

# Cisco CPAK 100GBASE Modules

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Fiber line cards provide industry-leading port density while consuming up to 70 percent less power than competing models.

## Product overview

Cisco CPAK® 100GBASE fiber modules for Cisco® switches and routers offer a selection of high-density 100-Gbps connectivity solutions. The modules are especially well suited for connections in enterprise and service provider data centers and in service provider edge networks.

The line cards use the Cisco CPAK form factor. They are 20 percent smaller and consume 40 percent less power than C Form-Factor Pluggable 2 (CFP2) modules; they use 70 percent less power than the CFP interface. Cisco CPAK modules give you up to 20 percent greater port density and front-panel bandwidth than competing products.

Choose the model that matches the distance you need to cover, the type of fiber cabling you are using, and the Cisco networking product you are using. Cisco CPAK 100GBASE modules work in the following Cisco networking equipment: ASR 1000 Series Router; ASR 9000 Series Router; CRS-X Carrier Routing System; NCS 2000, 4000, and 6000 Series Routers; the Nexus 7000 and 7700 Series Switches, and the Cisco ONS Transport Platform.

## Features and benefits

Cisco CPAK modules combine high density and bandwidth with low power consumption and many are interoperable with any IEEE-compliant 100GBASE-LR4 or 100GBASE-SR10 for investment protection and product choice. Some models use Cisco Complementary Metal-Oxide Semiconductor (CMOS) photonic technology to provide industry-leading optical integration, performance, power savings, and scalability.

The key features of Cisco CPAK 100GBASE modules are listed in Table 1.

**Table 1.** Cisco CPAK 100GBASE module features and benefits

| Requirement                                                            | Cisco CPAK Module Supporting Feature                                                                                                                                                                                         |
|------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Accommodate ever-growing bandwidth requirements</b>                 | Up to 10 100-Gigabit Ethernet connections deliver as much as 1 Tbps of front-panel bandwidth                                                                                                                                 |
| <b>Control costs</b>                                                   | Form factor consumes 40% less power than CFP2 and 70% less power than CFP form factors                                                                                                                                       |
| <b>Real estate conservation</b>                                        | Minimal footprint allows 20% greater port density and bandwidth than competing products                                                                                                                                      |
| <b>High availability for business continuity</b>                       | Hot-swappable input/output device plugs into a Cisco CPAK-module-based switch, router, or optical platform port                                                                                                              |
| <b>Accommodate a variety of distance and fiber type requirements</b>   | Flexible interface choices                                                                                                                                                                                                   |
| <b>Investment protection, affordable migration to higher bandwidth</b> | <ul style="list-style-type: none"><li>• Support for a “pay-as-you-grow” model</li><li>• Can plug any Cisco 100-Gbps, 40-Gbps, and 10-Gbps line cards into Cisco CPAK modules (supports the Cisco AnyPort solution)</li></ul> |
| <b>Manage performance</b>                                              | Digital Optical Monitoring (DOM) support                                                                                                                                                                                     |

