800G ZR/ZR+ pluggable coherent modules

Compatible coherent optics for the Nokia 7250 IXR and 7750 SR

Relentless demand for increased capacity at a lower cost per bit is compelling operators to continuously upgrade and optimize their IP-optical networks. Nokia coherent routing utilizes digital coherent optics (DCOs) equipped in router interface ports to connect directly over DWDM wavelengths.

Modules and applications



800G ZR -2dBm 0/70 °C is a standardized, interoperable 800G coherent interface specification available in the router-pluggable QSFP-DD format. Developed by the Optical Internetworking Forum (OIF) and released in October 2024, 800ZR is profile-optimized for high-density access and point-to-point DCI applications. Depending on fiber link characteristics, it is designed to deliver 800 Gb/s on a single dark fiber span over a distance of up to approximately 50 km without amplification. With external amplification, it supports up to 32 800G channels or 64 400G WDM channels in the C-band over distances up to 150 km.

800G ZR+ 0dBm 0/70 °C expands the application space for router-pluggable coherent optics in QSFP-DD format. Compared to 800ZR, it offers enhanced optical performance through advanced soft-decision FEC, flexible 100G–800G operating modes, and improved shaping that enables extended reach using lower-order modulation where supported. In 800G mode, and depending on fiber link characteristics, 800G ZR+ is designed to achieve distances of more than 1000 km with external amplification. Even greater distances are possible at 400G rates. Additionally, 800ZR+ can traverse a limited number of reconfigurable optical add-drop multiplexer (ROADM) nodes, enabling efficient router bypass in amplified DWDM networks when necessary.

Technical specifications

Operating environment

- Temperature: 0-70°C (32°F to 158°F)
- Relative humidity: 5% to 95%

Table 1. Nokia 800G Coherent tunable DWDM optics ordering information

Part Number	Description	Interface
3HE18112AA	QSFP112-DD 800G ZR -2dBm 0/70C	800GBase-ZR
3HE18113AA	QSFP112-DD 800G ZR+ 0dBm 0/70C	800GBase-ZR+

Table 2. Nokia QSFP112-DD 800G ZR pluggable coherent optic specifications: 800G operation mode

3HE18112AA - QSFP112-DD 800G ZR -2dBm 0/70C				
Parameter	**Unit**	**800G**		
Compatibility mode (config)		Long haul		
Host mode Framing				
Media code		6C		
Breakout		c1-800g	c2-400g	c8-100g
Host format		800GAUI-8-L-C2M	400GAUI-4-L-C2M	100GAUI-1-L-C2M
Baud rate	Gbaud	118.20		
Data rate	Gbit/s	800		
Signal Spectral Width - Min Tx Spectral excursion	GHz	-1.5		
Signal Spectral Width - Max Tx Spectral excursion	GHz	1.5		
Roll off parameter of the Tx pulse shaping filter (raised-cosine)	β	0.19		
Single or Dual Polarization		Dual		
Number of subcarriers		1		
Inband Transmit OSNR (db)	dB	37		
Out of Band Transmit OSNR (db)	dB	38		
Minimum configurable Transmit power	dBm	-10		
Maximum configurable Transmit power	dBm	-2		
Minimum configurable Frequency	GHz	191.7 THz		
Maximum configurable Frequency	GHz	196.1 THz		
Configurable frequency resolution	GHz	3.125 GHz		
Minimum receiver OSNR	dB	26.6		
Pre FEC BER required to achieve 1E-15 post FEC BER		0.02		
FEC type		OFEC		
Minimum Grid Spacing (effective channel spectral band-width)	GHz	150		
Minimum receiver signal power	dBm	-9		
Maximum receiver signal power	dBm	+1		
Maximum allowed Chromatic Dispersion	ps/nm	3000		
Chromatic Dispersion penalty for maximum compensation	dB	0.5		
Maximum allowed Polarization Mode Dispersion	ps	108		
Polarization Mode Dispersion penalty for max. compensation	dB	0.5		
Maximum allowed Polarization Dependent Loss	dB	4		
Polarization Dependent Loss penalty for max. compensation	dB	4		
Polarization Dependent Loss penalty curve	dB	0.5dB OSNR penalty @ 1 dB PDL 1.0dB OSNR penalty @ 2 dB PDL 4.0dB OSNR penalty @ 4 dB PDL		
Maximum allowed State of Polarization change	krad/s	175		
State of Polarization penalty for maximum tracking speed	dB	3		
State of Polarization penalty curve	dB	3dB penalty @ 175krads/s		
Maximum Receiver Total Power	dBm	+1		
Power consumption	W	29		

