DATA SHEET

ENHANCED OPTICAL BOOSTER AMPLIFIER 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.

PRODUCT OVERVIEW

The Cisco ONS 15454 MSTP offers enhanced optical booster amplifiers for extending the reach of a metro or regional network. The enhanced 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 enhanced optical amplifier cards (Figure 1) are plug-in modules that take advantage of 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 64 channels today—to meet the requirements of service provider and enterprise networks. Table 1 outlines the optical amplifier plug-in card types available for the Cisco ONS 15454 MSTP with the applications they are designed to support.

Figure 1
Cisco ONS 15454 Enhanced Optical Booster Amplifier

Table 1. Optical Amplifier Cards with Applications

Component	Deployment Application
Enhanced optical booster amplifier (OPT-BST-E)	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 optical supervisory channel (OSC) to be sent to and received from the optical service channel module (OSCM) card.
Optical booster amplifier (OPT-BST)	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.
Optical preamplifier (OPT-PRE)	This product amplifies the incoming composite DWDM signal to allow a sufficient optical power level to optical receivers on dropped wavelengths and to overcome the insertion losses of optical filters in the node. It employs a two-stage amplifier design to allow insertion of dispersion-management devices to compensate for pulse spreading at higher multiplexer speeds. Deployment locations include any site that requires additional signal level.

The Cisco ONS 15454 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 C-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 nodal- and network-based automatic power-level management. Extensive optical safety algorithms provide user safety when operating the network.

The enhanced booster 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 corresponds to shelf-slot icons located on the shelf assembly, indicating the shelf slot where the cards can be inserted. The cards are supported by the integrated 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 optical amplifiers depend 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. Figures 2 through 4 show sample signal-flow diagrams for a selection of Cisco ONS 15454 MSTP node types, outlining the use for each amplifier type.

