MATERIALS THAT MATTER®

100G QSFP28 Longwave Transceivers

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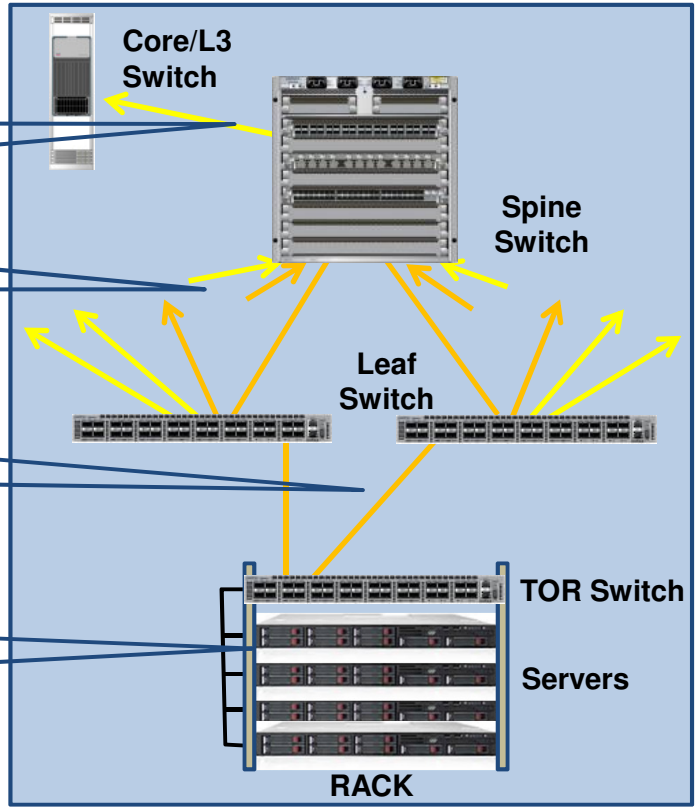
Optical Connections in Hyperscale Data Centers

Core Switch/Router to Spine Switch:
Deployed mostly 40GE LR4.
Deploying 100GE CWDM4/LR4 now
Roadmap is 400GE FR/LR next.

Spine Switch to Leaf Switch links:
Deployed mostly 40GE SR4/LR4.
Deploying 100GE CWDM4/eSR4/PSM4 now
Roadmap is 400GE or 200GE SR/FR next.

Leaf Switch to TOR Switch links:
Deployed mostly 40GE SR4.
Deploying 100GE SR4/AOC now
Roadmap is 400GE or 200GE SR next.

TOR Switch to Server links:
Deployed mostly 10GE SR/DAC.
Deploying 25GE SR/AOC/Octopus now
Roadmap is 50/100GE SR/AOC/Octopus next.



II-VI 100G QSFP28 Product Portfolio for Data Centers

- SFF-8436/8636
- Patented DD
- RoHS Compliant

InfiniBand

EDR (100m)

Omni-Path

Omni-Path™ (100m)

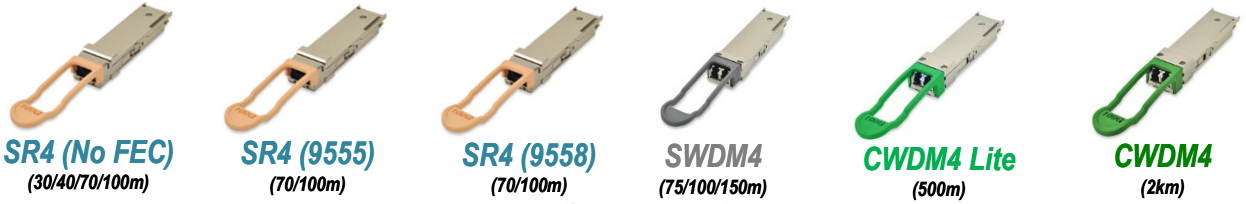
Fibre Channel

128G SW (70/100m) 128G LW (10km)

OTN

OTU4 (9555) (70/100m) OTU4 (2km) OTU4 (10km)

