



400G High-Speed Transceivers Types and Standards Guide



400G Series Highlights

400G QSFP56-DD 8CH (8x50G PAM4) | 400G QSFP56-DD 4CH (4x100G PAM4)
400G SiPh | 400G Coherent DCO



Lower Power Consumption

Advantage 01



High Signal Integrity

Advantage 02



Silicon Photonics Available

Advantage 03



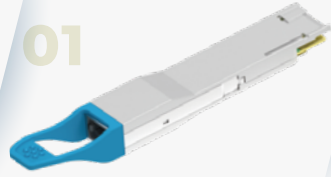
High Maturity

Advantage 04

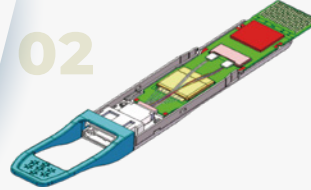
400G QSFP56-DD 8CH (8x50G PAM4)

PRODUCT >>

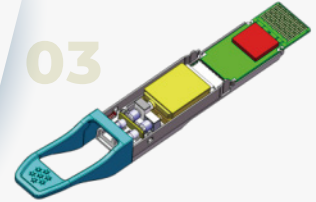
01



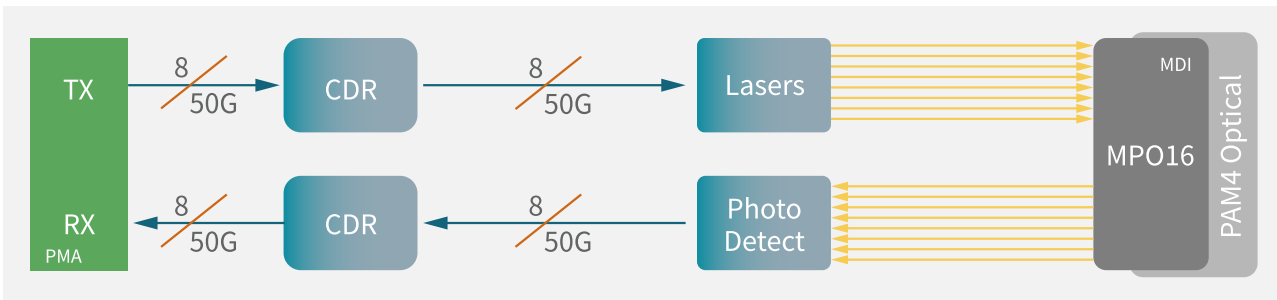
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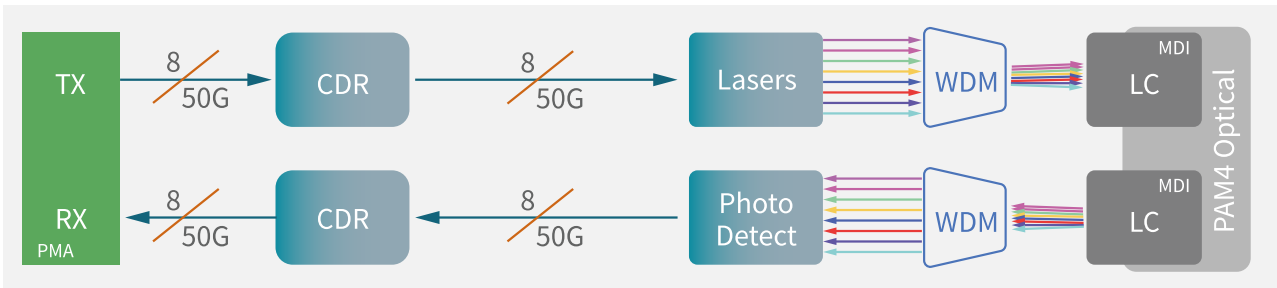
03



