Cisco 10GBASE DWDM X2 Modules

Product Overview

The Cisco® Dense Wavelength-Division Multiplexing (DWDM) X2 pluggable module (Figure 1) allows enterprise companies and service providers to offer scalable and easy-to-deploy 10 Gigabit Ethernet services in their networks.

Figure 1. Cisco DWDM X2 Module

Main features of the Cisco DWDM X2 include:

- The Cisco DWDM X2 supports 10GBASE Ethernet.
- The hot-swappable input/output device plugs into an Ethernet X2 port of a Cisco switch or router to link the port with the network.
- The Cisco DWDM X2 supports the Cisco Quality Identification (ID) feature, which enables a Cisco switch or router to identify whether or not the module is an X2 module certified and tested by Cisco.

  The module supports 32 nontunable ITU 100-GHz wavelengths compatible with the Cisco ONS DWDM channel plan.
- The Cisco DWDM X2 supports digital optical monitoring capability.

Platform Support

The Cisco DWDM X2 is supported across a variety of Cisco switches, routers, and optical transport devices. For more details, refer to the Cisco wavelength-division multiplexing transceivers compatibility matrix at http://www.cisco.com/en/US/docs/interfaces_modules/transceiver_modules/compatibility/matrix/OL_6982.html.

Connectors and Cabling

- **Equipment:** Standard X2 interface
- **Network:** Dual SC/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 (D x W x H) are 91 x 36 x 13.46 mm. Cisco X2s 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 X2 module is 4W.

Optical Parameters

Table 1 shows the main optical characteristics for the Cisco DWDM X2 Modules.

Table 1. Optical Parameters

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 2 for center wavelengths
Side-mode suppression ratio	SMSR	30			dB	
Transmitter extinction ratio	OMI	9			dB	
Transmitter optical output power	P_{out}	-1.0		3.0	dBm	Average power coupled into single-mode fiber
Receiver						
Receiver optical input wavelength		1530		1565	nm	
Receiver damage threshold				-1.0	dBm	
Dispersion tolerance		-500		1600	ps/nm	
Power-Limited Performance (measured at optical signal-to-noise ratio [OSNR] of 30 dB at 0.1-nm RBW)						
Optical input power	P_{in}	-23.0		-7.0	dBm	*
Dispersion power penalty				3	dB	*
Noise-Limited Performance (Measured at OSNR of 24 dB at 0.1-nm RBW)						
Optical input power	P_{in}	-17.0		-7.0	dB	*
Dispersion OSNR penalty				3	dB	*

* At Bit error rate (BER) = 1E-12 with IEEE802.3 test pattern.

Notes:

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 (10-dB) must be used to avoid overloading and damaging the receiver.
3. To prevent burst errors, Cisco suggests the use of appropriate optical attenuation in front of the receiver when interoperating X2 DWDM and XENPAK DWDM specifically under the following conditions:
   - When the input power on the receiver exceeds -14dBm
   - When the optical signal to noise ratio is less than 30dB @ 0.1nm RBW
   - When total chromatic dispersion is greater than 1500ps/nm

   The attenuation should be chosen to limit the input power into the receiver to be less than - 14dBm

Warranty

The standard warranty is 1 year.

Ordering Information

Table 2 gives details about ordering Cisco DWDM X2s.

Table 2. Cisco DWDM X2 Ordering Information

Product Number	Description	ITU Channel
DWDM-X2-60.61=	10GBASE-DWDM 1560.61 nm X2 (100-GHz ITU grid)	21
DWDM-X2-59.79=	10GBASE-DWDM 1559.79 nm X2 (100-GHz ITU grid)	22
DWDM-X2-58.98=	10GBASE-DWDM 1558.98 nm X2 (100-GHz ITU grid)	23
DWDM-X2-58.17=	10GBASE-DWDM 1558.17 nm X2 (100-GHz ITU grid)	24
DWDM-X2-56.55=	10GBASE-DWDM 1556.55 nm X2 (100-GHz ITU grid)	26
DWDM-X2-55.75=	10GBASE-DWDM 1555.75 nm X2 (100-GHz ITU grid)	27
DWDM-X2-54.94=	10GBASE-DWDM 1554.94 nm X2 (100-GHz ITU grid)	28
DWDM-X2-54.13=	10GBASE-DWDM 1554.13 nm X2 (100-GHz ITU grid)	29
DWDM-X2-52.52=	10GBASE-DWDM 1552.52 nm X2 (100-GHz ITU grid)	31
DWDM-X2-51.72=	10GBASE-DWDM 1551.72 nm X2 (100-GHz ITU grid)	32
DWDM-X2-50.92=	10GBASE-DWDM 1550.92 nm X2 (100-GHz ITU grid)	33
DWDM-X2-50.12=	10GBASE-DWDM 1550.12 nm X2 (100-GHz ITU grid)	34
DWDM-X2-48.51=	10GBASE-DWDM 1548.51 nm X2 (100-GHz ITU grid)	36
DWDM-X2-47.72=	10GBASE-DWDM 1547.72 nm X2 (100-GHz ITU grid)	37
DWDM-X2-46.92=	10GBASE-DWDM 1546.92 nm X2 (100-GHz ITU grid)	38
DWDM-X2-46.12=	10GBASE-DWDM 1546.12 nm X2 (100-GHz ITU grid)	39
DWDM-X2-44.53=	10GBASE-DWDM 1544.53 nm X2 (100-GHz ITU grid)	41
DWDM-X2-43.73=	10GBASE-DWDM 1543.73 nm X2 (100-GHz ITU grid)	42
DWDM-X2-42.94=	10GBASE-DWDM 1542.94 nm X2 (100-GHz ITU grid)	43
DWDM-X2-42.14=	10GBASE-DWDM 1542.14 nm X2 (100-GHz ITU grid)	44
DWDM-X2-40.56=	10GBASE-DWDM 1540.56 nm X2 (100-GHz ITU grid)	46
DWDM-X2-39.77=	10GBASE-DWDM 1539.77 nm X2 (100-GHz ITU grid)	47
DWDM-X2-38.98=	10GBASE-DWDM 1538.98 nm X2 (100-GHz ITU grid)	48
DWDM-X2-38.19=	10GBASE-DWDM 1538.19 nm X2 (100-GHz ITU grid)	49
DWDM-X2-36.61=	10GBASE-DWDM 1536.61 nm X2 (100-GHz ITU grid)	51
DWDM-X2-35.82=	10GBASE-DWDM 1535.82 nm X2 (100-GHz ITU grid)	52
DWDM-X2-35.04=	10GBASE-DWDM 1535.04 nm X2 (100-GHz ITU grid)	53
DWDM-X2-34.25=	10GBASE-DWDM 1534.25 nm X2 (100-GHz ITU grid)	54
DWDM-X2-32.68=	10GBASE-DWDM 1532.68 nm X2 (100-GHz ITU grid)	56
DWDM-X2-31.90=	10GBASE-DWDM 1531.90 nm X2 (100-GHz ITU grid)	57
DWDM-X2-31.12=	10GBASE-DWDM 1531.12 nm X2 (100-GHz ITU grid)	58
DWDM-X2-30.33=	10GBASE-DWDM 1530.33 nm X2 (100-GHz ITU grid)	59

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

Safety

- Laser Class I 21CFR1040
- Network Equipment Building Standards (NEBS) Level 3

For More Information

For more information about 10GBASE Cisco DWDM X2 Modules, contact your local Cisco sales representative.

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