

## SNS SFP-GD-ELX

### Dual Data Rates 1.0625/1.25 Gbps SFP 1310 nm DFB laser Single-Mode Optical Transceiver



#### Highlights

- SFP MSA transceiver
- Dual data-rate of 1.25Gbps/1.063Gbps
- Compatible with SONET OC-24-LR-1
- Protocols:
  - 1 Gigabit Ethernet (1.25 Gbps)
  - 1 Gbps Fibre Channel (1.0625 Gbps)
- Single-Mode .ber
- 1310nm DFB laser and PIN receiver for 40km transmission
- Dual Fiber (Tx/Rx)
- Duplex LC connector
- Digital Diagnostics
- Hot-swap

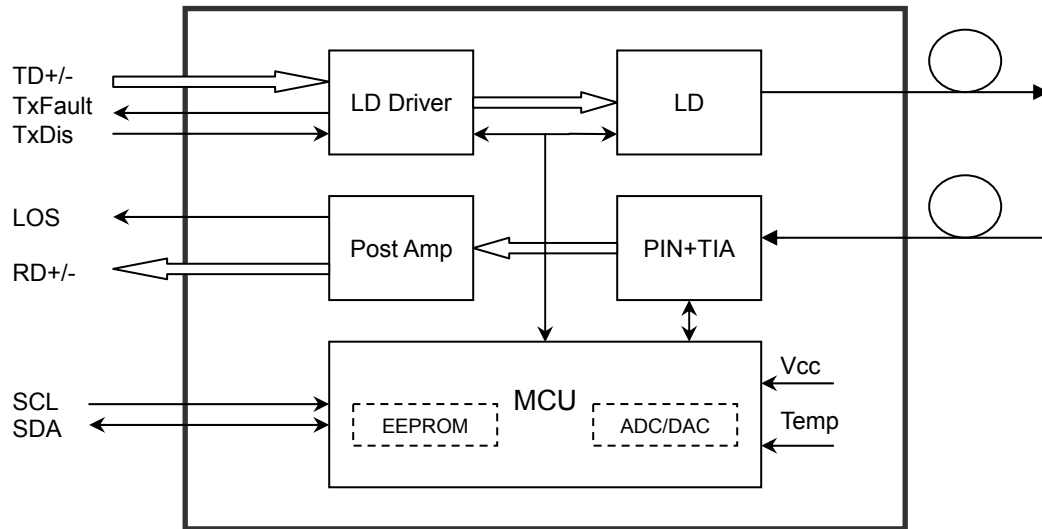
#### Overview

Optical SNS SFP is a high performance transceiver compliant with 1Gbps Small Form-Factor Pluggable (SFP) Multi-Source Agreement (MSA), supporting Dual data-rate of 1.25Gbps/1.063Gbps and transmission distance up to 40km. The transceiver module comprises a transmitter with 1310nm DFB laser, a PIN receiver photodiode integrated with a trans-impedance preamplifier (TIA). Transmitter and receiver are separate within a wide temperature range of -20/0 to 70/85°C and offers optimum heat dissipation and excellent electromagnetic shielding thus enabling high port densities for 1 Gbps systems.

#### Specifications

Data Rates:	1.25Gbps /1.063Gbps
Wavelength Tx	1310nm
Tx Power	-5 ~ 0 dBm
Tx Disable	Yes
Wavelength Range	1260 - 1360nm
Rx Sensitivity	-23.0 dBm
Rx Overload	-3 dBm
Operating Temperature Range	-20 / 0 to 70°C / 80°C
Power Consumption	< 1 Watts

The transceivers are compatible with SFP Multi-Source Agreement (MSA) and SFF-8472. For further information, please refer to SFP MSA.



