


TSCP-XX192L-L1 Optical Transceiver

CWDM SFP+ Single-Mode for 10GbE, With Diagnostic Monitoring
Duplex SFP+ Transceiver

Features

- Compliant with SFP+ MSA Specification SFF-8431
- Hot-Pluggable SFP+ footprint
- Data rate Up to 11.3Gb/s bit rates
- 18-Wavelength CWDM DFB Transmitter from 1271nm to 1611nm, with step 20nm
- 14dB Power Budget and maximum link length of 10km
- Power Dissipation < 1.0W
- Specifications compliant with SFF 8472
- 2-wire interface with integrated Digital Diagnostic monitoring
- Case operation temperature range:
 - Standard temperature 0°C to 70°C
 - Extended temperature: -20°C to 85°C
- Duplex LC connector
- RoHS6 compliant (lead free) 



Applications

- 10GBASE LR/LW 10G Ethernet
- 1200-SM-LL-L 10G Fibre Channel

Product Description

The TSCP-XX192L-L1 series optical transceiver is designed for fiber communications application such as 10G Ethernet (10GBASE-LR/LW), which fully compliant with the specification of SFF-8431.

This module is designed for single mode fiber and operates at a nominal wavelength of CWDM wavelength. There are 18 center wavelengths available from 1271nm to 1611nm, with each step 20nm.

The module is with the SFP+ connector to allow hot plug capability. Single 3.3V power supply is needed. The optical output can be disabled by LVTTTL logic high-level input of TX_DIS. Loss of signal (RX_LOS) output is provided to indicate the loss of an input optical signal of receiver. This module provides digital diagnostic functions via a 2-wire serial interface as defined by the SFF-8472 specification

Absolute Maximum Rating

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
Power Supply Voltage	VCC	-0.5	+3.6	V
Storage Temperature	Tc	-40	+85	°C
Relative Humidity	RH	0	85	%

Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit
Supply Voltage	VCC	3.15	3.3	3.45	V
Supply current	Icc	-	-	285	mA
Operating Case Temperature (Standard)	Tca	0	-	70	°C
Operating Case Temperature (Industrial)	Tca	-20	-	85	°C

Notes:

[1] Supply current is shared between VCCTX and VCCR. X.

[2] In-rush is defined as current level above steady state current requirements.

Electrical Characteristics

Parameter	Symbol	Min.	Typical	Max	Unit
Transmitter					
Data Rate	Mra	1.0	10.3	11.3	Gbps
Input differential impedance ¹	Rin	-	100	-	Ω
Differential Input Voltage swing	Vin	150	-	1200	mV
Transmit Disable Voltage	VD	2.0	-	VCC+0.3	V
Transmit Enable Voltage ²	Ven	Vee	-	Vee+0.8	V
Transmit Disable Assert Time	Vn	-	-	100	us
Receiver					
Data Rate	Mra	-	10.3	11.3	Gbps
Output differential impedance ¹	Rout	-	100	-	Ω
Differential Output Swing ³	Vout	300	-	700	mV
Loss of Signal –Asserted ⁴	-	2.0	-	VCC+0.3	V
Loss of Signal –Negated ⁴	-	Vee	-	Vee+0.8	V

Notes:

[1] AC coupled.

[2] Or open circuit.

[3] Into 100 ohm differential termination.

[4] LOS is LVTTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.

Transmitter Specifications – Optical

Parameter	Symbol	Min	Typical	Max	Unit
Average Optical Power ¹	Po	0	-	+4	dBm
Side Mode Suppression Ratio	SMSR	30	-	-	dB
Optical Wavelength ²	λ	λ -6.5	λ	λ +6.5	nm
Extinction Ratio	ER	3.5	-	-	dB
Transmitter and Dispersion Penalty	TDP	-	-	3.2	dB
Average Launch Power of OFF Transmitter	Poff	-	-	-30	dBm
Eye Mask	-	Compliant with IEEE 802.3			

Receiver Specifications – Optical

Parameter	Symbol	Min	Typical	Max	Unit
Input Operating Wavelength	λ	1260	-	1620	nm
Receiver sensitivity in OMA ³	Rsen	-	-	-14.4	dBm
Receiver Overload	Pmax	0.5	-	-	dBm
Receiver Reflectance	Rrx	-	-	-12	dB
LOS Asserted	Lsa	-28	-	-	dBm
LOS De-Asserted	Lda	-	-	-16	dBm
LOS Hysteresis	Lh	0.5	-	-	dB

Notes:

[1] Output power is coupled into a 9/125 μ m SMF.

