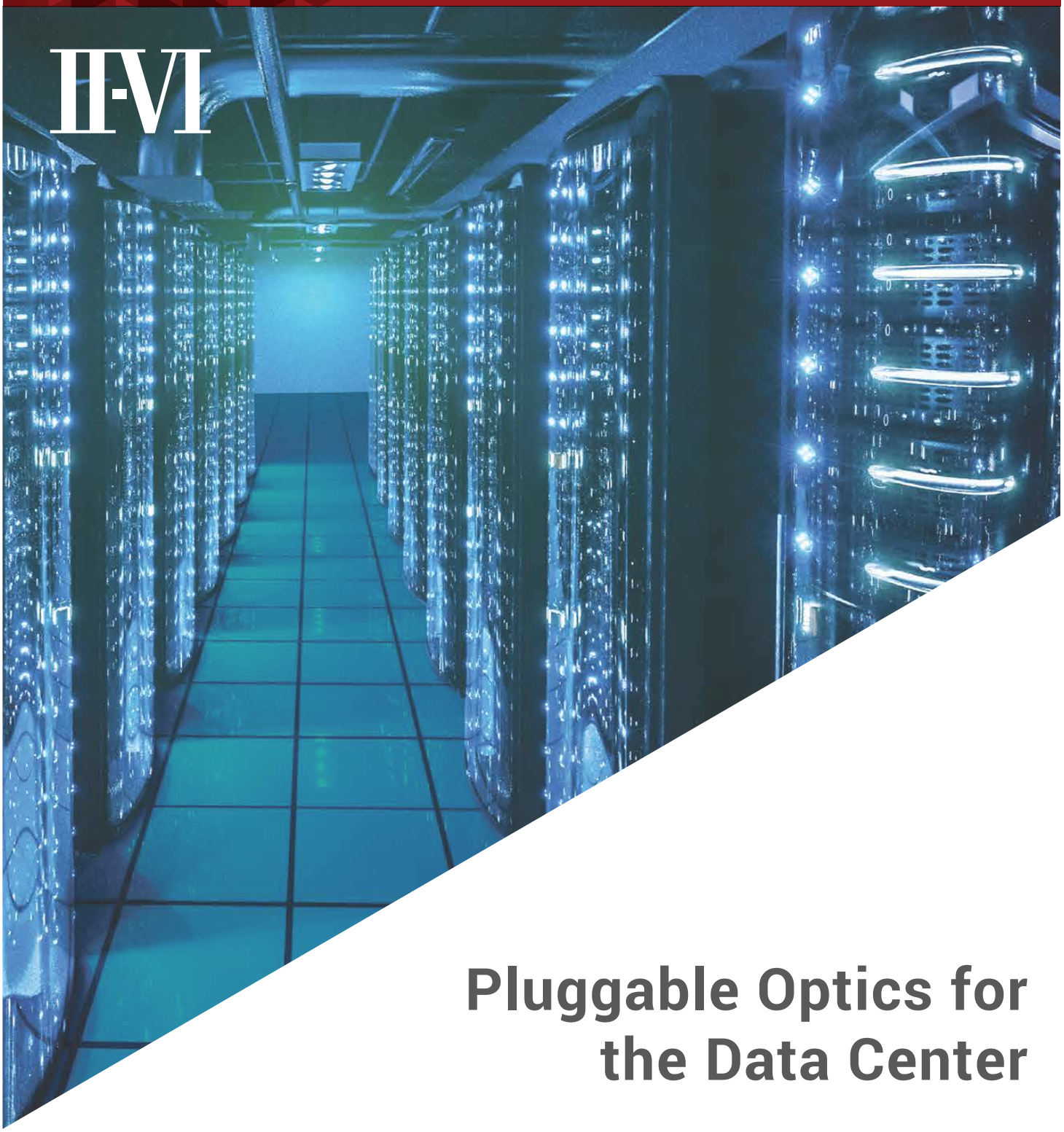
MATERIALS THAT MATTER

II-VI



Pluggable Optics for the Data Center

WEBSITE
ii-vi.com

CONTACT US
laser.solutions@ii-vi.com

01/2020

Pluggable Optics for the Data Center

The data center ecosystem is going through unprecedented growth and innovation as new players, new business models and new technologies converge. One of the key trends is the growing importance and evolving landscape of fiber optic technologies enabling new architectures and enhanced levels of performance in the data center.