## Absolute Maximum Ratings

**Table 1 - Absolute Maximum Ratings**

Parameter	Symbol	Min	Max	Unit
Supply Voltage	Vcc	-0.5	4.5	V
Storage Temperature	Ts	-40	+85	°C
Operating Humidity	-	5	85	%

## Recommended Operating Conditions

**Table 2 - Recommended Operating Conditions**

Parameter	Symbol	Min	Typical	Max	Unit
Operating Case Temperature	Tc	0		+70	°C
		-20		+85	°C
		-40		+85	
Power Supply Voltage	Vcc	3.13	3.3	3.47	V
Power Supply Current	Icc			300	mA
Data Rate			1.25		Gbps

## Optical and Electrical Characteristics

**SNS-SFP-GD-ELX: (DFB and PIN, 1310nm,40km Reach)**

**Table 3 - Optical and Electrical Characteristics**

Parameter		Symbol	Min	Typical	Max	Unit	Notes
Transmitter							
Centre Wavelength		$\lambda_c$	1260	1310	1360	nm	
Spectral Width (-20dB)		$\Delta\lambda$			1	nm	
Side Mode Suppression Ratio		SMSR	30			dB	
Average Output Power		P <sub>out</sub>	-5		0	dBm	1
Extinction Ratio		ER	9			dB	
Optical Rise/Fall Time (20%~80%)		tr/tf			0.26	ns	
Data Input Swing Differential		V <sub>IN</sub>	400		1800	mV	2
Input Differential Impedance		Z <sub>IN</sub>	90	100	110	$\Omega$	
TX Disable	Disable		2.0		V <sub>cc</sub>	V	
	Enable		0		0.8	V	
TX Fault	Fault		2.0		V <sub>cc</sub>	V	
	Normal		0		0.8	V	
Receiver							
Centre Wavelength		$\lambda_c$	1260		1580	nm	
Receiver Sensitivity					-23	dBm	3
Receiver Overload			-3			dBm	3
LOS De-Assert		LOS <sub>D</sub>			-24	dBm	
LOS Assert		LOS <sub>A</sub>	-35			dBm	
LOS Hysteresis			1		4	dB	
Data Output Swing Differential		V <sub>out</sub>	400		1800	mV	4
LOS	High		2.0		V <sub>cc</sub>	V	
	Low				0.8	V	

**Notes:**

1. The optical power is launched into SMF.
2. PECL input, internally AC-coupled and terminated.
3. Measured with a PRBS 2<sup>7</sup>-1 test pattern @1250Mbps, BER  $\leq 1 \times 10^{-12}$ .
4. Internally AC-coupled.

## Timing and Electrical

**Table 4 - Timing and Electrical**

Parameter	Symbol	Min	Typical	Max	Unit
Tx Disable Negate Time	t_on			1	ms
Tx Disable Assert Time	t_off			10	μs
Time To Initialize, including Reset of Tx Fault	t_init			300	ms
Tx Fault Assert Time	t_fault			100	μs
Tx Disable To Reset	t_reset	10			μs
LOS Assert Time	t_loss_on			100	μs
LOS De-assert Time	t_loss_off			100	μs
Serial ID Clock Rate	f_serial_clock			400	KHz
MOD_DEF (0:2)-High	V <sub>H</sub>	2		V <sub>cc</sub>	V
MOD_DEF (0:2)-Low	V <sub>L</sub>			0.8	V

