

SFP+ Small Form Pluggable Optical Transceivers



Features

- 850 nm multimode, 1310/1550 nm single mode, C/DWDM
- 6.25 Gb/s to 10 Gb/s, 150 m to 80 km
- Duplex LC connector, Z-axis hot pluggable
- AC coupling LVPECL differential I/O, TTL signal detect
- SFF-8431 MSA and RoHS Compliant

Applications

- ✓ FTTH, FTTX, ATM/SONET, SDH, Ethernet, Fiber Channel
- ✓ High speed I/O bus extension, systems interconnects
- ✓ Data Communication for SAN and LAN
- ✓ Routers and switches, computer cluster cross-connect
- ✓ Industrial control links and media converters



Products Selection Guide

Part Number *	Wavelength	Data Rate	Power Budget	Distance**	Temp. Range
6.25 Gb/s Single Mode Applications					
SFP-6250LX-AT2K	1310 nm	6.25 Gb/s	>8dB	2 km	0 – 70/-40 – 85°C
SFP-6250LX-AT10K	1310 nm	6.25 Gb/s	>8dB	10 km	0 – 70/-40 – 85°C
8.5 Gb/s Single Mode & Multimode Applications					
SFP-8500SX-AT150M	850 nm	8.5 Gb/s	>4 dB	150 m	0 – 70°C
SFP-8500LX-AT10K	1310 nm	8.5 Gb/s	>5 dB	10 km	0 – 70°C
10 Gb/s Single Mode & Multimode Applications					
SFP-10000SX-AT300M	850 nm	10 Gb/s	> 5 dB	300 m	0 – 70°C
SFP-10000LX-AT2K	1310 nm	10 Gb/s	>6 dB	2 km	0 – 70°C
SFP-10000LX-AT10K	1310 nm	10 Gb/s	>6 dB	10 km	0 – 70°C
SFP-10000LX-AT20K	1310 nm	10 Gb/s	>12 dB	20 km	0 – 70°C
SFP-10000EX-AT40K	1550 nm	10 Gb/s	>15 dB	40 km	0 – 70°C
SFP-10000EX-AT80K	1550 nm	10 Gb/s	>23 dB	80 km	0 – 70°C
10 Gb/s, Single Mode, CWDM & DWDM Applications, 40 – 80 km					
SFP-10000CX-AT40K-XX	1470 -1610 nm	10 Gb/s	>15 dB	40 km	0 – 70/-40 – 85°C
SFP-10000CX-AT80K-XX	1470 -1610 nm	10 Gb/s	>23 dB	80 km	0 – 70/-40 – 85°C
SFP-10000DX-AT40K-XX	ITU 17 – 61	10 Gb/s	>15 dB	40 km	0 – 70°C
SFP-10000DX-AT80K-XX	ITU 17 – 61	10 Gb/s	>23 dB	80 km	0 – 70°C

*: Add "-T" in the Part Number for products with extended temperature range -40-85 °C. For example, SFP-6250LX-AT10K-T. XX indicates wavelength selection for the 1270 – 1610 nm C/DWDM transceivers. See data sheet for details.

** : 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.

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Multi-Rate 1.25 – 6.25 Gb/s 1310 nm Single Mode, 2 km SFP+ Dual LC Connector



Description

OptixCom's multi-rate fiber optics transceiver is designed for data rate 1.25 to 6.25 Gb/s. This single mode module uses high performance 1310 nm FP laser and is compliant with Small Form Pluggable Plus (SFP+) specifications. The optical connector interface is dual LC.

The module is compliant with SFP+ Multi-Source Agreement (MSA). The transceiver reaches 2 km of distance with standard single mode fibers and 8 dB of power budget. The products are RoHS compliant. The total power consumption is < 1W.



Lead-Free

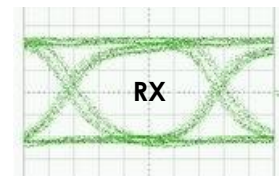
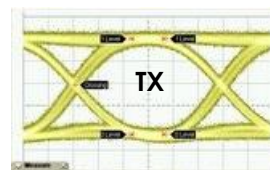
SFP-6250LX-AT2K



Key Features

- 1310 nm single mode
- Multi-rate from 1.25 to 6.25 Gb/s
- > 8 dB power budget, 2 km reach
- Duplex LC connector optical interface
- Z-axis hot pluggable
- SFF-8472 MSA Compliant
- AC coupling LVPECL differential I/O logics
- Single 3.3 V power supply
- -40–85 °C operating temperatures available
- TTL signal detect to monitor optical signals
- RoHS compliant

6.25 Gb/s, 2⁷-1 NRZ Data Eye Pattern



Applications

- ✓ Fiber Channel, Gigabit Ethernet
- ✓ High speed I/O for file server
- ✓ Video over fiber links
- ✓ Media converter
- ✓ Data Communication for SAN and LAN
- ✓ Industrial Control Link
- ✓ Central offices routers and switches
- ✓ Mass storage systems interconnect

Ordering Information

Part Number: SFP-6250LX-AT2K

Description:

1310 nm, 1 to 6.25 Gb/s, single mode, SFP+ fiber optics transceiver, 2 km reach, 0-70°C

* Add "-T" in the Part Number for extended temperature range -40–85 °C, i.e., SFP-6250LX-AT2K-T.

