Installing the OPT-AMP-L Card in the Cisco ONS 15454 SONET/SDH

Product Names: 15454-AMP-L

This document provides a card description, specifications, and installation procedure for the dense wavelength division multiplexer (DWDM) OPT-AMP-L card. The OPT-AMP-L card is compatible with the ONS 15454 SONET (ANSI) and the Cisco ONS 15454 SDH (ETSI) shelf assemblies. Use this document in conjunction with the *Cisco ONS 15454 DWDM Procedure Guide*.

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OPT-AMP-L Card Description

The OPT-AMP-L is an L-band DWDM optical amplifier module consisting of a two-stage EDFA with mid-stage access loss (MSL) for an external DCU and OSC add-and-drop capability. Using Cisco Transport Controller (CTC), the card is provisionable as a preamplifier (OPT-PRE) or booster amplifier (OPT-BST), as shown in *Cisco ONS 15454 DWDM Procedure Guide*. The amplifier is well suited for networks that employ DS fiber or SMF-28 single-mode fiber. The amplifier can operate up to 64 optical transmission channels at a channel spacing of 50 GHz in the wavelength range from 1570 nm to 1605 nm.

The OPT-AMP-L card is able to achieve a maximum signal power of 20 dBm throughout the gain and MSL ranges. The amplifier has a variable gain range that is settable from 12 to 24 dBm in the standard gain range and from 24 dBm to 35 dBm with uncontrolled gain tilt. It also provides up to 12 dBm MSL for an external DCU.

When an an OPT-AMP-L installed, only the OSCM needs to process the OSC. You can install the two-slot OPT-AMP-L in Slots 1 to 6 and 12 to 17. To control the gain tilt, the OPT-AMP-L is equipped with a built-in VOA.

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The OPT-AMP-L has the following features:

- Maximum power output of 20 dBm
- True variable gain amplifier
- Fast transient suppression; able to adjust power levels in hundreds of microseconds to avoid bit errors in failure or capacity growth situations
- Nondistorting low frequency transfer function
- Mid-stage access loss for dispersion compensation unit
- Constant pump current mode (test mode)
- Constant output power mode (used during optical node setup)
- Constant gain mode
- Internal ASE compensation in Constant Gain and in Constant Output Power mode
- Programmable tilt
- Full monitoring and alarm handling capability
- Optical safety support through signal loss detection and alarms at any input port, fast power down control (less than one second), and reduced maximum output power in safe power mode. For details on ALS provisioning for the card, see the *Cisco ONS 15454 DWDM Procedure Guide*. For information on using the card to implement ALS in a network, refer to the *Cisco ONS 15454 DWDM Reference Manual*.

Note Before disconnecting any OPT AMP-L fiber for troubleshooting, make sure the OPT AMP-L is unplugged.

Warning **Invisible laser radiation may be emitted from the end of the unterminated fiber cable or connector. Do not view directly with optical instruments. Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard.** Statement 1056

Figure 1 shows the faceplate and block diagram. Figure 2 shows optical module functional diagram of the OPT-AMP-L card.