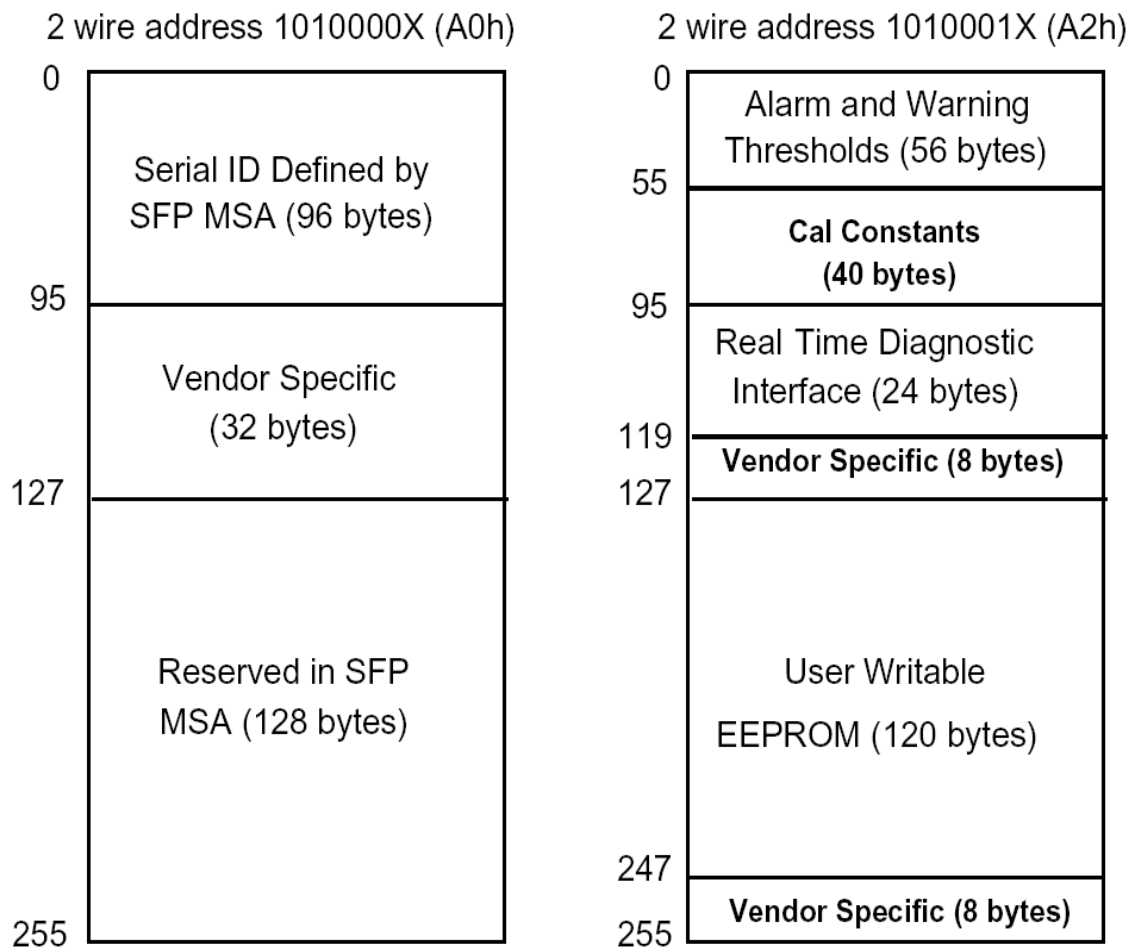
## Diagnostics

**Table 5 – Diagnostics Specification**

Parameter	Range	Unit	Accuracy	Calibration
Temperature	0 to +70	°C	±3°C	Internal / External
	-20 to +85			
	-40 to +85			
Voltage	3.0 to 3.6	V	±3%	Internal / External
Bias Current	0 to 100	mA	±10%	Internal / External
TX Power	-5 to 0	dBm	±3dB	Internal / External
RX Power	-23 to -3	dBm	±3dB	Internal / External

