

# Client Optics for PTX Series, MX Series, and ACX Series Platforms

## Product Overview

The relentless traffic growth driven by mobile, video, BYOD, and cloud-based services is straining traditional networks and negatively impacting the businesses that rely on them. Emerging Internet of Things (IoT) communications promise even greater challenges in the near future. Given these realities, there is a renewed focus on client optics integrated directly on routing elements, which can streamline network design and operations and help contain total cost of network ownership.

## Product Description

From the Juniper Networks® ACX Series Universal Access Routers for access and aggregation, to the MX Series 3D Universal Edge Routers and PTX Series Packet Transport Routers, Juniper's routing platforms support multiple application interface types and technologies. A variety of optic module options are available for these platforms, including pluggable that can be selected based on distance, form factor, and wavelength. Identifying the best optic module for a particular use case depends on the architecture, network topology, and business imperatives.

## Features and Benefits

Integrated client optics deliver the following benefits:

- Help service providers keep pace with ever-increasing network traffic, streamline network design and operations, and contain TCO.
- Eliminate the need for service providers to source and deploy optical equipment and IP/MPLS routers separately
- Reduce the number of management touch points up to four times
- Simplify operations by allowing optical and IP/MPLS to be deployed together

## Product Options

Client optics options are detailed in the following tables. To make the best choices, review the Line Card Pluggable Client Optics tables, locate the proper client optics pluggable interface, and review the Pluggable Optics Specifications table to validate that the selected optic meets your specified network needs. Alternatively, you can review the Client Optics table, find a match based on your needs (such as distance), and then review what line card options are available with the specific optics pluggable interface.



Table 1. Line Card Pluggable Client Optics Matrix: Small Form-Factor Pluggable Plus Transceiver (SFP+)

	Product Number	MPC3D-16XGE-SFPP	MIC3-3D-10XGE-SFPP, MPC4E-3D-32XGE-SFPP, MPC4E-3D-2CGE-8XGE	MPC5E, MPC6E	MPC7E-10G	P1-PTX-24-10GE-SFPP	P1-PTX-24-10G-W-SFPP
SFP+	SFPP-10GE-SR	✓	✓	✓	✓	✓	✓
	SFPP-10GE-LR	✓	✓	✓	✓	✓	✓
	SFPP-10G-LR-OTN	-	-	✓	-	-	-
	SFPP-10GE-ER	✓	✓	✓	✓	✓	✓
	SFPP-10GE-ER-XT	-	-	-	✓	-	-
	SFPP-10GE-ZR	✓	✓	-	-	✓	✓
	SFPP-10G-ZR-OTN-XT	✓	✓	-	✓	✓	-
	SFPP-10G-CT50-ZR	✓	-	-	-	-	-
	SFPP-10G-DT-ZRC2	✓	✓	✓	-	✓	✓

Table 2. Line Card Pluggable Client Optics Matrix: Quad Small Form-Factor Pluggable and Pluggable Plus Transceivers (QSFP and QSFP+)

	Product Number	MIC3-3D-2X40GE-QSFPP	MPC5E, MPC6E	MPC7E-MRATE, MIC-MRATE	P2-10G-40G-QSFPP P3-24-U-QSFP28 P3-15-U-QSFP28 P3-10-U-QSFP28	P1-PTX-2-40GE-CFP
QSFP+	QSFP-40GBASE-SR4	✓	✓	✓	✓	-
	QSFP-40G-LX4	✓	✓	-	-	-
	QSFP-40GBASE-LR4	✓	✓	✓	✓	-
	QSFP-40GBASE-ER4	✓	✓	-	-	-
	QSFP-4X10GE-SR	-	-	✓	✓	-
	QSFP-4X10GE-LR	-	-	✓	✓	-
QSFP-100G	QSFP-100GBASE-SR4	-	-	✓	✓ <sup>1</sup>	-
	QSFP-100GBASE-CWDM	-	-	✓	✓ <sup>2</sup>	-
	QSFP-100GBASE-LR4	-	-	✓	✓ <sup>3</sup>	-
SFPP	SFPP-10G-DT-ZRC2	-	-	✓	-	-

<sup>1</sup>Supported only on P3-15-U-QSFP28 and P3-10-U-QSFP28<sup>2</sup>Supported only on P3-15-U-QSFP28 and P3-10-U-QSFP28<sup>3</sup>Supported only on P3-15-U-QSFP28 and P3-10-U-QSFP28

