



Specifications

This appendix describes the specifications for the chassis and components used in the Cisco ONS 15540 ESPx system. This appendix includes the following sections:

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- [Channel to Wavelength Mapping, page A-3](#)
- [Mux/Demux Motherboard Specifications, page A-5](#)
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Note

Cisco recommends you to use the Cisco MetroPlanner tool to design your DWDM networks. For more information about optical power budgets and network planning, refer to the *Cisco ONS 15540 ESPx Planning Guide* and the *Cisco MetroPlanner DWDM Operations Guide*.

Chassis Specifications

Table A-1 lists the specifications for the Cisco ONS 15540 ESPx chassis.

Table A-1 Cisco ONS 15540 ESPx Specifications

Description	Specification
Environmental	
Temperature, ambient operating	32 to 104 F (0 to +40 C)
Relative humidity, ambient (noncondensing) operating	90 to 95%
Physical Characteristics	
Dimensions (H x W x D)	24 x 17.3 x 12 in. (60.1 x 43.9 x 30.4 cm)
Weight	Chassis and power cord: 51 lbs (23.1 kg) Chassis fully loaded: 153 lbs (69.40 kg)
Optical ports	SC-type connectors MU connectors MT-RJ LC
Fan assembly	2.5A at -48 VDC
Processor card	5.5 lbs (2.50 kg) 18 x 9 in. (45.7 x 22.9 cm)
AC-Input Power	
AC-input voltage	100 to 240 VAC (nominal) 85 to 264 VAC (full range)
Current maximum	13.2A (100 VAC), 6.6A (200 VAC)
Power consumption maximum	1320W
Heat dissipation	4500 BTU/hr
DC-Input Power	
DC-input voltage	-48 to -60 VDC (nominal) -40.5 to -72 VDC (full range)
Power consumption maximum	1125W
Heat dissipation	3840 BTU/hr

Channel to Wavelength Mapping

Table A-2 lists the channels, wavelengths, and frequencies for each band.

Table A-2 Channel to Wavelength Mapping

Cisco ONS 15540 ESPx Band	Cisco ONS 15540 ESPx Channel	ITU Channels	ITU Wavelength ¹	ITU Frequency ²
OSC ³		19	1562.23	191.900
A	1	21	1560.61	192.100
	2	22	1559.79	192.200
	3	23	1558.98	192.300
	4	24	1558.17	192.400
B	5	26	1556.55	192.600
	6	27	1555.75	192.700
	7	28	1554.94	192.800
	8	29	1554.13	192.900
C	9	31	1552.52	193.100
	10	32	1551.72	193.200
	11	33	1550.92	193.300
	12	34	1550.12	193.400
D	13	36	1548.51	193.600
	14	37	1547.72	193.700
	15	38	1546.92	193.800
	16	39	1546.12	193.900
E	17	41	1544.53	194.100
	18	42	1543.73	194.200
	19	43	1542.94	194.300
	20	44	1542.14	194.400

Table A-2 Channel to Wavelength Mapping (continued)

Cisco ONS 15540 ESPx Band	Cisco ONS 15540 ESPx Channel	ITU Channels	ITU Wavelength ¹	ITU Frequency ²
F	21	46	1540.56	194.600
	22	47	1539.77	194.700
	23	48	1538.98	194.800
	24	49	1538.19	194.900
G	25	51	1536.61	195.100
	26	52	1535.82	195.200
	27	53	1535.04	195.300
	28	54	1534.25	195.400
H	29	56	1532.68	195.600
	30	57	1531.90	195.700
	31	58	1531.12	195.800
	32	59	1530.33	195.900

1. Wavelengths in vacuum in nm
2. Frequency in THz, 100 GHz grid
3. OSC = optical supervisory channel

Mux/Demux Motherboard Specifications

Table A-3 lists the specifications for the mux/demux motherboard.

