

10G Small Form Pluggable (XFP) Optical Transceivers

Features

- 850 nm, 1310 nm, 1550 nm, CWDM, DWDM
- 9.95 – 11.3 Gb/s, up to 80 km
- XFP MSA and IEEE 802.3ae 10GBASE compliant
- Duplex LC optical connector
- 30-pin connector z-axis hot pluggable
- AC coupling LVPECL differential I/O, TTL signal detect

Applications

- ✓ 10 Gigabit Ethernet, 10G Fiber Channel
- ✓ SONET OC-192/SDH STM-64
- ✓ ITU-T G.709 DWDM networks
- ✓ Data Communication for SAN and LAN
- ✓ Routers and switches, computer cluster cross-connect



Products Selection Guide

Part Number *	Wavelength	Data Rate	Power Budget	Distance **	Temp. Range
850 nm, Multimode Applications					
XFP-10000SX-AT300M	850 nm	10 Gb/s	>4 dB	300 m	0 – 70/-10 - 85 C
1310 nm, Single Mode Applications					
XFP-10000LX-AT10K	1310 nm	10 Gb/s	>8dB	10 km	0 – 70/-25 - 85 C
1550 nm, Single Mode Applications, 40 – 80 km					
XFP-10000EX-AT40K	1550 nm	10 Gb/s	>15dB	40 km	-5 – 70 C
XFP-10000EX-AT80K	1550 nm	10 Gb/s	>23 dB	80 km	-5 – 70 C
CWDM & DWDM Applications, 10 – 80 km					
XFP-10000CLX-AT10K-XX	1270 - 1330 nm	10 Gb/s	>8 dB	10 km	0 – 70 C
XFP-10000CEX-AT40K-XX	1470 -1610 nm	10 Gb/s	>15dB	40 km	-5 – 70 C
XFP-10000CEX-AT80K-XX	1470 -1610 nm	10 Gb/s	>23 dB	80 km	-5 – 70 C
XFP-10000DEX-AT40K-XX	ITU 17 – 61	10 Gb/s	>15 dB	40 km	-5 – 70 C
XFP-10000DEX-AT80K-XX	ITU 17 - 59	10 Gb/s	>23 dB	80 km	-5 – 70 C

*: Add "-T" in the Part Number for products with extended temperature range -25–85 °C. For example, XFP-10000LX-AT10K-T.

** : The indicated distance is for reference only, not guaranteed specifications. The actual transmission distance depends on system configuration and power budget. For single mode fibers, the typical loss is 0.25 dB/km @ 1550 nm and 0.35 dB/km @ 1310 nm.

Description

OptoIC's 10 Gb/s XFP fiber optics transceiver is designed with advanced 850 nm VCSEL laser and high speed electronics to achieve the optimum performance for optical interconnect applications. It is compliant with 10G Ethernet and Fiber Channel for datacom applications. The product supports serial ID functionality and Digital Diagnostic Monitoring (DDM) interface through the 2-wire serial bus. It is compliant with XFP Multi-Source Agreement (MSA) INF-8077i.

The transceiver uses duplex LC connector for the optical interface. It is hot pluggable in the z-axis with a 30-pin connector. The transceiver has up to 10 dB of power budget and reaches up to 300 meters of transmission distance with OM3 multimode fibers. The product is RoHS compliant. Total power consumption is < 1.5W.



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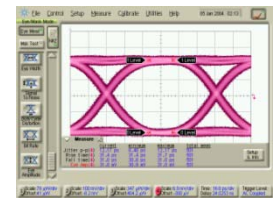
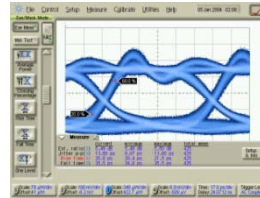
XFP-10000SX-AT300M



10 Gb/s, 2³¹-1 NRZ data eye pattern

TX

RX



Key Features

- 850 nm multimode, 300 m, 10 Gb/s data rate
- >4 dB power budget
- Duplex LC connector optical interface
- 30-pin Z-axis hot pluggable connector
- AC coupling CML differential I/O logics
- Compliant with XFP MSA standard
- Compliant with IEEE 802.3ae, 10GBASE-SW/SR
- Compliant with 10G FC Fiber Channel Standard
- -10-85 °C operating temperatures available
- Single 3.3V power supply
- RoHS compliant

Applications

- ✓ 10G Fiber Channel,
- ✓ 10 Gigabit Ethernet
- ✓ High speed I/O for file server
- ✓ Data Communication for SAN and LAN
- ✓ Central offices routers and switches
- ✓ Mass storage systems interconnect
- ✓ Computer cluster cross-connect

Ordering Information

Part Number: XFP-10000SX-AT300M

Description:
850 nm 10 Gb/s, multimode, XFP fiber optics transceiver, 300 m reach, 0-70°C

* Add "-T" in the Part Number for extended temperature range -10-85 °C, i.e., XFP-10000SX-AT300M -T.

Operating Conditions

Parameter	Min.	Typical	Max.	Units
Operate Temperature	0	25	70	C
- T Transceivers	-10	25	85	C
Data Rate	9.95	---	11.3	Gb/s
Supply Voltage	3.1	3.3	3.5	V
Supply Current	---	300	400	mA

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Units
Storage Temperature	T_{st}	-40	85	C
Supply Voltage	V_{CC}	-0.5	4.0	V
Input Voltage	V_{IN}	-0.5	V_{CC}	V
Operating Current	I_{op}	---	500	mA
Output Current	I_o	---	50	mA

