

2x5 Small Form Factor (SFF) Optical Transceivers

Features

- 850/1310 nm multimode, 1310/1550 nm single mode, CWDM
- 155Mb/s to 1.25 Gb/s, 500 m - 120 km
- Duplex LC connector, standard 2x5 pluggable package
- AC/DC coupling LVPECL differential I/Os
- Single 3.3 V power supply, TTL/LVPECL signal detect (SD)
- RoHS, TUV, UL, Class 1 Laser 21 CFR 1040.10 and 1040.11

Applications

- ✓ FTTH, FTTX, ATM/SONET OC-3, SDH STM-1, Ethernet
- ✓ High speed I/O bus extension, systems interconnects
- ✓ Video over fiber links, media converters
- ✓ Industrial Control Link
- ✓ Data Communication for SAN and LAN
- ✓ Routers and switches, computer cluster cross-connect



2x5 Small Form Factor (SFF) Transceiver

Products Selection Guide					
Part Number *	Wavelength	Data Rate	Power Budget	Distance **	Temp. Range
155 Mb/s & 1.25 Gb/s, Multimode Applications					
SFF-155LX-DP2K	1310 nm	155 Mb/s	>11 dB	2 km	0 – 70/-40 – 85 C
SFF-1250LX-AT2K	1310 nm	1.25 Gb/s	>11 dB	2 km	0 – 70/-40 – 85 C
SFF-1250SX-AT500M	850 nm	1.25 Gb/s	>8.5 dB	500 m	0 – 70 C/-20 – 85 C
155 Mb/s, 1310 nm, Single Mode Applications, 15 – 60 km					
SFF-155LX-DP15K	1310 nm	155 Mb/s	>12 dB	15 km	0 – 70/-40 – 85 C
SFF-155LX-DP30K	1310 nm	155 Mb/s	>19 dB	30 km	0 – 70/-40 – 85 C
SFF-155LX-DP60K	1310 nm	155 Mb/s	>30 dB	60 km	0 – 70/-40 – 85 C
155 Mb/s, 1550 nm, Single Mode Applications, 20 – 120 km					
SFF-155EX-DP20K	1550 nm	155 Mb/s	>19 dB	20 km	0 – 70/-40 – 85 C
SFF-155EX-DP100K	1550 nm	155 Mb/s	>30 dB	100 km	0 – 70/-40 – 85 C
SFF-155EX-DP120K	1550 nm	155 Mb/s	>35 dB	120 km	0 – 70/-40 – 85 C
1.25 Gb/s, 1310 nm, Single Mode Applications, 10 – 50 km					
SFF-1250LX-AT10K	1310 nm	1.25 Gb/s	>10.5 dB	10 km	0 – 70/-40 – 85 C
SFF-1250LX-AT40K	1310 nm	1.25 Gb/s	>20 dB	40 km	0 – 70/-40 – 85 C
SFF-1250LX-AT50K	1310 nm	1.25 Gb/s	>24 dB	50 km	0 – 70/-40 – 85 C

2x5 Small Form Factor (SFF) Optical Transceivers



Products Selection Guide (Cont'd)					
Part Number *	Wavelength	Data Rate	Power Budget	Distance**	Temp. Range
1.25 Gb/s, 1550 nm, Single Mode Applications, 30 – 80 km					
SFF-1250EX-AT30K	1550 nm	1.25 Gb/s	>12 dB	30 km	0 – 70/-40 – 85 C
SFF-1250EX-AT60K	1550 nm	1.25 Gb/s	>20 dB	60 km	0 – 70/-40 – 85 C
SFF-1250EX-AT80K	1550 nm	1.25 Gb/s	>24 dB	80 km	0 – 70/-40 – 85 C
1.25 Gb/s, Single Mode CWDM Applications, 40 – 80 km					
SFF-1250CLX-AT40K-XX	1270 - 1450 nm	1.25 Gb/s	20 dB	40 km	0 – 70 C
SFF-1250CLX-AT60K-XX	1270 - 1450 nm	1.25 Gb/s	24 dB	60 km	0 – 70 C
SFF-1250CEX-AT60K-XX	1470 -1610 nm	1.25 Gb/s	20 dB	60 km	0 – 70 C
SFF-1250CEX-AT80K-XX	1470 -1610 nm	1.25 Gb/s	24 dB	80 km	0 – 70 C

*: Add "-T" in the Part Number for products with extended temperature range -40-85 °C. For example, SFF-155LX-DP15K-T.

XX indicates wavelength selection for the 1270 - 1450 nm CWDM transceivers. See data sheet for details.

XX indicates wavelength selection for the 1470 – 1610 nm CWDM 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.

Class 1 Laser Product
Complies with
21 CFR 1040.10 and 1040.11



**155 Mb/s, 1310 nm
Multimode, 2 km Distance
2x5 SFF Dual LC Package**

Description

OptoC's 2x5 Small Form Factor (SFF) transceiver provides a low cost and compact solution for general transceiver is a high performance data link module compliant with the industry standard of SFF Multi-Source Agreement (MSA). This multimode transceiver is specifically designed with low cost, high performance 1310 nm LED light source. The dual LC connector interface also offers higher port density for system integrators.

The standard 2x5 pluggable package makes it easy for assembly and test. The transceiver operates at 155 Mb/s, and reaches more than 2 km of transmission distance with standard multimode fibers and >11 dB of power budget. This product is RoHS compliant.

Key Features

- 1310 nm multimode, 155 Mb/s
- >11 dB power budget, 2 km reach
- Duplex LC connector optical interface
- Industry standard 2x5 pluggable package
- DC coupling LVPECL differential I/O logics
- LVPECL Signal detect to monitor optical signals
- Single 3.3V power supply
- -40-85 °C operating temperatures available
- RoHS compliant

Applications

- ✓ FTTH, FTTX, ATM/SONET OC-3, SDH STM-1
- ✓ Fast 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
- ✓ Computer cluster cross-connect

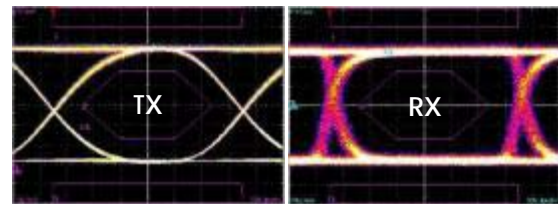


Lead-Free

SFF-155LX-DP2K



155 Mb/s, 2²³-1 NRZ Data EyePattern



Ordering Information

Part Number: SFF-155LX-DP2K

Description:

1310 nm 155 Mb/s, Multimode, 2x5 SFF Fiber Optics Transceiver, 2 km reach, 0-70°C

Part Number: SFF-155LX-DP2K-T

Description:

1310 nm 155 Mb/s, multimode, 2x5 SFF Fiber Optics Transceiver, 2 km reach, -40-85°C

