

Nokia CSTAR-800 coherent optical sub-assembly (COSA)

Enabling high-performance transmission with a state-of-the-art 800G coherent optical front end

The Nokia CSTAR-800 is a coherent optical sub-assembly (COSA) designed for high-performance, low-power coherent pluggable optics applications up to 800G. It supports short-haul, metro and long-haul transmission distances, exceeding 2,000 km at 800G when paired with suitable laser, digital signal processor (DSP) and optional optical amplifiers. Built around a state-of-the-art heterogeneous silicon photonics (SiPh) transmit/receive photonic integrated circuit (PIC) with bonded thin-film lithium niobate (TFLN), it is combined with co-designed and co-packaged radio frequency (RF) integrated circuits (ICs) in a compact, non-hermetic COSA form-factor.

The innovative heterogeneous integration of SiPh and TFLN in the CSTAR-800 combines the strengths of two photonic platforms. SiPh provides a scalable base to densely integrate key optical functions, while TFLN enables the high-bandwidth, low-loss and highly linear modulation required for high-performance coherent pluggable optics. Together, they deliver an optical front end optimized for performance, power efficiency and manufacturability for high-volume deployment, supporting reliable supply, predictable lead times, consistent performance and reduced supply-chain risk.

The CSTAR-800 architecture integrates a dual-polarization nested Mach-Zender modulator (MZM), high-speed photodetectors (PDs) and tunable polarization beam splitter and rotators (PBDRs), with variable optical attenuators (VOAs), monitor photodiodes and other photonic functions

into a monolithic PIC. RF ICs providing driver and transimpedance amplifier (TIA) functions are co-designed and co-packaged with the PIC in a compact, non-hermetic optical sub-assembly. Digital management interfaces provide control of both the PIC and RF ICs.



The image shown is for illustration purposes only and may not be an exact representation of the product.

As an industry leader in semiconductor and PIC technologies, Nokia develops the SiPh/TFLN PICs and RFICs in-house, ensuring the drivers and TIAs are closely matched and optimized to the modulator and receiver.

The CSTAR-800 is designed to be integrated into pluggable coherent optical modules, together with a packaged DSP, integrable tunable laser assembly (ITLA), and optional erbium-doped fiber amplifier (EDFA)/tunable optical filter (TOF), supporting form factors as small as OSFP.



Features:

- High-density integrated functions in a non-hermetic COSA, including PIC and RF ICs.
- High performance (up to 140 GBd) with up to +3 dBm transmit optical output power, low out-of-band noise, high transmit OSNR (with external EDFA/TOF and ITLA) and high receive sensitivity.
- Super C-band support.
- COSA management: digital OIF-compliant SPI and I2C interfaces.
- Fully ROHS/REACH compliant.

Benefits:

- Easy integration: adding a DSP and external laser provides a complete coherent transceiver solution; designed for compatibility with OSFP form factor, also suitable for CFP2-DCOs and high-density coherent line card designs.
- High efficiency: low power consumption, compact footprint and high reliability.
- High-volume manufacturability: for deployment in both coherent pluggables and embedded optical engines.
- Deployment flexibility: metro, regional and long-haul performance with support for a large number of cascaded ROADMs.

Key technical specifications (preliminary):

Wavelength capacities	400G, 600G, 800G
Target form factors	OSFP MSA Also suitable for CFP2-DCOs and high-density coherent line cards
Target application	Data-center interconnect, high-capacity metro/regional/long-haul networks
Symbol rate and target modulation formats	60 to 140 GBd; DP-QPSK, DP-SQAM-16
Output power	Up to +3 dBm (with external EDFA and ITLA)
Frequency range	Super C-band tunable, 190.625 THz to 196.725 THz
Operating temperature	Sustained operations: +15 °C to +80 °C Short duration: -5 °C to +85 °C

Data in this table is preliminary and may be subject to update with experimental validation.

About Nokia

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