

Specification

Small Form Factor Pluggable

Duplex LC Receptacle – SFP

Optical Transceivers


1000BASE

1250Mbit/s



Ordering Information

TSD-S2CB1-K10

Model Name	TSD-S2CB1-K10	Notes
Voltage	3.3V	
Device type	1310nm DFB / InGaAs PIN	
Interface	AC / AC Coupling	
LOS	LVTTL	
Temperature	-40°C~+85°C	
Distance	40km	
Latch Color	Blue 	

■Features

- Dual data-rate of 1.25Gbps/1.063Gbps operation
- 1310nm DFB laser and PIN photodetector for 40km 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
- Compatible with RoHS
- +3.3V single power supply

■Applications

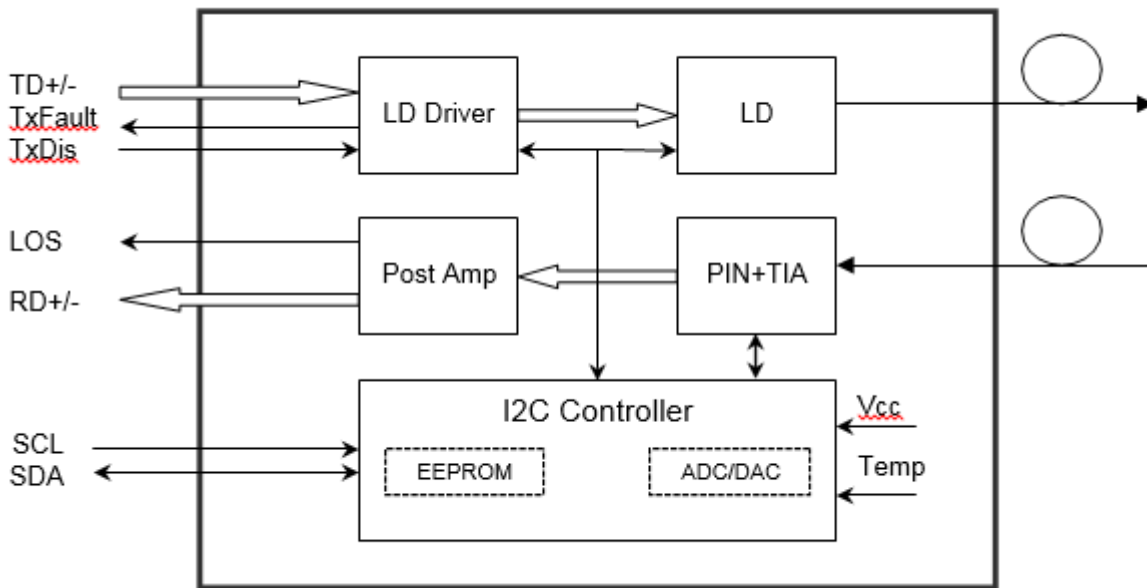
- Gigabit Ethernet
- Fiber Channel
- Switch to Switch interface
- Switched backplane applications
- Router/Server interface
- Other optical transmission systems

■Description

The SFP transceivers are high performance, cost effective modules supporting dual data-rate of 1.25Gbps/1.0625Gbps and 40km transmission distance with SMF.

The transceiver consists of three sections: a DFB 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.



Absolute Maximum Ratings

Parameter	Symbol	Unit	Min	Max
Storage Temperature Range	Ts	°C	-40	+85
Relative Humidity	RH	%	5	95
Power supply Voltage	Vcc	V	-0.5	4.5

Recommended Operating Conditions

Parameter	Symbol	Unit	Min	Typ.	Max
Case Operating Temperature Range	T _c	°C	-40		85
Power Supply Voltage	V _{cc}	V	3.135	3.3	3.465
Power Supply Current	I _{cc}	mA			300
Data Rate	-	Gb/s	-	1.25	-

Specifications (tested under recommended operating conditions, unless otherwise noted)

Parameter	Symbol	Unit	Min	Typ	Max	Notes
Optical transmitter Characteristics						
Average Output Power	P _o	dBm	-5	-	+2	1
Extinction Ratio	ER	dB	9	-	-	
Center Wavelength Range	λ _c	nm	1260	1310	1360	
Spectral Width (-20dB)	Δλ	nm			1	
Side Mode Suppression Ratio	SMSR	dB	30			
Optical Rise/Fall Time	Tr/Tf	ps			260	
Relative Intensity Noise	RIN	dB/Hz			-120	
Data Input Swing Differential	V _{IN}	mV	400		1800	2
Input Differential Impedance	Z _{IN}	Ω	90	100	110	
TX Disable	Disable	V	2.0		V _{cc}	
	Enable	V	0		0.8	
RX Disable	Fault	V	2.0		V _{cc}	
	Normal	V	0		0.8	
Optical receiver Characteristics						
Center Wavelength Range	λ _c	nm	1260		1360	
Receiver Sensitivity		dBm			-23	3
Overload Input Optical Power	P _{in}	dBm	-3			3
LOS	Optical De-assert	dBm			-24	