Operating Conditions

Parameter	Min.	Typical	Max.	Units
Operate Temperature	0	25	70	°C
- T Transceivers	-40	25	85	°C
Data Rate	1	---	6.25	Gb/s
Supply Voltage	3.15	3.3	3.45	V
Supply Current	---	220	300	mA

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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
Output Current	I_o	---	50	mA
Soldering Temperature (10 sec. on leads)	T_{sd}	---	260	°C

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	-6.0	---	-0.5	dBm
Optical Wavelength	λ_o	1284	1310	1345	nm
Relative Intensity Noise	RIN	---	---	-128	dB/Hz
Extinction Ratio	ET	4	---	---	dB
TX Disable Power	P_{TD}	---	---	-30	dBm
Spectral Width (rms)	$\Delta\lambda$	---	---	1	nm
TX Disable Voltage – High	V_{DH}	2.4	---	V_{cc}	V
TX Disable Voltage - Low	V_{DL}	0	---	0.5	V
TX Fault Output - High	V_{FH}	2.4	---	V_{cc}	V
TX Fault Output - Low	V_{FL}	0	---	0.5	V
TX Disable Assert Time	T_{ass}	---	---	10	μs
TX Disable Deassert Time	T_{disass}	---	---	1.0	ms
Time to Initialize	T_{as}	---	---	300	ms
TX Fault from Fault to Assertion	T_{fault}	---	---	100	μs
TX Disable Time to Start Reset	T_{reset}	10	---	---	μs

Notes:

1. Applied to AC LVPECL I/O coupling. See the design guide for proper termination.
2. Single ended will be 50 ohm for each signal line.
3. Output of coupling optical power into 9/125 μm SMF.

Class 1 Laser Product
Complies with
21 CFR 1040.10 and 1040.11



Receiver Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Input Impedance	Z	---	100	---	Ohm
Differential Output Voltage ¹	ΔV_o	0.4	---	0.8	V
Operating Wavelength	λ_c	1260	1310	1360	nm
Receiver Overload	P_{max}	+0.5	---	---	dBm
Receiver Sensitivity ²	P_I	---	---	-14.4	dBm
Receiver Sensitivity in OMA	P_{IOMA}	---	---	-12.6	dBm
Stressed Receiver Sensitivity ² (OMA)	P_I	---	---	-10.3	dBm
Optical Return Loss	OL	12	---	---	dB
RX Signal Loss – Deasserted	P_{RL-}	-30	---	---	dBm
RX Signal Loss – Asserted	P_{RL+}	---	---	-16	dBm
Signal Detect Hysteresis	$P_{RL+} - P_{RL-}$	0.5	---	---	dB
RX Signal Loss Assert Time	T_{RL+}	---	---	100	μ s
RX Signal Loss Deassert Time	T_{RL-}	---	---	100	μ s
RX Signal Loss Output - High	V_{RL+}	2.4	---	V_{CC}	V
RX Signal Loss Output - Low	V_{RL-}	0	---	0.5	V

Notes:

1. Applied to AC LVPECL I/O coupling. See the design guide for proper termination.
2. Test at 6.25 Gb/s, 2⁷ – 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



Multi-Rate 1.25 – 6.25 Gb/s 1310 nm Single Mode, 10 km SFP+ Dual LC Connector



Description

OptixCom's multi-rate fiber optics transceiver is designed for data rate 1.25 to 6.25 Gb/s. This single mode module uses high performance 1310 nm DFB laser and is compliant with Small Form Pluggable Plus (SFP+) specifications. The optical connector interface is dual LC.

The module is compliant with SFP+ Multi-Source Agreement (MSA). The transceiver reaches 10 km of distance with standard single mode fibers and 8 dB of power budget. The products are RoHS compliant. The total power consumption is < 1W.



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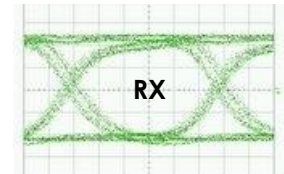
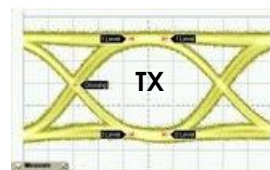
SFP-6250LX-AT10K



Key Features

- 1310 nm single mode.
- Multi-rate from 1.25 to 6.25 Gb/s
- > 8 dB power budget, 10 km reach
- Duplex LC connector optical interface
- Z-axis hot pluggable
- SFF-8472 MSA Compliant
- AC coupling LVPECL differential I/O logics
- Single 3.3 V power supply
- -40–85 °C operating temperatures available
- TTL signal detect to monitor optical signals
- RoHS compliant

6.25 Gb/s, 2⁷-1 NRZ Data Eye Pattern



Applications

- ✓ Fiber Channel, Gigabit Ethernet
- ✓ High speed I/O for file server
- ✓ Video over fiber links
- ✓ Media converter
- ✓ Data Communication for SAN and LAN
- ✓ Industrial Control Link
- ✓ Central offices routers and switches
- ✓ Mass storage systems interconnect

Ordering Information

Part Number: SFP-6250LX-AT10K

Description:

1310 nm ,1 to 6.25 Gb/s, single mode, SFP+ fiber optics transceiver, 10 km reach, 0-70°C

* Add "-T" in the Part Number for extended temperature range -40–85 °C, i.e., SFP-6250LX-AT10K-T.

