

4.25Gbps SFP Transceiver

MODEL: SFP-LH-405



Product Features

- Up to 4.25Gb/s data links with DDM
- DFB laser transmitter and PIN photo-detector.
- Up to 5km on 9/125µm SMF
- Hot-pluggable SFP footprint
- Duplex LC/UPC type pluggable optical interface
- Low power dissipation
- Metal enclosure, for lower EMI
- RoHS compliant and lead-free
- Support Digital Diagnostic Monitoring interface
- Single +3.3V power supply
- Compliant with SFF-8472
- Case operating temperature
 - Commercial: 0°C to +70°C
 - Extended: -10°C to +80°C
 - Industrial: -40°C to +85°C

Applications:

- 1000 Base-LX Ethernet
- 4xFC at 4.25Gbps
- 2xFC at 2.125Gbps
- 1xFC at 1.0625Gbps

Absolute Maximum Ratings

Table 1- Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Units	Notes
Power Supply Voltage	Vcc-Vee	-0.5	4	V	
Storage Temperature	Tst	-40	+85	°C	
Operating Humidity	Operating Humidity	5	95	%	Non-condensing

Recommended Operating Conditions

Table 2- Recommended operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit
Operating Case Temperature	Standard	0		+75	°C
	Industrial	-40		+85	

Power Supply Voltage	V _{cc}	3.13	3.3	3.47	V
Power Supply Current	I _{cc}			330	mA

Electrical Characteristics

Table 3- Electrical Characteristics

Transmitter						
Parameter	Symbol	Min	Typ	Max	Unit	Notes
Data Rate	V _{in}	mV _{pp}	4.25	-	Gb/s	
Centre Wavelength	λ _c	1270	1310	1360	nm	
Spectral Width (-20dB)	Δλ	V	2	1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Average Output Power(BOL)	P _{out}	-6		-1	dBm	1
Extinction Ratio	ER	6			dB	
Average Launch Power-OFF Transmitter	P _{out}			-40	dBm	
Optical Eye Diagram	Optical Eye Diagram					
Optical Rise/Fall Time (20%~80%)	tr/tf			130	ns	
Data Input Swing Differential	V _{IN}	200		2400	mV	2
Input Differential Impedance	Z _{IN}	90	100	120	Ω	
TX Disable	Disable	2.0		V _{cc}	V	
	Enable	0		0.8		
TX Fault	Fault	2.0		V _{cc}	V	
	Normal	0		0.8		
Receiver						
Centre Wavelength	λ _c	1270	0	1610	nm	
Receiver Sensitivity(BOL)	S _{en}			-18	dBm	3
LOS De-Assert	LOSD	-35			dBm	
LOS Assert	LOSA			-19	dBm	
LOS Hysteresis		0.5		6	dB	
Receiver Reflectance				-20	dB	
Data Output Swing Differential	V _{OUT}	350		1800	mV	4
Loss of Signal (LOS) Assert Time	T _{Assert}			500	nS	
Loss of Signal (LOS) Deassert Time	T _{Deassert}			500	nS	
LOS	High	2.0		V _{cc}	V	
	Low			0.8		

Notes:

1. The optical power is launched into SMF.
2. PECL input, internally AC-coupled and terminated.
3. Measured with a PRBS 2⁷-1 test pattern @4250Mbps, BER ≤ 1 × 10⁻¹².
4. CML Output, internally AC-coupled

Timing and Electrical

Table 4- Timing and Electrical

Parameter	Symbol	Min.	Typ	Max.	Unit
Tx Disable Negate Time	t _{on}			1	ms
62.5μm Core Diameter MMF	t _{off}			10	μs
Time To Initialize, including Reset of Tx Fault	t _{init}	0		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	VH	2		V _{cc}	V
MOD_DEF (0:2)-Low	VL			0.8	V

