

**Optronic TBSF13-3-12gSC-3i-FT**

## PRODUCT SPECIFICATION

<b>Product Name</b>	TBSF13-3-12gSC-3i-FT
<b>Product Model</b>	1.25Gbps SFP Bi-Di Transceiver, 3km Reach TX1310 / RX1550nm



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**Optronic TBSF13-3-12gSC-3i-FT**  
**1.25Gbps SFP Bi-Di Transceiver, 3km Reach**

**TX1310 / RX1550nm**

## **Features**

- ◆ Up to 1.25Gbps bi-directional data links
- ◆ 1310nm FP laser and PIN photo detector for 3km transmission
- ◆ Compliant with SFP MSA, INF-8074 and SFF-8472 with single SC receptacle
- ◆ Digital Diagnostic Monitoring: Internal Calibration or External Calibration
- ◆ Metal enclosure, for lower EMI
- ◆ Compatible with RoHS
- ◆ +3.3V single power supply
- ◆ Operating case temperature: -40 to +85°C

## **Application**

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

## **Description**

SFP 3KM 1310/1550 Small Form Factor Pluggable (SFP) transceivers are compatible with the Small Form Factor Pluggable Multi-Sourcing Agreement (MSA), The transceiver consists of five sections: the LD driver, the limiting amplifier, the digital diagnostic monitor, the FP laser and the PIN photo-detector .The module data link up to 3km in 9/125um single mode fiber.

The optical output can be disabled by a TTL logic high-level input of Tx Disable, and the system also can disable the module via I2C. Tx Fault is provided to indicate that degradation of the laser. Loss of signal (LOS) output is provided to indicate the loss of an input optical signal of receiver or the link status with partner. The system can also get the LOS (or Link)/Disable/Fault information via I2C register access.

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## Optronic TBSF13-3-12gSC-3i-FT

### Specification

Absolute Maximum Ratings				
Parameter	Symbol	Min	Max	Unit
Supply Voltage	Vcc	0	4	V
Damage Threshold	THd		5	dBm
Storage Temperature	Ts	-40	+85	°C
Operating Humidity	-	5	95	%

Recommended Operating Conditions					
Parameter	Symbol	Min	Typical	Max	Unit
Operating Case Temperature	Standard	Tc	-5	+70	°C
	Industrial	Tc	-40	+85	°C
Power Supply Voltage	Vcc	3.13	3.3	3.47	V
Power Supply Current	Icc			280	mA
Control Input Voltage High		2		Vcc	V
Control Input Voltage Low		0		0.8	V
Data Rate			1.25		Gbps
Fiber Length 9/125µm core SMF		-	3	-	km

Optical and Electrical Characteristics						
Parameter	Symbol	Min	Typical	Max	Unit	Notes
<b>Transmitter</b>						
Centre Wavelength	$\lambda_c$	1290	1310	1330	nm	
Spectral Width (RMS)	$\Delta\lambda$			3.5	nm	
Average Output Power	Pout	-11		-3	dBm	1
Extinction Ratio	ER	9			dB	
Optical Rise/Fall Time (20%~80%)	tr/tf			100	ps	
Transmit Disable Assert Time			5		us	
Data Input Swing Differential	V <sub>IN</sub>	200		2400	mV	2
Input Differential Impedance	Z <sub>IN</sub>	90	100	110	$\Omega$	

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TX Disable	Disable	V <sub>dis</sub>	V <sub>cc</sub> -1.3		V <sub>cc</sub>	V	
	Enable	V <sub>en</sub>	V <sub>ee</sub> -0.3		0.8	V	
TX Fault	Fault		2.0		V <sub>cc</sub>	V	
	Normal		0		0.8	V	
<b>Receiver</b>							
Centre Wavelength	λ <sub>c</sub>	1530	1550	1570	nm		
Receiver Sensitivity				-20	dBm		3
Receiver Overload			-3		dBm		3
LOS De-Assert	LOS <sub>D</sub>			-21	dBm		
LOS Assert	LOS <sub>A</sub>		-36		dBm		
LOS Hysteresis			1	4	dB		
Data Output Swing Differential	V <sub>out</sub>	500		900	mV		4
LOS	High		V <sub>cc</sub> -1.3		V <sub>cc</sub>	V	
	Low		V <sub>ee</sub> -0.3		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 ≤1×10<sup>-12</sup>.
4. Internally AC-coupled.