Table A-3 Mux/Demux Motherboard Specifications

Description	Specification	
Fiber type	SM ¹ 9 m	
Connector	MU	
Output wavelength	1562.23 nm, ITU channel	
Dimensions	3.7 x 9 in. (9.4 x 22.9 cm)	
Weight	3.5 lbs (1.59 kg)	
Receiver	Minimum	Maximum
Receive sensitivity	-19 dBm	
Receive overload		-1.5 dBm
Input wavelength	1530.33 nm	1562.23 nm
Optical reflectance	-27 dB	
Side mode suppression	30 dB	
Transmitter	Minimum	Maximum
Transmitter power	4 dBm	8 dBm
Output wavelength	1530.33 nm	1560.61 nm
Dispersion tolerance		1800 ps/nm ^{2, 3}

1. SM = single mode
2. ps/nm = picoseconds per nanometer
3. 1800 ps/nm at OC-48 rate

4-Channel OADM Module Specifications

Table A-4 lists the specifications for the 4-channel and 4-channel with OSC OADM module.

Table A-4 4-Channel and 4-Channel with OSC OADM Modules

Description	Specification
Dimensions	1.0 x 3.3 x 7.7 in. (+1.5 in. for handle) (2.5 x 8.4 x 19.6 cm [+3.8 cm for handle])
Weight	0.5 lbs (.23 kg)
Fiber	ITU-T G.652 compliant
OSC ¹	1562.23 nm
Connector	MU
Operating temperature	32 to 104 F (0 to 40 C)
Storage temperature	-40 to 85 F (-40 to 29.4 C)
Channel mapping	Bands A to H ²
Maximum relative humidity	90 to 95%

1. OSC = optical supervisory channel.
2. See Table A-2 for band A to H wavelengths.

8-Channel OADM Module Specifications

Table A-5 lists the specifications for the 8-channel and 8-channel with OSC OADM module.

Table A-5 8-Channel and 8-Channel with OSC OADM Modules

Description	Specification
Dimensions	1.0 x 3.3 x 7.7 in. (+1.5 in. for handle) (2.5 x 8.4 x 19.6 cm [+3.8 cm for handle])
Weight	1.0 lbs (0.45 kg)
Fiber	ITU-T G.652 compliant
OSC ¹	1562.23 nm
Connector	MU
Operating temperature	32 to 104 F (0 to 40 C)
Storage temperature	-40 to 85 F (-40 to 29.4 C)
Channel mapping	Channels AB, CD, EF, and GH ²
Maximum relative humidity	90 to 95%

1. OSC = optical supervisory channel.
2. See Table A-2 for band A to H wavelengths.

32-Channel Terminal Mux/Demux Module Specifications

Table A-6 lists the specifications for the 32-channel with OSC terminal mux/demux module.



Warning

If the chassis loses CPU power, traffic on the 32-channel module will be lost or seriously degraded. The 32-channel module uses arrayed wavelength grating (AWG) filters, which require temperature control. A power failure significantly reduces the power at the receiver because the passband of the filter is temperature sensitive.

Table A-6 32-Channel with OSC Terminal Mux/Demux Specifications

Description	Specification
Dimensions	13.8 x 8.6 in. (33 x 22 cm)
Weight	3.5 lbs (1.59 kg)
Operating temperature	32 to 149 F (0~to 65 C)
Storage temperature	-40 to 185 F (-40 to 85 C)
Channel mapping	Bands A to H ¹
Fiber	SMF-28 or equivalent
Monitor, OSC, and common ports	Low loss tuned MU/UPC
Add/drop channel connectors	Low loss MTP female /APC
Tap ratio	-20 1 dB (with connectors)

1. See Table A-2 for band A to H wavelengths.

PSM Optical Specifications

[Table A-7](#) lists the PSM specifications for the Cisco ONS 15540 ESPx.

Table A-7 PSM Specifications

Description	Specification
Dimensions	3.7 x 9 in. (9.4 x 22.9 cm)
Weight	3.5 lbs (1.59 kg)
Connector type	MU/UPC
Operation wavelength	1525 nm minimum, 1565 nm maximum
Measurement range	0 to -31dBm
Receive overload	17 dBm
Power monitor accuracy	1.9 dB

[Table A-8](#) lists the PSM optical specifications for the Cisco ONS 15540 ESPx.

