# XFPD-ER

XFP Single-Mode Dual Fiber DWDM Transceiver for 10GbE/10GFC/SDH/SONET


## Features

- 100GHz ITU Grid, C Band
- 10 Gbit/s Data Rate
- 14dB Power Budget
- Built-in Digital Diagnostics

## Applications

- 10GBASE-ER/EW Ethernet
- 1200-SM-LL-L 10G Fiber Channel
- SONET OC-192 IR-2
- SDH STM S-64.2b
- SONET OC-192 IR-3
- SDH STM S-64.3b

## Product Description

Opticonnect's XFPD-ER 40km Small Form Factor 10Gb/s transceiver complies with the current XFP Multi-Source Agreement (MSA) Specification. They support DWDM 10Gb/s SONET/SDH, DWDM 10-Gigabit Ethernet and 10-Gigabit Fibre Channel applications. Digital diagnostics functions are available via a 2-wire serial interface, as specified in the XFP MSA.

**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 | Power Budget | Temp. | Optical Interface |
|---|---|---|---|---|---|
| XFPD-ER-xx* | 10Gbps | EML EA | 14dB | Standard | LC |

*Note1: Standard version.

## xx- Channel refers to the following table:

| Channel | Part No. | Frequency (THz) | Center Wavelength (nm) |
|---|---|---|---|
| 17* | XFPD-ER1417 | 191.7 | 1563.86 |
| 18* | XFPD-ER1418 | 191.8 | 1563.05 |
| 19* | XFPD-ER1419 | 191.9 | 1562.23 |
| 20* | XFPD-ER1420 | 192.0 | 1561.42 |
| 21 | XFPD-ER1421 | 192.1 | 1560.61 |
| 22 | XFPD-ER1422 | 192.2 | 1559.79 |
| 23 | XFPD-ER1423 | 192.3 | 1558.98 |
| 24 | XFPD-ER1424 | 192.4 | 1558.17 |
| 25 | XFPD-ER1425 | 192.5 | 1557.36 |
| 26 | XFPD-ER1426 | 192.6 | 1556.55 |
| 27 | XFPD-ER1427 | 192.7 | 1555.75 |
| 28 | XFPD-ER1428 | 192.8 | 1554.94 |
| 29 | XFPD-ER1429 | 192.9 | 1554.13 |
| 30 | XFPD-ER1430 | 193.0 | 1553.33 |
| 31 | XFPD-ER1431 | 193.1 | 1552.52 |
| 32 | XFPD-ER1432 | 193.2 | 1551.72 |
| 33 | XFPD-ER1433 | 193.3 | 1550.92 |
| 34 | XFPD-ER1434 | 193.4 | 1550.12 |
| 35 | XFPD-ER1435 | 193.5 | 1549.32 |
| 36 | XFPD-ER1436 | 193.6 | 1548.51 |
| 37 | XFPD-ER1437 | 193.7 | 1547.72 |
| 38 | XFPD-ER1438 | 193.8 | 1546.92 |
| 39 | XFPD-ER1439 | 193.9 | 1546.12 |
| 40 | XFPD-ER1440 | 194.0 | 1545.32 |
| 41 | XFPD-ER1441 | 194.1 | 1544.53 |
| 42 | XFPD-ER1442 | 194.2 | 1543.73 |
| 43 | XFPD-ER1443 | 194.3 | 1542.94 |
| 44 | XFPD-ER1444 | 194.4 | 1542.14 |
| 45 | XFPD-ER1445 | 194.5 | 1541.35 |
| 46 | XFPD-ER1446 | 194.6 | 1540.56 |
| 47 | XFPD-ER1447 | 194.7 | 1539.77 |
| 48 | XFPD-ER1448 | 194.8 | 1538.98 |
| 49 | XFPD-ER1449 | 194.9 | 1538.19 |
| 50 | XFPD-ER1450 | 195.0 | 1537.40 |
| 51 | XFPD-ER1451 | 195.1 | 1536.61 |
| 52 | XFPD-ER1452 | 195.2 | 1535.82 |
| 53 | XFPD-ER1453 | 195.3 | 1535.04 |
| 54 | XFPD-ER1454 | 195.4 | 1534.25 |
| 55 | XFPD-ER1455 | 195.5 | 1533.47 |
| 56 | XFPD-ER1456 | 195.6 | 1532.68 |
| 57 | XFPD-ER1457 | 195.7 | 1531.90 |
| 58 | XFPD-ER1458 | 195.8 | 1531.12 |
| 59 | XFPD-ER1459 | 195.9 | 1530.33 |
| 60* | XFPD-ER1460 | 196.0 | 1529.55 |
| 61* | XFPD-ER1461 | 196.1 | 1528.77 |

*Note2: This channel is supported with limited availability; please contact Opticonnect for further details.

