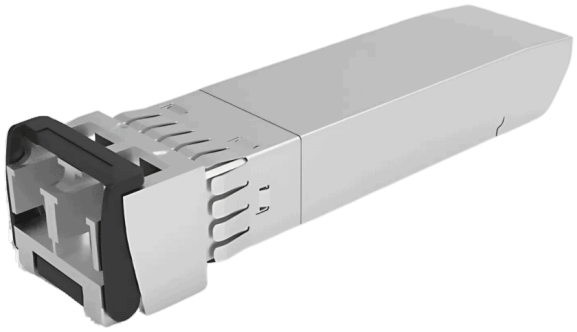
NebulaConnect 10G, SFP+ SR Dual LC Transceiver



Product Part Number

N954.NC10S+SR

Product Description

The **NebulaConnect 10G SFP+ SR Dual LC Transceiver** is a high-performance, cost-effective optical module designed for short-range data transmission in high-speed networking applications. Operating at a wavelength of **850nm**, this transceiver utilizes **VCSEL** (Vertical-Cavity Surface-Emitting Laser) **technology** and a **PIN photodetector** for reliable and efficient optical communication. It supports **up to 11.1Gbps data rates** and enables a maximum link distance of **300 meters** over **OM3 multimode fiber (MMF)**. Compliant with **IEEE 802.3ae, SFP+ MSA, and industry-standard SFF specifications**, this transceiver ensures seamless interoperability with a wide range of networking and telecom equipment. It is equipped with a **dual LC connector** and features **digital diagnostics monitoring (DDM)** for real-time performance tracking, making it ideal for data centers, cloud computing environments, and enterprise networking.

Standards Compliance

- **IEEE 802.3ae** – 10GBASE-SR standard compliance
- **SFF-8472** – Digital Diagnostics Monitoring (DDM) standard
- **SFP+ MSA** – Multi-Source Agreement for compatibility with major OEM vendors like Cisco, Juniper, Arista, Dell, and HP, making it a versatile and cost-effective networking solution.
- **SFF-8431 & SFF-8432** – Electrical and mechanical specifications for SFP+

Product Features

- High-Speed Performance : Supports data rates up to 11.1Gbps
- 850nm VCSEL Laser & PIN Receiver : Ensures reliable signal transmission
- Optimized for MMF : Reaches up to 300m over OM3 multimode fiber
- Compact SFP+ Form Factor : Hot-pluggable for flexible deployment
- Low Power Consumption : Energy-efficient operation
- Digital Diagnostics Monitoring (DDM) : Real-time performance monitoring
- Dual LC Optical Interface : Ensures easy connectivity and integration
- Superior Reliability : Compliant with industry standards for high interoperability

RoHS compliant

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Applications

- **Data Centers & Cloud Computing** – High-speed connectivity for modern data infrastructure
- **Networking Equipment** – Seamless integration with switches, routers, and network interface cards
- **Servers & Storage Devices** – Optimized for enterprise and hyperscale environments
- **High-Performance Computing (HPC)** – Supports fast, low-latency data transmission
- **Telecom Central Offices (CO)** – Ensures reliable optical networking in carrier-grade environments
- **Test & Measurement Equipment** – Used in lab environments for performance validation

Material Specifications

Form Factor	SFP+ (Hot-Pluggable)
Data Rate	Up to 11.1Gbps
Wavelength	850nm VCSEL Laser
Connector	Dual LC
Fiber Type	MMF (Multimode Fiber)
Maximum Distance	300m (OM3 MMF)
Receiver Type	PIN Photodetector
Power Consumption	<1W
DDM/DOM	Yes (Digital Diagnostics Monitoring)

Environmental Specifications

Operating Temperature Range	0°C to 70°C
Storage Temperature Range	-40°C to 85°C
Operating Relative Humidity (RH)	85% (No Condesation)

RoHS compliant

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General Specifications (Ta = 0°C to 70°C for commercial-grade modules, unless otherwise noted)

Parameter	Minimum	Maximum	Typical
Operating Case Temperature	0 °C	70 °C	
Power Supply Voltage (Vcc)	3.15 V	3.45 V	3.3 V
Lane Baud Rate			10.3125 Gbps
Power Consumption		1 W	
Supply Current (Icc)		300 mA	

Exceeding the absolute maximum ratings may result in permanent damage to the device. These limits define stress conditions only, and functional operation is not guaranteed beyond the specified operating conditions. Prolonged exposure to absolute maximum ratings may lead to irreversible damage and reduced device reliability.