Table 3. Nokia QSFP112-DD 800G ZR pluggable coherent optic specifications: 400G operation mode

3HE18112AA - QSFP112-DD 800G ZR -2dBm 0/70C			
Parameter	**Unit**	**400G**	
Compatibility mode (config)		Long haul	
Host mode Framing			
Media code		64	
App selection number			
Breakout		c1-400g-aui4	C4-100g-aui1
Host format		400GAUI-4-L-C2M	100GAUI-1-L-C2M
Baud rate	Gbaud	118.20	
Data rate	Gbit/s	400	
Signal Spectral Width - Min Tx Spectral excursion	GHz	-1.5	
Signal Spectral Width - Max Tx Spectral excursion	GHz	1.5	
Roll off parameter of the Tx pulse shaping filter (raised-cosine)	β	0.19	
Single or Dual Polarization		Dual	
Number of subcarriers		1	
Inband Transmit OSNR (db)	dB	37	
Out of Band Transmit OSNR (db)	dB	38	
Minimum configurable Transmit power	dBm	-10	
Maximum configurable Transmit power	dBm	-2	
Minimum configurable Frequency	GHz	191.7 THz	
Maximum configurable Frequency	GHz	196.1 THz	
Configurable frequency resolution	GHz	3.125 GHz	
Minimum receive OSNR	dB	17.9	
Pre FEC BER required to achieve 1E-15 post FEC BER		0.02	
FEC type		OFEC	
Minimum Grid Spacing (effective channel spectral bandwidth)	GHz	150	
Minimum receiver signal power	dBm	-12	
Maximum receiver signal power	dBm	+1	
Maximum allowed Chromatic Dispersion	ps/nm	58000	
Chromatic Dispersion penalty for maximum compensation	dB	0.5	
Maximum allowed Polarization Mode Dispersion	ps	108	
Polarization Mode Dispersion penalty for maximum compensation	dB	0.5	
Maximum allowed Polarization Dependent Loss	dB	4	
Polarization Dependent Loss penalty for maximum compensation	dB	4	
Polarization Dependent Loss penalty curve	dB	0.5dB OSNR penalty @ 1 dB PDL 1.0dB OSNR penalty @ 2 dB PDL 4.0dB OSNR penalty @ 4 dB PDL	
Maximum allowed State of Polarization change	krad/s	500	
State of Polarization penalty for maximum tracking speed	dB	3	
State of Polarization penalty curve	dB	3dB penalty @ 500krads/s	
Maximum Receiver Total Power	dBm	+1	
Power consumption	W	29	

Table 4. Nokia QSFP112-DD 800G ZR+ pluggable coherent optic specifications: 800G operation mode

