Cisco 10GBASE Dense Wavelength-Division Multiplexing XFP Modules

Product Overview

The Cisco® Dense Wavelength-Division Multiplexing (DWDM) XFP pluggable module (Figure 1) allows enterprise companies and service providers to provide scalable and easy-to-deploy 10 Gigabit LAN, WAN, and Optical Transport Network (OTN) services in their networks.

Figure 1. Cisco DWDM XFP Module

Main features of the Cisco DWDM XFP include:

- The Cisco DWDM XFP supports 10-Gigabit data rates from 9.9G to 11.1G (LAN, WAN, and OTU2/OTU2e).
- The hot-swappable input/output device plugs into an Ethernet XFP port of a Cisco switch or router to link the port with the network.
- The Cisco DWDM XFP supports the Cisco quality identification (ID) feature, which enables a Cisco switch or router to identify whether or not the module is an XFP module certified and tested by Cisco.
- The standard Cisco DWDM XFP supports 32 nontunable ITU 100-GHz wavelengths.
- The tunable Cisco DWDM XFP supports 80 tunable ITU 50-GHz wavelengths.
- Cisco DWDM XFP modules supports digital optical monitoring capability.

Platform Support

The Cisco DWDM XFPs are supported across a variety of Cisco switches, routers, and optical transport devices. For more details, refer to the Cisco 10-Gigabit transceivers compatibility matrix at http://www.cisco.com/en/US/docs/interfaces_modules/transceiver_modules/compatibility/matrix/OL_6974.pdf.

Connectors and Cabling

- Equipment: standard XFP interface
- Network: dual LC/PC connector

Note: Only connections with patch cords with PC or UPC connectors are supported. Patch cords with APC connectors are not supported. All cables and cable assemblies used must be compliant with the standards specified in the standards section.

Dimensions

- Dimensions (L x W x H): 71 x 18.5 x 8.5 mm. Cisco XFPs typically weigh less than 300 grams.
- Environmental conditions and power requirements:
  - Operating temperature range: 32 to 158°F (0 to 70°C).
  - Storage temperature range: -40 to 185°F (-40 to 85°C).
  - The maximum power consumption per Cisco XFP module is 3.5W.

Optical Parameters

Table 1 shows the main optical characteristics for the standard nontunable Cisco DWDM XFP modules.

Table 1. Optical Parameters for Standard DWDM XFP

Parameter	Symbol	Minimum	Typical	Maximum	Units	Notes and Conditions
Transmitter						
Spectral width				0.2	nm	Full width, -20 dB from maximum, with resolution bandwidth (RBW) = 0.01 nm
Transmitter center wavelength		x - 100	x	x + 100	pm	Refer to Table 4 for center wavelengths
Side-mode suppression ratio	SMSR	30			dB	
Transmitter extinction ratio		9			dB	
Transmitter optical output power	Pout	-1.0		3.0	dBm	Average power coupled into single-mode fiber
Receiver						
Receiver optical input wavelength		1530		1565	nm	
Receiver damage threshold		4.0			dBm	
Receiver overload		-7.0			dBm	
Receiver Performance at 10G LAN and 10G WAN Rates (NO-FEC Applications)						
Optical input power	Pin	-23.0		-7.0	dBm	At BER=1E-12, back-to-back, unamplified link
Optical input power (dispersion-limited)	Pin	-20.0		-7.0	dBm	At BER=1E-12, -500 to 1600 ps/nm chromatic dispersion, unamplified link
Optical input power (dispersion- and noise-limited	Pin	-18.0		-7.0	dBm	At BER=1E-12, -500 to 1600 ps/nm chromatic dispersion, amplified link with min 27dB OSNR (0.1nm RBW)
Receiver Performance at OTU2/OTU2e Rates (FEC Applications)						
Optical input power	Pin	-27.0		-7.0	dBm	At BER=1E-3 (pre-EFEC), back-to-back, unamplified link
Optical input power (dispersion-limited)	Pin	-24.0		-7.0	dBm	At BER=1E-3 (pre-EFEC), -500 to 1300 ps/nm chromatic dispersion, unamplified link

Parameter	Symbol	Minimum	Typical	Maximum	Units	Notes and Conditions
Optical input power (dispersion- and noise-limited)	Pin	-18.0		-7.0	dBm	At BER=1E-3 (pre-EFEC), -500 to 1100 ps/nm chromatic dispersion, amplified link with min 16dB OSNR (0.1nm RBW)
Optical input power (dispersion- and noise-limited)	Pin	-18.0		-7.0	dBm	At BER=1E-5 (pre-GFEC), -500 to 1100 ps/nm chromatic dispersion, amplified link with min 19dB OSNR (0.1nm RBW)

Note:

1. Parameters are specified over temperature and at end of life unless otherwise noted.
2. When shorter distances of single-mode fiber are used, an inline optical attenuator must be used to avoid overloading and damaging the receiver.

Table 2 shows the main optical characteristics for the tunable Cisco DWDM XFP modules.