Transmitter Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Input Voltage ¹	ΔV_i	0.2	---	0.8	V
Differential Input Impedance ²	Z	---	100	---	ohm
Optical Output Power ³	P_o	-7	---	-1	dBm
Optical Modulation Amplitude (OMA)	P_o	-2.8	---	---	dBm
Transmitter & Dispersion Penalty	TDP	---	---	3.9	dB
Optical Wavelength	λ_o	840	850	860	nm
Extinction Ratio	ET	3	---	---	dB
Spectral Width (rms)	$\Delta\lambda$	---	---	0.45	nm
Relative Intensity Noise	RIN	---	---	-128	dB/Hz
TX Disable Asserted	P_{OFF}	---	---	-30	dBm
TX Disable Voltage – High	V_{DH}	2.4	---	V_{CC}	V
TX Disable Voltage - Low	V_{DL}	0	---	0.5	V
TX Disable Assert Time	T_{ass}	---	---	10	μs
TX Disable Deassert Time	T_{disass}	---	---	2	ms
Time to Initialize	T_{ini}	---	---	300	ms
TX Fault from Fault to Assertion	T_{fault}	---	---	100	μs
TX Disable Time to Start Reset	T_{reset}	10	---	---	μs

Notes:

1. Module is designed for AC coupling. DC voltage will be filtered by internal capacitors.
2. Single ended will be 50 ohm for each signal line.
3. Output of coupling optical power into 50/125 μm MMF.
4. Refer to OptoIC "XFP Design Reference Guide" or IEEE 802.3ae for more design details.

Class 1 Laser Product Complies with 21 CFR 1040.10 and 1040.11
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Receiver Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Operating Wavelength	λ_c	840	---	860	nm
Receiver Overload	P_{max}	-1	---	---	dBm
Receiver Sensitivity ¹	P_I	---	---	-9.9	dBm
Receiver Sensitivity in OMA	P_{IOMA}	---	---	-11.1	dBm
Stressed Receiver Sensitivity in OMA	P_{IS}	---	---	-7.5	dBm
Differential Output Voltage	ΔV_o	0.4	---	0.8	V
Differential Input Impedance ²	Z	---	100	---	Ohm
Optical Return Loss	OL	12	---	---	dB
Rise/Fall Time (20% - 80%)	T_r/T_f	---	---	40	ps
RX Signal Loss – Asserted	P_{SD+}	---	---	-12	dBm
RX Signal Loss – Deasserted	P_{SD-}	-30	---	---	dBm
RX Signal Loss Output - High	V_{RL+}	2.4	---	V_{CC}	V
RX Signal Loss Output - Low	V_{RL-}	0	---	0.8	V
RX Signal Loss Assert Time	T_{RL+}	---	---	100	μ s
RX Signal Loss Deassert Time	T_{RL-}	---	---	100	μ s
Serial ID Clock Rate	f_C	---	---	400	kHz

Notes:

1. Test at 10 Gb/s, 2³¹ – 1 PRBS data pattern, and > 1x10⁻¹² of Bit-Error-Rate (BER).
2. Single ended will be 50 ohm for each signal line.
3. Refer to OptoIC "XFP Design Reference Guide" or IEEE 802.3ae for more design details.

Typical Transmission Distance for Multimode Fibers @ 850 nm

Data Rate	Fiber Type	Distance (m)	Data Rate	Fiber Type	Distance (m)
1.25 Gb/s	50 μ m, 500 MHz*km	550	10 Gb/s	50 μ m, 2000 MHz*km	300
	50 μ m, 400 MHz*km	500		50 μ m, 500 MHz*km	82
	62.5 μ m, 200 MHz*km	275		62.5 μ m, 200 MHz*km	33
	62.5 μ m, 160 MHz*km	220		62.5 μ m, 160 MHz*km	26

Class 1 Laser Product Complies with 21 CFR 1040.10 and 1040.11
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Description

OptoIC's 10 Gb/s XFP fiber optics transceiver is designed with advanced 1310 nm DFB laser and high speed electronics to achieve the optimum performance for optical interconnect applications. It is compliant with 10G Ethernet and Fiber Channel for datacom applications and SONET/SDH for telecom applications. The product supports serial ID functionality and Digital Diagnostic Monitoring (DDM) interface through the 2-wire serial bus. It is compliant with XFP Multi-Source Agreement (MSA) INF-8077i.

The transceiver uses duplex LC connector for the optical interface. It is hot pluggable in the z-axis with a 30-pin connector. The transceiver has > 8 dB power budget and reaches up to 10 km of transmission distance with standard single mode fibers. The product is RoHS compliant. Total power consumption is < 2.5W.



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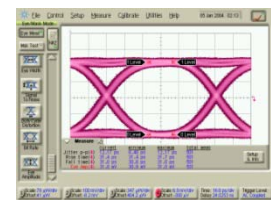
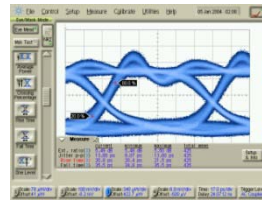
XFP-10000LX-AT10K



10 Gb/s, 2²³-1 NRZ data eye pattern

TX

RX



Key Features

- 1310 nm single mode, 10 km, 10 Gb/s data rate
- > 8 dB power budget
- Duplex LC connector optical interface
- 30-pin Z-axis hot pluggable connector
- AC coupling CML differential I/O logics
- Compliant with XFP MSA standard
- Compliant with IEEE 802.3ae, 10GBASE-LW/LR
- Compliant with 10G FC Fiber Channel Standard
- -25 – 85 °C operating temperatures available
- Single 3.3V power supply
- RoHS compliant

Applications

- ✓ 10G Fiber Channel, 10 Gigabit Ethernet
- ✓ SONET OC-192/SDH STM-64
- ✓ High speed I/O for file server
- ✓ Data Communication for SAN and LAN
- ✓ Central offices routers and switches
- ✓ Mass storage systems interconnect
- ✓ Computer cluster cross-connect

Ordering Information

Part Number: XFP-10000LX-AT10K

Description:

1310 nm 10 Gb/s, single mode, XFP fiber optics transceiver, 10 km reach, 0-70°C

* Add "-T" in the Part Number for extended temperature range -25 – 85 °C, i.e., XFP-10000LX-AT10K-T.