Operating Conditions

Parameter	Min.	Typical	Max.	Units
Operate Temperature	0	25	70	°C
- T Transceivers	-40	25	85	°C
Data Rate	1	---	6.25	Gb/s
Supply Voltage	3.1	3.3	3.5	V
Supply Current	---	220	300	mA

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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
Output Current	I_o	---	50	mA
Soldering Temperature (10 sec. on leads)	T_{sd}	---	260	°C

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	-6.0	---	-0.5	dBm
Optical Wavelength	λ_o	1284	1310	1345	nm
Relative Intensity Noise	RIN	---	---	-128	dB/Hz
Extinction Ratio	ET	4	---	---	dB
TX Disable Power	P_{TD}	---	---	-30	dBm
Spectral Width (-20dB)	$\Delta\lambda$	---	---	0.45	nm
TX Disable Voltage – High	V_{DH}	2.4	---	V_{cc}	V
TX Disable Voltage - Low	V_{DL}	0	---	0.5	V
TX Fault Output - High	V_{FH}	2.4	---	V_{cc}	V
TX Fault Output - Low	V_{FL}	0	---	0.5	V
TX Disable Assert Time	T_{ass}	---	---	10	μs
TX Disable Deassert Time	T_{disass}	---	---	1.0	ms
Time to Initialize	T_{as}	---	---	300	ms
TX Fault from Fault to Assertion	T_{fault}	---	---	100	μs
TX Disable Time to Start Reset	T_{reset}	10	---	---	μs

Notes:

1. Applied to AC LVPECL I/O coupling. See the design guide for proper termination.
2. Single ended will be 50 ohm for each signal line.
3. Output of coupling optical power into 9/125 μm SMF.

Class 1 Laser Product
Complies with
21 CFR 1040.10 and 1040.11



Receiver Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Input Impedance	Z	---	100	---	Ohm
Differential Output Voltage ¹	ΔV_o	0.4	---	0.8	V
Operating Wavelength	λ_c	1260	1310	1360	nm
Receiver Overload	P_{max}	+0.5	---	---	dBm
Receiver Sensitivity ²	P_I	---	---	-14.4	dBm
Receiver Sensitivity in OMA	P_{IOMA}	---	---	-12.6	dBm
Stressed Receiver Sensitivity ² (OMA)	P_I	---	---	-10.3	dBm
Optical Return Loss	OL	12	---	---	dB
RX Signal Loss – Deasserted	P_{RL-}	-30	---	---	dBm
RX Signal Loss – Asserted	P_{RL+}	---	---	-16	dBm
Signal Detect Hysteresis	$P_{RL+} - P_{RL-}$	0.5	---	---	dB
RX Signal Loss Assert Time	T_{RL+}	---	---	100	μ s
RX Signal Loss Deassert Time	T_{RL-}	---	---	100	μ s
RX Signal Loss Output - High	V_{RL+}	2.4	---	V_{cc}	V
RX Signal Loss Output - Low	V_{RL-}	0	---	0.5	V

Notes:

1. Applied to AC LVPECL I/O coupling. See the design guide for proper termination.
2. Test at 6.25 Gb/s, 2⁷ – 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**



Multi-Rate 1 – 8.5 Gb/s 850 nm Multimode, 150 m SFP+ Dual LC Connector

Description

OptixCom's multi-rate fiber optics transceiver is designed for 1X, 2X, 4X, 8X FC, GbE, and OC48 applications with data rate up to 8.5 Gb/s. This multimode fiber optics transceiver is designed with high performance 850 nm VCSEL light source. Dual LC connectors are used as standard interface and the package is compliant with Small Form Pluggable Plus (SFP+) specifications. The optical connector interface is dual LC.

The module is compliant with SFP+ Multi-Source Agreement (MSA). The transceiver reaches more than 50 meters of transmission distance with high-grade multimode fibers and >4 dB of power budget. The products are RoHS compliant.



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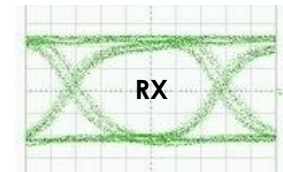
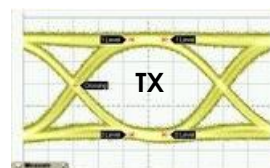
SFP-8500SX-AT150M



Key Features

- 850 nm multimode,
- Multi-rate from 1 to 8.5 Gb/s
- > 4 dB power budget, 150 m reach
- Duplex LC connector optical interface
- Z-axis hot pluggable
- SFF-8472 MSA Compliant
- AC coupling LVPECL differential I/O logics
- Single 3.3 V power supply
- TTL or PECL signal detect to monitor optical signals
- RoHS compliant

8.5 Gb/s, 2⁷-1 NRZ Data Eye Pattern



Ordering Information

Part Number: SFP-8500SX-AT150M

Description:

850 nm, 1 to 8.5 Gb/s, multimode, SFP+ fiber optics transceiver, 150 m reach, 0-70°C

Applications

- ✓ Fiber Channel, Gigabit Ethernet
- ✓ High speed I/O for file server
- ✓ Video over fiber links
- ✓ Media converter
- ✓ Data Communication for SAN and LAN
- ✓ Industrial Control Link
- ✓ Central offices routers and switches
- ✓ Mass storage systems interconnect

Operating Conditions

Parameter	Min.	Typical	Max.	Units
Operate Temperature	0	25	70	°C
Data Rate	1	---	8.5	Gb/s
Supply Voltage	3.1	3.3	3.5	V
Supply Current	---	200	250	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}	---	300	mA
Output Current	I_o	---	50	mA
Soldering Temperature (10 sec. on leads)	T_{sd}	---	260	°C

Transmitter Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Input Voltage ¹	ΔV_i	0.2	---	0.9	V
Differential Input Impedance ²	Z	---	100	---	ohm
Optical Output Power ³	P_o	-7	---	-1	dBm
Optical Wavelength	λ_o	840	850	860	nm
Relative Intensity Noise	RIN	---	---	-128	dB/Hz
Optical Modulation Amplitude	OMA	300	---	---	μW
TX Disable Power	P_{TD}	---	---	-30	dBm
Spectral Width (rms)	$\Delta\lambda$	---	---	0.65	nm
TX Disable Voltage – High	V_{DH}	2.4	---	V_{CC}	V
TX Disable Voltage - Low	V_{DL}	0	---	0.5	V
TX Fault Output - High	V_{FH}	2.4	---	V_{CC}	V
TX Fault Output - Low	V_{FL}	0	---	0.5	V
TX Disable Assert Time	T_{ass}	---	---	10	μs
TX Disable Deassert Time	T_{disass}	---	---	1.0	ms
Time to Initialize	T_{as}	---	---	300	ms
TX Fault from Fault to Assertion	T_{fault}	---	---	100	μs
TX Disable Time to Start Reset	T_{reset}	10	---	---	μs

Notes:

1. Applied to AC LVPECL I/O coupling. See the design guide for proper termination.
2. Single ended will be 50 ohm for each signal line.
3. Output of coupling optical power into OM2 50/125 μm MMF.
4. Optical eye diagram is compliant with IEEE 802.3z and 1x/2x/4X/8X FC standards.

