



## Specifications

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This appendix describes the specifications for the line card motherboards and transponder modules, and the mux/demux motherboards and modules used in the Cisco ONS 15540 ESP system. This appendix includes the following sections:

- [Chassis Specifications, page A-2](#)
- [Channel to Wavelength Mapping, page A-3](#)
- [Mux/Demux Motherboard Specifications, page A-5](#)
- [4-Channel OADM Module Specifications, page A-6](#)
- [8-Channel OADM Module Specifications, page A-7](#)
- [16-Channel OADM Module Specifications, page A-8](#)
- [Line Card Motherboard Specifications, page A-8](#)
- [2.5-Gbps Transponder Module Specifications, page A-9](#)
- [Type 2 Extended Range Transponder Module Specifications, page A-11](#)



### 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 ESP Planning Guide* and the *Cisco MetroPlanner DWDM Operations Guide*.

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# Chassis Specifications

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

*Table A-1 Cisco ONS 15540 ESP Specifications*

Description	Specification
<b>Environmental</b>	
Temperature, ambient operating	32 to 104 F (0 to +40 C)
Humidity (RH <sup>1</sup> ), ambient (noncondensing) operating	90 to 95 percent
<b>Physical Characteristics</b>	
Dimensions (H x W x D)	24.5 x 17.3 x 12 in. (62.2 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, MU, MT-RJ, LC, MPX
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)
<b>AC-Input Power</b>	
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
<b>DC-Input Power</b>	
DC-input voltage	-48 to -60 VDC (nominal) -40.5 to -72 VDC (full range)
Power consumption maximum	1125W
Heat dissipation	3840 BTU/hr

1. RH = relative humidity

# 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 ESP Band	Cisco ONS 15540 ESP Channel	ITU Channels	ITU Wavelength <sup>1</sup>	ITU Frequency <sup>2</sup>
OSC <sup>3</sup>		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 ESP Band	Cisco ONS 15540 ESP Channel	ITU Channels	ITU Wavelength <sup>1</sup>	ITU Frequency <sup>2</sup>
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 <sup>1</sup> 9 micron	
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)	
<b>Receiver</b>	<b>Minimum</b>	<b>Maximum</b>
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	
<b>Transmitter</b>	<b>Minimum</b>	<b>Maximum</b>
Transmitter power	4 dBm	8 dBm
Output wavelength	1530.33 nm	1560.61 nm
Dispersion tolerance		1800 ps/nm <sup>2 3</sup>

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 Mux/Demux 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 <sup>1</sup>	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 <sup>2</sup>
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 <sup>1</sup>	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 <sup>2</sup>
Maximum relative humidity	90 to 95%

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

# 16-Channel OADM Module Specifications

Table A-6 lists the specifications for the 16-channel OADM module.

*Table A-6 16-Channel OADM Modules*

Description	Specification
Dimensions	1.0 x 6.6 x 7.7 in. (+1.5 in. for handle) (2.5 x 2.0 x 19.6 cm [+3.8 cm for handle])
Weight	1.5 lbs (0.68 kg)
Fiber	ITU-T G.652 compliant
OSC <sup>1</sup>	1562.23 nm
Connectors	MU
Operating temperature	0 to 65 C
Storage temperature	-40 to 85 C
Wavelengths	32, ITU G.692

1. OSC = optical supervisory channel

# Line Card Motherboard Specifications

Table A-7 lists the specifications for the 2.5-Gbps line card motherboard.

*Table A-7 2.5-Gbps Line Card Motherboard Specifications*

Description	Specification
Dimensions	18 x 9 in. (45.72 x 22.86 cm)

Table A-8 lists the specifications for the 10-Gbps line card motherboard.

*Table A-8 10-Gbps Line Card Motherboard Specifications*

Description	Specification
Dimensions	1.3 x 9.1 x 18.1 in. (3.3 x 23.11 x 45.97 cm)



## 2.5-Gbps Transponder Module Specifications

Table A-9 lists the client side optical specifications for the 2.5-Gbps transponder module.