Figure 1 OPT-AMP-L Faceplate and Block Diagram

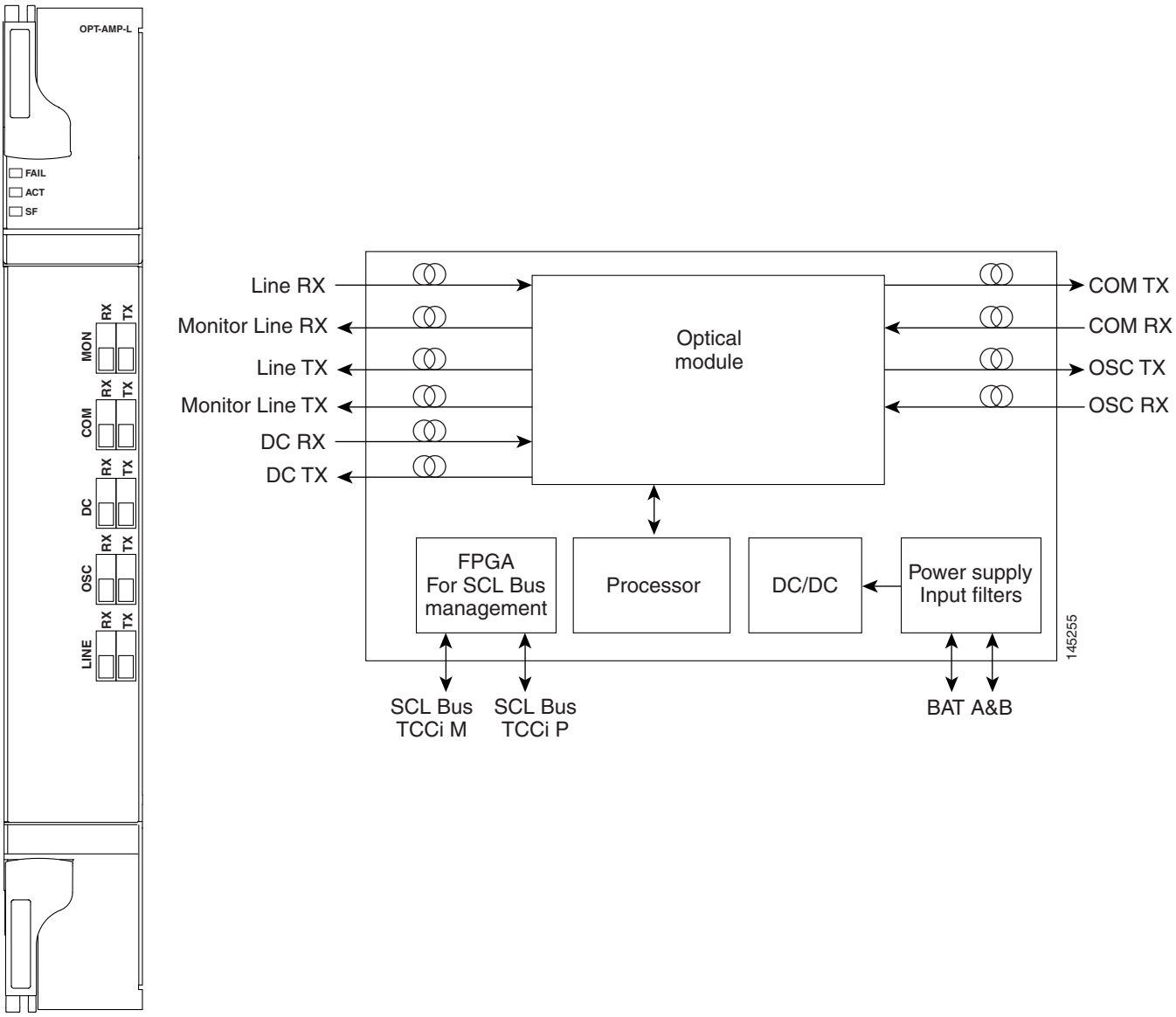
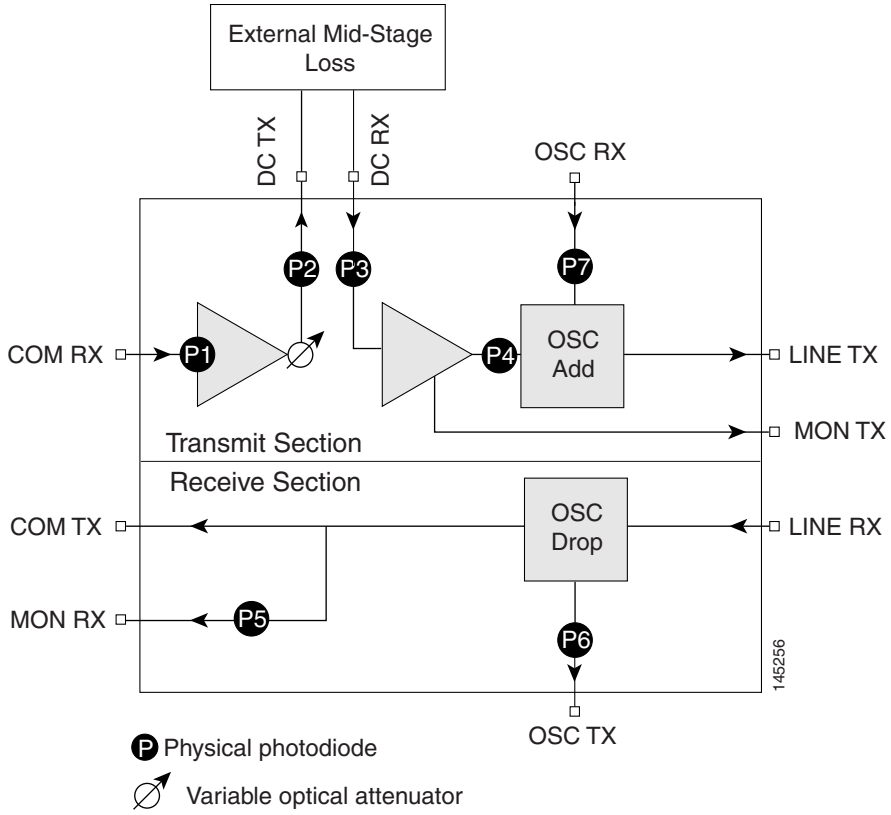