Class 1 Laser Product
Complies with
21 CFR 1040.10 and 1040.11



Receiver Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Input Impedance	Z	---	100	---	Ohm
Differential Output Voltage ¹	ΔV_o	0.4	---	0.8	V
Operating Wavelength	λ_c	840	---	860	nm
Receiver Overload	P_{max}	-1	---	---	dBm
Receiver Sensitivity ² (@8.5 Gb/s)	P_I	---	---	-11.1	dBm
Receiver Sensitivity (@4.25 Gb/s)	P_I	---	---	-13.1	dBm
Receiver Sensitivity (@2.125 Gb/s)	P_I	---	---	-15.1	dBm
Receiver Sensitivity (@1.0 Gb/s)	P_I	---	---	-17.1	dBm
Optical Return Loss	OL	12	---	---	dB
RX Signal Loss – Deasserted	P_{RL-}	-30	---	---	dBm
RX Signal Loss – Asserted	P_{RL+}	---	---	-14	dBm
Signal Detect Hysteresis	$P_{RL+} - P_{RL-}$	1.0	---	---	dB
RX Signal Loss Assert Time	T_{RL+}	---	---	100	μ s
RX Signal Loss Deassert Time	T_{RL-}	---	---	100	μ s
RX Signal Loss Output - High	V_{RL+}	2.4	---	V_{CC}	V
RX Signal Loss Output - Low	V_{RL-}	0	---	0.5	V

Notes:

1. Applied to AC LVPECL I/O coupling. See the design guide for proper termination.
2. Test at 8.5 Gb/s, 2⁷ – 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**



Multi-Rate 1 – 8.5 Gb/s 1310 nm Single Mode, 10 km SFP+ Dual LC Connector



Description

OptixCom's multi-rate fiber optics transceiver is designed for 1X, 2X, 4X, 8X FC, GbE, and OC48 applications with data rate up to 8.5 Gb/s. This single mode fiber optics transceiver is designed with high performance 1310 nm light source. Dual LC connectors are used as standard interface and the package is compliant with Small Form Pluggable Plus (SFP+) specifications. The optical connector interface is dual LC.

The module is compliant with SFP+ Multi-Source Agreement (MSA). The transceiver reaches more than 50 meters of transmission distance with high-grade multimode fibers and >5 dB of power budget. The products are RoHS compliant.



Lead-Free

SFP-8500LX-AT10K



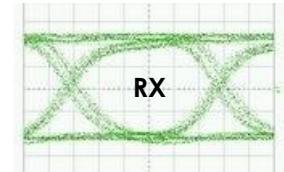
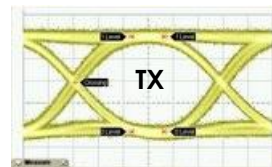
Key Features

- 1310 nm single mode,
- Multi-rate from 1 to 8.5 Gb/s
- > 5 dB power budget, 10 km reach
- Duplex LC connector optical interface
- Z-axis hot pluggable
- SFF-8472 MSA Compliant
- AC coupling LVPECL differential I/O logics
- Single 3.3 V power supply
- TTL or PECL signal detect to monitor optical signals
- RoHS compliant

Applications

- ✓ Fiber Channel, Gigabit Ethernet
- ✓ High speed I/O for file server
- ✓ Video over fiber links
- ✓ Media converter
- ✓ Data Communication for SAN and LAN
- ✓ Industrial Control Link
- ✓ Central offices routers and switches
- ✓ Mass storage systems interconnect

8.5 Gb/s, 2⁷-1 NRZ Data Eye Pattern



Ordering Information

Part Number: SFP-8500LX-AT10K

Description:

1310 nm, 1 to 8.5 Gb/s, single mode, SFP+ fiber optics transceiver, 10 km reach, 0-70°C

Operating Conditions

Parameter	Min.	Typical	Max.	Units
Operate Temperature	0	25	70	°C
Data Rate	1	---	8.5	Gb/s
Supply Voltage	3.1	3.3	3.5	V
Supply Current	---	350	400	mA

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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}	---	450	mA
Output Current	I_o	---	50	mA
Soldering Temperature (10 sec. on leads)	T_{sd}	---	260	°C

Transmitter Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Input Voltage ¹	ΔV_i	0.2	---	0.9	V
Differential Input Impedance ²	Z	---	100	---	ohm
Optical Output Power ³	P_o	-9	---	-1	dBm
Optical Wavelength	λ_o	1284	1310	1345	nm
Relative Intensity Noise	RIN	---	---	-128	dB/Hz
Extinction Ratio	ET	4	---	---	dB
TX Disable Power	P_{TD}	---	---	-30	dBm
Spectral Width (rms)	$\Delta\lambda$	---	---	1	nm
TX Disable Voltage – High	V_{DH}	2.4	---	V_{CC}	V
TX Disable Voltage - Low	V_{DL}	0	---	0.5	V
TX Fault Output - High	V_{FH}	2.4	---	V_{CC}	V
TX Fault Output - Low	V_{FL}	0	---	0.5	V
TX Disable Assert Time	T_{ass}	---	---	10	μs
TX Disable Deassert Time	T_{disass}	---	---	1.0	ms
Time to Initialize	T_{as}	---	---	300	ms
TX Fault from Fault to Assertion	T_{fault}	---	---	100	μs
TX Disable Time to Start Reset	T_{reset}	10	---	---	μs

Notes:

1. Applied to AC LVPECL I/O coupling. See the design guide for proper termination.
2. Single ended will be 50 ohm for each signal line.
3. Output of coupling optical power into OM2 9/125 μm SMF.
4. Optical eye diagram is compliant with IEEE 802.3z and 1x/2x/4X/8X FC standards.

