SFP 1GE-100FX 1310nm 2km MMF Optical Transceiver

Features

- Built-in PHY supporting SGMII Interface

- Hot-Pluggable

- 100BASE-FX operation

- 1310nm FP laser transmitter

- Duplex LC connector

- RoHS compliant and Lead Free

- Up to 2 km on 50/125 μm MMF

- Single +3.3V Power Supply

- Very low EMI and excellent ESD protection

- Support Digital Diagnostic Monitoring interface

- Power dissipation: ＜1W

- RoHs compliant and lead-free

- Compliant with SFF-8472 V9.5

- Operating case temperature: 0 to +70℃

Applications

- Switch to Switch interface

- Switched backplane applications

- Fast Ethernet

- Other optical transmission systems

Compliance

- SFP MSA(INF-8074i)

- SFF-8472 V9.5

- ITUT-G.957 STM-1

Description

The SFP-GE/FE-SX Small Form Factor Pluggable (SFP) transceivers are compatible with the Small Form Factor Pluggable Multi-Sourcing Agreement (MSA), and are designed for SGMII MAC interface to 100BASE-FX (The SGMII MAC Interface implements a modified 1000BASE-X Auto-Negotiation to indicate link, duplex, and peed to the MAC). The transceiver consists of four sections: the standard SFP part with DDM, the PHY part build with SGMII interface, the 1310nm FP laser and the PIN photo-detector. The module data link up to 2km in 50/125um multi mode fiber.

The SFP+ MSA defines a 256-byte memory map in EEPROM that is accessible over a 2-wire serial interface at the 8 bit address 1010000X (A0h). The digital diagnostic monitoring interface makes use of the 8 bit address 1010001X (A2h), so the originally defined serial ID memory map remains unchanged.

Absolute Maximum Ratings

Table1-Absolute Maximum Ratings

Parameter	Symbols	Min.	Typical	Max.	Unit	Notes
Storage Temperature	Ts	-40		+95	℃	
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		5			dBm	

Recommended Operating Conditions

Table2-Recommended Operating Conditions

Parameter	Symbols	Min.	Typical	Max.	Unit	Notes
Operating Case temperature	Tc	0		+70	℃	
Ambient Humidity	HA	+5		+70	%	Non-condensing
Power Supply Voltage	VCC	3.135	3.3	3.465	V	
Power Supply Current	ICC			400	mA	
Power Supply Noise Rejection				100	mVp-p	100Hz to 1MHz
Data Rate			125		Mbps	TX Rate/RX Rate
Transmission Distance				2	KM	
Coupled Fiber	Multi mode fiber					50/125um MMF

Electrical Characteristic

Table3-Electrical Characteristic

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes

Power Consumption	p			1.0	W	
Transmitter						
Total Supply Current	ICC			A	mA	1
Transmitter Disable Input-High	VDISH	2		Vcc+0.3	V	
Transmitter Disable Input-Low	VDISL	0		0.8	V	
Transmitter Fault Input-High	VDISL	2		Vcc+0.3	V	
Transmitter Fault Input-Low	VTxFH	0		0.8	V	
Receiver						
Total Supply Current	ICC			B	mA	1
LOSS Output Voltage-High	VLOSH	2		Vcc+0.3	V	LVTTL
LOSS Output Voltage-Low	VLOSL	0		0.8	V	

Notes:

[1] A (TX) + B (RX) = 400mA (Not include termination circuit)

