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JCO400 COHERENT OPTICAL TRANSCEIVERS DATASHEET

Product Overview

Co-developed by Juniper and an industry-leading optical partner, JCO400 Coherent Optical Transceivers are essential building blocks that enable operators to realize a transformative strategy for 400GbE and beyond in metro, edge, core, and cloud network modernization. Providing best-in-class power efficiency in a footprint-optimized form-factor and innovative software-integration for automation functions, JCO400 coherent DWDM optics eliminate the key operational pain-points of deploying a converged packet-optical solution. Additionally, the JCO400 series optics are compliant to key industry standards and specifications to ensure diversification of supply and seamless interoperability in multivendor environments.

Product Description

Juniper Networks® JCO400-QDD-ZR and JCO400-QDD-ZR-M Coherent Optical Transceivers are supported by 400GbE-ready router and switch platforms within the Juniper Networks ACX Series Routers, MX Series Routers, PTX Series Routers, and QFX Series Switches. Ideal for access, edge, core, data center, and cloud use cases, JCO400 coherent DWDM optics deliver industry-leading performance and operational simplicity in a footprint-optimized form factor while enabling service providers and cloud providers to realize the TCO savings of a converged IP-Optical architecture.

JCO400-QDD-ZR conforms to the Optical Internetworking Forum (OIF) 400ZR Implementation Agreement (IA), which was defined to address the growing demand from cloud providers for massive interconnect bandwidth between distributed data centers. Making use of Concatenated Forward Error Correction (CFEC), 400ZR transceivers can facilitate extended reach interconnects at scale with optimized power consumption.

JCO400-QDD-ZR-M conforms to the OpenZR+ Multi-Source Agreement (MSA), which extends upon the OIF 400ZR specification to address multiple performance-demanding applications required by CSPs for metro, regional, and core use cases. OpenZR+ transceivers employ Open Forward Error Correction (OFEC), which improves the net coding gain and maximizes the achievable performance at longer distances. As defined by OpenZR+ MSA, JCO400-QDD-ZR-M supports flexible configurations in various channelization modes to enable multiple use cases to be serviced out of a common module.

Features and Benefits

Industry-Leading Performance

The JCO400-ZR/ZR+ optics solutions provide best-in-class power efficiency in a footprint-optimized form factor that suits a range of metro, edge, and core network use cases, including data center interconnect, mobile backhaul, next gen packet core networks, and more. JCO400-ZR/ZR+ modules support flexible configurations and channelized modes as specified by the OIF 400ZR IA and OpenZR+ MSA.

Operational Simplicity

JCO400-ZR/ZR+ optic modules help network operators alleviate operational pain points in managing the health of the end-to-end IP/optical solution. For example, the JCO400-ZR/ZR+ optics have the ability to separate the operation of the host and line side interfaces. Separating the operation of the two interfaces enables simplified testing and provisioning of the optical elements of the network, independent of the IP-Ethernet layer. Additionally, Juniper supports the use of standardized OpenConfig models for vendor-agnostic management of 400GbE Coherent DWDM Optics, providing ease of integration, deployment, and network maintenance.

Open and Interoperable

As an active contributing member of the OIF, OpenZR+ MSA, and QSFP-DD MSA among other key optical-standards bodies, Juniper is at the forefront of building open and interoperable networking ecosystems. Juniper leverages a standards-compliant, multivendor ecosystem to seamlessly diversify the component supply chain ensuring stable supply and improved lead times.

Additional Resources

For compatibility questions, check out the [Hardware Compatibility Tool](). This online resourcecontains a regularly updated database of Juniper's pluggable transceivers, direct attach cables (DACs), and active optical cables (AOCs), along with information regarding compatibility with Juniper platforms and interface modules.