SR8/PSM8



FR8/LR8/ER8



PMD	Optical Interface	Laser	Wavelength	Tx+Rx	Connector	Reach
400G QSFP-DD SR8	8x50G PAM4	VCSEL	MMF/850nm	16(1λ)	MPO-16/24	100m
400G QSFP-DD PSM8	8x50G PAM4	EML	SMF/1310nm	16(1λ)	MPO-16/24	2km~10km
400G QSFP-DD XPSM8	8x50G PAM4	EML	SMF/1310nm	16(1λ)	MPO-16/24	10km+
400G QSFP-DD FR8	8x50G PAM4	EML	SMF/LWDM8	2(8λ)	LC-Duplex	2km
400G QSFP-DD LR8	8x50G PAM4	EML	SMF/LWDM8	2(8λ)	LC-Duplex	10km
400G QSFP-DD ER8	8x50G PAM4	EML	SMF/LWDM8	2(8λ)	LC-Duplex	40km

400G Coherent Module Highlights

400G CFP2 DCO | 400G QSFP-DD ZR DCO

01 Effective and Economical

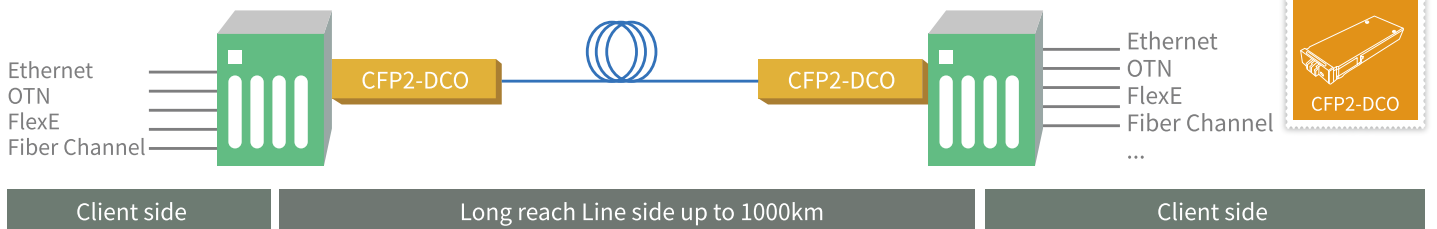
03 Ultra-long Distance Transmission

02 High-Scale Connectivity

04 Ultra High-capacity Optical Transmission

400G Coherent DCO

400G CFP2 DCO -Multi-services



400G QSFP-DD ZR DCO -Ethernet

80km DWDM IEEE 802.3cw



400G CFP2 DCO

- Reach beyond 1000km over SMF for 400G transmission
- Support 100/200/400G PM-QPSK/8QAM/16QAM Modulation
- Support SD-FEC
- OTU4/OTUC2/2*100GE/100GE Signaling Supported
- Compliant CEI-28G-MR Specifications
- Compliant OTL4.4/OTLC2/CAUI-4 Signaling
- CFP2 MSA Hardware Specification Rev. 1.0
- OIF-CFP2-DCO-01.0
- CFP MSA Management Interface Specification Version 2.6 (R06a)
- Line & Client PRBS Generator and Checker
- Line loopback, host terminal/facility loopback
- Power consumption 28W(400G)/26W(200G)/21W(100G)

400G QSFP-DD ZR DCO

- QSFP-DD MSA compliant
- Compliant with OIF 400ZR, version 01.0, March 10, 2020
- Digital diagnostic monitoring support
- Hot pluggable by 76-pin electrical interface
- Maximum power consumption 16.5 W
- 400G 16QAM modulation
- Compact size (18.4 mm x 93.4 mm x 8.5 mm)
- LC duplex connector
- 400GBASE-R, 425 Gbps bit rate
- 400G-AUI-8 C2M; 8 x CEI-56G-VSR PAM-4 electrical interface
- Operating case temperature: 0°C to 70°C
- Single 3.3 V power supply
- RoHS 2 compliant



200G Networks with Continuous Strong Growth

QSFP-DD NRZ & QSFP56 PAM4
Optical Transceiver Technologies

200G High-Speed Transceivers Types and Standards Guide



200G Series Highlights

Legacy NRZ-OOK Vs. PAM4 Modulation | 200G QSFP-DD 8x25G NRZ
200G QSFP56 4x50G PAM4 | 200G QSFP DD PAM4



