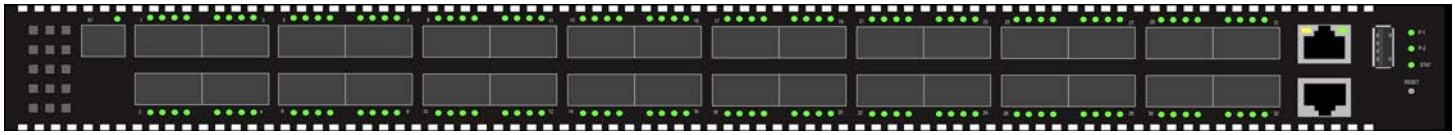
Overview

HPE Composable Fabric FM 3032Q

The HPE Composable Fabric FM 3032Q switch is a top-of-rack (TOR) connectivity module that empowers IT to support cloud-native workloads with high performance east/west traffic needs. With flat, wire-once, top-of-rack 25GbE and 100GbE server connectivity, programmatic control, easy rack-to-rack scaling, and broad compatibility with existing data center networks, the HPE Composable Fabric FM 3032Q helps minimize complexity and operational overhead.

HPE Composable Fabric FM 3032Q is an integral part of the HPE Composable Fabric networking solution, is built on industry standards, and provides a cost effective 1U solution for intensive big data and agile IT workload environments. The complete solution scales easily and non-disruptively within and across racks, and between data centers. In addition, it supports multiple, mixed workloads securely on a single network fabric to support better performance while also reducing costs.



HPE Composable Fabric FM 3032Q

Key Features

- 1 RU form factor
- 32xQSFP28 (100 GbE)
- Up to 800-1600 Gbps fabric capacity (using 8, up to 16, 100GbE QSFP28 ports)
- Up to 3.2 Tbps switching capacity
- Simplified cabling with FM 1006, direct or Leaf-Spine cabling
- Redundant/hot-swappable power and fans
- Controller based architecture using Composable Fabric Manager

Services

- HPE Pointnext full suite of support offerings (Proactive Care and Datacenter Care).

NOTE: For the best support experience, HPE Pointnext Installation Services is required and 24x7x365 support is recommended.

Standard Features

Features and Benefits

The Fabric Advantage

Each HPE Composable Fabric FM 3032Q switch features 32 QSFP28 optical interfaces delivering up to 3.2 Tbps full-duplex, bandwidth-creating, programmable, scalable meshed networks. HPE Composable Fabric FM 3032Q uses QSFP28 optics combined with a passive connectivity device HPE Composable Fabric FM 1006 to create an optical mesh between connectivity modules

Multi-Layered Network Architecture

The full potential of optical switching is unleashed by the HPE Composable Fabric FM 3032Q switch and its multi-layered network architecture that delivers efficient layer 1, layer 2, and layer 3 network topologies to critical application workloads. HPE Composable Fabric FM 3032Q provides layer 2 and layer 3 network topologies as part of the HPE Composable Fabric network architecture. The optical interfaces create a highly meshed, multipath network fabric with multiple direct and indirect paths between modules. HPE Composable Fabric Manager software, which understands the physical and logical network topology, as well as the application and data workload requirements, establishes a network where individual workloads receive their own portion of the network at each network layer.

Dynamic Topologies

In conjunction with the centralized HPE Composable Fabric Manager platform, the HPE Composable Fabric FM 3032Q switch provides intelligent and adaptive technology that ensures workloads always have access to the most optimal network paths. HPE Composable Fabric Manager provides both the integration platform, as well as a set of Hewlett Packard Enterprise -developed API level integrations that automate workflows based on the included sensors, actions, and triggers for 3rd party orchestration systems. HPE Composable Fabric switches intelligently select the best network paths for workloads that have resource requirements or explicit constraints defined by the integrations. Less sensitive workloads without explicitly defined constraints are efficiently forwarded across the available direct and indirect paths created by the network fabric. Based on Hewlett Packard Enterprise residual fit algorithms, HPE Composable Fabric Manager dynamically fits non-affinitized traffic. Unlike typical multi-path networks, which might utilize a maximum of 16 or 32 IP based equal cost paths between switch ports, HPE Composable Fabric Manager can intelligently select from hundreds of non-interfering, non-equal paths across the highly diverse HPE Composable Fabric at layer 1, 2, or 3.