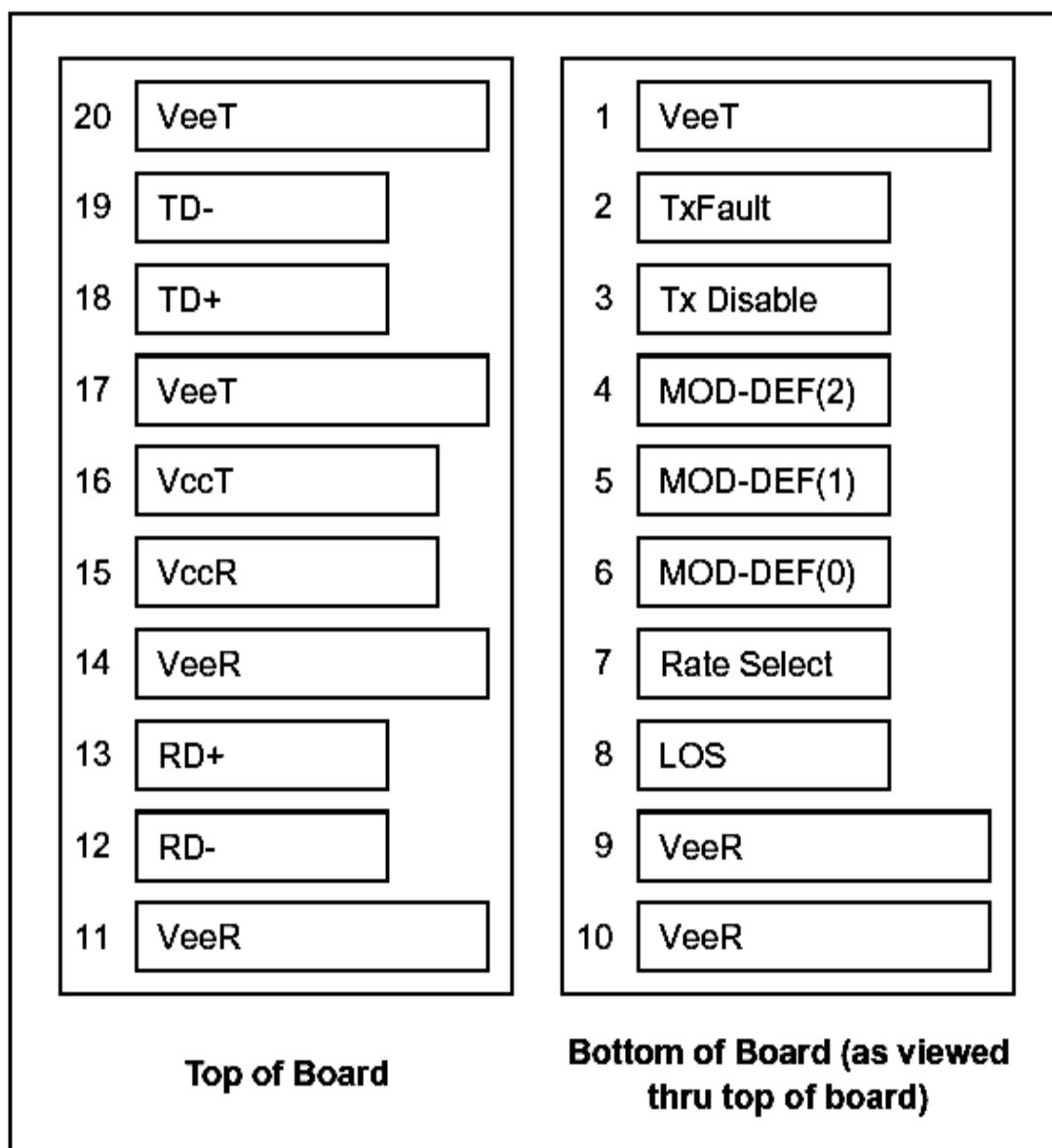
## Digital Diagnostic Memory Map

The digital diagnostic memory map specific data field defines as following.



## Pin Definitions

Pin Diagram



## Pin Descriptions

Pin	Signal Name	Description	Plug Seq.	Notes
1	V <sub>EET</sub>	Transmitter Ground	1	
2	TX FAULT	Transmitter Fault Indication	3	Note 1
3	TX DISABLE	Transmitter Disable	3	Note 2
4	MOD_DEF(2)	SDA Serial Data Signal	3	Note 3
5	MOD_DEF(1)	SCL Serial Clock Signal	3	Note 3
6	MOD_DEF(0)	TTL Low	3	Note 3
7	Rate Select	Not Connected	3	
8	LOS	Loss of Signal	3	Note 4
9	V <sub>EER</sub>	Receiver ground	1	
10	V <sub>EER</sub>	Receiver ground	1	
11	V <sub>EER</sub>	Receiver ground	1	
12	RD-	Inv. Received Data Out	3	Note 5
13	RD+	Received Data Out	3	Note 5
14	V <sub>EER</sub>	Receiver ground	1	
15	V <sub>CCR</sub>	Receiver Power Supply	2	
16	V <sub>CCT</sub>	Transmitter Power Supply	2	
17	V <sub>EET</sub>	Transmitter Ground	1	
18	TD+	Transmit Data In	3	Note 6
19	TD-	Inv. Transmit Data In	3	Note 6
20	V <sub>EET</sub>	Transmitter Ground	1	

