OEM Reverse PoE ONU Subscriber Port Overvoltage Protection Standards - Official Technical Overview & Hardware Datasheet

OEM REVERSE POE ONU SUBSCRIBER PORT OVERVOLTAGE PROTECTION STANDARDS

OFFICIAL TECHNICAL OVERVIEW & HARDWARE DATASHEET

EXECUTIVE SUMMARY

This document provides a comprehensive technical overview of the OEM Reverse Power over Ethernet (PoE) Optical Network Unit (ONU) series, with a primary focus on the industry-leading subscriber port overvoltage protection standards engineered into the hardware. Designed for carrier-grade FTTx deployments, the ONU platform integrates advanced surge suppression, transient voltage clamping, and isolation circuitry to ensure unparalleled network reliability and subscriber safety. The solution addresses the critical challenge of voltage anomalies on subscriber-side Ethernet interfaces, protecting both the ONU hardware and connected customer premises equipment (CPE) from electrical faults, lightning-induced surges, and AC mains cross-talk. This datasheet details the protective mechanisms, compliance with international safety standards, and the operational advantages of deploying this resilient platform in high-density access networks.



HARDWARE ARCHITECTURE & SILICON

The ONU hardware architecture is centered on a purpose-built, low-power system-on-chip (SoC) that integrates a Gigabit-capable Passive Optical Network (GPON) or Ethernet Passive Optical Network (EPON) media access controller (MAC) with a high-performance network processor. The critical protective elements are embedded at the physical layer of the four subscriber-side 10/100/1000BASE-T Ethernet ports. Each port features a dedicated protection circuit comprising a primary surge arrester, secondary transient voltage suppression (TVS) diode array, and a resettable overcurrent protection device. These components are strategically placed on the printed circuit board (PCB) adjacent to the RJ45 connectors to minimize parasitic inductance and optimize clamping response times. The design features a 4-layer PCB with controlled impedance traces, a solid ground plane for effective noise and surge current

dissipation, and reinforced isolation between the high-voltage line-side and low-voltage logic-side components.

KEY FEATURES & ROUTING LOGIC

- Feature 1: Multi-Stage Overvoltage Protection: Implements a hybrid protection scheme (GDT + TVS + PTC) per subscriber port, providing robust defense against IEEE 802.3-2018 specified surges (up to 6kV).
- Feature 2: Reverse PoE Power Delivery: Supports IEEE 802.3af/at standards for remote powering, with integrated prioritization and fault management logic that ensures automatic shutdown and restart of protected ports upon detection of sustained overvoltage conditions.
- Feature 3: Subscriber Port Isolation: Features galvanic isolation between the subscriber ports and the PON interface, preventing faults on the drop cable from propagating to the OLT side.
- Feature 4: Advanced Surge Shunting: Incorporates a low-capacitance (< 1pF) clamping diode network to maintain signal integrity for 1Gbps data rates while effectively shunting high-energy transients to chassis ground.
- Feature 5: Integrated Monitoring and Logging: Onboard voltage monitoring circuitry continuously tracks the bias voltage of the protection components, with the ability to generate warning SNMP traps to the NMS upon component degradation or a surge event.

COMPLIANCE & STANDARDS

The ONU hardware is certified to meet a comprehensive suite of international safety and compliance standards, ensuring its suitability for global telecom operator deployments.

- ITU-T K.21: Fully compliant with the ITU-T K.21 recommendation for resistibility of subscriber premises equipment to overvoltages and overcurrents, specifically tailored for access network terminations.
- ITU-T K.44: Conforms to the K.44 recommendation for resistibility tests for telecommunication equipment exposed to overvoltages and overcurrents on the subscriber side.
- EN 60950-1 / EN 62368-1: Meets safety requirements for power supplies and low-voltage equipment, ensuring electrical and fire safety.
- GR-1089-CORE: Adheres to the Network Equipment Building System (NEBS) Level 3 criteria for electromagnetic compatibility and safety in central office environments.
- IEC 61000-4-5: Passes the IEC 61000-4-5 surge immunity test at severity levels up to 4 (4kV line-to-earth, 2kV line-to-line) for the subscriber-side ports.

TECHNICAL SPECIFICATIONS

Parameter	Specification
Form Factor	1RU Compact (Wall-mount / Desktop)
Subscriber Ports	4x 10/100/1000BASE-T (Auto-MDI/X, Surge-Protected)
Overvoltage Protection Rating	Up to 6kV (Hybrid Surge Arrester + TVS Array)
Reverse PoE Standard	IEEE 802.3af/at (Class 0-4)
Operating Temperature	-5°C to +55°C (Extended: -25°C to +65°C)
Power Supply	54V Reverse PoE or External 12V DC Adapter