3HE18113AA QSFP112-DD 800G ZR+ 0dBm 0/70C				
Parameter	**Unit**	**800G**		
Compatibility mode (config)		Long haul		
Network mode framing		ZR+		
Media code		F7		
Breakout		c1-800g	c2-400g	c8-100g
Host format		800GAUI-8-L-C2M	400GAUI-4-L-C2M	100GAUI-1-L-C2M
Baud rate	Gbaud	131.30		
Data rate	Gbit/s	800		
Signal Spectral Width - Min Tx Spectral excursion	GHz	-1.5		
Signal Spectral Width - Max Tx Spectral excursion	GHz	1.5		
Roll off parameter of the Tx pulse shaping filter (raised-cosine)	β	0.175		
Single or Dual Polarization		Dual		
Number of subcarriers		1		
Inband Transmit OSNR (db)	dB	37		
Out of Band Transmit OSNR (db)	dB	38		
Minimum configurable Transmit power	dBm	-10		
Maximum configurable Transmit power	dBm	0		
Minimum configurable Frequency	GHz	191.7 THz		
Maximum configurable Frequency	GHz	196.1 THz		
Configurable frequency resolution	GHz	3.125 GHz		
Minimum receive OSNR	dB	24.7		
Pre FEC BER required to achieve 1E-15 post FEC BER		0.02		
FEC type		OFEC		
Minimum Grid Spacing (effective channel spectral band-width)	GHz	150		
Minimum receiver signal power	dBm	-9		
Maximum receiver signal power	dBm	+1		
Maximum allowed Chromatic Dispersion	ps/nm	24000		
Chromatic Dispersion penalty for maximum compensation	dB	0.5		
Maximum allowed Polarization Mode Dispersion	ps	97		
Polarization Mode Dispersion penalty for max. compensation	dB	0.5		
Maximum allowed Polarization Dependent Loss	dB	4		
Polarization Dependent Loss penalty for max. compensation	dB	4		
Polarization Dependent Loss penalty curve	dB	0.5dB OSNR penalty @ 1 dB PDL 1.0dB OSNR penalty @ 2 dB PDL 4.0dB OSNR penalty @ 4 dB PDL		
Maximum allowed State of Polarization change	Krad/s	300		
State of Polarization penalty for maximum tracking speed	dB	3		
State of Polarization penalty curve	dB	3dB penalty @ 300krads/s		
Maximum receiver total power	dBm	+1		
Power consumption	W	31		

Table 5. Nokia QSFP112-DD 800G ZR+ pluggable coherent optic specifications: 400G operation mode

3HE18113AA QSFP112-DD 800G ZR+ 0dBm 0/70C			
Parameter	**Unit**	**400G**	
Compatibility mode (config)		Long haul	
Ntwk mode framing		ZR+	
Media code		EC	
Breakout		c1-400g-aui4	c4-100g-aui1
Host format		400GAUI-4-L-C2M	100GAUI-1-L-C2M
Baud rate	Gbaud	131.30	
Data rate	Gbit/s	400	
Signal Spectral Width - Min Tx Spectral excursion	GHz	-1.5	
Signal Spectral Width - Max Tx Spectral excursion	GHz	1.5	
Roll off parameter of the Tx pulse shaping filter (raised-cosine)	β	0.3	
Single or Dual Polarization		Dual	
Number of subcarriers		1	
Inband Transmit OSNR (db)	dB	37	
Out of Band Transmit OSNR (db)	dB	38	
Minimum configurable Transmit power	dBm	-10	
Maximum configurable Transmit power	dBm	0	
Minimum configurable Frequency	GHz	191.7 THz	
Maximum configurable Frequency	GHz	196.1 THz	
Configurable frequency resolution	GHz	3.125 GHz	
Minimum receive osnr	dB	18	
Pre FEC BER required to achieve 1E-15 post FEC BER		0.02	
FEC type		OFEC	
Minimum Grid Spacing (effective channel spectral band-width)	GHz	150	
Minimum receiver signal power	dBm	-12	
Maximum receiver signal power	dBm	+1	
Maximum allowed Chromatic Dispersion	ps/nm	24000	
Chromatic Dispersion penalty for maximum compensation	dB	0.5	
Maximum allowed Polarization Mode Dispersion	ps	97	
Polarization Mode Dispersion penalty for max. compensation	dB	0.5	
Maximum allowed Polarization Dependent Loss	dB	4	
Polarization Dependent Loss penalty for max. compensation	dB	4	
Polarization Dependent Loss penalty curve	dB	0.5dB OSNR penalty @ 1 dB PDL 1.0dB OSNR penalty @ 2 dB PDL 4.0dB OSNR penalty @ 4 dB PDL	
Maximum allowed State of Polarization change	krad/s	775	
State of Polarization penalty for maximum tracking speed	dB	3	
State of Polarization penalty curve	dB	3dB penalty @ 775krads/s	
Maximum receiver total power	dBm	+1	
Power consumption	W	31	



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Nokia OYJ
Karakaari 7
02610 Espoo
Finland
Tel. +358 (0) 10 44 88 000

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