Scale Out, Not Up

HPE Composable Fabric FM 3032Q switch physically interconnects using its QSFP28 ports to create a very dense, full or partial mesh between connectivity modules. This creates a more cost effective and power efficient network architecture than traditional tree or leaf-and-spine hierarchical networks can achieve. The mesh architecture enables linear scaling, with each additional switch adding fabric capacity, resiliency, and multi-path options. HPE Composable Fabric connectivity modules create network fabrics ranging from a few server racks in size to a large capacity cloud data center. The linear build-out offers predictable economics and capacity growth in true scale-out fashion.

Leaf and Spine Compatibility

Composable Fabric delivers a unique fabric design that is not constrained by the legacy aggregation and spine boundaries, however if the traditional leaf and spine network design is required FM 3032Q rack connectivity module can be configured in a spine configuration providing full 32 port, 3.2Tbit/sec spine capacity using FM 3180 or other rack connectivity modules as leafs. Whichever configuration is chosen Composable Fabric conforms to the LS protocols (pass-thru mode) and can be connected to the existing network infrastructure.

Latest Switching Technology

HPE Composable Fabric FM 3032Q are based on the latest available commercial switching technology providing line rate forwarding. It provides up to 288,000 MAC table entries, 324,000 IPv4 and 168,000 IPv6 routing entries, sub 500 nanosecond L2 and L3 switching latency, full Data Center Bridging support and increased packet buffer allocation capabilities leading to improved congestion performance. This leading-edge silicon technology also provides full support for VXLAN and NVGRE overlay networks, with the ability to perform overlay to traditional network gateway functions, as well as optimized packet distribution algorithms based on VXLAN and NVGRE packet formats.

Standard Features

Fabric Deployments

HPE Composable Fabric delivers very flexible deployment models. Composable Fabric's deployments involve QSFP ports whose location and the amount varies per rack connectivity module's flavor. These ports connect to QSFP ports on another connectivity module for a direct connect, alternatively leaf and spine configuration can be created where FM 3032Q acts as a spine module. For simplified cabling and where there are more than 6 connectivity modules involved, FM 1006 is used.

HPE Composable Fabric FM 3032Q network deployments involve the eight, up to sixteen, QSFP28 ports that are located at the right side of I/O end of the module. These ports connect to an FM 1006 interconnect or to QSFP ports on another FM 3032Q for a direct connect network:

- **Direct Connect for four FM 3032Q modules or less.**
  - Directly connect FM 3032Q modules together using a QSFP28-to-QSFP28 cable such as a Direct Attach Cable (DAC) or Active Optical Cable (AOC). Avoid directly connecting FM 3032Q modules in a network if the deployment is expected to grow beyond four switches.
- **Optical-based FM 1006 passive solution for six FM 3032Q modules or more.**
  - Connect all FM 3032Q modules to an FM 1006 passive interconnect module. Plug each FM 3032Q into the FM 1006 using the HPE-supplied cable. The passive FM 1006 device creates the mesh structure of an HPE Composable Fabric. .
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HPE FM 3032Q QSFP28 Port Diagram

In the diagram, the QSFP28 ports include a label indicating direction (W1 through W4 and E1 through E4).
These labels are for informational purpose and are not found on the HPE Composable Fabric FM 3180 chassis.

FM 3180 QSFP28 Port Diagram

Fabric Capacity

- 800Gbps: 8 x QSFP28 (100GbE) – 8x100GbE and 24 x QSFP28 left for access ports
- 1600Gbps: 16 x QSFP28 (100GbE) – 16x100GbE and 16 x QSFP28 left for access ports

8 x 100GbE Fabric	16 x 100GbE Fabric
24 x 100GbE Access (3:1 OSR)	16x100GbE Access (1:1 OSR)
72 x 25GbE Access (3:1 OSR)	64x25GbE (1:1 OSR)