LOS	Optical Assert		dBm	-35			
LOS Hysteresis			dB	1		4	
Data Output Swing Differential		Vout	mV	370		1800	4
LOS	High	V	2.0			Vcc	
	Low	V				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 @1250Mbps, BER ≤1×10⁻¹².
4. Internally AC-couple

■ Timing and Electrical

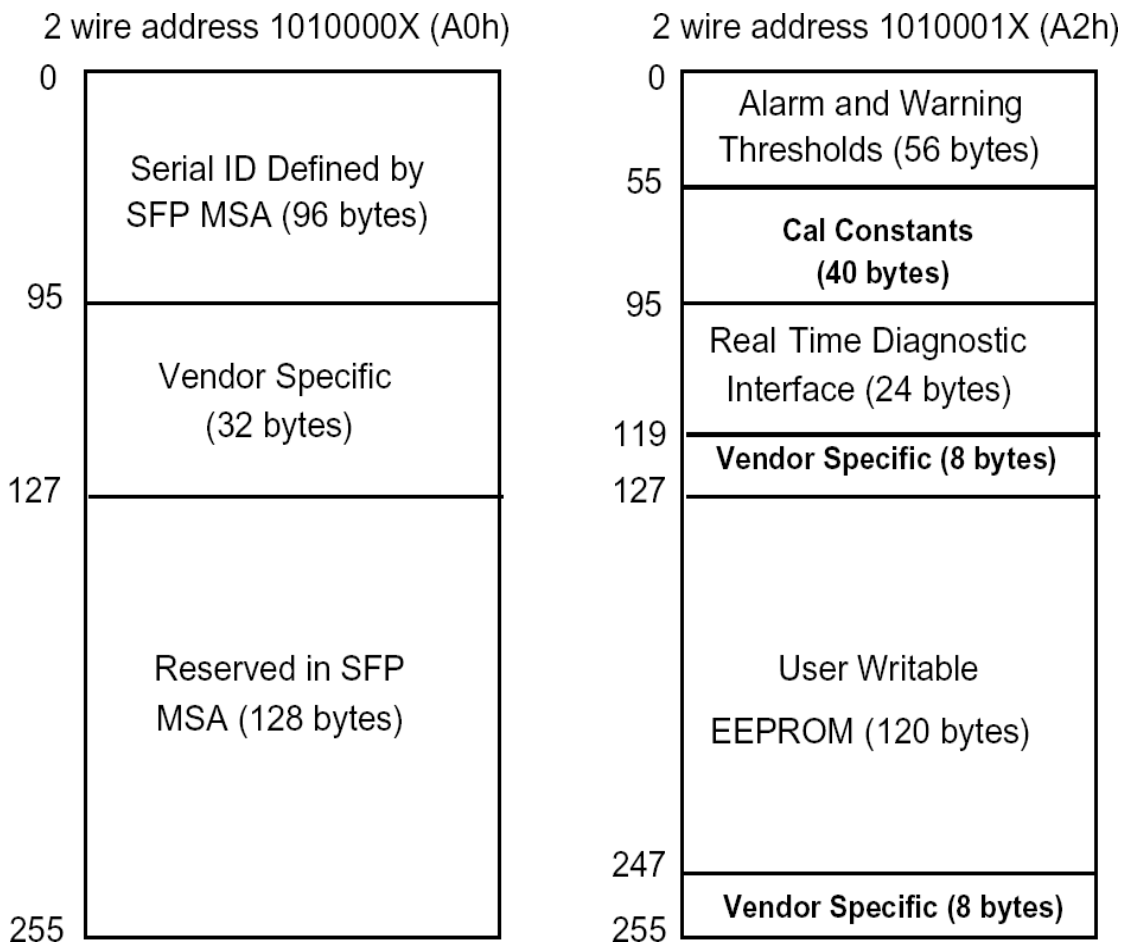
Parameter	Symbol	Min	Typical	Max	Unit
Tx Disable Negate Time	t_on			1	ms
Tx Disable Assert Time	t_off			10	μs
Time To Initialize, including Reset of Tx Fault	t_init			300	ms
Tx Fault Assert Time	t_fault			100	μs
Tx Disable To Reset	t_reset	10			μs
LOS Assert Time	t_loss_on			100	μs
LOS De-assert Time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

