

FIBERSTAMP 2023

NEWSPAPER



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Company Profile

FIBERSTAMP, headquartered in Singapore and Shenzhen, China, is spearheading the Silicon Photonics revolution, transforming high-performance data centers worldwide.

Our primary focus is pioneering cutting-edge 200G/400G/800G data center solutions, setting new benchmarks for reliability and performance in the industry. Additionally, we've emerged as global leaders in immersion cooling optical modules, offering unrivaled cooling solutions. What truly distinguishes us is our unique capability to provide coherent integration services for Data Center Interconnect (DCI), setting us apart from traditional device module manufacturers.

Bridging the Core of High-Performance Computing and Data Centers

01 FIBERSTAMP Silicon Photonics Transceivers Roadmap and New Products

Roadmap for Silicon Photonics Transceivers

Note* means product is under preliminary stage.



Roadmap for NPO/CPO Silicon Photonics Transceivers



400G Silicon Photonics Transceivers

The surge in demand for 400G optical transceivers is driven by data centers' migration to 400G deployments. While traditional VCSEL technology using PAM4 CDR is prevalent for short-distance 400G optical transmission, silicon photonics technology offers compelling advantages: low power consumption, cost-effectiveness, and scalability. Silicon photonics is poised to revolutionize the next-gen data center ecosystem in the long run. FIBERSTAMP strategically adopts parallel silicon Photonics chips as a pivotal approach. This decision is underpinned by the compatibility of multi-channel parallel optical transceivers with transparent data transmission links and manageable traffic.

The journey of silicon photonics has encountered its share of challenges and breakthroughs, establishing itself as a prominent industry technology trend. Beginning with 400G optical transceivers, silicon photonics has found synergy with EML platform products. Despite the absence of significant cost advantages at present, the ethos and technological essence advocated by silicon photonics continue to ignite enthusiasm among chip manufacturers and industry customers. FIBERSTAMP's silicon photonics transceiver development intersects with various segments of the silicon photonics industry chain, fostering open communication and driving collective progress.

FIBERSTAMP is poised to unveil a groundbreaking 400G QSFP DD xR4 (CWDM) silicon photonics transceiver this October. This versatile transceiver is compatible with FR4-2KM, CWDM4-6KM, and LR4-10KM, catering to diverse connectivity needs.



FIBERSTAMP is set to unveil 400G QSFP DD Silicon Photonics Transceivers – FR4, CWDM4, LR4.

A true standout among transceivers, this device boasts a cutting-edge transmitter. It harnesses the power of an in-house developed on-chip integrated CWDM MUX silicon-based modulation chip. Rigorous performance testing has unequivocally validated its capabilities. FIBERSTAMP, with its wealth of experience in high-speed silicon photonics, guarantees a flawlessly executed product launch.

The introduction of the silicon photonics 400G FR4 optical transceiver is poised to challenge the 400G data center market, while the emergence of the silicon photonics 400G LR4 complements long-distance DCI interconnection and metropolitan Ethernet markets traditionally dominated by 400G EML technology. Ongoing research and development of this product series will further enhance its applicability, delivering carrier-grade performance. FIBERSTAMP's Silicon Photonics 400G CWDM4 optical transceiver introduces an exclusive solution to address the long-term signal loss challenges of 100G PAM4 links, instilling confidence in customers' networks.



Unleashes 400G QSFP-DD and QSFP112 DR4++ Silicon Photonics Transceivers for 10km Connectivity.

In May 2023, FIBERSTAMP unveiled the 400G QSFP-DD/QSFP112 DR4++ transceivers to fulfill the high-speed, low-power, and low-loss transmission demands of data centers, communication operators, cloud computing providers, and large enterprises. Our DR4++ 10km silicon photonics transceiver extends silicon optics for exceptional long-distance performance.

400G QSFP-DD DR++

Compliant with QSFP-DD MSA, it supports 8 channels of 50G PAM4 electrical signals and 4 channels of 100G PAM4 optical signals, enabling dual-fiber transmission up to 10km. This transceiver features a highly integrated silicon photonics solution for the transmitter and a PIN detector for the receiver. OMA RX sensitivity meets -7.1dBm @ $2.4\text{E}-4$ Pre-FEC 26.5625GBd, with power consumption below 10W.