Fiber optics is no longer an optional technology, or only reserved for the toughest interconnect problems. Bandwidth, port density and low-power demands now require fiber optics. And fiber optics is now a pervasive, high-volume, low-cost set of technologies that make it an easy choice for switch interconnect and server I/O.

II-VI is investing heavily in the data center. Our 10G, 25G, 40G and 100G fiber optic products are enabling the highest bandwidth, highest density, lowest power and lowest total cost interconnect solutions on the market today. And we are already working on 200G, 400G and beyond. We are ready to partner with you to push optical interconnect technologies even further to enable unprecedented scale, bandwidth, flexibility and efficiency to the modern, highly-interconnected data center.

Extend Your Data Center Reach

II-VI optical products span all Ethernet data rates currently deployed, from 100Mb/s to 100Gb/s, and we're leading the market with our 25G Ethernet optical transceivers for next- generation servers and switches. Our QSFP products support link distances of up to 500 meters over multimode fiber, well beyond the IEEE Ethernet standard. We also support distances over single mode fiber of up to 20km on 100G QSFP28, 40km on 40G QSFP+ and 80km on 10G SFP+. And if you need to connect your data centers over metropolitan or regional networks, our coherent CFP2-ACO modules can support distances beyond 500km.

Re-Utilize Your Legacy Multimode Fiber Plant

Most data centers today are still architected around 10G Ethernet, focused on 10GBASE-SR links over OM3/OM4 duplex multimode fiber. As data center operators migrate from 10G to 40G and 100G, they want to maintain that existing fiber infrastructure. However, SR4 interfaces require ribbon multimode fiber, and LR4 requires duplex single mode fiber, neither of which are present in the existing duplex multimode fiber plant. II-VI today is supplying QSFP+ and QSFP28 SWDM4 transceivers which provide cost-effective duplex multimode fiber links for both 40G and 100G Ethernet. These duplex multimode transceivers also help decrease fiber infrastructure capex for new data center builds.

Increase Density and Consume Less Power

II-VI understands the importance of heat management in the data center, and has been at the forefront of providing next-generation lower power dissipation optical products.

Our 100G QSFP28 optical transceivers (SR4, LR4, CWDM4, and SWDM4) support a maximum power dissipation performance of 3.5 Watts.

Our 40G and 100G Quadwire Active Optical Cables provide low-power dissipation settings which the host system can utilize.

We are the market leader in the supply of 12x10G and 12x25G on-board optical Tx/Rx modules, or BOAs. On-board optics enable increased port density while minimizing power dissipation.