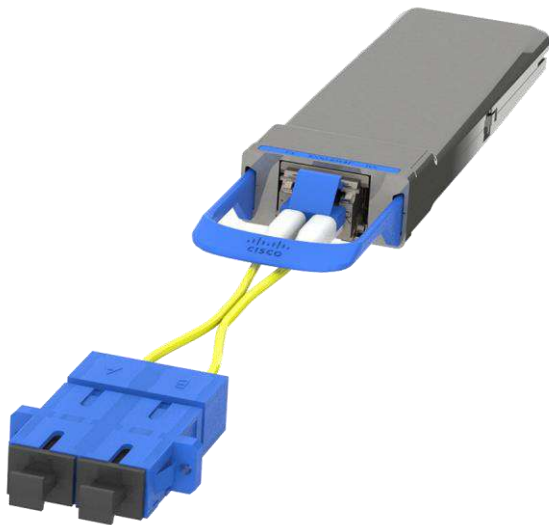
| Requirement                                                      | Cisco CPAK Module Supporting Feature                                                                                               |                   |                       |
|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|-------------------|-----------------------|
| Proper functioning and high performance with all Cisco platforms | Cisco quality Identification (ID) feature enables a Cisco platform to identify whether the module is certified and tested by Cisco |                   |                       |
| Standards compliance for equipment flexibility and choice        | Interoperability with any IEEE-compliant: 100GBASE-SR4, 100GBASE-LR4, 100GBASE-SR10, 40GBASE-SR4, 10GBASE-SR, 10GBASE-LR           |                   |                       |
| Protocol support                                                 | Product ID                                                                                                                         | Supported Mode(s) | Supported Protocol(s) |
|                                                                  | CPAK-100G-LR4                                                                                                                      | 1x100G            | IEEE 802.3ba          |
|                                                                  |                                                                                                                                    |                   | ITU OTU4              |
|                                                                  | CPAK-100GE-LR4                                                                                                                     | 1x100G            | IEEE 802.3ba          |
|                                                                  | CPAK-100G-ER4L                                                                                                                     | 1x100G            | IEEE 802.3ba          |
|                                                                  |                                                                                                                                    |                   | ITU OTU4              |
|                                                                  | CPAK-100G-ER4F                                                                                                                     | 1x100G            | IEEE 802.3ba          |
|                                                                  | CPAK-100G-CWDM4                                                                                                                    | 1x100G            | 100G CWDM4 MSA        |
|                                                                  | CPAK-100G-PSM4                                                                                                                     | 1x100G            | 100G PSM4 MSA         |
|                                                                  | CPAK-100G-SR4                                                                                                                      | 1x100G            | IEEE 802.3bm          |
|                                                                  | CPAK-100G-FR                                                                                                                       | 1x100G            | 100G Lambda MSA       |
|                                                                  | CPAK-10x10G-LR                                                                                                                     | 10x10G            | IEEE 802.3ae          |
|                                                                  |                                                                                                                                    |                   | FC                    |
|                                                                  |                                                                                                                                    |                   | ITU OTU2              |
|                                                                  |                                                                                                                                    |                   | ITU OTU1e             |
|                                                                  |                                                                                                                                    |                   | ITU OTU2e             |
|                                                                  | CPAK-10x10G-ERL                                                                                                                    | 10x10G            | IEEE 802.3ae          |
|                                                                  |                                                                                                                                    |                   | FC                    |
|                                                                  |                                                                                                                                    |                   | ITU OTU2              |
|                                                                  |                                                                                                                                    |                   | ITU OTU1e             |
|                                                                  |                                                                                                                                    |                   | ITU OTU2e             |

| Requirement | Cisco CPAK Module Supporting Feature |        |              |
|-------------|--------------------------------------|--------|--------------|
|             | <b>CPAK-100G-SR10</b>                | 1x100G | IEEE 802.3ba |
|             |                                      |        | ITU OTU4     |
|             |                                      | 2x40G  | IEEE 802.3ba |
|             |                                      |        | ITU OTU3     |
|             |                                      | 10x10G | IEEE 802.3ae |
|             |                                      |        | FC           |
|             |                                      |        | ITU OTU2     |
|             |                                      |        | ITU OTU1e    |
|             |                                      |        | ITU OTU2e    |

## Cisco CPAK 100GBASE-LR<sub>4</sub> Module

The primary application of the Cisco CPAK-100G-LR4 and CPAK-100GE-LR4 modules is to support 100Gbps optical links over standard Single-Mode Fiber (SMF, G.652) terminated with SC connectors (Figure 1) or LC connectors (Figure 2). The LC-SC adapter on CPAK-100G-LR4 is removable if LC connectors are desired rather than the standard SC connectors; however, SC is the officially supported connector type.

The LR4 module is IEEE 802.3ba-compliant and supports link lengths of up to 10 km over standard SMF, G.652. It delivers an aggregate data signal of 100 Gbps, carried over four LAN Wavelength-Division Multiplexing (WDM) wavelengths operating at a nominal 25 Gbps per lane. Optical multiplexing and demultiplexing of the four wavelengths are managed within the module.