Ethernet



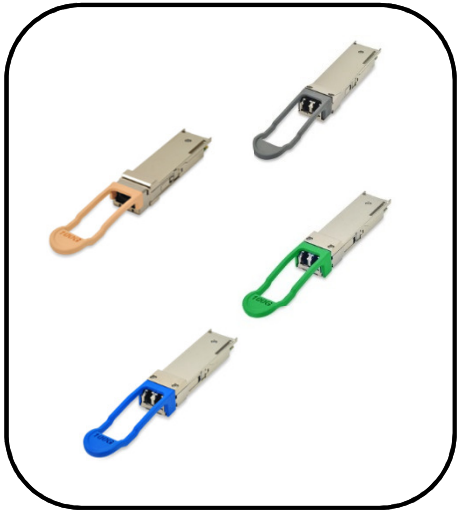
SR4 (No FEC) (30/40/70/100m)
SR4 (9555) (70/100m)
SR4 (9558) (70/100m)
SWDM4 (75/100/150m)
CWDM4 Lite (500m)
CWDM4 (2km)
100G (100m)
4x25G (30m)
eCWDM4 (10km)
LR4 (10km)
eLR4 (20km)

100G Ethernet QSFP28 Finisar® Transceivers

	Parallel (MPO)	Duplex (LC)
Multimode	SR4/OTU4 • 70/100m • FTLC9551xEPM SR4/OTU4/32G FC/wireless Gen 2 • 70/100m • FTLC9555xEPM SR4 GEN3 • 70/100m • FTLC9558REPM No-FEC SR4 • 30/40/70/100m • FTLC9555NEPM	SWDM4 • 75/100/150m • FTLC9152RGPL
Single Mode		LR4/OTU4 • 10km • FTLC1154xDPL CWDM4 • 2km • FTLC1155RGPL DR/FR • FTLC4351RJPL eLR4 (4WDM-20) • 20km (w/FEC) • FTLC1154RDPLA eCWDM4 (4WDM-10) • 10km • FTLC1155RGPLA

Black = Production released

Blue = In development



Multimode distances refer to OM3/OM4/OM5
Single mode distances refer to SMF28

QSFP28 100G CWDM4 Transceiver – GEN 2

FTLC1155RGPL

FT: Finisar transceiver
LC: 100G product family
1: DFB laser type, OOK EML/DML Tx - STD Rx
1: 4 optical channels (MUX/DEMUX)
5: QSFP28 form factor
5: Product Generation 2.0
R: 103.1 Gb/s Ethernet
G: 4x25G CWDM
P: Flat top (no heatsink), pull-tab release
L: Straight LC receptacles

		Temperature Range			
		Standard	Limited	Extended	Industrial
Reach	Standard		2	3	4
	Lite	5	6	7	8
	Extended	A	B	C	D

PRODUCT BASICS

- QSFP28 module form factor, per SFF-8665
- Standard interfaces defined by IEEE 802.3bm & CWDM4 MSA
  - 4x25G/28G CWDM optical architecture per CWDM4 MSA
  - 4x25G/28G retimed electrical I/O (IEEE CAUI-4)
- 2km reach on SMF (500m reach for Lite)
- 5dB loss budget (Requires RS-FEC on host – same as 100GBASE-SR4)
- Maximum power dissipation < 3.5W for Limited and C-Temp
- Maximum power dissipation < 5W for E-Temp, I-Temp
- Operating case temperature ranges:
  - C-Temp: 0°C to 70°C
  - Lim Temp: 15C to 60°C
  - Ext Temp: -20C to 85°C
  - Ind Temp: -40C to 85°C
- Adaptive CTLE; I2C management interface (same as QSFP+)

COMPETITIVE ADVANTAGES

- Finisar BH DFB and PIN arrays to ensure high quality optics
- Very high volume manufacturing
- Full digital diagnostics capability
- Lower power consumption

AVAILABILITY

- Production Released (Ext. and Ind Temp Prod. Release May, 2020)

QSFP28 100G CWDM4 Transceiver – GEN 3

FTLC1157RGPL

FT: Finisar transceiver
LC: 100G product family
1: DFB laser type, OOK EML/DML Tx - STD Rx
1: 4 optical channels (MUX/DEMUX)
5: QSFP28 form factor
7: Product Generation 3.0
R: 103.1 Gb/s Ethernet
G: 4x25G CWDM
P: Flat top (no heatsink), pull-tab release
L: Straight LC receptacles