Operating Conditions

Parameter	Min.	Typical	Max.	Units
Operate Temperature	0	25	70	C
- T Transceivers	-40	25	85	C
Data Rate	---	155	200	Mb/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	6.0	V
Input Voltage	V_{in}	-0.5	V_{cc}	V
Operating Current	I_{op}	---	400	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	0.3	---	1.6	V
Differential Input Impedance ²	Z	---	100	---	ohm
Optical Output Power ³	P_o	-20	---	-14	dBm
Optical Wavelength	λ_o	1270	1310	1380	nm
Extinction Ratio	ET	10	---	---	dB
Spectral Width (FWHM)	$\Delta\lambda$	---	---	170	nm
Duty Cycle Distortion	T_{dc}	---	---	0.6	ns
Rise/Fall Time (10% - 90%)	T_r/T_f	---	---	3	ns
Data Dependent Jitter	T_{DJ}	---	---	0.6	ns
Random Jitter	T_{RJ}	---	---	0.6	ns
Data Input Voltage - High	V_{IH}	$V_{cc} - 1.1$	---	$V_{cc} - 0.7$	V
Data Input Voltage - Low	V_{IL}	$V_{cc} - 2.0$	---	$V_{cc} - 1.6$	V

Notes:

1. Module is designed for DC LVPECL 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 50/125 or 62.5/125 μ m MMF.
4. Optical eye diagram is compliant with Telcordia GR-253-CORE and ITU-T G-957 standard.

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	---	1610	nm
Receiver Overload	P_{max}	0	---	---	dBm
Receiver Sensitivity ¹	P_I	---	---	-31	dBm
Differential Output Voltage	ΔV_o	0.3	---	1.6	V
Differential Input Impedance ²	Z	---	100	---	Ohm
Optical Return Loss	OL	12	---	---	dB
Rise/Fall Time (10% - 90%)	T_r/T_f	---	---	3	ns
Signal Detect- Asserted	P_{SD+}	---	---	-31	dBm
Signal Detect- Deasserted	P_{SD-}	-45	---	---	dBm
Signal Detect Assert Time	T_{ass}	---	---	100	μ s
Signal Detect Deassert Time	T_{disass}	---	---	100	μ s
Signal Detect Hysteresis	$P_{SD+} - P_{SD-}$	1.0	---	---	dB
Signal Detect Output - Low	V_{SD-}	$V_{CC} - 2.0$	---	$V_{CC} - 1.6$	V
Signal Detect Output - High	V_{SD+}	$V_{CC} - 1.1$	---	$V_{CC} - 0.7$	V
Data Output Voltage - Low	V_{OL}	$V_{CC} - 2.0$	---	$V_{CC} - 1.6$	V
Data Output Voltage - High	V_{OH}	$V_{CC} - 1.1$	---	$V_{CC} - 0.7$	V

Notes:

1. Test at 155 Mb/s, 2²³ - 1 PRBS data pattern, and > 1x10⁻¹⁰ of Bit-Error-Rate (BER).
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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**155 Mb/s, 1310 nm
Single Mode, 15 – 60 km
2x5 Dual LC Package**

Description

OptoIC's 2x5 SFF transceiver provides a low cost and compact solution for general data communication links. This single mode transceiver is designed with high performance 1310 nm laser. Dual LC connectors are used as the standard interface.

The transceiver modules use industry standard 2x5 pluggable package. These transceivers operate at 155 Mb/s for 15 - 60 km transmission distance with single mode fibers. The products are RoHS compliant.



Lead-Free

SFF-155LX-DPXXK
(XX = 15, 30, 60)



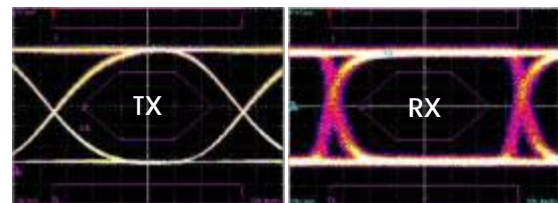
Key Features

- 1310 nm single mode, 155 Mb/s
- 15 – 60 km reach, 12 – 30 dB power budget
- Duplex LC connector optical interface
- Industry standard 2x5 pluggable package
- DC coupling LVPECL differential I/O logics
- LVPECL Signal detect to monitor optical signals
- Single 3.3V power supply
- -40–85 °C operating temperatures available
- RoHS compliant

Applications

- ✓ FTTH, FTTX, ATM/SONET OC-3, SDH STM-1
- ✓ Fast 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
- ✓ Computer cluster cross-connect

155 Mb/s, 2²³-1 NRZ Data Eye Pattern



Ordering Information

Part Number: SFF-155LX-DPXXK

Description:

1310 nm 155 Mb/s, single mode, 2x5 SFF Fiber Optics Transceiver, XX km reach, 0-70°C

* Add "-T" in the Part Number for extended temperature range -40–85 °C, i.e., SFF-155LX-DP15K-T.

Operating Conditions

Parameter	Min.	Typical	Max.	Units
Operate Temperature	0	25	70	C
- T Transceivers	-40	25	85	C
Data Rate	---	155	200	Mb/s
Supply Voltage	3.1	3.3	3.5	V

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

General Transmitter Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Input Voltage ¹	ΔV_i	0.3	---	1.6	V
Differential Input Impedance ²	Z	---	100	---	ohm
Relative Intensity Noise	RIN	---	---	-120	dB/Hz
Rise/Fall Time (10% - 90%)	T_r/T_f	---	1	2	ns
Data Input Current - High	I_{IH}	---	---	350	μA
Data Input Current - Low	I_{IL}	-350	---	---	μA
Data Input Voltage - High	V_{IH}	$V_{CC} - 1.1$	---	$V_{CC} - 0.7$	V
Data Input Voltage - Low	V_{IL}	$V_{CC} - 2.0$	---	$V_{CC} - 1.6$	V

General Receiver Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Output Voltage ¹	ΔV_o	0.3	---	1.6	V
Differential Input Impedance ²	Z	---	100	---	Ohm
Optical Return Loss	OL	14	---	---	dB
Rise/Fall Time (10% - 90%)	T_r/T_f	---	1	2	ns
Signal Detect Hysteresis	$P_{SD+} - P_{SD}$	1	---	---	dB
Signal Detect Output - Low	V_{SD-}	$V_{CC} - 2.0$	---	$V_{CC} - 1.6$	V
Signal Detect Output - High	V_{SD+}	$V_{CC} - 1.1$	---	$V_{CC} - 0.7$	V
Data Output Voltage - Low	V_{OL}	$V_{CC} - 2.0$	---	$V_{CC} - 1.6$	V
Data Output Voltage - High	V_{OH}	$V_{CC} - 1.1$	---	$V_{CC} - 0.7$	V

Notes:

1. Module is designed for DC LVPECL coupling. See the design guide for proper termination.
2. Single ended will be 50 ohm for each signal line.

Transmitter Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Optical Output Power ¹	P_o	-20	---	0	dBm
Optical Wavelength	λ_o	1260	1310	1360	nm
Extinction Ratio	ET	8.2	---	---	dB
Spectral Width (rms)	$\Delta\lambda$	---	---	4	nm

Receiver Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Operating Wavelength	λ_c	1260	---	1610	nm
Receiver Overload	P_{max}	0	---	---	dBm
Receiver Sensitivity ²	P_I	---	---	-32	dBm
Signal Detect- Asserted	P_{SD+}	---	---	-32	dBm
Signal Detect- Deasserted	P_{SD-}	-45	---	---	dBm

Notes:

1. Output of coupling optical power into 9/125 μ m SMF.
2. Test at 155 Mb/s, 2²³ - 1 PRBS data pattern, and > 1x10⁻¹⁰ of Bit-Error-Rate (BER).
3. Optical eye diagram is compliant with Telcordia GR-253-CORE and ITU-T G-957 standard.
4. Maximum supply current for the transceiver from Vcc is 220 mA.

