APPENDIX A

Hardware Specifications

Note The terms "Unidirectional Path Switched Ring" and "UPSR" may appear in Cisco literature. These terms do not refer to using Cisco ONS 15xxx products in a unidirectional path switched ring configuration. Rather, these terms, as well as "Path Protected Mesh Network" and "PPMN," refer generally to Cisco's path protection feature, which may be used in any topological network configuration. Cisco does not recommend using its path protection feature in any particular topological network configuration.

This appendix contains hardware and software specifications for the ONS 15454.

A.1 Shelf Specifications

This section provides specifications for shelf bandwidth; a list of topologies; Cisco Transport Controller (CTC) specifications; LAN, TL1, modem, alarm, and electrical interface assembly (EIA) interface specifications; timing, power, and environmental specifications; and shelf dimensions.

A.1.1 Bandwidth

The ONS 15454 has the following bandwidth specifications:

- Total bandwidth: 240 Gbps
- Data plane bandwidth: 160 Gbps
- SONET plane bandwidth: 80 Gbps

A.1.2 Configurations

The ONS 15454 can be configured as follows:

- Two-fiber path protection
- Path protected mesh network (PPMN)
- Two-fiber bidirectional line switch ring (BLSR)
- Four-fiber BLSR
- Add-drop multiplexer (ADM)
- Terminal mode

- Regenerator mode
- Hubbed rings
- Multihubbed rings
- Point-to-point
- Linear
- Linear with optical add/drop multiplexing (OADM)

A.1.3 Cisco Transport Controller

CTC, the ONS 15454 craft interface software, has the following specifications:

- 10BaseT
- TCC2/TCC2P access: RJ-45 connector
- Backplane access: LAN pin field

A.1.4 External LAN Interface

The ONS 15454 external LAN interface has the following specifications:

- 10BaseT Ethernet
- Backplane access: LAN pin field

A.1.5 TL1 Craft Interface

The ONS 15454 TL1 craft interface has the following specifications:

- Speed: 9600 bps
- TCC2/TCC2P access: EIA/TIA-232 DB-9 type connector
- Backplane access: CRAFT pin field

A.1.6 Modem Interface

The ONS 15454 modem interface has the following specifications:

- Hardware flow control
- TCC2/TCC2P: EIA/TIA-232 DB-9 type connector

A.1.7 Alarm Interface

The ONS 15454 alarm interface has the following specifications:

- Visual: Critical, Major, Minor, Remote
- Audible: Critical, Major, Minor, Remote
- Alarm contacts: 0.045 mm, –48 V, 50 mA

- Backplane access: Alarm pin fields

A.1.8 EIA Interface

The ONS 15454 EIA interface has the following specifications:

- SMB: AMP #415504-3 75-ohm, 4-leg connectors
- BNC: Trompeter #UCBJ224 75-ohm 4 leg connector (King and ITT are also compatible)
- AMP Champ: AMP#552246-1 with #552562-2 bail locks

A.1.9 BITS Interface

The ONS 15454 building integrated timing supply (BITS) interface has the following specifications:

- 2 DS-1 BITS inputs
- 2 derived DS-1 outputs
- Backplane access: BITS pin field

A.1.10 System Timing

The ONS 15454 has the following system timing specifications:

- Stratum 3 per Telcordia GR-253-CORE
- Free running accuracy: +/–4.6 ppm
- Holdover stability: 3.7 $x10^{-7}$ per day, including temperature (< 255 slips in first 24 hours)
- Reference: External BITS, line, internal

A.1.11 System Power

The ONS 15454 has the following power specifications:

- Input power: –48 VDC
- Power consumption: 72 W (fan tray only); 1100 W (maximum draw with cards)
- Power requirements: –40.5 to –57 VDC
- Power terminals: #8-32 screw. Ring or fork type lug suitable for 10 AWG stranded conductor with a 0.375inch maximum width.
- ANSI shelf: Two 30 A fuses (customer supplied fuse and alarm panel)
- HD shelf: 35 A fuse per shelf (customer supplied fuse and alarm panel)

A.1.12 System Environmental Specifications

The ONS 15454 has the following environmental specifications:

- Operating temperature: 0 to +55 degrees Celsius; –40 to +65 degrees Celsius with industrial temperature rated cards

- Operating humidity: 5 to 95 percent, noncondensing

A.1.13 Dimensions

The ONS 15454 shelf assembly has the following dimensions:

- Height: 18.5 in. (40.7 cm)
- Width: 19 or 23 in. (41.8 or 50.6 cm) with mounting ears attached
- Depth: 12 in. (26.4 cm) (5 in. or 12.7 cm projection from rack)
- Weight: 55 lb (24.947 kg) empty

A.2 SFP, XFP, and GBIC Specifications

Table A-1 lists the specifications for the available Small Form-factor Pluggables (SFPs), 10 Gbps Pluggables (XFPs) and GBICs. In the table, the following acronyms are used:

- ESCON = Enterprise System Connection
- FICON = fiber connectivity
- GE = Gigabit Ethernet
- FC = Fibre Channel
- HDTV = high definition television
- CWDM = coarse wavelength division multiplexing

Table A-1 SFP, XFP, and GBIC Specifications

SFP/XFP Product ID	Interface	Transmitter Output Power Min/Max (dBm)	Receiver Input Power Min/Max (dBm)
15454-SFP-LC-SX/ 15454E-SFP-LC-SX	GE	–9.5 to –4	–17 to 0
15454-SFP-LC-LX/ 15454E-SFP-LC-LX	GE	–9.5 to –3	–19 to –3
15454-SFP3-1-IR=	OC-3	–15 to –8	–23 to –8
15454E-SFP-L.1.1=	STM-1	–15 to –8	–34 to –10
15454-SFP12-4-IR=	OC-12, D1 Video	–15 to –8	–28 to –7
15454E-SFP-L.4.1=	STM-4, D1 Video	–15 to –8	–28 to –8
15454-SFP-OC48-IR=	OC-48, DV6000 (C-Cor)	–5 to +0	–18 to +0
ONS-SE-2G-S1=	OC-48, STM-16	–10 to –3	–18 to –3
15454E-SFP-L.16.1=	STM-16, DV6000 (C-Cor)	–5 to +0	–18 to +0
15454-SFP-200/ 15454E-SFP-200	ESCON	–8 to –4	–28 to –3
15454-SFP-GEFC-SX=/ 15454E-SFP-GEFC-S=	FC (1 and 2 Gbps), FICON, GE	–10 to –3.5	–17 to 0 (1 FC and 1GE) –15 to 0 (2 FC)

Table A-1 SFP, XFP, and GBIC Specifications (continued)

SFP/XFP Product ID	Interface	Transmitter Output Power Min/Max (dBm)	Receiver Input Power Min/Max (dBm)
15454-SFP-GE+-LX=/ 15454E-SFP-GE+-LX=	FC (1 and 2 Gbps), FICON, GE, HDTV	–9.5 to –3	–20 to –3 (1 FC, 1GE, and 2 FC)
ONS-SI-2G-S1	OC-48 SR	–10 to –3	–18 to –3
ONS-SI-2G-I1	OC-48 IR1	–5 to 0	–18 to 0
ONS-SI-2G-L1	OC-48 LR1	–2 to 3	–27 to –9
ONS-SI-2G-L2	OC-48 LR2	–2 to 3	–28 to –9
ONS-SC-2G-30.3 through ONS-SC-2G-60.6	OC-48 DWDM	0 to 4	–28 to –9
ONS-SI-622-I1	OC-3/OC-12 IR1 Dual rate	–15 to –8	–28 to –8
ONS-SI-622-L1	OC-12 LR1	–3 to 2	–28 to –8
ONS-SI-622-L2	OC-12 LR2	–3 to 2	–28 to –8
ONS-SE-622-1470 through ONS-SE-622-1610	OC-12 CWDM	0 to 5	–28 to –7
ONS-SI-155-I1	OC-3 IR1	–15 to –8	–28 to –8
ONS-SI-155-L1	OC-3 LR1	–5 to 0	–34 to –10
ONS-SI-155-L2	OC-3 LR2	–5 to 0	–34 to –10
ONS_SE-155-1470 through ONS-SE-155-1610	OC-3 CWDM	0 to 5	–34 to –7
ONS-XC-10G-S1	OC-192 SR1	–6 to –1	–11 to –1
ONS-XC-10G-I2	OC-192 IR2	–1 to +2	–14 to +2
ONS-XC-10G-L2	OC-192 LR2	0 to 4	–24 to –7
ONS-SE-100-FX	Fast Ethernet	–20 to –14	–30 to –14
ONS-SE-100-LX10	Fast Ethernet	–15 to –8	–25 to –8
15454-GBIC-SX	FC, GE	–9.5 to –3.5	–19 to –3
15454E-GBIC-SX	GE, FC		
15454-GBIC-LX/LH	GE, FC	–9 to –3	–19 to –3
15454E-GBIC-LX/LH	GE, FC	–9 to –3	–19 to –3
ONS-GX-2FC-MMI	FC	–9.5 to –5	–20.5/–15 max
ONS-GX-2FC-SML	FC	–9 to –3	–18 to –3

A.3 General Card Specifications

This section provides power specifications and temperature ranges for all ONS 15454 cards.

A.3.1 Power

Table A-2 provides power consumption information for the ONS 15454 cards.