Specifications

JCO400-QDD-ZR Specification

Parameters	JCO400-QDD-ZR
MSA compliance (SFF, e.g., SFF-8665)	OIF 400ZR Implementation Agreement (IA)
Speed/Mode	400 Gbps Ethernet, 4x100 Gbps Ethernet
Digital diagnostic monitoring (DDM)	Module temperature (Celsius) Pre - FEC bit error rate (BER) Uncorrected Frame Error Rate (FER) Signal-to-noise ratio (SNR) Tx power (dBm) Rx total power (dBm) Carrier frequency offset (MHz) Chromatic dispersion (ps/nm) Differential group delay (ps) Polarization dependent loss (PDL) (dB) Optical signal-to-noise ratio (OSNR) (dB)
Signaling rate, each lane	478.750 Gbps 59.84375 GBd +/- 20 ppm
Modulation format	DP-16 quadrature amplitude modulation (QAM)
Forward error correction (FEC) types	Concatenated FEC (CFEC)
Channel plan wavelength range	1567.13 nm through 1528.77 nm
Channel plan frequency range	191.3 THz through 196.1 THz
Channel spacing	75 GHz or 100 GHz
Channel tunability	6.25 GHz grid
Optical transmitter output power (on)	Min: –10 dBm, Tx output power accuracy: +/–1.5 dB
Optical transmitter output power (off)	-20 dBm
Optical transmitter wavelength accuracy	+/- 1.8 GHz
Optical transmitter channel tuning time	60 sec
Optical receiver input power range	–12 through 0 dBm
Optical receiver damage input power threshold	15 dBm
Optical receiver input sensitivity (unamplified or dark-fiber applications)	-20 dBm
Optical receiver minimum OSNR (back-to-back), typical	< 26 dB
Optical receiver minimum OSNR (back-to-back), worst-case, EOL	26 dB
Optical receiver chromatic dispersion tolerance	+/– 2.4 ns/nm
Optical receiver polarization-mode dispersion PMD tolerance	10 ps (@ 0.7 dB OSNR penalty) 7 ps (@ 0.5 dB Rx sensitivity penalty)
Optical receiver polarization tracking	50 krad/s
Receiver PDL tolerance (dB)	3.5 dB (@ 1.8 dB OSNR penalty) 1.5 dB (@ 0.4 dB Rx sensitivity penalty)
Cable type	Single-mode fiber-optic (SMF)

Parameters	JCO400-QDD-ZR
Core size/cladding	9/125 μm
Distance	120 km
Notes for distance	<120 km (DWDM amplified, noise limited links), < 40 km (single wavelength unamplified, loss limited links)
Maximum power consumption (W)	19 W
Operating temperature (range)	0° C to 70° C
Storage temperature	−40° C to 85° C
Typical weight and dimensions	Weight: 85 g +/−5 g; Dimensions: QSFP-DD MSA compliant

JCO400-QDD-ZR-M Specification

Parameters	JCO400-QDD-ZR-M				
Use-Case	DCI	Metro	Regional	Long Haul	Ultra-Long Haul
MSA compliance (SFF, e.g., SFF-8665)	OIF 400ZR Implementation Agreement (IA)	OpenZR+ MSA	OpenZR+ MSA	OpenZR+ MSA	OpenZR+ MSA
Speed/Mode	400 Gbps Ethernet, 4x100 Gbps Ethernet	400 Gbps Ethernet, 4x100 Gbps Ethernet	3x100Gbps Ethernet	2x100Gbps Ethernet	1x100Gbps Ethernet
Digital diagnostic monitoring (DDM)	Module temperature (Celsius) Pre - FEC bit error rate (BER) Uncorrected Frame Error Rate (FER) Signal-to-noise ratio (SNR) Tx power (dBm) Rx total power (dBm) Carrier frequency offset (MHz) Chromatic dispersion (ps/nm) Differential group delay (ps) Polarization dependent loss (PDL) (dB) Optical signal-to-noise ratio (OSNR) (dB)				
Signaling rate, each lane	478.750Gbps, (59.84375GBd), +/-20ppm	481.1Gbps, (60.14GBd), +/-20ppm	360.8Gbps, (60.14GBd), +/-20ppm	240.6Gbps, (60.14GBd), +/-20ppm	120.3Gbps, (30.07GBd), +/-20ppm
Modulation format	DP-16QAM	DP-16QAM	DP-8QAM	DP-QPSK	DP-QPSK
Forward error correction (FEC) types	Concatenated FEC (CFEC)	OFEC	OFEC	OFEC	OFEC
Channel plan wavelength range	1567.13 nm through 1528.77 nm				
Channel plan frequency range	1191.3 THz through 196.1 THz				
Channel spacing	1>75 GHz or greater	1>75 GHz or greater	1>75 GHz or greater	1>75 GHz or greater	50GHz or greater
Channel tunability	6.25 GHz grid				
Optical transmitter output power (on)	Min: −10 dBm, Tx output power accuracy: +/−1.5 dB	Min: −10 dBm, Tx output power accuracy: +/−1.5 dB	Min: −10 dBm, Tx output power accuracy: +/−1.5 dB	Min. −9dBm, Tx output power accuracy: +/−1.5dB	Min. −8dBm, Tx output power accuracy: +/−1.5dB
Optical transmitter output power (off)	Max -30dBm				
Optical transmitter wavelength accuracy	+/- 1.5 GHz				
Optical transmitter channel tuning time	60 sec				
Optical receiver input power range	−12 through 0 dBm	−12 through 0 dBm	-15 through 0dBm	-18 through 0dBm	-18 through 0dBm
Optical receiver damage input power threshold	15 dBm				
Optical receiver input sensitivity (unamplified or dark-fiber applications)	−21dBm	-23dBm	-26dBm	-31dBm	-34dBm
Optical receiver minimum OSNR (back-to-back), typical	25.5dB	23.5dB	20.5dB	15.5dB	12dB
Optical receiver minimum OSNR (back-to-back), worst-case, EOL	26dB	24dB	21dB	16dB	12.5dB
Optical receiver chromatic dispersion tolerance	+/−2.4ns/nm	+/−20ns/nm	+/−40ns/nm	+/−50ns/nm	+/−100ns/nm