Standard Features

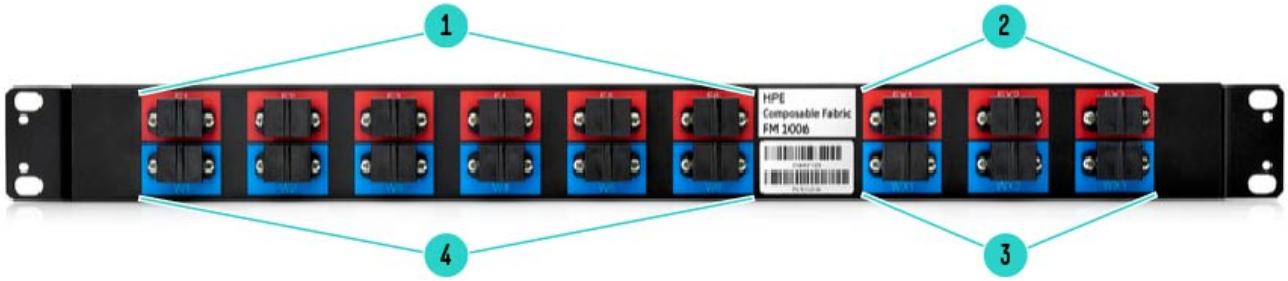
HPE Composable Fabric FM 1006

Network of six FM 3032Q rack connectivity modules or more (four minimum) requires connecting the modules to an FM 1006 passive interconnect.

The FM 1006 device is a passive optical module that uses HPE Composable Fabric optical interfaces to connect HPE Composable Fabric into a meshed network.

HPE Composable Fabric FM 1006

HPE Composable Fabric Port Naming Convention



HPE Composable Fabric FM 1006 - Port Names

1. East Fabric Ports (From 1 to 6)
2. East Extender Ports (From 1 to 3)
3. West Extender Ports (From 1 to 3)
4. West Fabric Ports (From 1 to 6)

1. East Fabric Ports
2. West Fabric Ports

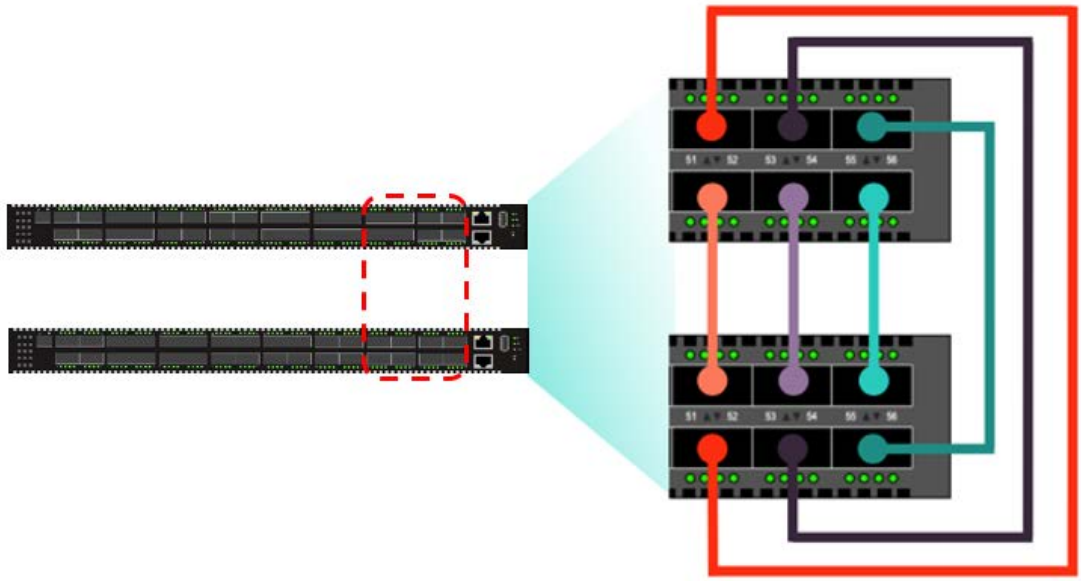
Standard Features

HPE Composable Fabric Port Naming Convention

Direct Fabric Interconnect

Direct fabric interconnect configuration with FM 3032Q rack connectivity modules.

- Directly connect up to four FM 3032Q modules together using a QSFP28-to-QSFP28 cable such as a Direct Attach Cable (DAC) or Active Optical Cable (AOC).



Optical Cables

- HPE 100 Gb QSFP28 to QSFP28 Direct Attach Copper Cable or
- HPE 100 Gb QSFP28 to QSFP28 Active Optical Cable