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	-15	---	-8	dBm
Optical Wavelength	λ_o	1260	1310	1360	nm
Extinction Ratio	ET	8.2	---	---	dB
Spectral Width (rms)	$\Delta\lambda$	---	---	4	nm

Receiver Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Operating Wavelength	λ_c	1260	---	1610	nm
Receiver Overload	P_{max}	0	---	---	dBm
Receiver Sensitivity ²	P_I	---	---	-34	dBm
Signal Detect- Asserted	P_{SD+}	---	---	-34	dBm
Signal Detect- Deasserted	P_{SD-}	-45	---	---	dBm

Notes:

1. Output of coupling optical power into 9/125 μm SMF.
2. Test at 155 Mb/s, 2²³ – 1 PRBS data pattern, and > 1x10⁻¹⁰ of Bit-Error-Rate (BER).
3. Optical eye diagram is compliant with Telcordia GR-253-CORE and ITU-T G-957 standard.
4. Maximum supply current for the transceiver from Vcc is 220 mA.

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	-5	---	0	dBm
Optical Wavelength	λ_o	1270	1310	1355	nm
Extinction Ratio	ET	10	---	---	dB
Spectral Width (rms)	$\Delta\lambda$	---	---	2.5	nm

Receiver Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Operating Wavelength	λ_c	1260	---	1610	nm
Receiver Overload	P_{max}	0	---	---	dBm
Receiver Sensitivity ²	P_I	---	---	-35	dBm
Signal Detect- Asserted	P_{SD+}	---	---	-35	dBm
Signal Detect- Deasserted	P_{SD-}	-45	---	---	dBm

Notes:

1. Output of coupling optical power into 9/125 μ m SMF.
2. Test at 155 Mb/s, 2²³ – 1 PRBS data pattern, and > 1x10⁻¹⁰ of Bit-Error-Rate (BER).
3. Optical eye diagram is compliant with Telcordia GR-253-CORE and ITU-T G-957 standard.
4. Maximum supply current for the transceiver from Vcc is 220 mA.

Class 1 Laser Product Complies with 21 CFR 1040.10 and 1040.11
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**155 Mb/s, 1550 nm
Single Mode, 20 – 120 km
2x5 Dual LC Package**

Description

OptoIC's 2x5 SFF transceiver provides a low cost and compact solution for general data communication links. This single mode transceiver is designed with high performance 1550 nm laser. Dual LC connectors are used as the standard interface.

The transceiver modules use industry standard 2x5 pluggable package. These transceivers operate at 155 Mb/s for 20 - 120 km transmission distance with single mode fibers. The products are RoHS compliant.



Lead-Free

SFF-155EX-DPXXK
(XX = 20, 100, 120)



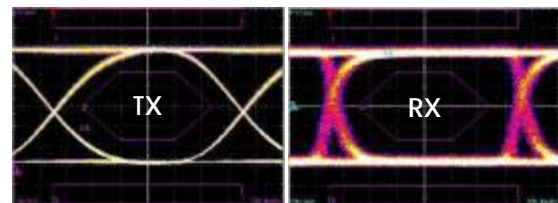
Key Features

- 1550 nm single mode, 155 Mb/s
- 20 – 120 km reach, 19 – 35 dB power budget
- Duplex LC connector optical interface
- Industry standard 2x5 pluggable package
- DC coupling LVPECL differential I/O logics
- LVPECL Signal detect to monitor optical signals
- Single 3.3V power supply
- -40–85 °C operating temperatures available
- RoHS compliant

Applications

- ✓ FTTH, FTTX, ATM/SONET OC-3, SDH STM-1
- ✓ Fast 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
- ✓ Computer cluster cross-connect

155 Mb/s, 2²³-1 NRZ Data Eye Pattern



Ordering Information

Part Number: SFF-155EX-DPXXK

Description:

1550 nm 155 Mb/s, single mode, 2x5 SFF Fiber Optics Transceiver, XX km reach, 0-70°C

* Add "-T" in the Part Number for extended temperature range -40–85 °C, i.e., SFF-155EX-DP20K-T.

Operating Conditions

Parameter	Min.	Typical	Max.	Units
Operate Temperature	0	25	70	C
- T Transceivers	-40	25	85	C
Data Rate	---	155	200	Mb/s
Supply Voltage	3.1	3.3	3.5	V

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

General Transmitter Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Input Voltage ¹	ΔV_i	0.3	---	1.6	V
Differential Input Impedance ²	Z	---	100	---	ohm
Relative Intensity Noise	RIN	---	---	-120	dB/Hz
Rise/Fall Time (10% - 90%)	T_r/T_f	---	1	2	ns
Data Input Current - High	I_{IH}	---	---	350	μ A
Data Input Current - Low	I_{IL}	-350	---	---	μ A
Data Input Voltage - High	V_{IH}	$V_{CC} - 1.1$	---	$V_{CC} - 0.7$	V
Data Input Voltage - Low	V_{IL}	$V_{CC} - 2.0$	---	$V_{CC} - 1.6$	V

General Receiver Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Output Voltage ¹	ΔV_o	0.3	---	1.6	V
Differential Input Impedance ²	Z	---	100	---	Ohm
Optical Return Loss	OL	14	---	---	dB
Rise/Fall Time (10% - 90%)	T_r/T_f	---	1	2	ns
Signal Detect Hysteresis	$P_{SD+} - P_{SD}$	1	---	---	dB
Signal Detect Output - Low	V_{SD-}	$V_{CC} - 2.0$	---	$V_{CC} - 1.6$	V
Signal Detect Output - High	V_{SD+}	$V_{CC} - 1.1$	---	$V_{CC} - 0.7$	V
Data Output Voltage - Low	V_{OL}	$V_{CC} - 2.0$	---	$V_{CC} - 1.6$	V
Data Output Voltage - High	V_{OH}	$V_{CC} - 1.1$	---	$V_{CC} - 0.7$	V

Notes:

1. Module is designed for DC LVPECL coupling. See the design guide for proper termination.
2. Single ended will be 50 ohm for each signal line.

Transmitter Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Optical Output Power ¹	P_o	-15	---	-8	dBm
Optical Wavelength	λ_o	1530	1550	1570	nm
Extinction Ratio	ET	8.2	---	---	dB
Spectral Width (rms)	$\Delta\lambda$	---	---	2.5	nm

Receiver Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Operating Wavelength	λ_c	1260	---	1610	nm
Receiver Overload	P_{max}	0	---	---	dBm
Receiver Sensitivity ²	P_I	---	---	-34	dBm
Signal Detect- Asserted	P_{SD+}	---	---	-34	dBm
Signal Detect- Deasserted	P_{SD-}	-45	---	---	dBm

Notes:

1. Output of coupling optical power into 9/125 μ m SMF.
2. Test at 155 Mb/s, 2²³ - 1 PRBS data pattern, and > 1x10⁻¹⁰ of Bit-Error-Rate (BER).
3. Optical eye diagram is compliant with Telcordia GR-253-CORE and ITU-T G-957 standard.
4. Maximum supply current for the transceiver from Vcc is 280 mA.

