Data Sheet

# L-Band Optical Amplifier Portfolio for the Cisco ONS 15454 Multiservice Transport Platform

**The Cisco® ONS 15454 Multiservice Transport Platform (MSTP) provides a comprehensive, intelligent dense wavelength-division multiplexing (DWDM) solution for expanding metropolitan (metro) and regional bandwidth.**

**Figure 1**
Cisco ONS 15454 L-Band Optical Amplifier (OPT-AMP-L) and Optical Booster Amplifier (OPT-BST-L) Cards

## Product Overview

The Cisco ONS 15454 MSTP offers optical amplifiers operating in the L-band region of the optical spectrum, shown in Figure 1, for extending the reach of a metro or regional network. The optical amplifier cards are part of the Cisco ONS 15454 MSTP intelligent DWDM architecture engineered to reduce DWDM complexity and speed the deployment of next-generation networking solutions.

The Cisco ONS 15454 optical amplifier cards are plug-in modules that take advantage of the proven Cisco ONS 15454 carrier-class features. These cards deliver the reach and optical performance to support a single DWDM channel all the way to 32 channels today (designed for 64-wavelength operation) – to meet the requirements of service provider and enterprise networks. Table 1 outlines the L-band optical amplifier plug-in card types available for the Cisco ONS 15454 MSTP with the applications they are designed to support.

**Table 1.** L-Band Optical Amplifier Cards with Applications

| Component | Deployment Application |
|---|---|
| Optical amplifier (OPT-AMP-L) | This product is a flexible amplifier that can be used as a preamplifier or as a booster amplifier. It integrates an optical service channel splitter/combiner to allow the optical supervisory channel (OSC) to be sent to and received from the optical service channel module (OSCM) card. It employs a two-stage amplifier design to allow insertion of dispersion-management devices to compensate for pulse spreading at higher multiplexer speeds.<br>Deployment locations include any site that requires additional signal level. |
| Optical booster amplifier (OPT-BST-L) | This product amplifies the outgoing composite DWDM signal to overcome the attenuation of the fiber network. It integrates an optical service channel splitter/combiner to allow the OSC to be sent to and received from the OSCM card. Deployment locations include any site that requires additional signal level. |

The Cisco ONS 15454 L-band optical amplifiers take advantage of the latest in amplifier technology, variable optical attenuators, photo diodes, and extensive software to facilitate a high degree of automation for simplified operations. They feature low-noise-gain blocks for L-band optical amplification requirements. For flexibility of application support, the amplifiers support two modes of operation, constant gain and constant power. They also provide fast-transient suppression to respond quickly to network changes without adding impairments and degradation. Each card integrates software-controllable variable optical attenuators (VOAs) along with extensive optical monitoring with photo diodes, to provide node- and network-based automatic power-level management. Extensive optical safety algorithms provide user safety when operating the network.

Flexibility provided by the OPT-AMP-L card and the possibility to configure it through software to operate as a preamplifier or as a booster amplifier greatly simplifies the operation of the Cisco ONS 15454 MSTP and reduces the number of spare units to be kept by the users. Midstage access loss (MAL) provided by the L-band optical amplifier can be used, when the card is used as a booster amplifier, to perform chromatic dispersion precompensation at the transmit location, improving overall system performances – especially with high (that is, 10 Gbps) and very high (that is, 40 Gbps) bit rates and services.

The optical amplifier cards incorporate faceplate-mounted LEDs to provide a quick visual check of the operational status at the card. Printed on each of the faceplates is an icon, an orange circle, which is mapped to shelf-slot icons indicating the shelf slot where the card can be physically installed. The cards are supported by the integrated Cisco ONS 15454 Cisco Transport Controller craft manager, which provides the user access for operations, administration, maintenance, and provisioning (OAM&P) for the system.

Selection and deployment of the L-band optical amplifiers depends on the requirements of the network. The Cisco MetroPlanner optical design tool is available to assist in the engineering, bill-of-material development, and deployment of the DWDM network. Figure 2 shows a sample signal-flow diagram for an L-band Cisco ONS 15454 MSTP Reconfigurable Add/Drop Multiplexing (ROADM) node type, outlining the use for each amplifier type. Figure 3 shows a sample signal-flow diagram for an L-band Cisco ONS 15454 MSTP Terminal Site (TS) node type.