**Figure 1.**  
Cisco CPAK-100G-LR4 Module with LC-SC Adapter

**Note:** SC is the officially supported connector type.



**Figure 2.**  
Cisco CPAK-100GE-LR4 Module with LC Connectors

### Cisco CPAK 100GBASE-ER<sub>4</sub> Lite Module

The primary application of the Cisco CPAK-100G-ER4L and CPAK-100G-ER4F modules is to support 100-Gbps optical links over long distances of standard single-mode fiber (SMF, G.652) terminated with SC connectors (Figure 3) or LC connectors (Figure 4).

These ER4 Lite modules are compatible with the 100GBASE-ER4 standard and deliver an aggregate data signal of 100 Gbps, carried over four LAN Wavelength-Division Multiplexing (WDM) wavelengths operating at a nominal 25 Gbps per lane. CPAK-100G-ER4L (no available FEC) supports link lengths up to about 25 km and CPAK-100G-ER4F supports link lengths up to about 30km with FEC disabled and 40km with FEC enabled over standard SMF, G.652. Optical multiplexing and demultiplexing of the four wavelengths are managed within the module.



**Figure 3.**  
Cisco CPAK-100G-ER4L Module with SC connectors



**Figure 4.**  
Cisco CPAK-100G-ER4F Module with LC connectors

### Cisco CPAK 10x10GBASE-LR Module

The Cisco CPAK-10X10G-LR module is used in 10 x 10Gb mode along with ribbon-to-duplex SMF breakout cables for connectivity to ten 10GBASE-LR optical interfaces. It supports link lengths up to 10km over standard SMF, G.652. The module delivers 100-Gbps links over 24-fiber ribbon cables terminated with MPO/MTP connectors.



**Figure 5.**  
Cisco CPAK-10X10G-LR Module

## Cisco CPAK 100GBASE-SR10 Module

The Cisco CPAK-100G-SR10 module delivers 100-Gbps links over 24-fiber ribbon cables terminated with MPO/MTP connectors. It can also be used in 10 x 10Gb mode along with ribbon-to-duplex-fiber breakout cables for connectivity to ten 10GBASE-SR optical interfaces. It supports link lengths of 100m and 150m on laser-optimized OM3 and OM4 multifiber cables, respectively.



**Figure 6.**  
Cisco CPAK-100G-SR10 Module

## Cisco CPAK 10x10GBASE-ERL Module

The Cisco CPAK-10X10G-ERL module is used in 10 x 10Gb mode along with ribbon-to-duplex SMF breakout cables for connectivity to ten 10GBASE-ER optical interfaces. It supports link lengths up to 25km over standard SMF, G.652. The module delivers 100Gbps links over 24-fiber ribbon cables terminated with MPO/MTP connectors.



**Figure 7.**  
Cisco CPAK-10X10G-ERL Module

## Cisco CPAK 100GBASE-SR4 Module

The Cisco CPAK-100G-SR4 Module supports link lengths of up to 70m (100m) over OM3 (OM4) Multimode Fiber with MPO connectors. It primarily enables high-bandwidth 100G optical links over 12-fiber parallel fiber terminated with MPO multifiber connectors. CPAK-100GE-SR4 supports 100GBase Ethernet rate.



**Figure 8.**  
Cisco CPAK-100G-SR4 Module

## Cisco CPAK 100GBASE CWDM4 Module

The Cisco CPAK-100G-CWDM4 Module supports link lengths of up to 2 km over a standard pair of G.652 Single-Mode Fiber (SMF) with duplex LC connectors. The 100 Gigabit Ethernet signal is carried over four wavelengths. Multiplexing and demultiplexing of the four wavelengths are managed within the device.



**Figure 9.**  
Cisco CPAK-100G-CWDM4 Module

## Cisco CPAK 100GBASE PSM<sub>4</sub> Module

The Cisco CPAK-100G-PSM4 Module supports link lengths of up to 500 meters over Single-Mode Fiber (SMF) with MPO connectors. The 100 Gigabit Ethernet signal is carried over 12-fiber parallel fiber terminated with MPO multifiber connectors.