Table A-2 Individual Card Power Requirements

Card Type	Card Name	Watts	Amperes	BTU/Hr.
Control Cards	TCC2	19.20	0.4	66.8
	TCC2P	27.00	0.56	92.2
	XCVT	34.40	0.72	117.46
	XC10G	48	1	163.68
	XC-VXC-10G	67	1.4	228.62
	AIC-I	4.8	0.1	15.3
	AEP	3	(from +5 VDC from AIC-I)	10.2
Electrical Cards	EC1-12	36.60	0.76	124.97
	DS1-14	12.60	0.26	43.02
	DS1N-14	12.60	0.26	43.02
	DS1/E1-56	36.00	0.76	124.97
	DS3-12	38.20	0.79	130.43
	DS3/EC1-48	45	0.58	95.6
	DS3N-12	38.20	0.79	130.43
	DS3i-N-12	30	0.63	102.4
	DS3-12E	26.80	0.56	91.51
	DS3N-12E	26.80	0.56	91.51
	DS3XM-12 Transmux	34	0.71	116.1
	DS3XM-6 Transmux	20	0.42	68

Table A-2 Individual Card Power Requirements (continued)

Card Type	Card Name	Watts	Amperes	BTU/Hr.
Optical Cards	OC3 IR 4	19.20	0.40	65.56
	OC3 IR 4/STM1 SH 1310	19.20	0.40	65.56
	OC3 IR 4/STM1SH 1310-8	26.00	0.48	78.5
	OC12 IR 1310	10.90	0.23	37.22
	OC12 LR 1310	9.28	0.2	31.68
	OC12 LR 1550	9.28	0.2	31.68
	OC12 LR/STM4 LH 1310	9.00	0.2	31.68
	OC12 LR/STM4 LH 1550	9.28	0.2	31.68
	OC12 IR/STM4 SH 1310-4	35.60	0.74	121.6
	OC48 IR 1310	32.20	0.67	109.94
	OC48 LR 1550	26.80	0.56	91.50
	OC48 IR/STM16 SH AS 1310	37.20	0.77	127.01
	OC48 LR/STM16 LH AS 1550	37.20	0.77	127.01
	OC48 ELR/STM16 EH 100 GHz	31.20	0.65	106.53
	OC48 ELR 200 GHz	31.20	0.65	106.53
Optical Cards	OC192 SR/STM64 IO H 1310	41.80	0.90	132.00
	OC192 IR/STM64 SH 1550	48.00	1.00	163.68
	OC192 LR/STM64 LH 1550	41.80	0.90	132.00
	OC192 LR/STM64 LH 15xx.xx	62.40	1.30	214.00
	15454_MRC-12	38	0.79	129.66
	OC192SR1/STM64IO Short Reach and OC-192/STM64 Any Reach[1]	40	0.83	136.49
Ethernet Cards	E100T-12	65	1.35	221.93
	E100T-G	65	1.35	221.93
	E1000-2	53.50	1.11	182.67
	E1000-2-G	53.50	1.11	182.67
	G1K-4	63.00 (including GBICs[2])	1.31	215.11
	ML100T-12	53	1.10	181.0
	ML1000-2	49 (including SFPs)	1.02	167.3
	ML100X-8	65	1.35	221.93
	CE-100T-8	53.14	1.10	181.3
Storage Access Networking	FC_MR-4	60	1.25	212.00

1. These cards are designated as OC192-XFP in CTC.
2. GBICs = Gigabit Interface Converters

A.3.2 Temperature

Table A-3 provides temperature ranges and product names for ONS 15454 cards.

Note The I-Temp symbol is displayed on the faceplate of an I-Temp compliant card. A card without this symbol is C-Temp compliant.

Table A-3 Card Temperature Ranges and Product Names

Card Type	Card Name	C-Temp Product Name (32 to 131 degrees Fahrenheit, 0 to +55 degrees Celsius)	I-Temp Product Name (–40 to 149 degrees Fahrenheit, –40 to +65 degrees Celsius)
Control Cards	TCC2	—	15454-TCC2
	TCC2P	—	15454-TCC2P
	XCVT	15454-XC-VT	15454-XC-VT-T
	XC10G	15454-XC-10G	—
	XC-VXC-10G	—	15454-XC-VXC-10G-T
	AIC-I	—	15454-AIC-I
	AEP	—	15454-AEP
Electrical	EC1-12	15454-EC1-12	15454-EC1-12-T
	DS1-14	15454-DS1-14	15454-DS1-14-T
	DS1N-14	15454-DS1N-14	15454-DS1N-14-T
	DS1/E1-56	—	15454-DS1E1-56
	DS3-12	15454-DS3-12	15454-DS3-12-T
	DS3/EC1-48	—	15454-DS3_EC1-48
	DS3N-12	15454-DS3N-12	15454-DS3N-12-T
	DS3i-N-12	15454-DS3i-N-12	—
	DS3-12E	—	15454-DS3-12E-T
	DS3N-12E	—	15454-DS3N-12E-T
	DS3XM-12 (Transmux)	—	15454-DS3XM-12
	DS3XM-6 (Transmux)	15454-DS3XM-6	15454-DS3XM-6-T

Table A-3 Card Temperature Ranges and Product Names (continued)

Card Type	Card Name	C-Temp Product Name (32 to 131 degrees Fahrenheit, 0 to +55 degrees Celsius)	I-Temp Product Name (–40 to 149 degrees Fahrenheit, –40 to +65 degrees Celsius)
Optical	OC3 IR 4/STM1 SH 1310	15454-OC34IR1310	15454-OC34I13-T
	OC3 IR/STM1 SH 1310-8	15454-OC3I8-1310	—
	OC12 IR/STM4 SH 1310	15454-OC121IR1310	15454-OC121I13-T
	OC12 LR/STM4 LH 1310	15454-OC121LR1310	15454-OC121L13-T
	OC12 LR/STM4 LH 1550	15454-OC121LR1550	15454-OC121L15-T
	OC12 IR/STM4 SH 1310-4	15454-OC12I4-1310	—
	OC48 IR 1310	15454-OC481IR1310	—
	OC48 LR 1550	15454-OC481LR1550	—
	OC48 IR/STM16 SH AS 1310	15454-OC481IR1310A	—
	OC48 LR/STM16 LH AS 1550	15454-OC481LR1550A	—
	OC48 ELR/STM16 EH 100 GHz	15454-OC48E-1-xx.xx (all wavelengths)	—
	OC48 ELR/STM16 EH 200 GHz	15454-OC48E-xx.xx (all wavelengths)	—
Optical	OC 192 SR/STM64 IO 1310	15454-OC192IO1310	—
	OC192 IR/STM64 SH 1550	15454-OC192IR1550	—
	OC192 LR/STM64 LH 1550	15454-OC192LR1550	—
	OC192 LR/STM64 LH ITU 15xx.xx	15454-OC192LR15xx	—
	15454_MRC-12	—	15454-MRC-12-T
	OC-192/STM-64 SR1 Short Reach[1]	15454_OC-192/STM-64 SR1 Short Reach	—
	OC-192/STM-64 Any Reach[1]	15454_OC-192/STM-64 Any Reach	—
Ethernet	E100T-12	15454-E100T	—
	E100T-G	15454-E100T-G	—
	E1000-2	15454-E1000-2	—
	E1000-2-G	15454-E1000-2-G	—
	G1K-4	15454-G1K-4	—
	ML100T-12	15454-ML100T-12	—
	ML1000-2	15454-ML1000-2	—
	ML100X-8	—	15454-ML100X-8
	CE-100T-8	15454-CE100T-8	—
Storage Access Networking	FC_MR-4	15454-FC_MR-4	—

1. Designated as OC192-XFP in CTC.

A.4 Common Control Card Specifications

This section provides specifications for the TCC2, TCC2P, XCVT, XC10G, XC-VXC-10G, and AIC-I cards.

For compliance information, refer to the *Cisco Optical Transport Products Safety and Compliance Information* document.

A.4.1 TCC2 Card Specifications

The TCC2 card has the following specifications:

- CTC software
  - Interface: EIA/TIA-232 (local craft access, on TCC2 faceplate)
  - Interface: 10BaseT LAN (on TCC2 faceplate)
  - Interface: 10BaseT LAN (through the backplane)
- Synchronization
  - Stratum 3, per Telcordia GR-253-CORE
  - Free running access: Accuracy +/– 4.6 ppm
  - Holdover stability: 3.7 * 10 exp – 7 per day including temperature (< 255 slips in first 24 hours)
  - Reference: External BITS, line, internal
- Supply voltage monitoring
  - Both supply voltage inputs are monitored.
  - Normal operation: –40.5 to –56.7 V
  - Undervoltage: Major alarm
  - Overvoltage: Major alarm
- Environmental
  - Operating temperature: –40 to +149 degrees Fahrenheit (–40 to +65 degrees Celsius)
  - Operating humidity: 5 to 95 percent, noncondensing
  - Power consumption: 26.00 W, 0.54 A at –48 V, 88.8 BTU/hr
- Dimensions
  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Depth with backplane connector: 9.250 in. (235 mm)
  - Weight not including clam shell: 1.5 lb (0.7 kg)

A.4.2 TCC2P Card Specifications

The TCC2P card has the following specifications:

- CTC software
  - Interface: EIA/TIA-232 (local craft access, on TCC2P faceplate)
  - Interface: 10BaseT LAN (on TCC2P faceplate)
  - Interface: 10BaseT LAN (via backplane)
- Synchronization
  - Stratum 3, per Telcordia GR-253-CORE
  - Free running access: Accuracy +/– 4.6 ppm
  - Holdover stability: 3.7 * 10 exp – 7 per day including temperature (< 255 slips in first 24 hours)
  - Reference: External BITS, line, internal
- Supply voltage monitoring
  - Both supply voltage inputs are monitored.
  - Normal operation: –40.5 to –56.7 V (in –48 VDC systems)
  - Undervoltage: Major alarm
  - Overvoltage: Major alarm
- Environmental
  - Operating temperature: –40 to +149 degrees Fahrenheit (–40 to +65 degrees Celsius)
  - Operating humidity: 5 to 95 percent, noncondensing
  - Power consumption: 26.00 W, 0.54 A at –48 V, 88.8 BTU/hr
- Dimensions
  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Depth with backplane connector: 9.250 in. (235 mm)
  - Weight not including clam shell: 1.5 lb (0.7 kg)

A.4.3 XCVT Card Specifications

The XCVT card has the following specifications:

- Environmental
  - Operating temperature:

    C-Temp (15454-XC-VT): 32 to 131 degrees Fahrenheit (0 to +55 degrees Celsius)

    I-Temp (15454-XC-VT-T): –40 to 149 degrees Fahrenheit (–40 to +65 degrees Celsius)
  - Operating humidity: 5 to 95 percent, noncondensing
  - Power consumption: 34.40 W, 0.72 A, 117.46 BTU/hr
- Dimensions

  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Card weight: 1.9 lb (0.8 kg)

A.4.4 XC10G Card Specifications

The XC10G card has the following specifications:

- Environmental
  - Operating temperature:

    C-Temp (15454-XC-10G): 32 to 131 degrees Fahrenheit (0 to +55 degrees Celsius)
  - Operating humidity: 5 to 85 percent, noncondensing
  - Power consumption: 48 W, 1.00 A, 163.68 BTU/hr
- Dimensions
  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Card weight: 1.5 lb (0.6 kg)

A.4.5 XC-XVC-10G Card Specifications

The XC-XVC-10G card has the following specifications:

- Environmental
  - Operating temperature:

    I-Temp (15454-XC-VXC-10G-T): –40 to 149 degrees Fahrenheit (–40 to +65 degrees Celsius)
  - Operating humidity: 5 to 85 percent, noncondensing
  - Power consumption: 67 W, 1.25 A, 204.73 BTU/hr
- Dimensions
  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Card weight: 1.5 lb (0.6 kg)

A.4.6 AIC-I Card Specifications

The AIC-I card has the following specifications:

- Alarm inputs
  - Number of inputs: 12 without alarm extension panel (AEP), 32 with AEP

  - Opto coupler isolated
  - Label is customer provisionable.
  - Severity is customer provisionable.
  - Common 32 V output for all alarm inputs
  - Each input limited to 2 mA
  - Termination: Wire-wrap on backplane without AEP, on AEP connectors with AEP
- Alarm outputs
  - Number of outputs: 4 (user configurable as inputs) without AEP, 16 with AEP
  - Switched by opto MOS (metal oxide semiconductor)
  - Triggered by definable alarm condition
  - Maximum allowed open circuit voltage: 60 VDC
  - Maximum allowed closed circuit current: 100 mA
  - Termination: Wire-wrap on backplane without AEP, on AEP connectors with AEP
- Express orderwire/Local orderwire (EOW/LOW)
  - ITU-T G.711, ITU-T G.712, Telcordia GR-253-CORE
  - A-law, mu-law

Note Due to the nature of mixed coding, in a mixed-mode configuration (A-law/mu-law) the orderwire is not ITU-T G.712 compliant.