Optical Characteristics

Table4-Optical Characteristics						
Parameter	Symbols	Min.	Typ.	Max.	Unit	Notes
Transmitter						
Average Output Power	P_{OUT}	-20		-14	dBm	1
Extinction Ratio	ER	8.2			dB	
Center Wavelength	λ C	1270	1310	1360	nm	FP Laser
Spectrum Bandwidth(RMS)	σ			3.5	nm	
Transmitter OFF Output Power	POff			-45	dBm	
Differential Line Input Impedance	RIN	90	100	110	Ohm	
Transmitter Eye Mask Definition	Compliant with G.957(class 1 laser safety)					2
Receiver						
Input Optical Wavelength	λ IN	1270		1610	nm	PIN-TIA
Receiver Sensitivity	PIN			-30	dBm	3
Input Saturation Power (Overload)	PSAT	-3			dBm	
LOS Assert	LOSA	-42			dBm	
LOS De-assert	LOSD			-33	dBm	4
LOS Hysteresis		0.5	2	6	dB	
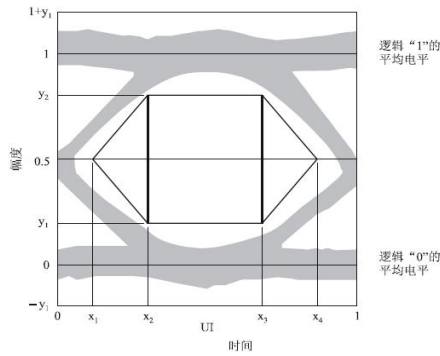
	STM-1	STM-4
x_1/x_4	0.15/0.85	0.25/0.75
x_2/x_3	0.35/0.65	0.40/0.60
y_1/y_2	0.20/0.80	0.20/0.80

Notes:

[1] Measure at 2^23-1 NRZ PRBS pattern

[2] Transmitter eye mask definition

[3] Measured with Light source 1310nm, ER=8.2dB; BER =＜10^-12 @PRBS=2^23-1 NRZ

[4] When LOS de-asserted, the RX data+/- output is High-level (fixed)

Digital Diagnostic Functions

The SFP-GE/FE-SX transceivers support the 2-wire serial communication protocol as defined in the SFP MSA. It is very closely related to the E2PROM defined in the GBIC standard, with the same electrical specifications.
The standard SFP serial ID provides access to identification information that describes the transceiver's capabilities, standard interfaces, manufacturer, and other information.

Additionally, 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.

The SFP MSA defines a 256-byte memory map in E2PROM that is accessible over a 2-wire serial interface at the 8 bit address 1010000X (A0h). The digital diagnostic monitoring interface makes use of the 8 bit address 1010001X (A2h), so the originally defined serial ID memory map remains unchanged. The interface is identical to, and is thus fully backward compatible with both the GBIC Specification and the SFP Multi Source Agreement.

The operating and diagnostics information is monitored and reported by a Digital Diagnostics Transceiver Controller (DDTC) inside the transceiver, which is accessed through a 2-wire serial interface. When the serial protocol is activated, the serial clock signal (SCL, Mod Def 1) is generated by the host. The positive edge clocks data into the SFP transceiver into those segments of the E2PROM that are not write-protected. The negative edge clocks data from the SFP transceiver.   The serial data signal (SDA, Mod Def 2) 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.

Digital diagnostics for the SFP-GE/FE-SX are internally calibrated by default.
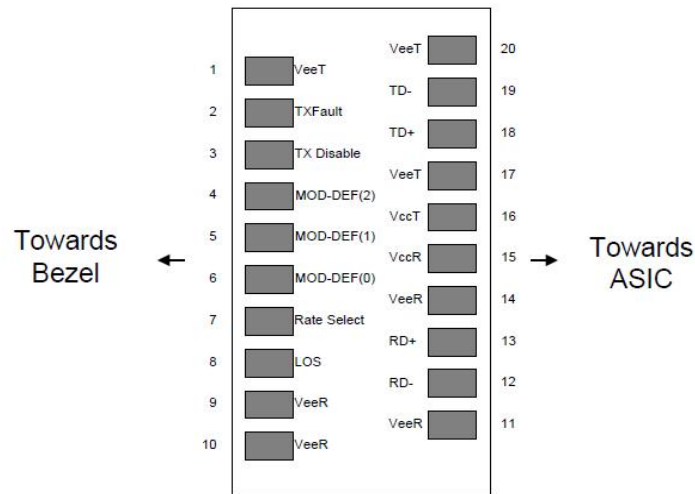
Pin Description