		Temperature Range			
		Standard	Limited	Extended	Industrial
Reach	Standard		2	3	4
	Lite	5	6	7	8
	Extended	A	B	C	D

PRODUCT BASICS

- QSFP28 module form factor, per SFF-8665
- Standard interfaces defined by IEEE 802.3bm & CWDM4 MSA
  - 4x25G/28G CWDM optical architecture per CWDM4 MSA
  - 4x25G/28G retimed electrical I/O (IEEE CAUI-4)
- 2km reach on SMF (500m reach for Lite)
- 5dB loss budget
- Requires RS-FEC on host – same as 100GBASE-SR4
- Maximum power dissipation < 3.5W for Limited and C-Temp
- Operating case temperature ranges:
  - C-Temp: 0°C to 70°C
  - Lim Temp: 15C to 60°C
- I2C management interface (same as QSFP+)

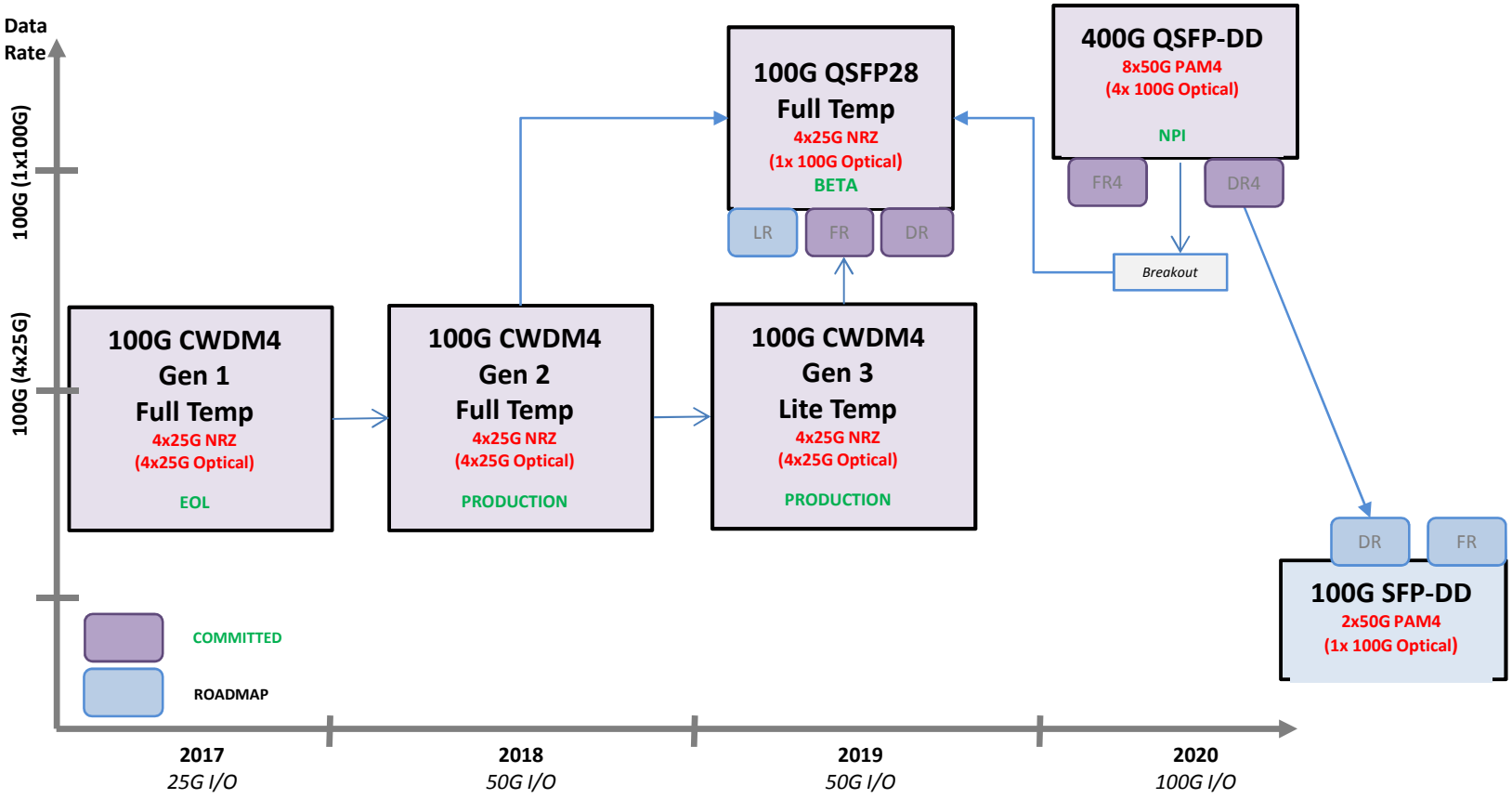
COMPETITIVE ADVANTAGES

- Finisar BH DFB and PIN arrays to ensure high quality optics
- Very high volume manufacturing
- Full digital diagnostics capability
- Lower power consumption

AVAILABILITY

- Production Released

QSFP28 CWDM4 High-Level Roadmap



QSFP28 100G LR4 Transceiver – GEN 2

FTLC1154RDPL

FT: Finisar transceiver
LC: 100G product family
1: DFB laser type, OOK EML/DML Tx - STD Rx
1: 4 optical channels (MUX/DEMUX)
5: QSFP28 form factor
4: Product Generation 2.0
R: 103.1 Gb/s Ethernet
D: 4x25G LAN-WDM
P: Flat top (no heatsink), pull-tab release
L: Straight LC receptacles

		Temperature Range			
		Standard	Limited	Extended	Industrial
Reach	Standard		2	3	4
	Lite	5	6	7	8
	Extended	A	B	C	D

PRODUCT BASICS

- QSFP28 module form factor, per SFF-8665
- Standard interfaces defined by IEEE 802.3bm
  - 4x25G/28G LAN-WDM optical architecture