  - Orderwire party line
  - Dual tone multifrequency (DTMF) signaling
- User data channel (UDC)
  - Bit rate: 64 kbps, bidirectional
  - ITU-T G.703
  - Input/output impedance: 120 ohm
  - Termination: RJ-11 connectors
- Data communications channel (DCC)
  - Bit rate: 576 kbps
  - EIA/TIA-485/V11
  - Input/output impedance: 120 ohm
  - Termination: RJ-45 connectors
- ACC connection for additional alarm interfaces
  - Connection to AEP
- Power monitoring alarming states:
  - Power failure (0 to –38 VDC)
  - Undervoltage (–38 to –40.5 VDC)
  - Overvoltage (beyond –56.7 VDC)

- Environmental
  - Operating temperature: –40 to 149 degrees Fahrenheit (–40 to +65 degrees Celsius)
  - Operating humidity: 5 to 95 percent, noncondensing
  - Power consumption (including AEP, if used): 8.00 W, 0.17 A, 27.3 BTU/hr
- Dimensions
  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Card weight: 1.8 lb (0.82 kg)

A.4.7 AEP Specifications

The AEP has the following specifications:

- Alarm inputs
  - Number of inputs: 32
  - Optocoupler isolated
  - Label customer provisionable
  - Severity customer provisionable
  - Common 32 V output for all alarm inputs
  - Each input limited to 2 mA
  - Termination: 50-pin AMP champ connector
- Alarm outputs
  - Number of outputs: 16
  - Switched by opto MOS
  - Triggered by definable alarm condition
  - Maximum allowed open circuit voltage: 60 VDC
  - Maximum allowed closed circuit current: 100 mA
  - Termination: 50-pin AMP champ connector
- Environmental
  - Overvoltage protection: as in ITU-T G.703 Annex B
  - Operating temperature: –40 to +65 degrees Celsius
  - Operating humidity: 5 to 95 percent, noncondensing
  - Power consumption: 3.00 W max., from +5 VDC from AIC-I, 10.2 BTU/hr max.
- Dimensions of AEP board
  - Height: 0.79 in. (20 mm)
  - Width: 13.0 in. (330 mm)
  - Depth: 3.5 in. (89 mm)
  - Weight: 0.4 lb (0.18 kg)

A.5 Electrical Card Specifications

This section provides specifications for the EC1-12, DS1-14, DS1N-14, DS1/E1-56, DS3/EC1-48, DS3-12, DS3N-12, DS3i-N-12, DS3-12E, DS3N-12E, DS3XM-6, DS3XM-12, and filler cards.

For compliance information, refer to the *Cisco Optical Transport Products Safety and Compliance Information* document.

A.5.1 EC1-12 Card Specifications

The EC1-12 card has the following specifications:

- Input
  - Bit rate: 51.84 Mbps +/– 20 ppm
  - Frame format: SONET
  - Line code: B3ZS
  - Termination: Unbalanced coaxial cable
  - Input impedance: 75 ohms +/– 5 percent
  - Cable loss: Max 450 feet 734A, RG-59, 728A/Max 79 feet RG-179
  - AIS: TR-TSY-000191 compliant
- Output
  - Bit rate: 51.84 Mbps +/– 20 ppm
  - Frame format: SONET
  - Line code: B3ZS
  - Termination: Unbalanced coaxial cable
  - Input impedance: 75 ohms +/–5 percent
  - Cable loss: Max 450 feet 734A, RG-59, 728A/Max 79 feet RG-179
  - AIS: TR-TSY-000191 compliant
  - Power level: –1.8 +/– 5.7 dBm
  - Pulse shape: ANSI T1.102-1988 Figure 8
  - Pulse amplitude: 0.36 to 0.85 V peak
  - Loopback modes: Terminal and facility
  - Line build out: 0 to 225 feet (0 to 68.8 meters); 226 to 450 feet (68.9 to 137.2 meters)
- Electrical interface: BNC or SMB connectors
- Operating temperature
  - C-Temp (15454-EC1-12): 0 to 131 degrees Fahrenheit (0 to +55 degrees Celsius)
  - I-Temp (15454-EC1-12-T): –40 to 149 degrees Fahrenheit (–40 to +65 degrees Celsius)

Note The I-Temp symbol is displayed on the faceplate of an I-Temp compliant card. A card without this symbol is C-Temp compliant.

- Operating humidity: 5 to 95 percent, noncondensing
- Power consumption: 36.60 W, 0.76 A, 124.97 BTU/hr
- Dimensions
  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Card weight: 2.0 lb (0.9 kg)

A.5.2 DS1-14 and DS1N-14 Card Specifications

The DS1-14 and DS1N-14 cards have the following specifications:

- Input
  - Bit rate: 1.544 Mbps +/– 32 ppm
  - Frame format: Off, SF (D4), ESF
  - Line code: AMI, B8ZS
  - Termination: Wire-wrap, AMP Champ
  - Input impedance: 100 ohms
  - Cable loss: Max 655 feet ABAM #22 AWG
  - AIS: TR-TSY-000191 compliant
- Output
  - Bit rate: 1.544 Mbps +/– 32 ppm
  - Frame format: Off, SF (D4), ESF
  - Line code: AMI, B8ZS
  - Termination: Wire-wrap, AMP Champ
  - Input impedance: 100 ohms
  - Cable loss: Max 655 feet ABAM #22 AWG
  - AIS: TR-TSY-000191 compliant
  - Power level: 12.5 to 17.9 dBm centered at 772 KHz, –16.4 to –11.1 dBm centered at 1544 KHz
  - Pulse shape: Telcordia GR-499-CORE Figure 9-5
  - Pulse amplitude: 2.4 to 3.6 V peak
  - Loopback modes: Terminal and facility
- Electrical interface: BNC or SMB connectors
- Surge protection: Telcordia GR-1089
- Operating temperature
  - C-Temp (15454-DS1-14 and 15454-DS1N-14): 0 to 131 degrees Fahrenheit (0 to +55 degrees Celsius)
  - I-Temp (15454-DS1-14-T and 15454-DS1N-14-T): –40 to 149 degrees Fahrenheit (–40 to +65 degrees Celsius)

Note The I-Temp symbol is displayed on the faceplate of an I-Temp compliant card. A card without this symbol is C-Temp compliant.

- Operating humidity: 5 to 95 percent, noncondensing
- Power consumption: 12.60 W, 0.26 A, 43.02 BTU/hr
- Dimensions
  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Card weight: 1.8 lb (0.8 kg)

A.5.3 DS1/E1-56 Card Specifications

The DS1/E1-56 card has the following specifications:

- Input
  - Bit rate: 1.544 Mbps ± 32 ppm (DS-1); 2.048 Mbps ±50ppm (E1)
  - Frame format: Off, SF (D4), ESF (DS-1); E1 multiframe, E1 CRC multiframe, and unframed (ITU) (E1)
  - Line code: AMI, B8ZS (DS-1); HDB3 (E1)
  - Termination: Balanced, twisted pair, #22/24 AWG
  - Input impedance: 100 ohms +/– 5 percent (DS1); 120 ohms =/–5% (E1)
  - Cable loss: Max 655 feet ABAM #22/24 AWG (DS1); Compliant per ITU-T G.703 (E1)
  - AIS: TR-TSY-000191 compliant
- Output
  - Bit rate: 1.544 Mbps ± 32 ppm (DS-1); 2.048 Mbps ±50ppm (E1)
  - Frame format: Off, SF (D4), ESF (DS-1); E1 multiframe, E1 CRC multiframe, and unframed (ITU) (E1)
  - Line code: AMI, B8ZS (DS-1); HDB3 (E1)
  - Termination: Balanced, twisted pair, #22/24 AWG
  - Input impedance: 100 ohms +/– 5 percent (DS1); 120 ohms =/–5% (E1)
  - Cable loss: Max 655 feet ABAM #22/24 AWG (DS1); Compliant per ITU-T G.703 (E1)
  - AIS: TR-TSY-000191 compliant
  - Power level: 12.6 to 17.9 dBm centered at 772 KHz
  - Pulse shape: Telcordia GR-499-CORE Figure 9-5 (DS-1); ITU-T G.703, Figure 15 (E1)
  - Pulse amplitude: 2.4 to 3.6 V peak (DS-1); 2.7 to 3.3 V peak (E1)
  - Loopback modes: Terminal and facility
- Electrical interface: SCSI (UBIC) connectors. UBIC-H: DS-1 and E1; UBIC-V: DS-1 only.
- Surge protection: Telcordia GR-1089

- Operating temperature
  - I-Temp (15454-DS1E1-56):–40 to 149 degrees Fahrenheit (–40 to +65 degrees Celsius)

Note The I-Temp symbol is displayed on the faceplate of an I-Temp compliant card. A card without this symbol is C-Temp compliant.

- Operating humidity: 5 to 95 percent, noncondensing
- Power consumption: 36.00 W, 0.76 A, 124.97 BTU/hr
- Dimensions
  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Card weight: 2.0 lb (0.9 kg)

A.5.4 DS3/EC1-48 Card Specifications

The DS3/EC1-48 card has the following specifications:

- Input
  - Bit rate: 44.736 Mbps +/– 20 ppm
  - Frame format: DS-3 ANSI T1.107-1988
  - Line code: B3ZS
  - Termination: Unbalanced coaxial cable
  - Input impedance: 75 ohms +/–5 percent
  - Cable loss: Max 450 feet with 734A or 728A, Max 79 feet with RG-179
  - AIS: TR-TSY-000191 compliant
- Output
  - Bit rate: 44.736 Mbps +/– 20 ppm
  - Frame format: DS-3 ANSI T1.107-1988
  - Line code: B3ZS
  - Termination: Unbalanced coaxial cable
  - Input impedance: 75 ohms +/–5 percent
  - Cable loss: Max 900 feet with 734A or 728A cable, Max 79 feet with RG-179
  - AIS: TR-TSY-000191 compliant
  - Power level: –1.8 to +5.7 dBm
  - Pulse shape: ANSI T1.102-1988 Figure 8
  - Pulse amplitude: 0.36 to 0.85 V peak
  - Loopback modes: Terminal and facility
  - Line build out: 0 to 225 feet (0 to 68.8 meters); 226 to 450 feet (68.9 to 137.2 meters)
- Electrical interface: BNC or SMB connectors

- Surge protection: Telcordia GR-1089
- Operating temperature:
  - I-Temp (15454-DS3_EC1-48): –40 to 149 degrees Fahrenheit (–40 to +65 degrees Celsius)

Note The I-Temp symbol is displayed on the faceplate of an I-Temp compliant card. A card without this symbol is C-Temp compliant.

