1.25Gb/s SFP BIDI TX-1550nm/RX-1490nm120km Optical Transceiver

Features

- Operating Data Rate up to 1.25Gbps
- 1550nm DFB transmitter /1490nm receiver
- Up to 120km on 9/125μm SMF
- Hot-pluggable SFP footprint
- BIDI LC/UPC type pluggable optical interface
- Low power dissipation
- Metal enclosure, for lower EMI
- RoHS compliant and lead-free
- Support Digital Diagnostic Monitor interface
- Single +3.3V power supply
- Commercial Temperature Range: 0~+70℃

Applications

- Switch to Switch Interface
- Fast Ethernet
- Switched Backplane Applications
- Router/Server Interface
- Other Optical Links

Compliance

- Compliant with MSA SFP Specification
- Compliant with SFF-8472
- Compliant with IEEE 802.3z

Description

The SFP-1G-D120-54 transceiver is compatible with the Small Form Factor Pluggable Multi-Sourcing Agreement (MSA). The transceiver consists of five sections: the LD driver, the limiting amplifier, the digital diagnostic monitor, the 1490nm FP laser (the 1550nm DFB laser)and the PIN/TIA. The module data link up to 120km in 9/125um Single-mode fiber.

This transceiver meets the Small Form Pluggable (SFP) industry standard package utilizing an integral LC-Bi-dirictional optical interface connector. An enhanced Digital Diagnostic Monitoring Interface compliant with SFF-8472 has been incorporated into the transceiver. It allows real time access to the transceiver operating parameters such as transceiver temperature, laser bias current, transmitted optical power, received optical power and transceiver supply voltage by reading a built-in memory with I^2C interface.

The optical output can be disabled by a LVTTL logic high-level input of Tx Disable, and the system also can disable the module via I^2C. Tx Fault is provided to indicate that degradation of the laser. Loss of signal (LOS) output is provided to indicate the loss of an input optical signal of receiver or the link status with partner. The system can also get the LOS (or Link)/Disable/Fault information via I^2C register access.

General Specifications

Table1-General Specifications

Parameter	Symbol	Min.	Typical	Max.	Unit
Bit Rate	BR			1.25	Gb/s
Max. Supported Link Length	LMAX			120	km

Absolute Maximum Ratings

Table2-Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit	Ref.
Storage Temperature	TS	-40		85	°C	
Storage Ambient Humidity	HA	5		95	%	
Power Supply Voltage	VCC	-0.5		4	V	
Signal Input Voltage		-0.3		Vcc+0.3	V	
Receiver Damage Threshold		+3			dBm	
Lead Soldering Temperature/Time	Tsold			260/10	°C/sec	Note 1
Lead Soldering Temperature/Time	Tsold			360/10	°C/sec	Note 2

Notes:

[1] Suitable for wave soldering.

[2] Only for soldering by iron.

Electrical Characteristics

Table3-Electrical Characteristics

Parameter	Symbols	Min.	Typical	Max.	Unit	Ref.
Case Operating Temperature	T_{case}	0		+70	°C	
Ambient Humidity	HA	5		70	%	
Power Supply Voltage	VCC	3.13	3.3	3.47	V	
Power Supply Current	ICC			280	mA	
Data Rate			1250/1250		Mbps	TX Rate/RX Rate
Transmission Distance				120	km	
Coupled Fiber	Single mode fiber					9/125 μ m G.652
Transmitter						
Total Supply Current	ICC			A	mA	
Transmitter Disable Input-High	VDISH	2		Vcc+0.3	V	Note 1
Transmitter Disable Input-Low	VDISL	0		0.8	V	LVTTL
Transmitter Fault Input-High	VTxFH	2		Vcc+0.3	V	LVTTL
Transmitter Fault Input-Low	VTxFL	0		0.8	V	LVTTL
Receiver						
Total Supply Current	ICC			B	mA	Note 1
LOS Output Voltage- High	VLOSH	2		VCC+0.3	V	LVTTL
LOS Output Voltage- Low	VLOSL	0		0.8	V	LVTTL

