



The bridge to possible



# Cisco Industrial Temperature 10GBASE Dense Wavelength-Division Multiplexing SFP+ Modules Datasheet

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Use industrial temperature (iTemp) Dense Wavelength-Division Multiplexing (DWDM) SFP+ modules to integrate baseband digital DWDM transport into your R-PHY shelf blades, RPDs, or digital PICs.

## Product overview

The Cisco® iTemp 10GBASE DWDM SFP+ Modules (Figure 1) are pluggable, temperature-hardened transceiver modules designed to deliver Remote PHY (R-PHY) capability in field or headend environments. They enable plug-and-play configuration of 10-Gbps Ethernet signals for simple configuration of R-PHY devices or shelves. With 40 ITU C-band wavelengths and three different distance values available, operators can control cost and wavelength assignments, and match link budgets in their fiber-deep networks. The standards-based SFP+ devices are compatible with existing passive filters and splitters, speeding deployments and minimizing service disruptions.



**Figure 1.**  
Cisco DWDM SFP+ Module

## Features and benefits

The Cisco iTemp 10GBASE Dense Wavelength-Division Multiplexing SFP+ Module offers the following features and benefits:

- Supports 10-Gigabit LAN PHY data rates (10.3125 Gbps) for IEEE Ethernet compatibility
- Industrial temperature range of operation from -40° C to 85° C
- Hot-swappable transceiver plugs into remote PHY devices, converged broadband-8 (cBR-8) Digital Physical Interface Card (D-PIC), and a variety of Cisco switches or routers in common usage
- Support for a pay-as-you-grow model for investment protection
- Standard digital diagnostics capability for incorporation into network management systems
- Multi-Source Agreement (MSA)-compliant physical form factor for compatibility with a broad range of available products
- DWDM fixed-wavelength modules support International Telecommunication Union (ITU) 100-GHz spaced channels (ITU 20–ITU 59)
- Dispersion-tolerant link lengths without added dispersion compensation; up to 80 km supported
- Supports the Cisco Quality Identification (ID) feature, enabling a Cisco switch or router to identify that the SFP+ module is tested and certified by Cisco

## Product specifications

Tables 1 through 3 describe the transmission and receiver characteristics in a 20 km link

**Table 1.** 20-km transmitter characteristics

Description	Unit	Minimum	Typical	Maximum	Notes
Launch power	dBm	-1		+3	
Extinction ratio	dB	7.5			
Wavelength $\lambda_i$	nm	1530.33		1561.42	ITU-20 to 59
Channel spacing	GHz		100		At End Of Life (EOL) over operating voltage and temperatures
Wavelength stability (after startup)	pm	$\lambda_i-100$		$\lambda_i+100$	
Side Mode Suppression Ratio (SMSR)	dB	30			
Crossing point	%	40		50	
Eye mask	%	10			
Maximum spectral width	pm			200	Modulated, full width, at -20dB, with RBW=0.01nm

**Table 2.** 20-km receiver characteristics

Description	Unit	Minimum	Maximum	Notes
Receiver wavelength range	nm	1529	1562	Covers ITU-20 to ITU-59
Receiver reflectance	dB		-27	
Maximum receiver input power	dBm	+3		Damage threshold

**Table 3.** 20-km link performance - no FEC application (10 GE LAN)

Condition	OSNR@0.5nm RBW (dB)		Receiver power range (dBm)		Notes
	Min	Max	Min	Max	
<b>Power-limited link</b>					
Back to back	25		-15	-1	At BER=1E-12, PRBS31, and 10 GE frame
<b>Dispersion-limited link</b>					
-200 ps/nm to 400 ps/nm	25		-14	-1	At BER=1E-12, PRBS31, and 10 GE frame

Tables 4 through 6 describe the transmission and receiver characteristics and link performance at 40 km.

**Table 4.** 40-km transmitter characteristics

Description	Unit	Min	Typical	Max	Notes
Launch power	dBm	-1		+3	
Extinction ratio	dB	8.2			
Wavelength $\lambda_i$	nm	1530.33		1561.42	ITU-20 to ITU-59
Channel spacing	GHz		100		At EOL over operating voltage and temperatures
Wavelength stability (after startup)	pm	$\lambda_i - 100$		$\lambda_i + 100$	
SMSR	dB	30			
Crossing point	%	40		50	
Eye mask	%	10			
Maximum spectral width	pm			200	Modulated, full width, at -20dB, with RBW=0.01nm