- Operating humidity: 5 to 95 percent, noncondensing
- Power consumption: 60W, 1.25A at -48V, 95.6 BTU/hr
- Dimensions
  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Weight: 1.7 lb (0.7 kg)

A.5.5 DS3-12 and DS3N-12 Card Specifications

The DS3-12 and DS3N-12 cards have the following specifications:

- Input
  - Bit rate: 44.736 Mbps +/– 20 ppm
  - Frame format: DS-3 ANSI T1.107-1988
  - Line code: B3ZS
  - Termination: Unbalanced coaxial cable
  - Input impedance: 75 ohms +/–5 percent
  - Cable loss: Max 450 feet 734A, RG-59, 728A/Max 79 feet RG-179
  - AIS: TR-TSY-000191 compliant
- Output
  - Bit rate: 44.736 Mbps +/– 20 ppm
  - Frame format: DS-3 ANSI T1.107-1988
  - Line code: B3ZS
  - Termination: Unbalanced coaxial cable
  - Input impedance: 75 ohms +/–5 percent
  - Cable loss: Max 450 feet 734A, RG-59, 728A/Max 79 feet RG-179
  - AIS: TR-TSY-000191 compliant
  - Power level: –1.8 to +5.7 dBm
  - Pulse shape: ANSI T1.102-1988 Figure 8
  - Pulse amplitude: 0.36 to 0.85 V peak
  - Loopback modes: Terminal and facility
  - Line build out: 0 to 225 feet (0 to 68.8 meters); 226 to 450 feet (68.9 to 137.2 meters)

- Electrical interface: BNC or SMB connectors
- Surge protection: Telcordia GR-1089
- Operating temperature

  C-Temp (15454-DS3-12 and 15454-DS3N-12): 0 to 131 degrees Fahrenheit (0 to +55 degrees Celsius)

  – I-Temp (15454-DS3-12-T and 15454-DS3N-12-T): –40 to 149 degrees Fahrenheit (–40 to +65 degrees Celsius)

  Note The I-Temp symbol is displayed on the faceplate of an I-Temp compliant card. A card without this symbol is C-Temp compliant.

- Operating humidity: 5 to 95 percent, noncondensing
- Power consumption: 38.20 W, 0.79 A, 130.43 BTU/hr
- Dimensions
  – Height: 12.650 in. (321.3 mm)
  – Width: 0.716 in. (18.2 mm)
  – Depth: 9.000 in. (228.6 mm)
  – DS3-12 card weight: 1.7 lb (0.7 kg)
  – DS3N-12 card weight: 1.8 lb (0.8 kg)

A.5.6 DS3i-N-12 Card Specifications

The DS3i-N-12 card has the following specifications:

- Input
  – Bit rate: 44.736 Mbps +/–20 ppm
  – Frame format: ITU-T G.704, ITU-T G.752/DS-3 ANSI T1.107-1988
  – Line code: B3ZS
  – Termination: Unbalanced coaxial cable
  – Input impedance: 75 ohms +/– 5 percent
  – Cable loss:
    Maximum 137 m (450 ft): 734A, RG59, 728A
    Maximum 24 m (79 ft): RG179
  – AIS: ITU-T G.704 compliant
- Output
  – Bit rate: 44.736 Mbps +/– 20 ppm
  – Frame format: ITU-T G.704, ITU-T G.752/DS-3 ANSI T1.107-1988
  – Line code: B3ZS
  – Termination: Unbalanced coaxial cable
  – Output impedance: 75 ohms +/–5 percent
  – AIS: ITU-T G.704 compliant

  - Power level: –1.8 to +5.7 dBm

Note The power level is for a signal of all ones and is measured at a center frequency of 22.368 MHz (3 +/–1 kHz) bandwidth.)

  - Pulse shape: ITU-T G.703, Figure 14/ANSI T1.102-1988, Figure 8
  - Pulse amplitude: 0.36 to 0.85 V peak-to-peak
  - Loopback modes: Terminal and facility
  - Line build out: 0 to 225 feet (0 to 68.8 meters); 226 to 450 feet (68.9 to 137.2 meters)
- Electrical interface connectors: SMB, BNC
- Environmental
  - Overvoltage protection: As in ITU-T G.703 Annex B
  - Operating temperature: +23 to +113 degrees Fahrenheit (–5 to +45 degrees Celsius)
  - Operating humidity: 5 to 95 percent, noncondensing
  - Power consumption: 26.80 W, 0.56 A at –48 V, 91.5 BTU/hr
- Dimensions
  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Depth with backplane connector: 9.250 in. (235 mm)
  - Weight not including clam shell: 1.9 lb (0.8 kg)

A.5.7 DS3-12E and DS3N-12E Card Specifications

The DS3-12E and DS3N-12E cards have the following specifications:

- Input
  - Bit rate: 44.736 Mbps +/– 20 ppm
  - Frame format: DS-3 ANSI T1.107-1988
  - Line code: B3ZS
  - Termination: Unbalanced coaxial cable
  - Input impedance: 75 ohms +/–5 percent
  - Cable loss: Max 450 feet 734A, RG-59, 728A/Max 79 feet RG-179
  - AIS: TR-TSY-000191 compliant
- Output
  - Bit rate: 44.736 Mbps +/– 20 ppm
  - Frame format: DS-3 ANSI T1.107-1988
  - Line code: B3ZS
  - Termination: Unbalanced coaxial cable
  - Input impedance: 75 ohms +/–5 percent

  - Cable loss: Max 450 feet 734A, RG-59, 728A/Max 79 feet RG-179
  - AIS: TR-TSY-000191 compliant
  - Power level: –1.8 to +5.7 dBm

    Note The power level is for a signal of all ones and is measured at a center frequency of 22.368 MHz (3 +/–1 kHz) bandwidth.

  - Pulse shape: ANSI T1.102-1988 Figure 8
  - Pulse amplitude: 0.36 to 0.85 V peak-to-peak
  - Loopback modes: Terminal and facility
  - Line build out: 0 to 225 feet (0 to 68.8 meters); 226 to 450 feet (68.9 to 137.2 meters)
- Electrical interface: Connectors: BNC or SMB
- Surge protection: Telcordia GR-1089
- Operating temperature: I-Temp (15454-DS3-12E-T and 15454-DS3N-12E-T): –40 to 149 degrees Fahrenheit (–40 to +65 degrees Celsius)

  Note The I-Temp symbol is displayed on the faceplate of an I-Temp compliant card. A card without this symbol is C-Temp compliant.

- Operating humidity: 5 to 95 percent, noncondensing
- Power consumption: 26.80 W, 0.56 A, 91.51 BTU/hr
- Dimensions
  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Depth with backplane connector: 9.250 in. (235.0 mm)
  - DS3-12E card weight: 1.8 lb (0.8 kg)
  - DS3N-12E card weight: 1.9 lb (0.8 kg)

A.5.8 DS3XM-12 Card Specifications

The DS3XM-12 card has the following specifications:

- Input
  - Bit rate: 44.736 Mbps +/–20 ppm
  - Frame format: DS-3 ANSI T1.107-1988
  - Line code: B3ZS
  - Termination: Unbalanced coaxial cable
  - Input impedance: 75 ohms +/–5 percent
  - Cable loss: Max 450 feet 734A, RG-59, 728A/Max 79 feet RG-179
  - AIS: TR-TSY-000191 compliant

- Output
  - Bit rate: 44.736 Mbps +/– 20 ppm
  - Frame format: DS-3 ANSI T1.107-1988
  - Line code: B3ZS
  - Termination: Unbalanced coaxial cable
  - Input impedance: 75 ohms +/–5 percent
  - Cable loss: Max 450 feet 734A, RG-59, 728A/Max 79 feet RG-179
  - AIS: TR-TSY-000191 compliant
  - Power level: –1.8 to +5.7 dBm
  - Pulse shape: ANSI T1.102-1988 Figure 8
  - Pulse amplitude: 0.36 to 0.85 V peak
  - Loopback modes: Terminal and facility
  - Line build out: 0 to 225 feet (0 to 68.8 meters); 226 to 450 feet (68.9 to 137.2 meters)
- Interface: BNC, SMB, UBIC and MiniBNC connectors
- Surge protection: Telcordia GR-1089
- Operating temperature:
  - I-Temp (15454-DS3XM-12): –40 to 149 degrees Fahrenheit (–40 to +65 degrees Celsius)

Note The I-Temp symbol is displayed on the faceplate of an I-Temp compliant card. A card without this symbol is C-Temp compliant.

- Operating humidity: 5 to 95 percent, noncondensing
- Power consumption: 34 W, 0.71A at –48 V, 116.1 BTU/hr
- Dimensions
  - Height: 12.65 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.00 in. (228.6 mm)
  - Card weight: 1.8 lb (0.8 kg)

A.5.9 DS3XM-6 Card Specifications

The DS3XM-6 card has the following specifications:

- Input
  - Bit rate: 44.736 Mbps +/–20 ppm
  - Frame format: DS-3 ANSI T1.107-1988
  - Line code: B3ZS
  - Termination: Unbalanced coaxial cable
  - Input impedance: 75 ohms +/–5 percent
  - Cable loss: Max 450 feet 734A, RG-59, 728A/Max 79 feet RG-179

  - AIS: TR-TSY-000191 compliant
- Output
  - Bit rate: 44.736 Mbps +/– 20 ppm
  - Frame format: DS-3 ANSI T1.107-1988
  - Line code: B3ZS
  - Termination: Unbalanced coaxial cable
  - Input impedance: 75 ohms +/–5 percent
  - Cable loss: Max 450 feet 734A, RG-59, 728A/Max 79 feet RG-179
  - AIS: TR-TSY-000191 compliant
  - Power level: –1.8 to +5.7 dBm
  - Pulse shape: ANSI T1.102-1988 Figure 8
  - Pulse amplitude: 0.36 to 0.85 V peak
  - Loopback modes: Terminal and facility
  - Line build out: 0 to 225 feet (0 to 68.8 meters); 226 to 450 feet (68.9 to 137.2 meters)
- Interface: BNC or SMB connectors
- Surge protection: Telcordia GR-1089
- Operating temperature:
  - C-Temp (15454-DS3XM-6): 0 to 131 degrees Fahrenheit (0 to +55 degrees Celsius)
  - I-Temp (15454-DS3XM-6-T): –40 to 149 degrees Fahrenheit (–40 to +65 degrees Celsius)

Note The I-Temp symbol is displayed on the faceplate of an I-Temp compliant card. A card without this symbol is C-Temp compliant.