Operating Conditions

Parameter	Min.	Typical	Max.	Units
Operate Temperature	0	25	70	C
- T Transceivers	-25	25	85	C
Data Rate	9.95	---	11.3	Gb/s
Supply Voltage	3.1	3.3	3.5	V
Supply Current	---	500	600	mA

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Units
Storage Temperature	T_{st}	-40	85	C
Supply Voltage	V_{CC}	-0.5	4.0	V
Input Voltage	V_{IN}	-0.5	V_{CC}	V
Operating Current	I_{op}	---	600	mA
Output Current	I_o	---	50	mA

Transmitter Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Input Voltage ¹	ΔV_i	0.2	---	0.8	V
Differential Input Impedance ²	Z	---	100	---	ohm
Optical Output Power ³	P_o	-6.5	---	+0.5	dBm
Optical Modulation Amplitude (OMA)	P_o	-5.2	---	---	dBm
Transmitter & Dispersion Penalty	TDP	---	---	3.2	dB
Optical Wavelength	λ_o	1290	1310	1330	nm
Extinction Ratio	ET	6	---	---	dB
Side Mode Suppression Ratio	$SMSR$	30	---	---	dB
Relative Intensity Noise	RIN	---	---	-128	dB/Hz
TX Disable Asserted	P_{OFF}	---	---	-30	dBm
TX Disable Voltage – High	V_{DH}	2.4	---	V_{CC}	V
TX Disable Voltage - Low	V_{DL}	0	---	0.5	V
TX Disable Assert Time	T_{ass}	---	---	10	μ s
TX Disable Deassert Time	T_{disass}	---	---	2	ms
Time to Initialize	T_{ini}	---	---	300	ms
TX Fault from Fault to Assertion	T_{fault}	---	---	100	μ s
TX Disable Time to Start Reset	T_{reset}	10	---	---	μ s

Notes:

1. Module is designed for AC coupling. DC voltage will be filtered by internal capacitors.
2. Single ended will be 50 ohm for each signal line.

Class 1 Laser Product Complies with 21 CFR 1040.10 and 1040.11
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Receiver Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Operating Wavelength	λ_c	1260	1310	1355	nm
Receiver Overload	P_{max}	0.5	---	---	dBm
Receiver Sensitivity ¹	P_I	---	---	-14.4	dBm
Receiver Sensitivity in OMA	P_{IOMA}	---	---	-12.6	dBm
Stressed Receiver Sensitivity in OMA	P_{IS}	---	---	-10.3	dBm
Differential Output Voltage	ΔV_o	0.4	---	0.8	V
Differential Input Impedance ²	Z	---	100	---	Ohm
Optical Return Loss	OL	12	---	---	dB
Rise/Fall Time (20% - 80%)	T_r/T_f	---	---	40	ps
RX Signal Loss – Asserted	P_{SD+}	---	---	-18	dBm
RX Signal Loss – Deasserted	P_{SD-}	-30	---	---	dBm
RX Signal Loss Output - High	V_{RL+}	2.4	---	V_{CC}	V
RX Signal Loss Output - Low	V_{RL-}	0	---	0.5	V
RX Signal Loss Assert Time	T_{RL+}	---	---	100	μ s
RX Signal Loss Deassert Time	T_{RL-}	---	---	100	μ s
Serial ID Clock Rate	f_c	1/64 of operating data rate			kHz

Notes:

1. Test at 10 Gb/s, 2³¹ – 1 PRBS data pattern, and > 1x10⁻¹² of Bit-Error-Rate (BER).
2. Single ended will be 50 ohm for each signal line.
3. Refer to OptoIC "XFP Design Reference Guide" or IEEE 802.3ae for more design details.

Class 1 Laser Product Complies with 21 CFR 1040.10 and 1040.11
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10 Gb/s, 1550 nm Single Mode, 40 and 80 km XFP Dual LC Package

Description

OptoIC's 10 Gb/s XFP fiber optics transceiver is designed with advanced 1550 nm DFB laser and high speed electronics to achieve the optimum performance for optical interconnect applications. It is compliant with 10G Ethernet and Fiber Channel for datacom applications and SONET/SDH for telecom applications. The product supports serial ID functionality and Digital Diagnostic Monitoring (DDM) interface through the 2-wire serial bus. It is compliant with XFP Multi-Source Agreement (MSA) INF-8077i.

The transceiver uses duplex LC connector for the optical interface. It is hot pluggable in the z-axis with a 30-pin connector. The transceiver has > 15 dB power budget for 40 km, and > 23 dB for 80 km of transmission distance with standard single mode fibers. The product is RoHS compliant. Total power consumption is < 3.5W.



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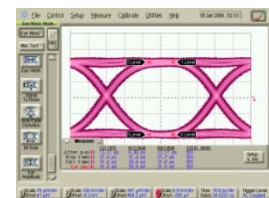
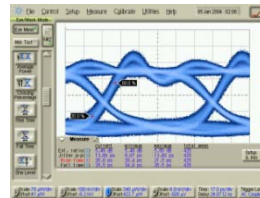
XFP-10000EX-AT~~XX~~K
(~~XX~~ = 40, 80)



10 Gb/s, 2²³-1 NRZ data eye pattern

TX

RX



Key Features

- 1550 nm single mode, 40/80 km, 10 Gb/s data rate
- > 15 dB power budget for 40 km
- > 23 dB power budget for 80 km
- Duplex LC connector optical interface
- 30-pin Z-axis hot pluggable connector
- AC coupling CML differential I/O logics
- Compliant with XFP MSA standard
- Compliant with IEEE 802.3ae, 10GBASE-EW/ER
- Compliant with 10G FC Fiber Channel Standard
- Multiple 3.3 and 5V power supply
- RoHS compliant

Applications

- ✓ 10G Fiber Channel, 10 Gigabit Ethernet
- ✓ SONET OC-192/SDH STM-64
- ✓ High speed I/O for file server
- ✓ Data Communication for SAN and LAN
- ✓ Central offices routers and switches
- ✓ Mass storage systems interconnect
- ✓ Computer cluster cross-connect

Ordering Information

Part Number: XFP-10000EX-AT~~XX~~K

Description:

1550 nm 10 Gb/s, single mode, XFP fiber optics transceiver, ~~XX~~ km reach, -5 - 70°C.