Table 2. Optical Parameters for Tunable DWDM XFP

Parameter	Symbol	Minimum	Typical	Maximum	Units	Notes and Conditions
Transmitter						
Spectral width				0.2	nm	Full width, -20 dB from maximum, with resolution bandwidth (RBW) = 0.01 nm
Transmitter center wavelength		x - 25	x	x + 25	pm	Refer to Table 3 for center wavelengths
Side-mode suppression ratio	SMSR	30			dB	
Transmitter extinction ratio		9			dB	
Transmitter optical output power	Pout	0.0		3.0	dBm	Average power coupled into single-mode fiber
Receiver						
Receiver optical input wavelength		1530		1565	nm	
Receiver damage threshold		4.0			dBm	
Receiver overload		-7.0			dBm	
Receiver Power Performance						
	Units		**Range**			**Notes and Conditions**
Performance at 10G LAN and 10G WAN Rates (NO-FEC Applications)						
Input power range	dBm		-7 to -24			At BER=1E-12, back-to-back, unamplified link
Input power range (dispersion-limited)	dBm		-7 to -22			At BER=1E-12, -500 to 1600 ps/nm chromatic dispersion, unamplified link
Input power range (dispersion- and noise-limited)	dBm		-7 to -20			At BER=1E-12, -500 to 1600 ps/nm chromatic dispersion, amplified link with min 26dB OSNR (0.1nm RBW)

Performance at OTU2/OTU2e Rates (FEC Applications)			
Input power range	dBm	-7 to -27	At BER=1E-3 (pre-EFEC), back-to-back, unamplified link
Input power range (dispersion-limited)	dBm	-7 to -26	At BER=1E-3 (pre-EFEC), -400 to 1300 ps/nm chromatic dispersion, unamplified link
Input power range (dispersion- and noise-limited)	dBm	-7 to -20	At BER=1E-3 (pre-EFEC), -400 to 1300 ps/nm chromatic dispersion, amplified link with min 14.5dB OSNR (0.1nm RBW)
Input power range (dispersion- and noise-limited)	dBm	-7 to -18	At BER=1E-5 (pre-GFEC), -400 to 1100 ps/nm chromatic dispersion, amplified link with min 17dB OSNR (0.1nm RBW)

Note:

1. Parameters are specified over temperature and at end of life unless otherwise noted.
2. When shorter distances of single-mode fiber are used, an inline optical attenuator must be used to avoid overloading and damaging the receiver.

Table 3 shows the 80 DWDM ITU-50GHz channels to which the device can be tuned.

Table 3. ITU 50-GHz Center Wavelengths and Channel Numbering

Channel ID	Frequency (THz)	Wavelength (nm)	Channel ID	Frequency (THz)	Wavelength (nm)
80	195.9	1530.33	79	195.85	1530.72
78	195.8	1531.12	77	195.75	1531.51
76	195.7	1531.90	75	195.65	1532.29
74	195.6	1532.68	73	195.55	1533.07
72	195.5	1533.47	71	195.45	1533.86
70	195.4	1534.25	69	195.35	1534.64
68	195.3	1535.04	67	195.25	1535.43
66	195.2	1535.82	65	195.15	1536.22
64	195.1	1536.61	63	195.05	1537.00
62	195.0	1537.40	61	194.95	1537.79
60	194.9	1538.19	59	194.85	1538.58
58	194.8	1538.98	57	194.75	1539.37
56	194.7	1539.77	55	194.65	1540.16
54	194.6	1540.56	53	194.55	1540.95
52	194.5	1541.35	51	194.45	1541.75
50	194.4	1542.14	49	194.35	1542.54
48	194.3	1542.94	47	194.25	1543.33
46	194.2	1543.73	45	194.15	1544.13
44	194.1	1544.53	43	194.05	1544.92
42	194.0	1545.32	41	193.95	1545.72
40	193.9	1546.12	39	193.85	1546.52
38	193.8	1546.92	37	193.75	1547.32
36	193.7	1547.72	35	193.65	1548.11
34	193.6	1548.51	33	193.55	1548.91
32	193.5	1549.32	31	193.45	1549.72
30	193.4	1550.12	29	193.35	1550.52
28	193.3	1550.92	27	193.25	1551.32
26	193.2	1551.72	25	193.15	1552.12

Channel ID	Frequency (THz)	Wavelength (nm)	Channel ID	Frequency (THz)	Wavelength (nm)
24	193.1	1552.52	23	193.05	1552.93
22	193.0	1553.33	21	192.95	1553.73
20	192.9	1554.13	19	192.85	1554.54
18	192.8	1554.94	17	192.75	1555.34
16	192.7	1555.75	15	192.65	1556.15
14	192.6	1556.55	13	192.55	1556.96
12	192.5	1557.36	11	192.45	1557.77
10	192.4	1558.17	9	192.35	1558.58
8	192.3	1558.98	7	192.25	1559.39
6	192.2	1559.79	5	192.15	1560.20
4	192.1	1560.61	3	192.05	1561.01
2	192.0	1561.42	1	191.95	1561.83

Warranty

Standard warranty: 1 year.

Ordering Information

Table 4 gives details about ordering Cisco DWDM XFPs.