  - 4x25G/28G retimed electrical I/O (IEEE CAUI-4)
- 10km reach on SMF (2km reach for Lite)
- Maximum power dissipation < 3.5W for Limited and C-Temp
- Maximum power dissipation < 5W for E-Temp, I-Temp
- Operating case temperature ranges:
  - C-Temp: 0°C to 70°C
  - Lim Temp: 15C to 60°C
  - Ext Temp: -20C to 85°C
  - Ind Temp: -40C to 85°C
- I2C management interface (same as QSFP+)
- Adaptive CTLE; Does not require FEC on the host

COMPETITIVE ADVANTAGES

- Finisar BH DFB and PIN arrays to ensure high quality optics
- Very high volume manufacturing
- Full digital diagnostics capability
- Lower power consumption; Available in single and dual rate

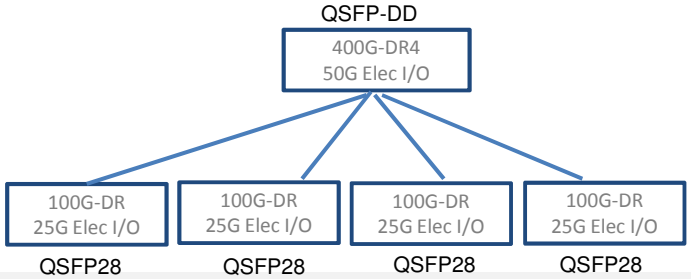
AVAILABILITY

- Production Released (Ext. and Ind Temp Prod. Release May, 2020)

QSFP28 100G DR/FR Transceiver

FTLC4351RJPL/FTLC4351RHPL

FT: Finisar transceiver
LC: 100G product family
4: 100G PAM4 EML Tx - STD Rx
3: 1 optical channel
5: QSFP28 form factor
1: Product Generation 1.0
R: 103.1 Gb/s Ethernet
J: 1x100G FR
H: 1x100G DR
P: Flat top (no heatsink), pull-tab release
L: Straight LC receptacles



* - Includes some part of CWDM4

PRODUCT BASICS

- QSFP28 module form factor, per SFF-8665
- 100G PAM4 DR serial lane interface per IEEE 802.3cd & 100G Lambda MSA
  - 1x100G Optical architecture
  - 4x25G retimed electrical I/O (IEEE CAUI-4)
- 2km reach on SMF (500m reach for DR)
- Maximum power dissipation < 4.5W for Limited and C-Temp
- Operating case temperature ranges:
  - C-Temp: 0°C to 70°C
  - Lim Temp: 15C to 60°C
- I2C management interface (same as QSFP+)