~~XX~~ = 40, 80.

Operating Conditions

Parameter	Min.	Typical	Max.	Units
Operate Temperature	-5	25	70	C
Data Rate	9.95	---	11.3	Gb/s
Supply Voltage	3.13	3.3	3.47	V
Supply Current @ 3.3V	---	---	750	mA
Supply Voltage	4.75	5.0	5.25	V
Supply Current @ 5V	---	---	500	mA

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Units
Storage Temperature	T_{st}	-40	85	C
Supply Voltage @ 3.3V	V_{CC}	-0.5	4.0	V
Input Voltage	V_{IN}	-0.5	V_{CC}	V
Supply Voltage @ 5V	V_{CC}	-0.5	6.0	V
Output Current	I_o	---	50	mA

General Transmitter Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Input Voltage ¹	ΔV_i	0.2	---	0.8	V
Differential Input Impedance ²	Z	---	100	---	ohm
Transmitter & Dispersion Penalty	TDP	---	---	3.0	dB
Side Mode Suppression Ratio	$SMSR$	30	---	---	dB
Relative Intensity Noise	RIN	---	---	-130	dB/Hz
TX Disable Asserted	P_{OFF}	---	---	-30	dBm
TX Disable Voltage – High	V_{DH}	2.4	---	V_{CC}	V
TX Disable Voltage - Low	V_{DL}	0	---	0.5	V
TX Disable Assert Time	T_{ass}	---	---	10	μs
TX Disable Deassert Time	T_{disass}	---	---	2	ms
Time to Initialize	T_{ini}	---	---	300	ms
TX Fault from Fault to Assertion	T_{fault}	---	---	100	μs
TX Disable Time to Start Reset	T_{reset}	10	---	---	μs

Notes:

1. Module is designed for AC coupling. DC voltage will be filtered by internal capacitors.
2. Single ended will be 50 ohm for each signal line.
3. Refer to OptoIC "XFP Design Reference Guide" or IEEE 802.3ae for more design details.

Class 1 Laser Product Complies with 21 CFR 1040.10 and 1040.11
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General Receiver Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Output Voltage	ΔV_o	0.4	---	0.8	V
Differential Input Impedance ¹	Z	---	100	---	Ohm
Optical Return Loss	OL	27	---	---	dB
Rise/Fall Time (20% - 80%)	T_r/T_f	---	---	40	ps
RX Signal Loss Output - High	V_{RL+}	2.4	---	V_{CC}	V
RX Signal Loss Output - Low	V_{RL-}	0	---	0.5	V
RX Signal Loss Assert Time	T_{RL+}	---	---	100	μ s
RX Signal Loss Deassert Time	T_{RL-}	---	---	100	μ s

Notes:

1. Single ended will be 50 ohm for each signal line.
2. Refer to OptoIC "XFP Design Reference Guide" or IEEE 802.3ae for more design details.

Class 1 Laser Product Complies with 21 CFR 1040.10 and 1040.11
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Transmitter Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Optical Output Power ¹	P_o	-1	---	+2	dBm
Optical Modulation Amplitude (OMA)	P_o	-2.1	---	---	dBm
Optical Wavelength	λ_o	1530	1550	1565	nm
Extinction Ratio	ET	8.2	---	---	dB

Receiver Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Operating Wavelength	λ_c	1270	---	1600	nm
Receiver Overload	P_{max}	-1	---	---	dBm
Receiver Sensitivity ²	P_i	---	---	-16	dBm
Receiver Sensitivity in OMA	P_{iOMA}	---	---	-14.1	dBm
Stressed Receiver Sensitivity in OMA	P_{iS}	---	---	-11.3	dBm
Dispersion Penalty		---	---	2	dB
Signal Detect- Deasserted	P_{SD-}	-28	---	---	dBm
Signal Detect- Asserted	P_{SD+}	---	---	-22	dBm

Notes:

1. Output of coupling optical power into 9/125 μ m SMF.
2. Test at 10 Gb/s, 2³¹ - 1 PRBS data pattern, and > 1x10⁻¹² of Bit-Error-Rate (BER).
3. Refer to OptoIC "XFP Design Reference Guide" or IEEE 802.3ae for more design details.

Class 1 Laser Product Complies with 21 CFR 1040.10 and 1040.11
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Transmitter Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Optical Output Power ¹	P_o	0	---	+4	dBm
Optical Modulation Amplitude (OMA)	P_o	-2.1	---	---	dBm
Optical Wavelength	λ_o	1530	1550	1565	nm
Extinction Ratio	ET	8.2	---	---	dB

Receiver Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Operating Wavelength	λ_c	1270	---	1600	nm
Receiver Overload	P_{max}	-7	---	---	dBm
Receiver Sensitivity ²	P_i	---	---	-23	dBm
Receiver Sensitivity in OMA	P_{iOMA}	---	---	-22.1	dBm
Dispersion Penalty		---	---	3	dB
Signal Detect- Deasserted	P_{SD-}	-34	---	---	dBm
Signal Detect- Asserted	P_{SD+}	---	---	-24	dBm

Notes:

1. Output of coupling optical power into 9/125 μ m SMF.
2. Test at 10 Gb/s, 2³¹ – 1 PRBS data pattern, and > 1x10⁻¹² of Bit-Error-Rate (BER).
3. Refer to OptoIC "XFP Design Reference Guide" or IEEE 802.3ae for more design details.