Table 3. Line Card Pluggable Client Optics Matrix: C Form-Factor Pluggable Transceiver (CFP) and 100-Gigabit Small Form-Factor Pluggable Transceiver (CXP)

	Product Number	MIC3-3D-1X100GE-CXP	MIC3-3D-1X100GE-CFP	MPC4E-3D-2CGE-8XGE	MPC5E-100G10G MPC5EQ-100G10G MIC6-100G-CFP2	P1-PTX-2-100GE-CFP	P2-100GE-CFP2 P2-100GE-OTN	P1-PTX-2-40GE-CFP
CFP	CFP-GEN2-100GBASE-LR4	-	✓	✓	-	✓	-	-
	CFP-100GBASE-ER4	-	✓	-	-	✓	-	-
	CFP-GEN2-CGE-ER4	-	✓	✓	-	✓	-	-
	CFP-100GBASE-ZR	-	✓	✓	-	✓	-	-
	CFP-40GBASE-LR4	-	-	-	-	-	-	✓
CFP2	CFP2-100G-SR10-D3	-	-	-	✓	-	✓	-
	CFP2-100GBASE-LR4	-	-	-	✓	-	✓	-
	CFP2-100G-LR4-D	-	-	-	✓	-	✓	-
	CFP2-100G-ER4-D	-	-	-	✓	-	✓	-
CXP	CXP-100GBASE-SR10	✓	-	-	✓	-	-	-

## Pluggable Optics Specifications

Product Number	Standard	Fiber Mode	Wavelength (nm)	Avg. Launch Power (dBm)	Avg. Receive Power (dBm)	Fiber connector	Distance
SFPP-10GE-SR	10GBASE-SR	MMF	850 (840-860)	-7.3 to -1.3	-9.9 to -1	LC	400 m (OM4)
							300 m (OM3)
							82 m (OM2, 500 MHz per km)
							66 m (OM2, 400 MHz per km)
							33 m (OM1, 200 MHz per km)
SFPP-10GE-ER	10GBASE-ER	SMF	1550 (1530-1565)	-4.7 to 4	-15.8 to -1	LC	26 m (OM1, 160 MHz per km)
							10 km
							10 km
							40 km
							40 km
SFPP-10GE-ZR	10G-ZR	SMF	1550 (1530-1565)	0 to +4	-7 to -24 (back-to-back) -7 to -22 (with 80 km fiber)	LC	80 km
SFPP-10G-ZR-OTN-XT	10G-ZR	SMF	1550 (1530-1565)	0 to +4	-7 to -24 (back-to-back) -7 to -22 (with 80 km fiber)	LC	80 km
SFPP-10G-CT50-ZR	10G-ZR	SMF	1550 (1528.3837 - 1568.7727)	-1 to 3	-7 to -24	LC	80 km