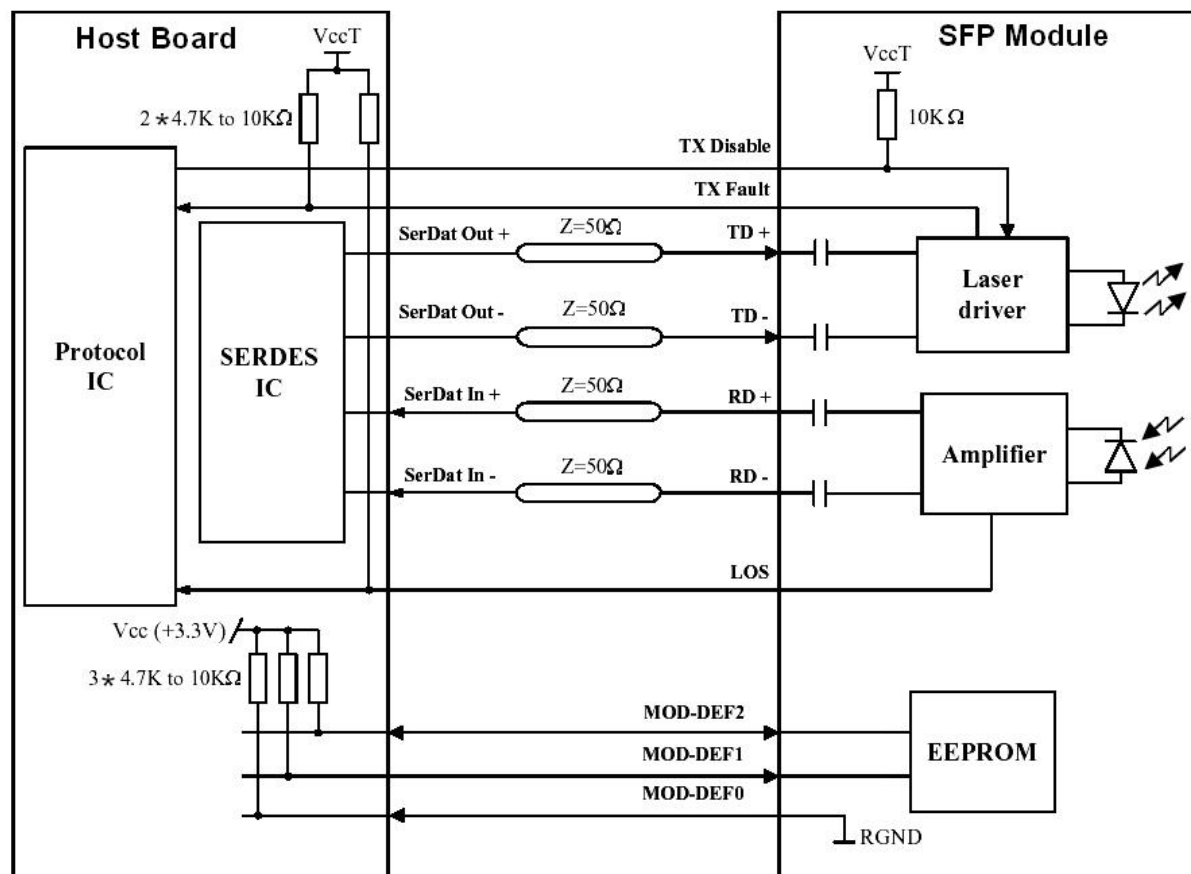
### Notes:

Plug Seq.: Pin engagement sequence during hot plugging.