Table A-8 Optical PSM Specifications

Port	Insertion Loss	
	Min	Max
Rx_West to monitor	19	20
Rx_East to monitor	19	20
Tx_Common to Tx_West	2.7	3.7
Tx_Common to Tx_East	2.7	3.7

Line Card Motherboard Specifications

Table A-9 lists the specifications for the Cisco ONS 15540 ESPx line card motherboards.

Table A-9 Line Card Motherboard Specifications

Description	Specification
Dimensions	18 x 9 in. (45.7 x 22.9 cm)
Connector	MTP

2.5-Gbps Transponder Module Specifications

[Table A-10](#) lists the client side optical specifications for the 2.5-Gbps SM and MM transponder module.



Note

Error-free transmission of some D1 video signals (defined by the SMPTE 259M standard) and test patterns (such as Matrix SDI) cannot be guaranteed by the Cisco 15500 Series because of the pathological pattern in D1 video. This well-known limitation is usually overcome by the D1 video equipment vendor, who uses a proprietary, second level of scrambling. No standards exist at this time for the second level of scrambling.

Table A-10 2.5-Gbps SM and MM Transponder Client Side Specifications

Description	Specification			
Dimensions	3 x 7.5 in. (7.6 x 19.1 cm)			
Weight				
Connector	SC			
Trunk connector	MUJ			
	Single Mode		Multimode	
Receiver	Minimum	Maximum	Minimum	Maximum
Bit rate	16 Mbps	2.5 Gbps	16 Mbps	622 Mbps
Receive sensitivity	-19 dBm		-25 dBm	
Receive overload		-1.5 dBm		-8 dBm
Input wavelength	1249 nm	1600 nm	1249 nm	1600 nm
Transmitter	Minimum	Maximum	Minimum	Maximum
Transmitter power	-5 dBm	0 dBm	-5 dBm	0 dBm
Output wavelength	1260 nm	1360 nm	1260 nm	1360 nm

Table A-11 lists the trunk side optical specifications for the 2.5-Gbps transponder module.

Table A-11 2.5-Gbps Transponder Module Trunk Side Optical Specifications

Description	Specification	
Fiber type	ITU-T G.652 compliant	
Connector	MUJ	
Receiver	Minimum	Maximum
OSNR ^{1, 2}	19 dB	
Receive sensitivity ²	-28 dBm	
Receive overload		-8 dBm
Input wavelength	1260 nm	1580 nm
Transmitter	Minimum	Maximum
Transmitter power	4 dBm	8 dBm
Dispersion tolerance		1800 ps/nm ³

1. OSNR = optical signal-to-noise ratio.
2. Add the proper network-level penalty to the OSNR and/or receive power based on your actual network topology characteristics, such as dispersion.
3. ps/nm = picoseconds per nanometer.

Type 2 Extended Range Transponder Module Specifications

Table A-12 lists the trunk side optical specifications for the Type 2 extended range transponder module.



Note

Error-free transmission of some D1 video signals (defined by the SMPTE 259M standard) and test patterns (such as Matrix SDI) cannot be guaranteed by the Cisco 15500 Series because of the pathological pattern in D1 video. This well-known limitation is usually overcome by the D1 video equipment vendor, who uses a proprietary, second level of scrambling. No standards exist at this time for the second level of scrambling.

Table A-12 Type 2 Extended Range Transponder Module Trunk Side Optical Specifications

Description	Specification	
Fiber	ITU-T G.652 compliant	
Receiver	Minimum	Maximum
OSNR ¹	19 dB	
Receive sensitivity ¹	-28 dBm	
Receive overload		-8 dBm
Input wavelength	1430 nm	1580 nm
Transmitter	Minimum	Maximum
Output power	5 dBm	10 dBm
Dispersion tolerance		3200 ps/nm

1. Add the proper network level penalty to the OSNR and/or receive power based on your actual network topology characteristics, such as dispersion.

SFP Optics Specifications

Table A-13 lists the specifications for the Cisco ONS 15540 ESPx fixed rate SFP optics.