Notes:

[1] A (TX) + B (RX) = 280mA (Not include termination circuit)

Optical Characteristics

Table4-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Ref.
Transmitter						
Average Output Power	POUT	0		5	dBm	
Extinction Ratio	ER	9			dB	
Center Wavelength	λ c	1530	1550	1570	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Spectrum Bandwidth(-20dB)	σ			1	nm	
Transmitter OFF Output Power	POFF			-45	dBm	
Jitter p-p	t			0.1	UI	Note 1
Output Eye Mask	Compliant with IEEE802.3 z (class 1 laser safety)					Note 2

Receiver						
Input Optical Wavelength	λ IN	1470	1490	1510	nm	
Receiver Sensitivity	PIN			-31	dBm	Note 3
Input Saturation Power (Overload)	PSAT	-8			dBm	
Loss of Signal Assert	PA	-45			dBm	
Loss of Signal De-assert	PD			-31	dBm	Note 4
LOS Hysteresis	PD- PA	0.5		6	dB	

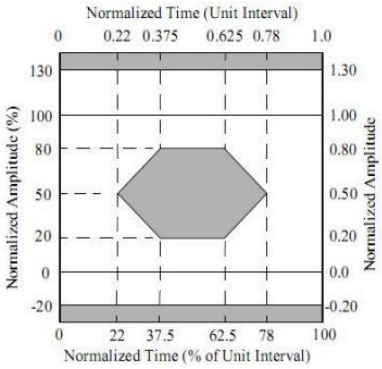
Notes:

[1] Measure at 2^7- 1 NRZ PRBS pattern.

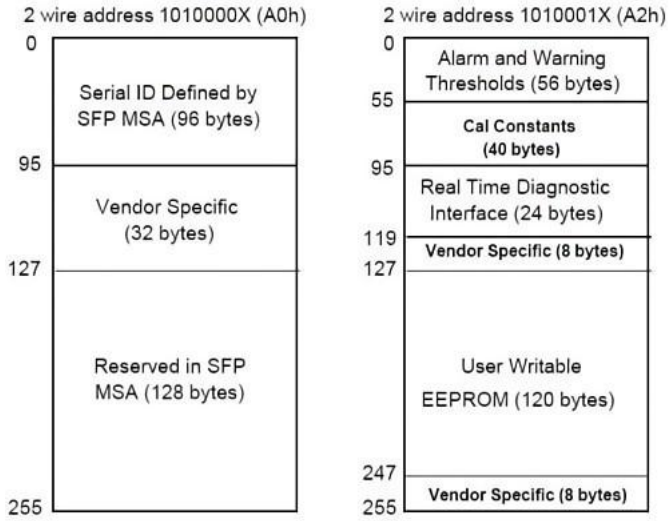
[2] Transmitter eye mask definition.

[3] Measured with light source 1490nm(1310nm), ER=9dB; BER = < 10^- 12 @PRBS=2^7- 1 NRZ

[4] When LOS De-asserted, the RX data+/- output is signal output



Digital Diagnostic Memory Map

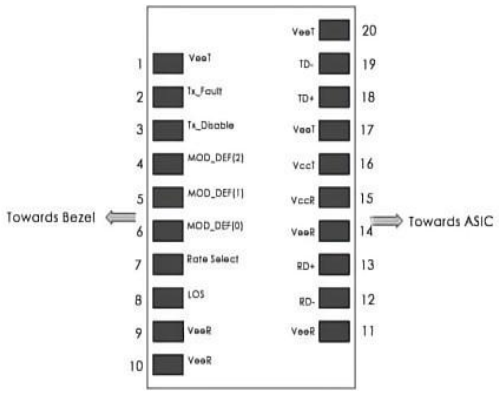


Digital Diagnostic Monitoring Information

Table5-Digital diagnostic Monitoring Information

Parameter	Unit	Notes
Case Temperature	℃	±3
Supply Voltage	V	±3%
TX Bias Current	mA	± 10%
TX Optical Power	dB	±3
RX Optical Power	dB	±3

