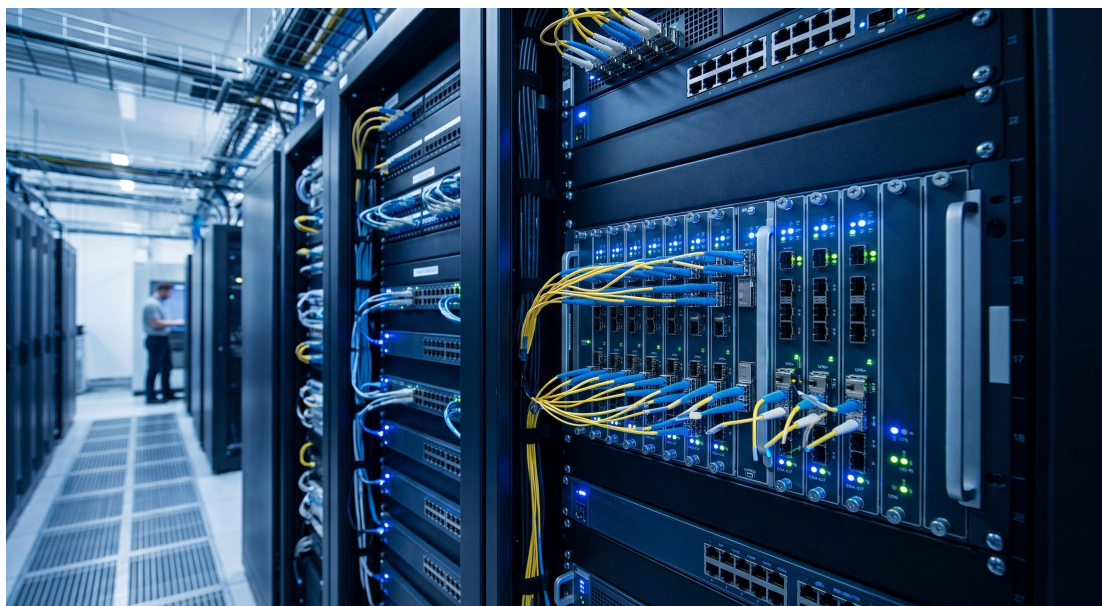


PON Optical Module (OLT/ONT SFP) - Official Technical Overview & Hardware

Datasheet

EXECUTIVE SUMMARY

This document serves as the definitive technical reference for the next-generation PON Optical Module series, encompassing both Optical Line Terminal (OLT) and Optical Network Terminal (ONT) Small Form-factor Pluggable (SFP) transceivers. Designed to meet the rigorous demands of modern fiber-to-the-x (FTTx) access networks, this product family delivers industry-leading performance, power efficiency, and interoperability. By integrating advanced digital diagnostics and a robust mechanical design, these modules enable service providers to offer gigabit-speed broadband, video, and voice services with unparalleled reliability. This datasheet provides a comprehensive overview of the hardware architecture, key features, technical specifications, compliance standards, and ordering information necessary for network architects, procurement specialists, and deployment engineers.



ARCHITECTURE & CHASSIS DESIGN

The PON Optical Module series is engineered around a highly integrated, low-power optical sub-assembly (OSA) and a sophisticated burst-mode laser driver and limiting amplifier. The architecture is fundamentally divided into two primary variants to serve distinct network roles. The OLT SFP module is optimized for the central office or headend, featuring a high-power, cooled 1490nm DFB laser for downstream transmission and a high-sensitivity 1310nm APD/TIA receiver for upstream burst-mode traffic. Conversely, the ONT SFP module is designed for the subscriber premise, utilizing a low-power 1310nm Fabry-Perot (FP) or DFB laser for upstream bursts and a 1490nm continuous-mode PIN/TIA receiver for downstream data. Both variants share a common, compact SFP footprint that adheres to the Multi-Source Agreement (MSA), ensuring seamless integration into a wide array of host networking

equipment.

The chassis design of the module prioritizes thermal management and electromagnetic interference (EMI) shielding. The housing is constructed from a zinc-alloy die-cast frame, providing excellent thermal conductivity to dissipate heat generated by the laser driver and control ICs. An integrated EMI finger-stock on the outer shell ensures a low-impedance ground path when inserted into a host port, mitigating signal integrity issues and meeting stringent FCC and CE emission requirements. The optical receptacle is a standard SC/UPC or SC/APC connector, providing a robust physical interface for the fiber optic cable. Internal layout is meticulously organized to separate sensitive analog and high-speed digital sections, minimizing crosstalk and ensuring optimal signal-to-noise ratios (SNR) for error-free transmission over distances up to 20 kilometers.