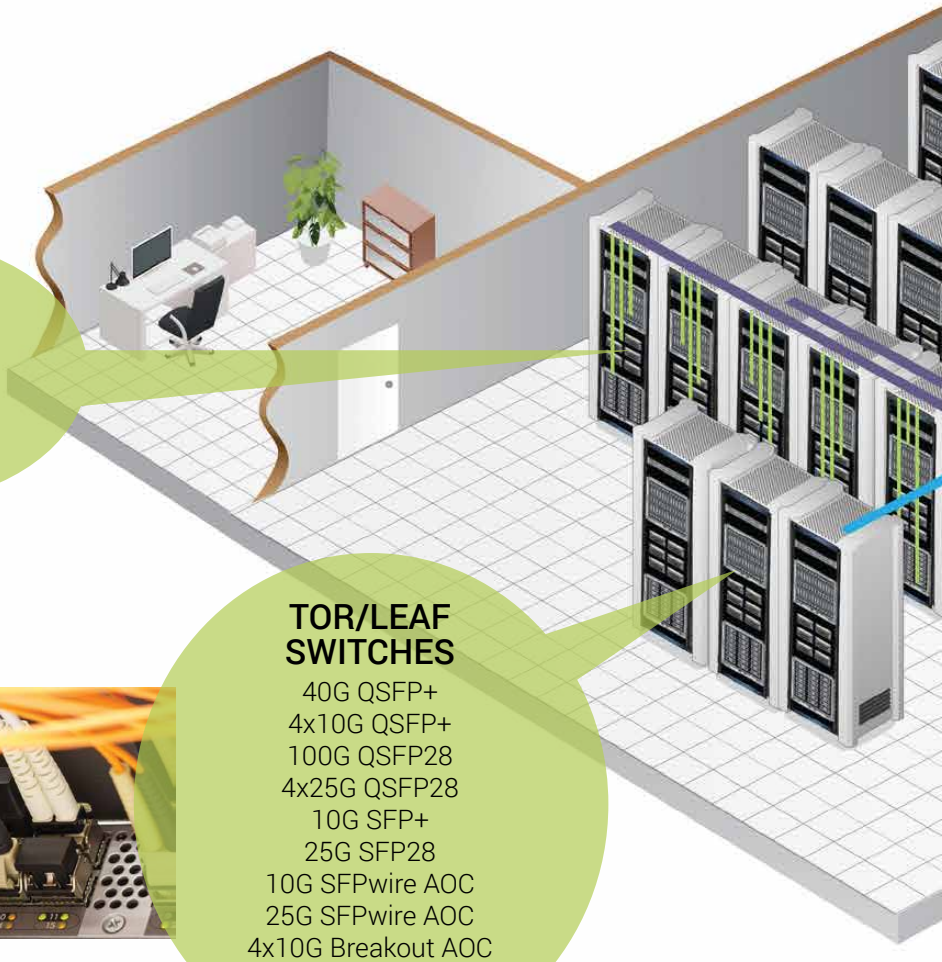
Move beyond 100G to 200G / 400G

II-VI has been the market leader in 100G Ethernet modules, supplying CFP modules to service provider router and transport deployments since 2010. We have now expanded our 100G product offering to include various types of CFP2, CFP4, CXP and QSFP28 modules, for telecom and also the emerging data center and enterprise 100G applications.

However, we're not stopping there. We currently have a leading role in standardization activities and are already developing our next-generation Ethernet products, which will support 50G, 200G and 400G data rates in modules like CFP8, QSFP56, QSFP-DD, and SFP-DD. These products will meet the performance demands of high-performance data centers for many years to come.