PIN Description



Pin Description

Table6-PIN Description

PIN	Name	Description	Notes
1	V_{EET}	Transmitter Ground (Common with Receiver Ground)	1
2	T_{FAULT}	Transmitter Fault.Open Drain. Logic "0" indicates normal operation.	2
3	T_{DIS}	Transmitter Disable. Laser output disabled on high or open.	3
4	MOD_DEF(2)	Module Definition 2. Data line for Serial ID.	4
5	MOD_DEF(1)	Module Definition 1. Clock line for Serial ID.	4
6	MOD_DEF(0)	Module Definition 0. Grounded within the module.	4
7	Rate Select	No connection required.	
8	LOS	Loss of Signal indication. Open Drain. Logic "0" indicates normal operation.	5
9	V_{EER}	Receiver Ground (Common with Transmitter Ground)	1
10	V_{EER}	Receiver Ground (Common with Transmitter Ground)	1
11	V_{EER}	Receiver Ground (Common with Transmitter Ground)	1
12	RD-	Receiver Inverted DATA out(CML). AC Coupled	
13	RD+	Receiver Non-inverted DATA out(CML). AC Coupled	
14	V_{EER}	Receiver Ground (Common with Transmitter Ground)	1
15	V_{CCR}	Receiver Power Supply	

16	V_{CCT}	Transmitter Power Supply	
17	V_{EET}	Transmitter Ground (Common with Receiver Ground)	1
18	TD+	Transmitter Non-Inverted DATA in. AC Coupled.	
19	TD-	Transmitter Inverted DATA in. AC Coupled.	
20	V_{EET}	Transmitter Ground (Common with Receiver Ground)	1

Notes:

[1] Circuit ground is internally isolated from chassis ground.

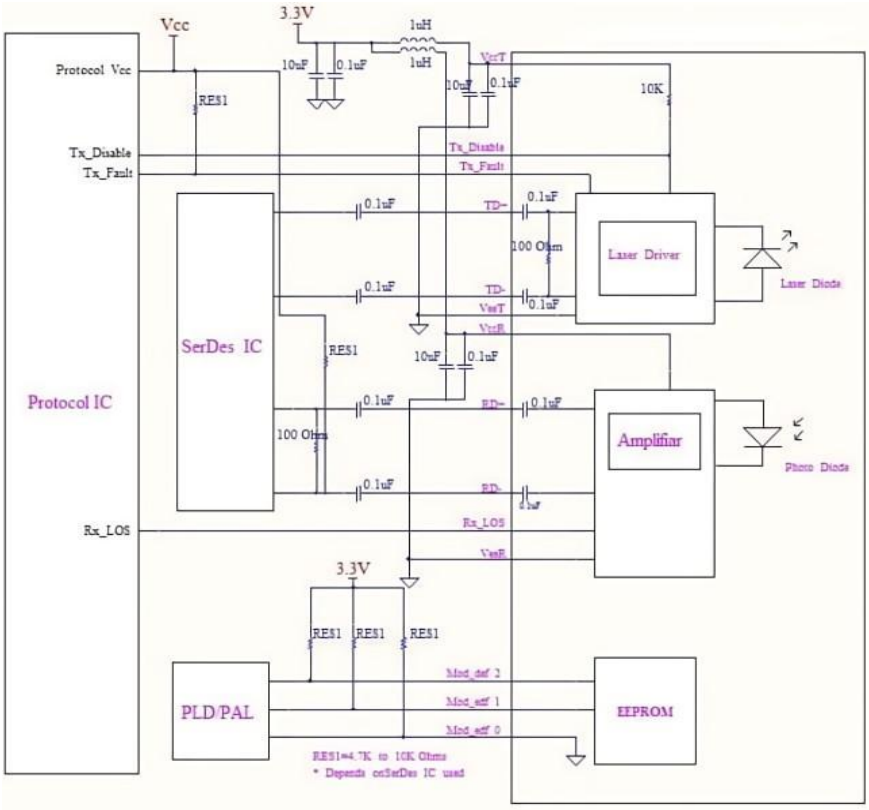
[2]. TX Fault is an open drain output, which should be pulled up with 4.7K – 10KΩ resistor on the host board. Pull up voltage between 2.0V to VccT/R+0.3V. When high, output indicates＜ 0.8V. When sensing an improper power level in the laser driver, the SFP sets this signal high and turns off the laser. TX-FAULT can be reset with the TX-DISABLE line. The signal is in LVTTL level.