Table 4. Cisco DWDM XFP Ordering Information

Product Number	Description	ITU Channel
DWDM-XFP-60.61=	10GBASE-DWDM 1560.61 nm XFP (100-GHz ITU grid)	21
DWDM-XFP-59.79=	10GBASE-DWDM 1559.79 nm XFP (100-GHz ITU grid)	22
DWDM-XFP-58.98=	10GBASE-DWDM 1558.98 nm XFP (100-GHz ITU grid)	23
DWDM-XFP-58.17=	10GBASE-DWDM 1558.17 nm XFP (100-GHz ITU grid)	24
DWDM-XFP-56.55=	10GBASE-DWDM 1556.55 nm XFP (100-GHz ITU grid)	26
DWDM-XFP-55.75=	10GBASE-DWDM 1555.75 nm XFP (100-GHz ITU grid)	27
DWDM-XFP-54.94=	10GBASE-DWDM 1554.94 nm XFP (100-GHz ITU grid)	28
DWDM-XFP-54.13=	10GBASE-DWDM 1554.13 nm XFP (100-GHz ITU grid)	29
DWDM-XFP-52.52=	10GBASE-DWDM 1552.52 nm XFP (100-GHz ITU grid)	31
DWDM-XFP-51.72=	10GBASE-DWDM 1551.72 nm XFP (100-GHz ITU grid)	32
DWDM-XFP-50.92=	10GBASE-DWDM 1550.92 nm XFP (100-GHz ITU grid)	33
DWDM-XFP-50.12=	10GBASE-DWDM 1550.12 nm XFP (100-GHz ITU grid)	34
DWDM-XFP-48.51=	10GBASE-DWDM 1548.51 nm XFP (100-GHz ITU grid)	36
DWDM-XFP-47.72=	10GBASE-DWDM 1547.72 nm XFP (100-GHz ITU grid)	37
DWDM-XFP-46.92=	10GBASE-DWDM 1546.92 nm XFP (100-GHz ITU grid)	38
DWDM-XFP-46.12=	10GBASE-DWDM 1546.12 nm XFP (100-GHz ITU grid)	39
DWDM-XFP-44.53=	10GBASE-DWDM 1544.53 nm XFP (100-GHz ITU grid)	41
DWDM-XFP-43.73=	10GBASE-DWDM 1543.73 nm XFP (100-GHz ITU grid)	42
DWDM-XFP-42.94=	10GBASE-DWDM 1542.94 nm XFP (100-GHz ITU grid)	43
DWDM-XFP-42.14=	10GBASE-DWDM 1542.14 nm XFP (100-GHz ITU grid)	44
DWDM-XFP-40.56=	10GBASE-DWDM 1540.56 nm XFP (100-GHz ITU grid)	46
DWDM-XFP-39.77=	10GBASE-DWDM 1539.77 nm XFP (100-GHz ITU grid)	47
DWDM-XFP-38.98=	10GBASE-DWDM 1538.98 nm XFP (100-GHz ITU grid)	48

Product Number	Description	ITU Channel
DWDM-XFP-38.19=	10GBASE-DWDM 1538.19 nm XFP (100-GHz ITU grid)	49
DWDM-XFP-36.61=	10GBASE-DWDM 1536.61 nm XFP (100-GHz ITU grid)	51
DWDM-XFP-35.82=	10GBASE-DWDM 1535.82 nm XFP (100-GHz ITU grid)	52
DWDM-XFP-35.04=	10GBASE-DWDM 1535.04 nm XFP (100-GHz ITU grid)	53
DWDM-XFP-34.25=	10GBASE-DWDM 1534.25 nm XFP (100-GHz ITU grid)	54
DWDM-XFP-32.68=	10GBASE-DWDM 1532.68 nm XFP (100-GHz ITU grid)	56
DWDM-XFP-31.90=	10GBASE-DWDM 1531.90 nm XFP (100-GHz ITU grid)	57
DWDM-XFP-31.12=	10GBASE-DWDM 1531.12 nm XFP (100-GHz ITU grid)	58
DWDM-XFP-30.33=	10GBASE-DWDM 1530.33 nm XFP (100-GHz ITU grid)	59
DWDM-XFP-C	10GBASE-DWDM tunable XFP (50-GHz ITU grid)	See table 3

Regulatory and Standards Compliance

Standards

- GR-20-CORE: Generic Requirements for Optical Fiber and Optical Fiber Cable
- GR-326-CORE: Generic Requirements for Single-Mode Optical Connectors and Jumper Assemblies
- GR-1435-CORE: Generic Requirements for Multifiber Optical Connectors
- IEEE 802.3: 10-Gigabit Ethernet
- ITU-T G.709: Interfaces for the Optical Transport Network (OTN)
- ITU-T G.975: GFEC
- ITU-T G.975.1: EFEC
- ITU-T G.694.1: DWDM frequency grid

Safety

- Laser Class I 21CFR1040 and IEC 60825

For More Information

For more information about Cisco 10GBASE DWDM XFP modules, contact your sales representative.

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