Class 1 Laser Product Complies with 21 CFR 1040.10 and 1040.11
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Description

OptoIC's CWDM XFP fiber optics transceivers are designed with high performance DFB laser and cover the wavelength spectrum from 1270 nm to 1330 nm, with industry standard 20 nm spacing. It is compliant with 10G Ethernet and Fiber Channel for datacom applications and SONET/SDH for telecom applications. The product supports serial ID functionality and Digital Diagnostic Monitoring (DDM) interface through the 2-wire serial bus. It is compliant with XFP Multi-Source Agreement (MSA) INF-8077i.

The transceiver uses duplex LC connector for the optical interface. It is hot pluggable in the z-axis with a 30-pin connector. The transceiver has > 8 dB power budget for 10 km of transmission distance with standard single mode fibers. The product is RoHS compliant. Total power consumption is < 2.5W.



Lead-Free

XFP-10000CLX-AT10K-XX



Key Features

- 1270 - 1330 nm single mode, 10 Gb/s data rate
- > 8 dB power budget for 10 km
- Duplex LC connector optical interface
- 30-pin Z-axis hot pluggable connector
- AC coupling CML differential I/O logics
- Compliant with XFP MSA standard
- Compliant with IEEE 802.3ae, 10GBASE-LW/LR
- Compliant with 10G FC Fiber Channel Standard
- Multiple 3.3 and 5V power supply
- RoHS compliant

Applications

- ✓ 10G Fiber Channel, 10 Gigabit Ethernet
- ✓ SONET OC-192/SDH STM-64
- ✓ Data Communication for SAN and LAN
- ✓ Central offices routers and switches
- ✓ Mass storage systems interconnect
- ✓ Computer cluster cross-connect

Ordering Information

Part Number: XFP-10000CLX-AT10K-XX

Description:

CWDM, 1270 - 1330 nm 10 Gb/s, single mode, XFP fiber optics transceiver, 10 km, 1XX0 nm wavelength, 0-70°C

XX specifies the wavelength described below. For example, XFP-10000CLX-AT10K-27 is the 1270 nm module.

<u>XX</u>	Wavelength	<u>XX</u>	Wavelength
27	1270 nm	31	1310 nm
29	1290 nm	33	1330 nm

Operating Conditions

Parameter	Min.	Typical	Max.	Units
Operate Temperature	0	25	70	C
Data Rate	9.95	---	11.3	Gb/s
Supply Voltage	3.13	3.3	3.47	V
Supply Current @ 3.3V	---	---	750	mA

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Units
Storage Temperature	T_{st}	-40	85	C
Supply Voltage	V_{CC}	-0.5	4.0	V
Input Voltage	V_{IN}	-0.5	V_{CC}	V
Operating Current	I_{op}	---	750	mA
Output Current	I_o	---	50	mA

Transmitter Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Input Voltage ¹	ΔV_i	0.2	---	0.8	V
Differential Input Impedance ²	Z	---	100	---	ohm
Optical Output Power ³	P_o	-6.5	---	+0.5	dBm
Center Wavelength – 1270 nm	λ_c	1264.5	1270	1277.5	nm
Center Wavelength – 1290 nm	λ_c	1284.5	1290	1297.5	nm
Center Wavelength – 1310 nm	λ_c	1304.5	1310	1317.5	nm
Center Wavelength – 1330 nm	λ_c	1324.5	1330	1337.5	nm
Side Mode Suppression Ratio	$SMSR$	30	---	---	dB
Extinction Ratio	ET	6	---	---	dB
Rise/Fall Time (20% - 80%)	T_r/T_f	---	---	40	ps
Relative Intensity Noise	RIN	---	---	-130	dB/Hz
TX Disable Asserted	P_{OFF}	---	---	-30	dBm
TX Disable Voltage – High	V_{DH}	2.4	---	V_{CC}	V
TX Disable Voltage – Low	V_{DL}	0	---	0.5	V
TX Disable Assert Time	T_{ass}	---	---	10	μ s
TX Disable Deassert Time	T_{disass}	---	---	2	ms
Time to Initialize	T_{ini}	---	---	300	ms
TX Fault from Fault to Assertion	T_{fault}	---	---	100	μ s
TX Disable Time to Start Reset	T_{reset}	10	---	---	μ s

Notes:

1. Module is designed for AC coupling. DC voltage will be filtered by internal capacitor.
2. Single ended will be 50 ohm for each signal line.
3. Output of average coupling optical power into 9/125 μ m SMF.
4. Refer to OptoIC "XFP Design Reference Guide" or IEEE 802.3ae for more design details.

Receiver Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Output Voltage	ΔV_o	0.4	---	0.8	V
Differential Input Impedance ¹	Z	---	100	---	Ohm
Optical Return Loss	OL	27	---	---	dB
Operating Wavelength	λ_c	1270	---	1600	nm
Receiver Overload	P_{max}	+0.5	---	---	dBm
Receiver Sensitivity ²	P _I	---	-16	-14.5	dBm
Receiver Sensitivity in OMA	P _{IOMA}	---	---	-12.5	dBm
Rise/Fall Time (20% - 80%)	T _r /T _f	---	---	40	ps
Signal Detect- Deasserted	P _{SD-}	-25	---	---	dBm
Signal Detect- Asserted	P _{SD+}	---	---	-15	dBm
Dispersion Penalty		---	---	4	dB
RX Signal Loss Output - High	V _{RL+}	2.4	---	V _{CC}	V
RX Signal Loss Output - Low	V _{RL-}	0	---	0.5	V
RX Signal Loss Assert Time	T _{RL+}	---	---	100	μs
RX Signal Loss Deassert Time	T _{RL-}	---	---	100	μs

Notes:

1. Single ended will be 50 ohm for each signal line.
2. Test at 10 Gb/s, 2³¹ - 1 PRBS data pattern, and > 1x10⁻¹² of Bit-Error-Rate (BER).
3. Refer to OptoIC "XFP Design Reference Guide" or IEEE 802.3ae for more design details.

