

Passive Optical Network Splitter Platform Specification & Architectural Whitepaper

PASSIVE OPTICAL NETWORK SPLITTER - PLATFORM SPECIFICATION & ARCHITECTURAL WHITEPAPER

EXECUTIVE SUMMARY

This document serves as the definitive technical reference for the Passive Optical Network (PON) Splitter portfolio, encompassing a comprehensive range of planar lightwave circuit (PLC) and fused biconical taper (FBT) splitting devices engineered for carrier-grade Fiber-to-the-Home (FTTH), Fiber-to-the-Building (FTTB), and next-generation xGS-PON infrastructure deployments. Designed to operate as the fundamental optical distribution node within the outside plant (OSP) and central office (CO) environments, these splitters deliver precise, low-loss optical signal partitioning across 1xN and 2xN configurations. This whitepaper details the architectural principles, optical performance metrics, environmental hardening, and compliance standards that position our PON splitters as the critical passive infrastructure element enabling high-density, scalable, and cost-efficient Passive Optical Networks.



ARCHITECTURE & CHASSIS DESIGN

The Passive Optical Network Splitter architecture is predicated on the principle of optical power division without the requirement for active electronics, ensuring unparalleled reliability and operational simplicity. The portfolio is available in two primary optical circuit topologies: Fused Biconical Taper (FBT) for low-port-count applications (up to 1x8) where cost-optimization is paramount, and Planar Lightwave Circuit (PLC) technology for high-port-count (1x16, 1x32, 1x64, and 2x32) applications demanding precise splitting ratios, broad wavelength transparency (1260nm to 1650nm), and superior uniformity across all output ports. The PLC splitters are fabricated on a silica-on-silicon substrate, utilizing advanced photolithographic processes to create a Y-branch waveguide network that guarantees low insertion loss, low polarization-dependent loss (PDL), and high return loss. A key architectural

advantage of the PLC design is its inherent wavelength independence, making it agnostic to Time-Division Multiplexing (TDM) and Wavelength-Division Multiplexing (WDM) transmission schemes, including RF-video overlay, thereby future-proofing the network for NG-PON2 and 25G-PON upgrades.

HARDWARE FEATURES AND PACKAGING OPTIONS

To accommodate the diverse physical constraints of network deployment, the splitter is offered in a comprehensive suite of mechanical form factors. For central office and headend environments, the 19-inch standard rack-mount chassis configurations are available, supporting 1RU and 2RU heights with capacity for up to 72 splitter modules or 144 individual splits in a high-density configuration. These chassis feature a modular, front-access design with slide-in cassette trays, facilitating rapid replacement and field upgrades without disturbing adjacent fibers. Each cassette is equipped with industry-standard adapters (SC/APC or LC/UPC) and integrated bend-radius protection to mitigate macro-bending losses. For outside plant deployments, our environmentally hardened enclosures offer IP68-rated protection against moisture, dust, and extreme temperature fluctuations. These ruggedized units, designed for pole-mount, strand-mount, or below-ground vault installations, incorporate hermetically sealed splice trays and robust mechanical strain-relief mechanisms. The splitter components themselves are constructed with Corning

SMF-28e+ compatible fiber and feature a passivation layer for enhanced durability against harsh chemical and UV exposure, ensuring a service life exceeding 25 years under adverse field conditions.

TECHNICAL SPECIFICATIONS

Optical performance specifications are verified via a rigorous characterization process utilizing a 1550nm laser source and a precision optical power meter. The maximum insertion loss is a critical metric, representing the total optical power loss from the input to each output port, excluding the theoretical splitting loss. For a 1x32 PLC splitter, the maximum insertion loss is guaranteed to not exceed 16.8 dB, which includes all connector, fiber, and internal waveguide losses, with a typical loss of 16.2 dB. Uniformity, defined as the maximum power variation across all output ports, is maintained within a tight tolerance of ± 1.0 dB for all PLC variants. The polarization-dependent loss (PDL) is strictly limited to ≤ 0.3 dB, ensuring consistent performance regardless of the input signal's polarization state. Return loss (RL), a measure of reflected optical power back towards the source, is maintained at ≥ 50 dB for APC connectors and ≥ 45 dB for UPC connectors, minimizing signal degradation from back-reflections and ensuring optimal transmitter performance. The operating wavelength range spans the entire optical transmission window from 1260 nm to 1650 nm, covering the O-, E-, S-, C-, and L-bands, with a directivity of ≥ 55 dB,

ensuring that signal crosstalk between output ports is effectively suppressed. Environmental specifications are equally robust, with the device capable of operating within a temperature range of -40 ° C to +85 ° C and storage temperatures from -40 ° C to +85 ° C, under relative humidity of up to 95% (non-condensing), conforming to GR-1209-CORE and GR-1221-CORE industry reliability standards.

Parameter	Specification
Split Ratio (PLC)	1x2, 1x4, 1x8, 1x16, 1x32, 1x64, 2x16, 2x32
Operating Wavelength	1260 nm to 1650 nm (O, E, S, C, L Bands)
Insertion Loss (1x32, Max)	≤16.8 dB (Typical 16.2 dB)
Uniformity (1x32, Max)	≤1.0 dB
Return Loss (APC Connector)	≥55 dB (Typical 60 dB)
Polarization Dependent Loss (PDL)	≤0.3 dB
Directivity	≥55 dB
Package Options	Rack-Mount (1RU/2RU), IP68 Outside Plant Enclosure, Miniature Module
Operating Temperature	-40°C to +85°C
Fiber Type	G.657A1 / G.652D Compliant

ORDERING OPTIONS AND SKU STRUCTURE

The product ordering matrix is structured to provide maximum flexibility in network design, simplifying procurement and logistics. Base SKUs are differentiated by split ratio, connector type, and packaging form factor. For rack-mount deployments, the primary configuration code follows the nomenclature SPL-PLC-1xN-Cxx-RM, where 'N' denotes the split count (16, 32, 64), and 'xx' represents the fiber connector terminus (SC/APC, LC/UPC). For outside plant applications, the ruggedized variants are designated SPL-PLC-1xN-Cxx-RG, with added options for pre-connectorized input and output pigtails of specified lengths (e.g., 1m, 2m, 5m) or splice-on connectors for fusion splicing. Additionally, the system supports a high-density, unloaded chassis offering for customers requiring custom module configurations, allowing for a blend of different split ratios within a single chassis to optimize fiber utilization in point-to-multipoint architectures. To facilitate project-specific demands, our engineering team offers custom splitting ratios, including unequal split configurations and customized fiber color-coding, to align with the operator's infrastructure standards. All products ship with comprehensive test reports, including insertion loss, return loss, and PDL measurements, ensuring full traceability and quality assurance from factory to field.