Transmitter Characteristics (Ta, unless otherwise noted)

Parameter	Minimum	Maximum
Center wavelength	840 nm	860 nm
RMS spectral width (Pm)		0.6 nm
Average optical power (Pavg)	-8.2 dBm	-1 dbm
Optical Modulation Amplitude (OMA)	-6.4 dBm	3 dBm
Average launch power of OFF transmitter (Poff)		-30 dBm
Extinction ratio (ER)	4 dB	
Optical Return Loss olerance		12 dB

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Receiver Characteristics (Ta, unless otherwise noted)

Parameter	Minimum	Maximum	Typical	Notes
Center wavelength	840 nm	860 nm	840 nm	
Damage threshold	3.4 dBm			
Receive power overload	-1 dBm			
Receiver reflectance		-12 dB		
Receiver sensitivity		-9.9 dBm		Tested with a 10.3125G PRBS-31 NRZ signal, ER > 3dB, and BER < 10^{-12}.
LOS Assert (LOSA)	-25 dBm			
LOS De-Assert (LOSD)		-11.5 dBm		
LOS Hysteresis (LOSH)	0.5 dB			

PIN Descriptions

PIN	Logic	Symbol	Name / Description
1		VeeT	Module Transmitter Ground
2	LVTTL-O	TX_Fault	Module Transmitter Fault
3	LVTTLI	TX_Dis	Transmitter Disable, Turns off transmitter laser output
4	LVTTL-I/O	SDA	2-Wire Serial Interface Data Line
5	LVTTL-I	SCL	2-Wire Serial Interface Clock
6		MOD_DEFO	Module Definition, Grounded in the module
7	LVTTL-I	RSO	Receiver Rate Select
8	LVTTL-O	RX Los	Receiver Loss of Signal Indication Active LOW
9	LVTTL-I	RS1	Transmitter Rate Select (not used)
10		VeeR	Module Receiver Ground
11		VeeR	Module Receiver Ground
12	CML-O	RD-	Receiver Inverted Data Output
13	CML-O	RD+	Receiver Data Output
14		VeeR	Module Receiver Ground
15		VccR	Module Receiver 3.3 V Supply
16		VccT	Module Receiver 3.3 V Supply
17		VeeT	Module Transmitter Ground
18	CML-I	TD+	Transmitter Non-Inverted Data Input
19	CML-I	TD-	Transmitter Inverted Data Input
20		VeeT	Module Transmitter Ground

Digital Diagnostic Specification

Parameter	Symbol	Accuracy
Transceiver Case Temperature	DMI_TEMP	±3 °C
Supply voltage monitor absolute error	DMI _VCC	±3 %
Channel Bias current monitor	DMI_IBIAS	±10 %
Channel RX power monitor absolute error	DMI_RX	±3 dB
Channel TX power monitor absolute error	DMI_TX	±3 dB

ESD Safety Precautions

This transceiver has an **ESD threshold of 1kV** for high-speed data pins and **2kV** for all other electrical input pins, tested in accordance with **MIL-STD-883, Method 3015.4 / JESD22-A114-A (HBM).** However, **proper ESD precautions must still be followed** when handling the module. The transceiver is shipped in **ESD-protective packaging** and should only be **unpacked and handled in an ESD-protected environment** to prevent potential damage.

Important Notice

The performance data, specifications, and illustrations provided in this datasheet are **typical values** and must be **formally confirmed in writing by Northern Link** before being considered applicable to any specific order or contract.

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Ordering Information

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