Class 1 Laser Product Complies with 21 CFR 1040.10 and 1040.11
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Description

OptoIC's CWDM XFP fiber optics transceivers are designed with high performance EML laser and APD receiver that cover the wavelength spectrum from 1470 nm to 1610 nm, with industry standard 20 nm spacing. It is compliant with 10G Ethernet and Fiber Channel for datacom applications and SONET/SDH for telecom applications. The product supports serial ID functionality and Digital Diagnostic Monitoring (DDM) interface through the 2-wire serial bus. It is compliant with XFP Multi-Source Agreement (MSA) INF-80771.

The transceiver uses duplex LC connector for the optical interface. It is hot pluggable in the z-axis with a 30-pin connector. The transceiver has > 15 dB power budget for 40 km, and > 23 dB for 80 km of transmission distance with standard single mode fibers. The product is RoHS compliant. Total power consumption is < 3.5W.

Key Features

- CWDM 1470 - 1610 nm, 10 Gb/s data rate
- > 15 dB power budget for 40 km
- > 23 dB power budget for 80 km
- Duplex LC connector optical interface
- 30-pin Z-axis hot pluggable connector
- AC coupling CML differential I/O logics
- Compliant with XFP MSA standard
- Compliant with IEEE 802.3ae, 10GBASE-LW/LR
- Compliant with 10G FC Fiber Channel Standard
- RoHS compliant

Applications

- ✓ 10G Fiber Channel, 10 Gigabit Ethernet
- ✓ SONET OC-192/SDH STM-64
- ✓ Data Communication for SAN and LAN
- ✓ Central offices routers and switches
- ✓ Mass storage systems interconnect
- ✓ Computer cluster cross-connect



Lead-Free

XFP-10000CEX-AT40K-XX
XFP-10000CEX-AT80K-XX



Ordering Information

Part Number: XFP-10000CEX-AT40K-XX

Description:

CWDM, 1470 - 1610 nm 10 Gb/s, single mode, XFP fiber optics transceiver, 40 km, 1XX0 nm wavelength, -5 -70°C

Part Number: XFP-10000CEX-AT80K-XX

Description:

CWDM, 1470 - 1610 nm 10 Gb/s, single mode, XFP fiber optics transceiver, 80 km, 1XX0 nm wavelength, -5 -70°C

XX specifies the wavelength described below. For example, XFP-10000CEX-AT40K-57 is the 1570 nm module.

<u>XX</u>	Wavelength	<u>XX</u>	Wavelength
47	1470 nm	55	1550 nm
49	1490 nm	57	1570 nm
51	1510 nm	59	1590 nm
53	1530 nm	61	1610 nm

Operating Conditions

Parameter	Min.	Typical	Max.	Units
Operate Temperature	-5	25	70	C
Data Rate	9.95	---	11.3	Gb/s
Supply Voltage (3.3V)	3.13	3.3	3.47	V
Supply Voltage (5V)	4.75	5.0	5.25	V
Supply Voltage (1.8V)	1.71	1.8	1.89	V

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Units
Storage Temperature	T_{st}	-40	85	C
Supply Voltage (3.3/5.0/1.8 V)	V_{CC}	-0.5	4.0/6.0/2.0	V
Input Voltage	V_{IN}	-0.5	V_{CC}	V
Operating Current (3.3/5.0/1.8 V)	I_{op}	---	400/350/750	mA
Output Current	I_o	---	50	mA

General Transmitter Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Input Voltage ¹	ΔV_i	0.2	---	0.8	V
Differential Input Impedance ²	Z	---	100	---	ohm
Spectral Width (-20 dB)	$\Delta \lambda$	---	0.1	0.3	nm
Side Mode Suppression Ratio	$SMSR$	30	---	---	dB
Relative Intensity Noise	RIN	---	---	-130	dB/Hz
Total Jitter	T_j	---	---	0.1	UI
TX Fault Output - Low	V_{FL}	0	---	0.5	V
TX Fault Output - High	V_{FH}	2.4	---	V_{CC}	V
TX Disable Voltage - Low	V_{DL}	0	---	0.5	V
TX Disable Voltage - High	V_{DH}	2.4	---	V_{CC}	V
TX Disable Deassert Time	T_{disass}	---	---	1.0	ms
TX Disable Assert Time	T_{ass}	---	---	10	μ s
TX Fault from Fault to Assertion	T_{fault}	---	---	100	μ s
TX Disable Time to Start Reset	T_{reset}	10	---	---	μ s
Time to Initialize	T_{as}	---	---	300	ms

Notes:

1. Module is designed for AC coupling. DC voltage will be filtered by internal capacitor.
2. Single ended will be 50 ohm for each signal line.
3. Refer to OptoIC "XFP Design Reference Guide" or IEEE 802.3ae for more design details.

Class 1 Laser Product Complies with 21 CFR 1040.10 and 1040.11
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General Receiver Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Output Voltage	ΔV_o	0.4	---	0.8	V
Differential Input Impedance ¹	Z	---	100	---	Ohm
Optical Return Loss	OL	27	---	---	dB
Rise/Fall Time (20% - 80%)	T_r/T_f	---	---	40	ps
Dispersion Penalty		---	---	2	dB
RX Signal Loss Output - High	V_{RL+}	2.4	---	V_{CC}	V
RX Signal Loss Output - Low	V_{RL-}	0	---	0.5	V
RX Signal Loss Assert Time	T_{RL+}	---	---	100	μ s
RX Signal Loss Deassert Time	T_{RL-}	---	---	100	μ s

Notes:

1. Single ended will be 50 ohm for each signal line.
2. Refer to OptoIC "XFP Design Reference Guide" or IEEE 802.3ae for more design details.