Class 1 Laser Product
Complies with
21 CFR 1040.10 and 1040.11



Receiver Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Input Impedance	Z	---	100	---	Ohm
Differential Output Voltage ¹	ΔV_o	0.4	---	0.8	V
Operating Wavelength	λ_c	1260	1310	1360	nm
Receiver Overload	P_{max}	-1	---	---	dBm
Receiver Sensitivity ² (@8.5 Gb/s)	P_I	---	---	-14.1	dBm
Receiver Sensitivity (@4.25 Gb/s)	P_I	---	---	-18.1	dBm
Receiver Sensitivity (@2.125 Gb/s)	P_I	---	---	-23	dBm
Receiver Sensitivity (@1.0 Gb/s)	P_I	---	---	-25	dBm
Optical Return Loss	OL	12	---	---	dB
RX Signal Loss – Deasserted	P_{RL-}	-30	---	---	dBm
RX Signal Loss – Asserted	P_{RL+}	---	---	-19	dBm
Signal Detect Hysteresis	$P_{RL+} - P_{RL-}$	1.0	---	---	dB
RX Signal Loss Assert Time	T_{RL+}	---	---	100	μ s
RX Signal Loss Deassert Time	T_{RL-}	---	---	100	μ s
RX Signal Loss Output - High	V_{RL+}	2.4	---	V_{CC}	V
RX Signal Loss Output - Low	V_{RL-}	0	---	0.5	V

Notes:

1. Applied to AC LVPECL I/O coupling. See the design guide for proper termination.
2. Test at 8.5 Gb/s, 2⁷ – 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**



Multi-Rate 1.0625 – 10 Gb/s 850 nm Multimode, 300 m SFP+ Dual LC Connector



Description

OptixCom's multi-rate fiber optics transceiver is designed for 1X, 2X, 4X, 8X, 10X FC, 10 GbE, and OC48 applications with data rate up to 10 Gb/s. This multimode fiber optics transceiver is designed with high performance 850 nm VCSEL light source. Dual LC connectors are used as standard interface and the package is compliant with Small Form Pluggable Plus (SFP+) specifications. The optical connector interface is dual LC.

The module is compliant with SFP+ Multi-Source Agreement (MSA). The transceiver reaches more than 300 meters of transmission distance with high-grade multimode fibers and >5 dB of power budget. The products are RoHS compliant.



SFP-10000SX-AT300M



Key Features

- 850 nm multimode,
- Multi-rate from 1.0625 to 10 Gb/s
- > 5 dB power budget, 300 m reach
- Duplex LC connector optical interface
- Z-axis hot pluggable
- SFF-8431 MSA Compliant
- AC coupling LVPECL differential I/O logics
- Single 3.3 V power supply
- TTL or PECL signal detect to monitor optical signals
- RoHS compliant

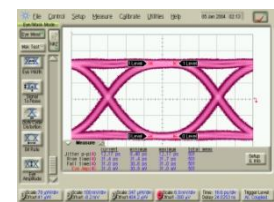
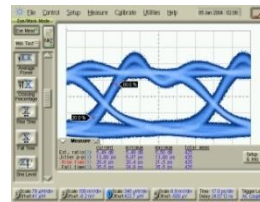
Applications

- ✓ 10G Fiber Channel, 10 Gigabit Ethernet
- ✓ High speed I/O for file server
- ✓ Video over fiber links
- ✓ Media converter
- ✓ Data Communication for SAN and LAN
- ✓ Industrial Control Link
- ✓ Central offices routers and switches
- ✓ Mass storage systems interconnect

10 Gb/s, 2²³-1 NRZ data eye pattern

TX

RX



Ordering Information

Part Number: SFP-10000SX-AT300M

Description:

850 nm, 1 to 10 Gb/s, multimode, SFP+ fiber optics transceiver, 300 m reach, 0-70°C

Operating Conditions

Parameter	Min.	Typical	Max.	Units
Operate Temperature	0	25	70	°C
Data Rate	1	---	10	Gb/s
Supply Voltage	3.1	3.3	3.5	V
Supply Current	---	200	250	mA

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Irvine, CA 92614

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Magdeburger Strasse 18, 66121
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Tel: +49 (0)681 4013-5172

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}	---	300	mA
Output Current	I_o	---	50	mA
Soldering Temperature (10 sec. on leads)	T_{sd}	---	260	°C

Transmitter Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Input Voltage ¹	ΔV_i	0.4	---	1.2	V
Differential Input Impedance ²	Z	---	100	---	ohm
Optical Output Power ³	P_o	-6.5	---	-1	dBm
Optical Wavelength	λ_o	840	850	860	nm
Relative Intensity Noise	RIN	---	---	-128	dB/Hz
Extinction Ratio	ET	4	---	---	dB
TX Disable Power	P_{TD}	---	---	-30	dBm
Spectral Width (-20dB)	$\Delta\lambda$	---	---	0.45	nm
TX Disable Voltage – High	V_{DH}	2.4	---	V_{CC}	V
TX Disable Voltage - Low	V_{DL}	0	---	0.5	V
TX Fault Output - High	V_{FH}	2.4	---	V_{CC}	V
TX Fault Output - Low	V_{FL}	0	---	0.5	V
TX Disable Assert Time	T_{ass}	---	---	10	μs
TX Disable Deassert Time	T_{disass}	---	---	1.0	ms
Time to Initialize	T_{as}	---	---	300	ms
TX Fault from Fault to Assertion	T_{fault}	---	---	100	μs
TX Disable Time to Start Reset	T_{reset}	10	---	---	μs

Notes:

1. Applied to AC LVPECL I/O coupling. See the design guide for proper termination.
2. Single ended will be 50 ohm for each signal line.
3. Output of coupling optical power into OM2 50/125 μm MMF.
4. Optical eye diagram is compliant with IEEE 802.3z and 1x/2x/4X/10X FC standards.

