TRICOM 1.25Gbps SFP BIDIRECTIONAL TRANSCEIVER, 40KM Tx1310nm/Rx1550nm

Product Description

The BIDI SFP transceivers are high performance, cost effective modules supporting dual data-rate of 1.25Gbps/1.0625Gbps and 20km transmission distance with SMF. The transceiver consists of three sections: a FP laser transmitter, a PIN photodiode integrated with a trans-impedance preamplifier (TIA) and MCU control unit. All modules satisfy class I laser safety requirements. The transceivers are compatible with SFP Multi-Source Agreement (MSA) and SFF-8472. For further information, please refer to SFP MSA.

Features

- Dual data-rate of 1.25Gbps/1.063Gbps operation

- 1310nm FP laser and PIN photodetector for 20km transmission

- Compliant with SFP MSA and SFF-8472 with duplex LC receptacle

- Digital Diagnostic Monitoring:

- Internal Calibration or External Calibration

- Compatible with SONET OC-24-LR-1

- Compatible with RoHS

- +3.3V single power supply

- Operating case temperature: Standard: 0 to +70°C

Applications

- Gigabit Ethernet

- Fiber Channel

- Switch to Switch interface

- Switched backplane applications

- Router/Server interface

- Other optical transmission systems
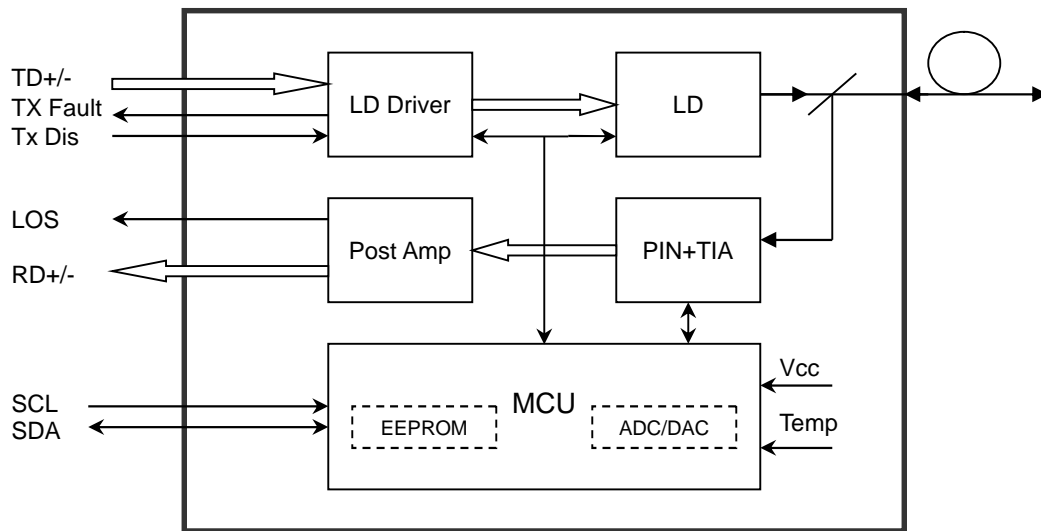
Absolute Maximum Ratings

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	Standard	Tc	0		+70	°C
Power Supply Voltage		Vcc	3.13	3.3	3.47	V
Power Supply Current		Icc			300	mA
Data Rate	Gigabit Ethernet			1.25		Gbps
	Fiber Channel			1.063		

Optical and Electrical Characteristics

(FP and PIN, 1310nm, 40km Reach)