Next-Generation 400G Transceiver - QSFP112 DR++

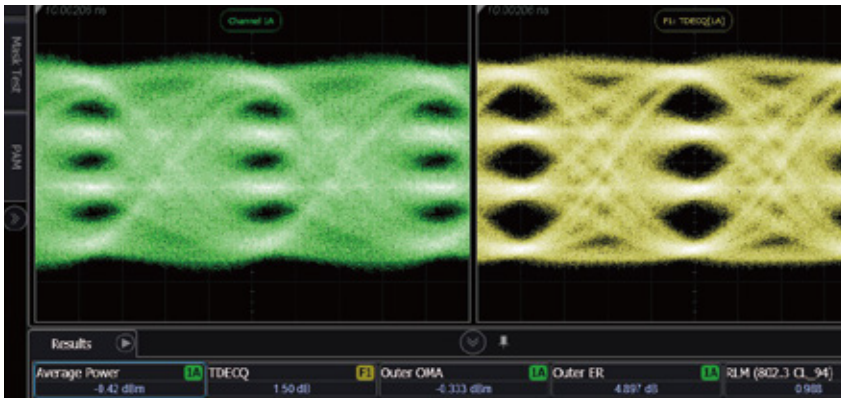
Compliant with QSFP112 MSA, it supports 4 channels of 112G-PAM4 electrical and optical signals, facilitating dual-fiber transmission over 10km. The transmitter utilizes an integrated silicon photonics solution, while the receiver employs a PIN detector. OMA RX sensitivity meets -7.1dBm @ $2.4\text{E}-4$ Pre-FEC 53.125GBd, with power consumption below 10W.

Building upon our proven silicon-based 100G and 400G optical modules, FIBERSTAMP, as an open optical network mail carrier, continues to set the industry standard for silicon-based integrated optical transceivers. Our transceivers effortlessly meet diverse transmission needs, spanning distances from 500m to 10km. With our matured silicon-based optical integration technology, these transceivers guarantee robust power budgets for uninterrupted 10km transmissions.



Released 800G QSFP-DD DR8/DR8+/DR8++ Silicon Photonics Transceivers

FIBERSTAMP 800G QSFP-DD DR8++ 10km silicon photonics transceiver employs four 1310nm CW lasers, boasting a maximum power consumption of less than 18W. With a TDECQ of less than 2dB, it supports 8 channels of 100G PAM4 optical signals, making it ideal for dual-fiber transmission up to 10km. Its impressive OMA RX sensitivity meets -7.1dBm @ 2.4E-4 Pre-FEC 53.125GBd, surpassing the 500-meter link budget requirement set by IEEE 802.3. In rigorous testing, even with KP4 FEC enabled on the 800GE traffic benchmark, it maintained flawless performance, with no packet loss during the 24-hour self-loop test over a 10km optical fiber transmission.



800G QSFP-DD DR8++ 10km Optical Eye Diagram

The currently available version offers compatibility with two connector architectures: MPO16/APC and Dual MPO12/APC. When compared to conventional 8-channel EML solutions for 800G optical transceivers, our silicon photonics transceiver utilizes fewer lasers, resulting in significantly lower power consumption. For instance, the 800G DR8 can achieve the same performance with just one laser.

In the current landscape, the demand for high computing power in AI continues to grow steadily. Thanks to our robust R&D capabilities, unwavering dedication, and strong support from the silicon photonics industry, FIBERSTAMP has successfully overcome the critical barriers in silicon photonics technology. We firmly believe that a series of innovative silicon photonics products will be introduced, fostering collaboration and resonance throughout the industry and with our valued customers.





FIBERSTAMP Introduces Two Distinct 400G Data Center Architectures Based On Silicon Photonics Technology

With the current high-bandwidth demands of 100G/200G data centers, achieving the best 400G data center model has become a focal point in the industry. Among these, silicon photonics-based solutions are considered the most promising 400G data center interconnect solutions in the field. Leveraging in-house silicon photonics technology and advancements in high-speed DAC/AOC technology, FIBERSTAMP announces two cost-effective 400G data center interconnect product lines to serve data center users.

