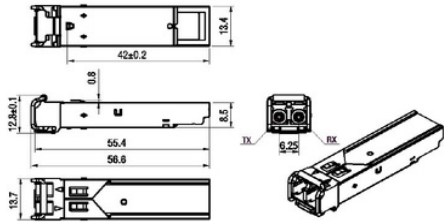


SFP-LH-S2020

1.25Gbps 1310nm SM



Applications

- Gigabit Ethernet Switches and Routers
- Fiber Channel Switch Infrastructure
- XDSL Applications
- Metro Edge Switching

Features

- Operating data rate up to 1.25Gbps
 - 1310nm FP LD Transmitter
 - Distance up to 20km
 - Single 3.3V Power supply and TTL Logic Interface
 - Duplex LC connector interface
 - Hot pluggable
 - Operating case temperature
Standard: 0°C~+70°C, Industrial: -40°C~+85°C
 - Compliant with MSA SFP specification
 - Digital diagnostic monitor interface
- Compatible with SFF-8472

Product Description

The SFP-LH-Sxxxx series single-mode transceivers is small form factor pluggable module for bi-directional serial optical data communications such as Gigabit Ethernet 1000Base-LX and Fiber Channel 1x SM-LC-L FC-PI. It is with the SFP 20-pin connector to allow hot plug capability. This module is designed for single- mode fiber and operates at a nominal wavelength of 1310nm. The transmitter section uses a multiple quantum well laser and is a Class 1 laser compliant according to International Safety Standard IEC 60825. The receiver section uses an integrated GaAs detector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC. The SFP-LH-Sxxxx series are designed to be compliant with SFF-8472 SFP Multi-source Agreement (MSA).

Regulatory Compliance

Feature	Standard MIL-STD-883E	Performance
Electrostatic Discharge (ESD) to the Electrical Pins	Method 3015.7 FCC Part 15 Class B	Class 1 (>500 V) Isolation with the case
(EMI)	FDA 21CFR 1040.10 and 1040.11	Compatible with standards
Laser Eye Safety	EN60950, EN(IEC) 60825-1,2 UL and CUL RoHS	Compatible with Class 1 laser Compatible with TÜV standards
Component Recognition		UL file E317337
Green Products		RoHS6

Absolute Maximum Ratings

Parameter Storage	Symbol	Min.	Max.	Unit
Temperature Supply	Ts Vcc	-40	+85	°C
Voltage		0.5	3.6	V

Recommended Operating Conditions

Parameter Operating Case	Symbol	Min.	Typical	Max.	Unit
Temperature	TA/2020	0		+70	°C °C
	TA/2020I	-40		+85	V mA
Power Supply Voltage	Vcc	3.15	3.3	3.45	mA
Power Supply Current	Icc			300	Gbaud
Surge Current	Isurge			+30	
Baud Rate			1.25		