**Figure 10.**  
Cisco CPAK-100G-PSM4 Module

## Cisco CPAK 100GBASE FR Module

The Cisco CPAK-100G-FR Module supports link lengths of up to 2 km over a standard pair of G.652 Single-Mode Fiber (SMF) with duplex LC connectors. The 100 Gigabit Ethernet optical signal is carried over a single wavelength using a PAM4 (Pulse-Amplitude Modulation 4-Level) modulation scheme.



**Figure 11.**  
Cisco CPAK-100G-FR Module

## Technical specifications

### Platform support

Cisco CPAK modules are supported on Cisco high-end switches, routers, and transport equipment:

- ASR 1000 Series Router
- ASR 9000 Series Router
- CRS-X Carrier Routing System
- NCS 2000, 4000, and 6000 Series Routers
- Nexus 7000 and 7700 Series Switches
- Cisco ONS Transport Platform

### Connectors and cabling

- Dual SC/PC connector (Cisco CPAK-100G-LR4 and Cisco CPAK-100G-ER4L module)

For duplex SMF modules, only connections with patch cords terminated with PC or UPC connectors are supported.

- Dual LC connector (Cisco CPAK-100GE-LR4, Cisco CPAK-100G-ER4F, Cisco CPAK-100G-CWDM4, and CPAK-100G-FR module)

Cisco CPAK-100G-LR4 can also accommodate Dual LC connector if LC-SC adapter is removed; however, SC is the officially supported connector type.

For duplex SMF modules, only connections with patch cords terminated with PC or UPC connectors are supported.

- 24-fiber MPO/MTP connector (Cisco CPAK-100G-SR10 module receives a female MPO/MTP-24 connector) Spring force required is 20N.
- 24-fiber MPO/MTP connector (Cisco CPAK-10X10G-LR and CPAK-10X10G-ERL modules receive a female MPO/MTP-24 APC connector). The MPO-24 SMF APC connector used on the CPAK-10X10G-LR and CPAK-10X10G-ERL has been designed to be compliant to IEC 61754-7-1, dated 2008-03. The standard specifies a nominal spring force of 10N for the connector. Performance of these devices is specified with the use of connectors with a 10N spring force. Customers should be careful not to use 22N spring force connectors at this time. Performance of the modules is not guaranteed with the higher spring force.

**Note:** All cables and cable assemblies used must be compliant with the standards specified in the [Regulatory and Standards Compliance](#) section.

For more compatibility details, refer to [Cisco 100 Gigabit Ethernet Transceiver Modules Compatibility Matrix](#).

## Product specifications

Tables 2 and 3 provide specifications for Cisco CPAK port cabling and modules.

**Table 2.** Cisco CPAK port cabling specifications

| Cisco CPAK Module                            | Wavelength (nm)        | Cable Type      | Core Size (Microns)            | Modal Bandwidth (MHz*km) <sup>a</sup> | Cable Distance <sup>b</sup>        |
|----------------------------------------------|------------------------|-----------------|--------------------------------|---------------------------------------|------------------------------------|
| Cisco CPAK-100G-LR4 and Cisco CPAK-100GE-LR4 | 1310                   | SMF Duplex      | 9-micron core<br>SMF per G.652 | -                                     | 10 km                              |
| Cisco CPAK-100G-ER4L                         | 1310                   | SMF Duplex      | 9-micron core<br>SMF per G.652 | -                                     | 25 km                              |
| Cisco CPAK-100G-ER4F                         | 1310                   | SMF Duplex      | 9-micron core<br>SMF per G.652 | -                                     | 30 km (no FEC)<br>40 km (with FEC) |
| Cisco CPAK-10X10G-LR                         | 1310                   | SMF (24 fibers) | 9-micron core<br>SMF per G.652 | -                                     | 10 km                              |
| Cisco CPAK-10X10G-ERL                        | 1550                   | SMF (24 fibers) | 9-micron core<br>SMF per G.652 | -                                     | 25 km                              |
| Cisco CPAK-100G-SR10                         | 850                    | MMF (24 fibers) | 50.0<br>50.0                   | 2000 (OM3)<br>4700 (OM4)              | 100m<br>150m <sup>c</sup>          |
| Cisco CPAK-100G-SR4                          | 850                    | MMF (12 fibers) | 50.0<br>50.0                   | 2000 (OM3)<br>4700 (OM4)              | 70m<br>100m <sup>c</sup>           |
| Cisco CPAK-100G-CWDM4                        | 1271, 1291, 1311, 1331 | SMF Duplex      | 9-micron core<br>SMF per G.652 | -                                     | 2 km                               |
| Cisco CPAK-100G-PSM4                         | 1295 to 1325           | SMF (12 fibers) | 9-micron core<br>SMF per G.652 | -                                     | 500m                               |
| Cisco CPAK-100G-FR                           | 1310                   | SMF Duplex      | 9-micron core<br>SMF per G.652 | -                                     | 2 km                               |