*Table A-9 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 power	-5 dBm	0 dBm	-5 dBm	0 dBm
Output wavelength	1260 nm	1360 nm	1260 nm	1360 nm

Table A-10 lists the trunk side optical specifications for the 2.5-Gbps transponder module.

*Table A-10 2.5-Gbps Trunk Side Optical Specifications*

Description	Specification	
Fiber type	ITU-T G.652 compliant	
Connector	MUJ	
Receiver	Minimum	Maximum
OSNR <sup>1, 2</sup>	19 dB	
Receive sensitivity <sup>2</sup>	-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 <sup>3</sup>

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-11 lists the specifications for the Type 2 extended range transponder modules.

*Table A-11 Type 2 Extended Range Transponder Module Specifications*

Description	Specification	
Fiber	ITU-T G.652 compliant	
<b>Receiver Specifications</b>	<b>Minimum</b>	<b>Maximum</b>
OSNR <sup>1</sup>	19 db	
Receive sensitivity <sup>1</sup>	-28 dBm	
Receive overload		-8 dBm
Input wavelength	1430 nm	1580 nm
<b>Transmitter Specification</b>	<b>Minimum</b>	<b>Maximum</b>
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-12 lists the specifications for the Cisco ONS 15540 ESP fixed rate SFP optics.



**Note**

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

*Table A-12 Fixed Rate SFP Optics Specifications*

Description	Specification	
<b>Part number</b>	<b>15500-XVRA-01A2</b>	
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, 50/125 m, 62.5/125 m	
Connector type	MT-RJ	
<b>Receiver</b>	<b>Minimum</b>	<b>Maximum</b>
Receive sensitivity	-33 dBm	-14 dBm
Input wavelength	1280 nm	1380 nm
<b>Transmitter</b>	<b>Minimum</b>	<b>Maximum</b>
Transmitter power	-19.5 dBm	-15 dBm
Output wavelength	1280 nm	1380 nm
<b>Part number</b>	<b>15500-XVRA-02C1</b>	
Gigabit Ethernet, Fibre Channel (1 Gbps), and FICON (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, 50/125 m, 62.5/125 m	
Connector type	LC	
<b>Receiver</b>	<b>Minimum</b>	<b>Maximum</b>
Receive sensitivity	-18 dBm	
Stressed receive sensitivity	-13.5 dBm	
Input wavelength	770 nm	860 nm
<b>Transmitter</b>	<b>Minimum</b>	<b>Maximum</b>
Transmitter power	-9.5 dBm	-4 dBm

*Table A-12 Fixed Rate SFP Optics Specifications (continued)*

Description	Specification	
Output wavelength	830 nm	860 nm
<b>Part number</b>	<b>15500-XVRA-03B1</b>	
Gigabit Ethernet, Fibre Channel (1 Gbps), and FICON (1Gbps) 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	
<b>Receiver</b>	<b>Minimum</b>	<b>Maximum</b>
Input power	-20.5 dBm	-3 dBm
Input wavelength	1270 nm	1600 nm
<b>Transmitter</b>	<b>Minimum</b>	<b>Maximum</b>
Transmitter power	-9.5 dBm	-3 dBm
Output wavelength	1275 nm	1350 nm
<b>Part number</b>	<b>15500-XVRA-03B2</b>	
Fibre Channel (1 Gbps and 2 Gbps) and FICON (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	
Fiber type	SM, 9/125 m	
Connector type	LC	
<b>Receiver</b>	<b>Minimum</b>	<b>Maximum</b>
Receive sensitivity	-20.5 dBm	
Input wavelength	1270 nm	1600 nm
<b>Transmitter</b>	<b>Minimum</b>	<b>Maximum</b>
Transmitter power	-9.5 dBm	-3 dBm
Output wavelength	1275 nm	1350 nm

*Table A-12 Fixed Rate SFP Optics Specifications (continued)*

Description	Specification	
<b>Part number</b>	<b>15500-XVRA-02C2</b>	
Fibre Channel (1 Gbps and 2 Gbps) and FICON (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, 50/125 m, 62.5/125 m	
Connector type	LC	
<b>Receiver</b>	<b>Minimum</b>	<b>Maximum</b>
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
<b>Transmitter</b>	<b>Minimum</b>	<b>Maximum</b>
Transmitter power	-9 dBm	-4 dBm
Output wavelength	830 nm	860 nm
<b>Part number</b>	<b>15500-XVRA-06B1</b>	
OC-12/STM-4 SM		
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	