400G Silicon Photonics Data Center Interconnect Architecture

Spine - Spine($\leq 10\text{km}$)	400G QSFP-DD CWDM4/LR4/DR4++(SiPh) 400G QSFP112 CWDM4/LR4/DR4++(SiPh) 400G OSFP-RHS CWDM4/LR4/DR4++(SiPh)
Leaf - Spine($\leq 2\text{km}$)	100G QSFP28 DR1/FR1(SiPh) 400G QSFP-DD FR4/DR4/DR4+(SiPh) 400G QSFP112 FR4/DR4/DR4+(SiPh) 400G OSFP-RHS FR4/DR4/DR4+(SiPh)
TOR - Leaf($\leq 100\text{m}$)	100G QSFP28 SR4 400G QSFP-DD SR4/VR4 400G QSFP112 SR4/VR4 400G OSFP-RHS SR4/VR4
Server - TOR($\leq 20\text{m}$)	400G QSFP-DD PCC/ACC/AOC 400G QSFP112 PCC/ACC/AOC 400G OSFP-RHS PCC/ACC/AOC



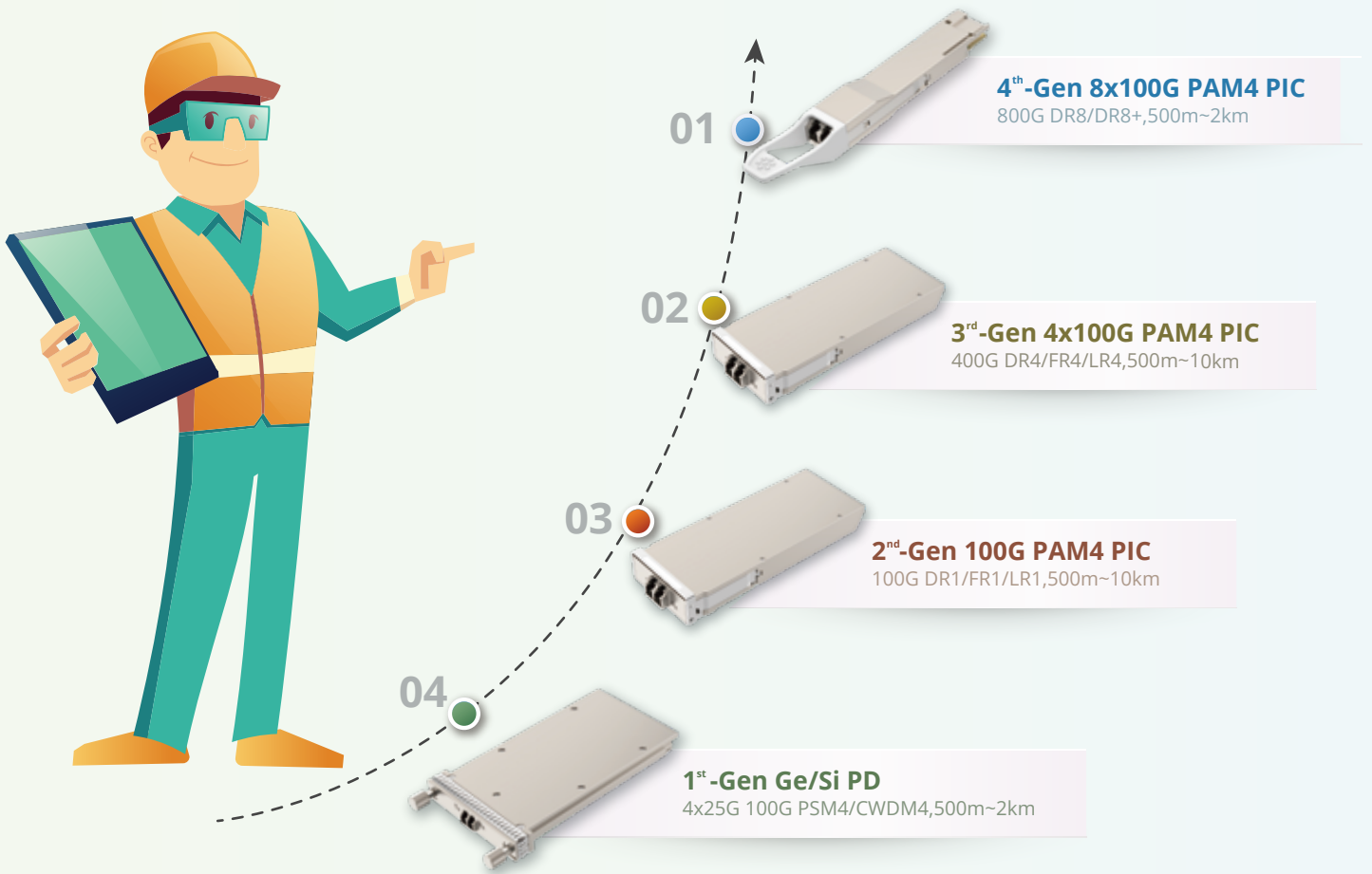
Relevant Networking-Compatible Silicon Photonics Products

Silicon photonics products compatible with it also include: 100G QSFP28 DR1/FR1, 100G QSFP28 LR1, 100G QSFP28 DWDM1 (O-BAND).