- Operating humidity: 5 to 95 percent, noncondensing
- Power consumption: 20 W, 0.42 A, 68 BTU/hr
- Dimensions
  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Card weight: 1.8 lb (0.8 kg)

A.5.10 FILLER Card Specifications

The FILLER cards have the following specifications:

- Environmental
  - Operating temperature:

    C-Temp: -40 to +149 degree Fahrenheit (-40 to +65 degrees Celsius)
  - Operating humidity: 5 to 95 percent, noncondensing
- Dimensions

- Height: 12.650 in. (321.3 mm)
- Width: 0.716 in. (18.2 mm)
- Depth: 9.000 in. (228.6 mm)
- Card weight: 0.4 lb (0.19 kg)

A.6 Optical Card Specifications

This section provides specifications for the OC3 IR4/STM1 SH 1310 (four-port), OC3 IR/STM1 SH 1310-8 (eight-port), OC12 IR/STM4 SH 1310, OC12 LR/STM4 LH 1310, OC12 LR STM4 LH 1550, OC12 IR/STM4 SH 1310-4 (four-port), OC48 IR 1310, OC48 LR 1550, OC48 IR/STM16 SH AS 1310, OC48 LR/STM16 LH AS 1550, OC48 ELR 100 GHz, OC48 ELR 200 GHz, OC192 SR/STM64 IO 1310, OC192 IR/STM64 SH 1550, OC192 LR/STM64 LH 1550, OC192 LR/STM64 LH ITU 15xx.xx, 15454_MRC-12 (12-port), OC192SR1/STM64IO Short Reach, and OC192/STM64 Any Reach cards.

For compliance information, refer to the *Cisco Optical Transport Products Safety and Compliance Information*.

A.6.1 OC3 IR 4/STM1 SH 1310 Card Specifications

The OC3 IR 4/STM1 SH 1310 card has the following specifications:

- Line
  - Bit rate: 155.52 Mbps
  - Code: Scrambled non-return to zero (NRZ)
  - Fiber: 1310-nm single-mode
  - Loopback modes: Terminal and facility
  - Connector: SC
  - Compliance: Telcordia GR-253-CORE, ITU-T G.707, ITU-T G.957
- Transmitter
  - Maximum transmitter output power: –8 dBm
  - Minimum transmitter output power: –15 dBm
  - Center wavelength: 1274 to 1356 nm
  - Nominal wavelength: 1310 nm
  - Transmitter: Fabry Perot (FP) laser
  - Extinction Ratio: 8.2 dB
  - Dispersion Ratio: 96 ps/nm
- Receiver
  - Maximum receiver level: –8 dBm at BER 1 * 10 exp – 12
  - Minimum receiver level: –28 dBm at BER 1 * 10 exp – 12
  - Receiver: InGaAs/InP photodetector
  - Link loss budget: 13 dB
  - Receiver input wavelength range: 1274 to 1356 nm

  - Jitter tolerance: Telcordia GR-253/ITU-T G.823 compliant
- Environmental
  - Operating temperature:

    C-Temp (15454-OC34IR1310): +23 to +113 degrees Fahrenheit (–5 to +45 degrees Celsius)

    I-Temp (15454-OC34I13-T): –40 to 149 degrees Fahrenheit (–40 to +65 degrees Celsius)
  - Operating humidity: 5 to 95 percent, noncondensing
  - Power consumption: 19.20 W, 0.40 A at –48 V, 65.56 BTU/hr
- Dimensions
  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Depth with backplane connector: 9.250 in. (235 mm)
  - Weight not including clam shell: 1.0 lb (0.4 kg)

A.6.2 OC3 IR/STM1SH 1310-8 Card Specifications

The OC3 IR/STM1SH 1310-8 card has the following specifications:

- Line
  - Bit rate: 155.52 Mbps
  - Code: Scrambled NRZ
  - Fiber: 1310-nm single-mode
  - Loopback modes: Terminal and facility
  - Connector: LC
  - Compliance: Telcordia GR-253-CORE, ITU-T G.707, ITU-T G.957
- Transmitter
  - Maximum transmitter output power: –8 dBm
  - Minimum transmitter output power: –15 dBm
  - Center wavelength: 1261 to 1360 nm
  - Nominal wavelength: 1310 nm
  - Transmitter: Fabry Perot laser
  - Extinction ratio: 8.2 dB
  - Dispersion tolerance: 96 ps/nm
- Receiver
  - Maximum receiver level: –8 dBm at BER 1 * 10 exp – 12
  - Minimum receiver level: –28 dBm at BER 1 * 10 exp – 12
  - Receiver: InGaAs/InP photodetector
  - Link loss budget: 13 dB
  - Receiver input wavelength range: 1261 to 1360 nm

  - Jitter tolerance: Telcordia GR-253/ITU-T G.823 compliant
- Environmental
  - Operating temperature: +23 to +113 degrees Fahrenheit (–5 to +45 degrees Celsius)
  - Operating humidity: 5 to 95 percent, noncondensing
  - Power consumption: 23.00 W, 0.48 A at –48 V, 78.5 BTU/hr
- Dimensions
  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Depth with backplane connector: 9.250 in. (235 mm)
  - Weight not including clam shell: 1.0 lb (0.4 kg)

A.6.3 OC12 IR/STM4 SH 1310 Card Specifications

The OC12 IR/STM4 SH 1310 card has the following specifications:

- Line
  - Bit rate: 622.08 Mbps
  - Code: Scrambled NRZ
  - Fiber: 1310-nm single-mode
  - Loopback modes: Terminal and facility
  - Connectors: SC
  - Compliance: Telcordia GR-253-CORE, ITU-T G.707, ITU-T G.957
- Transmitter
  - Maximum transmitter output power: –8 dBm
  - Minimum transmitter output power: –15 dBm
  - Center wavelength: 1274 to 1356 nm
  - Nominal wavelength: 1310 nm
  - Transmitter: Fabry Perot laser
  - Extinction ratio: 8.2 dB
  - Dispersion tolerance: 96 ps/nm
- Receiver
  - Maximum receiver level: –8 dBm at BER 1 * 10 exp – 12
  - Minimum receiver level: –28 dBm at BER 1 * 10 exp – 12
  - Receiver: InGa As/InP photodetector
  - Link loss budget: 13 dB
  - Receiver input wavelength range: 1274 to 1356 nm
  - Jitter tolerance: Telcordia GR-253/ITU-T G.823 compliant
- Environmental

  - Operating temperature:

    C-Temp (15454-OC121IR1310): +23 to +131 degrees Fahrenheit (–5 to +55 degrees Celsius)

    I-Temp (15454-OC121I13-T): –40 to +149 degrees Fahrenheit (–40 to +65 degrees Celsius)
  - Operating humidity: 5 to 95 percent, noncondensing
  - Power consumption: 10.90 W, 0.23 A at –48 V, 37.22 BTU/hr
- Dimensions
  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Weight not including clam shell: 1.4 lb (0.6 kg)

A.6.4 OC12 LR/STM4 LH 1310 Card Specifications

The OC12 LR/STM4 LH 1310 card has the following specifications:

- Line
  - Bit rate: 622.08 Mbps
  - Code: Scrambled NRZ
  - Fiber: 1310-nm single-mode
  - Loopback modes: Terminal and facility
  - Connectors: SC
  - Compliance: Telcordia SONET, Telcordia GR-253-CORE, ITU-T G.707, ITU-T G.957
- Transmitter
  - Maximum transmitter output power: +2 dBm
  - Minimum transmitter output power: –3 dBm
  - Center wavelength: 1280 to 1335 nm
  - Nominal wavelength: 1310 nm
  - Transmitter: Distributed feedback (DFB) laser
  - Extinction ratio: 10 dB
  - Dispersion tolerance: 190 ps/nm
- Receiver
  - Maximum receiver level: –8 dBm at BER 1 * 10 exp – 12
  - Minimum receiver level: –28 dBm at BER 1 * 10 exp – 12
  - Receiver: InGaAs/InP photodetector
  - Link loss budget: 25 dB
  - Receiver input wavelength range: 1280 to 1335 nm
  - Jitter tolerance: Telcordia GR-253/ITU-T G.823 compliant
- Environmental
  - Operating temperature:

C-Temp (15454-OC121LR1310): +23 to +131 degrees Fahrenheit (–5 to +55 degrees Celsius)

I-Temp (15454-OC121L13-T): –40 to +149 degrees Fahrenheit (–40 to +65 degrees Celsius)

  - Operating humidity: 5 to 95 percent, noncondensing
  - Power consumption: 9.28 W, 0.25 A, 41 BTU/hr
- Dimensions
  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Weight not including clam shell: 1.4 lb (0.6 kg)

A.6.5 OC12 LR/STM4 LH 1550 Card Specifications

The OC12 LR/STM4 LH 1550 card has the following specifications:

- Line
  - Bit rate: 622.08 Mbps
  - Code: Scrambled NRZ
  - Fiber: 1550-nm single-mode
  - Loopback modes: Terminal and facility
  - Connectors: SC
  - Compliance: Telcordia SONET, Telcordia GR-253-CORE, ITU-T G.707, ITU-T G.957
- Transmitter
  - Maximum transmitter output power: +2 dBm
  - Minimum transmitter output power: –3 dBm
  - Center wavelength: 1480 to 1580 nm
  - Nominal wavelength: 1550 nm
  - Transmitter: DFB laser
  - Dispersion tolerance: 1440 ps/nm
- Receiver
  - Maximum receiver level: –8 dBm at BER 1 * 10 exp – 12
  - Minimum receiver level: –28 dBm at BER 1 * 10 exp – 12
  - Receiver: InGaAs/InP photodetector
  - Link loss budget: 25 dB
  - Receiver input wavelength range: 1480 to 1580 nm
  - Jitter tolerance: Telcordia GR-253/ITU-T G.823 compliant
- Environmental
  - Operating temperature:

    C-Temp (15454-OC121LR1550): +23 to +131 degrees Fahrenheit (–5 to +55 degrees Celsius)

    I-Temp (15454-OC121L15-T): –40 to +149 degrees Fahrenheit (–40 to +65 degrees Celsius)

