ZITHA TECH SPECIALTY CABLES (Pty) Ltd

Quantum Communication-Grade GPON Equipment DML Selection Guide



Overview

Choose DML (Internal Modulated) if your project is a short-to-medium haul (≤30km) CATV or FTTH upgrade.

Key Takeaways

Selecting DML-equipped GPON OLTs for quantum communication requires balancing classical PON performance with QKD integration, ensuring wavelength separation, carrier-grade power, and low noise.Key Considerations for DML Selection



© 2026 ZITHA TECH SPECIALTY CABLES (Pty) Ltd - All rights reserved

1. Compatibility with GPON/XGS-PON Standards Choose DML drivers that support GPON (2.5 Gbps), XG-PON (10 Gbps), and XGS-PON (10 Gbps symmetric) to ensure smooth coexistence with existing fiber networks and future upgrades . Multi-rate DMLs allow operators to maintain classical broadband services while integrating quantum channels. 2. Wavelength Allocation for Quantum Channels Quantum key distribution (QKD) typically uses the O-band (~1310 nm), while classical GPON data occupies the C-band (~1490 nm downstream, 1310 nm upstream). DMLs must provide stable output power and low spectral broadening to minimize Spontaneous Raman Scattering (SpRS) noise that can degrade QKD performance . 3. Power and Extinction Ratio Control Carrier-grade DMLs, such as the GN25L99, offer dual-loop extinction ratio control and eye-shaping, ensuring reliable burst-mode operation for GPON OLTs . High launch power (up to 9.2 dBm tested in QKD-integrated PONs) is feasible, but careful attenuation may be required to protect quantum channels . 4. Integration with Coherent Receivers For quantum communication-grade networks, DMLs should be compatible with coherent detection systems for classical data, allowing QKD channels to coexist without significant BER penalties. Coherent receivers improve sensitivity, enabling higher DS launch powers while maintaining QKD integrity . 5. Multi-PON and Future-Proofing Select DMLs that support multi-PON configurations (GPON/XGS-PON/25G/50G) to allow flexible deployment scenarios, including enterprise-grade post-quantum networks . This ensures scalability and cost-efficient upgrades without replacing the entire OLT line card. 6. Diagnostics and Monitoring High-accuracy ADCs in DML drivers provide real-time monitoring of optical power, temperature, and extinction ratio, which is critical for maintaining both classical and quantum channel performance .

Practical Deployment Tips

• Use coarse WDM (CWDM) multiplexers to separate QKD and classical channels.

• Attenuate upstream classical signals if using single-feeder fibers to reduce backscattering noise.

• Deploy single-photon detectors (SPDs) at the OLT to share among multiple ONUs, reducing cost and complexity.

• Test BER performance of classical channels at carrier-grade power levels to ensure negligible impact on QKD .

Summary

For quantum communication-grade GPON networks, the ideal DML selection balances high-speed GPON/XGS-PON performance, precise power control, low noise, and wavelength stability to support QKD integration. Multi-rate, multi-PON DMLs with robust diagnostics and compatibility with coherent receivers provide a future-proof solution for secure, carrier-grade fiber access networks .

© 2026 ZITHA TECH SPECIALTY CABLES (Pty) Ltd - All rights reserved

Article Content

DML Selection Guide for Vehicle-Mounted Fiber Optic EPON

Choose DML (Internal Modulated) if your project is a short-to-medium haul (≤30km) CATV or FTTH upgrade. It is highly cost-effective

Coexistence Elements Solutions Guide

Leveraging investments in GPON services continues to have value for most residential subscribers. However, when using the same

Understand GPON Technology

This document describes the Gigabit Passive Optical Network (GPON) technology and how it functions.

Q1000K SmartNID user guide

The Quantum Fiber Q1000K SmartNID combines the modem and fiber network terminal into one device for

Optical line terminals

Our SDX 6000 Series of software-defined optical line terminals (OLTs) consists of open and disaggregated access devices that

GPON OLT Combined DML Laser Driver | Semtech

GN25L99 is a combined a 2.5Gbps DML Driver and 1.25Gbps burst mode limiting amplifier for gigabit passive optical network

GPON OLT & XGS-PON: OLT ONT Equipment Selection Guide

Compare GPON, XG-PON, and XGS-PON to plan future-ready fiber access with higher bandwidth, lower latency, and better

©2024 Q Fiber, LLC. All Rights Reserved. Quantum, Quantum

The Q1000K is a high performance 10G/1G XGSPON/GPON fiber SmartNID with a two-port LAN switch. One LAN port provides 10

GPON hardware: your questions answered

How does GPON work? Here''s an infographic of GPON technology at work: single line of into a splitter. The splitter contains glass

Relay Protection Grade GPON Equipment DML Selection Guide

© 2026 ZITHA TECH SPECIALTY CABLES (Pty) Ltd - All rights reserved

SELECTION GUIDE From high frequency relays for antenna switching to power control relays for end-user equipment, TE"s relay