COMPETITIVE ADVANTAGES

- Finisar BH DFB and PIN arrays to ensure high quality optics
- Very high volume manufacturing
- Full digital diagnostics capability
- Lower power consumption; Available in single and dual rate

AVAILABILITY

- Beta Release: Now
- Production Release: May, 2020

QSFP28 Longwave NPI Schedule

- **LW Modules currently in NPI**

NPI Products					
100G QSFP28 Modules					
PRODUCT PART NUMBER	**SHORT DESCRIPTION**	**DESCRIPTION**	**ALPHA PROTOTYPE AVAILABILITY(1)**	**BETA UNIT AVAILABILITY(2)**	**PRODUCTION UNIT AVAILABILITY(3)**
FTLC4351RJPL	**1x100G FR 2KM 100G QSFP28**	1x100G FR DFB, 1x28G PIN, 100G-FR, 100Gb/s, RoHS, single mode, QSFP28, 3.3V, 4.5W, 0/70°C operation, 2km	**N/A**	**Now**	**May-20**
FTLC4351RHPL	**1x100G DR 500M 100G QSFP28**	1x100G FR DFB, 1x28G PIN, 100G-FR, 100Gb/s, RoHS, single mode, QSFP28, 3.3V, 4.5W, 0/70°C operation, 500m	**N/A**	**Now**	**May-20**
FTLC4352RJPL	**1x100G FR 2KM 100G QSFP28**	1x100G FR DFB, 1x28G PIN, 100G-FR, 100Gb/s, RoHS, single mode, QSFP28, 3.3V, 4.5W, 0/70°C operation, 2km, Gen 2	**N/A**	**Sep-20**	**Jan-21**
FTLC4352RHPL	**1x100G DR 500M 100G QSFP28**	1x100G DR DFB, 1x28G PIN, 100G-FR, 100Gb/s, RoHS, single mode, QSFP28, 3.3V, 4.5W, 0/70°C operation, 500m, Gen 2	**N/A**	**Sep-20**	**Jan-21**
FTLC4352RKPL	**1x100G LR 500M 100G QSFP28**	1x100G LR DFB, 1x28G PIN, 100G-FR, 100Gb/s, RoHS, single mode, QSFP28, 3.3V, 4.5W, 0/70°C operation, 10km, Gen 2	**N/A**	**Sep-20**	**Jan-21**
FTLC1154RDPL4	**4x25G LR4, I-Temp 10KM 100G QSFP28 Gen2**	4x25G LR4 DFB, 4x28G PIN, 100G-LR4, 112Gb/s, RoHS, single mode, QSFP28, 3.3V, 4.5W, -40/85°C operation, 10km, Gen2	**N/A**	**Now**	**May-20**
FTLC1155RGPL4	**4x25G CWDM4, I-Temp 2KM 100G QSFP28 Gen2**	4x25G CWDM DFB, 4x28G PIN, 100G-CWDM4, 100Gb/s, RoHS, single mode, QSFP28, 3.3V, 4.5W, -40/85°C operation, 2km, Gen2	**N/A**	**Now**	**May-20**
FTLC1156RDPLx	**4x25G LR4 10KM 100G QSFP28 Gen3**	4x25G LR4 DFB, 4x28G PIN, 100G-LR4, 103Gb/s, RoHS, single mode, QSFP28, 3.3V, 3.5W, 0/70°C operation, 10km, Gen3	**N/A**	**Aug-20**	**Dec-20**
FTLC1156RDPLA,B	**4x25G LR4 20KM 100G QSFP28 Gen3**	4x25G LR4 DFB, 4x28G PIN, 100G-LR4, 103Gb/s, RoHS, single mode, QSFP28, 3.3V, 3.5W, 0/70°C operation, 20km, Gen3	**N/A**	**Aug-20**	**Dec-20**
FTLC1156SDPL	**4x28G LR4 10KM 100G QSFP28 Gen3**	4x28G LR4 DFB, 4x28G PIN, 100G-LR4, 112Gb/s, RoHS, single mode, QSFP28, 3.3V, 3.5W, 0/70°C operation, 10km, Gen3	**N/A**	**Aug-20**	**Dec-20**

MATERIALS THAT MATTER®