Digital Diagnostic Memory Map

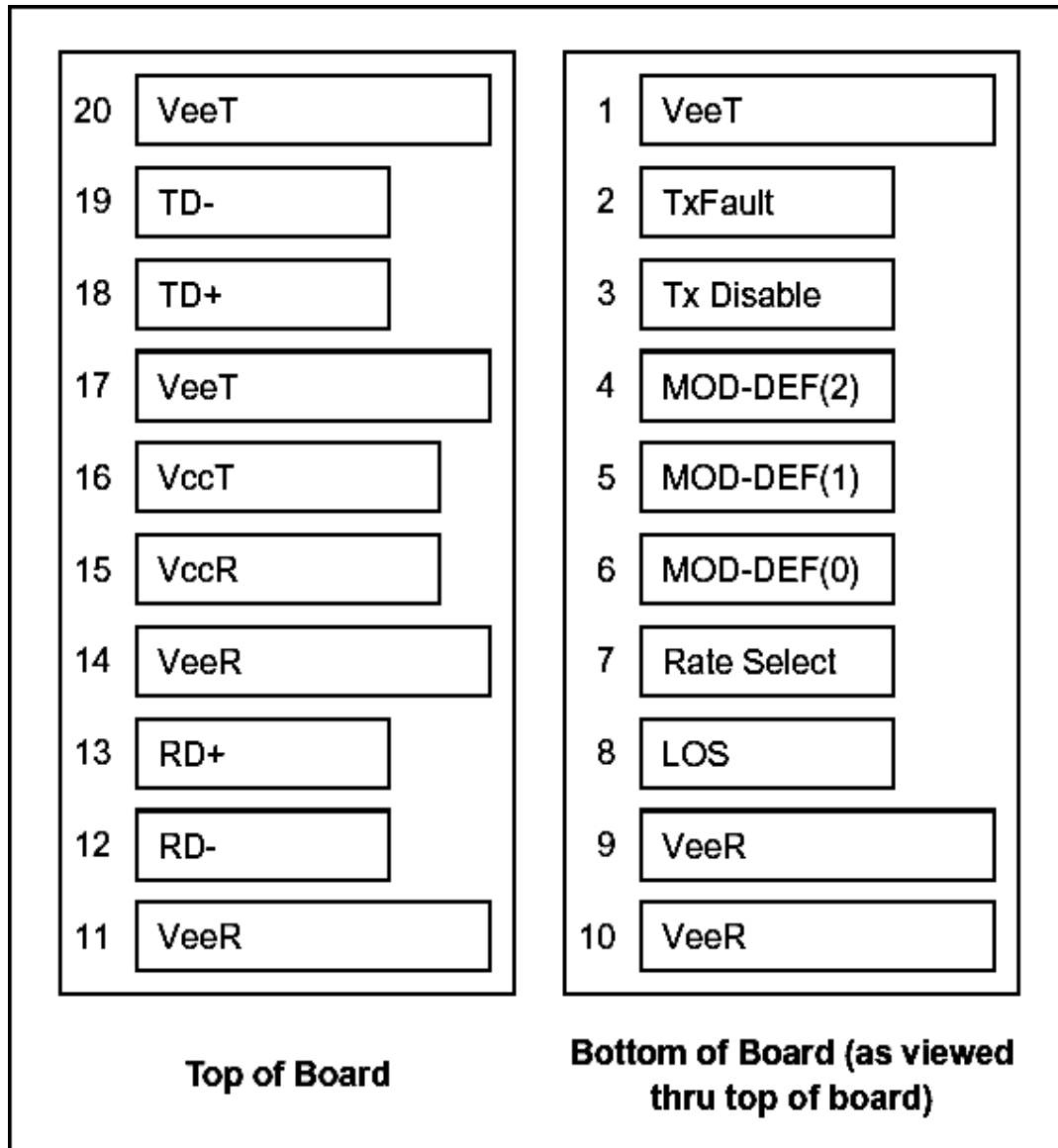
The transceivers provide serial ID memory contents and diagnostic information about the present operating conditions by the 2-wire serial interface (SCL, SDA).

