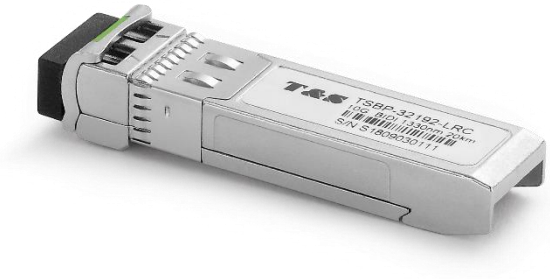
TSBP-23192-LR & TSBP-32192-LR Series

Tx: 1270nm/Rx: 1330nm BIDI SFP+ 10km Transceiver for 10GbE
Tx: 1330nm/Rx: 1270nm BIDI SFP+ 10km Transceiver for 10GbE
RoHS 6 Compliant

Features



- Simplex LC Connector Bi-Directional SFP+ Optical Transceiver
- Compliant with SFF-8431, SFF-8432 and IEE802.3ae
- Up to 10km on 9/125um SMF
- Two types：
  - A:1270nm DFB Laser transmitter,1330nm receiver
  - B:1330nm DFB Laser transmitter,1270nm receiver
- Digital Diagnostic SFF-8472 Compliant
- Operating case temperature 0 ~ 70 °C
- RoHS6 compliant (lead free)

Applications

- 10GBASE-LR at 10.3125Gbps
- Other Optical Links

Product Description

The TSBP-23192-LR & TSBP-32192-LR Series single mode transceiver is small form factor pluggable module for duplex optical data communications such as 10GBASE-LR/LW defined by IEEE 802.3ae. It is with the SFP+ 20-pin connector to allow hot plug capability.

The TSBP-23192-LR module is designed for single mode fiber and operates at a nominal wavelength of 1270nm; TSBP-32192-LR module is designed for single mode fiber and operates at a nominal wavelength of 1330nm. The transmitter section uses a multiple quantum well DFB, which is class 1 laser compliant according to International Safety Standard IEC-60825.

The receiver section uses an integrated InGaAs detector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC.

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Absolute Maximum Ratings

These values represent the damage threshold of the module. Stress in excess of any of the individual Absolute Maximum Ratings can cause immediate catastrophic damage to the module even if all other parameters are within Recommended Operating Conditions.

Parameters	Symbol	Min.	Max.	Unit
Supply Voltage	V_{CC}	-0.5	+3.6	V
Storage Temperature	Tc	-40	+85	°C
Operating Case Temperature	Tc	0	+70	°C
Relative Humidity	RH	0	85	%

Recommended Operating Conditions

Parameters	Symbol	Min.	Typical	Max.	Unit
Supply Voltage	V_{CC}	3.0	3.3	3.6	V
Supply current	Icc	-	200	300	mA
Operating Case Temperature	T_C	0	25	70	°C
Module Power Dissipation	Pm	-	0.7	1.1	W

Notes:

1. Supply current is shared between VCCTX and VCCRX.
2. In-rush is defined as current level above steady state current requirements.

Electrical Characteristics

Parameter	Symbol	Min.	Typical	Max	Unit	Ref.
Supply Voltage	V_{CC}	3.00	-	3.60	V	1
Supply Voltage	I_{cc}	-	200	300	mA	1
Transmitter						
Input differential impedance	R_{in}	-	100		Ω	2
Single ended data input swing	$V_{in,pp}$	150	-	1200	mVpp	-
Transmit Disable Voltage	V_D	2	-	V_{CC}	V	-
Transmit Enable Voltage	V_{EN}	Vee	-	Vee+0.8	V	3
Receiver						
Output differential impedance	R_{out}	-	100	-	Ω	2
Single ended data output swing	Vout,pp	300	-	700	mV	4
LOS Fault	$V_{LOS\ fault}$	2	-	VCC_{HOST}	V	5
LOS Normal	$V_{LOS\ norm}$	Vee	-	Vee+0.8	V	5

Notes:

1. Module power consumption never exceeds 1W.
2. AC coupled.
3. Or open circuit.
4. Into 100 ohm differential termination.
5. LOS is LVTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.

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Optical Characteristics (TSBP-23192-LR, 1270 DFB & PIN/TIA)

Parameter	Symbol	Min.	Typical	Max	Unit	Ref.
Transmitter						
Optical Wavelength	λ_C	1260	1270	1280	nm	-
Side Mode Suppress Ratio	SMSR	30	-	-	dB	-
Spectral Width(-20dB)	Δλ	-	-	1	nm	-
Average Output Power	P_{op}	-8.2	-	0.5	dBm	1,2
Extinction Ratio	ER	3.5	-	-	dB	-
Eye Mask	-	Compliant with IEEE 802.3				
Receiver						
Average Receiver Power	RSENS	-	-	-14.1	dBm	2,3
Receiver Overload	P_{MAX}	-	-	+0.5	dBm	-
Centre Wavelength	λC	1320	-	1340	nm	-
LOS De-Assert	LOS_D	-	-	-15	dBm	-
LOS Assert	LOS_A	-30	-	-	dBm	-
LOS Hysteresis	-	0.5	-	-	dB	-

Optical characteristics (TSBP-32192-LR, 1330 DFB & PIN/TIA)

Parameter	Symbol	Min.	Typical	Max	Unit	Ref.
Transmitter						
Optical Wavelength	λ_C	1320	1330	1340	nm	-
Side Mode Suppress Ratio	SMSR	30	-	-	dB	-
Spectral Width(-20dB)	Δλ	-	-	1	nm	-
Average Output Power	P_{op}	-8.2	-	0.5	dBm	1,2
Extinction Ratio	ER	3.5	-	-	dB	-
Eye Mask	-	Compliant with IEEE 802.3				
Receiver						
Average Receiver Power	RSENS	-	-	-14.1	dBm	2,3
Receiver Overload	P_{MAX}	-	-	+0.5	dBm	-
Centre Wavelength	λC	1260	-	1270	nm	-
LOS De-Assert	LOS_D	-	-	-15	dBm	-
LOS Assert	LOS_A	-30	-	-	dBm	-
LOS Hysteresis	-	0.5	-	-	dB	-

