

## GIGALIGHT Marketing Report

# New Era Solutions for 200G Data Centers

Issue 4, 2023

▶ 200G QSFP56 (4x50G PAM4) Series

▶ 200G QSFP-DD (8x25G NRZ) Series

# New Product Launch

## 200G QSFP56 DR4/FR4

In terms of cost-effectiveness and long-term viability, 200G data centers remain the reigning choice. Their advantages in low power consumption and technological solutions make them particularly appealing for underdeveloped countries or enterprise-level data centers, where 200G should be the preferred option.

In June 2023, GIGALIGHT released the 200G QSFP56 DR4 and 200G QSFP56 FR4 data center optical modules based on the PAM4 DML platform. This further confirmed and clarified the advantages of 200G in certain data center applications. The new 200G QSFP56 DR4/FR4 modules employ PAM4 modulation technology and DML lasers to deliver high-speed transmission and outstanding performance. Two versions are available, allowing for selection based on the mid-short distance transmission within the data center. Both DR4 and FR4 modules have a power consumption of less than 6W, reducing power consumption and operational costs. The FR4 module exhibits superior receive sensitivity OMA compared to the DR4 module (by 1dBm), with excellent parameters including high OMA sensitivity ( $<-9\text{dBm}$ ) under PAM4 modulation, allow it to adapt to different application scenarios, ensuring high-quality signal transmission and maintaining a good eye diagram quality.



-  Low Power Consumption  $< 6\text{W}$
-  High Sensitivity OMA  $<-9\text{dBm}$
-  Reliable PAM4 Modulation Technology
-  Cost Friendly DML Lasers

**200G QSFP56 DR4 500m**



**200G QSFP56 FR4 2km**

## 200G QSFP-DD SR8/PSM8 Industrial Optical Modules

In August 2022, GIGALIGHT upgraded the 200G QSFP-DD SR8/PSM8 optical modules to the industrial temperature range, better meeting the demands of AI supercomputing and outdoor high-speed signal distribution scenarios.

### 200G(8X25G) QSFP-DD Industrial-grade Optical Modules

- 8-channel ultra-high density optical design
- Zero bit error multi-channel transmission mechanism based on NRZ signal
- Industrial-grade -40 to 85 degree Celsius reliable transmission

Upgraded to Industrial Grad

Upgraded to Industrial Grad

200G QSFP-DD SR8

200G QSFP-DD PSM8

GIGALIGHT has gained a wide range of customers in different market segments world-wide after introducing the commercial grade 200G (8x25G NRZ) optical modules in the QSFP-DD form factor 4 years ago. Unlike the 200G QSFP56 XR4/200G QSFP-DD XR4 based on PAM4 modulation, the main features of the 200G QSFP-DD XR8 series include ultra-high density optical design, zero-bit error multi-channel transmission mechanism based on NRZ signal modulation and transmission reliability.

The upgraded 200G QSFP-DD SR8 and 200G QSFP-DD PSM8 optical modules use industrial-grade optoelectronic chips, enabling zero-error transmission in a temperature range of -40 to +85 degrees Celsius.

GIGALIGHT is almost the only supporter of the 8X25G NRZ QSFP-DD optical module series globally, resulting from its insistence on differentiation. The 8X25G NRZ QSFP-DD optical module will surely exist in the history of optical communication as a niche player.

# Extensive Reading

## Bandwidth and technology development are inseparable from 200G

After the widespread use of 100G data centers, 200G and 400G data center technologies emerged. Overall, people hope that the per-bit cost of investing in 200G and 400G data centers will be on par with 100G. However, in reality, since different data center business models and transmission latency requirements exist, cost is just one mainstream consideration for customers. The primary focus is on meeting business needs with comprehensive cost-effectiveness. The industry is designing various 200G and 400G data center optical interconnect products based on different application demands.