Diversity
QSFP-DD
and QSFP56

Advantage 01



Low-latency

Advantage 02



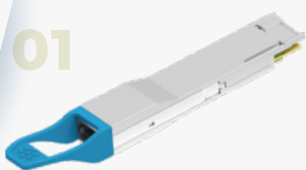
Low Power
Consumption

Advantage 03

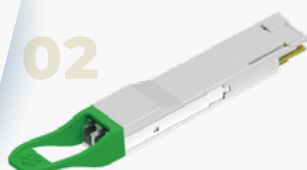
400G QSFP56-DD 4CH (4x100G PAM4)

PRODUCT >>

01



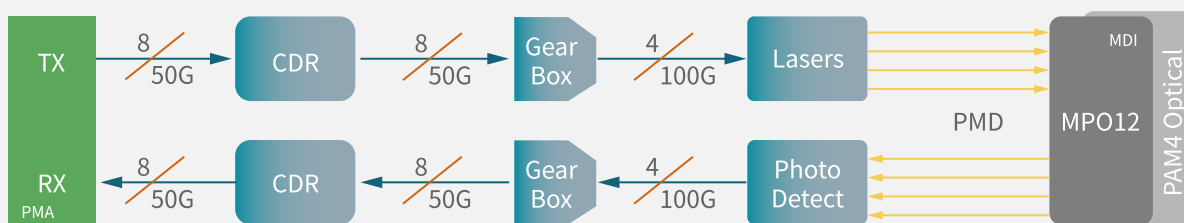
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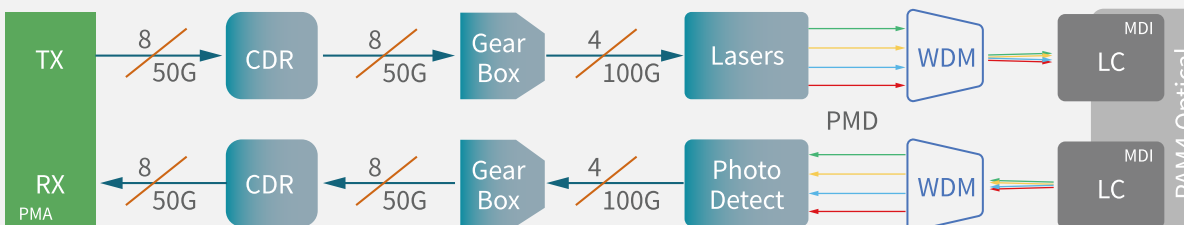
03