A Comprehensive Guide to GPON and EPON Technologies in PON

Given the distinct protocols and differences in physical and data link layers, GPON and EPON equipment generally

Unlocking the Power of GPON: Your Ultimate Guide to High-Speed

Introduction to GPON GPON, or Gigabit Passive Optical Network, is a fiber-optic communication standard that

Bloomberg Businessweek

Bloomberg Businessweek helps global leaders stay ahead with insights and in-depth analysis on the people, companies, events, and

Deploying GPON Tutorial

Deploying GPON Tutorial Joseph P. Brenkosh Jimmie V. Wolf Sandia National Laboratories is a multi-program laboratory managed

Understanding GPON ONU: A Comprehensive Guide – VCELINK

GPON ONU is a terminal device that converts optical signals into electrical signals, providing high-speed broadband

O-band QKD link over a multiple ONT loaded carrier-grade GPON for

We have successfully demonstrated the integration of a commercial O-band Quantum Key Distribution (QKD) system

What is GPON and How Does it Work?

GPON (Gigabit Passive Optical Network) is a next-generation PON standard used to deliver broadband access to homes and

GPON Technology Tutorial

The advantages of GPON, such as multi-services with QoS guarantees and strong OAM capabilities, are largely at the

Gigabit Passive Optical Networks (GPON) Fundamentals

GPON is abbreviation for Gigabit Passive Optical Networks which is defined series G.984.1 through G.984.6 by ITU-T

How GPON Works

© 2026 ZITHA TECH SPECIALTY CABLES (Pty) Ltd - All rights reserved

How GPON works explained. GPON network architecture, downstream broadcast and upstream TDMA, wavelength

Gigabit Passive Optical Networks (GPON) | Electronics Tutorial

Gigabit Passive Optical Networks (GPON) employ a point-to-multipoint (P2MP) topology, contrasting with Active Optical Networks

How To Choose The Best GPON Equipment: A Complete Buying Guide

A practical, no-nonsense guide to selecting GPON equipment—covering OLTs, ONUs, splitters, compatibility, certifications, and real

How GPON Works

How GPON works explained. GPON network architecture, downstream broadcast and upstream TDMA, wavelength

Gigabit Passive Optical Networks (GPON) | Electronics Tutorial

Gigabit Passive Optical Networks (GPON) employ a point-to-multipoint (P2MP) topology, contrasting with Active Optical Networks

How To Choose The Best GPON Equipment: A Complete Buying Guide

A practical, no-nonsense guide to selecting GPON equipment—covering OLTs, ONUs, splitters, compatibility, certifications, and real

GPON: What Is It & How Does It Work? Here''s All You

Here''s All You Need To Know GPON stands for Gigabyte Passive Optical Network – a telecommunications

FS Community

We would like to show you a description here but the site won''t allow us.

13-SDMS-11 REV. 00 SPECIFICATIONS FOR GPON ACTIVE

The aim of this document is to give the specifications for the active GPON equipment (OLTs and ONTs) for the deployment of an

Things You Must Know About Connecting to GPON

Connecting to a GPON network requires understanding its technology, selecting suitable equipment, and configuring

GPON Explained: What Is Gigabit Passive Optical Network?

GPON is a cornerstone of modern fiber-optic broadband. It enables Internet Service Provides (ISPs), businesses, and

© 2026 ZITHA TECH SPECIALTY CABLES (Pty) Ltd - All rights reserved

The Ultimate Guide to GPON OLT: Architecture, Backplane

This guide serves as a definitive primer for engineering teams evaluating GPON OLT platforms. We will dissect the

GPON hardware: your questions answered

However, many telecom operators and service providers have questions about GPON hardware, how it works and

Support

In a GPON network, adding a new ONU to an existing GPON system follows a standardized process known as the ONU registration

Unlocking the Potential of GPON OLT: A Comprehensive Guide

Discover the GPON OLT''s capabilities in managing fiber internet services effectively. This guide covers everything

Relay Protection Grade GPON Equipment DML Selection Guide

SELECTION GUIDE From high frequency relays for antenna switching to power control relays for end-user equipment, TE"s relay

A Comprehensive Guide to GPON and EPON Technologies in PON

Given the distinct protocols and differences in physical and data link layers, GPON and EPON equipment generally

Unlocking the Power of GPON: Your Ultimate Guide to High-Speed

Introduction to GPON GPON, or Gigabit Passive Optical Network, is a fiber-optic communication standard that

Bloomberg Businessweek

Bloomberg Businessweek helps global leaders stay ahead with insights and in-depth analysis on the people, companies, events, and

Deploying GPON Tutorial

Deploying GPON Tutorial Joseph P. Brenkosh Jimmie V. Wolf Sandia National Laboratories is a multi-program laboratory managed

Understanding GPON ONU: A Comprehensive Guide – VCELINK

GPON ONU is a terminal device that converts optical signals into electrical signals, providing high-speed broadband

O-band QKD link over a multiple ONT loaded carrier-grade GPON for

© 2026 ZITHA TECH SPECIALTY CABLES (Pty) Ltd - All rights reserved

We have successfully demonstrated the integration of a commercial O-band Quantum Key Distribution (QKD) system

What is GPON and How Does it Work?

