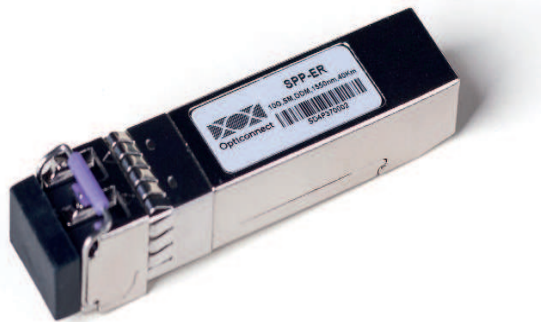


## SPP-ER

SFP+ Single-Mode, Dual Fiber Transceiver,  
With Digital Diagnostics for 10G BASE-EW/ER



### Product Description

The SPP-ER single mode transceiver is small form factor pluggable module for serial optical data communications such as IEEE 802.3ae 10GBASE-ER/ EW. It is with the SFP+ 20-pin connector to allow hot plug capability.

This module is designed for single mode fiber and operates at a nominal wavelength of 1310 nm. The transmitter section uses a 1310nm multiple quantum well DFB laser and is a 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.

### Features

- 10 Gbit/s Data Rate
- Distance up to 40km
- Compliant with MSA SFP+ Specification SFF-8431
- Compliant with IEEE 802.3ae 10GBASE-ER/ EW

### Applications

- 10GBASE-ER at 10.31Gbps
- 10GBASE-EW at 9.95Gbps
- Other optical links

For more information please contact:



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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 Type	Distance	Interface	Temp.	DDMI
SPP-ER	9.95Gbps to 10.3Gbps	1310nm DFB	SMF	40km	LC	Standard	YES

## 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: 30 MHz to 6 GHz. Good system EMI design practice required to achieve Class B margins. System margins depend 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 80 MHz to 1 GHz. 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 <sup>*note1</sup>

Note1: For update of the equipments and strict control of raw materials, Opticonnect has the ability to supply the customized products since Jan 1st, 2007, which meets 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 transceivers, because Opticonnects transceivers use glass, which may contain Pb, for components such as lenses, windows, isolators, and other electronic components.

## Absolute Maximum Ratings <sup>\*note2</sup>

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	T <sub>s</sub>	-40	+85	°C
Supply Voltage	V <sub>cc</sub>	-0.5	3.6	V
Input Voltage	V <sub>in</sub>	-0.5	V <sub>cc</sub>	V
Output Current	I <sub>o</sub>	-	50	mA

Note2: Exceeding any one of these values may destroy the device permanently

## Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	
Operating Case Temperature	T <sub>c</sub>	SPP-ER	-5		+70	°C
		SPP-ER-I	-40		+85	
Power Supply Voltage	V <sub>CC</sub>	3.15	3.3	3.45	V	
Power Supply Current	I <sub>CC</sub>			430	mA	
Surge Current	I <sub>Surge</sub>			+30	mA	
Baud Rate	10GBASE-ER		10.31		Gbps	
	10GBASE-EW		9.95			

## Performance Specifications – Electrical

Parameter	Symbol	Min.	Typ.	Max	Unit	Notes
Transmitter						
CML Inputs(Differential)	V <sub>in</sub>	150		1200	mVpp	AC coupled inputs
Input AC Common Mode Voltage		0		25	mV	RMS
Input Impedance (Differential)	Z <sub>in</sub>	85	100	115	ohm	R <sub>in</sub> > 100 kohms @ DC
Differential Input S-parameter	S <sub>DD</sub> 11	-	-	-10	dB	
Differential to Common Mode Conversion	S <sub>CD</sub> 11	-	-	-10	dB	
Tx_DISABLE Input Voltage – High		2		3.45	V	
Tx_DISABLE Input Voltage – Low		0		0.8	V	
Tx_FAULT Output Voltage – High		2		V <sub>CC</sub> +0.3	V	I <sub>o</sub> = 400µA; Host V <sub>CC</sub>
Tx_FAULT Output Voltage – Low		0		0.5	V	I <sub>o</sub> = -4.0mA
Receiver						
CML Outputs (Differential)	V <sub>out</sub>	350		700	mVpp	AC coupled outputs
Output AC Common Mode Voltage		0		15	mV	RMS
Output Impedance (Differential)	Z <sub>out</sub>	90	100	110	ohm	
Differential Output S-parameter	S <sub>D</sub> 22	-	-	-10	dB	
Rx_LOS Output Voltage – High		2		V <sub>CC</sub> +0.3	V	I <sub>o</sub> = 400µA; Host V <sub>CC</sub>
Rx_LOS Output Voltage – Low		0		0.8	V	I <sub>o</sub> = -4.0mA
MOD_DEF ( 0:2 )	VoH	2.5			V	With Serial ID
	VoL	0		0.5	V	

## Performance Specifications – Optical

Parameter		Symbol	Min.	Typical	Max.	Unit
9µm Core Diameter SMF				40		Km
Data Rate					10.3	Gbps
Transmitter						
Centre Wavelength		$\lambda_c$	1270	1310	1355	nm
Spectral Width (-20dB)		$\Delta\lambda$			1	nm
Average Output Power		$P_{out}$	-1		+4	dBm
Extinction Ratio		ER	3.5			dB
Average Power of OFF Transmitter		$P_{off}$			-30	dBm
Side Mode Suppression Ratio		SMSR	30			dB
Transmitter Dispersion Penalty		TDP			2	dB
Input Differential Impedance		$Z_{IN}$	90	100	110	$\Omega$
TX Disable	Disable		2.0		$V_{CC}+0.3$	V
	Enable		0		0.8	
TX Fault	Fault		2.0		$V_{CC}+0.3$	V
	Normal		0		0.8	
TX Disable Assert Time		$t_{off}$	-	-	10	us
TX_DISABLE Negate Time		$t_{on}$	-	-	1	ms
TX_BISABLE time to start reset		$t_{reset}$	10	-	-	us
Time to initialize, include reset of TX_FAULT		$t_{init}$	-	-	300	ms
TX_FAULT from fault to assertion		$t_{fault}$	-	-	100	us
Total Jitter		TJ	-	-	0.28	UI(p-p)
Data Dependant Jitter		DDJ	-	-	0.1	UI(p-p)
Uncorrelated Jitter		UJ	-	-	0.023	RMS
Receiver						
Centre Wavelength		$\lambda$	1260		1565	nm
Sensitivity		$P_{min}$			-15	dBm
Receiver Overload		$P_{max}$	0.5			dBm
Optical Return Loss		ORL			-12	dB
LOS De-Assert		$LOS_D$			-16	dBm
LOS Assert		$LOS_A$	-25			dBm
LOS	High		2.0		$V_{CC}+0.3$	V
	Low		0		0.8	