Solutions Guide

Pluggable Optics for the Data Center

FINISAR®

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.

Finisar 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**

Finisar 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 400 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, as well as enable bidirectional coherent links to minimize the number of fibers required.

**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. Finisar today is supplying QSFP+ and QSFP28 SWDM4 transceivers which provide cost-effective duplex multimode fiber links for both 40G and 100G Ethernet.

**Increase Density and Consume Less Power**

Finisar 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**

Finisar 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-Interconnected Data Center

<table>
<thead>
<tr>
<th>Fiber Types</th>
<th>Typical Reach</th>
<th>1G</th>
<th>10G</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active Optical Cables (AOC)</td>
<td>≤100m</td>
<td>SFPwire AOC (FCBG1105SD1Cxx)</td>
<td>SFPwire AOC (FCBG1105SD1Cxx)</td>
</tr>
<tr>
<td>Duplex Multimode Fiber</td>
<td>≤100m</td>
<td>SFP SX (FTLF8519P3BNL)</td>
<td>SFP+ SR (FTLX8574D3BCL)</td>
</tr>
<tr>
<td></td>
<td>≤220m to 500m</td>
<td></td>
<td>SFP+ LR (FTLX1371D3BCL)</td>
</tr>
<tr>
<td>Parallel Multimode Fiber</td>
<td>≤100m</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>≤400m</td>
<td></td>
<td>QSFPP+ 4xSR (FTL410QD3C)</td>
</tr>
<tr>
<td>Duplex Single Mode Fiber</td>
<td>≤1km to 2km</td>
<td></td>
<td>QSFPP+ LR (FTLX1475D3BCL)</td>
</tr>
<tr>
<td></td>
<td>≤10km</td>
<td>SFP LX (FTLF1318P3BTL)</td>
<td>SFP + LR (FTLX1475D3BCL)</td>
</tr>
<tr>
<td></td>
<td>≤20km to 40km</td>
<td></td>
<td>SFP + CWDM (FTLX2471DC0xx)</td>
</tr>
<tr>
<td>Parallel Single Mode Fiber</td>
<td>≤500m to 2km</td>
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Please contact Finisar for products supporting other applications and protocols, including fibre Channel, SONET/SDH/OTN, CPRI, InfiniBand, industrial.

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

**Ethernet Data Rates**

<table>
<thead>
<tr>
<th>25G</th>
<th>40G</th>
<th>100G</th>
<th>200G / 400G</th>
</tr>
</thead>
<tbody>
<tr>
<td>SFPwire AOC (FCBG125SD1Cxx)</td>
<td>Quadwire AOC (FCCN410QD3Cxx) 4x10G Breakout AOC</td>
<td>Quadwire AOC (FCBN425QE1Cxx) 4x25G Breakout AOC</td>
<td>Coming Soon</td>
</tr>
<tr>
<td>SFP28 SR (FTLF8536P4BCL) SFP28 SR Low Latency (FTLF8538P4BCL)</td>
<td>QSFP+ LR4 (FTL4C1Q4E2C)</td>
<td>QSFP28 LR4 (FTL1154RDOPL) CF4 LR4 (FTLC1141RDNL)</td>
<td>Coming Soon</td>
</tr>
<tr>
<td>SFP28 eSR (FTLF8540P4BCL)</td>
<td>QSFP+ SWDM4 (FTL4S1QE1C)</td>
<td>QSFP28 eSWDM4 (FTLC9153RGPL)</td>
<td>Coming Soon</td>
</tr>
<tr>
<td>Please contact Finisar</td>
<td>QSF28 eSR4 (FTLC9553REPM)</td>
<td>QSF28 eSR4 (FTLC9553REPM)</td>
<td>Coming Soon</td>
</tr>
<tr>
<td>SFP28 LR (FTLF1436P3BCL)</td>
<td>QSF28 PSM4 (FTLC1551REPM)</td>
<td>QSF28 PSM4 (FTLC1551REPM)</td>
<td>Coming Soon</td>
</tr>
</tbody>
</table>

**Routing and Switches**

- **100G CFP4**
- **100G CFP2**
- **100G CFP**
- **100G CFP2-ACO**

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

**WAN**

**Active Optical Cables (AOC)**

- ≤100m SFPwire AOC (FCBG110SD1Cxx)
- SFPwire AOC (FCBG125SD1Cxx)
- Quadwire AOC (FCCN410QD3Cxx)
- 4x10G Breakout AOC

- ≤100m SFP28 SR (FTLF8536P4BCL) SFP28 SR Low Latency (FTLF8538P4BCL)
- QSFP+ SR4 (FTL410QE4C)
- QSFP28 4xSR (FTLC9555REPM)
- QSFP28 eSR4 (FTLC9153REPM)

- ≤220m to 500m SFP SX (FTLF8519P3BNL) SFP+ SR (FTLX8574D3BCL)
- SFP+ LRM (FTLX1371D3BCL)
- SFP28 eSR (FTLF8540P4BCL) QSFP+ SWDM4 (FTLC9152RGPL)
- QSFP28 eSR4 (FTLC9553REPM)

- ≤400m QSFP+ 4xSR (FTL410QD3C)
- Please contact Finisar
- QSFP28 PSM4 (FTLC1551REPM)

- ≤1km to 2km SFP+ LR-Lite (FTLX1374D3BCL)
- QSFP28 CWDM4 (FTLC1155RDPL) Coming Soon
- SFP+ LR-Lite (FTLX1475D3BCL)
- SFP+ CWDM (FTLX2471DC0xx)
- SFP28 LR (FTLF1436P3BCL)
- QSFP28 LR4 (FTLC1154RDOPL) CF4 LR4 (FTLC1141RDNL) Coming Soon
- QSF28 eLR4 (FTLC1154RDPLA)
- QSFP28 eSR4 (FTLC2151RDPL)

- ≤20km to 40km SFP EX (FTLF1419P1BNL) SFP+ ER (FTLX1672D3BCL)
- QSFP+ ER4 (FTL4E1QE1C)
- QSFP28 eER4 (FTLC1154RDPL)
- QSFP28 eLR4 (FTLC2151RDPL)

- Parallel Multimode Fiber
- Parallel Single Mode Fiber
- Duplex Multimode Fiber
- Duplex Single Mode Fiber

All applications and many others. We have the broadest optical portfolio in the industry.
## Finisar 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

### 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/ER4f  
  2/10/20/40km SMF  
- 100G CFP4 LR4  
  10km SMF  
- 100G CFP2 LR4  
  10km SMF  
- 100G CFP LR4  
  10km SMF  
- CFP2-ACO  
  Metro/Long Haul  
  DWDM SMF

### 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  
  400/300m OM4 MMF  
- 100G Quadwire*  
  Up to 100m  
- 100G CXP SR10  
  150m OM4 MMF  
- 100G C.wire*  
  Up to 100m  
- 100G Quadwire*  
  Up to 100m
About Finisar

Finisar Corporation (NASDAQ: FNSR) is a global technology leader in optical communications, providing components and subsystems to networking equipment manufacturers, data center operators, telecom service providers, consumer electronics and automotive companies. Founded in 1988, Finisar designs products that meet the increasing demands for network bandwidth, data storage and 3D sensing subsystems. The company is headquartered in Sunnyvale, California, USA with R&D, manufacturing sites, and sales offices worldwide. Visit our website at www.finisar.com.

As the market share leader and world’s largest supplier of optical components and subsystems, Finisar achieved over $1B revenue in FY2017 and currently has 14,000 employees across the globe.

Datacom Customers (partial list)

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