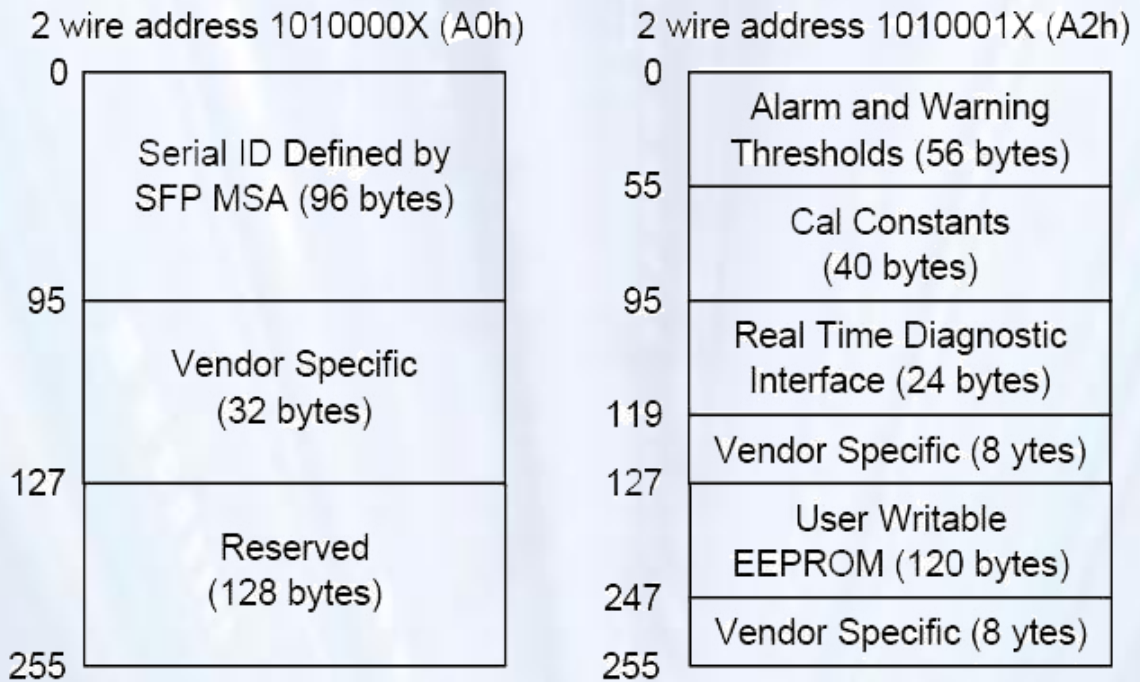
Receiver Performance

Table 5- optical RX Characteristics

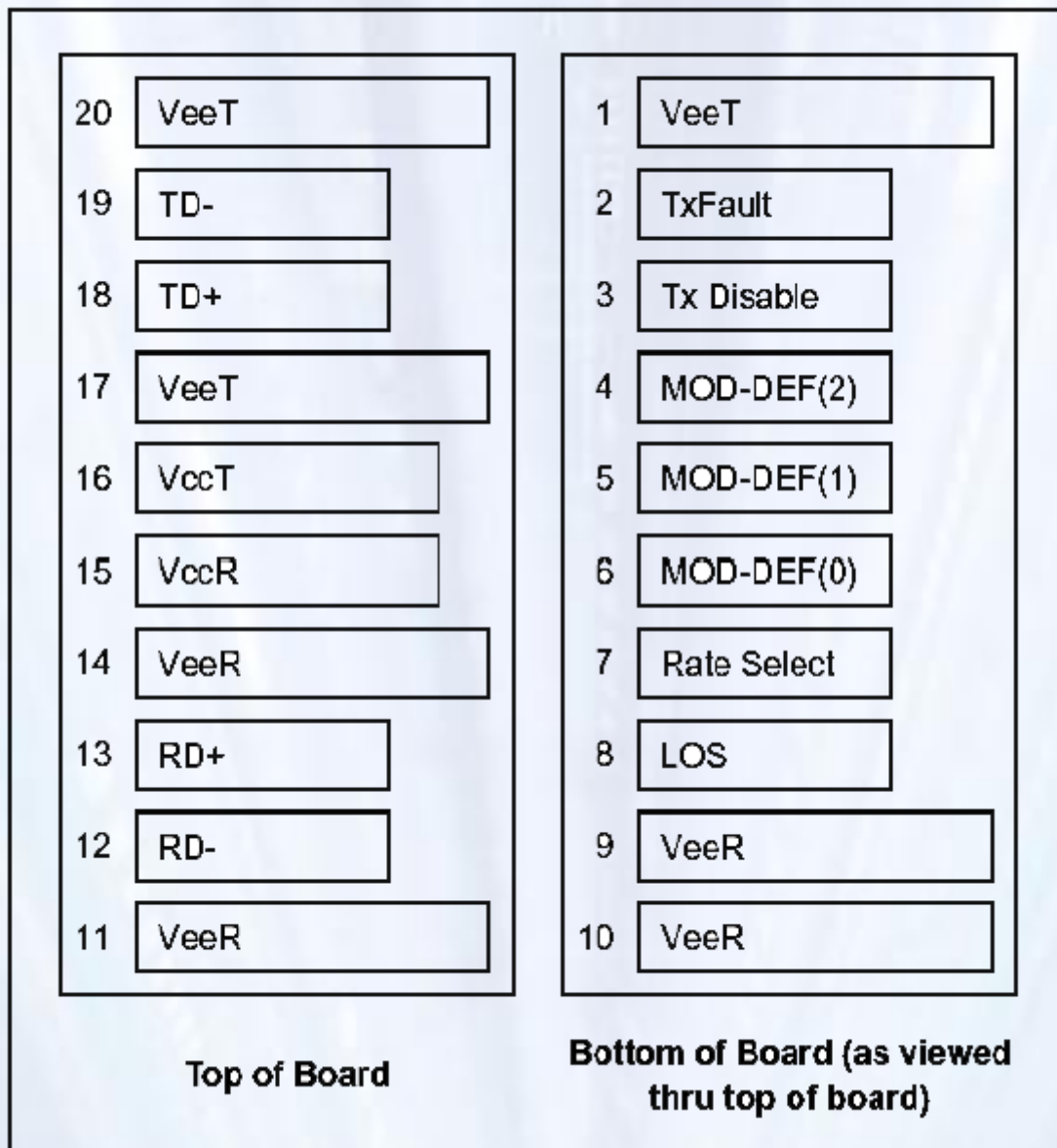
Parameter	Range	Unit	Accuracy	Calibration
Temperature	0 to +70	°C	±3°C	Internal / External
	-40 to +85			
Voltage	3.0 to 3.6	V	±3%	Internal / External
Bias Current	0 to 100	mA	±10%	Internal / External
TX Power	-9 to -3	dBm	±3dB	Internal / External
RX Power	-23 to -3	dBm	±3dB	Internal / External