*Table A-12 Fixed Rate SFP Optics Specifications (continued)*

Description	Specification	
<b>Receiver</b>	<b>Minimum</b>	<b>Maximum</b>
Receive sensitivity	-28 dBm	
Receive overload		-7 dBm
Input wavelength	1100 nm	1600 nm
<b>Transmitter</b>	<b>Minimum</b>	<b>Maximum</b>
Transmitter power	-15 dBm	-8 dBm
Output wavelength	1260 nm	1360 nm
<b>Part number</b>	<b>15500-XVRA-07B1</b>	
OC-48/STM-16 SM		
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	
<b>Receiver</b>	<b>Minimum</b>	<b>Maximum</b>
Receive sensitivity	-18 dBm	
Receive overload		-3 dBm
Input wavelength	1270 nm	1600 nm
<b>Transmitter</b>	<b>Minimum</b>	<b>Maximum</b>
Transmitter power	-9.5 dBm	-3 dBm
Output wavelength	1285 nm	1340 nm

Table A-13 lists the specifications for the Cisco ONS 15540 ESP variable rate SFP optics.

**Note**

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

*Table A-13 Variable Rate SFP Optics Specifications*

Description	Specification	
<b>Part number</b>	<b>15500-XVRA-10A1</b>	
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	
<b>Receiver</b>	<b>Minimum</b>	<b>Maximum</b>
Receive sensitivity @ $10^{-12}$ BER <sup>1</sup>	-32 dBm	
Receive sensitivity @ $10^{-15}$ BER	-29 dBm	
Receive overload @ $10^{-12}$ BER		-14 dBm
Input wavelength	1100 nm	1600 nm
<b>Transmitter</b>	<b>Minimum</b>	<b>Maximum</b>
Transmitter power	-19 dBm	-14 dBm
Output wavelength	1280 nm	1380 nm
<b>Part number</b>	<b>15500-XVRA-10B1</b>	
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	



*Table A-13 Variable Rate SFP Optics Specifications (continued)*

Description	Specification	
	Minimum	Maximum
<b>Receiver</b>		
Receive sensitivity @ $10^{-12}$ BER	-32 dBm	
Receive overload @ $10^{-12}$ BER		-3 dBm
Input wavelength	1100 nm	1600 nm
<b>Transmitter</b>	<b>Minimum</b>	<b>Maximum</b>
Transmitter power	-8 dBm	-4 dBm
Output wavelength	1260 nm	1360 nm
<b>Part number</b>	<b>15500-XVRA-11A1</b>	
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	
<b>Receiver</b>	<b>Minimum</b>	<b>Maximum</b>
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
<b>Transmitter</b>	<b>Minimum</b>	<b>Maximum</b>
Transmitter power	-20 dBm	-14 dBm
Output wavelength	1270 nm	1380 nm

*Table A-13 Variable Rate SFP Optics Specifications (continued)*

Description	Specification	
<b>Part number</b>	<b>15500-XVRA-11B1</b>	
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 m	
Connector type	LC	
<b>Receiver</b>	<b>Minimum</b>	<b>Maximum</b>
Receive sensitivity @ $10^{-12}$ BER	-20 dBm	
Maximum receive power @ $10^{-12}$ BER		-3 dBm
Input wavelength	1100 nm	1600 nm
<b>Transmitter</b>	<b>Minimum</b>	<b>Maximum</b>
Transmitter power	-9 dBm	-3 dBm
Output wavelength	1285 nm	1345 nm
<b>Part number</b>	<b>15500-XVRA-12B1</b>	
Supported protocol encapsulations	Fibre Channel, FICON, 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	
<b>Receiver</b>	<b>Minimum</b>	<b>Maximum</b>
Receive sensitivity @ $10^{-10}$ BER	-18 dBm	

*Table A-13 Variable Rate SFP Optics Specifications (continued)*

Description	Specification	
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

■ Type 2 Extended Range Transponder Module Specifications