**Figure 2**
MSTP L Band ROADM Node

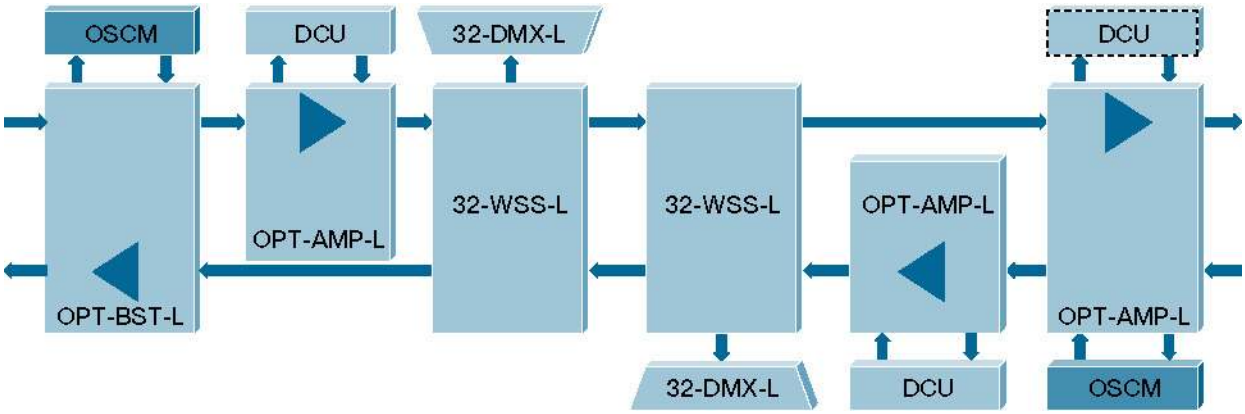
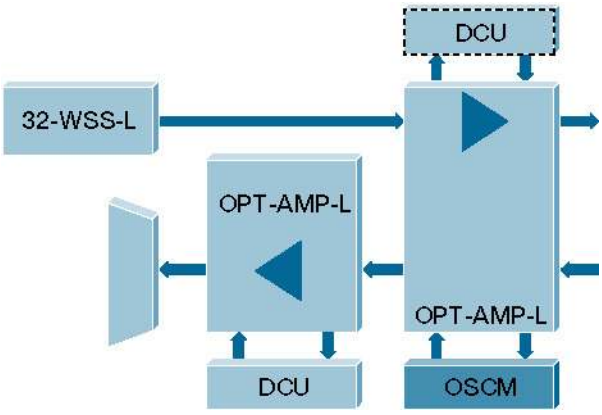



**Figure 3**
MSTP L-Band Terminal Site Node



## Cisco ONS 15454 L-Band Optical Amplifiers Specifications

Tables 2 through 5 give specifications of the Cisco ONS 15454 optical amplifiers. Figures 4 and 5 give the functional diagrams for the Cisco ONS 15454 L-band optical amplifiers.

**Table 2.** Regulatory Compliance[1]

| ANSI System | ETSI System |
|---|---|
| **Countries** | |
| • Canada<br>• United States<br>• Mexico<br>• Korea<br>• Japan<br>• European Union | • European Union<br>• Australia<br>• New Zealand<br>• Singapore<br>• China<br>• Mexico<br>• Hong Kong<br>• Korea |
| **EMC Emissions (radiated, conducted)** | |
| • ICES-003<br>• GR-1089-CORE<br>• 47CFR15<br>• VCCI V-3/2000.04<br>• CISPR24 | • EN 300 386-TC<br>• EN50081-1<br>• EN55022<br>• AS/NZS3548, Amendment 1 + 2 1995 |
| **EMC Immunity** | |
| • GR-1089-CORE<br>• CISPR24<br>• EN50082-2 | • EN300-386-TC<br>• EN55024 |
| **Safety** | |
| • CAN/CSA-C22.2 No. 60950-00 Third Ed., 12/1/2002<br>• GR-1089-CORE<br>• GR-63-CORE<br>• TS001 | • UL 60950 Third Ed., 12/1/2000<br>• EN60950 (to A4)<br>• IEC60950/EN60950, Third Ed.<br>• AS/NZS3260 Supplement 1, 2, 3, 4, 1997 |
| **Environmental** | |
| • GR-63-CORE<br>• AT&T Network Equipment Design Specifications (NEDS) | • ETS 300-019 (Class 3.1E) (Note 2) |
| **Structural Dynamics** | |
| • GR-63-CORE<br>• AT&T NEDS | • ETS 300-019 (Class 3.1E) (Note 2) |
| **Power and Grounding** | |
| • SBC (TP76200MP)<br>• ETS 300-132-1 (DC power) | • ETS 300-253 (grounding) |