Note

Only use Cisco-certified SFP optics for the Type 2 extended range transponders.

Table A-13 Fixed Rate SFP Optics Specifications

Description	Specification	
Part number	15500-XVRA-01A2	
ESCON, OC-3/STM-1 MM		
Dimensions (H x W x D)	0.486 x 0.522 x 2.24 in. (1.23 x 1325.9 x 5.69 cm)	
Data rate	155 Mbps, 200 Mbps	
Wavelength	1310 nm	
Fiber type	MM, 50 m, 62.5/125 m	
Connector type	MT-RJ	
Receiver	Minimum	Maximum
Receive sensitivity	-33 dBm	-14 dBm
Input wavelength	1280 nm	1380 nm
Transmitter	Minimum	Maximum
Transmitter power	-19.5 dBm	-15 dBm
Output wavelength	1280 nm	1380 nm
Part number	15500-XVRA-02C1	
Gigabit Ethernet and Fibre Channel (1 Gbps) MM		
Dimensions	0.486 x 0.522 x 2.24 in. (1.23 x 1325.9 x 5.69 cm)	
Data rate	1.0625 Gbps, 1.25 Gbps	
Wavelength	850 nm	
Fiber type	MM, 50 m, 62.5/125 m	

Table A-13 Fixed Rate SFP Optics Specifications (continued)

Description	Specification	
Connector type	LC	
Receiver	Minimum	Maximum
Receive sensitivity	-18 dBm	
Stressed receive sensitivity	-13.5 dBm	
Input wavelength	770 nm	860 nm
Transmitter	Minimum	Maximum
Transmitter power	-9.5 dBm	-4 dBm
Output wavelength	830 nm	860 nm
Part number	15500-XVRA-03B1	
Gigabit Ethernet and Fibre Channel (1 Gbps) SM		
Dimensions	0.486 x 0.522 x 2.24 in. (1.23 x 1325.9 x 5.69 cm)	
Data rate	1.0625 Gbps, 1.25 Gbps	
Wavelength	1310 nm	
Fiber type	SM, 9/125 m	
Connector type	LC	
Receiver	Minimum	Maximum
Input power	-20.5 dBm	-3 dBm
Input wavelength	1270 nm	1600 nm
Transmitter	Minimum	Maximum
Transmitter power	-9.5 dBm	-3 dBm
Output wavelength	1275 nm	1350 nm
Part number	15500-XVRA-03B2	
Fibre Channel (1 Gbps and 2 Gbps) SM		
Dimensions	0.486 x 0.522 x 2.24 in. (1.23 x 1325.9 x 5.69 cm)	
Data rate	1.0625 Gbps, 2.125 Gbps	
Wavelength	1310 nm	

Table A-13 Fixed Rate SFP Optics Specifications (continued)

Description	Specification	
Fiber type	SM, 9/125 m	
Connector type	LC	
Receiver	Minimum	Maximum
Receive sensitivity	-20.5 dBm	
Input wavelength	1270 nm	1600 nm
Transmitter	Minimum	Maximum
Transmitter power	-9.5 dBm	-3 dBm
Output wavelength	1275 nm	1350 nm
Part number	15500-XVRA-02C2	
Fibre Channel (1 Gbps and 2 Gbps) MM		
Dimensions	0.486 x 0.522 x 2.24 in. (1.23 x 1325.9 x 5.69 cm)	
Data rate	2.125 Gbps	
Wavelength	850 nm	
Fiber type	MM, 50 m, 62.5/125 m	
Connector type	LC	
Receiver	Minimum	Maximum
Receive sensitivity (≤ 1.06 Gbps)	-18 dBm	
Receive sensitivity (> 1.06 Gbps)	-15 dBm	
Stressed receive sensitivity (≤ 1.06 Gbps)	-13.5 dBm	
Stressed receive sensitivity (> 1.06 Gbps)	-12.1 dBm	-12.1 dBm
Input wavelength	770 nm	860 nm
Transmitter	Minimum	Maximum
Transmitter power	-9 dBm	-4 dBm