Table 3 - Optical and Electrical Characteristics

Parameter		Symbol	Min	Typical	Max	Unit	Notes
Transmitter							
Centre Wavelength		c	1260	1310	1360	nm	
Spectral Width (RMS)					4	nm	
Average Output Power		Pout	-9		-3	dBm	1
Extinction Ratio		ER	9			dB	
Optical Rise/Fall Time (20%~80%)		tr/tf			0.26	ns	
Data Input Swing Differential		VIN	400		1800	mV	2
Input Differential Impedance		ZIN	90	100	110		
TX Disable	Disable		2.0		Vcc	V	
	Enable		0		0.8	V	
TX Fault	Fault		2.0		Vcc	V	
	Normal		0		0.8	V	
Receiver							
Centre Wavelength		c	1480		1580	nm	
Receiver Sensitivity					-23	dBm	3
Receiver Overload			-3			dBm	3
LOS De-Assert		LOSD			-24	dBm	
LOS Assert		LOSA	-30			dBm	
LOS Hysteresis			1		4	dB	
Data Output Swing Differential		Vout	400		1800	mV	4

| LOS | High | 2.0 | | Vcc | 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 27-1 test pattern @1250Mbps, BER 1×10-12.
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	VH	2		Vcc	V
MOD_DEF (0:2)-Low	VL			0.8	V

Diagnostics

Table 5 – Diagnostics Specification

Parameter	Range	Unit	Accuracy	Calibration
Temperature	0 to +70	°C	±3°C	Internal / External
Voltage	3.0 to 3.6	V	±3%	Internal / External
Bias Current	0 to 100	mA	±10%	Internal / External
TX Power	-9 to 0	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).
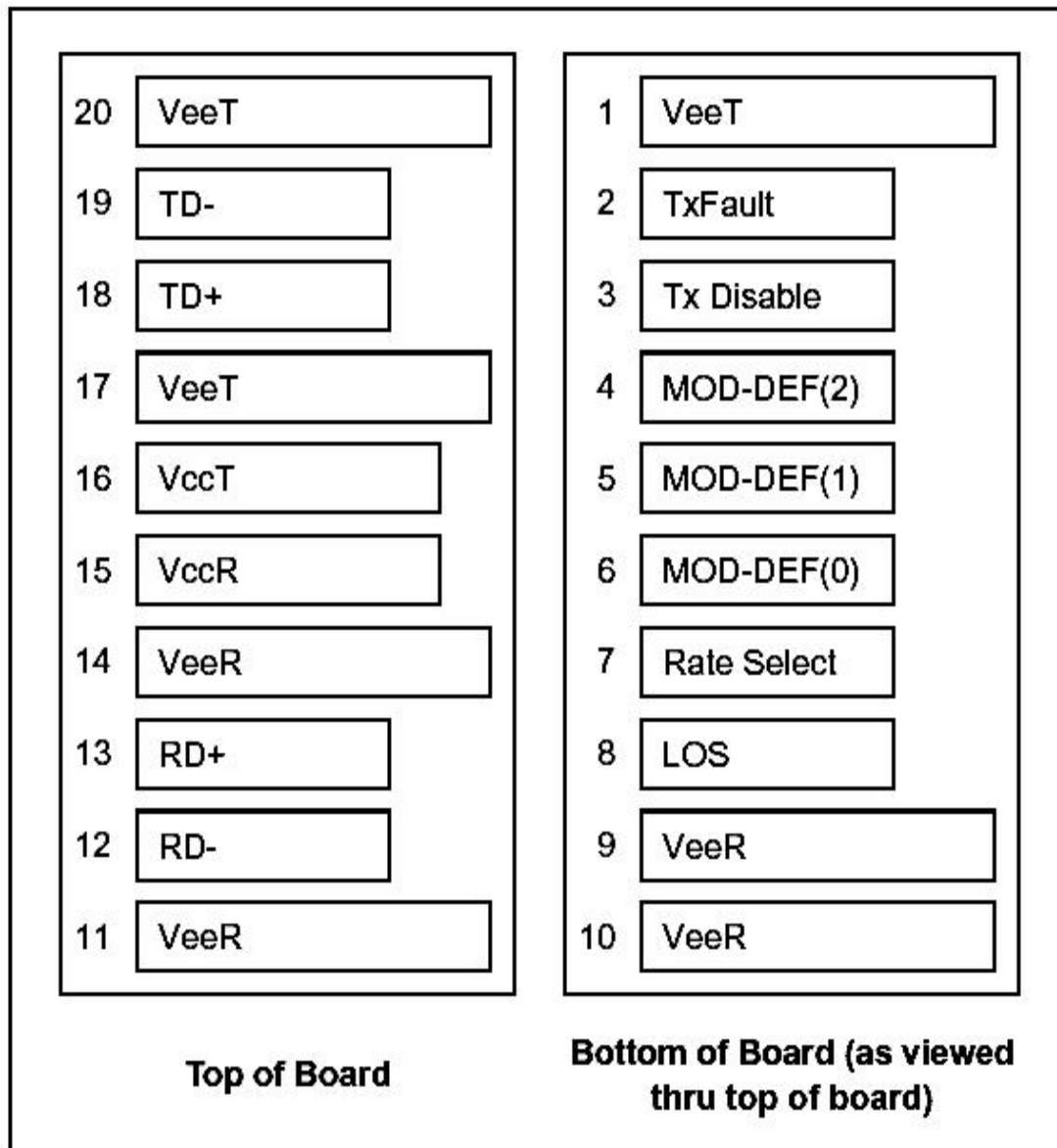
The diagnostic information with internal calibration or external calibration all are implemented, including received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring.