Product Number	Standard	Fiber Mode	Wavelength (nm)	Avg. Launch Power (dBm)	Avg. Receive Power (dBm)	Fiber Connector	Distance
SFPP-10G-DT-ZRC2	10G-ZR	SMF	1550 (1528.3837 – 1568.7727)	-1 to 3	-7 to -25	LC	80 km
QSFP-40GBASE-SR4	40GBASE-SR4	MMF	850 (840-860)	-7.6 to 2.4 (each lane)	-9.5 to 2.4 (each lane)	MTP-12	100 m (OM3) 150 m (OM4)
QSFP-40G-LX4	Juniper Networks Proprietary	SMF MMF	1310 1264.5-1277.5 1284.5-1297.5 1304.5-1317.5 1324.5-1337.5	-9 to 2.3 (SMF) -7 to 4.3 (MMF) (each lane)	-12 to 2.3 (SMF) -10 to 4.3 (MMF) (each lane)	LC	2 km (SMF) 100 m (OM3) 150 m (OM4)
QSFP-40GBASE-LR4	40GBASE-LR	SMF	1310 1264.5-1277.5 1284.5-1297.5 1304.5-1317.5 1324.5-1337.5	-7 to 2.3 (each lane)	-13.7 to 2.3 (each lane)	LC	10 km
QSFP-40GBASE-ER4	40GBASE-ER	SMF	1310 1264.5-1277.5 1284.5-1297.5 1304.5-1317.5 1324.5-1337.5	-2.7 to 4.5 (each lane)	-21.2 to 4.5 (each lane)	LC	40 km
QSFP-4X10GE-SR	10GBASE-SR per channel	MMF	850 (840-860)	-7.3 to -1.3 (each lane)	-9.9 to -1.0 (each lane)	MTP-12	300 m (OM3) 400 m (OM4)
QSFP-4X10GE-LR	10GBASE-LR per channel	SMF	1260 to 1355	-6.5 to 0.5 (each lane)	-14.4 to 1.5 (each lane)	MTP-12	10 km
CFP-40GBASE-LR4	40GBASE-LR	SMF	1310 1264.5-1277.5 1284.5-1297.5 1304.5-1317.5 1324.5-1337.5	-7 to 2.3 (each lane)	-13.7 to 2.3 (each lane)	SC	10 km
CFP-GEN2-100GBASE-LR4	100GBASE-LR4	SMF	1310 1294.53 – 1296.59 1299.02 – 1301.09 1303.54 – 1305.63 1308.09 – 1310.19	-4.3 to 4.5 (each lane) 1.7 to 10.5 (total of 4 lanes)	-10.6 to 4.5 (each lane)	LC	10 km
CFP-100GBASE-ER4	100GBASE-ER4	SMF	1310 1294.53 – 1296.59 1299.02 – 1301.09 1303.54 – 1305.63 1308.09 – 1310.19	2.9 to 2.9 (each lane) 8.9 (total of 4 lanes)	-20.9 – 4.5 (each lane)	LC	40 km
CFP-GEN2-CGE-ER4	100GBASE-ER4	SMF	1310 1294.53 – 1296.59 1299.02 – 1301.09 1303.54 – 1305.63 1308.09 – 1310.19	-2.9 to 2.9 (each lane) 8.9 (total of 4 lanes)	-20.9 – 4.5 (each lane)	LC	40 km
CFP-100GBASE-ZR	Juniper Networks Proprietary 100G DP-QPSK with FEC	SMF	1546.119 nm	5	-20 to 5	LC	80 km
CFP2-100GBASE-SR10-D3	100GBASE-SR10	MMF	850 (840-860)	-7.6 to 2.4 (each lane)	-9.5 to 2.4 (each lane)	MTP-24	100 m (OM3) 150 m (OM4)
CFP2-100GBASE-LR4	100GBASE-LR4	SMF	1310 1294.53 – 1296.59 1299.02 – 1301.09 1303.54 – 1305.63 1308.09 – 1310.19	-4.3 to 4.5 (each lane) 1.7 to 10.5 (total of 4 lanes)	-10.6 to 4.5 (each lane)	LC	10 km

Product Number	Standard	Fiber Mode	Wavelength (nm)	Avg. Launch Power (dBm)	Avg. Receive Power (dBm)	Fiber connector	Distance
CFP2-100G-LR4-D	100GBASE-LR4 + OTN (OTU4 Rate)	SMF	1310 1294.53 – 1296.59 1299.02 – 1301.09 1303.54 – 1305.63 1308.09 – 1310.19	4.3 to 4.5 (each lane) 1.7 to 10.5 (total of 4 lanes)	-10.6 to 4.5 (each lane)	LC	10 km
			1310 1294.53 – 1296.59 1299.02 – 1301.09 1303.54 – 1305.63 1308.09 – 1310.19	-2.9 to 2.9 (each lane) 8.9 (total of 4 lanes)	-20.9 – 4.5 (each lane)		
CXP-100GBASE-SR10*	100GBASE-SR10	MMF	850 (840-860)	-7.6 to 2.4 (each lane)	-9.5 to 2.4 (each lane)	MTP-24	100 m (OM3) 150 m (OM4)
QSFP-100GBASE-SR4	100GBASE-SR4	MMF	850 (840-860)	-8.4 to 2.4 (each lane)	-10.3 to 2.4 (each lane)	MTP-12	70 m (OM3) 100 m (OM4)
QSFP-100GBASE-CWDM	100G-CWDM4	SMF	1310 1264.5-1277.5 1284.5-1297.5 1304.5-1317.5 1324.5-1337.5	-6.5 to 2.5 dBm (each lane)	-11.5 to 2.5 (each lane)	LC	2 km
QSFP-100GBASE-LR4	100GBASE-LR4	SMF	1310 1294.53 – 1296.59 1299.02 – 1301.09 1303.54 – 1305.63 1308.09 – 1310.19	-4.3 to 4.5 dBm (each lane)	-10.6 to 4.5 (each lane)	LC	10 km

\* CXP-100GBASE-SR10 is only compatible with MIC6-100GCXP

## About Juniper Networks

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