The era of Silicon Photonics in data centers is now in full swing; come and be a part of this transformative journey with FIBERSTAMP.

02 Open Coherent Optical Network Open ZR+

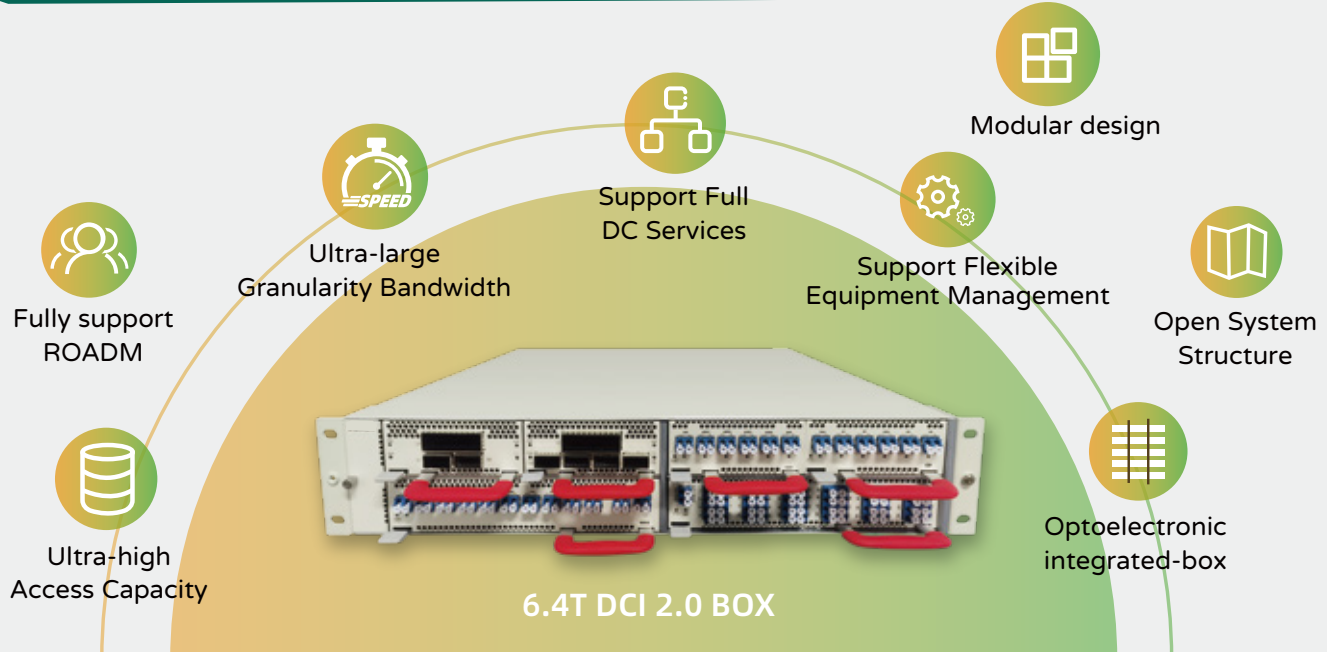
Development History of Coherent Optical Transceivers