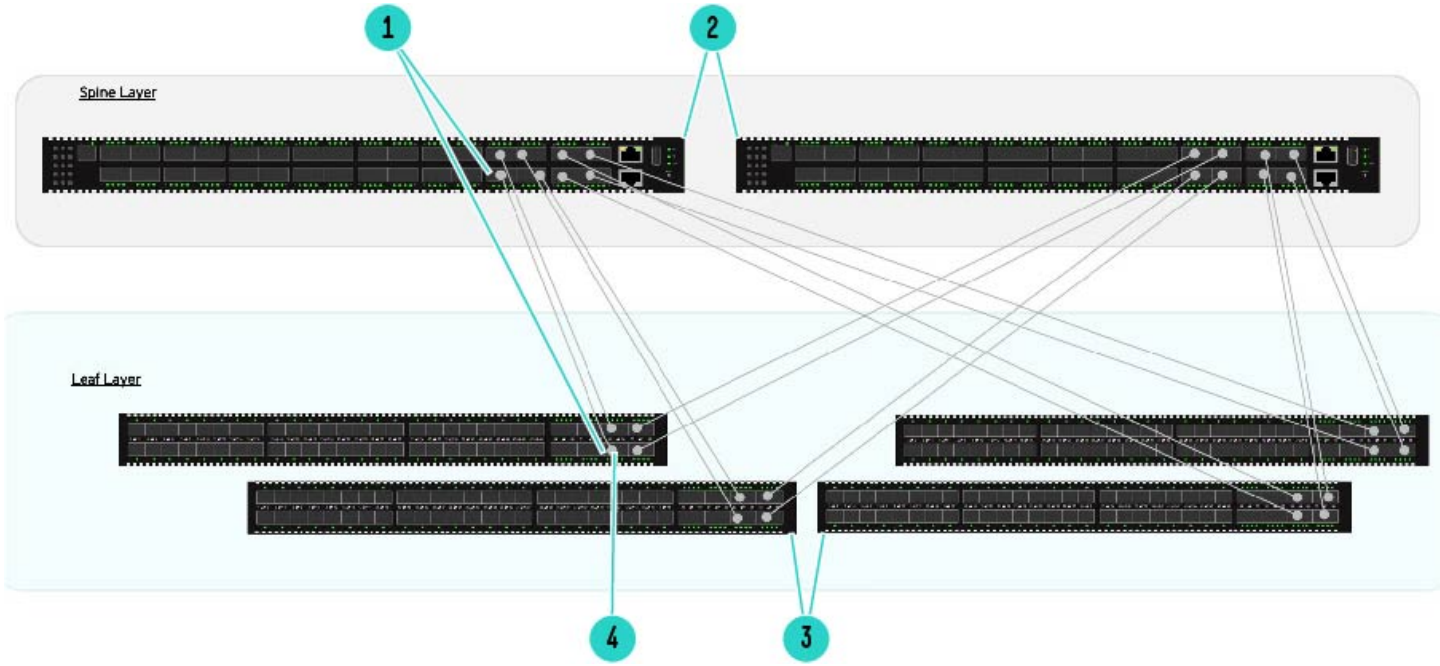
Leaf and Spine Deployment

NOTE: General Availability March 2019

When fabric manager computes the tree topologies for the modules, it uses 'proof by contradiction" to guarantee those trees are loop free which allows modules to be wired arbitrarily, including mesh and Leaf and Spine configurations. Leaf and Spine configuration involves FM 3032Q* that acts as a spine module.

- Directly connect FM 3032Q to the QSFP28 ports of other rack connectivity modules (e.g. FM 3180/3032Q etc.). Use a QSFP28-to-QSFP28 cable such as a Direct Attach Cable (DAC) or Active Optical Cable (AOC).

Standard Features



Spine and Leaf Configuration

1. HPE 100Gb QSFP28 LC CWDM4 2km Transceiver
2. Spine Module FM 3032Q
3. Leaf Module FM 3180/FM 3032Q/FM 3132Q/FM 2072
4. HPE 100Gb QSFP28 to: QSFP28 Direct Attach Copper Cable or QSFP28 Active Optical Cable

Fabric Interconnect with FM 1006

The FM 1006 device is a passive optical module that uses HPE Composable Fabric optical interfaces to create a meshed fabric.

Fabrics of up to six rack connectivity modules (four minimum) require connecting the modules to a FM 1006 passive interconnect.