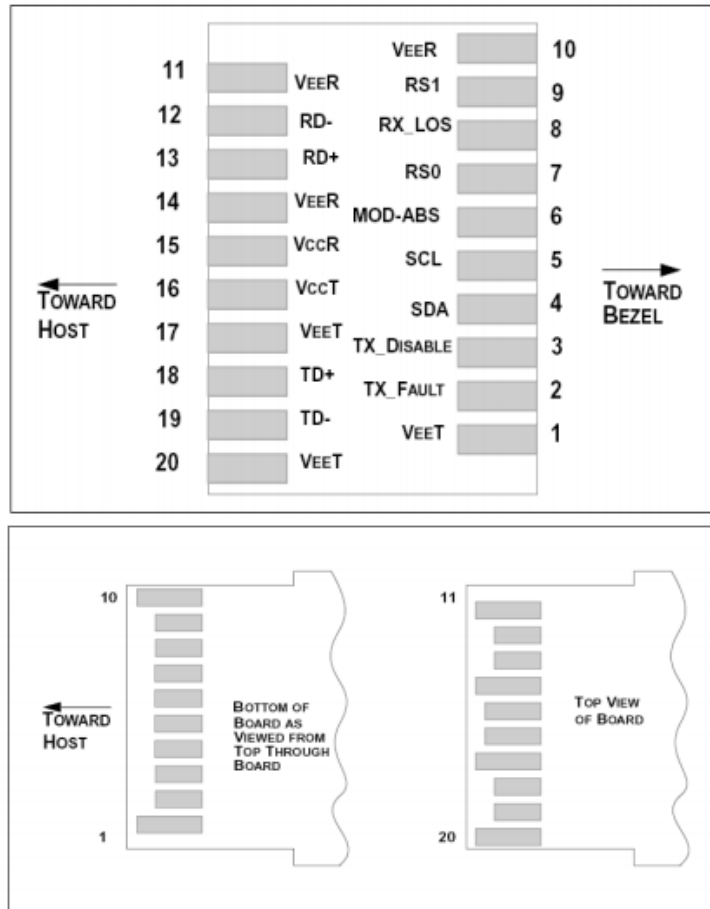
[2] ITU-T G.694.2 CWDM wavelength from 1271nm to 1611nm, each step 20nm.

[3] BER less than 1E-12 and PRBS 2³¹-1 test pattern.

Low Speed Characteristics

Parameter	Symbol	Min	Typical	Max	Unit
Power Consumption	-	-	-	1	W
TX_Fault,RX_LOS	VOL	0	-	0.4	V
	VOH	Host_VCC-	-	Host_VCC+	V
TX_DIS	VIL	-0.3	-	0.8	V
	VIH	2.0	-	VCCT+0.3	V
RS0,RS1	VIL	-0.3	-	0.8	V
	VIH	2.0	-	VCCT+0.3	V

Sfp+ Transceiver Electrical Pad Layout



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]	Rate Select 0
8	RX_LOS [2]	Loss of Signal indication. Logic 0 indicates normal operation
9	RS1 [5]	Rate Select 1
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

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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 3.15V and 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 to 10 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.

Ordering Information

Part Number	Product Description
TSCP-XX192L-L1C	10Gbps SFP+ CWDM 14dB 0°C ~ +70°C
TSCP-XX192L-L1E	10Gbps SFP+ CWDM 14dB -20°C ~ +85°C

Cwdm Wavelength

Band	XX	Wavelength(λ: nm)		
		Min.	Typ.	Max.
O-band Original	27	1264.5	1271	1277.5
	29	1284.5	1291	1297.5
	31	1304.5	1311	1317.5
	33	1324.5	1331	1337.5
	35	1344.5	1351	1357.5
E-band Extended	37	1364.5	1371	1377.5
	39	1384.5	1391	1397.5
	41	1404.5	1411	1417.5
	43	1424.5	1431	1437.5
	45	1444.5	1451	1457.5
S-band Short Wavelength	47	1464.5	1471	1477.5
	49	1484.5	1491	1497.5
	51	1504.5	1511	1517.5
	53	1524.5	1531	1537.5
C-band Conventional	55	1544.5	1551	1557.5
L-band Long	57	1564.5	1571	1577.5

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8 Jinxiu Middle Road, Pingshan, Shenzhen, Guangdong, 518118, P. R. China
+86 755 32983688 | info@china-tscom.com | www.china-tscom.com



Wavelength	59	1584.5	1591	1597.5
	61	1604.5	1611	1617.5

Note: 18 Wavelengths from 1271nm to 1611nm, each step 20nm. Please contact T&S to confirm whether the wavelength is available.

References

1. “Specifications for Enhanced Small Form Factor Pluggable Module SFP+” , SFF-8431, Rev 4.1, July 6, 2009.
2. “Improved Pluggable Form factor” , 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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