[1] All compliance testing and documentation may not be completed at release of the product. Check with your sales representative for countries outside of Canada, the United States, and the European Union.

| ANSI System | ETSI System |
|---|---|
| **Optical** | |
| • GR-253-CORE<br>• G.692 | |
| **Quality** | |
| • TR-NWT-000332, Issue 4, Method 1 calculation for 20-year mean time between failure (MTBF) | |

**Table 3.** System Requirements

| Component | Cisco ONS 15454 SONET/ANSI | Cisco ONS 15454 SDH/ETSI |
|---|---|---|
| **Processor** | TCC2P/TCC2 | TCC2P/TCC2 |
| **Cross-connect** | All (not required) | All (not required) |
| **Shelf assembly** | 15454-SA-HD or 15454-SA-HD-DDR shelf assembly with FTA3 version fan-tray assembly | 15454-SA-ETSI shelf assembly with SDH 48V fan-tray assembly |
| **System software** | Release 7.0.0 ANSI or greater | Release 7.0.0 ETSI or greater |

**Table 4.** Common L-Band Optical Amplifiers Specifications

| Specification | OPT-AMP-L | OPT-BST-L |
|---|---|---|
| **Management** | | |
| Card LEDs<br>Failure (FAIL)<br>Active/standby (ACT/STBY)<br>Signal fail (SF) | <br>Red<br>Green/yellow<br>Yellow | <br>Red<br>Green/yellow<br>Yellow |
| **Operating Environment** | | |
| Temperature | –5 to 55°C<br>23 to 131°F | –5 to 55°C<br>23 to 131°F |
| Humidity | 5 to 95% relative humidity | 5 to 95% relative humidity |
| **Storage environment** | | |
| Temperature | –40 to 185°F<br>–40 to 85°C | –40 to 185°F<br>–40 to 85°C |
| Humidity | 5 to 95% relative humidity | 5 to 95% relative humidity |