XDR4/PLR4



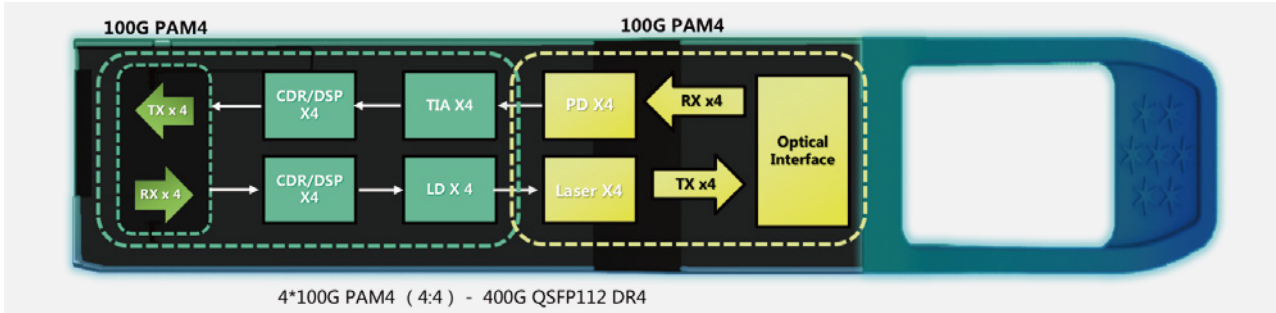
CWDM4



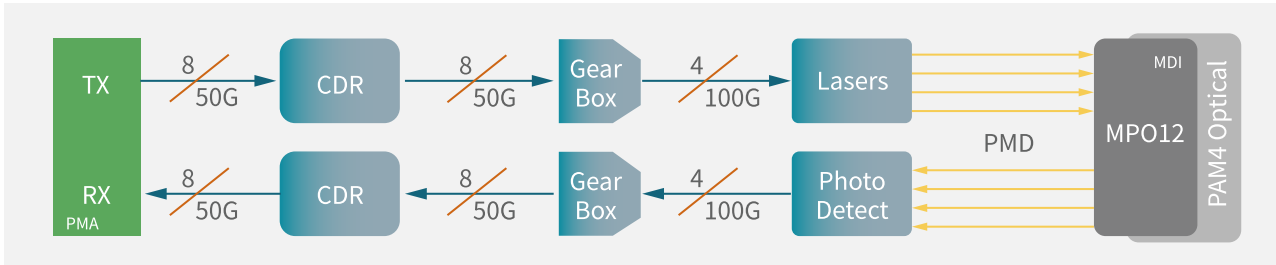
PMD	Optical Interface	Laser	Wavelength	Tx+Rx	Connector	Reach
400G QSFP-DD XDR4	8x56G PAM4 Gear Box 4x100G PAM4	EML	SMF/1310nm	8(1λ)	MPO-12	2km
400G QSFP-DD PLR4	8x56G PAM4 Gear Box 4x100G PAM4	EML	SMF/1310nm	8(1λ)	MPO-12	10km
400G QSFP-DD CWDM4	8x56G PAM4 Gear Box 4x100G PAM4	EML	SMF/CWDM4	2(4λ)	LC-Duplex	2km/6km/10km

400G QSFP56-DD & QSFP112 SiPh

QSFP112 DR4/DR4+



QSFP56-DD DR4/DR4+



PMD	Optical Interface	Laser	Wavelength	Tx+Rx	Connector	Reach
400G QSFP-DD DR4	8x56G PAM4 Gear Box 4x100G PAM4	SiPh	SMF/1310nm	8(1λ)	MPO-12	500m
400G QSFP-DD DR4+	8x56G PAM4 Gear Box 4x100G PAM4	SiPh	SMF/1310nm	8(1λ)	MPO-12	2km
400G QSFP112 DR4	4x100G PAM4	SiPh	SMF/1310nm	8(1λ)	MPO-12	500m
400G QSFP112 DR4+	4x100G PAM4	SiPh	SMF/1310nm	8(1λ)	MPO-12	2km

400G Roadmap

- 400G QSFP DD XLR4 (narrow LAN-WDM+PIN)
- 400G QSFP112 PLR4 (EML)

- 400G QSFP DD ER4 lite (narrow LAN-WDM+APD)
- 400G QSFP 112 CWDM4 (EML)

