

Features

- Transmitter applications
 - ✦ Dual 1310 nm FP Laser Transmitters
- 1250 Mb/s or 1062.5 Mb/s data rate
- 550m reach 50/125µm or 62.5/125µm MMF
- Dual Optical Transmitter unit with independent
- Meet SFF MSA with duplex LC receptacle
- Hot-pluggable
- 2x10 SFP MSA compliant package
- Metal enclosure for lower EMI
- +3.3V Single power supply
- Operating case temperature:
 - Standard : 0 to +70°C
- Qualified to meet the intent of Bellcore reliability practices
- Monitor and control functions:
 - ✦ Tx Disable (Tx_DIS), LVTTTL
 - ✦ Tx Fault (Tx_FAULT), LVTTTL
 - ✦ Tx_DATA
- LVPECL differential data interface
- With pull de-latch
- Compliant with UL standards

Application

- Distributed multi-processing
- 1250 Mb/s Gigabit Ethernet data links
- 1062.5 Mb/s Fibre Channel data links
- Data storage networks
- Host adapters
- Telecom switches
- ATM
- SONET/SDH
- Switches
- Routers/ Hubs

General

The SFP/LC dual optical Transmitter is intended for 550m reach service in 1250 Mb/s or 1062.5 Mb/s 1310 nm FP multi mode high-speed LAN and SAN data communications equipment where low-cost, extraordinary performance and reliability are essential. It meets the transmit requirements of IEEE802.3z 1000 BASE-SX and FC-PI-2-100-M5/M6-SN-I. It consumes low power, operates from a 3.3 volt DC power supply and is offered in the 0°C to +70°C commercial temperature ranges. The industry standard 2x10 small form pluggable (SFP) package is fabricated with a rugged die cast metal housing and cage assembly. The low jitter and low bit error rate optical assembly features dual 1310nm FP laser transmitters. It incorporates the Tx Fault (Tx_FAULT) and Tx Disable (Tx_DIS) monitor and control functions. The differential 100 Ohm line to line AC coupled Tx data interfaces are LVPECL compatible. The device is Class I laser safety compliant.

Transmitter Section

Transmitter is designed for multi mode fiber and operates at a nominal wavelength of 1310nm. The transmitter module use two FP laser diodes and full IEC825 and CDRH class 1 eye safety. The output power can be disabled via the single TxDis pin. Logic LVTTTL HIGH level disables the transmitter. It contains APC function, temperature compensation circuit, LVPECL data inputs, LVTTTL Txdis input and Tx fault Output interface.

Tx Disable (Tx_DIS) Description

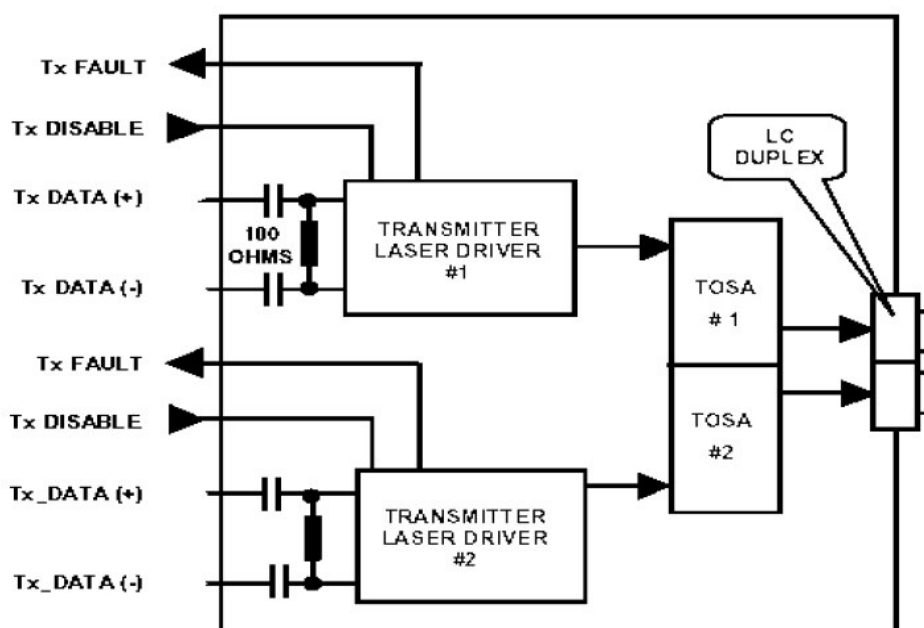
The Tx_DIS (Transmit Disable) is an open collector LVTTTL control port that is controlled by a logic signal on the host (system) printed circuit board. If the system is ready to send data then the Tx_DIS line is set LOW to enable the laser driver and the laser transmitter. If the system is not ready to send data, then the Tx_DIS line is set HIGH to disable the transmitter.