Table A-13 Fixed Rate SFP Optics Specifications (continued)

Description	Specification	
Output wavelength	830 nm	860 nm
Part number	15500-XVRA-06B1	
SONET OC-12 SM and SDH STM-4		
Dimensions	0.486 x 0.522 x 2.24 in. (1.23 x 1325.9 x 5.69 cm)	
Data rate	622 Mbps	
Wavelength	1310 nm	
Fiber type	SM, 9/125 m	
Connector type	LC	
Receiver	Minimum	Maximum
Receive sensitivity	-28 dBm	
Receive overload		-7 dBm
Input wavelength	1100 nm	1600 nm
Transmitter	Minimum	Maximum
Transmitter power	-15 dBm	-8 dBm
Output wavelength	1260 nm	1360 nm
Part number	15500-XVRA-07B1	
SONET OC-48 SM and SDH STM-16		
Dimensions	0.486 x 0.522 x 2.24 in. (1.23 x 1325.9 x 5.69 cm)	
Data rate	2.488 Mbps	
Wavelength	1310 nm	
Fiber type	SM, 9/125 m	
Connector type	LC	
Receiver	Minimum	Maximum
Receive sensitivity	-18 dBm	
Receive overload		-3 dBm
Input wavelength	1270 nm	1600 nm

Table A-13 Fixed Rate SFP Optics Specifications (continued)

Description	Specification	
	Minimum	Maximum
Transmitter		
Transmitter power	-9.5 dBm	-3 dBm
Output wavelength	1285 nm	1340 nm

Table A-14 lists the specifications for the Cisco ONS 15540 ESPx variable rate SFP optics.

**Note**

Only use Cisco-certified SFP optics for the Type 2 extended range transponders.

Table A-14 Variable Rate SFP Optics Specifications

Description	Specification	
Part number	15500-XVRA-10A1	
Supported protocol encapsulations	Sysplex, Fast Ethernet, OC-3/STM-1, ESCON (MM)	
Dimensions	0.486 x 0.522 x 2.24 in. (1.23 x 1325.9 x 5.69 cm)	
Data rate	8 to 200 Mbps	
Wavelength	1310 nm	
Fiber type	MM 50/125 m MM 62.5/125 m	
Connector type	LC	
Receiver	Minimum	Maximum
Receive sensitivity @ 10 ⁻¹² BER ¹	-32 dBm	
Receive sensitivity @ 10 ⁻¹⁵ BER	-29 dBm	
Receive overload @ 10 ⁻¹² BER		-14 dBm
Input wavelength	1100 nm	1600 nm

Table A-14 Variable Rate SFP Optics Specifications (continued)

Description	Specification	
Transmitter	Minimum	Maximum
Transmitter power	-19 dBm	-14 dBm
Output wavelength	1280 nm	1380 nm
Part number	15500-XVRA-10B1	
Supported protocol encapsulations	Sysplex, Fast Ethernet, OC-3/STM-1, ESCON (SM)	
Dimensions	0.486 x 0.522 x 2.24 in. (1.23 x 1325.9 x 5.69 cm)	
Data rate range	8 Mbps to 200 Mbps	
Wavelength	1310 nm	
Fiber type	SM, 9/125 m	
Connector type	LC	
Receiver	Minimum	Maximum
Receive sensitivity @ 10 ⁻¹² BER	-32 dBm	
Receive overload @ 10 ⁻¹² BER		-3 dBm
Input wavelength	1100 nm	1600 nm
Transmitter	Minimum	Maximum
Transmitter power	-8 dBm	-4 dBm
Output wavelength	1260 nm	1360 nm
Part number	15500-XVRA-11A1	
Supported protocol encapsulations	ESCON, OC-12/STM-4	
Dimensions	0.486 x 0.522 x 2.24 in. (1.23 x 1325.9 x 5.69 cm)	
Data rate range	200 Mbps to 622 Mbps	
Wavelength	1310 nm	
Fiber type	MM 62.5/125 m	
Connector type	LC	

Table A-14 Variable Rate SFP Optics Specifications (continued)