Figure 2 OPT-AMP-L Optical Module Functional Block Diagram



Power Monitoring

Physical photodiodes P1 through P7 monitor the power for the OPT-AMP-L card. The returned power level values are calibrated to the ports as shown in Table 1.

Table 1 OPT-AMP-L Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1	Input COM Power	COM RX
P2	Output DC (total power)	DC TX
	Output DC (signal power)	
P3	Input DC (input power)	DC RX
P4	Output Line Transmit (total power)	LINE TX
	Output Line Transmit (signal power)	
P5	Input Line Receive Power	LINE RX
P6	Input OSC Receive Power	
P7	Output OSC Transmit Power	OSC RX

OPT-AMP-L Card Level Indicators

The OPT-AMP-L amplifier has three card-level LED indicators, described in Table 2.

Table 2 OPT-AMP-L Card-Level Indicators

Card-Level Indicators	Description
Red FAIL LED	The red FAIL LED indicates that the card's processor is not ready or that there is an internal hardware failure. Replace the card if the red FAIL LED persists.
Green ACT LED	The green ACT LED indicates that the OPT-AMP-L is carrying traffic or is traffic-ready.
Amber SF LED	The amber SF LED indicates a signal failure or condition such as LOS on one or more of the card's ports. The amber SF LED also illuminates when the transmit and receive fibers are incorrectly connected. When the fibers are properly connected, the light turns off.

OPT-AMP-L Port-Level Indicators

You can find the status of the card ports using the LCD screen on the ONS 15454 ANSI fan-tray assembly. Use the LCD to view the status of any port or card slot; the screen displays the number and severity of alarms for a given port or slot.

The OPT-AMP-L amplifier has ten optical ports located on the faceplate:

- MON RX is the output monitor port (receive section).
- MON TX is the output monitor port.
- COM RX is the input signal port. LINE TX is the output signal port.
- LINE RX is the input signal port (receive section).
- COM TX is the output signal port (receive section).
- OSC RX is the OSC add input port.
- OSC TX is the OSC drop output port.
- DC TX is the output signal to the DCU.
- DC RX is the input signal from the DCU.

