

## SPPC-LR



SFP+ Single-Mode Dual Fiber CWDM Transceiver for 10GbE



### Product Description

The SPPC-LR-xx series optical transceiver is designed for fiber communications application such as 10G Ethernet (10GBASE-LR), which fully compliant with the specification of SFP+ MSA SFF-8431.

This module is designed for single mode fiber and operates at a nominal wavelength of CWDM wavelength. There are four center wavelengths available from 1270nm to 1610nm, with each step 20nm. A guaranteed minimum optical link budget of 10 dB is offered.

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.

### Features

- 10 Gbit/s Bit Rate
- 8-Wavelengths CWDM
- 1470nm to 1610nm
- 20nm spacing
- >10dB Power Budget

### Applications

- 10GBASE-LR/LW
- 10GBASE-LR at 10.31Gbps
- 10GBASE-LW at 9.95Gbps

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*Opticonnect SYSTEMS B.V., an Optical Networking vendor with its headquarters in the Netherlands, provides Optical Transport solutions and Optical Transceivers at the best price performance ratio possible. Our goal is to simplify the planning, deployment and maintenance of*

*complex Optical Networks. This is achieved by our user friendly planning apps and information, sophisticated products and transparent support. Relying on our superior product quality, all items are supplied with life time warranty.*

## Ordering information

Part No.	Data Rate	Laser	Fiber	Power budget	Interface
SPPC-LR-xx*(note1)	10G	CWDM DFB	SMF	>10dB Power Budget	LC

Note1: xx refers to CWDM Wavelength range 1470nm to 1610nm, X=47~61, denotes 1470~1610nm.

## CWDM\* Wavelength (0C~70C)

Band	Nomenclature	Wavelength(nm)		
		Min.	Typ.	Max.
S-band Short Wavelength	47	1464	1470	1477.5
	49	1484	1490	1497.5
	51	1504	1510	1517.5
	53	1524	1530	1537.5
C-band Conventional	55	1544	1550	1557.5
L-band Long Wavelength	57	1564	1570	1577.5
	59	1584	1590	1597.5
	61	1604	1610	1617.5

Note 2: CWDM\*: 8 Wavelengths from 1470nm to 1610nm, each step 20nm.

## Regulatory Compliance

Feature	Standard	Performance
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883G Method 3015.7	Class 1C (>1000 V)
Electrostatic Discharge to the Enclosure	EN 55024:1998+A1+A2 IEC-61000-4-2 GR-1089-CORE	Compliant with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN55022: 2006 CISPR 22B: 2006 VCCI Class B	Compliant with standards Noise frequency range: 30MHz to 6GHz. Good system EMI design practice required to achieve Class B margins. System margins are dependent on customer host board and chassis design.
Immunity	EN 55024:1998+A1+A2 IEC 61000-4-3	Compliant with standards. 1KHz sine-wave, 80% AM, from 80MHz to 1GHz. No effect on transmitter/receiver performance is detectable between these limits.
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN (IEC) 60825-1: 2007 EN (IEC) 60825-2: 2004+A1	CDRH compliant and Class I laser product. TüV Certificate No. 50135086
Component Recognition	UL and CUL EN60950-1: 2006	UL file E317337 TüV Certificate No. 50135086 (CB scheme )
RoHS6	2002/95/EC 4.1&4.2 2005/747/EC 5&7&13	Compliant with standards*note3

Note3: For update of the equipments and strict control of raw materials, OPTICONNECT has the ability to supply the customized products since Jan 1<sup>st</sup>, 2007, which meet the requirements of RoHS6 (Restrictions on use of certain Hazardous Substances) of European Union. In light of item 5 in RoHS exemption list of RoHS Directive 2002/95/EC, Item 5: Lead in glass of cathode ray tubes, electronic components and fluorescent tubes. In light of item 13 in RoHS exemption list of RoHS Directive 2005/747/EC, Item 13: Lead and cadmium in optical and filter glass. The three exemptions are being concerned for Opticonnect's transceivers, because Opticonnect's transceivers use glass, which may contain Pb, for components such as lenses, isolators, and other components.

## Absolute Maximum Ratings

Parameter	Symbol	Min	Typical	Max	Unit
Maximum Supply Voltage 1	Vcc	-0.5		4.0	V
Storage Temperature	TS	-40		85	°C
Case Operating Temperature	TOP	0		70	°C

## Recommend Operating Condition

Parameter	Symbol	Min	Typical	Max	Units
Operating Temperature	TOP	0		70	°C
Supply Voltage	Vcc	3.13	3.3	3.45	V
Supply Current	Icc			350	mA
Data Rate		9.95		11.1	Gbps

## Electrical Characteristics (T<sub>OP</sub> = 0 to 70°C, V<sub>CC</sub> = 3.15 to 3.45V)

Parameter	Symbol	Min.	Typ.	Max	Unit	Notes
Transmitter						
CML Inputs(Differential)	Vin	150		1200	mVpp	1
Input Impedance (Differential)	Zin	85	100	115	ohm	
Tx_DISABLE Input Voltage - High		2		Vcc+0.3	V	
Tx_DISABLE Input Voltage - Low		0		0.8	V	
Tx_FAULT Output Voltage -- High		2		Vcc+0.3	V	
Tx_FAULT Output Voltage -- Low		0		0.8	V	
Receiver						
CML Outputs (Differential)	Vout	350		700	mVpp	1
Output Impedance (Differential)	Zout	85	100	115	ohms	
Rx_LOS Output Voltage - High		2		Vcc+0.3	V	
Rx_LOS Output Voltage - Low		0		0.8	V	
MOD_DEF ( 0:2 )	VoH	2.5			V	2
	VoL	0		0.5	V	

1. After internal AC coupling.
2. Reference the SFF-8472 MSA.

## Optical Characteristics ( $T_{OP} = 0$ to $70^{\circ}\text{C}$ , $V_{CC} = 3.15$ to $3.45\text{V}$ )

Parameter	Symbol	Min	Typical	Max	Unit	Note
Transmitter						
Output Opt. Pwr: 9/125 SMF	Pout	-1		4	dBm	1
Optical Extinction Ratio	ER	3.5			dB	
Optical Wavelength	$\lambda$	$\lambda_c - 6$	$\lambda_c$	$\lambda_c + 7.5$	nm	2
-20dB Spectrum Width	$\Delta\lambda$			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Transmitter and Dispersion Penalty	TDP			2	dB	
Average Launch Power of OFF Transmitter	POFF			-30	dBm	
TX Jitter Generation (Peak-to-Peak)	TXj			0.1	UI	
TX Jitter Generation (RMS)	TXj RMS			0.01	UI	
Receiver						
Receiver Sensitivity @ 10.5Gb/s	Pmin			-14	dBm	3
Maximum Input Power	Pmax	+0.5			dBm	
Optical Center Wavelength	$\lambda$	1260		1620	nm	
Receiver Reflectance	Rrf			-27	dB	
LOS De-Assert	LOSD			-22	dBm	
LOS Assert	LOSA	-28			dBm	
LOS Hysteresis		1			dB	

Note 1: Output power is coupled into a 9/125 $\mu\text{m}$  SMF.

Note 2: ITU-T G.694.2 CWDM wavelength from 1270nm to 1610nm, each step 20nm.

Note 3: Average received power; BER less than  $1\text{E}-12$  and PRBS  $2^{31}-1$  test pattern.