[3]. TX disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with 4.7K – 10KΩresistor. Its states are: Low (0 – 0.8V): Transmitter on; (＞0.8, ＜2.0V): Undefined; High (2.0V to VccT/R+0.3V): Transmitter Disabled; Open: Transmitter Disabled. The TX-DISABLE signal is high (LVTTL logic "1") to turn off the laser output. The laser will turn on when TX- DISABLE is low (LVTTL logic "0").

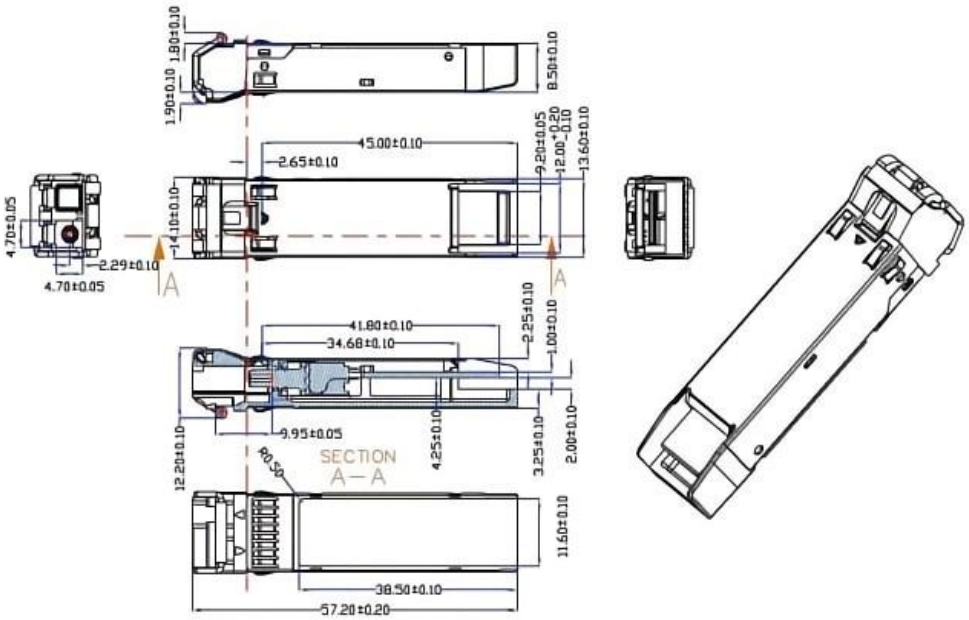
[4]. Should be pulled up with 4.7K - 10KΩ on host board to a voltage between 2.0V to VccT/R+0.3V. MOD_DEF (0) pulls line low to indicate module is plugged in.

[5]. LOS (Loss of Signal) is an open collector/drain output, which should be pulled up with 4.7K – 10KΩ resistor. Pull up voltage between 2.0V to 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. The RX-LOS is high (LVTTL logic "1") when there is no incoming light from the companion transceiver. This signal is normally used by the system for the diagnostic purpose. The signal is operated in LVTTL level.

Recommend Circuit Schematic



Mechanical Specifications



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