## Two Different 200G Data Center Architectures have been developed

- >> **200G 8x25G NRZ:** Due to the prevalence of 25G NRZ in existing networks and the demand for low latency, the 8x25G NRZ architecture is suitable for achieving 200G data transmission.
- >> **200G 4x50G PAM4:** The new network constructions without specific performance requirements, and equipment cost savings can be achieved by using PAM4 chipsets, enabling the application of PAM4 technology. Hence, the 4x50G PAM4 architecture is suitable for achieving 200G data transmission.

## Two 200G Ethernet optical module architectures and their applications listed below.

### >>> 200G (8x25G NRZ)

- 200G QSFP-DD SR8 (Low latency, common in intra-rack interconnections and interconnections between TOR switches and server network cards).
- 200G QSFP-DD PSM8 (Low latency, interconnections between racks with an abundance of single-mode fibers).
- 200G QSFP-DD 2xCWDM4 (Low latency, interconnections between racks while significantly reducing the use of single-mode fibers).

### >>> 200G (4x50G PAM4)

- 200G QSFP56 SR4 (Common in intra-rack interconnections and interconnections between TOR switches and server network cards).
- 200G QSFP56 DR4 (Interconnections between racks with an abundance of single-mode fibers).
- 200G QSFP56 FR4 (Interconnections between racks while significantly reducing the use of single-mode fibers).

## What are the advantages of 200G compared to 100G?

**200G (8x25G NRZ) VS 100G:** The physical delay of 8x25G NRZ 200G optical modules is extremely low. It has twice the channels compared to 100G, resulting in approximately double the power consumption and slightly higher costs. However, customers are not only seeking lower prices but also overall cost-effectiveness, making 200G slightly advantageous.

**200G (4x50G PAM4) VS 100G:** Compared to 100G optical modules, 4x50G PAM4 provides 2x capacity on a single port while achieving cost-effectiveness (This has actually been achieved)

## What are the advantages of 200G compared to 400G?

Compared to 400G data centers, 200G data centers require lower investments, have lower technical complexities and costs, and offer relatively higher cost-effectiveness. Although 400G provides higher transmission efficiency, its high deployment and maintenance costs and low localization rate limit its application.

Thanks to breakthroughs in domestic manufacturers' optical communication technology, the localization rate of 200G data centers has significantly increased. This reduces dependency on imports, enhances the independent controllability of data center technology in China, lowers the construction and operational costs of 200G data centers, and improves their cost-effectiveness.

In summary, 200G data centers have their irreplaceable advantages. In terms of cost-effectiveness or the long-term, 200G data centers remain the superior choice. Their low power consumption and significant technological benefits are especially valuable for underdeveloped countries or enterprise-level data centers, making 200G the preferred option.

## 200G PAM4 DML VS 200G PAM4 EML

To promote the development of economical data center technology, GIGALIGHT recently launched the 200G DR4/FR4 optical modules based on 200G PAM4 DML. How does this upgrade compare to the old version using EML?

200G PAM4 DML and 200G PAM4 EML are primarily used for a distance of 2km, with 50G PAM4 DML achieving cost and power consumption advantages. The 50G PAM4 DML, providing cost and power consumption advantages compared to 50G PAM4 EML, requires a TEC temperature control circuit to maintain a constant operating temperature for the EA electro-absorption modulator. By contrast, 50G PAM4 DML eliminates the need for this, reducing design complexity, cost, and product power consumption.

For example, the 200G QSFP56 FR4 DML version has a power consumption of 5W, making it more energy-efficient and cost-effective than the EML version.