  - Operating humidity: 5 to 95 percent, noncondensing
  - Power consumption: 9.28 W, 0.19 A, 31.68 BTU/hr
- Dimensions
  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Weight not including clam shell: 1.4 lb (0.6 kg)

A.6.6 OC12 IR/STM4 SH 1310-4 Specifications

The OC12 IR/STM4 SH 1310-4 card has the following specifications:

- Line
  - Bit rate: 622.08 Mbps
  - Code: Scrambled NRZ
  - Fiber: 1310-nm single-mode
  - Loopback modes: Terminal and facility
  - Connector: SC
  - Compliance: Telcordia GR-253-CORE, ITU-T G.707, ITU-T G.957
- Transmitter
  - Maximum transmitter output power: –8 dBm
  - Minimum transmitter output power: –15 dBm
  - Center wavelength: 1274 to 1356 nm
  - Nominal wavelength: 1310 nm
  - Transmitter: Fabry Perot laser
  - Extinction ratio: 10 dB
  - Dispersion tolerance: 190 ps/nm
- Receiver
  - Maximum receiver level: –8 dBm
  - Minimum receiver level: –30 dBm
  - Receiver: InGaAs/InP photodetector
  - Link loss budget: 15 dB
  - Receiver input wavelength range: 1274 to 1356 nm
  - Jitter tolerance: Telcordia GR-253/ITU-T G.823 compliant
- Operating temperature
  - C-Temp: +23 to +131 degrees Fahrenheit (–5 to +55 degrees Celsius)
- Operating humidity
  - 5 to 95 percent, noncondensing
- Power consumption

  - 28 W, 0.58 A, 100 BTU/hr
- Dimensions
  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Weight not including clam shell: 1.0 lb (0.4 kg)

Note Minimum transmit power, minimum receive power, and link loss budget might exceed standard specifications.

A.6.7 OC48 IR 1310 Card Specifications

The OC48 IR 1310 card has the following specifications:

- Line
  - Bit rate: 2.49 Gbps
  - Code: Scrambled NRZ
  - Fiber: 1310-nm single-mode
  - Loopback modes: Terminal and facility
  - Connectors: SC
  - Compliance: Telcordia GR-253-CORE
- Transmitter
  - Maximum transmitter output power: 0 dBm
  - Minimum transmitter output power: –5 dBm
  - Center wavelength: 1280 to 1350 nm
  - Nominal wavelength: 1310 nm
  - Transmitter: Uncooled direct modulated DFB
- Receiver
  - Maximum receiver level: 0 dBm
  - Minimum receiver level: –18 dBm
  - Receiver: InGaAs InP photodetector
  - Link loss budget: 13 dB minimum
  - Receiver input wavelength range: 1280 to 1350 nm
- Environmental
  - Operating temperature:

    C-Temp (15454-OC481IR1310): +23 to +131 degrees Fahrenheit (–5 to +55 degrees Celsius)
  - Operating humidity: 5 to 95 percent, noncondensing
  - Power consumption: 32.20 W, 0.67 A, 109.94 BTU/hr
- Dimensions

  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Weight not including clam shell: 1.8 lb (0.8 kg)

A.6.8 OC48 LR 1550 Card Specifications

The OC48 LR 1550 card has the following specifications:

- Line
  - Bit rate: 2.49 Gbps
  - Code: Scrambled NRZ
  - Fiber: 1550-nm single-mode
  - Loopback modes: Terminal and facility
  - Connectors: SC
  - Compliance: Telcordia GR-253-CORE
- Transmitter
  - Maximum transmitter output power: +3 dBm
  - Minimum transmitter output power: –2 dBm
  - Center wavelength: 1520 to 1580 nm
  - Nominal wavelength: 1550 nm
  - Transmitter: DFB laser
- Receiver
  - Maximum receiver level: –8 dBm
  - Minimum receiver level: –28 dBm
  - Receiver: InGaAs avalanche photo diode (APD) photodetector
  - Link loss budget: 26 dB minimum, with 1 dB dispersion penalty
  - Receiver input wavelength range: 1520 to 1580 nm
- Environmental
  - Operating temperature:

    C-Temp (15454-OC481LR1550): +23 to +131 degrees Fahrenheit (–5 to +55 degrees Celsius)
  - Operating humidity: 5 to 95 percent, noncondensing
  - Power consumption: 26.80 W, 0.56 A, 91.50 BTU/hr
- Dimensions
  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Weight not including clam shell: 1.8 lb (0.8 kg)

A.6.9 OC48 IR/STM16 SH AS 1310 Card Specifications

The OC48 IR/STM16 SH AS 1310 card has the following specifications:

- Line
  - Bit rate: 2.49 Gbps
  - Code: Scrambled NRZ
  - Fiber: 1310-nm single-mode
  - Loopback modes: Terminal and facility
  - Connectors: SC
  - Compliance: Telcordia GR-253-CORE, ITU-T G.707, ITU-T G.957
- Transmitter
  - Maximum transmitter output power: 0 dBm
  - Minimum transmitter output power: –5 dBm
  - Center wavelength: 1280 to 1350 nm
  - Nominal wavelength: 1310 nm
  - Transmitter: DFB laser
  - Dispersion tolerance: 96 ps/nm
- Receiver
  - Maximum receiver level: 0 dBm
  - Minimum receiver level: –18 dBm
  - Receiver: InGaAs InP photodetector
  - Link loss budget: 13 dB minimum
  - Receiver input wavelength range: 1280 to 1350 nm
  - Jitter tolerance: Telcordia GR-253/ITU-T G.823 compliant
- Environmental
  - Operating temperature:

    C-Temp (15454-OC481IR1310A): +23 to +131 degrees Fahrenheit (–5 to +55 degrees Celsius)
  - Operating humidity: 5 to 95 percent, noncondensing
  - Power consumption: 37.20 W, 0.77 A, 127.01 BTU/hr
- Dimensions
  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Weight not including clam shell: 2.2 lb (0.9 kg)

A.6.10 OC48 LR/STM16 LH AS 1550 Card Specifications

The OC48 LR/STM16 SH AS 1550 card has the following specifications:

- Line
  - Bit rate: 2.49 Gbps
  - Code: Scrambled NRZ
  - Fiber: 1550-nm single-mode
  - Loopback modes: Terminal and facility
  - Connectors: SC
  - Compliance: Telcordia GR-253-CORE, ITU-T G.707, ITU-T G.957
- Transmitter
  - Maximum transmitter output power: +3 dBm
  - Minimum transmitter output power: –2 dBm
  - Center wavelength: 1520 to 1580 nm
  - Nominal wavelength: 1550 nm
  - Transmitter: DFB laser
  - Dispersion ratio: 3600 ps/nm
- Receiver
  - Maximum receiver level: –8 dBm
  - Minimum receiver level: –28 dBm
  - Receiver: InGaAs APD photodetector
  - Link loss budget: 26 dB minimum, with 1 dB dispersion penalty
  - Receiver input wavelength range: 1520 to 1580 nm
  - Jitter tolerance: Telcordia GR-253/ITU-T G.823 compliant
- Environmental
  - Operating temperature:

    C-Temp (15454-OC481LR1550A): +23 to +131 degrees Fahrenheit (–5 to +55 degrees Celsius)
  - Operating humidity: 5 to 95 percent, noncondensing
  - Power consumption: 37.20 W, 0.77 A, 127.01 BTU/hr
- Dimensions
  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Weight not including clam shell: 2.2 lb (0.9 kg)

A.6.11 OC48 ELR/STM 16 EH 100 GHz Card Specifications

The OC48 ELR 100 GHz card has the following specifications:

- Line
  - Bit rate: 2.49 Gbps
  - Code: Scrambled NRZ

  - Fiber: 1550-nm single-mode
  - Loopback modes: Terminal and facility
  - Connectors: SC
  - Compliance: Telcordia GR-253-CORE, ITU-T G.692, ITU-T G.958
- Transmitter
  - Maximum transmitter output power: 0 dBm
  - Minimum transmitter output power: –2 dBm
  - Center wavelength accuracy: +/– 0.12 nm
  - Transmitter: Electro-absorption laser
  - Dispersion tolerance: 5400 ps/nm
- Receiver
  - Maximum receiver level: –9 dBm
  - Minimum receiver level: –27 dBm at 1E–12 BER
  - Receiver: InGaAs APD photodetector
  - Link loss budget: 25 dB minimum at 1E–12 BER (not including the power dispersion penalty)
  - Dispersion penalty: 2 dB for a dispersion of up to 5400 ps/nm
  - Receiver input wavelength range: 1520 to 1580 nm
  - Jitter tolerance: Telcordia GR-253/ITU-T G.823 compliant
- Environmental
  - Operating temperature: C-Temp: +23 to +131 degrees Fahrenheit (–5 to +55 degrees Celsius)
  - Operating humidity: 5 to 95 percent, noncondensing
  - Power consumption: 31.20 W, 0.65 A, 106.53 BTU/hr
- Dimensions
  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Weight not including clam shell: 2.4 lb (1.1 kg)

A.6.12 OC48 ELR 200 GHz Card Specifications

The OC48 ELR 200 GHz card has the following specifications:

- Line
  - Bit rate: 2.49 Gbps
  - Code: Scrambled NRZ
  - Fiber: 1550-nm single-mode
  - Loopback modes: Terminal and facility
  - Connectors: SC
  - Compliance: Telcordia GR-253-CORE, ITU-T G692, ITU-T G958

- Transmitter
  - Maximum transmitter output power: 0 dBm
  - Minimum transmitter output power: –2 dBm
  - Center wavelength accuracy: +/– 0.25 nm
  - Transmitter: Electro-absorption laser
  - Dispersion tolerance: 3600 ps/nm
- Receiver
  - Maximum receiver level: –8 dBm
  - Minimum receiver level: –28 dBm
  - Receiver: InGaAs APD photodetector
  - Link loss budget: 26 dB minimum, with 1 dB dispersion penalty
  - Receiver input wavelength range: 1520 to 1580 nm
  - Jitter tolerance: Telcordia GR-253/ITU-T G.823 compliant
- Environmental
  - Operating temperature:

    C-Temp: +23 to +131 degrees Fahrenheit (–5 to +55 degrees Celsius)
  - Operating humidity: 5 to 95 percent, noncondensing
  - Power consumption: 31.20 W, 0.65 A, 106.53 BTU/hr
- Dimensions
  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Weight not including clam shell: 2.9 lb (1.3 kg)

A.6.13 OC192 SR/STM64 IO 1310 Card Specifications

The OC192 SR/STM64 IO 1310 card has the following specifications:

- Line
  - Bit rate: 9.95328 Gbps
  - Code: Scrambled NRZ
  - Fiber: 1310-nm single-mode
  - Maximum chromatic dispersion allowance: 6.6 ps/nm
  - Loopback modes: Terminal and facility
  - Connectors: SC
  - Compliance: Telcordia GR-253-CORE, ITU-T G.707, ITU-T G.957, ITU-T G.691
- Transmitter
  - Maximum transmitter output power: –1 dBm
  - Minimum transmitter output power: –6 dBm