Parameters	JCO400-QDD-ZR-M				
Optical receiver polarization-mode dispersion PMD tolerance	10ps (@ 0.5dB OSNR penalty)	20ps (@ 0.5dB OSNR penalty)	25ps (@ 0.5dB OSNR penalty)	25ps (@ 0.5dB OSNR penalty)	30ps (@ 0.5dB OSNR penalty)
Optical receiver polarization tracking	50 krad/s	50 krad/s	200 krad/s	300 krad/s	300 krad/s
Receiver PDL tolerance (dB)	3.5 dB (@ 1.3 dB OSNR penalty)				
Cable type	Single-mode fiber-optic (SMF)				
Core size/cladding	9/125 µm				
Distance	40km (unamplified) 120km (amplified)	40km (unamplified) 500km (amplified)	50km (unamplified) 900km (amplified)	70km (unamplified) 2000km (amplified)	80km (unamplified) >>2000km (amplified)
Maximum power consumption (W)	19W	22W	23W	22W	18.5W
Typical Power consumption (W)	17W	20W	21.5W	20W	17W
Operating temperature (range)	0° C to 70° C				
Storage temperature	–40° C to 85° C				
Typical weight and dimensions	Weight: 85 g +/–5 g; Dimensions: QSFP-DD MSA compliant				

Ordering Information

Juniper coherent DWDM optics are orderable in bundled SKUs as shown in the below table. Please contact your Juniper sales representative for product availability.

Optics Type	Bundle SKUs	Bundle Contents
OIF 400ZR	JCO-4C-ZR-P-B J	1 x JCO400-QDD-ZR (Juniper Co-Developed) 1 x S-JCO-400-A1-ZR-P (400ZR License)
	QDD-4C-ZR-P-B	1 x QDD-400G-ZR (Generic Qualified) 1 x S-JCO-400-A1-ZR-P (400ZR License)
400G OpenZR+	JCO-4C-ZRM-P-B	1 x JCO400-QDD-ZR-M (Juniper Co-Developed) 1 x S-JCO-400-A1-ZRM-P (OpenZR+ License)
	QDD-4C-ZRM-P-B	1 x QDD-400G-ZR-M (Generic Qualified) 1 x S-JCO-400-A1-ZRM-P (OpenZR+ License)
400G OpenZR+ High Power	QDD-4C-ZRM-HP-P-B	1 x QDD-400G-ZR-M-HP (Generic Qualified) 1 x S-JCO-400-A1-ZRM-P (OpenZR+ License)

Statement of Product Direction

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At Juniper Networks, we are dedicated to dramatically simplifying network operations and driving superior experiences for end users. Our solutions deliver industry-leading insight, automation, security and AI to drive real business results. We believe that powering connections will bring us closer together while empowering us all to solve the world's greatest challenges of well-being, sustainability and equality.

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