The Modern Highly-Interc

SERVERS
10G SFP+
25G SFP28
10G SFPwire AOC
25G SFPwire AOC

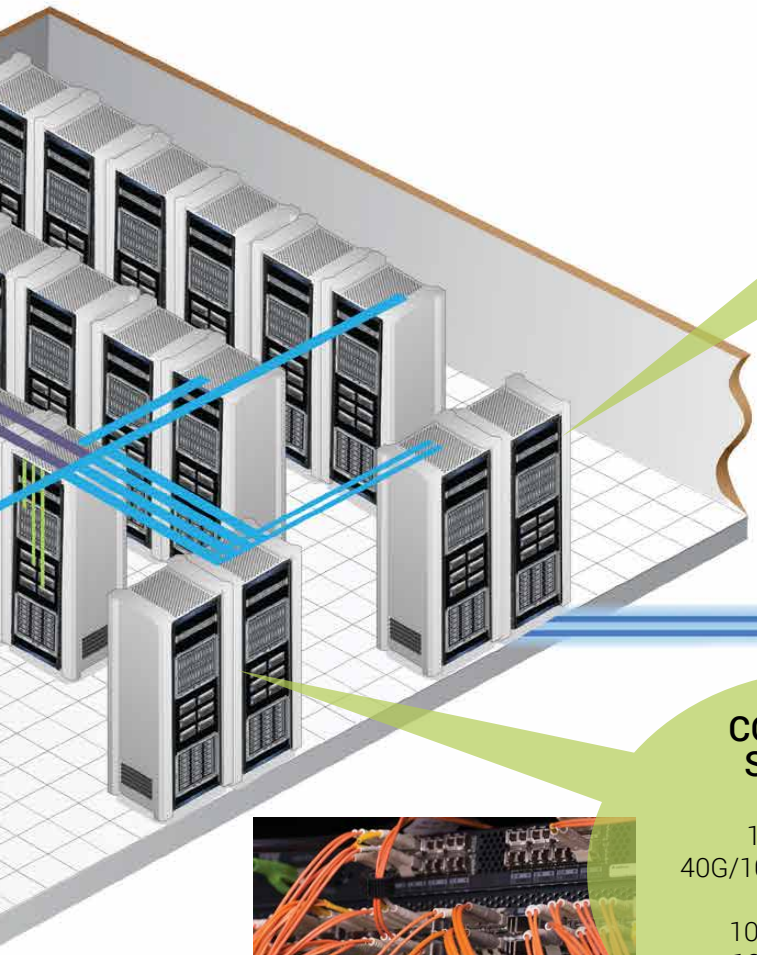


TOR/LEAF SWITCHES
40G QSFP+
4x10G QSFP+
100G QSFP28
4x25G QSFP28
10G SFP+
25G SFP28
10G SFPwire AOC
25G SFPwire AOC
4x10G Breakout AOC
4x25G Breakout AOC

Fiber Types	Typical Reach	1G	10G
Active Optical Cables (AOC)	≤100m		SFPwire AOC (**FCBG110SD1Cxx**)
Duplex Multimode Fiber	≤100m to 180m		
	≤220m to 500m	SFP SX (**FTLF8519P3BNL**)	SFP+ SR (**FTLX8574D3BCL**) SFP+ LRM (**FTLX1371D3BCL**)
Parallel Multimode Fiber	≤100m		
	≤400m		QSFP+ 4xSR (**FTL410QD3C**)
Duplex Single Mode Fiber	≤500m to 2km		SFP+ LR-Lite (**FTLX1374D3BCL**)
	≤10km	SFP LX (**FTLF1318P3BTL**)	SFP+ LR (**FTLX1475D3BCL**) SFP+ CWDM (**FTLX2471DC0xx**)
	≤20km to 40km	SFP EX (**FTLF1419P1BNL**)	SFP+ ER (**FTLX1672D3BCL**)
Parallel Single Mode Fiber	≤500m to 2km		

Please contact II-VI for products supporting other applications and protocols, including Fibre Channel, SONET/SDH/OTN, CPRI/eCPRI, InfiniBand, industrial applications and many others. We have the broadest optical portfolio in the industry.

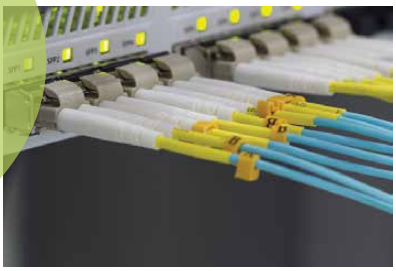
onnected Data Center



ROUTERS
100G CFP4
100G CFP2
100G CFP
100G CFP2-ACO
400G CFP8
400G QSFP-DD

WAN

CORE/SPINE SWITCHES
40G QSFP+
100G QSFP28
40G/100G Quadwire AOC
100G CXP
100G C.wire AOC
120G/300G BOA
200G QSFP56
400G QSFP-DD