**200G QSFP56 FR4 EML Version**

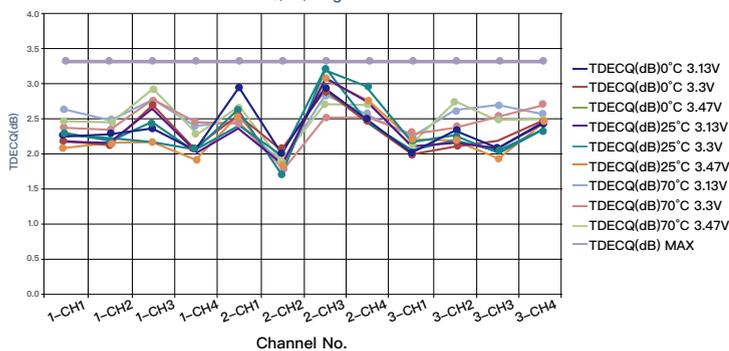
S/N	Power Consumption(W)		
	0°C3.3V	25°C3.3V	70°C3.3V
1	6.62	6.55	6.88
	20.2°C	45.3°C	69.8°C
2	6.67	6.64	7.04
	20.9°C	45.2°C	70.6°C
3	6.63	6.51	6.85
	20.2°C	44.9°C	69.6°C

**200G QSFP56 FR4 DML Version**

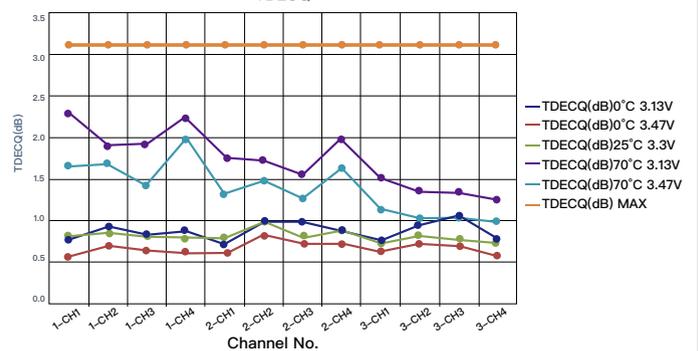
S/N	Power Consumption(W)		
	0°C3.3V	25°C3.3V	70°C3.3V
1	4.30	4.41	4.81
	-0.7	28.8	69.7
2	4.34	4.45	4.85
	-2	30.6	69
3	4.34	4.49	5.03
	-1.5	28.2	72.9

With the development of DML technology, especially in 50G PAM4 2km systems, the performance gap between DML and EML has decreased. With low-consumption, cost-effectiveness and simple manufacture, GIGALIGHT's 50G PAM4 DML laser excels at applications in large-scale data centers while maintaining compatible metrics. The receiving OMA sensitivity and TDECQ (dB) indicators of the 200G QSFP56 FR4 DML version fully meet the protocol and the current application indicators of 200G FR4 2km transmission.

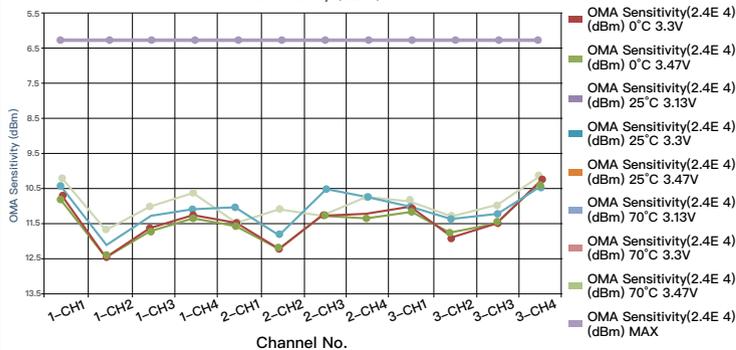
**200G QSFP56 FR4 EML**  
TDECQ(dB)Diagram