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 Definition and Descriptions



Pin	Name	Function/Description	Engagement order	Notes
1	VeeT	Transmitter Ground	1	
2	TX Fault	Transmitter Fault Indication	3	1
3	TX Disable	Transmitter Disable-Module disables on high or open	3	2
4	MOD_DEF2	Module Definition 2-Two wire serial ID interface	3	3
5	MOD_DEF1	Module Definition 1-Two wire serial ID interface	3	3
6	MOD_DEF0	Module Definition 0-Two wire serial ID interface	3	3
7	Rate Select	Not Connected	3	
8	LOS	Loss of Signal	3	4
9	VeeR	Receiver Ground	1	
10	VeeR	Receiver Ground	1	
11	VeeR	Receiver Ground	1	
12	RD-	Inverse Received Data out	3	5
13	RD+	Received Data out	3	5
14	VeeR	Receiver Ground	1	
15	VccR	Receiver Power — +3.3V±5%	2	6
16	VccT	Transmitter Power — +3.3 V±5%	2	6
17	VeeT	Transmitter Ground	1	
18	TD+	Transmitter Data In	3	7
19	TD-	Inverse Transmitter Data In	3	7
20	VeeT	Transmitter Ground	1	

Notes 1: TX Fault is open collector/drain output which should be pulled up externally with a 4.7K-10KΩresistor on the host board to supply <VccT+0.3V or VccR+0.3V. When high, this output indicates a laser fault of some kind.

Low indicates normal operation. In the low state, the output will be pulled to <0.8V.

Notes 2: TX Disable input is used to shut down the laser output per the state table below. It is pulled up within the module with a 4.7-10K resistor.

Low (0-0.8V): Transmitter on

Between (0.8V and 2V):
Undefined High (2.0-VccT):
Transmitter Disabled Open :
Transmitter Disabled

Notes 3: Mod-Def 0, 1, 2. These are the module definition pins. They should be pulled up with a 4.7 - 10K resistor on the host board to supply less than $V_{ccT}+0.3V$ or $V_{ccR}+0.3V$. Mod-Def 0 is grounded by the module to indicate that the module is present. Mod-Def 1 is clock line of two wire serial interface for optional serial ID.

Mod-Def 2 is data line of two wire serial interface for optional serial ID.

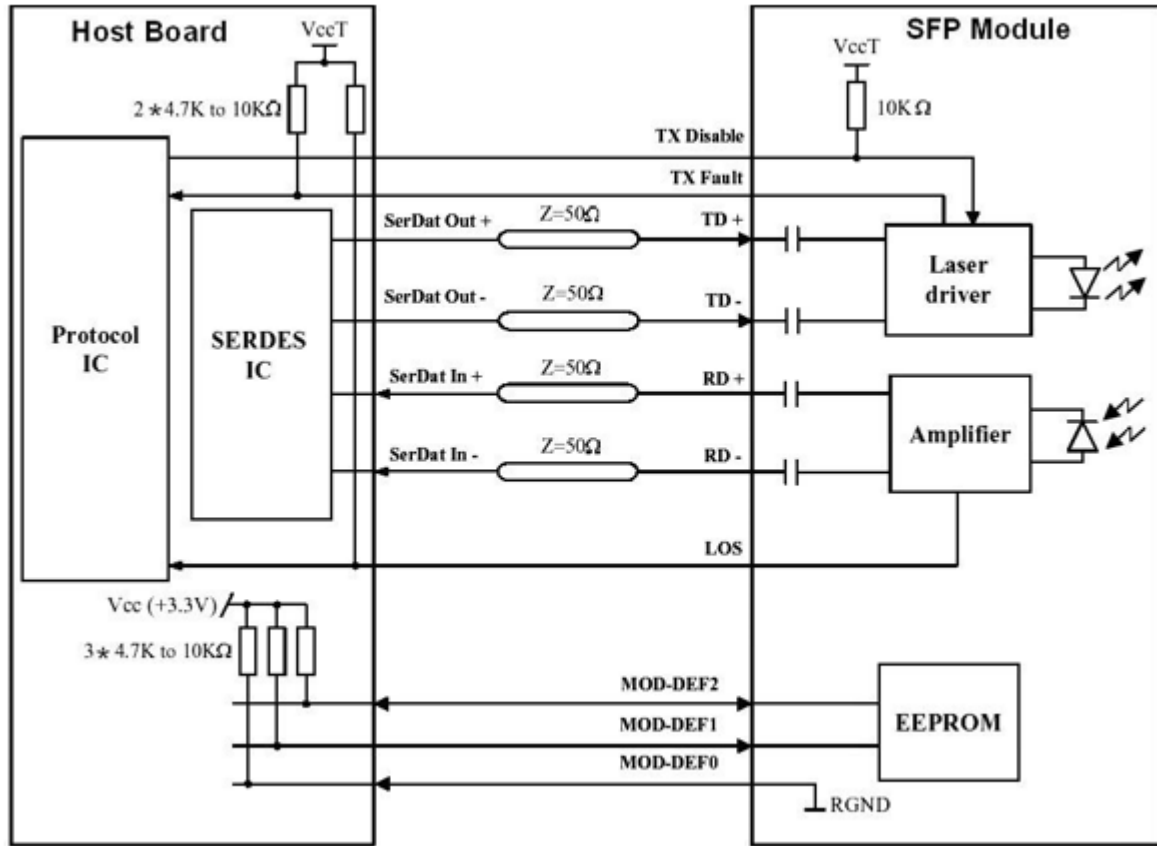
Notes 4: LOS (Loss of signal) is an open collector/drain output which should be pulled up externally with a 4.7- 10K resistor on the host board to supply $<V_{ccT}+0.3V$ or $V_{ccR}+0.3V$. When high, this output indicates the received optical power is below the worst case receiver sensitivity (as defined by the standard in use). Low indicates normal operation. In the low state, the output will be pulled to $<0.8V$.