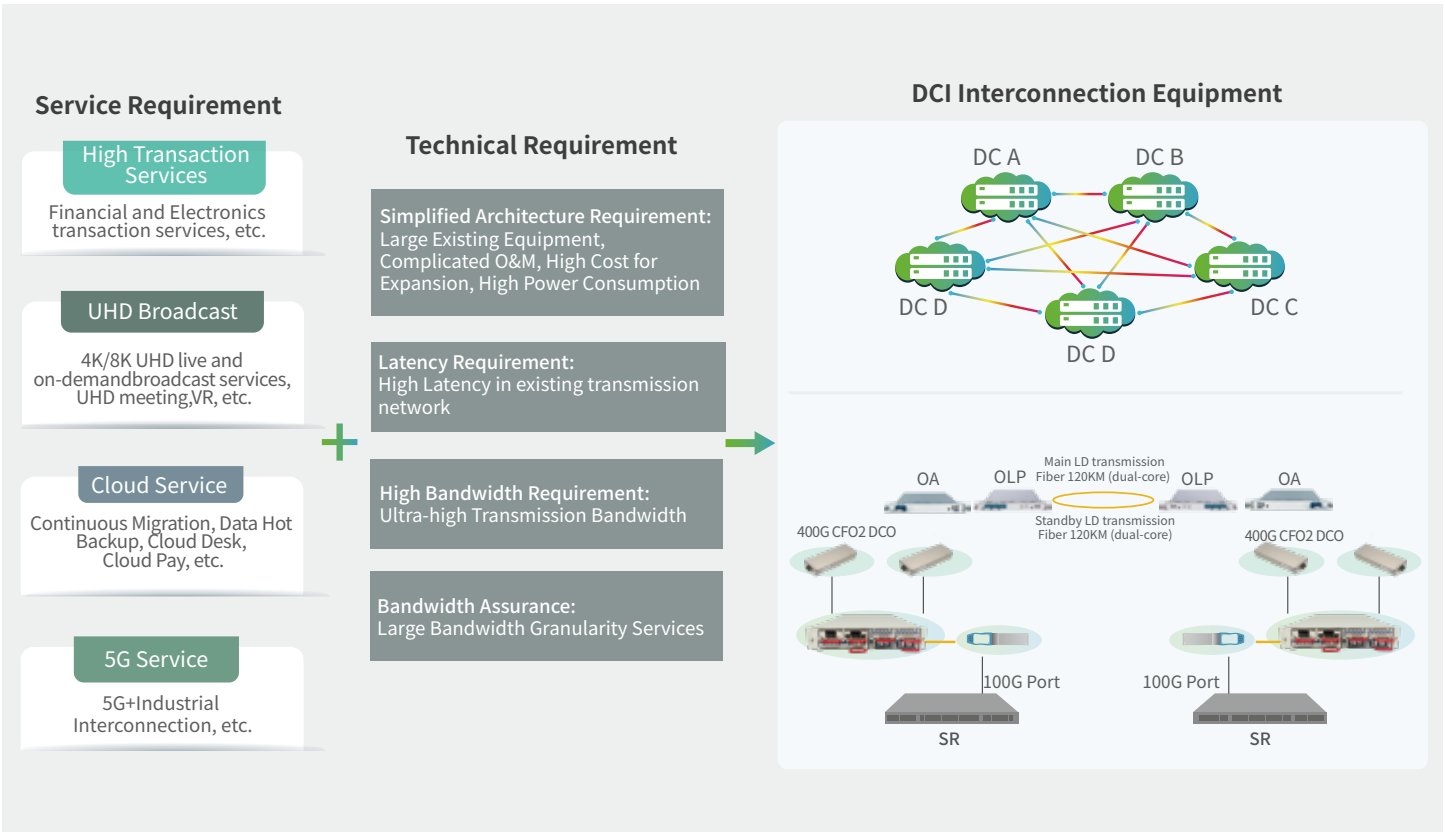
Coherent Optical Transceivers Ordering Information

Product	Modulation	RX OSNR	Power Dissipation	Distance	Temperature
100G CFP DCO	100G PM-QPSK	13dB/0.1nm	21W/22W/28W	120km/600km/2000km	0~70°C
100G CFP2 DCO	100G PM-QPSK	11.5dB/0.1nm	22W	800km/2000km	0~70°C
200G CFP2 DCO	200G PM-16QAM	17.5dB/0.1nm	22W	800km/2000km	0~70°C
400G CFP2 DCO	400G PM-16QAM	23dB/0.1nm	22W	400km	0~70°C
400G QSFP-DD ZR	400G PM-16QAM	26dB/0.1nm	16.5W	120km	0~70°C
400G QSFP-DD ZR+	400G PM-16QAM	24dB/0.1nm	22W	400km	0~70°C