Figure 2
32 Channel ROADM Node

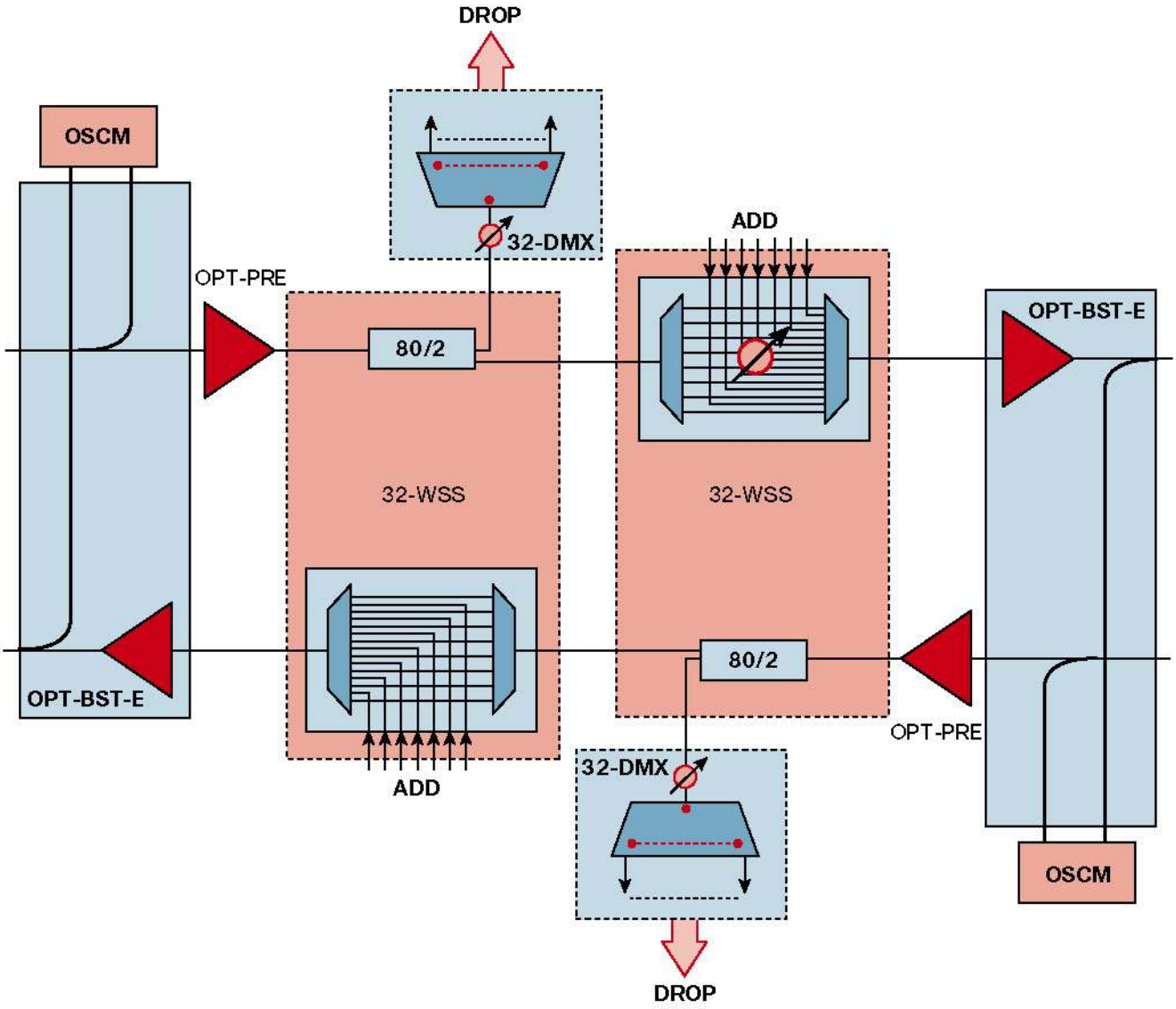


Figure 3

64 Channel ROADM Node

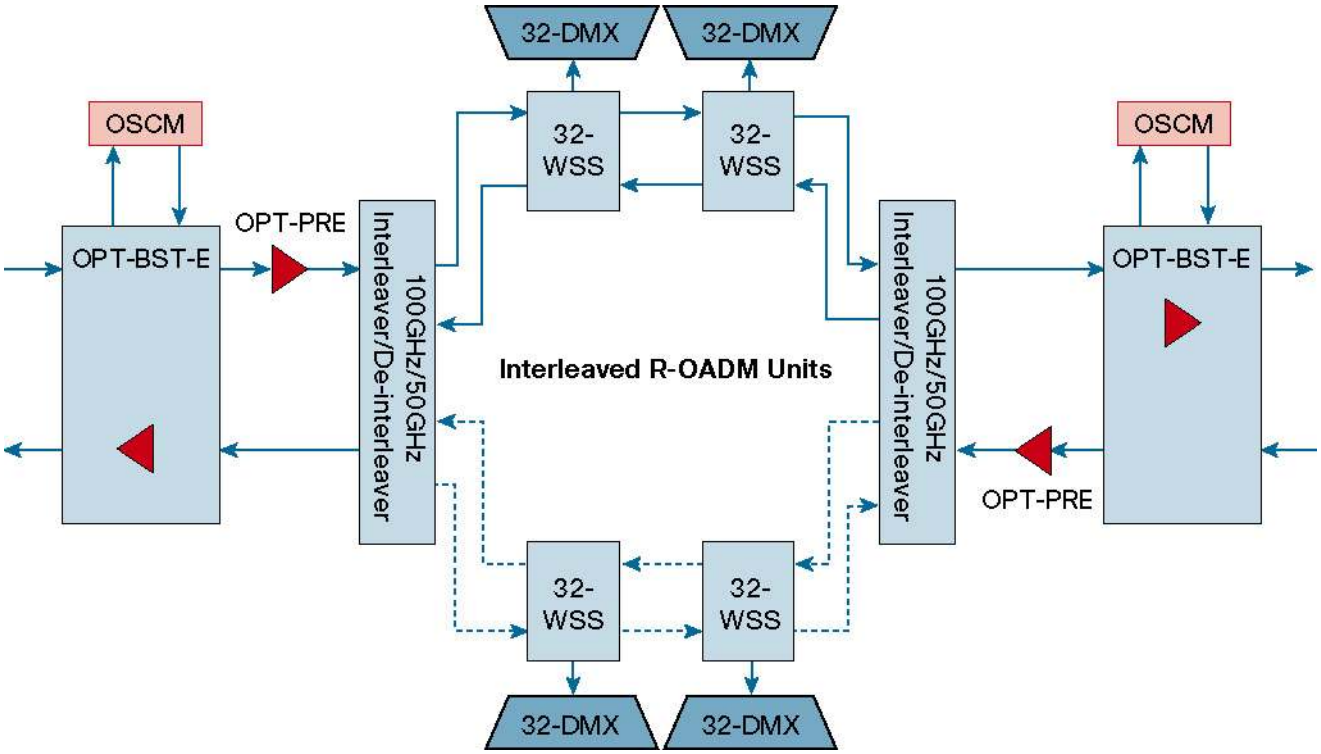
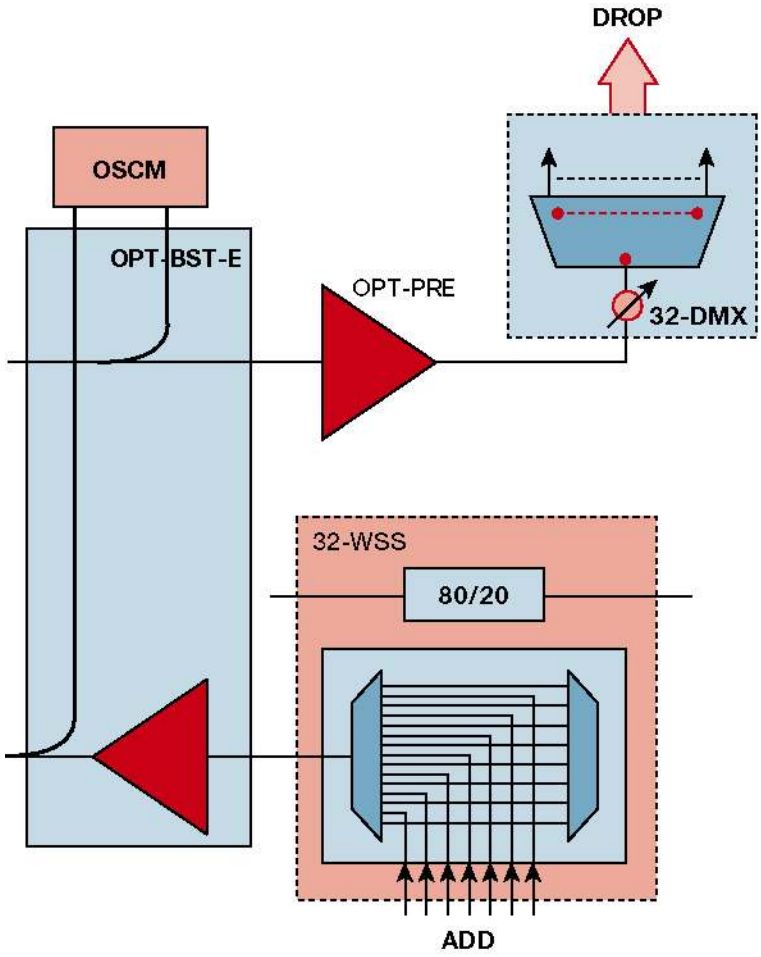