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	-5	---	0	dBm
Optical Wavelength	λ_o	1530	1550	1570	nm
Extinction Ratio	ET	10	---	---	dB
Spectral Width (-20 dB)	$\Delta\lambda$	---	---	1	nm

Receiver Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Operating Wavelength	λ_c	1260	---	1610	nm
Receiver Overload	P_{max}	0	---	---	dBm
Receiver Sensitivity ²	P_I	---	---	-35	dBm
Signal Detect- Asserted	P_{SD+}	---	---	-35	dBm
Signal Detect- Deasserted	P_{SD-}	-45	---	---	dBm

Notes:

1. Output of coupling optical power into 9/125 μm SMF.
2. Test at 155 Mb/s, 2²³ – 1 PRBS data pattern, and > 1x10⁻¹⁰ of Bit-Error-Rate (BER).
3. Optical eye diagram is compliant with Telcordia GR-253-CORE and ITU-T G-957 standard.
4. Maximum supply current for the transceiver from Vcc is 280 mA.

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	---	+5	dBm
Optical Wavelength	λ_o	1530	1550	1570	nm
Extinction Ratio	ET	10	---	---	dB
Spectral Width (-20 dB)	$\Delta\lambda$	---	---	1	nm

Receiver Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Operating Wavelength	λ_c	1260	---	1610	nm
Receiver Overload	P_{max}	0	---	---	dBm
Receiver Sensitivity ²	P_I	---	---	-35	dBm
Signal Detect- Asserted	P_{SD+}	---	---	-35	dBm
Signal Detect- Deasserted	P_{SD-}	-45	---	---	dBm

Notes:

1. Output of coupling optical power into 9/125 μ m SMF.
2. Test at 155 Mb/s, 2²³ – 1 PRBS data pattern, and > 1x10⁻¹⁰ of Bit-Error-Rate (BER).
3. Optical eye diagram is compliant with Telcordia GR-253-CORE and ITU-T G-957 standard.
4. Maximum supply current for the transceiver from Vcc is 280 mA.

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 Complies with
 21 CFR 1040.10 and 1040.11



**1.25 Gb/s, 850 nm
Multimode, 500 m
2x5 Dual LC Package**

Description

OptoIC's 2x5 SFF transceiver provides a low cost and compact solution for general data communication links. This multimode fiber optics transceiver is designed with high performance 850 nm VCSEL light source. Dual LC connectors are used as the standard interface.

The transceiver modules use industry standard 2x5 pluggable package. This product can be used at 1.0625 Gb/s for Fiber Channel or 1.25 Gb/s for Gigabit Ethernet applications. The transceiver reaches more than 500 meters of transmission distance with high-grade multimode fibers and >8.5 dB of power budget. The products are RoHS compliant.



Lead-Free

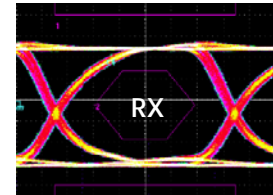
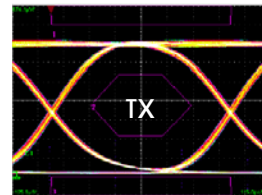
SFF-1250SX-AT500M



Key Features

- 850 nm multimode, 1.0625/1.25 Gb/s data rates
- > 8.5 dB power budget, 500 m reach
- Duplex LC connector optical interface
- Industry standard 2x5 pluggable package
- AC coupling LVPECL differential I/O logics
- Single 3.3 V power supply
- TTL or PECL signal detect to monitor optical signals
- IEEE 802.3z Gigabit Ethernet standard compliant
- 1X Fiber Channel standard compliant
- -20-85 °C operating temperatures available
- RoHS compliant

1.25 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
- ✓ Computer cluster cross-connect

Ordering Information

Part Number: SFF-1250SX-AT500M

Description:

850 nm 1.0625/1.25 Gb/s, multimode, 2x5 SFF fiber optics transceiver, 500 m reach, 0-70°C

* Add "-T" in the Part Number for extended temperature range -20-85 °C, i.e., SFF-1250SX-AT500M-T.

Operating Conditions

Parameter	Min.	Typical	Max.	Units
Operate Temperature	0	25	70	C
- T Transceivers	-20	25	85	C
Data Rate	---	1.25	1.3	Gb/s
Supply Voltage	3.1	3.3	3.5	V
Supply Current	---	120	250	mA

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Units
Storage Temperature	T_{st}	-40	85	C
Supply Voltage	V_{CC}	-0.5	6.0	V
Input Voltage	V_{IN}	-0.5	V_{CC}	V
Operating Current	I_{op}	---	400	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	0.3	---	1.6	V
Differential Input Impedance ²	Z	---	100	---	ohm
Optical Output Power ³	P_o	-9.5	---	-4	dBm
Optical Wavelength	λ_o	830	850	860	nm
Extinction Ratio	ET	9	---	---	dB
Spectral Width (rms)	$\Delta\lambda$	---	---	0.85	nm
Relative Intensity Noise	RIN	---	---	-117	dB/Hz
Rise/Fall Time (20% - 80%)	T_r/T_f	---	---	260	ps
Total Jitter	T_j	---	---	227	ps
Data Input Current - Low	I_{IL}	-350	---	---	μA
Data Input Current - High	I_{IH}	---	---	350	μA

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 50/125 μm or 62.5/125 μm MMF.
4. Optical eye diagram is compliant with IEEE 802.3z standard.

Class 1 Laser Product
 Complies with
 21 CFR 1040.10 and 1040.11



Receiver Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Operating Wavelength	λ_c	770	---	860	nm
Receiver Overload	P_{max}	0	---	---	dBm
Receiver Sensitivity ¹	P_I	---	---	-18	dBm
Differential Output Voltage ²	ΔV_O	0.3	---	1.6	V
Differential Input Impedance	Z	---	100	---	Ohm
Optical Return Loss	OL	12	---	---	dB
Rise/Fall Time (20% - 80%)	T_r/T_f	---	---	350	ps
Signal Detect- Asserted	P_{SD+}	---	---	-18	dBm
Signal Detect- Deasserted	P_{SD-}	-30	---	---	dBm
Signal Detect Hysteresis	$P_{SD+} - P_{SD-}$	1.0	---	---	dB
Stressed Receiver Sensitivity		---	---	-13	dBm
Signal Detect Assert Time	T_{ass}	---	---	100	μ s
Signal Detect Deassert Time	T_{disass}	---	---	100	μ s
Signal Detect Output - High	V_{SD+}	2.4	---	V_{CC}	V
Signal Detect Output - Low	V_{SD-}	0	---	0.5	V

Notes:

1. Test at 1.25 Gb/s, 2⁷ - 1 PRBS data pattern, and > 1x10⁻¹² of Bit-Error-Rate (BER)
2. Applied to AC LVPECL I/O coupling. See the design guide for proper termination.