Latest DCI 2.0 Coherent Subsystem
Up to 6.4T Single-Frame Access Capacity

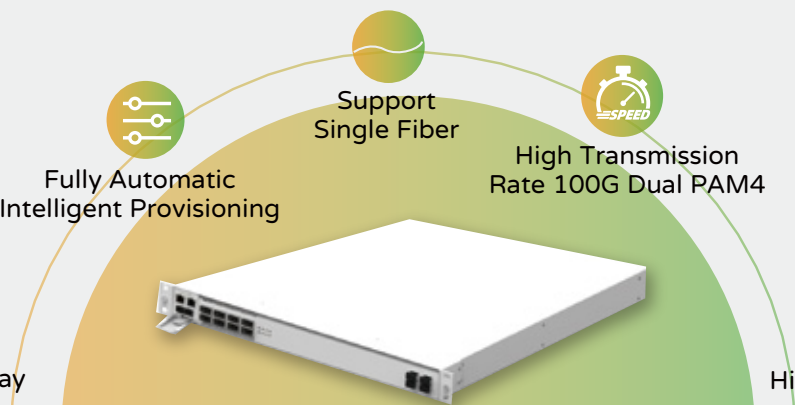


Data Center Interconnection in Optical Networks



Cost-Efficient DCI DWDM Transmission System

Latest 1U 800G DWDM DCI BOX
100G QSFP28 DWDM (2X50G PAM4) DCI BOX



- Support Single Fiber
- High Transmission Rate 100G Dual PAM4
- Economical, High Integration
- Plug and Play
- Fully Automatic Intelligent Provisioning

1U 800G DWDM DCI BOX is a compact, multi-service wavelength division transmission platform designed for a maximum of 8×100GE point-to-point service transmission. Each box offers a standard access capacity of 800G.

Silicon Photonics 100G Single Lambda Economical Optical Transceivers



- 100G QSFP28 DWDM1 O-Band (Siph)
- 100G QSFP28 LR1 (Siph)

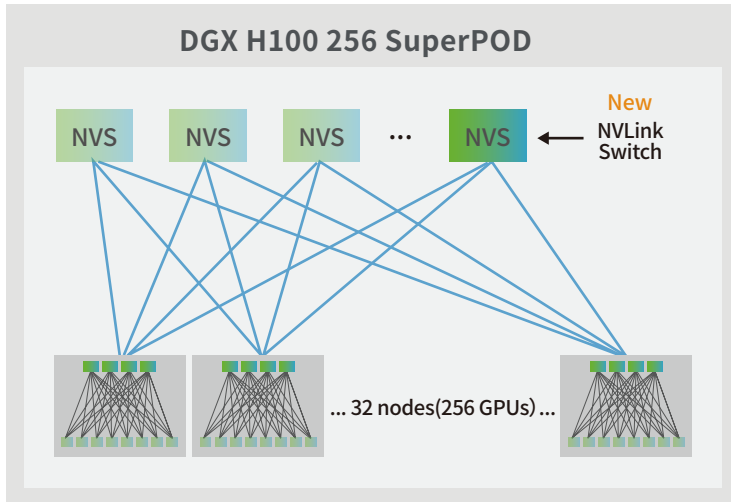
100G DWDM PSM Transceivers



- 100G QSFP28 DWDM4 C-Band EML
- 100G QSFP28 DWDM4 O-Band DML

03

Data Center and AI High Computational Applications



AI Parallel Data Center Architecture

- Nvidia's DGX H100 and GH200 leverage the NVLink switch architecture for substantial GPU interconnection bandwidth improvement.
- In the H100/H800 8-card server, the network bandwidth stands at an impressive 3.2T, achieved by multiplying 400G by 8.
- The H100/H800 8-card server boasts an external NVLink bandwidth of 14.4T, resulting in a remarkable card-to-optical transceiver ratio of 1:9 at 400G each. This highlights exceptional connectivity capabilities.

To support high-performance computing in HPC data centers and demanding AI computational tasks, FIBERSTAMP has introduced a range of products, including 800G QSFP-DD/OSFP PCC/ACC, 800G QSFP-DD/OSFP AOC, 400G QSFP112 and 400G OSFP-RHS optical modules.