**Figure 4**
Functional Diagram of L-Band Optical Amplifier (OPT-AMP-L)

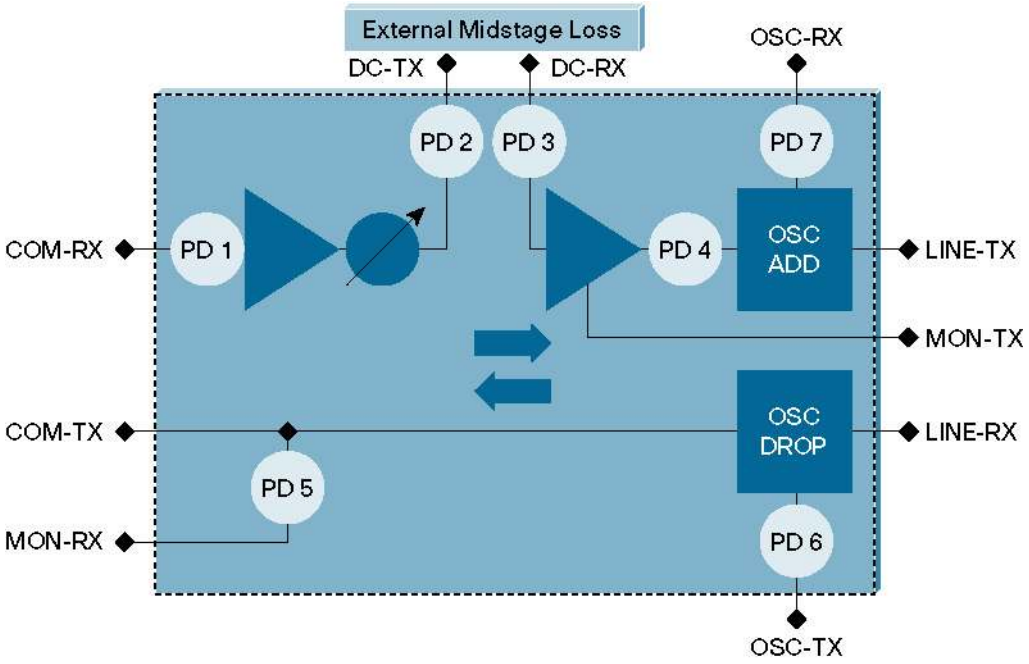



**Figure 5**
Functional Diagram of L-Band Booster Amplifier (OPT-BST-L)

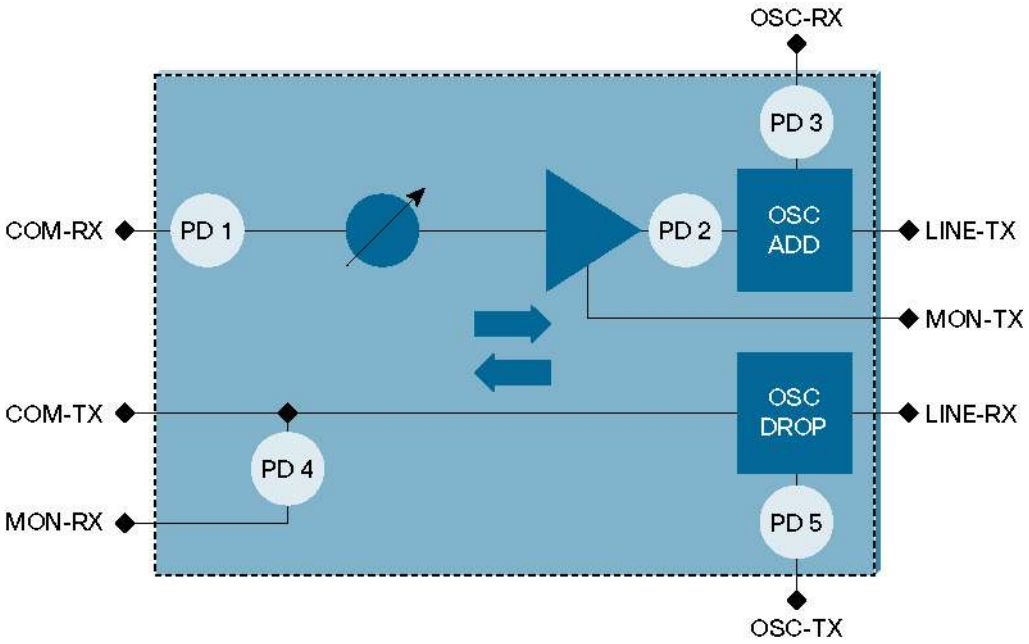


**Table 5.** Specifications for L-Band Optical Amplifiers

| Specification | OPT-AMP-L | OPT-BST-L |
|---|---|---|
| **Optical Parameters** | | |
| Operating wavelength range | 1570.0 to 1605.0 nm | 1570.0 to 1605.0 nm |
| Input power range | –15 to 8 dBm (full channel load)<br>–40 to –17 dBm (single channel) | –10 to 9 dBm (full channel load)<br>–37 to 18 dBm (single channel) |
| Maximum total output power | 21 dBm | 17.5 dBm |
| Output power set resolution | 0.1 dB | 0.1 dB |
| Standard gain range (0 dB gain tilt) | 12 to 24 dB | 8 to 20 dB |
| Extended gain range | 24 to 35 dB | 20 to 27 dB |
| Maximum gain ripple (peak to valley) | 1.5 dB | 1.5 dB |
| Gain set resolution | 0.1 dB | 0.1 dB |
| Midstage access loss range | 0 to 12 dB | – |
| **Connectors** | | |
| Composite ports | LC | LC |
| OSC ports | LC | LC |
| **Power** | | |
| Card power draw<br>Typical<br>Maximum | <br>45W<br>55W | <br>40W<br>50W |
| **Physical** | | |
| Size | 2 slots | 1 slot |
| Supported shelf slots | 1–6, 12–17 | 1–6, 12–17 |

## Ordering Information

Tables 6 gives ordering information for the Cisco ONS 15454 L-Band Optical Amplifier cards.

**Table 6.** System Ordering Information

| Part Number | Description |
|---|---|
| **15454-OPT-AMP-L=** | Optical amplifier; can be configured as preamplifier or booster; L-band, 64 channels, 50-GHz compatible, LC connectors, midstage access; includes one 4-dB LC/LC attenuated loopback (to be used if Dispersion Compensation Units [DCU] are not required) and two 2-meter LC/LC fiber-optic cables |
| **15454-OPT-BST-L=** | Optical booster amplifier, L-band, 64 channels, 50-GHz compatible, LC connectors; includes two 2-meter LC/LC fiber-optic cables |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