Class 1 Laser Product
Complies with
21 CFR 1040.10 and 1040.11



Receiver Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Input Impedance	Z	---	100	---	Ohm
Differential Output Voltage ¹	ΔV_o	0.3	---	0.9	V
Operating Wavelength	λ_c	840	---	860	nm
Receiver Overload	P_{max}	-1	---	---	dBm
Receiver Sensitivity ²	P_I	---	---	-11.1	dBm
Receiver Sensitivity (OMA) ²	P_I	---	---	-7.5	dBm
Optical Return Loss	OL	12	---	---	dB
RX Signal Loss – Deasserted	P_{RL-}	-30	---	---	dBm
RX Signal Loss – Asserted	P_{RL+}	---	---	-12	dBm
Signal Detect Hysteresis	$P_{RL+} - P_{RL-}$	1.0	---	---	dB
RX Signal Loss Assert Time	T_{RL+}	---	---	100	μ s
RX Signal Loss Deassert Time	T_{RL-}	---	---	100	μ s
RX Signal Loss Output - High	V_{RL+}	2.4	---	V_{cc}	V
RX Signal Loss Output - Low	V_{RL-}	0	---	0.5	V

Notes:

1. Applied to AC LVPECL I/O coupling. See the design guide for proper termination.
2. Test at 10 Gb/s, 2²³ – 1 PRBS data pattern, and > 1x10⁻¹² of Bit-Error-Rate (BER)

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



**10 Gb/s, 1310 nm
Single mode, 2-20 km
SFP+ Dual LC Connector**



Description

OptixCom's 10 Gb/s SFP+ fiber optics transceiver is designed with advanced 1310 nm FP laser and high speed electronics to achieve the optimum performance for optical interconnect applications. It is compliant with 10G Ethernet and Fiber Channel for the datacom and SONET/SDH for telecom applications. The optical connector interface is dual LC.

The module is compliant with SFP+ Multi-Source Agreement (MSA). The transceiver has > 6 dB power budget for 2-10 km of transmission distance with standard single mode fibers. The product is RoHS compliant. Total power consumption is < 2W.



Lead-Free

SFP-10000LX-ATXXK
(XX = 2, 10, 20)



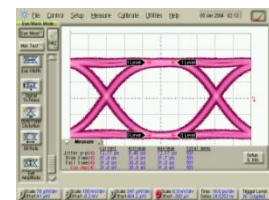
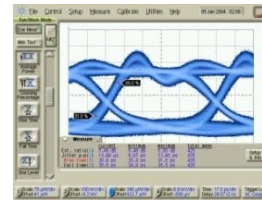
Key Features

- 1310 nm single mode, 2-10 km, 10 Gb/s
- > 6 dB power budget for 2-10 km
- > 12 dB power budget for 20 km
- Duplex LC connector optical interface
- Z-axis hot pluggable
- AC coupling LVPECL differential I/O logics
- SFF-8431 MSA Compliant
- TTL Signal detect to monitor optical signals
- Single 3.3 V power supply
- RoHS compliant

Applications

- ✓ Fiber Channel 1X, 2X, 4X, 8X, and 10X
- ✓ IEEE 802.3z 10 Gigabit Ethernet
- ✓ High speed I/O for file server
- ✓ Video over fiber links
- ✓ Data Communication for SAN and LAN
- ✓ Central offices routers and switches
- ✓ Mass storage systems interconnect

10 Gb/s, 2²³-1 NRZ data eye pattern
TX RX



Ordering Information

Part Number: SFP-10000LX-ATXXK

Description:

1310 nm ,10 Gb/s, single mode, SFP+ fiber optics transceiver, XX km reach, 0 - 70°C.

XX = 2, 10, 20

Operating Conditions

Parameter	Min.	Typical	Max.	Units
Operate Temperature	0	25	70	°C
Data Rate	1	---	10	Gb/s
Supply Voltage	3.1	3.3	3.5	V
Supply Current	---	350	450	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
Soldering Temperature (10 sec. on leads)	T_{sd}	---	260	°C

Transmitter Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Input Voltage ¹	ΔV_i	0.4	---	1.2	V
Differential Input Impedance ²	Z	---	100	---	ohm
Optical Output Power ³	P_o	-8.2	---	0.5	dBm
Optical Wavelength	λ_o	1285	1310	1345	Nm
Relative Intensity Noise	RIN	---	---	-128	dB/Hz
OMA	OMA	-5.2	---	---	dBm
TX Disable Power	P_{TD}	---	---	-30	dBm
Side Mode Suppression Ratio	SMSR	30	---	---	dB
TX Disable Voltage – High	V_{DH}	2.4	---	V_{CC}	V
TX Disable Voltage - Low	V_{DL}	0	---	0.5	V
TX Fault Output - High	V_{FH}	2.4	---	V_{CC}	V
TX Fault Output - Low	V_{FL}	0	---	0.5	V
TX Disable Assert Time	T_{ass}	---	---	10	μs
TX Disable Deassert Time	T_{disass}	---	---	1.0	ms
Time to Initialize	T_{as}	---	---	300	ms
TX Fault from Fault to Assertion	T_{fault}	---	---	100	μs
TX Disable Time to Start Reset	T_{reset}	10	---	---	μs

Notes:

1. Applied to AC LVPECL I/O coupling. See the design guide for proper termination.
2. Single ended will be 50 ohm for each signal line.
3. Output of coupling optical power into 9/125 μm SMF.
4. Optical eye diagram is compliant with IEEE 802.3z and 1x/2x/4X/8X/10X FC standards.

