2.0 – 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-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 (Loss Of Signal) is an open collector/drain output, which should be pulled up with a 4.7k-10kΩ resistor. Pull up voltage between 2.0V and VccT, R+0.3V. When high, this output indicates the received optical power is below the worst-case receiver sensitivity (as defined by the standard in use). Low indicates normal operation. In the low state, the output will be pulled to <0.8V.

5. VeeR and VeeT may be internally connected within the SFP module.

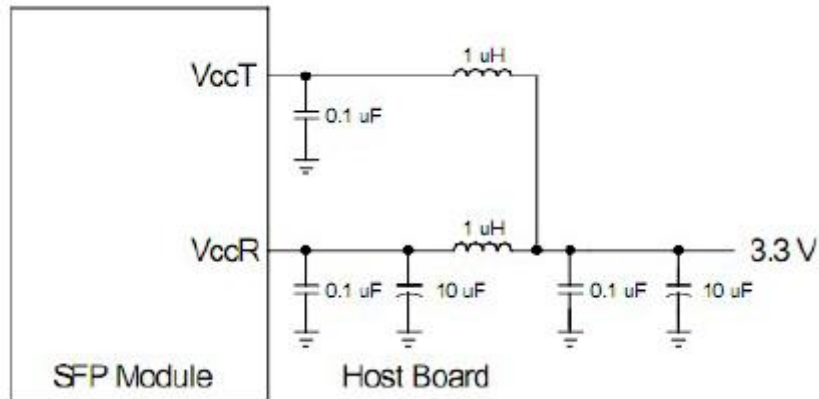
6. RD-/+: These are the differential receiver outputs. They are AC coupled 100Ω differential lines which should be terminated with 100Ω (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board.

7. VccR and VccT are the receiver and transmitter power supplies. They are defined as 3.3V ±5% at the SFP connector pin. Maximum supply current is 300mA. Recommended host board power supply filtering is shown below. Inductors with DC resistance of less than 1Ω should be used in order to maintain the required voltage at the SFP input pin with 3.3V supply voltage. When the recommended supply filtering network is used, hot plugging of the SFP transceiver module will result in an inrush current of no more than 30 mA greater than the steady state value. VccR and VccT may be internally connected within the SFP transceiver module.

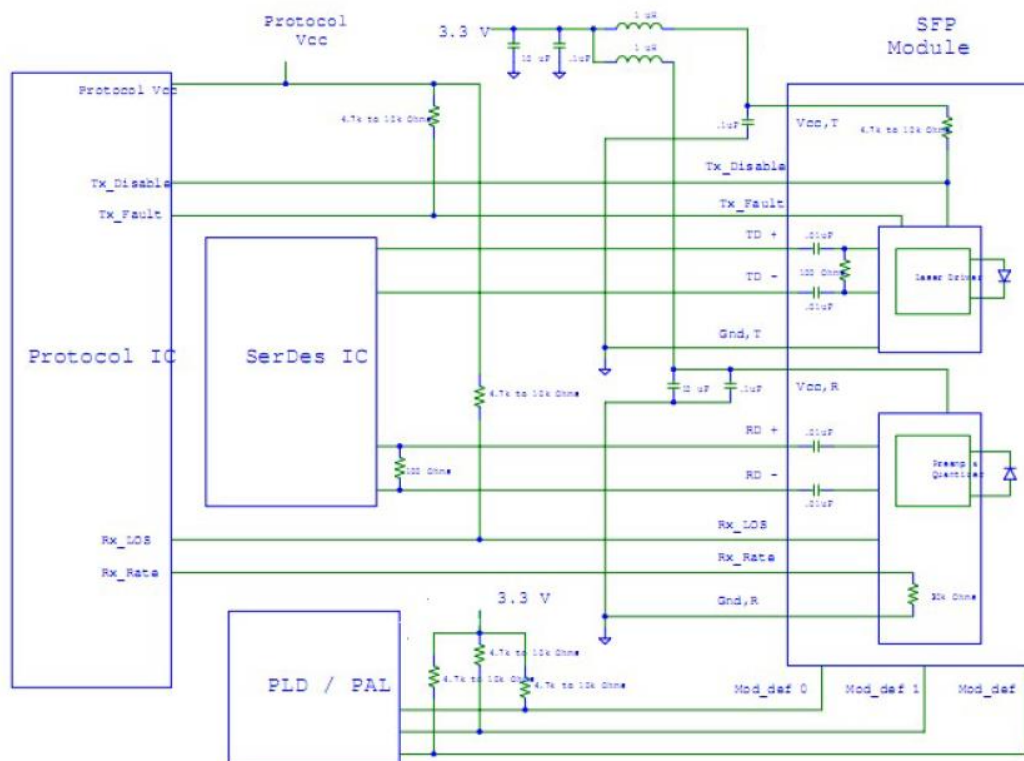
8. TD-/+: These are the differential transmitter inputs. They are AC-coupled, differential lines with 100Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board.

Recommended Circuit

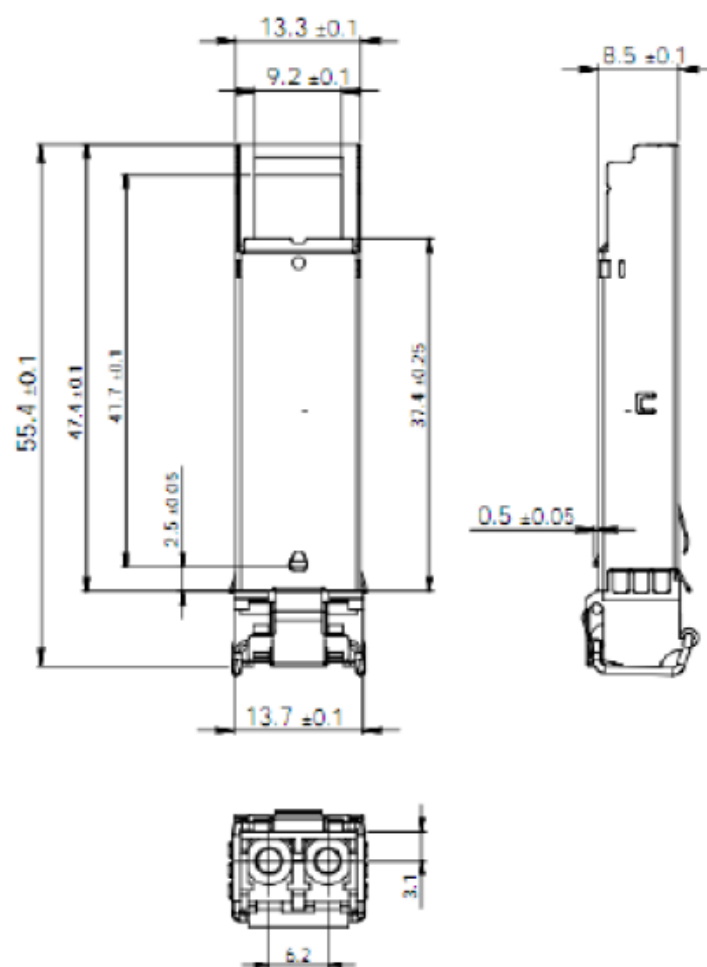
Recommended Host Board Supply Filtering Network



Example SFP Host Board Schematic



Package Diagram



Unit: mm

Order information:

Please contact PICadvanced for ordering and quotation: global@picadvanced.com