800G SR8/AOC

QSFP-DD & OSFP support, max power 14W

800G OSFP AOC	70m@OM3/100m@OM4
800G QSFP-DD AOC	70m@OM3/100m@OM4

800G DAC

QSFP-DD & OSFP support, max power 2.5W

800G OSFP PCC/ACC	Max 1.8M@PCC, 5M@ACC
800G QSFP-DD PCC/ACC	Max 2M@PCC, 5M@ACC

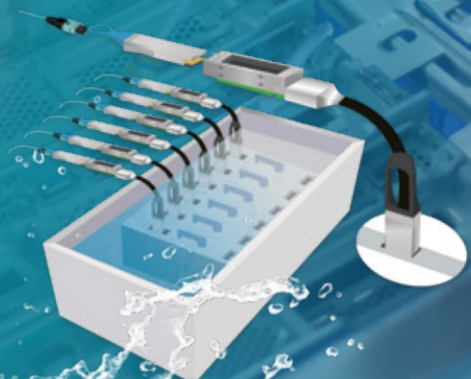
400G QSFP112/OSFP-RHS Optical modules

400G QSFP112 DR4/LR4	2km/10km, 4*100G PAM4
400G OSFP-RHS LR4	10km, 4*100G PAM4



Immersion Liquid Interconnect Solution

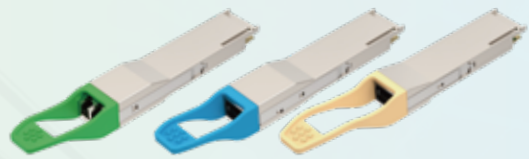
QSFP+/QSFP28/QSFP56/QSFP-DD Extender	200G QSFP56 SR4
10G SFP+ SR/LR/BIDI LR	25G SFP28 DAC
25G SFP28 SR/LR/BIDI LR	100G QSFP28 DAC
40G QSFP SR4	200G QSFP56 DAC
100G QSFP28 SR4/PSM4	



04 Unwavering Commitment FIBERSTAMP's Ever-Advancing 200G Product Line

In the current optical network landscape, the importance of 200G technology cannot be overstated. As data demands continue to surge across various sectors, FIBERSTAMP recognizes the critical role that 200G technology plays in addressing these challenges. Our comprehensive range of optical modules spans across diverse sectors, including data centers, AI supercomputing, 5G networks, and metro telecom markets.

- 200G QSFP-DD SR8/PSM8/LR8 and 200G QSFP-DD 2×CWDM4 (8X25G NRZ, dual LC interfaces) catering to low-latency data centers and broadcast and television markets.



- 200G QSFP56 optical transceivers and AOCs, ideal for large data centers, featuring cost-effective 50G PAM4 DML technology



- 200G QSFP-DD PSM4/LR4/ER4 optical transceivers designed for 5G backhaul and next-generation metro telecommunications interconnections, featuring advanced 50G PAM4 7nm DSP technology



- The upcoming 200G QSFP56 LPO DR4 silicon photonics transceiver, tailored for AI supercomputing.



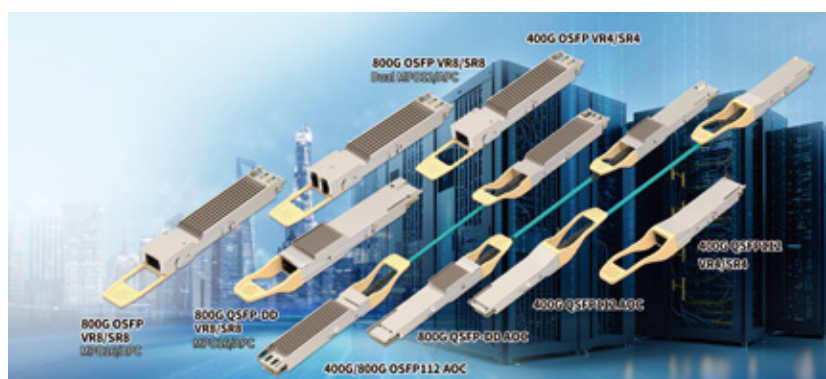
- 200G CFP2 DCO coherent optical transceivers for DCI interconnection and metro telecom markets.



05 Revolutionizing Connectivity for HPC Data Center FIBERSTAMP's Latest 400G/800G Optical Offer

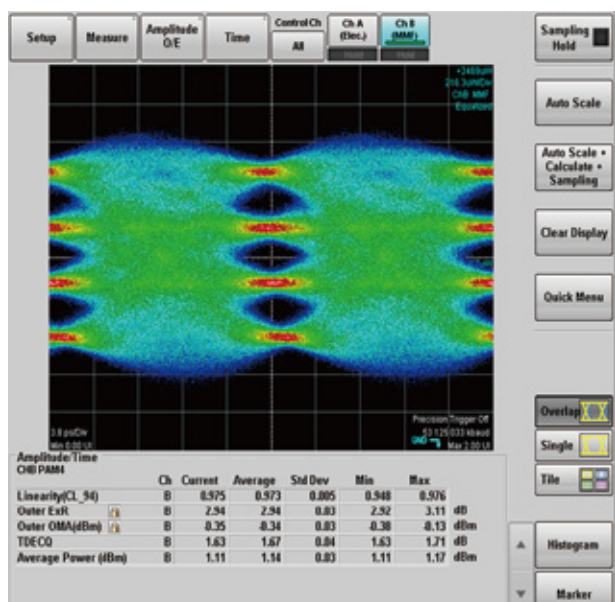
New 800G VR8/SR8, 400G VR4/SR4 Optical Modules and AOC in QSFP-DD & OSFP Form Factors