  - Center wavelength: 1290 to 1330 nm
  - Nominal wavelength: 1310 nm
  - Transmitter: Directly modulated laser
- Receiver
  - Maximum receiver level: –1 dBm at BER 1 * 10 exp – 12
  - Minimum receiver level: –11 dBm at BER 1 * 10 exp – 12
  - Receiver: PIN diode
  - Link loss budget: 5 dB minimum, plus 1 dB dispersion penalty at BER = 1 * 10 exp – 12 including dispersion
  - Receiver input wavelength range: 1290 to 1330 nm
  - Dispersion tolerance: 6.6 ps/nm
- Environmental
  - Operating temperature: +23 to +131 degrees Fahrenheit (–5 to +55 degrees Celsius)
  - Operating humidity: 5 to 95 percent, noncondensing
  - Power consumption: 47.00 W, 0.98 A at –48 V, 160.5 BTU/hr
- Dimensions
  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Depth with backplane connector: 9.250 in. (235 mm)
  - Weight not including clam shell: 3.1 lb (1.3 kg)

A.6.14 OC192 IR/STM64 SH 1550 Card Specifications

The OC192 IR/STM64 SH 1550 card has the following specifications:

- Line
  - Bit rate: 9.95328 Gbps
  - Code: Scrambled NRZ
  - Fiber: 1550-nm single-mode
  - Maximum chromatic dispersion allowance: 800 ps/nm
  - Loopback modes: Terminal and facility

Note You must use a 3 to 15 dB fiber attenuator (5 dB recommended) when working with the OC192 IR/STM64 SH 1550 card in a loopback. Do not use fiber loopbacks with the OC192 IR/STM64 SH 1550 card. Using fiber loopbacks can cause irreparable damage to the OC192 IR/STM64 SH 1550 card.

  - Connectors: SC
  - Compliance: Telcordia GR-253-CORE, ITU-T G.707, ITU-T G.957, ITU-T G.691

- Transmitter
  - Maximum transmitter output power: +2 dBm
  - Minimum transmitter output power: –1 dBm
  - Center wavelength: 1530 to 1565 nm
  - Nominal wavelength: 1550 nm
  - Transmitter: Cooled EA (European accreditation) modulated laser
- Receiver
  - Maximum receiver level: –1 dBm at BER 1 * 10 exp – 12
  - Minimum receiver level: –14 dBm at BER 1 * 10 exp – 12
  - Receiver: PIN diode
  - Link loss budget: 13 dB minimum, plus 2 dB dispersion penalty at BER = 1 * 10 exp – 12 including dispersion
  - Receiver input wavelength range: 1530 to 1565 nm
  - Dispersion tolerance: 800 ps/nm
- Environmental
  - Operating temperature: +23 to +131 degrees Fahrenheit (–5 to +55 degrees Celsius)
  - Operating humidity: 5 to 95 percent, noncondensing
  - Power consumption: 50.00 W, 1.04 A at –48 V, 170.7 BTU/hr
- Dimensions
  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Depth with backplane connector: 9.250 in. (235 mm)
  - Weight not including clam shell: 3.1 lb (1.3 kg)

A.6.15 OC192 LR/STM64 LH 1550 Card Specifications

The OC192 LR/STM64 LH 1550 card has the following specifications:

- Line
  - Bit rate: 9.95328 Gbps
  - Code: Scrambled NRZ
  - Fiber: 1550-nm single-mode
  - Loopback modes: Terminal and facility

Note You must use a fiber attenuator when connecting a fiber loopback to an OC192 LR/STM64 LH 1550 card. Use a 19 to 24 dB attenuator for 15454-OC192LR1550 or a 14 to 28 dB attenuator for 15454-OC192-LR2 (20 dB is recommended). Never connect a direct fiber loopback.

  - Connectors: SC

  - Compliance: Telcordia GR-253-CORE, ITU-T G.707, ITU-T G.957
- Transmitter
  - Maximum transmitter output power:
    +10 dBm (15454-OC192LR1550);
    +7 dBm (15454-OC192-LR2)
  - Minimum transmitter output power:
    +7 dBm (15454-OC192LR1550);
    +4 dBm (15454-OC192-LR2)
  - Center wavelength: 1530 to 1565 nm
  - Nominal wavelength: 1550 nm
  - Maximum chromatic dispersion allowed: 1600 ps/nm
  - Transmitter: LN (Lithium Niobate) external modulator transmitter
- Receiver
  - Maximum receiver level:
    –10 dBm (15454-OC192LR1550);
    –7 dBm (15454-OC192LR1550)
  - Minimum receiver level:
    –19 dBm (15454-OC192LR1550);
    –24 dBm from 1530 to 1565 nm
    –20 dBm from 1290 to 1330 nm (15454-OC192-LR2)
  - Receiver: APD/TIA
  - Link loss budget: 24 dB minimum, with no dispersion or 22 dB optical path loss at BER = 1 – exp (–12) including dispersion
  - Receiver input wavelength range: 1530 to 1565 nm
  - Jitter tolerance: Telcordia GR-253/ITU-T G.823 compliant
- Environmental
  - Operating temperature:

    C-Temp (15454-OC192LR1550): +23 to +131 degrees Fahrenheit (–5 to +55 degrees Celsius)
  - Operating humidity: 5 to 95 percent, noncondensing
  - Power consumption: 72.20 W, 1.50 A, 246.52 BTU/hr (15454-OC192LR1550);
    52.00 W, 1.08 A at –48 V, 177.6 BTU/hr (15454-OC192-LR2)
- Dimensions
  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Weight not including clam shell: 3.1 lb (1.3 kg)

A.6.16 OC192 LR/STM64 LH ITU 15xx.xx Card Specifications

The OC192 LR/STM64 LH ITU 15xx.xx card has the following specifications:

- Line

  - Bit rate: 9.95328 Gbps
  - Code: Scrambled NRZ
  - Fiber: 1550-nm single-mode
  - Maximum chromatic dispersion allowance:

    In deployments with a dispersion compensation unit (DCU): +/– 1000 ps/nm, with optical signal-to-noise ration (OSNR) of 19 dB (0.5 nm resolution bandwidth [RBW])

    In deployments without a DCU: +/– 1200 ps/nm, with OSNR of 23 dB (0.5 nm RBW)
  - Loopback modes: Terminal and facility

Note You must use a 20-dB fiber attenuator (15 to 25 dB) when working with the OC192 LR/STM64 LH 15xx.xx card in a loopback. Do not use fiber loopbacks with the OC192 LR/STM64 LH 15xx.xx card. Using fiber loopbacks causes irreparable damage to this card.

  - Connectors: SC
  - Compliance: Telcordia GR-253-CORE, ITU-T G.707, ITU-T G.691, ITU-T G.957
- Transmitter
  - Maximum transmitter output power: +6 dBm
  - Minimum transmitter output power: +3 dBm
  - Center wavelength: See wavelength plan
  - Center wavelength accuracy: +/– 0.040 nm
  - Transmitter: LN external modulator transmitter
- Receiver
  - Maximum receiver level: –8 dBm at BER 1 * 10 exp – 12
  - Minimum receiver level: –22 dBm at BER 1 * 10 exp – 12
  - Receiver: APD
  - Link loss budget: 25 dB minimum, plus 2 dB dispersion penalty at BER = 1 * 10 exp – 12 including dispersion
  - Receiver input wavelength range: 1529 to 1565 nm
- Environmental
  - Operating temperature: +23 to +131 degrees Fahrenheit (–5 to +55 degrees Celsius)
  - Operating humidity: 5 to 95 percent, noncondensing
  - Power consumption: 52.00 W, 1.08 A at –48 V, 177.6 BTU/hr
- Dimensions
  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Depth with backplane connector: 9.250 in. (235 mm)
  - Weight not including clam shell: 3.1 lb (1.3 kg)

- Currently available wavelengths and versions of OC192 LR/STM64 LH ITU 15xx.xx card:

  ITU grid blue band:

  - 1534.25 +/– 0.040 nm, OC192 LR/STM64 LH ITU 1534.25
  - 1535.04 +/– 0.040 nm, OC192 LR/STM64 LH ITU 1535.04
  - 1535.82 +/– 0.040 nm, OC192 LR/STM64 LH ITU 1535.82
  - 1536.61 +/– 0.040 nm, OC192 LR/STM64 LH ITU 1536.61
  - 1538.19 +/– 0.040 nm, OC192 LR/STM64 LH ITU 1538.19
  - 1538.98 +/– 0.040 nm, OC192 LR/STM64 LH ITU 1538.98
  - 1539.77 +/– 0.040 nm, OC192 LR/STM64 LH ITU 1539.77
  - 1540.56 +/– 0.040 nm, OC192 LR/STM64 LH ITU 1540.56

  ITU grid red band:

  - 1550.12 +/– 0.040 nm, OC192 LR/STM64 LH ITU 1550.12
  - 1550.92 +/– 0.040 nm, OC192 LR/STM64 LH ITU 1550.92
  - 1551.72 +/– 0.040 nm, OC192 LR/STM64 LH ITU 1551.72
  - 1552.52 +/– 0.040 nm, OC192 LR/STM64 LH ITU 1552.52
  - 1554.13 +/– 0.040 nm, OC192 LR/STM64 LH ITU 1554.13
  - 1554.94 +/– 0.040 nm, OC192 LR/STM64 LH ITU 1554.94
  - 1555.75 +/– 0.040 nm, OC192 LR/STM64 LH ITU 1555.75
  - 1556.55 +/– 0.040 nm, OC192 LR/STM64 LH ITU 1556.55

A.6.17 15454_MRC-12 Card Specifications

The 15454_MRC-12 card has the following specifications:

- Line
  - Bit rate: up to OC-48 (2488.320 Mbps), depending on SFP

  Note Each optical interface on the card can be configured as OC-3, OC-12, or OC-48, depending on the available backplane bandwidth and existing provisioned lines. In general, the card supports all different rates on the line side as long as the accumulated bandwidth does not exceed the total backplane allowed bandwidth.