Tx Fault (Tx_FAULT) Description

The Tx_FAULT (Transmit Fault) is an open collector LVTTTL monitor port. It switches states based on the condition of the laser driver and the laser including the end of life condition of the laser. If the parameters of the laser driver and laser are within specifications then the Tx_FAULT is set LOW indicating normal transceiver operation. If a fault occurs, including excess optical output power then Tx_FAULT is set HIGH which disables the transmitter. The Tx_FAULT can be reset to normal operation by toggling Tx_DIS or switching the power supply. The Tx_FAULT pin requires an external 4.7k to 10k Ohm pull-up resistor.

DUAL TRANSMITTER BLOCK DIAGRAM

The dual transmitters consist of high reliability 1310 nm FP laser diodes (LD) with back facet monitor photo detectors (PD) in dual eye safe optical sub-assemblies (TOSA), which are mated to the dual Tx ports of the fiber optic LC duplex receptacle. A driver IC converts LVPECL differential input data signals into an analog current source that drives the laser diodes. Each transmitter section is provided with the Tx_Disable and Tx_FAULT control and monitoring functions.

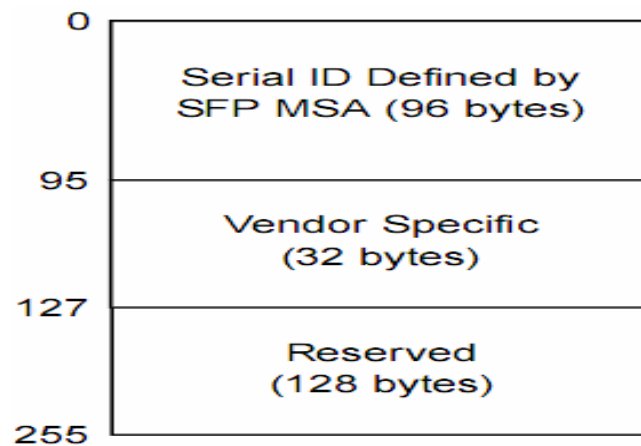


EEPROM Section

The optical receiver contains an EEPROM. It provides access to sophisticated identification information that describes the receiver's capabilities, standard interfaces, manufacturer, and other information.

The serial interface uses the 2-wire serial CMOS EEPROM protocol defined for the ATMEL AT24C01A/02/04 family of components. When the serial protocol is activated, the host generates the serial clock signal (SCL, Mod Def 1). The positive edge clocks data into those segments of the EEPROM that are not write protected within the SFP receiver. The negative edge clocks data from the SFP receiver. 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.

Memory Map:



2 wire address 1010000x (A0h)

Performance Specifications

Table 1. Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Storage Temperature	Tst	-40	+85	°C
Operating Temperature	To SMFP3152-TT	0	+70	°C
Input Voltage	-	GND	Vcc	V
Power Supply Voltage	Vcc-Vee	-0.5	+3.6	V
Tx DATA	Vin	0	Vcc+0.5	V
Signal / Data Input Voltage (Tx_DATA)	VIN PK-PK	-	2.4	V
Tx DISABLE or Tx FAULT Logic HIGH State	Tx_DIS / Tx_FAULT	-	Vcc+0.5	V

Note: Stress in excess of maximum absolute ratings can cause permanent damage to the module