<sup>a</sup> Specified at transmission wavelength.

<sup>b</sup> Minimum cabling distance for -LR4 modules is 2 meters, according to the IEEE 802.3ba.

<sup>c</sup> Considered an engineered link with maximum 1dB allocated to connectors and splice loss.

Table 3 lists the primary optical characteristics and specifications for Cisco CPAK 100GBASE modules.

**Table 3.** Optical transmit and receive specifications

| Module                                              | Type                        | Transmit Power (dBm) <sup>1</sup> |                            | Receive Power (dBm) <sup>1</sup> |                                      | Transmit and Receive Center Wavelength Range (nm)                                                   |
|-----------------------------------------------------|-----------------------------|-----------------------------------|----------------------------|----------------------------------|--------------------------------------|-----------------------------------------------------------------------------------------------------|
|                                                     |                             | Maximum                           | Minimum                    | Maximum                          | Minimum                              |                                                                                                     |
| <b>Cisco CPAK-100G-LR4 and Cisco CPAK-100GE-LR4</b> | 100GBASE-LR4<br>1310 nm SMF | 4.5 per lane                      | -4.3 per lane              | 4.5 per lane                     | -10.6 per lane                       | Four lanes:<br>1294.53 to 1296.59<br>1299.02 to 1301.09<br>1303.54 to 1305.63<br>1308.09 to 1310.19 |
| <b>Cisco CPAK-100G-ER4L</b>                         | 100GBASE-ER4<br>1310 nm SMF | 2.9 per lane                      | -2.9 per lane              | 4.5 per lane                     | -14 per lane <sup>2</sup>            | Four lanes:<br>1294.53 to 1296.59<br>1299.02 to 1301.09<br>1303.54 to 1305.63<br>1308.09 to 1310.19 |
| <b>Cisco CPAK-100G-ER4F</b>                         | 100GBASE-ER4<br>1310 nm SMF | 6.5 per lane                      | -2.5 per lane              | -3.5 per lane                    | -20.5 FEC ON<br>-17 FEC OFF per lane | Four lanes:<br>1294.53 to 1296.59<br>1299.02 to 1301.09<br>1303.54 to 1305.63<br>1308.09 to 1310.19 |
| <b>Cisco CPAK-10X10G-LR<sup>3,4</sup></b>           | 1310 nm SMF                 | 0.5 per lane                      | -8.2 per lane              | 0.5 per lane                     | -14.4 per lane                       | Ten lanes:<br>1260 to 1355 nm                                                                       |
| <b>Cisco CPAK-10X10G-ERL<sup>3,4</sup></b>          | 1550 nm SMF                 | 4.0 per lane                      | -7.7 per lane <sup>5</sup> | 0.5 per lane                     | -14.4 per lane                       | Ten lanes:<br>1530 to 1565 nm                                                                       |
| <b>Cisco CPAK-100G-SR10</b>                         | 100GBASE-SR10<br>850 nm MMF | -1.0 per lane                     | -7.6 per lane              | 2.4 per lane                     | -9.5 per lane                        | Ten lanes:<br>840 to 860 nm                                                                         |
| <b>Cisco CPAK-100G-SR4</b>                          | 100GBASE-SR4<br>850 nm MMF  | +2.4, per lane                    | -8.4, per lane             | +2.4, per lane                   | -10.3, per lane                      | Four lanes:<br>840 to 860 nm                                                                        |
| <b>Cisco CPAK-100G-CWDM4</b>                        | 100GBASE CWDM4 SMF          | +2.5, per lane                    | -6.5, per lane             | +2.5, per lane                   | -11.5, per lane                      | Four lanes:<br>1271, 1291, 1311, 1331                                                               |
| <b>Cisco CPAK-100G-PSM4</b>                         | 100GBASE PSM4 SMF           | +2.0, per lane                    | -9.4, per lane             | +2.0, per lane                   | -12.7, per lane                      | Four lanes:<br>1295 to 1325                                                                         |