Digital Diagnostic Memory Map

The transceivers provide serial ID memory contents and diagnostic information about the present operating conditions by the 2-wire serial interface (SCL, SDA). The diagnostic information with internal calibration or external calibration all are implemented, including received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring. The digital diagnostic memory map specific data field defines as following.



Pin Definitions



Pin Function Definitions

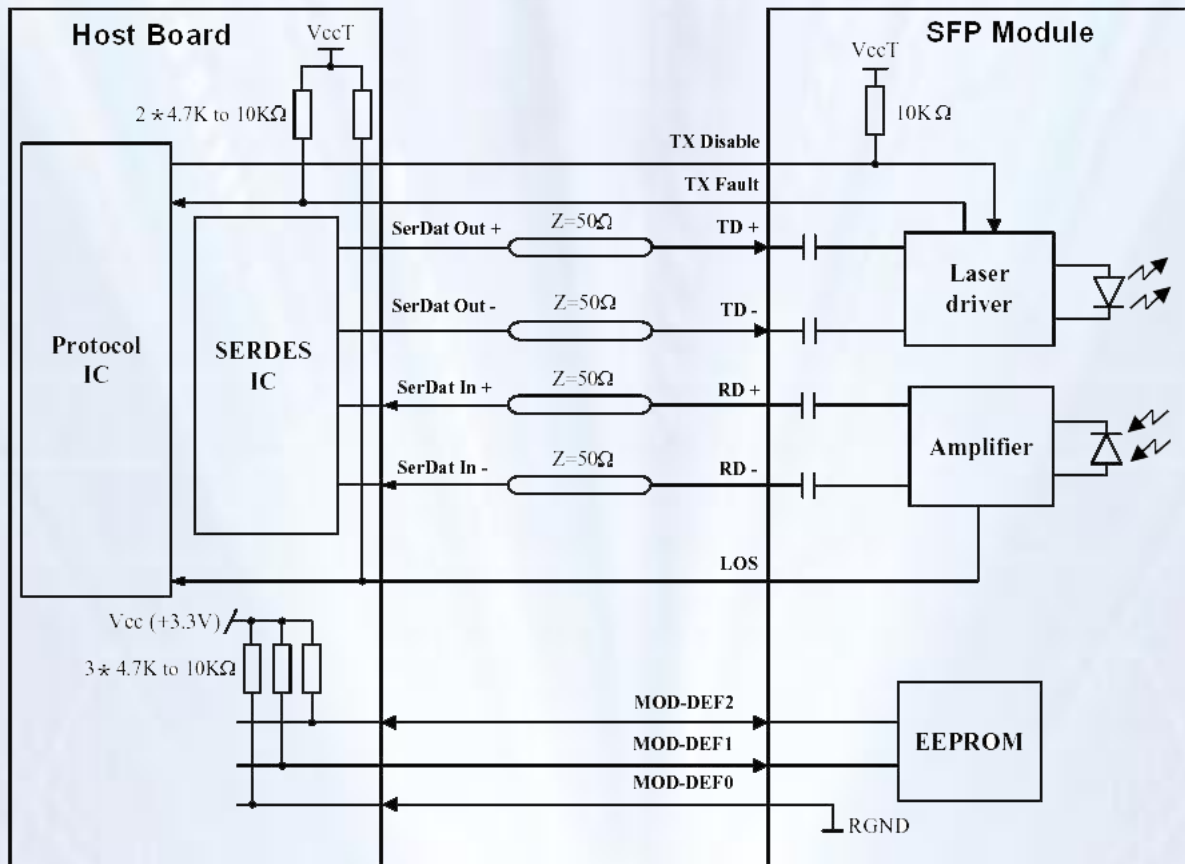
Pin Num	Name	FUNCTION	Plug Seq.	Notes
1	VeeT	Transmitter Ground	1	
2	TX Fault	Transmitter Fault Indication	3	Note 1
3	TX Disable	Transmitter Disable	3	Note 2
4	MOD-DEF2	Module Definition 2	3	Note 3
5	MOD-DEF1	Module Definition 1	3	Note 3
6	MOD-DEF0	Module Definition 0	3	Note 3
7	Rate Select	Not Connect	3	
8	LOS	Loss of Signal	3	Note 4
9	VeeR	Receiver Ground	1	
10	VeeR	Receiver Ground	1	
11	VeeR	Receiver Ground	1	
12	RD-	Inv. Received Data Out	3	Note 5
13	RD+	Received Data Out	3	Note 5
14	VeeR	Receiver Ground	1	
15	VccR	Receiver Power	2	