Table 2. Operating Environment

Parameter	Symbol	Min	Max	Unit
Power Supply Voltage	Vcc	+3.1	+3.5	V
Ambient Operating Temperature	TA SMFP3152-TT	0	+70	°C

Table 3. Transmitter optical-electrical characteristics (TA = 25 °C)

Parameter	Symbol	Min	Typ	Max	Unit	Note
Center Wavelength	λ_p	1260	1310	1360	nm	-
Extinction Ratio	Ext	8.2	-	-	dB	1
Spectral Width (RMS)	$\Delta\lambda$	-	-	3	nm	-
Average Optical Output Power	Po	-10	-	-3	dBm	-
Transmitter disable Voltage	VD	2.0	-	Vcc	V	-
Transmitter Enable Voltage	VEN	0	-	0.8	V	-
Power supply Current	Icc	70	150	180	mA	2
Data Input Voltage	Vpp	300	-	1600	mV	Data
Data Output Rise / Fall Time	tr / tf	-	-	0.28	ns	20-80%
Tx Differential Input Impedance	Zin	-	100	-	Ohms	-
Tx Differential Input Voltage	Vpp	300	-	1600	mV	-
Output Eye Diagram	Compliant with ITU-T.G957					

Notes:

1. Minimum Sensitivity and saturation levels for a $2^7 - 1$ PRBS test pattern @1.25Gbit/s
2. Internally AC coupled

Table 4. Transmitter Logic

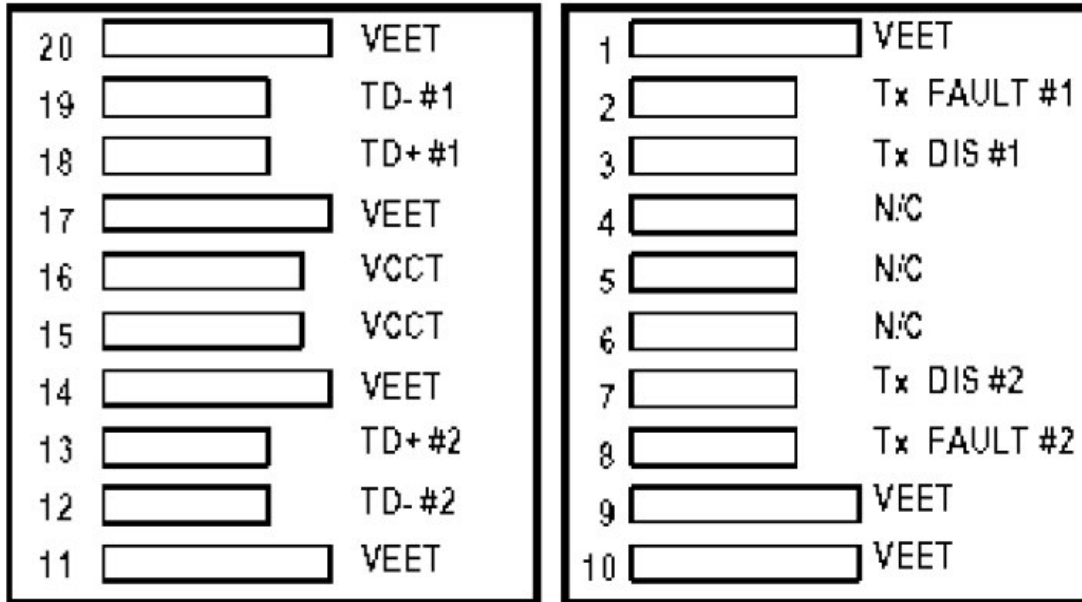
Parameter	Function	Logic State	Logic Style	Min	Max	Unit	Notes
Tx DIS	DISABLE	HIGH	LVTTL	2.0	VCC+0.3	V	Laser is OFF
Tx DIS	ENABLE	LOW	LVTTL	0	0.8	V	Laser is ON
Tx DIS	Assert Time	-	LVTTL	-	10	μ s	-
Tx FAULT	FAULT	HIGH	LVTTL	2.0	VCC+0.3	V	Transmitter is OFF
Tx FAULT	NORMAL	LOW	LVTTL	0	0.8	V	Transmitter is ON

Notes:

1. Optical Extinction Ratio is defined as the ratio of the average output optical power of the transmitter in the high ("1") state to the low ("0") state. This Optical Extinction Ratio is expressed in decibels (dB) by the relationship $10\log(P_{high\ avg}/P_{low\ avg})$.
2. The current excludes the output load current.