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

2 wire address 1010000X (A0h)

```
0   ┌──────────────────────────┐
    │                          │
    │  Serial ID Defined by    │
    │  SFP MSA (96 bytes)      │
    │                          │
95  ├──────────────────────────┤
    │                          │
    │  Vendor Specific         │
    │  (32 bytes)              │
127 ├──────────────────────────┤
    │                          │
    │                          │
    │  Reserved in SFP         │
    │  MSA (128 bytes)         │
    │                          │
    │                          │
255 └──────────────────────────┘
```

2 wire address 1010001X (A2h)

```
0   ┌──────────────────────────┐
    │  Alarm and Warning       │
    │  Thresholds (56 bytes)   │
55  ├──────────────────────────┤
    │  Cal Constants           │
    │  (40 bytes)              │
95  ├──────────────────────────┤
    │  Real Time Diagnostic    │
    │  Interface (24 bytes)    │
119 ├──────────────────────────┤
    │  Vendor Specific (8 bytes)│
127 ├──────────────────────────┤
    │                          │
    │  User Writable           │
    │  EEPROM (120 bytes)      │
    │                          │
247 ├──────────────────────────┤
    │  Vendor Specific (8 bytes)│
255 └──────────────────────────┘
```
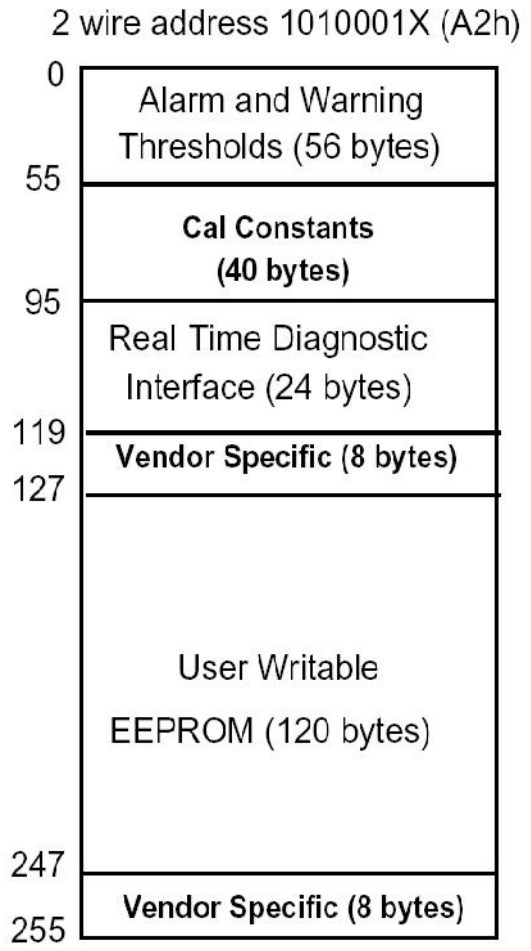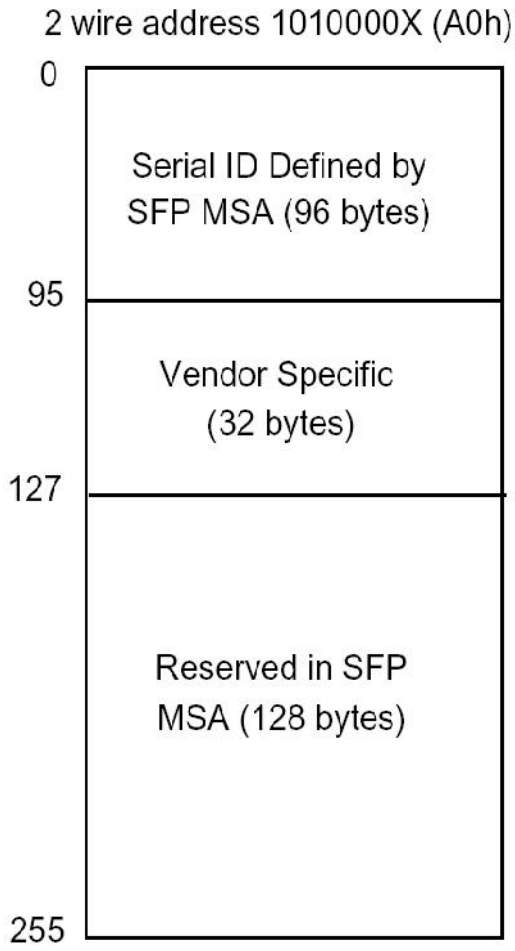
Pin Definitions