Typical Transmission Distance for Multimode Fibers @ 850 nm

Data Rate	Fiber Type	Distance (m)	Data Rate	Fiber Type	Distance (m)
1.0625 Gb/s	50 μ m, 2000 MHz*km	860	2.125 Gb/s	50 μ m, 2000 MHz*km	500
	50 μ m, 500 MHz*km	500		50 μ m, 500 MHz*km	300
	50 μ m, 400 MHz*km	450		50 μ m, 400 MHz*km	260
	62.5 μ m, 200 MHz*km	300		62.5 μ m, 200 MHz*km	150
	62.5 μ m, 160 MHz*km	250		62.5 μ m, 160 MHz*km	120
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	150
	62.5 μ m, 200 MHz*km	275		62.5 μ m, 200 MHz*km	75
	62.5 μ m, 160 MHz*km	220		62.5 μ m, 160 MHz*km	---

 Class 1 Laser Product
 Complies with
 21 CFR 1040.10 and 1040.11


Description

OptoIC's 2x5 SFF transceiver provides a low cost and compact solution for general data communication links. This multimode fiber optics transceiver is designed with high performance 1310 nm FP laser. Dual LC connectors are used as the standard interface.

The transceiver uses industry standard 2x5 pluggable package. This product can be used at 1.0625 Gb/s for Fiber Channel or 1.25 Gb/s for Gigabit Ethernet applications. It offers 2 km of transmission distance with multimode fibers and >10 dB of power budget. This product is RoHS compliant.



Lead-Free

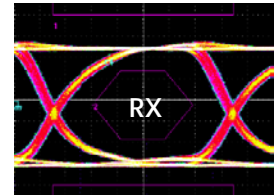
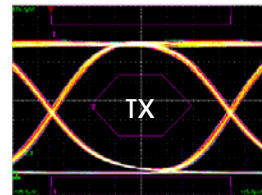
SFF-1250LX-AT2K



Key Features

- 1310 nm multimode, 1.0625/1.25 Gb/s data rates
- >10 dB power budget, 2 km reach
- Duplex LC connector optical interface
- Industry standard 2x5 pluggable package
- AC coupling LVPECL differential I/O logics
- Single 3.3 V power supply
- TTL signal detect to monitor optical signals
- IEEE 802.3z Gigabit Ethernet standard compliant
- 1X Fiber Channel standard compliant
- -40–85 °C operating temperatures available
- RoHS compliant

1.25 Gb/s, 2⁷-1 NRZ Data Eye Pattern



Ordering Information

Part Number: SFF-1250LX-AT2K

Description:

1310 nm 1.0625/1.25 Gb/s, multimode, 2x5 SFF Fiber Optics Transceiver, 2 km reach, 0-70°C, RoHS compliant.

* Add "-T" in the Part Number for extended temperature range -40–85 °C, i.e., SFF-1250LX-AT2K-T.

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
- ✓ Computer cluster cross-connect

Operating Conditions

Parameter	Min.	Typical	Max.	Units
Operate Temperature	0	25	70	C
- T Transceivers	-40	25	85	C
Data Rate	---	1.25	1.3	Gb/s
Supply Voltage	3.1	3.3	5.25	V
Supply Current	---	200	300	mA

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Units
Storage Temperature	T_{st}	-40	85	C
Supply Voltage	V_{cc}	-0.5	6.0	V
Input Voltage	V_{in}	-0.5	V_{cc}	V
Operating Current	I_{op}	---	400	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	0.3	---	1.6	V
Differential Input Impedance ²	Z	---	100	---	ohm
Optical Output Power ³	P_o	-9	---	-1	dBm
Optical Wavelength	λ_o	1260	1310	1360	nm
Extinction Ratio	ET	9	---	---	dB
Spectral Width (rms)	$\Delta\lambda$	---	---	4	nm
Relative Intensity Noise	RIN	---	---	-120	dB/Hz
Rise/Fall Time (20% - 80%)	T_r/T_f	---	---	260	ps
Total Jitter	T_j	---	---	227	ps
Data Input Current - Low	I_{Ll}	-350	---	---	μA
Data Input Current - High	I_{Hl}	---	---	350	μA

Notes:

1. Module is designed for AC LVPECL 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 62.5/125 or 50/125 μm MMF.
4. Optical eye diagram is compliant with IEEE 802.3z standard.

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	---	1610	nm
Receiver Overload	P_{max}	-1	---	---	dBm
Receiver Sensitivity ¹	P_I	---	---	-19	dBm
Differential Output Voltage	ΔV_o	0.3	---	1.6	V
Differential Input Impedance ²	Z	---	100	---	Ohm
Optical Return Loss	OL	12	---	---	dB
Rise/Fall Time (20% - 80%)	T_r/T_f	---	---	350	ps
Signal Detect- Asserted	P_{SD+}	---	---	-19	dBm
Signal Detect- Deasserted	P_{SD-}	-35	---	---	dBm
Signal Detect Hysteresis	$P_{SD+} - P_{SD-}$	1.0	---	---	dB
Stressed Receiver Sensitivity		---	---	-17	dBm
Signal Detect Assert Time	T_{ass}	---	---	100	μ s
Signal Detect Deassert Time	T_{disass}	---	---	100	μ s
Signal Detect Output - High	V_{SD+}	2.4	---	V_{CC}	V
Signal Detect Output - Low	V_{SD-}	0	---	0.5	V

Notes:

1. Test at 1.25 Gb/s, 2⁷ - 1 PRBS data pattern, and > 1x10⁻¹² of Bit-Error-Rate (BER).
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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**1.25 Gb/s, 1310 nm
Single Mode, 10 – 50 km
2x5 Dual LC Package**

Description

OptoC's 2x5 SFF transceiver provides a low cost and compact solution for general data communication links. This single mode transceiver is designed with high performance 1310 nm laser. Dual LC connectors are used as the standard interface.

The transceiver modules use industry standard 2x5 pluggable package. This product can be used at 1.0625 Gb/s for Fiber Channel or 1.25 Gb/s for Gigabit Ethernet applications with 10 - 50 km transmission distance with single mode fibers. The products are RoHS compliant.



Lead-Free

SFF-1250LX-AT~~XX~~K
(~~XX~~ = 10, 40, 50)



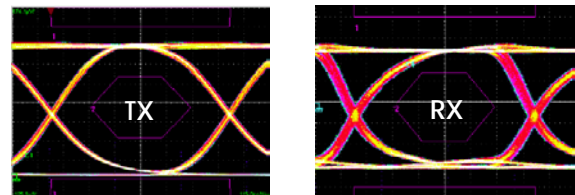
Key Features

- 1310 nm single mode, 1.0625/1.25 Gb/s data rates
- 10 – 50 km reach, 11 – 24 dB power budget
- Duplex LC connector optical interface
- Industry standard 2x5 pluggable package
- AC coupling LVPECL differential I/O logics
- Single 3.3 V power supply
- TTL signal detect to monitor optical signals
- IEEE 802.3z Gigabit Ethernet standard compliant
- 1X Fiber Channel standard compliant
- -40–85 °C operating temperatures available
- 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
- ✓ Computer cluster cross-connect

1.25 Gb/s, 2⁷-1 NRZ Data Eye Pattern



Ordering Information

Part Number: SFF-1250LX-AT~~XX~~K

Description:

1310 nm 1.0625/1.25 Gb/s, single mode, 2x5 SFF Fiber Optics Transceiver, ~~XX~~ km reach, 0-70°C

* Add "-T" in the Part Number for extended temperature range -40–85 °C, i.e., SFF-1250LX-AT10K-T.