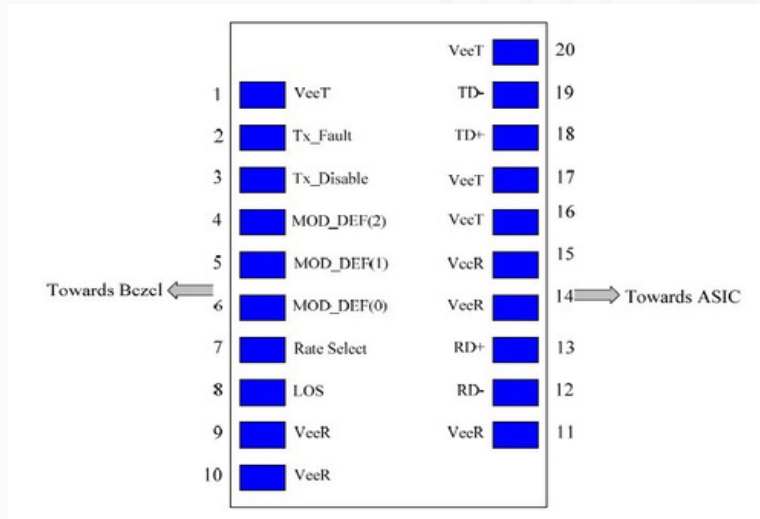
Performance Specifications - Electrical

Parameter	Symbol	Min.	Typ.	Max	Unit	Notes
Transmitter						
CML/PECL Inputs(Differential)	Vin	400		2500	mVp	AC coupled inputs
Input Impedance(Differential)	Zin	85	100	115 3.45	ohms	DC
Tx_Disable Input Voltage-High		2 0		0.8	V V	
Tx_Disable Input Voltage-Low		2 0		Vcc+0.3	V V	
Tx_Fault Output Voltage-High				0.5		Io=400μA;Host Vcc
Tx_Fault Output Voltage-Low						Io=-4.0mA
Receiver						
CML Outputs(Differential)	Vout	400	800	1200	mVpp	AC coupled outputs
Output Impedance(Differntial)	Zout	85	100	115	ohms	
Rx_LOS Output Voltage-High		2 0		Vcc+0.3	V V V	Io=400μA;Host Vcc
Rx_LOS Output Voltage-Low		2.5		0.8	V	Io=-4.0mA
MOD_DEF(0:2)	VoH	0				With Serial ID
	VoL			0.5		

Optical and Electrical Characteristics

Parameter 9µm Core Diameter SMF Data Rate	Symbol	Min.	Typical	Max.	Unit
			20		km
			1.25		Gbps
Transmitter					
Centre Wavelength	λ_c	1260	1310	1360	nm
Spectral Width(RMS)	δ			4 -3	nm
Average Output Power	P _{out}	-9			dBm
Extinction Ratio	EX	9			dBm
Rise/Fall Time(20%~80%)	tr/tf			1.2	ns
Total Jitter	TJ			56.5	ps
Output Optical Eye	IUT-T G.957 Compliant				
Data Input Swing Differential	V _{IN}	500		2000	mV
Input Differential Impedance	Z _{IN}	90	100	110	Ω
Tx_Disable disable		2.0		V _{cc} +0.3	V
Tx_Disable enable		0		0.8	V
Tx_Fault fault		2.0		V _{cc} +0.3	V
Tx_Fault normal		0		0.8 10	V
Tx_Disable Assert Time	t _{off}				us
Receiver					
Centre Wavelength	λ_c	1100		1600	nm
Receiver Sensitivity	P _{IN}			-23	dBm
Output Differential Impedance	P _{IN}	90	100	110	Ω
Data Output Swing Differential	V _{out}	370		2000	mV
Rise/Fall Time	Tr/tf			2.2	ns
LOS De-Assert	LOS			-35	dBm
LOS Assert	D	-40			dBm
LOS High	LOS	2.0		V _{cc} +0.3	V V
LOS Low	A	0		0.8	

SFP Transceiver Electrical Pad Layout



Pin Function Definitions

Num.	Name VeeT	Function Transmitter	PlugSeq	Notes
1	Tx Fault	Ground	1	
2	Tx Disable	Transmitter Fault	3	Note 1
3	MOD-DEF2	Transmitter Disable	3	Note 2,Module disables on high or open
4	MOD-DEF1	Module Definition 2	3	Note 3,Data line for Serial ID.
5	MOD-DEF0	Module Definition 1	3	Note 3,Clock line for Serial ID.
6	Rate Select	Module Definition 0	3	Note 3,Grounded within the module
7	LOS	Not Connect	3	Function not available
8	VeeR	Loss of Signal	3	Note 4
9	VeeR	Receiver Ground	1	Note 5
10	VeeR	Receiver Ground	1	Note 5
11	RD-	Receiver Ground	1	Note 5
12	RD+	Inv. Receiver Data Out	3	Note 6
13	VeeR	Receiver Data Out	3	Note 7
14	VccR	Receiver Ground	1	Note 5
15	VccI	Receiver Power	2	3.3±5%,Note 7
16	VeeT	Transmitter Power	2	3.3±5%,Note 7
17	TD+	Transmitter Ground	1	Note 5
18	TD-	Transmit Data In	3	Note 8
19	VeeT	Inv. Transmit Data In	3	Note 8
20		Transmitter Ground	1	Note 5

Notes:

1)Tx Fault is an open collector/drain output, which should be pulled up with a 4.7k-10k Ω resistor on the host board. Pull up voltage between 2.0V and VccT,R+.03V. 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 output. It is pulled up within the module with a 4.7-10k Ω 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-10k Ω resistor on the host board. The pull-up voltage shall be VccT or VccR (see section IV for further details). 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-10k Ω 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 100 Ω differential lines which should be terminated with 100 Ω (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board. The voltage swing on these lines will be between 370 and 2000 mV differential (185-1000mV single ended) when properly terminated.