Pin Diagram

20	VeeT
19	TD-
18	TD+
17	VeeT
16	VccT
15	VccR
14	VeeR
13	RD+
12	RD-
11	VeeR

Top of Board

1	VeeT
2	TxFault
3	Tx Disable
4	MOD-DEF(2)
5	MOD-DEF(1)
6	MOD-DEF(0)
7	Rate Select
8	LOS
9	VeeR
10	VeeR

Bottom of Board (as viewed thru top of board)

Pin Descriptions

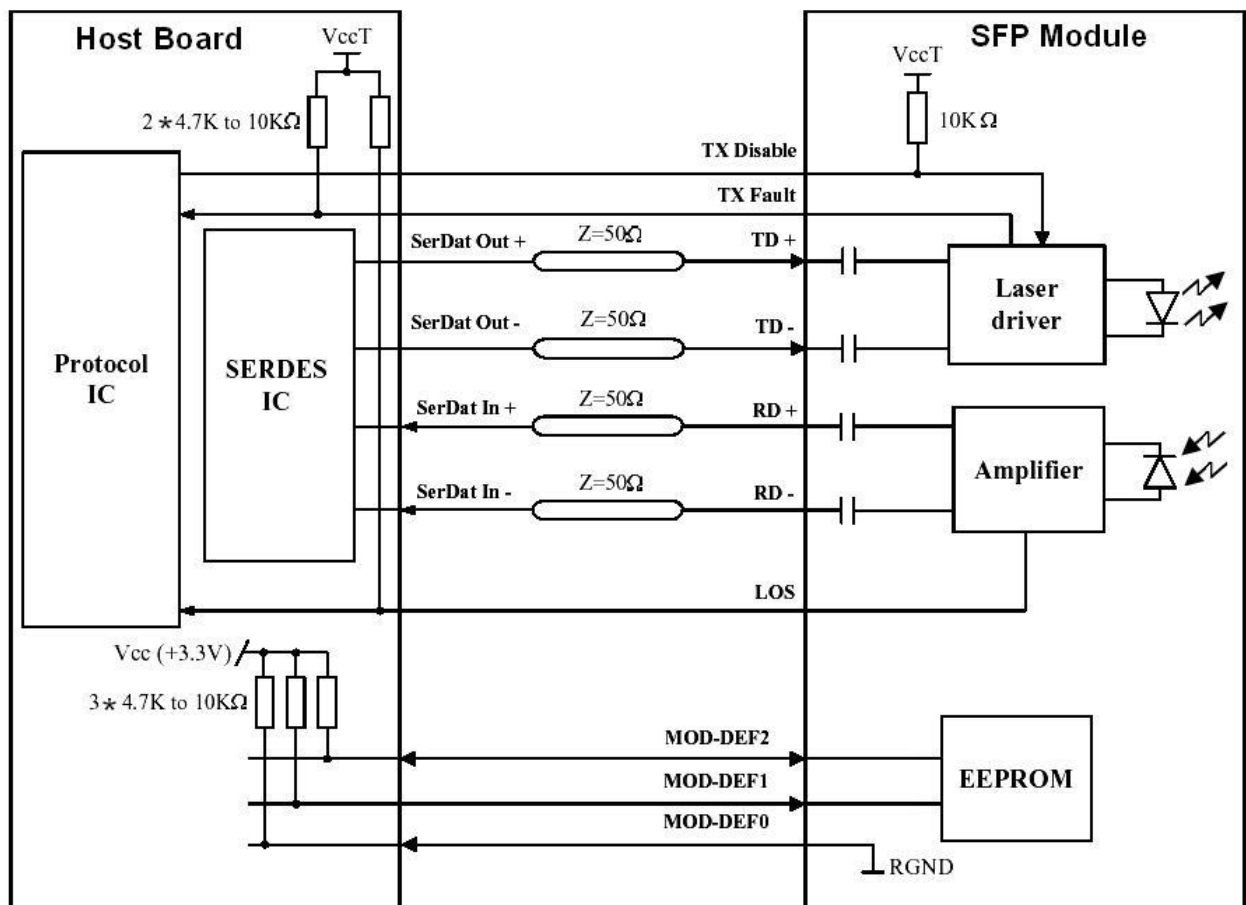| Pin	Signal Name	Description	Plug Seq.	Notes
1	V_{EET}	Transmitter Ground	1	
2	TX FAULT	Transmitter Fault Indication	3	Note 1
3	TX DISABLE	Transmitter Disable	3	Note 2
4	MOD_DEF(2)	SDA Serial Data Signal	3	Note 3
5	MOD_DEF(1)	SCL Serial Clock Signal	3	Note 3
6	MOD_DEF(0)	TTL Low	3	Note 3
7	Rate Select	Not Connected	3	
8	LOS	Loss of Signal	3	Note 4
9	V_{EER}	Receiver ground	1	
10	V_{EER}	Receiver ground	1	
11	V_{EER}	Receiver ground	1	
12	RD-	Inv. Received Data Out	3	Note 5
13	RD+	Received Data Out	3	Note 5
14	V_{EER}	Receiver ground	1	
15	V_{CCR}	Receiver Power Supply	2	
16	V_{CCT}	Transmitter Power Supply	2	
17	V_{EET}	Transmitter Ground	1	
18	TD+	Transmit Data In	3	Note 6
19	TD-	Inv. Transmit Data In	3	Note 6
20	V_{EET}	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~10k resistor on the host board to a voltage between 2.0V and Vcc+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~10k 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~10k resistor on the host board. The pull-up voltage shall be VccT or VccR.
   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~10k resistor. Pull up voltage between 2.0V and Vcc+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 100 (differential) at the user SERDES.

6) TD-/+: These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100 differential termination inside the module.

Recommended Interface Circuit

Mechanical Dimensions

BOSA

13.7 ±0.1

13.4 ±0.1

8.5 ±0.1

45

57.10