### Diagnostics

Parameter	Range	Unit	Accuracy	Calibration
Temperature	-5 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	-11 to -3	dBm	±3dB	Internal / External
RX Power	-4 to -20	dBm	±3dB	Internal / External

### Digital Diagnostic Memory Map

The transceivers provide serial ID memory contents and diagnostic information about the

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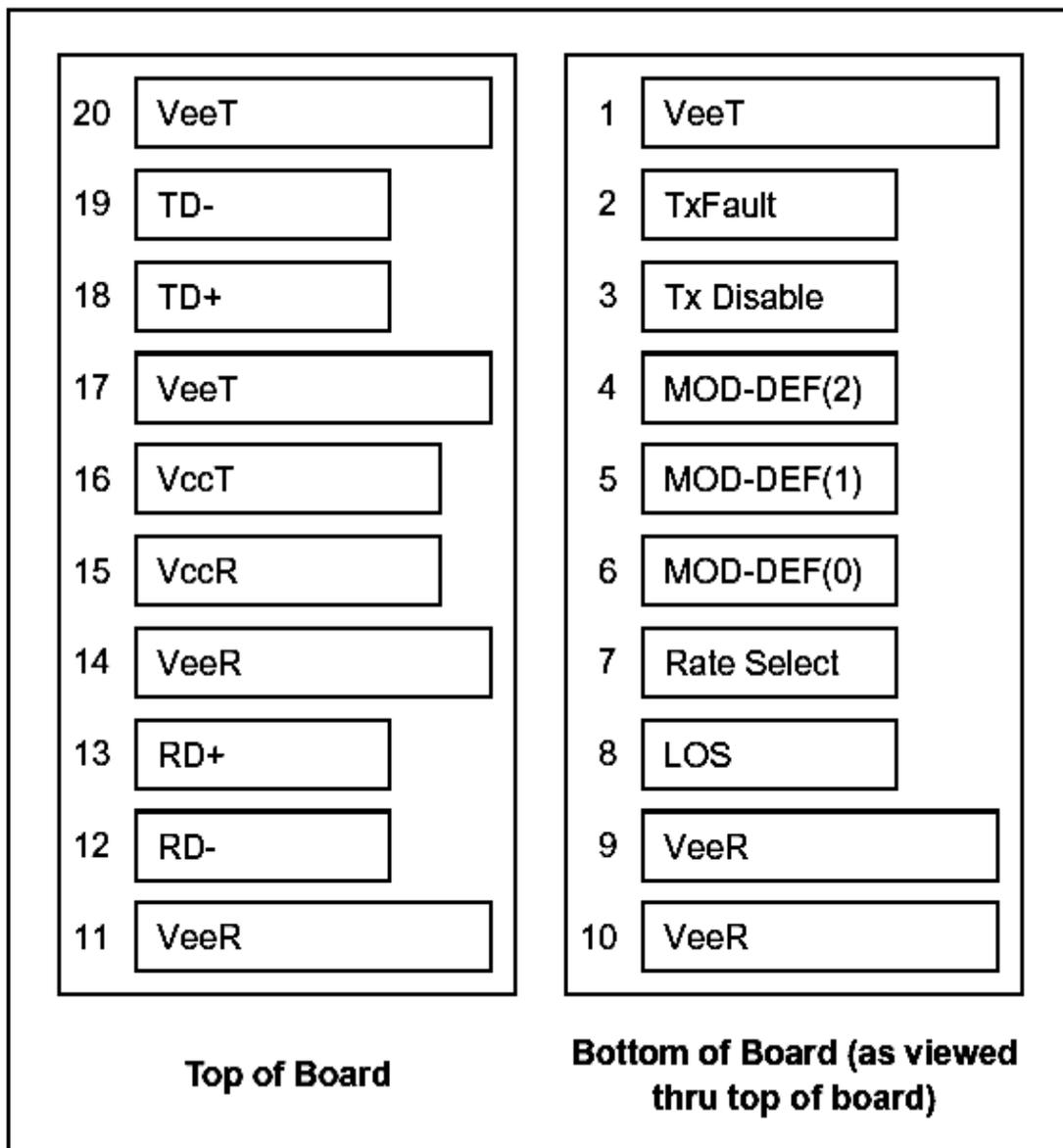
present operating conditions by the 2-wire serial interface (SCL, SDA).