Notes:

1. Output is coupled into a 9/125um SMF.
2. Average Receiver Power (Min) is informative and not the principal indicator of signal strength. A received power below this value cannot be compliant.
3. Measured with a PRBS231-1 test pattern @10.3125Gbps, BER≦10-12

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Pin Definition

Pin	Symbol	Name/Description
1	VEET [1]	Transmitter Ground
2	Tx_FAULT [2]	Transmitter Fault
3	Tx_DIS [3]	Transmitter Disable. Laser output disabled on high or open
4	SDA [2]	2-wire Serial Interface Data Line
5	SCL [2]	2-wire Serial Interface Clock Line
6	MOD_ABS [4]	Module Absent. Grounded within the module
7	RS0 [5]	RS0 for Rate Select: Open or Low = Module supports ≤4.25Gbps High = Module supports 9.95 Gb/s to 10.3125 Gb/s
8	RX_LOS [2]	Loss of Signal indication. Logic 0 indicates normal operation
9	RS1 [5]	No connection required
10	VEER [1]	Receiver Ground
11	VEER [1]	Receiver Ground
12	RD-	Receiver Inverted DATA out. AC Coupled
13	RD+	Receiver DATA out. AC Coupled
14	VEER [1]	Receiver Ground
15	VCCR	Receiver Power Supply
16	VCCT	Transmitter Power Supply
17	VEET [1]	Transmitter Ground
18	TD+	Transmitter DATA in. AC Coupled
19	TD-	Transmitter Inverted DATA in. AC Coupled
20	VEET [1]	Transmitter Ground

Notes:
[1] Module circuit ground is isolated from module chassis ground within the module.
[2].should be pulled up with 4.7k – 10k ohms on host board to a voltage between 3.15Vand 3.6V.
[3]Tx_Disable is an input contact with a 4.7 kΩ to 10 kΩ pullup to VccT inside the module.
[4]Mod_ABS is connected to VeeT or VeeR in the SFP+ module. The host may pull this contact up to Vcc_Host with a resistor in the range 4.7 kΩ to10 kΩ.Mod_ABS is asserted “High” when the SFP+ module is physically absent from a host slot.
[5] RS0 and RS1 are module inputs and are pulled low to VeeT with > 30 kΩ resistors in the module.

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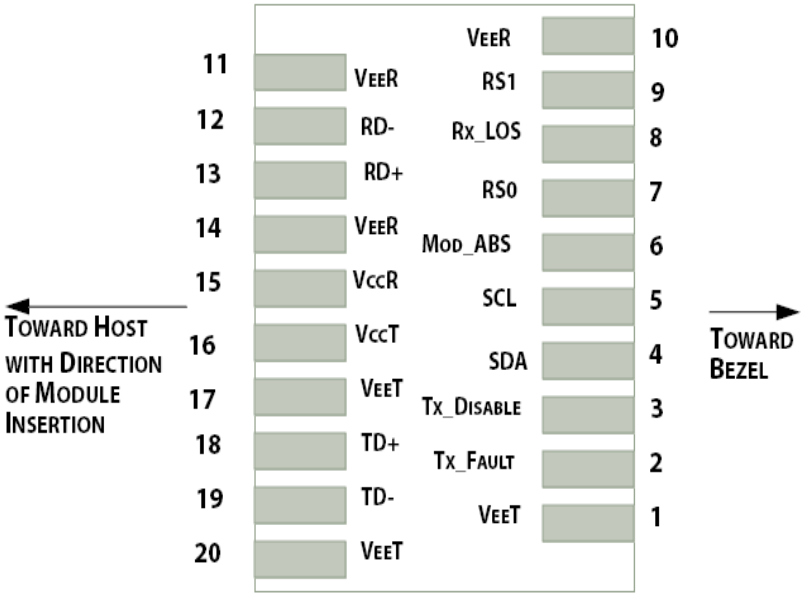

Figure1.Electrical Pin-out Details

Regulatory Compliance

T&S SFP+ transceiver is designed to be Class I Laser safety compliant and is certified per the following standards:

Feature	Agency	Standard	Certificate / Comments
Laser Safety	FDA	CDRH 21 CFR 1040 annd Laser Notice No. 50	1120292-000
Product Safety	UL	UL and CUL EN60950-2:2007	E347511
Environmental protection	SGS	RoHS Directive 2002/95/EC	GZ1001008918/CHEM
EMC	WALTEK	EN 55022:2006+A1:2007 EN 55024:1998+A1+A2:2003	WT10093759-D-E-E

Ordering Information

Part Number	Product Description
TSBP-23192-LR	10Gbps, SFP+ BIDI TX1270nm/RX1330nm 10km, 0ºC ~ +70ºC
TSBP-32192-LR	10Gbps, SFP+ BIDI TX1330nm/RX1270nm, 10km, 0ºC ~ +70ºC

References

1. "Specifications for Enhanced Small Form Factor Pluggable Module SFP+", SFF-8431, Rev 4.1, July 6, 2009.
2. "Improved Pluggable Formfactor", SFF-8432, Rev 4.2, Apr 18, 2007
3. IEEE802.3ae – 2002
4. "Diagnostic Monitoring Interface for Optical Transceivers" SFF-8472, Rev 10.3, Dec 1,2007

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