Class 1 Laser Product
Complies with
21 CFR 1040.10 and 1040.11



Receiver Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Input Impedance	Z	---	100	---	Ohm
Differential Output Voltage ¹	ΔV_o	0.3	---	0.9	V
Operating Wavelength	λ_c	1260	---	1600	nm
Receiver Overload	P_{max}	0.5	---	---	dBm
Receiver Sensitivity ² (@10 Gb/s)	P_I	---	---	-14.4	dBm
Receiver Sensitivity ² (OMA)	P_I	---	---	-12.6	dBm
Stressed Receiver Sensitivity ² (OMA)	P_I	---	---	-10.3	dBm
Optical Return Loss	OL	12	---	---	dB
RX Signal Loss – Deasserted	P_{RL-}	-30	---	---	dBm
RX Signal Loss – Asserted	P_{RL+}	---	---	-15	dBm
Signal Detect Hysteresis	$P_{RL+} - P_{RL-}$	1.0	---	---	dB
RX Signal Loss Assert Time	T_{RL+}	---	---	100	μ s
RX Signal Loss Deassert Time	T_{RL-}	---	---	100	μ s
RX Signal Loss Output - High	V_{RL+}	2.4	---	V_{cc}	V
RX Signal Loss Output - Low	V_{RL-}	0	---	0.5	V

Notes:

1. Applied to AC LVPECL I/O coupling. See the design guide for proper termination.
2. Test at 10 Gb/s, 2²³ – 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**



Transmitter Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Optical Output Power ¹	P_o	-8.2	---	+0.5	dBm
Optical Modulation Amplitude (OMA)	P_o	-5.2	---	---	dBm
Optical Wavelength	λ_o	1285	1310	1345	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}	0.5	---	---	dBm
Receiver Sensitivity ²	P_I	---	---	-14.4	dBm
Receiver Sensitivity in OMA	P_{IOMA}	---	---	-12.6	dBm
Stressed Receiver Sensitivity in OMA	P_{IS}	---	---	-10.3	dBm
Dispersion Penalty		---	---	2	dB
Signal Detect– Deasserted	P_{SD-}	-25	---	---	dBm
Signal Detect– Asserted	P_{SD+}	---	---	-15	dBm

Notes:

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



Transmitter Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Optical Output Power ¹	P_o	-8.2	---	+0.5	dBm
Optical Modulation Amplitude (OMA)	P_o	-5.2	---	---	dBm
Optical Wavelength	λ_o	1285	1310	1345	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}	0.5	---	---	dBm
Receiver Sensitivity ²	P_i	---	---	-14.4	dBm
Receiver Sensitivity in OMA	P_{iOMA}	---	---	-12.6	dBm
Stressed Receiver Sensitivity in OMA	P_{iS}	---	---	-10.3	dBm
Dispersion Penalty		---	---	2	dB
Signal Detect– Deasserted	P_{SD-}	-25	---	---	dBm
Signal Detect– Asserted	P_{SD+}	---	---	-15	dBm

Notes:

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



Transmitter Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Optical Output Power ¹	P_o	-3	---	+3	dBm
Optical Modulation Amplitude (OMA)	P_o	-2.1	---	---	dBm
Optical Wavelength	λ_o	1285	1310	1345	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	---	---	-15	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-}	-25	---	---	dBm
Signal Detect– Asserted	P_{SD+}	---	---	-18	dBm

Notes:

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



**10 Gb/s, 1550 nm
Single mode, 40 - 80 km
SFP+ Dual LC Connector**



Description

OptixCom's 10 Gb/s SFP+ 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 optical connector interface is dual LC.

The module is compliant with SFP+ Multi-Source Agreement (MSA). 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 < 2W.



SFP-10000EX-ATXXK
(XX = 40, 80)



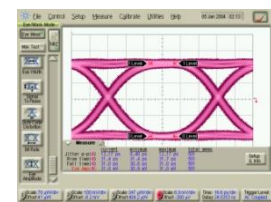
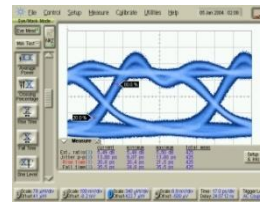
Key Features

- 1550 nm single mode, 40 - 80 km, 10 Gb/s
- > 15 dB power budget for 40 km
- > 23 dB power budget for 80 km
- Duplex LC connector optical interface
- Z-axis hot pluggable
- AC coupling LVPECL differential I/O logics
- SFF-8431 MSA Compliant
- TTL Signal detect to monitor optical signals
- Single 3.3 V power supply
- RoHS compliant

10 Gb/s, 2²³-1 NRZ data eye pattern

TX

RX



Ordering Information

Part Number: SFP-10000EX-ATXXK

Description:

1550 nm, 10 Gb/s, single mode, SFP+ fiber optics transceiver, XX km reach, -5 - 70°C.
XX = 40, 80.

Applications

- ✓ Fiber Channel 1X, 2X, 4X, 8X, and 10X
- ✓ IEEE 802.3z 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

Operating Conditions

Parameter	Min.	Typical	Max.	Units
Operate Temperature	-5	25	70	°C
Data Rate	1	---	10	Gb/s
Supply Voltage	3.1	3.3	3.5	V
Supply Current (40km)	---	360	450	mA
Supply Current (80km)	---	420	620	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
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.