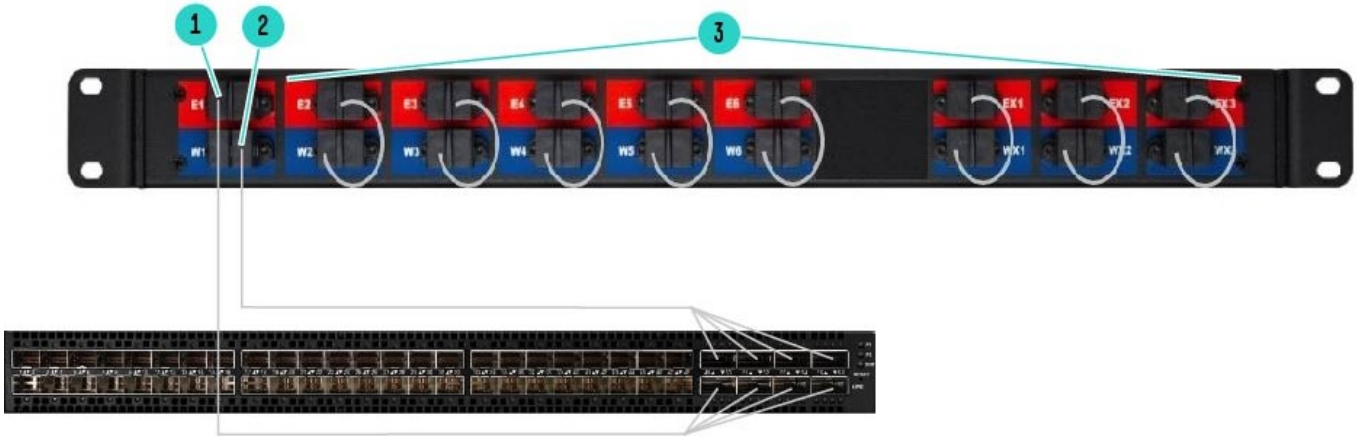
The FM 1006 creates a meshed network between the HPE Composable Fabric rack connectivity modules, which is used by HPE Composable Fabric Manager to create forwarding topologies based on Affinities. All values of the Composable Fabric solution are preserved in this deployment. As a passive device, the FM 1006 consumes no power and as such has failure behaviors that are similar to, or better than, fiber patch panels. FM 1006s can be connected together to create larger networks.

With 3 simple MPO cables, FM 1006 can be extended to provide a single implementation of a meshed network for the attached rack connectivity modules. In increments of 6 rack connectivity modules, any sized Composable Fabric network can be created.

- Optical-based FM 1006 passive interconnect solution with simplified cabling for six rack connectivity modules or more:
  - Connect FM 3032Q modules to an FM 1006 interconnect passive device. Plug each FM 3032Q into the FM 1006 using the HPE-supplied cable. The passive FM 1006 device creates the mesh structure of an HPE Composable Fabric.