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 Diagram



## Optronic TBSF13-3-12gSC-3i-FT

### 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

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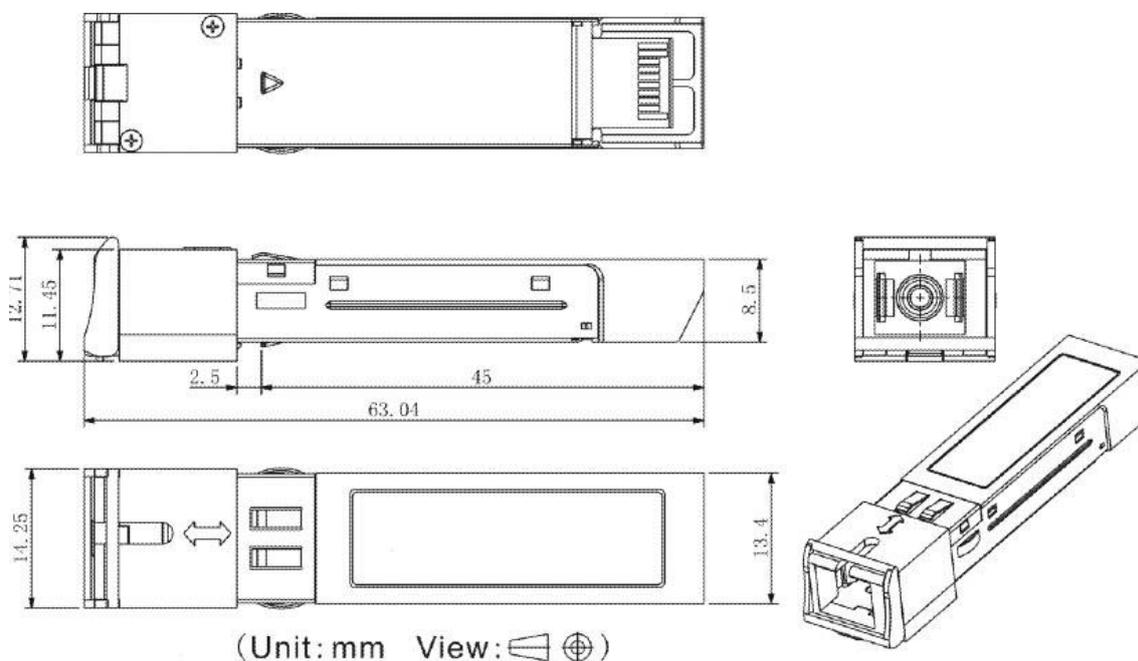
Vcc+0.3V. Logic 1 indicates loss of signal; Logic 0 indicates normal operation. In the low state, the output will be pulled to less than 0.8V.

- 5) RD-/+ : These are the differential receiver outputs. They are internally AC-coupled 100 differential lines which should be terminated with 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.

### Package Outline

Dimensions are in millimeters. All dimensions are ±0.2mm unless otherwise specified.

(Unit: mm)



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