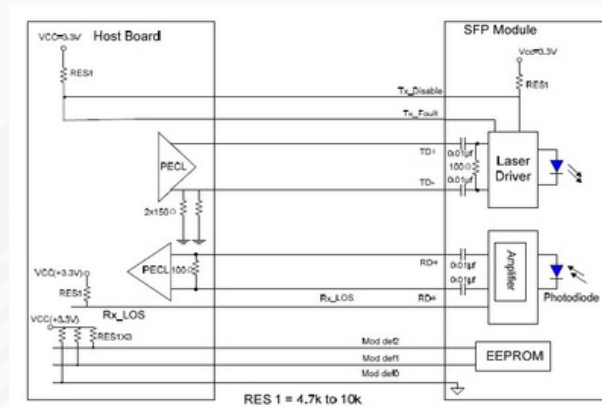
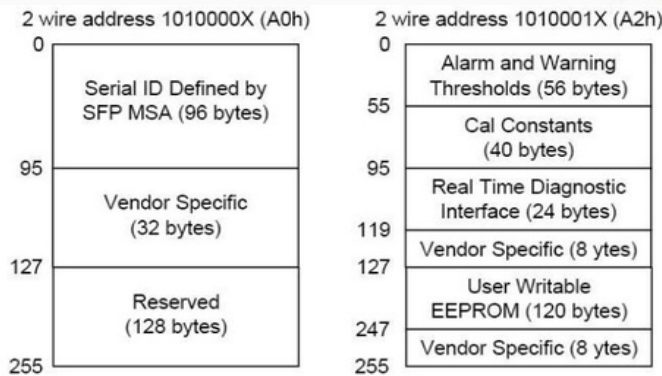
7)VccR and VccT are the receiver and transmitter power suppliers. They are defined as 3.3V \pm 5% at the SFP connector pin. Maximum supply current is 300mA. Recommended host board power supply filtering is shown below. Inductors with DC resistance of less than 1 ohm should be used in order to maintain 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 inrushcurrent of no more than 30mA 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 100 Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board. The inputs will accept differential swings of 500-2400mV(250-1200mV single-ended),though it is recommended that values between 500 and 1200 mV differential (250-600mV single-ended) be used for best EMI performance.

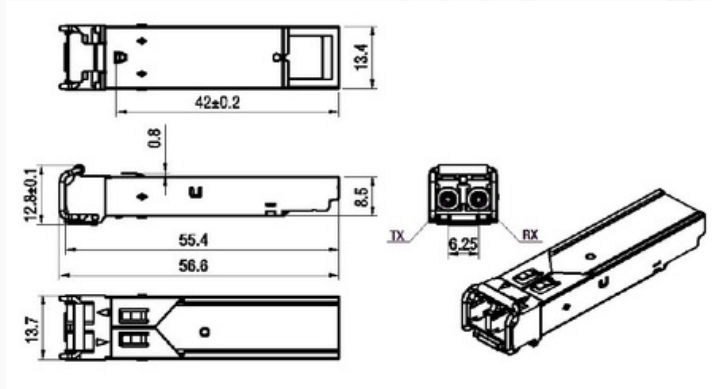
EEPROM

The serial interface uses the 2-wire serial CMOS EEPROM protocol defined for the ATMEL AT24C02/04 family of components. When the serial protocol is activated, the host generates the serial clock signal (SCL). The positive edge clocks data into those segments of the EEPROM that are not write protected within the SFP transceiver. The negative edge clocks data from the SFP transceiver. The serial data signal (SDA) 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.

The module provides diagnostic information about the present operating conditions. The transceiver generates this diagnostic data by digitization of internal analog signals. Calibration and alarm/warning threshold data is written during device manufacture. Received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring all are implemented. 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 at wire serial bus address A2h. The digital diagnostic memory map specific data field define as following. For detail EEPROM information, please refer to the related document of SFF-8472 Rev 9.3.



Mechanical Specifications



Ordering information

Part No.	Data Rate	Laser	FibreType	Distance	Optical Interface
SFP-LH-S2020	1.25Gbps	1310nm FP	SMF	20km	LC LC LC LC
SFP-LH-S2020I	1.25Gbps	1310nm FP	SMF	20km	
SFP-LH-S2020D	1.25Gbps	1310nm FP	SMF	20km	
SFP-LHS2020ID1.	25Gbps	1310nm FP	SMF	20km	

I: Industrial operating temperature

D: DDMI

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