Operating Conditions

Parameter	Min.	Typical	Max.	Units
Operate Temperature	0	25	70	C
- T Transceivers	-40	25	85	C
Data Rate	---	1.25	1.3	Gb/s
Supply Voltage	3.1	3.3	3.5	V

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

General Transmitter Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Input Voltage ¹	ΔV_i	0.3	---	1.6	V
Differential Input Impedance ²	Z	---	100	---	ohm
Relative Intensity Noise	RIN	---	---	-120	dB/Hz
Rise/Fall Time (20% - 80%)	T_r/T_f	---	---	260	ps
Data Input Current - High	I_{IH}	---	---	350	μA
Data Input Current - Low	I_{IL}	-350	---	---	μA
Side Mode Suppression Ratio	$SMSR$	30	---	---	dB
Total Jitter	T_j	---	---	227	ps

General Receiver Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Output Voltage ¹	ΔV_o	0.3	---	1.6	V
Differential Input Impedance ²	Z	---	100	---	Ohm
Optical Return Loss	OL	12	---	---	dB
Rise/Fall Time (20% - 80%)	T_r/T_f	---	---	350	ps
Signal Detect Hysteresis	$P_{SD+} - P_{SD}$	1	---	---	dB
Signal Detect Output - Low	V_{SD-}	0	---	0.5	V
Signal Detect Output - High	V_{SD+}	2.4	---	V_{CC}	V

Notes:

1. Module is designed for AC LVPECL coupling. See the design guide for proper termination.
2. Single ended will be 50 ohm for each signal line.

Transmitter Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Optical Output Power ¹	P_o	-9.5	---	-3	dBm
Optical Wavelength	λ_o	1270	1310	1355	nm
Extinction Ratio	ET	9	---	---	dB
Spectral Width (rms)	$\Delta\lambda$	---	---	2.5	nm

Receiver Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Operating Wavelength	λ_c	1260	---	1610	nm
Receiver Overload	P_{max}	-3	---	---	dBm
Receiver Sensitivity ²	P_I	---	---	-20	dBm
Signal Detect- Asserted	P_{SD+}	---	---	-20	dBm
Signal Detect- Deasserted	P_{SD-}	-35	---	---	dBm

Notes:

1. Output of coupling optical power into 9/125 μ m SMF.
2. Test at 1.25 Gb/s, 2⁷ - 1 PRBS data pattern, and > 1x10⁻¹² of Bit-Error-Rate (BER).
3. Optical eye diagram is compliant with IEEE 802.3z standard.
4. Maximum supply current for the transceiver from Vcc is 300 mA for 3.3V and 400 mA for 5V.

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	-4	---	+3	dBm
Optical Wavelength	λ_o	1280	1310	1340	nm
Extinction Ratio	ET	7	---	---	dB
Spectral Width (-20 dB)	$\Delta\lambda$	---	---	1	nm

Receiver Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Operating Wavelength	λ_c	1260	---	1610	nm
Receiver Overload	P_{max}	-3	---	---	dBm
Receiver Sensitivity ²	P_I	---	---	-24	dBm
Signal Detect- Asserted	P_{SD+}	---	---	-24	dBm
Signal Detect- Deasserted	P_{SD-}	-35	---	---	dBm

Notes:

1. Output of coupling optical power into 9/125 μ m SMF.
2. Test at 1.25 Gb/s, 2⁷ - 1 PRBS data pattern, and > 1x10⁻¹² of Bit-Error-Rate (BER).
3. Optical eye diagram is compliant with IEEE 802.3z standard.
4. Maximum supply current for the transceiver from Vcc is 300 mA for 3.3V and 400 mA for 5V.

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	---	+5	dBm
Optical Wavelength	λ_o	1280	1310	1340	nm
Extinction Ratio	ET	7	---	---	dB
Spectral Width (-20 dB)	$\Delta\lambda$	---	---	1	nm

Receiver Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Operating Wavelength	λ_c	1260	---	1610	nm
Receiver Overload	P_{max}	-2	---	---	dBm
Receiver Sensitivity ²	P_I	---	---	-24	dBm
Signal Detect- Asserted	P_{SD+}	---	---	-24	dBm
Signal Detect- Deasserted	P_{SD-}	-35	---	---	dBm

Notes:

1. Output of coupling optical power into 9/125 μm SMF.
2. Test at 1.25 Gb/s, 2⁷ – 1 PRBS data pattern, and > 1x10⁻¹² of Bit-Error-Rate (BER).
3. Optical eye diagram is compliant with IEEE 802.3z standard.
4. Maximum supply current for the transceiver from Vcc is 300 mA for 3.3V and 400 mA for 5V.

Class 1 Laser Product Complies with 21 CFR 1040.10 and 1040.11
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1.25 Gb/s, 1550 nm Single Mode, 30 – 80 km 2x5 Dual LC Package

Description

OptoIC's 2x5 SFF transceiver provides a low cost and compact solution for general data communication links. This single mode transceiver is designed with high performance 1550 nm laser. Dual LC connectors are used as the standard interface.

The transceiver modules use industry standard 2x5 pluggable package. This product can be used at 1.0625 Gb/s for Fiber Channel or 1.25 Gb/s for Gigabit Ethernet applications with 30 - 80 km transmission distance with single mode fibers. The products are RoHS compliant.



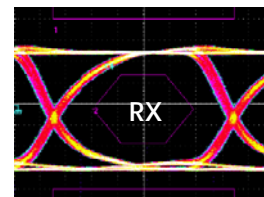
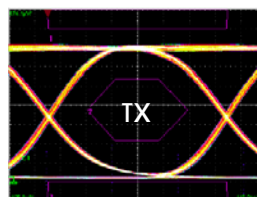
Lead-Free

SFF-1250EX-ATXXK
(XX = 30, 60, 80)



Key Features

- 1550 nm single mode, 1.0625/1.25 Gb/s data rates
- 30 – 80 km reach, 12 – 24 dB power budget
- Duplex LC connector optical interface
- Industry standard 2x5 pluggable package
- AC coupling LVPECL differential I/O logics
- Single 3.3 V power supply
- TTL signal detect to monitor optical signals
- IEEE 802.3z Gigabit Ethernet standard compliant
- 1X Fiber Channel standard compliant
- -40–85 °C operating temperatures available
- 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
- ✓ Computer cluster cross-connect

Ordering Information

Part Number: SFF-1250EX-ATXXK

Description:

1550 nm 1.0625/1.25 Gb/s, single mode, 2x5 SFF Fiber Optics Transceiver, XX km reach, 0-70°C

* Add "-T" in the Part Number for extended temperature range -40–85 °C, i.e., SFF-1250EX-AT60K-T.