  - Fiber: 1550-nm single-mode
  - Connectors: LC duplex connector for each SFP
  - Compliance: Telcordia GR-253-CORE
- Transmitter
  - Maximum transmitter output power: Depends on SFP (see A.2 SFP, XFP, and GBIC Specifications, page A-4)
  - Minimum transmitter output power: Depends on SFP (see A.2 SFP, XFP, and GBIC Specifications, page A-4)
  - Center wavelength: See wavelength plan

  - Center wavelength accuracy: 1 nm to 4 nm, depending on SFP
  - Transmitter: FP and DFB laser
- Receiver
  - Maximum receiver level: Depends on SFP (see A.2 SFP, XFP, and GBIC Specifications, page A-4)
  - Minimum receiver level: Depends on SFP (see A.2 SFP, XFP, and GBIC Specifications, page A-4)
  - Receiver: PIN PD
  - Receiver input wavelength range: Depends on SFP
- Environmental
  - Operating temperature: –40 to +149 degrees Fahrenheit (–40 to +65 degrees Celsius)
  - Operating humidity: 5 to 95 percent, noncondensing
  - Power consumption: 38.00 W, 0.79 A at –48 V, 129.66 BTU/hr
- Dimensions
  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Depth with backplane connector: 9.250 in. (235 mm)
  - Weight not including clam shell: 3.1 lb (1.3 kg)
- Wavelength plan. Currently available wavelengths and versions of the 15454_MRC-12 card:
  - For ONS-SC-2G-30.3 through ONS-SC-2G-60.0 SFPs: 1530.33 nm to 1560.61 nm (32 distinct wavelengths at 100 GHz spacing)
  - For ONS-SE-622-1470 through ONS-SE-622-1610 SFPs: 1470 to 1610 nm (eight distinct wavelengths at 2500 GHz spacing)
  - For ONS_SE-155-1470 through ONS-SE-155-1610 SFPs: 1470 to 1610 nm (eight distinct wavelengths at 2500 GHz spacing)

A.6.18 OC192SR1/STM64IO Short Reach Card Specifications

Note The OC192SR1/STM64IO Short Reach card is designated as OC192-XFP in CTC.

The OC192SR1/STM64IO Short Reach card has the following specifications:

- Line
  - Bit rate: OC-192 (9.9520 Gbps)
  - Fiber: 1310-nm single-mode
  - Connectors: LC duplex connector for the XFP
  - Compliance: Telcordia GR-253-CORE
- Transmitter
  - Maximum transmitter output power: –1 dBm

  - Minimum transmitter output power: –6 dBm
- Receiver
  - Maximum receiver level: –1 dBm
  - Minimum receiver level: –11 dBm
  - Receiver input wavelength range: 1260 to 1565 nm
- Environmental
  - Operating temperature: 32 to +131 degrees Fahrenheit (0 to +55 degrees Celsius)
  - Operating humidity: 5 to 95 percent, noncondensing
  - Power consumption: 40.00 W, 0.83 A at –48 V, 136.49 BTU/hr
- Dimensions
  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Depth with backplane connector: 9.250 in. (235 mm)
  - Weight not including clam shell: 3.1 lb (1.3 kg)

A.6.19 OC192/STM64 Any Reach Card Specifications

Note The OC192/STM64 Any Reach card is designated as OC192-XFP in CTC.

The OC192/STM64 Any Reach card has the following specifications:

- Line
  - Bit rate: OC-192 (9.9520 Gbps)
  - Fiber: 1310-nm single-mode for ONS-XC-10G-S1 XFP, 1550-nm single mode for ONS-XC-10G-I2 and ONS-XC-10G-L2 XFPs
  - Connectors: LC duplex connector for the XFPs
  - Compliance: Telcordia GR-253-CORE
- Transmitter
  - Maximum transmitter output power: Depends on SFP (see A.2 SFP, XFP, and GBIC Specifications, page A-4)
  - Minimum transmitter output power: Depends on SFP (see A.2 SFP, XFP, and GBIC Specifications, page A-4)
- Receiver
  - Maximum receiver level: Depends on SFP (see A.2 SFP, XFP, and GBIC Specifications, page A-4)
  - Minimum receiver level: Depends on SFP (see A.2 SFP, XFP, and GBIC Specifications, page A-4)
  - Receiver input wavelength range: 1260 to 1565 nm
- Environmental

  - Operating temperature: 32 to +131 degrees Fahrenheit (0 to +55 degrees Celsius)
  - Operating humidity: 5 to 95 percent, noncondensing
  - Power consumption: 40.00 W, 0.83 A at –48 V, 136.49 BTU/hr
- Dimensions
  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Depth with backplane connector: 9.250 in. (235 mm)
  - Weight not including clam shell: 3.1 lb (1.3 kg)

A.7 Ethernet Card Specifications

This section includes specifications for the E100T-12, E100T-G, E1000-2, E1000-2-G, CE-100T-8, G1K-4, ML100T-12, ML1000-2, and ML100X-8 cards.

For compliance information, refer to the *Cisco Optical Transport Products Safety and Compliance Information* document.

A.7.1 E100T-12 Card Specifications

The E100T-12 card has the following specifications:

- Environmental
  - Operating temperature

    C-Temp (15454-E100T): 32 to 131 degrees Fahrenheit (0 to +55 degrees Celsius)
  - Operating humidity: 5 to 95 percent, noncondensing
  - Power consumption: 65 W, 1.35 A, 221.93 BTU/hr
- Dimensions
  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Card weight: 2.3 lb (1.0 kg)

A.7.2 E100T-G Card Specifications

The E100T-G card has the following specifications:

- Environmental
  - Operating temperature:

    C-Temp (15454-E100T-G): 32 to 131 degrees Fahrenheit (0 to +55 degrees Celsius)
  - Operating humidity: 5 to 95 percent, noncondensing
  - Power consumption: 65 W, 1.35 A, 221.93 BTU/hr

- Dimensions
  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Card weight: 2.3 lb (1.0 kg)

A.7.3 E1000-2 Card Specifications

The E1000-2 card has the following specifications:

- Environmental
  - Operating temperature:
    C-Temp (15454-E1000-2): 32 to 131 degrees Fahrenheit (0 to +55 degrees Celsius)
  - Operating humidity: 5 to 95 percent, noncondensing
  - Power consumption: 53.50 W, 1.11 A, 182.67 BTU/hr
- Dimensions
  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Card weight: 2.1 lb (0.9 kg)

A.7.4 E1000-2-G Card Specifications

The E1000-2-G card has the following specifications:

- Environmental
  - Operating temperature:
    C-Temp (15454-E1000-2-G): 32 to 131 degrees Fahrenheit (0 to +55 degrees Celsius)
  - Operating humidity: 5 to 95 percent, noncondensing
  - Power consumption: 53.50 W, 1.11 A, 182.67 BTU/hr
- Dimensions
  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Card weight: 2.1 lb (0.9 kg)

A.7.5 CE-100T-8 Card Specifications

The CE-100T-8 card has the following specifications:

- Environmental

  - Operating temperature

    C-Temp (15454-CE100T): 32 to 131 degrees Fahrenheit (0 to +55 degrees Celsius)
  - Operating humidity: 0 to 95 percent, noncondensing
  - Power consumption: 53 W, 1.1 A, 181.3 BTU/hr
- Dimensions
  - Height: 12.650 in. (321.3 mm)
  - Width: 0.913 in. (23.19 mm)
  - Depth: 9.073 in. (230.45 mm)
  - Card weight: 1.8 lb (0.82 kg)

A.7.6 G1K-4 Card Specifications

The G1K-4 card has the following specifications:

- Environmental
  - Operating temperature: +23 to +131 degrees Fahrenheit (–5 to +55 degrees Celsius)
  - Operating humidity: 5 to 95 percent, noncondensing
  - Power consumption: 63.00 W, 1.31 A at –48 V, 215.1 BTU/hr
- Dimensions
  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Depth with backplane connector: 9.250 in. (235 mm)
  - Weight not including clam shell: 2.1 lb (0.9 kg)

A.7.7 ML100T-12 Card Specifications

The ML100T-12 card has the following specifications:

- Environmental
  - Operating temperature: +23 to +131 degrees Fahrenheit (–5 to +55 degrees Celsius)
  - Operating humidity: 5 to 95 percent, noncondensing
  - Power consumption: 53.00 W, 1.10 A at –48 V, 181.0 BTU/hr
- Dimensions
  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Depth with backplane connector: 9.250 in. (235 mm)
  - Weight not including clam shell: 2.3 lb (1.0 kg)

A.7.8 ML1000-2 Card Specifications

The ML1000-2 card has the following specifications:

- Environmental
  - Operating temperature: +23 to +131 degrees Fahrenheit (–5 to +55 degrees Celsius)
  - Operating humidity: 5 to 95 percent, noncondensing
  - Power consumption: 49.00 W, 1.02 A at –48 V, 167.3 BTU/hr
- Dimensions
  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Depth with backplane connector: 9.250 in. (235 mm)
  - Weight not including clam shell: 0.9 kg (2.1 lb)

A.7.9 ML100X-8 Card Specifications

The ML100X-8 card has the following specifications:

- Environmental
  - Operating temperature: +23 to +131 degrees Fahrenheit (–5 to +55 degrees Celsius)
  - Operating humidity: 5 to 95 percent, noncondensing
  - Power consumption: 65.00 W, 1.35 A at –48 V, 221.93 BTU/hr
- Dimensions
  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Depth with backplane connector: 9.250 in. (235 mm)
  - Weight not including clam shell: 0.9 kg (2.1 lb)

A.8 Storage Access Networking Card Specifications

This section describes the FC_MR-4 (Fibre Channel) card specifications.

For compliance information, refer to the *Cisco Optical Transport Products Safety and Compliance Information* document.

A.8.1 FC_MR-4 Card Specifications

The FC_MR-4 card has the following specifications:

- Fibre Channel Support: FC-0 and FC-1 layers of ANSI X3.230 FC-PH
- GBIC Line Interface

  - Bit Rate: 1.0625 Gbit/s single-rate or 1.0625/2.125 dual-rate Gbit/s Fibre Channel (FC)
  - Wavelength/Fiber/Reach:

    850 nm, multimode fiber, 550 m (SX)

    1310 nm, single-mode fiber, 10 km (LX)

    1550 nm/, single-mode fiber, 80 km (ZX)
  - Hot pluggable
  - Auto-detection
- Transmitter
  - Maximum transmitter output power: depends on GBIC type (see Table A-1)
  - Minimum transmitter output power: depends on GBIC type (see Table A-1)
- Receiver
  - Maximum receiver level: depends on GBIC type (see Table A-1)
  - Minimum receiver level: depends on GBIC type (see Table A-1)
- Environmental
  - Operating temperature

    C-Temp (15454-E100T): 23 to 131 degrees Fahrenheit (–5 to +55 degrees Celsius)
  - Operating humidity: 5 to 95 percent, noncondensing
  - Power consumption: 60 W, 1.35 A, 221.93 BTU/hr
- Dimensions
  - Height: 12.650 in. (321.3 mm)
  - Width: 0.716 in. (18.2 mm)
  - Depth: 9.000 in. (228.6 mm)
  - Card weight: 2.59 lb (1.17 kg)