Standard Features

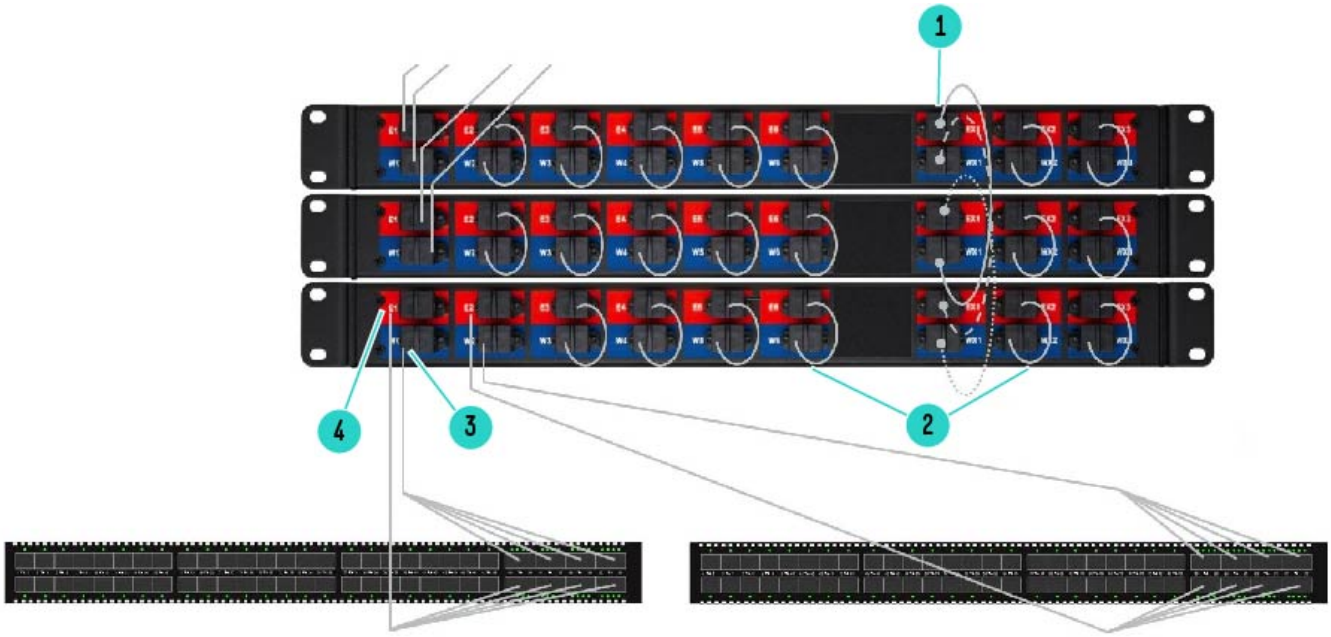
Deployment with single FM 1006



4 x QSFP28 Deployment – Optical Cables

1. HPE 100Gb QSFP28 LC CWDM4 2km Transceiver
2. HPE 24Fiber MPO to 4xLC Single-mode
3. HPE 24 Fiber MPO 0.25M

Deployment with multiple FM 1006's



Optical Cables

1. HPE 24 Fiber MPO
2. HPE 24 Fiber MPO 0.25M - loopback
3. HPE 100Gb QSFP28 LC CWDM4 2km Transceiver
4. HPE 24 Fiber MPO to 4xLC Single-mode

Service and Support

Services for customers purchasing from Hewlett Packard Enterprise or an enterprise reseller are quoted using Hewlett Packard Enterprise order configuration tools.

Technology Services for increased uptime, productivity and ROI

At HPE, our priority is to maximize your workload uptime, avoiding problems before they occur. As the experts for the HPE Composable Fabric, HPE Pointnext support will be your 24x7x 365 single point-of-contact for all of your support needs with HPE Pointnext Proactive Care Support. This means you can spend more time developing apps and adding value to the business rather than maintaining your infrastructure.

If there is a potential risk in your infrastructure, our remote support technology will proactively notify HPE and initiate the resolution process. If you are experiencing any issue with your solution, HPE Pointnext Proactive Care will provide you immediate access to our team of solution experts, whose first priority is to ensure your workloads are up and running, and then immediately start diagnosing the failure.

HPE Pointnext offers its full portfolio of support services. This includes Foundation Care, Proactive Care, Proactive Care Advanced and Datacenter Care. Flexible Capacity and Operational Support Services are also available.

HPE Composable Fabric is supported by the power of HPE, in 30+ different languages, with local presence across 140 countries.

Please consult your HPE Sales Representative for any additional questions and support options.

Installation and Startup Services

HPE Pointnext provides a full set of installation and startup services to meet your unique requirements.

Warranty and support

- **1-year Warranty**
  See **http://www.hpe.com/networking/warrantysummary** for warranty and support information included with your product purchase.
- **Software releases**
  To find software for your product, refer to **http://www.hpe.com/networking/support**; for details on the software releases available with your product purchase, refer to **http://www.hpe.com/networking/warrantysummary**.

Parts and Materials

Hewlett Packard Enterprise will provide HPE-supported replacement parts and materials necessary to maintain the covered hardware product in operating condition, including parts and materials for available and recommended engineering improvements.

Parts and components that have reached their maximum supported lifetime and/or the maximum usage limitations as set forth in the manufacturer's operating manual, product quick-specs, or the technical product data sheet will not be provided, repaired, or replaced as part of these services.

The defective media retention service feature option applies only to Disk or eligible SSD/Flash Drives replaced by Hewlett Packard Enterprise due to malfunction.

Configuration Information

The Composable Fabric FM 3032Q

HPE Composable Fabric FM 3032Q 32-port QSFP28 1RU Front-to-Back Module	R1N27A
HPE Composable Fabric FM 3032Q 32-port QSFP28 1RU Back-to-Front Module	R1N28A

HPE Composable Fabric Licenses

HPE Composable Fabric FM 3xxx 32-port 25GbE 3yr E-LTU	R2E51AAE
HPE Composable Fabric FM 3xxx 32-port 25GbE 5yr E-LTU	R2E52AAE
HPE Composable Fabric FM 3xxx 8-port Upgrade 3yr E-LTU	R2E53AAE
HPE Composable Fabric FM 3xxx 8-port Upgrade 5yr E-LTU	R2E54AAE