OPT-AMP-L Card Specifications

The OPT-AMP-L card has the following specifications:

- Optical characteristics:
  - DWDM channel wavelength plan, 100 GHz, 4 skip 1, ITU-T wavelength grid channels 71 (1602.3 nm) to 90 (1570.4 nm)
  - DWDM channel wavelength plan, 50 GHz, 8 skip 2, ITU-T wavelength grid channels 70.5 (1602.7 nm) to 90 (1570.4 nm)
  - Channel spacing: 100 and 50 GHz

  - Total operating wavelength range 1570.0 - 1605.0 nm
  - Gain ripple (peak to valley): 1.5 dB
  - Standard gain range: 12 to 24 dB
  - Extended gain range (uncontrolled gain tilt): 24 to 35 dB
  - Gain and power regulation over/undershoot: 0.5 dB
  - Maximum power output (standard or extended gain range): 20 dB
  - Input power range (full channel load): –15 to 8 dB
  - Input power range (single channel load): –40 to –17
  - Noise figure at G^3 20 dB = 8.9 dB
  - Insertion loss (Line RX to OSC TX): 0.3 to 1.8 dB
  - Insertion loss (Line RX to COM TX): 0.3 to 1.0 dB
  - Insertion loss (OSC RX to LINE TX): 0.3 to 1.3 dB
  - Optical connectors: LC-UPC/2
- Environmental
  - Operating temperature:

    C-Temp: –5 to +55 degrees Celsius (+23 to +131 degrees Fahrenheit)
  - Operating humidity: 5 to 85 percent, noncondensing
- Dimensions
  - Height: 12.65 in. (332 mm)
  - Width: 0.92 in. (24 mm)
  - Depth: 9.00 in. (240 mm)

Install the OPT-AMP-L Card

Warning **During this procedure, wear grounding wrist straps to avoid ESD damage to the card. Do not directly touch the backplane with your hand or any metal tool, or you could shock yourself.** Statement 94

Warning **Class 1M laser radiation when open. Do not view directly with optical instruments.** Statement 1053

Warning **Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments.** Statement 272

Caution Always use the supplied ESD wristband when working with a powered ONS 15454. Plug the wristband cable into the ESD jack located on the lower-right outside edge of the shelf assembly.

Caution Do not install the DWDM cards until you are directed to do so during DWDM node turnup.

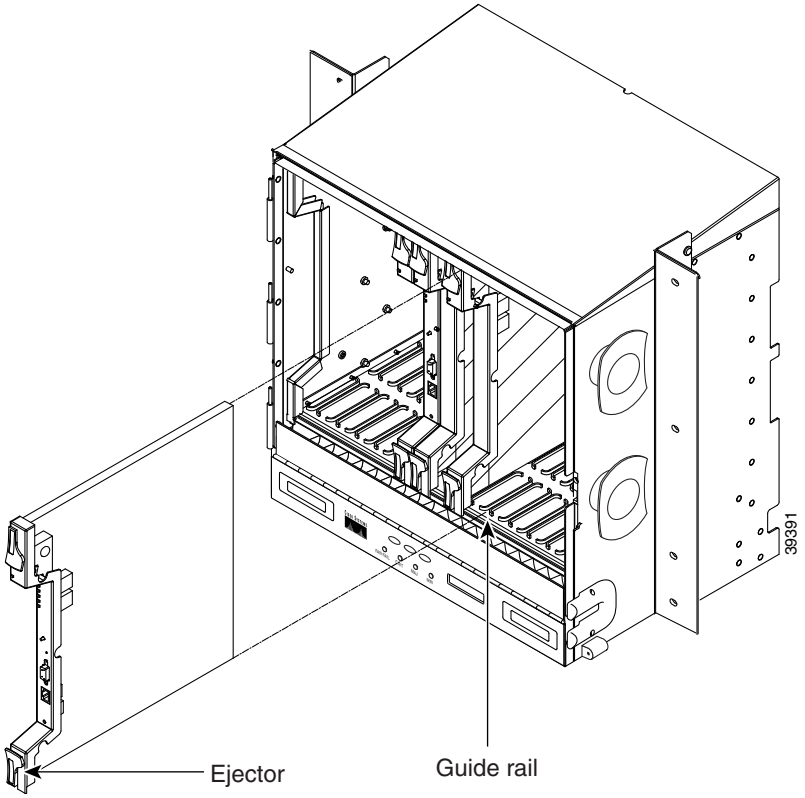
Note If protective clips are installed on the rear connectors of the cards, remove the clips before installing the cards.