- 1) TX Fault is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor on the host board to a voltage between 2.0V and V<sub>cc</sub>+0.3V. Logic 0 indicates normal operation; Logic 1 indicates a laser fault of some kind. In the low state, the output will be pulled to less than 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 4.7k~10kΩ resistor. Its states are:
 

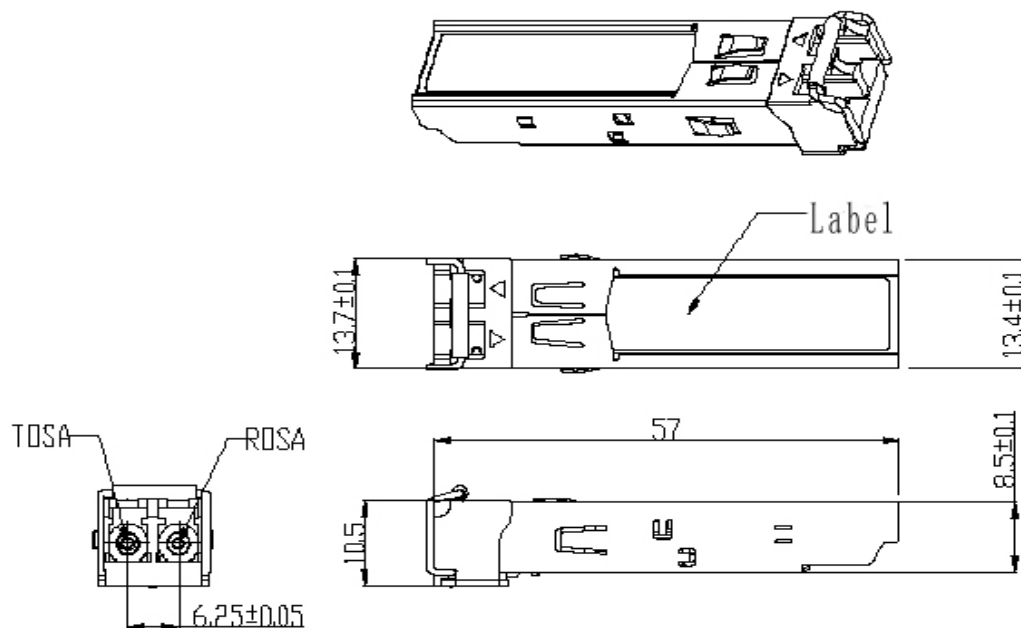
Low (0 to 0.8V):	Transmitter on
(>0.8V, < 2.0V):	Undefined
High (2.0 to 3.465V):	Transmitter Disabled
Open:	Transmitter Disabled
- 3) Mod-Def 0,1,2. These are the module definition pins. They should be pulled up with a 4.7k~10kΩ resistor on the host board. The pull-up voltage shall be V<sub>ccT</sub> or V<sub>ccR</sub>.  
 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 is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor. Pull up voltage between 2.0V and V<sub>cc</sub>+0.3V. Logic 1 indicates loss of signal; Logic 0 indicates normal operation. In the low state, the output will be pulled to less than 0.8V.
- 5) RD-/+ : These are the differential receiver outputs. They are internally AC-coupled 100 differential lines which should be terminated with 100Ω (differential) at the user SERDES.
- 6) TD-/+ : These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100Ω differential termination inside the module.

## Recommended Interface Circuit





## Mechanical Dimensions



## Ordering Information

<b>SNS SFP-GD-ELX</b>	Data Rates of 1.25 Gbps SFP 1310 nm DFB laser Single-Mode Optical Transceiver
<b>SNS SFP-GD-ELXTH</b>	Data Rates of 1.25 Gbps SFP 1310 nm DFB laser Single-Mode Optical Transceiver -20 to 80°C

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