Figure 4
Terminal Node



CISCO ONS 15454 ENHANCED BOOSTER AMPLIFIER

Tables 2 through 7 give specifications for the Cisco ONS 15454 enhanced booster amplifier. Figure 5 provides the functional diagrams for the Cisco ONS 15454 enhanced booster amplifier.

Table 2. Regulatory Compliance[1]

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

SONET/ANSI System	SDH/ETSI System
Optical	
• GR-253-CORE • 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	TCC2 or TCC2P	TCC2 or TCC2P
Cross-connect	All (not required)	All (not required)
Shelf assembly	15454-SA-ANSI or 15454-SA-HD shelf assembly with FTA3 version fan-tray assembly	15454-SA-ETSI shelf assembly with SDH 48V fan-tray assembly
System software	Release 5.0.2 SONET or later	Release 5.0.2 SDH or later

Table 4. Common Amplifier Specifications

Specification	Enhanced Amplifier
Management	
Card LEDs	
Failure (FAIL)	Red
Signal fail (SF)	Yellow
Operating environment	
Temperature	23 to 131°F (–5 to 55°C)
Humidity	5 to 95% noncondensing
Storage environment	
Temperature	–40 to 185°F (–40 to 85°C)
Humidity	5 to 95% noncondensing

Figure 5
Functional Diagrams for Cisco ONS 15454 Enhanced Optical Booster Amplifier