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



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	---	0.8	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.

Class 1 Laser Product
Complies with
21 CFR 1040.10 and 1040.11



Transmitter Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Optical Output Power ¹	P_o	0	---	+3	dBm
Optical Modulation Amplitude (OMA)	P_{oMA}	-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	---	---	-15	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-}	-25	---	---	dBm
Signal Detect– Asserted	P_{SD+}	---	---	-18	dBm

Notes:

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



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}	-8	---	---	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).

Class 1 Laser Product
Complies with
21 CFR 1040.10 and 1040.11



**10 Gb/s, 40 - 80 km
CWDM 1470 - 1610 nm
SFP+ Dual LC Package**



Description

OptixCom's CWDM SFP+ fiber optics transceiver s 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. It is compliant with SFP+ Multi-Source Agreement (MSA).

The transceiver uses duplex LC connector for the optical interface. 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

SFP-10000CX-AT40K-XX
SFP-10000CX-AT80K-XX



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
- Z-axis hot pluggable
- AC coupling LVPECL differential I/O logics
- SFF-8431MSA Compliant
- TTL Signal detect to monitor optical signals
- Single 3.3 V 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: SFP-10000CX-AT40K-XX
Description:

CWDM, 1470 - 1610 nm, 10 Gb/s, single mode, SFP+ fiber optics transceiver, 40 km, 1XX0 nm wavelength, 0-70°C

Part Number: SFP-10000CX-AT80K-XX
Description:

CWDM, 1470 - 1610 nm, 10 Gb/s, single mode, SFP+ fiber optics transceiver, 80 km, 1XX0 nm wavelength, 0-70°C

XX specifies the wavelength described below. For example, SFP-10000CX-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	0	25	70	°C
Data Rate	9.95	---	11.3	Gb/s
Supply Voltage	3.13	3.3	3.47	V

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Units
Storage Temperature	T_{st}	-40	85	°C
Supply Voltage	V_{cc}	-0.5	4.0/6.0/2.0	V
Input Voltage	V_{IN}	-0.5	V_{cc}	V
Operating Current	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	μs
TX Fault from Fault to Assertion	T_{fault}	---	---	100	μs
TX Disable Time to Start Reset	T_{reset}	10	---	---	μs
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.

Class 1 Laser Product
Complies with
21 CFR 1040.10 and 1040.11



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	---	0.8	V
RX Signal Loss Assert Time	T_{RL+}	---	---	100	μ s
RX Signal Loss Deassert Time	T_{RL-}	---	---	100	μ s

Notes:

- Single ended will be 50 ohm for each signal line.

Transmitter Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Optical Output Power ¹ (SFP-10000CX-AT40K-XX)	P_o	-1	---	+3	dBm
Optical Output Power ¹ (SFP-10000CX-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}	---	---	-30	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:

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

SFP-10000CX-AT40K-XX

Receiver Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Operating Wavelength	λ_c	1260	---	1620	nm
Receiver Overload	P_{max}	--	---	-1	dBm
Receiver Sensitivity ¹	P_I	---	---	-16	dBm
Receiver Sensitivity in OMA ¹	P_I	---	---	-14	dBm
RX Signal Loss – Asserted	P_{RL+}	---	---	-18	dBm
RX Signal Loss – Deasserted	P_{RL-}	-28	---	---	dBm

SFP-10000CX-AT80K-XX

Receiver Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Operating Wavelength	λ_c	1260	---	1620	nm
Receiver Overload	P_{max}	--	---	-3	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



10 Gb/s, 40 - 80 km DWDM ITU Channels 17 - 61 SFP+ Dual LC Package



Description

OptixCom's DWDM SFP+ fiber optics transceivers are designed with high performance EML laser and PIN/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 SFP Multi-Source Agreement (MSA).

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 < 2W.



Lead-Free

SFP-10000DX-AT40K-XX
SFP-10000DX-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
- Compliant with IEEE 802.3ae, 10GBASE-LW/LR
- Compliant with 10G FC Fiber Channel Standard
- Z-axis hot pluggable
- AC coupling LVPECL differential I/O logics
- SFF-8431MSA Compliant
- Single 3.3 V 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: SFP-10000DX-AT40K-XX
Description:

DWDM, 10 Gb/s, single mode, SFP+ fiber optics transceiver, 40 km, XX ITU channel code 17-61, 0-70°C.

Part Number: SFP-10000DX-AT80K-XX
Description:

DWDM, 10 Gb/s, single mode, SFP+ fiber optics transceiver, 80 km, XX ITU channel code 17-61, 0-70°C

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

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	---	350	400	mA

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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	V_{cc}	-0.5	3.8	V
Input Voltage	V_{in}	-0.5	V_{cc}	V
Relative Humidity	$R.H.$	0	85	%
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 OptixCom "SFP Design Reference Guide" for more design details.

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	$\lambda_c + 25$	nm
Center Wavelength (End of Life)	λ_c	$\lambda_c - 100$	λ_c	$\lambda_c + 100$	nm

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+}	---	---	-18	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, $2^{31} - 1$ 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



Transmitter Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Optical Output Power ¹	P_o	0	---	+5	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}	--	---	-6	dBm
Receiver Sensitivity ²	P_I	---	---	-23	dBm
Receiver Sensitivity in OMA ²	P_I	---	---	-20	dBm
RX Signal Loss – Asserted	P_{RL+}	---	---	-26	dBm
RX Signal Loss – Deasserted	P_{RL-}	-32	---	---	dBm

Notes:

1. Output of coupling optical power into 9/125 μm 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