Transmitter Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Optical Output Power ¹ (XFP-10000CEX-AT40K-XX)	P_o	-1	---	+2	dBm
Optical Output Power ¹ (XFP-10000CEX-AT80K-XX)	P_o	0	---	+4	dBm
Spectral Width (-20 dB)	$\Delta\lambda$	---	0.1	0.3	nm
Extinction Ratio	ET	8.2	---	---	dB
TX Disable Asserted	P_{OFF}	---	---	-40	dBm
Center Wavelength – 1470 nm	λ_c	1464.5	1470	1477.5	nm
Center Wavelength – 1490 nm	λ_c	1484.5	1490	1497.5	nm
Center Wavelength – 1510 nm	λ_c	1504.5	1510	1517.5	nm
Center Wavelength – 1530 nm	λ_c	1524.5	1530	1537.5	nm
Center Wavelength – 1550 nm	λ_c	1544.5	1550	1557.5	nm
Center Wavelength – 1570 nm	λ_c	1564.5	1570	1577.5	nm
Center Wavelength – 1590 nm	λ_c	1584.5	1590	1597.5	nm
Center Wavelength – 1610 nm	λ_c	1604.5	1610	1617.5	nm

Notes:

1. Output of coupling optical power into 9/125 μ m SMF.

XFP-10000CEX-AT40K-XX

Receiver Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Operating Wavelength	λ_c	1260	---	1620	nm
Receiver Overload (XFP-10000CEX-AT40K-XX)	P_{max}	--	---	-1	dBm
Receiver Sensitivity ¹	P_i	---	---	-16	dBm
Receiver Sensitivity in OMA ¹	P_i	---	---	-14.1	dBm
RX Signal Loss – Asserted	P_{RL+}	---	---	-22	dBm
RX Signal Loss – Deasserted	P_{RL-}	-28	---	---	dBm

XFP-10000CEX-AT80K-XX

Receiver Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Operating Wavelength	λ_c	1260	---	1620	nm
Receiver Overload (XFP-10000CEX-AT40K-XX)	P_{max}	--	---	-7	dBm
Receiver Sensitivity ¹	P_i	---	---	-23	dBm
Receiver Sensitivity in OMA ¹	P_i	---	---	-22	dBm
RX Signal Loss – Asserted	P_{RL+}	---	---	-24	dBm
RX Signal Loss – Deasserted	P_{RL-}	-34	---	---	dBm

1. Test at 10 Gb/s, 2³¹ – 1 PRBS data pattern, and > 1x10⁻¹² of Bit-Error-Rate (BER).

Class 1 Laser Product
Complies with
21 CFR 1040.10 and 1040.11



Description

OptoC's DWDM XFP fiber optics transceivers are designed with high performance EML laser and APD receiver. They are used in 100 GHz channel spacing DWDM systems. It is compliant with 10G Ethernet and Fiber Channel for datacom applications and SONET/SDH for telecom applications. Our transceivers cover the ITU channels from 17 to 61. It is compliant with XFP Multi-Source Agreement (MSA) INF-8077i.

The transceiver uses duplex LC connector for the optical interface. It is hot pluggable in the z-axis with a 30-pin connector. The transceiver has > 15 dB power budget for 40 km, and > 23 dB for 80 km of transmission distance with standard single mode fibers. The product is RoHS compliant. Total power consumption is < 3.5W.



Lead-Free

XFP-10000DEX-AT40K-XX
XFP-10000DEX-AT80K-XX



Key Features

- Cover ITU channels 17-61, 10 Gb/s data rate.
- > 15 dB power budget for 40 km
- > 23 dB power budget for 80 km
- Duplex LC connector optical interface
- 30-pin Z-axis hot pluggable connector
- AC coupling CML differential I/O logics
- Compliant with XFP MSA standard
- Compliant with IEEE 802.3ae, 10GBASE-LW/LR
- Compliant with 10G FC Fiber Channel Standard
- RoHS compliant

Applications

- ✓ 10G Fiber Channel, 10 Gigabit Ethernet
- ✓ SONET OC-192/SDH STM-64
- ✓ Data Communication for SAN and LAN
- ✓ Central offices routers and switches
- ✓ Mass storage systems interconnect
- ✓ Computer cluster cross-connect

Ordering Information

Part Number: XFP-10000DEX-AT40K-XX

Description:

DWDM, 10 Gb/s, single mode, XFP fiber optics transceiver, 40 km, XX ITU channel code 17-61, -5 -70°C.

Part Number: XFP-10000DEX-AT80K-XX

Description:

DWDM, 10 Gb/s, single mode, XFP fiber optics transceiver, 80 km, XX ITU channel code 17-59, -5 -70°C

XX specifies ITU channel code associated with the wavelength. For example, XFP-10000DEX-AT40K-17 is the 1ITU-17 channel with the 1563.86 nm wavelength and 191.7 THz frequency.

Operating Conditions

Parameter	Min.	Typical	Max.	Units
Operate Temperature	-5	25	70	C
Data Rate	9.95	---	11.3	Gb/s
Supply Voltage (3.3V)	3.13	3.3	3.47	V
Supply Voltage (5V)	4.75	5.0	5.25	V
Supply Voltage (1.8V)	1.71	1.8	1.89	V