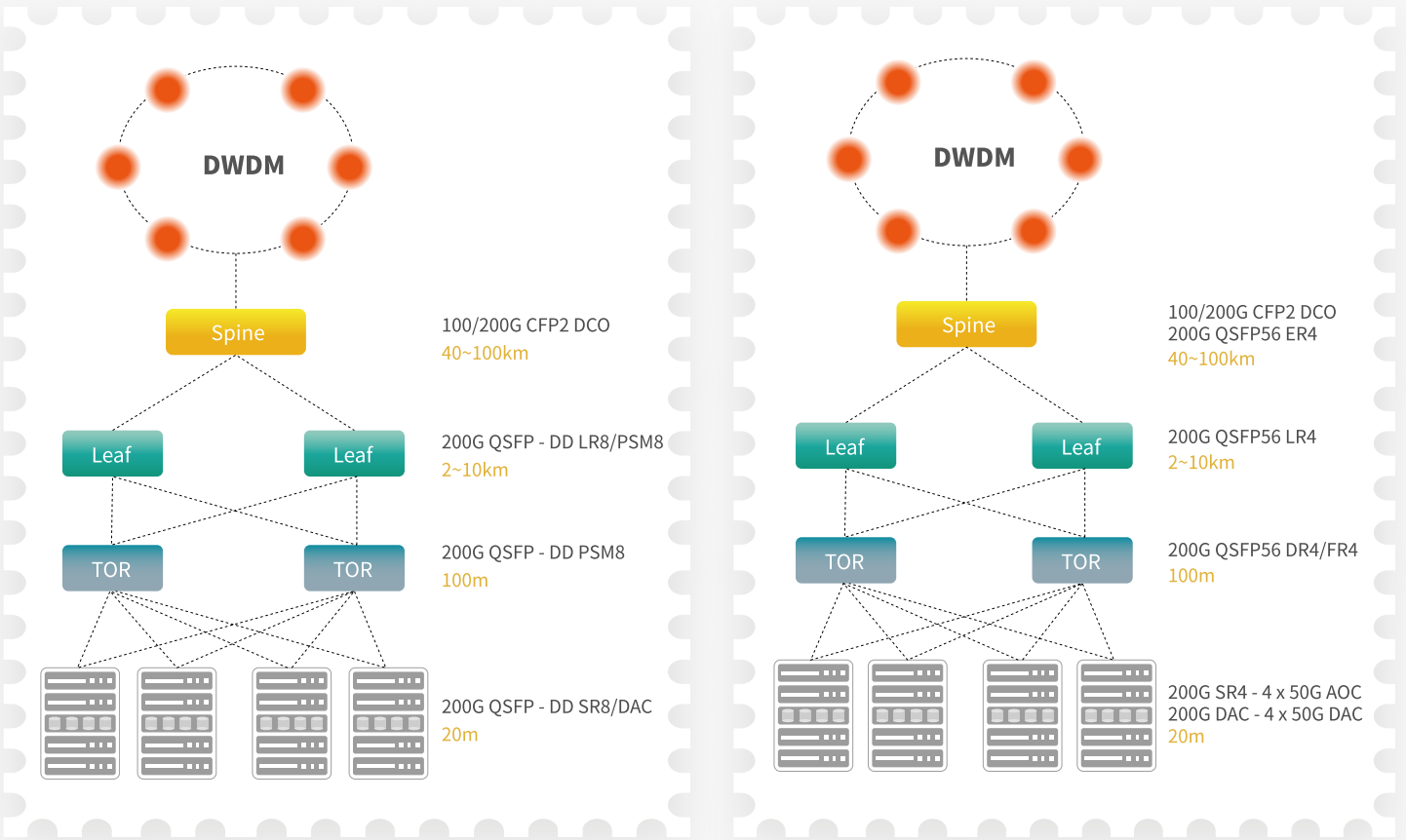
- 400G QSFP 112 XLR4 (narrow LAN-WDM+PIN)
- 400G QSFP112 ER4 (narrow LAN-WDM+APD)