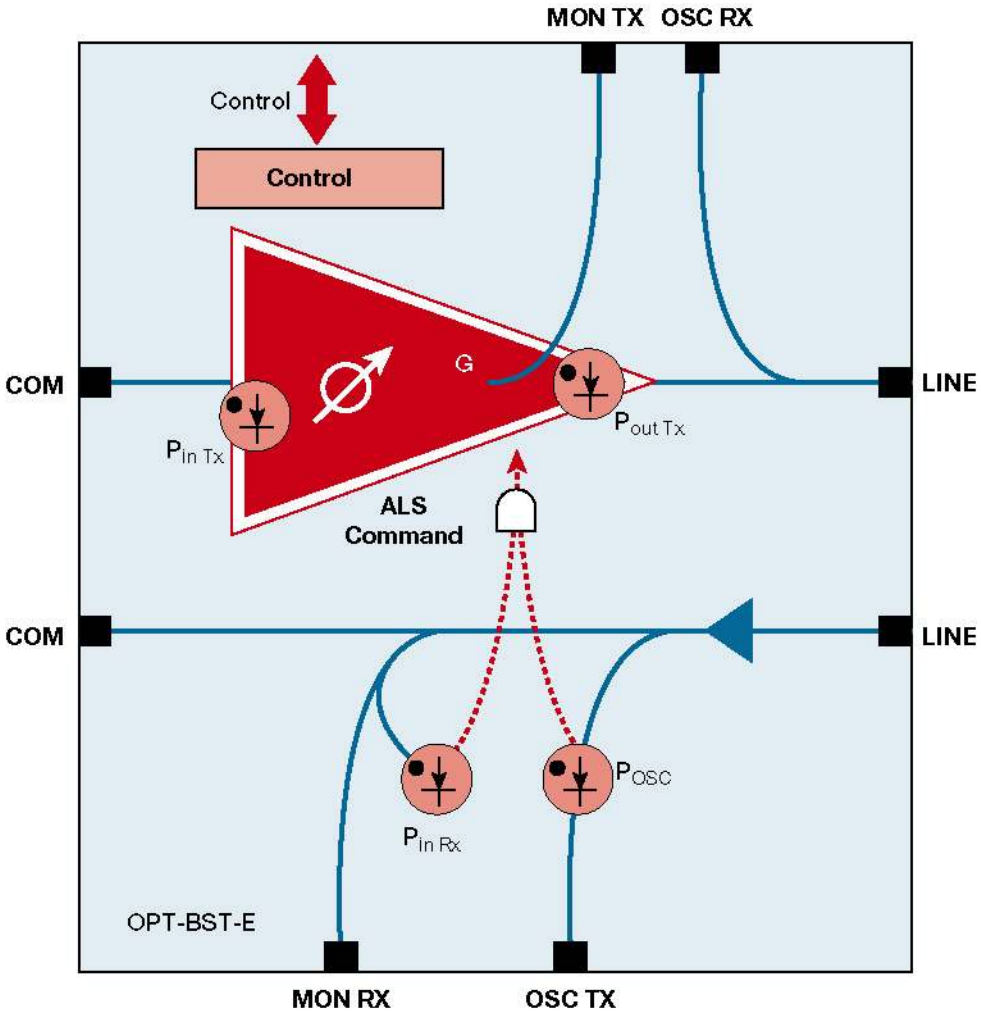


Table 5. Cisco ONS 15454 Optical Booster Amplifier Specifications

Specification	Enhanced Amplifier
Optical parameters	
Input power range (P_{in})	
Full-channel loading	–6 to 12 dBm
1-channel loading	–26 to –8 dBm
Output power (P_{out} maximum)	20.5 dBm
Gain range	
Standard (with tilt control)	8 to 23 dB
Extended (without tilt control)	23 to 26 dB
Gain ripple (peak to valley)	1.8 dB

Specification	Enhanced Amplifier
Gain and power regulation	
Over-/under-shoot	0.5 dB
Noise figure (at gain ≥ 23 dB)	5.5 dB
Transient suppression	Refer to Table 6
OSC filter type	Interferential
OSC filter insertion loss	
Drop OSC (maximum)	1.8 dB
Add OSC (maximum)	1.3 dB
OSC filter passband	1500 to 1522 nm
Connectors	
Input/output ports	LC
Monitor ports	LC
Power	
Card power draw	
Typical	30W
Maximum	40W
Physical	
Size	1 slot
Supported shelf slots	1–6, 12–17

Table 6. Cisco ONS 15454 Enhanced Booster Amplifier Transient Suppression Specifications

Input Power Excursion	Undershoot and Overshoot (maximum)	Settling Time (maximum)	Gain Error
15 dB	3.5 dB	500 µs	0.5 dB
6 dB	0.5 dB	100 µs	0.5 dB
3 dB	0.5 dB	100 µs	0.5 dB

ORDERING INFORMATION

Table 7 gives ordering information for the Cisco ONS 15454 enhanced optical booster amplifier.

Table 7. Ordering Information

Part Number	Description
15454-OPT-BST-E=	Enhanced optical booster amplifier, C-band, 64-channel, 50-GHz compatible, LC connector

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