Pin Definition

Pin Out Diagram



TRANSCEIVER ELECTRICAL PAD LAYOUT

Top View

Bottom View

Table 5.Pin Function Definitions

Pin#	Name	Description	Notes
1	VeeT	Transmitter Ground	Note 4
2	Tx_FAULT #1	Transmitter Fault LOW = Normal Operation; HIGH = Fault Indication	Note 1
3	Tx_DIS #1	Transmit Disable LOW = Normal Operation; HIGH = Disables Module	Note 2
4	N/C	Internally Connected - Do Not Use This Pin	-
5	N/C	Internally Connected - Do Not Use This Pin	-
6	N/C	Internally Connected - Do Not Use This Pin	-
7	Tx_DIS #2	Transmit Disable LOW = Normal Operation; HIGH = Disables Module	Note 2
8	Tx_FAULT #2	Transmitter Fault LOW = Normal Operation; HIGH = Fault Indication	Note 1
9	VeeT	Transmitter Ground	Note 4
10	VeeT	Transmitter Ground	Note 4
11	VeeT	Transmitter Ground	Note 4
12	TD- #2	Tx_Data Output (Inverted)	Note 3
13	TD+ #2	Tx_Data Output (Non Inverted)	Note 3
14	VeeT	Transmitter Ground	Note 4
15	VccT #2	Transmitter Power	Note 5, 3.3V± 5%
16	VccT #1	Transmitter Power	Note 5, 3.3V± 5%
17	VeeT	Transmitter Ground	Note 4
18	TD+ #1	Tx_Data Output (Non Inverted)	Note 3
19	TD- #1	Tx_Data Output (Inverted)	Note 3
20	VeeT	Transmitter Ground	Note 4

Note:

- TX Fault is an open collector/drain output, which should be pulled up with a 4.7K–10K Ω resistor on the host board. Pull up voltage between 2.0V and VccT+0.3V. When high, output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.**
- 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 Ω resistor. Its states are:**