GPON (Gigabit Passive Optical Network) is a next-generation PON standard used to deliver broadband access to homes and

GPON Technology Tutorial

The advantages of GPON, such as multi-services with QoS guarantees and strong OAM capabilities, are largely at the

Gigabit Passive Optical Networks (GPON) Fundamentals

GPON is abbreviation for Gigabit Passive Optical Networks which is defined series G.984.1 through G.984.6 by ITU-T

How GPON Works

How GPON works explained. GPON network architecture, downstream broadcast and upstream TDMA, wavelength

Gigabit Passive Optical Networks (GPON) | Electronics Tutorial

Gigabit Passive Optical Networks (GPON) employ a point-to-multipoint (P2MP) topology, contrasting with Active Optical Networks

How To Choose The Best GPON Equipment: A Complete Buying Guide

A practical, no-nonsense guide to selecting GPON equipment—covering OLTs, ONUs, splitters, compatibility, certifications, and real

DML Selection Guide for Vehicle-Mounted Fiber Optic EPON

Choose DML (Internal Modulated) if your project is a short-to-medium haul (≤30km) CATV or FTTH upgrade. It is highly cost-effective

Coexistence Elements Solutions Guide

Leveraging investments in GPON services continues to have value for most residential subscribers. However, when using the same

Understand GPON Technology

This document describes the Gigabit Passive Optical Network (GPON) technology and how it functions.

Q1000K SmartNID user guide

© 2026 ZITHA TECH SPECIALTY CABLES (Pty) Ltd - All rights reserved

The Quantum Fiber Q1000K SmartNID combines the modem and fiber network terminal into one device for

Optical line terminals

Our SDX 6000 Series of software-defined optical line terminals (OLTs) consists of open and disaggregated access devices that

GPON OLT Combined DML Laser Driver | Semtech

GN25L99 is a combined a 2.5Gbps DML Driver and 1.25Gbps burst mode limiting amplifier for gigabit passive optical network

GPON OLT & XGS-PON: OLT ONT Equipment Selection Guide

Compare GPON, XG-PON, and XGS-PON to plan future-ready fiber access with higher bandwidth, lower latency, and better

©2024 Q Fiber, LLC. All Rights Reserved. Quantum, Quantum

The Q1000K is a high performance 10G/1G XGSPON/GPON fiber SmartNID with a two-port LAN switch. One LAN port provides 10

GPON hardware: your questions answered

How does GPON work? Here''s an infographic of GPON technology at work: single line of into a splitter. The splitter contains glass

DML Selection Guide for Vehicle-Mounted Fiber Optic EPON

Choose DML (Internal Modulated) if your project is a short-to-medium haul (≤30km) CATV or FTTH upgrade. It is highly cost-effective

Coexistence Elements Solutions Guide

Leveraging investments in GPON services continues to have value for most residential subscribers. However, when using the same

Understand GPON Technology

This document describes the Gigabit Passive Optical Network (GPON) technology and how it functions.

Q1000K SmartNID user guide

The Quantum Fiber Q1000K SmartNID combines the modem and fiber network terminal into one device for

Optical line terminals

© 2026 ZITHA TECH SPECIALTY CABLES (Pty) Ltd - All rights reserved

Our SDX 6000 Series of software-defined optical line terminals (OLTs) consists of open and disaggregated access devices that

GPON OLT Combined DML Laser Driver | Semtech

GN25L99 is a combined a 2.5Gbps DML Driver and 1.25Gbps burst mode limiting amplifier for gigabit passive optical network

GPON OLT & XGS-PON: OLT ONT Equipment Selection Guide

Compare GPON, XG-PON, and XGS-PON to plan future-ready fiber access with higher bandwidth, lower latency, and better

©2024 Q Fiber, LLC. All Rights Reserved. Quantum, Quantum

The Q1000K is a high performance 10G/1G XGSPON/GPON fiber SmartNID with a two-port LAN switch. One LAN port provides 10

GPON hardware: your questions answered

How does GPON work? Here''s an infographic of GPON technology at work: single line of into a splitter. The splitter contains glass

Contact Us

Continue your research online:

Website: https://zithatech.co.za
Technical inquiry: https://zithatech.co.za/contact.html

This document is for preliminary research. Verify specifications against current standards, product documentation and project requirements.

© 2026 ZITHA TECH SPECIALTY CABLES (Pty) Ltd - All rights reserved