## Regulatory Compliance

| Feature | Standard | Performance |
|---|---|---|
| Electrostatic Discharge (ESD) to the Electrical Pins | MIL-STD-883G Method 3015.7 | Class 1C (>1000V) |
| Electrostatic Discharge to the Enclosure | EN 55024:1998+A1+A2<br>IEC-61000-4-2<br>GR-1089-CORE | Compliant with standards |
| Electromagnetic Interference (EMI) | FCC Part 15 Class B<br>EN55022: 2006<br>CISPR 22B: 2006<br>VCCI Class B | Compliant with standards<br>Noise frequency range: 30MHz to 6GHz. Good system EMI design practice required to achieve Class B margins.<br>System margins are dependent on customer host board and chassis design. |
| Immunity | EN 55024:1998+A1+A2<br>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<br>EN (IEC) 60825-1: 2007<br>EN (IEC) 60825-2: 2004+A1 | CDRH compliant and Class I laser product.<br>TüV Certificate No. 50135086 |
| Component Recognition | UL and CUL<br>EN60950-1: 2006 | UL file E317337<br>TüV Certificate No. 50135086<br>(CB scheme ) |
| RoHS6 | 2002/95/EC 4.1&4.2<br>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 1st, 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 | Typ. | Max | Unit |
|---|---|---|---|---|---|
| Maximum Supply Voltage 1 | Vcc3 | -0.5 | | 4.0 | V |
| Maximum Supply Voltage 2 | Vcc5 | -0.5 | | 6.0 | V |
| Storage Temperature | $T_S$ | -40 | | 85 | °C |
| Case Operating Temperature | $T_{OP}$, XFPD-ER | 0 | | 70 | °C |
| | $T_{OP}$, XFPD-ER-I | -40 | | 85 | |

## Recommend Operating Condition

| Parameter | Symbol | Min | Typ. | Max | Units |
|---|---|---|---|---|---|
| Supply Voltage 1 | Vcc3 | 3.13 | 3.3 | 3.45 | V |
| Supply Voltage 2 | Vcc5 | 4.75 | 5 | 5.25 | V |
| Case Operating Temperature | $T_{OP}$, XFPD-ER | 0 | | 70 | °C |
| | $T_{OP}$, XFPD-ER-I | -40 | | 85 | °C |

## Electrical Characteristics - (TOP = -40 to 85 °C, Vcc5 = 4.75 to 5.25 Volt)

| Parameter | Symbol | Min | Typ. | Max | Unit | Note |
|---|---|---|---|---|---|---|
| Main Supply Voltage | Vcc5 | 4.75 | | 5.25 | V | |
| Supply Voltage #2 | Vcc3 | 3.13 | | 3.45 | V | |
| Supply Current – Vcc5 supply | Icc5 | | | 350 | mA | |
| Supply Current – Vcc3 supply | Icc3 | | | 520 | mA | |
| Transmitter | | | | | | |
| Input Differential Impedance | Rin | | 100 | | Ω | 1 |
| Differential Data Input Swing | Vin, pp | 120 | | 820 | mV | |
| Transmit Disable Voltage | $V_D$ | 2.0 | | Vcc | V | |
| Transmit Enable Voltage | $V_{EN}$ | GND | | GND+0.8 | V | |
| Transmit Disable Assert Time | | | | 10 | µs | |
| Receiver | | | | | | |
| Differential Data Output Swing | Vout,pp | 340 | 650 | 850 | mV | |
| Data Output Rise Time | Tr | | | 38 | ps | 2 |
| Data Output Fall Time | Tf | | | 38 | ps | 2 |
| LOS Fault | $V_{LOS\ Fault}$ | Vcc – 0.5 | | $Vcc_{HOST}$ | V | 3 |
| LOS Normal | $V_{LOS\ Normal}$ | GND | | GND+0.5 | V | 3 |
| Power Supply Noise Rejection | PSNR | Compliant to Section 2.7.1 of XFP MSA | | | | |

Note 1: Internal AC coupling.
Note 2: 20% – 80%
Note 3: Loss Of Signal is open collector to be pulled up with a 4.7k – 10kohm resistor to 3.15 – 3.6V. Logic 0 indicates normal operation; logic 1 indicates no signal detected.

## Optical Characteristics (TOP = -40 to 85 °C, Vcc5 = 4.75 to 5.25 Volt)

| Parameter | Symbol | Min | Typ | Max | Unit | Ref. |
|---|---|---|---|---|---|---|
| Transmitter | | | | | | |
| Output Opt. Pwr: 9/125 SMF | Pout | -1 | | +4 | dBm | |
| Center Wavelength Spacing | | | 100 | | GHz | |
| | | | 0.8 | | nm | |
| Optical Wavelength-EOL | $\lambda_C$ | X-100 | X | X+100 | pm | |
| Transmitter Center Wavelength –BOL | $\lambda_C$ | X-25 | X | X+25 | pm | |
| Optical Extinction Ratio | ER | 8.2 | | | dB | |
| Transmitter and Dispersion Penalty | TDP | | | 2 | dB | |
| Side Mode Suppression Ratio | SMSR | 30 | | | dB | |
| TX Jitter Generation (peak-to-peak) | TXj | | | 0.1 | UI | |
| TX Jitter Generation (RMS) | $TXj_{RMS}$ | | | 0.01 | UI | |
| Receiver | | | | | | |
| Receiver Sensitivity @ 10.7Gb/s | Pmin | | | -15 | dBm | |
| Maximum Input Power | Pmax | +0.5 | | | dBm | |
| Optical Center Wavelength | $\lambda_C$ | 1270 | | 1600 | nm | |
| Path Penalty | | | | 2 | dB | |
| Receiver Reflectance | Rrx | | | -27 | dB | |
| LOS De-Assert | LOSD | | | -16 | dBm | |
| LOS Assert | LOSA | -28 | | | dBm | |
| LOS Hysteresis | | 1 | | | dB | |