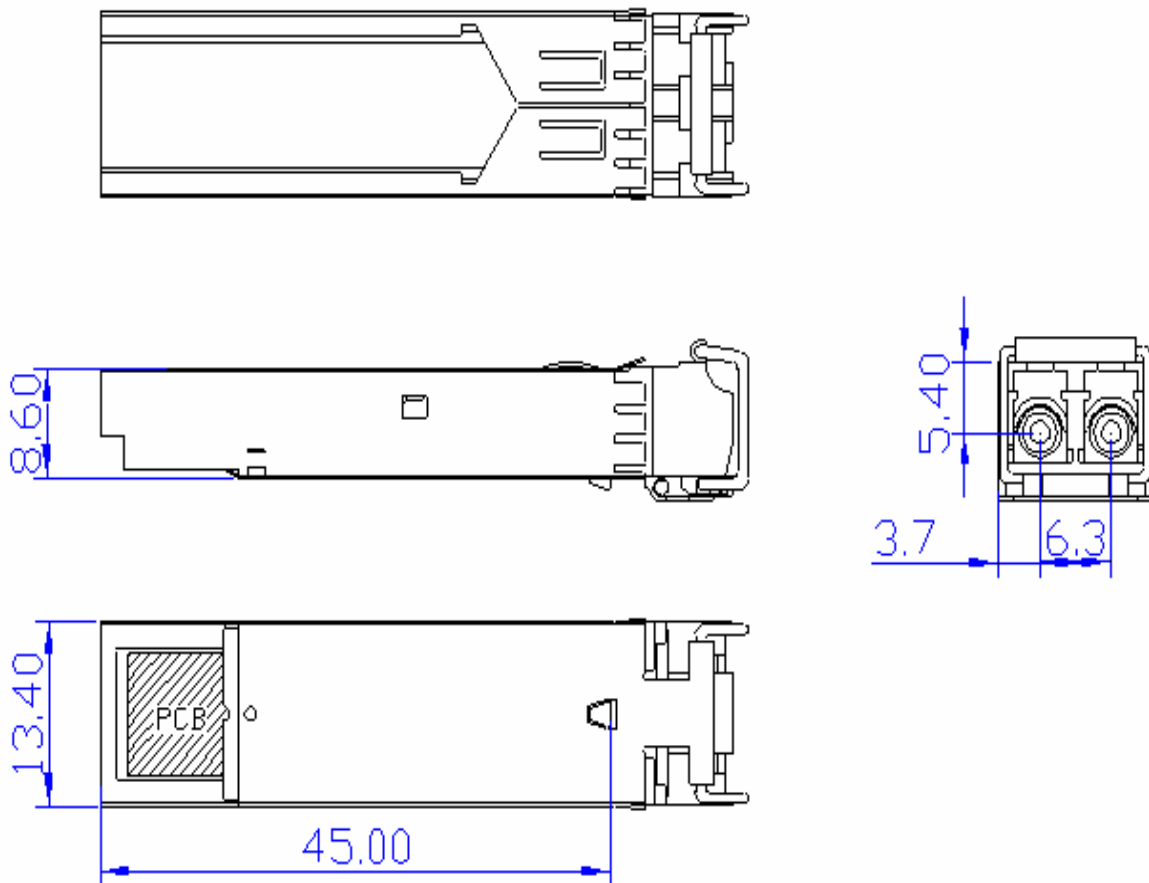
Low (0 – 0.8V): Transmitter on

(>0.8, < 2.0V): Undefined

High (2.0 – 3.465V): Transmitter Disabled

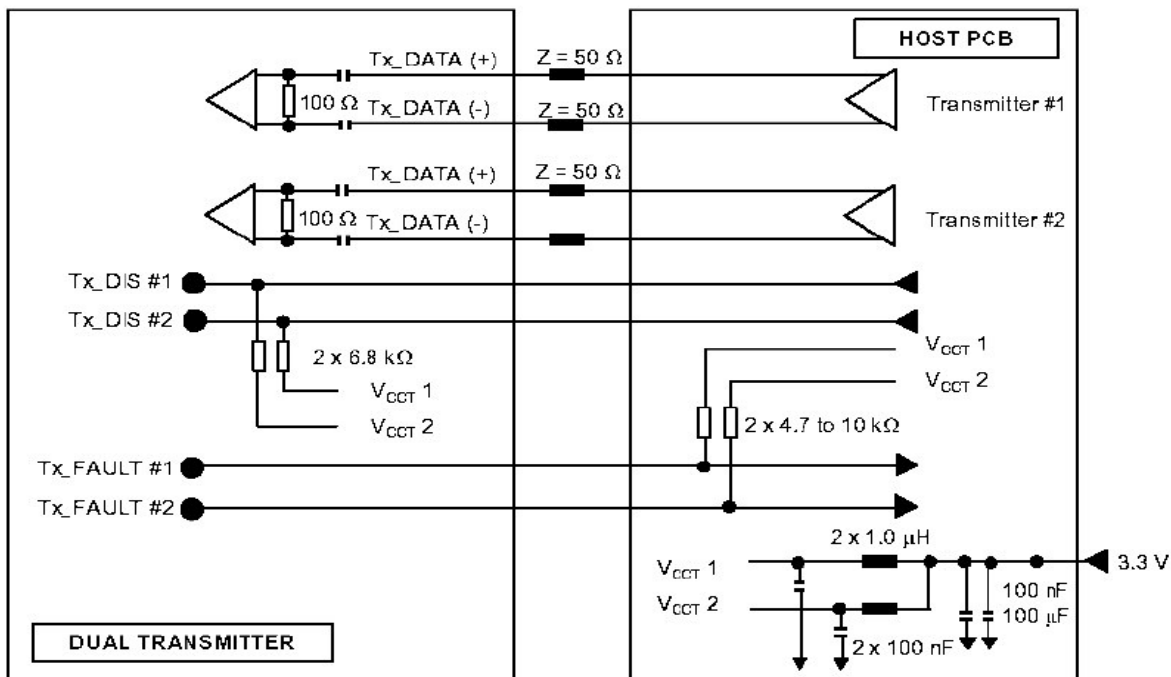
3. TD-/+ : These are the differential transmitter inputs. They are AC-coupled, differential lines with 100 Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board. VeeR may be internally connected within the SFP module.
4. VeeT may be internally connected within the SFP module
5. VccT are the receiver and transmitter power supplies. They are defined as 3.3V ±5% at the SFP connector pin. Maximum supply current is 300mA. Recommended host board power supply filtering is shown below. Inductors with DC resistance of less than 1Ω should be used in order to maintain the required voltage at the SFP input pin with 3.3V supply voltage. When the recommended supply filtering network is used, hotplugging of the SFP transceiver module will result in an inrush current of no more than 30 mA greater than the steady state value.