Figure1 Pin view

Pin Function Definitions

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.	3
5	MOD_DEF(1)	Module Definition 1. Clock line for Serial ID.	3
6	MOD_DEF(0)	Module Definition 0. Grounded within the module.	4
7	Rate Select	No connection required.	5
8	LOS	Loss of Signal indication. Open Drain. Logic "0" indicates normal operation.	4
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] Laser output disabled on TDIS＞2.0V or open, enabled on TDIS＜0.8V.

[3] Should be pulled up with 4.7k - 10kohms on host board to a voltage between 2.0V and 3.6V MOD_DEF(0) pulls line low to indicate module is plugged in.

[4] This is an optional input used to control the receiver bandwidth for compatibility with multiple data rates (most likely Fiber Channel 1x and 2x Rates). If implemented, the input will be internally pulled down with＞30kΩ resistor. The input states are:

    Low (0 – 0.8V): Reduced Bandwidth

    (＞0.8V, ＜2.0V): Undefined

    High (2.0 – 3.465V): Full Bandwidth

    Open: Reduced Bandwidth

[5] LOS is open collector output. Should be pulled up with 4.7k - 10kohms on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

Digital Diagnostic Functions

The following digital diagnostic characteristics are defined over the Recommended Operating Environment unless otherwise specified. It is compliant to SFF-8472 Rev10.2 with internal calibration mode. For external calibration mode please contact our sales staff.

Table6-Digital Diagnostic Functions

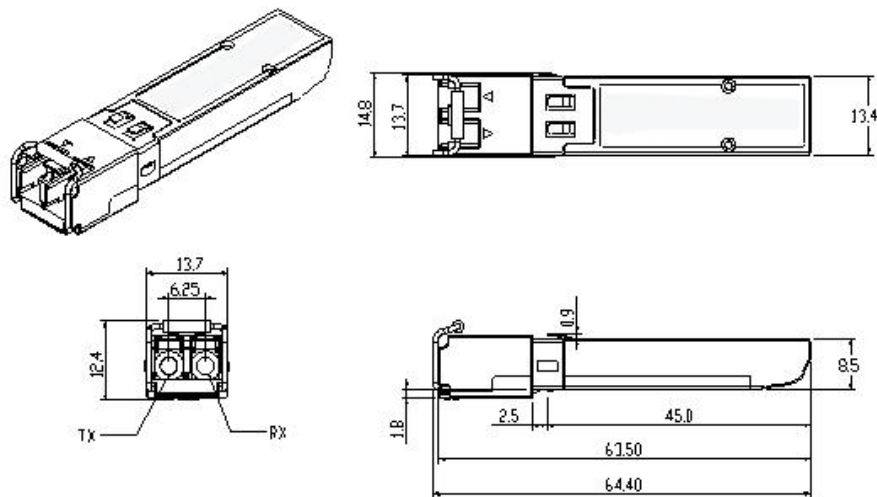| Parameter	Symbol	Min.	Max.	Unit	Notes
Temperature monitor absolute error	DMI_ Temp	-3	3	degC	Over operating temp
Supply voltage monitor absolute error	DMI _VCC	-0.15	0.15	V	Full operating range
RX power monitor absolute error	DMI_RX	-3	3	dB	
Bias current monitor	DMI_ bias	-10%	10%	mA	
TX power monitor absolute error	DMI_TX	-3	3	dB	

Mechanical Dimensions

Figure2 Mechanical Outline

Precautions

a．This device is susceptible to damage as a result of electrostatic discharge (ESD). A static free environment is highly recommended. Follow guidelines according to proper ESD procedures.

b． Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.

NADDOD

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2. Nothing herein should be construed as constituting an additional warranty.

3. NADDOD assumes no responsibility for the use or reliability of equipment or software not provided by NADDOD.

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