DWDM ITU Grid Wavelength Guide

ITU Code	Frequency (THz)	Wavelength (nm)	ITU Code	Frequency (THz)	Wavelength (nm)
17	191.7	1563.86	40	194.0	1545.32
18	191.8	1563.05	41	194.1	1544.53
19	191.9	1562.23	42	194.2	1543.73
20	192.0	1561.42	43	194.3	1542.94
21	192.1	1560.61	44	194.4	1542.14
22	192.2	1559.79	45	194.5	1541.35
23	192.3	1558.98	46	194.6	1540.56
24	192.4	1558.17	47	194.7	1539.77
25	192.5	1557.36	48	194.8	1538.98
26	192.6	1556.56	49	194.9	1538.19
27	192.7	1555.75	50	195.0	1537.40
28	192.8	1554.94	51	195.1	1536.61
29	192.9	1554.13	52	195.2	1535.82
30	193.0	1553.33	53	195.3	1535.04
31	193.1	1552.52	54	195.4	1534.25
32	193.2	1551.72	55	195.5	1533.47
33	193.3	1550.92	56	195.6	1532.68
34	193.4	1550.12	57	195.7	1531.90
35	193.5	1549.32	58	195.8	1531.12
36	193.6	1548.52	59	195.9	1530.33
37	193.7	1547.72	60	196.0	1529.55
38	193.8	1546.92	61	196.1	1528.77
39	193.9	1546.12			

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Units
Storage Temperature	T_{st}	-40	85	C
Supply Voltage (3.3/5.0/1.8 V)	V_{cc}	-0.5	4.0/6.0/2.0	V
Input Voltage	V_{IN}	-0.5	V_{cc}	V
Operating Current (3.3/5.0/1.8 V)	I_{op}	---	400/350/750	mA
Output Current	I_o	---	50	mA

General Transmitter Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Input Voltage ¹	ΔV_i	0.2	---	0.8	V
Differential Input Impedance ²	Z	---	100	---	ohm
Spectral Width (-20 dB)	$\Delta\lambda$	---	0.1	0.3	nm
Side Mode Suppression Ratio	$SMSR$	30	---	---	dB
Channel Spacing	Δf	---	100	---	GHz
Total Jitter	T_j	---	---	0.1	UI
Relative Intensity Noise	RIN	---	---	-130	dB/Hz
TX Fault Output – Low	V_{FL}	0	---	0.5	V
TX Fault Output – High	V_{FH}	2.4	---	V_{CC}	V
TX Disable Voltage – Low	V_{DL}	0	---	0.5	V
TX Disable Voltage – High	V_{DH}	2.4	---	V_{CC}	V
TX Disable Deassert Time	T_{disass}	---	---	1.0	ms
TX Disable Assert Time	T_{ass}	---	---	10	μ s
TX Fault from Fault to Assertion	T_{fault}	---	---	100	μ s
TX Disable Time to Start Reset	T_{reset}	10	---	---	μ s
Time to Initialize	T_{as}	---	---	300	ms

General Receiver Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Output Voltage ¹	ΔV_o	0.4	---	0.8	V
Differential Input Impedance ²	Z	---	100	---	Ohm
Optical Return Loss	OL	27	---	---	dB
Rise/Fall Time (20% - 80%)	T_r/T_f	---	---	40	ps
Dispersion Penalty		---	---	2	dB
RX Signal Loss Output - High	V_{RL+}	2.4	---	V_{CC}	V
RX Signal Loss Output - Low	V_{RL-}	0	---	0.5	V
RX Signal Loss Assert Time	T_{RL+}	---	---	100	μ s
RX Signal Loss Deassert Time	T_{RL-}	---	---	100	μ s

Notes:

1. Module is designed for AC coupling. DC voltage will be filtered by internal capacitor.
2. Single ended will be 50 ohm for each signal line.
3. Refer to OptoIC "XFP Design Reference Guide" or IEEE 802.3ae for more design details.

Transmitter Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Optical Output Power ¹	P_o	-1	---	+2	dBm
Extinction Ratio	ET	8.2	---	---	dB
TX Disable Asserted	P_{OFF}	---	---	-40	dBm
Center Wavelength (Start of Life)	λ_c	$\lambda_c - 25$	λ_c	$\lambda_c + 25$	pm
Center Wavelength (End of Life)	λ_c	$\lambda_c - 100$	λ_c	$\lambda_c + 100$	pm

Receiver Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Operating Wavelength	λ_c	1528	---	1564	nm
Receiver Overload	P_{max}	--	---	-1	dBm
Receiver Sensitivity ²	P_I	---	---	-16	dBm
Receiver Sensitivity in OMA ²	P_I	---	---	-14.1	dBm
RX Signal Loss – Asserted	P_{RL+}	---	---	-22	dBm
RX Signal Loss – Deasserted	P_{RL-}	-28	---	---	dBm

Notes:

1. Output of coupling optical power into 9/125 μ m SMF.
2. Test at 10 Gb/s, 2³¹ – 1 PRBS data pattern, and > 1x10⁻¹² of Bit-Error-Rate (BER).

Class 1 Laser Product Complies with 21 CFR 1040.10 and 1040.11
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Transmitter Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Optical Output Power ¹	P_o	-1	---	+3	dBm
Extinction Ratio	ET	8.2	---	---	dB
TX Disable Asserted	P_{OFF}	---	---	-30	dBm
Center Wavelength (Start of Life)	λ_c	$\lambda_c - 25$	λ_c	$\lambda_c + 25$	pm
Center Wavelength (End of Life)	λ_c	$\lambda_c - 100$	λ_c	$\lambda_c + 100$	pm

Receiver Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Operating Wavelength	λ_c	1528	---	1564	nm
Receiver Overload	P_{max}	--	---	-7	dBm
Receiver Sensitivity ²	P_I	---	---	-24	dBm
Receiver Sensitivity in OMA ²	P_I	---	---	-23	dBm
RX Signal Loss – Asserted	P_{RL+}	---	---	-24	dBm
RX Signal Loss – Deasserted	P_{RL-}	-34	---	---	dBm

Notes:

1. Output of coupling optical power into 9/125 μm SMF.
2. Test at 10 Gb/s, $2^{31} - 1$ PRBS data pattern, and $> 1 \times 10^{-12}$ of Bit-Error-Rate (BER).

Class 1 Laser Product Complies with 21 CFR 1040.10 and 1040.11
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