In today's digital landscape, the demand for high-speed data transmission has reached unprecedented levels. Optical modules and cables are the unsung heroes responsible for ensuring seamless data flow in this connectivity revolution. As data rates soar, their importance cannot be overstated. FIBERSTAMP, an open optical network mail carrier, understands this significance. We are proud to introduce our latest cutting-edge optical modules and active optical cables, designed to meet the surging demands of the modern era.



112Gpbs PAM4 400G/800G MMF Series Products

FIBERSTAMP new product series includes the 800G QSFP-DD VR8/SR8, 800G OSFP VR8/SR8, 400G QSFP112 VR4/SR4, and 400G OSFP112 VR4/SR4 optical modules, complemented by a range of active optical cables. These cutting-edge modules feature high-performance 112Gbps VCSEL lasers and advanced 7nm DSP technology. With electrical host interfaces supporting 112Gbps PAM4 signals per channel, all our offerings adhere to the CMIS 4.0 protocol, ensuring top-notch performance for your data center needs.



Key Performance Highlights

- Eye Diagram and Sensitivity Metrics TDECQ**
 Per channel is less than 3dB; OMA RXsen sensitivity meets -5.2dBm @ 2.4E-4 Pre-FEC 53.125GBd.
- Transmission Distances**
 VR8/VR4: 30m (OM3 MMF), 50m (OM4 MMF)
 SR8/SR4: 60m (OM3 MMF), 100m (OM4 MMF)
- Form Factors**
 400G/800G optical modules support two form factor: QSFP-DD and OSFP.
- Power Consumption Design**
 Power consumption is less than 14W for 800G optical modules/AOCs, and less than 8W for 400G optical modules/AOCs.

Eye Diagram and Sensitivity Metrics TDECQ

FIBERSTAMP 400G and 800G DAC Solutions Redefine Parallel Computing

FIBERSTAMP, renowned for its expertise in 100G PAM4 technology, is unwavering in its dedication to innovation. As we step into the era of 400G commercialization and set our sights on the 800G frontier, we are thrilled to unveil our comprehensive 400G/800G DAC series. Notably, this release includes the cutting-edge 800G QSFP-DD ACC and 800G OSFP ACC, reaffirming our status as trailblazers in high-performance parallel computing environments.



Key Performance Highlights

- Enhanced Reach:**
 Up to 4m reach for short-distance interconnections.
- Advanced Copper Cabling:**
 Utilizes 16 pairs of 26AWG copper cables for bidirectional transmission.
- High-Speed Data Transfer:**
 Achieves lightning-fast speeds of 112GB/s across 8 channels.

Our ACCs offer backward compatibility for seamless integration into existing setups. They excel in power efficiency, with a typical consumption of only 2.5W, and boast minimal latency, measuring less than 20ns. When compared to conventional Re-Timer alternatives, our ACCs stand out for their ability to maintain precise signal-to-noise ratios. Choose FIBERSTAMP for exceptional connectivity in both QSFP-DD and OSFP form factors.

FIBERSTAMP 400G/800G DAC Series Products Overview

PCC / ACC Series	Total Speed (Gbps)	Lanes, Lane Speed (Gbps)	Lengths (Meter)
800G QSFP-DD PCC	850	8,100	1m(30AWG)/1.8m(26AWG)
800G OSFP-DD PCC	850	8,100	1m(30AWG)/1.8m(26AWG)
400G OSFP-RHS PCC	425	8,100	1m(30AWG)/1.8m(26AWG)
800G QSFP-DD ACC	850	8,100	5m(30/26AWG)
400G QSFP-DD ACC	425	8,50	7m(30/26AWG)
400G OSFP-RHS ACC	425	8,50	5m(30/26AWG)

Boost your HPC data center's performance with FIBERSTAMP's cutting-edge DAC/AOC and silicon photonics optical modules, tailored for parallel computing. Experience seamless backward compatibility, exceptional power efficiency, and ultra-low latency to elevate your parallel computing capabilities.

Visit us at OCP2023 Booth C14 and SC2023 Booth 1486!

✉ Contact, sales@fiberstamp.com

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