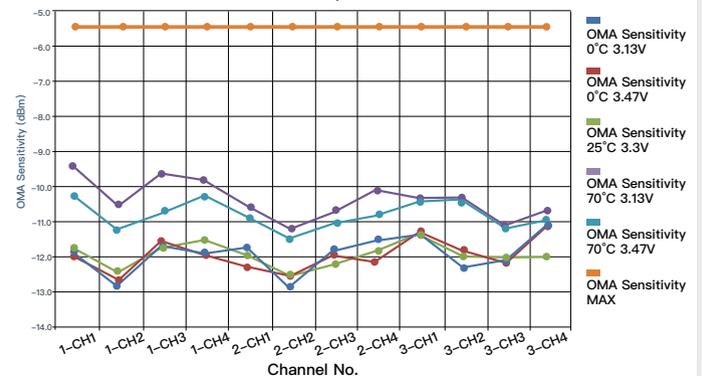
**200G QSFP56 FR4 DML**  
TDECQ



**200G QSFP56 FR4 EML**  
OMA Sensitivity (dBm)



**200G QSFP56 FR4 DML**  
OMA Sensitivity (dBm)



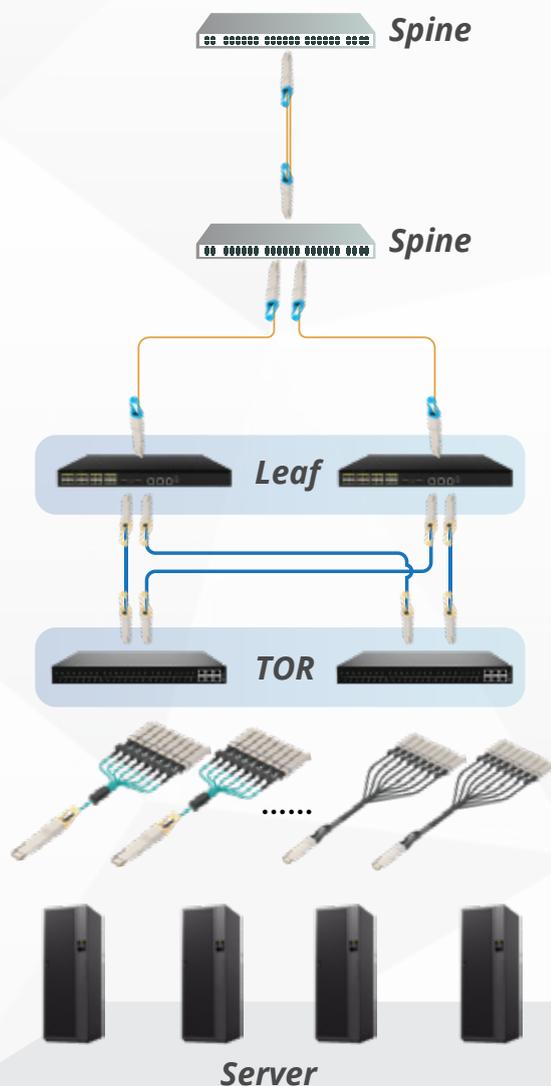
As the leader of open optical network devices, GIGALIGHT advocates the vigorous development of economical data center technology. In order to implement this concept, we have launched a full range of 200G QSFP-DD and 200G QSFP56 data center optical transceiver products to further highlight the advantages of 200G in the field of economical data centers.

# More Recommendations

**GIGALIGHT is the pioneer of global 200G data center concept and products**

GIGALIGHT is always committed to providing customers with high-performance, high-reliability and more economical optical communication solutions. It has a rich 200G product line including QSFP-DD and QSFP56, providing more economical choices for the construction of high-speed green data centers!

## 200G (8x25G NRZ)



### 200G QSFP-DD LR8

206.25Gbps  
LWDM EML+PIN  
10km/20km  
7.5W  
Duplex LC



### 200G QSFP-DD PSM8

206.25Gbps  
1310nm DML+PIN  
2km/10km  
6W(2km) or 6.5W(10km)  
MPO24



### 200G QSFP-DD SR8

850nm VCSEL+PIN  
206.25Gbps  
70m(OM3) or 100m(OM4)  
4W  
MPO24



### 200G QSFP-DD to 8x25G SFP28 Breakout AOC

850nm VCSEL+PIN  
206.25Gbps & 2x103.125Gbps  
70m(OM3) or 100m(OM4)  
4W(200G QSFP-DD) & 1W(25G SFP28)