HARDWARE FEATURES

The PON Optical Module series is equipped with a comprehensive set of hardware features that elevate network performance and operational efficiency. Central to its functionality is the integrated Digital Diagnostic Monitoring (DDM) interface, which provides real-time access to critical operating parameters via the I2C bus. This includes monitoring of temperature, supply voltage, bias

current, transmit optical power, and receive optical power. This granular insight enables proactive network management, allowing operators to detect potential fiber degradation or hardware faults before they impact service quality. The modules also support a robust set of industry-standard alarms and warnings to flag out-of-specification conditions.

For OLT applications, the module incorporates a high-performance burst-mode receiver that can recover data from widely varying input power levels, a crucial requirement for handling upstream traffic from multiple ONTs at varying distances. The transmit section features an automatic power control (APC) loop to maintain a constant optical output power over temperature and lifetime. For ONT applications, the emphasis is on power conservation and low-cost, high-volume manufacturing, featuring a simplified control interface and efficient burst-mode turn-on/off characteristics. All modules include a built-in Tx Disable pin and Rx LOS (Loss of Signal) indication, providing host system control and status reporting for robust fault management and link protection mechanisms.

COMPLIANCE & STANDARDS

This product family is designed and rigorously tested to comply with the foremost international standards for optical networking, ensuring

interoperability and carrier-grade reliability. The modules fully conform to the ITU-T G.984 series (GPON) and G.987 series (XG-PON) standards, making them suitable for a wide range of global access network deployments. Additionally, the modules adhere to the IEEE 802.3ah and 802.3av standards for Ethernet in the First Mile (EFM) and 10G-EPON, respectively. Compliance with the SFF-8472 standard ensures that the DDM functionality is universally accessible and interpretable by standard network management systems.

From a safety and regulatory standpoint, the modules are Class 1 Laser Products, certified under IEC 60825-1 and FDA 21 CFR 1040.10. They are designed to meet the environmental requirements of RoHS (Restriction of Hazardous Substances) and REACH regulations, supporting global sustainability initiatives. Electromagnetic compatibility is guaranteed by rigorous testing to FCC Part 15 and CISPR 22/EN 55022 Class B standards. The modules are also designed to meet the Telcordia GR-468-CORE reliability and qualification requirements, with a calculated MTBF exceeding 1 million hours, demonstrating exceptional long-term stability and field-proven durability.

TECHNICAL SPECIFICATIONS

Parameter	Specification
Form Factor	SFP / SFP+ (MSA Compliant)

Data Rate (Downstream)	2.488 Gbps (GPON) / 9.953 Gbps (XG-PON)
Data Rate (Upstream)	1.244 Gbps (GPON) / 2.488 Gbps (XG-PON)
Wavelength (Tx)	1490 nm (DFB Laser) for OLT / 1310 nm (FP/DFB) for ONT
Wavelength (Rx)	1310 nm for OLT / 1490 nm for ONT
Output Power (OLT)	+3 to +7 dBm (2.5G) / +3 to +6 dBm (10G)
Receiver Sensitivity (OLT)	-28 dBm (GPON) / -30 dBm (XG-PON)
Optical Connector	SC/UPC or SC/APC
Operating Temperature	0 to 70°C (Commercial) / -40 to 85°C (Industrial)
Power Supply Voltage	3.3V $\pm$ 5%
Power Consumption	< 1.5W (OLT) / < 1.0W (ONT)
Digital Diagnostics	SFF-8472 Compliant with DDM

ORDERING OPTIONS

The PON Optical Module series offers a diverse set of ordering options to cater to varying network requirements and deployment scenarios. The product code

structure is built to encode key parameters, allowing for precise selection. The base part number follows the convention: [XXX]-[PON-TYPE]-[SPEED]-[DISTANCE]-[TEMP]-[CONNECTOR]. For example, part number 'TEL-OLT-24GPON-20-IND-SC/APC' denotes an OLT module for 2.5G GPON, capable of 20km reach, operating in an industrial temperature range, with an SC/APC connector.

Customers can choose between OLT and ONT variants, as well as select for GPON, XG-PON, or 10G-EPON protocols. The reach options typically include 10km, 20km, and 40km, with corresponding optical power budgets. Temperature range options are C-Temp (0°C to 70°C) for standard commercial deployments, and I-Temp (-40°C to 85°C) for extended and rugged outdoor environments. The connector interface is available in both SC/UPC (for standard single-mode fiber) and SC/APC (for angled physical contact to reduce back reflection, essential for high-bandwidth analog video transmission). For large-scale deployments, we offer factory-packaged trays of 10 or 20 modules, providing significant cost and inventory management advantages. Custom firmware and MIB (Management Information Base) options are also available for Original Equipment Manufacturers (OEMs) upon request.