Operating Conditions

Parameter	Min.	Typical	Max.	Units
Operate Temperature	0	25	70	C
- T Transceivers	-40	25	85	C
Data Rate	---	1.25	1.3	Gb/s
Supply Voltage	3.1	3.3	3.5	V

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

General Transmitter Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Input Voltage ¹	ΔV_i	0.3	---	1.6	V
Differential Input Impedance ²	Z	---	100	---	ohm
Relative Intensity Noise	RIN	---	---	-120	dB/Hz
Rise/Fall Time (20% - 80%)	T_r/T_f	---	---	260	ps
Data Input Current - High	I_{IH}	---	---	350	μA
Data Input Current - Low	I_{IL}	-350	---	---	μA
Side Mode Suppression Ratio	$SMSR$	30	---	---	dB
Total Jitter	T_j	---	---	227	ps

General Receiver Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Output Voltage ¹	ΔV_o	0.3	---	1.6	V
Differential Input Impedance ²	Z	---	100	---	Ohm
Optical Return Loss	OL	12	---	---	dB
Rise/Fall Time (20% - 80%)	T_r/T_f	---	---	350	ps
Signal Detect Hysteresis	$P_{SD+} - P_{SD}$	1	---	---	dB
Signal Detect Output - Low	V_{SD-}	0	---	0.5	V
Signal Detect Output - High	V_{SD+}	2.4	---	V_{cc}	V

Notes:

1. Module is designed for AC LVPECL coupling. See the design guide for proper termination.
2. Single ended will be 50 ohm for each signal line.

Transmitter Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Optical Output Power ¹	P_o	-9	---	-3	dBm
Optical Wavelength	λ_o	1520	1550	1580	nm
Extinction Ratio	ET	7	---	---	dB
Spectral Width (-20 dB)	$\Delta\lambda$	---	---	1	nm

Receiver Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Operating Wavelength	λ_c	1260	---	1610	nm
Receiver Overload	P_{max}	-3	---	---	dBm
Receiver Sensitivity ²	P_I	---	---	-21	dBm
Signal Detect- Asserted	P_{SD+}	---	---	-21	dBm
Signal Detect- Deasserted	P_{SD-}	-35	---	---	dBm

Notes:

1. Output of coupling optical power into 9/125 μm SMF.
2. Test at 1.25 Gb/s, 2⁷ – 1 PRBS data pattern, and > 1x10⁻¹² of Bit-Error-Rate (BER).
3. Optical eye diagram is compliant with IEEE 802.3z standard.
4. Maximum supply current for the transceiver from Vcc is 300 mA for 3.3V and 400 mA for 5V.

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	-4	---	+1	dBm
Optical Wavelength	λ_o	1520	1550	1580	nm
Extinction Ratio	ET	7	---	---	dB
Spectral Width (-20 dB)	$\Delta\lambda$	---	---	1	nm

Receiver Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Operating Wavelength	λ_c	1260	---	1610	nm
Receiver Overload	P_{max}	-3	---	---	dBm
Receiver Sensitivity ²	P_I	---	---	-24	dBm
Signal Detect- Asserted	P_{SD+}	---	---	-24	dBm
Signal Detect- Deasserted	P_{SD-}	-35	---	---	dBm

Notes:

1. Output of coupling optical power into 9/125 μm SMF.
2. Test at 1.25 Gb/s, 2⁷ – 1 PRBS data pattern, and > 1x10⁻¹² of Bit-Error-Rate (BER).
3. Optical eye diagram is compliant with IEEE 802.3z standard.
4. Maximum supply current for the transceiver from Vcc is 300 mA for 3.3V and 400 mA for 5V.

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	---	+5	dBm
Optical Wavelength	λ_o	1520	1550	1580	nm
Extinction Ratio	ET	7	---	---	dB
Spectral Width (-20 dB)	$\Delta\lambda$	---	---	1	nm

Receiver Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Operating Wavelength	λ_c	1260	---	1610	nm
Receiver Overload	P_{max}	-3	---	---	dBm
Receiver Sensitivity ²	P_I	---	---	-24	dBm
Signal Detect- Asserted	P_{SD+}	---	---	-24	dBm
Signal Detect- Deasserted	P_{SD-}	-35	---	---	dBm

Notes:

1. Output of coupling optical power into 9/125 μm SMF.
2. Test at 1.25 Gb/s, 2⁷ – 1 PRBS data pattern, and > 1x10⁻¹² of Bit-Error-Rate (BER).
3. Optical eye diagram is compliant with IEEE 802.3z standard.
4. Maximum supply current for the transceiver from Vcc is 300 mA for 3.3V and 400 mA for 5V.

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

OptoIC's CWDM transceivers are designed with high performance DFB laser and cover the wavelength spectrum from 1270 nm to 1450 nm, with industry standard 20 nm spacing. The transceiver modules use industry standard 2x5 pluggable package. This product can be used at 1.0625 Gb/s for Fiber Channel or 1.25 Gb/s for Gigabit Ethernet applications.

Two transceiver designs reach up to 40 km and 60 km of distances with 20 dB and 24 dB of power budget, respectively, for standard single mode fibers. The products are RoHS compliant.



Lead-Free

SFF-1250CLX-AT40K-XX
SFF-1250CLX-AT60K-XX



Key Features

- 1270 - 1450 nm single mode, 1.0625/1.25 Gb/s
- Duplex LC connector optical interface
- Industry standard 2x5 pluggable package
- AC coupling LVPECL differential I/O logics
- 40 km with 20 dB power budget
- 60 km with 24 dB power budget
- Compliant with IEEE 802.3z, 1000BASE-LX
- Compliant with Fiber Channel Standard
- TTL Signal detect to monitor optical signals
- Single 3.3 V power supply
- RoHS compliant

Applications

- ✓ 1X Fiber Channel
- ✓ Gigabit Ethernet
- ✓ High speed I/O for file server
- ✓ Video over fiber links
- ✓ Media converter
- ✓ Data Communication for SAN and LAN
- ✓ Central offices routers and switches
- ✓ Mass storage systems interconnect
- ✓ Computer cluster cross-connect

Ordering Information

Part Number: SFF-1250CLX-AT40K-XX

Description:

CWDM 1270 - 1450 nm 1.0625/1.25 Gb/s 2x5 SFF Transceiver, 40 km reach, 1XX0 nm wavelength, 0-70°C.

Part Number: SFF-1250CLX-AT60K-XX

Description:

CWDM 1270 – 1450 nm, 1.0625/1.25 Gb/s 2x5 SFF Transceiver, 60 km reach, 1XX0 nm wavelength, 0-70°C

XX specifies the wavelength described below.
For example, SFF-1250CLX-AT40K-27 is the 1270 nm module.