16	VccT	Transmitter Power	2	
17	VeeT	Transmitter Ground	1	
18	TD+	Transmit Data In	3	Note 6
19	TD-	Inv. Transmit Data In	3	Note
20	VeeT	Transmitter Ground	1	

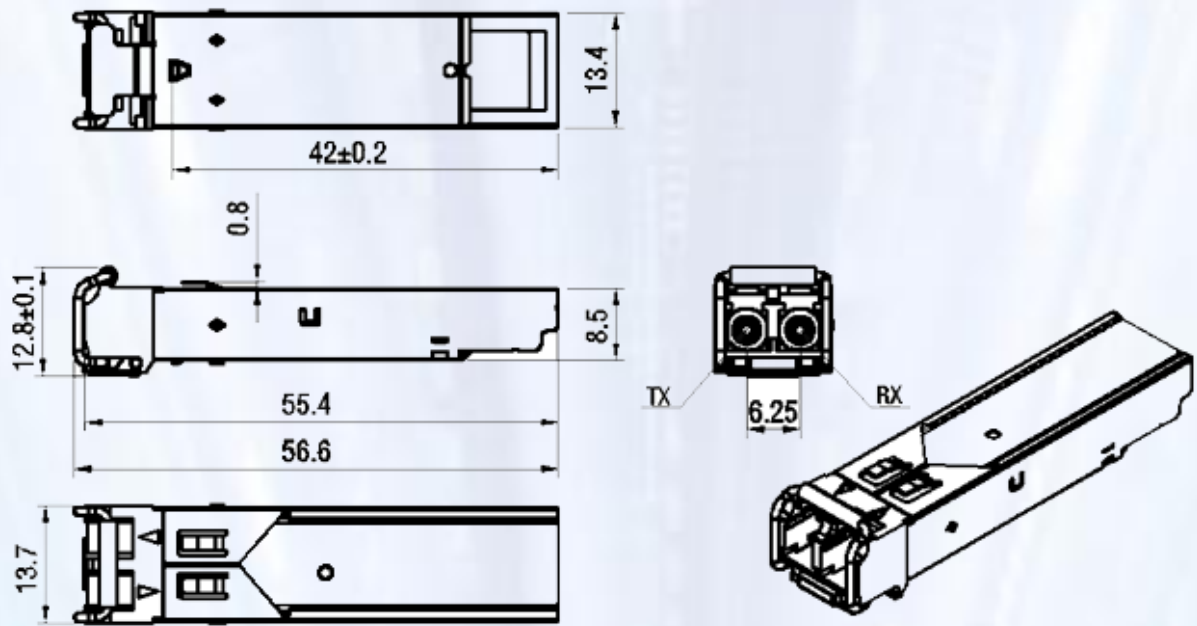
Notes:

- 1) TX Fault is an open collector/drain output, which should be pulled up with a 4.7K – 10K_ resistor on the host board. Pull up voltage between 2.0V and VccT, R+0.3V. When high, output indicates a laser ault 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 – 10 K _ 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_ 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_ 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_ differential lines which should be terminated with 100_ (differential) at the user SERDES. The AC coupling is done inside the 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 –1000 mV single ended) when properly terminated.

Recommend Circuit Schematic



Mechanical Specifications



Order Information

Table 7-Order Information

Part Number	Product Description
SFP-LH-405	1310nm, 4.25Gbps, 5km, 0°C ~ +70°C, With Digital Diagnostic Monitoring
SFP-LH-405I	1310nm, 4.25Gbps, 5km, -40°C ~ +85°C, With Digital Diagnostic Monitoring

1. Small Form Factor Pluggable (SFP) Transceiver Multi-Source Agreement (MSA), September 2000.
2. Telcordia GR-253-CORE and ITU-T G.957 Specifications.

Important Notice

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