**Table 5.** 40-km receiver characteristics

Description	Unit	Min	Max	Notes
Receiver wavelength range	nm	1529	1562	Covers ITU-20 to ITU-59
Receiver reflectance	dB		-27	
Maximum receiver input power	dBm	+3		Damage threshold

**Table 6.** 40-km link performance - no FEC application (10 GE LAN)

Condition	OSNR@0.5nm RBW (dB)		Receiver power range (dBm)		Notes
	Min	Max	Min	Max	
<b>Power-limited link</b>					
Back to back	25		-23	-7	At BER=1E-12, PRBS31, and 10 GE frame
<b>Dispersion-limited link</b>					
-400 ps/nm to 800 ps/nm	25		-21	-7	At BER=1E-12, PRBS31, and 10 GE frame

Tables 7 through 9 describe the transmission and receiver characteristics and link performance at 40 km.

**Table 7.** 80-km transmitter characteristics

Description	Unit	Min	Typical	Max	Notes
Launch power (Limiting)	dBm	0	1	3	
Extinction ratio (Limiting)	dB	8.2			
Wavelength $\lambda_i$	nm	1530.33		1561.42	ITU-20 to ITU-59
Channel spacing	GHz		100		At EOL over operating voltage and temperatures
Wavelength stability (after startup)	pm	$\lambda_i-100$		$\lambda_i+100$	
SMSR	dB	30			
Crossing point	%	40		50	
Eye mask	%	10			
Maximum spectral width	pm			200	Modulated, full width, at -20dB, with RBW=0.01nm
SBS threshold (limiting)	dBm	+6			

**Table 8.** 80-km receiver characteristics

Description	Unit	Min	Max	Notes
Receiver wavelength range	nm	1529	1562	Covers ITU-20 to ITU-59
Receiver reflectance	dB		-27	
Maximum receiver input power	dBm	+3		Damage threshold

**Table 9.** 80-km link performance - no FEC application (10 GE LAN)

Condition	OSNR@0.5nm RBW (dB)		Receiver power range (dBm)		Notes
	Min	Max	Min	Max	
<b>Power-limited link (limiting)</b>					
Back to back	28		-23.5	-7	At BER=1E-12, PRBS31, and 10 GE frame
<b>Dispersion-limited link</b>					
-500 ps/nm to 1400 ps/nm	28		-21.1	-7	At BER=1E-12, PRBS31, and 10 GE frame

**Notes:**

1. Receiver optical filter bandwidth @-3dB for BER measurement shall be 0.4 nm

**Physical and environmental characteristics**

- Dimensions (H x W x D): 8.5 x 13.4 x 56.5 mm
- Cisco SFP+ modules typically weigh 75 grams or less
- Industrial operational case temperature range (IND): -40 to 85° C (-40 to 185° F)
- Storage temperature range: -40 to 85° C (-40 to 185° F)
- Optical connector is Duplex LC/PC
- Bail color: 80 km - green, 40 km - red, 20 km - white

**Regulatory, safety, and standards compliance**

- SFP+ MSA SFF-8431 (electrical)
- SFF-8432 improved pluggable form factor (mechanical)
- SFF-8472 diagnostic monitor interface for optical transceiver
- IEEE 802.3: 10-Gigabit Ethernet
- user class 1 (21CFR1040 and IEC 60825)

**Warranty**

- Standard warranty: 1 year
- Expedited replacement available via a Cisco SMARTnet® Service support contract

**Product ordering information**

**Table 10.** Cisco iTemp 10GBASE DWDM SFP+ Modules product identification listing

ITU	20-km parts	40-km parts	80-km parts
20	RPHY-S10G-20K-200=	RPHY-S10G-40K-200=	RPHY-S10G-80K-200=
21	RPHY-S10G-20K-210=	RPHY-S10G-40K-210=	RPHY-S10G-80K-210=
22	RPHY-S10G-20K-220=	RPHY-S10G-40K-220=	RPHY-S10G-80K-220=
23	RPHY-S10G-20K-230=	RPHY-S10G-40K-230=	RPHY-S10G-80K-230=
24	RPHY-S10G-20K-240=	RPHY-S10G-40K-240=	RPHY-S10G-80K-240=
25	RPHY-S10G-20K-250=	RPHY-S10G-40K-250=	RPHY-S10G-80K-250=
26	RPHY-S10G-20K-260=	RPHY-S10G-40K-260=	RPHY-S10G-80K-260=
27	RPHY-S10G-20K-270=	RPHY-S10G-40K-270=	RPHY-S10G-80K-270=