| Module             | Type            | Transmit Power (dBm) <sup>1</sup> |                | Receive Power (dBm) <sup>1</sup> |                | Transmit and Receive Center Wavelength Range (nm) |
|--------------------|-----------------|-----------------------------------|----------------|----------------------------------|----------------|---------------------------------------------------|
|                    |                 | Maximum                           | Minimum        | Maximum                          | Minimum        |                                                   |
| Cisco CPAK-100G-FR | 100GBASE FR SMF | 4.0, per lane                     | -2.4, per lane | 4.5, per lane                    | -7.1, per lane | One lane:<br>1304.5 to 1317.5                     |

<sup>1</sup> Transmitter and receiver power are in averages, unless specified.

<sup>2</sup> Receiver sensitivity does not fully meet IEEE 100GBASE-ER4 specifications. Application of this module is targeted for links less than 25km with links where Cisco CPAK modules are at both ends of the link.

<sup>3</sup> Tx Disabled power for an individual lane is <-10dBm. Tx Disabled power for an individual lane is <-30dBm when the subject lane and its partner lane are both Tx disabled. Subject/Partner lanes are: Lanes 0 and 1, lanes 2 and 3, lanes 4 and 5, lanes 6 and 7, or lanes 8 and 9. For example, if only lane 2 is Tx Disabled, Tx Power for lane 2 will be <-10dBm. If both lanes 2 and 3 are Tx Disabled, Tx Power for both lanes 2 and 3 will be <-30dBm.

<sup>4</sup> Host FEC is required when operating in OTN mode.

<sup>5</sup> Output power of this module is 3dB below the IEEE 100GBASE-ER specification. Application of this module is targeted for links less than 25km where Cisco CPAK modules are at both ends of the link.

## Dimensions

Maximum outer dimensions for the Cisco CPAK modules (H x W x D): 11.6 x 34.8 x 101.2 mm (0.46 x 1.37 x 3.98 in).

The Cisco CPAK modules typically weigh approximately 127 grams (4.48 oz.).

## Environmental conditions and power requirements

- Storage temperature range: -40 to 85° C (-40 to 185° F)
- Operating temperature range: 0 to 70° C (32 to 158° F)
- Cisco CPAK 100GBASE-LR4 power consumption at 70° C: <8.0W maximum
- Cisco CPAK 100GBASE-ER4L power consumption at 70° C: <8.5W maximum
- Cisco CPAK 100GBASE-ER4F power consumption at 70° C: <10.0W maximum
- Cisco CPAK 10x 10GBASE-LR power consumption at 70° C: <5.0W maximum
- Cisco CPAK 10x 10GBASE-ERL power consumption at 70° C: <5.0W maximum
- Cisco CPAK 100GBASE-SR10 power consumption at 70° C: <4.5W maximum
- Cisco CPAK 100GBASE-SR4 power consumption at 70° C: <9.0W maximum
- Cisco CPAK 100GBASE CWDM4 power consumption at 70° C: <9.0W maximum
- Cisco CPAK 100GBASE PSM4 power consumption at 70° C: <9.0W maximum
- Cisco CPAK 100GBASE FR power consumption at 70° C: <9.0W maximum

## Warranty

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

## Ordering information

Table 4 provides ordering information for Cisco CPAK modules and related cables.