Related Options

HPE Composable Fabric Accessories

HPE Composable Fabric FM 1006 1RU Passive Module	R1N31A
HPE 100GbE 24 Fiber MPO Single-mode 0.25m Phm Cable	R1N92A
HPE 25GbE 24 Fiber MPO Single-mode 0.25m Phm Cable	R1N96A
HPE 24 Fiber MPO Single-mode 0.25m Cable	R1N44A
HPE 24 Fiber MPO Single-mode 1m Cable	R1N78A
HPE 24 Fiber MPO Single-mode 3m Cable	R1N54A
HPE 24 Fiber MPO Single-mode 5m Cable	R1N53A
HPE 24 Fiber MPO Single-mode 10m Cable	R1N52A
HPE 24 Fiber MPO Single-mode 20m Cable	R1N73A
HPE 24 Fiber MPO Single-mode 40m Cable	R1N85A
HPE 24 Fiber MPO Single-mode 100m Cable	R1N80A
HPE 24 Fiber MPO to 3x12 Fiber MPO Single-mode 1m Cable	R1N87A
HPE 24 Fiber MPO to 3x12 Fiber MPO Single-mode 3m Cable	R1N42A
HPE 24 Fiber MPO to 3x12 Fiber MPO Single-mode 5m Cable	R1N56A
HPE 24 Fiber MPO to 3x12 Fiber MPO Single-mode 10m Cable	R1N88A
HPE 24 Fiber MPO to 3x12 Fiber MPO Single-mode 15m Cable	R1N89A
HPE 24 Fiber MPO to 3x12 Fiber MPO Single-mode 20m Cable	R1N93A
HPE 24 Fiber MPO to 4xLC Single-mode 1m Cable	R1N90A
HPE 24 Fiber MPO to 4xLC Single-mode 3m Cable	R1N58A
HPE 24 Fiber MPO to 4xLC Single-mode 5m Cable	R1N59A
HPE 24 Fiber MPO to 4xLC Single-mode 10m Cable	R1N60A
HPE 24 Fiber MPO to 4xLC Single-mode 15m Cable	R1N91A
HPE 24 Fiber MPO to 4xLC Single-mode 20m Cable	R1N61A
HPE 40Gb QSFP+ to 4x10Gb SFP+ 3m Direct Attach Copper Cable	R1N64A
HPE 40Gb QSFP+ to QSFP+ 0.35m Direct Attach Copper Cable	R0Y58A
HPE 40Gb QSFP+ to QSFP+ 1m Direct Attach Copper Cable	R0Y56A
HPE 40Gb QSFP+ to QSFP+ 3m Direct Attach Copper Cable	R0Y57A
HPE 40Gb QSFP+ to QSFP+ 5m Direct Attach Copper Cable	R0Y59A
HPE 40Gb QSFP+ to QSFP+ 7m Active Optical Cable	R1N39A
HPE 40Gb QSFP+ to QSFP+ 15m Active Optical Cable	R1N40A
HPE 100Gb QSFP28 to QSFP28 0.5m Direct Attach Copper Cable	R1N34A
HPE 100Gb QSFP28 to QSFP28 1m Direct Attach Copper Cable	R1N35A
HPE 100Gb QSFP28 to QSFP28 3m Direct Attach Copper Cable	R1N68A
HPE 100Gb QSFP28 to QSFP28 5m Direct Attach Copper Cable	R1N69A
HPE 100Gb QSFP28 to QSFP28 7m Active Optical Cable	R1N36A
HPE 100Gb QSFP28 to QSFP28 15m Active Optical Cable	R1N37A
HPE 40Gb QSFP+ to 4x10Gb SFP+ 1m Direct Attach Copper Cable	R1N75A
HPE 40Gb QSFP+ to 4x10Gb SFP+ 3m Direct Attach Copper Cable	R1N64A
HPE 40Gb QSFP+ to 4x10Gb SFP+ 5m Direct Attach Copper Cable	R1N74A
HPE 40Gb QSFP+ to 4x10Gb SFP+ 3m Active Optical Cable	R1N82A
HPE 40Gb QSFP+ to 4x10Gb SFP+ 5m Active Optical Cable	R1N77A
HPE 40Gb QSFP+ to 4x10Gb SFP+ 10m Active Optical Cable	R1N83A
HPE 40Gb QSFP+ to 4x10Gb SFP+ 20m Active Optical Cable	R1N84A