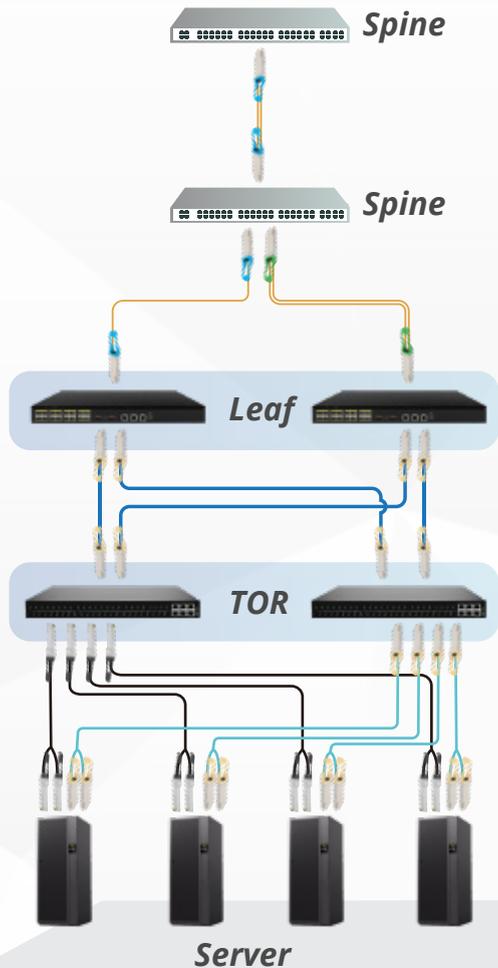


### 200G QSFP-DD to 8x25G SFP28 Breakout PCC

206.25Gbps  
8x25G NRZ  
3m



## 200G (4x50G PAM4)



### 200G QSFP56 LR4

212.5Gbps  
CWDM/LWDM DML+PIN  
10km  
7.5W  
Duplex LC



### 200G QSFP56 DR4

212.5Gbps  
1310nm DML+PIN  
500m  
5.5W  
MPO12



### 200G QSFP56 FR4

212.5Gbps  
CWDM DML/EML+PIN  
10km/20km  
5.5W  
Duplex LC



### 200G QSFP56 SR4

212.5Gbps  
850nm VCSEL+PIN  
70m(OM3) or 100m(OM4)  
5W  
MPO12



### 200G QSFP56 to 2x100G QSFP56 Breakout AOC

850nm VCSEL+PIN  
212.5Gbps & 2x106.25Gbps  
70m(OM3) or 100m(OM4)  
5W(200G QSFP56) & 4.5W(100G QSFP56)



### 200G QSFP56 to 2x100G QSFP56 Breakout PCC

212.5Gbps & 2x106.25Gbps  
4x50G PAM4  
5m



In addition, GIGALIGHT also offers the following 200G QSFP-DD xR4 products featuring low power consumption and low latency, meeting the general requirements of high-performance computing.

Product	LD	PD	Reach	Interface	Power Consumption	P/N
200G QSFP-DD PSM4	1310nm EML	PIN	2km	MPO12	5.5W	GDM-SPO201-DR4C
200G QSFP-DD LR4	LWDM4 EML	PIN	10km	Duplex LC	9W	GQD-SPO201-LR4C
200G QSFP-DD ER4	LWDM4 EML	APD	40km	Duplex LC	9W	GQD-SPO201-ER4C
200G QSFP-DD 2xCWDM4	2xCWDM4 DML	PIN	2km/10km	Dual Duplex LC	7W	GQD-SPO201-CIR4C GQD-SPO201-CLR4C
200G QSFP-DD PSM DWDM4	C-BAND EML	PIN+SOA	40km	MPO	9W	GQD-Cxx201-DZR4



Open Optical Network Device Explore

For any needs, please contact [sales@gigalight.com](mailto:sales@gigalight.com). Thanks!

<https://www.gigalight.com/>