**Table 4.** Ordering information

| Description                                                                                                                         | Product Number  |
|-------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| <b>100GBASE-LR4 Cisco CPAK Module for SMF (terminated with SC Connectors via LC-SC adapter), Dual rate (100G Ethernet and OTU4)</b> | CPAK-100G-LR4   |
| <b>100GBASE-LR4 Cisco CPAK Module for SMF (terminated with LC Connectors), 100G Ethernet rate only</b>                              | CPAK-100GE-LR4  |
| <b>100GBASE-ER4 Lite Cisco CPAK Module for SMF (terminated with SC Connectors), Dual rate (100G Ethernet and OTU4)</b>              | CPAK-100G-ER4L  |
| <b>100GBASE-ER4 Lite Cisco CPAK Module for SMF (FEC available, terminated with LC Connectors), 100G Ethernet rate only</b>          | CPAK-100G-ER4F  |
| <b>10x10G-LR Cisco CPAK Module for SMF</b>                                                                                          | CPAK-10X10G-LR  |
| <b>100GBASE-SR10 Cisco CPAK Module for MMF</b>                                                                                      | CPAK-100G-SR10  |
| <b>10x10G-ERL Cisco CPAK Module for SMF</b>                                                                                         | CPAK-10X10G-ERL |
| <b>100GBASE-SR4 Cisco CPAK Module for MMF</b>                                                                                       | CPAK-100G-SR4   |
| <b>100GBASE-CWDM4 Cisco CPAK Module for SMF</b>                                                                                     | CPAK-100G-CWDM4 |
| <b>100GBASE-PSM4 Cisco CPAK Module for SMF</b>                                                                                      | CPAK-100G-PSM4  |
| <b>100GBASE FR Cisco CPAK Module for SMF</b>                                                                                        | CPAK-100G-FR    |

## Product 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                       |
|-----------------------------------------------------------------------------------------------------------|---------------------------------|
| <b>Information on product material content laws and regulations</b>                                       | <a href="#">Materials</a>       |
| <b>Information on electronic waste laws and regulations, including products, batteries, and packaging</b> | <a href="#">WEEE compliance</a> |

Cisco makes the packaging data available for informational purposes only. It may not reflect the most current legal developments, and Cisco does not represent, warrant, or guarantee that it is complete, accurate, or up to date. This information is subject to change without notice.

## 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 802.3ba (LR4, ER4, 10GBASE-LR, SR10)
- Reduction of Hazardous Substances (RoHS) 6 compliant

**Table 5.** Safety

| Product                       | Laser Class |
|-------------------------------|-------------|
| Cisco CPAK 100GBASE-LR4       | 1           |
| Cisco CPAK 100GBASE-ER4Lite   | 1           |
| Cisco CPAK 10x 10GBASE-LR     | 1           |
| Cisco CPAK 100GBASE-SR10      | 1           |
| Cisco CPAK 10x 10GBASE-ERLite | 1           |
| Cisco CPAK 100GBASE-SR4       | 1           |
| Cisco CPAK 100GBASE-CWDM4     | 1           |
| Cisco CPAK 100GBASE PSM4      | 1           |
| Cisco CPAK 100GBASE FR        | 1           |

## Next steps

Learn more about Cisco CPAK 100GBASE switch and router modules by contacting your sales representative or visiting <https://www.cisco.com/go/dcnm>.

## Cisco Capital

### Flexible payment solutions to help you achieve your objectives

Cisco Capital makes it easier to get the right technology to achieve your objectives, enable business transformation and help you stay competitive. We can help you reduce the total cost of ownership, conserve capital, and accelerate growth. In more than 100 countries, our flexible payment solutions can help you acquire hardware, software, services and complementary third-party equipment in easy, predictable payments. [Learn more](#).

## Document history

Table 6. Document history

| New or Revised Topic                                                                                                                                                     | Described In                         | Date         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|--------------|
| <b>Documented change for CPAK-100G-LR4 from native SC connector to version with native LC connector + LC-SC adapter. Added Note 3 in Table 3 for CPAK 10x10G optics.</b> | Pages 3-6, Tables 2 and 4<br>Table 3 | Aug 16, 2021 |
| <b>Clarified that SC is officially supported connector type for CPAK-100G-LR4</b>                                                                                        | Page 5, 11                           | Dec 16, 2021 |

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