

## SPPC-ZR

SFP+ Single-Mode, Dual fiber, CWDM transceiver for 10GbE



### Product description

The SPPC-ZR-XX series optical transceiver is designed for fiber communications application such as 10G Ethernet (10GBASE-ZR/ZW), 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 eight center wavelengths available from 1470nm to 1610nm, with each step 20nm. A guaranteed optical link budget of 23 dB is offered.

The module is with the SFP+ connector to allow hot plug capability. Only 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

- Data Rate 10 Gbit/s
- 23dB Power budget
- 8-Wavelengths CWDM
- 1470nm to 1610nm
- 20nm spacing
- Hot Pluggable
- Duplex LC Connector
- MSA Compliant
- Digital Diagnostics

### Applications

- 10GBASE-ZR/ZW
- 10GBASE-ZR at 10.31Gbps
- 10GBASE-ZW at 9.95Gbps



All product specifications are subject to change without notice to improve reliability, function or design or otherwise.

*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	CDR	Interface
SPPC-ZR-xx <sup>*note1</sup>	10G	CWDM EML	SMF	23dB	NO	LC

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

## CWDM\* Wavelength (0°C~70°C)

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

Feature	Standard	Performance
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

Note 3: 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	V <sub>CC</sub>	-0.5		4.0	V
Storage temperature	T <sub>s</sub>	-40		85	°C

### Recommend operating condition

Parameter	Symbol	Min	Typical	Max	Units
Case operating temperature	T <sub>c</sub>	0		70	°C
Supply voltage	V <sub>CC</sub>	3.13	3.3	3.45	V
Supply current	I <sub>CC</sub>			455	mA
Data rate				10.3	Gbps

### Electrical Characteristics (T<sub>OP</sub> = -5 to 70°C, V<sub>CC</sub> = 3.15 to 3.45V)

Parameter	Symbol	Min.	Typ.	Max	Unit
Transmitter					
CML inputs (differential)*Note1	V <sub>in</sub>	180		1000	mVpp
Input impedance (differential)	Z <sub>in</sub>	85	100	115	ohm
TX_DISABLE Input voltage - High		2		V <sub>CC</sub> +0.3	V
TX_DISABLE Input voltage - Low		0		0.8	V
TX_FAULT Output voltage - High		2		V <sub>CC</sub> +0.3	V
TX_FAULT Output voltage - Low		0		0.8	V
Receiver					
CML outputs (differential)*Note1	V <sub>out</sub>	350		700	mVpp
Output impedance (differential)	Z <sub>out</sub>	85	100	115	ohm

Parameter	Symbol	Min.	Typ.	Max	Unit
RX_LOS Output voltage - High		2		$V_{CC}+0.3$	V
RX_LOS Output voltage - Low		0		0.8	V
MOD_DEF ( 0:2 ) <sup>*Note2</sup>	VoH	2.5			V
	VoL	0		0.5	V

Note 1: After internal AC coupling.

Note 2: Reference the SFF-8472 MSA.

### Optical characteristics ( $T_{OP} = -5$ to $70^{\circ}C$ , $V_{CC} = 3.15$ to $3.45V$ )

Parameter	Symbol	Min	Typical	Max	Unit
Transmitter					
Output Opt. Pwr: 9/125 SMF <sup>*Note1</sup>	P <sub>out</sub>	0		+4	dBm
Optical extinction ratio	ER	3.5			dB
Optical wavelength <sup>*Note2</sup>	$\lambda$	$\lambda_c-6$	$\lambda_c$	$\lambda_c+7.5$	nm
-20dB Spectrum width	$\Delta\lambda$			1	nm
Side mode suppression ratio	SMSR	30			dB
Average launch power of OFF transmitter	P <sub>OFF</sub>			-30	dBm
Transmitter dispersion penalty	TDP			3.5	dB
TX jitter	TXj	Per 802.3ae requirements			
Relative intensity noise	RIN			-128	dB/Hz
Receiver					
Receiver sensitivity @ 10.3125Gb/s <sup>*Note3</sup>	P <sub>min</sub>			-23	dBm
Input overload	P <sub>max</sub>	-8			dBm
Optical center wavelength	$\lambda$	1260		1620	nm
Receiver reflectance	R <sub>rf</sub>			-12	dB
LOS De-Assert	LOS <sub>D</sub>			-24	dBm
LOS assert	LOS <sub>A</sub>	-37			dBm
LOS hysteresis		1			dB

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

Note 2: ITU-T G.694.2 CWDM wavelength from 1470nm to 1610nm, each step 20nm.

Note 3: Average received power; BER less than 1E-12 and PRBS 2<sup>31</sup>-1 test pattern.