Related Options

HPE QSFP28 to 4x25Gb SFP28 1m Direct Attach Copper Cable	R1N62A
HPE QSFP28 to 4x25Gb SFP28 3m Direct Attach Copper Cable	R1N63A
HPE QSFP28 to 4x25Gb SFP28 7m Active Optical Cable	R1N50A
HPE QSFP28 to 4x25Gb SFP28 15m Active Optical Cable	R1N51A
HPE 10Gb SFP+ to SFP+ 1m Direct Attach Copper Cable	R0Y52A
HPE 10Gb SFP+ to SFP+ 3m Direct Attach Copper Cable	R0Y53A
HPE 10Gb SFP+ to SFP+ 5m Direct Attach Copper Cable	R0Y54A
HPE 10Gb SFP+ to SFP+ 5m Active Optical Cable	R1N79A
HPE 10Gb SFP+ to SFP+ 7m Active Optical Cable	R1N81A
HPE 10GBASE-T SFP+ RJ45 30m Transceiver	R0Y65A
HPE 10Gb SFP+ LC LR 10km Transceiver	R0Y61A
HPE 10Gb SFP+ LC SR 300m Transceiver	R0Y62A
HPE 40Gb QSFP+ MPO SR4 100m Transceiver	R1N49A
HPE 40Gb QSFP+ LC LR 10km Transceiver	R1N48A
HPE 40Gb QSFP+ MPO IR4P 2km Transceiver	R1N55A
HPE 100Gb QSFP28 PSM4 500m Transceiver	R1N45A
HPE 100Gb QSFP28 MPO SR4 100m Transceiver	R1N47A
HPE 100Gb QSFP28 LC CWDM4 2km Transceiver	R1N46A
HPE 100Gb QSFP28 LC LR 10km Transceiver	R1N94A
HPE 100Gb QSFP28 Bidirectional Multi-mode 100m Transceiver	R1P00A
HPE 12 Fiber MPO to 4xLC Multi-mode 3m Cable	R1N86A
HPE 12 Fiber MPO to 4xLC Single-mode 2m Cable	R1N76A
HPE QSFP28 to SFP28 Adapter	R1P15A

Technical Specifications

Chassis	1RU Form Factor Redundant Hot Swappable Power Supplies Hot swappable fans Console, RJ45
Fabric Interfaces	8 (up to 16) x QSFP28 (100GbE)
Access Interfaces	24 x QSFP28 (100GbE) or 16 x QSFP28 (100GbE) – Splittable into 4 x 10/25GbE ports
Fabric/Switching Capacity	3.6 Tbps Up to 2 billion packets per second Line rate L2 and L3 forwarding L2/L3 Latency from 500ns
Platform Software	Linux ONIE
Power and Cooling	1+1 redundant, hot swap PSUs 100 - 240VAC auto-ranging, 47-63Hz auto input 3+1 redundant fans, front to back and back to front system cooling
Power Consumption	Maximum Power Draw 430W Typical Power Draw 246W
Dimensions	**Height**: 43.8 mm (1.73") 1 EIA unit Width: 437 mm (17.2") **Depth:** 556 mm (21.9")
Weight	22.4 lbs. (10.2 Kg)
Altitude	-60 to 3000m
Temperature	32°F to 104°F (0°C to 40°C)
Humidity	5% to 90% non-condensing
Approvals	EMC: CN(GB9254-2008), EU(EN55022, EN55024), FCC, VCCI, CCC Safety: IEC60950-1, GB4943, UL/CSA, CB, CCC
Other	ROHS-6
Memory and processor	Intel Denverton 1.6Ghz Dual-core (up to 8-core), 16GB ECC DDR4 and 128GB M.2 SSD
Performance	**Throughput** up to 2 Bpps **Fabric/ Switching capacity** 800-1600 Gbps IO Bandwidth, 16M Byte Buffer **Routing table size** 128K entries (IPv4), 64K entries (IPv6) **Mac address table size** 136K
Management	HPE Composable Fabric Manager; Command-line interface; Out-of-band management; Telnet; FTP
Services	Refer to the Hewlett Packard Enterprise website at **http://www.hpe.com/networking/services** for details on the service-level descriptions and product numbers. For details about services and response times in your area, please contact your local Hewlett Packard Enterprise sales office.

Summary of Changes

Date	Version History	Action	Description of Change:
17-Feb-2020	Version 4	Changed	Overview, Service and Support, and Related Options sections were updated.
04-Nov-2019	Version 3	Changed	Configuration Information section was updated.
		Added	SKUs added in Configuration Information section: R1N93A, R1N79A, R1N95A
06-May-2019	Version 2	Changed	Service and Support and Configuration Information sections were updated.
		Added	SKUs added in Configuration Information section: R1N78A, R1N87A, R1N88A, R1N89A.
04-Mar-2019	Version 1	Created	New QuickSpecs

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