Description	Specification	
	Minimum	Maximum
Receiver		
Receive sensitivity @ 10^{-10} BER	-26 dBm	
Receive sensitivity @ 10^{-12} BER	-25 dBm	
Maximum receive power @ 10^{-10} BER		-14
Input wavelength	1100 nm	1600 nm
Transmitter	Minimum	Maximum
Transmitter power	-20 dBm	-14 dBm
Output wavelength	1270 nm	1380 nm
Part number	15500-XVRA-11B1	
Supported protocol encapsulations	ESCON, SONET OC-12, SDH STM-4, FC, GE	
Dimensions	0.486 x 0.522 x 2.24 in. (1.23 x 1325.9 x 5.69 cm)	
Data rate range	200 Mbps to 1.25 Gbps	
Wavelength	1310 nm	
Fiber type	SM, 9/125 μ m	
Connector type	LC	
Receiver	Minimum	Maximum
Receive sensitivity @ 10^{-12} BER	-20 dBm	
Maximum receive power @ 10^{-12} BER		-3 dBm
Input wavelength	1100 nm	1600 nm
Transmitter	Minimum	Maximum
Transmitter power	-9 dBm	-3 dBm
Output wavelength	1285 nm	1345 nm
Part number	15500-XVRA-12B1	

Table A-14 Variable Rate SFP Optics Specifications (continued)

Description	Specification	
Supported protocol encapsulations	Fibre Channel, GE, OC-48/STM-16	
Dimensions	0.486 x 0.522 x 2.24 in (1.23 x 1325.9 x 5.69 cm)	
Data rate range	1.062 Mbps to 2.488 Gbps	
Wavelength	1310 nm	
Fiber type	SM, 9/125 m	
Connector type	LC	
Receiver	Minimum	Maximum
Receive sensitivity @ 10^{-10} BER	-18 dBm	
Maximum receive power @ 10^{-10} BER		-3 dBm
Input wavelength	1100 nm	1600 nm
Transmitter	Minimum	Maximum
Transmitter power	-10 dBm	-3 dBm
Output wavelength	1266 nm	1360 nm

1. BER = bit error rate

10-GE Transponder Module Specifications

Table A-15 specifies the client side transmit and receive characteristics for the 10-GE transponders.



Note

Error-free transmission of some D1 video signals (defined by the SMPTE 259M standard) and test patterns (such as Matrix SDI) cannot be guaranteed by the Cisco 15500 Series because of the pathological pattern in D1 video. This well-known limitation is usually overcome by the D1 video equipment vendor, who uses a proprietary, second level of scrambling. No standards exist at this time for the second level of scrambling.

Table A-15 10-GE Transponder Module Client Side Optical Specifications

Description	Specification	
Fiber type	SM 1310 nm	
Connector	SC	
Dimensions	10.4 x 1.105 x 8.797 in. (264.2 x 28.1 x 223.4 mm)	
Bit rate	10 GE LAN-PHY	
Receiver	Minimum	Maximum
Receive sensitivity	-13.23 dBm	
Receive overload		0.5 dBm
Stressed receive sensitivity	-10.3 dBm	
Transmitter	Minimum	Maximum
Transmit power	-5.2 dBm	0.5 dBm
Wavelength range	1260 nm	1355 nm

Table A-16 specifies the trunk side transmit and receive characteristics for the 10-GE transponders.

Table A-16 10-GE Transponder Module Trunk Side Optical Specifications

Description	Specification	
	Fiber type	ITU-T G.652
Connector	SC	
Receiver	Minimum	Maximum
OSNR ^{1, 2}	26 dB	
Receive sensitivity ²	-22 dBm	
Receive overload		-8 dBm
Input wavelength	1430 nm	1580 nm
Transmitter	Minimum	Maximum
Output power	1 dBm	6 dBm
Dispersion tolerance		1000 ps/nm ³

1. OSNR = optical signal-to-ratio.
2. Add the proper network level penalty to the OSNR and/or receive power based on your actual network topology characteristics, such as dispersion.
3. ps/nm = picosecond per nanometer.