2023.Q3

2023.Q4

2024.Q1

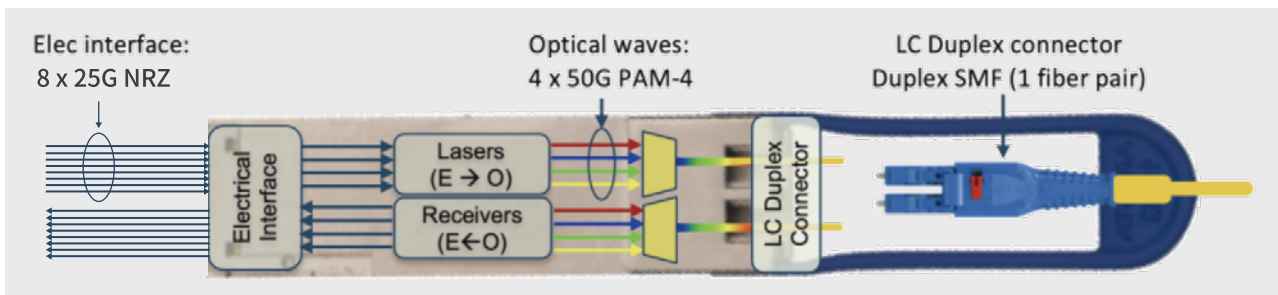
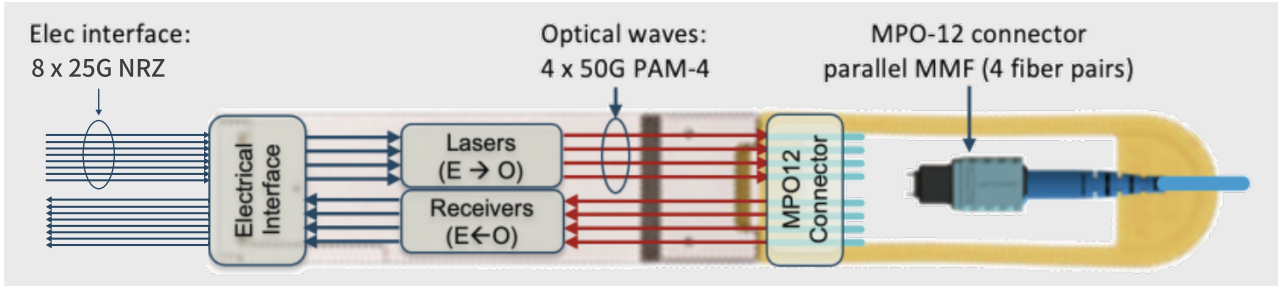
200G QSFP-DD 8x25G NRZ/200G QSFP56 4x50G PAM4



PMD	Optical Interface	Laser	Wavelength	Tx+Rx	Connector	Reach
200G QSFP-DD SR8	8x25G NRZ	VCSEL	MMF/850nm	16(1λ)	MPO-16	100m
200G QSFP-DD PSM8	8x25G NRZ	DFB	SMF/1310nm	16(1λ)	MPO-16	2km~10km
200G QSFP-DD XPSM8	8x25G NRZ	DFB	SMF/1310nm	16(1λ)	MPO-16	20km
200G QSFP-DD LR8	8x25G NRZ	DFB	SMF/LWDM8	2(8λ)	LC-Duplex	10km
200G QSFP-DD XLR8	8x25G NRZ	DFB	SMF/LWDM8	2(8λ)	LC-Duplex	20km
2x100G QSFP-DD CWDM4	2x4x25G NRZ	DFB	SMF/CWDM4	2(4λ)	LC-Duplex	6km

PMD	Optical Interface	Laser	Wavelength	Tx+Rx	Connector	Reach
200G QSFP56 SR4	4x50G PAM4	VCSEL	MMF/850nm	8(1λ)	MPO-12	100m
200G QSFP56 DR4(Siph)	4x50G PAM4	Siph	SMF/1310nm	8(1λ)	MPO-12	500m
200G QSFP56 LR4	4x50G PAM4	EML	SMF/LWDM4	2(4λ)	LC-Duplex	10km
200G QSFP56 ER4	4x50G PAM4	EML	SMF/LWDM4	2(4λ)	LC-Duplex	40km

200G QSFP-DD 4x50G PAM4



System Platformization



Product Modularity



Unified Management

PMD	Optical Interface	Laser	Wavelength	Tx+Rx	Connector	Reach
200G QSFP-DD SR4	4x50G PAM4	VCSEL	MMF/850nm	8(1λ)	MPO-12	100m
200G QSFP-DD PSM4	4x50G PAM4	EML	SMF/1310nm	8(1λ)	MPO-12	2~10km
200G QSFP-DD FR4	4x50G PAM4	EML	SMF/CWDM4	2(4λ)	LC-Duplex	2km
200G QSFP-DD LR4	4x50G PAM4	EML	SMF/LWDM4	2(4λ)	LC-Duplex	10km
200G QSFP-DD ER4	4x50G PAM4	EML	SMF/LWDM4	2(4λ)	LC-Duplex	40km



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