Notes 5: RD-/+: These are the differential receiver outputs. They are AC coupled 100 Ω differential lines which should be terminated with 100 Ω differential at the user SERDES. The AC coupling is done inside the module and thus not required on the host board.

Notes 6: VccR and VccT are the receiver and transmitter power supplies. They are defined as $3.3V\pm5\%$ at the SFP connector pin. The in-rush current will typically be no more than 30Ma above steady state supply current after 500ns.

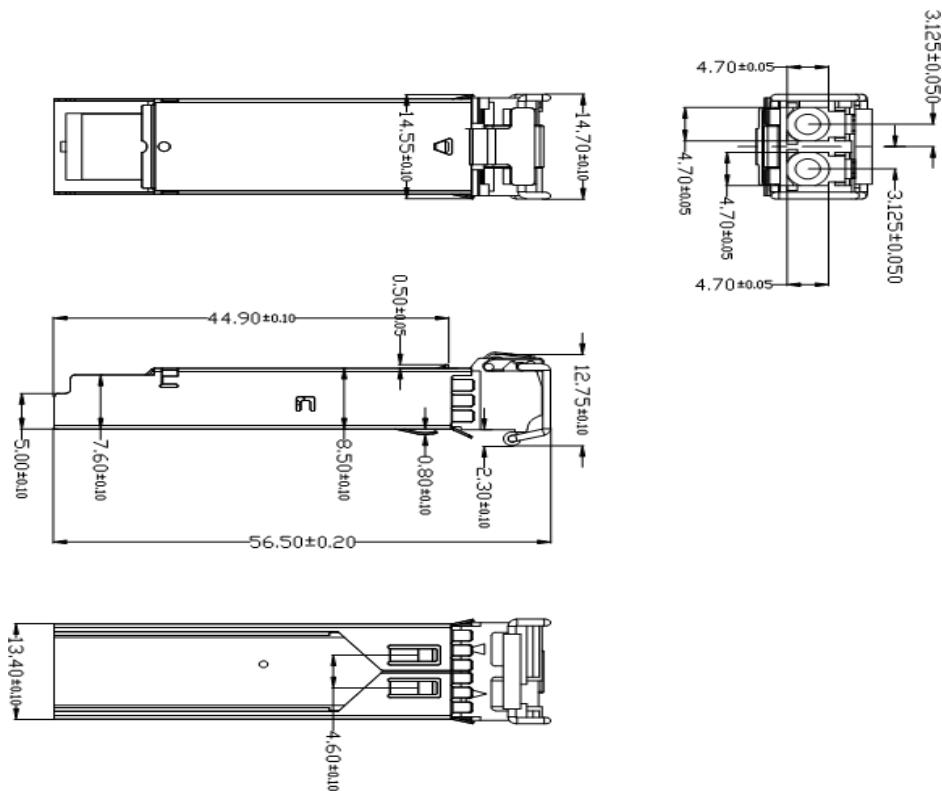
Notes 7: TD-/+: These are the differential transmitter inputs. They are AC coupled differential lines with 100 Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on host board.

Recommended Circuit diagram



Mechanical Outlines

(Unit : mm)



■ Contact Information

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■ Revision History

Date	Version	Description
10/09/2019	1.0	Initial release
12/20/2021	2.0	Update Specifications information