ITU	20-km parts	40-km parts	80-km parts
28	RPHY-S10G-20K-280=	RPHY-S10G-40K-280=	RPHY-S10G-80K-280=
29	RPHY-S10G-20K-290=	RPHY-S10G-40K-290=	RPHY-S10G-80K-290=
30	RPHY-S10G-20K-300=	RPHY-S10G-40K-300=	RPHY-S10G-80K-300=
31	RPHY-S10G-20K-310=	RPHY-S10G-40K-310=	RPHY-S10G-80K-310=
32	RPHY-S10G-20K-320=	RPHY-S10G-40K-320=	RPHY-S10G-80K-320=
33	RPHY-S10G-20K-330=	RPHY-S10G-40K-330=	RPHY-S10G-80K-330=
34	RPHY-S10G-20K-340=	RPHY-S10G-40K-340=	RPHY-S10G-80K-340=
35	RPHY-S10G-20K-350=	RPHY-S10G-40K-350=	RPHY-S10G-80K-350=
36	RPHY-S10G-20K-360=	RPHY-S10G-40K-360=	RPHY-S10G-80K-360=
37	RPHY-S10G-20K-370=	RPHY-S10G-40K-370=	RPHY-S10G-80K-370=
38	RPHY-S10G-20K-380=	RPHY-S10G-40K-380=	RPHY-S10G-80K-380=
39	RPHY-S10G-20K-390=	RPHY-S10G-40K-390=	RPHY-S10G-80K-390=
40	RPHY-S10G-20K-400=	RPHY-S10G-40K-400=	RPHY-S10G-80K-400=
41	RPHY-S10G-20K-410=	RPHY-S10G-40K-410=	RPHY-S10G-80K-410=
42	RPHY-S10G-20K-420=	RPHY-S10G-40K-420=	RPHY-S10G-80K-420=
43	RPHY-S10G-20K-430=	RPHY-S10G-40K-430=	RPHY-S10G-80K-430=
44	RPHY-S10G-20K-440=	RPHY-S10G-40K-440=	RPHY-S10G-80K-440=
45	RPHY-S10G-20K-450=	RPHY-S10G-40K-450=	RPHY-S10G-80K-450=
46	RPHY-S10G-20K-460=	RPHY-S10G-40K-460=	RPHY-S10G-80K-460=
47	RPHY-S10G-20K-470=	RPHY-S10G-40K-470=	RPHY-S10G-80K-470=
48	RPHY-S10G-20K-480=	RPHY-S10G-40K-480=	RPHY-S10G-80K-480=
49	RPHY-S10G-20K-490=	RPHY-S10G-40K-490=	RPHY-S10G-80K-490=
50	RPHY-S10G-20K-500=	RPHY-S10G-40K-500=	RPHY-S10G-80K-500=
51	RPHY-S10G-20K-510=	RPHY-S10G-40K-510=	RPHY-S10G-80K-510=
52	RPHY-S10G-20K-520=	RPHY-S10G-40K-520=	RPHY-S10G-80K-520=
53	RPHY-S10G-20K-530=	RPHY-S10G-40K-530=	RPHY-S10G-80K-530=
54	RPHY-S10G-20K-540=	RPHY-S10G-40K-540=	RPHY-S10G-80K-540=



ITU	20-km parts	40-km parts	80-km parts
55	RPHY-S10G-20K-550=	RPHY-S10G-40K-550=	RPHY-S10G-80K-550=
56	RPHY-S10G-20K-560=	RPHY-S10G-40K-560=	RPHY-S10G-80K-560=
57	RPHY-S10G-20K-570=	RPHY-S10G-40K-570=	RPHY-S10G-80K-570=
58	RPHY-S10G-20K-580=	RPHY-S10G-40K-580=	RPHY-S10G-80K-580=
59	RPHY-S10G-20K-590=	RPHY-S10G-40K-590=	RPHY-S10G-80K-590=

## Cisco environmental sustainability

Information about Cisco’s environmental sustainability policies and initiatives for our products, solutions, operations, and extended operations or supply chain is provided in the “Environment Sustainability” section of Cisco’s [Corporate Social Responsibility](#) (CSR) Report.

Reference links to information about key environmental sustainability topics (mentioned in the “Environment Sustainability” section of the CSR Report) are provided in the following table:

Sustainability topic	Reference
Information on product material content laws and regulations	<a href="#">Materials</a>
Information on electronic waste laws and regulations, including products, batteries, and packaging	<a href="#">WEEE compliance</a>

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