Ethernet Data Rates			
25G	**40G**	**100G**	**200G / 400G**
SFPwire AOC (**FCBG125SD1Cxx**)	Quadwire AOC (**FCBN410QD3Cxx**) 4x10G Breakout AOC	Quadwire AOC (**FCBN425QE1Cxx**) 4x25G Breakout AOC	Coming Soon
SFP28 SR (**FTLF8536P4BCL**) SFP28 SR Low Latency (**FTLF8538P4BCL**)	QSFP+ LM4 (**FTL4C2QE2C**)	QSFP28 SWDM4 (**FTLC9152RGPL**)	Coming Soon
SFP28 eSR (**FTLF8540P4BCL**)	QSFP+ SWDM4 (**FTL4S1QE1C**)		
QSFP28 4x25G-SR (**FTLC9551REPM**) CFP4 4x25G-SR (**FTLC9141RENM**)	QSFP+ SR4 (**FTL410QE4C**)	QSFP28 SR4 (**FTLC9555REPM**) CFP4 SR4 (**FTLC9141RENM**)	Coming Soon
	QSFP+ eSR4 (**FTL410QD4C**)		
		QSFP28 CWDM4 (**FTLC1155RGPL**) QSFP28 DR (**FTLC4351RHPL**) QSFP28 FR (**FTLC4351RJPL**)	QSFP56 FR4 (**FTCC1112E1PLL**) QSFP-DD FR8 (**FTCD1333E1PCL**)
SFP28 LR (**FTLF1436P3BCL**)	QSFP+ LR4 (**FTL4C1QE2C**)	QSFP28 LR4 (**FTLC1154RDPL**) CFP4 LR4 (**FTLC1141RDNL**)	QSFP-DD LR8 (**FTCD1323E1PCL**)
	QSFP+ ER4 (**FTL4E1QE1C**)	QSFP28 eLR4 (**FTLC1154RDPLA**)	
			QSFP-DD DR4 (FTCD2523E1PCM)

Pluggable Optics for the Data Center

II-VI Products for the Data Center

Intra-rack

10G & 25G SFPwire®

10G SFP+ SR

25G SFP28 SR
(incl. low latency version)

4x10G QSFP+ SR

4x25G QSFP28 SR
(incl. low latency version)

BOA (optical engine)

4x10G Breakout AOC

4x25 Breakout AOC

Inter-rack

10G SFP+ SR
400m OM4 MMF

10G & 25G SFPwire®
Up to 30m

25G SFP28 SR
400m OM4 MMF

40G QSFP+ SR4/SWDM4
400m OM4 MMF

40G Quadwire®
Up to 100m

100G QSFP28 SR4/SWDM4
100/150m OM4 MMF

Long span/Inter-building

10G SFP+
LR/Bidi/xWDM/Tunable
10/40/80km SMF

25G SFP28 LR
10km SMF

40G QSFP+ LR4/ER4
10/40km SMF

100G QSFP28
CWDM4/LR4/eLR4
2/10/20km SMF

100G CFP4 LR4
10km SMF

100G CFP2 LR4
10km SMF

200G QSFP56 FR4
2km SMF

400G CFP8 FR8/LR8
2/10km SMF

400G QSFP-DD FR8/LR8
2/10km SMF

CFP2-ACO
Metro/Long Haul
DWDM SMF

100G Quadwire®
Up to 100m

400G QSFP-DD DR4
500m SMF

Pluggable Optics for the Data Center

About II-VI

II-VI Incorporated, a global leader in engineered materials and optoelectronic components, is a vertically integrated manufacturing company that develops innovative products for diversified applications in communications, materials processing, aerospace & defense, semiconductor capital equipment, life sciences, consumer electronics, and automotive markets. Headquartered in Saxonburg, Pennsylvania, the Company has research and development, manufacturing, sales, service, and distribution facilities worldwide. The Company produces a wide variety

of application-specific photonic and electronic materials and components, and deploys them in various forms, including integrated with advanced software to support our customers. For more information, please visit us at www.ii-vi.com.

Datacom Customers (partial list)

DELL EMC · intel · CISCO · IBM · JUNIPER NETWORKS

BROCADE · EMULEX We network storage · Extreme Connect Beyond the Network · H3C

NetApp · Hewlett Packard Enterprise · QLOGIC · ORACLE · Mellanox TECHNOLOGIES