Note If you install a card incorrectly, the FAIL LED flashes continuously.

Note The automatic node setup (ANS) of the ONS 15454 DWDM system begins to determine what kind of site you are installing as soon as you install cards. The automatic power control (APC) is enabled after ANS initializes and after a channel has been provisioned. To provision a DWDM channel, see the *Cisco ONS 15454 DWDM Procedure Guide*. For more information about amplifier power control, see the *Cisco ONS 15454 DWDM Reference Manual*.

Figure 3 shows general card installation.

Figure 3 Installing a Card in the Cisco ONS 15454 (ANSI) Shelf



Install OPT-AMP-L cards in any open east and west pair of slots.

Step 1 Plan your node installation or consult the site plan. As soon as you begin installing cards, ANS determines what kind of site to set up based on the following parameters:

- Hub site—Two 32DMX-O and two 32MUX-O cards are provisioned but no AD-xC or AD-xB cards are provisioned
- Terminal—One 32DMX-O and one 32MUX-O card are provisioned, and no AD-xC or AD-xB cards are provisioned
- Line site—Only one OPT-PRE, OPT-BST or OPT-AMP-L is provisioned per line direction. (Up to two OPT-PRE, two OPT-BST, and two OPT-AMP-L cards can be provisioned in the same shelf.)
- OADM site—At least 1 AD-xC or AD-xB is provisioned and no 32DMX-O or 32MUX-O cards are provisioned
- Unknown—Provisioned cards do not follow any of the previously listed categories.

Step 2 Open the card latches/ejectors.

Step 3 Use the latches/ejectors to firmly slide the DWDM card along the guide rails until the card plugs into the receptacle at the back of the slot.

Step 4 Install the card in any open east and west pair of slots. OPT-AMP-L cards are often installed in Slots 1 to 6 and 12 to 17.

Step 5 Verify that the card is inserted correctly and close the latches/ejectors on the card.

Note It is possible to close the latches/ejectors when the card is not completely plugged into the backplane. Ensure that you cannot insert the card any further.

Step 6 Verify the LED activity described in Table 3.

Table 3 LED Activity During OPT-AMP-L Card Installation

Card Type	LED Activity
OPT-AMP-L	1. The FAIL LED turns on for approximately 35 seconds 2. The FAIL LED blinks for approximately 40 seconds 3. All LEDs turn on and then turn off within 5 seconds 4. If new software is being downloaded to the card, the ACT and SF LEDs blink for 20 seconds to 3.5 minutes, depending on the card type 5. The ACT LED turns on 6. The signal fail (SF) LED stays on until all card ports connect to their far-end counterparts and a signal is present

Step 7 If the card does not boot up properly, or the LED activity does not mimic Step 6, check the following:

- When a physical card type does not match the type of card provisioned for that slot in CTC, the card might not boot. If a OPT-AMP-L card does not boot, open CTC and ensure that the slot is not provisioned for a different card type before assuming the card is faulty.
- If the red FAIL LED does not turn on, check the power.
- If you insert a card into a slot provisioned for a different card, all LEDS turn off.

- If the red FAIL LED is on continuously or the LEDs behave erratically, the card is not installed properly. Remove the card and repeat steps 2 to 6.

Related Documentation

- *Cisco ONS 15454 DWDM Procedure Guide*
- *Cisco ONS 15454 DWDM Reference Manual*
- *Cisco ONS 15454 DWDM Troubleshooting Guide*
- *Cisco MetroPlanner DWDM Operations Guide*

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, submitting a service request, and gathering additional information, see the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation, at:

http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html

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