<u>XX</u>	Wavelength	<u>XX</u>	Wavelength
27	1270 nm	37	1370 nm
29	1290 nm	39	1390 nm
31	1310 nm	41	1410 nm
33	1330 nm	43	1430 nm
35	1350 nm	45	1450 nm

Operating Conditions

Parameter	Min.	Typical	Max.	Units
Operate Temperature	0	25	70	C
Data Rate	---	1.25	1.3	Gb/s
Supply Voltage	3.1	3.3	3.5	V
Supply Current	---	250	400	mA

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Units
Storage Temperature	T_{st}	-40	85	C
Supply Voltage	V_{cc}	-0.5	6.0	V
Input Voltage	V_{in}	-0.5	V_{cc}	V
Operating Current	I_{op}	---	400	mA
Output Current	I_o	---	50	mA

Transmitter Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Input Voltage ¹	ΔV_i	0.65	---	2.0	V
Differential Input Impedance ²	Z	---	100	---	ohm
Optical Output Power ³ (SFF-1250CLX-AT40K-XX)	P_o	-4	---	+1	dBm
Optical Output Power ³ (SFF-1250CLX-AT60K-XX)	P_o	-1	---	+4	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
Center Wavelength – 1350 nm	λ_c	1344.5	1350	1357.5	nm
Center Wavelength – 1370 nm	λ_c	1364.5	1370	1377.5	nm
Center Wavelength – 1390 nm	λ_c	1384.5	1390	1397.5	nm
Center Wavelength – 1410 nm	λ_c	1404.5	1410	1417.5	nm
Center Wavelength – 1430 nm	λ_c	1424.5	1430	1437.5	nm
Center Wavelength – 1450 nm	λ_c	1444.5	1450	1457.5	nm
Spectral Width (-20 dB)	$\Delta\lambda$	---	---	1	nm
Extinction Ratio	ET	7	---	---	dB
Side Mode Suppression Ratio	$SMSR$	30	---	---	dB
Relative Intensity Noise	RIN	---	---	-120	dB/Hz
Rise/Fall Time (20% - 80%)	T_r/T_f	---	---	260	ps
Total Jitter	T_j	---	---	227	ps

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 μm SMF.
4. Optical eye diagram is compliant with IEEE 802.3z standard.

Receiver Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Operating Wavelength	λ_c	1260	---	1610	nm
Receiver Overload	P_{max}	-3	---	---	dBm
Receiver Sensitivity ¹	P_i	---	-26	-24	dBm
Differential Output Voltage	ΔV_o	0.4	---	2.0	V
Differential Input Impedance ²	Z	---	100	---	Ohm
Optical Return Loss	OL	12	---	---	dB
Rise/Fall Time	T_r/T_f	---	---	350	ps
Signal Detect Hysteresis	$P_{SD+} - P_{SD}$	1	---	---	dB
Signal Detect Output - Low	V_{SD-}	0	---	0.5	V
Signal Detect Output - High	V_{SD+}	2.4	---	V_{CC}	V

Notes:

1. Test at 1.25 Gb/s, 2⁷ - 1 PRBS data pattern, and > 1x10⁻¹² of Bit-Error-Rate (BER).
2. Single ended will be 50 ohm for each signal line.

Class 1 Laser Product
 Complies with
 21 CFR 1040.10 and 1040.11



Description

OptoIC's CWDM transceivers are designed with high performance DFB laser and cover the wavelength spectrum from 1470 nm to 1610 nm, with industry standard 20 nm spacing. The transceiver modules use industry standard 2x5 pluggable package. This product can be used at 1.0625 Gb/s for Fiber Channel or 1.25 Gb/s for Gigabit Ethernet applications.

Two transceiver designs reach up to 60 km and 80 km of distances with 20 dB and 24 dB of power budget, respectively, for standard single mode fibers. The products are RoHS compliant.



Lead-Free

SFF-1250CEX-AT60K-XX
SFF-1250CEX-AT80K-XX



Key Features

- 1470 - 1610 nm single mode, 1.0625/1.25 Gb/s
- Duplex LC connector optical interface
- Industry standard 2x5 pluggable package
- AC coupling LVPECL differential I/O logics
- 60 km with 20 dB power budget
- 80 km with 24 dB power budget
- Compliant with IEEE 802.3z, 1000BASE-EX
- Compliant with Fiber Channel Standard
- TTL Signal detect to monitor optical signals
- Single 3.3 V power supply
- RoHS compliant

Applications

- ✓ 1X Fiber Channel
- ✓ Gigabit Ethernet
- ✓ High speed I/O for file server
- ✓ Video over fiber links
- ✓ Media converter
- ✓ Data Communication for SAN and LAN
- ✓ Bus extension
- ✓ Central offices routers and switches
- ✓ Mass storage systems interconnect
- ✓ Computer cluster cross-connect

Ordering Information

Part Number: SFF-1250CEX-AT60K-XX

Description

CWDM 1470 - 1610 nm 1.0625/1.25 Gb/s 2x5 SFF Transceiver, 60 km reach, 1XX0 nm wavelength, 0-70°C.

Part Number: SFF-1250CEX-AT80K-XX

Description:

CWDM 1470 – 1610 nm 1.0625/1.25 Gb/s 2x5 SFF Transceiver, 80 km reach, 1XX0 nm wavelength, 0-70°C.

XX specifies the wavelength as below. For example, SFF-1250CEX-AT60K-47 is the 1470 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	---	1.25	1.3	Gb/s
Supply Voltage	3.1	3.3	3.5	V
Supply Current	---	250	400	mA

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Units
Storage Temperature	T_{st}	-40	85	C
Supply Voltage	V_{CC}	-0.5	6.0	V
Input Voltage	V_{IN}	-0.5	V_{CC}	V
Operating Current	I_{op}	---	400	mA
Output Current	I_o	---	50	mA

Transmitter Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Differential Input Voltage ¹	ΔV_i	0.65	---	2.0	V
Differential Input Impedance ²	Z		100		ohm
Optical Output Power ³ (SFF-1250CEX-AT60K-XX)	P_o	-4	---	+1	dBm
Optical Output Power ³ (SFF-1250CEX-AT80K-XX)	P_o	0	+2	+5	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
Spectral Width (-20 dB)	$\Delta\lambda$	---	---	1	nm
Extinction Ratio	ET	9	---	---	dB
Side Mode Suppression Ratio	$SMSR$	30	---	---	dB
Relative Intensity Noise	RIN	---	---	-120	dB/Hz
Rise/Fall Time (20% - 80%)	T_r/T_f	---	---	260	ps
Total Jitter	T_j	---	---	227	ps

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. Optical eye diagram is compliant with IEEE 802.3z

Receiver Electro-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Units
Operating Wavelength	λ_c	1260	---	1610	nm
Receiver Overload	P_{max}	-3	---	---	dBm
Receiver Sensitivity ¹	P_I	---	-26	-24	dBm
Differential Output Voltage	ΔV_o	0.4	---	2.0	V
Differential Input Impedance ²	Z	---	100	---	Ohm
Optical Return Loss	OL	12	---	---	dB
Rise/Fall Time	T_r/T_f	---	---	350	ps
Signal Detect Hysteresis	$P_{SD+} - P_{SD-}$	1	---	---	dB
Signal Detect Output - Low	V_{SD-}	0	---	0.5	V
Signal Detect Output - High	V_{SD+}	2.4	---	V_{CC}	V

Notes:

1. Test at 1.25 Gb/s, 2⁷ - 1 PRBS data pattern, and > 1x10⁻¹² of Bit-Error-Rate (BER).
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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