Package information



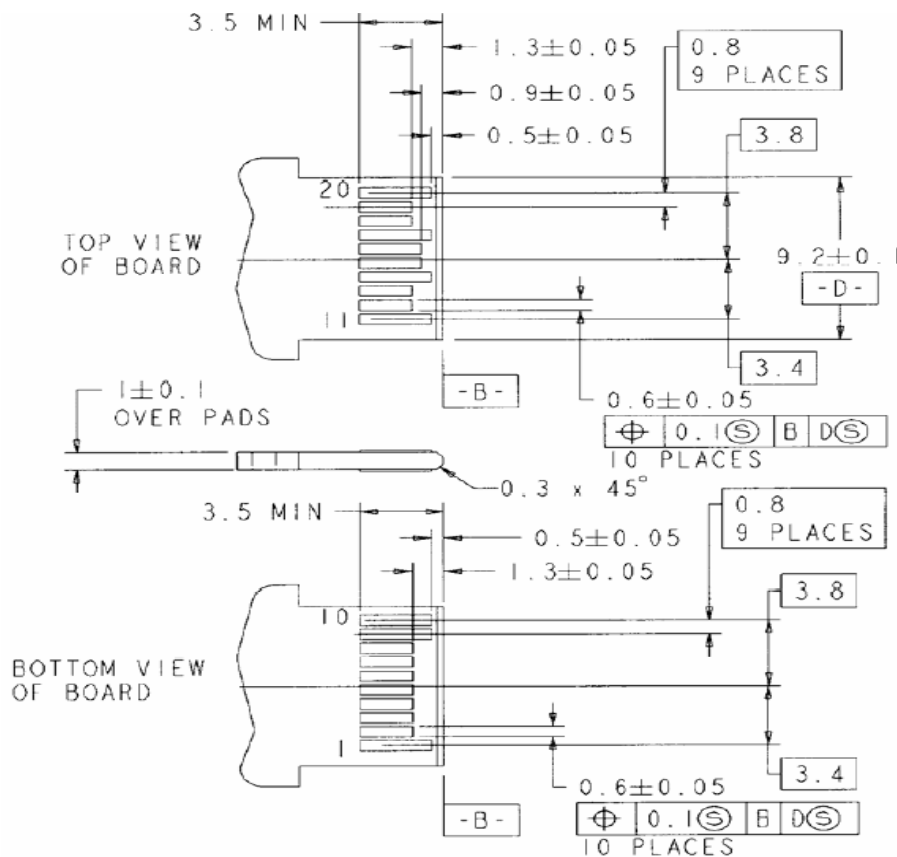
Unit: mm

Recommended Circuit



Note: 4.7K ohms < RES < 10K ohms

Recommended Board Layout Hole Pattern



Obtaining Document

Please visit our website:

[Http://www.staropto.com](http://www.staropto.com)

Ordering Information

S M FP 3 1 5 2 - TT

Manufact -urer	Mode Type	Package Type	Wave length (nm)	LD Type	Data Rate (Mb/s)	Package Type	
S: Star opto	M: Multi Mode	FP: small form pluggable (SFP) package	3: 1310	1: FP	5: 1250	2: Without DDM	TT: Dual Optical Transmitter